1. General description

4-fold bidirectional ElectroStatic Discharge (ESD) protection array designed to protect up to four lines from the damage caused by ESD and other transients.

The device is housed in a leadless extremely thin small DFN1308-6 (SOT8006) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- Bidirectional ESD protection of up to 4 lines
- Very high surge robustness; $I_{PP} = 6$ A for 8/20 µs pulse
- Very low clamping voltage: $V_{CL} = 7.3$ V typ. for 6 A 8/20 µs pulse
- ESD protection up to 20 kV
- Very low dynamic resistance $R_{dy} = 0.2$ Ω (TLP)

3. Applications

ESD protection for low-speed lines in portable communication, consumer devices and computing devices.

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>$T_{amb} = 25$ °C</td>
<td>-</td>
<td>-</td>
<td>3.3</td>
<td>V</td>
</tr>
<tr>
<td>$I_{PPM}$</td>
<td>rated peak pulse current</td>
<td>$I_p = 8/20$ µs; $T_{amb} = 25$ °C</td>
<td>[1]</td>
<td>-</td>
<td>6</td>
<td>A</td>
</tr>
<tr>
<td>$V_{t1}$</td>
<td>trigger voltage</td>
<td>$T_{amb} = 25$ °C</td>
<td>-</td>
<td>6.7</td>
<td>-</td>
<td>V</td>
</tr>
</tbody>
</table>

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.
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></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CC</td>
<td>common cathode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>K2</td>
<td>cathode (diode 2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>K3</td>
<td>cathode (diode 3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>CC</td>
<td>common cathode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>K4</td>
<td>cathode (diode 4)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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>PESD3V3L4BHC</td>
<td>DFN1308-6</td>
<td>DFN1308-6, plastic, leadless extremely thin small package; 6 terminals; body 1.3 x 0.8 x 0.38 mm</td>
<td>SOT8006</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>PESD3V3L4BHC</td>
<td>L4</td>
</tr>
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</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>$t_p = 8/20 \mu s; T_{amb} = 25 ^\circ C$</td>
<td>[1]</td>
<td>6</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>
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</table>

**ESD maximum ratings**

<table>
<thead>
<tr>
<th>V_{ESD}</th>
<th>electrostatic discharge voltage</th>
<th>IEC 61000-4-2 (contact discharge)</th>
<th>[2]</th>
<th>20</th>
<th>kV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IEC 61000-4-2 (air discharge)</td>
<td>[2]</td>
<td>20</td>
<td>kV</td>
</tr>
</tbody>
</table>

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.
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>$V_{RWM}$</td>
<td>reverse standoff voltage</td>
<td>$T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>-</td>
<td>3.3</td>
<td>V</td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>reverse leakage current</td>
<td>$V_{RWM} = 3.3 , V; \ T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>3</td>
<td>100</td>
<td>nA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 , MHz; \ V_R = 0 , V; \ T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>7.2</td>
<td>9</td>
<td>pF</td>
</tr>
<tr>
<td>$V_{CL}$</td>
<td>clamping voltage</td>
<td>$I_{PPM} = 1 , A; \ t_p = 8/20 , \mu s; \ T_{amb} = 25 , ^\circ C$</td>
<td>[1]</td>
<td>5.9</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$R_{dyn}$</td>
<td>dynamic resistance</td>
<td>$I_R = 10 , A; \ T_{amb} = 25 , ^\circ C$</td>
<td>[2]</td>
<td>0.2</td>
<td>-</td>
<td>Ω</td>
</tr>
<tr>
<td>$V_{t1}$</td>
<td>trigger voltage</td>
<td>$T_{amb} = 25 , ^\circ C$</td>
<td>-</td>
<td>6.7</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>$V_h$</td>
<td>holding voltage</td>
<td></td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>V</td>
</tr>
</tbody>
</table>

[1] Device stressed with 8/20 µs exponential decay waveform according to IEC 61000-4-5.
Fig. 3. V-I characteristics for a bidirectional ESD protection diode

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

Fig. 5. Positive clamping voltage (TLP); typical values

Fig. 6. Negative clamping voltage (TLP); typical values
ESD TESTER

\[ R_d \quad C_s \]

