

TVS Diode – SMF Series

Features

- Plastic package, excellent insulation strength.
- Glass passivated chip junction in SOD-123 package.
- Excellent voltage clamping capability.
- Low Zener impedance.
- 200W peak pulse power capability on 10/1000μs waveform.
- Typical leakage current less than 1μA above 13V.
- Very fast response time, typically less than 1.0ps from 0 volt to V_{BR} minimum.
- High temperature soldering guaranteed: 265°C/10 sec.
- MSL: JEDEC-J-STD-020, Level 1

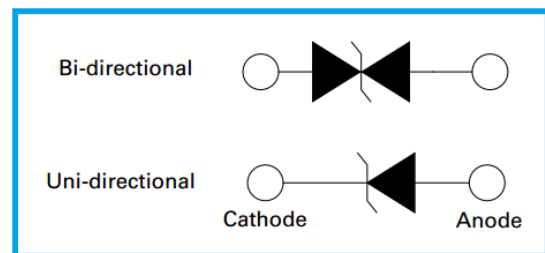


Applications

- I/O interface, V_{CC} bus
- Telecom
- Industrial and consumer electronic applications.
- Relay and electromagnetic valve surge absorption.

Agency Approval

- Pending



Mechanical and Physical Data

- Case: JEDEC SMF molded plastic.
- Surface mount device, solderable per MIL-STD-750, Method 2026
- Polarity: Color band denoted cathode except bidirectional.

Maximum Ratings and Thermal Characteristics

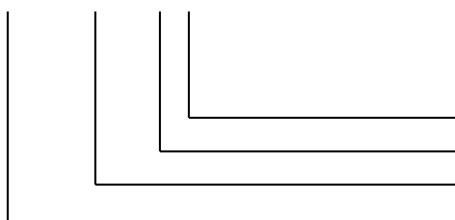
Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation on 10/1000μs waveform (Note 1, Fig.1).	P _{PPM}	Min 200	W
Peak Pulse Current of 10/1000μs waveform (Note 1, Fig.3).	I _{PPM}	See Table	A
Peak Forward Surge Current, 8.3 ms Single Half Sine Wave Superimposed on Rated Load (Note 2, Fig.6).	I _{FSM}	20	A
Operating Junction and Storage Temperature Range.	T _J , T _{STG}	-55~150	°C

Note:

1. Non-repetitive current pulse, per Fig.3 and derated above T_A = 25°C per Fig.2.
2. 8.3ms single half sine wave, or equivalent square wave, Duty cycle = 4 pulses per minutes maximum.

Part Number Code

SMF □□□ C A



- V_{BR} Voltage tolerance (A: 5%; Blank: 10%)
- C: Bi-directional; Blank: Uni-directional
- Reverse Stand-Off Voltage or Typical Breakdown Voltage
- SMF Series (200W)

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I-V Curve Characteristics



I_{PPM} Peak Pulse Power Dissipation – Maximum 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

Electrical Characteristics

Part Number		Marking		Reverse Stand Off Voltage V_R (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C (V) @ I_{PP}	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R (μ A) @ V_R
Uni	Bi	Uni	Bi		Min.	Max.				
SMF5.0A	SMF5.0CA	FE	KE	5.0	6.40	7.00	10	9.2	21.74	400
SMF6.0A	SMF6.0CA	FG	KG	6.0	6.67	7.37	10	10.3	19.42	400
SMF6.5A	SMF6.5CA	FK	KK	6.5	7.22	7.98	10	11.2	17.86	250
SMF7.0A	SMF7.0CA	FM	KM	7.0	7.78	8.60	10	12.0	16.67	100
SMF7.5A	SMF7.5CA	FP	KP	7.5	8.33	9.21	1	12.9	15.50	50
SMF8.0A	SMF8.0CA	FR	KR	8.0	8.89	9.83	1	13.6	14.71	25
SMF8.5A	SMF8.5CA	FT	KT	8.5	9.44	10.40	1	14.4	13.89	10
SMF9.0A	SMF9.0CA	FV	KV	9.0	10.00	11.10	1	15.4	12.99	5.0
SMF10A	SMF10CA	FX	KX	10	11.10	12.30	1	17.0	11.76	2.5
SMF11A	SMF11CA	FZ	KZ	11	12.20	13.50	1	18.2	10.99	2.5
SMF12A	SMF12CA	HE	LE	12	13.30	14.70	1	19.9	10.05	2.5
SMF13A	SMF13CA	HG	LG	13	14.40	15.90	1	21.5	9.30	1
SMF14A	SMF14CA	HK	LK	14	15.60	17.20	1	23.2	8.62	1
SMF15A	SMF15CA	HM	LM	15	16.70	18.50	1	24.4	8.20	1
SMF16A	SMF16CA	HP	LP	16	17.80	19.70	1	26.0	7.69	1
SMF17A	SMF17CA	HR	LR	17	18.90	20.90	1	27.6	7.25	1
SMF18A	SMF18CA	HT	LT	18	20.00	22.10	1	29.2	6.85	1

