

# 1SMA10CAT3 Series

## 400 Watt Peak Power Zener Transient Voltage Suppressors

### Bidirectional\*

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 – 10 V to 78 V
- Standard Zener Breakdown Voltage Range – 11.7 V to 91.3 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
- Pb-Free Packages are Available

#### 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 polarity notch does not indicate polarity

**MOUNTING POSITION:** Any



**ON Semiconductor®**

<http://onsemi.com>

**PLASTIC SURFACE MOUNT  
ZENER OVERVOLTAGE  
TRANSIENT SUPPRESSORS  
10–78 V  $V_R$   
400 W PEAK POWER**



**SMA  
CASE 403B  
PLASTIC**

#### MARKING DIAGRAM



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

#### ORDERING INFORMATION

| Device*     | Package          | Shipping†        |
|-------------|------------------|------------------|
| 1SMAxxCAT3  | SMA              | 5000/Tape & Reel |
| 1SMAxxCAT3G | SMA<br>(Pb-Free) | 5000/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.

\*The "T3" suffix refers to a 13 inch 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.

# 1SMA10CAT3 Series

## MAXIMUM RATINGS

| Rating                                                                                                                   | Symbol          | Value       | Unit                      |
|--------------------------------------------------------------------------------------------------------------------------|-----------------|-------------|---------------------------|
| Peak Power Dissipation (Note 1)<br>@ $T_L = 25^\circ\text{C}$ , Pulse Width = 1 ms                                       | $P_{PK}$        | 400         | W                         |
| DC Power Dissipation @ $T_L = 75^\circ\text{C}$<br>Measured Zero Lead Length (Note 2)<br>Derate Above $75^\circ\text{C}$ | $P_D$           | 1.5         | W                         |
| Thermal Resistance from Junction-to-Lead                                                                                 | $R_{\theta JL}$ | 20          | mW/ $^\circ\text{C}$      |
|                                                                                                                          |                 | 50          | $^\circ\text{C}/\text{W}$ |
| DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$<br>Derate Above $25^\circ\text{C}$                              | $P_D$           | 0.5         | W                         |
| Thermal Resistance from Junction-to-Ambient                                                                              | $R_{\theta JA}$ | 4.0         | mW/ $^\circ\text{C}$      |
|                                                                                                                          |                 | 250         | $^\circ\text{C}/\text{W}$ |
| Operating and Storage Temperature Range                                                                                  | $T_J, T_{stg}$  | -65 to +150 | $^\circ\text{C}$          |

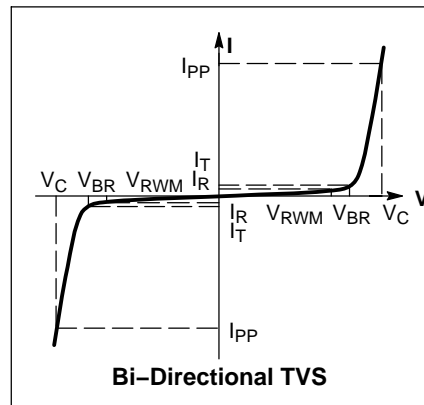
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

- 10 X 1000  $\mu\text{s}$ , non-repetitive.
- 1 in square copper pad, FR-4 board.
- FR-4 board, using ON Semiconductor minimum recommended footprint, as shown in 403B case outline dimensions spec.

## ELECTRICAL CHARACTERISTICS

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

| 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                                |



