

Website: <http://www.microsemi.com>

**SURFACE MOUNT 600 W  
 Transient Voltage Suppressor**

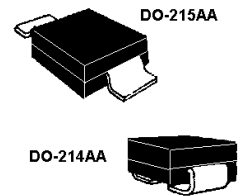
- High Reliability controlled devices
- Unidirectional (A) and Bidirectional (CA) construction
- Available in both J-bend and Gull-wing terminations
- Selections for 5.0 to 170 V standoff voltages ( $V_{WM}$ )

**DEVICES MSMBJ5.0A thru MSMBJ170CA, e3  
 and MSMBG5.0A thru MSMBG170CA, e3**

**LEVELS  
 M, MA, MX, MXL**

**FEATURES**

- High reliability controlled devices with wafer fabrication and assembly lot traceability
- 100 % surge tested devices
- Optional up screening available by replacing the M prefix with MA, MX or MXL. These prefixes specify various screening and conformance inspection options based on MIL-PRF-19500. Refer to [MicroNote 129](#) for more details on the screening options.
- Axial-leaded equivalent packages for through-hole mounting available as MP6KE6.8A to MP6KE200CA
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020B
- RoHS compliant devices available by adding an “e3” suffix
- $3\sigma$  lot norm screening performed on Standby Current  $I_D$



**APPLICATIONS / BENEFITS**

- Protects sensitive components such as IC's, CMOS, Bipolar, BiCMOS, ECL, DTL, T<sup>2</sup>L, etc.
- Protection from switching transients & induced RF
- Protection from ESD and EFT per IEC 61000-4-2 and IEC 61000-4-4
- Secondary lightning protection per IEC61000-4-5 with 42 Ohms source impedance:
  - Class 1: MSMB5.0A to MSMB120CA
  - Class 2: MSMB5.0A to MSMB60CA
  - Class 3: MSMB5.0A to MSMB30CA
  - Class 4: MSMB5.0A to MSMB15CA
- Secondary lightning protection per IEC61000-4-5 with 12 Ohms source impedance:
  - Class 1: MSMB5.0A to MSMB36CA
  - Class 2: MSMB5.0A to MSMB18CA

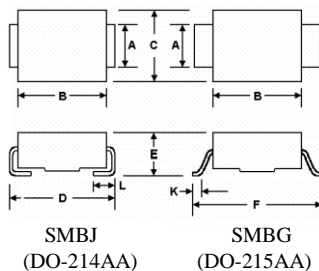
**MAXIMUM RATINGS**

- Peak Pulse Power dissipation at 25 °C: 600 watts at 10/1000  $\mu$ s (also see Figures 1, 2, and 3) with impulse repetition rate (duty factor) of 0.01 % or less
- $t_{clamping}$  (0 volts to  $V_{BR}$  min.): < 100 ps theoretical for unidirectional and < 5 ns for bidirectional
- Operating and Storage temperature: -65 °C to +150 °C
- Thermal resistance: 25 °C/W junction to lead, or 90 °C/W junction to ambient when mounted on FR4 PC board (1oz Cu) with recommended footprint (see page 2)
- Steady-State Power dissipation: 5 watts at  $T_L = 25$  °C, or 1.38 watts at  $T_A = 25$  °C when mounted on FR4 PC board with recommended footprint (see page 2)
- Forward Surge at 25 °C: 100 Amp peak impulse of 8.3 ms half-sine wave (unidirectional only)
- Solder temperatures: 260 °C for 10 s (maximum)

## MECHANICAL AND PACKAGING

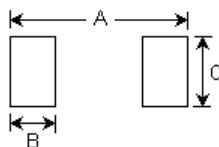
- Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- Gull-wing or J-bend tin-lead (90 % Sn, 10 % Pb) or RoHS (100 % Sn) compliant annealed matte-tin plating solderable per MIL-STD-750, method 2026
- Cathode indicated by band (No cathode band on bi-directional devices)
- Part number marked on package
- Available in bulk or custom tape-and-reel packaging
- TAPE-AND-REEL option available with up to 750 devices on 7 inch reel or up to 2500 devices on 13 inch reel per EIA-481-1-A with 12 mm tape. Add "TR" suffix to part number.
- Weight: 0.1 gram (approximately)

## PACKAGE DIMENSIONS



DIMENSIONS IN INCHES								
	A	B	C	D	E	F	K	L
MIN	.077	.160	.130	.205	.077	.235	.015	.030
MAX	.083	.180	.155	.220	.104	.255	.030	.060
DIMENSIONS IN MILLIMETERS								
MIN	1.96	4.06	3.30	5.21	1.95	5.97	.381	.760
MAX	2.10	4.57	3.94	5.59	2.65	6.48	.762	1.520

## PAD LAYOUT



SMBJ (DO-214AA)

	INCHES	mm
A	.260	6.60
B	.085	2.16
C	.110	2.79

SMBG (DO-215AA)

