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MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

Zener Overvoltage Transient Suppressors

1SMB5.0, A thru 1SMB170, A

PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSORS 6.8–200 VOLTS 600 WATT PEAK POWER 3.0 WATTS STEADY STATE

CASE 403A-01

. . . this device is designed specifically for transient voltage suppression. The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground.

A 600 W (SMB) device is normally selected when the threat of transients is from ESD or board level load switching components. It is also used for protection against lightning induced transients when preceded by a suitable primary protection device (gas discharge arrestor). Source impedance at component level in a system is usually high enough to limit the current to within the peak pulse current (I_{pp}) rating of this series.

- Standard Zener Voltage Range — 5.0 to 170 V
- Peak Power — 600 Watts @ 1.0 ms
- Low Inductance Package
- Low Leakage < 5.0 μA Above 10 V
- Available in Tape and Reel

Mechanical Characteristics:
CASE: Void-free, transfer-molded, thermosetting plastic
LEADS: Modified L-Bend providing more contact area to bond pads
FINISH: All external surfaces are corrosion resistant and leads are readily solderable and weldable
POLARITY: Cathode indicated by molded polarity notch. When operated in zener mode, will be positive with respect to anode.
STANDARD PACKAGING: 12 mm Tape and Reel
MOUNTING POSITION: Any
MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES: 230°C for 10 seconds

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation (1) @ $T_L \leq 25°C$	P_{PK}	600	Watts
Steady State Power Dissipation @ $T_L \leq 75°C$	P_D	3.0	Watts
Derated above T_L = 75°C		50	mW/°C
Forward Surge Current (2) @ T_A = 25°C	I_{FSM}	100	Amps
Operating and Storage Temperature Range	T_J, T_{stg}	−65 to +175	°C

Note 1. A transient suppressor is normally selected according to the reverse "Stand Off Voltage" (V_R) which should be equal to or greater than the DC or continuous peak operating voltage level.
Note 2. 1/2 Square wave (or equivalent), PW = 8.3 ms, Duty Cycle = 4 Pulses per min max.

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

Device	Reverse Stand-Off Voltage V_R Volts (1)	Breakdown Voltage V_{BR} @ I_T Volts Min	Breakdown Voltage V_{BR} @ I_T mA	Maximum Clamping Voltage @ I_{pp} Volts	Peak Pulse Current (See Figure 2) I_{pp} Amps	Maximum Reverse Leakage @ V_R I_R μA	Device Marking
1SMB5.0	5.0	6.40	10	9.6	62.5	800	KD
1SMB5.0A	5.0	6.40	10	9.2	65.2	800	KE
1SMB6.0	6.0	6.67	10	11.4	52.6	800	KF
1SMB6.0A	6.0	6.67	10	10.3	58.3	800	KG
1SMB6.5	6.5	7.22	10	12.3	48.7	500	KH
1SMB6.5A	6.5	7.22	10	11.2	53.6	500	KK
1SMB7.0	7.0	7.78	10	13.3	45.1	200	KL
1SMB7.0A	7.0	7.78	10	12.0	50.0	200	KM

(continued)

