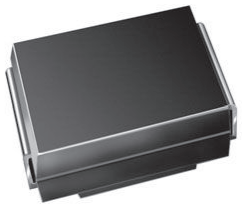
THE DATASHEET OF

SMBJ48D-M3/H

SMBJ5.0D thru SMBJ188D, SMBJ5.0CD thru SMBJ120CD

Surface-Mount TRANSZORB® Transient Voltage Suppressors



SMB (DO-214AA)

FEATURES

- Low profile package
- Ideal for automated placement
- ± 3.5 %: very tight V_{BR} tolerance
- Low leakage current
- Available in unidirectional and bidirectional
- 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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT
HALOGEN FREE

LINKS TO ADDITIONAL RESOURCES

3D Models

PRIMARY CHARACTERISTICS	
V_{BR} (unidirectional)	6.5 V to 228 V
V_{BR} (bidirectional)	6.5 V to 145 V
V_{WM} (unidirectional)	5.0 V to 188 V
V_{WM} (bidirectional)	5.0 V to 120 V
P_{PPM}	600 W
P_D at T_M = 50 °C	5.0 W
P_D at T_A = 25 °C	1.0 W
T_J max.	150 °C
Polarity	Unidirectional, bidirectional
Package	SMB (DO-214AA)

DEVICES FOR BIDIRECTIONAL APPLICATIONS

For bidirectional devices use CD suffix (e.g. SMBJ5.0CD). 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, MOSFETs, 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-M3 - halogen-free, RoHS-compliant, and industrial grade

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 unidirectional types the band denotes cathode end, no cathode band on bidirectional types

MAXIMUM RATINGS (T_A = 25 °C unless otherwise noted)

PARAMETER		SYMBOL	VALUE	UNIT
Peak pulse power dissipation	with a 10/1000 µs waveform	P_{PPM} (1)	600	W
Peak pulse current	with a 10/1000 µs waveform	I_{PPM} (1)	See next table	A
Power dissipation	T_M = 50 °C	P_D (2)	5.0	W
	T_A = 25 °C	P_D (3)	1.0	
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) Power dissipation mounted on infinite heatsink
(3) Power dissipation mounted on minimum recommended pad layout

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ELECTRICAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)

