

# NZ23C5V6ALT1G

## 24 Watt Peak Power Zener Transient Voltage Suppressors

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

This dual monolithic silicon Zener diodes is designed for applications requiring transient overvoltage protection capability. This is intended for use in voltage and ESD sensitive equipment such as computers, printers, business machines, communication systems, medical equipment and other applications. The dual junction common anode design protects two separate lines using only one package. This device is ideal for situations where board space is at a premium.

#### Features

- SOT-23 Package Allows Either Two Separate Unidirectional Configurations or a Single Bidirectional Configuration
- Working Peak Reverse Voltage Range – 3 V
- Standard Zener Breakdown Voltage Range – 5.6 V
- Peak Power – 24 W @ 1.0 ms (Unidirectional), per Figure 5 Waveform
- ESD Rating:
  - Class 3B (> 16 kV) per the Human Body Model
  - Class C (> 400 V) per the Machine Model
- Maximum Clamping Voltage @ Peak Pulse Current
- Low Leakage < 0.1  $\mu$ A
- Flammability Rating UL 94 V-0
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

#### 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

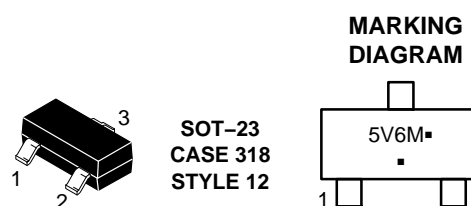
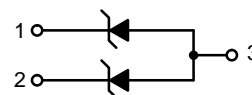
Small package size for high density applications

Available in 8 mm Tape and Reel



ON Semiconductor®

[www.onsemi.com](http://www.onsemi.com)



SOT-23  
CASE 318  
STYLE 12

5V6 = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

Device	Package	Shipping†
NZ23C5V6ALT1G	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.

#### DEVICE MARKING INFORMATION

See specific marking information in the device marking column of the table on page 2 of this data sheet.

# NZ23C5V6ALT1G

## MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Power Dissipation @ 1.0 ms (Note 1) @ $T_L \leq 25^\circ\text{C}$	$P_{pk}$	24	W
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	$^\circ\text{C}/\text{W}$
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	$^\circ\text{C}/\text{W}$
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 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.

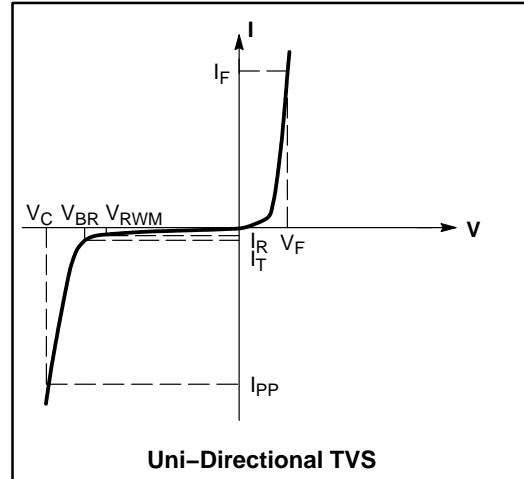
1. Non-repetitive current pulse per Figure 5 and derate above  $T_A = 25^\circ\text{C}$  per Figure 6.
  2. FR-5 = 1.0 x 0.75 x 0.62 in.
  3. Alumina = 0.4 x 0.3 x 0.024 in, 99.5% alumina.
- \*Other voltages may be available upon request.

## 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
$\Theta_{VBR}$	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** (Circuit 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**

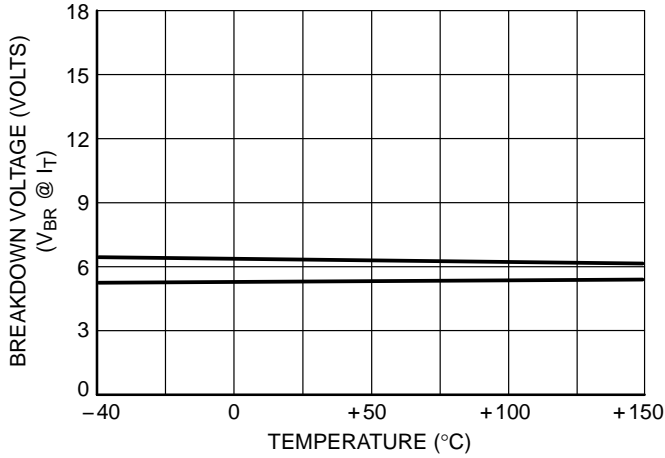
Device	Device Marking	$V_{RWM}$ Volts	$I_R$ @ $V_{RWM}$ $\mu\text{A}$	Breakdown Voltage				Max Zener Impedance (Note 5)			$V_C$ @ $I_{PP}$ (Note 6)		$\Theta_{VBR}$ mV/ $^\circ\text{C}$
				$V_{BR}$ (Note 4) (V)			$Z_{ZT}$ @ 20mA $\Omega$	$Z_{ZK}$ @ $I_{ZK}$ $\Omega$	$V_C$ V	$I_{PP}$ A			
				Min	Nom	Max					@ $I_T$ mA		
NZ23C5V6ALT1G	5V6	1.0	0.1	5.2	5.6	6.0	5.0	11	1600	0.25	8.0	3.0	1.26

