

# MMBZ15VDLT1, MMBZ27VCLT1, SZMMBZ15VDLT1G, SZMMBZ27VCLT1G

## 40 Watt Peak Power Zener Transient Voltage Suppressors

### SOT-23 Dual Common Cathode Zeners for ESD Protection

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.

The MMBZ27VCLT1/SZMMBZ27VCLT1G can be used to protect a single wire communication network from EMI and ESD transient surge voltages. The MMBZ27VCLT1/SZMMBZ27VCLT1G is recommended by the Society of Automotive Engineers (SAE), February 2000, J2411 "Single Wire Can Network for Vehicle Applications" specification as a solution for transient voltage problems.

#### Specification Features:

- SOT-23 Package Allows Either Two Separate Unidirectional Configurations or a Single Bidirectional Configuration
- Working Peak Reverse Voltage Range – 12.8 V, 22 V
- Standard Zener Breakdown Voltage Range – 15 V, 27 V
- Peak Power – 40 W @ 1.0 ms (Bidirectional), per Figure 5 Waveform
- ESD Rating of Class 3B (exceeding 16 kV) per the Human Body Model
- Low Leakage < 100 nA
- Flammability Rating: UL 94 V-O
- AEC-Q101 Qualified and PPAP Capable
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- Pb-Free Packages are Available

#### Mechanical Characteristics:

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

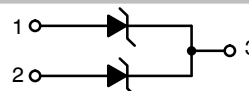
**FINISH:** Corrosion resistant finish, easily solderable

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

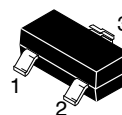


ON Semiconductor®

<http://onsemi.com>

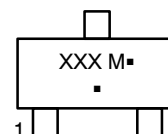


PIN 1. ANODE  
2. ANODE  
3. CATHODE



SOT-23  
CASE 318  
STYLE 9

#### MARKING DIAGRAM



XXX = 15D or 27C

M = Date Code

■ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
MMBZ15VDLT1	SOT-23	3000 / Tape & Reel
MMBZ15VDLT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
SZMMBZ15VDLT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
MMBZ15VDLT3	SOT-23	10,000 / Tape & Reel
MMBZ15VDLT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
SZMMBZ15VDLT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
MMBZ27VCLT1	SOT-23	3000 / Tape & Reel
MMBZ27VCLT1G	SOT-23 (Pb-Free)	3000 / Tape & Reel
SZMMBZ27VCLT1G	SOT-23 (Pb-Free)	3000 / 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.

# MMBZ15VDLT1, MMBZ27VCLT1, SZMMBZ15VDLT1G, SZMMBZ27VCLT1G

## 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 $25^\circ\text{C}$	$P_D$	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Power Dissipation on Alumina Substrate (Note 3) @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance Junction-to-Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to +150	$^\circ\text{C}$
Lead Solder Temperature – Maximum (10 Second Duration)	$T_L$	260	$^\circ\text{C}$

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.

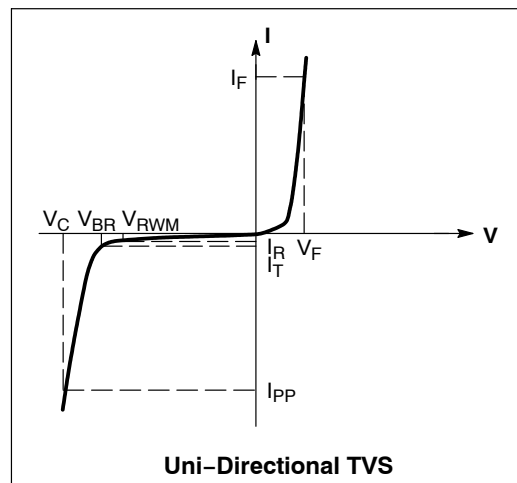
1. Nonrepetitive current pulse per Figure 5 and derate above  $T_A = 25^\circ\text{C}$  per Figure 6.
2. FR-5 =  $1.0 \times 0.75 \times 0.62$  in.
3. Alumina =  $0.4 \times 0.3 \times 0.024$  in., 99.5% alumina

