

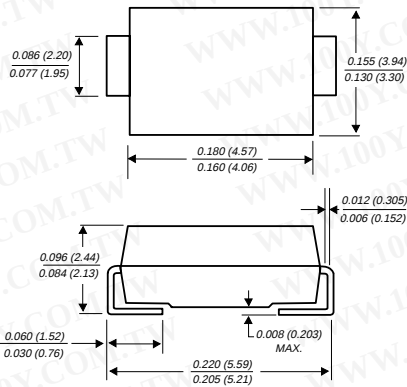
SMBG AND SMBJ5.0 THRU 170CA

SURFACE MOUNT TRANSZORB™ TRANSIENT VOLTAGE SUPPRESSOR

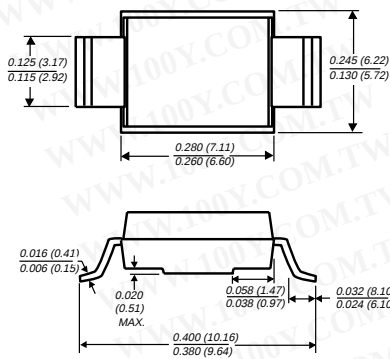
Stand-off Voltage - 5.0 to 170 Volts

Peak Pulse Power - 600 Watts

DO-214AA
MODIFIED J-BEND



DO-215AA
GULL WING



Dimensions in inches and (millimeters)

FEATURES

- ◆ Plastic package has Underwriters Laboratory Flammability Classification 94V-0
- ◆ For surface mounted applications in order to optimize board space
- ◆ Low profile package
- ◆ Built-in strain relief
- ◆ Glass passivated junction
- ◆ Low incremental surge resistance
- ◆ 600W peak pulse power capability with a 10/1000μs waveform, repetition rate (duty cycle): 0.01%
- ◆ Excellent clamping capability
- ◆ Fast response time: typically less than 1.0ps from 0 volts to V_{BR} for unidirectional and 5.0ns for bidirectional types
- ◆ For devices with $V_{BR} \geq 10V$, I_D are typically less than 1.0μA
- ◆ High temperature soldering guaranteed: 250°C/10 seconds at terminals



MECHANICAL DATA

Case: JEDEC DO214AA / DO215AA molded plastic body over passivated junction

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

Polarity: For unidirectional types the color band denotes the cathode, which is positive with respect to the anode under normal TVS operation

Mounting Position: Any

Weight: 0.003 ounces, 0.093 gram

DEVICES FOR BIDIRECTIONAL APPLICATIONS

For bidirectional use suffix C or CA for types SMB-5.0 thru SMB-170 (eg. SMBG5.0C, SMBJ170CA).

Electrical characteristics apply in both directions

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

	SYMBOLS	VALUE	UNITS
Peak pulse power dissipation with a 10/1000μs waveform (NOTES 1, 2, FIG. 1)	P _{PPM}	Minimum 600	Watts
Peak pulse current with a 10/1000μs waveform (NOTE 1)	I _{PPM}	SEE TABLE 1	Amps
Peak forward surge current 8.3ms single half sine-wave superimposed on rated load (JEDEC Method) (NOTES 2, 3) - unidirectional only	I _{FSM}	100.0	Amps
Maximum instantaneous forward voltage at 50A (NOTE 3) unidirectional only	V _F	3.5	Volts
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 $T_A=25^\circ\text{C}$ per Fig. 2
- (2) Mounted on 0.2 x 0.2" (5.0 x 5.0mm) copper pads to each terminal
- (3) Measured on 8.3ms single half sine-wave. For uni-directional devices only.

