




#### Agency Approvals

| AGENCY  | AGENCY FILE NUMBER |
|---|--------------------|
|  | E230531            |

#### Maximum Ratings and Thermal Characteristics ( $T_A=25^\circ\text{C}$ unless otherwise noted)

| Parameter   | Symbol         | Value      | Unit               |
|---|----------------|------------|--------------------|
| Peak Pulse Power Dissipation at $T_A=25^\circ\text{C}$ by $10\times 1000\mu\text{s}$ waveform (Fig.1)(Note 1), (Note 2) | $P_{PPM}$      | 1500       | W                  |
| Power Dissipation on infinite heat sink at $T_A=50^\circ\text{C}$   | $P_{MAV}$      | 6.5        | W                  |
| Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)  | $I_{FSM}$      | 200        | A                  |
| Maximum Instantaneous Forward Voltage at 100A for Unidirectional only (Note 4)  | $V_F$          | 3.5/5.0    | V                  |
| Operating Junction and Storage Temperature Range  | $T_J, T_{STG}$ | -65 to 150 | $^\circ\text{C}$   |
| Typical Thermal Resistance Junction to Lead   | $R_{JL}$       | 15         | $^\circ\text{C/W}$ |
| Typical Thermal Resistance Junction to Ambient  | $R_{JA}$       | 75         | $^\circ\text{C/W}$ |

#### Notes:

1. Non-repetitive current pulse, per Fig. 3 and derated above  $T_A = 25^\circ\text{C}$  per Fig. 2.
2. Mounted on copper pad area of  $0.31\times 0.31"$  ( $8.0\times 8.0\text{mm}$ ) to each terminal.
3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.
4.  $V_F < 3.5\text{V}$  for  $V_{BR} \leq 200\text{V}$  and  $V_F < 5.0\text{V}$  for  $V_{BR} \geq 201\text{V}$ .

#### Description

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

#### Features

- Halogen-Free
- RoHS compliant
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^\circ\text{C} \times \Delta T$
- Glass passivated chip junction
- 1500W peak pulse power capability at  $10\times 1000\mu\text{s}$  waveform, repetition rate (duty cycles):0.01%
- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical  $I_R$  less than  $1\mu\text{A}$  above 12V
- High Temperature soldering guaranteed:  $260^\circ\text{C}/40$  seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-0
- Matte Tin Lead-free Plated


#### Applications

TVS devices are ideal for the protection of I/O Interfaces,  $V_{CC}$  bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

