



**THE DATASHEET OF
BZX84C12ET1G**



BZX84CxxxET1G Series, SZBZX84CxxxET1G Series

Zener Voltage Regulators

250 mW SOT-23 Surface Mount

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.

Specification Features

- 250 mW Rating on FR-4 or FR-5 Board
- Zener Breakdown Voltage Range – 2.4 V to 75 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
- Peak Power – 225 W (8 X 20 μ s)
- 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 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 | Unit |
|--|----------------|-------------|-------|
| Peak Power Dissipation @ 20 μ s (Note 1) @ $T_L \leq 25^\circ\text{C}$ | P_{pk} | 225 | W |
| Total Power Dissipation on FR-5 Board, (Note 2) @ $T_A = 25^\circ\text{C}$ Derated above 25°C Thermal Resistance, Junction-to-Ambient | P_D | 250 | mW |
| | | 2.0 | mW/°C |
| | | 500 | °C/W |
| Total Power Dissipation on Alumina Substrate, (Note 3) @ $T_A = 25^\circ\text{C}$ Derated above 25°C Thermal Resistance, Junction-to-Ambient | P_D | 300 | mW |
| | | 2.4 | mW/°C |
| | | 417 | °C/W |
| Junction and Storage Temperature Range | T_J, T_{stg} | -65 to +150 | °C |

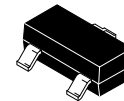
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Nonrepetitive current pulse per Figure 9.
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.

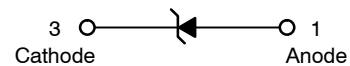


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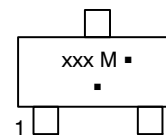
www.onsemi.com



**SOT-23
CASE 318
STYLE 8**



MARKING DIAGRAM



xxx = Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

| Device | Package | Shipping [†] |
|-----------------|------------------|-----------------------|
| BZX84CxxxET1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SZBZX84CxxxET1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BZX84CxxxET3G | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| SZBZX84CxxxET3G | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

DEVICE MARKING INFORMATION

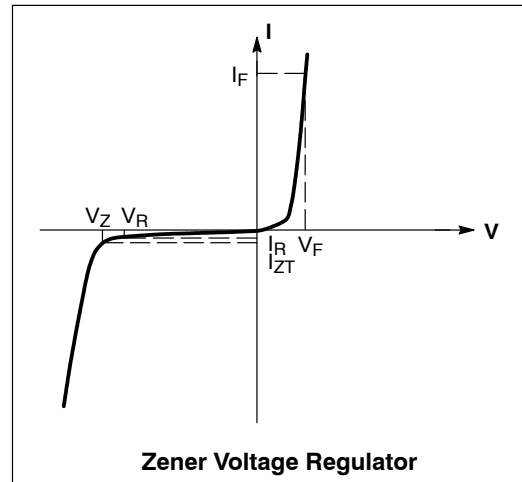
See specific marking information in the device marking column of the Electrical Characteristics table on page 3 of this data sheet.

BZX84CxxxET1G Series, SZBZX84CxxxET1G Series

ELECTRICAL CHARACTERISTICS

(Pinout: 1-Anode, 2-No Connection, 3-Cathode) ($T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 0.90\text{ V Max. @ } I_F = 10\text{ mA}$)

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



BZX84CxxxET1G Series, SZBZX84CxxxET1G Series

ELECTRICAL CHARACTERISTICS

(Pinout: 1-Anode, 2-No Connection, 3-Cathode) ($T_A = 25^\circ\text{C}$ unless otherwise noted, $V_F = 0.90\text{ V Max.}$ @ $I_F = 10\text{ mA}$)

