



**THE DATASHEET OF  
SMBJ70AHE3/52**



# Surface-Mount TRANSZORB® Transient Voltage Suppressors


**SMB (DO-214AA)**

**FEATURES**

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in unidirectional and bidirectional
- 600 W peak pulse power capability with a 10/1000  $\mu$ 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 °C
- AEC-Q101 qualified available
  - Automotive ordering code: base P/NHE3 or base P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

**LINKS TO ADDITIONAL RESOURCES**


PRIMARY CHARACTERISTICS	
$V_{BR}$ (bidirectional)	6.4 V to 231 V
$V_{BR}$ (unidirectional)	6.4 V to 231 V
$V_{WM}$	5.0 V to 188 V
$P_{PPM}$	600 W
$P_D$	5.0 W
$I_{FSM}$ (unidirectional only)	100 A
$T_J$ max.	150 °C
Polarity	Unidirectional, bidirectional
Package	SMB (DO-214AA)

**DEVICES FOR BIDIRECTION APPLICATIONS**

For bidirectional devices use CA suffix (e.g. SMBJ10CA). 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, 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 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> (fig. 1)	$P_{PPM}$	600	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 at $T_A = 50$ °C	$P_D$	5.0	W
Peak forward surge current 8.3 ms single half sine-wave unidirectional only <sup>(2)</sup>	$I_{FSM}$	100	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 0.2" 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 MODIFIED "J" BEND LEAD	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)	MAXIMUM TEMPERATURE COEFFICIENT OF V <sub>BR</sub> (%/°C)
	UNI	BI	MIN.	MAX.						
(+)SMBJ5.0A <sup>(5)</sup>	KE	KE	6.40	7.07	10	5.0	800	65.2	9.2	0.057
(+)SMBJ6.0A	KG	KG	6.67	7.37	10	6.0	800	58.3	10.3	0.059
(+)SMBJ6.5A	KK	AK	7.22	7.98	10	6.5	500	53.6	11.2	0.061
(+)SMBJ7.0A	KM	KM	7.78	8.60	10	7.0	200	50.0	12.0	0.065
(+)SMBJ7.5A	KP	AP	8.33	9.21	1.0	7.5	100	46.5	12.9	0.067
(+)SMBJ8.0A	KR	AR	8.89	9.83	1.0	8.0	50	44.1	13.6	0.069
(+)SMBJ8.5A	KT	AT	9.44	10.4	1.0	8.5	20	41.7	14.4	0.073
(+)SMBJ9.0A	KV	AV	10.0	11.1	1.0	9.0	10	39.0	15.4	0.074
(+)SMBJ10A	KX	AX	11.1	12.3	1.0	10	5.0	35.3	17.0	0.078
(+)SMBJ11A	KZ	KZ	12.2	13.5	1.0	11	5.0	33.0	18.2	0.080
(+)SMBJ12A	LE	BE	13.3	14.7	1.0	12	5.0	30.2	19.9	0.083
(+)SMBJ13A	LG	LG	14.4	15.9	1.0	13	1.0	27.9	21.5	0.084
(+)SMBJ14A	LK	BK	15.6	17.2	1.0	14	1.0	25.9	23.2	0.087
(+)SMBJ15A	LM	BM	16.7	18.5	1.0	15	1.0	24.6	24.4	0.088
(+)SMBJ16A	LP	LM	17.8	19.7	1.0	16	1.0	23.1	26.0	0.089
(+)SMBJ17A	LR	LR	18.9	20.9	1.0	17	1.0	21.7	27.6	0.090
(+)SMBJ18A	LT	BT	20.0	22.1	1.0	18	1.0	20.5	29.2	0.092
(+)SMBJ20A	LV	LV	22.2	24.5	1.0	20	1.0	18.5	32.4	0.094
