

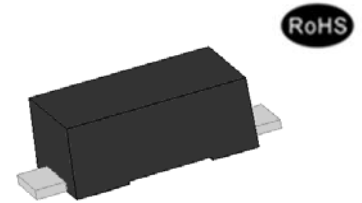


## SMFxxCAL Series 400W Transient Voltage Suppressor

Rev.1.6

### DESCRIPTION

TVS diodes can be used in a wide range of applications which like consumer electronic products, automotive industries, munitions, telecommunications, aerospace industries, and intelligent control systems.



SOD-123FL



Bi-directional

Symbol

### FEATURES

- ✧ Low profile package.
- ✧ Low inductance.
- ✧ Excellent clamping capability.
- ✧ 400W peak pulse power capability at 10/1000μs waveform.
- ✧ Typical  $I_R$  less than 1μA above 10V.
- ✧ Fast response time: typically less than 1.0ps from 0V to  $V_{BR}$  min.
- ✧ High temperature reflow soldering: 260°C/40s at terminals.
- ✧ Plastic package has underwriters laboratory flammability 94V-0.
- ✧ Meets MSL level 1, per J-STD-020, LF maximum peak of 260°C.
- ✧ Terminal: solder plated, solderable per J-STD-002.
- ✧ For surface mounted applications in order to optimize board space.
- ✧ IEC61000-4-2 (ESD) ±30kV (air), ±30kV (contact).

### ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , RH=45%-75%, unless otherwise noted)

Parameter	Symbol	Value	Unit
Storage and operating junction temperature range	$T_{STG}/T_J$	-55 to +150	°C
Peak pulse power dissipation at 10/1000μs waveform	$P_{PP}$	400	W
Typical thermal resistance junction to lead	$R_{\theta JL}$	100	°C/W
Typical thermal resistance junction to ambient	$R_{\theta JA}$	220	°C/W

MARKING



5CL : Device Marking Code

ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C)

Part Number	Marking	V <sub>R</sub>	I <sub>R</sub> @V <sub>R</sub>	V <sub>BR</sub> @I <sub>T</sub>		I <sub>T</sub>	V <sub>C</sub> @I <sub>PP</sub>	I <sub>PP</sub> <sup>Ⓞ</sup>
				min(V)	max(V)			
Bi-Polar	Bi	V	max(μA)	min(V)	max(V)	mA	max(V)	A
SMF5.0CAL	5CL	5.0	120	6.40	7.00	10	9.2	40.1
SMF6.0CAL	6CL	6.0	120	6.67	7.37	10	10.3	35.9
SMF6.5CAL	6VCL	6.5	80	7.22	7.98	10	11.2	33.1
SMF7.0CAL	7CL	7.0	50	7.78	8.60	10	12.0	30.9
SMF7.5CAL	7VCL	7.5	50	8.33	9.21	1	12.9	28.7
SMF8.0CAL	8CL	8.0	20	8.89	9.83	1	13.6	27.2
SMF9.0CAL	9CL	9.0	5	10.00	11.10	1	15.4	24.1
SMF10CAL	10CL	10.0	2	11.10	12.30	1	17.0	23.5
SMF11CAL	11CL	11.0	1	12.20	13.50	1	18.2	22.0
SMF12CAL	12CL	12.0	1	13.30	14.70	1	19.9	20.1
SMF13CAL	13CL	13.0	1	14.40	15.90	1	21.5	18.6
SMF14CAL	14CL	14.0	1	15.60	17.20	1	23.2	17.2
SMF15CAL	15CL	15.0	1	16.70	18.50	1	24.4	16.4
SMF16CAL	16CL	16.0	1	17.80	19.70	1	26.0	15.4
SMF17CAL	17CL	17.0	1	18.90	20.90	1	27.6	14.5
SMF18CAL	18CL	18.0	1	20.00	22.10	1	29.2	13.7
SMF20CAL	20CL	20.0	1	22.20	24.50	1	32.4	12.3
SMF22CAL	22CL	22.0	1	24.40	26.90	1	35.5	11.3
SMF24CAL	24CL	24.0	1	26.70	29.50	1	38.9	10.3
SMF26CAL	26CL	26.0	1	28.90	31.90	1	42.1	9.5
SMF28CAL	28CL	28.0	1	31.10	34.40	1	45.4	8.8
SMF30CAL	30CL	30.0	1	33.30	36.80	1	48.4	8.3
SMF33CAL	33CL	33.0	1	36.70	40.60	1	53.3	7.5
SMF36CAL	36CL	36.0	1	40.00	44.20	1	58.1	6.9

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C, continued)

