

## SMF5.0AT1G Series



# OBSOLETE/EOL

**DATE** June/30/2018 **PCN/ECN#** LFPCN41246  
**REPLACED BY** SMF Series



### Maximum Ratings and Thermal Characteristics

| Rating                                                                          | Symbol          | Value       | Unit                 |
|---------------------------------------------------------------------------------|-----------------|-------------|----------------------|
| Maximum Ppk Dissipation (PW=10/1000 $\mu$ s) (Note 1) SMF5.0A – SMF58A          | $P_{PK}$        | 200         | W                    |
| Maximum Ppk Dissipation @ $T_A = 25^\circ\text{C}$ , (PW=8/20 $\mu$ s) (Note 2) | $P_{PK}$        | 1000        | W                    |
| DC Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 3)                        | PD              | 385         | mW                   |
| Derate Above $25^\circ\text{C}$                                                 |                 | 4.0         | mW/ $^\circ\text{C}$ |
| Thermal Resistance from Junction-to-Ambient (Note 3)                            | $R_{\theta JA}$ | 325         | $^\circ\text{C/W}$   |
| Operating and Storage Temperature Range                                         | $T_J, T_{stg}$  | -55 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.

1. Non-repetitive current pulse at  $T_A = 25^\circ\text{C}$ , per waveform of Figure 2.
2. Non-repetitive current pulse at  $T_A = 25^\circ\text{C}$ , per waveform of Figure 3.
3. Mounted with recommended minimum pad size, DC board FR-4.

### Description

The SMF5.0AT1G Series is designed to protect voltage sensitive components from high voltage, high energy transients. Excellent clamping capability, high surge capability, low zener impedance and fast response time. Because of its small size, it is ideal for use in cellular phones, portable devices, business machines, power supplies and many other industrial/consumer applications.

### Features

- Stand-off Voltage: 5 – 58 Volts
- Peak Power – 200 Watts @ 1 ms (SMF5.0A – SMF58A)
- Low Leakage
- Response Time is Typically < 1 ns
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- ESD Rating of Level 4 (8 kV Contact Discharge) per IEC61000-4-2
- EFT (Electrical Fast Transients) Rating of 40 A per IEC61000-4-4
- Low Profile – Maximum Height of 1.0 mm
- Small Footprint – Footprint Area of 8.45 mm<sup>2</sup>
- Supplied in 8 mm Tape and Reel – 3,000 Units per Reel
- Cathode Indicated by Polarity Band
- Lead Orientation in Tape: Cathode Lead to Sprocket Holes
- These Devices are Pb-Free and are RoHS Compliant

