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SMF Series

Agency Approvals

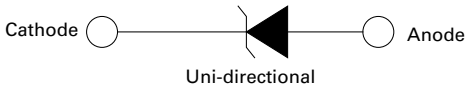
AGENCY	AGENCY FILE NUMBER
®	E230531

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 10/1000µs (Note 1)	P_{PPM}	200	W
Thermal Resistance Junction- to-Ambient	R_{THJ-A}	220	°C/W
Thermal Resistance Junction- to-Lead	R_{THJ-L}	100	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

Notes:
1. Non-repetitive current pulse, per Fig. 4 and derated above T_A=25°C per Fig. 3.

Functional Diagram



Description

The SMF series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

SMF package is 50% smaller in footprint when compare to SMA package and delivering low height profile (1.1mm) in the industry.

Features

- Compatible with industrial standard package SOD-123F
- For surface mounted applications to optimize board space
- Low profile: maximum height of 1.1mm.
- 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 (IEC801-2)
- EFT protection of data lines in accordance with IEC 61000-4-4 (IEC801-4)
- Low inductance, excellent clamping capability
- 200W peak pulsepower capability at 10/1000µs waveform, repetition rate (duty cycle): 0.01%
- Fast response time: typically less than 1.0ns from 0 Volts to V_{BR} min
- High temperature soldering: 260°C/40 seconds at terminals
- Glass passivated junction
- Built-in strain relief
- Meet MSL level1, per J-STD-020, LF maximum peak of 260°C
- Matte tin lead–free plated
- Halogen-free and RoHS compliant

Applications

SMF devices are ideal for the protection of I/O interfaces, V_{CC} bus and other vulnerable circuit used in cellular phones, portable devices, business machines, power supplies and other consumer applications.

Additional Information

Datasheet | Resources | Samples

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Transient Voltage Suppression Diodes

Surface Mount – 200W > SMF Series

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 I_{pp} (A)	Maximum Clamping Voltage @ I_{pp} V_C (V)	Agency Approval
		MIN	MAX						
SMF5.0A	AE	6.40	7.00	10	5.0	400	21.7	9.2	X
SMF6.0A	AG	6.67	7.37	10	6.0	400	19.4	10.3	X
SMF6.5A	AK	7.22	7.98	10	6.5	250	17.9	11.2	X
SMF7.0A	AM	7.78	8.60	10	7.0	100	16.7	12.0	X
SMF7.5A	AP	8.33	9.21	1	7.5	50	15.5	12.9	X
SMF8.0A	AR	8.89	9.83	1	8.0	25	14.7	13.6	X
SMF8.5A	AT	9.44	10.40	1	8.5	10	13.9	14.4	X
SMF9.0A	AV	10.00	11.10	1	9.0	5	13.0	15.4	X
SMF10A	AX	11.10	12.30	1	10	2.5	11.8	17.0	X
SMF11A	AZ	12.20	13.50	1	11	2.5	11.0	18.2	X
SMF12A	BE	13.30	14.70	1	12	2.5	10.1	19.9	X
SMF13A	BG	14.40	15.90	1	13	1.0	9.3	21.5	X
SMF14A	BK	15.60	17.20	1	14	1.0	8.6	23.2	X
SMF15A	BM	16.70	18.50	1	15	1.0	8.2	24.4	X
SMF16A	BP	17.80	19.70	1	16	1.0	7.7	26.0	X
SMF17A	BR	18.90	20.90	1	17	1.0	7.2	27.6	X
SMF18A	BT	20.0 0	22.10	1	18	1.0	6.8	29.2	X
SMF20A	BV	22.20	24.50	1	20	1.0	6.2	32.4	X
SMF22A	BX	24.40	26.90	1	22	1.0	5.6	35.5	X
SMF24A	BZ	26.70	29.50	1	24	1.0	5.1	38.9	X
SMF26A	CE	28.90	31.90	1	26	1.0	4.8	42.1	X
SMF28A	CG	31.10	34.40	1	28	1.0	4.4	45.4	X
SMF30A	CK	33.30	36.80	1	30	1.0	4.1	48.4	X
SMF33A	CM	36.70	40.60	1	33	1.0	3.8	53.3	X
SMF36A	CP	40.0 0	44.20	1	36	1.0	3.4	58.1	X
SMF40A	CR	44.40	49.10	1	40	1.0	3.1	64.5	X
SMF43A	CT	47.80	52.80	1	43	1.0	2.9	69.4	X
SMF45A	CV	50.00	55.30	1	45	1.0	2.8	72.7	X
SMF48A	CX	53.30	58.90	1	48	1.0	2.6	77.4	X
SMF51A	CZ	56.70	62.70	1	51	1.0	2.4	82.4	X
SMF54A	DE	60.00	66.30	1	54	1.0	2.3	87.1	X
SMF58A	RG	64.40	71.20	1	58	1.0	2.1	93.6	X
SMF60A	RK	66.70	73.70	1	60	1.0	1.8	96.8	X
SMF64A	RM	71.10	78.60	1	64	1.0	1.7	103.0	X
SMF70A	RP	77.80	86.00	1	70	1.0	1.5	113.0	X
SMF75A	RR	83.30	92.10	1	75	1.0	1.4	121.0	X
SMF78A	RT	86.70	95.80	1	78	1.0	1.4	126.0	X
SMF85A	RV	94.40	104.00	1	85	1.0	1.3	137.0	X

