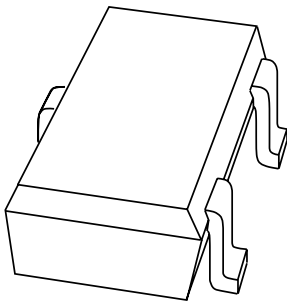


# DATA SHEET



## **BZB784 series** Voltage regulator double diodes

Product specification

2000 May 24

# Voltage regulator double diodes

# BZB784 series

### FEATURES

- Total power dissipation: max. 350 mW
- Approx. 5%  $V_Z$  tolerance
- Working voltage range: nom. 2.4 to 15 V (E24 range).

### APPLICATIONS

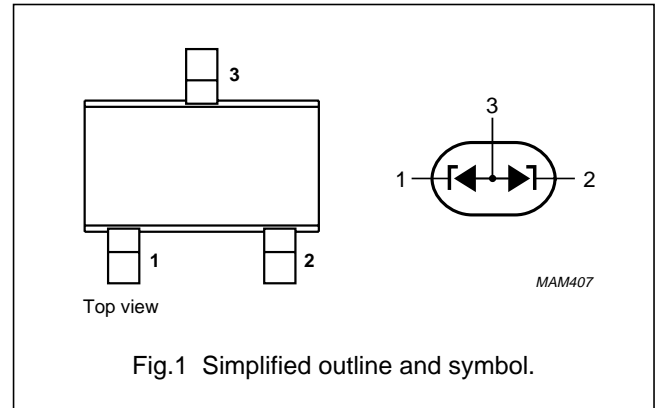
- General regulation functions
- ESD and surge protection.

### DESCRIPTION

Low-power voltage regulator diodes in a small SOT323 (SC-70) package.

### PINNING SOT323 (SC-70)

| PIN | DESCRIPTION  |
|-----|--------------|
| 1   | cathode      |
| 2   | cathode      |
| 3   | common anode |



### MARKING

| TYPE NUMBER | MARKING CODE | TYPE NUMBER | MARKING CODE | TYPE NUMBER | MARKING CODE | TYPE NUMBER | MARKING CODE |
|-------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|
| BZB784-C2V4 | 91           | BZB784-C3V9 | 96           | BZB784-C6V2 | 9B           | BZB784-C10  | 9G           |
| BZB784-C2V7 | 92           | BZB784-C4V3 | 97           | BZB784-C6V8 | 9C           | BZB784-C11  | 9H           |
| BZB784-C3V0 | 93           | BZB784-C4V7 | 98           | BZB784-C7V5 | 9D           | BZB784-C12  | 9J           |
| BZB784-C3V3 | 94           | BZB784-C5V1 | 99           | BZB784-C8V2 | 9E           | BZB784-C13  | 9K           |
| BZB784-C3V6 | 95           | BZB784-C5V6 | 9A           | BZB784-C9V1 | 9F           | BZB784-C15  | 9L           |

### LIMITING VALUES

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

| SYMBOL    | PARAMETER                               | CONDITIONS   | MIN.        | MAX. | UNIT             |
|-----------|---|--|-------------|------|------------------|
| $I_F$     | continuous forward current              |  | –           | 200  | mA               |
| $I_{ZSM}$ | non-repetitive peak reverse current     | $t_p = 100 \mu s$ ; square wave;<br>$T_{amb} = 25 \text{ }^\circ\text{C}$ ; prior to surge | see Table 1 |      |                  |
| $P_{tot}$ | total power dissipation; note 1         | $T_{amb} = 25 \text{ }^\circ\text{C}$ ; 2 diodes loaded                                    | –           | 350  | mW               |
|           |   | $T_{amb} = 25 \text{ }^\circ\text{C}$ ; 1 diode loaded                                     | –           | 180  | mW               |
| $P_{ZSM}$ | non-repetitive peak reverse dissipation | $t_p = 100 \mu s$ ; square wave;<br>$T_{amb} = 25 \text{ }^\circ\text{C}$ ; prior to surge | –           | 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 printed-circuit board.

