SMBJ5.0A thru SMBJ188A

Vishay General Semiconductor

RoHS

COMPLIANT HALOGEN

FREE

Surface Mount TRANSZORB[®] Transient Voltage Suppressors



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SMB (DO-214AA)

PRIMARY CHARACTERISTICS					
V _{BR} (bi-directional)	6.4 V to 231 V				
V _{BR} (uni-directional)	6.4 V to 231 V				
V _{WM}	5.0 V to 188 V				
P _{PPM}	600 W				
I _{FSM} (uni-directional only)	100 A				
T _J max.	150 °C				
Polarity	Uni-directional, bi-directional				
Package	SMB (DO-214AA)				

DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional devices use CA suffix (e.g. SMBJ10CA). 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
- 600 W peak pulse power capability with a 10/1000 μs waveform, repetitive rate (duty cycle): 0.01 %
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- \bullet Meets MSL level 1, per J-STD-020, LF maximum peak of 260 $^{\circ}\mathrm{C}$
- AEC-Q101 qualified available
 Automotive ordering code: base P/NHE3 or P/NHM3
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

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

MAXIMUM RATINGS ($T_A = 25 \text{ °C}$ unless otherwise noted)						
PARAMETER	SYMBOL	VALUE	UNIT			
Peak pulse power dissipation with a 10/1000 μs waveform $^{(1)(2)}$ (fig. 1)	P _{PPM}	600	W			
Peak pulse current with a 10/1000 μs waveform $^{(1)}$	I _{PPM}	See next table	А			
Peak forward surge current 8.3 ms single half sine-wave uni-directional only $^{\left(2\right) }$	I _{FSM}	100	А			
Operating junction and storage temperature range	T _J , T _{STG}	-55 to +150	°C			

Notes

⁽¹⁾ Non-repetitive current pulse, per fig. 3 and derated above $T_A = 25$ °C per fig. 2

