



PESD24VV1BL

Bidirectional ESD protection diode

12 May 2022

Product data sheet

1. General description

ESD protection device in a leadless ultra small DFN1006-2 (SOD882) Surface-Mounted Device (SMD) plastic package, designed to protect one single line from the damage caused by ElectroStatic discharge (ESD) and other transients.

2. Features and benefits

- Reverse stand-off voltage: $V_{RWM} = 24\text{ V}$
- Low clamping voltage: $V_{CL} = 33\text{ V}$ at $I_{PP} = 3.5\text{ A}$
- ESD protection up to 30 kV (IEC 61000-4-2)
- ESD protection up to 30 kV (ISO 10605: C = 330 pF, R = 330 Ω)
- Ultra low leakage current: $I_{RM} < 1\text{ nA}$

3. Applications

ESD protection for low-speed interfaces in communication, consumer and computing devices

- USB Type-C, CC and SBU lines

4. Quick reference data

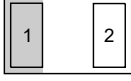
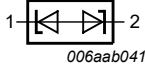
Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|---|-----|-----|-----|------|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25\text{ }^{\circ}\text{C}$ | - | - | 24 | V |
| I_{PPM} | rated peak pulse current | $t_p = 8/20\text{ }\mu\text{s}$ | [1] | - | 3.5 | A |
| V_{CL} | clamping voltage | $I_{PPM} = 3.5\text{ A}$; $t_p = 8/20\text{ }\mu\text{s}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$ | [1] | 33 | 42 | V |

[1] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|-------------------|--|--|
| 1 | K1 | cathode (diode 1) |  <p>Transparent top view</p> <p>DFN1006-2 (SOD882)</p> |  <p>006aab041</p> |
| 2 | K2 | cathode (diode 2) | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|-----------|---|---------|
| | Name | Description | Version |
| PESD24VV1BL | DFN1006-2 | plastic, leadless ultra small package; 2 terminals; 0.65 mm pitch; 1 mm x 0.6 mm x 0.48 mm body | SOD882 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| PESD24VV1BL | 9F |

8. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|----------------------------|---------------------------------|---|-----|-----|-----|------|
| I_{PPM} | rated peak pulse current | $t_p = 8/20 \mu s$ | [1] | - | 3.5 | A |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -55 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |
| ESD maximum ratings | | | | | | |
| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2; contact discharge | [2] | - | 30 | kV |
| | | ISO 10605: contact discharge; C = 330 pF, R = 330 Ω | [2] | - | 30 | kV |
| | | ISO 10605: contact discharge; C = 150 pF, R = 330 Ω | [2] | - | 30 | kV |

[1] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.

[2] Device stressed with ten non-repetitive ESD pulses.

