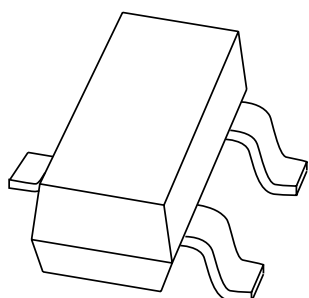


DATA SHEET



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.

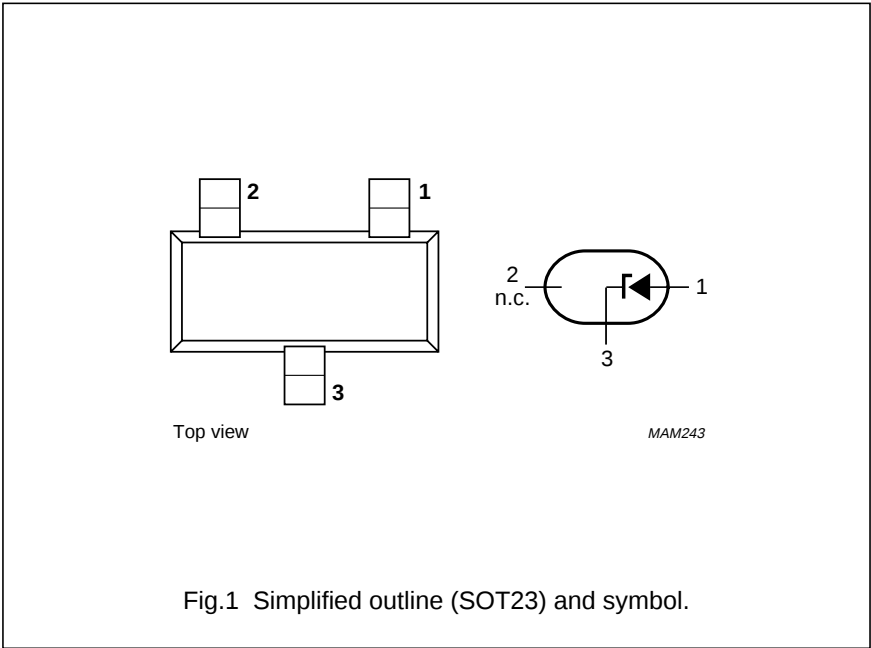
DESCRIPTION

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 ⁽¹⁾	TYPE NUMBER	MARKING CODE ⁽¹⁾	TYPE NUMBER	MARKING CODE ⁽¹⁾	TYPE NUMBER	MARKING CODE
Marking codes for BZX84-C2V4 to BZX84-C75							
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	—	—
Marking codes for BZX84-B2V4 to BZX84-B75							
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	—	—
Marking codes for BZX84-A2V4 to BZX84-A75							
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	$t_p = 100 \mu s$; square wave; $T_j = 25^\circ C$ prior to surge	see Tables 1 and 2		
P_{tot}	total power dissipation	$T_{amb} = 25^\circ C$; note 1	—	250	mW
P_{ZSM}	non-repetitive peak reverse power dissipation	$t_p = 100 \mu s$; square wave; $T_j = 25^\circ C$ prior to surge; see Fig.2	—	40	W
T_{stg}	storage temperature		−65	+150	$^\circ C$
T_j	junction temperature		−65	+150	$^\circ C$