### Functional Diagram



### Additional Information



Datasheet

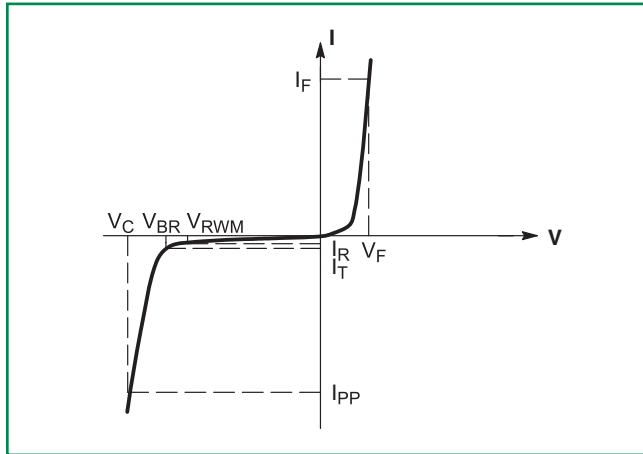


Resources



Samples

### I-V Curve Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 3.5\text{ V Max. @ } I_F$ (Note 4) = 12 A)

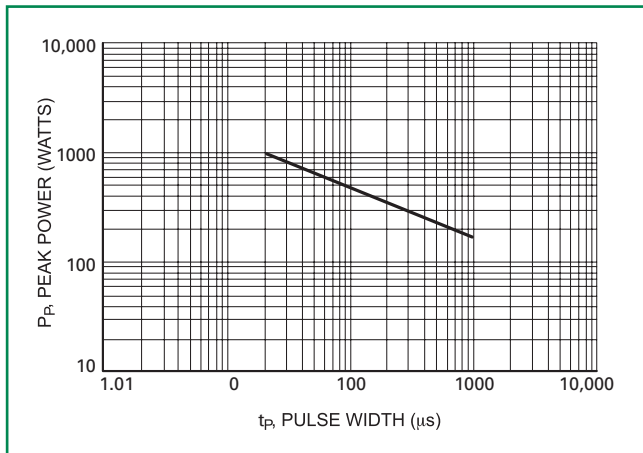


| Symbol    | Parameter                                   |
|-----------|---------------------------------------------|
| $I_{PP}$  | Maximum Reverse Peak Pulse Current          |
| $V_C$     | Clamping Voltage @ $I_{PP}$                 |
| $V_{RWM}$ | Working Peak Reverse Voltage                |
| $I_R$     | Maximum Reverse Leakage Current @ $V_{RWM}$ |
| $V_{BR}$  | Breakdown Voltage @ $I_T$                   |
| $I_T$     | Test Current                                |
| $I_F$     | Forward Current                             |
| $V_F$     | Forward Voltage @ $I_F$                     |

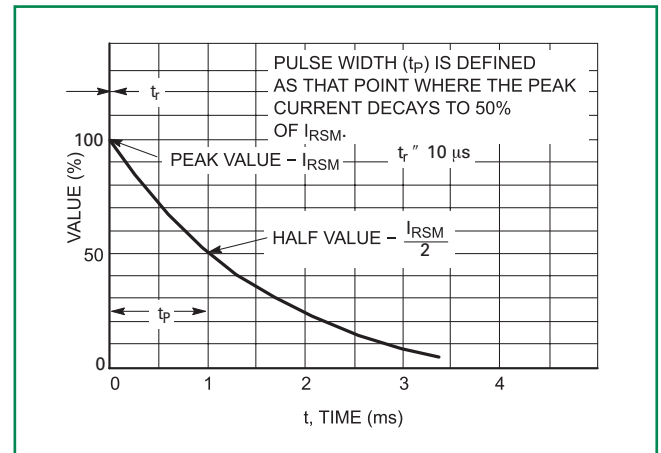
4. 1/2 sine wave (or equivalent square wave), PW = 8.3 ms, duty cycle = 4 pulses per minute maximum.

### Ratings and Characteristic Curves

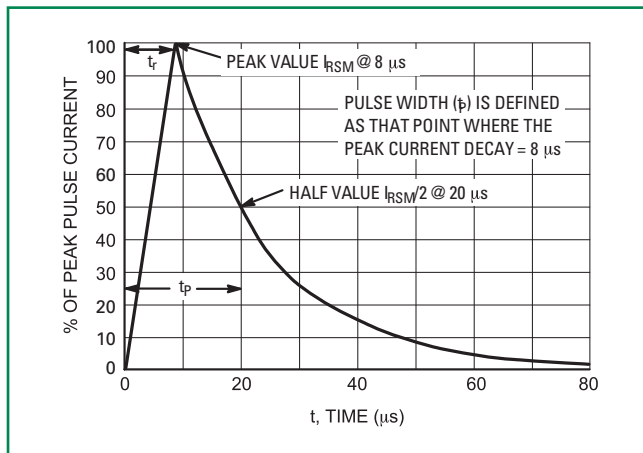
**Figure 1. Pulse Rating Curve**



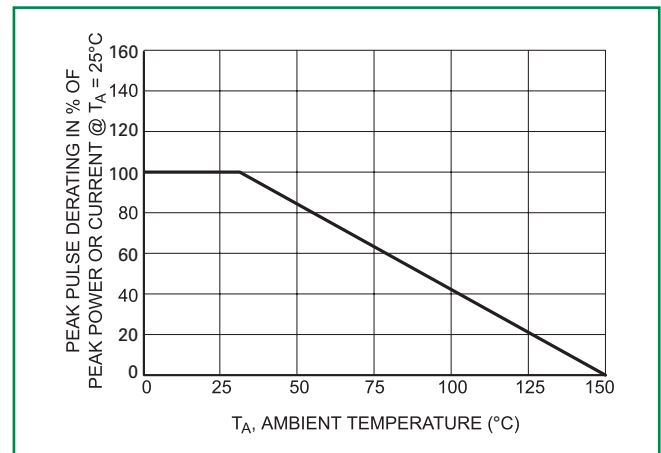
**Figure 2. 10 X 1000 μs Pulse Waveform**



