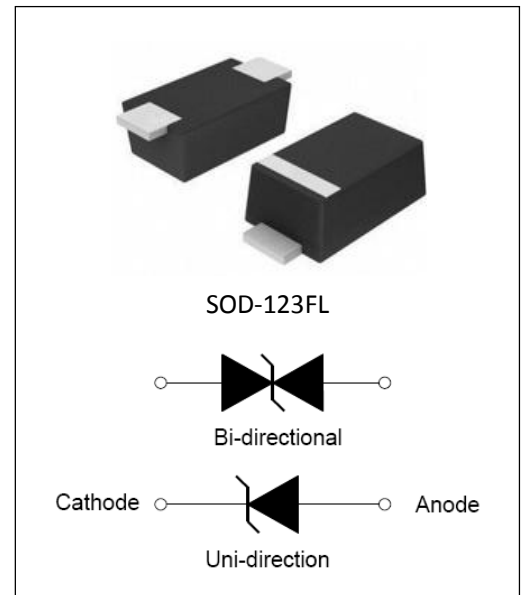


## Features

- Peak power dissipation 200W @10 x 1000 us Pulse
- Low profile package.
- Excellent clamping capability.
- Glass passivated junction.
- Fast response time: typically less than 1ns from 0 Volts to BV min
- Typical  $I_R$  less than 1uA when  $V_{BR}$  min above 15V.
- IEC 61000-4-2 ESD 30KV(Air), 30KV(Contact)
- ESD protection of data lines in accordance with IEC 61000-4-2
- EFT protection of data lines in accordance with IEC 61000-4-4
- Halogen free and RoHS compliant
- Lead-free finish



## Mechanical Characteristics

- CASE: SOD-123FL Molded Plastic over glass passivated junction.
- Mounting Position: Any
- Polarity: by cathode band denotes uni-directional device, none cathode band denotes bi-directional device.
- Terminal: Solder plated

## Maximum Ratings and Characteristics @ 25°C Ambient Temperature (unless otherwise noted)

| Parameter  | Symbol    | Value       | Units |
|--|-----------|-------------|-------|
| Peak Pulse Power Dissipation on 10/1000 us Waveform (Note 1, 2, FIG.1) | $P_{PPM}$ | Min 200     | W     |
| Peak Pulse Current of on 10/1000us Waveform (Note 1, FIG.3)            | $I_{PPM}$ | See Table 1 | A     |
| Operating Junction Temperature Range                                   | $T_J$     | -55 to 150  | °C    |
| Storage Temperature Range  | $T_{STG}$ | -55 to 150  | °C    |
|  |           |             |       |

Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above  $T_A=25^\circ\text{C}$  per Fig.2.

