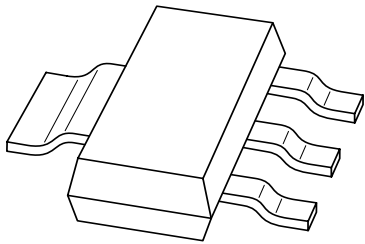


# DATA SHEET



## **BZV90 series** Voltage regulator diodes

Product data sheet  
Supersedes data of 1996 Oct 25

1999 May 17

# Voltage regulator diodes

# BZV90 series

### FEATURES

- Total power dissipation: max. 1500 mW
- Tolerance series: approx. ±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.

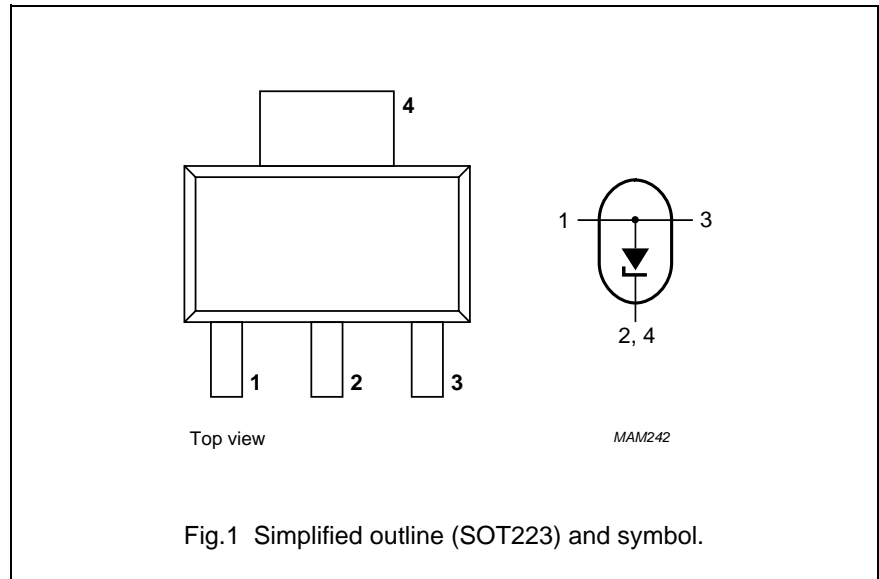
### DESCRIPTION

Medium-power voltage regulator diodes in SOT223 plastic SMD packages.

The diodes are available in the normalized E24 approx. ±5% tolerance range. The series consists of 37 types with nominal working voltages from 2.4 to 75 V (BZV90-C2V4 to C75).

### PINNING

| PIN  | DESCRIPTION |
|------|-------------|
| 1    | anode       |
| 2, 4 | cathode     |
| 3    | anode       |



### LIMITING VALUES

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

| SYMBOL    | PARAMETER                                     | CONDITIONS  | MIN.                 | MAX. | UNIT             |
|-----------|---|---|----------------------|------|------------------|
| $I_F$     | continuous forward current                    |   | –                    | 400  | mA               |
| $I_{ZSM}$ | non-repetitive peak reverse current           | $t_p = 100 \mu s$ ; square wave;<br>$T_j = 25 \text{ }^\circ\text{C}$ prior to surge            | see Table "Per type" |      |                  |
| $P_{tot}$ | total power dissipation                       | $T_{amb} = 25 \text{ }^\circ\text{C}$ ; note 1  | –                    | 1500 | mW               |
| $P_{ZSM}$ | non-repetitive peak reverse power dissipation | $t_p = 100 \mu s$ ; square wave;<br>$T_j = 25 \text{ }^\circ\text{C}$ prior to surge; see Fig.2 | –                    | 40   | W                |
| $T_{stg}$ | storage temperature                           |   | –65                  | +150 | $^\circ\text{C}$ |
| $T_j$     | junction temperature                          |   | –                    | 150  | $^\circ\text{C}$ |

