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# SMF Series

## 200W Surface Mount Transient Voltage Suppressors

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## Features

- Peak power disspation
  200W@10 x 1000 us Pluse
- Low incremental surge resistance
- Excellent clamping capability
- Fast response time
- Low leakage current
- Halogen free and RoHS compliant

## Applications

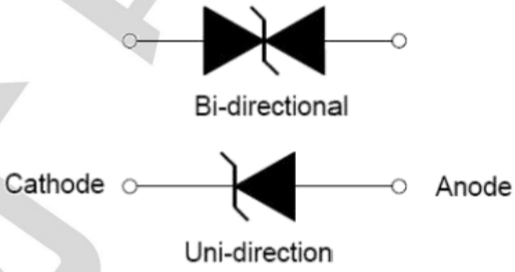
- Personal digital assistants (PDA)
- Cellular handsets & Accessories
- Handhelds and notebooks
- Portable instrumentation

## Mechanical Characteristics

- SOD-123FL surface mount package

## Dimensions and Pin Configuration

SOD-123FL




Pin Configuration

## Maximum Ratings& Thermal Characteristics

**(Tamb=25°C unless otherwise specified)**

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Peak pulse power (tp=10/1000μs waveform) | $P_{PPM}$ | 200 | W |
| Steady state power dissipation at $T_A$=50℃ | $P_{M(AV)}$ | 1 | W |
| Peak Pulse Current of on 10/1000us Waveform | IPPM | See Table | A |
| Typical thermal resistance junction to ambient | $R_{\theta JA}$ | 220 | ℃/W |
| Storage & operating temperature range | $T_{STG}$ ,$T_J$ | -55~+150 | ℃ |



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## Electrical Characteristics (TA=25°C unless otherwise specified)

| Part Number (Uni) | Part Number (Bi) | Reverse Stand off Voltage $V_R$ (V) | Breakdown Voltage $V_{BR}$ @ $I_T$ (V) | | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$@ $I_{PP}$ (V) | Maximum Peak Pulse Current $I_{PP}$ (A) | Maximun Reverse Leakage $I_R$ @ $V_R$ (μA) |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | | | | |
| SMF5.0A | SMF5.0CA | 5 | 6.4 | 7 | 10 | 9.2 | 21.7 | 400 |
| SMF6.0A | SMF6.0CA | 6 | 6.67 | 7.37 | 10 | 10.3 | 19.4 | 400 |
| SMF6.5A | SMF6.5CA | 6.5 | 7.22 | 7.98 | 10 | 11.2 | 17.9 | 250 |
| SMF7.0A | SMF7.0CA | 7 | 7.78 | 8.6 | 10 | 12 | 16.7 | 100 |
| SMF7.5A | SMF7.5CA | 7.5 | 8.33 | 9.21 | 1 | 12.9 | 15.5 | 50 |
| SMF8.0A | SMF8.0CA | 8 | 8.89 | 9.83 | 1 | 13.6 | 14.7 | 25 |
| SMF8.5A | SMF8.5CA | 8.5 | 9.44 | 10.4 | 1 | 14.4 | 13.9 | 10 |
| SMF9.0A | SMF9.0CA | 9 | 10 | 11.1 | 1 | 15.4 | 13 | 5 |
| SMF10A | SMF10CA | 10 | 11.1 | 12.3 | 1 | 17 | 11.8 | 2.5 |
| SMF11A | SMF11CA | 11 | 12.2 | 13.5 | 1 | 18.2 | 11 | 2.5 |
| SMF12A | SMF12CA | 12 | 13.3 | 14.7 | 1 | 19.9 | 10.1 | 2.5 |
| SMF13A | SMF13CA | 13 | 14.4 | 15.9 | 1 | 21.5 | 9.3 | 1 |
| SMF14A | SMF14CA | 14 | 15.6 | 17.2 | 1 | 23.2 | 8.6 | 1 |
| SMF15A | SMF15CA | 15 | 16.7 | 18.5 | 1 | 24.4 | 8.2 | 1 |
| SMF16A | SMF16CA | 16 | 17.8 | 19.7 | 1 | 26 | 7.7 | 1 |
| SMF17A | SMF17CA | 17 | 18.9 | 20.9 | 1 | 27.6 | 7.2 | 1 |
| SMF18A | SMF18CA | 18 | 20 | 22.1 | 1 | 29.2 | 6.8 | 1 |
| SMF20A | SMF20CA | 20 | 22.2 | 24.5 | 1 | 32.4 | 6.2 | 1 |
| SMF22A | SMF22CA | 22 | 24.4 | 26.9 | 1 | 35.5 | 5.6 | 1 |
| SMF24A | SMF24CA | 24 | 26.7 | 29.5 | 1 | 38.9 | 5.1 | 1 |
| SMF26A | SMF26CA | 26 | 28.9 | 31.9 | 1 | 42.1 | 4.8 | 1 |
| SMF28A | SMF28CA | 28 | 31.1 | 34.4 | 1 | 45.4 | 4.4 | 1 |
| SMF30A | SMF30CA | 30 | 33.3 | 36.8 | 1 | 48.4 | 4.1 | 1 |
| SMF33A | SMF33CA | 33 | 36.7 | 40.6 | 1 | 53.3 | 3.8 | 1 |
| SMF36A | SMF36CA | 36 | 40 | 44.2 | 1 | 58.1 | 3.4 | 1 |
| SMF40A | SMF40CA | 40 | 44.4 | 49.1 | 1 | 64.5 | 3.1 | 1 |
| SMF43A | SMF43CA | 43 | 47.8 | 52.8 | 1 | 69.4 | 2.9 | 1 |
| SMF45A | SMF45CA | 45 | 50 | 55.3 | 1 | 72.7 | 2.8 | 1 |
| SMF48A | SMF48CA | 48 | 53.3 | 58.9 | 1 | 77.4 | 2.6 | 1 |
| SMF51A | SMF51CA | 51 | 56.7 | 62.7 | 1 | 82.4 | 2.4 | 1 |
| SMF54A | SMF54CA | 54 | 60 | 66.3 | 1 | 87.1 | 2.3 | 1 |

