

Unidirectional ESD protection diode Rev. 1 — 11 May 2011

Product data sheet

Product profile 1.

1.1 General description

Unidirectional ElectroStatic Discharge (ESD) protection diode designed to protect one signal line from the damage caused by ESD and other transients. The device is housed in a SOD882D leadless ultra small Surface-Mounted Device (SMD) plastic package with visible and solderable side pads.

1.2 Features and benefits

- ESD protection of one line
- Ultra small SMD plastic package
- Solderable side pads
- Package height typ. 0.37 mm
- Low clamping voltage: $V_{Cl} = 23 \text{ V}$
- AEC-Q101 qualified

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Communication systems
- Portable electronics

1.4 Quick reference data

Table 1. Quick reference data

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

| Symbol | Parameter | Conditions | Min | Тур | Max | Unit |
|------------------|--------------------------|--|-----|-----|-----|------|
| V _{RWM} | reverse standoff voltage | | - | - | 15 | V |
| C _d | diode capacitance | $f = 1 \text{ MHz}; V_R = 0 \text{ V}$ | - | 32 | 70 | pF |

- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); I_{PP} = 5 A
- Max. peak pulse power: P_{PP} = 150 W
- Ultra low leakage current: I_{RM} < 1 nA



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2. Pinning information

| Pin | Description | Simplified outline | Graphic symbol |
|-----|-------------|-------------------------|------------------|
| 1 | cathode | <u>[1]</u> | |
| 2 | anode | | 1 2 006aaa152 |
| | | Transparent top view | |

3. Ordering information

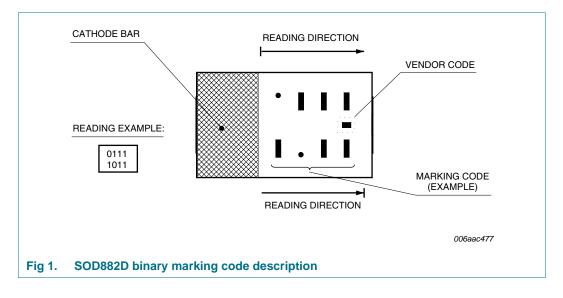
| Table 3. Ordering | g informati | on | |
|-------------------|-------------|--|---------|
| Type number | Package | | |
| | Name | Description | Version |
| PESD15VS1ULD | - | leadless ultra small plastic package; 2 terminals; body 1 \times 0.6 \times 0.4 mm | SOD882D |

4. Marking

| Table 4. Marking codes | |
|------------------------|-----------------------------|
| Type number | Marking code ^[1] |
| PESD15VS1ULD | 0110 0000 |

[1] For SOD882D binary marking code description, see Figure 1.

4.1 Binary marking code description



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Limiting values 5.

Table 5. **Limiting values**

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

| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|----------------------|--------------------------|--------------|------|------|
| P _{PP} | peak pulse power | t _p = 8/20 μs | <u>[1]</u> _ | 150 | W |
| I _{PP} | peak pulse current | t _p = 8/20 μs | <u>[1]</u> _ | 5 | А |
| Tj | 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 exponential decay waveform according to IEC 61000-4-5.

Table 6. **ESD** maximum ratings

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

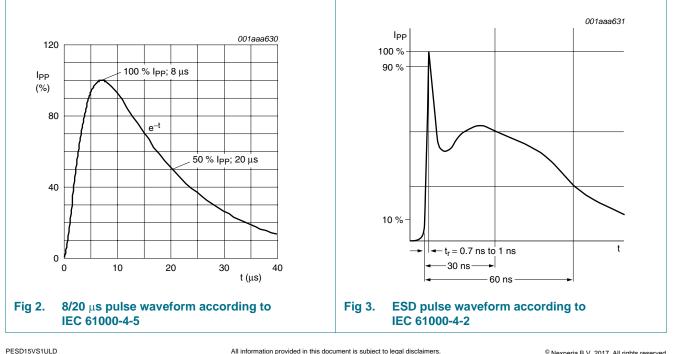
| Symbol | Parameter | Conditions | Min | Max | Unit |
|------------------|------------------------------------|--------------------------------------|-----------------|-----|------|
| V _{ESD} | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | <u>[1][2]</u> _ | 30 | kV |
| | | MIL-STD-883 (human body model) | [2] _ | 10 | kV |

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

[2] Measured from pin 1 to 2.

