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 form 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-O
- 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



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(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.

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

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1) @ $T_L \le 25^{\circ}C$	P _{pk}	40	Watts
Total Power Dissipation on FR–5 Board (Note 2) @ $T_A = 25^{\circ}C$ Derate above 25°C	PD	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) @ $T_A = 25^{\circ}C$ 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)	ΤL	260	°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°C per Figure 6.

2. $FR-5 = 1.0 \times 0.75 \times 0.62$ 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 _{RV}			
V _{BR}	Breakdown Voltage @ I _T		
Ι _Τ	Test Current		
V _{BR}	Maximum Temperature Coefficient of V_{BR}		
١ _F	Forward Current		
V _F	Forward Voltage @ I _F		



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)

				Breakdown Voltage			V _C @ I _{PF}			
	Device	V _{RWM}	I _R @ V _{RWM}	V _{BR} (Note 4) (V)		@ հ	Vc	IPP	V _{BR}	
Device*	Marking	Volts	nA	Min	Nom	Max	mA	v	Α	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)

				Breakdown Voltage			V _C @ I _{PF}			
	Device	V _{RWM}	I _R @ V _{RWM}	VBI	V _{BR} (Note 4) (V) @		@ I _T	v _c	I _{PP}	V _{BR}
Device*	Marking	Volts	nA	Min	Nom	Max	mA	v	Α	mV/°C
MMBZ27VCLT1G/T3G	27C	22	50	25.65	27	28.35	1.0	38	1.0	26

 $\begin{array}{l} \mbox{4. V}_{BR} \mbox{ measured at pulse test current } I_T \mbox{ at an ambient temperature of } 25^\circ C. \\ \mbox{5. Surge current waveform per Figure 5 and derate per Figure 6} \end{array}$

*Include SZ-prefix devices where applicable.

MMBZ15VDLT1G, SZMMBZ15VDLT1G MMBZ27VCLT1G, SZMMBZ27VCLT1G 17 29 BREAKDOWN VOLTAGE (VOLTS) (VBR @ I τ) BREAKDOWN VOLTAGE (VOLTS) (VBR @ 1 τ) BIDIRECTIONAL BIDIRECTIONAL 16 28 15 27 26 14 UNIDIRECTIONAL 25 13 - 40 +25 + 85 +125 - 55 +25 + 85 +125 TEMPERATURE (°C) TEMPERATURE (°C) Figure 1. Typical Breakdown Voltage Figure 2. Typical Breakdown Voltage versus Temperature versus Temperature 1000 300 250 100 PD, POWER DISSIPATION (mW) ALUMINA SUBSTRATE 200 10 IR (nA) 150 100 FR-5 BOARD 0.1 50 0.01 0 - 40 + 25 + 85 + 125 0 25 50 75 100 125 150 175 TEMPERATURE (°C) TEMPERATURE (°C) Figure 3. Typical Leakage Current Figure 4. Steady State Power Derating Curve versus Temperature 100 PULSE WIDTH (tp) IS DEFINED PEAK PULSE DERATING IN % OF PEAK POWER AS THAT POINT WHERE THE 90 ≤10 µs PEAK CURRENT DECAYS TO 80 OR CURRENT @ $T_A = 25^{\circ}C$ 50% OF IPP. PEAK VALUE - IPP 100 70 Value (%) 60 I_{PP} 50 HALF VALUE 2 40 50 30 20 10 0 0 0 3 0 1 2 4 25 50 75 100 125 150 175 200 T_A, AMBIENT TEMPERATURE (°C) t, TIME (ms)

TYPICAL CHARACTERISTICS





Figure 6. Pulse Derating Curve

TYPICAL APPLICATIONS



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 318-08 ISSUE AP





NOTES:

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

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.

	м	ILLIMETE	RS	INCHES				
DIM	MIN	NOM	MAX	MIN	NOM	MAX		
Α	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		
с	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		
е	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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