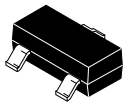
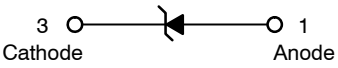
Zener Voltage Regulators

250 mW SOT−23 Surface Mount

BZX84BxxxLT1G, BZX84CxxxLT1G Series, SZBZX84BxxxLT1G, SZBZX84CxxxLT1G Series



SOT−23
CASE 318
STYLE 8



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

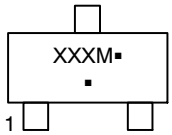
- 250 mW Rating on FR−4 or FR−5 Board
- Zener Breakdown Voltage Range − 2.4 V to 75 V
- Package Designed for Optimal Automated Board Assembly
- Small Package Size for High Density Applications
- ESD Rating of Class 3 (> 16 kV) per Human Body Model
- Tight Tolerance Series Available (See Page 4)
- SZ 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

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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†
BZX84CxxxLT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SZBZX84CxxxLT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BZX84CxxxLT3G	SOT−23 (Pb−Free)	10,000 / Tape & Reel
SZBZX84CxxxLT3G	SOT−23 (Pb−Free)	10,000 / Tape & Reel
BZX84BxxxLT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
SZBZX84BxxxLT1G	SOT−23 (Pb−Free)	3,000 / Tape & Reel
BZX84BxxxLT3G	SOT−23 (Pb−Free)	10,000 / Tape & Reel
SZBZX84BxxxLT3G	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.

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MAXIMUM RATINGS

Rating	Symbol	Max	Unit
Total Power Dissipation on FR−5 Board, (Note 1) @ T_A = 25°C Derated above 25°C Thermal Resistance, Junction−to−Ambient	P_D $R_{\theta JA}$	 250 2.0 500	 mW mW/°C °C/W
Total Power Dissipation on Alumina Substrate, (Note 2) @ T_A = 25°C Derated above 25°C Thermal Resistance, Junction−to−Ambient	P_D $R_{\theta JA}$	 300 2.4 417	 mW mW/°C °C/W
Junction and Storage Temperature Range	T_J, T_{stg}	−65 to +150	°C

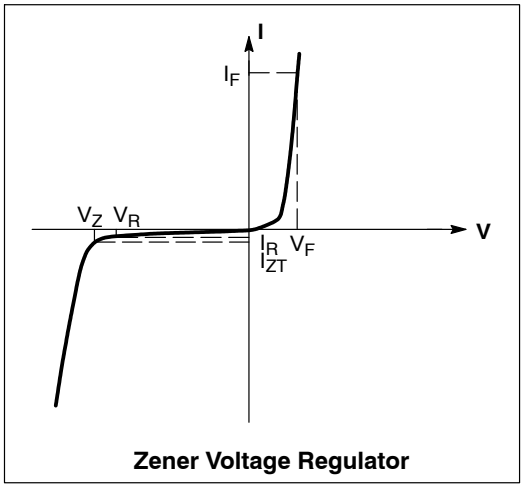
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. 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.

ELECTRICAL CHARACTERISTICS

(Pinout: 1-Anode, 2-No Connection, 3-Cathode) (T_A = 25°C unless otherwise noted, V_F = 0.90 V Max. @ I_F = 10 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 MHz



Zener Voltage Regulator

ELECTRICAL CHARACTERISTICS – BZX84CxxxLT1 SERIES (STANDARD TOLERANCE)

(Pinout: 1-Anode, 2-No Connection, 3-Cathode) (T_A = 25°C unless otherwise noted, V_F = 0.90 V Max. @ I_F = 10 mA)
(Devices listed in ***bold, italic*** are **onsemi** Preferred devices.)

