



# BAS21LL-Q

## High-voltage switching diode

23 February 2024

Product data sheet

### 1. General description

High-voltage switching diode, encapsulated in an SOD123 small Surface-Mounted Device (SMD) plastic package.

### 2. Features and benefits

- High switching speed:  $t_{rr} \leq 50$  ns
- Low leakage current:  $I_R \leq 100$  nA
- High reverse voltage  $V_R \leq 200$  V
- Low capacitance:  $C_d \leq 2$  pF
- Ultra small SMD plastic package
- Qualified according to AEC-Q101 and recommended for use in automotive applications

### 3. Applications

- High-speed switching
- General-purpose switching
- Voltage clamping
- Reverse polarity protection

### 4. Quick reference data

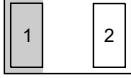

Table 1. Quick reference data

| Symbol    | Parameter                       | Conditions  |     | Min | Typ | Max  | Unit |
|-----------|---------------------------------|---|-----|-----|-----|------|------|
| $I_F$     | forward current                 | $T_j = 25$ °C   | [1] | -   | -   | 330  | mA   |
| $V_R$     | reverse voltage                 |   |     | -   | -   | 200  | V    |
| $V_{RRM}$ | repetitive peak reverse voltage |   |     | -   | -   | 250  | V    |
| $V_F$     | forward voltage                 | $I_F = 200$ mA; $t_p \leq 300$ $\mu$ s; $\delta \leq 0.02$ ;<br>$T_j = 25$ °C               |     | -   | -   | 1.25 | V    |
| $I_R$     | reverse current                 | $V_R = 200$ V; pulsed; $T_j = 25$ °C  |     | -   | -   | 100  | nA   |
| $t_{rr}$  | reverse recovery time           | $I_F = 30$ mA; $I_R = 30$ mA; $R_L = 100$ $\Omega$ ;<br>$I_{R(meas)} = 3$ mA; $T_j = 25$ °C |     | -   | -   | 50   | ns   |

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

## 5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline   | Graphic symbol  |
|-----|--------|-------------|--|---|
| 1   | K      | cathode     |  <p>Transparent<br/>top view</p> <p><b>DFN1006-2 (SOD882)</b></p> |  <p>aaa-028035</p> |
| 2   | A      | anode       |  |   |

## 6. Ordering information

Table 3. Ordering information

| Type number               | Package   |   |                        |
|---------------------------|-----------|---|------------------------|
|                           | Name      | Description   | Version                |
| <a href="#">BAS21LL-Q</a> | DFN1006-2 | plastic, leadless ultra small package; 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.48 mm body | <a href="#">SOD882</a> |

## 7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BAS21LL-Q   | J3           |

## 8. Limiting values

Table 5. Limiting values

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

| Symbol           | Parameter                           | Conditions  |     | Min | Max | Unit |
|------------------|-------------------------------------|---|-----|-----|-----|------|
| $V_{RRM}$        | repetitive peak reverse voltage     | $T_j = 25\text{ °C}$  |     | -   | 250 | V    |
| $V_R$            | reverse voltage                     |   |     | -   | 200 | V    |
| $I_F$            | forward current                     |   | [1] | -   | 330 | mA   |
| $I_{FSM}$        | non-repetitive peak forward current | $t_p = 1\text{ }\mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25\text{ °C}$   |     | -   | 9   | A    |
|                  |                                     | $t_p = 100\text{ }\mu\text{s}$ ; square wave; $T_{j(\text{init})} = 25\text{ °C}$ |     | -   | 3   | A    |
|                  |                                     | $t_p = 10\text{ ms}$ ; square wave; $T_{j(\text{init})} = 25\text{ °C}$           |     | -   | 1.7 | A    |
| $I_{FRM}$        | repetitive peak forward current     | $t_p \leq 1\text{ ms}$ ; $\delta \leq 0.25$                                       |     | -   | 900 | mA   |
| $P_{\text{tot}}$ | total power dissipation             | $T_{\text{amb}} \leq 25\text{ °C}$  | [1] | -   | 335 | mW   |
|                  |                                     |   | [2] | -   | 610 | mW   |
| $T_j$            | junction temperature                |   |     | -   | 150 | °C   |
| $T_{\text{amb}}$ | ambient temperature                 |   |     | -55 | 150 | °C   |
| $T_{\text{stg}}$ | storage temperature                 |   |     | -65 | 150 | °C   |

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

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for cathode 1cm<sup>2</sup>.

