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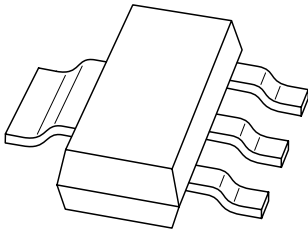
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# DATA SHEET



## **PZT3904** NPN switching transistor

Product specification  
Supersedes data of 1997 Jul 04

1999 Apr 14

# NPN switching transistor

# PZT3904

### FEATURES

- Low current (max. 200 mA)
- Low voltage (max. 40 V).

### APPLICATIONS

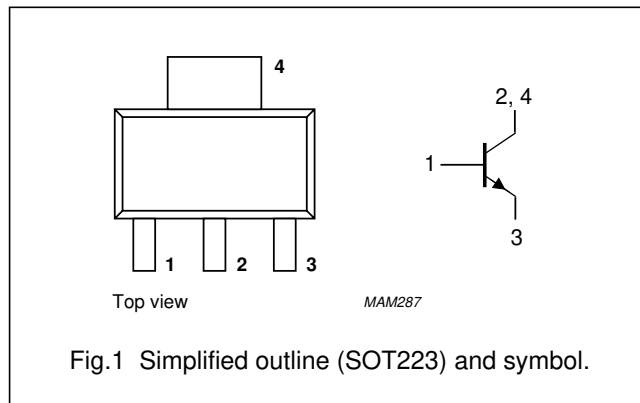
- High-speed saturated switching.

### DESCRIPTION

NPN switching transistor in a SOT223 plastic package.  
PNP complement: PZT3906.

### PINNING

| PIN  | DESCRIPTION |
|------|-------------|
| 1    | base        |
| 2, 4 | collector   |
| 3    | emitter     |



### LIMITING VALUES

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

| SYMBOL    | PARAMETER                     | CONDITIONS                                       | MIN. | MAX. | UNIT             |
|-----------|-------------------------------|--|------|------|------------------|
| $V_{CBO}$ | collector-base voltage        | open emitter                                     | –    | 60   | V                |
| $V_{CEO}$ | collector-emitter voltage     | open base  | –    | 40   | V                |
| $V_{EBO}$ | emitter-base voltage          | open collector                                   | –    | 6    | V                |
| $I_C$     | collector current (DC)        |  | –    | 200  | mA               |
| $I_{CM}$  | peak collector current        |  | –    | 300  | mA               |
| $I_{BM}$  | peak base current             |  | –    | 100  | mA               |
| $P_{tot}$ | total power dissipation       | $T_{amb} \leq 25\text{ }^\circ\text{C}$ ; note 1 | –    | 1.05 | W                |
| $T_{stg}$ | storage temperature           |  | –65  | +150 | $^\circ\text{C}$ |
| $T_j$     | junction temperature          |  | –    | 150  | $^\circ\text{C}$ |
| $T_{amb}$ | operating ambient temperature |  | –65  | +150 | $^\circ\text{C}$ |

### Note

1. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm<sup>2</sup>. For other mounting conditions, see “Thermal considerations for SOT223 in the General Part of associated Handbook”.

## NPN switching transistor

PZT3904

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER   | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient         | note 1     | 117   | K/W  |
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point |            | 36    | K/W  |

## Note

1. Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 1 cm<sup>2</sup>. For other mounting conditions, see "Thermal considerations for SOT223 in the General Part of associated Handbook".

