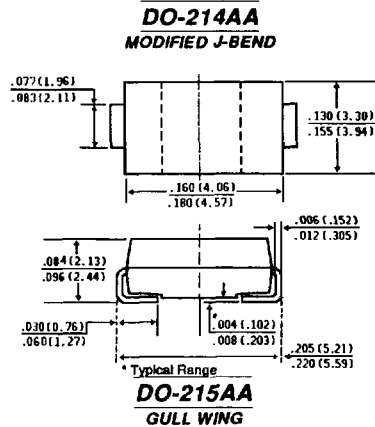


# SMBG AND SMBJ 5.0 THRU 170C,CA SERIES

**BIDIRECTIONAL SURFACE MOUNT TRANSIENT VOLTAGESUPPRESSOR**  
**VOLTAGE - 5.0 - 170 Volts Peak Pulse Power - 600 Watts**

## FEATURES

- ◆ For surface mounted applications in order to optimize board space
- ◆ Low profile package
- ◆ Built-in strain relief
- ◆ Glass passivated junction
- ◆ Low inductance
- ◆ Excellent clamping capability
- ◆ Repetition Rate (duty cycle): 0.01%
- ◆ Fast response time: typically less than 5.0ns from 0 volts to BV for bidirectional types
- ◆ Typical  $I_D$  less than  $1\mu A$  above 10V
- ◆ High temperature soldering: 250°C/10 seconds at terminals
- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0



Dimensions in inches and (millimeters)

## MECHANICAL DATA

**Case:** JEDEC DO214 / DO215 molded plastic over passivated junction

**Terminals:** Solder plated solderable per MIL-STD-750, Method 2026

**Standard Packaging:** 12mm tape (EIA STD RS-481)

**Weight:** 0.003 ounces, 0.093 gram



Schematic Symbol

## MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Electrical characteristics apply in both directions  
 Ratings at 25°C ambient temperature unless otherwise specified.

	SYMBOLS	VALUE	UNITS
Peak Pulse Power Dissipation on 10/1000ms waveform (Notes 1, 2, Fig. 1)	PPPM	Minimum 600	Watts
Peak Pulse Current on 10/1000ms waveform (Note 1, Fig. 3)	IPPM	See Table 1	Amps
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  $T_A=25^\circ C$  per Fig. 2.
2. Mounted on  $5.0mm^2$  (.013mm thick) land areas.
3. Measured on 8.3ms single half sine-wave or equivalent squarewave, duty cycle 4 pulses per minute maximum.