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.

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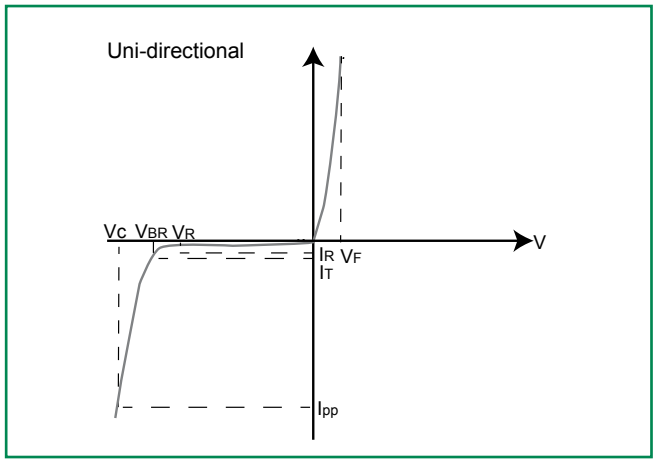
I-V Curve Characteristics



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 suppressor 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

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

Figure 1 - TVS Transients Clamping Waveform

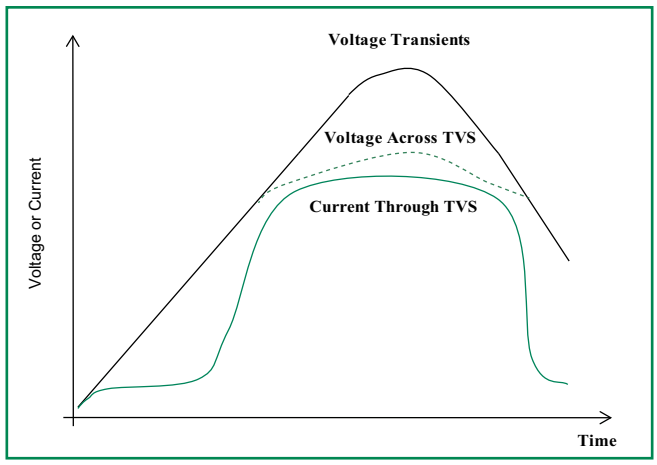
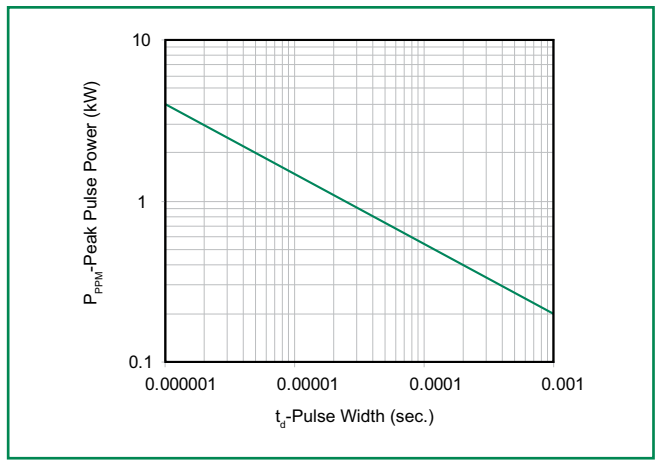


