1. Product profile

1.1 General description
Extremely low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in a leadless ultra small SOD882 (DFN1006-2) 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.

1.2 Features and benefits
- Bidirectional ESD protection of one line
- Extremely low capacitance: \( C_d = 0.49 \text{ pF} \)
- Low clamping voltage: \( V_{CL} = 18 \text{ V} \)
- Ultra low leakage current: \( I_{RM} = 1 \text{ nA} \)
- ESD protection up to 8 kV
- IEC 61000-4-2; level 4 (ESD)
- AEC-Q101 qualified
- Low clamping voltage: \( V_{CL} = 18 \text{ V} \)
- Ultra low leakage current: \( I_{RM} = 1 \text{ nA} \)

1.3 Applications
- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- 10/100/1000 Mbit/s Ethernet
- USB, High-Definition Multimedia Interface (HDMI), FireWire
- Portable electronics
- SIM card protection
- High-speed data lines
- Communication systems

1.4 Quick reference data

Table 1. 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>0.49</td>
<td>0.60</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></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>cathode (diode 2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0X1BCL</td>
<td>DFN1006-2</td>
<td>SOD882</td>
<td>leadless ultra small plastic package; 2 terminals; body 1.0 x 0.6 x 0.5 mm</td>
</tr>
</tbody>
</table>

4. Marking

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0X1BCL</td>
<td>11</td>
</tr>
</tbody>
</table>

5. Limiting values

<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>I_{PPM}</td>
<td>rated peak pulse current</td>
<td>t_p = 8/20 µs</td>
<td>U</td>
<td>1.7</td>
<td>A</td>
</tr>
<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>
</tr>
</tbody>
</table>

[1] Device stressed with ten non-repetitive current pulses (8/20 µs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321).
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] -</td>
<td>8</td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>machine model</td>
<td>-</td>
<td>400</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIL-STD-883 (human body model)</td>
<td>-</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; 8 kV (contact)</td>
</tr>
<tr>
<td>MIL-STD-883; class 3B (human body model)</td>
<td>&gt; 8 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>$V_{RWM} = 5.5 \text{ V}$</td>
<td>-</td>
<td>-</td>
<td>5.5</td>
<td>V</td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>reverse leakage current</td>
<td>$I_R = 10 \text{ mA}$</td>
<td>-</td>
<td>$&lt;1$</td>
<td>10</td>
<td>nA</td>
</tr>
<tr>
<td>$V_{BR}$</td>
<td>breakdown voltage</td>
<td>$I_R = 10 \text{ mA}$</td>
<td>8.1</td>
<td>9.8</td>
<td>12.3</td>
<td>V</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 \text{ MHz}; V_R = 0 \text{ V}$</td>
<td>-</td>
<td>0.49</td>
<td>0.60</td>
<td>pF</td>
</tr>
<tr>
<td>$V_{CL}$</td>
<td>clamping voltage</td>
<td>$I_{PPM} = 1.7 \text{ A}$</td>
<td>[1]</td>
<td>-</td>
<td>18</td>
<td>V</td>
</tr>
<tr>
<td>$r_{dyn}$</td>
<td>dynamic resistance</td>
<td>$I_R = 10 \text{ A}$</td>
<td>[2]</td>
<td>-</td>
<td>0.9</td>
<td>$\Omega$</td>
</tr>
</tbody>
</table>

[1] Device stressed with $8/20 \mu$s exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321.

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

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
7. Application information

PESD5V0X1BCL is designed for the protection of one bidirectional 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.

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. 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 7. Package outline PESD5V0X1BCL (SOD882/DFN1006-2)

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>PESD5V0X1BCL</td>
<td>SOD882</td>
<td>2 mm pitch, 8 mm tape and reel</td>
<td>10000 -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 PESD5V0X1BCL (SOD882/DFN1006-2)
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>PESD5V0X1BCL v.1</td>
<td>20120312</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
13. Legal information

13.1 Data sheet status

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</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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14. Contact information

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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