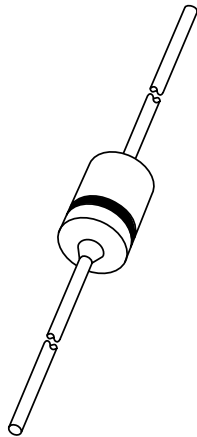


# DATA SHEET



## **BZX55 series** Voltage regulator diodes

Product specification  
Supersedes data of April 1992

1996 Apr 26

## Voltage regulator diodes

## BZX55 series

## FEATURES

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

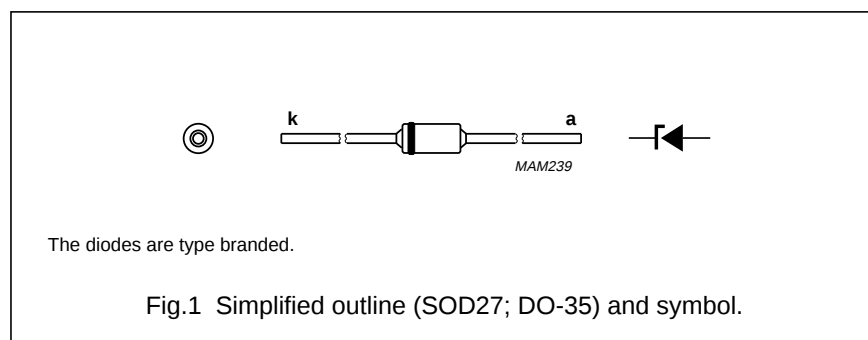
## APPLICATIONS

- 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  $\pm 5\%$  tolerance range. The series consists of 37 types with nominal working voltages from 2.4 to 75 V (BZX55-C2V4 to BZX55-C75).



## LIMITING VALUES

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

| 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 Table<br>“Per type” |      |            |
| $P_{tot}$ | 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  | –                       | 40   | W          |
|           |                                               | $t_p = 8.3 ms$ ; square wave;<br>$T_j \leq 150^\circ C$ prior to surge | –                       | 30   | W          |
| $T_{stg}$ | storage temperature                           |                                                                        | –65                     | +200 | $^\circ C$ |
| $T_j$     | junction temperature                          |                                                                        | –                       | 200  | $^\circ C$ |

## Notes

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

## ELECTRICAL CHARACTERISTICS

## Total series

$T_j = 25^\circ C$ ; unless otherwise specified.

| SYMBOL | PARAMETER       | CONDITIONS                 | MIN. | MAX. | UNIT |
|--------|-----------------|----------------------------|------|------|------|
| $V_F$  | forward voltage | $I_F = 100 mA$ ; see Fig.4 | –    | 1.0  | V    |

