



# PESD5V0V1BL-Q

Very low capacitance bidirectional ESD protection diode

30 September 2022

Product data sheet

## 1. General description

Very low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in an SOD882 leadless ultra-small Surface-Mounted Device (SMD) plastic package, designed to protect one signal line from the damage caused by ESD and other transients.

## 2. Features and benefits

- Bidirectional ESD protection of one line
- Very low diode capacitance:  $C_d = 11$  pF
- Max. peak pulse power:  $P_{PPM} = 45$  W
- Low clamping voltage:  $V_{CL} = 12.5$  V
- Ultra low leakage current:  $I_{RM} = 1$  nA
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge);  $I_{PPM} = 4.8$  A
- Qualified according to AEC-Q101 and recommended for use in automotive applications

## 3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- SIM card protection
- Communication systems
- Portable electronics
- 10/100 Mbit/s Ethernet

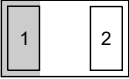
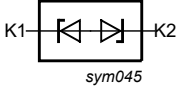
## 4. Quick reference data

Table 1. Quick reference data

| Symbol    | Parameter                | Conditions                                  | Min | Typ | Max | Unit |
|-----------|--------------------------|---------------------------------------------|-----|-----|-----|------|
| $V_{RWM}$ | reverse standoff voltage | $T_{amb} = 25$ °C                           | -   | -   | 5   | V    |
| $C_d$     | diode capacitance        | $f = 1$ MHz; $V_R = 0$ V; $T_{amb} = 25$ °C | -   | 11  | 13  | pF   |

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description       | Simplified outline                                                                                                                        | Graphic symbol                                                                                       |
|-----|--------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| 1   | K1     | cathode (diode 1) | <br>Transparent<br>top view<br><b>DFN1006-2 (SOD882)</b> | <br><i>sym045</i> |
| 2   | K2     | cathode (diode 2) |                                                                                                                                           |                                                                                                      |

6. Ordering information

Table 3. Ordering information

| Type number   | Package   |                                                                                                 |         |
|---------------|-----------|-------------------------------------------------------------------------------------------------|---------|
|               | Name      | Description                                                                                     | Version |
| PESD5V0V1BL-Q | 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 |
|---------------|--------------|
| PESD5V0V1BL-Q | X1           |

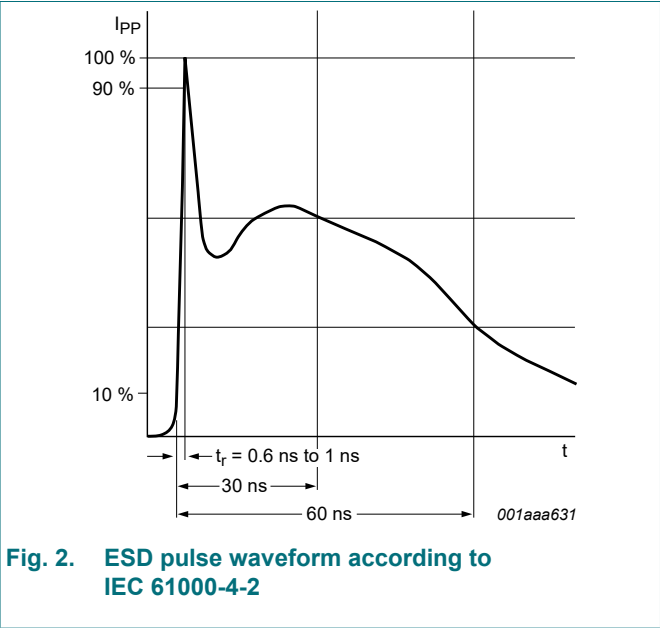
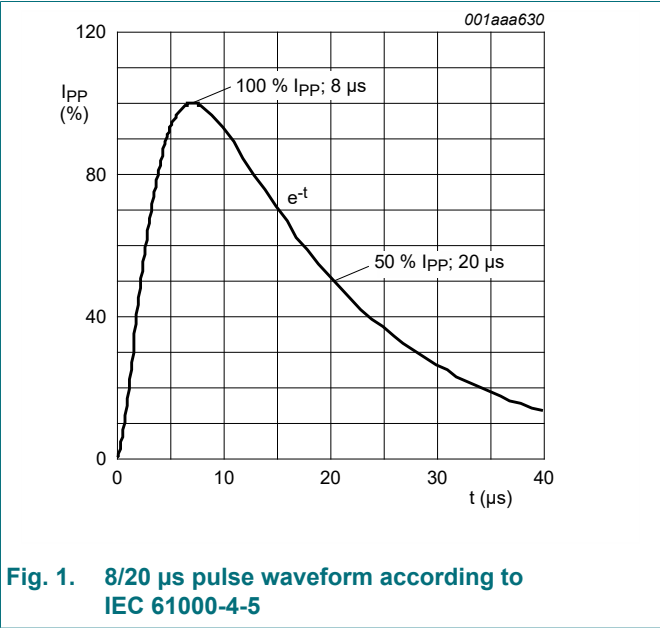
8. Limiting values

