

## Surface Mount TRANSZORB® Transient Voltage Suppressors


**SMA (DO-214AC)**

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

**FEATURES**

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in uni-directional and bi-directional
- 400 W peak pulse power capability with a 10/1000  $\mu$ s waveform, repetitive rate (duty cycle): 0.01 % (300 W above 78 V)
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available  
- Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

PRIMARY CHARACTERISTICS	
$V_{BR}$ uni-directional	6.40 V to 231 V
$V_{BR}$ bi-directional	6.40 V to 231 V
$V_{WM}$	5.0 V to 188 V
$P_{PPM}$	400 W, 300 W
$I_{FSM}$	40 A
$T_J$ max.	150 °C
Polarity	Uni-directional, bi-directional
Package	SMA (DO-214AC)

**DEVICES FOR BI-DIRECTION APPLICATIONS**

For bi-directional use CA suffix (e.g. SMAJ10CA).  
Electrical characteristics apply in both directions.

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

Molding compound meets UL 94 V-0 flammability rating

Base P/N-E3 - RoHS-compliant, commercial grade

Base P/N-M3 - halogen-free, RoHS-compliant, commercial grade

Base P/NHE3\_X - RoHS-compliant and AEC-Q101 qualified

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

E3, M3, HE3, and HM3 suffix meets JESD 201 class 2 whisker test

**Polarity:** for uni-directional types the band denotes cathode end, no marking on bi-directional types

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup> (fig. 1)	$P_{PPM}$	400	W
Peak pulse current with a waveform <sup>(1)</sup>	$I_{PPM}$	See next table	A
Peak forward surge current 8.3 ms single half sine-wave uni-directional only <sup>(2)</sup>	$I_{FSM}$	40	A
Operating junction and storage temperature range	$T_J, T_{STG}$	-55 to +150	°C

**Notes**

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25$  °C per fig. 2. Rating is 300 W above 78 V