## 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] | -   | -   | 375 | K/W  |
|                |  |             | [2] | -   | -   | 205 | K/W  |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point |             | [3] | -   | -   | 45  | 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 1cm<sup>2</sup>.
- [3] Soldering point of cathode tab.

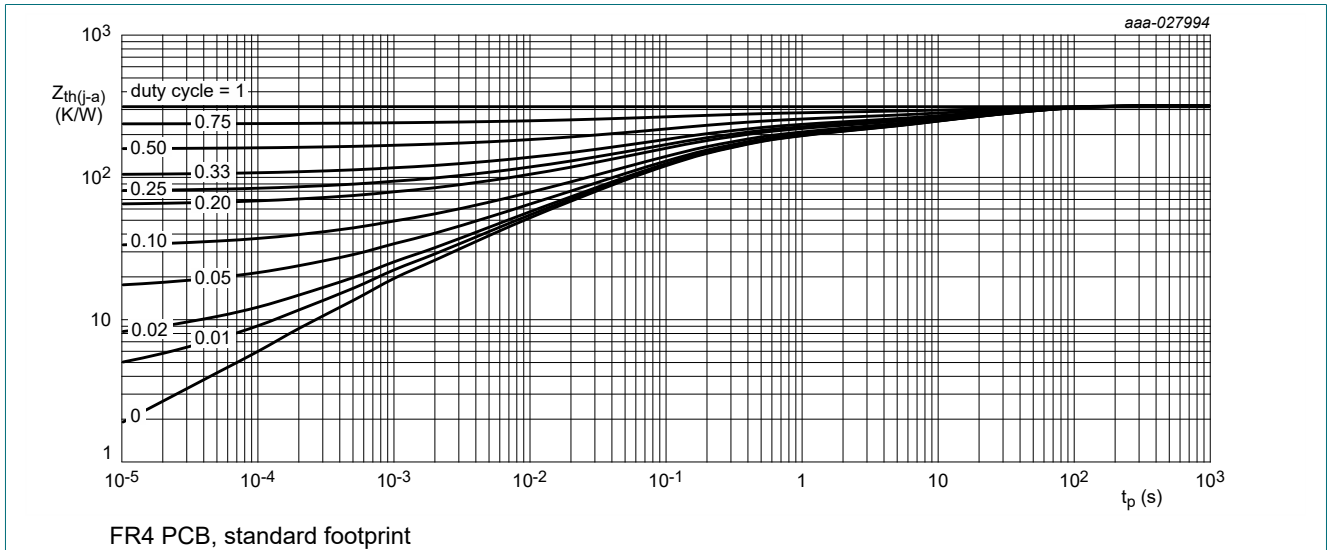


Fig. 1. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

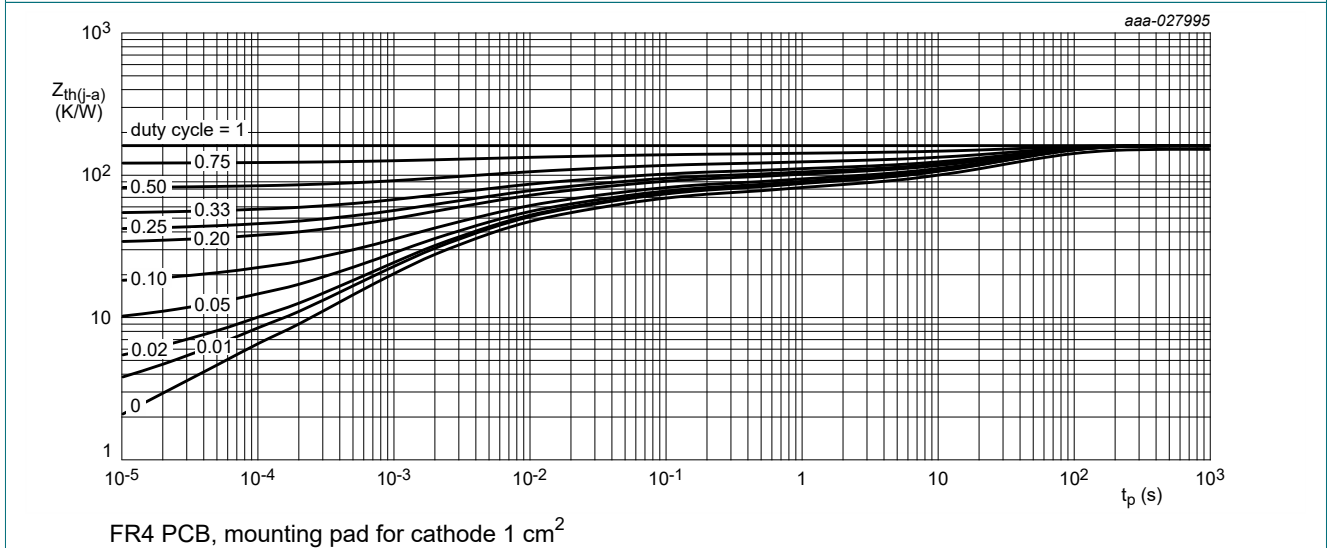
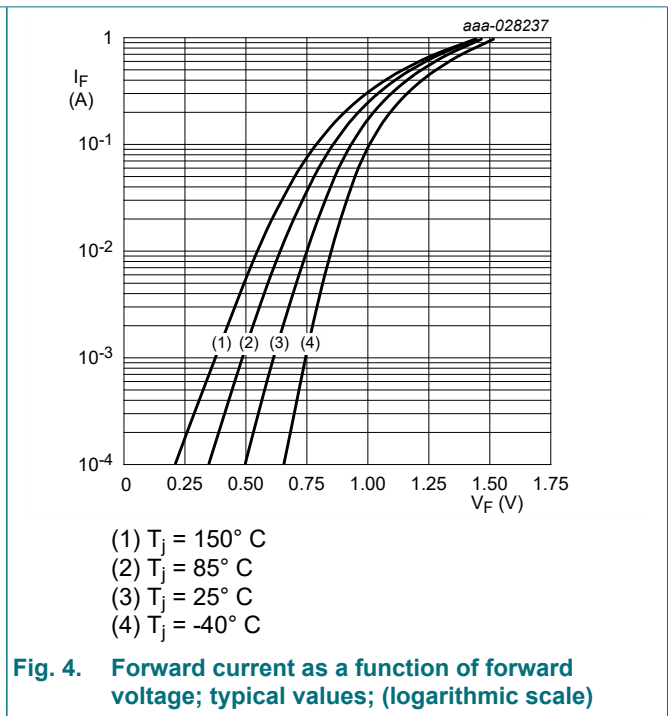
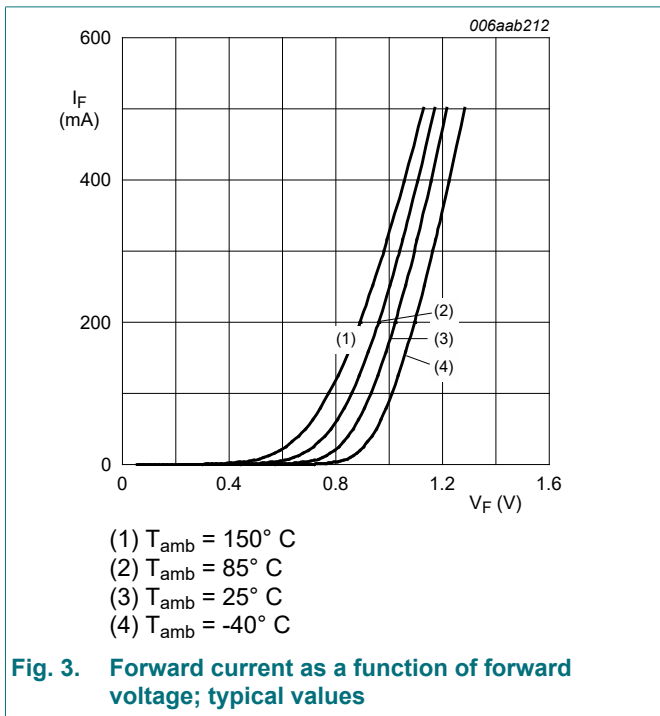


