



## Surface Mount 3000 Watt Transient Voltage Suppressor

Screening in  
reference to  
MIL-PRF-19500  
available

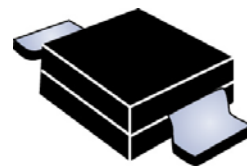
### DESCRIPTION

The MSMLG(J)5.0A through MXLSMLG(J)170A series of high-reliability Transient Voltage Suppressors (TVSs) protect circuits from voltage spikes containing up to 3000 W (10/1000  $\mu$ s model pulse). The SMLG gull-wing design in the DO-215AB package allows for visible solder connections. The SMLJ J-bend design in the DO-214AB package allows for greater PC board mounting density. Selections include unidirectional and bidirectional as well as RoHS compliant versions. These are available with a variety of upscreening options for enhanced reliability. They protect against the secondary effects of lightning per IEC61000-4-5 and against voltage pulses from inductive switching environments and induced by RF radiation. 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.

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

### FEATURES

- High reliability devices with fabrication and assembly lot traceability for all M prefix devices
- All devices are 100% surge tested
- 3 $\sigma$  lot norm screening performed on standby current ( $I_D$ ) for all M prefix devices
- Available in both unidirectional and bidirectional versions
- Moisture classification is "Level 1" with no dry pack required per IPC/JEDEC J-STD-020B for all M prefix devices.
- Enhanced reliability screening options with M prefix are available in reference to MIL-PRF-19500. Refer to [High Reliability Up-Screened Plastic Products Portfolio](#) for more details on the screening options.  
(See [part nomenclature](#) for all available options.)
- RoHS compliant versions available
- Axial-lead equivalent packages for thru-hole mounting are available as M5KP5.0A to M5KP110CA with 5000 W rating (contact Microsemi for other surface mount options).



**DO-215AB  
Package**



**DO-214AB  
Package**

### APPLICATIONS / BENEFITS

- Suppresses transients up to 3000 watts (10/1000 us test pulse - see [Figure 2](#))
- Selections for 5.0 to 170 volts standoff voltages ( $V_{WM}$ )
- 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 & 2: SML 5.0A to SML 170A or CA
  - Class 3: SML 5.0A to SML 150A or CA
  - Class 4: SML 5.0A to SML 75A or CA
- Secondary lightning protection per IEC61000-4-5 with 12 ohms source impedance:
  - Class 1: SML 5.0A to SML 170A or CA
  - Class 2: SML 5.0A to SML 90A or CA
  - Class 3: SML 5.0A to SML 48A or CA
  - Class 4: SML 5.0A to SML 24A or CA
- Secondary lightning protection per IEC61000-4-5 with 2 ohms source impedance:
  - Class 2: SML 5.0A to SML 43A or CA
  - Class 3: SML 5.0A to SML 22A or CA
  - Class 4: SML 5.0A to SML10A or CA

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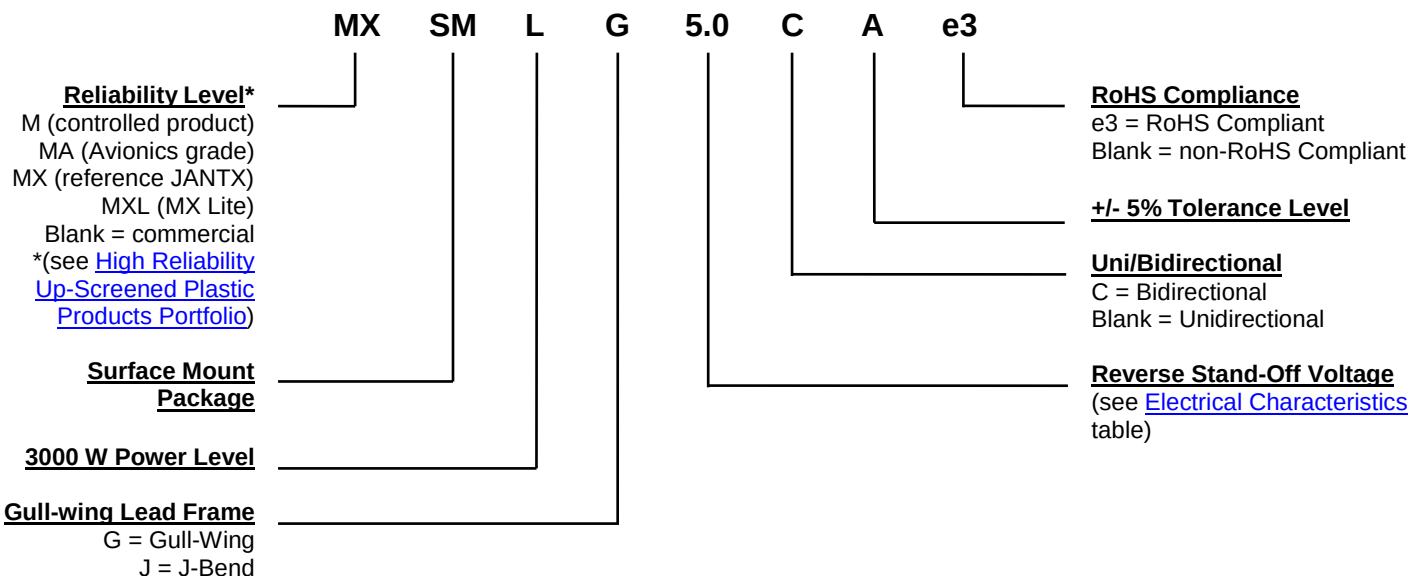
**MAXIMUM RATINGS**

