



# BAL99-Q

## High-speed switching diode

26 May 2025

Product data sheet

### 1. General description

High-speed switching diode fabricated in planar technology, and encapsulated in the small SOT23 plastic SMD package.

### 2. Features and benefits

- Small plastic SMD package
- High switching speed: max. 4 ns
- Continuous reverse voltage: max. 70 V
- Repetitive peak reverse voltage: max. 70 V
- Repetitive peak forward current: max. 500 mA
- Qualified according to AEC-Q101 and recommended for use in automotive applications

### 3. Applications

- High-speed switching in e.g. surface mounted circuits.

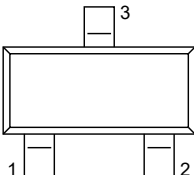
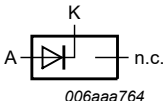
### 4. Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                       | Conditions                                    | Min | Typ | Max | Unit          |
|-----------|---------------------------------|---|-----|-----|-----|---------------|
| $V_{RRM}$ | repetitive peak reverse voltage |   | -   | -   | 70  | V             |
| $V_R$     | reverse voltage                 |   | -   | -   | 70  | V             |
| $V_F$     | forward voltage                 | $I_F = 1 \text{ mA}; T_j = 25^\circ\text{C}$  | -   | -   | 715 | mV            |
|           |                                 | $I_F = 10 \text{ mA}; T_j = 25^\circ\text{C}$ | -   | -   | 855 | mV            |
| $I_R$     | reverse current                 | $V_R = 25 \text{ V}; T_j = 25^\circ\text{C}$  | -   | -   | 30  | nA            |
|           |                                 | $V_R = 70 \text{ V}; T_j = 25^\circ\text{C}$  | -   | -   | 1   | $\mu\text{A}$ |

### 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description   | Simplified outline   | Graphic symbol   |
|-----|--------|---------------|--|--|
| 1   | n.c.   | not connected | <br>SOT23 | <br>006aaa764 |
| 2   | K      | cathode       |  |  |
| 3   | A      | anode         |  |  |

6. Ordering information

Table 3. Ordering information

| Type number | Package |  |         |
|-------------|---------|--|---------|
|             | Name    | Description  | Version |
| BAL99-Q     | SOT23   | plastic, surface-mounted package; 3 terminals; 1.9 mm pitch; 2.9 mm x 1.3 mm x 1 mm body | SOT23   |

7. Marking

Table 4. Marking codes

| Type number | Marking code[1] |
|-------------|-----------------|
| BAL99-Q     | JF%             |

[1] % = placeholder for manufacturing site code

8. Limiting values

Table 5. Limiting values

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

| Symbol           | Parameter                           | Conditions  |     | Min | Max | Unit |
|------------------|-------------------------------------|---|-----|-----|-----|------|
| V <sub>RRM</sub> | repetitive peak reverse voltage     |   |     | -   | 70  | V    |
| V <sub>R</sub>   | reverse voltage                     |   |     | -   | 70  | V    |
| I <sub>F</sub>   | forward current                     |   | [1] | -   | 215 | mA   |
| I <sub>FSM</sub> | non-repetitive peak forward current | t <sub>p</sub> = 1 μs; square wave; T <sub>j(init)</sub> = 25 °C    |     | -   | 4   | A    |
|                  |                                     | t <sub>p</sub> = 1 ms; square wave; T <sub>j(init)</sub> = 25 °C    |     | -   | 1   | A    |
|                  |                                     | t <sub>p</sub> = 1000 ms; square wave; T <sub>j(init)</sub> = 25 °C |     | -   | 0.5 | A    |
| I <sub>FRM</sub> | repetitive peak forward current     |   |     | -   | 500 | mA   |
| P <sub>tot</sub> | total power dissipation             | T <sub>amb</sub> = 25 °C  | [1] | -   | 250 | mW   |
| T <sub>j</sub>   | junction temperature                |   |     | -   | 150 | °C   |
| T <sub>stg</sub> | storage temperature                 |   |     | -65 | 150 | °C   |