Table 5. Limiting values

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

| Symbol              | Parameter                       | Conditions                          |     | Min | Max | Unit |
|---------------------|---------------------------------|-------------------------------------|-----|-----|-----|------|
| P <sub>PPM</sub>    | rated peak pulse power          | t <sub>p</sub> = 8/20 μs            | [1] | -   | 45  | W    |
| I <sub>PPM</sub>    | rated peak pulse current        |                                     | [1] | -   | 4.8 | A    |
| T <sub>j</sub>      | junction temperature            |                                     |     | -   | 150 | °C   |
| T <sub>amb</sub>    | ambient temperature             |                                     |     | -55 | 150 | °C   |
| T <sub>stg</sub>    | storage temperature             |                                     |     | -65 | 150 | °C   |
| ESD maximum ratings |                                 |                                     |     |     |     |      |
| V <sub>ESD</sub>    | electrostatic discharge voltage | IEC 61000-4-2; contact discharge    | [2] | -   | 30  | kV   |
|                     |                                 | machine model                       |     | -   | 2   | kV   |
|                     |                                 | MIL-STD-883; human body model (HBM) |     | -   | 16  | kV   |

- [1] Non-repetitive current pulse 8/20 μs exponentially decaying waveform according to IEC 61000-4-5  
[2] Device stressed with ten non-repetitive ESD pulses.



9. Characteristics

Table 6. Characteristics

| Symbol     | Parameter                | Conditions                                                                                          |     | Min | Typ | Max  | Unit     |
|------------|--------------------------|-----------------------------------------------------------------------------------------------------|-----|-----|-----|------|----------|
| $V_{RWM}$  | reverse standoff voltage | $T_{amb} = 25\text{ }^{\circ}\text{C}$                                                              |     | -   | -   | 5    | V        |
| $V_{BR}$   | breakdown voltage        | $I_R = 5\text{ mA}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                                        |     | 5.8 | 6.8 | 7.8  | V        |
| $I_{RM}$   | reverse leakage current  | $V_{RWM} = 5\text{ V}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                                     |     | -   | 1   | 10   | nA       |
| $C_d$      | diode capacitance        | $f = 1\text{ MHz}$ ; $V_R = 0\text{ V}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                    |     | -   | 11  | 13   | pF       |
| $V_{CL}$   | clamping voltage         | $I_{PPM} = 4.8\text{ A}$ ; $t_p = 8/20\text{ }\mu\text{s}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$ | [1] | -   | -   | 12.5 | V        |
| $R_{dyn}$  | dynamic resistance       | $I_R = 10\text{ A}$ ; $t_p = 100\text{ ns}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                | [2] | -   | 0.2 | -    | $\Omega$ |
| $R_{diff}$ | differential resistance  | $I_R = 5\text{ mA}$ ; $T_{amb} = 25\text{ }^{\circ}\text{C}$                                        |     | -   | -   | 35   | $\Omega$ |

- [1] Non-repetitive current pulse 8/20  $\mu\text{s}$  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

