



PTVSxU1UPA series

300 W Transient Voltage Suppressor

Rev. 1 — 6 March 2014

Product data sheet

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: $P_{PPM} = 300 \text{ W}$
- Reverse current: $I_{RM} = 1 \text{ nA}$
- Reverse standoff voltage range: $V_{RWM} = 7.5 \text{ V to } 26 \text{ V}$
- Very low package height: 0.65 mm
- AEC-Q101 qualified

1.3 Applications

- Power supply protection
- Industrial application
- Power management

1.4 Quick reference data

Table 1. Quick reference data

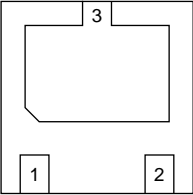

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|-----------|--------------------------|------------|--------|-----|-----|------|
| P_{PPM} | rated peak pulse power | | [1][2] | - | 300 | W |
| V_{RWM} | reverse standoff voltage | | 7.5 | - | 26 | V |

[1] In accordance with IEC 61643-321 (10/1000 μs current waveform).

[2] Measured from pin 1 and 2 to pin 3.

2. Pinning information

Table 2. Pinning

| Pin | Description | Simplified outline | Graphic symbol |
|---------|-------------|---|--|
| 1 and 2 | anode |  <p>Transparent top view</p> |  <p>006aab838</p> |
| 3 | cathode | | |

3. Ordering information

Table 3. Ordering information

| Type number ^[1] | Package | | |
|----------------------------|-----------|--|---------|
| | Name | Description | Version |
| PTVSxU1UPA series | DFN2020-3 | plastic thermal enhanced ultra thin small outline package; no leads; 3 terminals; body 2 × 2 × 0.65 mm | SOT1061 |

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

4. Marking

Table 4. Marking codes

| Type number | Marking code |
|--------------|--------------|
| PTVS7V5U1UPA | CX |
| PTVS10VU1UPA | CY |
| PTVS12VU1UPA | CZ |
| PTVS15VU1UPA | D1 |
| PTVS18VU1UPA | D2 |
| PTVS26VU1UPA | D3 |

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|------------------|--------------------------|------------|--------|-----------------------------|------|---|
| P _{PPM} | rated peak pulse power | | [1][3] | - | 300 | W |
| | | | [2][3] | - | 3000 | W |
| I _{PPM} | rated peak pulse current | | - | see Table 8 | | |
| T _j | junction temperature | | - | 150 | °C | |
| T _{amb} | ambient temperature | | -55 | +150 | °C | |
| T _{stg} | storage temperature | | -65 | +150 | °C | |

[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).

[3] Measured from pin 1 and 2 to pin 3.

Table 6. ESD maximum ratings

T_{amb} = 25 °C unless otherwise specified.

| Symbol | Parameter | Conditions | Min | Max | Unit | |
|------------------|---------------------------------|--------------------------------------|--------|-----|------|----|
| V _{ESD} | electrostatic discharge voltage | IEC 61000-4-2 (contact discharge) | [1][2] | - | 30 | kV |
| | | IEC 61000-4-2 (air discharge) | [1][2] | - | 30 | kV |

[1] Device stressed with ten non-repetitive ElectroStatic Discharge (ESD) pulses.

[2] Measured from pin 1 and 2 to pin 3.

