



PESD5V0F1BRSF

Extremely low capacitance bidirectional ESD protection diode

Rev. 1 — 13 February 2013

Product data sheet

1. Product profile

1.1 General description

Extremely low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in a DSN0603-2 (SOD962) leadless ultra small Surface-Mounted Device (SMD) package designed to protect one signal line from the damage caused by ESD and other transients.

1.2 Features and benefits

- Bidirectional ESD protection of one line
- Extremely low diode capacitance $C_d = 0.25$ pF
- Minimized capacitance variation over voltage
- ESD protection up to ± 10 kV according to IEC 61000-4-2
- Ultra small SMD package

1.3 Applications

- Cellular handsets and accessories
- Portable electronics
- Communication systems
- Computers and peripherals

1.4 Quick reference data

Table 1. Quick reference data

$T_{amb} = 25$ °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|--------------------------|------|------|------|------|
| V_{RWM} | reverse standoff voltage | | - | - | 5 | V |
| C_d | diode capacitance | $f = 1$ MHz; $V_R = 0$ V | 0.20 | 0.25 | 0.30 | pF |

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------------|-----------------------------|----------------|
| 1 | cathode (diode 1) | <p>Transparent top view</p> | <p>sym045</p> |
| 2 | cathode (diode 2) | | |



3. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|---------------|-----------|--|---------|
| | Name | Description | Version |
| PESD5V0F1BRSF | DSN0603-2 | leadless ultra small package; 2 terminals; body 0.6 × 0.3 × 0.3 mm | SOD962 |

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|---------------|--------------|
| PESD5V0F1BRSF | F |

5. Limiting values

Table 5. Limiting values

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|--------------------------|--------------------|-------|------|------|
| P_{PPM} | rated peak pulse power | $t_p = 8/20 \mu s$ | [1] - | 28 | W |
| I_{PPM} | rated peak pulse current | $t_p = 8/20 \mu s$ | [1] - | 2.2 | A |
| T_j | junction temperature | | - | 150 | °C |
| T_{amb} | ambient temperature | | -55 | +150 | °C |
| T_{stg} | storage temperature | | -65 | +150 | °C |

[1] Non-repetitive current pulse 8/20 μs exponentially decaying waveform according to IEC61000-4-5.

Table 6. ESD maximum ratings

| Symbol | Parameter | Conditions | Min | Max | Unit |
|-----------|---------------------------------|-----------------------------------|-------|-----|------|
| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [1] - | 10 | kV |
| | | IEC 61000-4-2 (air discharge) | [1] - | 15 | kV |
| | | MIL-STD-883 (human body model) | - | 10 | kV |

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

Table 7. ESD standards compliance

| Standard | Conditions |
|--|---------------------------------|
| IEC 61000-4-2, level 4 (ESD) | > 15 kV (air); > 8 kV (contact) |
| MIL-STD-883; class 3B (human body model) | > 8 kV |

