



PESD5V0R1BDSF

Extremely low clamping bidirectional ESD protection diode

11 October 2021

Short data sheet

1. General description

Extremely low clamping, extremely low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode, part of the TrEOS protection family. This device is housed in a DSN0603-2 (SOD962-2) leadless, ultra-small Surface-Mounted Device (SMD) 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
- Extremely low diode capacitance, $C_d = 0.1$ pF at 10 GHz
- Extremely low clamping voltage to protect sensitive transceivers
- Extremely low leakage current < 1 nA at 5 V
- Extremely low inductance protection path to ground
- Very high surge robustness: 4.8 A for 8/20 μ s pulse
- Extremely low insertion loss: -0.28 dB at 10 GHz
- Extremely low return loss: -19 dB at 10 GHz
- 20 Gbps capable
- Ultra-small SMD package

3. Applications

- Cellular handsets and accessories
- Portable electronics
- Communication systems
- Computers and peripherals
- USB4, USB3.2, Thunderbolt4 and HDMI2.1 data lines

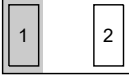
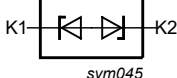
4. Quick reference data

Table 1. Quick reference data

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|--|-----|-----|-----|------|
| V_{RWM} | reverse standoff voltage | | -5 | - | 5 | V |
| C_d | diode capacitance | $f = 10$ GHz; $V_R = 0$ V; $T_{amb} = 25$ °C | - | 0.1 | - | pF |

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>DSN0603-2 (SOD962-2)</p> |  <p><i>sym045</i></p> |
| 2 | K2 | cathode (diode 2) | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------|-----------|---|----------|
| | Name | Description | Version |
| PESD5V0R1BDSF | DSN0603-2 | silicon, leadless ultra small package; 2 terminals; 0.4 mm pitch; 0.6 mm x 0.3 mm x 0.3 mm body | SOD962-2 |

7. Application information

The device is designed for the protection of one data or signal 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.

The device uses an advanced clamping structure showing a negative dynamic resistance. This snap-back behavior strongly reduces the clamping voltage to the system behind the ESD protection during an ESD event. Do not connect unlimited DC current sources to the data lines to avoid keeping the ESD protection device in snap-back state after exceeding breakdown voltage (due to an ESD pulse for instance).

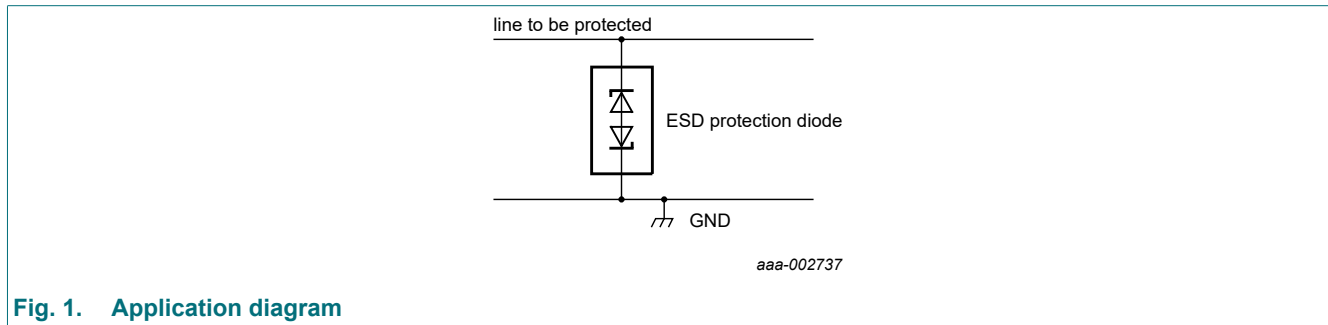


Fig. 1. Application diagram

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.

