

Description:

These dual monolithic silicon Zener diodes are designed for applications requiring transient over voltage 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

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-3V to 26V

Standard Zener Breakdown Voltage Range-5.6V to 33V

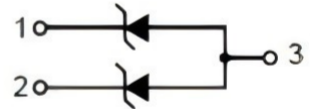
Peak Power-24 or 40Watts@1.0ms(Unidirectional), per Figure 5 Waveform

ESD Rating of Class N(exceeding 16kV) per the Human Body Model

Maximum Clamping Voltage@Peak Pulse Current

Low Leakage<5.0 μ A

Flammability Rating UL 94V-0



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 Tap 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 13inch/10,000 unit reel.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 1.0ms (Note 1) SMMBZ5V6ALT1G thru SMMBZ10VALT1G @ $T_A \leq 25^\circ\text{C}$ SMMBZ12VALT1G thru SMMBZ33VALT1G	P_{pk}	24 40	Watts
Total Power Dissipation on FR-5 Board (Note 2) @ $T_A = 25^\circ\text{C}$	P_D	225	mW
Derate above 25°C		1.8	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) @ $T_A = 25^\circ\text{C}$	P_D	300	mW
Derate above 25°C		2.4	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	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied damage may occur and reliability may be affected.

1. Non-repetitive current pulse per Figure 5 and derate above $T_A = 25^\circ\text{C}$ per Figure 6.

2. FR-5 = 1.0x0.75x0.62 in.

3. Alumina = 0.4x0.3x0.024 in, 99.5% alumina

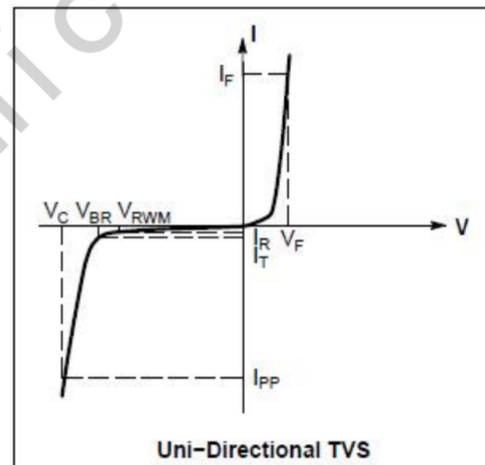
*Other voltages may be available upon request.

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
θV_{BR}	Maximum Temperature Coefficient of V_{BR}
I_F	Forward Current
V_F	Forward Voltage @ I_F
Z_{ZT}	Maximum Zener Impedance @ I_{ZT}
I_{ZK}	Reverse Current
Z_{ZK}	Maximum Zener Impedance @ I_{ZK}



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

UNIDIRECTIONAL(Circuited tied to Pins 1 and 3 or Pins 2 and 3)

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

24 WATTS

Device	V_{RWM}	$I_R@V_{RWM}$	Breakdown Voltage				Max Zener Impedance (Note5)			$V_C@I_{PP}$ (Note 6)		θV_{BR}
			$V_{BR}(\text{Note 4})(V)$			$@I_R$	$Z_{ZT}@I_{ZT}$	$Z_{ZK}@I_{ZK}$		V_C	I_{PP}	
			Min	Nom	Max	mA	Ω	Ω	mA	V	A	
SMMBZ5V6AL	3.0	5.0	5.32	5.6	5.88	20	11	1600	0.25	8.0	3.0	1.26
SMMBZ6V2AL	3.0	0.5	5.89	6.2	6.51	1.0	—	—	—	8.7	2.76	2.80
SMMBZ6V8AL	4.5	0.5	6.46	6.8	7.14	1.0	—	—	—	9.6	2.5	34
SMMBZ9V1AL	6.0	0.3	8.65	9.1	9.56	1.0	—	—	—	14	1.7	7.5
SMMBZ10VAL	6.5	0.3	9.5	10	10.5	1.0	—	—	—	14.2	1.7	7.5

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

40 WATTS

Device	V_{RWM}	$I_R@V_{RWM}$	Breakdown Voltage				$V_C@I_{PP}(\text{Note 6})$		θV_{BR}
			$V_{BR}(\text{Note 4})(V)$			$@I_R$	V_C	I_{PP}	
			Min	Nom	Max	mA	V	A	
SMMBZ12VAL	8.5	200	11.40	12	12.60	1.0	17	2	7.5
SMMBZ13VAL	10.5	50	12.35	13	13.65	1.0	18	2.1	10.8
SMMBZ15VAL	12	50	14.25	15	15.75	1.0	21	1.9	12
SMMBZ18VAL	14.5	50	17.10	18	18.90	1.0	25	1.6	15.3
SMMBZ20VAL	17	50	19.00	20	21.00	1.0	28	1.4	172
SMMBZ27VAL	22	50	25.65	27	28.35	1.0	40	1.0	24.3
SMMBZ33VAL	26	50	31.35	33	34.65	1.0	46	0.87	30

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

 2. Z_{ZT} and Z_{ZK} are measured by dividing the AC voltage drop across the device by the AC current applied. The specified limits are for $I_{Z(AC)}=0.1I_{Z(DC)}$, with the AC frequency=1.0kHz.