### Note

1. Device mounted on an FR4 double-sided copper-clad printed circuit-board; copper area = 2 cm<sup>2</sup>.

### ELECTRICAL CHARACTERISTICS

#### Total series

$T_j = 25 \text{ }^\circ\text{C}$  unless otherwise specified.

| SYMBOL | PARAMETER       | CONDITIONS                        | MIN. | MAX. | UNIT |
|--------|-----------------|-----------------------------------|------|------|------|
| $V_F$  | forward voltage | $I_F = 50 \text{ mA}$ ; see Fig.3 | –    | 1.0  | V    |

## Voltage regulator diodes

## BZV90 series

## Per type

$T_j = 25\text{ °C}$  unless otherwise specified.

| BZV90-<br>CXXX | WORKING VOLTAGE<br>$V_Z$ (V)<br>at $I_{Ztest}$ |      | DIFFERENTIAL RESISTANCE<br>$r_{dif}$ ( $\Omega$ )<br>at $I_{Ztest}$ |      | TEMP. COEFF.<br>$S_Z$ (mV/K)<br>at $I_{Ztest}$<br>see Figs 4 and 5 |      |      | TEST CURRENT<br>$I_{Ztest}$ (mA) | DIODE CAP.<br>$C_d$ (pF)<br>at $f = 1\text{ MHz}$ ;<br>at $V_R = 0\text{ V}$ | REVERSE CURRENT at REVERSE VOLTAGE |           | NON-REPETITIVE PEAK REVERSE CURRENT<br>$I_{ZSM}$ (A)<br>at $t_p = 100\ \mu\text{s}$ ;<br>$T_{amb} = 25\text{ °C}$ |
|----------------|--|------|---|------|--|------|------|----------------------------------|--|------------------------------------|-----------|---|
|                | MIN.   | MAX. | TYP.  | MAX. | MIN.   | TYP. | MAX. |                                  |  | $I_R$ ( $\mu\text{A}$ )            | $V_R$ (V) |   |
|                |  |      |   |      |  |      |      |                                  |  | MAX.                               | MAX.      |   |
| 2V4            | 2.2  | 2.6  | 70  | 100  | -3.5   | -1.6 | 0    | 5                                | 450  | 50                                 | 1.0       | 6.0   |
| 2V7            | 2.5  | 2.9  | 75  | 100  | -3.5   | -2.0 | 0    | 5                                | 450  | 20                                 | 1.0       | 6.0   |
| 3V0            | 2.8  | 3.2  | 80  | 95   | -3.5   | -2.1 | 0    | 5                                | 450  | 10                                 | 1.0       | 6.0   |
| 3V3            | 3.1  | 3.5  | 85  | 95   | -3.5   | -2.4 | 0    | 5                                | 450  | 5                                  | 1.0       | 6.0   |
| 3V6            | 3.4  | 3.8  | 85  | 90   | -3.5   | -2.4 | 0    | 5                                | 450  | 5                                  | 1.0       | 6.0   |
| 3V9            | 3.7  | 4.1  | 85  | 90   | -3.5   | -2.5 | 0    | 5                                | 450  | 3                                  | 1.0       | 6.0   |
| 4V3            | 4.0  | 4.6  | 80  | 90   | -3.5   | -2.5 | 0    | 5                                | 450  | 3                                  | 1.0       | 6.0   |
