



## Surface Mount TRANSZORB® Transient Voltage Suppressors



SMCG (DO-215AB)

## FEATURES

- Low profile package
- Ideal for automated placement
- Glass passivated chip junction
- Available in uni-directional and bi-directional
- Excellent clamping capability
- Very fast response time
- Low incremental surge resistance
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## PRIMARY CHARACTERISTICS

|                            |                                 |
|----------------------------|---------------------------------|
| $V_{WM}$                   | 5.0 V to 188 V                  |
| $V_{BR}$ (uni-directional) | 6.4 V to 231 V                  |
| $V_{BR}$ (bi-directional)  | 6.4 V to 231 V                  |
| $P_{PPM}$                  | 1500 W                          |
| $P_D$                      | 6.5 W                           |
| $I_{FSM}$                  | 200 A                           |
| $T_J$ max.                 | 150 °C                          |
| Polarity                   | Uni-directional, bi-directional |
| Package                    | SMCG (DO-215AB)                 |

## DEVICES FOR BI-DIRECTION APPLICATIONS

For bi-directional devices use CA suffix (e.g. SMCG188CA).

Electrical characteristics apply in both directions.

## TYPICAL APPLICATIONS

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, and telecommunication.

## MECHANICAL DATA

**Case:** SMCG (DO-215AB)

Molding compound meets UL 94 V-0 flammability rating  
Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD22-B102

M3 suffix meets JESD 201 class 2 whisker test

**Polarity:** for uni-directional types the band denotes cathode end, no marking on bi-directional types

MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ , unless otherwise noted)

| PARAMETER                                                                                   | SYMBOL         | VALUE          | UNIT |
|---------------------------------------------------------------------------------------------|----------------|----------------|------|
| Peak pulse power dissipation with a 10/1000 $\mu$ s waveform <sup>(1)(2)</sup>              | $P_{PPM}$      | 1500           | W    |
| Peak pulse current with a 10/1000 $\mu$ s waveform <sup>(1)</sup>                           | $I_{PPM}$      | See next table | A    |
| Power dissipation on infinite heatsink $T_A = 50\text{ °C}$                                 | $P_D$          | 6.5            | W    |
| Peak forward surge current 8.3 ms single half sine-wave uni-directional only <sup>(2)</sup> | $I_{FSM}$      | 200            | A    |
| Operating junction and storage temperature range                                            | $T_J, T_{STG}$ | -55 to +150    | °C   |

## Notes

<sup>(1)</sup> Non-repetitive current pulse, per fig. 3 and derated above  $T_A = 25\text{ °C}$  per fig. 2

<sup>(2)</sup> Mounted on 0.31" x 0.31" (8.0 mm x 8.0 mm) copper pads to each terminal