3. Surge current waveform per Figure 5 and derate per Figure6.

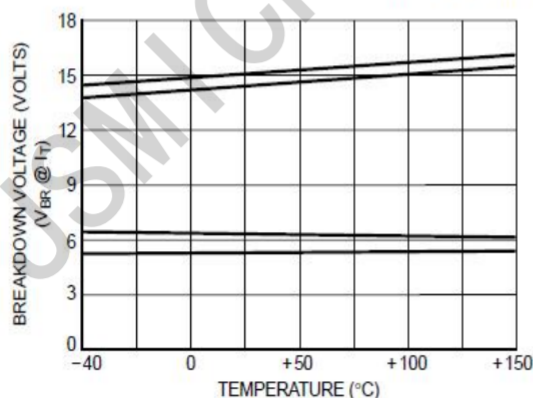
TYPICAL CHARACTERISTICS


Figure 1. Typical Breakdown Voltage versus Temperature

(Upper curve for each voltage is bidirectional mode, lower curve is unidirectional mode)

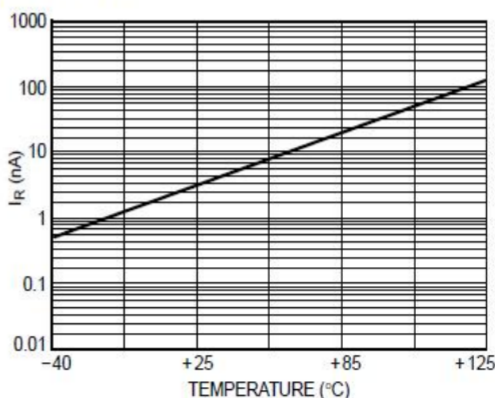


Figure 2. Typical Leakage Current versus Temperature

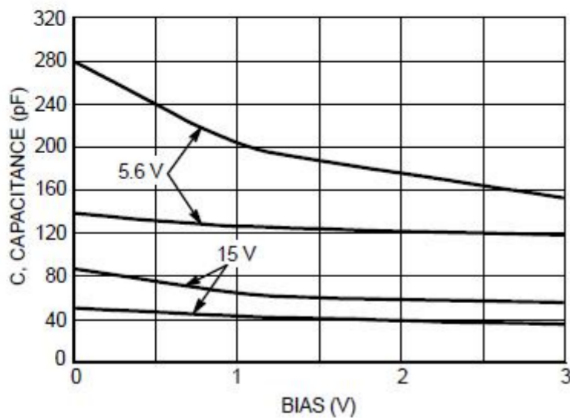


Figure 3. Typical Capacitance versus Bias Voltage
(Upper curve for each voltage is unidirectional mode, lower curve is bidirectional mode)

