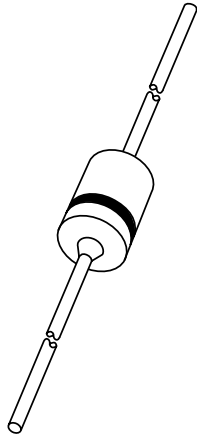


# DATA SHEET



## **BZX79 series** Voltage regulator diodes

Product data sheet  
Supersedes data of 1999 May 25

2002 Feb 27

## Voltage regulator diodes

## BZX79 series

## FEATURES

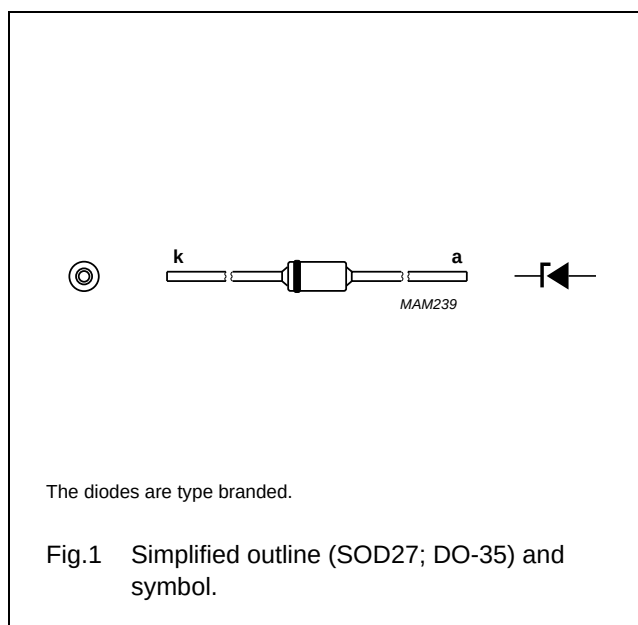
- Total power dissipation: max. 500 mW
- Two tolerance series:  $\pm 2\%$ , and approx.  $\pm 5\%$
- Working voltage range: nom. 2.4 to 75 V (E24 range)
- Non-repetitive peak reverse power dissipation: max. 40 W.

## APPLICATIONS

- 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  $\pm 2\%$  (BZX79-B) and approx.  $\pm 5\%$  (BZX79-C) tolerance range. The series consists of 37 types with nominal working voltages from 2.4 to 75 V.



## 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           | $t_p = 100 \mu s$ ; square wave;<br>$T_j = 25^\circ C$ prior to surge            | see Tables 1 and 2 |      | A          |
| $P_{tot}$ | total power dissipation                       | $T_{amb} = 50^\circ C$ ; note 1                                                  | —                  | 400  | mW         |
|           |                                               | $T_{amb} = 50^\circ C$ ; note 2                                                  | —                  | 500  | mW         |
| $P_{ZSM}$ | non-repetitive peak reverse power dissipation | $t_p = 100 \mu s$ ; square wave;<br>$T_j = 25^\circ C$ prior to surge; see Fig.3 | —                  | 40   | W          |
| $T_{stg}$ | storage temperature                           |                                                                                  | -65                | +200 | $^\circ C$ |
| $T_j$     | junction temperature                          |                                                                                  | -65                | +200 | $^\circ C$ |

## Notes

1. Device mounted on a printed circuit-board without metallization pad; lead length max.
2. Tie-point temperature  $\leq 50^\circ C$ ; max. lead length 8 mm.