## Electrical Characteristics (TA=25°C unless otherwise specified)

| Part Number (Uni) | Part Number (Bi) | Reverse Stand off Voltage $V_R$ (V) | Breakdown Voltage $V_{BR}$ @ $I_T$ (V) | | Test Current $I_T$ (mA) | Maximum Clamping Voltage $V_C$@ $I_{PP}$ (V) | Maximum Peak Pulse Current $I_{PP}$ (A) | Maximun Reverse Leakage $I_R$ @ $V_R$ (μA) |
|---|---|---|---|---|---|---|---|---|
| | | | Min | Max | | | | |
| SMF58A | SMF58CA | 58 | 64.4 | 71.2 | 1 | 93.6 | 2.1 | 1 |
| SMF60A | SMF60CA | 60 | 66.7 | 73.7 | 1 | 96.8 | 1.8 | 1 |
| SMF64A | SMF64CA | 64 | 71.1 | 78.6 | 1 | 103 | 1.7 | 1 |
| SMF70A | SMF70CA | 70 | 77.8 | 86 | 1 | 113 | 1.5 | 1 |
| SMF75A | SMF75CA | 75 | 83.3 | 92.1 | 1 | 121 | 1.4 | 1 |
| SMF78A | SMF78CA | 78 | 86.7 | 95.8 | 1 | 126 | 1.4 | 1 |
| SMF85A | SMF85CA | 85 | 94.4 | 104 | 1 | 137 | 1.3 | 1 |
| SMF90A | SMF90CA | 90 | 100 | 111 | 1 | 146 | 1.2 | 1 |
| SMF100A | SMF100CA | 100 | 111 | 123 | 1 | 162 | 1.1 | 1 |
| SMF110A | SMF110CA | 110 | 122 | 135 | 1 | 177 | 1 | 1 |
| SMF120A | SMF120CA | 120 | 133 | 147 | 1 | 193 | 0.9 | 1 |
| SMF130A | SMF130CA | 130 | 144 | 159 | 1 | 209 | 0.8 | 1 |
| SMF150A | SMF150CA | 150 | 167 | 185 | 1 | 243 | 0.7 | 1 |
| SMF160A | SMF160CA | 160 | 178 | 197 | 1 | 259 | 0.7 | 1 |
| SMF170A | SMF170CA | 170 | 189 | 209 | 1 | 275 | 0.6 | 1 |
| SMF58A | SMF58CA | 58 | 64.4 | 71.2 | 1 | 93.6 | 2.1 | 1 |
| SMF60A | SMF60CA | 60 | 66.7 | 73.7 | 1 | 96.8 | 1.8 | 1 |
| SMF64A | SMF64CA | 64 | 71.1 | 78.6 | 1 | 103 | 1.7 | 1 |
| SMF70A | SMF70CA | 70 | 77.8 | 86 | 1 | 113 | 1.5 | 1 |
| SMF75A | SMF75CA | 75 | 83.3 | 92.1 | 1 | 121 | 1.4 | 1 |
| SMF78A | SMF78CA | 78 | 86.7 | 95.8 | 1 | 126 | 1.4 | 1 |
| SMF85A | SMF85CA | 85 | 94.4 | 104 | 1 | 137 | 1.3 | 1 |
| SMF90A | SMF90CA | 90 | 100 | 111 | 1 | 146 | 1.2 | 1 |
| SMF100A | SMF100CA | 100 | 111 | 123 | 1 | 162 | 1.1 | 1 |
| SMF110A | SMF110CA | 110 | 122 | 135 | 1 | 177 | 1 | 1 |
| SMF120A | SMF120CA | 120 | 133 | 147 | 1 | 193 | 0.9 | 1 |
| SMF130A | SMF130CA | 130 | 144 | 159 | 1 | 209 | 0.8 | 1 |
| SMF150A | SMF150CA | 150 | 167 | 185 | 1 | 243 | 0.7 | 1 |
| SMF160A | SMF160CA | 160 | 178 | 197 | 1 | 259 | 0.7 | 1 |
| SMF170A | SMF170CA | 170 | 189 | 209 | 1 | 275 | 0.6 | 1 |