## Voltage regulator double diodes

## BZB784 series

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER   | CONDITIONS              | VALUE | UNIT |
|---------------|---|-------------------------|-------|------|
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point | 2 diodes loaded; note 1 | 140   | K/W  |
|               |   | 1 diode loaded; note 1  | 265   | K/W  |
| $R_{th\ j-a}$ | thermal resistance from junction to ambient         | 2 diodes loaded; note 2 | 355   | K/W  |
|               |   | 1 diode loaded; note 2  | 680   | K/W  |

## Notes

- Solder points on cathode tabs.
- Device mounted on a FR4 printed-circuit board.

## ELECTRICAL CHARACTERISTICS

## Total BZB784-C series

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

| SYMBOL     | PARAMETER             | CONDITIONS                       | MAX. | UNIT          |
|------------|-----------------------|----------------------------------|------|---------------|
| $V_F$      | forward voltage       | $I_F = 10\text{ mA}$ ; see Fig.2 | 0.9  | V             |
| $I_R$      | reverse current       |                                  |      |               |
|            | BZB784-C2V4           | $V_R = 1\text{ V}$               | 50   | $\mu\text{A}$ |
|            | BZB784-C2V7           | $V_R = 1\text{ V}$               | 20   | $\mu\text{A}$ |
|            | BZB784-C3V0           | $V_R = 1\text{ V}$               | 10   | $\mu\text{A}$ |
|            | BZB784-C3V3           | $V_R = 1\text{ V}$               | 5    | $\mu\text{A}$ |
|            | BZB784-C3V6           | $V_R = 1\text{ V}$               | 5    | $\mu\text{A}$ |
|            | BZB784-C3V9           | $V_R = 1\text{ V}$               | 3    | $\mu\text{A}$ |
|            | BZB784-C4V3           | $V_R = 1\text{ V}$               | 3    | $\mu\text{A}$ |
|            | BZB784-C4V7           | $V_R = 2\text{ V}$               | 3    | $\mu\text{A}$ |
|            | BZB784-C5V1           | $V_R = 2\text{ V}$               | 2    | $\mu\text{A}$ |
|            | BZB784-C5V6           | $V_R = 2\text{ V}$               | 1    | $\mu\text{A}$ |
|            | BZB784-C6V2           | $V_R = 4\text{ V}$               | 3    | $\mu\text{A}$ |
|            | BZB784-C6V8           | $V_R = 4\text{ V}$               | 2    | $\mu\text{A}$ |
|            | BZB784-C7V5           | $V_R = 5\text{ V}$               | 1    | $\mu\text{A}$ |
|            | BZB784-C8V2           | $V_R = 5\text{ V}$               | 700  | nA            |
|            | BZB784-C9V1           | $V_R = 6\text{ V}$               | 500  | nA            |
|            | BZB784-C10            | $V_R = 7\text{ V}$               | 200  | nA            |
|            | BZB784-C11            | $V_R = 8\text{ V}$               | 100  | nA            |
|            | BZB784-C12            | $V_R = 8\text{ V}$               | 100  | nA            |
| BZB784-C13 | $V_R = 8\text{ V}$    | 100                              | nA   |               |
| BZB784-C15 | $V_R = 10.5\text{ V}$ | 50                               | nA   |               |