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  $25^\circ\text{C}$ .
5.  $Z_{ZT}$  and  $Z_{ZK}$  are measured by dividing the AC voltage drop across the device by the AC current applied. The specified limits are for  $I_{Z(AC)} = 0.1 I_{Z(DC)}$ , with the AC frequency = 1.0 kHz.
6. Surge current waveform per Figure 5 and derate per Figure 6

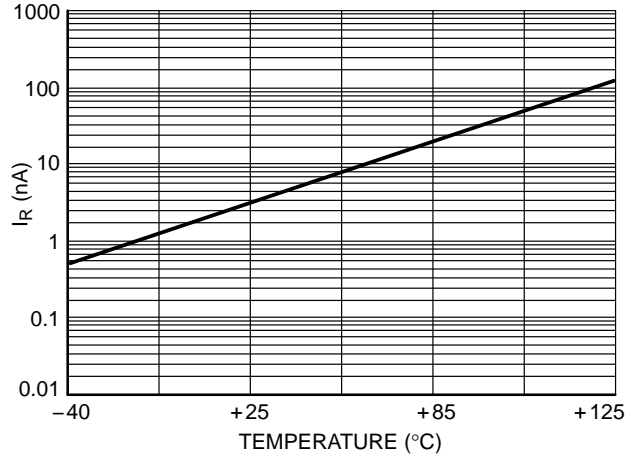
# NZ23C5V6ALT1G

## TYPICAL CHARACTERISTICS

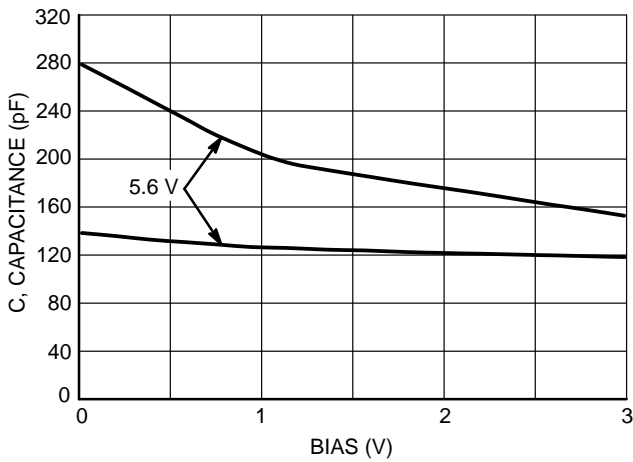


**Figure 1. Typical Breakdown Voltage versus Temperature**

(Upper curve is bidirectional mode, lower curve is unidirectional mode)

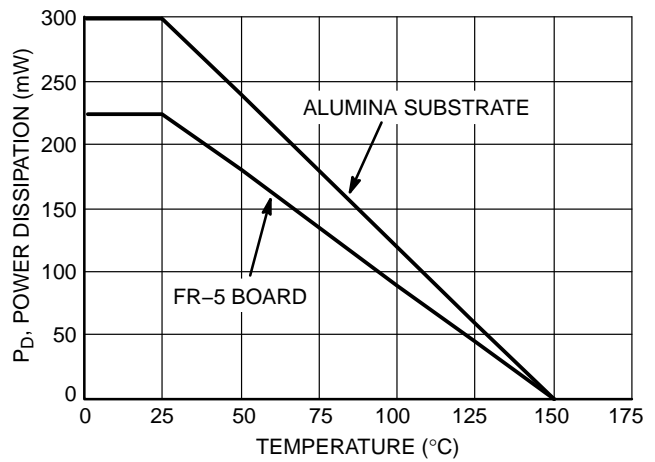


**Figure 2. Typical Leakage Current versus Temperature**



**Figure 3. Typical Capacitance versus Bias Voltage**

(Upper curve is unidirectional mode, lower curve is bidirectional mode)



