SMF3.3



Uni-directional

Agency Approvals

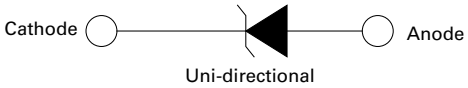
AGENCY	AGENCY FILE NUMBER
UL	E230531

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

Parameter		Symbol	Value	Unit
Peak Pulse Power Dissipation at T_A=25°C (Note 1)	8/20µs	P_{PPM}	1200	W
	10/1000µs		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 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. 4 & 6 and derated above T_J (initial) =25°C per Fig. 3.

Functional Diagram



Uni-directional

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 10/1000µs waveform, repetition rate (duty cycle): 0.01%
- 1200W peak pulse power capability at 8/20us waveform
- Excellent clamping capability
- Compatible with industrial standard package SOD-123FL
- Low profile: maximum height of 1.08mm.
- 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 V_{BR} min
- High temperature soldering: 260°C/40 seconds at terminals
- Built-in strain relief
- Meet MSL level1, per J-STD-020C, LF maximun 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 tin(Sn) (IPC/JEDEC J-STD-609A.01)

Applications

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

Electrical Characteristics (T_A=25°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 (10/1000µS) I_{pp} (A)	Maximum Clamping Voltage @I_{pp} (10/1000µS) V_C (V)	Maximum Peak Pulse Current (8/20µS) I_{pp} (A)	Maximum Clamping Voltage @I_{pp} (8/20µS) 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:
1. V_{BR} measured after I_T applied for 300µs, I_T = 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. Surge current waveform per 8/20µs exponential wave and derated per Fig.6.

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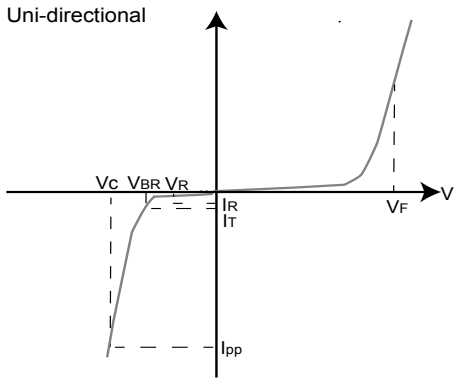
I-V Curve Characteristics



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 Ippm (peak impulse current)
I_R Reverse Leakage Current – Current measured at V_R
V_F Forward Voltage Drop for Uni-directional
note: V_F distribution range from 10V to 15V

