

1SMA5.0AT3G Series, SZ1SMA5.0AT3G Series

400 Watt Peak Power Zener Transient Voltage Suppressors

Unidirectional

The SMA series is designed to protect voltage sensitive components from high voltage, high energy transients. They have excellent clamping capability, high surge capability, low zener impedance and fast response time. The SMA series is supplied in ON Semiconductor's exclusive, cost-effective, highly reliable SURMETIC® package and is ideally suited for use in communication systems, automotive, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/consumer applications.

Features

- Working Peak Reverse Voltage Range – 5.0 V to 78 V
- Standard Zener Breakdown Voltage Range – 6.7 V to 91.25 V
- Peak Power – 400 W @ 1 ms
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Response Time is Typically < 1 ns
- Flat Handling Surface for Accurate Placement
- Package Design for Top Slide or Bottom Circuit Board Mounting
- Low Profile Package
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free Devices*

Mechanical Characteristics:

CASE: Void-free, transfer-molded plastic

FINISH: All external surfaces are corrosion resistant and leads are readily solderable

MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES: 260°C for 10 Seconds

POLARITY: Cathode indicated by molded polarity notch or polarity band

MOUNTING POSITION: Any



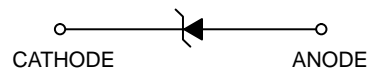
ON Semiconductor®

www.onsemi.com

PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSORS 5.0 – 78 V, 400 W PEAK POWER



SMA
CASE 403D
STYLE 1



MARKING DIAGRAM



- xx = Device Code (Refer to page 3)
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

ORDERING INFORMATION

| Device | Package | Shipping† |
|--------------|------------------|------------------------|
| 1SMAxxAT3G | SMA (Pb-Free) | 5,000 / Tape & Reel |
| SZ1SMAxxAT3G | SMA (Pb-Free) | 5,000 / 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.

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

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MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|-----------------|-------------|----------------------------|
| Peak Power Dissipation (Note 1) @ $T_L = 25^\circ\text{C}$, Pulse Width = 1 ms | P_{PK} | 400 | W |
| DC Power Dissipation @ $T_L = 75^\circ\text{C}$ Measured Zero Lead Length (Note 2) Derate Above 75°C | P_D | 1.5 | W |
| Thermal Resistance from Junction to Lead | $R_{\theta JL}$ | 20 | $\text{mW}/^\circ\text{C}$ |
| DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ Derate Above 25°C | P_D | 0.5 | W |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 4.0 | $\text{mW}/^\circ\text{C}$ |
| Forward Surge Current (Note 4) @ $T_A = 25^\circ\text{C}$ | I_{FSM} | 250 | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

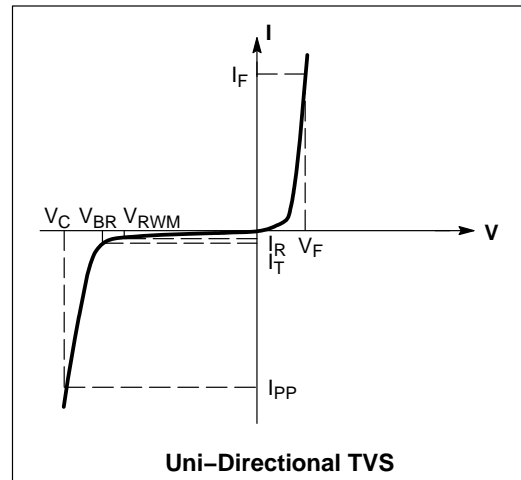
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- 10 X 1000 μs , non-repetitive.
- 1" square copper pad, FR-4 board.
- FR-4 board, using ON Semiconductor minimum recommended footprint, as shown in 403B case outline dimensions spec.
- 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 3.5\text{ V Max.}$ @ $I_F = 30\text{ A}$ for all types) (Note 5)

| 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 |

- 1/2 sine wave or equivalent, PW = 8.3 ms, non-repetitive duty cycle.



