



# THE DATASHEET OF IP5006CX11





# Discrete Semiconductors Selection Guide 2010

Diodes, transistors, ESD and signal conditioning devices  
Excellence in portfolio and performance



# Introducing new package technology

Portable and increasingly smaller end products fuel the race towards more sophisticated functionality in smaller form factors. To support system designers manage this challenge we as NXP develop products that fulfill requirements regarding space constraints, boosted performance and environmental aspects. Have a look at these five new SMD packages that take discretes to the next level:

## Leadless powerhouse – SOT1061 and SOT1118

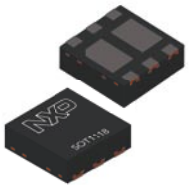
### Features

- ▶ Exposed heat sink for excellent thermal and electrical conductivity
- ▶ Power dissipation capability ( $P_{tot}$ ) of > 1 W
- ▶ Small footprint of 2 x 2 mm and height of 0.65 mm



#### Products in SOT1061

- 1 and 2 A low  $V_F$  Schottky rectifiers, *pages 11 and 12*
- Low  $V_{CEsat}$  (BISS) transistors, *pages 57, 59, 64 and 65*



#### Products in SOT1118

- Small-signal MOSFET P-channel and FET-KYs, *page 77*

## FlatPower – SOD123W and SOD128

### Features

- ▶ High power ratings due to clip-bonding technology and optimized die design
- ▶ 1 mm low profile, footprint of 2.6 x 1.7 (SOD123W) and 3.8 x 2.5 mm (SOD128)
- ▶ Pad layout compatible with SMA for easy drop-in replacement
- ▶ AEC-Q101 qualified



#### Products in SOD123W and SOD128

- 400 W and 600 W TVS diodes, *pages 44 and 45*
- 1 to 5 A low  $V_F$  Schottky rectifiers, *page 10*

## Small, strong, perfectly visible – SOD882D

### Features

- ▶ Exposed leads facilitate visual inspection of solder joints
- ▶ More rugged and reliable bond between device and PCB board
- ▶ Reduced height down to 0.37 mm and small footprint of 1 x 0.6 mm



#### Products in SOD882D

- Standard ESD protection devices, *page 24*

## Transfer to halogen-free products

Since 2009 all NXP small-signal discrete SMD packages on the market are “Dark Green”, meaning they are fully RoHS compliant (directive 2002/95/EC) and do not contain halogens or antimony exceeding allowed limits:

| Substances                         | Limit              |
|------------------------------------|--------------------|
| Antimony Oxides                    | < 900 ppm          |
| Chlorinated + Brominated Compounds | $\Sigma$ < 900 ppm |

# Discrete Semiconductors Selection Guide 2010

## Products for general applications

Benefit from interactive features in the online edition of this selection guide: A click on a product type takes you to the corresponding product information page on the NXP website. There you'll find data sheets and other design-support documents. To access the online selection guide, go to [www.nxp.com/discrete\\_selection\\_guide](http://www.nxp.com/discrete_selection_guide)

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# Support tools

To help you achieve the best, most efficient design-ins with our products, we offer a wide variety of support tools, available on the NXP Semiconductors website.

### Application notes

Comprehensive application information:  
[http://www.nxp.com/all\\_appnotes](http://www.nxp.com/all_appnotes)

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You can order samples directly from our online system. Please register here:  
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### Selection Guide – offline version

The pdf file of this selection guide can be downloaded here:  
[http://www.nxp.com/discrete\\_selection\\_guide](http://www.nxp.com/discrete_selection_guide)

### Spice models

A selection of our spice models can be found on the internet:  
<http://www.nxp.com/models>

### X-reference tool

Looking for the most up-to-date information on small-signal discrete, power management, RF and standard logic products?  
Then download our x-reference offline tool from the NXP website:  
<http://www.nxp.com/search/advanced>

For further design-in support please contact your local sales office.



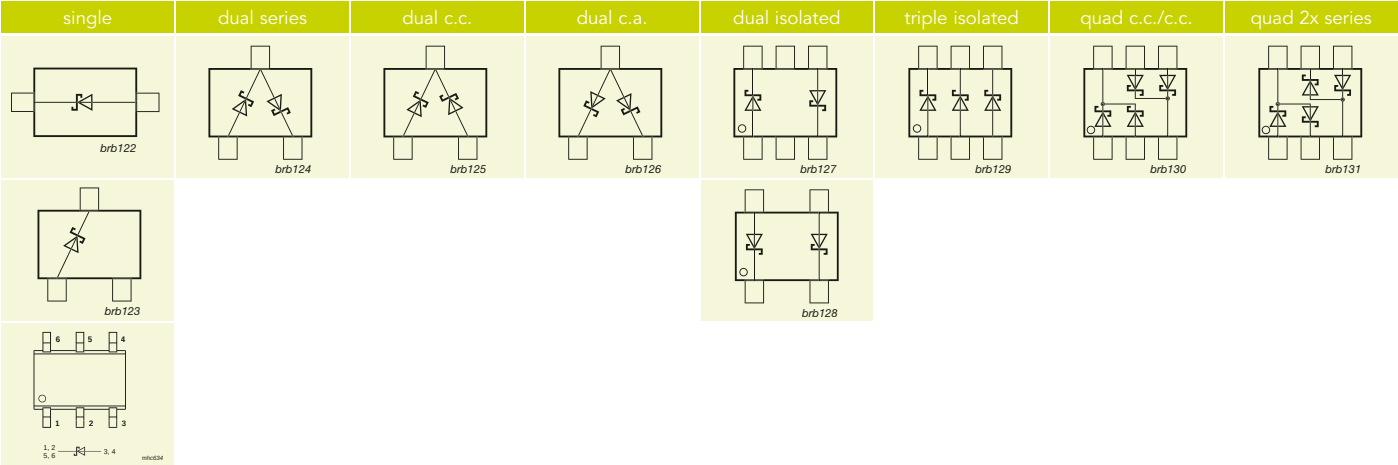
# Diodes

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General purpose Schottky diodes ≤ 250 mA

types in **bold** represent new products

| I <sub>F</sub> max (mA) | V <sub>R</sub> max (V) | V <sub>F</sub> max (mV) | @ I <sub>F</sub> (mA) | I <sub>R</sub> max (μA) | @ V <sub>R</sub> (V) | Package         | SOD80C<br>(MiniMelf)                                                              | SOD68<br>(DO-34)                                                                    | SOT23                                                                               | SOT143B                                                                             |                 | SOD123F                                                                             | SOT323<br>(SC-70)                                                                   | SOT363<br>(SC-88)                                                                   | SOD323F<br>(SC-90)                                                                  | SOD323<br>(SC-76)                                                                   | SOT666                                                                              | SOT416<br>(SC-75)                                                                   | SOD523<br>(SC-79)                                                                   | SOD882/<br>SOT883<br>(SC-101)                                                       |                 |  |
|-------------------------|------------------------|-------------------------|-----------------------|-------------------------|----------------------|-----------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------|--|
|                         |                        |                         |                       |                         |                      |                 |  |  |  |  |                 |  |  |  |  |  |  |  |  |  |                 |  |
|                         |                        |                         |                       |                         |                      |                 | Size (mm)                                                                         | 3.5 x 1.5 x 1.5                                                                     | 3.04 x 1.6 x 0.55                                                                   | 2.9 x 1.3 x 1.0                                                                     | 2.9 x 1.3 x 1.0 |                                                                                     | 2.6 x 1.6 x 1.1                                                                     | 2.0 x 1.25 x 0.95                                                                   | 2.0 x 1.25 x 0.95                                                                   | 1.7 x 1.25 x 0.7                                                                    | 1.7 x 1.25 x 0.95                                                                   | 1.6 x 1.2 x 0.55                                                                    | 1.6 x 0.8 x 0.77                                                                    | 1.2 x 0.8 x 0.6                                                                     | 1.0 x 0.6 x 0.5 |  |
|                         |                        |                         |                       |                         |                      |                 | P <sub>tot</sub> (mW)                                                             | 300                                                                                 | 500                                                                                 | 250                                                                                 | 250             |                                                                                     | 830                                                                                 | 250                                                                                 | 300                                                                                 | 550                                                                                 | 400                                                                                 | 300                                                                                 | 150                                                                                 | 500                                                                                 | 250             |  |
| 70                      | 70                     | 750                     | 10                    | 0.1                     | 50                   | single          |                                                                                   |                                                                                     | BAS70                                                                               |                                                                                     |                 | BAS70H                                                                              | BAS70W                                                                              |                                                                                     |                                                                                     | 1PS76SB70                                                                           |                                                                                     |                                                                                     | 1PS79SB70                                                                           | BAS70L                                                                              |                 |  |
|                         |                        |                         |                       |                         |                      | dual series     |                                                                                   |                                                                                     | BAS70-04                                                                            |                                                                                     |                 | BAS70-04W                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.c.       |                                                                                   |                                                                                     | BAS70-05                                                                            |                                                                                     |                 | BAS70-05W                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.a.       |                                                                                   |                                                                                     | BAS70-06                                                                            |                                                                                     |                 | BAS70-06W                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual isolated   |                                                                                   |                                                                                     |                                                                                     | BAS70-07                                                                            |                 |                                                                                     | BAS70-07S                                                                           |                                                                                     |                                                                                     | BAS70-07V                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | triple isolated |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     | BAS70VV                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
| 120                     | 40                     | 370                     | 1                     | 0.5                     | 30                   | quad 2x series  |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     | BAS70XY                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | single          |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     | RB751V40                                                                            |                                                                                     |                                                                                     |                                                                                     | RB751S40                                                                            | RB751CS40                                                                           |                                                                                     |                 |  |
|                         |                        | 500                     | 10                    | 1                       | 30                   | single          |                                                                                   |                                                                                     | BAS40                                                                               |                                                                                     | BAS40H          | BAS40W                                                                              |                                                                                     |                                                                                     | 1PS76SB40                                                                           |                                                                                     |                                                                                     | 1PS79SB40                                                                           | BAS40L                                                                              |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual series     |                                                                                   |                                                                                     | BAS40-04                                                                            |                                                                                     |                 | BAS40-04W                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.c.       |                                                                                   |                                                                                     | BAS40-05                                                                            |                                                                                     |                 | BAS40-05W                                                                           |                                                                                     |                                                                                     |                                                                                     | 1PS75SB45                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.a.       |                                                                                   |                                                                                     | BAS40-06                                                                            |                                                                                     |                 | BAS40-06W                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
| 500                     | 10                     | 1                       | 30                    | dual isolated           |                      |                 |                                                                                   | BAS40-07                                                                            |                                                                                     |                                                                                     |                 |                                                                                     | BAS40-07V                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       | quad c.c./c.c.          |                      |                 |                                                                                   |                                                                                     |                                                                                     | 1PS88SB48                                                                           |                 | BAS40-05V                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
| 200                     | 30                     | 300                     | 10                    | 30                      | 10                   | quad 2x series  |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     | 1PS88SB48<br>BAS40XY                                                                |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | single          |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 1PS79SB31                                                                           |                                                                                     |                 |  |
|                         |                        | 340                     | 10                    | 2                       | 25                   | single          |                                                                                   |                                                                                     | BAT754                                                                              |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual series     |                                                                                   |                                                                                     | BAT754S                                                                             |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.c.       |                                                                                   |                                                                                     | BAT754C                                                                             |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.a.       |                                                                                   |                                                                                     | BAT754A                                                                             |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | triple isolated |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     | BAT754L                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        | 400                     | 10                    | 2                       | 25                   | single          | BAS85                                                                             | BAT85                                                                               | BAT54                                                                               |                                                                                     |                 | BAT54H                                                                              | BAT54W                                                                              |                                                                                     | BAT54J                                                                              | 1PS76SB10                                                                           |                                                                                     | <b>BAT54T</b>                                                                       | 1PS79SB10                                                                           | BAT54L                                                                              |                 |  |
|                         |                        |                         |                       |                         |                      | dual series     |                                                                                   |                                                                                     | BAT54S                                                                              |                                                                                     |                 |                                                                                     | BAT54SW                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.c.       |                                                                                   |                                                                                     | BAT54C                                                                              |                                                                                     |                 |                                                                                     | BAT54CW                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAT54CM                                                                             |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.a.       |                                                                                   |                                                                                     | BAT54A                                                                              |                                                                                     |                 |                                                                                     | BAT54AW                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual isolated   |                                                                                   |                                                                                     |                                                                                     | BAT74                                                                               |                 |                                                                                     |                                                                                     | BAT74S                                                                              |                                                                                     |                                                                                     | BAT74V                                                                              |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | triple isolated |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAT54VV                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | quad c.c./c.c.  |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     | BAT54CV                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | quad 2x series  |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     | BAT54XY                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        | 500                     | 200                   | 30                      | 10                   | single          |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | <b>RB521S30</b>                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        | 600                     | 200                   | 1                       | 10                   | single          |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | <b>RB520S30</b>                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        | 300                     | 10                    | 15                      | 30                   | single          |                                                                                   |                                                                                     | BAT721                                                                              |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 1PS76SB21                                                                           |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual series     |                                                                                   |                                                                                     | BAT721S                                                                             |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.c.       |                                                                                   |                                                                                     | BAT721C                                                                             |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      | dual c.a.       |                                                                                   |                                                                                     | BAT721A                                                                             |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         | 360                   | 10                      | 0.5                  | 25              | single                                                                            |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 1PS79SB30                                                                           |                 |  |
|                         |                        |                         |                       |                         |                      |                 | single                                                                            |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         | 420                   | 30                      | 0.5                  | 25              | dual series                                                                       |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     | BAT854W                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      |                 | dual c.c.                                                                         |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     | BAT854SW                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
|                         |                        |                         |                       |                         |                      |                 | dual c.a.                                                                         |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     | BAT854CW                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
| dual c.a.               |                        |                         |                       |                         |                      |                 |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 | BAT854AW                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
| 50                      | 450                    | 10                      | 5                     | 40                      | single               | BAS86           | BAT86                                                                             |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     |                                                                                     | BAT46WJ                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |
| 250                     | 100                    | 950                     | 250                   | 18                      | 75                   | single          |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                 |                                                                                     | BAT46WH                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |  |



Medium power low  $V_F$  Schottky rectifiers single  $\geq 200$  mA

types in **bold** represent new products

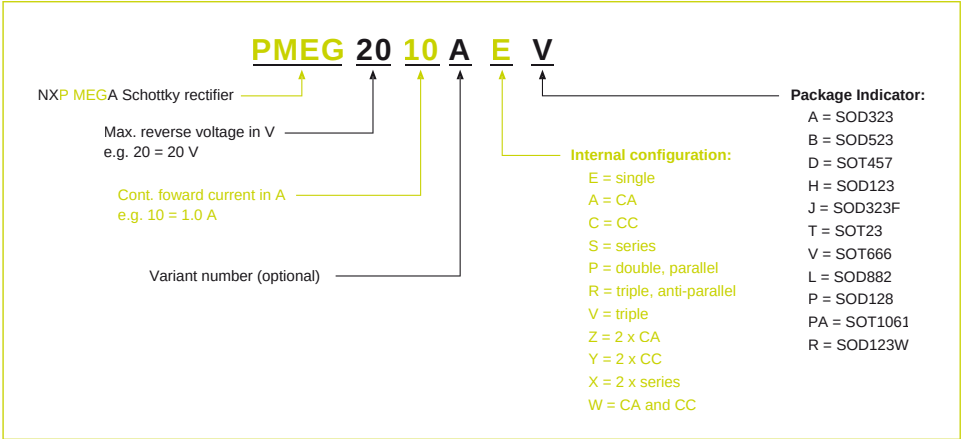
| $I_F$ max (A) | $V_R$ max (V) | $V_F$ max (mV)<br>@ $I_F$ max | $I_R$ max (mA)<br>@ $V_R$ max | Package    | SOD128                                                                            | SOD87<br>(Melf)                                                                   | SOT457<br>(SC-74)                                                                   | SOT23                                                                               | SOD123W                                                                             |                                                                                     | SOD123F                                                                             | SOT1061                                                                             | SOT323<br>(SC-70)                                                                   | SOD323<br>(SC-76)                                                                   | SOD323F<br>(SC-90)                                                                  | SOT666                                                                              | SOD523<br>(SC-79)                                                                   | SOD882          |                 |
|---------------|---------------|-------------------------------|-------------------------------|------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------|-----------------|
|               |               |                               |                               |            |  |  |  |  |  |  |  |  |  |  |  |  |  |                 |                 |
|               |               |                               |                               |            | Size (mm)                                                                         | 3.8 x 2.5 x 1.0                                                                   | 3.5 x 2.05 x 2.05                                                                   | 2.9 x 1.5 x 1.0                                                                     | 2.9 x 1.3 x 1.0                                                                     | 2.6 x 1.7 x 1.0                                                                     |                                                                                     | 2.6 x 1.6 x 1.1                                                                     | 2.0 x 2.0 x 0.65                                                                    | 2.0 x 1.25 x 0.95                                                                   | 1.7 x 1.25 x 0.95                                                                   | 1.7 x 1.25 x 0.7                                                                    | 1.6 x 1.2 x 0.55                                                                    | 1.2 x 0.8 x 0.6 | 1.0 x 0.6 x 0.5 |
|               |               |                               |                               |            | $P_{tot}$ (mW) @ 1 cm <sup>2</sup>                                                | 1050                                                                              | 1000                                                                                | 540                                                                                 | 420                                                                                 | 950                                                                                 |                                                                                     | 830                                                                                 | 1000                                                                                | 250                                                                                 | 570                                                                                 | 830                                                                                 | 570                                                                                 | 450             | 250             |
| Optimization  |               |                               |                               |            |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
| 0.2           | 30            | 480                           | 0.04                          | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3002EJ                                                                          |                                                                                     | PMEG3002AEB                                                                         | PMEG3002AEL     |                 |
|               | 40            | 600                           | 0.01                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG4002EJ                                                                          |                                                                                     | PMEG4002EB                                                                          | PMEG4002EL      |                 |
|               | 60            | 600                           | 0.1                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG6002EJ                                                                          |                                                                                     | PMEG6002EB                                                                          |                 |                 |
| 0.5           | 20            | 390                           | 0.2                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     | PMEG2005ET                                                                          |                                                                                     |                                                                                     | PMEG2005EH                                                                          |                                                                                     |                                                                                     | PMEG2005AEA                                                                         | PMEG2005EJ                                                                          | PMEG2005AEV                                                                         |                                                                                     |                 |                 |
|               |               | 440                           | 1.5                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2005AEL                                                                         |                 |                 |
|               |               | 480                           | 0.01                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2005EB                                                                          |                                                                                     |                 |                 |
|               |               | 500                           | 0.03                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2005EL                                                                          |                 |                 |
|               | 30            | 430                           | 0.15                          | low $V_F$  |                                                                                   |                                                                                   |                                                                                     | PMEG3005ET                                                                          |                                                                                     |                                                                                     | PMEG3005EH                                                                          |                                                                                     |                                                                                     | PMEG3005AEA                                                                         | PMEG3005EJ                                                                          | PMEG3005AEV                                                                         |                                                                                     |                 |                 |
|               |               | 500                           | 0.5                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3005EB                                                                          | PMEG3005EL      |                 |
|               | 40            | 470                           | 0.1                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     | PMEG4005ET                                                                          |                                                                                     |                                                                                     | PMEG4005EH                                                                          |                                                                                     |                                                                                     | PMEG4005AEA                                                                         | PMEG4005EJ                                                                          | PMEG4005AEV                                                                         |                                                                                     |                 |                 |
| 550           | 0.1           | low $V_F$                     |                               |            |                                                                                   | BAT720                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     | 1PS70SB20                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
| 1.0           | 20            | 340                           | 1                             | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     | PMEG2010ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 375                           | 1.9                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2010EPA                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 430                           | 0.2                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     | PMEG2010AET                                                                         |                                                                                     |                                                                                     | PMEG2010AEH                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 450                           | 0.05                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     | PMEG2010BER                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 500                           | 1.0                           | low $V_F$  |                                                                                   | PRLL5817                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 500                           | 0.2                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     | PMEG2010ET                                                                          |                                                                                     |                                                                                     | PMEG2010EH                                                                          |                                                                                     |                                                                                     | PMEG2010BEA                                                                         | PMEG2010EJ                                                                          | PMEG2010BEV                                                                         |                                                                                     |                 |                 |
|               |               | 550                           | 0.07                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2010EA<br>BAT760                                                                | PMEG2010AEJ                                                                         | PMEG2010EV<br>BAT960                                                                |                                                                                     |                                                                                     |                 |                 |
|               | 30            | 620                           | 1.5                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2010AEB                                                                         |                 |                 |
|               |               | 450                           | 1.0                           | low $V_F$  |                                                                                   |                                                                                   | 1PS74SB23                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 360                           | 1.5                           | low $V_F$  | PMEG3010EP                                                                        |                                                                                   |                                                                                     |                                                                                     | PMEG3010ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 450                           | 0.05                          | low $I_R$  | PMEG3010BEP                                                                       |                                                                                   |                                                                                     |                                                                                     | PMEG3010BER                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 520                           | 0.05                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3010CEH                                                                         |                                                                                     |                                                                                     |                                                                                     | PMEG3010CEJ                                                                         |                                                                                     |                                                                                     |                 |                 |
|               |               | 550                           | 1                             | low $V_F$  |                                                                                   | PRLL5818                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3010CEJ                                                                         |                                                                                     |                                                                                     |                 |                 |
|               |               | 560                           | 0.15                          | low $V_F$  |                                                                                   |                                                                                   |                                                                                     | PMEG3010ET                                                                          |                                                                                     |                                                                                     | PMEG3010EH                                                                          |                                                                                     |                                                                                     | PMEG3010BEA                                                                         | PMEG3010EJ                                                                          | PMEG3010BEV                                                                         |                                                                                     |                 |                 |
|               | 40            | 680                           | 0.5                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3010EB      |                 |
|               |               | 490                           | 0.05                          | low $V_F$  | PMEG4010EP                                                                        |                                                                                   |                                                                                     |                                                                                     | PMEG4010ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 600                           | 1.0                           | low $V_F$  |                                                                                   | PRLL5819                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 640                           | 0.1                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     | PMEG4010ET                                                                          |                                                                                     |                                                                                     | PMEG4010EH                                                                          |                                                                                     |                                                                                     | PMEG4010BEA                                                                         | PMEG4010EJ                                                                          | PMEG4010BEV                                                                         |                                                                                     |                 |                 |
|               |               | 570                           | 0.05                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG4010CEH                                                                         |                                                                                     |                                                                                     |                                                                                     | PMEG4010CEJ                                                                         |                                                                                     |                                                                                     |                 |                 |
|               | 60            | 530                           | 0.06                          | low $V_F$  | PMEG6010EP                                                                        |                                                                                   |                                                                                     |                                                                                     | PMEG6010ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 650                           | 0.35                          | low $V_F$  |                                                                                   |                                                                                   | PMEG6010AED                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
| 660           |               | 0.05                          | low $I_R$                     |            |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     | PMEG6010CEH                                                                         |                                                                                     |                                                                                     |                                                                                     | PMEG6010CEJ                                                                         |                                                                                     |                                                                                     |                                                                                     |                 |                 |
| 1.5           | 20            | 660                           | 0.07                          | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2015EH                                                                          |                                                                                     |                                                                                     | PMEG2015EA                                                                          | PMEG2015EJ                                                                          | PMEG2015EV                                                                          |                                                                                     |                 |                 |
|               | 30            | 550                           | 1.0                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3015EH                                                                          |                                                                                     |                                                                                     |                                                                                     | PMEG3015EJ                                                                          | PMEG3015EV                                                                          |                                                                                     |                 |                 |
| 2.0           | 10            | 460                           | 3.0                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG1020EH                                                                          |                                                                                     |                                                                                     | PMEG1020EA                                                                          | PMEG1020EJ                                                                          | PMEG1020EV                                                                          |                 |                 |
|               | 20            | 420                           | 1.9                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2020EPA                                                                         |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 525                           | 0.2                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG2020EH                                                                          |                                                                                     |                                                                                     | PMEG2020AEA                                                                         | PMEG2020EJ                                                                          |                                                                                     |                                                                                     |                 |                 |
|               | 30            | 360                           | 3.0                           | low $V_F$  | PMEG3020EP                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 420                           | 1.5                           | low $V_F$  | PMEG3020CEP                                                                       |                                                                                   |                                                                                     |                                                                                     | PMEG3020ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 450                           | 0.1                           | low $I_R$  | PMEG3020BEP                                                                       |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 470                           | 2.5                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3020EPA                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 520                           | 0.05                          | low $I_R$  | PMEG3020DEP                                                                       |                                                                                   |                                                                                     |                                                                                     | PMEG3020BER                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 620                           | 1.0                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG3020EH                                                                          |                                                                                     |                                                                                     |                                                                                     | PMEG3020EJ                                                                          |                                                                                     |                                                                                     |                 |                 |
|               | 40            | 490                           | 0.1                           | low $V_F$  | PMEG4020EP                                                                        |                                                                                   |                                                                                     |                                                                                     | PMEG4020ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 535                           | 0.1                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG4020EPA                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               | 60            | 530                           | 0.15                          | low $V_F$  | PMEG6020EP                                                                        |                                                                                   |                                                                                     |                                                                                     | PMEG6020ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 575                           | 0.25                          | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG6020EPA                                                                         |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
| 3.0           | 10            | 530                           | 3.0                           | low $V_F$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMEG1030EH                                                                          |                                                                                     |                                                                                     |                                                                                     | PMEG1030EJ                                                                          |                                                                                     |                                                                                     |                 |                 |
|               | 30            | 360                           | 5.0                           | low $V_F$  | PMEG3030EP                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 450                           | 0.15                          | low $I_R$  | PMEG3030BEP                                                                       |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               | 40            | 490                           | 0.2                           | low $V_F$  | PMEG4030EP                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 540                           | 0.1                           | low $I_R$  |                                                                                   |                                                                                   |                                                                                     |                                                                                     | PMEG4030ER                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
| 5.0           | 60            | 530                           | 0.2                           | low $V_F$  | PMEG6030EP                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               | 30            | 360                           | 8.0                           | low $V_F$  | PMEG3050EP                                                                        |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
|               |               | 450                           | 0.25                          | low $I_R$  | PMEG3050BEP                                                                       |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |
| 40            | 490           | 0.3                           | low $V_F$                     | PMEG4050EP |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                 |                 |

Medium power low  $V_F$  Schottky rectifiers dual  $\geq 200$  mA

types in **bold** represent new products

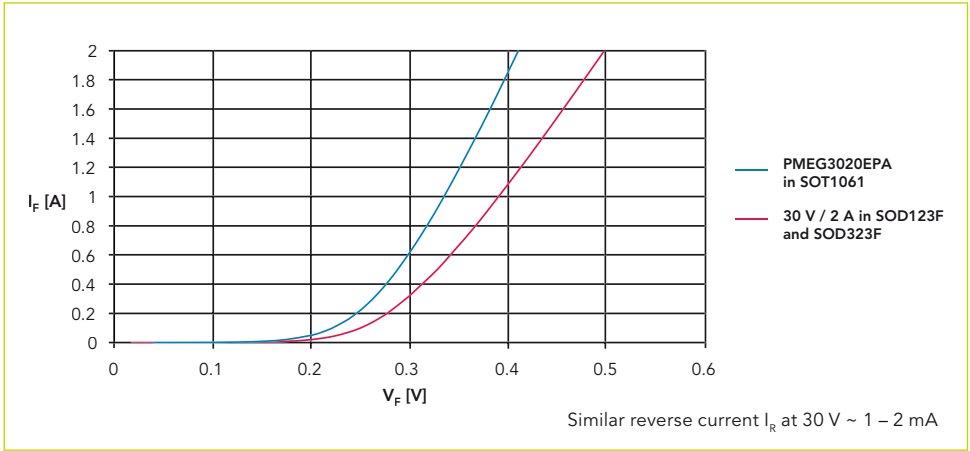
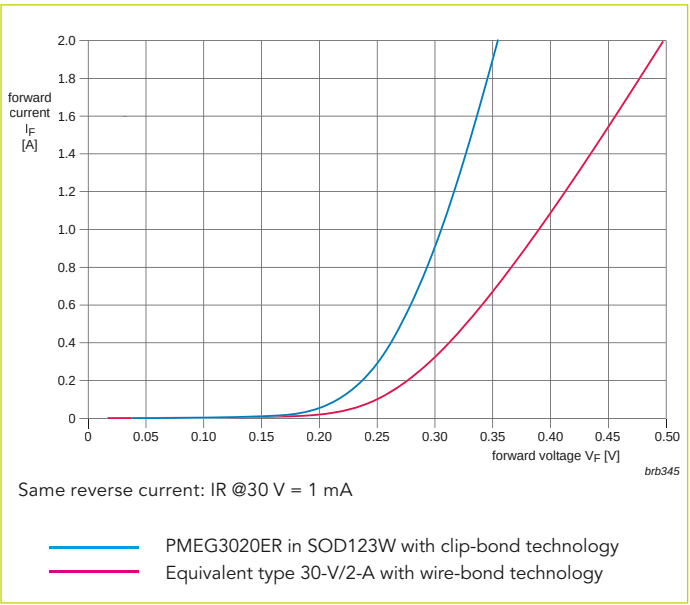
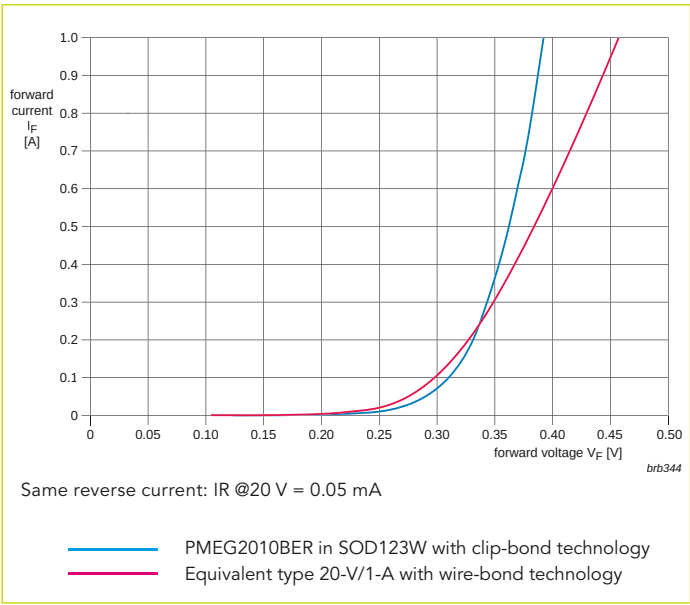
| $I_F$ max (A) | $V_R$ max (V) | $V_F$ max (mV)<br>@ $I_F$ max | $I_R$ max (mA)<br>@ $V_R$ max | Optimization | Package                                                                                            | SOT223<br>(SC-73)                                                                   | SOT23                                                                               | SOT1061                                                                             | SOT666           |
|---------------|---------------|-------------------------------|-------------------------------|--------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------|
|               |               |                               |                               |              |                   |  |  |  |                  |
|               |               |                               |                               |              | Size (mm)                                                                                          | 6.5 x 3.5 x 1.65                                                                    | 2.9 x 1.3 x 1.0                                                                     | 2.0 x 2.0 x 0.65                                                                    | 1.6 x 1.2 x 0.55 |
|               |               |                               |                               |              | $P_{tot}$ (mW)                                                                                     | 1500                                                                                | 250                                                                                 | 1000                                                                                | 300              |
| 0.2           | 30            | 480                           | 0.03                          | low $V_F$    | dual isolated<br> |                                                                                     |                                                                                     |                                                                                     | PMEG3002TV       |
|               | 60            | 600                           | 0.1                           | low $V_F$    |                                                                                                    |                                                                                     |                                                                                     |                                                                                     | PMEG6002TV       |
| 0.5           | 20            | 390                           | 0.2                           | low $V_F$    | dual c.c.<br>     |                                                                                     | PMEG2005CT                                                                          |                                                                                     |                  |
|               | 30            | 430                           | 0.15                          | low $V_F$    |                                                                                                    |                                                                                     | PMEG3005CT                                                                          |                                                                                     |                  |
|               | 40            | 470                           | 0.1                           | low $V_F$    |                                                                                                    |                                                                                     | PMEG4005CT                                                                          |                                                                                     |                  |
| 1.0           | 25            | 450                           | 1.0                           | low $V_F$    | dual series<br>   | BAT120S                                                                             |                                                                                     |                                                                                     |                  |
|               |               |                               |                               | low $V_F$    | dual c.c.<br>     | BAT120C                                                                             |                                                                                     |                                                                                     |                  |
|               |               |                               |                               | low $V_F$    | dual c.a.<br>    | BAT120A                                                                             |                                                                                     |                                                                                     |                  |
|               | 40            | 500                           | 0.05                          | low $V_F$    | dual c.c.<br>   |                                                                                     |                                                                                     | PMEG4010CPA                                                                         |                  |
|               |               |                               |                               | low $V_F$    | dual c.c.<br>   |                                                                                     |                                                                                     | PMEG6010CPA                                                                         |                  |
|               | 60            | 650                           | 0.35                          | low $V_F$    | dual series<br> | BAT160S                                                                             |                                                                                     |                                                                                     |                  |
|               |               |                               |                               | low $V_F$    | dual c.c.<br>   | BAT160C                                                                             |                                                                                     |                                                                                     |                  |
|               |               |                               |                               | low $V_F$    | dual c.a.<br>   | BAT160A                                                                             |                                                                                     |                                                                                     |                  |
|               | 20            | 420                           | 1.0                           | low $V_F$    | dual c.c.<br>   |                                                                                     |                                                                                     | PMEG2020CPA                                                                         |                  |
|               |               |                               |                               | low $V_F$    | dual c.c.<br>   |                                                                                     |                                                                                     | PMEG3020CPA                                                                         |                  |
| 2.0           | 30            | 440                           | 2.0                           | low $V_F$    |                                                                                                    |                                                                                     |                                                                                     |                                                                                     |                  |

Nomenclature of low  $V_F$  (MEGA) Schottky rectifiers



Improved forward characteristics of (MEGA) Schottky rectifiers in new packages

NXP low  $V_F$  maximum efficiency general applications (MEGA) Schottky rectifiers in new FlatPower SOD123W and medium power leadless SOT1061 package



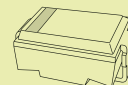
Low capacitance Schottky diodes

| $I_F$ max (mA) | $V_R$ max (V) | $V_F$ max (mV)<br>@ $I_F$ (mA) | $C_d$ max (pF)<br>@ $V_R = 0$ V | Package                                                                                                                              | SOT23                                                                             | SOT323<br>(SC-70)                                                                 | SOT363<br>(SC-88)                                                                 | SOD323<br>(SC-76)                                                                 | SOT666                                                                             | SOD523<br>(SC-79)                                                                   | SOD882                                                                              |
|----------------|---------------|--------------------------------|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                |               |                                |                                 | Size (mm)                                                                                                                            |  |  |  |  |  |  |  |
|                |               |                                |                                 | $P_{tot}$ (mW)                                                                                                                       | 250                                                                               | 250                                                                               | 300                                                                               | 400                                                                               | 300                                                                                | 500                                                                                 | 250                                                                                 |
| 30             | 4             | 450                            | 1                               | <br>single<br>BAT17                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 | <br>single<br>1PS76SB17                             |                                                                                   |                                                                                   |                                                                                   | 1PS76SB17                                                                         |                                                                                    | 1PS79SB17                                                                           |                                                                                     |
|                |               |                                |                                 | <br>triple isolated                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                   | 1PS66SB17                                                                          |                                                                                     |                                                                                     |
|                |               |                                |                                 | <br>dual series<br>PMBD353<br>PMBD354 <sup>1)</sup> |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                | 15            | 340                            | 1                               | <br>single                                          |                                                                                   | 1PS70SB82                                                                         |                                                                                   |                                                                                   |                                                                                    |                                                                                     | 1PS10SB82                                                                           |
|                |               |                                |                                 | <br>triple isolated                                |                                                                                   |                                                                                   | 1PS88SB82                                                                         |                                                                                   | 1PS66SB82                                                                          |                                                                                     |                                                                                     |
|                |               |                                |                                 | <br>dual series                                   |                                                                                   | 1PS70SB84                                                                         |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 | <br>dual c.c.                                     |                                                                                   | 1PS70SB85                                                                         |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 | <br>dual c.a.                                     |                                                                                   | 1PS70SB86                                                                         |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 |                                                                                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 |                                                                                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 |                                                                                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 |                                                                                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |
|                |               |                                |                                 |                                                                                                                                      |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |

<sup>1)</sup> diodes have matched capacitance

PN rectifiers in SMA, SMB, SMC

types in **bold** represent new products

| Package       | SOD131 (SMA)                                                                        |             |              |              | SOD132 (SMB)                                                                        |             |             | SOD133 (SMC)                                                                        |             |             |             |
|---------------|-------------------------------------------------------------------------------------|-------------|--------------|--------------|-------------------------------------------------------------------------------------|-------------|-------------|-------------------------------------------------------------------------------------|-------------|-------------|-------------|
|               |  |             |              |              |  |             |             |  |             |             |             |
|               | 4.25 x 2.67 x 2.14                                                                  |             |              |              | 4.32 x 3.62 x 2.29                                                                  |             |             | 6.86 x 5.91 x 2.34                                                                  |             |             |             |
| Size (mm)     |                                                                                     | 30          |              |              |                                                                                     | 30          |             |                                                                                     | 30          |             |             |
| $t_r$ (ns)    |                                                                                     | 30          |              |              |                                                                                     | 30          |             |                                                                                     | 30          |             |             |
| $V_R$ max (V) | $I_F$ max (A)                                                                       |             |              |              |                                                                                     |             |             |                                                                                     |             |             |             |
| 50            | 1                                                                                   | <b>ES1A</b> | <b>US1A</b>  | <b>RS1A</b>  | <b>S1A</b>                                                                          |             |             |                                                                                     |             |             |             |
|               | 1.5                                                                                 |             |              | <b>RS2AA</b> |                                                                                     |             | <b>RS2A</b> | <b>S2A</b>                                                                          |             |             |             |
|               | 2                                                                                   |             |              |              |                                                                                     | <b>ES2A</b> |             |                                                                                     |             |             |             |
|               | 3                                                                                   |             |              |              |                                                                                     |             |             |                                                                                     | <b>ES3A</b> | <b>US3A</b> | <b>RS3A</b> |
| 100           | 1                                                                                   | <b>ES1B</b> | <b>US1B</b>  | <b>RS1B</b>  | <b>S1B</b>                                                                          |             |             |                                                                                     |             |             |             |
|               | 1.5                                                                                 |             |              | <b>RS2BA</b> |                                                                                     |             | <b>RS2B</b> | <b>S2B</b>                                                                          |             |             |             |
|               | 2                                                                                   |             |              |              |                                                                                     | <b>ES2B</b> |             |                                                                                     |             |             |             |
|               | 3                                                                                   |             |              |              |                                                                                     |             |             |                                                                                     | <b>ES3B</b> | <b>US3B</b> | <b>RS3B</b> |
| 200           | 1                                                                                   | <b>ES1D</b> | <b>US1D</b>  | <b>RS1D</b>  | <b>S1D</b>                                                                          |             |             |                                                                                     |             |             |             |
|               | 1.5                                                                                 |             | <b>US2DA</b> | <b>RS2DA</b> | <b>S2DA</b>                                                                         |             | <b>RS2D</b> | <b>S2D</b>                                                                          |             |             |             |
|               | 2                                                                                   |             |              |              |                                                                                     | <b>ES2D</b> |             |                                                                                     |             |             |             |
|               | 3                                                                                   |             |              |              |                                                                                     |             |             |                                                                                     | <b>ES3D</b> | <b>US3D</b> | <b>RS3D</b> |
| 400           | 1                                                                                   | <b>ES1G</b> | <b>US1G</b>  | <b>RS1G</b>  | <b>S1G</b>                                                                          |             |             |                                                                                     |             |             |             |
|               | 1.5                                                                                 |             | <b>US2GA</b> | <b>RS2GA</b> | <b>S2GA</b>                                                                         |             | <b>RS2G</b> | <b>S2G</b>                                                                          |             |             |             |
|               | 2                                                                                   |             |              |              |                                                                                     | <b>ES2G</b> |             |                                                                                     |             |             |             |
|               | 3                                                                                   |             |              |              |                                                                                     |             |             |                                                                                     | <b>ES3G</b> | <b>US3G</b> | <b>RS3G</b> |
| 600           | 1                                                                                   |             | <b>US1J</b>  | <b>RS1J</b>  | <b>S1J</b>                                                                          |             | <b>RS2J</b> | <b>S2J</b>                                                                          |             |             |             |
|               | 1.5                                                                                 |             | <b>US2JA</b> | <b>RS2JA</b> | <b>S2JA</b>                                                                         |             |             |                                                                                     |             |             |             |
|               | 3                                                                                   |             |              |              |                                                                                     |             |             |                                                                                     |             | <b>US3J</b> | <b>RS3J</b> |
| 800           | 1                                                                                   |             | <b>US1K</b>  | <b>RS1K</b>  | <b>S1K</b>                                                                          |             | <b>RS2K</b> | <b>S2K</b>                                                                          |             |             |             |
|               | 1.5                                                                                 |             |              | <b>RS2KA</b> | <b>S2KA</b>                                                                         |             |             |                                                                                     |             |             |             |
|               | 3                                                                                   |             |              |              |                                                                                     |             |             |                                                                                     |             | <b>US3K</b> | <b>RS3K</b> |
| 1000          | 1                                                                                   |             | <b>US1M</b>  | <b>RS1M</b>  | <b>S1M</b>                                                                          |             | <b>RS2M</b> | <b>S2M</b>                                                                          |             |             |             |
|               | 1.5                                                                                 |             |              | <b>RS2MA</b> | <b>S2MA</b>                                                                         |             |             |                                                                                     |             |             |             |
|               | 3                                                                                   |             |              |              |                                                                                     |             |             |                                                                                     |             | <b>US3M</b> | <b>RS3M</b> |

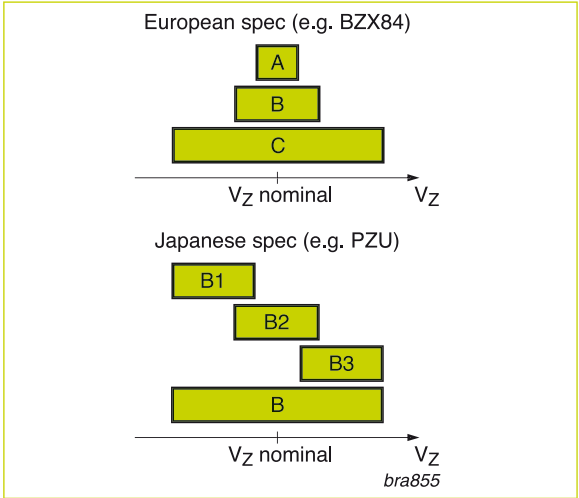
General purpose Zener diodes

| $I_z$ max (mA) | $P_{ZSM}$ (W) | $V_z$ nom (V) | $V_z$ tolerance | Note          | Configuration                                                                                     | Series            | Package                                                                              | Size (mm)          | $P_{tot}$ (mW) |
|----------------|---------------|---------------|-----------------|---------------|---------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------|--------------------|----------------|
| 500            | -             | 3.3~24        | C               | Eur           | single           | 1N47xxA series    |    | 4.8 x 2.6 x 0.81   | 1000           |
|                | 60            | 3.6~75        |                 |               |                                                                                                   | BZV85 series      |                                                                                      |                    |                |
| 250            | -             | 2.4~36        | about 2 %       | special       | single           | NZX series        |    | 4.25 x 1.85 x 0.56 | 400            |
|                | 40            | 2.4~75        | B, C            | Eur           |                                                                                                   | BZX79 series      |                                                                                      |                    |                |
| 400            | 40            | 2.4~75        | C               | Eur           | single           | BZV90 series      |    | 6.5 x 3.5 x 1.65   | 1500           |
| 250            | 40            | 2.4~75        | C               | Eur           | single           | BZV49 series      |    | 4.5 x 2.5 x 1.5    | 1000           |
| 250            | 40            | 2.4~75        | B, C            | Eur           | single           | BZV55 series      |    | 3.5 x 1.5 x 1.5    | 300            |
| 200            | 40            | 2.4~75        | B, C            | Eur           | dual c.a.        | BZB84 series      |    | 2.9 x 1.3 x 1.0    | 250            |
|                |               |               | A, B, C         |               | single           | BZX84 series      |                                                                                      |                    |                |
| 250            | 30            | 5~6.8         | 0.2 V           | Ave           |                                                                                                   | PLVA600A series   |                                                                                      |                    |                |
|                |               |               | 0.2 V           | Ave           | dual c.a.       | PLVA2600A series  |                                                                                      |                    |                |
| 250            | -             | 3.0~30        | about 2.5 %     | special       | single         | <b>NZH series</b> |  | 2.6 x 1.6 x 1.1    | 830            |
|                | 40            | 2.4~75        | C               | Eur           |                                                                                                   | BZT52H series     |                                                                                      |                    |                |
| 200            | 40            | 2.7~24        | B2              | Jap           | dual isolated  | PZUxDB2 series    |  | 2.0 x 1.25 x 0.95  | 300            |
| 200            | 40            | 2.4~15        | C               | Eur           | dual c.a.      | BZB784 series     |  | 2.0 x 1.25 x 0.95  | 350            |
| 200            | 30            | 100           | C               | Eur           | back-to-back   | BZB100A           |  | 1.7 x 1.25 x 0.95  | 300            |
|                | 40            | 2.4~36        | B2              | Jap           | PDZ-B series                                                                                      |                   |                                                                                      |                    |                |
|                | 250           | 40            | 2.4~75          | B, C          | Eur                                                                                               | BZX384 series     |                                                                                      |                    |                |
|                | 200           | 40            | 2.4~36          | B, B1, B2, B3 | Jap                                                                                               | PZUxBA series     |                                                                                      |                    |                |
| 200            | 60            | 100           | C               | Eur           | single         | BZX100A           |  | 1.7 x 1.25 x 0.7   | 550            |
| 200            | 40            | 2.4~36        | B, B1, B2, B3   | Jap           |                                                                                                   | PZUxB series      |                                                                                      |                    |                |
| 250            | 40            | 2.4~75        | B, C            | Eur           |                                                                                                   | BZX84J series     |                                                                                      |                    |                |
|                |               |               |                 |               |                                                                                                   |                   |                                                                                      |                    |                |
| 200            | 40            | 2.4~15        | C               | Eur           | dual c.a.      | BZB984 series     |  | 1.6 x 1.2 x 0.55   | 350            |
| 200            | 40            | 2.4~75        | B, C            | Eur           | single         | BZX585 series     |  | 1.2 x 0.8 x 0.6    | 300            |
| 200            | 40            | 2.4~75        | B, C            | Eur           | single         | BZX884 series     |  | 1.0 x 0.6 x 0.5    | 250            |
|                |               | 2.4~36        | B, B2           | Jap           |                                                                                                   | PZUxBL series     |                                                                                      |                    |                |

Notes:  
Jap: B selection: app. 5 %  $V_z$  tolerance, B1, B2, B3 selections: app. 2 %  $V_z$  tolerance in sequential intervals  
Eur: A selection: app. 1 %  $V_z$  tolerance, B selection: app. 2 %  $V_z$  tolerance, C selection: app. 5 %  $V_z$  tolerance; the selections are in overlapping intervals  
Ave: low voltage avalanche regulator diodes  
dual c.a.: dual common anode

types in **bold** represent new products

Differences in Zener specification



BZX-series, European spec

| y =        | C-series<br>± 5 %<br>$V_z$ (V) | B-series<br>± 2 %<br>$V_z$ (V) | A-series<br>± 1 %<br>$V_z$ (V) |
|------------|--------------------------------|--------------------------------|--------------------------------|
| BZX84-y2V4 | 2.2 - 2.6                      | 2.35 - 2.45                    | 2.37 - 2.43                    |
| BZX84-y2V7 | 2.5 - 2.9                      | 2.65 - 2.75                    | 2.67 - 2.73                    |
| BZX84-y3V0 | 2.8 - 3.2                      | 2.94 - 3.06                    | 2.97 - 3.03                    |
| BZX84-y3V3 | 3.1 - 3.5                      | 3.23 - 3.37                    | 3.26 - 3.34                    |
| BZX84-y3V6 | 3.4 - 3.8                      | 3.53 - 3.67                    | 3.56 - 3.64                    |
| BZX84-y3V9 | 3.7 - 4.1                      | 3.82 - 3.98                    | 3.86 - 3.94                    |
| BZX84-y4V3 | 4 - 4.6                        | 4.21 - 4.39                    | 4.25 - 4.35                    |
| BZX84-y4V7 | 4.4 - 5                        | 4.61 - 4.79                    | 4.65 - 4.75                    |
| BZX84-y5V1 | 4.8 - 5.4                      | 5 - 5.2                        | 5.04 - 5.16                    |
| BZX84-y5V6 | 5.2 - 6                        | 5.49 - 5.71                    | 5.54 - 5.66                    |
| BZX84-y6V2 | 5.8 - 6.6                      | 6.08 - 6.32                    | 6.13 - 6.27                    |
| BZX84-y6V8 | 6.4 - 7.2                      | 6.66 - 6.94                    | 6.73 - 6.87                    |
| BZX84-y7V5 | 7 - 7.9                        | 7.35 - 7.65                    | 7.42 - 7.58                    |
| BZX84-y8V2 | 7.7 - 8.7                      | 8.04 - 8.36                    | 8.11 - 8.29                    |
| BZX84-y9V1 | 8.5 - 9.6                      | 8.92 - 9.28                    | 9 - 9.2                        |
| BZX84-y10  | 9.4 - 10.6                     | 9.8 - 10.2                     | 9.9 - 10.1                     |
| BZX84-y11  | 10.4 - 11.6                    | 10.8 - 11.2                    | 10.8 - 11.11                   |
| BZX84-y12  | 11.4 - 12.7                    | 11.8 - 12.2                    | 11.88 - 12.12                  |
| BZX84-y13  | 12.4 - 14.1                    | 12.7 - 13.3                    | 12.87 - 13.13                  |
| BZX84-y15  | 13.8 - 15.6                    | 14.7 - 15.3                    | 14.85 - 15.15                  |
| BZX84-y16  | 15.3 - 17.1                    | 15.7 - 16.3                    | -                              |
| BZX84-y18  | 16.8 - 19.1                    | 17.6 - 18.4                    | -                              |
| BZX84-y20  | 18.8 - 21.2                    | 19.6 - 20.4                    | 19.8 - 20.2                    |
| BZX84-y22  | 20.8 - 23.3                    | 21.6 - 22.4                    | -                              |
| BZX84-y24  | 22.8 - 25.6                    | 23.5 - 24.5                    | -                              |
| BZX84-y27  | 25.1 - 28.9                    | 26.5 - 27.5                    | 26.73 - 27.27                  |
| BZX84-y30  | 28 - 32                        | 29.4 - 30.6                    | -                              |
| BZX84-y33  | 31 - 35                        | 32.3 - 33.7                    | -                              |
| BZX84-y36  | 34 - 38                        | 35.3 - 36.7                    | 35.64 - 36.36                  |
| BZX84-y39  | 37 - 41                        | 38.2 - 39.8                    | 38.61 - 39.39                  |
| BZX84-y43  | 40 - 46                        | 42.1 - 43.9                    | 42.57 - 43.43                  |
| BZX84-y47  | 44 - 50                        | 46.1 - 47.9                    | -                              |
| BZX84-y51  | 48 - 54                        | 50 - 52                        | 50.49 - 51.51                  |
| BZX84-y56  | 52 - 60                        | 54.9 - 57.1                    | -                              |
| BZX84-y62  | 58 - 66                        | 60.8 - 63.2                    | -                              |
| BZX84-y68  | 64 - 72                        | 66.6 - 69.4                    | -                              |
| BZX84-y75  | 70 - 79                        | 73.5 - 76.5                    | 74.25 - 75.75                  |

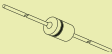
PZU-series in SOD323F, Japanese spec

| y =     | B-series<br>± 5 %<br>$V_z$ (V) | B1-series<br>± 2 %<br>$V_z$ (V) | B2-series<br>± 2 %<br>$V_z$ (V) | B3-series<br>± 2 %<br>$V_z$ (V) |
|---------|--------------------------------|---------------------------------|---------------------------------|---------------------------------|
| PZU2.4y | 2.3 - 2.6                      | -                               | -                               | -                               |
| PZU2.7y | 2.5 - 2.9                      | 2.5 - 2.75                      | 2.65 - 2.9                      | -                               |
| PZU3.0y | 2.8 - 3.2                      | 2.8 - 3.05                      | 2.95 - 3.2                      | -                               |
| PZU3.3y | 3.1 - 3.5                      | 3.1 - 3.35                      | 3.25 - 3.5                      | -                               |
| PZU3.6y | 3.4 - 3.8                      | 3.4 - 3.65                      | 3.55 - 3.8                      | -                               |
| PZU3.9y | 3.7 - 4.1                      | 3.7 - 3.97                      | 3.87 - 4.1                      | -                               |
| PZU4.3y | 4.01 - 4.48                    | 4.01 - 4.21                     | 4.15 - 4.34                     | 4.28 - 4.48                     |
| PZU4.7y | 4.42 - 4.9                     | 4.42 - 4.61                     | 4.55 - 4.75                     | 4.69 - 4.9                      |
| PZU5.1y | 4.84 - 5.37                    | 4.84 - 5.04                     | 4.98 - 5.2                      | 5.14 - 5.37                     |
| PZU5.6y | 5.31 - 5.92                    | 5.31 - 5.55                     | 5.49 - 5.73                     | 5.67 - 5.92                     |
| PZU6.2y | 5.86 - 6.53                    | 5.86 - 6.12                     | 6.06 - 6.33                     | 6.26 - 6.53                     |
| PZU6.8y | 6.47 - 7.14                    | 6.47 - 6.73                     | 6.65 - 6.93                     | 6.86 - 7.14                     |
| PZU7.5y | 7.06 - 7.84                    | 7.06 - 7.36                     | 7.28 - 7.6                      | 7.52 - 7.84                     |
| PZU8.2y | 7.76 - 8.64                    | 7.76 - 8.1                      | 8.02 - 8.36                     | 8.28 - 8.64                     |
| PZU9.1y | 8.56 - 9.55                    | 8.56 - 8.93                     | 8.85 - 9.23                     | 9.15 - 9.55                     |
| PZU10y  | 9.45 - 10.55                   | 9.45 - 9.87                     | 9.77 - 10.21                    | 10.11 - 10.55                   |
| PZU11y  | 10.44 - 11.56                  | 10.44 - 10.88                   | 10.76 - 11.22                   | 11.1 - 11.56                    |
| PZU12y  | 11.42 - 12.6                   | 11.42 - 11.9                    | 11.74 - 12.24                   | 12.08 - 12.6                    |
| PZU13y  | 12.47 - 13.96                  | 12.47 - 13.03                   | 12.91 - 13.49                   | 13.37 - 13.96                   |
| PZU14y  | -                              | -                               | 13.7 - 14.3                     | -                               |
| PZU15y  | 13.84 - 15.52                  | 13.84 - 14.46                   | 14.34 - 14.98                   | 14.85 - 15.52                   |
| PZU16y  | 15.37 - 17.09                  | 15.37 - 16.01                   | 15.85 - 16.51                   | 16.35 - 17.09                   |
| PZU18y  | 16.94 - 19.03                  | 16.94 - 17.7                    | 17.56 - 18.35                   | 18.21 - 19.03                   |
| PZU20y  | 18.86 - 21.08                  | 18.86 - 19.7                    | 19.52 - 20.39                   | 20.21 - 21.08                   |
| PZU22y  | 20.88 - 23.17                  | 20.88 - 21.77                   | 21.54 - 22.47                   | 22.23 - 23.17                   |
| PZU24y  | 22.93 - 25.57                  | 22.93 - 23.96                   | 23.72 - 24.78                   | 24.54 - 25.57                   |
| PZU27y  | 25.1 - 28.9                    | -                               | -                               | -                               |
| PZU30y  | 28 - 32                        | -                               | -                               | -                               |
| PZU33y  | 31 - 35                        | -                               | -                               | -                               |
| PZU36y  | 34 - 38                        | -                               | -                               | -                               |

NZX-series in SOD27

|         | $V_z$ (V) |         | $V_z$ (V)     |        | $V_z$ (V)     |
|---------|-----------|---------|---------------|--------|---------------|
| NZX2V4A | 2.3 - 2.5 | NZX6V2D | 6.1 - 6.4     | NZX14B | 13.5 - 14     |
| NZX2V4B | 2.4 - 2.6 | NZX6V2E | 6.3 - 6.6     | NZX14C | 13.8 - 14.3   |
| NZX2V7A | 2.5 - 2.7 | NZX6V8A | 6.4 - 6.7     | NZX15A | 14.1 - 14.7   |
| NZX2V7B | 2.6 - 2.8 | NZX6V8B | 6.6 - 6.9     | NZX15B | 14.5 - 15.1   |
| NZX2V7C | 2.7 - 2.9 | NZX6V8C | 6.7 - 7       | NZX15C | 14.9 - 15.5   |
| NZX3V0A | 2.8 - 3   | NZX6V8D | 6.9 - 7.2     | NZX15X | 14.35 - 15.09 |
| NZX3V0B | 2.9 - 3.1 | NZX7V5A | 7 - 7.3       | NZX16A | 15.3 - 15.9   |
| NZX3V0C | 3 - 3.2   | NZX7V5B | 7.2 - 7.6     | NZX16B | 15.7 - 16.5   |
| NZX3V3A | 3.1 - 3.3 | NZX7V5C | 7.3 - 7.7     | NZX16C | 16.3 - 17.1   |
| NZX3V3B | 3.2 - 3.4 | NZX7V5D | 7.5 - 7.9     | NZX18A | 16.9 - 17.7   |
| NZX3V3C | 3.3 - 3.5 | NZX7V5X | 7.07 - 7.45   | NZX18B | 17.5 - 18.3   |
| NZX3V6A | 3.4 - 3.6 | NZX8V2A | 7.7 - 8.1     | NZX18C | 18.1 - 19     |
| NZX3V6B | 3.5 - 3.7 | NZX8V2B | 7.9 - 8.3     | NZX20A | 18.8 - 19.7   |
| NZX3V6C | 3.6 - 3.8 | NZX8V2C | 8.1 - 8.5     | NZX20B | 19.5 - 20.4   |
| NZX3V9A | 3.7 - 3.9 | NZX8V2D | 8.3 - 8.7     | NZX20C | 20.2 - 21.2   |
| NZX3V9B | 3.8 - 4   | NZX9V1A | 8.5 - 8.9     | NZX22A | 20.9 - 21.9   |
| NZX3V9C | 3.9 - 4.1 | NZX9V1B | 8.7 - 9.1     | NZX22B | 21.6 - 22.6   |
| NZX4V3A | 4 - 4.2   | NZX9V1C | 8.9 - 9.3     | NZX22C | 22.3 - 23.3   |
| NZX4V3B | 4.1 - 4.3 | NZX9V1D | 9.1 - 9.5     | NZX24A | 22.9 - 24     |
| NZX4V3C | 4.2 - 4.4 | NZX9V1E | 9.3 - 9.7     | NZX24B | 23.6 - 24.7   |
| NZX4V3D | 4.3 - 4.5 | NZX10A  | 9.5 - 9.9     | NZX24C | 24.3 - 25.5   |
| NZX4V7A | 4.4 - 4.6 | NZX10B  | 9.7 - 10.1    | NZX24X | 22.61 - 23.77 |
| NZX4V7B | 4.5 - 4.7 | NZX10C  | 9.9 - 10.3    | NZX27A | 25.2 - 26.6   |
| NZX4V7C | 4.6 - 4.8 | NZX10D  | 10.2 - 10.6   | NZX27B | 26.2 - 27.6   |
| NZX4V7D | 4.7 - 4.9 | NZX11A  | 10.4 - 10.8   | NZX27C | 27.2 - 28.6   |
| NZX5V1A | 4.8 - 5   | NZX11B  | 10.7 - 11.1   | NZX27X | 26.99 - 28.39 |
| NZX5V1B | 4.9 - 5.1 | NZX11C  | 10.9 - 11.3   | NZX30A | 28.2 - 29.6   |
| NZX5V1C | 5 - 5.2   | NZX11D  | 11.1 - 11.6   | NZX30B | 29.2 - 30.6   |
| NZX5V1D | 5.1 - 5.3 | NZX12A  | 11.4 - 11.9   | NZX30C | 30.2 - 31.6   |
| NZX5V6A | 5.2 - 5.5 | NZX12B  | 11.6 - 12.1   | NZX30X | 29.02 - 30.51 |
| NZX5V6B | 5.3 - 5.6 | NZX12C  | 11.9 - 12.4   | NZX33A | 31.2 - 32.6   |
| NZX5V6C | 5.4 - 5.7 | NZX12D  | 12.2 - 12.7   | NZX33B | 32.2 - 33.6   |
| NZX5V6D | 5.5 - 5.8 | NZX12X  | 11.44 - 12.03 | NZX33C | 33.2 - 34.5   |
| NZX5V6E | 5.6 - 5.9 | NZX13A  | 12.4 - 12.9   | NZX36A | 34.2 - 35.7   |
| NZX6V2A | 5.7 - 6   | NZX13B  | 12.6 - 13.1   | NZX36B | 35.3 - 36.8   |
| NZX6V2B | 5.8 - 6.1 | NZX13C  | 12.9 - 13.4   | NZX36C | 36.4 - 38     |
| NZX6V2C | 6 - 6.3   | NZX14A  | 13.2 - 13.7   | NZX36X | 35.36 - 37.19 |

General purpose switching diodes ≤ 100V

| $V_F$ max (V) | $V_F$ max (V) | @ $I_F$ (mA) | $I_R$ max (nA) | @ $V_R$ (V) | $t_{rr}$ max (ns) | Package                                                                             | SOD27<br>(DO-35)                                                                   | SOD68<br>(DO-34)                                                                    | SOD80C<br>(MiniMelf)                                                                | SOT23                                                                               |                        | SOT143B                                                                             | SOD123F                                                                             | SOT323<br>(SC-70)                                                                   | SOT363<br>(SC-88)                                                                   | SOD323<br>(SC-76)                                                                   | SOD323F<br>(SC-90)                                                                  | SOT666                                                                              | SOT416<br>(SC-75)                                                                   | SOD523<br>(SC-79)                                                                   | SOD882                                                                              | SOT883<br>(SC-101)                                                                  |
|---------------|---------------|--------------|----------------|-------------|-------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|               |               |              |                |             |                   |                                                                                     |  |  |  |  |                        |  |  |  |  |  |  |  |  |  |  |  |
|               |               |              |                |             |                   |                                                                                     | Size (mm)<br>P <sub>tot</sub> (mW)                                                 | 4.25 x 1.85 x 0.56<br>500                                                           | 3.04 x 1.6 x 0.55<br>500                                                            | 3.5 x 1.5 x 1.5<br>500                                                              | 2.9 x 1.3 x 1.0<br>250 | 2.9 x 1.3 x 1.0<br>250                                                              | 2.6 x 1.6 x 1.1<br>830                                                              | 2.0 x 1.25 x 0.95<br>200                                                            | 2.0 x 1.25 x 0.95<br>300                                                            | 1.7 x 1.25 x 0.95<br>400                                                            | 1.7 x 1.25 x 0.7<br>550                                                             | 1.6 x 1.2 x 0.55<br>180                                                             | 1.6 x 0.8 x 0.77<br>170                                                             | 1.2 x 0.8 x 0.6<br>500                                                              | 1.0 x 0.6 x 0.5<br>250                                                              | 1.0 x 0.6 x 0.5<br>250                                                              |
| 50            | 1             | 50           | 100            | 50          | 4                 |    |                                                                                    |                                                                                     |                                                                                     | BAL74                                                                               |                        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 70            | 1             | 50           | 1000           | 70          | 4                 |    |                                                                                    |                                                                                     |                                                                                     | BAL99                                                                               |                        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 75            | 1             | 10           | 25             | 20          | 4                 |    |                                                                                    | 1N4531                                                                              |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               | 50           | 1000           | 75          | 4                 |    |                                                                                    |                                                                                     |                                                                                     |                                                                                     | BAS28                  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               | 100          | 5000           | 75          | 4                 |    |                                                                                    |                                                                                     | BAS32L                                                                              |                                                                                     |                        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 90            | 1             | 50           | 500            | 80          | 4                 |    |                                                                                    |                                                                                     |                                                                                     | BAW56                                                                               |                        |                                                                                     |                                                                                     | BAW56W                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAW56T                                                                              |                                                                                     | BAW56M                                                                              |
|               |               |              |                |             |                   |   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     | BAW56S                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     | BAV756S                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 100           | 1             | 10           | 25             | 20          | 4                 |  | 1N4148                                                                             |                                                                                     |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               | 50           | 500            | 80          | 4                 |  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                        | BAS16H                                                                              |                                                                                     |                                                                                     |                                                                                     | BAS316                                                                              | BAS16J                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     | BAS16                                                                               |                        |                                                                                     |                                                                                     | BAS16W                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAS16T                                                                              |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAS516                                                                              | BAS16L                                                                              |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     |                                                                                     | BAS16VY                                                                             |                                                                                     |                                                                                     | BAS16VV                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     | BAV70                                                                               |                        |                                                                                     |                                                                                     | BAV70W                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     | BAV70T                                                                              |                                                                                     |                                                                                     | BAV70M                                                                              |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     |                                                                                     | BAV70S                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     | BAV99                                                                               |                        |                                                                                     |                                                                                     | BAV99W                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                        |                                                                                     |                                                                                     |                                                                                     | BAV99S                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

