

# Surface Mount Transient Voltage Suppressors (TVS)

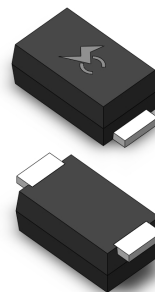
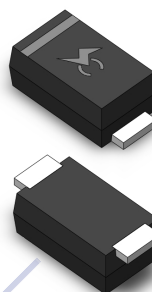
**4.0SMF Series**
**5.0 to 85 V**
**400W**
**SOD-123FL**

## Features

- ◆ For surface mounted applications
- ◆ Low-profile package
- ◆ Ideal for automated placement
- ◆ Available in Unidirectional and Bidirectional
- ◆ 400W peak pulse power capability with a 10/1000μs waveform
- ◆ Low incremental surge resistance, excellent clamping capability
- ◆ Very fast response time
- ◆ High temperature soldering guaranteed: 260°C/10s at terminals
- ◆ Meets MSL level 1
- ◆ Component in accordance to RoHS

Uni-directional

Bi-directional



SOD-123FL

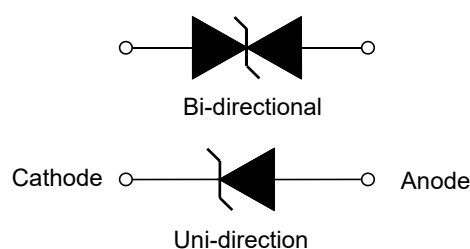
## Applications

Use in sensitive electronics protection against voltage transients induced by inductive load switching and lighting on ICs, MOSFET, signal lines of sensor units for consumer, computer, industrial, telecommunication.

## Mechanical Data

- ◆ Package: SOD-123FL
- ◆ Molding compound meets UL94V-0 flammability rating, RoHS-compliant, halogen-free
- ◆ Terminals: Tin plated leads, solderable per J-STD-002 and JESD22-B102
- ◆ Polarity: For uni-directional types the band denotes cathode end, no marking on bi-directional types

## Functional Diagram



## Maximum Ratings (T<sub>A</sub>=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Peak Power Dissipation with a 10/1000μs waveform (Note 1), (Note 2) (Fig.1)		P <sub>PPM</sub>	400	W
Peak Pulse Current with a 10/1000μs waveform (Note1)		I <sub>PPM</sub>	See Next Table	A
Power Dissipation on Infinite Heat Sink at T <sub>L</sub> =75°C		P <sub>D</sub>	0.8	W
Peak Forward Surge Current, 8.3ms Single Half Sine-Wave Unidirectional Only (Note 3)		I <sub>FSM</sub>	30	A
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C
Thermal Resistance	Between junction and lead	R <sub>θJL</sub>	26	°C/W
	Between junction and Ambient	R <sub>θJA</sub>	300	°C/W
	Between junction and Curve	R <sub>θJC</sub>	40	°C/W

### Notes:

- (1). Non-repetitive current pulse, per Fig. 2 and derated above T<sub>A</sub>=25°C per Fig. 3.
- (2). T<sub>L</sub>=30°C unless otherwise noted, V<sub>F</sub> ≤1.25V@200mA.
- (3). Measured on 8.3 ms single half sine-wave or equivalent square wave, duty cycle = 4 pulses per minute maximum.

