

SMF-Q Series

Surface Mount – 200W

AUTOMOTIVE GRADE **HF** **RoHS** **Pb** **e3**



Additional Information



Resources



Accessories



Samples

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	8/20μs	P _{PPM}	1000	W
	10/1000μs		200	
Power Dissipation On Infinite Heat Sink at T _L =75°C		P _D	1	W
Maximum Instantaneous Forward Voltage at 12A 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}	20	A
Thermal Resistance Junction- to- Ambient		R _{θJA}	220	°C/W
Thermal Resistance Junction- to- Lead		R _{θJL}	100	°C/W
Operating Temperature Range		T _J	-55 to 150	°C
Storage Temperature Range		T _{STG}	-55 to 150	°C

Notes:

1. Non-repetitive current pulse, per Fig.3 and derated above T_J (initial) =25°C per Fig.2.
2. Each terminal is surface Mounted on the 5.0mm×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 SMF-Q series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

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

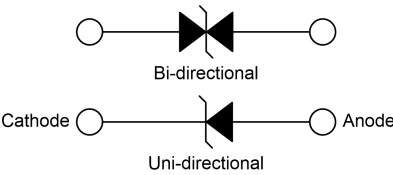
Features

- High reliability application and automotive grade AEC-Q101 qualified
- 200W peak pulse power capability at 10/1000μs waveform, repetition rate (duty cycles):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°C/20~40sec.
- 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°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

SMF-Q 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



SMF-Q Series

Surface Mount – 200W

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

Part Number		Type	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.		$V_{B \text{ Min. (V)}}$	$V_{B \text{ Max. (V)}}$				
SMF5.0A	SMF5.0CA	Q	KE	AE	5.0	6.40	7.00	10	9.2	21.8	500
SMF6.0A	SMF6.0CA	Q	KG	AG	6.0	6.67	7.37	10	10.3	19.4	400
SMF6.5A	SMF6.5CA	Q	KK	AK	6.5	7.22	7.98	10	11.2	17.9	350
SMF7.0A	SMF7.0CA	Q	KM	AM	7.0	7.78	8.60	10	12.0	16.7	200
SMF7.5A	SMF7.5CA	Q	KP	AP	7.5	8.33	9.21	1	12.9	15.5	100
SMF8.0A	SMF8.0CA	Q	KR	AR	8.0	8.89	9.83	1	13.6	14.7	50
SMF8.5A	SMF8.5CA	Q	KT	AT	8.5	9.44	10.40	1	14.4	13.9	20
SMF9.0A	SMF9.0CA	Q	KV	AV	9.0	10.00	11.10	1	15.4	13.0	10
SMF10A	SMF10CA	Q	KX	AX	10.0	11.10	12.30	1	17.0	11.8	5