Note

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

ELECTRICAL CHARACTERISTICS

Total BZX84-A and B and C series

$T_j = 25^\circ C$ 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	μA
	BZX84-A/B/C2V7	$V_R = 1 \text{ V}$	20	μA
	BZX84-A/B/C3V0	$V_R = 1 \text{ V}$	10	μA
	BZX84-A/B/C3V3	$V_R = 1 \text{ V}$	5	μA
	BZX84-A/B/C3V6	$V_R = 1 \text{ V}$	5	μA
	BZX84-A/B/C3V9	$V_R = 1 \text{ V}$	3	μA
	BZX84-A/B/C4V3	$V_R = 1 \text{ V}$	3	μA
	BZX84-A/B/C4V7	$V_R = 2 \text{ V}$	3	μA
	BZX84-A/B/C5V1	$V_R = 2 \text{ V}$	2	μA
	BZX84-A/B/C5V6	$V_R = 2 \text{ V}$	1	μA
	BZX84-A/B/C6V2	$V_R = 4 \text{ V}$	3	μA
	BZX84-A/B/C6V8	$V_R = 4 \text{ V}$	2	μA
	BZX84-A/B/C7V5	$V_R = 5 \text{ V}$	1	μA
	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-A or B or C XXX	WORKING VOLTAGE V _Z (V) at I _{Ztest} = 5 mA						DIFFERENTIAL RESISTANCE r _{dif} (Ω)				TEMP. COEFF. S _Z (mV/K) at I _{Ztest} = 5 mA (see Figs 4 and 5)			DIODE CAP. C _d (pF) at f = 1 MHz; V _R = 0 V	NON-REPETITIVE PEAK REVERSE CURRENT I _{ZSM} (A) at t _p = 100 μs; T _{amb} = 25 °C
	Tol. ±1% (A)		Tol. ±2% (B)		Tol. approx. ±5% (C)		at I _{Ztest} = 1 mA		at I _{Ztest} = 5 mA						
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	MIN.	TYP.	MAX.	MAX.	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 $T_j = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

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

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-tp}$	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