<sup>(2)</sup> Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal



ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)									
DEVICE TYPE	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V <sub>BR</sub> AT I <sub>T</sub> <sup>(1)</sup> (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>D</sub> (μA) <sup>(3)</sup>	MAXIMUM PEAK PULSE SURGE CURRENT I <sub>PPM</sub> (A) <sup>(2)</sup>	MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V)
	UNI	BI	MIN.	MAX.					
(+)SMAJ5.0A <sup>(5)</sup>	AE	WE	6.40	7.07	10	5.0	800	43.5	9.2
(+)SMAJ6.0A	AG	WG	6.67	7.37	10	6.0	800	38.8	10.3
(+)SMAJ6.5A	AK	WK	7.22	7.98	10	6.5	500	35.7	11.2
(+)SMAJ7.0A	AM	WM	7.78	8.60	10	7.0	200	33.3	12.0
(+)SMAJ7.5A	AP	WP	8.33	9.21	1.0	7.5	100	31.0	12.9
(+)SMAJ8.0A	AR	WR	8.89	9.83	1.0	8.0	50	29.4	13.6
(+)SMAJ8.5A	AT	WT	9.44	10.4	1.0	8.5	10	27.8	14.4
(+)SMAJ9.0A	AV	WV	10.0	11.1	1.0	9.0	5.0	26.0	15.4
(+)SMAJ10A	AX	WX	11.1	12.3	1.0	10	1.0	23.5	17.0
(+)SMAJ11A	AZ	WZ	12.2	13.5	1.0	11	1.0	22.0	18.2
(+)SMAJ12A	BE	XE	13.3	14.7	1.0	12	1.0	20.1	19.9
(+)SMAJ13A	BG	XG	14.4	15.9	1.0	13	1.0	18.6	21.5
(+)SMAJ14A	BK	XK	15.6	17.2	1.0	14	1.0	17.2	23.2
(+)SMAJ15A	BM	XM	16.7	18.5	1.0	15	1.0	16.4	24.4
(+)SMAJ16A	BP	XP	17.8	19.7	1.0	16	1.0	15.4	26.0
(+)SMAJ17A	BR	XR	18.9	20.9	1.0	17	1.0	14.5	27.6
(+)SMAJ18A	BT	XT	20.0	22.1	1.0	18	1.0	13.7	29.2
(+)SMAJ20A	BV	XV	22.2	24.5	1.0	20	1.0	12.3	32.4
(+)SMAJ22A	BX	XX	24.4	26.9	1.0	22	1.0	11.3	35.5
(+)SMAJ24A	BZ	XZ	26.7	29.5	1.0	24	1.0	10.3	38.9
(+)SMAJ26A	CE	YE	28.9	31.9	1.0	26	1.0	9.5	42.1
(+)SMAJ28A	CG	YG	31.1	34.4	1.0	28	1.0	8.8	45.4
(+)SMAJ30A	CK	YK	33.3	36.8	1.0	30	1.0	8.3	48.4
(+)SMAJ33A	CM	YM	36.7	40.6	1.0	33	1.0	7.5	53.3
(+)SMAJ36A	CP	YP	40.0	44.2	1.0	36	1.0	6.9	58.1
(+)SMAJ40A	CR	YR	44.4	49.1	1.0	40	1.0	6.2	64.5
(+)SMAJ43A	CT	YT	47.8	52.8	1.0	43	1.0	5.8	69.4
(+)SMAJ45A	CV	YV	50.0	55.3	1.0	45	1.0	5.5	72.7
(+)SMAJ48A	CX	YX	53.3	58.9	1.0	48	1.0	5.2	77.4
(+)SMAJ51A	CZ	YZ	56.7	62.7	1.0	51	1.0	4.9	82.4
(+)SMAJ54A	RE	ZE	60.0	66.3	1.0	54	1.0	4.6	87.1
(+)SMAJ58A	RG	ZG	64.4	71.2	1.0	58	1.0	4.3	93.6
(+)SMAJ60A	RK	ZK	66.7	73.7	1.0	60	1.0	4.1	96.8
(+)SMAJ64A	RM	ZM	71.1	78.6	1.0	64	1.0	3.9	103
(+)SMAJ70A	RP	ZP	77.8	86.0	1.0	70	1.0	3.5	113
(+)SMAJ75A	RR	ZR	83.3	92.1	1.0	75	1.0	3.3	121
(+)SMAJ78A	RT	ZT	86.7	95.8	1.0	78	1.0	3.2	126
(+)SMAJ85A	RV	ZV	94.4	104	1.0	85	1.0	2.2	137
(+)SMAJ90A	RX	ZX	100	111	1.0	90	1.0	2.1	146
(+)SMAJ100A	RZ	ZZ	111	123	1.0	100	1.0	1.9	162
(+)SMAJ110A	SE	VE	122	135	1.0	110	1.0	1.7	177
(+)SMAJ120A	VG	VG	133	147	1.0	120	1.0	1.6	193
(+)SMAJ130A	VK	VK	144	159	1.0	130	1.0	1.4	209
(+)SMAJ150A	VM	VM	167	185	1.0	150	1.0	1.2	243
(+)SMAJ160A	SP	VP	178	197	1.0	160	1.0	1.2	259
(+)SMAJ170A	SR	VR	189	209	1.0	170	1.0	1.09	275
(+)SMAJ188A	SS	VS	209	231	1.0	188	1.0	0.91	328

Notes

- (1) Pulse test: t<sub>p</sub> ≤ 50 ms
- (2) Surge current waveform per fig. 3 and derate per fig. 2
- (3) For bi-directional types having V<sub>WM</sub> of 10 V and less, the I<sub>D</sub> limit is doubled
- (4) All terms and symbols are consistent with ANSI/IEEE C62.35
- (5) For the bi-directional SMAJ5.0CA, the maximum V<sub>BR</sub> is 7.25 V
- (6) V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 25 A (uni-directional only)
- (+) Underwriters Laboratory Recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both uni-directional and bi-directional device