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

Figure 1 - TVS Transients Clamping Waveform

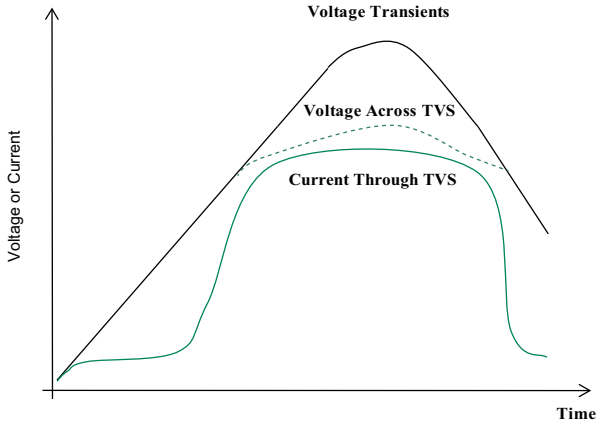


Figure 2 - Peak Pulse Power Rating Curve

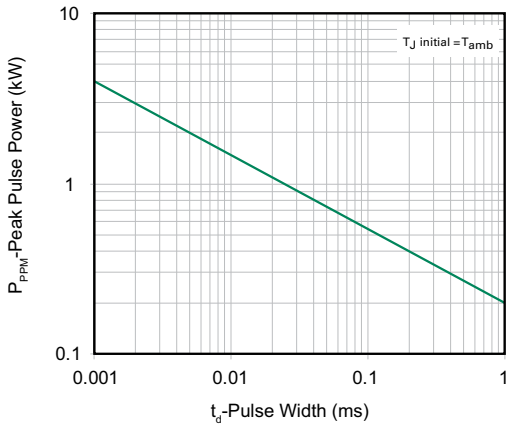


Figure 3 - Peak Pulse Power Derating Curve

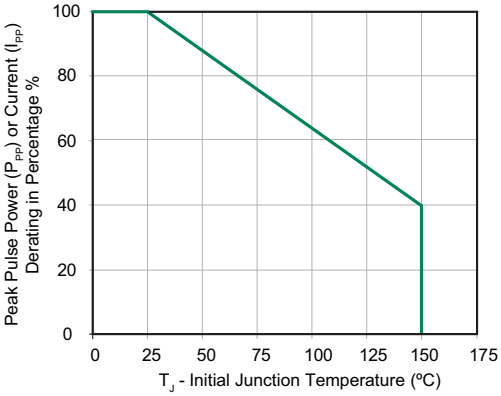


Figure 4 - 10/1000µS Pulse Waveform

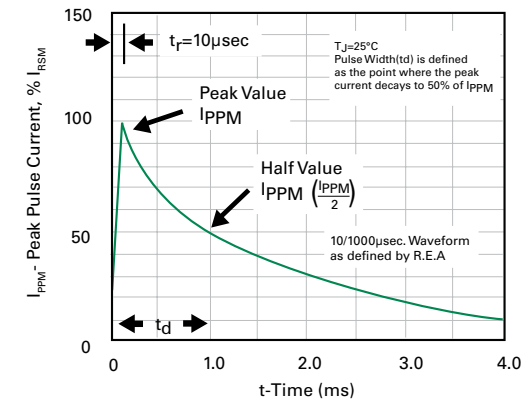


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Figure 5 - Capacitance vs. Reverse Bias

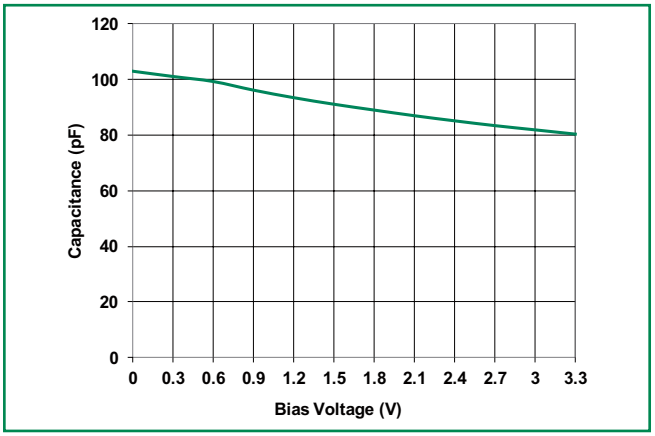
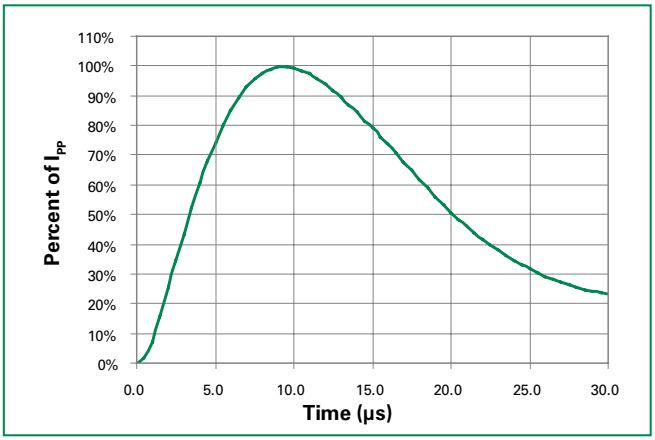
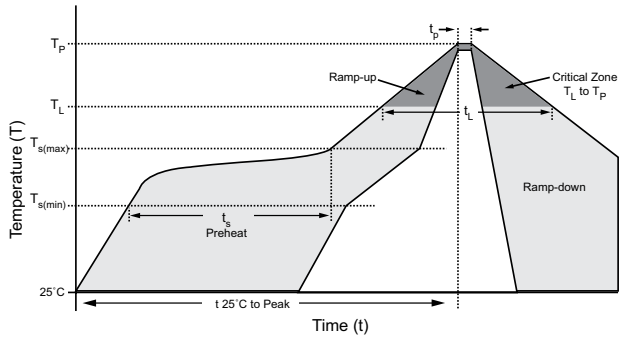


Figure 6 - 8/20µS Pulse Waveform



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 – 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)		$260^{+0/-5}$ °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		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