| Device* | Device Marking | V_{Z1} (V) @ $I_{ZT1} = 5\text{ mA}$ (Note 4) | | | Z_{ZT1} (Ω) @ $I_{ZT1} = 5\text{ mA}$ | V_{Z2} (V) @ $I_{ZT2} = 1\text{ mA}$ (Note 4) | | Z_{ZT2} (Ω) @ $I_{ZT2} = 1\text{ mA}$ | V_{Z3} (V) @ $I_{ZT3} = 20\text{ mA}$ (Note 4) | | Z_{ZT3} (Ω) @ $I_{ZT3} = 20\text{ mA}$ | Max Reverse Leakage Current | | θ_{VZ} (mV/k) @ $I_{ZT1} = 5\text{ mA}$ | | C (pF) @ $V_R = 0\text{ V}$ $f = 1\text{ MHz}$ |
|---------------|----------------|---|-----|------|---|---|------|---|--|------|--|-----------------------------|-----------|--|------|--|
| | | Min | Nom | Max | | Min | Max | | Min | Max | | I_R (μA) | V_R (V) | Min | Max | |
| BZX84C2V4ET1G | BA1 | 2.2 | 2.4 | 2.6 | 100 | 1.7 | 2.1 | 600 | 2.6 | 3.2 | 50 | 50 | 1.0 | -3.5 | 0 | 450 |
| BZX84C2V7ET1G | BA2 | 2.5 | 2.7 | 2.9 | 100 | 1.9 | 2.4 | 600 | 3.0 | 3.6 | 50 | 20 | 1.0 | -3.5 | 0 | 450 |
| BZX84C3V0ET1G | BA3 | 2.8 | 3.0 | 3.2 | 95 | 2.1 | 2.7 | 600 | 3.3 | 3.9 | 50 | 10 | 1.0 | -3.5 | 0 | 450 |
| BZX84C3V3ET1G | BA4 | 3.1 | 3.3 | 3.5 | 95 | 2.3 | 2.9 | 600 | 3.6 | 4.2 | 40 | 5.0 | 1.0 | -3.5 | 0 | 450 |
| BZX84C3V6ET1G | BA5 | 3.4 | 3.6 | 3.8 | 90 | 2.7 | 3.3 | 600 | 3.9 | 4.5 | 40 | 5.0 | 1.0 | -3.5 | 0 | 450 |
| BZX84C3V9ET1G | BA6 | 3.7 | 3.9 | 4.1 | 90 | 2.9 | 3.5 | 600 | 4.1 | 4.7 | 30 | 3.0 | 1.0 | -3.5 | -2.5 | 450 |
| BZX84C4V3ET1G | BA7 | 4.0 | 4.3 | 4.6 | 90 | 3.3 | 4.0 | 600 | 4.4 | 5.1 | 30 | 3.0 | 1.0 | -3.5 | 0 | 450 |
| BZX84C4V7ET1G | BA9 | 4.4 | 4.7 | 5.0 | 80 | 3.7 | 4.7 | 500 | 4.5 | 5.4 | 15 | 3.0 | 2.0 | -3.5 | 0.2 | 260 |
| BZX84C5V1ET1G | BB1 | 4.8 | 5.1 | 5.4 | 60 | 4.2 | 5.3 | 480 | 5.0 | 5.9 | 15 | 2.0 | 2.0 | -2.7 | 1.2 | 225 |
| BZX84C5V6ET1G | BB2 | 5.2 | 5.6 | 6.0 | 40 | 4.8 | 6.0 | 400 | 5.2 | 6.3 | 10 | 1.0 | 2.0 | -2 | 2.5 | 200 |
| BZX84C6V2ET1G | BB3 | 5.8 | 6.2 | 6.6 | 10 | 5.6 | 6.6 | 150 | 5.8 | 6.8 | 6 | 3.0 | 4.0 | 0.4 | 3.7 | 185 |
| BZX84C6V8ET1G | BB4 | 6.4 | 6.8 | 7.2 | 15 | 6.3 | 7.2 | 80 | 6.4 | 7.4 | 6 | 2.0 | 4.0 | 1.2 | 4.5 | 155 |
| BZX84C7V5ET1G | BB5 | 7.0 | 7.5 | 7.9 | 15 | 6.9 | 7.9 | 80 | 7.0 | 8.0 | 6 | 1.0 | 5.0 | 2.5 | 5.3 | 140 |
| BZX84C8V2ET1G | BB6 | 7.7 | 8.2 | 8.7 | 15 | 7.6 | 8.7 | 80 | 7.7 | 8.8 | 6 | 0.7 | 5.0 | 3.2 | 6.2 | 135 |
| BZX84C9V1ET1G | BB7 | 8.5 | 9.1 | 9.6 | 15 | 8.4 | 9.6 | 100 | 8.5 | 9.7 | 8 | 0.5 | 6.0 | 3.8 | 7.0 | 130 |
| BZX84C10ET1G | BB8 | 9.4 | 10 | 10.6 | 20 | 9.3 | 10.6 | 150 | 9.4 | 10.7 | 10 | 0.2 | 7.0 | 4.5 | 8.0 | 130 |
| BZX84C11ET1G | BB9 | 10.4 | 11 | 11.6 | 20 | 10.2 | 11.6 | 150 | 10.4 | 11.8 | 10 | 0.1 | 8.0 | 5.4 | 9.0 | 130 |
| BZX84C12ET1G | BC1 | 11.4 | 12 | 12.7 | 25 | 11.2 | 12.7 | 150 | 11.4 | 12.9 | 10 | 0.1 | 8.0 | 6.0 | 10 | 130 |