## Voltage regulator diodes

## BZX55 series

## Per type

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

| BZX55-<br>CXXX | WORKING<br>VOLTAGE<br>V <sub>Z</sub> (V)<br>at I <sub>Ztest</sub> |      | DIFFERENTIAL<br>RESISTANCE<br>r <sub>dif</sub> (Ω) |                          | TEMP. COEFF.<br>S <sub>Z</sub> (mV/K)<br>at I <sub>Ztest</sub><br>see Figs 5 and 6 | TEST<br>CURRENT<br>I <sub>Ztest</sub> (mA) | DIODE CAP.<br>C <sub>d</sub> (pF)<br>at f = 1 MHz;<br>at V <sub>R</sub> = 0 V | REVERSE CURRENT at<br>REVERSE VOLTAGE<br>I <sub>R</sub> (μA) |                               |                       | NON-REPETITIVE<br>PEAK REVERSE<br>CURRENT<br>I <sub>ZSM</sub> (A)<br>at t <sub>p</sub> = 100 μs;<br>T <sub>amb</sub> = 25 °C |
|----------------|-------------------------------------------------------------------|------|----------------------------------------------------|--------------------------|------------------------------------------------------------------------------------|--------------------------------------------|-------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------|
|                |                                                                   |      | at<br>I <sub>Z</sub>                               | at<br>I <sub>Ztest</sub> |                                                                                    |                                            |                                                                               | at<br>T <sub>j</sub> = 25 °C                                 | at<br>T <sub>j</sub> = 150 °C | V <sub>R</sub><br>(V) |                                                                                                                              |
|                | MIN.                                                              | MAX. | MAX.                                               | MAX.                     | TYP.                                                                               |                                            |                                                                               | MAX.                                                         | MAX.                          |                       |                                                                                                                              |
| 2V4            | 2.28                                                              | 2.56 | 600                                                | 85                       | −1.8                                                                               | 5                                          | 450                                                                           | 50                                                           | 100                           | 1.0                   | 6.0                                                                                                                          |
| 2V7            | 2.5                                                               | 2.9  | 600                                                | 85                       | −1.9                                                                               | 5                                          | 450                                                                           | 10                                                           | 50                            | 1.0                   | 6.0                                                                                                                          |
| 3V0            | 2.8                                                               | 3.2  | 600                                                | 85                       | −2.1                                                                               | 5                                          | 450                                                                           | 4                                                            | 40                            | 1.0                   | 6.0                                                                                                                          |
| 3V3            | 3.1                                                               | 3.5  | 600                                                | 85                       | −2.2                                                                               | 5                                          | 450                                                                           | 2                                                            | 40                            | 1.0                   | 6.0                                                                                                                          |
| 3V6            | 3.4                                                               | 3.8  | 600                                                | 85                       | −2.4                                                                               | 5                                          | 450                                                                           | 2                                                            | 40                            | 1.0                   | 6.0                                                                                                                          |
| 3V9            | 3.7                                                               | 4.1  | 600                                                | 85                       | −2.4                                                                               | 5                                          | 450                                                                           | 2                                                            | 40                            | 1.0                   | 6.0                                                                                                                          |
| 4V3            | 4.0                                                               | 4.6  | 600                                                | 80                       | −2.4                                                                               | 5                                          | 450                                                                           | 1                                                            | 20                            | 1.0                   | 6.0                                                                                                                          |
| 4V7            | 4.4                                                               | 5.0  | 600                                                | 70                       | −1.4                                                                               | 5                                          | 300                                                                           | 0.5                                                          | 10                            | 1.0                   | 6.0                                                                                                                          |
| 5V1            | 4.8                                                               | 5.4  | 550                                                | 50                       | −0.8                                                                               | 5                                          | 300                                                                           | 0.1                                                          | 2                             | 1.0                   | 6.0                                                                                                                          |
| 5V6            | 5.2                                                               | 6.0  | 450                                                | 30                       | 1.6                                                                                | 5                                          | 300                                                                           | 0.1                                                          | 2                             | 1.0                   | 6.0                                                                                                                          |
| 6V2            | 5.8                                                               | 6.6  | 200                                                | 10                       | 2.2                                                                                | 5                                          | 200                                                                           | 0.1                                                          | 2                             | 2.0                   | 6.0                                                                                                                          |
| 6V8            | 6.4                                                               | 7.2  | 150                                                | 8                        | 3.0                                                                                | 5                                          | 200                                                                           | 0.1                                                          | 2                             | 3.0                   | 6.0                                                                                                                          |
| 7V5            | 7.0                                                               | 7.9  | 50                                                 | 7                        | 3.8                                                                                | 5                                          | 150                                                                           | 0.1                                                          | 2                             | 5.0                   | 4.0                                                                                                                          |
| 8V2            | 7.7                                                               | 8.7  | 50                                                 | 7                        | 4.5                                                                                | 5                                          | 150                                                                           | 0.1                                                          | 2                             | 6.15                  | 4.0                                                                                                                          |
| 9V1            | 8.5                                                               | 9.6  | 50                                                 | 10                       | 5.5                                                                                | 5                                          | 150                                                                           | 0.1                                                          | 2                             | 6.8                   | 3.0                                                                                                                          |
| 10             | 9.4                                                               | 10.6 | 70                                                 | 15                       | 6.5                                                                                | 5                                          | 90                                                                            | 0.1                                                          | 2                             | 7.5                   | 3.0                                                                                                                          |
| 11             | 10.4                                                              | 11.6 | 70                                                 | 20                       | 7.7                                                                                | 5                                          | 85                                                                            | 0.1                                                          | 2                             | 8.25                  | 2.5                                                                                                                          |
| 12             | 11.4                                                              | 12.7 | 90                                                 | 20                       | 8.4                                                                                | 5                                          | 85                                                                            | 0.1                                                          | 2                             | 9.0                   | 2.5                                                                                                                          |
| 13             | 12.4                                                              | 14.1 | 110                                                | 26                       | 9.8                                                                                | 5                                          | 80                                                                            | 0.1                                                          | 2                             | 9.75                  | 2.5                                                                                                                          |
| 15             | 13.8                                                              | 15.6 | 110                                                | 30                       | 11.3                                                                               | 5                                          | 75                                                                            | 0.1                                                          | 2                             | 11.25                 | 2.0                                                                                                                          |
| 16             | 15.3                                                              | 17.1 | 170                                                | 40                       | 12.8                                                                               | 5                                          | 75                                                                            | 0.1                                                          | 2                             | 12.0                  | 1.5                                                                                                                          |
| 18             | 16.8                                                              | 19.1 | 170                                                | 50                       | 14.4                                                                               | 5                                          | 70                                                                            | 0.1                                                          | 2                             | 13.5                  | 1.5                                                                                                                          |
| 20             | 18.8                                                              | 21.2 | 220                                                | 55                       | 16.0                                                                               | 5                                          | 60                                                                            | 0.1                                                          | 2                             | 15.0                  | 1.5                                                                                                                          |

