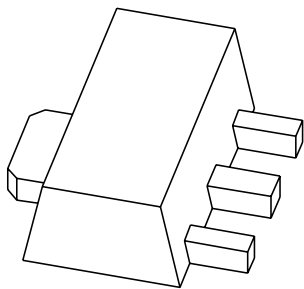


# DATA SHEET



## **BSR30; BSR31; BSR33** PNP medium power transistors

Product specification  
Supersedes data of 1997 Apr 01

1999 Apr 26

# PNP medium power transistors

# BSR30; BSR31; BSR33

### FEATURES

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

### APPLICATIONS

- Telephony and general industrial applications
- Thick and thin-film circuits.

### DESCRIPTION

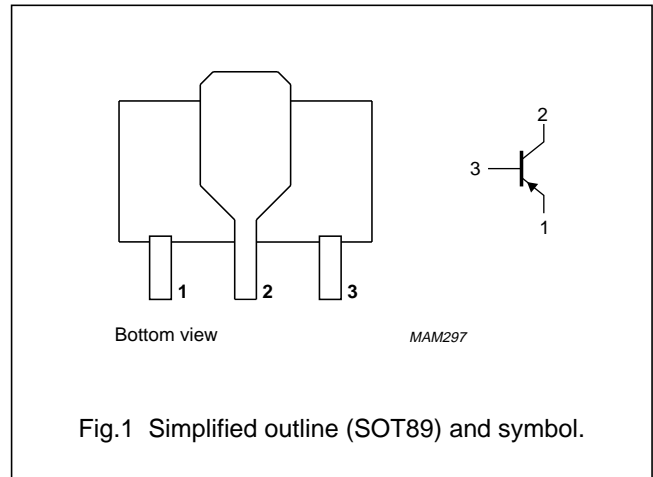
PNP medium power transistor in a SOT89 plastic package. NPN complements: BSR40; BSR41 and BSR43.

### MARKING

| TYPE NUMBER | MARKING CODE |
|-------------|--------------|
| BSR30       | BR1          |
| BSR31       | BR2          |
| BSR33       | BR4          |

### PINNING

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



### 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                     |      |      |      |
|                  | BSR30; BSR31                  |                                  | –    | –70  | V    |
|                  | BSR33                         |                                  | –    | –90  | V    |
| V <sub>CEO</sub> | collector-emitter voltage     | open base                        |      |      |      |
|                  | BSR30; BSR31                  |                                  | –    | –60  | V    |
|                  | BSR33                         |                                  | –    | –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 | –    | 1.35 | 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 6 cm<sup>2</sup>. For other mounting conditions, see “Thermal considerations for SOT89 in the General Part of associated Handbook”.

## PNP medium power transistors

## BSR30; BSR31; BSR33

## 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 |            | 13    | K/W  |

## Note

- Device mounted on a printed-circuit board, single-sided copper, tinplated, mounting pad for collector 6 cm<sup>2</sup>.  
For other mounting conditions, see "Thermal considerations for SOT89 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   | μA   |
| $I_{EBO}$   | emitter cut-off current                  | $I_C = 0; V_{EB} = -5\text{ V}$                                       | –    | –100  | nA   |
| $h_{FE}$    | DC current gain<br>BSR30<br>BSR31; BSR33 | $I_C = -100\text{ μA}; V_{CE} = -5\text{ V}; \text{note 1}$           | 10   | –     |      |
|             |  |   | 30   | –     |      |
|             | DC current gain<br>BSR30<br>BSR31; BSR33 | $I_C = -100\text{ mA}; V_{CE} = -5\text{ V}; \text{note 1}$           | 40   | 120   |      |
|             |  |   | 100  | 300   |      |
|             | DC current gain<br>BSR30<br>BSR31; BSR33 | $I_C = -500\text{ mA}; V_{CE} = -5\text{ V}; \text{note 1}$           | 30   | –     |      |
|             |  |   | 50   | –     |      |
| $V_{CEsat}$ | collector-emitter saturation voltage     | $I_C = -150\text{ mA}; I_B = -15\text{ mA}; \text{note 1}$            | –    | –0.25 | V    |
|             |  | $I_C = -500\text{ mA}; I_B = -50\text{ mA}; \text{note 1}$            | –    | –0.5  | V    |
| $V_{BEsat}$ | 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    |
| $f_T$       | transition frequency                     | $I_C = -50\text{ mA}; V_{CE} = -10\text{ V};$<br>$f = 100\text{ MHz}$ | 100  | –     | MHz  |

## Note

- Pulse test:  $t_p = 300\text{ μs}; \delta < 0.01$ .

