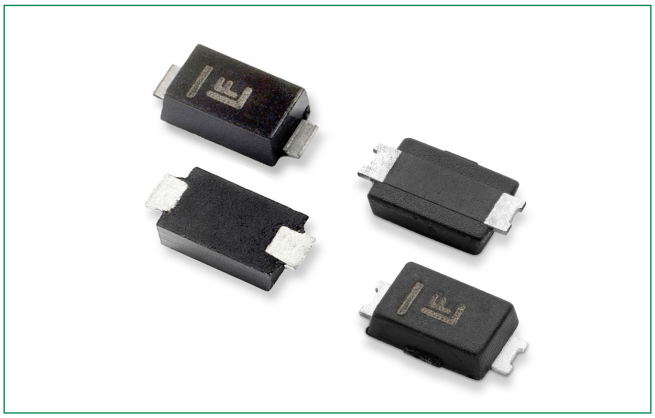
SMF Ultra Low Voltage Series

Surface Mount – 200 W



Agency Approvals

Agency	Agency File Number
	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 by 10/1000 µs(Note 1)	P_{PPM}	200	W
Power Dissipation On Infinite Heat Sink at T_L = 50 °C	P_D	1.7	W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance Junction to Lead	$R_{\theta JL}$	60	°C/W

Notes:

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

Functional Diagram

Uni-directional

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_{BR} @ T_J = V_{BR}@25 °C x (1+αT x (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 °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

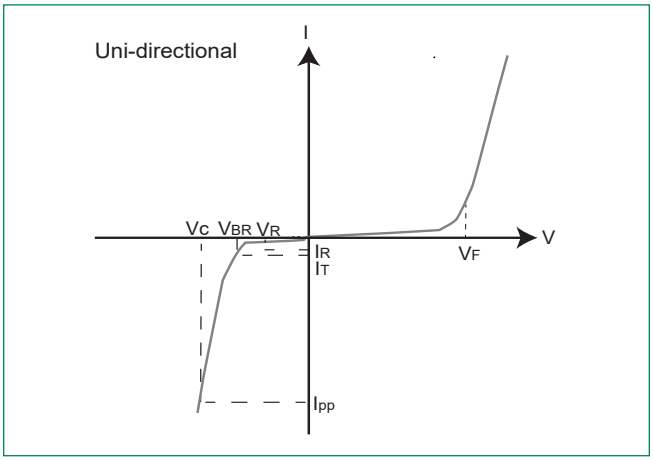
Notes:

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.

SMF Ultra Low Voltage Series

Surface Mount – 200 W

I-V Curve Characteristics



P_{PPM} Peak Pulse Power Dissipation (I_{PP} x 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 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

