



**THE DATASHEET OF  
SMB10J20AHE3/5B**





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



SMB (DO-214AA)

### LINKS TO ADDITIONAL RESOURCES



PRIMARY CHARACTERISTICS	
V <sub>BR</sub> (unidirectional)	6.4 V to 49.1 V
V <sub>BR</sub> (bidirectional)	6.4 V to 49.1 V
V <sub>WM</sub>	5.0 V to 40 V
P <sub>PPM</sub> (unidirectional)	1000 W
P <sub>PPM</sub> (bidirectional)	800 W
I <sub>FSM</sub> (uni-directional only)	100 A
T <sub>J</sub> max.	150 °C
Polarity	Unidirectional, bidirectional
Package	SMB (DO-214AA)

### FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated pellet 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)



RoHS COMPLIANT HALOGEN FREE Available

### 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:** SMB (DO-214AA)  
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 color band denotes cathode end, no marking on bidirectional types

MAXIMUM RATINGS (T <sub>A</sub> = 25 °C unless otherwise noted)			
PARAMETER	SYMBOL	VALUE	UNIT
Peak pulse power dissipation with a 10/1000 μs waveform (fig. 1)	unidirectional	1000	W
	bidirectional	800	
Peak pulse current with a 10/1000 μs waveform	I <sub>PPM</sub> <sup>(1)</sup>	See next table	A
Peak forward surge current 8.3 ms single half sine-wave uni-directional only	I <sub>FSM</sub> <sup>(2)</sup>	100	A
Operating junction and storage temperature range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### Notes

(1) Non-repetitive current pulse, per fig. 3 and derated above T<sub>A</sub> = 25 °C per fig. 2

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



## UNIDIRECTIONAL

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)	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.					
SMB10J5.0A	1AE	6.40	7.07	10	5.0	1000	108.7	9.2
SMB10J6.0A	1AG	6.67	7.37	10	6.0	1000	97.1	10.3
SMB10J6.5A	1AK	7.22	7.98	10	6.5	500	89.3	11.2
SMB10J7.0A	1AM	7.78	8.60	10	7.0	200	83.3	12.0
SMB10J7.5A	1AP	8.33	9.21	1.0	7.5	100	77.5	12.9
SMB10J8.0A	1AR	8.89	9.83	1.0	8.0	50	73.5	13.6
SMB10J8.5A	1AT	9.44	10.4	1.0	8.5	20	69.4	14.4
SMB10J9.0A	1AV	10.0	11.1	1.0	9.0	10	64.9	15.4
SMB10J10A	1AX	11.1	12.3	1.0	10	5.0	58.8	17.0
SMB10J11A	1AZ	12.2	13.5	1.0	11	5.0	54.9	18.2
SMB10J12A	1BE	13.3	14.7	1.0	12	5.0	50.3	19.9
SMB10J13A	1BG	14.4	15.9	1.0	13	1.0	46.5	21.5
SMB10J14A	1BK	15.6	17.2	1.0	14	1.0	43.1	23.2
SMB10J15A	1BM	16.7	18.5	1.0	15	1.0	41.0	24.4
SMB10J16A	1BP	17.8	19.7	1.0	16	1.0	38.5	26.0
SMB10J17A	1BR	18.9	20.9	1.0	17	1.0	36.2	27.6
SMB10J18A	1BT	20.0	22.1	1.0	18	1.0	34.2	29.2
SMB10J20A	1BV	22.2	24.5	1.0	20	1.0	30.9	32.4
SMB10J22A	1BX	24.4	26.9	1.0	22	1.0	28.2	35.5
SMB10J24A	1BZ	26.7	29.5	1.0	24	1.0	25.7	38.9
SMB10J26A	1CE	28.9	31.9	1.0	26	1.0	23.8	42.1
SMB10J28A	1CG	31.1	34.4	1.0	28	1.0	22.0	45.4
SMB10J30A	1CK	33.3	36.8	1.0	30	1.0	20.7	48.4
SMB10J33A	1CM	36.7	40.6	1.0	33	1.0	18.8	53.3
SMB10J36A	1CP	40.0	44.2	1.0	36	1.0	17.2	58.1
SMB10J40A	1CR	44.4	49.1	1.0	40	1.0	15.5	64.5

## Notes

- (1) Pulse test: t<sub>p</sub> ≤ 50 ms  
(2) Surge current waveform per fig. 3 and derate per fig. 2  
(3) All terms and symbols are consistent with ANSI/IEEE C62.35  
(4) V<sub>F</sub> = 3.5 V at I<sub>F</sub> = 50 A (uni-directional only)