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ELECTRICAL CHARACTERISTICS

| Device* | Device Marking | V _{RWM} (Note 6) Volts | I _R @ V _{RWM} μA | Breakdown Voltage | | | V _C @ I _{PP} (Note 8) | | C Typ. (Note 9) pF | |
|-------------|----------------|---------------------------------------|--|----------------------------------|-------|------|--|----------------|--------------------------|-----------------|
| | | | | V _{BR} (Volts) (Note 7) | | | @ I _T | V _C | | I _{PP} |
| | | | | Min | Nom | Max | mA | Volts | | Amps |
| 1SMA5.0AT3G | QE | 5.0 | 400 | 6.4 | 6.7 | 7.0 | 10 | 9.2 | 43.5 | 2035 |
| 1SMA6.0AT3G | QG | 6.0 | 400 | 6.67 | 7.02 | 7.37 | 10 | 10.3 | 38.8 | 1730 |
| 1SMA6.5AT3G | QK | 6.5 | 250 | 7.22 | 7.6 | 7.98 | 10 | 11.2 | 35.7 | 1605 |
| 1SMA8.0AT3G | QR | 8.0 | 25 | 8.89 | 9.36 | 9.83 | 1 | 13.6 | 29.4 | 1035 |
| 1SMA8.5AT3G | QT | 8.5 | 5.0 | 9.44 | 9.92 | 10.4 | 1 | 14.4 | 27.8 | 1265 |
| 1SMA9.0AT3G | QV | 9.0 | 2.5 | 10 | 10.55 | 11.1 | 1 | 15.4 | 26.0 | 1200 |
| 1SMA10AT3G | QX | 10 | 2.5 | 11.1 | 11.7 | 12.3 | 1 | 17.0 | 23.5 | 1090 |
| 1SMA11AT3G | QZ | 11 | 2.5 | 12.2 | 12.85 | 13.5 | 1 | 18.2 | 22.0 | 1000 |
| 1SMA12AT3G | RE | 12 | 2.5 | 13.3 | 14.0 | 14.7 | 1 | 19.9 | 20.1 | 925 |
| 1SMA13AT3G | RG | 13 | 2.5 | 14.4 | 15.15 | 15.9 | 1 | 21.5 | 18.6 | 860 |
| 1SMA14AT3G | RH | 14 | 2.5 | 15.6 | 16.4 | 17.2 | 1 | 23.2 | 17.2 | 800 |
| 1SMA15AT3G | RM | 15 | 2.5 | 16.7 | 17.6 | 18.5 | 1 | 24.4 | 16.4 | 758 |
| 1SMA16AT3G | RP | 16 | 2.5 | 17.8 | 18.75 | 19.7 | 1 | 26.0 | 15.4 | 715 |
| 1SMA17AT3G | RR | 17 | 2.5 | 18.9 | 19.9 | 20.9 | 1 | 27.6 | 14.5 | 680 |
| 1SMA18AT3G | RT | 18 | 2.5 | 20 | 21.05 | 22.1 | 1 | 29.2 | 13.7 | 645 |
| 1SMA20AT3G | RV | 20 | 2.5 | 22.2 | 23.35 | 24.5 | 1 | 32.4 | 12.3 | 585 |
| 1SMA22AT3G | RX | 22 | 2.5 | 24.4 | 25.65 | 26.9 | 1 | 35.5 | 11.3 | 540 |
| 1SMA24AT3G | RZ | 24 | 2.5 | 26.7 | 28.1 | 29.5 | 1 | 38.9 | 10.3 | 500 |
| 1SMA26AT3G | SE | 26 | 2.5 | 28.9 | 30.4 | 31.9 | 1 | 42.1 | 9.5 | 460 |
| 1SMA28AT3G | SG | 28 | 2.5 | 31.1 | 32.75 | 34.4 | 1 | 45.4 | 8.8 | 430 |
| 1SMA30AT3G | SK | 30 | 2.5 | 33.3 | 35.05 | 36.8 | 1 | 48.4 | 8.3 | 405 |
| 1SMA33AT3G | SM | 33 | 2.5 | 36.7 | 38.65 | 40.6 | 1 | 53.3 | 7.5 | 375 |
| 1SMA36AT3G | SP | 36 | 2.5 | 40 | 42.1 | 44.2 | 1 | 58.1 | 6.9 | 345 |
| 1SMA40AT3G | SR | 40 | 2.5 | 44.4 | 46.75 | 49.1 | 1 | 64.5 | 6.2 | 315 |
| 1SMA43AT3G | ST | 43 | 2.5 | 47.8 | 50.3 | 52.8 | 1 | 69.4 | 5.8 | 295 |
| 1SMA45AT3G | SV | 45 | 2.5 | 50 | 52.65 | 55.3 | 1 | 72.2 | 5.5 | 280 |
| 1SMA48AT3G | SX | 48 | 2.5 | 53.3 | 56.1 | 58.9 | 1 | 77.4 | 5.2 | 265 |
| 1SMA54AT3G | TE | 54 | 2.5 | 60 | 63.15 | 66.3 | 1 | 87.1 | 4.6 | 240 |
| 1SMA58AT3G | TG | 58 | 2.5 | 64.4 | 67.8 | 71.5 | 1 | 93.6 | 4.3 | 225 |
| 1SMA70AT3G | TP | 70 | 2.5 | 77.8 | 81.9 | 86.0 | 1 | 113 | 3.5 | 190 |