**Electrical Specification @ Tamb 25°C**

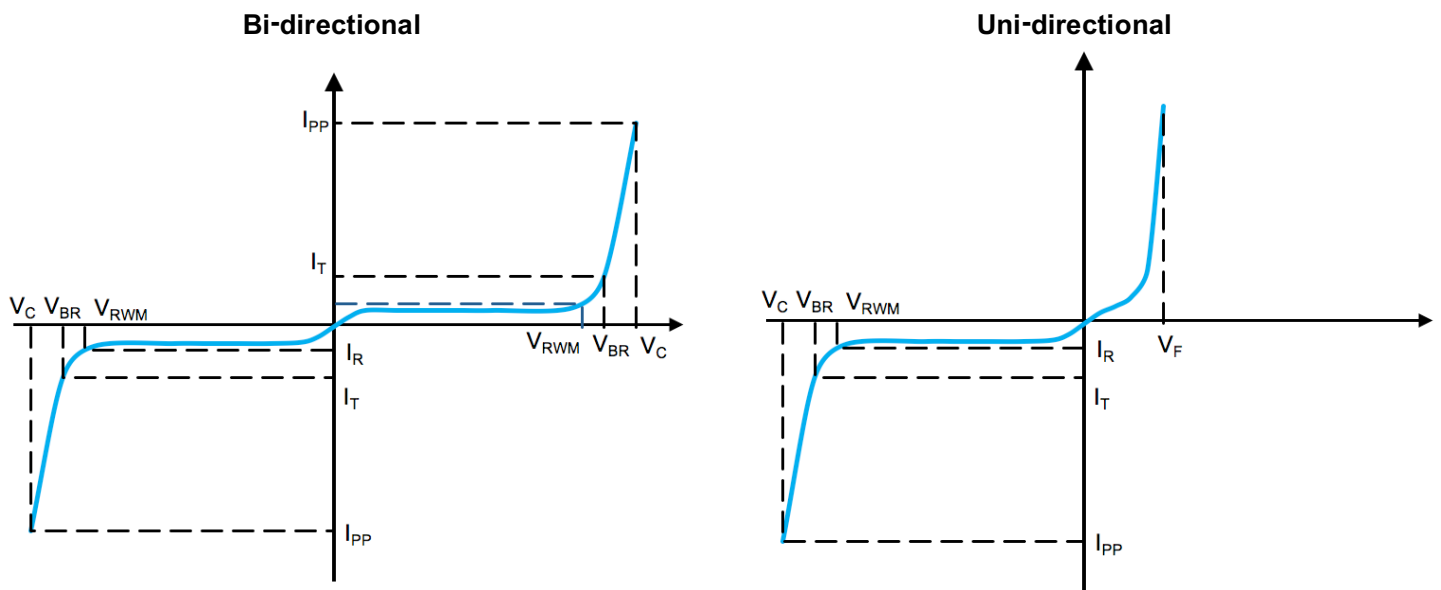
| Type Number |           | Marking |       | Reverse Stand-Off Voltage | Breakdown Voltage Min. @ I <sub>T</sub> | Breakdown Voltage Max. @ I <sub>T</sub> | Test Current        | Maximum Clamping Voltage @ I <sub>PP</sub> | Peak Pulse Current  | Reverse Leakage @ V <sub>RWM</sub> |
|-------------|-----------|---------|-------|---------------------------|---|---|---------------------|--|---------------------|------------------------------------|
| Uni         | Bi        | Uni     | Bi    | V <sub>RMW</sub> (V)      | V <sub>BR MIN</sub> (V)                 | V <sub>BR MAX</sub> (V)                 | I <sub>T</sub> (mA) | V <sub>C</sub> (V)                         | I <sub>PP</sub> (A) | I <sub>R</sub> (uA)                |
| SMFJ5.0A    | SMFJ5.0CA | 5.0A    | 5.0CA | 5.0                       | 6.40                                    | 7.00                                    | 10                  | 9.2  | 21.7                | 400.0                              |
| SMFJ6.0A    | SMFJ6.0CA | 6.0A    | 6.0CA | 6.0                       | 6.67                                    | 7.37                                    | 10                  | 10.3                                       | 19.4                | 400.0                              |
| SMFJ6.5A    | SMFJ6.5CA | 6.5A    | 6.5CA | 6.5                       | 7.22                                    | 7.98                                    | 10                  | 11.2                                       | 17.9                | 250.0                              |
| SMFJ7.0A    | SMFJ7.0CA | 7.0A    | 7.0CA | 7.0                       | 7.78                                    | 8.60                                    | 10                  | 12.0                                       | 16.7                | 100.0                              |
| SMFJ7.5A    | SMFJ7.5CA | 7.5A    | 7.5CA | 7.5                       | 8.33                                    | 9.21                                    | 1                   | 12.9                                       | 15.5                | 50.0                               |
| SMFJ8.0A    | SMFJ8.0CA | 8.0A    | 8.0CA | 8.0                       | 8.89                                    | 9.83                                    | 1                   | 13.6                                       | 14.7                | 25.0                               |
| SMFJ8.5A    | SMFJ8.5CA | 8.5A    | 8.5CA | 8.5                       | 9.44                                    | 10.40                                   | 1                   | 14.4                                       | 13.9                | 10.0                               |
| SMFJ9.0A    | SMFJ9.0CA | 9.0A    | 9.0CA | 9.0                       | 10.00                                   | 11.10                                   | 1                   | 15.4                                       | 13.0                | 5.0                                |
| SMFJ10A     | SMFJ10CA  | 10A     | 10CA  | 10.0                      | 11.10                                   | 12.30                                   | 1                   | 17.0                                       | 11.8                | 2.5                                |
| SMFJ11A     | SMFJ11CA  | 11A     | 11CA  | 11.0                      | 12.20                                   | 13.50                                   | 1                   | 18.2                                       | 11.0                | 2.5                                |