	INCHES	mm
A	.320	8.13
B	.085	2.16
C	.110	2.79

## SYMBOLS & DEFINITIONS

Symbol	Definition	Symbol	Definition
$V_{WM}$	Working Peak (Standoff) Voltage	$I_{PP}$	Peak Pulse Current
$P_{PP}$	Peak Pulse Power	$V_C$	Clamping Voltage
$V_{BR}$	Breakdown Voltage	$I_{BR}$	Breakdown Current for $V_{BR}$
$I_D$	Standby Current		

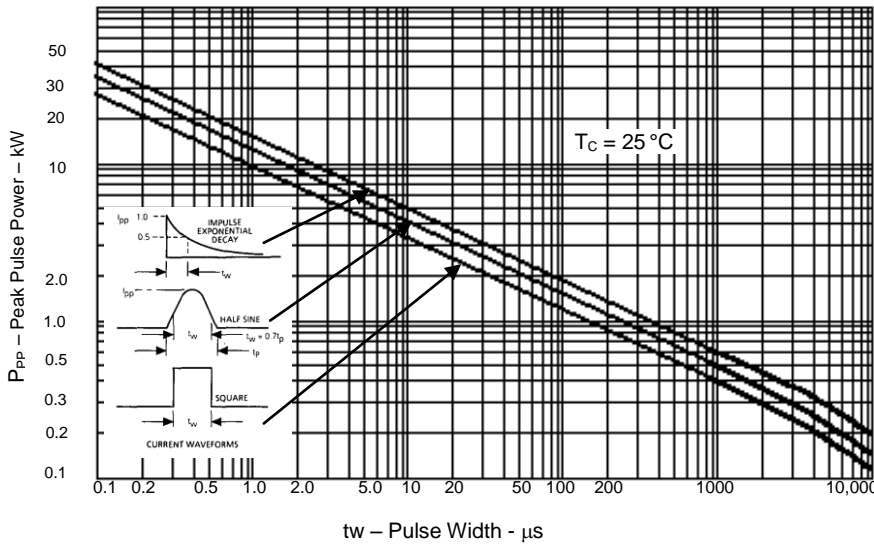
## ELECTRICAL CHARACTERISTICS @ 25°C

MICROSEMI PART NUMBER		REVERSE STAND-OFF VOLTAGE $V_{WM}$	BREAKDOWN VOLTAGE $V_{BR} @ I_{BR}$		MAXIMUM CLAMPING VOLTAGE $V_C @ I_{PP}$	PEAK PULSE CURRENT (see Fig. 2) $I_{PP}$	MAXIMUM STANDBY CURRENT $I_b @ V_{WM}$
GULL-WING	J-BEND	V	V	mA	V	A	$\mu A$
MSMBG5.0A	MSMBJ5.0A	5	6.40 – 7.00	10	9.2	65.2	800
MSMBG6.0A	MSMBJ6.0A	6	6.67 – 7.37	10	10.3	58.3	800
MSMBG6.5A	MSMBJ6.5A	6.5	7.22 – 7.98	10	11.2	53.6	500
MSMBG7.0A	MSMBJ7.0A	7	7.78 – 8.60	10	12	50	200
MSMBG7.5A	MSMBJ7.5A	7.5	8.33 – 9.21	1	12.9	46.5	100
MSMBG8.0A	MSMBJ8.0A	8	8.89 – 9.83	1	13.6	44.1	50
MSMBG8.5A	MSMBJ8.5A	8.5	9.44 – 10.4	1	14.4	41.7	10
MSMBG9.0A	MSMBJ9.0A	9	10.0 – 11.1	1	15.4	39	5
MSMBG10A	MSMBJ10A	10	11.1 – 12.3	1	17	35.3	5
MSMBG11A	MSMBJ11A	11	12.2 – 13.5	1	18.2	33	5
MSMBG12A	MSMBJ12A	12	13.3 – 14.7	1	19.9	30.2	5
MSMBG13A	MSMBJ13A	13	14.4 – 15.9	1	21.5	27.9	1
MSMBG14A	MSMBJ14A	14	15.6 – 17.2	1	23.2	25.8	1
MSMBG15A	MSMBJ15A	15	16.7 – 18.5	1	24.4	24	1
MSMBG16A	MSMBJ16A	16	17.8 – 19.7	1	26	23.1	1
MSMBG17A	MSMBJ17A	17	18.9 – 20.9	1	27.6	21.7	1
MSMBG18A	MSMBJ18A	18	20.0 – 22.1	1	29.2	20.5	1
MSMBG20A	MSMBJ20A	20	22.2 – 24.5	1	32.4	18.5	1
MSMBG22A	MSMBJ22A	22	24.4 – 26.9	1	35.5	16.9	1
MSMBG24A	MSMBJ24A	24	26.7 – 29.5	1	38.9	15.4	1
MSMBG26A	MSMBJ26A	26	28.9 – 31.9	1	42.1	14.2	1
MSMBG28A	MSMBJ28A	28	31.1 – 34.4	1	45.4	13.2	1
MSMBG30A	MSMBJ30A	30	33.3 – 36.8	1	48.4	12.4	1
MSMBG33A	MSMBJ33A	33	36.7 – 40.6	1	53.3	11.3	1
MSMBG36A	MSMBJ36A	36	40.0 – 44.2	1	58.1	10.3	1
MSMBG40A	MSMBJ40A	40	44.4 – 49.1	1	64.5	9.3	1
MSMBG43A	MSMBJ43A	43	47.8 – 52.8	1	69.4	8.6	1
MSMBG45A	MSMBJ45A	45	50.0 – 55.3	1	72.7	8.3	1
MSMBG48A	MSMBJ48A	48	53.3 – 58.9	1	77.4	7.7	1
MSMBG51A	MSMBJ51A	51	56.7 – 62.7	1	82.4	7.3	1
MSMBG54A	MSMBJ54A	54	60.0 – 66.3	1	87.1	6.9	1
MSMBG58A	MSMBJ58A	58	64.4 – 71.2	1	93.6	6.4	1
MSMBG60A	MSMBJ60A	60	66.7 – 73.7	1	96.8	6.2	1
MSMBG64A	MSMBJ64A	64	71.1 – 78.6	1	103	5.8	1
MSMBG70A	MSMBJ70A	70	77.8 – 86.0	1	113	5.3	1
MSMBG75A	MSMBJ75A	75	83.3 – 92.1	1	121	4.9	1
MSMBG78A	MSMBJ78A	78	86.7 – 95.8	1	126	4.7	1
MSMBG85A	MSMBJ85A	85	94.4 – 104	1	137	4.4	1
MSMBG90A	MSMBJ90A	90	100 – 111	1	146	4.1	1
MSMBG100A	MSMBJ100A	100	111 – 123	1	162	3.7	1
MSMBG110A	MSMBJ110A	110	122 – 135	1	177	3.4	1
MSMBG120A	MSMBJ120A	120	133 – 147	1	193	3.1	1
MSMBG130A	MSMBJ130A	130	144 – 159	1	209	2.9	1
MSMBG150A	MSMBJ150A	150	167 – 185	1	243	2.5	1
MSMBG160A	MSMBJ160A	160	178 – 197	1	259	2.3	1
MSMBG170A	MSMBJ170A	170	189 – 209	1	275	2.2	1