# 1SMA10CAT3 Series

## ELECTRICAL CHARACTERISTICS

| Device*       | Device Marking | V <sub>RWM</sub><br>(Note 4)<br>Volts | I <sub>R</sub> @ V <sub>RWM</sub><br>μA | Breakdown Voltage                |       |       |                  | V <sub>C</sub> @ I <sub>PP</sub><br>(Note 6) |                 | C Typ.<br>(Note 7)<br>pF |
|---------------|----------------|---------------------------------------|-----------------------------------------|----------------------------------|-------|-------|------------------|----------------------------------------------|-----------------|--------------------------|
|               |                |                                       |                                         | V <sub>BR</sub> (Volts) (Note 5) |       |       | @ I <sub>T</sub> | V <sub>C</sub>                               | I <sub>PP</sub> |                          |
|               |                |                                       |                                         | Min                              | Nom   | Max   | mA               | Volts                                        | Amps            |                          |
| 1SMA10CAT3, G | QXC            | 10                                    | 2.5                                     | 11.1                             | 11.69 | 12.27 | 1.0              | 17.0                                         | 23.5            | 580                      |
| 1SMA11CAT3, G | QZC            | 11                                    | 2.5                                     | 12.2                             | 12.84 | 13.48 | 1.0              | 18.2                                         | 22.0            | 530                      |
| 1SMA12CAT3, G | REC            | 12                                    | 2.5                                     | 13.3                             | 14.00 | 14.70 | 1.0              | 19.9                                         | 20.1            | 490                      |
| 1SMA13CAT3, G | RGC            | 13                                    | 2.5                                     | 14.4                             | 15.16 | 15.92 | 1.0              | 21.5                                         | 18.6            | 455                      |
| 1SMA14CAT3, G | RKC            | 14                                    | 2.5                                     | 15.6                             | 16.42 | 17.24 | 1.0              | 23.2                                         | 17.2            | 425                      |
| 1SMA15CAT3, G | RMC            | 15                                    | 2.5                                     | 16.7                             | 17.58 | 18.46 | 1.0              | 24.4                                         | 16.4            | 400                      |
| 1SMA16CAT3, G | RPC            | 16                                    | 2.5                                     | 17.8                             | 18.74 | 19.67 | 1.0              | 26.0                                         | 15.4            | 375                      |
| 1SMA18CAT3, G | RTC            | 18                                    | 2.5                                     | 20                               | 21.06 | 22.11 | 1.0              | 29.2                                         | 13.7            | 335                      |
| 1SMA20CAT3, G | RVC            | 20                                    | 2.5                                     | 22.2                             | 23.37 | 24.54 | 1.0              | 32.4                                         | 12.3            | 305                      |
| 1SMA22CAT3, G | RXC            | 22                                    | 2.5                                     | 24.4                             | 25.69 | 26.97 | 1.0              | 35.5                                         | 11.3            | 280                      |
| 1SMA24CAT3, G | RZC            | 24                                    | 2.5                                     | 26.7                             | 28.11 | 29.51 | 1.0              | 38.9                                         | 10.3            | 260                      |
| 1SMA26CAT3, G | SEC            | 26                                    | 2.5                                     | 28.9                             | 30.42 | 31.94 | 1.0              | 42.1                                         | 9.5             | 240                      |
| 1SMA28CAT3, G | SGC            | 28                                    | 2.5                                     | 31.1                             | 32.74 | 34.37 | 1.0              | 45.4                                         | 8.8             | 225                      |
| 1SMA30CAT3, G | SKC            | 30                                    | 1.0                                     | 33.3                             | 35.06 | 36.81 | 1.0              | 48.4                                         | 8.3             | 210                      |
| 1SMA33CAT3, G | SMC            | 33                                    | 2.5                                     | 36.7                             | 38.63 | 40.56 | 1.0              | 53.3                                         | 7.5             | 190                      |
| 1SMA36CAT3, G | SPC            | 36                                    | 2.5                                     | 40                               | 42.11 | 44.21 | 1.0              | 58.1                                         | 6.9             | 175                      |
| 1SMA40CAT3, G | SRC            | 40                                    | 2.5                                     | 44.4                             | 46.74 | 49.07 | 1.0              | 64.5                                         | 6.2             | 160                      |
| 1SMA43CAT3, G | STC            | 43                                    | 2.5                                     | 47.8                             | 50.32 | 52.83 | 1.0              | 69.4                                         | 5.8             | 150                      |
| 1SMA48CAT3, G | SXC            | 48                                    | 2.5                                     | 53.3                             | 56.11 | 58.91 | 1.0              | 77.4                                         | 5.2             | 135                      |
| 1SMA51CAT3, G | SZC            | 51                                    | 2.5                                     | 56.7                             | 59.69 | 62.67 | 1.0              | 82.4                                         | 4.9             | 130                      |
| 1SMA54CAT3, G | TEC            | 54                                    | 2.5                                     | 60                               | 63.16 | 66.32 | 1.0              | 87.1                                         | 4.6             | 120                      |
| 1SMA58CAT3, G | TGC            | 58                                    | 2.5                                     | 64.4                             | 67.79 | 71.18 | 1.0              | 93.6                                         | 4.3             | 115                      |
| 1SMA60CAT3, G | TKC            | 60                                    | 2.5                                     | 66.7                             | 70.21 | 73.72 | 1.0              | 96.8                                         | 4.1             | 110                      |
| 1SMA64CAT3, G | TMC            | 64                                    | 2.5                                     | 71.1                             | 74.84 | 78.58 | 1.0              | 103                                          | 3.9             | 105                      |
| 1SMA70CAT3, G | TPC            | 70                                    | 2.5                                     | 77.8                             | 81.90 | 85.99 | 1.0              | 113                                          | 3.5             | 95                       |
| 1SMA78CAT3, G | TTC            | 78                                    | 2.5                                     | 86.7                             | 91.27 | 95.83 | 1.0              | 126                                          | 3.2             | 90                       |