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

9. Thermal characteristics

Table 6. Thermal characteristics

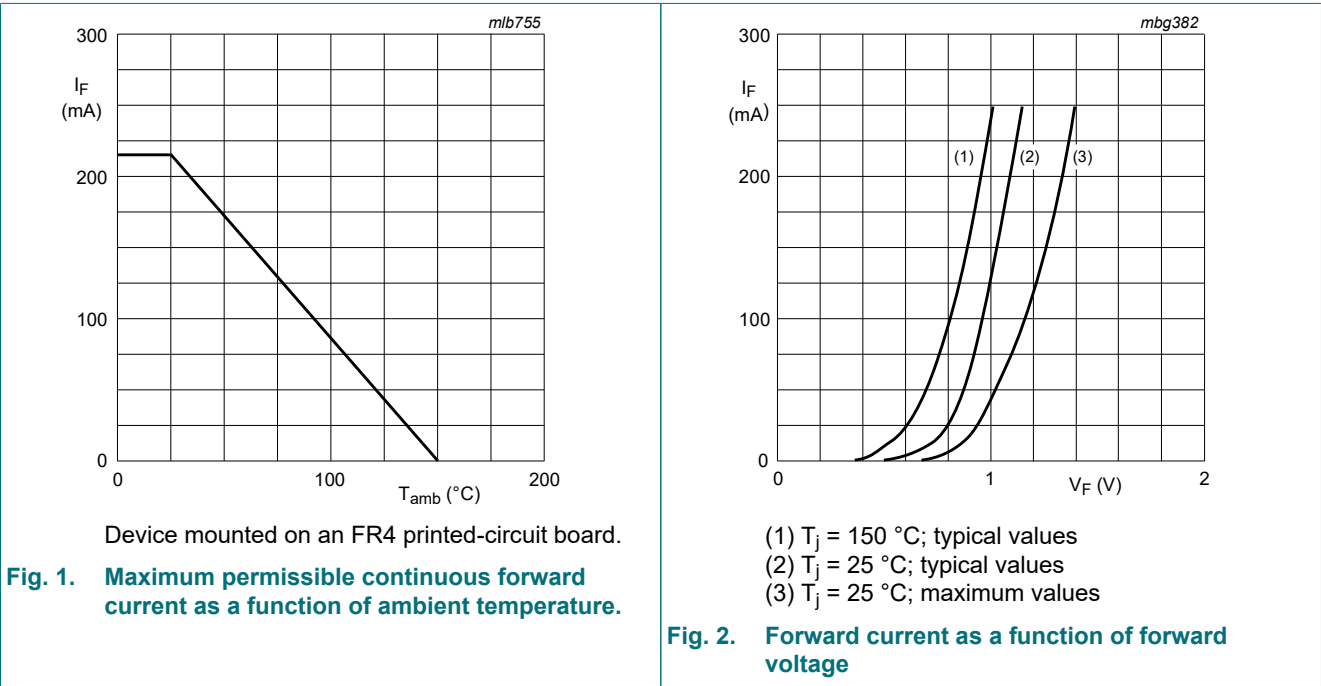
| Symbol         | Parameter  | Conditions  |     | Min | Typ | Max | Unit |
|----------------|--|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$  | thermal resistance from junction to ambient      | in free air | [1] | -   | -   | 500 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             |     | -   | -   | 360 | K/W  |

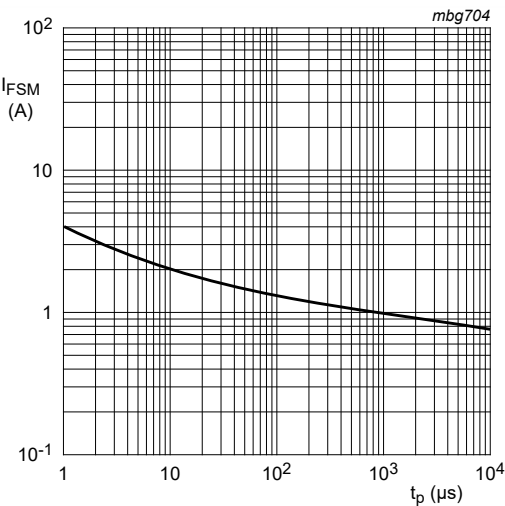
[1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.

