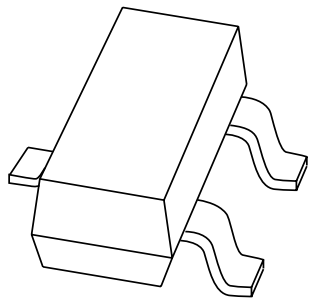


# DATA SHEET



## **BZX84 series** Voltage regulator diodes

Product specification  
Supersedes data of 1996 Apr 26

1999 May 18

# 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.

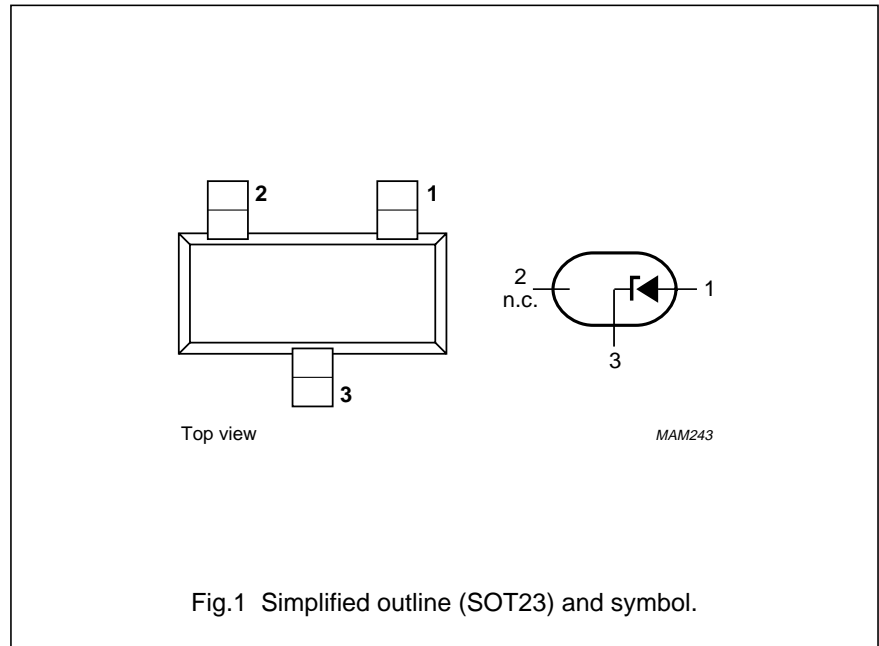
### DESCRIPTION

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
<b>Marking codes for BZX84-C2V4 to BZX84-C75</b>							
BZX84-C2V4	Z11	BZX84-C6V2	Z4*	BZX84-C16	Y5*	BZX84-C43	Y15
BZX84-C2V7	Z12	BZX84-C6V8	Z5*	BZX84-C18	Y6*	BZX84-C47	Y16
BZX84-C3V0	Z13	BZX84-C7V5	Z6*	BZX84-C20	Y7*	BZX84-C51	Y17
BZX84-C3V3	Z14	BZX84-C8V2	Z7*	BZX84-C22	Y8*	BZX84-C56	Y18
BZX84-C3V6	Z15	BZX84-C9V1	Z8*	BZX84-C24	Y9*	BZX84-C62	Y19
BZX84-C3V9	Z16	BZX84-C10	Z9*	BZX84-C27	Y10	BZX84-C68	Y20
BZX84-C4V3	Z17	BZX84-C11	Y1*	BZX84-C30	Y11	BZX84-C75	Y21
BZX84-C4V7	Z1*	BZX84-C12	Y2*	BZX84-C33	Y12	–	–
BZX84-C5V1	Z2*	BZX84-C13	Y3*	BZX84-C36	Y13	–	–
BZX84-C5V6	Z3*	BZX84-C15	Y4*	BZX84-C39	Y14	–	–
<b>Marking codes for BZX84-B2V4 to BZX84-B75</b>							
BZX84-B2V4	Z50	BZX84-B6V2	Z60	BZX84-B16	Z70	BZX84-B43	Z80
BZX84-B2V7	Z51	BZX84-B6V8	Z61	BZX84-B18	Z71	BZX84-B47	Z81
BZX84-B3V0	Z52	BZX84-B7V5	Z62	BZX84-B20	Z72	BZX84-B51	Z82
BZX84-B3V3	Z53	BZX84-B8V2	Z63	BZX84-B22	Z73	BZX84-B56	Z83
BZX84-B3V6	Z54	BZX84-B9V1	Z64	BZX84-B24	Z74	BZX84-B62	Z84
BZX84-B3V9	Z55	BZX84-B10	Z65	BZX84-B27	Z75	BZX84-B68	Z85
BZX84-B4V3	Z56	BZX84-B11	Z66	BZX84-B30	Z76	BZX84-B75	Z86
BZX84-B4V7	Z57	BZX84-B12	Z67	BZX84-B33	Z77	–	–
BZX84-B5V1	Z58	BZX84-B13	Z68	BZX84-B36	Z78	–	–
BZX84-B5V6	Z59	BZX84-B15	Z69	BZX84-B39	Z79	–	–
<b>Marking codes for BZX84-A2V4 to BZX84-A75</b>							
BZX84-A2V4	Y50	BZX84-A6V2	Y60	BZX84-A16	Y70	BZX84-A43	Y80
BZX84-A2V7	Y51	BZX84-A6V8	Y61	BZX84-A18	Y71	BZX84-A47	Y81
BZX84-A3V0	Y52	BZX84-A7V5	Y62	BZX84-A20	Y72	BZX84-A51	Y82
BZX84-A3V3	Y53	BZX84-A8V2	Y63	BZX84-A22	Y73	BZX84-A56	Y83
BZX84-A3V6	Y54	BZX84-A9V1	Y64	BZX84-A24	Y74	BZX84-A62	Y84
BZX84-A3V9	Y55	BZX84-A10	Y65	BZX84-A27	Y75	BZX84-A68	Y85
BZX84-A4V3	Y56	BZX84-A11	Y66	BZX84-A30	Y76	BZX84-A75	Y86
BZX84-A4V7	Y57	BZX84-A12	Y67	BZX84-A33	Y77	–	–
BZX84-A5V1	Y58	BZX84-A13	Y68	BZX84-A36	Y78	–	–
BZX84-A5V6	Y59	BZX84-A15	Y69	BZX84-A39	Y79	–	–

