

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

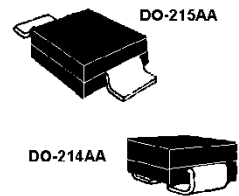
**MSMBJ5.0A thru MSMBJ170CA, e3
and MSMBG5.0A thru MSMBG170CA, e3**

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
- 3σ 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, T²L, 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

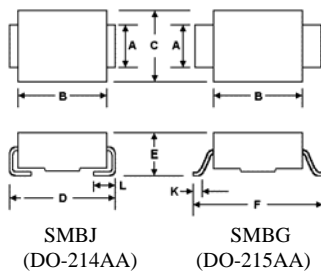
MAXIMUM RATINGS

- Peak Pulse Power dissipation at 25 °C: 600 watts at 10/1000 μ 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

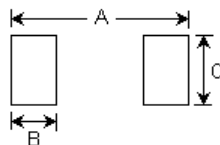
- Void-free transfer molded thermosetting epoxy body meeting UL94V-0
- Gull-wing or J-bend tin-lead (90 % Sn, 10 % Pb) or RoHS (100 % Sn) compliant annealed matte-tin plating solderable per MIL-STD-750, method 2026
- Cathode indicated by band (No cathode band on bi-directional devices)
- Part number 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 | 1.95 | 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_{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 | μA |
| 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

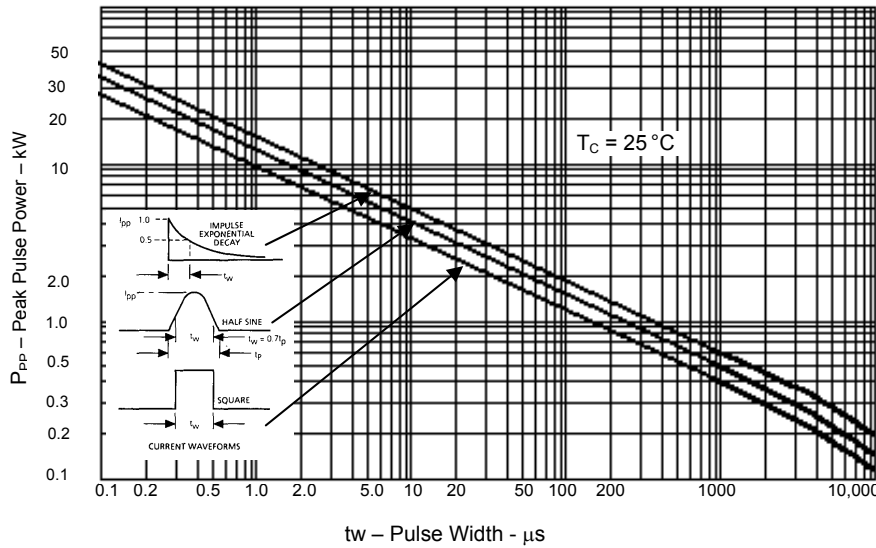
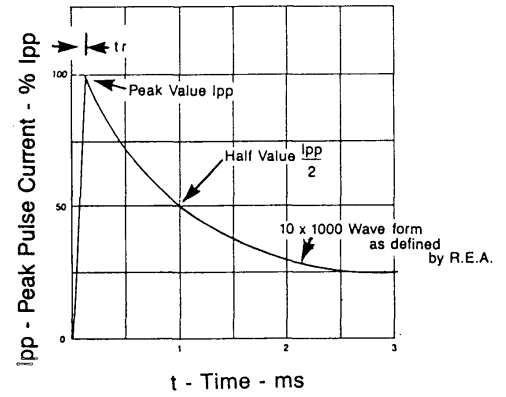


FIGURE 1 Peak Pulse Power vs. Pulse Time



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

FIGURE 2 Pulse Waveform for Exponential Surge

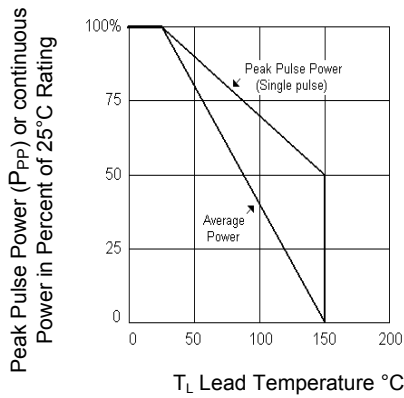


FIGURE 3 Derating Curve

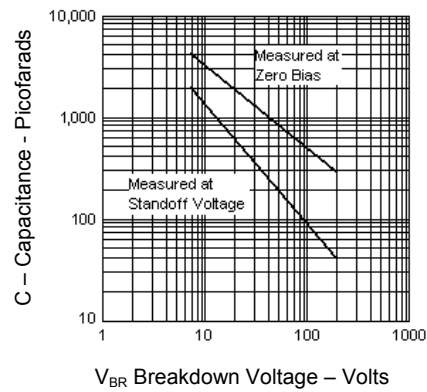


FIGURE 4 Typical Capacitance vs Breakdown Voltage