**BIDIRECTIONAL**

<b>ELECTRICAL CHARACTERISTICS</b> ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)								
DEVICE TYPE	DEVICE MARKING CODE	BREAKDOWN VOLTAGE $V_{BR}$ AT $I_T$ <sup>(1)</sup> (V)		TEST CURRENT $I_T$ (mA)	STAND-OFF VOLTAGE $V_{WM}$ (V)	MAXIMUM REVERSE LEAKAGE AT $V_{WM}$ $I_D$ ( $\mu\text{A}$ )	MAXIMUM PEAK PULSE SURGE CURRENT $I_{PPM}$ <sup>(2)</sup> (A)	MAXIMUM CLAMPING VOLTAGE AT $I_{PPM}$ $V_C$ (V)
		MIN.	MAX.					
SMB8J5.0CA	1AE	6.40	7.25	10	5.0	2000	87.0	9.2
SMB8J6.0CA	1AG	6.67	7.37	10	6.0	2000	77.7	10.3
SMB8J6.5CA	1AK	7.22	7.98	10	6.5	1000	71.4	11.2
SMB8J7.0CA	1AM	7.78	8.60	10	7.0	400	66.7	12.0
SMB8J7.5CA	1AP	8.33	9.21	1.0	7.5	200	62.0	12.9
SMB8J8.0CA	1AR	8.89	9.83	1.0	8.0	100	58.8	13.6
SMB8J8.5CA	1AT	9.44	10.4	1.0	8.5	40	55.6	14.4
SMB8J9.0CA	1AV	10.0	11.1	1.0	9.0	20	51.9	15.4
SMB8J10CA	1AX	11.1	12.3	1.0	10	10	47.1	17.0
SMB8J11CA	1AZ	12.2	13.5	1.0	11	5.0	44.0	18.2
SMB8J12CA	1BE	13.3	14.7	1.0	12	5.0	40.2	19.9
SMB8J13CA	1BG	14.4	15.9	1.0	13	1.0	37.2	21.5
SMB8J14CA	1BK	15.6	17.2	1.0	14	1.0	34.5	23.2
SMB8J15CA	1BM	16.7	18.5	1.0	15	1.0	32.8	24.4
SMB8J16CA	1BP	17.8	19.7	1.0	16	1.0	30.8	26.0
SMB8J17CA	1BR	18.9	20.9	1.0	17	1.0	29.0	27.6
SMB8J18CA	1BT	20.0	22.1	1.0	18	1.0	27.4	29.2
SMB8J20CA	1BV	22.2	24.5	1.0	20	1.0	24.7	32.4
SMB8J22CA	1BX	24.4	26.9	1.0	22	1.0	22.5	35.5
SMB8J24CA	1BZ	26.7	29.5	1.0	24	1.0	20.6	38.9
SMB8J26CA	1CE	28.9	31.9	1.0	26	1.0	19.0	42.1
SMB8J28CA	1CG	31.1	34.4	1.0	28	1.0	17.6	45.4
SMB8J30CA	1CK	33.3	36.8	1.0	30	1.0	16.5	48.4
SMB8J33CA	1CM	36.7	40.6	1.0	33	1.0	15.0	53.3
SMB8J36CA	1CP	40.0	44.2	1.0	36	1.0	13.8	58.1
SMB8J40CA	1CR	44.4	49.1	1.0	40	1.0	12.4	64.5

**Notes**

- (1) Pulse test:  $t_p \leq 50\text{ ms}$   
(2) Surge current waveform per fig. 3 and derate per fig. 2  
(3) All terms and symbols are consistent with ANSI/IEEE C62.35

<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>	$R_{\theta JA}$	72	$^\circ\text{C}/\text{W}$
Typical thermal resistance, junction to lead	$R_{\theta JL}$	20	

**Note**

- (1) Mounted on minimum recommended pad layout

<b>ORDERING INFORMATION</b> (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
SMB10J5.0A-E3/52	0.106	52	750	7" diameter plastic tape and reel
SMB10J5.0A-M3/52				
SMB10J5.0A-E3/5B	0.106	5B	3200	13" diameter plastic tape and reel
SMB10J5.0A-M3/5B				
SMB10J5.0AHE3_B/H <sup>(1)</sup>	0.106	H	750	7" diameter plastic tape and reel
SMB10J5.0AHM3_B/H <sup>(1)</sup>				
SMB10J5.0AHE3_B/I <sup>(1)</sup>	0.106	I	3200	13" diameter plastic tape and reel
SMB10J5.0AHM3_B/I <sup>(1)</sup>				

**Note**

- (1) AEC-Q101 qualified

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



Fig. 1 - Peak Pulse Power Rating Curve

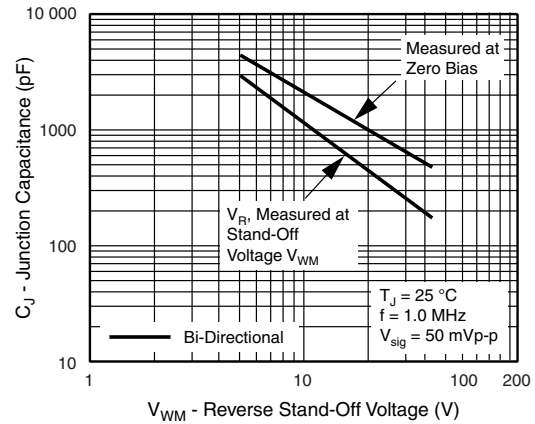


Fig. 4 - Typical Junction Capacitance

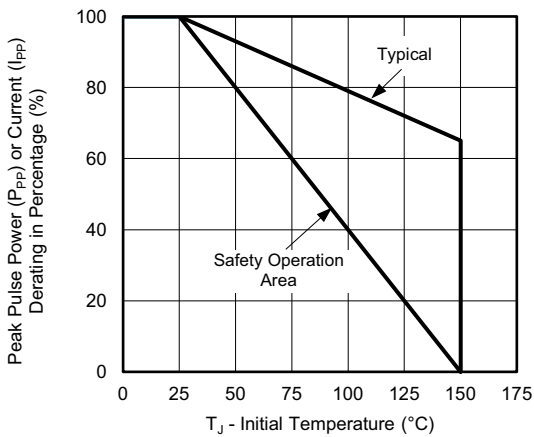


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature



Fig. 5 - Typical Transient Thermal Impedance



Fig. 3 - Pulse Waveform



Fig. 6 - Maximum Non-Repetitive Forward Surge Current



## PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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