



**THE DATASHEET OF  
BSP316PH6327XTSA1**



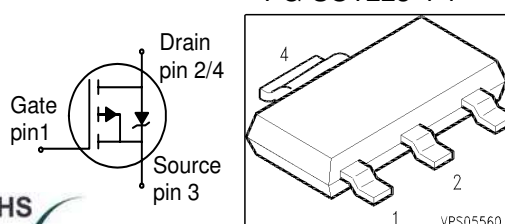
**SIPMOS® Small-Signal-Transistor**
**Feature**

- P-Channel
- Enhancement mode
- Logic Level
- dv/dt rated
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC 61249-2-21

**Product Summary**

|              |       |          |
|--------------|-------|----------|
| $V_{DS}$     | -100  | V        |
| $R_{DS(on)}$ | 1.8   | $\Omega$ |
| $I_D$        | -0.68 | A        |

PG-SOT223-4-1



| Type    | Package       | Tape and Reel Information | Marking | Packaging |
|---------|---------------|---------------------------|---------|-----------|
| BSP316P | PG-SOT223-4-1 | H6327: 1000 pcs/reel      | BSP316P | Non dry   |

**Maximum Ratings, at  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

| Parameter   | Symbol                | Value          | Unit              |
|---|-----------------------|----------------|-------------------|
| Continuous drain current<br>$T_A=25\text{ }^\circ\text{C}$<br>$T_A=70\text{ }^\circ\text{C}$  | $I_D$                 | -0.68<br>-0.54 | A                 |
| Pulsed drain current<br>$T_A=25\text{ }^\circ\text{C}$  | $I_{D\text{ puls}}$   | -2.72          |                   |
| Reverse diode dv/dt<br>$I_S=-0.68\text{ A}$ , $V_{DS}=-48\text{ V}$ , $di/dt=-200\text{ A}/\mu\text{s}$ , $T_{j\text{max}}=150\text{ }^\circ\text{C}$ | dv/dt                 | 6              | kV/ $\mu\text{s}$ |
| Gate source voltage   | $V_{GS}$              | $\pm 20$       | V                 |
| Power dissipation<br>$T_A=25\text{ }^\circ\text{C}$   | $P_{\text{tot}}$      | 1.8            | W                 |
| Operating and storage temperature   | $T_j, T_{\text{stg}}$ | -55... +150    | $^\circ\text{C}$  |
| IEC climatic category; DIN IEC 68-1   |                       | 55/150/56      |                   |
| ESD Class<br>JESD22-A114-HBM  |                       | Class 1a       |                   |

**Thermal Characteristics**

| Parameter   | Symbol     | Values |          |           | Unit |
|---|------------|--------|----------|-----------|------|
|   |            | min.   | typ.     | max.      |      |
| <b>Characteristics</b>  |            |        |          |           |      |
| Thermal resistance, junction - soldering point<br>(Pin 4)   | $R_{thJS}$ | -      | 15       | 25        | K/W  |
| SMD version, device on PCB:<br>@ min. footprint<br>@ 6 cm <sup>2</sup> cooling area <sup>1)</sup> | $R_{thJA}$ | -<br>- | 80<br>48 | 115<br>70 |      |

**Electrical Characteristics, at  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

| Parameter  | Symbol        | Values |             |              | Unit          |
|--|---------------|--------|-------------|--------------|---------------|
|  |               | min.   | typ.        | max.         |               |
| <b>Static Characteristics</b>  |               |        |             |              |               |
| Drain-source breakdown voltage<br>$V_{GS}=0, I_D=-250\mu\text{A}$  | $V_{(BR)DSS}$ | -100   | -           | -            | V             |
| Gate threshold voltage, $V_{GS} = V_{DS}$<br>$I_D=-170\mu\text{A}$   | $V_{GS(th)}$  | -1     | -1.5        | -2           |               |
| Zero gate voltage drain current<br>$V_{DS}=-100\text{V}, V_{GS}=0, T_j=25^\circ\text{C}$<br>$V_{DS}=-100\text{V}, V_{GS}=0, T_j=150^\circ\text{C}$ | $I_{DSS}$     | -<br>- | -0.1<br>-10 | -0.2<br>-100 | $\mu\text{A}$ |
| Gate-source leakage current<br>$V_{GS}=-20\text{V}, V_{DS}=0$  | $I_{GSS}$     | -      | -10         | -100         |               |
| Drain-source on-state resistance<br>$V_{GS}=-4.5\text{V}, I_D=-0.61\text{A}$   | $R_{DS(on)}$  | -      | 1.5         | 2.3          | $\Omega$      |
| Drain-source on-state resistance<br>$V_{GS}=-10\text{V}, I_D=-0.68\text{A}$  | $R_{DS(on)}$  | -      | 1.4         | 1.8          |               |