## ELECTRICAL CHARACTERISTICS

## Total BZX79-B and BZX79-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.4 | 0.9  | V    |

## Voltage regulator diodes

## BZX79 series

| SYMBOL | PARAMETER                  | CONDITIONS          | MAX. | UNIT          |
|--------|----------------------------|---------------------|------|---------------|
| $I_R$  | reverse current            |                     |      |               |
|        | BZX79-B/C2V4               | $V_R = 1\text{ V}$  | 50   | $\mu\text{A}$ |
|        | BZX79-B/C2V7               | $V_R = 1\text{ V}$  | 20   | $\mu\text{A}$ |
|        | BZX79-B/C3V0               | $V_R = 1\text{ V}$  | 10   | $\mu\text{A}$ |
|        | BZX79-B/C3V3               | $V_R = 1\text{ V}$  | 5    | $\mu\text{A}$ |
|        | BZX79-B/C3V6               | $V_R = 1\text{ V}$  | 5    | $\mu\text{A}$ |
|        | BZX79-B/C3V9               | $V_R = 1\text{ V}$  | 3    | $\mu\text{A}$ |
|        | BZX79-B/C4V3               | $V_R = 1\text{ V}$  | 3    | $\mu\text{A}$ |
|        | BZX79-B/C4V7               | $V_R = 2\text{ V}$  | 3    | $\mu\text{A}$ |
|        | BZX79-B/C5V1               | $V_R = 2\text{ V}$  | 2    | $\mu\text{A}$ |
|        | BZX79-B/C5V6               | $V_R = 2\text{ V}$  | 1    | $\mu\text{A}$ |
|        | BZX79-B/C6V2               | $V_R = 4\text{ V}$  | 3    | $\mu\text{A}$ |
|        | BZX79-B/C6V8               | $V_R = 4\text{ V}$  | 2    | $\mu\text{A}$ |
|        | BZX79-B/C7V5               | $V_R = 5\text{ V}$  | 1    | $\mu\text{A}$ |
|        | BZX79-B/C8V2               | $V_R = 5\text{ V}$  | 700  | nA            |
|        | BZX79-B/C9V1               | $V_R = 6\text{ V}$  | 500  | nA            |
|        | BZX79-B/C10                | $V_R = 7\text{ V}$  | 200  | nA            |
|        | BZX79-B/C11                | $V_R = 8\text{ V}$  | 100  | nA            |
|        | BZX79-B/C12                | $V_R = 8\text{ V}$  | 100  | nA            |
|        | BZX79-B/C13                | $V_R = 8\text{ V}$  | 100  | nA            |
|        | BZX79-B/C15 to BZX79-B/C75 | $V_R = 0.7V_{Znom}$ | 50   | nA            |