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

Device	Reverse Stand-Off Voltage V_R Volts (1)	Breakdown Voltage V_{BR} @ I_T Volts Min	Breakdown Voltage V_{BR} @ I_T mA	Maximum Clamping Voltage @ I_{pp} Volts	Peak Pulse Current (See Figure 2) I_{pp} Amps	Maximum Reverse Leakage @ V_R I_R μA	Device Marking
1SMB7.5	7.5	8.33	1.0	14.3	42.0	100	KN
1SMB7.5A	7.5	8.33	1.0	12.9	46.5	100	KP
1SMB8.0	8.0	8.89	1.0	15.0	40.0	50	KQ
1SMB8.0A	8.0	8.89	1.0	13.6	44.1	50	KR
1SMB8.5	8.5	9.44	1.0	15.9	37.7	10	KS
1SMB8.5A	8.5	9.44	1.0	14.4	41.7	10	KT
1SMB9.0	9.0	10.0	1.0	16.9	36.5	5.0	KU
1SMB9.0A	9.0	10.0	1.0	15.4	39.0	5.0	KV
1SMB10	10	11.1	1.0	18.8	31.9	5.0	KW
1SMB10A	10	11.1	1.0	17.0	35.3	5.0	KX
1SMB11	11	12.2	1.0	20.1	29.9	5.0	KY
1SMB11A	11	12.2	1.0	18.2	33.0	5.0	KZ
1SMB12	12	13.3	1.0	22.0	27.3	5.0	LD
1SMB12A	12	13.3	1.0	19.9	30.2	5.0	LE
1SMB13	13	14.4	1.0	23.8	25.2	5.0	LF
1SMB13A	13	14.4	1.0	21.5	27.9	5.0	LG
1SMB14	14	15.6	1.0	25.8	23.3	5.0	LH
1SMB14A	14	15.6	1.0	23.2	25.8	5.0	LK
1SMB15	15	16.7	1.0	26.9	22.3	5.0	LL
1SMB15A	15	16.7	1.0	24.4	24.0	5.0	LM
1SMB16	16	17.8	1.0	28.8	20.8	5.0	LN
1SMB16A	16	17.8	1.0	26.0	23.1	5.0	LP
1SMB17	17	18.9	1.0	30.5	19.7	5.0	LQ
1SMB17A	17	18.9	1.0	27.6	21.7	5.0	LR
1SMB18	18	20.0	1.0	32.2	18.6	5.0	LS
1SMB18A	18	20.0	1.0	29.2	20.5	5.0	LT
1SMB20	20	22.2	1.0	35.8	16.7	5.0	LU
1SMB20A	20	22.2	1.0	32.4	18.5	5.0	LV
1SMB22	22	24.4	1.0	39.4	15.2	5.0	LW
1SMB22A	22	24.4	1.0	35.5	16.9	5.0	LX
1SMB24	24	26.7	1.0	43.0	14.0	5.0	LY
1SMB24A	24	26.7	1.0	38.9	15.4	5.0	LZ
1SMB26	26	28.9	1.0	46.6	12.4	5.0	MD
1SMB26A	26	28.9	1.0	42.1	14.2	5.0	ME
1SMB28	28	31.1	1.0	50.0	12.0	5.0	MF
1SMB28A	28	31.1	1.0	45.4	13.2	5.0	MG
1SMB30	30	33.3	1.0	53.5	11.2	5.0	MH
1SMB30A	30	33.3	1.0	48.4	12.4	5.0	MK
1SMB33	33	36.7	1.0	59.0	10.2	5.0	ML
1SMB33A	33	36.7	1.0	53.3	11.3	5.0	MM
1SMB36	36	40.0	1.0	64.3	9.3	5.0	MN
1SMB36A	36	40.0	1.0	58.1	10.3	5.0	MP
1SMB40	40	44.4	1.0	71.4	8.4	5.0	MQ
1SMB40A	40	44.4	1.0	64.5	9.3	5.0	MR
1SMB43	43	47.8	1.0	76.7	7.8	5.0	MS
1SMB43A	43	47.8	1.0	69.4	8.6	5.0	MT
1SMB45	45	50.0	1.0	80.3	7.5	5.0	MU
1SMB45A	45	50.0	1.0	72.7	8.3	5.0	MV
1SMB48	48	53.3	1.0	85.5	7.0	5.0	MW
1SMB48A	48	53.3	1.0	77.4	7.7	5.0	MX
1SMB51	51	56.7	1.0	91.1	6.6	5.0	MY
1SMB51A	51	56.7	1.0	82.4	7.3	5.0	MZ
1SMB54	54	60.0	1.0	96.3	8.2	5.0	ND
1SMB54A	54	60.0	1.0	87.1	8.9	5.0	NE
1SMB58	58	64.4	1.0	103	5.8	5.0	NF
1SMB58A	58	64.4	1.0	93.6	6.4	5.0	NG

Note 1. A transient suppressor is normally selected according to the reverse "Stand Off Voltage" (V_R) which should be equal to or greater than the DC or continuous peak operating voltage level.

T-11-23

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

Device	Reverse Stand-Off Voltage V_R Volts (1)	Breakdown Voltage V_{BR} @ I_T Volts Min	Breakdown Voltage V_{BR} @ I_T mA	Maximum Clamping Voltage @ I_{pp} Volts	Peak Pulse Current (See Figure 2) I_{pp} Amps	Maximum Reverse Leakage @ V_R I_R μA	Device Marking
1SMB60	60	66.7	1.0	107	5.6	5.0	NH
1SMB60A	60	66.7	1.0	96.8	6.2	5.0	NK
1SMB64	64	71.1	1.0	114	5.3	5.0	NL
1SMB64A	64	71.1	1.0	103	5.8	5.0	NM
1SMB70	70	77.8	1.0	125	4.8	5.0	NN
1SMB70A	70	77.8	1.0	113	5.3	5.0	NP
1SMB75	75	83.3	1.0	134	4.6	5.0	NQ
1SMB75A	75	83.3	1.0	121	4.9	5.0	NR
1SMB78	78	86.7	1.0	139	4.3	5.0	NS
1SMB78A	78	86.7	1.0	126	4.7	5.0	NT
1SMB85	85	94.4	1.0	151	3.9	5.0	NU
1SMB85A	85	94.4	1.0	137	4.4	5.0	NV
1SMB90	90	100	1.0	160	3.8	5.0	NW
1SMB90A	90	100	1.0	146	4.1	5.0	NX
1SMB100	100	111	1.0	179	3.4	5.0	NY
1SMB100A	100	111	1.0	162	3.7	5.0	NZ
1SMB110	110	122	1.0	196	3.0	5.0	PD
1SMB110A	110	122	1.0	177	3.4	5.0	PE
1SMB120	120	133	1.0	214	2.8	5.0	PF
1SMB120A	120	133	1.0	193	3.1	5.0	PG
1SMB130	130	144	1.0	231	2.6	5.0	PH
1SMB130A	130	144	1.0	209	2.9	5.0	PK
1SMB150	150	167	1.0	268	2.2	5.0	PL
1SMB150A	150	167	1.0	243	2.5	5.0	PM
1SMB160	160	178	1.0	287	2.1	5.0	PN
1SMB160A	160	178	1.0	259	2.3	5.0	PP
1SMB170	170	189	1.0	304	2.0	5.0	PQ
1SMB170A	170	189	1.0	275	2.2	5.0	PR

Note 1. A transient suppressor is normally selected according to the reverse "Stand Off Voltage" (V_R) which should be equal to or greater than the DC or continuous peak operating voltage level.

