

# SMF3.3

## Surface Mount – 200W



### Description

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

### Features and Benefits

- 200W peak pulse power capability at 10/1000 $\mu$ s waveform, repetition rate (duty cycle): 0.01%
- 1200W peak pulse power capability at 8/20 $\mu$ s 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 VBR min
- High temperature soldering: 260°C/30 seconds at terminals
- Built-in strain relief
- Meet MSL level1, per J-STD-020C, 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 tin(Sn) (IPC/JEDEC J-STD-609A.01)

### 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)	$P_{PPM}$	1200	W
8/20 $\mu$ s (Note 2) 10/1000 $\mu$ s (Note 3)		200	W
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	$^\circ\text{C}$

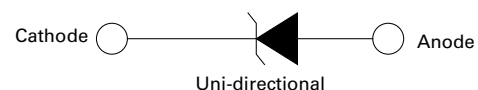
#### Notes:

1. Non-repetitive current pulse, per Fig. 4 and derated above  $T_J$  (initial) =  $25^\circ\text{C}$  per Fig. 3.

### Applications

SMF3.3 series is ideal for the protection of portable electronics/ 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 @ $V_R$ $I_R$ ( $\mu\text{A}$ )	Maximum Peak Pulse Current (10/1000 $\mu\text{S}$ ) $I_{PP}$ (A)	Maximum Clamping Voltage @ $I_{PP}$ (10/1000 $\mu\text{S}$ ) $V_C$ (V)	Maximum Peak Pulse Current (8/20 $\mu\text{S}$ ) $I_{PP}$ (A)	Maximum Clamping Voltage @ $I_{PP}$ (8/20 $\mu\text{S}$ ) $V_C$ (V)
		MIN	MAX							
SMF3.3	33	3.4	4.3	10	3.3	0.5	30.0	6.8	120.0	10.0

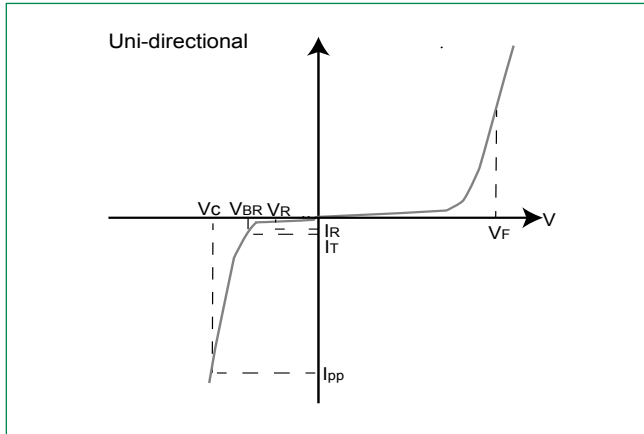
#### Notes:

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

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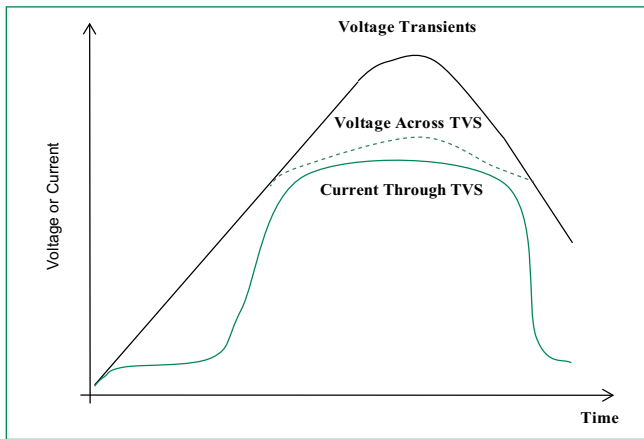
### I-V Curve Characteristics