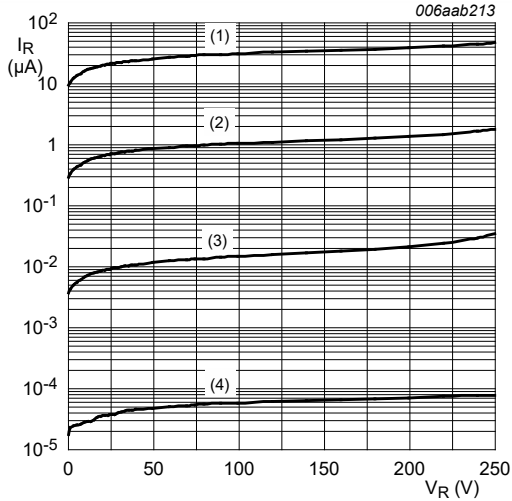
Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

### 10. Characteristics

Table 7. Characteristics

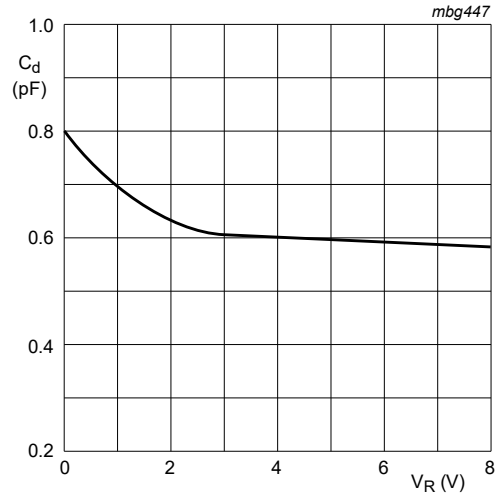
| Symbol          | Parameter             | Conditions  | Min | Typ | Max  | Unit |
|-----------------|-----------------------|---|-----|-----|------|------|
| V <sub>F</sub>  | forward voltage       | I <sub>F</sub> = 100 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>j</sub> = 25 °C  | -   | -   | 1    | V    |
|                 |                       | I <sub>F</sub> = 200 mA; t <sub>p</sub> ≤ 300 μs; δ ≤ 0.02; T <sub>j</sub> = 25 °C  | -   | -   | 1.25 | V    |
| I <sub>R</sub>  | reverse current       | V <sub>R</sub> = 200 V; pulsed; T <sub>j</sub> = 25 °C  | -   | -   | 100  | nA   |
|                 |                       | V <sub>R</sub> = 200 V; pulsed; T <sub>j</sub> = 150 °C   | -   | -   | 100  | μA   |
| C <sub>d</sub>  | diode capacitance     | V <sub>R</sub> = 0 V; f = 1 MHz; T <sub>j</sub> = 25 °C   | -   | -   | 2    | pF   |
| t <sub>rr</sub> | reverse recovery time | I <sub>F</sub> = 30 mA; I <sub>R</sub> = 30 mA; R <sub>L</sub> = 100 Ω; I <sub>R(meas)</sub> = 3 mA; T <sub>j</sub> = 25 °C | -   | -   | 50   | ns   |