## Voltage regulator diodes

## BZX79 series

**Table 1** Per type, BZX79-B/C2V4 to BZX79-B/C24 $T_j = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

| BZX79-<br>Bxxx<br>Cxxx | WORKING VOLTAGE<br>$V_z$ (V)<br>at $I_{Z\text{test}} = 5\text{ mA}$ |       |                               |      | DIFFERENTIAL RESISTANCE<br>$r_{\text{dif}}$ ( $\Omega$ ) |      |                                     |      | TEMP. COEFF.<br>$S_z$ (mV/K)<br>at $I_{Z\text{test}} = 5\text{ mA}$<br>(see Figs 5 and 6) |      |      | DIODE CAP.<br>$C_d$ (pF)<br>at $f = 1\text{ MHz}$ ;<br>$V_R = 0\text{ V}$ | NON-REPETITIVE PEAK<br>REVERSE CURRENT<br>$I_{ZSM}$ (A)<br>at $t_p = 100\text{ }\mu\text{s}$ ; $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$ |
|------------------------|---------------------------------------------------------------------|-------|-------------------------------|------|----------------------------------------------------------|------|-------------------------------------|------|-------------------------------------------------------------------------------------------|------|------|---------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                        | Tol. $\pm 2\%$ (B)                                                  |       | Tol. approx.<br>$\pm 5\%$ (C) |      | at $I_{Z\text{test}} = 1\text{ mA}$                      |      | at $I_{Z\text{test}} = 5\text{ mA}$ |      | MIN.                                                                                      | TYP. | MAX. | MAX.                                                                      | MAX.                                                                                                                                         |
|                        | MIN.                                                                | MAX.  | MIN.                          | MAX. | TYP.                                                     | MAX. | TYP.                                | MAX. |                                                                                           |      |      |                                                                           |                                                                                                                                              |
| 2V4                    | 2.35                                                                | 2.45  | 2.2                           | 2.6  | 275                                                      | 600  | 70                                  | 100  | -3.5                                                                                      | -1.6 | 0    | 450                                                                       | 6.0                                                                                                                                          |
| 2V7                    | 2.65                                                                | 2.75  | 2.5                           | 2.9  | 300                                                      | 600  | 75                                  | 100  | -3.5                                                                                      | -2.0 | 0    | 450                                                                       | 6.0                                                                                                                                          |
| 3V0                    | 2.94                                                                | 3.06  | 2.8                           | 3.2  | 325                                                      | 600  | 80                                  | 95   | -3.5                                                                                      | -2.1 | 0    | 450                                                                       | 6.0                                                                                                                                          |
| 3V3                    | 3.23                                                                | 3.37  | 3.1                           | 3.5  | 350                                                      | 600  | 85                                  | 95   | -3.5                                                                                      | -2.4 | 0    | 450                                                                       | 6.0                                                                                                                                          |
| 3V6                    | 3.53                                                                | 3.67  | 3.4                           | 3.8  | 375                                                      | 600  | 85                                  | 90   | -3.5                                                                                      | -2.4 | 0    | 450                                                                       | 6.0                                                                                                                                          |
| 3V9                    | 3.82                                                                | 3.98  | 3.7                           | 4.1  | 400                                                      | 600  | 85                                  | 90   | -3.5                                                                                      | -2.5 | 0    | 450                                                                       | 6.0                                                                                                                                          |
| 4V3                    | 4.21                                                                | 4.39  | 4.0                           | 4.6  | 410                                                      | 600  | 80                                  | 90   | -3.5                                                                                      | -2.5 | 0    | 450                                                                       | 6.0                                                                                                                                          |
| 4V7                    | 4.61                                                                | 4.79  | 4.4                           | 5.0  | 425                                                      | 500  | 50                                  | 80   | -3.5                                                                                      | -1.4 | 0.2  | 300                                                                       | 6.0                                                                                                                                          |
| 5V1                    | 5.00                                                                | 5.20  | 4.8                           | 5.4  | 400                                                      | 480  | 40                                  | 60   | -2.7                                                                                      | -0.8 | 1.2  | 300                                                                       | 6.0                                                                                                                                          |
| 5V6                    | 5.49                                                                | 5.71  | 5.2                           | 6.0  | 80                                                       | 400  | 15                                  | 40   | -2.0                                                                                      | 1.2  | 2.5  | 300                                                                       | 6.0                                                                                                                                          |
