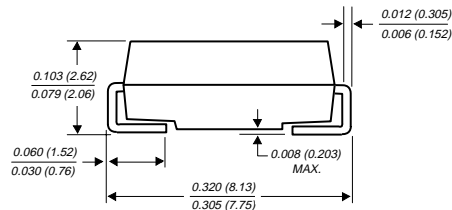
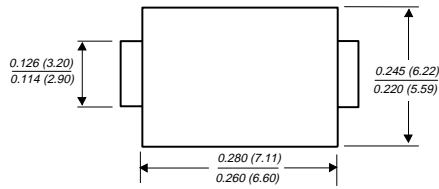


# SMCG AND SMCJ5.0 THRU 170CA

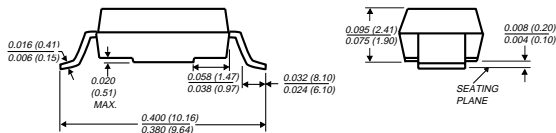
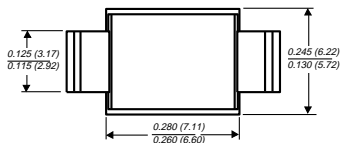
## SURFACE MOUNT TRANSZORB™ TRANSIENT VOLTAGE SUPPRESSOR

Stand-off Voltage - 5.0 - 170 Volts Peak Pulse Power - 1500 Watts

### DO-214AB MODIFIED J-BEND



### DO-215AB 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 inductance
- ◆ 1500W 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 uni-directional and 5.0ns for bi-directional 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 DO214AB / DO215AB molded plastic 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:** 0.007 ounces, 0.21 gram

## DEVICES FOR BI-DIRECTIONAL APPLICATIONS

For bi-directional use add suffix C or CA for types SMC-5.0 thru SMC-170 (e.g. SMC5.0C, SMCJ170CA).

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)  | PPPM                              | Minimum 1500 | Watts |
| Peak pulse current with a 10/1000μs waveform (NOTE 1, FIG. 3)  | I <sub>PPM</sub>                  | SEE TABLE 1  | Amps  |
| Peak forward surge current 8.3ms single half sine-wave superimposed on rated load (JEDEC Method) (NOTES 2, 3) - uni-directional only | I <sub>FSM</sub>                  | 200.0        | Amps  |
| Maximum instantaneous forward voltage at 100A (NOTE 3) uni-directional only  | V <sub>F</sub>                    | 3.5          | Volts |
| Operating junction and storage temperature range   | T <sub>J</sub> , T <sub>STG</sub> | -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 0.31 x 0.31" (8.0 x 8.0mm) copper pads to each terminal
- (3) Measured on 8.3ms single half sine-wave. For uni-directional devices only.

