

MMBZ15VDLT1G, MMBZ27VCLT1G, 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 MMBZ27VCLT1G/SZMMBZ27VCLT1G can be used to protect a single wire communication network from EMI and ESD transient surge voltages.

The MMBZ27VCLT1G/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-0
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- Pb-Free Packages are Available*

Mechanical Characteristics:

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

FINISH: Corrosion resistant finish, easily solderable

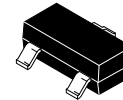
MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:
260°C for 10 Seconds

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

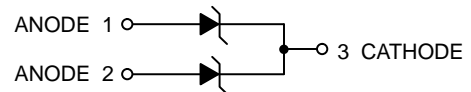


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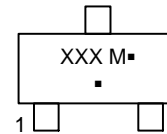
<http://onsemi.com>



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† |
|----------------|---------------------|-------------------------|
| MMBZ15VDLT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SZMMBZ15VDLT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| MMBZ15VDLT3G | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| SZMMBZ15VDLT3G | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| MMBZ27VCLT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SZMMBZ27VCLT1G | SOT-23 (Pb-Free) | 3,000 / 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.

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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°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°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.

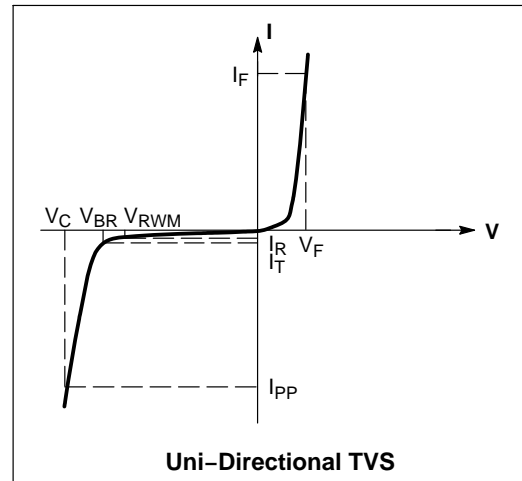
1. Nonrepetitive current pulse per Figure 5 and derate above $T_A = 25^\circ\text{C}$ per Figure 6.
2. FR-5 = 1.0 x 0.75 x 0.62 in.
3. Alumina = 0.4 x 0.3 x 0.024 in., 99.5% alumina

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_{RWM} Volts | $I_R @ V_{RWM}$ nA | Breakdown Voltage | | | | $V_C @ I_{PP}$ (Note 5) | | V_{BR} mV/ $^\circ\text{C}$ |
|------------------|----------------|--------------------|-----------------------|-----------------------|-----|------|---------------|-------------------------|---------------|----------------------------------|
| | | | | V_{BR} (Note 4) (V) | | | @ I_T mA | V_C V | I_{PP} A | |
| | | | | Min | Nom | Max | | | | |
| MMBZ15VDLT1G/T3G | 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_{RWM} Volts | $I_R @ V_{RWM}$ nA | Breakdown Voltage | | | | $V_C @ I_{PP}$ (Note 5) | | V_{BR} mV/ $^\circ\text{C}$ |
|------------------|----------------|--------------------|-----------------------|-----------------------|-----|-------|---------------|-------------------------|---------------|----------------------------------|
| | | | | V_{BR} (Note 4) (V) | | | @ I_T mA | V_C V | I_{PP} A | |
| | | | | Min | Nom | Max | | | | |
| MMBZ27VCLT1G/T3G | 27C | 22 | 50 | 25.65 | 27 | 28.35 | 1.0 | 38 | 1.0 | 26 |

4. V_{BR} measured at pulse test current I_T at an ambient temperature of 25°C .

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

*Include SZ-prefix devices where applicable.

