1. General description

Ultra low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in a leadless ultra small Surface-Mounted Device (SMD) plastic 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
- ESD protection up to 9 kV
- Ultra low diode capacitance: \( C_d = 1.3 \, \text{pF} \)
- Very low leakage current: \( I_{\text{RM}} = 1 \, \text{nA} \)
- IEC 61000-4-2; level 4 (ESD)
- AEC-Q101 qualified

3. Application information

- USB interfaces
- Cellular handsets and accessories
- Antenna protection
- Portable electronics
- 10/100/1000 Mbit/s Ethernet
- Communication systems
- Computers and peripherals
- High-speed data lines
- Audio and video equipment
- SIM card protection

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_{\text{RWM}} )</td>
<td>reverse standoff voltage</td>
<td>( T_{\text{amb}} = 25 , ^\circ\text{C} )</td>
<td>-</td>
<td>-</td>
<td>3.3</td>
<td>V</td>
</tr>
<tr>
<td>( C_d )</td>
<td>diode capacitance</td>
<td>( f = 1 , \text{MHz}; , V_R = 0 , \text{V}; , T_{\text{amb}} = 25 , ^\circ\text{C} )</td>
<td>-</td>
<td>1.3</td>
<td>1.6</td>
<td>pF</td>
</tr>
</tbody>
</table>
5. Pinning information

Table 2. Pinning information

<table>
<thead>
<tr>
<th>Pin</th>
<th>Symbol</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K1</td>
<td>cathode (diode 1)</td>
<td><img src="image" alt="DFN1006-2" /></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>K2</td>
<td>cathode (diode 2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. 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>PESD3V3X1BL</td>
<td>DFN1006-2</td>
<td>plastic, leadless</td>
<td>ultra small package; 2 terminals; 0.65 mm</td>
<td>SOD882</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Description</td>
<td>pitch; 1 mm x 0.6 mm x 0.48 mm body</td>
<td></td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD3V3X1BL</td>
<td>SS</td>
</tr>
</tbody>
</table>
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_amb</td>
<td>ambient temperature</td>
<td></td>
<td>-55</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>T_stg</td>
<td>storage temperature</td>
<td></td>
<td>-65</td>
<td>150</td>
<td>°C</td>
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</table>

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</td>
<td>IEC 61000-4-2; contact discharge</td>
<td>-</td>
<td>9</td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td>voltage</td>
<td>MIL-STD-883 (human body model)</td>
<td>-</td>
<td>10</td>
<td>kV</td>
</tr>
</tbody>
</table>


Fig. 1. ESD pulse waveform according to IEC 61000-4-2
## 9. Characteristics

### Table 6. 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>$T_{amb} = 25^\circ C$</td>
<td>-</td>
<td>-</td>
<td>3.3</td>
<td>V</td>
</tr>
<tr>
<td>$V_{BR}$</td>
<td>breakdown voltage</td>
<td>$I_R = 5 \text{ mA}; T_{amb} = 25^\circ C$</td>
<td>5</td>
<td>6.3</td>
<td>7.8</td>
<td>V</td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>reverse leakage current</td>
<td>$V_{RWM} = 3 \text{ V}; T_{amb} = 25^\circ C$</td>
<td>-</td>
<td>1</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25^\circ C$</td>
<td>-</td>
<td>1.3</td>
<td>1.6</td>
<td>pF</td>
</tr>
<tr>
<td>$r_{dif}$</td>
<td>differential resistance</td>
<td>$I_R = 5 \text{ mA}$</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>Ω</td>
</tr>
</tbody>
</table>

![Fig. 2. Diode capacitance as a function of reverse voltage; typical values](006aab4f2)

![Fig. 3. V-I characteristics for a bidirectional ESD protection diode](006aaas676)

---

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Product data sheet 22 August 2018
Fig. 4. ESD clamping test setup and waveforms
10. **Application information**

The device is designed for the protection of one bidirectional data or signal line from the damage caused by ESD. The device may be used on line 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 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.

---

11. **Test information**

**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.
12. Package outline

![Package outline DFN1006-2 (SOD882)](image)

Dimensions in mm

- 1.02 x 0.95
- 0.65 x 0.47
- 0.55 x 0.46
- 0.30 x 0.22

Cathode marking on top side (if applicable)

Fig. 6. Package outline DFN1006-2 (SOD882)

13. Soldering

![Reflow soldering footprint for DFN1006-2 (SOD882)](image)

- solder lands
- solder resist
- solder paste
- occupied area

Dimensions in mm

Fig. 7. Reflow soldering footprint for DFN1006-2 (SOD882)
14. Revision history

<table>
<thead>
<tr>
<th>Data sheet ID</th>
<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<tr>
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<td>20180822</td>
<td>Product data sheet</td>
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<td>PESD3V3X1BL v.1</td>
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**Modifications:**
- Application information: updated.
- The format of this data sheet has been redesigned to comply with the identity guidelines of Nexperia.
- Legal texts have been adapted to the new company name where appropriate.

<table>
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<tr>
<th>Data sheet ID</th>
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<td>Product data sheet</td>
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15. Legal information

Data sheet status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<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 https://www.nexperia.com.

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