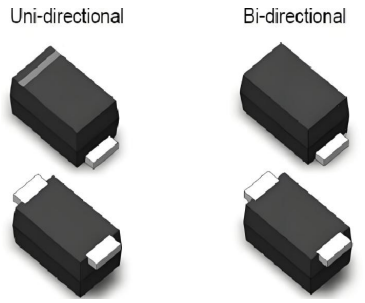
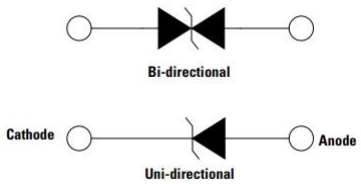
TVS Diodes SMF series

Transient Voltage Suppressors

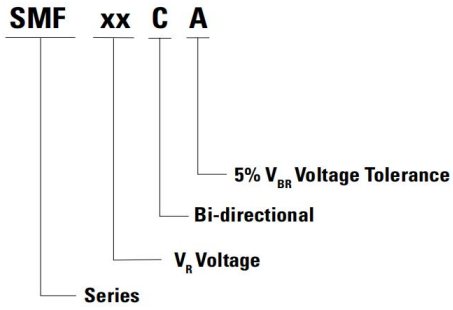
Features



- 200W peak pulse power capability at 10/1000μs waveform, repetition rate (duty cycle): 0.01%
- For surface mounted applications to optimize board space
- Low incremental surge impedance
- Excellent clamping capability
- Typical IR less than 1μA above 12V
- High Temperature soldering guaranteed: 260℃/40 seconds at terminals
- Plastic package has underwriters laboratory flammability 94V-0
- Meets MSL level 1, per J-STD-020
- Meet Halogen free and RoHS compliant



Part Number Coding System



Applications

- Personal digital assistants (PDA)
- Cellular handsets & Accessories
- Portable devices
- Portable instrumentation
- Handhelds and notebooks
- Digital cameras

Mechanical Data

- Case: SOD-123FL package.
- Polarity: Color band denotes positive end (cathode) except bi-directional models.

Maximum Rating and Characteristics

Parameters at 25℃ ambient temperature unless otherwise Noted.

Rating	Symbol	Value	Unit
Peak Pulse power Dissipation at 10/1000μs Waveform (Note1,Note2,)	P_{PPM}	Minimum 200	Watts
Peak pulse current of at 10/1000μs waveform (Note 1, Fig.2)	I_{PPM}	See Table	Amps
Steady state power dissipation at T_A=50℃	$P_{M(AV)}$	1.0	Watts
Peak forward surge current, 8.3ms single half sine-wave superimposed on rated load, (JEDEC Method) (Note3, Fig.6)	I_{FSM}	30	Amps
Operating junction and Storage Temperature Range.	T_J, T_{STG}	-65 to +150	℃

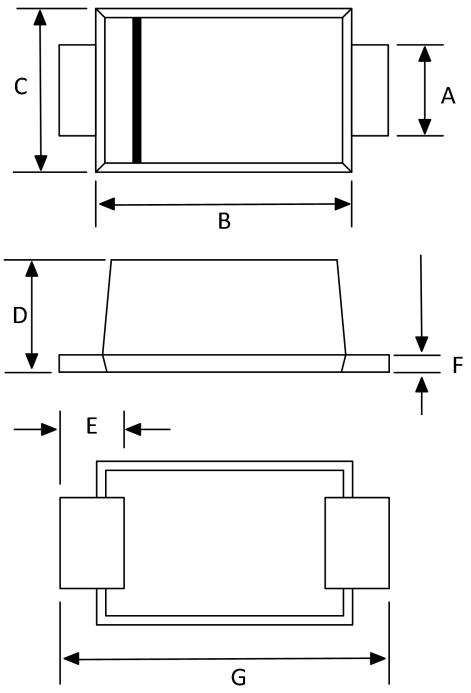
Notes:

1. Non-repetitive current pulse, per Fig.2 and derated above T_A=25℃ per Fig.1 .

2. Mounted on 5.0mm×5.0mm (0.03mm thick) copper pads to each terminal.

3. 8.3ms single half sine-wave, or equivalent square wave, duty cycle=4 pulses per minutes maximum.

