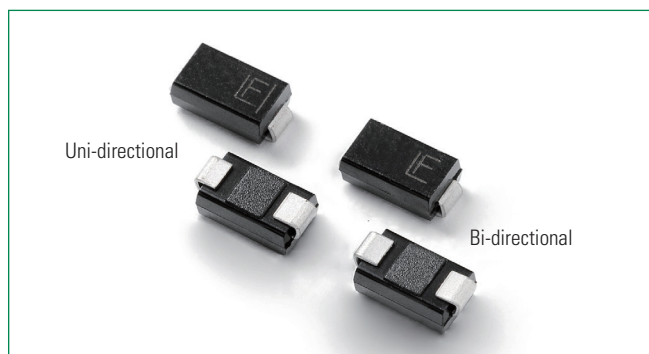


## SMA6J Series



### Agency Approvals

| Agency                                                                            | Agency File Number |
|-----------------------------------------------------------------------------------|--------------------|
|  | E230531            |

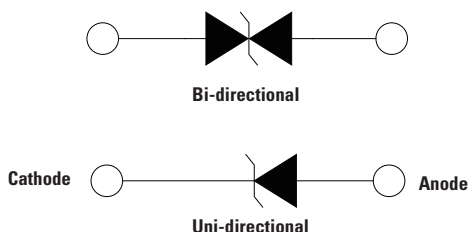
### Maximum Ratings and Thermal Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

| Parameter                                                                     | Symbol           | Value      | Unit |
|-------------------------------------------------------------------------------|------------------|------------|------|
| Peak Pulse Power Dissipation by 10/1000µs Waveform (Fig.2) (Note 1), (Note 2) | P <sub>PPM</sub> | 600        | W    |
| Power Dissipation on Infinite Heat Sink at T <sub>J</sub> = 50°C              | P <sub>D</sub>   | 3.3        | W    |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)              | I <sub>FSM</sub> | 60         | A    |
| Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only          | V <sub>F</sub>   | 3.5        | V    |
| Operating Temperature Range                                                   | T <sub>J</sub>   | -65 to 150 | °C   |
| Storage Temperature Range                                                     | T <sub>STG</sub> | -65 to 175 | °C   |
| Typical Thermal Resistance Junction to Lead                                   | R <sub>θJL</sub> | 30         | °C/W |
| Typical Thermal Resistance Junction to Ambient                                | R <sub>θJA</sub> | 120        | °C/W |

#### Notes:

1. Non-repetitive current pulse, per Fig.4 and derated above T<sub>J</sub> (initial) = 25°C per Fig. 3.
2. Mounted on 5.0x5.0mm copper pad to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional component only.

### Functional Diagram



### Description

The SMA6J series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

### Features

- Small DO-214AC SMT footprint for minimal board space requirement
- Typical failure mode is a short circuit condition for current events exceeding component rating
- Whisker test is conducted based on JEDEC JESD201A per its table 4a and 4c
- IEC 61000-4-2 ESD 30kV(Air), 30kV (Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- Built-in strain relief
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 600W peak pulsepower capability at 10/1000µs waveform, repetition rate (duty cycle): 0.01 %
- Fast response time: typically less than 1.0ps from 0 Volts to V<sub>BR</sub> min
- Typical I<sub>R</sub> < 1µA when V<sub>BR</sub> min > 12 V
- High temperature reflow soldering guaranteed: 260°C/30sec
- V<sub>BR</sub> @ T<sub>J</sub> = V<sub>BR</sub> @ 25°C × (1 + α × (T<sub>J</sub> - 25)) (α T: Temperature Coefficient, typical value is 0.1%)
- UL Recognized compound meeting flammability rating V-0
- Meet MSL level1, per J-STD-020, lead-frame maximum peak of 260°C
- Matte tin lead-free plated
- Pb-free E3 means 2<sup>nd</sup> level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

