

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

High Temperature Stability and High Reliability Conditions



DO-214AC (SMA)



**RoHS**  
COMPLIANT

## FEATURES

- Junction passivation optimized design passivated anisotropic rectifier technology
- $T_J = 185\text{ }^\circ\text{C}$  capability suitable for high reliability and automotive requirement
- Available in uni-directional polarity only
- 400 W peak pulse power capability with a 10/1000  $\mu\text{s}$  waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- 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

$V_{WM}$	5.5 V to 36.8 V
$V_{BR}$	6.8 V to 43 V
$P_{PPM}$	400 W
$P_D$	1.0 W
$I_{FSM}$	40 A
$T_J$ max.	$185\text{ }^\circ\text{C}$
Polarity	Uni-directional
Package	DO-214AC (SMA)

## 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.

## MECHANICAL DATA

**Case:** DO-214AC (SMA)

Molding compound meets UL 94 V-0 flammability rating Base P/NHE3\_X - 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

HE3 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 <sup>(1)(2)</sup> (fig. 3)	$P_{PPM}$	400	W
Peak power pulse current with a 10/1000 $\mu\text{s}$ waveform <sup>(1)</sup> (fig. 1)	$I_{PPM}$	See next table	A
Power dissipation at $T_A = 25\text{ }^\circ\text{C}$ <sup>(4)</sup>	$P_D$	1.0	W
Peak forward surge current 8.3 ms single half sine-wave <sup>(3)</sup>	$I_{FSM}$	40	A
Maximum instantaneous forward voltage at 25 A <sup>(3)</sup>	$V_F$	3.5	V
Operating junction and storage temperature range	$T_J, T_{STG}$	- 65 to + 185	$^\circ\text{C}$

### 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> Mounted on PCB with 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads attached to each terminal

<sup>(3)</sup> Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minutes maximum

<sup>(4)</sup> Mounted on minimum recommended pad layout



### 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)	T <sub>J</sub> = 150 °C MAXIMUM REVERSE LEAKAGE AT V <sub>WM</sub> 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.						
TPSMA6.8	ADP	6.12	7.48	10	5.50	300	1000	37.0	10.8
TPSMA6.8A	AEP	6.45	7.14	10	5.80	300	1000	38.1	10.5
TPSMA7.5	AFP	6.75	8.25	10	6.05	150	500	34.2	11.7
TPSMA7.5A	AGP	7.13	7.88	10	6.40	150	500	35.4	11.3
TPSMA8.2	AHP	7.38	9.02	10	6.63	50	200	32.0	12.5
TPSMA8.2A	AKP	7.79	8.61	10	7.02	50	200	33.1	12.1
TPSMA9.1	ALP	8.19	10.00	1.0	7.37	10	50	29.0	13.8
TPSMA9.1A	AMP	8.65	9.55	1.0	7.78	10	50	29.9	13.0
TPSMA10	ANP	9.00	11.00	1.0	8.10	5.0	20	26.7	15.0
TPSMA10A	APP	9.50	10.50	1.0	8.65	5.0	20	27.6	14.5
TPSMA11	AQP	9.90	12.10	1.0	8.92	1.0	5.0	24.7	16.2
TPSMA11A	ARP	10.50	11.60	1.0	9.40	1.0	5.0	25.6	15.6
TPSMA12	ASP	10.80	13.20	1.0	9.72	1.0	5.0	23.1	17.3
TPSMA12A	ATP	11.40	12.60	1.0	10.20	1.0	5.0	24.0	16.7
TPSMA13	AUP	11.70	14.30	1.0	10.50	1.0	5.0	21.1	19.0
TPSMA13A	AVP	12.40	13.70	1.0	11.10	1.0	5.0	22.0	18.2
TPSMA15	AWP	13.50	16.30	1.0	12.10	1.0	5.0	18.2	22.0
TPSMA15A	AXP	14.30	15.80	1.0	12.80	1.0	5.0	18.9	21.2
TPSMA16	AYP	14.40	17.60	1.0	12.90	1.0	5.0	17.0	23.5
TPSMA16A	AZP	15.20	16.80	1.0	13.60	1.0	5.0	17.8	22.0
TPSMA18	BDP	16.20	19.80	1.0	14.50	1.0	5.0	15.1	26.5
TPSMA18A	BEP	17.10	18.90	1.0	15.30	1.0	5.0	15.9	25.5
TPSMA20	BFP	18.00	22.00	1.0	16.20	1.0	5.0	13.7	29.1
TPSMA20A	BGP	19.00	21.00	1.0	17.10	1.0	5.0	14.4	27.7
TPSMA22	BHP	19.80	24.20	1.0	17.80	1.0	5.0	12.5	31.9
TPSMA22A	BKP	20.90	23.10	1.0	18.80	1.0	5.0	13.1	30.6
TPSMA24	BLP	21.60	26.40	1.0	19.40	1.0	5.0	11.5	34.7
TPSMA24A	BMP	22.80	25.20	1.0	20.50	1.0	5.0	12.0	33.2
TPSMA27	BNP	24.30	29.70	1.0	21.80	1.0	5.0	10.2	39.1
TPSMA27A	BPP	25.70	28.40	1.0	23.10	1.0	5.0	10.7	37.5
TPSMA30	BQP	27.00	33.00	1.0	24.30	1.0	5.0	9.2	43.5
TPSMA30A	BRP	28.50	31.50	1.0	25.60	1.0	5.0	9.7	41.4
TPSMA33	BSP	29.70	36.30	1.0	26.80	1.0	5.0	8.4	47.0
TPSMA33A	BTP	31.40	34.70	1.0	28.20	1.0	5.0	8.8	45.7
TPSMA36	BUP	32.40	39.60	1.0	29.10	1.0	5.0	7.7	52.0
TPSMA36A	BVP	34.20	37.80	1.0	30.80	1.0	5.0	8.0	49.9
TPSMA39	BWP	35.10	42.90	1.0	31.60	1.0	5.0	7.1	56.4
TPSMA39A	BXP	37.10	41.00	1.0	33.30	1.0	5.0	7.4	53.9
TPSMA43	BYP	38.70	47.30	1.0	34.80	1.0	5.0	6.5	61.9
TPSMA43A	BZP	40.90	45.20	1.0	36.80	1.0	5.0	6.7	59.3