**ELECTRICAL CHARACTERISTICS at (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1**

| Device Type<br>Gull Wing<br>Lead | Device Type<br>Modified<br>"J" Bend Lead | Device<br>Marking<br>Code |     | Breakdown<br>Voltage<br>V <sub>(BR)</sub> (Volts)<br>(NOTE 1)<br>(MIN / MAX) | Test<br>Current<br>at I <sub>T</sub> (mA) | Stand-off<br>Voltage<br>V <sub>WM</sub> (Volts) | Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>(NOTE 3) I <sub>D</sub> (μA) | Maximum<br>Peak Pulse<br>Surge<br>Current I <sub>PPM</sub><br>(NOTE 2) (Amps) | Maximum<br>Clamping<br>Voltage at I <sub>PPM</sub><br>V <sub>C</sub> (Volts) |
|----------------------------------|--|---------------------------|-----|--|---|---|---|---|--|
|                                  |  | UNI                       | BI  |  |   |   |   |   |  |
| SMCG5.0                          | SMCJ5.0                                  | GDD                       | GDD | 6.40 / 7.82  | 10.0                                      | 5.0   | 1000  | 156.3   | 9.6  |
| SMCG5.0A                         | SMCJ5.0                                  | GDE                       | GDE | 6.40 / 7.07  | 10.0                                      | 5.0   | 1000  | 163.0   | 9.2  |
| SMCG6.0                          | SMCJ6.0                                  | GDF                       | GDF | 6.67 / 8.15  | 10.0                                      | 6.0   | 1000  | 131.6   | 11.4   |
| SMCG6.0A                         | SMCJ6.0A                                 | GDG                       | GDG | 6.67 / 7.37  | 10.0                                      | 6.0   | 1000  | 145.6   | 10.3   |
| SMCG6.5                          | SMCJ6.5                                  | GDH                       | BDH | 7.22 / 8.82  | 10.0                                      | 6.5   | 500   | 122.0   | 12.3   |
| SMCG6.0A                         | SMCJ6.5A                                 | GDK                       | BDK | 7.22 / 7.98  | 10.0                                      | 6.5   | 500   | 133.9   | 11.2   |
| SMCG7.0                          | SMCJ7.0                                  | GDL                       | GDL | 7.78 / 9.51  | 10.0                                      | 7.0   | 200   | 112.8   | 13.3   |
| SMCG7.0A                         | SMCJ7.0A                                 | GDM                       | GDM | 7.78 / 8.60  | 10.0                                      | 7.0   | 200   | 125.0   | 12.0   |
| SMCG7.5                          | SMCJ7.5                                  | GDN                       | BDN | 8.33 / 10.2  | 1.0                                       | 7.5   | 100   | 104.9   | 14.3   |
| SMCG7.5A                         | SMCJ7.5A                                 | GDP                       | BDP | 8.33 / 9.21  | 1.0                                       | 7.5   | 100   | 116.3   | 12.9   |
| SMCG8.0                          | SMCJ8.0                                  | GDQ                       | BDG | 8.89 / 10.9  | 1.0                                       | 8.0   | 50  | 100.0   | 15.0   |
| SMCG8.0A                         | SMCJ8.0A                                 | GDR                       | BDR | 8.89 / 9.83  | 1.0                                       | 8.0   | 50  | 110.3   | 13.6   |
| SMCG8.5                          | SMCJ8.5                                  | GDS                       | BDS | 9.44 / 11.5  | 1.0                                       | 8.5   | 20  | 94.3  | 15.9   |
| SMCG8.5A                         | SMCJ8.5A                                 | GDT                       | BDT | 9.44 / 10.4  | 1.0                                       | 8.5   | 20  | 104.2   | 14.4   |
| SMCG9.0                          | SMCJ9.0                                  | GDU                       | BDU | 10.0 / 12.2  | 1.0                                       | 9.0   | 10  | 88.8  | 16.9   |
| SMCG9.0A                         | SMCJ9.0A                                 | GDV                       | BDV | 10.0 / 11.1  | 1.0                                       | 9.0   | 10  | 97.4  | 15.4   |
| SMCG10                           | SMCJ10                                   | GDW                       | BDW | 11.1 / 13.6  | 1.0                                       | 10.0  | 5.0   | 79.8  | 18.8   |
