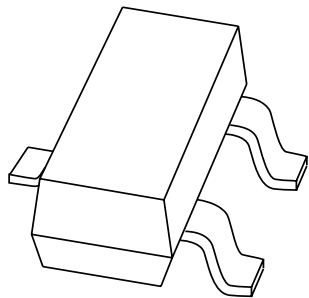


# DATA SHEET



## **BZX84 series** Voltage regulator diodes

Product specification  
Supersedes data of 1999 May 18

2003 Apr 10

# Voltage regulator diodes

# BZX84 series

### FEATURES

- Total power dissipation: max. 250 mW
- Three tolerance series:  $\pm 1\%$ ,  $\pm 2\%$  and approx.  $\pm 5\%$
- Working voltage range: nom. 2.4 to 75 V (E24 range)
- Non-repetitive peak reverse power dissipation: max. 40 W.

### APPLICATIONS

- General regulation functions.

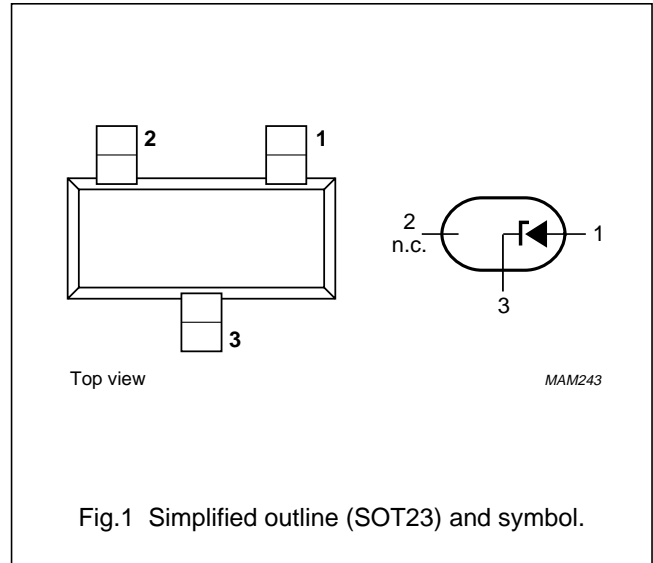
### DESCRIPTION

Low-power voltage regulator diodes in small SOT23 plastic SMD packages.

The diodes are available in the normalized E24  $\pm 1\%$  (BZX84-A),  $\pm 2\%$  (BZX84-B) and approx.  $\pm 5\%$  (BZX84-C) tolerance range. The series consists of 37 types with nominal working voltages from 2.4 to 75 V.