## CHARACTERISTICS

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

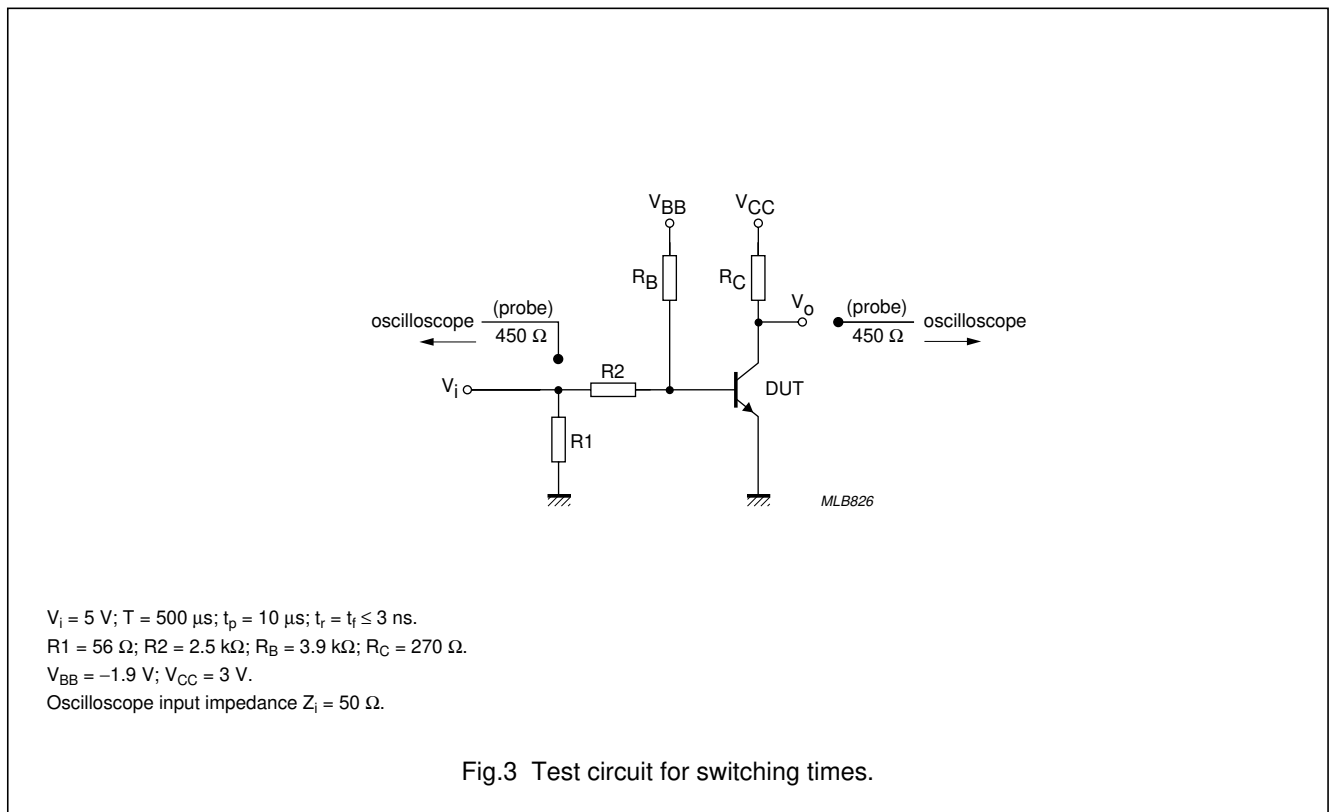
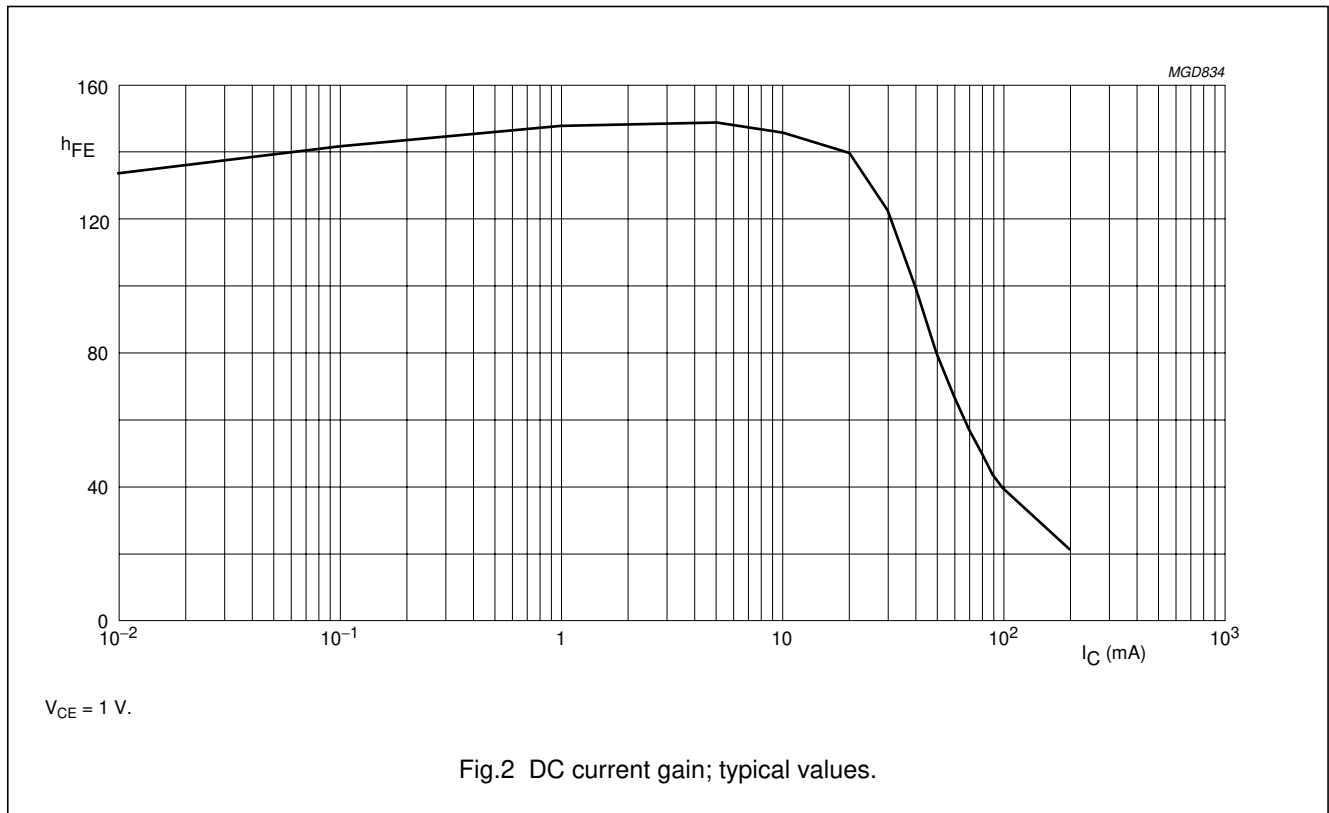
| SYMBOL      | PARAMETER                 | CONDITIONS   | MIN.                        | MAX.                    | UNIT     |
|-------------|---------------------------|--|-----------------------------|-------------------------|----------|
| $I_{CBO}$   | collector cut-off current | $I_E = 0; V_{CB} = 30\text{ V}$  | –                           | 50                      | nA       |
| $I_{EBO}$   | emitter cut-off current   | $I_C = 0; V_{EB} = 6\text{ V}$   | –                           | 50                      | nA       |
| $h_{FE}$    | DC current gain           | $V_{CE} = 1\text{ V}$ ; (see Fig.2)<br>$I_C = 0.1\text{ mA}$<br>$I_C = 1\text{ mA}$<br>$I_C = 10\text{ mA}$<br>$I_C = 50\text{ mA}$<br>$I_C = 100\text{ mA}$ | 60<br>80<br>100<br>60<br>30 | –<br>–<br>300<br>–<br>– |          |
| $V_{CEsat}$ | saturation voltage        | $I_C = 10\text{ mA}; I_B = 1\text{ mA}$<br>$I_C = 50\text{ mA}; I_B = 5\text{ mA}$   | –<br>–                      | 200<br>200              | mV<br>mV |
| $V_{BEsat}$ | saturation voltage        | $I_C = 10\text{ mA}; I_B = 1\text{ mA}$<br>$I_C = 50\text{ mA}; I_B = 5\text{ mA}$   | –<br>–                      | 850<br>950              | mV<br>mV |
| $C_c$       | collector capacitance     | $I_E = i_e = 0; V_{CB} = 5\text{ V}; f = 1\text{ MHz}$   | –                           | 4                       | pF       |
| $C_e$       | emitter capacitance       | $I_C = i_c = 0; V_{EB} = 500\text{ mV}; f = 1\text{ MHz}$  | –                           | 8                       | pF       |
| $f_T$       | transition frequency      | $I_C = 10\text{ mA}; V_{CE} = 20\text{ V}; f = 100\text{ MHz}$   | 300                         | –                       | MHz      |
| F           | noise figure              | $I_C = 100\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; R_S = 1\text{ k}\Omega$ ;<br>$f = 10\text{ Hz to }15.7\text{ kHz}$                                       | –                           | 5                       | dB       |

