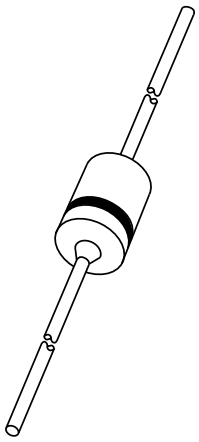
DATA SHEET



BZX79 series
Voltage regulator diodes

Product specification
Supersedes data of April 1992
File under Discrete Semiconductors, SC01

1996 Apr 26

Philips
Semiconductors

PHILIPS

Voltage regulator diodes BZX79 series

FEATURES

- Total power dissipation: max. 500 mW
- Four tolerance series: ±1%, ±2%, ±3% and ±5%
- Working voltage range: nom. 2.4 to 75 V (E24 range)
- Non-repetitive peak reverse power dissipation: max. 40 W.

APPLICATIONS

- Low voltage stabilizers or voltage references.

DESCRIPTION

Low-power voltage regulator diodes in hermetically sealed leaded glass SOD27 (DO-35) packages. The diodes are available in the normalized E24 ±1% (BZX79-A), ±2% (BZX79-B), ±3% (BZX79-F) and ±5% (BZX79-C) tolerance range. The series consists of 37 types with nominal working voltages from 2.4 to 75 V.

The diodes are type branded.

Fig.1 Simplified outline (SOD27; DO-35) and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_F	continuous forward current		–	250	mA
I_{ZSM}	non-repetitive peak reverse current	t_p = 100 μs; square wave; T_j = 25 °C prior to surge	see Tables 1, 2, 3 and 4		
P_{tot}	total power dissipation	T_{amb} = 50 °C; note 1	–	400	mW
		T_{amb} = 50 °C; note 2	–	500	mW
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 μs; square wave; T_j = 25 °C prior to surge; see Fig.3	–	40	W
T_{stg}	storage temperature		–65	+200	°C
T_j	junction temperature		–65	+200	°C

Notes

1. Device mounted on a printed circuit-board without metallization pad; lead length max.
2. Tie-point temperature ≤ 50 °C; max. lead length 8 mm.

ELECTRICAL CHARACTERISTICS

Total BZX79-A and B and F and C series

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	I_F = 10 mA; see Fig.4	0.9	V
I_R	reverse current			
	BZX79-A/B/F/C2V4	V_R = 1 V	50	µA
	BZX79-A/B/F/C2V7	V_R = 1 V	20	µA
	BZX79-A/B/F/C3V0	V_R = 1 V	10	µA
	BZX79-A/B/F/C3V3	V_R = 1 V	5	µA
	BZX79-A/B/F/C3V6	V_R = 1 V	5	µA
	BZX79-A/B/F/C3V9	V_R = 1 V	3	µA
	BZX79-A/B/F/C4V3	V_R = 1 V	3	µA
	BZX79-A/B/F/C4V7	V_R = 2 V	3	µA
	BZX79-A/B/F/C5V1	V_R = 2 V	2	µA
	BZX79-A/B/F/C5V6	V_R = 2 V	1	µA
	BZX79-A/B/F/C6V2	V_R = 4 V	3	µA
	BZX79-A/B/F/C6V8	V_R = 4 V	2	µA
	BZX79-A/B/F/C7V5	V_R = 5 V	1	µA
	BZX79-A/B/F/C8V2	V_R = 5 V	700	nA
	BZX79-A/B/F/C9V1	V_R = 6 V	500	nA
	BZX79-A/B/F/C10	V_R = 7 V	200	nA
	BZX79-A/B/F/C11	V_R = 8 V	100	nA
	BZX79-A/B/F/C12	V_R = 8 V	100	nA
	BZX79-A/B/F/C13	V_R = 8 V	100	nA
	BZX79-A/B/F/C15 to 75	$V_R = 0.7V_{Znom}$	50	nA

Table 1 Per type BZX79-**A/B2V4** to **A/B24**

T_j = 25 °C; unless otherwise specified.