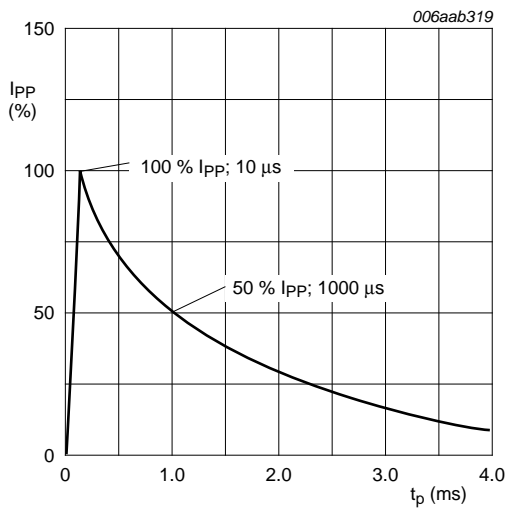


Fig 1. 10/1000 μ s pulse waveform according to IEC 61643-321

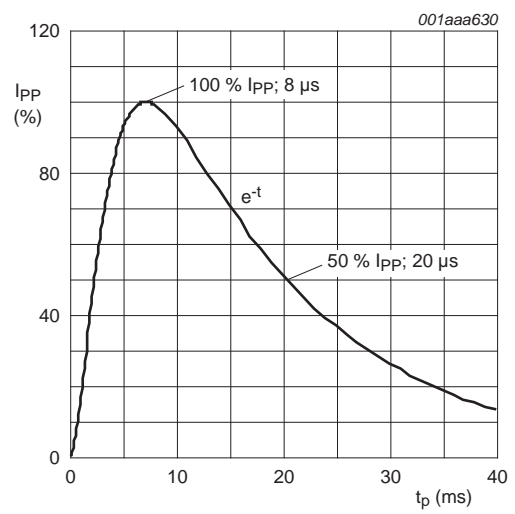


Fig 2. 8/20 μ s pulse waveform according to IEC 61000-4-5 and IEC 61643-321

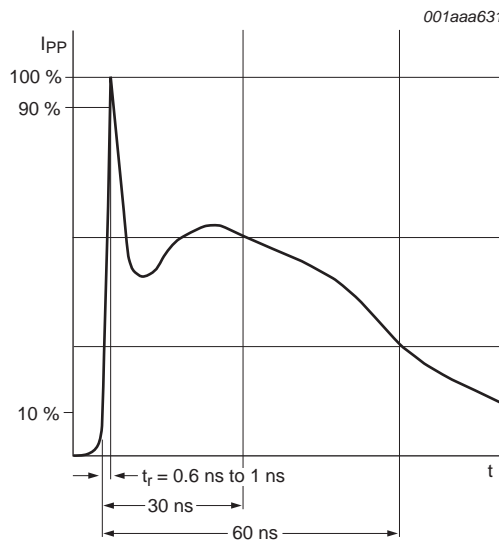


Fig 3. ESD pulse waveform according to IEC 61000-4-2

6. Thermal characteristics

Table 7. Thermal characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit | |
|----------------|--|-------------|-----|-----|-----|------|-----|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 240 | K/W |
| | | | [2] | - | - | 120 | K/W |
| | | | [3] | - | - | 65 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [4] | - | - | 10 | K/W |

- [1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.
 [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated, mounting pad for cathode 1 cm².
 [3] Device mounted on a ceramic PCB, Al₂O₃, standard footprint.
 [4] Soldering point of cathode tab.