Figure 2 - Peak Pulse Power Rating Curve



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

Figure 3 - Pulse Derating Curve

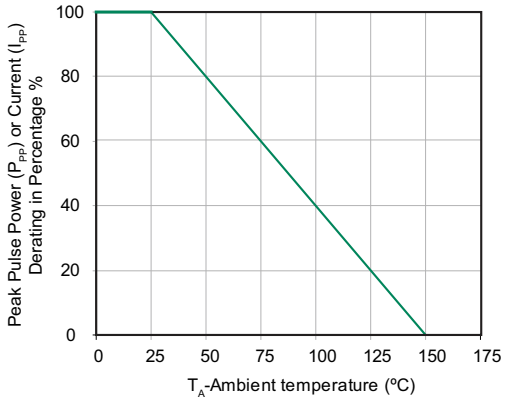


Figure 4 - Pulse Waveform - 10/1000µS

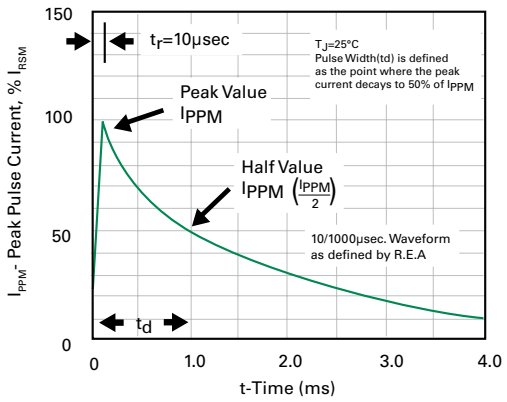


Figure 5 - Steady State Power Dissipation Derating Curve

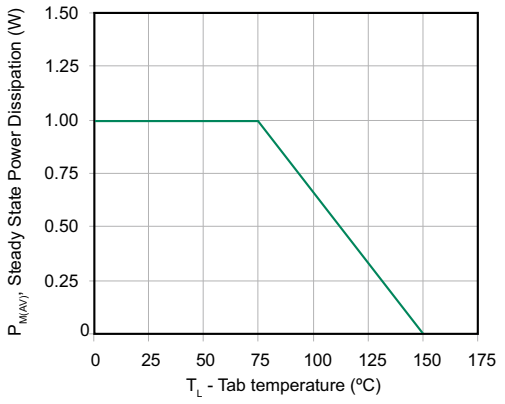


Figure 6 - Forward Voltage

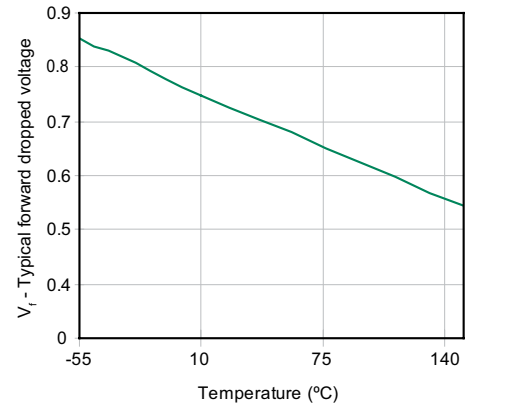
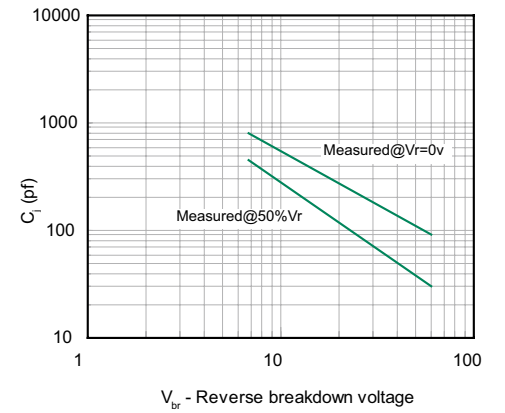
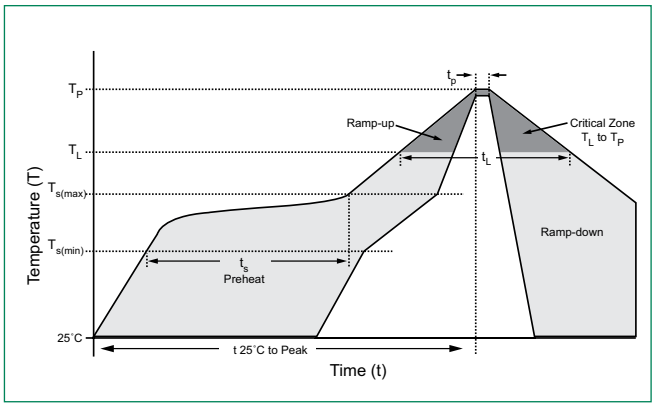


