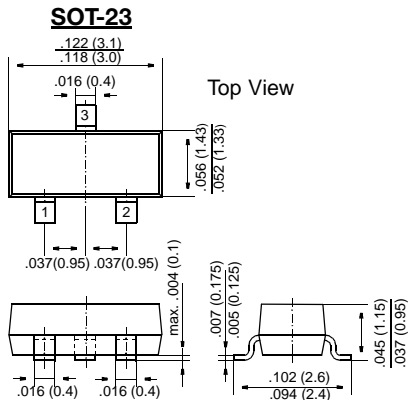


BC846 THRU BC849

Small Signal Transistors (NPN)



FEATURES

- ◆ NPN Silicon Epitaxial Planar Transistors for switching and AF amplifier applications.
- ◆ Especially suited for automatic insertion in thick- and thin-film circuits.
- ◆ These transistors are subdivided into three groups A, B and C according to their current gain. The type BC846 is available in groups A and B, however, the types BC847 and BC848 can be supplied in all three groups. The BC849 is a low noise type available in groups B and C. As complementary types, the PNP transistors BC856...BC859 are recommended.



MECHANICAL DATA

Case: SOT-23 Plastic Package

Weight: approx. 0.008 g

Marking code

| Type | Marking | Type | Marking |
|--------|---------|--------|---------|
| BC846A | 1A | BC848A | 1J |
| B | 1B | B | 1K |
| BC847A | 1E | C | 1L |
| B | 1F | BC849B | 2B |
| C | 1G | C | 2C |

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

| | Symbol | Value | Unit |
|---------------------------------------|---|-------------------------------------|-------------|
| Collector-Base Voltage | BC846 BC847 BC848, BC849 | V_{CB0} V_{CB0} V_{CB0} | V V V |
| Collector-Emitter Voltage | BC846 BC847 BC848, BC849 | V_{CES} V_{CES} V_{CES} | V V V |
| Collector-Emitter Voltage | BC846 BC847 BC848, BC849 | V_{CEO} V_{CEO} V_{CEO} | V V V |
| Emitter-Base Voltage | BC846, BC847 BC848, BC849 | V_{EBO} V_{EBO} | V 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 $T_{SB} = 50$ °C | P_{tot} | 310 ¹⁾ | mW |
| Junction Temperature | T_j | 150 | °C |
| Storage Temperature Range | T_S | -65 to +150 | °C |

¹⁾ Device on fiberglass substrate, see layout

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ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