Table 7. **ESD** standards compliance

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



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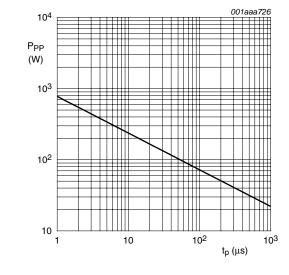
6. Characteristics

| Table 8. $T_{amb} = 25$ | Characteristics 5 ℃ unless otherwise spe | cified. | | | | | |
|--------------------------------|---|-------------------------|--------------|------|-----|------|------|
| Symbol | Parameter | Conditions | | Min | Тур | Max | Unit |
| V_{RWM} | reverse standoff voltage | | | - | - | 15 | V |
| I _{RM} | reverse leakage current | V _{RWM} = 15 V | • | - | < 1 | 50 | nA |
| V _{BR} | breakdown voltage | I _R = 5 mA | | 17.6 | 18 | 18.4 | V |
| C _d | diode capacitance | $f = 1 MHz; V_R = 0 V$ | | - | 32 | 70 | pF |
| V _{CL} | clamping voltage | | [1][2] | | | | |
| | | I _{PP} = 1 A | | - | - | 23 | V |
| | | I _{PP} = 5 A | | - | - | 40 | V |
| r _{dyn} | dynamic resistance | I _R = 10 A | <u>[3]</u> . | - | 0.6 | - | Ω |

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

[2] Measured from pin 1 to 2.

[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) t_p = 100 ns; square pulse; ANS/IESD STM5-1-2008.



 $T_{amb} = 25 \ ^{\circ}C$

Fig 4. Peak pulse power as a function of exponential pulse duration; typical values

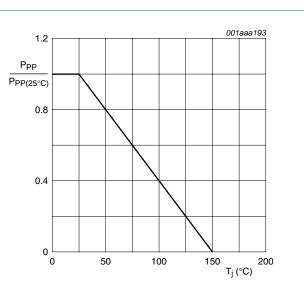
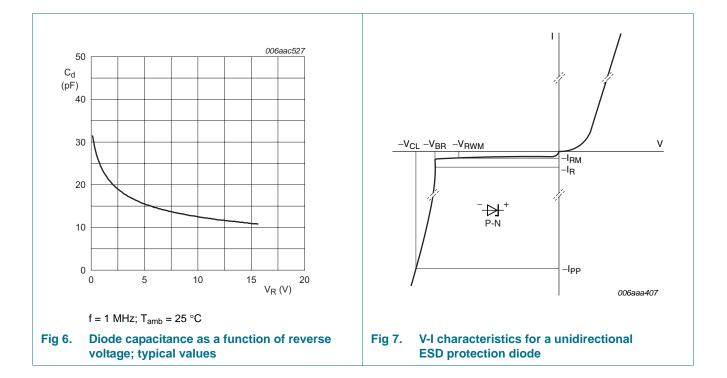


Fig 5. Relative variation of peak pulse power as a function of junction temperature; typical values

