



# Zener Voltage Regulators

## 200 mW SOD-323 Surface Mount

### ORDERING INFORMATION

| Device*                | Package | Shipping       |
|------------------------|---------|----------------|
| LM3ZxxT1               | SOD-323 | 3000/Tape&Reel |
| LM3ZxxT1G<br>(Pb-Free) | SOD-323 | 3000/Tape&Reel |

\* The "G" suffix refers to Pb-Free package.

This series of Zener diodes is packaged in a SOD-323 surface mount package that has a power dissipation of 200 mW. 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 75 V
- Steady State Power Rating of 200 mW
- Small Body Outline Dimensions: 0.067" x 0.049"(1.7 mm x 1.25 mm)
- Low Body Height: 0.035" (0.9 mm)
- Package Weight: 4.507 mg/unit
- ESD Rating of Class 3 (>16 kV) per Human Body Model
- Pb-Free package is available.

### Mechanical Characteristics:

**CASE:** Void-free, transfer-molded plastic

**FINISH:** All external surfaces are corrosion resistant

### MAXIMUM CASE TEMPERATURE FOR SOLDERING PURPOSES:

260°C for 10 Seconds

**POLARITY:** Cathode indicated by polarity band

**FLAMMABILITY RATING:** UL94 V-0

**MOUNTING POSITION:** Any

### MAXIMUM RATINGS

| Rating                                                        | Symbol                            | Max        | Unit  |
|---------------------------------------------------------------|-----------------------------------|------------|-------|
| Total Device Dissipation FR-5 Board,<br>(Note 1.) @ TA = 25°C | P <sub>D</sub>                    | 200        | mW    |
| Derate above 25°C                                             |                                   | 1.5        | mW/°C |
| Thermal Resistance from<br>Junction to Ambient                | R <sub>θJA</sub>                  | 635        | °C/W  |
| Junction and Storage<br>Temperature Range                     | T <sub>J</sub> , T <sub>stg</sub> | -65 to+150 | °C    |

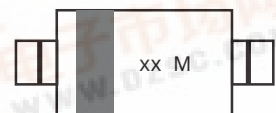
1. FR-4 Minimum Pad

## LM3Z2V4T1 SERIES

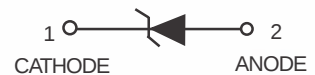


SOD-323

### MARKING DIAGRAM



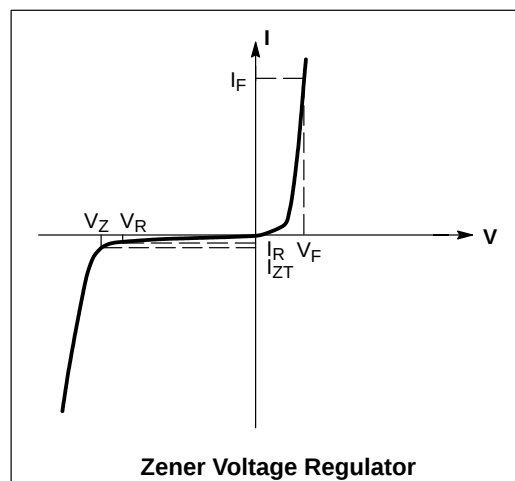
xx = Specific Device Code  
M = Date Code



**LM3Z2V4T1 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 @ $I_F$                             |
| $\Theta V_Z$ | Maximum Temperature Coefficient of $V_Z$            |
| C            | Max. Capacitance @ $V_R = 0$ and $f = 1\text{ MHz}$ |



