

# BZX84C2V4ET1 Series

## Zener Voltage Regulators

### 225 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

- 225 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  $\mu$ s)
- Pb-Free Package is Available

#### 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 $\mu$ s (Note 1) @ $T_L \leq 25^\circ\text{C}$	$P_{pk}$	225	Watts
Total Power Dissipation on FR-5 Board, (Note 2) @ $T_A = 25^\circ\text{C}$ Derated above 25°C	$P_D$	225 1.8	mW mW/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	556	°C/W
Total Power Dissipation on Alumina Substrate, (Note 3) @ $T_A = 25^\circ\text{C}$ Derated above 25°C	$P_D$	300 2.4	mW mW/°C
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature Range	$T_J, T_{stg}$	-65 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Nonrepetitive current pulse per Figure 9.

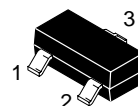
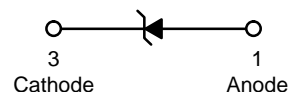
2. FR-5 = 1.0 X 0.75 X 0.62 in.

3. Alumina = 0.4 X 0.3 X 0.024 in, 99.5% alumina.



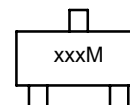
**ON Semiconductor®**

<http://onsemi.com>



**SOT-23  
CASE 318  
STYLE 8**

#### MARKING DIAGRAM



xxx = Specific Device Code

M = Date Code

#### ORDERING INFORMATION

Device	Package	Shipping†
BZX84CxxxET1	SOT-23	3000/Tape & Reel
BZX84CxxxET1G	SOT-23 (Pb-Free)	3000/Tape & Reel
BZX84CxxxET3	SOT-23	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

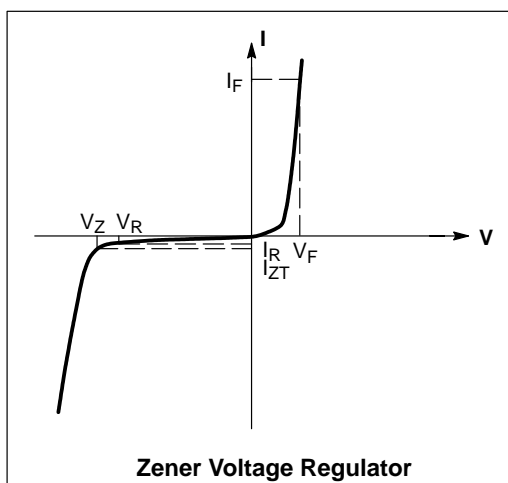
See specific marking information in the device marking column of the Electrical Characteristics table on page 2 of this data sheet.

## BZX84C2V4ET1 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 @ $I_{ZT}$
$I_R$	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 $f = 1\text{ MHz}$



### ELECTRICAL CHARACTERISTICS

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

(Devices listed in **bold, italic** are ON Semiconductor Preferred devices.)