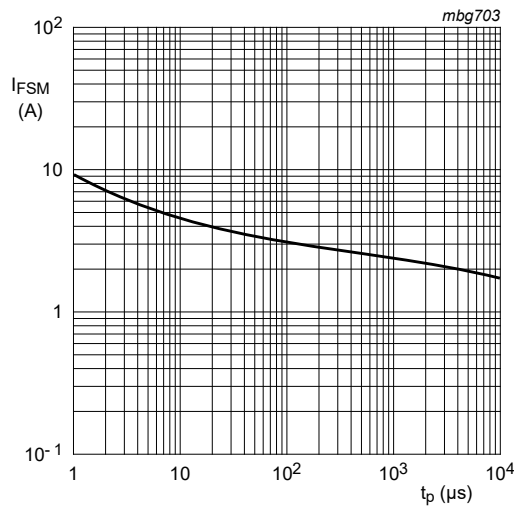
- (1)  $T_{amb} = 150^{\circ}C$
- (2)  $T_{amb} = 85^{\circ}C$
- (3)  $T_{amb} = 25^{\circ}C$
- (4)  $T_{amb} = -40^{\circ}C$

**Fig. 5. Reverse current as a function of reverse voltage; typical values**



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

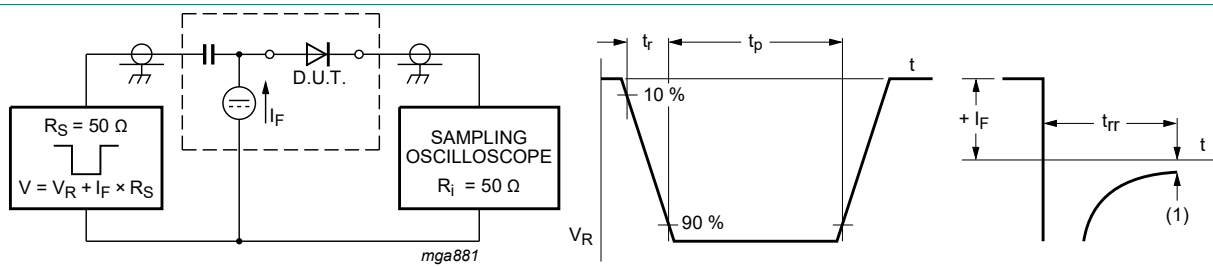
**Fig. 6. Diode capacitance as a function of reverse voltage; typical values**