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GENERAL
SEMICONDUCTOR®

ELECTRICAL CHARACTERISTICS (T_A=25°C unless otherwise noted) TABLE 1

Device Type Gull Wing Lead	Device Type Modified "J" Bend Lead	Device Marking Code	UNI	BI	Breakdown Voltage V _(BR) (Volts) (NOTE 1) (MIN / MAX)	Test Current at I _T (mA)	Stand-off Voltage V _{WM} (Volts)	Maximum Reverse Leakage I _D at V _{WM} (μA) (NOTE 3)	Maximum Peak Pulse Surge Current I _{PPM} (NOTE 2) (Amps)	Maximum Clamping Voltage at I _{PPM} V _C (Volts)
SMBG5.0	SMBJ5.0	KD	KD		6.40 / 7.82	10	5.0	800	62.5	9.6
SMBG5.0A	SMBJ5.0A	KE	KE		6.40 / 7.07	10	5.0	800	65.2	9.2
SMBG6.0	SMBJ6.0	KF	KF		6.67 / 8.15	10	6.0	800	52.6	11.4
SMBG6.0A	SMBJ6.0A	KG	KG		6.67 / 7.37	10	6.0	800	58.3	10.3
SMBG6.5	SMBJ6.5	KH	AH		7.22 / 8.82	10	6.5	500	48.8	12.3
SMBG6.5A	SMBJ6.5A	KK	AK		7.22 / 7.98	10	6.5	500	53.6	11.2
SMBG7.0	SMBJ7.0	KL	KL		7.78 / 9.51	10	7.0	200	45.1	13.3
SMBG7.0A	SMBJ7.0A	KM	KM		7.78 / 8.60	10	7.0	200	50.0	12.0
SMBG7.5	SMBJ7.5	KN	AN		8.33 / 10.2	1.0	7.5	100	42.0	14.3
SMBG7.5A	SMBJ7.5A	KP	AP		8.33 / 9.21	1.0	7.5	100	46.5	12.9
SMBG8.0	SMBJ8.0	KQ	AQ		8.89 / 10.9	1.0	8.0	50	40.0	15.0
SMBG8.0A	SMBJ8.0A	KR	AR		8.89 / 9.83	1.0	8.0	50	44.1	13.6
SMBG8.5	SMBJ8.5	KS	AS		9.44 / 11.5	1.0	8.5	20	37.7	15.9
SMBG8.5A	SMBJ8.5A	KT	AT		9.44 / 10.4	1.0	8.5	20	41.7	14.4
SMBG9.0	SMBJ9.0	KU	AU		10.0 / 12.2	1.0	9.0	10	35.5	16.9
SMBG9.0A	SMBJ9.0A	KV	AV		10.0 / 11.1	1.0	9.0	10	39.0	15.4
SMBG10	SMBJ10	KW	AW		11.1 / 13.6	1.0	10	5.0	31.9	18.8
SMBG10A	SMBJ10A	KX	AX		11.1 / 12.3	1.0	10	5.0	35.3	17.0
SMBG11	SMBJ11	KY	KY		12.2 / 14.9	1.0	11	5.0	29.9	20.1
SMBG11A	SMBJ11A	KZ	KZ		12.2 / 13.5	1.0	11	5.0	33.0	18.2
SMBG12	SMBJ12	LD	BD		13.3 / 16.3	1.0	12	5.0	27.3	22.0
SMBG12A	SMBJ12A	LE	BE		13.3 / 14.7	1.0	12	5.0	30.2	19.9
SMBG13	SMBJ13	LF	LF		14.4 / 17.6	1.0	13	5.0	25.2	23.8
SMBG13A	SMBJ13A	LG	LG		14.4 / 15.9	1.0	13	5.0	27.9	21.5
SMBG14	SMBJ14	LH	BH		15.6 / 19.1	1.0	14	5.0	23.3	25.8
