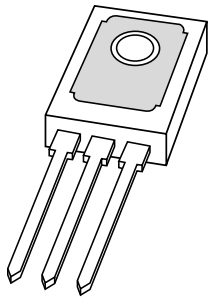


DATA SHEET



BD135; BD137; BD139 NPN power transistors

Product specification
Supersedes data of September 1994
File under Discrete Semiconductors, SC04

1997 Mar 04

NPN power transistors

BD135; BD137; BD139

FEATURES

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

APPLICATIONS

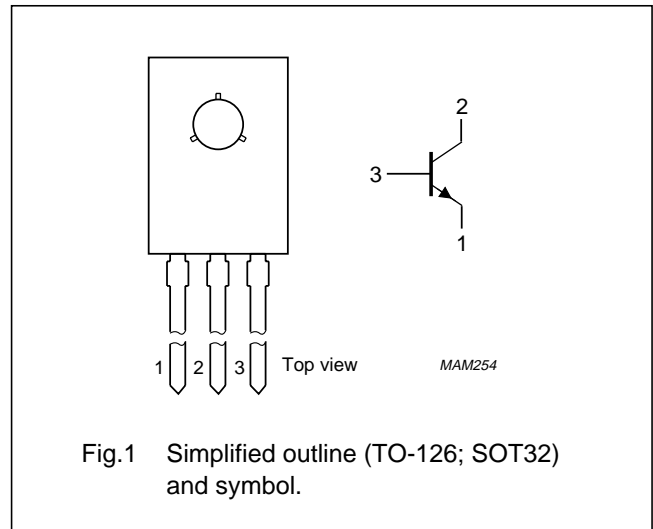
- Driver stages in hi-fi amplifiers and television circuits.

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 |



QUICK REFERENCE DATA

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | 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 |
| I_{CM} | peak collector current | | – | – | 2 | A |
| P_{tot} | total power dissipation | $T_{mb} \leq 70\text{ }^{\circ}\text{C}$ | – | – | 8 | W |
| h_{FE} | DC current gain | $I_C = 150\text{ mA}; V_{CE} = 2\text{ V}$ | 40 | – | 250 | |
| f_T | transition frequency | $I_C = 50\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$ | – | 190 | – | MHz |

NPN power transistors

BD135; BD137; BD139

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 |
| | BD139 | | – | 100 | 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} ≤ 70 °C | – | 8 | W |
| T _{stg} | storage temperature | | –65 | +150 | °C |
| T _j | junction temperature | | – | 150 | °C |
| T _{amb} | operating ambient temperature | | –65 | +150 | °C |

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.