Part Number	Marking	V <sub>R</sub>	I <sub>R</sub> @V <sub>R</sub>	V <sub>BR</sub> @I <sub>T</sub>		I <sub>T</sub>	V <sub>C</sub> @I <sub>PP</sub>	I <sub>PP</sub> <sup>①</sup>
				min(V)	max(V)			
Bi-Polar	Bi	V	max(μA)	min(V)	max(V)	mA	max(V)	A
SMF40CAL	40CL	40.0	1	44.40	49.10	1	64.5	6.2
SMF43CAL	43CL	43.0	1	47.80	52.80	1	69.4	5.8
SMF45CAL	45CL	45.0	1	50.00	55.30	1	72.7	5.5
SMF48CAL	48CL	48.0	1	53.30	58.90	1	77.4	5.2

① Surge waveform: 10/1000μs

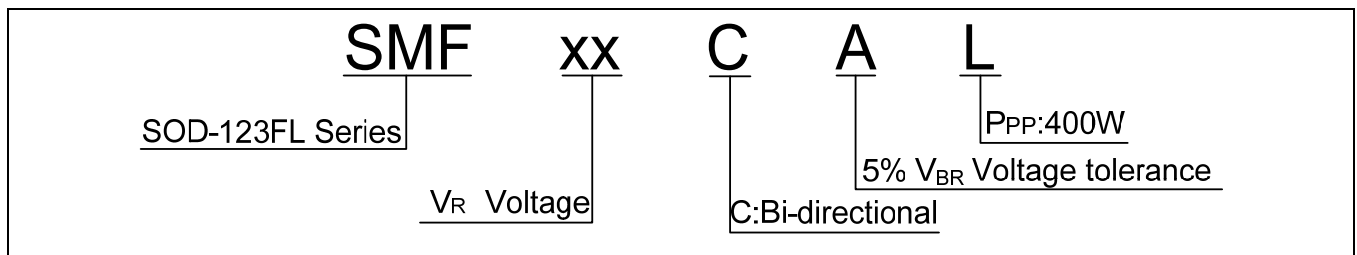
V<sub>R</sub>: Stand-off voltage -- maximum voltage that can be applied

V<sub>BR</sub>: Breakdown voltage

V<sub>C</sub>: Clamping voltage -- peak voltage measured across the suppressor at a specified I<sub>PP</sub>

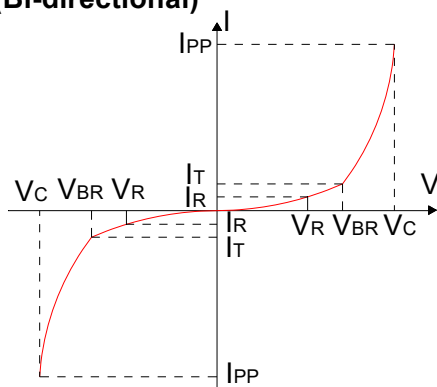
I<sub>R</sub>: Reverse leakage current

## ORDERING INFORMATION



## RATINGS AND V-I CHARACTERISTICS CURVES (T<sub>A</sub>=25°C, unless otherwise noted)

**FIG.1: V- I curve characteristics (Bi-directional)**



**FIG.2: Pulse waveform**

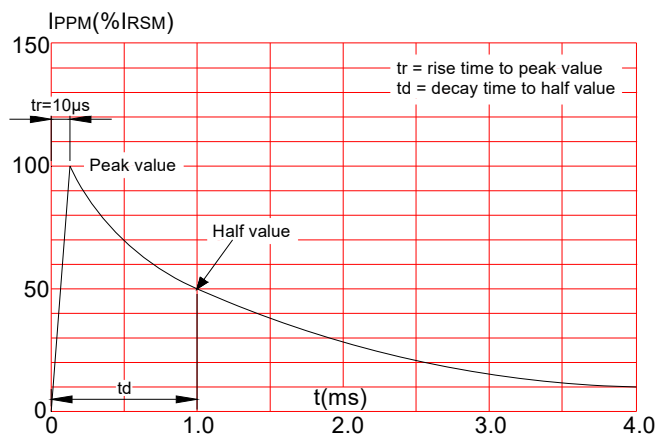
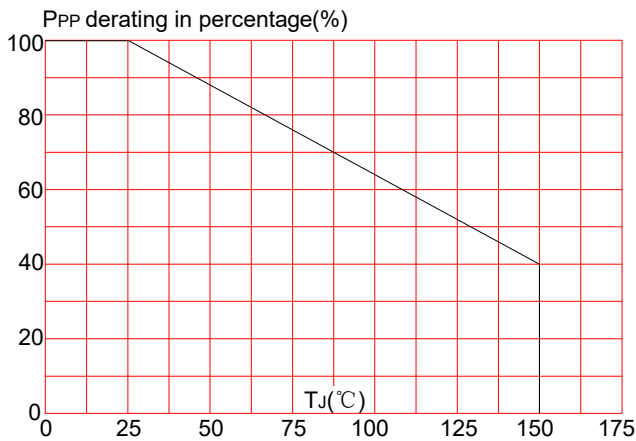
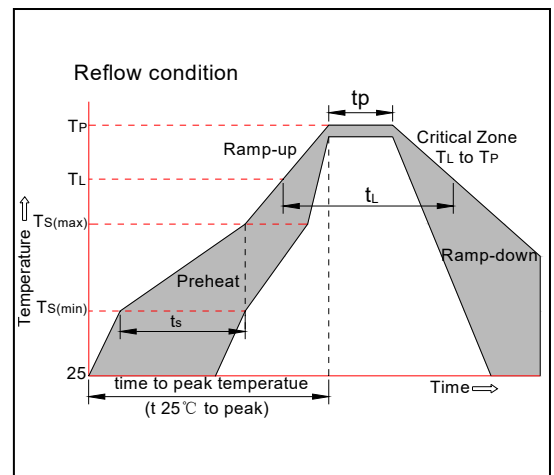