| 6V2                    | 6.08                                                                | 6.32  | 5.8                           | 6.6  | 40                                                       | 150  | 6                                   | 10   | 0.4                                                                                       | 2.3  | 3.7  | 200                                                                       | 6.0                                                                                                                                          |
| 6V8                    | 6.66                                                                | 6.94  | 6.4                           | 7.2  | 30                                                       | 80   | 6                                   | 15   | 1.2                                                                                       | 3.0  | 4.5  | 200                                                                       | 6.0                                                                                                                                          |
| 7V5                    | 7.35                                                                | 7.65  | 7.0                           | 7.9  | 30                                                       | 80   | 6                                   | 15   | 2.5                                                                                       | 4.0  | 5.3  | 150                                                                       | 4.0                                                                                                                                          |
| 8V2                    | 8.04                                                                | 8.36  | 7.7                           | 8.7  | 40                                                       | 80   | 6                                   | 15   | 3.2                                                                                       | 4.6  | 6.2  | 150                                                                       | 4.0                                                                                                                                          |
| 9V1                    | 8.92                                                                | 9.28  | 8.5                           | 9.6  | 40                                                       | 100  | 6                                   | 15   | 3.8                                                                                       | 5.5  | 7.0  | 150                                                                       | 3.0                                                                                                                                          |
| 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                                                               | 11.20 | 10.4                          | 11.6 | 50                                                       | 150  | 10                                  | 20   | 5.4                                                                                       | 7.4  | 9.0  | 85                                                                        | 2.5                                                                                                                                          |
| 12                     | 11.80                                                               | 12.20 | 11.4                          | 12.7 | 50                                                       | 150  | 10                                  | 25   | 6.0                                                                                       | 8.4  | 10.0 | 85                                                                        | 2.5                                                                                                                                          |
| 13                     | 12.70                                                               | 13.30 | 12.4                          | 14.1 | 50                                                       | 170  | 10                                  | 30   | 7.0                                                                                       | 9.4  | 11.0 | 80                                                                        | 2.5                                                                                                                                          |
| 15                     | 14.70                                                               | 15.30 | 13.8                          | 15.6 | 50                                                       | 200  | 10                                  | 30   | 9.2                                                                                       | 11.4 | 13.0 | 75                                                                        | 2.0                                                                                                                                          |
| 16                     | 15.70                                                               | 16.30 | 15.3                          | 17.1 | 50                                                       | 200  | 10                                  | 40   | 10.4                                                                                      | 12.4 | 14.0 | 75                                                                        | 1.5                                                                                                                                          |
| 18                     | 17.60                                                               | 18.40 | 16.8                          | 19.1 | 50                                                       | 225  | 10                                  | 45   | 12.4                                                                                      | 14.4 | 16.0 | 70                                                                        | 1.5                                                                                                                                          |
| 20                     | 19.60                                                               | 20.40 | 18.8                          | 21.2 | 60                                                       | 225  | 15                                  | 55   | 12.3                                                                                      | 15.6 | 18.0 | 60                                                                        | 1.5                                                                                                                                          |
| 22                     | 21.60                                                               | 22.40 | 20.8                          | 23.3 | 60                                                       | 250  | 20                                  | 55   | 14.1                                                                                      | 17.6 | 20.0 | 60                                                                        | 1.25                                                                                                                                         |
| 24                     | 23.50                                                               | 24.50 | 22.8                          | 25.6 | 60                                                       | 250  | 25                                  | 70   | 15.9                                                                                      | 19.6 | 22.0 | 55                                                                        | 1.25                                                                                                                                         |

