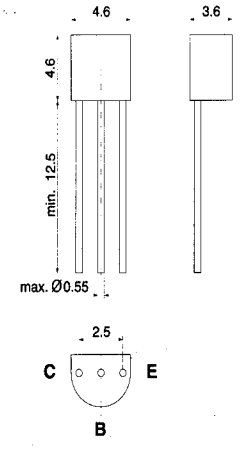
NPN Silicon Expitaxial Planar Transistor

These transistors are subdivided into three groups A, B and C according to their current gain. The type BC546 is available in groups A and B, however, the types BC547 and BC548 can be supplied in all three groups. The BC549 is a low-noise type and available in groups B and C. As complementary types, the PNP transistors BC556...BC559 are recommended.

On special request, these transistors can be manufactured in different pin configurations. Please refer to the "TO-92 TRANSISTOR PACKAGE OUTLINE" on page 80 for the available pin options.




TO-92 Plastic Package
Weight approx. 0.18 g
Dimensions in mm

**Absolute Maximum Ratings ($T_a$ = 25°C)**

| | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | **HN / BC 546** | $V_{CBO}$ | 80 | V |
| | **HN / BC 547** | $V_{CBO}$ | 50 | V |
| | **HN / BC 548, HN / BC 549** | $V_{CBO}$ | 30 | V |
| Collector-Emitter Voltage | **HN / BC 546** | $V_{CES}$ | 85 | V |
| | **HN / BC 547** | $V_{CES}$ | 50 | V |
| | **HN / BC 548, HN / BC 549** | $V_{CES}$ | 30 | V |
| Collector-Emitter Voltage | **HN / BC 546** | $V_{CEO}$ | 65 | V |
| | **HN / BC 547** | $V_{CEO}$ | 45 | V |
| | **HN / BC 548, HN / BC 549** | $V_{CEO}$ | 30 | V |
| Emitter-Base Voltage | **HN / BC 546, HN / BC 547** | $V_{EBO}$ | 6 | V |
| | **HN / BC 548, HN / BC 549** | $V_{EBO}$ | 5 | V |
| Collector Current | | $I_C$ | 100 | mA |
| Peak Collector Current | | $I_{CM}$ | 200 | mA |
| Peak Base Current | | $I_{BM}$ | 200 | mA |
| Peak Emitter Current | | $-I_{EM}$ | 200 | mA |
| Power Dissipation at $T_{amb}$ = 25 °C | | $P_{tot}$ | 500[1)] | mW |
| Junction Temperature | | $T_j$ | 150 | °C |
| Storage Temperature Range | | $T_S$ | -65 to + 150 | °C |