## LM3Z2V4T1 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)

| Device    | Device Marking | Zener Voltage (Note 2.) |       |      |                   | Zener Impedance                      |                                   |     | Leakage Current                 |       | ΘV <sub>Z</sub><br>(mV/k)<br>@ I <sub>ZT</sub> |      | C<br>@ V <sub>R</sub> = 0<br>f = 1 MHz |
|-----------|----------------|-------------------------|-------|------|-------------------|--------------------------------------|-----------------------------------|-----|---------------------------------|-------|------------------------------------------------|------|----------------------------------------|
|           |                | V <sub>Z</sub> (Volts)  |       |      | @ I <sub>ZT</sub> | Z <sub>ZT</sub><br>@ I <sub>ZT</sub> | Z <sub>ZK</sub> @ I <sub>ZK</sub> |     | I <sub>R</sub> @ V <sub>R</sub> |       |                                                |      |                                        |
|           |                | Min                     | Nom   | Max  | mA                | Ω                                    | Ω                                 | mA  | μA                              | Volts | Min                                            | Max  | pF                                     |
| LM3Z2V4T1 | 00             | 2.2                     | 2.4   | 2.6  | 5                 | 100                                  | 1000                              | 0.5 | 50                              | 1.0   | −3.5                                           | 0    | 450                                    |
| LM3Z2V7T1 | 01             | 2.5                     | 2.7   | 2.9  | 5                 | 100                                  | 1000                              | 0.5 | 20                              | 1.0   | −3.5                                           | 0    | 450                                    |
| LM3Z3V0T1 | 02             | 2.8                     | 3.0   | 3.2  | 5                 | 100                                  | 1000                              | 0.5 | 10                              | 1.0   | −3.5                                           | 0    | 450                                    |
| LM3Z3V3T1 | 05             | 3.1                     | 3.3   | 3.5  | 5                 | 95                                   | 1000                              | 0.5 | 5                               | 1.0   | −3.5                                           | 0    | 450                                    |
| LM3Z3V6T1 | 06             | 3.4                     | 3.6   | 3.8  | 5                 | 90                                   | 1000                              | 0.5 | 5                               | 1.0   | −3.5                                           | 0    | 450                                    |
| LM3Z3V9T1 | 07             | 3.7                     | 3.9   | 4.1  | 5                 | 90                                   | 1000                              | 0.5 | 3                               | 1.0   | −3.5                                           | −2.5 | 450                                    |
| LM3Z4V3T1 | 08             | 4.0                     | 4.3   | 4.6  | 5                 | 90                                   | 1000                              | 0.5 | 3                               | 1.0   | −3.5                                           | 0    | 450                                    |
| LM3Z4V7T1 | 09             | 4.4                     | 4.7   | 5.0  | 5                 | 80                                   | 800                               | 0.5 | 3                               | 2.0   | −3.5                                           | 0.2  | 260                                    |
| LM3Z5V1T1 | 0A             | 4.8                     | 5.1   | 5.4  | 5                 | 60                                   | 500                               | 0.5 | 2                               | 2.0   | −2.7                                           | 1.2  | 225                                    |
| LM3Z5V6T1 | 0C             | 5.2                     | 5.6   | 6.0  | 5                 | 40                                   | 200                               | 0.5 | 1                               | 2.0   | −2.0                                           | 2.5  | 200                                    |
| LM3Z6V2T1 | 0E             | 5.8                     | 6.2   | 6.6  | 5                 | 10                                   | 100                               | 0.5 | 3                               | 4.0   | 0.4                                            | 3.7  | 185                                    |
| LM3Z6V8T1 | 0F             | 6.4                     | 6.8   | 7.2  | 5                 | 15                                   | 160                               | 0.5 | 2                               | 4.0   | 1.2                                            | 4.5  | 155                                    |
| LM3Z7V5T1 | 0G             | 7.0                     | 7.5   | 7.9  | 5                 | 15                                   | 160                               | 0.5 | 1                               | 5.0   | 2.5                                            | 5.3  | 140                                    |
| LM3Z8V2T1 | 0H             | 7.7                     | 8.2   | 8.7  | 5                 | 15                                   | 160                               | 0.5 | 0.7                             | 5.0   | 3.2                                            | 6.2  | 135                                    |
| LM3Z9V1T1 | 0K             | 8.5                     | 9.1   | 9.6  | 5                 | 15                                   | 160                               | 0.5 | 0.2                             | 7.0   | 3.8                                            | 7.0  | 130                                    |
| LM3Z10VT1 | 0L             | 9.4                     | 10    | 10.6 | 5                 | 20                                   | 160                               | 0.5 | 0.1                             | 8.0   | 4.5                                            | 8.0  | 130                                    |