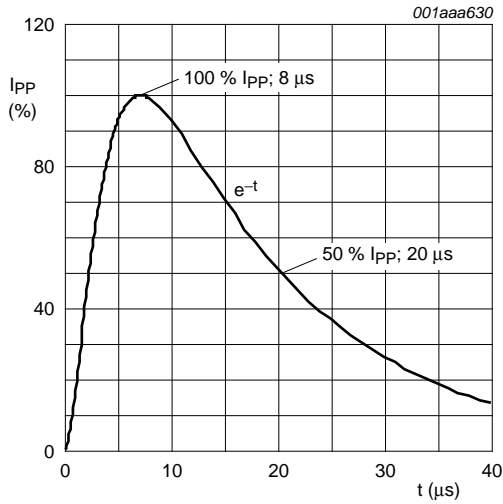


Fig 1. 8/20 μs pulse waveform according to IEC 61000-4-5

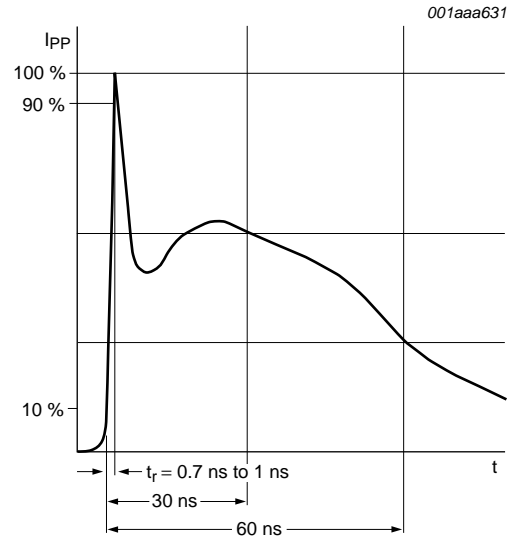


Fig 2. ESD pulse waveform according to IEC 61000-4-2

6. Characteristics

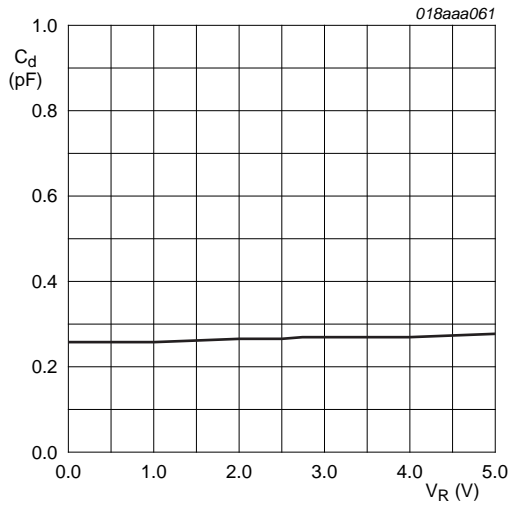
Table 8. Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|--------------------------------------|------|------|------|----------|
| V_{RWM} | reverse standoff voltage | | - | - | 5 | V |
| I_{RM} | reverse leakage current | $V_{RWM} = 5\text{ V}$ | - | 1 | 100 | nA |
| V_{CL} | clamping voltage | $I_{PP} = 0.5\text{ A}$ | [1] | - | 10 | V |
| | | $I_{PPM} = 2.2\text{ A}$ | [1] | - | 12.8 | V |
| V_{BR} | breakdown voltage | $I_R = 1\text{ mA}$ | 6 | - | 10 | V |
| C_d | diode capacitance | $f = 1\text{ MHz}; V_R = 0\text{ V}$ | 0.20 | 0.25 | 0.30 | pF |
| r_{dyn} | dynamic resistance | $I_R = 10\text{ A}$ | [2] | - | 1.3 | Ω |

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.

[2] Non-repetitive current pulse, Transmission Line Pulse (TLP) $t_p = 100\text{ ns}$; square pulse; ANS/IESD STM5.1-2008.



f = 1 MHz; T_{amb} = 25 °C

Fig. 3. Diode capacitance as a function of reverse voltage; typical values

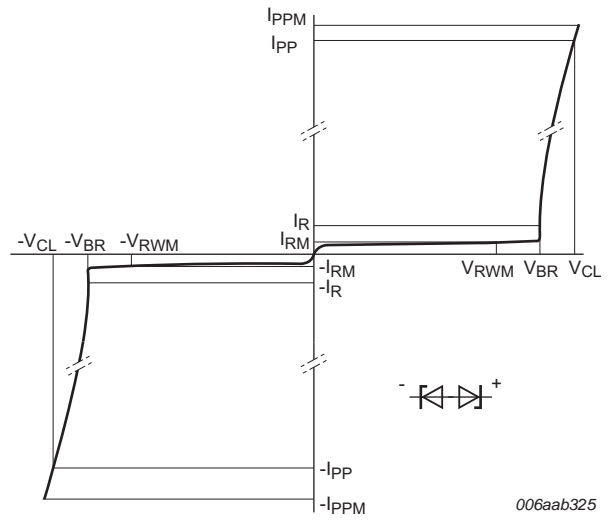
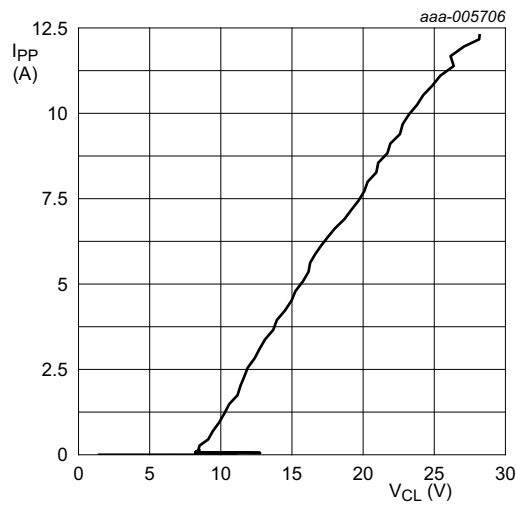