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

Figure 1 - Typical Transient Thermal Impedance

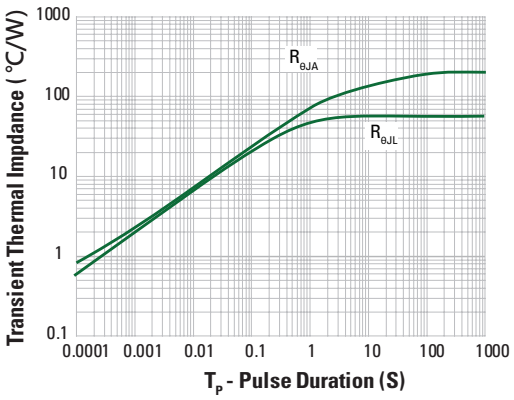


Figure 2 - Peak Pulse Power Rating Curve

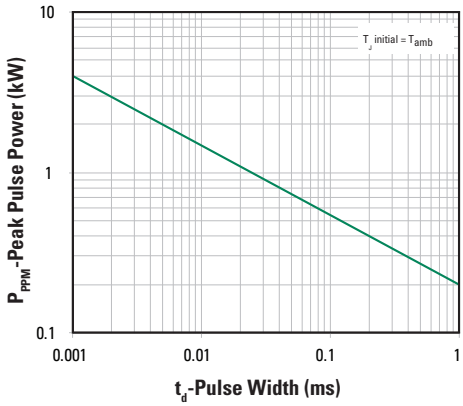


Figure 3 - Peak Pulse Power Derating Curve

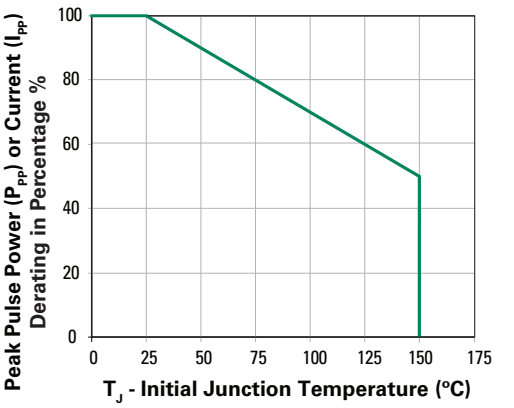
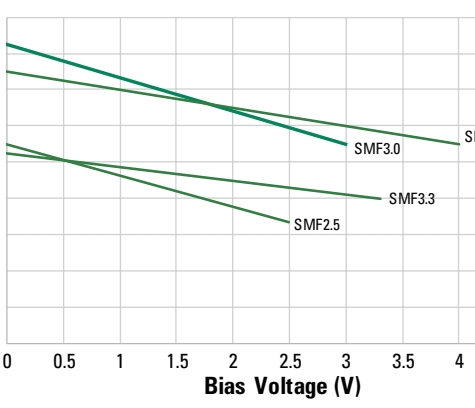


Figure 4 - Capacitance vs. Reverse Bias



SMF Ultra Low Voltage Series
Surface Mount – 200 W

Figure 5 - Pulse Waveform - 10/1000 µS

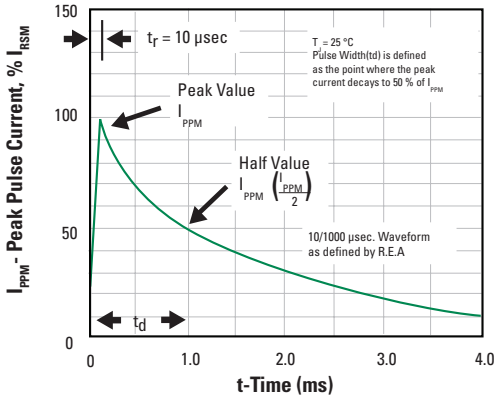
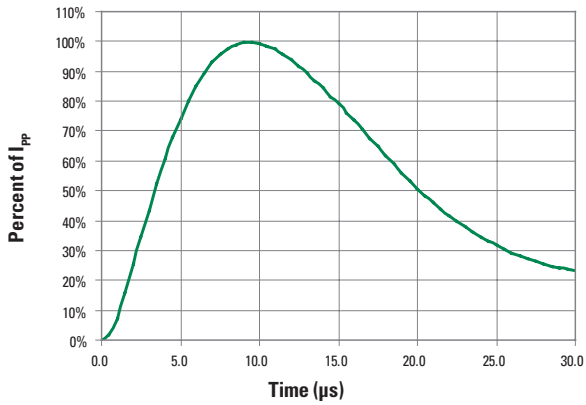
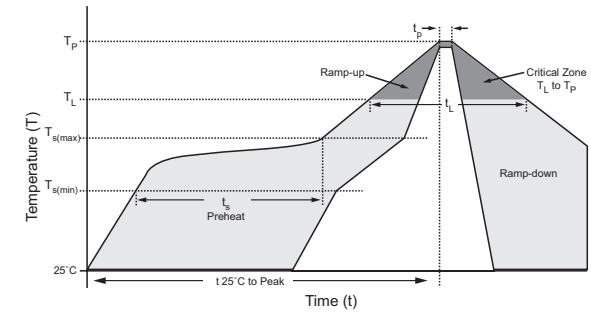


Figure 6 - Pulse Waveform - 8/20 µS



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 5°C to Peak Temperature (T_P)		8 minutes max
Do Not Exceed		260 °C



