1. General description

Unidirectional Transient Voltage Suppressor (TVS) in a very small leadless DSN1608-2 (SOD964) package.

2. Features and benefits

- Rated peak pulse current: $I_{PPM} = 65$ A (8/20 µs pulse)
- Rated peak pulse power: $P_{PPM} = 1900$ W (8/20 µs pulse)
- Dynamic resistance $R_{dyn} = 0.11$ Ω
- Reverse current: $I_{RM} = 0.1$ nA
- Very low package height: 0.29 mm

3. Applications

- Power supply protection
- Industrial application
- Power management

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>12</td>
<td>V</td>
</tr>
<tr>
<td>$I_{PPM}$</td>
<td>peak pulse current</td>
<td>$t_p = 8/20$ µs</td>
<td>[1][2]</td>
<td>-</td>
<td>-</td>
<td>65 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t_p = 10/1000$ µs</td>
<td>[3][2]</td>
<td>-</td>
<td>-</td>
<td>10.5 A</td>
</tr>
</tbody>
</table>

[1] In accordance with IEC 61000-4-5 (8/20 µs current waveform).
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>K</td>
<td>cathode</td>
<td><img src="DSN1608-2" alt="Simplified outline" title="SOD964" /></td>
<td><img src="sym035" alt="Graphic symbol" /></td>
</tr>
<tr>
<td>2</td>
<td>A</td>
<td>anode</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>PTVS12VZ1USK</td>
<td>DSN1608-2</td>
<td>leadless very small package; 2 terminals; body 1.6 x 0.8 x 0.29 mm</td>
<td>SOD964</td>
</tr>
</tbody>
</table>

7. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
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<tr>
<td>PTVS12VZ1USK</td>
<td>Z5</td>
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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>$P_{PPM}$</td>
<td>peak pulse power</td>
<td>$t_p = 8/20 \mu s$</td>
<td>[1][2]</td>
<td>-</td>
<td>1900 W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t_p = 10/1000 \mu s$</td>
<td>[3][2]</td>
<td>-</td>
<td>230 W</td>
</tr>
<tr>
<td>$I_{PPM}$</td>
<td>peak pulse current</td>
<td>$t_p = 8/20 \mu s$</td>
<td>[1][2]</td>
<td>-</td>
<td>65 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$t_p = 10/1000 \mu s$</td>
<td>[3][2]</td>
<td>-</td>
<td>10.5 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>-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>

**ESD maximum ratings**

| $V_{ESD}$ | electrostatic discharge voltage | IEC 61000-4-2; contact discharge | [4][2] | - | 30 kV |
|           |                                  | IEC 61000-4-2; air discharge     | [4][2] | - | 30 kV |

[1] In accordance with IEC 61000-4-5 (8/20 µs current waveform).

---

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

**Fig. 2.** ESD pulse waveform according to IEC 61000-4-2
Fig. 3. 10/1000 µs pulse waveform according to IEC 61643-321

### 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>$T_{amb} = 25 ^\circ C$</td>
<td></td>
<td></td>
<td>12</td>
<td>V</td>
</tr>
<tr>
<td>$V_{BR}$</td>
<td>breakdown voltage</td>
<td>$I_R = 10 \text{ mA}; \ T_{amb} = 25 ^\circ C$</td>
<td>13.3</td>
<td>14.4</td>
<td>15.4</td>
<td>V</td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>reverse leakage current</td>
<td>$V_{RWM} = 12 \text{ V}; \ T_{amb} = 25 ^\circ C$</td>
<td>-</td>
<td>0.1</td>
<td>200</td>
<td>nA</td>
</tr>
<tr>
<td>$C_d$</td>
<td>diode capacitance</td>
<td>$f = 1 \text{ MHz}; \ V_R = 0 \text{ V}; \ T_{amb} = 25 ^\circ C$</td>
<td>-</td>
<td>430</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>$V_{CL}$</td>
<td>clamping voltage</td>
<td>$I_{PPM} = 65 \text{ A}; \ T_{amb} = 25 ^\circ C; \ t_p = 8/20 \mu s$</td>
<td></td>
<td>24.9</td>
<td>29</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_{PPM} = 10.5 \text{ A}; \ T_{amb} = 25 ^\circ C; \ t_p = 10/1000 \mu s$</td>
<td></td>
<td>18</td>
<td>21.8</td>
<td>V</td>
</tr>
<tr>
<td>$R_{dyn}$</td>
<td>dynamic resistance</td>
<td>$I_R = 10 \text{ A}; \ T_{amb} = 25 ^\circ C$</td>
<td>0.11</td>
<td>-</td>
<td>-</td>
<td>Ω</td>
</tr>
</tbody>
</table>

[2] In accordance with IEC 61000-4-5 (8/20 µs current waveform).
Fig. 4. V-I characteristics for a unidirectional TVS protection diode

Fig. 5. Rated peak pulse power as a function of square pulse duration; typical values

Fig. 6. Relative variation of rated peak pulse power as a function of junction temperature; typical values

Fig. 7. Relative variation of reverse leakage current as a function of ambient temperature; typical values

VRWM = 12 V
Fig. 8. Positive clamping voltage (TLP); typical values

Fig. 9. Negative clamping voltage (TLP); typical values

Fig. 10. Positive clamping voltage (8/20 µs pulse); typical values

Fig. 11. Negative clamping voltage (8/20 µs pulse); typical values
Fig. 12. ESD clamping test setup and waveforms

Fig. 13. Clamped +8 kV pulse waveform (IEC 61000-4-2 network)

Fig. 14. Clamped -8 kV pulse waveform (IEC 61000-4-2 network)
10. Application information

Fig. 15. Application diagram
11. Package outline

DSN1608-2, leadless very small package; 2 terminals; body 1.6 x 0.8 x 0.29 mm

Fig. 16. Package outline DSN1608-2 (SOD964)
12. Soldering

Fig. 17. Reflow soldering footprint for DSN1608-2 (SOD964)
13. Revision history

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<th>Data sheet status</th>
<th>Change notice</th>
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<td>Product data sheet</td>
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<td>PTVS12VZ1USK v.1</td>
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<td></td>
<td>according to the latest measurements</td>
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<td>PTVS12VZ1USK v.1</td>
<td>20160212</td>
<td>Preliminary data sheet</td>
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14. Legal information

Data sheet status

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<th>Product status</th>
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<td>[1][2]</td>
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Objective [short] data sheet
Development
This document contains data from the objective specification for product development.

Preliminary [short] data sheet
Qualification
This document contains data from the preliminary specification.

Product [short] data sheet
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This document contains the product specification.

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