1. General description

Very low capacitance bidirectional ElectroStatic Discharge (ESD) protection diode designed to protect one signal line from the damage caused by ESD and other transients. The device is housed in a leadless ultra small DFN1006-2 (SOD882) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Bidirectional ESD protection of one line
- Low diode capacitance $C_d = 17 \text{ pF}$
- Rated peak pulse power: $P_{PPM} = 290 \text{ W}$
- Ultra low leakage current $I_{RM} < 1 \text{ nA}$
- ESD protection up to 30 kV
- IEC 61000-4-2; level 4 (ESD)
- IEC 61000-4-5 (surge); $I_{PPM} = 7.8 \text{ A}$
- AEC-Q101 qualified

3. Applications

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

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>12</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>-</td>
<td>17</td>
<td>25</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>
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<tbody>
<tr>
<td>1</td>
<td>K</td>
<td>cathode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>K</td>
<td>cathode</td>
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6. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package</th>
<th>Description</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>PESD12VV1BL</td>
<td>DFN1006-2</td>
<td>DFN1006-2: leadless ultra small plastic package; 2 terminals</td>
<td>SOD882</td>
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7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
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<tr>
<td>PESD12VV1BL</td>
<td>MW</td>
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</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>$P_{PPM}$</td>
<td>rated peak pulse power</td>
<td></td>
<td>[1]</td>
<td>-</td>
<td>290  W</td>
</tr>
<tr>
<td>$I_{PPM}$</td>
<td>rated peak pulse current $t_p = 8/20$ µs</td>
<td></td>
<td>[1]</td>
<td>-</td>
<td>7.8  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 | [2] | -   | 30   kV |
|           | machine model |                                | -   | 400 | V     |
|           | human body model (MIL-STD-883) |                                | -   | 10  | kV    |

Very low capacitance bidirectional ESD protection diode

Fig. 1. 8/20 μs pulse waveform according to IEC 61000-4-5 and IEC 61643-321

Fig. 2. 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>VRWM</td>
<td>reverse standoff voltage</td>
<td>T_{amb} = 25 °C</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>V</td>
</tr>
<tr>
<td>VB</td>
<td>breakdown voltage</td>
<td>I_R = 5 mA; T_{amb} = 25 °C</td>
<td>14.6</td>
<td>15.7</td>
<td>16.8</td>
<td>V</td>
</tr>
<tr>
<td>IRM</td>
<td>reverse leakage current</td>
<td>V_{RWM} = 12 V; T_{amb} = 25 °C</td>
<td>-</td>
<td>1</td>
<td>10</td>
<td>nA</td>
</tr>
<tr>
<td>C_d</td>
<td>diode capacitance</td>
<td>f = 1 MHz; V_R = 0 V; T_{amb} = 25 °C</td>
<td>-</td>
<td>17</td>
<td>25</td>
<td>pF</td>
</tr>
<tr>
<td>VC</td>
<td>clamping voltage</td>
<td>I_{PP} = 1 A; T_{amb} = 25 °C</td>
<td>[1]</td>
<td>-</td>
<td>22</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I_{PPM} = 7.8 A; T_{amb} = 25 °C</td>
<td>[1]</td>
<td>-</td>
<td>38</td>
<td>V</td>
</tr>
<tr>
<td>R_d</td>
<td>dynamic resistance</td>
<td>I_R = 10 A; T_{amb} = 25 °C</td>
<td>[2]</td>
<td>-</td>
<td>0.7</td>
<td>Ω</td>
</tr>
</tbody>
</table>

[1] Device stressed with 8/20 μs exponential decay waveform according to IEC 61000-4-5 and IEC 61643-321.
Very low capacitance bidirectional ESD protection diode

**PESD12VV1BL**

**Fig. 3.** Rated peak pulse power as a function of square pulse duration; maximum values

**Fig. 4.** Diode capacitance as a function of reverse voltage; typical values

**Fig. 5.** V-I characteristics for a bidirectional ESD protection diode
Fig. 6. 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 DFN1006-2 (SOD882)](image)

Fig. 8. Package outline DFN1006-2 (SOD882)

13. Soldering

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

Fig. 9. Reflow soldering footprint for DFN1006-2 (SOD882)
14. Revision history

Table 7. Revision history

<table>
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<th>Release date</th>
<th>Data sheet status</th>
<th>Change notice</th>
<th>Supersedes</th>
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<td>Modifications</td>
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<td>PESD12VV1BL v.2</td>
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15. Legal information

Data sheet status

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<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<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 request via the local Nexperia sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

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