### Applications

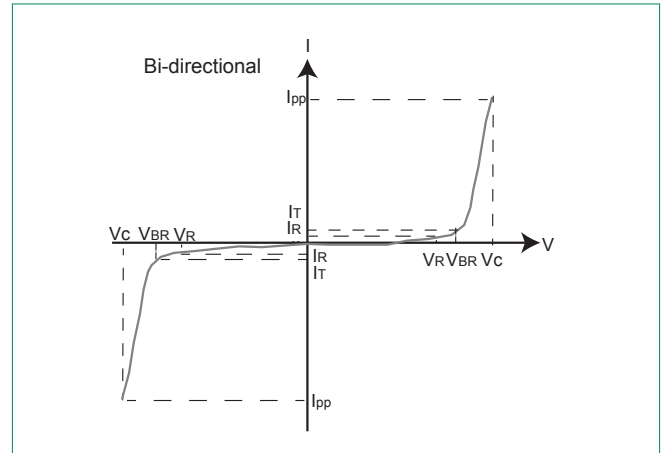
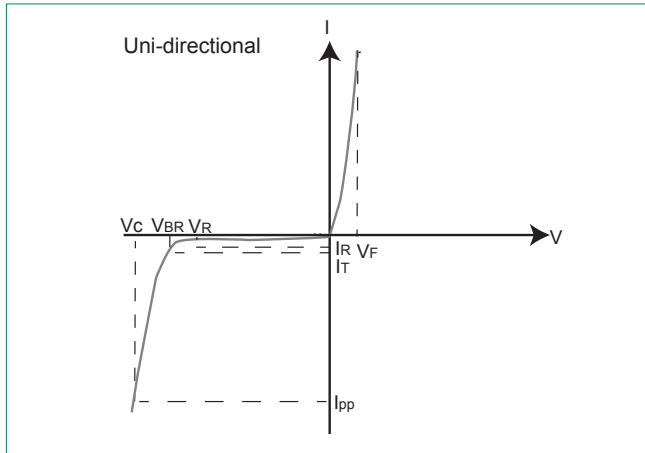
TVS components are ideal for the protection of I/O Interfaces, V<sub>CC</sub> bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

### Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

| Part Number (Uni) | Part Number (Bi) | Marking |      | Reverse Stand off Voltage V <sub>R</sub> (Volts) | Breakdown Voltage V <sub>BR</sub> (Volts) @ I <sub>T</sub> |       | Test Current I <sub>T</sub> (mA) | Maximum Clamping Voltage V <sub>C</sub> @ I <sub>PP</sub> (V) | Maximum Peak Pulse Current I <sub>PP</sub> (A) | Maximum Reverse Leakage I <sub>R</sub> @ V <sub>R</sub> (µA) | Agency Recognition  |
|-------------------|------------------|---------|------|--------------------------------------------------|------------------------------------------------------------|-------|----------------------------------|---------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|                   |                  | UNI     | BI   |                                                  | MIN                                                        | MAX   |                                  |                                                               |                                                |                                                              |                                                                                                        |
| SMA6J5.0A         | SMA6J5.0CA       | 6BA     | 6VVE | 5                                                | 6.40                                                       | 7.00  | 10                               | 9.2                                                           | 66.0                                           | 800                                                          | X                                                                                                      |
| SMA6J6.0A         | SMA6J6.0CA       | 6AG     | 6VVG | 6                                                | 6.67                                                       | 7.37  | 10                               | 10.3                                                          | 61.0                                           | 800                                                          | X                                                                                                      |
| SMA6J6.5A         | SMA6J6.5CA       | 6AK     | 6VVK | 6.5                                              | 7.22                                                       | 7.98  | 10                               | 11.2                                                          | 56.0                                           | 500                                                          | X                                                                                                      |
| SMA6J7.0A         | SMA6J7.0CA       | 6AM     | 6VWM | 7                                                | 7.78                                                       | 8.60  | 10                               | 12.0                                                          | 50.0                                           | 200                                                          | X                                                                                                      |
| SMA6J7.5A         | SMA6J7.5CA       | 6AP     | 6VWP | 7.5                                              | 8.33                                                       | 9.21  | 1                                | 12.9                                                          | 46.5                                           | 100                                                          | X                                                                                                      |
| SMA6J8.0A         | SMA6J8.0CA       | 6AR     | 6VWR | 8                                                | 8.89                                                       | 9.83  | 1                                | 13.6                                                          | 44.1                                           | 50                                                           | X                                                                                                      |
| SMA6J8.5A         | SMA6J8.5CA       | 6AT     | 6VWT | 8.5                                              | 9.44                                                       | 10.40 | 1                                | 14.4                                                          | 41.7                                           | 20                                                           | X                                                                                                      |
| SMA6J9.0A         | SMA6J9.0CA       | 6AV     | 6VVV | 9                                                | 10.0                                                       | 11.1  | 1                                | 15.4                                                          | 39.0                                           | 10                                                           | X                                                                                                      |
| SMA6J10A          | SMA6J10CA        | 6AX     | 6VWX | 10                                               | 11.1                                                       | 12.3  | 1                                | 17.0                                                          | 37.0                                           | 5                                                            | X                                                                                                      |
| SMA6J11A          | SMA6J11CA        | 6AZ     | 6VWZ | 11                                               | 12.2                                                       | 13.5  | 1                                | 18.2                                                          | 33.0                                           | 1                                                            | X                                                                                                      |
| SMA6J12A          | SMA6J12CA        | 6BE     | 6XE  | 12                                               | 13.3                                                       | 14.7  | 1                                | 19.9                                                          | 31.0                                           | 1                                                            | X                                                                                                      |
| SMA6J13A          | SMA6J13CA        | 6BG     | 6XG  | 13                                               | 14.4                                                       | 15.9  | 1                                | 21.5                                                          | 29.0                                           | 1                                                            | X                                                                                                      |
| SMA6J14A          | SMA6J14CA        | 6BK     | 6XK  | 14                                               | 15.6                                                       | 17.2  | 1                                | 23.2                                                          | 25.8                                           | 1                                                            | X                                                                                                      |
| SMA6J15A          | SMA6J15CA        | 6BM     | 6XM  | 15                                               | 16.7                                                       | 18.5  | 1                                | 24.4                                                          | 25.1                                           | 1                                                            | X                                                                                                      |
| SMA6J16A          | SMA6J16CA        | 6BP     | 6XP  | 16                                               | 17.8                                                       | 19.7  | 1                                | 26.0                                                          | 23.1                                           | 1                                                            | X                                                                                                      |
| SMA6J17A          | SMA6J17CA        | 6BR     | 6XR  | 17                                               | 18.9                                                       | 20.9  | 1                                | 27.6                                                          | 22.6                                           | 1                                                            | X                                                                                                      |
| SMA6J18A          | SMA6J18CA        | 6BT     | 6XT  | 18                                               | 20.0                                                       | 22.1  | 1                                | 29.2                                                          | 21.5                                           | 1                                                            | X                                                                                                      |
| SMA6J20A          | SMA6J20CA        | 6BV     | 6XV  | 20                                               | 22.2                                                       | 24.5  | 1                                | 32.4                                                          | 19.4                                           | 1                                                            | X                                                                                                      |
| SMA6J22A          | SMA6J22CA        | 6BX     | 6XX  | 22                                               | 24.4                                                       | 26.9  | 1                                | 35.5                                                          | 17.0                                           | 1                                                            | X                                                                                                      |
| SMA6J24A          | SMA6J24CA        | 6BZ     | 6XZ  | 24                                               | 26.7                                                       | 29.5  | 1                                | 38.9                                                          | 16.0                                           | 1                                                            | X                                                                                                      |