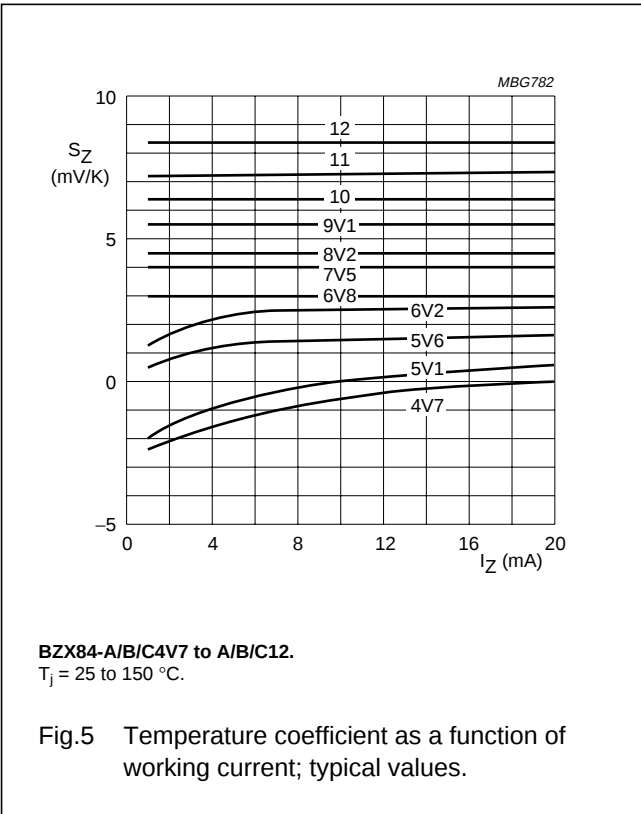
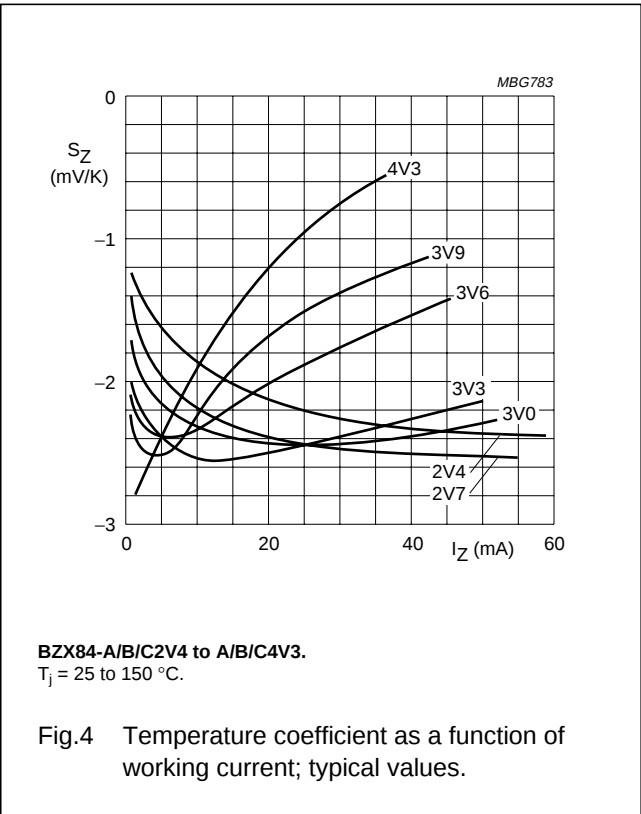
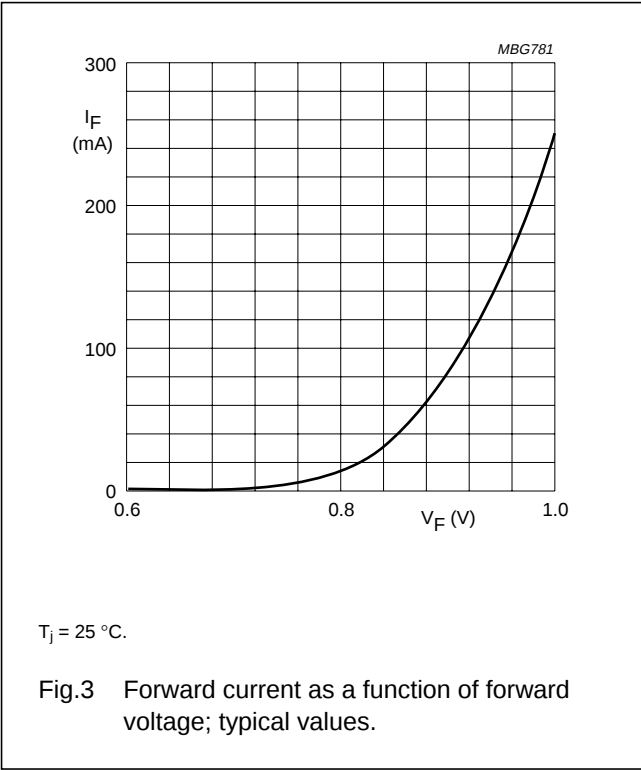
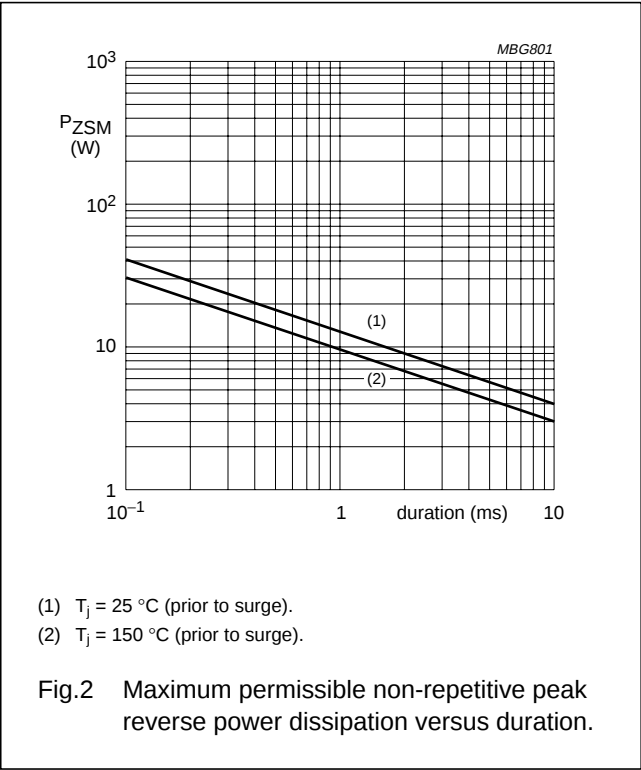
Note