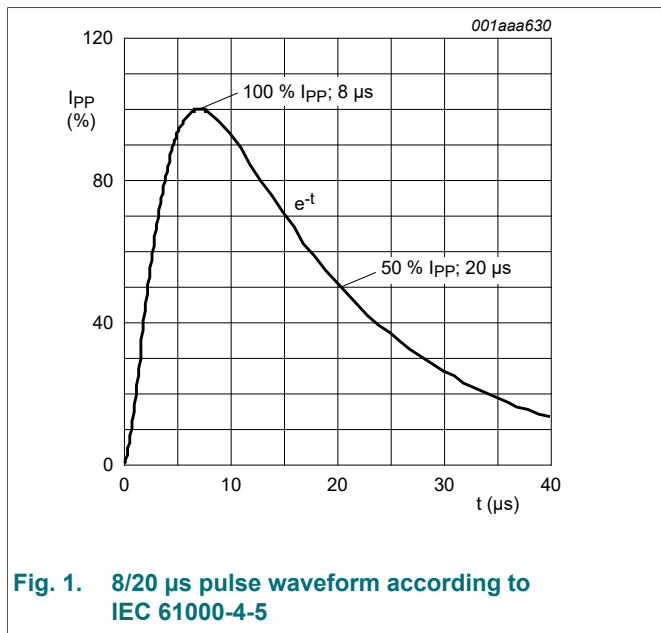


Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5

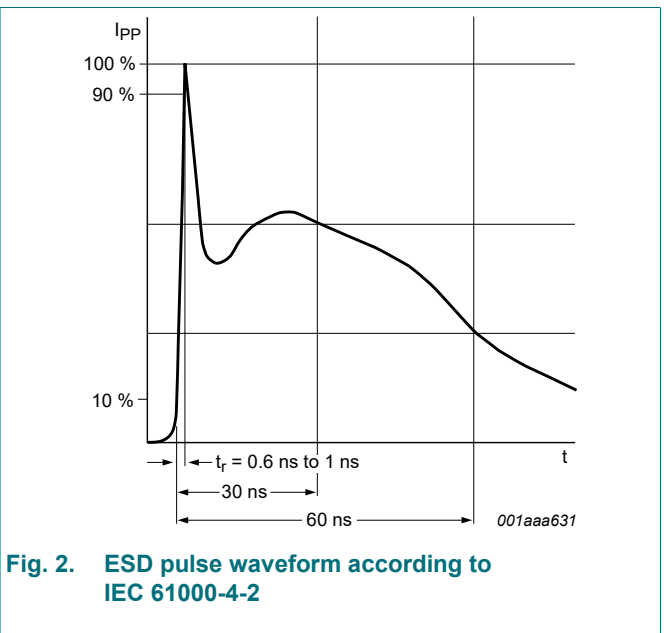


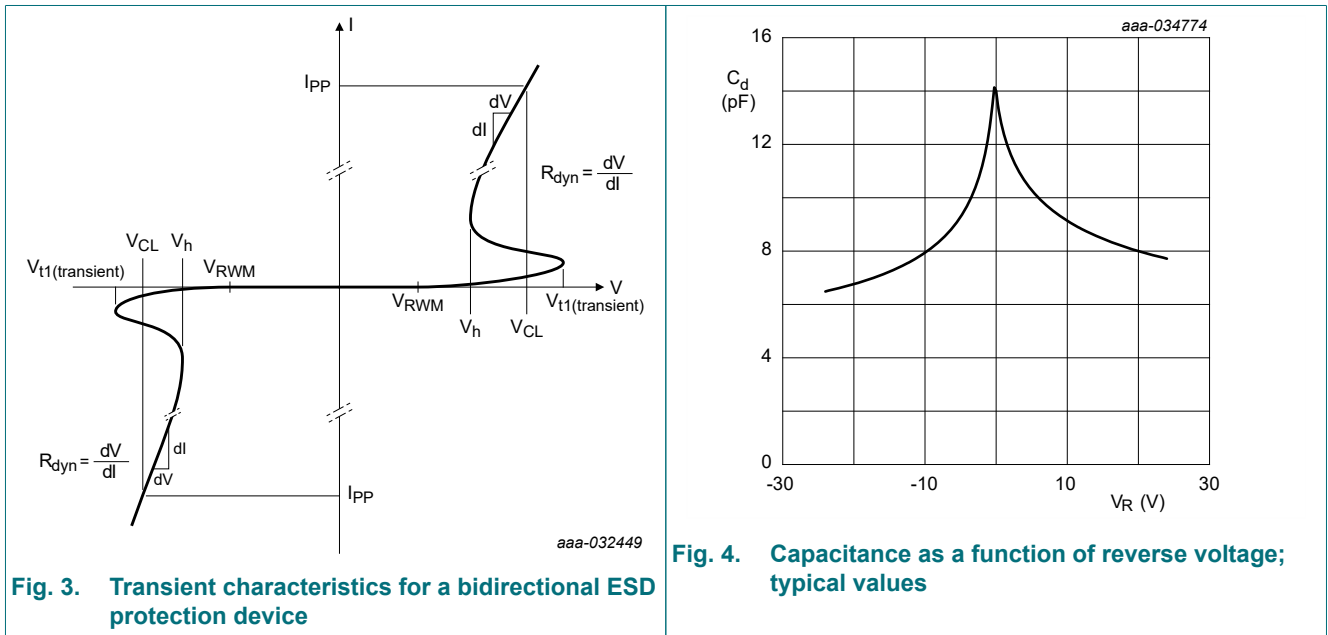
Fig. 2. ESD pulse waveform according to IEC 61000-4-2

