

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

**SURFACE MOUNT 600 W  
 Transient Voltage Suppressor**

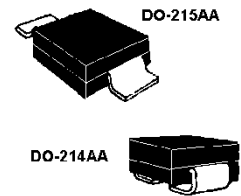
- High Reliability controlled devices
- Unidirectional (A) and Bidirectional (CA) construction
- Available in both J-bend and Gull-wing terminations
- Selections for 5.0 to 170 V standoff voltages ( $V_{WM}$ )

**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  $I_D$



Refer to table below  
 for dimensions

**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
<b>MIN</b>	.077	.160	.130	.205	.077	.235	.015	.030
<b>MAX</b>	.083	.180	.155	.220	.104	.255	.030	.060
DIMENSIONS IN MILLIMETERS								
<b>MIN</b>	1.95	4.06	3.30	5.21	1.95	5.97	.381	.760
<b>MAX</b>	2.10	4.57	3.94	5.59	2.65	6.48	.762	1.520

## PAD LAYOUT



SMBJ (DO-214AA)

	INCHES	mm
<b>A</b>	.260	6.60
<b>B</b>	.085	2.16
<b>C</b>	.110	2.79

SMBG (DO-215AA)

	INCHES	mm
<b>A</b>	.320	8.13
<b>B</b>	.085	2.16
<b>C</b>	.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		

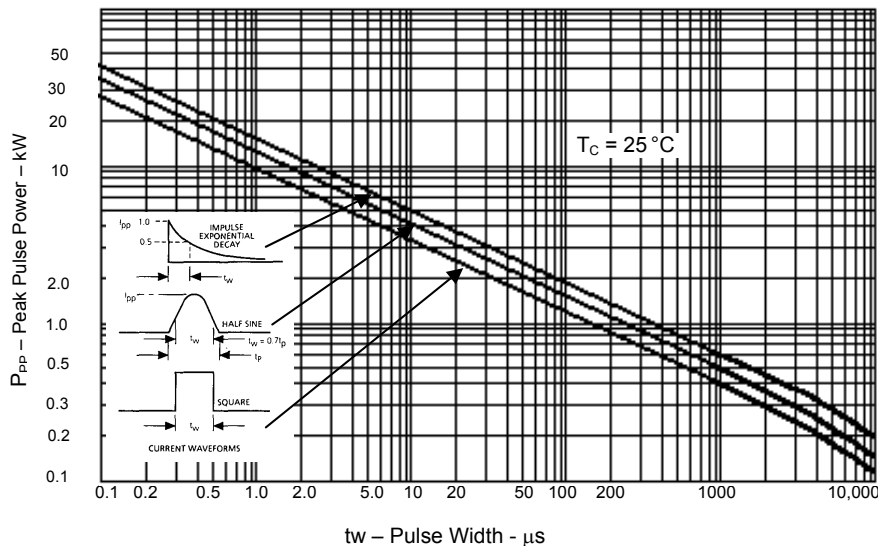
## ELECTRICAL CHARACTERISTICS @ 25°C

MICROSEMI PART NUMBER		REVERSE STAND-OFF VOLTAGE $V_{WM}$	BREAKDOWN VOLTAGE $V_{BR}$ @ $I_{BR}$		MAXIMUM CLAMPING VOLTAGE $V_C$ @ $I_{FP}$	PEAK PULSE CURRENT (see Fig. 2) $I_{FP}$	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

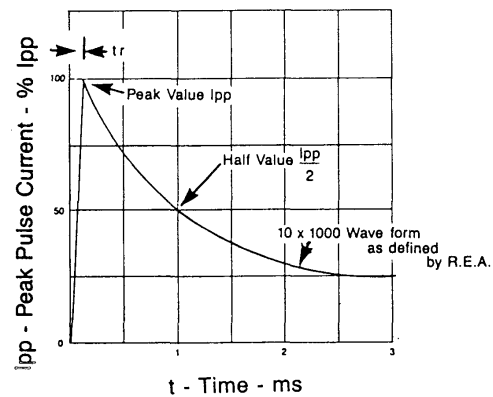
**NOTE 1:** For Bidirectional device types indicate CA suffix after the part number. (i.e. MSMBJ170CA). Bidirectional capacitance is half that shown in figure 4 at zero volts.

**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

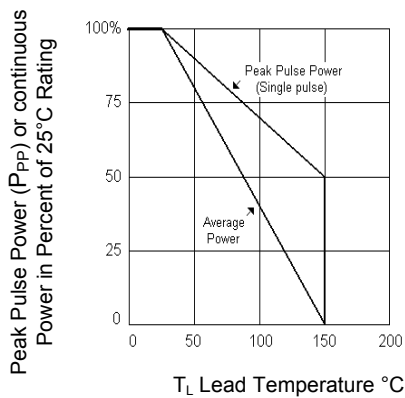


**FIGURE 1** Peak Pulse Power vs. Pulse Time

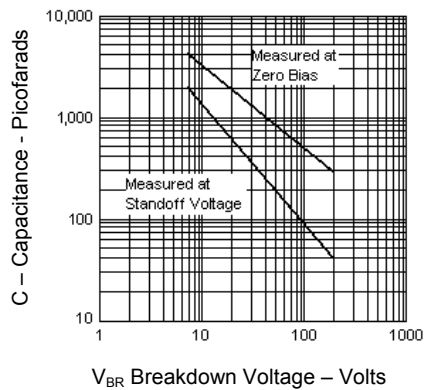


Test waveform parameters:  $t_r=10 \mu s$ ,  $t_w=1000 \mu s$

**FIGURE 2** Pulse Waveform for Exponential Surge



**FIGURE 3** Derating Curve



**FIGURE 4** Typical Capacitance vs Breakdown Voltage