# Transient Voltage Suppression Diodes

## Surface Mount – 1500W > SMCJ series

### Electrical Characteristics

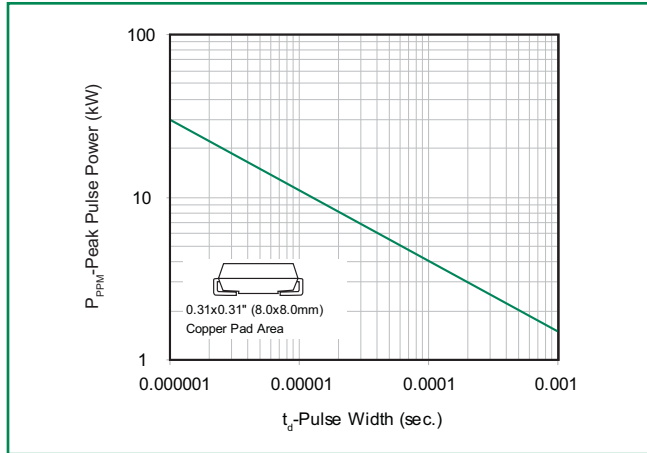
| Part Number (Uni) | Part Number (Bi) | Marking |     | Reverse Stand off Voltage $V_R$ (Volts) | Breakdown Voltage $V_{BR}$ (Volts) @ $I_T$ |        | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (V) | Maximum Peak Pulse Current $I_{PP}$ (A) | Maximum Reverse Leakage $I_R$ @ $V_R$ ( $\mu$ A) | Agency Approval  |
|-------------------|------------------|---------|-----|---|--|--------|-------------------------|---|---|--|---|
|                   |                  | UNI     | BI  |   | MIN  | MAX    |                         |   |   |  |   |
| SMCJ5.0A          | SMCJ5.0CA        | GDE     | BDE | 5.0                                     | 6.40                                       | 7.00   | 10                      | 9.2   | 163.0                                   | 800  | X   |
| SMCJ6.0A          | SMCJ6.0CA        | GDG     | BDG | 6.0                                     | 6.67                                       | 7.37   | 10                      | 10.3  | 145.7                                   | 800  | X   |
| SMCJ6.5A          | SMCJ6.5CA        | GDK     | BDK | 6.5                                     | 7.22                                       | 7.98   | 10                      | 11.2  | 134.0                                   | 500  | X   |
| SMCJ7.0A          | SMCJ7.0CA        | GDM     | BDM | 7.0                                     | 7.78                                       | 8.60   | 10                      | 12.0  | 125.0                                   | 200  | X   |
| SMCJ7.5A          | SMCJ7.5CA        | GDP     | BDP | 7.5                                     | 8.33                                       | 9.21   | 1                       | 12.9  | 116.3                                   | 100  | X   |
| SMCJ8.0A          | SMCJ8.0CA        | GDR     | BDR | 8.0                                     | 8.89                                       | 9.83   | 1                       | 13.6  | 110.3                                   | 50   | X   |
| SMCJ8.5A          | SMCJ8.5CA        | GDT     | BDT | 8.5                                     | 9.44                                       | 10.40  | 1                       | 14.4  | 104.2                                   | 20   | X   |
| SMCJ9.0A          | SMCJ9.0CA        | GDV     | BDV | 9.0                                     | 10.00                                      | 11.10  | 1                       | 15.4  | 97.4                                    | 10   | X   |
| SMCJ10A           | SMCJ10CA         | GDX     | BDX | 10.0                                    | 11.10                                      | 12.30  | 1                       | 17.0  | 88.3                                    | 5  | X   |
| SMCJ11A           | SMCJ11CA         | GDZ     | BDZ | 11.0                                    | 12.20                                      | 13.50  | 1                       | 18.2  | 82.5                                    | 1  | X   |
| SMCJ12A           | SMCJ12CA         | GEE     | BEE | 12.0                                    | 13.30                                      | 14.70  | 1                       | 19.9  | 75.4                                    | 1  | X   |
| SMCJ13A           | SMCJ13CA         | GEG     | BEG | 13.0                                    | 14.40                                      | 15.90  | 1                       | 21.5  | 69.8                                    | 1  | X   |
| SMCJ14A           | SMCJ14CA         | GEK     | BEK | 14.0                                    | 15.60                                      | 17.20  | 1                       | 23.2  | 64.7                                    | 1  | X   |
| SMCJ15A           | SMCJ15CA         | GEM     | BEM | 15.0                                    | 16.70                                      | 18.50  | 1                       | 24.4  | 61.5                                    | 1  | X   |
| SMCJ16A           | SMCJ16CA         | GEP     | BEP | 16.0                                    | 17.80                                      | 19.70  | 1                       | 26.0  | 57.7                                    | 1  | X   |
| SMCJ17A           | SMCJ17CA         | GER     | BER | 17.0                                    | 18.90                                      | 20.90  | 1                       | 27.6  | 54.4                                    | 1  | X   |