(+)SMBJ22A	LX	BX	24.4	26.9	1.0	22	1.0	16.9	35.5	0.096
(+)SMBJ24A	LZ	BZ	26.7	29.5	1.0	24	1.0	15.4	38.9	0.096
(+)SMBJ26A	ME	CE	28.9	31.9	1.0	26	1.0	14.3	42.1	0.097
(+)SMBJ28A	MG	MG	31.1	34.4	1.0	28	1.0	13.2	45.4	0.098
(+)SMBJ30A	MK	CK	33.3	36.8	1.0	30	1.0	12.4	48.4	0.099
(+)SMBJ33A	MM	CM	36.7	40.6	1.0	33	1.0	11.3	53.3	0.100
(+)SMBJ36A	MP	CP	40.0	44.2	1.0	36	1.0	10.3	58.1	0.100
(+)SMBJ40A	MR	CR	44.4	49.1	1.0	40	1.0	9.3	64.5	0.101
(+)SMBJ43A	MT	CT	47.8	52.8	1.0	43	1.0	8.6	69.4	0.102
(+)SMBJ45A	MV	MV	50.0	55.3	1.0	45	1.0	8.3	72.7	0.102
(+)SMBJ48A	MX	MX	53.3	58.9	1.0	48	1.0	7.8	77.4	0.103
(+)SMBJ51A	MZ	MZ	56.7	62.7	1.0	51	1.0	7.3	82.4	0.104
(+)SMBJ54A	NE	NE	60.0	66.3	1.0	54	1.0	6.9	87.1	0.104
(+)SMBJ58A	NG	NG	64.4	71.2	1.0	58	1.0	6.4	93.6	0.104
(+)SMBJ60A	NK	NK	66.7	73.7	1.0	60	1.0	6.2	96.8	0.105
(+)SMBJ64A	NM	NM	71.1	78.6	1.0	64	1.0	5.8	103	0.105
(+)SMBJ70A	NP	NP	77.8	86.0	1.0	70	1.0	5.3	113	0.105
(+)SMBJ75A	NR	NR	83.3	92.1	1.0	75	1.0	5.0	121	0.106
(+)SMBJ78A	NT	NT	86.7	95.8	1.0	78	1.0	4.8	126	0.106
(+)SMBJ85A	NV	NV	94.4	104	1.0	85	1.0	4.4	137	0.106
(+)SMBJ90A	NX	NX	100	111	1.0	90	1.0	4.1	146	0.106
(+)SMBJ100A	NZ	NZ	111	123	1.0	100	1.0	3.7	162	0.107
(+)SMBJ110A	PE	PE	122	135	1.0	110	1.0	3.4	177	0.107
(+)SMBJ120A	PG	PG	133	147	1.0	120	1.0	3.1	193	0.108
(+)SMBJ130A	PK	PK	144	159	1.0	130	1.0	2.9	209	0.108
(+)SMBJ150A	PM	PM	167	185	1.0	150	1.0	2.5	243	0.108
(+)SMBJ160A	PP	PP	178	197	1.0	160	1.0	2.3	259	0.108
(+)SMBJ170A	PR	PR	189	209	1.0	170	1.0	2.2	275	0.108
SMBJ188A	PS	PS	209	231	1.0	188	1.0	2.0	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 SMBJ5.0CA, the maximum V<sub>BR</sub> is 7.25 V
- (6) V<sub>F</sub> = 3.5 V max. at I<sub>F</sub> = 50 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 <sup>(1)</sup>	$R_{\theta JA}$	100	°C/W
Typical thermal resistance, junction to lead	$R_{\theta JL}$	20	

**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
SMBJ5.0A-E3/52	0.106	52	750	7" diameter plastic tape and reel
SMBJ5.0A-M3/52				
SMBJ5.0A-E3/5B	0.106	5B	3200	13" diameter plastic tape and reel
SMBJ5.0A-M3/5B				
SMBJ5.0AHE3_B/H <sup>(1)</sup>	0.106	H	750	7" diameter plastic tape and reel
SMBJ5.0AHM3_B/H <sup>(1)</sup>				
SMBJ5.0AHE3_B/I <sup>(1)</sup>	0.106	I	3200	13" diameter plastic tape and reel
SMBJ5.0AHM3_B/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



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



### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

SMB (DO-214AA)



Mounting Pad Layout





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