

# 1.5SMCxxAT3G



## Description

The 1.5SMCxxAT3G 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. This 1.5SMCxxAT3G series is provided in an SMC package ideally suited for small form factor requirements found in communication, automotive, process control, medical equipment and many other industrial and consumer applications.

## Features

- Working Peak Reverse Voltage Range – 5.8 V to 78 V
- Nominal Breakdown Voltage Range – 6.8 V to 91V
- Peak Power – 1500 W @ 1 ms
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Low Leakage < 5  $\mu$ A Above 10 V
- Maximum Temperature Coefficient Specified
- Response Time is Typically < 1 ns
- Pb-Free Packages are Available

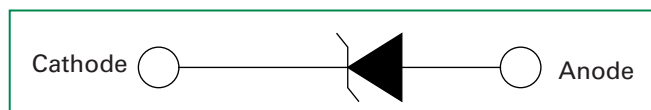
## Maximum Ratings and Thermal Characteristics

| Parameter  | Symbol          | Value       | Unit                      |
|--|-----------------|-------------|---------------------------|
| Peak Power Dissipation (Note 1) @ $T_L = 25^\circ\text{C}$ , Pulse Width = 1 ms  | $P_{PK}$        | 1500        | W                         |
| DC Power Dissipation @ $T_L = 75^\circ\text{C}$<br>Measured Zero Lead Length (Note 2)<br>Derate Above $75^\circ\text{C}$ | $P_D$           | 4.0<br>54.6 | W<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance from Junction-to-Lead   | $R_{JL}$        | 18.3        | $^\circ\text{C}/\text{W}$ |
| DC Power Dissipation (Note 3) @ $T_A = 25^\circ\text{C}$<br>Derate Above $25^\circ\text{C}$                              | $P_D$           | 0.75<br>6.1 | W<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance from Junction-to-Ambient  | $R_{\theta JA}$ | 165         | $^\circ\text{C}/\text{W}$ |
| Forward Surge Current (Note 4)<br>@ $T_A = 25^\circ\text{C}$   | $I_{FSM}$       | 200         | A                         |
| Operating and Storage Temperature Range  | $T_J, T_{stg}$  | -65 to +150 | $^\circ\text{C}$          |

Stresses exceeding Maximum Ratings may damage the component. 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 component reliability.

1. 10 x 1000  $\mu$ s, non-repetitive.
2. 1 in square copper pad, FR-4 board.
3. FR-4 board, using Littelfuse minimum recommended footprint, as shown in 403-03 case outline dimensions spec.
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

## Functional Diagram



## Additional Information



[Datasheet](#)

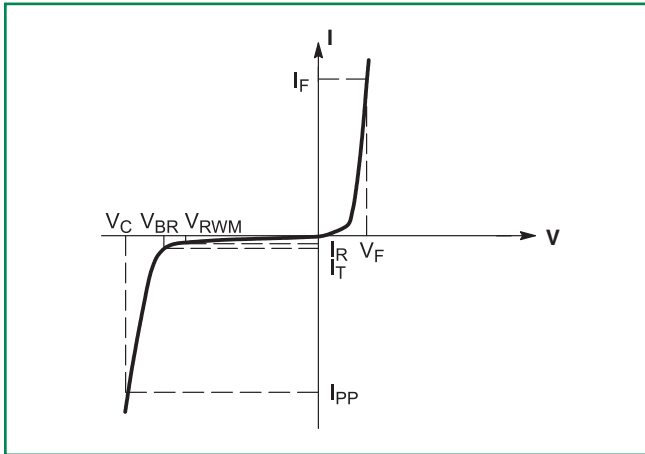


[Resources](#)



[Samples](#)

**I-V Curve Characteristics** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 3.5\text{ V Max @ } I_F = 100\text{ A}$ ) (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 @ $I_F$                     |

