

# NS6A5.0AFT3G, SZNS6A5.0AFT3G Series



Expertise Applied | Answers Delivered

Littelfuse.com

## 500 Watt Peak Power Zener Transient Voltage Suppressors

### Unidirectional

The NS6AxxAFT3G series is designed to protect voltage sensitive components from high voltage, high energy transients. This device has excellent clamping capability, high surge capability, low zener impedance and fast response time. The NS6AxxAFT3G series is ideally suited for use in computer hard disk drives, communication systems, automotive, numerical controls, process controls, medical equipment, business machines, power supplies and many other industrial/consumer applications.

#### Specification Features:

- Peak Reverse Working Voltage Range – 5 V to 64 V
- Peak Pulse Power of 500 W (10 x 1000 µsec)
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- ESD Rating of Class 4 (>8 kV) IEC 61000-4-2
- Fast Response Time
- Low Profile Package
- 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

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

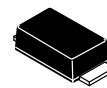
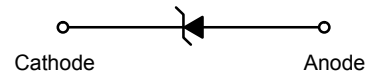
**MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:**  
260°C for 10 Seconds

**LEADS:** Modified L-Bend providing more contact area to bond pads

**POLARITY:** Cathode indicated by polarity band

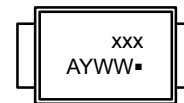
**MOUNTING POSITION:** Any

### PLASTIC SURFACE MOUNT ZENER OVERVOLTAGE TRANSIENT SUPPRESSORS



SMA-FL  
CASE 403AA

#### MARKING DIAGRAM



- xxx = Specific Device Code
- A = Assembly Location
- Y = Year
- WW = Work Week
- = Pb-Free Package

#### ORDERING INFORMATION

| Device                        | Package             | Shipping              |
|-------------------------------|---------------------|-----------------------|
| NS6AxxAFT3G,<br>SZNS6AxxAFT3G | SMA-FL<br>(Pb-Free) | 5000 / Tape &<br>Reel |

# NS6A5.0AFT3G, SZNS6A5.0AFT3G Series

## MAXIMUM RATINGS

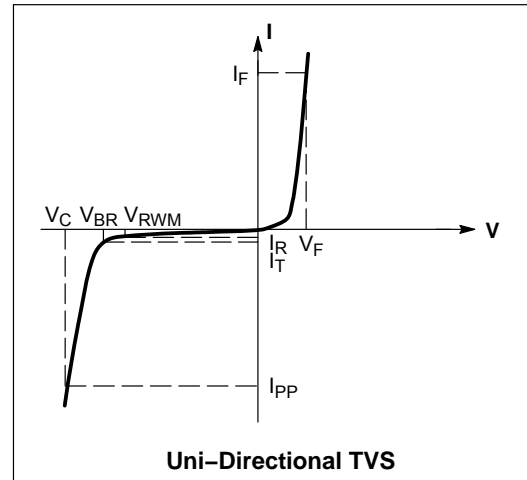
| Rating   | Symbol          | Value       | Unit                      |
|--|-----------------|-------------|---------------------------|
| Peak Power Dissipation (Note 1) @ $T_L = 25^\circ\text{C}$ , Pulse Width = 1 ms  | $P_{PK}$        | 500         | W                         |
| DC Power Dissipation @ $T_L = 75^\circ\text{C}$<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         | $^\circ\text{C}/\text{W}$ |
| 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 | $^\circ\text{C}$          |

1. 10 X 1000  $\mu\text{s}$ , non-repetitive.
2. 1 in square copper pad, FR-4 board.
3. FR-4 board, using Littelfuse minimum recommended footprint, as shown in 403AA case outline dimensions spec.
4. 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, $V_F = 3.5\text{ V Max.}$ @ $I_F$ (Note 5) = 30 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 @ $I_F$                     |