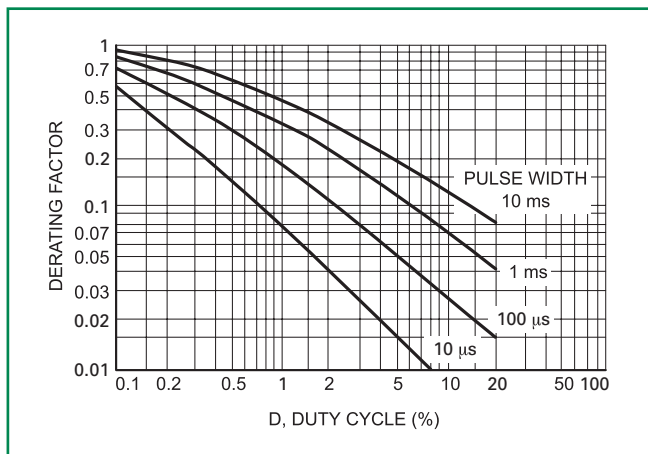
**Figure 3. 8 X 20 μs Pulse Waveform**



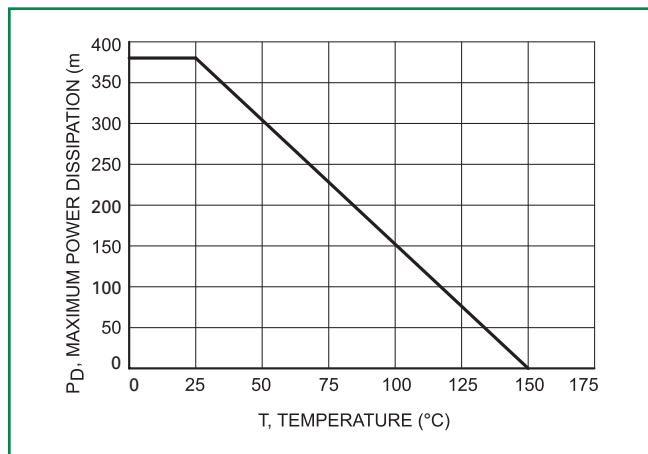
**Figure 4. Pulse Derating Curve**



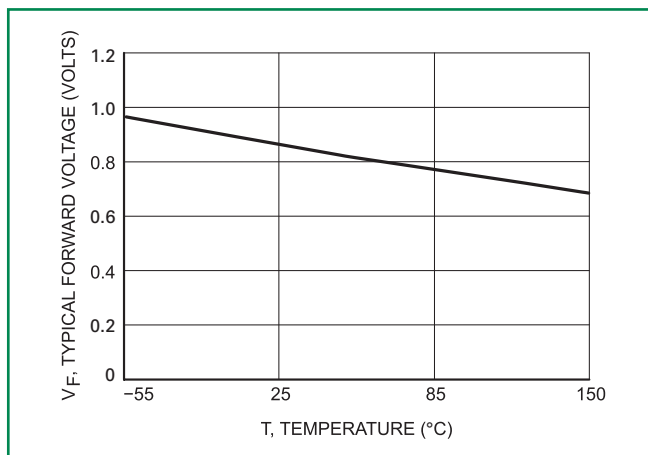
**Figure 5. Typical Derating Factor for Duty Cycle**



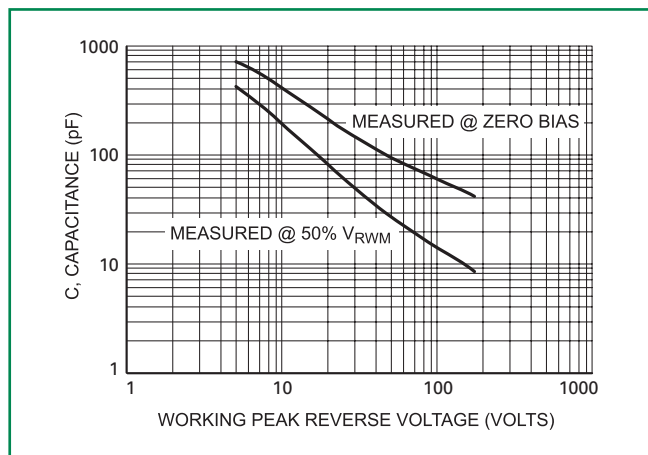
**Figure 6. Steady State Power Derating**