| Parameters/Test Conditions                                                                             | Symbol              | Value               | Unit   |
|--------------------------------------------------------------------------------------------------------|---------------------|---------------------|--------|
| Junction and Storage Temperature                                                                       | $T_J$ and $T_{STG}$ | -65 to +150         | °C     |
| Thermal Resistance Junction-to-Lead                                                                    | $R_{\theta JL}$     | 17.5                | °C/W   |
| Thermal Resistance Junction-to-Ambient <sup>(1)</sup>                                                  | $R_{\theta JA}$     | 77.5                | °C/W   |
| Peak Pulse Power Dissipation @ 25 °C<br>(at 10/1000 $\mu$ s, see <a href="#">Figures 1, 2, and 3</a> ) | $P_{PP}$            | 3000                | W      |
| Impulse Repetition Rate (duty factor)                                                                  | df                  | 0.01 or less        | %      |
| $t_{clamping}$ (0 volts to $V_{(BR)}$ min.)                                                            | $t_{clamping}$      | <100                | ps     |
| Unidirectional                                                                                         |                     | <5                  | ns     |
| Bidirectional                                                                                          |                     |                     |        |
| Rated Average Power Dissipation                                                                        | $P_{M(AV)}$         | 6                   | W      |
| $T_L = +45$ °C                                                                                         |                     | 1.61 <sup>(1)</sup> |        |
| $T_A = +25$ °C                                                                                         |                     |                     |        |
| Maximum Forward Surge Current <sup>(2)</sup>                                                           | $I_{FSM}$           | 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 marked on package
- POLARITY: Cathode indicated by band. No cathode band on bi-directional devices
- TAPE & REEL option: Standard per EIA-481-B 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: 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**

