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Team Nexperia
1. Product profile

1.1 General description
300 W unidirectional Transient Voltage Suppressor (TVS) in a DFN2020-3 (SOT1061) leadless medium power Surface-Mounted Device (SMD) plastic package, designed for transient overvoltage protection.

1.2 Features and benefits
- Rated peak pulse power: \( P_{\text{PPM}} = 300 \, \text{W} \)
- Reverse current: \( I_{\text{RM}} = 1 \, \text{nA} \)
- Reverse standoff voltage range: \( V_{\text{RWM}} = 7.5 \, \text{V} \) to \( 26 \, \text{V} \)
- AEC-Q101 qualified

1.3 Applications
- Power supply protection
- Industrial application
- Power management

1.4 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>( P_{\text{PPM}} )</td>
<td>rated peak pulse power</td>
<td>[1][2]</td>
<td>-</td>
<td>-</td>
<td>300</td>
<td>W</td>
</tr>
<tr>
<td>( V_{\text{RWM}} )</td>
<td>reverse standoff voltage</td>
<td>7.5</td>
<td>-</td>
<td>26</td>
<td>V</td>
<td></td>
</tr>
</tbody>
</table>

[1] In accordance with IEC 61643-321 (10/1000 \( \mu \text{s} \) current waveform).
2. Pinning information

Table 2. Pinning

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
<th>Simplified outline</th>
<th>Graphic symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 and 2</td>
<td>anode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>cathode</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Ordering information

Table 3. Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Package Description</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTVSxU1UPA series</td>
<td>DFN2020-3 plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 × 2 × 0.65 mm</td>
<td>SOT1061</td>
</tr>
</tbody>
</table>

[1] The series consists of 6 types with reverse standoff voltages from 7.5 V to 26 V.

4. Marking

Table 4. Marking codes

<table>
<thead>
<tr>
<th>Type number</th>
<th>Marking code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTVS7V5U1UPA</td>
<td>CX</td>
</tr>
<tr>
<td>PTVS10VU1UPA</td>
<td>CY</td>
</tr>
<tr>
<td>PTVS12VU1UPA</td>
<td>CZ</td>
</tr>
<tr>
<td>PTVS15VU1UPA</td>
<td>D1</td>
</tr>
<tr>
<td>PTVS18VU1UPA</td>
<td>D2</td>
</tr>
<tr>
<td>PTVS26VU1UPA</td>
<td>D3</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>P_{PPM}</td>
<td>rated peak pulse power</td>
<td>[1][3]</td>
<td>-</td>
<td>300</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[2][3]</td>
<td>-</td>
<td>3000</td>
<td>W</td>
</tr>
<tr>
<td>I_{PPM}</td>
<td>rated peak pulse current</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[1][3]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>[2][3]</td>
<td></td>
<td></td>
<td></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>-55</td>
<td></td>
<td>+150</td>
<td>°C</td>
</tr>
<tr>
<td>T_{stg}</td>
<td>storage temperature</td>
<td>-65</td>
<td></td>
<td>+150</td>
<td>°C</td>
</tr>
</tbody>
</table>

[1] In accordance with IEC 61643-321 (10/1000 μs current waveform).
[2] In accordance with IEC 61000-4-5 and IEC 61643-321 (8/20 μs current waveform).

Table 6. ESD maximum ratings
T_{amb} = 25 °C unless otherwise specified.