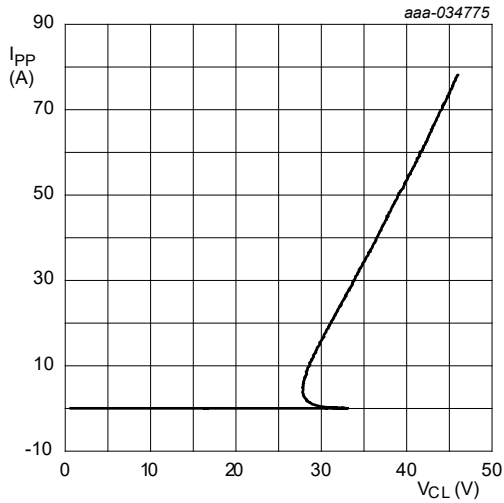
9. Characteristics

Table 6. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|-----------|--------------------------|---|------|------|------|----------|---|
| V_{RWM} | reverse standoff voltage | $T_{amb} = 25\text{ }^{\circ}\text{C}$ | - | - | 24 | V | |
| V_{BR} | breakdown voltage | $I_R = 10\text{ mA}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | 25.5 | 30.5 | 35.5 | V | |
| I_{RM} | reverse leakage current | $V_R = 24\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | - | 1 | 50 | nA | |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 0\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | - | 14 | 17 | pF | |
| V_{CL} | clamping voltage | $I_{PP} = 1\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | [1] | - | 31 | 40 | V |
| | | $I_{PPM} = 3.5\text{ A}; t_p = 8/20\text{ }\mu\text{s}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | [1] | - | 33 | 42 | V |
| | | $I_{PP} = 16\text{ A}; t_p = 100\text{ ns}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | [2] | - | 32 | - | V |
| R_{dyn} | dynamic resistance | $I_R = 10\text{ A}; T_{amb} = 25\text{ }^{\circ}\text{C}$ | [2] | - | 0.2 | Ω | |

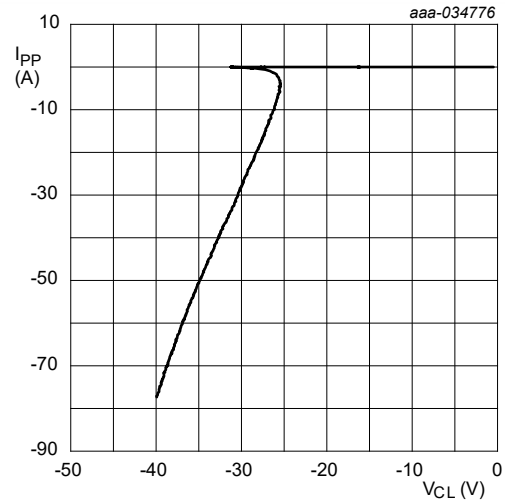
- [1] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5.
- [2] Non-repetitive current pulse, Transmission Line Pulse (TLP); square pulse; ANSI / ESD STM5.5.1-2008





Transmission Line Pulse (TLP);
 $t_p = 100 \text{ ns}$; $t_r = 1 \text{ ns}$

Fig. 5. Dynamic resistance with positive clamping; typical values



Transmission Line Pulse (TLP);
 $t_p = 100 \text{ ns}$; $t_r = 1 \text{ ns}$

Fig. 6. Dynamic resistance with negative clamping; typical values

10. Application information

The device is designed for the protection of one bidirectional data line from surge pulses and ESD damage. The device is suitable on lines where the signal polarities are both positive and negative with respect to ground.

