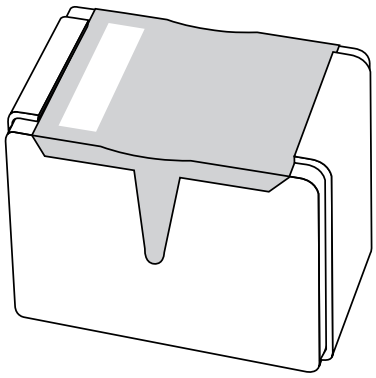
# DATA SHEET



# BZX284 series
## Voltage regulator diodes

Product data sheet
Supersedes data of 1999 Apr 19

2002 May 28

NXP founded by Philips

# Voltage regulator diodes BZX284 series

## FEATURES

- Total power dissipation: max. 400 mW
- Two tolerance series: ±2% and ±5%
- Working voltage range: nom. 2.4 to 75 V (E24 range).

## APPLICATIONS

- General regulation functions.

## DESCRIPTION

Low-power voltage regulator diodes in a SOD110 very small ceramic SMD package. The diodes are available in the normalized E24 ±2% (BZX284-B) and ±5% (BZX284-C) tolerance range. The series consists of 37 types with nominal working voltages from 2.4 to 75 V.

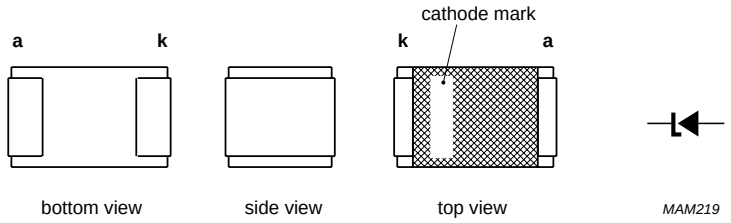



Fig.1 Simplified outline (SOD110) and symbol.

## MARKING

| TYPE NUMBER | MARKING CODE | TYPE NUMBER | MARKING CODE | TYPE NUMBER | MARKING CODE | TYPE NUMBER | MARKING CODE |
|---|---|---|---|---|---|---|---|
| BZX284-B2V4 | WO | BZX284-B15 | XH | BZX284-C2V4 | YO | BZX284-C15 | ZH |
| BZX284-B2V7 | WP | BZX284-B16 | XI | BZX284-C2V7 | YP | BZX284-C16 | ZI |
| BZX284-B3V0 | WQ | BZX284-B18 | XJ | BZX284-C3V0 | YQ | BZX284-C18 | ZJ |
| BZX284-B3V3 | WR | BZX284-B20 | XK | BZX284-C3V3 | YR | BZX284-C20 | ZK |
| BZX284-B3V6 | WS | BZX284-B22 | XL | BZX284-C3V6 | YS | BZX284-C22 | ZL |
| BZX284-B3V9 | WT | BZX284-B24 | XM | BZX284-C3V9 | YT | BZX284-C24 | ZM |
| BZX284-B4V3 | WU | BZX284-B27 | XN | BZX284-C4V3 | YU | BZX284-C27 | ZN |
| BZX284-B4V7 | WV | BZX284-B30 | XO | BZX284-C4V7 | YV | BZX284-C30 | ZO |
| BZX284-B5V1 | WW | BZX284-B33 | XP | BZX284-C5V1 | YW | BZX284-C33 | ZP |
| BZX284-B5V6 | WX | BZX284-B36 | XQ | BZX284-C5V6 | YX | BZX284-C36 | ZQ |
| BZX284-B6V2 | WY | BZX284-B39 | XR | BZX284-C6V2 | YY | BZX284-C39 | ZR |
| BZX284-B6V8 | WZ | BZX284-B43 | XS | BZX284-C6V8 | YZ | BZX284-C43 | ZS |
| BZX284-B7V5 | XA | BZX284-B47 | XT | BZX284-C7V5 | ZA | BZX284-C47 | ZT |
| BZX284-B8V2 | XB | BZX284-B51 | XU | BZX284-C8V2 | ZB | BZX284-C51 | ZU |
| BZX284-B9V1 | XC | BZX284-B56 | XV | BZX284-C9V1 | ZC | BZX284-C56 | ZV |
| BZX284-B10 | XD | BZX284-B62 | XW | BZX284-C10 | ZD | BZX284-C62 | ZW |
| BZX284-B11 | XE | BZX284-B68 | XX | BZX284-C11 | ZE | BZX284-C68 | ZX |
| BZX284-B12 | XF | BZX284-B75 | XY | BZX284-C12 | ZF | BZX284-C75 | ZY |
| BZX284-B13 | XG | – | – | BZX284-C13 | ZG | – | – |