Device*	Device Marking	V_{Z1} (Volts) @ I_{ZT1} = 5 mA (Note 3)			Z_{ZT1} (Ω) @ I_{ZT1} = 5 mA	V_{Z2} (V) @ I_{ZT2} = 1 mA (Note 3)		Z_{ZT2} (Ω) @ I_{ZT2} = 1 mA	V_{Z3} (V) @ I_{ZT3} = 20 mA (Note 3)		Z_{ZT3} (Ω) @ I_{ZT3} = 20 mA	Max Reverse Leakage Current		θ_{VZ} (mV/k) @ I_{ZT1} = 5 mA		C (pF) @ V_R = 0 f = 1 MHz
		Min	Nom	Max		Min	Max		Min	Max		I_R μA @	V_R Volts	Min	Max	
BZX84C2V4LT1G	Z11	2.2	2.4	2.6	100	1.7	2.1	600	2.6	3.2	50	50	1	–3.5	0	450
BZX84C2V7LT1G	Z12	2.5	2.7	2.9	100	1.9	2.4	600	3	3.6	50	20	1	–3.5	0	450
BZX84C3V0LT1G	Z13	2.8	3	3.2	95	2.1	2.7	600	3.3	3.9	50	10	1	–3.5	0	450
BZX84C3V3LT1G	Z14	3.1	3.3	3.5	95	2.3	2.9	600	3.6	4.2	40	5	1	–3.5	0	450
BZX84C3V6LT1G	Z15	3.4	3.6	3.8	90	2.7	3.3	600	3.9	4.5	40	5	1	–3.5	0	450
BZX84C3V9LT1G	Z16	3.7	3.9	4.1	90	2.9	3.5	600	4.1	4.7	30	3	1	–3.5	–2.5	450
BZX84C4V3LT1G	W9	4	4.3	4.6	90	3.3	4	600	4.4	5.1	30	3	1	–3.5	0	450
BZX84C4V7LT1/T3G	***Z1***	***4.4***	***4.7***	***5***	***80***	***3.7***	***4.7***	***500***	***4.5***	***5.4***	***15***	***3***	***2***	***–3.5***	***0.2***	***260***
BZX84C5V1LT1/T3G	***Z2***	***4.8***	***5.1***	***5.4***	***60***	***4.2***	***5.3***	***480***	***5***	***5.9***	***15***	***2***	***2***	***–2.7***	***1.2***	***225***
BZX84C5V6LT1/T3G	***Z3***	***5.2***	***5.6***	***6***	***40***	***4.8***	***6***	***400***	***5.2***	***6.3***	***10***	***1***	***2***	***–2.0***	***2.5***	***200***
BZX84C6V2LT1/T3G	***Z4***	***5.8***	***6.2***	***6.6***	***10***	***5.6***	***6.6***	***150***	***5.8***	***6.8***	***6***	***3***	***4***	***0.4***	***3.7***	***185***
BZX84C6V8LT1/T3G	Z5	6.4	6.8	7.2	15	6.3	7.2	80	6.4	7.4	6	2	4	1.2	4.5	155
BZX84C7V5LT1G	Z6	7	7.5	7.9	15	6.9	7.9	80	7	8	6	1	5	2.5	5.3	140
BZX84C8V2LT1G	Z7	7.7	8.2	8.7	15	7.6	8.7	80	7.7	8.8	6	0.7	5	3.2	6.2	135
BZX84C9V1LT1/T3G	Z8	8.5	9.1	9.6	15	8.4	9.6	100	8.5	9.7	8	0.5	6	3.8	7.0	130
BZX84C10LT1G	Z9	9.4	10	10.6	20	9.3	10.6	150	9.4	10.7	10	0.2	7	4.5	8.0	130
BZX84C11LT1G	Y1	10.4	11	11.6	20	10.2	11.6	150	10.4	11.8	10	0.1	8	5.4	9.0	130
BZX84C12LT1G	***Y2***	***11.4***	***12***	***12.7***	***25***	***11.2***	***12.7***	***150***	***11.4***	***12.9***	***10***	***0.1***	***8***	***6.0***	***10.0***	***130***
BZX84C13LT1G	Y3	12.4	13	14.1	30	12.3	14	170	12.5	14.2	15	0.1	8	7.0	11.0	120
BZX84C15LT1/T3G	Y4	13.8	15	15.6	30	13.7	15.5	200	13.9	15.7	20	0.05	10.5	9.2	13.0	110
BZX84C16LT1G	Y5	15.3	16	17.1	40	15.2	17	200	15.4	17.2	20	0.05	11.2	10.4	14.0	105
BZX84C18LT1/T3G	***Y6***	***16.8***	***18***	***19.1***	***45***	***16.7***	***19***	***225***	***16.9***	***19.2***	***20***	***0.05***	***12.6***	***12.4***	***16.0***	***100***
BZX84C20LT1G	Y7	18.8	20	21.2	55	18.7	21.1	225	18.9	21.4	20	0.05	14	14.4	18.0	85
BZX84C22LT1G	Y8	20.8	22	23.3	55	20.7	23.2	250	20.9	23.4	25	0.05	15.4	16.4	20.0	85
BZX84C24LT1G	Y9	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 mA			Z_{ZT1} Below @ I_{ZT1} = 2 mA	V_{Z2} Below @ I_{ZT2} = 0.1 mA		Z_{ZT2} Below @ I_{ZT4} = 0.5 mA	V_{Z3} Below @ I_{ZT3} = 10 mA		Z_{ZT3} Below @ I_{ZT3} = 10 mA	Max Reverse Leakage Current		θ_{VZ} (mV/k) Below @ I_{ZT1} = 2 mA		C (pF) @ V_R = 0 f = 1 MHz
		Min	Nom	Max		Min	Max		Min	Max		I_R μA @	V_R (V)	Min	Max	
BZX84C27LT1G	Y10	25.1	27	28.9	80	25	28.9	300	25.2	29.3	45	0.05	18.9	21.4	25.3	70
BZX84C30LT1G	Y11	28	30	32	80	27.8	32	300	28.1	32.4	50	0.05	21	24.4	29.4	70
BZX84C33LT1/T3G	Y12	31	33	35	80	30.8	35	325	31.1	35.4	55	0.05	23.1	27.4	33.4	70
BZX84C36LT1G	Y13	34	36	38	90	33.8	38	350	34.1	38.4	60	0.05	25.2	30.4	37.4	70
BZX84C39LT1G	Y14	37	39	41	130	36.7	41	350	37.1	41.5	70	0.05	27.3	33.4	41.2	45
BZX84C43LT1G	Y15	40	43	46	150	39.7	46	375	40.1	46.5	80	0.05	30.1	37.6	46.6	40
BZX84C47LT1G	Y16	44	47	50	170	43.7	50	375	44.1	50.5	90	0.05	32.9	42.0	51.8	40
BZX84C51LT1G	Y17	48	51	54	180	47.6	54	400	48.1	54.6	100	0.05	35.7	46.6	57.2	40
BZX84C56LT1G	Y18	52	56	60	200	51.5	60	425	52.1	60.8	110	0.05	39.2	52.2	63.8	40
BZX84C62LT1G	Y19	58	62	66	215	57.4	66	450	58.2	67	120	0.05	43.4	58.8	71.6	35
BZX84C68LT1G	Y20	64	68	72	240	63.4	72	475	64.2	73.2	130	0.05	47.6	65.6	79.8	35
BZX84C75LT1G	Y21	70	75	79	255	69.4	79	500	70.3	80.2	140	0.05	52.5	73.4	88.6	35