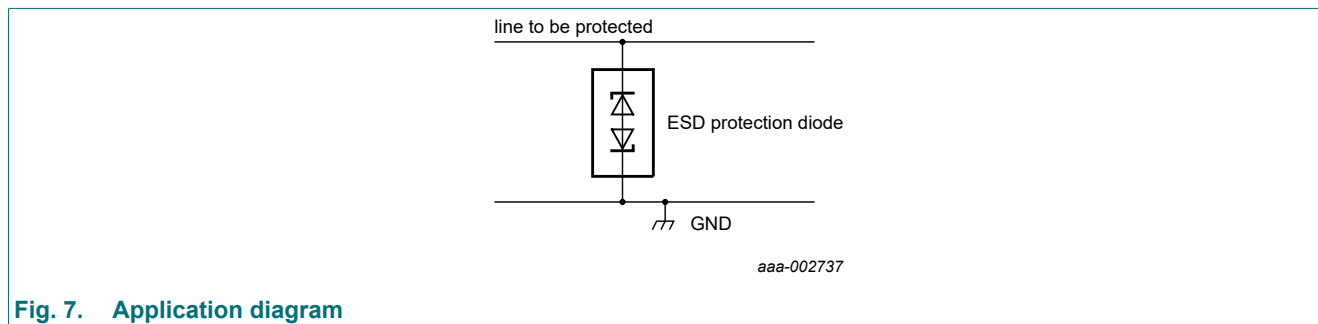


Fig. 7. Application diagram

Circuit board layout and protection device placement

Circuit board layout is critical for the suppression of ESD, Electrical Fast Transient (EFT) and surge transients. The following guidelines are recommended:

1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
6. Minimize the length of the transient return path to ground.
7. Avoid using shared transient return paths to a common ground point.
8. Use ground planes whenever possible. For multilayer PCBs, use ground vias.