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

Out/Wing Lead	Modified "I" Band Lead	Device Marking Code	Breakdown Voltage $V_{BR}$ (Volts) (NOTE 1) Min / Max	Reverse Stand-off Voltage $V_{RSM}$ (Volts) at $I_R$ (mA)	Reverse Stand-off Voltage $V_{RSM}$ (Volts)	Maximum Reverse Leakage at $V_{RSM}$ (nA)	Maximum Peak Pulse Surge Current IPPM (NOTE 2) (Amps)	Maximum Clamping Voltage at IPPM $V_C$ (Volts)
SMBG5.0C	SMBJ5.0C	KD	6.40 / 7.55	10	5.0	1600.0	62.5	8.6
SMBG5.0CA	SMBJ5.0CA	KE	6.40 / 7.25	10	5.0	1600.0	65.2	9.2
SMBG6.0C	SMBJ6.0C	KF	6.67 / 8.45	10	6.0	1600.0	52.6	11.4
SMBG6.0CA	SMBJ6.0CA	KG	6.67 / 7.87	10	6.0	1600.0	58.3	10.3
SMBG6.5C	SMBJ6.5C	AH	7.22 / 9.14	10	6.5	1000.0	48.7	12.3
SMBG6.5CA	SMBJ6.5CA	AK	7.22 / 8.30	10	6.5	1000.0	53.6	11.2
SMBG7.0C	SMBJ7.0C	KL	7.78 / 9.86	10	7.0	400.0	45.1	13.3
SMBG7.0CA	SMBJ7.0CA	KM	7.78 / 8.95	10	7.0	400.0	50.0	12.0
SMBG7.5C	SMBJ7.5C	AN	8.33 / 10.67	1.0	7.5	200.0	42.0	14.3
SMBG7.5CA	SMBJ7.5CA	AP	8.33 / 9.58	1.0	7.5	200.0	48.5	12.9
SMBG8.0C	SMBJ8.0C	AQ	8.89 / 11.3	1.0	8.0	100.0	40.0	15.0
SMBG8.0CA	SMBJ8.0CA	AR	8.89 / 10.23	1.0	8.0	100.0	44.1	13.6
SMBG8.5C	SMBJ8.5C	AS	9.44 / 11.92	1.0	8.5	20.0	37.7	15.9
SMBG8.5CA	SMBJ8.5CA	AT	9.44 / 10.82	1.0	8.5	20.0	41.7	14.4
SMBG9.0C	SMBJ9.0C	AU	10.0 / 12.6	1.0	9.0	10.0	35.5	16.9
SMBJ9.0CA	SMBJ9.0CA	AV	10.0 / 11.5	1.0	9.0	10.0	39.0	15.4
SMBG10C	SMBJ10C	AW	11.1 / 14.1	1.0	10	5.0	31.9	18.8
SMBG10CA	SMBJ10CA	AX	11.1 / 12.8	1.0	10	5.0	35.3	17.0
SMBG11C	SMBJ11C	KY	12.2 / 15.4	1.0	11	5.0	29.9	20.1
SMBG11CA	SMBJ11CA	KZ	12.2 / 14.0	1.0	11	5.0	33.0	18.2
SMBG12C	SMBJ12C	BD	13.3 / 16.9	1.0	12	5.0	27.3	22.0
SMBG12CA	SMBJ12CA	BE	13.3 / 15.3	1.0	12	5.0	30.2	19.9
SMBG13C	SMBJ13C	LF	14.4 / 18.2	1.0	13	5.0	25.2	23.8
SMBG13CA	SMBJ13CA	LG	14.4 / 16.5	1.0	13	5.0	27.9	21.5
SMBG14C	SMBJ14C	BH	15.6 / 19.8	1.0	14	5.0	23.3	25.8
SMBG14CA	SMBJ14CA	BK	15.6 / 17.9	1.0	14	5.0	25.8	23.2
SMBG15C	SMBJ15C	BL	16.7 / 21.1	1.0	15	5.0	22.3	26.9
SMBG15CA	SMBJ15CA	BM	16.7 / 19.2	1.0	15	5.0	24.0	24.4
SMBG16C	SMBJ16C	LN	17.8 / 22.6	1.0	16	5.0	20.8	28.8
SMBG16CA	SMBJ16CA	LM	17.8 / 20.5	1.0	16	5.0	23.1	26.0
SMBG17C	SMBJ17C	LQ	18.9 / 23.9	1.0	17	5.0	19.7	30.5
SMBG17CA	SMBJ17CA	LR	18.9 / 21.7	1.0	17	5.0	21.7	27.6
SMBG18C	SMBJ18C	BS	20.0 / 25.3	1.0	18	5.0	18.6	32.2
SMBG18CA	SMBJ18CA	BT	20.0 / 23.3	1.0	18	5.0	20.5	29.2
SMBG20C	SMBJ20C	LU	22.2 / 28.1	1.0	20	5.0	16.7	35.8
SMBG20CA	SMBJ20CA	LV	22.2 / 25.5	1.0	20	5.0	18.5	32.4
SMBG22C	SMBJ22C	BW	24.4 / 30.9	1.0	22	5.0	15.2	39.4
SMBG22CA	SMBJ22CA	BX	24.4 / 28.0	1.0	22	5.0	16.9	35.5
SMBG24C	SMBJ24C	BY	26.7 / 33.8	1.0	24	5.0	14.0	43.0
SMBG24CA	SMBJ24CA	BZ	26.7 / 30.7	1.0	24	5.0	15.4	38.9
SMBG26C	SMBJ26C	CD	28.9 / 36.6	1.0	26	5.0	12.4	46.6
SMBG26CA	SMBJ26CA	CE	28.9 / 33.2	1.0	26	5.0	14.2	42.1
SMBG28C	SMBJ28C	MF	31.1 / 39.4	1.0	28	5.0	12.0	50.0
SMBG28CA	SMBJ28CA	MG	31.1 / 35.8	1.0	28	5.0	13.2	45.4
SMBG30C	SMBJ30C	CH	33.3 / 42.2	1.0	30	5.0	11.2	53.5
SMBG30CA	SMBJ30CA	CK	33.1 / 38.3	1.0	30	5.0	12.4	46.6
SMBG33C	SMBJ33C	CL	36.7 / 46.5	1.0	33	5.0	10.2	59.0
SMBG33CA	SMBJ33CA	CM	36.7 / 42.2	1.0	33	5.0	11.3	53.3
SMBG36C	SMBJ36C	CN	40.0 / 50.7	1.0	36	5.0	9.3	64.3
SMBG36CA	SMBJ36CA	CP	40.0 / 46.0	1.0	36	5.0	10.3	58.1
SMBG40C	SMBJ40C	CQ	44.4 / 56.3	1.0	40	5.0	8.4	71.4
SMBG40CA	SMBJ40CA	CR	44.4 / 51.1	1.0	40	5.0	9.3	64.5
SMBG43C	SMBJ43C	CS	47.8 / 60.5	1.0	43	5.0	7.8	76.7
SMBG43CA	SMBJ43CA	C T	47.8 / 54.9	1.0	43	5.0	8.6	69.4
SMBG45C	SMBJ45C	MU	50.0 / 63.3	1.0	45	5.0	7.5	80.3
SMBG45CA	SMBJ45CA	MV	50.0 / 57.5	1.0	45	5.0	8.3	72.7
SMBG48C	SMBJ48C	MW	53.3 / 67.5	1.0	48	5.0	7.0	85.5
SMBG48CA	SMBJ48CA	MX	53.3 / 61.3	1.0	48	5.0	7.7	77.4
SMBG51C	SMBJ51C	MY	56.7 / 71.8	1.0	51	5.0	6.6	91.1
SMBG51CA	SMBJ51CA	MZ	56.7 / 65.2	1.0	51	5.0	7.3	82.4
SMBG54C	SMBJ54C	ND	60.0 / 76.0	1.0	54	5.0	6.2	96.3
SMBG54CA	SMBJ54CA	NE	60.0 / 69.0	1.0	54	5.0	6.9	87.1