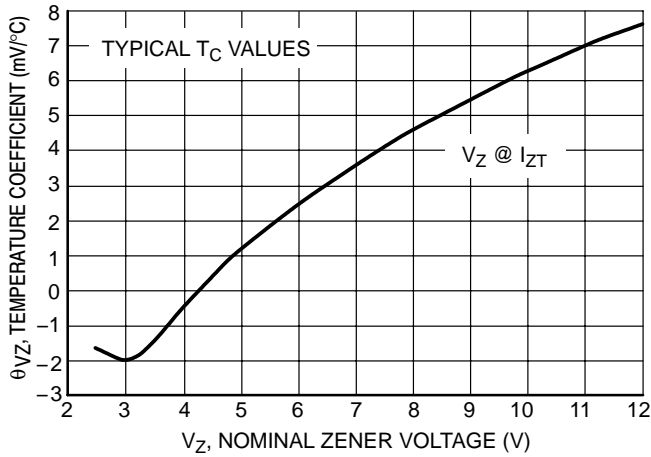
Device	Device Marking	$V_{Z1}$ (V) @ $I_{ZT1} = 5\text{ mA}$ (Note 4)			$Z_{ZT1}$ ( $\Omega$ ) @ $I_{ZT1} = 5\text{ mA}$	$V_{Z2}$ (V) @ $I_{ZT2} = 1\text{ mA}$ (Note 4)		$Z_{ZT2}$ ( $\Omega$ ) @ $I_{ZT2} = 1\text{ mA}$	$V_{Z3}$ (V) @ $I_{ZT3} = 20\text{ mA}$ (Note 4)		$Z_{ZT3}$ ( $\Omega$ ) @ $I_{ZT3} = 20\text{ mA}$	Max Reverse Leakage Current		$\theta_{VZ}$ (mV/k) @ $I_{ZT1} = 5\text{ mA}$		C (pF) @ $V_R = 0$ $f = 1\text{ MHz}$
		Min	Nom	Max		Min	Max		Min	Max		$I_R$ ( $\mu\text{A}$ )	$V_R$ (V)	Min	Max	
BZX84C3V3ET1	BA4	3.1	3.3	3.5	95	2.3	2.9	600	3.6	4.2	40	5	1	-3.5	0	450
<b>BZX84C4V7ET1</b>	<b>BA9</b>	<b>4.4</b>	<b>4.7</b>	<b>5</b>	<b>80</b>	<b>3.7</b>	<b>4.7</b>	<b>500</b>	<b>4.5</b>	<b>5.4</b>	<b>15</b>	<b>3</b>	<b>2</b>	<b>-3.5</b>	<b>0.2</b>	<b>260</b>
<b>BZX84C5V1ET1</b>	<b>BB1</b>	<b>4.8</b>	<b>5.1</b>	<b>5.4</b>	<b>60</b>	<b>4.2</b>	<b>5.3</b>	<b>480</b>	<b>5</b>	<b>5.9</b>	<b>15</b>	<b>2</b>	<b>2</b>	<b>-2.7</b>	<b>1.2</b>	<b>225</b>
<b>BZX84C5V6ET1</b>	<b>BB2</b>	<b>5.2</b>	<b>5.6</b>	<b>6</b>	<b>40</b>	<b>4.8</b>	<b>6</b>	<b>400</b>	<b>5.2</b>	<b>6.3</b>	<b>10</b>	<b>1</b>	<b>2</b>	<b>-2.0</b>	<b>2.5</b>	<b>200</b>
<b>BZX84C6V2ET1, G*</b>	<b>BB3</b>	<b>5.8</b>	<b>6.2</b>	<b>6.6</b>	<b>10</b>	<b>5.6</b>	<b>6.6</b>	<b>150</b>	<b>5.8</b>	<b>6.8</b>	<b>6</b>	<b>3</b>	<b>4</b>	<b>0.4</b>	<b>3.7</b>	<b>185</b>
BZX84C6V8ET1	BB4	6.4	6.8	7.2	15	6.3	7.2	80	6.4	7.4	6	2	4	1.2	4.5	155
BZX84C7V5ET1	BB5	7	7.5	7.9	15	6.9	7.9	80	7	8	6	1	5	2.5	5.3	140
BZX84C10ET1	BB8	9.4	10	10.6	20	9.3	10.6	150	9.4	10.7	10	0.2	7	4.5	8.0	130
<b>BZX84C12ET1</b>	<b>BC1</b>	<b>11.4</b>	<b>12</b>	<b>12.7</b>	<b>25</b>	<b>11.2</b>	<b>12.7</b>	<b>150</b>	<b>11.4</b>	<b>12.9</b>	<b>10</b>	<b>0.1</b>	<b>8</b>	<b>6.0</b>	<b>10.0</b>	<b>130</b>
BZX84C15ET1	BC3	14.3	15	15.8	30	13.7	15.5	200	13.9	15.7	20	0.05	10.5	9.2	13.0	110
BZX84C16ET1	BC4	15.3	16	17.1	40	15.2	17	200	15.4	17.2	20	0.05	11.2	10.4	14.0	105
<b>BZX84C18ET1</b>	<b>BC5</b>	<b>16.8</b>	<b>18</b>	<b>19.1</b>	<b>45</b>	<b>16.7</b>	<b>19</b>	<b>225</b>	<b>16.9</b>	<b>19.2</b>	<b>20</b>	<b>0.05</b>	<b>12.6</b>	<b>12.4</b>	<b>16.0</b>	<b>100</b>
BZX84C24ET1	BC8	22.8	24	25.6	70	22.7	25.5	250	22.9	25.7	25	0.05	16.8	18.4	22.0	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 @ $I_{ZT2} = 0.5\text{ mA}$	$V_{Z3}$ Below @ $I_{ZT3} = 10\text{ mA}$ A		$Z_{ZT3}$ Below @ $I_{ZT3} = 10\text{ mA}$	Max Reverse Leakage Current		$\theta_{VZ}$ (mV/k) Below @ $I_{ZT1} = 2\text{ mA}$		C (pF) @ $V_R = 0$ $f = 1\text{ MHz}$
		Min	Nom	Max		Min	Max		Min	Max		Min	Max	$I_R$ ( $\mu\text{A}$ )	$V_R$ (V)	
BZX84C27ET1	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
BZX84C43ET1	BK6	40	43	46	150	39.7	46	375	40.1	46.5	80	0.05	30.1	37.6	46.6	40