General purpose switching diodes > 100V

types in **bold** represent new products

| $V_R$ max (V) | $V_F$ max (V) | @ $I_F$ (mA) | $I_R$ max (nA) | @ $V_R$ (V) | $t_{rr}$ max (ns) | Package                                                                             | SOD27 (DO-35)                                                                     | SOD80C (MiniMelf)                                                                 | SOT457 (SC-74)                                                                    | SOT23                                                                             | SOT143B                                                                           | SOD123F                                                                            | SOT323 (SC-70)                                                                      | SOT363 (SC-88)                                                                      | SOD323 (SC-76)                                                                      | SOD323F (SC-90)                                                                     | SOD523 (SC-79)                                                                      |
|---------------|---------------|--------------|----------------|-------------|-------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|               |               |              |                |             |                   | Size (mm)                                                                           |  |  |  |  |  |  |  |  |  |  |  |
|               |               |              |                |             |                   | P <sub>tot</sub> (mW)                                                               | 500                                                                               | 300                                                                               | 500                                                                               | 250                                                                               | 250                                                                               | 830                                                                                | 350                                                                                 | 300                                                                                 | 400                                                                                 | 550                                                                                 | 500                                                                                 |
|               |               |              |                |             |                   | Symbol                                                                              |  |  |  |  |  |   |   |  |  |  |  |
| 150           | 1             | 100          | 100            | 150         | 50                |    | BAV20                                                                             |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| ≥ 200         | 1             | 100          | 100            | 200         | 150               |    | BAV21                                                                             | BAV103                                                                            |                                                                                   |                                                                                   |                                                                                   | BAS21H                                                                             |                                                                                     |                                                                                     | BAS321                                                                              |                                                                                     |                                                                                     |
|               |               |              |                |             | 50                |    |                                                                                   |                                                                                   |                                                                                   | BAS21                                                                             |                                                                                   |                                                                                    | <b>BAS21W</b>                                                                       |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |    |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BAV23                                                                             |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |    |                                                                                   |                                                                                   |                                                                                   | BAV23A                                                                            |                                                                                   |                                                                                    | <b>BAS21AW</b>                                                                      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |    |                                                                                   |                                                                                   |                                                                                   | BAV23C                                                                            |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |   |                                                                                   |                                                                                   |                                                                                   | BAV23S                                                                            |                                                                                   |                                                                                    | <b>BAS21SW</b>                                                                      |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   | BAS21VD                                                                           |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     | BAS21J                                                                              | BAS521                                                                              |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                   | BAS101                                                                            |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                   | BAS101S                                                                           |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 300           | 1.1           | 100          | 150            | 250         | 50                |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   | BAW101                                                                            |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|               |               |              |                |             |                   |  |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                   |                                                                                    | BAS101S                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

Controlled avalanche switching diodes

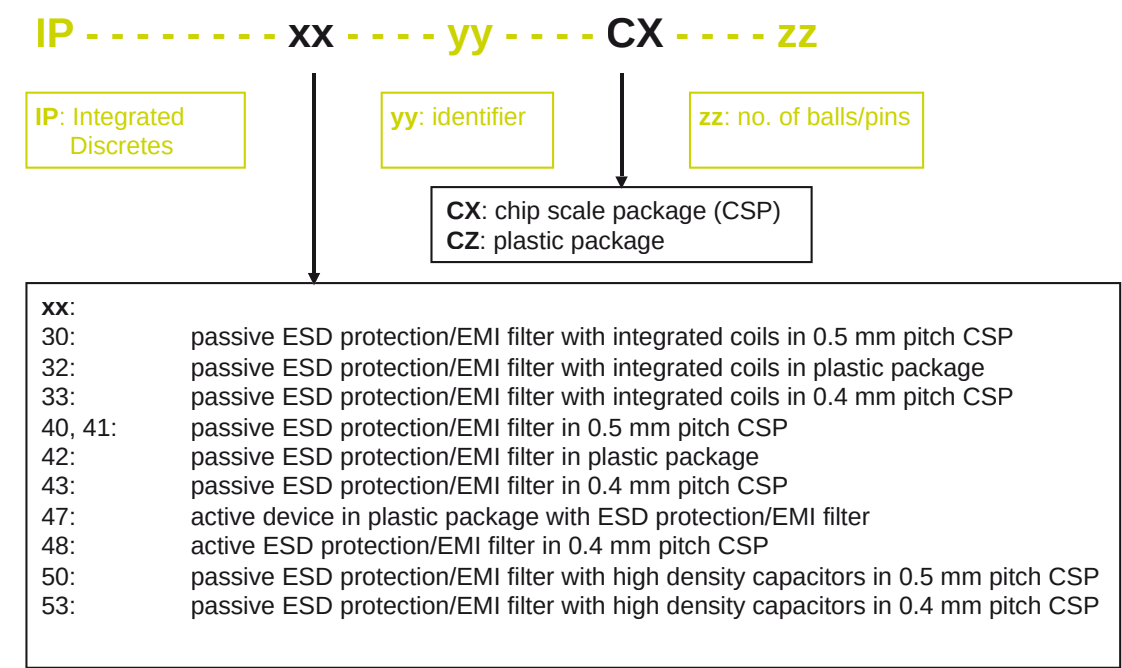
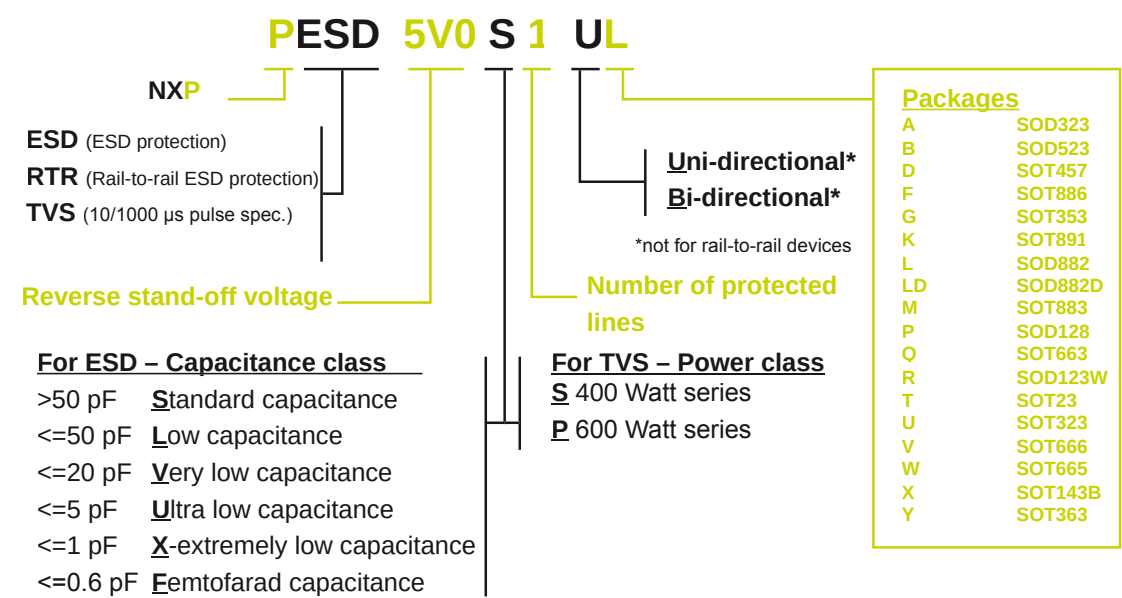
| $V_R$ max (V) | $V_F$ max (V) | @ $I_F$ (mA) | $I_{AS}$ max (nA) @ $V_R$ max | $I_{FSM}$ max (A) | $I_{PRM}$ max (mA) | $C_j$ max (pF) | $t_{rr}$ max (ns) | Package                                                                             | SOT23                                                                               | SOT143B                                                                             |
|---------------|---------------|--------------|-------------------------------|-------------------|--------------------|----------------|-------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|               |               |              |                               |                   |                    |                |                   | Size (mm)                                                                           |  |  |
|               |               |              |                               |                   |                    |                |                   | P <sub>tot</sub> (mW)                                                               | 250                                                                                 | 250                                                                                 |
|               |               |              |                               |                   |                    |                |                   | Symbol                                                                              |  |  |
| 60            | 1             | 200          | 100                           | 9                 | 600                | 2.5            | 6                 |  |                                                                                     | BAS56                                                                               |
| 90            | 1             | 200          | 100                           | 10                | 600                | 35             | 50                |  | BAS29                                                                               |                                                                                     |
|               |               |              |                               |                   |                    |                |                   |  | BAS31                                                                               |                                                                                     |
|               |               |              |                               |                   |                    |                |                   |  | BAS35                                                                               |                                                                                     |

Low leakage current switching diodes

types in **bold** represent new products

| $V_R$ max (V) | $V_F$ max (V) | @ $I_F$ (mA) | $I_R$ max (nA) @ $V_R$ max | $t_{rr}$ max (ns) | Package                                                                               | SOD80C (MiniMelf)                                                                     | SOD68 (DO-34)                                                                         | SOT23                                                                                 | SOD123F                                                                               | SOT323 (SC-70)                                                                        | SOD323 (SC-76)                                                                        | SOT416 (SC-75)                                                                        | SOD523 (SC-79)                                                                        |
|---------------|---------------|--------------|----------------------------|-------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|               |               |              |                            |                   | Size (mm)                                                                             |   |   |   |   |   |   |   |   |
|               |               |              |                            |                   | P <sub>tot</sub> (mW)                                                                 | 300                                                                                   | 500                                                                                   | 250                                                                                   | 830                                                                                   | 250                                                                                   | 400                                                                                   | 170                                                                                   | 500                                                                                   |
|               |               |              |                            |                   | Symbol                                                                                |  |  |  |  |  |  |  |  |
| 75            | 1             | 10           | 5                          | 3                 |  |                                                                                       |                                                                                       |                                                                                       | BAS116H                                                                               |                                                                                       | BAS416                                                                                |                                                                                       | BAS716                                                                                |
|               |               |              |                            |                   |  |                                                                                       |                                                                                       | BAS116                                                                                |                                                                                       |                                                                                       |                                                                                       | <b>BAS116T</b>                                                                        |                                                                                       |
|               |               |              |                            |                   |  |                                                                                       |                                                                                       | BAV199                                                                                |                                                                                       | BAV199W                                                                               |                                                                                       |                                                                                       |                                                                                       |
|               |               |              |                            |                   |  |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|               |               |              |                            |                   |  |                                                                                       |                                                                                       | BAW156                                                                                |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|               |               |              |                            |                   |  |                                                                                       |                                                                                       | BAV170                                                                                |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
| 125           | 1             | 100          | 1                          | 1.5 typ           |  | BAS45AL                                                                               | BAS45A                                                                                |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |

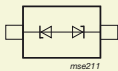
Protection and signal conditioning nomenclature



Protection and signal conditioning

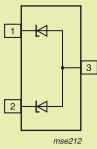
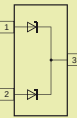
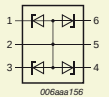
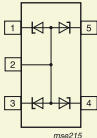
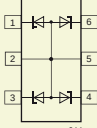
|                                                            |    |
|------------------------------------------------------------|----|
| Standard ESD protection devices                            | 24 |
| Low capacitance ESD protection devices                     | 26 |
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Standard ESD protection devices

| Number of protected lines |               | V <sub>RWM</sub> (V) | C <sub>line</sub> typ (pF) | C <sub>line</sub> max (pF) | P <sub>PP</sub> <sup>[1]</sup> max (W) | ESD rating <sup>[2]</sup> max (kV) | I <sub>R</sub> max (μA) @ V <sub>RWM</sub> | Configuration                                                                       | Type                | Package                                                                               | Size (mm)                                                                             |                 |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|----------------------------------------|------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
| Unidirectional            | Bidirectional |                      |                            |                            |                                        |                                    |                                            |                                                                                     |                     |                                                                                       |                                                                                       |                 |
| 1                         | 0             | 3.3                  | 207                        | 300                        | 150                                    | 30                                 | 2                                          |    | PESD3V3S1UL         | SOD882                                                                                | 1.0 x 0.6 x 0.5                                                                       |                 |
|                           |               | 5                    | 152                        | 200                        | 150                                    | 30                                 | 1                                          |                                                                                     | PESD5V0S1UL         |    |                                                                                       |                 |
|                           |               | 12                   | 38                         | 75                         | 150                                    | 30                                 | 0.05                                       |                                                                                     | PESD12VS1UL         |                                                                                       |                                                                                       |                 |
|                           |               | 15                   | 32                         | 70                         | 150                                    | 30                                 | 0.05                                       |                                                                                     | PESD15VS1UL         |                                                                                       |                                                                                       |                 |
|                           |               | 24                   | 23                         | 50                         | 150                                    | 23                                 | 0.05                                       |                                                                                     | PESD24VS1UL         |                                                                                       |                                                                                       |                 |
|                           |               | 5                    | 152                        | 200                        | 150                                    | 30                                 | 1                                          |                                                                                     | <b>PESD5V0S1ULD</b> | SOD882D                                                                               | 1.0 x 0.6 x 0.37                                                                      |                 |
|                           |               | 3.3                  | 207                        | 300                        | 330                                    | 30                                 | 2                                          |                                                                                     | PESD3V3S1UB         | SOD523 (SC-79)                                                                        |    | 1.2 x 0.8 x 0.6 |
|                           |               | 5                    | 152                        | 200                        | 260                                    | 30                                 | 1                                          |                                                                                     | PESD5V0S1UB         |                                                                                       |                                                                                       |                 |
|                           |               | 12                   | 38                         | 75                         | 180                                    | 30                                 | 0.05                                       |                                                                                     | PESD12VS1UB         |                                                                                       |                                                                                       |                 |
|                           |               | 15                   | 32                         | 70                         | 160                                    | 30                                 | 0.05                                       |                                                                                     | PESD15VS1UB         |                                                                                       |                                                                                       |                 |
|                           |               | 24                   | 23                         | 50                         | 160                                    | 23                                 | 0.05                                       |                                                                                     | PESD24VS1UB         |                                                                                       |                                                                                       |                 |
|                           |               | 5                    | 480                        | 530                        | 890                                    | 30                                 | 4                                          |                                                                                     | PESD5V0S1UA         | SOD323 (SC-76)                                                                        | 1.7 x 1.25 x 0.95                                                                     |                 |
|                           |               | 12                   | 160                        | 180                        | 600                                    | 30                                 | 0.1                                        |                                                                                     | PESD12VS1UA         |   |                                                                                       |                 |
|                           |               | 5                    | 480                        | 530                        | 890                                    | 30                                 | 4                                          |                                                                                     | PESD5V0S1UJ         | SOD323F (SC-90)                                                                       | 1.7 x 1.25 x 0.7                                                                      |                 |
|                           |               | 12                   | 160                        | 180                        | 600                                    | 30                                 | 0.1                                        |                                                                                     | PESD12VS1UJ         |  |                                                                                       |                 |
|                           |               | 2.5                  | 229                        | 300                        | 260                                    | 30                                 | 6                                          |                                                                                     | PESD5Z2.5           | SOD523 (SC-79)                                                                        |  | 1.2 x 0.8 x 0.6 |
|                           |               | 3.3                  | 172                        | 200                        | 260                                    | 30                                 | 0.05                                       |                                                                                     | PESD5Z3.3           |                                                                                       |                                                                                       |                 |
|                           |               | 5                    | 89                         | 150                        | 180                                    | 30                                 | 0.05                                       |                                                                                     | PESD5Z5.0           |                                                                                       |                                                                                       |                 |
|                           |               | 6                    | 78                         | 150                        | 180                                    | 30                                 | 0.01                                       |                                                                                     | PESD5Z6.0           |                                                                                       |                                                                                       |                 |
|                           |               | 7                    | 69                         | 150                        | 180                                    | 30                                 | 0.01                                       |                                                                                     | PESD5Z7.0           |                                                                                       |                                                                                       |                 |
|                           |               | 12                   | 35                         | 75                         | 200                                    | 30                                 | 0.01                                       |                                                                                     | PESD5Z12            |                                                                                       |                                                                                       |                 |
| 0                         | 1             | 5                    | 35                         | 45                         | 130                                    | 30                                 | 0.1                                        |  | PESD5V0S1BL         | SOD882                                                                                | 1.0 x 0.6 x 0.5                                                                       |                 |
|                           |               | 5                    | 35                         | 45                         | 130                                    | 30                                 | 0.1                                        |                                                                                     | <b>PESD5V0S1BLD</b> | SOD882D                                                                               | 1.0 x 0.6 x 0.37                                                                      |                 |
|                           |               | 5                    | 35                         | 45                         | 130                                    | 30                                 | 0.1                                        |                                                                                     | PESD5V0S1BB         | SOD523 (SC-79)                                                                        | 1.2 x 0.8 x 0.6                                                                       |                 |
|                           |               | 5                    | 35                         | 45                         | 130                                    | 30                                 | 0.1                                        |                                                                                     | PESD5V0S1BA         | SOD323 (SC-76)                                                                        | 1.7 x 1.25 x 0.95                                                                     |                 |

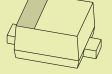
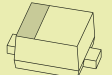
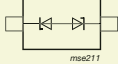
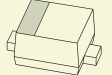
<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5      <sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

Standard ESD protection devices

| Number of protected lines |               | V <sub>RWM</sub> (V) | C <sub>line</sub> typ (pF) | C <sub>line</sub> max (pF) | P <sub>PP</sub> <sup>[1]</sup> max (W) | ESD rating <sup>[2]</sup> max (kV) | I <sub>R</sub> max (μA) @ V <sub>RWM</sub> | Configuration                                                                         | Type         | Package         | Size (mm)         |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|----------------------------------------|------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------|--------------|-----------------|-------------------|
| Unidirectional            | Bidirectional |                      |                            |                            |                                        |                                    |                                            |                                                                                       |              |                 |                   |
| 2                         | 1             | 3.3                  | 200                        | 275                        | 150                                    | 23                                 | 3                                          |    | PESD3V3S2UQ  | SOT663          | 1.6 x 1.2 x 0.55  |
|                           |               | 5                    | 150                        | 215                        | 150                                    | 30                                 | 0.3                                        |                                                                                       | PESD5V0S2UQ  |                 |                   |
|                           |               | 12                   | 38                         | 100                        | 150                                    | 30                                 | 0.03                                       |                                                                                       | PESD12VS2UQ  |                 |                   |
|                           |               | 15                   | 32                         | 70                         | 150                                    | 30                                 | 0.05                                       |                                                                                       | PESD15VS2UQ  |                 |                   |
|                           |               | 24                   | 23                         | 50                         | 150                                    | 23                                 | 0.05                                       |                                                                                       | PESD24VS2UQ  |                 |                   |
|                           |               | 3.3                  | 207                        | 300                        | 330                                    | 30                                 | 2                                          |                                                                                       | PESD3V3S2UT  | SOT23           | 2.9 x 1.3 x 1.0   |
|                           |               | 5.2                  | 152                        | 200                        | 260                                    | 30                                 | 1                                          |                                                                                       | PESD5V2S2UT  |                 |                   |
|                           |               | 12                   | 38                         | 75                         | 180                                    | 30                                 | 1                                          |                                                                                       | PESD12VS2UT  |                 |                   |
|                           |               | 15                   | 32                         | 70                         | 160                                    | 30                                 | 1                                          |                                                                                       | PESD15VS2UT  |                 |                   |
|                           |               | 24                   | 23                         | 50                         | 160                                    | 23                                 | 1                                          |                                                                                       | PESD24VS2UT  |                 |                   |
|                           |               | 36                   | 17                         | 35                         | 160                                    | 30                                 | 1 (@ 30 V)                                 |                                                                                       | PESD36VS2UT  |                 |                   |
|                           |               | 3.3                  | 207                        | 300                        | 330                                    | 30                                 | 2                                          |    | PESD3V3S2UAT |                 |                   |
|                           |               | 5                    | 152                        | 200                        | 260                                    | 30                                 | 1                                          |                                                                                       | PESD5V0S2UAT |                 |                   |
|                           |               | 12                   | 38                         | 75                         | 180                                    | 30                                 | 0.05                                       |                                                                                       | PESD12VS2UAT |                 |                   |
|                           |               | 15                   | 32                         | 70                         | 160                                    | 30                                 | 0.05                                       |                                                                                       | PESD15VS2UAT |                 |                   |
|                           |               | 24                   | 23                         | 50                         | 160                                    | 23                                 | 0.05                                       |                                                                                       | PESD24VS2UAT |                 |                   |
|                           |               | 3.3                  | 110                        | 300                        | 110                                    | 30                                 | 1 (@ 3 V)                                  |    | PESD3V3S4UF  | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5  |
|                           |               | 5                    | 85                         | 220                        | 110                                    | 30                                 | 0.1 (@ 4.3 V)                              |                                                                                       | PESD5V0S4UF  |                 |                   |
|                           |               | 3                    | 107                        | 125                        | -                                      | 8                                  | 1                                          |  | BZA956A      | SOT665          | 1.6 x 1.2 x 0.55  |
|                           |               | 4                    | 90                         | 105                        | -                                      | 8                                  | 0.5                                        |                                                                                       | BZA962A      |                 |                   |
|                           |               | 4.3                  | 78                         | 90                         | -                                      | 8                                  | 0.1                                        |                                                                                       | BZA968A      |                 |                   |
|                           |               | 3                    | 200                        | 240                        | -                                      | 8                                  | 2                                          |                                                                                       | BZA856A      | SOT353 (SC-88A) | 2.0 x 1.25 x 0.95 |
|                           |               | 3                    | 107                        | 125                        | -                                      | 8                                  | 1                                          |                                                                                       | BZA856AL     |                 |                   |
|                           |               | 4                    | 165                        | 200                        | -                                      | 8                                  | 0.7                                        |                                                                                       | BZA862A      |                 |                   |
|                           |               | 4                    | 90                         | 105                        | -                                      | 8                                  | 0.5                                        |                                                                                       | BZA862AL     |                 |                   |
|                           |               | 4.3                  | 145                        | 180                        | -                                      | 8                                  | 0.2                                        |                                                                                       | BZA868A      |                 |                   |
|                           |               | 4.3                  | 78                         | 90                         | -                                      | 8                                  | 0.1                                        |                                                                                       | BZA868AL     |                 |                   |
|                           |               | 15                   | 37                         | 50                         | -                                      | 8                                  | 0.1                                        |                                                                                       | BZA820A      | SOT457 (SC-74)  | 2.9 x 1.5 x 1.0   |
|                           |               | 3                    | 200                        | 240                        | -                                      | 8                                  | 2                                          |  | BZA456A      |                 |                   |
|                           |               | 4                    | 165                        | 200                        | -                                      | 15                                 | 0.7                                        |                                                                                       | BZA462A      |                 |                   |
|                           |               | 14                   | 37                         | 48                         | -                                      | 8                                  | 0.075                                      |                                                                                       | BZA418A      |                 |                   |
|                           |               | 15                   | 37                         | 48                         | -                                      | 8                                  | 0.1                                        |                                                                                       | BZA420A      |                 |                   |
|                           |               | 3.3                  | 215                        | 300                        | 200                                    | 30                                 | 0.8                                        |                                                                                       | PESD3V3S4UD  |                 |                   |
|                           |               | 5                    | 165                        | 220                        | 200                                    | 30                                 | 0.2                                        |  | PESD5V0S4UD  |                 |                   |
|                           |               | 12                   | 73                         | 100                        | 200                                    | 30                                 | 0.015                                      |                                                                                       | PESD12VS4UD  |                 |                   |
|                           |               | 15                   | 60                         | 90                         | 200                                    | 30                                 | 0.015                                      |                                                                                       | PESD15VS4UD  |                 |                   |
|                           |               | 24                   | 40                         | 70                         | 200                                    | 23                                 | 0.015                                      |                                                                                       | PESD24VS4UD  |                 |                   |
|                           |               | 3.3                  | 215                        | 300                        | 200                                    | 30                                 | 0.8                                        |  | PESD3V3S5UD  |                 |                   |
| 5                         | 4             | 5                    | 165                        | 220                        | 200                                    | 30                                 | 0.2                                        |                                                                                       | PESD5V0S5UD  |                 |                   |
|                           |               | 12                   | 73                         | 100                        | 200                                    | 30                                 | 0.015                                      |                                                                                       | PESD12VS5UD  |                 |                   |
|                           |               | 15                   | 60                         | 90                         | 200                                    | 30                                 | 0.015                                      |                                                                                       | PESD15VS5UD  |                 |                   |
|                           |               | 24                   | 45                         | 70                         | 200                                    | 23                                 | 0.015                                      |                                                                                       | PESD24VS5UD  |                 |                   |
|                           |               | 0                    | 45                         | 75                         | -                                      | 15                                 | 0.1                                        |  | BZA408B      | SOT163 (SO20)   | 12.8 x 7.5 x 2.65 |
|                           |               | 18                   | 17                         | 5.2                        | 100                                    | 120                                | -                                          | 8                                                                                     | BZA100       |                 |                   |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5      <sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

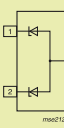
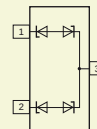
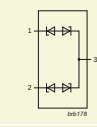
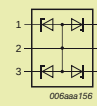
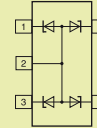
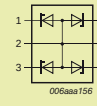
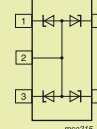
Low capacitance ESD protection devices

| Number of protected lines |               | V <sub>RWM</sub> (V) | C <sub>line</sub> typ (pF) | C <sub>line</sub> max (pF) | P <sub>PP</sub> <sup>[1]</sup> max (W) | ESD rating <sup>[2]</sup> max (kV) | I <sub>R</sub> max (μA) @ V <sub>RWM</sub> | Configuration                                                                       | Type        | Package                                                                                              | Size (mm)         |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|----------------------------------------|------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------|-------------------|
| Unidirectional            | Bidirectional |                      |                            |                            |                                        |                                    |                                            |                                                                                     |             |                                                                                                      |                   |
| 1                         | 0             | 3.3                  | 34                         | 40                         | 45                                     | 30                                 | 0.3                                        |    | PESD3V3L1UL | SOD882            | 1.0 x 0.6 x 0.5   |
|                           |               | 5                    | 25                         | 30                         | 42                                     | 26                                 | 0.1                                        |                                                                                     | PESD5V0L1UL |                                                                                                      |                   |
|                           |               | 3.3                  | 34                         | 40                         | 45                                     | 30                                 | 0.3                                        |                                                                                     | PESD3V3L1UB | SOD523 (SC-79)    | 1.2 x 0.8 x 0.6   |
|                           |               | 5                    | 25                         | 30                         | 42                                     | 26                                 | 0.1                                        |                                                                                     | PESD5V0L1UB |                                                                                                      |                   |
|                           |               | 3.3                  | 34                         | 40                         | 45                                     | 30                                 | 0.3                                        |                                                                                     | PESD3V3L1UA | SOD323 (SC-76)    | 1.7 x 1.25 x 0.95 |
|                           |               | 5                    | 25                         | 30                         | 42                                     | 26                                 | 0.1                                        |                                                                                     | PESD5V0L1UA |                                                                                                      |                   |
|                           |               | 3.3                  | 2.6                        | 3.1                        | -                                      | 9                                  | 0.1 (@ 3 V)                                |                                                                                     | PESD3V3U1UL | SOD882            | 1.0 x 0.6 x 0.5   |
|                           |               | 5                    | 2                          | 2.6                        | -                                      | 9                                  | 0.1                                        |                                                                                     | PESD5V0U1UL |                                                                                                      |                   |
|                           |               | 3.3                  | 2.6                        | 3.1                        | -                                      | 9                                  | 0.1 (@ 3 V)                                |                                                                                     | PESD3V3U1UB | SOD523 (SC-79)    | 1.2 x 0.8 x 0.6   |
|                           |               | 5                    | 2                          | 2.6                        | -                                      | 9                                  | 0.1                                        |                                                                                     | PESD5V0U1UB |                                                                                                      |                   |
|                           |               | 3.3                  | 2.6                        | 3.1                        | -                                      | 9                                  | 0.1 (@ 3 V)                                |                                                                                     | PESD3V3U1UA | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |
|                           |               | 5                    | 2                          | 2.6                        | -                                      | 9                                  | 0.1                                        |                                                                                     | PESD5V0U1UA |                                                                                                      |                   |
| 0                         | 1             | 3.3                  | 101                        | -                          | 500                                    | 30                                 | 2                                          |  | PESD3V3L1BA |                 | 1.7 x 1.25 x 0.95 |
|                           |               | 5                    | 75                         | -                          | 500                                    | 30                                 | 1                                          |                                                                                     | PESD5V0L1BA |                                                                                                      |                   |
|                           |               | 12                   | 19                         | -                          | 200                                    | 30                                 | 0.05                                       |                                                                                     | PESD12VL1BA |                                                                                                      |                   |
|                           |               | 15                   | 16                         | -                          | 200                                    | 30                                 | 0.05                                       |                                                                                     | PESD15VL1BA |                                                                                                      |                   |
|                           |               | 24                   | 11                         | -                          | 200                                    | 23                                 | 0.05                                       |                                                                                     | PESD24VL1BA |                                                                                                      |                   |
|                           |               | 5                    | 11                         | 13                         | 45                                     | 30                                 | 0.01                                       |                                                                                     | PESD5V0V1BL | SOD882          | 1.0 x 0.6 x 0.5   |
|                           |               | 5                    | 11                         | 13                         | 45                                     | 30                                 | 0.01                                       |                                                                                     | PESD5V0V1BB | SOD523 (SC-79)  | 1.2 x 0.8 x 0.6   |
|                           |               | 5                    | 11                         | 13                         | 45                                     | 30                                 | 0.01                                       |                                                                                     | PESD5V0V1BA | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |
|                           |               | 5                    | 2.9                        | 3.5                        | -                                      | 10                                 | 0.1                                        |                                                                                     | PESD5V0U1BL | SOD882          | 1.0 x 0.6 x 0.5   |
|                           |               | 5                    | 2.9                        | 3.5                        | -                                      | 10                                 | 0.1                                        |                                                                                     | PESD5V0U1BB | SOD523 (SC-79)  | 1.2 x 0.8 x 0.6   |
|                           |               | 5                    | 2.9                        | 3.5                        | -                                      | 10                                 | 0.1                                        |                                                                                     | PESD5V0U1BA | SOD323 (SC-76)  | 1.7 x 1.25 x 0.95 |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                     |             |                                                                                                      |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                     |             |                                                                                                      |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                     |             |                                                                                                      |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                     |             |                                                                                                      |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                     |             |                                                                                                      |                   |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5      <sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

Low capacitance ESD protection devices

types in **bold** represent new products

| Number of protected lines |               | V <sub>RWM</sub> (V) | C <sub>line</sub> typ (pF) | C <sub>line</sub> max (pF) | P <sub>PP</sub> <sup>[1]</sup> max (W) | ESD rating <sup>[2]</sup> max (kV) | I <sub>R</sub> max (μA) @ V <sub>RWM</sub> | Configuration                                                                         | Type               | Package                                                                                               | Size (mm)         |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|----------------------------------------|------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------|--------------------|-------------------------------------------------------------------------------------------------------|-------------------|
| Unidirectional            | Bidirectional |                      |                            |                            |                                        |                                    |                                            |                                                                                       |                    |                                                                                                       |                   |
| 2                         | 1             | 3.3                  | 22                         | 28                         | 30                                     | 15                                 | 0.3                                        |    | PESD3V3L2UM        | SOT883 (SC-101)    | 1.0 x 0.6 x 0.5   |
|                           |               | 5                    | 16                         | 19                         | 30                                     | 15                                 | 0.025                                      |                                                                                       | PESD5V0L2UM        |                                                                                                       |                   |
|                           |               | 5                    | 38                         | 46                         | 70                                     | 30                                 | 0.09 (@ 4 V)                               |    | PESD5V0L2UU        | SOT323 (SC-70)     | 2.0 x 1.25 x 0.95 |
|                           |               | 6                    | 34                         | 40                         | 60                                     | 30                                 | 0.018 (@ 4.3 V)                            |                                                                                       | PESD6V0L2UU        |                                                                                                       |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                       |                    |                                                                                                       |                   |
| 0                         | 2             | 3.3                  | 101                        | -                          | 350                                    | 30                                 | 2                                          |    | PESD3V3L2BT        | SOT23              | 2.9 x 1.3 x 1.0   |
|                           |               | 5                    | 75                         | -                          | 350                                    | 30                                 | 1                                          |                                                                                       | PESD5V0L2BT        |                                                                                                       |                   |
|                           |               | 12                   | 19                         | -                          | 200                                    | 30                                 | 0.05                                       |                                                                                       | PESD12VL2BT        |                                                                                                       |                   |
|                           |               | 15                   | 16                         | -                          | 200                                    | 30                                 | 0.05                                       |                                                                                       | PESD15VL2BT        |                                                                                                       |                   |
|                           |               | 24                   | 11                         | -                          | 200                                    | 23                                 | 0.05                                       |                                                                                       | PESD24VL2BT        |                                                                                                       |                   |
|                           |               | 5                    | 35                         | 45                         | 130                                    | 30                                 | 0.1                                        |   | PESD5V0S2BT        | SOT883 (SC-101)   | 1.0 x 0.6 x 0.5   |
|                           |               | 5                    | 2.9                        | 3.5                        | -                                      | 10                                 | 0.1                                        |                                                                                       | PESD5V0U2BT        |                                                                                                       |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                       |                    |                                                                                                       |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                       |                    |                                                                                                       |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                       |                    |                                                                                                       |                   |
| 4                         | 3             | 3.3                  | 22                         | 28                         | 30                                     | 20                                 | 0.3                                        |  | PESD3V3L4UF        | SOT886 (XSON6)   | 1.45 x 1.0 x 0.5  |
|                           |               | 5                    | 16                         | 19                         | 30                                     | 20                                 | 0.025                                      |                                                                                       | PESD5V0L4UF        |                                                                                                       |                   |
|                           |               | 3.3                  | 22                         | 28                         | 30                                     | 20                                 | 0.3                                        |  | PESD3V3L4UW        | SOT665           | 1.6 x 1.2 x 0.55  |
|                           |               | 5                    | 16                         | 19                         | 30                                     | 20                                 | 0.025                                      |                                                                                       | PESD5V0L4UW        |                                                                                                       |                   |
|                           |               | 3.3                  | 22                         | 28                         | 30                                     | 20                                 | 0.3                                        |                                                                                       | PESD3V3L4UG        | SOT353 (SC-88A)  | 2.0 x 1.25 x 0.95 |
|                           |               | 5                    | 16                         | 19                         | 30                                     | 20                                 | 0.025                                      |                                                                                       | PESD5V0L4UG        |                                                                                                       |                   |
|                           |               | 3.3                  | 13                         | 17                         | 14                                     | 10                                 | 1                                          |  | <b>PESD3V3V4UK</b> | SOT891 (XSON6)   | 1.0 x 1.0 x 0.5   |
|                           |               | 5                    | 12                         | 15                         | 20                                     | 15                                 | 0.5                                        |                                                                                       | <b>PESD5V0V4UK</b> |                                                                                                       |                   |
|                           |               | 9                    | 6.5                        | 10                         | 25                                     | 8                                  | 0.5                                        |                                                                                       | <b>PESD9V0V4UK</b> |                                                                                                       |                   |
|                           |               | 3.3                  | 15                         | 18                         | 16                                     | 12                                 | 0.3                                        |  | PESD3V3V4UF        | SOT886 (XSON6)   | 1.45 x 1.0 x 0.5  |
|                           |               | 5                    | 12                         | 15                         | 16                                     | 12                                 | 0.025                                      |                                                                                       | PESD5V0V4UF        |                                                                                                       |                   |
|                           |               | 3.3                  | 15                         | 18                         | 16                                     | 12                                 | 0.3                                        |  | PESD3V3V4UW        | SOT665           | 1.6 x 1.2 x 0.55  |
|                           |               | 5                    | 12                         | 15                         | 16                                     | 12                                 | 0.025                                      |                                                                                       | PESD5V0V4UW        |                                                                                                       |                   |
|                           |               | 3.3                  | 15                         | 18                         | 16                                     | 12                                 | 0.3                                        |                                                                                       | PESD3V3V4UG        | SOT353 (SC-88A)  | 2.0 x 1.25 x 0.95 |
|                           |               | 5                    | 12                         | 15                         | 16                                     | 12                                 | 0.025                                      |                                                                                       | PESD5V0V4UG        |                                                                                                       |                   |
|                           |               |                      |                            |                            |                                        |                                    |                                            |                                                                                       |                    |                                                                                                       |                   |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5      <sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

Low capacitance ESD protection devices

types in **bold** represent new products

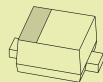
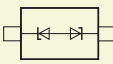
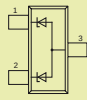
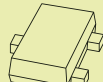
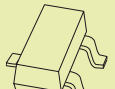
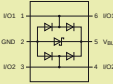
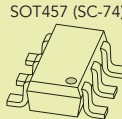
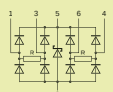
| Number of protected lines |               | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}^{[1]}$ max (W) | ESD rating <sup>[2]</sup> max (kV) | $I_R$ max (μA) @ $V_{RWM}$ | Configuration | Type               | Package         | Size (mm)         |
|---------------------------|---------------|---------------|---------------------|---------------------|------------------------|------------------------------------|----------------------------|---------------|--------------------|-----------------|-------------------|
| Unidirectional            | Bidirectional |               |                     |                     |                        |                                    |                            |               |                    |                 |                   |
| 0                         | 4             | 5             | 2.9                 | 3.5                 | -                      | 10                                 | 0.1                        |               | PESD5V0U4BF        | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5  |
|                           |               | 5             | 2.9                 | 3.5                 | -                      | 10                                 | 0.1                        |               | PESD5V0U4BW        | SOT665          | 1.6 x 1.2 x 0.55  |
| 5                         | 4             | 3.3           | 22                  |                     | 25                     | 20                                 | 1                          |               | <b>PESD3V3L5UK</b> | SOT891 (XSON6)  | 1.0 x 1.0 x 0.5   |
|                           |               | 5             | 16                  |                     | 25                     | 20                                 | 0.025                      |               | <b>PESD5V0L5UK</b> |                 |                   |
|                           |               | 3.3           | 22                  | 28                  | 25                     | 20                                 | 0.3                        |               | PESD3V3L5UF        | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5  |
|                           |               | 5             | 16                  | 19                  | 25                     | 20                                 | 0.025                      |               | PESD5V0L5UF        |                 |                   |
|                           |               | 3.3           | 22                  | 28                  | 25                     | 20                                 | 0.3                        |               | PESD3V3L5UV        | SOT666          | 1.6 x 1.2 x 0.55  |
|                           |               | 5             | 16                  | 19                  | 25                     | 20                                 | 0.025                      |               | PESD5V0L5UV        |                 |                   |
|                           |               | 3.3           | 22                  | 28                  | 25                     | 20                                 | 0.3                        |               | PESD3V3L5UY        | SOT363 (SC-88)  | 2.0 x 1.25 x 0.95 |
|                           |               | 5             | 16                  | 19                  | 25                     | 20                                 | 0.025                      |               | PESD5V0L5UY        |                 |                   |
| 0                         | 5             | 5             | 2.9                 | 3.5                 | -                      | 10                                 | 0.1                        |               | PESD5V0U5BF        | SOT886 (XSON6)  | 1.45 x 1.0 x 0.5  |
|                           |               | 5             | 2.9                 | 3.5                 | -                      | 10                                 | 0.1                        |               | PESD5V0U5BV        | SOT666          | 1.6 x 1.2 x 0.55  |
| 6                         | 5             | 5             | 16                  | 19                  | 35                     | 20                                 | 0.025                      |               | PESD5V0L6UAS       | SOT505 (TSSOP8) | 3.0 x 3.0 x 1.1   |
|                           |               | 5             | 16                  | 19                  | 35                     | 20                                 | 0.025                      |               | PESD5V0L6US        | SOT96 (SO8)     | 4.9 x 3.9 x 1.75  |
| 0                         | 7             | 5             | 8                   | 10                  | 35                     | 10                                 | 0.025                      |               | PESD5V0L7BAS       | SOT505 (TSSOP8) | 3.0 x 3.0 x 1.1   |
|                           |               | 5             | 8                   | 10                  | 35                     | 10                                 | 0.025                      |               | PESD5V0L7BS        | SOT96 (SO8)     | 4.9 x 3.9 x 1.75  |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5

<sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

ESD protection for very high speed interfaces (< 2 pF)

types in **bold** represent new products

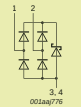
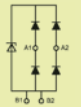
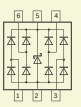
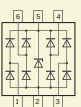
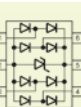
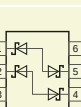
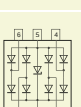
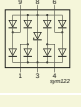
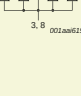
| Number of protected lines |               | $V_{RWM}$ (V) | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | ESD rating <sup>[2]</sup> max (kV) | $I_R$ max (μA) @ $V_{RWM}$ | Configuration                                                                         | Type         | Package                                                                               | Size (mm)        |
|---------------------------|---------------|---------------|---------------------|---------------------|------------------------------------|----------------------------|---------------------------------------------------------------------------------------|--------------|---------------------------------------------------------------------------------------|------------------|
| Unidirectional            | Bidirectional |               |                     |                     |                                    |                            |                                                                                       |              |                                                                                       |                  |
| 1                         | 0             | 5             | 0.9                 | 1                   | 8                                  | 0.2                        |    | PESD5V0X1UB  |    | 1.2 x 0.8 x 0.6  |
|                           |               | 5             | 1.8                 | 2                   | 15                                 | 0.2                        |                                                                                       | PESD5V0X1UAB |                                                                                       |                  |
|                           |               | 16            | 0.83                | 0.95                | 8                                  | 0.1                        |    | PESD16VX1UL  |    | 1.0 x 0.6 x 0.5  |
|                           |               | 5.5           | 1                   | 1.5                 | 8                                  | 0.1 (@ 3 V)                |                                                                                       | PRTR5V0U1T   |    | 2.9 x 1.3 x 1.0  |
| 0                         | 1             | 5.5           | 0.4                 | 0.55                | 10                                 | 0.1                        |    | PESD5V0F1BL  |    | 1.0 x 0.6 x 0.5  |
|                           |               | 16            | 0.5                 | 0.65                | 8                                  | 0.1                        |                                                                                       | PESD16VF1BL  |                                                                                       |                  |
|                           |               | 3.3           | 1.3                 | 1.6                 | 9                                  | 0.1                        |                                                                                       | PESD3V3X1BL  |                                                                                       |                  |
|                           |               | 5             | 0.9                 | 1.3                 | 9                                  | 0.1                        |                                                                                       | PESD5V0X1BL  |                                                                                       |                  |
| 2                         | 1             | 5             | 0.9                 | 1.3                 | 9                                  | 0.1                        |   | PESD5V0X1BQ  |   | 1.6 x 1.2 x 0.55 |
|                           |               | 5             | 0.9                 | 1.3                 | 9                                  | 0.1                        |                                                                                       | PESD5V0X1BT  |  | 2.9 x 1.3 x 1.0  |
|                           |               | 80            | 0.6                 | 0.75                | 30                                 | 0.1                        |                                                                                       | NUP1301      |                                                                                       |                  |
|                           | 0             | 5.5           | 1                   | 1.5                 | 8                                  | 0.1 (@ 3 V)                |  | PRTR5V0U2X   |  | 2.9 x 1.3 x 1.0  |
|                           |               | 5.5           | 1.8                 | -                   | 12                                 | 0.1 (@ 3 V)                |                                                                                       | PRTR5V0U2AX  |                                                                                       |                  |
|                           |               | 5.5           | 1                   | 1.5                 | 8                                  | 0.1 (@ 3 V)                |  | PRTR5V0U2K   |  | 1.0 x 1.0 x 0.5  |
|                           |               | 5.5           | 1                   | 1.5                 | 8                                  | 0.1 (@ 3 V)                |                                                                                       | PRTR5V0U2D   |  | 2.9 x 1.5 x 1.0  |
|                           |               | 5.5           | 1                   | 1.5                 | 8                                  | 0.1 (@ 3 V)                |                                                                                       | PRTR5V0U2F   |  | 1.45 x 1.0 x 0.5 |
|                           |               | 5.5           | 2                   | -                   | 15                                 | -                          |  | IP4234CZ6    |  | 2.9 x 1.5 x 1.0  |
|                           |               | 5.5           | 1.5                 | -                   | 8                                  | -                          |                                                                                       | IP3219CZ6    |  | 2.3 x 3.5 x 0.85 |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5

ESD protection for very high speed interfaces (< 2 pF)

ESD protection for very high speed interfaces (< 2 pF)

types in **bold** represent new products

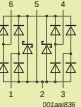
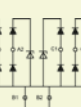
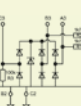
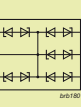
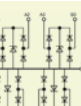
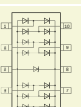
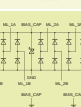
| Number of protected lines |               | V <sub>RWM</sub> (V) | C <sub>line</sub> typ (pF) | C <sub>line</sub> max (pF) | ESD rating <sup>[1]</sup> max (kV) | I <sub>R</sub> max (μA) @ V <sub>RWM</sub> | Configuration                                                                       | Type             | Package           | Size (mm)          |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------|------------------|-------------------|--------------------|
| Unidirectional            | Bidirectional |                      |                            |                            |                                    |                                            |                                                                                     |                  |                   |                    |
| 2                         | 0             | 5.5                  | 0.7                        | -                          | 8                                  | -                                          |    | <b>IP4282CZ6</b> | SOT886 (XSON6)    | 1.45 x 1.0 x 0.5   |
|                           |               | 5.5                  | 1.3                        | -                          | 15                                 | -                                          |    | <b>IP4359CX4</b> | CSP               | 0.76 x 0.76 x 0.61 |
| 4                         | 0             | 5.5                  | 1                          | -                          | 8                                  | -                                          |    | IP4220CZ6        | SOT457 (SC-74)    | 2.9 x 1.5 x 1.0    |
|                           |               | 5.5                  | 1                          | -                          | 8                                  | -                                          |    | IP4221CZ6-S      | SOT886 (XSON6)    | 1.45 x 1.0 x 0.5   |
|                           |               | 5.5                  | 1                          | -                          | 8                                  | -                                          |   | IP4221CZ6-XS     | SOT891 (XSON6)    | 1.0 x 1.0 x 0.5    |
|                           |               | 5.5                  | 1                          | -                          | 8                                  | -                                          |  | <b>IP4233CZ6</b> | SOT363 (SC-88)    | 2.0 x 1.25 x 0.95  |
|                           |               | 5.5                  | 1                          | -                          | 8                                  | -                                          |  | PRTR5V0U4AD      | SOT457 (SC-74)    | 2.9 x 1.5 x 1.0    |
|                           |               | 5.5                  | 1                          | -                          | 8                                  | -                                          |  | PRTR5V0U4D       | SOT363 (SC-88)    | 2.0 x 1.25 x 0.95  |
|                           |               | 5.5                  | 1                          | -                          | 8                                  | -                                          |  | PRTR5V0U4Y       |                   |                    |
|                           |               | 5.5                  | 0.7                        | -                          | 8                                  | -                                          |  | IP4280CZ10       | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1    |
|                           |               | 5.5                  | 0.7                        | -                          | 8                                  | -                                          |  | IP4281CZ10       | SOT1059 (XSON10U) | 1.0 x 2.5 x 0.5    |
|                           |               | 5.5                  | 0.6                        | -                          | 8                                  | -                                          |                                                                                     | IP4283CZ10-TB    | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1    |
|                           |               | 5.5                  | 0.6                        | -                          | 8                                  | -                                          |                                                                                     | IP4283CZ10-TT    |                   |                    |
|                           |               | 5.5                  | 0.6                        | -                          | 8                                  | -                                          |  |                  |                   |                    |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5

ESD protection for very high speed interfaces (< 2 pF)

ESD protection for very high speed interfaces (< 2 pF)

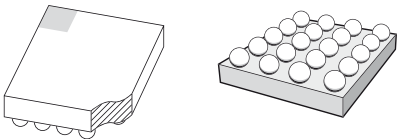
types in **bold** represent new products

| Number of protected lines |               | V <sub>RWM</sub> (V) | C <sub>line</sub> typ (pF) | C <sub>line</sub> max (pF) | ESD rating <sup>[1]</sup> max (kV) | I <sub>R</sub> max (μA) @ V <sub>RWM</sub> | Configuration                                                                         | Type                 | Package           | Size (mm)          |
|---------------------------|---------------|----------------------|----------------------------|----------------------------|------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------|----------------------|-------------------|--------------------|
| Unidirectional            | Bidirectional |                      |                            |                            |                                    |                                            |                                                                                       |                      |                   |                    |
| 4                         | 0             | 5.5                  | 0.6                        | -                          | 8                                  | -                                          |    | <b>IP4286CZ6-TBF</b> | SOT886 (XSON6)    | 1.45 x 1.0 x 0.5   |
|                           |               | 5.5                  | 0.6                        | -                          | 8                                  | -                                          |                                                                                       | <b>IP4286CZ6-TTY</b> | SOT363 (SC-88)    | 2.0 x 1.25 x 0.95  |
|                           |               | 5.5                  | 0.5                        | -                          | 8                                  | -                                          |    | <b>IP4284CZ10-TB</b> | SOT1059 (XSON10U) | 1 x 2.5 x 0.5      |
|                           |               | 5.5                  | 0.5                        | -                          | 8                                  | -                                          |                                                                                       | <b>IP4284CZ10-TT</b> | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1    |
| 5                         | 0             | 5.5                  | 1.3                        | -                          | 15                                 | -                                          |   | <b>IP4358CX6</b>     | CSP               | 0.76 x 1.16 x 0.61 |
|                           |               | 5.5                  | 10                         | -                          | 15                                 | -                                          |  | <b>IP4310CX8</b>     | CSP               | 1.16 x 1.16 x 0.61 |
| 0                         | 5             | 5                    | 0.5                        | 0.65                       | 8                                  | 0.2                                        |  | <b>PESD5V0F5BK</b>   | SOT891 (XSON6)    | 1.0 x 1.0 x 0.5    |
| 8                         | 0             | 5.5                  | 1.3                        | -                          | 15                                 | -                                          |  | <b>IP4309CX9</b>     | CSP               | 1.16 x 1.16 x 0.61 |
|                           |               | 5.5                  | 1                          | -                          | 8                                  | -                                          |  | PRTR5V0U8S           | SOT552 (TSSOP10)  | 3.0 x 3.0 x 1.1    |
| 11                        | 0             | 5.5                  | 0.7                        | -                          | 8                                  | -                                          |  | <b>IP4790CZ38</b>    | SOT510 (TSSOP38)  | 9.7 x 4.4 x 1.1    |

<sup>[1]</sup> 8/20 μs surge pulse acc. to IEC 61000-4-5

NXP Wafer-Level Chip Scale Package (WL-CSP)

- ▶ Smallest possible solution for ESD and EMI circuits, saving maximum of space
- ▶ Lowest parasitic inductance to GND contact, ensures best performance
- ▶ High mechanical robustness



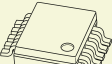
Audio interfaces

types in **bold** represent new products

| Baseband interface | Number of protected lines | Line small-signal equivalents                  |                 | Digital interface clock speed (MHz) | Remark                                                                                                                                          | Type             | Package     | Size (mm)          |
|--------------------|---------------------------|------------------------------------------------|-----------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------|--------------------|
|                    |                           | $R_{line}$                                     | $C_{line}$ (pF) |                                     |                                                                                                                                                 |                  |             |                    |
| Audio              | 2                         | 0.9 $\Omega$                                   | 290             | -                                   | Low-ohmic speaker (< ~8 $\Omega$ )                                                                                                              | IP4047CX6/LF     | 6 ball CSP  | 1.56 x 1.01 x 0.65 |
|                    |                           | 10 $\Omega$                                    | 200             | -                                   | Low-ohmic speaker (> ~8 $\Omega$ )                                                                                                              | IP4048CX5/LF     |             | 0.91 x 1.28 x 0.65 |
|                    |                           | 15 $\Omega$                                    | 5000            | -                                   | Low-ohmic speaker (> ~8 $\Omega$ )                                                                                                              | IP5311CX5/LF     | 5 ball CSP  | 0.80 x 1.16 x 0.61 |
|                    |                           | 68 $\Omega$                                    | 110             | -                                   | Single-ended or differential microphone                                                                                                         | IP4049CX5/LF     |             | 0.91 x 1.28 x 0.65 |
|                    |                           | 470 $\Omega$                                   | 35              | -                                   | Single-ended or differential microphone                                                                                                         | IP4055CX6/LF     | 6 ball CSP  | 1.56 x 1.03 x 0.65 |
|                    |                           | 470 $\Omega$                                   | 20              | -                                   | Single-ended or differential microphone                                                                                                         | IP4355CX6/LF     |             | 1.16 x 0.76 x 0.65 |
|                    |                           | 50 $\Omega$ / 2.2 k $\Omega$                   | 2000            | -                                   | Single-ended to quasi-differential microphone channel with integrated biasing network                                                           | IP5002CX8/LF     | 8 ball CSP  | 1.67 x 1.67 x 0.65 |
|                    |                           | 2.25 k $\Omega$                                | 4000            | -                                   | Differential microphone filter with integrated biasing network for $\Sigma\Delta$ ADC converters                                                | IP5006CX11/LF    | 11 ball CSP | 1.41 x 1.91 x 0.65 |
|                    |                           | 5 $\Omega$ / 20 $\Omega$ / 1.5 k $\Omega$      | 550             | -                                   | Differential microphone filter with integrated biasing network for $\Sigma\Delta$ including coupling capacitors                                 | IP5020CX16/LF    | 16 ball CSP | 2.01 x 1.91 x 0.65 |
|                    |                           | 0.25 $\Omega$ , 3 nH                           | -               | -                                   | Inductive, low-ohmic differential channel LC filter                                                                                             | <b>IP3047CX6</b> | 6 ball CSP  | 1.60 x 1.15 x 0.65 |
|                    |                           | 0.25 $\Omega$ , 3 nH                           | -               | -                                   | Inductive, low-ohmic differential channel LC filter                                                                                             | <b>IP3048CX5</b> | 5 ball CSP  | 1.51 x 1.15 x 0.65 |
|                    |                           | 2.2 k $\Omega$ / 1 k $\Omega$ / 0.8 k $\Omega$ | 0.8 nF / 1.6 nF | -                                   | Differential microphone biasing ESD protection / EMI filtering                                                                                  | IP5306CX8        | 8 ball CSP  | 1.19 x 1.19 x 0.61 |
|                    | 4                         | 10 $\Omega$                                    | 5000            | -                                   | Dual differential speaker                                                                                                                       | IP5040CX11/LF    | 11 ball CSP | 1.41 x 2.01 x 0.65 |
|                    | 6                         | 15 $\Omega$ / 95 $\Omega$                      | 65 / 33         | -                                   | Single-ended microphone and high-ohmic speaker (> ~8 $\Omega$ ) with integrated 2 kohm pull-up resistor                                         | IP4363CX10/LF    | 10 ball CSP | 0.76 x 1.96 x 0.61 |
|                    |                           | 40 $\Omega$ / 1450 $\Omega$ / 10 $\Omega$      | 50 / 20 / 200   | -                                   | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4025CX20/LF    |             | 1.98 x 2.53 x 0.65 |
|                    |                           | 40 $\Omega$ / 1450 $\Omega$ / 10 $\Omega$      | 50 / 20 / 200   | -                                   | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4027CX20/LF    | 20 ball CSP | 1.91 x 2.52 x 0.65 |
|                    |                           | 50 $\Omega$ / 10 $\Omega$                      | 50 / 100 / 1000 | -                                   | Fully integrated audio interface protection for differential microphone and differential speaker, including EMI filtering and pull up resistors | IP4125CX20/LF    |             | 2.00 x 2.66 x 0.65 |
|                    | 8                         | 0.8 $\Omega$ / 30 $\Omega$ / 200 $\Omega$      | 20 / 50 / 150   | ~20                                 | Fully integrated audio interface protection including EMI filtering for microphone and speaker, and additional 4-channel EMI filter             | IP4110CX20/LF    |             | 1.91 x 2.47 x 0.65 |

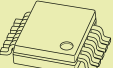
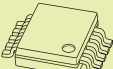
Video interfaces

types in **bold** represent new products

| Baseband interface | Number of protected lines | Buffer | Level shifter | $C_{line}$ (pF) | Resistor ( $\Omega$ ) | Remark                                         | Type                 | Package                                                                               | Size (mm)         |
|--------------------|---------------------------|--------|---------------|-----------------|-----------------------|------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|-------------------|
| Display port       | 4                         | -      | -             | 0.6             | -                     | ESD protection for ultra high speed interfaces | <b>IP4283CZ10-TB</b> |    | 1.0 x 2.5 x 0.5   |
|                    |                           | -      | -             | 0.6             | -                     | ESD protection for ultra high speed interfaces | <b>IP4283CZ10-TT</b> |    | 3.0 x 3.0 x 1.1   |
|                    |                           | -      | -             | 0.5             | -                     | ESD protection for ultra high speed interfaces | <b>IP4284CZ10-TB</b> |    | 1.0 x 2.5 x 0.5   |
|                    |                           | -      | -             | 0.5             | -                     | ESD protection for ultra high speed interfaces | <b>IP4284CZ10-TT</b> |    | 3.0 x 3.0 x 1.1   |
|                    |                           | -      | -             | 0.6             | -                     | ESD protection for ultra high speed interfaces | <b>IP4286CZ6-TBF</b> |    | 1.45 x 1.0 x 0.5  |
|                    |                           |        |               |                 |                       | ESD protection for ultra high speed interfaces | <b>IP4286CZ6-TTY</b> |  | 2.0 x 1.25 x 0.95 |
|                    | 11                        | -      | -             | 0.7             | -                     | ESD protection for display port                | IP4790CZ38           |  | 9.7 x 4.4 x 1.1   |
|                    |                           | -      | -             | 5               | 100                   | 100 $\Omega$ termination                       | IP4263CZ14           |  | 8.65 x 3.9 x 1.75 |
| LVDS               | 10                        | -      | -             | 5               | 100                   | 100 $\Omega$ termination                       | IP4263CZ14           |  | 8.65 x 3.9 x 1.75 |
| HDMI               | 2                         | -      | -             | 0.7             | -                     | ESD protection for ultra high speed interfaces | <b>IP4282CZ6</b>     |  | 1.45 x 1.0 x 0.5  |
|                    | 4                         | -      | -             | 0.7             | -                     | ESD protection for ultra high speed interfaces | IP4280CZ10           |  | 3.0 x 3.0 x 1.1   |
|                    |                           | -      | -             | 0.7             | -                     | ESD protection for ultra high speed interfaces | IP4281CZ10           |  | 1.0 x 2.5 x 0.5   |
|                    |                           | -      | -             | 0.7             | -                     | ESD protection for ultra high speed interfaces | IP4281CZ10           |  | 1.0 x 2.5 x 0.5   |

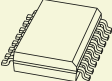
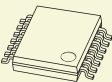
Video interfaces

types in **bold** represent new products

| Baseband interface | Number of protected lines | Buffer | Level shifter | C <sub>line</sub> (pF) | Resistor (Ω)  | Remark                                                                                                  | Type                 | Package                                                                               | Size (mm)          |
|--------------------|---------------------------|--------|---------------|------------------------|---------------|---------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|--------------------|
| HDMI               | 4                         | -      | -             | 0.6                    | -             | ESD protection for ultra high speed interfaces                                                          | <b>IP4283CZ10-TB</b> |    | 1.0 x 2.5 x 0.5    |
|                    |                           | -      | -             | 0.6                    | -             | ESD protection for ultra high speed interfaces                                                          | <b>IP4283CZ10-TT</b> |    | 3.0 x 3.0 x 1.1    |
|                    |                           | -      | -             | 0.6                    | -             | ESD protection for ultra high speed interfaces                                                          | <b>IP4286CZ6-TBF</b> |    | 1.45 x 1.0 x 0.5   |
|                    |                           |        |               |                        |               |                                                                                                         | <b>IP4286CZ6-TTY</b> |    | 2.0 x 1.25 x 0.95  |
|                    |                           | -      | -             | 0.5                    | -             | ESD protection for ultra high speed interfaces                                                          | <b>IP4284CZ10-TB</b> |    | 1.0 x 2.5 x 0.5    |
|                    |                           | -      | -             | 0.5                    | -             | ESD protection for ultra high speed interfaces                                                          | <b>IP4284CZ10-TT</b> |  | 3.0 x 3.0 x 1.1    |
|                    | 5                         | -      | -             | 0.5                    | -             | ESD protection for up to 5 ultra high speed datalines                                                   | <b>PESD5V0F5BK</b>   |  | 1.0 x 1.0 x 0.5    |
|                    |                           | -      | -             | 10                     | 1.75 k, 100 k | HDMI, DDC, CEC, hotplug ESD protection and biasing                                                      | <b>IP4310CX8</b>     | 8 ball CSP                                                                            | 1.16 x 1.16 x 0.61 |
|                    | 8                         | -      | -             | 1.3                    | -             | HDMI, TMDS line ESD protection                                                                          | <b>IP4309CX9</b>     | 9 ball CSP                                                                            | 1.16 x 1.16 x 0.61 |
|                    | 12                        | -      | yes           | 0.7                    | -             | ESD protection and level shifting for a complete HDMI port                                              | IP4776CZ38           |  | 9.7 x 4.4 x 1.1    |
|                    |                           | yes    | yes           | 0.7                    | -             | ESD protection, DDC buffering, noise reduction and Hot Plug application for a complete HDMI source port | IP4777CZ38           |                                                                                       |                    |
|                    |                           | yes    | yes           | 0.7                    | -             | ESD protection, DDC buffering, noise reduction and Hot Plug application for a complete HDMI sink port   | IP4778CZ38           |                                                                                       |                    |

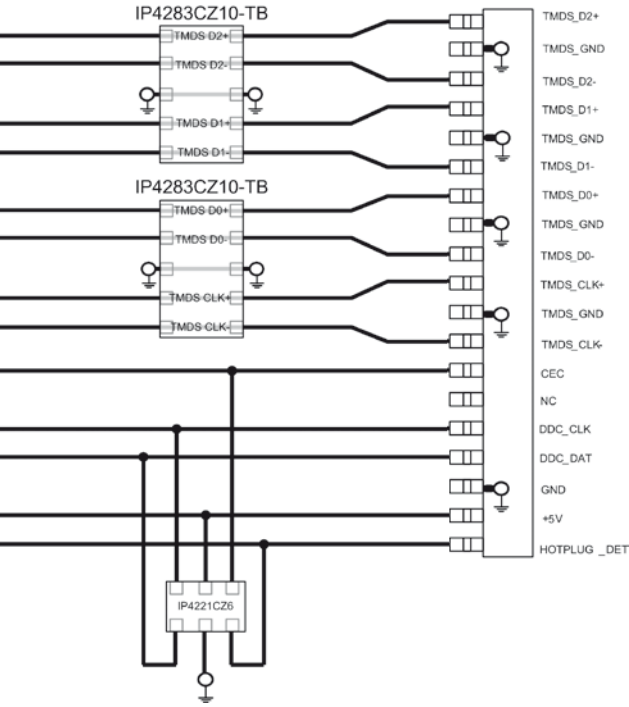
Video interfaces

types in **bold** represent new products

| Baseband interface | Number of protected lines | Buffer | Level shifter | C <sub>line</sub> (pF) | Resistor (Ω) | Remark                                            | Type              | Package                                                                               | Size (mm)        |
|--------------------|---------------------------|--------|---------------|------------------------|--------------|---------------------------------------------------|-------------------|---------------------------------------------------------------------------------------|------------------|
| VGA                | 7                         | yes    | yes           | 5                      | 55           | H&V sync buffer, DDC level shifter                | IP4770CZ16        |    | 4.9 x 3.9 x 1.73 |
|                    |                           | yes    | yes           | 5                      | 65           | H&V sync buffer, DDC level shifter                | IP4771CZ16        |    | 4.9 x 3.9 x 1.73 |
|                    |                           | yes    | yes           | 5                      | 10           | H&V sync buffer, DDC level shifter                | IP4772CZ16        |    | 4.9 x 3.9 x 1.73 |
|                    |                           | yes    | no            | 4                      | 10           | VGA receivers and transmitters, H&V sync buffer   | IP4773CZ14        |    | 6.2 x 5.3 x 2.0  |
|                    |                           | yes    | no            | 4                      | 10           | VGA receivers and transmitters, H sync buffer     | IP4774CZ14        |    | 6.2 x 5.3 x 2.0  |
|                    |                           | no     | yes           | 4                      | 1.3 - 2.4    | VGA receivers and transmitters, DDC level shifter | <b>IP4769CZ14</b> |  | 5.0 x 4.4 x 1.1  |