### PINNING

PIN	DESCRIPTION
1	anode
2	not connected
3	cathode



## Voltage regulator diodes

## BZX84 series

## MARKING

TYPE NUMBER	MARKING CODE <sup>(1)</sup>	TYPE NUMBER	MARKING CODE <sup>(1)</sup>	TYPE NUMBER	MARKING CODE <sup>(1)</sup>	TYPE NUMBER	MARKING CODE <sup>(1)</sup>
<b>Marking codes for BZX84-A2V4 to BZX84-A75</b>							
BZX84-A2V4	Y50 or *50	BZX84-A6V2	Y60 or *60	BZX84-A16	Y70	BZX84-A43	Y80 or *C5
BZX84-A2V7	Y51 or *51	BZX84-A6V8	Y61 or *61	BZX84-A18	Y71	BZX84-A47	Y81
BZX84-A3V0	Y52 or *52	BZX84-A7V5	Y62 or *62	BZX84-A20	Y72 or *C2	BZX84-A51	Y82 or *C6
BZX84-A3V3	Y53	BZX84-A8V2	Y63 or *63	BZX84-A22	Y73	BZX84-A56	Y83
BZX84-A3V6	Y54 or *C1	BZX84-A9V1	Y64 or *64	BZX84-A24	Y74	BZX84-A62	Y84
BZX84-A3V9	Y55 or *55	BZX84-A10	Y65 or *65	BZX84-A27	Y75 or *75	BZX84-A68	Y85
BZX84-A4V3	Y56 or *56	BZX84-A11	Y66 or *04	BZX84-A30	Y76	BZX84-A75	Y86 or *86
BZX84-A4V7	Y57 or *57	BZX84-A12	Y67 or *67	BZX84-A33	Y77	–	–
BZX84-A5V1	Y58 or *58	BZX84-A13	Y68 or *C0	BZX84-A36	Y78 or *C3	–	–
BZX84-A5V6	Y59 or *59	BZX84-A15	Y69 or *69	BZX84-A39	Y79 or *C4	–	–
<b>Marking codes for BZX84-B2V4 to BZX84-B75</b>							
BZX84-B2V4	Z50 or *Z0	BZX84-B6V2	Z60 or *R5	BZX84-B16	Z70 or *70	BZX84-B43	Z80 or *S5
BZX84-B2V7	Z51 or *Z1	BZX84-B6V8	Z61 or *R6	BZX84-B18	Z71 or *71	BZX84-B47	Z81 or *S6
BZX84-B3V0	Z52 or *S1	BZX84-B7V5	Z62 or *R8	BZX84-B20	Z72 or *72	BZX84-B51	Z82 or *S9
BZX84-B3V3	Z53 or *S2	BZX84-B8V2	Z63 or *R9	BZX84-B22	Z73 or *73	BZX84-B56	Z83 or *R0
BZX84-B3V6	Z54 or *S3	BZX84-B9V1	Z64 or *T1	BZX84-B24	Z74 or *74	BZX84-B62	Z84 or *R3
BZX84-B3V9	Z55 or *S4	BZX84-B10	Z65 or *66	BZX84-B27	Z75 or *Z5	BZX84-B68	Z85 or *R4
BZX84-B4V3	Z56 or *S7	BZX84-B11	Z66 or *Z6	BZX84-B30	Z76 or *Z4	BZX84-B75	Z86 or *R7
BZX84-B4V7	Z57 or *S8	BZX84-B12	Z67 or *Z7	BZX84-B33	Z77 or *Y1	–	–
BZX84-B5V1	Z58 or *R1	BZX84-B13	Z68 or *Z8	BZX84-B36	Z78 or *Y2	–	–
BZX84-B5V6	Z59 or *R2	BZX84-B15	Z69 or *Z9	BZX84-B39	Z79 or *S0	–	–
<b>Marking codes for BZX84-C2V4 to BZX84-C75</b>							
BZX84-C2V4	Z11 or *T3	BZX84-C6V2	Z4*	BZX84-C16	Y5*	BZX84-C43	Y15 or *B4
BZX84-C2V7	Z12 or *T4	BZX84-C6V8	Z5*	BZX84-C18	Y6*	BZX84-C47	Y16 or *B5
BZX84-C3V0	Z13 or *T9	BZX84-C7V5	Z6*	BZX84-C20	Y7*	BZX84-C51	Y17 or *B7
BZX84-C3V3	Z14 or *B1	BZX84-C8V2	Z7*	BZX84-C22	Y8*	BZX84-C56	Y18 or *B8
BZX84-C3V6	Z15 or *B2	BZX84-C9V1	Z8*	BZX84-C24	Y9*	BZX84-C62	Y19 or *B9
BZX84-C3V9	Z16 or *B3	BZX84-C10	Z9*	BZX84-C27	Y10 or *T2	BZX84-C68	Y20 or *B0
BZX84-C4V3	Z17 or *B6	BZX84-C11	Y1*	BZX84-C30	Y11 or *T5	BZX84-C75	Y21 or *A1
BZX84-C4V7	Z1*	BZX84-C12	Y2*	BZX84-C33	Y12 or *T6	–	–
BZX84-C5V1	Z2*	BZX84-C13	Y3*	BZX84-C36	Y13 or *T7	–	–
BZX84-C5V6	Z3*	BZX84-C15	Y4*	BZX84-C39	Y14 or *T8	–	–

## Note

- \* = p : Made in Hong Kong.  
\* = t : Made in Malaysia.  
\* = W : Made in China.