## 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)

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

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 5)		V <sub>BR</sub>
		Volts	nA	V <sub>BR</sub> (Note 4) (V)			@ I <sub>T</sub>	V <sub>C</sub>	I <sub>PP</sub>	
				Min	Nom	Max	mA	V	A	
SZ/MMBZ15VDLT1, G*	15D	12.8	100	14.3	15	15.8	1.0	21.2	1.9	12

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

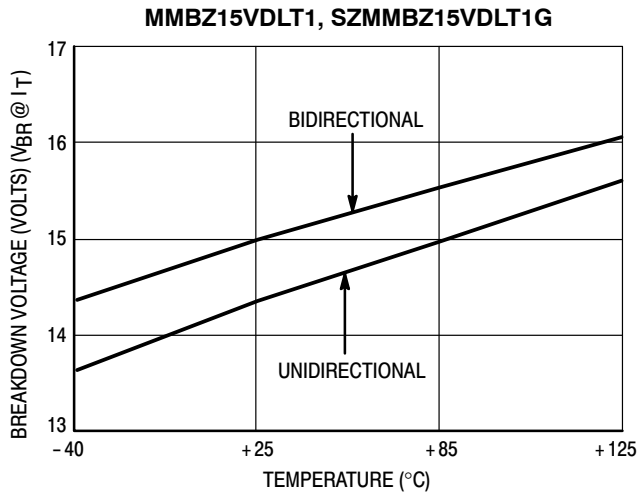
Device	Device Marking	V <sub>RWM</sub>	I <sub>R</sub> @ V <sub>RWM</sub>	Breakdown Voltage				V <sub>C</sub> @ I <sub>PP</sub> (Note 5)		V <sub>BR</sub>
				V <sub>BR</sub> (Note 4) (V)			@ I <sub>T</sub>	V <sub>C</sub>	I <sub>PP</sub>	
		Volts	nA	Min	Nom	Max	mA	V	A	mV/°C
SZ/MMBZ27VCLT1, G*	27C	22	50	25.65	27	28.35	1.0	38	1.0	26

\*The "G" suffix indicates Pb-Free package available.

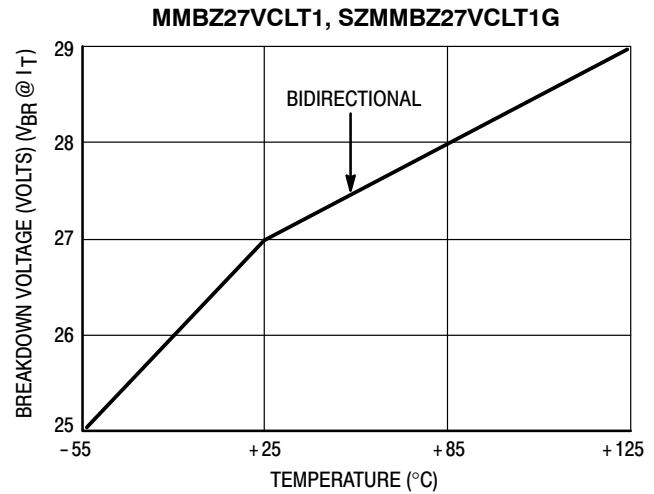
4.  $V_{BR}$  measured at pulse test current  $I_T$  at an ambient temperature of  $25^\circ\text{C}$ .
5. Surge current waveform per Figure 5 and derate per Figure 6