| 4V7            | 4.4  | 5.0  | 50  | 80   | -3.5   | -1.4 | 0.2  | 5                                | 300  | 3                                  | 2.0       | 6.0   |
| 5V1            | 4.8  | 5.4  | 40  | 60   | -2.7   | -0.8 | 1.2  | 5                                | 300  | 2                                  | 2.0       | 6.0   |
| 5V6            | 5.2  | 6.0  | 15  | 40   | -2.0   | 1.2  | 2.5  | 5                                | 300  | 1                                  | 2.0       | 6.0   |
| 6V2            | 5.8  | 6.6  | 6   | 10   | 0.4  | 2.3  | 3.7  | 5                                | 200  | 3                                  | 4.0       | 6.0   |
| 6V8            | 6.4  | 7.2  | 6   | 15   | 1.2  | 3.0  | 4.5  | 5                                | 200  | 2                                  | 4.0       | 6.0   |
| 7V5            | 7.0  | 7.9  | 6   | 15   | 2.5  | 4.0  | 5.3  | 5                                | 150  | 1                                  | 5.0       | 4.0   |
| 8V2            | 7.7  | 8.7  | 6   | 15   | 3.2  | 4.6  | 6.2  | 5                                | 150  | 0.7                                | 5.0       | 4.0   |
| 9V1            | 8.5  | 9.6  | 6   | 15   | 3.8  | 5.5  | 7.0  | 5                                | 150  | 0.5                                | 6.0       | 3.0   |
| 10             | 9.4  | 10.6 | 8   | 20   | 4.5  | 6.4  | 8.0  | 5                                | 90   | 0.2                                | 7.0       | 3.0   |
| 11             | 10.4   | 11.6 | 10  | 20   | 5.4  | 7.4  | 9.0  | 5                                | 85   | 0.1                                | 8.0       | 2.5   |
| 12             | 11.4   | 12.7 | 10  | 25   | 6.0  | 8.4  | 10.0 | 5                                | 85   | 0.1                                | 8.0       | 2.5   |
| 13             | 12.4   | 14.1 | 10  | 30   | 7.0  | 9.4  | 11.0 | 5                                | 80   | 0.1                                | 8.0       | 2.5   |
| 15             | 13.8   | 15.6 | 10  | 30   | 9.2  | 11.4 | 13.0 | 5                                | 75   | 0.05                               | 10.5      | 2.0   |
| 16             | 15.3   | 17.1 | 10  | 40   | 10.4   | 12.4 | 14.0 | 5                                | 75   | 0.05                               | 11.2      | 1.5   |
| 18             | 16.8   | 19.1 | 10  | 45   | 12.4   | 14.4 | 16.0 | 5                                | 70   | 0.05                               | 12.6      | 1.5   |
| 20             | 18.8   | 21.2 | 15  | 55   | 14.4   | 16.4 | 18.0 | 5                                | 60   | 0.05                               | 14.0      | 1.5   |