For ultra high speed single line ESD protection please refer to pages 29 - 31

HDMI ESD protection using IP4283CZ10-TB and IP4221CZ6-S



Multichannel EMI filter, ESD protection for LCD and camera

types in **bold** represent new products

| Baseband interface          | Number of protected lines | Line small-signal equivalents |                        | Digital interface clock speed (MHz) | Remark                                           | Type                 | Package                                                                               | Size (mm)          |
|-----------------------------|---------------------------|-------------------------------|------------------------|-------------------------------------|--------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|--------------------|
|                             |                           | R <sub>line</sub>             | C <sub>line</sub> (pF) |                                     |                                                  |                      |                                                                                       |                    |
| LCD display, camera, keypad | 1                         | 75 Ω                          | 36                     | ~40                                 | EMI filter, ESD protection with common ground    | IP4307CX4/LF         | 4 ball CSP                                                                            | 0.76 x 0.76 x 0.61 |
|                             |                           | 100 Ω                         | 30                     | ~40                                 | EMI filter, ESD protection                       | IP4256CZ3-M          |    | 1.0 x 0.6 x 0.5    |
|                             | 2                         | 100 Ω                         | 30                     | ~40                                 | EMI filter, ESD protection                       | IP4256CZ5-W          |    | 1.6 x 1.2 x 0.5    |
|                             |                           | 100 Ω                         | 30                     | ~40                                 | EMI filter, ESD protection                       | IP4256CZ6-F          |    | 1.45 x 1.0 x 0.5   |
|                             | 4                         | 100 Ω                         | 15                     | ~50                                 | EMI filter, ESD protection                       | IP4251CZ8-4          |    | 1.7 x 1.35 x 0.5   |
|                             |                           | 40 Ω                          | 18                     | ~70                                 | EMI filter, ESD protection                       | IP4252CZ8-4          |                                                                                       | 1.7 x 1.35 x 0.5   |
|                             |                           | 100 Ω                         | 45                     | ~30                                 | EMI filter, ESD protection                       | IP4254CZ8-4          |                                                                                       | 1.7 x 1.35 x 0.5   |
|                             |                           | 200 Ω                         | 45                     | ~30                                 | EMI filter, ESD protection                       | IP4253CZ8-4          |                                                                                       | 1.7 x 1.35 x 0.5   |
|                             | 6                         | 100 Ω                         | 60                     | ~20                                 | EMI filter, ESD protection plus 4x ESD           | IP4054CX15/LF        | 15 ball CSP                                                                           | 2.96 x 1.32 x 0.65 |
|                             |                           | 100 Ω                         | 15                     | ~50                                 | EMI filter, ESD protection                       | IP4251CZ12-6         |    | 2.5 x 1.35 x 0.5   |
|                             |                           | 40 Ω                          | 18                     | ~70                                 | EMI filter, ESD protection                       | IP4252CZ12-6         |                                                                                       | 2.5 x 1.35 x 0.5   |
|                             |                           | 100 Ω                         | 45                     | ~30                                 | EMI filter, ESD protection                       | IP4254CZ12-6         |                                                                                       | 2.5 x 1.35 x 0.5   |
|                             |                           | 200 Ω                         | 45                     | ~30                                 | EMI filter, ESD protection                       | IP4253CZ12-6         |                                                                                       | 2.5 x 1.35 x 0.5   |
|                             |                           | 100 Ω                         | 60                     | ~20                                 | EMI filter, ESD protection                       | IP4053CX15/LF        | 15 ball CSP                                                                           | 2.96 x 1.32 x 0.65 |
|                             |                           | 100 Ω                         | 30                     | ~40                                 | EMI filter, ESD protection                       | IP4153CX15/LF        |                                                                                       | 2.91 x 1.28 x 0.65 |
|                             |                           | 100 Ω                         | 60                     | ~20                                 | EMI filter, ESD protection                       | IP4353CX15/LF        |                                                                                       | 2.38 x 1.05 x 0.61 |
|                             | 7                         | 70 Ω                          | 25                     | ~40                                 | EMI filter, ESD protection, extremely small size | IP4337CX18/LF/E      | 18 ball CSP                                                                           | 1.96 x 1.61 x 0.61 |
|                             |                           | 125 Ω                         | 25                     | ~60                                 | 60 nH coils RLC filter                           | <b>IP3337CX18/LF</b> |                                                                                       | 2.11 x 1.81 x 0.61 |
|                             | 8                         | 100 Ω                         | 15                     | ~50                                 | EMI filter, ESD protection                       | IP4251CZ16-8         |  | 3.3 x 1.35 x 0.5   |
|                             |                           | 40 Ω                          | 18                     | ~70                                 | EMI filter, ESD protection                       | IP4252CZ16-8         |                                                                                       | 3.3 x 1.35 x 0.5   |
|                             |                           | 100 Ω                         | 45                     | ~30                                 | EMI filter, ESD protection                       | IP4254CZ16-8         |                                                                                       | 3.3 x 1.35 x 0.5   |
|                             |                           | 200 Ω                         | 45                     | ~20                                 | EMI filter, ESD protection                       | IP4253CZ16-8         |                                                                                       | 3.3 x 1.35 x 0.5   |
|                             |                           | 100 Ω                         | 50                     | ~25                                 | EMI filter, ESD protection                       | IP4088CX20/LF        | 20 ball CSP                                                                           | 3.91 x 1.28 x 0.65 |
|                             | 10                        | 125 Ω                         | 25                     | ~60                                 | 60 nH coils RLC filter                           | <b>IP3338CX24/LF</b> | 24 ball CSP                                                                           | 2.11 x 2.11 x 0.61 |
|                             |                           | 70 Ω                          | 25                     | ~40                                 | EMI filter, ESD protection, extremely small size | <b>IP4338CX24/LF</b> |                                                                                       | 1.96 x 2.01 x 0.61 |
|                             |                           | 200 Ω                         | 50                     | ~20                                 | EMI filter, ESD protection                       | IP4041CX25/LF        | 25 ball CSP                                                                           | 2.41 x 2.41 x 0.65 |
|                             | 4                         | -                             | 25                     | ~175                                | LC low-pass filter                               | IP3253CZ8            |  | 1.7 x 1.35 x 0.5   |
|                             | 6                         | -                             | 25                     | ~175                                | LC low-pass filter                               | IP3253CZ12           |  | 2.5 x 1.35 x 0.5   |
|                             | 8                         | -                             | 25                     | ~175                                | LC low-pass filter                               | IP3253CZ16           |  | 3.3 x 1.35 x 0.5   |
|                             | 4                         | -                             | 25                     | ~175                                | LC low-pass filter                               | IP3254CZ8            |  | 1.7 x 1.35 x 0.5   |
|                             | 6                         | -                             | 25                     | ~175                                | LC low-pass filter                               | IP3254CZ12           |  | 2.5 x 1.35 x 0.5   |
|                             | 8                         | -                             | 25                     | ~175                                | LC low-pass filter                               | IP3254CZ16           |  | 3.3 x 1.35 x 0.5   |

Multichannel EMI filter, ESD protection for LCD and camera

types in **bold** represent new products

| Baseband interface     | Number of protected lines | Line small-signal equivalents |                        | Digital interface clock speed (MHz)         | Remark                                                                               | Type                | Package    | Size (mm)          |
|------------------------|---------------------------|-------------------------------|------------------------|---------------------------------------------|--------------------------------------------------------------------------------------|---------------------|------------|--------------------|
|                        |                           | R <sub>line</sub>             | C <sub>line</sub> (pF) |                                             |                                                                                      |                     |            |                    |
| Generic ESD protection | 1                         | -                             | 10                     | ~40                                         | 1x back-to-back diode with one common ground, extremely small size                   | IP4302CX2/LF        | 2 ball CSP | 0.49 x 0.67 x 0.38 |
|                        | 2                         | -                             | 10                     | ~40                                         | 2x back-to-back diode with one common ground, extremely small size                   | IP4303CX4/LF        | 4 ball CSP | 0.76 x 0.76 x 0.61 |
|                        |                           | -                             | 0.6                    | -                                           | 16 V ultra low capacitance ESD protection in 4 mm pitch                              | <b>IP4361CX4/LF</b> |            | 0.76 x 0.76 x 0.61 |
|                        | 4                         | -                             | 30                     | ~30                                         | 4x single diode with one common ground                                               | IP4042CX5/LF        | 5 ball CSP | 0.91 x 1.28 x 0.65 |
|                        |                           | -                             | 14                     | ~40                                         | 4x single diode with one common ground                                               | IP4142CX5/LF        |            | 0.91 x 1.28 x 0.65 |
|                        |                           | -                             | 15                     | Breakdown: min. 5.5 V                       | Quad diode array with ESD protection                                                 | IP4332CX5/LF        |            | 0.76 x 1.06 x 0.61 |
|                        |                           | -                             | 30                     | Breakdown: min. 5.5 V                       | Quad diode array with ESD protection                                                 | IP4342CX5/LF        |            | 0.76 x 1.06 x 0.61 |
|                        |                           | -                             | 16                     | ~40                                         | 4x back-to-back diode with one common ground                                         | IP4043CX5/LF        |            | 1.12 x 1.12 x 0.65 |
|                        |                           | -                             | 16                     | ~40                                         | 4x back-to-back diode with one common ground, extremely small size                   | IP4343CX5/LF        |            | 0.93 x 0.93 x 0.61 |
|                        | 1                         | -                             | 65                     | Breakdown: min. 20 V Forward: 0.25 - 0.5 V  | Schottky power diode in WLCSP                                                        | IP4306CX2/LF        | 2 ball CSP | 0.49 x 0.67 x 0.38 |
|                        | 2                         | -                             | 19                     | Breakdown: min. 15 V Forward: 0.25 - 0.45 V | 1x back-to-back diode with integrated dual Schottky diode array incl. ESD protection | IP4305CX4/LF        | 4 ball CSP | 0.96 x 0.96 x 0.61 |

Protection and signal conditioning

SD-, SIM-card and MMC

types in **bold** represent new products

| Baseband interface | Number of protected lines | Line small-signal equivalents |                        | Digital interface clock speed (MHz) | Remark                                                                                                              | Type                 | Package                                                                                                   | Size (mm)          |
|--------------------|---------------------------|-------------------------------|------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------|--------------------|
|                    |                           | R <sub>line</sub>             | C <sub>line</sub> (pF) |                                     |                                                                                                                     |                      |                                                                                                           |                    |
| SIM card           | 3 + 2                     | 47 Ω / 100 Ω                  | 10                     | ~20                                 | Integrated low capacitance SIM-card passive filter array & USB ESD protection                                       | <b>IP4365CX11</b>    | 11 ball CSP                                                                                               | 1.16 x 1.56 x 0.61 |
|                    | 3                         | 47 Ω / 100 Ω                  | 40                     | ~12                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4044CX8/LF         | 8 ball CSP                                                                                                | 1.46 x 1.49 x 0.65 |
|                    |                           | 47 Ω / 100 Ω                  | 20                     | ~20                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4064CX8/LF/S       |                                                                                                           | 1.41 x 1.41 x 0.65 |
|                    |                           | 47 Ω / 100 Ω                  | 20                     | ~20                                 | Smaller size, integrated SIM-card EMI filter and ESD protection                                                     | IP4364CX8/LF         |                                                                                                           | 1.16 x 1.16 x 0.61 |
|                    |                           | 47 Ω / 100 Ω                  | 10                     | ~20                                 | Smaller size, low capacitance integrated SIM-card EMI filter and ESD protection                                     | <b>IP4366CX8/LF</b>  |                                                                                                           | 1.16 x 1.16 x 0.61 |
|                    |                           | 47 Ω / 100 Ω                  | 40                     | ~12                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4264CZ8-40         | SOT983 (8 pin QFN)<br> | 1.7 x 1.35 x 0.5   |
|                    |                           | 47 Ω / 100 Ω                  | 20                     | ~20                                 | Integrated SIM-card EMI filter and ESD protection                                                                   | IP4264CZ8-20         |                                                                                                           | 1.7 x 1.35 x 0.5   |
|                    |                           | -                             | 1                      | ~240                                | Quad channel low capacitance ESD protection                                                                         | IP4221CZ6-S          | SOT886 (XSON6)<br>     | 1.45 x 1.0 x 0.5   |
| SD-card / MMC      | 4                         | 47 Ω / 13 k Ω / 56 k Ω        | 25                     | ~30                                 | MMC ESD protection, pull-up resistors                                                                               | IP4051CX11/LF        | 11 ball CSP                                                                                               | 1.44 x 1.96 x 0.65 |
|                    |                           | 50 Ω / 75 k Ω / 7 k Ω         | 18                     | ~50                                 | High-speed MMC ESD protection, pull-up resistors                                                                    | IP4060CX16/LF        | 16 ball CSP                                                                                               | 1.96 x 1.97 x 0.65 |
|                    | 7                         | 40 Ω / 50 k Ω / 25 k Ω        | 18                     | ~20                                 | (Mini) SD/trans flash card ESD protection, EMI filter, pull-up resistors                                            | IP4052CX20/LF        | 20 ball CSP                                                                                               | 2.54 x 1.96 x 0.65 |
|                    |                           | -                             | 5                      | ~24                                 | Memory stick PRO ESD protection                                                                                     | IP4067CX9/LF         | 9 ball CSP                                                                                                | 1.46 x 1.52 x 0.65 |
|                    | 6 (+3)                    | 15 Ω / 50 k Ω / 15 k Ω        | 8                      | > 52                                | Very low capacitance, low channel resistance (mini) SD card/trans flash ESD protection EMI filter, pull-up resistor | IP4350CX24/LF        | 24 ball CSP                                                                                               | 1.95 x 2.11 x 0.61 |
|                    |                           | 40 Ω / 50 k Ω / 15 k Ω        | 20                     | > 52                                | (Mini) SD card/trans flash ESD protection, EMI filter, pull-up resistor                                             | IP4352CX24/LF        |                                                                                                           | 2.02 x 2.01 x 0.61 |
|                    |                           | -                             | -                      | > 52                                | (Mini) SD/SDIO memory card level shifter, can be combined with IP4352CX24/LF                                        | IP4852CX25/LF        | 25 ball CSP                                                                                               | 2.01 x 2.01 x 0.61 |
|                    |                           | 40 Ω / 50 k Ω / 15 k Ω        | -                      | > 52                                | (Mini) SD/SDIO memory card level shifter, and voltage regular, incl. ESD and EMI filter                             | <b>IP4853CX24/LF</b> | 24 ball CSP                                                                                               | 2.01 x 2.01 x 0.61 |
|                    |                           |                               |                        |                                     |                                                                                                                     |                      |                                                                                                           |                    |
|                    |                           |                               |                        |                                     |                                                                                                                     |                      |                                                                                                           |                    |

For ultra high speed single line ESD protection please refer to pages 29 - 31

Battery and charger protection

types in **bold** represent new products

| Baseband interface           | Number of protected lines | C <sub>line</sub> (pF) | Diode voltage           | Remark      | Type             | Package                                                                                                  | Size (mm)          |
|------------------------------|---------------------------|------------------------|-------------------------|-------------|------------------|----------------------------------------------------------------------------------------------------------|--------------------|
| Battery & charger protection | 1                         | 180                    | Breakdown 16 V          | Power diode | IP4085CX4        | 4 ball CSP                                                                                               | 0.91 x 0.91 x 0.65 |
|                              |                           | 450                    | Breakdown 7 V           | Power diode | IP4385CX4        |                                                                                                          | 0.76 x 0.76 x 0.61 |
|                              |                           | 160                    | Breakdown 16 V          | Power diode | <b>IP4386CX4</b> |                                                                                                          | 0.76 x 0.76 x 0.61 |
|                              |                           | 290                    | Breakdown 10 V          | Power diode | <b>IP4387CX4</b> |                                                                                                          | 0.76 x 0.76 x 0.61 |
|                              |                           | 160                    | V <sub>RWM</sub> = 12 V | Power diode | PESD12VS1UJ      | SOD323F (SC-90)<br> | 1.7 x 1.25 x 0.7   |
|                              |                           | 160                    | V <sub>RWM</sub> = 12 V | Power diode | PESD12VS1UA      | SOD323 (SC-76)<br>  | 1.7 x 1.25 x 0.95  |
|                              |                           | 480                    | V <sub>RWM</sub> = 5 V  | Power diode | PESD5V0S1UJ      | SOD323F (SC-90)<br> | 1.7 x 1.25 x 0.7   |
|                              |                           | 480                    | V <sub>RWM</sub> = 5 V  | Power diode | PESD5V0S1UA      | SOD323 (SC-76)<br>  | 1.7 x 1.25 x 0.95  |
|                              |                           |                        |                         |             |                  |                                                                                                          |                    |
|                              |                           |                        |                         |             |                  |                                                                                                          |                    |

USB, LVDS, SATA, LAN

types in **bold** represent new products

| Baseband interface       | Number of protected lines | R <sub>line</sub>                | C <sub>line</sub> (pF) | Digital interface clock speed (MHz) | Remark                                                                                                                   | Type             | Package                                                                                                     | Size (mm)          |
|--------------------------|---------------------------|----------------------------------|------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------------------------------|--------------------|
| USB (CSP package)        | 2                         | 33 Ω / 1.3 k Ω                   | 30                     | >6                                  | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4056CX8        | 8 ball CSP                                                                                                  | 1.27 x 1.83 x 0.65 |
|                          |                           | 33 Ω / 1.3 k Ω / 10 k Ω          | 30                     | >6                                  | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4057CX10       | 10 ball CSP                                                                                                 | 1.56 x 1.91 x 0.65 |
|                          |                           | 33 Ω / 1.3 k Ω / 17 k Ω / 15 k Ω | 27                     | >6                                  | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4065CX11       | 11 ball CSP                                                                                                 | 1.47 x 1.97 x 0.65 |
|                          |                           | 33 Ω / 1.5 k Ω                   | 35                     | >6                                  | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4058CX8        | 8 ball CSP                                                                                                  | 0.91 x 1.91 x 0.65 |
|                          |                           | 17 Ω / 1.5 k Ω                   | 35                     | >6                                  | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection, pull-up resistors and impedance matching | IP4158CX8        |                                                                                                             |                    |
|                          |                           | 33 Ω                             | 35                     | >6                                  | Fully integrated USB low / fullspeed interface with EMI filter, ESD protection and impedance matching                    | <b>IP4078CX6</b> | 6 ball CSP                                                                                                  | 0.91 x 1.41 x 0.65 |
|                          |                           | -                                | 1.3                    | ~1 GHz                              | USB2.0 high-speed ESD protection                                                                                         | <b>IP4359CX4</b> | 4 ball CSP                                                                                                  | 0.76 x 0.76 x 0.61 |
|                          | 3+2                       | 47 Ω / 100 Ω                     | 10                     | ~20/6                               | Integrated low capacitance SIM-Card & USB passive filter array with ESD protection                                       | IP4365CX11       | 11 ball CSP                                                                                                 | 1.16 x 1.56 x 0.61 |
|                          | 4                         | -                                | 3                      | >240                                | USB2.0 high-speed ESD protection                                                                                         | IP4059CX5        | 5 ball CSP                                                                                                  | 0.96 x 1.34 x 0.65 |
|                          |                           |                                  | 1.3                    | ~1 GHz                              | USB2.0 high-speed ESD protection                                                                                         | <b>IP4358CX6</b> | 6 ball CSP                                                                                                  | 0.76 x 1.16 x 0.41 |
| USB2.0 (Plastic package) | 2                         | -                                | 1.5                    | -                                   | 2-channel common mode filter with integrated ESD protection                                                              | <b>IP3219CZ6</b> | SOT1082-1 (VSON6U)<br> | 2.3 x 3.5 x 0.85   |
|                          |                           | 0.5                              | 2                      | -                                   | >15 kV IEC contact ESD protection with pi-filter                                                                         | <b>IP4234CZ6</b> | SOT457 (SC-74)<br>     | 2.9 x 1.5 x 1.0    |
|                          |                           | -                                | 1.0                    | -                                   | ESD protection for up to 2 ultra high speed datalines                                                                    | PRTR5V0U2X       | SOT143B<br>            | 2.9 x 1.3 x 1.0    |
|                          |                           | -                                | 1.8                    | -                                   | ESD protection for up to 2 ultra high speed datalines with 12 kV ESD robustness                                          | PRTR5V0U2AX      |                                                                                                             |                    |
|                          |                           | -                                | 0.7                    | -                                   | ESD protection for ultra high speed interfaces                                                                           | <b>IP4282CZ6</b> | SOT886 (XSON6)<br>     | 1.45 x 1.0 x 0.5   |

Protection and signal conditioning

USB, LVDS, SATA, LAN

types in **bold** represent new products

| Baseband interface          | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Digital interface clock speed (MHz) | Remark                                                   | Type              | Package                                                                               | Size (mm)         |
|-----------------------------|---------------------------|------------|-----------------|-------------------------------------|----------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------|-------------------|
| USB2.0<br>(Plastic package) | 2                         | -          | 1               | -                                   | ESD protection for up to 2 ultra high speed datalines    | PRTR5V0U2K        |    | 1.0 x 1.0 x 0.5   |
|                             |                           | -          | 1               | -                                   | ESD protection for up to 2 ultra high speed datalines    | PRTR5V0U2D        |    | 2.9 x 1.5 x 1.0   |
|                             |                           | -          | 1               | -                                   | ESD protection for up to 2 ultra high speed datalines    | PRTR5V0U2F        |    | 1.45 x 1.0 x 0.5  |
|                             | 4                         | -          | 1               | -                                   | ESD protection for USB2.0 high- speed, SD-Card, SIM card | IP4221CZ6-S       |   | 2.9 x 1.5 x 1.0   |
|                             |                           | -          | 1               | -                                   | ESD protection for USB2.0 high- speed, SD-Card, SIM card | IP4220CZ6         |                                                                                       |                   |
|                             |                           | -          | 1               | -                                   | Dual USB2.0, ESD protection                              | IP4220CZ6         |                                                                                       |                   |
|                             |                           | -          | 1               | -                                   | ESD protection, as IP4220CZ6 but different bonding       | PRTR5V0U4AD       |                                                                                       |                   |
|                             |                           | -          | 1               | -                                   | ESD protection, as IP4220CZ6 but different package       | PRTR5V0U4Y        |  | 2.0 x 1.25 x 0.95 |
|                             |                           | -          | 1               | -                                   | ESD protection for USB2.0 high-speed, SD-Card, SIM card  | IP4221CZ6-S       |  | 1.45 x 1.0 x 0.5  |
|                             |                           | -          | 1               | -                                   | ESD protection for USB2.0 high-speed, SD-Card, SIM card  | IP4221CZ6-XS      |  | 1.0 x 1.0 x 0.5   |
|                             |                           | 1          | 3               | -                                   | >15 kV IEC contact ESD protection with pi-filter         | <b>IP4225CZ10</b> |  | 2.9 x 1.5 x 1.0   |

USB, LVDS, SATA, LAN

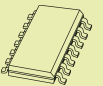
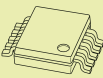
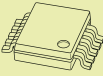
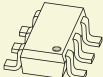
types in **bold** represent new products

| Baseband interface             | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Digital interface clock speed (MHz) | Remark                                                | Type                 | Package                                                                               | Size (mm)        |
|--------------------------------|---------------------------|------------|-----------------|-------------------------------------|-------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------|------------------|
| USB3.0 SuperSpeed USB / USB2.0 | 4                         | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4283CZ10-TB</b> |    | 1.0 x 2.5 x 0.5  |
|                                |                           | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4283CZ10-TT</b> |    | 3.0 x 3.0 x 1.1  |
|                                |                           | -          | 0.5             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4284CZ10-TB</b> |    | 1.0 x 2.5 x 0.5  |
|                                |                           | -          | 0.5             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4284CZ10-TT</b> |    | 3.0 x 3.0 x 1.1  |
|                                | 5                         | -          | 0.5             | -                                   | ESD protection for up to 5 ultra high speed datalines | <b>PESD5V0F5BK</b>   |  | 1.0 x 1.0 x 0.5  |
| Display port                   | 4                         | 0.6        | 0.6             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4283CZ10-TB</b> |  | 1.0 x 2.5 x 0.5  |
|                                |                           | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4283CZ10-TT</b> |  | 3.0 x 3.0 x 1.1  |
|                                |                           | -          | 0.5             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4284CZ10-TB</b> |  | 1.0 x 2.5 x 0.5  |
|                                |                           | -          | 0.5             | -                                   | ESD protection for ultra high speed interfaces        | <b>IP4284CZ10-TT</b> |  | 3.0 x 3.0 x 1.1  |
|                                |                           | -          | 0.6             | -                                   | ESD protection for high speed interfaces              | <b>IP4286CZ6-TBF</b> |  | 1.45 x 1.0 x 0.5 |

Protection and signal conditioning

USB, LVDS, SATA, LAN

types in **bold** represent new products

| Baseband interface | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Digital interface clock speed (MHz) | Remark                                         | Type                 | Package                                                                                                    | Size (mm)         |
|--------------------|---------------------------|------------|-----------------|-------------------------------------|------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------|-------------------|
| Display port       | 4                         | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4286CZ6-TTY</b> | SOT363 (SC-88)<br>      | 2.0 x 1.25 x 0.95 |
|                    | 11                        | -          | 0.7             | -                                   | ESD protection                                 | IP4790CZ38           | SOT510 (TSSOP38)<br>    | 9.7 x 4.4 x 1.1   |
| LVDS               | 10                        | -          | 5               | -                                   | 100 $\Omega$ termination                       | IP4263CZ14           | SOT108 (SO14)<br>       | 8.65 x 3.9 x 1.75 |
| SATA               | 2                         | -          | 0.7             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4282CZ6</b>     | SOT886 (XSON6)<br>      | 1.45 x 1.0 x 0.5  |
|                    |                           | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4286CZ6-TBF</b> |                                                                                                            |                   |
|                    |                           | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4286CZ6-TTY</b> | SOT363 (SC-88)<br>    | 2.0 x 1.25 x 0.95 |
|                    | 4                         | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4283CZ10-TB</b> | SOT1059 (XSON10U)<br> | 1.0 x 2.5 x 0.5   |
|                    |                           | -          | 0.6             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4283CZ10-TT</b> | SOT552 (TSSOP10)<br>  | 3.0 x 3.0 x 1.1   |
|                    |                           | -          | 0.5             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4284CZ10-TB</b> | SOT1059 (XSON10U)<br> | 1.0 x 2.5 x 0.5   |
|                    |                           | -          | 0.5             | -                                   | ESD protection for ultra high speed interfaces | <b>IP4284CZ10-TT</b> | SOT552 (TSSOP10)<br>  | 3.0 x 3.0 x 1.1   |
|                    | 4                         | 55         | 5               | -                                   | ESD protection and termination for IEEE1394    | IP4224CZ6            | SOT457 (SC-74)<br>    | 2.9 x 1.5 x 1.0   |

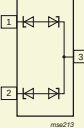
USB, LVDS, SATA, LAN

types in **bold** represent new products

| Baseband interface | Number of protected lines | $R_{line}$ | $C_{line}$ (pF) | Digital interface clock speed (MHz) | Remark                                  | Type             | Package                                                                                                 | Size (mm)         |
|--------------------|---------------------------|------------|-----------------|-------------------------------------|-----------------------------------------|------------------|---------------------------------------------------------------------------------------------------------|-------------------|
| LAN                | 1                         | -          | 0.6             | -                                   | Ethernet ESD protection $V_{RWM}=3.3$ V | PESD3V3U1UT      | SOT23<br>            | 2.9 x 1.3 x 1.0   |
|                    |                           | -          | 0.6             | -                                   | Ethernet ESD protection $V_{RWM}=5.0$ V | PESD5V0U1UT      |                                                                                                         |                   |
|                    |                           | -          | 0.6             | -                                   | Ethernet ESD protection $V_{RWM}=12$ V  | PESD12VU1UT      |                                                                                                         |                   |
|                    |                           | -          | 0.6             | -                                   | Ethernet ESD protection $V_{RWM}=15$ V  | PESD15VU1UT      |                                                                                                         |                   |
|                    |                           | -          | 0.6             | -                                   | Ethernet ESD protection $V_{RWM}=24$ V  | PESD24VU1UT      |                                                                                                         |                   |
|                    | 4                         | -          | 1               | -                                   | Ethernet ESD protection                 | IP4220CZ6        | SOT457 (SC-74)<br> | 2.9 x 1.5 x 1.0   |
|                    |                           | -          | 1               | -                                   | Ethernet line surge ESD protection      | <b>IP4233CZ6</b> | SOT363 (SC-88)<br> | 2.0 x 1.25 x 0.95 |

For ultra high speed single line ESD protection please refer to pages 29 - 31

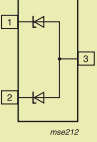
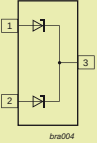
Automotive LIN/CAN/FlexRay

| Number of protected lines bidirectional | $V_{RWM}$ (V)                | $C_{line}$ typ (pF) | $C_{line}$ max (pF) | $P_{PP}^{[1]}$ max (W) | ESD rating <sup>[2]</sup> max (kV) | $I_T$ max [μA] @ $V_{RWM}$ | Configuration                                                                         | Type      | Package                                                                                                 | Size (mm)         |
|-----------------------------------------|------------------------------|---------------------|---------------------|------------------------|------------------------------------|----------------------------|---------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------|-------------------|
| 1                                       | 15 (diode 1)<br>24 (diode 2) | 13                  | 17                  | 160                    | 23                                 | 0.05                       |  | PESD1LIN  | SOD323 (SC-76)<br> | 1.7 x 1.25 x 0.95 |
| 2                                       | 24                           | 11                  | 17                  | 200                    | 23                                 | 0.05                       |  | PESD1CAN  | SOT23<br>          | 2.9 x 1.3 x 1.0   |
|                                         |                              | 25                  | 30                  | 230                    | 30                                 | 0.01                       |                                                                                       | PESD2CAN  |                                                                                                         | 2.9 x 1.3 x 1.0   |
|                                         |                              | 11                  | 17                  | 200                    | 23                                 | 0.05                       |                                                                                       | PESD1FLEX |                                                                                                         | 2.9 x 1.3 x 1.0   |

<sup>[1]</sup> 8/20  $\mu$ s surge pulse acc. to IEC 61000-4-5

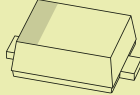
<sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

TVS diodes, 24 W/ 40 W

| types in <b>bold</b> represent new products         |               |                          |                          |                          |            |                                    |                    |                             |              |                                     | Configuration                                                                      | Type             | Package                                                                             | Size (mm)       |
|-----------------------------------------------------|---------------|--------------------------|--------------------------|--------------------------|------------|------------------------------------|--------------------|-----------------------------|--------------|-------------------------------------|------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------|-----------------|
| Power (W) (10/1000 $\mu$ s waveform) <sup>[1]</sup> | $V_{RWM}$ (V) | $V_{BR}$ min (V) @ $I_R$ | $V_{BR}$ typ (V) @ $I_R$ | $V_{BR}$ max (V) @ $I_R$ | $I_R$ (mA) | ESD rating <sup>[2]</sup> max (kV) | $C_{int}$ typ (pF) | $V_{CL}$ max (V) @ $I_{PP}$ | $I_{PP}$ (A) | $I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$ |                                                                                    |                  |                                                                                     |                 |
| 24                                                  | 3             | 5.32                     | 5.6                      | 5.88                     | 20         | 30                                 | 210                | 8                           | 3            | 5                                   |  | <b>MMBZ5V6AL</b> |  | 2.9 x 1.3 x 1.0 |
|                                                     | 3             | 5.89                     | 6.2                      | 6.51                     | 1          | 30                                 | 175                | 8.7                         | 2.76         | 0.2                                 |                                                                                    | <b>MMBZ6V2AL</b> |                                                                                     |                 |
|                                                     | 4.5           | 6.48                     | 6.8                      | 7.14                     | 1          | 30                                 | 150                | 9.6                         | 2.5          | 0.3                                 |                                                                                    | <b>MMBZ6V8AL</b> |                                                                                     |                 |
|                                                     | 6             | 8.65                     | 9.1                      | 9.56                     | 1          | 30                                 | 155                | 14                          | 1.7          | 0.1                                 |                                                                                    | <b>MMBZ9V1AL</b> |                                                                                     |                 |
|                                                     | 6.5           | 9.5                      | 10                       | 10.5                     | 1          | 30                                 | 130                | 14.2                        | 1.7          | 0.02                                |                                                                                    | <b>MMBZ10VAL</b> |                                                                                     |                 |
| 40                                                  | 8.5           | 11.4                     | 12                       | 12.6                     | 1          | 30                                 | 110                | 17                          | 2.35         | 0.005                               |                                                                                    | MMBZ12VAL        |                                                                                     |                 |
|                                                     | 12            | 14.25                    | 15                       | 15.75                    | 1          | 30                                 | 85                 | 21                          | 1.9          | 0.005                               |                                                                                    | MMBZ15VAL        |                                                                                     |                 |
|                                                     | 14.5          | 17.1                     | 18                       | 18.9                     | 1          | 30                                 | 70                 | 25                          | 1.6          | 0.005                               |                                                                                    | MMBZ18VAL        |                                                                                     |                 |
|                                                     | 17            | 19                       | 20                       | 21                       | 1          | 30                                 | 65                 | 28                          | 1.4          | 0.005                               |                                                                                    | MMBZ20VAL        |                                                                                     |                 |
|                                                     | 22            | 25.65                    | 27                       | 28.35                    | 1          | 30                                 | 48                 | 40                          | 1            | 0.005                               |                                                                                    | MMBZ27VAL        |                                                                                     |                 |
|                                                     | 26            | 31.35                    | 33                       | 34.65                    | 1          | 30                                 | 45                 | 46                          | 0.87         | 0.005                               |                                                                                    | MMBZ33VAL        |                                                                                     |                 |
|                                                     | 8.5           | 11.4                     | 12                       | 12.6                     | 1          | 30                                 | 110                | 17                          | 2.35         | 0.005                               |  | MMBZ12VDL        |                                                                                     |                 |
|                                                     | 12.8          | 14.3                     | 15                       | 15.8                     | 1          | 30                                 | 85                 | 21.2                        | 1.9          | 0.005                               |                                                                                    | MMBZ15VDL        |                                                                                     |                 |
|                                                     | 14.5          | 17.1                     | 18                       | 18.9                     | 1          | 30                                 | 70                 | 25                          | 1.6          | 0.005                               |                                                                                    | MMBZ18VCL        |                                                                                     |                 |
|                                                     | 17            | 19                       | 20                       | 21                       | 1          | 30                                 | 65                 | 28                          | 1.4          | 0.005                               |                                                                                    | MMBZ20VCL        |                                                                                     |                 |
|                                                     | 22            | 25.65                    | 27                       | 28.35                    | 1          | 30                                 | 48                 | 38                          | 1            | 0.005                               |                                                                                    | MMBZ27VCL        |                                                                                     |                 |
|                                                     | 26            | 31.35                    | 33                       | 34.65                    | 1          | 30                                 | 45                 | 46                          | 0.87         | 0.005                               |                                                                                    | MMBZ33VCL        |                                                                                     |                 |

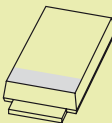
<sup>[1]</sup> acc. to IEC 61643-321 <sup>[2]</sup> acc. to IEC 61000-4-2 (contact discharge)

TVS diodes, 400 W

| Power (W) (10/1000 $\mu$ s waveform) <sup>[1]</sup> | $V_{RWM}$ (V) | $V_{BR}$ min (V) @ $I_R$ | $V_{BR}$ typ (V) @ $I_R$ | $V_{BR}$ max (V) @ $I_R$ | $I_R$ (mA) | $V_{CL}$ max (V) @ $I_{PP}$ | $I_{PP}$ (A) | $I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$ | $I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$ | Type        | Package                                                                               | Size (mm)       |
|-----------------------------------------------------|---------------|--------------------------|--------------------------|--------------------------|------------|-----------------------------|--------------|-------------------------------------|-------------------------------------|-------------|---------------------------------------------------------------------------------------|-----------------|
| 350                                                 | 3.5           | 5.20                     | 5.60                     | 6.00                     | 10         | 8.0                         | 43.8         | 5                                   | 600                                 | PTVS3V3S1UR |  | 2.6 x 1.7 x 1.0 |
| 400                                                 | 5.0           | 6.40                     | 6.70                     | 7.00                     | 10         | 9.2                         | 43.5         | 5                                   | 400                                 | PTVS5V0S1UR |                                                                                       |                 |
|                                                     | 6.0           | 6.67                     | 7.02                     | 7.37                     | 10         | 10.3                        | 38.8         | 5                                   | 400                                 | PTVS6V0S1UR |                                                                                       |                 |
|                                                     | 6.5           | 7.22                     | 7.60                     | 7.98                     | 10         | 11.2                        | 35.7         | 5                                   | 250                                 | PTVS6V5S1UR |                                                                                       |                 |
|                                                     | 7.0           | 7.78                     | 8.20                     | 8.60                     | 10         | 12.0                        | 33.3         | 3                                   | 100                                 | PTVS7V0S1UR |                                                                                       |                 |
|                                                     | 7.5           | 8.33                     | 8.77                     | 9.21                     | 1          | 12.9                        | 31.0         | 0.2                                 | 50                                  | PTVS7V5S1UR |                                                                                       |                 |
|                                                     | 8.0           | 8.89                     | 9.36                     | 9.83                     | 1          | 13.6                        | 29.4         | 0.03                                | 25                                  | PTVS8V0S1UR |                                                                                       |                 |
|                                                     | 8.5           | 9.44                     | 9.92                     | 10.40                    | 1          | 14.4                        | 27.8         | 0.01                                | 10                                  | PTVS8V5S1UR |                                                                                       |                 |
|                                                     | 9.0           | 10.00                    | 10.55                    | 11.10                    | 1          | 15.4                        | 26.0         | 0.005                               | 5                                   | PTVS9V0S1UR |                                                                                       |                 |
|                                                     | 10            | 11.10                    | 11.70                    | 12.30                    | 1          | 17.0                        | 23.5         | 0.005                               | 2.5                                 | PTVS10VS1UR |                                                                                       |                 |
|                                                     | 11            | 12.20                    | 12.85                    | 13.50                    | 1          | 18.2                        | 22.0         | 0.005                               | 2.5                                 | PTVS11VS1UR |                                                                                       |                 |
|                                                     | 12            | 13.30                    | 14.00                    | 14.70                    | 1          | 19.9                        | 20.1         | 0.005                               | 2.5                                 | PTVS12VS1UR |                                                                                       |                 |
|                                                     | 13            | 14.40                    | 15.15                    | 15.90                    | 1          | 21.5                        | 18.6         | 0.001                               | 0.1                                 | PTVS13VS1UR |                                                                                       |                 |
|                                                     | 14            | 15.60                    | 16.40                    | 17.20                    | 1          | 23.2                        | 17.2         | 0.001                               | 0.1                                 | PTVS14VS1UR |                                                                                       |                 |
|                                                     | 15            | 16.70                    | 17.60                    | 18.50                    | 1          | 24.4                        | 16.4         | 0.001                               | 0.1                                 | PTVS15VS1UR |                                                                                       |                 |
|                                                     | 16            | 17.80                    | 18.75                    | 19.70                    | 1          | 26.0                        | 15.4         | 0.001                               | 0.1                                 | PTVS16VS1UR |                                                                                       |                 |
|                                                     | 17            | 18.90                    | 19.90                    | 20.90                    | 1          | 27.6                        | 14.5         | 0.001                               | 0.1                                 | PTVS17VS1UR |                                                                                       |                 |
|                                                     | 18            | 20.00                    | 21.00                    | 22.10                    | 1          | 29.2                        | 13.7         | 0.001                               | 0.1                                 | PTVS18VS1UR |                                                                                       |                 |
|                                                     | 20            | 22.20                    | 23.35                    | 24.50                    | 1          | 32.4                        | 12.3         | 0.001                               | 0.1                                 | PTVS20VS1UR |                                                                                       |                 |
|                                                     | 22            | 24.40                    | 25.60                    | 26.90                    | 1          | 35.5                        | 11.3         | 0.001                               | 0.1                                 | PTVS22VS1UR |                                                                                       |                 |
|                                                     | 24            | 26.70                    | 28.10                    | 29.50                    | 1          | 38.9                        | 10.3         | 0.001                               | 0.1                                 | PTVS24VS1UR |                                                                                       |                 |
|                                                     | 26            | 28.90                    | 30.40                    | 31.90                    | 1          | 42.1                        | 9.5          | 0.001                               | 0.1                                 | PTVS26VS1UR |                                                                                       |                 |
|                                                     | 28            | 31.10                    | 32.80                    | 34.40                    | 1          | 45.4                        | 8.8          | 0.001                               | 0.1                                 | PTVS28VS1UR |                                                                                       |                 |
|                                                     | 30            | 33.30                    | 35.10                    | 36.80                    | 1          | 48.4                        | 8.3          | 0.001                               | 0.1                                 | PTVS30VS1UR |                                                                                       |                 |
|                                                     | 33            | 36.70                    | 38.70                    | 40.60                    | 1          | 53.3                        | 7.5          | 0.001                               | 0.1                                 | PTVS33VS1UR |                                                                                       |                 |
|                                                     | 36            | 40.00                    | 42.10                    | 44.20                    | 1          | 58.1                        | 6.9          | 0.001                               | 0.1                                 | PTVS36VS1UR |                                                                                       |                 |
|                                                     | 40            | 44.40                    | 46.80                    | 49.10                    | 1          | 64.5                        | 6.2          | 0.001                               | 0.1                                 | PTVS40VS1UR |                                                                                       |                 |
|                                                     | 43            | 47.80                    | 50.30                    | 52.80                    | 1          | 69.4                        | 5.8          | 0.001                               | 0.1                                 | PTVS43VS1UR |                                                                                       |                 |
|                                                     | 45            | 50.00                    | 52.65                    | 55.30                    | 1          | 72.7                        | 5.5          | 0.001                               | 0.1                                 | PTVS45VS1UR |                                                                                       |                 |
|                                                     | 48            | 53.30                    | 56.10                    | 58.90                    | 1          | 77.4                        | 5.2          | 0.001                               | 0.1                                 | PTVS48VS1UR |                                                                                       |                 |
|                                                     | 51            | 56.70                    | 59.70                    | 62.70                    | 1          | 82.4                        | 4.9          | 0.001                               | 0.1                                 | PTVS51VS1UR |                                                                                       |                 |
|                                                     | 54            | 60.00                    | 63.15                    | 66.30                    | 1          | 87.1                        | 4.6          | 0.001                               | 0.1                                 | PTVS54VS1UR |                                                                                       |                 |
|                                                     | 58            | 64.40                    | 67.80                    | 71.20                    | 1          | 93.6                        | 4.3          | 0.001                               | 0.1                                 | PTVS58VS1UR |                                                                                       |                 |
|                                                     | 60            | 66.70                    | 70.20                    | 73.70                    | 1          | 96.8                        | 4.1          | 0.001                               | 0.1                                 | PTVS60VS1UR |                                                                                       |                 |
|                                                     | 64            | 71.10                    | 74.85                    | 78.60                    | 1          | 103.0                       | 3.9          | 0.001                               | 0.1                                 | PTVS64VS1UR |                                                                                       |                 |

<sup>[1]</sup> 10/1000  $\mu$ s acc. to IEC 61643-321

TVS diodes, 600 W

| types in <b>bold</b> represent new products         |               |                          |                          |                          |            |                             |              |                                     |                                     |                    | Type                                                                                | Package         | Size (mm) |
|-----------------------------------------------------|---------------|--------------------------|--------------------------|--------------------------|------------|-----------------------------|--------------|-------------------------------------|-------------------------------------|--------------------|-------------------------------------------------------------------------------------|-----------------|-----------|
| Power (W) (10/1000 $\mu$ s waveform) <sup>[1]</sup> | $V_{RWM}$ (V) | $V_{BR}$ min (V) @ $I_R$ | $V_{BR}$ typ (V) @ $I_R$ | $V_{BR}$ max (V) @ $I_R$ | $I_R$ (mA) | $V_{CL}$ max (V) @ $I_{PP}$ | $I_{PP}$ (A) | $I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$ | $I_{RM}$ max ( $\mu$ A) @ $V_{RWM}$ |                    |                                                                                     |                 |           |
| 600                                                 | 3.5           | 5.20                     | 5.60                     | 6.00                     | 10         | 8                           | 75           | 5                                   | 600                                 | <b>PTVS3V3P1UP</b> |  | 3.8 x 2.6 x 1.0 |           |
|                                                     | 5             | 6.40                     | 6.70                     | 7.00                     | 10         | 9.2                         | 65.2         | 5                                   | 400                                 | <b>PTVS5V0P1UP</b> |                                                                                     |                 |           |
|                                                     | 6             | 6.67                     | 7.02                     | 7.37                     | 10         | 10.3                        | 58.3         | 5                                   | 400                                 | <b>PTVS6V0P1UP</b> |                                                                                     |                 |           |
|                                                     | 6.5           | 7.22                     | 7.60                     | 7.98                     | 10         | 11.2                        | 53.6         | 5                                   | 250                                 | <b>PTVS6V5P1UP</b> |                                                                                     |                 |           |
|                                                     | 7             | 7.78                     | 8.20                     | 8.60                     | 10         | 12                          | 50           | 3                                   | 100                                 | <b>PTVS7V0P1UP</b> |                                                                                     |                 |           |
|                                                     | 7.5           | 8.33                     | 8.77                     | 9.21                     | 1          | 12.9                        | 46.5         | 0.2                                 | 50                                  | <b>PTVS7V5P1UP</b> |                                                                                     |                 |           |
|                                                     | 8             | 8.89                     | 9.36                     | 9.83                     | 1          | 13.6                        | 44.1         | 0.03                                | 25                                  | <b>PTVS8V0P1UP</b> |                                                                                     |                 |           |
|                                                     | 8.5           | 9.44                     | 9.92                     | 10.40                    | 1          | 14.4                        | 41.7         | 0.01                                | 10                                  | <b>PTVS8V5P1UP</b> |                                                                                     |                 |           |
|                                                     | 9             | 10.00                    | 10.55                    | 11.10                    | 1          | 15.4                        | 39           | 0.005                               | 5                                   | <b>PTVS9V0P1UP</b> |                                                                                     |                 |           |
|                                                     | 10            | 11.10                    | 11.70                    | 12.30                    | 1          | 17                          | 35.3         | 0.005                               | 2.5                                 | <b>PTVS10VP1UP</b> |                                                                                     |                 |           |
|                                                     | 11            | 12.20                    | 12.85                    | 13.50                    | 1          | 18.2                        | 33           | 0.005                               | 2.5                                 | <b>PTVS11VP1UP</b> |                                                                                     |                 |           |
|                                                     | 12            | 13.30                    | 14.00                    | 14.70                    | 1          | 19.9                        | 30.2         | 0.005                               | 2.5                                 | <b>PTVS12VP1UP</b> |                                                                                     |                 |           |
|                                                     | 13            | 14.40                    | 15.15                    | 15.90                    | 1          | 21.5                        | 27.9         | 0.001                               | 0.1                                 | <b>PTVS13VP1UP</b> |                                                                                     |                 |           |
|                                                     | 14            | 15.60                    | 16.40                    | 17.20                    | 1          | 23.2                        | 25.9         | 0.001                               | 0.1                                 | <b>PTVS14VP1UP</b> |                                                                                     |                 |           |
|                                                     | 15            | 16.70                    | 17.60                    | 18.50                    | 1          | 24.4                        | 24.6         | 0.001                               | 0.1                                 | <b>PTVS15VP1UP</b> |                                                                                     |                 |           |
|                                                     | 16            | 17.80                    | 18.75                    | 19.70                    | 1          | 26                          | 23.1         | 0.001                               | 0.1                                 | <b>PTVS16VP1UP</b> |                                                                                     |                 |           |
|                                                     | 17            | 18.90                    | 19.90                    | 20.90                    | 1          | 27.6                        | 21.7         | 0.001                               | 0.1                                 | <b>PTVS17VP1UP</b> |                                                                                     |                 |           |
|                                                     | 18            | 20.00                    | 21.00                    | 22.10                    | 1          | 29.2                        | 20.5         | 0.001                               | 0.1                                 | <b>PTVS18VP1UP</b> |                                                                                     |                 |           |
|                                                     | 20            | 22.20                    | 23.35                    | 24.50                    | 1          | 32.4                        | 18.5         | 0.001                               | 0.1                                 | <b>PTVS20VP1UP</b> |                                                                                     |                 |           |
|                                                     | 22            | 24.40                    | 25.60                    | 26.90                    | 1          | 35.5                        | 16.9         | 0.001                               | 0.1                                 | <b>PTVS22VP1UP</b> |                                                                                     |                 |           |
|                                                     | 24            | 26.70                    | 28.10                    | 29.50                    | 1          | 38.9                        | 15.4         | 0.001                               | 0.1                                 | <b>PTVS24VP1UP</b> |                                                                                     |                 |           |
|                                                     | 26            | 28.90                    | 30.40                    | 31.90                    | 1          | 42.1                        | 14.2         | 0.001                               | 0.1                                 | <b>PTVS26VP1UP</b> |                                                                                     |                 |           |
|                                                     | 28            | 31.10                    | 32.80                    | 34.40                    | 1          | 45.4                        | 13.2         | 0.001                               | 0.1                                 | <b>PTVS28VP1UP</b> |                                                                                     |                 |           |
|                                                     | 30            | 33.30                    | 35.10                    | 36.80                    | 1          | 48.4                        | 12.4         | 0.001                               | 0.1                                 | <b>PTVS30VP1UP</b> |                                                                                     |                 |           |
|                                                     | 33            | 36.70                    | 38.70                    | 40.60                    | 1          | 53.3                        | 11.3         | 0.001                               | 0.1                                 | <b>PTVS33VP1UP</b> |                                                                                     |                 |           |
|                                                     | 36            | 40.00                    | 42.10                    | 44.20                    | 1          | 58.1                        | 10.3         | 0.001                               | 0.1                                 | <b>PTVS36VP1UP</b> |                                                                                     |                 |           |
|                                                     | 40            | 44.40                    | 46.80                    | 49.10                    | 1          | 64.5                        | 9.3          | 0.001                               | 0.1                                 | <b>PTVS40VP1UP</b> |                                                                                     |                 |           |
|                                                     | 43            | 47.80                    | 50.30                    | 52.80                    | 1          | 69.4                        | 8.6          | 0.001                               | 0.1                                 | <b>PTVS43VP1UP</b> |                                                                                     |                 |           |
|                                                     | 45            | 50.00                    | 52.65                    | 55.30                    | 1          | 72.7                        | 8.3          | 0.001                               | 0.1                                 | <b>PTVS45VP1UP</b> |                                                                                     |                 |           |
|                                                     | 48            | 53.30                    | 56.10                    | 58.90                    | 1          | 77.4                        | 7.8          | 0.001                               | 0.1                                 | <b>PTVS48VP1UP</b> |                                                                                     |                 |           |
|                                                     | 51            | 56.70                    | 59.70                    | 62.70                    | 1          | 82.4                        | 7.3          | 0.001                               | 0.1                                 | <b>PTVS51VP1UP</b> |                                                                                     |                 |           |
|                                                     | 54            | 60.00                    | 63.15                    | 66.30                    | 1          | 87.1                        | 6.9          | 0.001                               | 0.1                                 | <b>PTVS54VP1UP</b> |                                                                                     |                 |           |
|                                                     | 58            | 64.40                    | 67.80                    | 71.20                    | 1          | 93.6                        | 6.4          | 0.001                               | 0.1                                 | <b>PTVS58VP1UP</b> |                                                                                     |                 |           |
|                                                     | 60            | 66.70                    | 70.20                    | 73.70                    | 1          | 96.8                        | 6.2          | 0.001                               | 0.1                                 | <b>PTVS60VP1UP</b> |                                                                                     |                 |           |
|                                                     | 64            | 71.10                    | 74.85                    | 78.60                    | 1          | 103                         | 5.8          | 0.001                               | 0.1                                 | <b>PTVS64VP1UP</b> |                                                                                     |                 |           |



## Small-signal transistors

### General purpose bipolar transistors

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Single transistors

| Package               |                      |                     |                     |                     |                          | SOT23                                                                             | SOT323 (SC-70)                                                                      | SOT416 (SC-75)                                                                      | SOT883 (SC-101)                                                                     |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                      |                     |                     |                     |                          |  |  |  |  |
| Size (mm)             |                      |                     |                     |                     |                          | 2.9 x 1.3 x 1.0                                                                   | 2.0 x 1.25 x 0.95                                                                   | 1.6 x 0.8 x 0.77                                                                    | 1.0 x 0.6 x 0.5                                                                     |
| P <sub>tot</sub> (mW) |                      |                     |                     |                     |                          | 250                                                                               | 200                                                                                 | 150                                                                                 | 250                                                                                 |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| NPN                   | 25                   | 100                 | 450                 | 1200                | 100                      |                                                                                   | PMST5089                                                                            |                                                                                     |                                                                                     |
|                       | 30                   | 100                 | 110 - 200           | 450 - 800           | 100                      | BC848B                                                                            | BC848W                                                                              |                                                                                     |                                                                                     |
|                       |                      |                     | 350                 | 900                 | 100                      |                                                                                   | PMST5088                                                                            |                                                                                     |                                                                                     |
|                       | 32                   | 100                 | 110 - 420           | 220 - 800           | 100                      | BCW31 / 32 / 33                                                                   |                                                                                     |                                                                                     |                                                                                     |
|                       |                      |                     | 180 - 380           | 310 - 630           | 250                      | BCW60B / C / D                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                       | 40                   | 100                 | 120 - 270           | 270 - 560           | 100                      |                                                                                   |                                                                                     |                                                                                     | 2PC4617QM / RM                                                                      |
|                       | 45                   | 100                 | 110 - 420           | 220 - 800           | 100                      | BC847 / A / B / C                                                                 | BC847W / AW / BW / CW                                                               | BC847T / AT / BT / CT                                                               | BC847AM / BM / CM                                                                   |
|                       |                      |                     | 120 - 380           | 220 - 630           | 100                      | BCX70G / H / J / K                                                                |                                                                                     |                                                                                     |                                                                                     |
|                       |                      |                     | 110 - 200           | 220 - 450           | 100                      | BCW71 / 72                                                                        |                                                                                     |                                                                                     |                                                                                     |
|                       |                      |                     | 500                 | 1250                | 100                      | PMBT6429                                                                          | PMST6429                                                                            |                                                                                     |                                                                                     |
|                       | 50                   | 100                 | 210 - 290           | 340 - 460           | 100 - 150                | 2PD601ART<br>2PD601ARL<br>2PD601ASL                                               | 2PD601ARW / SW                                                                      |                                                                                     |                                                                                     |
|                       |                      |                     | 250                 | 650                 | 100                      | PMBT6428                                                                          | PMST6428                                                                            |                                                                                     |                                                                                     |
|                       | 60                   | 100                 | 110 - 200           | 220 - 450           | 100                      | BCV71 / 72                                                                        |                                                                                     |                                                                                     |                                                                                     |
|                       | 65                   | 100                 | 110 - 200           | 220 - 450           | 100                      | BC846 / A / B                                                                     | BC846W / AW / BW                                                                    | BC846T / AT / BT                                                                    |                                                                                     |
|                       | 80                   | 100                 | 20                  | 80                  | 60                       | BSS64                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       | 50                   | 150                 | 120 - 270           | 270 - 560           | 100                      |                                                                                   | 2PC4081Q / R / S                                                                    | 2PC4617Q / R                                                                        |                                                                                     |
|                       | 45                   | 500                 | 100 - 250           | 250 - 600           | 100                      | BC817 / -16 / -25 / -40                                                           | BC817W / -16W / -25W / -40W                                                         |                                                                                     |                                                                                     |
|                       |                      |                     | 100                 | 600                 | 100                      | BCX19                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       | 50                   | 500                 | 85 - 170            | 170 - 340           | 140 - 180                | 2PD602AQL<br>2PD602ARL<br>2PD602ASL                                               | 2PD1820AR / S                                                                       |                                                                                     |                                                                                     |
|                       | 60                   | 500                 | 50                  | -                   | 100                      |                                                                                   | PMSTA05                                                                             |                                                                                     |                                                                                     |
|                       | 80                   | 500                 | 100                 | -                   | 100                      | PMBTA06                                                                           | PMSTA06                                                                             |                                                                                     |                                                                                     |
| PNP                   | 30                   | 100                 | 125 - 220           | 500 - 800           | 100                      | BC858B                                                                            | BC858W                                                                              |                                                                                     |                                                                                     |
|                       | 32                   | 100                 | 120 - 215           | 260 - 500           | 100                      | BCW29 / 30                                                                        |                                                                                     |                                                                                     |                                                                                     |
|                       |                      |                     | 180 - 380           | 310 - 630           | 100                      | BCW61B / C / D                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                       | 40                   | 100                 | 120 - 270           | 270 - 560           | 100                      |                                                                                   |                                                                                     |                                                                                     | 2PA1774QM / RM / SM                                                                 |
|                       | 45                   | 100                 | 210 - 290           | 340 - 460           | 70 - 80                  | 2PB709ART<br>2PB709ARL<br>2PB709ASL                                               | 2PB709ARW / SW                                                                      |                                                                                     |                                                                                     |
|                       |                      |                     | 180 - 380           | 310 - 630           | 100                      | BCX71H / J / K                                                                    |                                                                                     |                                                                                     |                                                                                     |
|                       |                      |                     | 120 - 215           | 260 - 500           | 100                      | BCW69 / 70                                                                        |                                                                                     |                                                                                     |                                                                                     |
|                       |                      |                     | 125 - 420           | 250 - 800           | 100                      | BC857 / A / B / C                                                                 | BC857W / AW / BW / CW                                                               | BC857T / AT / BT / CT                                                               | BC857AM / BM / CM                                                                   |
|                       | 60                   | 100                 | 120                 | 260                 | 150                      | BCW89                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       | 65                   | 100                 | 125 - 200           | 250 - 475           | 100                      | BC856 / A / B                                                                     | BC856W / AW / BW                                                                    | BC856T / AT / BT                                                                    |                                                                                     |
|                       | 100                  | 100                 | 30                  | -                   | 50                       | BSS63                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       | 50                   | 150                 | 120 - 270           | 270 - 560           | 100                      |                                                                                   | 2PA1576Q / R / S                                                                    | 2PA1774Q / R / S                                                                    |                                                                                     |
|                       | 25                   | 500                 | 100                 | 600                 | 80                       | BCX18                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       | 45                   | 500                 | 100 - 250           | 250 - 600           | 80                       | BC807 / -16 / -25 / -40                                                           | BC807W / -16W / -25W / -40W                                                         |                                                                                     |                                                                                     |
|                       |                      |                     | 100                 | 600                 | 80                       | BCX17                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       | 50                   | 500                 | 85 - 170            | 170 - 340           | 100 - 140                | 2PB710ARL<br>2PB710ASL                                                            | 2PB1219AQ / R / S                                                                   |                                                                                     |                                                                                     |
|                       | 60                   | 500                 | 100                 | -                   | 50                       |                                                                                   | PMSTA55                                                                             |                                                                                     |                                                                                     |
|                       | 80                   | 500                 | 100                 | -                   | 50                       | PMBTA56                                                                           | PMSTA56                                                                             |                                                                                     |                                                                                     |

Double transistors

| Package               |                      |                     |                     |                     |                          | SOT457 (SC-74)                                                                      | SOT363 (SC-88)                                                                      | SOT666                                                                              |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                      |                     |                     |                     |                          |  |  |  |
| Size (mm)             |                      |                     |                     |                     |                          | 2.9 x 1.5 x 1.0                                                                     | 2.0 x 1.25 x 0.95                                                                   | 1.6 x 1.2 x 0.55                                                                    |
| P <sub>tot</sub> (mW) |                      |                     |                     |                     |                          | 600                                                                                 | 300                                                                                 | 300                                                                                 |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |                                                                                     |                                                                                     |                                                                                     |
| NPN                   | 40                   | 100                 | 120                 | 450                 | 100                      |                                                                                     | PUMX1                                                                               | PEMX1                                                                               |
|                       | 45                   | 100                 | 200                 | 450                 | 100                      | <b>BC847DS</b>                                                                      | BC847BS                                                                             | BC847BV                                                                             |
|                       | 65                   | 100                 | 110                 | -                   | 100                      |                                                                                     | BC846S                                                                              |                                                                                     |
|                       | 50                   | 150                 | 200                 | 450                 | 100                      | <b>BC846DS</b>                                                                      | <b>BC846BS</b>                                                                      |                                                                                     |
|                       |                      |                     | 120                 | 560                 | 100                      |                                                                                     | PUMX2                                                                               |                                                                                     |
| PNP                   | 45                   | 500                 | 160                 | 400                 | 80                       | BC817DS                                                                             |                                                                                     |                                                                                     |
|                       | 40                   | 100                 | 120                 | 450                 | 100                      | PIMT1                                                                               | PUMT1                                                                               | PEMT1                                                                               |
|                       | 45                   | 100                 | 200                 | 450                 | 100                      |                                                                                     | BC857BS                                                                             | BC857BV                                                                             |
|                       | 65                   | 100                 | 110                 | -                   | 100                      |                                                                                     | BC856S                                                                              |                                                                                     |
|                       | 45                   | 500                 | 200                 | 450                 | 100                      |                                                                                     | <b>BC856BS</b>                                                                      |                                                                                     |
|                       |                      |                     | 160                 | 400                 | 80                       | BC807DS                                                                             |                                                                                     |                                                                                     |
| NPN/PNP               | 40                   | 100                 | 120                 | 450                 | 100                      |                                                                                     | PUMZ1                                                                               | PEMZ1                                                                               |
|                       | 45                   | 100                 | 200                 | 450                 | 100                      |                                                                                     | BC847BPN                                                                            | BC847BVN                                                                            |
|                       | 50                   | 100                 | 120                 | 560                 | 100                      | PIMZ2                                                                               | PUMZ2                                                                               |                                                                                     |
|                       | 65                   | 100                 | 200                 | 450                 | 100                      |                                                                                     | <b>BC846BPN</b>                                                                     |                                                                                     |
|                       | 12                   | 500                 | 200                 | -                   | 250/100                  |                                                                                     |                                                                                     | PEMZ7                                                                               |
|                       | 45                   | 500                 | 160                 | 400                 | 100/80                   | BC817DPN                                                                            |                                                                                     |                                                                                     |

Single and double switching transistors

| Package               |                      |                     |                     |                     |                          |                       | SOT223 (SC-73)                                                                        | SOT89 (SC-62)                                                                         | SOT23                                                                                 | SOT323 (SC-70)                                                                        | SOT363 (SC-88)                                                                        | SOT666                                                                                | SOT883 (SC-101)                                                                       |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-----------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|                       |                      |                     |                     |                     |                          |                       |  |  |  |  |  |  |  |
| Size (mm)             |                      |                     |                     |                     |                          |                       | 6.5 x 3.5 x 1.65                                                                      | 4.5 x 2.5 x 1.5                                                                       | 2.9 x 1.3 x 1.0                                                                       | 2.0 x 1.25 x 0.95                                                                     | 2.0 x 1.25 x 0.95                                                                     | 1.6 x 1.2 x 0.55                                                                      | 1.0 x 0.6 x 0.5                                                                       |
| P <sub>tot</sub> (mW) |                      |                     |                     |                     |                          |                       | 1700                                                                                  | 1300                                                                                  | 250                                                                                   | 200                                                                                   | 300                                                                                   | 300                                                                                   | 250                                                                                   |
| Configuration         |                      |                     |                     |                     |                          |                       | single                                                                                | single                                                                                | single                                                                                | single                                                                                | double                                                                                | double                                                                                | single                                                                                |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) | t <sub>off</sub> (ns) |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
| NPN                   | 12                   | 100                 | 40                  | 120                 | 400                      | 20                    |                                                                                       |                                                                                       | BSV52                                                                                 |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       | 40                   | 100                 | 100                 | 300                 | 180                      | 1200                  |                                                                                       |                                                                                       | PMBS3904                                                                              | PMSS3904                                                                              |                                                                                       |                                                                                       |                                                                                       |
|                       |                      |                     |                     |                     | 300                      | 250                   |                                                                                       | PXT2222A                                                                              |                                                                                       |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       | 15                   | 200                 | 40                  | 120                 | 500                      | 20                    |                                                                                       |                                                                                       | PMBT2369                                                                              | PMST2369                                                                              |                                                                                       |                                                                                       |                                                                                       |
|                       | 40                   | 200                 | 100                 | 300                 | 300                      | 250                   |                                                                                       |                                                                                       | MMBT3904                                                                              |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       | 30                   | 600                 | 100                 | 300                 | 250                      | 250                   |                                                                                       |                                                                                       | PMBT3904                                                                              | PMST3904                                                                              | PMBT3904YS                                                                            | PMBT3904VS                                                                            | PMBT3904M                                                                             |
|                       |                      |                     |                     |                     | 250                      | 250                   |                                                                                       |                                                                                       | PMBT2222                                                                              | PMST2222                                                                              |                                                                                       |                                                                                       |                                                                                       |
|                       | 40                   | 600                 | 100                 | 300                 | 250                      | 250                   | PZT4401                                                                               | PXT4401                                                                               | PMBT4401                                                                              | PMST4401                                                                              |                                                                                       |                                                                                       |                                                                                       |
|                       |                      |                     |                     |                     | 300                      | 250                   |                                                                                       |                                                                                       | MMBT2222A                                                                             |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       | 40                   | 800                 | 100                 | 300                 | 300                      | 250                   | PZT2222A                                                                              |                                                                                       | PMBT2222A                                                                             | PMST2222A                                                                             |                                                                                       |                                                                                       |                                                                                       |
|                       |                      |                     |                     |                     | 300                      | 250                   |                                                                                       |                                                                                       | BSR14                                                                                 |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       | 40                   | 100                 | 100                 | 300                 | 150                      | 700                   |                                                                                       |                                                                                       | PMBS3906                                                                              | PMSS3906                                                                              |                                                                                       |                                                                                       |                                                                                       |
| PNP                   | 40                   | 200                 | 100                 | 300                 | 250                      | 300                   |                                                                                       |                                                                                       | MMBT3906                                                                              |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       |                      |                     |                     |                     |                          |                       |                                                                                       |                                                                                       | PMBT3906                                                                              | PMST3906                                                                              | PMBT3906YS                                                                            | PMBT3906VS                                                                            | PMBT3906M                                                                             |
|                       | 40                   | 600                 | 100                 | 300                 | 200                      | 350                   | PZT4403                                                                               | PXT4403                                                                               | PMBT4403                                                                              | PMST4403                                                                              |                                                                                       |                                                                                       |                                                                                       |
|                       |                      |                     |                     |                     |                          | 365                   |                                                                                       |                                                                                       | PMBT2907                                                                              |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       | 60                   | 600                 | 100                 | 300                 | 200                      | 300                   |                                                                                       |                                                                                       |                                                                                       | PMST2907A                                                                             |                                                                                       |                                                                                       |                                                                                       |
|                       |                      |                     |                     |                     |                          | 365                   |                                                                                       |                                                                                       | BSR16                                                                                 |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       | 40                   | 200                 | 100                 | 300                 | 300/250                  | 250/300               | PZT2907A                                                                              | PXT2907A                                                                              | PMBT2907A                                                                             |                                                                                       |                                                                                       |                                                                                       |                                                                                       |
|                       |                      |                     |                     |                     |                          |                       |                                                                                       |                                                                                       |                                                                                       | PMBT3946YPN                                                                           | PMBT3946VPN                                                                           |                                                                                       |                                                                                       |

Small-signal  
transistors

Matched pair transistors

| Package               |                         |                        |                        |                        |                                        |                                             | SOT143B                                                                           | SOT457<br>(SC-74)                                                                 | SOT353<br>(SC-88A)                                                                | SOT363 (SC-88)                                                                      | SOT666                                                                              |
|-----------------------|-------------------------|------------------------|------------------------|------------------------|----------------------------------------|---------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                         |                        |                        |                        |                                        |                                             |  |  |  |  |  |
| Size (mm)             |                         |                        |                        |                        |                                        |                                             | 2.9 x 1.3 x 1.0                                                                   | 2.9 x 1.5 x 1.0                                                                   | 2.0 x 1.25 x 0.95                                                                 | 2.0 x 1.25 x 0.95                                                                   | 1.6 x 1.2 x 0.55                                                                    |
| P <sub>tot</sub> (mW) |                         |                        |                        |                        |                                        |                                             | 250                                                                               | 380                                                                               | 300                                                                               | 300                                                                                 | 300                                                                                 |
| Polarity              | V <sub>CEO</sub><br>(V) | I <sub>C</sub><br>(mA) | h <sub>FE</sub><br>min | h <sub>FE</sub><br>max | h <sub>FE1</sub> /<br>h <sub>FE2</sub> | V <sub>BE1</sub> - V <sub>BE2</sub><br>(mV) |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
| NPN                   | 30                      | 100                    | 110                    | 800                    | 0.7 <sup>1)</sup>                      | n.a.                                        | BCV61/A/B/C <sup>1)</sup>                                                         |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                       | 45                      | 100                    | 200                    | 450                    | 0.9 <sup>1)</sup>                      | 2                                           | BCM61B <sup>1)</sup>                                                              | BCM847DS                                                                          |                                                                                   | BCM847BS                                                                            | BCM847BV                                                                            |
|                       |                         |                        |                        |                        | 0.95                                   | 2                                           |                                                                                   |                                                                                   | PMP4501G                                                                          | PMP4501Y                                                                            | PMP4501V                                                                            |
|                       |                         |                        |                        |                        | 0.98                                   | 2                                           |                                                                                   |                                                                                   | PMP4201G                                                                          | PMP4201Y                                                                            | PMP4201V                                                                            |
|                       | Configuration           |                        |                        |                        |                                        |                                             |                                                                                   |  |  |   |  |
| PNP                   | 30                      | 100                    | 100                    | 800                    | 0.7 <sup>1)</sup>                      | n.a.                                        | BCV62/A/B/C <sup>1)</sup>                                                         |                                                                                   |                                                                                   |                                                                                     |                                                                                     |
|                       | 45                      | 100                    | 200                    | 450                    | 0.9 <sup>1)</sup>                      | 2                                           | BCM62B <sup>1)</sup>                                                              | BCM857DS                                                                          |                                                                                   | BCM857BS                                                                            | BCM857BV                                                                            |
|                       |                         |                        |                        |                        | 0.95                                   | 2                                           |                                                                                   |                                                                                   | PMP5501G                                                                          | PMP5501Y                                                                            | PMP5501V                                                                            |
|                       |                         |                        |                        |                        | 0.98                                   | 2                                           |                                                                                   |                                                                                   | PMP5201G                                                                          | PMP5201Y                                                                            | PMP5201V                                                                            |
|                       | 65                      |                        |                        |                        | 100                                    | 200                                         | 450                                                                               | 0.9                                                                               | 2                                                                                 |                                                                                     | BCM856DS                                                                            |
| Configuration         |                         |                        |                        |                        |                                        |                                             |  |  |  |   |  |

<sup>1)</sup> I<sub>C1</sub>/I<sub>E2</sub>

Key features

- ▶ Current gain matching to 10 %, 5 % or 2 %
- ▶ Base-emitter voltage matching to 2 mV
- ▶ Choice of standard double transistor pinout or application-optimized pinout
- ▶ Common-emitter configuration for 5-pin type
- ▶ Range of small, very small and ultra small packages

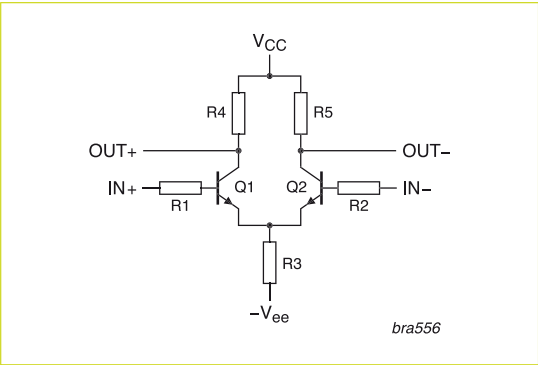
Key benefits

- ▶ Improved performance of current mirror and differential amplifier circuits
- ▶ Drop-in replacement for standard double transistors (BCM series)
- ▶ Simplified board layout (PMP series)
- ▶ Eliminates the need for costly additional trimming

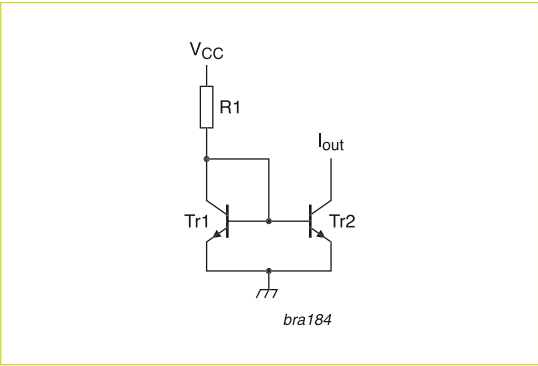
Key applications

- ▶ Current mirrors
- ▶ Differential and instrumentation amplifiers
- ▶ Logarithmic amplifiers
- ▶ Comparators

Differential amplifier



Current mirror



High voltage transistors

| Package                                                                             |                      |                     |                     |                     |                          |  | SOT223<br>(SC-73)                                                                   | SOT89<br>(SC-62)                                                                    | SOT457<br>(SC-74)                                                                   | SOT23                                                                               | SOT323<br>(SC-70) |
|-------------------------------------------------------------------------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------|
|  |                      |                     |                     |                     |                          |  |  |  |  |  |                   |
| Size (mm)                                                                           |                      |                     |                     |                     |                          |  | 6.5 x 3.5 x 1.65                                                                    | 4.5 x 2.5 x 1.5                                                                     | 2.9 x 1.5 x 1.0                                                                     | 2.9 x 1.3 x 1.0                                                                     | 2.0 x 1.25 x 0.95 |
| P <sub>tot</sub> (mW)                                                               |                      |                     |                     |                     |                          |  | 1700                                                                                | 1300                                                                                | 600                                                                                 | 250                                                                                 | 200               |
| Polarity                                                                            | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                   |
| NPN                                                                                 | 80                   | 100                 | 20                  | -                   | 60                       |  |                                                                                     |                                                                                     |                                                                                     | BSS64                                                                               |                   |
|                                                                                     | 140                  | 100                 | 60                  | 250                 | 100                      |  |                                                                                     |                                                                                     |                                                                                     | PMBT5550                                                                            | PMST5550          |
|                                                                                     | 160                  | 300                 | 80                  | 250                 | 100                      |  |                                                                                     |                                                                                     |                                                                                     | PMBT5551/BSR19A                                                                     | PMST5551          |
|                                                                                     | 250                  | 100                 | 50                  | -                   | 60                       |  | BF722                                                                               | BF622                                                                               |                                                                                     | BF822                                                                               |                   |
|                                                                                     | 300                  | 100                 | 50                  | -                   | 60                       |  | BF720                                                                               | BF620                                                                               |                                                                                     | BF820                                                                               | BF820W            |
|                                                                                     | 350                  | 100                 | 40                  | -                   | 50                       |  | PZTA42                                                                              | PXTA42                                                                              |                                                                                     | PMBTA42                                                                             | PMSTA42           |
|                                                                                     | 400                  | 300                 | 50                  | 200                 | 20                       |  | PZTA44                                                                              |                                                                                     |                                                                                     | PMBTA44                                                                             |                   |
| PNP                                                                                 | 100                  | 100                 | 30                  | -                   | 50                       |  |                                                                                     |                                                                                     |                                                                                     | BSS63                                                                               |                   |
|                                                                                     | 250                  | 100                 | 50                  | -                   | 60                       |  | BF723                                                                               |                                                                                     |                                                                                     |                                                                                     |                   |
|                                                                                     |                      |                     | 50                  | -                   | 60                       |  |                                                                                     | BF623                                                                               |                                                                                     | BF823                                                                               |                   |
|                                                                                     |                      |                     | 50                  | -                   | 60                       |  |                                                                                     | BF621                                                                               |                                                                                     | BF821                                                                               |                   |
|                                                                                     | 300                  | 100                 | 40                  | -                   | 50                       |  | PZTA92                                                                              | PXTA92                                                                              |                                                                                     | PMBTA92                                                                             | PMSTA92           |
| 2 x NPN                                                                             | 300                  | 100                 | 40                  | -                   | 50                       |  |                                                                                     |                                                                                     | PMBTA42DS                                                                           |                                                                                     |                   |

For high voltage transistors with increased performance please refer to our high voltage low V<sub>CEsat</sub> (BISS) transistor portfolio on pages 56 - 64.

