

### 1SMA5.0AT3G Series

# OBSOLETE/EOL

**DATE** June/30/2018 **PCN/ECN#** LFPCN41246

**REPLACED BY** [SMAJ Series](#)



#### Maximum Ratings and Thermal Characteristics

| Parameter                                                                             | 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 @ $T_L = 75^\circ\text{C}$<br>Measured Zero Lead Length (Note 2) | $P_D$           | 1.0         | W                         |
| Derate Above $75^\circ\text{C}$                                                       |                 | 20          | mW/ $^\circ\text{C}$      |
| Thermal Resistance from Junction to-Lead                                              | RJL             | 50          | $^\circ\text{C}/\text{W}$ |
| DC Power Dissipation (Note 3)<br>@ $T_A = 25^\circ\text{C}$                           | $P_D$           | 0.5         | W                         |
| Derate Above $25^\circ\text{C}$                                                       |                 | 4.0         | 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 | $^\circ\text{C}$          |

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  $\mu\text{s}$ , non-repetitive.
- 1" square copper pad, FR-4 board.
- FR-4 board, using Littelfuse minimum recommended footprint, as shown in 403D-02 case outline dimensions spec.
- 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

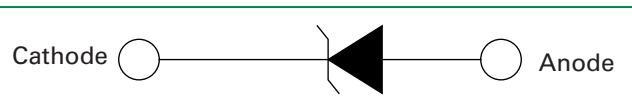
#### Description

The 1SMA5.0AT3G 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 1SMA5.0AT3G series is supplied in the Littelfuse exclusive, cost-effective, highly reliable 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
- These are Pb-Free Device

#### Functional Diagram



#### Additional Information



Datasheet

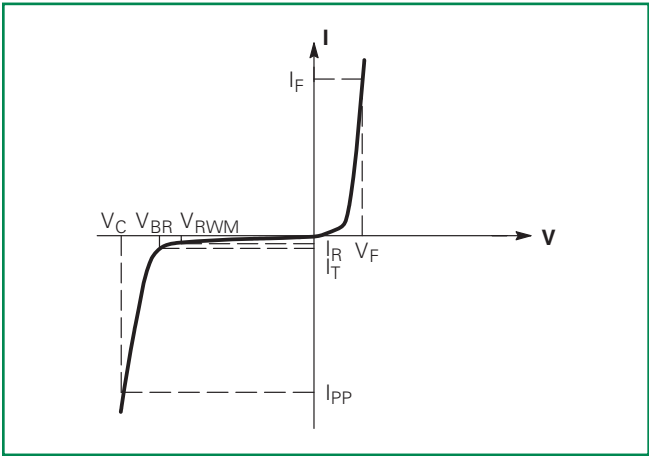


Resources



Samples

**I-V Curve 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                                |
| $I_F$     | Maximum Temperature Coefficient of $V_{BR}$ |
| $V_F$     | Forward Voltage @ $I_F$                     |

5. 1/2 sine wave or equivalent, PW = 8.3 ms, non-repetitive duty cycle.

5. 1/2 sine wave or equivalent, PW = 8.3 ms non-repetitive duty cycle

### Electrical Characteristics

| Device *    | Device Marking | $V_{RWM}$<br>(Note 6) | $I_R$ @<br>$V_{RWM}$ | Breakdown Voltage             |       |      |         | $V_C$ @ $I_{PP}$<br>(Note 8) |          | C Typ.<br>(Note 9) |
|-------------|----------------|-----------------------|----------------------|-------------------------------|-------|------|---------|------------------------------|----------|--------------------|
|             |                |                       |                      | $V_{BR}$ @ $I_T$ (V) (Note 7) |       |      | @ $I_T$ | $V_C$                        | $I_{PP}$ |                    |
|             |                | Volts                 | μA                   | MIN                           | NOM   | MAX  | mA      | Volts                        | Amps     | pF                 |
| 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.

