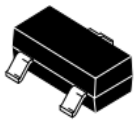
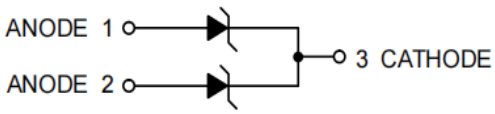
SOT−23 Dual Common Anode Zeners for ESD Protection

24 and 40 Watt Peak Power Zener Transient Voltage Suppressors

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 anode design protects two separate lines using only one package. These devices are ideal for situations where board space is at a premium.



SOT−23
CASE 318
STYLE 9



Features

- Pb−Free Packages are Available
- SOT−23 Package Allows Either Two Separate Unidirectional Configurations or a Single Bidirectional Configuration
- Working Peak Reverse Voltage Range − 3 V to 26 V
- Standard Zener Breakdown Voltage Range − 5.6 V to 33 V
- Peak Power − 24 or 40 Watts @ 1.0 ms (Unidirectional), per Figure 5 Waveform
- ESD Rating of Class N (exceeding 16 kV) per the Human Body Model
- Maximum Clamping Voltage @ Peak Pulse Current
- Low Leakage < 5.0 _A
- Flammability Rating UL 94 V−O

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.

Replace the "T1" with "T3" in the Device Number to order the 13 inch/10,000 unit reel.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1) @ $T_L \le 25°C$	P_{pk}	40	Watts
Total Power Dissipation on FR−5 Board (Note 2) @ $T_A = 25°C$ Derate above 25°C	P_D	 225 1.8	 mW mW/°C
Thermal Resistance Junction−to−Ambient	$R_{\theta JA}$	556	°C/W
Total Power Dissipation on Alumina Substrate (Note 3) @ $T_A = 25°C$ Derate above 25°C	P_D	 300 2.4	 mW mW/°C
Thermal Resistance Junction−to−Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	T_J, T_{stg}	− 55 to +150	°C
Lead Solder Temperature − Maximum (10 Second Duration)	T_L	260	°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.

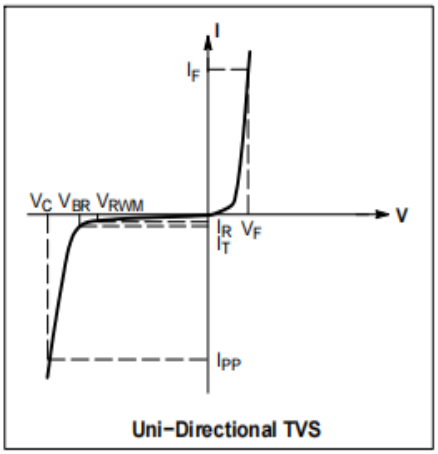
1. Nonrepetitive current pulse per Figure 5 and derate above $T_A = 25°C$ per Figure 6.
2. FR−5 = 1.0 x 0.75 x 0.62 in.
3. Alumina = 0.4 x 0.3 x 0.024 in., 99.5% alumina

ELECTRICAL CHARACTERISTICS

($T_A = 25°C$ 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



Uni−Directional TVS

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)
UNIDIRECTIONAL (Circuit tied to Pins 1 and 3 or Pins 2 and 3)

(V_F = 0.9 V Max @ I_F = 10 mA)

Device*	Device Marking	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage V_{BR} (Note 4) (V)			@ I_T	V_C @ I_{PP} (Note 5) V_C	I_{PP}	V_{BR}
		Volts	nA	Min	Nom	Max	mA	V	A	mV/°C
MMBZ15VDLT1G/T3G	15D	12.8	100	14.3	15	15.8	1.0	21.2	1.9	12

(V_F = 1.1 V Max @ I_F = 200 mA)

Device*	Device Marking	V_{RWM}	I_R @ V_{RWM}	Breakdown Voltage V_{BR} (Note 4) (V)			@ I_T	V_C @ I_{PP} (Note 5) V_C	I_{PP}	V_{BR}
		Volts	nA	Min	Nom	Max	mA	V	A	mV/°C
MMBZ27VCLT1G/T3G	27C	22	50	25.65	27	28.35	1.0	38	1.0	26
MMBZ39VCLT1G/T3G	39C	31.2	50	37.05	39	40.95	1.0	55	0.76	35.3

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.
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.

