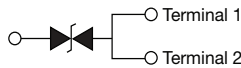


# Surface Mount PAR<sup>®</sup> Transient Voltage Suppressors

Bi-directional 1500 W TVS in TO-277 (SMPC) Package

**eSMP<sup>®</sup> Series**

**TO-277A (SMPC)**

**FEATURES**

- Junction passivation optimized PAR<sup>®</sup> design
- $T_J = 185\text{ }^\circ\text{C}$  capability suitable for high reliability and automotive requirement
- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Bi-direction only
- Excellent clamping capability
- Low leakage current
- Very fast response time
- AEC-Q101 qualified available  
- Automotive ordering code: base P/NHM3
- Meets MSL level 1, per J-STD-020, LF maximum peak of  $260\text{ }^\circ\text{C}$
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

 AUTOMOTIVE  
GRADE

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

PRIMARY CHARACTERISTICS	
$V_{WM}$	10.5 V to 37.8 V
$V_{BR}$ (Bi-directional)	11 V to 36 V
$P_{PPM}$	1500 W
$T_J$ max.	$185\text{ }^\circ\text{C}$
Polarity	Bi-directional
Package	TO-277A (SMPC)

**Note**

- All electrical characteristics are only applicable when two identical polarity terminals are connected.

**TYPICAL APPLICATIONS**

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for automotive, consumer, computer, industrial, and telecommunication.

**MECHANICAL DATA**
**Case:** TO-277A (SMPC)

Molding compound meets UL 94 V-0 flammability rating Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**Terminals:** Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** no marking on bi-directional types

MAXIMUM RATINGS ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Peak power dissipation with a 10/1000 $\mu\text{s}$ waveform <sup>(1)</sup>	$P_{PPM}$	1500	W
Peak pulse current with a 10/1000 $\mu\text{s}$ waveform <sup>(1)</sup>	$I_{PPM}$	See next table	A
Operating junction and storage temperature range	$T_J, T_{STG}$	-65 to +185	$^\circ\text{C}$

**Note**

- <sup>(1)</sup> Non-repetitive current pulse per fig.3 and derated above  $T_A = 25\text{ }^\circ\text{C}$



ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)								
DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE $V_{BR}^{(1)}$ AT $I_T$ (V)		TEST CURRENT $I_T$ (mA)	STAND-OFF VOLTAGE $V_{WM}$ (V)	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ ( $\mu\text{A}$ )	MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}^{(2)}$ (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)
		MIN.	MAX.					
TPC11CA	BAF	10.5	11.6	1.0	9.40	5.0	96.2	15.6
TPC12CA	BAG	11.4	12.6	1.0	10.2	2.0	89.8	16.7
TPC13CA	BAH	12.4	13.7	1.0	11.1	2.0	82.4	18.2
TPC15CA	BAI	14.3	15.8	1.0	12.8	1.0	70.8	21.2
TPC16CA	BAJ	15.2	16.8	1.0	13.6	1.0	66.7	22.5
TPC18CA	BAK	17.1	18.9	1.0	15.3	1.0	59.5	25.2
TPC20CA	BAL	19.0	21.0	1.0	17.1	1.0	54.2	27.7
TPC22CA	BAM	20.9	23.1	1.0	18.8	1.0	49.0	30.6
TPC24CA	BAN	22.8	25.2	1.0	20.5	1.0	45.2	33.2
TPC27CA	BAO	25.7	28.4	1.0	23.1	1.0	40.0	37.5
TPC30CA	BAP	28.5	31.5	1.0	25.6	1.0	36.2	41.4
TPC33CA	BAQ	31.4	34.7	1.0	28.2	1.0	32.8	45.7
TPC36CA	BAR	34.2	37.8	1.0	30.8	1.0	30.1	49.9

**Notes**

- All terms and symbols are consistent with ANSI/IEEE C62.35
- <sup>(1)</sup>  $V_{BR}$  measured after  $I_T$  applied for 300  $\mu\text{s}$ ,  $I_T$  = square wave pulse or equivalent
- <sup>(2)</sup> Surge current waveform per fig.3

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TPC11CAHM3/H <sup>(1)</sup>	0.10	H	1500	7" diameter plastic tape and reel
TPC11CAHM3/I <sup>(1)</sup>	0.10	I	6500	13" diameter plastic tape and reel