11. Package outline

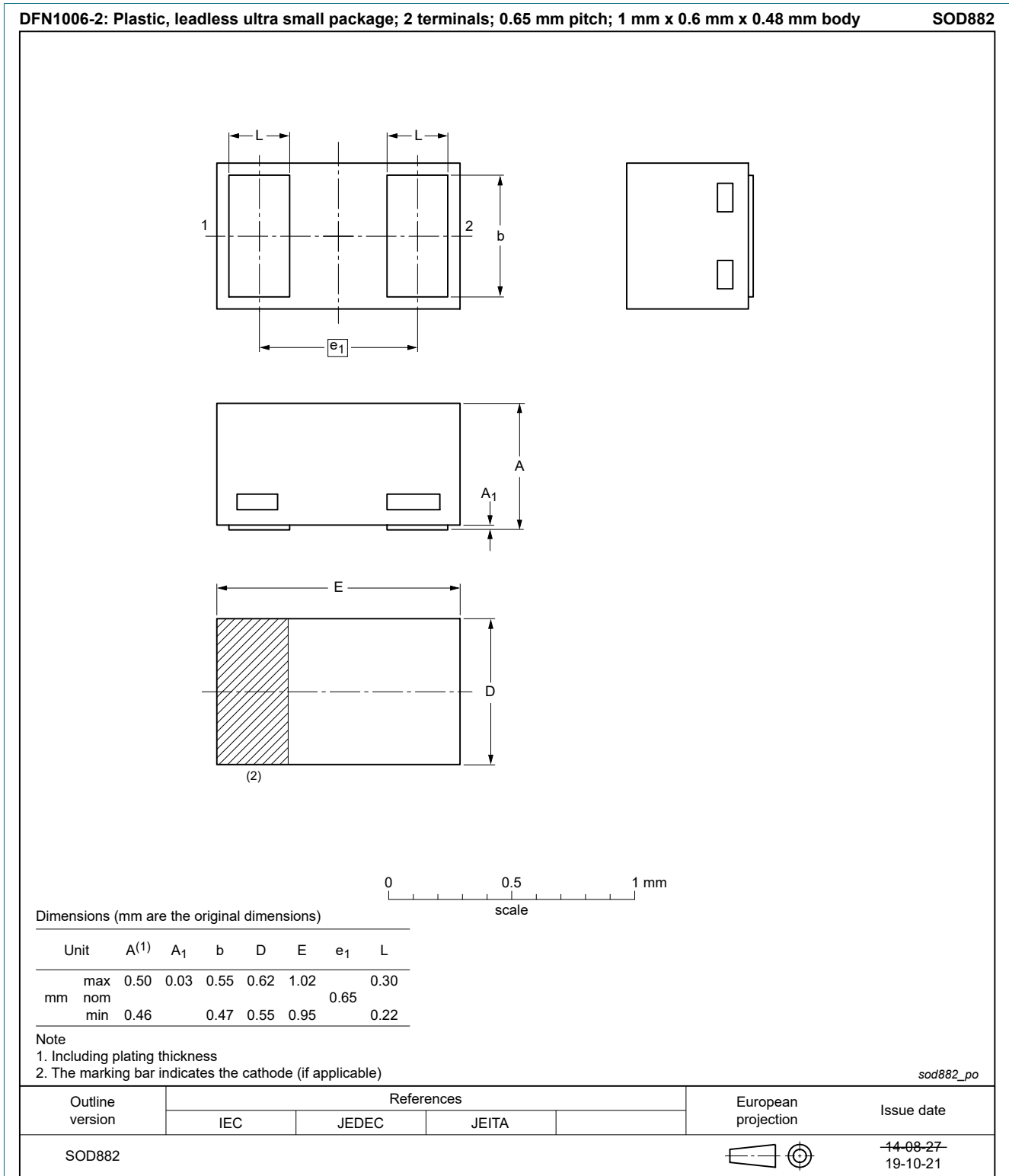


Fig. 8. Package outline DFN1006-2 (SOD882)

12. Soldering

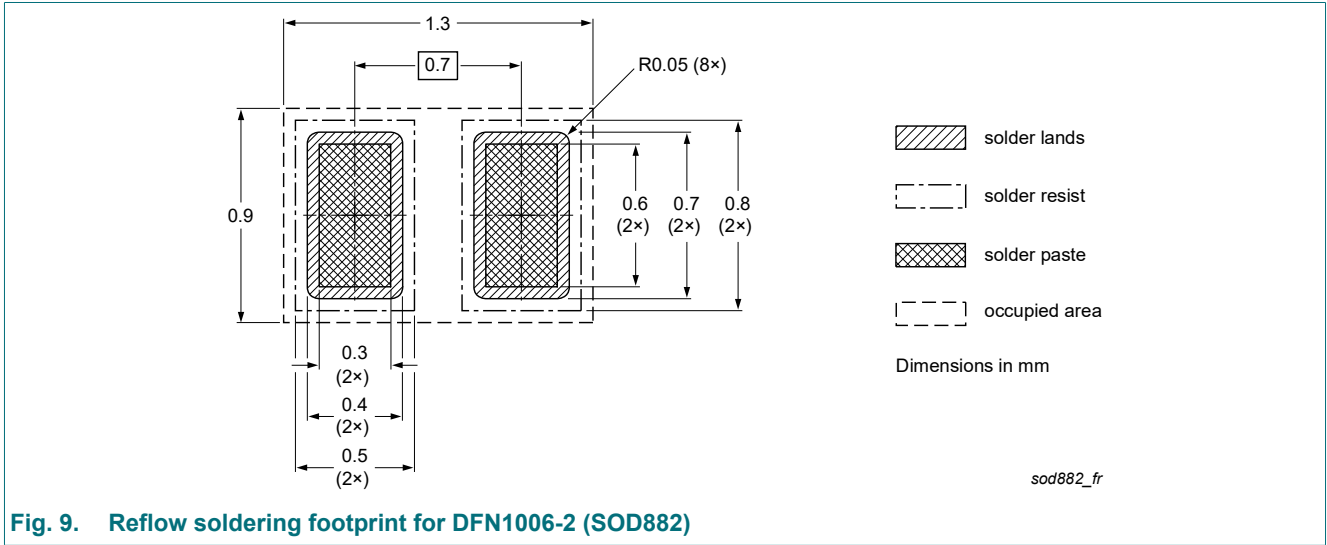


Fig. 9. Reflow soldering footprint for DFN1006-2 (SOD882)

13. Revision history

Table 7. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------|--------------|--------------------|---------------|------------|
| PESD24VV1BL v.1 | 20220512 | Product data sheet | - | - |

14. 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. |

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- [2] The term 'short data sheet' is explained in section "Definitions".
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Contents

| | |
|----------------------------------|----|
| 1. General description..... | 1 |
| 2. Features and benefits..... | 1 |
| 3. Applications..... | 1 |
| 4. Quick reference data..... | 1 |
| 5. Pinning information..... | 2 |
| 6. Ordering information..... | 2 |
| 7. Marking..... | 2 |
| 8. Limiting values..... | 3 |
| 9. Characteristics..... | 4 |
| 10. Application information..... | 6 |
| 11. Package outline..... | 7 |
| 12. Soldering..... | 8 |
| 13. Revision history..... | 9 |
| 14. Legal information..... | 10 |

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