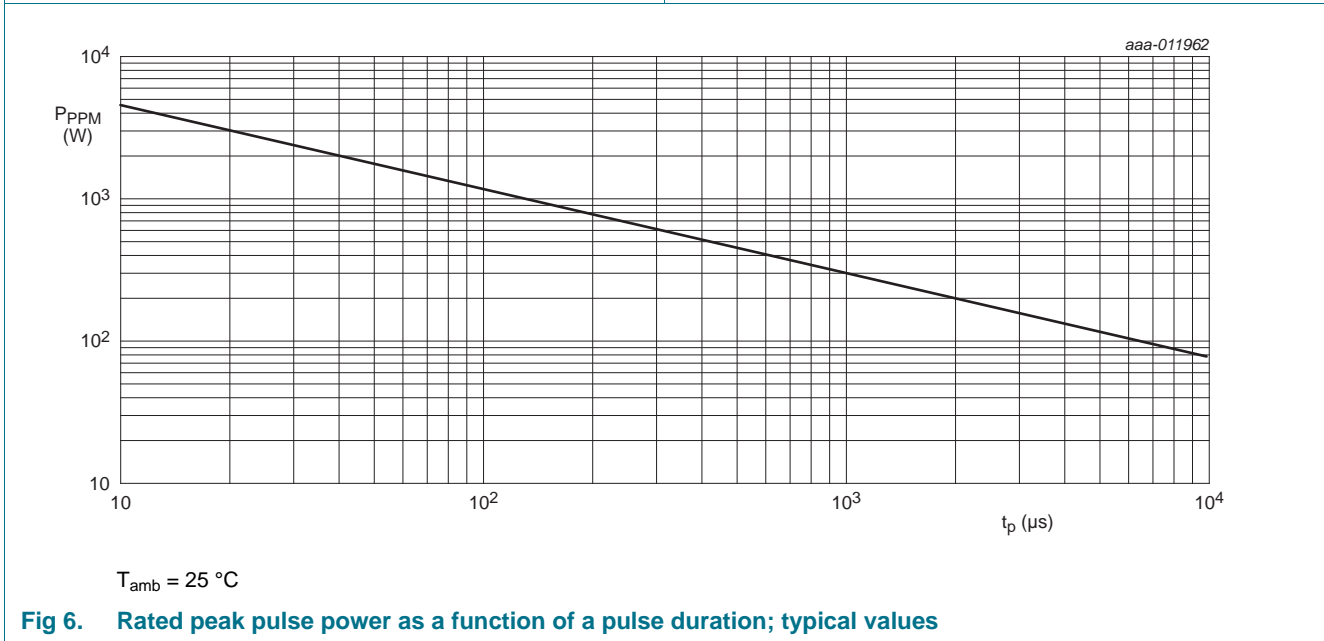
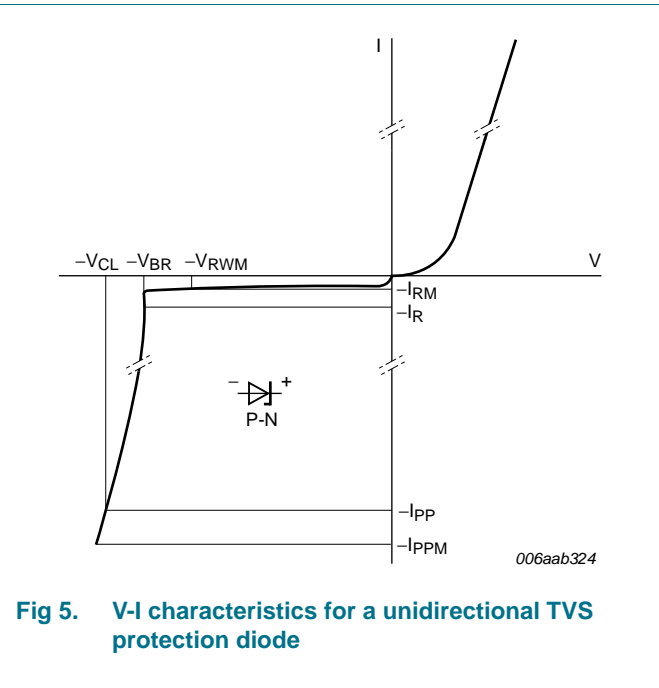
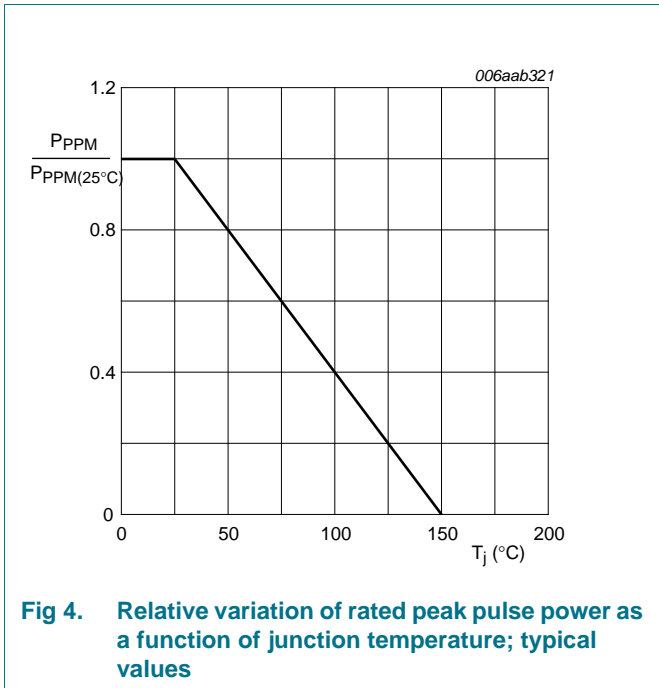
7. Characteristics