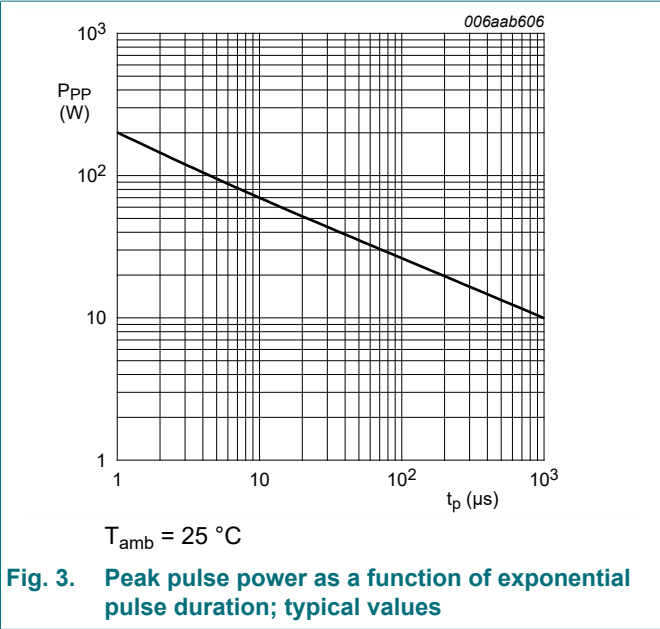


Fig. 3. Peak pulse power as a function of exponential pulse duration; typical values

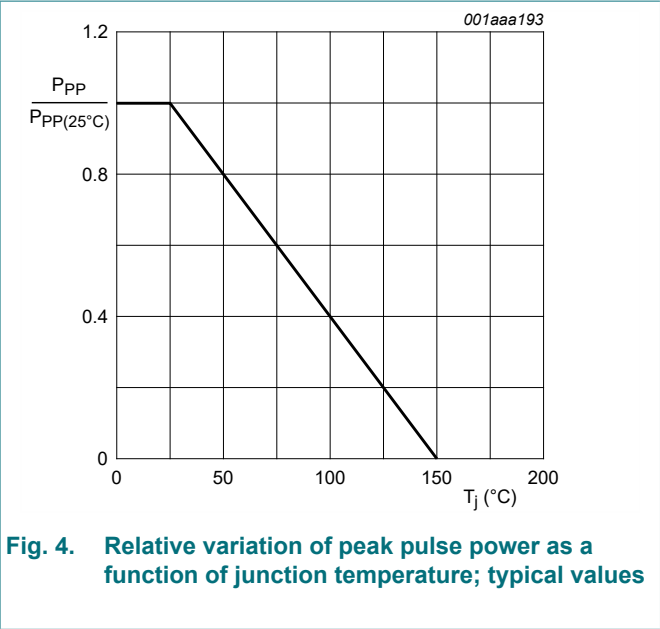


Fig. 4. Relative variation of peak pulse power as a function of junction temperature; typical values

