

### Transient Voltage Suppressors (TVS) Data Sheet

#### Description

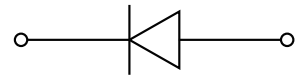
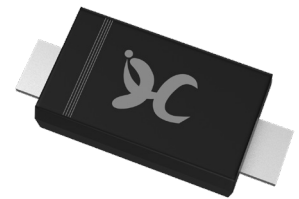
The SMF series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events

#### Features

- For surface mounted applications in order to optimize board space
- Low leakage
- Glass passivated junction
- Low inductance
- Excellent clamping capability
- 200W peak pulse power capability at 10/1000μs waveform
- Fast response time
- Typical IR less than 5μA above 12V
- High Temperature soldering: 260°C /40 seconds at terminals
- Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^{\circ}C \times \Delta T$
- Plastic package has Underwriters Laboratory Flammability 94V-0
- Matte tin lead-free Plated
- Halogen free and RoHS compliant
- 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)

**Breakdown Voltage**  
3.3 to 250 V  
**Peak Pulse Power**  
200 W

SOD-123FL



#### Applications

TVS devices are ideal for the protection of I/O interfaces, VCC bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications

#### Maximum Ratings (Ta=25°C Unless otherwise specified)

PARAMETER	SYMBOL	VALUE	SYMBOL
Peak Pulse Power Dissipation with a 10/1000μs waveform (Fig.1)(Note 1), (Note 2)	P <sub>PPM</sub>	200	W
Peak Pulse Current with a 10/1000μs waveform.(Note1, Fig.3)	I <sub>PP</sub>	See Next Table	A
Power Dissipation on Infinite Heat Sink at TL=75° C	P <sub>M(AV)</sub>	0.4	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I <sub>FSM</sub>	30	A
Maximum Instantaneous Forward Voltage at 25A for Unidirectional Only(Note 4)	V <sub>F</sub>	3.5	V
Operating junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C
Typical thermal resistance junction to lead	R <sub>θJ-L</sub>	100	°C /W
Typical thermal resistance junction to ambient	R <sub>θJ-A</sub>	220	°C /W

Note :

- (1) Non-repetitive current pulse, per Fig. 3 and derated above Ta = 25°C per Fig. 2.
- (2) Mounted on 5.0mm x 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.
- (4) VF<3.5V for VBR<200V and VF< 6.5V for VBR>201V.

### ● Package Outline Dimensions (SOD-123FL)

Symbol	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.10	0.035	0.430
B	2.55	2.85	0.100	0.111
C	1.60	1.90	0.063	0.074
D	3.60	3.90	0.031	0.043
E	1.00	1.20	0.031	0.035
F	0.40	0.90	0.047	0.055
G	0.10	0.25	0.003	0.007

### ● Electrical Characteristics (Ta=25°C Unless otherwise specified)

Part Number		Marking		Reverse Stand-Off Voltage	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current	Maximum Clamping Voltage@ $I_{PP}$	Peak Pulse Current	Reverse Leakage @ $V_{RWM}$
Uni	Bi	Uni	Bi	$V_{RWM}$ (V)	Min.	Max.	$I_T$ (mA)	$V_C$ (V)	$I_{PP}$ (A)	$I_R$ ( $\mu$ A)
SMF3.3A	SMF3.3CA	AD	HD	3.3	4.3	5.3	10	7.3	27.4	500
SMF5.0A	SMF5.0CA	AE	HE	5	6.4	7	10	9.2	21.7	400
SMF6.0A	SMF6.0CA	AG	HG	6	6.67	7.37	10	10.3	19.4	400
SMF6.5A	SMF6.5CA	AK	HK	6.5	7.22	7.98	10	11.2	17.9	250
SMF7.0A	SMF7.0CA	AM	HM	7	7.78	8.6	10	12.0	16.7	100
SMF7.5A	SMF7.5CA	AP	HP	7.5	8.33	9.21	1	12.9	15.5	50
SMF8.0A	SMF8.0CA	AR	HR	8	8.89	9.83	1	13.6	14.7	25
SMF8.5A	SMF8.5CA	AT	HT	8.5	9.44	10.4	1	14.4	13.9	10
SMF9.0A	SMF9.0CA	AV	HV	9	10	11.1	1	15.4	13.0	5
SMF10A	SMF10CA	AX	HX	10	11.1	12.3	1	17.0	11.8	2.5
SMF11A	SMF11CA	AZ	HZ	11	12.2	13.5	1	18.2	11.0	2.5
SMF12A	SMF12CA	BE	IE	12	13.3	14.7	1	19.9	10.1	2.5
SMF13A	SMF13CA	BG	IG	13	14.4	15.9	1	21.5	9.3	1
SMF14A	SMF14CA	BK	IK	14	15.6	17.2	1	23.2	8.6	1
SMF15A	SMF15CA	BM	IM	15	16.7	18.5	1	24.4	8.2	1
SMF16A	SMF16CA	BP	IP	16	17.8	19.7	1	26.0	7.7	1
SMF17A	SMF17CA	BR	IR	17	18.9	20.9	1	27.6	7.2	1
SMF18A	SMF18CA	BT	IT	18	20	22.1	1	29.2	6.8	1
SMF20A	SMF20CA	BV	IV	20	22.2	24.5	1	32.4	6.2	1
SMF22A	SMF22CA	BX	IX	22	24.4	26.9	1	35.5	5.6	1
SMF24A	SMF24CA	BZ	IZ	24	26.7	29.5	1	38.9	5.1	1
SMF26A	SMF26CA	CE	JE	26	28.9	31.9	1	42.1	4.8	1
SMF28A	SMF28CA	CG	JG	28	31.1	34.4	1	45.4	4.4	1
SMF30A	SMF30CA	CK	JK	30	33.3	36.8	1	48.4	4.1	1
SMF33A	SMF33CA	CM	JM	33	36.7	40.6	1	53.3	3.8	1
SMF36A	SMF36CA	CP	JP	36	40	44.2	1	58.1	3.4	1
SMF40A	SMF40CA	CR	JR	40	44.4	49.1	1	64.5	3.1	1

