



# 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

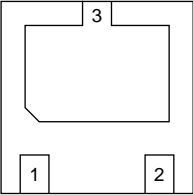

[1] In accordance with IEC 61643-321 (10/1000  $\mu\text{s}$  current waveform).

[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 <sup>[1]</sup>	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 <sub>PPM</sub>	rated peak pulse power		[1][3]	-	300	W
			[2][3]	-	3000	W
I <sub>PPM</sub>	rated peak pulse current		-	see <a href="#">Table 8</a>		
T <sub>j</sub>	junction temperature		-	150	°C	
T <sub>amb</sub>	ambient temperature		-55	+150	°C	
T <sub>stg</sub>	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.

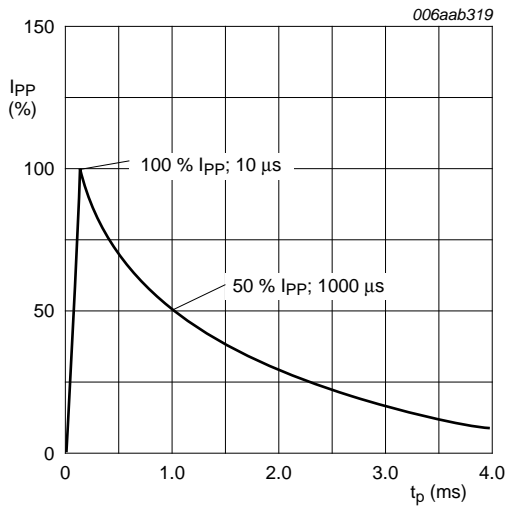
**Table 6. ESD maximum ratings**

T<sub>amb</sub> = 25 °C unless otherwise specified.

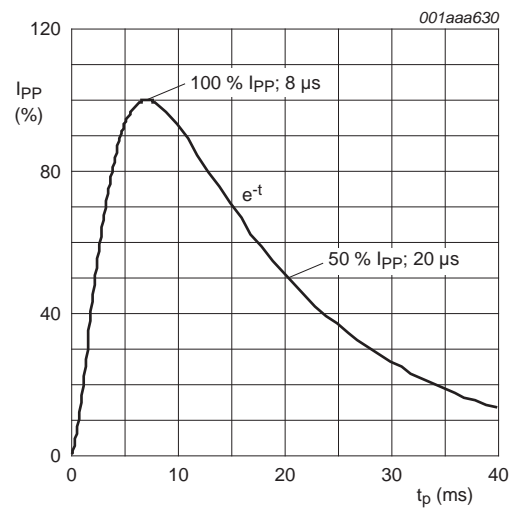
Symbol	Parameter	Conditions	Min	Max	Unit	
V <sub>ESD</sub>	electrostatic discharge voltage	IEC 61000-4-2 (contact discharge)	[1][2]	-	30	kV
		IEC 61000-4-2 (air discharge)	[1][2]	-	30	kV

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

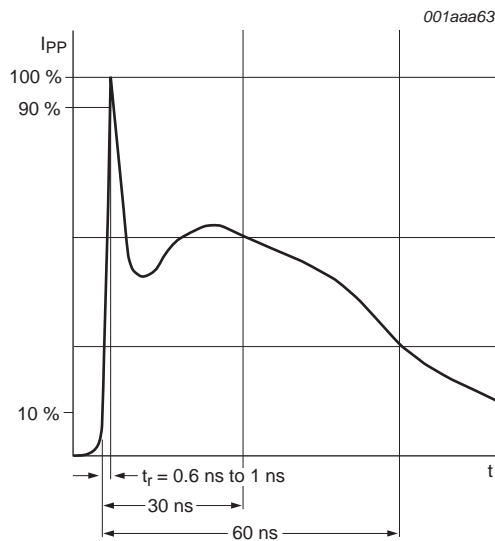
[2] Measured from pin 1 and 2 to pin 3.



**Fig 1. 10/1000  $\mu$ s pulse waveform according to IEC 61643-321**



**Fig 2. 8/20  $\mu$ 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 cm<sup>2</sup>.
- [3] Device mounted on a ceramic PCB, Al<sub>2</sub>O<sub>3</sub>, standard footprint.
- [4] Soldering point of cathode tab.