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

# NZ23C5V6ALT1G

## TYPICAL CHARACTERISTICS

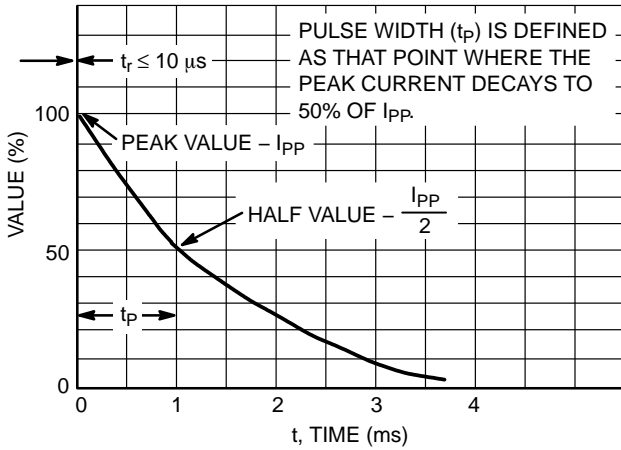


Figure 5. Pulse Waveform

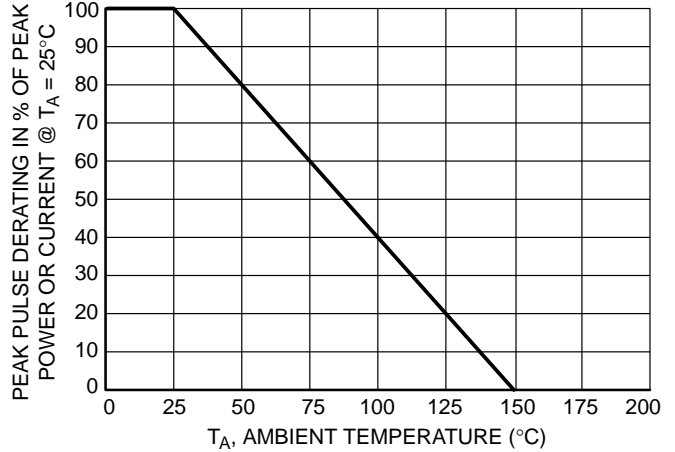


Figure 6. Pulse Derating Curve

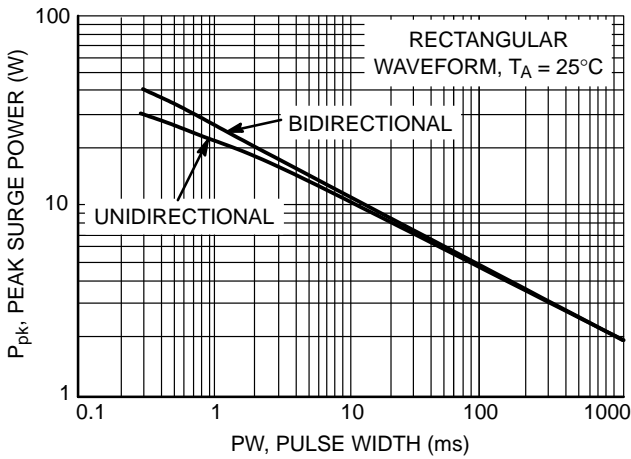


Figure 7. Maximum Non-repetitive Surge Power,  $P_{pk}$  versus PW

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

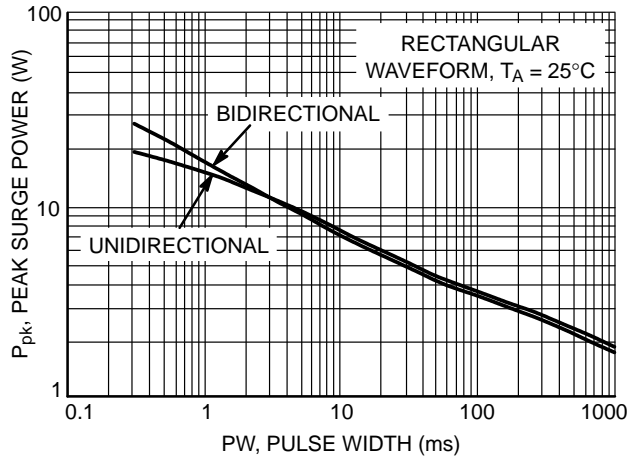


Figure 8. Maximum Non-repetitive Surge Power,  $P_{pk}(NOM)$  versus PW

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.

