

# MMBZxxVAWT1G Series, SZMMBZxxVAWT1G Series

## Zener Diodes, 40 Watt Peak Power

### SC-70 Dual Common Anode Zeners

These dual monolithic silicon Zener diodes are designed for applications requiring protection capability. They are intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment and other applications. Their dual junction common anode design protects two separate lines using only one package. These devices are ideal for situations where board space is at a premium.

#### Features

- SC-70 Package Allows Either Two Separate Unidirectional Configurations or a Single Bidirectional Configuration
- Standard Zener Breakdown Voltage Range: 15 – 33 V
- Peak Power – 40 W @ 1.0 ms (Unidirectional), per Figure 5 Waveform
- ESD Rating:
  - Class 3B (> 16 kV) per the Human Body Model
  - Class C (> 400 V) per the Machine Model
- Low Leakage < 5.0  $\mu$ A
- Flammability Rating UL 94 V-0
- AEC-Q101 Qualified and PPAP Capable – SZMMBZxxVAWT1G
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These are Pb-Free Devices\*

#### Mechanical Characteristics:

**CASE:** Void-free, transfer-molded, thermosetting plastic case

**FINISH:** Corrosion resistant finish, easily solderable

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

Package designed for optimal automated board assembly

Small package size for high density applications

Available in 8 mm Tape and Reel

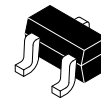
Use the Device Number to order the 7 inch/3,000 unit reel.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

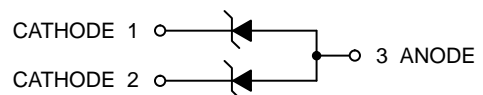


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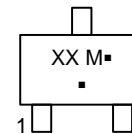
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SC-70  
CASE 419  
STYLE 4



#### MARKING DIAGRAM



XX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device         | Package            | Shipping†              |
|----------------|--------------------|------------------------|
| MMBZxxVAWT1G   | SC-70<br>(Pb-Free) | 3,000 /<br>Tape & Reel |
| SZMMBZxxVAWT1G | SC-70<br>(Pb-Free) | 3,000 /<br>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.

#### DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the table on page 2 of this data sheet.

# MMBZxxVAWT1G Series, SZMMBZxxVAWT1G Series

## MAXIMUM RATINGS

| Rating  | Symbol          | Value        | Unit                       |
|---|-----------------|--------------|----------------------------|
| Peak Power Dissipation @ 1.0 ms (Note 1)<br>@ $T_L \leq 25^\circ\text{C}$                                       | $P_{pk}$        | 40           | W                          |
| Total Power Dissipation on FR-5 Board (Note 2)<br>@ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 200<br>1.6   | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance Junction-to-Ambient  | $R_{\theta JA}$ | 618          | $^\circ\text{C/W}$         |
| Junction and Storage Temperature Range  | $T_J, T_{stg}$  | - 55 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.

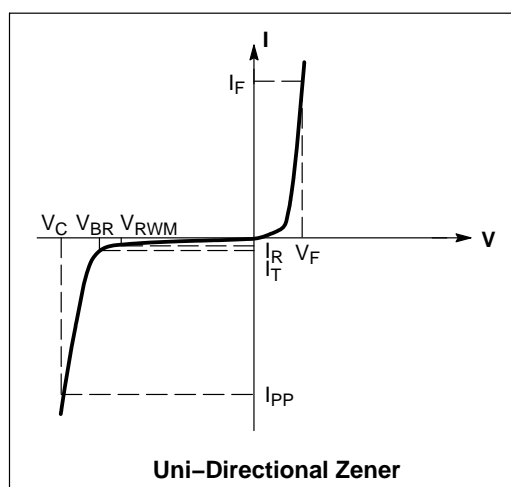
1. Non-repetitive current pulse per Figure 5 and derate above  $T_A = 25^\circ\text{C}$  per Figure 6.
2. FR-5 = 1.0 x 0.75 x 0.62 in.