| SMA6J26A          | SMA6J26CA        | 6CE     | 6YE  | 26                                               | 28.9                                                       | 31.9  | 1                                | 42.1                                                          | 14.9                                           | 1                                                            | X                                                                                                      |
| SMA6J28A          | SMA6J28CA        | 6CG     | 6YG  | 28                                               | 31.1                                                       | 34.4  | 1                                | 45.4                                                          | 13.8                                           | 1                                                            | X                                                                                                      |
| SMA6J30A          | SMA6J30CA        | 6CK     | 6YK  | 30                                               | 33.3                                                       | 36.8  | 1                                | 48.4                                                          | 12.5                                           | 1                                                            | X                                                                                                      |
| SMA6J33A          | SMA6J33CA        | 6CM     | 6YM  | 33                                               | 36.7                                                       | 40.6  | 1                                | 53.3                                                          | 11.8                                           | 1                                                            | X                                                                                                      |
| SMA6J36A          | SMA6J36CA        | 6CP     | 6YP  | 36                                               | 40.0                                                       | 44.2  | 1                                | 58.1                                                          | 10.4                                           | 1                                                            | X                                                                                                      |
| SMA6J40A          | SMA6J40CA        | 6CR     | 6YR  | 40                                               | 44.4                                                       | 49.1  | 1                                | 64.5                                                          | 9.7                                            | 1                                                            | X                                                                                                      |
| SMA6J43A          | SMA6J43CA        | 6CT     | 6YT  | 43                                               | 47.8                                                       | 52.8  | 1                                | 69.4                                                          | 8.7                                            | 1                                                            | X                                                                                                      |
| SMA6J45A          | SMA6J45CA        | 6CV     | 6YV  | 45                                               | 50.0                                                       | 55.3  | 1                                | 72.7                                                          | 8.3                                            | 1                                                            | X                                                                                                      |
| SMA6J48A          | SMA6J48CA        | 6CX     | 6YX  | 48                                               | 53.3                                                       | 58.9  | 1                                | 77.4                                                          | 8.1                                            | 1                                                            | X                                                                                                      |
| SMA6J51A          | SMA6J51CA        | 6CZ     | 6YZ  | 51                                               | 56.7                                                       | 62.7  | 1                                | 82.4                                                          | 7.4                                            | 1                                                            | X                                                                                                      |
| SMA6J54A          | SMA6J54CA        | 6RE     | 6ZE  | 54                                               | 60.0                                                       | 66.3  | 1                                | 87.1                                                          | 6.9                                            | 1                                                            | X                                                                                                      |
| SMA6J58A          | SMA6J58CA        | 6RG     | 6ZG  | 58                                               | 64.4                                                       | 71.2  | 1                                | 93.6                                                          | 6.7                                            | 1                                                            | X                                                                                                      |
| SMA6J60A          | SMA6J60CA        | 6RK     | 6ZK  | 60                                               | 66.7                                                       | 73.7  | 1                                | 96.8                                                          | 6.2                                            | 1                                                            | X                                                                                                      |
| SMA6J64A          | SMA6J64CA        | 6RM     | 6ZM  | 64                                               | 71.1                                                       | 78.6  | 1                                | 103                                                           | 5.9                                            | 1                                                            | X                                                                                                      |
| SMA6J70A          | SMA6J70CA        | 6RP     | 6ZP  | 70                                               | 77.8                                                       | 86.0  | 1                                | 113                                                           | 5.5                                            | 1                                                            | X                                                                                                      |
| SMA6J75A          | SMA6J75CA        | 6RR     | 6ZR  | 75                                               | 83.3                                                       | 92.1  | 1                                | 121                                                           | 5.0                                            | 1                                                            | X                                                                                                      |
| SMA6J78A          | SMA6J78CA        | 6RT     | 6ZT  | 78                                               | 86.7                                                       | 95.8  | 1                                | 126                                                           | 4.8                                            | 1                                                            | X                                                                                                      |
| SMA6J85A          | SMA6J85CA        | 6RV     | 6ZV  | 85                                               | 94.4                                                       | 104   | 1                                | 137                                                           | 4.6                                            | 1                                                            | X                                                                                                      |
| SMA6J90A          | SMA6J90CA        | 6RX     | 6ZX  | 90                                               | 100                                                        | 111   | 1                                | 146                                                           | 4.2                                            | 1                                                            | X                                                                                                      |
| SMA6J100A         | -                | 6RZ     | -    | 100                                              | 111                                                        | 123   | 1                                | 162                                                           | 3.8                                            | 1                                                            | X                                                                                                      |
| SMA6J110A         | -                | 6SE     | -    | 110                                              | 122                                                        | 135   | 1                                | 177                                                           | 3.5                                            | 1                                                            | X                                                                                                      |
| SMA6J120A         | -                | 6SG     | -    | 120                                              | 133                                                        | 147   | 1                                | 193                                                           | 3.2                                            | 1                                                            | X                                                                                                      |
| SMA6J130A         | -                | 6SK     | -    | 130                                              | 144                                                        | 159   | 1                                | 209                                                           | 2.9                                            | 1                                                            | X                                                                                                      |