For bi-directional type having Vrwm of 10 Volts and less, the IR limit is double.
For parts without A, the VBR is +10%.

## Typical Characteristics Curves

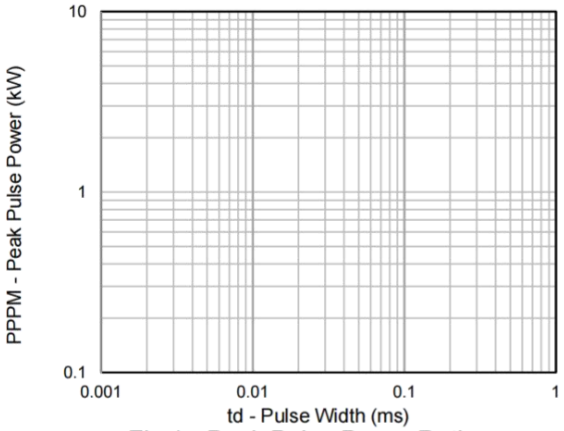



Fig.1 - Peak Pulse Power Rating

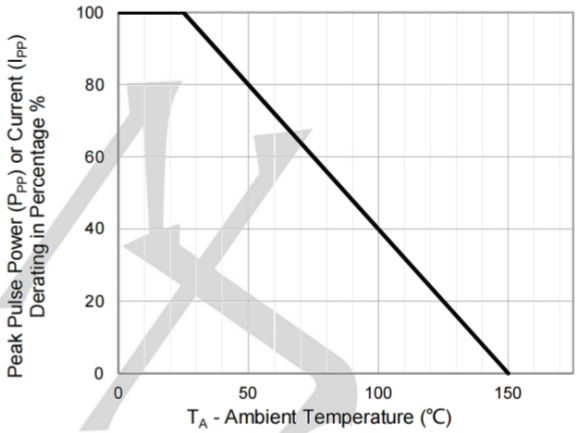



Fig.2 - Pulse Derating Curve