| SMFJ12A     | SMFJ12CA  | 12A     | 12CA  | 12.0                      | 13.30                                   | 14.70                                   | 1                   | 19.9                                       | 10.1                | 2.5                                |
| SMFJ13A     | SMFJ13CA  | 13A     | 13CA  | 13.0                      | 14.40                                   | 15.90                                   | 1                   | 21.5                                       | 9.3                 | 1                                  |
| SMFJ14A     | SMFJ14CA  | 14A     | 14CA  | 14.0                      | 15.60                                   | 17.20                                   | 1                   | 23.2                                       | 8.6                 | 1                                  |
| SMFJ15A     | SMFJ15CA  | 15A     | 15CA  | 15.0                      | 16.70                                   | 18.50                                   | 1                   | 24.4                                       | 8.2                 | 1                                  |
| SMFJ16A     | SMFJ16CA  | 16A     | 16CA  | 16.0                      | 17.80                                   | 19.70                                   | 1                   | 26.0                                       | 7.7                 | 1                                  |
| SMFJ17A     | SMFJ17CA  | 17A     | 17CA  | 17.0                      | 18.90                                   | 20.90                                   | 1                   | 27.6                                       | 7.2                 | 1                                  |
| SMFJ18A     | SMFJ18CA  | 18A     | 18CA  | 18.0                      | 20.00                                   | 22.10                                   | 1                   | 29.2                                       | 6.8                 | 1                                  |
| SMFJ20A     | SMFJ20CA  | 20A     | 20CA  | 20.0                      | 22.20                                   | 24.50                                   | 1                   | 32.4                                       | 6.2                 | 1                                  |
| SMFJ22A     | SMFJ22CA  | 22A     | 22CA  | 22.0                      | 24.40                                   | 26.90                                   | 1                   | 35.5                                       | 5.6                 | 1                                  |
| SMFJ24A     | SMFJ24CA  | 24A     | 24CA  | 24.0                      | 26.70                                   | 29.50                                   | 1                   | 38.9                                       | 5.1                 | 1                                  |
| SMFJ26A     | SMFJ26CA  | 26A     | 26CA  | 26.0                      | 28.90                                   | 31.90                                   | 1                   | 42.1                                       | 4.8                 | 1                                  |
| SMFJ28A     | SMFJ28CA  | 28A     | 28CA  | 28.0                      | 31.10                                   | 34.40                                   | 1                   | 45.4                                       | 4.4                 | 1                                  |
| SMFJ30A     | SMFJ30CA  | 30A     | 30CA  | 30.0                      | 33.30                                   | 36.80                                   | 1                   | 48.4                                       | 4.1                 | 1                                  |