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Part Number		Marking		Reverse Stand Off Voltage V_R (V)	Breakdown Voltage V_{BR} (V) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C (V) @ I_{PP}	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R (μ A) @ V_R
Uni	Bi	Uni	Bi		Min.	Max.				
SMF19A	SMF19CA	HB	LB	19	21.10	23.30	1	30.6	6.54	1
SMF20A	SMF20CA	HV	LV	20	22.20	24.50	1	32.4	6.17	1
SMF22A	SMF22CA	HX	LX	22	24.40	26.90	1	35.5	5.63	1
SMF24A	SMF24CA	HZ	LZ	24	26.70	29.50	1	38.9	5.14	1
SMF26A	SMF26CA	JE	ME	26	28.90	31.90	1	42.1	4.75	1
SMF28A	SMF28CA	JG	MG	28	31.10	34.40	1	45.4	4.41	1
SMF30A	SMF30CA	JK	MK	30	33.30	36.80	1	48.4	4.13	1
SMF33A	SMF33CA	JM	MM	33	36.70	40.60	1	53.3	3.75	1
SMF36A	SMF36CA	JP	MP	36	40.00	44.20	1	58.1	3.44	1
SMF40A	SMF40CA	JR	MR	40	44.40	49.10	1	64.5	3.10	1
SMF43A	SMF43CA	JT	MT	43	47.80	52.80	1	69.4	2.88	1
SMF45A	SMF45CA	JV	MV	45	50.00	55.30	1	72.7	2.75	1
SMF48A	SMF48CA	JX	MX	48	53.30	58.90	1	77.4	2.58	1
SMF51A	SMF51CA	JZ	MZ	51	56.70	62.70	1	82.4	2.43	1
SMF54A	SMF54CA	XE	NE	54	60.00	66.30	1	87.1	2.30	1
SMF58A	SMF58CA	XG	NG	58	64.40	71.20	1	93.6	2.14	1
SMF60A	SMF60CA	XK	NK	60	66.70	73.70	1	96.8	2.07	1
SMF64A	SMF64CA	XM	NM	64	71.10	78.60	1	103.0	1.94	1
SMF70A	SMF70CA	XP	NP	70	77.80	86.00	1	113.0	1.77	1
SMF75A	SMF75CA	XR	NR	75	83.30	92.10	1	121.0	1.65	1
SMF78A	SMF78CA	XT	NT	78	86.70	95.80	1	126.0	1.59	1
SMF80A	SMF80CA	XB	NB	80	88.80	97.60	1	129.0	1.55	1
SMF85A	SMF85CA	XV	NV	85	94.40	104.0	1	137.0	1.46	1
SMF90A	SMF90CA	XX	NX	90	100.0	111.0	1	146.0	1.37	1
SMF100A	SMF100CA	XZ	NZ	100	111.0	123.0	1	162.0	1.23	1
SMF110A	SMF110CA	TE	PE	110	122.0	135.0	1	177.0	1.13	1
SMF120A	SMF120CA	TG	PG	120	133.0	147.0	1	193.0	1.04	1
SMF130A	SMF130CA	TK	PK	130	144.0	159.0	1	209.0	0.96	1
SMF140A	SMF140CA	TB	PB	140	155.0	171.0	1	224.0	0.89	1
SMF150A	SMF150CA	TM	PM	150	167.0	185.0	1	243.0	0.82	1
SMF160A	SMF160CA	TP	PP	160	178.0	197.0	1	259.0	0.77	1
SMF170A	SMF170CA	TR	PR	170	189.0	209.0	1	275.0	0.73	1
SMF180A	SMF180CA	TT	PT	180	200.0	220.0	1	292.0	0.68	1
SMF190A	SMF190CA	TV	PV	190	211.0	232.0	1	308.0	0.65	1
SMF200A	SMF200CA	TX	PX	200	224.0	247.0	1	324.0	0.62	1
SMF220A	SMF220CA	TZ	PZ	220	246.0	272.0	1	356.0	0.56	1