Dimensions (SOD-123FL)



Ref.	Millimeters		Inches	
	Min	Max	Min.	Max.
A	0.70	1.10	0.028	0.043
B	2.50	2.90	0.098	0.114
C	1.50	1.90	0.059	0.075
D	0.90	1.10	0.035	0.043
E	0.55	0.95	0.022	0.037
F	0.10	0.20	0.004	0.008
G	3.40	3.80	0.134	0.150

Electrical Characteristics (T_A=25℃ 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_{RWM}
	UNI	BI	V_{RWM}(V)	$V_{BR\ MIN.}$(V)	$V_{BR\ MAX.}$(V)	I_T(mA)	V_C(V)	I_{PP}(A)	I_R(μA)
SMF5.0(C)A	AE	HE	5.0	6.40	7.00	10	9.2	21.8	400
SMF6 .0(C)A	AG	HG	6.0	6.67	7.37	10	10.3	19.4	400
SMF6.5(C)A	AK	HK	6.5	7.22	7.98	10	11.2	17.9	250
SMF7.0(C)A	AM	HM	7.0	7.78	8.60	10	12.0	16.7	100
SMF7.5(C)A	AP	HP	7.5	8.33	9.21	1	12.9	15.5	50
SMF8.0(C)A	AR	HR	8.0	8.89	9.83	1	13.6	14.7	25
SMF8.5(C)A	AT	HT	8.5	9.44	10.40	1	14.4	13.9	10
SMF9.0(C)A	AV	HV	9.0	10.00	11.10	1	15.4	13.0	2.5
SMF10(C)A	AX	HX	10.0	11.10	12.30	1	17.0	11.8	2.5
SMF11(C)A	AZ	HZ	11.0	12.20	13.50	1	18.2	11.0	2.5
SMF12(C)A	BE	IE	12.0	13.30	14.70	1	19.9	10.1	2.5
SMF13(C)A	BG	IG	13.0	14.40	15.90	1	21.5	9.3	1
SMF14(C)A	BK	IK	14.0	15.60	17.20	1	23.2	8.6	1
SMF15(C)A	BM	IM	15.0	16.70	18.50	1	24.4	8.2	1
SMF16(C)A	BP	IP	16.0	17.80	19.70	1	26.0	7.7	1
SMF17(C)A	BR	IR	17.0	18.90	20.90	1	27.6	7.2	1
SMF18(C)A	BT	IT	18.0	20.00	22.10	1	29.2	6.8	1
SMF20(C)A	BV	IV	20.0	22.20	24.50	1	32.4	6.2	1
SMF22(C)A	BX	IX	22.0	24.40	26.90	1	35.5	5.7	1
SMF24(C)A	BZ	IZ	24.0	26.70	29.50	1	38.9	5.1	1
SMF26(C)A	CE	JE	26.0	28.90	31.90	1	42.1	4.8	1
SMF28(C)A	CG	JG	28.0	31.10	34.40	1	45.4	4.4	1
SMF30(C)A	CK	JK	30.0	33.30	36.80	1	48.4	4.1	1
SMF33(C)A	CM	JM	33.0	36.70	40.60	1	53.3	3.8	1
SMF36(C)A	CP	JP	36.0	40.00	44.20	1	58.1	3.4	1
SMF40(C)A	CR	JR	40.0	44.40	49.10	1	64.5	3.1	1
SMF43(C)A	CT	JT	43.0	47.80	52.80	1	69.4	2.9	1
SMF45(C)A	CV	JV	45.0	50.00	55.30	1	72.7	2.8	1
SMF48(C)A	CX	JX	48.0	53.30	58.90	1	77.4	2.6	1
SMF51(C)A	CZ	JZ	51.0	56.70	62.70	1	82.4	2.4	1
SMF54(C)A	DE	KE	54.0	60.00	66.30	1	87.1	2.3	1
SMF58(C)A	RG	KG	58.0	64.40	71.20	1	93.6	2.1	1