4. A transient suppressor is normally selected according to the working peak reverse voltage (V<sub>RWM</sub>), which should be equal to or greater than the DC or continuous peak operating voltage level

5. V<sub>BR</sub> measured at pulse test current I<sub>T</sub> at an ambient temperature of 25°C

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

7. Bias voltage = 0 V, F = 1.0 MHz, T<sub>J</sub> = 25°C.

†Please see 1SMA5.0AT3 to 1SMA78AT3 for Unidirectional devices.

\* The "G" suffix indicates Pb-Free package available.

# 1SMA10CAT3 Series

## RATING AND TYPICAL CHARACTERISTIC CURVES

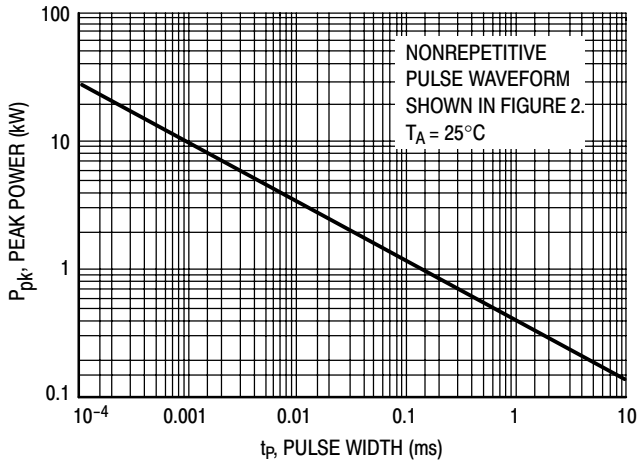


Figure 1. Pulse Rating Curve

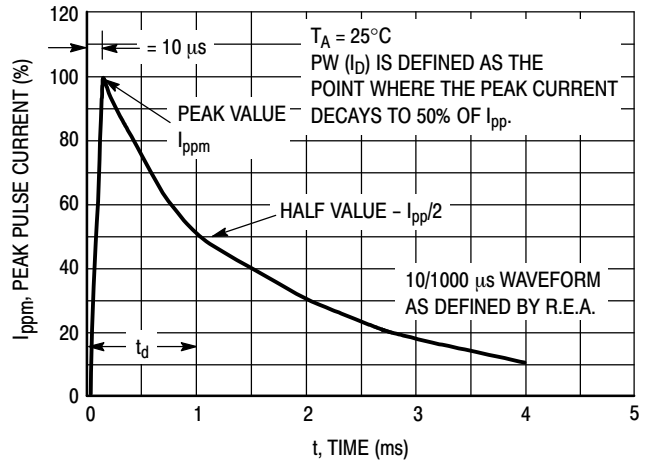


Figure 2. Pulse Waveform