BZX79-A or B 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 5 and 6)			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)		at I_{Ztest} = 1 mA		at I_{Ztest} = 5 mA						
	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	MIN.	TYP.	MAX.	MAX.	MAX.
2V4	2.37	2.43	2.35	2.45	275	600	70	100	–3.5	–1.6	0	450	6.0
2V7	2.67	2.73	2.65	2.75	300	600	75	100	–3.5	–2.0	0	450	6.0
3V0	2.97	3.03	2.94	3.06	325	600	80	95	–3.5	–2.1	0	450	6.0
3V3	3.26	3.34	3.23	3.37	350	600	85	95	–3.5	–2.4	0	450	6.0
3V6	3.56	3.64	3.53	3.67	375	600	85	90	–3.5	–2.4	0	450	6.0
3V9	3.86	3.94	3.82	3.98	400	600	85	90	–3.5	–2.5	0	450	6.0
4V3	4.25	4.35	4.21	4.39	410	600	80	90	–3.5	–2.5	0	450	6.0
4V7	4.65	4.75	4.61	4.79	425	500	50	80	–3.5	–1.4	0.2	300	6.0
5V1	5.04	5.16	5.00	5.20	400	480	40	60	–2.7	–0.8	1.2	300	6.0
5V6	5.54	5.66	5.49	5.71	80	400	15	40	–2.0	1.2	2.5	300	6.0
6V2	6.13	6.27	6.08	6.32	40	150	6	10	0.4	2.3	3.7	200	6.0
6V8	6.73	6.87	6.66	6.94	30	80	6	15	1.2	3.0	4.5	200	6.0
7V5	7.42	7.58	7.35	7.65	30	80	6	15	2.5	4.0	5.3	150	4.0
8V2	8.11	8.29	8.04	8.36	40	80	6	15	3.2	4.6	6.2	150	4.0
9V1	9.00	9.20	8.92	9.28	40	100	6	15	3.8	5.5	7.0	150	3.0
10	9.90	10.10	9.80	10.20	50	150	8	20	4.5	6.4	8.0	90	3.0
11	10.89	11.11	10.80	11.20	50	150	10	20	5.4	7.4	9.0	85	2.5
12	11.88	12.12	11.80	12.20	50	150	10	25	6.0	8.4	10.0	85	2.5
13	12.87	13.13	12.70	13.30	50	170	10	30	7.0	9.4	11.0	80	2.5
15	14.85	15.15	14.70	15.30	50	200	10	30	9.2	11.4	13.0	75	2.0
16	15.84	16.16	15.70	16.30	50	200	10	40	10.4	12.4	14.0	75	1.5
18	17.82	18.18	17.60	18.40	50	225	10	45	12.4	14.4	16.0	70	1.5
20	19.80	20.20	19.60	20.40	60	225	15	55	14.4	16.4	18.0	60	1.5
22	21.78	22.22	21.60	22.40	60	250	20	55	16.4	18.4	20.0	60	1.25
24	23.76	24.24	23.50	24.50	60	250	25	70	18.4	20.4	22.0	55	1.25

Table 2 Per type BZX79-**A/B27** to **A/B75**

T_j = 25 °C; unless otherwise specified.

BZX79-A or B XXX	WORKING VOLTAGE V_Z (V) at I_{Ztest} = 2 mA				DIFFERENTIAL RESISTANCE r_{dif} (Ω)				TEMP. COEFF. S_Z (mV/K) at I_{Ztest} = 2 mA (see Figs 5 and 6)			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)		at I_{Ztest} = 0.5 mA		at I_{Ztest} = 2 mA						
	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	MIN.	TYP.	MAX.	MAX.	MAX.
27	26.73	27.27	26.50	27.50	65	300	25	80	21.4	23.4	25.3	50	1.0
30	29.70	30.30	29.40	30.60	70	300	30	80	24.4	26.6	29.4	50	1.0
33	32.67	33.33	32.30	33.70	75	325	35	80	27.4	29.7	33.4	45	0.9
36	35.64	36.36	35.30	36.70	80	350	35	90	30.4	33.0	37.4	45	0.8
39	38.61	39.39	38.20	39.80	80	350	40	130	33.4	36.4	41.2	45	0.7
43	42.57	43.43	42.10	43.90	85	375	45	150	37.6	41.2	46.6	40	0.6
47	46.53	47.47	46.10	47.90	85	375	50	170	42.0	46.1	51.8	40	0.5
51	50.49	51.51	50.00	52.00	90	400	60	180	46.6	51.0	57.2	40	0.4
56	55.44	56.56	54.90	57.10	100	425	70	200	52.2	57.0	63.8	40	0.3
62	61.38	62.62	60.80	63.20	120	450	80	215	58.8	64.4	71.6	35	0.3
68	67.32	68.68	66.60	69.40	150	475	90	240	65.6	71.7	79.8	35	0.25
75	74.25	75.75	73.50	76.50	170	500	95	255	73.4	80.2	88.6	35	0.2

Table 3 Per type BZX79-**F/C2V4** to **F/C24**

T_j = 25 °C; unless otherwise specified.