## Voltage regulator diodes

## BZX55 series

| BZX55-<br>CXXX | WORKING<br>VOLTAGE<br>$V_Z$ (V)<br>at $I_{Ztest}$ |      | DIFFERENTIAL<br>RESISTANCE<br>$r_{dif}$ ( $\Omega$ ) |      | TEMP. COEFF.<br>$S_Z$ (mV/K)<br>at $I_{Ztest}$<br>see Figs 5 and 6 | TEST<br>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<br>REVERSE VOLTAGE<br>$I_R$ ( $\mu$ A) |      |              | NON-REPETITIVE<br>PEAK REVERSE<br>CURRENT<br>$I_{ZSM}$ (A)<br>at $t_p = 100 \mu$ s;<br>$T_{amb} = 25^\circ\text{C}$ |
|----------------|---------------------------------------------------|------|------------------------------------------------------|------|--------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------|------|--------------|---------------------------------------------------------------------------------------------------------------------|
|                |                                                   |      |                                                      |      |                                                                    |                                     |                                                               |                                                           |      |              |                                                                                                                     |
|                | MIN.                                              | MAX. | MAX.                                                 | MAX. | TYP.                                                               |                                     | MAX.                                                          | MAX.                                                      | MAX. | $V_R$<br>(V) | MAX.                                                                                                                |
| 22             | 20.8                                              | 23.3 | 220                                                  | 55   | 18.7                                                               | 5                                   | 60                                                            | 0.1                                                       | 2    | 16.5         | 1.25                                                                                                                |
| 24             | 22.8                                              | 25.6 | 220                                                  | 80   | 20.4                                                               | 5                                   | 55                                                            | 0.1                                                       | 2    | 18.0         | 1.25                                                                                                                |
| 27             | 25.1                                              | 28.9 | 220                                                  | 80   | 22.9                                                               | 5                                   | 50                                                            | 0.1                                                       | 2    | 20.25        | 1.0                                                                                                                 |
| 30             | 28.0                                              | 32.0 | 220                                                  | 80   | 27.0                                                               | 5                                   | 50                                                            | 0.1                                                       | 2    | 22.25        | 1.0                                                                                                                 |
| 33             | 31.0                                              | 35.0 | 220                                                  | 80   | 29.7                                                               | 5                                   | 45                                                            | 0.1                                                       | 2    | 24.75        | 0.9                                                                                                                 |
| 36             | 34.0                                              | 38.0 | 220                                                  | 80   | 32.4                                                               | 5                                   | 45                                                            | 0.1                                                       | 2    | 27.0         | 0.8                                                                                                                 |
| 39             | 37.0                                              | 41.0 | 500                                                  | 90   | 35.1                                                               | 2.5                                 | 45                                                            | 0.1                                                       | 2    | 29.25        | 0.7                                                                                                                 |
| 43             | 40.0                                              | 46.0 | 600                                                  | 90   | 38.7                                                               | 2.5                                 | 40                                                            | 0.1                                                       | 2    | 32.25        | 0.6                                                                                                                 |
| 47             | 44.0                                              | 50.0 | 700                                                  | 110  | 44.0                                                               | 2.5                                 | 40                                                            | 0.1                                                       | 2    | 35.25        | 0.5                                                                                                                 |
| 51             | 48.0                                              | 54.0 | 700                                                  | 125  | 49.0                                                               | 2.5                                 | 40                                                            | 0.1                                                       | 2    | 38.25        | 0.4                                                                                                                 |
| 56             | 52.0                                              | 60.0 | 1000                                                 | 135  | 55.0                                                               | 2.5                                 | 40                                                            | 0.1                                                       | 2    | 42.0         | 0.3                                                                                                                 |
| 62             | 58.0                                              | 66.0 | 1000                                                 | 150  | 62.0                                                               | 2.5                                 | 35                                                            | 0.1                                                       | 2    | 46.5         | 0.3                                                                                                                 |
| 68             | 64.0                                              | 72.0 | 1000                                                 | 200  | 70.0                                                               | 2.5                                 | 35                                                            | 0.1                                                       | 2    | 51.0         | 0.25                                                                                                                |
| 75             | 70.0                                              | 79.0 | 1500                                                 | 250  | 78.0                                                               | 2.5                                 | 35                                                            | 0.1                                                       | 2    | 56.25        | 0.2                                                                                                                 |