#### 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
TPSMA6.8AHE3_A/H <sup>(1)</sup>	0.064	H	1800	7" diameter plastic tape and reel
TPSMA6.8AHE3_A/I <sup>(1)</sup>	0.064	I	7500	13" diameter plastic tape and reel

**Note**

(1) AEC-Q101 qualified

## RATINGS AND CHARACTERISTICS CURVES (T<sub>A</sub> = 25 °C unless otherwise noted)

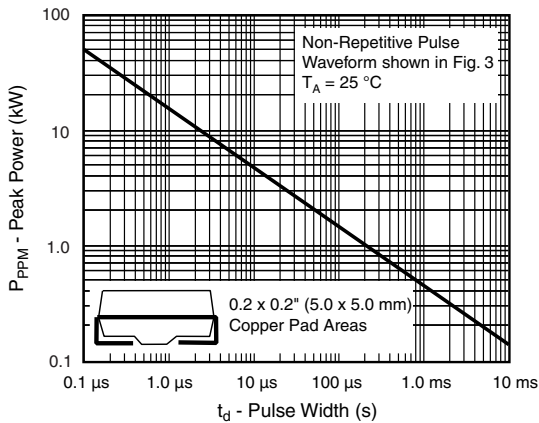


Fig. 1 - Peak Pulse Power Rating Curve

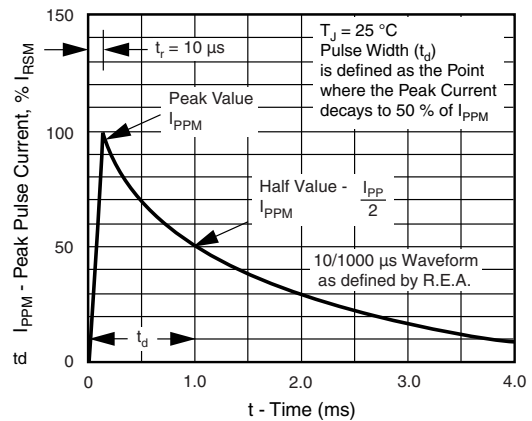


Fig. 3 - Pulse Waveform