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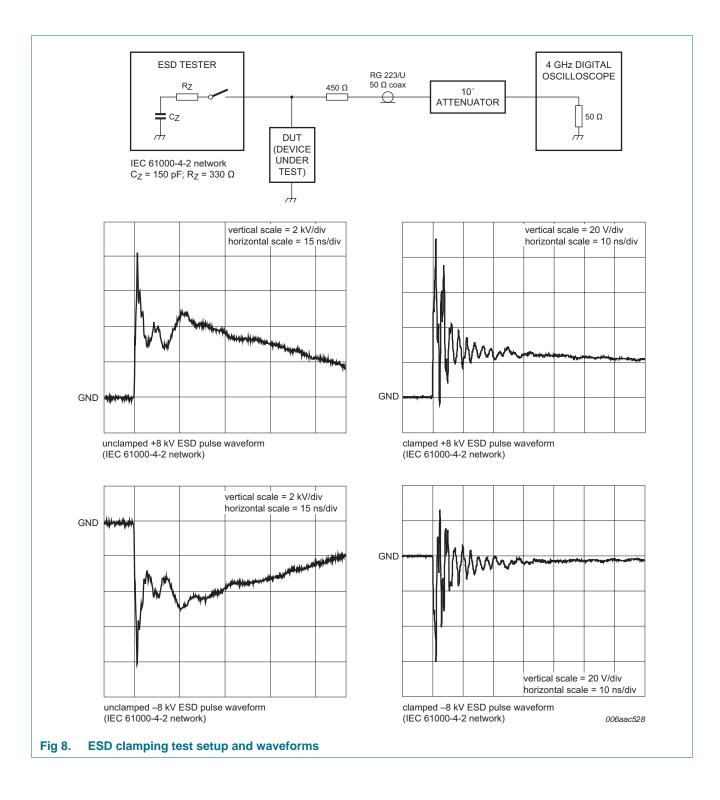
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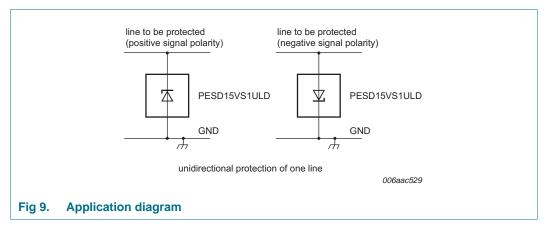


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7. Application information

The PESD15VS1ULD is designed for the protection of one unidirectional data or signal line from the damage caused by ESD and surge pulses. The device may be used on lines where the signal polarities are either positive or negative with respect to ground. The PESD15VS1ULD provides a surge capability of 150 W per line for an 8/20 μ s waveform.



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 PESD15VS1ULD as close to the input terminal or connector as possible.
- 2. The path length between the PESD15VS1ULD and the protected line should be minimized.
- 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. Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

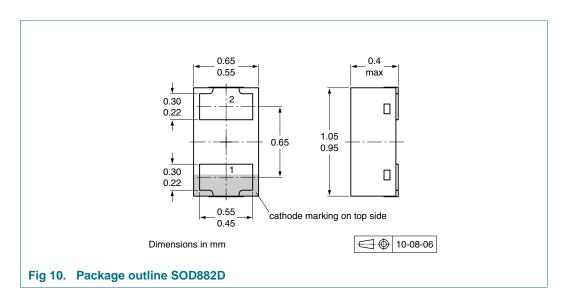
8. Test information

8.1 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.

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9. Package outline



10. Packing information

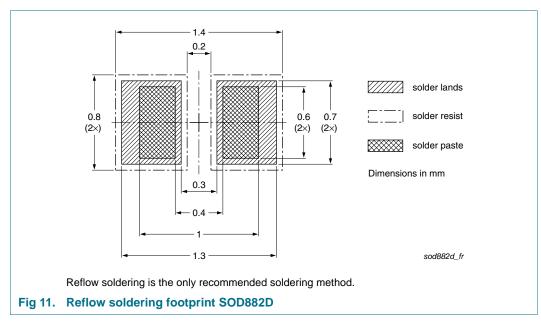
Table 9. Packing methods

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

| Type number | Package | Description | Packing quantity |
|--------------|---------|--------------------------------|------------------|
| | | | 10000 |
| PESD15VS1ULD | SOD882D | 2 mm pitch, 8 mm tape and reel | -315 |

[1] For further information and the availability of packing methods, see <u>Section 14</u>.

11. Soldering



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PESD15VS1ULD

12. Revision history

| Table 10. Revision hist | Revision history | | | | | |
|-------------------------|------------------|--------------------|---------------|------------|--|--|
| Document ID | Release date | Data sheet status | Change notice | Supersedes | | |
| PESD15VS1ULD v.1 | 20110511 | Product data sheet | - | - | | |

13. Legal information

13.1 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".

[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 URL http://www.nexperia.com.

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Product data sheet

PESD15VS1ULD

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For more information, please visit: http://www.nexperia.com

For sales office addresses, please send an email to: salesaddresses@nexperia.com

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