## Note

- For BZX55-C2V4 up to C36  $I_Z = 1$  mA; for C39 up to C75  $I_Z = 0.5$  mA.

Voltage regulator diodes

BZX55 series

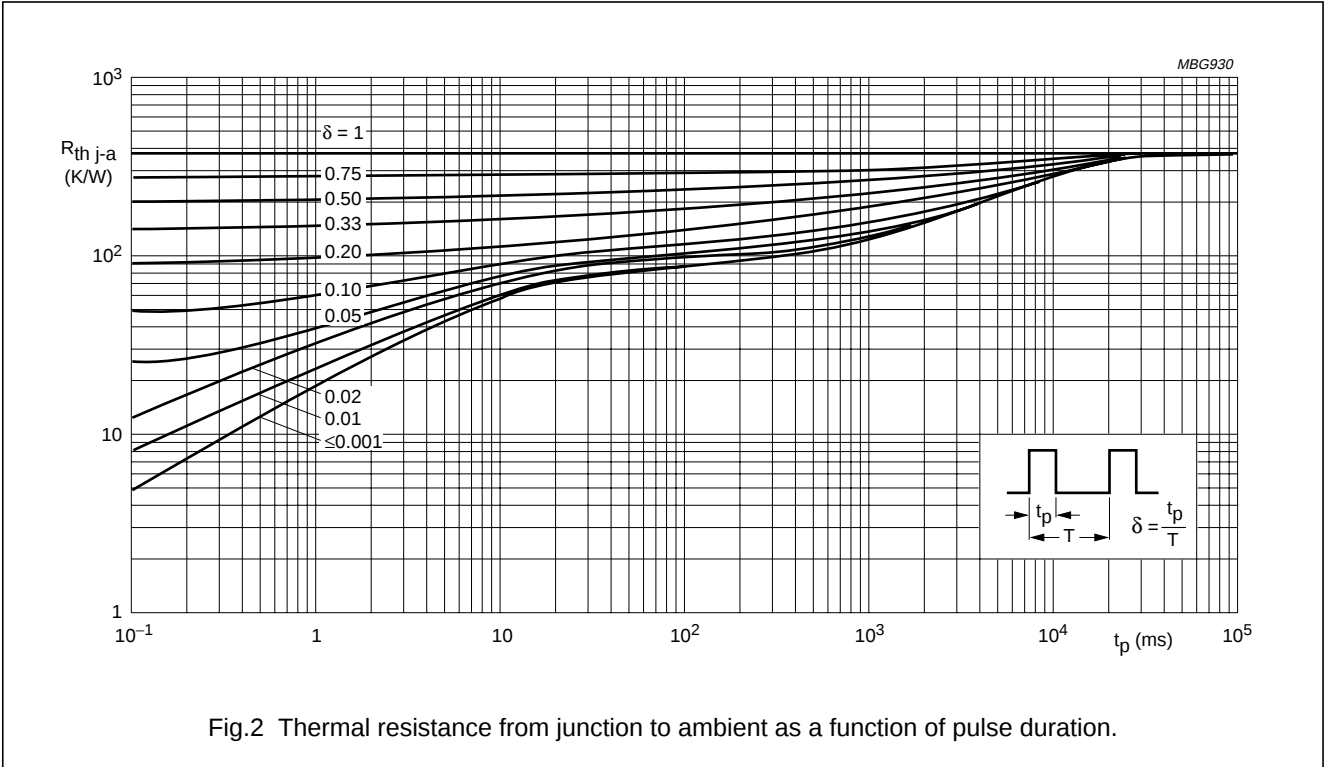
THERMAL CHARACTERISTICS

| 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

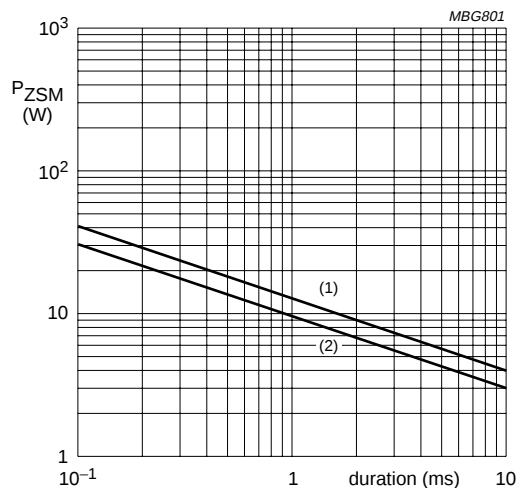
1. Device mounted on a printed circuit-board without metallization pad.