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

Voltage regulator diodes

BZX84 series

GRAPHICAL DATA



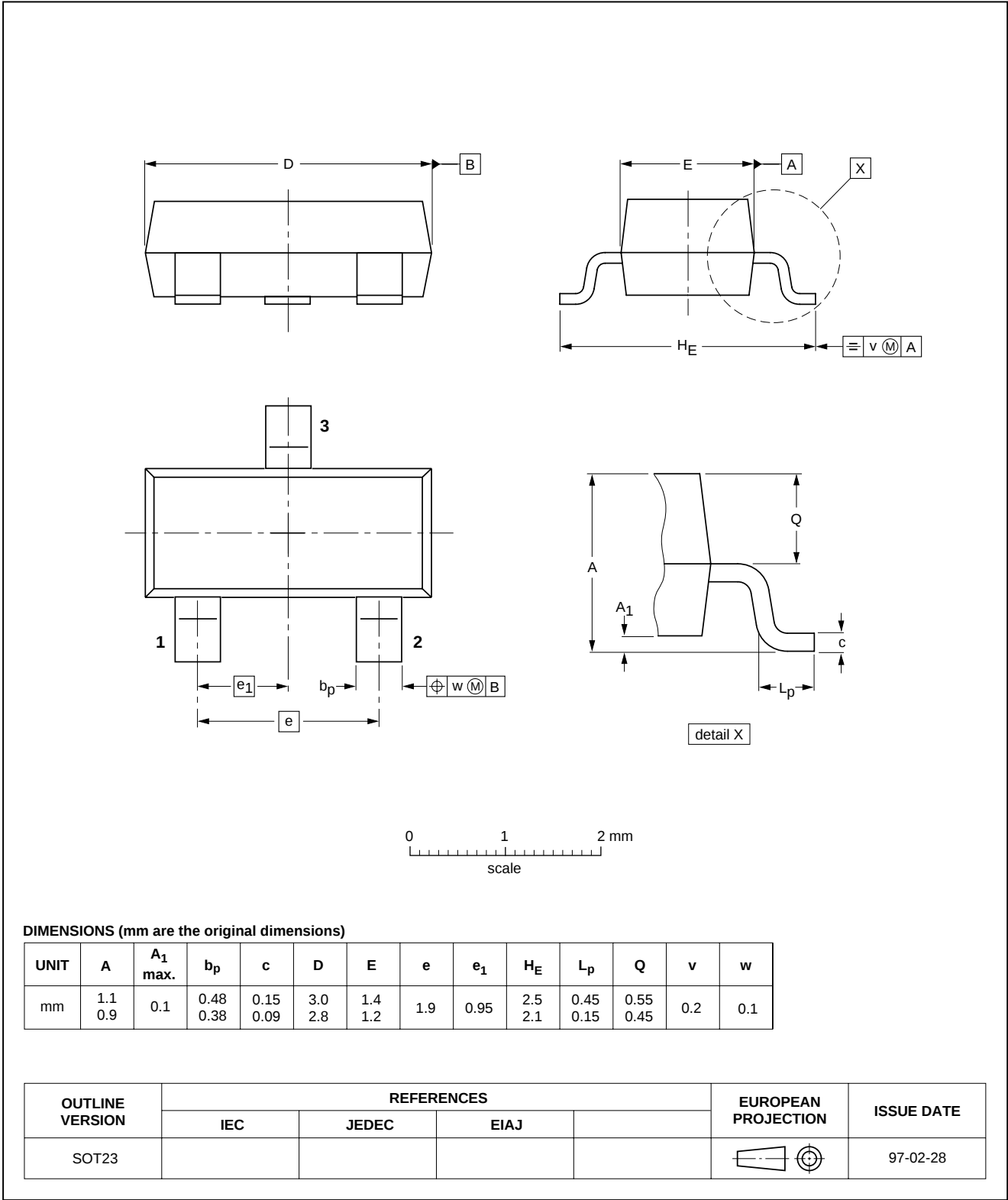
Voltage regulator diodes

BZX84 series

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT23



Voltage regulator diodes

BZX84 series

DEFINITIONS

Data sheet status	
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.
Limiting values	
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.	
Application information	
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