8. Package outline

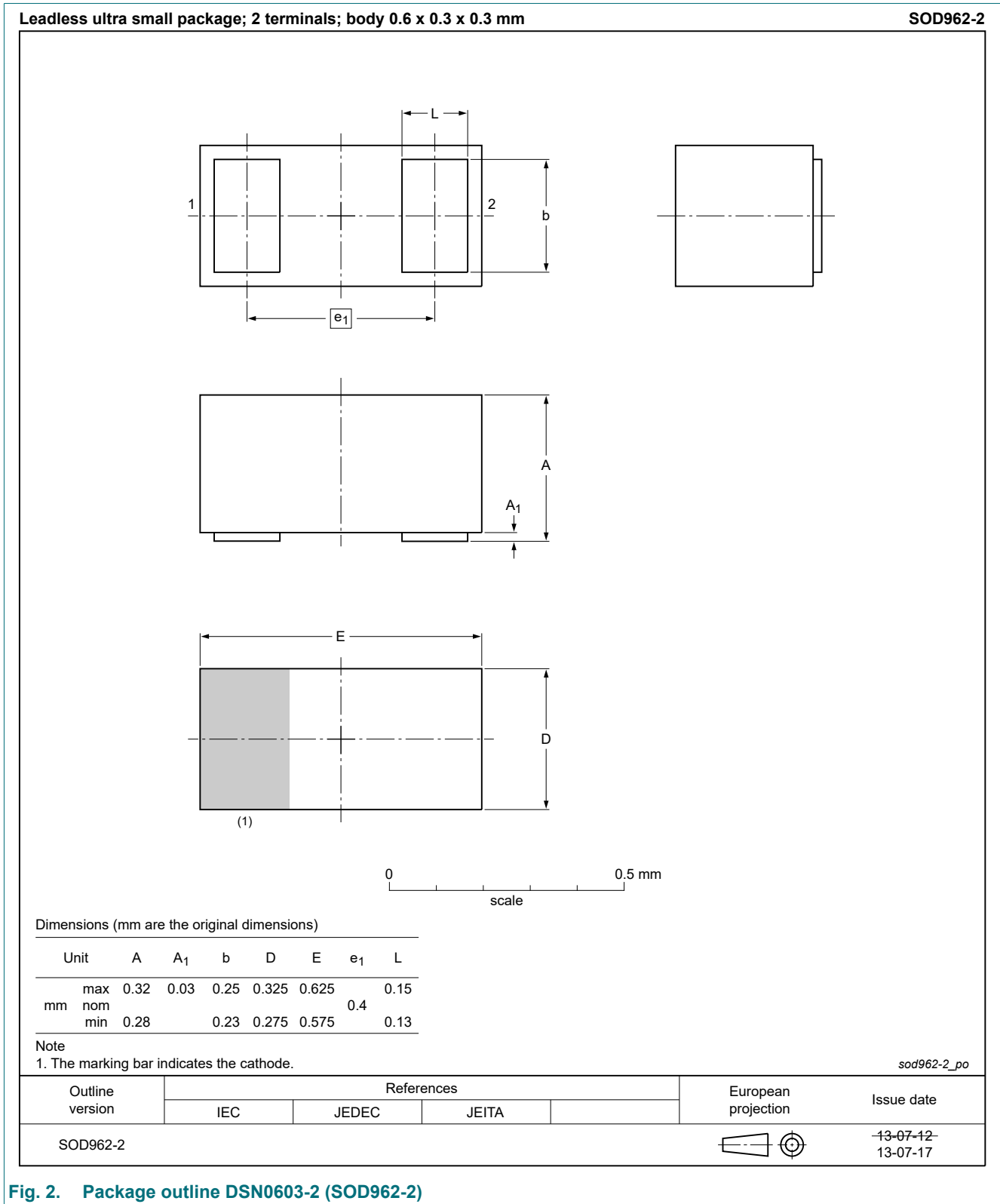


Fig. 2. Package outline DSN0603-2 (SOD962-2)

