SMF5.0AT1 Series, SZSMF5.0AT1 Series

200 W Transient Voltage Suppressor SOD-123 Flat Lead Package

The SMF5.0A Series is designed to protect voltage sensitive components from high voltage, high energy transients. Excellent clamping capability, high surge capability, low zener impedance and fast response time. Because of its small size, it is ideal for use in cellular phones, portable devices, business machines, power supplies and many other industrial/consumer applications.

Features

- Stand−off Voltage: 5 − 58 Volts
- Peak Power − 200 Watts @ 1 ms (SMF5.0A − SMF58A)
- Low Leakage
- Response Time is Typically < 1 ns
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- ESD Rating of Level 4 (8 kV Contact Discharge) per IEC61000−4−2
- EFT (Electrical Fast Transients) Rating of 40 A per IEC61000−4−4
- Low Profile − Maximum Height of 1.0 mm
- Small Footprint − Footprint Area of 8.45 mm^2
- Supplied in 8 mm Tape and Reel − 3,000 Units per Reel
- Cathode Indicated by Polarity Band
- Lead Orientation in Tape: Cathode Lead to Sprocket Holes
- AEC−Q101 Qualified and PPAP Capable
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- Pb−Free Packages are Available*

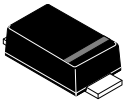
Mechanical Characteristics:
CASE: Void-free, transfer-molded, thermosetting plastic
Epoxy Meets UL 94 V−0
LEAD FINISH: 100% Matte Sn (Tin)
MOUNTING POSITION: Any
QUALIFIED MAX REFLOW TEMPERATURE: 260°C
Device Meets MSL 1 Requirements

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

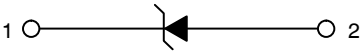
ON Semiconductor®

http://onsemi.com

PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSOR 5 − 58 VOLTS 200 WATT PEAK POWER

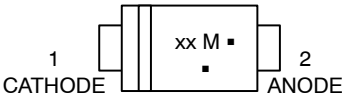


SOD−123FL
CASE 498
PLASTIC



1: CATHODE
2: ANODE

MARKING DIAGRAM



xx = Device Code (Refer to page 3)
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
SMFxxxAT1G	SOD−123FL (Pb−Free)	3,000 / Tape & Reel
SZSMFxxxAT3G	SOD−123FL (Pb−Free)	3,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the Electrical Characteristics table on page 3 of this data sheet.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Maximum P_{pk} Dissipation (PW−10/1000 μs) (Note 1) SMF5.0A − SMF58A	P_{pk}	200	W
Maximum P_{pk} Dissipation @ T_A = 25°C, (PW−8/20 μs) (Note 2)	P_{pk}	1000	W
DC Power Dissipation @ T_A = 25°C (Note 3) Derate above 25°C Thermal Resistance, Junction−to−Ambient (Note 3)	 P_D $R_{\theta JA}$	 385 4.0 325	 mW mW/°C °C/W
Thermal Resistance, Junction−to−Lead (Note 3)	$R_{\theta Jcathode}$	26	°C/W
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to +150	°C

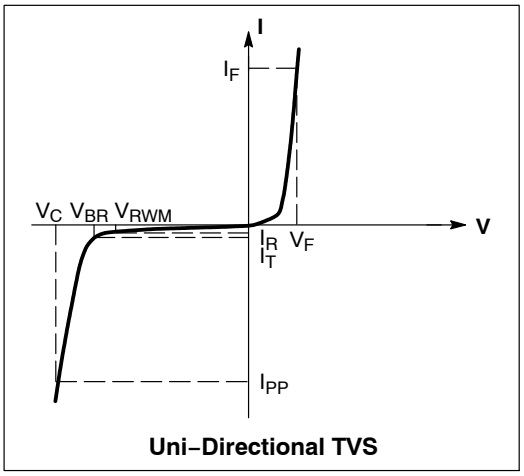
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Non−repetitive current pulse at T_A = 25°C, per waveform of Figure 2.
2. Non−repetitive current pulse at T_A = 25°C, per waveform of Figure 3.
3. Mounted with recommended minimum pad size, DC board FR−4.

