

**SURFACE MOUNT 1500 Watt  
Transient Voltage Suppressor**

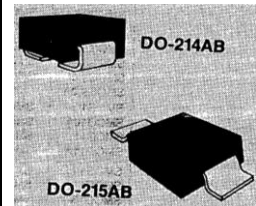
- High Reliability controlled devices
- Unidirectional (A) and Bidirectional (CA) construction
- Available in both J-bend and Gull-wing terminations
- Selections for 5.0 to 170 V standoff voltages ( $V_{WM}$ )

**DEVICES**      **MSMCJ5.0A thru MSMCJ170CA, e3  
and MSMCG5.0A thru MSMCG170CA, e3**

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

### FEATURES

- High reliability controlled devices with fabrication and assembly lot traceability
- 100 % surge tested devices
- Optional upscreening available by replacing the M prefix with MA, MX or MXL prefixes. 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-lead equivalent packages for thru-hole mounting available as 1.5KE6.8A to 1.5KE200CA or 1N6267 thru 1N6303A and 1N5908 (consult factory for other surface mount options).
- 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

- Protection from switching transients and induced RF
- Protection from ESD and EFT per IEC 61000-4-2 and IEC 61000-4-4
- Secondary lightning protection per IEC 61000-4-5 with 42 Ohms source impedance:
  - Class 1: MSMC5.0A to MSMC170CA
  - Class 2: MSMC5.0A to MSMC150CA
  - Class 3: MSMC5.0A to MSMC75CA
  - Class 4: MSMC5.0A to MSMC36CA
- Secondary lightning protection per IEC 61000-4-5 with 12 Ohms source impedance:
  - Class 1: MSMC5.0A to MSMC90CA
  - Class 2: MSMC5.0A to MSMC45CA
  - Class 3: MSMC5.0A to MSMC24CA
  - Class 4: MSMC5.0A to MSMC11CA
- Secondary lightning protection per IEC 61000-4-5 with 2 Ohms source impedance:
  - Class 2: MSMC5.0A to MSMC22CA
  - Class 3: MSMC5.0A to MSMC10CA

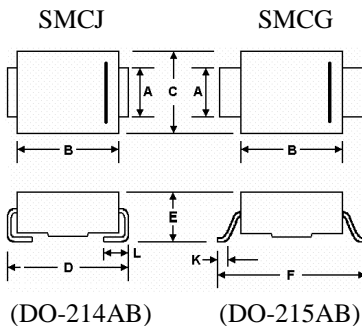
### MAXIMUM RATINGS

- Peak Pulse Power dissipation at 25 °C: 1500 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: 20 °C/W junction to lead, or 80 °C/W junction to ambient when mounted on FR4 PC board (1oz Cu) with recommended footprint (see page 2)
- Steady-State Power dissipation: 6 watts at  $T_L = 30$  °C, or 1.56 watts at  $T_A = 25$  °C when mounted on FR4 PC board with recommended footprint (see page 2)
- Forward Surge: 200 Amps peak impulse of 8.3 ms half-sine wave at 25 °C (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: 0.25 grams (approximately)

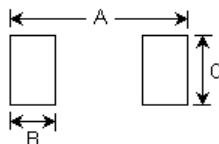
## PACKAGE DIMENSIONS



| DIMENSIONS IN INCHES      |      |      |      |      |      |       |       |       |
|---------------------------|------|------|------|------|------|-------|-------|-------|
|                           | A    | B    | C    | D    | E    | F     | K     | L     |
| <b>MIN</b>                | .115 | .260 | .220 | .305 | .077 | .380  | .025  | .030  |
| <b>MAX</b>                | .121 | .280 | .245 | .320 | .104 | .400  | .040  | .060  |
| DIMENSIONS IN MILLIMETERS |      |      |      |      |      |       |       |       |
|                           | A    | B    | C    | D    | E    | F     | K     | L     |
| <b>MIN</b>                | 2.92 | 6.60 | 5.59 | 7.75 | 1.95 | 9.65  | 0.635 | .760  |
| <b>MAX</b>                | 3.07 | 7.11 | 6.22 | 8.13 | 2.65 | 10.16 | 1.016 | 1.520 |