**Note**

- <sup>(1)</sup> AEC-Q101 qualified

## RATINGS AND CHARACTERISTICS CURVES ( $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted)

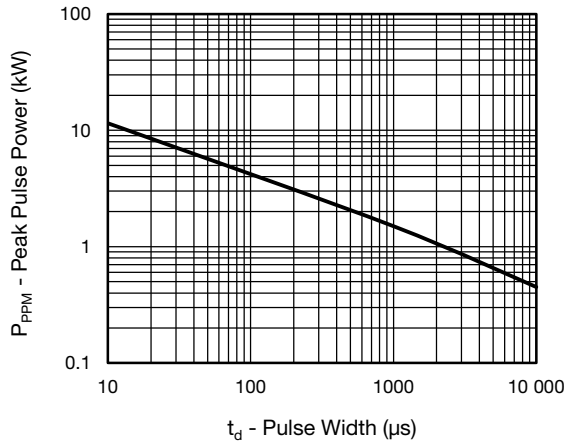


Fig. 1 - Peak Pulse Power Rating Curve

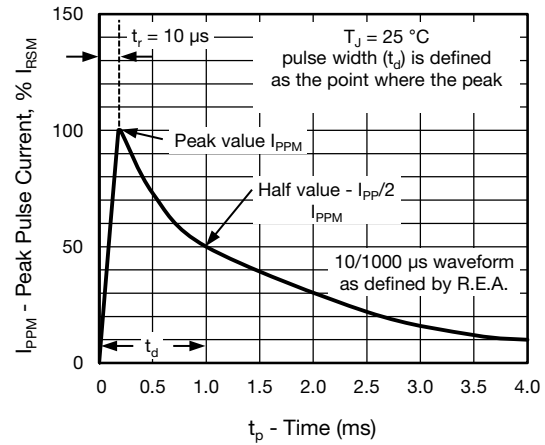


Fig. 3 - Pulse Waveform

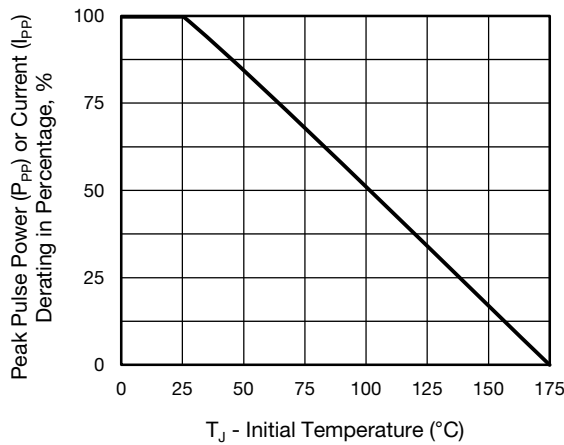


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

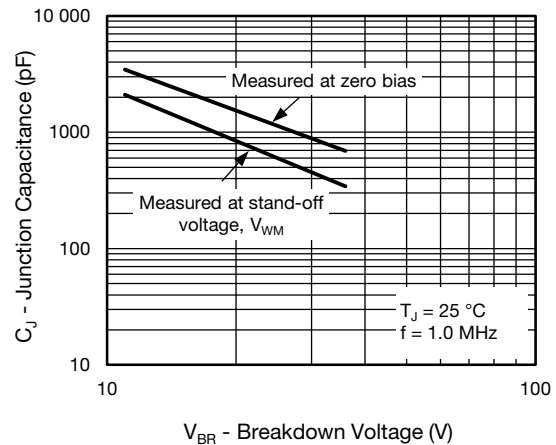


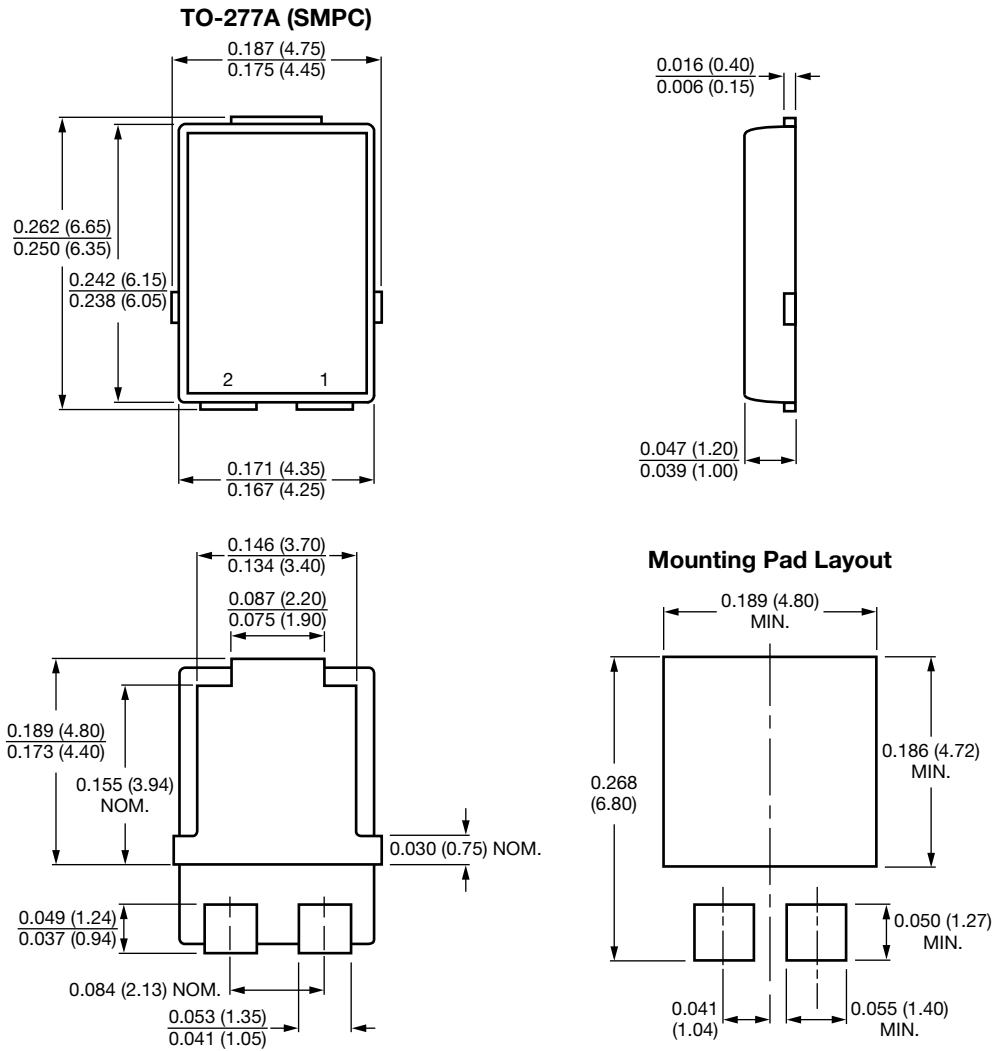
Fig. 4 - Typical Junction Capacitance

### Note

- Fig.1 power calculation is based on  $I_{PPM}$ , times defined maximum clamping voltage by pulse width.



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



Conform to JEDEC® TO-277A



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.