1. General description

Low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode in a very small SOD323 (SC-76) 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
- Low diode capacitance: $C_d = 2.9 \text{ pF}$
- Ultra low leakage current: $I_{RM} = 5 \text{ nA}$
- ESD protection of up to 10 kV
- IEC 61000-4-2, level 4 (ESD)
- AEC-Q101 qualified

3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- 10/100/1000 Ethernet
- Local Area Network (LAN) equipment
- Communication systems
- Portable electronics
- SIM card protection
- High-speed data lines

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>$T_{\text{amb}} = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>-</td>
<td>5</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>2.9</td>
<td>3.5</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$f = 1 \text{ MHz}; V_R = 5 \text{ V}; T_{\text{amb}} = 25 ^\circ \text{C}$</td>
<td>-</td>
<td>1.9</td>
<td>-</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>SOD323</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>K2</td>
<td>cathode (diode 2)</td>
<td></td>
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</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>PESD5V0U1BA</td>
<td>SOD323</td>
<td>SOD323</td>
<td></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>PESD5V0U1BA</td>
<td>AA</td>
</tr>
</tbody>
</table>
8. 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>$T_{amb}$</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>

ESD maximum ratings

<table>
<thead>
<tr>
<th>$V_{ESD}$</th>
<th>electrostatic discharge voltage</th>
<th>Conditions</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{ESD}$</td>
<td></td>
<td>IEC 61000-4-2 (contact discharge)</td>
<td>[1]</td>
<td>10</td>
<td>kV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MIL-STD-883 (human body model)</td>
<td>-</td>
<td>8</td>
<td>kV</td>
</tr>
</tbody>
</table>


Fig. 1. ESD pulse waveform according to IEC 61000-4-2
9. 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>$T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>$V_{BR}$</td>
<td>breakdown voltage</td>
<td>$I_R = 5 , \text{mA}; T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>5.5</td>
<td>7</td>
<td>9.5</td>
<td>V</td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>reverse leakage current</td>
<td>$V_{RWM} = 5 , \text{V}; T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>5</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 , \text{MHz}; V_R = 0 , \text{V}; T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>2.9</td>
<td>3.5</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$f = 1 , \text{MHz}; V_R = 5 , \text{V}; T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>1.9</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$r_{\text{dif}}$</td>
<td>differential resistance</td>
<td>$I_R = 1 , \text{mA}; T_{\text{amb}} = 25 , ^\circ\text{C}$</td>
<td>-</td>
<td>-</td>
<td>100</td>
<td>$\Omega$</td>
</tr>
</tbody>
</table>

Fig. 2. Diode capacitance as a function of reverse voltage; typical values

Fig. 3. V-I characteristics for a bidirectional ESD protection diode
Low capacitance bidirectional ESD protection diode

Fig. 4. ESD clamping test setup and waveforms
10. Application information

The device is designed for the protection of one bidirectional data 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.

![Application diagram](aaa-002737)

**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 SOD323](image1.png)

Fig. 6. Package outline SOD323

13. Soldering

![Reflow soldering footprint for SOD323](image2.png)

Fig. 7. Reflow soldering footprint for SOD323

![Wave soldering footprint for SOD323](image3.png)

Fig. 8. Wave soldering footprint for SOD323
14. Revision history

Table 7. 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>
<td>PESD5V0U1BA v.1</td>
<td>20181011</td>
<td>Product data sheet</td>
<td>-</td>
<td>PESD5V0U1BA _BB_BL_1</td>
</tr>
</tbody>
</table>

Modifications:
- Features and benefit AEC-Q101 qualified added
- AEC-Q101 quality information added
- Limiting values; $T_{\text{amb}}$ updated to -55°C.
- The format of this data sheet had been redesigned to comply with the identity guidelines of Nexperia
- Legal texts have been adapted to the new company name where appropriate

| PESD5V0U1BA _BB_BL_1 | 20070425     | Product data sheet| -             | -                  |
Low capacitance bidirectional ESD protection diode

15. Legal information

Data sheet status

<table>
<thead>
<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>[1][2]</td>
<td>Development</td>
<td>This document contains data from the respective 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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