Note:

1. For bi-directional type having V_R of 10 volts and less, the I_R limit is double.

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Ratings and Characteristic Curves

Fig 1 - Peak Pulse Power Rating Curve

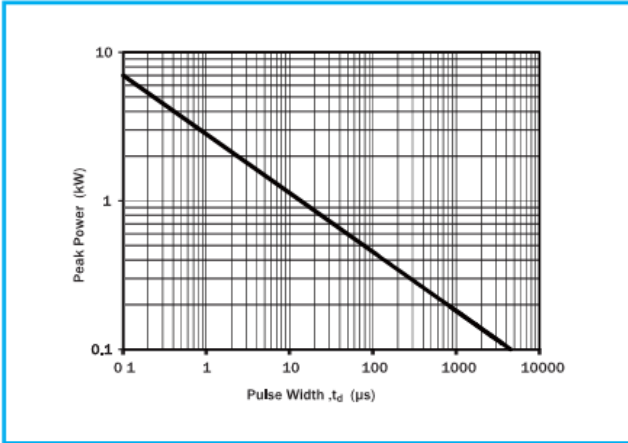


Fig 2 - Pulse Derating Curve

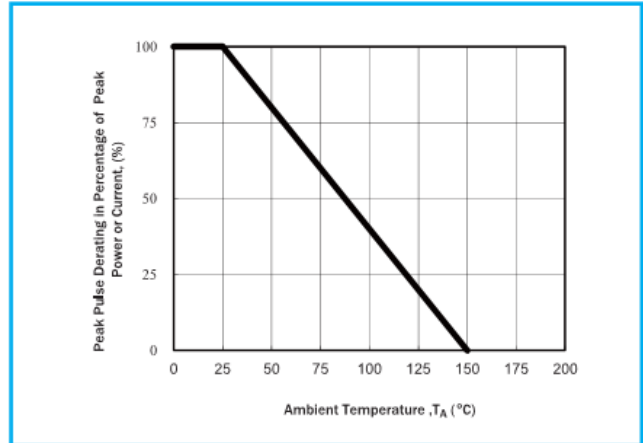


Fig 3 - Pulse Waveform

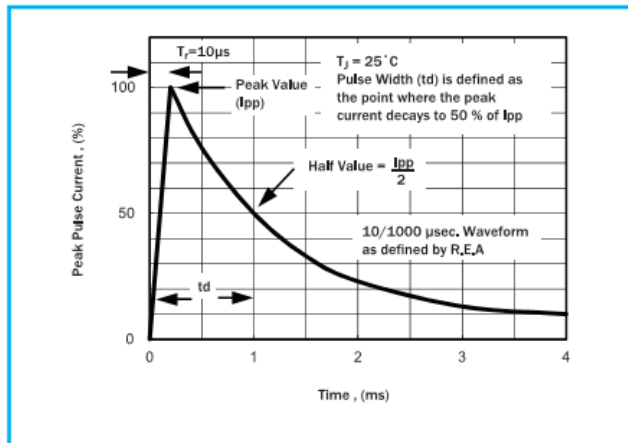


Fig 4 - Typical Junction Capacitance Uni-directional

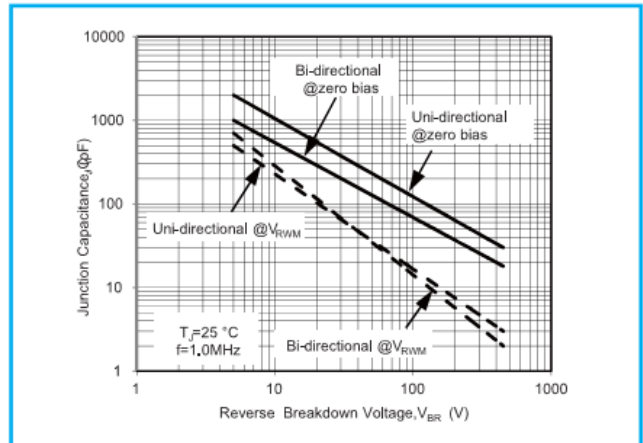


Fig 5 - Steady State Power Dissipation Derating Curve

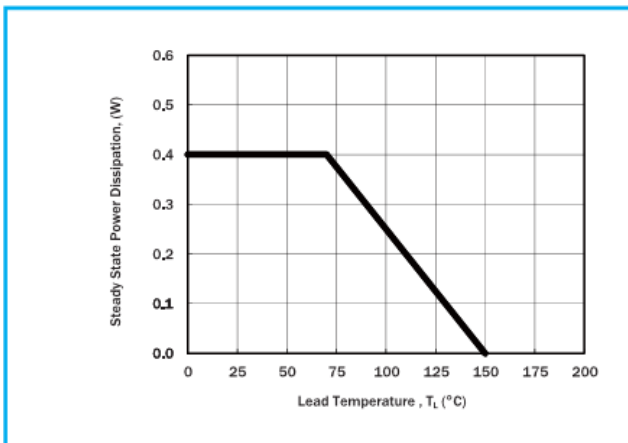
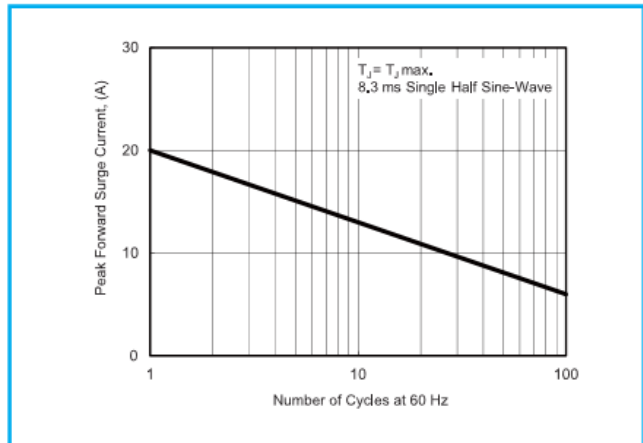
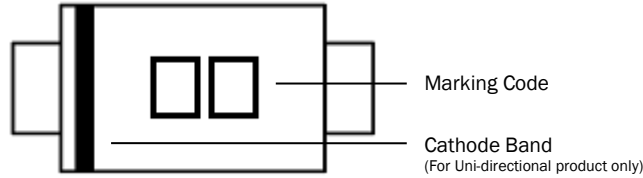


Fig 6 - Maximum Non-Repetitive Forward Surge Current (Uni-directional Only)

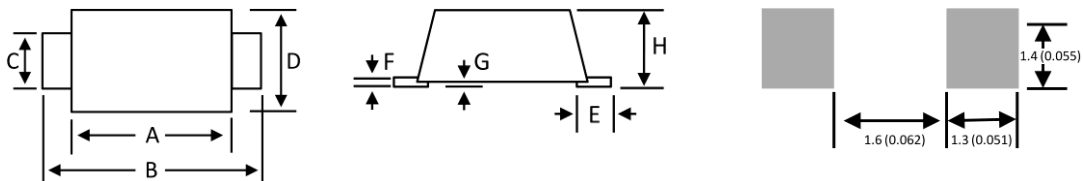


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Marking Definitions