## ELECTRICAL CHARACTERISTICS

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

**UNIDIRECTIONAL** (Circuit tied to Pins 1 and 3 or 2 and 3)

| 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                                |
| $\theta V_{BR}$ | Maximum Temperature Coefficient of $V_{BR}$ |
| $I_F$           | Forward Current                             |
| $V_F$           | Forward Voltage @ $I_F$                     |
| $Z_{ZT}$        | Maximum Zener Impedance @ $I_{ZT}$          |
| $I_{ZK}$        | Reverse Current                             |
| $Z_{ZK}$        | Maximum Zener Impedance @ $I_{ZK}$          |



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

**UNIDIRECTIONAL** (Circuit tied to Pins 1 and 3 or Pins 2 and 3)

( $V_F = 0.9\text{ V Max}$  @  $I_F = 10\text{ mA}$ )

| Device*      | Device Marking | $V_{RWM}$<br>Volts | $I_R$ @<br>$V_{RWM}$<br>nA | Breakdown Voltage     |     |       | $V_C$ @ $I_{PP}$ (Note 4) |               | $\theta V_{BR}$<br>mV/ $^\circ\text{C}$ |               |
|--------------|----------------|--------------------|----------------------------|-----------------------|-----|-------|---------------------------|---------------|---|---------------|
|              |                |                    |                            | $V_{BR}$ (Note 3) (V) |     |       | $V_C$<br>V                | $I_{PP}$<br>A |   |               |
|              |                |                    |                            | Min                   | Nom | Max   |                           |               |   | @ $I_T$<br>mA |
| MMBZ15VAWT1G | AT             | 12                 | 50                         | 14.25                 | 15  | 15.75 | 1.0                       | 21            | 1.9                                     | 12.3          |
| MMBZ20VAWT1G | AU             | 17                 | 50                         | 19.00                 | 20  | 21.00 | 1.0                       | 28            | 1.4                                     | 17.2          |
| MMBZ27VAWT1G | AA             | 22                 | 50                         | 25.65                 | 27  | 28.35 | 1.0                       | 40            | 1.0                                     | 24.3          |
| MMBZ33VAWT1G | AV             | 26                 | 50                         | 31.35                 | 33  | 34.65 | 1.0                       | 46            | 0.87                                    | 30.4          |

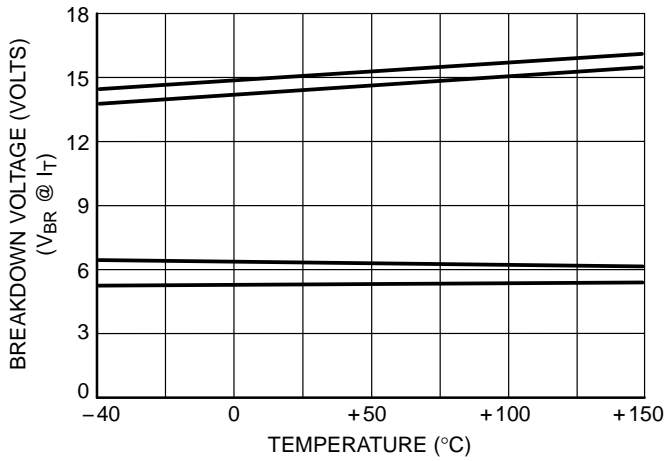
3.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .

4. Surge current waveform per Figure 5 and derate per Figure 6

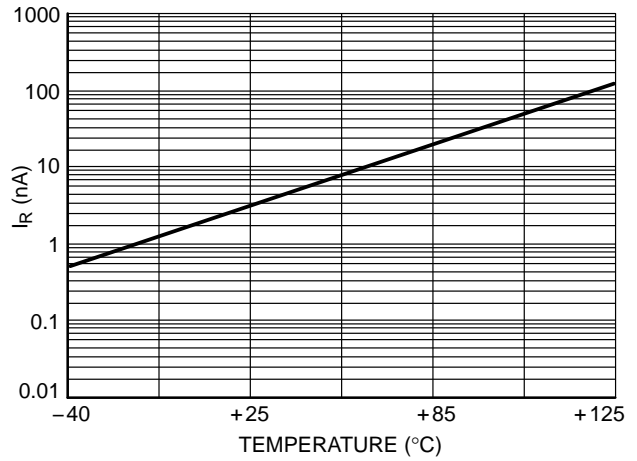
\*Include SZ-prefix devices where applicable.