Part Number	Device Marking Code		Reverse Stand-Off Voltage	Breakdown Voltage @I_T		Test Curret	Maximum Clamping Voltage @I_{PP}	Peak Pulse Current	Reverse Leakage @V_{RWM}
	UNI	BI	V_{RWM}(V)	$V_{BR\ MIN.}$(V)	$V_{BR\ MAX.}$(V)	I_T(mA)	V_C(V)	I_{PP}(A)	I_R(μA)
SMF60(C)A	RK	KK	60.0	66.70	73.70	1	96.8	2.1	1
SMF64(C)A	RM	KM	64.0	71.10	78.60	1	103.0	1.9	1
SMF70(C)A	RP	KP	70.0	77.80	86.00	1	113.0	1.7	1
SMF75(C)A	RR	KR	75.0	83.30	92.10	1	121.0	1.6	1
SMF78(C)A	RT	KT	78.0	86.70	95.80	1	126.0	1.6	1
SMF85(C)A	RV	KV	85.0	94.40	104.00	1	137.0	1.5	1
SMF90A	RW	-	90.0	100.00	111.00	1	146.0	1.2	1
SMF100A	RX	-	100.0	111.00	123.00	1	162.0	1.1	1
SMF110A	SE	-	110.0	122.00	135.00	1	177.0	1.1	1
SMF120A	SG	-	120.0	133.00	147.00	1	193.0	1.0	1
SMF130A	SK	-	130.0	144.00	159.00	1	209.0	1.0	1
SMF150A	SM	-	150.0	167.00	185.00	1	243.0	0.8	1
SMF160A	SP	-	160.0	178.00	197.00	1	259.0	0.8	1
SMF170A	SR	-	170.0	189.00	209.00	1	275.0	0.7	1
SMF180A	ST	-	180.0	201.00	222.00	1	292.0	0.7	1
SMF190A	SV	-	188.0	209.00	231.00	1	304.0	0.7	1
SMF200A	SX	-	200.0	224.00	247.00	1	324.0	0.6	1
SMF220A	SZ	-	220.0	246.00	272.00	1	356.0	0.6	1
SMF250A	TE	-	250.0	279.00	309.00	1	405.0	0.5	1

Note: For bidirectional type having V_{RWM} of 10V and less, the I_R limit is double.

Ratings and Characteristic Curves (TA=25℃ unless otherwise noted)