Low noise transistors

| Package                                                                              |                      |                     |             |                     |                     |                          | SOT23                                                                                | SOT323 (SC-70)    |
|--------------------------------------------------------------------------------------|----------------------|---------------------|-------------|---------------------|---------------------|--------------------------|--------------------------------------------------------------------------------------|-------------------|
|  |                      |                     |             |                     |                     |                          |  |                   |
| Size (mm)                                                                            |                      |                     |             |                     |                     |                          | 2.9 x 1.3 x 1.0                                                                      | 2.0 x 1.25 x 0.95 |
| P <sub>tot</sub> (mW)                                                                |                      |                     |             |                     |                     |                          | 250                                                                                  | 200               |
| Polarity                                                                             | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | NF max (dB) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> min (MHz) |                                                                                      |                   |
| NPN                                                                                  | 30                   | 100                 | 4           | 200                 | 450                 | 100                      | BC849B                                                                               | BC849BW           |
|                                                                                      |                      |                     |             | 420                 | 800                 | 100                      | BC849C                                                                               | BC849CW           |
|                                                                                      | 45                   | 100                 | 4           | 200                 | 450                 | 100                      | BC850B                                                                               | BC850BW           |
|                                                                                      |                      |                     |             | 420                 | 800                 | 100                      | BC850C                                                                               | BC850CW           |
| PNP                                                                                  | 30                   | 100                 | 4           | 220                 | 475                 | 100                      | BC859B                                                                               | BC859BW           |
|                                                                                      |                      |                     |             | 420                 | 800                 | 100                      | BC859C                                                                               | BC859CW           |
|                                                                                      | 45                   | 100                 | 4           | 220                 | 475                 | 100                      | BC860B                                                                               | BC860BW           |
|                                                                                      |                      |                     |             | 420                 | 800                 | 100                      | BC860C                                                                               | BC860CW           |

Darlington transistors

| Package                                                                               |                      |                     |                     |                          | SOT223 (SC-73)                                                                        | SOT89 (SC-62)                                                                         | SOT23           |
|---------------------------------------------------------------------------------------|----------------------|---------------------|---------------------|--------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------|
|  |                      |                     |                     |                          |  |  |                 |
| Size (mm)                                                                             |                      |                     |                     |                          | 6.5 x 3.5 x 1.65                                                                      | 4.5 x 2.5 x 1.5                                                                       | 2.9 x 1.3 x 1.0 |
| P <sub>tot</sub> (mW)                                                                 |                      |                     |                     |                          | 1700                                                                                  | 1300                                                                                  | 250             |
| Polarity                                                                              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | f <sub>T</sub> typ (MHz) |                                                                                       |                                                                                       |                 |
| NPN                                                                                   | 30                   | 500                 | 10000               | 125                      |                                                                                       |                                                                                       | PMBTA13         |
|                                                                                       |                      |                     | 20000               | 125                      | PZTA14                                                                                | PXTA14                                                                                | PMBTA14         |
|                                                                                       |                      |                     |                     | 220                      |                                                                                       | BCV29                                                                                 | BCV27           |
|                                                                                       | 45                   | 1000                | 2000                | 200                      | BSP50                                                                                 | BST50                                                                                 |                 |
|                                                                                       |                      |                     | 10000               | 220                      |                                                                                       | BCV49                                                                                 | BCV47           |
|                                                                                       | 60                   | 500                 | 2000                | 200                      | BSP51                                                                                 | BST51                                                                                 |                 |
| PNP                                                                                   | 30                   | 500                 | 20000               | 125                      |                                                                                       |                                                                                       | PMBTA64         |
|                                                                                       |                      |                     | 2000                | 220                      |                                                                                       | BCV28                                                                                 | BCV26           |
|                                                                                       |                      |                     | 10000               | 220                      | BSP60                                                                                 | BST60                                                                                 |                 |
|                                                                                       | 45                   | 1000                | 2000                | 200                      |                                                                                       | BCV48                                                                                 | BCV46           |
|                                                                                       |                      |                     | 10000               | 220                      | BSP61                                                                                 | BST61                                                                                 |                 |
|                                                                                       | 80                   | 1000                | 2000                | 200                      | BSP62                                                                                 | BST62                                                                                 |                 |

Medium frequency transistors

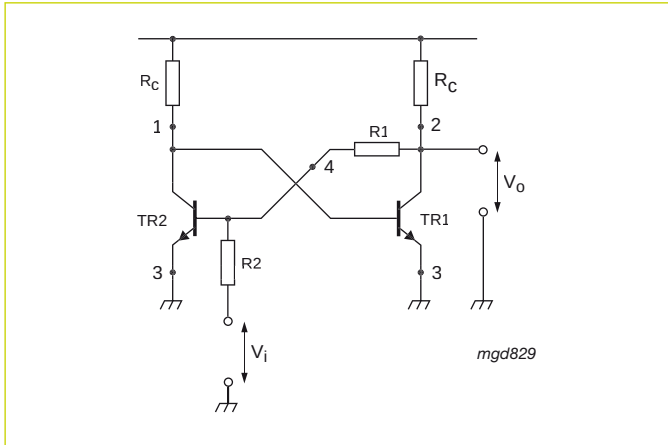
| Package               |                      |                     |                     |                     |                          | SOT23                                                                             | SOT323 (SC-70)                                                                    |
|-----------------------|----------------------|---------------------|---------------------|---------------------|--------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
|                       |                      |                     |                     |                     |                          |  |  |
| Size (mm)             |                      |                     |                     |                     |                          | 2.9 x 1.3 x 1.0                                                                   | 2.0 x 1.25 x 0.95                                                                 |
| P <sub>tot</sub> (mW) |                      |                     |                     |                     |                          | 250                                                                               | 200                                                                               |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | f <sub>T</sub> typ (MHz) |                                                                                   |                                                                                   |
| NPN                   | 15                   | 100                 | 40                  | -                   | 500                      | BF570                                                                             |                                                                                   |
|                       | 20                   | 25                  | 40                  | 85                  | > 275                    | BFS20                                                                             | BFS20W                                                                            |
|                       |                      | 30                  | 65                  | 225                 | 260                      | BFS19                                                                             |                                                                                   |
| PNP                   | 40                   | 25                  | 67                  | 220                 | 380                      | BF840                                                                             |                                                                                   |
|                       | 30                   | 25                  | 25                  | 50                  | 250                      | BF824                                                                             | BF824W                                                                            |
|                       | 40                   | 25                  | 50                  | -                   | > 325                    | BF550                                                                             |                                                                                   |

Schmitt trigger

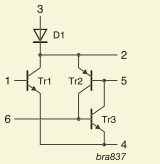
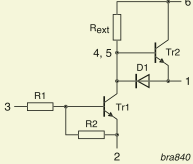
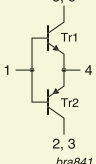
| Package               |                          |                          |                     |                     |                     |                             | SOT143B                                                                             |
|-----------------------|--------------------------|--------------------------|---------------------|---------------------|---------------------|-----------------------------|-------------------------------------------------------------------------------------|
|                       |                          |                          |                     |                     |                     |                             |  |
| Size (mm)             |                          |                          |                     |                     |                     |                             | 2.9 x 1.3 x 1.0                                                                     |
| P <sub>tot</sub> (mW) |                          |                          |                     |                     |                     |                             | 250                                                                                 |
| Polarity              | V <sub>CEO</sub> (V) TR1 | V <sub>CEO</sub> (V) TR2 | I <sub>C</sub> (mA) | h <sub>FE</sub> min | h <sub>FE</sub> max | V <sub>CEsat</sub> typ (mV) |                                                                                     |
| NPN                   | 30                       | 6                        | 100                 | 110                 | 800                 | 250                         | BCV63 / B                                                                           |
| PNP                   | 30                       | 6                        | 100                 | 220                 | 475                 | 250                         | BCV64B                                                                              |

- Key features
- ▶ Low current (max. 100 mA)
  - ▶ Low voltage (max. 30 and 6 V)
- Key benefits
- ▶ Reduced component count and pick-and-place costs
  - ▶ Smaller designs
- Key applications
- ▶ General purpose switching and amplification
  - ▶ Schmitt trigger applications

Schmitt trigger



MOSFET driver

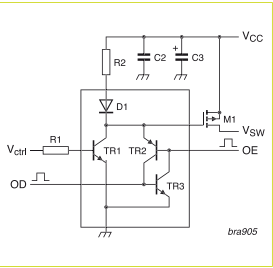
| Package                                                                                                      |  |                    |                     |          |  | SOT457 (SC-74)                                                                      |                                                                                     |                                                                                     |
|--------------------------------------------------------------------------------------------------------------|--|--------------------|---------------------|----------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                                                                                                              |  |                    |                     |          |  |  |                                                                                     |                                                                                     |
| Size (mm)                                                                                                    |  |                    |                     |          |  | 2.9 x 1.5 x 1.0                                                                     |                                                                                     |                                                                                     |
| P <sub>tot</sub> (mW)                                                                                        |  |                    |                     |          |  | 400                                                                                 | 400                                                                                 | 580                                                                                 |
| Configuration                                                                                                |  |                    |                     |          |  |  |  |  |
| Contains                                                                                                     |  | I <sub>C</sub> (A) | I <sub>CM</sub> (A) |          |  | R1 = R2 (kΩ)                                                                        |                                                                                     |                                                                                     |
|                                                                                                              |  |                    |                     | PMD9050D |  | -                                                                                   | PMD9010D                                                                            | BCV65 (SOT143B)                                                                     |
| General purpose transistors                                                                                  |  | 0.1                | 0.2                 |          |  | 2.2                                                                                 | PMD9001D                                                                            |                                                                                     |
|                                                                                                              |  |                    |                     |          |  | 4.7                                                                                 | PMD9002D                                                                            |                                                                                     |
|                                                                                                              |  |                    |                     |          |  | 10                                                                                  | PMD9003D                                                                            |                                                                                     |
| Switching transistors - reduced storage time                                                                 |  | 0.6                | 1.0                 |          |  | -                                                                                   |                                                                                     | PMD2001D                                                                            |
| Low V <sub>CEsat</sub> (BISS) transistors - Low V <sub>CEsat</sub> , high h <sub>FE</sub> and I <sub>C</sub> |  | 1.0                | 2.0                 |          |  | -                                                                                   |                                                                                     | PMD3001D                                                                            |

- Key features
- ▶ Three different configurations
  - ▶ Types available with standard, switching and low V<sub>CEsat</sub> (BISS) transistors
  - ▶ Small footprint packages

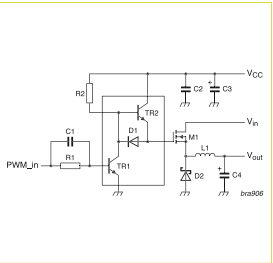
- Key benefits
- ▶ Reduced component count
  - ▶ Smaller end products

- Key applications
- ▶ MOSFET driver
  - ▶ Bipolar power transistor driver
  - ▶ Push-pull driver

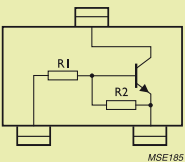
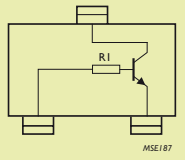
MOSFET driver with hardware output disable function

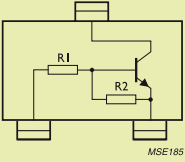
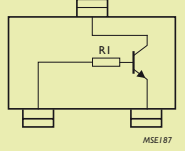


High-side MOSFET driver with level shifter function



RETs 100 mA single

| Package               |                     |                                                                                   |         |         | SOT23                                                                             |           | SOT323 (SC-70)                                                                     |           |
|-----------------------|---------------------|-----------------------------------------------------------------------------------|---------|---------|-----------------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------|-----------|
|                       |                     |                                                                                   |         |         |  |           |  |           |
| Size (mm)             |                     |                                                                                   |         |         | 2.9 x 1.3 x 1.0                                                                   |           | 2.0 x 1.25 x 0.95                                                                  |           |
| P <sub>tot</sub> (mW) |                     |                                                                                   |         |         | 250                                                                               |           | 200                                                                                |           |
| V <sub>CEO</sub> (V)  | I <sub>c</sub> (mA) | Configuration                                                                     | R1 (kΩ) | R2 (kΩ) | NPN                                                                               | PNP       | NPN                                                                                | PNP       |
| 50                    | 100                 |  | 1       | 1       |                                                                                   | PDTA113ET |                                                                                    | PDTA113EU |
|                       |                     |                                                                                   | 2.2     | 2.2     | PDTC123ET                                                                         | PDTA123ET | PDTC123EU                                                                          | PDTA123EU |
|                       |                     |                                                                                   | 4.7     | 4.7     | PDTC143ET                                                                         | PDTA143ET | PDTC143EU                                                                          | PDTA143EU |
|                       |                     |                                                                                   | 10      | 10      | PDTC114ET                                                                         | PDTA114ET | PDTC114EU                                                                          | PDTA114EU |
|                       |                     |                                                                                   | 22      | 22      | PDTC124ET                                                                         | PDTA124ET | PDTC124EU                                                                          | PDTA124EU |
|                       |                     |                                                                                   | 47      | 47      | PDTC144ET                                                                         | PDTA144ET | PDTC144EU                                                                          | PDTA144EU |
|                       |                     |                                                                                   | 100     | 100     | PDTC115ET                                                                         | PDTA115ET | PDTC115EU                                                                          | PDTA115EU |
|                       |                     |                                                                                   | 1       | 10      |                                                                                   | PDTA113ZT |                                                                                    | PDTA113ZU |
|                       |                     |                                                                                   | 2.2     | 10      | PDTC123YT                                                                         | PDTA123YT | PDTC123YU                                                                          | PDTA123YU |
|                       |                     |                                                                                   | 2.2     | 47      | PDTC123JT                                                                         | PDTA123JT | PDTC123JU                                                                          | PDTA123JU |
|                       |                     |                                                                                   | 4.7     | 10      | PDTC143XT                                                                         | PDTA143XT | PDTC143XU                                                                          | PDTA143XU |
|                       |                     |                                                                                   | 4.7     | 47      | PDTC143ZT                                                                         | PDTA143ZT | PDTC143ZU                                                                          | PDTA143ZU |
|                       |                     |                                                                                   | 10      | 47      | PDTC114YT                                                                         | PDTA114YT | PDTC114YU                                                                          | PDTA114YU |
|                       |                     |                                                                                   | 22      | 47      | PDTC124XT                                                                         | PDTA124XT | PDTC124XU                                                                          | PDTA124XU |
|                       |                     |                                                                                   | 47      | 10      | PDTC144VT                                                                         | PDTA144VT | PDTC144VU                                                                          | PDTA144VU |
|                       |                     |                                                                                   | 47      | 22      | PDTC144WT                                                                         | PDTA144WT | PDTC144WU                                                                          | PDTA144WU |
|                       |                     |  | 2.2     | -       | PDTC123TT                                                                         | PDTA123TT | PDTC123TU                                                                          | PDTA123TU |
|                       |                     |                                                                                   | 4.7     | -       | PDTC143TT                                                                         | PDTA143TT | PDTC143TU                                                                          | PDTA143TU |
|                       |                     |                                                                                   | 10      | -       | PDTC114TT                                                                         | PDTA114TT | PDTC114TU                                                                          | PDTA114TU |
|                       |                     |                                                                                   | 22      | -       | PDTC124TT                                                                         | PDTA124TT | PDTC124TU                                                                          | PDTA124TU |
|                       |                     |                                                                                   | 47      | -       | PDTC144TT                                                                         | PDTA144TT | PDTC144TU                                                                          | PDTA144TU |
|                       |                     |                                                                                   | 100     | -       | PDTC115TT                                                                         | PDTA115TT | PDTC115TU                                                                          | PDTA115TU |

| Package               |                     |                                                                                     |         |         | SOT416 (SC-75)                                                                      |           | SOT883 (SC-101)                                                                      |           |
|-----------------------|---------------------|-------------------------------------------------------------------------------------|---------|---------|-------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------|-----------|
|                       |                     |                                                                                     |         |         |  |           |  |           |
| Size (mm)             |                     |                                                                                     |         |         | 1.6 x 0.8 x 0.77                                                                    |           | 1.0 x 0.6 x 0.5                                                                      |           |
| P <sub>tot</sub> (mW) |                     |                                                                                     |         |         | 150                                                                                 |           | 250                                                                                  |           |
| V <sub>CEO</sub> (V)  | I <sub>c</sub> (mA) | Configuration                                                                       | R1 (kΩ) | R2 (kΩ) | NPN                                                                                 | PNP       | NPN                                                                                  | PNP       |
| 50                    | 100                 |  | 1       | 1       |                                                                                     | PDTA113EE |                                                                                      | PDTA113EM |
|                       |                     |                                                                                     | 2.2     | 2.2     | PDTC123EE                                                                           | PDTA123EE | PDTC123EM                                                                            | PDTA123EM |
|                       |                     |                                                                                     | 4.7     | 4.7     | PDTC143EE                                                                           | PDTA143EE | PDTC143EM                                                                            | PDTA143EM |
|                       |                     |                                                                                     | 10      | 10      | PDTC114EE                                                                           | PDTA114EE | PDTC114EM                                                                            | PDTA114EM |
|                       |                     |                                                                                     | 22      | 22      | PDTC124EE                                                                           | PDTA124EE | PDTC124EM                                                                            | PDTA124EM |
|                       |                     |                                                                                     | 47      | 47      | PDTC144EE                                                                           | PDTA144EE | PDTC144EM                                                                            | PDTA144EM |
|                       |                     |                                                                                     | 100     | 100     | PDTC115EE                                                                           | PDTA115EE | PDTC115EM                                                                            | PDTA115EM |
|                       |                     |                                                                                     | 1       | 10      |                                                                                     | PDTA113ZE |                                                                                      | PDTA113ZM |
|                       |                     |                                                                                     | 2.2     | 10      | PDTC123YE                                                                           | PDTA123YE | PDTC123YM                                                                            | PDTA123YM |
|                       |                     |                                                                                     | 2.2     | 47      | PDTC123JE                                                                           | PDTA123JE | PDTC123JM                                                                            | PDTA123JM |
|                       |                     |                                                                                     | 4.7     | 10      | PDTC143XE                                                                           | PDTA143XE | PDTC143XM                                                                            | PDTA143XM |
|                       |                     |                                                                                     | 4.7     | 47      | PDTC143ZE                                                                           | PDTA143ZE | PDTC143ZM                                                                            | PDTA143ZM |
|                       |                     |                                                                                     | 10      | 47      | PDTC114YE                                                                           | PDTA114YE | PDTC114YM                                                                            | PDTA114YM |
|                       |                     |                                                                                     | 22      | 47      | PDTC124XE                                                                           | PDTA124XE | PDTC124XM                                                                            | PDTA124XM |
|                       |                     |                                                                                     | 47      | 10      | PDTC144VE                                                                           | PDTA144VE | PDTC144VM                                                                            | PDTA144VM |
|                       |                     |                                                                                     | 47      | 22      | PDTC144WE                                                                           | PDTA144WE | PDTC144WM                                                                            | PDTA144WM |
|                       |                     |  | 2.2     | -       | PDTC123TE                                                                           | PDTA123TE | PDTC123TM                                                                            | PDTA123TM |
|                       |                     |                                                                                     | 4.7     | -       | PDTC143TE                                                                           | PDTA143TE | PDTC143TM                                                                            | PDTA143TM |
|                       |                     |                                                                                     | 10      | -       | PDTC114TE                                                                           | PDTA114TE | PDTC114TM                                                                            | PDTA114TM |
|                       |                     |                                                                                     | 22      | -       | PDTC124TE                                                                           | PDTA124TE | PDTC124TM                                                                            | PDTA124TM |
|                       |                     |                                                                                     | 47      | -       | PDTC144TE                                                                           | PDTA144TE | PDTC144TM                                                                            | PDTA144TM |
|                       |                     |                                                                                     | 100     | -       | PDTC115TE                                                                           | PDTA115TE | PDTC115TM                                                                            | PDTA115TM |

RETs 100 mA double

| Package               |                     |         |         |         | SOT457 (SC-74)                                                                      |         | SOT363 (SC-88)                                                                      |         |         | SOT666                                                                              |         |         |
|-----------------------|---------------------|---------|---------|---------|-------------------------------------------------------------------------------------|---------|-------------------------------------------------------------------------------------|---------|---------|-------------------------------------------------------------------------------------|---------|---------|
|                       |                     |         |         |         |  |         |  |         |         |  |         |         |
| Size (mm)             |                     |         |         |         | 2.9 x 1.5 x 1.0                                                                     |         | 2.0 x 1.25 x 0.95                                                                   |         |         | 1.6 x 1.2 x 0.55                                                                    |         |         |
| P <sub>tot</sub> (mW) |                     |         |         |         | 600                                                                                 |         | 300                                                                                 |         |         | 300                                                                                 |         |         |
| V <sub>CEO</sub> (V)  | I <sub>c</sub> (mA) |         | R1 (kΩ) | R2 (kΩ) | NPN/NPN                                                                             | NPN/PNP | NPN/NPN                                                                             | NPN/PNP | PNP/PNP | NPN/NPN                                                                             | NPN/PNP | PNP/PNP |
| 50                    | 100                 | R1 = R2 | 2.2     | 2.2     |                                                                                     |         | PUMH20                                                                              | PUMD20  | PUMB20  | PEMH20                                                                              | PEMD20  | PEMB20  |
|                       |                     |         | 4.7     | 4.7     |                                                                                     |         | PUMH15                                                                              | PUMD15  | PUMB15  | PEMH15                                                                              | PEMD15  | PEMB15  |
|                       |                     |         | 10      | 10      |                                                                                     | PIMD3   | PUMH11                                                                              | PUMD3   | PUMB11  | PEMH11                                                                              | PEMD3   | PEMB11  |
|                       |                     |         | 22      | 22      |                                                                                     | PIMD2   | PUMH1                                                                               | PUMD2   | PUMB1   | PEMH1                                                                               | PEMD2   | PEMB1   |
|                       |                     |         | 47      | 47      |                                                                                     |         | PUMH2                                                                               | PUMD12  | PUMB2   | PEMH2                                                                               | PEMD12  | PEMB2   |
|                       |                     |         | 100     | 100     |                                                                                     |         | PUMH24                                                                              | PUMD24  | PUMB24  | PEMH24                                                                              | PEMD24  | PEMB24  |
|                       |                     | R1 ≠ R2 | 2.2     | 47      |                                                                                     |         | PUMH10                                                                              | PUMD10  | PUMB10  | PEMH10                                                                              | PEMD10  | PEMB10  |
|                       |                     |         | 4.7     | 10      |                                                                                     |         | PUMH18                                                                              | PUMD18  | PUMB18  | PEMH18                                                                              | PEMD18  | PEMB18  |
|                       |                     |         | 4.7     | 47      |                                                                                     |         | PUMH13                                                                              | PUMD13  | PUMB13  | PEMH13                                                                              | PEMD13  | PEMB13  |
|                       |                     |         | 10      | 47      | PIMH9                                                                               |         | PUMH9                                                                               | PUMD9   | PUMB9   | PEMH9                                                                               | PEMD9   | PEMB9   |
|                       |                     |         | 22      | 47      |                                                                                     |         | PUMH16                                                                              | PUMD16  | PUMB16  | PEMH16                                                                              | PEMD16  | PEMB16  |
|                       |                     |         | 47      | 22      |                                                                                     |         | PUMH17                                                                              | PUMD17  | PUMB17  | PEMH17                                                                              | PEMD17  | PEMB17  |
|                       |                     | Only R1 | 47/2.2  | 47/47   |                                                                                     |         |                                                                                     | PUMD48  |         |                                                                                     | PEMD48  |         |
|                       |                     |         | 2.2     | -       |                                                                                     |         | PUMH30                                                                              | PUMD30  | PUMB30  | PEMH30                                                                              | PEMD30  | PEMB30  |
|                       |                     |         | 4.7     | -       |                                                                                     |         | PUMH7                                                                               | PUMD6   | PUMB3   | PEMH7                                                                               | PEMD6   | PEMB3   |
|                       |                     |         | 10      | -       |                                                                                     |         | PUMH4                                                                               | PUMD4   | PUMB4   | PEMH4                                                                               | PEMD4   | PEMB4   |
|                       |                     |         | 22      | -       |                                                                                     |         | PUMH19                                                                              | PUMD19  | PUMB19  | PEMH19                                                                              | PEMD19  | PEMB19  |
|                       |                     |         | 47      | -       |                                                                                     |         | PUMH14                                                                              | PUMD14  | PUMB14  | PEMH14                                                                              | PEMD14  | PEMB14  |

Small-signal  
transistors

RETs 500 mA

types in **bold** represent new products

| Package               |                     |         |         |         | SOT457 (SC-74)                                                                        |               | SOT23                                                                                 |           |
|-----------------------|---------------------|---------|---------|---------|---------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------|-----------|
|                       |                     |         |         |         |  |               |  |           |
| Size (mm)             |                     |         |         |         | 2.9 x 1.5 x 1.0                                                                       |               | 2.9 x 1.3 x 1.0                                                                       |           |
| P <sub>tot</sub> (mW) |                     |         |         |         | 600                                                                                   |               | 250                                                                                   |           |
| V <sub>CEO</sub> (V)  | I <sub>c</sub> (mA) |         | R1 (kΩ) | R2 (kΩ) | NPN/NPN                                                                               | NPN/PNP       | NPN                                                                                   | PNP       |
| 50                    | 500                 | R1 = R2 | 1.0     | 1.0     |                                                                                       |               | PDTD113ET                                                                             | PDTB113ET |
|                       |                     |         | 2.2     | 2.2     |                                                                                       |               | PDTD123ET                                                                             | PDTB123ET |
|                       |                     | R1 ≠ R2 | 1.0     | 10      | PIMN31                                                                                | <b>PIMC31</b> | PDTD113ZT                                                                             | PDTB113ZT |
|                       |                     |         | 2.2     | 10      |                                                                                       |               | PDTD123YT                                                                             | PDTB123YT |
|                       |                     | Only R1 | 2.2     | -       |                                                                                       |               | PDTD123TT                                                                             | PDTB123TT |

Low V<sub>CEsat</sub> (BISS) RETs

| Package               |                      |                     |         |         |         | SOT23                                                                                 |
|-----------------------|----------------------|---------------------|---------|---------|---------|---------------------------------------------------------------------------------------|
|                       |                      |                     |         |         |         |  |
| Size (mm)             |                      |                     |         |         |         | 2.9 x 1.3 x 1.0                                                                       |
| P <sub>tot</sub> (mW) |                      |                     |         |         |         | 250                                                                                   |
| Polarity              | V <sub>CEO</sub> (V) | I <sub>c</sub> (mA) |         | R1 (kΩ) | R2 (kΩ) |                                                                                       |
| NPN                   | 40                   | 600                 | R1 = R2 | 1       | 1       | PBRN113ET                                                                             |
|                       |                      |                     |         | 2.2     | 2.2     | PBRN123ET                                                                             |
|                       |                      |                     | R1 ≠ R2 | 1       | 10      | PBRN113ZT                                                                             |
|                       |                      |                     |         | 2.2     | 10      | PBRN123YT                                                                             |
| PNP                   | 40                   | 600                 | R1 = R2 | 1       | 1       | PBRP113ET                                                                             |
|                       |                      |                     |         | 2.2     | 2.2     | PBRP123ET                                                                             |
|                       |                      |                     | R1 ≠ R2 | 1       | 10      | PBRP113ZT                                                                             |
|                       |                      |                     |         | 2.2     | 10      | PBRP123YT                                                                             |

Low V<sub>CEsat</sub> (BISS) transistors single NPN

types in **bold** represent new products

| Package                 |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         | SOT223<br>(SC-73)                                                                  | SOT89<br>(SC-62)                                                                    | SOT457<br>(SC-74)                                                                   |            | SOT23                                                                               | SOT1061                                                                             | SOT323<br>(SC-70)                                                                   | SOT363<br>(SC-88)                                                                   | SOT416<br>(SC-75)                                                                   | SOT666                                                                              | SOT883<br>(SC-101)                                                                  |  |
|-------------------------|-----------------------|------------------------|----------------------------|-------------------------|--------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------|-------------------------|-------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
|                         |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         |  |  |  |            |  |  |  |  |  |  |  |  |
| Size (mm)               |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         | 6.5 × 3.5 × 1.65                                                                   | 4.5 × 2.5 × 1.5                                                                     | 2.9 × 1.5 × 1.0                                                                     |            | 2.9 × 1.3 × 1.0                                                                     | 2.0 × 2.0 × 0.65                                                                    | 2.0 × 1.25 × 0.95                                                                   | 2.0 × 1.25 × 0.95                                                                   | 1.6 × 0.8 × 0.77                                                                    | 1.6 × 1.2 × 0.55                                                                    | 1.0 × 0.6 × 0.5                                                                     |  |
| P <sub>tot</sub> (mW)   |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                   |                         |                         | 1700                                                                               | 1650                                                                                | 750                                                                                 |            | 480                                                                                 | 1400                                                                                | 350                                                                                 | 430                                                                                 | 250                                                                                 | 500                                                                                 | 250                                                                                 |  |
| V <sub>CEO</sub><br>(V) | I <sub>C</sub><br>(A) | I <sub>CM</sub><br>(A) | h <sub>FE</sub><br>min/typ | @ I <sub>C</sub><br>(A) | @ V <sub>CE</sub><br>(V) | R <sub>CEsat</sub> typ<br>(mΩ);<br>I <sub>C</sub> /I <sub>B</sub> = 10 | V <sub>CEsat</sub> typ<br>(mV);<br>I <sub>C</sub> = 0.5 A;<br>I <sub>B</sub> = 0.05 A | V <sub>CEsat</sub><br>max<br>(mV) | @ I <sub>C</sub><br>(A) | @ I <sub>B</sub><br>(A) |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 12                      | 5.3                   | 10.6                   | 300/530                    | 0.5                     | 2                        | 27 <sup>1)</sup>                                                       | 18                                                                                    | 200                               | 5.3                     | 0.265                   | PBSS301NZ                                                                          | PBSS301NX                                                                           |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.8                   | 11.6                   | 300/530                    | 0.5                     | 2                        | 29 <sup>1)</sup>                                                       | 18                                                                                    | 235                               | 5.8                     | 0.29                    |                                                                                    |                                                                                     |                                                                                     |            | PBSS4612PA                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                        | 33 <sup>1)</sup>                                                       | 20                                                                                    | 275                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 15                      | 0.5                   | 1.0                    | 200/325                    | 0.01                    | 2                        | 360                                                                    | -                                                                                     | 250                               | 0.5                     | 0.05                    |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS2515M                                                                           |  |
|                         |                       |                        | 200/425                    | 0.01                    | 2                        | 300                                                                    | 200                                                                                   | 250                               | 0.5                     | 0.05                    |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     | PBSS2515E                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 20                      | 1.0                   | 3.0                    | 350/470                    | 0.1                     | 2                        | 220                                                                    | 110 <sup>2)</sup>                                                                     | 250                               | 1                       | 0.05                    |                                                                                    |                                                                                     |                                                                                     | PBSS4120T  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 2.0                   | 4.0                    | 220/410                    | 0.5                     | 2                        | 140                                                                    | 70                                                                                    | 350                               | 2                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS4220V                                                                           |                                                                                     |                                                                                     |  |
|                         |                       | 5.0                    | 220/330                    | 0.1                     | 2                        | 80                                                                     | 45                                                                                    | 310                               | 3                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     | PBSS4320T  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 3.0                   | 5.0                    | 220/390                    | 0.5                     | 2                        | 85                                                                     | 40                                                                                    | 310                               | 3                       | 0.3                     |                                                                                    |                                                                                     | PBSS4320X                                                                           |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 4.0                   | 15.0                   | 300/450                    | 0.5                     | 2                        | 50                                                                     | 30                                                                                    | 280                               | 4                       | 0.4                     |                                                                                    |                                                                                     | PBSS301ND                                                                           |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 4.3                   | 8.0                    | 300/550                    | 0.5                     | 2                        | 36                                                                     | 21                                                                                    | 220                               | 4                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     | PBSS4021NT |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.0                   | 10.0                   | 300/450                    | 0.5                     | 2                        | 32                                                                     | 35                                                                                    | 220                               | 5                       | 0.5                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.3                   | 10.6                   | 300/570                    | 0.5                     | 2                        | 27 <sup>1)</sup>                                                       | 20                                                                                    | 200                               | 5.3                     | 0.265                   |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.8                   | 10.2                   | 300/570                    | 0.5                     | 2                        | 30 <sup>1)</sup>                                                       | 20                                                                                    | 250                               | 5.8                     | 0.29                    | PBSS302NZ                                                                          |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                        | 33 <sup>1)</sup>                                                       | 20                                                                                    | 275                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     | PBSS4620PA                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 7.0                   | 15.0                   | 300/550                    | 0.5                     | 2                        | 19                                                                     | 12                                                                                    | 210                               | 7                       | 0.35                    |                                                                                    |                                                                                     | PBSS4021NX                                                                          |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 30                      | 1.0                   | 3.0                    | 300/550                    | 0.5                     | 2                        | 14                                                                     | 9                                                                                     | 170                               | 8                       | 0.4                     | PBSS4021NZ                                                                         |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 2.0                   | 3.0                    | 300/450                    | 0.5                     | 2                        | 240                                                                    | 120 <sup>2)</sup>                                                                     | 270                               | 1                       | 0.05                    |                                                                                    |                                                                                     |                                                                                     | PBSS4130T  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 2.6                   | 5.0                    | 300/500                    | 0.5                     | 2                        | 76                                                                     | 80                                                                                    | 320                               | 3                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     | PBSS4230T  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 3.0                   | 5.0                    | 300/490                    | 0.5                     | 2                        | 80                                                                     | 45                                                                                    | 300                               | 3                       | 0.3                     |                                                                                    |                                                                                     | PBSS4330X                                                                           |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 3.5                   | 6.0                    | 300/500                    | 0.5                     | 2                        | 50                                                                     | 70                                                                                    | 300                               | 4                       | 0.4                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 4.7                   | 10.0                   | 300/500                    | 0.5                     | 2                        | 45                                                                     | 57                                                                                    | 250                               | 4                       | 0.4                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.1                   | 10.2                   | 300/480                    | 0.5                     | 2                        | 30 <sup>1)</sup>                                                       | 20                                                                                    | 220                               | 5.1                     | 0.255                   |                                                                                    |                                                                                     | PBSS4032NX <sup>3)</sup>                                                            |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.4                   | 10.0                   | 300/500                    | 0.5                     | 2                        | 45                                                                     | 57                                                                                    | 340                               | 5.4                     | 0.27                    | PBSS4032NZ <sup>3)</sup>                                                           | PBSS303NX                                                                           |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.5                   | 11.0                   | 300/480                    | 0.5                     | 2                        | 31 <sup>1)</sup>                                                       | 20                                                                                    | 240                               | 5.5                     | 0.275                   | PBSS303NZ                                                                          |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 6.0                   | 7.0                    | 280/450                    | 0.5                     | 2                        | 35 <sup>1)</sup>                                                       | 21                                                                                    | 275                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     | PBSS4630PA                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 40                      | 0.5                   | 1.0                    | 200/550                    | 0.01                    | 2                        | 380                                                                    | 200 <sup>2)</sup>                                                                     | 250                               | 0.5                     | 0.05                    |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS2540M                                                                           |  |
|                         |                       |                        | 200/350                    | 0.01                    | 2                        | 380                                                                    | 190                                                                                   | 250                               | 0.5                     | 0.05                    |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     | PBSS2540E                                                                           |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 1.0                   | 3.0                    | 300/-                      | 0.5                     | 5                        | 150                                                                    | 70                                                                                    | 440                               | 2                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS4140V                                                                           |                                                                                     |  |
|                         |                       |                        | 300/440                    | 0.5                     | 5                        | 240                                                                    | 130                                                                                   | 500                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     | PBSS4140U  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       | 2.0                    | 300/510                    | 0.5                     | 5                        | 230                                                                    | 120                                                                                   | 500                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     | PMMT491A   |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 300/420                    | 0.5                     | 5                        | 150                                                                    | 130                                                                                   | 500                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     | PBSS4140T  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 2.0                   | 3.0                    | 300/400                    | 0.5                     | 5                        | 150                                                                    | 70                                                                                    | 400                               | 2                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS4240V                                                                           |  |
|                         |                       |                        | 350/470                    | 0.1                     | 2                        | 120                                                                    | 70                                                                                    | 320                               | 2                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     | PBSS4240Y                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       | 300/450                | 0.5                        | 2                       | 120                      | 70                                                                     | 320                                                                                   | 2                                 | 0.2                     |                         |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       | 4.0                    | 15.0                       | 300/520                 | 0.5                      | 2                                                                      | 55                                                                                    | 35                                | 300                     | 4                       | 0.4                                                                                |                                                                                     |                                                                                     | PBSS302ND  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 5.0                     | 10.0                  | 300/500                | 0.5                        | 2                       | 40                       | 21                                                                     | 355                                                                                   | 5                                 | 0.5                     |                         |                                                                                    | PBSS4540X                                                                           |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 10.0                  | 300/500                | 0.5                        | 2                       | 42                       | 25                                                                     | 355                                                                                   | 5                                 | 0.5                     | PBSS4540Z               |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 50                      | 2.0                   | 5.0                    | 300/495                    | 0.5                     | 2                        | 100                                                                    | 60                                                                                    | 260                               | 2                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     | PBSS4350T  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 300/-                      | 0.5                     | 2                        | 160                                                                    | 90 <sup>2)</sup>                                                                      | 320                               | 2                       | 0.2                     |                                                                                    |                                                                                     | PBSS4250X                                                                           |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 3.0                   | 5.0                    | 200/280                    | 0.5                     | 2                        | 110                                                                    | 65                                                                                    | 290                               | 2                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 300/460                    | 0.5                     | 2                        | 75                                                                     | 50                                                                                    | 370                               | 3                       | 0.3                     |                                                                                    |                                                                                     | PBSS4350X                                                                           |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 200/280                    | 0.5                     | 2                        | 110                                                                    | 60 <sup>1)</sup>                                                                      | 290                               | 2                       | 0.2                     | PBSS4350Z                                                                          |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 60                      | 1.0                   | 2.0                    | 200/400                    | 0.5                     | 5                        | 200                                                                    | 110                                                                                   | 250                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS4160V                                                                           |  |
|                         |                       |                        | 200/420                    | 0.5                     | 5                        | 230                                                                    | 120                                                                                   | 280                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     | PBSS4160U                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 200/350                    | 0.5                     | 5                        | 200                                                                    | 110                                                                                   | 250                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 3.0                   | 6.0                    | 345/570                    | 0.5                     | 2                        | 65                                                                     | 40                                                                                    | 260                               | 3                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 3.8                   | 8.0                    | 300/500                    | 0.5                     | 2                        | 46                                                                     | 29                                                                                    | 200                               | 3                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 4.7                   | 9.4                    | 300/520                    | 0.5                     | 2                        | 37 <sup>1)</sup>                                                       | 25                                                                                    | 245                               | 4.7                     | 0.235                   |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.2                   | 10.4                   | 300/520                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                       | 25                                                                                    | 280                               | 5.2                     | 0.26                    | PBSS304NZ                                                                          | PBSS304NX                                                                           |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                        | 34 <sup>1)</sup>                                                       | 22                                                                                    | 290                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 6.2                   | 15.0                   | 300/500                    | 0.5                     | 2                        | 25                                                                     | 17                                                                                    | 230                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 7.0                     | 15.0                  | 300/500                | 0.5                        | 2                       | 17.5                     | 13                                                                     | 195                                                                                   | 7                                 | 0.35                    | PBSS4041NZ              |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 80                      | 3.0                   | 6.0                    | 240/360                    | 0.5                     | 2                        | 67                                                                     | 40                                                                                    | 255                               | 3                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 4.0                   | 10.0                   | 250/400                    | 0.5                     | 2                        | 43 <sup>1)</sup>                                                       | 25                                                                                    | 230                               | 4                       | 0.2                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 4.6                   | 9.2                    | 300/470                    | 0.5                     | 2                        | 37 <sup>1)</sup>                                                       | 25                                                                                    | 240                               | 4.6                     | 0.23                    |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.1                   | 10.2                   | 300/470                    | 0.5                     | 2                        | 38 <sup>1)</sup>                                                       | 25                                                                                    | 270                               | 5.1                     | 0.255                   | PBSS305NZ                                                                          |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.6                   | 7.0                    | 270/425                    | 0.5                     | 2                        | 40 <sup>1)</sup>                                                       | 25                                                                                    | 320                               | 5.6                     | 0.28                    |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     | PBSS4580PA                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 100                     | 1.0                   | 3.0                    | 150/400                    | 0.25                    | 10                       | 160                                                                    | 80                                                                                    | 200                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 150/300                    | 0.25                    | 10                       | 165                                                                    | 70                                                                                    | 200                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     | PBSS8110T  |                                                                                     |                                                                                     | PBSS8110Y                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 150/290                    | 0.25                    | 10                       | 160                                                                    | 75                                                                                    | 200                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 150/290                    | 0.25                    | 10                       | 165                                                                    | 73                                                                                    | 200                               | 1                       | 0.1                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         |                       |                        | 150/290                    | 0.25                    | 10                       | 160                                                                    | 73                                                                                    | 200                               | 1                       | 0.1                     | PBSS8110Z                                                                          |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 3.0                   | 4.0                    | 170/275                    | 0.5                     | 2                        | 72                                                                     | 45                                                                                    | 360                               | 4                       | 0.4                     |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 4.5                   | 9.0                    | 200/330                    | 0.5                     | 2                        | 38 <sup>1)</sup>                                                       | 27                                                                                    | 245                               | 4.5                     | 0.225                   |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                         | 5.1                   | 10.2                   | 200/330                    | 0.5                     | 2                        | 43 <sup>1)</sup>                                                       | 27                                                                                    | 300                               | 5.1                     | 0.255                   | PBSS306NZ                                                                          |                                                                                     |                                                                                     |            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 5.2                     | 6.0                   | 180/285                | 0.5                        | 2                       | 48 <sup>1)</sup>         | 30                                                                     | 340                                                                                   | 5.2                               | 0.26                    |                         |                                                                                    |                                                                                     |                                                                                     |            |                                                                                     | PBSS8510PA                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |

Low V<sub>CEsat</sub> (BISS) transistors single PNP

types in **bold** represent new products

| Package                 |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                |                         |                         | SOT223<br>(SC-73)                                                                   | SOT89<br>(SC-62)                                                                    | SOT457<br>(SC-74)                                                                   |           | SOT23                                                                               | SOT1061                                                                             | SOT323<br>(SC-70)                                                                   | SOT363<br>(SC-88)                                                                   | SOT416<br>(SC-75)                                                                   | SOT666                                                                              | SOT883<br>(SC-101)                                                                  |
|-------------------------|-----------------------|------------------------|----------------------------|-------------------------|--------------------------|------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------|-------------------------|-------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Size (mm)               |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                |                         |                         |  |  |  |           |  |  |  |  |  |  |  |
| P <sub>tot</sub> (mW)   |                       |                        |                            |                         |                          |                                                                        |                                                                                       |                                |                         |                         | 1700                                                                                | 1650                                                                                | 750                                                                                 |           | 480                                                                                 | 1400                                                                                | 350                                                                                 | 430                                                                                 | 250                                                                                 | 500                                                                                 | 250                                                                                 |
| V <sub>CEO</sub><br>(V) | I <sub>C</sub><br>(A) | I <sub>CM</sub><br>(A) | h <sub>FE</sub><br>min/typ | Ⓢ I <sub>C</sub><br>(V) | Ⓢ V <sub>CE</sub><br>(V) | R <sub>CEsat</sub> typ<br>(mΩ);<br>I <sub>C</sub> /I <sub>B</sub> = 10 | V <sub>CEsat</sub> typ<br>(mV);<br>I <sub>C</sub> = 0.5 A;<br>I <sub>C</sub> = 0.05 A | V <sub>CEsat</sub> max<br>(mV) | Ⓢ I <sub>C</sub><br>(A) | Ⓢ I <sub>B</sub><br>(A) |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 12                      | 5.3                   | 10.6                   | 250/400                    | 0.5                     | 2                        | 28 <sup>1)</sup>                                                       | 20                                                                                    | 210                            | 5.3                     | 0.265                   | PBSS301PZ                                                                           | PBSS301PX                                                                           |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 5.7                   | 11.4                   | 250/400                    | 0.5                     | 2                        | 30 <sup>1)</sup>                                                       | 20                                                                                    | 245                            | 5.7                     | 0.285                   |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 6.0                   | 7.0                    | 220/335                    | 0.5                     | 2                        | 33 <sup>1)</sup>                                                       | 20                                                                                    | 300                            | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 15                      | 0.5                   | 1.0                    | 200/260                    | 0.01                    | 2                        | 300                                                                    | 150                                                                                   | 250                            | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS3515M                                                                           |
|                         |                       |                        | 200/325                    | 0.01                    | 2                        | 300                                                                    | 150                                                                                   | 250                            | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS3515E                                                                           |                                                                                     |                                                                                     |
| 20                      | 1.0                   | 2.0                    | 300/450                    | 0.1                     | 2                        | 250                                                                    | 125 <sup>2)</sup>                                                                     | 250                            | 1                       | 0.05                    |                                                                                     |                                                                                     |                                                                                     |           | PBSS5120T                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 4.0                        | 220/440                 | 0.1                      | 2                                                                      | 140                                                                                   | 75                             | 390                     | 2                       | 0.2                                                                                 |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS5220V                                                                           |                                                                                     |
|                         |                       |                        | 3.0                        | 225/ -                  | 0.5                      | 2                                                                      | 115                                                                                   | 80 <sup>2)</sup>               | 225                     | 2                       | 0.2                                                                                 |                                                                                     |                                                                                     | PBSS5220T |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.0                   | 3.0                    | 220/420                    | 0.5                     | 2                        | 75                                                                     | 50                                                                                    | 210                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     | PBSS5320T |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/ -                     | 0.5                     | 2                        | 85                                                                     | 80 <sup>2)</sup>                                                                      | 400                            | 3                       | 0.3                     |                                                                                     |                                                                                     | PBSS5320D                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 220/450                    | 0.5                     | 2                        | 90                                                                     | 50                                                                                    | 300                            | 3                       | 0.3                     |                                                                                     | PBSS5320X                                                                           |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 3.0                   | 5.0                    | 250/400                    | 0.5                     | 2                        | 55                                                                     | 35                                                                                    | 375                            | 4                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS4021PT                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 250/400                    | 0.5                     | 2                        | 50                                                                     | 35                                                                                    | 280                            | 4                       | 0.4                     |                                                                                     |                                                                                     | PBSS301PD                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 300/430                    | 0.5                     | 2                        | 34                                                                     | 45                                                                                    | 270                            | 5                       | 0.5                     |                                                                                     |                                                                                     | PBSS5520X                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 5.1                   | 10.2                   | 250/370                    | 0.5                     | 2                        | 32 <sup>1)</sup>                                                       | 25                                                                                    | 230                            | 5.1                     | 0.255                   |                                                                                     |                                                                                     | PBSS302PX                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 250/370                    | 0.5                     | 2                        | 34 <sup>1)</sup>                                                       | 25                                                                                    | 265                            | 5.5                     | 0.275                   | PBSS302PZ                                                                           |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 230/345                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                       | 25                                                                                    | 350                            | 6                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     | PBSS5620PA                                                                          |                                                                                     |                                                                                     |                                                                                     |
|                         | 6.2                   | 15.0                   | 250/400                    | 0.5                     | 2                        | 25                                                                     | 18                                                                                    | 240                            | 6                       | 0.3                     |                                                                                     |                                                                                     | PBSS4021PX                                                                          |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 250/400                    | 0.5                     | 2                        | 22                                                                     | 16                                                                                    | 240                            | 7                       | 0.35                    | PBSS4021PZ                                                                          |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 250/400                    | 0.5                     | 2                        | 220                                                                    | 110                                                                                   | 225                            | 1                       | 0.05                    |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 30                      | 1.0                   | 3.0                    | 260/350                    | 0.5                     | 2                        | 160                                                                    | 70                                                                                    | 350                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS5130T                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.0                   | 3.0                    | 300/450                    | 0.1                     | 2                        | 110                                                                    | 95                                                                                    | 330                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS5230T                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.4                   | 5.0                    | 200/320                    | 0.5                     | 2                        | 88                                                                     | 87                                                                                    | 395                            | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS4032PT <sup>3)</sup>                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.7                   | 5.0                    | 200/350                    | 0.5                     | 2                        | 80                                                                     | 50                                                                                    | 320                            | 3                       | 0.3                     |                                                                                     |                                                                                     | PBSS4032PD <sup>3)</sup>                                                            |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 3.0                   | 5.0                    | 200/380                    | 0.5                     | 2                        | 58                                                                     | 70                                                                                    | 345                            | 4                       | 0.4                     |                                                                                     |                                                                                     | PBSS5330X                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 4.2                   | 10.0                   | 200/350                    | 0.5                     | 2                        | 58                                                                     | 70                                                                                    | 400                            | 4                       | 0.2                     |                                                                                     |                                                                                     | PBSS4032PX <sup>3)</sup>                                                            |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 4.4                   | 10.0                   | 200/350                    | 0.5                     | 2                        | 32 <sup>1)</sup>                                                       | 25                                                                                    | 230                            | 5.1                     | 0.255                   | PBSS4032PZ <sup>3)</sup>                                                            |                                                                                     |                                                                                     | PBSS303PX |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 5.1                   | 10.2                   | 250/400                    | 0.5                     | 2                        | 35 <sup>1)</sup>                                                       | 25                                                                                    | 265                            | 5.3                     | 0.265                   |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 5.3                   | 10.6                   | 250/400                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                       | 25                                                                                    | 350                            | 6                       | 0.3                     | PBSS303PZ                                                                           |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 6.0                   | 7.0                    | 200/335                    | 0.5                     | 2                        | 440                                                                    | 220                                                                                   | 350                            | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS3540M                                                                           |
| 40                      | 0.5                   | 1.0                    | 200/380                    | 0.01                    | 2                        | 440                                                                    | 230                                                                                   | 350                            | 0.5                     | 0.05                    |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS3540E                                                                           |                                                                                     |                                                                                     |
|                         | 1.0                   | 2.0                    | 300/ -                     | 0.1                     | 5                        | 200                                                                    | 120                                                                                   | 310                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     | PBSS5140U                                                                           |                                                                                     |                                                                                     | PBSS5140V                                                                           |                                                                                     |
|                         |                       |                        | 300/520                    | 0.1                     | 5                        | 230                                                                    | 130                                                                                   | 500                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 300/800                    | 0.1                     | 5                        | 250                                                                    | 130                                                                                   | 500                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS5240T                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 1.8                   | 3.0                    | 300/510                    | 0.1                     | 5                        | 230                                                                    | 130                                                                                   | 500                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 300/450                    | 0.1                     | 5                        | 185                                                                    | 100                                                                                   | 530                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS5240V                                                                           |                                                                                     |
|                         |                       |                        | 300/ -                     | 0.1                     | 2                        | 200                                                                    | 110 <sup>2)</sup>                                                                     | 350                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.0                   | 3.0                    | 300/450                    | 0.1                     | 2                        | 150                                                                    | 70                                                                                    | 350                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/310                    | 0.5                     | 2                        | 55                                                                     | 46                                                                                    | 300                            | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     | PBSS302PD |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 250/370                    | 0.5                     | 2                        | 45                                                                     | 33                                                                                    | 375                            | 5                       | 0.5                     |                                                                                     |                                                                                     | PBSS5540X                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 50                      | 4.0                   | 10.0                   | 250/350                    | 0.5                     | 2                        | 55                                                                     | 40 <sup>1)</sup>                                                                      | 160                            | 2                       | 0.2                     | PBSS5540Z                                                                           |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.0                   | 3.0                    | 200/ -                     | 0.5                     | 2                        | 150                                                                    | 90 <sup>2)</sup>                                                                      | 300                            | 2                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS5250T                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/360                    | 0.5                     | 2                        | 90                                                                     | 55                                                                                    | 270                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     | PBSS5350T |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/ -                     | 0.5                     | 2                        | 160                                                                    | 90 <sup>2)</sup>                                                                      | 320                            | 2                       | 0.2                     |                                                                                     |                                                                                     | PBSS5250X                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 3.0                   | 5.0                    | 200/300                    | 0.5                     | 2                        | 120                                                                    | 70                                                                                    | 300                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     | PBSS5350D |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/375                    | 0.5                     | 2                        | 120                                                                    | 70                                                                                    | 390                            | 3                       | 0.3                     |                                                                                     |                                                                                     | PBSS5350X                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 60                      | 1.0                   | 2.0                    | 150/250                    | 0.5                     | 5                        | 220                                                                    | 120                                                                                   | 330                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS5160V                                                                           |                                                                                     |
|                         |                       |                        | 150/250                    | 0.5                     | 5                        | 255                                                                    | 135                                                                                   | 340                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     | PBSS5160U                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 150/250                    | 0.5                     | 5                        | 220                                                                    | 120                                                                                   | 330                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS5160T                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.7                   | 8.0                    | 200/300                    | 0.5                     | 2                        | 80                                                                     | 49                                                                                    | 360                            | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS4041PT                                                                          |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 3.0                   | 6.0                    | 180/265                    | 0.5                     | 2                        | 70                                                                     | 55                                                                                    | 290                            | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS303PD |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 4.2                   | 8.4                    | 200/295                    | 0.5                     | 2                        | 53 <sup>1)</sup>                                                       | 35                                                                                    | 310                            | 4.2                     | 0.21                    |                                                                                     |                                                                                     | PBSS304PX                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 4.5                   | 9.0                    | 200/295                    | 0.5                     | 2                        | 59 <sup>1)</sup>                                                       | 35                                                                                    | 375                            | 4.5                     | 0.225                   | PBSS304PZ                                                                           |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 5.0                   | 15.0                   | 170/260                    | 0.5                     | 2                        | 35 <sup>1)</sup>                                                       | 55                                                                                    | 450                            | 5                       | 0.25                    |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/300                    | 0.5                     | 2                        | 40                                                                     | 30                                                                                    | 300                            | 5                       | 0.5                     |                                                                                     |                                                                                     | PBSS4041PX                                                                          |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/300                    | 0.5                     | 2                        | 29                                                                     | 22                                                                                    | 285                            | 6                       | 0.3                     | PBSS4041PZ                                                                          |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 80                      | 3.0                   | 5.0                    | 155/225                    | 0.5                     | 2                        | 71                                                                     | 55                                                                                    | 290                            | 3                       | 0.3                     |                                                                                     |                                                                                     |                                                                                     | PBSS304PD |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 4.0                   | 10.0                   | 180/265                    | 0.5                     | 2                        | 65 <sup>1)</sup>                                                       | 40                                                                                    | 420                            | 4                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/300                    | 0.5                     | 2                        | 50                                                                     | 35                                                                                    | 380                            | 5                       | 0.5                     |                                                                                     |                                                                                     | PBSS5480X                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 200/280                    | 0.5                     | 2                        | 43                                                                     | 36                                                                                    | 240                            | 4                       | 0.4                     |                                                                                     |                                                                                     | PBSS305PX                                                                           |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 4.5                   | 9.0                    | 200/280                    | 0.5                     | 2                        | 69 <sup>1)</sup>                                                       | 36                                                                                    | 450                            | 4.5                     | 0.225                   | PBSS305PZ                                                                           |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 100                     | 1.0                   | 3.0                    | 150/ -                     | 0.25                    | 5                        | 170                                                                    | 93                                                                                    | 320                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PBSS9110Y                                                                           |                                                                                     |                                                                                     |
|                         |                       |                        | 150/350                    | 0.5                     | 5                        | 170                                                                    | 95                                                                                    | 320                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     |           | PBSS9110T                                                                           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 150/350                    | 0.5                     | 5                        | 170                                                                    | 100                                                                                   | 320                            | 1                       | 0.1                     |                                                                                     |                                                                                     |                                                                                     | PBSS9110D |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         |                       |                        | 150/ -                     | 0.5                     | 5                        | 170                                                                    | 90                                                                                    | 320                            | 1                       | 0.1                     | PBSS9110Z                                                                           |                                                                                     |                                                                                     | PBSS9110X |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.0                   | 3.0                    | 175/275                    | 0.5                     | 2                        | 88                                                                     | 65                                                                                    | 250                            | 2                       | 0.2                     |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 2.7                   | 4.0                    | 180/295                    | 0.5                     | 2                        | 110 <sup>1)</sup>                                                      | 45                                                                                    | 450                            | 2.7                     | 0.135                   |                                                                                     |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 3.7                   | 7.4                    | 200/300                    | 0.5                     | 2                        | 52                                                                     | 45                                                                                    | 300                            | 4                       | 0.4                     |                                                                                     |                                                                                     |                                                                                     | PBSS306PX |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                         | 4.1                   | 8.2                    | 200/300                    | 0.5                     | 5                        | 57                                                                     | 45                                                                                    | 325                            | 4.1                     | 0.41                    | PBSS306PZ                                                                           |                                                                                     |                                                                                     |           |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

<sup>1)</sup> I<sub>C</sub>/I<sub>B</sub> = 20  
<sup>2)</sup> V<sub>CEsat</sub> (max)  
<sup>3)</sup> optimized for high speed switching

