

Zener Transient Voltage Suppressors Unidirectional and Bidirectional

The SA5.0A series is designed to protect voltage sensitive components from high voltage, high energy transients. They have excellent clamping capability, high surge capability, low zener impedance and fast response time. The SA5.0A series is supplied in Motorola's exclusive, cost-effective, highly reliable Surmetic axial leaded package and is ideally-suited for use in communication systems, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/consumer applications.

Specification Features:

- Stand-off Zener Voltage Range — 5 to 170 V
- Peak Power — 500 Watts @ 1 ms
- Maximum Clamp Voltage @ Peak Pulse Current
- Low Leakage < 1 μ A Above 8.5 Volts
- Maximum Temperature Coefficient Specified
- Response Time is Typically Less than 1 ns

Mechanical Characteristics:

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

FINISH: All external surfaces are corrosion resistant and leads are readily solderable

POLARITY: Cathode indicated by polarity band. When operated in zener mode, will be positive with respect to anode

MOUNTING POSITION: Any

WAFER FAB LOCATION: Phoenix, Arizona

ASSEMBLY/TEST LOCATION: Guadalajara, Mexico

**SA5.0A
through
SA170A**

**MOSORB
ZENER OVERVOLTAGE
TRANSIENT
SUPPRESSORS
5-170 VOLT
500 WATT PEAK POWER
3 WATT STEADY STATE**



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation (1) @ $T_L \leq 25^\circ\text{C}$	P_{PK}	500	Watts
Steady State Power Dissipation @ $T_L \leq 75^\circ\text{C}$, Lead Length = 3/8" Derated above $T_L = 75^\circ\text{C}$	P_D	3 30	Watts mW/ $^\circ\text{C}$
Forward Surge Current (2) @ $T_A = 25^\circ\text{C}$	I_{FSM}	70	Amps
Operating and Storage Temperature Range	T_J, T_{stg}	- 55 to +175	$^\circ\text{C}$

Lead Temperature not less than 1/16" from the case for 10 seconds: 230°C

NOTES: 1. Nonrepetitive current pulse per Figure 4 and derated above $T_A = 25^\circ\text{C}$ per Figure 2.

2. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) $V_F = 3.5\text{ V}$ Max, $I_F^* = 35\text{ A}$ (except bidirectional devices).

Device	Breakdown Voltage			Working Peak Reverse Voltage V _{RWM} ** (Volts)	Maximum Reverse Leakage @ V _{RWM} I _R (μA)	Maximum Reverse Surge Current I _{RSM} [†] (Amps)	Maximum Reverse Voltage @ I _{RSM} (Clamping Voltage) V _{RSM} (Volts)	Maximum Voltage Temperature Variation of V _{BR} mV/°C
	V _{BR} ^{††} (Volts)		@ I _T (mA)					
	Min	Max						
SA5.0A	6.4	7	10	5	600	54.3	9.2	5
SA6.0A	6.67	7.37	10	6	600	48.5	10.3	5
SA6.5A	7.22	7.98	10	6.5	400	44.7	11.2	5
SA7.0A	7.78	8.6	10	7	150	41.7	12	6
SA7.5A	8.33	9.21	1	7.5	50	38.8	12.9	7
SA8.0A	8.89	9.83	1	8	25	36.7	13.6	7
SA8.5A	9.44	10.4	1	8.5	5	34.7	14.4	8
SA10A	11.1	12.3	1	10	1	29.4	17	10
SA11A	12.2	13.5	1	11	1	27.4	18.2	11
SA12A	13.3	14.7	1	12	1	25.1	19.9	12
SA13A	14.4	15.9	1	13	1	23.2	21.5	13
SA14A	15.6	17.2	1	14	1	21.5	23.2	14
SA15A	16.7	18.5	1	15	1	20.6	24.4	16
SA16A	17.8	19.7	1	16	1	19.2	26	17
SA17A	18.9	20.9	1	17	1	18.1	27.6	19
SA18A	20	22.1	1	18	1	17.2	29.2	20
SA20A	22.2	24.5	1	20	1	15.4	32.4	23
SA24A	26.7	29.5	1	24	1	12.8	38.9	28
SA26A	28.9	31.9	1	26	1	11.9	42.1	30
SA28A	31.1	34.4	1	28	1	11	45.4	31
SA30A	33.3	36.8	1	30	1	10.3	48.4	36
SA33A	36.7	40.6	1	33	1	9.4	53.3	39
SA36A	40	44.2	1	36	1	8.6	58.1	41
SA40A	44.4	49.1	1	40	1	7.8	64.5	46
SA43A	47.8	52.8	1	43	1	7.2	69.4	50
SA45A	50	55.3	1	45	1	6.9	72.7	52
SA48A	53.3	58.9	1	48	1	6.5	77.4	56
SA51A	56.7	62.7	1	51	1	6.1	82.4	61
SA58A	64.4	71.2	1	58	1	5.3	93.6	70
SA60A	66.7	73.7	1	60	1	5.2	96.8	71
SA64A	71.1	78.6	1	64	1	4.9	103	76
SA70A	77.8	86	1	70	1	4.4	113	85
SA78A	86.7	95.8	1	78	1	4	126	95
SA90A	100	111	1	90	1	3.4	146	110
SA100A	111	123	1	100	1	3.1	162	123
SA120A	133	147	1	120	1	2.5	193	146
SA130A	144	159	1	130	1	2.4	209	158
SA150A	167	185	1	150	1	2.1	243	184
SA160A	178	197	1	160	1	1.9	259	196
SA170A	189	209	1	170	1	1.8	275	208