| SMCG10A                          | SMCJ10A                                  | GDX                       | BDX | 11.1 / 12.3  | 1.0                                       | 10.0  | 5.0   | 88.2  | 17.0   |
| SMCG11                           | SMCJ11                                   | GDY                       | GDY | 12.2 / 14.9  | 1.0                                       | 11.0  | 5.0   | 74.6  | 20.1   |
| SMCG11A                          | SMCJ11A                                  | GDZ                       | GDZ | 12.2 / 13.5  | 1.0                                       | 11.0  | 5.0   | 82.4  | 18.2   |
| SMCG12                           | SMCJ12                                   | GED                       | BED | 13.3 / 16.3  | 1.0                                       | 12.0  | 5.0   | 68.2  | 22.0   |
| SMCG12A                          | SMCJ12A                                  | GEE                       | BEE | 13.3 / 14.7  | 1.0                                       | 12.0  | 5.0   | 75.4  | 19.9   |
| SMCG13                           | SMCJ13                                   | GEF                       | GEF | 14.4 / 17.6  | 1.0                                       | 13.0  | 5.0   | 63.0  | 23.8   |
| SMCG13A                          | SMCJ13A                                  | GEG                       | GEG | 14.4 / 15.9  | 1.0                                       | 13.0  | 5.0   | 69.8  | 21.5   |
| SMCG14                           | SMCJ14                                   | GEH                       | BEH | 15.6 / 19.1  | 1.0                                       | 14.0  | 5.0   | 58.1  | 25.8   |
| SMCG14A                          | SMCJ14A                                  | GEK                       | BEK | 15.6 / 17.2  | 1.0                                       | 14.0  | 5.0   | 64.7  | 23.2   |
| SMCG15                           | SMCJ15                                   | GEL                       | BEL | 16.7 / 20.4  | 1.0                                       | 15.0  | 5.0   | 55.8  | 26.9   |
| SMCG15A                          | SMCJ15A                                  | GEM                       | BEM | 16.7 / 18.5  | 1.0                                       | 15.0  | 5.0   | 61.5  | 24.4   |
| SMCG16                           | SMCJ16                                   | GEN                       | GEN | 17.8 / 21.8  | 1.0                                       | 16.0  | 5.0   | 52.1  | 28.8   |
| SMCG16A                          | SMCJ16A                                  | GEP                       | GEP | 17.8 / 19.7  | 1.0                                       | 16.0  | 5.0   | 57.7  | 26.0   |
| SMCG17                           | SMCJ17                                   | GEQ                       | GEQ | 18.9 / 23.1  | 1.0                                       | 17.0  | 5.0   | 49.2  | 30.5   |
| SMCG17A                          | SMCJ17A                                  | GER                       | GER | 18.9 / 20.9  | 1.0                                       | 17.0  | 5.0   | 54.3  | 27.6   |
| SMCG18                           | SMCJ18                                   | GES                       | BES | 20.0 / 24.4  | 1.0                                       | 18.0  | 5.0   | 46.6  | 32.2   |
| SMCG18A                          | SMCJ18A                                  | GET                       | BET | 20.0 / 22.1  | 1.0                                       | 18.0  | 5.0   | 51.4  | 29.2   |
| SMCG20                           | SMCJ20                                   | GEU                       | BEU | 22.2 / 27.1  | 1.0                                       | 20.0  | 5.0   | 41.9  | 35.8   |
| SMCG20A                          | SMCJ20A                                  | GEV                       | BEV | 22.2 / 24.5  | 1.0                                       | 20.0  | 5.0   | 46.3  | 32.4   |
| SMCG22                           | SMCJ22                                   | GEW                       | BEW | 24.4 / 29.8  | 1.0                                       | 22.0  | 5.0   | 38.1  | 39.4   |
| SMCG22A                          | SMCJ22A                                  | GEX                       | BEX | 24.4 / 26.9  | 1.0                                       | 22.0  | 5.0   | 42.3  | 35.5   |
| SMCG24                           | SMCJ24                                   | GEY                       | BEY | 26.7 / 32.6  | 1.0                                       | 24.0  | 5.0   | 34.9  | 43.0   |