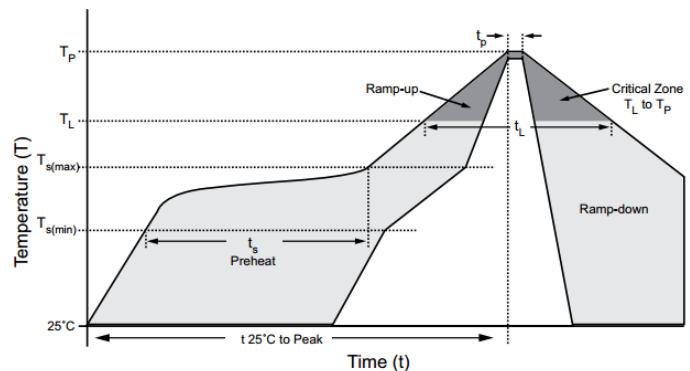
Physical Dimensions



Dimension	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	-	0.10	-	0.0039
H	0.95	1.30	0.0374	0.0512

Lead Free Reflow Soldering Recommendations

Preheat	
- Temperature Min (T_{s_min})	150°C
- Temperature Max (T_{s_max})	200°C
- Time (T_{s_min} to T_{s_max})	60-180 seconds
- Average Ramp-Up Rate	1~3°C/second
Peak Temperature	260°C max.
Time within 5°C of actual Peak Temperature (t_p)	40 seconds max.
Ramp-Down Rate	6 °C /second max.



Note: If the soldering temperatures exceed the recommended profile, devices may not meet the performance requirements.

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Packaging Information

Part Number	Component Package	Quantity	Packaging Option	Packaging Specification
SMF Series	SOD-123	3000	Tape & Reel – 8mm tape/7" reel	EIA STD RS-481

Tape and Reel Specifications