Typical Standoff Height: 0.004" – 0.008" (0.1mm – 0.2mm)

## PAD LAYOUT



SMCJ (DO-214AB)

|          | INCHES | mm   |
|----------|--------|------|
| <b>A</b> | 0.390  | 9.90 |
| <b>B</b> | 0.110  | 2.79 |
| <b>C</b> | 0.150  | 3.81 |

SMCG (DO-215AB)

|          | INCHES | mm    |
|----------|--------|-------|
| <b>A</b> | 0.510  | 12.95 |
| <b>B</b> | 0.110  | 2.79  |
| <b>C</b> | 0.150  | 3.81  |

## 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                 |          |                                |

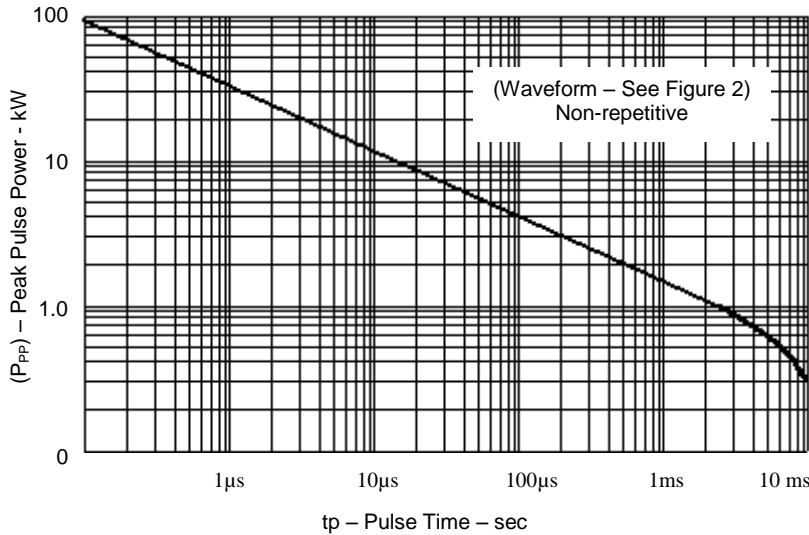
## ELECTRICAL CHARACTERISTICS @ 25°C

| MICROSEMI PART NUMBER |           | REVERSE STAND-OFF VOLTAGE<br>$V_{WM}$ | BREAKDOWN VOLTAGE<br>$V_{BR}$ @ $I_{BR}$ |    | MAXIMUM CLAMPING VOLTAGE<br>$V_C$ @ $I_{PP}$ | PEAK PULSE CURRENT<br>(see Fig. 2)<br>$I_{PP}$ | MAXIMUM STANDBY CURRENT<br>$I_D$ @ $V_{WM}$ |
|-----------------------|-----------|---------------------------------------|--|----|--|--|---|
| GULL-WING             | J- BEND   | V                                     | V  | mA | V  | A  | $\mu A$                                     |
| MSMCG5.0A             | MSMCJ5.0A | 5.0                                   | 6.40 – 7.00                              | 10 | 9.2  | 163.0  | 1000  |
| MSMCG6.0A             | MSMCJ6.0A | 6.0                                   | 6.67 – 7.37                              | 10 | 10.3   | 145.6  | 1000  |
| MSMCG6.5A             | MSMCJ6.5A | 6.5                                   | 7.22 – 7.98                              | 10 | 11.2   | 133.9  | 500   |
| MSMCG7.0A             | MSMCJ7.0A | 7.0                                   | 7.78 – 8.60                              | 10 | 12.0   | 125.0  | 200   |
| MSMCG7.5A             | MSMCJ7.5A | 7.5                                   | 8.33 – 9.21                              | 1  | 12.9   | 116.3  | 100   |
| MSMCG8.0A             | MSMCJ8.0A | 8.0                                   | 8.89 – 9.83                              | 1  | 13.6   | 110.3  | 50  |
| MSMCG8.5A             | MSMCJ8.5A | 8.5                                   | 9.44 – 10.4                              | 1  | 14.4   | 104.2  | 20  |
| MSMCG9.0A             | MSMCJ9.0A | 9.0                                   | 10.0 – 11.1                              | 1  | 15.4   | 97.4   | 10  |
| MSMCG10A              | MSMCJ10A  | 10                                    | 11.1 – 12.3                              | 1  | 17.0   | 88.2   | 5   |
| MSMCG11A              | MSMCJ11A  | 11                                    | 12.2 – 13.5                              | 1  | 18.2   | 82.4   | 5   |
| MSMCG12A              | MSMCJ12A  | 12                                    | 13.3 – 14.7                              | 1  | 19.9   | 75.3   | 5   |
| MSMCG13A              | MSMCJ13A  | 13                                    | 14.4 – 15.9                              | 1  | 21.5   | 69.7   | 1   |
| MSMCG14A              | MSMCJ14A  | 14                                    | 15.6 – 17.2                              | 1  | 23.2   | 64.7   | 1   |
| MSMCG15A              | MSMCJ15A  | 15                                    | 16.7 – 18.5                              | 1  | 24.4   | 61.5   | 1   |
| MSMCG16A              | MSMCJ16A  | 16                                    | 17.8 – 19.7                              | 1  | 26.0   | 57.7   | 1   |
| MSMCG17A              | MSMCJ17A  | 17                                    | 18.9 – 20.9                              | 1  | 27.6   | 53.3   | 1   |
| MSMCG18A              | MSMCJ18A  | 18                                    | 20.0 – 22.1                              | 1  | 29.2   | 51.4   | 1   |
| MSMCG20A              | MSMCJ20A  | 20                                    | 22.2 – 24.5                              | 1  | 32.4   | 46.3   | 1   |
| MSMCG22A              | MSMCJ22A  | 22                                    | 24.4 – 26.9                              | 1  | 35.5   | 42.2   | 1   |