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

*Includes SZ-prefix devices where applicable.

ELECTRICAL CHARACTERISTICS – BZX84BxxxL (Tight Tolerance Series)

(Pinout: 1-Anode, 2-No Connection, 3-Cathode) (T_A = 25°C unless otherwise noted, V_F = 0.90 V Max. @ I_F = 10 mA)

Device	Device Marking	V_Z (Volts) @ I_{ZT} = 5 mA (Note 4)			Z_{ZT} (Ω) @ I_{ZT} = 5 mA (Note 4)	Max Reverse Leakage Current		θ_{VZ} (mV/k) @ I_{ZT} = 5 mA		C (pF) @ V_R =0, f = 1 MHz
						I_R @ V_R				
		Min	Nom	Max	Max	μA	Volts	Min	Max	
BZX84B3V3LT1G	T2A	3.23	3.3	3.37	95	5	1	–3.5	0	450
BZX84B4V7LT1G	T10	4.61	4.7	4.79	80	3	2	–3.5	0.2	260
BZX84B5V1LT1G	T11	5.00	5.1	5.20	60	2	2	–2.7	1.2	225
BZX84B5V6LT1G	T12	5.49	5.6	5.71	40	1	2	–2	2.5	200
BZX84B6V2LT1G	T13	6.08	6.2	6.32	10	3	4	0.4	3.7	185
BZX84B6V8LT1G	T14	6.66	6.8	6.94	15	2	4	1.2	4.5	155
BZX84B7V5LT1G	T15	7.35	7.5	7.65	15	1	5	2.5	5.3	140
BZX84B8V2LT1G	T16	8.04	8.2	8.36	15	0.7	5	3.2	6.2	135
BZX84B9V1LT1G, T3G	T17	8.92	9.1	9.28	15	0.5	6	3.8	7	130
BZX84B10LT1G	T2E	9.8	10	10.2	20	0.2	7	4.5	8	130
BZX84B12LT1G	T18	11.8	12	12.2	25	0.1	8	6	10	130
BZX84B15LT1G	T22	14.7	15	15.3	30	0.05	10.5	9.2	13	110
BZX84B16LT1G	T19	15.7	16	16.3	40	0.05	11.2	10.4	14	105
BZX84B18LT1G	T20	17.6	18	18.4	45	0.05	12.6	12.4	16	100
BZX84B22LT1G	T24	21.6	22	22.4	55	0.05	15.4	16.4	20	85
BZX84B24LT1G	T25	23.5	24	24.5	70	0.05	16.8	18.4	22	80