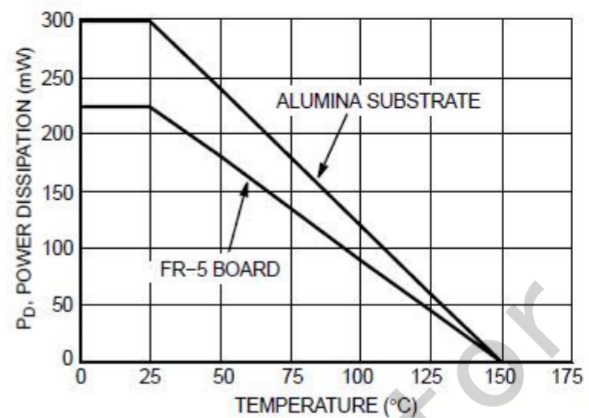


Figure 4. Steady State Power Derating Curve

TYPICAL CHARACTERISTICS

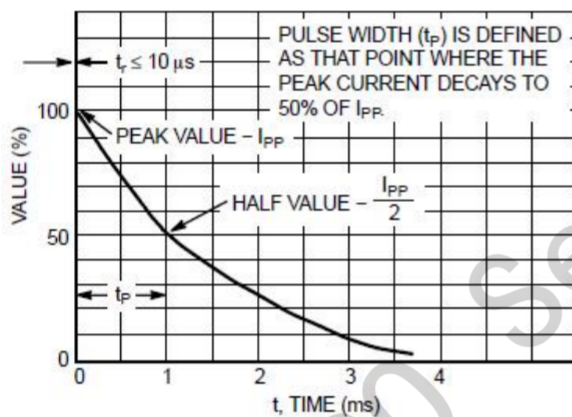


Figure 5. Pulse Waveform

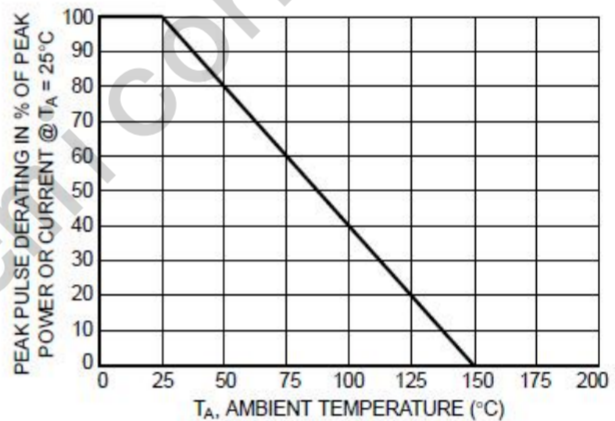


Figure 6. Pulse Derating Curve

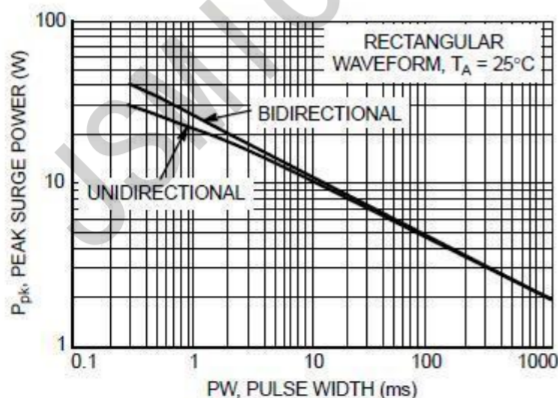


Figure 7. Maximum Non-repetitive Surge Power, P_{pk} versus PW

Power is defined as $V_{RSM} \times I_Z(pk)$ where V_{RSM} is the clamping voltage at $I_Z(pk)$.

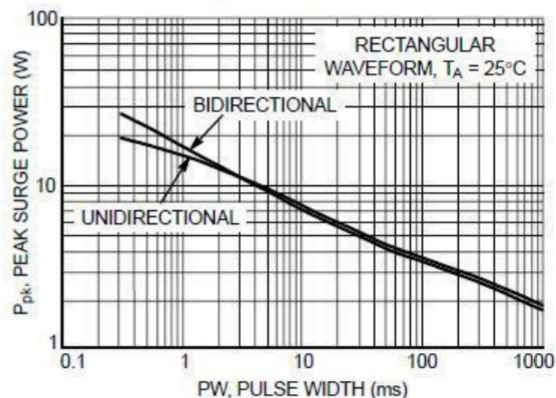


Figure 8. Maximum Non-repetitive Surge Power, $P_{pk}(NOM)$ versus PW

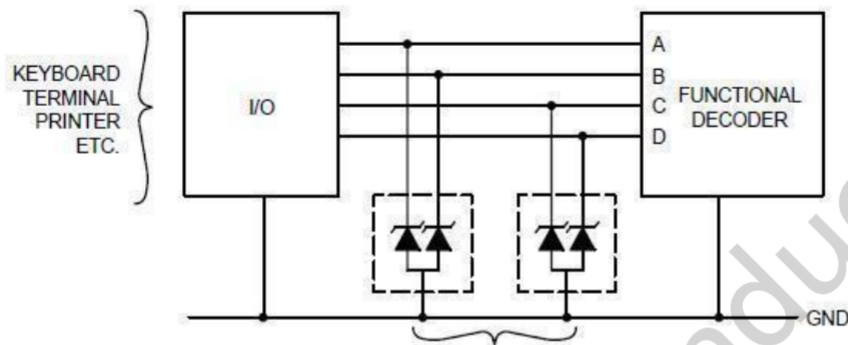
Power is defined as $V_Z(NOM) \times I_Z(pk)$ where $V_Z(NOM)$ is the nominal Zener voltage measured at the low test current used for voltage classification.