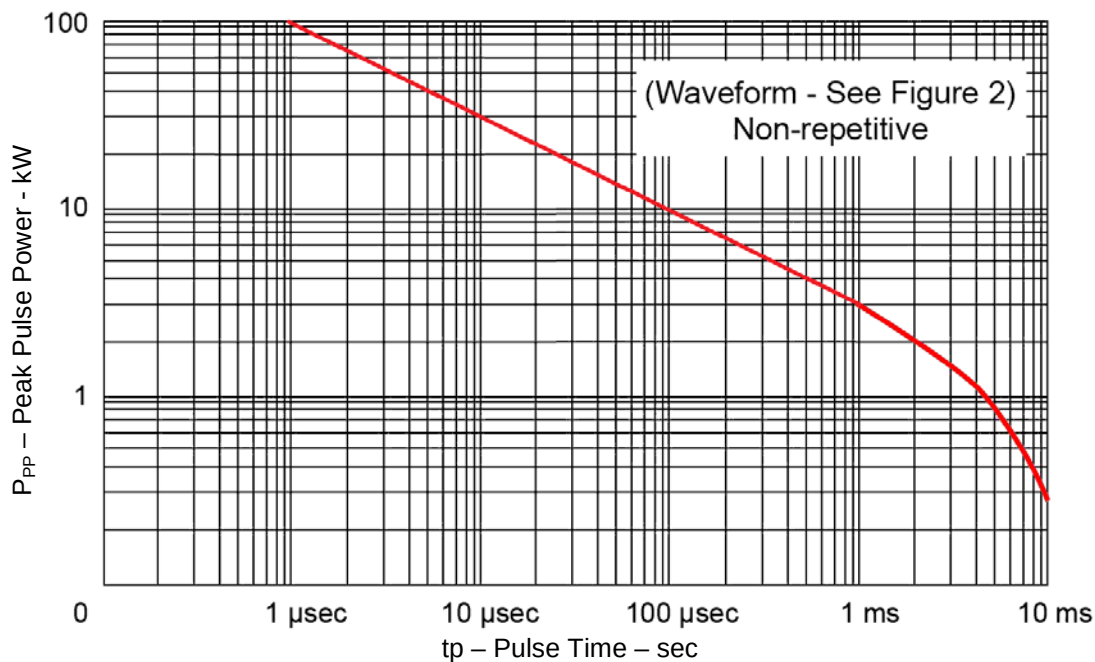
| PART NUMBER |          | REVERSE<br>STAND-OFF<br>VOLTAGE<br>$V_{WM}$ | BREAKDOWN<br>VOLTAGE<br>$V_{(BR)}$ @ $I_{(BR)}$<br>Volts |      | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>@ $I_{PP}$ | PEAK PULSE<br>CURRENT<br>(See Fig. 2)<br>$I_{PP}$ | MAXIMUM<br>STANDBY<br>CURRENT<br>@ $V_{WM}$<br>$I_D$<br>$\mu A$ |
|-------------|----------|---------------------------------------------|----------------------------------------------------------|------|----------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------|
| Gull-Wing   | J-Bend   | Volts                                       | MIN.                                                     | MAX. | Volts                                        | Amps                                              |                                                                 |
| SMLG5.0A    | SMLJ5.0A | 5.0                                         | 6.40 – 7.00                                              | 10   | 9.2                                          | 326.0                                             | 1000                                                            |
| SMLG6.0A    | SMLJ6.0A | 6.0                                         | 6.67 – 7.37                                              | 10   | 10.3                                         | 291.3                                             | 1000                                                            |
| SMLG6.5A    | SMLJ6.5A | 6.5                                         | 7.22 – 7.98                                              | 10   | 11.2                                         | 267.9                                             | 500                                                             |
| SMLG7.0A    | SMLJ7.0A | 7.0                                         | 7.78 – 8.60                                              | 10   | 12.0                                         | 250.0                                             | 200                                                             |
| SMLG7.5A    | SMLJ7.5A | 7.5                                         | 8.33 – 9.21                                              | 1    | 12.9                                         | 232.6                                             | 100                                                             |
| SMLG8.0A    | SMLJ8.0A | 8.0                                         | 8.89 – 9.83                                              | 1    | 13.6                                         | 220.6                                             | 50                                                              |
| SMLG8.5A    | SMLJ8.5A | 8.5                                         | 9.44 – 10.4                                              | 1    | 14.4                                         | 208.4                                             | 25                                                              |
| SMLG9.0A    | SMLJ9.0A | 9.0                                         | 10.0 – 11.1                                              | 1    | 15.4                                         | 194.8                                             | 10                                                              |
| SMLG10A     | SMLJ10A  | 10                                          | 11.1 – 12.3                                              | 1    | 17.0                                         | 176.4                                             | 5                                                               |
| SMLG11A     | SMLJ11A  | 11                                          | 12.2 – 13.5                                              | 1    | 18.2                                         | 164.8                                             | 5                                                               |
| SMLG12A     | SMLJ12A  | 12                                          | 13.3 – 14.7                                              | 1    | 19.9                                         | 150.6                                             | 5                                                               |
| SMLG13A     | SMLJ13A  | 13                                          | 14.4 – 15.9                                              | 1    | 21.5                                         | 139.4                                             | 5                                                               |
| SMLG14A     | SMLJ14A  | 14                                          | 15.6 – 17.2                                              | 1    | 23.2                                         | 129.4                                             | 2                                                               |
| SMLG15A     | SMLJ15A  | 15                                          | 16.7 – 18.5                                              | 1    | 24.4                                         | 123.0                                             | 2                                                               |
| SMLG16A     | SMLJ16A  | 16                                          | 17.8 – 19.7                                              | 1    | 26.0                                         | 115.4                                             | 2                                                               |
| SMLG17A     | SMLJ17A  | 17                                          | 18.9 – 20.9                                              | 1    | 27.6                                         | 106.6                                             | 2                                                               |
| SMLG18A     | SMLJ18A  | 18                                          | 20.0 – 22.1                                              | 1    | 29.2                                         | 102.8                                             | 2                                                               |
