

SM4F Series

Surface Mount – 400W



Additional Information



Resources



Accessories



Samples

Maximum Ratings and Thermal Characteristics

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

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_A=25^{\circ}\text{C}$	P_{PPM}	2000	W
		400	
Power Dissipation On Infinite Heat Sink at $T_L=75^{\circ}\text{C}$	P_D	1	W
Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only	V_F	3.5	V
Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note3, Fig.6)	I_{FSM}	30	A
Thermal Resistance Junction- to-Ambient	$R_{\theta JA}$	220	$^{\circ}\text{C}/\text{W}$
Thermal Resistance Junction- to-Lead	$R_{\theta JL}$	100	$^{\circ}\text{C}/\text{W}$
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.3 and derated above T_J (initial) $=25^{\circ}\text{C}$ per Fig.2.
2. Each terminal is surface Mounted on the 5.0mm $\times$ 5.0mm(0.03mm thick) copper pads.
3. 8.3ms single half sine-wave or equivalent square wave, duty cycle=4 pulses per minutes maximum.

Description

The SM4F series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

SM4F package is 50% smaller in footprint when compare to SMA package and delivering one of the low height profiles (1.2mm) in the industry.

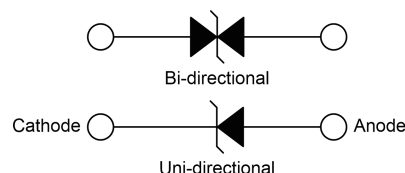
Features

- 400W peak pulse power capability at 10/1000 μs waveform, repetition rate (duty cycle): 0.01%
- Compatible with industrial standard package SOD-123FL
- Low profile: maximum height of 1.2mm.
- Low inductance, excellent clamping capability
- For surface mounted applications to optimize board space
- High temperature to reflow soldering guaranteed: 260 $^{\circ}\text{C}/20\sim 40\text{sec}$.
- 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
- ESD protection of data lines in accordance with IEC 61000-4-2, 30kV(Air), 30kV (Contact)
- EFT protection of data lines in accordance with IEC61000-4-4
- Fast response time: typically less than 1.0ns from 0 Volts to V_B min
- Glass passivated junction
- Built-in strain relief
- Meet MSL level1, per J-STD-020, LF maximum peak of 260 $^{\circ}\text{C}$
- 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-STD609A.01)

Applications

SM4F series is ideal for the protection of I/O interfaces, V_{CC} bus and other vulnerable circuit used in cellular phones, portable electronics, business machines, power supplies and other consumer applications.