BZX79-F 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 5 and 6)			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. ±3% (F)		Tol. ±5% (C)		at I_{Ztest} = 1 mA		at I_{Ztest} = 5 mA						
	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	MIN.	TYP.	MAX.	MAX.	MAX.
2V4	2.33	2.47	2.2	2.6	275	600	70	100	–3.5	–1.6	0	450	6.0
2V7	2.62	2.78	2.5	2.9	300	600	75	100	–3.5	–2.0	0	450	6.0
3V0	2.91	3.09	2.8	3.2	325	600	80	95	–3.5	–2.1	0	450	6.0
3V3	3.20	3.40	3.1	3.5	350	600	85	95	–3.5	–2.4	0	450	6.0
3V6	3.49	3.71	3.4	3.8	375	600	85	90	–3.5	–2.4	0	450	6.0
3V9	3.78	4.02	3.7	4.1	400	600	85	90	–3.5	–2.5	0	450	6.0
4V3	4.17	4.43	4.0	4.6	410	600	80	90	–3.5	–2.5	0	450	6.0
4V7	4.56	4.84	4.4	5.0	425	500	50	80	–3.5	–1.4	0.2	300	6.0
5V1	4.95	5.25	4.8	5.4	400	480	40	60	–2.7	–0.8	1.2	300	6.0
5V6	5.43	5.77	5.2	6.0	80	400	15	40	–2.0	1.2	2.5	300	6.0
6V2	6.01	6.39	5.8	6.6	40	150	6	10	0.4	2.3	3.7	200	6.0
6V8	6.60	7.00	6.4	7.2	30	80	6	15	1.2	3.0	4.5	200	6.0
7V5	7.28	7.72	7.0	7.9	30	80	6	15	2.5	4.0	5.3	150	4.0
8V2	7.95	8.45	7.7	8.7	40	80	6	15	3.2	4.6	6.2	150	4.0
9V1	8.83	9.37	8.5	9.6	40	100	6	15	3.8	5.5	7.0	150	3.0
10	9.70	10.30	9.4	10.6	50	150	8	20	4.5	6.4	8.0	90	3.0
11	10.67	11.33	10.4	11.6	50	150	10	20	5.4	7.4	9.0	85	2.5
12	11.64	12.36	11.4	12.7	50	150	10	25	6.0	8.4	10.0	85	2.5
13	12.61	13.39	12.4	14.1	50	170	10	30	7.0	9.4	11.0	80	2.5
15	14.55	15.45	13.8	15.6	50	200	10	30	9.2	11.4	13.0	75	2.0
16	15.50	16.50	15.3	17.1	50	200	10	40	10.4	12.4	14.0	75	1.5
18	17.50	18.50	16.8	19.1	50	225	10	45	12.4	14.4	16.0	70	1.5
20	19.40	20.60	18.8	21.2	60	225	15	55	14.4	16.4	18.0	60	1.5
22	21.30	22.70	20.8	23.3	60	250	20	55	16.4	18.4	20.0	60	1.25
24	23.30	24.70	22.8	25.6	60	250	25	70	18.4	20.4	22.0	55	1.25

Table 4 Per type BZX79-**F/C27** to **F/C75**

T_j = 25 °C; unless otherwise specified.

