

SMF Ultra Low Voltage Series

Surface Mount – 200 W



Agency Approvals

Agency	Agency File Number
	E230531

Maximum Ratings and Thermal Characteristics

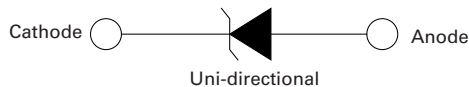
($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_A = 25^\circ\text{C}$ by 10/1000 μs (Note 1)	P_{PPM}	200	W
Power Dissipation On Infinite Heat Sink at $T_A = 50^\circ\text{C}$	P_D	1.7	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	200	$^\circ\text{C/W}$
Thermal Resistance Junction to Lead	$R_{\theta JL}$	60	$^\circ\text{C/W}$

Notes:

1. Non-repetitive current pulse, per Fig. 5 and derated above T_J (initial) = 25°C per Fig. 3.

Functional Diagram



Description

SMF Ultra Low Voltage Series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

Features

- 200 W peak pulse power capability at 10/1000 μs waveform, repetition rate (duty cycles): 0.01 %
- SOD-123FL low profile package: maximum height of 1.08 mm
- 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 pass class 1 and class 2
- IEC 61000-4-2 ESD 30 kV (Air), 30 kV (Contact)
- Low dynamic resistance
- $V_{\text{BR}} @ T_J = V_{\text{BR}} @ 25^\circ\text{C} \times (1 + \alpha T \times (T_J - 25))$ (αT : Temperature Coefficient, typical value is 0.1 %)
- Recognized compound meeting flammability rating UL94 V-0
- 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)
- Recognized to UL 497B as an Isolated Loop Circuit Protector

Applications

The component is ideal for the protection of portable components/ hard drives, notebooks, V_{CC} busses, POS terminal, SSDs, power supplies, monitors, and vulnerable circuit used in other consumer applications.

Electrical Characteristics ($T_A = 25^\circ\text{C}$ 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)	Forward Voltage V_F @ 1mA (V)		Agency Approval
		Min	Max								Min	Max	
SMF2.5	25	2.6	3.3	40	2.5	0.5	38.5	5.2	117.0	7.7	25	38	-
SMF3.0	30	3.1	3.7	40	3.0	0.5	34.5	5.8	139.2	8.6	20	35	-
SMF3.3	33	3.4	4.3	10	3.3	0.5	30.0	6.8	120.0	10.0	7	16	X
SMF4.0	40	4.3	4.8	40	4.0	0.5	26.7	7.5	108.0	11.1	7	16	X

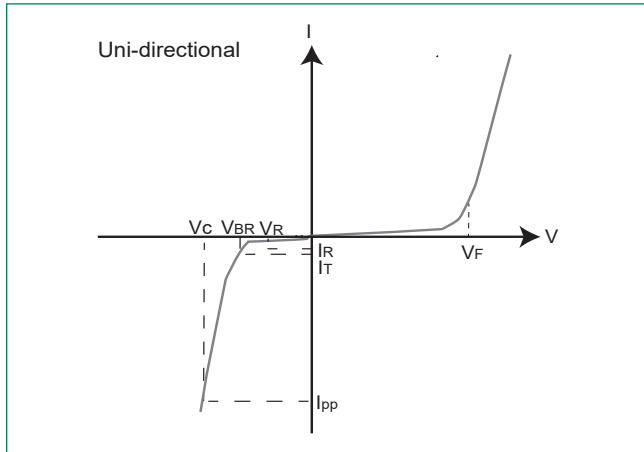
Notes:

1. Surge current waveform per 10/1000 μs exponential wave and derated per Fig.3.
 2. Surge current waveform per 8/20 μs exponential wave and derated per Fig.3.

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I-V Curve Characteristics



- P_{PPM} Peak Pulse Power Dissipation ($I_{pp} \times V_c$)** – 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 through 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**