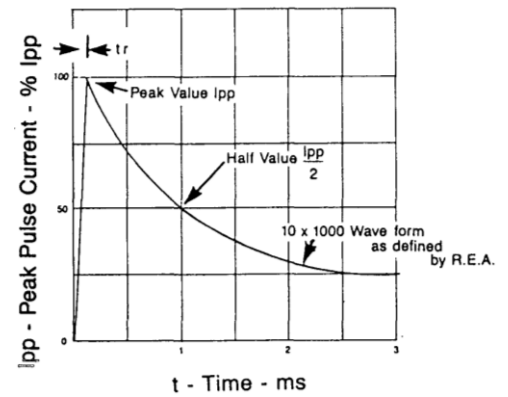
**NOTE 1:** For Bidirectional device types indicate CA suffix after the part number. (i.e. MSMBJ170CA). Bidirectional capacitance is half that shown in figure 4 at zero volts.

**NOTE 2:** Microsemi Corp's MSMB series (600 W) 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

## GRAPHS

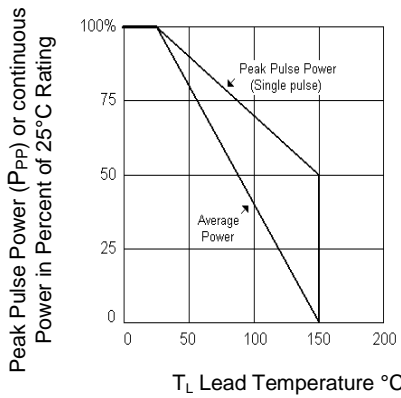


**FIGURE 1** Peak Pulse Power vs. Pulse Time

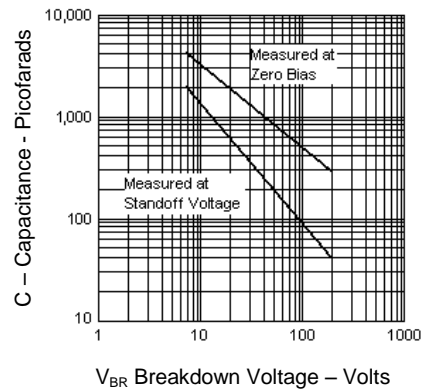


Test waveform parameters:  $t_r=10 \mu s$ ,  $t_w=1000 \mu s$

**FIGURE 2** Pulse Waveform for Exponential Surge



**FIGURE 3** Derating Curve



**FIGURE 4** Typical Capacitance vs Breakdown Voltage