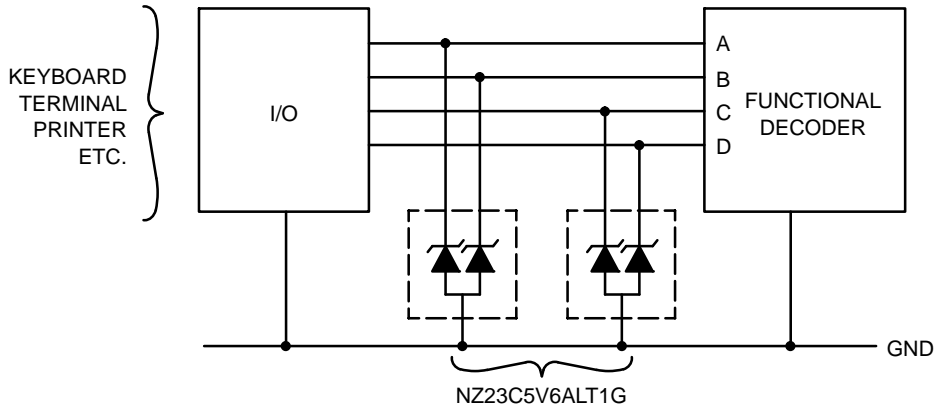
# NZ23C5V6ALT1G

## TYPICAL COMMON ANODE APPLICATIONS

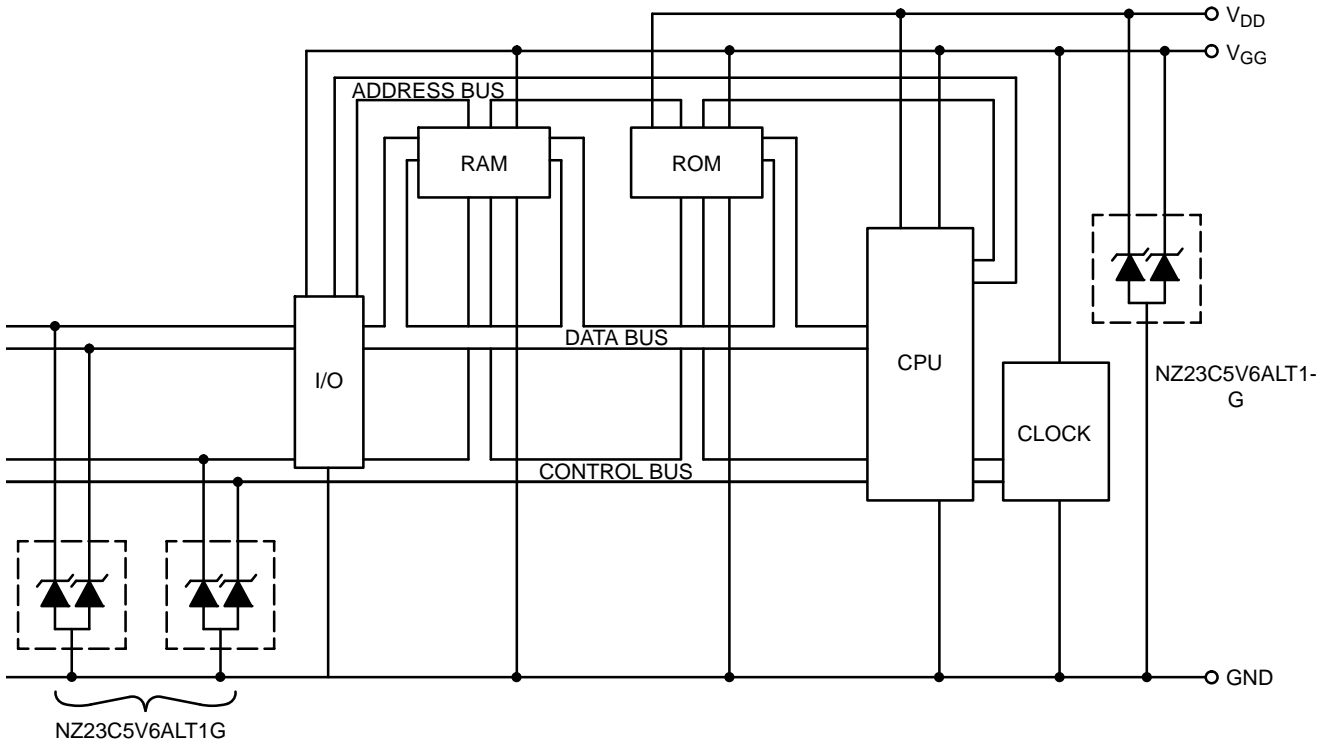
A quad junction common anode design in a SOT-23 package protects four separate lines using only one package. This adds flexibility and creativity to PCB design especially

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

### Computer Interface Protection



### Microprocessor Protection



**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at [www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)