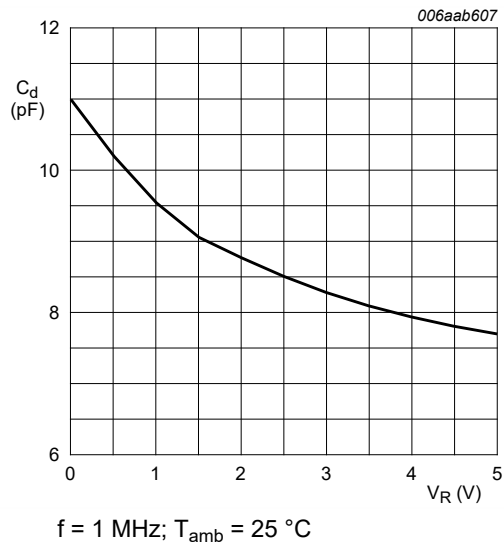


Fig. 5. Diode capacitance as a function of reverse voltage; typical values

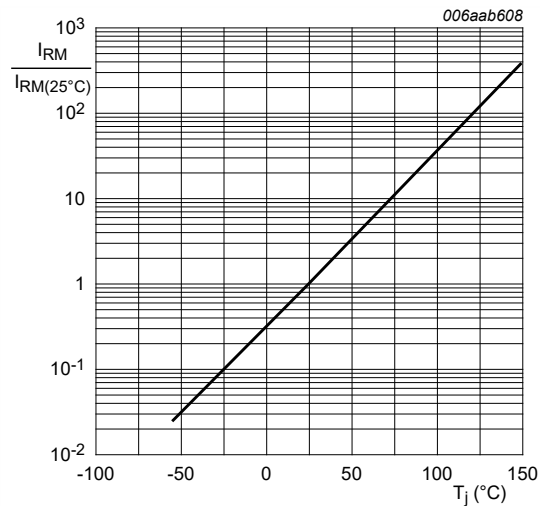