Functional Diagram



SM4F Series

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

Part Number		Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @ I_T		Test Current	Maximum Clamping Voltage @ I_{PP}	Peak Pulse Current	Reverse Leakage @ V_R
Uni.	Bi.	Uni.	Bi.	$V_R(V)$	$V_{B\ Min.}(V)$	$V_{B\ Max.}(V)$	$I_T(mA)$	$V_C(V)$	$I_{PP}(A)$	$I_R(\mu A)$
SM4F5.0A	SM4F5.0CA	AE	WE	5.0	6.4	7.0	10	9.2	43.6	500
SM4F6.0A	SM4F6.0CA	AG	WG	6.0	6.67	7.37	10	10.3	38.8	400
SM4F6.5A	SM4F6.5CA	AK	WK	6.5	7.22	7.98	10	11.2	35.8	350
SM4F7.0A	SM4F7.0CA	AM	WM	7.0	7.78	8.6	10	12.0	33.4	200
SM4F7.5A	SM4F7.5CA	AP	WP	7.5	8.33	9.21	1	12.9	31.0	100
SM4F8.0A	SM4F8.0CA	AR	WR	8.0	8.89	9.83	1	13.6	29.4	50
SM4F8.5A	SM4F8.5CA	AT	WT	8.5	9.44	10.4	1	14.4	27.8	20
SM4F9.0A	SM4F9.0CA	AV	WV	9.0	10.0	11.1	1	15.4	26.0	10
SM4F10A	SM4F10CA	AX	WX	10.0	11.1	12.3	1	17.0	23.6	5
SM4F11A	SM4F11CA	AZ	WZ	11.0	12.2	13.5	1	18.2	22.0	3
SM4F12A	SM4F12CA	BE	XE	12.0	13.3	14.7	1	19.9	20.2	1
SM4F13A	SM4F13CA	BG	XG	13.0	14.4	15.9	1	21.5	18.6	1
SM4F14A	SM4F14CA	BK	XK	14.0	15.6	17.2	1	23.2	17.2	1
SM4F15A	SM4F15CA	BM	XM	15.0	16.7	18.5	1	24.4	16.4	1
SM4F16A	SM4F16CA	BP	XP	16.0	17.8	19.7	1	26.0	15.4	1
SM4F17A	SM4F17CA	BR	XR	17.0	18.9	20.9	1	27.6	14.6	1
SM4F18A	SM4F18CA	BT	XT	18.0	20.0	22.1	1	29.2	13.8	1
SM4F20A	SM4F20CA	BV	XV	20.0	22.2	24.5	1	32.4	12.4	1
SM4F22A	SM4F22CA	BX	XX	22.0	24.4	26.9	1	35.5	11.4	1
SM4F24A	SM4F24CA	BZ	XZ	24.0	26.7	29.5	1	38.9	10.4	1
SM4F26A	SM4F26CA	CE	YE	26.0	28.9	31.9	1	42.1	9.6	1
SM4F28A	SM4F28CA	CG	YG	28.0	31.1	34.4	1	45.4	8.8	1
SM4F30A	SM4F30CA	CK	YK	30.0	33.3	36.8	1	48.4	8.4	1
SM4F33A	SM4F33CA	CM	YM	33.0	36.7	40.6	1	53.3	7.6	1
SM4F36A	SM4F36CA	CP	YP	36.0	40.0	44.2	1	58.1	7.0	1
SM4F40A	SM4F40CA	CR	YR	40.0	44.4	49.1	1	64.5	6.2	1
SM4F43A	-	CT	-	43.0	47.8	52.8	1	69.4	5.8	1
SM4F45A	-	CV	-	45.0	50.0	55.3	1	72.7	5.5	1
SM4F48A	-	CX	-	48.0	53.3	58.9	1	77.4	5.2	1
SM4F51A	-	CZ	-	51.0	56.7	62.7	1	82.4	4.9	1
SM4F54A	-	RE	-	54.0	60.0	66.3	1	87.1	4.6	1
SM4F58A	-	RG	-	58.0	64.4	71.2	1	93.6	4.3	1
SM4F60A	-	RK	-	60.0	66.7	73.7	1	96.8	4.1	1
SM4F64A	-	RM	-	64.0	71.1	78.6	1	103.0	3.9	1