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

Part Number		Marking		Reverse Stand-Off Voltage $V_{RWM}$ (V)	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current $I_T$ (mA) (1)	Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (V)	Maximum Peak Pulse Current $I_{PP}$ (A) (2)	Maximum Reverse Leakage $I_R$ @ $V_{RWM}$ ( $\mu\text{A}$ )
Uni	Bi	Uni	Bi		MIN	MAX				
4.0SMF5.0A	4.0SMF5.0CA	AE	5CL	5.0	6.40	7.07	10	9.2	43.38	800
4.0SMF6.0A	4.0SMF6.0CA	AG	6CL	6.0	6.67	7.37	10	10.3	38.83	800
4.0SMF6.5A	4.0SMF6.5CA	AK	6VCL	6.5	7.22	7.98	10	11.2	35.71	500
4.0SMF7.0A	4.0SMF7.0CA	AM	7CL	7.0	7.78	8.60	10	12.0	33.33	200
4.0SMF7.5A	4.0SMF7.5CA	AP	7VCL	7.5	8.33	9.21	1	12.9	31.01	100
4.0SMF8.0A	4.0SMF8.0CA	AR	8CL	8.0	8.89	9.83	1	13.6	29.41	50
4.0SMF8.5A	4.0SMF8.5CA	AT	8VCL	8.5	9.44	10.40	1	14.4	27.78	10
4.0SMF9.0A	4.0SMF9.0CA	AV	9CL	9.0	10.00	11.10	1	15.4	25.97	5
4.0SMF10A	4.0SMF10CA	AX	10CL	10.0	11.10	12.30	1	17.0	23.52	2.5
4.0SMF11A	4.0SMF11CA	AZ	11CL	11.0	12.20	13.50	1	18.2	21.98	2.5
4.0SMF12A	4.0SMF12CA	BE	12CL	12.0	13.30	14.70	1	19.9	20.1	2.5
4.0SMF13A	4.0SMF13CA	BG	13CL	13.0	14.40	15.90	1	20.0	18.6	1
4.0SMF14A	4.0SMF14CA	BK	14CL	14.0	15.60	17.20	1	23.2	17.24	1
4.0SMF15A	4.0SMF15CA	BM	15CL	15.0	16.70	18.50	1	24.4	16.4	1
4.0SMF16A	4.0SMF16CA	BP	16CL	16.0	17.80	19.70	1	26.0	15.38	1
4.0SMF17A	4.0SMF17CA	BR	17CL	17.0	18.90	20.90	1	27.6	14.5	1
4.0SMF18A	4.0SMF18CA	BT	18CL	18.0	20.00	22.10	1	29.2	13.7	1
4.0SMF19A	4.0SMF19CA	BB	19CL	19.0	21.10	23.30	1	30.6	13.08	1
4.0SMF20A	4.0SMF20CA	BV	20CL	20.0	22.20	24.50	1	32.4	12.34	1
4.0SMF22A	4.0SMF22CA	BX	22CL	22.0	24.40	26.90	1	35.5	11.26	1
4.0SMF24A	4.0SMF24CA	BZ	24CL	24.0	26.70	29.50	1	38.9	10.28	1
4.0SMF26A	4.0SMF26CA	CE	26CL	26.0	28.90	31.90	1	42.1	9.5	1
4.0SMF28A	4.0SMF28CA	CG	28CL	28.0	31.10	34.40	1	45.4	8.82	1
4.0SMF30A	4.0SMF30CA	CK	30CL	30.0	33.30	36.80	1	48.4	8.26	1
4.0SMF33A	4.0SMF33CA	CM	33CL	33.0	36.70	40.60	1	53.3	7.5	1
4.0SMF36A	4.0SMF36CA	CP	36CL	36.0	40.00	44.20	1	58.1	6.88	1
4.0SMF40A	4.0SMF40CA	CR	40CL	40.0	44.40	49.10	1	64.5	6.2	1
4.0SMF43A	4.0SMF43CA	CT	43CL	43.0	47.80	52.80	1	69.4	5.76	1
4.0SMF45A	4.0SMF45CA	CV	45CL	45.0	50.00	55.30	1	72.7	5.5	1
4.0SMF48A	4.0SMF48CA	CX	48CL	48.0	53.30	58.90	1	77.4	5.16	1