| BZX84C13ET1G | BC2 | 12.4 | 13 | 14.1 | 30 | 12.3 | 14 | 170 | 12.5 | 14.2 | 15 | 0.1 | 8.0 | 7.0 | 11 | 120 |
| BZX84C15ET1G | BC3 | 13.8 | 15 | 15.6 | 30 | 13.7 | 15.5 | 200 | 13.9 | 15.7 | 20 | 0.05 | 10.5 | 9.2 | 13 | 110 |
| BZX84C16ET1G | BC4 | 15.3 | 16 | 17.1 | 40 | 15.2 | 17 | 200 | 15.4 | 17.2 | 20 | 0.05 | 11.2 | 10.4 | 14 | 105 |
| BZX84C18ET1G | BC5 | 16.8 | 18 | 19.1 | 45 | 16.7 | 19 | 225 | 16.9 | 19.2 | 20 | 0.05 | 12.6 | 12.4 | 16 | 100 |
| BZX84C20ET1G | BC6 | 18.8 | 20 | 21.2 | 55 | 18.7 | 21.1 | 225 | 18.9 | 21.4 | 20 | 0.05 | 14 | 14.4 | 18 | 85 |
| BZX84C22ET1G | BC7 | 20.8 | 22 | 23.3 | 55 | 20.7 | 23.2 | 250 | 20.9 | 23.4 | 25 | 0.05 | 15.4 | 16.4 | 20 | 85 |
| BZX84C24ET1G | BC8 | 22.8 | 24 | 25.6 | 70 | 22.7 | 25.5 | 250 | 22.9 | 25.7 | 25 | 0.05 | 16.8 | 18.4 | 22 | 80 |
| Device* | Device Marking | V_{Z1} Below @ $I_{ZT1} = 2\text{ mA}$ | | | Z_{ZT1} Below @ $I_{ZT1} = 2\text{ mA}$ | V_{Z2} Below @ $I_{ZT2} = 0.1\text{ mA}$ | | Z_{ZT2} Below @ $I_{ZT4} = 0.5\text{ mA}$ | V_{Z3} Below @ $I_{ZT3} = 10\text{ mA}$ | | Z_{ZT3} Below @ $I_{ZT3} = 10\text{ mA}$ | Max Reverse Leakage Current | | θ_{VZ} (mV/k) Below @ $I_{ZT1} = 2\text{ mA}$ | | C (pF) @ $V_R = 0\text{ V}$ $f = 1\text{ MHz}$ |
| | | Min | Nom | Max | | Min | Max | | Min | Max | | I_R (μA) | V_R (V) | Min | Max | |
| BZX84C27ET1G | BC9 | 25.1 | 27 | 28.9 | 80 | 25 | 28.9 | 300 | 25.2 | 29.3 | 45 | 0.05 | 18.9 | 21.4 | 25.3 | 70 |
| BZX84C30ET1G | BD1 | 28 | 30 | 32 | 80 | 27.8 | 32 | 300 | 28.1 | 32.4 | 50 | 0.05 | 21 | 24.4 | 29.4 | 70 |
| BZX84C33ET1G | BD2 | 31 | 33 | 35 | 80 | 30.8 | 35 | 325 | 31.1 | 35.4 | 55 | 0.05 | 23.1 | 27.4 | 33.4 | 70 |
| BZX84C36ET1G | BD3 | 34 | 36 | 38 | 90 | 33.8 | 38 | 350 | 34.1 | 38.4 | 60 | 0.05 | 25.2 | 30.4 | 37.4 | 70 |
| BZX84C39ET1G | BD4 | 37 | 39 | 41 | 130 | 36.7 | 41 | 350 | 37.1 | 41.5 | 70 | 0.05 | 27.3 | 33.4 | 41.2 | 45 |
| BZX84C43ET1G | BK6 | 40 | 43 | 46 | 150 | 39.7 | 46 | 375 | 40.1 | 46.5 | 80 | 0.05 | 30.1 | 37.6 | 46.6 | 40 |
| BZX84C47ET1G | BD5 | 44 | 47 | 50 | 170 | 43.7 | 50 | 375 | 44.1 | 50.5 | 90 | 0.05 | 32.9 | 42 | 51.8 | 40 |
| BZX84C51ET1G | BD6 | 48 | 51 | 54 | 180 | 47.6 | 54 | 400 | 48.1 | 54.6 | 100 | 0.05 | 35.7 | 46.6 | 57.2 | 40 |
| BZX84C56ET1G | BD7 | 52 | 56 | 60 | 200 | 51.5 | 60 | 425 | 52.1 | 60.8 | 110 | 0.05 | 39.2 | 52.2 | 63.8 | 40 |
| BZX84C62ET1G | BD8 | 58 | 62 | 66 | 215 | 57.4 | 66 | 450 | 58.2 | 67 | 120 | 0.05 | 43.4 | 58.8 | 71.6 | 35 |
| BZX84C68ET1G | BD9 | 64 | 68 | 72 | 240 | 63.4 | 72 | 475 | 64.2 | 73.2 | 130 | 0.05 | 47.6 | 65.6 | 79.8 | 35 |
| BZX84C75ET1G | BE1 | 70 | 75 | 79 | 255 | 69.4 | 79 | 500 | 70.3 | 80.2 | 140 | 0.05 | 52.5 | 73.4 | 88.6 | 35 |