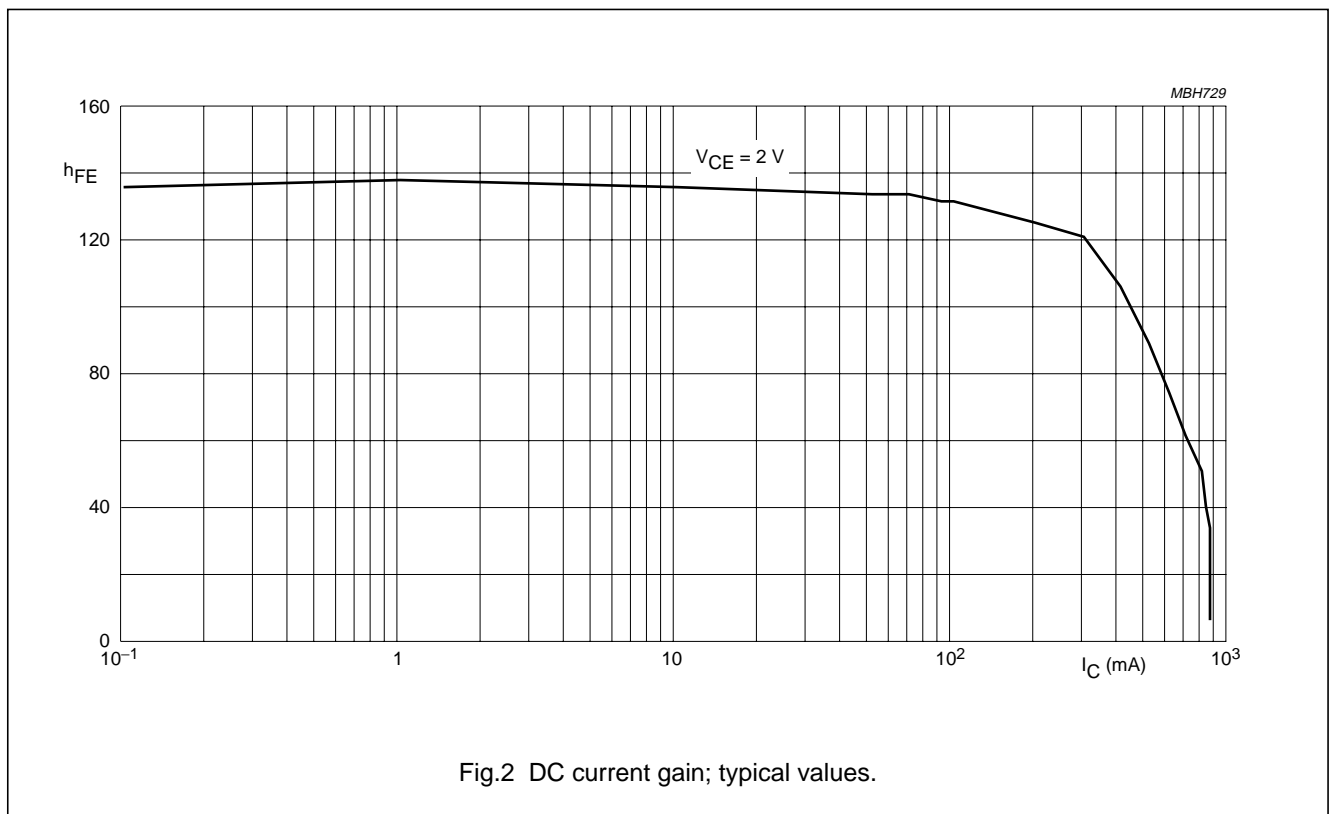
NPN power transistors

BD135; BD137; BD139

CHARACTERISTICS

$T_j = 25\text{ }^\circ\text{C}$ 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 |
| | | $I_E = 0; V_{CB} = 30\text{ V}; T_j = 125\text{ }^\circ\text{C}$ | – | – | 10 | μA |
| 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 $I_C = 5\text{ mA}$ $I_C = 150\text{ mA}$ $I_C = 500\text{ mA}$ | 40 | – | – | |
| | | | 40 | – | 250 | |
| | | | 25 | – | – | |
| h_{FE} | DC current gain BD135-10; BD137-10; BD139-10 BD135-16; BD137-16; BD139-16 | $I_C = 150\text{ mA}; V_{CE} = 2\text{ V};$ see Fig.2 | 63 | – | 160 | |
| | | | 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 | $I_C = 50\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$ | – | 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 | |