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| DEVICE TYPE<br>MODIFIED<br>GULL WING | DEVICE<br>MARKING<br>CODE |     | BREAKDOWN<br>VOLTAGE<br>$V_{BR}$ AT $I_T$ (V) <sup>(1)</sup> |      | TEST<br>CURRENT<br>$I_T$<br>(mA) | STAND-OFF<br>VOLTAGE<br>$V_{WM}$<br>(V) | MAXIMUM<br>REVERSE<br>LEAKAGE<br>AT $V_{WM}$<br>$I_D$ ( $\mu\text{A}$ ) <sup>(3)</sup> | MAXIMUM<br>PEAK<br>PULSE<br>CURRENT<br>$I_{PPM}$ (A) <sup>(2)</sup> | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>AT $I_{PPM}$<br>$V_C$ (V) |
|--------------------------------------|---------------------------|-----|--------------------------------------------------------------|------|----------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------|
|                                      | UNI                       | BI  | MIN.                                                         | MAX. |                                  |                                         |                                                                                        |                                                                     |                                                             |
| (+)SMCG5.0A <sup>(5)</sup>           | GDE                       | GDE | 6.40                                                         | 7.07 | 10.0                             | 5.0                                     | 1000                                                                                   | 163.0                                                               | 9.2                                                         |
| (+)SMCG6.0A                          | GDG                       | GDG | 6.67                                                         | 7.37 | 10.0                             | 6.0                                     | 1000                                                                                   | 145.6                                                               | 10.3                                                        |
| (+)SMCG6.5A                          | GDK                       | BDK | 7.22                                                         | 7.98 | 10.0                             | 6.5                                     | 500                                                                                    | 133.9                                                               | 11.2                                                        |
| (+)SMCG7.0A                          | GDM                       | GDM | 7.78                                                         | 8.60 | 10.0                             | 7.0                                     | 200                                                                                    | 125.0                                                               | 12.0                                                        |
| (+)SMCG7.5A                          | GDP                       | BDP | 8.33                                                         | 9.21 | 1.0                              | 7.5                                     | 100                                                                                    | 116.3                                                               | 12.9                                                        |
| (+)SMCG8.0A                          | GDR                       | BDR | 8.89                                                         | 9.83 | 1.0                              | 8.0                                     | 50                                                                                     | 110.3                                                               | 13.6                                                        |
| (+)SMCG8.5A                          | GDT                       | BDT | 9.44                                                         | 10.4 | 1.0                              | 8.5                                     | 20                                                                                     | 104.2                                                               | 14.4                                                        |
| (+)SMCG9.0A                          | GDV                       | BDV | 10.0                                                         | 11.1 | 1.0                              | 9.0                                     | 10                                                                                     | 97.4                                                                | 15.4                                                        |
| (+)SMCG10A                           | GDX                       | BDX | 11.1                                                         | 12.3 | 1.0                              | 10                                      | 5.0                                                                                    | 88.2                                                                | 17.0                                                        |
| (+)SMCG11A                           | GDZ                       | GDZ | 12.2                                                         | 13.5 | 1.0                              | 11                                      | 5.0                                                                                    | 82.4                                                                | 18.2                                                        |
| (+)SMCG12A                           | GEE                       | BEE | 13.3                                                         | 14.7 | 1.0                              | 12                                      | 5.0                                                                                    | 75.4                                                                | 19.9                                                        |
| (+)SMCG13A                           | GEG                       | GEG | 14.4                                                         | 15.9 | 1.0                              | 13                                      | 1.0                                                                                    | 69.8                                                                | 21.5                                                        |
| (+)SMCG14A                           | GEK                       | BEK | 15.6                                                         | 17.2 | 1.0                              | 14                                      | 1.0                                                                                    | 64.7                                                                | 23.2                                                        |
| (+)SMCG15A                           | GEM                       | BEM | 16.7                                                         | 18.5 | 1.0                              | 15                                      | 1.0                                                                                    | 61.5                                                                | 24.4                                                        |
| (+)SMCG16A                           | GEP                       | GEP | 17.8                                                         | 19.7 | 1.0                              | 16                                      | 1.0                                                                                    | 57.7                                                                | 26.0                                                        |
| (+)SMCG17A                           | GER                       | GER | 18.9                                                         | 20.9 | 1.0                              | 17                                      | 1.0                                                                                    | 54.3                                                                | 27.6                                                        |
| (+)SMCG18A                           | GET                       | BET | 20.0                                                         | 22.1 | 1.0                              | 18                                      | 1.0                                                                                    | 51.4                                                                | 29.2                                                        |
| (+)SMCG20A                           | GEV                       | BEV | 22.2                                                         | 24.5 | 1.0                              | 20                                      | 1.0                                                                                    | 46.3                                                                | 32.4                                                        |
| (+)SMCG22A                           | GEX                       | BEX | 24.4                                                         | 26.9 | 1.0                              | 22                                      | 1.0                                                                                    | 42.3                                                                | 35.5                                                        |
| (+)SMCG24A                           | GEZ                       | BEZ | 26.7                                                         | 29.5 | 1.0                              | 24                                      | 1.0                                                                                    | 38.6                                                                | 38.9                                                        |
| (+)SMCG26A                           | GFE                       | BFE | 28.9                                                         | 31.9 | 1.0                              | 26                                      | 1.0                                                                                    | 35.6                                                                | 42.1                                                        |
| (+)SMCG28A                           | GFG                       | BFG | 31.1                                                         | 34.4 | 1.0                              | 28                                      | 1.0                                                                                    | 33.0                                                                | 45.4                                                        |