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

Figure 1:
Peak Pulse Power Rating Curve

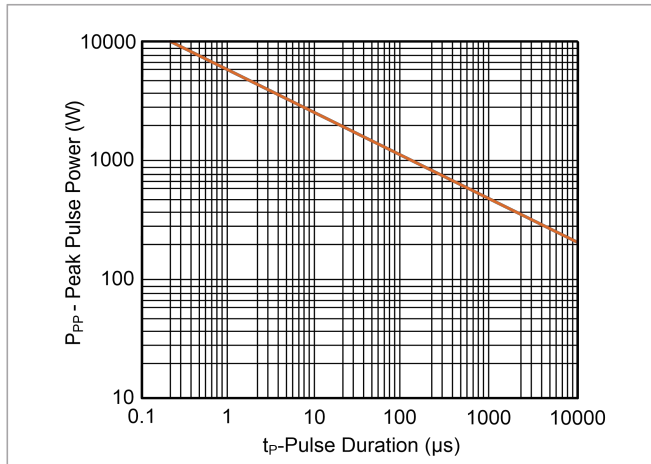


Figure 2:
Pulse Derating Curve

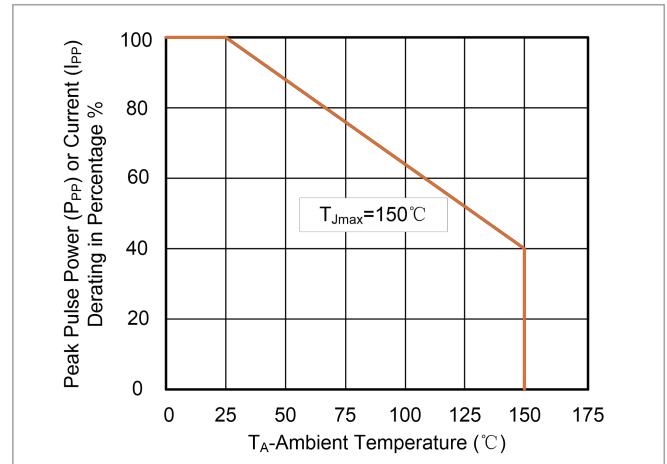


Figure 3:
Pulse Waveform

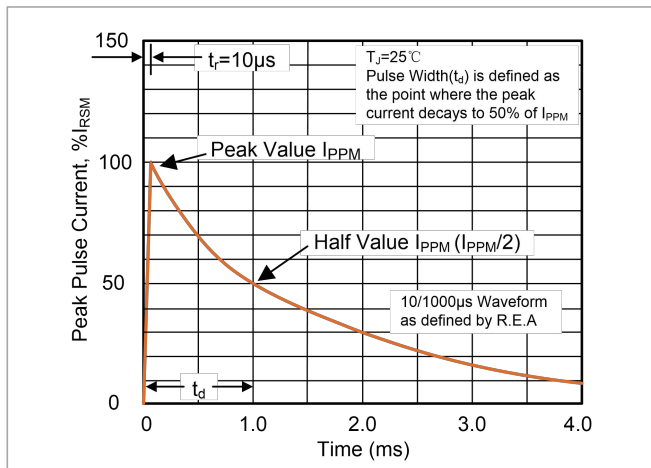


Figure 4:
Typical Junction Capacitance

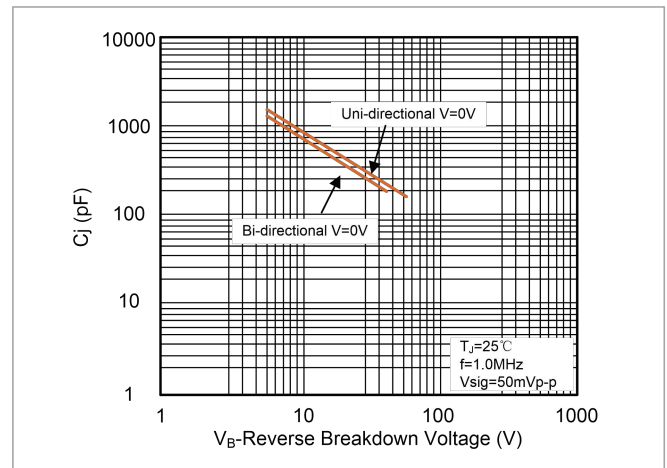


Figure 5:
Steady State Power Dissipation Derating Curve

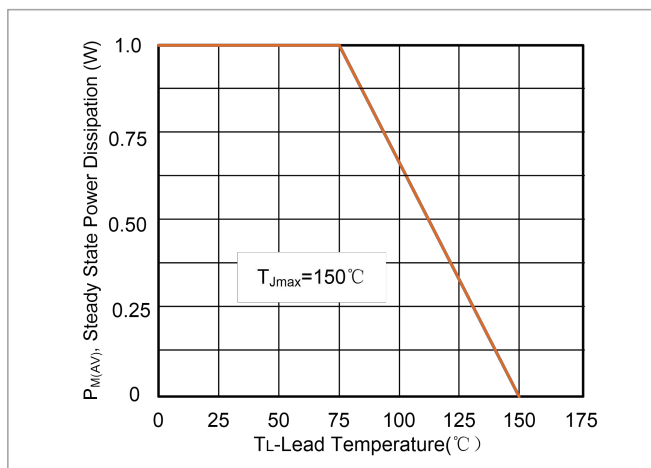
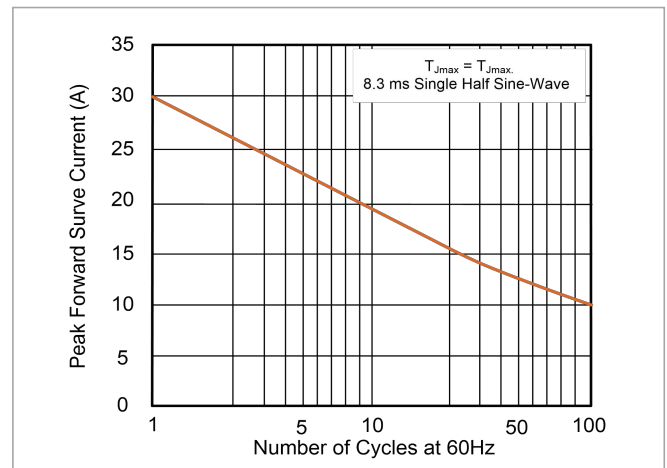