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



## NS6A5.0AFT3G, SZNS6A5.0AFT3G Series

### ELECTRICAL CHARACTERISTICS

| Device*        | Device Marking | V <sub>RWM</sub><br>(Note 6)<br>V | I <sub>R</sub> @ V <sub>RWM</sub><br>μA | Breakdown Voltage              |       |      |                  | V <sub>C</sub> @ I <sub>PP</sub> (Note 8) |                 | C <sub>typ</sub><br>(Note 9)<br>pF |
|----------------|----------------|-----------------------------------|---|--------------------------------|-------|------|------------------|---|-----------------|------------------------------------|
|                |                |                                   |   | V <sub>BR</sub> (Note 7) Volts |       |      | @ I <sub>T</sub> | V <sub>C</sub>                            | I <sub>PP</sub> |                                    |
|                |                |                                   |   | Min                            | Nom   | Max  | mA               | V   | A               |                                    |
| NS6A5.0AFT3G   | 6AA            | 5                                 | 800                                     | 6.4                            | 6.70  | 7    | 10               | 9.2                                       | 65.2            | 2700                               |
| NS6A6.0AFT3G** | 6AB            | 6                                 | 800                                     | 6.67                           | 7.02  | 7.37 | 10               | 10.3                                      | 58.3            | 2300                               |
| NS6A6.5AFT3G** | 6AC            | 6.5                               | 500                                     | 7.22                           | 7.60  | 7.98 | 10               | 11.2                                      | 53.6            | 2140                               |
| NS6A7.0AFT3G** | 6AD            | 7                                 | 500                                     | 7.78                           | 8.19  | 8.6  | 10               | 12  | 50              | 2005                               |
| NS6A7.5AFT3G** | 6AE            | 7.5                               | 100                                     | 8.33                           | 8.77  | 9.21 | 1                | 12.9                                      | 46.5            | 1890                               |
| NS6A8.0AFT3G** | 6AF            | 8                                 | 50                                      | 8.89                           | 9.36  | 9.83 | 1                | 13.6                                      | 44.1            | 1780                               |
| NS6A8.5AFT3G   | 6AG            | 8.5                               | 10                                      | 9.44                           | 9.92  | 10.4 | 1                | 14.4                                      | 41.7            | 1690                               |
| NS6A9.0AFT3G** | 6AH            | 9                                 | 5                                       | 10                             | 10.55 | 11.1 | 1                | 15.4                                      | 39              | 1605                               |
| NS6A10AFT3G**  | 6AI            | 10                                | 5                                       | 11.1                           | 11.70 | 12.3 | 1                | 17  | 35.3            | 1460                               |
| NS6A11AFT3G**  | 6AL            | 11                                | 5                                       | 12.2                           | 12.85 | 13.5 | 1                | 18.2                                      | 33              | 1345                               |
| NS6A12AFT3G    | 6AJ            | 12                                | 5                                       | 13.3                           | 14.00 | 14.7 | 1                | 19.9                                      | 30.2            | 1245                               |
| NS6A13AFT3G    | 6AK            | 13                                | 5                                       | 14.4                           | 15.15 | 15.9 | 1                | 21.5                                      | 27.9            | 1160                               |
| NS6A14AFT3G**  | 6AM            | 14                                | 5                                       | 15.6                           | 16.40 | 17.2 | 1                | 23.2                                      | 20.5            | 1085                               |
| NS6A15AFT3G    | 6AN            | 15                                | 5                                       | 16.7                           | 17.60 | 18.5 | 1                | 24.4                                      | 20.0            | 1020                               |
| NS6A16AFT3G**  | 6AO            | 16                                | 5                                       | 17.8                           | 18.75 | 19.7 | 1                | 26  | 19.5            | 965                                |