### ● Electrical Characteristics (Ta=25°C Unless otherwise specified)

Part Number		Marking		Reverse Stand-Off Voltage	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current	Maximum Clamping Voltage@ $I_{PP}$	Peak Pulse Current	Reverse Leakage @ $V_{RWM}$
Uni	Bi	Uni	Bi	$V_{RWM}$ (V)	Min.	Max.	$I_T$ (mA)	$V_C$ (V)	$I_{PP}$ (A)	$I_R$ ( $\mu$ A)
SMF43A	SMF43CA	CT	JT	43	47.8	52.8	1	69.4	2.9	1
SMF45A	SMF45CA	CV	JV	45	50	55.3	1	72.7	2.8	1
SMF48A	SMF48CA	CX	JX	48	53.3	58.9	1	77.4	2.6	1
SMF51A	SMF51CA	CZ	JZ	51	56.7	62.7	1	82.4	2.4	1
SMF54A	SMF54CA	DE	KE	54	60	66.3	1	87.1	2.3	1
SMF58A	SMF58CA	RG	KG	58	64.4	71.2	1	93.6	2.1	1
SMF60A	SMF60CA	RK	KK	60	66.7	73.7	1	96.8	2.1	1
SMF64A	SMF64CA	RM	KM	64	71.1	78.6	1	103	1.9	1
SMF70A	SMF70CA	RP	KP	70	77.8	86	1	113	1.7	1
SMF75A	SMF75CA	RR	KR	75	83.3	92.1	1	121	1.6	1
SMF78A	SMF78CA	RT	KT	78	86.7	95.8	1	126	1.6	1
SMF85A	SMF85CA	RV	KV	85	94.4	104	1	137	1.5	1
SMF90A	SMF90CA	RW	KX	90	100	111	1	146	1.2	1
SMF100A	SMF100CA	RX	KZ	100	111	123	1	162	1.1	1
SMF110A	SMF110CA	SE	LE	110	122	135	1	177	1.1	1
SMF120A	SMF120CA	SG	LG	120	133	147	1	193	1.0	1
SMF130A	SMF130CA	SK	LK	130	144	159	1	209	1.0	1
SMF150A	SMF150CA	SM	LM	150	167	185	1	243	0.8	1
SMF160A	SMF160CA	SP	LP	160	178	197	1	259	0.8	1
SMF170A	SMF170CA	SR	LR	170	189	209	1	275	0.7	1
SMF180A	SMF180CA	ST	LT	180	201	222	1	292	0.7	1
SMF188A	SMF188CA	SV	LV	188	209	231	1	304	0.7	1
SMF200A	SMF200CA	SX	LX	200	224	247	1	324	0.6	1
SMF220A	SMF220CA	SZ	LZ	220	246	272	1	356	0.6	1
SMF250A	SMF250CA	TE	ME	250	279	309	1	405	0.5	1

Note :

(1)Suffix 'A' denotes 5% tolerance device.

(2)Add suffix ' CA ' after part number to specify Bi-directional devices.