[1)] Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

**G S P FORM A AVAILABLE**

**Characteristics** at $T_{amb}$ =25 °C

| | | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| h-Parameters at $V_{CE}$ = 5V, $I_C$ = 2 mA, f = 1 kHz, | | | | | | |
| Small Signal Current Gain | Current Gain Group A | $h_{fe}$ | - | 220 | - | - |
| | B | $h_{fe}$ | - | 330 | - | - |
| | C | $h_{fe}$ | - | 600 | - | - |
| Input Impedance | Current Gain Group A | $h_{ie}$ | 1.6 | 2.7 | 4.5 | kΩ |
| | B | $h_{ie}$ | 3.2 | 4.5 | 8.5 | kΩ |
| | C | $h_{ie}$ | 6 | 8.7 | 15 | kΩ |
| Output Admittance | Current Gain Group A | $h_{oe}$ | - | 18 | 30 | µS |
| | B | $h_{oe}$ | - | 30 | 60 | µS |
| | C | $h_{oe}$ | - | 60 | 110 | µS |
| Reverse Voltage Transfer Ratio | | | | | | |
| | Current Gain Group A | $h_{re}$ | - | $1.5 \cdot 10^{-4}$ | - | - |
| | B | $h_{re}$ | - | $2 \cdot 10^{-4}$ | - | - |
| | C | $h_{re}$ | - | $3 \cdot 10^{-4}$ | - | - |
| DC Current Gain. | | | | | | |
| at $V_{CE}$ = 5V, $I_C$ = 10 µA | | | | | | |
| | Current Gain Group A | $h_{FE}$ | - | 90 | - | - |
| | B | $h_{FE}$ | - | 150 | - | - |
| | C | $h_{FE}$ | - | 270 | - | - |
| at $V_{CE}$ = 5V, $I_C$ = 2 mA | | | | | | |
| | Current Gain Group A | $h_{FE}$ | 110 | 180 | 220 | - |
| | B | $h_{FE}$ | 200 | 290 | 450 | - |
| | C | $h_{FE}$ | 420 | 500 | 800 | - |
| at $V_{CE}$ = 5V, $I_C$ = 100 mA | | | | | | |
| | Current Gain Group A | $h_{FE}$ | - | 120 | - | - |
| | B | $h_{FE}$ | - | 200 | - | - |
| | C | $h_{FE}$ | - | 400 | - | - |
| Thermal Resistance Junction to Ambient Air | | $R_{thA}$ | - | - | 250[1] | K/W |
| Collector Saturation Voltage | | | | | | |
| at $I_C$ = 10 mA, $I_B$ = 0.5 mA | | $V_{CEsat}$ | - | 80 | 200 | mV |
| at $I_C$ = 100 mA, $I_B$ = 5 mA | | $V_{CEsat}$ | - | 200 | 600 | mV |
| Base Saturation Voltage | | | | | | |
| at $I_C$ = 10 mA, $I_B$ = 0.5 mA | | $V_{BEsat}$ | - | 700 | - | mV |
| at $I_C$ = 100 mA, $I_B$ = 5 mA | | $V_{BEsat}$ | - | 900 | - | mV |
| Base Emitter Voltage | | | | | | |
| at $V_{CE}$ = 5 V, $I_C$ = 2 mA | | $V_{BE}$ | 580 | 660 | 700 | mV |
| at $V_{CE}$ = 5 V, $I_C$ = 10 mA | | $V_{BE}$ | - | - | 720 | mV |
| Collector Emitter Cutoff Current | | | | | | |
| at $V_{CE}$ = 80 V | **HN / BC 546** | $I_{CES}$ | - | 0.2 | 15 | nA |
| at $V_{CE}$ = 50 V | **HN / BC 547** | $I_{CES}$ | - | 0.2 | 15 | nA |
| at $V_{CE}$ = 30 V | **HN / BC 548, HN / BC 549** | $I_{CES}$ | - | 0.2 | 15 | nA |
| at $V_{CE}$ = 80 V, $T_j$ = 125 °C | **HN / BC 546** | $I_{CES}$ | - | - | 4 | µA |
| at $V_{CE}$ = 50 V, $T_j$ = 125 °C | **HN / BC 547** | $I_{CES}$ | - | - | 4 | µA |

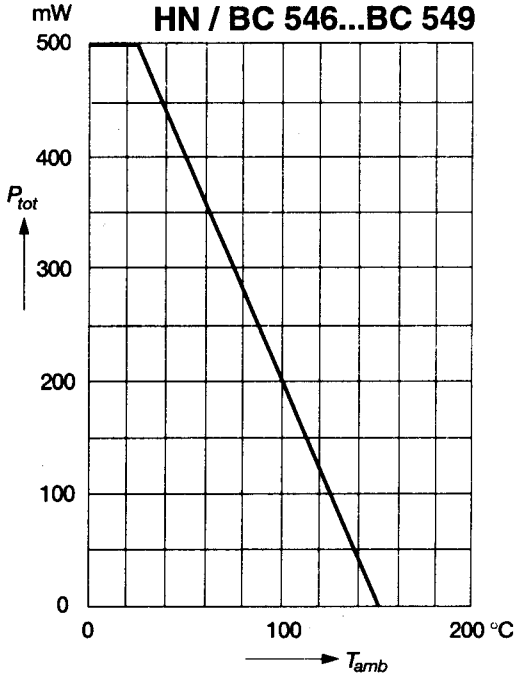
[1] Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case.

**Characteristics, continuation**

| | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| at $V_{CE}$ = 30V, $T_j$ = 125 °C **HN / BC 548, HN / BC 549** | $I_{CES}$ | - | - | 4<br>4 | µA<br>µA |
| Gain-Bandwidth Product<br>at $V_{CE}$ = 5V, $I_C$ = 10 mA, f = 100MHz | $f_T$ | - | 300 | - | MHz |
| Collector-Base Capacitance<br>at $V_{CB}$ = 10 V, f = 1MHz | $C_{CBO}$ | - | 3.5 | 6 | pF |
| Emitter-Base Capacitance<br>at $V_{EB}$ = 0.5 V, f = 1MHz | $C_{EBO}$ | - | 9 | - | pF |
| Noise Figure<br>at $V_{CE}$ = 5 V, $I_C$ = 200 µA, $R_G$ = 2 kΩ,<br>f = 1kHz, Δf = 200 Hz **HN / BC 546, HN / BC 547** | F | - | 2 | 10 | dB |
| **HN / BC 548**<br>**HN / BC 549** | F | - | 1.2 | 4 | dB |