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

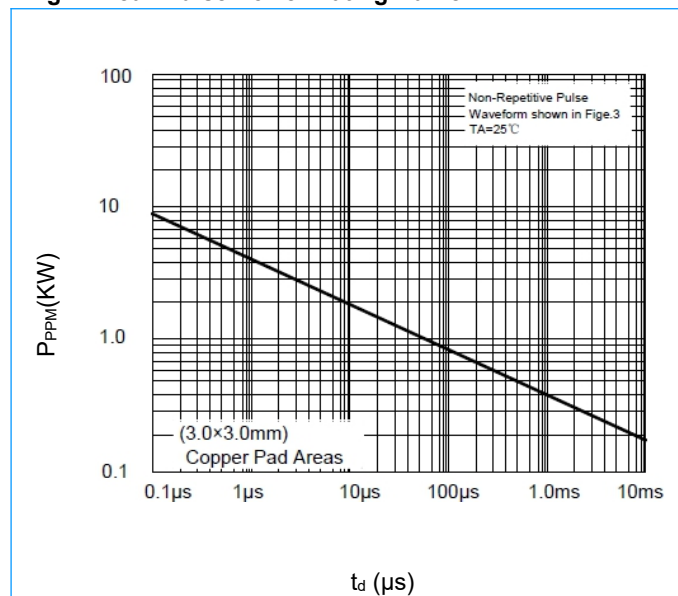
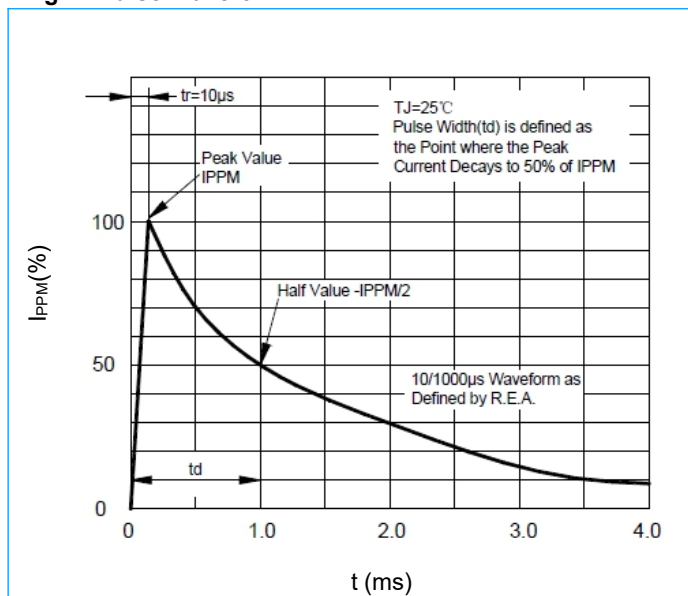
Part Number		Marking		Reverse Stand-Off Voltage $V_{RWM}$ (V)	Breakdown Voltage $V_{BR}$ (V) @ $I_T$		Test Current $I_T$ (mA) (1)	Maximum Clamping Voltage $V_C$ @ $I_{PP}$ (V)	Maximum Peak Pulse Current $I_{PP}$ (A) (2)	Maximum Reverse Leakage $I_R$ @ $V_{RWM}$ ( $\mu\text{A}$ )
Uni	Bi	Uni	Bi		MIN	MAX				
4.0SMF51A	4.0SMF51CA	CZ	51CL	51.0	56.70	62.70	1	82.4	4.86	1
4.0SMF58A	4.0SMF58CA	DE	58CL	58.0	64.40	71.20	1	93.6	4.28	1
4.0SMF60A	4.0SMF60CA	DG	60CL	60.0	66.70	73.70	1	96.8	4.14	1
4.0SMF64A	4.0SMF64CA	DM	64CL	64.0	71.10	78.60	1	103.0	3.88	1
4.0SMF70A	4.0SMF70CA	DP	70CL	70.0	77.80	86.00	1	113.0	3.54	1
4.0SMF75A	4.0SMF75CA	DR	75CL	75.0	83.30	92.10	1	121.0	3.3	1
4.0SMF78A	4.0SMF78CA	DT	78CL	78.0	86.70	95.80	1	126.0	3.18	1
4.0SMF85A	4.0SMF85CA	DV	85CL	85.0	94.40	104.00	1	137.0	2.92	1