NOTES

Philips Semiconductors – a worldwide company

Argentina: see South America

Australia: 34 Waterloo Road, NORTH RYDE, NSW 2113,
Tel. +61 2 9805 4455, Fax. +61 2 9805 4466

Austria: Computerstr. 6, A-1101 WIEN, P.O. Box 213,
Tel. +43 1 60 101 1248, Fax. +43 1 60 101 1210

Belarus: Hotel Minsk Business Center, Bld. 3, r. 1211, Volodarski Str. 6,
220050 MINSK, Tel. +375 172 20 0733, Fax. +375 172 20 0773

Belgium: see The Netherlands

Brazil: see South America

Bulgaria: Philips Bulgaria Ltd., Energoproject, 15th floor,
51 James Bourchier Blvd., 1407 SOFIA,
Tel. +359 2 68 9211, Fax. +359 2 68 9102

Canada: PHILIPS SEMICONDUCTORS/COMPONENTS,
Tel. +1 800 234 7381, Fax. +1 800 943 0087

China/Hong Kong: 501 Hong Kong Industrial Technology Centre,
72 Tat Chee Avenue, Kowloon Tong, HONG KONG,
Tel. +852 2319 7888, Fax. +852 2319 7700

Colombia: see South America

Czech Republic: see Austria

Denmark: Sydhavnsgade 23, 1780 COPENHAGEN V,
Tel. +45 33 29 3333, Fax. +45 33 29 3905

Finland: Sinikalliontie 3, FIN-02630 ESPOO,
Tel. +358 9 615 800, Fax. +358 9 6158 0920

France: 51 Rue Carnot, BP317, 92156 SURESNES Cedex,
Tel. +33 1 4099 6161, Fax. +33 1 4099 6427

Germany: Hammerbrookstraße 69, D-20097 HAMBURG,
Tel. +49 40 2353 60, Fax. +49 40 2353 6300

Hungary: see Austria

India: Philips INDIA Ltd, Band Box Building, 2nd floor,
254-D, Dr. Annie Besant Road, Worli, MUMBAI 400 025,
Tel. +91 22 493 8541, Fax. +91 22 493 0966

Indonesia: PT Philips Development Corporation, Semiconductors Division,
Gedung Philips, Jl. Buncit Raya Kav.99-100, JAKARTA 12510,
Tel. +62 21 794 0040 ext. 2501, Fax. +62 21 794 0080

Ireland: Newstead, Clonskeagh, DUBLIN 14,
Tel. +353 1 7640 000, Fax. +353 1 7640 200

Israel: RAPAC Electronics, 7 Kehilat Saloniki St, PO Box 18053,
TEL AVIV 61180, Tel. +972 3 645 0444, Fax. +972 3 649 1007

Italy: PHILIPS SEMICONDUCTORS, Piazza IV Novembre 3,
20124 MILANO, Tel. +39 02 67 52 2531, Fax. +39 02 67 52 2557

Japan: Philips Bldg 13-37, Kohnan 2-chome, Minato-ku,
TOKYO 108-8507, Tel. +81 3 3740 5130, Fax. +81 3 3740 5077

Korea: Philips House, 260-199 Itaewon-dong, Yongsan-ku, SEOUL,
Tel. +82 2 709 1412, Fax. +82 2 709 1415

Malaysia: No. 76 Jalan Universiti, 46200 PETALING JAYA, SELANGOR,
Tel. +60 3 750 5214, Fax. +60 3 757 4880

Mexico: 5900 Gateway East, Suite 200, EL PASO, TEXAS 79905,
Tel. +9-5 800 234 7381, Fax +9-5 800 943 0087

Middle East: see Italy

Netherlands: Postbus 90050, 5600 PB EINDHOVEN, Bldg. VB,
Tel. +31 40 27 82785, Fax. +31 40 27 88399