Based on square wave currents.  
 $T_{j(\text{init})} = 25^{\circ}C$

**Fig. 7. Non-repetitive peak forward current as a function of pulse duration; maximum values**

## 11. Test information



(1)  $I_R = 3\text{ mA}$

**Fig. 8. Reverse recovery time 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**

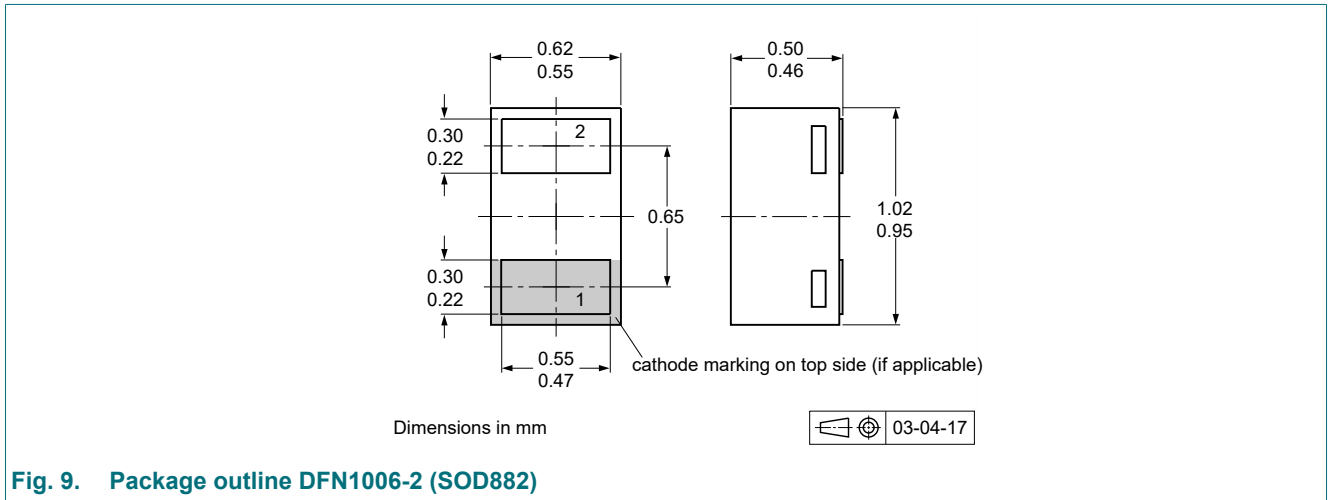


Fig. 9. Package outline DFN1006-2 (SOD882)

**13. Soldering**

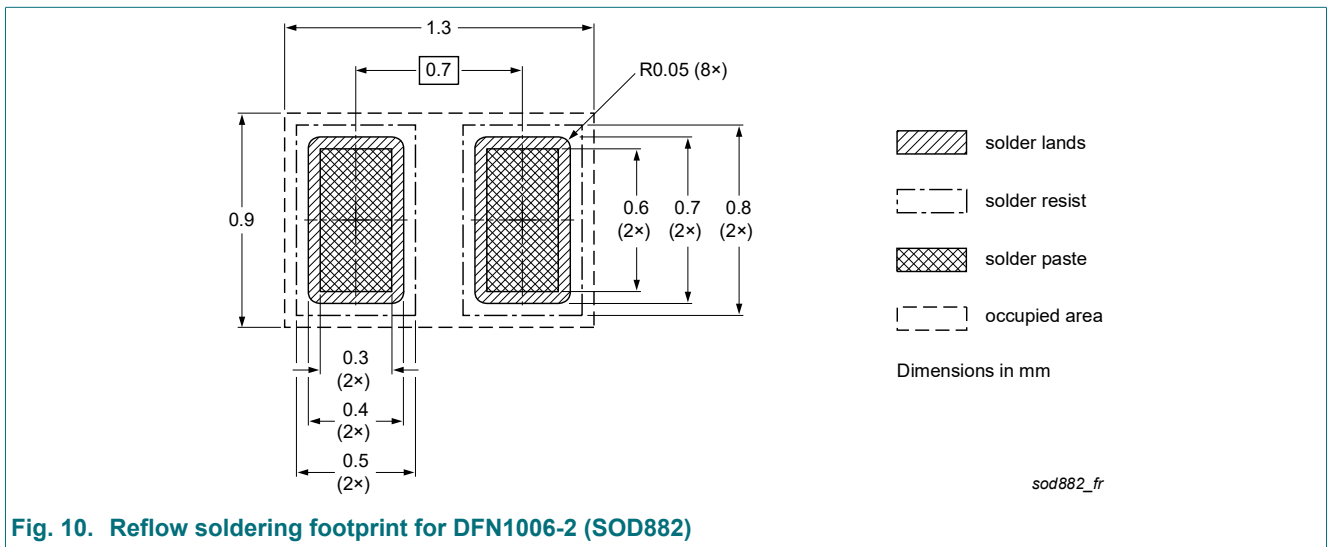


Fig. 10. Reflow soldering footprint for DFN1006-2 (SOD882)

## 14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status  | Change notice | Supersedes |
|---------------|--------------|--------------------|---------------|------------|
| BAS21LL-Q v.1 | 20240223     | 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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