BZX79-F or C XXX	WORKING VOLTAGE V_Z (V) at I_{Ztest} = 2 mA				DIFFERENTIAL RESISTANCE r_{dif} (Ω)				TEMP. COEFF. S_Z (mV/K) at I_{Ztest} = 2 mA (see Figs 5 and 6)			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. ±3% (F)		Tol. ±5% (C)		at I_{Ztest} = 0.5 mA		at I_{Ztest} = 2 mA						
	MIN.	MAX.	MIN.	MAX.	TYP.	MAX.	TYP.	MAX.	MIN.	TYP.	MAX.	MAX.	MAX.
27	26.20	27.80	25.1	28.9	65	300	25	80	21.4	23.4	25.3	50	1.0
30	29.10	30.90	28.0	32.0	70	300	30	80	24.4	26.6	29.4	50	1.0
33	32.00	34.00	31.0	35.0	75	325	35	80	27.4	29.7	33.4	45	0.9
36	34.90	37.10	34.0	38.0	80	350	35	90	30.4	33.0	37.4	45	0.8
39	37.80	40.20	37.0	41.0	80	350	40	130	33.4	36.4	41.2	45	0.7
43	41.70	44.30	40.0	46.0	85	375	45	150	37.6	41.2	46.6	40	0.6
47	45.60	48.40	44.0	50.0	85	375	50	170	42.0	46.1	51.8	40	0.5
51	49.50	52.50	48.0	54.0	90	400	60	180	46.6	51.0	57.2	40	0.4
56	54.30	57.70	52.0	60.0	100	425	70	200	52.2	57.0	63.8	40	0.3
62	60.10	63.90	58.0	66.0	120	450	80	215	58.8	64.4	71.6	35	0.3
68	66.00	70.00	64.0	72.0	150	475	90	240	65.6	71.7	79.8	35	0.25
75	72.80	77.20	70.0	79.0	170	500	95	255	73.4	80.2	88.6	35	0.2

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}tp}$	thermal resistance from junction to tie-point	lead length 8 mm.	300	K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	lead length max.; see Fig.2 and note 1	380	K/W

Note

1. Device mounted on a printed circuit-board without metallization pad.

GRAPHICAL DATA

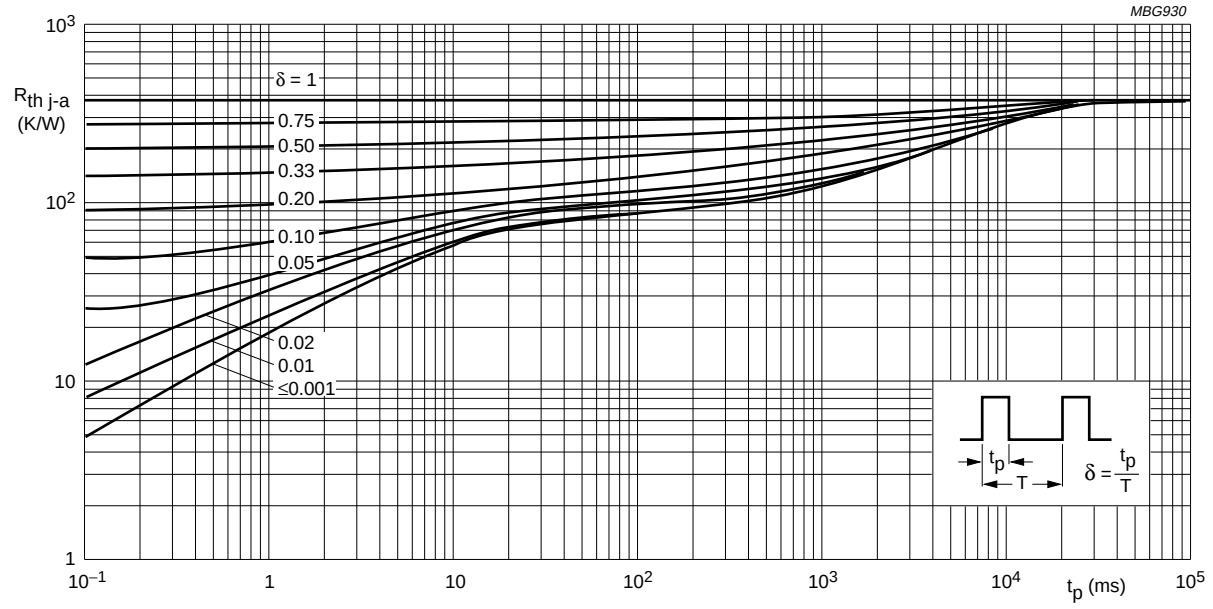
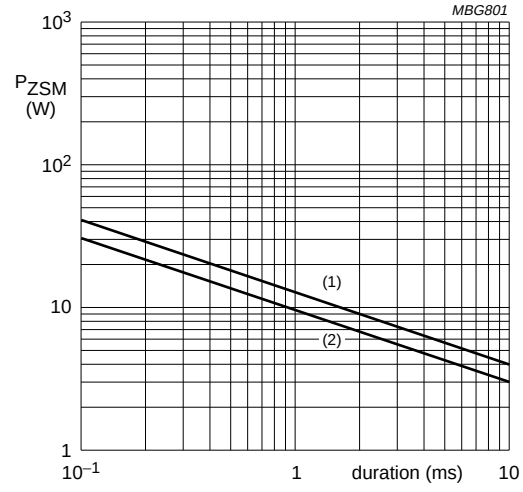
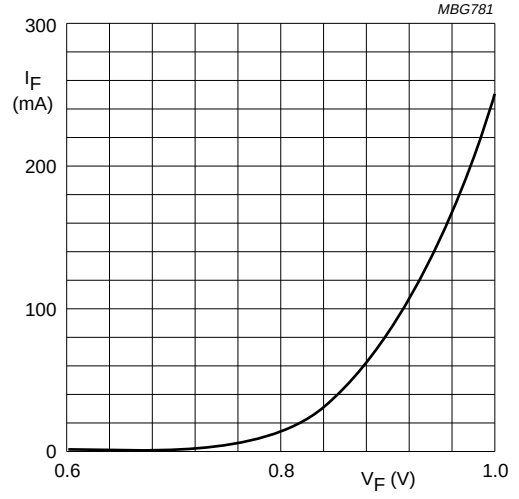