| SMCJ18A           | SMCJ18CA         | GET     | BET | 18.0                                    | 20.00                                      | 22.10  | 1                       | 29.2  | 51.4                                    | 1  | X   |
| SMCJ20A           | SMCJ20CA         | GEV     | BEV | 20.0                                    | 22.20                                      | 24.50  | 1                       | 32.4  | 46.3                                    | 1  | X   |
| SMCJ22A           | SMCJ22CA         | GEX     | BEX | 22.0                                    | 24.40                                      | 26.90  | 1                       | 35.5  | 42.3                                    | 1  | X   |
| SMCJ24A           | SMCJ24CA         | GEZ     | BEZ | 24.0                                    | 26.70                                      | 29.50  | 1                       | 38.9  | 38.6                                    | 1  | X   |
| SMCJ26A           | SMCJ26CA         | GFE     | BEF | 26.0                                    | 28.90                                      | 31.90  | 1                       | 42.1  | 35.7                                    | 1  | X   |
| SMCJ28A           | SMCJ28CA         | GFG     | BEF | 28.0                                    | 31.10                                      | 34.40  | 1                       | 45.4  | 33.1                                    | 1  | X   |
| SMCJ30A           | SMCJ30CA         | GFK     | BEF | 30.0                                    | 33.30                                      | 36.80  | 1                       | 48.4  | 31.0                                    | 1  | X   |
| SMCJ33A           | SMCJ33CA         | GFM     | BFM | 33.0                                    | 36.70                                      | 40.60  | 1                       | 53.3  | 28.2                                    | 1  | X   |
| SMCJ36A           | SMCJ36CA         | GFP     | BFP | 36.0                                    | 40.00                                      | 44.20  | 1                       | 58.1  | 25.9                                    | 1  | X   |
| SMCJ40A           | SMCJ40CA         | GFR     | BFR | 40.0                                    | 44.40                                      | 49.10  | 1                       | 64.5  | 23.3                                    | 1  | X   |
| SMCJ43A           | SMCJ43CA         | GFT     | BFT | 43.0                                    | 47.80                                      | 52.80  | 1                       | 69.4  | 21.7                                    | 1  | X   |
| SMCJ45A           | SMCJ45CA         | GFV     | BFV | 45.0                                    | 50.00                                      | 55.30  | 1                       | 72.7  | 20.6                                    | 1  | X   |
| SMCJ48A           | SMCJ48CA         | GFX     | BFX | 48.0                                    | 53.30                                      | 58.90  | 1                       | 77.4  | 19.4                                    | 1  | X   |
| SMCJ51A           | SMCJ51CA         | GFZ     | BFZ | 51.0                                    | 56.70                                      | 62.70  | 1                       | 82.4  | 18.2                                    | 1  | X   |
| SMCJ54A           | SMCJ54CA         | GGE     | BGE | 54.0                                    | 60.00                                      | 66.30  | 1                       | 87.1  | 17.3                                    | 1  | X   |
| SMCJ58A           | SMCJ58CA         | GGG     | BGG | 58.0                                    | 64.40                                      | 71.20  | 1                       | 93.6  | 16.1                                    | 1  | X   |
| SMCJ60A           | SMCJ60CA         | GGK     | BGK | 60.0                                    | 66.70                                      | 73.70  | 1                       | 96.8  | 15.5                                    | 1  | X   |
| SMCJ64A           | SMCJ64CA         | GGM     | BGM | 64.0                                    | 71.10                                      | 78.60  | 1                       | 103.0   | 14.6                                    | 1  | X   |
| SMCJ70A           | SMCJ70CA         | GGP     | BGP | 70.0                                    | 77.80                                      | 86.00  | 1                       | 113.0   | 13.3                                    | 1  | X   |