Low  $V_{CEsat}$  (BISS) transistors

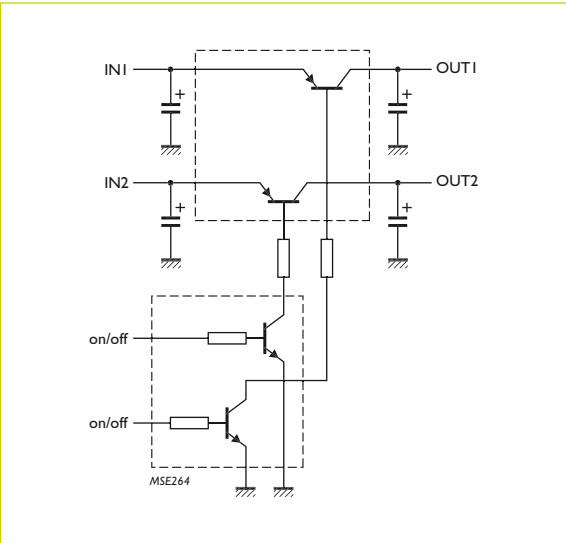
Low  $V_{CEsat}$  (BISS) transistors double

types in **bold** represent new products

| Package        |           |          |              |             |                |                                                     |                      |             |             | SOT96 (SO8)                      | SOT457 (SC-74)  | SOT363 (SC-88)    | SOT666           |
|----------------|-----------|----------|--------------|-------------|----------------|-----------------------------------------------------|----------------------|-------------|-------------|----------------------------------|-----------------|-------------------|------------------|
| Size (mm)      |           |          |              |             |                |                                                     |                      |             |             | 4.9 x 3.9 x 1.75                 | 2.9 x 1.5 x 1.0 | 2.0 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55 |
| $P_{tot}$ (mW) |           |          |              |             |                |                                                     |                      |             |             | 2000 <sup>2)</sup>               | 750             | 430               | 500              |
| $V_{CE0}$ (V)  | $I_C$ (A) | Polarity | $h_{FE}$ min | @ $I_C$ (A) | @ $V_{CE}$ (V) | $V_{CEsat}$ typ (mV); $I_C = 0.5$ A; $I_B = 0.05$ A | $V_{CEsat}$ max (mV) | @ $I_C$ (A) | @ $I_B$ (A) |                                  |                 |                   |                  |
| 15             | 0.5       | 2 x NPN  | 200          | 0.01        | 2              | 170 <sup>1)</sup>                                   | 250                  | 0.5         | 0.05        |                                  |                 |                   | PBSS2515VS       |
|                |           | 2 x PNP  | 200          | 0.01        | 2              | 170 <sup>1)</sup>                                   | 250                  | 0.5         | 0.05        |                                  |                 |                   | PBSS3515VS       |
|                |           | NPN/PNP  | 200          | 0.01        | 2              | 170 <sup>1)</sup>                                   | 250                  | 0.5         | 0.05        |                                  |                 |                   | PBSS2515VPN      |
|                |           | NPN/PNP  | 200          | 0.01        | 2              | 170 <sup>1)</sup>                                   | 250                  | 0.5         | 0.05        |                                  |                 | PBSS2515YPN       |                  |
| 20             | 7.5       | NPN/NPN  | 300          | 0.5         | 2              | 15                                                  | 150                  | 4           | 0.2         | <b>PBSS4021SN</b>                |                 |                   |                  |
|                | 6.3       | PNP/PNP  | 250          | 0.5         | 2              | 24                                                  | 225                  | 4           | 0.2         | <b>PBSS4021SP</b>                |                 |                   |                  |
|                | 7.5 / 6.3 | NPN/PNP  | 300/250      | 0.5         | 2              | 15/24                                               | 150/225              | 4           | 0.2         | <b>PBSS4021SPN</b>               |                 |                   |                  |
| 30             | 5.7       | NPN/NPN  | 300          | 0.5         | 2              | 57                                                  | 250                  | 4           | 0.4         | <b>PBSS4032SN</b> <sup>3)</sup>  |                 |                   |                  |
|                | 4.8       | PNP/PNP  | 200          | 0.5         | 2              | 70                                                  | 390                  | 4           | 0.4         | <b>PBSS4032SP</b> <sup>3)</sup>  |                 |                   |                  |
|                | 5.7 / 4.8 | NPN/PNP  | 300/200      | 0.5         | 2              | 57/70                                               | 250/390              | 4           | 0.4         | <b>PBSS4032SPN</b> <sup>3)</sup> |                 |                   |                  |
| 40             | 1.0       | NPN/PNP  | 300/250      | 0.5         | 5              | 130/150                                             | 500                  | 1           | 0.1         |                                  | PBSS4140DPN     |                   |                  |
|                | 2.0       | NPN/PNP  | 300/250      | 0.5         | 5              | 80/100                                              | 400/530              | 2           | 0.2         |                                  | PBSS4240DPN     |                   |                  |
| 50             | 2.7       | 2 x NPN  | 300          | 0.5         | 2              | 50                                                  | 340                  | 2.7         | 0.27        | PBSS4350SS                       |                 |                   |                  |
|                |           | 2 x PNP  | 200          | 0.5         | 2              | 60                                                  | 370                  | 2.7         | 0.27        | PBSS5350SS                       |                 |                   |                  |
|                |           | NPN/PNP  | 300/200      | 0.5         | 2              | 50/60                                               | 340/370              | 2.7         | 0.27        | PBSS4350SPN                      |                 |                   |                  |
| 60             | 1.0       | 2 x NPN  | 200          | 0.5         | 5              | 115                                                 | 250                  | 1           | 0.1         |                                  | PBSS4160DS      |                   |                  |
|                |           | 2 x PNP  | 150          | 0.5         | 5              | 120                                                 | 330                  | 1           | 0.1         |                                  | PBSS5160DS      |                   |                  |
|                |           | NPN/PNP  | 200/150      | 0.5         | 5              | 115/120                                             | 250/330              | 1           | 0.1         |                                  | PBSS4160DPN     |                   |                  |
|                | 6.7       | NPN/NPN  | 300          | 0.5         | 2              | 20                                                  | 190                  | 4           | 0.2         | <b>PBSS4041SN</b>                |                 |                   |                  |
|                | 5.9       | PNP/PNP  | 200          | 0.5         | 2              | 35                                                  | 330                  | 4           | 0.2         | <b>PBSS4041SP</b>                |                 |                   |                  |
|                | 6.7 / 5.9 | NPN/PNP  | 300/200      | 0.5         | 2              | 20/35                                               | 190/330              | 4           | 0.2         | <b>PBSS4041SPN</b>               |                 |                   |                  |

<sup>1)</sup>  $I_C/I_B=20$   
<sup>2)</sup> Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.  
<sup>3)</sup> Optimized for high speed switching

Dual load switch using double RETs and double BISS transistors



Low  $V_{CEsat}$  (BISS) transistors

Low  $V_{CEsat}$  (BISS) load switches

types in **bold** represent new products

| Package        |           |                                                     |             | SOT96 (SO8)        | SOT457 (SC-74)    |                   | SOT363 (SC-88)    | SOT666            |
|----------------|-----------|-----------------------------------------------------|-------------|--------------------|-------------------|-------------------|-------------------|-------------------|
| Size (mm)      |           |                                                     |             | 4.9 x 3.9 x 1.75   | 2.9 x 1.5 x 1.0   |                   | 2.0 x 1.25 x 0.95 | 1.6 x 1.2 x 0.55  |
| $P_{tot}$ (mW) |           |                                                     |             | 1500 <sup>1)</sup> | 750 <sup>1)</sup> | 600 <sup>1)</sup> | 300 <sup>2)</sup> | 300 <sup>2)</sup> |
| $V_{CE0}$ (V)  | $I_C$ (A) | $V_{CEsat}$ max (mV); $I_C = 0.5$ A; $I_B = 0.05$ A | R1, R2 (kΩ) |                    |                   |                   |                   |                   |
| 15             | 0.5       | 250                                                 | 2.2         |                    |                   |                   | PBLS1501Y         | PBLS1501V         |
|                |           |                                                     | 4.7         |                    |                   |                   | PBLS1502Y         | PBLS1502V         |
|                |           |                                                     | 10          |                    |                   |                   | PBLS1503Y         | PBLS1503V         |
|                |           |                                                     | 22          |                    |                   |                   | PBLS1504Y         | PBLS1504V         |
| 20             | 1         | 150                                                 | 2.2         |                    |                   | PBLS2001D         |                   |                   |
|                |           |                                                     | 4.7         |                    |                   | PBLS2002D         |                   |                   |
|                |           |                                                     | 10          |                    |                   | PBLS2003D         |                   |                   |
|                |           |                                                     | 22          |                    |                   | PBLS2004D         |                   |                   |
|                | 1.8       | 70                                                  | 2.2         |                    | <b>PBLS2021D</b>  |                   |                   |                   |
|                |           |                                                     | 4.7         |                    | <b>PBLS2022D</b>  |                   |                   |                   |
|                |           |                                                     | 10          |                    | <b>PBLS2023D</b>  |                   |                   |                   |
|                |           |                                                     | 22          |                    | <b>PBLS2024D</b>  |                   |                   |                   |
|                | 3         | 75                                                  | 2.2         | PBLS2001S          |                   |                   |                   |                   |
|                |           |                                                     | 4.7         | PBLS2002S          |                   |                   |                   |                   |
|                |           |                                                     | 10          | PBLS2003S          |                   |                   |                   |                   |
|                |           |                                                     | 22          |                    |                   |                   |                   |                   |
| 40             | 0.5       | 350                                                 | 2.2         |                    |                   |                   | PBLS4001Y         | PBLS4001V         |
|                |           |                                                     | 4.7         |                    |                   |                   | PBLS4002Y         | PBLS4002V         |
|                |           |                                                     | 10          |                    |                   |                   | PBLS4003Y         | PBLS4003V         |
|                |           |                                                     | 22          |                    |                   |                   | PBLS4004Y         | PBLS4004V         |
|                | 1         | 170                                                 | 47          |                    |                   |                   | PBLS4005Y         | PBLS4005V         |
|                |           |                                                     | 2.2         |                    |                   | PBLS4001D         |                   |                   |
|                |           |                                                     | 4.7         |                    |                   | PBLS4002D         |                   |                   |
|                |           |                                                     | 10          |                    |                   | PBLS4003D         |                   |                   |
|                |           |                                                     | 22          |                    |                   | PBLS4004D         |                   |                   |
|                | 1         | 180                                                 | 47          |                    |                   | PBLS4005D         |                   |                   |
|                |           |                                                     | 2.2         |                    |                   | PBLS6001D         |                   |                   |
|                |           |                                                     | 4.7         |                    |                   | PBLS6002D         |                   |                   |
| 60             | 1         | 100                                                 | 10          |                    |                   | PBLS6003D         |                   |                   |
|                |           |                                                     | 22          |                    |                   | PBLS6004D         |                   |                   |
|                |           |                                                     | 47          |                    |                   | PBLS6005D         |                   |                   |
|                |           |                                                     | 2.2         |                    | <b>PBLS6021D</b>  |                   |                   |                   |
|                | 1.5       | 100                                                 | 4.7         |                    | <b>PBLS6022D</b>  |                   |                   |                   |
|                |           |                                                     | 10          |                    | <b>PBLS6023D</b>  |                   |                   |                   |
|                |           |                                                     | 22          |                    | <b>PBLS6024D</b>  |                   |                   |                   |
|                |           |                                                     | 47          |                    |                   |                   |                   |                   |

<sup>1)</sup> Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint  
<sup>2)</sup> Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint

Key features

- ▶ Low  $V_{CEsat}$  (BISS) transistor and resistor-equipped transistor (RET) in one package
- ▶ Low saturation voltage
- ▶ Low ‘threshold’ voltage (< 1 V) compared to MOSFET
- ▶ Low drive power required
- ▶ Range of small, very small and ultra small packages

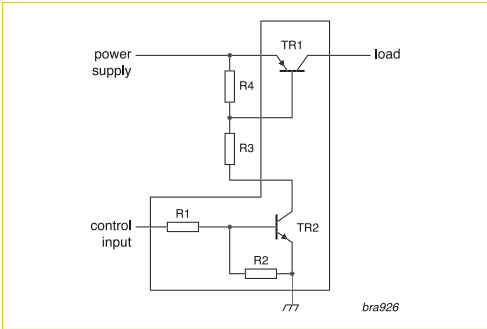
Key benefits

- ▶ Smaller end products
- ▶ Reduced component count
- ▶ Less sourcing effort
- ▶ Fewer solder points increase reliability
- ▶ Cost reduction
- ▶ More efficient, cooler running systems

Key applications

- ▶ Supply line switch
- ▶ Battery charger
- ▶ High-side switch for LEDs, drivers and backlights
- ▶ Portable equipment

BISS load switch



Low  $V_{CEsat}$  (BISS) transistors

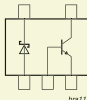
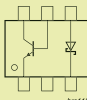
High voltage low  $V_{CEsat}$  (BISS) transistors

types in **bold** represent new products

| Package               |                                  |                      |                    | SOT223 (SC-73)                                                                    | SOT89 (SC-62)                                                                     | SOT23                                                                              |
|-----------------------|----------------------------------|----------------------|--------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|                       |                                  |                      |                    |  |  |  |
| Size (mm)             |                                  |                      |                    | 6.5 x 3.5 x 1.65                                                                  | 4.5 x 2.5 x 1.5                                                                   | 2.9 x 1.3 x 1.0                                                                    |
| P <sub>tot</sub> (mW) |                                  |                      |                    | 1700                                                                              | 1300                                                                              | 250                                                                                |
| Polarity              | V <sub>CESM</sub> <sup>(1)</sup> | V <sub>CEO</sub> (V) | I <sub>C</sub> (A) |                                                                                   |                                                                                   |                                                                                    |
| NPN                   | -                                | 150                  | 1                  | PBHV8115Z                                                                         |                                                                                   | PBHV8115T                                                                          |
|                       |                                  |                      | 2                  | <b>PBHV8215Z</b>                                                                  |                                                                                   |                                                                                    |
|                       | 500                              | 400                  | 0.5                | PBHV8540Z                                                                         |                                                                                   | PBHV8540T                                                                          |
|                       |                                  |                      | 1                  | <b>PBHV8140Z</b>                                                                  |                                                                                   |                                                                                    |
|                       |                                  | 500                  | 0.15               |                                                                                   |                                                                                   | <b>PMBTA45</b>                                                                     |
|                       |                                  |                      | 0.4                | <b>PBHV8550Z</b>                                                                  |                                                                                   |                                                                                    |
| PNP                   | -                                | 150                  | 1                  | PBHV9115Z                                                                         | <b>PBHV9115X</b>                                                                  | PBHV9115T                                                                          |
|                       |                                  |                      | 2                  | <b>PBHV9215Z</b>                                                                  |                                                                                   |                                                                                    |
|                       | 500                              | 400                  | 0.25               | PBHV9040Z                                                                         |                                                                                   | PBHV9040T                                                                          |
|                       |                                  |                      | 0.5                | <b>PBHV9540Z</b>                                                                  |                                                                                   |                                                                                    |
|                       |                                  | 500                  | 0.15               |                                                                                   |                                                                                   | <b>PBHV9050T</b>                                                                   |
|                       |                                  |                      | 0.25               | <b>PBHV9050Z</b>                                                                  |                                                                                   |                                                                                    |

<sup>1)</sup> Collector-emitter peak voltage

Low  $V_{CEsat}$  modules – Schottky diode / (BISS) transistor

| Package                  |                        |                               |                        |                        |                         | SOT457 (SC-74)                                                                                | SOT353 (SC-88A)                                                                   |            |
|--------------------------|------------------------|-------------------------------|------------------------|------------------------|-------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------|
|                          |                        |                               |                        |                        |                         |              |  |            |
| Size (mm)                |                        |                               |                        |                        |                         | 2.9 x 1.5 x 1.0                                                                               | 2.0 x 1.25 x 0.95                                                                 |            |
| P <sub>tot</sub> (mW)    |                        |                               |                        |                        |                         | 500                                                                                           | 250                                                                               |            |
| Transistor               |                        |                               | Schottky rectifier     |                        |                         | Configuration                                                                                 |                                                                                   |            |
| V <sub>CEO</sub> max (V) | I <sub>C</sub> max (A) | V <sub>CE(sat)</sub> max (mV) | I <sub>F</sub> max (A) | V <sub>R</sub> max (V) | V <sub>F</sub> max (mV) |                                                                                               |                                                                                   |            |
| 15                       | 0.5                    | 250                           | 0.5                    | 20                     | 390                     | <br>brs119 |                                                                                   | PMEM1505NG |
| 40                       | 1.0                    | 210                           | 1                      | 20                     | 550                     | <br>brs118 | PMEM4010ND                                                                        |            |
|                          | 2.0                    | 400                           | 1                      | 20                     | 550                     |                                                                                               | PMEM4020ND                                                                        |            |
|                          |                        |                               |                        | 40                     | 640                     |                                                                                               | PMEM4020AND                                                                       |            |
| 15                       | 0.5                    | 250                           | 0.5                    | 20                     | 390                     | <br>brs121 |                                                                                   | PMEM1505PG |
| 40                       | 1.0                    | 410                           | 1                      | 20                     | 550                     | <br>brs122 | PMEM4010PD                                                                        |            |
|                          | 2.0                    | 530                           | 1                      | 20                     | 550                     |                                                                                               | PMEM4020PD                                                                        |            |
|                          |                        |                               |                        | 40                     | 640                     |                                                                                               | PMEM4020APD                                                                       |            |

Key features

- ▶ Combination of low  $V_F$  (MEGA) Schottky rectifier and low  $V_{CEsat}$  (BISS) transistor in one package
- ▶ High forward current capability
- ▶ Low power dissipation

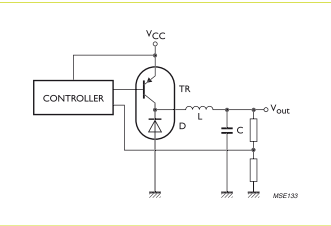
Key benefits

- ▶ Reduced component count
- ▶ Space savings of up to 32 %
- ▶ Higher efficiency
- ▶ Higher power density
- ▶ Cost reduction potential
- ▶ Simplified circuit design

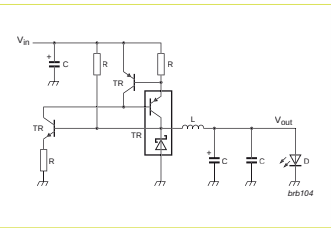
Key applications

- ▶ DC/DC conversion
- ▶ Inductive load driver
- ▶ Push-pull driver

Step-down DC/DC converter



Power LED driver



Low  $V_{CEsat}$  (BISS) transistors

Low  $V_{CEsat}$  (BISS) RETs

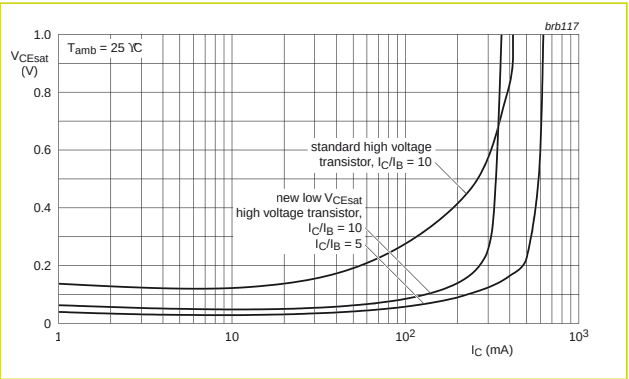
| Package               |                     |         |         |         | SOT23                                                                               |           |
|-----------------------|---------------------|---------|---------|---------|-------------------------------------------------------------------------------------|-----------|
|                       |                     |         |         |         |  |           |
| Size (mm)             |                     |         |         |         | 2.9 x 1.3 x 1.0                                                                     |           |
| P <sub>tot</sub> (mW) |                     |         |         |         | 250                                                                                 |           |
| V <sub>CEO</sub> (V)  | I <sub>C</sub> (mA) |         | R1 (kΩ) | R2 (kΩ) | NPN                                                                                 | PNP       |
| 40                    | 600                 | R1 = R2 | 1       | 1       | PBRN113ET                                                                           | PBRP113ET |
|                       |                     |         | 2.2     | 2.2     | PBRN123ET                                                                           | PBRP123ET |
|                       |                     | R1 ≠ R2 | 1       | 10      | PBRN113ZT                                                                           | PBRP113ZT |
|                       |                     |         | 2.2     | 10      | PBRN123YT                                                                           | PBRP123YT |

Advantages of low  $V_{CEsat}$  (BISS) technology

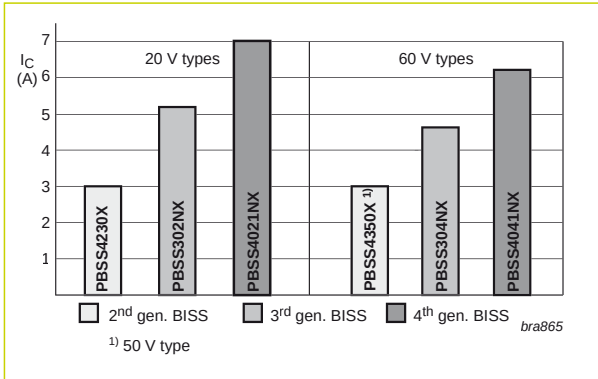
Our BISS (Breakthrough In Small-Signal) transistors show lowest  $V_{CEsat}$  values due to an innovative mesh-emitter technology and further technology improvement.

High voltage low  $V_{CEsat}$  (BISS)

$V_{CEsat}$  improvement leads to higher  $I_C$  capability

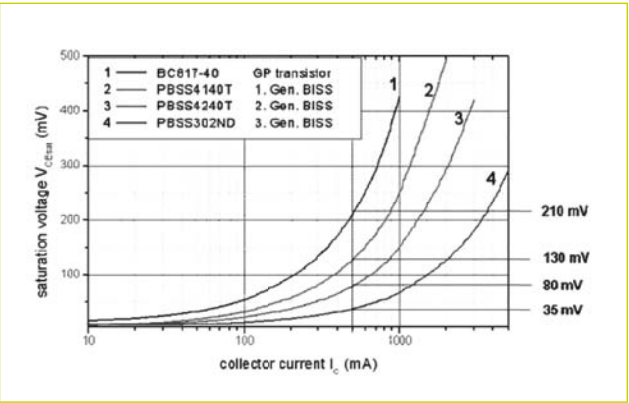


Improved collector current capabilities

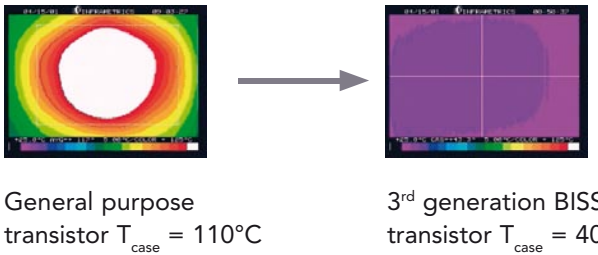


Saturation voltage:

General purpose versus low  $V_{CEsat}$  (BISS) transistors (NPN in SOT23/SOT457)



65 % heat reduction by BISS transistors



General purpose transistor  $T_{case} = 110^{\circ}\text{C}$

3<sup>rd</sup> generation BISS transistor  $T_{case} = 40^{\circ}\text{C}$

Temperature profile of device surface ( $T_{case}$ ). Comparison of a general purpose transistor and a 3<sup>rd</sup> generation BISS transistor.

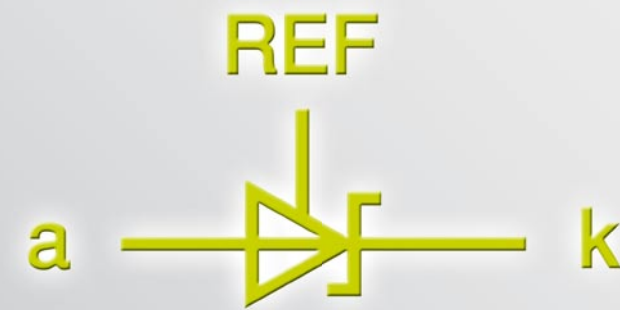
Medium power low V<sub>CEsat</sub> (BISS) transistors NPN

| Package               |                         |                       |                        |                            |                         |                             |                                                                        |                                                                                     |                                   |                         |                         | SOT223<br>(SC-73)                                                                  | SOT89<br>(SC-62)                                                                    | SOT457<br>(SC-74)                                                                   | SOT1061                                                                             |  |  |
|-----------------------|-------------------------|-----------------------|------------------------|----------------------------|-------------------------|-----------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------|-------------------------|-------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|--|
|                       |                         |                       |                        |                            |                         |                             |                                                                        |                                                                                     |                                   |                         |                         |  |  |  |  |  |  |
| Size (mm)             |                         |                       |                        |                            |                         |                             |                                                                        |                                                                                     |                                   |                         |                         | 6.5 × 3.5 × 1.65                                                                   | 4.5 × 2.5 × 1.5                                                                     | 2.9 × 1.5 × 1.0                                                                     | 2.0 × 2.0 × 0.65                                                                    |  |  |
| P <sub>tot</sub> (mW) |                         |                       |                        |                            |                         |                             |                                                                        |                                                                                     |                                   |                         |                         | 1700                                                                               | 1650                                                                                | 750                                                                                 | 1400                                                                                |  |  |
| Polarity              | V <sub>CEO</sub><br>(V) | I <sub>C</sub><br>(A) | I <sub>CM</sub><br>(A) | h <sub>FE</sub><br>min/typ | @ I <sub>C</sub><br>(A) | @<br>V <sub>CE</sub><br>(V) | R <sub>CEsat</sub> typ<br>(mΩ);<br>I <sub>C</sub> /I <sub>B</sub> = 10 | V <sub>CEsat</sub> typ<br>(mV);<br>I <sub>C</sub> = 0.5A;<br>I <sub>B</sub> = 0.05A | V <sub>CEsat</sub><br>max<br>(mV) | @ I <sub>C</sub><br>(A) | @ I <sub>B</sub><br>(A) |                                                                                    |                                                                                     |                                                                                     |                                                                                     |  |  |
| NPN                   | 12                      | 5.3                   | 10.6                   | 300/530                    | 0.5                     | 2                           | 27 <sup>1)</sup>                                                       | 18                                                                                  | 200                               | 5.3                     | 0.265                   |                                                                                    | PBSS301NX                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.8                   | 11.6                   | 300/530                    | 0.5                     | 2                           | 29 <sup>1)</sup>                                                       | 18                                                                                  | 235                               | 5.8                     | 0.29                    | PBSS301NZ                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                           | 33 <sup>1)</sup>                                                       | 20                                                                                  | 275                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     | PBSS4612PA                                                                          |  |  |
|                       | 20                      | 3.0                   | 5.0                    | 220/390                    | 0.5                     | 2                           | 85                                                                     | 40                                                                                  | 310                               | 3                       | 0.3                     |                                                                                    | PBSS4320X                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 4.0                   | 15.0                   | 300/450                    | 0.5                     | 2                           | 50                                                                     | 30                                                                                  | 280                               | 4                       | 0.4                     |                                                                                    |                                                                                     | PBSS301ND                                                                           |                                                                                     |  |  |
|                       |                         | 5.0                   | 10.0                   | 300/450                    | 0.5                     | 2                           | 32                                                                     | 35                                                                                  | 220                               | 5                       | 0.5                     |                                                                                    | PBSS4520X                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.3                   | 10.6                   | 300/570                    | 0.5                     | 2                           | 27 <sup>1)</sup>                                                       | 20                                                                                  | 200                               | 5.3                     | 0.265                   |                                                                                    | PBSS302NX                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.8                   | 10.2                   | 300/570                    | 0.5                     | 2                           | 30 <sup>1)</sup>                                                       | 20                                                                                  | 250                               | 5.8                     | 0.29                    | PBSS302NZ                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                           | 33 <sup>1)</sup>                                                       | 20                                                                                  | 275                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     | PBSS4620PA                                                                          |  |  |
|                       |                         | 7.0                   | 15.0                   | 300/550                    | 0.5                     | 2                           | 19                                                                     | 12                                                                                  | 210                               | 7                       | 0.35                    |                                                                                    | PBSS4021NX                                                                          |                                                                                     |                                                                                     |  |  |
|                       |                         | 8.0                   | 20.0                   | 300/550                    | 0.5                     | 2                           | 14                                                                     | 9                                                                                   | 170                               | 8                       | 0.4                     | PBSS4021NZ                                                                         |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 3.0                   | 5.0                    | 300/490                    | 0.5                     | 2                           | 80                                                                     | 45                                                                                  | 300                               | 3                       | 0.3                     |                                                                                    | PBSS4330X                                                                           |                                                                                     | PBSS4330PA                                                                          |  |  |
|                       | 30                      | 3.5                   | 6.0                    | 300/500                    | 0.5                     | 2                           | 50                                                                     | 70                                                                                  | 300                               | 4                       | 0.4                     |                                                                                    |                                                                                     | PBSS4032ND <sup>3)</sup>                                                            |                                                                                     |  |  |
|                       |                         | 4.7                   | 10.0                   | 300/500                    | 0.5                     | 2                           | 45                                                                     | 57                                                                                  | 250                               | 4                       | 0.4                     |                                                                                    | PBSS4032NX <sup>3)</sup>                                                            |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.1                   | 10.2                   | 300/480                    | 0.5                     | 2                           | 30 <sup>1)</sup>                                                       | 20                                                                                  | 220                               | 5.1                     | 0.255                   | PBSS303NX                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.4                   | 10.0                   | 300/500                    | 0.5                     | 2                           | 45                                                                     | 57                                                                                  | 340                               | 5.4                     | 0.27                    | PBSS4032NZ <sup>3)</sup>                                                           |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.5                   | 11.0                   | 300/480                    | 0.5                     | 2                           | 31 <sup>1)</sup>                                                       | 20                                                                                  | 240                               | 5.5                     | 0.275                   | PBSS303NZ                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       | 40                      | 6.0                   | 7.0                    | 280/450                    | 0.5                     | 2                           | 35                                                                     | 21                                                                                  | 275                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     | PBSS4630PA                                                                          |  |  |
|                       |                         | 4.0                   | 15.0                   | 300/520                    | 0.5                     | 2                           | 55                                                                     | 35                                                                                  | 300                               | 4                       | 0.4                     |                                                                                    |                                                                                     | PBSS302ND                                                                           |                                                                                     |  |  |
|                       |                         |                       | 10.0                   | 300/500                    | 0.5                     | 2                           | 40                                                                     | 21                                                                                  | 355                               | 5                       | 0.5                     |                                                                                    | PBSS4540X                                                                           |                                                                                     |                                                                                     |  |  |
|                       | 50                      | 5.0                   | 10.0                   | 300/500                    | 0.5                     | 2                           | 42                                                                     | 25                                                                                  | 355                               | 5                       | 0.5                     | PBSS4540Z                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         |                       | 2.0                    | 5.0                        | 300/495                 | 0.5                         | 2                                                                      | 100                                                                                 | 60                                | 260                     | 2                       | 0.2                                                                                |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         |                       |                        | 300/-                      | 0.5                     | 2                           | 160                                                                    | 90 <sup>2)</sup>                                                                    | 320                               | 2                       | 0.2                     |                                                                                    | PBSS4250X                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         |                       |                        | 200/280                    | 0.5                     | 2                           | 110                                                                    | 65                                                                                  | 290                               | 2                       | 0.2                     |                                                                                    |                                                                                     | PBSS4350D                                                                           |                                                                                     |  |  |
|                       |                         | 3.0                   | 5.0                    | 300/460                    | 0.5                     | 2                           | 75                                                                     | 50                                                                                  | 370                               | 3                       | 0.3                     |                                                                                    | PBSS4350X                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         |                       |                        | 200/280                    | 0.5                     | 2                           | 110                                                                    | 60 <sup>1)</sup>                                                                    | 290                               | 2                       | 0.2                     | PBSS4350Z                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 3.0                   | 6.0                    | 345/570                    | 0.5                     | 2                           | 65                                                                     | 40                                                                                  | 260                               | 3                       | 0.3                     |                                                                                    |                                                                                     | PBSS303ND                                                                           |                                                                                     |  |  |
|                       | 60                      | 4.7                   | 9.4                    | 300/520                    | 0.5                     | 2                           | 37 <sup>1)</sup>                                                       | 25                                                                                  | 245                               | 4.7                     | 0.235                   |                                                                                    | PBSS304NX                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.2                   | 10.4                   | 300/520                    | 0.5                     | 2                           | 39 <sup>1)</sup>                                                       | 25                                                                                  | 280                               | 5.2                     | 0.26                    | PBSS304NZ                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 6.0                   | 7.0                    | 280/440                    | 0.5                     | 2                           | 34 <sup>1)</sup>                                                       | 22                                                                                  | 290                               | 6                       | 0.3                     |                                                                                    |                                                                                     |                                                                                     | PBSS4560PA                                                                          |  |  |
|                       |                         | 6.2                   | 15.0                   | 300/500                    | 0.5                     | 2                           | 25                                                                     | 17                                                                                  | 230                               | 6                       | 0.3                     |                                                                                    | PBSS4041NX                                                                          |                                                                                     |                                                                                     |  |  |
|                       |                         | 7.0                   | 15.0                   | 300/500                    | 0.5                     | 2                           | 17.5                                                                   | 13                                                                                  | 195                               | 7                       | 0.35                    | PBSS4041NZ                                                                         |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 3.0                   | 6.0                    | 240/360                    | 0.5                     | 2                           | 67                                                                     | 40                                                                                  | 255                               | 3                       | 0.3                     |                                                                                    |                                                                                     | PBSS304ND                                                                           |                                                                                     |  |  |
|                       | 80                      | 4.0                   | 10.0                   | 250/400                    | 0.5                     | 2                           | 43 <sup>1)</sup>                                                       | 25                                                                                  | 230                               | 4                       | 0.2                     |                                                                                    | PBSS4480X                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 4.6                   | 9.2                    | 300/470                    | 0.5                     | 2                           | 37 <sup>1)</sup>                                                       | 25                                                                                  | 240                               | 4.6                     | 0.23                    |                                                                                    | PBSS305NX                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.1                   | 10.2                   | 300/470                    | 0.5                     | 2                           | 38 <sup>1)</sup>                                                       | 25                                                                                  | 270                               | 5.1                     | 0.255                   | PBSS305NZ                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.6                   | 7.0                    | 270/425                    | 0.5                     | 2                           | 40 <sup>1)</sup>                                                       | 25                                                                                  | 320                               | 5.6                     | 0.28                    |                                                                                    |                                                                                     |                                                                                     | PBSS4580PA                                                                          |  |  |
|                       |                         |                       |                        | 150/290                    | 0.25                    | 10                          | 160                                                                    | 75                                                                                  | 200                               | 1                       | 0.1                     |                                                                                    |                                                                                     | PBSS8110D                                                                           |                                                                                     |  |  |
|                       | 100                     | 1.0                   | 3.0                    | 150/290                    | 0.25                    | 10                          | 165                                                                    | 73                                                                                  | 200                               | 1                       | 0.1                     |                                                                                    | PBSS8110X                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         |                       |                        | 150/290                    | 0.25                    | 10                          | 160                                                                    | 73                                                                                  | 200                               | 1                       | 0.1                     | PBSS8110Z                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 3.0                   | 4.0                    | 170/275                    | 0.5                     | 2                           | 72                                                                     | 45                                                                                  | 360                               | 4                       | 0.4                     |                                                                                    |                                                                                     | PBSS305ND                                                                           |                                                                                     |  |  |
|                       |                         | 4.5                   | 9.0                    | 200/330                    | 0.5                     | 2                           | 38 <sup>1)</sup>                                                       | 27                                                                                  | 245                               | 4.5                     | 0.225                   |                                                                                    | PBSS306NX                                                                           |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.1                   | 10.2                   | 200/330                    | 0.5                     | 2                           | 43 <sup>1)</sup>                                                       | 27                                                                                  | 300                               | 5.1                     | 0.255                   | PBSS306NZ                                                                          |                                                                                     |                                                                                     |                                                                                     |  |  |
|                       |                         | 5.2                   | 6.0                    | 180/285                    | 0.5                     | 2                           | 48 <sup>1)</sup>                                                       | 30                                                                                  | 340                               | 5.2                     | 0.26                    |                                                                                    |                                                                                     |                                                                                     | PBSS8510PA                                                                          |  |  |

<sup>1)</sup> I<sub>C</sub>/I<sub>B</sub> = 20  
<sup>2)</sup> V<sub>CEsat</sub> (max)  
<sup>3)</sup> optimized for high speed switching

Medium power low V<sub>CEsat</sub> (BISS) transistors PNP

| Package               |                         |                       |                        |                            |                         |                          |                                                                        |                                                                                     |                                   |                         |                         | SOT223<br>(SC-73)        | SOT89<br>(SC-62)         | SOT457<br>(SC-74)        | SOT1061          |  |
|-----------------------|-------------------------|-----------------------|------------------------|----------------------------|-------------------------|--------------------------|------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------|-------------------------|-------------------------|--------------------------|--------------------------|--------------------------|------------------|--|
| Size (mm)             |                         |                       |                        |                            |                         |                          |                                                                        |                                                                                     |                                   |                         |                         | 6.5 x 3.5 x 1.65         | 4.5 x 2.5 x 1.5          | 2.9 x 1.5 x 1.0          | 2.0 x 2.0 x 0.65 |  |
| P <sub>tot</sub> (mW) |                         |                       |                        |                            |                         |                          |                                                                        |                                                                                     |                                   |                         |                         | 1700                     | 1650                     | 750                      | 1400             |  |
| Polarity              | V <sub>CEO</sub><br>(V) | I <sub>C</sub><br>(A) | I <sub>CM</sub><br>(A) | h <sub>FE</sub><br>min/typ | @ I <sub>C</sub><br>(V) | @ V <sub>CE</sub><br>(V) | R <sub>CEsat</sub> typ<br>(mΩ);<br>I <sub>C</sub> /I <sub>B</sub> = 10 | V <sub>CEsat</sub> typ<br>(mV);<br>I <sub>C</sub> = 0.5A;<br>I <sub>B</sub> = 0.05A | V <sub>CEsat</sub><br>max<br>(mV) | @ I <sub>C</sub><br>(A) | @ I <sub>B</sub><br>(A) |                          |                          |                          |                  |  |
| PNP                   | 12                      | 5.3                   | 10.6                   | 250/400                    | 0.5                     | 2                        | 28 <sup>1)</sup>                                                       | 20                                                                                  | 210                               | 5.3                     | 0.265                   | PBSS301PZ                | PBSS301PX                |                          |                  |  |
|                       |                         | 5.7                   | 11.4                   | 250/400                    | 0.5                     | 2                        | 30 <sup>1)</sup>                                                       | 20                                                                                  | 245                               | 5.7                     | 0.285                   |                          |                          |                          |                  |  |
|                       |                         | 6.0                   | 7.0                    | 220/335                    | 0.5                     | 2                        | 33 <sup>1)</sup>                                                       | 20                                                                                  | 300                               | 6                       | 0.3                     |                          |                          |                          | PBSS5612PA       |  |
|                       | 20                      | 3.0                   | 5.0                    | 200/-                      | 0.5                     | 2                        | 85                                                                     | 80 <sup>2)</sup>                                                                    | 400                               | 3                       | 0.3                     |                          |                          | PBSS5320D                |                  |  |
|                       |                         |                       |                        | 220/450                    | 0.5                     | 2                        | 90                                                                     | 50                                                                                  | 300                               | 3                       | 0.3                     |                          | PBSS5320X                |                          |                  |  |
|                       |                         | 4.0                   | 15.0                   | 250/400                    | 0.5                     | 2                        | 50                                                                     | 35                                                                                  | 280                               | 4                       | 0.4                     |                          |                          | PBSS301PD                |                  |  |
|                       |                         | 5.0                   | 10.0                   | 300/430                    | 0.5                     | 2                        | 34                                                                     | 45                                                                                  | 270                               | 5                       | 0.5                     |                          | PBSS5520X                |                          |                  |  |
|                       |                         | 5.1                   | 10.2                   | 250/370                    | 0.5                     | 2                        | 32 <sup>1)</sup>                                                       | 25                                                                                  | 230                               | 5.1                     | 0.255                   | PBSS302PX                |                          |                          |                  |  |
|                       |                         | 5.5                   | 11.0                   | 250/370                    | 0.5                     | 2                        | 34 <sup>1)</sup>                                                       | 25                                                                                  | 265                               | 5.5                     | 0.275                   | PBSS302PZ                |                          |                          |                  |  |
|                       |                         | 6.0                   | 7.0                    | 230/345                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                       | 25                                                                                  | 350                               | 6                       | 0.3                     |                          |                          | PBSS5620PA               |                  |  |
|                       |                         | 6.2                   | 15.0                   | 250/400                    | 0.5                     | 2                        | 25                                                                     | 18                                                                                  | 240                               | 6                       | 0.3                     |                          | PBSS4021PX               |                          |                  |  |
|                       |                         | 6.6                   | 20.0                   | 250/400                    | 0.5                     | 2                        | 22                                                                     | 16                                                                                  | 240                               | 7                       | 0.35                    | PBSS4021PZ               |                          |                          |                  |  |
|                       | 30                      | 2.7                   | 5.0                    | 200/350                    | 0.5                     | 2                        | 88                                                                     | 87                                                                                  | 395                               | 3                       | 0.3                     |                          |                          | PBSS4032PD <sup>3)</sup> |                  |  |
|                       |                         | 3.0                   | 5.0                    | 200/380                    | 0.5                     | 2                        | 80                                                                     | 50                                                                                  | 320                               | 3                       | 0.3                     |                          | PBSS5330X                |                          | PBSS5330PA       |  |
|                       |                         | 4.2                   | 10.0                   | 200/350                    | 0.5                     | 2                        | 58                                                                     | 70                                                                                  | 345                               | 4                       | 0.4                     |                          | PBSS4032PX <sup>3)</sup> |                          |                  |  |
|                       |                         | 4.4                   | 10.0                   | 200/350                    | 0.5                     | 2                        | 58                                                                     | 70                                                                                  | 400                               | 4                       | 0.2                     | PBSS4032PZ <sup>3)</sup> |                          |                          |                  |  |
|                       |                         | 5.1                   | 10.2                   | 250/400                    | 0.5                     | 2                        | 32 <sup>1)</sup>                                                       | 25                                                                                  | 230                               | 5.1                     | 0.255                   |                          | PBSS303PX                |                          |                  |  |
|                       |                         | 5.3                   | 10.6                   | 250/400                    | 0.5                     | 2                        | 35 <sup>1)</sup>                                                       | 25                                                                                  | 265                               | 5.3                     | 0.265                   | PBSS303PZ                |                          |                          |                  |  |
|                       |                         | 6.0                   | 7.0                    | 230/345                    | 0.5                     | 2                        | 39 <sup>1)</sup>                                                       | 25                                                                                  | 350                               | 6                       | 0.3                     |                          |                          | PBSS5630PA               |                  |  |
|                       | 40                      | 15.0                  | 200/310                | 0.5                        | 2                       | 55                       | 46                                                                     | 300                                                                                 | 4                                 | 0.4                     |                         |                          |                          | PBSS302PD                |                  |  |
|                       |                         | 4.0                   |                        | 10.0                       | 250/370                 | 0.5                      | 2                                                                      | 45                                                                                  | 33                                | 375                     | 5                       | 0.5                      |                          | PBSS5540X                |                  |  |
|                       |                         | 5.0                   | 10.0                   | 250/350                    | 0.5                     | 2                        | 55                                                                     | 40 <sup>1)</sup>                                                                    | 160                               | 2                       | 0.2                     | PBSS5540Z                |                          |                          |                  |  |
|                       | 50                      | 2.0                   | 5.0                    | 200/-                      | 0.5                     | 2                        | 160                                                                    | 90 <sup>2)</sup>                                                                    | 320                               | 2                       | 0.2                     |                          | PBSS5250X                |                          |                  |  |
|                       |                         |                       |                        | 200/300                    | 0.5                     | 2                        | 120                                                                    | 70                                                                                  | 300                               | 2                       | 0.2                     |                          |                          | PBSS5350D                |                  |  |
|                       |                         | 3.0                   | 5.0                    | 200/375                    | 0.5                     | 2                        | 120                                                                    | 70                                                                                  | 390                               | 3                       | 0.3                     |                          | PBSS5350X                |                          |                  |  |
|                       | 60                      |                       |                        | 200/300                    | 0.5                     | 2                        | 120                                                                    | 70                                                                                  | 300                               | 2                       | 0.2                     | PBSS5350Z                |                          |                          |                  |  |
|                       |                         | 3.0                   | 6.0                    | 180/265                    | 0.5                     | 2                        | 70                                                                     | 55                                                                                  | 290                               | 3                       | 0.3                     |                          |                          | PBSS303PD                |                  |  |
|                       |                         | 4.2                   | 8.4                    | 200/295                    | 0.5                     | 2                        | 53 <sup>1)</sup>                                                       | 35                                                                                  | 310                               | 4.2                     | 0.21                    |                          | PBSS304PX                |                          |                  |  |
|                       |                         | 4.5                   | 9.0                    | 200/295                    | 0.5                     | 2                        | 59 <sup>1)</sup>                                                       | 35                                                                                  | 375                               | 4.5                     | 0.225                   | PBSS304PZ                |                          |                          |                  |  |
|                       |                         | 5.0                   | 6.0                    | 180/265                    | 0.5                     | 2                        | 35 <sup>1)</sup>                                                       | 55                                                                                  | 450                               | 5                       | 0.25                    |                          |                          | PBSS5560PA               |                  |  |
|                       | 80                      |                       | 15.0                   | 200/300                    | 0.5                     | 2                        | 40                                                                     | 30                                                                                  | 300                               | 5                       | 0.5                     |                          | PBSS4041PX               |                          |                  |  |
|                       |                         | 5.7                   | 15.0                   | 200/300                    | 0.5                     | 2                        | 29                                                                     | 22                                                                                  | 285                               | 6                       | 0.3                     | PBSS4041PZ               |                          |                          |                  |  |
| 3.0                   |                         | 5.0                   | 155/225                | 0.5                        | 2                       | 71                       | 55                                                                     | 290                                                                                 | 3                                 | 0.3                     |                         |                          | PBSS304PD                |                          |                  |  |
| 4.0                   |                         | 5.0                   | 180/265                | 0.5                        | 2                       | 65 <sup>1)</sup>         | 40                                                                     | 420                                                                                 | 4                                 | 0.2                     |                         |                          | PBSS5580PA               |                          |                  |  |
| 4.5                   |                         | 9.0                   | 200/280                | 0.5                        | 2                       | 69 <sup>1)</sup>         | 36                                                                     | 450                                                                                 | 4.5                               | 0.225                   | PBSS305PZ               |                          |                          |                          |                  |  |
| 5.7                   |                         | 15.0                  | 200/300                | 0.5                        | 2                       | 29                       | 22                                                                     | 285                                                                                 | 6                                 | 0.3                     | PBSS4041PZ              |                          |                          |                          |                  |  |
|                       |                         |                       | 150/350                | 0.5                        | 5                       | 170                      | 100                                                                    | 320                                                                                 | 1                                 | 0.1                     |                         |                          | PBSS9110D                |                          |                  |  |
| 100                   | 1.0                     | 3.0                   | 150/350                | 0.5                        | 5                       | 170                      | 90                                                                     | 320                                                                                 | 1                                 | 0.1                     |                         |                          | PBSS9110X                |                          |                  |  |
|                       |                         |                       | 150/-                  | 0.5                        | 5                       | 170                      | 90                                                                     | 320                                                                                 | 1                                 | 0.1                     | PBSS9110Z               |                          |                          |                          |                  |  |
|                       | 2.0                     | 3.0                   | 175/275                | 0.5                        | 2                       | 88                       | 65                                                                     | 250                                                                                 | 2                                 | 0.2                     |                         |                          | PBSS305PD                |                          |                  |  |
|                       | 2.7                     | 4.0                   | 180/295                | 0.5                        | 2                       | 110 <sup>1)</sup>        | 45                                                                     | 450                                                                                 | 2.7                               | 0.135                   |                         |                          | PBSS9410PA               |                          |                  |  |
|                       | 3.7                     | 7.4                   | 200/300                | 0.5                        | 2                       | 52                       | 45                                                                     | 300                                                                                 | 4                                 | 0.4                     |                         |                          |                          |                          |                  |  |
|                       | 4.1                     | 8.2                   | 200/300                | 0.5                        | 5                       | 57                       | 45                                                                     | 325                                                                                 | 4.1                               | 0.41                    | PBSS306PZ               |                          |                          |                          |                  |  |



## Standard linear products

|                                                           |    |
|-----------------------------------------------------------|----|
| Adjustable shunt voltage regulator IC                     | 68 |
| Low-dropout adjustable and fixed linear voltage regulator | 69 |
| Discrete voltage regulator                                | 69 |
| Constant current source                                   | 70 |



Constant current source

Constant current source

| SOT353 (SC-88A)       |                                                                                   |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
|-----------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| Package               |  |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| Size (mm)             | 2.0 x 1.25 x 0.95                                                                 |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| P <sub>tot</sub> (mW) | 335                                                                               |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| Type                  | PSSI2021SAY                                                                       |                                                                                         |                                                                                        |                                   |                                   |                                                            |                                                                                            |
| Description           | maximum supply voltage                                                            | maximum supply current                                                                  | typical stabilized output current                                                      | minimum stabilized output current | maximum stabilized output current | typical load stability of stabilized output current        | typical output current change over ambient temperature                                     |
| Parameter             | V <sub>S</sub> max (V)                                                            | I <sub>S</sub> max (mA)                                                                 | I <sub>out</sub> typ (μA)                                                              | I <sub>out</sub> min (mA)         | I <sub>out</sub> max (mA)         | ΔI <sub>out</sub> /I <sub>out</sub> typ (%)                | ΔI <sub>out</sub> /I <sub>out</sub> typ (°C/K)                                             |
| Condition             |                                                                                   | @ V <sub>S</sub> = 12 V;<br>I <sub>out</sub> = 15 μA;<br>V <sub>out</sub> = 1 V to 10 V | @ V <sub>S</sub> = 12 V;<br>V <sub>out</sub> = 1 V to 10 V;<br>R <sub>ext</sub> = open |                                   |                                   | @ V <sub>S</sub> = 12 V;<br>V <sub>out</sub> = 1 V to 10 V | @ V <sub>S</sub> = 12 V;<br>V <sub>out</sub> = 1 V;<br>T <sub>amb</sub> = -55 °C to 150 °C |
| Value                 | 75>                                                                               | 2.2                                                                                     | 15                                                                                     | 0.015                             | 50                                | 0.5                                                        | 0.15                                                                                       |

Key features

- ▶ Single-chip constant current source
- ▶ Output current set by an external resistor
- ▶ Very small footprint package

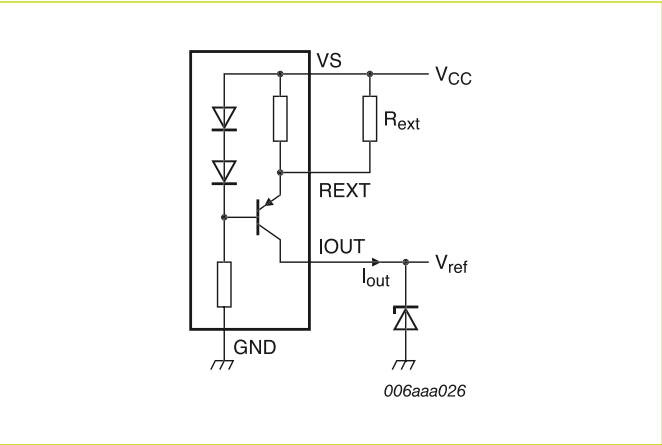
Key benefits

- ▶ Reduced component count and pick-and-place costs
- ▶ Smaller designs

Key applications

- ▶ Constant current LED driver
- ▶ Generic constant current source
- ▶ Active bias control for audio amplifiers

Voltage reference



MOSFETs

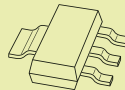
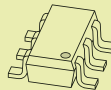
Small-signal MOSFETs72

|                                                  |    |
|--------------------------------------------------|----|
| Small-signal MOSFETs single (N-channel) < 50 V   | 72 |
| Small-signal MOSFETs single (N-channel) ≥ 50 V   | 74 |
| Small-signal MOSFETs dual (N-channel)            | 76 |
| Small-signal MOSFETs single (P-Channel)          | 76 |
| Small-signal MOSFET dual (P-channel) and FET-KYs | 76 |

Power MOSFETs78

|                                       |    |
|---------------------------------------|----|
| Power MOSFETs single (N-channel)      | 78 |
| Power MOSFETs single (P-channel)      | 84 |
| Power MOSFETs dual (N- and P-channel) | 85 |

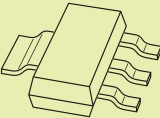
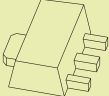
Small-signal MOSFETs single (N-channel) < 50V

| Package               |                     |                    |                               |                               |                             |                              |                            |                   |                                                |                   |       |                   | SOT223 (SC-73)                                                                      |  | TSOP6<br>SOT457 (SC-74)                                                             | SOT23                                                                               | SOT363 (SC-88)                                                                      | SOT323 (SC-70)                                                                      | SOT416 (SC-75)                                                                      | SOT883 (SC-101)                                                                     |  |
|-----------------------|---------------------|--------------------|-------------------------------|-------------------------------|-----------------------------|------------------------------|----------------------------|-------------------|------------------------------------------------|-------------------|-------|-------------------|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
|                       |                     |                    |                               |                               |                             |                              |                            |                   |                                                |                   |       |                   |  |  |  |  |  |  |  |  |  |
| Size (mm)             |                     |                    |                               |                               |                             |                              |                            |                   |                                                |                   |       |                   | 6.5 x 3.5 x 1.65                                                                    |  | 2.9 x 1.5 x 1.0                                                                     | 2.9 x 1.3 x 1.0                                                                     | 2.0 x 1.25 x 0.95                                                                   | 2.0 x 1.25 x 0.95                                                                   | 1.6 x 0.8 x 0.77                                                                    | 1.0 x 0.6 x 0.5                                                                     |  |
| P <sub>tot</sub> (mW) |                     |                    |                               |                               |                             |                              |                            |                   |                                                |                   |       |                   | 1700                                                                                |  | 600                                                                                 | 250                                                                                 | 300                                                                                 | 200                                                                                 | 150                                                                                 | 250                                                                                 |  |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th)</sub><br>min(V) | V <sub>GS(th)</sub><br>max(V) | t <sub>on</sub> typ<br>(ns) | t <sub>off</sub> typ<br>(ns) | Q <sub>G</sub> typ<br>(nC) | ESD<br>protection | R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> = |                   |       |                   |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     |                    |                               |                               |                             |                              |                            |                   | 10 V                                           | 4.5 V             | 2.5 V | 1.8 V             |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 12                    | 8                   | 5.7                | 0.4                           | -                             | 23                          | 67                           | 10.1                       | -                 | -                                              | 28                | -     | 39                |                                                                                     |  | PMN28UN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 20                    | 8                   | 6.3                | 2                             | 4                             | 23                          | 71                           | 10.6                       | -                 | -                                              | 23                | -     | 37                |                                                                                     |  | PMN23UN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 5.7                | 0.4                           | -                             | 23                          | 71                           | 10.6                       | -                 | -                                              | 27                | -     | 39                |                                                                                     |  | PMN27UN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 5.7                | 0.45                          | -                             | 20                          | 66                           | 7.4                        | -                 | -                                              | 30                | -     | 44                |                                                                                     |  |                                                                                     | PMV30UN <sup>1)</sup>                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 3.76               | 0.65                          | -                             | 35                          | 84                           | 5.4                        | -                 | -                                              | 56                | 77    | -                 |                                                                                     |  |                                                                                     | PMV56XN <sup>1)</sup>                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 2.5                | 0.65                          | -                             | 35                          | 84                           | 5.4                        | -                 | -                                              | 56                | 77    | -                 |                                                                                     |  |                                                                                     | SI2302DS                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 1.05               | 0.4                           | -                             | 6.5                         | 65                           | -                          | -                 | -                                              | 140               | -     | 240               |                                                                                     |  |                                                                                     | BSH105                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 2.28               | 0.45                          | 0.95                          | 14.5                        | 23.5                         | 0.89                       | -                 | -                                              | 250               | -     | 420               |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMZ250UN                                                                            |                                                                                     |  |
|                       |                     | 1                  | 0.45                          | 1                             | 14.5                        | 23.5                         | 0.89                       | -                 | -                                              | 280               | -     | 460               |                                                                                     |  |                                                                                     |                                                                                     | PMF280UN                                                                            | PMR280UN                                                                            |                                                                                     |                                                                                     |  |
|                       | 12                  | 5.9                | 0.5                           | 1.5                           | 25                          | 37                           | 5.8                        | -                 | -                                              | 31                | 44    | -                 |                                                                                     |  |                                                                                     | PMV31XN <sup>1)</sup>                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 2.15               | 0.5                           | 1.5                           | 16                          | 17                           | 0.72                       | -                 | -                                              | 270               | 440   | -                 |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMZ270XN                                                                            |  |
|                       |                     | 1                  | 0.5                           | 1.5                           | 16                          | 17                           | 0.72                       | -                 | -                                              | 290               | 460   | -                 |                                                                                     |  |                                                                                     |                                                                                     | PMF290XN                                                                            | PMR290XN                                                                            |                                                                                     |                                                                                     |  |
|                       | 15                  | 5.7                | 1                             | 2                             | 24                          | 35                           | 13.1                       | -                 | 28                                             | 34                | -     | -                 |                                                                                     |  | PMN34LN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 4.1                | 1                             | 2                             | 24                          | 35                           | 13.1                       | -                 | 55                                             | 70                | -     | -                 |                                                                                     |  | PMN55LN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
| 30                    | 8                   | 4.9                | 0.45                          | -                             | 22                          | 60                           | 9.9                        | -                 | -                                              | 38                | -     | 54                |                                                                                     |  | PMN34UN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 4.9                | 0.45                          | -                             | 18                          | 50                           | 9.3                        | -                 | -                                              | 40                | -     | 55                |                                                                                     |  |                                                                                     | PMV40UN <sup>1)</sup>                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 1.78               | 0.45                          | 0.95                          | 11.5                        | 22.5                         | 0.89                       | -                 | -                                              | 390               | -     | 550               |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMZ390UN                                                                            |  |
|                       |                     | 0.85               | 0.4                           | -                             | 6                           | 27                           | -                          | -                 | -                                              | 400 <sup>2)</sup> | -     | 600 <sup>2)</sup> |                                                                                     |  |                                                                                     | BSH103                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 0.8                | 0.45                          | 1                             | 11.5                        | 22.5                         | 0.89                       | -                 | -                                              | 400               | -     | 580               |                                                                                     |  |                                                                                     |                                                                                     | PMF400UN                                                                            | PMR400UN                                                                            |                                                                                     |                                                                                     |  |
|                       | 12                  | 1.87               | 0.5                           | 1.5                           | 16                          | 19.5                         | 0.65                       | -                 | -                                              | 350               | 520   | -                 |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMZ350XN                                                                            |  |
|                       |                     | 0.87               | 0.35                          |                               | 16                          | 19.5                         | -                          | -                 | -                                              | 370               | 550   | -                 |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     | PMF370XN                                                                            |                                                                                     |                                                                                     |  |
|                       |                     | 0.9                | 0.5                           | 1.5                           | 16                          | 19.5                         | 0.65                       | -                 | -                                              | 370               | 550   | -                 |                                                                                     |  |                                                                                     |                                                                                     | PMG370XN                                                                            |                                                                                     | PMR370XN                                                                            |                                                                                     |  |
|                       | 15                  | 5.4                | 1                             | 2                             | 12                          | 27                           | 13.8                       | -                 | 32                                             | 40                | -     | -                 |                                                                                     |  | PMN40LN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       | 20                  | 10                 | 1                             | 2.8                           | 18                          | 44                           | 24                         | -                 | 20                                             | 30                | -     | -                 | BSP030                                                                              |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 5.4                | 1                             | 2                             | 33                          | 44                           | 6.1                        | -                 | 31                                             | 38                | -     | -                 |                                                                                     |  | PMN38EN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 5.2                | 1                             | 2                             | 33                          | 44                           | 6.1                        | -                 | 32                                             | 42                | -     | -                 |                                                                                     |  | PMN45EN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 5.4                | 1                             | 2                             | 12                          | 21.5                         | 9.4                        | -                 | 35                                             | 45                | -     | -                 |                                                                                     |  |                                                                                     | PMV45EN <sup>1)</sup>                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 4.6                | 1                             | 2                             | 8.4                         | 17.8                         | 8.8                        | -                 | 40                                             | 49                | -     | -                 |                                                                                     |  | PMN49EN                                                                             |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 4.7                | 1                             | 2                             | 12                          | 23.5                         | 9.4                        | -                 | 47                                             | 60                | -     | -                 |                                                                                     |  |                                                                                     | PMV60EN <sup>1)</sup>                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 1.9                | 1                             | 2                             | 11                          | 41                           | 6.4                        | -                 | 77                                             | 102               | -     | -                 |                                                                                     |  |                                                                                     | BSH108                                                                              |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 2.5                | 1.5                           | -                             | 12                          | 23.5                         | 4.6                        | -                 | 74                                             | 117               | -     | -                 |                                                                                     |  |                                                                                     | PMV117EN                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 6                  | 1                             | 2.8                           | 14                          | 36                           | -                          | -                 | 80                                             | 120               | -     | -                 | BSP100                                                                              |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |
|                       |                     | 1.7                | 1.5                           | -                             | 11.5                        | 31                           | 4.6                        | -                 | 117 <sup>2)</sup>                              | 190 <sup>2)</sup> | -     | -                 |                                                                                     |  |                                                                                     | SI2304DS                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |  |

