1 Product profile

1.1 General description
Very symmetrical bidirectional ElectroStatic Discharge (ESD) protection diode. This device is housed in a DSN0603-2 (SOD962) leadless ultra small Surface-Mounted Device (SMD) package designed to protect one signal line from the damage caused by ESD and other transients.

1.2 Features and benefits
• Bidirectional ESD protection of one line
• Extremely symmetrical layout
• Very low diode capacitance $C_d = 5.5 \text{ pF max.}$
• Low clamping to protect sensitive I/Os
• Extremely low inductance protection path to ground
• ESD protection up to $\pm 25 \text{ kV}$ contact according to IEC 61000-4-2
• Ultra small SMD package

1.3 Applications
• Cellular handsets and accessories
• Portable electronics
• Communication systems
• Computers and peripherals

1.4 Quick reference data

Table 1. Quick reference data
$T_{\text{amb}} = 25 \degree \text{C unless otherwise specified.}$

<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></td>
<td>-18</td>
<td>-</td>
<td>18</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>4.1</td>
<td>5.5</td>
<td>pF</td>
</tr>
</tbody>
</table>
# Pinning information

**Table 2. Pinning**

<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>K</td>
<td>cathode (diode 1)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>K</td>
<td>cathode (diode 2)</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

# 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>PESD18VV1BBSF</td>
<td>DSN0603-2</td>
<td>leadless ultra small package; 2 terminals; body 0.6 x 0.3 x 0.3 mm</td>
<td>SOD962</td>
</tr>
</tbody>
</table>

# Marking

**Table 4. Marking**

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PESD18VV1BBSF</td>
<td>b</td>
</tr>
</tbody>
</table>
5 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>-40</td>
<td>125</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>

Table 6. 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) $^{[1]}$</td>
<td>-25</td>
<td>25</td>
<td>kV</td>
</tr>
</tbody>
</table>

$^{[1]}$ Device stressed with ten non-repetitive ESD pulses.

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>
</tbody>
</table>

Figure 1. 8/20 μs pulse waveform according to IEC 61000-4-5

Figure 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>
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<td>reverse standoff voltage</td>
<td></td>
<td>-18</td>
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<td>18</td>
<td>V</td>
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<td>C_d</td>
<td>diode capacitance</td>
<td>f = 1 MHz; V_R = 0 V</td>
<td>-</td>
<td>4.1</td>
<td>5.5</td>
<td>pF</td>
</tr>
<tr>
<td>I_{PPM}</td>
<td>rated peak pulse current</td>
<td>t_p = 8/20 µs</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>A</td>
</tr>
<tr>
<td>I_{RM}</td>
<td>reverse leakage current</td>
<td>V_{RWM} = 18 V</td>
<td>-</td>
<td>1</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>r_{dyn}</td>
<td>dynamic resistance</td>
<td>I_R = 10 A</td>
<td>[1]</td>
<td>0.37</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>r_{dyn}</td>
<td>dynamic resistance</td>
<td>I_R = -10 A</td>
<td>[1]</td>
<td>0.37</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>V_{CL}</td>
<td>clamping voltage</td>
<td>I_{PP} = 3 A; t_p = 8/20 µs</td>
<td>-</td>
<td>22.8</td>
<td>26.5</td>
<td>V</td>
</tr>
</tbody>
</table>

The device uses an advanced clamping structure showing a negative dynamic resistance. This snap-back behaviour strongly reduces the clamping voltage to the system behind the ESD protection during an ESD event. Do not connect unlimited DC current sources to the data lines to avoid keeping the ESD protection device in snap-back state after exceeding breakdown voltage (due to an ESD pulse for instance).
7 Application information

The device is designed for the protection of one 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.

The device uses an advanced clamping structure showing a negative dynamic resistance. This snap-back behaviour strongly reduces the clamping voltage to the system behind the ESD protection during an ESD event. Do not connect unlimited DC current sources to the data lines to avoid keeping the ESD protection device in snap-back state after exceeding breakdown voltage (due to an ESD pulse for instance).

![Application diagram](image)

**Figure 9. 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.
8 Package outline

Table 9. Package outline

![Diagram of package outline](sod962_fr)

Figure 10. Package outline DSN0603-2 (SOD962)

9 Soldering

Table 10. Soldering

<table>
<thead>
<tr>
<th>Footprint information for reflow soldering of leadless ultra small package; 2 terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOD962</td>
</tr>
</tbody>
</table>

![Diagram of reflow soldering footprint](sod962_fr)

Figure 11. Reflow soldering footprint DSN0603-2 (SOD962)
10 Revision history

Table 11. 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>PESD18VV1BBSF v.1</td>
<td>20171220</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
11 Legal information

11.1 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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