## LIMITING VALUES

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

| 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; $T_{amb}$ = 25 °C prior to surge | see Tables 1 and 2 | | |
| $P_{tot}$ | total power dissipation | $T_{amb}$ = 25 °C; note 1 | – | 400 | mW |
| $T_{stg}$ | storage temperature | | −65 | +150 | °C |
| $T_j$ | junction temperature | | – | 150 | °C |

**Note**

1. Device mounted on a printed-circuit board: 11 × 25 × 1.6 mm.

## ELECTRICAL CHARACTERISTICS

**Total BZX284-B and BZX284-C series**

$T_j$ = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MAX. | UNIT |
|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 10 mA; see Fig.2 | 0.9 | V |
| | | $I_F$ = 100 mA; see Fig.2 | 1.1 | V |
| $I_R$ | reverse current | | | |
| | BZX284-B/C2V4 | $V_R$ = 1 V | 50 | μA |
| | BZX284-B/C2V7 | $V_R$ = 1 V | 20 | μA |
| | BZX284-B/C3V0 | $V_R$ = 1 V | 10 | μA |
| | BZX284-B/C3V3 | $V_R$ = 1 V | 5 | μA |
| | BZX284-B/C3V6 | $V_R$ = 1 V | 5 | μA |
| | BZX284-B/C3V9 | $V_R$ = 1 V | 3 | μA |
| | BZX284-B/C4V3 | $V_R$ = 1 V | 3 | μA |
| | BZX284-B/C4V7 | $V_R$ = 2 V | 3 | μA |
| | BZX284-B/C5V1 | $V_R$ = 2 V | 2 | μA |
| | BZX284-B/C5V6 | $V_R$ = 2 V | 1 | μA |
| | BZX284-B/C6V2 | $V_R$ = 4 V | 3 | μA |
| | BZX284-B/C6V8 | $V_R$ = 4 V | 2 | μA |
| | BZX284-B/C7V5 | $V_R$ = 5 V | 1 | μA |
| | BZX284-B/C8V2 | $V_R$ = 5 V | 700 | nA |
| | BZX284-B/C9V1 | $V_R$ = 6 V | 500 | nA |
| | BZX284-B/C10 | $V_R$ = 7 V | 200 | nA |
| | BZX284-B/C11 | $V_R$ = 8 V | 100 | nA |
| | BZX284-B/C12 | $V_R$ = 8 V | 100 | nA |
| | BZX284-B/C13 | $V_R$ = 8 V | 100 | nA |
| | BZX284-B/C15 to 75 | $V_R = 0.7V_{Znom}$ | 50 | nA |

**Table 1** Per type BZX284-**B/C2V4** to **B/C24**

$T_j$ = 25 °C unless otherwise specified.