## Voltage regulator diodes

## BZX84 series

**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_F$	continuous forward current		–	200	mA
$I_{ZSM}$	non-repetitive peak reverse current	$t_p = 100 \mu\text{s}$ ; square wave; $T_j = 25 \text{ }^\circ\text{C}$ prior to surge	see Tables 1 and 2		
$P_{tot}$	total power dissipation	$T_{amb} = 25 \text{ }^\circ\text{C}$ ; note 1	–	250	mW
$P_{ZSM}$	non-repetitive peak reverse power dissipation	$t_p = 100 \mu\text{s}$ ; square wave; $T_j = 25 \text{ }^\circ\text{C}$ prior to surge; see Fig.2	–	40	W
$T_{stg}$	storage temperature		–65	+150	$^\circ\text{C}$
$T_j$	junction temperature		–65	+150	$^\circ\text{C}$

**Note**

1. Device mounted on an FR4 printed circuit-board.

**ELECTRICAL CHARACTERISTICS****Total BZX84-A and B and C series** $T_j = 25 \text{ }^\circ\text{C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$V_F$	forward voltage	$I_F = 10 \text{ mA}$ ; see Fig.3	0.9	V
$I_R$	reverse current			
	BZX84-A/B/C2V4	$V_R = 1 \text{ V}$	50	$\mu\text{A}$
	BZX84-A/B/C2V7	$V_R = 1 \text{ V}$	20	$\mu\text{A}$
	BZX84-A/B/C3V0	$V_R = 1 \text{ V}$	10	$\mu\text{A}$
	BZX84-A/B/C3V3	$V_R = 1 \text{ V}$	5	$\mu\text{A}$
	BZX84-A/B/C3V6	$V_R = 1 \text{ V}$	5	$\mu\text{A}$
	BZX84-A/B/C3V9	$V_R = 1 \text{ V}$	3	$\mu\text{A}$
	BZX84-A/B/C4V3	$V_R = 1 \text{ V}$	3	$\mu\text{A}$
	BZX84-A/B/C4V7	$V_R = 2 \text{ V}$	3	$\mu\text{A}$
	BZX84-A/B/C5V1	$V_R = 2 \text{ V}$	2	$\mu\text{A}$
	BZX84-A/B/C5V6	$V_R = 2 \text{ V}$	1	$\mu\text{A}$
	BZX84-A/B/C6V2	$V_R = 4 \text{ V}$	3	$\mu\text{A}$
	BZX84-A/B/C6V8	$V_R = 4 \text{ V}$	2	$\mu\text{A}$
	BZX84-A/B/C7V5	$V_R = 5 \text{ V}$	1	$\mu\text{A}$
	BZX84-A/B/C8V2	$V_R = 5 \text{ V}$	700	nA
	BZX84-A/B/C9V1	$V_R = 6 \text{ V}$	500	nA
	BZX84-A/B/C10	$V_R = 7 \text{ V}$	200	nA
BZX84-A/B/C11	$V_R = 8 \text{ V}$	100	nA	
BZX84-A/B/C12	$V_R = 8 \text{ V}$	100	nA	
BZX84-A/B/C13	$V_R = 8 \text{ V}$	100	nA	
BZX84-A/B/C15 to 75	$V_R = 0.7V_{Znom}$	50	nA	

