1. Product profile

1.1 General description

Ultra low capacitance bidirectional 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

- Bidirectional ESD protection of one line
- AEC-Q101 qualified
- Ultra small SMD plastic package
- ESD protection up to 10 kV
- Solderable side pads
- IEC 61000-4-2; level 4 (ESD)
- Package height typ. 0.37 mm
- Ultra low leakage current: IRM = 5 nA
- Ultra low diode capacitance Cd = 2.9 pF

1.3 Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- High-speed data lines
- Communication systems
- Portable electronics

1.4 Quick reference data

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>VRWM</td>
<td>reverse standoff voltage</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Cd</td>
<td>diode capacitance</td>
<td>f = 1 MHz; VR = 0 V</td>
<td>-</td>
<td>2.9</td>
<td>3.5</td>
<td>pF</td>
</tr>
</tbody>
</table>

2. Pinning information

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>cathode (diode 1)</td>
<td><img src="image1.png" alt="Simplified outline" /></td>
<td><img src="image2.png" alt="Graphic symbol" /></td>
</tr>
<tr>
<td>2</td>
<td>cathode (diode 2)</td>
<td><img src="image1.png" alt="Simplified outline" /></td>
<td><img src="image2.png" alt="Graphic symbol" /></td>
</tr>
</tbody>
</table>

3. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0U1BLD</td>
<td>-</td>
<td></td>
<td>leadless ultra small package; 2 terminals; body 1 × 0.6 × 0.4 mm</td>
<td>SOD882D</td>
</tr>
</tbody>
</table>

4. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code[1]</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0U1BLD</td>
<td>0001 0000</td>
</tr>
</tbody>
</table>

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

4.1 Binary marking code description

Fig 1. SOD882D binary marking code description

5. Limiting values

Table 5. Limiting values

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

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T_J$</td>
<td>junction temperature</td>
<td></td>
<td>-</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{amb}}$</td>
<td>ambient temperature</td>
<td>-55</td>
<td>+150</td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>$T_{\text{stg}}$</td>
<td>storage temperature</td>
<td>-65</td>
<td>+150</td>
<td></td>
<td>°C</td>
</tr>
</tbody>
</table>
Table 6. ESD maximum ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{ESD}</td>
<td>electrostatic discharge voltage</td>
<td>IEC 61000-4-2 (contact discharge)</td>
<td>[1][2]</td>
<td>10</td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td>machine model</td>
<td></td>
<td>-</td>
<td>400</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>MIL-STD-883 (human body model)</td>
<td></td>
<td>[2]</td>
<td>10</td>
<td>kV</td>
</tr>
</tbody>
</table>


Table 7. ESD standards compliance

<table>
<thead>
<tr>
<th>Standard</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEC 61000-4-2; level 4 (ESD)</td>
<td>&gt; 15 kV (air); &gt; 8 kV (contact)</td>
</tr>
<tr>
<td>MIL-STD-883; class 3 (human body model)</td>
<td>&gt; 4 kV</td>
</tr>
</tbody>
</table>

Fig 2. 8/20 μs pulse waveform according to IEC 61000-4-5

Fig 3. ESD pulse waveform according to IEC 61000-4-2
6. Characteristics

Table 8. Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{RWM}$</td>
<td>reverse standoff voltage</td>
<td>$V_{RWM} = 5 \text{ V}$</td>
<td></td>
<td>-</td>
<td>-</td>
<td>5 $\text{ V}$</td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>reverse leakage current</td>
<td>$V_{RWM} = 5 \text{ V}$</td>
<td>-</td>
<td>5</td>
<td>100</td>
<td>$\text{nA}$</td>
</tr>
<tr>
<td>$V_{BR}$</td>
<td>breakdown voltage</td>
<td>$I_{R} = 5 \text{ mA}$</td>
<td>5.5</td>
<td>7</td>
<td>9.5</td>
<td>$\text{V}$</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 \text{ MHz} \gg \omega ; , V_{R} = 0 \text{ V}$</td>
<td>-</td>
<td>2.9</td>
<td>3.5</td>
<td>$\text{pF}$</td>
</tr>
<tr>
<td>$r_{dyn}$</td>
<td>dynamic resistance</td>
<td>$I_{R} = 10 \text{ A}$</td>
<td>-</td>
<td>0.8</td>
<td>-</td>
<td>$\Omega$</td>
</tr>
</tbody>
</table>

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

![Diode capacitance as a function of reverse voltage; typical values](image1.png)

**Fig 4.** Diode capacitance as a function of reverse voltage; typical values

![V-I characteristics for a bidirectional ESD protection diode](image2.png)

**Fig 5.** V-I characteristics for a bidirectional ESD protection diode
Fig 6. ESD clamping test setup and waveforms
7. Application information

The PESD5V0U1BLD is designed for the protection of one bidirectional 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 both, positive and negative with respect to ground.

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 PESD5V0U1BLD as close to the input terminal or connector as possible.
2. The path length between the PESD5V0U1BLD 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.
9. Package outline

Fig 8. Package outline SOD882D

10. Packing information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Packing quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0U1BLD</td>
<td>SOD882D</td>
<td>2 mm pitch, 8 mm tape and reel</td>
<td>-315</td>
</tr>
</tbody>
</table>

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

11. Soldering

Fig 9. Reflow soldering footprint SOD882D

Reflow soldering is the only recommended soldering method.
## 12. Revision history

<table>
<thead>
<tr>
<th>Document ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<tr>
<td>PESD5V0U1BLD v.2</td>
<td>20110727</td>
<td>Product data sheet</td>
<td>-</td>
<td>PESD5V0U1BLD v.1</td>
</tr>
<tr>
<td>Modifications:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Section 2 “Pinning information” is corrected.</td>
<td></td>
<td></td>
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<tr>
<td>PESD5V0U1BLD v.1</td>
<td>20110504</td>
<td>Product data sheet</td>
<td>-</td>
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</table>
### 13. Legal information

#### 13.1 Data sheet status

<table>
<thead>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Objective [short] data sheet</td>
<td>Development</td>
<td>This document contains data from the objective specification for product development.</td>
</tr>
<tr>
<td>Preliminary [short] data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product [short] data sheet</td>
<td>Production</td>
<td>This document contains the product specification.</td>
</tr>
</tbody>
</table>

[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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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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