| SMCJ75A           | SMCJ75CA         | GGR     | BGR | 75.0                                    | 83.30                                      | 92.10  | 1                       | 121.0   | 12.4                                    | 1  | X   |
| SMCJ78A           | SMCJ78CA         | GGT     | BGT | 78.0                                    | 86.70                                      | 95.80  | 1                       | 126.0   | 11.9                                    | 1  | X   |
| SMCJ85A           | SMCJ85CA         | GGV     | BGV | 85.0                                    | 94.40                                      | 104.00 | 1                       | 137.0   | 11.0                                    | 1  | X   |
| SMCJ90A           | SMCJ90CA         | GGX     | BGX | 90.0                                    | 100.00                                     | 111.00 | 1                       | 146.0   | 10.3                                    | 1  | X   |
| SMCJ100A          | SMCJ100CA        | GGZ     | BGZ | 100.0                                   | 111.00                                     | 123.00 | 1                       | 162.0   | 9.3                                     | 1  | X   |
| SMCJ110A          | SMCJ110CA        | GHE     | BHE | 110.0                                   | 122.00                                     | 135.00 | 1                       | 177.0   | 8.5                                     | 1  | X   |
| SMCJ120A          | SMCJ120CA        | GHG     | BHG | 120.0                                   | 133.00                                     | 147.00 | 1                       | 193.0   | 7.8                                     | 1  | X   |
| SMCJ130A          | SMCJ130CA        | GHK     | BHK | 130.0                                   | 144.00                                     | 159.00 | 1                       | 209.0   | 7.2                                     | 1  | X   |
| SMCJ150A          | SMCJ150CA        | GHM     | BHM | 150.0                                   | 167.00                                     | 185.00 | 1                       | 243.0   | 6.2                                     | 1  | X   |
| SMCJ160A          | SMCJ160CA        | GHP     | BHP | 160.0                                   | 178.00                                     | 197.00 | 1                       | 259.0   | 5.8                                     | 1  | X   |
| SMCJ170A          | SMCJ170CA        | GHR     | BHR | 170.0                                   | 189.00                                     | 209.00 | 1                       | 275.0   | 5.5                                     | 1  | X   |
| SMCJ180A          | SMCJ180CA        | GHT     | BHT | 180.0                                   | 201.00                                     | 222.00 | 1                       | 292.0   | 5.1                                     | 1  | X   |
| SMCJ200A          | SMCJ200CA        | GHV     | BHV | 200.0                                   | 224.00                                     | 247.00 | 1                       | 324.0   | 4.6                                     | 1  | X   |
| SMCJ220A          | SMCJ220CA        | GHX     | BHX | 220.0                                   | 246.00                                     | 272.00 | 1                       | 356.0   | 4.2                                     | 1  | X   |
| SMCJ250A          | SMCJ250CA        | GHZ     | BHZ | 250.0                                   | 279.00                                     | 309.00 | 1                       | 405.0   | 3.7                                     | 1  | X   |
| SMCJ300A          | SMCJ300CA        | GJE     | BJE | 300.0                                   | 335.00                                     | 371.00 | 1                       | 486.0   | 3.1                                     | 1  | X   |
| SMCJ350A          | SMCJ350CA        | GJG     | BJG | 350.0                                   | 391.00                                     | 432.00 | 1                       | 567.0   | 2.6                                     | 1  | X   |
| SMCJ400A          | SMCJ400CA        | GJK     | BJK | 400.0                                   | 447.00                                     | 494.00 | 1                       | 648.0   | 2.3                                     | 1  | X   |
| SMCJ440A          | SMCJ440CA        | GJM     | BJM | 440.0                                   | 492.00                                     | 543.00 | 1                       | 713.0   | 2.1                                     | 1  | X   |