## Voltage regulator diodes

## BZX84 series

**Table 1** Per type BZX84-A/B/C2V4 to A/B/C24 $T_j = 25\text{ }^\circ\text{C}$  unless otherwise specified.

BZX84- Axxx Bxxx Cxxx	WORKING VOLTAGE $V_Z$ (V) at $I_{Z\text{test}} = 5\text{ mA}$						DIFFERENTIAL RESISTANCE $r_{\text{dif}}$ ( $\Omega$ )				TEMP. COEFF. $S_Z$ (mV/K) at $I_{Z\text{test}} = 5\text{ mA}$ (see Figs 4 and 5)			DIODE CAP. $C_d$ (pF) at $f = 1\text{ MHz}$ ; $V_R = 0\text{ V}$	NON-REPETITIVE PEAK REVERSE CURRENT $I_{ZSM}$ (A) at $t_p = 100\text{ }\mu\text{s}$ ; $T_{\text{amb}} = 25\text{ }^\circ\text{C}$
	Tol. $\pm 1\%$ (A)		Tol. $\pm 2\%$ (B)		Tol. approx. $\pm 5\%$ (C)		at $I_{Z\text{test}} = 1\text{ mA}$		at $I_{Z\text{test}} = 5\text{ mA}$		MIN.	TYP.	MAX.	MAX.	MAX.
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.					
2V4	2.37	2.43	2.35	2.45	2.2	2.6	275	600	70	100	-3.5	-1.6	0	450	6.0
2V7	2.67	2.73	2.65	2.75	2.5	2.9	300	600	75	100	-3.5	-2.0	0	450	6.0
3V0	2.97	3.03	2.94	3.06	2.8	3.2	325	600	80	95	-3.5	-2.1	0	450	6.0
3V3	3.26	3.34	3.23	3.37	3.1	3.5	350	600	85	95	-3.5	-2.4	0	450	6.0
3V6	3.56	3.64	3.53	3.67	3.4	3.8	375	600	85	90	-3.5	-2.4	0	450	6.0
3V9	3.86	3.94	3.82	3.98	3.7	4.1	400	600	85	90	-3.5	-2.5	0	450	6.0
4V3	4.25	4.35	4.21	4.39	4.0	4.6	410	600	80	90	-3.5	-2.5	0	450	6.0
4V7	4.65	4.75	4.61	4.79	4.4	5.0	425	500	50	80	-3.5	-1.4	0.2	300	6.0
5V1	5.04	5.16	5.00	5.20	4.8	5.4	400	480	40	60	-2.7	-0.8	1.2	300	6.0
5V6	5.54	5.66	5.49	5.71	5.2	6.0	80	400	15	40	-2.0	1.2	2.5	300	6.0
6V2	6.13	6.27	6.08	6.32	5.8	6.6	40	150	6	10	0.4	2.3	3.7	200	6.0
6V8	6.73	6.87	6.66	6.94	6.4	7.2	30	80	6	15	1.2	3.0	4.5	200	6.0
7V5	7.42	7.58	7.35	7.65	7.0	7.9	30	80	6	15	2.5	4.0	5.3	150	4.0
8V2	8.11	8.29	8.04	8.36	7.7	8.7	40	80	6	15	3.2	4.6	6.2	150	4.0
9V1	9.00	9.20	8.92	9.28	8.5	9.6	40	100	6	15	3.8	5.5	7.0	150	3.0
10	9.90	10.10	9.80	10.20	9.4	10.6	50	150	8	20	4.5	6.4	8.0	90	3.0
11	10.80	11.11	10.80	11.20	10.4	11.6	50	150	10	20	5.4	7.4	9.0	85	2.5
12	11.88	12.12	11.80	12.20	11.4	12.7	50	150	10	25	6.0	8.4	10.0	85	2.5
13	12.87	13.13	12.70	13.30	12.4	14.1	50	170	10	30	7.0	9.4	11.0	80	2.5
15	14.85	15.15	14.70	15.30	13.8	15.6	50	200	10	30	9.2	11.4	13.0	75	2.0
16	15.84	16.16	15.70	16.30	15.3	17.1	50	200	10	40	10.4	12.4	14.0	75	1.5
18	17.82	18.18	17.60	18.40	16.8	19.1	50	225	10	45	12.4	14.4	16.0	70	1.5
20	19.80	20.20	19.60	20.40	18.8	21.2	60	225	15	55	14.4	16.4	18.0	60	1.5
22	21.78	22.22	21.60	22.40	20.8	23.3	60	250	20	55	16.4	18.4	20.0	60	1.25
24	23.76	24.24	23.50	24.50	22.8	25.6	60	250	25	70	18.4	20.4	22.0	55	1.25