Fig. 4. V-I characteristics for a bidirectional ESD protection diode



t_p = 100 ns; Transmission Line Pulse (TLP)

Fig. 5. Dynamic resistance; typical values

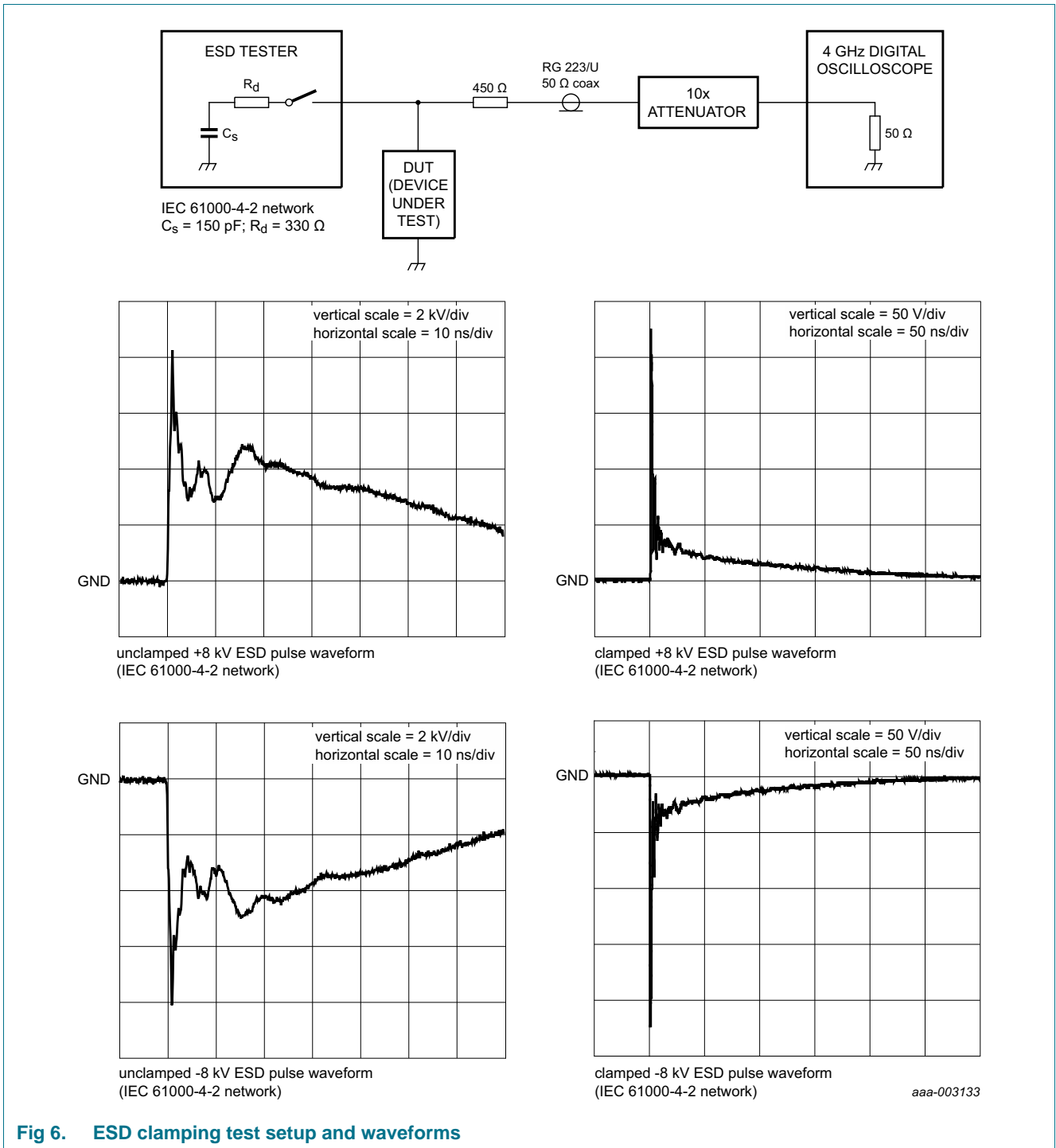


Fig 6. ESD clamping test setup and waveforms

7. Application information