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TYPICAL CHARACTERISTICS

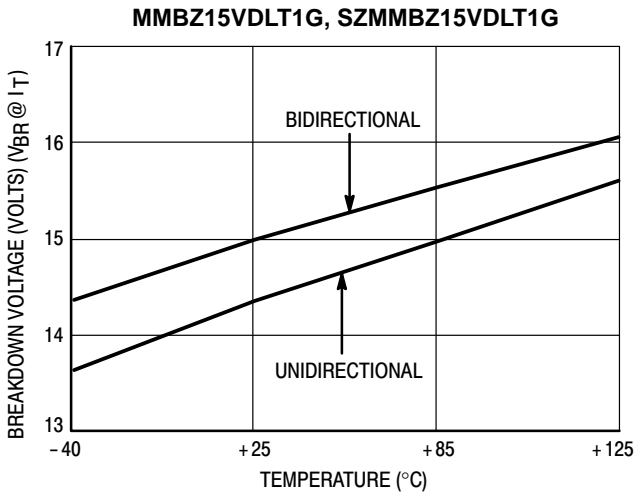


Figure 1. Typical Breakdown Voltage versus Temperature

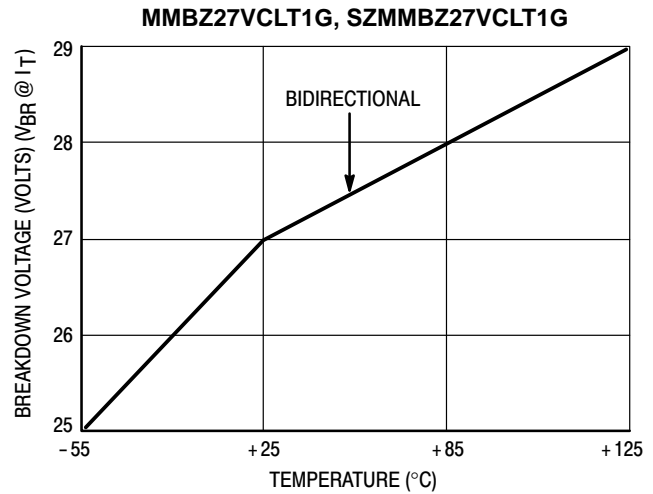


Figure 2. Typical Breakdown Voltage versus Temperature

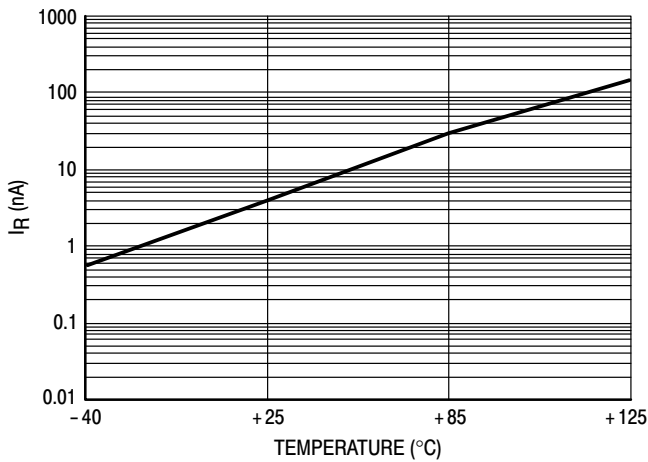


Figure 3. Typical Leakage Current versus Temperature

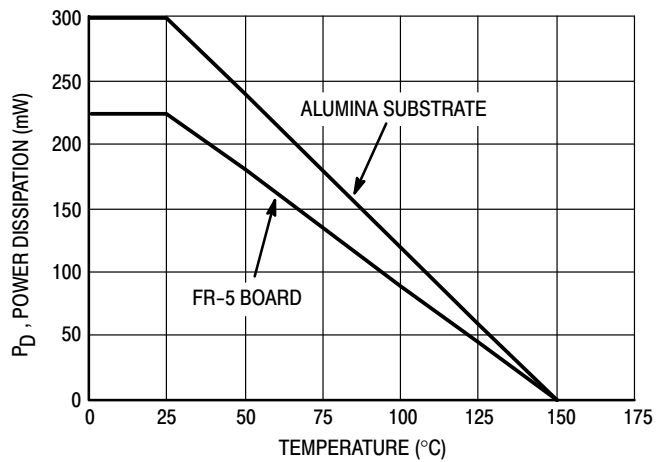


Figure 4. Steady State Power Derating Curve

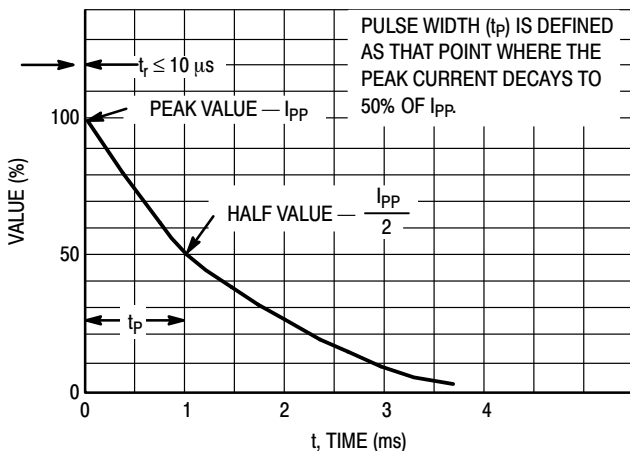


Figure 5. Pulse Waveform

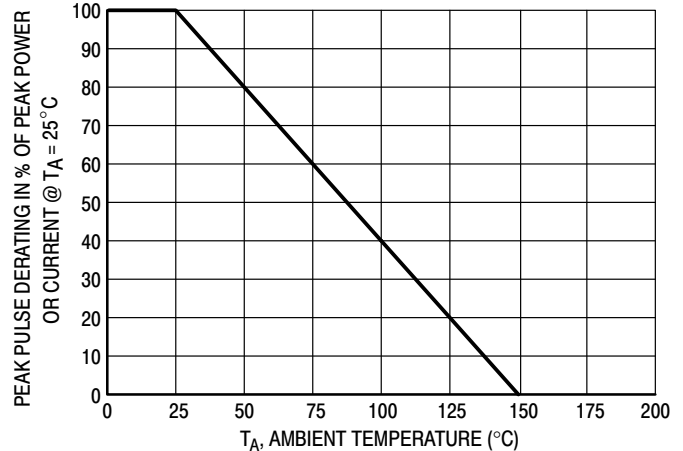
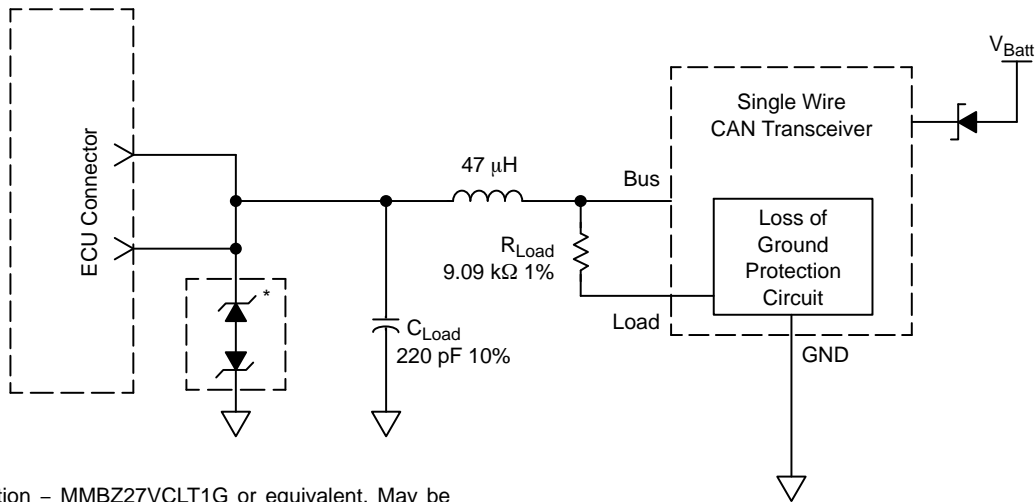


Figure 6. Pulse Derating Curve

TYPICAL APPLICATIONS



