

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

**eSMP<sup>®</sup> Series**

**DO-220AA (SMP)**

**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 1.0 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, LF maximum peak of  $260\text{ }^\circ\text{C}$
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

PRIMARY CHARACTERISTICS	
$V_{BR}$	6.8 V to 43 V
$V_{WM}$	5.8 V to 36.8 V
$P_{PPM}$ (for $V_{BR}$ 6.8 V)	250 W
$P_{PPM}$ (for $V_{BR}$ 7.5 V to 12 V)	300 W
$P_{PPM}$ (for $V_{BR}$ 13 V to 43 V)	400 W
$P_D$	2.5 W
$I_{FSM}$	40 A
$T_J$ max.	$185\text{ }^\circ\text{C}$
Polarity	Uni-directional
Package	DO-220AA (SMP)

**TYPICAL APPLICATIONS**

Protection for ICs, drive transistors, signal lines of sensor units, and electronic units in consumer, computer, industrial, and automotive applications.

**MECHANICAL DATA**

**Case:** DO-220AA (SMP)

Molding compound meets UL 94 V-0 flammability rating Base P/NHM3\_X - halogen-free, RoHS-compliant and AEC-Q101 qualified ("X" denotes revision code e.g. A, B, ...)

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

HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** color band denotes cathode end

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. 1 and 3) <sup>(1)(2)</sup>	$P_{PPM}$	See table next page	W
Peak power pulse current with a 10/1000 $\mu\text{s}$ waveform (fig. 1) <sup>(1)</sup>	$I_{PPM}$	See table next page	A
Power dissipation on infinite heatsink, $T_A = 75\text{ }^\circ\text{C}$	$P_D$	2.5	W
Peak forward surge current 10 ms single half sine-wave superimposed on rated load	$I_{FSM}$	40	A
Maximum instantaneous forward voltage at 25 A <sup>(3)</sup>	$V_F$	2.5	V
Operating junction and storage temperature range	$T_J, T_{STG}$	-65 to +185	$^\circ\text{C}$

**Notes**

- (1) Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25\text{ }^\circ\text{C}$  per fig. 2
- (2) Mounted on PCB with 5.0 mm x 5.0 mm copper pads attached to each terminal
- (3) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle



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 $V_{WM}$ $I_R$ ( $\mu\text{A}$ )	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $T_J = 150\text{ }^\circ\text{C}$ $I_D$ ( $\mu\text{A}$ )	MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}^{(2)}$ (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)	MAXIMUM TEMPERATURE COEFFICIENT OF $V_{BR}$ ( $\%/^\circ\text{C}$ )
		MIN.	MAX.							
TPSMP6.8A	AEP	6.45	7.14	10.0	5.80	300	1000	23.8	10.5	0.057
TPSMP7.5A	AGP	7.13	7.88	10.0	6.40	150	500	26.5	11.3	0.061
TPSMP8.2A	AKP	7.79	8.61	10.0	7.02	50.0	200	24.8	12.1	0.065
TPSMP9.1A	AMP	8.65	9.55	1.0	7.78	10.0	50.0	22.4	13.4	0.068
TPSMP10A	APP	9.50	10.5	1.0	8.55	5.0	20.0	20.7	14.5	0.073
TPSMP11A	ARP	10.5	11.6	1.0	9.40	2.0	10.0	19.2	15.6	0.075
TPSMP12A	ATP	11.4	12.6	1.0	10.2	1.0	5.0	18.0	16.7	0.078
TPSMP13A	AVP	12.4	13.7	1.0	11.1	1.0	5.0	22.0	18.2	0.081
TPSMP15A	AXP	14.3	15.8	1.0	12.8	1.0	5.0	18.9	21.2	0.084
TPSMP16A	AZP	15.2	16.8	1.0	13.6	1.0	5.0	17.8	22.5	0.086
TPSMP18A	BEP	17.1	18.9	1.0	15.3	1.0	5.0	15.9	25.5	0.088
TPSMP20A	BGP	19.0	21.0	1.0	17.1	1.0	5.0	14.4	27.7	0.090
TPSMP22A	BKP	20.9	23.1	1.0	18.8	1.0	5.0	13.1	30.6	0.092
TPSMP24A	BMP	22.8	25.2	1.0	20.5	1.0	5.0	12.0	33.2	0.094
TPSMP27A	BPP	25.7	28.4	1.0	23.1	1.0	5.0	10.7	37.5	0.096
TPSMP30A	BRP	28.5	31.5	1.0	25.6	1.0	5.0	9.7	41.4	0.097
TPSMP33A	BTP	31.4	34.7	1.0	28.2	1.0	5.0	8.8	45.7	0.098
TPSMP36A	BVP	34.2	37.8	1.0	30.8	1.0	5.0	8.0	49.9	0.099
TPSMP39A	BXP	37.1	41.0	1.0	33.3	1.0	5.0	7.4	53.9	0.100
TPSMP43A	BZP	40.9	45.2	1.0	36.8	1.0	5.0	6.7	59.3	0.101

