



# Zener Voltage Regulators

## 225 mW SOT-23 Surface Mount

### MMBZ52xxBLT1G Series, SZMMBZ52xxBLT1G Series

This series of Zener diodes is offered in the convenient, surface mount plastic SOT-23 package. These devices are designed to provide voltage regulation with minimum space requirement. They are well suited for applications such as cellular phones, hand held portables, and high density PC boards.

#### Features

- 225 mW Rating on FR-4 or FR-5 Board
- Zener Voltage Range – 2.4 V to 91 V
- Package Designed for Optimal Automated Board Assembly
- Small Package Size for High Density Applications
- 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 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

**POLARITY:** Cathode indicated by polarity band

**FLAMMABILITY RATING:** UL 94 V-0

#### MAXIMUM RATINGS

| Rating   | Symbol          | Max         | Units                      |
|--|-----------------|-------------|----------------------------|
| Total Power Dissipation on FR-5 Board,<br>(Note 1) @ $T_A = 25^\circ\text{C}$<br>Derated above $25^\circ\text{C}$        | $P_D$           | 225<br>1.8  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction-to-Ambient (Note 1)  | $R_{\theta JA}$ | 556         | $^\circ\text{C}/\text{W}$  |
| Total Power Dissipation on Alumina<br>Substrate, (Note 2) @ $T_A = 25^\circ\text{C}$<br>Derated above $25^\circ\text{C}$ | $P_D$           | 300<br>2.4  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance,<br>Junction-to-Ambient (Note 2)  | $R_{\theta JA}$ | 417         | $^\circ\text{C}/\text{W}$  |
| Junction and Storage<br>Temperature Range  | $T_J, T_{stg}$  | -65 to +150 | $^\circ\text{C}$           |

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. FR-5 = 1.0 X 0.75 X 0.62 in.
2. Alumina = 0.4 X 0.3 X 0.024 in, 99.5% alumina.



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SOT-23  
CASE 318  
STYLE 8



#### MARKING DIAGRAM



- xxx = Specific Device Code
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

#### ORDERING INFORMATION

| Device          | Package             | Shipping†               |
|-----------------|---------------------|-------------------------|
| MMBZ52xxBLT1G   | SOT-23<br>(Pb-Free) | 3,000 /<br>Tape & Reel  |
| SZMMBZ52xxBLT1G | SOT-23<br>(Pb-Free) | 3,000 /<br>Tape & Reel  |
| MMBZ52xxBLT3G   | SOT-23<br>(Pb-Free) | 10,000 /<br>Tape & Reel |
| SZMMBZ52xxBLT3G | SOT-23<br>(Pb-Free) | 10,000 /<br>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 table on page 3 of this data sheet.

## MMBZ52xxBLT1G Series, SZMMBZ52xxBLT1G Series

### ELECTRICAL CHARACTERISTICS

(Pinout: 1-Anode, 2-No Connection, 3-Cathode) ( $T_A = 25^\circ\text{C}$  unless otherwise noted,  $V_F = 0.95\text{ V Max. @ } I_F = 10\text{ mA}$ )

| 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 @ $I_F$            |



## MMBZ52xxBLT1G Series, SZMMBZ52xxBLT1G Series

**ELECTRICAL CHARACTERISTICS** (Pinout: 1-Anode, 2-NC, 3-Cathode) ( $V_F = 0.9\text{ V Max @ }I_F = 10\text{ mA}$  for all types.)