SMBG14A	SMBJ14A	LK	BK		15.6 / 17.2	1.0	14	5.0	25.9	23.2
SMBG15	SMBJ15	LL	BL		16.7 / 20.4	1.0	15	5.0	22.3	26.9
SMBG15A	SMBJ15A	LM	BM		16.7 / 18.5	1.0	15	5.0	24.6	24.4
SMBG16	SMBJ16	LN	LN		17.8 / 21.8	1.0	16	5.0	20.8	28.8
SMBG16A	SMBJ16A	LP	LM		17.8 / 19.7	1.0	16	5.0	23.1	26.0
SMBG17	SMBJ17	LQ	LQ		18.9 / 23.1	1.0	17	5.0	19.7	30.5
SMBG17A	SMBJ17A	LR	LR		18.9 / 20.9	1.0	17	5.0	21.7	27.6
SMBG18	SMBJ18	LS	BS		20.0 / 24.4	1.0	18	5.0	18.6	32.2
SMBG18A	SMBJ18A	LT	BT		20.0 / 22.1	1.0	18	5.0	20.5	29.2
SMBG20	SMBJ20	LU	LU		22.2 / 27.1	1.0	20	5.0	16.8	35.8
SMBG20A	SMBJ20A	LV	LV		22.2 / 24.5	1.0	20	5.0	18.5	32.4
SMBG22	SMBJ22	LW	BW		24.4 / 29.8	1.0	22	5.0	15.2	39.4
SMBG22A	SMBJ22A	LX	BX		24.4 / 26.9	1.0	22	5.0	16.9	35.5
SMBG24	SMBJ24	LY	BY		26.7 / 32.6	1.0	24	5.0	14.0	43.0
SMBG24A	SMBJ24A	LZ	BZ		26.7 / 29.5	1.0	24	5.0	15.4	38.9
SMBG26	SMBJ26	MD	CD		28.9 / 35.3	1.0	26	5.0	12.9	46.6
SMBG26A	SMBJ26A	ME	CE		28.9 / 31.9	1.0	26	5.0	14.3	42.1
SMBG28	SMBJ28	MF	MF		31.1 / 38.0	1.0	28	5.0	12.0	50.0
SMBG28A	SMBJ28A	MG	MG		31.1 / 34.4	1.0	28	5.0	13.2	45.4
SMBG30	SMBJ30	MH	CH		33.3 / 40.7	1.0	30	5.0	11.2	53.5
SMBG30A	SMBJ30A	MK	CK		33.3 / 36.8	1.0	30	5.0	12.4	48.4
SMBG33	SMBJ33	ML	CL		36.7 / 44.9	1.0	33	5.0	10.2	59.0
SMBG33A	SMBJ33A	MM	CM		36.7 / 40.6	1.0	33	5.0	11.3	53.3
SMBG36	SMBJ36	MN	CN		40.0 / 48.9	1.0	36	5.0	9.3	64.3
SMBG36A	SMBJ36A	MP	CP		40.0 / 44.2	1.0	36	5.0	10.3	58.1
SMBG40	SMBJ40	MQ	CQ		44.4 / 54.3	1.0	40	5.0	8.4	71.4
SMBG40A	SMBJ40A	MR	CR		44.4 / 49.1	1.0	40	5.0	9.3	64.5
SMBG43	SMBJ43	MS	CS		47.8 / 58.4	1.0	43	5.0	7.8	76.7
SMBG43A	SMBJ43A	MT	CT		47.8 / 52.8	1.0	43	5.0	8.6	69.4
SMBG45	SMBJ45	MU	MU		50.0 / 61.1	1.0	45	5.0	7.5	80.3
SMBG45A	SMBJ45A	MV	MV		50.0 / 55.3	1.0	45	5.0	8.3	72.7
SMBG48	SMBJ48	MW	MW		53.3 / 65.1	1.0	48	5.0	7.0	85.5
SMBG48A	SMBJ48A	MX	MX		53.3 / 58.9	1.0	48	5.0	7.8	77.4
SMBG51	SMBJ51	MY	MY		56.7 / 69.3	1.0	51	5.0	6.6	91.1
SMBG51A	SMBJ51A	MZ	MZ		56.7 / 62.7	1.0	51	5.0	7.3	82.4

