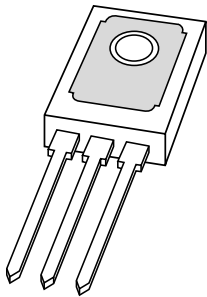


# DATA SHEET



## **BD135; BD137; BD139** NPN power transistors

Product specification  
Supersedes data of 1997 Mar 04

1999 Apr 12

## NPN power transistors

## BD135; BD137; BD139

## FEATURES

- High current (max. 1.5 A)
- Low voltage (max. 80 V).

## APPLICATIONS

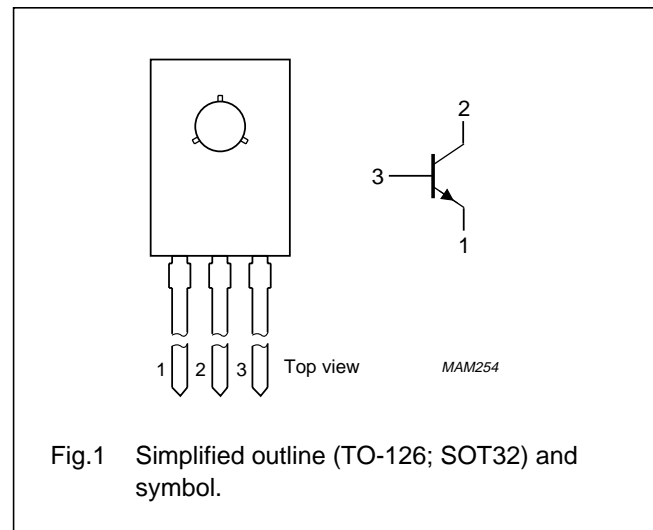
- Driver stages in hi-fi amplifiers and television circuits.

## DESCRIPTION

NPN power transistor in a TO-126; SOT32 plastic package. PNP complements: BD136, BD138 and BD140.

## PINNING

| PIN | DESCRIPTION  |
|-----|--|
| 1   | emitter  |
| 2   | collector, connected to metal part of mounting surface |
| 3   | base   |



## 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               |      |      |      |
|           | BD135                         |                            | –    | 45   | V    |
|           | BD137                         |                            | –    | 60   | V    |
| $V_{CEO}$ | collector-emitter voltage     | open base                  |      |      |      |
|           | BD135                         |                            | –    | 45   | V    |
|           | BD137                         |                            | –    | 60   | V    |
|           | BD139                         |                            | –    | 80   | V    |
| $V_{EBO}$ | emitter-base voltage          | open collector             | –    | 5    | V    |
| $I_C$     | collector current (DC)        |                            | –    | 1.5  | A    |
| $I_{CM}$  | peak collector current        |                            | –    | 2    | A    |
| $I_{BM}$  | peak base current             |                            | –    | 1    | A    |
| $P_{tot}$ | total power dissipation       | $T_{mb} \leq 70\text{ °C}$ | –    | 8    | W    |
| $T_{stg}$ | storage temperature           |                            | –65  | +150 | °C   |
| $T_j$     | junction temperature          |                            | –    | 150  | °C   |
| $T_{amb}$ | operating ambient temperature |                            | –65  | +150 | °C   |

## NPN power transistors

## BD135; BD137; BD139

## THERMAL CHARACTERISTICS

| SYMBOL         | PARAMETER   | CONDITIONS | VALUE | UNIT |
|----------------|---|------------|-------|------|
| $R_{th\ j-a}$  | thermal resistance from junction to ambient       | note 1     | 100   | K/W  |
| $R_{th\ j-mb}$ | thermal resistance from junction to mounting base |            | 10    | K/W  |