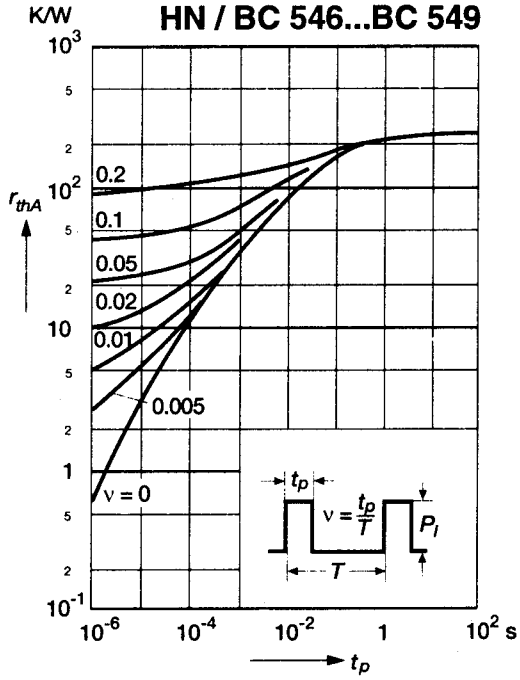
**Admissible power dissipation versus temperature**

Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

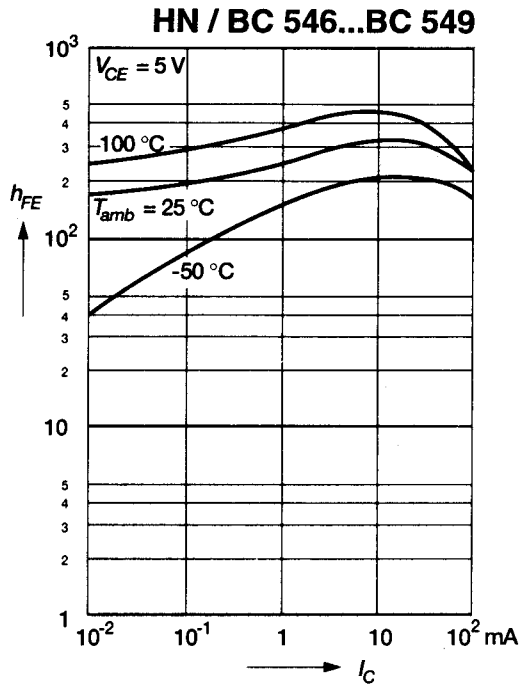



**Pulse thermal resistance versus pulse duration**

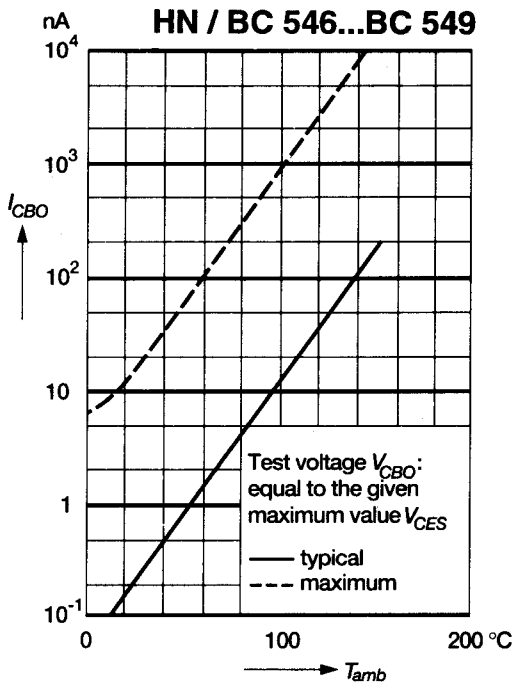
Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case



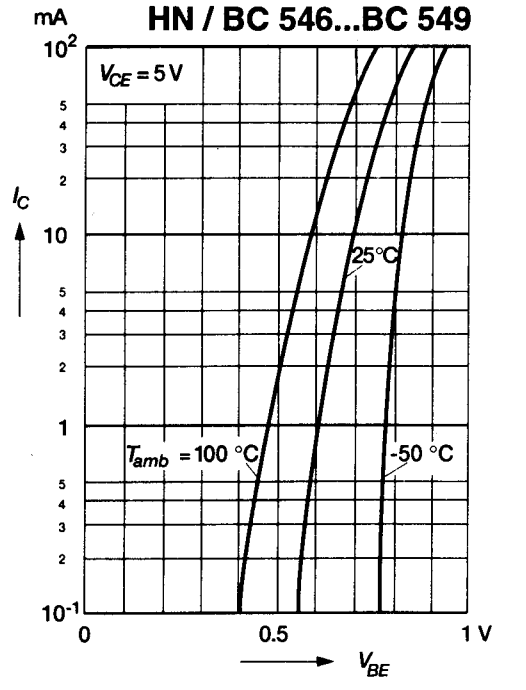
**DC current gain versus collector current**