DEVICE TYPE	DEVICE MARKING CODE		BREAKDOWN VOLTAGE V_{BR} AT I_T (1) (V)		TEST CURRENT I_T (mA)	STAND-OFF VOLTAGE V_{WM} (V)	MAXIMUM REVERSE LEAKAGE AT V_{WM} I_D (µA) (2)	MAXIMUM PEAK PULSE SURGE CURRENT I_{PPM} (A) (3)	MAXIMUM CLAMPING VOLTAGE AT I_{PPM} V_C (V)
	UNI	BI	MIN.	MAX.					
(+)SMBJ5.0D	6AA	6AA	6.50	6.97	10	5.0	500	65.9	9.1
(+)SMBJ6.0D	6AB	6AB	6.77	7.27	10	6.0	500	58.9	10.2
(+)SMBJ6.5D	6AC	6AC	7.33	7.87	10	6.5	300	54.5	11.0
(+)SMBJ7.0D	6AD	6AD	7.90	8.48	10	7.0	150	50.8	11.8
(+)SMBJ7.5D	6AE	6AE	8.46	9.08	1.0	7.5	75	47.2	12.7
(+)SMBJ8.0D	6AF	6AF	9.03	9.69	1.0	8.0	35	44.8	13.4
(+)SMBJ8.5D	6AG	6AG	9.57	10.3	1.0	8.5	15	42.2	14.3
(+)SMBJ9.0D	6AH	6AH	10.2	10.9	1.0	9.0	5.0	39.7	15.1
(+)SMBJ10D	6AK	6AK	11.3	12.1	1.0	10	2.0	35.9	16.7
(+)SMBJ11D	6AL	6AL	12.4	13.3	1.0	11	2.0	33.5	17.9
(+)SMBJ12D	6AM	6AM	13.5	14.5	1.0	12	2.0	30.6	19.6
(+)SMBJ13D	6AN	6AN	14.6	15.7	1.0	13	0.5	28.3	21.2
(+)SMBJ14D	6AP	6AP	15.8	17.0	1.0	14	0.5	26.2	22.9
(+)SMBJ15D	6AQ	6AQ	17.0	18.2	1.0	15	0.5	25.0	24.0
(+)SMBJ16D	6AR	6AR	18.1	19.4	1.0	16	0.5	23.4	25.6
(+)SMBJ17D	6AS	6AS	19.2	20.6	1.0	17	0.5	22.1	27.2
(+)SMBJ18D	6AT	6AT	20.3	21.8	1.0	18	0.5	20.8	28.8
(+)SMBJ20D	6AU	6AU	22.5	24.2	1.0	20	0.5	18.8	32.0
(+)SMBJ22D	6AV	6AV	24.8	26.6	1.0	22	0.5	17.1	35.1
(+)SMBJ24D	6AW	6AW	27.1	29.1	1.0	24	0.5	15.6	38.4
(+)SMBJ26D	6AX	6AX	29.3	31.5	1.0	26	0.5	14.5	41.6
(+)SMBJ28D	6AY	6AY	31.6	33.9	1.0	28	0.5	13.4	44.7
(+)SMBJ30D	6AZ	6AZ	33.8	36.3	1.0	30	0.5	12.6	47.7
(+)SMBJ33D	6BA	6BA	37.3	40.0	1.0	33	0.5	11.5	52.5
(+)SMBJ36D	6BB	6BB	40.6	43.6	1.0	36	0.5	10.5	57.3
(+)SMBJ40D	6BC	6BC	45.1	48.4	1.0	40	0.5	9.43	63.6
(+)SMBJ43D	6BD	6BD	48.5	52.1	1.0	43	0.5	8.76	68.5
(+)SMBJ45D	6BE	6BE	50.8	54.5	1.0	45	0.5	8.40	71.6
(+)SMBJ48D	6BF	6BF	54.1	58.1	1.0	48	0.5	7.90	76.3
(+)SMBJ51D	6BG	6BG	57.6	61.8	1.0	51	0.5	7.40	81.2
(+)SMBJ54D	6BH	6BH	60.9	65.4	1.0	54	0.5	7.00	85.9
(+)SMBJ58D	6BK	6BK	65.4	70.2	1.0	58	0.5	6.50	92.3
(+)SMBJ60D	6BL	6BL	67.7	72.7	1.0	60	0.5	6.28	95.5
(+)SMBJ64D	6BM	6BM	72.2	77.5	1.0	64	0.5	5.88	102
(+)SMBJ70D	6BN	6BN	79.0	84.8	1.0	70	0.5	5.40	111
(+)SMBJ75D	6BP	6BP	84.6	90.8	1.0	75	0.5	5.06	119
(+)SMBJ78D	6BQ	6BQ	88.1	94.4	1.0	78	0.5	4.86	124
(+)SMBJ85D	6BR	6BR	95.7	103	1.0	85	0.5	4.46	135
(+)SMBJ90D	6BS	6BS	102	109	1.0	90	0.5	4.17	144
(+)SMBJ100D	6BT	6BT	113	121	1.0	100	0.5	3.77	159
(+)SMBJ110D	6BU	6BU	124	133	1.0	110	0.5	3.45	174
(+)SMBJ120D	6BV	6BV	135	145	1.0	120	0.5	3.15	190
(+)SMBJ130D	6BW	-	146	157	1.0	130	0.5	2.94	206
(+)SMBJ150D	6BX	-	170	182	1.0	150	0.5	2.53	239
(+)SMBJ160D	6BY	-	181	194	1.0	160	0.5	2.34	256
(+)SMBJ170D	6BZ	-	192	206	1.0	170	0.5	2.23	270
SMBJ188D	6CA	-	212	228	1.0	188	0.5	2.03	301