| (+)SMCG30A                           | GFK                       | BFK | 33.3                                                         | 36.8 | 1.0                              | 30                                      | 1.0                                                                                    | 31.0                                                                | 48.4                                                        |
| (+)SMCG33A                           | GFM                       | BFM | 36.7                                                         | 40.6 | 1.0                              | 33                                      | 1.0                                                                                    | 28.1                                                                | 53.3                                                        |
| (+)SMCG36A                           | GFP                       | BFP | 40.0                                                         | 44.2 | 1.0                              | 36                                      | 1.0                                                                                    | 25.8                                                                | 58.1                                                        |
| (+)SMCG40A                           | GFR                       | BFR | 44.4                                                         | 49.1 | 1.0                              | 40                                      | 1.0                                                                                    | 23.3                                                                | 64.5                                                        |
| (+)SMCG43A                           | GFT                       | BFT | 47.8                                                         | 52.8 | 1.0                              | 43                                      | 1.0                                                                                    | 21.6                                                                | 69.4                                                        |
| (+)SMCG45A                           | GFV                       | GFV | 50.0                                                         | 55.3 | 1.0                              | 45                                      | 1.0                                                                                    | 20.6                                                                | 72.7                                                        |
| (+)SMCG48A                           | GFX                       | GFX | 53.3                                                         | 58.9 | 1.0                              | 48                                      | 1.0                                                                                    | 19.4                                                                | 77.4                                                        |
| (+)SMCG51A                           | GFZ                       | GFZ | 56.7                                                         | 62.7 | 1.0                              | 51                                      | 1.0                                                                                    | 18.2                                                                | 82.4                                                        |
| (+)SMCG54A                           | GGE                       | GGE | 60.0                                                         | 66.3 | 1.0                              | 54                                      | 1.0                                                                                    | 17.2                                                                | 87.1                                                        |
| (+)SMCG58A                           | GGG                       | GGG | 64.4                                                         | 71.2 | 1.0                              | 58                                      | 1.0                                                                                    | 16.0                                                                | 93                                                          |
| (+)SMCG60A                           | GGK                       | GGK | 66.7                                                         | 73.7 | 1.0                              | 60                                      | 1.0                                                                                    | 15.5                                                                | 96                                                          |
| (+)SMCG64A                           | GGM                       | GGM | 71.1                                                         | 78.6 | 1.0                              | 64                                      | 1.0                                                                                    | 14.6                                                                | 103                                                         |
| (+)SMCG70A                           | GGP                       | GGP | 77.8                                                         | 86.0 | 1.0                              | 70                                      | 1.0                                                                                    | 13.3                                                                | 113                                                         |
| (+)SMCG75A                           | GGR                       | GGR | 83.3                                                         | 92.1 | 1.0                              | 75                                      | 1.0                                                                                    | 12.4                                                                | 121                                                         |
| (+)SMCG78A                           | GGT                       | GGT | 86.7                                                         | 95.8 | 1.0                              | 78                                      | 1.0                                                                                    | 11.9                                                                | 126                                                         |
| (+)SMCG85A                           | GGV                       | GGV | 94.4                                                         | 104  | 1.0                              | 85                                      | 1.0                                                                                    | 10.9                                                                | 137                                                         |
| (+)SMCG90A                           | GGX                       | GGX | 100                                                          | 111  | 1.0                              | 90                                      | 1.0                                                                                    | 10.3                                                                | 146                                                         |
| (+)SMCG100A                          | GGZ                       | GGZ | 111                                                          | 123  | 1.0                              | 100                                     | 1.0                                                                                    | 9.3                                                                 | 162                                                         |
| (+)SMCG110A                          | GHE                       | GHE | 122                                                          | 135  | 1.0                              | 110                                     | 1.0                                                                                    | 8.5                                                                 | 177                                                         |
| (+)SMCG120A                          | GHG                       | GHG | 133                                                          | 147  | 1.0                              | 120                                     | 1.0                                                                                    | 7.8                                                                 | 193                                                         |
| (+)SMCG130A                          | GHK                       | GHK | 144                                                          | 159  | 1.0                              | 130                                     | 1.0                                                                                    | 7.2                                                                 | 209                                                         |
| (+)SMCG150A                          | GHM                       | GHM | 167                                                          | 185  | 1.0                              | 150                                     | 1.0                                                                                    | 6.2                                                                 | 243                                                         |
| (+)SMCG160A                          | GHP                       | GHP | 178                                                          | 197  | 1.0                              | 160                                     | 1.0                                                                                    | 5.8                                                                 | 259                                                         |
| (+)SMCG170A                          | GHR                       | GHR | 189                                                          | 209  | 1.0                              | 170                                     | 1.0                                                                                    | 5.5                                                                 | 275                                                         |
| SMCG188A                             | GHS                       | GHS | 209                                                          | 231  | 1.0                              | 188                                     | 1.0                                                                                    | 4.6                                                                 | 328                                                         |

