

SMF3.3

Surface Mount – 200W



Additional Information



Resources



Accessories



Samples

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 $T_A = 25^\circ\text{C}$ (Note 1)	P_{PPM}	2000	W
8/20 μs (Note 2)		400	W
10/1000 μs (Note 3)			
Thermal Resistance Junction- to- Ambient	$R_{\theta JA}$	220	$^\circ\text{C/W}$
Thermal Resistance Junction- to- Lead	$R_{\theta JL}$	100	$^\circ\text{C/W}$
Operating Temperature Range	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to 150	$^\circ\text{C}$

Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above T_J (initial) = 25°C per Fig. 3.

Description

SMF3.3 is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

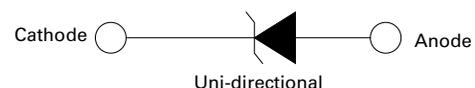
Features

- 200W peak pulse power capability at 10/1000 μs waveform, repetition rate (duty cycle): 0.01%
- 1200W peak pulse power capability at 8/20 μs waveform
- Excellent clamping capability
- Compatible with industrial standard package SOD-123FL
- Low profile: maximum height of 1.1mm.
- For surface mounted applications to optimize board space
- 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
- High temperature soldering: 260 $^\circ\text{C}$ /30 seconds at terminals
- Built-in strain relief
- Meet MSL level1, per J-STD-020C, LF maximum peak of 260 $^\circ\text{C}$
- 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 tin(Sn) (IPC/JEDEC J-STD-609A.01)

Applications

SMF3.3 devices are ideal for the protection of portable devices/ hard drives, notebooks, VCC busses, POS terminal, SSDs, power supplies, monitors, and vulnerable circuit used in other consumer applications.

Functional Diagram



Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Part Number	Marking Code	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Reverse Stand off Voltage V_R (V)	Maximum Reverse Leakage @ V_R I_R (μA)	Maximum Peak Pulse Current (10/1000 μs) I_{PP} (A)	Maximum Clamping Voltage @ I_{PP} (10/1000 μs) V_C (V)	Maximum Peak Pulse Current (8/20 μs) I_{PP} (A)	Maximum Clamping Voltage @ I_{PP} (8/20 μs) V_C (V)
		MIN	MAX							
SMF3.3	33	3.4	4.3	10	3.3	0.5	30.0	6.8	120.0	10.0

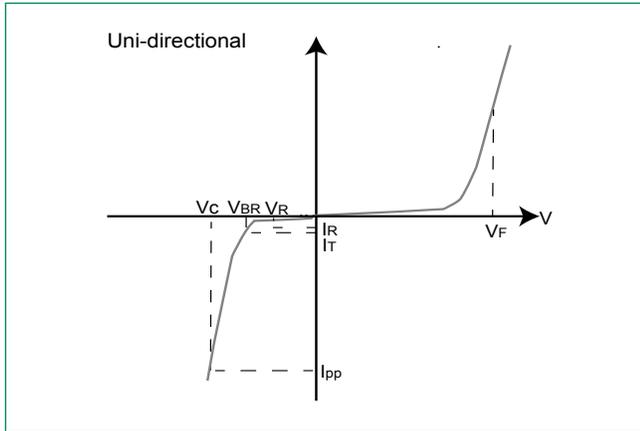
Notes:

- V_{BR} measured after I_T applied for 300 μs , I_T = square wave pulse or equivalent.
- Surge current waveform per 10/1000 μs exponential wave and derated per Fig.2.
- All terms and symbols are consistent with ANSI/IEEE C62.35.
- Surge current waveform per 8/20 μs exponential wave and derated per Fig.6.

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I-V Curve Characteristics



- 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 VR
 - V_F Forward Voltage Drop for Uni-directional**
- Note:** VF distribution range from 7V to 16V at IF 1mA.