For bidirectional type having V<sub>R</sub> of 10 volts and less, the I<sub>R</sub> limit is double.

## I-V Curve Characteristics



**P<sub>PPM</sub>** Peak Pulse Power Dissipation – Max power dissipation

**V<sub>R</sub>** Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation

**V<sub>BR</sub>** Breakdown Voltage – Maximum voltage that flows through the TVS at a specified test current (I<sub>T</sub>)

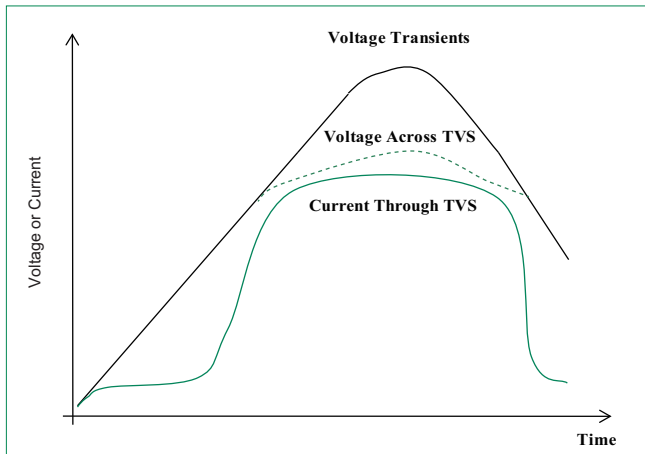
**V<sub>C</sub>** Clamping Voltage – Peak voltage measured across the TVS at a specified I<sub>PPM</sub> (peak impulse current @ 10/1000)

**I<sub>R</sub>** Reverse Leakage Current – Current measured at V<sub>R</sub>

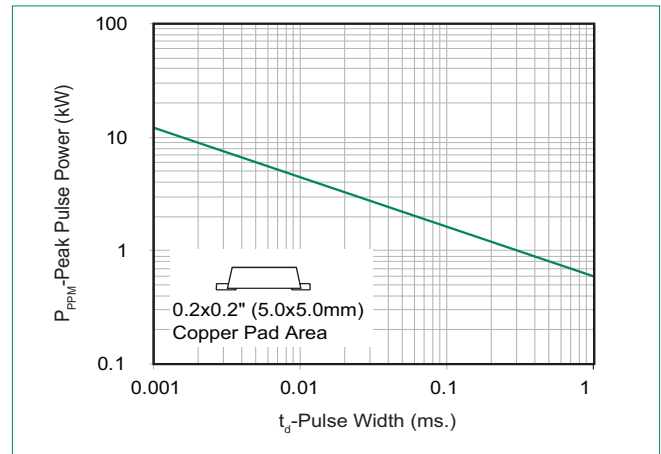
**V<sub>F</sub>** Forward Voltage Drop for Uni-directional

