

1SMA5.0AT3 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.

Specification 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 Watts @ 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

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

MAXIMUM RATINGS

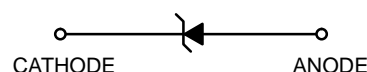
Please See the Table on the Following Page



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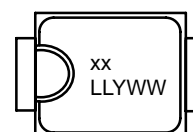
<http://onsemi.com>

**PLASTIC SURFACE MOUNT
ZENER OVERVOLTAGE
TRANSIENT SUPPRESSORS
5.0–78 VOLTS
400 WATTS PEAK POWER**



**SMA
CASE 403B
PLASTIC**

MARKING DIAGRAM



xx = Specific Device Code
(See Table on Page 3)
LL = Assembly Location
Y = Year
WW = Work Week

ORDERING INFORMATION

| Device † | Package | Shipping |
|-----------|---------|------------------|
| 1SMAxxAT3 | SMA | 5000/Tape & Reel |

*Please see 1SMA10CAT3 to 1SMA78CAT3 for Bidirectional devices.

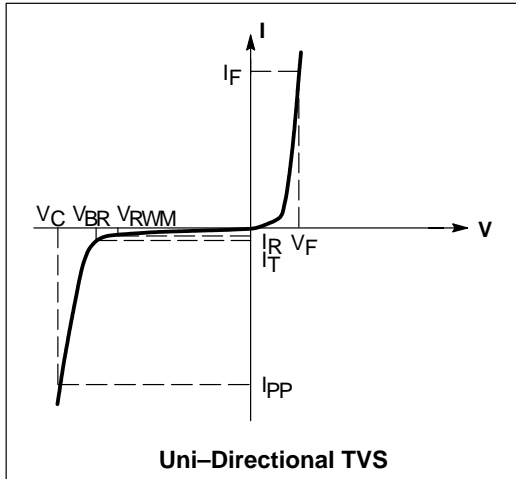
†The "T3" suffix refers to a 13 inch reel.

1SMA5.0AT3 Series

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 50 | mW/ $^\circ\text{C}$ $^\circ\text{C}/\text{W}$ |
| DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$ Derate Above 25°C | P_D | 0.5 4.0 | W mW/ $^\circ\text{C}$ |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 250 | $^\circ\text{C}/\text{W}$ |
| Forward Surge Current (Note 4) @ $T_A = 25^\circ\text{C}$ | I_{FSM} | 40 | A |
| Operating and Storage Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

