

# 40 Watt Peak Power Zener Surge Protection Device

## SC-70 Dual Common Cathode Zeners

### MMBZ27VCW

These dual monolithic silicon zener diodes are designed for applications requiring transient overvoltage 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 cathode design protects two separate lines using only one package. These devices are ideal for situations where board space is at a premium.

#### Specification Features:

- SC-70 Package Allows Either Two Separate Unidirectional Configurations or a Single Bidirectional Configuration
- Working Peak Reverse Voltage Range – 22 V
- Standard Zener Breakdown Voltage – 27 V
- Peak Power – 40 W @ 1.0 ms (Bidirectional), per Figure 4 Waveform
- ESD Rating of Class N (exceeding 16 kV) per the Human Body Model
- Low Leakage < 100 nA
- Flammability Rating: UL 94 V-O
- 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, Halogen Free/BFR Free and are RoHS Compliant

#### Mechanical Characteristics:

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

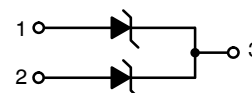
**FINISH:** Corrosion resistant finish, easily solderable

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



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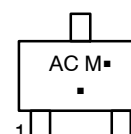


PIN 1. ANODE  
2. ANODE  
3. CATHODE



**SC-70  
CASE 419  
STYLE 4**

#### MARKING DIAGRAM



AC = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
MMBZ27VCWT1G	SC-70 (Pb-Free)	3000 / Tape & Reel
SZMMBZ27VCWT1G	SC-70 (Pb-Free)	3000 / Tape & Reel
MMBZ27VCWT3G	SC-70 (Pb-Free)	10000 / Tape & Reel
SZMMBZ27VCWT3G	SC-70 (Pb-Free)	10000 / 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.

# MMBZ27VCW

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1) @ $T_L \leq 25^\circ\text{C}$	$P_{pk}$	40	Watts
Total Power Dissipation on FR-5 Board (Note 2) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	200 1.6	mW 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.

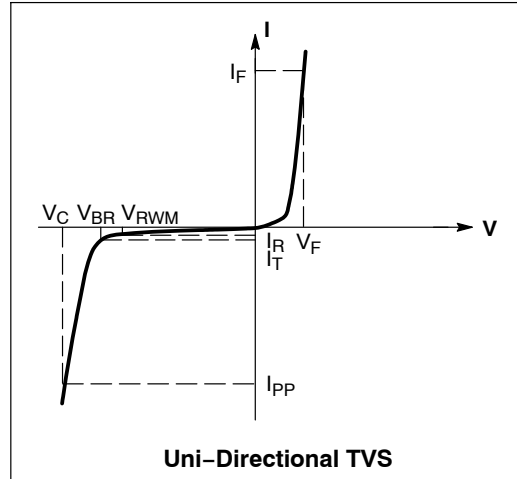
1. Nonrepetitive current pulse per Figure 4 and derate above  $T_A = 25^\circ\text{C}$  per Figure 5.
2. FR-5 = 1.0 x 0.75 x 0.62 in.

## 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
$V_{BR}$	Maximum Temperature Coefficient of $V_{BR}$
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$



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

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

( $V_F = 1.1 \text{ V Max}$  @  $I_F = 200 \text{ mA}$ )

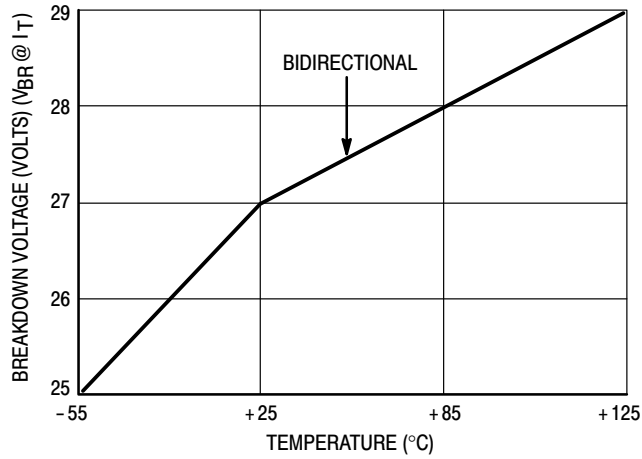
Device	Device Marking	V <sub>RWM</sub>	I <sub>R</sub> @ V <sub>RWM</sub>	Breakdown Voltage				V <sub>C</sub> @ I <sub>PP</sub> (Note 4)		V <sub>BR</sub>
				V <sub>BR</sub> (Note 3) (V)			@ I <sub>T</sub>	V <sub>C</sub>	I <sub>PP</sub>	
		Volts	nA	Min	Nom	Max	mA	V	A	mV/°C
MMBZ27VCWT1G, SZMMBZ27VCWT1G, MMBZ27VCWT3G, SZMMBZ27VCWT3G	AC	22	50	25.65	27	28.35	1.0	38	1.0	26