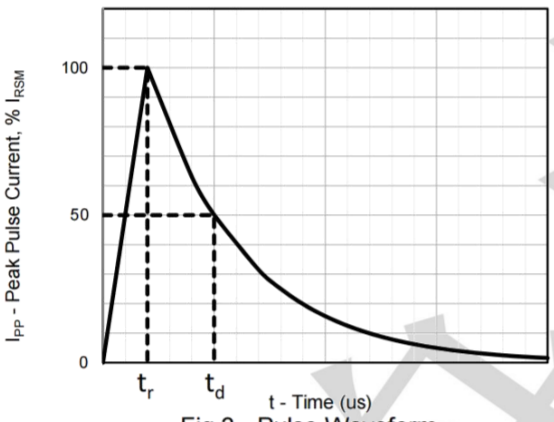



Fig.3 - Pulse Waveform

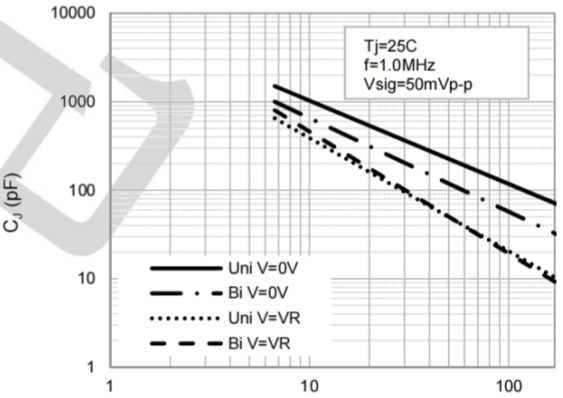



Fig.4 - Typical Junction Capacitance

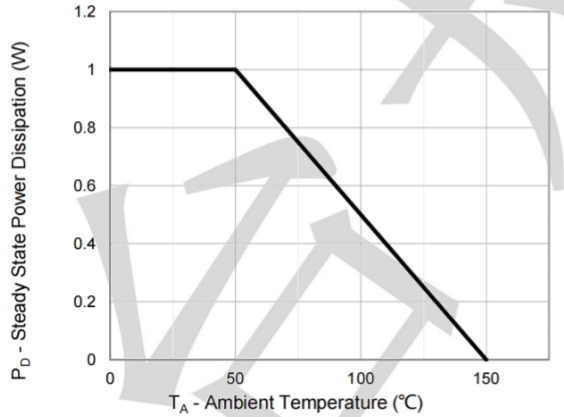



Fig.5 - Steady State Power Dissipation Derating Curve

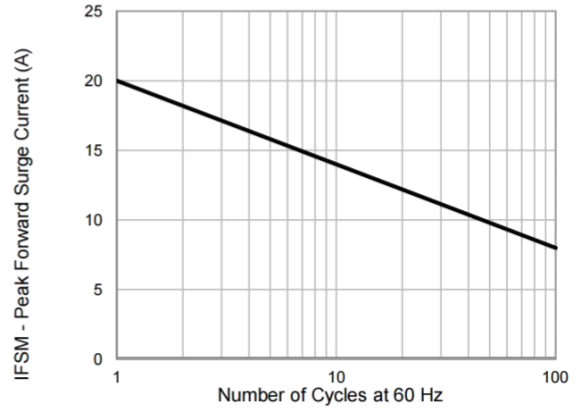
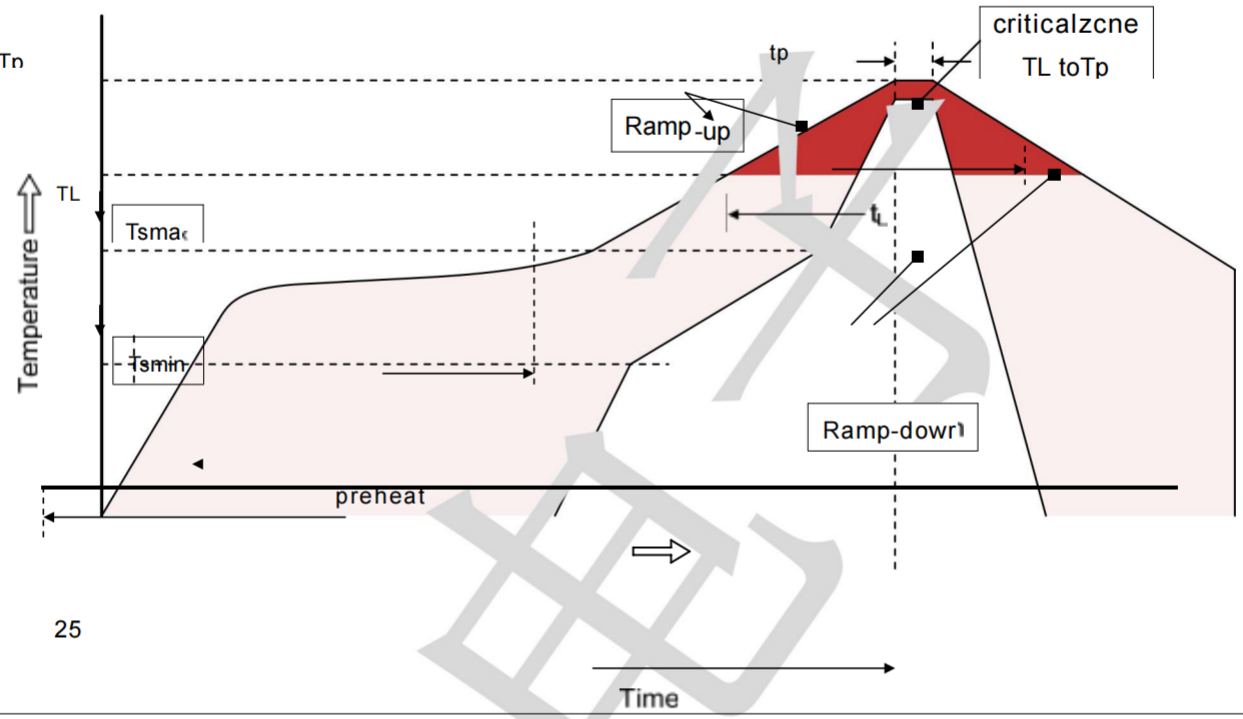