10. Characteristics

Table 7. Characteristics

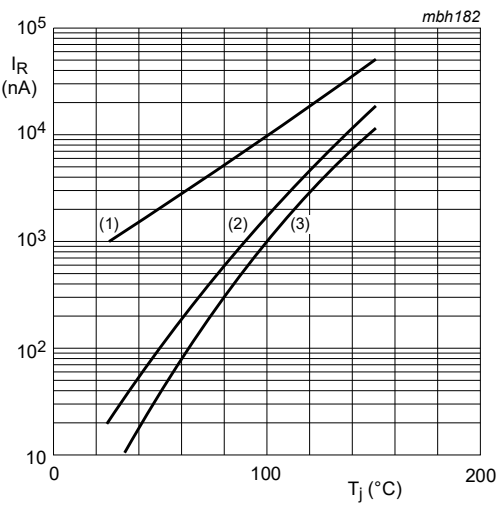
| Symbol    | Parameter                     | Conditions  |  | Min | Typ | Max  | Unit          |
|-----------|-------------------------------|---|--|-----|-----|------|---------------|
| $V_F$     | forward voltage               | $I_F = 1\text{ mA}; T_j = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | 715  | mV            |
|           |                               | $I_F = 10\text{ mA}; T_j = 25\text{ }^{\circ}\text{C}$  |  | -   | -   | 855  | mV            |
|           |                               | $I_F = 50\text{ mA}; T_j = 25\text{ }^{\circ}\text{C}$  |  | -   | -   | 1    | V             |
|           |                               | $I_F = 150\text{ mA}; T_j = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | 1.25 | V             |
| $I_R$     | reverse current               | $V_R = 25\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | 30   | nA            |
|           |                               | $V_R = 70\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$   |  | -   | -   | 1    | $\mu\text{A}$ |
|           |                               | $V_R = 25\text{ V}; T_j = 150\text{ }^{\circ}\text{C}$  |  | -   | -   | 30   | $\mu\text{A}$ |
|           |                               | $V_R = 70\text{ V}; T_j = 150\text{ }^{\circ}\text{C}$  |  | -   | -   | 50   | $\mu\text{A}$ |
| $C_d$     | diode capacitance             | $V_R = 0\text{ V}; f = 1\text{ MHz}; T_j = 25\text{ }^{\circ}\text{C}$  |  | -   | -   | 1.5  | pF            |
| $t_{rr}$  | reverse recovery time         | $I_F = 10\text{ mA}; I_R = 10\text{ mA}; R_L = 100\text{ }\Omega;$<br>$I_{R(meas)} = 1\text{ mA}; T_j = 25\text{ }^{\circ}\text{C}$ |  | -   | -   | 4    | ns            |
| $V_{FRM}$ | peak forward recovery voltage | $I_F = 10\text{ mA}; t_r = 20\text{ ns}; T_j = 25\text{ }^{\circ}\text{C}$  |  | -   | -   | 1.75 | V             |





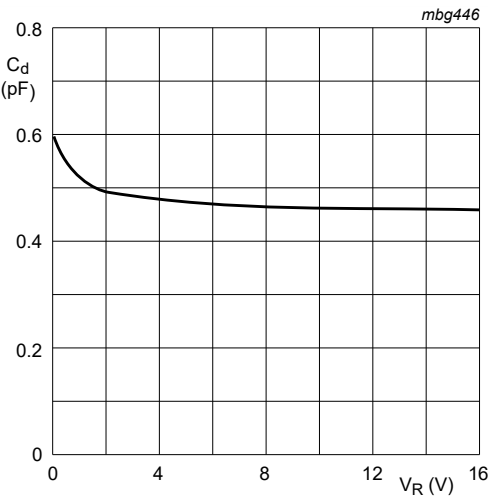
Based on square wave currents;  $T_j = 25\text{ }^{\circ}\text{C}$  prior to surge.

