

SMF5.0AT1G Series, SZSMF5.0AT1G Series



Expertise Applied | Answers Delivered

200 W Transient Voltage Suppressor SOD-123 Flat Lead Package

The SMF5.0AT1G 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 mm²
- 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
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

Mechanical Characteristics:

CASE: Void-free, transfer-molded, thermosetting plastic
Epoxy Meets UL 94 V-0

LEAD FINISH: 100% Matte Sn (Tin)

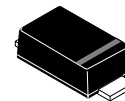
MOUNTING POSITION: Any

QUALIFIED MAX REFLOW TEMPERATURE: 260°C

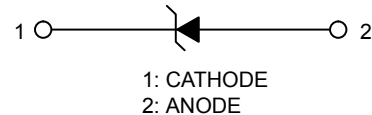
Device Meets MSL 1 Requirements

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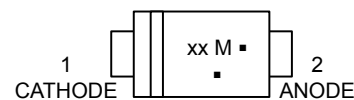
PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSOR 5 – 58 VOLTS 200 WATT PEAK POWER



SOD-123FL
CASE 498



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 |
| SZSMFxxxAT1G | SOD-123FL (Pb-Free) | 3,000 / Tape & Reel |

DEVICE MARKING INFORMATION

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

SMF5.0AT1G Series, SZSMF5.0AT1G Series

MAXIMUM RATINGS

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

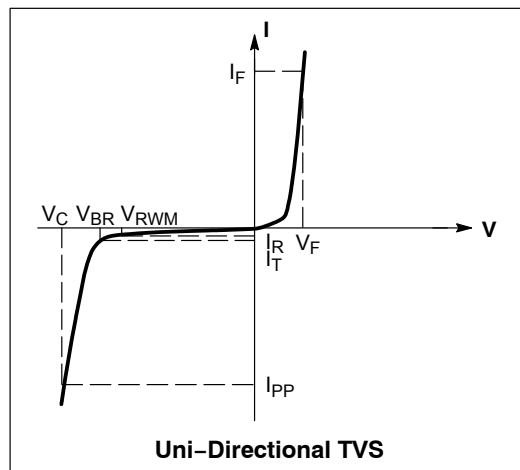
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Non-repetitive current pulse at $T_A = 25^\circ\text{C}$, per waveform of Figure 2.
2. Non-repetitive current pulse at $T_A = 25^\circ\text{C}$, per waveform of Figure 3.
3. Mounted with recommended minimum pad size, DC board FR-4.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 3.5\text{ V Max. @ } I_F$ (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.



SMF5.0AT1G Series, SZSMF5.0AT1G Series

ELECTRICAL CHARACTERISTICS ($T_L = 30^\circ\text{C}$ unless otherwise noted, $V_F = 1.25$ Volts @ 200 mA)

| Device* | Marking | V_{RWM} (V) | V_{BR} @ I_T (V) (Note 6) | | | I_T | I_R @ V_{RWM} | $V_C(\text{Max})$ | $I_{PP}(\text{Max})$ (A) |
|----------|---------|---------------|-------------------------------|-------|------|-------|-------------------|-------------------|--------------------------|
| | | (Note 5) | Min | Nom | Max | (mA) | (μA) | (V) | (Note 7) |
| SMF5.0AG | KE | 5 | 6.4 | 6.7 | 7 | 10 | 400 | 9.2 | 21.7 |
| SMF6.0AG | KG | 6 | 6.67 | 7.02 | 7.37 | 10 | 400 | 10.3 | 19.4 |
| SMF6.5AG | KK | 6.5 | 7.22 | 7.6 | 7.98 | 10 | 250 | 11.2 | 17.9 |
| SMF7.0AG | KM | 7 | 7.78 | 8.2 | 8.6 | 10 | 100 | 12 | 16.7 |
| SMF7.5AG | KP | 7.5 | 8.33 | 8.77 | 9.21 | 1 | 50 | 12.9 | 15.5 |
| SMF8.0AG | KR | 8 | 8.89 | 9.36 | 9.83 | 1 | 25 | 13.6 | 14.7 |
| SMF9.0AG | KV | 9 | 10 | 10.55 | 11.1 | 1 | 5 | 15.4 | 13.0 |
| SMF10AG | KX | 10 | 11.1 | 11.7 | 12.3 | 1 | 2.5 | 17 | 11.8 |
| SMF11AG | KZ | 11 | 12.2 | 12.85 | 13.5 | 1 | 2.5 | 18.2 | 11.0 |
| SMF12AG | LE | 12 | 13.3 | 14 | 14.7 | 1 | 2.5 | 19.9 | 10.1 |
| SMF13AG | LG | 13 | 14.4 | 15.15 | 15.9 | 1 | 1 | 21.5 | 9.3 |
| SMF14AG | LK | 14 | 15.6 | 16.4 | 17.2 | 1 | 1 | 23.2 | 8.6 |
| SMF15AG | LM | 15 | 16.7 | 17.6 | 18.5 | 1 | 1 | 24.4 | 8.2 |
| SMF18AG | LT | 18 | 20 | 21 | 22.1 | 1 | 1 | 29.2 | 6.8 |
| SMF20AG | LV | 20 | 22.2 | 23.35 | 24.5 | 1 | 1 | 32.4 | 6.2 |
| SMF22AG | LX | 22 | 24.4 | 25.6 | 26.9 | 1 | 1 | 35.5 | 5.6 |
| SMF24AG | LZ | 24 | 26.7 | 28.1 | 29.5 | 1 | 1 | 38.9 | 5.1 |
| SMF26AG | ME | 26 | 28.9 | 30.4 | 31.9 | 1 | 1 | 42.1 | 4.8 |
| SMF28AG | MG | 28 | 31.1 | 32.8 | 34.4 | 1 | 1 | 45.4 | 4.4 |
| SMF30AG | MK | 30 | 33.3 | 35.1 | 36.8 | 1 | 1 | 48.4 | 4.1 |
| SMF33AG | MM | 33 | 36.7 | 38.7 | 40.6 | 1 | 1 | 53.3 | 3.8 |
| SMF36AG | MP | 36 | 40 | 42.1 | 44.2 | 1 | 1 | 58.1 | 3.4 |
| SMF48AG | MX | 48 | 53.3 | 56.1 | 58.9 | 1 | 1 | 77.4 | 2.6 |
| SMF51AG | MZ | 51 | 56.7 | 59.7 | 62.7 | 1 | 1 | 82.4 | 2.4 |
| SMF58AG | 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.