## Note

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

## Voltage regulator diodes

## BZX84 series

**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 134).

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 $T_j = 25\text{ °C}$  unless otherwise specified.

BZX84-A or B or C XXX	WORKING VOLTAGE $V_Z$ (V) at $I_{Ztest} = 5\text{ mA}$						DIFFERENTIAL RESISTANCE $r_{dif}$ ( $\Omega$ )				TEMP. COEFF. $S_Z$ (mV/K) at $I_{Ztest} = 5\text{ mA}$ (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 $t_p = 100\text{ }\mu\text{s}$ ; $T_{amb} = 25\text{ °C}$
	Tol. $\pm 1\%$ (A)		Tol. $\pm 2\%$ (B)		Tol. approx. $\pm 5\%$ (C)		at $I_{Ztest} = 1\text{ mA}$		at $I_{Ztest} = 5\text{ mA}$		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-A or B or C XXX	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 $t_p = 100\ \mu$ ; $T_{amb} = 25\text{ °C}$
	Tol. $\pm 1\%$ (A)		Tol. $\pm 2\%$ (B)		Tol. approx. $\pm 5\%$ (C)		at $I_{Ztest} = 0.5\text{ mA}$ A		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

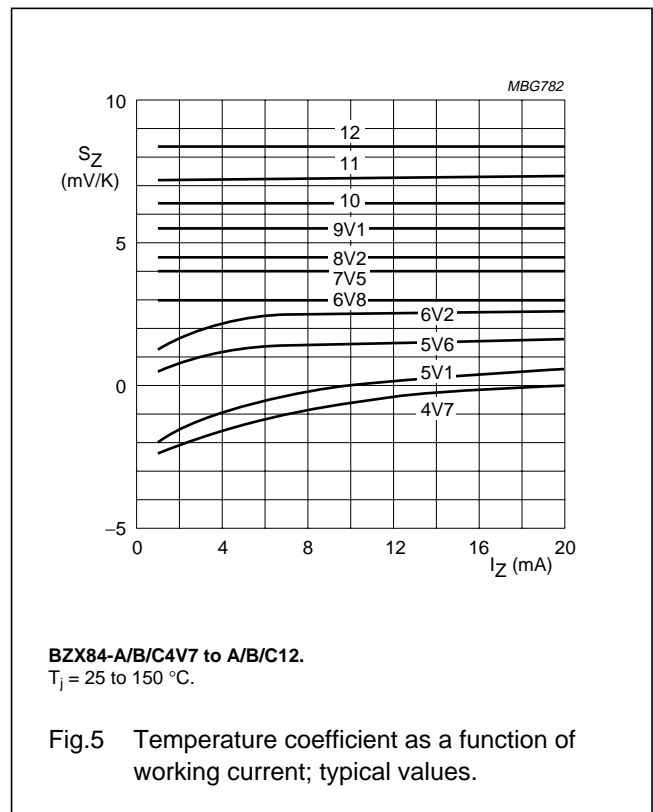
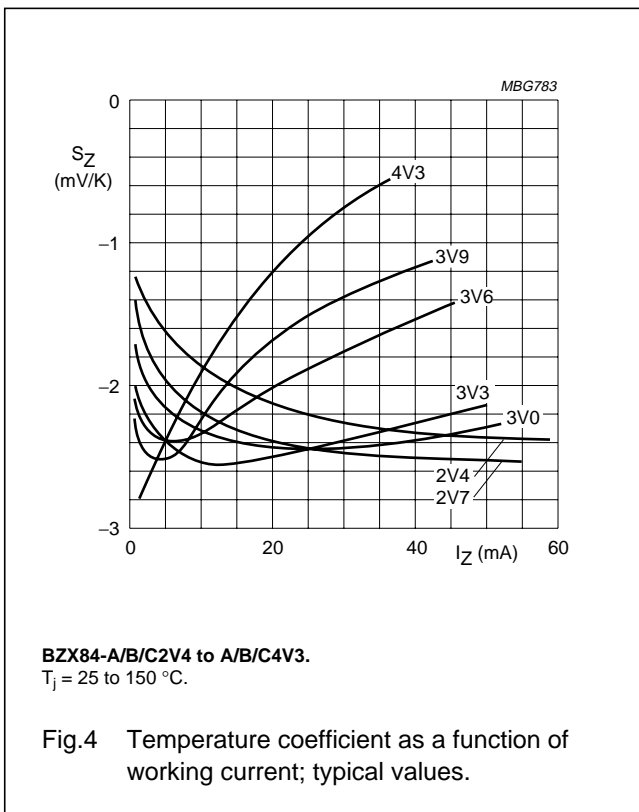
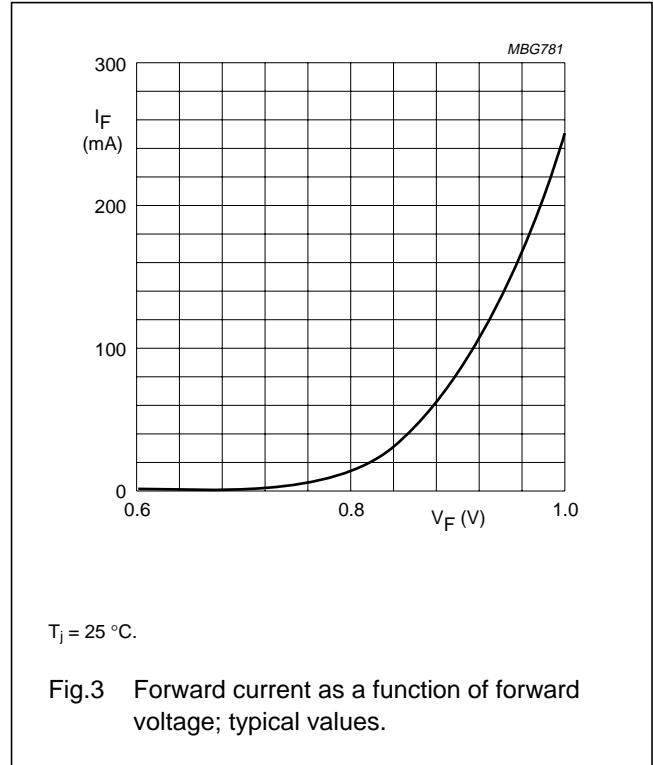
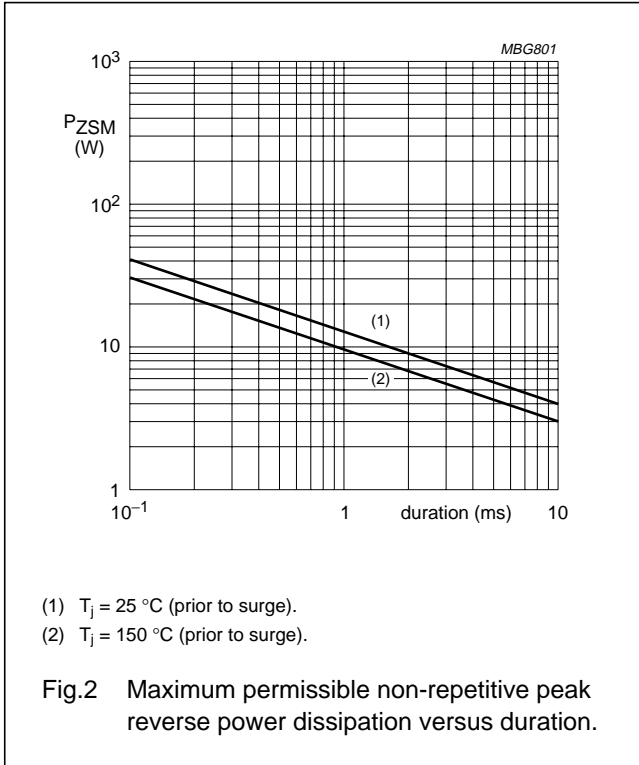
**Note**