For bidirectional type having  $V_R$  of 10 volts and less, the  $I_R$  limit is double.

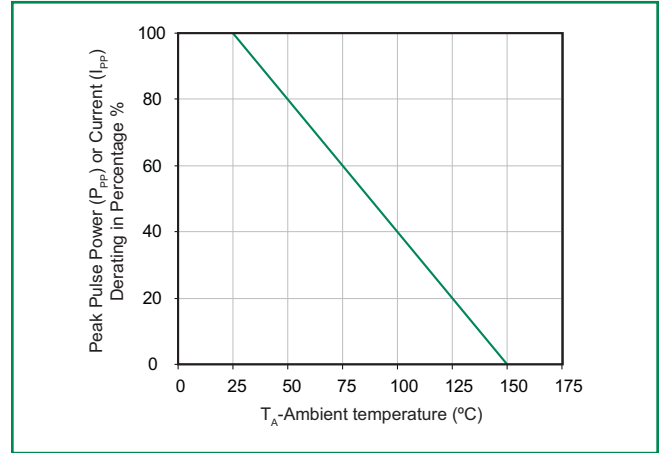
For parts without A, the  $V_{BR}$  is  $\pm 10\%$  and  $V_C$  is 5% higher than with A parts.

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

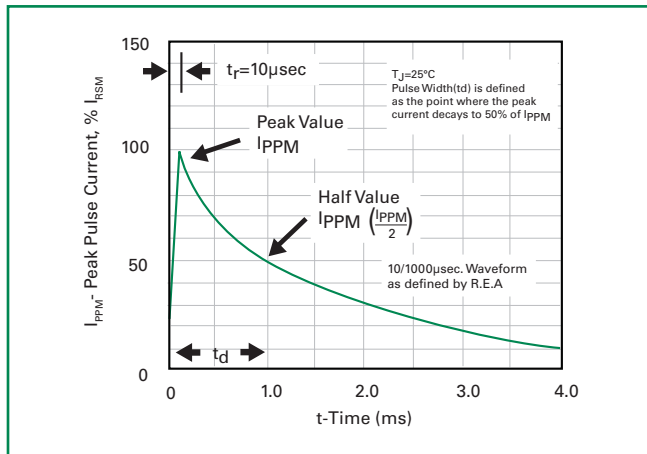
**Figure 1 - Peak Pulse Power Rating**



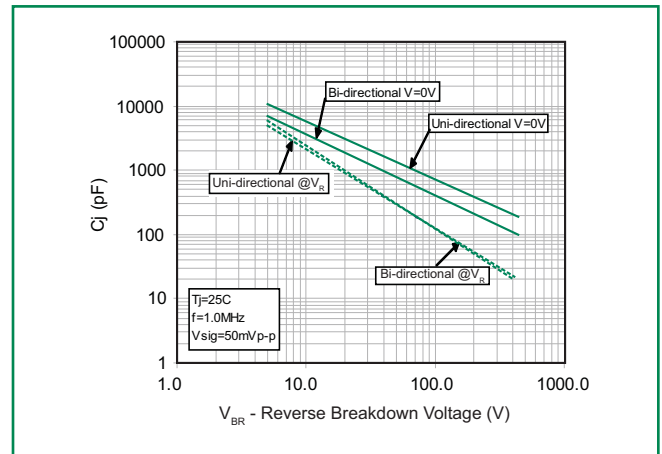
**Figure 2 - Pulse Derating Curve**



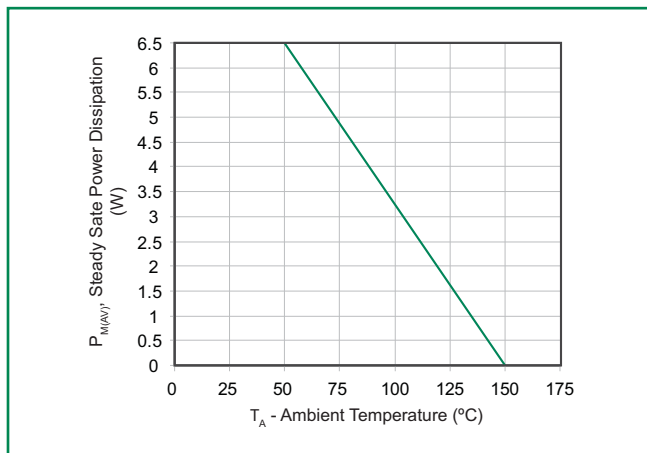
**Figure 3 - Pulse Waveform**



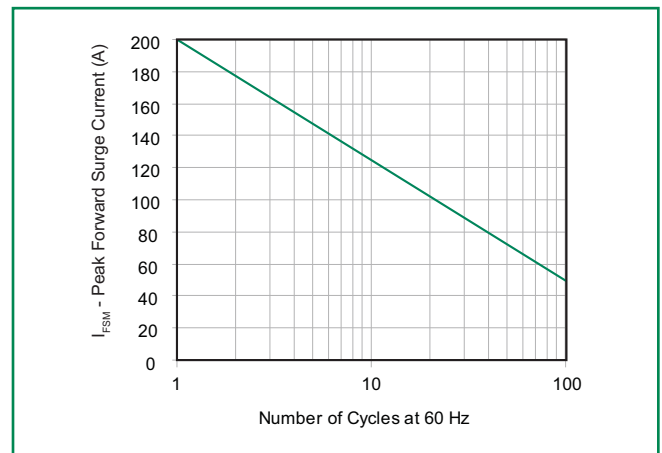
**Figure 4 - Typical Junction Capacitance**