SMF11A	SMF11CA	Q	KZ	AZ	11.0	12.20	13.50	1	18.2	11.0	3
SMF12A	SMF12CA	Q	LE	BE	12.0	13.30	14.70	1	19.9	10.1	1
SMF13A	SMF13CA	Q	LG	BG	13.0	14.40	15.90	1	21.5	9.3	1
SMF14A	SMF14CA	Q	LK	BK	14.0	15.60	17.20	1	23.2	8.6	1
SMF15A	SMF15CA	Q	LM	BM	15.0	16.70	18.50	1	24.4	8.2	1
SMF16A	SMF16CA	Q	LP	BP	16.0	17.80	19.70	1	26.0	7.7	1
SMF17A	SMF17CA	Q	LR	BR	17.0	18.90	20.90	1	27.6	7.3	1
SMF18A	SMF18CA	Q	LT	BT	18.0	20.00	22.10	1	29.2	6.9	1
SMF20A	SMF20CA	Q	LV	BV	20.0	22.20	24.50	1	32.4	6.2	1
SMF22A	SMF22CA	Q	LX	BX	22.0	24.40	26.90	1	35.5	5.7	1
SMF24A	SMF24CA	Q	LZ	BZ	24.0	26.70	29.50	1	38.9	5.2	1
SMF26A	SMF26CA	Q	ME	CE	26.0	28.90	31.90	1	42.1	4.8	1
SMF28A	SMF28CA	Q	MG	CG	28.0	31.10	34.40	1	45.4	4.4	1
SMF30A	SMF30CA	Q	MK	CK	30.0	33.30	36.80	1	48.4	4.2	1
SMF33A	SMF33CA	Q	MM	CM	33.0	36.70	40.60	1	53.3	3.8	1
SMF36A	SMF36CA	Q	MP	CP	36.0	40.00	44.20	1	58.1	3.5	1
SMF40A	SMF40CA	Q	MR	CR	40.0	44.40	49.10	1	64.5	3.1	1
SMF43A	SMF43CA	Q	MT	CT	43.0	47.80	52.80	1	69.4	2.9	1
SMF45A	SMF45CA	Q	MV	CV	45.0	50.00	55.30	1	72.7	2.8	1
SMF48A	SMF48CA	Q	MX	CX	48.0	53.30	58.90	1	77.4	2.6	1
SMF51A	SMF51CA	Q	MZ	CZ	51.0	56.70	62.70	1	82.4	2.5	1
SMF54A	SMF54CA	Q	NE	DE	54.0	60.00	66.30	1	87.1	2.3	1
SMF58A	SMF58CA	Q	NG	DG	58.0	64.40	71.20	1	93.6	2.2	1
SMF60A	SMF60CA	Q	NK	DK	60.0	66.70	73.70	1	96.8	2.1	1
SMF64A	SMF64CA	Q	NM	DM	64.0	71.10	78.60	1	103.0	2.0	1
SMF70A	SMF70CA	Q	NP	DP	70.0	77.80	86.00	1	113.0	1.8	1
SMF75A	SMF75CA	Q	NR	DR	75.0	83.30	92.10	1	121.0	1.7	1
SMF78A	SMF78CA	Q	NT	DT	78.0	86.70	95.80	1	126.0	1.6	1
SMF85A	SMF85CA	Q	NV	DV	85.0	94.40	104.00	1	137.0	1.5	1
SMF90A	SMF90CA	Q	NX	DX	90.0	100.00	111.00	1	146.0	1.4	1
SMF100A	SMF100CA	Q	NZ	DZ	100.0	111.00	123.00	1	162.0	1.3	1
SMF110A	SMF110CA	Q	PE	EE	110.0	122.00	135.00	1	177.0	1.2	1
SMF120A	SMF120CA	Q	PG	EG	120.0	133.00	147.00	1	193.0	1.1	1
SMF130A	SMF130CA	Q	PK	EK	130.0	144.00	159.00	1	209.0	1.0	1
SMF150A	SMF150CA	Q	PM	EM	150.0	167.00	185.00	1	243.0	0.8	1
SMF160A	SMF160CA	Q	PP	EP	160.0	178.00	197.00	1	259.0	0.8	1
SMF170A	SMF170CA	Q	PR	ER	170.0	189.00	209.00	1	275.0	0.8	1
SMF180A	SMF180CA	Q	PT	ET	180.0	201.00	222.00	1	292.0	0.7	1