| SMFJ33A     | SMFJ33CA  | 33A     | 33CA  | 33.0                      | 36.70                                   | 40.60                                   | 1                   | 53.3                                       | 3.8                 | 1                                  |
| SMFJ36A     | SMFJ36CA  | 36A     | 36CA  | 36.0                      | 40.00                                   | 44.20                                   | 1                   | 58.1                                       | 3.4                 | 1                                  |
| SMFJ40A     | SMFJ40CA  | 40A     | 40CA  | 40.0                      | 44.40                                   | 49.10                                   | 1                   | 64.5                                       | 3.1                 | 1                                  |
| SMFJ43A     | SMFJ43CA  | 43A     | 43CA  | 43.0                      | 47.80                                   | 52.80                                   | 1                   | 69.4                                       | 2.9                 | 1                                  |
| SMFJ45A     | SMFJ45CA  | 45A     | 45CA  | 45.0                      | 50.00                                   | 55.30                                   | 1                   | 72.7                                       | 2.8                 | 1                                  |
| SMFJ48A     | SMFJ48CA  | 48A     | 48CA  | 48.0                      | 53.30                                   | 58.90                                   | 1                   | 77.4                                       | 2.6                 | 1                                  |
| SMFJ51A     | SMFJ51CA  | 51A     | 51CA  | 51.0                      | 56.70                                   | 62.70                                   | 1                   | 82.4                                       | 2.4                 | 1                                  |
| SMFJ54A     | SMFJ54CA  | 54A     | 54CA  | 54.0                      | 60.00                                   | 66.30                                   | 1                   | 87.1                                       | 2.3                 | 1                                  |
| SMFJ58A     | SMFJ58CA  | 58A     | 58CA  | 58.0                      | 64.40                                   | 71.20                                   | 1                   | 93.6                                       | 2.1                 | 1                                  |
| SMFJ60A     | SMFJ60CA  | 60A     | 60CA  | 60.0                      | 66.70                                   | 73.70                                   | 1                   | 96.8                                       | 1.8                 | 1                                  |
| SMFJ64A     | SMFJ64CA  | 64A     | 64CA  | 64.0                      | 71.10                                   | 78.60                                   | 1                   | 103.0                                      | 1.7                 | 1                                  |
| SMFJ70A     | SMFJ70CA  | 70A     | 70CA  | 70.0                      | 77.80                                   | 86.00                                   | 1                   | 113.0                                      | 1.5                 | 1                                  |
| SMFJ75A     | SMFJ75CA  | 75A     | 75CA  | 75.0                      | 83.30                                   | 92.10                                   | 1                   | 121.0                                      | 1.4                 | 1                                  |

