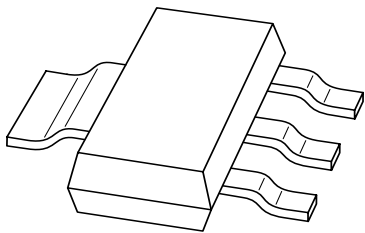


# DATA SHEET



## **BSP31; BSP32; BSP33** PNP medium power transistors

Product data sheet  
Supersedes data of 1997 Apr 08

1999 Apr 26

# PNP medium power transistors

# BSP31; BSP32; BSP33

## FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V).

## APPLICATIONS

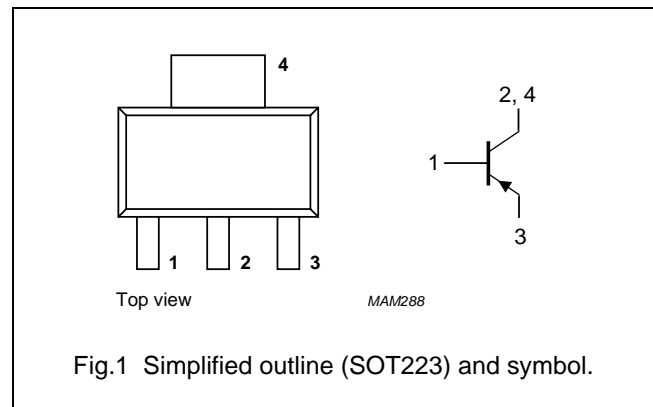
- Telephony and general industrial applications.

## DESCRIPTION

PNP medium power transistor in a SOT223 plastic package. NPN complements: BSP41 and BSP43.

## 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 <sub>CBO</sub> | collector-base voltage        | open emitter                     |      |      |      |
|                  | BSP31                         |                                  | –    | –70  | V    |
|                  | BSP32; BSP33                  |                                  | –    | –90  | V    |
| V <sub>CEO</sub> | collector-emitter voltage     | open base                        |      |      |      |
|                  | BSP31                         |                                  | –    | –60  | V    |
|                  | BSP32; BSP33                  |                                  | –    | –80  | V    |
| V <sub>EBO</sub> | emitter-base voltage          | open collector                   | –    | –5   | V    |
| I <sub>C</sub>   | collector current (DC)        |                                  | –    | –1   | A    |
| I <sub>CM</sub>  | peak collector current        |                                  | –    | –2   | A    |
| I <sub>BM</sub>  | peak base current             |                                  | –    | –200 | mA   |
| P <sub>tot</sub> | total power dissipation       | T <sub>amb</sub> = 25 °C; note 1 | –    | 1.3  | W    |
| T <sub>stg</sub> | storage temperature           |                                  | –65  | +150 | °C   |
| T <sub>j</sub>   | junction temperature          |                                  | –    | 150  | °C   |
| T <sub>amb</sub> | operating ambient temperature |                                  | –65  | +150 | °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”.

## PNP medium power transistors

## BSP31; BSP32; BSP33

## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER   | CONDITIONS | VALUE | UNIT |
|---------------|---|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient         | note 1     | 93    | K/W  |
| $R_{th\ j-s}$ | thermal resistance from junction to soldering point |            | 12    | 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

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

| SYMBOL  | PARAMETER                            | CONDITIONS   | MIN. | MAX. | UNIT          |
|---|--------------------------------------|--|------|------|---------------|
| $I_{CBO}$   | collector cut-off current            | $I_E = 0; V_{CB} = -60\text{ V}$   | –    | –100 | nA            |
|   |                                      | $I_E = 0; V_{CB} = -60\text{ V}; T_j = 150\text{ °C}$                      | –    | –50  | $\mu\text{A}$ |
| $I_{EBO}$   | emitter cut-off current              | $I_C = 0; V_{EB} = -5\text{ V}$  | –    | –100 | nA            |
| $h_{FE}$  | DC current gain<br>BSP32             | $I_C = -100\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; \text{note 1}$       | 10   | –    |               |
|   |                                      | $I_C = -100\text{ mA}; V_{CE} = -5\text{ V}; \text{note 1}$                | 40   | 120  |               |
|   |                                      | $I_C = -500\text{ mA}; V_{CE} = -5\text{ V}; \text{note 1}$                | 30   | –    |               |
| $h_{FE}$  | DC current gain<br>BSP31; BSP33      | $I_C = -100\text{ }\mu\text{A}; V_{CE} = -5\text{ V}; \text{note 1}$       | 30   | –    |               |
|   |                                      | $I_C = -100\text{ mA}; V_{CE} = -5\text{ V}; \text{note 1}$                | 100  | 300  |               |
|   |                                      | $I_C = -500\text{ mA}; V_{CE} = -5\text{ V}; \text{note 1}$                | 50   | –    |               |
| $V_{CEsat}$   | collector-emitter saturation voltage | $I_C = -150\text{ mA}; I_B = -15\text{ mA}; \text{note 1}$                 | –    | –250 | mV            |
|   |                                      | $I_C = -500\text{ mA}; I_B = -50\text{ mA}; \text{note 1}$                 | –    | –500 | mV            |
| $V_{BEsat}$   | base-emitter saturation voltage      | $I_C = -150\text{ mA}; I_B = -15\text{ mA}; \text{note 1}$                 | –    | –1   | V             |
|   |                                      | $I_C = -500\text{ mA}; I_B = -50\text{ mA}; \text{note 1}$                 | –    | –1.2 | V             |
| $C_c$   | collector capacitance                | $I_E = i_e = 0; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$                   | –    | 20   | pF            |
| $C_e$   | emitter capacitance                  | $I_C = i_c = 0; V_{EB} = -0.5\text{ V}; f = 1\text{ MHz}$                  | –    | 120  | pF            |
| $f_T$   | transition frequency                 | $I_C = -50\text{ mA}; V_{CE} = -10\text{ V}; f = 100\text{ MHz}$           | 100  | –    | MHz           |
| <b>Switching times (between 10% and 90% levels)</b> |                                      |  |      |      |               |
| $t_{on}$  | turn-on time                         | $I_{Con} = -100\text{ mA}; I_{Bon} = -5\text{ mA}; I_{Boff} = 5\text{ mA}$ | –    | 500  | ns            |
| $t_{off}$   | turn-off time                        |  | –    | 650  | ns            |

## Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.01$ .

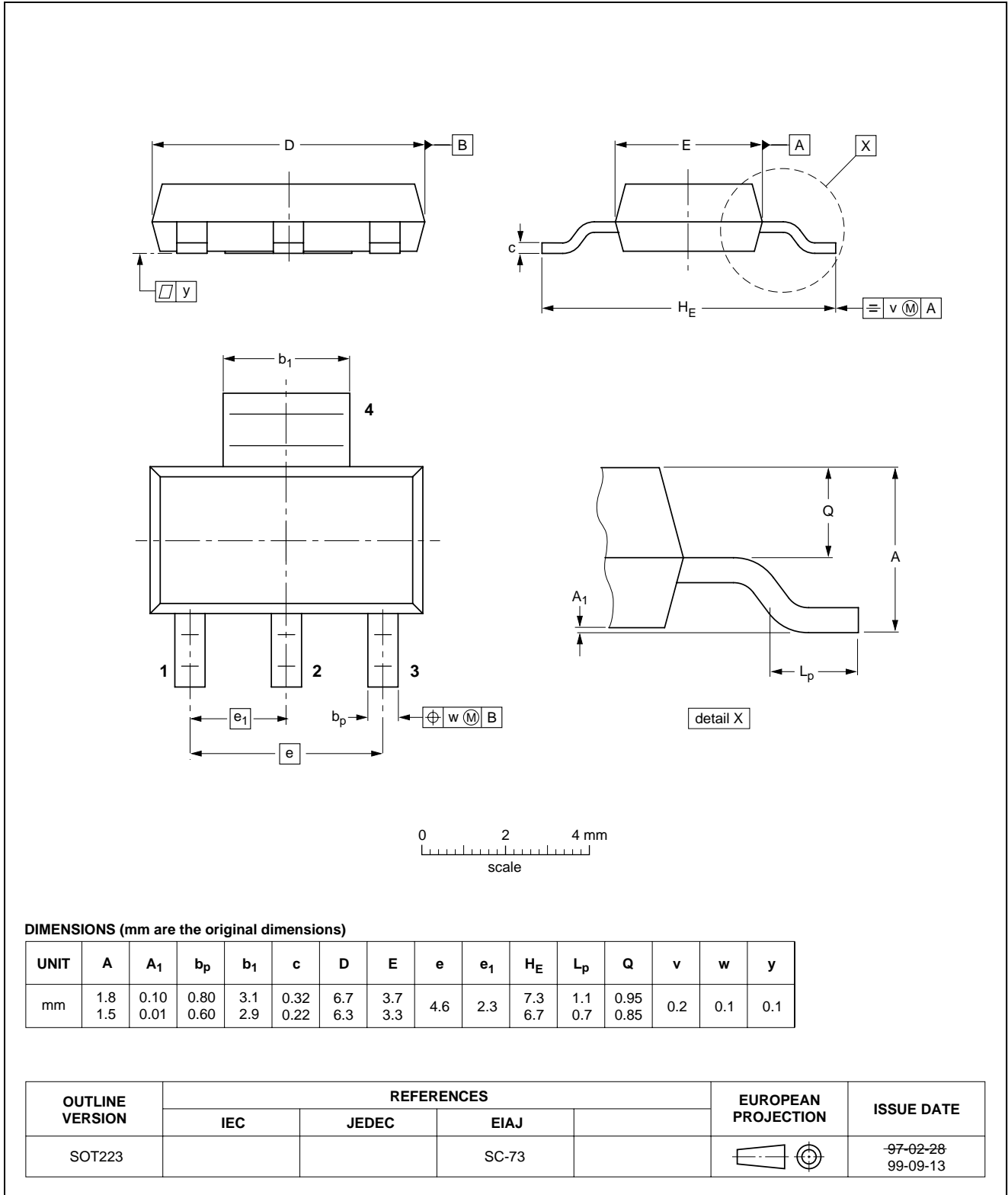
PNP medium power transistors

BSP31; BSP32; BSP33

PACKAGE OUTLINE

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

SOT223



## PNP medium power transistors

## BSP31; BSP32; BSP33

## 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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