**Notes**

- (1) Pulse test:  $t_p \leq 50$  ms
- (2) Surge current waveform per fig. 3 and derate per fig. 2
- (3) For bi-directional types having  $V_{WM}$  of 10 V and less, the  $I_D$  limit is doubled
- (4) All terms and symbols are consistent with ANSI/IEEE CA62.35
- (5) For the bi-directional SMCG5.0CA, the maximum  $V_{BR}$  is 7.25 V
- (6)  $V_F = 3.5$  V at  $I_F = 100$  A (uni-directional only)
- (+) Underwriters laboratory recognition for the classification of protectors (QVGQ2) under the UL standard for safety 497B and file number E136766 for both uni-directional and bi-directional devices

**THERMAL CHARACTERISTICS** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)

| PARAMETER                                       | SYMBOL                | VALUE | UNIT                 |
|-------------------------------------------------|-----------------------|-------|----------------------|
| Typical thermal resistance, junction to ambient | $R_{\theta JA}^{(1)}$ | 75    | $^{\circ}\text{C/W}$ |
| Typical thermal resistance, junction to lead    | $R_{\theta JL}$       | 15    | $^{\circ}\text{C/W}$ |

**Note**
<sup>(1)</sup> Mounted on minimum recommended pad layout

**ORDERING INFORMATION** (Example)

| PREFERRED P/N   | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE                      |
|-----------------|-----------------|------------------------|---------------|------------------------------------|
| SMCG5.0A-M3/57T | 0.211           | 57T                    | 850           | 7" diameter plastic tape and reel  |
| SMCG5.0A-M3/9AT | 0.211           | 9AT                    | 3500          | 13" diameter plastic tape and reel |

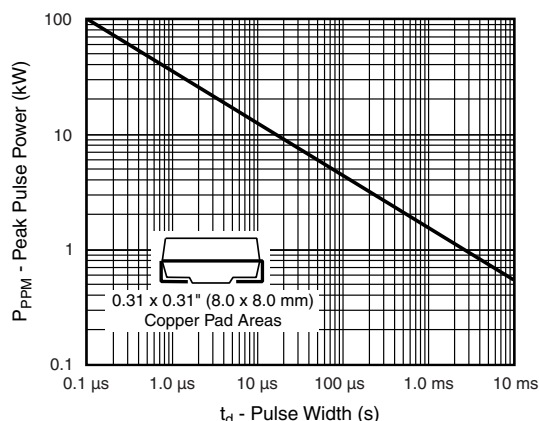
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Peak Pulse Power Rating Curve