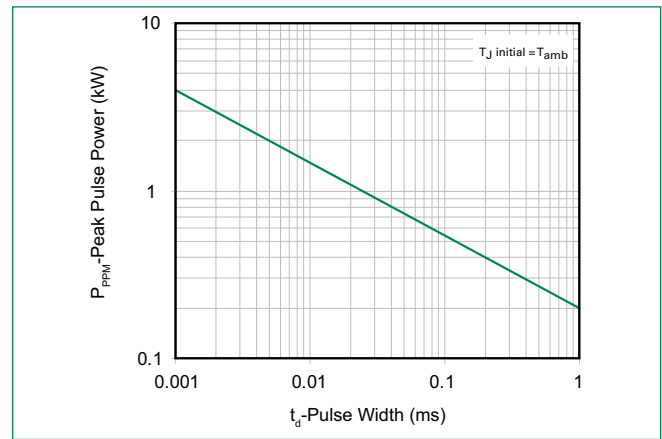
- $P_{PPM}$  Peak Pulse Power Dissipation** – Max power dissipation
  - $V_R$  Stand-off Voltage** -- Maximum voltage that can be applied to the TVS without operation
  - $V_{BR}$  Breakdown Voltage** -- Maximum voltage that flows though the TVS at a specified test current ( $I_T$ )
  - $V_C$  Clamping Voltage** -- Peak voltage measured across the TVS at a specified  $I_{ppm}$  (peak impulse current)
  - $I_R$  Reverse Leakage Current** – Current measured at  $V_R$
  - $V_F$  Forward Voltage Drop for Uni-directional**
- Note:**  $V_F$  distribution range from 7V to 16V at  $I_F$  1mA.

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

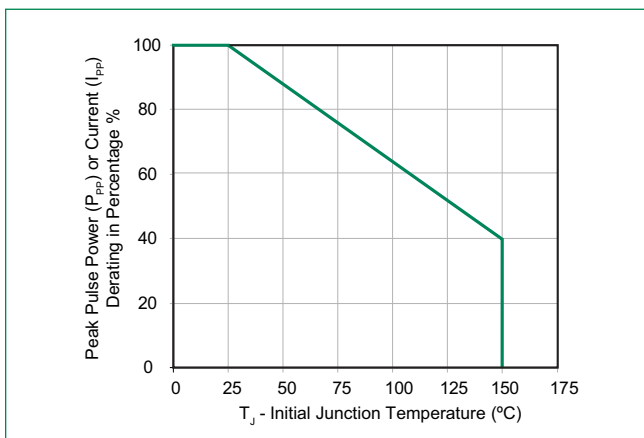
**Figure 1 -**  
TVS Transients Clamping Waveform



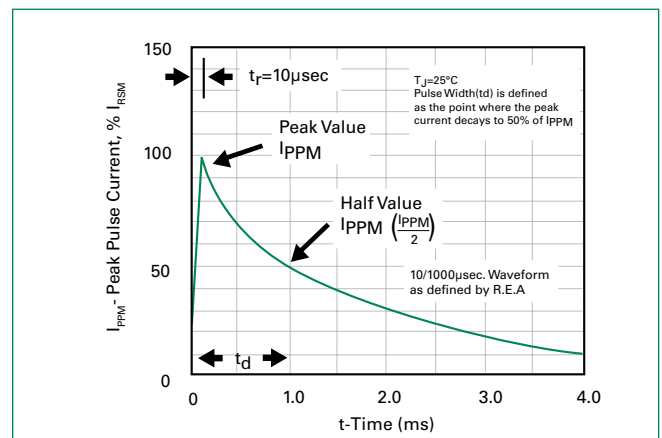
**Figure 2 -**  
Peak Pulse Power Rating Curve