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

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ELECTRICAL CHARACTERISTICS (T _A = 25 °C unless otherwise noted)									
DEVICE TYPE MODIFIED "J" BEND LEAD	DEVICE N CO	MARKING DE	BREAK VOLT V _{BR} A ((DOWN FAGE T I _T ⁽¹⁾ V)	TEST CURRENT I _T (mA)	STAND-OFF VOLTAGE V _{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V _{WM}	MAXIMUM PEAK PULSE SURGE CURRENT	MAXIMUM CLAMPING VOLTAGE AT
	UNI	BI	MIN.	MAX.			I _D (μΑ) ⁽³⁾	I _{PPM} (A) ⁽²⁾	V _c (V)
(+)SMBJ5.0A (5)	KE	KE	6.40	7.07	10	5.0	800	65.2	9.2
(+)SMBJ6.0A	KG	KG	6.67	7.37	10	6.0	800	58.3	10.3
(+)SMBJ6.5A	KK	AK	7.22	7.98	10	6.5	500	53.6	11.2
(+)SMBJ7.0A	KM	KM	7.78	8.60	10	7.0	200	50.0	12.0
(+)SMBJ7.5A	KP	AP	8.33	9.21	1.0	7.5	100	46.5	12.9
(+)SMBJ8.0A	KR	AR	8.89	9.83	1.0	8.0	50	44.1	13.6
(+)SMBJ8.5A	KT	AT	9.44	10.4	1.0	8.5	20	41.7	14.4
⁽⁺⁾ SMBJ9.0A	KV	AV	10.0	11.1	1.0	9.0	10	39.0	15.4
(+)SMBJ10A	KX	AX	11.1	12.3	1.0	10	5.0	35.3	17.0
⁽⁺⁾ SMBJ11A	KZ	KZ	12.2	13.5	1.0	11	5.0	33.0	18.2
⁽⁺⁾ SMBJ12A	LE	BE	13.3	14.7	1.0	12	5.0	30.2	19.9
⁽⁺⁾ SMBJ13A	LG	LG	14.4	15.9	1.0	13	1.0	27.9	21.5
⁽⁺⁾ SMBJ14A	LK	BK	15.6	17.2	1.0	14	1.0	25.9	23.2
⁽⁺⁾ SMBJ15A	LM	BM	16.7	18.5	1.0	15	1.0	24.6	24.4
⁽⁺⁾ SMBJ16A	LP	LM	17.8	19.7	1.0	16	1.0	23.1	26.0
(+)SMBJ17A	LR	LR	18.9	20.9	1.0	17	1.0	21.7	27.6
⁽⁺⁾ SMBJ18A	LT	BT	20.0	22.1	1.0	18	1.0	20.5	29.2
(+)SMBJ20A	LV	LV	22.2	24.5	1.0	20	1.0	18.5	32.4
⁽⁺⁾ SMBJ22A	LX	BX	24.4	26.9	1.0	22	1.0	16.9	35.5
(+)SMBJ24A	LZ	BZ	26.7	29.5	1.0	24	1.0	15.4	38.9
(+)SMBJ26A	ME	CE	28.9	31.9	1.0	26	1.0	14.3	42.1
(+)SMBJ28A	MG	MG	31.1	34.4	1.0	28	1.0	13.2	45.4
(+)SMBJ30A	MK	CK	33.3	36.8	1.0	30	1.0	12.4	48.4
(+)SMBJ33A	MM	CM	36.7	40.6	1.0	33	1.0	11.3	53.3
(+)SMBJ36A	MP	CP	40.0	44.2	1.0	36	1.0	10.3	58.1
(+)SMBJ40A	MR	CR	44.4	49.1	1.0	40	1.0	9.3	64.5
(+)SMBJ43A	MT	СТ	47.8	52.8	1.0	43	1.0	8.6	69.4
(+)SMBJ45A	MV	MV	50.0	55.3	1.0	45	1.0	8.3	72.7
(+)SMBJ48A	MX	MX	53.3	58.9	1.0	48	1.0	7.8	77.4
(+)SMBJ51A	MZ	MZ	56.7	62.7	1.0	51	1.0	7.3	82.4
(+)SMBJ54A	NE	NE	60.0	66.3	1.0	54	1.0	6.9	87.1
(+)SMBJ58A	NG	NG	64.4	71.2	1.0	58	1.0	6.4	93.6
(+)SMBJ60A	NK	NK	66.7	73.7	1.0	60	1.0	6.2	96.8
(+)SMBJ64A	NM	NM	71.1	78.6	1.0	64	1.0	5.8	103
(+)SMBJ70A	NP	NP	77.8	86.0	1.0	70	1.0	5.3	113
(+)SMBJ75A	NR	NR	83.3	92.1	1.0	75	1.0	5.0	121
(+)SMBJ78A	NT	NT	86.7	95.8	1.0	78	1.0	4.8	126
(+)SMBJ85A	NV	NV	94.4	104	1.0	85	1.0	4.4	137
(+)SMBJ90A	NX	NX	100	111	1.0	90	1.0	4.1	146
(+)SMBJ100A	NZ	NZ	111	123	1.0	100	1.0	3.7	162
(+)SMBJ110A	PE	PE	122	135	1.0	110	1.0	3.4	177
(+)SMBJ120A	PG	PG	133	147	1.0	120	1.0	3.1	193
(+)SMBJ130A	PK	PK	144	159	1.0	130	1.0	2.9	209
(+)SMBJ150A	PM	PM	167	185	1.0	150	1.0	2.5	243
(+)SMBJ160A	PP	PP	178	100	1.0	160	1.0	2.3	259
(+)SMBJ170A	PR	PR	189	209	1.0	170	1.0	2.2	275
SMBJ188A	PS	PS	209	231	1.0	188	1.0	2.0	328
SMEDIOUR	10	.0	200	201	1.0	100	1.0	2.0	020

Notes

⁽¹⁾ 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

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

 $^{(5)}$ For the bi-directional SMBJ5.0CA, the maximum V_{BR} is 7.25 V

⁽⁶⁾ $V_F = 3.5 V \text{ max.}$ at $I_F = 50 \text{ A}$ (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 devices