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

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

| Component*    | Component Marking | $V_{RWM}$<br>(Note 6) | $I_R$ @<br>$V_{RWM}$ | Breakdown Voltage         |               |      |         | $V_C$ @ $I_{PP}$ (Note 8) |          | MV BR |
|---------------|-------------------|-----------------------|----------------------|---------------------------|---------------|------|---------|---------------------------|----------|-------|
|               |                   |                       |                      | $V_{BR}$ (V) (Note 6 & 7) |               |      | @ $I_T$ | $V_C$                     | $I_{PP}$ |       |
|               |                   |                       |                      | Volts                     | $\mu\text{A}$ | MIN  | NOM     | MAX                       | mA       | Volts |
| 1.5SMC6.8AT3G | 6V8A              | 5.8                   | 1000                 | 6.45                      | 6.8           | 7.14 | 10      | 10.5                      | 143      | 0.057 |
| 1.5SMC7.5AT3G | 7V5A              | 6.4                   | 500                  | 7.13                      | 7.5           | 7.88 | 10      | 11.3                      | 132      | 0.061 |
| 1.5SMC8.2AT3G | 8V2A              | 7.02                  | 200                  | 7.79                      | 8.2           | 8.61 | 10      | 12.1                      | 124      | 0.065 |
| 1.5SMC10AT3G  | 10A               | 8.55                  | 10                   | 9.5                       | 10            | 10.5 | 1       | 14.5                      | 103      | 0.073 |
| 1.5SMC12AT3G  | 12A               | 10.2                  | 5                    | 11.4                      | 12            | 12.6 | 1       | 16.7                      | 90       | 0.078 |
| 1.5SMC13AT3G  | 13A               | 11.1                  | 5                    | 12.4                      | 13            | 13.7 | 1       | 18.2                      | 82       | 0.081 |
| 1.5SMC15AT3G  | 15A               | 12.8                  | 5                    | 14.3                      | 15            | 15.8 | 1       | 21.2                      | 71       | 0.084 |
| 1.5SMC16AT3G  | 16A               | 13.6                  | 5                    | 15.2                      | 16            | 16.8 | 1       | 22.5                      | 67       | 0.086 |
| 1.5SMC18AT3G  | 18A               | 15.3                  | 5                    | 17.1                      | 18            | 18.9 | 1       | 25.2                      | 59.5     | 0.088 |
| 1.5SMC20AT3G  | 20A               | 17.1                  | 5                    | 19                        | 20            | 21   | 1       | 27.7                      | 54       | 0.09  |
| 1.5SMC22AT3G  | 22A               | 18.8                  | 5                    | 20.9                      | 22            | 23.1 | 1       | 30.6                      | 49       | 0.092 |
| 1.5SMC24AT3G  | 24A               | 20.5                  | 5                    | 22.8                      | 24            | 25.2 | 1       | 33.2                      | 45       | 0.094 |
| 1.5SMC27AT3G  | 27A               | 23.1                  | 5                    | 25.7                      | 27            | 28.4 | 1       | 37.5                      | 40       | 0.096 |
| 1.5SMC30AT3G  | 30A               | 25.6                  | 5                    | 28.5                      | 30            | 31.5 | 1       | 41.4                      | 36       | 0.097 |
| 1.5SMC33AT3G  | 33A               | 28.2                  | 5                    | 31.4                      | 33            | 34.7 | 1       | 45.7                      | 33       | 0.098 |
| 1.5SMC36AT3G  | 36A               | 30.8                  | 5                    | 34.2                      | 36            | 37.8 | 1       | 49.9                      | 30       | 0.099 |
| 1.5SMC39AT3G  | 39A               | 33.3                  | 5                    | 37.1                      | 39            | 41   | 1       | 53.9                      | 28       | 0.1   |
| 1.5SMC43AT3G  | 43A               | 36.8                  | 5                    | 40.9                      | 43            | 45.2 | 1       | 59.3                      | 25.3     | 0.101 |
| 1.5SMC47AT3G  | 47A               | 40.2                  | 5                    | 44.7                      | 47            | 49.4 | 1       | 64.8                      | 23.2     | 0.101 |
| 1.5SMC51AT3G  | 51A               | 43.6                  | 5                    | 48.5                      | 51            | 53.6 | 1       | 70.1                      | 21.4     | 0.102 |
| 1.5SMC56AT3G  | 56A               | 47.8                  | 5                    | 53.2                      | 56            | 58.8 | 1       | 77                        | 19.5     | 0.103 |
| 1.5SMC62AT3G  | 62A               | 53                    | 5                    | 58.9                      | 62            | 65.1 | 1       | 85                        | 17.7     | 0.104 |
| 1.5SMC68AT3G  | 68A               | 58.1                  | 5                    | 64.6                      | 68            | 71.4 | 1       | 92                        | 16.3     | 0.104 |
| 1.5SMC75AT3G  | 75A               | 64.1                  | 5                    | 71.3                      | 75            | 78.8 | 1       | 103                       | 14.6     | 0.105 |
| 1.5SMC82AT3G  | 82A               | 70.1                  | 5                    | 77.9                      | 82            | 86.1 | 1       | 113                       | 13.3     | 0.105 |
| 1.5SMC91AT3G  | 91A               | 77.8                  | 5                    | 86.5                      | 91            | 95.5 | 1       | 125                       | 12       | 0.106 |