**Figure 3 -**  
Peak Pulse Power Derating Curve



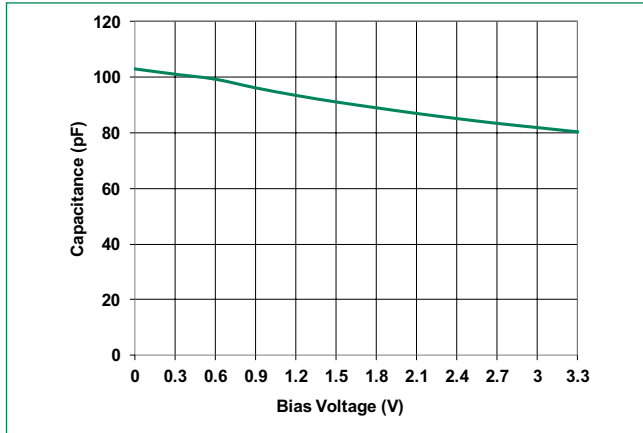
**Figure 4 -**  
10/1000 $\mu\text{s}$  Pulse Waveform



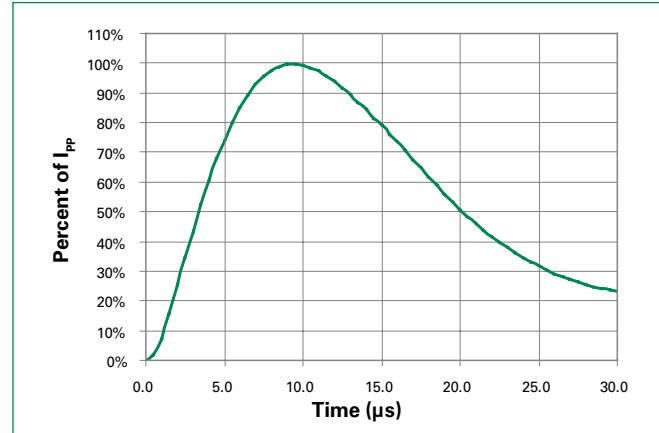
# SMF3.3

## Surface Mount – 200W

**Figure 5 -**  
Capacitance vs. Reverse Bias

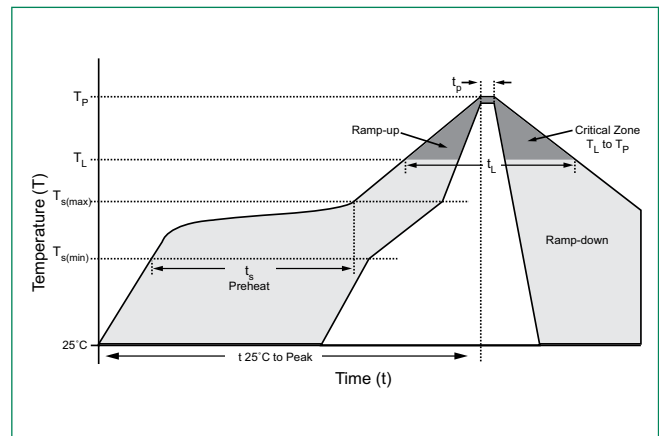


**Figure 6 -**  
8/20µS Pulse Waveform



## Soldering Parameters

<b>Reflow Condition</b>		Lead-free assembly
<b>Pre Heat</b>	- Temperature Min ( $T_{s(min)}$ )	150°C
	- Temperature Max ( $T_{s(max)}$ )	200°C
	- Time (min to max) ( $t_s$ )	60 – 120 secs
<b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b>		3°C/second max
<b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>		3°C/second max
<b>Reflow</b>	- Temperature ( $T_L$ ) (Liquidus)	217°C
	- Time (min to max) ( $t_r$ )	60 – 150 seconds
<b>Peak Temperature (<math>T_p</math>)</b>		260 <sup>+0/-5</sup> °C
<b>Time within 5°C of actual peak Temperature (<math>t_p</math>)</b>		30 seconds max
<b>Ramp-down Rate</b>		6°C/second max
<b>Time 25°C to peak Temperature (<math>T_p</math>)</b>		8 minutes max.
<b>Do not exceed</b>		260°C