- 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 | VRWM (Note 6) | IR @ VRWM | Breakdown Voltage | | | | VC @ IPP (Note 8) | |
|------------|----------------|------------------|-----------|----------------------|-------|------|------|-------------------|------|
| | | | | VBR (Volts) (Note 7) | | | @ IT | VC | IPP |
| | | Volts | μA | Min | Nom | Max | mA | Volts | Amps |
| 1SMA5.0AT3 | QE | 5.0 | 400 | 6.4 | 6.7 | 7.0 | 10 | 9.2 | 43.5 |
| 1SMA6.0AT3 | QG | 6.0 | 400 | 6.67 | 7.02 | 7.37 | 10 | 10.3 | 38.8 |
| 1SMA6.5AT3 | QK | 6.5 | 250 | 7.22 | 7.6 | 7.98 | 10 | 11.2 | 35.7 |
| 1SMA7.0AT3 | QM | 7.0 | 250 | 7.78 | 8.19 | 8.6 | 10 | 12.0 | 33.3 |
| 1SMA7.5AT3 | QP | 7.5 | 50 | 8.33 | 8.77 | 9.21 | 1 | 12.9 | 31.0 |
| 1SMA8.0AT3 | QR | 8.0 | 25 | 8.89 | 9.36 | 9.83 | 1 | 13.6 | 29.4 |
| 1SMA8.5AT3 | QT | 8.5 | 5.0 | 9.44 | 9.92 | 10.4 | 1 | 14.4 | 27.8 |
| 1SMA9.0AT3 | QV | 9.0 | 2.5 | 10 | 10.55 | 11.1 | 1 | 15.4 | 26.0 |
| 1SMA10AT3 | QX | 10 | 2.5 | 11.1 | 11.7 | 12.3 | 1 | 17.0 | 23.5 |
| 1SMA11AT3 | QZ | 11 | 2.5 | 12.2 | 12.85 | 13.5 | 1 | 18.2 | 22.0 |
| 1SMA12AT3 | RE | 12 | 2.5 | 13.3 | 14.0 | 14.7 | 1 | 19.9 | 20.1 |
| 1SMA13AT3 | RG | 13 | 2.5 | 14.4 | 15.15 | 15.9 | 1 | 21.5 | 18.6 |
| 1SMA14AT3 | RK | 14 | 2.5 | 15.6 | 16.4 | 17.2 | 1 | 23.2 | 17.2 |
| 1SMA15AT3 | RM | 15 | 2.5 | 16.7 | 17.6 | 18.5 | 1 | 24.4 | 16.4 |
| 1SMA16AT3 | RP | 16 | 2.5 | 17.8 | 18.75 | 19.7 | 1 | 26.0 | 15.4 |
| 1SMA17AT3 | RR | 17 | 2.5 | 18.9 | 19.9 | 20.9 | 1 | 27.6 | 14.5 |
| 1SMA18AT3 | RT | 18 | 2.5 | 20 | 21.05 | 22.1 | 1 | 29.2 | 13.7 |
| 1SMA20AT3 | RV | 20 | 2.5 | 22.2 | 23.35 | 24.5 | 1 | 32.4 | 12.3 |
| 1SMA22AT3 | RX | 22 | 2.5 | 24.4 | 25.65 | 26.9 | 1 | 35.5 | 11.3 |
| 1SMA24AT3 | RZ | 24 | 2.5 | 26.7 | 28.1 | 29.5 | 1 | 38.9 | 10.3 |
| 1SMA26AT3 | SE | 26 | 2.5 | 28.9 | 30.4 | 31.9 | 1 | 42.1 | 9.5 |
| 1SMA28AT3 | SG | 28 | 2.5 | 31.1 | 32.75 | 34.4 | 1 | 45.4 | 8.8 |
| 1SMA30AT3 | SK | 30 | 2.5 | 33.3 | 35.05 | 36.8 | 1 | 48.4 | 8.3 |
| 1SMA33AT3 | SM | 33 | 2.5 | 36.7 | 38.65 | 40.6 | 1 | 53.3 | 7.5 |
| 1SMA36AT3 | SP | 36 | 2.5 | 40 | 42.1 | 44.2 | 1 | 58.1 | 6.9 |
| 1SMA40AT3 | SR | 40 | 2.5 | 44.4 | 46.75 | 49.1 | 1 | 64.5 | 6.2 |
| 1SMA43AT3 | ST | 43 | 2.5 | 47.8 | 50.3 | 52.8 | 1 | 69.4 | 5.8 |
| 1SMA45AT3 | SV | 45 | 2.5 | 50 | 52.65 | 55.3 | 1 | 72.2 | 5.5 |
| 1SMA48AT3 | SX | 48 | 2.5 | 53.3 | 56.1 | 58.9 | 1 | 77.4 | 5.2 |
| 1SMA51AT3 | SZ | 51 | 2.5 | 56.7 | 59.7 | 62.7 | 1 | 82.4 | 4.9 |
| 1SMA54AT3 | TE | 54 | 2.5 | 60 | 63.15 | 66.3 | 1 | 87.1 | 4.6 |
| 1SMA58AT3 | TG | 58 | 2.5 | 64.4 | 67.8 | 71.5 | 1 | 93.6 | 4.3 |
| 1SMA60AT3 | TK | 60 | 2.5 | 66.7 | 70.2 | 73.7 | 1 | 96.8 | 4.1 |
| 1SMA64AT3 | TM | 64 | 2.5 | 71.1 | 74.85 | 78.6 | 1 | 103 | 3.9 |
| 1SMA70AT3 | TP | 70 | 2.5 | 77.8 | 81.9 | 86.0 | 1 | 113 | 3.5 |
| 1SMA75AT3 | TR | 75 | 2.5 | 83.3 | 87.7 | 92.1 | 1 | 121 | 3.3 |
| 1SMA78AT3 | TS | 78 | 2.5 | 86.7 | 91.25 | 95.8 | 1 | 126 | 3.2 |