## Note

1. Refer to TO-126; SOT32 standard mounting conditions.

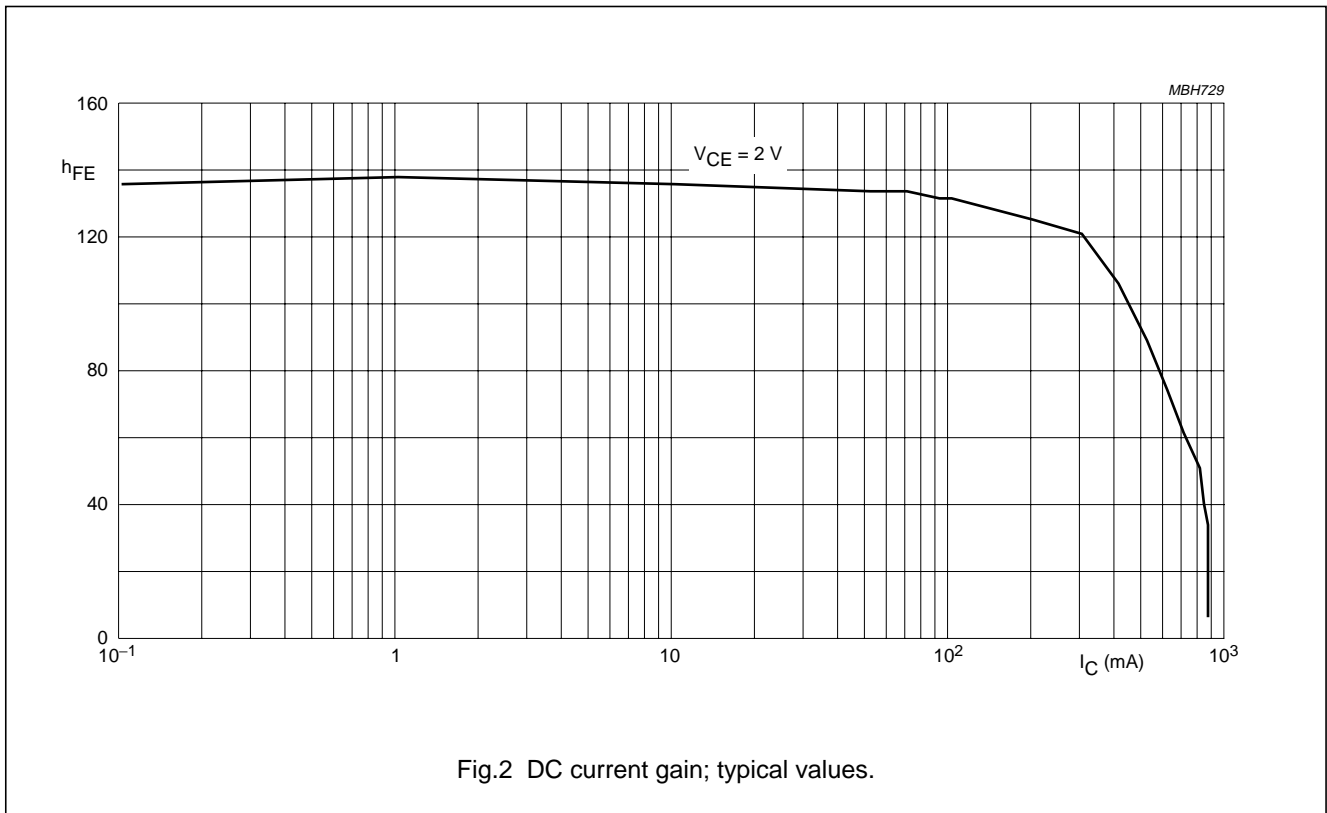
## CHARACTERISTICS

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

| SYMBOL                    | PARAMETER  | CONDITIONS   | MIN. | TYP. | MAX. | UNIT          |
|---------------------------|--|--|------|------|------|---------------|
| $I_{CBO}$                 | collector cut-off current                                    | $I_E = 0; V_{CB} = 30\text{ V}$                                    | –    | –    | 100  | nA            |
|                           |  | $I_E = 0; V_{CB} = 30\text{ V}; T_j = 125\text{ °C}$               | –    | –    | 10   | $\mu\text{A}$ |
| $I_{EBO}$                 | emitter cut-off current                                      | $I_C = 0; V_{EB} = 5\text{ V}$                                     | –    | –    | 100  | nA            |
| $h_{FE}$                  | DC current gain  | $V_{CE} = 2\text{ V};$ (see Fig.2)                                 |      |      |      |               |
|                           |  | $I_C = 5\text{ mA}$  | 40   | –    | –    |               |
|                           |  | $I_C = 150\text{ mA}$  | 63   | –    | 250  |               |
|                           | $I_C = 500\text{ mA}$  | 25   | –    | –    |      |               |
|                           | DC current gain  | $I_C = 150\text{ mA}; V_{CE} = 2\text{ V};$<br>(see Fig.2)         | 63   | –    | 160  |               |
|                           | BD135-10; BD137-10; BD139-10<br>BD135-16; BD137-16; BD139-16 |  | 100  | –    | 250  |               |
| $V_{CEsat}$               | collector-emitter saturation voltage                         | $I_C = 500\text{ mA}; I_B = 50\text{ mA}$                          | –    | –    | 0.5  | V             |
| $V_{BE}$                  | base-emitter voltage   | $I_C = 500\text{ mA}; V_{CE} = 2\text{ V}$                         | –    | –    | 1    | V             |
| $f_T$                     | transition frequency   | $I_C = 50\text{ mA}; V_{CE} = 5\text{ V};$<br>$f = 100\text{ MHz}$ | –    | 190  | –    | MHz           |
| $\frac{h_{FE1}}{h_{FE2}}$ | DC current gain ratio of the complementary pairs             | $ I_C  = 150\text{ mA};  V_{CE}  = 2\text{ V}$                     | –    | 1.3  | 1.6  |               |