GRAPHICAL DATA



Voltage regulator diodes

BZX55 series



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

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

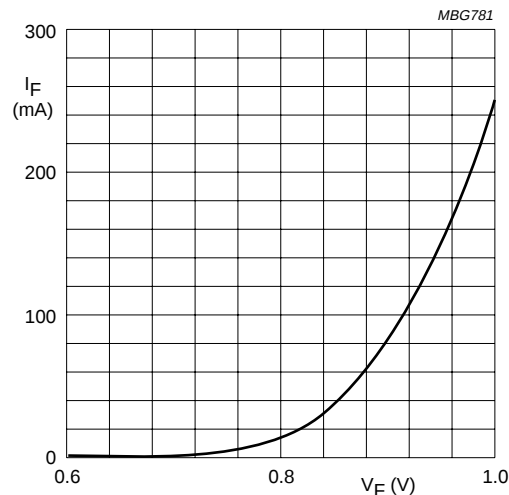
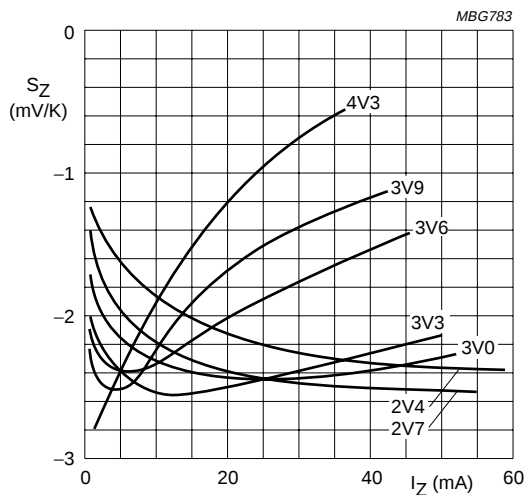
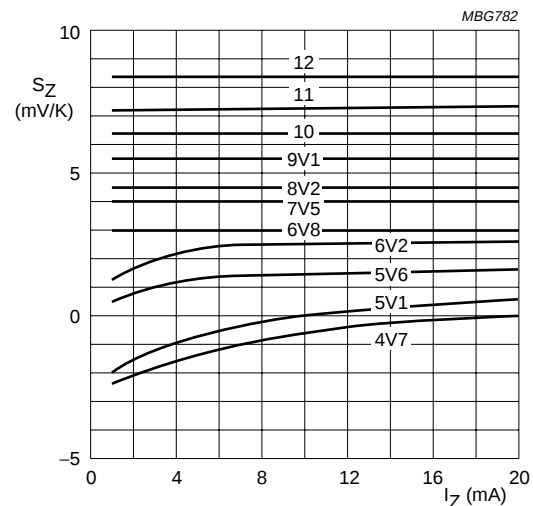


Fig.4 Forward current as a function of forward voltage; typical values.