Notes:

1. V_{BR} measured after I_T applied for 300 μ s, I_T = square wave pulse or equivalent.
2. Surge current waveform per 10/1000 μ s exponential wave and derated per Fig.3.
3. All terms and symbols are consistent with ANSI/IEEE C62.35.
4. For bidirectional type having V_R of 10 volts and less, the I_R limit is double.

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

Figure 1:
Peak Pulse Power Rating Curve

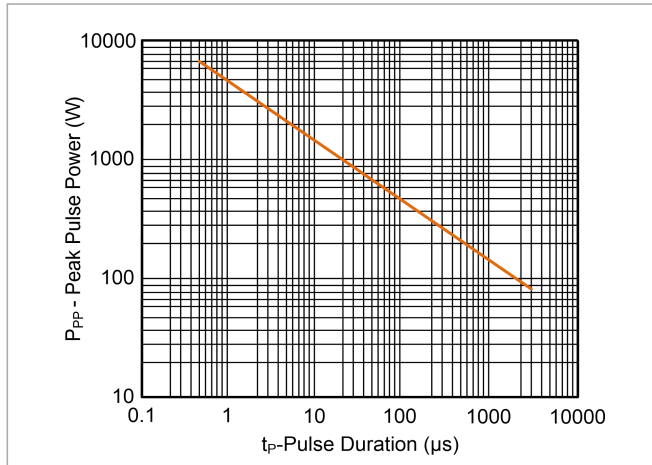


Figure 2:
Pulse Derating Curve

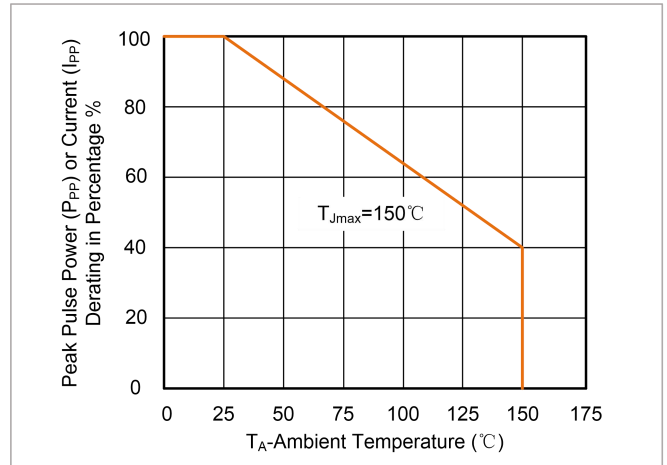


Figure 3:
Pulse Waveform

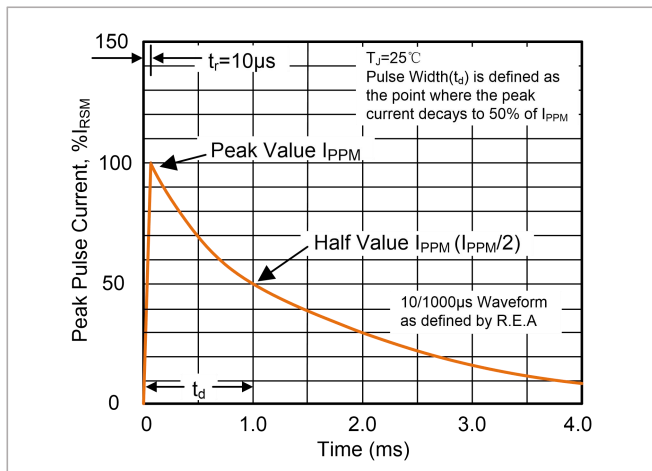


Figure 4:
Typical Junction Capacitance

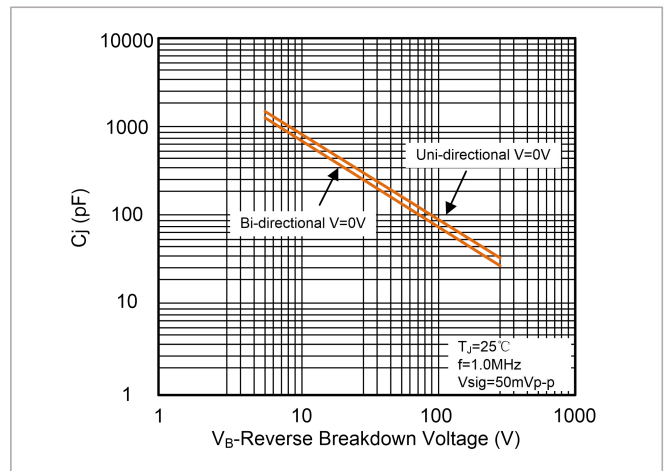


Figure 5:
Steady State Power Dissipation Derating Curve

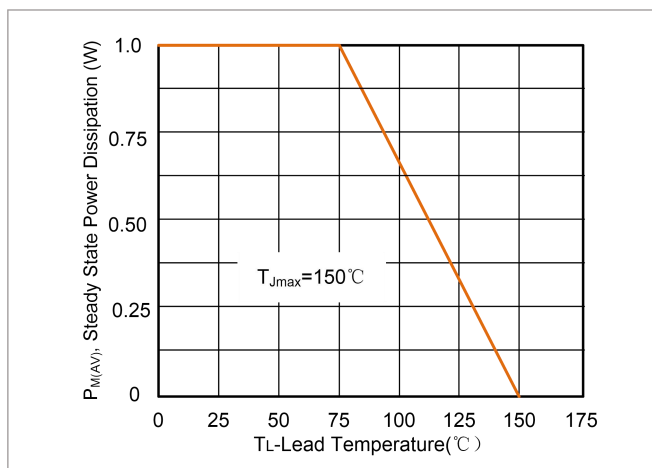
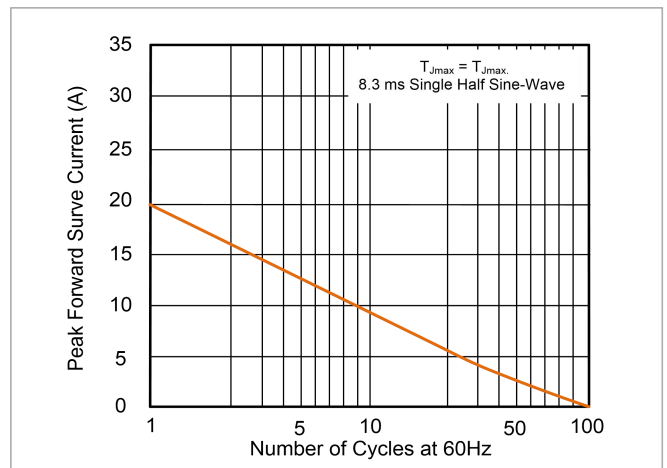