 ※ For Bi-directional type having V<sub>RWM</sub> of 10 Volts and less, the I<sub>R</sub> limit is double

| Type Number |           | Marking |      | Reverse Stand-Off Voltage | Breakdown Voltage Min. @ $I_T$ | Breakdown Voltage Max. @ $I_T$ | Test Current | Maximum Clamping Voltage @ $I_{PP}$ | Peak Pulse Current | Reverse Leakage @ $V_{RWM}$ |
|-------------|-----------|---------|------|---------------------------|--------------------------------|--------------------------------|--------------|-------------------------------------|--------------------|-----------------------------|
| Uni         | Bi        | Uni     | Bi   | $V_{RWM}(V)$              | $V_{BR MIN}(V)$                | $V_{BR MAX}(V)$                | $I_T (mA)$   | $V_C(V)$                            | $I_{PP}(A)$        | $I_R(\mu A)$                |
| SMFJ78A     | SMFJ78CA  | 78A     | 78CA | 78.0                      | 86.70                          | 95.80                          | 1            | 126.0                               | 1.4                | 1                           |
| SMFJ85A     | SMFJ85CA  | 85A     | 85CA | 85.0                      | 94.40                          | 104.00                         | 1            | 137.0                               | 1.3                | 1                           |
| SMFJ90A     | SMFJ90CA  | 90A     | 90CA | 90.0                      | 100.00                         | 111.00                         | 1            | 146.0                               | 1.2                | 1                           |
| SMFJ100A    | SMFJ100CA | 100     | 100C | 100.0                     | 111.00                         | 123.00                         | 1            | 162.0                               | 1.1                | 1                           |
| SMFJ110A    | SMFJ110CA | 110     | 110C | 110.0                     | 122.00                         | 135.00                         | 1            | 177.0                               | 1.0                | 1                           |
| SMFJ120A    | SMFJ120CA | 120     | 120C | 120.0                     | 133.00                         | 147.00                         | 1            | 193.0                               | 0.9                | 1                           |
| SMFJ130A    | SMFJ130CA | 130     | 130C | 130.0                     | 144.00                         | 159.00                         | 1            | 209.0                               | 0.8                | 1                           |
| SMFJ150A    | SMFJ150CA | 150     | 150C | 150.0                     | 167.00                         | 185.00                         | 1            | 243.0                               | 0.7                | 1                           |
| SMFJ160A    | SMFJ160CA | 160     | 160C | 160.0                     | 178.00                         | 197.00                         | 1            | 259.0                               | 0.7                | 1                           |
| SMFJ170A    | SMFJ170CA | 170     | 170C | 170.0                     | 189.00                         | 209.00                         | 1            | 275.0                               | 0.6                | 1                           |
| SMFJ180A    | SMFJ180CA | 180     | 180C | 180.0                     | 198.00                         | 222.00                         | 1            | 292.0                               | 0.6                | 1                           |
| SMFJ190A    | SMFJ190CA | 190     | 190C | 190.0                     | 209.00                         | 233.00                         | 1            | 308.0                               | 0.5                | 1                           |