## Voltage regulator diodes

## BZX84 series

**Table 2** Per type BZX84-A/B/C27 to A/B/C75 $T_j = 25\text{ °C}$  unless otherwise specified.

BZX84- Axxx Bxxx Cxxx	WORKING VOLTAGE $V_Z$ (V) at $I_{Ztest} = 2\text{ mA}$						DIFFERENTIAL RESISTANCE $r_{dif}$ ( $\Omega$ )				TEMP. COEFF. $S_Z$ (mV/K) at $I_{Ztest} = 2\text{ mA}$ (see Figs 4 and 5)			DIODE CAP. $C_d$ (pF) at $f = 1\text{ MHz}$ ; $V_R = 0\text{ V}$	NON-REPETITIVE PEAK REVERSE CURRENT $I_{ZSM}$ (A) at $t_p = 100\text{ }\mu\text{s}$ ; $T_{amb} = 25\text{ °C}$
	Tol. $\pm 1\%$ (A)		Tol. $\pm 2\%$ (B)		Tol. approx. $\pm 5\%$ (C)		at $I_{Ztest} = 0.5\text{ mA}$		at $I_{Ztest} = 2\text{ mA}$		MIN.	TYP.	MAX.	MAX.	MAX.
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	MIN.	TYP.	MAX.	MAX.	MAX.
27	26.73	27.27	26.50	27.50	25.1	28.9	65	300	25	80	21.4	23.4	25.3	50	1.0
30	29.70	30.30	29.40	30.60	28.0	32.0	70	300	30	80	24.4	26.6	29.4	50	1.0
33	32.67	33.33	32.30	33.70	31.0	35.0	75	325	35	80	27.4	29.7	33.4	45	0.9
36	35.64	36.36	35.30	36.70	34.0	38.0	80	350	35	90	30.4	33.0	37.4	45	0.8
39	38.61	39.39	38.20	39.80	37.0	41.0	80	350	40	130	33.4	36.4	41.2	45	0.7
43	42.57	43.43	42.10	43.90	40.0	46.0	85	375	45	150	37.6	41.2	46.6	40	0.6
47	46.53	47.47	46.10	47.90	44.0	50.0	85	375	50	170	42.0	46.1	51.8	40	0.5
51	50.49	51.51	50.00	52.00	48.0	54.0	90	400	60	180	46.6	51.0	57.2	40	0.4
56	55.44	56.56	54.90	57.10	52.0	60.0	100	425	70	200	52.2	57.0	63.8	40	0.3
62	61.38	62.62	60.80	63.20	58.0	66.0	120	450	80	215	58.8	64.4	71.6	35	0.3
68	67.32	68.68	66.60	69.40	64.0	72.0	150	475	90	240	65.6	71.7	79.8	35	0.25
75	74.25	75.75	73.50	76.50	70.0	79.0	170	500	95	255	73.4	80.2	88.6	35	0.2

## Voltage regulator diodes

## BZX84 series

**THERMAL CHARACTERISTICS**

<b>SYMBOL</b>	<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>VALUE</b>	<b>UNIT</b>
$R_{th\ j-tp}$	thermal resistance from junction to tie-point		330	K/W
$R_{th\ j-a}$	thermal resistance from junction to ambient	note 1	500	K/W