High Reliability Test Specification

Pre-condition (HTRB/ TC/ PCT/ H3TRB)	(1) Bake 24hrs @150°C (2)168hrs @85% RH and 85°C (3) I_R reflow,3 reflows, peak temperature of 260°C
HTRB	JESD 22-108C V_{CC} bias= 80%V_{DRM} & T_A=150°C, 1008hrs
Temperature Cycling	MIL-STD-883F, Method 1010.8 Condition C -65°C to150°C, 1000 cycles
Pressure Cooker	JEDEC 22-A102C 100%RH @121°C @15psi, 96hrs
Bias Humidity (H3TRB)	JESD 22-A101B Vcc bias (pin1to pin3)=V_{DRM} ,85%RH, 85°C , 1008 hours
RSH	JESD 22-A111 260°C ,10 secs.

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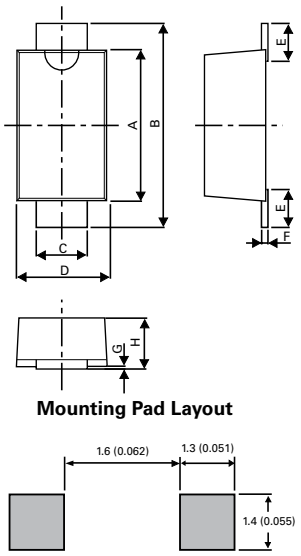
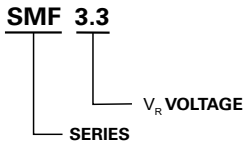
Dimensions - SOD-123FL Package

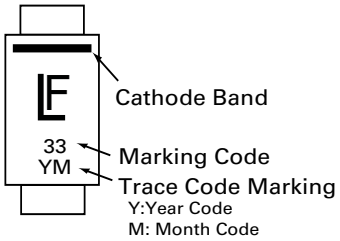


Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	2.90	3.10	0.114	0.122
B	3.50	3.90	0.138	0.154
C	0.85	1.05	0.033	0.041
D	1.70	2.00	0.067	0.079
E	0.43	0.83	0.017	0.033
F	0.10	0.25	0.004	0.010
G	0.00	0.10	0.000	0.004
H	0.90	1.08	0.035	0.043

Part Numbering System



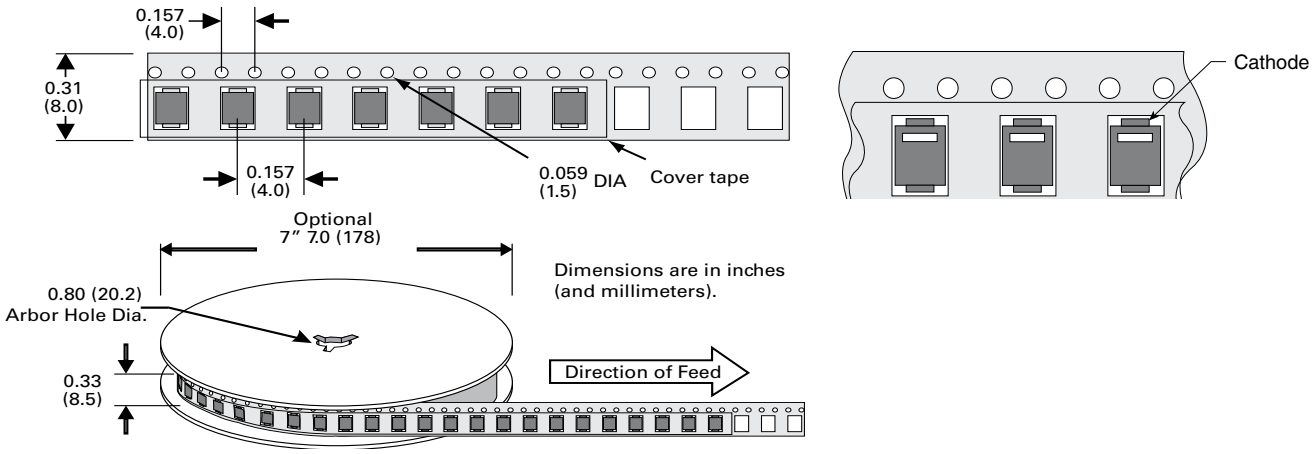
Part Marking System



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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