TYPICAL CHARACTERISTICS

MMBZ15VDL, SZMMBZ15VDL

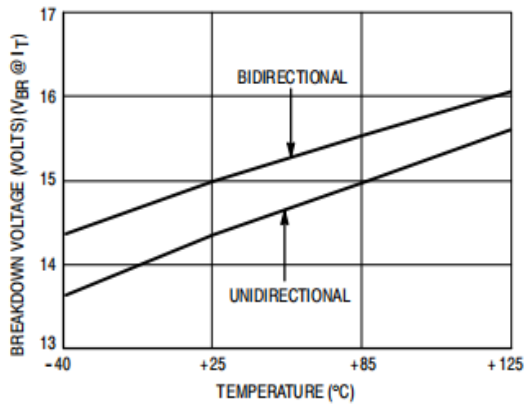


Figure 1. Typical Breakdown Voltage versus Temperature

MMBZ27VCL, SZMMBZ27VCL

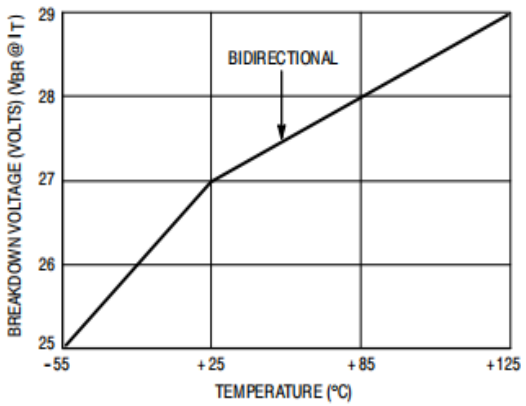


Figure 2. Typical Breakdown Voltage versus Temperature

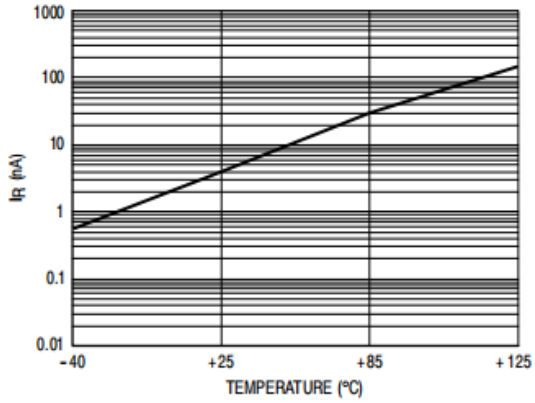


Figure 3. Typical Leakage Current versus Temperature

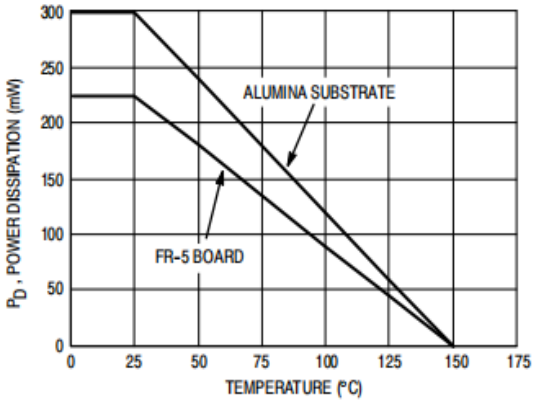


Figure 4. Steady State Power Derating Curve

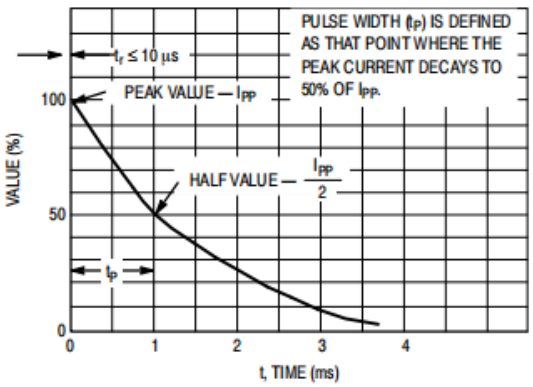


Figure 5. Pulse Waveform

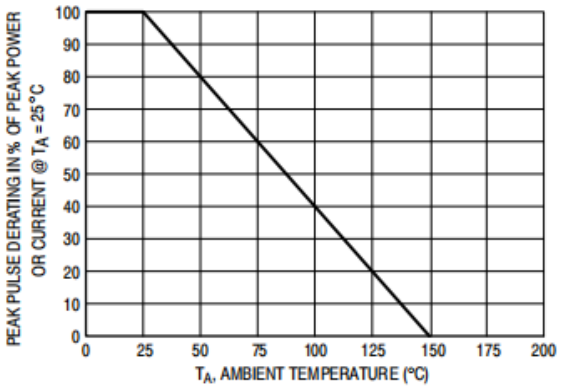
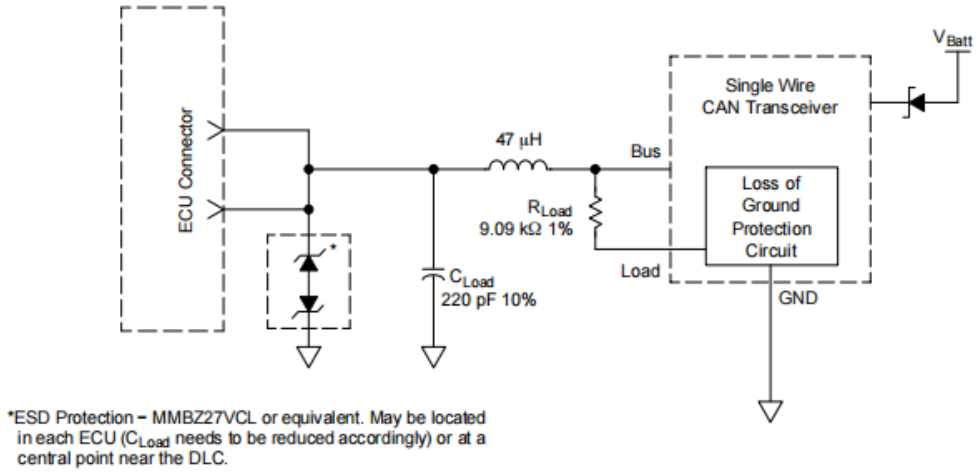


Figure 6. Pulse Derating Curve

TYPICAL APPLICATIONS



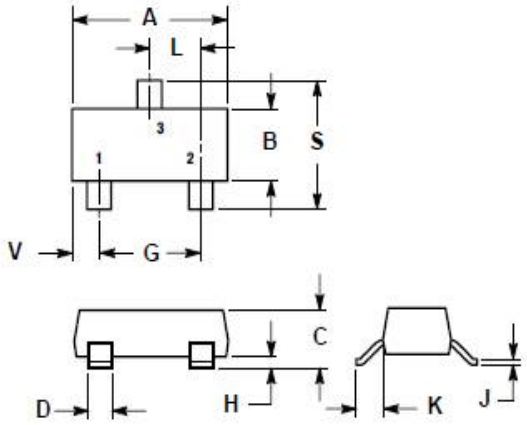
*ESD Protection – MMBZ27VCL or equivalent. May be located in each ECU (C_{Load} needs to be reduced accordingly) or at a central point near the DLC.

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.

PACKAGE DIMENSIONS

SOT−23 (TO−236)
CASE 318−09
ISSUE AH

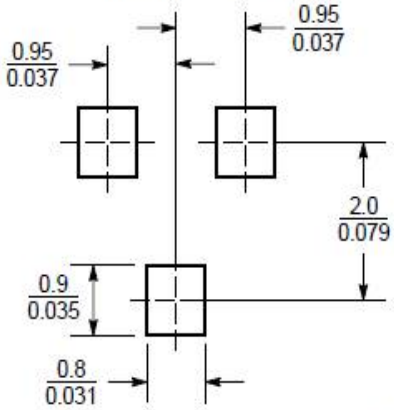


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIUMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318−01, −02, AND −06 OBSOLETE, NEW STANDARD 318−09.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0385	0.0498	0.99	1.26
D	0.0140	0.0200	0.36	0.50
G	0.0670	0.0826	1.70	2.10
H	0.0040	0.0098	0.10	0.25
J	0.0034	0.0070	0.085	0.177
K	0.0180	0.0236	0.45	0.60
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.0984	2.10	2.50
V	0.0177	0.0236	0.45	0.60

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

SOLDERING FOOTPRINT*



SCALE 10:1 (mm / inches)

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