| LM3Z11VT1 | 0M             | 10.4                    | 11    | 11.6 | 5                 | 20                                   | 160                               | 0.5 | 0.1                             | 8.0   | 5.4                                            | 9.0  | 130                                    |
| LM3Z12VT1 | 0N             | 11.4                    | 12    | 12.7 | 5                 | 25                                   | 80                                | 0.5 | 0.1                             | 8.0   | 6.0                                            | 10   | 130                                    |
| LM3Z13VT1 | 0P             | 12.4                    | 13.25 | 14.1 | 5                 | 30                                   | 80                                | 0.5 | 0.1                             | 8.0   | 7.0                                            | 11   | 120                                    |
| LM3Z15VT1 | 0T             | 14.3                    | 15    | 15.8 | 5                 | 30                                   | 80                                | 0.5 | 0.05                            | 10.5  | 9.2                                            | 13   | 110                                    |
| LM3Z16VT1 | 0U             | 15.3                    | 16.2  | 17.1 | 5                 | 40                                   | 80                                | 0.5 | 0.05                            | 11.2  | 10.4                                           | 14   | 105                                    |
| LM3Z18VT1 | 0W             | 16.8                    | 18    | 19.1 | 5                 | 45                                   | 80                                | 0.5 | 0.05                            | 12.6  | 12.4                                           | 16   | 100                                    |
| LM3Z20VT1 | 0Z             | 18.8                    | 20    | 21.2 | 5                 | 55                                   | 100                               | 0.5 | 0.05                            | 14.0  | 14.4                                           | 18   | 85                                     |
| LM3Z22VT1 | 10             | 20.8                    | 22    | 23.3 | 5                 | 55                                   | 100                               | 0.5 | 0.05                            | 15.4  | 16.4                                           | 20   | 85                                     |
| LM3Z24VT1 | 11             | 22.8                    | 24.2  | 25.6 | 5                 | 70                                   | 120                               | 0.5 | 0.05                            | 16.8  | 18.4                                           | 22   | 80                                     |
| LM3Z27VT1 | 12             | 25.1                    | 27    | 28.9 | 2                 | 80                                   | 300                               | 0.5 | 0.05                            | 18.9  | 21.4                                           | 25.3 | 70                                     |
| LM3Z30VT1 | 14             | 28                      | 30    | 32   | 2                 | 80                                   | 300                               | 0.5 | 0.05                            | 21.0  | 24.4                                           | 29.4 | 70                                     |
| LM3Z33VT1 | 18             | 31                      | 33    | 35   | 2                 | 80                                   | 300                               | 0.5 | 0.05                            | 23.2  | 27.4                                           | 33.4 | 70                                     |
| LM3Z36VT1 | 19             | 34                      | 36    | 38   | 2                 | 90                                   | 500                               | 0.5 | 0.05                            | 25.2  | 30.4                                           | 37.4 | 70                                     |
| LM3Z39VT1 | 20             | 37                      | 39    | 41   | 2                 | 130                                  | 500                               | 0.5 | 0.05                            | 27.3  | 33.4                                           | 41.2 | 45                                     |
| LM3Z43VT1 | 21             | 40                      | 43    | 46   | 2                 | 150                                  | 500                               | 0.5 | 0.05                            | 30.1  | 37.6                                           | 46.6 | 40                                     |
| LM3Z47VT1 | 1A             | 44                      | 47    | 50   | 2                 | 170                                  | 500                               | 0.5 | 0.05                            | 32.9  | 42.0                                           | 51.8 | 40                                     |
| LM3Z51VT1 | 1C             | 48                      | 51    | 54   | 2                 | 180                                  | 500                               | 0.5 | 0.05                            | 35.7  | 46.6                                           | 57.2 | 40                                     |
| LM3Z56VT1 | 1D             | 52                      | 56    | 60   | 2                 | 200                                  | 500                               | 0.5 | 0.05                            | 39.2  | 52.2                                           | 63.8 | 40                                     |
| LM3Z62VT1 | 1E             | 58                      | 62    | 66   | 2                 | 215                                  | 500                               | 0.5 | 0.05                            | 43.4  | 58.8                                           | 71.6 | 35                                     |
| LM3Z68VT1 | 1F             | 64                      | 68    | 72   | 2                 | 240                                  | 500                               | 0.5 | 0.05                            | 47.6  | 65.6                                           | 79.8 | 35                                     |
| LM3Z75VT1 | 1G             | 70                      | 75    | 79   | 2                 | 255                                  | 500                               | 0.5 | 0.05                            | 52.5  | 73.4                                           | 88.6 | 35                                     |

