



**THE DATASHEET OF
BZT52H-B3V9,115**





BZT52H series

Voltage regulator diodes

Rev. 4 — 21 January 2019

Product data sheet

1. Product profile

1.1. General description

General-purpose Zener diodes in an SOD123F small and flat lead Surface-Mounted Device (SMD) plastic package.

1.2. Features and benefits

- Total power dissipation: ≤ 830 mW
- Wide working voltage range: nominal 2.4 V to 75 V (E24 range)
- Small plastic package suitable for surface-mounted design
- AEC-Q101 qualified

1.3. Applications

- General regulation functions

1.4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|-------------------------|----------------------|-------|-----|-----|------|
| V_F | forward voltage | $I_F = 10$ mA | [1] - | - | 0.9 | V |
| P_{tot} | total power dissipation | $T_{amb} \leq 25$ °C | [2] - | - | 375 | mW |
| | | | [3] - | - | 830 | mW |

[1] Pulse test: $t_p \leq 300$ μ s; $\delta \leq 0.02$.

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|--------------------|----------------|
| 1 | cathode | | |
| 2 | anode | | |

[1] The marking bar indicates the cathode.

3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------------------------|---------|--|---------|
| | Name | Description | Version |
| BZT52H-B2V4 to BZT52H-C75 [1] | - | plastic surface-mounted package; 2 leads | SOD123F |

[1] The series consists of 74 types with nominal working voltages from 2.4 V to 75 V.

4. Marking

Table 4. Marking codes

| Type number | Marking code | Type number | Marking code | Type number | Marking code | Type number | Marking code |
|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|
| BZT52H-B2V4 | DC | BZT52H-B15 | DX | BZT52H-C2V4 | B3 | BZT52H-C15 | BN |
| BZT52H-B2V7 | DD | BZT52H-B16 | DY | BZT52H-C2V7 | B4 | BZT52H-C16 | BP |
| BZT52H-B3V0 | DE | BZT52H-B18 | DZ | BZT52H-C3V0 | B5 | BZT52H-C18 | BQ |
| BZT52H-B3V3 | DF | BZT52H-B20 | E1 | BZT52H-C3V3 | B6 | BZT52H-C20 | BR |
| BZT52H-B3V6 | DG | BZT52H-B22 | E2 | BZT52H-C3V6 | B7 | BZT52H-C22 | BS |
| BZT52H-B3V9 | DH | BZT52H-B24 | E3 | BZT52H-C3V9 | B8 | BZT52H-C24 | BT |
| BZT52H-B4V3 | DJ | BZT52H-B27 | E4 | BZT52H-C4V3 | B9 | BZT52H-C27 | BU |
| BZT52H-B4V7 | DK | BZT52H-B30 | E5 | BZT52H-C4V7 | BA | BZT52H-C30 | BV |
| BZT52H-B5V1 | DL | BZT52H-B33 | E6 | BZT52H-C5V1 | BB | BZT52H-C33 | BW |
| BZT52H-B5V6 | DM | BZT52H-B36 | E7 | BZT52H-C5V6 | BC | BZT52H-C36 | BX |
| BZT52H-B6V2 | DN | BZT52H-B39 | E8 | BZT52H-C6V2 | BD | BZT52H-C39 | BY |
| BZT52H-B6V8 | DP | BZT52H-B43 | E9 | BZT52H-C6V8 | BE | BZT52H-C43 | BZ |
| BZT52H-B7V5 | DQ | BZT52H-B47 | EA | BZT52H-C7V5 | BF | BZT52H-C47 | C1 |
| BZT52H-B8V2 | DR | BZT52H-B51 | EB | BZT52H-C8V2 | BG | BZT52H-C51 | C2 |
| BZT52H-B9V1 | DS | BZT52H-B56 | EC | BZT52H-C9V1 | BH | BZT52H-C56 | C3 |
| BZT52H-B10 | DT | BZT52H-B62 | ED | BZT52H-C10 | BJ | BZT52H-C62 | C4 |
| BZT52H-B11 | DU | BZT52H-B68 | EE | BZT52H-C11 | BK | BZT52H-C68 | C5 |
| BZT52H-B12 | DV | BZT52H-B75 | EF | BZT52H-C12 | BL | BZT52H-C75 | C6 |
| BZT52H-B13 | DW | - | - | BZT52H-C13 | BM | - | - |

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---|-----------------------------|-------|----------------------|------|
| I_F | forward current | | - | 250 | mA |
| I_{ZSM} | non-repetitive peak reverse current | | - | see Table 8,9 and 10 | |
| P_{ZSM} | non-repetitive peak reverse power dissipation | | [1] - | 40 | W |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [2] - | 375 | mW |
| | | | [3] - | 830 | mW |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -65 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] $t_p = 100\ \mu\text{s}$; square wave; $T_j = 25\text{ °C}$ prior to surge.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[3] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .

6. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|----------------|--|-------------|-------|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] - | - | 330 | K/W |
| | | | [2] - | - | 150 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [3] - | - | 70 | K/W |

[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm^2 .

[3] Soldering point of cathode tab.

7. Characteristics

Table 7. Characteristics

$T_j = 25\text{ °C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|--------|-----------------|----------------------|-------|-----|-----|------|
| V_F | forward voltage | $I_F = 10\text{ mA}$ | [1] - | - | 0.9 | V |

[1] Pulse test: $t_p \leq 300\text{ }\mu\text{s}$; $\delta \leq 0.02$.

Table 8. Characteristics per type; BZT52H-B2V4 to BZT52H-C24

$T_j = 25\text{ °C}$ unless otherwise specified.

| BZT52H -xxx | Sel | Working voltage V_Z (V); $I_Z = 5\text{ mA}$ | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μA) | | Temperature coefficient S_Z (mV/K); $I_Z = 5\text{ mA}$ | | Diode capacitance C_d (pF) [1] | Non-repetitive peak reverse current I_{ZSM} (A) [2] |
|----------------|-----|--|------|---|---------------------|--|-----------|--|-----|--|--|
| | | Min | Max | $I_Z = 1\text{ mA}$ | $I_Z = 5\text{ mA}$ | Max | V_R (V) | Min | Max | Max | Max |
| 2V4 | B | 2.35 | 2.45 | 400 | 85 | 50 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 2.2 | 2.6 | | | | | | | | |
| 2V7 | B | 2.65 | 2.75 | 500 | 83 | 20 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 2.5 | 2.9 | | | | | | | | |
| 3V0 | B | 2.94 | 3.06 | 500 | 95 | 10 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 2.8 | 3.2 | | | | | | | | |
| 3V3 | B | 3.23 | 3.37 | 500 | 95 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 3.1 | 3.5 | | | | | | | | |
| 3V6 | B | 3.53 | 3.67 | 500 | 95 | 5 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 3.4 | 3.8 | | | | | | | | |
| 3V9 | B | 3.82 | 3.98 | 500 | 95 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 3.7 | 4.1 | | | | | | | | |
| 4V3 | B | 4.21 | 4.39 | 500 | 95 | 3 | 1 | -3.5 | 0.0 | 450 | 6.0 |
| | C | 4.0 | 4.6 | | | | | | | | |
| 4V7 | B | 4.61 | 4.79 | 500 | 78 | 3 | 2 | -3.5 | 0.2 | 300 | 6.0 |
| | C | 4.4 | 5.0 | | | | | | | | |
| 5V1 | B | 5.0 | 5.2 | 480 | 60 | 2 | 2 | -2.7 | 1.2 | 300 | 6.0 |
| | C | 4.8 | 5.4 | | | | | | | | |
| 5V6 | B | 5.49 | 5.71 | 400 | 40 | 1 | 2 | -2.0 | 2.5 | 300 | 6.0 |
| | C | 5.2 | 6.0 | | | | | | | | |
| 6V2 | B | 6.08 | 6.32 | 150 | 10 | 3 | 4 | 0.4 | 3.7 | 200 | 6.0 |
| | C | 5.8 | 6.6 | | | | | | | | |
| 6V8 | B | 6.66 | 6.94 | 80 | 8 | 2 | 4 | 1.2 | 4.5 | 200 | 6.0 |
| | C | 6.4 | 7.2 | | | | | | | | |
| 7V5 | B | 7.35 | 7.65 | 80 | 10 | 1 | 5 | 2.5 | 5.3 | 150 | 4.0 |
| | C | 7.0 | 7.9 | | | | | | | | |
| 8V2 | B | 8.04 | 8.36 | 80 | 10 | 0.7 | 5 | 3.2 | 6.2 | 150 | 4.0 |
| | C | 7.7 | 8.7 | | | | | | | | |
| 9V1 | B | 8.92 | 9.28 | 100 | 10 | 0.5 | 6 | 3.8 | 7.0 | 150 | 3.0 |
| | C | 8.5 | 9.6 | | | | | | | | |