| NS6A17AFT3G**  | 6AP            | 17                                | 5                                       | 18.9                           | 19.90 | 20.9 | 1                | 27.6                                      | 19.0            | 915                                |
| NS6A18AFT3G**  | 6AQ            | 18                                | 5                                       | 20                             | 21.05 | 22.1 | 1                | 29.2                                      | 18.5            | 870                                |
| NS6A20AFT3G**  | 6AR            | 20                                | 5                                       | 22.2                           | 23.35 | 24.5 | 1                | 32.4                                      | 17.5            | 790                                |
| NS6A22AFT3G    | 6AS            | 22                                | 5                                       | 24.4                           | 25.65 | 26.9 | 1                | 35.5                                      | 16.5            | 730                                |
| NS6A24AFT3G    | 6AT            | 24                                | 5                                       | 26.7                           | 28.10 | 29.5 | 1                | 38.9                                      | 15.4            | 675                                |
| NS6A26AFT3G**  | 6AU            | 26                                | 5                                       | 28.9                           | 30.40 | 31.9 | 1                | 42.1                                      | 14.2            | 630                                |
| NS6A28AFT3G    | 6AV            | 28                                | 5                                       | 31.1                           | 32.75 | 34.4 | 1                | 45.4                                      | 13.2            | 590                                |
| NS6A30AFT3G    | 6AW            | 30                                | 5                                       | 33.3                           | 35.05 | 36.8 | 1                | 48.4                                      | 12.4            | 555                                |
| NS6A33AFT3G    | 6AX            | 33                                | 5                                       | 36.7                           | 38.65 | 40.6 | 1                | 53.3                                      | 11.3            | 510                                |
| NS6A36AFT3G    | 6AY            | 36                                | 5                                       | 40                             | 42.10 | 44.2 | 1                | 58.1                                      | 10.3            | 470                                |
| NS6A40AFT3G**  | 6AZ            | 40                                | 5                                       | 44.4                           | 46.75 | 49.1 | 1                | 64.5                                      | 9.3             | 430                                |
| NS6A43AFT3G**  | 6A0            | 43                                | 5                                       | 47.8                           | 50.30 | 52.8 | 1                | 69.4                                      | 8.6             | 400                                |
| NS6A45AFT3G**  | 6A1            | 45                                | 5                                       | 50                             | 52.65 | 55.3 | 1                | 72.2                                      | 8.3             | 385                                |
| NS6A48AFT3G**  | 6A2            | 48                                | 5                                       | 53.3                           | 56.10 | 58.9 | 1                | 77.4                                      | 7.7             | 365                                |
| NS6A51AFT3G**  | 6A3            | 51                                | 5                                       | 56.7                           | 59.70 | 62.7 | 1                | 82.4                                      | 7.3             | 345                                |
| NS6A54AFT3G**  | 6A4            | 54                                | 5                                       | 60                             | 63.15 | 66.3 | 1                | 87.1                                      | 6.9             | 330                                |
| NS6A58AFT3G**  | 6A5            | 58                                | 5                                       | 64.4                           | 67.80 | 71.2 | 1                | 93.6                                      | 6.4             | 310                                |
| NS6A60AFT3G**  | 6A7            | 60                                | 5                                       | 66.7                           | 70.20 | 73.7 | 1                | 96.8                                      | 6.2             | 300                                |
| NS6A64AFT3G    | 6A8            | 64                                | 5                                       | 71.1                           | 74.85 | 78.6 | 1                | 103                                       | 5.8             | 280                                |