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

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RATING AND TYPICAL CHARACTERISTIC CURVES

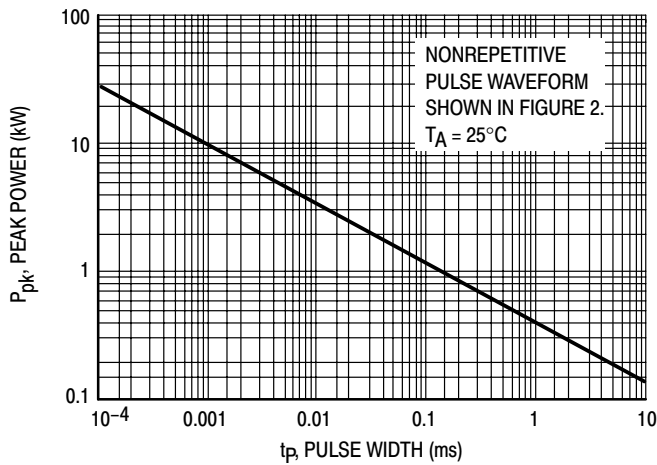


Figure 1. Pulse Rating Curve

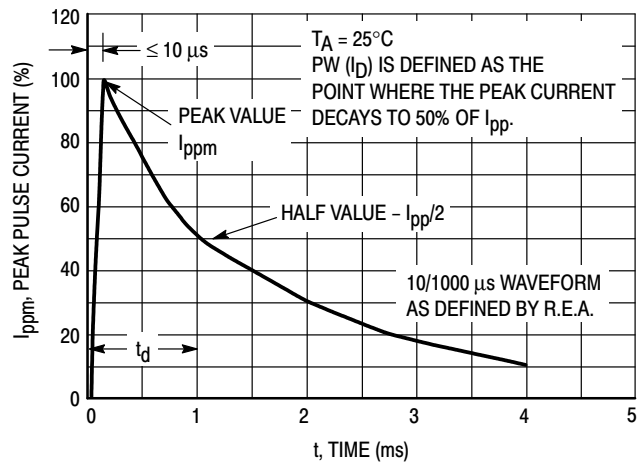


Figure 2. Pulse Waveform

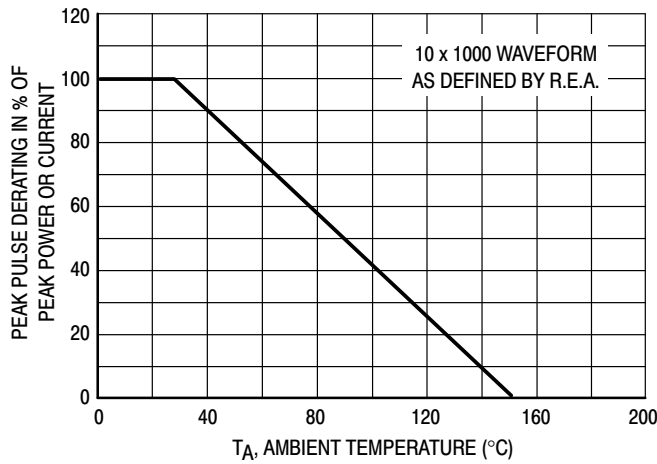


Figure 3. Pulse Derating Curve

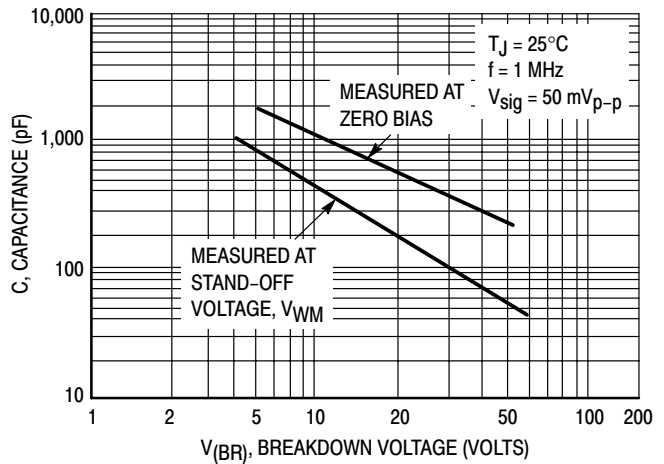


Figure 4. Typical Junction Capacitance

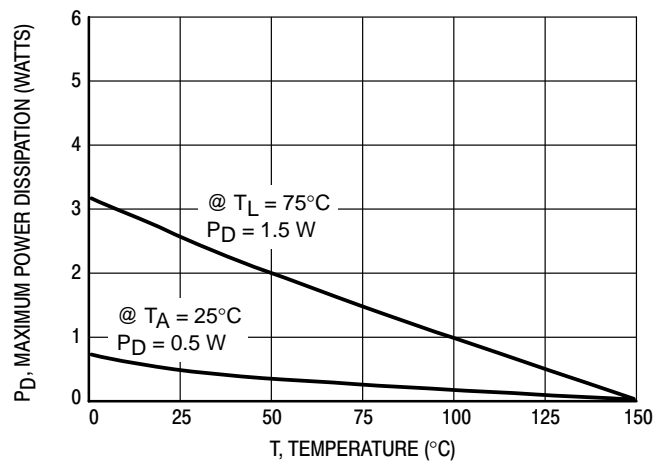
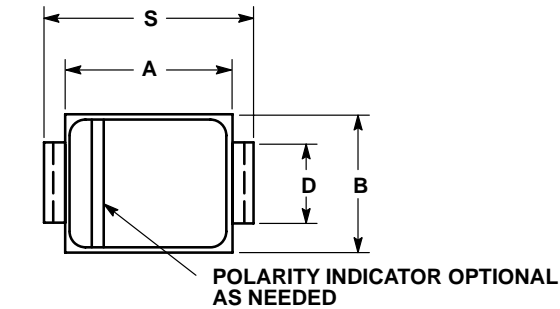


Figure 5. Steady State Power Derating

Transient Voltage Suppressors – Surface Mounted