Figure 6:
Maximum Non-Repetitive Forward Surge Current Uni-Directional

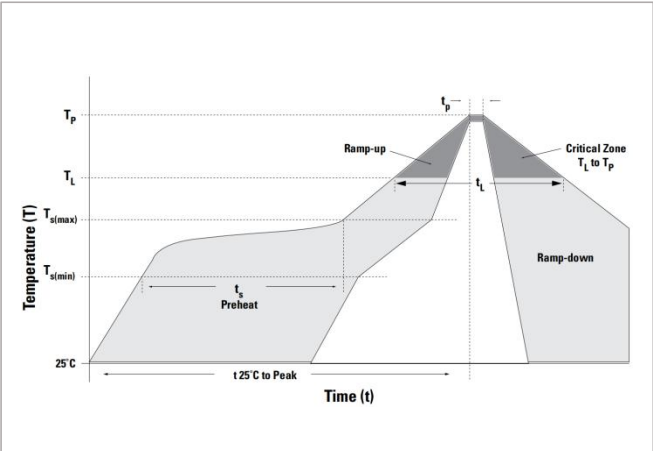


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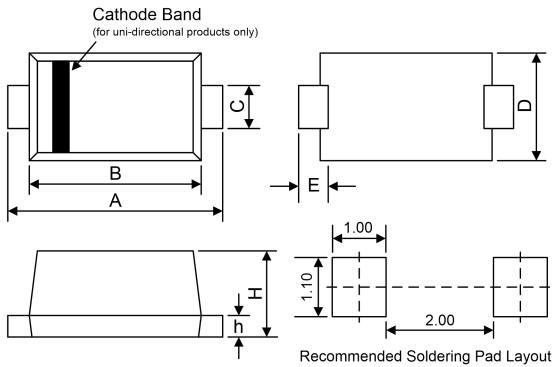
Soldering Parameters

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



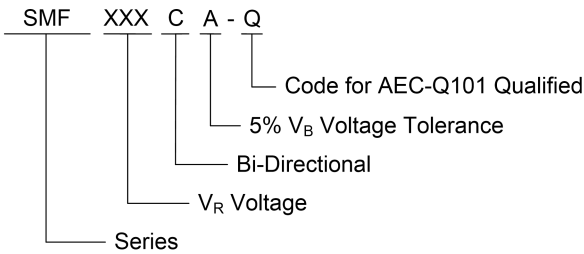
Dimensions

SOD-123FL

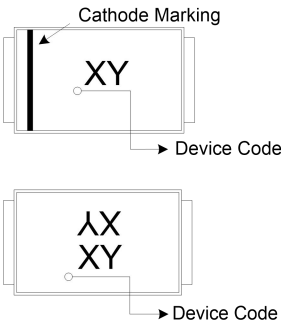


Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	3.50	3.90	0.138	0.154
B	2.60	3.05	0.102	0.120
C	0.75	1.10	0.030	0.043
D	1.60	2.00	0.063	0.079
E	0.80Typ.		0.031Typ.	
H	0.90	1.35	0.035	0.053
h	0.12	0.22	0.005	0.009

Part Numbering System



Part Marking System



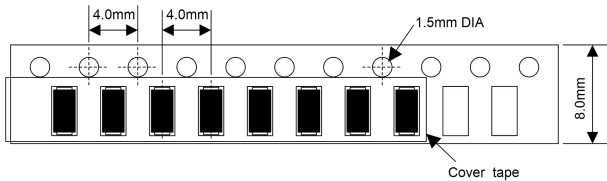
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Packaging

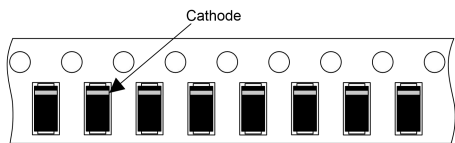
Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMFxxxXX-Q	SOD-123FL	3000	Tape & Reel – 8mm tape/7" reel	EIA STD RS-481

Tape and Reel Specification

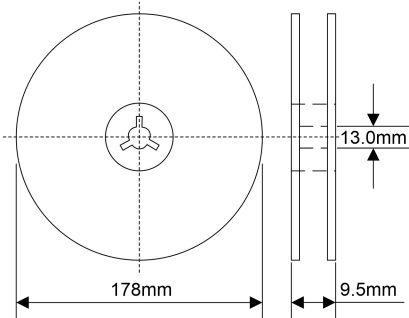
Tape



For Uni-Devices



7 Inches Reel



Quantity: 3000pcs/reel