Fig. 6. Relative variation of reverse leakage current as a function of junction temperature; typical values

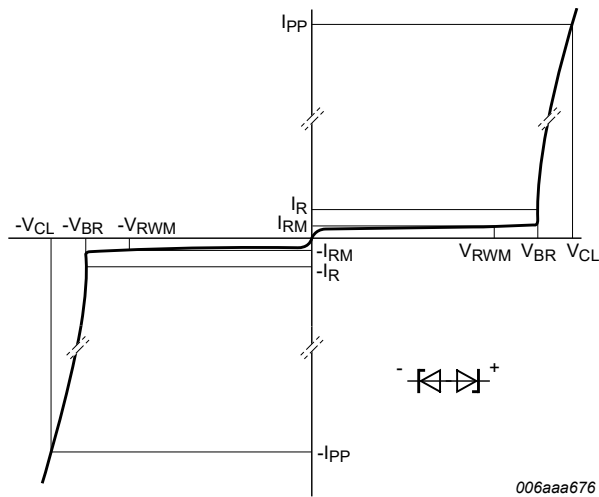
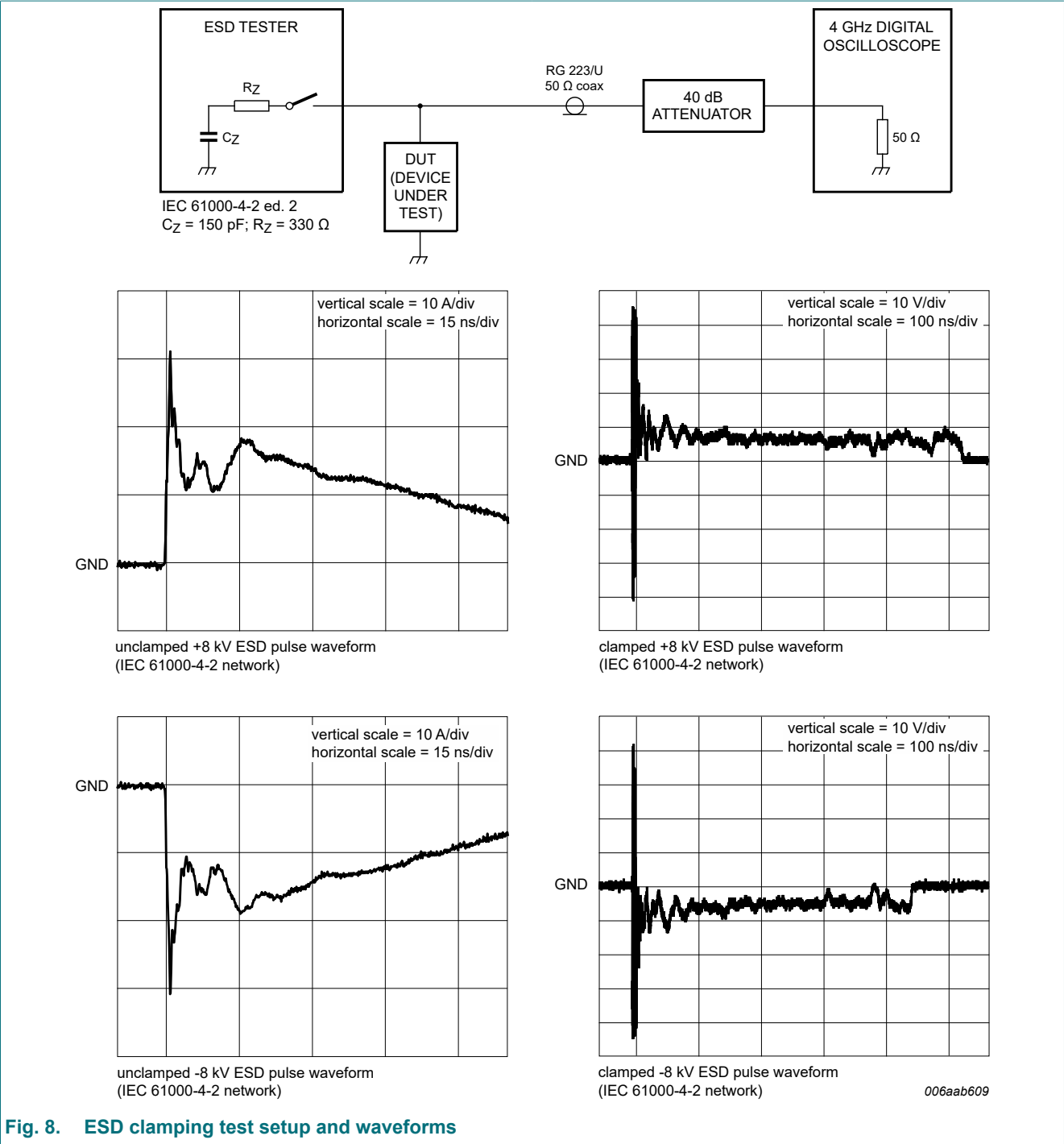