2. Zener voltage is measured with a pulse test current  $I_Z$  at an ambient temperature of  $25^\circ\text{C}$ .

## LM3Z2V4T1 SERIES

### Typical Characteristics

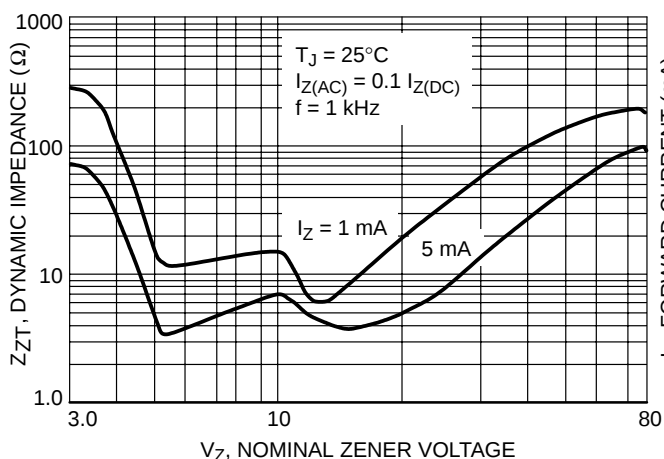


Figure 1. Effect of Zener Voltage on Zener Impedance

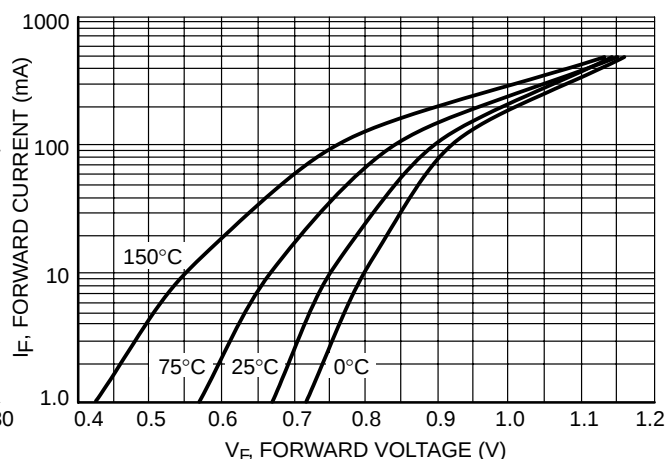


Figure 2. Typical Forward Voltage

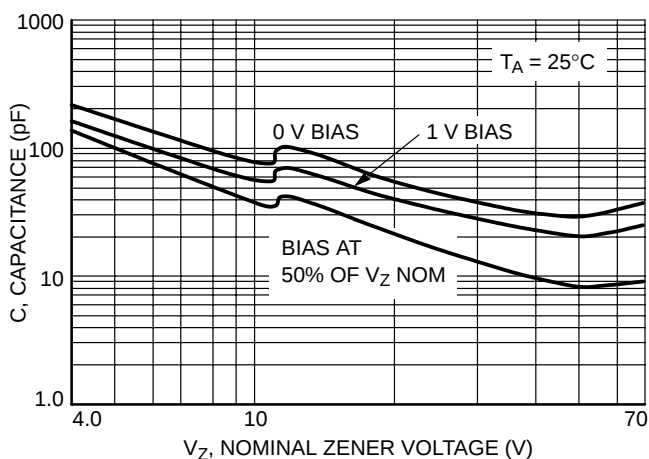


Figure 3. Typical Capacitance

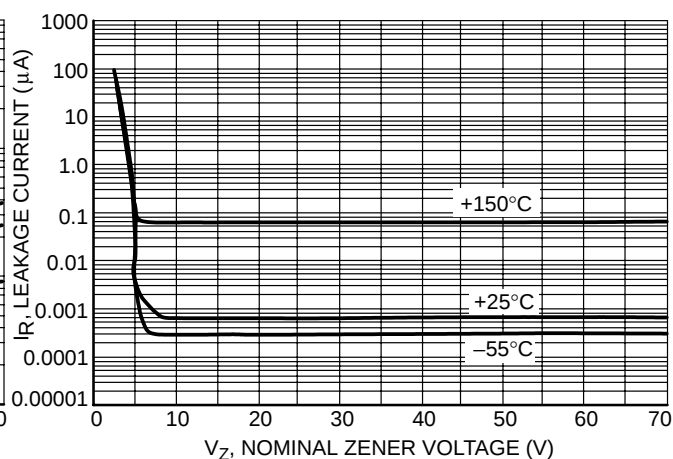


Figure 4. Typical Leakage Current

## LM3Z2V4T1 SERIES

### Typical Characteristics

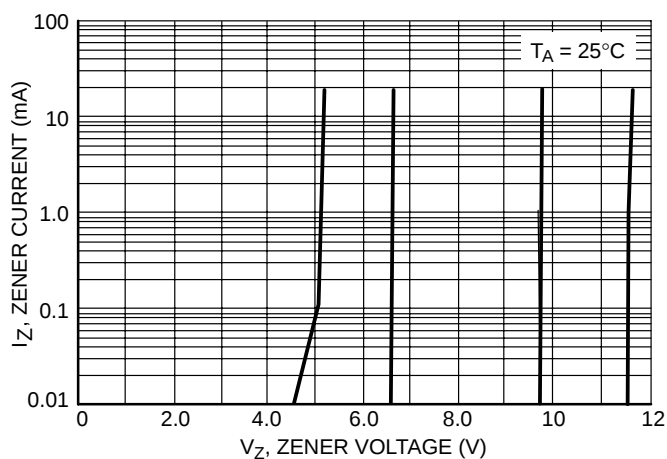


Figure 5. Zener Voltage versus Zener Current  
( $V_Z$  Up to 12 V)