**Notes:**

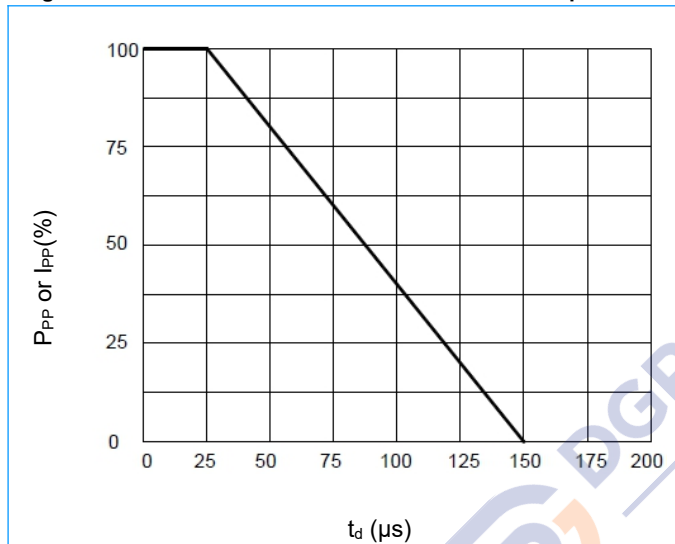
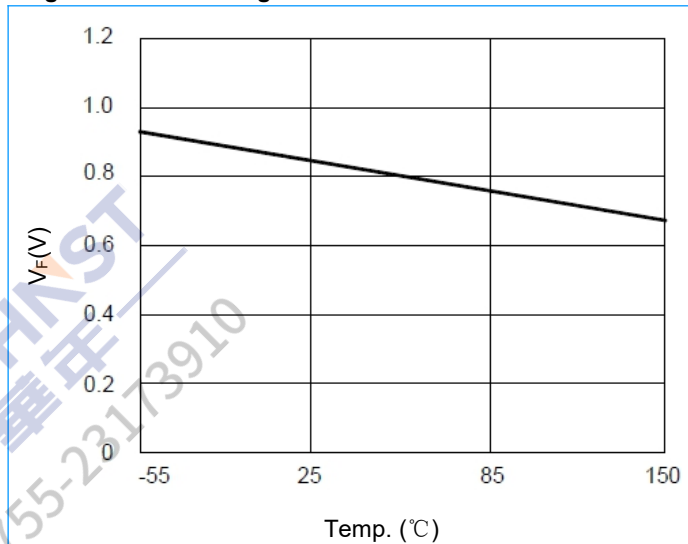
(1)  $t_p \leq 50\text{ms}$  Pulse test:  $t_p \leq 50\text{ms}$ .

(2) Surge current waveform per Fig. 2 and derated per Fig.3.

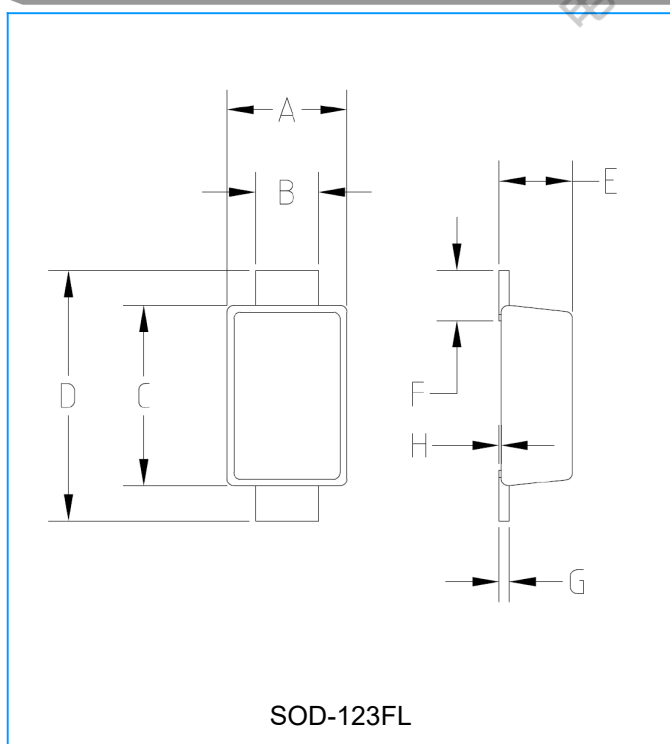
## Typical Characteristics Curves ( $T_A=25^\circ\text{C}$ unless otherwise noted)

**Fig. 1. Peak Pulse Power Rating Curve**

**Fig. 2. Pulse Waveform**


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**Typical Characteristics Curves ( $T_A=25^{\circ}\text{C}$  unless otherwise noted) (Continue)**
**Fig. 3. Pulse Power or Current vs. Initial Junction Temperature**

**Fig. 4. Forward Voltage Curve**


## Outline Dimensions



Symbol	Dimensions in Millimeters	
	Min	Max
<b>A</b>	1.60	1.90
<b>B</b>	0.85	1.05
<b>C</b>	2.55	2.85
<b>D</b>	3.60	3.90
<b>E</b>	0.93	1.33
<b>F</b>	0.40	0.90
<b>G</b>	0.10	0.25
<b>H</b>	0.02	0.05

## Surface Mount Transient Voltage Suppressors (TVS)

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### Packaging

Part Number	Component Package	Quantity
4.0SMF Series	SOD-123FL	3000 PCS / REEL

### Warning



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