**Notes**

- (1)  $V_{BR}$  measured after  $I_T$  applied for 300  $\mu\text{s}$ ,  $I_T$  = 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
TPSMP6.8AHM3_A/H <sup>(1)</sup>	0.024	H	3000	7" diameter plastic tape and reel
TPSMP6.8AHM3_A/I <sup>(1)</sup>	0.024	I	10 000	13" diameter plastic tape and reel

**Note**

- (1) Automotive grade



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

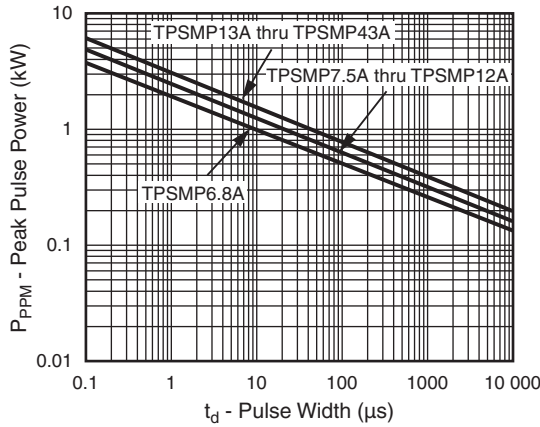


Fig. 1 - Peak Pulse Power Rating Curve

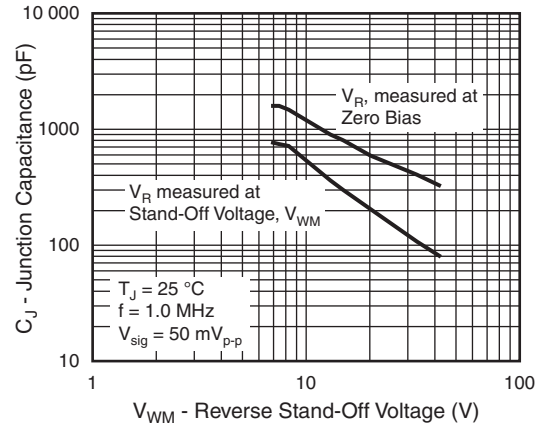


Fig. 4 - Typical Junction Capacitance

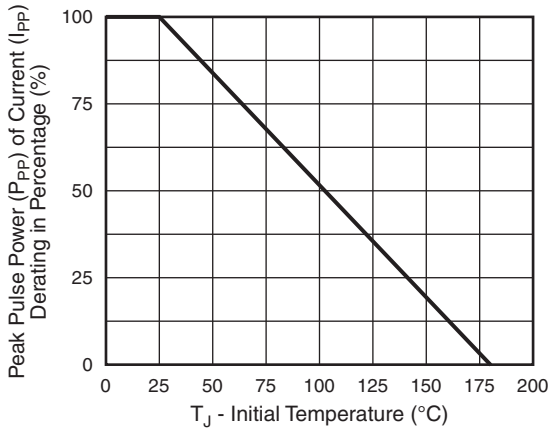