# MMBZxxVAWT1G Series, SZMMBZxxVAWT1G Series

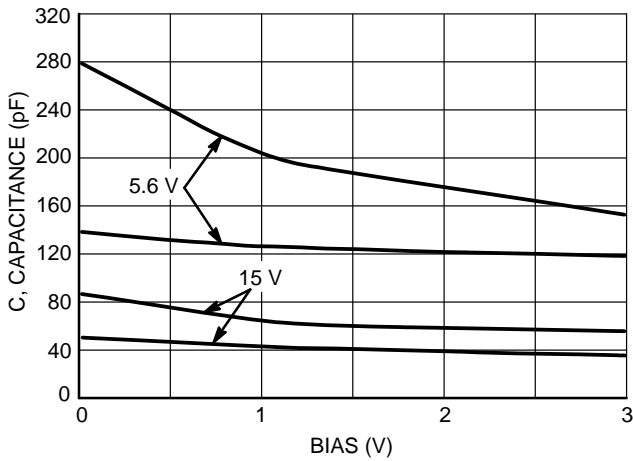
## TYPICAL CHARACTERISTICS



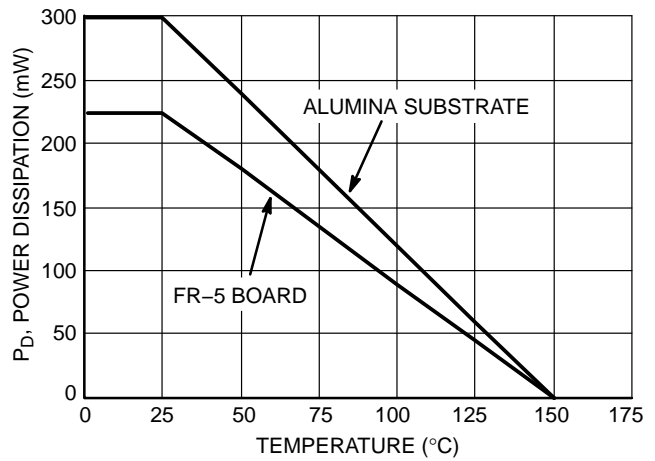
**Figure 1. Typical Breakdown Voltage versus Temperature**  
(Upper curve for each voltage is bidirectional mode, lower curve is unidirectional mode)



**Figure 2. Typical Leakage Current versus Temperature**



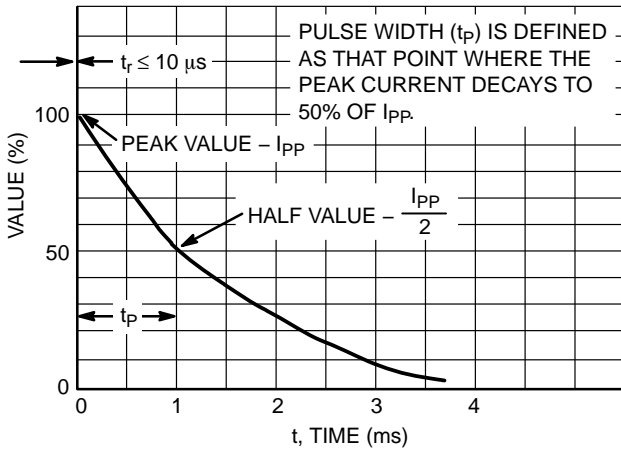
**Figure 3. Typical Capacitance versus Bias Voltage**  
(Upper curve for each voltage is unidirectional mode, lower curve is bidirectional mode)