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

Figure 1 - Typical Transient Thermal Impedance

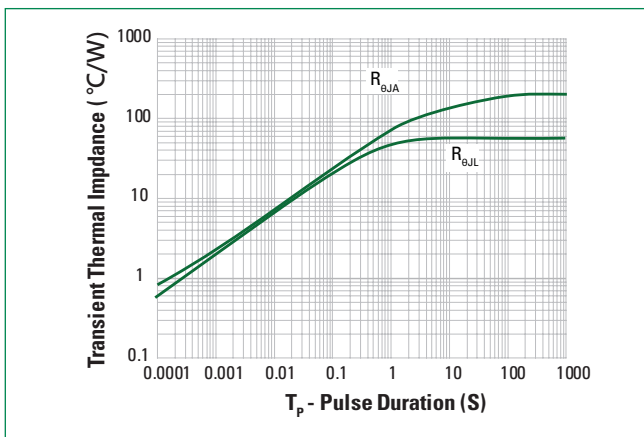


Figure 2 - Peak Pulse Power Rating Curve

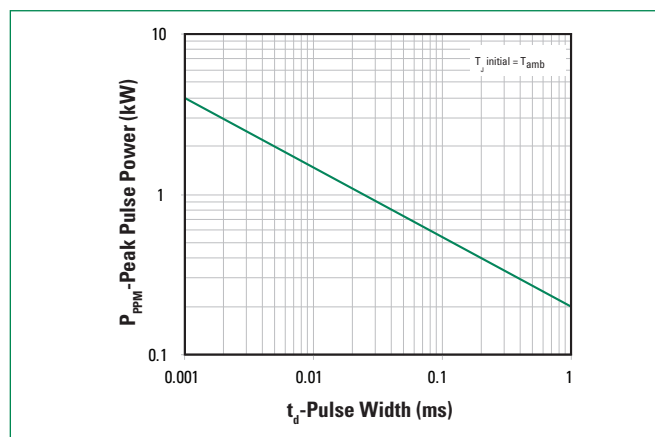


Figure 3 - Peak Pulse Power Derating Curve

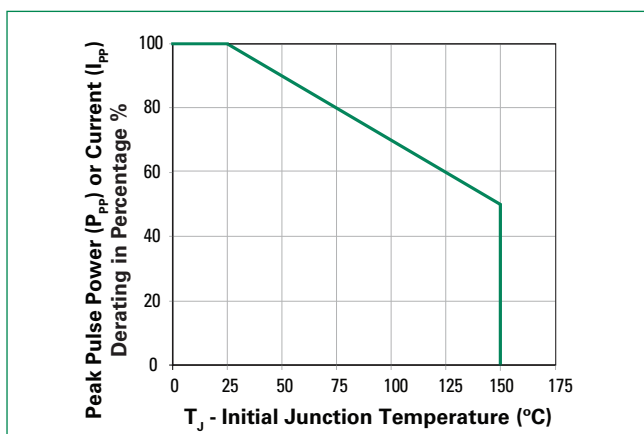
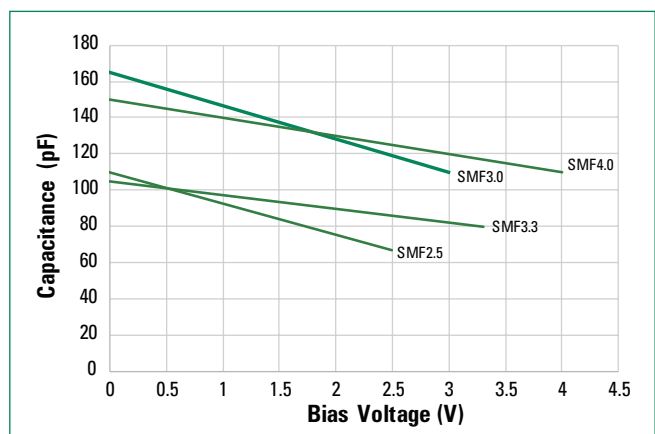
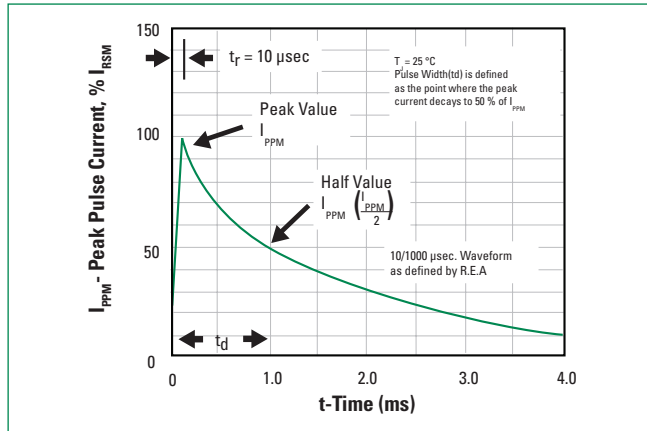
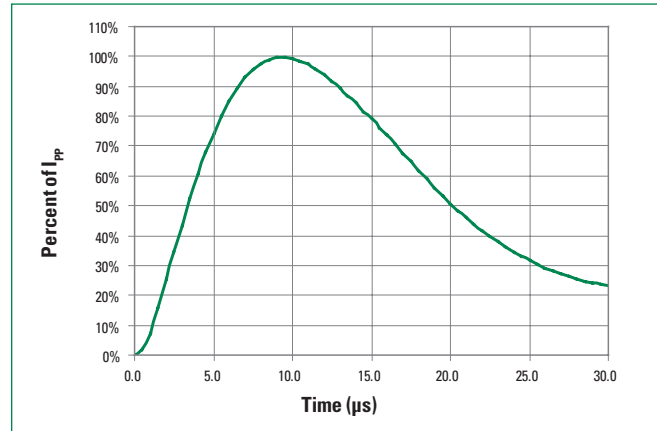


