

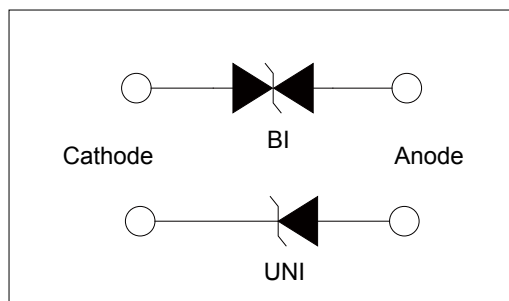
# Transient Voltage Suppressors

**SMFJ Series**

## Transient Voltage Suppressors - SMFJ Series

### Features

- Fast response time
- Built-in strain relief
- Low incremental surge resistance
- Matte tin lead-free Plated
- Halogen free and RoHS compliant
- For surface mounted applications to optimize board space
- Compatible with industrial standard package SOD-123FL
- ESD protection of data lines in accordance with IEC 61000-4-2 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- 200W peak pulsepower capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- High temperature soldering : 260°C/ 40 seconds at terminals



### Description

The SMFJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events. SOD-123FL package is 50% smaller in footprint when compare to SMA package and delivering low height profile (1.1mm) in the industry.

### Mechanical Characteristics

| Rating  | Symbol          | Value          | Units |
|---|-----------------|----------------|-------|
| Peak Pulse Power Dissipation at TA=25°C by 10/1000 $\mu$ s (Note 1) | $P_{PPM}$       | 200            | W     |
| Thermal Resistance Junction- to- Ambient                            | $R_{\theta JA}$ | 220            | °C/W  |
| Thermal Resistance Junction- to- Lead                               | $R_{\theta JL}$ | 100            | °C/W  |
| Operating junction and Storage Temperature Range.                   | $T_J, T_{STG}$  | -55°C to 150°C | °C    |

Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above TA=25°C per Fig. 3

## Transient Voltage Suppressors - SMFJ Series

### Electrical Characteristics

| Type Number |           | Marking |       | Reverse Stand-Off Voltage | Breakdown Voltage               |        | Test Current   | Max Clamping Voltage 10/1000µs | Peak Pulse Current 10/1000µs | Reverse Leakage                  |
|-------------|-----------|---------|-------|---------------------------|---------------------------------|--------|----------------|--------------------------------|------------------------------|----------------------------------|
|             |           |         |       | V <sub>RWM</sub>          | V <sub>BR</sub> @I <sub>T</sub> |        | I <sub>T</sub> | VC@I <sub>PP</sub>             | I <sub>PP</sub>              | I <sub>R</sub> @V <sub>RWM</sub> |
| UNI         | BI        | UNI     | BI    | V                         | Min(V)                          | Max(V) | mA             | V                              | A                            | µA                               |
| SMFJ5.0A    | SMFJ5.0CA | 5.0A    | 5.0CA | 5.0                       | 6.40                            | 7.25   | 10             | 9.20                           | 21.7                         | 400                              |
| SMFJ6.0A    | SMFJ6.0CA | 6.0A    | 6.0CA | 6.0                       | 6.67                            | 7.67   | 10             | 10.3                           | 19.4                         | 400                              |
| SMFJ6.5A    | SMFJ6.5CA | 6.5A    | 6.5CA | 6.5                       | 7.22                            | 8.30   | 10             | 11.2                           | 17.9                         | 250                              |
| SMFJ7.0A    | SMFJ7.0CA | 7.0A    | 7.0CA | 7.0                       | 7.78                            | 8.95   | 10             | 12.0                           | 16.7                         | 100                              |
| SMFJ7.5A    | SMFJ7.5CA | 7.5A    | 7.5CA | 7.5                       | 8.33                            | 9.58   | 1              | 12.9                           | 15.5                         | 50                               |
| SMFJ8.0A    | SMFJ8.0CA | 8.0A    | 8.0CA | 8.0                       | 8.89                            | 10.23  | 1              | 13.6                           | 14.7                         | 25                               |
| SMFJ8.5A    | SMFJ8.5CA | 8.5A    | 8.5CA | 8.5                       | 9.44                            | 10.82  | 1              | 14.4                           | 13.9                         | 10                               |
| SMFJ9.0A    | SMFJ9.0CA | 9.0A    | 9.0CA | 9.0                       | 10.00                           | 11.50  | 1              | 15.4                           | 13.0                         | 5.0                              |
| SMFJ10A     | SMFJ10CA  | 10A     | 10CA  | 10.0                      | 11.10                           | 12.80  | 1              | 17.0                           | 11.8                         | 2.5                              |
| SMFJ11A     | SMFJ11CA  | 11A     | 11CA  | 11.0                      | 12.20                           | 14.00  | 1              | 18.2                           | 11.0                         | 2.5                              |
| SMFJ12A     | SMFJ12CA  | 12A     | 12CA  | 12.0                      | 13.30                           | 15.30  | 1              | 19.9                           | 10.1                         | 2.5                              |
| SMFJ13A     | SMFJ13CA  | 13A     | 13CA  | 13.0                      | 14.40                           | 16.50  | 1              | 21.5                           | 9.30                         | 1                                |
| SMFJ14A     | SMFJ14CA  | 14A     | 14CA  | 14.0                      | 15.60                           | 17.90  | 1              | 23.2                           | 8.60                         | 1                                |
| SMFJ15A     | SMFJ15CA  | 15A     | 15CA  | 15.0                      | 16.70                           | 19.20  | 1              | 24.4                           | 8.20                         | 1                                |
| SMFJ16A     | SMFJ16CA  | 16A     | 16CA  | 16.0                      | 17.80                           | 20.50  | 1              | 26.0                           | 7.70                         | 1                                |
| SMFJ17A     | SMFJ17CA  | 17A     | 17CA  | 17.0                      | 18.90                           | 21.70  | 1              | 27.6                           | 7.20                         | 1                                |
| SMFJ18A     | SMFJ18CA  | 18A     | 18CA  | 18.0                      | 20.00                           | 23.30  | 1              | 29.2                           | 6.80                         | 1                                |
| SMFJ20A     | SMFJ20CA  | 20A     | 20CA  | 20.0                      | 22.20                           | 25.50  | 1              | 32.4                           | 6.20                         | 1                                |
| SMFJ22A     | SMFJ22CA  | 22A     | 22CA  | 22.0                      | 24.40                           | 28.00  | 1              | 35.5                           | 5.60                         | 1                                |
| SMFJ24A     | SMFJ24CA  | 24A     | 24CA  | 24.0                      | 26.70                           | 30.70  | 1              | 38.9                           | 5.10                         | 1                                |
| SMFJ26A     | SMFJ26CA  | 26A     | 26CA  | 26.0                      | 28.90                           | 33.20  | 1              | 42.1                           | 4.80                         | 1                                |
| SMFJ28A     | SMFJ28CA  | 28A     | 28CA  | 28.0                      | 31.10                           | 35.80  | 1              | 45.4                           | 4.40                         | 1                                |
| SMFJ30A     | SMFJ30CA  | 30A     | 30CA  | 30.0                      | 33.30                           | 38.30  | 1              | 48.4                           | 4.10                         | 1                                |
| SMFJ33A     | SMFJ33CA  | 33A     | 33CA  | 33.0                      | 36.70                           | 42.20  | 1              | 53.3                           | 3.80                         | 1                                |
| SMFJ36A     | SMFJ36CA  | 36A     | 36CA  | 36.0                      | 40.00                           | 46.00  | 1              | 58.1                           | 3.40                         | 1                                |
| SMFJ40A     | SMFJ40CA  | 40A     | 40CA  | 40.0                      | 44.40                           | 51.10  | 1              | 64.5                           | 3.10                         | 1                                |
| SMFJ43A     | SMFJ43CA  | 43A     | 43CA  | 43.0                      | 47.80                           | 54.90  | 1              | 69.4                           | 2.90                         | 1                                |
| SMFJ45A     | SMFJ45CA  | 45A     | 45CA  | 45.0                      | 50.00                           | 57.50  | 1              | 72.7                           | 2.80                         | 1                                |
| SMFJ48A     | SMFJ48CA  | 48A     | 48CA  | 48.0                      | 53.30                           | 61.30  | 1              | 77.4                           | 2.60                         | 1                                |
| SMFJ51A     | SMFJ51CA  | 51A     | 51CA  | 51.0                      | 56.70                           | 65.20  | 1              | 82.4                           | 2.40                         | 1                                |