Voltage regulator diodes

BZX79 series

**Table 2** Per type, BZX79-B/C27 to BZX79-B/C75  
 $T_j = 25\text{ °C}$  unless otherwise specified.

| BZX79-<br>Bxxx<br>Cxxx | WORKING VOLTAGE<br>$V_Z$ (V)<br>at $I_{Z\text{test}} = 2\text{ mA}$ |       |                               |      | DIFFERENTIAL RESISTANCE<br>$r_{\text{dif}}$ ( $\Omega$ ) |      |                                     |      | TEMP. COEFF.<br>$S_Z$ (mV/K)<br>at $I_{Z\text{test}} = 2\text{ mA}$<br>(see Figs 5 and 6) |      |      | DIODE CAP.<br>$C_d$ (pF)<br>at $f = 1\text{ MHz}$ ;<br>$V_R = 0\text{ V}$ | NON-REPETITIVE PEAK<br>REVERSE CURRENT<br>$I_{ZSM}$ (A)<br>at $t_p = 100\text{ }\mu\text{s}$ ; $T_{\text{amb}} = 25\text{ °C}$ |
|------------------------|---------------------------------------------------------------------|-------|-------------------------------|------|----------------------------------------------------------|------|-------------------------------------|------|-------------------------------------------------------------------------------------------|------|------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
|                        | Tol. $\pm 2\%$ (B)                                                  |       | Tol. approx.<br>$\pm 5\%$ (C) |      | at $I_{Z\text{test}} = 0.5\text{ mA}$                    |      | at $I_{Z\text{test}} = 2\text{ mA}$ |      | MIN.                                                                                      | TYP. | MAX. | MAX.                                                                      | MAX.                                                                                                                           |
|                        | MIN.                                                                | MAX.  | MIN.                          | MAX. | TYP.                                                     | MAX. | TYP.                                | MAX. |                                                                                           |      |      |                                                                           |                                                                                                                                |
| 27                     | 26.50                                                               | 27.50 | 25.1                          | 28.9 | 65                                                       | 300  | 25                                  | 80   | 18.0                                                                                      | 22.7 | 25.3 | 50                                                                        | 1.0                                                                                                                            |
| 30                     | 29.40                                                               | 30.60 | 28.0                          | 32.0 | 70                                                       | 300  | 30                                  | 80   | 20.6                                                                                      | 25.7 | 29.4 | 50                                                                        | 1.0                                                                                                                            |
| 33                     | 32.30                                                               | 33.70 | 31.0                          | 35.0 | 75                                                       | 325  | 35                                  | 80   | 23.3                                                                                      | 28.7 | 33.4 | 45                                                                        | 0.9                                                                                                                            |
| 36                     | 35.30                                                               | 36.70 | 34.0                          | 38.0 | 80                                                       | 350  | 35                                  | 90   | 26.0                                                                                      | 31.8 | 37.4 | 45                                                                        | 0.8                                                                                                                            |
| 39                     | 38.20                                                               | 39.80 | 37.0                          | 41.0 | 80                                                       | 350  | 40                                  | 130  | 28.7                                                                                      | 34.8 | 41.2 | 45                                                                        | 0.7                                                                                                                            |
| 43                     | 42.10                                                               | 43.90 | 40.0                          | 46.0 | 85                                                       | 375  | 45                                  | 150  | 31.4                                                                                      | 38.8 | 46.6 | 40                                                                        | 0.6                                                                                                                            |
| 47                     | 46.10                                                               | 47.90 | 44.0                          | 50.0 | 85                                                       | 375  | 50                                  | 170  | 35.0                                                                                      | 42.9 | 51.8 | 40                                                                        | 0.5                                                                                                                            |
| 51                     | 50.00                                                               | 52.00 | 48.0                          | 54.0 | 90                                                       | 400  | 60                                  | 180  | 38.6                                                                                      | 46.9 | 57.2 | 40                                                                        | 0.4                                                                                                                            |
| 56                     | 54.90                                                               | 57.10 | 52.0                          | 60.0 | 100                                                      | 425  | 70                                  | 200  | 42.2                                                                                      | 52.0 | 63.8 | 40                                                                        | 0.3                                                                                                                            |
| 62                     | 60.80                                                               | 63.20 | 58.0                          | 66.0 | 120                                                      | 450  | 80                                  | 215  | 58.8                                                                                      | 64.4 | 71.6 | 35                                                                        | 0.3                                                                                                                            |
| 68                     | 66.60                                                               | 69.40 | 64.0                          | 72.0 | 150                                                      | 475  | 90                                  | 240  | 65.6                                                                                      | 71.7 | 79.8 | 35                                                                        | 0.25                                                                                                                           |
| 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