## Physical Specifications

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

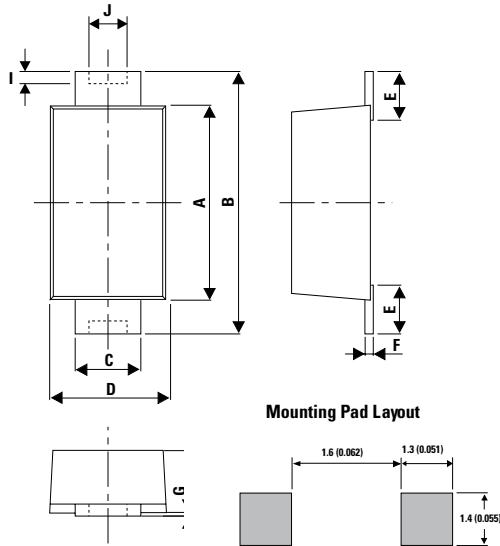
## Environmental Specification

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

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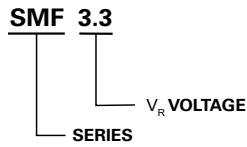
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### Dimensions - SOD-123FL Package

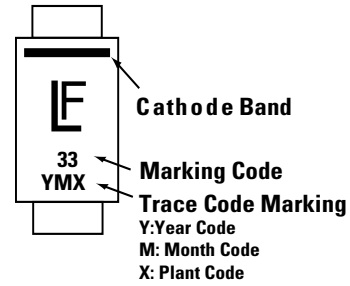


Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	2.70	3.10	0.106	0.122
B	3.50	3.90	0.138	0.154
C	0.85	1.05	0.033	0.041
D	1.70	2.00	0.067	0.079
E	0.43	0.83	0.017	0.033
F	0.10	0.25	0.004	0.010
G	0.00	0.10	0.000	0.004
H	0.90	1.08	0.035	0.043
I	0.00	0.20	0.000	0.008
J	0.40	0.60	0.016	0.024

### Part Numbering System



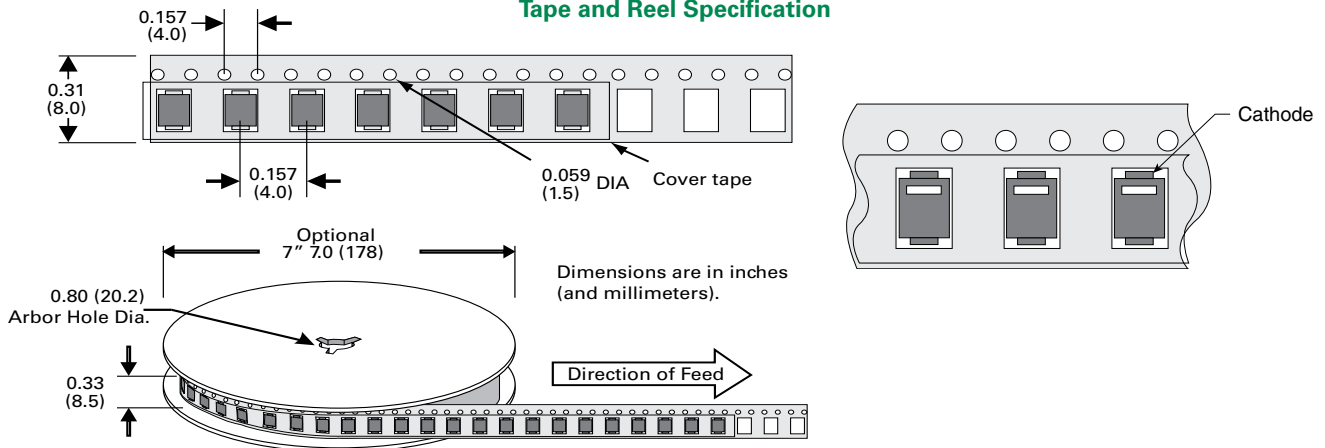
### Part Marking System



### 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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