FIG.3: Pulse derating curve

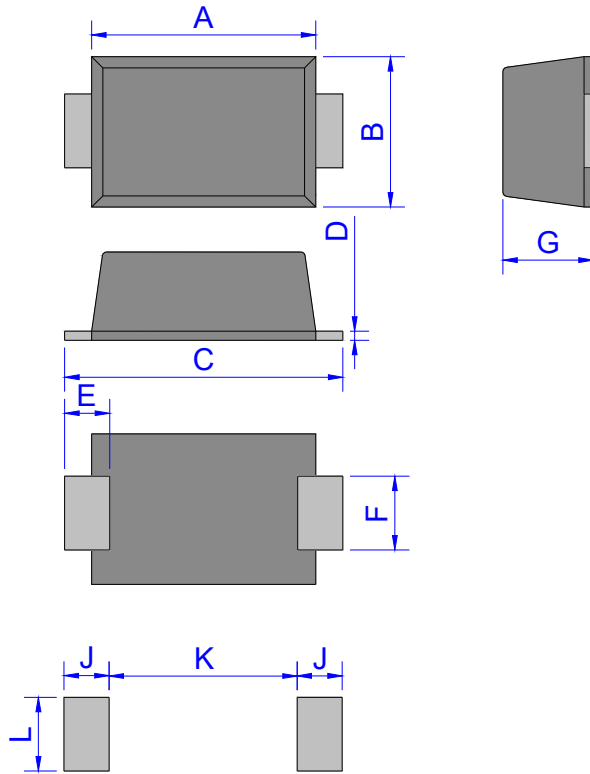


SOLDERING PARAMETERS

Reflow Condition		Pb-Free assembly (see figure at right)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max ( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature ( $T_L$ ) (Liquidus)	+217°C
	-Temperature ( $t_L$ )	60-150 secs.
Peak Temp ( $T_P$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		20-40secs.
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_P$ )		8 min. Max
Do not exceed		+260°C



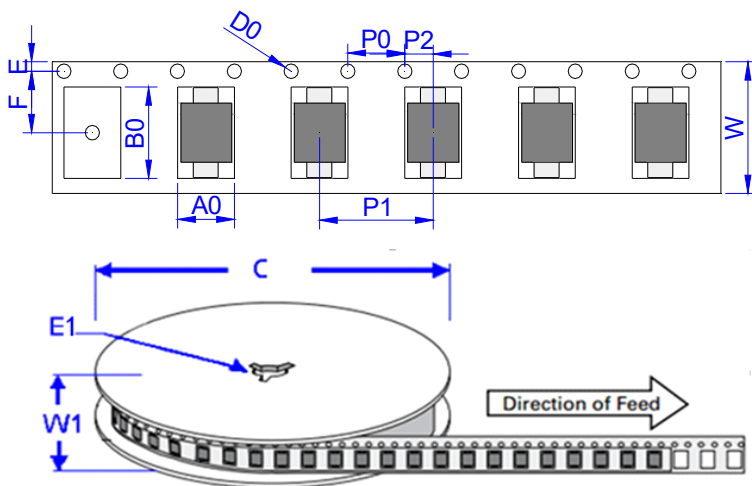
PACKAGE MECHANICAL DATA



SOD-123FL

Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.60	3.00	0.102	0.118
B	1.60	2.00	0.063	0.079
C	3.45	3.95	0.136	0.156
D	0.10	0.25	0.004	0.01
E	0.3	0.9	0.012	0.035
F	0.80	1.20	0.031	0.047
G	0.95	1.35	0.037	0.053
J	1.30		0.051	
K		1.70		0.067
L	1.30		0.051	

TAPE AND REEL SPECIFICATION-SOD-123FL



Ref.	Dimensions	
	Millimeters	Inches
A0	1.95 ± 0.3	0.077± 0.012
B0	3.95 ± 0.3	0.156 ± 0.012
C	178	7.0
D0	1.55 ± 0.1	0.061 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3 ± 0.3	0.524± 0.012
F	3.50 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.0± 0.2	0.315 ± 0.008
W1	11.5 ± 1.0	0.453 ± 0.039

PART No.	UNIT WEIGHT (g/PCS) typ.	REEL (PCS)	PER CARTON (PCS)	DESCRIPTION
SMFxxCAL	0.0144	3,000	150,000	7 inch reel pack


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