## Transient Voltage Suppressors - SMFJ Series

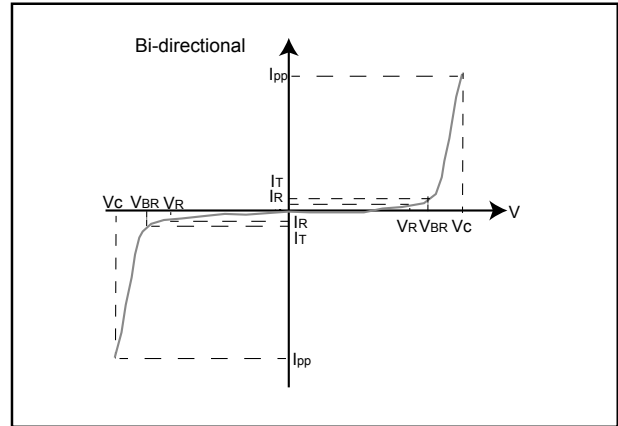
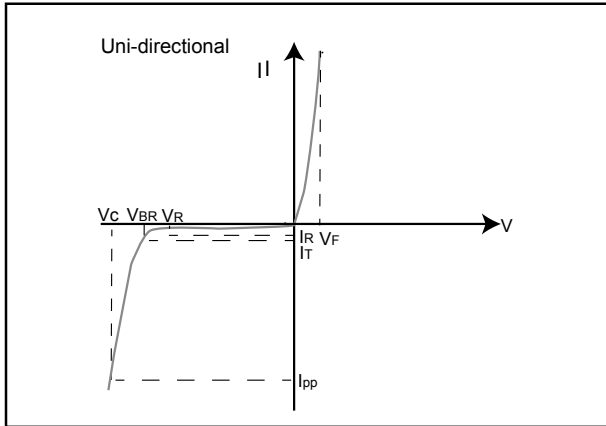
### Electrical Characteristics

| Type Number |           | Marking |       | Reverse Stand-Off Voltage | Breakdown Voltage               |        | Test Current | Max Clamping Voltage<br>10/1000µs | Peak Pulse Current<br>10/1000µs | Reverse Leakage |
|-------------|-----------|---------|-------|---------------------------|---------------------------------|--------|--------------|-----------------------------------|---------------------------------|-----------------|
|             |           |         |       | V <sub>RWM</sub>          | V <sub>BR</sub> @I <sub>T</sub> |        |              |                                   |                                 |                 |
| UNI         | BI        | UNI     | BI    | V                         | Min(V)                          | Max(V) | mA           | V                                 | A                               | µA              |
| SMFJ54A     | SMFJ54CA  | 54A     | 54CA  | 54.0                      | 60.00                           | 69.00  | 1            | 87.1                              | 2.30                            | 1               |
| SMFJ58A     | SMFJ58CA  | 58A     | 58CA  | 58.0                      | 64.40                           | 74.10  | 1            | 93.6                              | 2.10                            | 1               |
| SMFJ60A     | SMFJ60CA  | 60A     | 60CA  | 60.0                      | 66.70                           | 76.70  | 1            | 96.8                              | 1.80                            | 1               |
| SMFJ64A     | SMFJ64CA  | 64A     | 64CA  | 64.0                      | 71.10                           | 81.80  | 1            | 103.0                             | 1.70                            | 1               |
| SMFJ70A     | SMFJ70CA  | 70A     | 70CA  | 70.0                      | 77.80                           | 89.50  | 1            | 113.0                             | 1.50                            | 1               |
| SMFJ75A     | SMFJ75CA  | 75A     | 75CA  | 75.0                      | 83.30                           | 95.80  | 1            | 121.0                             | 1.40                            | 1               |
| SMFJ78A     | SMFJ78CA  | 78A     | 78CA  | 78.0                      | 86.70                           | 99.70  | 1            | 126.0                             | 1.40                            | 1               |
| SMFJ85A     | SMFJ85CA  | 85A     | 85CA  | 85.0                      | 94.40                           | 108.20 | 1            | 137.0                             | 1.30                            | 1               |
| SMFJ90A     | SMFJ90CA  | 90A     | 90CA  | 90.0                      | 100.00                          | 115.50 | 1            | 146.0                             | 1.20                            | 1               |
| SMFJ100A    | SMFJ100CA | 100A    | 100CA | 100.0                     | 111.00                          | 128.00 | 1            | 162.0                             | 1.10                            | 1               |
| SMFJ110A    | SMFJ110CA | 110A    | 110CA | 110.0                     | 122.00                          | 140.50 | 1            | 177.0                             | 1.00                            | 1               |
| SMFJ120A    | SMFJ120CA | 120A    | 120CA | 120.0                     | 133.00                          | 153.00 | 1            | 193.0                             | 0.90                            | 1               |
| SMFJ130A    | SMFJ130CA | 130A    | 130CA | 130.0                     | 144.00                          | 165.50 | 1            | 209.0                             | 0.80                            | 1               |
| SMFJ150A    | SMFJ150CA | 150A    | 150CA | 150.0                     | 167.00                          | 192.50 | 1            | 243.0                             | 0.70                            | 1               |
| SMFJ160A    | SMFJ160CA | 160A    | 160CA | 160.0                     | 178.00                          | 205.00 | 1            | 259.0                             | 0.70                            | 1               |
| SMFJ170A    | SMFJ170CA | 170A    | 170CA | 170.0                     | 189.00                          | 217.50 | 1            | 275.0                             | 0.60                            | 1               |
| SMFJ180A    | SMFJ180CA | 180A    | 180CA | 180.0                     | 198.00                          | 230.40 | 1            | 292.0                             | 0.60                            | 1               |
| SMFJ190A    | SMFJ190CA | 190A    | 190CA | 190.0                     | 209.00                          | 243.20 | 1            | 308.0                             | 0.50                            | 1               |

