



Surface Mount 1500 Watt Transient Voltage Suppressor

DESCRIPTION

The SMC 5.0 through SMC 170A series of 1500 watt Transient Voltage Suppressors (TVSs) protects a variety of voltage-sensitive components. The gull-wing design (SMCG) in the DO-215AB package allows for visible solder connections. The J-bend design (SMCJ) in the DO-214AB package allows for greater PC board mounting density. Selections include unidirectional and bidirectional as well as RoHS compliant versions. They can protect from secondary lightning effects per IEC61000-4-5 and class levels defined herein, or for inductive switching environments and induced RF protection. Since their response time is virtually instantaneous, they can also be used in protection from ESD and EFT per IEC61000-4-2 and IEC61000-4-4. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

Important: For the latest information, visit our website <http://www.microsemi.com>.

FEATURES

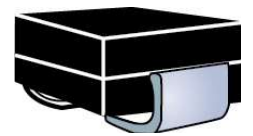
- Economical surface mount design with gull-wing or J-bend terminations.
- Wide leads assure a large surface contact for good heat dissipation and a low resistance path for surge current flow to ground.
- Available in both unidirectional and bidirectional construction.
- Designed specifically for transient voltage suppression.
- Ideal for protecting sensitive components such as integrated circuits and MOS devices.
- Moisture classification is "Level 1" with no dry pack required per IPC/JEDEC J-STD-020B.
- RoHS compliant versions available.
- Axial-lead equivalent packages for thru-hole mounting are available as 1.5KE6.8A to 1.5KE200CA or 1N6267 through 1N6303A and 1N5908 (contact Microsemi for other surface mount options).

APPLICATIONS / BENEFITS

- Selections for 5.0 to 170 volts standoff voltages (V_{WM}).
- Tolerance levels of 5% or 10% available.
- 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 IEC61000-4-5 with 42 ohms source impedance:
 - Class 1: SMC 5.0 to SMC 170A or CA
 - Class 2: SMC 5.0 to SMC 150A or CA
 - Class 3: SMC 5.0 to SMC 75A or CA
 - Class 4: SMC 5.0 to SMC 36A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 ohms source impedance:
 - Class 1: SMC 5.0 to SMC 90A or CA
 - Class 2: SMC 5.0 to SMC 45A or CA
 - Class 3: SMC 5.0 to SMC 24A or CA
 - Class 4: SMC 5.0 to SMC 11A or CA
- Secondary lightning protection per IEC61000-4-5 with 2 ohms source impedance:
 - Class 2: SMC 5.0 to SMC 22A or CA
 - Class 3: SMC 5.0 to SMC 10A or CA



**DO-215AB
(SMCG) Package**



**DO-214AB
(SMCJ) Package**

NOTE: All SMC series are equivalent to prior SMM package identifications.

Also available in:

Hi-Rel Level

[MSMCG\(J\)5.0A – MXLSMCG\(J\)170CAe3](#)

MSC – Lawrence
 6 Lake Street,
 Lawrence, MA 01841
 Tel: 1-800-446-1158 or
 (978) 620-2600
 Fax: (978) 689-0803

MSC – Ireland
 Gort Road Business Park,
 Ennis, Co. Clare, Ireland
 Tel: +353 (0) 65 6840044
 Fax: +353 (0) 65 6822298