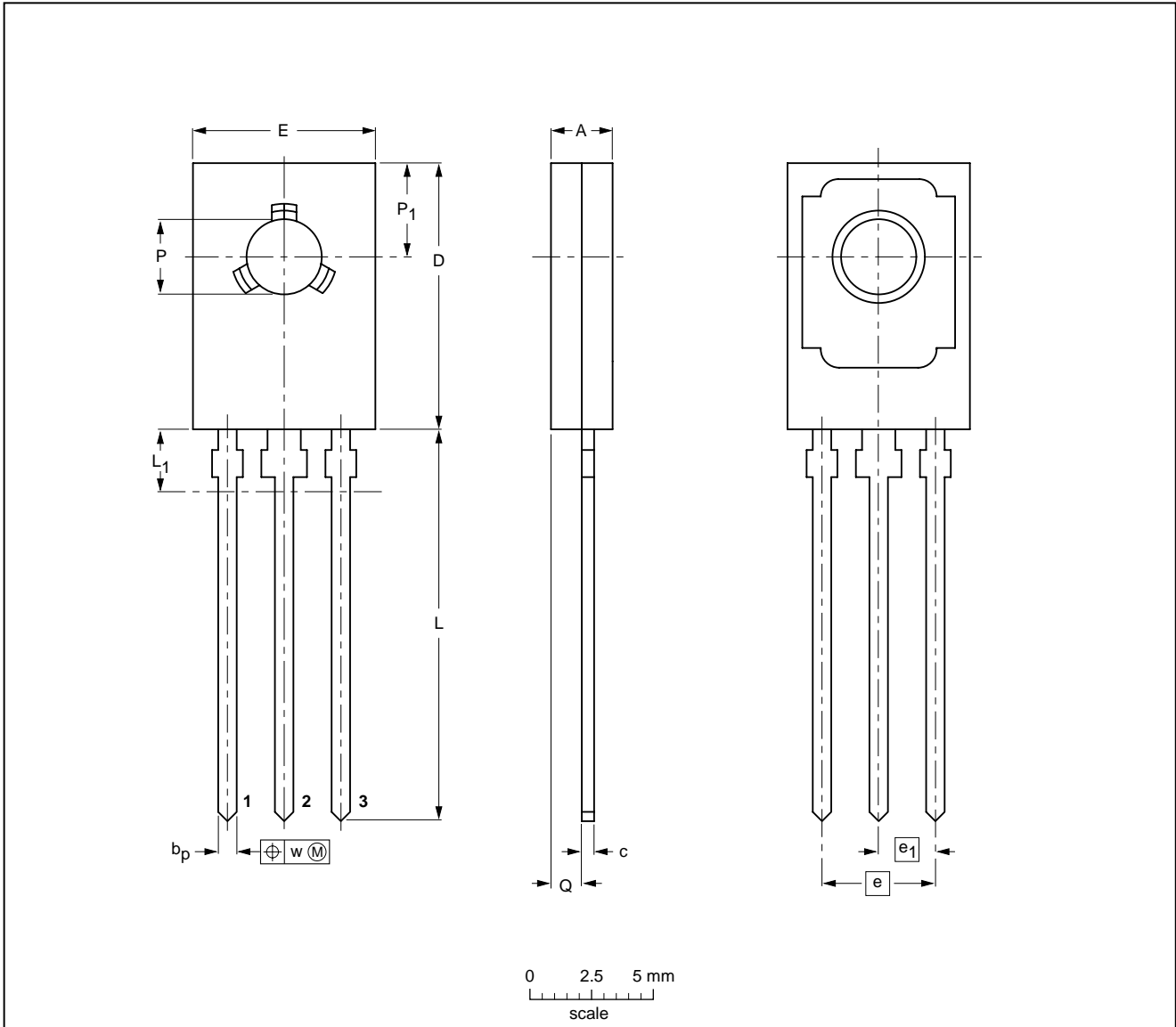


NPN power transistors

BD135; BD137; BD139

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 _p | c | D | E | e | e ₁ | L | L ₁ ⁽¹⁾ max | Q | P | P ₁ | w |
|------|------------|----------------|--------------|--------------|------------|------|----------------|--------------|--------------------------------------|------------|------------|----------------|-------|
| mm | 2.7 2.3 | 0.88 0.65 | 0.60 0.45 | 11.1 10.5 | 7.8 7.2 | 4.58 | 2.29 | 16.5 15.3 | 2.54 | 1.5 0.9 | 3.2 3.0 | 3.9 3.6 | 0.254 |

Note

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

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

NPN power transistors

BD135; BD137; BD139

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. | |

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NPN power transistors

BD135; BD137; BD139

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