Notes

- All terms and symbols are consistent with ANSI/IEEE C62.35

(1) Pulse test: $t_p \leq 50$ ms

(2) For bi-directional types having V_{WM} of 12 V and less, the I_D limit is doubled

(3) Surge current waveform per fig. 3 and derate per fig. 2

(+) 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 device

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THERMAL CHARACTERISTICS (T_A = 25 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VALUE**	**UNIT**
Typical thermal resistance, junction to ambient	$R_{\theta JA}$ (1)	125	°C/W
	$R_{\theta JA}$ (2)	100	
Typical thermal resistance, junction to mount	$R_{\theta JM}$	20	

Notes

(1) Mounted on minimum recommended pad layout

(2) Mounted on 5.0 mm x 5.0 mm copper pad area

ORDERING INFORMATION (Example)				
PREFERRED P/N	**UNIT WEIGHT (g)**	**PREFERRED PACKAGE CODE**	**BASE QUANTITY**	**DELIVERY MODE**
SMBJ5.0D-M3/H	0.096	H	750	7" diameter plastic tape and reel
SMBJ5.0D-M3/I	0.096	I	3200	13" diameter plastic tape and reel

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

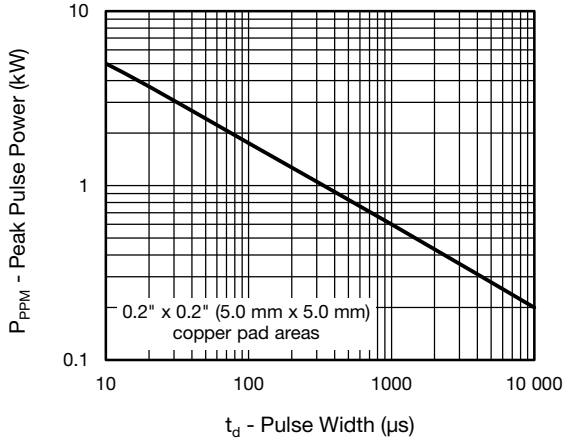


Fig. 1 - Peak Pulse Power Rating Curve

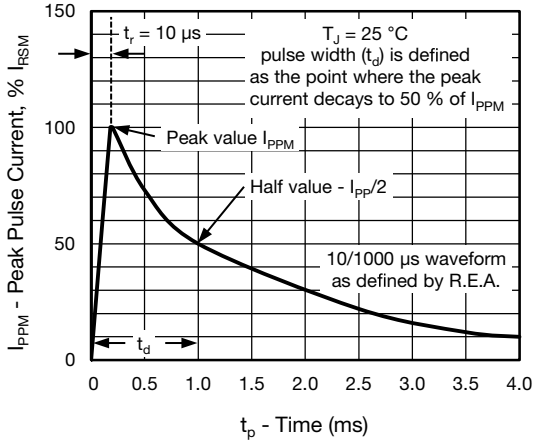


Fig. 3 - Pulse Waveform

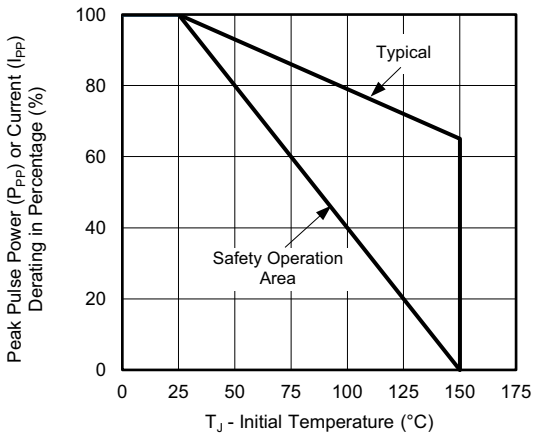


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

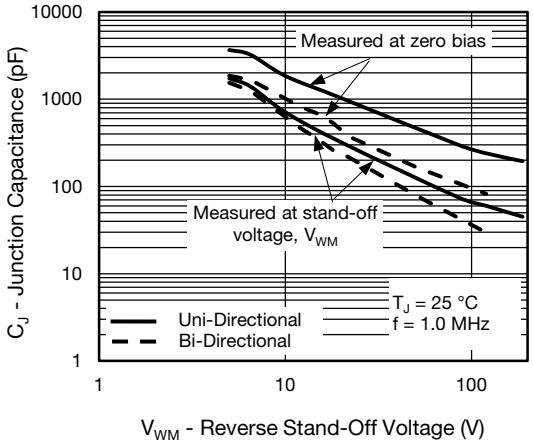


Fig. 4 - Typical Junction Capacitance

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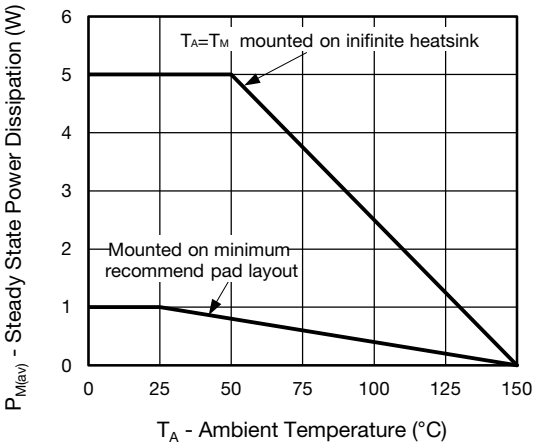


Fig. 5 - Power Dissipation Derating Curve

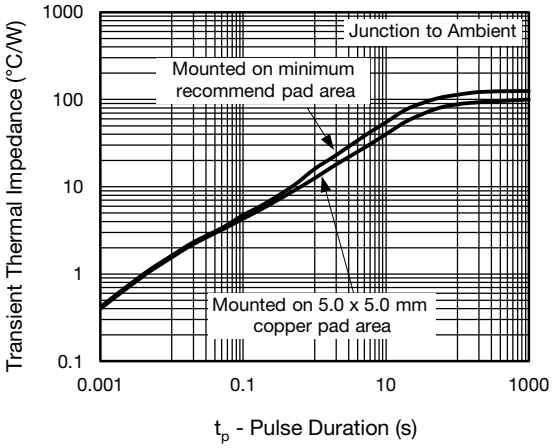
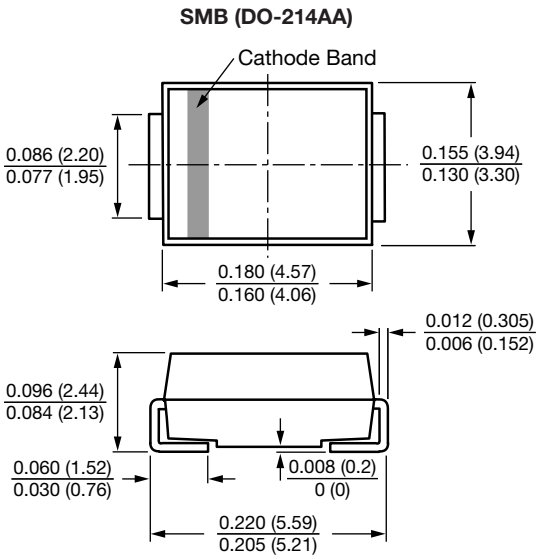


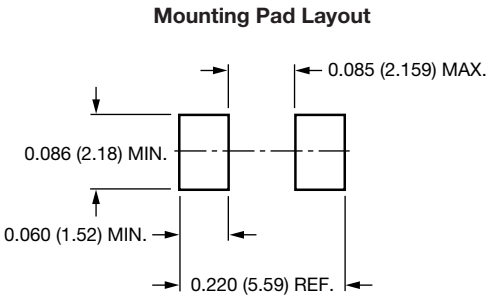
Fig. 6 - Typical Transient Thermal Impedance

Note

- Fig.1, 10 000 µs P_{ppm} is actual test for $V_{WM} \leq 60$ V types, over 60 V types 10 000 µs P_{ppm} is curve extensional value

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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