<sup>1)</sup> enhanced thermal capability  
<sup>2)</sup> max values

Small-signal MOSFETs single (N-channel) ≥ 50 V

types in **bold** represent new products

| Package               |                     |                    |                            |                            |                          |                           |                         |                |                                                  |                    |       |       | SOT223 (SC-73)                                                                      |  | SOT89 (SC-62)                                                                       | SOT873                                                                              | SOT23                                                                               | SOT323 (SC-70)                                                                      | SOT416 (SC-75)                                                                      | SOT883 (SC-101)                                                                     |
|-----------------------|---------------------|--------------------|----------------------------|----------------------------|--------------------------|---------------------------|-------------------------|----------------|--------------------------------------------------|--------------------|-------|-------|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                       |                     |                    |                            |                            |                          |                           |                         |                |                                                  |                    |       |       |  |  |  |  |  |  |  |  |
| Size (mm)             |                     |                    |                            |                            |                          |                           |                         |                |                                                  |                    |       |       | 6.5 x 3.5 x 1.65                                                                    |  | 4.5 x 2.5 x 1.5                                                                     | 3.3 x 3.3 x 0.85                                                                    | 2.9 x 1.3 x 1.0                                                                     | 2.0 x 1.25 x 0.95                                                                   | 1.6 x 0.8 x 0.77                                                                    | 1.0 x 0.6 x 0.5                                                                     |
| P <sub>tot</sub> (mW) |                     |                    |                            |                            |                          |                           |                         |                |                                                  |                    |       |       | 1700                                                                                |  | 1300                                                                                | 250                                                                                 | 250                                                                                 | 200                                                                                 | 150                                                                                 | 250                                                                                 |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS(th)</sub> min(V) | V <sub>GS(th)</sub> max(V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD protection | R <sub>DS(on)</sub> typ (mΩ) @ V <sub>gs</sub> = |                    |       |       |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     |                    |                            |                            |                          |                           |                         |                | 10 V                                             | 4.5 V              | 2.5 V | 1.8 V |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 50                    | 20                  | 0.1                | 0.4                        | 1.8                        | 2                        | 5                         | -                       | -              | 2800                                             | 3800 <sup>3)</sup> | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | BSN20                                                                               |                                                                                     |                                                                                     |                                                                                     |
| 55                    | 8                   | 0.3                | 0.4                        | 1.3                        | 4                        | 11                        | 1                       | -              | -                                                | 2300               | 2400  | 3100  |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     | BSH121                                                                              |                                                                                     |                                                                                     |
|                       | 10                  | 0.335              | 0.4                        | 1.3                        | 4                        | 11                        | 1                       | -              | -                                                | 2300               | 2400  | 3100  |                                                                                     |  |                                                                                     |                                                                                     | BSH111                                                                              |                                                                                     |                                                                                     |                                                                                     |
|                       | 13                  | 4.9                | 1                          | 2                          | -                        | -                         | -                       | 2KV            | -                                                | 30                 | -     | -     | PHT11N06LT                                                                          |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 3.5                | 1                          | 2                          | -                        | -                         | -                       | 2KV            | -                                                | 65                 | -     | -     | PHT8N06LT                                                                           |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 2.5                | 1                          | 2                          | -                        | -                         | -                       | 2KV            | -                                                | 120                | -     | -     | PHT6N06LT                                                                           |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 2.5                | 2                          | 4                          | -                        | -                         | -                       | 2KV            | 120                                              | -                  | -     | -     | PHT6N06T                                                                            |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 60                    | 15                  | 0.26               | 1                          | 3.3                        | 3                        | 9                         | -                       | 1KV            | 2800                                             | 3800               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     | PMF3800SN                                                                           |                                                                                     |                                                                                     |
|                       |                     | 0.34               | 1                          | -                          | 3                        | 9                         | -                       | 1KV            | 2800                                             | 3800               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | 2N7002K                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.3                | 1                          | -                          | 3                        | 9                         | -                       | yes            | 2800                                             | 3800               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | BSH112                                                                              |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.3                | 1                          | 2.5                        | 16                       | 60                        | 1.09                    | 3KV            | 1100                                             | 1300               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | <b>2N7002CK</b>                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.3                | 1                          | 2.5                        | tbd                      | tbd                       | tbd                     | -              | 2000 <sup>2)</sup>                               | 3000 <sup>2)</sup> | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | <b>2N7002P</b>                                                                      | <b>2N7002PW</b>                                                                     | <b>2N7002PT</b>                                                                     | <b>2N7002PM</b>                                                                     |
|                       |                     | 0.3                | 1                          | 2.5                        | tbd                      | tbd                       | tbd                     | 2KV            | 1600 <sup>2)</sup>                               | 3000 <sup>2)</sup> | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | <b>2N7002BK</b>                                                                     | <b>2N7002BKW</b>                                                                    | <b>2N7002BKT</b>                                                                    | <b>2N7002BKM</b>                                                                    |
|                       |                     | 0.57               | 1                          | -                          | 6                        | 7.2                       | -                       | -              | 780                                              | 1100               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     | PMF780SN                                                                            |                                                                                     |                                                                                     |
|                       |                     | 0.55               | 1                          | 3                          | 6                        | 7.2                       | 1.05                    | -              | 780                                              | 1100               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMR780SN                                                                            |                                                                                     |
|                       |                     | 1.22               | 1                          | 3                          | 6                        | 7.2                       | 1.05                    | -              | 760                                              | 1100               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     | PMZ760SN                                                                            |
|                       |                     | 0.25               | 0.8                        | 3                          | -                        | -                         | -                       | -              | 2500                                             | -                  | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | PMBF170                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       | 30                  | 0.385              | 1                          | 2.5                        | 2.5                      | 11                        | 0.69                    | -              | 780                                              | 1200               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | 2N7002E                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.475              | 1                          | 2.5                        | 2.5                      | 11                        | 0.69                    | -              | 780                                              | 1200               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | 2N7002F                                                                             |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.3                | 1                          | 2.5                        | 2.5                      | 11                        | -                       | -              | 2800                                             | 3800               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | 2N7002                                                                              |                                                                                     |                                                                                     |                                                                                     |
| 100                   | 16                  | 3.5                | 1                          | 2                          | 14                       | 73                        | -                       | -              | -                                                | 200                | -     | -     | PHT4NQ10LT                                                                          |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 20                  | 0.19               | 1                          | -                          | 3                        | 12                        | -                       | -              | -                                                | 5000               | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | BST82                                                                               |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.52               | 1                          | -                          | 3                        | 12                        | -                       | -              | -                                                | 5000               | -     | -     | BSP110                                                                              |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.85               | 2                          | 4                          | 19                       | 13                        | 4.6                     | -              | 400                                              | -                  | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | BSH114                                                                              |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.15               | 1                          | 2.8                        | 3                        | 12                        | -                       | -              | 3500                                             | -                  | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | BSS123                                                                              |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 3.5                | 2                          | 4                          | 21                       | 31                        | 7.4                     | -              | 200                                              | -                  | -     | -     | PHT4NQ10T                                                                           |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 3                  | 2                          | 4                          | -                        | -                         | -                       | -              | 57                                               | -                  | -     | -     | PHT6NQ10T                                                                           |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       | 30                  | 1.9                | 2                          | 4                          | 10.5                     | 12.5                      | 7                       | -              | 213                                              | -                  | -     | -     |                                                                                     |  |                                                                                     |                                                                                     | PMV213SN <sup>1)</sup>                                                              |                                                                                     |                                                                                     |                                                                                     |
| 200                   | 20                  | 0.55               | 0.4                        | 2                          | 10                       | 45                        | -                       | -              | 1700                                             | -                  | 3000  | -     | BSP122                                                                              |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.4                | 0.8                        | 2.8                        | 6                        | 49                        | -                       | -              | 1600                                             | -                  | -     | -     |                                                                                     |  | BSS87                                                                               |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 8.8                | 2                          | 4                          | 18                       | 26                        | 13.3                    | -              | 250                                              | -                  | -     | -     |                                                                                     |  |                                                                                     | PML260SN                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 220                   | 20                  | 7.3                | 2                          | 4                          | 20.8                     | 24.3                      | 13.2                    | -              | 320                                              | -                  | -     | -     |                                                                                     |  |                                                                                     | PML340SN                                                                            |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 240                   | 20                  | 0.375              | 0.8                        | 2                          | 6                        | 47                        | -                       | -              | 2800                                             | 7500 <sup>2)</sup> | -     | -     | BSP89                                                                               |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 250                   | 20                  | 0.35               | 0.8                        | 2                          | 6                        | 47                        | -                       | -              | 2800                                             | -                  | -     | -     | BSP126                                                                              |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 300                   | 20                  | 0.35               | 0.8                        | 2                          | 6                        | 46                        | -                       | -              | 3700                                             | -                  | 4800  | -     | BSP130                                                                              |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |                                                                                     |

<sup>1)</sup> enhanced thermal capability  
<sup>2)</sup> max values  
<sup>3)</sup> @ V<sub>gs</sub> = 5 V

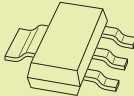
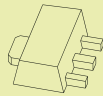
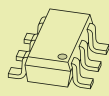
Small-signal MOSFETs dual (N-channel)

types in **bold** represent new products

| Package               |                     |                    |                                |                                |                          |                           |                         |                   |                                                |                    |       |       |  | SOT363 (SC-88)                                                                      | SOT666 (SC-88)                                                                      |
|-----------------------|---------------------|--------------------|--------------------------------|--------------------------------|--------------------------|---------------------------|-------------------------|-------------------|------------------------------------------------|--------------------|-------|-------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Size (mm)             |                     |                    |                                |                                |                          |                           |                         |                   |                                                |                    |       |       |  |  |  |
| P <sub>tot</sub> (mW) |                     |                    |                                |                                |                          |                           |                         |                   |                                                |                    |       |       |  | 300                                                                                 | 300                                                                                 |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS</sub> (th)<br>min(V) | V <sub>GS</sub> (th)<br>max(V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD<br>protection | R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> = |                    |       |       |  |                                                                                     |                                                                                     |
|                       |                     |                    |                                |                                |                          |                           |                         |                   | 10 V                                           | 4.5 V              | 2.5 V | 1.8 V |  |                                                                                     |                                                                                     |
| 20                    | 8                   | 0.87               | 0.45                           | 1                              | 14.5                     | 23.5                      | -                       | -                 | -                                              | 280                | -     | 460   |  | PMGD280UN                                                                           |                                                                                     |
|                       | 12                  | 0.86               | 0.5                            | 1.5                            | 16                       | 17                        | 0.72                    | -                 | -                                              | 290                | 460   | -     |  | PMGD290XN                                                                           |                                                                                     |
| 30                    | 8                   | 0.71               | 0.45                           | 1                              | 11.5                     | 22.5                      | 0.89                    | -                 | -                                              | 400                | -     | 580   |  | PMGD400UN                                                                           |                                                                                     |
|                       | 12                  | 0.74               | 0.5                            | 1.5                            | 17                       | 19.5                      | 0.65                    | -                 | -                                              | 370                | 550   | -     |  | PMGD370XN                                                                           |                                                                                     |
|                       | 15                  | 0.125              | 0.8                            | 1.5                            | 17                       | 22                        | 0.35                    | -                 | -                                              | 1800               | 2900  | -     |  | PMGD8000LN                                                                          |                                                                                     |
| 60                    | 20                  | 0.3                | 1                              | 2.5                            | tbd                      | tbd                       | tbd                     | -                 | 2000 <sup>2)</sup>                             | 3000 <sup>2)</sup> | -     | -     |  | <b>2N7002PS</b>                                                                     | <b>2N7002PV</b>                                                                     |
|                       |                     | 0.3                | 1                              | 2.5                            | tbd                      | tbd                       | tbd                     | 2KV               | 1600 <sup>2)</sup>                             | 3000 <sup>2)</sup> | -     | -     |  | <b>2N7002BKS</b>                                                                    | <b>2N7002BKV</b>                                                                    |
|                       |                     | 0.49               | 1                              | -                              | 6                        | 7.2                       | 1.05                    | -                 | 780                                            | 1100               | -     | -     |  | PMGD780SN                                                                           |                                                                                     |

<sup>1)</sup> enhanced thermal capability    <sup>2)</sup> max values

Small-signal MOSFETs single (P-channel)

| Package               |                     |                    |                                |                                |                          |                           |                         |                   |                                                |       |       |       |  | SOT223 (SC-73)                                                                      | SOT89 (SC-62)                                                                       | TSOP6 SOT457 (SC-74)                                                                | SOT23                                                                               |
|-----------------------|---------------------|--------------------|--------------------------------|--------------------------------|--------------------------|---------------------------|-------------------------|-------------------|------------------------------------------------|-------|-------|-------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Size (mm)             |                     |                    |                                |                                |                          |                           |                         |                   |                                                |       |       |       |  |  |  |  |  |
| P <sub>tot</sub> (mW) |                     |                    |                                |                                |                          |                           |                         |                   |                                                |       |       |       |  | 1700                                                                                | 1300                                                                                | 600                                                                                 | 250                                                                                 |
| V <sub>DS</sub> (V)   | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS</sub> (th)<br>min(V) | V <sub>GS</sub> (th)<br>max(V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD<br>protection | R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> = |       |       |       |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
|                       |                     |                    |                                |                                |                          |                           |                         |                   | 10 V                                           | 4.5 V | 2.5 V | 1.8 V |  |                                                                                     |                                                                                     |                                                                                     |                                                                                     |
| 12                    | 8                   | 1.52               | 0.4                            | -                              | 6.5                      | 65                        | -                       | -                 | -                                              | 80    | -     | 140   |  |                                                                                     |                                                                                     | BSH207                                                                              |                                                                                     |
|                       |                     | 0.75               | 0.4                            | -                              | 6.5                      | 65                        | -                       | -                 | -                                              | 180   | -     | 420   |  |                                                                                     |                                                                                     |                                                                                     | BSH205 <sup>1)</sup>                                                                |
| 20                    | 12                  | 4.8                | 0.55                           | 0.95                           | 16                       | 117                       | 10                      | -                 | -                                              | 48    | 65    | -     |  |                                                                                     |                                                                                     | PMN50XP                                                                             |                                                                                     |
|                       |                     | 3.9                | 0.55                           | 0.95                           | 28                       | 101                       | 7.6                     | -                 | -                                              | 65    | 90    | -     |  |                                                                                     |                                                                                     |                                                                                     | PMV65XP <sup>1)</sup>                                                               |
| 30                    | 8                   | 0.47               | 0.4                            | -                              | 6.5                      | 65                        | -                       | -                 | -                                              | 660   | -     | 1100  |  |                                                                                     |                                                                                     |                                                                                     | BSH203                                                                              |
|                       | 20                  | 3                  | 1                              | 2.8                            | 20                       | 50                        | -                       | -                 | 220                                            | 330   | -     | -     |  | BSP250                                                                              |                                                                                     |                                                                                     |                                                                                     |
|                       |                     | 0.52               | 1                              | -                              | 6.5                      | 65                        | -                       | -                 | 630                                            | 890   | -     | -     |  |                                                                                     |                                                                                     |                                                                                     | BSH202                                                                              |
| 50                    | 20                  | 0.13               | 0.8                            | 2                              | 3                        | 7                         | -                       | -                 | 6000                                           | -     | -     | -     |  |                                                                                     |                                                                                     |                                                                                     | BSS84                                                                               |
| 60                    | 20                  | 0.3                | 1                              | -                              | 6.5                      | 65                        | -                       | -                 | 2100                                           | 2700  | -     | -     |  |                                                                                     |                                                                                     |                                                                                     | BSH201                                                                              |
| 200                   | 20                  | 0.225              | 0.8                            | 2.8                            | 5                        | 20                        | -                       | -                 | 10000                                          | -     | -     | -     |  | BSP220                                                                              |                                                                                     |                                                                                     |                                                                                     |
| 240                   | 20                  | 0.2                | 0.8                            | 2.8                            | 5                        | 20                        | -                       | -                 | 10000                                          | -     | -     | -     |  |                                                                                     | BSS192                                                                              |                                                                                     |                                                                                     |
| 250                   | 20                  | 0.225              | 0.8                            | 2.8                            | 5                        | 10                        | -                       | -                 | 10000                                          | -     | -     | -     |  | BSP225                                                                              |                                                                                     |                                                                                     |                                                                                     |
| 300                   | 20                  | 0.21               | 1.95                           | 2.8                            | 5                        | 15                        | -                       | -                 | 17000 <sup>2)</sup>                            | -     | -     | -     |  | BSP230                                                                              |                                                                                     |                                                                                     |                                                                                     |

<sup>1)</sup> enhanced thermal capability    <sup>2)</sup> max values

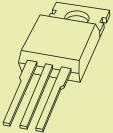
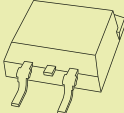
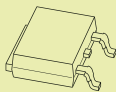
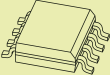
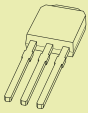
Small-signal MOSFET dual (P-channel) and FET-KYs

types in **bold** represent new products

| Package               |                     |                     |                    |                                |                                |                          |                           |                         |                   |                    |                    |                             |  | SOT1118                                                                               |       |       |                    |
|-----------------------|---------------------|---------------------|--------------------|--------------------------------|--------------------------------|--------------------------|---------------------------|-------------------------|-------------------|--------------------|--------------------|-----------------------------|--|---------------------------------------------------------------------------------------|-------|-------|--------------------|
|                       |                     |                     |                    |                                |                                |                          |                           |                         |                   |                    |                    |                             |  |  |       |       |                    |
| Size (mm)             |                     |                     |                    |                                |                                |                          |                           |                         |                   |                    |                    |                             |  | 2.0 x 2.0 x 0.65                                                                      |       |       |                    |
| P <sub>tot</sub> (mW) |                     |                     |                    |                                |                                |                          |                           |                         |                   |                    |                    |                             |  | >500                                                                                  |       |       |                    |
| Configuration         | V <sub>DS</sub> (V) | V <sub>GS</sub> (V) | I <sub>D</sub> (A) | V <sub>GS</sub> (th)<br>min(V) | V <sub>GS</sub> (th)<br>max(V) | t <sub>on</sub> typ (ns) | t <sub>off</sub> typ (ns) | Q <sub>G</sub> typ (nC) | ESD<br>protection | I <sub>F</sub> (A) | V <sub>R</sub> (V) | V <sub>F</sub> typ.<br>(mA) |  | R <sub>DSon</sub> typ (mΩ) @ V <sub>gs</sub> =                                        |       |       |                    |
|                       |                     |                     |                    |                                |                                |                          |                           |                         |                   |                    |                    |                             |  | 4.5 V                                                                                 | 2.5 V | 1.8 V |                    |
| dual                  | 20                  | 8                   | 3.3                | 0.5                            | 1.5                            | tbd                      | tbd                       | tbd                     | 800 V             | -                  | -                  | -                           |  | 65                                                                                    | 95    | 130   | <b>PMDPB65UP</b>   |
| single + schottky     | 20                  | 8                   | 3.3                | 0.5                            | 1.5                            | tbd                      | tbd                       | tbd                     | 800 V             | 2                  | 30                 | 455                         |  | 65                                                                                    | 95    | 130   | <b>PMFPB6545UP</b> |
|                       |                     |                     | 3.3                | 0.5                            | 1.5                            | tbd                      | tbd                       | tbd                     | 800 V             | 2.2                | 30                 | 325                         |  | 65                                                                                    | 95    | 130   | <b>PMFPB6532UP</b> |

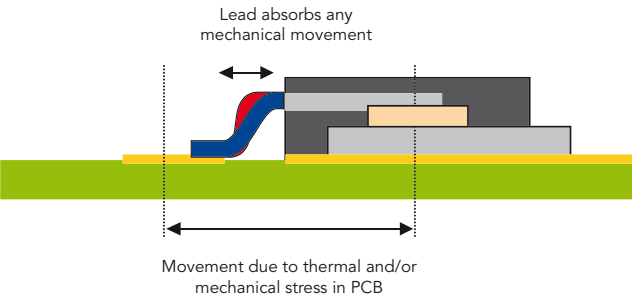
Power MOSFETs single (N-channel)

types in **bold** represent new products

| V <sub>DS</sub> (max) (V) | R <sub>DSon</sub> (max)<br>(mΩ) @ V <sub>gs</sub> =<br>10 V | R <sub>DSon</sub> (max)<br>(mΩ)<br>@ V <sub>gs</sub> = 4.5 V | I <sub>D</sub> (max) (A) @<br>25 °C | Power-SO8<br>(LFPAK)                                                              | TO-220AB<br>(SOT78)                                                                | D2PAK<br>(SOT404)                                                                   | DPAK<br>(SOT428)                                                                    |  | SO8<br>(SOT96-1)                                                                    | IPAK<br>(SOT533)                                                                    |
|---------------------------|-------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                           |                                                             |                                                              |                                     |  |  |  |  |  |  |  |
| 20                        | 2.65                                                        | 3.7                                                          | 100                                 | 3.95 x 4.9 x 1.1                                                                  | 15.6 x 10 x 4.4                                                                    | 11 x 10 x 4.3                                                                       | 6 x 6.6 x 2.3                                                                       |  | 4.9 x 3.9 x 1.75                                                                    | 6 x 6.6 x 2.3                                                                       |
|                           | -                                                           | 2.7                                                          | 100                                 | PH3120L                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | -                                                           | 5                                                            | 32                                  | PH2520U                                                                           |                                                                                    |                                                                                     |                                                                                     |  | PSMN006-20K                                                                         |                                                                                     |
|                           | -                                                           | 16 @ 5 V                                                     | 44.7                                |                                                                                   |                                                                                    |                                                                                     | PHD38N02LT                                                                          |  |                                                                                     |                                                                                     |
|                           | -                                                           | 20 @ 5 V                                                     | 10.9                                |                                                                                   |                                                                                    |                                                                                     |                                                                                     |  | PHKD6N02LT                                                                          |                                                                                     |
| 25                        | 1.2                                                         | 1.85                                                         | 100                                 | <b>PSMN1R2-25YL</b>                                                               |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 1.5                                                         | 2.2                                                          | 100                                 | <b>PSMN1R5-25YL</b>                                                               |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 2.5                                                         | 3.9                                                          | 100                                 | PH2525L                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 2.8                                                         | 4.1                                                          | 100                                 | PH2625L                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 4                                                           | -                                                            | 99                                  | PH4025L                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 4.95                                                        | -                                                            | 75                                  |                                                                                   |                                                                                    |                                                                                     | PHD96NQ03LT                                                                         |  |                                                                                     |                                                                                     |
|                           | 5.5                                                         | 8.2                                                          | 81.7                                | PH5525L                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 5.8                                                         | -                                                            | 75                                  |                                                                                   |                                                                                    |                                                                                     | PSMN005-25D                                                                         |  |                                                                                     |                                                                                     |
|                           | 6                                                           | -                                                            | 75                                  |                                                                                   |                                                                                    |                                                                                     | PHD108NQ03LT                                                                        |  |                                                                                     |                                                                                     |
|                           | 6.3                                                         | 9.5                                                          | 78.7                                | PH6325L                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 6.3                                                         | 10.6                                                         | 75                                  |                                                                                   |                                                                                    |                                                                                     | PHD97NQ03LT                                                                         |  |                                                                                     |                                                                                     |
|                           | 6.6                                                         | -                                                            | 75                                  |                                                                                   |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     | PHU97NQ03LT                                                                         |
|                           | 9                                                           | 13                                                           | 66                                  | PH9025L                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 9                                                           | -                                                            | 66.4                                |                                                                                   |                                                                                    |                                                                                     | PHD78NQ03LT                                                                         |  |                                                                                     | PHU78NQ03LT                                                                         |
|                           | 9                                                           | -                                                            | 61                                  |                                                                                   | PHP78NQ03LT                                                                        |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                           | 9.5                                                         | -                                                            | 75                                  |                                                                                   |                                                                                    |                                                                                     | PHD77NQ03T                                                                          |  |                                                                                     | PHU77NQ03T                                                                          |
|                           | 10.5                                                        | -                                                            | 66                                  |                                                                                   |                                                                                    | PHB66NQ03LT                                                                         | PHD66NQ03LT                                                                         |  |                                                                                     |                                                                                     |
|                           | -                                                           | 3                                                            | 100                                 | PH2925U                                                                           |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |

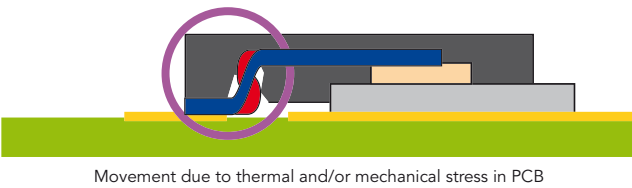
LFPAK for mechanical & thermal ruggedness

NXP LFPAK



LFPAK pins provide compliance and allow for thermal expansion due to temperature difference between the MOSFET & PCB and also mechanical strain due to PCB bending & flexing

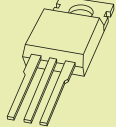
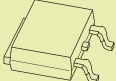
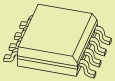
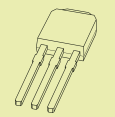
QFN Based Power-SO8



QFN sawn or micro-lead pins are fully encapsulated and do not allow for movement. Cracks in the mould compound can lead to moisture ingress & ionic contamination causing early failure of the MOSFET

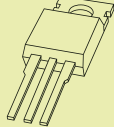
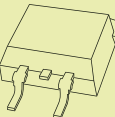
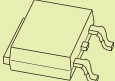
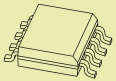
Power MOSFETs single (N-channel)

types in **bold** represent new products

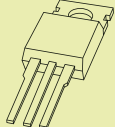
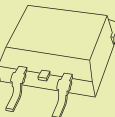
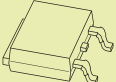
| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ $25\text{ °C}$ | Power-SO8<br>(LFPAK)<br> | TO-220AB<br>(SOT78)<br> | DPAK<br>(SOT428)<br> | SO8<br>(SOT96-1)<br> | IPAK<br>(SOT533)<br> |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                           | 3.95 x 4.9 x 1.1                                                                                          | 15.6 x 10 x 4.4                                                                                          | 6 x 6.6 x 2.3                                                                                           | 4.9 x 3.9 x 1.75                                                                                        | 6 x 6.6 x 2.3                                                                                           |
| 30                       | 1.3                                                     | 1.95                                                     | 100                                       | <b>PSMN1R3-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 1.7                                                     | 2.1                                                      | 100                                       |                                                                                                           | <b>PSMN1R6-30PL</b>                                                                                      |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 1.7                                                     | 2.6                                                      | 100                                       | <b>PSMN1R7-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 1.8                                                     | -                                                        | -                                         |                                                                                                           | <b>PSMN1R8-30PL</b>                                                                                      |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 2                                                       | 3.2                                                      | 100                                       | <b>PSMN2R0-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 2.1                                                     | 2.8                                                      | 100                                       |                                                                                                           | <b>PSMN2R0-30PL</b>                                                                                      |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 2.4                                                     | 3.9                                                      | 100                                       | <b>PSMN2R5-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 2.7                                                     | -                                                        | -                                         |                                                                                                           | <b>PSMN2R7-30PL</b>                                                                                      |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 2.8                                                     | -                                                        | 75                                        |                                                                                                           | PSMN003-30P                                                                                              |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 3                                                       | 4.8                                                      | 100                                       | <b>PSMN3R0-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 3.2                                                     | -                                                        | 100                                       | PH3230S                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 3.3                                                     | 4.5                                                      | 100                                       | PH3330L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 3.4                                                     | -                                                        | -                                         |                                                                                                           | <b>PSMN3R4-30PL</b>                                                                                      |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 3.5                                                     | 5.6                                                      | 100                                       | <b>PSMN3R5-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 3.8                                                     | -                                                        | 98                                        | PH3830L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 4                                                       | 6.5                                                      | 99                                        | <b>PSMN4R0-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 4.3                                                     | 6.2                                                      | 100                                       |                                                                                                           | <b>PSMN4R3-30PL</b>                                                                                      |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 4.3                                                     | -                                                        | 95.9                                      | PH4330L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 4.4                                                     | -                                                        | 30.4                                      |                                                                                                           |                                                                                                          |                                                                                                         | PHK31NQ03LT                                                                                             |                                                                                                         |
|                          | 4.8                                                     | -                                                        | 84                                        | PH4830L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 5                                                       | 8                                                        | 84                                        | <b>PSMN5R0-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 5.5                                                     | -                                                        | 20 @ 80 °C                                |                                                                                                           |                                                                                                          |                                                                                                         | PSMN005-30K                                                                                             |                                                                                                         |
|                          | 5.5                                                     | -                                                        | 75                                        |                                                                                                           | PHP101NQ03LT                                                                                             | PHD101NQ03LT                                                                                            |                                                                                                         | PHU101NQ03LT                                                                                            |
|                          | 5.7                                                     | -                                                        | 80                                        | PH5330E                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 5.9                                                     | -                                                        | 76.7                                      | PH8030L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 6                                                       | 9.7                                                      | 76.7                                      | PH6030L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 6                                                       | 9.7                                                      | 73                                        | <b>PSMN6R0-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 6.5                                                     | -                                                        | 23.7                                      |                                                                                                           |                                                                                                          |                                                                                                         | PHK28NQ03LT                                                                                             |                                                                                                         |
|                          | 7                                                       | 11.3                                                     | 65                                        | <b>PSMN7R0-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 7.9                                                     | 11                                                       | 68                                        | PH7030L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 8                                                       | 13.8                                                     | 55                                        | <b>PSMN9R0-30YL</b>                                                                                       |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 8.2                                                     | -                                                        | 67                                        | PH8230E                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 8.9                                                     | -                                                        | 20.3                                      |                                                                                                           |                                                                                                          |                                                                                                         | PHK18NQ03LT                                                                                             |                                                                                                         |
|                          | 9                                                       | 12.5                                                     | 63                                        | PH9030L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |
|                          | 9.9                                                     | -                                                        | 63                                        | PH9930L                                                                                                   |                                                                                                          |                                                                                                         |                                                                                                         |                                                                                                         |

Power MOSFETs single (N-channel)

types in **bold** represent new products

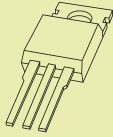
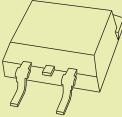
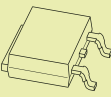
| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ $25\text{ °C}$ | TO-220AB<br>(SOT78)<br> | D2PAK<br>(SOT404)<br> | DPAK<br>(SOT428)<br> | SO8<br>(SOT96-1)<br> |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                           | 15.6 x 10 x 4.4                                                                                            | 11 x 10 x 4.3                                                                                            | 6 x 6.6 x 2.3                                                                                           | 4.9 x 3.9 x 1.75                                                                                        |
| 30                       | 10                                                      | -                                                        | 75                                        |                                                                                                            |                                                                                                          | PHD71NQ03LT                                                                                             |                                                                                                         |
|                          | 13                                                      | -                                                        | 68.9                                      |                                                                                                            |                                                                                                          | PHD63NQ03LT                                                                                             |                                                                                                         |
|                          | 13.5                                                    | 20                                                       | 10                                        |                                                                                                            |                                                                                                          |                                                                                                         | SI4410DY                                                                                                |
|                          | 17                                                      | -                                                        | 43.4                                      | PHP36N03LT                                                                                                 |                                                                                                          | PHD36N03LT                                                                                              |                                                                                                         |
|                          | 20                                                      | 26                                                       | 13.8                                      |                                                                                                            |                                                                                                          |                                                                                                         | PHK13N03LT                                                                                              |
|                          | 20                                                      | 26                                                       | 10.4                                      |                                                                                                            |                                                                                                          |                                                                                                         | PHKD13N03LT                                                                                             |
|                          | 22.0                                                    | -                                                        | -                                         | <b>PSMN022-30PL</b>                                                                                        |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 30                                                      | -                                                        | 6.3                                       |                                                                                                            |                                                                                                          |                                                                                                         | PHN203                                                                                                  |
|                          | 100                                                     | 200                                                      | 3.4                                       |                                                                                                            |                                                                                                          |                                                                                                         | PHN210                                                                                                  |
|                          | 100                                                     | 200                                                      | 3.4                                       |                                                                                                            |                                                                                                          |                                                                                                         | PHN210T                                                                                                 |
| 36                       | -                                                       | 14                                                       | 11.8                                      |                                                                                                            |                                                                                                          |                                                                                                         | PHK12NQ03LT                                                                                             |
|                          | 4                                                       | -                                                        | 75                                        |                                                                                                            | PSMN004-36B                                                                                              |                                                                                                         |                                                                                                         |

types in **bold** represent new products

| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ $25\text{ °C}$ | Power-SO8<br>(LFPAK)<br> | TO-220AB<br>(SOT78)<br> | D2PAK<br>(SOT404)<br> | DPAK<br>(SOT428)<br> |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|-------------------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                           | 3.95 x 4.9 x 1.1                                                                                             | 15.6 x 10 x 4.4                                                                                             | 11 x 10 x 4.3                                                                                             | 6 x 6.6 x 2.3                                                                                            |
| 40                       | 2                                                       | -                                                        | -                                         | <b>PSMN2R0-40YS</b>                                                                                          |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 2.1                                                     | -                                                        | 100                                       |                                                                                                              | <b>PSMN2R2-40PS</b>                                                                                         |                                                                                                           |                                                                                                          |
|                          | 2.8                                                     | -                                                        | -                                         |                                                                                                              | <b>PSMN2R8-40PS</b>                                                                                         |                                                                                                           |                                                                                                          |
|                          | 2.8                                                     | -                                                        | 100                                       | <b>PSMN2R6-40YS</b>                                                                                          |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 3.3                                                     | -                                                        | -                                         | <b>PSMN3R3-40YS</b>                                                                                          |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 4.1                                                     | -                                                        | 94.5                                      | PH4840S                                                                                                      |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 4.2                                                     | -                                                        | 100                                       | <b>PSMN4R0-40YS</b>                                                                                          |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 4.3                                                     | -                                                        | 75                                        |                                                                                                              | PHP176NQ04T                                                                                                 |                                                                                                           |                                                                                                          |
|                          | 4.6                                                     | -                                                        | 100                                       |                                                                                                              | <b>PSMN4R5-40PS</b>                                                                                         |                                                                                                           |                                                                                                          |
|                          | 5.2                                                     | -                                                        | 75                                        |                                                                                                              | PHP143NQ04T                                                                                                 |                                                                                                           |                                                                                                          |
|                          | 5.7                                                     | -                                                        | -                                         | <b>PSMN5R8-40YS</b>                                                                                          |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 7.6                                                     | -                                                        | 77                                        |                                                                                                              | <b>PSMN8R0-40PS</b>                                                                                         |                                                                                                           |                                                                                                          |
|                          | 8                                                       | -                                                        | 75                                        |                                                                                                              | PHP101NQ04T                                                                                                 | PHB101NQ04T                                                                                               |                                                                                                          |
|                          | 8.6                                                     | -                                                        | 70                                        | <b>PSMN8R3-40YS</b>                                                                                          |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 14                                                      | -                                                        | -                                         | <b>PSMN014-40YS</b>                                                                                          |                                                                                                             |                                                                                                           |                                                                                                          |
| 55                       | 3.7                                                     | -                                                        | 75                                        |                                                                                                              | PHP191NQ06LT                                                                                                | PHB191NQ06LT                                                                                              |                                                                                                          |
|                          | 5.8                                                     | -                                                        | 75                                        |                                                                                                              | PSMN005-55P                                                                                                 | PSMN005-55B                                                                                               |                                                                                                          |
|                          | 7                                                       | -                                                        | 75                                        |                                                                                                              | PHP110NQ06LT                                                                                                | PHB110NQ06LT                                                                                              |                                                                                                          |
|                          | 7.1                                                     | -                                                        | 75                                        |                                                                                                              | PHP119NQ06T                                                                                                 | PHB119NQ06T                                                                                               |                                                                                                          |
|                          | 8.3                                                     | 9.9                                                      | 62.5                                      | PH955L                                                                                                       |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 10.5                                                    | -                                                        | 75                                        |                                                                                                              |                                                                                                             |                                                                                                           | PSMN010-55D                                                                                              |
|                          | 17.3                                                    | 21                                                       | 40                                        | PH1955L                                                                                                      |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 20                                                      | -                                                        | 54                                        |                                                                                                              | PHP54N06T                                                                                                   |                                                                                                           |                                                                                                          |
|                          | 36                                                      | 45                                                       | 24                                        | PH3855L                                                                                                      |                                                                                                             |                                                                                                           |                                                                                                          |
|                          | 70                                                      | -                                                        | 19                                        |                                                                                                              | PHP21N06LT                                                                                                  | PHB21N06LT                                                                                                | PHD21N06LT                                                                                               |
|                          | 75                                                      | -                                                        | 21                                        |                                                                                                              | PHP21N06T                                                                                                   |                                                                                                           |                                                                                                          |
|                          | 75                                                      | -                                                        | 20.3                                      |                                                                                                              | PHP20N06T                                                                                                   | PHB20N06T                                                                                                 |                                                                                                          |
|                          | 77                                                      | -                                                        | 18                                        |                                                                                                              |                                                                                                             |                                                                                                           | PHD20N06T                                                                                                |

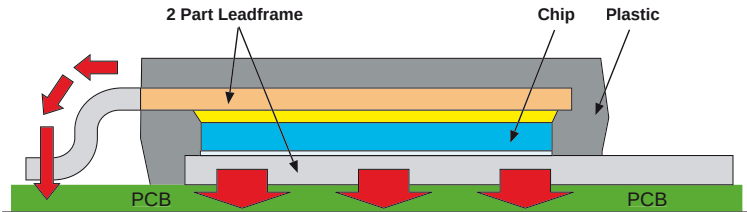
Power MOSFETs single (N-channel)

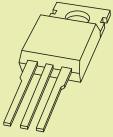
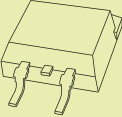
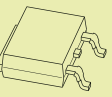
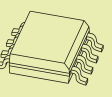
types in **bold** represent new products

| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ $25\text{ °C}$ | Power-SO8<br>(LFPAK)<br> | TO-220AB<br>(SOT78)<br> | D2PAK<br>(SOT404)<br> | DPAK<br>(SOT428)<br> |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                           | 3.95 x 4.9 x 1.1                                                                                          | 15.6 x 10 x 4.4                                                                                           | 11 x 10 x 4.3                                                                                            | 6 x 6.6 x 2.3                                                                                           |
| 60                       | 3.6                                                     | -                                                        | 75                                        |                                                                                                           |                                                                                                           | PSMN004-60B                                                                                              |                                                                                                         |
|                          | 22                                                      | -                                                        | 52                                        |                                                                                                           | PHP52N06T                                                                                                 |                                                                                                          |                                                                                                         |
|                          | 150                                                     | -                                                        | 10.3                                      |                                                                                                           | PHP3055E                                                                                                  |                                                                                                          | PHD3055E                                                                                                |
|                          | -                                                       | 43                                                       | 34                                        |                                                                                                           | PHP32N06LT                                                                                                | PHB32N06LT                                                                                               |                                                                                                         |
| 75                       | 5                                                       | -                                                        | 75                                        |                                                                                                           | PHP165NQ08T                                                                                               |                                                                                                          |                                                                                                         |
|                          | 5                                                       | -                                                        | 75                                        |                                                                                                           | PSMN005-75P                                                                                               | PSMN005-75B                                                                                              |                                                                                                         |
|                          | 5.6                                                     | -                                                        | 75                                        |                                                                                                           | PHP160NQ08T                                                                                               | PHB160NQ08T                                                                                              |                                                                                                         |
|                          | 8.5                                                     | -                                                        | 75                                        |                                                                                                           | PSMN008-75P                                                                                               | PSMN008-75B                                                                                              |                                                                                                         |
|                          | 9                                                       | -                                                        | 75                                        |                                                                                                           | PHP110NQ08T                                                                                               | PHB110NQ08T                                                                                              |                                                                                                         |
|                          | 13                                                      | -                                                        | 75                                        |                                                                                                           | PHP75NQ08T                                                                                                |                                                                                                          |                                                                                                         |
|                          | 16                                                      | -                                                        | 73                                        |                                                                                                           | PHP79NQ08LT                                                                                               |                                                                                                          |                                                                                                         |
|                          | 16.5                                                    | -                                                        | 45.8                                      | PH1875L                                                                                                   |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 28                                                      | 34                                                       | 30                                        | PH3075L                                                                                                   |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 50 @ 11 V                                               | -                                                        | 27                                        |                                                                                                           | PHP29N08T                                                                                                 | PHB29N08T                                                                                                |                                                                                                         |
|                          | 4.1                                                     | -                                                        | 100                                       |                                                                                                           | <b>PSMN4R4-80PS</b>                                                                                       |                                                                                                          |                                                                                                         |
|                          | 4.7                                                     | -                                                        | 100                                       |                                                                                                           | <b>PSMN5R0-80PS</b>                                                                                       |                                                                                                          |                                                                                                         |
| 80                       | 6.4                                                     | -                                                        | -                                         | <b>PSMN6R0-80YS</b>                                                                                       |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 6.5                                                     | -                                                        | -                                         |                                                                                                           | <b>PSMN6R5-80PS</b>                                                                                       |                                                                                                          |                                                                                                         |
|                          | 8.5                                                     | -                                                        | 82                                        | <b>PSMN8R2-80YS</b>                                                                                       |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 8.7                                                     | -                                                        | -                                         |                                                                                                           | <b>PSMN8R7-80PS</b>                                                                                       |                                                                                                          |                                                                                                         |
|                          | 11                                                      | -                                                        | -                                         | <b>PSMN011-80YS</b>                                                                                       |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 11                                                      | -                                                        | 74                                        |                                                                                                           | <b>PSMN012-80PS</b>                                                                                       |                                                                                                          |                                                                                                         |
|                          | 12.9                                                    | -                                                        | 60                                        | <b>PSMN013-80YS</b>                                                                                       |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 17.0                                                    | -                                                        | -                                         |                                                                                                           | <b>PSMN017-80PS</b>                                                                                       |                                                                                                          |                                                                                                         |
|                          | 19.5                                                    | -                                                        | -                                         | <b>PSMN018-80YS</b>                                                                                       |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 27.5                                                    | -                                                        | 34                                        | <b>PSMN026-80YS</b>                                                                                       |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 46                                                      | -                                                        | -                                         | <b>PSMN045-80YS</b>                                                                                       |                                                                                                           |                                                                                                          |                                                                                                         |
|                          | 46                                                      | -                                                        | 22                                        |                                                                                                           | <b>PSMN050-80PS</b>                                                                                       |                                                                                                          |                                                                                                         |

Power-SO8 (LFPAK) Design

- ▶ Low Thermal resistance
- ▶ Low Electrical resistance
- ▶ Low Inductance



| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ $25\text{ °C}$ | Power-SO8<br>(LFPAK)<br> | TO-220AB<br>(SOT78)<br> | D2PAK<br>(SOT404)<br> | DPAK<br>(SOT428)<br> | SO8<br>(SOT96-1)<br> |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                           | 3.95 x 4.9 x 1.1                                                                                            | 15.6 x 10 x 4.4                                                                                            | 11 x 10 x 4.3                                                                                            | 6 x 6.6 x 2.3                                                                                           | 4.9 x 3.9 x 1.75                                                                                        |
| 100                      | 8.8                                                     | -                                                        | 75                                        |                                                                                                             | PSMN009-100P                                                                                               | PSMN009-100B                                                                                             |                                                                                                         |                                                                                                         |
|                          | 15                                                      | -                                                        | 75                                        |                                                                                                             | PSMN015-100P                                                                                               | PSMN015-100B                                                                                             |                                                                                                         |                                                                                                         |
|                          | 23                                                      | -                                                        | 34.3                                      | PH20100S                                                                                                    |                                                                                                            |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 25                                                      | -                                                        | 47                                        |                                                                                                             | PHP45NQ10T                                                                                                 | PHB45NQ10T                                                                                               |                                                                                                         |                                                                                                         |
|                          | 25                                                      | -                                                        | 47                                        |                                                                                                             | PHP45NQ10TA                                                                                                |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 25                                                      | -                                                        | 47                                        |                                                                                                             |                                                                                                            |                                                                                                          | PSMN025-100D                                                                                            |                                                                                                         |
|                          | 28                                                      | -                                                        | 47                                        |                                                                                                             |                                                                                                            | PHB47NQ10T                                                                                               |                                                                                                         |                                                                                                         |
|                          | 28                                                      | -                                                        | 11.6                                      |                                                                                                             |                                                                                                            |                                                                                                          |                                                                                                         | PHK12NQ10T                                                                                              |
|                          | 38                                                      | -                                                        | 6.3 @ 80 °C                               |                                                                                                             |                                                                                                            |                                                                                                          |                                                                                                         | PSMN038-100K                                                                                            |
|                          | 40                                                      | -                                                        | 35                                        |                                                                                                             |                                                                                                            |                                                                                                          | PHD34NQ10T                                                                                              |                                                                                                         |
|                          | 50                                                      | -                                                        | 28                                        |                                                                                                             |                                                                                                            | PHB27NQ10T                                                                                               |                                                                                                         |                                                                                                         |
|                          | 90                                                      | -                                                        | 18                                        |                                                                                                             | PHP18NQ10T                                                                                                 | PHB18NQ10T                                                                                               | PHD18NQ10T                                                                                              |                                                                                                         |
|                          | 90                                                      | -                                                        | 3                                         |                                                                                                             |                                                                                                            |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 90                                                      | -                                                        | 3                                         |                                                                                                             |                                                                                                            |                                                                                                          |                                                                                                         | PHKD3NQ10T                                                                                              |
| 105                      | 25                                                      | -                                                        | 47                                        |                                                                                                             | PHP45NQ11T                                                                                                 |                                                                                                          |                                                                                                         |                                                                                                         |
| 110                      | 15                                                      | -                                                        | 75                                        |                                                                                                             | PSMN015-110P                                                                                               |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 40                                                      | -                                                        | 35                                        |                                                                                                             | PHP34NQ11T                                                                                                 |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 50                                                      | -                                                        | 27.6                                      |                                                                                                             | PHP27NQ11T                                                                                                 |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 70                                                      | -                                                        | 23                                        |                                                                                                             | PHP23NQ11T                                                                                                 |                                                                                                          |                                                                                                         |                                                                                                         |
|                          | 90                                                      | -                                                        | 18                                        |                                                                                                             | PHP18NQ11T                                                                                                 |                                                                                                          |                                                                                                         |                                                                                                         |

NXP Power solutions make your PC Energy Efficient

MOSFETs for high efficiency power management

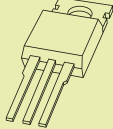
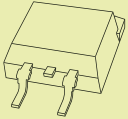
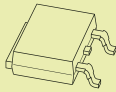
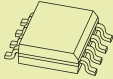
Smaller, faster, cooler

- ▶ Class leading LFPAK package with state of the art Trench 6 silicon technology
  - **Smaller:** Power-SO8 form factor LFPAK
  - **Faster:** Best in class switching performance
  - **Cooler:** Higher efficiency equals lower temperatures
  - **Easier:** easier to use in development and production than other Power-SO8 packages

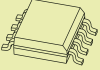
High performance MOSFETs for DC-DC converters, OR-ing and load switching

- ▶ Supported by Secure supply/Capacity availability (Silicon & Package)

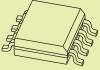
Power MOSFETs single (N-channel)

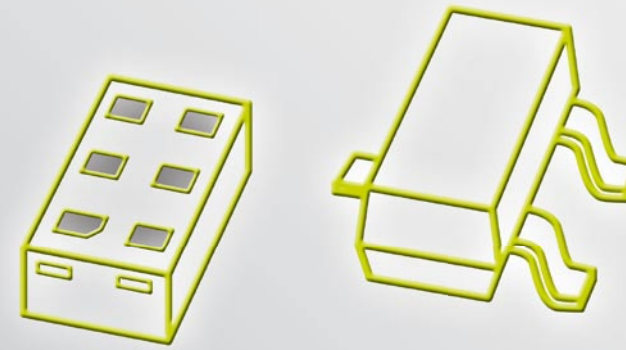
| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ 25 °C | Power-SO8<br>(LFPAK)                                                              | TO-220AB<br>(SOT78)                                                                | D2PAK<br>(SOT404)                                                                   | DPAK<br>(SOT428)                                                                    |  | SO8<br>(SOT96-1)                                                                    | HVSON8<br>(SOT873-1)                                                                |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                  |  |  |  |  |  |  |  |
|                          |                                                         |                                                          |                                  | 3.95 x 4.9 x 1.1                                                                  | 15.6 x 10 x 4.4                                                                    | 11 x 10 x 4.3                                                                       | 6 x 6.6 x 2.3                                                                       |  | 4.9 x 3.9 x 1.75                                                                    | 3.3 x 3.3 x 0.85                                                                    |
| 150                      | 30                                                      | -                                                        | 55.5                             |                                                                                   | PSMN030-150P                                                                       | PSMN030-150B                                                                        |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 35                                                      | -                                                        | 50                               |                                                                                   | PSMN035-150P                                                                       | PSMN035-150B                                                                        |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 42                                                      | -                                                        | 45.1                             |                                                                                   |                                                                                    | PHB45NQ15T                                                                          |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 59                                                      | -                                                        | 43                               | PSMN059-150Y                                                                      |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 63                                                      | -                                                        | 29                               |                                                                                   | PHP30NQ15T                                                                         |                                                                                     | PSMN063-150D                                                                        |  |                                                                                     |                                                                                     |
|                          | 65                                                      | -                                                        | 28.5                             |                                                                                   | PHP28NQ15T                                                                         |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 75                                                      | -                                                        | 5                                |                                                                                   |                                                                                    |                                                                                     |                                                                                     |  | PHK5NQ15T                                                                           |                                                                                     |
|                          | 85                                                      | -                                                        | 3.5 @ 80 °C                      |                                                                                   |                                                                                    |                                                                                     |                                                                                     |  | PSMN085-150K                                                                        |                                                                                     |
| 200                      | 57                                                      | -                                                        | 39                               |                                                                                   | PSMN057-200P                                                                       | PSMN057-200B                                                                        |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 70                                                      | -                                                        | 35                               |                                                                                   | PSMN070-200P                                                                       | PSMN070-200B                                                                        |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 77                                                      | -                                                        | 32.7                             |                                                                                   | PHP33NQ20T                                                                         | PHB33NQ20T                                                                          |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 102                                                     | -                                                        | 21.5                             | PSMN102-200Y                                                                      |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     |                                                                                     |
|                          | 130                                                     | -                                                        | 20                               |                                                                                   | PHP20NQ20T                                                                         | PHB20NQ20T                                                                          | PSMN130-200D                                                                        |  |                                                                                     |                                                                                     |
|                          | 165                                                     | -                                                        | 2.9 @ 80 °C                      |                                                                                   |                                                                                    |                                                                                     |                                                                                     |  | PSMN165-200K                                                                        |                                                                                     |
|                          | 294                                                     | -                                                        | 8.8                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     | PML260SN                                                                            |
|                          | 400                                                     | -                                                        | 8.7                              |                                                                                   | PHP9NQ20T                                                                          |                                                                                     | PHD9NQ20T                                                                           |  |                                                                                     |                                                                                     |
| 220                      | 386                                                     | -                                                        | 7.3                              |                                                                                   |                                                                                    |                                                                                     |                                                                                     |  |                                                                                     | PML340SN                                                                            |

Power MOSFETs single (P-channel)

| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ 25 °C | SO8<br>(SOT96-1)                                                                    |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                  |  |
|                          |                                                         |                                                          |                                  | 4.9 x 3.9 x 1.75                                                                    |
| -16                      | -                                                       | 120                                                      | -4.66                            | PHK04P02T                                                                           |
| -20                      | -                                                       | 50                                                       | -7.9                             | PMK50XP                                                                             |
| -30                      | 19                                                      | -                                                        | -14.9                            | PMK30EP<br>PMK35EP                                                                  |

Power MOSFETs dual (N- and P-channel)

| $V_{DS}$<br>(max)<br>(V) | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 10\text{ V}$ | $R_{DSon}$<br>(max)<br>(mΩ)<br>@ $V_{gs} = 4.5\text{ V}$ | $I_D$<br>(max)<br>(A)<br>@ 25 °C | Configuration      | SO8<br>(SOT96-1)                                                                      |
|--------------------------|---------------------------------------------------------|----------------------------------------------------------|----------------------------------|--------------------|---------------------------------------------------------------------------------------|
|                          |                                                         |                                                          |                                  |                    |  |
|                          |                                                         |                                                          |                                  |                    | 4.9 x 3.9 x 1.75                                                                      |
| 20                       | -                                                       | 20 @ 5 V                                                 | 10.9                             | dual N-channel     | PHKD6N02LT                                                                            |
| 30                       | 20                                                      | 26                                                       | 10.4                             | dual N-channel     | PHKD13N03LT                                                                           |
| 30                       | 30                                                      | -                                                        | 6.3                              | dual N-channel     | PHN203                                                                                |
| 30                       | 100                                                     | 200                                                      | 3.4                              | dual N-channel     | PHN210<br>PHN210T                                                                     |
| 30, -30                  | 100, 250                                                | -                                                        | 3.5, -2.3 @ 80 °C                | complementary pair | PHC21025                                                                              |
| -30                      | 250                                                     | -                                                        | -2.3 @ 80 °C                     | dual P-channel     | PHP225                                                                                |
| 100                      | 90                                                      | -                                                        | 3                                | dual N-channel     | PHKD3NQ10T                                                                            |
| 300, -300                | 6000, 17000                                             | -                                                        | 0.34, -0.235 @ 80 °C             | complementary pair | PHC2300                                                                               |



## Packages

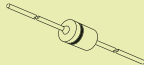
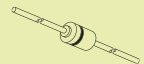
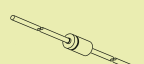
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Package cross reference

| NXP               | Industry standard names | Size (l x w x h)   | Pins / leads | P <sub>tot</sub> (mW) | Package | Competitor synonyms |          |                  |              |          |             |         |                 |
|-------------------|-------------------------|--------------------|--------------|-----------------------|---------|---------------------|----------|------------------|--------------|----------|-------------|---------|-----------------|
|                   |                         |                    |              |                       |         | Rohm                | Toshiba  | ON Semi          | Renesas      | Infineon | Diodes Inc  | KEC     | Vishay          |
| SOD27             | DO-35                   | 4.25 x 1.85 x 0.56 | 2            | 500                   |         | GSD                 |          |                  | DO-35        |          | DO-35       |         | DO-204AH        |
| SOD66             | DO-41                   | 4.8 x 2.6 x 0.81   | 2            | 1300                  |         | GSR                 | DO-41    |                  |              |          | DO-41       |         | DO-204AL        |
| SOD68             | DO-34                   | 3.04 x 1.6 x 0.55  | 2            | 500                   |         | MSD                 |          |                  |              |          |             |         |                 |
| SOD80C            | MiniMelf                | 3.5 x 1.5 x 1.5    | 2            | 300                   |         | LLDS                |          |                  | LLD          |          | MiniMELF    |         | MiniMELF        |
| SOD87             | Melf                    | 3.5 x 2.05 x 2.05  | 2            | 1000                  |         |                     |          |                  |              |          |             |         |                 |
| SOD123F           | -                       | 2.6 x 1.6 x 1.1    | 2            | 830                   |         | PMDU                | S-Flat   | SOD-123-FL       |              |          | Power-DI123 | SMF     |                 |
| SOD123W           | -                       | 2.6 x 1.7 x 1.0    | 2            | 900                   |         |                     | S-Flat   | SOD-123-FL       |              |          | Power-DI123 |         |                 |
| SOD128            | -                       | 3.8 x 2.6 x 1.0    | 2            | 1000                  |         | PMDT                | M-Flat   |                  |              |          |             |         |                 |
| SOD323            | SC-76                   | 1.7 x 1.25 x 0.95  | 2            | 400                   |         |                     | USC      | SOD-323          | URP          | SOD323   | SOD-323     | USC     | SOD323          |
| SOD323F           | SC-90                   | 1.7 x 1.25 x 0.7   | 2            | 830                   |         | UMD2                | US-Flat  |                  |              |          | Power-DI323 |         |                 |
| SOD523            | SC-79                   | 1.2 x 0.8 x 0.6    | 2            | 500                   |         | EMD2                | ESC/TESC | SOD-523          | UFP          | SC79     |             | ESC     | SOD523          |
| SOD882            | -                       | 1.0 x 0.6 x 0.5    | 2            | 250                   |         |                     | CTS2     |                  |              | TSLP-2   | DFN1006-2   |         |                 |
| <b>SOD882D</b>    | -                       | 1.0 x 0.6 x 0.37   | 2            | 250                   |         |                     |          |                  |              | TSLP-2-7 | DFN1006H4-2 |         |                 |
| <b>SOD131 SMA</b> | DO-214AC                | 4.25 x 2.67 x 2.14 | 2            | 900                   |         | PMDS (SOD-106)      |          | SMA Case 403D-02 |              |          | SMA         | SMA     |                 |
| <b>SOD132 SMB</b> | DO-214AA                | 4.32 x 3.62 x 2.29 | 2            | 1000                  |         |                     |          | SMB Case 403A-03 |              |          | SMB         |         |                 |
| <b>SOD133 SMC</b> | DO-214AB                | 6.86 x 5.91 x 2.34 | 2            | 1200                  |         |                     |          | SMC Case 403-03  |              |          | SMC         |         |                 |
| <b>SOT1061</b>    | HUSON3                  | 2.0 x 2.0 x 0.65   | 3            | 1300                  |         |                     |          | WDFN3            |              |          | DFN2020-3   |         | PowerPAK SC706L |
| SOT23             | -                       | 2.9 x 1.3 x 1.0    | 3            | 250                   |         | SSD3/SST3           |          | SOT-23           |              | SOT23    | SOT-23      | SOT-23  | SOT23           |
| SOT323            | SC-70                   | 2.0 x 1.25 x 0.95  | 3            | 200                   |         | UMD3/UMT3           | USM      | SC-70            | CMAK/CMPAK   | SOT323   | SOT-323     | USM     | SC-70 3 leads   |
| SOT416            | SC-75                   | 1.6 x 0.8 x 0.77   | 3            | 150                   |         | EMD3/EMT3           | SSM      | SC-75            | SMPAK        | SC75     |             |         | SC-75A          |
| SOT663            | -                       | 1.6 x 1.2 x 0.55   | 3            | 300                   |         |                     |          |                  |              |          |             |         |                 |
| SOT883            | SC-101                  | 1.0 x 0.6 x 0.5    | 3            | 250                   |         |                     | SS CSP2  |                  |              | TSLP-3-1 | DFN1006-3   |         |                 |
| SOT89             | SC-62                   | 4.5 x 2.5 x 1.5    | 3            | 1300                  |         | MPT3                | PW-Mini  | SOT-89           | UPAK (SOT89) | SOT89    |             | SOT-89  |                 |
| SOT143B           | -                       | 2.9 x 1.3 x 1.0    | 4            | 250                   |         |                     | CP4      |                  | MPAK-4R      | SOT143   | SOT-143     |         |                 |
| SOT223            | SC-73                   | 6.5 x 3.5 x 1.65   | 4            | 1700                  |         |                     |          | SOT-223          |              | SOT223   | SOT-223     | SOT-223 | SOT223          |

| NXP            | Industry standard names | Size (l x w x h)  | Pins / leads | P <sub>tot</sub> (mW) | Package | Competitor synonyms |         |            |            |          |            |        |            |
|----------------|-------------------------|-------------------|--------------|-----------------------|---------|---------------------|---------|------------|------------|----------|------------|--------|------------|
|                |                         |                   |              |                       |         | Rohm                | Toshiba | ON Semi    | Renesas    | Infineon | Diodes Inc | KEC    | Vishay     |
| SOT353         | SC-88A                  | 2.0 x 1.25 x 0.95 | 5            | 300                   |         | UMD5/UMT5           | USV     | SC-88A     | CMPAK-5(T) |          |            | USV    | SOT353     |
| SOT665         | -                       | 1.6 x 1.2 x 0.55  | 5            | 300                   |         | EMD5/EMT5           | ESV     | SOT-553    | VSON-5     |          |            | TESV   |            |
| SOT1082        | VSON6U                  | 2.3 x 3.5 x 0.85  | 6            | -                     |         |                     |         |            |            |          |            |        |            |
| SOT363         | SC-88                   | 2.0 x 1.25 x 0.95 | 6            | 300                   |         | UMD6/UMT6           | US6     | SC-88      | CMPAK-6    | SOT363   | SOT-363    | US6    | SOT363     |
| SOT457         | SC-74                   | 2.9 x 1.5 x 1.0   | 6            | 750                   |         | SMD6/SMT6           | SM6     | SC-74      | TSOP-6     | SC74     |            | TSOP6  | TSOP-6     |
| SOT666         | -                       | 1.6 x 1.2 x 0.55  | 6            | 300                   |         | EMD6/EMT6           | ES6     | SOT-563    | SMFPAK-6   | SOT666   | SOT563     | TES6   | SC89-6lead |
| <b>SOT1118</b> | -                       | 2.0 x 2.0 x 0.65  | 6            | 1300                  |         |                     |         | 6 Lead DFN |            |          | DFN2020B-6 |        |            |
| SOT886         | XSON6                   | 1.45 x 1.0 x 0.5  | 6            | 250                   |         |                     |         |            |            |          |            |        |            |
| SOT891         | XSON6                   | 1.0 x 1.0 x 0.5   | 6            | -                     |         |                     | CS6     |            |            |          |            |        |            |
| SOT505         | TSSOP8                  | 3.0 x 3.0 x 1.1   | 8            | -                     |         |                     |         | TSSOP-8    |            |          |            | TSSOP8 |            |
| SOT873         | HVSON8                  | 3.3 x 3.3 x 0.85  | 8            | 1500                  |         |                     |         |            |            |          |            |        |            |
| SOT96          | SO8                     | 4.9 x 3.9 x 1.75  | 8            | 1500                  |         | SOP8                | FM8     | SOIC-8 NB  | SOP-8      |          |            | FLP-8  | SO8        |
| SOT983         | HXSON8                  | 1.7 x 1.35 x 0.5  | 8            | -                     |         |                     |         |            |            | TSSOP38  |            |        |            |
| SOT1059        | XSON10U                 | 1.0 x 2.5 x 0.5   | 10           | -                     |         |                     |         |            |            |          |            |        |            |
| SOT552         | TSSOP10                 | 3.0 x 3.0 x 1.1   | 10           | -                     |         |                     |         | Micro10    |            | TSSOP10  |            |        |            |
| SOT984         | HXSON12                 | 2.5 x 1.35 x 0.5  | 12           | -                     |         |                     |         |            |            |          |            |        |            |
| SOT108         | SO14                    | 8.65 x 3.9 x 1.75 | 14           | -                     |         | SOP14               |         |            |            | DSO14    |            |        |            |
| SOT402         | TSSOP14                 | 5.0 x 4.4 x 1.1   | 14           | -                     |         |                     |         |            |            |          |            |        |            |
| SOT109         | SO16                    | 9.9 x 3.9 x 1.75  | 16           | -                     |         | SOP16               |         | SOIC-16    |            | DSO16    |            | FLP-16 |            |
| SOT519         | SSOP16                  | 4.9 x 3.9 x 1.73  | 16           | -                     |         |                     |         |            |            |          |            |        |            |
| SOT985         | HXSON16                 | 3.3 x 1.35 x 0.5  | 16           | -                     |         |                     |         | Micro10    |            | TSSOP10  |            |        |            |
| SOT163         | SO20                    | 12.8 x 7.5 x 2.65 | 20           | 1250                  |         |                     |         |            |            |          |            |        |            |
| SOT360         | TSSOP20                 | 6.5 x 4.4 x 1.1   | 20           | -                     |         |                     |         | TSSOP20    |            | TSSOP20  |            |        |            |
| SOT510         | TSSOP38                 | 9.7 x 4.4 x 1.1   | 38           | -                     |         |                     |         |            |            | TSSOP38  |            |        |            |
| SOT357         | TQFP64                  | 10 x 10 x 1       | 64           | -                     |         |                     |         |            |            |          |            |        |            |