| Device*           | Device Marking | Zener Voltage (Note 3) |     |       | Zener Impedance   |                                   |                                   | Leakage Current |                                 |       |
|-------------------|----------------|------------------------|-----|-------|-------------------|-----------------------------------|-----------------------------------|-----------------|---------------------------------|-------|
|                   |                | V <sub>Z</sub> (Volts) |     |       | @ I <sub>ZT</sub> | Z <sub>ZT</sub> @ 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 |
| MMBZ5221BLT1G     | 18A            | 2.28                   | 2.4 | 2.52  | 20                | 30                                | 1200                              | 0.25            | 100                             | 1     |
| MMBZ5222BLT1G     | 18B            | 2.37                   | 2.5 | 2.63  | 20                | 30                                | 1250                              | 0.25            | 100                             | 1     |
| MMBZ5223BLT1G     | 18C            | 2.56                   | 2.7 | 2.84  | 20                | 30                                | 1300                              | 0.25            | 75                              | 1     |
| MMBZ5224BLT1G     | 18D            | 2.66                   | 2.8 | 2.94  | 20                | 30                                | 1400                              | 0.25            | 75                              | 1     |
| MMBZ5225BLT1G     | 18E            | 2.85                   | 3   | 3.15  | 20                | 29                                | 1600                              | 0.25            | 50                              | 1     |
| MMBZ5226BLT1G     | 8A             | 3.13                   | 3.3 | 3.47  | 20                | 28                                | 1600                              | 0.25            | 25                              | 1     |
| MMBZ5227BLT1G     | 8B             | 3.42                   | 3.6 | 3.78  | 20                | 24                                | 1700                              | 0.25            | 15                              | 1     |
| MMBZ5228BLT1G     | 8C             | 3.70                   | 3.9 | 4.10  | 20                | 23                                | 1900                              | 0.25            | 10                              | 1     |
| MMBZ5229BLT1G     | 8D             | 4.08                   | 4.3 | 4.52  | 20                | 22                                | 2000                              | 0.25            | 5                               | 1     |
| MMBZ5230BLT1G     | 8E             | 4.46                   | 4.7 | 4.94  | 20                | 19                                | 1900                              | 0.25            | 5                               | 2     |
| MMBZ5231BLT1G/T3G | 8F             | 4.84                   | 5.1 | 5.36  | 20                | 17                                | 1600                              | 0.25            | 5                               | 2     |
| MMBZ5232BLT1G/T3G | 8G             | 5.32                   | 5.6 | 5.88  | 20                | 11                                | 1600                              | 0.25            | 5                               | 3     |
| MMBZ5233BLT1G     | 8H             | 5.70                   | 6   | 6.30  | 20                | 7                                 | 1600                              | 0.25            | 5                               | 3.5   |
| MMBZ5234BLT1G/T3G | 8J             | 5.89                   | 6.2 | 6.51  | 20                | 7                                 | 1000                              | 0.25            | 5                               | 4     |
| MMBZ5235BLT1G     | 8K             | 6.46                   | 6.8 | 7.14  | 20                | 5                                 | 750                               | 0.25            | 3                               | 5     |
| MMBZ5236BLT1G     | 8L             | 7.12                   | 7.5 | 7.88  | 20                | 6                                 | 500                               | 0.25            | 3                               | 6     |
| MMBZ5237BLT1G     | 8M             | 7.79                   | 8.2 | 8.61  | 20                | 8                                 | 500                               | 0.25            | 3                               | 6.5   |
| MMBZ5238BLT1G     | 8N             | 8.26                   | 8.7 | 9.14  | 20                | 8                                 | 600                               | 0.25            | 3                               | 6.5   |
| MMBZ5239BLT1G     | 8P             | 8.64                   | 9.1 | 9.56  | 20                | 10                                | 600                               | 0.25            | 3                               | 7     |
| MMBZ5240BLT1G     | 8Q             | 9.50                   | 10  | 10.50 | 20                | 17                                | 600                               | 0.25            | 3                               | 8     |
| MMBZ5241BLT1G/T3G | 8R             | 10.4                   | 11  | 11.55 | 20                | 22                                | 600                               | 0.25            | 2                               | 8.4   |
| MMBZ5242BLT1G/T3G | 8S             | 11.40                  | 12  | 12.60 | 20                | 30                                | 600                               | 0.25            | 1                               | 9.1   |
| MMBZ5243BLT1G     | 8T             | 12.35                  | 13  | 13.65 | 9.5               | 13                                | 600                               | 0.25            | 0.5                             | 9.9   |