BZX79 series

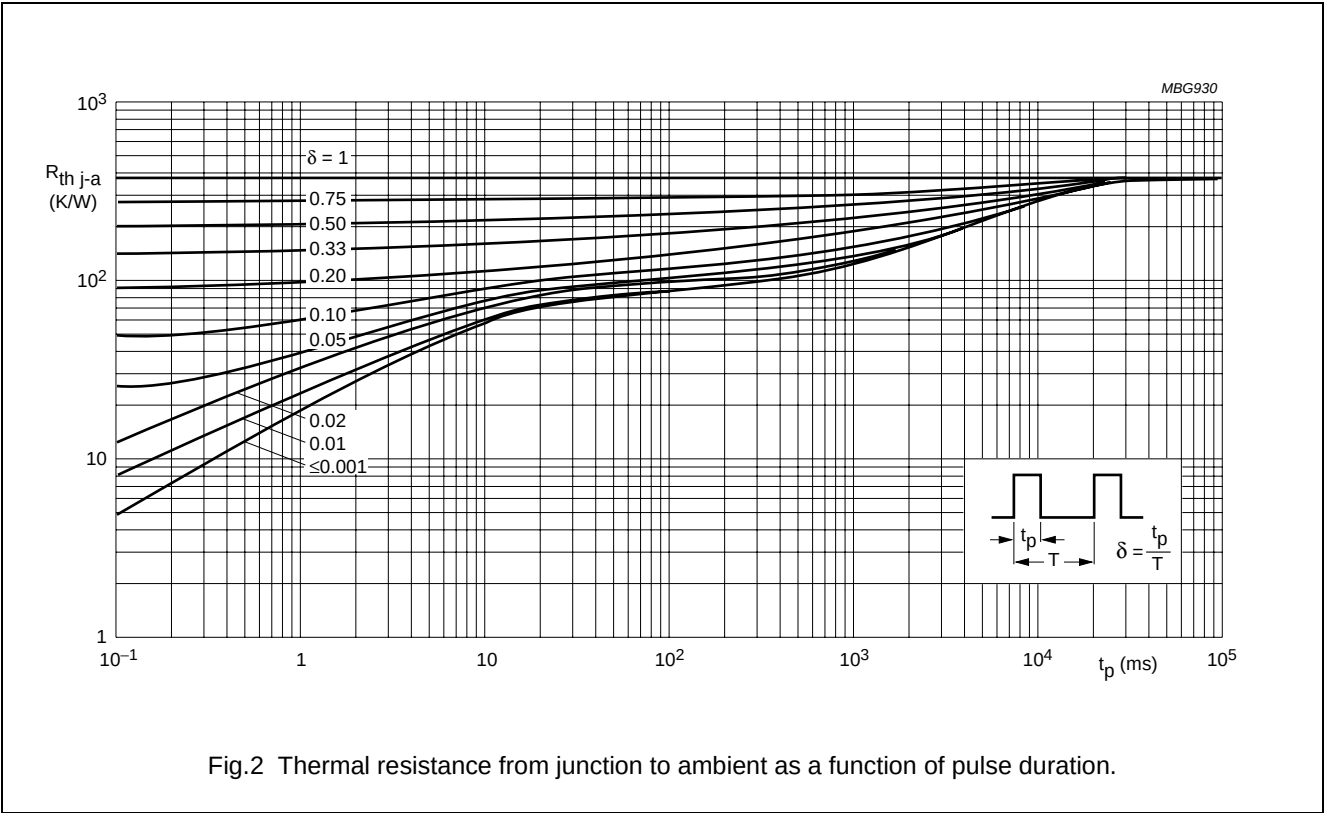
THERMAL CHARACTERISTICS

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

Note

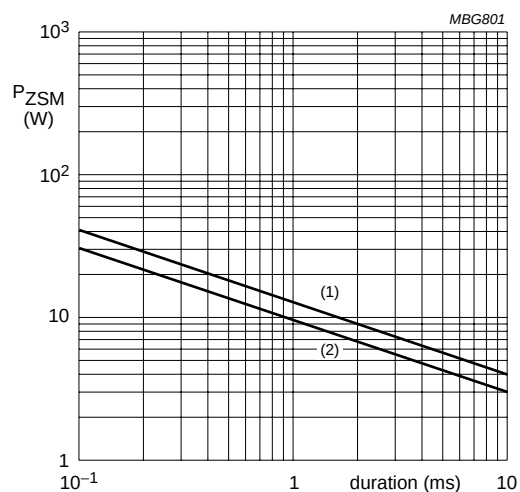
1. Device mounted on a printed circuit-board without metallization pad.