Fig. 3. Maximum permissible non-repetitive peak forward current as a function of pulse duration.



(1)  $V_R = 70\text{ V}$ ; maximum values  
(2)  $V_R = 70\text{ V}$ ; typical values.  
(3)  $V_R = 25\text{ V}$ ; typical values.

Fig. 4. Reverse current as a function of junction temperature.



$f = 1\text{ MHz}$ ;  $T_j = 25\text{ }^{\circ}\text{C}$

Fig. 5. Diode capacitance as a function of reverse voltage; typical values

11. Test information

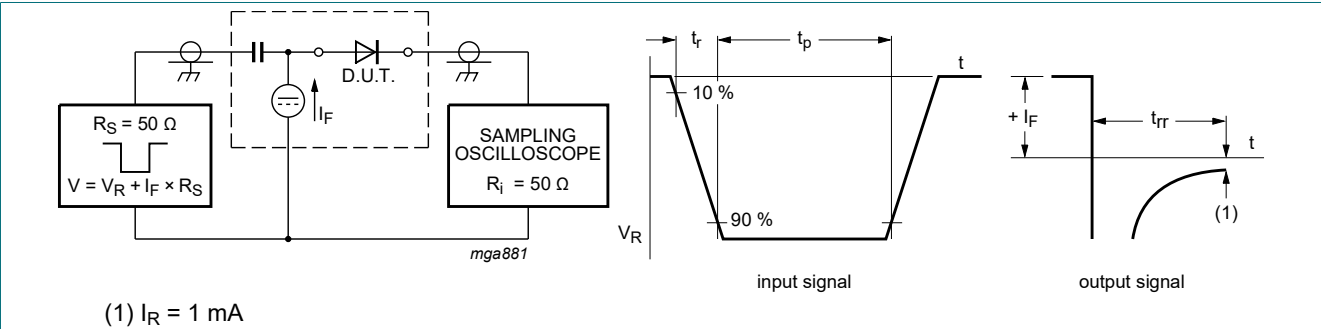


Fig. 6. Reverse recovery time test circuit and waveforms

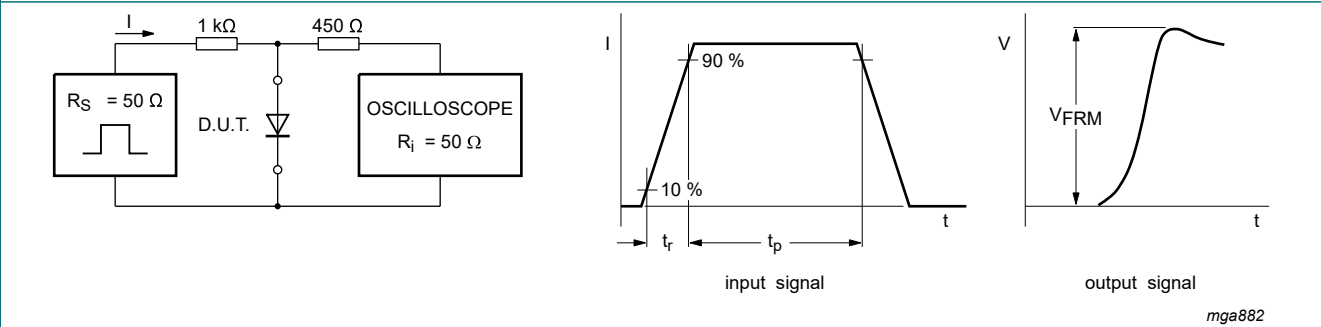


Fig. 7. Forward recovery voltage test circuit and waveforms

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.