| MSMCG24A              | MSMCJ24A  | 24                                    | 26.7 – 29.5                              | 1  | 38.9   | 38.6   | 1   |
| MSMCG26A              | MSMCJ26A  | 26                                    | 28.9 – 31.9                              | 1  | 42.1   | 35.6   | 1   |
| MSMCG28A              | MSMCJ28A  | 28                                    | 31.1 – 34.4                              | 1  | 45.4   | 33.0   | 1   |
| MSMCG30A              | MSMCJ30A  | 30                                    | 33.3 – 36.8                              | 1  | 48.4   | 31.0   | 1   |
| MSMCG33A              | MSMCJ33A  | 33                                    | 36.7 – 40.6                              | 1  | 53.3   | 28.1   | 1   |
| MSMCG36A              | MSMCJ36A  | 36                                    | 40.0 – 44.2                              | 1  | 58.1   | 25.8   | 1   |
| MSMCG40A              | MSMCJ40A  | 40                                    | 44.4 – 49.1                              | 1  | 64.5   | 23.2   | 1   |
| MSMCG43A              | MSMCJ43A  | 43                                    | 47.8 – 52.8                              | 1  | 69.4   | 21.6   | 1   |
| MSMCG45A              | MSMCJ45A  | 45                                    | 50.0 – 55.3                              | 1  | 72.7   | 20.6   | 1   |
| MSMCG48A              | MSMCJ48A  | 48                                    | 53.3 – 58.9                              | 1  | 77.4   | 19.4   | 1   |
| MSMCG51A              | MSMCJ51A  | 51                                    | 56.7 – 62.7                              | 1  | 82.4   | 18.2   | 1   |
| MSMCG54A              | MSMCJ54A  | 54                                    | 60.0 – 66.3                              | 1  | 87.1   | 17.2   | 1   |
| MSMCG58A              | MSMCJ58A  | 58                                    | 64.4 – 71.2                              | 1  | 93.6   | 16.0   | 1   |
| MSMCG60A              | MSMCJ60A  | 60                                    | 66.7 – 73.7                              | 1  | 96.8   | 15.5   | 1   |
| MSMCG64A              | MSMCJ64A  | 64                                    | 71.1 – 78.6                              | 1  | 103.0  | 14.6   | 1   |
| MSMCG70A              | MSMCJ70A  | 70                                    | 77.8 – 86.0                              | 1  | 113  | 13.3   | 1   |
| MSMCG75A              | MSMCJ75A  | 75                                    | 83.3 – 92.1                              | 1  | 121  | 12.4   | 1   |
| MSMCG78A              | MSMCJ78A  | 78                                    | 86.7 – 95.8                              | 1  | 126  | 11.4   | 1   |
| MSMCG85A              | MSMCJ85A  | 85                                    | 94.4 – 104.0                             | 1  | 137  | 10.4   | 1   |
| MSMCG90A              | MSMCJ90A  | 90                                    | 100 – 111                                | 1  | 146  | 10.3   | 1   |
| MSMCG100A             | MSMCJ100A | 100                                   | 111 – 123                                | 1  | 162  | 9.3  | 1   |
| MSMCG110A             | MSMCJ110A | 110                                   | 122 – 135                                | 1  | 177  | 8.4  | 1   |
| MSMCG120A             | MSMCJ120A | 120                                   | 133 – 147                                | 1  | 193  | 7.8  | 1   |
| MSMCG130A             | MSMCJ130A | 130                                   | 144 – 159                                | 1  | 209  | 7.2  | 1   |
| MSMCG150A             | MSMCJ150A | 150                                   | 167 – 185                                | 1  | 243  | 6.2  | 1   |
| MSMCG160A             | MSMCJ160A | 160                                   | 178 – 197                                | 1  | 259  | 5.8  | 1   |
| MSMCG170A             | MSMCJ170A | 170                                   | 189 – 209                                | 1  | 275  | 5.5  | 1   |