## Voltage regulator double diodes

## BZB784 series

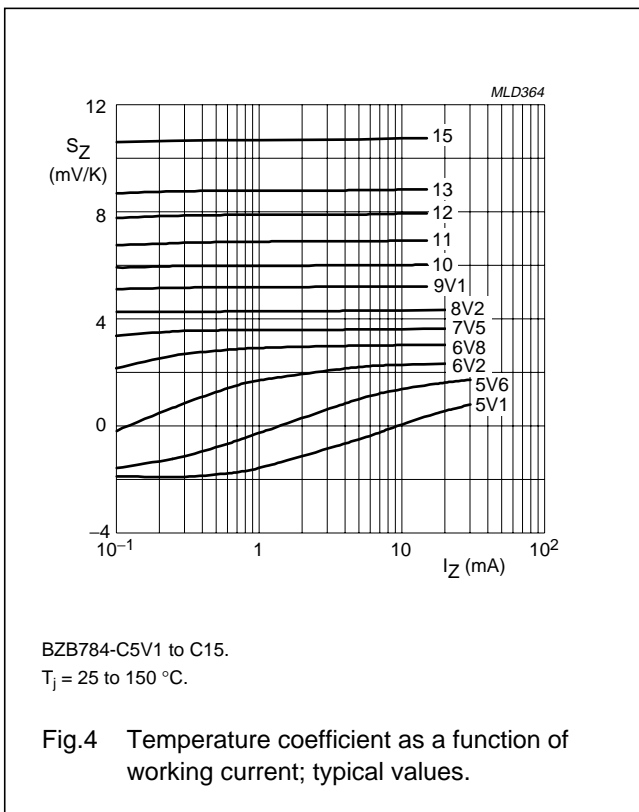
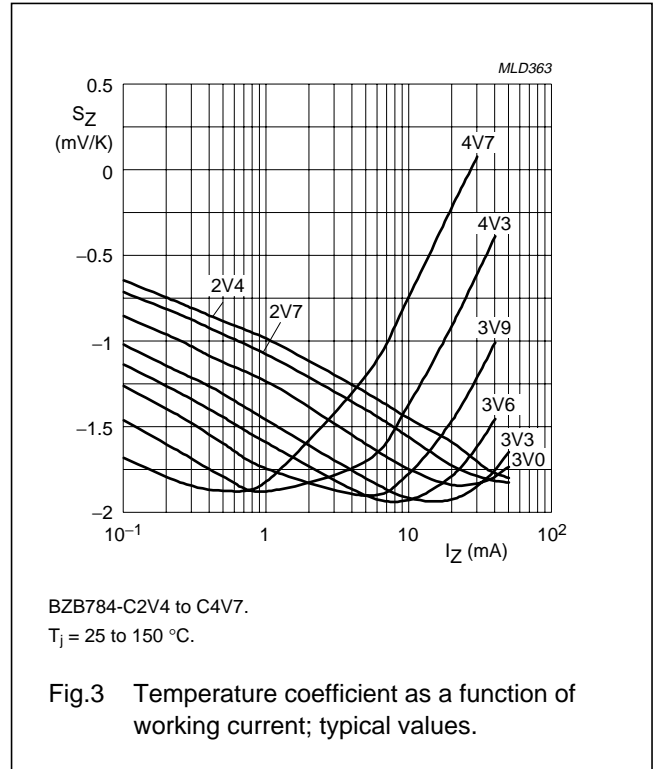
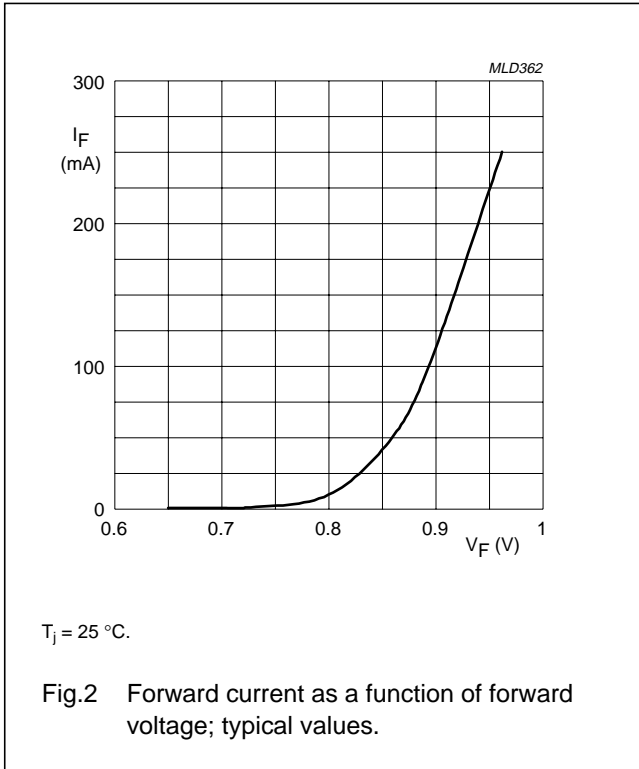
**Table 1** Per type BZB784-C2V4 to C15 $T_j = 25\text{ °C}$  unless otherwise specified.