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

ELECTRICAL CHARACTERISTICS – BZX84BxxxL (Tight Tolerance Series)

(Pinout: 1-Anode, 2-No Connection, 3-Cathode) (T_A = 25°C unless otherwise noted, V_F = 0.90 V Max. @ I_F = 10 mA)

Device*	Device Marking	V_Z (Volts) @ I_{ZT} = 2 mA (Note 4)			Z_{ZT} (Ω) @ I_{ZT} = 2 mA (Note 4)	Max Reverse Leakage Current		θ_{VZ} (mV/k) @ I_{ZT} = 2 mA		C (pF) @ V_R =0, f = 1 MHz
						I_R @ V_R				
		Min	Nom	Max	Max	μA	Volts	Min	Max	
BZX84B27LT1G	T27	26.5	27	27.5	80	0.05	18.9	21.4	25.3	70

*Includes SZ-prefix devices where applicable.

TYPICAL CHARACTERISTICS

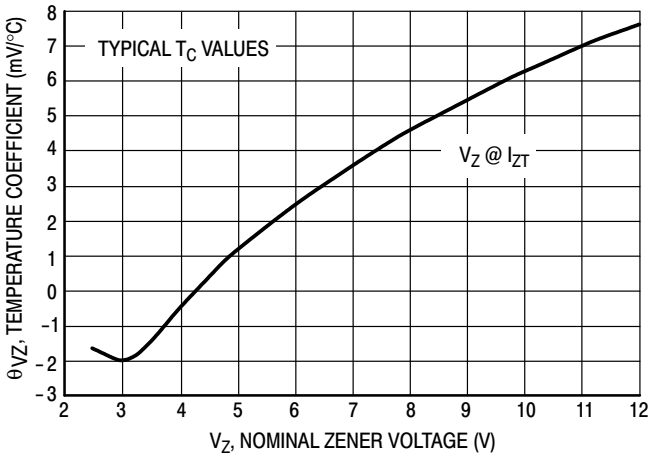


Figure 1. Temperature Coefficients (Temperature Range −55°C to +150°C)

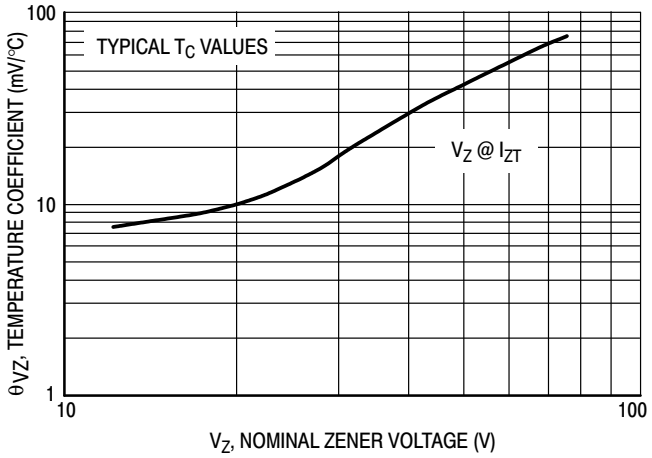


Figure 2. Temperature Coefficients (Temperature Range −55°C to +150°C)

