1. Product profile

1.1 General description

Femtofarad bidirectional ElectroStatic Discharge (ESD) protection diode in a leadless ultra small SOD882 Surface-Mounted Device (SMD) plastic package designed to protect one signal line from the damage caused by ESD and other transients. The combination of extremely low capacitance, high ESD maximum rating and ultra small package makes the device ideal for high-speed data line protection and antenna protection applications.

1.2 Features and benefits

- Bidirectional ESD protection of one line
- Femtofarad capacitance: \( C_d = 400 \text{ fF} \)
- Low ESD clamping voltage: 30 V at 30 ns and \( \pm 8 \text{ kV} \)
- Very low leakage current: \( I_{RM} < 1 \text{ nA} \)
- ESD protection up to 10 kV
- IEC 61000-4-2; level 4 (ESD)
- AEC-Q101 qualified
- Low ESD clamping voltage: 30 V

1.3 Applications

- 10/100/1000 Mbit/s Ethernet
- FireWire
- High-speed data lines
- Subscriber Identity Module (SIM) card protection
- Cellular handsets and accessories
- Portable electronics
- Communication systems
- Computers and peripherals
- Audio and video equipment
- Antenna protection

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>( V_{RWM} )</td>
<td>reverse standoff voltage</td>
<td>-</td>
<td>-</td>
<td>5.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>( C_d )</td>
<td>diode capacitance</td>
<td>( f = 1 \text{ MHz}; V_R = 0 \text{ V} )</td>
<td>-</td>
<td>0.4</td>
<td>0.55</td>
<td>pF</td>
</tr>
</tbody>
</table>
Nexperia

**PESD5V0F1BL**

Femtofarad bidirectional ESD protection diode

## 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></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>cathode (diode 2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Transparent top view

![Transparent top view](image)

## 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Name</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0F1BL</td>
<td>SOD882</td>
<td>leadless ultra small plastic package; 2 terminals; body 1.0 × 0.6 × 0.5 mm</td>
<td></td>
</tr>
</tbody>
</table>

## 4. Marking

### Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0F1BL</td>
<td>ZZ</td>
</tr>
</tbody>
</table>

## 5. Limiting values

### 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>IPp</td>
<td>peak pulse current</td>
<td>tp = 8/20 μs</td>
<td>2.5</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Tj</td>
<td>junction temperature</td>
<td></td>
<td>125</td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>Tamb</td>
<td>ambient temperature</td>
<td></td>
<td>-40</td>
<td>+125</td>
<td>°C</td>
</tr>
<tr>
<td>Tstg</td>
<td>storage temperature</td>
<td></td>
<td>-55</td>
<td>+125</td>
<td>°C</td>
</tr>
</tbody>
</table>

[1] Non-repetitive current pulse 8/20 μs exponential decay waveform according to IEC 61000-4-5.
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>$V_{\text{ESD}}$</td>
<td>electrostatic discharge voltage</td>
<td>IEC 61000-4-2 (contact discharge)</td>
<td>10 kV</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIL-STD-883 (human body model)</td>
<td>10 kV</td>
<td></td>
<td></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; 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 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

<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>-</td>
<td>-</td>
<td>5.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>I_RM</td>
<td>reverse leakage current</td>
<td>V_RWM = 5 V</td>
<td>-</td>
<td>1</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>V_BR</td>
<td>breakdown voltage</td>
<td>I_R = 1 mA</td>
<td>1</td>
<td>8</td>
<td>10</td>
<td>V</td>
</tr>
<tr>
<td>C_d</td>
<td>diode capacitance</td>
<td>f = 1 MHz; V_R = 0 V</td>
<td>0.4</td>
<td>0.55</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>V_CL</td>
<td>clamping voltage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I_PP = 1 A</td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I_PP = 2.5 A</td>
<td>-</td>
<td>-</td>
<td>15</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>r_dif</td>
<td>differential resistance</td>
<td>I_R = 20 mA</td>
<td>-</td>
<td>-</td>
<td>30</td>
<td>Ω</td>
</tr>
</tbody>
</table>

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

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

Fig 4. V-I characteristics for a bidirectional ESD protection diode
Fig 5. ESD clamping test setup and waveforms

IEC 61000-4-2 network
CZ = 150 pF; RZ = 330 Ω
7. Application information

PESD5V0F1BL 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.

![Application diagram](image)

Fig 6. 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. The path length between the device 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

![Package outline diagram](image)

Dimensions in mm

This is a generic drawing for SOD882 package. This product has no cathode marking.

Fig 7. Package outline PESD5V0F1BL (SOD882)

10. Packing information

Table 9. Packing methods

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Packing quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0F1BL</td>
<td>SOD882</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

Reflow soldering is the only recommended soldering method.

Fig 8. Reflow soldering footprint PESD5V0F1BL (SOD882)
12. Revision history

Table 10. 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>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0F1BL v.3</td>
<td>20111024</td>
<td>Product data sheet</td>
<td>-</td>
<td>PESD5V0F1BL v.2</td>
</tr>
<tr>
<td>Modifications:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Figure 7 &quot;Package outline PESD5V0F1BL (SOD882)&quot;</td>
<td>updated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Section 13 &quot;Legal information&quot;</td>
<td>updated.</td>
<td></td>
</tr>
<tr>
<td>PESD5V0F1BL v.2</td>
<td>20110323</td>
<td>Product data sheet</td>
<td>-</td>
<td>PESD5V0F1BL v.1</td>
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<tr>
<td>PESD5V0F1BL v.1</td>
<td>20091001</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
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</table>
13. Legal information

13.1 Data sheet status

<table>
<thead>
<tr>
<th>Objective [short] data sheet</th>
<th>Product status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<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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