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

Voltage regulator diodes

BZX84 series

GRAPHICAL DATA



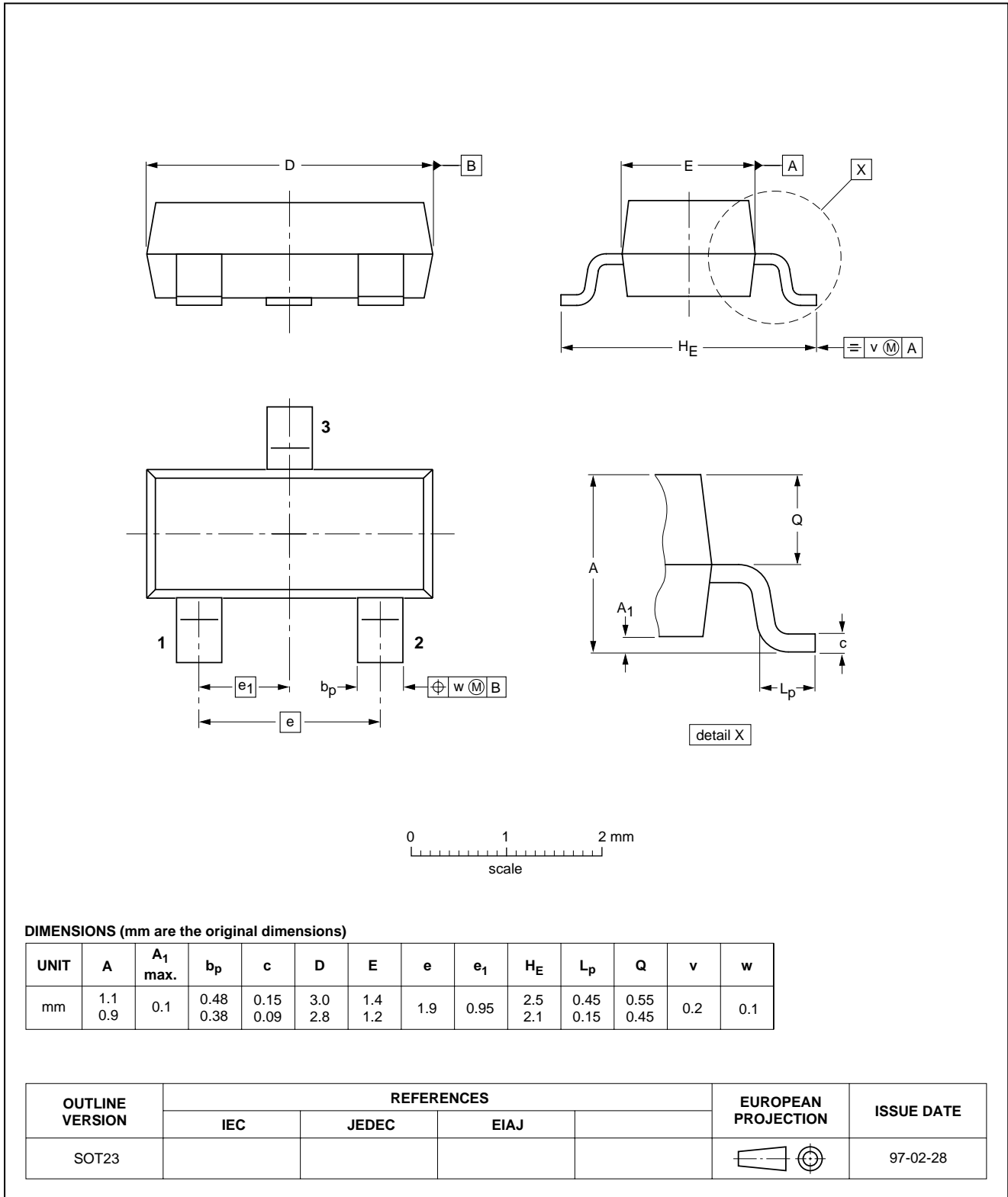
Voltage regulator diodes

BZX84 series

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



## Voltage regulator diodes

## BZX84 series

**DEFINITIONS**

<b>Data sheet status</b>	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
<b>Limiting values</b>	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

**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 customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

Voltage regulator diodes

BZX84 series

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