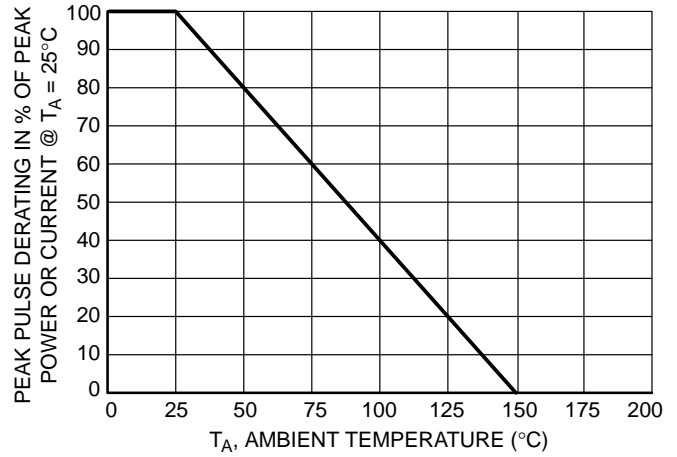
**Figure 4. Steady State Power Derating Curve**

# MMBZxxVAWT1G Series, SZMMBZxxVAWT1G Series

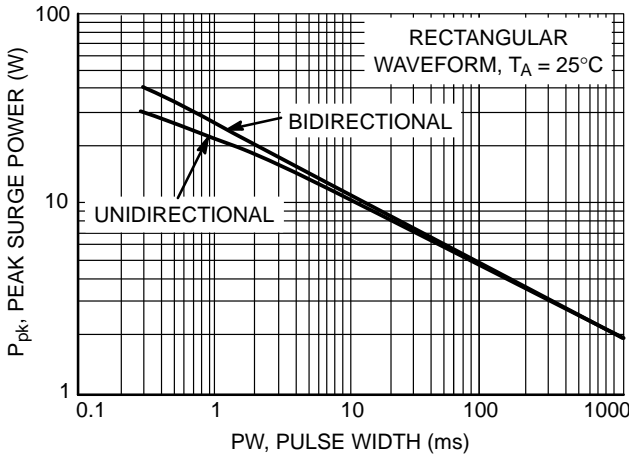
## TYPICAL CHARACTERISTICS



**Figure 5. Pulse Waveform**

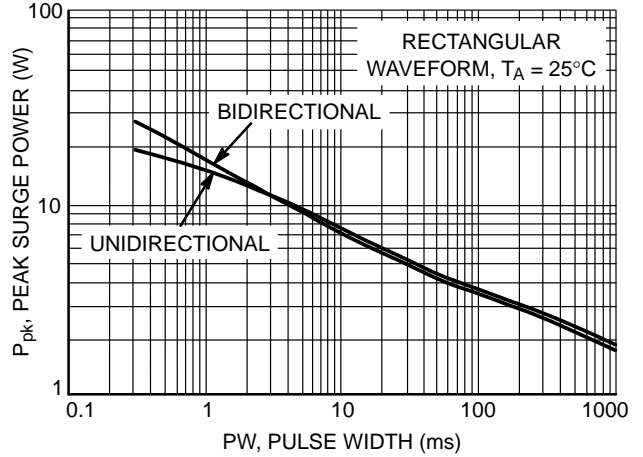


**Figure 6. Pulse Derating Curve**



**Figure 7. Maximum Non-repetitive Surge Power,  $P_{pk}$  versus PW**

Power is defined as  $V_{RSM} \times I_Z(pk)$  where  $V_{RSM}$  is the clamping voltage at  $I_Z(pk)$ .