* 1/2 sine wave (or equivalent square wave), $PW = 8.3\text{ ms}$, duty cycle = 4 pulses per minute maximum. (continued)

** MOSORB transient suppressors are normally selected according to the maximum reverse stand-off voltage (V_{RWM}), which should be equal to or greater than the dc or continuous peak operating voltage level.

† Surge current waveform per Figure 4 and derate per Figure 2.

†† V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C .

FOR BIDIRECTIONAL APPLICATIONS

USE CA SUFFIX for SA6.0CA through SA170CA

Electrical characteristics apply in both directions.

Preferred Bidirectional Devices —

SA6.5CA

SA13CA

SA18CA

SA12CA

SA15CA

SA24CA

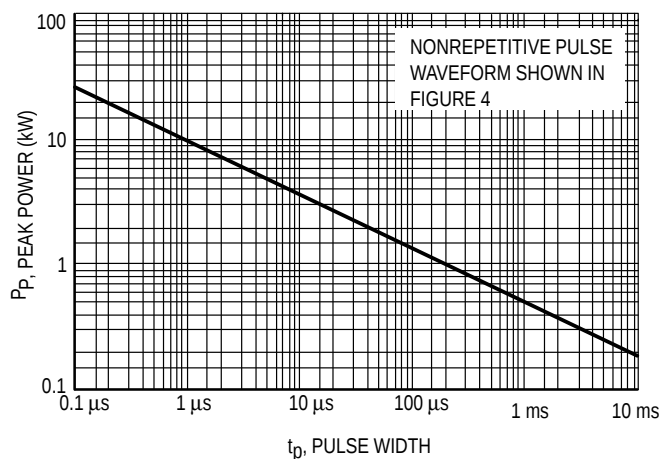


Figure 1. Pulse Rating Curve

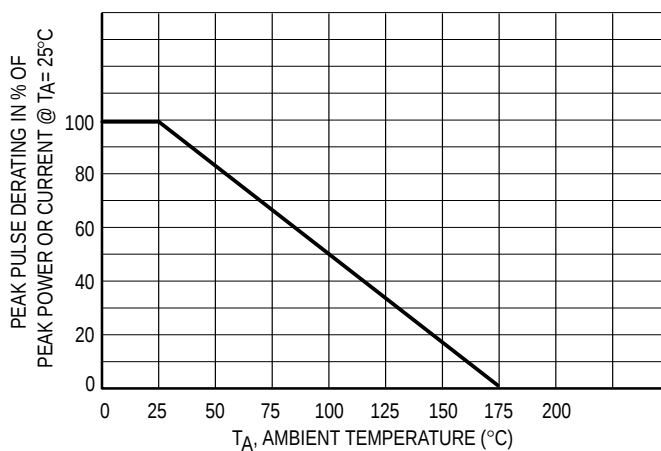


Figure 2. Pulse Derating Curve

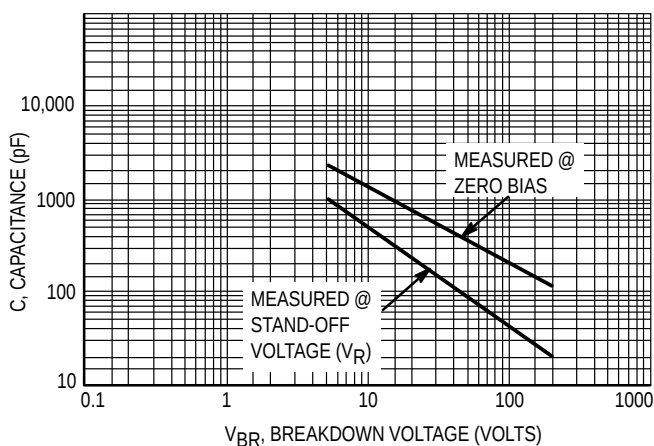


Figure 3. Capacitance versus Breakdown Voltage