Figure 6:
Maximum Non-Repetitive Forward Surge Current Uni-Directional

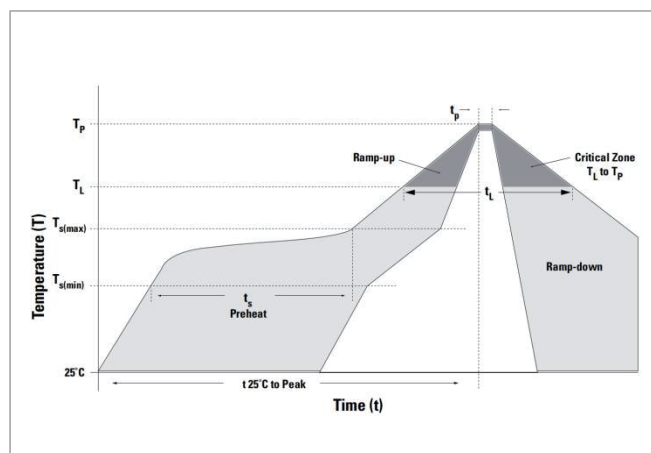


SM4F Series

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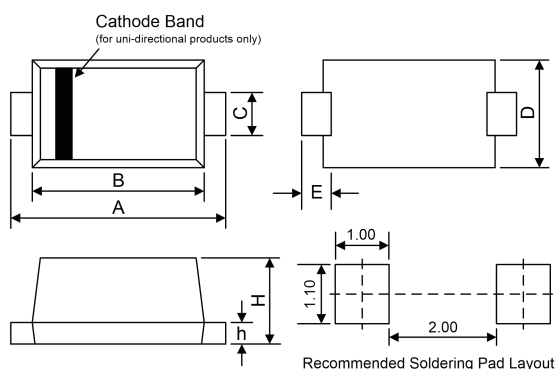
Soldering Parameters

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_L)	60-150 seconds
Peak Temperature (T_P)		260°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		8 minutes max.
Do not exceed		260°C



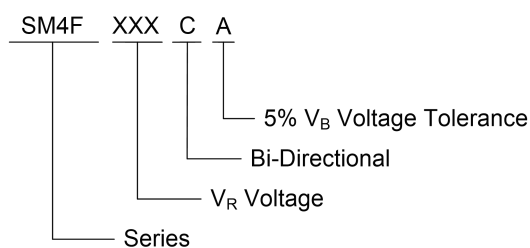
Dimensions

SOD-123FL

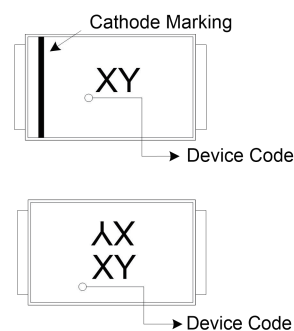


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.50	3.90	0.138	0.154
B	2.60	3.05	0.102	0.120
C	0.75	1.10	0.030	0.043
D	1.60	2.00	0.063	0.079
E	0.80Typ.		0.031Typ.	
H	0.90	1.35	0.035	0.053
h	0.12	0.22	0.005	0.009

Part Numbering System



Part Marking System



SM4F Series

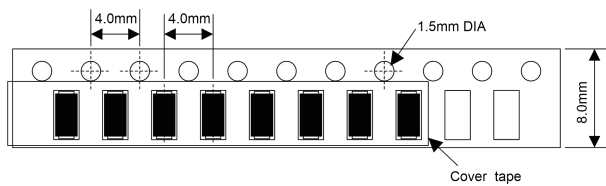
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Packaging Options

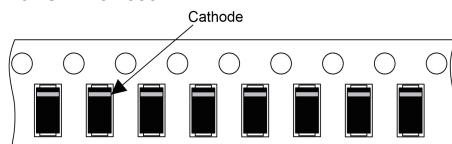
Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SM4FxxxXX	SOD-123FL	3000	Tape & Reel – 8mm tape/7" reel	EIA STD RS-481

Tape and Reel Specification

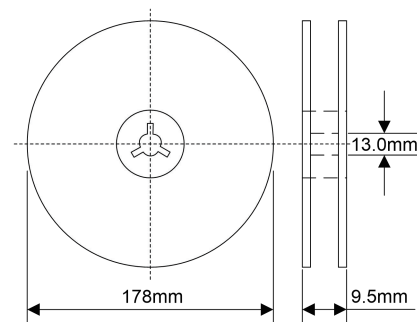
Tape



For Uni-Devices



7 Inches Reel



Quantity: 3000pcs/reel