| BZX284-Bxxx Cxxx | 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 3 and 4) | 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. ±2% (B) | | Tol. ±5% (C) | | at $I_{Ztest}$ = 1 mA | | at $I_{Ztest}$ = 5 mA | | | | |
| | MIN. | MAX. | MIN. | MAX. | TYP. | MAX. | TYP. | MAX. | TYP. | MAX. | MAX. |
| 2V4 | 2.35 | 2.45 | 2.2 | 2.6 | 275 | 400 | 70 | 100 | −1.6 | 450 | 12.0 |
| 2V7 | 2.65 | 2.75 | 2.5 | 2.9 | 300 | 450 | 75 | 100 | −2.0 | 440 | 12.0 |
| 3V0 | 2.94 | 3.06 | 2.8 | 3.2 | 325 | 500 | 80 | 95 | −2.1 | 425 | 12.0 |
| 3V3 | 3.23 | 3.37 | 3.1 | 3.5 | 350 | 500 | 85 | 95 | −2.4 | 410 | 12.0 |
| 3V6 | 3.53 | 3.67 | 3.4 | 3.8 | 375 | 500 | 85 | 90 | −2.4 | 390 | 12.0 |
| 3V9 | 3.82 | 3.98 | 3.7 | 4.1 | 400 | 500 | 85 | 90 | −2.5 | 370 | 12.0 |
| 4V3 | 4.21 | 4.39 | 4.0 | 4.6 | 410 | 600 | 80 | 90 | −2.5 | 350 | 12.0 |
| 4V7 | 4.61 | 4.79 | 4.4 | 5.0 | 425 | 500 | 50 | 80 | −1.4 | 325 | 12.0 |
| 5V1 | 5.00 | 5.20 | 4.8 | 5.4 | 400 | 480 | 40 | 60 | −0.8 | 300 | 12.0 |
| 5V6 | 5.49 | 5.71 | 5.2 | 6.0 | 80 | 400 | 15 | 40 | 1.2 | 275 | 12.0 |
| 6V2 | 6.08 | 6.32 | 5.8 | 6.6 | 40 | 150 | 6 | 10 | 2.3 | 250 | 12.0 |
| 6V8 | 6.66 | 6.94 | 6.4 | 7.2 | 30 | 80 | 6 | 15 | 3.0 | 215 | 12.0 |
| 7V5 | 7.35 | 7.65 | 7.0 | 7.9 | 15 | 80 | 2 | 10 | 4.0 | 170 | 4.0 |
| 8V2 | 8.04 | 8.36 | 7.7 | 8.7 | 20 | 80 | 2 | 10 | 4.6 | 150 | 4.0 |
| 9V1 | 8.92 | 9.28 | 8.5 | 9.6 | 20 | 100 | 2 | 10 | 5.5 | 120 | 3.0 |
| 10 | 9.80 | 10.20 | 9.4 | 10.6 | 20 | 150 | 2 | 10 | 6.4 | 110 | 3.0 |
| 11 | 10.80 | 11.20 | 10.4 | 11.6 | 25 | 150 | 2 | 10 | 7.4 | 108 | 2.5 |
| 12 | 11.80 | 12.20 | 11.4 | 12.7 | 25 | 150 | 2 | 10 | 8.4 | 105 | 2.5 |
| 13 | 12.70 | 13.30 | 12.4 | 14.1 | 25 | 170 | 2 | 10 | 9.4 | 103 | 2.5 |
| 15 | 14.70 | 15.30 | 13.8 | 15.6 | 25 | 200 | 3 | 15 | 11.4 | 99 | 2.0 |
| 16 | 15.70 | 16.30 | 15.3 | 17.1 | 25 | 200 | 4 | 20 | 12.4 | 97 | 1.5 |
| 18 | 17.60 | 18.40 | 16.8 | 19.1 | 25 | 225 | 4 | 20 | 14.4 | 93 | 1.5 |
| 20 | 19.60 | 20.40 | 18.8 | 21.2 | 30 | 225 | 4 | 20 | 16.4 | 88 | 1.5 |
| 22 | 21.60 | 22.40 | 20.8 | 23.3 | 30 | 250 | 5 | 25 | 18.4 | 84 | 1.25 |
| 24 | 23.50 | 24.50 | 22.8 | 25.6 | 30 | 250 | 6 | 30 | 20.4 | 80 | 1.25 |

**Table 2** Per type BZX284-**B/C27** to **B/C75**

$T_j$ = 25 °C unless otherwise specified.

| BZX284-Bxxx Cxxx | 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 | 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. ±2% (B) | | Tol. ±5% (C) | | at $I_{Ztest}$ = 0.5 mA | | at $I_{Ztest}$ = 2 mA | | | | |
| | MIN. | MAX. | MIN. | MAX. | TYP. | MAX. | TYP. | MAX. | TYP. | MAX. | MAX. |
| 27 | 26.50 | 27.50 | 25.1 | 28.9 | 35 | 250 | 8 | 40 | 23.4 | 73 | 1.0 |
| 30 | 29.40 | 30.60 | 28.0 | 32.0 | 35 | 250 | 10 | 40 | 26.6 | 66 | 1.0 |
| 33 | 32.30 | 33.70 | 31.0 | 35.0 | 40 | 275 | 11 | 40 | 29.7 | 60 | 0.9 |
| 36 | 35.30 | 36.70 | 34.0 | 38.0 | 40 | 300 | 15 | 60 | 33.0 | 59 | 0.8 |
| 39 | 38.20 | 39.80 | 37.0 | 41.0 | 40 | 300 | 25 | 75 | 36.4 | 58 | 0.7 |
| 43 | 42.10 | 43.90 | 40.0 | 46.0 | 45 | 325 | 30 | 80 | 41.2 | 56 | 0.6 |
| 47 | 46.10 | 47.90 | 44.0 | 50.0 | 45 | 325 | 30 | 90 | 46.1 | 55 | 0.5 |
| 51 | 50.00 | 52.00 | 48.0 | 54.0 | 45 | 350 | 35 | 110 | 51.0 | 52 | 0.4 |
| 56 | 54.90 | 57.10 | 52.0 | 60.0 | 50 | 375 | 40 | 120 | 57.0 | 49 | 0.3 |
| 62 | 60.80 | 63.20 | 58.0 | 66.0 | 60 | 400 | 50 | 140 | 64.4 | 44 | 0.3 |
| 68 | 66.60 | 69.40 | 64.0 | 72.0 | 75 | 400 | 55 | 160 | 71.7 | 40 | 0.25 |
| 75 | 73.50 | 76.50 | 70.0 | 79.0 | 85 | 400 | 70 | 175 | 80.2 | 35 | 0.2 |