| BZT52H -xxx | Sel | Working voltage V_Z (V); $I_Z = 5$ mA | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μ A) | | Temperature coefficient S_Z (mV/K); $I_Z = 5$ mA | | Diode capacitance C_d (pF) [1] | Non-repetitive peak reverse current I_{ZSM} (A) [2] |
|----------------|-----|---|------|---|--------------|-------------------------------------|-----------|---|------|--|--|
| | | Min | Max | $I_Z = 1$ mA | $I_Z = 5$ mA | Max | V_R (V) | Min | Max | Max | Max |
| 10 | B | 9.8 | 10.2 | 70 | 10 | 0.2 | 7 | 4.5 | 8.0 | 90 | 3.0 |
| | C | 9.4 | 10.6 | | | | | | | | |
| 11 | B | 10.8 | 11.2 | 70 | 10 | 0.1 | 8 | 5.4 | 9.0 | 85 | 2.5 |
| | C | 10.4 | 11.6 | | | | | | | | |
| 12 | B | 11.8 | 12.2 | 90 | 10 | 0.1 | 8 | 6.0 | 10.0 | 85 | 2.5 |
| | C | 11.4 | 12.7 | | | | | | | | |
| 13 | B | 12.7 | 13.3 | 110 | 10 | 0.1 | 8 | 7.0 | 11.0 | 80 | 2.5 |
| | C | 12.4 | 14.1 | | | | | | | | |
| 15 | B | 14.7 | 15.3 | 110 | 15 | 0.05 | 10.5 | 9.2 | 13.0 | 75 | 2.0 |
| | C | 13.8 | 15.6 | | | | | | | | |
| 16 | B | 15.7 | 16.3 | 170 | 20 | 0.05 | 11.2 | 10.4 | 14.0 | 75 | 1.5 |
| | C | 15.3 | 17.1 | | | | | | | | |
| 18 | B | 17.6 | 18.4 | 170 | 20 | 0.05 | 12.6 | 12.4 | 16.0 | 70 | 1.5 |
| | C | 16.8 | 19.1 | | | | | | | | |
| 20 | B | 19.6 | 20.4 | 220 | 20 | 0.05 | 14 | 14.4 | 18.0 | 60 | 1.5 |
| | C | 18.8 | 21.2 | | | | | | | | |
| 22 | B | 21.6 | 22.4 | 220 | 25 | 0.05 | 15.4 | 16.4 | 20.0 | 60 | 1.25 |
| | C | 20.8 | 23.3 | | | | | | | | |
| 24 | B | 23.5 | 24.5 | 220 | 30 | 0.05 | 16.8 | 18.4 | 22.0 | 55 | 1.25 |
| | C | 22.8 | 25.6 | | | | | | | | |

[1] $f = 1$ MHz; $V_R = 0$ V.

[2] $t_p = 100$ μ s; $T_{amb} = 25$ °C.

Table 9. Characteristics per type; BZT52H-B27 to BZT52H-C51

$T_j = 25$ °C unless otherwise specified.

| BZT52H -xxx | Sel | Working voltage V_Z (V); $I_Z = 2$ mA | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μ A) | | Temperature coefficient S_Z (mV/K); $I_Z = 5$ mA | | Diode capacitance C_d (pF) [1] | Non-repetitive peak reverse current I_{ZSM} (A) [2] |
|----------------|-----|---|------|---|--------------|-------------------------------------|-----------|---|------|--|--|
| | | Min | Max | $I_Z = 1$ mA | $I_Z = 5$ mA | Max | V_R (V) | Min | Max | Max | Max |
| 27 | B | 26.5 | 27.5 | 250 | 40 | 0.05 | 18.9 | 21.4 | 25.3 | 50 | 1.0 |
| | C | 25.1 | 28.9 | | | | | | | | |
| 30 | B | 29.4 | 30.6 | 250 | 40 | 0.05 | 21 | 24.4 | 29.4 | 50 | 1.0 |
| | C | 28.0 | 32.0 | | | | | | | | |
| 33 | B | 32.3 | 33.7 | 250 | 40 | 0.05 | 23.1 | 27.4 | 33.4 | 45 | 0.9 |
| | C | 31.0 | 35.0 | | | | | | | | |
| 36 | B | 35.3 | 36.7 | 250 | 60 | 0.05 | 25.2 | 30.4 | 37.4 | 45 | 0.8 |
| | C | 34.0 | 38.0 | | | | | | | | |
| 39 | B | 38.2 | 39.8 | 300 | 75 | 0.05 | 27.3 | 33.4 | 41.2 | 45 | 0.7 |
| | C | 37.0 | 41.0 | | | | | | | | |
| 43 | B | 42.1 | 43.9 | 325 | 80 | 0.05 | 30.1 | 37.6 | 46.6 | 40 | 0.6 |
| | C | 40.0 | 46.0 | | | | | | | | |