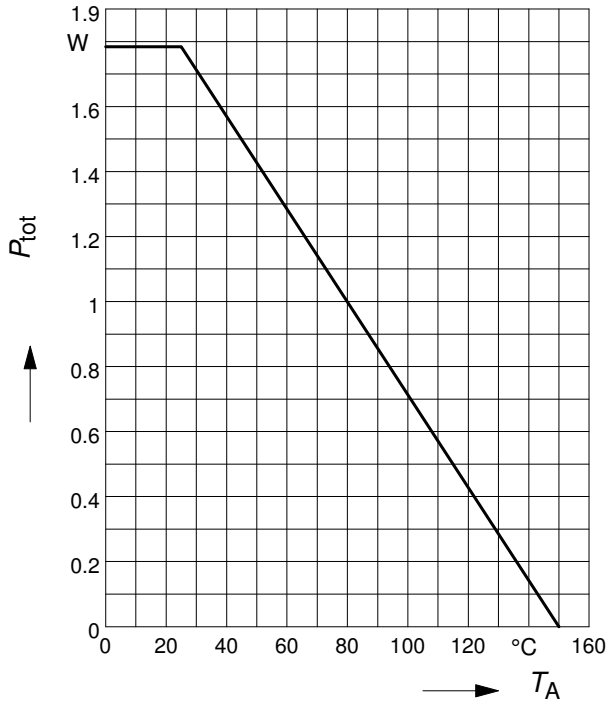
<sup>1)</sup> Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

**Electrical Characteristics**, at  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified

| Parameter                                | Symbol          | Conditions  | Values |       |       | Unit |
|--|-----------------|---|--------|-------|-------|------|
|  |                 |   | min.   | typ.  | max.  |      |
| <b>Dynamic Characteristics</b>           |                 |   |        |       |       |      |
| Transconductance                         | $g_{fs}$        | $ V_{DS}  \geq 2 \cdot  I_D  \cdot R_{DS(on)max}$<br>$I_D = -0.54\text{A}$            | 0.5    | 1     | -     | S    |
| Input capacitance                        | $C_{iss}$       | $V_{GS} = 0, V_{DS} = -25\text{V},$<br>$f = 1\text{MHz}$                              | -      | 117   | 146   | pF   |
| Output capacitance                       | $C_{oss}$       |   | -      | 27.7  | 34.5  |      |
| Reverse transfer capacitance             | $C_{rss}$       |   | -      | 12    | 15    |      |
| Turn-on delay time                       | $t_{d(on)}$     | $V_{DD} = -50\text{V}, V_{GS} = -10\text{V},$<br>$I_D = -0.68\text{A}, R_G = 6\Omega$ | -      | 4.7   | 7     | ns   |
| Rise time                                | $t_r$           |   | -      | 7.5   | 11.2  |      |
| Turn-off delay time                      | $t_{d(off)}$    |   | -      | 67.4  | 101   |      |
| Fall time                                | $t_f$           |   | -      | 25.9  | 38.9  |      |
| <b>Gate Charge Characteristics</b>       |                 |   |        |       |       |      |
| Gate to source charge                    | $Q_{gs}$        | $V_{DD} = -80\text{V}, I_D = -0.68\text{A}$   | -      | -0.2  | -0.3  | nC   |
| Gate to drain charge                     | $Q_{gd}$        |   | -      | -1.87 | -2.8  |      |
| Gate charge total                        | $Q_g$           | $V_{DD} = -80\text{V}, I_D = -0.68\text{A},$<br>$V_{GS} = 0 \text{ to } -10\text{V}$  | -      | -5.1  | -6.4  |      |
| Gate plateau voltage                     | $V_{(plateau)}$ | $V_{DD} = -80\text{V}, I_D = -0.68\text{A}$   | -      | -2.7  | -     | V    |
| <b>Reverse Diode</b>                     |                 |   |        |       |       |      |
| Inverse diode continuous forward current | $I_S$           | $T_A = 25^\circ\text{C}$  | -      | -     | -0.68 | A    |
| Inv. diode direct current, pulsed        | $I_{SM}$        |   | -      | -     | -2.72 |      |
| Inverse diode forward voltage            | $V_{SD}$        | $V_{GS} = 0, I_F = -0.68\text{A}$   | -      | -0.85 | -1.2  | V    |
| Reverse recovery time                    | $t_{rr}$        | $V_R = -50\text{V}, I_F = I_S,$<br>$di_F/dt = 100\text{A}/\mu\text{s}$                | -      | 44.2  | 55.3  | ns   |
| Reverse recovery charge                  | $Q_{rr}$        |   | -      | 56.3  | 70.4  |      |