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) TABLE 1 (Cont'd)

Device Type Gull Wing Lead	Device Type Modified "J" Bend Lead	Device Marking Code	Breakdown Voltage V _(BR) (Volts) (NOTE 1) (Min /Max)	Test Current at I _T (mA)	Stand-off Voltage V _{WM} (Volts)	Maximum Reverse Leakage I _D at V _{WM} (μA)(NOTE 3)	Maximum Peak Pulse Surge Current I _{PPM} (NOTE 2) (Amps)	Maximum Clamping Voltage at I _{PPM} V _C (Volts)
SMBG54	SMBJ54	ND ND	60.0 / 73.3	1.0	54	5.0	6.2	96.3
SMBG54A	SMBJ54A	NE NE	60.0 / 66.3	1.0	54	5.0	6.9	87.1
SMBG58	SMBJ58	NF NF	64.4 / 78.7	1.0	58	5.0	5.8	103
SMBG58A	SMBJ58A	NG NG	64.4 / 71.2	1.0	58	5.0	6.4	93.6
SMBG60	SMBJ60	NH NH	66.7 / 81.5	1.0	60	5.0	5.6	107
SMBG60A	SMBJ60A	NK NK	66.7 / 73.7	1.0	60	5.0	6.2	96.8
SMBG64	SMBJ64	NL NL	71.1 / 86.9	1.0	64	5.0	5.3	114
SMBG64A	SMBJ64A	NM NM	71.1 / 78.6	1.0	64	5.0	5.8	103
SMBG70	SMBJ70	NN NN	77.8 / 95.1	1.0	70	5.0	4.8	125
SMBG70A	SMBJ70A	NP NP	77.8 / 86.0	1.0	70	5.0	5.3	113
SMBG75	SMBJ75	NQ NQ	83.3 / 102	1.0	75	5.0	4.5	134
SMBG75A	SMBJ75A	NR NR	83.3 / 92.1	1.0	75	5.0	5.0	121
SMBG78	SMBJ78	NS NS	86.7 / 106	1.0	78	5.0	4.3	139
SMBG78A	SMBJ78A	NT NT	86.7 / 95.8	1.0	78	5.0	4.8	126
SMBG85	SMBJ85	NU NU	94.4 / 115	1.0	85	5.0	4.0	151
SMBG85A	SMBJ85A	NV NV	94.4 / 104	1.0	85	5.0	4.4	137
SMBG90	SMBJ90	NW NW	100 / 122	1.0	90	5.0	3.8	160
SMBG90A	SMBJ90A	NX NX	100 / 111	1.0	90	6.0	4.1	146
SMBG100	SMBJ100	NY NY	111 / 136	1.0	100	5.0	3.4	179
SMBG100A	SMBJ100A	NZ NZ	111 / 123	1.0	100	5.0	3.7	162
SMBG110	SMBJ110	PD PD	122 / 149	1.0	110	5.0	3.1	196
SMBG110A	SMBJ110A	PE PE	122 / 135	1.0	110	5.0	3.4	177
SMBG120	SMBJ120	PF PF	133 / 163	1.0	120	5.0	2.8	214
SMBG120A	SMBJ120A	PG PG	133 / 147	1.0	120	5.0	3.1	193
SMBG130	SMBJ130	PH PH	144 / 176	1.0	130	5.0	2.6	231
SMBG130A	SMBJ130A	PK PK	144 / 159	1.0	130	5.0	2.9	209
SMBG150	SMBJ150	PL PL	167 / 204	1.0	150	5.0	2.2	268
SMBG150A	SMBJ150A	PM PM	167 / 185	1.0	150	5.0	2.5	243
SMBG160	SMBJ160	PN PN	178 / 218	1.0	160	5.0	2.1	287
SMBG160A	SMBJ160A	PP PP	178 / 197	1.0	160	5.0	2.3	259
SMBG170	SMBJ170	PQ PQ	189 / 231	1.0	170	5.0	2.0	304
SMBG170A	SMBJ170A	PR PR	189 / 209	1.0	170	5.0	2.2	275

NOTES:

- (1) V_(BR) measured after I_T applied for 300μs square wave pulse or equivalent
- (2) Surge current waveform per Fig. 3 and derate per Fig. 2
- (3) For bi-directional types having V_{WM} of 10 Volts and less, the I_D limit is doubled
- (4) For the bi-directional SMBG/SMBJ5.0CA, the maximum V_(BR) is 7.25 Volts
- (5) All terms and symbols are consistent with ANSI/IEEE C62.35

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APPLICATION NOTES

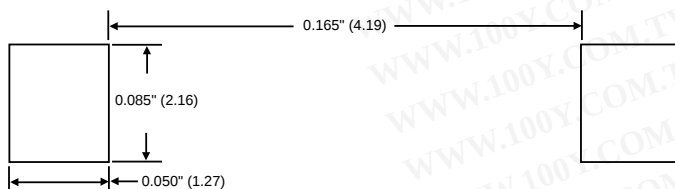
These surface mountable packages are designed specifically for transient voltage suppression. The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground. These high speed transient voltage suppressors can be used to effectively 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 (I_{PP}) rating of this series.

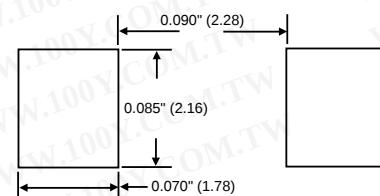
RECOMMENDED PAD SIZES

The pad dimensions should be 0.010" (0.25mm) longer than the contact size, in the lead axis.
This allows a solder fillet to form, see Fig. below. Contact factory for soldering methods.