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

## Transient Voltage Suppressors - SMFJ Series

### I-V Curve Characteristics



**PPM Peak Pulse Power Dissipation** -- Max power dissipation

**VR Stand-off Voltage** -- Maximum voltage that can be applied to the TVS without operation

**VBR Breakdown Voltage** -- Maximum voltage that flows through the TVS at a specified test current ( $I_T$ )

**VC Clamping Voltage** -- Peak voltage measured across the TVS at a specified  $I_{ppm}$  (peak impulse current)

**IR Reverse Leakage Current** -- Current measured at  $V_R$

**VF Forward Voltage Drop for Uni-directional**

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

Figure 1 - TVS Transients Clamping Waveform

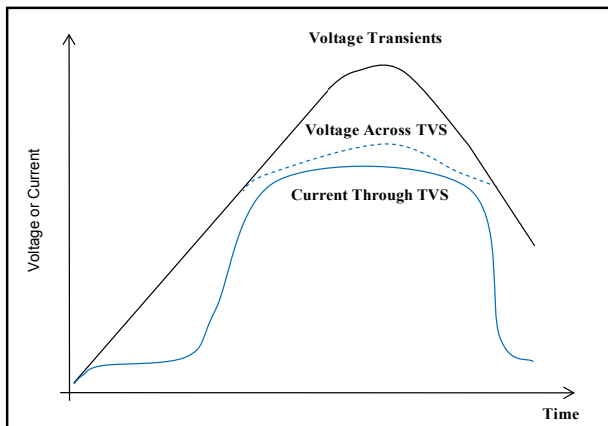
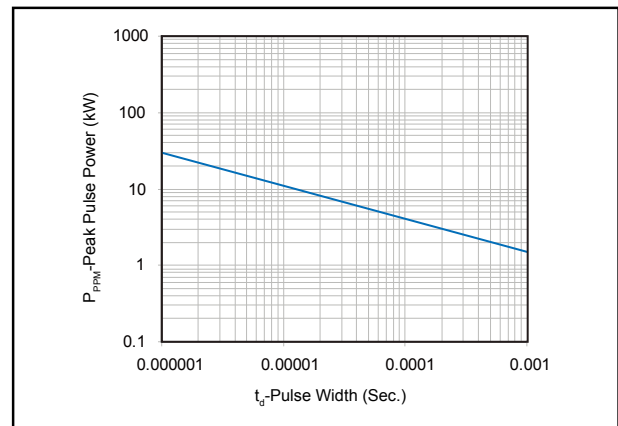