<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to ambient <sup>(1)</sup>	$R_{\theta JA}$	120	$^\circ\text{C/W}$
Typical thermal resistance, junction to lead	$R_{\theta JL}$	30	$^\circ\text{C/W}$

**Note**
<sup>(1)</sup> Mounted on minimum recommended pad layout

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SMAJ5.0A-E3/61	0.064	61	1800	7" diameter plastic tape and reel
SMAJ5.0A-M3/61				
SMAJ5.0A-E3/5A	0.064	5A	7500	13" diameter plastic tape and reel
SMAJ5.0A-M3/5A				
SMAJ5.0AHE3_A/H <sup>(1)</sup>	0.064	H	1800	7" diameter plastic tape and reel
SMAJ5.0AHM3_A/H <sup>(1)</sup>				
SMAJ5.0AHE3_A/I <sup>(1)</sup>	0.064	I	7500	13" diameter plastic tape and reel
SMAJ5.0AHM3_A/I <sup>(1)</sup>				

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

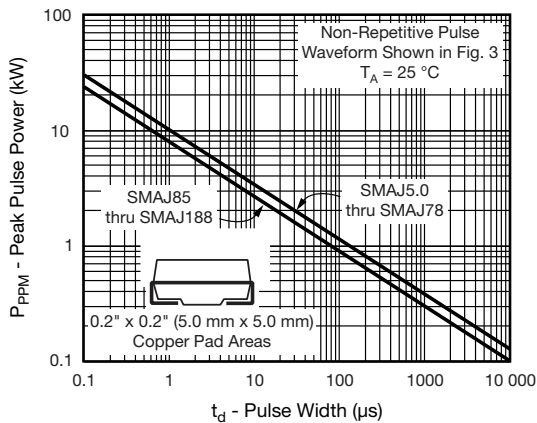
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^\circ\text{C}$  unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve

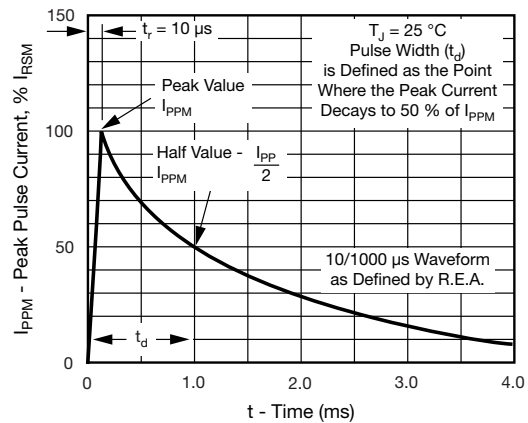


Fig. 3 - Pulse Waveform

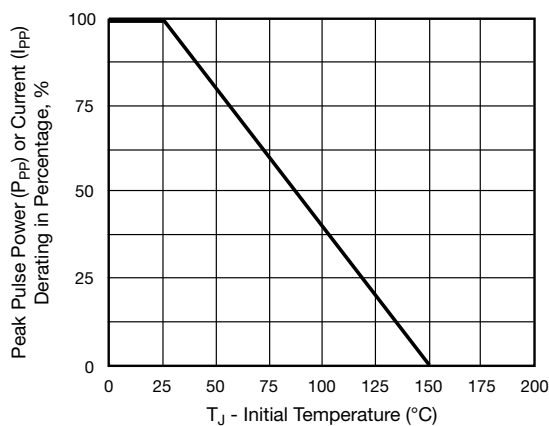


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

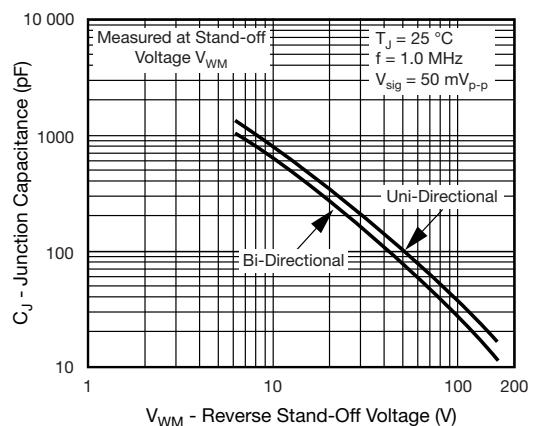


Fig. 4 - Typical Junction Capacitance

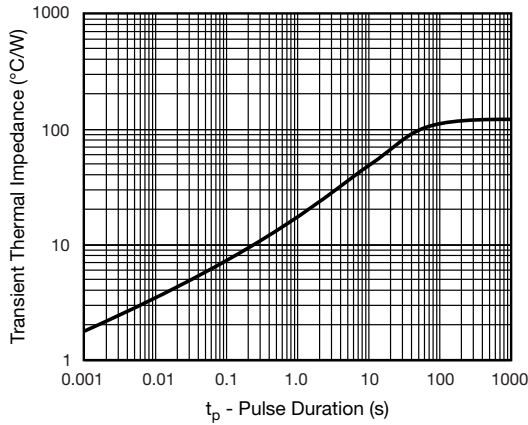


Fig. 5 - Typical Transient Thermal Impedance

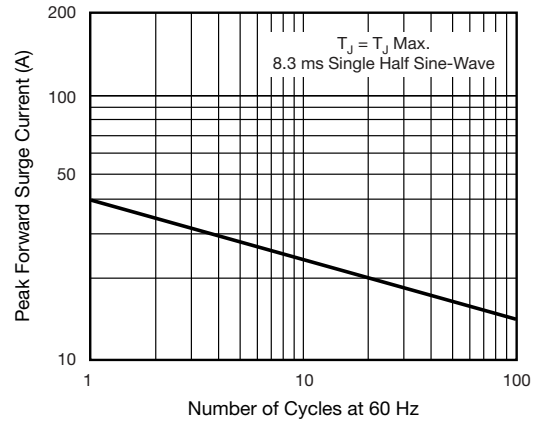
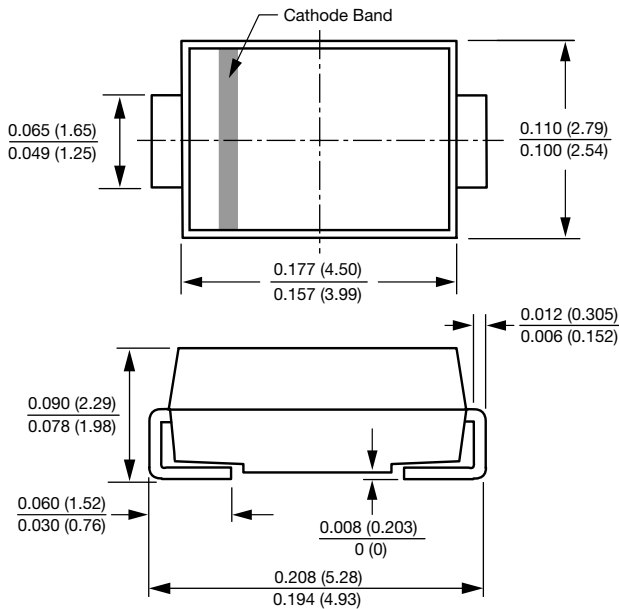


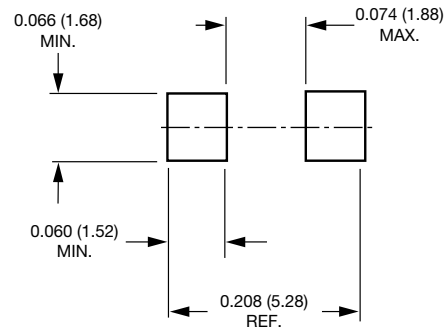
Fig. 6 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

### SMA (DO-214AC)



### Mounting Pad Layout





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