*Include SZ-prefix devices where applicable.

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TYPICAL PROTECTION CIRCUIT

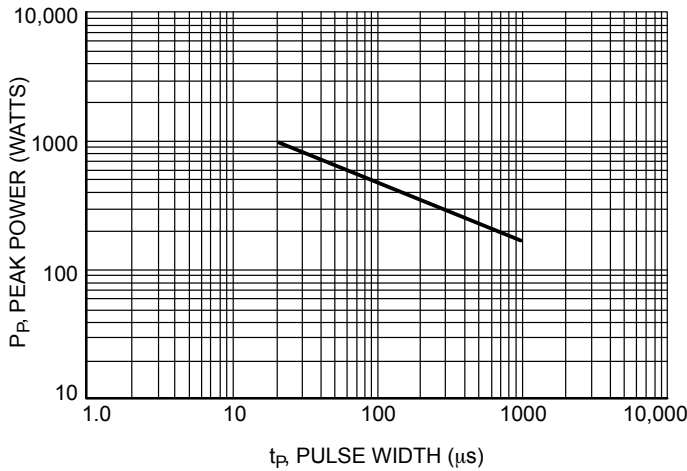
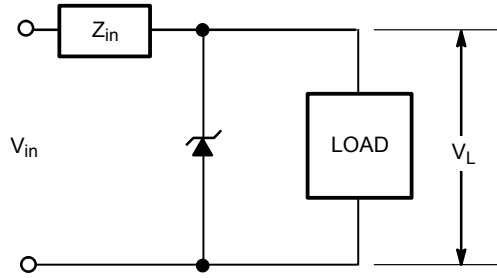