Website:
www.microsemi.com

MAXIMUM RATINGS

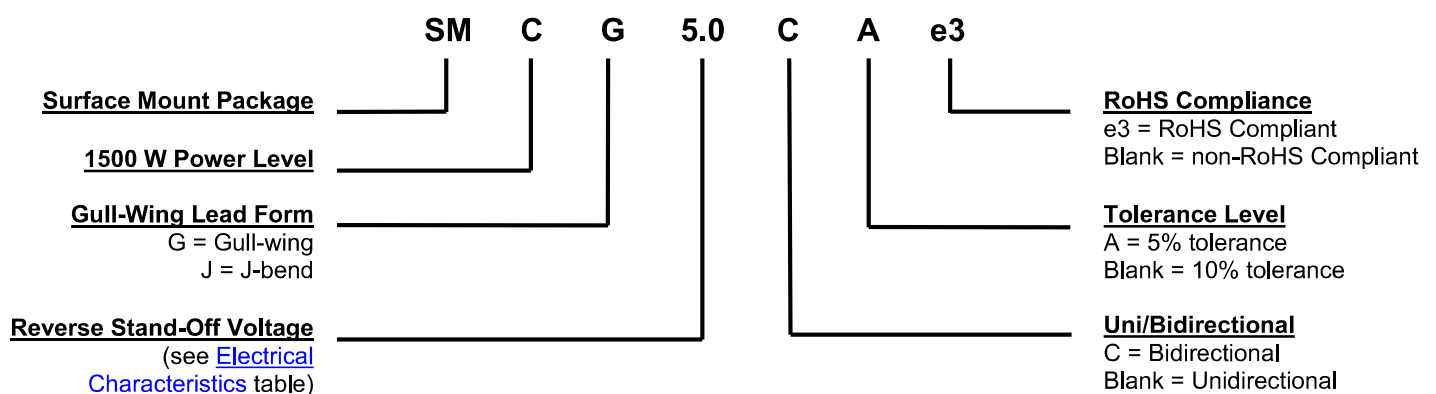
| Parameters/Test Conditions | Symbol | Value | Unit |
|--|-------------------------------------|--------------------|---------------------|
| Junction and Storage Temperature | T _J and T _{STG} | -65 to +150 | °C |
| Thermal Resistance Junction-to-Lead | R _{θJL} | 20 | °C/W |
| Thermal Resistance Junction-to-Ambient ⁽¹⁾ | R _{θJA} | 80 | °C/W |
| Peak Pulse Power dissipation @ 25 °C (at 10/1000 μs, see Figures 1, 2, and 3) | P _{PP} | 1500 | W |
| Impulse Repetition Rate (duty factor) | df | 0.01 | % |
| t _{clamping} (0 volts to V _(BR) min.) | Unidirectional | <100 | ps |
| | Bidirectional | <5 | ns |
| Rated Average Power Dissipation | T _L = +30 °C | P _{M(AV)} | 6 |
| | T _A = +25 °C | | 1.56 ⁽¹⁾ |
| Maximum Forward Surge Current ⁽²⁾ | I _{FSM} | 200 | A (pk) |
| Solder Temperature @ 10 s | T _{SP} | 260 | °C |

- Notes:** 1. When mounted on FR4 PC board (1oz Cu) with recommended footprint (see [last page](#)).
2. Peak impulse of 8.3 ms half-sine wave at 25 °C (unidirectional only).

MECHANICAL and PACKAGING

- CASE: Void-free transfer molded thermosetting epoxy body meeting UL94V-0.
- TERMINALS: Tin-lead or RoHS compliant annealed matte-tin plating. Solderable to MIL-STD-750, method 2026.
- MARKING: Part number without “SM” prefix (e.g. C5.0A, C5.0CA, 5.0Ae3, C5.0CAe3, C36A, C36CA, C36CAe3, etc.).
- POLARITY: Cathode indicated by band. No marking on bi-directional devices.
- TAPE & REEL option: Standard per EIA-481-2 with 16 mm tape (add “TR” suffix to part number). Consult factory for quantities.
- WEIGHT: Approximately 0.25 grams.
- See [package dimensions](#) on last page.

PART NOMENCLATURE



SYMBOLS & DEFINITIONS

| Symbol | Definition |
|------------|--|
| $I_{(BR)}$ | Breakdown Current: The current used for measuring breakdown voltage $V_{(BR)}$. |
| I_D | Standby Current: The current at the rated standoff voltage (V_{WM}). |
| I_F | Forward Current: The forward current dc value, no alternating component. |
| I_O | Average Rectified Output Current: The output current averaged over a full cycle with a 50 Hz or 60 Hz sine-wave input and a 180 degree conduction angle. |
| I_{PP} | Peak Impulse Current: The peak current during the impulse. |
| P_{PP} | Peak Pulse Power: The peak power dissipation resulting from the peak impulse current I_{PP} . |
| V_C | Clamping Voltage: The maximum clamping voltage at specified I_{PP} (Peak Pulse Current) at the specified pulse conditions. |
| $V_{(BR)}$ | Minimum Breakdown Voltage: The minimum voltage the device will exhibit at a specified current. |
| V_{WM} | Working Peak Voltage: The maximum peak voltage that can be applied over the operating temperature range. This is also referred to as standoff voltage. |