GULL- WING



MODIFIED J-BEND



MAXIMUM RATINGS AND CHARACTERISTIC CURVES SMBG AND SMBJ5.0 THRU 170CA

FIG. 1 - PEAK PULSE POWER RATING CURVE

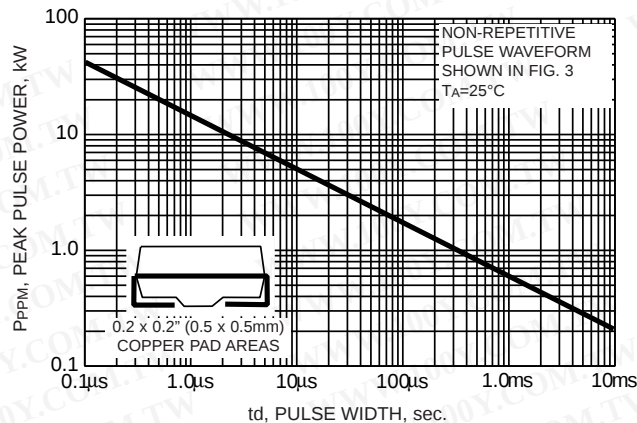


FIG. 2 - PULSE DERATING CURVE

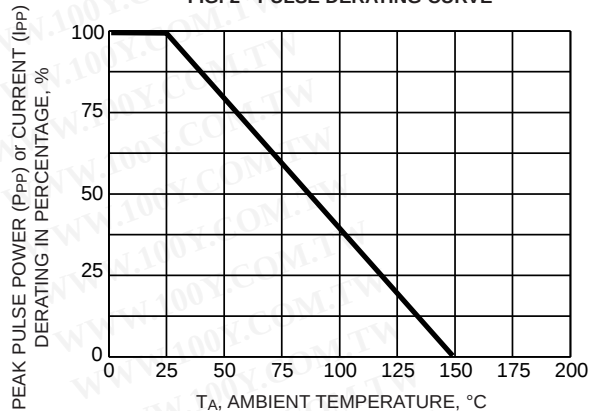


FIG. 3 - PULSE WAVEFORM

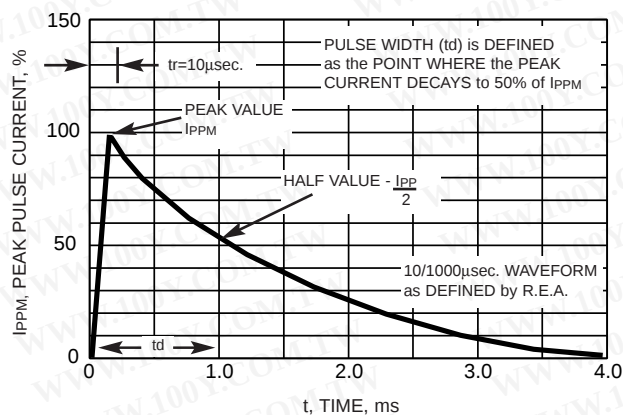


FIG. 4 - TYPICAL JUNCTION CAPACITANCE UNIDIRECTIONAL

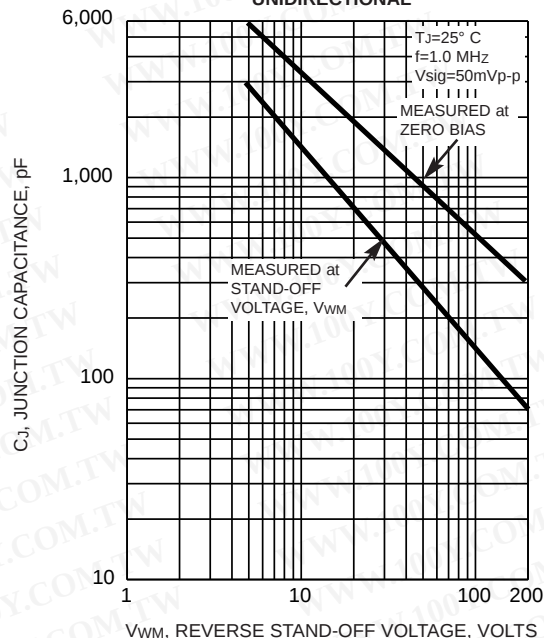


FIG. 5 - TYPICAL JUNCTION CAPACITANCE BIDIRECTIONAL

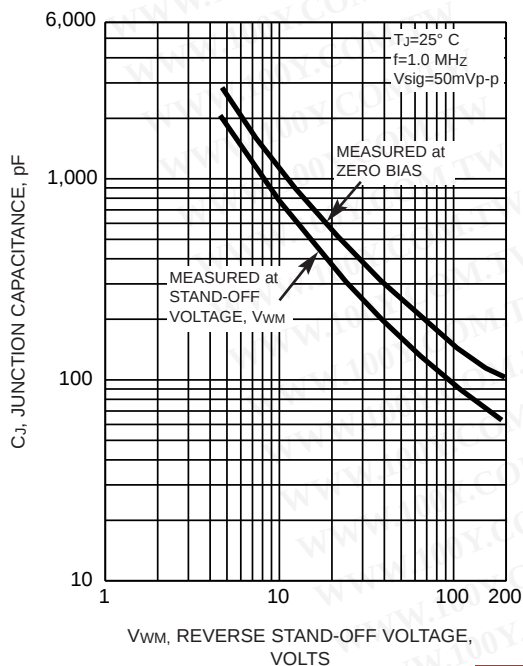


FIG. 6 - MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT

