

## NPN general purpose transistors

## BC546; BC547

## FEATURES

- Low current (max. 100 mA)
- Low voltage (max. 65 V).

## APPLICATIONS

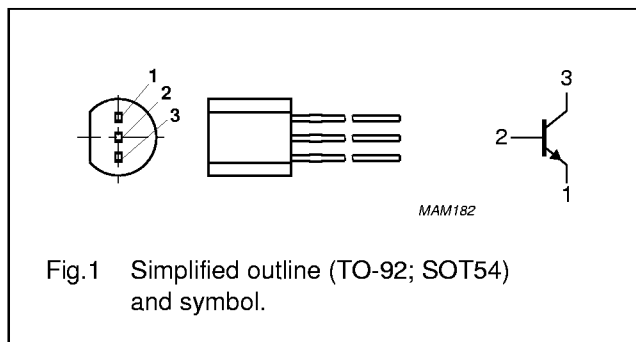
- General purpose switching and amplification.

## DESCRIPTION

NPN transistor in a TO-92; SOT54 plastic package.  
PNP complements: BC556 and BC557.

## PINNING

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



## 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                         | —    | 80   | V    |
|           | BC546                         |                                      | —    | 50   | V    |
|           | BC547                         |                                      | —    | 50   | V    |
| $V_{CEO}$ | collector-emitter voltage     | open base                            | —    | 65   | V    |
|           | BC546                         |                                      | —    | 45   | V    |
|           | BC547                         |                                      | —    | 45   | V    |
| $V_{EBO}$ | emitter-base voltage          | open collector                       | —    | 6    | V    |
|           | BC546                         |                                      | —    | 6    | V    |
|           | BC547                         |                                      | —    | 6    | V    |
| $I_C$     | collector current (DC)        |                                      | —    | 100  | mA   |
| $I_{CM}$  | peak collector current        |                                      | —    | 200  | mA   |
| $I_{BM}$  | peak base current             |                                      | —    | 200  | mA   |
| $P_{tot}$ | total power dissipation       | $T_{amb} \leq 25\text{ °C}$ ; note 1 | —    | 500  | mW   |
| $T_{stg}$ | storage temperature           |                                      | −65  | +150 | °C   |
| $T_j$     | junction temperature          |                                      | —    | 150  | °C   |
| $T_{amb}$ | operating ambient temperature |                                      | −65  | +150 | °C   |

## Note

1. Transistor mounted on an FR4 printed-circuit board.

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## THERMAL CHARACTERISTICS

| SYMBOL        | PARAMETER                                   | CONDITIONS | VALUE | UNIT |
|---------------|---------------------------------------------|------------|-------|------|
| $R_{th\ j-a}$ | thermal resistance from junction to ambient | note 1     | 0.25  | K/mW |

## Note

1. Transistor mounted on an FR4 printed-circuit board.

## CHARACTERISTICS

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

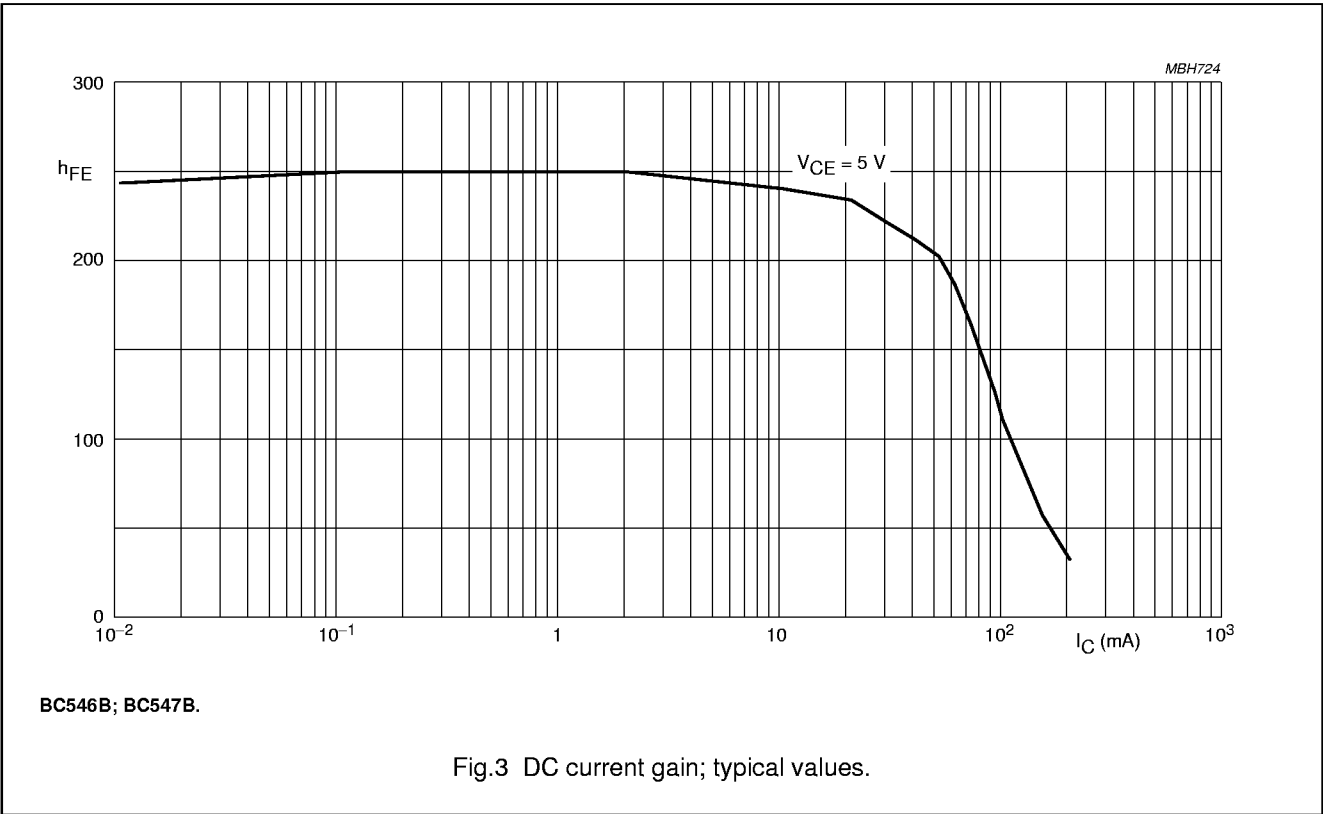
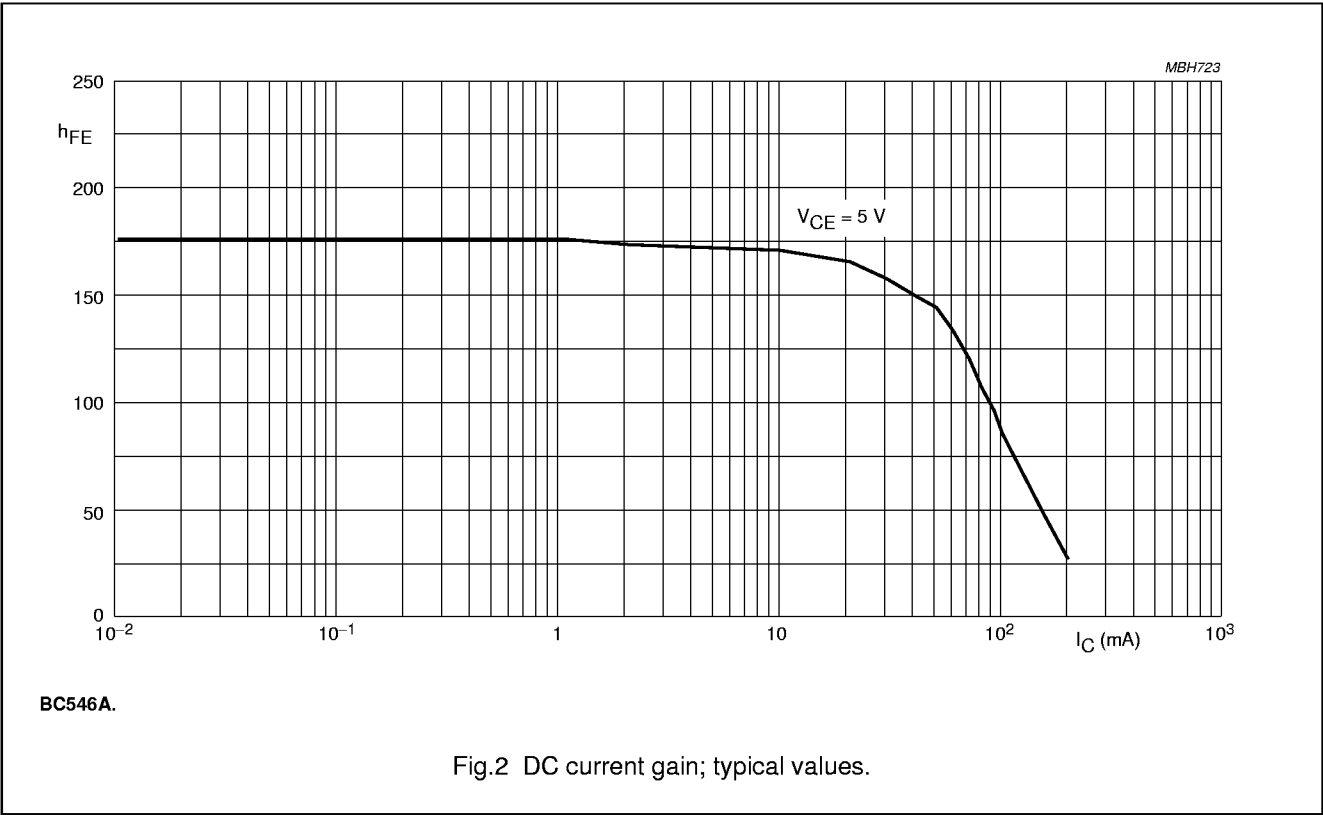
| SYMBOL      | PARAMETER                            | CONDITIONS                                                                                                            | MIN. | TYP. | MAX. | UNIT          |
|-------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------|------|------|---------------|
| $I_{CBO}$   | collector cut-off current            | $I_E = 0; V_{CB} = 30\text{ V}$                                                                                       | —    | —    | 15   | nA            |
|             |                                      | $I_E = 0; V_{CB} = 30\text{ V}; T_j = 150\text{ °C}$                                                                  | —    | —    | 5    | $\mu\text{A}$ |
| $I_{EBO}$   | emitter cut-off current              | $I_C = 0; V_{EB} = 5\text{ V}$                                                                                        | —    | —    | 100  | nA            |
| $h_{FE}$    | DC current gain<br>BC546A            | $I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V};$<br>see Figs 2, 3 and 4                                            | —    | 90   | —    |               |
|             | BC546B; BC547B                       |                                                                                                                       | —    | 150  | —    |               |
|             | BC547C                               |                                                                                                                       | —    | 270  | —    |               |
|             | DC current gain<br>BC546A            | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V};$<br>see Figs 2, 3 and 4                                                      | 110  | 180  | 220  |               |
|             | BC546B; BC547B                       |                                                                                                                       | 200  | 290  | 450  |               |
|             | BC547C                               |                                                                                                                       | 420  | 520  | 800  |               |
|             | BC547                                |                                                                                                                       | 110  | —    | 800  |               |
|             | BC546                                |                                                                                                                       | 110  | —    | 450  |               |
| $V_{CEsat}$ | collector-emitter saturation voltage | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA}$                                                                             | —    | 90   | 250  | mV            |
|             |                                      | $I_C = 100\text{ mA}; I_B = 5\text{ mA}$                                                                              | —    | 200  | 600  | mV            |
| $V_{BEsat}$ | base-emitter saturation voltage      | $I_C = 10\text{ mA}; I_B = 0.5\text{ mA};$ note 1                                                                     | —    | 700  | —    | mV            |
|             |                                      | $I_C = 100\text{ mA}; I_B = 5\text{ mA};$ note 1                                                                      | —    | 900  | —    | mV            |
| $V_{BE}$    | base-emitter voltage                 | $I_C = 2\text{ mA}; V_{CE} = 5\text{ V};$ note 2                                                                      | 580  | 660  | 700  | mV            |
|             |                                      | $I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$                                                                             | —    | —    | 770  | mV            |
| $C_c$       | collector capacitance                | $I_E = I_C = 0; V_{CB} = 10\text{ V}; f = 1\text{ MHz}$                                                               | —    | 1.5  | —    | pF            |
| $C_e$       | emitter capacitance                  | $I_C = I_E = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$                                                              | —    | 11   | —    | pF            |
| $f_T$       | transition frequency                 | $I_C = 10\text{ mA}; V_{CE} = 5\text{ V}; f = 100\text{ MHz}$                                                         | 100  | —    | —    | MHz           |
| F           | noise figure                         | $I_C = 200\text{ }\mu\text{A}; V_{CE} = 5\text{ V};$<br>$R_S = 2\text{ k}\Omega; f = 1\text{ kHz}; B = 200\text{ Hz}$ | —    | 2    | 10   | dB            |

## Notes

1.  $V_{BEsat}$  decreases by about 1.7 mV/K with increasing temperature.
2.  $V_{BE}$  decreases by about 2 mV/K with increasing temperature.

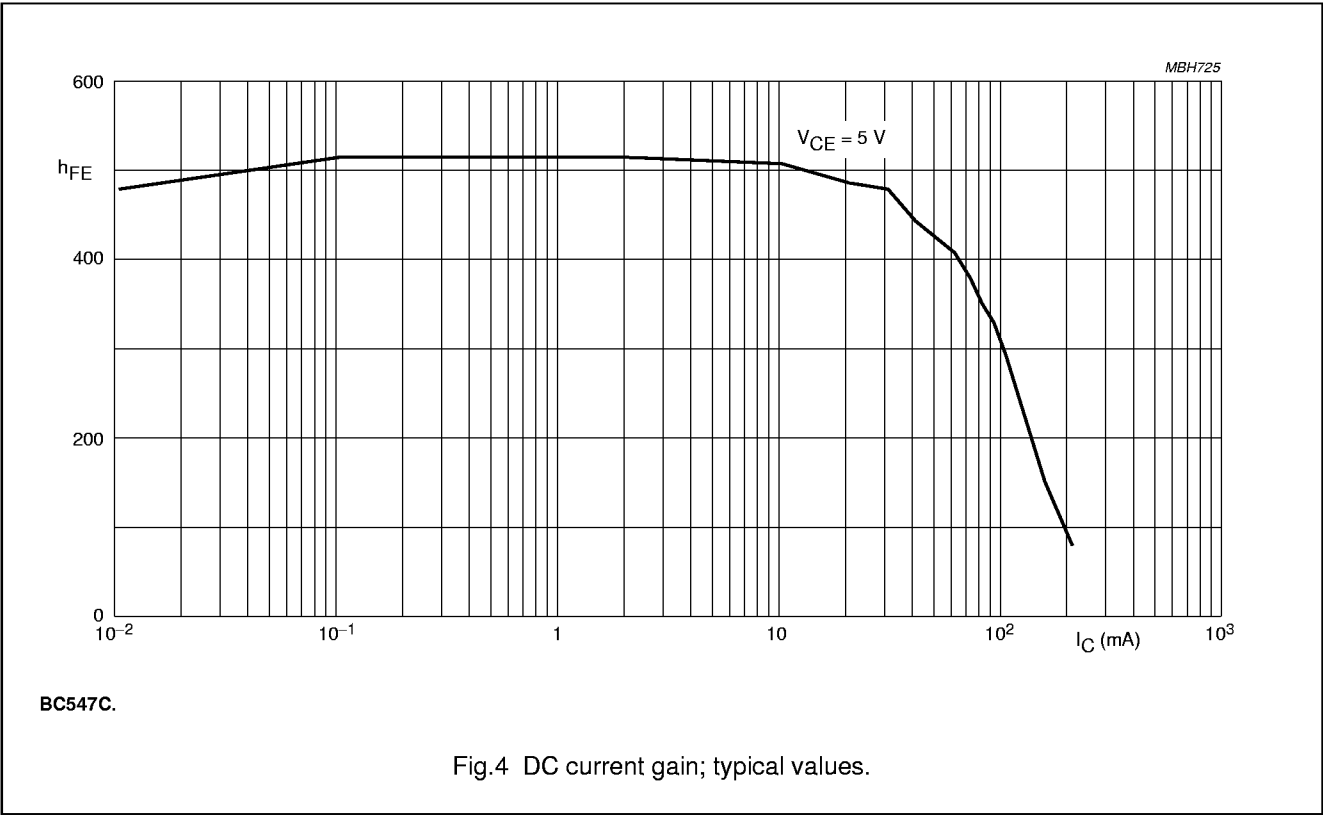
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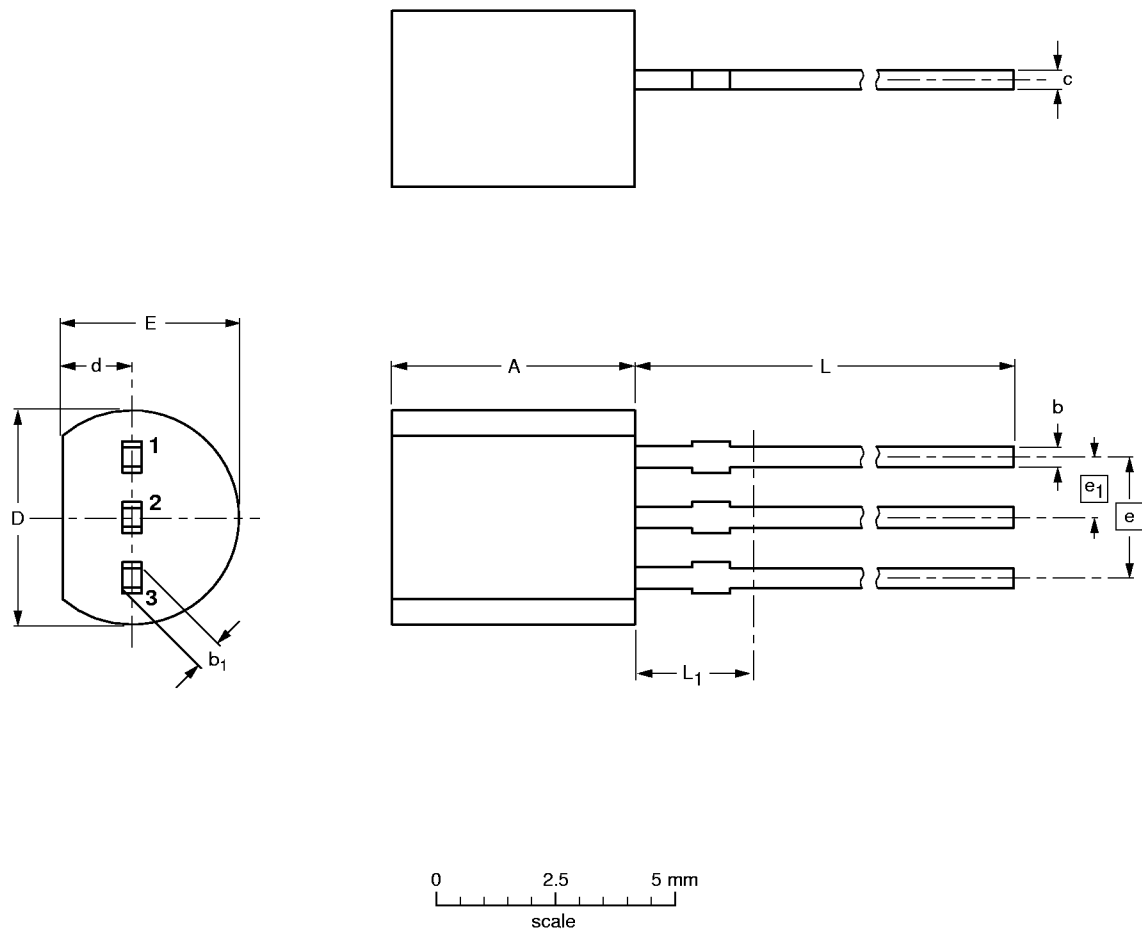
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PACKAGE OUTLINE

Plastic single-ended leaded (through hole) package; 3 leads

SOT54



DIMENSIONS (mm are the original dimensions)

| UNIT | A          | b            | b <sub>1</sub> | c            | D          | d          | E          | e    | e <sub>1</sub> | L            | L <sub>1</sub> <sup>(1)</sup> |
|------|------------|--------------|----------------|--------------|------------|------------|------------|------|----------------|--------------|-------------------------------|
| mm   | 5.2<br>5.0 | 0.48<br>0.40 | 0.66<br>0.56   | 0.45<br>0.40 | 4.8<br>4.4 | 1.7<br>1.4 | 4.2<br>3.6 | 2.54 | 1.27           | 14.5<br>12.7 | 2.5                           |

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  |  |                                                                                       |            |
| SOT54              |            | TO-92 | SC-43 |  |  | 97-02-28   |