6. 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.

7. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C.

8. Surge current waveform per Figure 2 and derate per Figure 3.

9. Bias voltage = 0 V, F = 1.0 MHz, T_J = 25°C.

†Please see 1SMA10CAT3 to 1SMA75CAT3 for Bidirectional devices.

* Include SZ-prefix devices where applicable.

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RATING AND TYPICAL CHARACTERISTIC CURVES

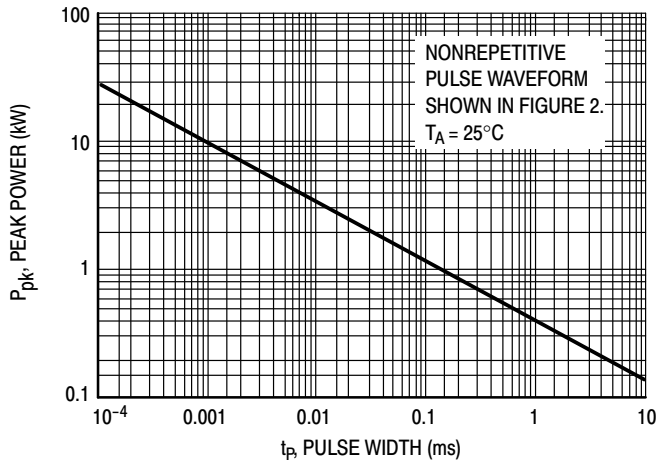


Figure 1. Pulse Rating Curve

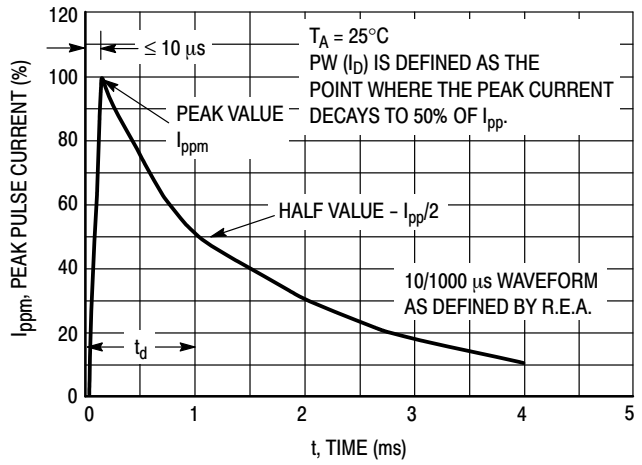


Figure 2. Pulse Waveform

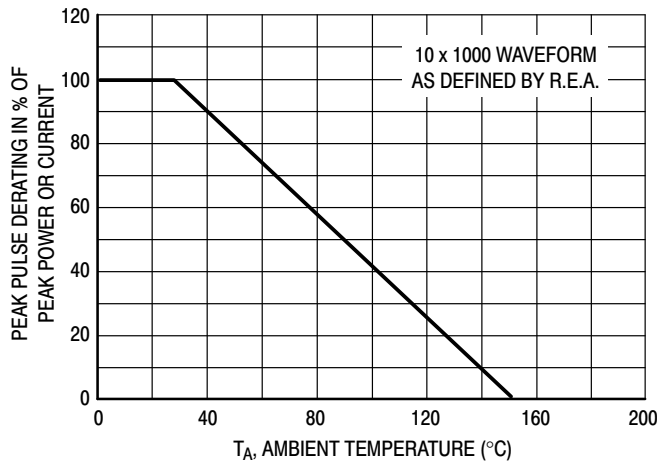


Figure 3. Pulse Derating Curve

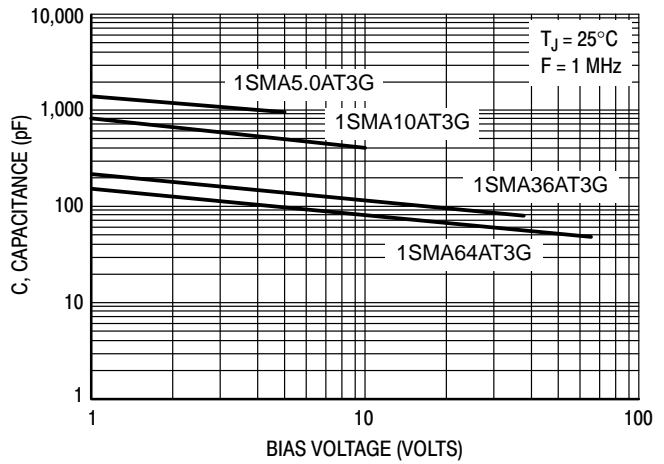


Figure 4. Typical Junction Capacitance vs. Bias Voltage

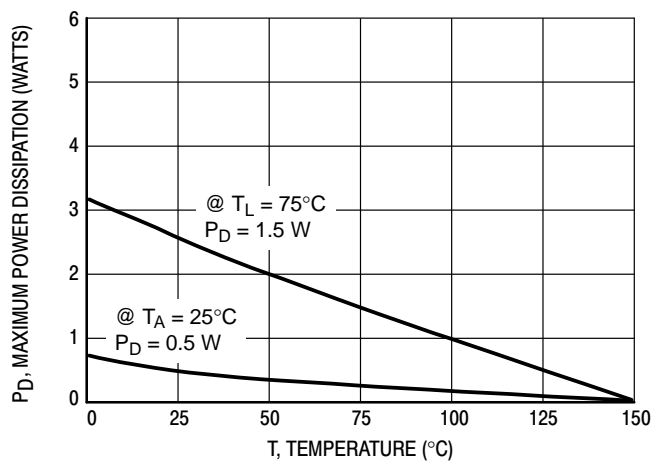
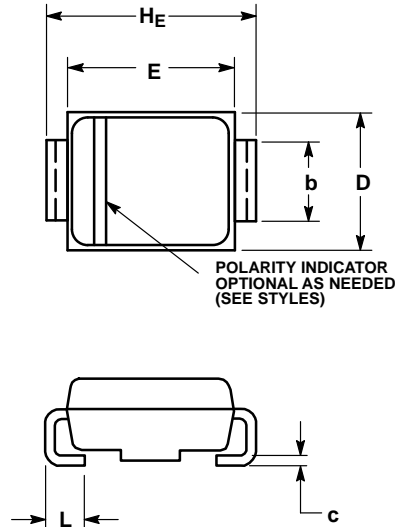


Figure 5. Steady State Power Derating