**Figure 5 - Steady State Power Dissipation Derating Curve**

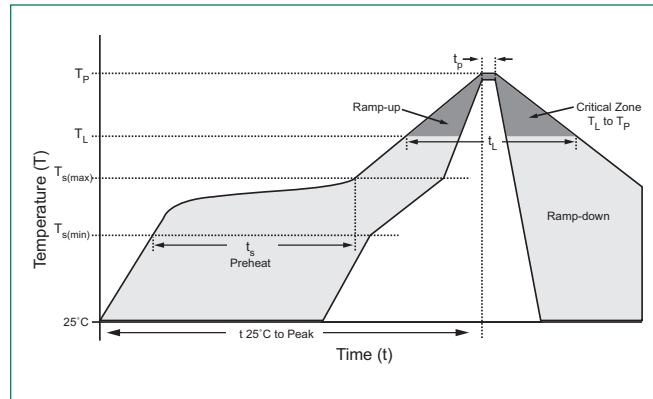


**Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only**



### Soldering Parameters

|  |                                    |                         |
|--|------------------------------------|-------------------------|
| Reflow Condition                                       |                                    | Lead-free assembly      |
| Pre Heat   | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|  | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 180 secs           |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak) |                                    | 3°C/second max          |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                    | 3°C/second max          |
| Reflow   | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|  | - Time (min to max) ( $t_s$ )      | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                             |                                    | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )   |                                    | 20 – 40 seconds         |
| Ramp-down Rate   |                                    | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )                |                                    | 8 minutes Max.          |
| Do not exceed  |                                    | 280°C                   |



### Physical Specifications

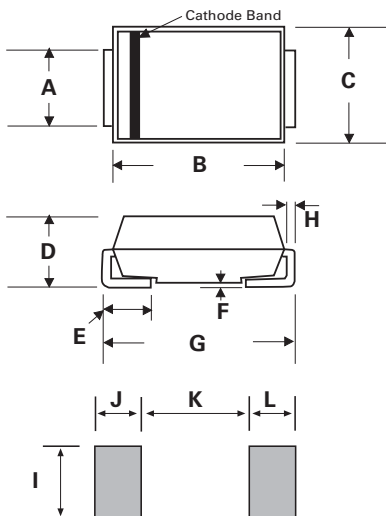
|                 |   |
|-----------------|---|
| <b>Weight</b>   | 0.007 ounce, 0.21 grams   |
| <b>Case</b>     | JEDEC DO214AB. Molded plastic body over glass passivated junction |
| <b>Polarity</b> | Color band denotes positive end (cathode) except Bidirectional.   |
| <b>Terminal</b> | Matte Tin-plated leads, Solderable per JESD22-B102D               |

### Environmental Specifications

|                           |              |
|---------------------------|--------------|
| <b>Temperature Cycle</b>  | JESD22-A104  |
| <b>Pressure Cooker</b>    | JESD 22-A102 |
| <b>High Temp. Storage</b> | JESD22-A103  |
| <b>HTRB</b>               | JESD22-A108  |
| <b>Thermal Shock</b>      | JESD22-A106  |

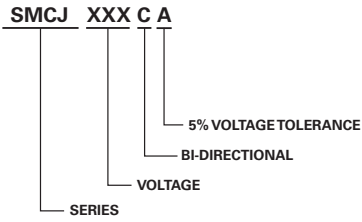
### Dimensions

DO-214AB (SMC J-Bend)

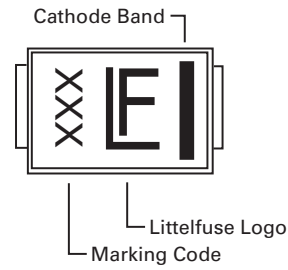


| Dimensions | Inches |       | Millimeters |       |
|------------|--------|-------|-------------|-------|
|            | Min    | Max   | Min         | Max   |
| A          | 0.114  | 0.126 | 2.900       | 3.200 |
| B          | 0.260  | 0.280 | 6.600       | 7.110 |
| C          | 0.220  | 0.245 | 5.590       | 6.220 |
| D          | 0.079  | 0.103 | 2.060       | 2.620 |
| E          | 0.030  | 0.060 | 0.760       | 1.520 |
| F          | -      | 0.008 | -           | 0.203 |
| G          | 0.305  | 0.320 | 7.750       | 8.130 |
| H          | 0.006  | 0.012 | 0.152       | 0.305 |
| I          | 0.129  | -     | 3.300       | -     |
| J          | 0.094  | -     | 2.400       | -     |
| K          | -      | 0.165 | -           | 4.200 |
| L          | 0.094  | -     | 2.400       | -     |

### Part Numbering System



### Part Marking System



### Packaging

| Part number | Component Package | Quantity | Packaging Option            | Packaging Specification |
|-------------|-------------------|----------|-----------------------------|-------------------------|
| SMCJxxxXX   | DO-214AB          | 3000     | Tape & Reel – 16mm/13" tape | EIA STD RS-481          |