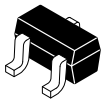
**Figure 8. Maximum Non-repetitive Surge Power,  $P_{pk}(NOM)$  versus PW**

Power is defined as  $V_Z(NOM) \times I_Z(pk)$  where  $V_Z(NOM)$  is the nominal Zener voltage measured at the low test current used for voltage classification.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

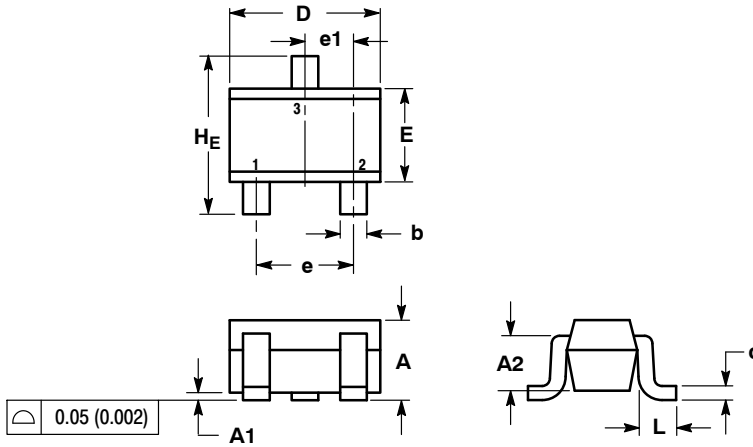
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SCALE 4:1

SC-70 (SOT-323)  
CASE 419-04  
ISSUE N

DATE 11 NOV 2008

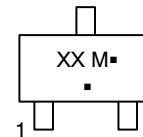


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | MILLIMETERS |      |      | INCHES    |       |       |
|-----|-------------|------|------|-----------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN       | NOM   | MAX   |
| A   | 0.80        | 0.90 | 1.00 | 0.032     | 0.035 | 0.040 |
| A1  | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A2  | 0.70 REF    |      |      | 0.028 REF |       |       |
| b   | 0.30        | 0.35 | 0.40 | 0.012     | 0.014 | 0.016 |
| c   | 0.10        | 0.18 | 0.25 | 0.004     | 0.007 | 0.010 |
| D   | 1.80        | 2.10 | 2.20 | 0.071     | 0.083 | 0.087 |
| E   | 1.15        | 1.24 | 1.35 | 0.045     | 0.049 | 0.053 |
| e   | 1.20        | 1.30 | 1.40 | 0.047     | 0.051 | 0.055 |
| e1  | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L   | 0.20        | 0.38 | 0.56 | 0.008     | 0.015 | 0.022 |
| HE  | 2.00        | 2.10 | 2.40 | 0.079     | 0.083 | 0.095 |

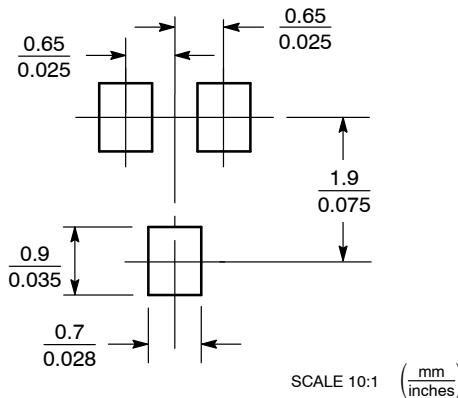
### GENERIC MARKING DIAGRAM



- XX = Specific Device Code
- M = Date Code
- = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present.

### 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.

- |   |   |   |  |   |   |
|---|---|---|--|---|---|
| STYLE 1:<br>CANCELLED                                 | STYLE 2:<br>PIN 1. ANODE<br>2. N.C.<br>3. CATHODE     | STYLE 3:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE       | STYLE 5:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE          |   |
| STYLE 6:<br>PIN 1. EMITTER<br>2. BASE<br>3. COLLECTOR | STYLE 7:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 8:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN      | STYLE 9:<br>PIN 1. ANODE<br>2. CATHODE<br>3. CATHODE-ANODE | STYLE 10:<br>PIN 1. CATHODE<br>2. ANODE<br>3. ANODE-CATHODE | STYLE 11:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. CATHODE |

|                         |                        |  |
|-------------------------|------------------------|--|
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| <b>DESCRIPTION:</b>     | <b>SC-70 (SOT-323)</b> | <b>PAGE 1 OF 1</b>   |

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