Figure 2 - Peak Pulse Power Rating



## Transient Voltage Suppressors - SMFJ Series

### Ratings and Characteristic Curves (TA=25°C unless otherwise noted) (Continued)

Figure 3 - Pulse Derating Curve

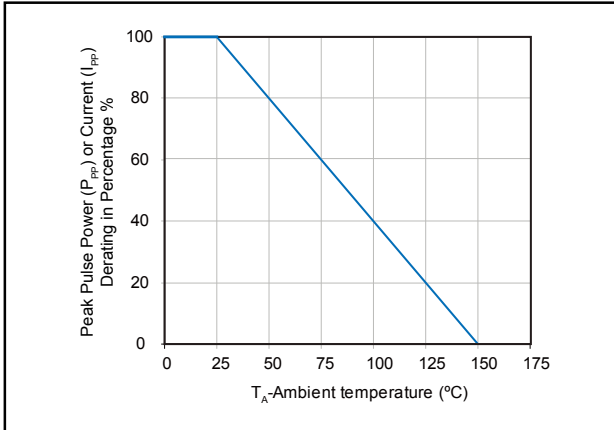


Figure 4 - Pulse Waveform - 10/1000 μS

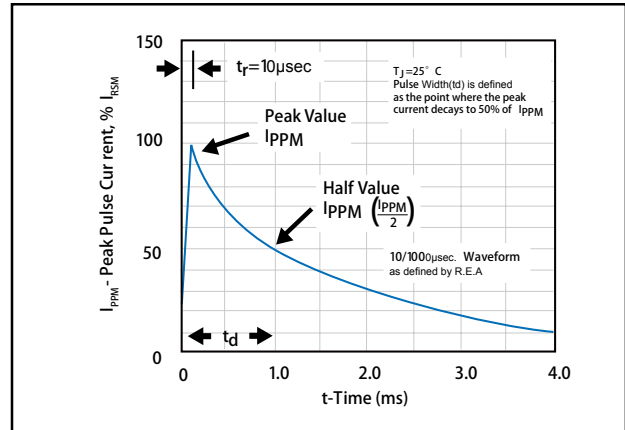


Figure 5 - Steady State Power Dissipation Derating Curve

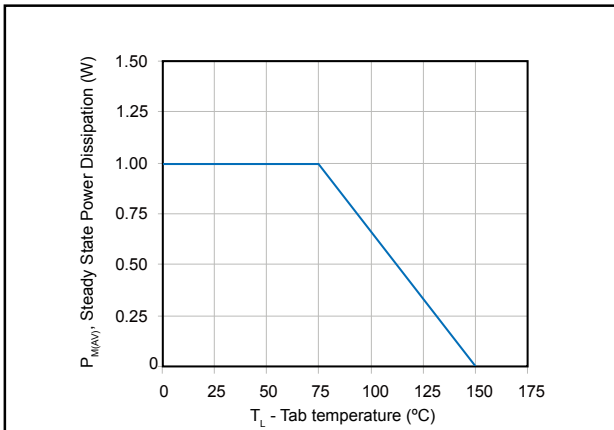


Figure 6 - Forward Voltage

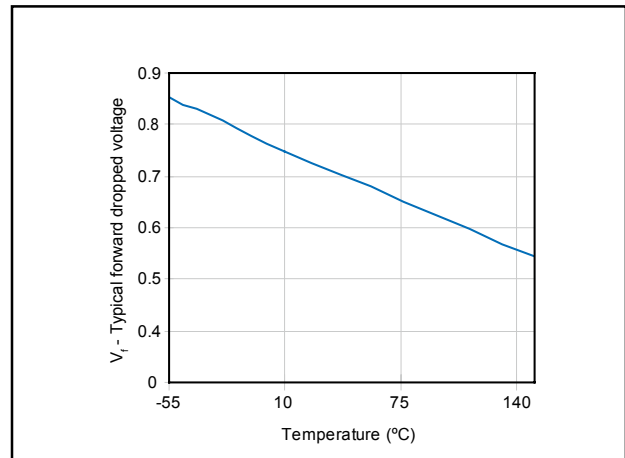
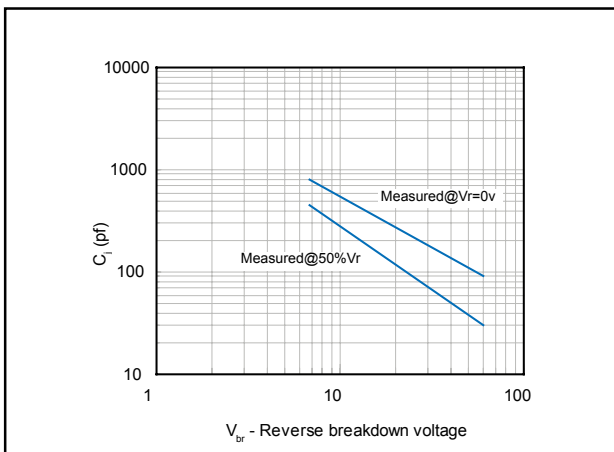


