

**MOTOROLA**  
**SEMICONDUCTOR**  
**TECHNICAL DATA**

T-11-23 Order this data sheet  
 by 1SMC5.0/D

# Zener Overvoltage Transient Suppressors

... 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 1500 W (SMC) device is normally selected when the threat of transients is from lightning induced transients, conducted via external leads or I/O lines. It is also used to protect against switching transients induced by large coils or industrial motors. 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 — 1500 Watts @ 1.0 ms
- Low Inductance Package
- Low Leakage < 5.0  $\mu$ A Above 10 V
- Package Designed for Top Side or Bottom Circuit Board Mounting
- Available in Tape and Reel

**Mechanical Characteristics:**

**CASE:** Void-free, transfer-molded, thermosetting plastic

**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.

**MOUNTING POSITION:** Any

**LEADS:** Modified L-Bend providing more contact area to bond pad

**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:** 230°C for 10 seconds

**MAXIMUM RATINGS**

Rating	Symbol	Value	Unit
Peak Power Dissipation (1) @ $T_L \leq 25^\circ\text{C}$	$P_{PK}$	600	Watts
Steady State Power Dissipation @ $T_L \leq 75^\circ\text{C}$ Derated above $T_L = 75^\circ\text{C}$	$P_D$	5.0	Watts
		50	mW/°C
Forward Surge Current (2) @ $T_A = 25^\circ\text{C}$	$I_{FSM}$	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.

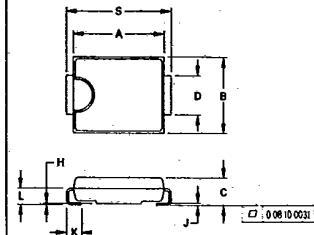
**1SMC5.0, A  
 thru  
 1SMC170, A**

**PLASTIC SURFACE MOUNT  
 ZENER OVERVOLTAGE  
 TRANSIENT SUPPRESSORS  
 1500 WATT PEAK POWER  
 5.0 WATTS STEADY STATE**



CASE 403-01

**OUTLINE DIMENSIONS**



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	6.74	6.98	0.265	0.275
B	5.72	5.96	0.225	0.235
C	2.01	2.26	0.079	0.089
D	2.88	3.12	0.113	0.123
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	1.17	1.42	0.046	0.056
S	7.80	8.05	0.307	0.317



ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted).

Device	Reverse Stand-Off Voltage V <sub>R</sub> Volts (1)	Breakdown Voltage		Maximum Clamping Voltage @ I <sub>pp</sub> Volts	Peak Pulse Current (See Figure 2) I <sub>pp</sub> Amps	Maximum Reverse Leakage @ V <sub>R</sub> I <sub>R</sub> μA	Device Marking
		V <sub>BR</sub> @ I <sub>T</sub>					
		Volts Min	mA				
1SMC5.0	5.0	6.40	10	9.6	156.2	1000	GDD
1SMC5.0A	5.0	6.40	10	9.2	163.0	1000	GDE
1SMC6.0	6.0	6.67	10	11.4	131.6	1000	GDF
1SMC6.0A	6.0	6.67	10	10.3	145.6	1000	GDG
1SMC6.5	6.5	7.22	10	12.3	122.0	500	GDH
1SMC6.5A	6.5	7.22	10	11.2	133.9	500	GDK
1SMC7.0	7.0	7.78	10	13.3	112.8	200	GDL
1SMC7.0A	7.0	7.78	10	12.0	125.0	200	GDM
1SMC7.5	7.5	8.33	1.0	14.3	104.9	100	GDN
1SMC7.5A	7.5	8.33	1.0	12.9	116.3	100	GDP
1SMC8.0	8.0	8.89	1.0	15.0	100.0	50	GDQ
1SMC8.0A	8.0	8.89	1.0	13.6	110.3	50	GDR
1SMC8.5	8.5	9.44	1.0	15.9	94.3	25	GDS
1SMC8.5A	8.5	9.44	1.0	14.4	104.2	20	GDT
1SMC9.0	9.0	10.0	1.0	16.9	88.7	10	GDU
1SMC9.0A	9.0	10.0	1.0	15.4	97.4	10	GDV
1SMC10	10	11.1	1.0	18.8	79.8	5.0	GDW
1SMC10A	10	11.1	1.0	17.0	88.2	5.0	GDY
1SMC11	11	12.2	1.0	20.1	74.6	5.0	GDZ
1SMC11A	11	12.2	1.0	18.2	82.4	5.0	GED
1SMC12	12	13.3	1.0	22.0	68.2	5.0	GEE
1SMC12A	12	13.3	1.0	19.9	75.3	5.0	GEF
1SMC13	13	14.4	1.0	23.8	63.0	5.0	GEH
1SMC13A	13	14.4	1.0	21.5	69.7	5.0	GEK
1SMC14	14	15.6	1.0	25.8	58.1	5.0	GEL
1SMC14A	14	15.6	1.0	23.2	64.7	5.0	GEM
1SMC15	15	16.7	1.0	26.9	55.8	5.0	GEN
1SMC15A	15	16.7	1.0	24.4	61.5	5.0	GEP
1SMC16	16	17.8	1.0	28.8	52.1	5.0	GEQ
1SMC16A	16	17.8	1.0	26.0	57.7	5.0	GER
1SMC17	17	18.9	1.0	30.5	49.2	5.0	GES
1SMC17A	17	18.9	1.0	27.6	53.3	5.0	GET
1SMC18	18	20.0	1.0	32.2	46.6	5.0	GEU
1SMC18A	18	20.0	1.0	29.2	51.4	5.0	GEV
1SMC20	20	22.2	1.0	35.8	41.9	5.0	GEW
1SMC20A	20	22.2	1.0	32.4	46.3	5.0	GEX
1SMC22	22	24.4	1.0	39.4	38.1	5.0	GEY
1SMC22A	22	24.4	1.0	35.5	42.2	5.0	GEZ
1SMC24	24	26.7	1.0	43.0	34.9	5.0	GFD
1SMC24A	24	26.7	1.0	38.9	38.6	5.0	GFE
1SMC26	26	28.9	1.0	46.6	32.2	5.0	GFF
1SMC26A	26	28.9	1.0	42.1	35.6	5.0	GFG
1SMC28	28	31.1	1.0	50.0	30.0	5.0	GFH
1SMC28A	28	31.1	1.0	45.4	33.0	5.0	GFK
1SMC30	30	33.3	1.0	53.5	28.0	5.0	GFL
1SMC30A	30	33.3	1.0	48.4	31.0	5.0	GFM
1SMC33	33	36.7	1.0	59.0	25.2	5.0	GFN
1SMC33A	33	36.7	1.0	53.3	28.1	5.0	GFP
1SMC36	36	40.0	1.0	64.3	23.3	5.0	GFQ
1SMC36A	36	40.0	1.0	58.1	25.8	5.0	GFR
1SMC40	40	44.4	1.0	71.4	21.0	5.0	GFS
1SMC40A	40	44.4	1.0	64.5	32.2	5.0	GFT
1SMC43	43	47.8	1.0	76.7	19.6	5.0	GFT
1SMC43A	43	47.8	1.0	69.4	21.6	5.0	GFU
1SMC45	45	50.0	1.0	80.3	18.7	5.0	GFV
1SMC45A	45	50.0	1.0	72.7	20.6	5.0	