### 1 Power dissipation

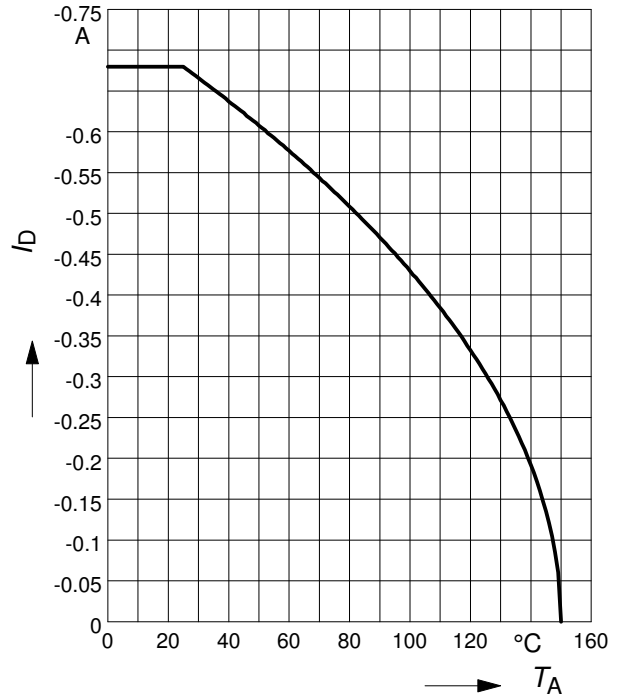
$$P_{\text{tot}} = f(T_A)$$



### 2 Drain current

$$I_D = f(T_A)$$

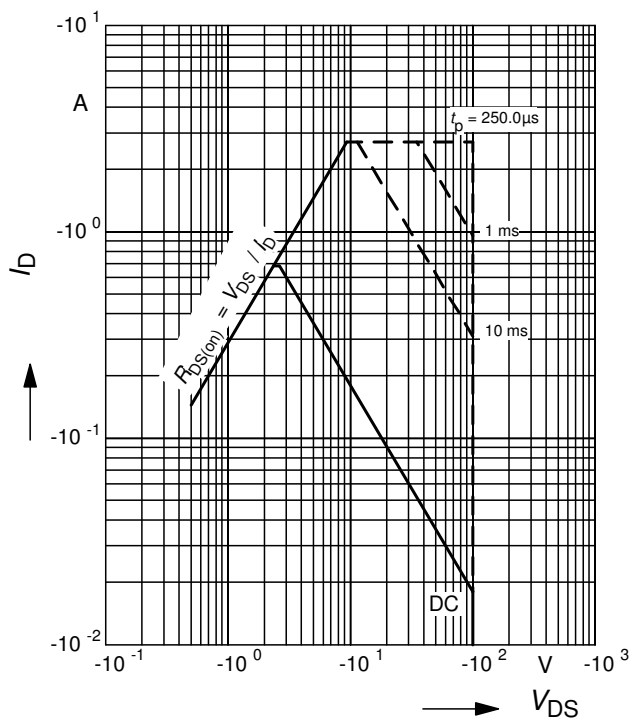
parameter:  $|V_{GS}| \geq 10V$



### 3 Safe operating area

$$I_D = f(V_{DS})$$

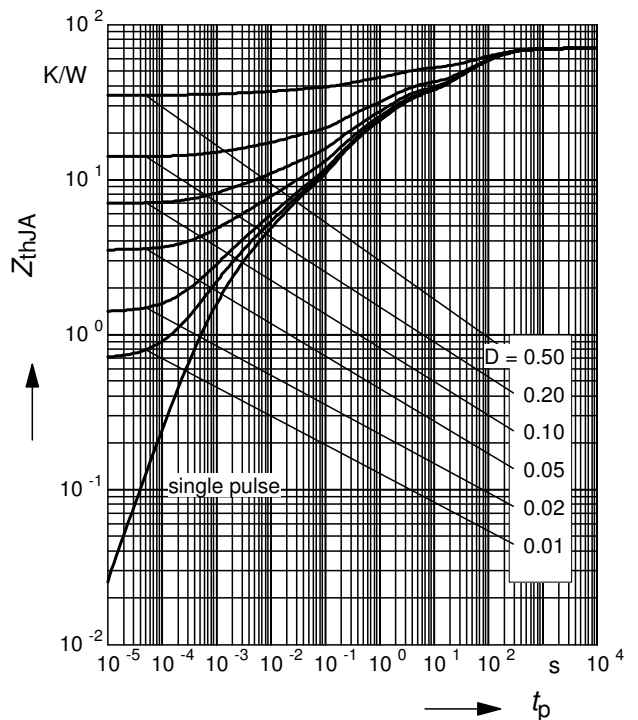