The PESD5V0F1BRSF 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. It provides protection against surges with up to 28 W per line.

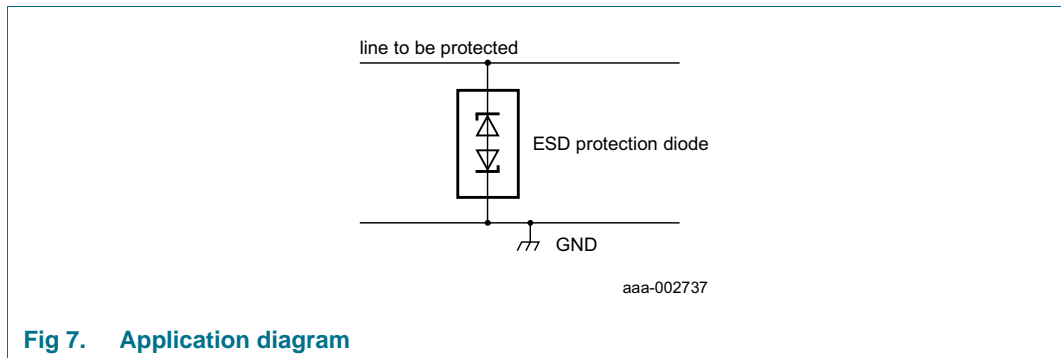


Fig 7. Application diagram

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.

8. Package outline

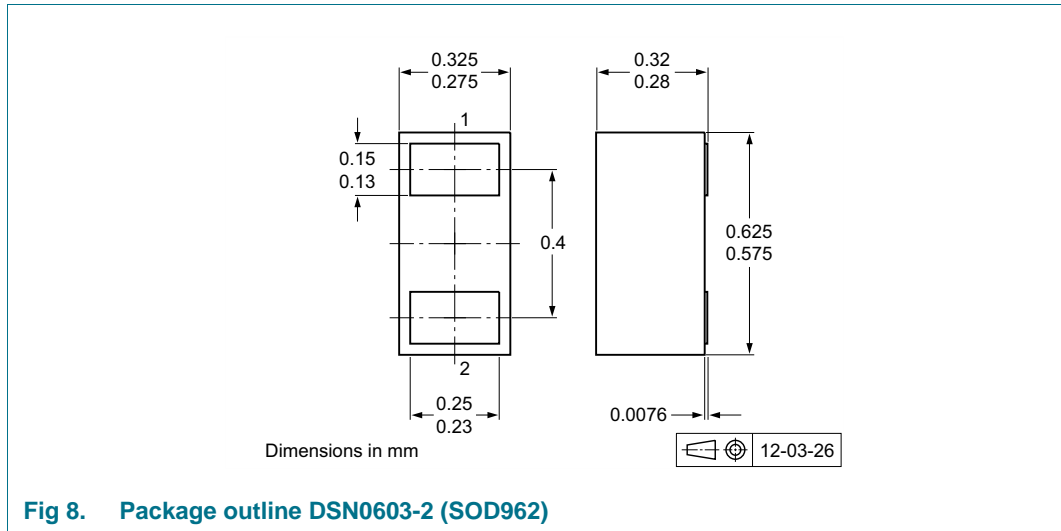


Fig 8. Package outline DSN0603-2 (SOD962)