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

Figure 1 -
TVS Transients Clamping Waveform

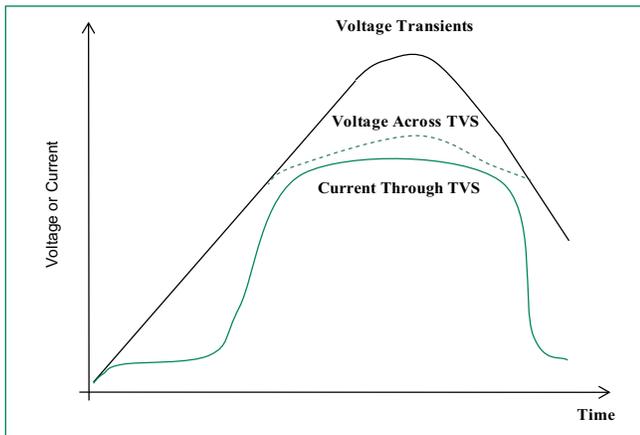


Figure 2 -
Peak Pulse Power Rating Curve

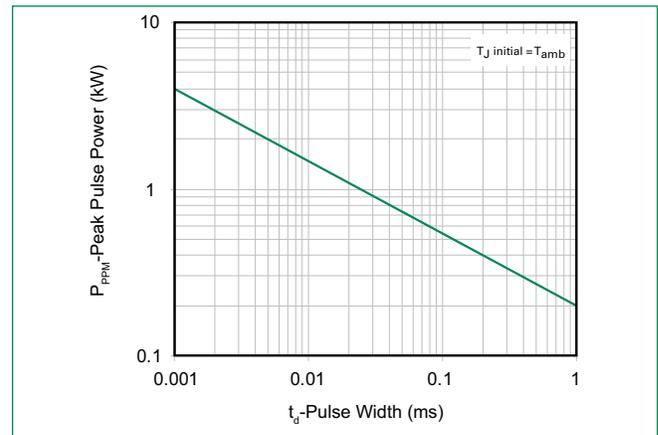


Figure 3 -
Peak Pulse Power Derating Curve

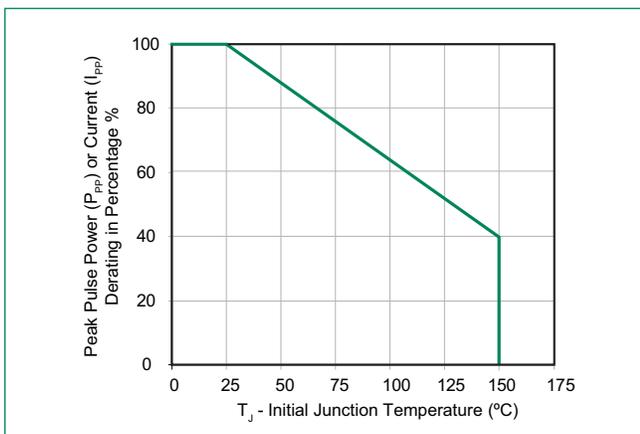
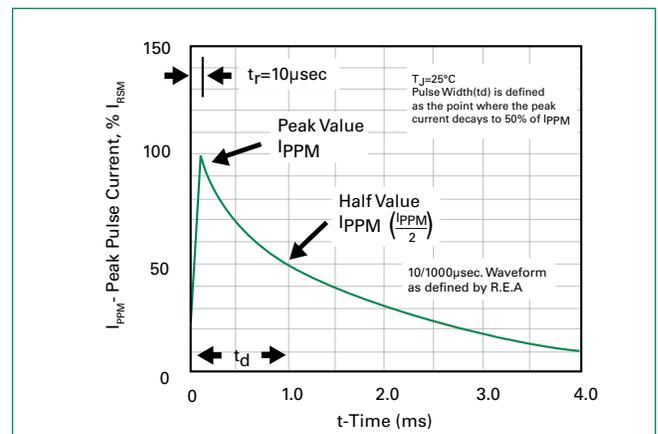


Figure 4 -
10/1000 μs Pulse Waveform



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Figure 5 -
Capacitance vs. Reverse Bias

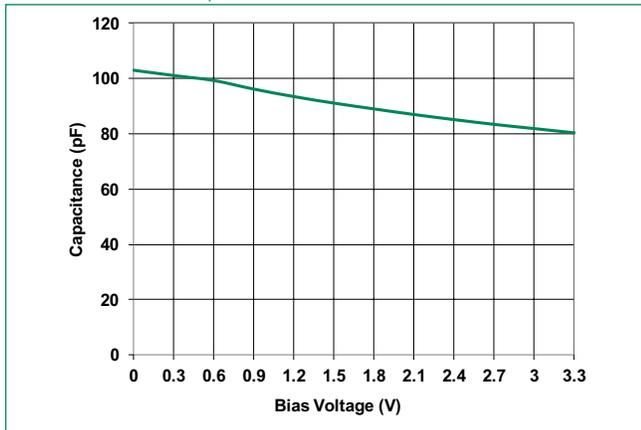
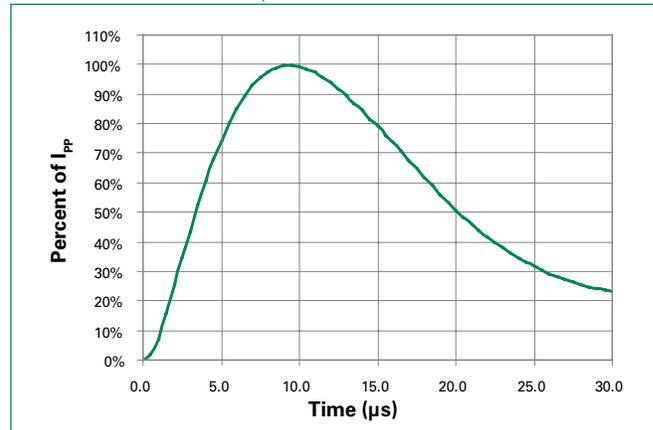
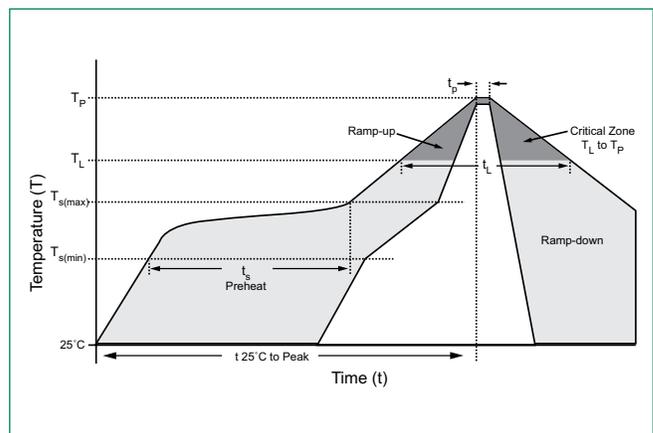