parameter:  $D = 0, T_A = 25^\circ C$



### 4 Transient thermal impedance

$$Z_{thJA} = f(t_p)$$

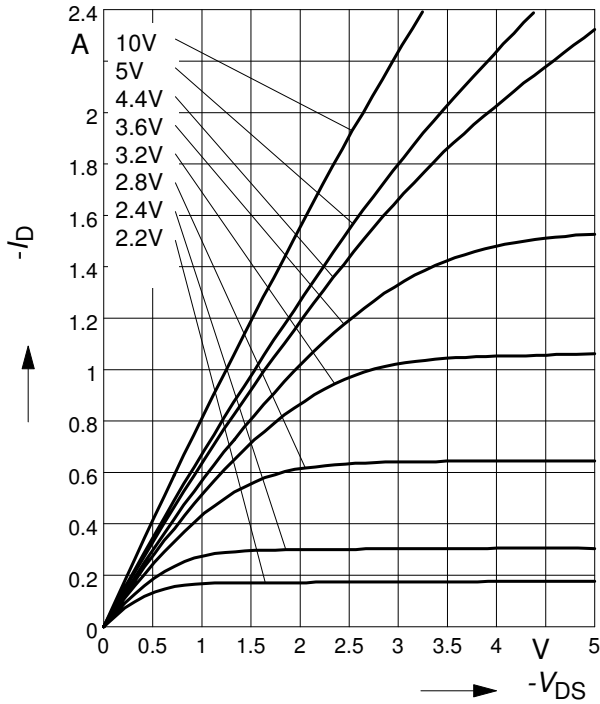
parameter:  $D = t_p/T$



**5 Typ. output characteristic**

$I_D = f(V_{DS})$

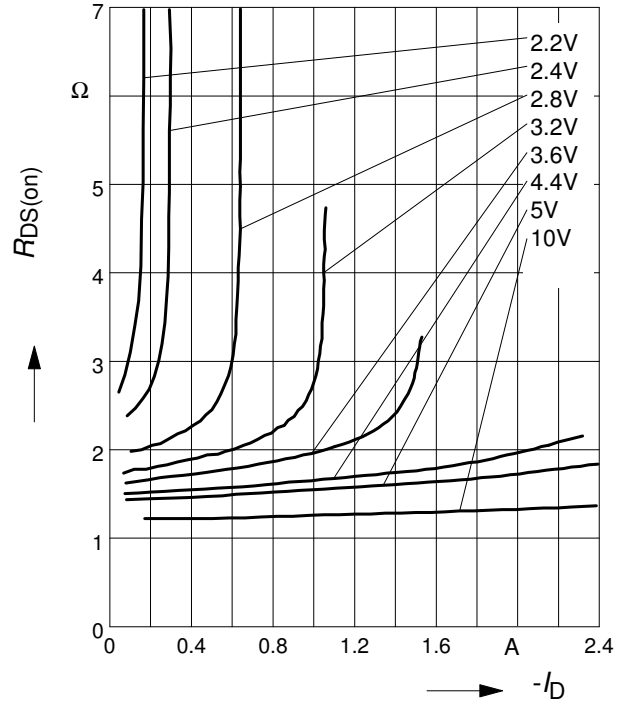
parameter:  $T_j = 25^\circ\text{C}, -V_{GS}$