9. Soldering

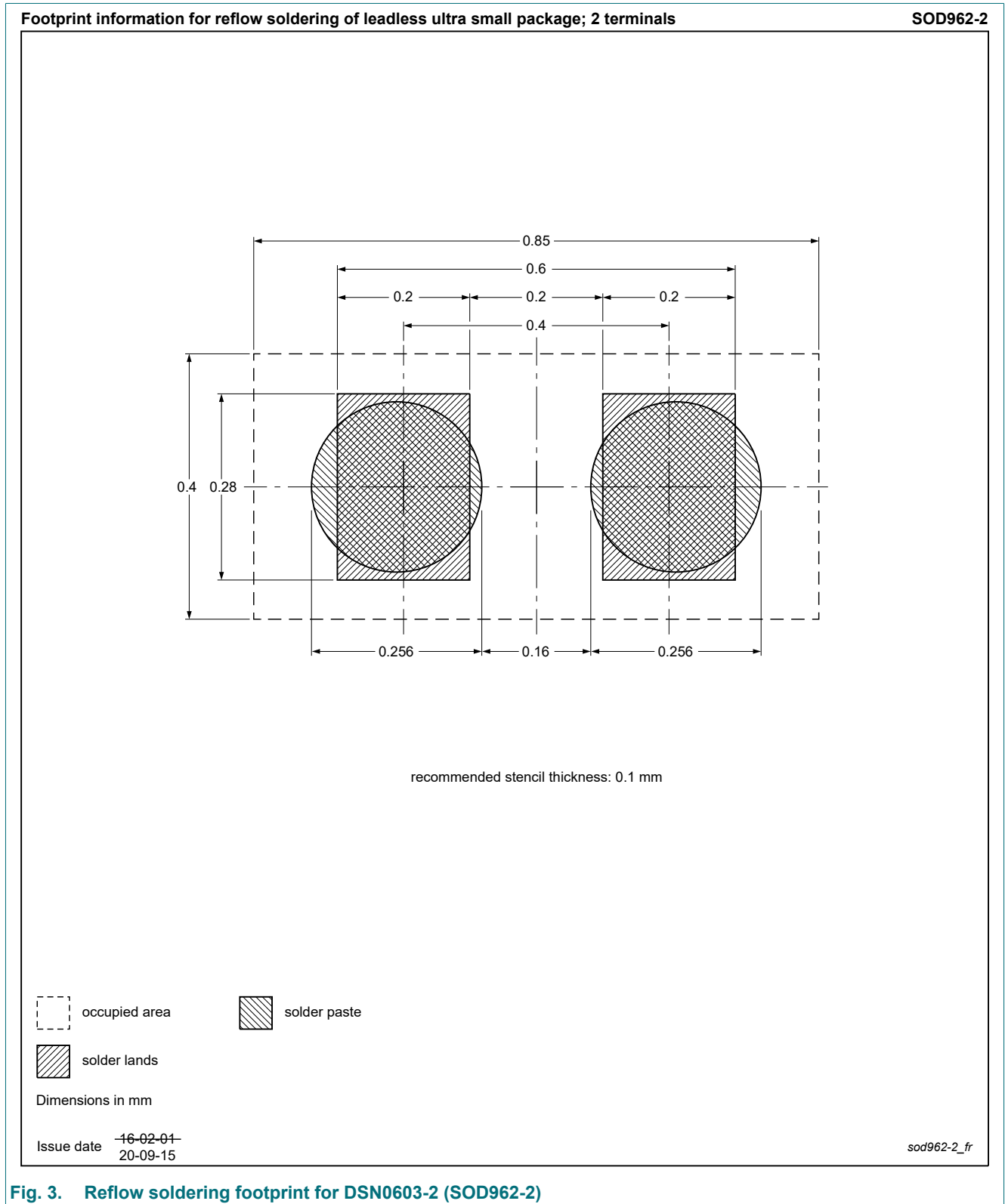


Fig. 3. Reflow soldering footprint for DSN0603-2 (SOD962-2)

10. Revision history

Table 4. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|-----------------------|----------------------------------|-------------------|---------------|-----------------------|
| PESD5V0R1BDSF_SDS v.2 | 20211011 | Short data sheet | - | PESD5V0R1BDSF_SDS v.1 |
| Modifications: | • Update of applications chapter | | | |
| PESD5V0R1BDSF_SDS v.1 | 20210212 | Short data sheet | - | - |

11. 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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