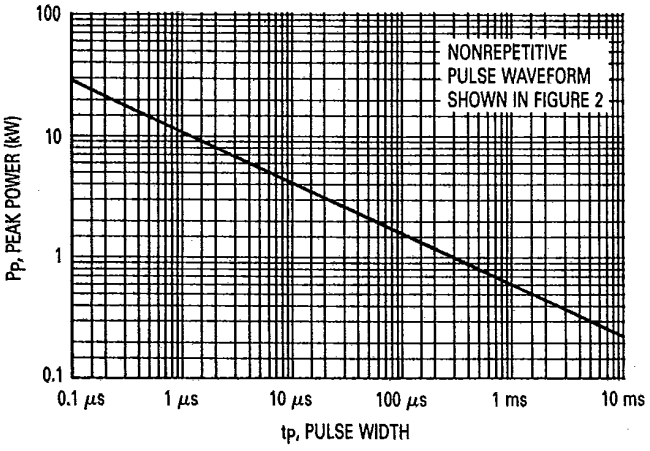


Figure 1. Pulse Rating Curve

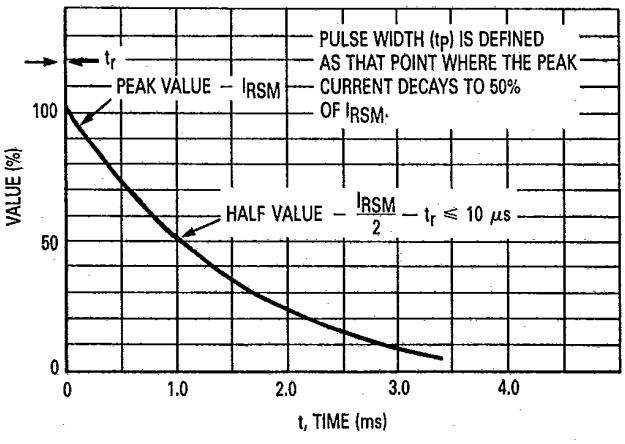


Figure 2. Pulse Waveform

ABBREVIATIONS AND SYMBOLS

V_R Stand Off Voltage. Applied reverse voltage to assure a non-conductive condition (See Note 1 on page 1)

$V_{(BR)min}$ This is the minimum breakdown voltage the device will exhibit and is used to assure that conduction does not occur prior to this voltage level at 25°C.

V_C Maximum Clamping Voltage. The maximum peak voltage appearing across the transient suppressor when subjected to the peak pulse current in a one millisecond time interval. The peak pulse voltages are the combination of voltage rise due to both the series resistance and thermal rise.

I_{PP} Peak Pulse Current — See Figure 2

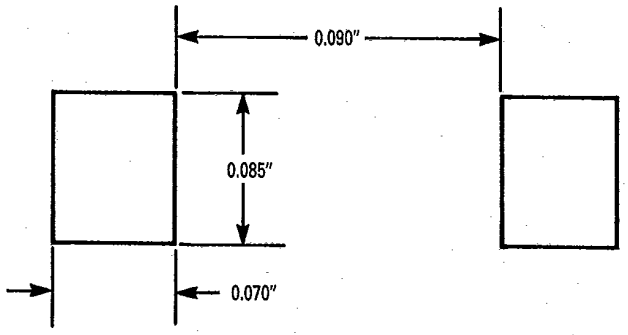
P_P Peak Pulse Power

I_R Reverse Leakage

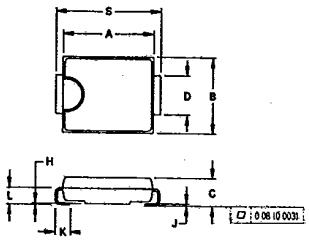
RECOMMENDED PAD SIZES

The pad dimensions should be 0.010" longer than the contact size, in the lead axis. This allows a solder fillet to form, see figure below.

MODIFIED J-BEND



OUTLINE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

CASE 403A-01

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.20	4.44	0.165	0.175
B	3.43	3.68	0.135	0.145
C	2.01	2.26	0.079	0.089
D	1.91	2.15	0.075	0.085
H	0.013	0.101	0.0005	0.0040
J	0.11	0.25	0.004	0.010
K	1.02	1.27	0.040	0.050
L	1.22	1.47	0.048	0.058
S	5.29	5.53	0.208	0.218

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