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

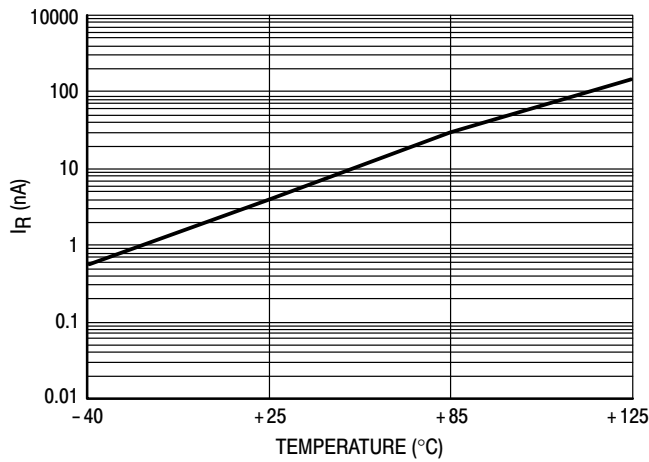
4. Surge current waveform per Figure 4 and derate per Figure 5

# MMBZ27VCW

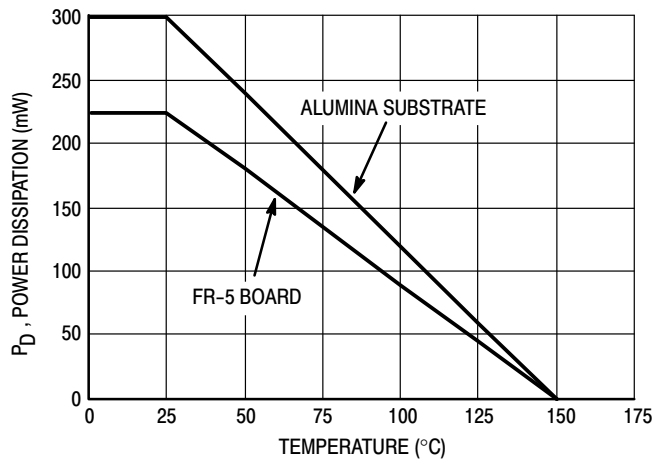
## TYPICAL CHARACTERISTICS



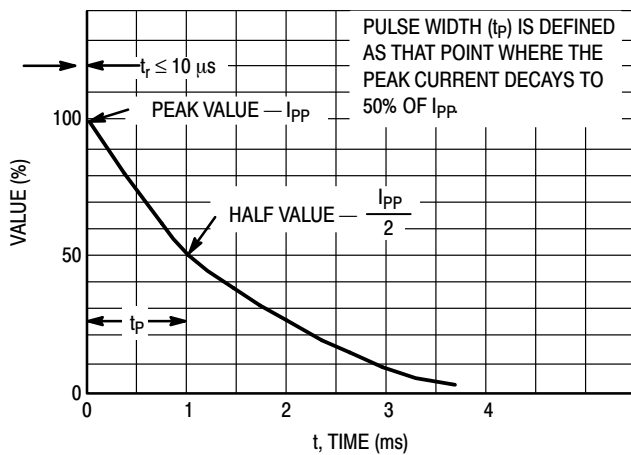
**Figure 1. Typical Breakdown Voltage versus Temperature**



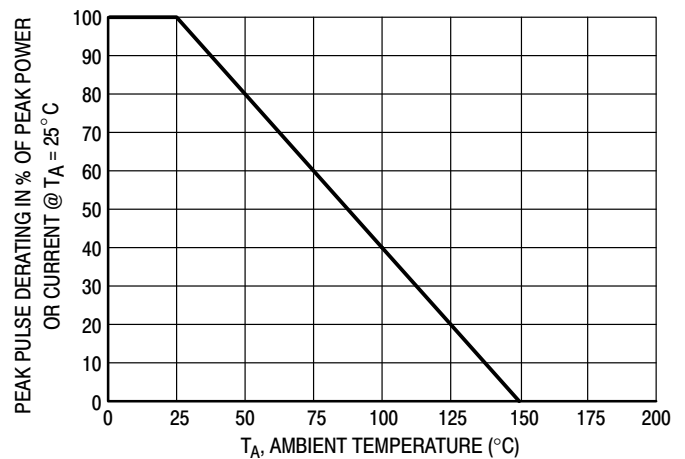
**Figure 2. Typical Leakage Current versus Temperature**