| BZB78-C<br>XXX | WORKING VOLTAGE<br>$V_Z$ (V)<br>at $I_Z = 5\text{ mA}$ |      | DIFFERENTIAL RESISTANCE<br>$r_{\text{dif}}$ ( $\Omega$ ) |      |                        |      | TEMP.<br>COEFFICIENT<br>$S_Z$ (mV/K)<br>at $I_{Z\text{test}} = 5\text{ mA}$<br>(see Figs 3 and 4) | 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) at $t_p = 100\text{ }\mu\text{s}$ ;<br>$T_{\text{amb}} = 25\text{ °C}$ |
|----------------|--|------|--|------|------------------------|------|---|---|--|
|                | Tol. $\approx 5\%$                                     |      | at $I_Z = 1\text{ mA}$                                   |      | at $I_Z = 5\text{ mA}$ |      |   |   |  |
|                | MIN.   | MAX. | TYP.   | MAX. | TYP.                   | MAX. |   |   |  |
| 2V4            | 2.2  | 2.6  | 275  | 600  | 70                     | 100  | -1.3  | 450   | 6.0  |
| 2V7            | 2.5  | 2.9  | 300  | 600  | 75                     | 100  | -1.4  | 450   | 6.0  |
| 3V0            | 2.8  | 3.2  | 325  | 600  | 80                     | 95   | -1.6  | 450   | 6.0  |
| 3V3            | 3.1  | 3.5  | 350  | 600  | 85                     | 95   | -1.8  | 450   | 6.0  |
| 3V6            | 3.4  | 3.8  | 375  | 600  | 85                     | 90   | -1.9  | 450   | 6.0  |
| 3V9            | 3.7  | 4.1  | 400  | 600  | 85                     | 90   | -1.9  | 450   | 6.0  |
| 4V3            | 4.0  | 4.6  | 410  | 600  | 80                     | 90   | -1.7  | 450   | 6.0  |
| 4V7            | 4.4  | 5.0  | 425  | 500  | 50                     | 80   | -1.2  | 300   | 6.0  |
| 5V1            | 4.8  | 5.4  | 400  | 480  | 40                     | 60   | -0.5  | 300   | 6.0  |
| 5V6            | 5.2  | 6.0  | 80   | 400  | 15                     | 40   | 1.0   | 300   | 6.0  |
| 6V2            | 5.8  | 6.6  | 40   | 150  | 6                      | 10   | 2.2   | 200   | 6.0  |
| 6V8            | 6.4  | 7.2  | 30   | 80   | 6                      | 15   | 3.0   | 200   | 6.0  |
| 7V5            | 7.0  | 7.9  | 30   | 80   | 6                      | 15   | 3.6   | 150   | 4.0  |
| 8V2            | 7.7  | 8.7  | 40   | 80   | 6                      | 15   | 4.3   | 150   | 4.0  |
| 9V1            | 8.5  | 9.6  | 40   | 100  | 6                      | 15   | 5.2   | 150   | 3.0  |
| 10             | 9.4  | 10.6 | 50   | 150  | 8                      | 20   | 6.0   | 90  | 3.0  |
| 11             | 10.4   | 11.6 | 50   | 150  | 10                     | 20   | 6.9   | 90  | 2.5  |
| 12             | 11.4   | 12.7 | 50   | 150  | 10                     | 25   | 7.9   | 85  | 2.5  |
| 13             | 12.4   | 14.1 | 50   | 170  | 10                     | 30   | 8.8   | 80  | 2.5  |
| 15             | 13.8   | 15.6 | 50   | 200  | 10                     | 30   | 10.7  | 75  | 2.0  |