TYPICAL COMMON ANODE APPLICATIONS

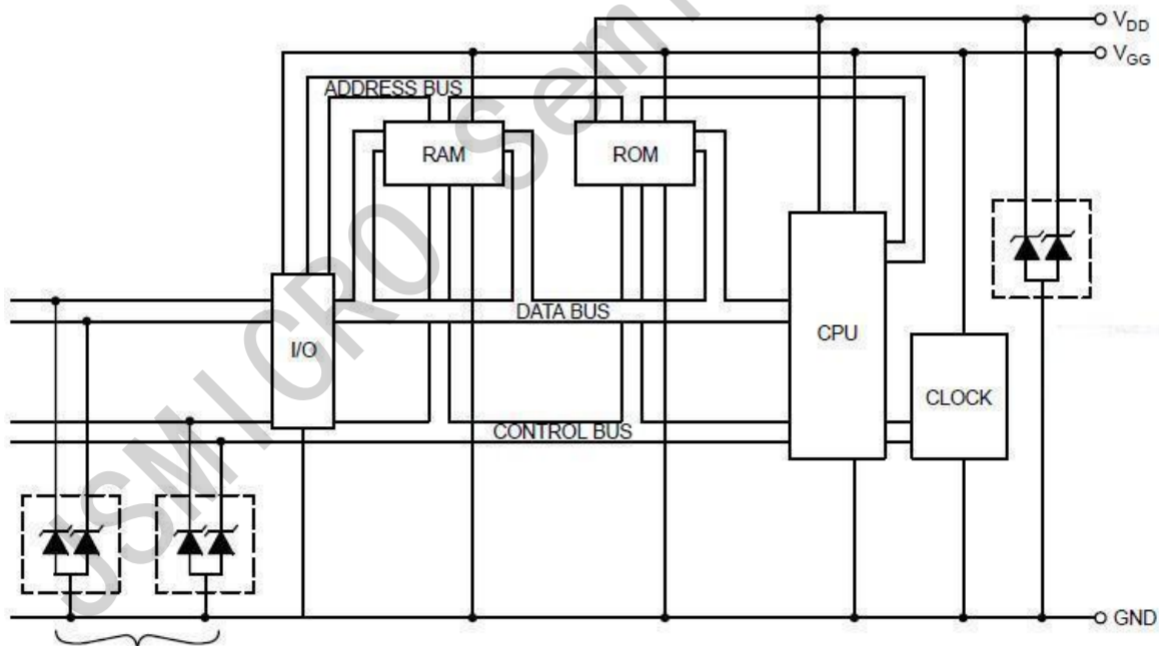
A quad junction common anode design in a SOT-23 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially

when board space is at a premium. Two simplified examples of TVS applications are illustrated below.

Computer Interface Protection

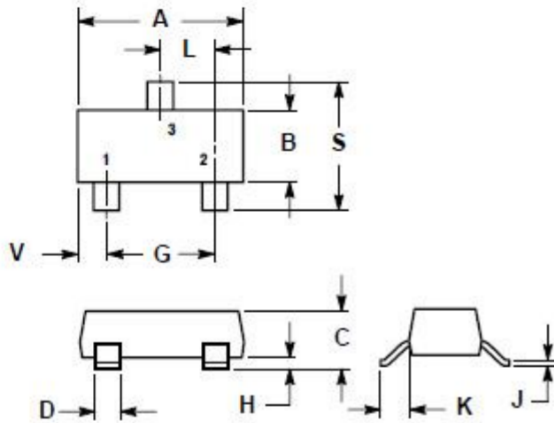


Microprocessor Protection



PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-09
ISSUE AH



NOTES:

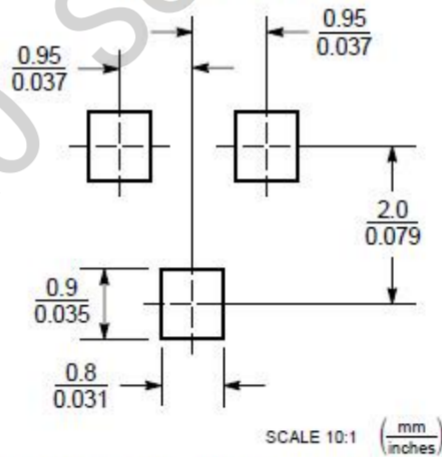
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01, -02, AND -06 OBSOLETE. NEW STANDARD 318-09.

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	0.0930	0.0984	2.10	2.50
V	0.0177	0.0236	0.45	0.60

STYLE 12:

1. CATHODE
2. CATHODE
3. ANODE

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.