| SMCG24A                          | SMCJ24A                                  | GEZ                       | BEZ | 26.7 / 29.5  | 1.0                                       | 24.0  | 5.0   | 38.6  | 38.9   |
| SMCG26                           | SMCJ26                                   | GFD                       | BFD | 28.9 / 35.3  | 1.0                                       | 26.0  | 5.0   | 32.2  | 46.6   |
| SMCG26A                          | SMCJ26A                                  | GFE                       | BFE | 28.9 / 31.9  | 1.0                                       | 26.0  | 5.0   | 35.6  | 42.1   |
| SMCG28                           | SMCJ28                                   | GFF                       | BFF | 31.1 / 38.0  | 1.0                                       | 28.0  | 5.0   | 30.0  | 50.0   |
| SMCG28A                          | SMCJ28A                                  | GFG                       | BFG | 31.1 / 34.4  | 1.0                                       | 28.0  | 5.0   | 33.0  | 45.4   |
| SMCG30                           | SMCJ30                                   | GFH                       | BFH | 33.3 / 40.7  | 1.0                                       | 30.0  | 5.0   | 28.0  | 53.5   |
| SMCG30A                          | SMCJ30A                                  | GFK                       | BFK | 33.3 / 36.8  | 1.0                                       | 30.0  | 5.0   | 31.0  | 48.4   |
| SMCG33                           | SMCJ33                                   | GFL                       | BFL | 36.7 / 44.9  | 1.0                                       | 33.0  | 5.0   | 25.4  | 59.0   |
| SMCG33A                          | SMCJ33A                                  | GFM                       | BFM | 36.7 / 40.6  | 1.0                                       | 33.0  | 5.0   | 28.1  | 53.3   |
| SMCG36                           | SMCJ36                                   | GFN                       | BFN | 40.0 / 48.9  | 1.0                                       | 36.0  | 5.0   | 23.3  | 64.3   |
| SMCG36A                          | SMCJ36A                                  | GFP                       | BFP | 40.0 / 44.2  | 1.0                                       | 36.0  | 5.0   | 25.8  | 58.1   |
| SMCG40                           | SMCJ40                                   | GFQ                       | BFQ | 44.4 / 54.3  | 1.0                                       | 40.0  | 5.0   | 21.0  | 71.4   |
| SMCG40A                          | SMCJ40A                                  | GFR                       | BFR | 44.4 / 49.1  | 1.0                                       | 40.0  | 5.0   | 23.3  | 64.5   |
| SMCG43                           | SMCJ43                                   | GFS                       | BFS | 47.8 / 58.4  | 1.0                                       | 43.0  | 5.0   | 19.6  | 76.7   |
| SMCG43A                          | SMCJ43A                                  | GFT                       | BFT | 47.8 / 52.8  | 1.0                                       | 43.0  | 5.0   | 21.6  | 69.4   |
| SMCG45                           | SMCJ45                                   | GFU                       | BFU | 50.0 / 61.1  | 1.0                                       | 45.0  | 5.0   | 18.7  | 80.3   |
| SMCG45A                          | SMCJ45A                                  | GFV                       | BFV | 50.0 / 55.3  | 1.0                                       | 45.0  | 5.0   | 20.6  | 72.7   |
| SMCG48                           | SMCJ48                                   | GFW                       | BFW | 53.3 / 65.1  | 1.0                                       | 48.0  | 5.0   | 17.5  | 85.5   |
| SMCG48A                          | SMCJ48A                                  | GFX                       | BFX | 53.3 / 58.9  | 1.0                                       | 48.0  | 5.0   | 19.4  | 77.4   |
| SMCG51                           | SMCJ51                                   | GFY                       | BFY | 56.7 / 69.3  | 1.0                                       | 51.0  | 5.0   | 16.5  | 91.1   |
| SMCG51A                          | SMCJ51A                                  | GFZ                       | BFZ | 56.7 / 62.7  | 1.0                                       | 51.0  | 5.0   | 18.2  | 82.4   |