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

T-11-23

ELECTRICAL CHARACTERISTICS — continued ( $T_A = 25^\circ\text{C}$  unless otherwise noted).

Device	Reverse Stand-Off Voltage $V_R$ Volts (1)	Breakdown Voltage		Maximum Clamping Voltage @ $I_{pp}$ Volts	Peak Pulse Current (See Figure 2) $I_{pp}$ Amps	Maximum Reverse Leakage @ $V_R$ $I_R$ $\mu\text{A}$	Device Marking
		$V_{BR}$ @ $I_T$					
		Volts Min	mA				
1SMC48	48	53.3	1.0	85.5	17.5	5.0	GFW
1SMC48A	48	53.3	1.0	77.4	19.4	5.0	GFX
1SMC51	51	56.7	1.0	91.1	18.5	5.0	GFY
1SMC51A	51	56.7	1.0	82.4	18.2	5.0	GFZ
1SMC54	54	60.0	1.0	96.3	15.6	5.0	GGD
1SMC54A	54	60.0	1.0	87.1	17.2	5.0	GGE
1SMC58	58	64.4	1.0	103	14.6	5.0	GGF
1SMC58A	58	64.4	1.0	93.6	16.0	5.0	GGG
1SMC60	60	66.7	1.0	107	14.0	5.0	GGH
1SMC60A	60	66.7	1.0	96.8	15.5	5.0	GGK
1SMC64	64	71.1	1.0	114	13.2	5.0	GGL
1SMC64A	64	71.1	1.0	103	14.6	5.0	GGM
1SMC70	70	77.8	1.0	125	12.0	5.0	GGN
1SMC70A	70	77.8	1.0	113	13.3	5.0	GGP
1SMC75	75	83.3	1.0	134	11.2	5.0	GGQ
1SMC75A	75	83.3	1.0	121	12.4	5.0	GGR
1SMC78	78	86.7	1.0	139	10.8	5.0	GGS
1SMC78A	78	86.7	1.0	126	11.4	5.0	GGT
1SMC85	85	94.4	1.0	151	9.9	5.0	GGU
1SMC85A	85	94.4	1.0	137	10.4	5.0	GGV
1SMC90	90	100	1.0	160	9.4	5.0	GGW
1SMC90A	90	100	1.0	146	10.3	5.0	GGX
1SMC100	100	111	1.0	179	8.4	5.0	GGY
1SMC100A	100	111	1.0	162	9.3	5.0	GGZ
1SMC110	110	122	1.0	196	7.7	5.0	GHD
1SMC110A	110	122	1.0	177	8.4	5.0	GHE
1SMC120	120	133	1.0	214	7.0	5.0	GHF
1SMC120A	120	133	1.0	193	7.8	5.0	GHG
1SMC130	130	144	1.0	231	6.5	5.0	GHH
1SMC130A	130	144	1.0	209	7.2	5.0	GHK
1SMC150	150	167	1.0	268	5.6	5.0	GHL
1SMC150A	150	167	1.0	243	6.2	5.0	GHM
1SMC160	160	178	1.0	287	5.2	5.0	GHN
1SMC160A	160	178	1.0	259	5.8	5.0	GHP
1SMC170	170	189	1.0	304	4.9	5.0	GHQ
1SMC170A	170	189	1.0	275	5.5	5.0	GHR