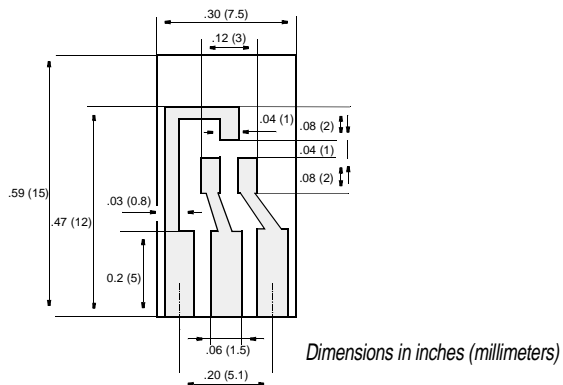
| | Symbol | Min. | Typ. | Max. | Unit | |
|---|---------------------|----------|------|---------------------|---------|-----------|
| h-Parameters at $V_{CE} = 5\text{ V}$, $I_C = 2\text{ mA}$, $f = 1\text{ kHz}$, Small Signal Current Gain | | | | | | |
| Current Gain Group | A | h_{fe} | 220 | – | – | |
| | B | h_{fe} | 330 | – | – | |
| | C | h_{fe} | 600 | – | – | |
| Input Impedance | A | h_{ie} | 1.6 | 2.7 | 4.5 | $k\Omega$ |
| | B | h_{ie} | 3.2 | 4.5 | 8.5 | $k\Omega$ |
| | C | h_{ie} | 6 | 8.7 | 15 | $k\Omega$ |
| Output Admittance | A | h_{oe} | – | 18 | 30 | μS |
| | B | h_{oe} | – | 30 | 60 | μS |
| | C | h_{oe} | – | 60 | 110 | μS |
| Reverse Voltage Transfer Ratio | 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 $V_{CE} = 5\text{ V}$, $I_C = 10\text{ }\mu A$ | | | | | | |
| Current Gain Group | A | h_{FE} | – | 90 | – | – |
| | B | h_{FE} | – | 150 | – | – |
| | C | h_{FE} | – | 270 | – | – |
| at $V_{CE} = 5\text{ V}$, $I_C = 2\text{ mA}$ | | | | | | |
| Current Gain Group | A | h_{FE} | 110 | 180 | 220 | – |
| | B | h_{FE} | 200 | 290 | 450 | – |
| | C | h_{FE} | 420 | 520 | 800 | – |
| Thermal Resistance Junction to Substrate Backside | R_{thSB} | – | – | 320 ¹⁾ | K/W | |
| Thermal Resistance Junction to Ambient Air | R_{thJA} | – | – | 450 ¹⁾ | K/W | |
| Collector Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$ at $I_C = 100\text{ mA}$, $I_B = 5\text{ mA}$ | | | | | | |
| V_{CEsat} | | – | 90 | 250 | mV | |
| | | – | 200 | 600 | mV | |
| Base Saturation Voltage at $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$ at $I_C = 100\text{ mA}$, $I_B = 5\text{ mA}$ | | | | | | |
| V_{BEsat} | | – | 700 | – | mV | |
| | | – | 900 | – | mV | |
| Base-Emitter Voltage at $V_{CE} = 5\text{ V}$, $I_C = 2\text{ mA}$ at $V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$ | | | | | | |
| V_{BE} | | 580 | 660 | 700 | mV | |
| | | – | – | 720 | mV | |
| Collector-Emitter Cutoff Current | | | | | | |
| at $V_{CE} = 80\text{ V}$ | BC846 | – | 0.2 | 15 | nA | |
| at $V_{CE} = 50\text{ V}$ | BC847 | – | 0.2 | 15 | nA | |
| at $V_{CE} = 30\text{ V}$ | BC848, BC849 | – | 0.2 | 15 | nA | |
| at $V_{CE} = 80\text{ V}$, $T_j = 125\text{ }^\circ C$ | BC846 | – | – | 4 | μA | |
| at $V_{CE} = 50\text{ V}$, $T_j = 125\text{ }^\circ C$ | BC847 | – | – | 4 | μA | |
| at $V_{CE} = 30\text{ V}$, $T_j = 125\text{ }^\circ C$ | BC848, BC849 | – | – | 4 | μA | |
| Gain-Bandwidth Product at $V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$, $f = 100\text{ MHz}$ | f_T | – | 300 | – | MHz | |
| 1) Device on fiberglass substrate, see layout | | | | | | |

BC846 THRU BC849

ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

| | Symbol | Min. | Typ. | Max. | Unit |
|---|-----------|------|------|------|------|
| Collector-Base Capacitance at $V_{CB} = 10 \text{ V}$, $f = 1 \text{ MHz}$ | C_{CBO} | – | 3.5 | 6 | pF |
| Emitter-Base Capacitance at $V_{EB} = 0.5 \text{ V}$, $f = 1 \text{ MHz}$ | C_{EBO} | – | 9 | – | pF |
| Noise Figure at $V_{CE} = 5 \text{ V}$, $I_C = 200 \mu\text{A}$, $R_G = 2 \text{ k}\Omega$, $f = 1 \text{ kHz}$, $\Delta f = 200 \text{ Hz}$ BC846, BC847, BC848 | F | – | 2 | 10 | dB |
| | F | – | 1.2 | 4 | dB |
| at $V_{CE} = 5 \text{ V}$, $I_C = 200 \mu\text{A}$, $R_G = 2 \text{ k}\Omega$, $f = 30 \dots 15000 \text{ Hz}$ BC849 | F | – | 1.4 | 4 | dB |



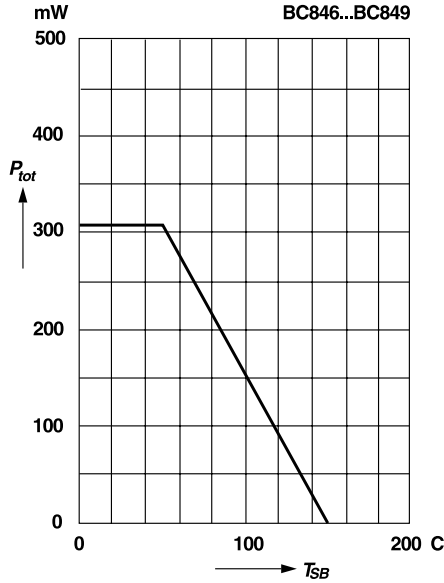
Layout for R_{thJA} test

Thickness: Fiberglass 0.059 in (1.5 mm)