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted, V_F = 3.5 V Max. @ I_F (Note 4) = 12 A)

Symbol	Parameter
I_{PP}	Maximum Reverse Peak Pulse Current
V_C	Clamping Voltage @ I_{PP}
V_{RWM}	Working Peak Reverse Voltage
I_R	Maximum Reverse Leakage Current @ V_{RWM}
V_{BR}	Breakdown Voltage @ I_T
I_T	Test Current
I_F	Forward Current
V_F	Forward Voltage @ I_F

4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.



Uni−Directional TVS

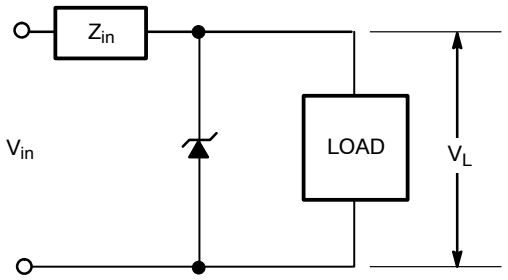
ELECTRICAL CHARACTERISTICS (T_L = 30°C unless otherwise noted, V_F = 1.25 Volts @ 200 mA)

Device*	Marking	V_{RWM} (V) (Note 5)	V_{BR} @ I_T (V) (Note 6) Min	Nom	Max	I_T (mA)	I_R @ V_{RWM} (μA)	$V_{C(Max)}$ (V)	$I_{PP(Max)}$ (A) (Note 7)
SMF5.0A, G	KE	5	6.4	6.7	7	10	400	9.2	21.7
SMF6.0A, G	KG	6	6.67	7.02	7.37	10	400	10.3	19.4
SMF6.5A, G	KK	6.5	7.22	7.6	7.98	10	250	11.2	17.9
SMF7.0A, G	KM	7	7.78	8.2	8.6	10	100	12	16.7
SMF7.5A, G	KP	7.5	8.33	8.77	9.21	1	50	12.9	15.5
SMF8.0A, G	KR	8	8.89	9.36	9.83	1	25	13.6	14.7
SMF8.5A, G	KT	8.5	9.44	9.92	10.4	1	10	14.4	13.9
SMF9.0A, G	KV	9	10	10.55	11.1	1	5	15.4	13.0
SMF10A, G	KX	10	11.1	11.7	12.3	1	2.5	17	11.8
SMF11A, G	KZ	11	12.2	12.85	13.5	1	2.5	18.2	11.0
SMF12A, G	LE	12	13.3	14	14.7	1	2.5	19.9	10.1
SMF13A, G	LG	13	14.4	15.15	15.9	1	1	21.5	9.3
SZ/SMF14A, G	LK	14	15.6	16.4	17.2	1	1	23.2	8.6
SMF15A, G	LM	15	16.7	17.6	18.5	1	1	24.4	8.2
SMF16A, G	LP	16	17.8	18.75	19.7	1	1	26	7.7
SMF17A, G	LR	17	18.9	19.9	20.9	1	1	27.6	7.2
SMF18A, G	LT	18	20	21	22.1	1	1	29.2	6.8
SZ/SMF20A, G	LV	20	22.2	23.35	24.5	1	1	32.4	6.2
SMF22A, G	LX	22	24.4	25.6	26.9	1	1	35.5	5.6
SMF24A, G	LZ	24	26.7	28.1	29.5	1	1	38.9	5.1
SMF26A, G	ME	26	28.9	30.4	31.9	1	1	42.1	4.8
SMF28A, G	MG	28	31.1	32.8	34.4	1	1	45.4	4.4
SMF30A, G	MK	30	33.3	35.1	36.8	1	1	48.4	4.1
SZ/SMF33A, G	MM	33	36.7	38.7	40.6	1	1	53.3	3.8
SMF36A, G	MP	36	40	42.1	44.2	1	1	58.1	3.4
SMF40A, G	MR	40	44.4	46.8	49.1	1	1	64.5	3.1
SMF43A, G	MT	43	47.8	50.3	52.8	1	1	69.4	2.9
SMF45A, G	MV	45	50	52.65	55.3	1	1	72.7	2.8
SMF48A, G	MX	48	53.3	56.1	58.9	1	1	77.4	2.6
SMF51A, G	MZ	51	56.7	59.7	62.7	1	1	82.4	2.4
SMF54A, G	NE	54	60	63.15	66.3	1	1	87.1	2.3
SMF58A, G	NG	58	64.4	67.8	71.2	1	1	93.6	2.1