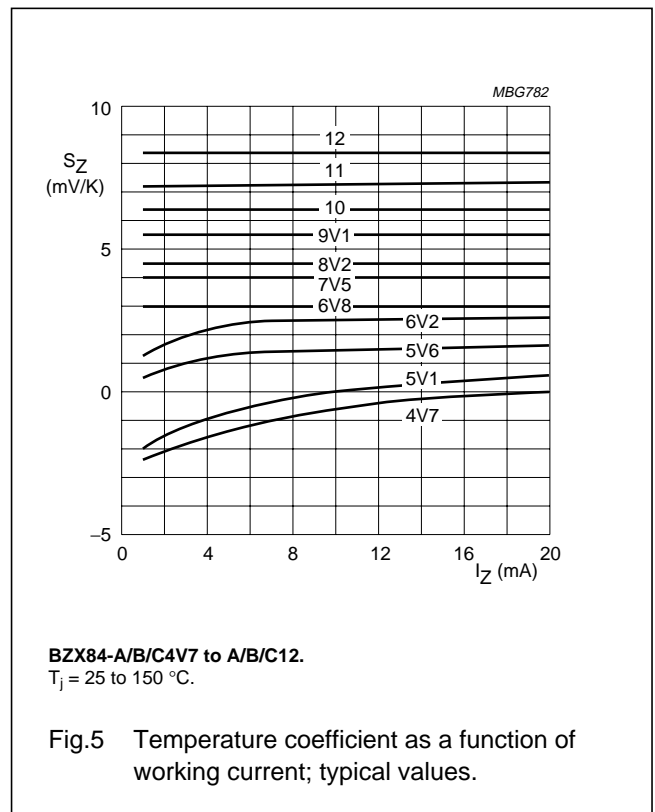
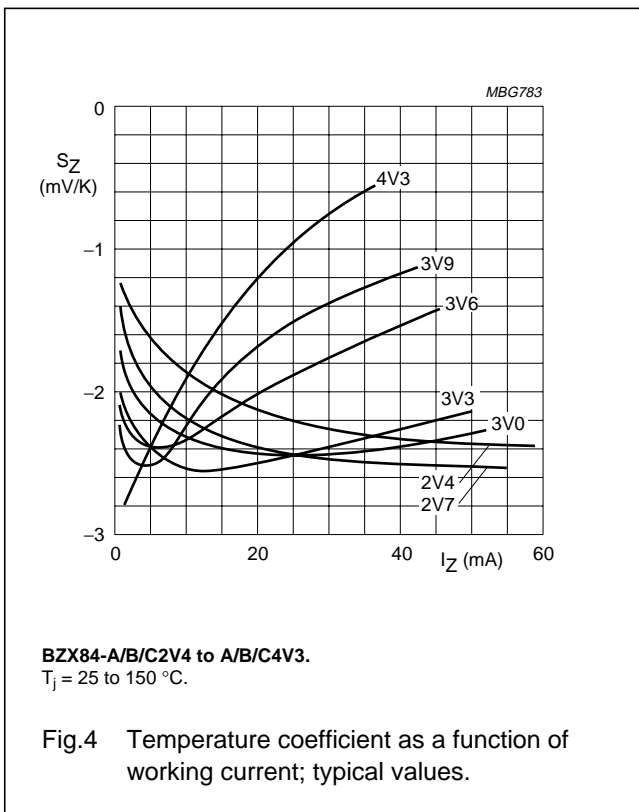