## Switching times (between 10% and 90% levels); (see Fig.3)

|           |               |  |   |     |    |
|-----------|---------------|--|---|-----|----|
| $t_{on}$  | turn-on time  | $I_{Con} = 10\text{ mA}; I_{Bon} = 1\text{ mA}; I_{Boff} = -1\text{ mA}$ | – | 65  | ns |
| $t_d$     | delay time    |  | – | 35  | ns |
| $t_r$     | rise time     |  | – | 35  | ns |
| $t_{off}$ | turn-off time |  | – | 240 | ns |
| $t_s$     | storage time  |  | – | 200 | ns |
| $t_f$     | fall time     |  | – | 50  | ns |

NPN switching transistor

PZT3904



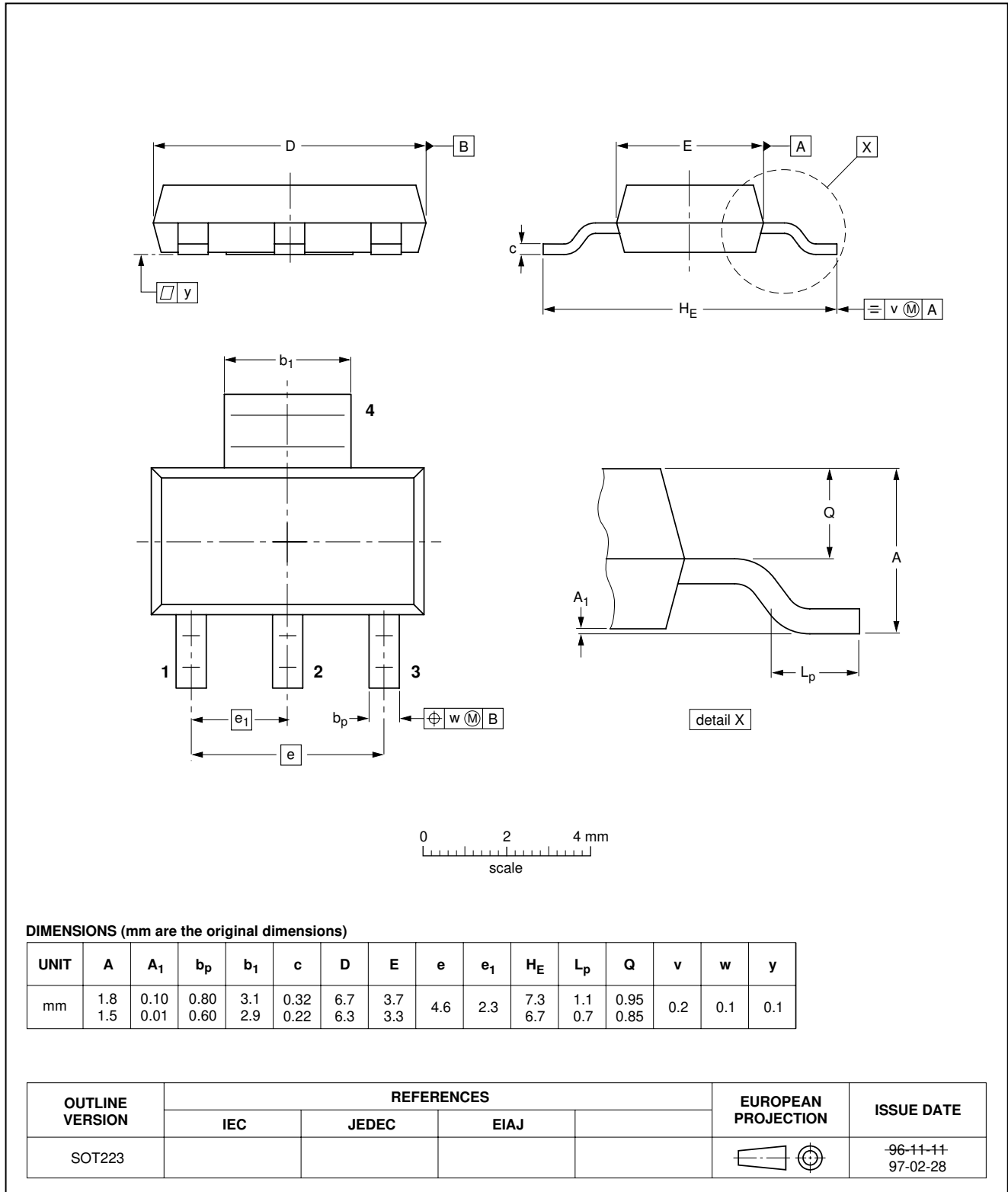
NPN switching transistor

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PACKAGE OUTLINE

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

SOT223



## NPN switching transistor

PZT3904

**DEFINITIONS**

|   |   |
|---|---|
| <b>Data sheet status</b>  |   |
| 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.                                |
| <b>Limiting values</b>  |   |
| 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. |   |
| <b>Application information</b>  |   |
| Where application information is given, it is advisory and does not form part of the specification.   |   |

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NPN switching transistor

PZT3904

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