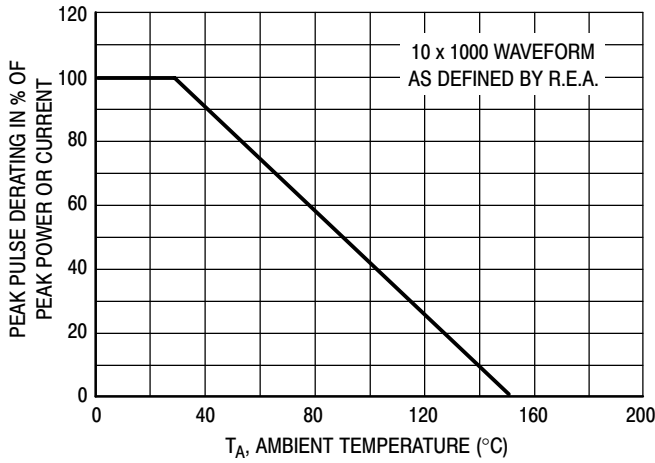


Figure 3. Pulse Derating Curve

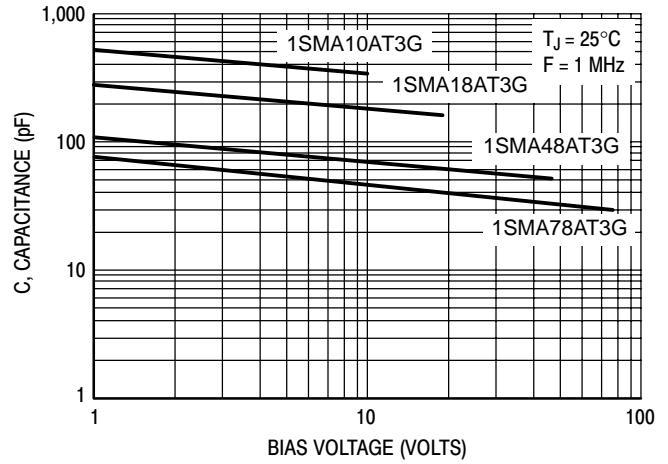
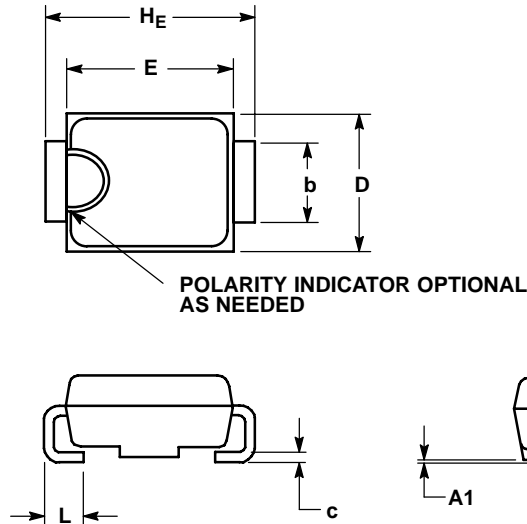


Figure 4. Typical Junction Capacitance vs. Bias Voltage

# 1SMA10CAT3 Series

## PACKAGE DIMENSIONS

SMA  
CASE 403B-02  
ISSUE D

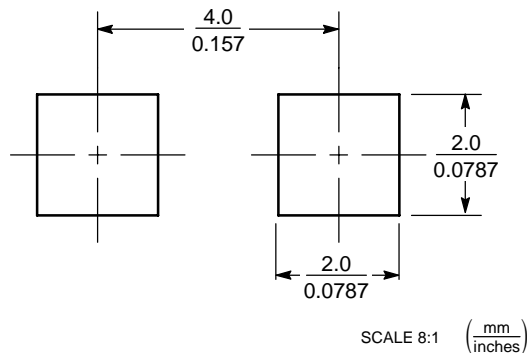


NOTES:

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

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 1.91        | 2.16 | 2.41 | 0.075  | 0.085 | 0.095 |
| A1  | 0.05        | 0.10 | 0.15 | 0.002  | 0.004 | 0.006 |
| 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 |

### 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.

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