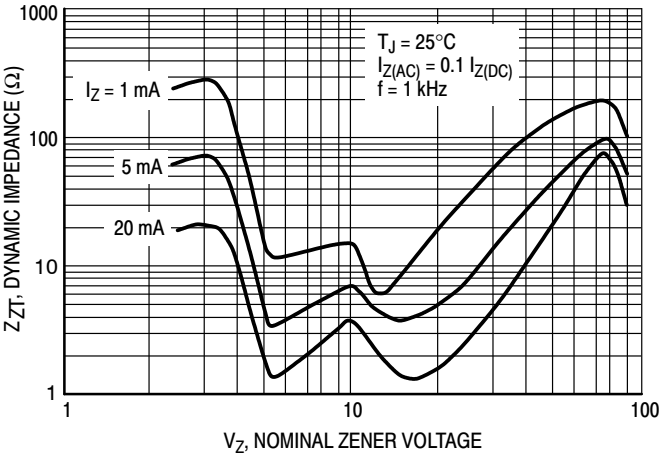


Figure 3. Effect of Zener Voltage on Zener Impedance

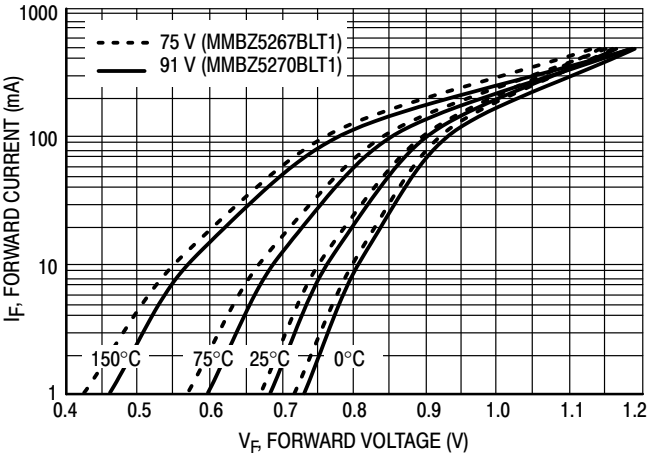


Figure 4. Typical Forward Voltage

TYPICAL CHARACTERISTICS

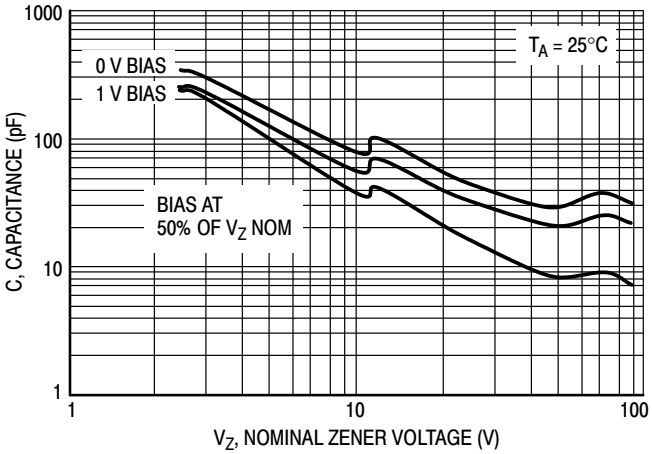


Figure 5. Typical Capacitance

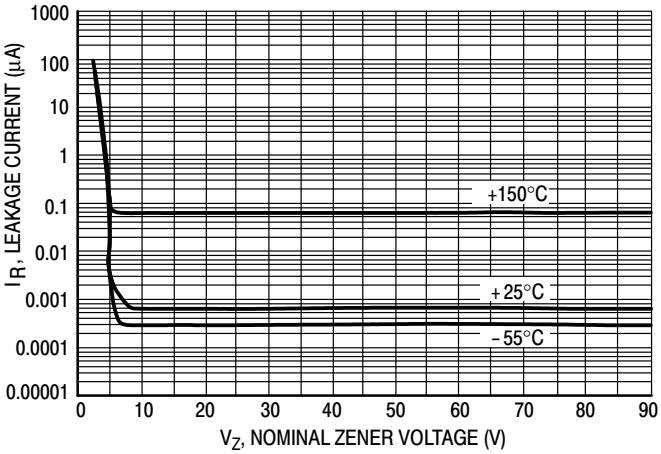


Figure 6. Typical Leakage Current

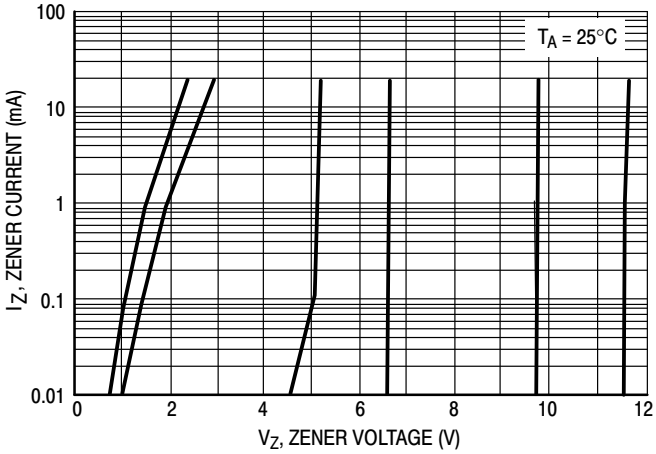


Figure 7. Zener Voltage versus Zener Current (V_Z Up to 12 V)