ELECTRICAL CHARACTERISTICS @ 25 °C unless otherwise stated

| MICROSEMI PART NUMBER | | REVERSE STAND-OFF VOLTAGE V_{WM} Volts | BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$ Volts | | MAXIMUM CLAMPING VOLTAGE @ I_{PP} Volts | PEAK PULSE CURRENT (See Fig. 2) I_{PP} Amps | MAXIMUM STANDBY CURRENT @ V_{WM} I_D μA |
|-----------------------|----------|--|---|------|---|--|---|
| Gull-Wing | J-Bend | | MIN. | MAX. | | | |
| SMCG5.0 | SMCJ5.0 | 5.0 | 6.40 – 7.30 | 10 | 9.6 | 156.2 | 1000 |
| SMCG5.0A | SMCJ5.0A | 5.0 | 6.40 – 7.00 | 10 | 9.2 | 163.0 | 1000 |
| SMCG6.0 | SMCJ6.0 | 6.0 | 6.67 – 8.15 | 10 | 11.4 | 131.6 | 1000 |
| SMCG6.0A | SMCJ6.0A | 6.0 | 6.67 – 7.37 | 10 | 10.3 | 145.6 | 1000 |
| SMCG6.5 | SMCJ6.5 | 6.5 | 7.22 – 8.82 | 10 | 12.3 | 122.0 | 500 |
| SMCG6.5A | SMCJ6.5A | 6.5 | 7.22 – 7.98 | 10 | 11.2 | 133.9 | 500 |
| SMCG7.0 | SMCJ7.0 | 7.0 | 7.78 – 9.51 | 10 | 13.3 | 112.8 | 200 |
| SMCG7.0A | SMCJ7.0A | 7.0 | 7.78 – 8.60 | 10 | 12.0 | 125.0 | 200 |
| SMCG7.5 | SMCJ7.5 | 7.5 | 8.33 – 10.2 | 1 | 14.3 | 104.9 | 100 |
| SMCG7.5A | SMCJ7.5A | 7.5 | 8.33 – 9.21 | 1 | 12.9 | 116.3 | 100 |
| SMCG8.0 | SMCJ8.0 | 8.0 | 8.89 – 10.9 | 1 | 15.0 | 100.0 | 50 |
| SMCG8.0A | SMCJ8.0A | 8.0 | 8.89 – 9.83 | 1 | 13.6 | 110.3 | 50 |
| SMCG8.5 | SMCJ8.5 | 8.5 | 9.44 – 11.5 | 1 | 15.9 | 94.3 | 20 |
| SMCG8.5A | SMCJ8.5A | 8.5 | 9.44 – 10.4 | 1 | 14.4 | 104.2 | 20 |
| SMCG9.0 | SMCJ9.0 | 9.0 | 10.0 – 12.2 | 1 | 16.9 | 88.7 | 10 |
| SMCG9.0A | SMCJ9.0A | 9.0 | 10.0 – 11.1 | 1 | 15.4 | 97.4 | 10 |
| SMCG10 | SMCJ10 | 10 | 11.1 – 13.6 | 1 | 18.8 | 79.8 | 5 |
| SMCG10A | SMCJ10A | 10 | 11.1 – 12.3 | 1 | 17.0 | 88.2 | 5 |
| SMCG11 | SMCJ11 | 11 | 12.2 – 14.9 | 1 | 20.1 | 74.6 | 5 |
| SMCG11A | SMCJ11A | 11 | 12.2 – 13.5 | 1 | 18.2 | 82.4 | 5 |
| SMCG12 | SMCJ12 | 12 | 13.3 – 16.3 | 1 | 22.0 | 68.2 | 5 |
| SMCG12A | SMCJ12A | 12 | 13.3 – 14.7 | 1 | 19.9 | 75.3 | 5 |
| SMCG13 | SMCJ13 | 13 | 14.4 – 17.6 | 1 | 23.8 | 63.0 | 1 |
| SMCG13A | SMCJ13A | 13 | 14.4 – 15.9 | 1 | 21.5 | 69.7 | 1 |
| SMCG14 | SMCJ14 | 14 | 15.6 – 19.1 | 1 | 25.8 | 58.1 | 1 |
| SMCG14A | SMCJ14A | 14 | 15.6 – 17.2 | 1 | 23.2 | 64.7 | 1 |
| SMCG15 | SMCJ15 | 15 | 16.7 – 20.4 | 1 | 26.9 | 55.8 | 1 |
| SMCG15A | SMCJ15A | 15 | 16.7 – 18.5 | 1 | 24.4 | 61.5 | 1 |
| SMCG16 | SMCJ16 | 16 | 17.8 – 21.8 | 1 | 28.8 | 52.1 | 1 |
| SMCG16A | SMCJ16A | 16 | 17.8 – 19.7 | 1 | 26.0 | 57.7 | 1 |
| SMCG17 | SMCJ17 | 17 | 18.9 – 23.1 | 1 | 30.5 | 49.2 | 1 |
| SMCG17A | SMCJ17A | 17 | 18.9 – 20.9 | 1 | 27.6 | 53.3 | 1 |
| SMCG18 | SMCJ18 | 18 | 20.0 – 24.4 | 1 | 32.2 | 46.6 | 1 |
| SMCG18A | SMCJ18A | 18 | 20.0 – 22.1 | 1 | 29.2 | 51.4 | 1 |
| SMCG20 | SMCJ20 | 20 | 22.2 – 27.1 | 1 | 35.8 | 41.9 | 1 |
| SMCG20A | SMCJ20A | 20 | 22.2 – 24.5 | 1 | 32.4 | 46.3 | 1 |
| SMCG22 | SMCJ22 | 22 | 24.4 – 29.8 | 1 | 39.4 | 38.1 | 1 |
| SMCG22A | SMCJ22A | 22 | 24.4 – 26.9 | 1 | 35.5 | 42.2 | 1 |
| SMCG24 | SMCJ24 | 24 | 26.7 – 32.6 | 1 | 43.0 | 34.9 | 1 |
| SMCG24A | SMCJ24A | 24 | 26.7 – 29.5 | 1 | 38.9 | 38.6 | 1 |