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

* Include SZ-prefix devices where applicable.

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TYPICAL CHARACTERISTICS



Figure 1. Temperature Coefficients
(Temperature Range -55°C to $+150^{\circ}\text{C}$)



Figure 2. Temperature Coefficients
(Temperature Range -55°C to $+150^{\circ}\text{C}$)



Figure 3. Effect of Zener Voltage on Zener Impedance



Figure 4. Typical Forward Voltage

TYPICAL CHARACTERISTICS

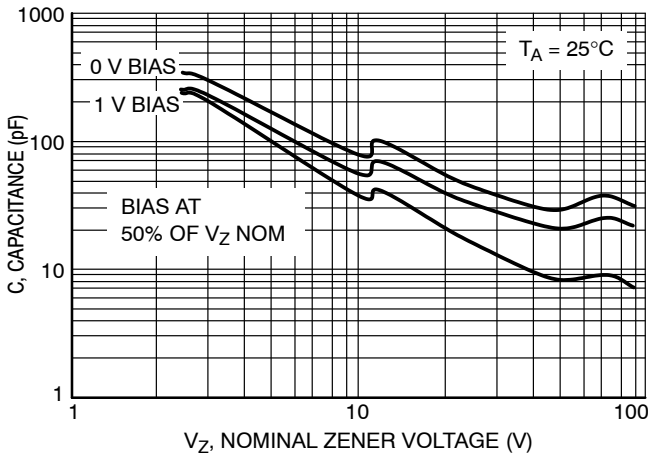


Figure 5. Typical Capacitance



Figure 6. Typical Leakage Current

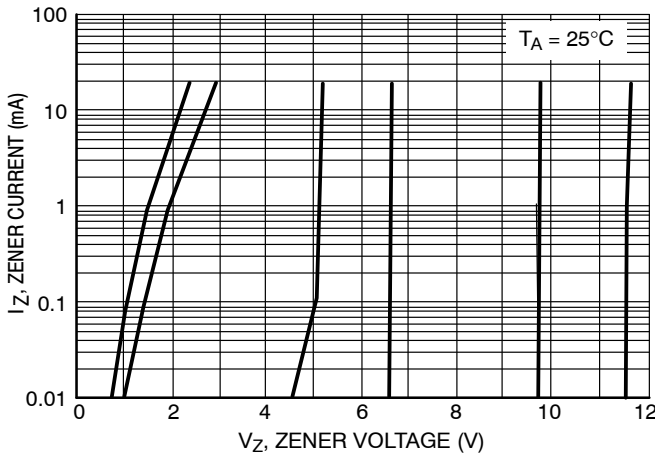


Figure 7. Zener Voltage versus Zener Current (V_Z Up to 12 V)



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

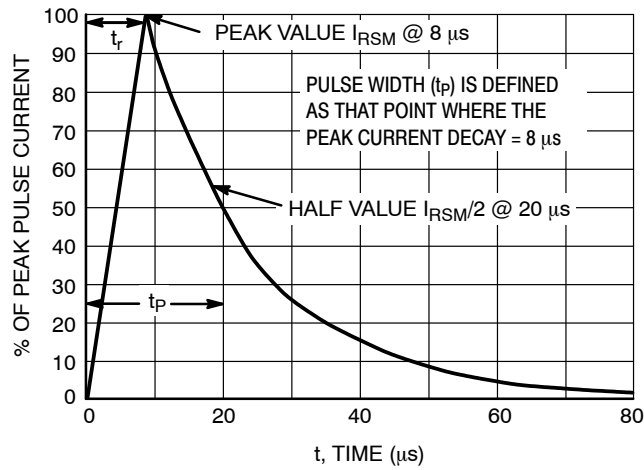


Figure 9. 8 × 20 μs Pulse Waveform

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