Figure 1. Pulse Rating Curve

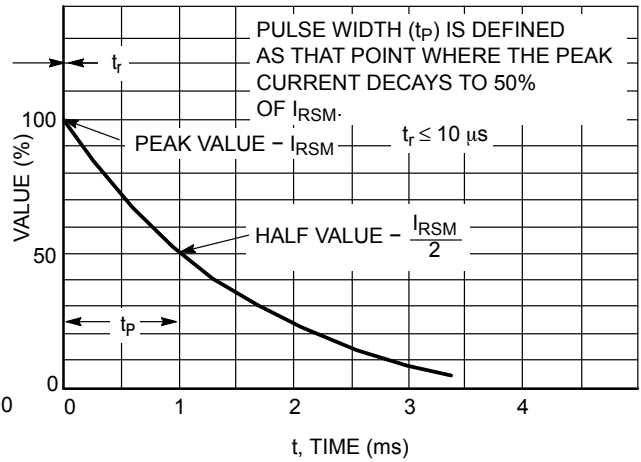


Figure 2. 10 X 1000 μ s Pulse Waveform

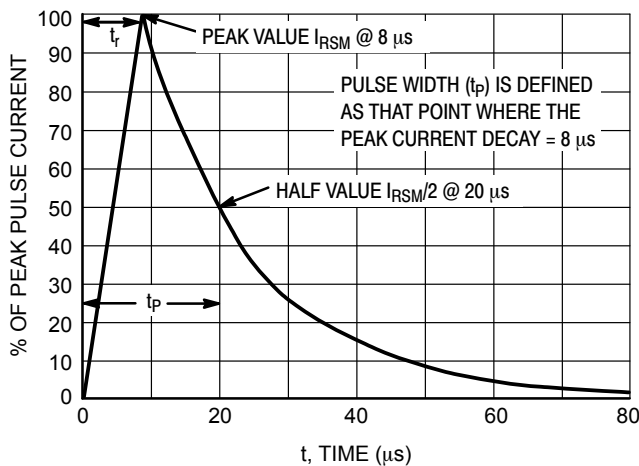


Figure 3. 8 X 20 μ s Pulse Waveform

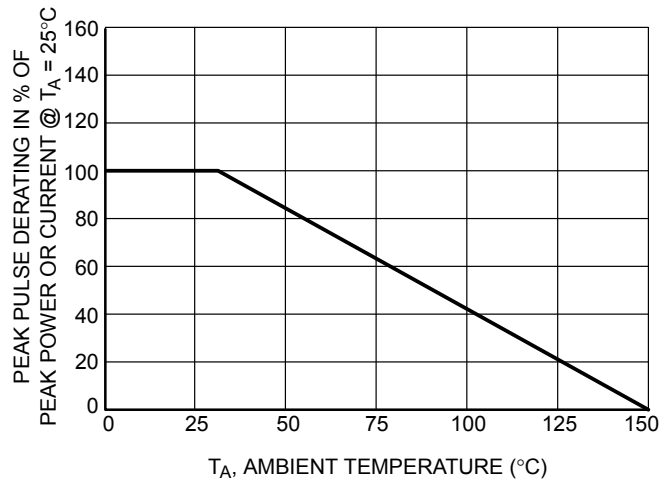


Figure 4. Pulse Derating Curve

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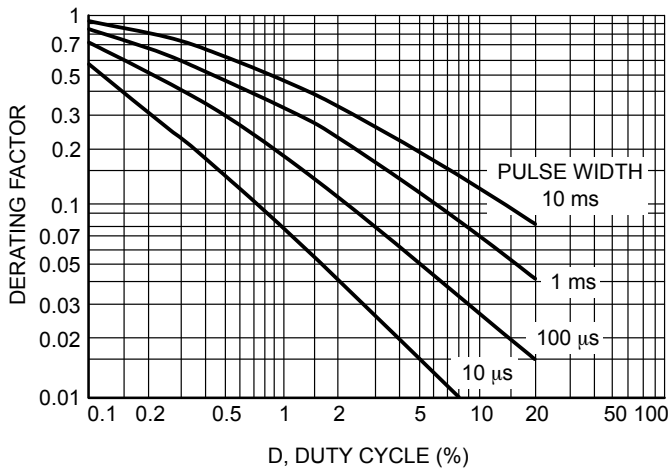