\* The "G" suffix indicates Pb-Free package available.

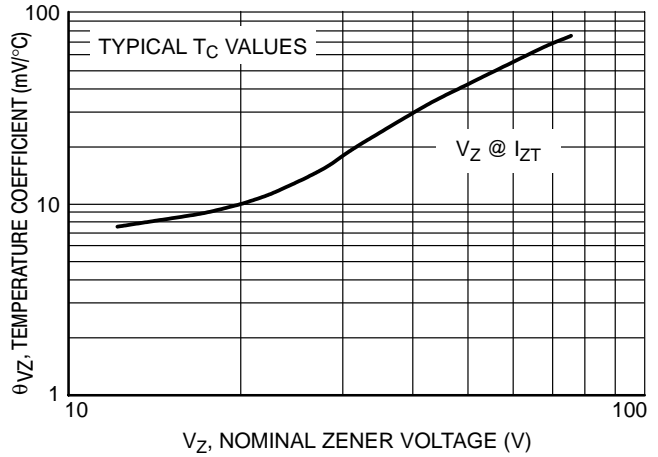
4. Zener voltage is measured with a pulse test current  $I_Z$  at an ambient temperature of  $25^\circ\text{C}$

# BZX84C2V4ET1 Series

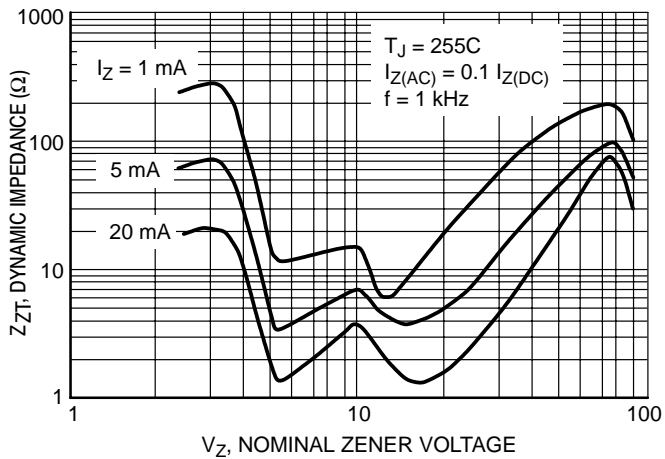
## TYPICAL CHARACTERISTICS



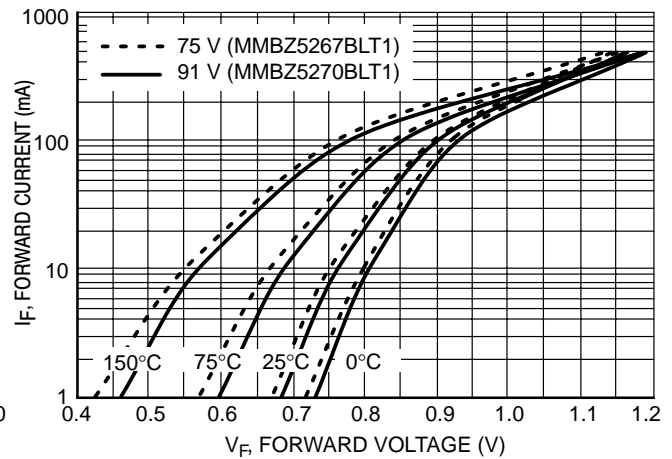
**Figure 1. Temperature Coefficients  
(Temperature Range -55°C to +150°C)**