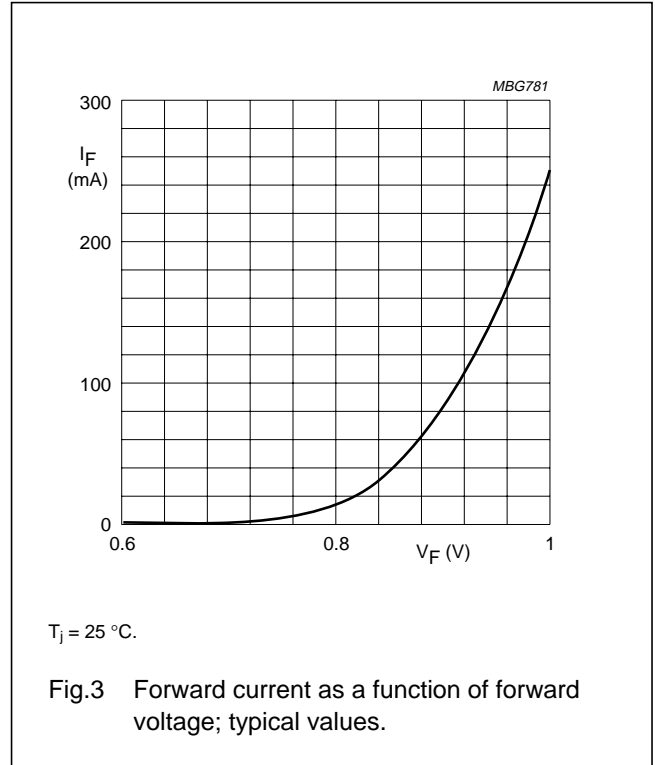
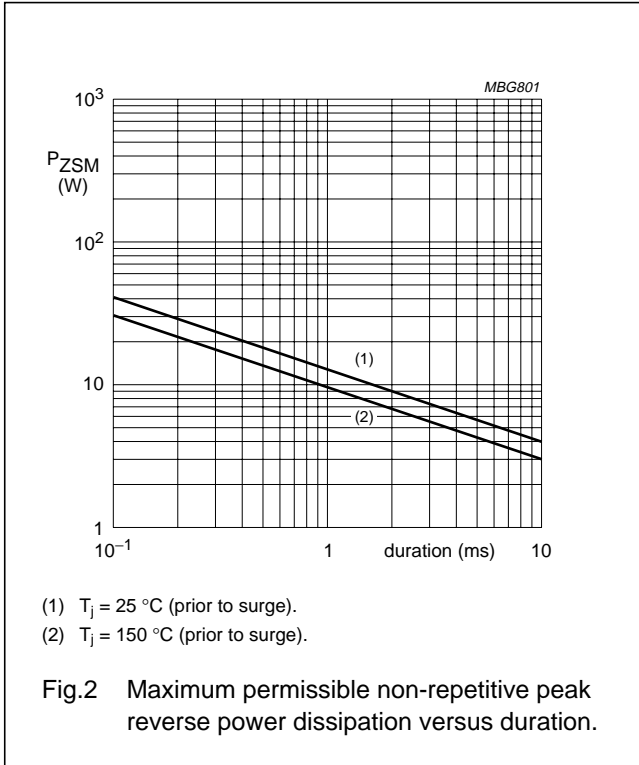
**Note**