## Voltage regulator diodes

## BZV90 series

| BZV90-<br>CXXX | WORKING VOLTAGE<br>$V_Z$ (V)<br>at $I_{Ztest}$ |      | DIFFERENTIAL RESISTANCE<br>$r_{dif}$ ( $\Omega$ )<br>at $I_{Ztest}$ |      | TEMP. COEFF.<br>$S_Z$ (mV/K)<br>at $I_{Ztest}$<br>see Figs 4 and 5 |      |      | TEST CURRENT<br>$I_{Ztest}$ (mA) | DIODE CAP.<br>$C_d$ (pF)<br>at $f = 1$ MHz;<br>at $V_R = 0$ V | REVERSE CURRENT at REVERSE VOLTAGE |       | NON-REPETITIVE PEAK REVERSE CURRENT<br>$I_{ZSM}$ (A)<br>at $t_p = 100 \mu s$ ;<br>$T_{amb} = 25^\circ C$ |
|----------------|--|------|---|------|--|------|------|----------------------------------|---|------------------------------------|-------|--|
|                | MIN.   | MAX. | TYP.  | MAX. | MIN.   | TYP. | MAX. |                                  |   | $I_R$ ( $\mu A$ )                  | $V_R$ |  |
|                |  |      |   |      |  |      |      |                                  |   | MAX.                               | (V)   |  |
| 22             | 20.8   | 23.3 | 20  | 55   | 16.4   | 18.4 | 20.0 | 5                                | 60  | 0.05                               | 15.4  | 1.25   |
| 24             | 22.8   | 25.6 | 25  | 70   | 18.4   | 20.4 | 22.0 | 5                                | 55  | 0.05                               | 16.8  | 1.25   |
| 27             | 25.0   | 28.9 | 25  | 80   | 21.4   | 23.4 | 25.3 | 2                                | 50  | 0.05                               | 18.9  | 1.0  |
| 30             | 28.0   | 32.0 | 30  | 80   | 24.4   | 26.6 | 29.4 | 2                                | 50  | 0.05                               | 21.0  | 1.0  |
| 33             | 31.0   | 35.0 | 35  | 80   | 27.4   | 29.7 | 33.4 | 2                                | 45  | 0.05                               | 23.1  | 0.9  |
| 36             | 34.0   | 38.0 | 35  | 90   | 30.4   | 33.0 | 37.4 | 2                                | 45  | 0.05                               | 25.2  | 0.8  |
| 39             | 37.0   | 41.0 | 40  | 130  | 33.4   | 36.4 | 41.2 | 2                                | 45  | 0.05                               | 27.3  | 0.7  |
| 43             | 40.0   | 46.0 | 45  | 150  | 37.6   | 41.2 | 46.6 | 2                                | 40  | 0.05                               | 30.1  | 0.6  |
| 47             | 44.0   | 50.0 | 50  | 170  | 42.0   | 46.1 | 51.8 | 2                                | 40  | 0.05                               | 32.9  | 0.5  |
| 51             | 48.0   | 54.0 | 60  | 180  | 46.6   | 51.0 | 57.2 | 2                                | 40  | 0.05                               | 35.7  | 0.4  |
| 56             | 52.0   | 60.0 | 70  | 200  | 52.2   | 57.0 | 63.8 | 2                                | 40  | 0.05                               | 39.2  | 0.3  |
| 62             | 58.0   | 66.0 | 80  | 215  | 58.8   | 64.4 | 71.6 | 2                                | 35  | 0.05                               | 43.4  | 0.3  |
| 68             | 64.0   | 72.0 | 90  | 240  | 65.6   | 71.7 | 79.8 | 2                                | 35  | 0.05                               | 47.6  | 0.25   |
| 75             | 70.0   | 79.0 | 95  | 255  | 73.4   | 80.2 | 88.6 | 2                                | 35  | 0.05                               | 52.5  | 0.2  |