Continued.

ELECTRICAL CHARACTERISTICS @ 25 °C unless otherwise stated (continued)

| MICROSEMI PART NUMBER | | REVERSE STAND-OFF VOLTAGE V_{WM} Volts | BREAKDOWN VOLTAGE $V_{(BR)}$ @ $I_{(BR)}$ Volts | | MAXIMUM CLAMPING VOLTAGE @ I_{PP} Volts | PEAK PULSE CURRENT (See Fig. 2) I_{PP} Amps | MAXIMUM STANDBY CURRENT @ V_{WM} I_D μA |
|-----------------------|----------|--|--|------|---|---|---|
| | | | MIN. | MAX. | | | |
| Gull-Wing | J-Bend | | | | | | |
| SMCG26 | SMCJ26 | 26 | 28.9 – 35.3 | 1 | 46.6 | 32.2 | 1 |
| SMCG26A | SMCJ26A | 26 | 28.9 – 31.9 | 1 | 42.1 | 35.6 | 1 |
| SMCG28 | SMCJ28 | 28 | 31.1 – 38.0 | 1 | 50.0 | 30.0 | 1 |
| SMCG28A | SMCJ28A | 28 | 31.1 – 34.4 | 1 | 45.4 | 33.0 | 1 |
| SMCG30 | SMCJ30 | 30 | 33.3 – 40.7 | 1 | 53.5 | 28.0 | 1 |
| SMCG30A | SMCJ30A | 30 | 33.3 – 36.8 | 1 | 48.4 | 31.0 | 1 |
| SMCG33 | SMCJ33 | 33 | 36.7 – 44.9 | 1 | 59.0 | 25.2 | 1 |
| SMCG33A | SMCJ33A | 33 | 36.7 – 40.6 | 1 | 53.3 | 28.1 | 1 |
| SMCG36 | SMCJ36 | 36 | 40.0 – 48.9 | 1 | 64.3 | 23.3 | 1 |
| SMCG36A | SMCJ36A | 36 | 40.0 – 44.2 | 1 | 58.1 | 25.8 | 1 |
| SMCG40 | SMCJ40 | 40 | 44.4 – 54.3 | 1 | 71.4 | 21.0 | 1 |
| SMCG40A | SMCJ40A | 40 | 44.4 – 49.1 | 1 | 64.5 | 23.2 | 1 |
| SMCG43 | SMCJ43 | 43 | 47.8 – 58.4 | 1 | 76.7 | 19.6 | 1 |
| SMCG43A | SMCJ43A | 43 | 47.8 – 52.8 | 1 | 69.4 | 21.6 | 1 |
| SMCG45 | SMCJ45 | 45 | 50.0 – 61.1 | 1 | 80.3 | 18.7 | 1 |
| SMCG45A | SMCJ45A | 45 | 50.0 – 55.3 | 1 | 72.7 | 20.6 | 1 |
| SMCG48 | SMCJ48 | 48 | 53.3 – 65.1 | 1 | 85.5 | 17.5 | 1 |
| SMCG48A | SMCJ48A | 48 | 53.3 – 58.9 | 1 | 77.4 | 19.4 | 1 |
| SMCG51 | SMCJ51 | 51 | 56.7 – 69.3 | 1 | 91.1 | 18.5 | 1 |
| SMCG51A | SMCJ51A | 51 | 56.7 – 62.7 | 1 | 82.4 | 18.2 | 1 |
| SMCG54 | SMCJ54 | 54 | 60.0 – 73.3 | 1 | 96.3 | 15.6 | 1 |
| SMCG54A | SMCJ54A | 54 | 60.0 – 66.3 | 1 | 87.1 | 17.2 | 1 |