**6 Typ. drain-source on resistance**

$R_{DS(on)} = f(I_D)$

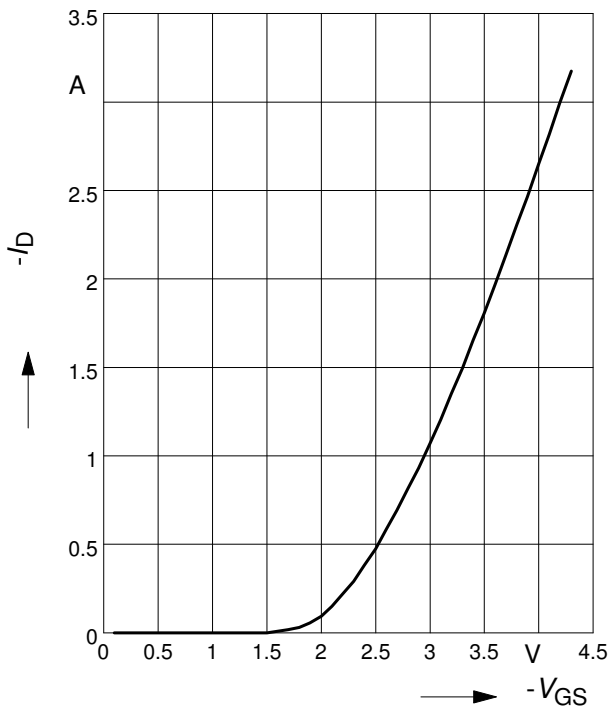
parameter:  $T_j = 25^\circ\text{C}, -V_{GS}$