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THERMAL CHARACTERISTICS ($T_A = 25 \text{ °C}$ unless otherwise noted)						
PARAMETER	SYMBOL	VALUE	UNIT			
Typical thermal resistance, junction to ambient ⁽¹⁾	$R_{ ext{ heta}JA}$	100	°C/W			
Typical thermal resistance, junction to lead	$R_{ ext{ heta}JL}$	20	C/ W			

Note

⁽¹⁾ Mounted on minimum recommended pad layout

ORDERING INFORMATION (Example)						
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE		
SMBJ5.0A-E3/52	0.096 52		750	7" diameter plastic tape and reel		
SMBJ5.0A-M3/52	0.090	52	750	i diameter plastic tape and reel		
SMBJ5.0A-E3/5B	0.096	5B	3200	13" diameter plastic tape and reel		
SMBJ5.0A-M3/5B	0.090	30				
SMBJ5.0AHE3_A/H ⁽¹⁾	0.096	Н	750	7" diameter plastic tape and reel		
SMBJ5.0AHM3_A/H ⁽¹⁾	0.090	П	750	i diameter plastic tape and reel		
SMBJ5.0AHE3_A/I ⁽¹⁾	0.096		3200	13" diameter plastic tape and reel		
SMBJ5.0AHM3_A/I ⁽¹⁾	0.090	I		15 Giameter plastic tape and reel		

Note

(1) AEC-Q101 qualified

RATINGS AND CHARACTERISTICS CURVES (T_A = 25 °C unless otherwise noted)

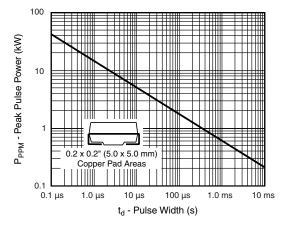


Fig. 1 - Peak Pulse Power Rating Curve

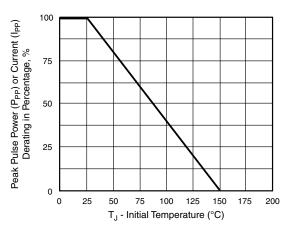


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

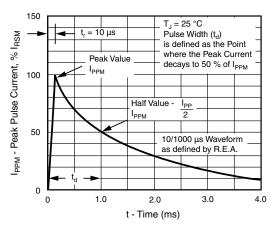
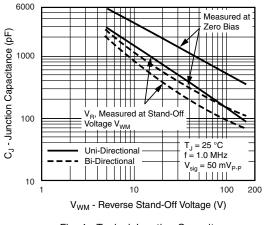


Fig. 3 - Pulse Waveform





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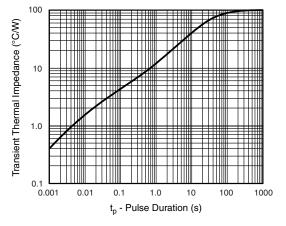


Fig. 5 - Typical Transient Thermal Impedance

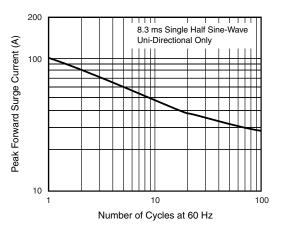
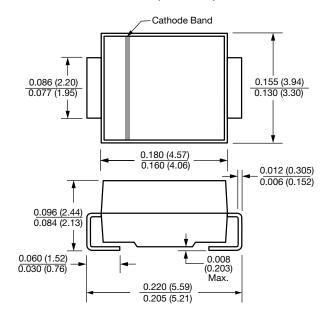
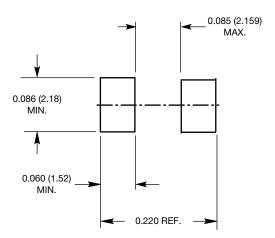


Fig. 6 - Maximum Non-Repetitive Peak Forward Surge Current

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



SMB (DO-214AA)



Mounting Pad Layout

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