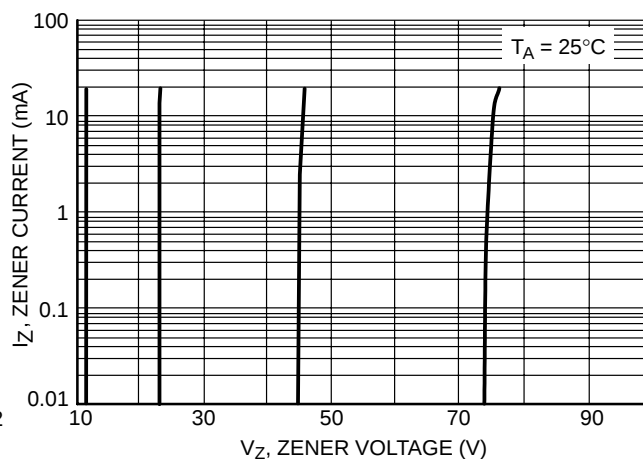


Figure 6. Zener Voltage versus Zener Current  
(12 V to 75 V)

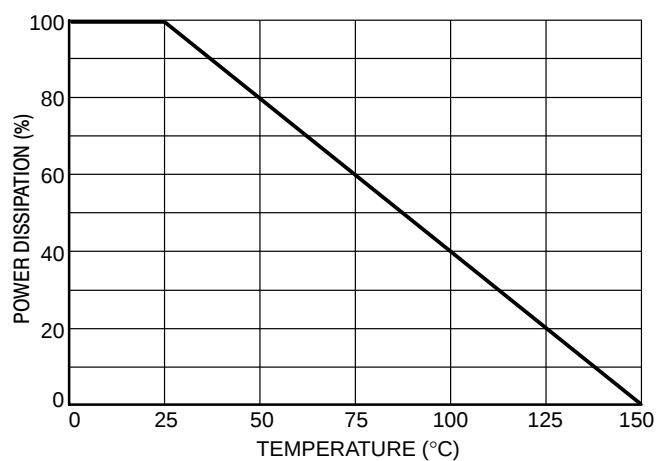
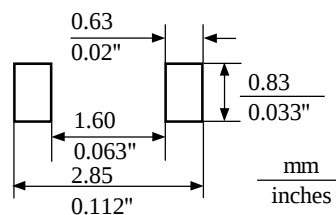
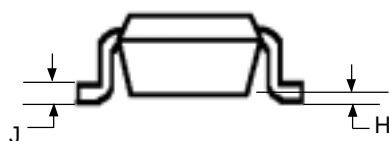
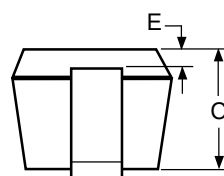
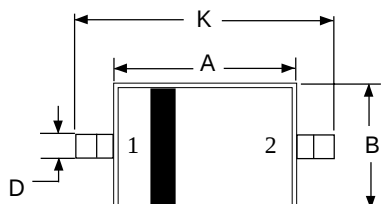


Figure 7. Steady State Power Derating

## LM3Z2V4T1 SERIES

### PACKAGE DIMENSIONS SOD-323



#### NOTES:

1. CONTROLLING DIMENSION: MILLIMETERS
2. LEAD THICKNESS SPECIFIED PER L/F DRAWING WITH SOLDER PLATING.

| DIN | MILLIMETERS |       | INCHES    |        |
|-----|-------------|-------|-----------|--------|
|     | MIN         | MAX   | MIN       | MAX    |
| A   | 1.60        | 1.80  | 0.063     | 0.071  |
| B   | 1.15        | 1.35  | 0.045     | 0.053  |
| C   | 0.80        | 1.00  | 0.031     | 0.039  |
| D   | 0.25        | 0.40  | 0.010     | 0.016  |
| E   | 0.15 REF    |       | 0.006 REF |        |
| H   | 0.00        | 0.10  | 0.0000    | 0.004  |
| J   | 0.089       | 0.177 | 0.0035    | 0.0070 |
| K   | 2.30        | 2.70  | 0.091     | 0.106  |

STYLE 1:

PIN 1: CATHODE  
2: ANODE