Fig. 7. V-I characteristics for a bidirectional ESD protection diode



## 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.

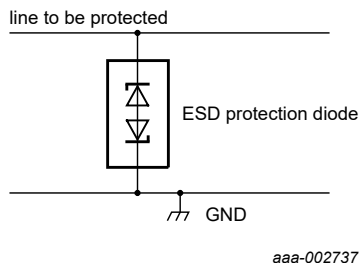


Fig. 9. Application diagram

### 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:

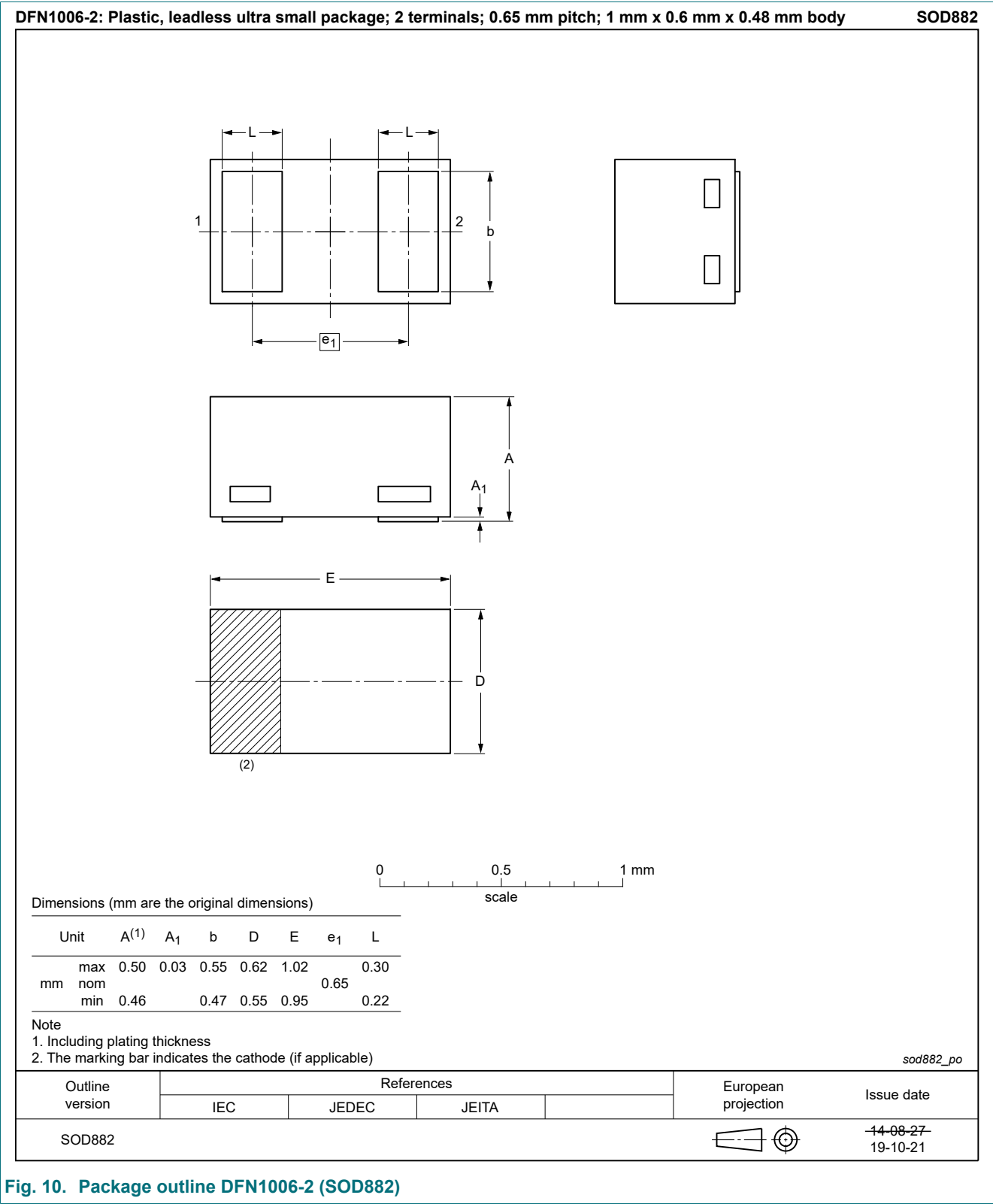
1. Place the device as close to the input terminal or connector as possible.
2. Minimize the path length between the device and the protected line.
3. Keep parallel signal paths to a minimum.
4. Avoid running protected conductors in parallel with unprotected conductors.
5. Minimize all Printed-Circuit 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. Test information

### Quality information

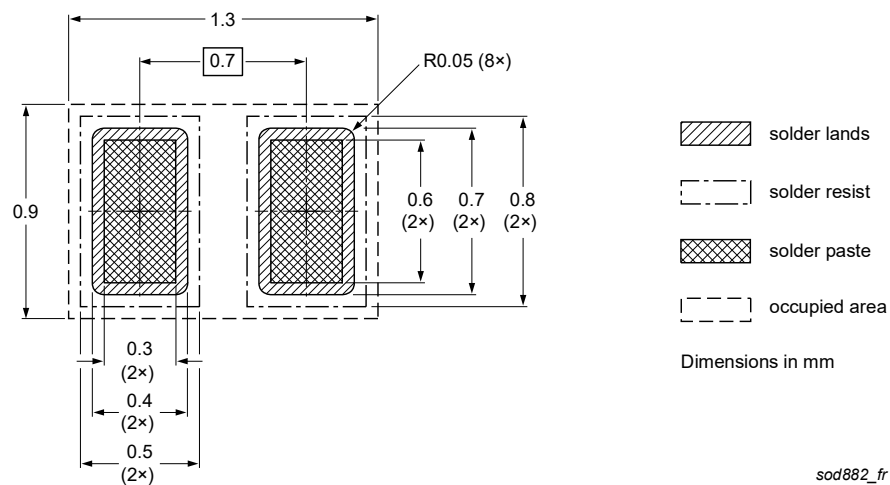
This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - *Stress test qualification for discrete semiconductors*, and is suitable for use in automotive applications.

12. Package outline





## 13. Soldering



**Fig. 11. Reflow soldering footprint for DFN1006-2 (SOD882)**

14. Revision history

Table 7. Revision history

| Data sheet ID     | Release date | Data sheet status  | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PESD5V0V1BL-Q v.1 | 20220930     | Product data sheet | -             | -          |

## 15. Legal information

### Data sheet status

| Document status<br>[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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