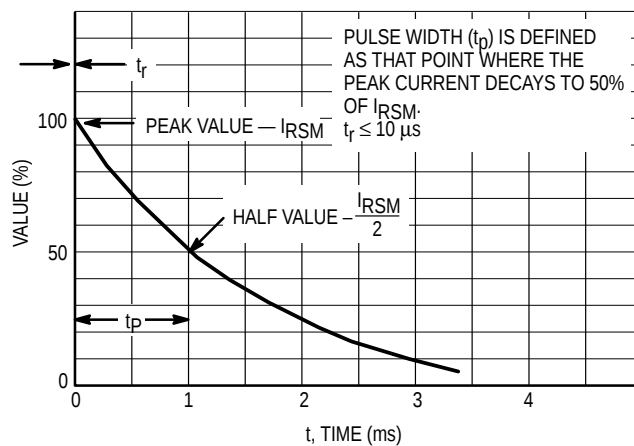


Figure 4. Pulse Waveform

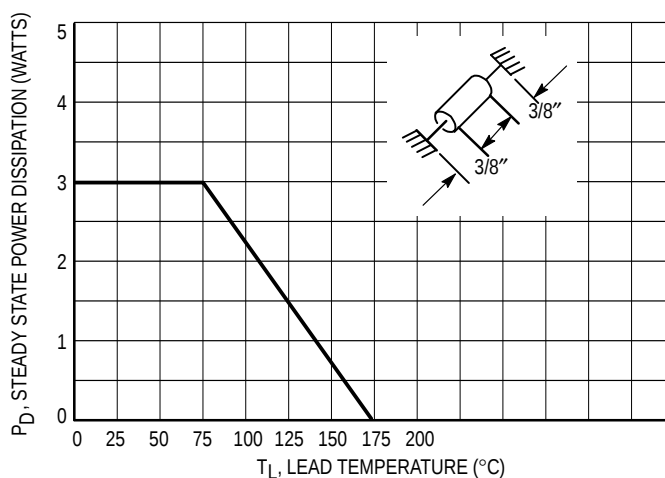
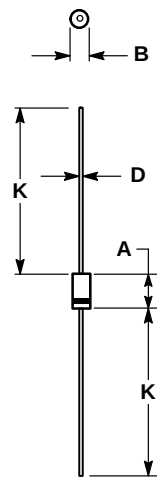


Figure 5. Steady State Power Derating

Devices listed in bold, italic are Motorola preferred devices.

Transient Voltage Suppressors — Axial Leaded

500 Watt Peak Power



- NOTES:
- 1. ALL RULES AND NOTES ASSOCIATED WITH JEDEC DO-41 OUTLINE SHALL APPLY.
 - 2. POLARITY DENOTED BY CATHODE BAND.
 - 3. LEAD DIAMETER NOT CONTROLLED WITHIN F DIMENSION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	5.97	6.60	0.235	0.260
B	2.79	3.05	0.110	0.120
D	0.76	0.86	0.030	0.034
K	27.94	—	1.100	—

CASE 59-04
PLASTIC

(Refer to Section 10 for Surface Mount, Thermal Data and Footprint Information.)

MULTIPLE PACKAGE QUANTITY (MPQ) REQUIREMENTS

Package Option	Type No. Suffix	MPQ (Units)
Tape and Reel	RL	5K

(Refer to Section 10 for more information on Packaging Specifications.)