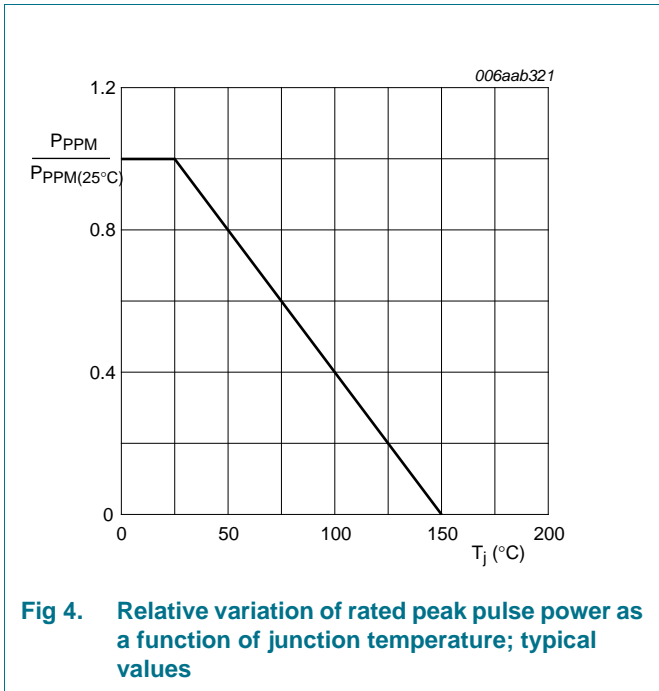
## 7. Characteristics

**Table 8. Characteristics per type; PTVS7V5U1UPA to PTVS26VU1UPA**

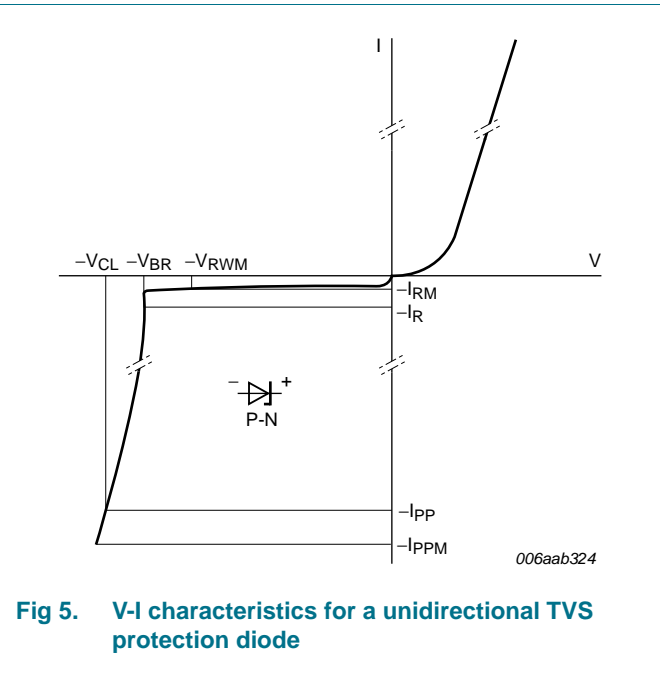
$T_j = 25\text{ °C}$  unless otherwise specified.

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]
		Min	Typ	Max	Typ	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

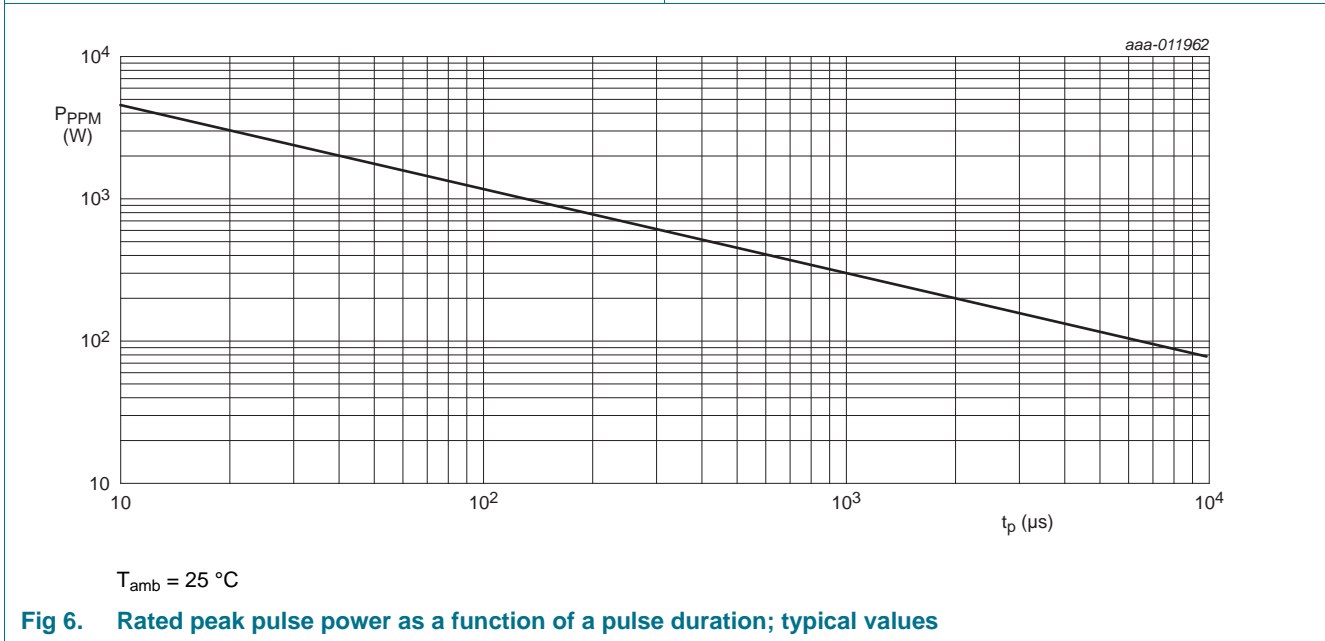
- [1] In accordance with IEC 61000-4-5 and IEC 61643-321 (8/20  $\mu\text{s}$  current waveform).
- [2] In accordance with IEC 61643-321 (10/1000  $\mu\text{s}$  current waveform).
- [3] Measured from pin 1 and 2 to pin 3.