Physical Specifications

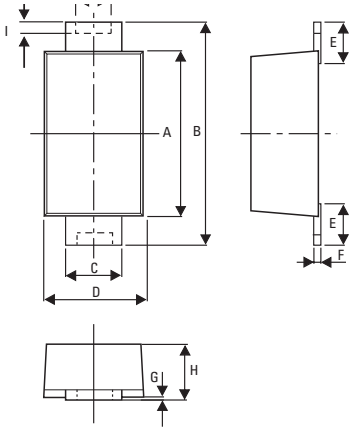
Polarity	Color band denotes cathode except bipolar
Terminal	Matte tin-plated leads, solderable per JESD22-B102

Environmental Specifications

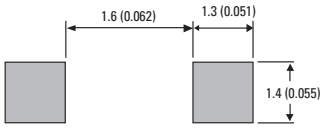
High Temp Voltage Blocking (HTRB)	100 % DC reverse voltage rated 150 °C, 1008 hours JEDEC, JESD22-A-108
Biased Temp & Humidity (H3TRB)	80 % breakdown voltage (+85 °C) 85 %RH, 1008 hours JEDEC, JESD22-A-101
Unbiased Highly Accelerated Stress Test (UHAST)	96 hours at T_A = 130 °C/85 %RH. JEDEC, JESD22-A-118
Temp Cycling (TC)	-55 °C to +150 °C, 15 min. dwell, 1000 cycles. JEDEC, JESD22-A104
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

SMF Ultra Low Voltage Series
Surface Mount – 200 W

Dimensions - SOD-123FL Package

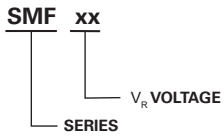


Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	2.70	3.10	0.106	0.122
B	3.50	3.90	0.138	0.154
C	0.85	1.05	0.033	0.041
D	1.70	2.00	0.067	0.079
E	0.43	0.83	0.017	0.033
F	0.10	0.25	0.004	0.010
G	0.00	0.10	0.000	0.004
H	0.90	1.08	0.035	0.043
I	0.00	0.20	0.000	0.008
J	0.40	0.60	0.016	0.024

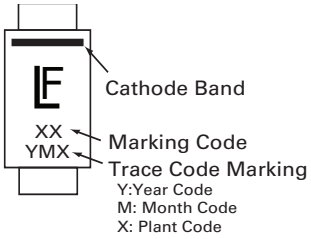


Mounting Pad Layout

Part Numbering System



Part Marking System

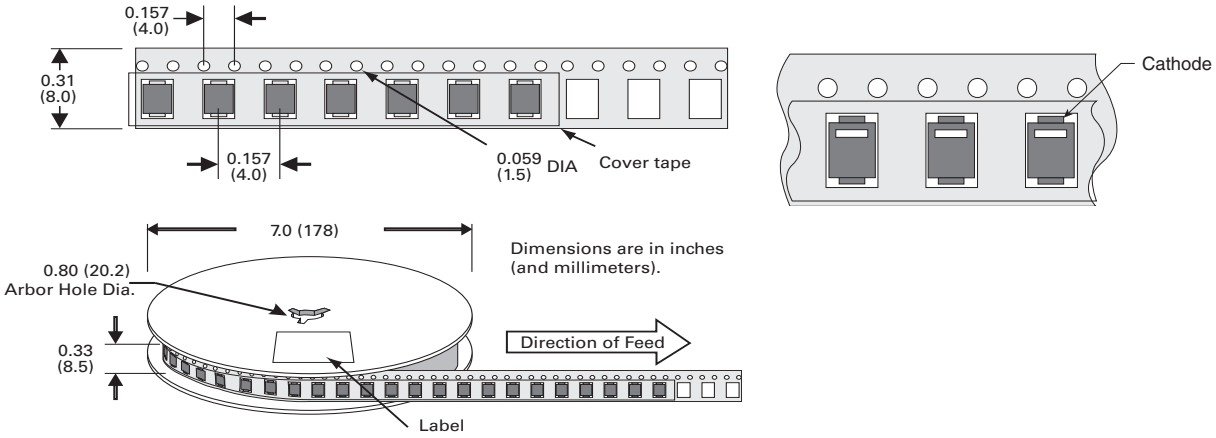


Packaging Options

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

SMF Ultra Low Voltage Series
Surface Mount – 200 W

Tape and Reel Specification



Revised: FW.12/19/24 v.0