BZX55-C2V4 to C4V3.  
 $T_j = 25\text{ to }150\text{ }^{\circ}\text{C}$ .

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



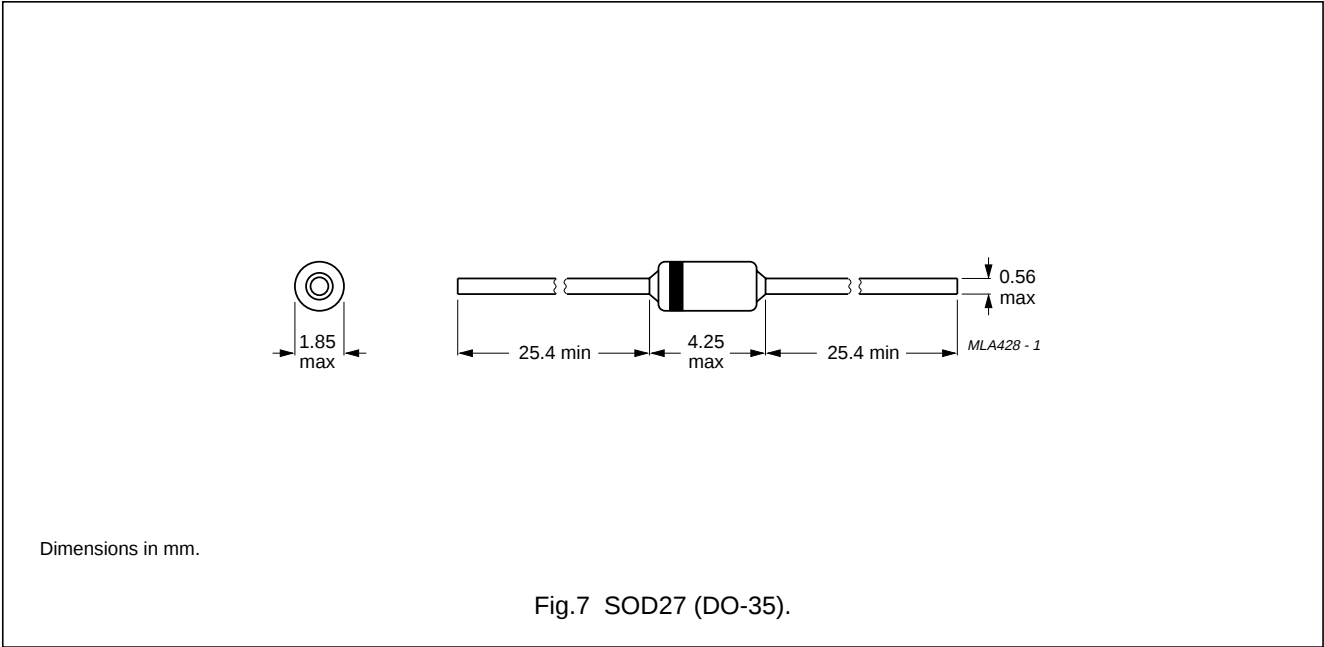
BZX55-C4V7 to C12.  
 $T_j = 25\text{ to }150\text{ }^{\circ}\text{C}$ .

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

Voltage regulator diodes

BZX55 series

PACKAGE OUTLINE



DEFINITIONS

| Data sheet status                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Objective specification                                                                                                                                                                                                                                                                                                                                                                                                                                   | This data sheet contains target or goal specifications for product development.       |
| Preliminary specification                                                                                                                                                                                                                                                                                                                                                                                                                                 | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification                                                                                                                                                                                                                                                                                                                                                                                                                                     | This data sheet contains final product specifications.                                |
| Limiting values                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                       |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). 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. |                                                                                       |
| Application information                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                       |
| Where application information is given, it is advisory and does not form part of the specification.                                                                                                                                                                                                                                                                                                                                                       |                                                                                       |

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.