SMF Series
Surface Mount – 200W

Description
The SMF series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events. SMF package is 50% smaller in footprint when compare to SMA package and delivering one of the low height profiles (1.1mm) in the industry.

Features & Benefits
- 200W peak pulsepower capability at 10/1000µs waveform, repetition rate (duty cycle): 0.01%
- Compatible with industrial standard package SOD-123FL
- Low profile: maximum height of 1.1mm.
- Low inductance, excellent clamping capability
- For surface mounted applications to optimize board space
- High temperature to reflow soldering guaranteed: 260°C/30sec
- Typical failure mode is short from over-specified voltage or current
- 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
- EFT protection of data lines in accordance with IEC 61000-4-4
- Fast response time: typically less than 1.0ns from 0 Volts to VBR min
- Glass passivated junction
- Built-in strain relief
- Plastic package is flammability rated V-0 per UL 94
- Meet MSL level1, per J-STD-020, LF maximum peak of 260°C
- Matte tin lead-free plated
- Halogen-free and RoHS compliant
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tinSn (IPC/ JEDEC J-STD-609A.01)
- UL Recognized to UL 497B as an Isolated Loop Circuit Protector.

Maximum Ratings and Thermal Characteristics
(Ta=25°C unless otherwise noted)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Pulse Power Dissipation</td>
<td>P_{PPM}</td>
<td>1000</td>
<td>W</td>
</tr>
<tr>
<td>at T_a=25°C</td>
<td>8/20µs</td>
<td>200</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td>10/1000µs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power Dissipation On Infinite Heat Sink at T_L=50°C</td>
<td>P_{D}</td>
<td>1</td>
<td>W</td>
</tr>
<tr>
<td>Thermal Resistance Junction-to-Ambient</td>
<td>R_{BJA}</td>
<td>220</td>
<td>°C/W</td>
</tr>
<tr>
<td>Thermal Resistance Junction-to-Lead</td>
<td>R_{JL}</td>
<td>100</td>
<td>°C/W</td>
</tr>
<tr>
<td>Operating Temperature Range</td>
<td>T_J</td>
<td>-65 to 150</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature Range</td>
<td>T_{STG}</td>
<td>-65 to 175</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes:
1. Non-repetitive current pulse, per Fig. 4 and derated above T_{j_initial}=25°C per Fig. 3.
2. SMF90A-SMF100A: Peak Pulse Power Dissipation is 170W min, 200W typical @ 10/1000µs

Applications
SMF series is ideal for the protection of I/O interfaces, V_{CC}, bus and other vulnerable circuit used in cellular phones, portable electronics, business machines, power supplies and other consumer applications.

Agency Approvals

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

Agency Agnecy File Number

Functional Diagram

Bi-directional

Uni-directional

Cathode

Anode
## SMF Series
### Surface Mount – 200W

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

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Marking Code</th>
<th>Breakdown Voltage VBR (Volts) @ IT</th>
<th>Test Current IT (mA)</th>
<th>Reverse Stand off Voltage VR (V)</th>
<th>Maximum Reverse Leakage @ VR IR (µA)</th>
<th>Maximum Peak Pulse Current @ipp A (10*1000us)</th>
<th>Maximum Clamping Voltage @ipp VC (V)</th>
<th>Agency Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMF5.0A</td>
<td>SMF5.0CA</td>
<td>5.0</td>
<td>2.5</td>
<td>100</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>X X</td>
</tr>
<tr>
<td>SMF6.0A</td>
<td>SMF6.0CA</td>
<td>6.0</td>
<td>2.5</td>
<td>100</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>X X</td>
</tr>
<tr>
<td>SMF6.5A</td>
<td>SMF6.5CA</td>
<td>6.5</td>
<td>2.5</td>
<td>100</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>X X</td>
</tr>
<tr>
<td>SMF7.0A</td>
<td>SMF7.0CA</td>
<td>7.0</td>
<td>2.5</td>
<td>100</td>
<td>10.0</td>
<td>10.0</td>
<td>10.0</td>
<td>X X</td>
</tr>
</tbody>
</table>

**Notes:**
1. V<sub>B</sub> measured after IT applied for 300µs, I<sub>PP</sub> = square wave pulse or equivalent.
2. Surge current waveform per 10/1000µs exponential wave and derated per Fig. 2.
3. All terms and symbols are consistent with ANSI/IEEE C62.35.
4. For bidirectional type having VR of 10 volts and less, the IR limit is double.
SMF Series
Surface Mount – 200W