**Fig 4. Relative variation of rated peak pulse power as a function of junction temperature; typical values**

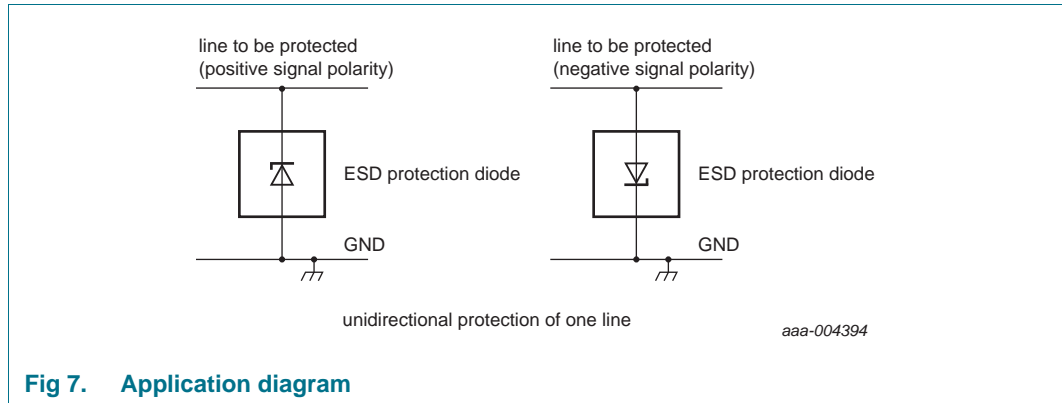


**Fig 5. V-I characteristics for a unidirectional TVS protection diode**



**Fig 6. Rated peak pulse power as a function of a pulse duration; typical values**

## 8. Application information

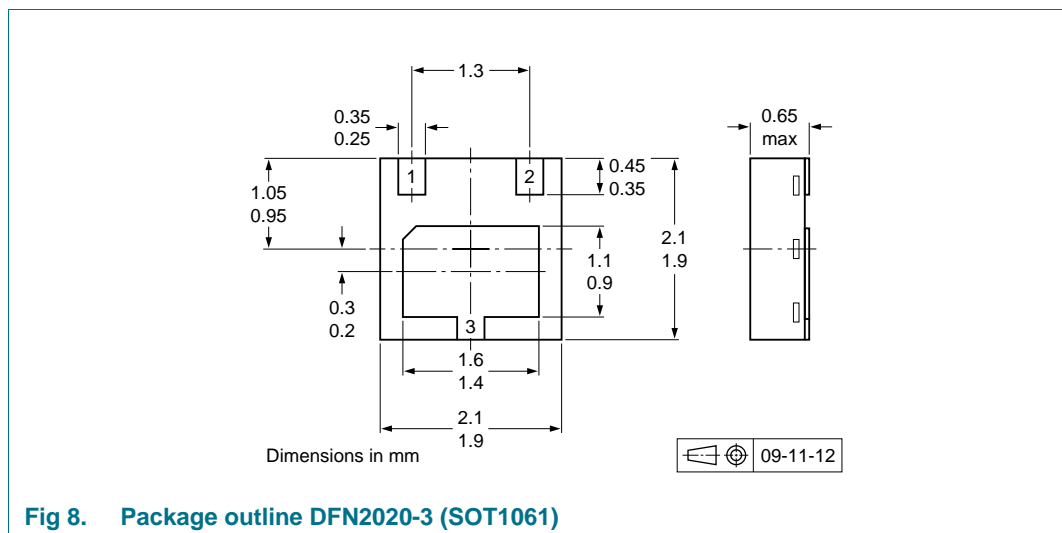


## 9. Test information

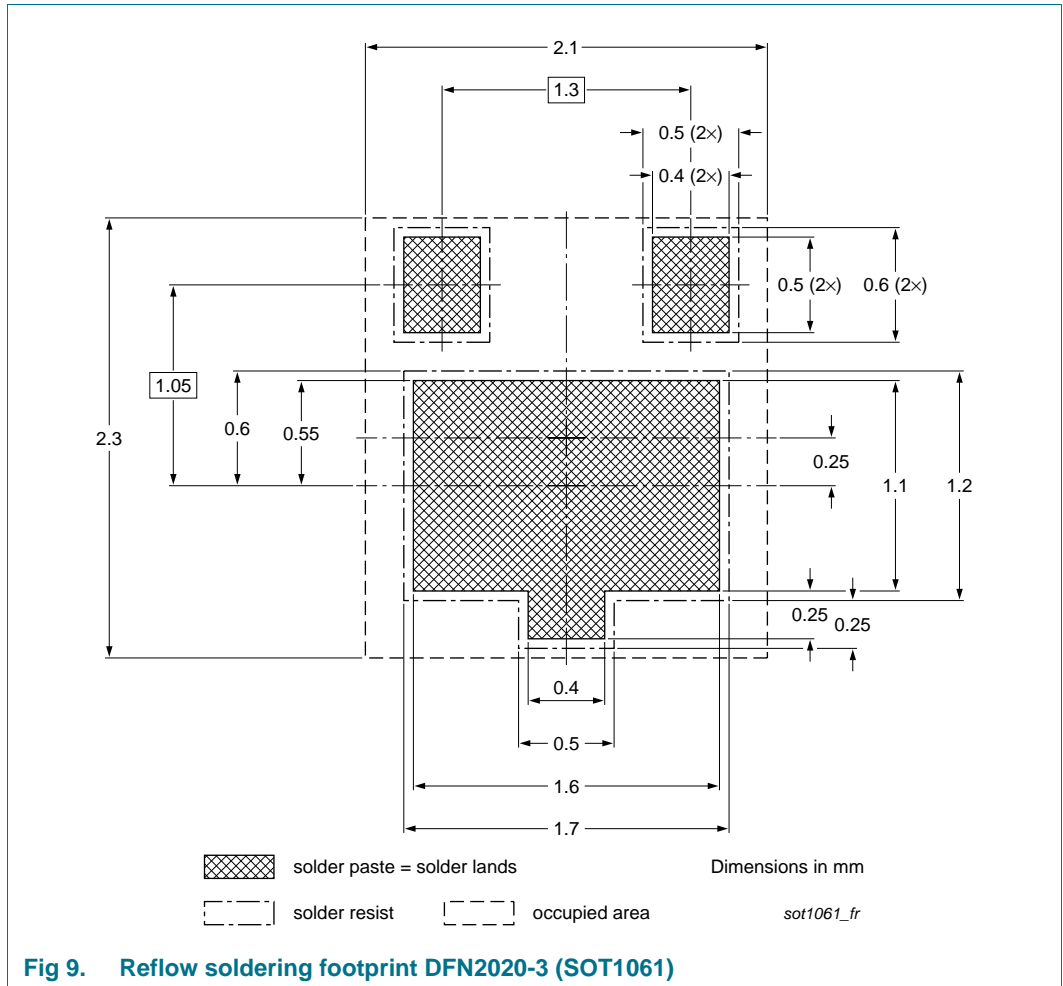
### 9.1 Quality information

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 <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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.
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**15. Contents**

**1 Product profile . . . . . 1**

1.1 General description . . . . . 1

1.2 Features and benefits . . . . . 1

1.3 Applications . . . . . 1

1.4 Quick reference data . . . . . 1

**2 Pinning information . . . . . 2**

**3 Ordering information . . . . . 2**

**4 Marking . . . . . 2**

**5 Limiting values . . . . . 3**

**6 Thermal characteristics . . . . . 5**

**7 Characteristics . . . . . 5**

**8 Application information . . . . . 7**

**9 Test information . . . . . 7**

9.1 Quality information . . . . . 7

**10 Package outline . . . . . 7**

**11 Soldering . . . . . 8**

**12 Revision history . . . . . 9**

**13 Legal information . . . . . 10**

13.1 Data sheet status . . . . . 10

13.2 Definitions . . . . . 10

13.3 Disclaimers . . . . . 10

13.4 Trademarks . . . . . 11

**14 Contact information . . . . . 11**

**15 Contents . . . . . 12**

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