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

Gull-Wing Lead	Modified "J" Bend Lead	Device Marking Code	Breakdown Voltage	at $I_T$ mA	Reverse Stand-off Voltage $V_{WM}$ (Volts)	Maximum Reverse Leakage at $V_{WM}$	Maximum Peak Pulse Surge Current (ppm) (NOTE 2) (Amps)	Maximum Clamping Voltage at IPPM $V_C$ (Volts)
			$V_{BR}$ Volts (NOTE 1) Min. / Max.			at $I_T$ mA		
SMBG58C	SMBJ58C	NF	64.4 / 81.6	1.0	58	5.0	5.8	103.0
SMBG58CA	SMBJ58CA	NG	64.4 / 74.1	1.0	58	5.0	6.4	93.6
SMBG60C	SMBJ60C	NH	66.7 / 84.5	1.0	60	5.0	5.6	107.0
SMBG60CA	SMBJ60CA	NK	66.7 / 76.7	1.0	60	5.0	6.2	96.8
SMBG64C	SMBJ64C	NL	71.1 / 90.1	1.0	64	5.0	5.3	114.0
SMBG64CA	SMBJ64CA	NM	71.1 / 81.8	1.0	64	5.0	5.8	103.0
SMBG70C	SMBJ70C	NN	77.8 / 98.6	1.0	70	5.0	4.8	125
SMBG70CA	SMBJ70CA	NP	77.8 / 89.5	1.0	70	5.0	5.3	113
SMBG75C	SMBJ75C	NO	83.3 / 105.7	1.0	75	5.0	4.5	134
SMBG75CA	SMBJ75CA	NR	83.3 / 95.8	1.0	75	5.0	4.9	121
SMBG78C	SMBJ78C	NS	86.7 / 109.8	1.0	78	5.0	4.3	139
SMBG78CA	SMBJ78CA	NT	86.7 / 99.7	1.0	78	5.0	4.7	126
SMBG85C	SMBJ85C	NU	94.4 / 119.2	1.0	85	5.0	3.9	151
SMBG85CA	SMBJ85CA	NV	94.4 / 108.2	1.0	85	5.0	4.4	137
SMBG90C	SMBJ90C	NW	100 / 126.5	1.0	90	5.0	3.8	160
SMBG90CA	SMBJ90CA	NX	100 / 115.5	1.0	90	5.0	4.1	148
SMBG100C	SMBJ100C	NY	111 / 141.0	1.0	100	5.0	3.4	179
SMBG100CA	SMBJ100CA	NZ	111 / 128.0	1.0	100	5.0	3.7	162
SMBG110C	SMBJ110C	PD	122 / 154.5	1.0	110	5.0	3.0	196
SMBG110CA	SMBJ110CA	PE	122 / 140.5	1.0	110	5.0	3.4	177
SMBG120C	SMBJ120C	PF	133 / 169.0	1.0	120	5.0	2.8	214
SMBG120CA	SMBJ120CA	PG	133 / 153.0	1.0	120	5.0	3.1	193
SMBG130C	SMBJ130C	PH	144 / 182.5	1.0	130	5.0	2.6	231
SMBG130CA	SMBJ130CA	PK	144 / 165.5	1.0	130	5.0	2.9	209
SMBG150C	SMBJ150C	PL	167 / 211.5	1.0	150	5.0	2.2	268
SMBG150CA	SMBJ150CA	PM	167 / 192.5	1.0	150	5.0	2.5	243
SMBG160C	SMBJ160C	PN	178 / 228.0	1.0	160	5.0	2.1	287
SMBG160CA	SMBJ160CA	PP	178 / 205.0	1.0	160	5.0	2.3	259
SMBG170C	SMBJ170C	PQ	189 / 239.5	1.0	170	5.0	2.0	304
SMBG170CA	SMBJ170CA	PR	189 / 217.5	1.0	170	5.0	2.2	275