<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)</td>
<td>[1][2]</td>
<td>-</td>
<td>30 kV</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IEC 61000-4-2 (air discharge)</td>
<td>[1][2]</td>
<td>-</td>
<td>30 kV</td>
</tr>
</tbody>
</table>

Fig 1. 10/1000 μs pulse waveform according to IEC 61643-321

Fig 2. 8/20 μs pulse waveform according to IEC 61000-4-5 and IEC 61643-321

Fig 3. ESD pulse waveform according to IEC 61000-4-2
6. Thermal characteristics

Table 7. Thermal 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>$R_{th(j-a)}$</td>
<td>thermal resistance from junction to ambient</td>
<td>in free air</td>
<td>[1]</td>
<td>-</td>
<td>240</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[2]</td>
<td>-</td>
<td>120</td>
<td>K/W</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>[3]</td>
<td>-</td>
<td>65</td>
<td>K/W</td>
</tr>
<tr>
<td>$R_{th(j-sp)}$</td>
<td>thermal resistance from junction to solder point</td>
<td></td>
<td>[4]</td>
<td>-</td>
<td>10</td>
<td>K/W</td>
</tr>
</tbody>
</table>


7. Characteristics

Table 8. Characteristics per type; PTVS7V5U1UPA to PTVS26VU1UPA

$T_j = 25 \degree C$ unless otherwise specified.

<table>
<thead>
<tr>
<th>Type number</th>
<th>Reverse standoff voltage $V_RWM$ (V)</th>
<th>Breakdown voltage $V_{BR}$ (V) $I_R = 1 \ mA$</th>
<th>Reverse leakage current $I_{R\text{M}}$ (nA) at $V_{RWM}$</th>
<th>Rated peak pulse current $I_{PPM}$ (A) $[1][3]$</th>
<th>Rated peak pulse current $I_{PPM}$ (A) $[2][3]$</th>
<th>Clamping voltage $V_{CL}$ (V); at $I_{PPM}$ (A) $[1][3]$</th>
<th>Clamping voltage $V_{CL}$ (V); at $I_{PPM}$ (A) $[2][3]$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTVS7V5U1UPA</td>
<td>7.5</td>
<td>8.33</td>
<td>8.77</td>
<td>9.21</td>
<td>200</td>
<td>1000</td>
<td>178</td>
</tr>
<tr>
<td>PTVS10VU1UPA</td>
<td>10</td>
<td>11.10</td>
<td>11.70</td>
<td>12.30</td>
<td>2</td>
<td>50</td>
<td>148</td>
</tr>
<tr>
<td>PTVS12VU1UPA</td>
<td>12</td>
<td>13.30</td>
<td>14.00</td>
<td>14.70</td>
<td>1</td>
<td>50</td>
<td>131</td>
</tr>
<tr>
<td>PTVS15VU1UPA</td>
<td>15</td>
<td>16.70</td>
<td>17.60</td>
<td>18.50</td>
<td>1</td>
<td>50</td>
<td>111</td>
</tr>
<tr>
<td>PTVS18VU1UPA</td>
<td>18</td>
<td>20.00</td>
<td>21.00</td>
<td>22.10</td>
<td>1</td>
<td>50</td>
<td>97</td>
</tr>
<tr>
<td>PTVS26VU1UPA</td>
<td>26</td>
<td>28.90</td>
<td>30.40</td>
<td>31.90</td>
<td>1</td>
<td>50</td>
<td>69</td>
</tr>
</tbody>
</table>

[1] In accordance with IEC 61000-4-5 and IEC 61643-321 (8/20 $\mu$s current waveform).
[2] In accordance with IEC 61643-321 (10/1000 $\mu$s current waveform).
Fig 4. Relative variation of rated peak pulse power as a function of junction temperature; typical values

Fig 5. V-I characteristics for a unidirectional TVS protection diode

Fig 6. Rated peak pulse power as a function of a pulse duration; typical values
8. Application information

![Application diagram](aaa-004394)

**Fig 7. Application diagram**

9. Test information

9.1 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.

10. Package outline

![Package outline](09-11-12)

**Fig 8. Package outline DFN2020-3 (SOT1061)**
11. Soldering

Fig 9. Reflow soldering footprint DFN2020-3 (SOT1061)
12. Revision history

Table 9. 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>PTVSXU1UPA_SER v.1</td>
<td>20140306</td>
<td>Product data sheet</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
13. Legal information

13.1 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".

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