

# NZ9F2V4T5G, SZNZ9F2V4T5G SERIES

## Zener Voltage Regulators

### 200 mW SOD-923 Surface Mount

This series of Zener diodes is packaged in a SOD-923 surface mount package. They are designed to provide voltage regulation protection and are especially attractive in situations where space is at a premium. They are well suited for applications such as cellular phones, hand held portables, and high density PC boards.

#### Specification Features:

- Standard Zener Breakdown Voltage Range – 2.4 V to 24 V
- Steady State Power Rating of 200 mW
- Small Body Outline Dimensions:  
0.039" x 0.024" (1.00 mm x 0.60 mm)
- Low Body Height: 0.016" (0.40 mm)
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These are Pb-Free Devices

#### Mechanical Characteristics:

**CASE:** Void-free, transfer-molded, thermosetting plastic  
Epoxy Meets UL 94 V-0

**LEAD FINISH:** 100% Matte Sn (Tin)

**MOUNTING POSITION:** Any

**QUALIFIED MAX REFLOW TEMPERATURE:** 260°C  
Device Meets MSL 1 Requirements

#### MAXIMUM RATINGS

| Rating   | Symbol          | Max            | Unit        |
|--|-----------------|----------------|-------------|
| Total Device Dissipation FR-5 Board,<br>(Note 1) @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 250<br>2.0     | mW<br>mW/°C |
| Thermal Resistance from<br>Junction-to-Ambient   | $R_{\theta JA}$ | 500            | °C/W        |
| Junction and Storage Temperature Range   | $T_J, T_{stg}$  | -65 to<br>+150 | °C          |

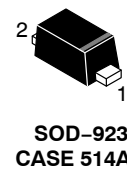
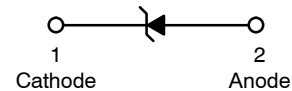
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 Minimum Pad.

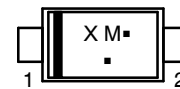


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#### MARKING DIAGRAM



X = Specific Device Code  
M = Month Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device                        | Package              | Shipping†        |
|-------------------------------|----------------------|------------------|
| NZ9FxxxxT5G,<br>SZNZ9FxxxxT5G | SOD-923<br>(Pb-Free) | 8000/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

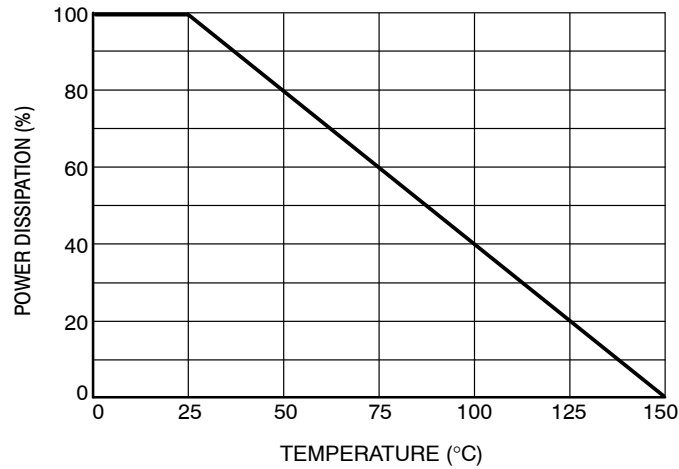
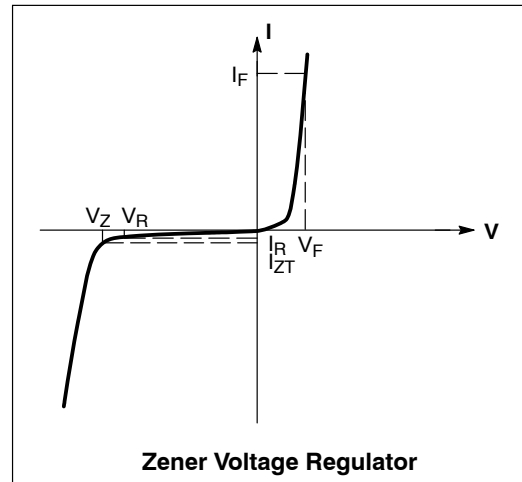
See specific marking information in the device marking column of the Electrical Characteristics tables starting on page 3 of this data sheet.