**NOTES:**

- $V_{BR}$  measured after  $I_T$  applied for 300 $\mu$ s  $I_T$  = Square Wave Pulse or equivalent.
- Surge Current Waveform per Figure 3 and Derate per Figure 2.
- A TransZorb TVS is normally selected according to the reverse "Stand Off Voltage" ( $V_{WM}$ ) which should be equal to or greater than the DC or continuous peak operating voltage level.
- All terms and symbols are consistent with ANSI / IEEE C62.35 specifications.

**APPLICATION NOTES**

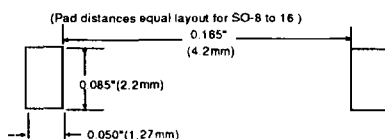
These surface mountable packages are designed specifically for transient voltage suppression. The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground. These high speed transient voltage suppressors can be used to effectively protect sensitive components such as integrated circuits and MOS devices.

A 600W (SMB) 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. System impedance at component level in a system is usually high enough to limit the current to within the peak pulse current (Ipp) rating of this series. In an overstress condition, the failure mode is a short circuit.

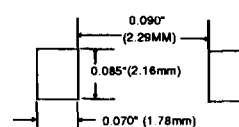
**RECOMMENDED PAD SIZES**

The pad dimensions should be 0.010" (.25mm) longer than the contact size, in the lead axis. This allows a solder fillet to form, see figure below. Contact factory for soldering methods.

**GULL-WING**

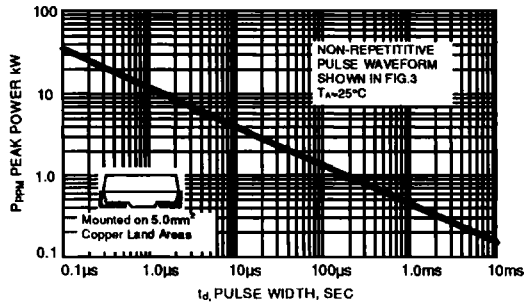


**MODIFIED J-BEND**

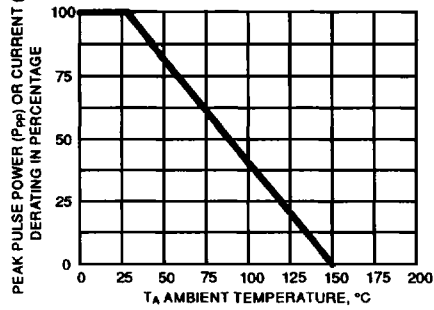


# MAXIMUM RATINGS AND CHARACTERISTIC CURVES SMBG AND SMBJ SERIES

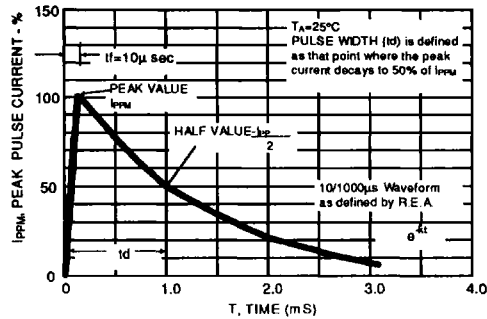
**FIG. 1 - PEAK PULSE POWER RATING CURVE**



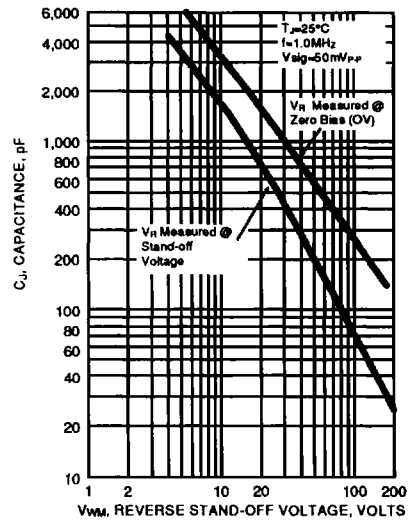
**FIG. 2 - PULSE RATING CURVE**



**FIG. 3 - PULSE WAVEFORM**



**FIG. 4 - TYPICAL JUNCTION CAPACITANCE**



**FIG. 5 - MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT**