**7 Typ. transfer characteristics**

$I_D = f(V_{GS}); |V_{DS}| \geq 2 \times |I_D| \times R_{DS(on)max}$

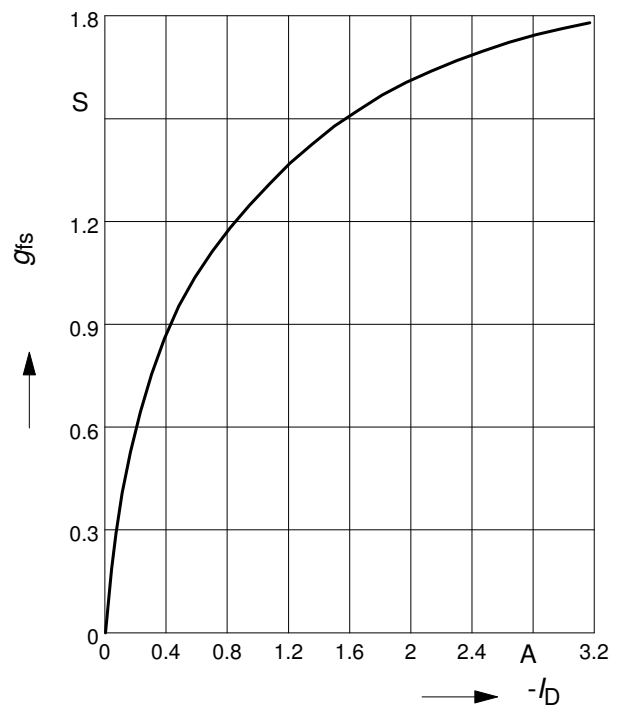
parameter:  $T_j = 25^\circ\text{C}$



**8 Typ. forward transconductance**

$g_{fs} = f(I_D)$

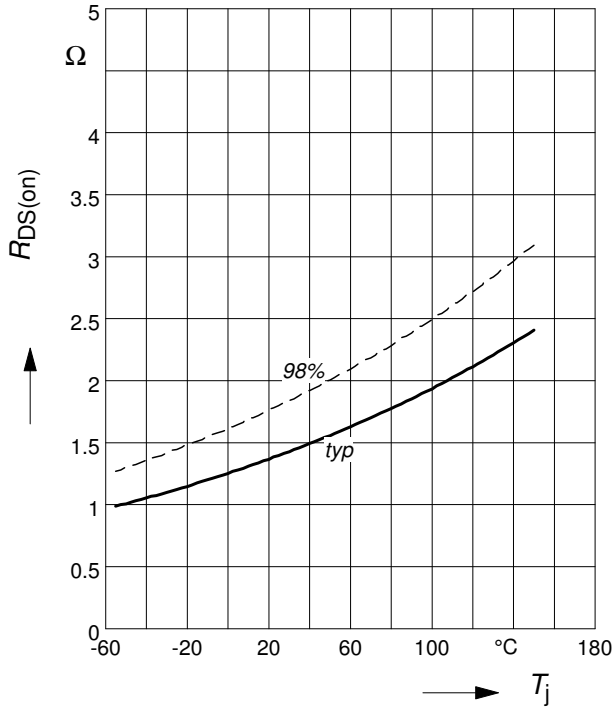
parameter:  $T_j = 25^\circ\text{C}$



**9 Drain-source on-state resistance**

$$R_{DS(on)} = f(T_j)$$

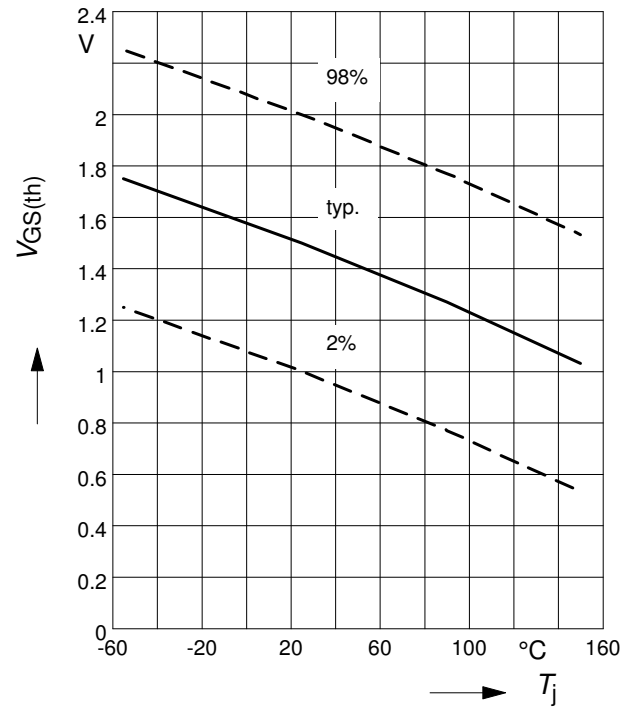
parameter :  $I_D = -0.68 \text{ A}$ ,  $V_{GS} = -10 \text{ V}$