**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**

# BZX84C2V4ET1 Series

## TYPICAL CHARACTERISTICS

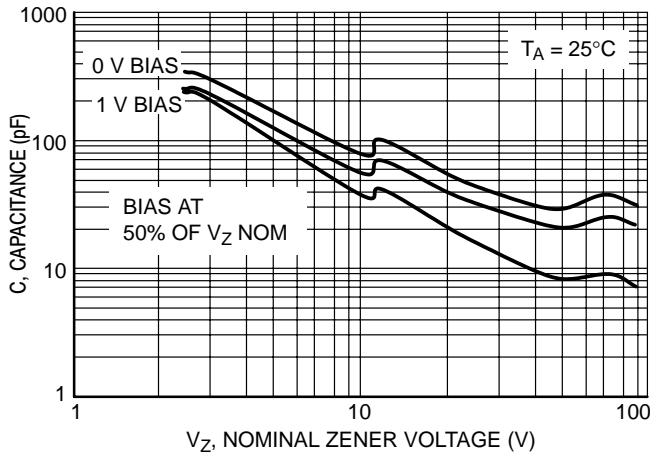


Figure 5. Typical Capacitance

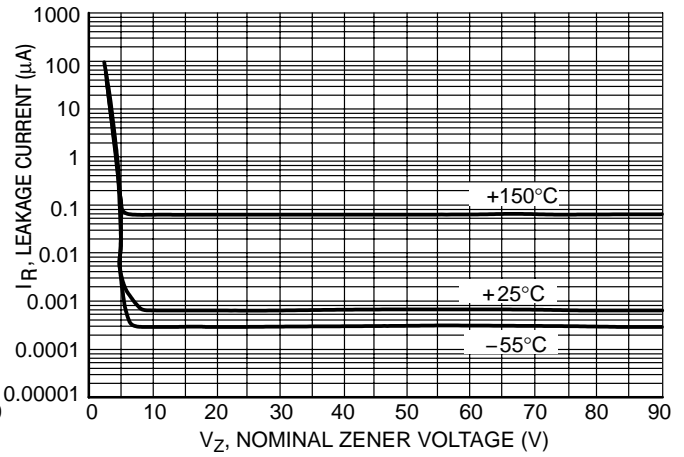


Figure 6. Typical Leakage Current

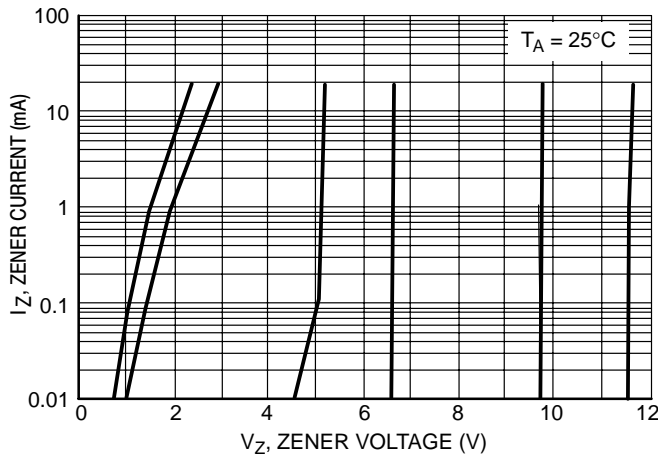


Figure 7. Zener Voltage versus Zener Current (V<sub>Z</sub> Up to 12 V)