## Ratings and Characteristic Curves (T<sub>A</sub>=25°C unless otherwise noted)

**Figure 1 - TVS Transients Clamping Waveform**

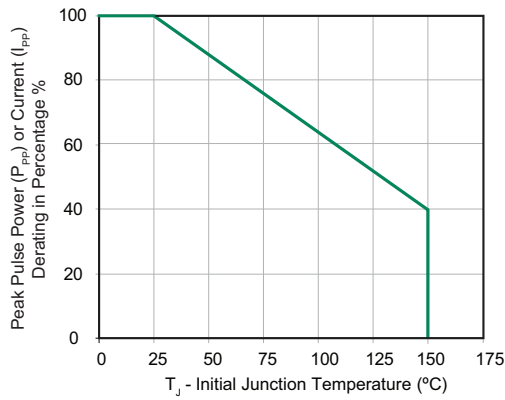


**Figure 2 - Peak Pulse Power Rating Curve**

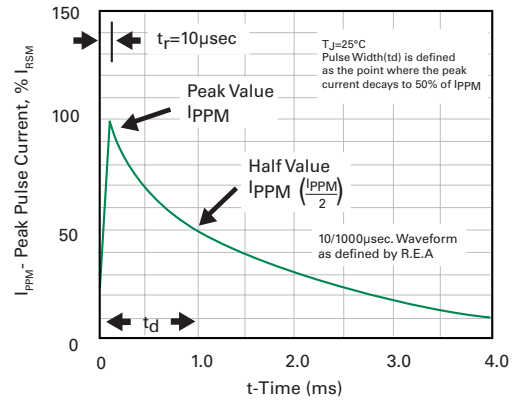


**Ratings and Characteristic Curves** ( $T_A=25^\circ\text{C}$  unless otherwise noted) (Continued)

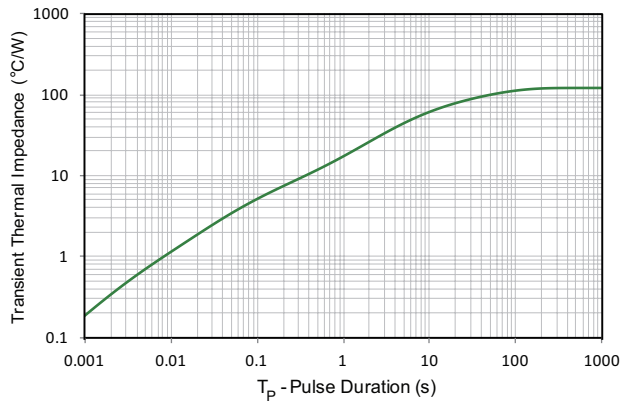
**Figure 3 - Peak Pulse Power Derating Curve**