| BZT52H Sel -xxx | | Working voltage V_Z (V); $I_Z = 2$ mA | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μ A) | | Temperature coefficient S_Z (mV/K); $I_Z = 5$ mA | | Diode capacitance C_d (pF) [1] | Non-repetitive peak reverse current I_{ZSM} (A) [2] |
|--------------------|---|---|------|--|--------------|----------------------------------|-----------|--|------|-------------------------------------|--|
| | | Min | Max | $I_Z = 1$ mA | $I_Z = 5$ mA | Max | V_R (V) | Min | Max | Max | Max |
| 47 | B | 46.1 | 47.9 | 325 | 90 | 0.05 | 32.9 | 42.0 | 51.8 | 40 | 0.5 |
| | C | 44.0 | 50.0 | | | | | | | | |
| 51 | B | 50.0 | 52.0 | 350 | 100 | 0.05 | 35.7 | 46.6 | 57.2 | 40 | 0.4 |
| | C | 48.0 | 54.0 | | | | | | | | |

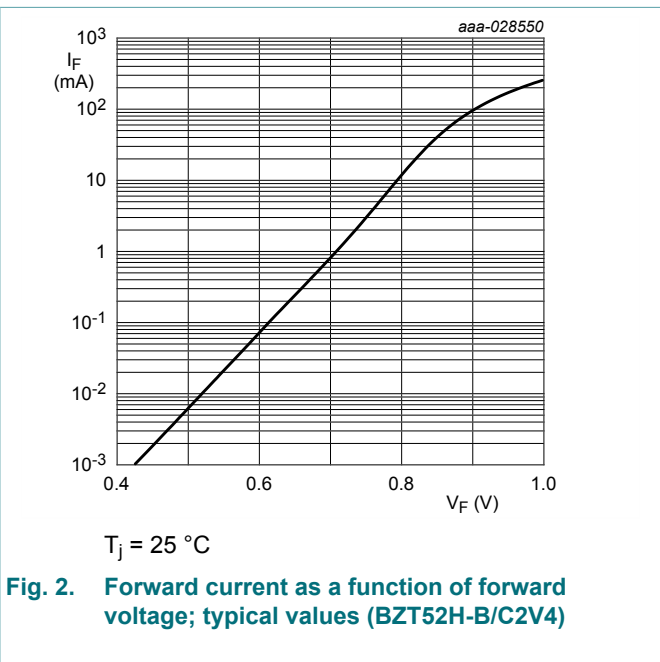
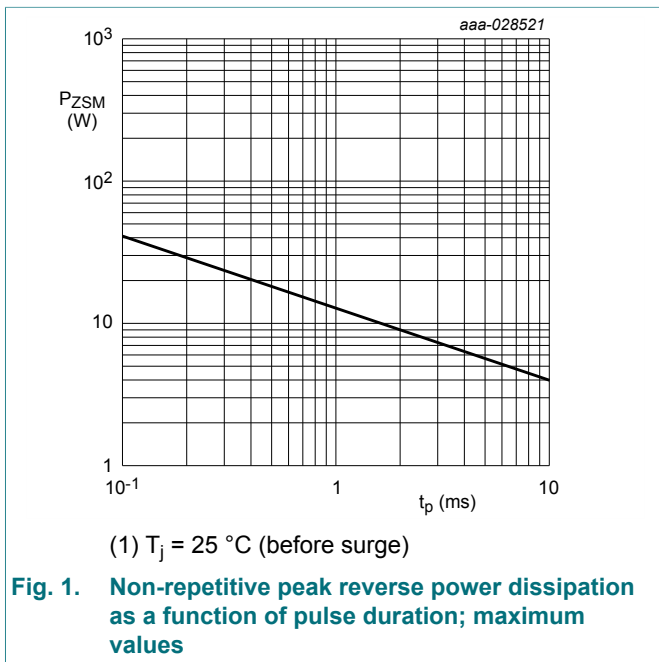
[1] $f = 1$ MHz; $V_R = 0$ V.
 [2] $t_p = 100$ μ s; $T_{amb} = 25$ $^{\circ}$ C.