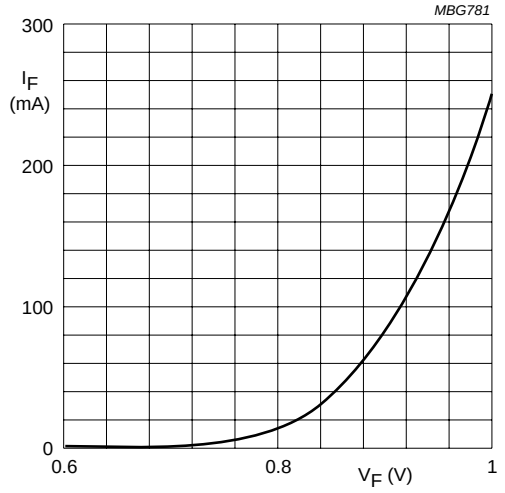
### THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th\ j\text{-}a}$ | thermal resistance from junction to ambient | note 1 | 315 | K/W |

**Note**

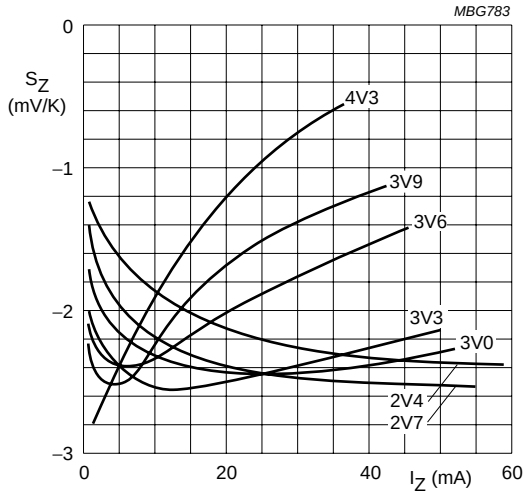
1. Device mounted on a printed-circuit board: 11 × 25 × 1.6 mm.

### GRAPHICAL DATA




$T_j$ = 25 °C.

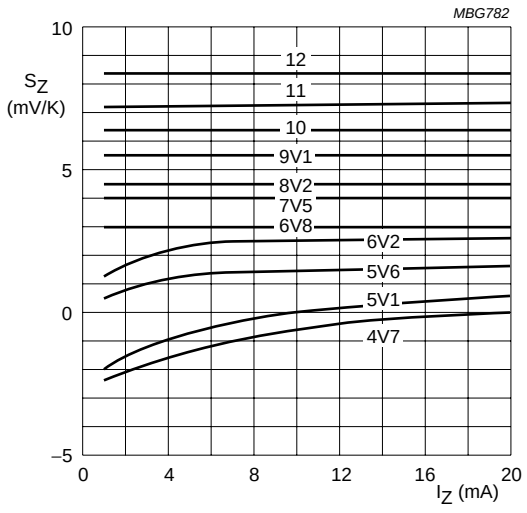
Fig.2 Forward current as a function of forward voltage; typical values.




**BZX284-B/C2V4 to B/C4V3.**

$T_j$ = 25 to 150 °C.

Fig.3 Temperature coefficient as a function of working current; typical values.

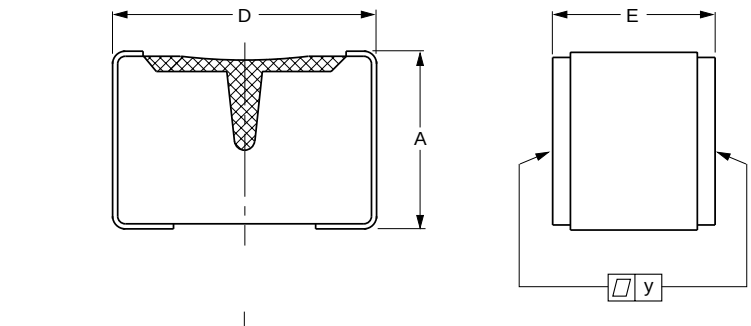


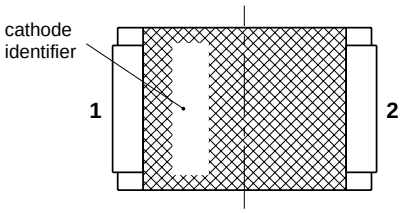

**BZX284-B/C4V7 to B/C12.**
$T_j$ = 25 to 150 °C.

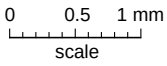
Fig.4 Temperature coefficient as a function of working current; typical values.

## PACKAGE OUTLINE

**Very small ceramic rectangular surface mounted package** **SOD110**




**DIMENSIONS (mm are the original dimensions)**

| UNIT | A max. | D | E | y |
|---|---|---|---|---|
| mm | 1.6 | 2.10<br>1.90 | 1.40<br>1.10 | 0.1 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOD110 | | | | | | 97-04-14 |

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| DOCUMENT STATUS[1] | PRODUCT STATUS[2] | DEFINITION |
|---|---|---|
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