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.

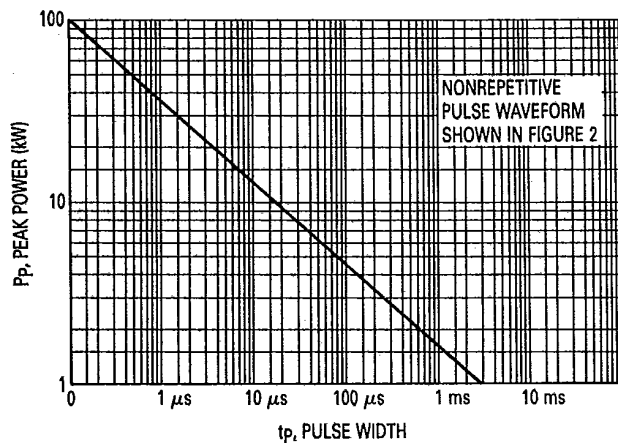


Figure 1. Pulse Rating Curve

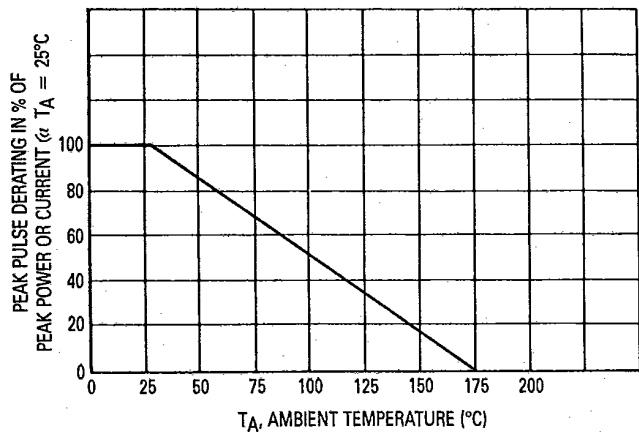


Figure 2. Pulse Derating Curve

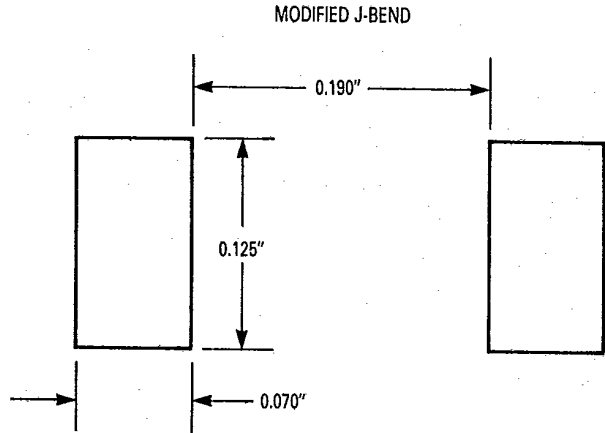
T-11-23

**ABBREVIATIONS AND SYMBOLS**

- V<sub>R</sub>** Stand Off Voltage. Applied reverse voltage to assure a non-conductive condition (See Note 1, on page 1)
- V<sub>(BR)min</sub>** 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<sub>C</sub>** 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 series resistance and thermal rise.
- I<sub>pp</sub>** Peak Pulse Current — See Figure 2
- P<sub>p</sub>** Peak Pulse Power
- I<sub>R</sub>** 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.



Motorola reserves the right to make changes without further notice to any products herein to improve reliability, function or design. Motorola does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights nor the rights of others. Motorola products are not authorized for use as components in life support devices or systems intended for surgical implant into the body or intended to support or sustain life. Buyer agrees to notify Motorola of any such intended end use whereupon Motorola shall determine availability and suitability of its product or products for the use intended. Motorola and are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Employment Opportunity/Affirmative Action Employer.

**Literature Distribution Centers:**

- USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.
- EUROPE: Motorola Ltd.; European Literature Center; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.
- ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; P.O. Box 80300; Cheung Sha Wan Post Office; Kowloon Hong Kong.
- JAPAN: Nippon Motorola Ltd.; 3-20-1 Minamiazabu, Minato-ku, Tokyo 106 Japan.



**MOTOROLA**