**10 Typ. gate threshold voltage**

$$V_{GS(th)} = f(T_j)$$

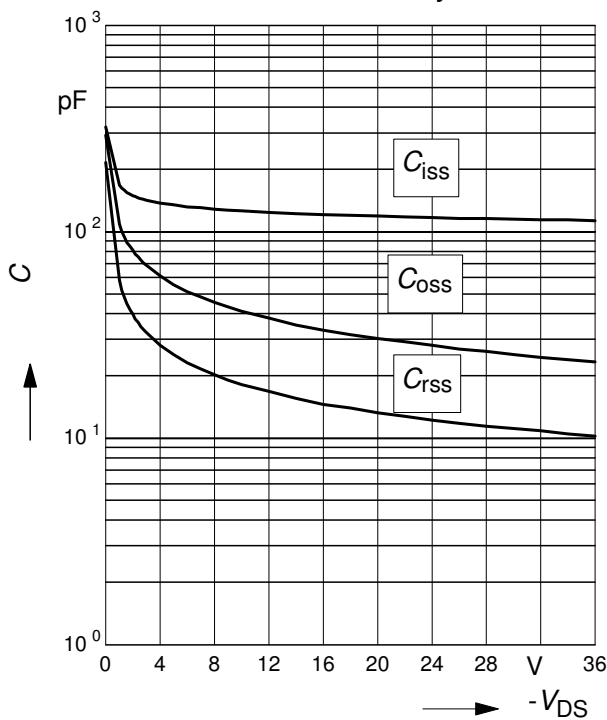
parameter:  $V_{GS} = V_{DS}$



**11 Typ. capacitances**

$$C = f(V_{DS})$$

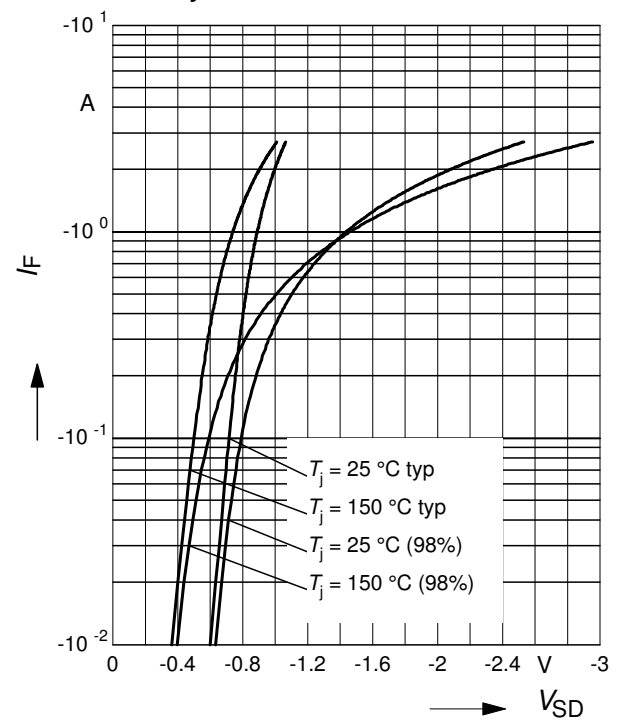
parameter:  $V_{GS}=0$ ,  $f=1 \text{ MHz}$ ,  $T_j = 25 \text{ }^\circ\text{C}$