(3)For Bi-Directional devices having VR of 10 volts and under, the IR limit is double.

### ● Ratings And Characteristics Curves (Ta=25°C Unless otherwise specified)

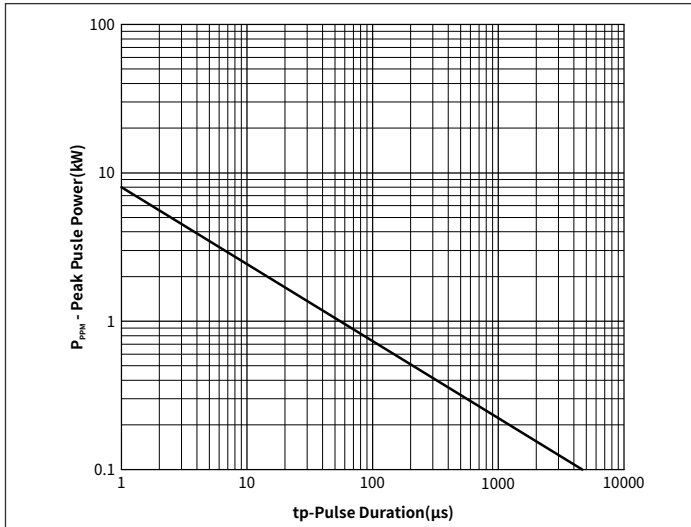


Fig. 1 Peak Pulse Power Rating Curve

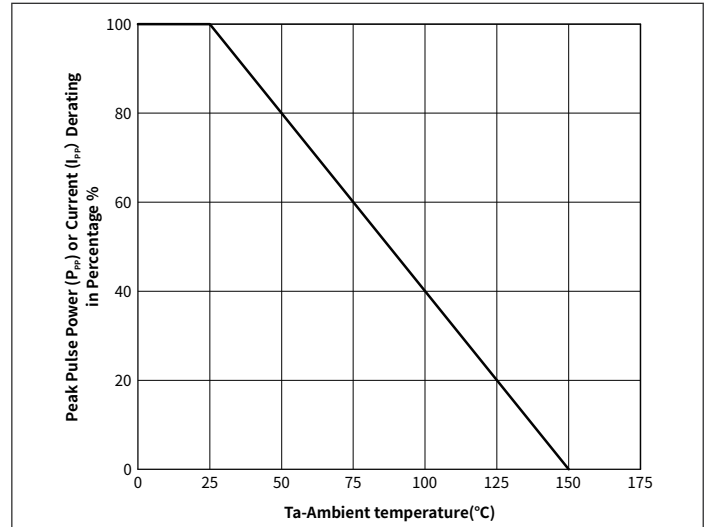


Fig. 2 Pulse Derating Curve