Table 10. Characteristics per type; BZT52H-B56 to BZT52H-C75

$T_j = 25$ $^{\circ}$ C unless otherwise specified.

| BZT52H Sel -xxx | | Working voltage V_Z (V); $I_Z = 2$ mA | | Maximum differential resistance r_{dif} (Ω) | | Reverse current I_R (μ A) | | Temperature coefficient S_Z (mV/K); $I_Z = 5$ mA | | Diode capacitance C_d (pF) [1] | Non-repetitive peak reverse current I_{ZSM} (A) [2] |
|--------------------|---|---|------|--|--------------|----------------------------------|-----------|--|------|-------------------------------------|--|
| | | Min | Max | $I_Z = 0.5$ mA | $I_Z = 2$ mA | Max | V_R (V) | Min | Max | Max | Max |
| 56 | B | 54.9 | 57.1 | 375 | 120 | 0.05 | 39.2 | 52.2 | 63.8 | 40 | 0.3 |
| | C | 52.0 | 60.0 | | | | | | | | |
| 62 | B | 60.8 | 63.2 | 400 | 140 | 0.05 | 43.4 | 58.8 | 71.6 | 35 | 0.3 |
| | C | 58.0 | 66.0 | | | | | | | | |
| 68 | B | 66.6 | 69.4 | 400 | 160 | 0.05 | 47.6 | 65.6 | 79.8 | 35 | 0.25 |
| | C | 64.0 | 72.0 | | | | | | | | |
| 75 | B | 73.5 | 76.5 | 400 | 175 | 0.05 | 52.5 | 73.4 | 88.6 | 35 | 0.20 |
| | C | 70.0 | 79.0 | | | | | | | | |

[1] $f = 1$ MHz; $V_R = 0$ V.
 [2] $t_p = 100$ μ s; $T_{amb} = 25$ $^{\circ}$ C.





$T_j = 25\text{ °C}$

Fig. 3. Forward current as a function of forward voltage; typical values (BZT52H-B/C6V8)



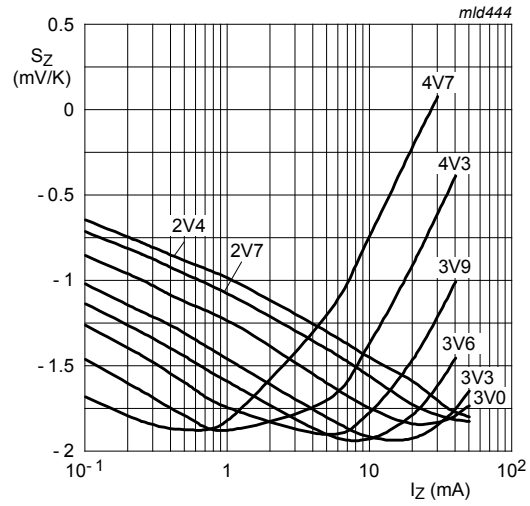
$T_j = 25\text{ °C}$

Fig. 4. Forward current as a function of forward voltage; typical values (BZT52H-B/C7V5)



$T_j = 25\text{ °C}$

Fig. 5. Forward current as a function of forward voltage; typical values (BZT52H-B/C75)



$T_j = 25\text{ °C to }150\text{ °C}$

Fig. 6. Temperature coefficient as a function of working current; typical values (BZT52H-B/C2V4 to B/C4V7)



Fig. 7. Temperature coefficient as a function of working current; typical values (BZT52H-B/C5V1 to B/C15)



Fig. 8. Reverse current as a function of reverse voltage; typical values (BZT52H-B/C2V4 to BZT52H-B/C6V8)



Fig. 9. Reverse current as a function of reverse voltage; typical values (BZT52H-B/C7V5 to BZT52H-B/C24)



Fig. 10. Reverse current as a function of reverse voltage; typical values (BZT52H-B/C27 to BZT52H-B/C75)

8. Test information

8.1. Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

9. Package outline



Fig. 11. Package outline SOD123F

10. Soldering



11. Revision history

Table 11. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|----------------|---|--------------------|---------------|----------------|
| BZT52H_SER v.4 | 20190121 | Product data sheet | - | BZT52H_SER v.3 |
| Modifications: | <ul style="list-style-type: none"> The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia. Legal texts have been adapted to the new company name where appropriate. Characteristics: figures updated | | | |
| BZT52H_SER v.3 | 20091115 | Product data sheet | - | BZT52H_SER v.2 |
| BZT52H_SER v.2 | 20091115 | Product data sheet | - | BZT52H_SER v.1 |
| BZT52H_SER v.1 | 20051222 | Product data sheet | - | - |

12. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
- [3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the internet at <https://www.nexperia.com>.

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