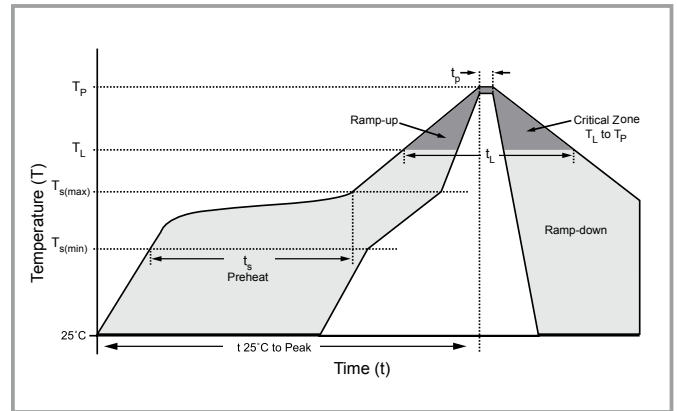
Figure 7 - C<sub>j</sub> vs. Working Peak Reverse Voltage



## Transient Voltage Suppressors - SMFJ Series

### 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 ( $T_A$ ) to peak) |                                    | 3°C/second max          |
| $T_{S(max)}$ to $T_A$ - Ramp-up Rate                   |                                    | 3°C/second max          |
| Reflow   | - Temperature ( $T_A$ ) (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

|           |   |
|-----------|---|
| Case      | JEDEC SOD-123FL molded plastic body over passivated junction. |
| Polarity  | Color band denotes the cathode except Bipolar.                |
| Terminals | Matte Tin axial leads, solderable per JESD22-B102D.           |

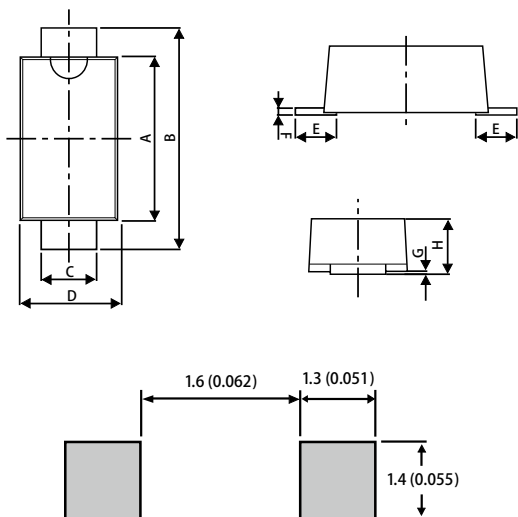
### Environmental Specifications

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

### Flow/Wave Soldering

|                    |            |
|--------------------|------------|
| Peak Temperature : | 265°C      |
| Dipping Time :     | 10 seconds |
| Soldering :        | 1 time     |