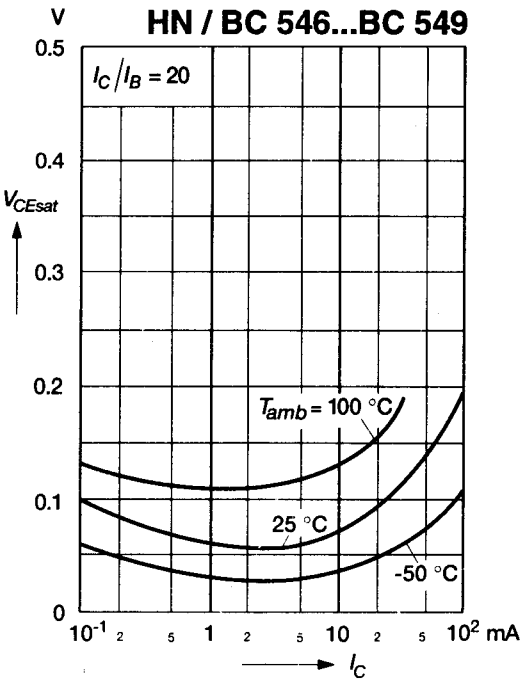

**Collector-base cutoff current versus ambient temperature**



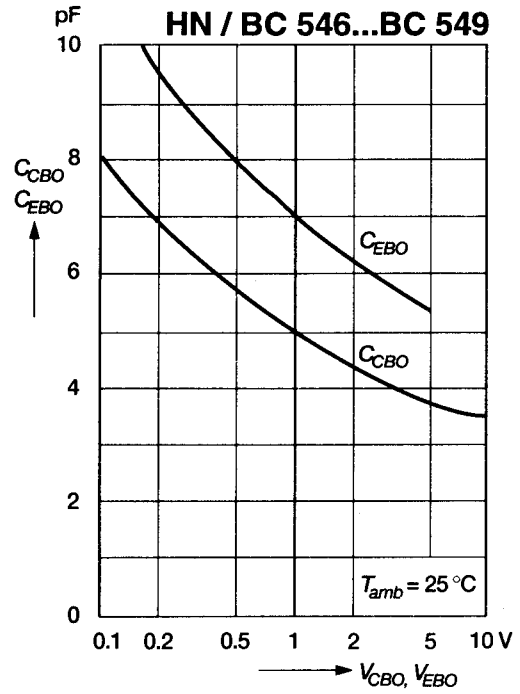

**Collector current versus base-emitter voltage**



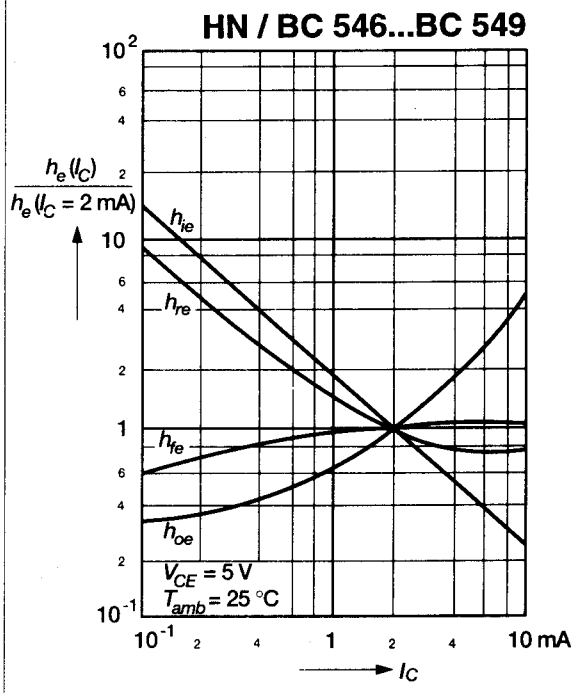

**Collector saturation voltage versus collector current**



**Collector-base capacitance, Emitter-base capacitance versus reverse bias voltage**




**Relative h-parameters versus collector current**




**Gain-bandwidth product versus collector current**