Figure 1. Peak Pulse Power Derating Curve

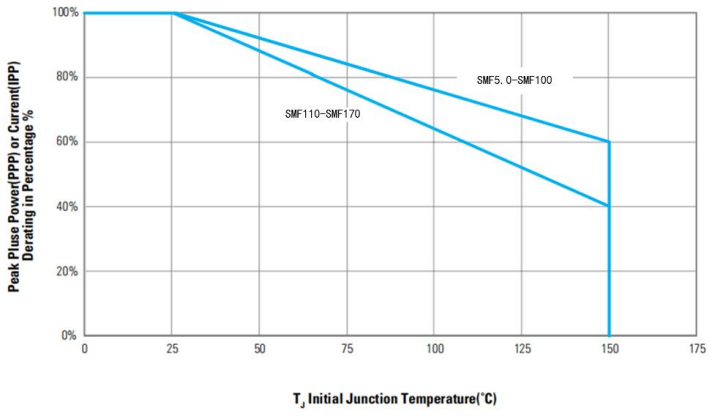


Figure 2. Pulse Waveform - 10/1000μS

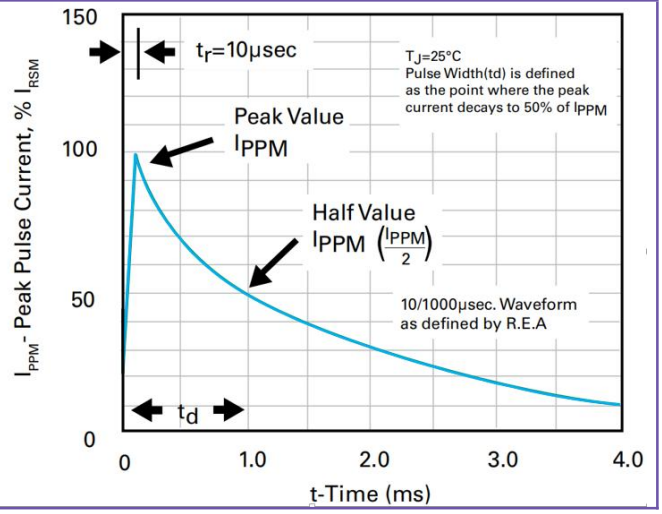


Figure 3. Forward Voltage

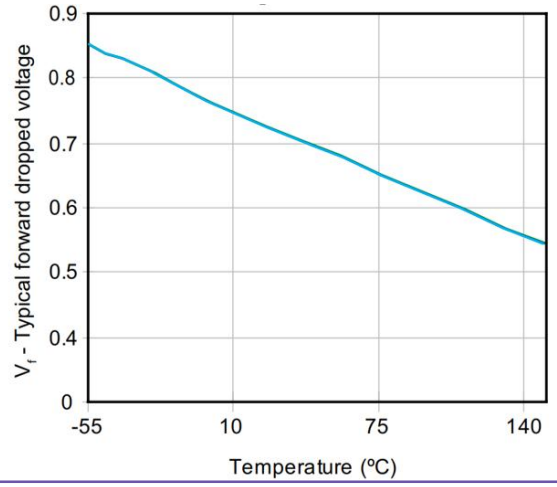


Figure 4. Typical Junction Capacitance

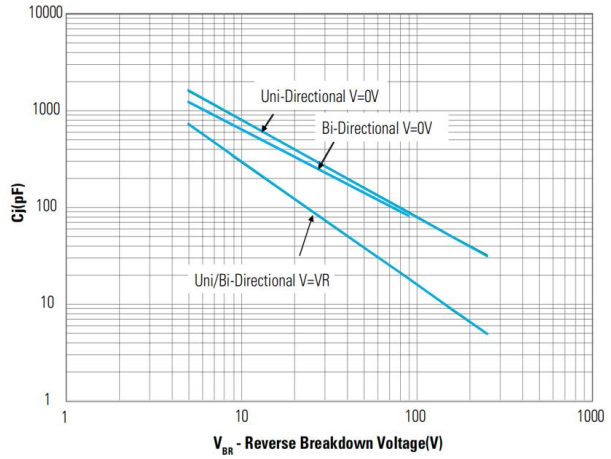


Figure 5. Peak Forward Voltage Drop vs. Peak Forward Current

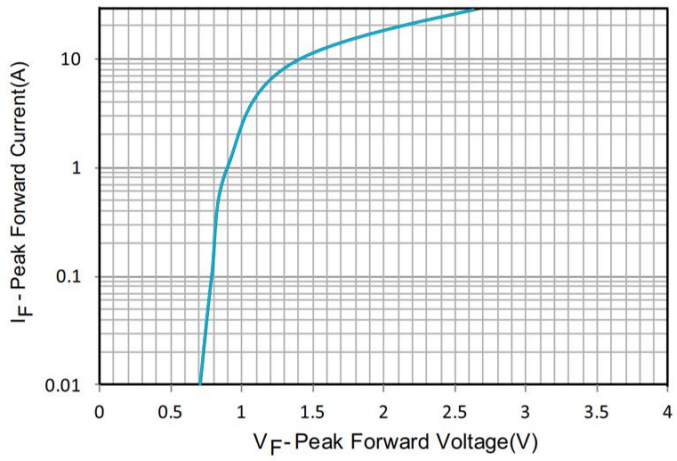
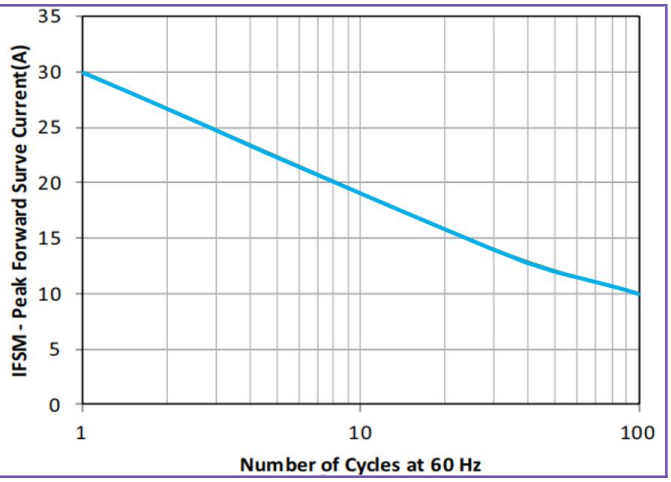
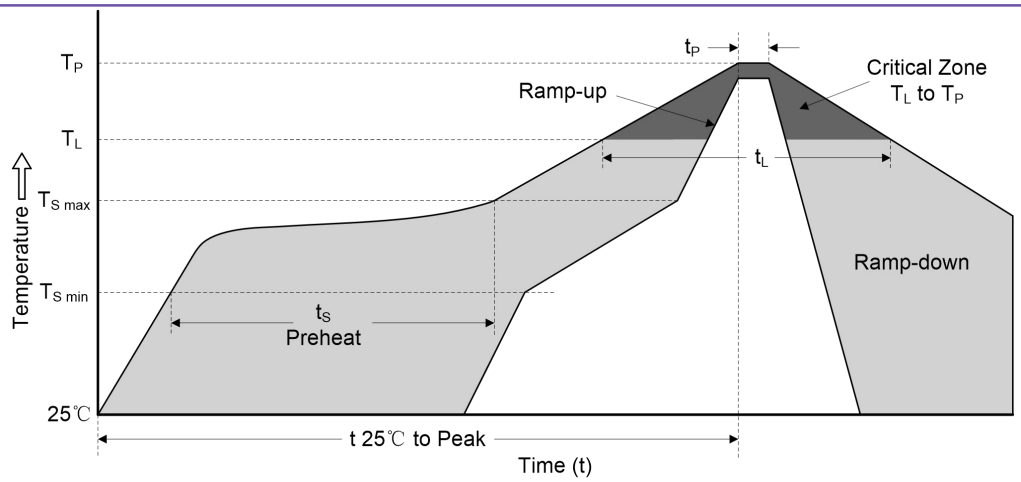


Figure 6. Maximum Non-Repetitive Forward Surge Current Uni-Directional Only



Reflow Soldering Parameters



Reflow Condition		Lead-free Assembly
Pre heat	-Temperature Min ($T_{S\,min}$)	150℃
	-Temperature Max ($T_{S\,max}$)	200℃
	-Time (min to max) (t_S)	60-120 seconds
Average ramp-up rate (T_L to T_P)		3℃/second max.
$T_{S\,max}$ to T_L -Ramp-up Rate		3℃/second max.
Reflow	-Temperature (T_L) (Liquidus)	217℃
	-Time (min to max) (t_S)	60-150 seconds
Peak Temperature (T_P)		260(+0/-5)℃
Time within 5℃ of actual Peak Temperature (t_P)		20-40 seconds
Ramp-down Rate		6℃/second max.
Time 25℃ to Peak Temperature(T_P)		8 minutes max.
Do not exceed		260℃

Reliability

Items	Standards
Terminal strength	MIL-STD-750 Method 2036
Mechanical shock	JESD22-B104
Vibration	JESD22-B103
High Temp. Storage	JESD22-A103
High Temp Reverse Bias	JESD22-A108
Temperature Cycling	JESD22-A104
High Temp High Humidity Reverse Bias	JESD22-A101
Resistance to solder heat	JESD22-A111(SMD)