## ELECTRICAL CHARACTERISTICS at (T<sub>A</sub>=25°C unless otherwise noted) TABLE 1 (Cont'd)

| Device Type<br>Gull Wing<br>Lead | Device Type<br>Modified<br>"J" Bend Lead | Device<br>Marking<br>Code |     | Breakdown<br>Voltage<br>V <sub>(BR)</sub> (Volts)<br>(NOTE 1)<br>(MIN / MAX) | Test<br>Current<br>at I <sub>T</sub> (mA) | Stand-off<br>Voltage<br>V <sub>WM</sub> (Volts) | Maximum<br>Reverse<br>Leakage<br>at V <sub>WM</sub><br>(NOTE 3) I <sub>D</sub> (μA) | Maximum<br>Peak Pulse<br>Surge<br>Current I <sub>PPM</sub><br>(NOTE 2) (Amps) | Maximum<br>Clamping<br>Voltage at I <sub>PPM</sub><br>V <sub>C</sub> (Volts) |
|----------------------------------|--|---------------------------|-----|--|---|---|---|---|--|
|                                  |  | UNI                       | BI  |  |   |   |   |   |  |
| SMCG54                           | SMCJ54                                   | GGD                       | GGD | 60.0 / 73.3  | 1.0                                       | 54.0  | 5.0   | 15.6  | 96.3   |
| SMCG54A                          | SMCJ54A                                  | GGE                       | GGE | 60.0 / 66.3  | 1.0                                       | 54.0  | 5.0   | 17.2  | 87.1   |
| SMCG58                           | SMCJ58                                   | GGF                       | GGF | 64.4 / 78.7  | 1.0                                       | 58  | 5.0   | 14.6  | 103  |
| SMCG58A                          | SMCJ58A                                  | GGG                       | GGG | 6.4.4 / 71.2   | 1.0                                       | 58  | 5.0   | 16.0  | 93   |
| SMCG60                           | SMCJ60                                   | GGH                       | GGH | 66.7 / 81.5  | 1.0                                       | 60  | 5.0   | 14.0  | 107  |
| SMCG60A                          | SMCJ60A                                  | GGK                       | GGK | 66.7 / 73.7  | 1.0                                       | 60  | 5.0   | 15.5  | 96   |
| SMCG64                           | SMCJ64                                   | GGL                       | GGL | 71.1 / 86.9  | 1.0                                       | 64  | 5.0   | 13.2  | 114  |
| SMCG64A                          | SMCJ64A                                  | GGM                       | GGM | 71.1 / 78.6  | 1.0                                       | 64  | 5.0   | 14.6  | 103  |
| SMCG70                           | SMCJ70                                   | GGN                       | GGN | 77.8 / 95.1  | 1.0                                       | 70  | 5.0   | 12.0  | 125  |
| SMCG70A                          | SMCJ70A                                  | GGP                       | GGP | 77.8 / 86.0  | 1.0                                       | 70  | 5.0   | 13.3  | 113  |
| SMCG75                           | SMCJ75                                   | GGQ                       | GGQ | 83.3 / 102   | 1.0                                       | 75  | 5.0   | 11.2  | 134  |
| SMCG75A                          | SMCJ75A                                  | GGR                       | GGR | 83.3 / 92.1  | 1.0                                       | 75  | 5.0   | 12.4  | 121  |
| SMCG78                           | SMCJ78                                   | GGS                       | GGs | 86.7 / 106   | 1.0                                       | 78  | 5.0   | 10.8  | 139  |
| SMCG78A                          | SMCJ78A                                  | GGT                       | GGT | 86.7 / 95.8  | 1.0                                       | 78  | 5.0   | 11.9  | 126  |
| SMCG85                           | SMCJ85                                   | GGU                       | GGU | 94.4 / 115   | 1.0                                       | 85  | 5.0   | 9.9   | 151  |
| SMCG85A                          | SMCJ85A                                  | GGV                       | GGV | 94.4 / 104   | 1.0                                       | 85  | 5.0   | 10.9  | 137  |
| SMCG90                           | SMCJ90                                   | GGW                       | GGW | 100 / 122  | 1.0                                       | 90  | 5.0   | 9.4   | 160  |
| SMCG90A                          | SMCJ90A                                  | GGX                       | GGX | 100 / 111  | 1.0                                       | 90  | 5.0   | 10.3  | 146  |
| SMCG100                          | SMCJ100                                  | GGY                       | GGY | 111 / 136  | 1.0                                       | 100   | 5.0   | 8.4   | 179  |
| SMCG100A                         | SMCJ100A                                 | GGZ                       | GGZ | 111 / 123  | 1.0                                       | 100   | 5.0   | 9.3   | 162  |
| SMCG110                          | SMCJ110                                  | GHD                       | GHD | 122 / 149  | 1.0                                       | 110   | 5.0   | 7.7   | 196  |
| SMCG110A                         | SMCJ110A                                 | GHE                       | GHE | 122 / 135  | 1.0                                       | 110   | 5.0   | 8.5   | 177  |
| SMCG120                          | SMCJ120                                  | GHF                       | GHF | 133 / 163  | 1.0                                       | 120   | 5.0   | 7.0   | 214  |
| SMCG120A                         | SMCJ120A                                 | GHG                       | GHG | 133 / 147  | 1.0                                       | 120   | 5.0   | 7.8   | 193  |
| SMCG130                          | SMCJ130                                  | GHH                       | GHH | 144 / 176  | 1.0                                       | 130   | 5.0   | 6.5   | 231  |
| SMCG130A                         | SMCJ130A                                 | GHK                       | GHK | 144 / 159  | 1.0                                       | 130   | 5.0   | 7.2   | 209  |
| SMCG150                          | SMCJ150                                  | GHL                       | GHL | 16.7 / 204   | 1.0                                       | 150   | 5.0   | 5.6   | 268  |
| SMCG150A                         | SMCJ150A                                 | GHM                       | GHM | 167 / 185  | 1.0                                       | 150   | 5.0   | 6.2   | 243  |
| SMCG160                          | SMCJ160                                  | GHN                       | GHN | 178 / 218  | 1.0                                       | 160   | 5.0   | 5.2   | 287  |
| SMCG160A                         | SMCJ160A                                 | GHP                       | GHP | 178 / 197  | 1.0                                       | 160   | 5.0   | 5.8   | 259  |
| SMCG170                          | SMCJ170                                  | GHQ                       | GHQ | 189 / 231  | 1.0                                       | 170   | 5.0   | 4.9   | 304  |
| SMCG170A                         | SMCJ170A                                 | GHR                       | GHR | 189 / 209  | 1.0                                       | 170   | 5.0   | 5.5   | 275  |