Voltage regulator diodes

BZV90 series

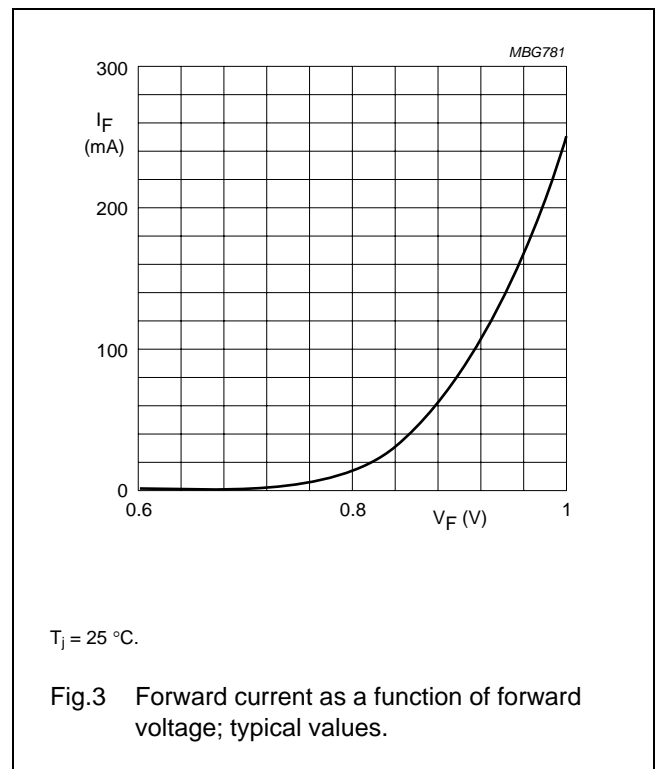
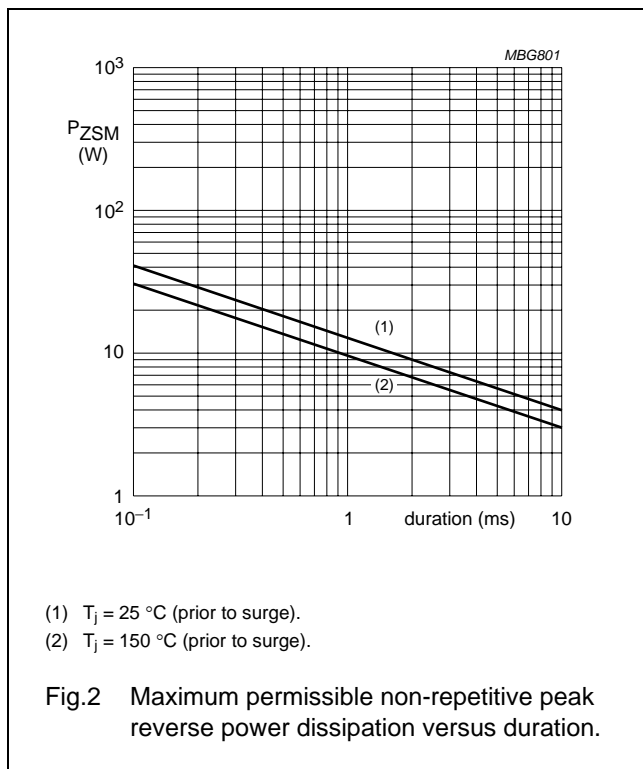
**THERMAL CHARACTERISTICS**

| SYMBOL        | PARAMETER                                   | CONDITIONS               | VALUE | UNIT |
|---------------|---|--------------------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | lead length max.; note 1 | 83.3  | K/W  |

