



**THE DATASHEET OF  
SMCJ12CA-E3/9AT**



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


**SMC (DO-214AB)**

**LINKS TO ADDITIONAL RESOURCES**


PRIMARY CHARACTERISTICS	
$V_{BR}$ unidirectional	6.40 V to 231 V
$V_{BR}$ bidirectional	6.40 V to 231 V
$V_{WM}$	5.0 V to 188 V
$P_{PPM}$	1500 W
$P_D$	6.5 W
$I_{FSM}$ (unidirectional only)	200 A
$T_J$ max.	150 °C
Polarity	Unidirectional, bidirectional
Package	SMC (DO-214AB)

**DEVICES FOR BIDIRECTION APPLICATIONS**

For bidirectional devices use CA suffix (e.g. SMCJ188CA).  
Electrical characteristics apply in both directions.

**FEATURES**

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in unidirectional and bidirectional
- 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)


**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:** SMC (DO-214AB)

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 unidirectional types the band denotes cathode end, no marking on bidirectional 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>	$P_{PPM}$	1500	W
Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>	$I_{PPM}$	See next table	A
Power dissipation on infinite heatsink, $T_A = 50$ °C	$P_D$	6.5	W
Peak forward surge current 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup>	$I_{FSM}$	200	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

<sup>(2)</sup> Mounted on 0.31" x 0.31" (8.0 mm x 8.0 mm) copper pads to each terminal



ELECTRICAL CHARACTERISTICS (T <sub>A</sub> = 25 °C unless otherwise noted)										
DEVICE TYPE MODIFIED "J" BEND LEAD	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V <sub>BR</sub> AT I <sub>T</sub> (1)		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) (3)	MAXIMUM PEAK PULSE SURGE CURRENT I <sub>PPM</sub> (A) (2)	MAXIMUM CLAMPING VOLTAGE AT I <sub>PPM</sub> V <sub>C</sub> (V)	MAXIMUM TEMPERATURE COEFFICIENT OF V <sub>BR</sub> (%/°C)
	UNI	BI	MIN.	MAX.						
(+)SMCJ5.0A (5)	GDE	GDE	6.40	7.07	10	5.0	1000	163.0	9.2	0.057
(+)SMCJ6.0A	GDG	GDG	6.67	7.37	10	6.0	1000	145.6	10.3	0.059
(+)SMCJ6.5A	GDK	BDK	7.22	7.98	10	6.5	500	133.9	11.2	0.061
(+)SMCJ7.0A	GDM	GDM	7.78	8.60	10	7.0	200	125.0	12.0	0.065
(+)SMCJ7.5A	GDP	BDP	8.33	9.21	1.0	7.5	100	116.3	12.9	0.067
(+)SMCJ8.0A	GDR	BDR	8.89	9.83	1.0	8.0	50	110.3	13.6	0.069
(+)SMCJ8.5A	GDT	BDT	9.44	10.4	1.0	8.5	20	104.2	14.4	0.073
(+)SMCJ9.0A	GDV	BDV	10.0	11.1	1.0	9.0	10	97.4	15.4	0.074
(+)SMCJ10A	GDX	BDX	11.1	12.3	1.0	10	5.0	88.2	17.0	0.078
(+)SMCJ11A	GDZ	GDZ	12.2	13.5	1.0	11	5.0	82.4	18.2	0.080
(+)SMCJ12A	GEE	BEE	13.3	14.7	1.0	12	5.0	75.4	19.9	0.083
(+)SMCJ13A	GEG	GEG	14.4	15.9	1.0	13	1.0	69.8	21.5	0.084
(+)SMCJ14A	GEK	BEK	15.6	17.2	1.0	14	1.0	64.7	23.2	0.087
(+)SMCJ15A	GEM	BEM	16.7	18.5	1.0	15	1.0	61.5	24.4	0.088
(+)SMCJ16A	GEP	GEP	17.8	19.7	1.0	16	1.0	57.7	26.0	0.089
(+)SMCJ17A	GER	GER	18.9	20.9	1.0	17	1.0	54.3	27.6	0.090
(+)SMCJ18A	GET	BET	20.0	22.1	1.0	18	1.0	51.4	29.2	0.092
(+)SMCJ20A	GEV	BEV	22.2	24.5	1.0	20	1.0	46.3	32.4	0.094
(+)SMCJ22A	GEX	BEX	24.4	26.9	1.0	22	1.0	42.3	35.5	0.096
(+)SMCJ24A	GEZ	BEZ	26.7	29.5	1.0	24	1.0	38.6	38.9	0.096
(+)SMCJ26A	GFE	BFE	28.9	31.9	1.0	26	1.0	35.6	42.1	0.097
(+)SMCJ28A	GFG	BFG	31.1	34.4	1.0	28	1.0	33.0	45.4	0.098
(+)SMCJ30A	GFK	BFK	33.3	36.8	1.0	30	1.0	31.0	48.4	0.099
(+)SMCJ33A	GFM	BFM	36.7	40.6	1.0	33	1.0	28.1	53.3	0.100
(+)SMCJ36A	GFP	BFP	40.0	44.2	1.0	36	1.0	25.8	58.1	0.100
(+)SMCJ40A	GFR	BFR	44.4	49.1	1.0	40	1.0	23.3	64.5	0.101
(+)SMCJ43A	GFT	BFT	47.8	52.8	1.0	43	1.0	21.6	69.4	0.102
(+)SMCJ45A	GFV	GFV	50.0	55.3	1.0	45	1.0	20.6	72.7	0.102
(+)SMCJ48A	GFX	GFX	53.3	58.9	1.0	48	1.0	19.4	77.4	0.103
(+)SMCJ51A	GFZ	GFZ	56.7	62.7	1.0	51	1.0	18.2	82.4	0.104
(+)SMCJ54A	GGE	GGE	60.0	66.3	1.0	54	1.0	17.2	87.1	0.104
(+)SMCJ58A	GGG	GGG	64.4	71.2	1.0	58	1.0	16.0	93.6	0.104
(+)SMCJ60A	GGK	GGK	66.7	73.7	1.0	60	1.0	15.5	96.8	0.105
(+)SMCJ64A	GGM	GGM	71.1	78.6	1.0	64	1.0	14.6	103	0.105
(+)SMCJ70A	GGP	GGP	77.8	86.0	1.0	70	1.0	13.3	113	0.105
(+)SMCJ75A	GGR	GGR	83.3	92.1	1.0	75	1.0	12.4	121	0.106
(+)SMCJ78A	GGT	GGT	86.7	95.8	1.0	78	1.0	11.9	126	0.106
(+)SMCJ85A	GGV	GGV	94.4	104	1.0	85	1.0	10.9	137	0.106
(+)SMCJ90A	GGX	GGX	100	111	1.0	90	1.0	10.3	146	0.106
(+)SMCJ100A	GGZ	GGZ	111	123	1.0	100	1.0	9.3	162	0.107
(+)SMCJ110A	GHE	GHE	122	135	1.0	110	1.0	8.5	177	0.107
(+)SMCJ120A	GHG	GHG	133	147	1.0	120	1.0	7.8	193	0.108
(+)SMCJ130A	GHK	GHK	144	159	1.0	130	1.0	7.2	209	0.108
(+)SMCJ150A	GHM	GHM	167	185	1.0	150	1.0	6.2	243	0.108
(+)SMCJ160A	GHP	GHP	178	197	1.0	160	1.0	5.8	259	0.108
(+)SMCJ170A	GHR	GHR	189	209	1.0	170	1.0	5.5	275	0.108
SMCJ188A	GHS	GHS	209	231	1.0	188	1.0	4.6	328	0.108