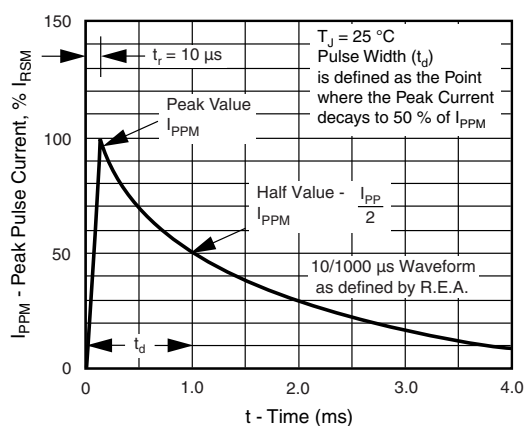


Fig. 3 - Pulse Waveform

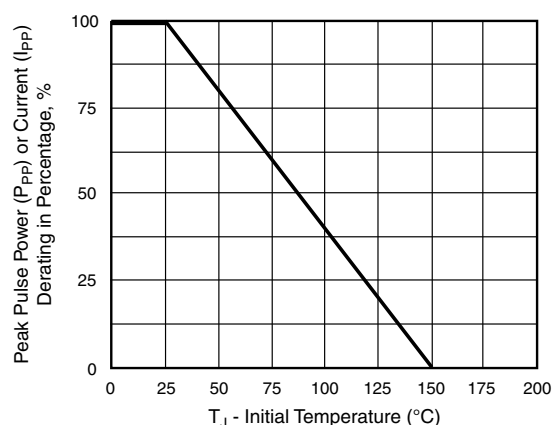


Fig. 2 - Pulse Power or Current vs. Initial Junction Temperature

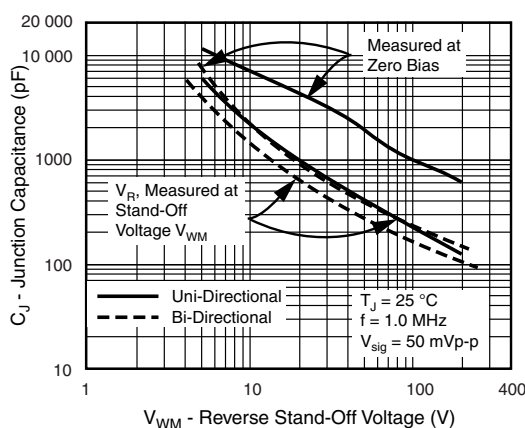


Fig. 4 - Typical Junction Capacitance Uni-Directional

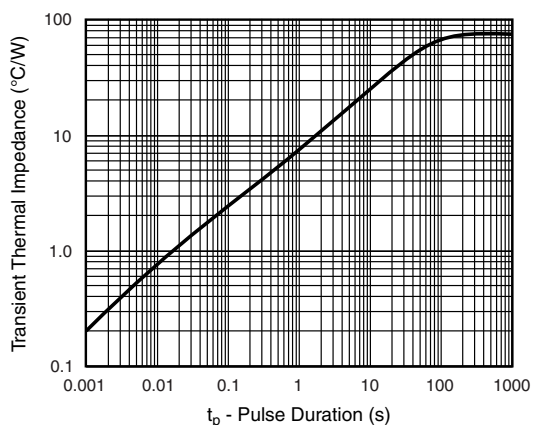


Fig. 5 - Typical Transient Thermal Impedance

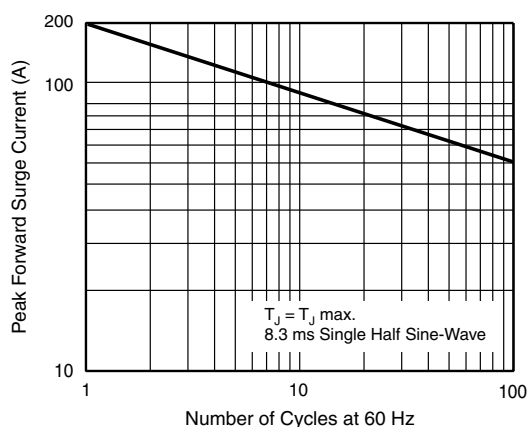
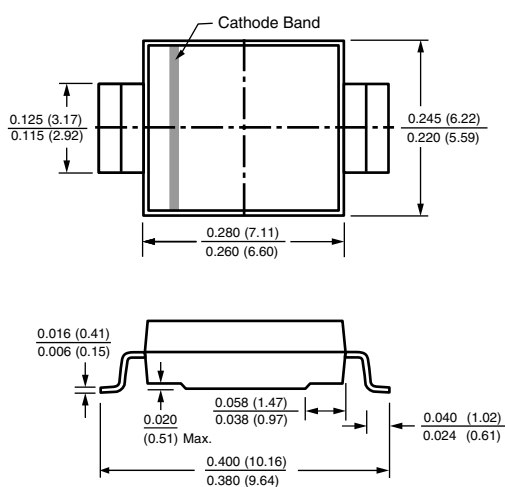


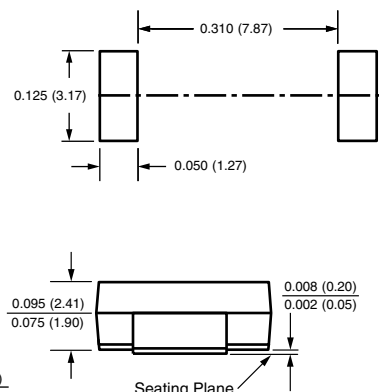
Fig. 6 - Maximum Non-Repetitive Forward Surge Current  
Uni-Directional Use Only

### PACKAGE OUTLINE DIMENSIONS in inches (millimeters)

#### SMCG (DO-215AB)



#### Mounting Pad Layout





## Disclaimer

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