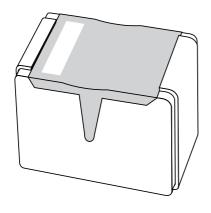
# DISCRETE SEMICONDUCTORS

# DATA SHEET



# **BZX284 series**Voltage regulator diodes

Product data sheet Supersedes data of 1999 Apr 19 2002 May 28



# Voltage regulator diodes

#### **BZX284** series

#### **FEATURES**

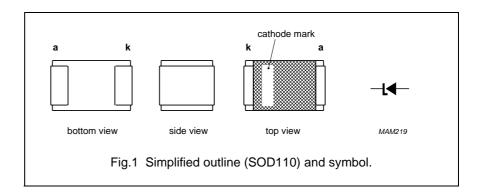
- Total power dissipation: max. 400 mW
- Two tolerance series: ±2% and ±5%
- Working voltage range: nom. 2.4 to 75 V (E24 range).

#### **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  $\pm 2\%$  (BZX284-B) and  $\pm 5\%$  (BZX284-C) tolerance range. The series consists of 37 types with nominal working voltages from 2.4 to 75 V.



#### **MARKING**

| TYPE<br>NUMBER | MARKING<br>CODE | TYPE<br>NUMBER | MARKING<br>CODE | TYPE<br>NUMBER | MARKING<br>CODE | TYPE<br>NUMBER | MARKING<br>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     | ХО              | 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              | _              | -               |

# Voltage regulator diodes

BZX284 series

#### **LIMITING VALUES**

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

| SYMBOL           | PARAMETER                           | PARAMETER CONDITIONS   |            |      |    |
|------------------|-------------------------------------|--|------------|------|----|
| I <sub>F</sub>   | continuous forward current          |  | _          | 250  | mA |
| I <sub>ZSM</sub> | non-repetitive peak reverse current | t <sub>p</sub> = 100 μs; square wave;<br>T <sub>amb</sub> = 25 °C prior to surge | see Tables |      |    |
| P <sub>tot</sub> | total power dissipation             | T <sub>amb</sub> = 25 °C; note 1   | _          | 400  | mW |
| T <sub>stg</sub> | storage temperature                 |  | -65        | +150 | °C |
| Tj               | junction temperature                |  | _          | 150  | °C |

#### Note

1. Device mounted on a printed-circuit board: 11  $\times$  25  $\times$  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 <sub>F</sub> | forward voltage    | I <sub>F</sub> = 10 mA; see Fig.2  | 0.9  | V    |
|                |                    | $I_F = 100 \text{ mA}$ ; see Fig.2 | 1.1  | V    |
| I <sub>R</sub> | reverse current    |                                    |      |      |
|                | BZX284-B/C2V4      | V <sub>R</sub> = 1 V               | 50   | μΑ   |
|                | BZX284-B/C2V7      | V <sub>R</sub> = 1 V               | 20   | μΑ   |
|                | BZX284-B/C3V0      | V <sub>R</sub> = 1 V               | 10   | μΑ   |
|                | BZX284-B/C3V3      | V <sub>R</sub> = 1 V               | 5    | μΑ   |
|                | BZX284-B/C3V6      | V <sub>R</sub> = 1 V               | 5    | μΑ   |
|                | BZX284-B/C3V9      | V <sub>R</sub> = 1 V               | 3    | μΑ   |
|                | BZX284-B/C4V3      | V <sub>R</sub> = 1 V               | 3    | μΑ   |
|                | BZX284-B/C4V7      | V <sub>R</sub> = 2 V               | 3    | μΑ   |
|                | BZX284-B/C5V1      | V <sub>R</sub> = 2 V               | 2    | μΑ   |
|                | BZX284-B/C5V6      | V <sub>R</sub> = 2 V               | 1    | μΑ   |
|                | BZX284-B/C6V2      | V <sub>R</sub> = 4 V               | 3    | μΑ   |
|                | BZX284-B/C6V8      | V <sub>R</sub> = 4 V               | 2    | μΑ   |
|                | BZX284-B/C7V5      | V <sub>R</sub> = 5 V               | 1    | μΑ   |
|                | BZX284-B/C8V2      | V <sub>R</sub> = 5 V               | 700  | nA   |
|                | BZX284-B/C9V1      | V <sub>R</sub> = 6 V               | 500  | nA   |
|                | BZX284-B/C10       | V <sub>R</sub> = 7 V               | 200  | nA   |
|                | BZX284-B/C11       | V <sub>R</sub> = 8 V               | 100  | nA   |
|                | BZX284-B/C12       | V <sub>R</sub> = 8 V               | 100  | nA   |
|                | BZX284-B/C13       | V <sub>R</sub> = 8 V               | 100  | nA   |
|                | BZX284-B/C15 to 75 | $V_R = 0.7 V_{Znom}$               | 50   | nA   |

Voltage regulator diodes

BZX284 series

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

T<sub>j</sub> = 25 °C unless otherwise specified.