**Figure 3. Steady State Power Derating Curve**

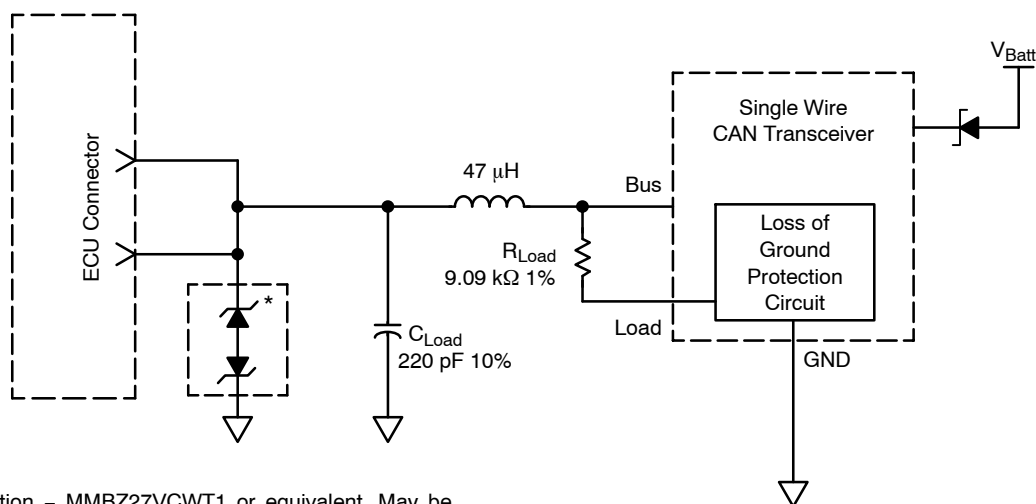


**Figure 4. Pulse Waveform**



**Figure 5. Pulse Derating Curve**

TYPICAL APPLICATIONS



\*ESD Protection – MMBZ27VCWT1 or equivalent. May be located in each ECU ( $C_{Load}$  needs to be reduced accordingly) or at a central point near the DLC.

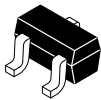
**Figure 6. Single Wire CAN Network**

Figure is the recommended solution for transient EMI/ESD protection. This circuit is shown in the Society of Automotive Engineers February, 2000 J2411 “Single Wire CAN Network for Vehicle Applications” specification (Figure 6, page 11). Note: the dual common anode zener configuration shown above is electrically equivalent to a dual common cathode zener configuration.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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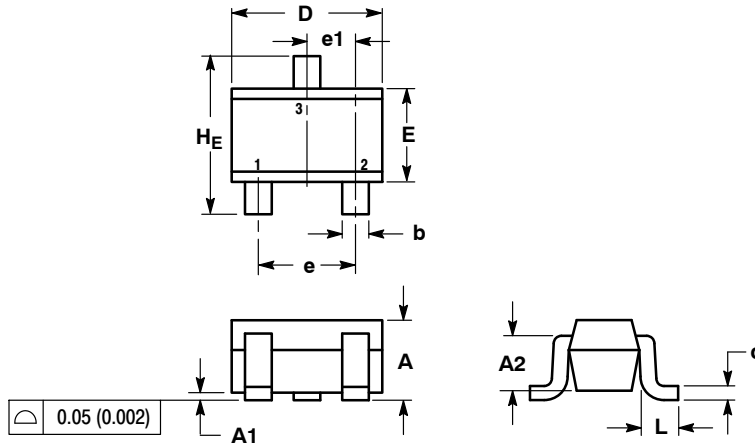
SCALE 4:1

### SC-70 (SOT-323)

#### CASE 419-04

#### ISSUE N

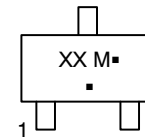
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NOTES:  
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
2. CONTROLLING DIMENSION: INCH.

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
H <sub>E</sub>	2.00	2.10	2.40	0.079	0.083	0.095

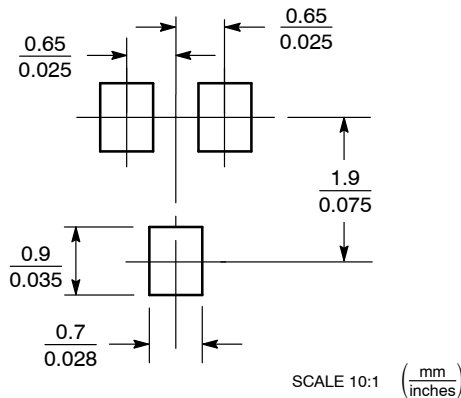
### GENERIC MARKING DIAGRAM



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:  
CANCELLED

STYLE 2:  
PIN 1. ANODE  
2. N.C.  
3. CATHODE

STYLE 3:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 5:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 6:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 7:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 8:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

STYLE 9:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

STYLE 10:  
PIN 1. CATHODE  
2. ANODE  
3. ANODE-CATHODE

STYLE 11:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE

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