| SMLG20A     | SMLJ20A  | 20                                          | 22.2 – 24.5                                              | 1    | 32.4                                         | 92.6                                              | 2                                                               |
| SMLG22A     | SMLJ22A  | 22                                          | 24.4 – 26.9                                              | 1    | 35.5                                         | 84.4                                              | 2                                                               |
| SMLG24A     | SMLJ24A  | 24                                          | 26.7 – 29.5                                              | 1    | 38.9                                         | 77.2                                              | 2                                                               |
| SMLG26A     | SMLJ26A  | 26                                          | 28.9 – 31.9                                              | 1    | 42.1                                         | 71.2                                              | 2                                                               |
| SMLG28A     | SMLJ28A  | 28                                          | 31.1 – 34.4                                              | 1    | 45.4                                         | 66.0                                              | 2                                                               |
| SMLG30A     | SMLJ30A  | 30                                          | 33.3 – 36.8                                              | 1    | 48.4                                         | 62.0                                              | 2                                                               |
| SMLG33A     | SMLJ33A  | 33                                          | 36.7 – 40.6                                              | 1    | 53.3                                         | 56.2                                              | 2                                                               |
| SMLG36A     | SMLJ36A  | 36                                          | 40.0 – 44.2                                              | 1    | 58.1                                         | 51.6                                              | 2                                                               |
| SMLG40A     | SMLJ40A  | 40                                          | 44.4 – 49.1                                              | 1    | 64.5                                         | 46.4                                              | 2                                                               |
| SMLG43A     | SMLJ43A  | 43                                          | 47.8 – 52.8                                              | 1    | 69.4                                         | 43.2                                              | 2                                                               |
| SMLG45A     | SMLJ45A  | 45                                          | 50.0 – 55.3                                              | 1    | 72.7                                         | 41.2                                              | 2                                                               |
| SMLG48A     | SMLJ48A  | 48                                          | 53.3 – 58.9                                              | 1    | 77.4                                         | 38.8                                              | 2                                                               |
| SMLG51A     | SMLJ51A  | 51                                          | 56.7 – 62.7                                              | 1    | 82.4                                         | 36.4                                              | 2                                                               |
| SMLG54A     | SMLJ54A  | 54                                          | 60.0 – 66.3                                              | 1    | 87.1                                         | 34.4                                              | 2                                                               |
| SMLG58A     | SMLJ58A  | 58                                          | 64.4 – 71.2                                              | 1    | 93.6                                         | 32.0                                              | 2                                                               |
| SMLG60A     | SMLJ60A  | 60                                          | 66.7 – 73.7                                              | 1    | 96.8                                         | 31.0                                              | 2                                                               |
| SMLG64A     | SMLJ64A  | 64                                          | 71.1 – 78.6                                              | 1    | 103.0                                        | 29.2                                              | 2                                                               |
| SMLG70A     | SMLJ70A  | 70                                          | 77.8 – 86.0                                              | 1    | 113                                          | 26.6                                              | 2                                                               |
| SMLG75A     | SMLJ75A  | 75                                          | 83.3 – 92.1                                              | 1    | 121                                          | 24.8                                              | 2                                                               |