| MMBZ5244BLT1G     | 8U             | 13.30                  | 14  | 14.70 | 9                 | 15                                | 600                               | 0.25            | 0.1                             | 10    |
| MMBZ5245BLT1G     | 8V             | 14.25                  | 15  | 15.75 | 8.5               | 16                                | 600                               | 0.25            | 0.1                             | 11    |
| MMBZ5246BLT1G     | 8W             | 15.20                  | 16  | 16.80 | 7.8               | 17                                | 600                               | 0.25            | 0.1                             | 12    |
| MMBZ5247BLT1G/T3G | 8X             | 16.15                  | 17  | 17.85 | 7.4               | 19                                | 600                               | 0.25            | 0.1                             | 13    |
| MMBZ5248BLT1G/T3G | 8Y             | 17.10                  | 18  | 18.90 | 7                 | 21                                | 600                               | 0.25            | 0.1                             | 14    |
| MMBZ5249BLT1G     | 8Z             | 18.05                  | 19  | 19.95 | 6.6               | 23                                | 600                               | 0.25            | 0.1                             | 14    |
| MMBZ5250BLT1G/T3G | 81A            | 19.00                  | 20  | 21.00 | 6.2               | 25                                | 600                               | 0.25            | 0.1                             | 15    |
| MMBZ5251BLT1G     | 81B            | 20.90                  | 22  | 23.10 | 5.6               | 29                                | 600                               | 0.25            | 0.1                             | 17    |
| MMBZ5252BLT1G     | 81C            | 22.80                  | 24  | 25.20 | 5.2               | 33                                | 600                               | 0.25            | 0.1                             | 18    |
| MMBZ5253BLT1G     | 81D            | 23.75                  | 25  | 26.25 | 5                 | 35                                | 600                               | 0.25            | 0.1                             | 19    |
| MMBZ5254BLT1G     | 81E            | 25.65                  | 27  | 28.35 | 4.6               | 41                                | 600                               | 0.25            | 0.1                             | 21    |
| MMBZ5255BLT1G     | 81F            | 26.60                  | 28  | 29.40 | 4.5               | 44                                | 600                               | 0.25            | 0.1                             | 21    |
| MMBZ5256BLT1G     | 81G            | 28.50                  | 30  | 31.50 | 4.2               | 49                                | 600                               | 0.25            | 0.1                             | 23    |
| MMBZ5257BLT1G/T3G | 81H            | 31.35                  | 33  | 34.65 | 3.8               | 58                                | 700                               | 0.25            | 0.1                             | 25    |
| MMBZ5258BLT1G     | 81J            | 34.20                  | 36  | 37.80 | 3.4               | 70                                | 700                               | 0.25            | 0.1                             | 27    |
| MMBZ5259BLT1G     | 81K            | 37.05                  | 39  | 40.95 | 3.2               | 80                                | 800                               | 0.25            | 0.1                             | 30    |
| MMBZ5260BLT1G     | 81L            | 40.85                  | 43  | 45.15 | 3                 | 93                                | 900                               | 0.25            | 0.1                             | 33    |
| MMBZ5261BLT1G/T3G | 81M            | 44.65                  | 47  | 49.35 | 2.7               | 105                               | 1000                              | 0.25            | 0.1                             | 36    |
| MMBZ5262BLT1G     | 81N            | 48.45                  | 51  | 53.55 | 2.5               | 125                               | 1100                              | 0.25            | 0.1                             | 39    |
| MMBZ5263BLT1G     | 81P            | 53.20                  | 56  | 58.80 | 2.2               | 150                               | 1300                              | 0.25            | 0.1                             | 43    |
| MMBZ5264BLT1G     | 81Q            | 57.00                  | 60  | 63.00 | 2.1               | 170                               | 1400                              | 0.25            | 0.1                             | 46    |
| MMBZ5265BLT1G     | 81R            | 58.90                  | 62  | 65.10 | 2                 | 185                               | 1400                              | 0.25            | 0.1                             | 47    |
| MMBZ5266BLT1G     | 81S            | 64.60                  | 68  | 71.40 | 1.8               | 230                               | 1600                              | 0.25            | 0.1                             | 52    |
| MMBZ5267BLT1G     | 81T            | 71.25                  | 75  | 78.75 | 1.7               | 270                               | 1700                              | 0.25            | 0.1                             | 56    |
| MMBZ5268BLT1G     | 81U            | 77.90                  | 82  | 86.10 | 1.5               | 330                               | 2000                              | 0.25            | 0.1                             | 62    |
| MMBZ5270BLT1G     | 81W            | 86.45                  | 91  | 95.55 | 1.4               | 400                               | 2300                              | 0.25            | 0.1                             | 69    |