I-V Curve Characteristics

- **Uni-directional**
- **Bi-directional**

**Figure 1:** TVS Transients Clamping Waveform

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

**Ratings and Characteristic Curves** *(T_a=25°C unless otherwise noted)*

- **P_{PPM}** Peak Pulse Power Dissipation – Max power dissipation
- **V_R** Stand-off Voltage – Maximum voltage that can be applied to the TVS without operation
- **V_{BR}** Breakdown Voltage – Maximum voltage that flows though the TVS at a specified test 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
SMF Series
Surface Mount – 200W

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

Figure 3: Peak Pulse Power Derating Curve

Figure 4: Pulse Waveform - 10/1000µS

Figure 5: Forward Voltage

Figure 6: Typical Junction Capacitance

Figure 7: Peak Forward Voltage Drop vs. Peak Forward Current

Figure 8: Maximum Non-Repetitive Forward Surge Current
Uni-Directional Only
SMF Series
Surface Mount – 200W

Soldering Parameters

Reflow Condition
- Temperature Min (Tmin)
- Temperature Max (Tmax)
- Time (min to max) (t)

Pre Heat
- Temperature Max (Tmax)
- Time (min to max) (t)

Average ramp up rate (Liquidus Temp (Tl) to peak
Tmax to Tl - Ramp-up Rate

Ramp-down Rate

Time 25°C to peak Temperature (TP)
Do not exceed

Specifications

Physical Specifications
Case
SOD-123FL plastic over glass passivated junction
Polarity
Color band denotes cathode except bipolar
Terminal
Matte tin-plated leads, solderable per JESD22-B102

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

Dimensions - SOD-123FL Package

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Millimeters</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2.50 - 3.10</td>
<td>0.0984 - 0.1220</td>
</tr>
<tr>
<td>B</td>
<td>3.40 - 3.90</td>
<td>0.1339 - 0.1535</td>
</tr>
<tr>
<td>C</td>
<td>0.70 - 1.20</td>
<td>0.0275 - 0.0472</td>
</tr>
<tr>
<td>D</td>
<td>1.50 - 2.00</td>
<td>0.0591 - 0.0787</td>
</tr>
<tr>
<td>E</td>
<td>0.35 - 0.90</td>
<td>0.0138 - 0.0354</td>
</tr>
<tr>
<td>F</td>
<td>0.05 - 0.26</td>
<td>0.0020 - 0.0102</td>
</tr>
<tr>
<td>G</td>
<td>0.00 - 0.10</td>
<td>0.000 - 0.0039</td>
</tr>
<tr>
<td>H</td>
<td>0.90 - 1.10</td>
<td>0.0354 - 0.0433</td>
</tr>
<tr>
<td>I</td>
<td>0.00 - 0.20</td>
<td>0.000 - 0.008</td>
</tr>
<tr>
<td>J</td>
<td>0.40 - 0.60</td>
<td>0.016 - 0.024</td>
</tr>
</tbody>
</table>
Part Numbering System

SMF     xx   C   A

5% \( V_{br} \) Voltage Tolerance
Bi-directional
\( V_{br} \) Voltage

Part Marking System

Cathode Band
(for uni-directional products only)

Marking Code
Y: Year Code
M: Month Code
X: Plant Code

Trace Code Marking

Packaging Options

<table>
<thead>
<tr>
<th>Part number</th>
<th>Component Package</th>
<th>Quantity</th>
<th>Packaging Option</th>
<th>Packaging Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMFXXX</td>
<td>SOD-123FL</td>
<td>3000</td>
<td>Tape &amp; Reel – 8mm tape/7” reel</td>
<td>EIA RS-481</td>
</tr>
<tr>
<td>SMFXXX-T13</td>
<td>SOD-123FL</td>
<td>10000</td>
<td>Tape &amp; Reel – 8mm tape/13” reel</td>
<td>EIA RS-481</td>
</tr>
</tbody>
</table>

Tape and Reel Specification

Dimensions are in inches (and millimeters).

Arbor Hole Dia.: 0.80 (20.2)

0.31 (8.0)

0.157 (4.0)

0.33 (8.5)

7.0 (178)

Cover tape

Direction of Feed

Cathode

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