# NZ9F2V4T5G, SZNZ9F2V4T5G SERIES

## ELECTRICAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  unless otherwise noted,  
 $V_F = 0.9\text{ V Max. @ } I_F = 10\text{ mA}$  for all types)

| Symbol        | Parameter   |
|---------------|---|
| $V_Z$         | Reverse Zener Voltage @ $I_{ZT}$                    |
| $I_{ZT}$      | Reverse Current                                     |
| $Z_{ZT}$      | Maximum Zener Impedance @ $I_{ZT}$                  |
| $I_{ZK}$      | Reverse Current                                     |
| $Z_{ZK}$      | Maximum Zener Impedance @ $I_{ZK}$                  |
| $I_R$         | Reverse Leakage Current @ $V_R$                     |
| $V_R$         | Reverse Voltage                                     |
| $I_F$         | Forward Current                                     |
| $V_F$         | Forward Voltage @ $I_F$                             |
| $\Theta_{VZ}$ | Maximum Temperature Coefficient of $V_Z$            |
| C             | Max. Capacitance @ $V_R = 0$ and $f = 1\text{ MHz}$ |



**Figure 1. Steady State Power Derating**

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**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 0.9\text{ V Max.}$  @  $I_F = 10\text{ mA}$  for all types)

| Device***      | Device Marking | Zener Voltage<br>(Note 1) |       | Zener Impedance        |                     |          | Leakage Current |               | $\theta_{V_Z}$<br>(mV/k) @ $I_{ZT}$ |      | C<br>@ $V_R = 0$<br>f = 1 MHz |     |
|----------------|----------------|---------------------------|-------|------------------------|---------------------|----------|-----------------|---------------|-------------------------------------|------|-------------------------------|-----|
|                |                | $V_Z$ (Volts)             |       | $Z_{ZT}$<br>@ $I_{ZT}$ | $Z_{ZK}$ @ $I_{ZK}$ |          | $I_R$ @ $V_R$   |               |                                     |      |                               |     |
|                |                | Min                       | Max   | mA                     | $\Omega$            | $\Omega$ | mA              | $\mu\text{A}$ | Volts                               | Min  | Max                           | pF  |
| SZ, NZ9F2V4T5G | J              | 2.28                      | 2.52  | 5                      | 100                 | 1000     | 1               | 50            | 1                                   | -3.5 | 0                             | 210 |
| SZ, NZ9F2V7T5G | E**            | 2.57                      | 2.84  | 5                      | 100                 | 1000     | 1               | 20            | 1                                   | -3.5 | 0                             | 210 |
| SZ, NZ9F3V0T5G | T**            | 2.85                      | 3.15  | 5                      | 100                 | 1000     | 1               | 10            | 1                                   | -3.5 | 0                             | 210 |
| SZ, NZ9F3V3T5G | Q              | 3.14                      | 3.47  | 5                      | 100                 | 1000     | 1               | 10            | 1                                   | -3.5 | 0                             | 210 |
| SZ, NZ9F3V6T5G | 3**            | 3.42                      | 3.78  | 5                      | 100                 | 1000     | 1               | 10            | 1                                   | -3.5 | 0                             | 210 |
| SZ, NZ9F3V9T5G | V**            | 3.71                      | 4.10  | 5                      | 100                 | 1000     | 1               | 5             | 1                                   | -3.5 | -2.5                          | 210 |
| SZ, NZ9F4V3T5G | Y**            | 4.09                      | 4.52  | 5                      | 100                 | 1000     | 1               | 5             | 1                                   | -3.5 | 0                             | 210 |
| SZ, NZ9F4V7T5G | 3              | 4.47                      | 4.94  | 5                      | 100                 | 800      | 0.5             | 2             | 1                                   | -3.5 | 0.2                           | 150 |
| SZ, NZ9F5V1T5G | 4              | 4.85                      | 5.36  | 5                      | 80                  | 500      | 0.5             | 2             | 1.5                                 | -2.7 | 1.2                           | 130 |
| SZ, NZ9F5V6T5G | 5              | 5.32                      | 5.88  | 5                      | 60                  | 200      | 0.5             | 1             | 2.5                                 | -2.0 | 2.5                           | 115 |
| SZ, NZ9F6V2T5G | 6              | 5.89                      | 6.51  | 5                      | 60                  | 100      | 0.5             | 1             | 3                                   | 0.4  | 3.7                           | 110 |
| SZ, NZ9F6V8T5G | A*             | 6.46                      | 7.14  | 5                      | 40                  | 60       | 0.5             | 0.5           | 3.5                                 | 1.2  | 4.5                           | 105 |
| SZ, NZ9F7V5T5G | D*             | 7.13                      | 7.88  | 5                      | 30                  | 60       | 0.5             | 0.5           | 4                                   | 2.5  | 5.3                           | 100 |
| SZ, NZ9F8V2T5G | E*             | 7.79                      | 8.61  | 5                      | 30                  | 60       | 0.5             | 0.5           | 5                                   | 3.2  | 6.2                           | 90  |
| SZ, NZ9F9V1T5G | F*             | 8.65                      | 9.56  | 5                      | 30                  | 60       | 0.5             | 0.5           | 6                                   | 3.8  | 7                             | 80  |
| SZ, NZ9F10VT5G | J*             | 9.50                      | 10.50 | 5                      | 30                  | 60       | 0.5             | 0.1           | 7                                   | 4.5  | 8                             | 80  |
| SZ, NZ9F11VT5G | K*             | 10.45                     | 11.55 | 5                      | 30                  | 60       | 0.5             | 0.1           | 8                                   | 5.4  | 9                             | 80  |
| SZ, NZ9F12VT5G | L*             | 11.40                     | 12.60 | 5                      | 30                  | 80       | 0.5             | 0.1           | 9                                   | 6    | 10                            | 80  |
| SZ, NZ9F13VT5G | P*             | 12.35                     | 13.65 | 5                      | 37                  | 80       | 0.5             | 0.1           | 10                                  | 7    | 11                            | 75  |
| SZ, NZ9F15VT5G | Q*             | 14.25                     | 15.75 | 5                      | 42                  | 80       | 0.5             | 0.1           | 11                                  | 9.2  | 13                            | 70  |
| SZ, NZ9F16VT5G | R*             | 15.20                     | 16.80 | 5                      | 50                  | 80       | 0.5             | 0.1           | 12                                  | 10.4 | 14                            | 65  |
| SZ, NZ9F18VT5G | T*             | 17.10                     | 18.90 | 5                      | 50                  | 80       | 0.5             | 0.1           | 14                                  | 12.4 | 16                            | 60  |
| SZ, NZ9F20VT5G | V*             | 19.00                     | 21.00 | 5                      | 55                  | 100      | 0.5             | 0.1           | 15.4                                | 14.4 | 18                            | 55  |
| SZ, NZ9F22VT5G | Y*             | 20.90                     | 23.10 | 5                      | 55                  | 100      | 0.5             | 0.1           | 16.8                                | 15.4 | 20                            | 55  |
| SZ, NZ9F24VT5G | F              | 22.80                     | 25.20 | 5                      | 70                  | 120      | 0.5             | 0.1           | 18.9                                | 16.8 | 22                            | 50  |