| BZX284-<br>Bxxx | WORKING VOLTAGE  V <sub>Z</sub> (V)  at I <sub>Ztest</sub> = 5 mA |        |        | DIFFE  | ERENTIA<br>r <sub>dif</sub> | L RESIST<br>(Ω) | ANCE                  | TEMP. COEFF.  S <sub>Z</sub> (mV/K)  at I <sub>Ztest</sub> = 5 mA | DIODE CAP.  C <sub>d</sub> (pF)  at f = 1 MHz; | NON-REPETITIVE PEAK REVERSE CURRENT $I_{ZSM}$ (A) at $t_p = 100 \mu s$ ; |                          |  |
|-----------------|---|--------|--------|--------|-----------------------------|-----------------|-----------------------|---|--|--|--------------------------|--|
| Cxxx            | Tol. ±  | 2% (B) | Tol. ± | 5% (C) | at I <sub>Ztest</sub>       | = 1 mA          | at I <sub>Ztest</sub> | = 5 mA  | (see Figs 3 and 4)                             | V <sub>R</sub> = 0 V   | T <sub>amb</sub> = 25 °C |  |
|                 | 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                     |  |

Product data sheet

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

T<sub>i</sub> = 25 °C unless otherwise specified.

| BZX284-<br>Bxxx | WORKING VOLTAGE $V_Z (V)$ at $I_{Ztest} = 2 \text{ mA}$ |        |        | DIFFI  | ERENTIAI<br>r <sub>dif</sub> | L RESIST<br>(Ω) | ANCE                  | TEMP. COEFF.<br>S <sub>Z</sub> (mV/K)<br>at I <sub>Ztest</sub> = 2 mA | DIODE CAP.  C <sub>d</sub> (pF)  at f = 1 MHz; | NON-REPETITIVE PEAK REVERSE CURRENT $I_{ZSM}$ (A) at $t_p$ = 100 $\mu s$ ; |                          |  |
|-----------------|---|--------|--------|--------|------------------------------|-----------------|-----------------------|---|--|--|--------------------------|--|
| Cxxx            | Tol. ±  | 2% (B) | Tol. ± | 5% (C) | at I <sub>Ztest</sub>        | = 0.5 mA        | at I <sub>Ztest</sub> | test = 2 mA   |  | V <sub>R</sub> = 0 V   | T <sub>amb</sub> = 25 °C |  |
|                 | 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                      |  |

# Voltage regulator diodes

BZX284 series

#### THERMAL CHARACTERISTICS

| SYMBOL              | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------------|---|------------|-------|------|
| R <sub>th j-a</sub> | thermal resistance from junction to ambient | note 1     | 315   | K/W  |

#### Note

1. Device mounted on a printed-circuit board: 11  $\times$  25  $\times$  1.6 mm.

#### **GRAPHICAL DATA**

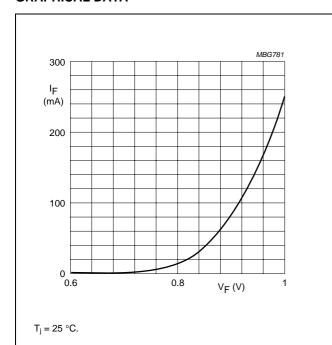


Fig.2 Forward current as a function of forward voltage; typical values.

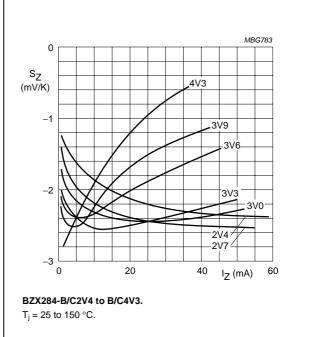
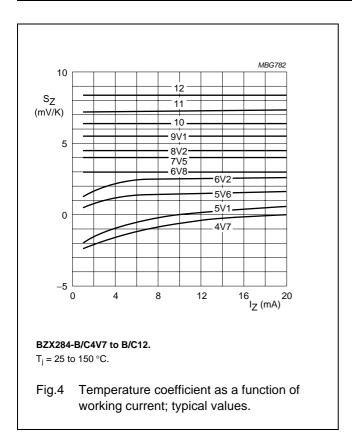


Fig.3 Temperature coefficient as a function of working current; typical values.

# Voltage regulator diodes

BZX284 series



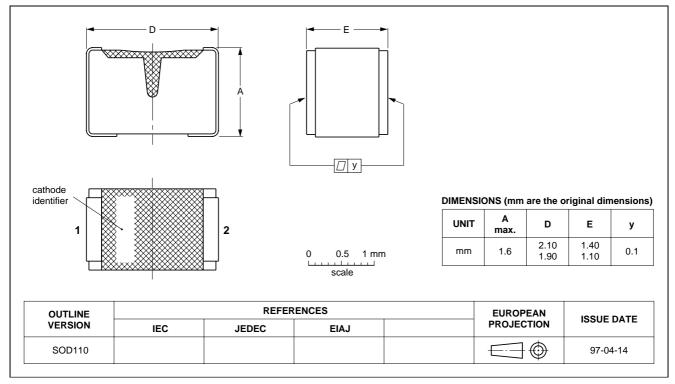
# Voltage regulator diodes

# BZX284 series

#### **PACKAGE OUTLINE**

#### Very small ceramic rectangular surface mounted package

#### SOD110



### Voltage regulator diodes

BZX284 series

#### **DATA SHEET STATUS**

| DOCUMENT<br>STATUS <sup>(1)</sup> | PRODUCT<br>STATUS <sup>(2)</sup> | DEFINITION  |
|-----------------------------------|----------------------------------|---|
| Objective data sheet              | Development                      | This document contains data from the objective specification for product development. |
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