5. A transient suppressor is normally selected according to the Working Peak Reverse Voltage (V_{RWM}) which should be equal to or greater than the DC or continuous peak operating voltage level.
6. V_{BR} measured at pulse test current I_T at ambient temperature of 25°C.
7. Surge current waveform per Figure 2 and derate per Figure 3.

*The “G” suffix indicates Pb−Free package available.

TYPICAL PROTECTION CIRCUIT



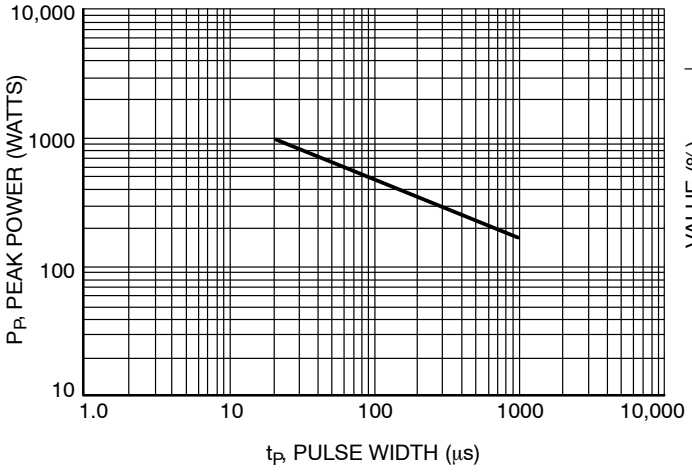


Figure 1. Pulse Rating Curve

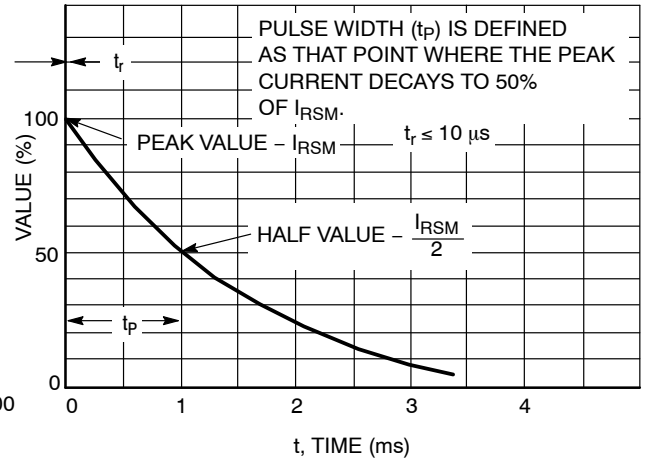


Figure 2. 10 X 1000 μs Pulse Waveform

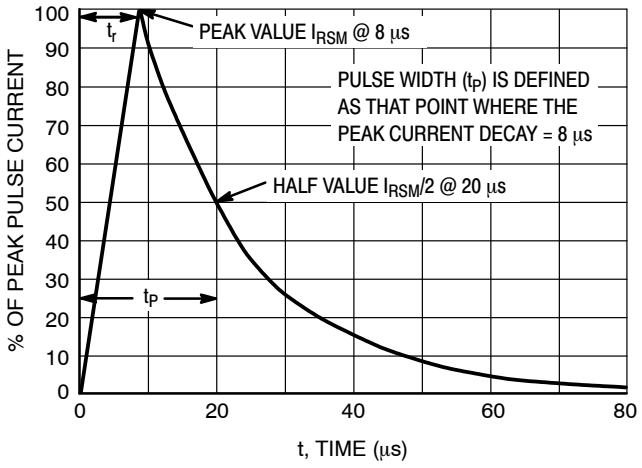


Figure 3. 8 X 20 μs Pulse Waveform