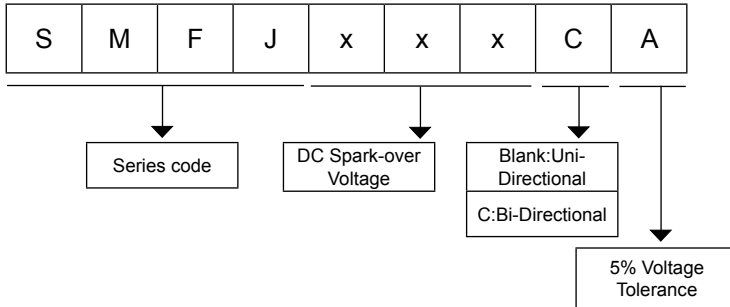
### Dimensions SOD-123FL



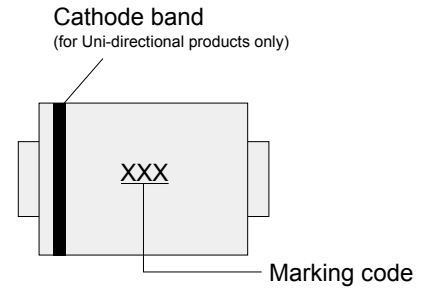
| DIM | Inches |        | Millimeters |      |
|-----|--------|--------|-------------|------|
|     | Min    | Max    | Min         | Max  |
| A   | 0.0984 | 0.1222 | 2.5         | 3.1  |
| B   | 0.1339 | 0.1535 | 3.40        | 3.90 |
| C   | 0.0275 | 0.0472 | 0.7         | 1.2  |
| D   | 0.051  | 0.0787 | 1.5         | 2.0  |
| E   | 0.0138 | 0.0354 | 0.35        | 0.90 |
| F   | 0.0020 | 0.0039 | 0.05        | 0.26 |
| G   | 0.0000 | 0.0039 | 0.00        | 0.10 |
| H   | 0.0374 | 0.0433 | 0.95        | 1.35 |

## Transient Voltage Suppressors - SMFJ Series

### Product Name



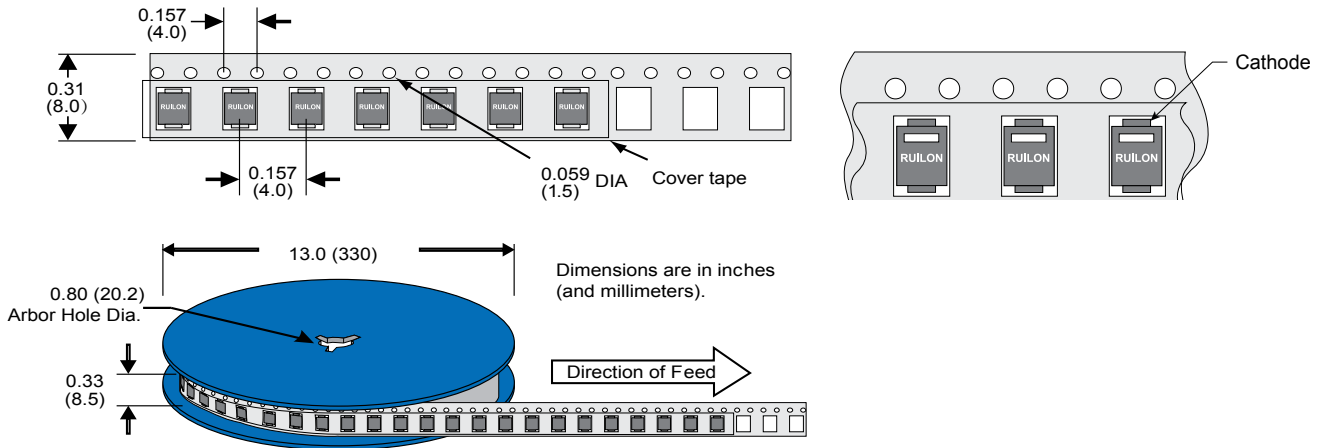
### Part Marking System



### Packaging

| Part Number | Component Package | Quantity | Packaging Option | Packaging Specification |
|-------------|-------------------|----------|------------------|-------------------------|
| SMFJxxxXX   | SOD-123FL         | 3000     | Tape & Reel      | EIA STD RS-481          |

### Tape and Reel Specification





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[MPLAD30KP43CAE3](#) [SMAJ43A-TP](#) [D5V0F6U8LP33-7](#) [TVS5501V10MUT5G](#) [5.0SMLJ24CA-TP](#) [SMAJ110CA-TP](#) [MPLAD15KP75CAE3](#)  
[MMAD1103e3/TR13](#) [DFLT40AQ-7](#)