**Figure 7. Forward Voltage**



**Figure 8. Capacitance vs. Working Peak Reverse Voltage**



### Electrical Characteristics (T<sub>L</sub> = 30°C unless otherwise noted, V<sub>F</sub> = 1.25 Volts @ 200 mA)

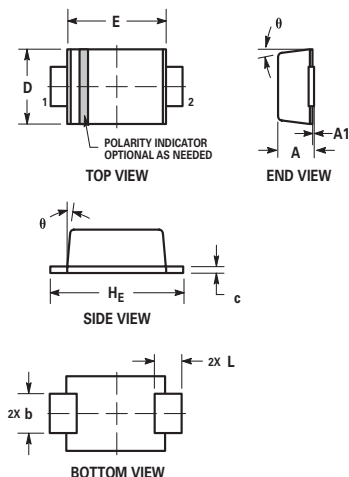
| Device   | Device Marking | V <sub>RWM</sub> | I <sub>R</sub> @ V <sub>RWM</sub> | V <sub>BR</sub> @ I <sub>T</sub> (V) (Note 6) |       |      | @ I <sub>T</sub> | I <sub>R</sub> @ V <sub>RWM</sub> | V <sub>C</sub> (Max) | I <sub>PP</sub> (Max) (A) |
|----------|----------------|------------------|-----------------------------------|-----------------------------------------------|-------|------|------------------|-----------------------------------|----------------------|---------------------------|
|          |                | V                | μA                                | Min                                           | Nom   | Max  | mA               | (μA)                              | (V)                  | (Note 7)                  |
| SMF5.0AG | KE             | 5                | 400                               | 6.4                                           | 6.7   | 7.0  | 10               | 400                               | 9.2                  | 21.7                      |
| SMF6.0AG | KG             | 6                | 400                               | 6.67                                          | 7.02  | 7.37 | 10               | 400                               | 10.3                 | 19.4                      |
| SMF6.5AG | KK             | 6.5              | 250                               | 7.22                                          | 7.60  | 7.98 | 10               | 250                               | 11.2                 | 17.9                      |
| SMF7.0AG | KM             | 7                | 100                               | 7.78                                          | 8.19  | 8.6  | 10               | 100                               | 12                   | 16.7                      |
| SMF7.5AG | KP             | 7.5              | 50                                | 8.33                                          | 8.77  | 9.21 | 1                | 50                                | 12.9                 | 15.5                      |
| SMF8.0AG | KR             | 8                | 25                                | 8.89                                          | 9.36  | 9.83 | 1                | 25                                | 13.6                 | 14.7                      |
| SMF9.0AG | KV             | 9                | 5                                 | 10                                            | 10.55 | 11.1 | 1                | 5                                 | 15.4                 | 13.0                      |
| SMF10AG  | KX             | 10               | 2.5                               | 11.1                                          | 11.7  | 12.3 | 1                | 2.5                               | 17                   | 11.8                      |
| SMF11AG  | KZ             | 11               | 2.5                               | 12.2                                          | 12.85 | 13.5 | 1                | 2.5                               | 18.2                 | 11.0                      |
| SMF12AG  | LE             | 12               | 2.5                               | 13.3                                          | 14    | 14.7 | 1                | 2.5                               | 19.9                 | 10.1                      |
| SMF13AG  | LG             | 13               | 1                                 | 14.4                                          | 15.15 | 15.9 | 1                | 1                                 | 21.5                 | 9.3                       |
| SMF14AG  | LK             | 14               | 1                                 | 15.6                                          | 16.4  | 17.2 | 1                | 1                                 | 23.2                 | 8.6                       |
| SMF15AG  | LM             | 15               | 1                                 | 16.7                                          | 17.6  | 18.5 | 1                | 1                                 | 24.4                 | 8.2                       |
| SMF18AG  | LT             | 18               | 1                                 | 20                                            | 21    | 22.1 | 1                | 1                                 | 29.2                 | 6.8                       |
| SMF20AG  | LV             | 20               | 1                                 | 22.2                                          | 23.35 | 24.5 | 1                | 1                                 | 32.4                 | 6.2                       |
| SMF22AG  | LX             | 22               | 1                                 | 24.4                                          | 25.6  | 26.9 | 1                | 1                                 | 35.5                 | 5.6                       |
| SMF24AG  | LZ             | 24               | 1                                 | 26.7                                          | 28.1  | 29.5 | 1                | 1                                 | 38.9                 | 5.1                       |
| SMF26AG  | ME             | 26               | 1                                 | 28.9                                          | 30.4  | 31.9 | 1                | 1                                 | 42.1                 | 4.8                       |
| SMF28AG  | MG             | 28               | 1                                 | 31.1                                          | 32.8  | 34.4 | 1                | 1                                 | 45.4                 | 4.4                       |
| SMF30AG  | MK             | 30               | 1                                 | 33.3                                          | 35.1  | 36.8 | 1                | 1                                 | 48.4                 | 4.1                       |
| SMF33AG  | MM             | 33               | 1                                 | 36.7                                          | 38.7  | 40.6 | 1                | 1                                 | 53.3                 | 3.8                       |
| SMF36AG  | MP             | 36               | 1                                 | 40                                            | 42.1  | 44.2 | 1                | 1                                 | 58.1                 | 3.4                       |
| SMF48AG  | MX             | 48               | 1                                 | 53.3                                          | 56.1  | 58.9 | 1                | 1                                 | 77.4                 | 2.6                       |
| SMF51AG  | MZ             | 51               | 1                                 | 56.7                                          | 59.7  | 62.7 | 1                | 1                                 | 82.4                 | 2.4                       |
| SMF58AG  | NG             | 58               | 1                                 | 64.4                                          | 67.8  | 71.2 | 1                | 1                                 | 93.6                 | 2.1                       |