**Note**

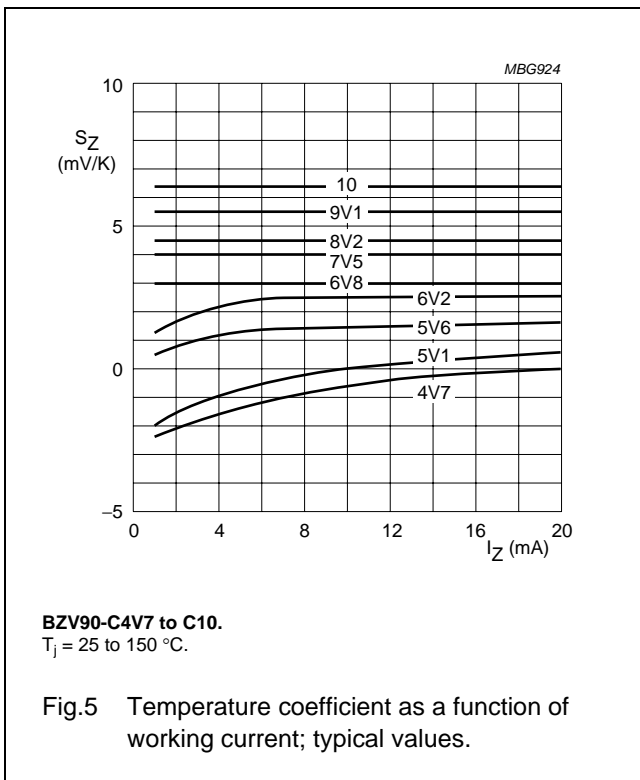
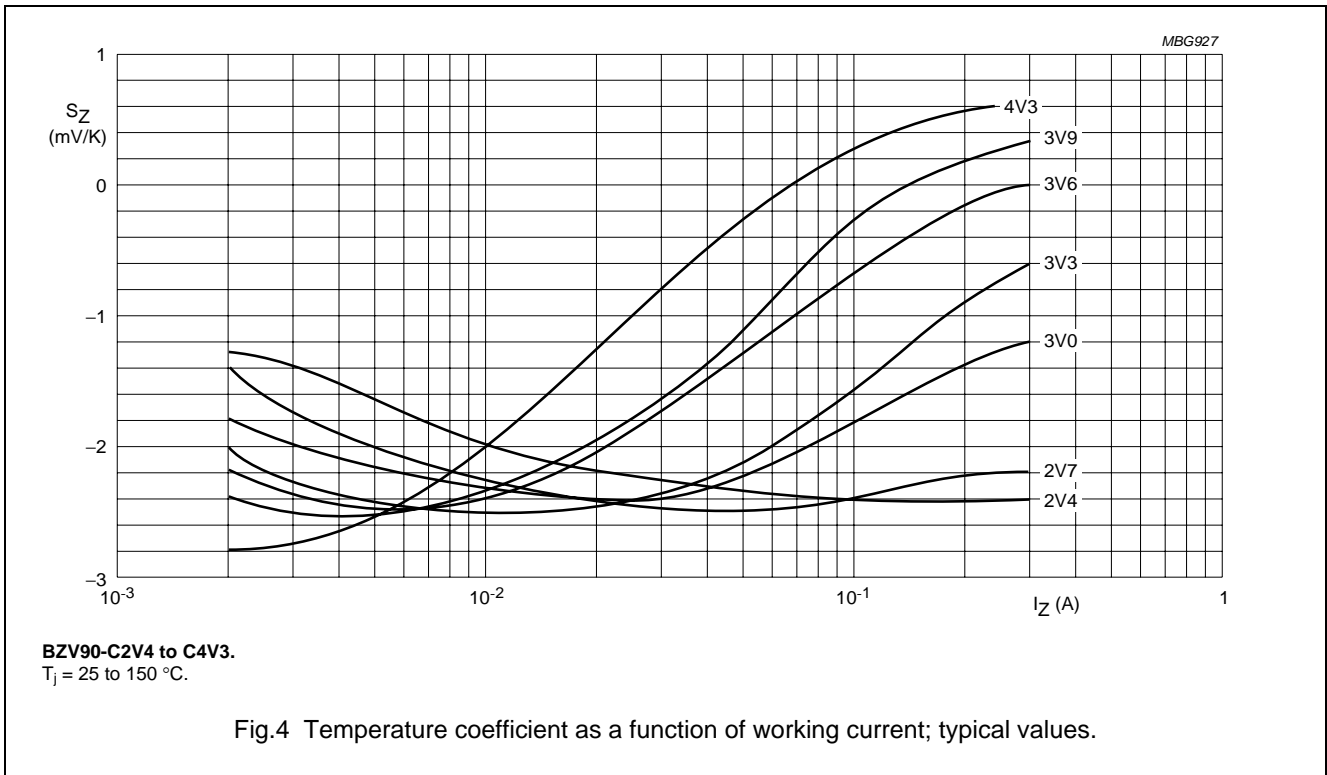
1. Device mounted on an FR4 double-sided copper-clad printed circuit-board; copper area = 2 cm<sup>2</sup>.