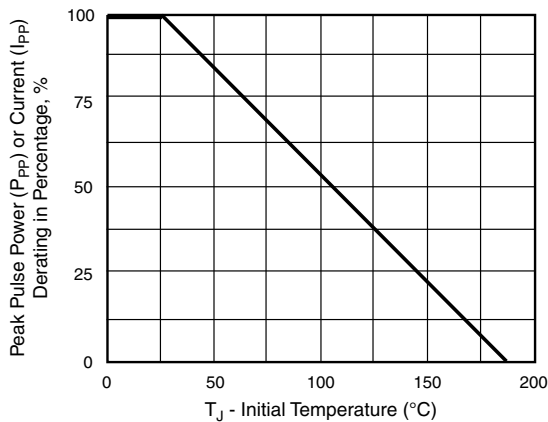


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

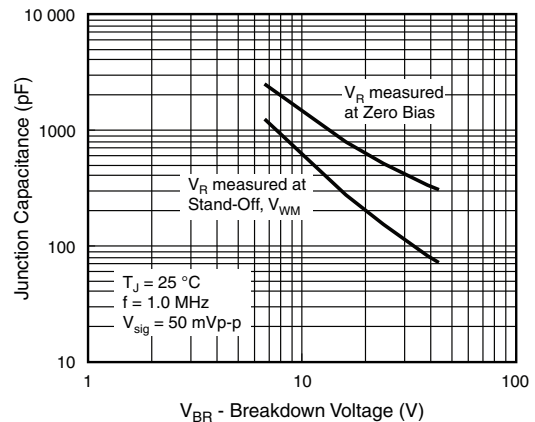


Fig. 4 - Typical Junction Capacitance

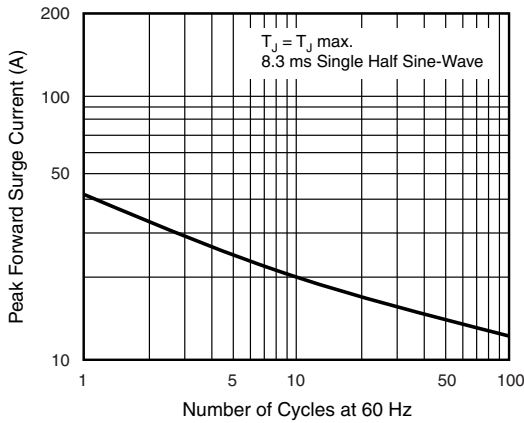
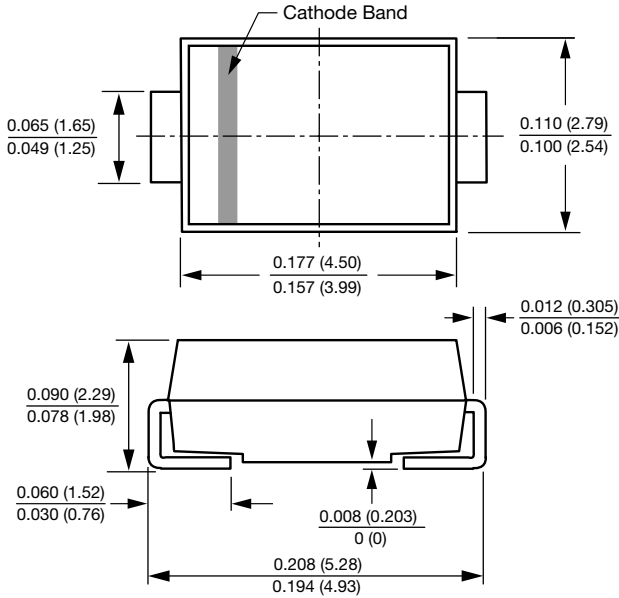


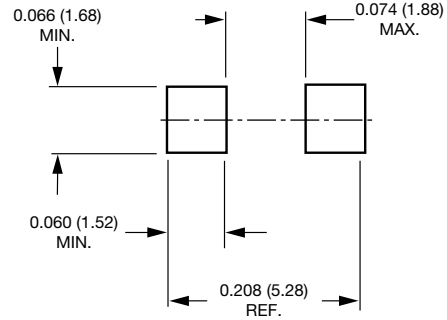
Fig. 5 - Maximum Non-Repetitive Peak Forward Surge Current

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)

**DO-214AC (SMA)**



**Mounting Pad Layout**





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