Fig.2 Thermal resistance from junction to ambient as a function of pulse duration.



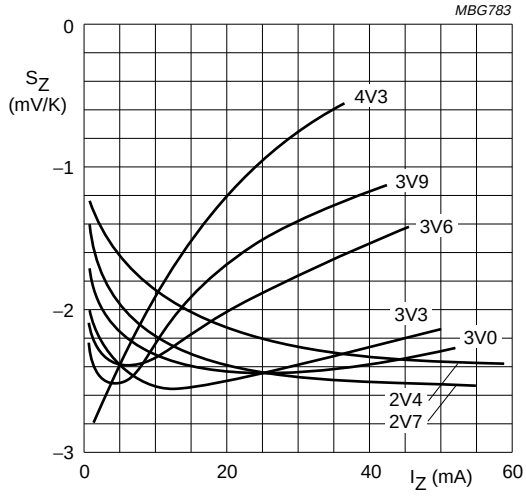
(1) T_j = 25 °C (prior to surge).
(2) T_j = 150 °C (prior to surge).

Fig.3 Maximum permissible non-repetitive peak reverse power dissipation versus duration.



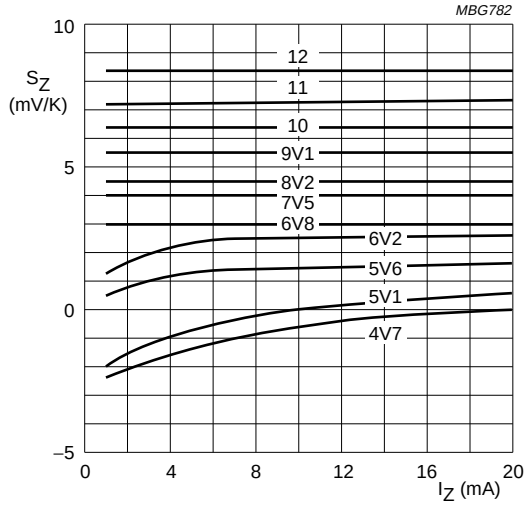
T_j = 25 °C.

Fig.4 Forward current as a function of forward voltage; typical values.



BZX79-A/B/F/C2V4 to A/B/F/C4V3.
T_j = 25 to 150 °C.

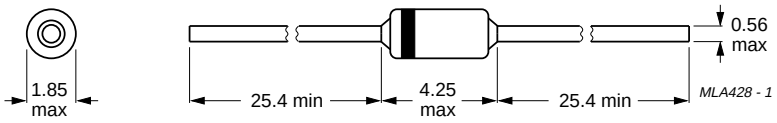
Fig.5 Temperature coefficient as a function of working current; typical values.



BZX79-A/B/F/C4V7 to A/B/F/C12.
T_j = 25 to 150 °C.

Fig.6 Temperature coefficient as a function of working current; typical values.

PACKAGE OUTLINE



Dimensions in mm.

Fig.7 SOD27 (DO-35).

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.