GRAPHICAL DATA



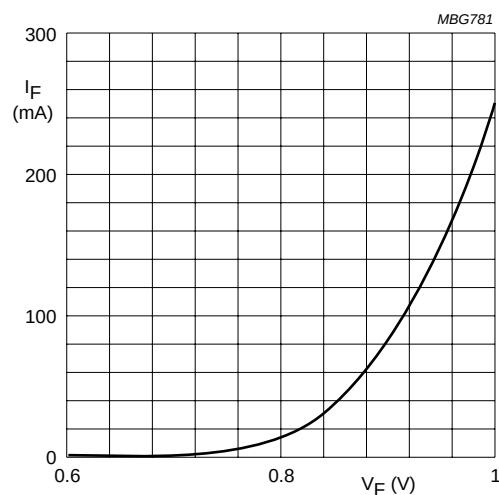
## Voltage regulator diodes

## BZX79 series



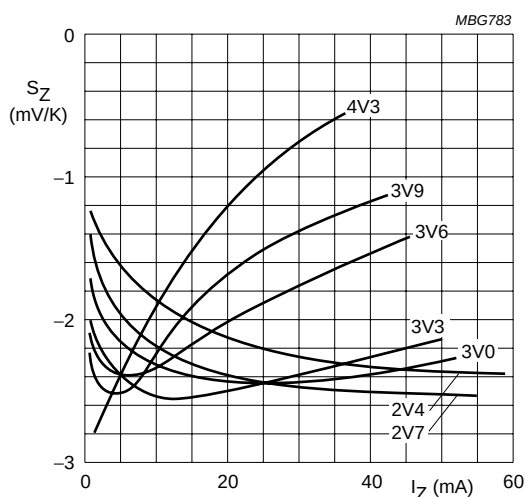
- (1)  $T_j = 25\text{ °C}$  (prior to surge).  
 (2)  $T_j = 150\text{ °C}$  (prior to surge).

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



$T_j = 25\text{ °C}$ .

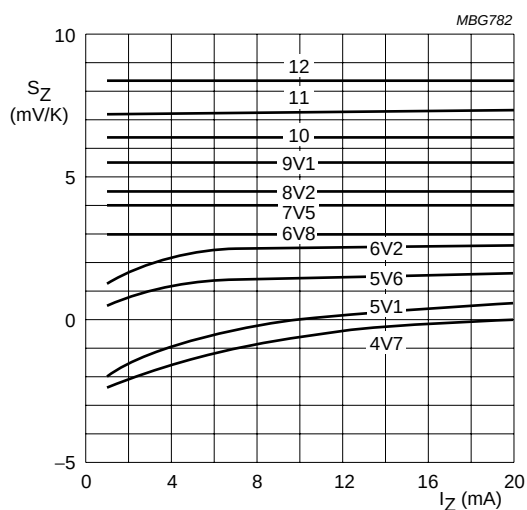
Fig.4 Typical forward current as a function of forward voltage.



BZX79-B/C2V4 to BZX79-B/C4V3.

$T_j = 25$  to  $150\text{ °C}$ .

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



BZX79-B/C4V7 to BZX79-B/C12.

$T_j = 25$  to  $150\text{ °C}$ .

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

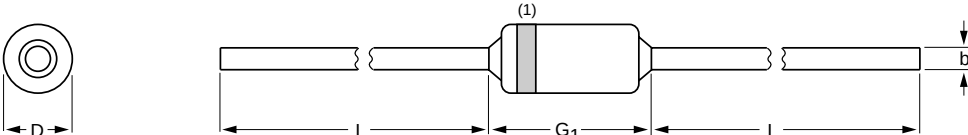
Voltage regulator diodes

BZX79 series

PACKAGE OUTLINE

Hermetically sealed glass package; axial leaded; 2 leads

SOD27



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

| UNIT | b<br>max. | D<br>max. | G <sub>1</sub><br>max. | L<br>min. |
|------|-----------|-----------|------------------------|-----------|
| mm   | 0.56      | 1.85      | 4.25                   | 25.4      |

012 mm

scale

**Note**

1. The marking band indicates the cathode.

| OUTLINE<br>VERSION | REFERENCES |       |       |  | EUROPEAN<br>PROJECTION                                                                | ISSUE DATE |
|--------------------|------------|-------|-------|--|---------------------------------------------------------------------------------------|------------|
|                    | IEC        | JEDEC | EIAJ  |  |                                                                                       |            |
| SOD27              | A24        | DO-35 | SC-40 |  |  | 97-06-09   |



## Voltage regulator diodes

## BZX79 series

## DATA SHEET STATUS

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

## Notes

1. Please consult the most recently issued document before initiating or completing a design.
2. The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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