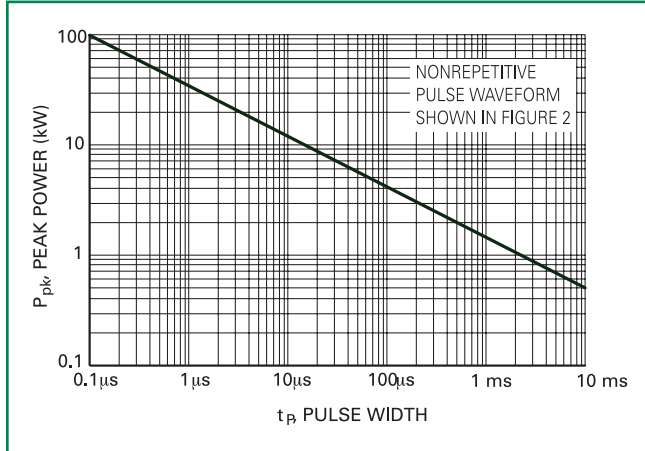
6. A transient suppressor is normally selected according to the maximum working peak reverse voltage ( $V_{RWM}$ ), which should be equal to or greater than the DC or continuous peak operating voltage level.

7.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

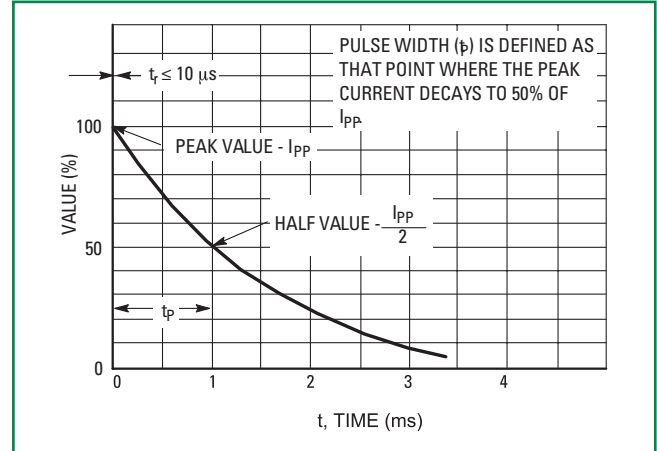
8. Surge current waveform per Figure 2 and derate per Figure 3 of the General Data – 1500 Watt at the beginning of this group.