\*Rotated 90°.

\*\*Rotated 270°.

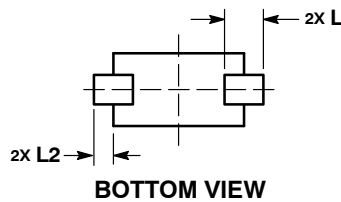
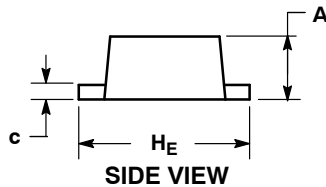
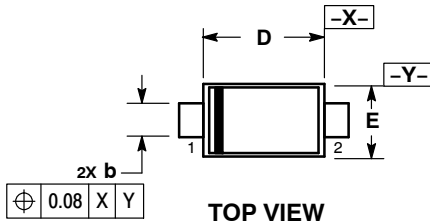
\*\*\*SZ Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

1. Zener voltage is measured with a pulse test current  $I_Z$  at an ambient temperature of 25°C.

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## PACKAGE DIMENSIONS

**SOD-923**  
CASE 514AB  
ISSUE C

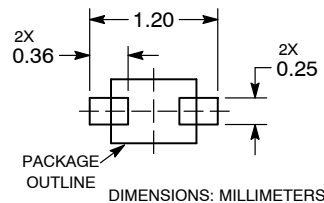


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. 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              | 0.34        | 0.37 | 0.40 | 0.013     | 0.015 | 0.016 |
| b              | 0.15        | 0.20 | 0.25 | 0.006     | 0.008 | 0.010 |
| c              | 0.07        | 0.12 | 0.17 | 0.003     | 0.005 | 0.007 |
| D              | 0.75        | 0.80 | 0.85 | 0.030     | 0.031 | 0.033 |
| E              | 0.55        | 0.60 | 0.65 | 0.022     | 0.024 | 0.026 |
| H <sub>E</sub> | 0.95        | 1.00 | 1.05 | 0.037     | 0.039 | 0.041 |
| L              | 0.19 REF    |      |      | 0.007 REF |       |       |
| L2             | 0.05        | 0.10 | 0.15 | 0.002     | 0.004 | 0.006 |

**SOLDERING FOOTPRINT\***



See Application Note AND845/D for more mounting details

\*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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