| SMCG58 | SMCJ58 | 58 | 64.4 – 78.7 | 1 | 103.0 | 14.6 | 1 |
| SMCG58A | SMCJ58A | 58 | 64.4 – 71.2 | 1 | 93.6 | 16.0 | 1 |
| SMCG60 | SMCJ60 | 60 | 66.7 – 81.5 | 1 | 107.0 | 14.0 | 1 |
| SMCG60A | SMCJ60A | 60 | 66.7 – 73.7 | 1 | 96.8 | 15.5 | 1 |
| SMCG64 | SMCJ64 | 64 | 71.1 – 86.9 | 1 | 114.0 | 13.2 | 1 |
| SMCG64A | SMCJ64A | 64 | 71.1 – 78.6 | 1 | 103.0 | 14.6 | 1 |
| SMCG70 | SMCJ70 | 70 | 77.8 – 95.1 | 1 | 125 | 12.0 | 1 |
| SMCG70A | SMCJ70A | 70 | 77.8 – 86.0 | 1 | 113 | 13.3 | 1 |
| SMCG75 | SMCJ75 | 75 | 83.3 – 102.0 | 1 | 134 | 11.2 | 1 |
| SMCG75A | SMCJ75A | 75 | 83.3 – 92.1 | 1 | 121 | 12.4 | 1 |
| SMCG78 | SMCJ78 | 78 | 86.7 – 106.0 | 1 | 139 | 10.8 | 1 |
| SMCG78A | SMCJ78A | 78 | 86.7 – 95.8 | 1 | 126 | 11.4 | 1 |
| SMCG85 | SMCJ85 | 85 | 94.4 – 115.0 | 1 | 151 | 9.9 | 1 |
| SMCG85A | SMCJ85A | 85 | 94.4 – 104.0 | 1 | 137 | 10.4 | 1 |
| SMCG90 | SMCJ90 | 90 | 100 – 122 | 1 | 160 | 9.4 | 1 |
| SMCG90A | SMCJ90A | 90 | 100 – 111 | 1 | 146 | 10.3 | 1 |
| SMCG100 | SMCJ100 | 100 | 111 – 136 | 1 | 179 | 8.4 | 1 |
| SMCG100A | SMCJ100A | 100 | 111 – 123 | 1 | 162 | 9.3 | 1 |
| SMCG110 | SMCJ110 | 110 | 122 – 149 | 1 | 196 | 7.7 | 1 |
| SMCG110A | SMCJ110A | 110 | 122 – 135 | 1 | 177 | 8.4 | 1 |
| SMCG120 | SMCJ120 | 120 | 133 – 163 | 1 | 214 | 7.0 | 1 |
| SMCG120A | SMCJ120A | 120 | 133 – 147 | 1 | 193 | 7.8 | 1 |
| SMCG130 | SMCJ130 | 130 | 144 – 176 | 1 | 231 | 6.5 | 1 |
| SMCG130A | SMCJ130A | 130 | 144 – 159 | 1 | 209 | 7.2 | 1 |
| SMCG150 | SMCJ150 | 150 | 167 – 204 | 1 | 268 | 5.6 | 1 |
| SMCG150A | SMCJ150A | 150 | 167 – 185 | 1 | 243 | 6.2 | 1 |
| SMCG160 | SMCJ160 | 160 | 178 – 218 | 1 | 287 | 5.2 | 1 |
| SMCG160A | SMCJ160A | 160 | 178 – 197 | 1 | 259 | 5.8 | 1 |
| SMCG170 | SMCJ170 | 170 | 189 – 231 | 1 | 304 | 4.9 | 1 |
| SMCG170A | SMCJ170A | 170 | 189 – 209 | 1 | 275 | 5.5 | 1 |