Figure 5. Typical Derating Factor for Duty Cycle

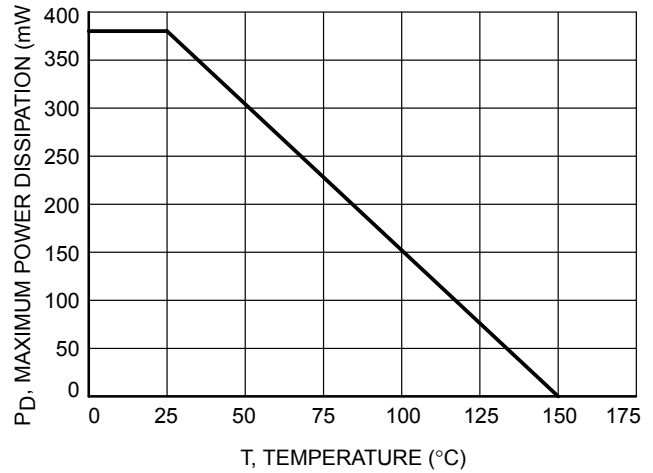


Figure 6. Steady State Power Derating

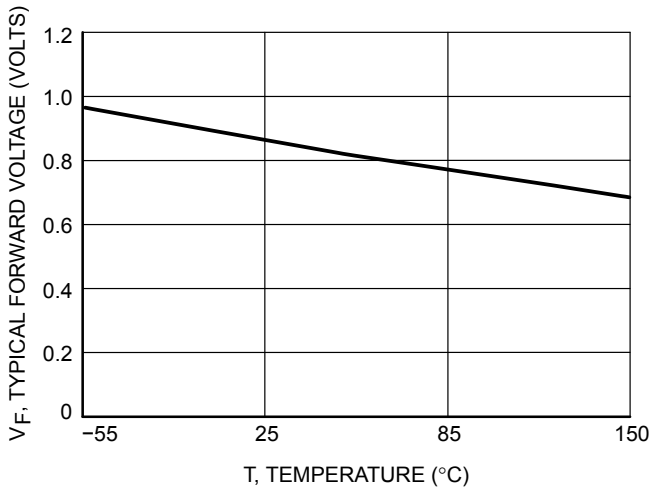


Figure 7. Forward Voltage

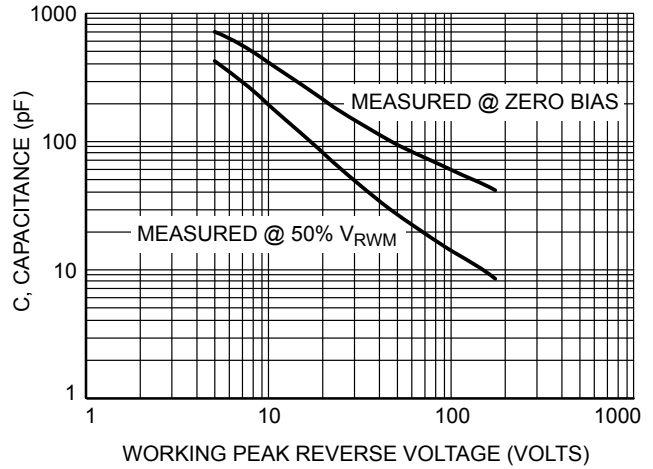
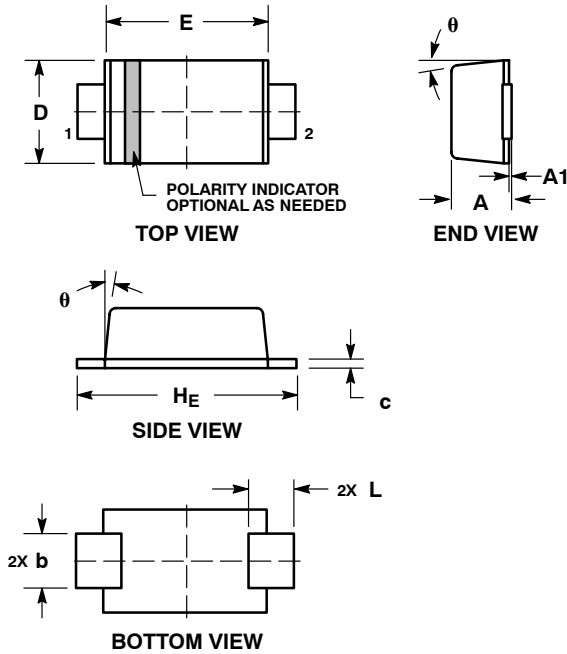


Figure 8. Capacitance versus Working Peak Reverse Voltage

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PACKAGE DIMENSIONS

SOD-123FL
CASE 498
ISSUE D

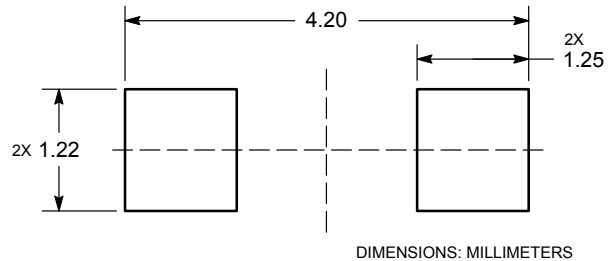


NOTES:

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.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.90 | 0.95 | 0.98 | 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 |
| HE | 3.40 | 3.60 | 3.80 | 0.134 | 0.142 | 0.150 |
| θ | 0° | - | 8° | 0° | - | 8° |

RECOMMENDED SOLDERING FOOTPRINT



Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, military, aerospace, medical, life-saving, life-sustaining or nuclear facility applications, devices intended for surgical implant into the body, or any other application in which the failure or lack of desired operation of the product may result in personal injury, death, or property damage) other than those expressly set forth in applicable Littelfuse product documentation. Warranties granted by Littelfuse shall be deemed void for products used for any purpose not expressly set forth in applicable Littelfuse documentation. Littelfuse shall not be liable for any claims or damages arising out of products used in applications not expressly intended by Littelfuse as set forth in applicable Littelfuse documentation. The sale and use of Littelfuse products is subject to Littelfuse Terms and Conditions of Sale, unless otherwise agreed by Littelfuse.

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