Continued.

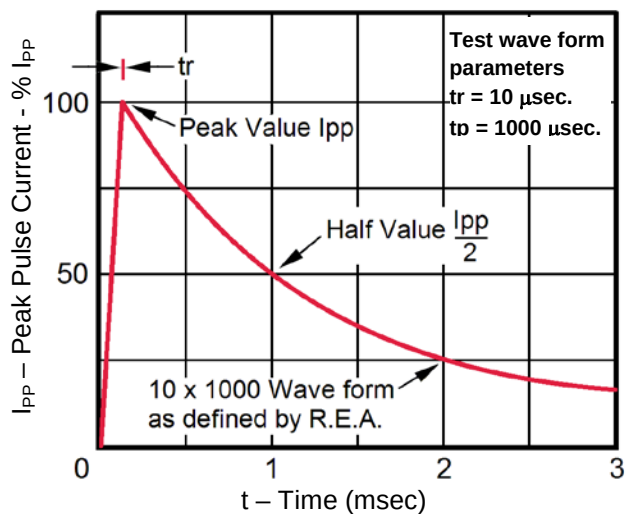
**ELECTRICAL CHARACTERISTICS @ 25 °C unless otherwise stated (continued)**

| MICROSEMI PART NUMBER |          | REVERSE<br>STAND-OFF<br>VOLTAGE<br>$V_{WM}$ | BREAKDOWN<br>VOLTAGE<br>$V_{(BR)}$ @ $I_{(BR)}$<br>Volts |       | MAXIMUM<br>CLAMPING<br>VOLTAGE<br>@ $I_{PP}$ | PEAK PULSE<br>CURRENT<br>(See <a href="#">Fig. 2</a> )<br>$I_{PP}$ | MAXIMUM<br>STANDBY<br>CURRENT<br>@ $V_{WM}$<br>$I_D$<br>$\mu A$ |
|-----------------------|----------|---------------------------------------------|----------------------------------------------------------|-------|----------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------|
| Gull-Wing             | J-Bend   |                                             | MIN.                                                     | MAX.  |                                              |                                                                    |                                                                 |
| SMLG78A               | SMLJ78A  | 78                                          | 86.7                                                     | 95.8  | 126                                          | 22.8                                                               | 2                                                               |
| SMLG85A               | SMLJ85A  | 85                                          | 94.4                                                     | 104.0 | 137                                          | 20.8                                                               | 2                                                               |
| SMLG90A               | SMLJ90A  | 90                                          | 100                                                      | 111   | 146                                          | 20.6                                                               | 2                                                               |
| SMLG100A              | SMLJ100A | 100                                         | 111                                                      | 123   | 162                                          | 18.6                                                               | 2                                                               |
| SMLG110A              | SMLJ110A | 110                                         | 122                                                      | 135   | 177                                          | 16.8                                                               | 2                                                               |
| SMLG120A              | SMLJ120A | 120                                         | 133                                                      | 147   | 193                                          | 15.6                                                               | 2                                                               |
| SMLG130A              | SMLJ130A | 130                                         | 144                                                      | 159   | 209                                          | 14.4                                                               | 2                                                               |
| SMLG150A              | SMLJ150A | 150                                         | 167                                                      | 185   | 243                                          | 12.4                                                               | 2                                                               |
| SMLG160A              | SMLJ160A | 160                                         | 178                                                      | 197   | 259                                          | 11.6                                                               | 2                                                               |
| SMLG170A              | SMLJ170A | 170                                         | 189                                                      | 209   | 275                                          | 11.0                                                               | 2                                                               |

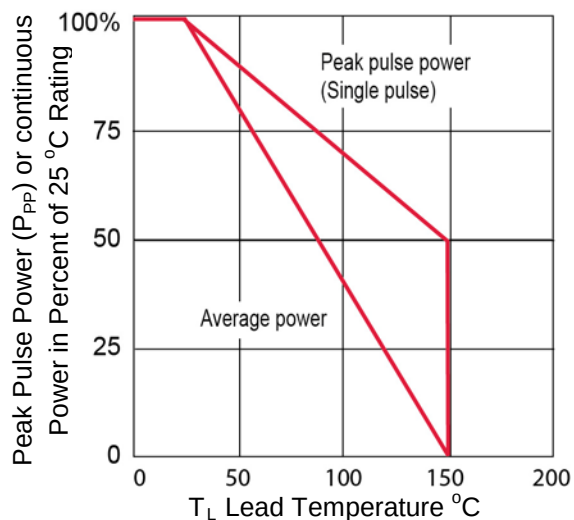
**NOTE 1:** Bidirectional capacitance is half that shown in figure 4 at zero volts.