9. Packing information

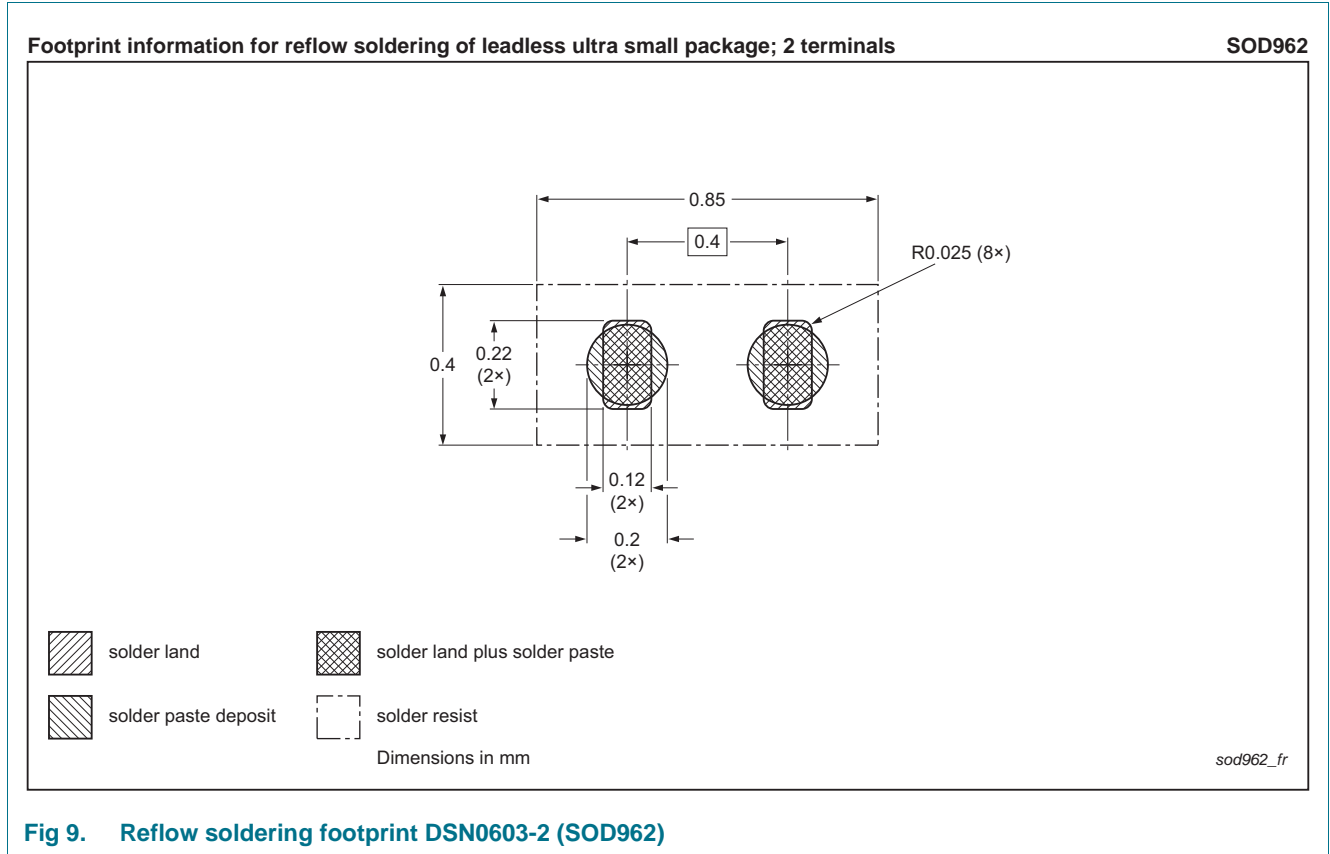
Table 9. Packing methods

The indicated -xxx are the last three digits of the 12NC ordering code.^[1]

| Type number | Package | Description | Packing quantity |
|---------------|--------------------|--------------------------------|------------------|
| | | | 9000 |
| PESD5V0F1BRSF | DSN0603-2 (SOD962) | 2 mm pitch, 8 mm tape and reel | -315 |

[1] For further information and the availability of packing methods, see [Section 13](#).

10. Soldering



11. Revision history

Table 10. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|-------------------|--------------|--------------------|---------------|------------|
| PESD5V0F1BRSF v.1 | 20130213 | Product data sheet | - | - |

12. Legal information

12.1 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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