NPN power transistors

BD135; BD137; BD139

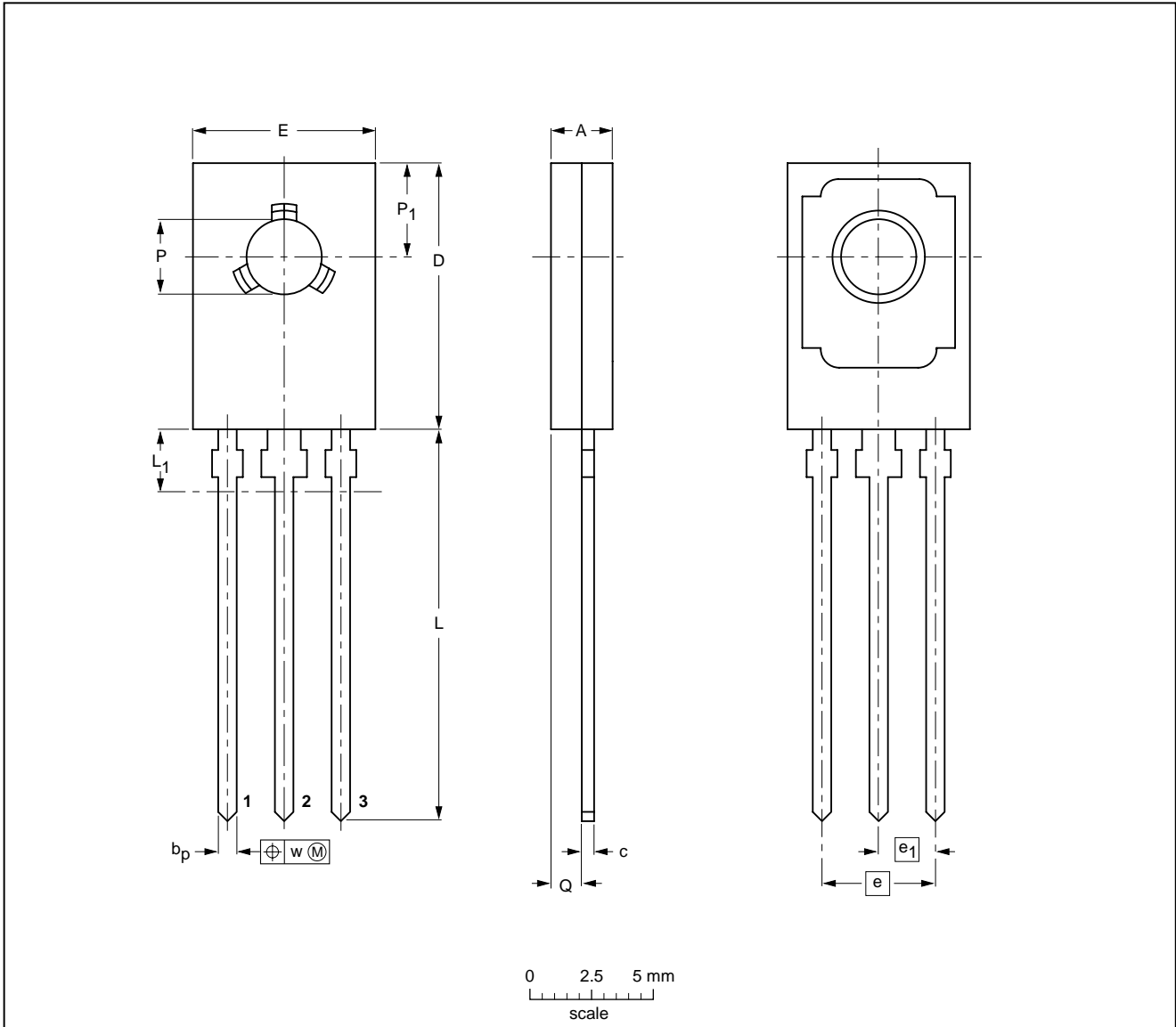


NPN power transistors

BD135; BD137; BD139

PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; mountable to heatsink, 1 mounting hole; 3 leads SOT32



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | b <sub>p</sub> | c            | D            | E          | e    | e <sub>1</sub> | L            | L <sub>1</sub> <sup>(1)</sup><br>max | Q          | P          | P <sub>1</sub> | w     |
|------|------------|----------------|--------------|--------------|------------|------|----------------|--------------|--------------------------------------|------------|------------|----------------|-------|
| mm   | 2.7<br>2.3 | 0.88<br>0.65   | 0.60<br>0.45 | 11.1<br>10.5 | 7.8<br>7.2 | 4.58 | 2.29           | 16.5<br>15.3 | 2.54                                 | 1.5<br>0.9 | 3.2<br>3.0 | 3.9<br>3.6     | 0.254 |

Note

1. Terminal dimensions within this zone are uncontrolled to allow for flow of plastic and terminal irregularities.

| OUTLINE<br>VERSION | REFERENCES |        |      |  | EUROPEAN<br>PROJECTION | ISSUE DATE |
|--------------------|------------|--------|------|--|------------------------|------------|
|                    | IEC        | JEDEC  | EIAJ |  |                        |            |
| SOT32              |            | TO-126 |      |  |                        | 97-03-04   |