### Ratings and Characteristic Curves

**Figure 1. Pulse Rating Curve**

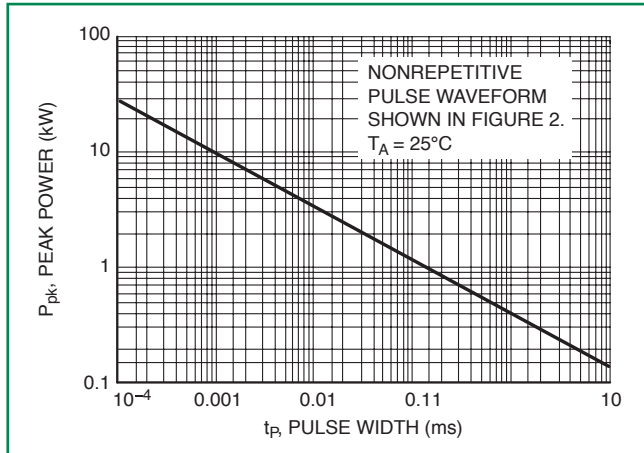


**Figure 2. Pulse Waveform**

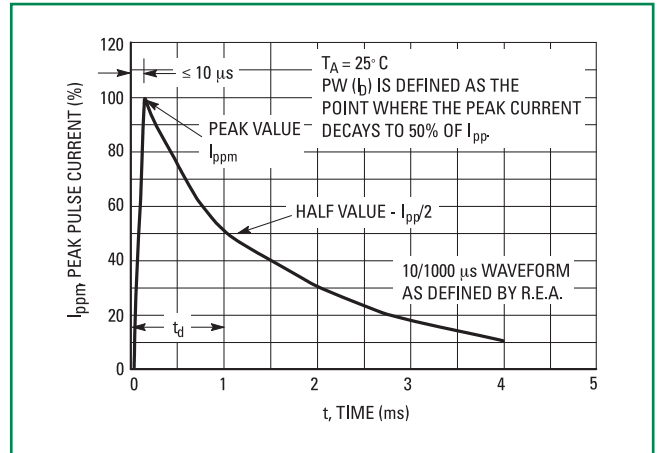


**Figure 3 - Pulse Derating Curve**

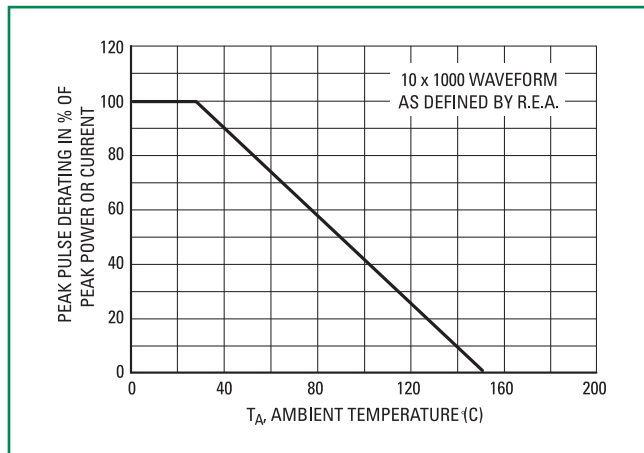


**Figure 4. Typical Junction Capacitance vs. Bias Voltage**

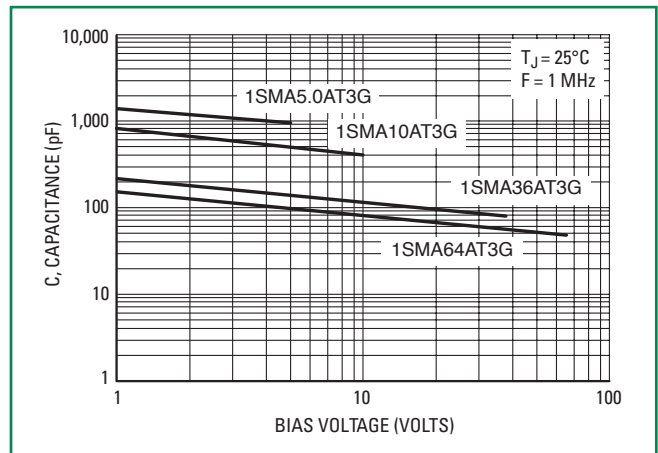
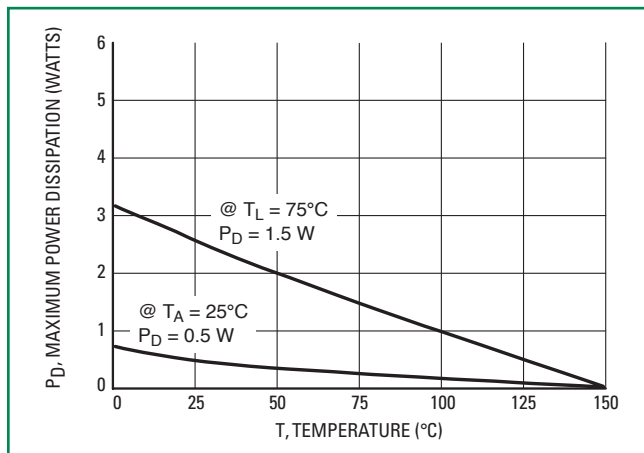
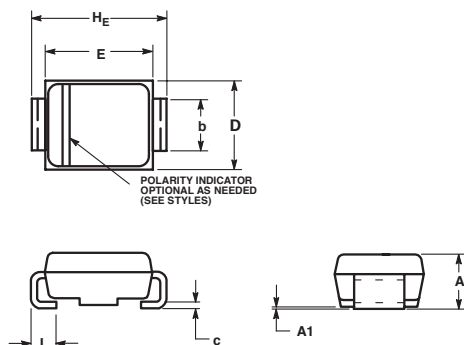


**Figure 5. Steady State Power Derating**



### Dimensions



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

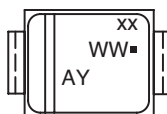
#### NOTES:

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

#### STYLE 1:

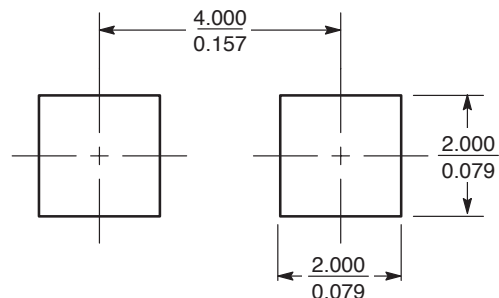
1. PIN 1. CATHODE (POLARITY BAND)
2. ANODE

### Part Marking System



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

### Soldering Footprint



SCALE 8:1 (mm/inches)

### ORDERING INFORMATION

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

### Flow/Wave Soldering (Solder Dipping)

|                    |            |
|--------------------|------------|
| Peak Temperature : | 260°C      |
| Dipping Time :     | 10 seconds |

### Physical Specifications

|                   |                                                                                |
|-------------------|--------------------------------------------------------------------------------|
| Case              | Void-free, transfer-molded, thermosetting plastic                              |
| Polarity          | Cathode indicated by molded polarity notch                                     |
| Mounting Position | Any                                                                            |
| Finish            | All external surfaces are corrosion resistant and leads are readily solderable |

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