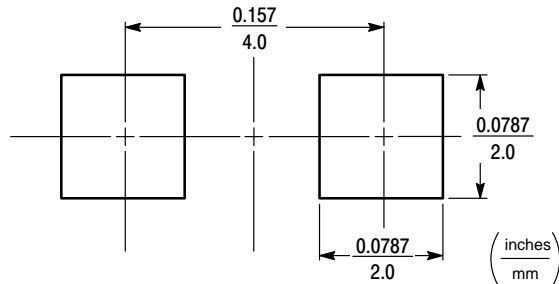
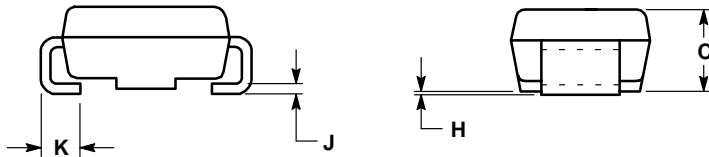
400 Watt Peak Power

SMA
CASE 403D-02
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. 403D-01 OBSOLETE, NEW STANDARD IS 403D-02.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.160 | 0.180 | 4.06 | 4.57 |
| B | 0.090 | 0.115 | 2.29 | 2.92 |
| C | 0.075 | 0.095 | 1.91 | 2.41 |
| D | 0.050 | 0.064 | 1.27 | 1.63 |
| H | 0.002 | 0.006 | 0.05 | 0.15 |
| J | 0.006 | 0.016 | 0.15 | 0.41 |
| K | 0.030 | 0.060 | 0.76 | 1.52 |
| S | 0.190 | 0.220 | 4.83 | 5.59 |




SMA FOOTPRINT

Notes

Notes

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