1. Device mounted on an FR4 printed circuit-board.

Voltage regulator diodes

BZX84 series

GRAPHICAL DATA





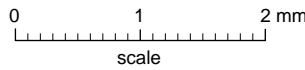
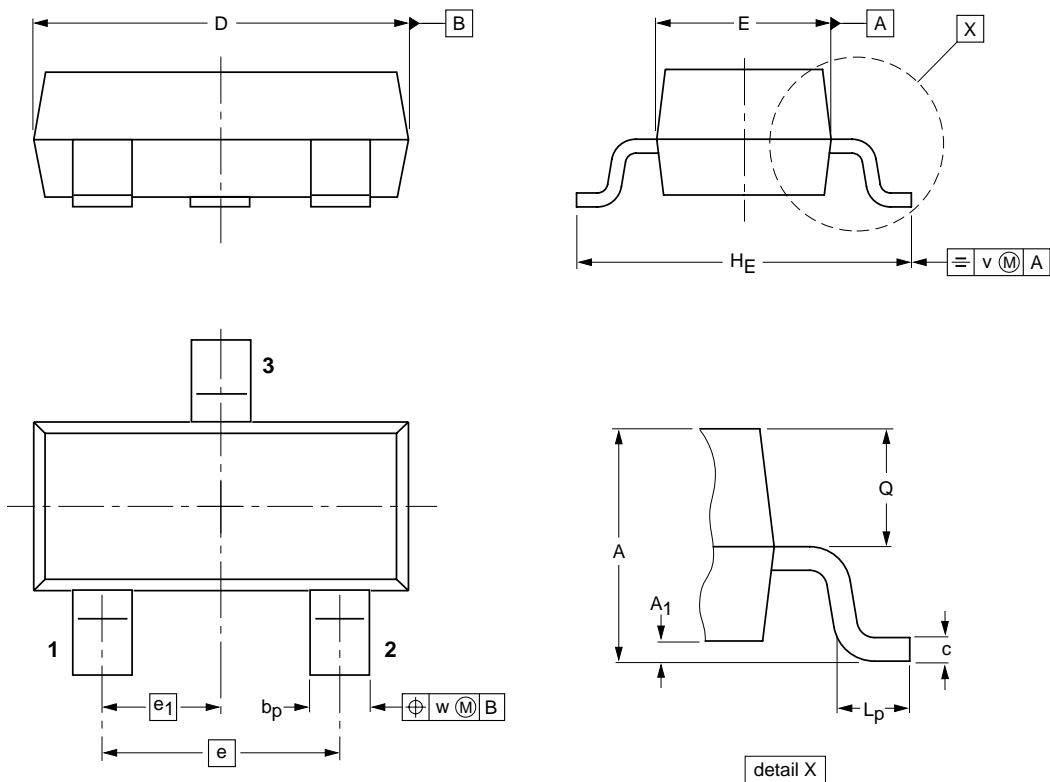
Voltage regulator diodes

BZX84 series

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



DIMENSIONS (mm are the original dimensions)

UNIT	A	A <sub>1</sub> max.	b <sub>p</sub>	c	D	E	e	e <sub>1</sub>	H <sub>E</sub>	L <sub>p</sub>	Q	v	w
mm	1.1 0.9	0.1	0.48 0.38	0.15 0.09	3.0 2.8	1.4 1.2	1.9	0.95	2.5 2.1	0.45 0.15	0.55 0.45	0.2	0.1

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT23		TO-236AB			97-02-28 99-09-13

## Voltage regulator diodes

## BZX84 series

## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
II	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
III	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

## Notes

1. Please consult the most recently issued data sheet before initiating or completing a design.
2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL <http://www.semiconductors.philips.com>.
3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

## DEFINITIONS

**Short-form specification** — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

**Application information** — Applications that are described herein for any of these products are for illustrative purposes only. Philips Semiconductors make no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

## DISCLAIMERS

**Life support applications** — These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips Semiconductors customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips Semiconductors for any damages resulting from such application.

**Right to make changes** — Philips Semiconductors reserves the right to make changes in the products - including circuits, standard cells, and/or software - described or contained herein in order to improve design and/or performance. When the product is in full production (status 'Production'), relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN). Philips Semiconductors assumes no responsibility or liability for the use of any of these products, conveys no licence or title under any patent, copyright, or mask work right to these products, and makes no representations or warranties that these products are free from patent, copyright, or mask work right infringement, unless otherwise specified.

Voltage regulator diodes

BZX84 series

---

**NOTES**

# ***Philips Semiconductors – a worldwide company***

## **Contact information**

For additional information please visit <http://www.semiconductors.philips.com>. Fax: +31 40 27 24825

For sales offices addresses send e-mail to: [sales.addresses@www.semiconductors.philips.com](mailto:sales.addresses@www.semiconductors.philips.com).

© Koninklijke Philips Electronics N.V. 2003

SCA75

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner.

The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Printed in The Netherlands

613514/03/pp12

Date of release: 2003 Apr 10

Document order number: 9397 750 10959

*Let's make things better.*

**Philips  
Semiconductors**



**PHILIPS**