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.

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

NOTE: MMBZ5233BLT1G, MMBZ5246BLT1G, MMBZ5251BLT1G, and MMBZ5252BLT1G Not Available in 10,000/Tape & Reel.

\*Include SZ-prefix devices where applicable.

# MMBZ52xxBLT1G Series, SZMMBZ52xxBLT1G Series

## TYPICAL CHARACTERISTICS



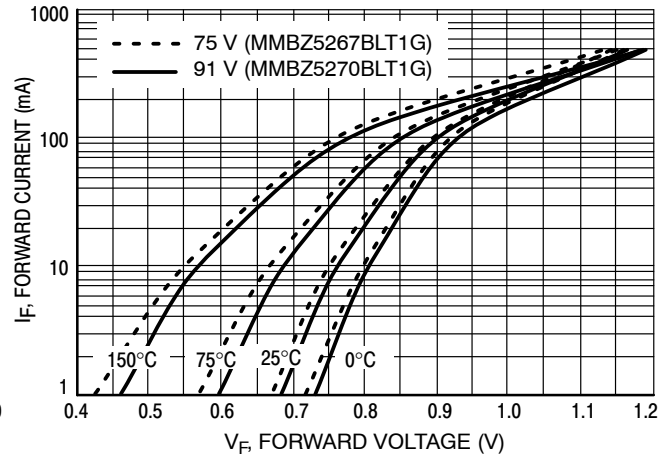
**Figure 1. Temperature Coefficients**  
(Temperature Range -55°C to +150°C)



**Figure 2. Temperature Coefficients**  
(Temperature Range -55°C to +150°C)



**Figure 3. Effect of Zener Voltage on Zener Impedance**



**Figure 4. Typical Forward Voltage**

# MMBZ52xxBLT1G Series, SZMMBZ52xxBLT1G Series

## TYPICAL CHARACTERISTICS



Figure 5. Typical Capacitance



Figure 6. Typical Leakage Current

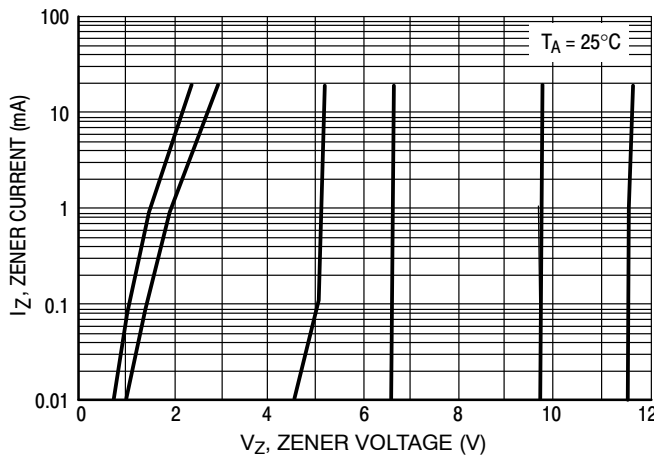


Figure 7. Zener Voltage versus Zener Current ( $V_Z$  Up to 12 V)

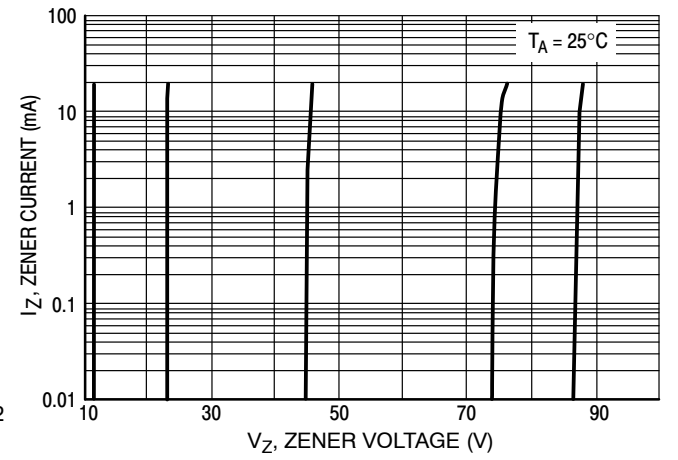


Figure 8. Zener Voltage versus Zener Current (12 V to 91 V)

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