# MMBZ15VDLT1, MMBZ27VCLT1, SZMMBZ15VDLT1G, SZMMBZ27VCLT1G

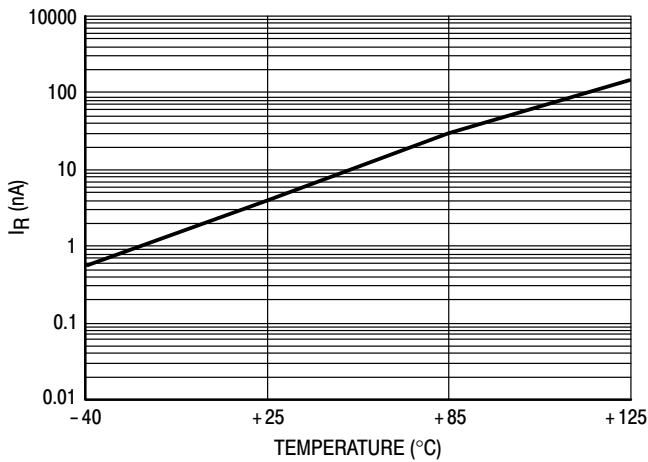
## TYPICAL CHARACTERISTICS



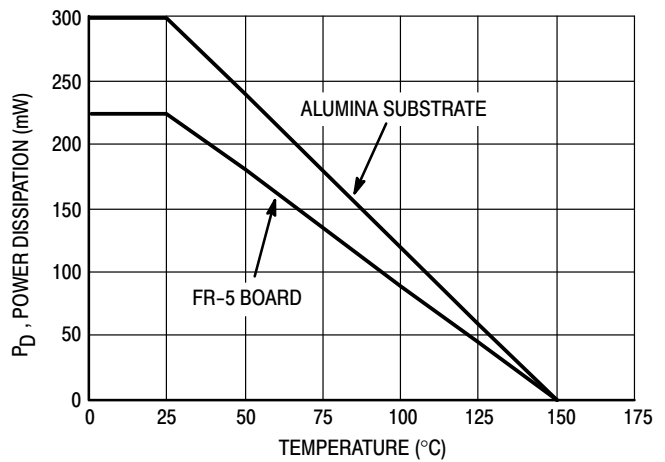
**Figure 1. Typical Breakdown Voltage versus Temperature**



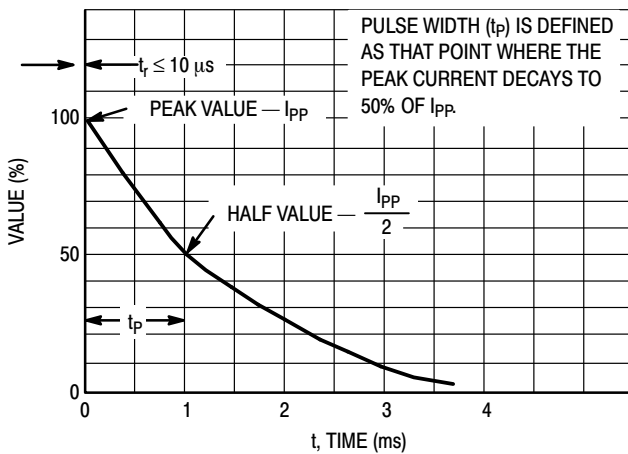
**Figure 2. Typical Breakdown Voltage versus Temperature**



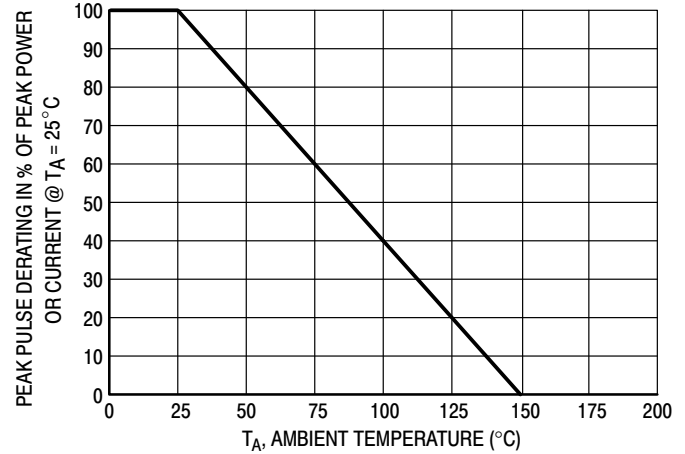
**Figure 3. Typical Leakage Current versus Temperature**