**GRAPHS**


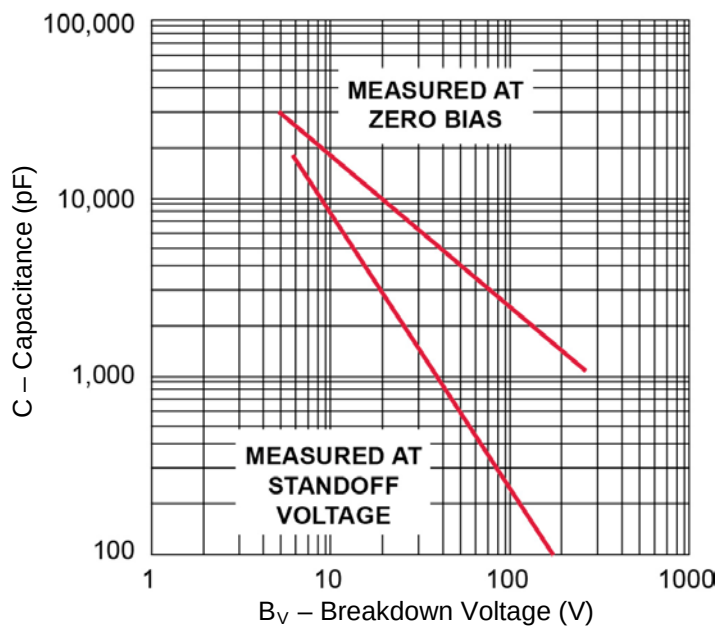
**FIGURE 1**  
Peak Pulse Power vs. Pulse Time



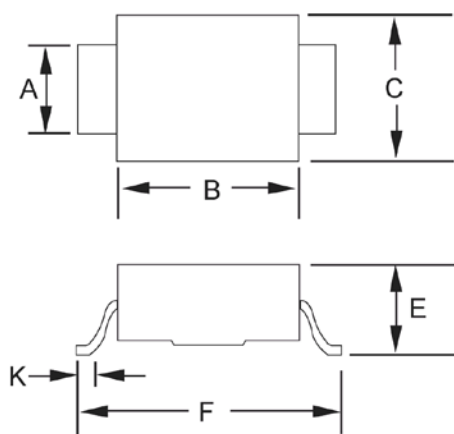
**FIGURE 2**  
Pulse Waveform

**GRAPHS (continued)**


**FIGURE 3**  
Derating Curve

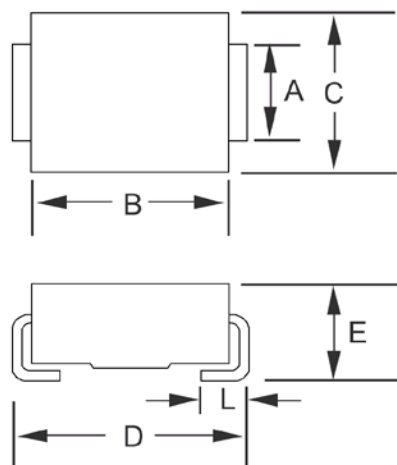


**FIGURE 4**  
Typical Capacitance vs.  
Breakdown Voltage (unidirectional configuration)  
NOTE: Bidirectional capacitance is half that shown at zero volts.

**PACKAGE DIMENSIONS**

**SMLG (DO-215AB)**

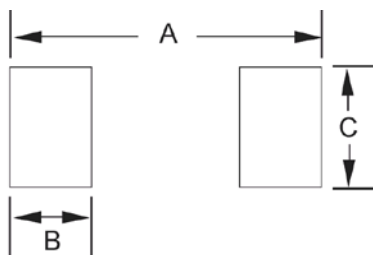
| Ltr | Dimensions |       |             |       |
|-----|------------|-------|-------------|-------|
|     | Inch       |       | Millimeters |       |
|     | Min        | Max   | Min         | Max   |
| A   | 0.115      | 0.121 | 2.92        | 3.07  |
| B   | 0.260      | 0.280 | 6.60        | 7.11  |
| 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 as shown.  
Typical Standoff Height: 0.004" – 0.008" (0.1 mm – 0.2 mm).


**SMLJ (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 | 0.760       | 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**


| <b>SMLG (DO-215AB)</b> |             |                    |
|------------------------|-------------|--------------------|
| <b>Ltr</b>             | <b>Inch</b> | <b>Millimeters</b> |
| <b>A</b>               | 0.510       | 12.95              |
| <b>B</b>               | 0.110       | 2.79               |
| <b>C</b>               | 0.150       | 3.81               |

| <b>SMLJ (DO-214AB)</b> |             |                    |
|------------------------|-------------|--------------------|
| <b>Ltr</b>             | <b>Inch</b> | <b>Millimeters</b> |
| <b>A</b>               | 0.390       | 9.90               |
| <b>B</b>               | 0.110       | 2.79               |
| <b>C</b>               | 0.150       | 3.81               |