

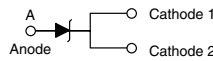
# Surface Mount PAR<sup>®</sup> Transient Voltage Suppressors

High Temperature Stability and High Reliability Conditions

## eSMP<sup>®</sup> Series



**TO-277A (SMPC)**



AUTOMOTIVE  
GRADE  
Available



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

## FEATURES

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 185\text{ }^\circ\text{C}$  capability suitable for high reliability and automotive requirement
- Very low profile - typical height of 1.1 mm
- Ideal for automated placement
- Uni-direction only
- Excellent clamping capability
- Low incremental surge resistance
- Very fast response time
- Meets MSL level 1, per J-STD-020
- AEC-Q101 qualified
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

## MECHANICAL DATA

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

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

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

HM3 suffix meets JESD 201 class 2 whisker test

PRIMARY CHARACTERISTICS	
$V_{WM}$	5.50 V to 43.6 V
$V_{BR}$	6.8 V to 51 V
$P_{PPM}$	1500 W
$T_J$ max.	185 °C
Polarity	Uni-directional
Package	TO-277A (SMPC)

## 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 consumer, computer, industrial, automotive, and telecommunication.

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 (fig. 3) <sup>(1)(2)</sup>	$P_{PPM}$	1500	W
Peak power pulse current with a 10/1000 $\mu\text{s}$ waveform (fig. 1) <sup>(1)</sup>	$I_{PPM}$	See next table	A
Peak forward surge current 8.3 ms single half sine-wave <sup>(2)</sup>	$I_{FSM}$	200	A
Maximum instantaneous forward voltage at 100 A <sup>(3)</sup>	$V_F$	3.5	V
Operating junction and storage temperature range	$T_J, T_{STG}$	- 65 to + 185	°C

### Notes

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25\text{ }^\circ\text{C}$  per fig. 2

<sup>(2)</sup> Measured on 8.3 ms single half sine-wave, or equivalent square wave, duty cycle = 4 pulses per minute maximum

<sup>(3)</sup> Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle



ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C, unless otherwise noted)									
DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE V <sub>BR</sub> <sup>(1)</sup> AT I <sub>T</sub> (V)		TEST CURRENT I <sub>T</sub> (mA)	STAND-OFF VOLTAGE V <sub>WM</sub> (V)	MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> I <sub>R</sub> (μA)	MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> T <sub>J</sub> = 150 °C I <sub>D</sub> (μA)	MAXIMUM PEAK PULSE SURGE CURRENT I <sub>PPM</sub> <sup>(2)</sup> (A)	MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V)
		MIN.	MAX.						
TPC6.8	DDP	6.12	7.48	10	5.50	1500	10 000	139	10.8
TPC6.8A	DEP	6.45	7.14	10	5.80	1500	10 000	143	10.5
TPC7.5	DFP	6.75	8.25	10	6.05	500	5000	128	11.7
TPC7.5A	DGP	7.13	7.88	10	6.40	500	5000	133	11.3
TPC8.2	DHP	7.38	9.02	10	6.63	200	2000	120	12.5
TPC8.2A	DKP	7.79	8.61	10	7.02	200	2000	124	12.1
TPC9.1	DLP	8.19	10.0	1.0	7.37	50	500	109	13.8
TPC9.1A	DMP	8.65	9.55	1.0	7.78	50	500	112	13.4
TPC10	DNP	9.0	11.0	1.0	8.10	20	200	100	15.0
TPC10A	DPP	9.5	10.5	1.0	8.55	20	200	103	14.5
TPC11	DQP	9.9	12.1	1.0	8.92	5.0	50	92.6	16.2
TPC11A	DRP	10.5	11.6	1.0	9.40	5.0	50	96.2	15.6
TPC12	DSP	10.8	13.2	1.0	9.72	2.0	10	86.7	17.3
TPC12A	DTP	11.4	12.6	1.0	10.2	2.0	10	89.8	16.7
TPC13	DUP	11.7	14.3	1.0	10.5	2.0	10	78.9	19.0
TPC13A	DVP	12.4	13.7	1.0	11.1	2.0	10	82.4	18.2
TPC15	DWP	13.5	16.5	1.0	12.1	1.0	10	68.2	22.0
TPC15A	DXP	14.3	15.8	1.0	12.8	1.0	10	70.8	21.2
TPC16	DYP	14.4	17.6	1.0	12.9	1.0	10	63.8	23.5
TPC16A	DZP	15.2	16.8	1.0	13.6	1.0	10	66.7	22.5
TPC18	EDP	16.2	19.8	1.0	14.5	1.0	10	56.6	26.5
TPC18A	EEP	17.1	18.9	1.0	15.3	1.0	10	59.5	25.2
TPC20	EFP	18.0	22.0	1.0	16.2	1.0	10	51.5	29.1
TPC20A	EGP	19.0	21.0	1.0	17.1	1.0	10	54.2	27.7
TPC22	EHP	19.8	24.2	1.0	17.8	1.0	10	47.0	31.9
TPC22A	EKP	20.9	23.1	1.0	18.8	1.0	10	49.0	30.6
TPC24	ELP	21.6	26.4	1.0	19.4	1.0	10	43.2	34.7
TPC24A	EMP	22.8	25.2	1.0	20.5	1.0	10	45.2	33.2
TPC27	ENP	24.3	29.7	1.0	21.8	1.0	10	38.4	39.1
TPC27A	EPP	25.7	28.4	1.0	23.1	1.0	10	40.0	37.5
TPC30	EQP	27.0	33.0	1.0	24.3	1.0	10	34.5	43.5
TPC30A	ERP	28.5	31.5	1.0	25.6	1.0	10	36.2	41.4
TPC33	ESP	29.7	36.3	1.0	26.8	1.0	10	31.4	47.7
TPC33A	ETP	31.4	34.7	1.0	28.2	1.0	10	32.8	45.7
TPC36	EUP	32.4	39.6	1.0	29.1	1.0	15	28.8	52.0
TPC36A	EVP	34.2	37.8	1.0	30.8	1.0	15	30.1	49.9
TPC39	EWP	35.1	42.9	1.0	31.6	1.0	15	26.6	56.4
TPC39A	EXP	37.1	41.0	1.0	33.3	1.0	15	27.8	53.9
TPC43	EYP	38.7	47.3	1.0	34.8	1.0	20	24.2	61.9
TPC43A	EZP	40.9	45.2	1.0	36.8	1.0	20	25.3	59.3
TPC47A	FEP	44.7	49.4	1.0	40.2	1.0	20	23.1	64.8
TPC51A	FGP	48.5	53.6	1.0	43.6	1.0	20	21.4	70.1