Packing methods

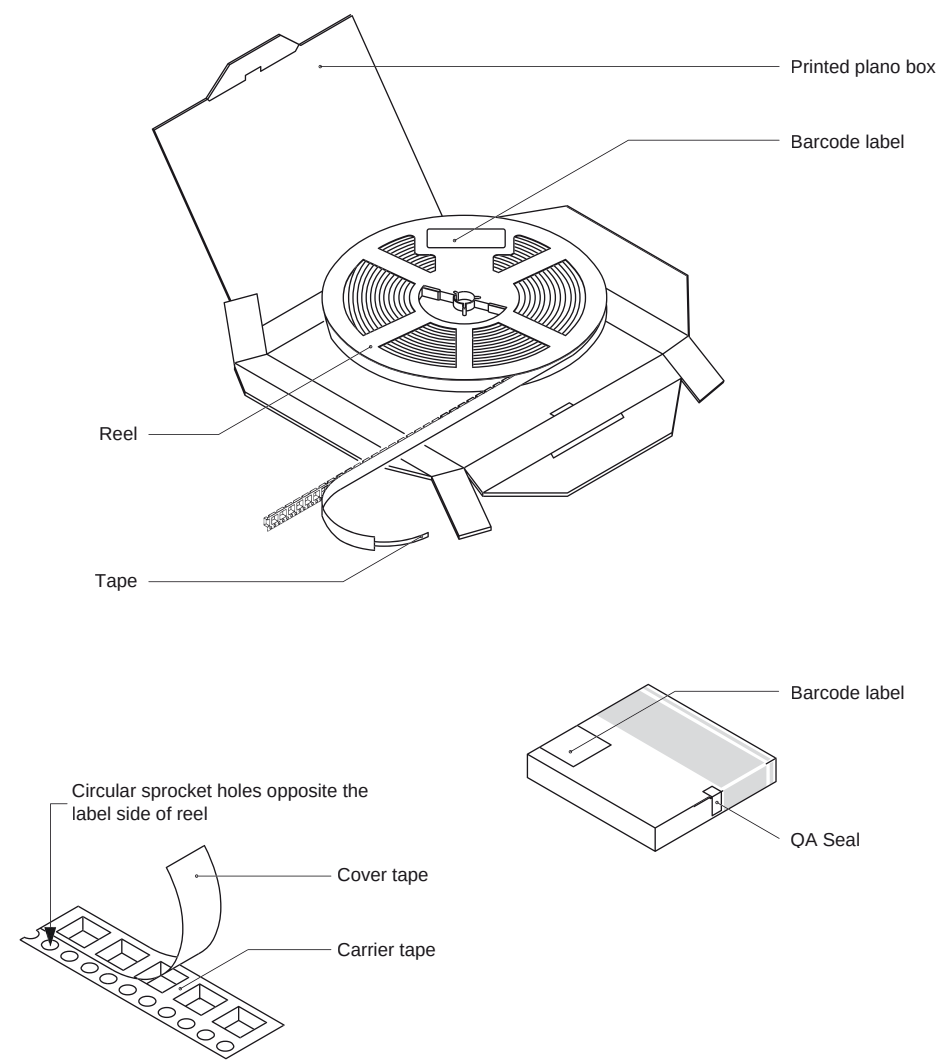
| Package        | Packing method and tape dimension | Reel dimension (d x w) | Package                                                                             | Packing quantity |      |      |      |      |      |       |
|----------------|-----------------------------------|------------------------|-------------------------------------------------------------------------------------|------------------|------|------|------|------|------|-------|
|                |                                   |                        |                                                                                     | 2000             | 2500 | 3000 | 4000 | 5000 | 8000 | 10000 |
| SOD27          | 26 mm tape ammo pack, axial       |                        |    | -                | -    | -    | -    | -143 | -    | -     |
|                | 52 mm tape ammo pack, axial       |                        |                                                                                     | -                | -    | -    | -    | -    | -    | -133  |
|                | 52 mm reel pack, axial            |                        |                                                                                     | -                | -    | -    | -    | -    | -    | -113  |
| SOD66          | 52 mm tape ammo pack, axial       |                        |    | -                | -    | -    | -    | -    | -    | -133  |
|                | 52 mm reel pack, axial            |                        |                                                                                     | -                | -    | -    | -    | -    | -    | -113  |
| SOD68          | 26 mm tape ammo pack, axial       |                        |    | -                | -    | -    | -    | -143 | -    | -     |
|                | 52 mm reel pack, axial            |                        |                                                                                     | -                | -    | -    | -    | -    | -    | -113  |
|                | 52 mm tape ammo pack, axial       |                        |                                                                                     | -                | -    | -    | -    | -    | -    | -133  |
| SOD80C         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |    | -                | -115 | -    | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 330 x 8 mm             |                                                                                     | -                | -    | -    | -    | -    | -    | -135  |
| SOD87          | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |    | -115             | -    | -    | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 330 x 8 mm             |                                                                                     | -                | -    | -    | -    | -    | -135 | -     |
| SOD123F        | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |    | -                | -    | -115 | -    | -    | -    | -     |
| SOD123W        | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |    | -                | -    | -115 | -    | -    | -    | -     |
| SOD128         | 4 mm pitch, 12 mm tape and reel   | 180 x 12 mm            |   | -                | -    | -115 | -    | -    | -    | -     |
| SOD323         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -115 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             |                                                                                     | -                | -    | -    | -    | -    | -    | -135  |
| SOD323F        | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -115 | -    | -    | -    | -     |
| SOD523         | 2 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -    | -    | -    | -315 | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |                                                                                     | -                | -    | -115 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             |                                                                                     | -                | -    | -    | -    | -    | -    | -135  |
| SOD882         | 2 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -    | -    | -    | -    | -315  |
| <b>SOD882D</b> | 2 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -    | -    | -    | -    | -315  |
| <b>SOT1061</b> | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -115 | -    | -    | -    | -     |
| SOT23          | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -215 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             |                                                                                     | -                | -    | -    | -    | -    | -    | -235  |
| SOT323         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -115 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             |                                                                                     | -                | -    | -    | -    | -    | -    | -135  |
| SOT416         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -115 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             |                                                                                     | -                | -    | -    | -    | -    | -    | -135  |
| SOT663         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -    | -115 | -    | -    | -     |
| SOT883         | 2 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |  | -                | -    | -    | -    | -    | -    | -315  |

types in **bold** represent new products

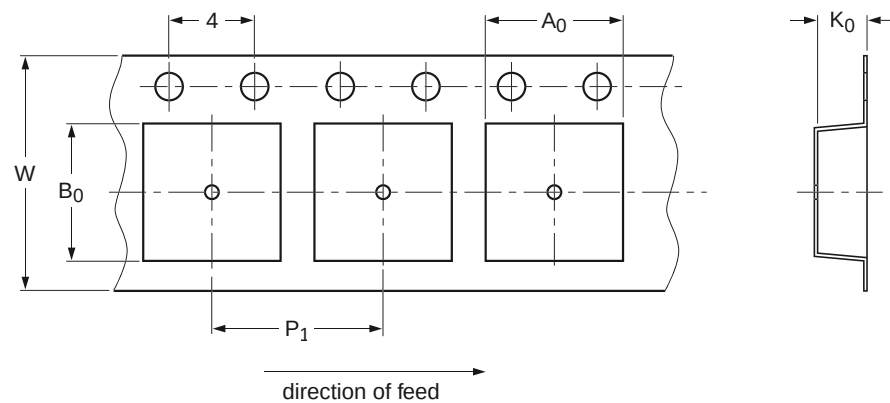
| Package        | Packing method and tape dimension | Reel dimension (d x w) | Taping | Package                                                                               | Packing quantity |      |      |      |      |      |      |       |
|----------------|-----------------------------------|------------------------|--------|---------------------------------------------------------------------------------------|------------------|------|------|------|------|------|------|-------|
|                |                                   |                        |        |                                                                                       | 1000             | 1400 | 2500 | 3000 | 4000 | 5000 | 8000 | 10000 |
| SOT89          | 8 mm pitch, 12 mm tape and reel   | 180 x 12 mm            | T1     |    | -115             | -    | -    | -    | -    | -    | -    | -     |
|                | 8 mm pitch, 12 mm tape and reel   | 330 x 12 mm            | T1     |                                                                                       | -                | -    | -    | -    | -135 | -    | -    | -     |
|                | 8 mm pitch, 12 mm tape and reel   | 180 x 12 mm            | T3     |                                                                                       | -146             | -    | -    | -    | -    | -    | -    | -     |
|                | 8 mm pitch, 12 mm tape and reel   | 180 x 12 mm            | T4     |                                                                                       | -147             | -    | -    | -    | -    | -    | -    | -     |
|                |                                   |                        |        |                                                                                       |                  |      |      |      |      |      |      |       |
| SOT143B        | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |        |    | -                | -    | -    | -215 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             |        |                                                                                       | -                | -    | -    | -    | -    | -    | -    | -235  |
| SOT223         | 8 mm pitch, 12 mm tape and reel   | 180 x 12 mm            |        |    | -115             | -    | -    | -    | -    | -    | -    | -     |
|                | 8 mm pitch, 12 mm tape and reel   | 330 x 12 mm            |        |                                                                                       | -                | -    | -    | -    | -135 | -    | -    | -     |
| SOT353         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T1     |    | -                | -    | -    | -115 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             | T1     |                                                                                       | -                | -    | -    | -    | -    | -    | -    | -135  |
|                | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T2     |                                                                                       | -                | -    | -    | -125 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             | T2     |                                                                                       | -                | -    | -    | -    | -    | -    | -    | -165  |
| SOT665         | 2 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |        |    | -                | -    | -    | -    | -    | -    | -315 | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |        |                                                                                       | -                | -    | -    | -    | -115 | -    | -    | -     |
| SOT363         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T1     |  | -                | -    | -    | -115 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             | T1     |                                                                                       | -                | -    | -    | -    | -    | -    | -    | -135  |
|                | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T2     |                                                                                       | -                | -    | -    | -125 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             | T2     |                                                                                       | -                | -    | -    | -    | -    | -    | -    | -165  |
| SOT457         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T1     |  | -                | -    | -    | -115 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             | T1     |                                                                                       | -                | -    | -    | -    | -    | -    | -    | -135  |
|                | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T2     |                                                                                       | -                | -    | -    | -125 | -    | -    | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 286 x 8 mm             | T2     |                                                                                       | -                | -    | -    | -    | -    | -    | -    | -165  |
| SOT666         | 2 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |        |  | -                | -    | -    | -    | -    | -    | -315 | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |        |                                                                                       | -                | -    | -    | -    | -115 | -    | -    | -     |
| <b>SOT1118</b> | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             |        |  | -                | -    | -    | -115 | -    | -    | -    | -     |
| SOT886         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T1     |  | -                | -    | -    | -    | -    | -115 | -    | -     |
|                | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T4     |                                                                                       | -                | -    | -    | -    | -    | -132 | -    | -     |
| SOT891         | 4 mm pitch, 8 mm tape and reel    | 180 x 8 mm             | T4     |  | -                | -    | -    | -    | -    | -132 | -    | -     |
| SOT505         | 8 mm pitch, 12 mm tape and reel   | 330 x 12 mm            |        |  | -                | -    | -118 | -    | -    | -    | -    | -     |
| SOT873         | 8 mm pitch, 12 mm tape and reel   | 180 x 12 mm            |        |  | -                | -118 | -    | -    | -    | -    | -    | -     |
| SOT96          | 8 mm pitch, 12 mm tape and reel   | 180 x 12 mm            |        |  | -115             | -    | -    | -    | -    | -    | -    | -     |
|                | 8 mm pitch, 12 mm tape and reel   | 330 x 12 mm            |        |                                                                                       | -                | -    | -118 | -    | -    | -    | -    | -     |

types in **bold** represent new products

Tape and reel pack for SMD packages



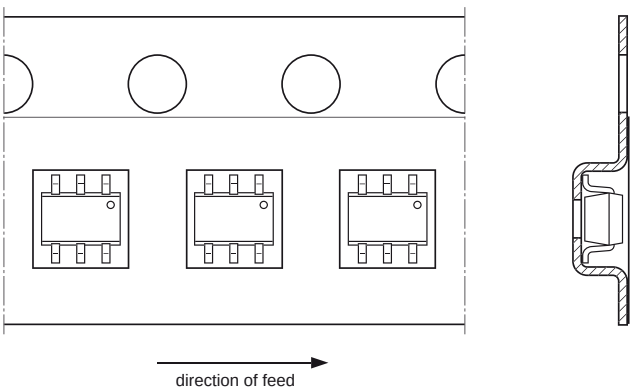
Carrier tape - tape and reel



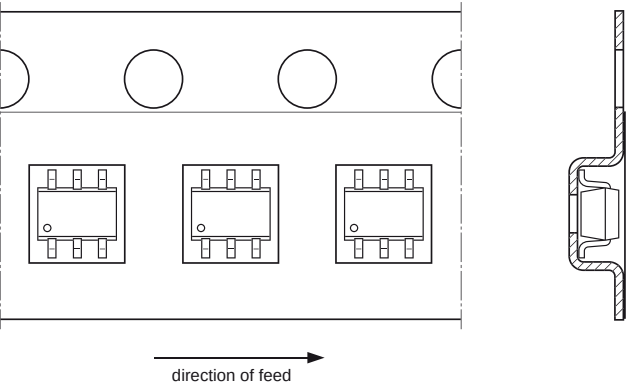
$P_1$  = pitch (see table packing methods)  
 $W$  = tape width (see table packing methods)  
Compartment width ( $A_0$ ), length ( $B_0$ ) and depth ( $K_0$ ) depending on package

Product orientation (tape and reel pack) T1-T4

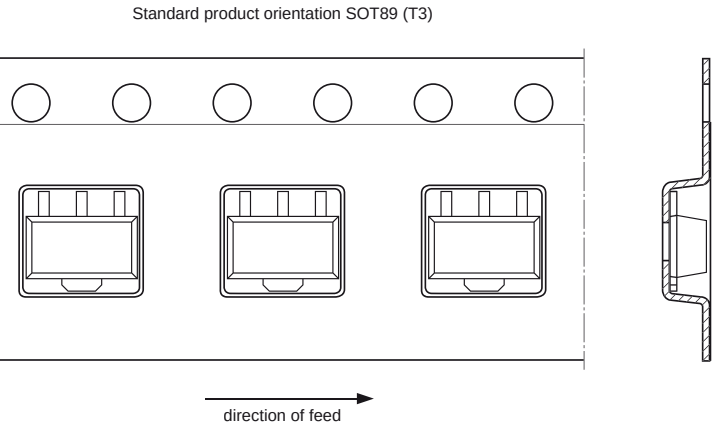
T1 taping



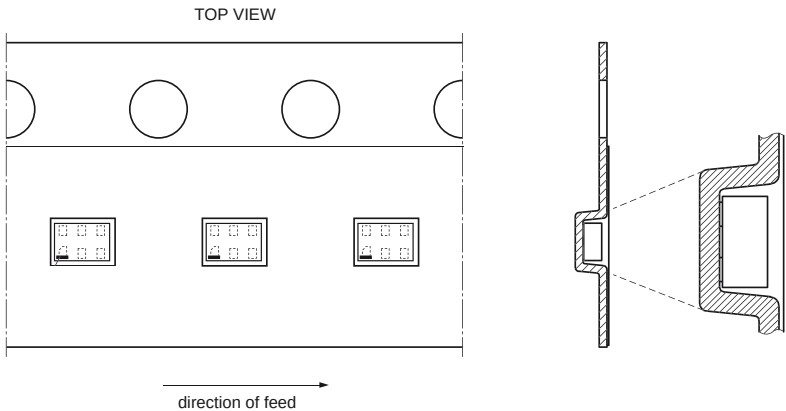
T2 taping



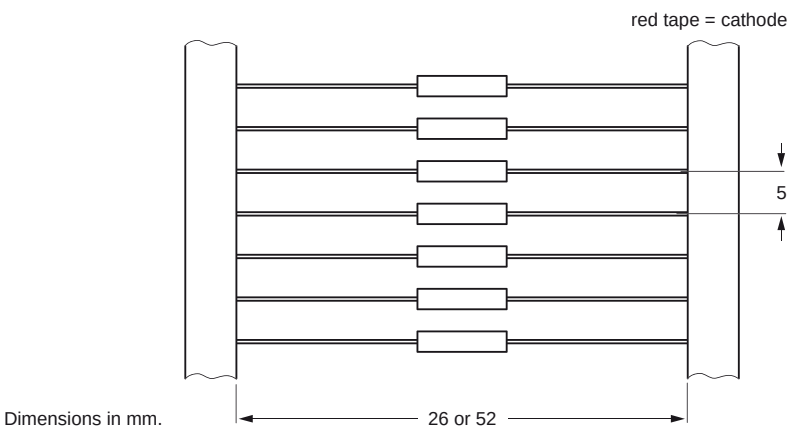
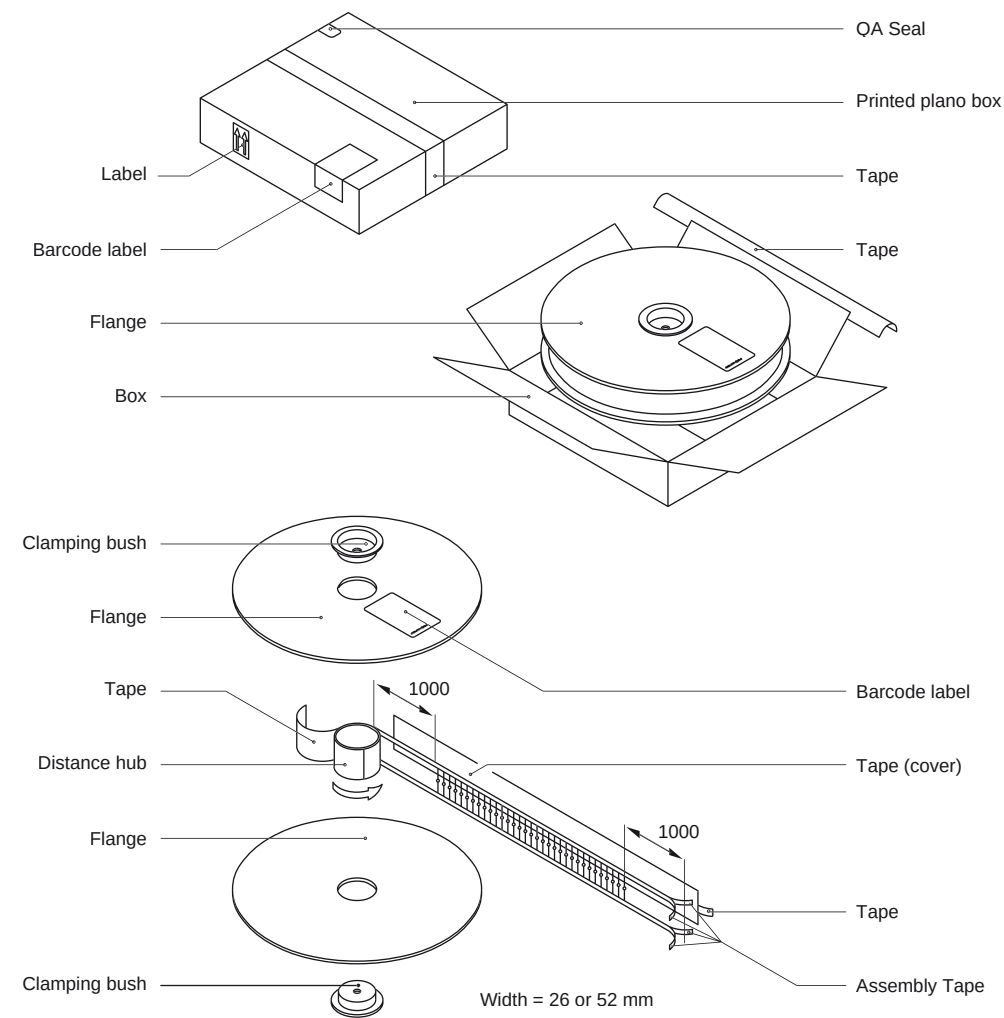
T3 taping



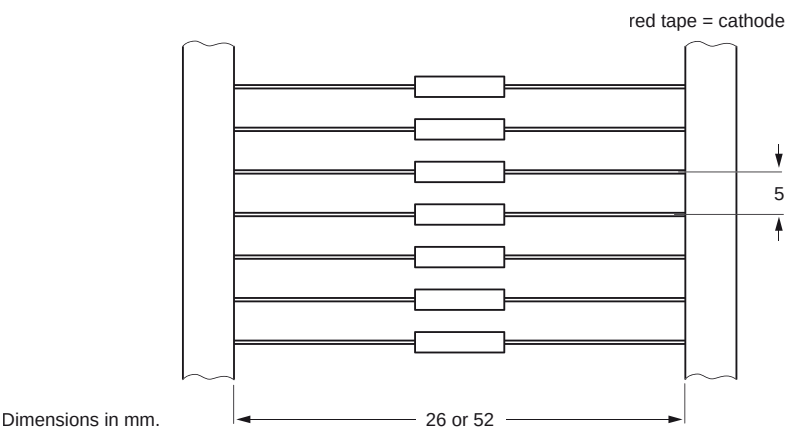
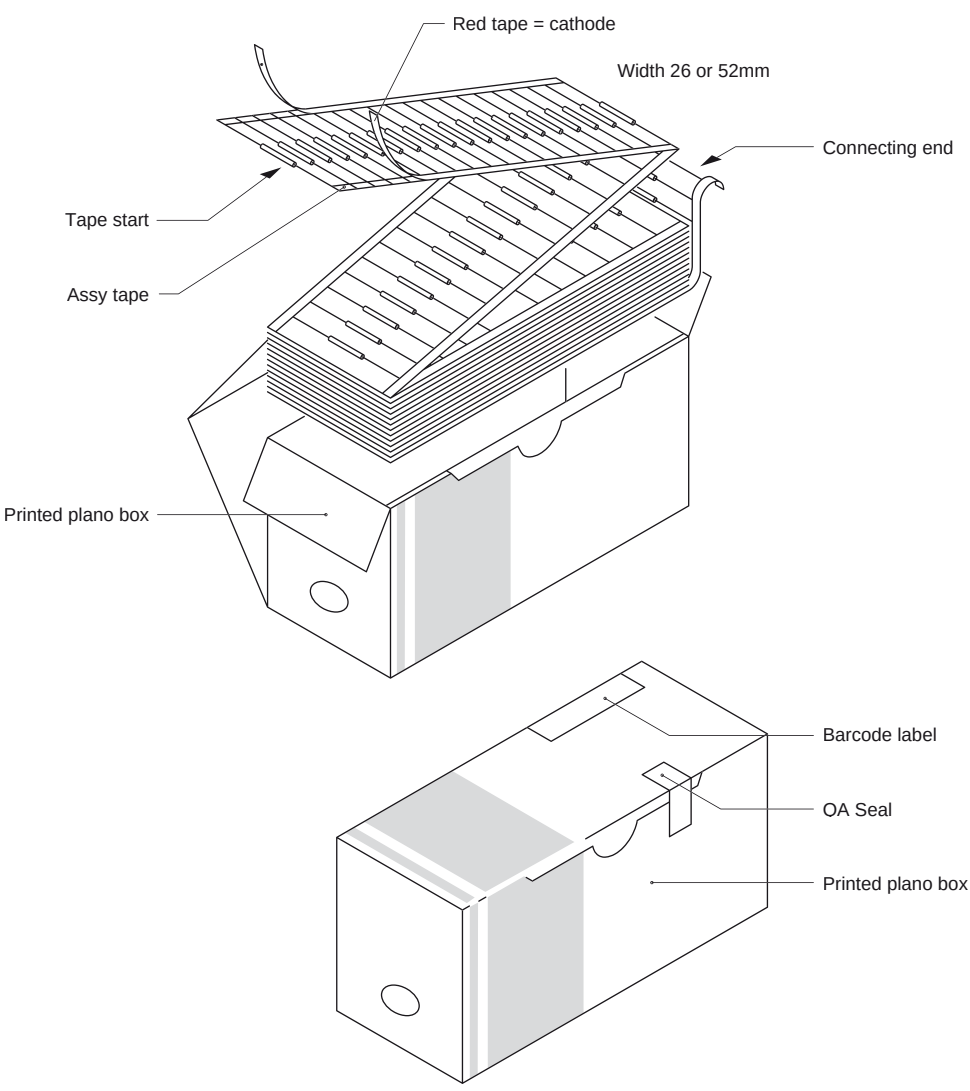
T4 taping



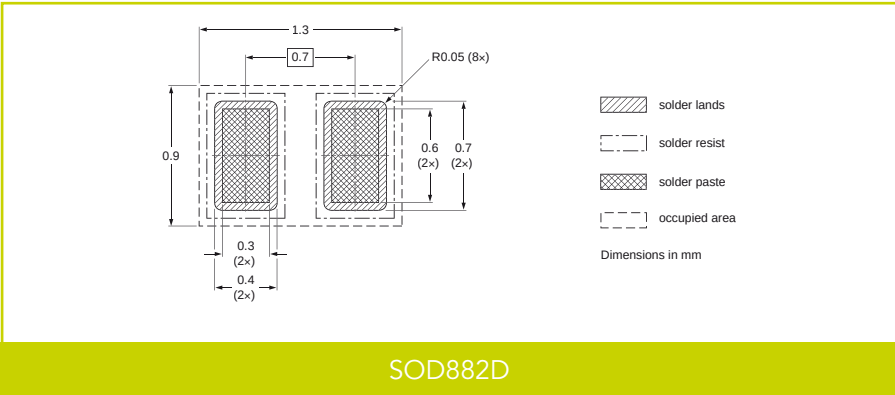
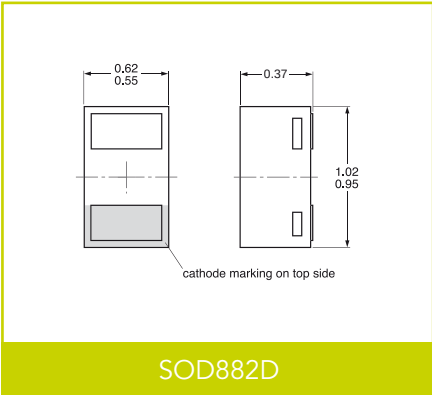
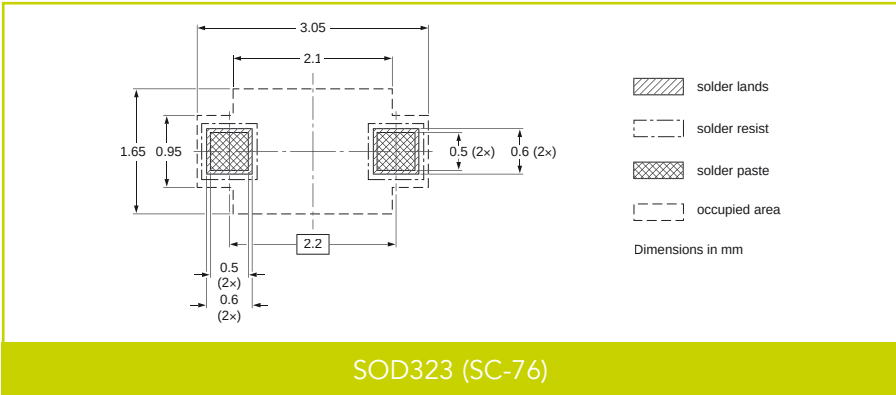
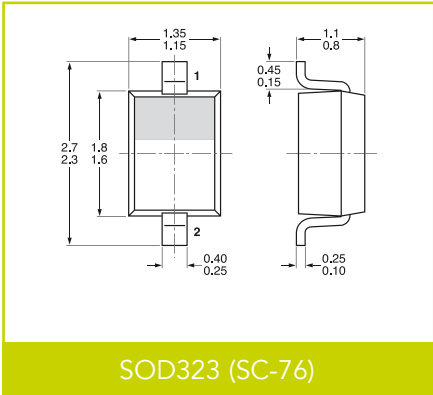
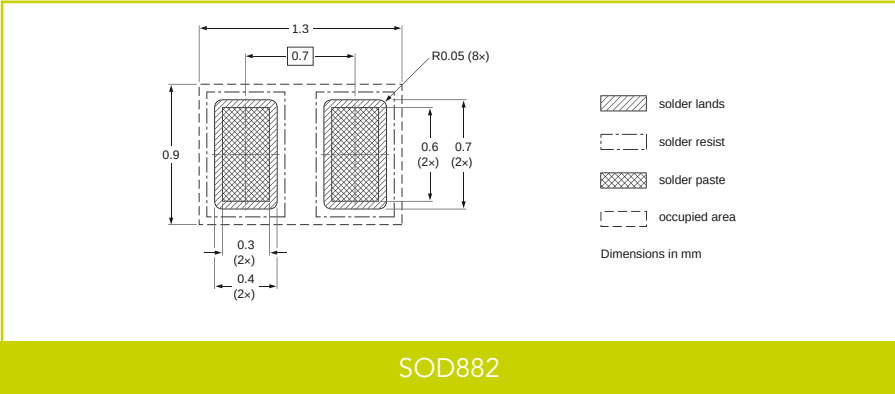
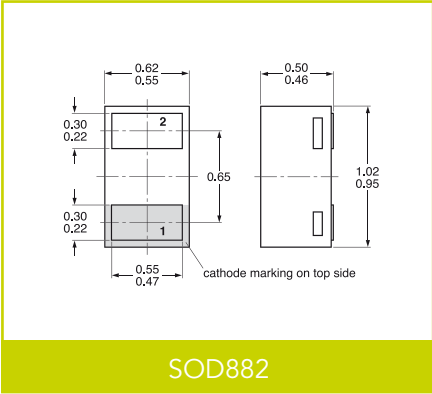
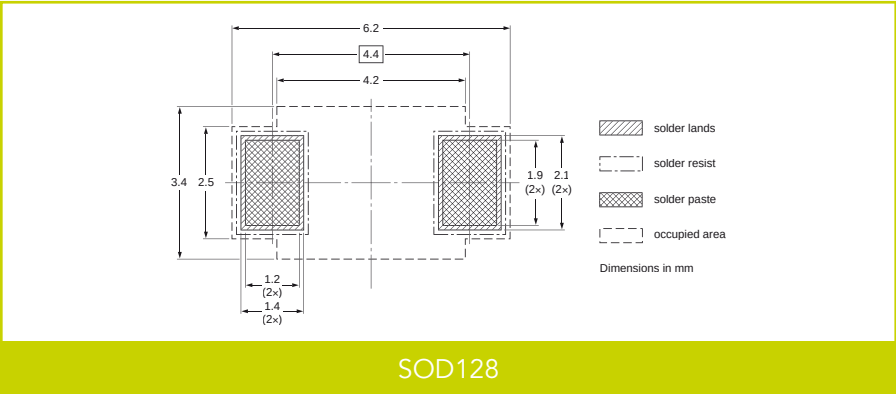
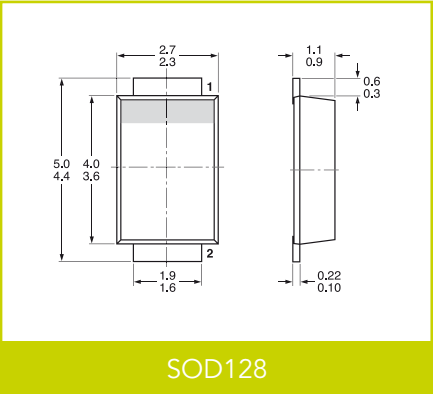
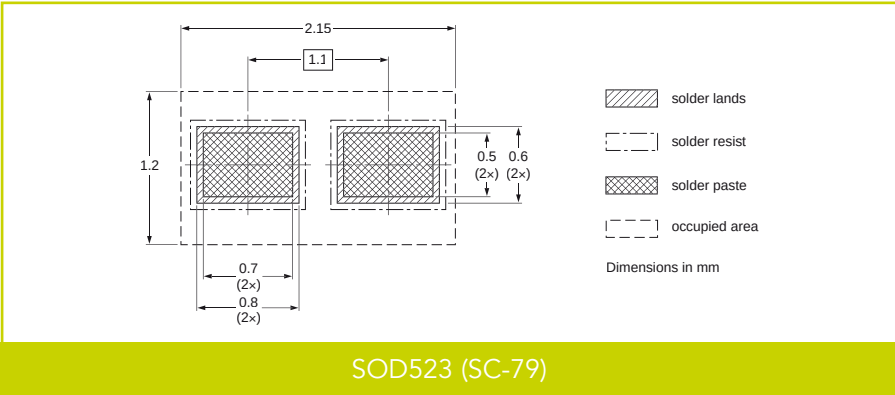
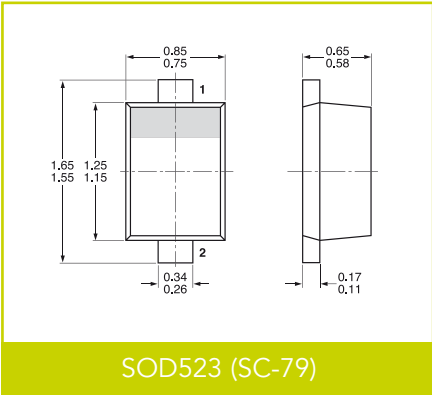
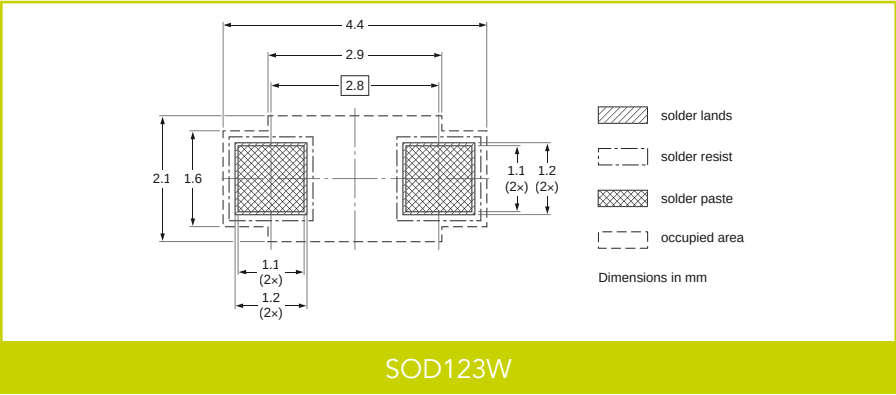
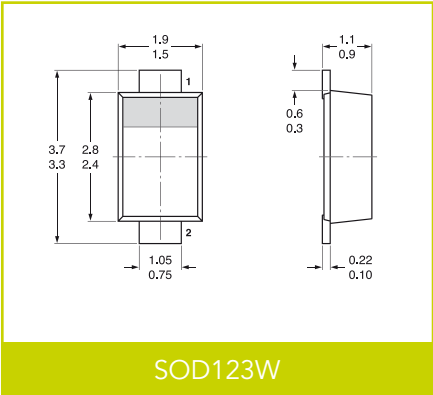
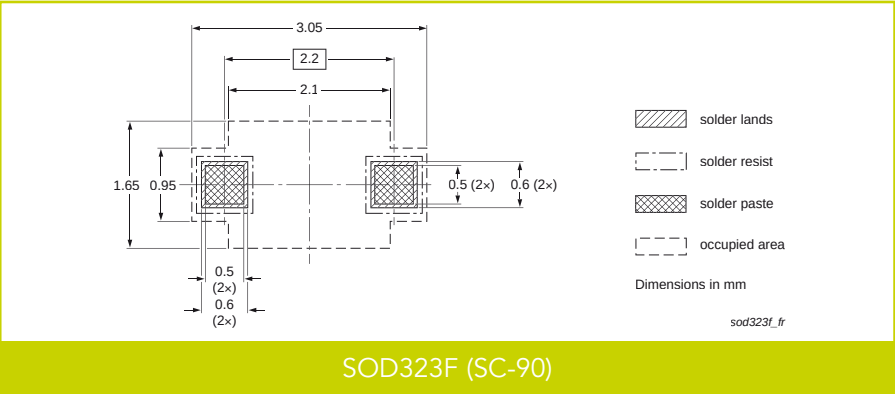
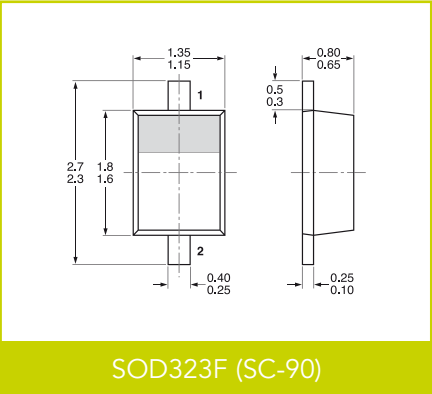
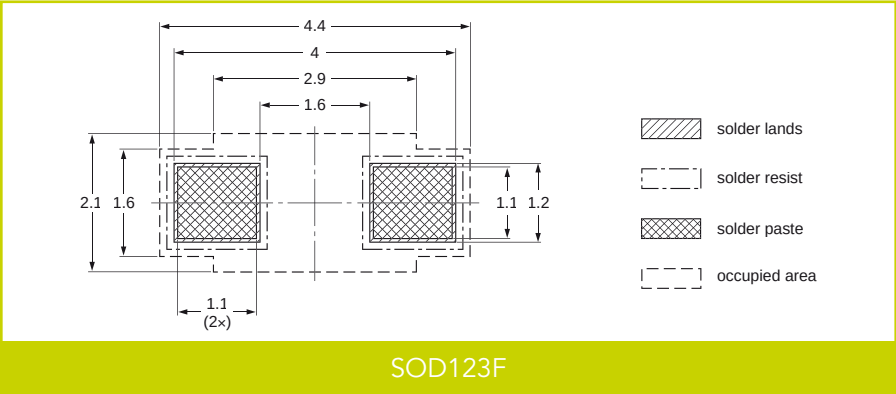
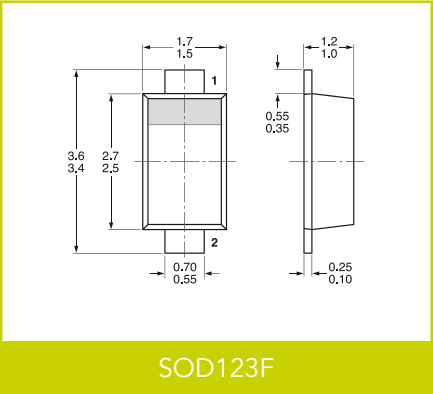
Reel pack axial tape for glass diodes



Ammo pack axial tape for glass diodes

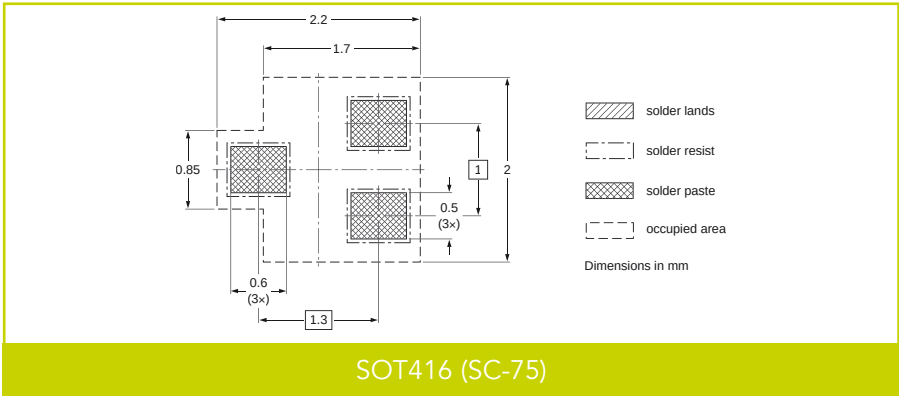
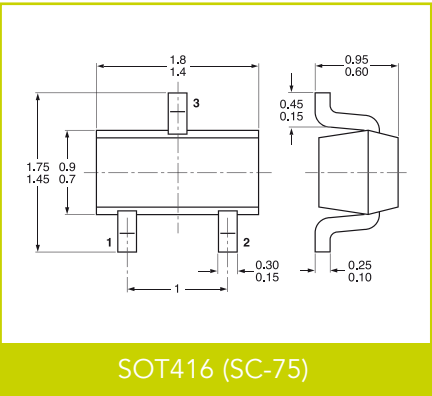
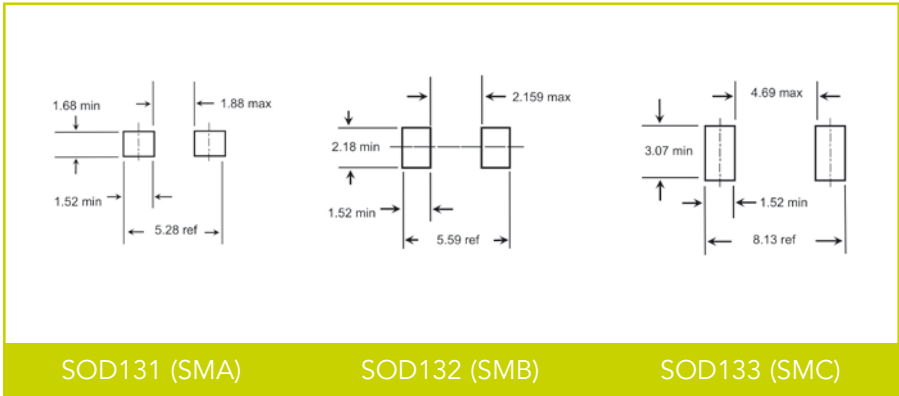
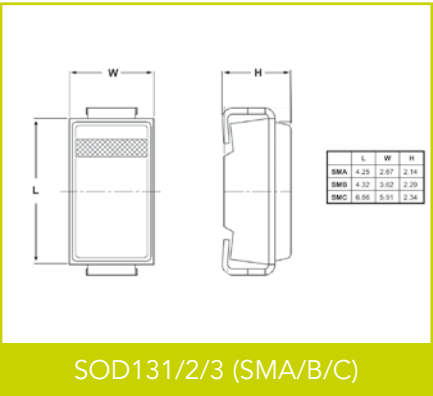


2-Pin SMD Packages

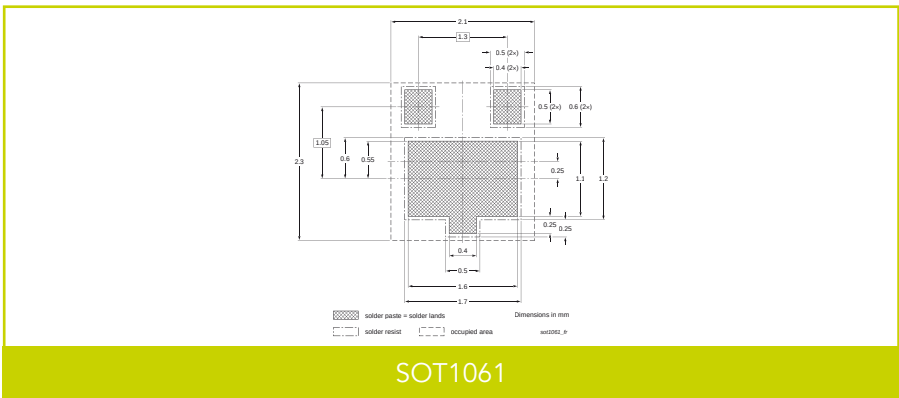
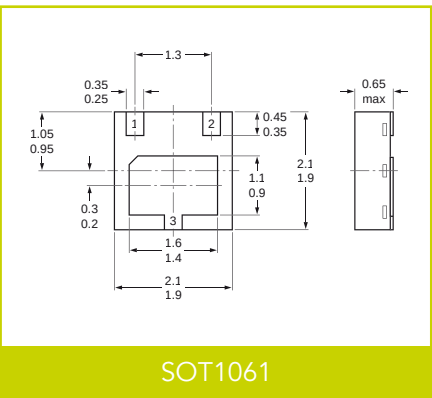
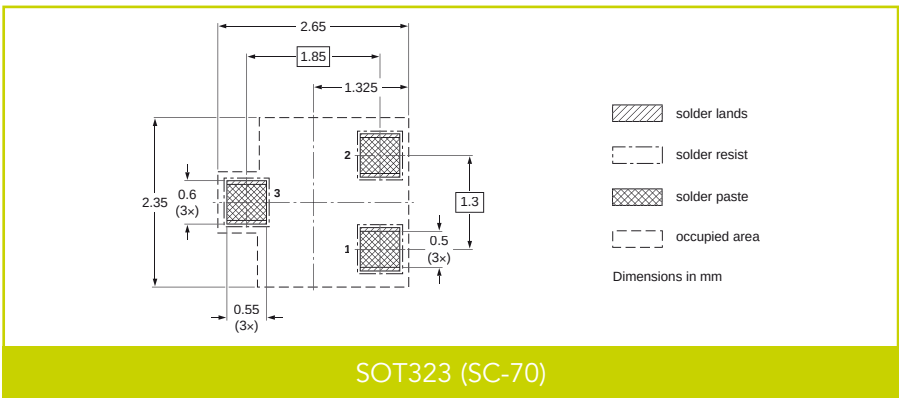
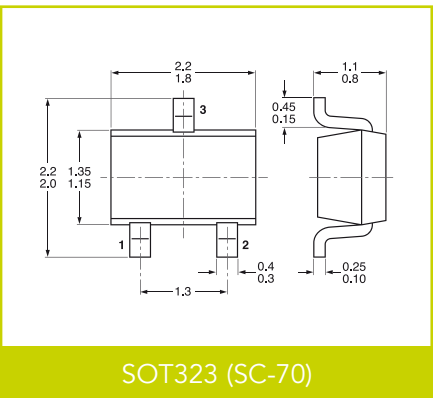
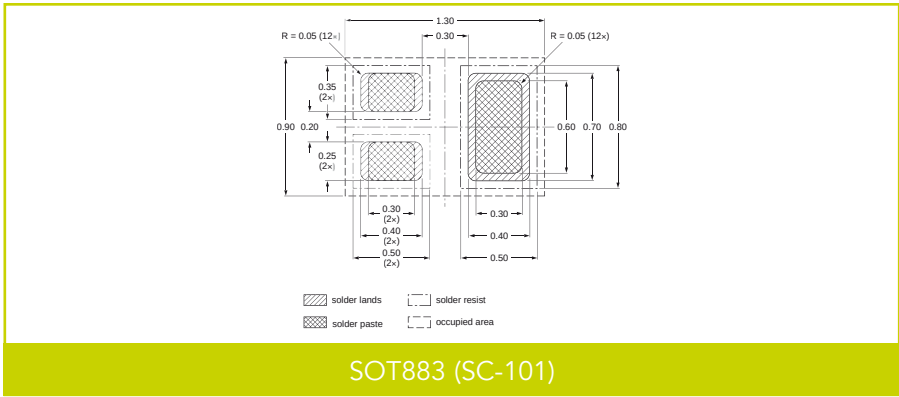
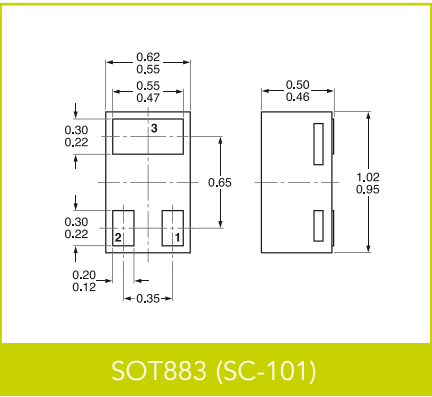
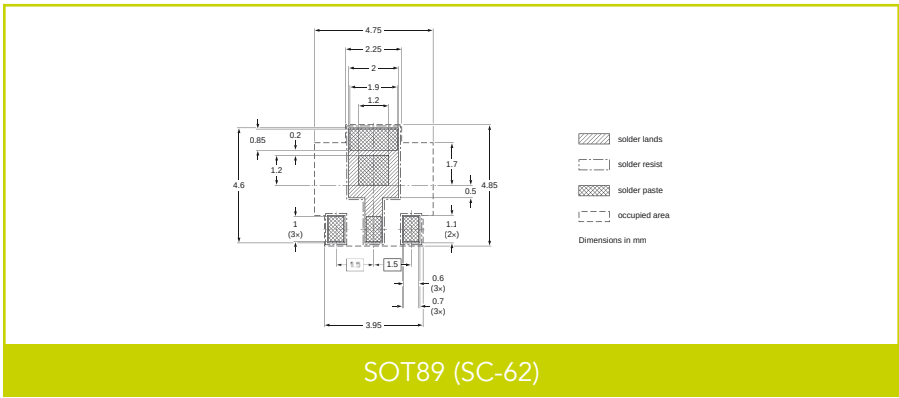
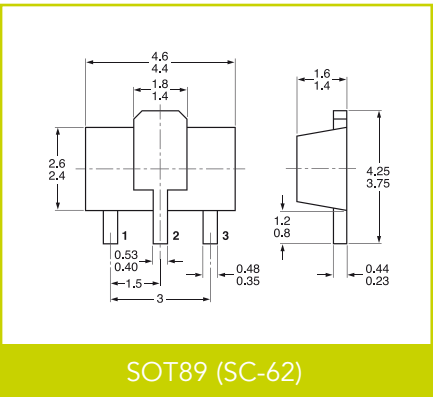
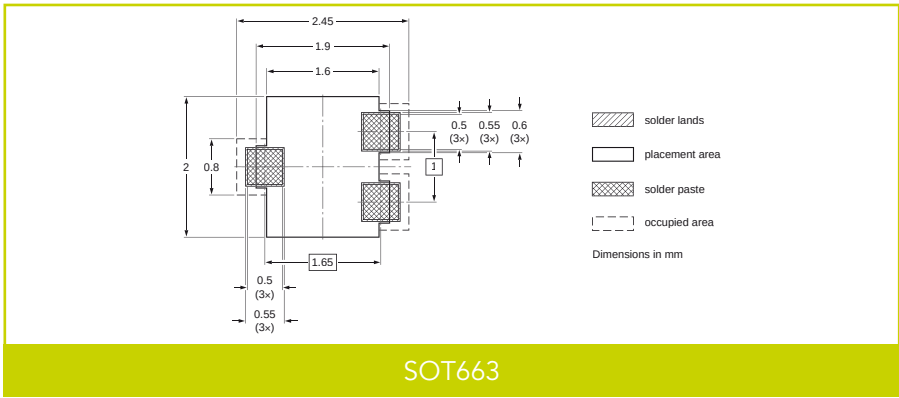
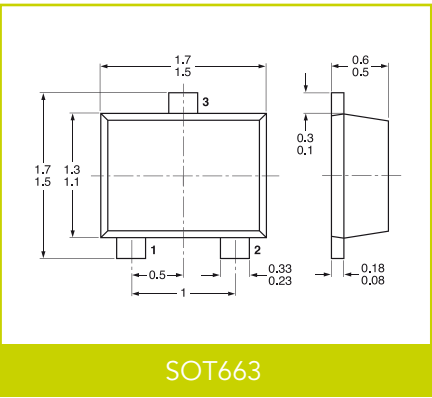
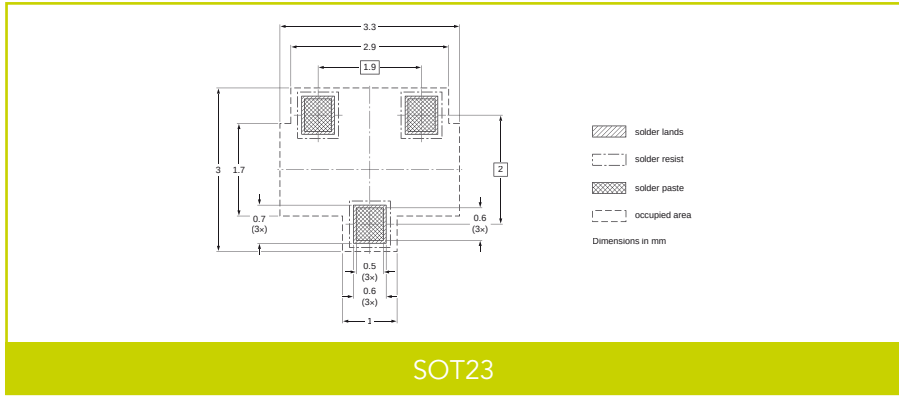
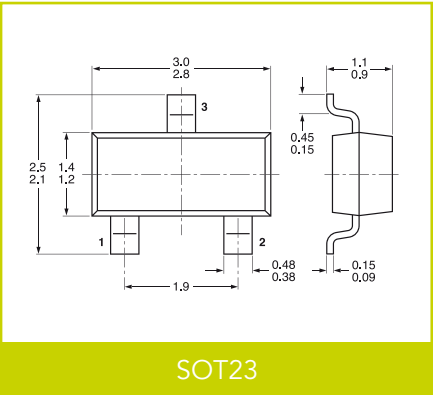


Dimensions in mm

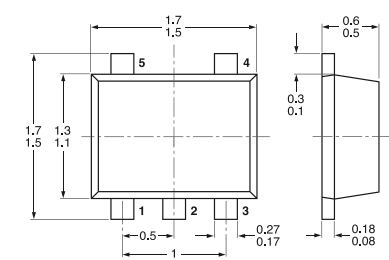
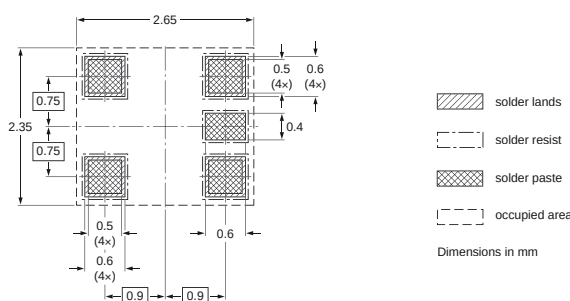
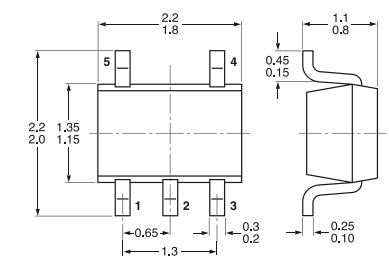
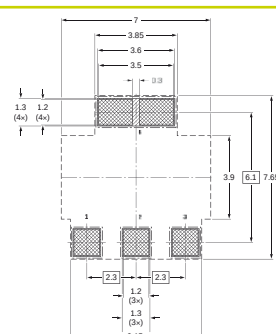
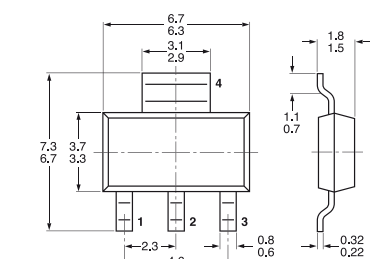
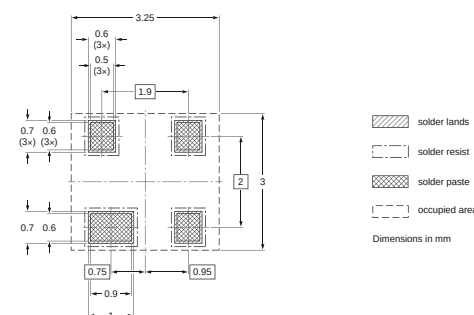
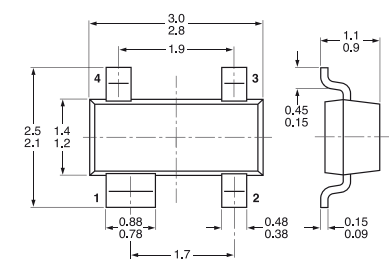
Dimensions in mm



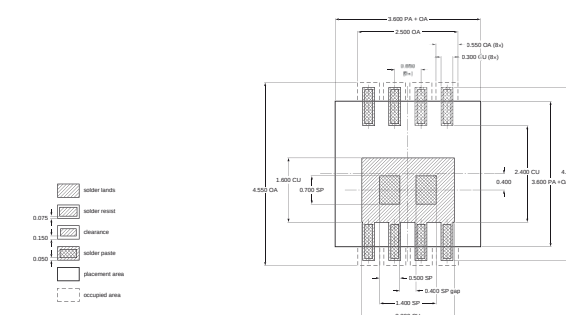
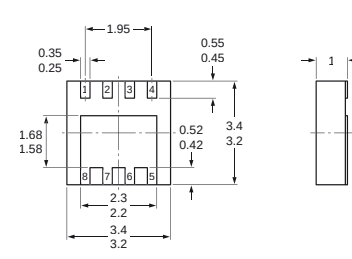
3-Pin SMD Packages



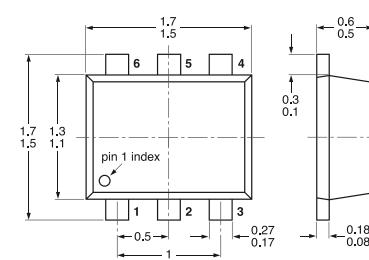
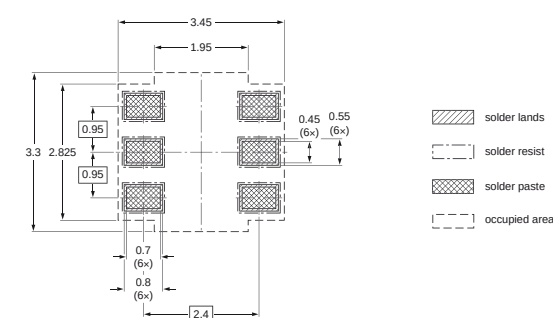
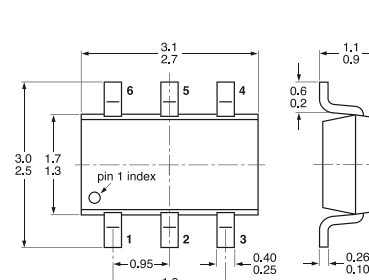
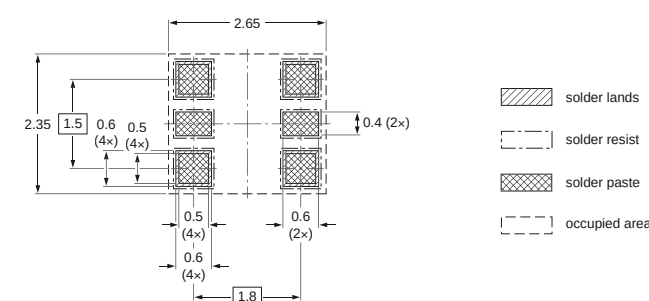
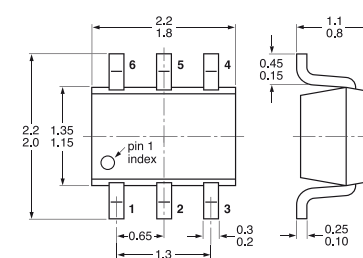
## 4-/5-Pin SMD Packages



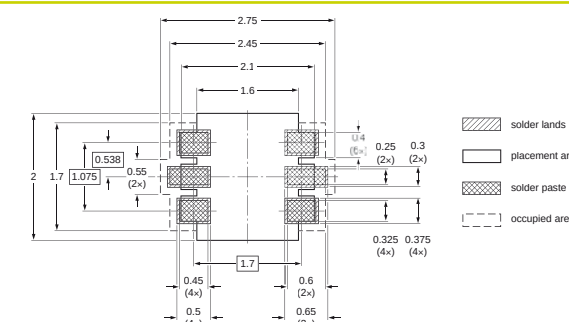
Dimensions in mm

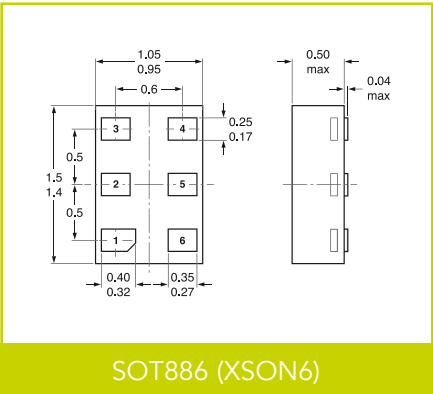


## 6-Pin SMD Packages

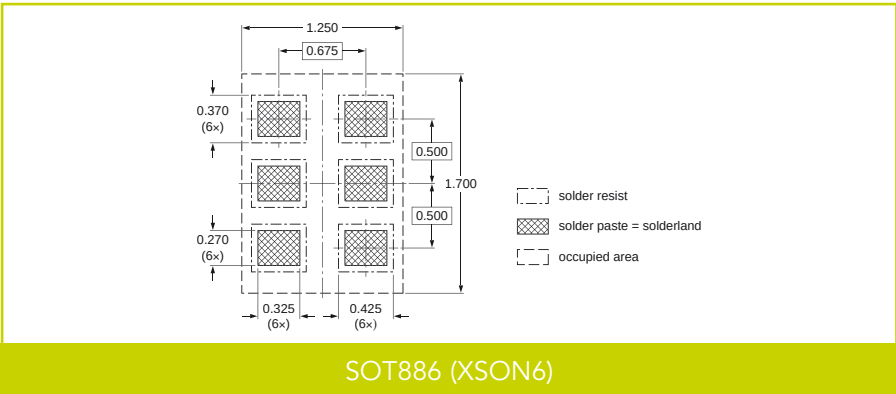


Dimensions in mm

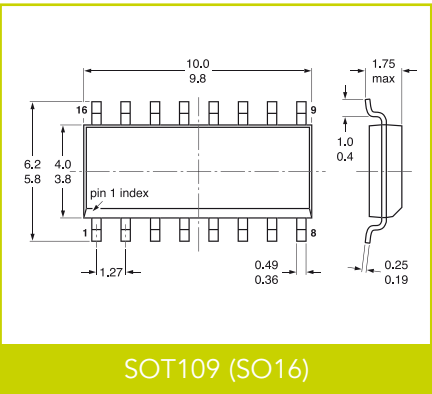




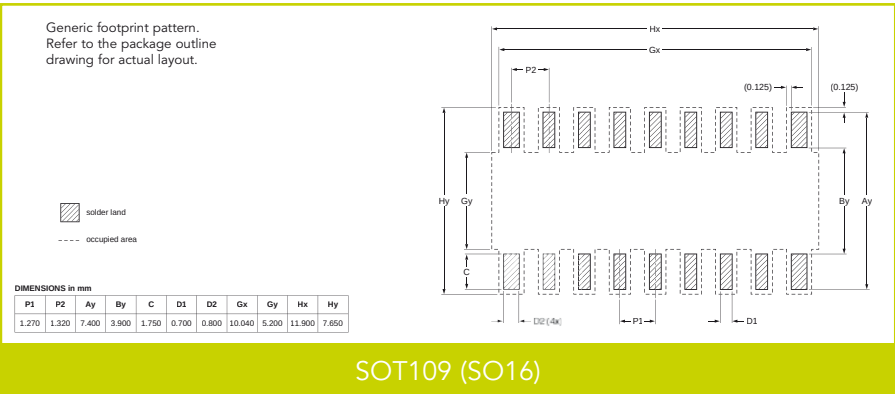
SOT886 (XSON6)



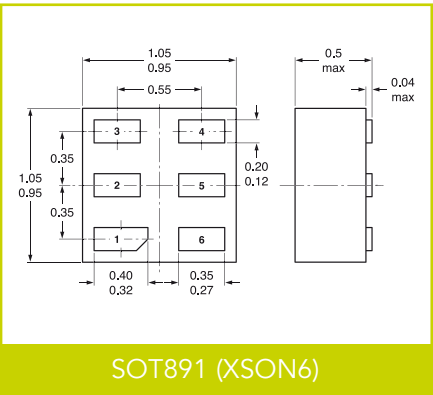
SOT886 (XSON6)



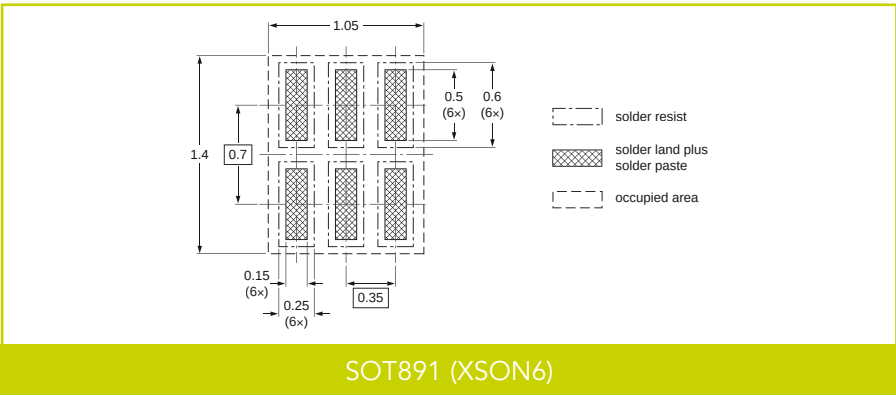
SOT109 (SO16)



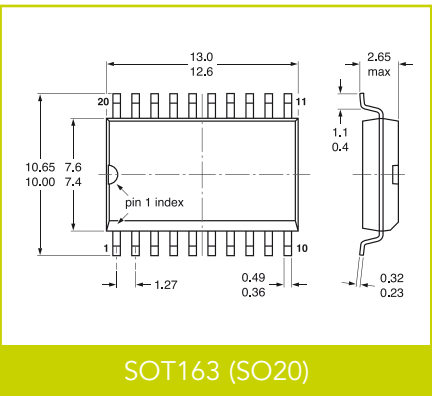
SOT109 (SO16)



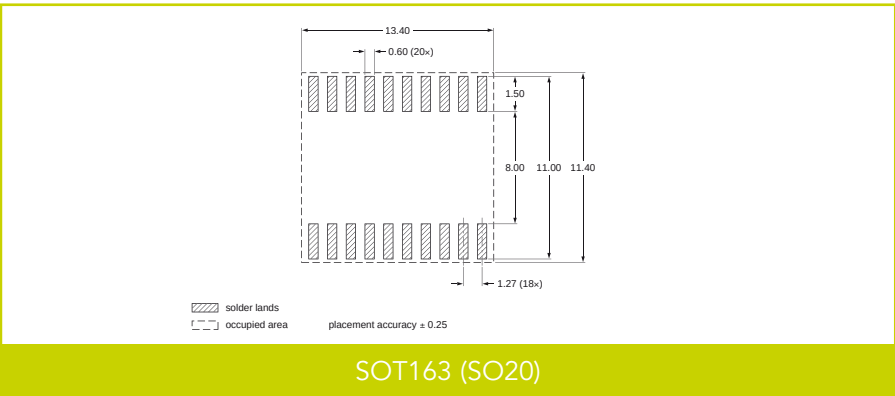
SOT891 (XSON6)



SOT891 (XSON6)

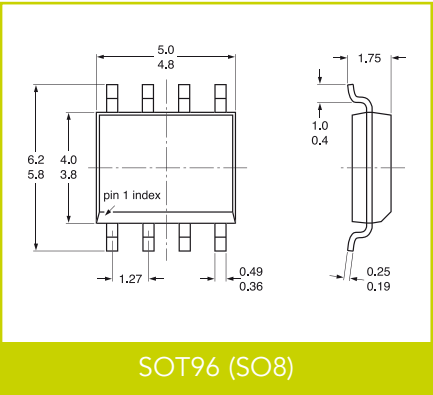


SOT163 (SO20)

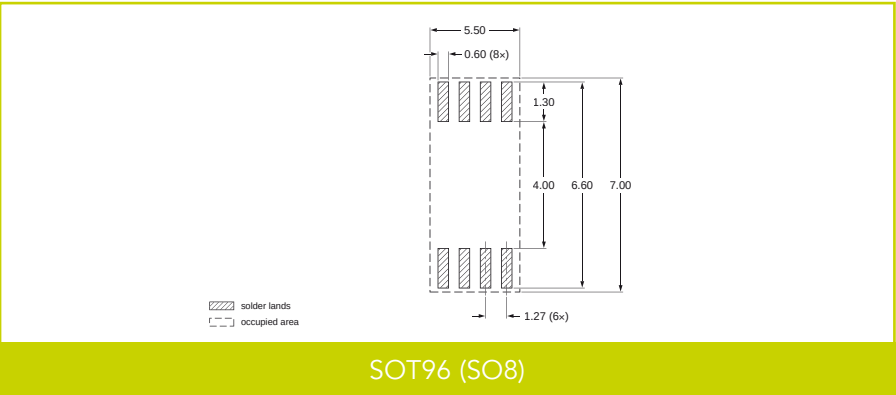


SOT163 (SO20)

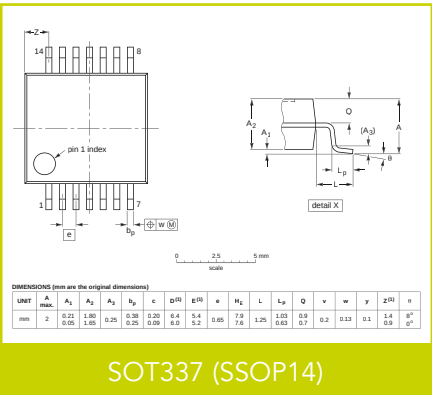
Multi-Pin SMD Packages



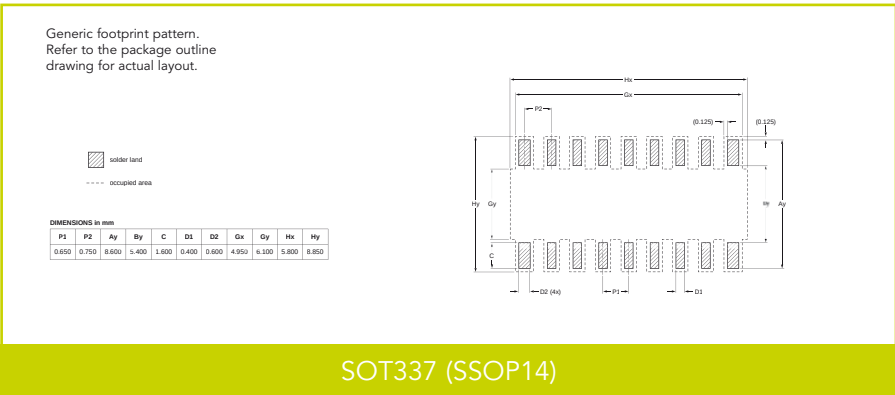
SOT96 (SO8)



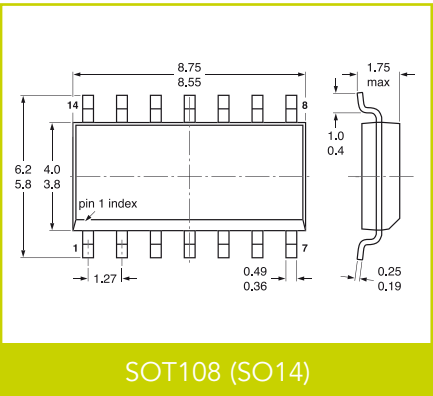
SOT96 (SO8)



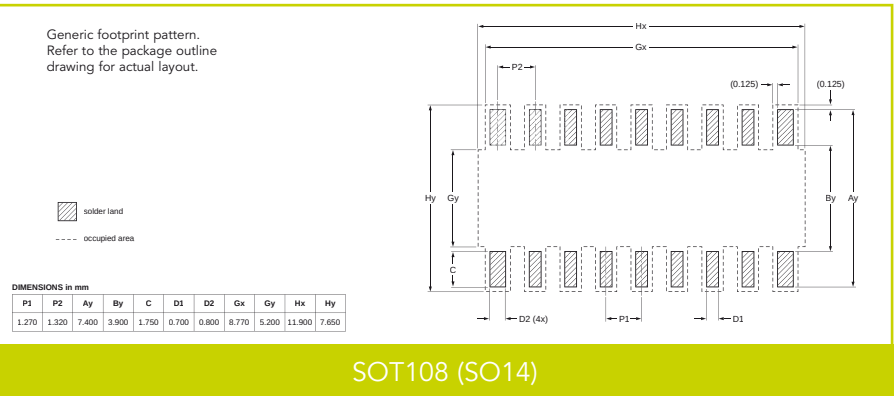
SOT337 (SSOP14)



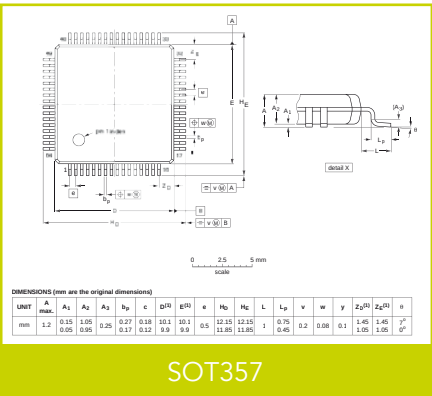
SOT337 (SSOP14)