**GRAPHICAL DATA**



Voltage regulator diodes

BZV90 series



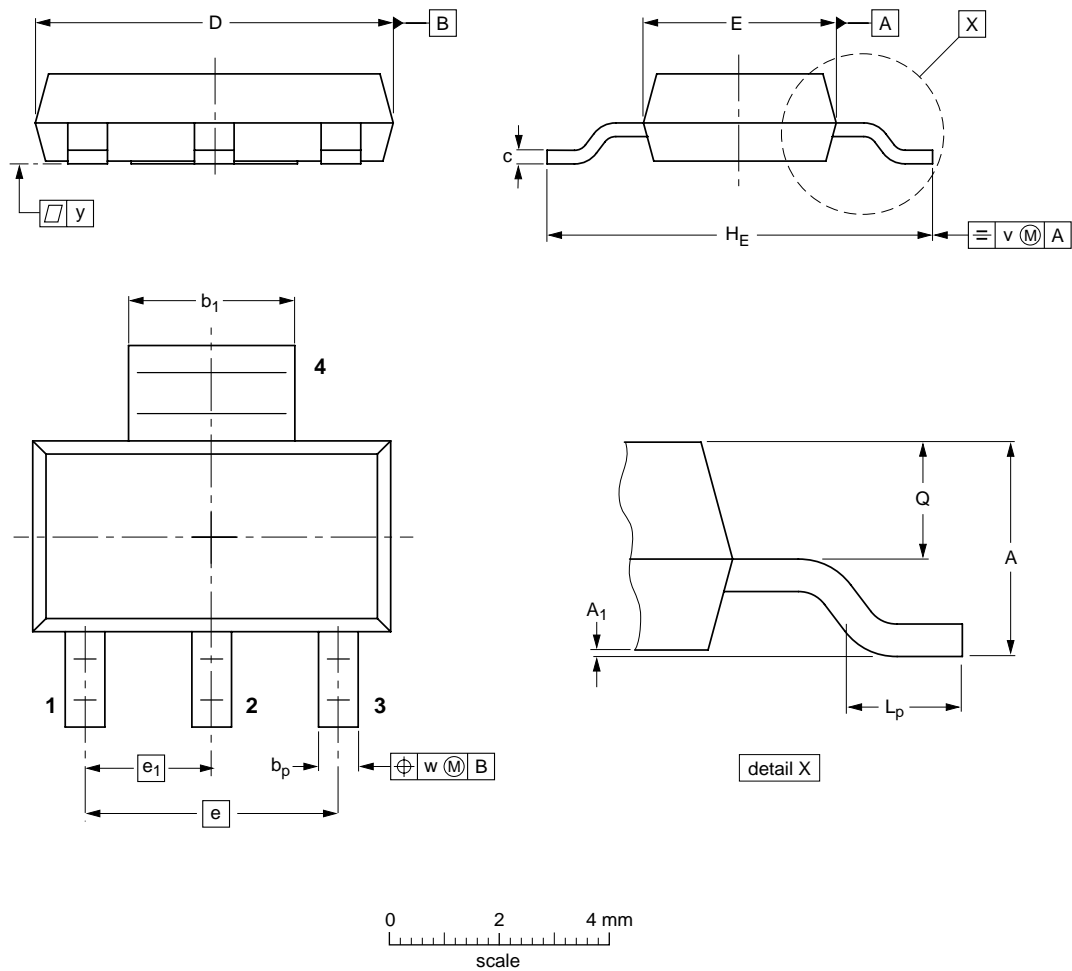
Voltage regulator diodes

BZV90 series

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 4 leads

SOT223



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub> | b <sub>p</sub> | b <sub>1</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   | y   |
|------|------------|----------------|----------------|----------------|--------------|------------|------------|-----|----------------|----------------|----------------|--------------|-----|-----|-----|
| mm   | 1.8<br>1.5 | 0.10<br>0.01   | 0.80<br>0.60   | 3.1<br>2.9     | 0.32<br>0.22 | 6.7<br>6.3 | 3.7<br>3.3 | 4.6 | 2.3            | 7.3<br>6.7     | 1.1<br>0.7     | 0.95<br>0.85 | 0.2 | 0.1 | 0.1 |

| OUTLINE VERSION | REFERENCES |       |       |  | EUROPEAN PROJECTION | ISSUE DATE           |
|-----------------|------------|-------|-------|--|---------------------|----------------------|
|                 | IEC        | JEDEC | EIAJ  |  |                     |                      |
| SOT223          |            |       | SC-73 |  |                     | 97-02-28<br>99-09-13 |

## Voltage regulator diodes

## BZV90 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.                                     |

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