Table 8. Characteristics per type; PTVS7V5U1UPA to PTVS26VU1UPA

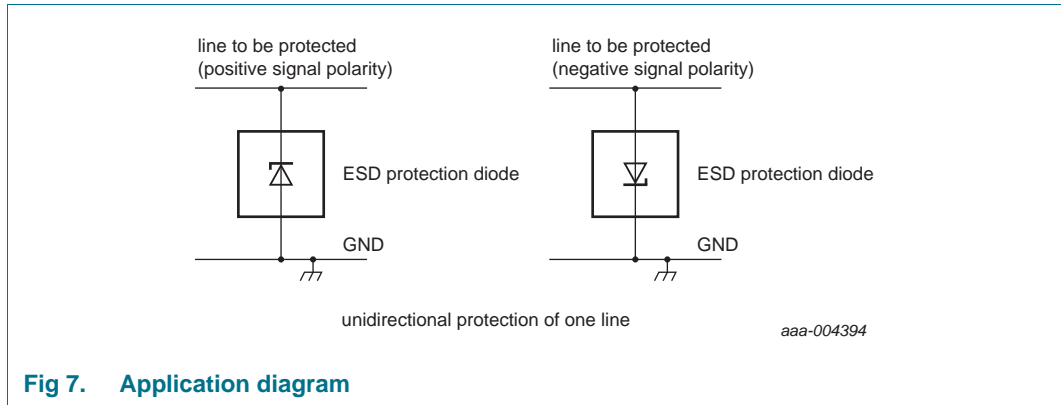
$T_j = 25\text{ °C}$ unless otherwise specified.

| Type number | Reverse standoff voltage V_{RWM} (V) | Breakdown voltage V_{BR} (V) $I_R = 1\text{ mA}$ | | | Reverse leakage current I_{RM} (nA) at V_{RWM} | | Rated peak pulse current I_{PPM} (A) [1][3] | Rated peak pulse current I_{PPM} (A) [2][3] | Clamping voltage V_{CL} (V); at I_{PPM} (A) [1][3] | Clamping voltage V_{CL} (V); at I_{PPM} (A) [2][3] |
|--------------|---|--|-------|-------|---|------|---|---|---|---|
| | | Max | Min | Typ | Max | Typ | Max | Max | Max | Max |
| PTVS7V5U1UPA | 7.5 | 8.33 | 8.77 | 9.21 | 200 | 1000 | 178 | 23.3 | 19.7 | 12.9 |
| PTVS10VU1UPA | 10 | 11.10 | 11.70 | 12.30 | 2 | 50 | 148 | 17.6 | 23.0 | 17.0 |
| PTVS12VU1UPA | 12 | 13.30 | 14.00 | 14.70 | 1 | 50 | 131 | 15.1 | 25.2 | 19.9 |
| PTVS15VU1UPA | 15 | 16.70 | 17.60 | 18.50 | 1 | 50 | 111 | 12.3 | 28.8 | 24.4 |
| PTVS18VU1UPA | 18 | 20.00 | 21.00 | 22.10 | 1 | 50 | 97 | 10.3 | 32.0 | 29.2 |
| PTVS26VU1UPA | 26 | 28.90 | 30.40 | 31.90 | 1 | 50 | 69 | 7.0 | 43.5 | 42.1 |

- [1] In accordance with IEC 61000-4-5 and IEC 61643-321 (8/20 μ s current waveform).
 [2] In accordance with IEC 61643-321 (10/1000 μ s current waveform).
 [3] Measured from pin 1 and 2 to pin 3.