DUT

(DEVICE UNDER TEST)

RG 223/U

50 Ω coax

40 dB ATTENUATOR

4 GHz DIGITAL OSCILLOSCOPE

4-fold bidirectional ESD protection array

IEC 61000-4-2 ed.2

\[ C_s = 150 \text{ pF}; \quad R_d = 330 \Omega \]

V (kV)

\[ -2 \quad 0 \quad 2 \quad 4 \quad 6 \quad 8 \quad 10 \]

\( t \) (ns)

\[-10 \quad 0 \quad 10 \quad 20 \quad 30 \quad 40 \quad 50 \quad 60 \quad 70 \]

undamped +8 kV ESD pulse waveform

(IEC 61000-4-2 network)

V (kV)

\[ -2 \quad 0 \quad 2 \quad 4 \quad 6 \quad 8 \quad 10 \]

\( t \) (ns)

\[-10 \quad 0 \quad 10 \quad 20 \quad 30 \quad 40 \quad 50 \quad 60 \quad 70 \]

unclamped -8 kV ESD pulse waveform

(IEC 61000-4-2 network)

Fig. 7. ESD clamping test setup and waveforms

VCL (V)

\[ -60 \quad -40 \quad -20 \quad 0 \quad 20 \quad 40 \quad 60 \]

\( t \) (ns)

\[-10 \quad 0 \quad 10 \quad 20 \quad 30 \quad 40 \quad 50 \quad 60 \quad 70 \]

VCL at 30 ns = 7.0 V

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

VCL (V)

\[ -100 \quad -60 \quad -20 \quad 20 \quad 60 \quad 100 \]

\( t \) (ns)

\[-10 \quad 0 \quad 10 \quad 20 \quad 30 \quad 40 \quad 50 \quad 60 \quad 70 \]

VCL at 30 ns = -6.8 V

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

The device is designed for protection of up to 4 bidirectional data lines from the damage caused by ESD and surge pulses. The device is suitable on lines where the signal polarities are above or below 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:

• Place the device as close to the input terminal or connector as possible
• Minimize the path length between the device and the protected line.
• Keep parallel signal paths to a minimum.
• Avoid running protected conductors in parallel with unprotected conductors.
• Minimize all Printed-Circuit Board (PCB) conductive loops including power and ground loops.
• Minimize the length of the transient return path to ground.
• Avoid using shared transient return paths to a common ground point.
• Use ground planes whenever possible. For multilayer PCBs, use ground vias.
11. Package outline

DFN1308-6, plastic, leadless extremely thin small package; 6 terminals; body 1.3 x 0.8 x 0.38 mm

Fig. 11. Package outline DFN1308-6 (SOT8006)
12. Soldering

Footprint information for reflow soldering of DFN1308-6 package

SOT8006

Fig. 12. Reflow soldering footprint for DFN1308-6 (SOT8006)
## 13. 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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<tbody>
<tr>
<td>PESD3V3L4BHC v.1</td>
<td>20190607</td>
<td>Product data sheet</td>
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14. Legal information

Data sheet status

<table>
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<tr>
<th>Document status</th>
<th>Product status</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Objective data sheet</td>
<td>Development</td>
<td>This document contains data from the respective specification for product development.</td>
</tr>
<tr>
<td>Preliminary data sheet</td>
<td>Qualification</td>
<td>This document contains data from the preliminary specification.</td>
</tr>
<tr>
<td>Product 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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## Contents

1. General description ........................................................................ 1  
2. Features and benefits .................................................................... 1  
3. Applications .................................................................................. 1  
4. Quick reference data ...................................................................... 1  
5. Pinning information ........................................................................ 2  
6. Ordering information ..................................................................... 2  
7. Marking .......................................................................................... 2  
8. Limiting values ............................................................................... 2  
9. Characteristics ............................................................................... 3  
10. Application information ............................................................... 6  
11. Package outline ........................................................................... 7  
12. Soldering ....................................................................................... 8  
13. Revision history ........................................................................... 9  
14. Legal information .........................................................................10  

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