

## 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  $\mu$ 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

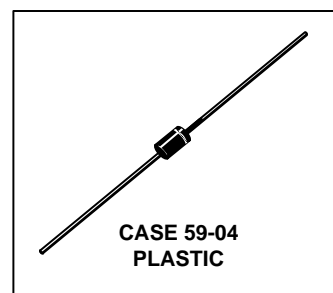
**MOUNTING POSITION:** Any

**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	Watts
		30	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 $^\circ\text{C}$

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.

Devices listed in bold, italic are Motorola preferred devices.

# SA5.0A through SA170A

**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 @ $V_{RWM}$ $I_R$ ( $\mu\text{A}$ )	Maximum Reverse Surge Current $I_{RSM}^\dagger$ (Amps)	Maximum Reverse Voltage @ $I_{RSM}$ (Clamping Voltage) $V_{RSM}$ (Volts)	Maximum Voltage Variation of $V_{BR}$ $\text{mV}/^\circ\text{C}$
	$V_{BR}^{\dagger\dagger}$ (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
SA9.0A	10	11.1	1	9	1	32.5	15.4	9
SA10A	11.1	12.3	1	10	1	29.4	17	10
<b>SA11A</b>	<b>12.2</b>	<b>13.5</b>	<b>1</b>	<b>11</b>	<b>1</b>	<b>27.4</b>	<b>18.2</b>	<b>11</b>
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
SA22A	24.4	26.9	1	22	1	14.1	35.5	25
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
SA54A	60	66.3	1	54	1	5.7	87.1	65
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
SA75A	83.3	92.1	1	75	1	4.1	121	91
SA78A	86.7	95.8	1	78	1	4	126	95
SA85A	94.4	104	1	85	1	3.6	137	103
<b>SA90A</b>	<b>100</b>	<b>111</b>	<b>1</b>	<b>90</b>	<b>1</b>	<b>3.4</b>	<b>146</b>	<b>110</b>
SA100A	111	123	1	100	1	3.1	162	123
SA110A	122	135	1	110	1	2.8	177	133
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 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  $25^\circ\text{C}$ .

**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

# SA5.0A through SA170A

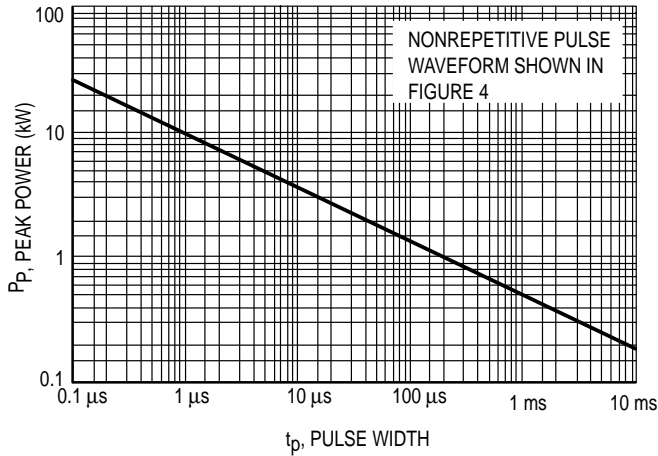


Figure 1. Pulse Rating Curve

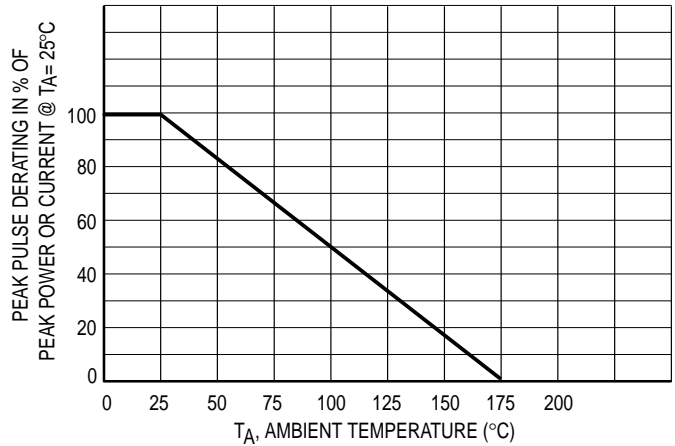


Figure 2. Pulse Derating Curve

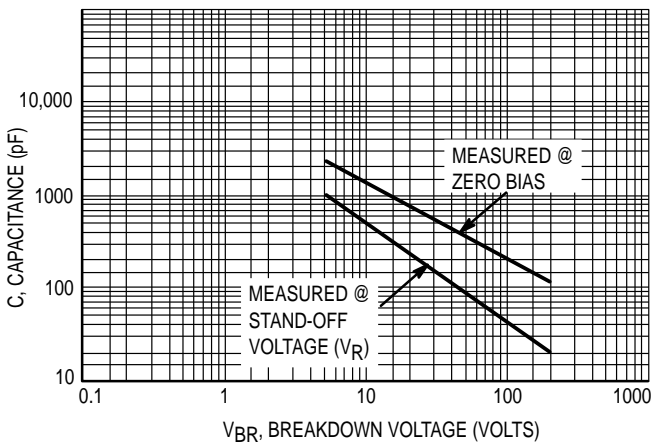


Figure 3. Capacitance versus Breakdown Voltage

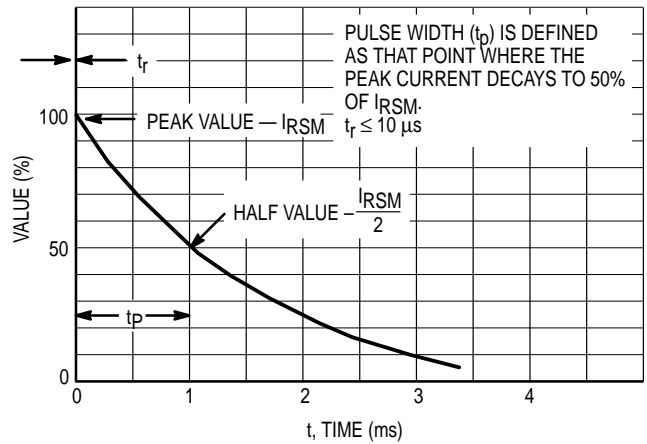


Figure 4. Pulse Waveform

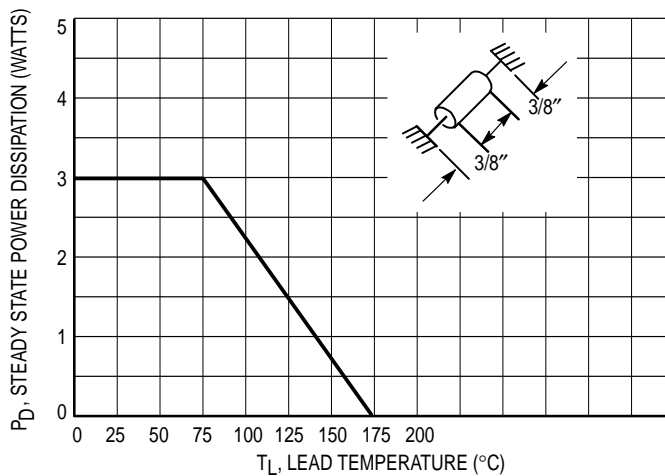


Figure 5. Steady State Power Derating

Devices listed in bold, italic are Motorola preferred devices.