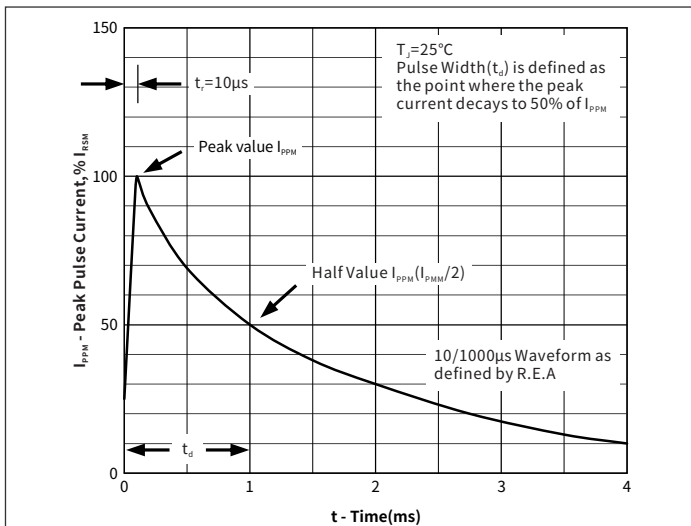


Fig. 3 Pulse Waveform

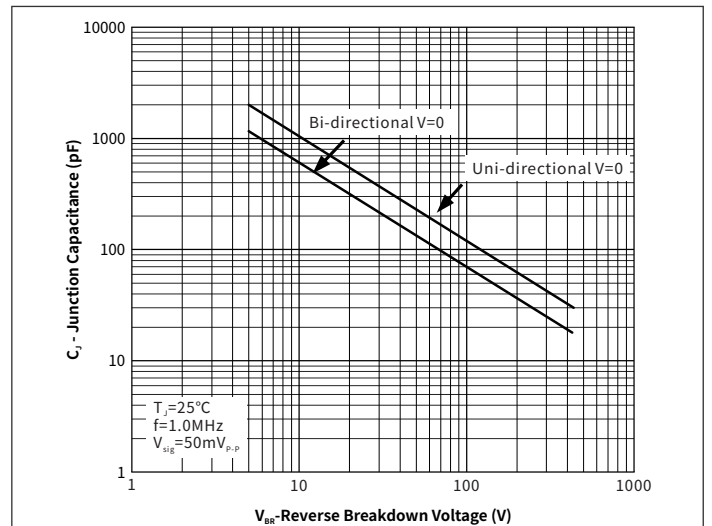


Fig. 4 Typical Junction Capacitance

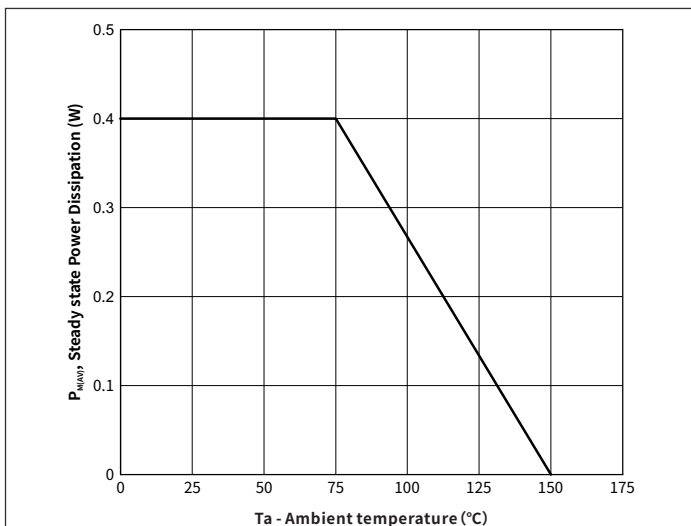


Fig. 5 Steady State Power Dissipation Derating Curve

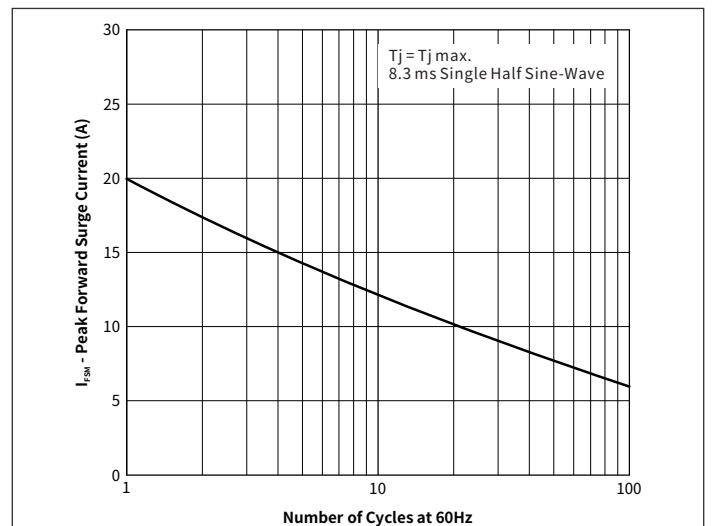
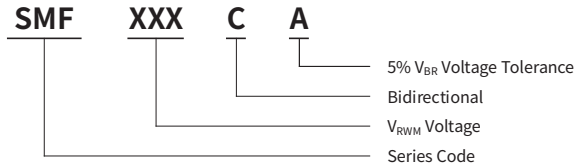