### NOTES:

- (1) V<sub>(BR)</sub> measured after I<sub>T</sub> 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<sub>WM</sub> of 10 Volts and less, the I<sub>D</sub> limit is doubled
- (4) For the bi-directional SMCG/SMCJ5.0CA, the maximum V<sub>(BR)</sub> is 7.25 Volts
- (5) All terms and symbols are consistent with ANSI/IEEE C62.35

## APPLICATION NOTES

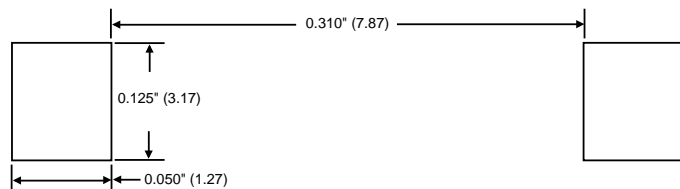
These surface mountable packages are designed specifically for transient voltage suppression. The wide leads assure a large surface contact for good heat dissipation, and a low resistance path for surge current flow to ground. These high speed transient voltage suppressors can be used to effectively protect sensitive components such as integrated circuits and MOS devices.

A 1500W (SMC) 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<sub>PP</sub>) rating of this series.

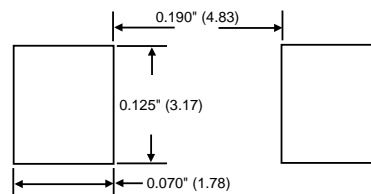
## RECOMMENDED PAD SIZES

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 figure below. Contact factory for soldering methods.