Fig.6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only

## Recommended Soldering Conditions

Reflow Soldering

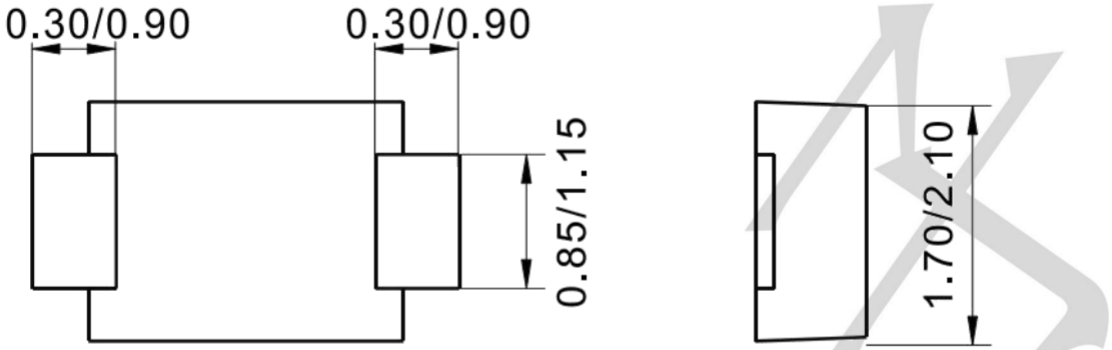


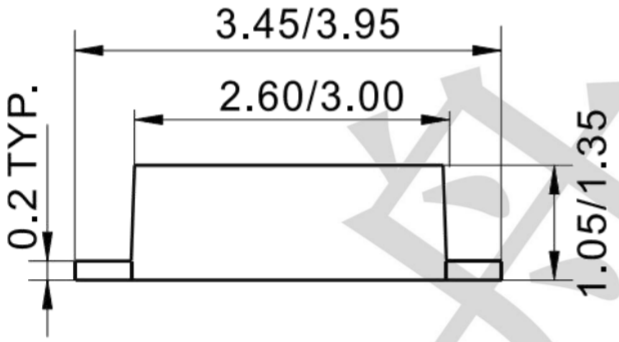

Recommended Conditions

| Profile Feature | Pb-Free Assembly |
|---|---|
| Average ramp-up rate ($T_L$ to $T_P$) | 3℃/second max. |
| Preheat<br>-Temperature Min ($T_{S\ min}$)<br>-Temperature Max ($T_{S\ max}$)<br>-Time (minto max) (ts) | <br>150℃<br>200℃<br>60-180 seconds |
| $T_{S\ max}$ to $T_L$<br>-Ramp-up Rate | <br>3℃/second max. |
| Time maintained above:<br>-Temperature ($T_L$)<br>-Time ($t_L$) | <br>217℃<br>60-150 seconds |
| Peak Temperature ($T_P$) | 260℃ |
| Time within 5℃ of actual Peak Temperature ($t_P$) | 20-40 seconds |
| Ramp-down Rate | 6℃/second max. |
| Time 25℃ to Peak Temperature | 8 minutes max. |

## Package Outline Dimensions (unit: mm)

**SOD-123FL**




## Mounting Pad Layout (unit: mm)