*ESD Protection – MMBZ27VCLT1G or equivalent. May be located in each ECU (C_{Load} needs to be reduced accordingly) or at a central point near the DLC.

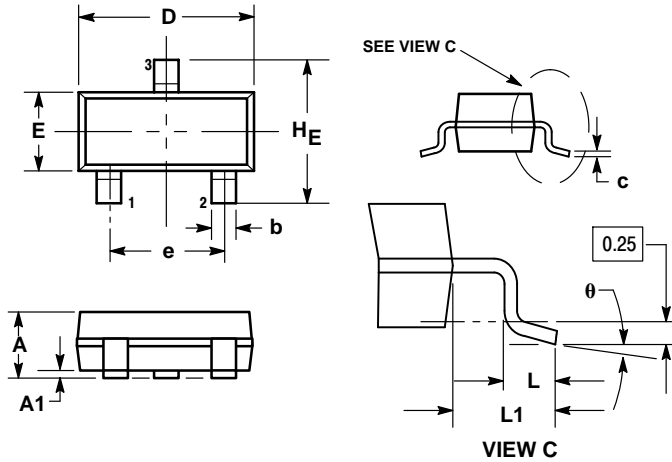
Figure 7. Single Wire CAN Network

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.

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PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-08
ISSUE AP

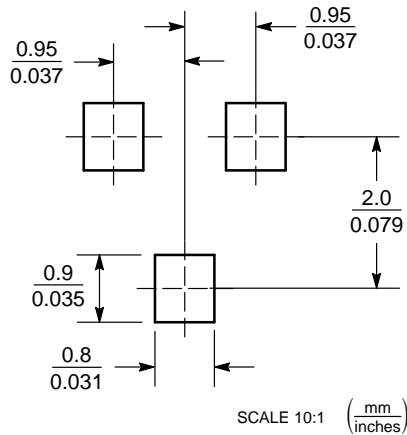


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| 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
2. ANODE
3. 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.

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