Figure 7 - C_j vs. Working Peak Reverse Voltage



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_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_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



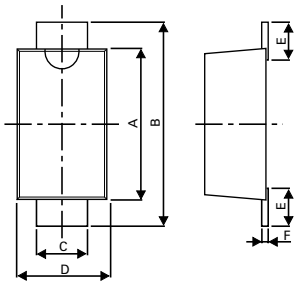
Physical Specifications

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

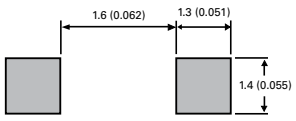
Environmental Specifications

High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Temperature Cycling	JESD22-A104
MSL	JEDEC-J-STD-020, Level 1
H3TRB	JESD22-A101
RSH	JESD22-B106

Dimensions - SOD-123F Package



Mounting Pad Layout



Dimensions	Millimeters		Inches	
	Min	Max	Min	Max
A	2.50	2.90	0.0984	0.1142
B	3.40	3.90	0.1339	0.1535
C	0.70	1.20	0.0275	0.0472
D	1.50	2.00	0.0591	0.0787
E	0.35	0.90	0.0138	0.0354
F	0.05	0.26	0.0020	0.0102
G	0.00	0.10	0.0000	0.0039
H	0.95	1.10	0.0374	0.0433

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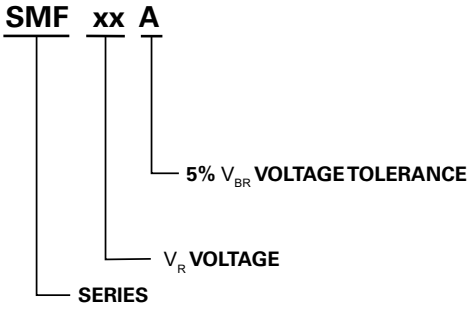
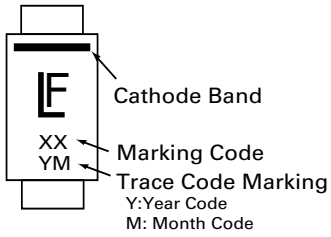
Transient Voltage Suppression Diodes

Surface Mount – 200W > SMF Series

Part Numbering System



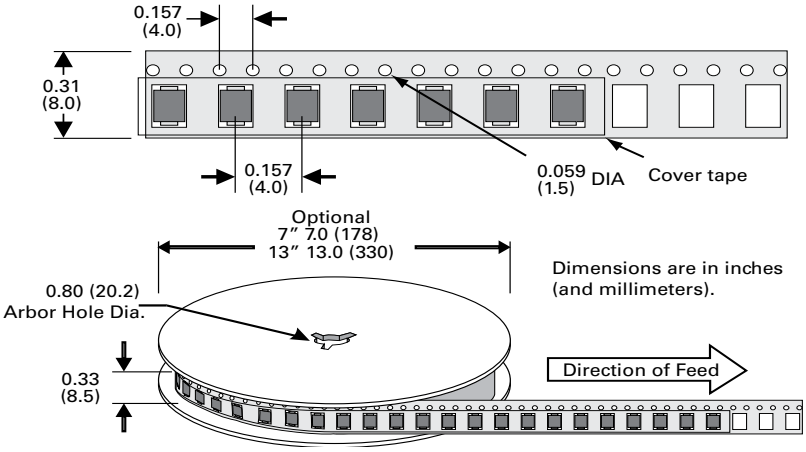
Part Marking System

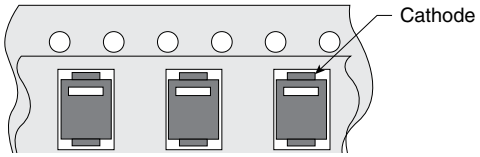


Packaging Options

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMFXXX	SOD-123F	3000	Tape & Reel – 8mm tape/7" reel	EIA RS-481
SMFXXX-T13	SOD-123F	10000	Tape & Reel – 8mm tape/13" reel	EIA RS-481

Tape and Reel Specification





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