Figure 4 - Capacitance vs. Reverse Bias



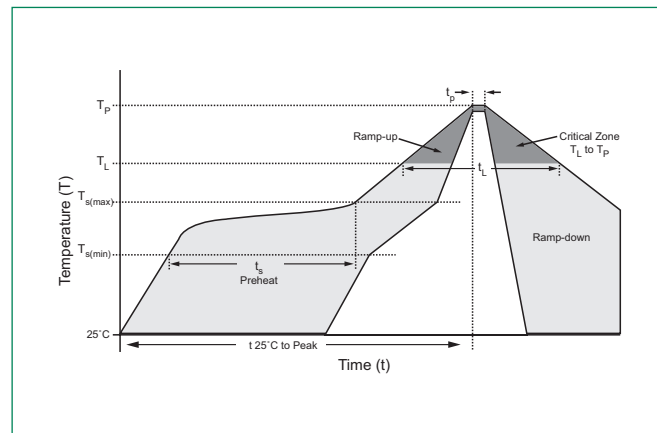
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Figure 5 - Pulse Waveform - 10/1000 μ SFigure 6 - Pulse Waveform - 8/20 μ S

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 seconds
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 2 °C to Peak Temperature (T_p)		8 minutes max
Do Not Exceed		260 °C



Physical Specifications

Polarity	Color band denotes cathode except bipolar
Terminal	Matte tin-plated leads, solderable per JESD22-B102

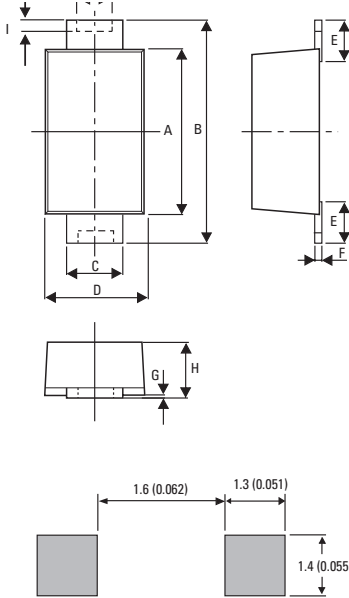
Environmental Specifications

High Temp Voltage Blocking (HTRB)	100 % DC reverse voltage rated 150 °C, 1008 hours JEDEC, JESD22-A-108
Biased Temp & Humidity (H3TRB)	80 % breakdown voltage (+85 °C) 85 % RH, 1008 hours JEDEC, JESD22-A-101
Unbiased Highly Accelerated Stress Test (UHAST)	96 hours at $T_A = 130^\circ\text{C}/85\% \text{RH}$. JEDEC, JESD22-A-118
Temp Cycling (TC)	-55 °C to +150 °C, 15 min. dwell, 1000 cycles. JEDEC, JESD22-A-104
Moisture Sensitivity Level (MSL)	85 % RH, +85 °C, 168 hours, 3 reflow cycles (+260 °C Peak). JEDEC, JEDEC-J-STD-020, Level 1
Resistance to Solder Heat (RSH)	+260 °C, 30 seconds JEDEC, JEDEC JESD22-A-111

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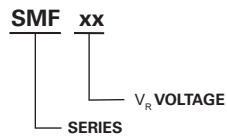
Dimensions - SOD-123FL Package



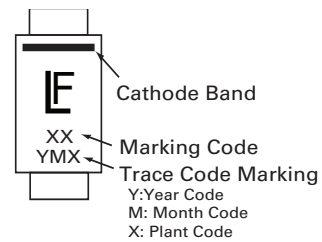
Mounting Pad Layout

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



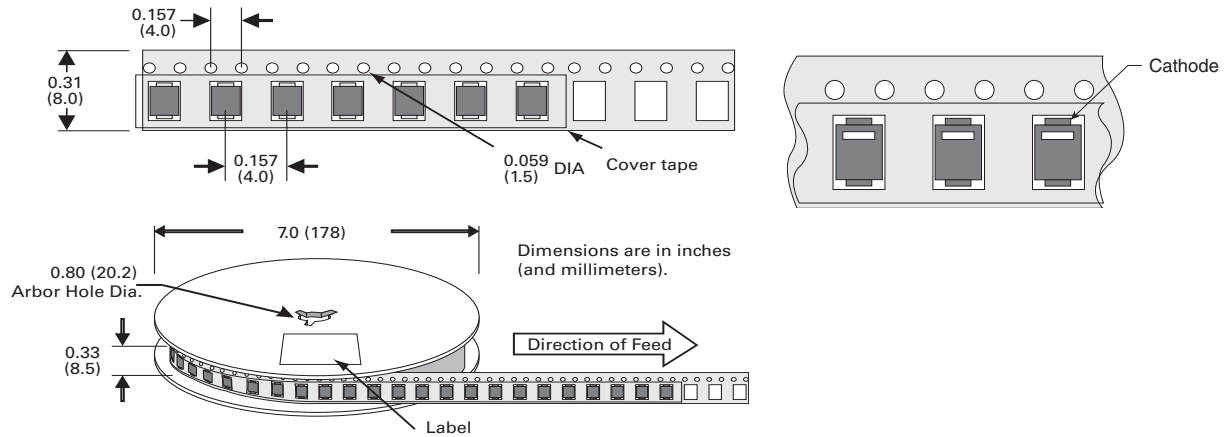
Packaging Options

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

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Tape and Reel Specification



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