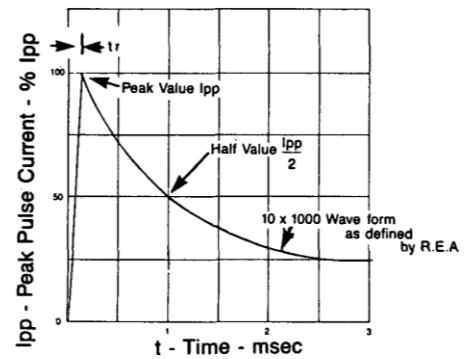
**NOTE 1:** For Bidirectional device types indicate CA suffix after the part number. (i.e. MSMCJ170CA). Bidirectional capacitance is half that shown in Figure 4 at zero volts.

**NOTE 2:** Microsemi Corp's MSMC series (1500 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 device.

## GRAPHS

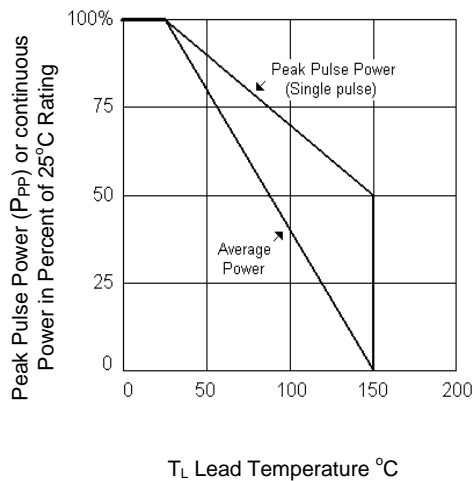


**FIGURE 1** – Peak Pulse Power vs. Pulse Time

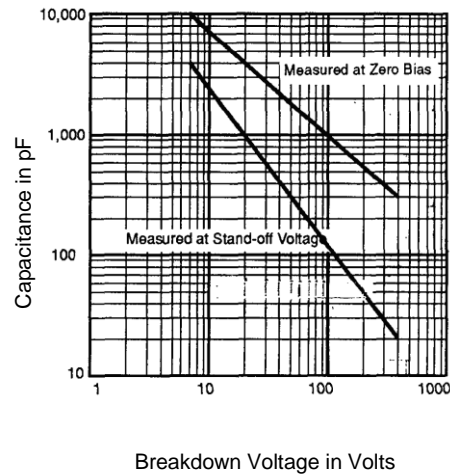


Test waveform parameters  
 $t_r = 10\mu s$ ,  $t_p = 1000\mu s$

**FIGURE 2** – Pulse Waveform



**FIGURE 3** – Derating Curve



**FIGURE 4** – Typical Capacitance vs. Breakdown