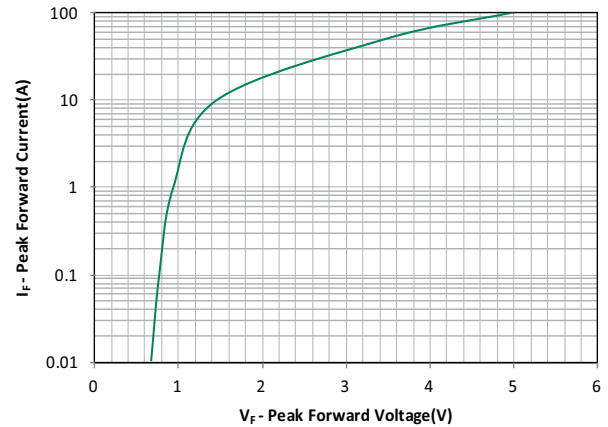
**Figure 4 - Pulse Waveform**



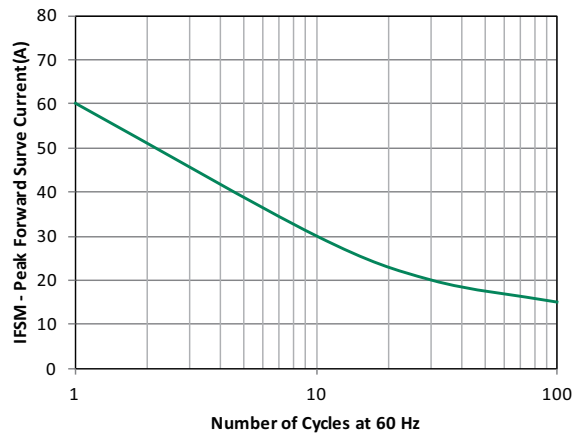
**Figure 5 - Typical Transient Thermal Impedance**



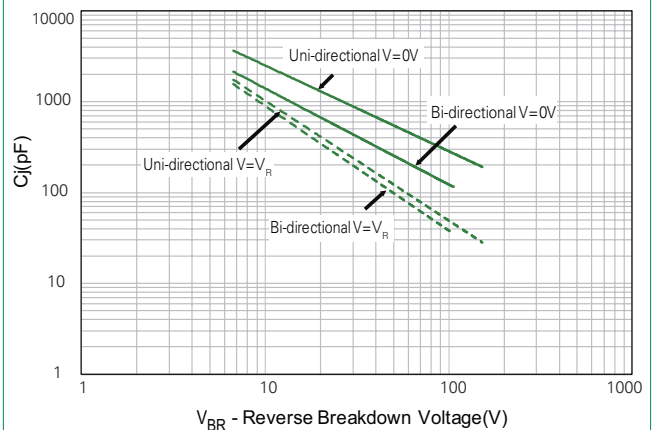
**Figure 6 - Peak Forward Voltage Drop vs Peak Forward Current (typical values)**



**Figure 7 - Maximum Non-Repetitive Forward Surge Current Uni-Directional Only**

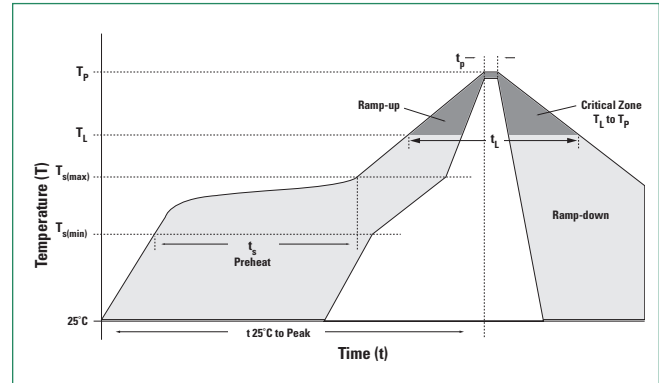


**Figure 8 - Typical Junction Capacitance**



## Soldering Parameters

|                                                                       |                                    |                         |
|-----------------------------------------------------------------------|------------------------------------|-------------------------|
| <b>Reflow Condition</b>                                               |                                    | Lead-free assembly      |
| <b>Pre Heat</b>                                                       | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|                                                                       | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|                                                                       | - Time (min to max) ( $t_s$ )      | 60 – 120 secs           |
| <b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak</b> |                                    | 3°C/second max          |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>     |                                    | 3°C/second max          |
| <b>Reflow</b>                                                         | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|                                                                       | - Time (min to max) ( $t_L$ )      | 60 – 150 seconds        |
| <b>Peak Temperature (<math>T_p</math>)</b>                            |                                    | 260 <sup>+0/-5</sup> °C |
| <b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>  |                                    | 30 seconds max          |
| <b>Ramp-down Rate</b>                                                 |                                    | 6°C/second max          |
| <b>Time 25°C to peak Temperature (<math>T_p</math>)</b>               |                                    | 8 minutes Max.          |
| <b>Do not exceed</b>                                                  |                                    | 260°C                   |