12. Package outline

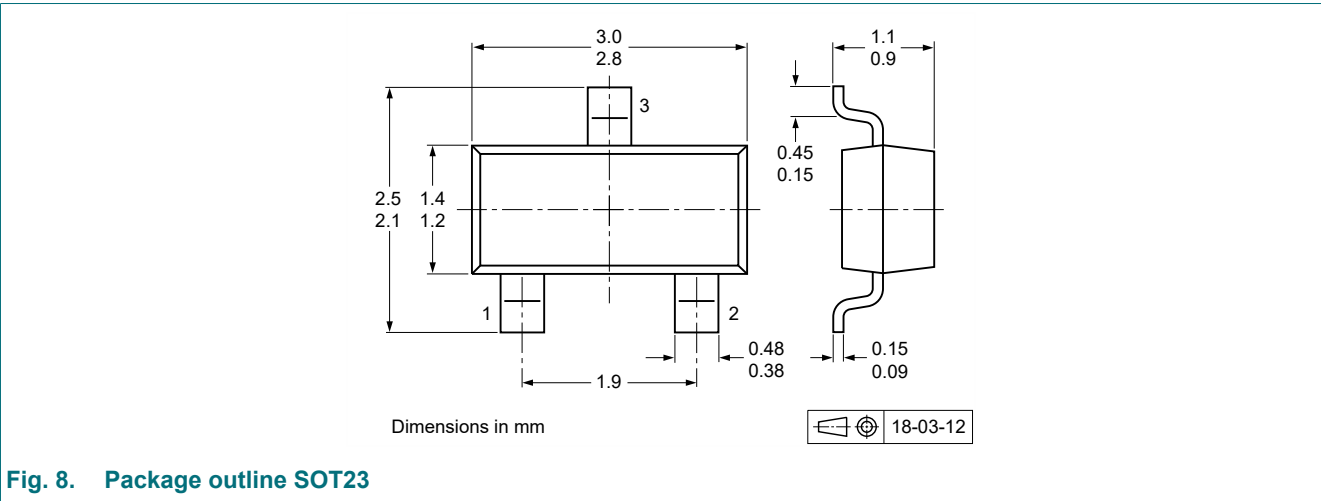
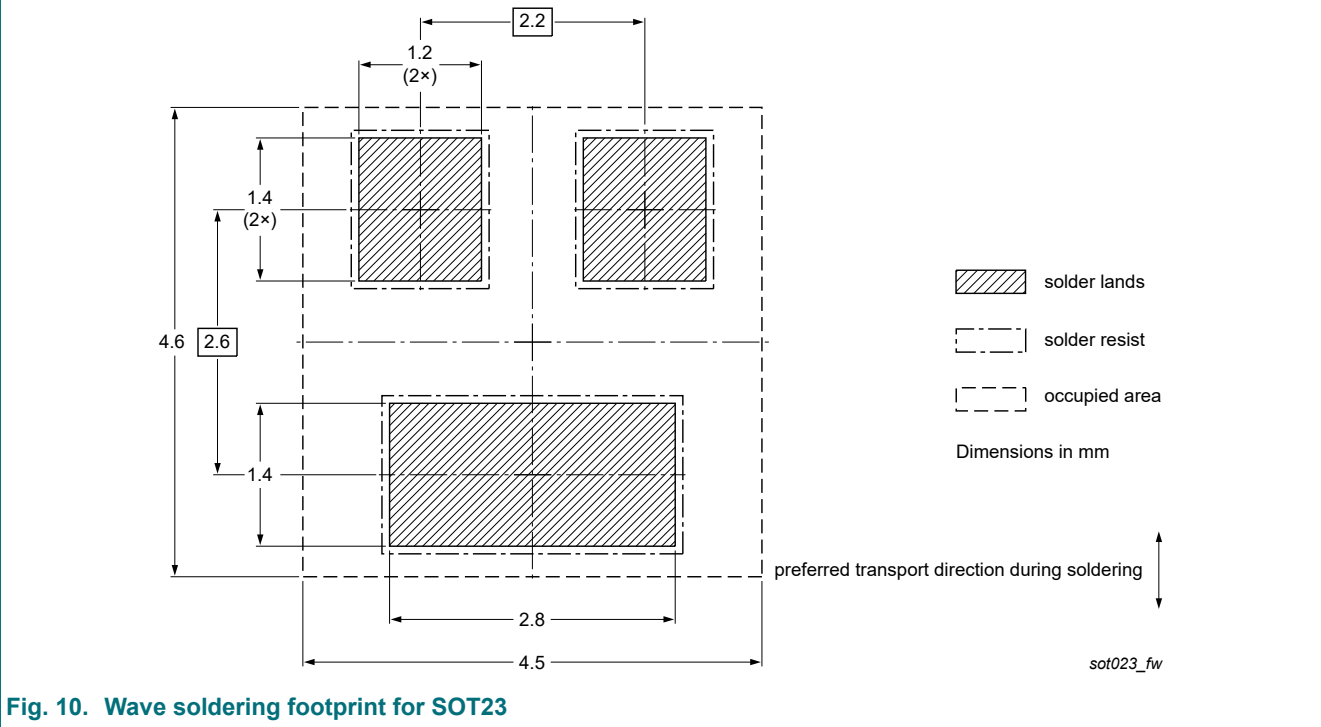
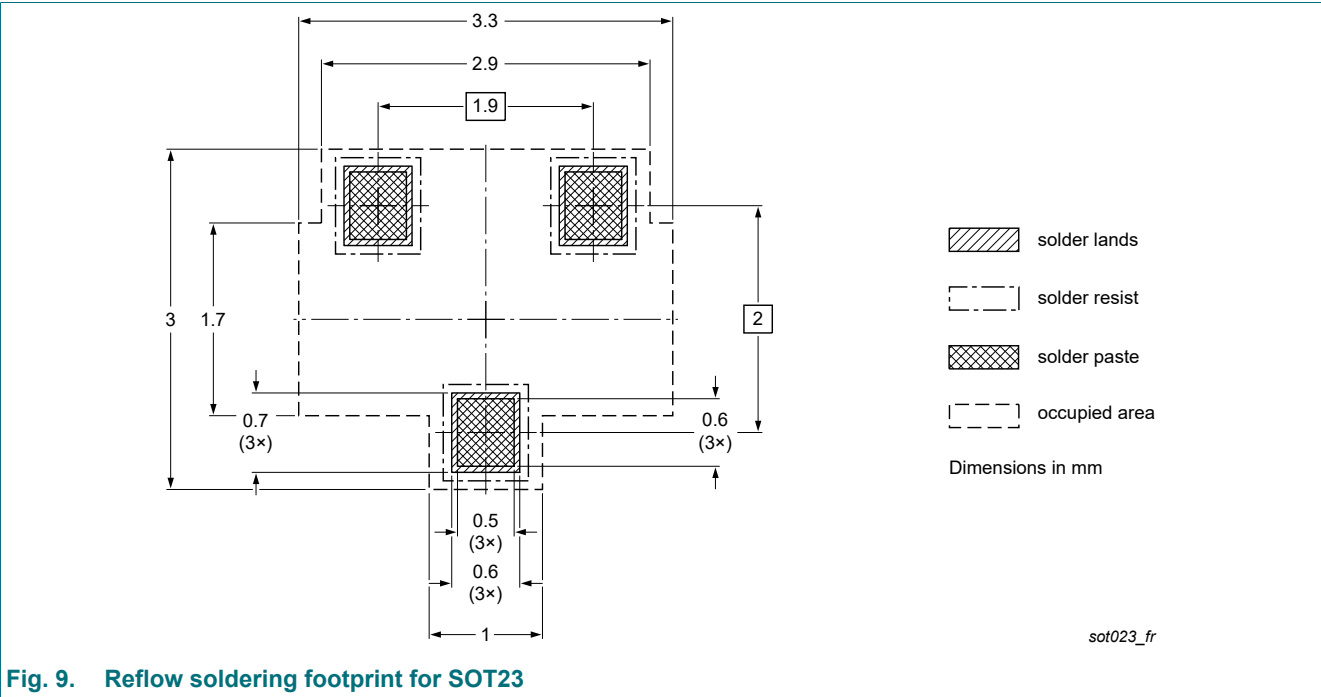


Fig. 8. Package outline SOT23

13. Soldering



## 14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BAL99-Q v.1   | 20250526     | Product data sheet | -             | -          |

## 15. 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".
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For sales office addresses, please send an email to: [salesaddresses@nexperia.com](mailto:salesaddresses@nexperia.com)

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