# SMAJ5.0A thru SMAJ188CA

Vishay General Semiconductor

# Surface Mount TRANSZORB<sup>®</sup> **Transient Voltage Suppressors**



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PRIMARY CHARACTERISTICS						
V <sub>BR</sub> uni-directional	6.40 V to 231 V					
V <sub>BR</sub> bi-directional	6.40 V to 231 V					
V <sub>WM</sub>	5.0 V to 188 V					
P <sub>PPM</sub>	400 W, 300 W					
I <sub>FSM</sub>	40 A					
T <sub>J</sub> max.	150 °C					
Polarity	Uni-directional, bi-directional					
Package	DO-214AC (SMA)					

### **DEVICES FOR BI-DIRECTION APPLICATIONS**

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

## **FEATURES**

- Low profile package
- Ideal for automated placement
- · Glass passivated chip junction
- Available in uni-directional and bi-directional



- RoHS • 400 W peak pulse power capability with a COMPLIANT 10/1000 µs 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 gualified
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

## **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/N-E3 - RoHS compliant, commercial grade Base P/NHE3 - RoHS compliant, AEC-Q101 qualified

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

M3 suffix meets JESD 201 class 2 whisker test

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

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

(2) Mounted on 0.2" x 0.2" (5.0 mm x 5.0 mm) copper pads to each terminal

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<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25 \text{ °C}$ 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>	MAXIMUM PEAK PULSE SURGE CURRENT	MAXIMUM CLAMPING VOLTAGEAT I <sub>PPM</sub>
	UNI	BI	MIN.	MAX.	(11/4)	(•)	I <sub>D</sub> (μΑ) <sup>(3)</sup>	I <sub>PPM</sub> (A) <sup>(2)</sup>	V <sub>C</sub> (V)
SMAJ5.0A (5)	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	121
SMAJ85A	RV	ZV	94.4	104	1.0	85	1.0	2.2	137
SMAJ90A	RX	ZX	100	111	1.0	90	1.0	2.2	146
SMAJ100A	RZ	ZZ	111	123	1.0	100	1.0	1.9	140
SMAJ110A	SE	VE	122	135	1.0	110	1.0	1.5	177
SMAJ120A	VG	VC	133	147	1.0	120	1.0	1.6	193
SMAJ130A	VG VK	VG VK	133	147	1.0	130	1.0	1.4	209
SMAJ150A SMAJ150A	VK	VM	144	185	1.0	150	1.0	1.4	209
SMAJ160A	SP	VP	178	185	1.0	160	1.0	1.2	243
SMAJ170A	SP	VP	178	209	1.0	170	1.0	1.09	259
GIVIAG I / UA	SR	VR VS	209	209	1.0	188	1.0	0.91	328

### Notes

<sup>(1)</sup> Pulse test:  $t_p \le 50 \text{ ms}$ 

 $^{(2)}\,$  Surge current waveform per fig. 3 and derate per fig. 2

 $^{(3)}$  For bi-directional types having  $V_{WM}$  of 10 V and less, the  $I_D$  limit is doubled

<sup>(4)</sup> All terms and symbols are consistent with ANSI/IEEE C62.35

 $^{(5)}\,$  For the bi-directional SMAJ5.0CA, the maximum  $V_{BR}$  is 7.25 V

 $^{(6)}~~V_F=3.5$  V at  $I_F=25$  A (uni-directional only)

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

Note

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

ORDERING INFORMATION (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-E3/5A	0.064	5A	7500	13" diameter plastic tape and reel			
SMAJ5.0AHE3/61 <sup>(1)</sup>	0.064	61	1800	7" diameter plastic tape and reel			
SMAJ5.0AHE3/5A (1)	0.064	5A	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)

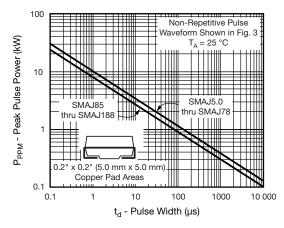
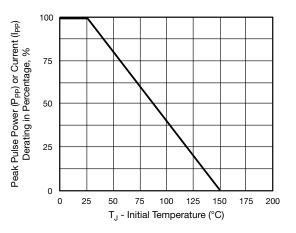
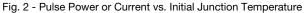
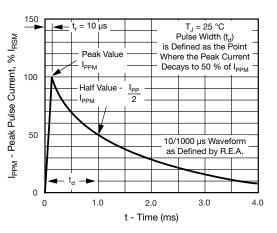
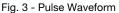


Fig. 1 - Peak Pulse Power Rating Curve









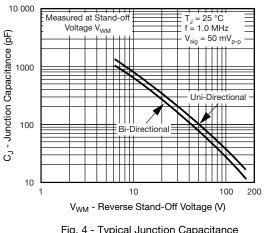


Fig. 4 - Typical Junction Capacitance

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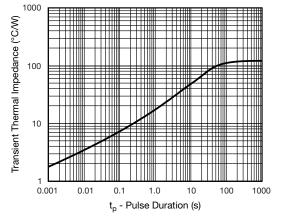


Fig. 5 - Typical Transient Thermal Impedance

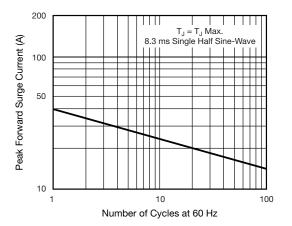
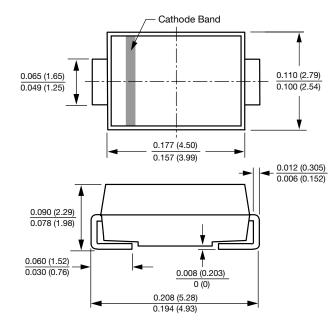
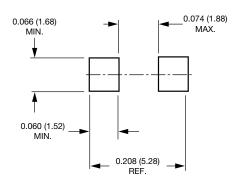


Fig. 6 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

## PACKAGE OUTLINE DIMENSIONS in inches (millimeters) DO-214AC (SMA)



## **Mounting Pad Layout**





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