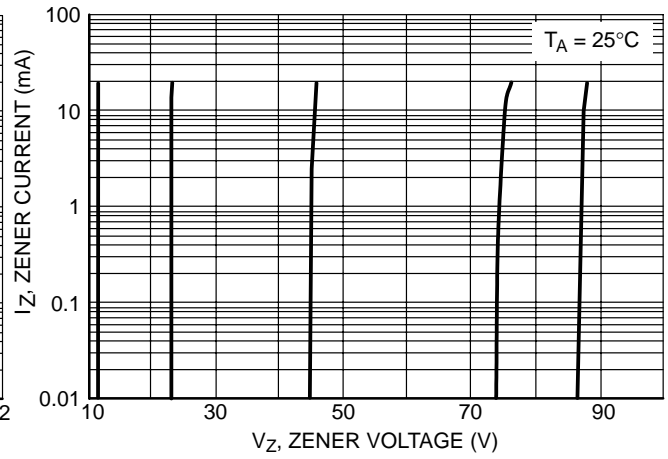


Figure 8. Zener Voltage versus Zener Current (12 V to 91 V)

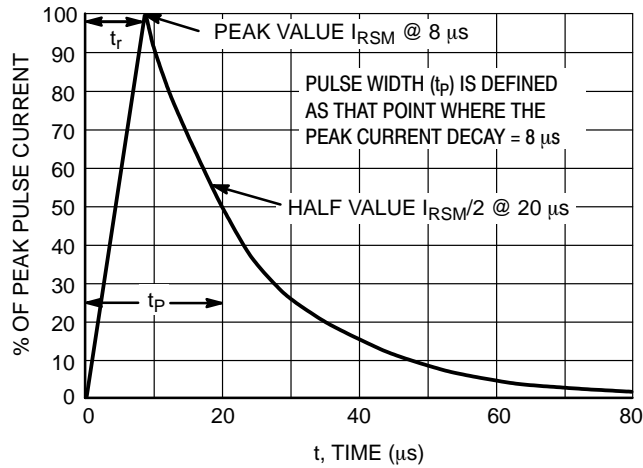
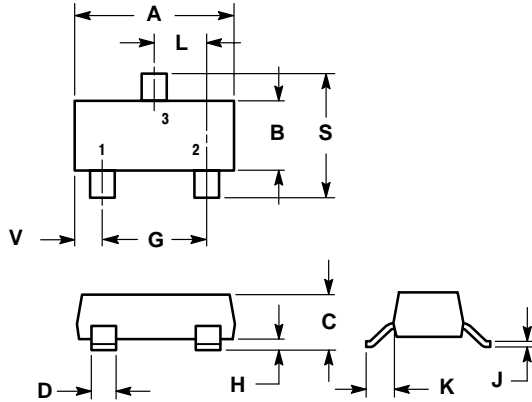


Figure 9. 8 × 20 μs Pulse Waveform

# BZX84C2V4ET1 Series

## PACKAGE DIMENSIONS

SOT-23  
TO-236AB  
CASE 318-09  
ISSUE AJ



NOTES:

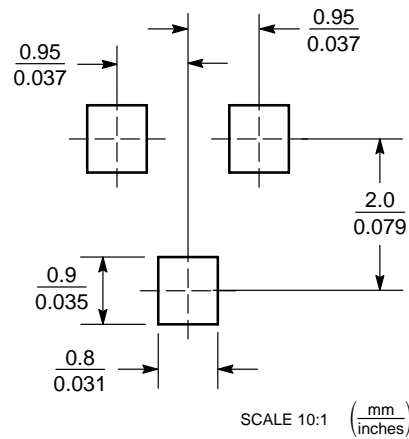
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01, -02, AND -06 OBSOLETE, NEW STANDARD 318-09.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0385	0.0498	0.99	1.26
D	0.0140	0.0200	0.36	0.50
G	0.0670	0.0826	1.70	2.10
H	0.0040	0.0098	0.10	0.25
J	0.0034	0.0070	0.085	0.177
K	0.0180	0.0236	0.45	0.60
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.0984	2.10	2.50
V	0.0177	0.0236	0.45	0.60

STYLE 8:

1. ANODE
2. NO CONNECTION
3. CATHODE

### SOLDERING FOOTPRINT\*



\*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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**BZX84C2V4ET1/D**