Fig. 6 Maximum Non-Repetitive Forward Surge Current Uni-Directional Only

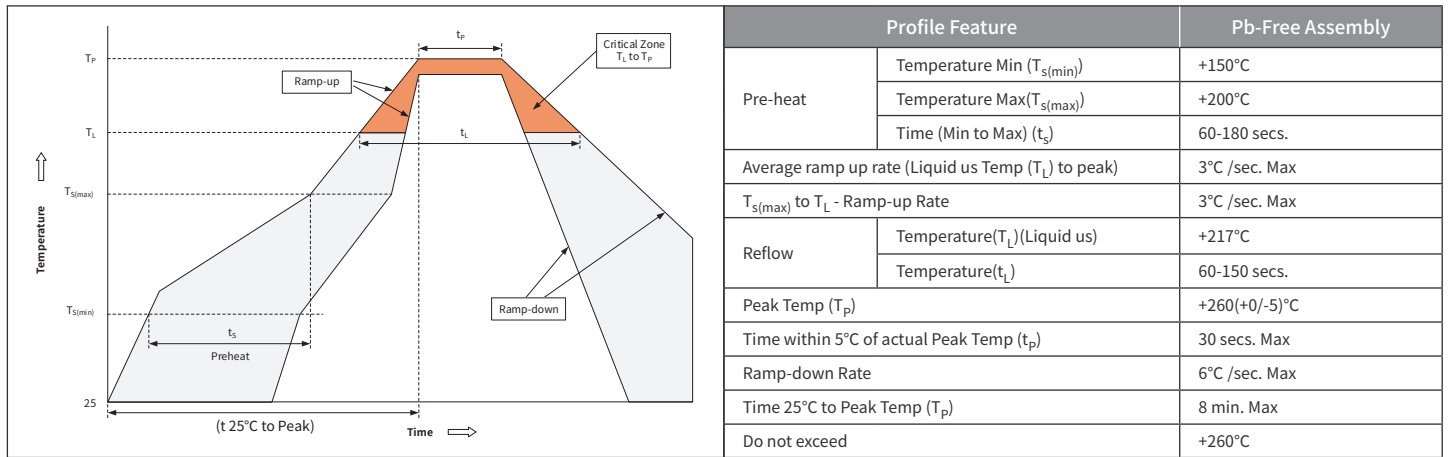
### Ordering Information

PACKAGE	PACKAGE CODE	UNIT WEIGHT(g)	REEL(pcs)	BOX(pcs)	CARTON(pcs)	DELIVERY MODE
SOD-123FL	R1	0.0169	3000	15000	150000	7"

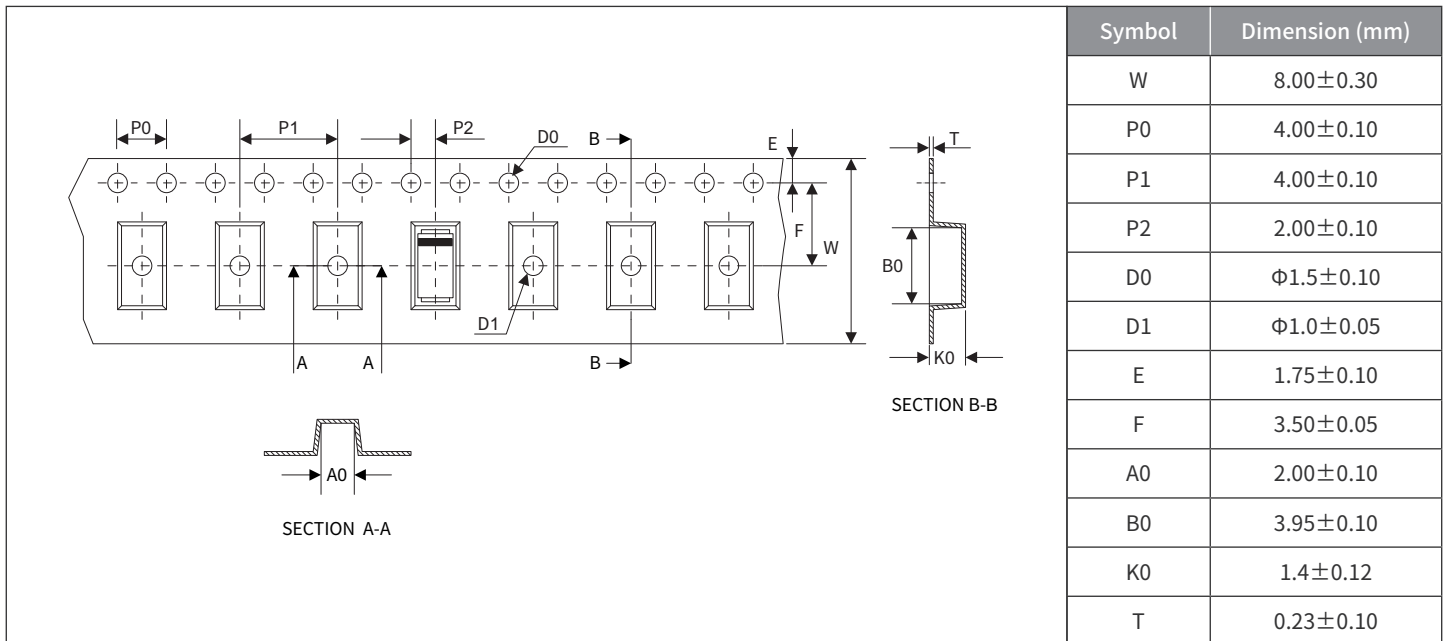
### Part Numbering



### Soldering Parameters



### Packaging (SOD-123FL)



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