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PACKAGE DIMENSIONS

SMA CASE 403D ISSUE H

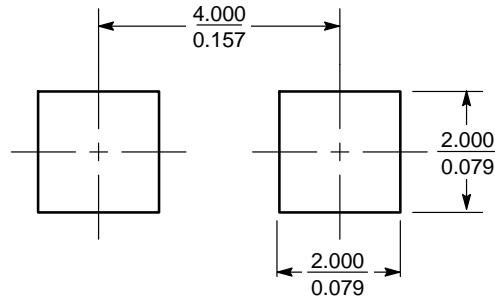


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION b SHALL BE MEASURED WITHIN DIMENSION L.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 1.97 | 2.10 | 2.20 | 0.078 | 0.083 | 0.087 |
| A1 | 0.05 | 0.10 | 0.20 | 0.002 | 0.004 | 0.008 |
| b | 1.27 | 1.45 | 1.63 | 0.050 | 0.057 | 0.064 |
| c | 0.15 | 0.28 | 0.41 | 0.006 | 0.011 | 0.016 |
| D | 2.29 | 2.60 | 2.92 | 0.090 | 0.103 | 0.115 |
| E | 4.06 | 4.32 | 4.57 | 0.160 | 0.170 | 0.180 |
| HE | 4.83 | 5.21 | 5.59 | 0.190 | 0.205 | 0.220 |
| L | 0.76 | 1.14 | 1.52 | 0.030 | 0.045 | 0.060 |

- STYLE 1:
PIN 1. CATHODE (POLARITY BAND)
2. ANODE

SOLDERING FOOTPRINT*



SCALE 8:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

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