Notes

- (1) Pulse test: t<sub>p</sub> ≤ 50 ms
- (2) Surge current waveform per fig. 3 and derate per fig. 2
- (3) For bidirectional 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 bidirectional SMCJ5.0CA, the maximum V<sub>BR</sub> is 7.25 V
- (6) V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 100 A (unidirectional 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 devices



<b>THERMAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Typical thermal resistance, junction to ambient air <sup>(1)</sup>	$R_{\theta JA}$	75	°C/ W
Typical thermal resistance, junction to lead	$R_{\theta JL}$	15	

**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
SMCJ5.0A-E3/57T	0.211	57T	850	7" diameter plastic tape and reel
SMCJ5.0A-M3/57T				
SMCJ5.0A-E3/9AT	0.211	9AT	3500	13" diameter plastic tape and reel
SMCJ5.0A-M3/9AT				
SMCJ5.0AHE3_A/H <sup>(1)</sup>	0.211	H	850	7" diameter plastic tape and reel
SMCJ5.0AHM3_A/H <sup>(1)</sup>				
SMCJ5.0AHE3_A/I <sup>(1)</sup>	0.211	I	3500	13" diameter plastic tape and reel
SMCJ5.0AHM3_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. 4 - Typical Junction Capacitance Unidirectional



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



Fig. 5 - Typical Transient Thermal Impedance



Fig. 3 - Pulse Waveform



Fig. 6 - Maximum Non-Repetitive Peak Forward Surge Current Unidirectional Use On



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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