※ For Bi-directional type having  $V_{RWM}$  of 10 Volts and less, the  $I_R$  limit is double

### I-V Curve Characteristics



**$P_{PPM}$  Peak Pulse Power Dissipation** - Max power dissipation

**$V_{RWM}$  Reverse Stand-off Voltage** - Maximum voltage that can be applied to TVS without operation

**$V_{BR}$  Breakdown Voltage** – Maximum voltage that flows through the TVS at a specified current ( $I_T$ )

**$V_C$  Clamping Voltage** – Peak voltage measured across the TVS at a specified  $I_{PPM}$  (peak impulse current)

**$I_R$  Reverse Leakage Current** – Current measured at  $V_R$

**$V_F$  Forward Voltage Drop for Uni-directional**

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

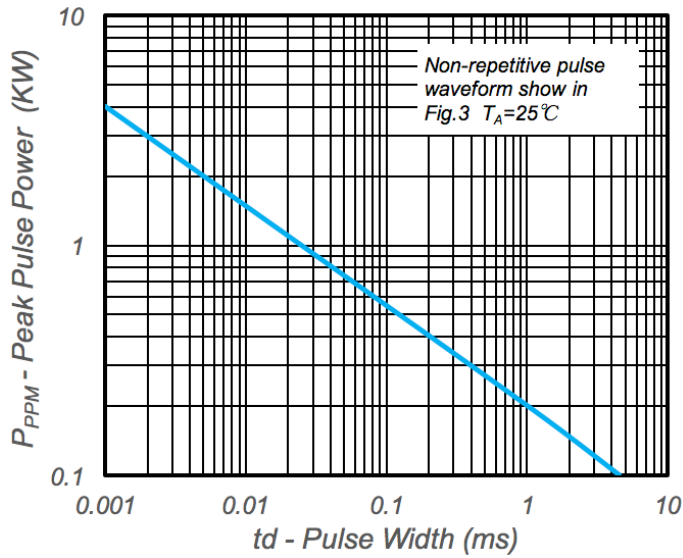


Fig.1 Peak Pulse Power Rating

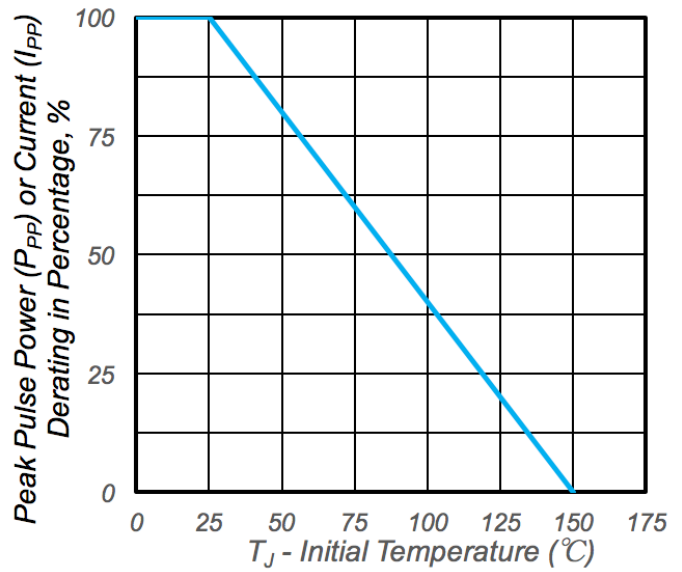


Fig.2 Pulse Derating Curve

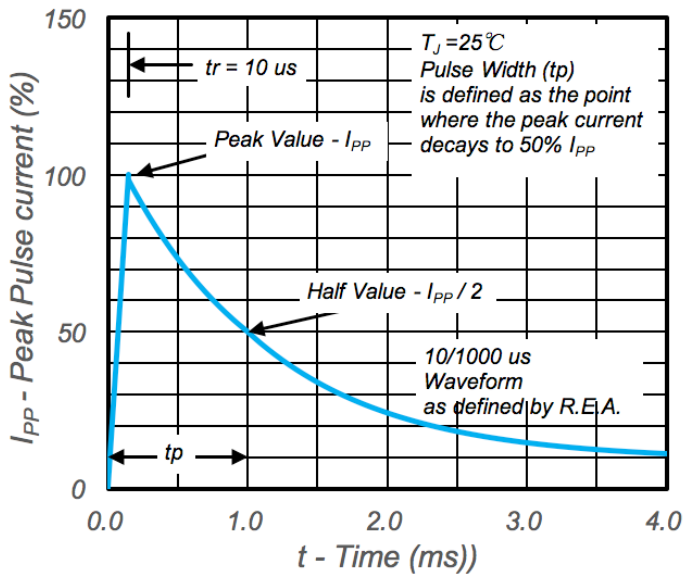


Fig.3 Pulse Waveform

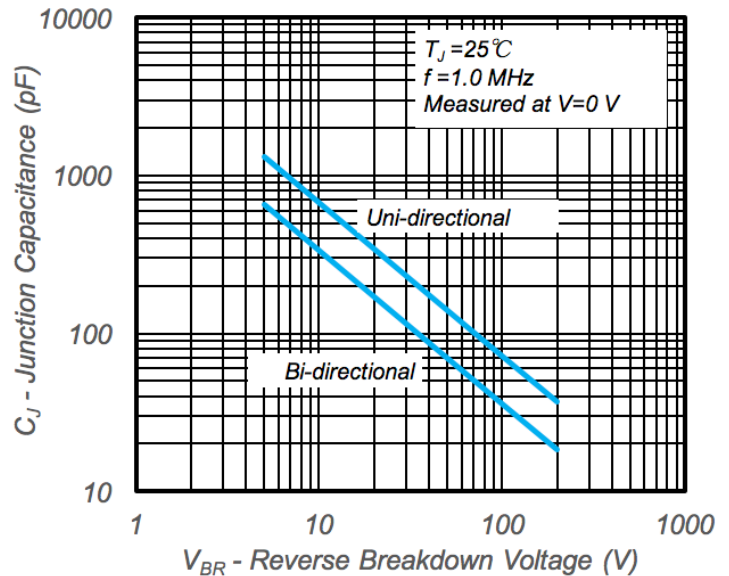
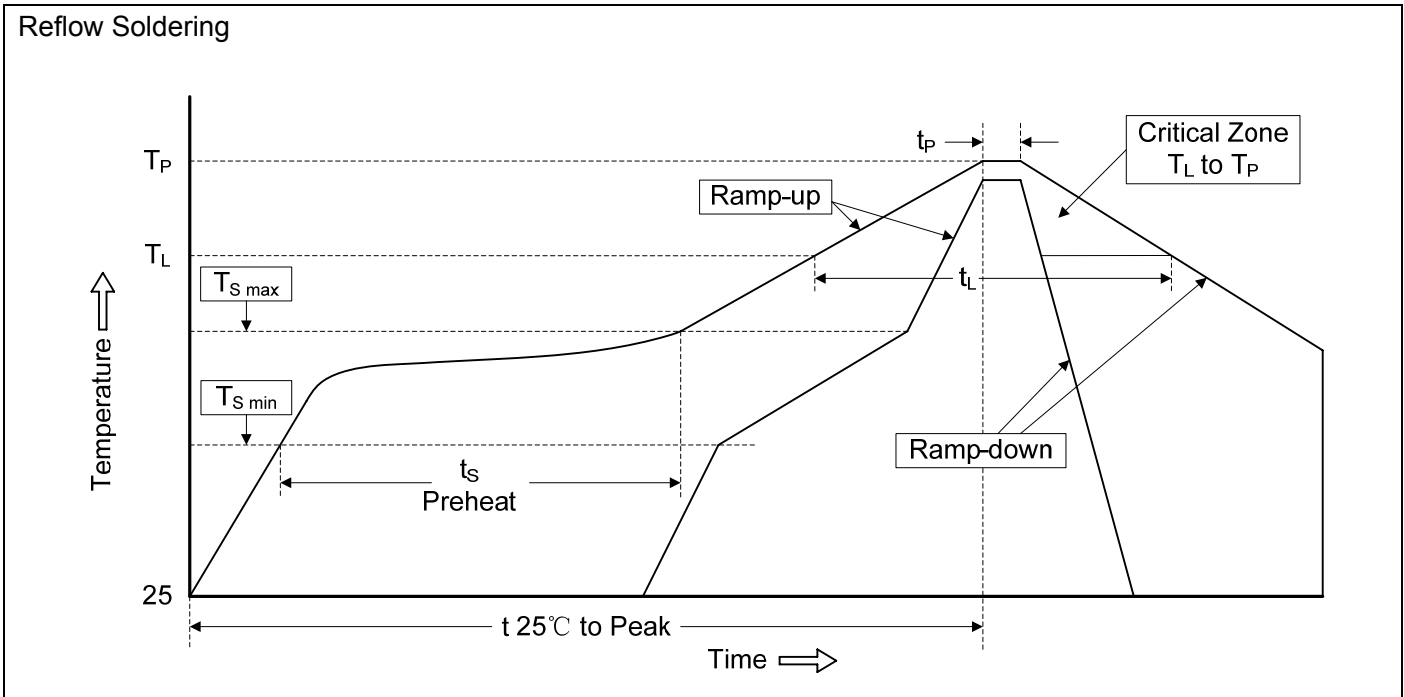