- For bidirectional device types, indicate a C or CA suffix after the part number. (i.e.: SMCG170CA). Bidirectional capacitance is half that shown in [Figure 4](#) at zero volts.

GRAPHS

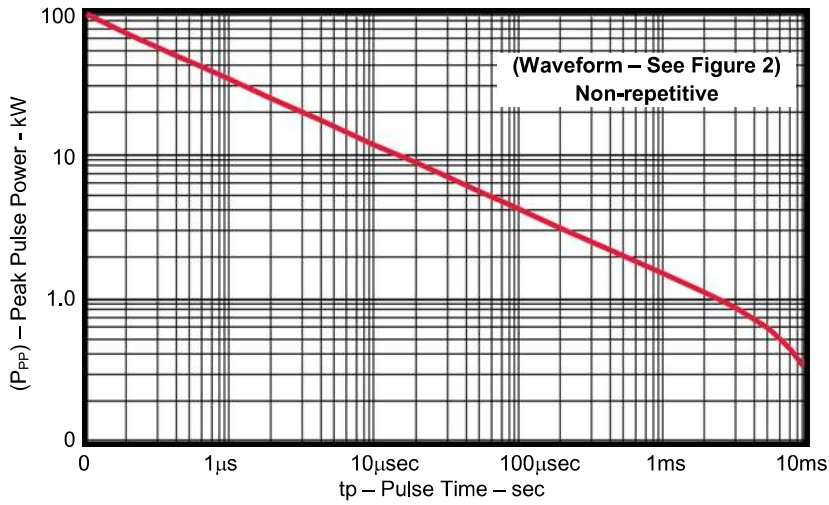


FIGURE 1 – Peak Pulse Power vs. Pulse Time

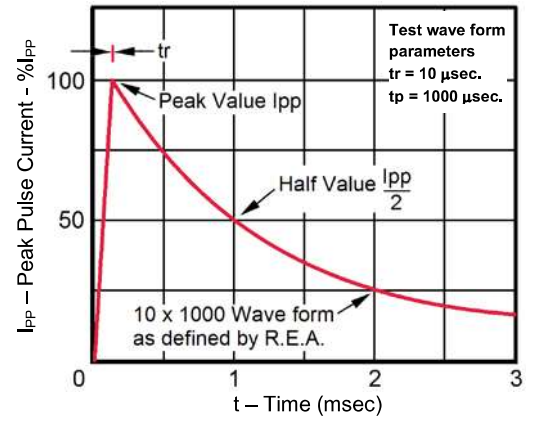


FIGURE 2 – Pulse Waveform

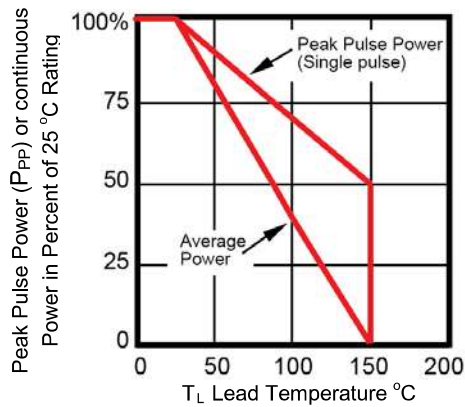


FIGURE 3 – Derating Curve

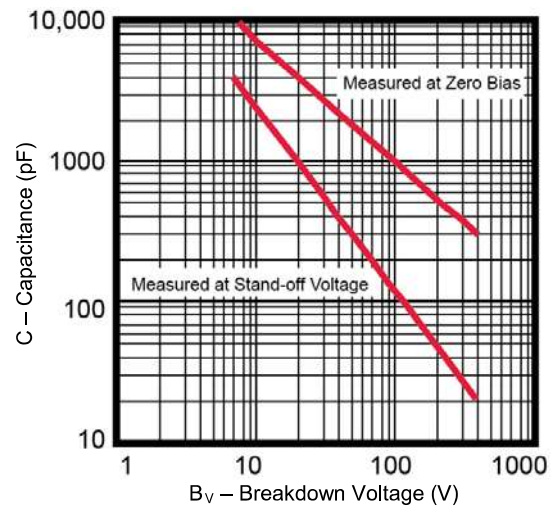
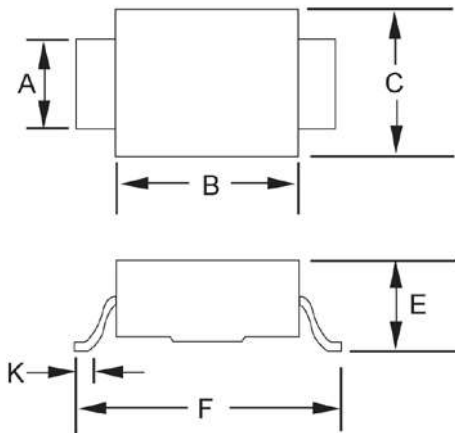
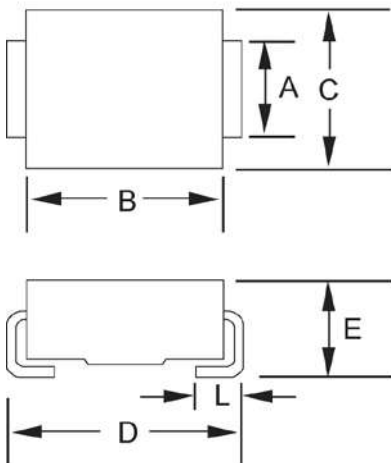


FIGURE 4
Typical Capacitance vs.
Breakdown Voltage

PACKAGE DIMENSIONS

SMCG (DO-215AB)

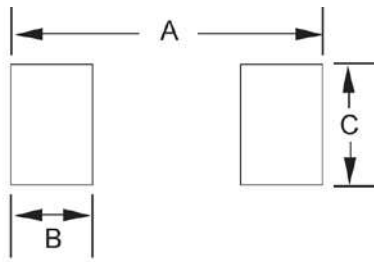
| Ltr | Dimensions | | | |
|----------|------------|-------|-------------|-------|
| | Inch | | Millimeters | |
| | Min | Max | Min | Max |
| A | 0.115 | 0.121 | 2.92 | 3.07 |
| B | 0.260 | 0.280 | 6.60 | 7.11 |
| C | 0.220 | 0.245 | 5.59 | 6.22 |
| E | 0.077 | 0.110 | 1.95 | 2.80 |
| F | 0.380 | 0.400 | 9.65 | 10.16 |
| K | 0.025 | 0.040 | 0.635 | 1.016 |