**Ratings and Characteristic Curves**

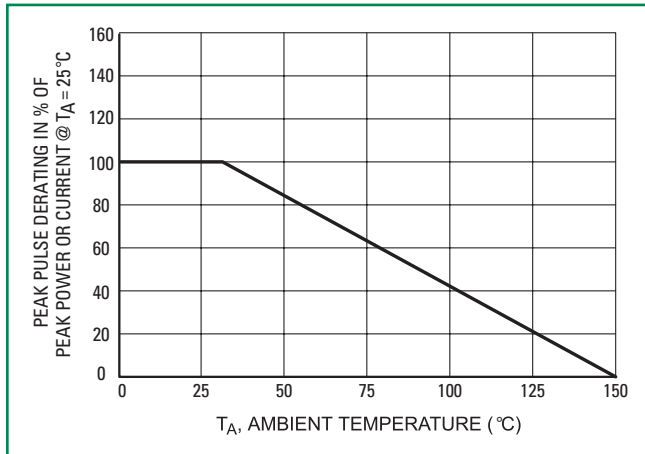
**Figure 1. Pulse Rating Curve**



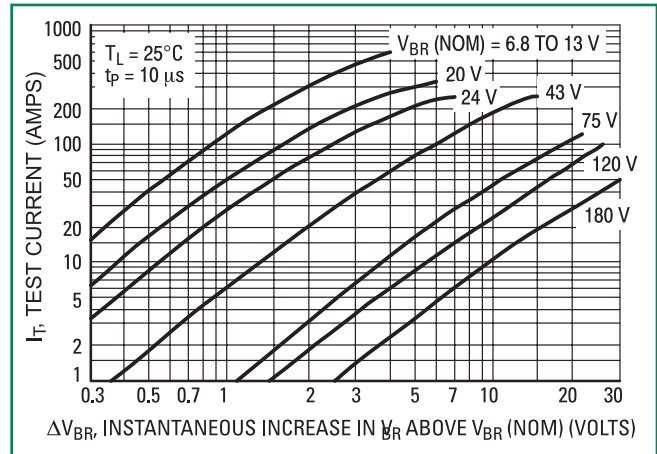
**Figure 2. Pulse Waveform**



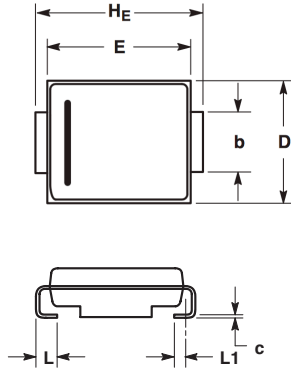
**Figure 3. Pulse Derating Curve**



**Figure 4. Dynamic Impedance**



**Dimensions**



| Dim            | Inches    |       |          | Millimeters |      |      |
|----------------|-----------|-------|----------|-------------|------|------|
|                | Min       | Nom   | Max      | Min         | Nom  | Max  |
| A              | 0.075     | 0.084 | 0.095    | 1.90        | 2.13 | 2.41 |
| A1             | 0.002     | 0.004 | 0.006    | 0.05        | 0.10 | 0.15 |
| b              | 0.115     | 0.118 | 0.121    | 2.92        | 3.00 | 3.07 |
| c              | 0.006     | 0.009 | 0.012    | 0.15        | 0.23 | 0.30 |
| D              | 0.220     | 0.230 | 0.240    | 5.59        | 5.84 | 6.10 |
| E              | 0.260     | 0.270 | 0.280    | 6.60        | 6.86 | 7.11 |
| H <sub>E</sub> | 0.305     | 0.313 | 0.320    | 7.75        | 7.94 | 8.13 |
| L              | 0.030     | 0.040 | 0.050    | 0.76        | 1.02 | 1.27 |
| L1             | 0.020 REF |       | 0.51 REF |             |      |      |

**NOTES**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. D DIMENSION SHALL BE MEASURED WITHIN DIMENSION P.
4. 403-01 THRU -02 OBSOLETE, NEW STANDARD 403-03.

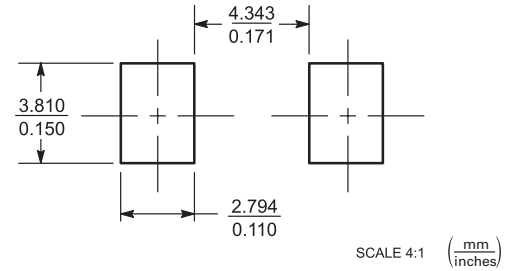
**Part Marking System**



- xxxA = **Specific Component Code**  
(See Table on Page 3)
- A = **Assembly Location**
- Y = **Year**
- WW = **Work Week**
- = **Pb-Free Package**

(Note: Microdot may be in either location)

**Soldering Footprint**



**ORDERING INFORMATION**

| Component  | Package          | Shipping               |
|------------|------------------|------------------------|
| 1SMCxxAT3G | SMC<br>(Pb-Free) | 2,500 /<br>Tape & Reel |

**Flow/Wave Soldering (Solder Dipping)**

|                           |            |
|---------------------------|------------|
| <b>Peak Temperature :</b> | 260°C      |
| <b>Dipping Time :</b>     | 10 seconds |

**Physical Specifications**

|                          |  |
|--------------------------|--|
| <b>Case</b>              | Void-free, transfer-molded, thermosetting plastic                              |
| <b>Polarity</b>          | Cathode indicated by polarity band   |
| <b>Mounting Position</b> | Any  |
| <b>Finish</b>            | All external surfaces are corrosion resistant and leads are readily solderable |
| <b>Leads</b>             | Modified L-Bend providing more contact area to bond pads                       |

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