8. Application information

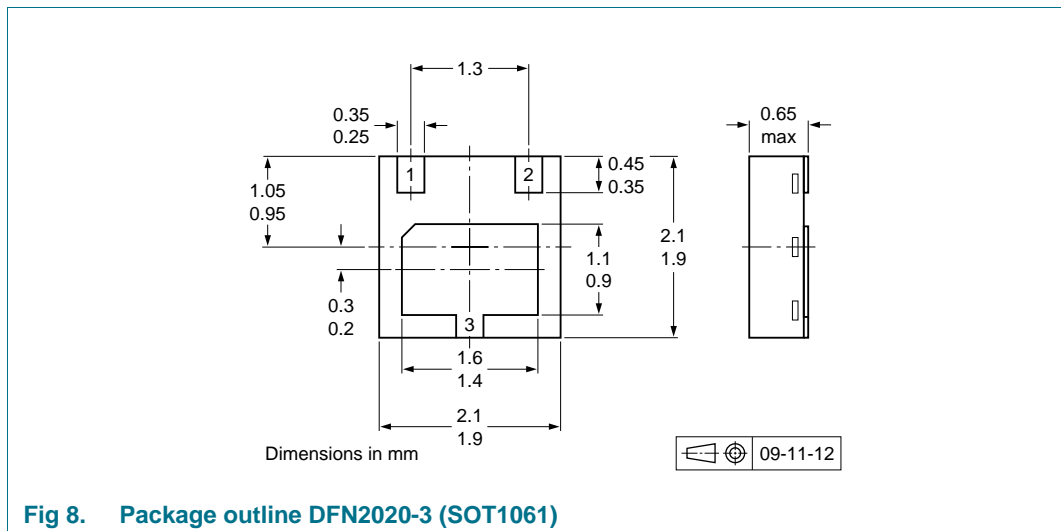


9. Test information

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



11. Soldering

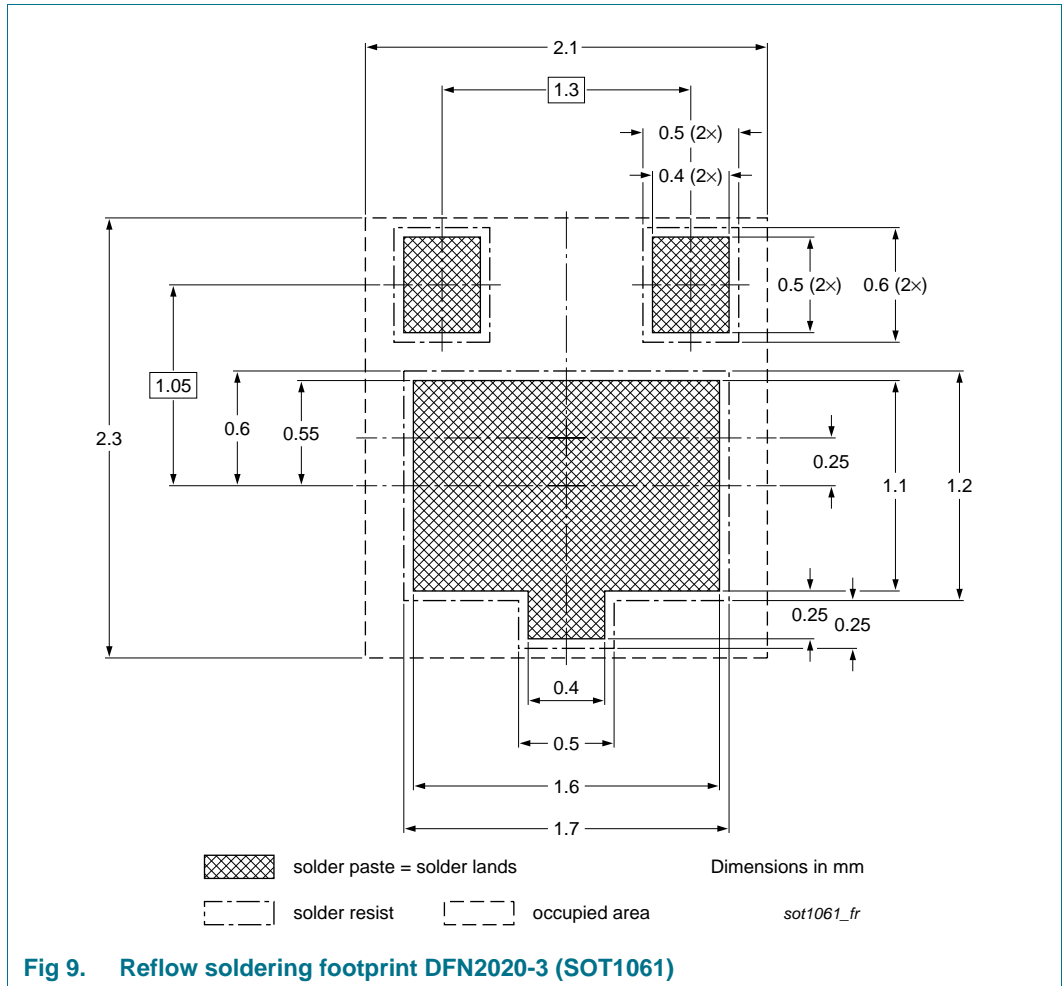


Fig 9. Reflow soldering footprint DFN2020-3 (SOT1061)

12. Revision history

Table 9. Revision history

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|--------------------|--------------|--------------------|---------------|------------|
| PTVSXU1UPA_SER v.1 | 20140306 | Product data sheet | - | - |

13. Legal information

13.1 Data sheet status

| Document status ^{[1][2]} | Product status ^[3] | Definition |
|-----------------------------------|-------------------------------|---|
| 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 | Production | This document contains the product specification. |

[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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