New Zealand: 2 Wagener Place, C.P.O. Box 1041, AUCKLAND,
Tel. +64 9 849 4160, Fax. +64 9 849 7811

Norway: Box 1, Manglerud 0612, OSLO,
Tel. +47 22 74 8000, Fax. +47 22 74 8341

Pakistan: see Singapore

Philippines: Philips Semiconductors Philippines Inc.,
106 Valero St. Salcedo Village, P.O. Box 2108 MCC, MAKATI,
Metro MANILA, Tel. +63 2 816 6380, Fax. +63 2 817 3474

Poland: Ul. Lukiska 10, PL 04-123 WARSZAWA,
Tel. +48 22 612 2831, Fax. +48 22 612 2327

Portugal: see Spain

Romania: see Italy

Russia: Philips Russia, Ul. Usatcheva 35A, 119048 MOSCOW,
Tel. +7 095 755 6918, Fax. +7 095 755 6919

Singapore: Lorong 1, Toa Payoh, SINGAPORE 319762,
Tel. +65 350 2538, Fax. +65 251 6500

Slovakia: see Austria

Slovenia: see Italy

South Africa: S.A. PHILIPS Pty Ltd., 195-215 Main Road Martindale,
2092 JOHANNESBURG, P.O. Box 58088 Newville 2114,
Tel. +27 11 471 5401, Fax. +27 11 471 5398

South America: Al. Vicente Pinzon, 173, 6th floor,
04547-130 SÃO PAULO, SP, Brazil,
Tel. +55 11 821 2333, Fax. +55 11 821 2382

Spain: Balmes 22, 08007 BARCELONA,
Tel. +34 93 301 6312, Fax. +34 93 301 4107

Sweden: Kottbygatan 7, Akalla, S-16485 STOCKHOLM,
Tel. +46 8 5985 2000, Fax. +46 8 5985 2745

Switzerland: Allmendstrasse 140, CH-8027 ZÜRICH,
Tel. +41 1 488 2741 Fax. +41 1 488 3263

Taiwan: Philips Semiconductors, 6F, No. 96, Chien Kuo N. Rd., Sec. 1,
TAIPEI, Taiwan Tel. +886 2 2134 2886, Fax. +886 2 2134 2874

Thailand: PHILIPS ELECTRONICS (THAILAND) Ltd.,
209/2 Sanpavuth-Bangna Road Prakanong, BANGKOK 10260,
Tel. +66 2 745 4090, Fax. +66 2 398 0793

Turkey: Yukari Dudullu, Org. San. Blg., 2.Cad. Nr. 28 81260 Umraniye,
ISTANBUL, Tel. +90 216 522 1500, Fax. +90 216 522 1813

Ukraine: PHILIPS UKRAINE, 4 Patrice Lumumba str., Building B, Floor 7,
252042 KIEV, Tel. +380 44 264 2776, Fax. +380 44 268 0461

United Kingdom: Philips Semiconductors Ltd., 276 Bath Road, Hayes,
MIDDLESEX UB3 5BX, Tel. +44 181 730 5000, Fax. +44 181 754 8421

United States: 811 East Arques Avenue, SUNNYVALE, CA 94088-3409,
Tel. +1 800 234 7381, Fax. +1 800 943 0087

Uruguay: see South America

Vietnam: see Singapore

Yugoslavia: PHILIPS, Trg N. Pasica 5/v, 11000 BEOGRAD,
Tel. +381 11 62 5344, Fax. +381 11 63 5777

For all other countries apply to: Philips Semiconductors,
International Marketing & Sales Communications, Building BE-p, P.O. Box 218,
5600 MD EINDHOVEN, The Netherlands, Fax. +31 40 27 24825

Internet: <http://www.semiconductors.philips.com>

© Philips Electronics N.V. 1999

SCA 64

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

115002/00/02/pp12

Date of release: 1999 May 18

Document order number: 9397 750 05931

Let's make things better.

**Philips
Semiconductors**



PHILIPS