5. 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.

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

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

### Dimensions

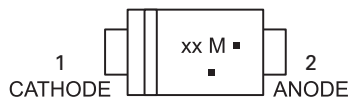


| Dim            | Inches |       |       | Millimeters |      |      |
|----------------|--------|-------|-------|-------------|------|------|
|                | Min    | Nom   | Max   | Min         | Nom  | Max  |
| A              | 0.035  | 0.037 | 0.039 | 0.90        | 0.95 | 0.98 |
| A1             | 0.000  | 0.002 | 0.004 | 0.00        | 0.05 | 0.10 |
| b              | 0.028  | 0.035 | 0.043 | 0.70        | 0.90 | 1.10 |
| c              | 0.004  | 0.006 | 0.008 | 0.10        | 0.15 | 0.20 |
| D              | 0.059  | 0.065 | 0.071 | 1.50        | 1.65 | 1.80 |
| E              | 0.098  | 0.106 | 0.114 | 2.50        | 2.70 | 2.90 |
| L              | 0.022  | 0.030 | 0.037 | 0.55        | 0.75 | 0.95 |
| H <sub>E</sub> | 0.134  | 0.142 | 0.150 | 3.40        | 3.60 | 3.80 |
| θ              | 0°     | —     | 8°    | 0°          | —    | 8°   |

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH.
4. DIMENSIONS D AND J ARE TO BE MEASURED ON FLAT SECTION OF THE LEAD: BETWEEN 0.10 AND 0.25 MM FROM THE LEAD TIP.

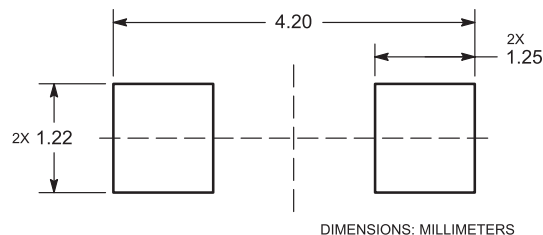
### Part Marking System



xx = Device Code (Refer to page 3)  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### Soldering Footprint



### ORDERING INFORMATION

| Device     | Package                | Shipping†              |
|------------|------------------------|------------------------|
| SMFxxxAT1G | SOD-123FL<br>(Pb-Free) | 3,000 /<br>Tape & Reel |

### Flow/Wave Soldering (Solder Dipping)

|                           |                                             |
|---------------------------|---------------------------------------------|
| <b>Peak Temperature :</b> | 260°C<br>Device Meets MSL 1<br>Requirements |
|---------------------------|---------------------------------------------|

### Physical Specifications

|                          |                                                                         |
|--------------------------|-------------------------------------------------------------------------|
| <b>Case</b>              | Void-free, transfer-molded, thermosetting plastic Epoxy Meets UL 94 V-0 |
| <b>Lead Finish</b>       | 100% Matte Sn (Tin)                                                     |
| <b>Mounting Position</b> | Any                                                                     |

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