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

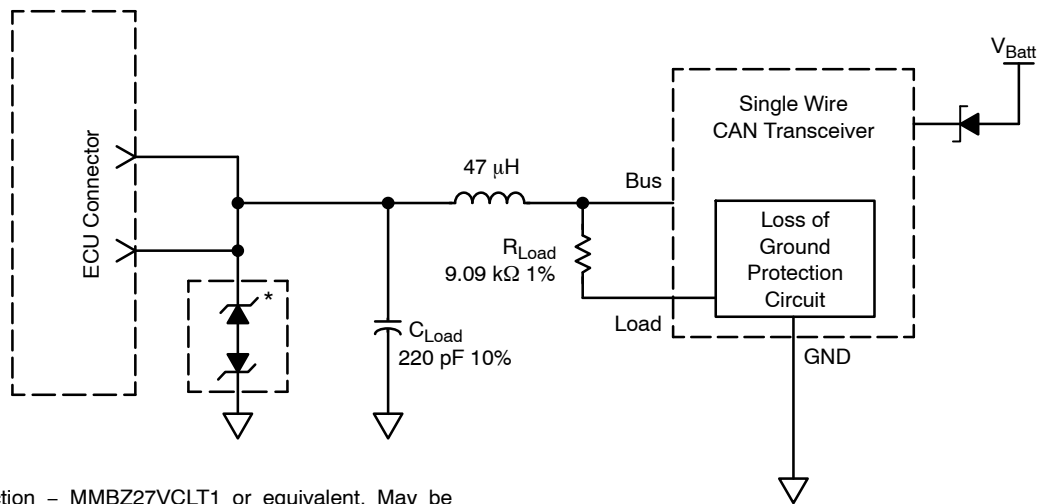


**Figure 5. Pulse Waveform**



**Figure 6. Pulse Derating Curve**

## TYPICAL APPLICATIONS



\*ESD Protection – MMBZ27VCLT1 or equivalent. May be located in each ECU (C<sub>Load</sub> needs to be reduced accordingly) or at a central point near the DLC.

**Figure 7. 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.

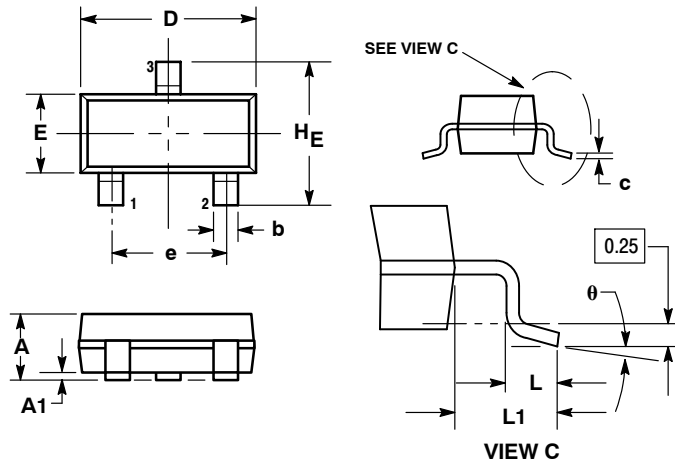
# MMBZ15VDLT1, MMBZ27VCLT1, SZMMBZ15VDLT1G, SZMMBZ27VCLT1G

## PACKAGE DIMENSIONS

### SOT-23 (TO-236)

CASE 318-08

ISSUE AP



#### NOTES:

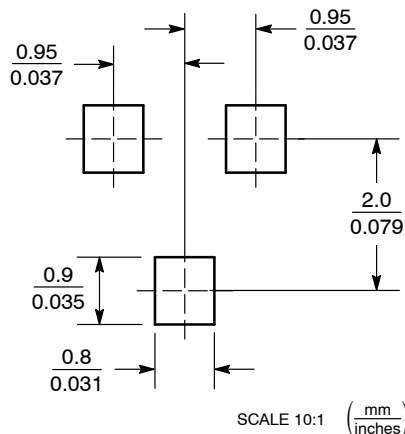
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.89	1.00	1.11	0.035	0.040	0.044
A1	0.01	0.06	0.10	0.001	0.002	0.004
b	0.37	0.44	0.50	0.015	0.018	0.020
c	0.09	0.13	0.18	0.003	0.005	0.007
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.081
L	0.10	0.20	0.30	0.004	0.008	0.012
L1	0.35	0.54	0.69	0.014	0.021	0.029
HE	2.10	2.40	2.64	0.083	0.094	0.104
θ	0°	---	10°	0°	---	10°


#### STYLE 9:

- PIN 1. ANODE
- ANODE
- CATHODE

### 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.

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
Email: [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

N. American Technical Support: 800-282-9855 Toll Free  
USA/Canada

Europe, Middle East and Africa Technical Support:  
Phone: 421 33 790 2910

Japan Customer Focus Center  
Phone: 81-3-5817-1050

ON Semiconductor Website: [www.onsemi.com](http://www.onsemi.com)

Order Literature: <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative

MMBZ15VDLT1/D