**Notes**

- (1) V<sub>BR</sub> measured after I<sub>T</sub> applied for 300 μs, I<sub>T</sub> = square wave pulse or equivalent  
(2) Surge current waveform per fig. 3 and derated per fig. 2  
(3) All terms and symbols are consistent with ANSI/IEEE C62.35



ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TPC10AHM3/86A <sup>(1)</sup>	0.10	86A	1500	7" diameter plastic tape and reel
TPC10AHM3/87A <sup>(1)</sup>	0.10	87A	6500	13" diameter plastic tape and reel

**Note**

<sup>(1)</sup> Automotive grade

**RATINGS AND CHARACTERISTICS CURVES**

(T<sub>A</sub> = 25 °C unless otherwise noted)

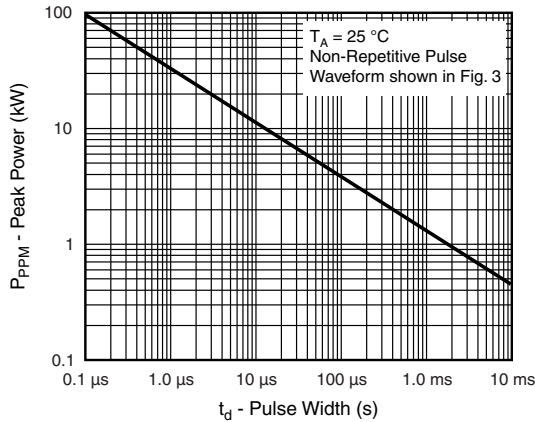


Fig. 1 - Peak Pulse Power Rating Curve

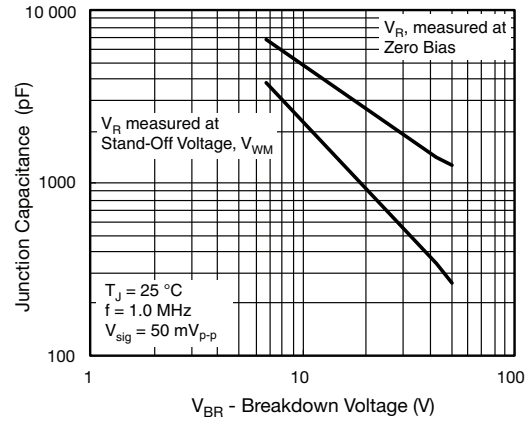


Fig. 4 - Typical Junction Capacitance

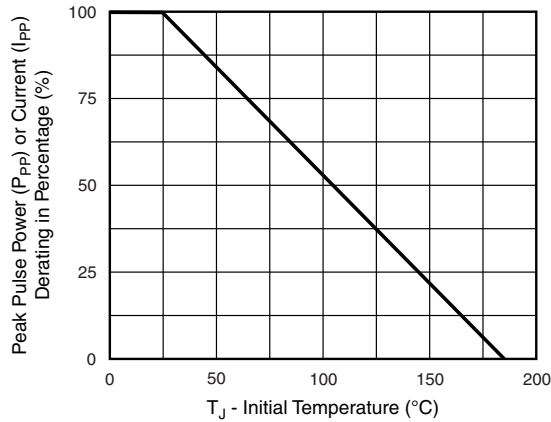


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

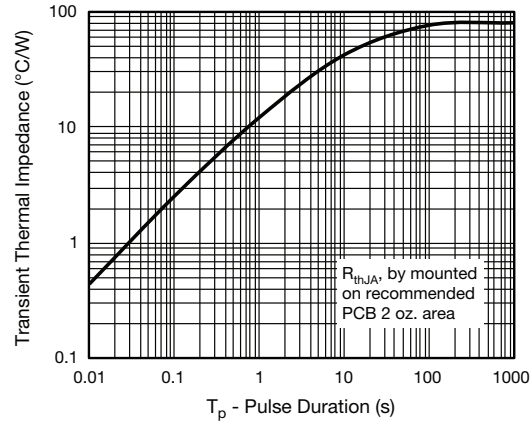


Fig. 5 - Typical Transient Thermal Impedance

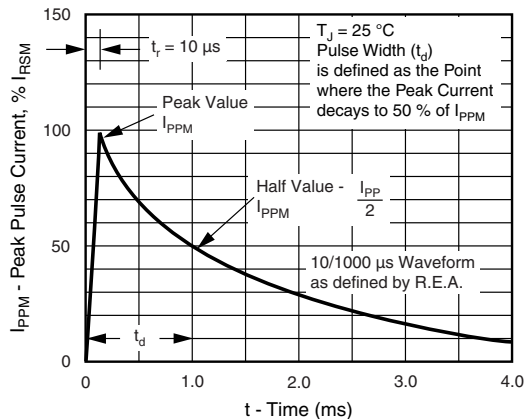
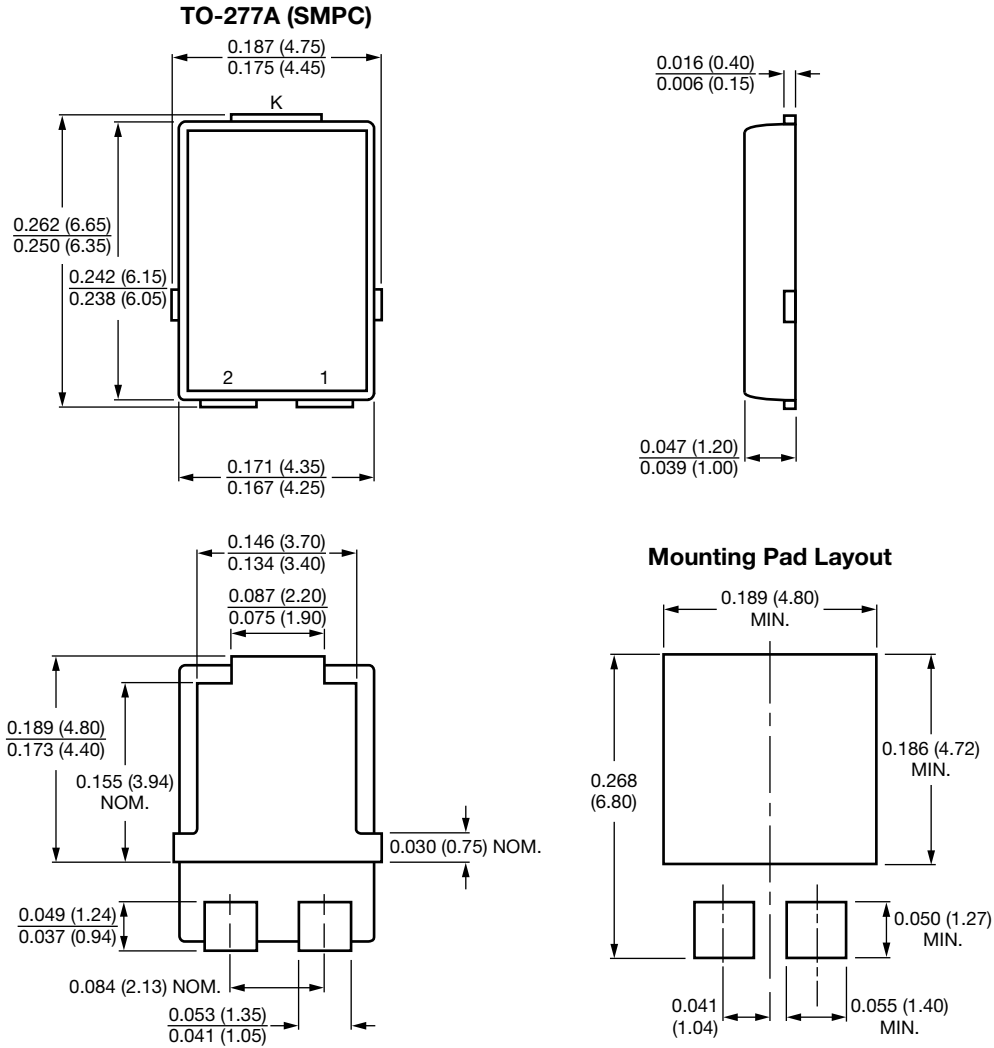


Fig. 3 - Pulse Waveform



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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