1. General description

Two bidirectional ElectroStatic Discharge (ESD) protection diodes designed to protect two signal lines from damage caused by ESD and other transients. The device is housed in a DFN1006-3 (SOT883) leadless ultra small Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Bidirectional ESD protection of two lines
- Ultra small SMD plastic package
- ESD protection up to 30 kV; IEC 61000-4-2
- $I_{PPM} = 9 \text{ A}$; IEC 61000-4-5 (surge)
- Ultra low leakage current: $I_{RM} = 1 \text{ nA}$
- AEC-Q101 qualified

3. Applications

- Computers and peripherals
- Audio and video equipment
- Cellular handsets and accessories
- Communication systems
- Portable electronics

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>$T_{amb} = 25 \degree \text{ C}$</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 \text{ MHz}; V_R = 0 \text{ V}; T_{amb} = 25 \degree \text{ C}$</td>
<td>18</td>
<td>20</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</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>K2</td>
<td>cathode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>K3</td>
<td>common cathode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DFN1006-3 (SOT883)

6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0V2BM</td>
<td>DFN1006-3</td>
<td>DFN1006-3: leadless ultra small plastic package; 3 solder lands</td>
<td>SOT883</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>PESD5V0V2BM</td>
<td>M2</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>I_{PPM}</td>
<td>rated peak pulse current</td>
<td>( t_p = 8/20 , \mu s )</td>
<td>[1]2</td>
<td>9</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>

ESD maximum ratings

| V_{ESD} | electrostatic discharge voltage | IEC 61000-4-2; contact discharge | [1][3] | -  | 30 | kV |
|         |                                  | IEC 61000-4-2; air discharge     | [1][3] | -  | 30 | kV |
|         |                                  | MIL-STD-883; human body model    | [1]   | -  | 10 | kV |

[1] Measured from pin 1 or 2 to pin 3.
Very low capacitance bidirectional ESD protection diodes

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_{\text{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>(I_{\text{RM}})</td>
<td>reverse leakage current</td>
<td>(V_{\text{RWM}} = 5 , \text{V}; ; T_{\text{amb}} = 25 , ^\circ\text{C})</td>
<td>[1]</td>
<td>1</td>
<td>10</td>
<td>nA</td>
</tr>
<tr>
<td>(V_{\text{BR}})</td>
<td>breakdown voltage</td>
<td>(I_{\text{R}} = 5 , \text{mA}; ; T_{\text{amb}} = 25 , ^\circ\text{C})</td>
<td>[1]</td>
<td>5.5</td>
<td>6.8</td>
<td>7.8</td>
</tr>
<tr>
<td>(C_{d})</td>
<td>diode capacitance</td>
<td>(f = 1 , \text{MHz}; ; V_{\text{R}} = 0 , \text{V}; ; T_{\text{amb}} = 25 , ^\circ\text{C})</td>
<td>-</td>
<td>18</td>
<td>20</td>
<td>pF</td>
</tr>
<tr>
<td>(V_{\text{CL}})</td>
<td>clamping voltage</td>
<td>(I_{\text{PP}} = 1 , \text{A}; ; T_{\text{amb}} = 25 , ^\circ\text{C}; ; t_{\text{p}} = 8/20 , \mu\text{s})</td>
<td>[1][2]</td>
<td>8</td>
<td>9.5</td>
<td>V</td>
</tr>
<tr>
<td>(V_{\text{CL}})</td>
<td>clamping voltage</td>
<td>(I_{\text{PPM}} = 9 , \text{A}; ; T_{\text{amb}} = 25 , ^\circ\text{C}; ; t_{\text{p}} = 8/20 , \mu\text{s})</td>
<td>[1][2]</td>
<td>11</td>
<td>12.5</td>
<td>V</td>
</tr>
<tr>
<td>(R_{\text{dyn}})</td>
<td>dynamic resistance</td>
<td>(I_{\text{R}} = 10 , \text{A}; ; T_{\text{amb}} = 25 , ^\circ\text{C})</td>
<td>[1][3]</td>
<td>0.15</td>
<td>-</td>
<td>Ω</td>
</tr>
</tbody>
</table>

[1] Measured from pin 1 or 2 to pin 3.
[3] Non-repetitive current pulse, Transmission Line Pulse (TLP) \(t_{\text{p}} = 100 \, \text{ns}\); square pulse; ANSI / ESD STM5.5.1-2008.
Very low capacitance bidirectional ESD protection diodes

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

$f = 1 \text{ MHz}; \ T_{\text{amb}} = 25 \ ^\circ\text{C}$

**Fig. 4.** V-I characteristics for a bidirectional ESD protection diode

**Fig. 5.** Dynamic resistance

$t_p = 100 \text{ ns}; \ \text{Transmission Line Pulse (TLP)}$

**Fig. 6.** Dynamic resistance

$t_p = 100 \text{ ns}; \ \text{Transmission Line Pulse (TLP)}$
Fig. 7. ESD clamping test setup and waveforms

Fig. 8. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

Fig. 9. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)
10. **Application information**

The device is designed for the protection of up to two bidirectional data lines from surge pulses and ESD damage.

**Fig. 10. 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. 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**

11.1 **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.
12. Package outline

Leadless ultra small plastic package; 3 solder lands; body 1.0 x 0.6 x 0.5 mm

**DIMENSIONS (mm are the original dimensions)**

<table>
<thead>
<tr>
<th>UNIT</th>
<th>A(1)</th>
<th>A₁ max</th>
<th>b</th>
<th>b₁</th>
<th>D</th>
<th>E</th>
<th>e₁</th>
<th>L</th>
<th>L₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>mm</td>
<td>0.50</td>
<td>0.03</td>
<td>0.20</td>
<td>0.55</td>
<td>0.62</td>
<td>1.02</td>
<td>0.35</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>mm</td>
<td>0.46</td>
<td></td>
<td>0.03</td>
<td>0.12</td>
<td>0.47</td>
<td>0.55</td>
<td>0.95</td>
<td>0.65</td>
<td>0.30</td>
</tr>
</tbody>
</table>

**Note**  
1. Including plating thickness

**OUTLINE VERSION**  
SOT883

**REFERENCES**  
IEC    
JEDEC  
JEITA  
SC-101

**EUROPEAN PROJECTION**  

**ISSUE DATE**  
03-04-03

Fig. 11. Package outline DFN1006-3 (SOT883)
13. Soldering

Fig. 12. Reflow soldering footprint for DFN1006-3 (SOT883)
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>
</tr>
</thead>
<tbody>
<tr>
<td>PESD5V0V2BM v.1</td>
<td>20150814</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
15. Legal information

15.1 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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Very low capacitance bidirectional ESD protection diodes

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