**12 Forward character. of reverse diode**

$$I_F = f(V_{SD})$$

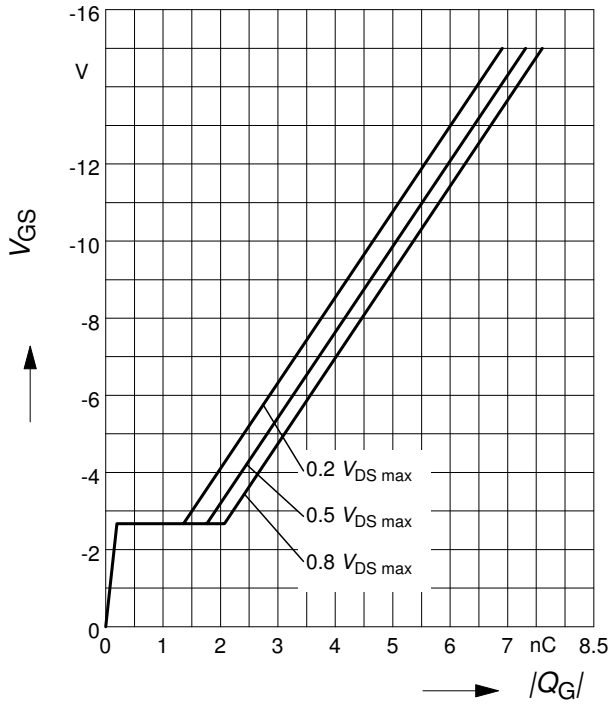
parameter:  $T_j$



**13 Typ. gate charge**

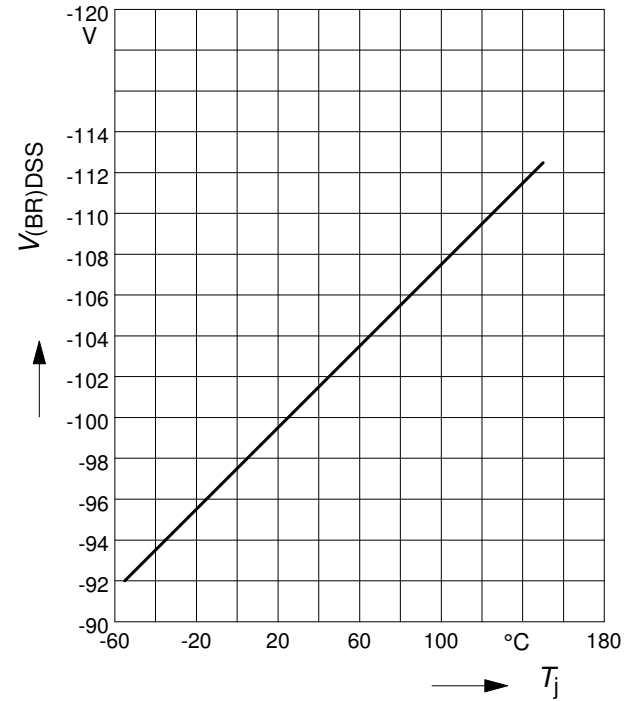
$$V_{GS} = f(Q_{Gate})$$

parameter:  $I_D = -0.68$  A pulsed,  $T_j = 25$  °C

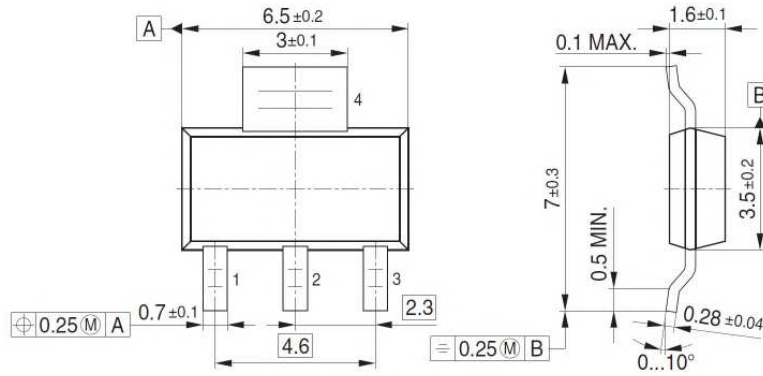


**14 Drain-source breakdown voltage**

$$V_{(BR)DSS} = f(T_j)$$

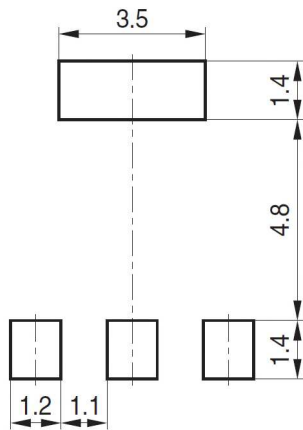


Package Outline SOT-223

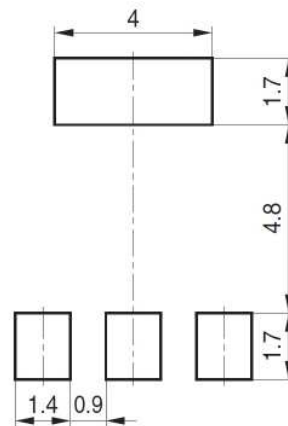


Footprint

Soldering type: Reflow soldering



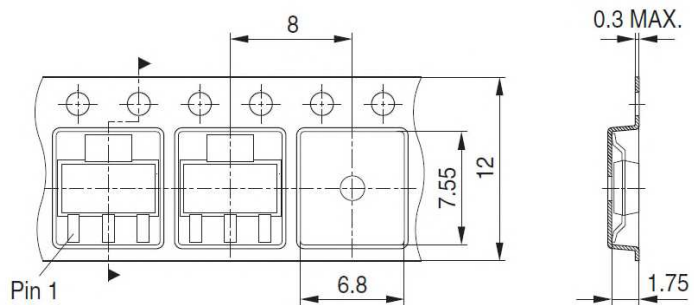
Soldering type: Wave soldering



Tape and Reel

Reel  $\varnothing 180$  mm: 1.000 Pieces/Reel  
 Reels/Box: 1 x 1.000 = 1.000

Reel  $\varnothing 330$  mm: 4.000 Pieces/Reel  
 Reels/Box: 1 x 4.000 = 4.000



Dimensions in mm

# -100V SIPMOS Small Signal Transistor

## BSP316P

### Revision History

BSP316P

**Revision: 2016-06-10, Rev. 2.0**

Previous Revision

| Revision | Date       | Subjects (major changes since last revision) |
|----------|------------|--|
| 2.0      | 2016-06-10 | Release of final version                     |

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