NOTES: Dimension "E" exceeds the JEDEC outline in height as shown.
Typical Standoff Height: 0.004" – 0.008" (0.1 mm – 0.2 mm).


SMCJ (DO-214AB)

| Ltr | Dimensions | | | |
|----------|------------|-------|-------------|------|
| | Inch | | Millimeters | |
| | Min | Max | Min | Max |
| A | 0.115 | 0.121 | 2.92 | 3.07 |
| B | 0.260 | 0.280 | 6.60 | 7.11 |
| C | 0.220 | 0.245 | 5.59 | 6.22 |
| D | 0.305 | 0.320 | 7.75 | 8.13 |
| E | 0.077 | 0.110 | 1.95 | 2.80 |
| L | 0.030 | 0.060 | .760 | 1.52 |

NOTES: Dimension "E" exceeds the JEDEC outline in height as shown.
Typical Standoff Height: 0.004" – 0.008" (0.1 mm – 0.2 mm).

PAD LAYOUT


| SMCG (DO-215AB) | | |
|------------------------|-------------|--------------------|
| Ltr | Inch | Millimeters |
| A | 0.510 | 12.95 |
| B | 0.110 | 2.79 |
| C | 0.150 | 3.81 |

| SMCJ (DO-214AB) | | |
|------------------------|-------------|--------------------|
| Ltr | Inch | Millimeters |
| A | 0.390 | 9.90 |
| B | 0.110 | 2.79 |
| C | 0.150 | 3.81 |