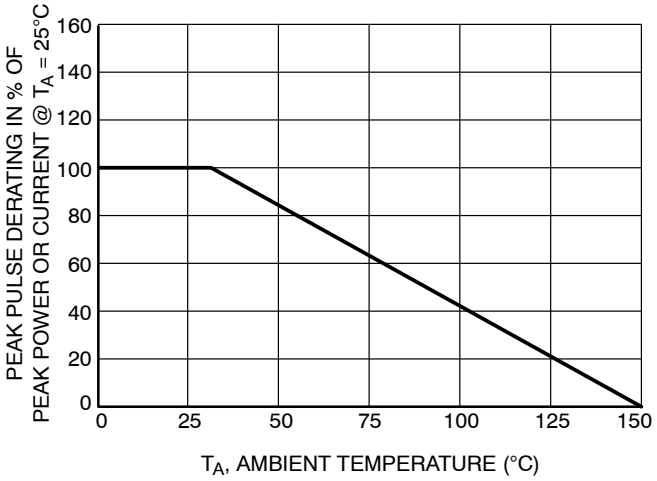


Figure 4. Pulse Derating Curve

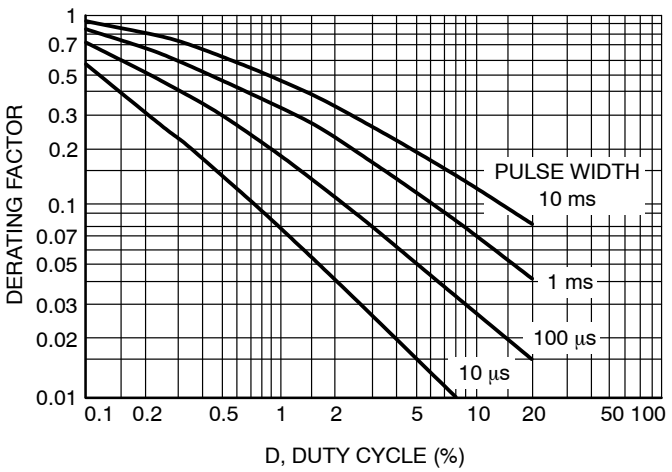


Figure 5. Typical Derating Factor for Duty Cycle

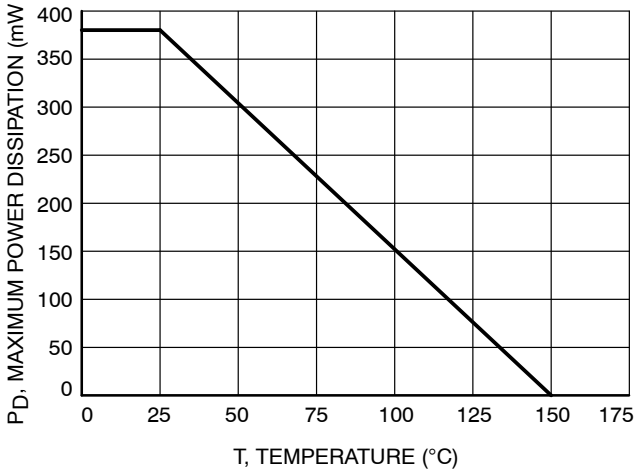


Figure 6. Steady State Power Derating

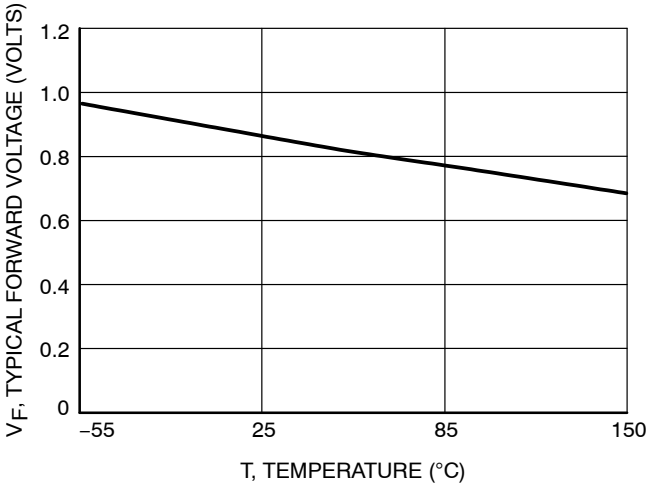


Figure 7. Forward Voltage

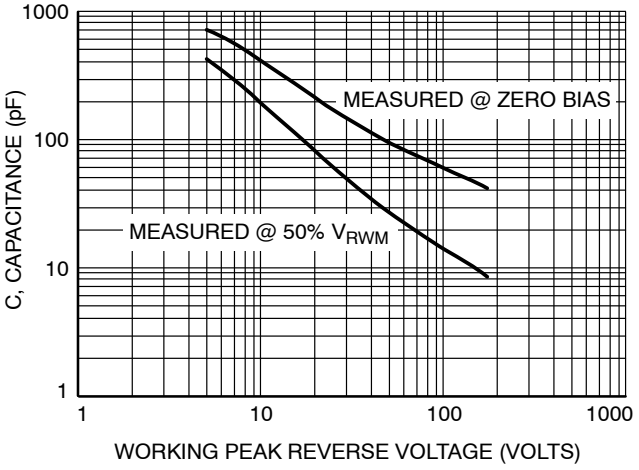
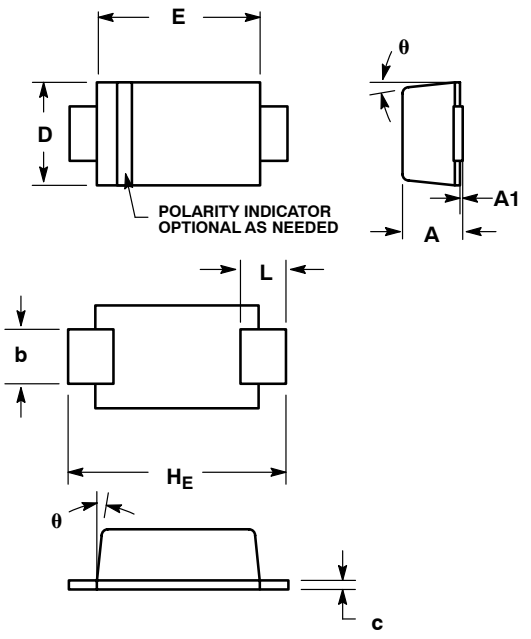


Figure 8. Capacitance versus Working Peak Reverse Voltage

PACKAGE DIMENSIONS

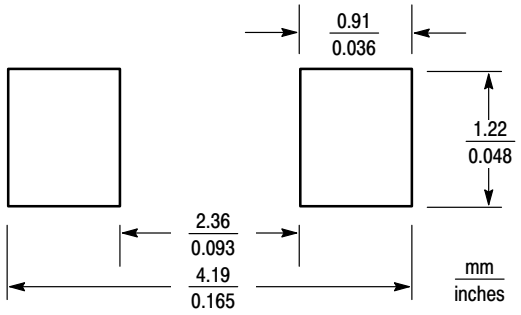
SOD−123FL
CASE 498−01
ISSUE B



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH.
4. DIMENSIONS D AND J ARE TO BE MEASURED ON FLAT SECTION OF THE LEAD: BETWEEN 0.10 AND 0.25 MM FROM THE LEAD TIP.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.90	0.95	1.00	0.035	0.037	0.039
A1	0.00	0.05	0.10	0.000	0.002	0.004
b	0.70	0.90	1.10	0.028	0.035	0.043
c	0.10	0.15	0.20	0.004	0.006	0.008
D	1.50	1.65	1.80	0.059	0.065	0.071
E	2.50	2.70	2.90	0.098	0.106	0.114
L	0.55	0.75	0.95	0.022	0.030	0.037
H_E	3.40	3.60	3.80	0.134	0.142	0.150
θ	0°	–	8°	0°	–	8°

SOLDERING FOOTPRINT*



*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
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Phone: 81−3−5817−1050

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SMF5.0AT1/D