Voltage regulator double diodes

BZB784 series

GRAPHICAL DATA



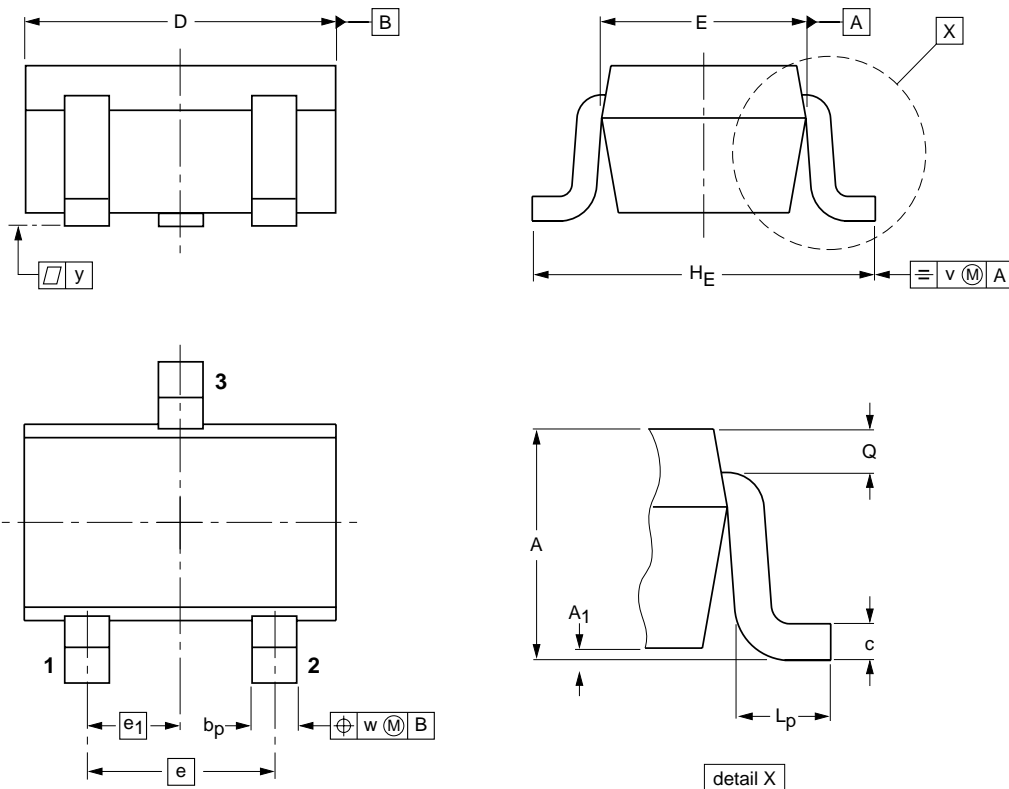
Voltage regulator double diodes

BZB784 series

PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT323



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | A <sub>1</sub><br>max | b <sub>p</sub> | c            | D          | E            | e   | e <sub>1</sub> | H <sub>E</sub> | L <sub>p</sub> | Q            | v   | w   |
|------|------------|-----------------------|----------------|--------------|------------|--------------|-----|----------------|----------------|----------------|--------------|-----|-----|
| mm   | 1.1<br>0.8 | 0.1                   | 0.4<br>0.3     | 0.25<br>0.10 | 2.2<br>1.8 | 1.35<br>1.15 | 1.3 | 0.65           | 2.2<br>2.0     | 0.45<br>0.15   | 0.23<br>0.13 | 0.2 | 0.2 |

| OUTLINE VERSION | REFERENCES |       |       |  | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|-------|--|---------------------|------------|
|                 | IEC        | JEDEC | EIAJ  |  |                     |            |
| SOT323          |            |       | SC-70 |  |                     | 97-02-28   |

## Voltage regulator double diodes

## BZB784 series

## DATA SHEET STATUS

| DATA SHEET STATUS         | PRODUCT STATUS | DEFINITIONS <sup>(1)</sup>   |
|---------------------------|----------------|--|
| Objective specification   | Development    | This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.  |
| Preliminary specification | Qualification  | This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product. |
| Product specification     | Production     | This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.   |

## Note

1. Please consult the most recently issued data sheet before initiating or completing a design.

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**Limiting values definition** — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). 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.

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Printed in The Netherlands

613514/01/pp8

Date of release: 2000 May 24

Document order number: 9397 750 07101

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