Fig.4 Typical Junction Capacitance

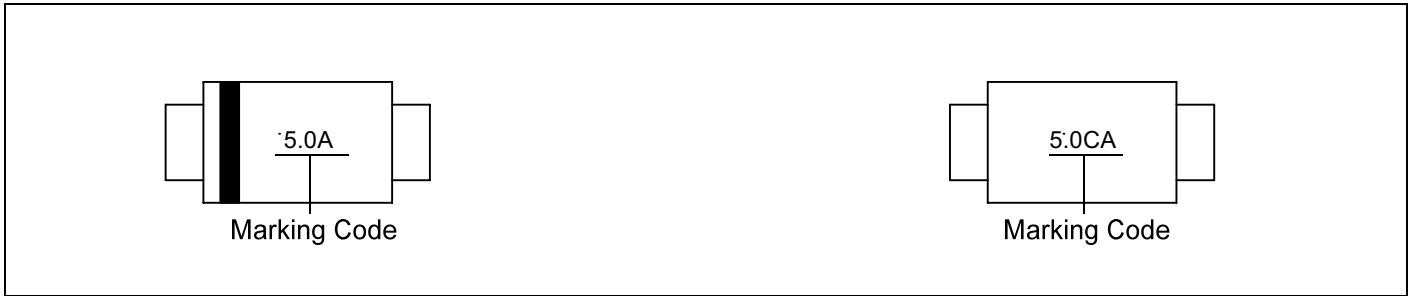
### Recommended Soldering Conditions



#### Recommended Conditions

| Profile Feature  | Pb-Free Assembly |
|--|------------------|
| Average ramp-up rate (T <sub>L</sub> to T <sub>P</sub> )     | 3°C/second max.  |
| Preheat  |                  |
| -Temperature Min (T <sub>S min</sub> )                       | 150°C            |
| -Temperature Max (T <sub>S max</sub> )                       | 200°C            |
| -Time (min to max) (t <sub>s</sub> )                         | 60-180 seconds   |
| T <sub>S max</sub> to T <sub>L</sub>                         |                  |
| -Ramp-up Rate  | 3°C/second max.  |
| Time maintained above:                                       |                  |
| -Temperature (T <sub>L</sub> )                               | 217°C            |
| -Time (t <sub>L</sub> )                                      | 60-150 seconds   |
| Peak Temperature (T <sub>P</sub> )                           | 260°C            |
| Time within 5°C of actual Peak Temperature (t <sub>p</sub> ) | 20-40 seconds    |
| Ramp-down Rate   | 6°C/second max.  |
| Time 25°C to Peak Temperature                                | 8 minutes max.   |

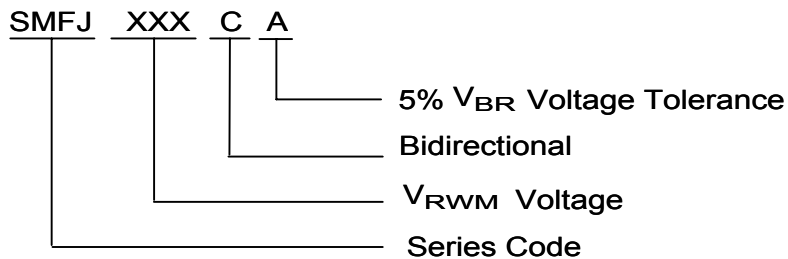
### Marking Code



### Package Outline Dimensions and Pad Layouts (SOD123FL)

| Symbol | Dimension   |      |           |       |
|--------|-------------|------|-----------|-------|
|        | millimeters |      | Inches    |       |
|        | Min         | Max  | Min       | Max   |
| A      | 3.50        | 3.90 | 0.138     | 0.154 |
| B      | 2.60        | 3.00 | 0.102     | 0.118 |
| C      | 0.75        | 1.10 | 0.030     | 0.043 |
| D      | 1.60        | 2.00 | 0.063     | 0.079 |
| E      | 0.80Typ.    |      | 0.031Typ. |       |
| F      | 0.90        | 1.40 | 0.035     | 0.055 |
| G      | 0.12        | 0.22 | 0.005     | 0.009 |

### Ordering Information



**Packaging**

| Tape              | Symbol                                   | Dimension(mm) |            |
|-------------------|--|---------------|------------|
|                   | W  | 8.00±0.30     |            |
|                   | P0                                       | 4.00±0.10     |            |
|                   | P1                                       | 4.00±0.10     |            |
|                   | P2                                       | 2.00±0.10     |            |
|                   | D0                                       | Φ1.50±0.10    |            |
|                   | D1                                       | Φ1.00±0.05    |            |
|                   | E  | 1.75±0.10     |            |
|                   | F  | 3.50±0.10     |            |
|                   | A  | 2.00±0.10     |            |
|                   | B  | 3.95±0.10     |            |
|                   | K  | 1.40±0.12     |            |
|                   | t  | 0.23±0.10     |            |
|                   | <p data-bbox="97 1043 159 1075">Reel</p> | D             | Φ178.0±2.0 |
|                   |  | D2            | Φ13.0      |
|                   |  | W1            | 9.5        |
| Quantity: 3000PCS |  |               |            |

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