Fig. 2 - Pulse Derating Curve

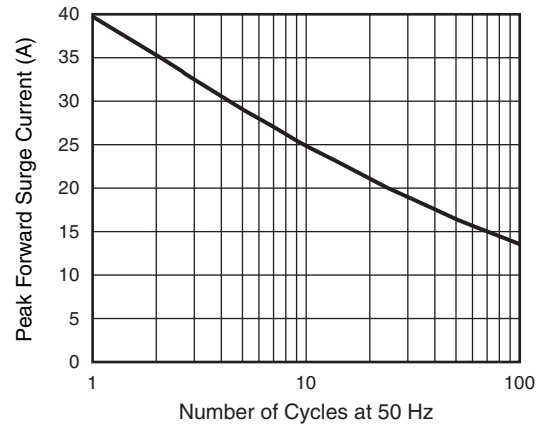


Fig. 5 - Maximum Peak Forward Surge Current

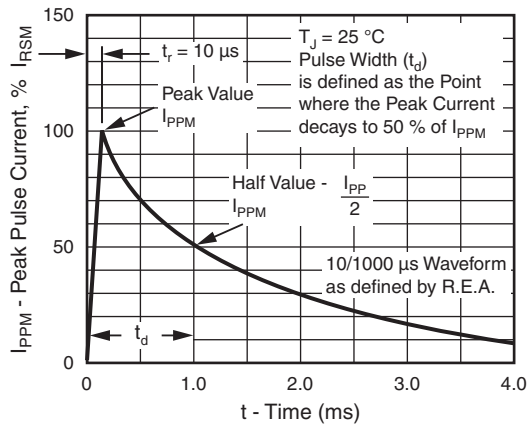


Fig. 3 - Pulse Waveform

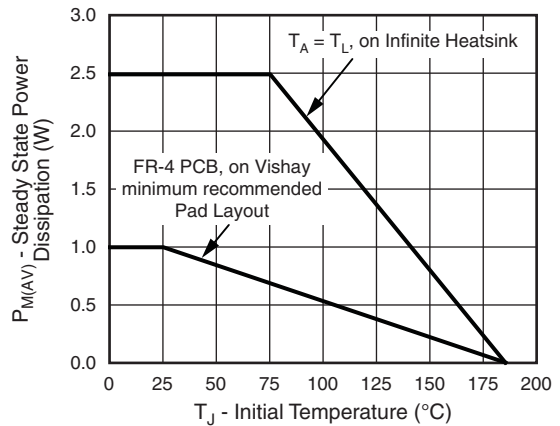
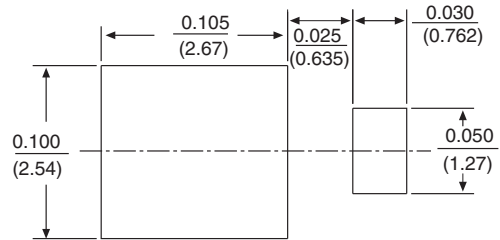
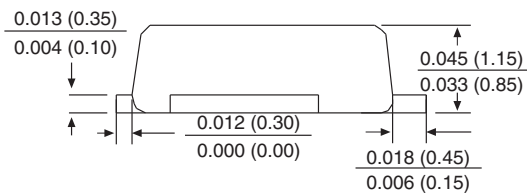
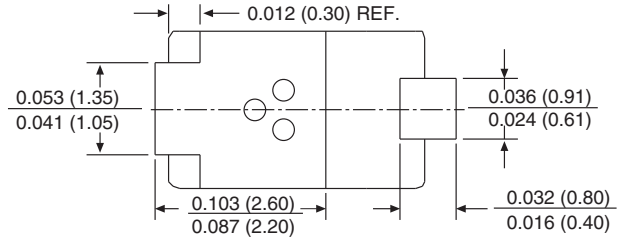
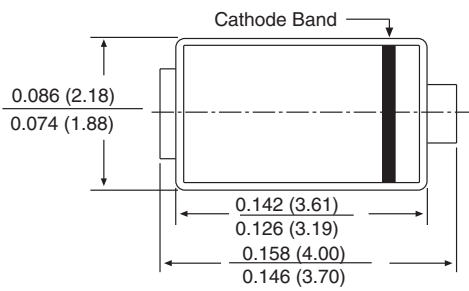


Fig. 6 - Steady State Power Derating Curve



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### DO-220AA (SMP)





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