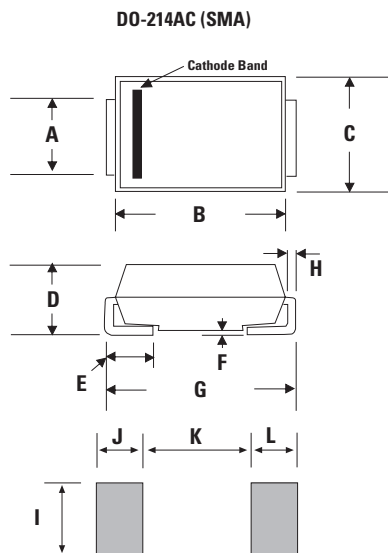
## Physical Specifications

|                 |                                                              |
|-----------------|--------------------------------------------------------------|
| <b>Weight</b>   | 0.002 ounce, 0.061 gram                                      |
| <b>Case</b>     | JEDEC DO-214AC Molded Plastic over glass passivated junction |
| <b>Polarity</b> | Color band denotes cathode except Bipolar                    |
| <b>Terminal</b> | Matte Tin-plated leads, Solderable per JESD22-B102           |

## Environmental Specifications

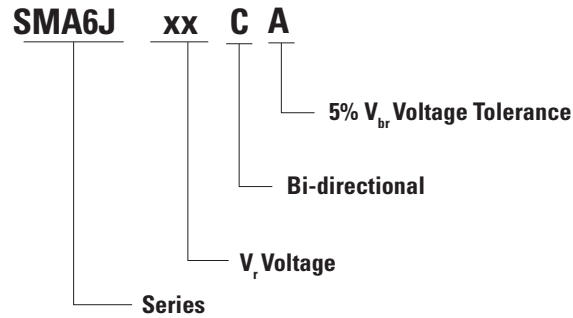
|                            |                          |
|----------------------------|--------------------------|
| <b>High Temp. Storage</b>  | JESD22-A103              |
| <b>HTRB</b>                | JESD22-A108              |
| <b>Temperature Cycling</b> | JESD22-A104              |
| <b>MSL</b>                 | JEDEC-J-STD-020, Level 1 |
| <b>H3TRB</b>               | JESD22-A101              |
| <b>RSH</b>                 | JESD22-A111              |

## Dimensions

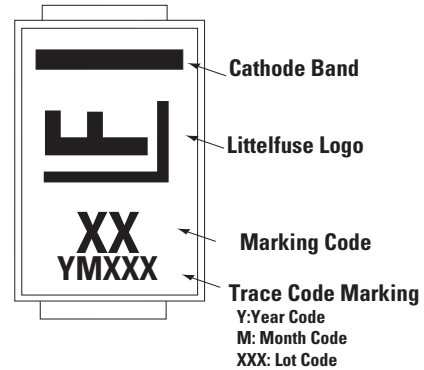


| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.049  | 0.065 | 1.250       | 1.650 |
| B          | 0.157  | 0.181 | 3.990       | 4.600 |
| C          | 0.095  | 0.110 | 2.400       | 2.790 |
| D          | 0.075  | 0.090 | 1.900       | 2.290 |
| E          | 0.030  | 0.060 | 0.780       | 1.520 |
| F          | -      | 0.008 | -           | 0.203 |
| G          | 0.189  | 0.208 | 4.800       | 5.280 |
| H          | 0.006  | 0.012 | 0.152       | 0.305 |
| I          | 0.070  | -     | 1.800       | -     |
| J          | 0.082  | -     | 2.100       | -     |
| K          | -      | 0.090 | -           | 2.300 |
| L          | 0.082  | -     | 2.100       | -     |

### Part Numbering System



### Part Marking System



### Packaging

| Part number | Component Package | Quantity | Packaging Option                 | Packaging Specification |
|-------------|-------------------|----------|----------------------------------|-------------------------|
| SMA6JxxXX   | DO-214AC          | 5000     | Tape & Reel - 12mm tape/13" reel | EIA RS-481              |

### Tape and Reel Specification