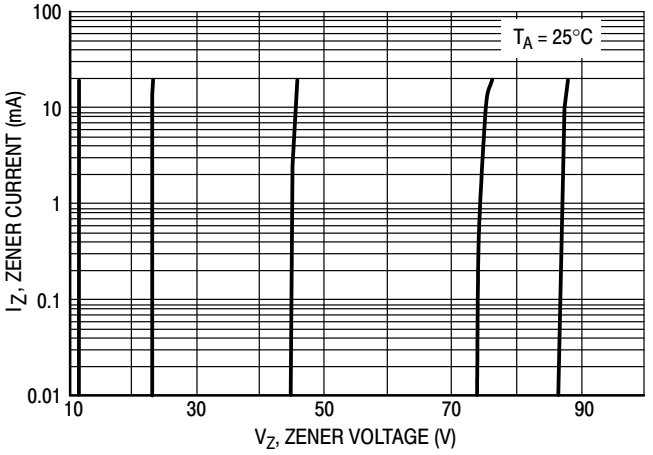
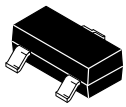


Figure 8. Zener Voltage versus Zener Current (12 V to 91 V)

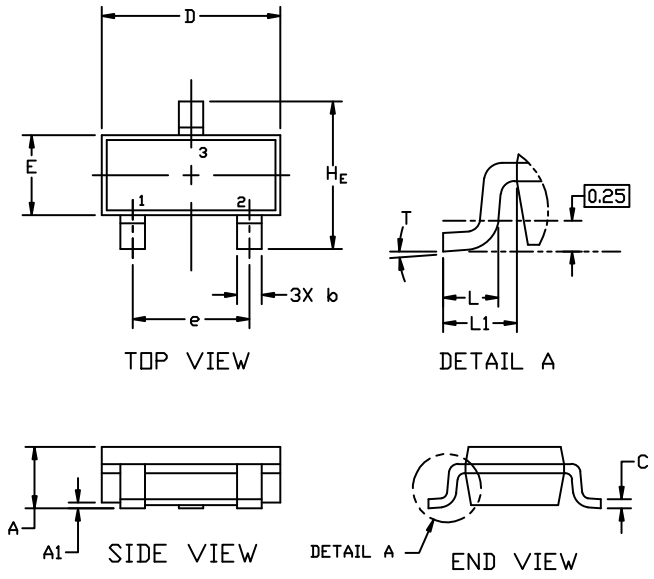
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS



SCALE 4:1

SOT−23 (TO−236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

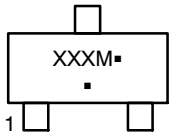


NOTES:

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 THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

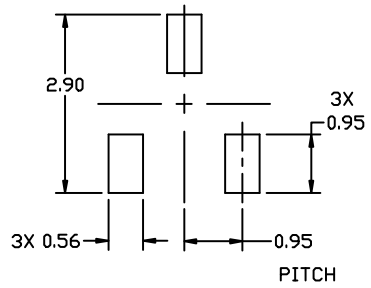
	MILLIMETERS			INCHES		
DIM	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.89	1.00	1.11	0.035	0.039	0.044
A1	0.01	0.06	0.10	0.000	0.002	0.004
b	0.37	0.44	0.50	0.015	0.017	0.020
c	0.08	0.14	0.20	0.003	0.006	0.008
D	2.80	2.90	3.04	0.110	0.114	0.120
E	1.20	1.30	1.40	0.047	0.051	0.055
e	1.78	1.90	2.04	0.070	0.075	0.080
L	0.30	0.43	0.55	0.012	0.017	0.022
L1	0.35	0.54	0.69	0.014	0.021	0.027
H_E	2.10	2.40	2.64	0.083	0.094	0.104
T	0°	---	10°	0°	---	10°

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED
MOUNTING 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.

STYLES ON PAGE 2

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DESCRIPTION:	**SOT−23 (TO−236)**		**PAGE 1 OF 2**

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SOT−23 (TO−236)
CASE 318
ISSUE AT

DATE 01 MAR 2023

STYLE 1 THRU 5:
CANCELLED

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

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