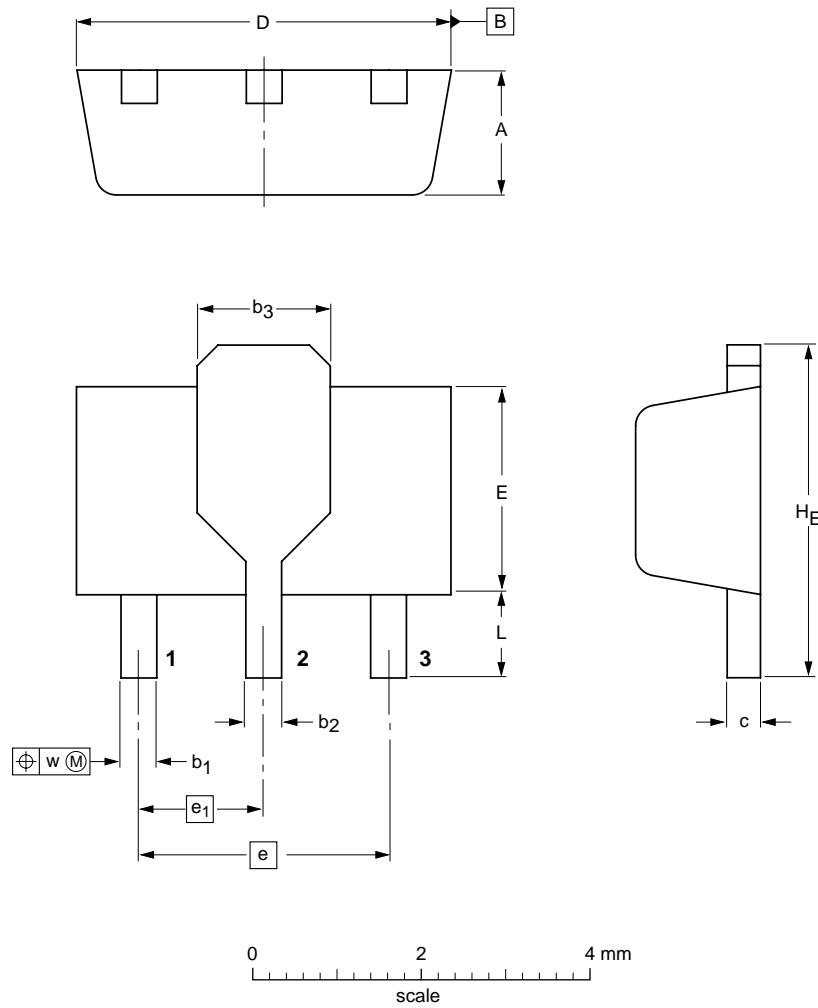
PNP medium power transistors

BSR30; BSR31; BSR33

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | b <sub>1</sub> | b <sub>2</sub> | b <sub>3</sub> | c            | D          | E          | e   | e <sub>1</sub> | H <sub>E</sub> | L min. | w    |
|------|------------|----------------|----------------|----------------|--------------|------------|------------|-----|----------------|----------------|--------|------|
| mm   | 1.6<br>1.4 | 0.48<br>0.35   | 0.53<br>0.40   | 1.8<br>1.4     | 0.44<br>0.37 | 4.6<br>4.4 | 2.6<br>2.4 | 3.0 | 1.5            | 4.25<br>3.75   | 0.8    | 0.13 |

| OUTLINE VERSION | REFERENCES |       |      |  | EUROPEAN PROJECTION | ISSUE DATE |
|-----------------|------------|-------|------|--|---------------------|------------|
|                 | IEC        | JEDEC | EIAJ |  |                     |            |
| SOT89           |            |       |      |  |                     | 97-02-28   |

## PNP medium power transistors

## BSR30; BSR31; BSR33

**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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PNP medium power transistors

BSR30; BSR31; BSR33

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**NOTES**

PNP medium power transistors

BSR30; BSR31; BSR33

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**NOTES**

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