\*Includes SZ-prefix devices where applicable.

\*\*In development. Contact local sales rep for availability.

6. 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.

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

8. Surge current waveform per Figure 1.

9. Bias Voltage = 0 V, F = 1 MHz, T<sub>J</sub> = 25°C.

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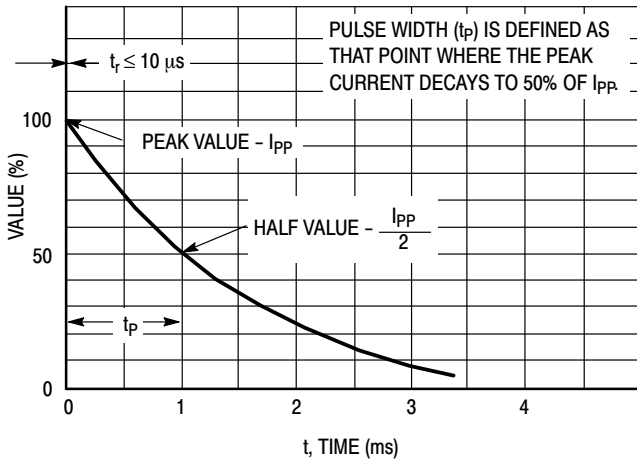


Figure 1.  $10 \times 1000 \mu s$  Pulse Waveform

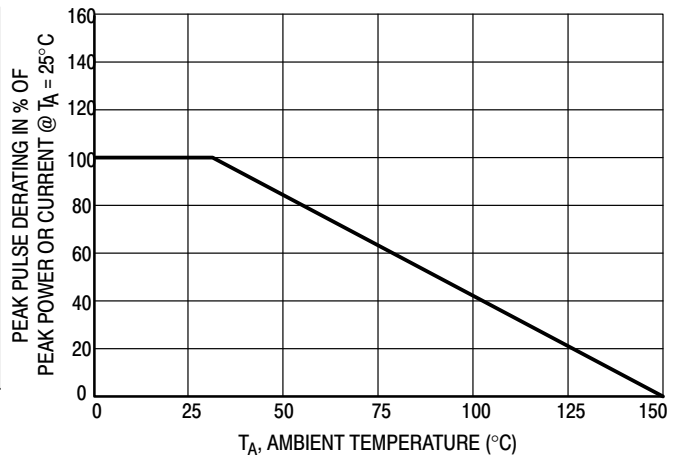


Figure 2. Pulse Derating Curve

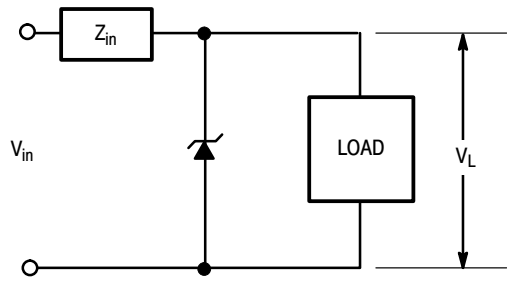
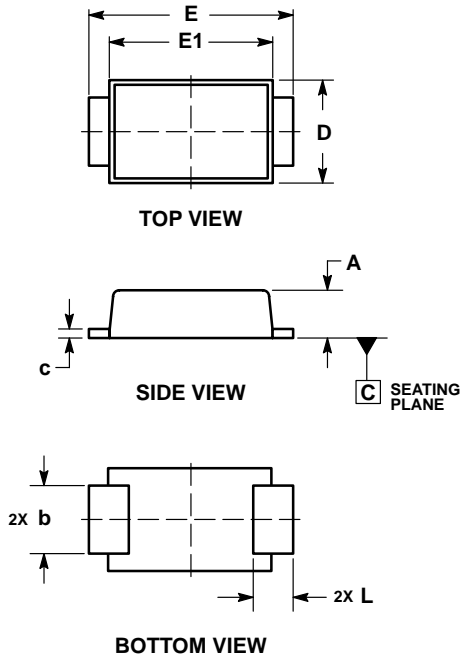


Figure 3. Typical Protection Circuit

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## PACKAGE DIMENSIONS

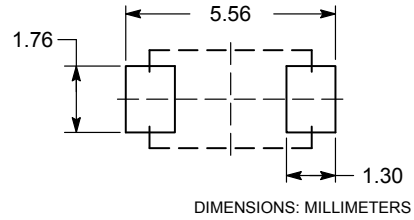
SMA-FL  
CASE 403AA  
ISSUE O



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.

| MILLIMETERS |      |      |
|-------------|------|------|
| DIM         | MIN  | MAX  |
| A           | 0.90 | 1.10 |
| b           | 1.25 | 1.65 |
| c           | 0.15 | 0.30 |
| D           | 2.40 | 2.80 |
| E           | 4.80 | 5.40 |
| E1          | 4.00 | 4.60 |
| L           | 0.70 | 1.10 |

### RECOMMENDED SOLDER FOOTPRINT



Littelfuse products are not designed for, and shall not be used for, any purpose (including, without limitation, automotive, 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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