Figure 6 -
8/20µs Pulse Waveform



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 – 120 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_L)	60 – 150 seconds
Peak Temperature (T_p)		260 ^{+0/-5} °C
Time within 5°C of actual peak Temperature (t_p)		30 seconds max
Ramp-down Rate		6°C/second max
Time 25°C to peak Temperature (T_p)		8 minutes max.
Do not exceed		260°C



Physical Specifications

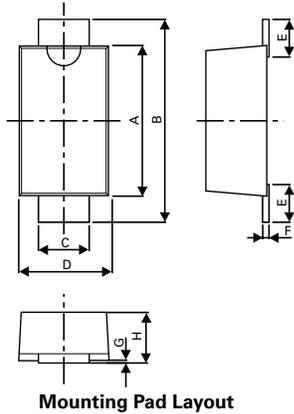
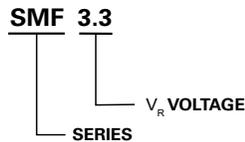
Case	SOD-123FL plastic over passivated junction
Polarity	Color band denotes cathode except bipolar
Terminal	Matte tin-plated leads, solderable per JESD22-B102

Environmental Specification

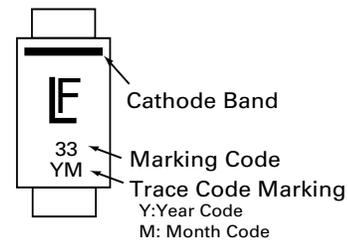
High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JEDEC-J-STD-020, LEVEL 1
H3TRB	JESD22-A101
RSH	JESD22-A111

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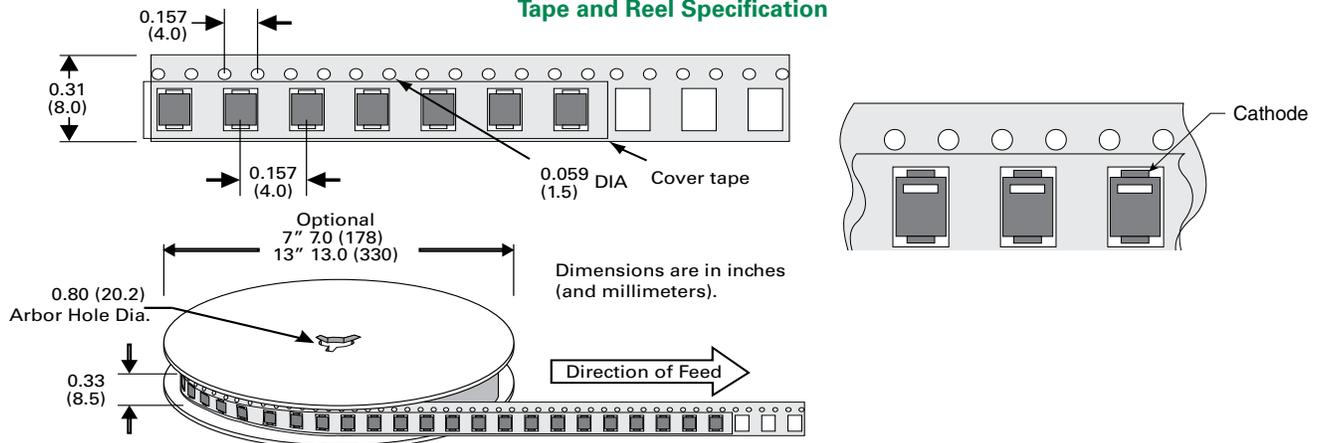
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Dimensions - SOD-123FL Package**Part Numbering System**

Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	2.90	3.10	0.114	0.122
B	3.50	3.90	0.138	0.154
C	0.85	1.05	0.033	0.041
D	1.70	2.00	0.067	0.079
E	0.43	0.83	0.017	0.033
F	0.10	0.25	0.004	0.010
G	0.00	0.10	0.000	0.004
H	0.90	1.08	0.035	0.043

Part Marking System**Packaging Options**

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMF3.3	SOD-123FL	3000	Tape & Reel – 8mm tape/7" reel	EIA RS-481

Tape and Reel Specification

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