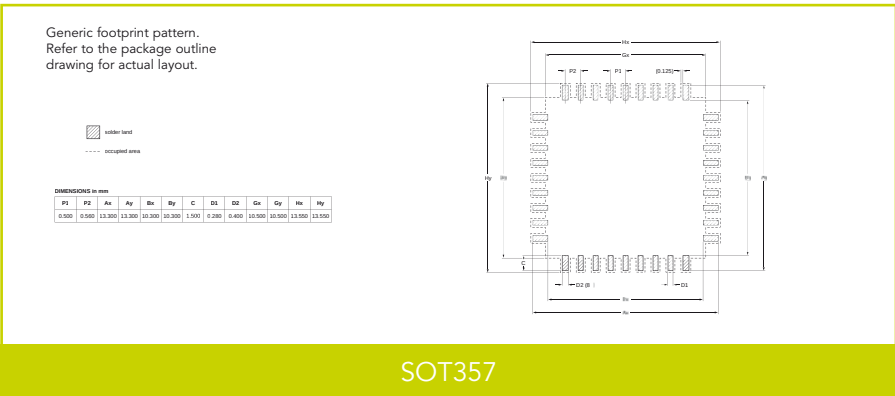
SOT108 (SO14)



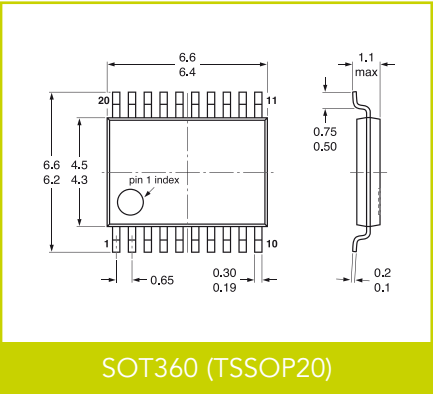
SOT108 (SO14)



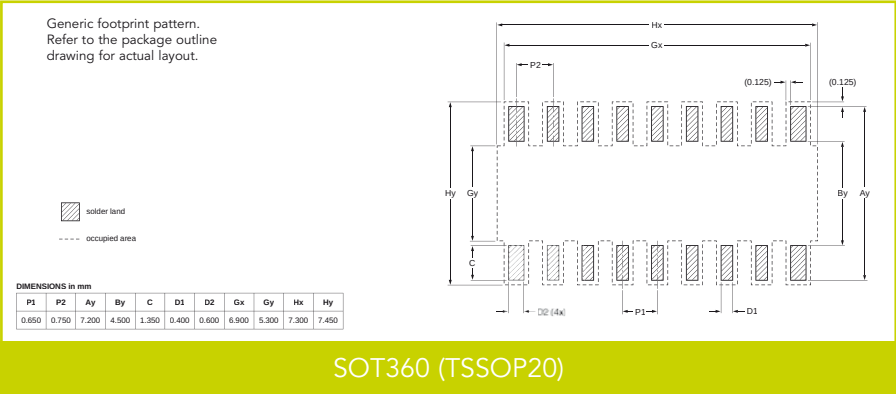
SOT357



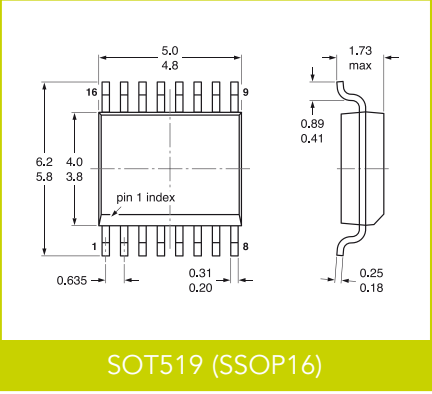
SOT357



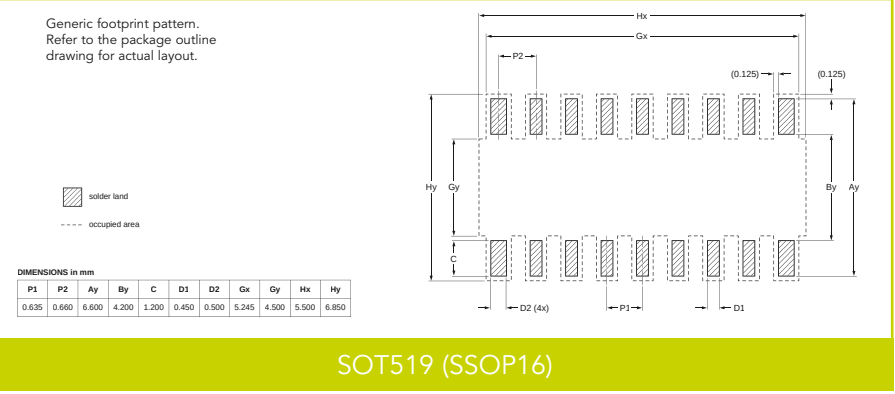
SOT360 (TSSOP20)



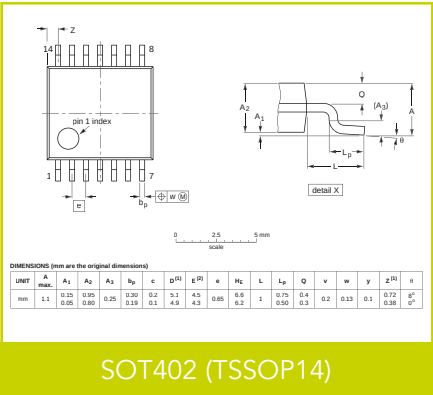
SOT360 (TSSOP20)



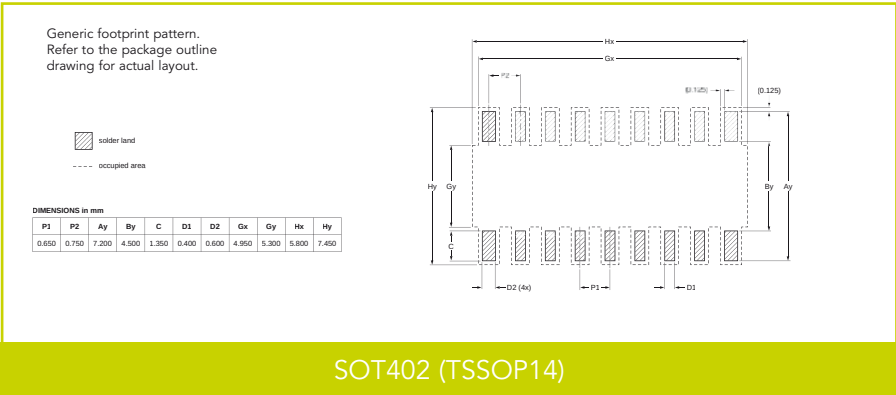
SOT519 (SSOP16)



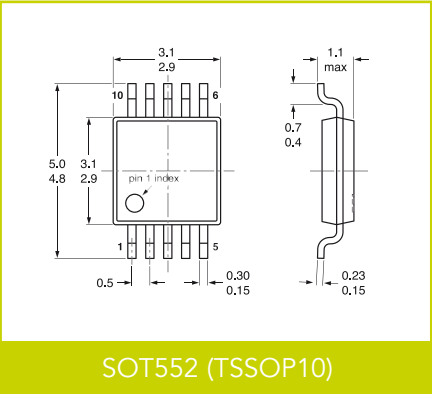
SOT519 (SSOP16)



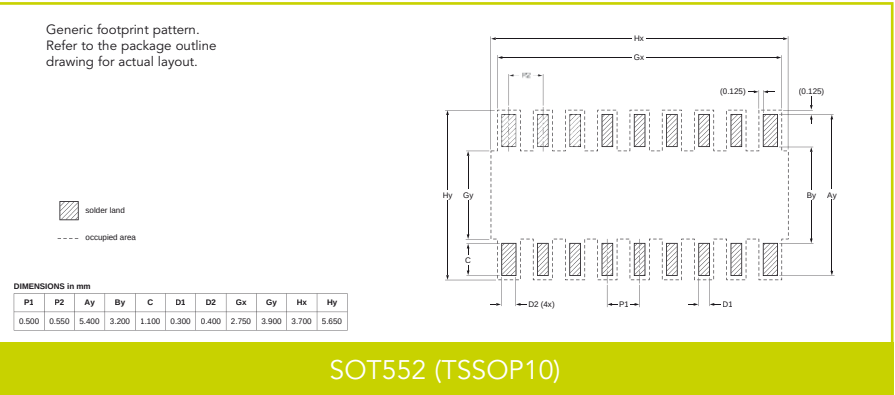
SOT402 (TSSOP14)



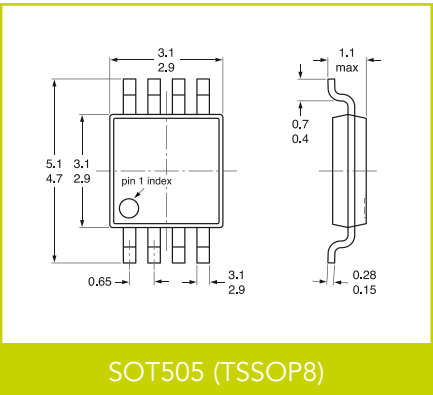
SOT402 (TSSOP14)



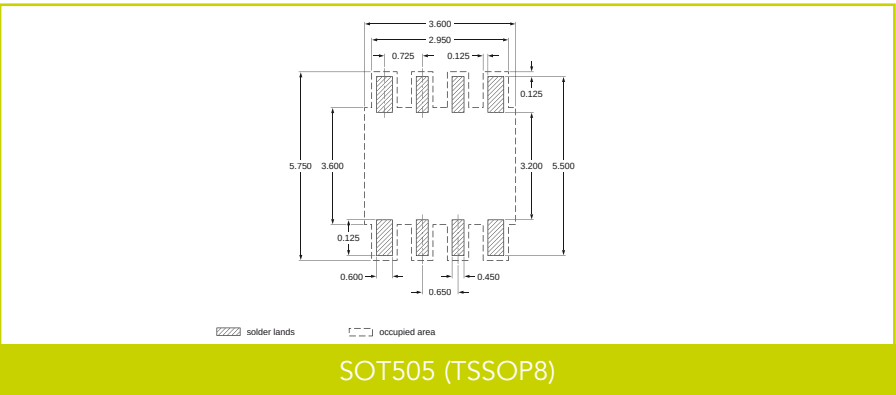
SOT552 (TSSOP10)



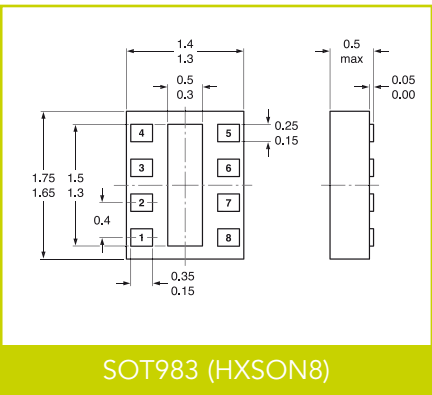
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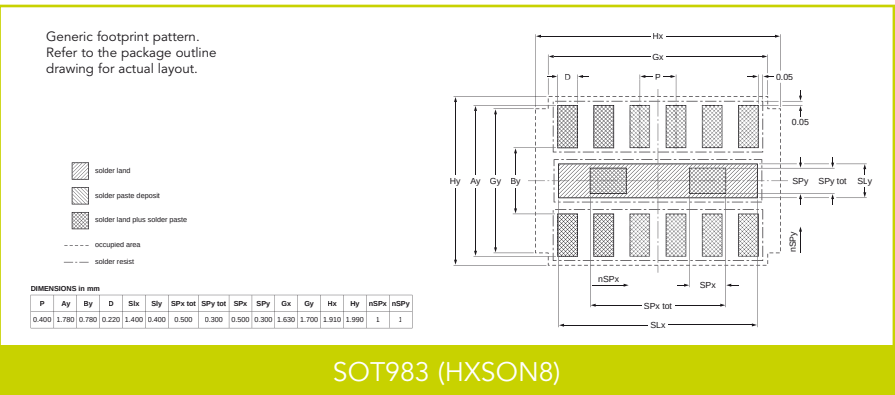
SOT505 (TSSOP8)



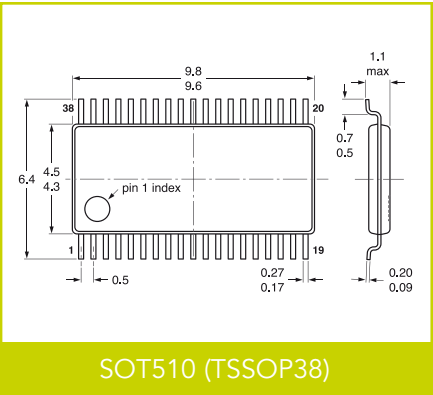
SOT505 (TSSOP8)



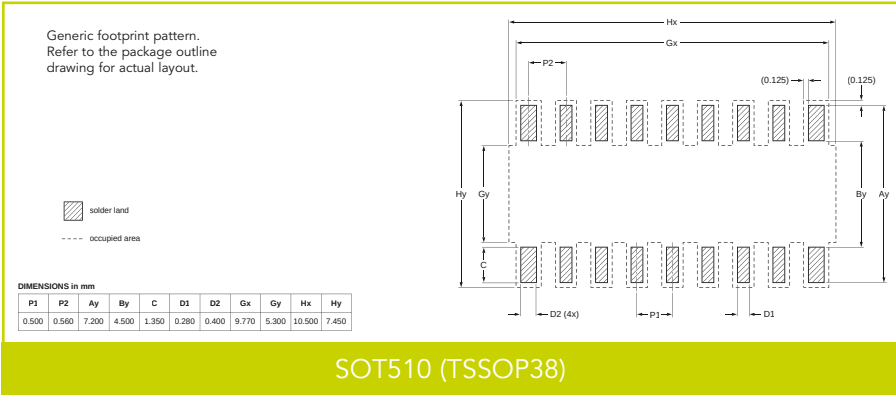
SOT983 (HXSON8)



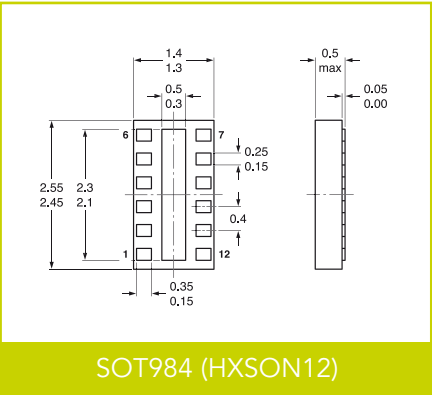
SOT983 (HXSON8)



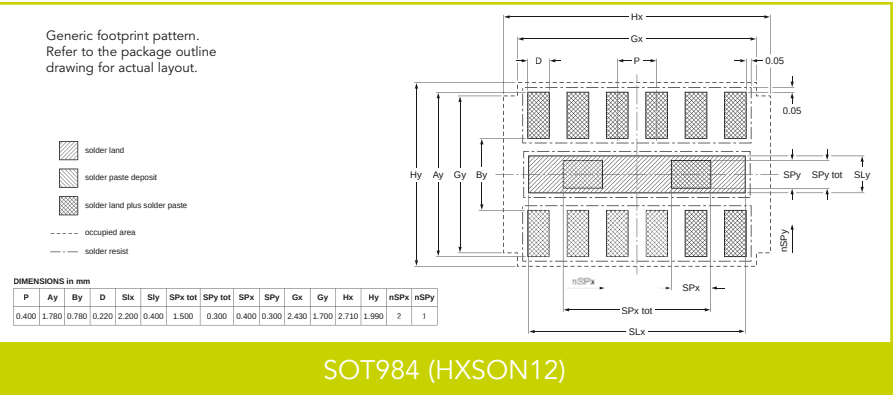
SOT510 (TSSOP38)



SOT510 (TSSOP38)

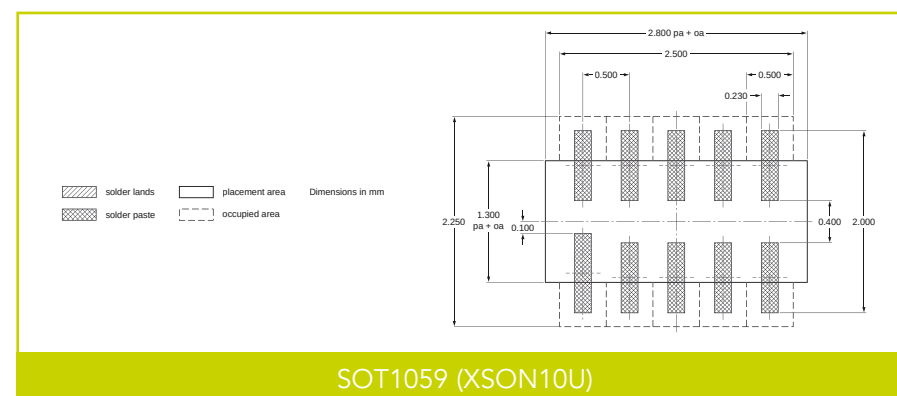
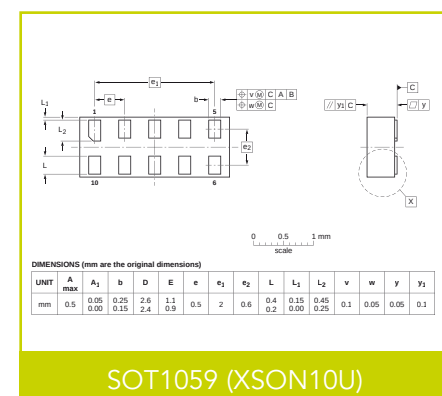
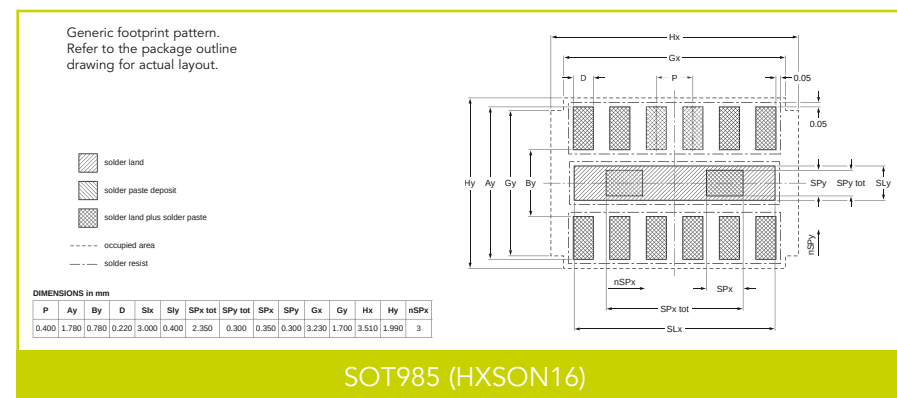
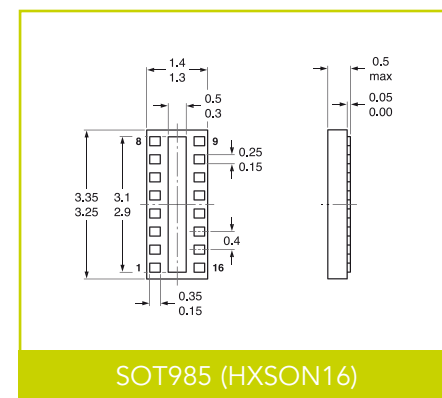


SOT984 (HXSON12)

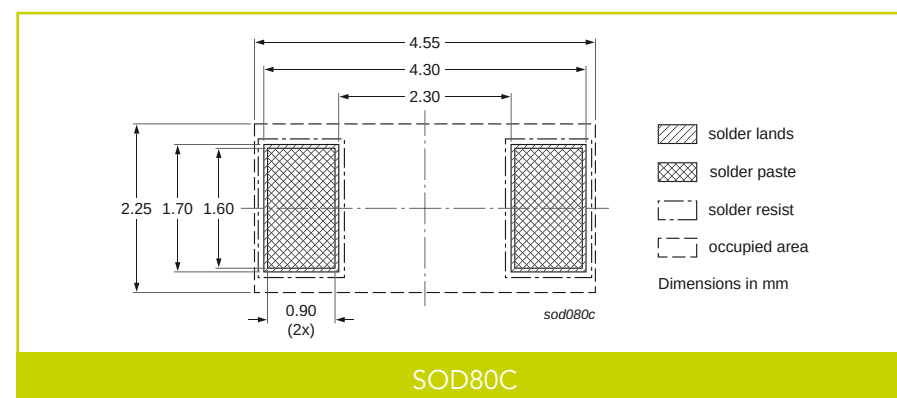
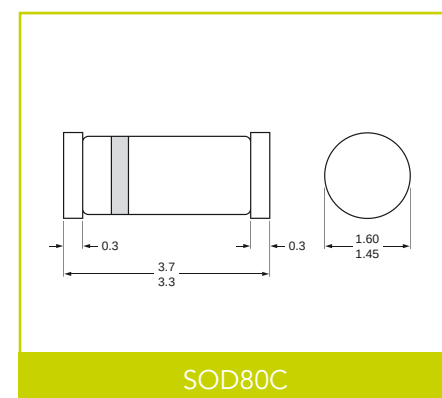
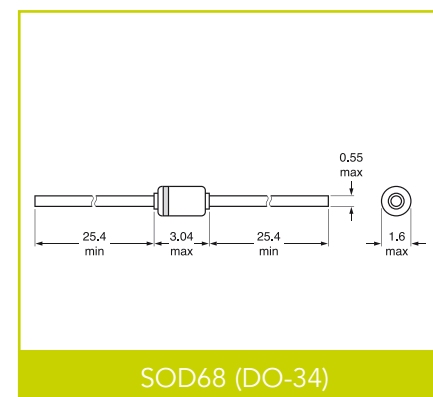
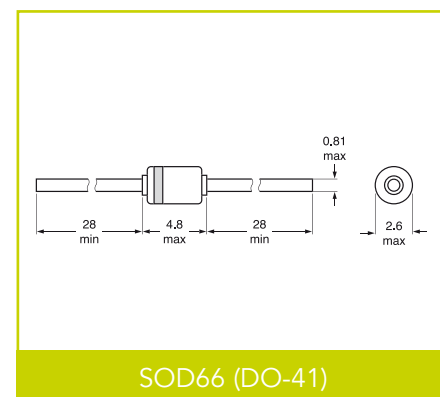
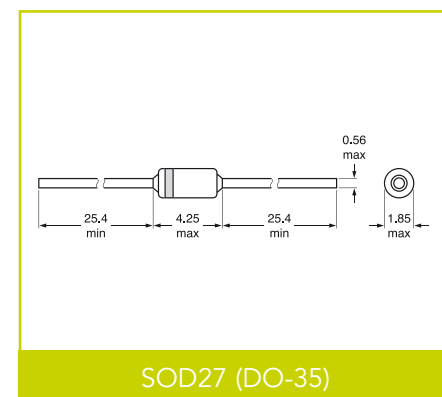


SOT984 (HXSON12)

Minimized outline drawings and reflow soldering footprint

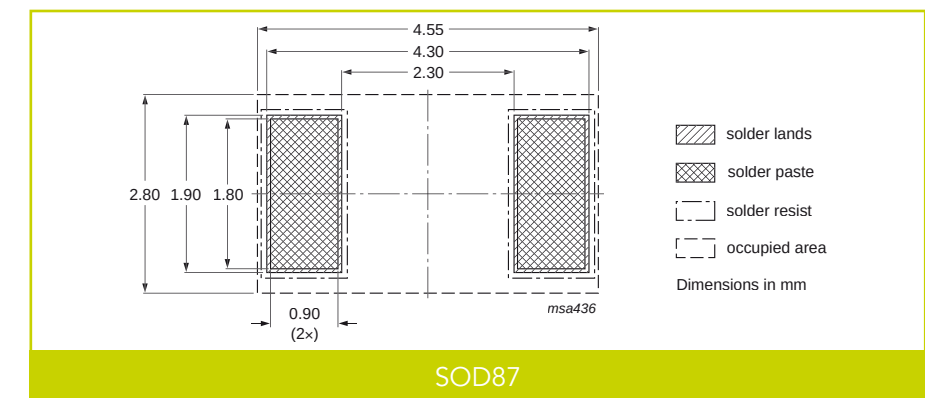
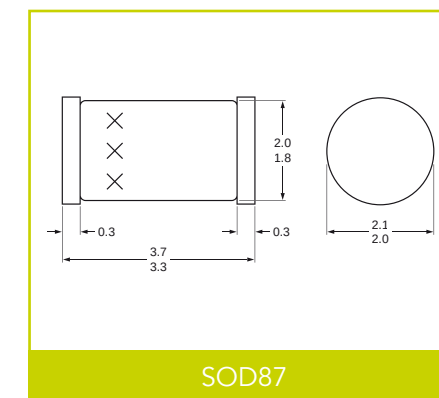


## Glass diodes



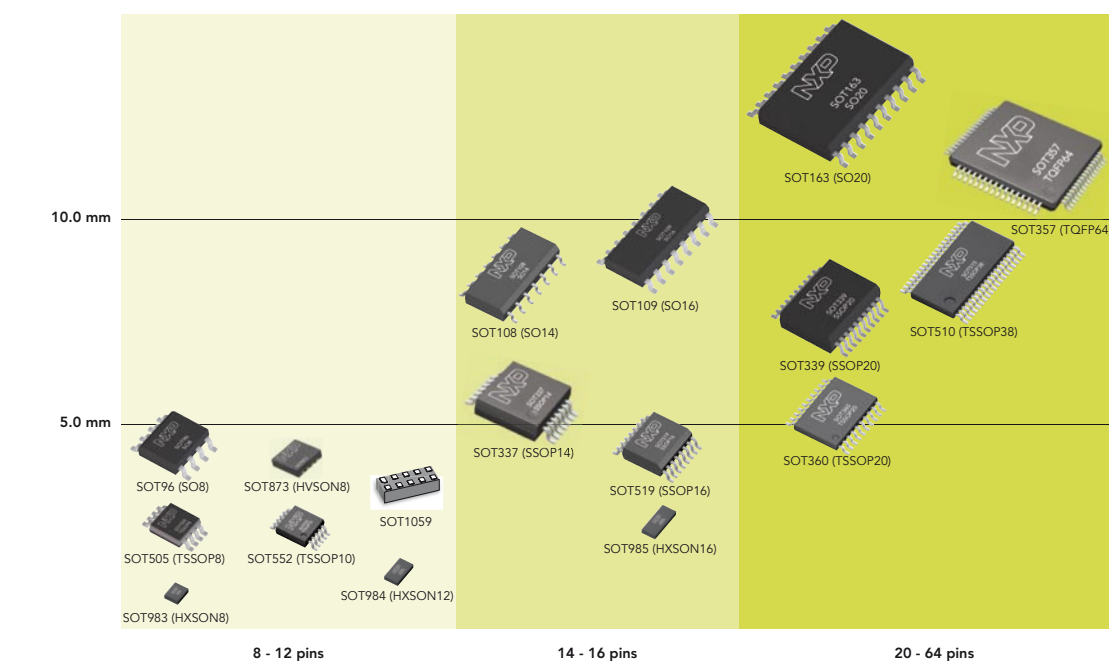
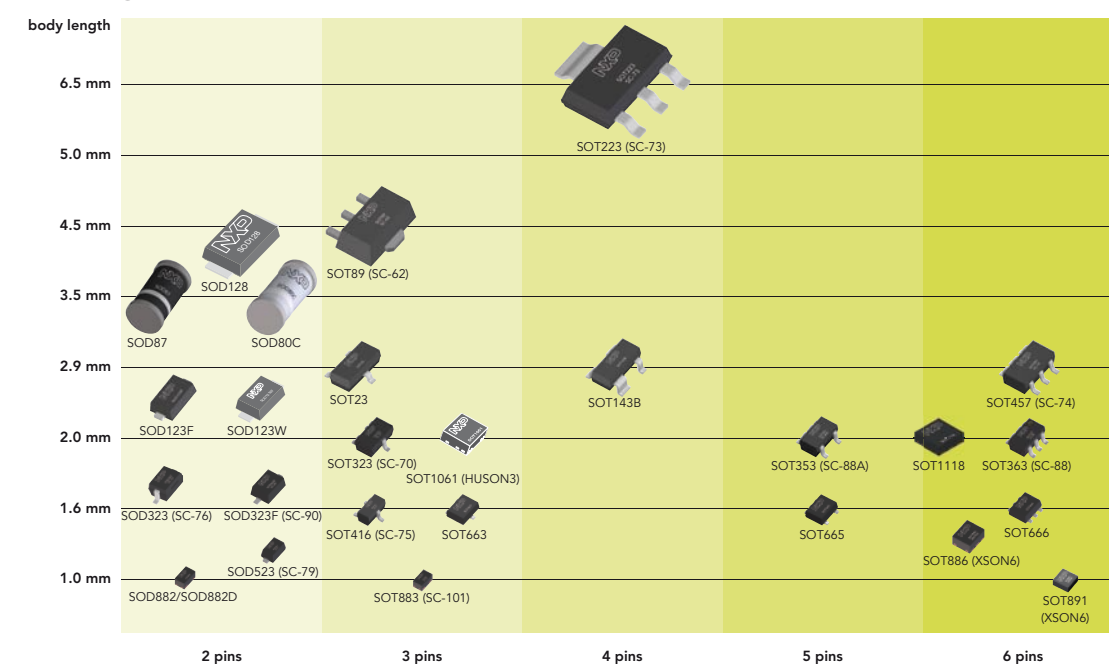
Dimensions in mm

Minimized outline drawings and reflow soldering footprint



Dimensions in mm

## Package overview



## Packages

| Type Number         | Page Number | Type Number    | Page Number | Type Number | Page Number | Type Number                 | Page Number | Type Number           | Page Number |
|---------------------|-------------|----------------|-------------|-------------|-------------|-----------------------------|-------------|-----------------------|-------------|
| 1N4148              | 18          | 2PD601ARW / SW | 48          | BAS70-06    | 8           | BAV103                      | 20          | BC850CW               | 51          |
| 1N4531              | 18          | 2PD601ASL      | 48          | BAS70-06W   | 9           | BAV170                      | 21          | BC856 / A / B         | 48          |
| 1N47xxA series      | 16          | 2PD602AQL      | 48          | BAS70-07    | 8           | BAV199                      | 21          | BC856BS               | 49          |
| 1PS10SB82           | 14          | 2PD602ARL      | 48          | BAS70-07S   | 9           | BAV199W                     | 21          | BC856S                | 49          |
| 1PS66SB17           | 14          | 2PD602ASL      | 48          | BAS70-07V   | 9           | BAV20                       | 20          | BC856T / AT / BT      | 48          |
| 1PS66SB82           | 14          | BAL74          | 18          | BAS70H      | 9           | BAV21                       | 20          | BC856W / AW / BW      | 48          |
| 1PS70SB20           | 11          | BAL99          | 18          | BAS70L      | 9           | BAV23                       | 20          | BC857 / A / B / C     | 48          |
| 1PS70SB82           | 14          | BAS101         | 20          | BAS70VV     | 9           | BAV23A                      | 20          | BC857AM / BM / CM     | 48          |
| 1PS70SB84           | 14          | BAS101S        | 20          | BAS70W      | 9           | BAV23C                      | 20          | BC857BS               | 49          |
| 1PS70SB85           | 14          | BAS116         | 21          | BAS70XY     | 9           | BAV23S                      | 20          | BC857BV               | 49          |
| 1PS70SB86           | 14          | BAS116H        | 21          | BAS716      | 21          | BAV70                       | 18          | BC857T / AT / BT / CT | 48          |
| 1PS74SB23           | 10          | BAS116T        | 21          | BAS85       | 8           | BAV70M                      | 19          | BC857W / AW / BW / CW | 48          |
| 1PS75SB45           | 9           | BAS16          | 18          | BAS86       | 8           | BAV70S                      | 19          | BC858B                | 48          |
| 1PS76SB10           | 9           | BAS16H         | 19          | BAT120A     | 12          | BAV70T                      | 19          | BC858W                | 48          |
| 1PS76SB17           | 14          | BAS16J         | 19          | BAT120C     | 12          | BAV70W                      | 19          | BC859B                | 51          |
| 1PS76SB21           | 9           | BAS16L         | 19          | BAT120S     | 12          | BAV756S                     | 19          | BC859BW               | 51          |
| 1PS76SB40           | 9           | BAS16T         | 19          | BAT160A     | 12          | BAV99                       | 18          | BC859C                | 51          |
| 1PS76SB70           | 9           | BAS16VV        | 19          | BAT160C     | 12          | BAV99S                      | 19          | BC859CW               | 51          |
| 1PS79SB10           | 9           | BAS16VY        | 19          | BAT160S     | 12          | BAV99W                      | 19          | BC860B                | 51          |
| 1PS79SB17           | 14          | BAS16W         | 19          | BAT17       | 14          | BAW101                      | 20          | BC860BW               | 51          |
| 1PS79SB30           | 9           | BAS21          | 20          | BAT46WH     | 9           | BAW101S                     | 20          | BC860C                | 51          |
| 1PS79SB31           | 9           | BAS21AW        | 20          | BAT46WJ     | 9           | BAW156                      | 21          | BC860CW               | 51          |
| 1PS79SB40           | 9           | BAS21H         | 20          | BAT54       | 8           | BAW56                       | 18          | BC868 / -25           | 65          |
| 1PS79SB70           | 9           | BAS21J         | 20          | BAT54A      | 8           | BAW56M                      | 19          | BC869 / -16 / -25     | 65          |
| 1PS88SB48           | 9           | BAS21SW        | 20          | BAT54AW     | 9           | BAW56S                      | 19          | BCM61B                | 50          |
| 1PS88SB82           | 14          | BAS21VD        | 20          | BAT54C      | 8           | BAW56T                      | 19          | BCM62B                | 50          |
| 2N7002              | 77          | BAS21W         | 20          | BAT54CM     | 9           | BAW56W                      | 19          | BCM847BS              | 50          |
| 2N7002BK            | 77          | BAS28          | 19          | BAT54CV     | 9           | BC807 / -16 / -25 / -40     | 48          | BCM847BV              | 50          |
| 2N7002BKM           | 77          | BAS29          | 21          | BAT54CW     | 9           | BC807DS                     | 49          | BCM847DS              | 50          |
| 2N7002BK5           | 79          | BAS31          | 21          | BAT54H      | 9           | BC807W / -16W / -25W / -40W | 48          | BCM856BS              | 50          |
| 2N7002BKT           | 77          | BAS316         | 19          | BAT54J      | 9           | BC817 / -16 / -25 / -40     | 48          | BCM856DS              | 50          |
| 2N7002BKV           | 79          | BAS321         | 20          | BAT54L      | 9           | BC817DPN                    | 49          | BCM857BS              | 50          |
| 2N7002BKW           | 77          | BAS32L         | 18          | BAT54S      | 8           | BC817DS                     | 49          | BCM857BV              | 50          |
| 2N7002CK            | 77          | BAS35          | 21          | BAT54SW     | 9           | BC817W / -16W / -25W / -40W | 48          | BCM857DS              | 50          |
| 2N7002E             | 77          | BAS40          | 8           | BAT54T      | 9           | BC846 / A / B               | 48          | BCP51 / -10 / -16     | 65          |
| 2N7002F             | 77          | BAS40-04       | 8           | BAT54VV     | 9           | BC846BPN                    | 49          | BCP52 / -10 / -16     | 65          |
| 2N7002K             | 77          | BAS40-04W      | 9           | BAT54W      | 9           | BC846BS                     | 49          | BCP53 / -10 / -16     | 65          |
| 2N7002P             | 77          | BAS40-05       | 8           | BAT54XY     | 9           | BC846DS                     | 49          | BCP54 / -10 / -16     | 65          |
| 2N7002PM            | 77          | BAS40-05V      | 9           | BAT720      | 10          | BC846S                      | 49          | BCP55 / -10 / -16     | 65          |
| 2N7002PS            | 79          | BAS40-05W      | 9           | BAT721      | 8           | BC846T / AT / BT            | 48          | BCP56 / -10 / -16     | 65          |
| 2N7002PT            | 77          | BAS40-06       | 8           | BAT721A     | 8           | BC846W / AW / BW            | 48          | BCP68 / -25           | 65          |
| 2N7002PV            | 79          | BAS40-06W      | 9           | BAT721C     | 8           | BC847 / A / B / C           | 48          | BCP69 / -16 / -25     | 65          |
| 2N7002PW            | 77          | BAS40-07       | 8           | BAT721S     | 8           | BC847AM / BM / CM           | 48          | BCV26                 | 51          |
| 2PA1576Q / R / S    | 48          | BAS40-07V      | 9           | BAT74       | 8           | BC847BPN                    | 49          | BCV27                 | 51          |
| 2PA1774Q / R / S    | 48          | BAS40H         | 9           | BAT74S      | 9           | BC847BS                     | 49          | BCV28                 | 51          |
| 2PA1774QM / RM / SM | 48          | BAS40L         | 9           | BAT74V      | 9           | BC847BV                     | 49          | BCV29                 | 51          |
| 2PB1219AQ / R / S   | 48          | BAS40W         | 9           | BAT754      | 8           | BC847BVN                    | 49          | BCV46                 | 51          |
| 2PB709ARL           | 48          | BAS40XY        | 9           | BAT754A     | 8           | BC847DS                     | 49          | BCV47                 | 51          |
| 2PB709ART           | 48          | BAS416         | 21          | BAT754C     | 8           | BC847T / AT / BT / CT       | 48          | BCV48                 | 51          |
| 2PB709ARW / SW      | 48          | BAS45A         | 21          | BAT754L     | 9           | BC847W / AW / BW / CW       | 48          | BCV49                 | 51          |
| 2PB709ASL           | 48          | BAS45AL        | 21          | BAT754S     | 8           | BC848B                      | 48          | BCV61/A/B/C           | 50          |
| 2PB710ARL           | 48          | BAS516         | 19          | BAT760      | 11          | BC848W                      | 48          | BCV62/A/B/C           | 50          |
| 2PB710ASL           | 48          | BAS521         | 20          | BAT85       | 8           | BC849B                      | 51          | BCV63 / B             | 52          |
| 2PC4081Q / R / S    | 48          | BAS56          | 21          | BAT854AW    | 9           | BC849BW                     | 51          | BCV64B                | 52          |
| 2PC4617Q / R        | 48          | BAS70          | 8           | BAT854CW    | 9           | BC849C                      | 51          | BCV65 (SOT143B)       | 53          |
| 2PC4617QM / RM      | 48          | BAS70-04       | 8           | BAT854SW    | 9           | BC849CW                     | 51          | BCV71 / 72            | 48          |
| 2PD1820AR / S       | 48          | BAS70-04W      | 9           | BAT854W     | 9           | BC850B                      | 51          | BCW29 / 30            | 48          |
| 2PD601ARL           | 48          | BAS70-05       | 8           | BAT86       | 8           | BC850BW                     | 51          | BCW31 / 32 / 33       | 48          |
| 2PD601ART           | 48          | BAS70-05W      | 9           | BAT960      | 11          | BC850C                      | 51          | BCW60B / C / D        | 48          |

| Type Number        | Page Number | Type Number   | Page Number | Type Number   | Page Number | Type Number    | Page Number | Type Number     | Page Number |
|--------------------|-------------|---------------|-------------|---------------|-------------|----------------|-------------|-----------------|-------------|
| BCW61B / C / D     | 48          | BSP32 / 33    | 65          | BZX79 series  | 16          | IP3254CZ12     | 36          | IP4263CZ14      | 33          |
| BCW69 / 70         | 48          | BSP41         | 65          | BZX84 series  | 16          | IP3254CZ16     | 36          | IP4264CZ8-20    | 38          |
| BCW71 / 72         | 48          | BSP43         | 65          | BZX84J series | 16          | IP3254CZ8      | 36          | IP4264CZ8-40    | 38          |
| BCW89              | 48          | BSP50         | 51          | BZX84-y10     | 17          | IP3337CX18/LF  | 36          | IP4280CZ10      | 30          |
| BCX17              | 48          | BSP51         | 51          | BZX84-y11     | 17          | IP3338CX24/LF  | 36          | IP4281CZ10      | 30          |
| BCX18              | 48          | BSP52         | 51          | BZX84-y12     | 17          | IP4025CX20/LF  | 32          | IP4282CZ6       | 33          |
| BCX19              | 48          | BSP60         | 51          | BZX84-y13     | 17          | IP4027CX20/LF  | 32          | IP4282CZ6       | 30          |
| BCX51 / -10 / -16  | 65          | BSP61         | 51          | BZX84-y15     | 17          | IP4041CX25/LF  | 36          | IP4283CZ10-TB   | 30          |
| BCX52 / -10 / -16  | 65          | BSP62         | 51          | BZX84-y16     | 17          | IP4042CX5/LF   | 37          | IP4283CZ10-TT   | 30          |
| BCX53 / -10 / -16  | 65          | BSP89         | 76          | BZX84-y18     | 17          | IP4043CX5/LF   | 37          | IP4284CZ10-TB   | 31          |
| BCX54 / -10 / -16  | 65          | BSR14         | 49          | BZX84-y20     | 17          | IP4044CX8/LF   | 38          | IP4284CZ10-TT   | 31          |
| BCX55 / -10 / -16  | 65          | BSR16         | 49          | BZX84-y22     | 17          | IP4047CX6/LF   | 32          | IP4286CZ6-TBF   | 31          |
| BCX56 / -10 / -16  | 65          | BSR30 / 31    | 65          | BZX84-y24     | 17          | IP4048CX5/LF   | 32          | IP4286CZ6-TTY   | 31          |
| BCX70G / H / J / K | 48          | BSR33         | 65          | BZX84-y27     | 17          | IP4049CX5/LF   | 32          | IP4302CX2/LF    | 37          |
| BCX71H / J / K     | 48          | BSR41         | 65          | BZX84-y2V4    | 17          | IP4051CX11/LF  | 38          | IP4303CX4/LF    | 37          |
| BF550              | 52          | BSR42 / 43    | 65          | BZX84-y2V7    | 17          | IP4052CX20/LF  | 38          | IP4305CX4/LF    | 37          |
| BF570              | 52          | BSS123        | 77          | BZX84-y30     | 17          | IP4053CX15/LF  | 36          | IP4306CX2/LF    | 37          |
| BF620              | 51          | BSS192        | 79          | BZX84-y33     | 17          | IP4054CX15/LF  | 36          | IP4307CX4/LF    | 36          |
| BF621              | 51          | BSS63         | 48          | BZX84-y36     | 17          | IP4055CX6/LF   | 32          | IP4309CX9       | 31          |
| BF622              | 51          | BSS64         | 48          | BZX84-y39     | 17          | IP4056CX8      | 39          | IP4310CX8       | 31          |
| BF623              | 51          | BSS84         | 79          | BZX84-y3V0    | 17          | IP4057CX10     | 39          | IP4332CX5/LF    | 37          |
| BF720              | 51          | BSS87         | 77          | BZX84-y3V3    | 17          | IP4058CX8      | 39          | IP4337CX18/LF/E | 36          |
| BF722              | 51          | BST39         | 51          | BZX84-y3V6    | 17          | IP4059CX5      | 39          | IP4338CX24/LF   | 36          |
| BF723              | 51          | BST50         | 51          | BZX84-y3V9    | 17          | IP4060CX16/LF  | 38          | IP4342CX5/LF    | 37          |
| BF820              | 51          | BST51         | 51          | BZX84-y43     | 17          | IP4064CX8/LF/S | 38          | IP4343CX5/LF    | 37          |
| BF820W             | 51          | BST52         | 51          | BZX84-y47     | 17          | IP4065CX11     | 39          | IP4350CX24/LF   | 38          |
| BF821              | 51          | BST60         | 51          | BZX84-y4V3    | 17          | IP4067CX9/LF   | 38          | IP4352CX24/LF   | 38          |
| BF822              | 51          | BST61         | 51          | BZX84-y4V7    | 17          | IP4078CX6      | 39          | IP4353CX15/LF   | 36          |
| BF823              | 51          | BST62         | 51          | BZX84-y51     | 17          | IP4085CX4      | 38          | IP4355CX6/LF    | 32          |
| BF824              | 52          | BST82         | 77          | BZX84-y56     | 17          | IP4088CX20/LF  | 36          | IP4358CX6       | 31          |
| BF824W             | 52          | BSV52         | 49          | BZX84-y5V1    | 17          | IP4110CX20/LF  | 32          | IP4359CX4       | 30          |
| BF840              | 52          | BZA100        | 25          | BZX84-y5V6    | 17          | IP4125CX20/LF  | 32          | IP4359CX4       | 39          |
| BFS19              | 52          | BZA408B       | 25          | BZX84-y62     | 17          | IP4142CX5/LF   | 37          | IP4361CX4/LF    | 37          |
| BFS20              | 52          | BZA418A       | 25          | BZX84-y68     | 17          | IP4153CX15/LF  | 36          | IP4363CX10/LF   | 32          |
| BFS20W             | 52          | BZA420A       | 25          | BZX84-y6V2    | 17          | IP4158CX8      | 39          | IP4364CX8/LF    | 38          |
| BSH103             | 75          | BZA456A       | 25          | BZX84-y6V8    | 17          | IP4220CZ6      | 43          | IP4365CX11      | 38          |
| BSH105             | 75          | BZA462A       | 25          | BZX84-y75     | 17          | IP4220CZ6      | 40          | IP4366CX8/LF    | 38          |
| BSH108             | 75          | BZA820A       | 25          | BZX84-y7V5    | 17          | IP4220CZ6      | 30          | IP4385CX4       | 38          |
| BSH111             | 77          | BZA856A       | 25          | BZX84-y8V2    | 17          | IP4221CZ6-S    | 30          | IP4386CX4       | 38          |
| BSH112             | 77          | BZA856AL      | 25          | BZX84-y9V1    | 17          | IP4221CZ6-XS   | 30          | IP4387CX4       | 38          |
| BSH114             | 77          | BZA862A       | 25          | BZX884 series | 16          | IP4224CZ6      | 42          | IP4769CZ14      | 35          |
| BSH121             | 77          | BZA862AL      | 25          | ES1A          | 15          | IP4225CZ10     | 40          | IP4770CZ16      | 35          |
| BSH201             | 79          | BZA868A       | 25          | ES1B          | 15          | IP4233CZ6      | 30          | IP4771CZ16      | 35          |
| BSH202             | 79          | BZA868AL      | 25          | ES1D          | 15          | IP4234CZ6      | 29          | IP4772CZ16      | 35          |
| BSH203             | 79          | BZA956A       | 25          | ES1G          | 15          | IP4251CZ12-6   | 36          | IP4773CZ14      | 35          |
| BSH205             | 79          | BZA962A       | 25          | ES2A          | 15          | IP4251CZ16-8   | 36          | IP4774CZ14      | 35          |
| BSH207             | 79          | BZA968A       | 25          | ES2B          | 15          | IP4251CZ8-4    | 36          | IP4776CZ38      | 34          |
| BSN20              | 77          | BZB100A       | 16          | ES2D          | 15          | IP4252CZ12-6   | 36          | IP4777CZ38      | 34          |
| BSP030             | 74          | BZB784 series | 16          | ES2G          | 15          | IP4252CZ16-8   | 36          | IP4778CZ38      | 34          |
| BSP100             | 74          | BZB84 series  | 16          | ES3A          | 15          | IP4252CZ8-4    | 36          | IP4790CZ38      | 31          |
| BSP122             | 76          | BZB984 series | 16          | ES3B          | 15          | IP4253CZ12-6   | 36          | IP4852CX25/LF   | 38          |
| BSP126             | 76          | BZT52H series | 16          | ES3D          | 15          | IP4253CZ16-8   | 36          | IP4853CX24/LF   | 38          |
| BSP130             | 76          | BZV49 series  | 16          | ES3G          | 15          | IP4253CZ8-4    | 36          | IP5002CX8/LF    | 32          |
| BSP19              | 51          | BZV55 series  | 16          | IP3047CX6     | 32          | IP4254CZ12-6   | 36          | IP5006CX11/LF   | 32          |
| BSP220             | 79          | BZV85 series  | 16          | IP3048CX5     | 32          | IP4254CZ16-8   | 36          | IP5020CX16/LF   | 32          |
| BSP225             | 79          | BZV90 series  | 16          | IP3219CZ6     | 29          | IP4254CZ8-4    | 36          | IP5040CX11/LF   | 32          |
| BSP230             | 79          | BZX100A       | 16          | IP3253CZ12    | 36          | IP4256CZ3-M    | 36          | IP5306CX8       | 32          |
| BSP250             | 79          | BZX384 series | 16          | IP3253CZ16    | 36          | IP4256CZ5-W    | 36          | IP5311CX5/LF    | 32          |
| BSP31              | 65          | BZX585 series | 16          | IP3253CZ8     | 36          | IP4256CZ6-F    | 36          | MMBT2222A       | 49          |

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| MMBT3904    | 49          | NZX13C      | 17          | NZX4V3D     | 17          | PBLS2001D   | 61          | PBSS302PX   | 58          |
| MMBT3906    | 49          | NZX14A      | 17          | NZX4V7A     | 17          | PBLS2001S   | 61          | PBSS302PZ   | 58          |
| MMBZ10VAL   | 44          | NZX14B      | 17          | NZX4V7B     | 17          | PBLS2002D   | 61          | PBSS303ND   | 56          |
| MMBZ12VAL   | 44          | NZX14C      | 17          | NZX4V7C     | 17          | PBLS2002S   | 61          | PBSS303NX   | 56          |
| MMBZ12VDL   | 44          | NZX15A      | 17          | NZX4V7D     | 17          | PBLS2003D   | 61          | PBSS303NZ   | 56          |
| MMBZ15VAL   | 44          | NZX15B      | 17          | NZX5V1A     | 17          | PBLS2003S   | 61          | PBSS303PD   | 58          |
| MMBZ15VDL   | 44          | NZX15C      | 17          | NZX5V1B     | 17          | PBLS2004D   | 61          | PBSS303PX   | 58          |
| MMBZ18VAL   | 44          | NZX15X      | 17          | NZX5V1C     | 17          | PBLS2021D   | 61          | PBSS303PZ   | 58          |
| MMBZ18VCL   | 44          | NZX16A      | 17          | NZX5V1D     | 17          | PBLS2022D   | 61          | PBSS304ND   | 56          |
| MMBZ20VAL   | 44          | NZX16B      | 17          | NZX5V6A     | 17          | PBLS2023D   | 61          | PBSS304NX   | 56          |
| MMBZ20VCL   | 44          | NZX16C      | 17          | NZX5V6B     | 17          | PBLS2024D   | 61          | PBSS304NZ   | 56          |
| MMBZ27VAL   | 44          | NZX18A      | 17          | NZX5V6C     | 17          | PBLS4001D   | 61          | PBSS304PD   | 58          |
| MMBZ27VCL   | 44          | NZX18B      | 17          | NZX5V6D     | 17          | PBLS4001V   | 61          | PBSS304PX   | 58          |
| MMBZ33VAL   | 44          | NZX18C      | 17          | NZX5V6E     | 17          | PBLS4001Y   | 61          | PBSS304PZ   | 58          |
| MMBZ33VCL   | 44          | NZX20A      | 17          | NZX6V2A     | 17          | PBLS4002D   | 61          | PBSS305ND   | 56          |
| MMBZ5V6AL   | 44          | NZX20B      | 17          | NZX6V2B     | 17          | PBLS4002V   | 61          | PBSS305NX   | 56          |
| MMBZ6V2AL   | 44          | NZX20C      | 17          | NZX6V2C     | 17          | PBLS4002Y   | 61          | PBSS305NZ   | 56          |
| MMBZ6V8AL   | 44          | NZX22A      | 17          | NZX6V2D     | 17          | PBLS4003D   | 61          | PBSS305PD   | 58          |
| MMBZ9V1AL   | 44          | NZX22B      | 17          | NZX6V2E     | 17          | PBLS4003V   | 61          | PBSS305PX   | 58          |
| NUP1301     | 29          | NZX22C      | 17          | NZX6V8A     | 17          | PBLS4003Y   | 61          | PBSS305PZ   | 58          |
| NX1117C120Z | 69          | NZX24A      | 17          | NZX6V8B     | 17          | PBLS4004D   | 61          | PBSS306NX   | 56          |
| NX1117C12Z  | 69          | NZX24B      | 17          | NZX6V8C     | 17          | PBLS4004V   | 61          | PBSS306NZ   | 56          |
| NX1117C15Z  | 69          | NZX24C      | 17          | NZX6V8D     | 17          | PBLS4004Y   | 61          | PBSS306PX   | 58          |
| NX1117C18Z  | 69          | NZX24X      | 17          | NZX7V5A     | 17          | PBLS4005D   | 61          | PBSS306PZ   | 58          |
| NX1117C19Z  | 69          | NZX27A      | 17          | NZX7V5B     | 17          | PBLS4005V   | 61          | PBSS3515E   | 59          |
| NX1117C20Z  | 69          | NZX27B      | 17          | NZX7V5C     | 17          | PBLS4005Y   | 61          | PBSS3515M   | 59          |
| NX1117C25Z  | 69          | NZX27C      | 17          | NZX7V5D     | 17          | PBLS6001D   | 61          | PBSS3515VS  | 60          |
| NX1117C285Z | 69          | NZX27X      | 17          | NZX7V5X     | 17          | PBLS6002D   | 61          | PBSS3540E   | 59          |
| NX1117C33Z  | 69          | NZX2V4A     | 17          | NZX8V2A     | 17          | PBLS6003D   | 61          | PBSS3540M   | 59          |
| NX1117C50Z  | 69          | NZX2V4B     | 17          | NZX8V2B     | 17          | PBLS6004D   | 61          | PBSS4021NT  | 57          |
| NX1117CADJZ | 69          | NZX2V7A     | 17          | NZX8V2C     | 17          | PBLS6005D   | 61          | PBSS4021NX  | 56          |
| NX1117I120Z | 69          | NZX2V7B     | 17          | NZX8V2D     | 17          | PBLS6021D   | 61          | PBSS4021NZ  | 56          |
| NX1117I12Z  | 69          | NZX2V7C     | 17          | NZX9V1A     | 17          | PBLS6022D   | 61          | PBSS4021PT  | 59          |
| NX1117I15Z  | 69          | NZX30A      | 17          | NZX9V1B     | 17          | PBLS6023D   | 61          | PBSS4021PX  | 58          |
| NX1117I18Z  | 69          | NZX30B      | 17          | NZX9V1C     | 17          | PBLS6024D   | 61          | PBSS4021PZ  | 58          |
| NX1117I19Z  | 69          | NZX30C      | 17          | NZX9V1D     | 17          | PBRN113ET   | 55          | PBSS4021SN  | 60          |
| NX1117I20Z  | 69          | NZX30X      | 17          | NZX9V1E     | 17          | PBRN113ZT   | 55          | PBSS4021SP  | 60          |
| NX1117I25Z  | 69          | NZX33A      | 17          | PBHV8115T   | 62          | PBRN123ET   | 55          | PBSS4021SPN | 60          |
| NX1117I285Z | 69          | NZX33B      | 17          | PBHV8115Z   | 62          | PBRN123YT   | 55          | PBSS4032ND  | 56          |
| NX1117I33Z  | 69          | NZX33C      | 17          | PBHV8140Z   | 62          | PBRP113ET   | 55          | PBSS4032NT  | 57          |
| NX1117I50Z  | 69          | NZX36A      | 17          | PBHV8215Z   | 62          | PBRP113ZT   | 55          | PBSS4032NX  | 56          |
| NX1117IADJZ | 69          | NZX36B      | 17          | PBHV8540T   | 62          | PBRP123ET   | 55          | PBSS4032NZ  | 56          |
| NZH series  | 16          | NZX36C      | 17          | PBHV8540Z   | 62          | PBRP123YT   | 55          | PBSS4032PD  | 58          |
| NZX series  | 16          | NZX36X      | 17          | PBHV8550Z   | 62          | PBSS2515E   | 57          | PBSS4032PD  | 65          |
| NZX10A      | 17          | NZX3V0A     | 17          | PBHV9040T   | 62          | PBSS2515M   | 57          | PBSS4032PT  | 59          |
| NZX10B      | 17          | NZX3V0B     | 17          | PBHV9040Z   | 62          | PBSS2515VPN | 60          | PBSS4032PX  | 58          |
| NZX10C      | 17          | NZX3V0C     | 17          | PBHV9050T   | 62          | PBSS2515VS  | 60          | PBSS4032PZ  | 58          |
| NZX10D      | 17          | NZX3V3A     | 17          | PBHV9050Z   | 62          | PBSS2540E   | 57          | PBSS4032PZ  | 65          |
| NZX11A      | 17          | NZX3V3B     | 17          | PBHV9115T   | 62          | PBSS2540M   | 57          | PBSS4032SN  | 60          |
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| NZX12C      | 17          | NZX3V9B     | 17          | PBLS1502Y   | 61          | PBSS301PZ   | 58          | PBSS4041PT  | 59          |
| NZX12D      | 17          | NZX3V9C     | 17          | PBLS1503V   | 61          | PBSS302ND   | 56          | PBSS4041PX  | 58          |
| NZX12X      | 17          | NZX4V3A     | 17          | PBLS1503Y   | 61          | PBSS302NX   | 56          | PBSS4041PZ  | 58          |
| NZX13A      | 17          | NZX4V3B     | 17          | PBLS1504V   | 61          | PBSS302NZ   | 56          | PBSS4041SN  | 60          |
| NZX13B      | 17          | NZX4V3C     | 17          | PBLS1504Y   | 61          | PBSS302PD   | 58          | PBSS4041SP  | 60          |

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| PBSS4160U   | 57          | PBSS5560PA  | 59          | PDTA123YT   | 54          | PDTC114YT   | 54          | PDTC144TM    | 54          |
| PBSS4160V   | 57          | PBSS5580PA  | 59          | PDTA123YU   | 54          | PDTC114YU   | 54          | PDTC144TT    | 54          |
| PBSS4220V   | 57          | PBSS5612PA  | 59          | PDTA124EE   | 54          | PDTC115EE   | 54          | PDTC144TU    | 54          |
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| PBSS5320X   | 58          | PDTA123ET   | 54          | PDTB123TT   | 55          | PDTC143XM   | 54          | PEMD30       | 55          |
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| PEMD6        | 55          | PESD24VU1UT  | 43          | PESD5V0S1UJ  | 24          | PH4840S      | 83          | PHKD6N02LT   | 81          |
| PEMD9        | 55          | PESD2CAN     | 43          | PESD5V0S1UL  | 24          | PH5330E      | 82          | PHN203       | 83          |
| PEMH1        | 55          | PESD36VS2UT  | 25          | PESD5V0S1ULD | 24          | PH5525L      | 80          | PHN210       | 83          |
| PEMH10       | 55          | PESD3V3L1BA  | 26          | PESD5V0S2BT  | 27          | PH6030L      | 82          | PHN210T      | 83          |
| PEMH11       | 55          | PESD3V3L1UA  | 26          | PESD5V0S2UAT | 25          | PH6325L      | 80          | PHP101NQ03LT | 82          |
| PEMH13       | 55          | PESD3V3L1UB  | 26          | PESD5V0S2UQ  | 25          | PH7030L      | 82          | PHP101NQ04T  | 83          |
| PEMH14       | 55          | PESD3V3L1UL  | 26          | PESD5V0S4UD  | 25          | PH8030L      | 82          | PHP110NQ06LT | 83          |
| PEMH15       | 55          | PESD3V3L2BT  | 27          | PESD5V0S4UF  | 25          | PH8230E      | 82          | PHP110NQ08T  | 84          |
| PEMH16       | 55          | PESD3V3L2UM  | 27          | PESD5V0S5UD  | 25          | PH9025L      | 80          | PHP119NQ06T  | 83          |
| PEMH17       | 55          | PESD3V3L4UF  | 27          | PESD5V0U1BA  | 26          | PH9030L      | 82          | PHP143NQ04T  | 83          |
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| PEMH19       | 55          | PESD3V3L4UW  | 27          | PESD5V0U1BL  | 26          | PH9930L      | 82          | PHP165NQ08T  | 84          |
| PEMH2        | 55          | PESD3V3L5UF  | 28          | PESD5V0U1UA  | 26          | PHB101NQ04T  | 83          | PHP176NQ04T  | 83          |
| PEMH20       | 55          | PESD3V3L5UK  | 28          | PESD5V0U1UB  | 26          | PHB110NQ06LT | 83          | PHP18NQ10T   | 85          |
| PEMH24       | 55          | PESD3V3L5UV  | 28          | PESD5V0U1UL  | 26          | PHB110NQ08T  | 84          | PHP18NQ11T   | 85          |
| PEMH30       | 55          | PESD3V3L5UY  | 28          | PESD5V0U1UT  | 43          | PHB119NQ06T  | 83          | PHP191NQ06LT | 83          |
| PEMH4        | 55          | PESD3V3S1UB  | 24          | PESD5V0U2BM  | 27          | PHB160NQ08T  | 84          | PHP20N06T    | 83          |
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| PEMH9        | 55          | PESD3V3S2UAT | 25          | PESD5V0U4BF  | 28          | PHB191NQ06LT | 83          | PHP21N06LT   | 83          |
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| PSMN4R5-40PS | 83          | PTVS51VS1UR | 44          | PUMD9       | 55          | PZU22y        | 17          | S1G            | 15          |
| PSMN5R0-30YL | 82          | PTVS54VP1UP | 45          | PUMH1       | 55          | PZU24y        | 17          | S1J            | 15          |
| PSMN5R0-80PS | 84          | PTVS54VS1UR | 44          | PUMH10      | 55          | PZU27y        | 17          | S1K            | 15          |
| PSMN5R8-40YS | 83          | PTVS58VP1UP | 45          | PUMH11      | 55          | PZU3.0y       | 17          | S1M            | 15          |
| PSMN6R0-30YL | 82          | PTVS58VS1UR | 44          | PUMH13      | 55          | PZU3.3y       | 17          | S2A            | 15          |
| PSMN6R0-80YS | 84          | PTVS5V0P1UP | 45          | PUMH14      | 55          | PZU3.6y       | 17          | S2B            | 15          |
| PSMN6R5-80PS | 84          | PTVS5V0S1UR | 44          | PUMH15      | 55          | PZU3.9y       | 17          | S2D            | 15          |
| PSMN7R0-30YL | 82          | PTVS60VP1UP | 45          | PUMH16      | 55          | PZU30y        | 17          | S2DA           | 15          |
| PSMN8R0-40PS | 83          | PTVS60VS1UR | 44          | PUMH17      | 55          | PZU33y        | 17          | S2G            | 15          |
| PSMN8R2-80YS | 84          | PTVS64VP1UP | 45          | PUMH18      | 55          | PZU36y        | 17          | S2GA           | 15          |
| PSMN8R3-40YS | 83          | PTVS64VS1UR | 44          | PUMH19      | 55          | PZU4.3y       | 17          | S2J            | 15          |
| PSMN8R7-80PS | 84          | PTVS6V0P1UP | 45          | PUMH2       | 55          | PZU4.7y       | 17          | S2JA           | 15          |
| PSMN9R0-30YL | 82          | PTVS6V0S1UR | 44          | PUMH20      | 55          | PZU5.1y       | 17          | S2K            | 15          |
| PSSI2021SAY  | 70          | PTVS6V5P1UP | 45          | PUMH24      | 55          | PZU5.6y       | 17          | S2KA           | 15          |
| PTVS10VP1UP  | 45          | PTVS6V5S1UR | 44          | PUMH30      | 55          | PZU6.2y       | 17          | S2M            | 15          |
| PTVS10VS1UR  | 44          | PTVS7V0P1UP | 45          | PUMH4       | 55          | PZU6.8y       | 17          | S2MA           | 15          |
| PTVS11VP1UP  | 45          | PTVS7V0S1UR | 44          | PUMH7       | 55          | PZU7.5y       | 17          | S3A            | 15          |
| PTVS11VS1UR  | 44          | PTVS7V5P1UP | 45          | PUMH9       | 55          | PZU8.2y       | 17          | S3B            | 15          |

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| S3D         | 15          | TL431AQDBZR | 68          | TL431SDT       | 68          | TLVH431MQDBZR | 68          | US2JA       | 15          |
| S3G         | 15          | TL431ASDT   | 68          | TLVH431ACDBZR  | 68          | TLVH431QDBZR  | 68          | US3A        | 15          |
| S3J         | 15          | TL431BCDBZR | 68          | TLVH431AIDBZR  | 68          | US1A          | 15          | US3B        | 15          |
| S3K         | 15          | TL431BIDBZR | 68          | TLVH431AMQDBZR | 68          | US1B          | 15          | US3D        | 15          |
| S3M         | 15          | TL431BMSDT  | 68          | TLVH431AQDBZR  | 68          | US1D          | 15          | US3G        | 15          |
| SI2302DS    | 75          | TL431BQDBZR | 68          | TLVH431BCDBZR  | 68          | US1G          | 15          | US3J        | 15          |
| SI2304DS    | 75          | TL431BSDT   | 68          | TLVH431BIDBZR  | 68          | US1J          | 15          | US3K        | 15          |
| SI4410DY    | 83          | TL431CDBZR  | 68          | TLVH431BMQDBZR | 68          | US1K          | 15          | US3M        | 15          |
| TL431ACDBZR | 68          | TL431IDBZR  | 68          | TLVH431BQDBZR  | 68          | US1M          | 15          |             |             |
| TL431AIDBZR | 68          | TL431MSDT   | 68          | TLVH431CDBZR   | 68          | US2DA         | 15          |             |             |
| TL431AMSDT  | 68          | TL431QDBZR  | 68          | TLVH431IDBZR   | 68          | US2GA         | 15          |             |             |

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This image shows a full page of blank, lined paper. It features approximately 20 evenly spaced horizontal grey lines across its entire width, providing a guide for handwriting or typing. The background is a clean, solid white color.



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