### GULL-WING



### MODIFIED J-BEND



# MAXIMUM RATINGS AND CHARACTERISTIC CURVES SMCG AND SMCJ5.0 THRU 170CA

FIG. 1 - PEAK PULSE POWER RATING CURVE

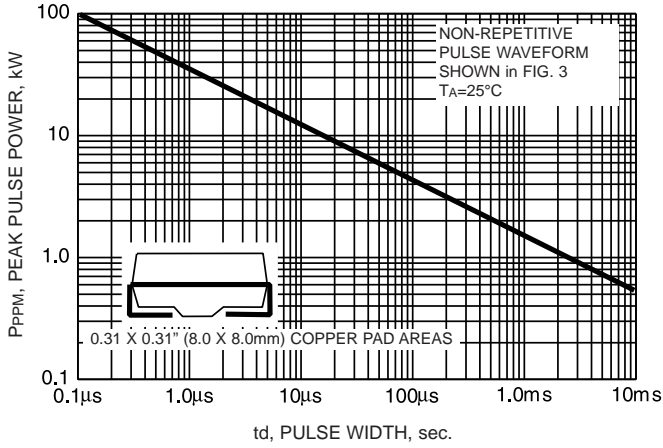


FIG. 2 - PULSE DERATING CURVE

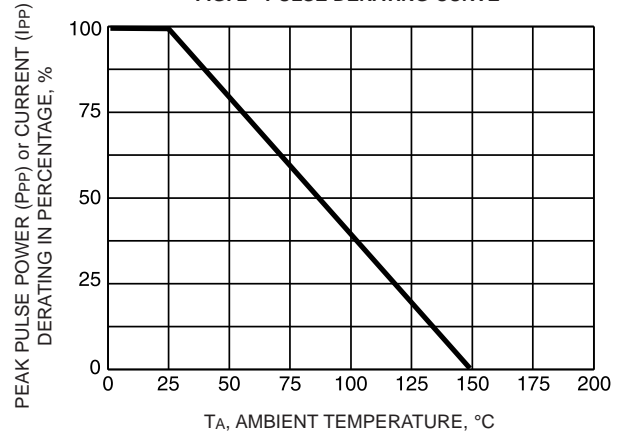


FIG. 3 - PULSE WAVEFORM

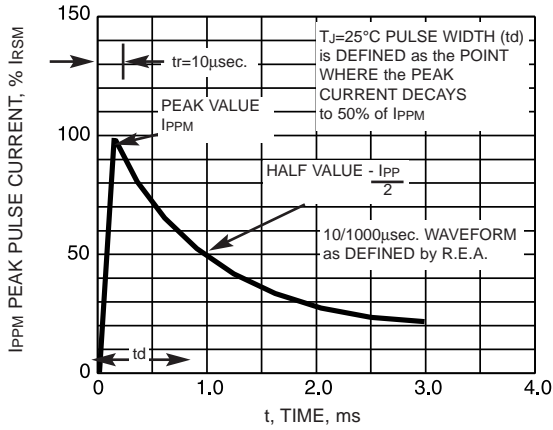


FIG. 4 - TYPICAL JUNCTION CAPACITANCE UNI-DIRECTIONAL

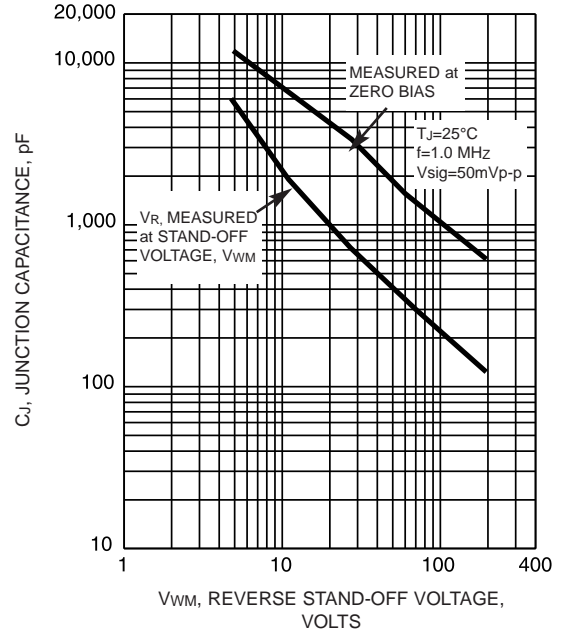


FIG. 5 - TYPICAL JUNCTION CAPACITANCE BI-DIRECTIONAL

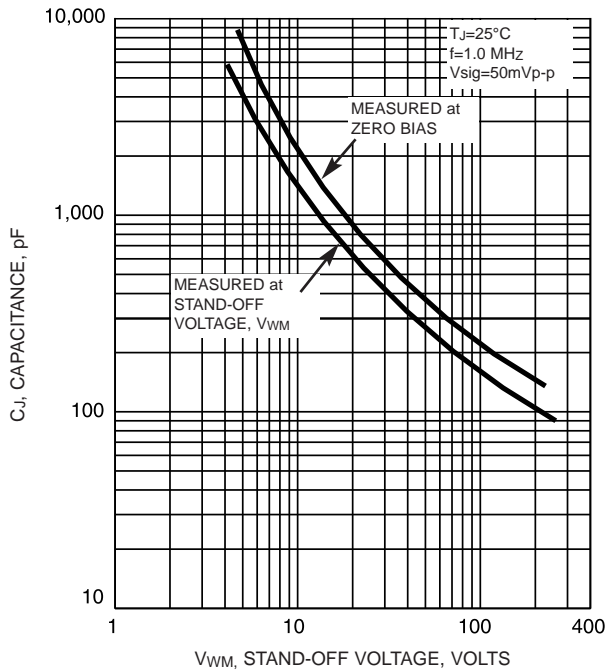
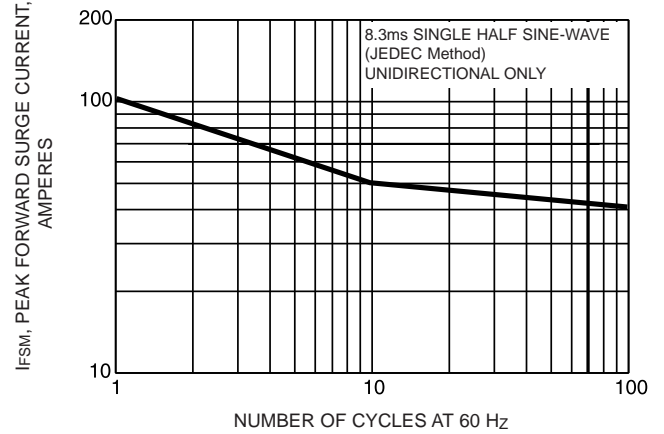


FIG. 6 - MAXIMUM NON-REPETITIVE PEAK FORWARD SURGE CURRENT



# MAXIMUM RATINGS AND CHARACTERISTIC CURVES SMCJ AND SMCJ5.0 THRU 170CA

FIG. 7 - MAXIMUM CONTINUOUS POWER DISSIPATION