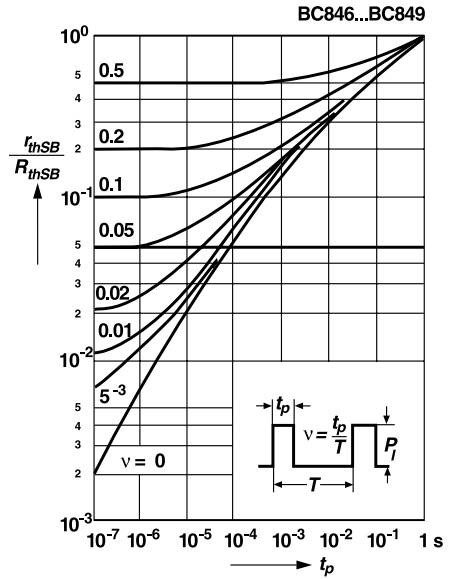
Copper leads 0.012 in (0.3 mm)

RATINGS AND CHARACTERISTIC CURVES BC846 THRU BC849

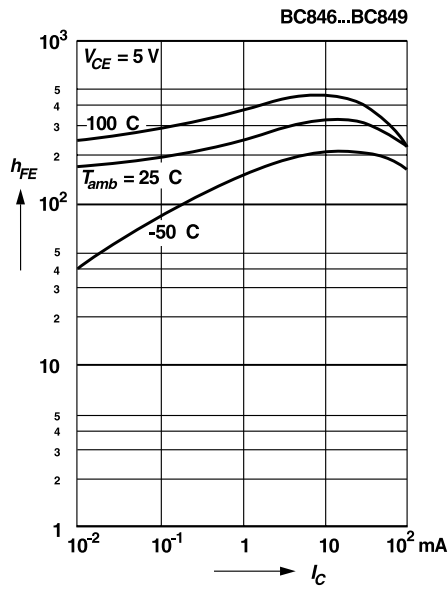
Admissible power dissipation versus temperature of substrate backside
Device on fiberglass substrate, see layout



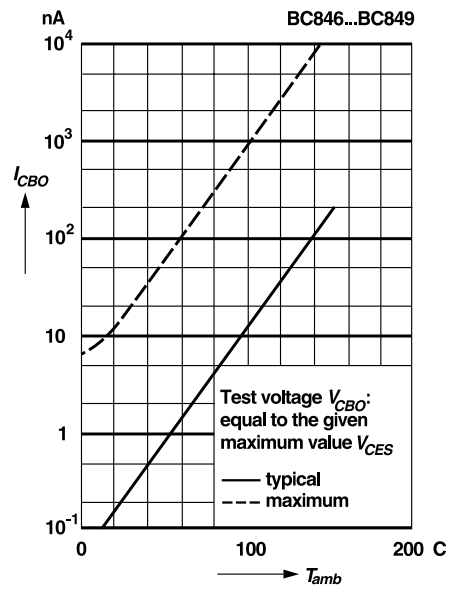
Pulse thermal resistance versus pulse duration (normalized)
Device on fiberglass substrate, see layout



DC current gain versus collector current

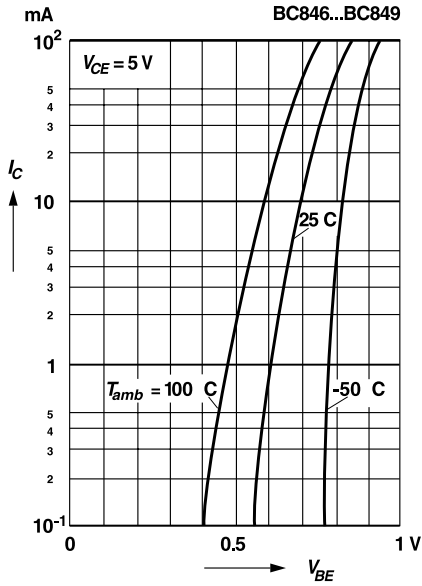


Collector-Base cutoff current versus ambient temperature

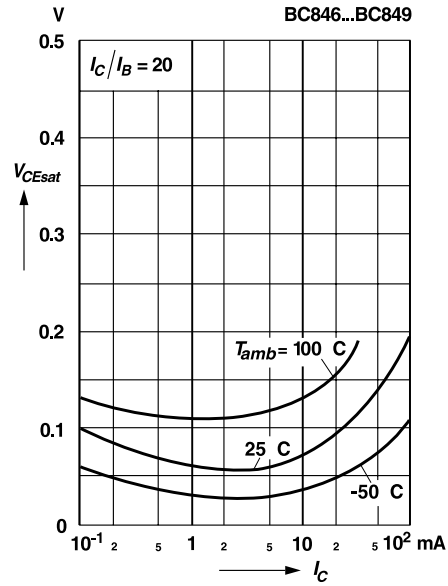


RATINGS AND CHARACTERISTIC CURVES BC846 THRU BC849

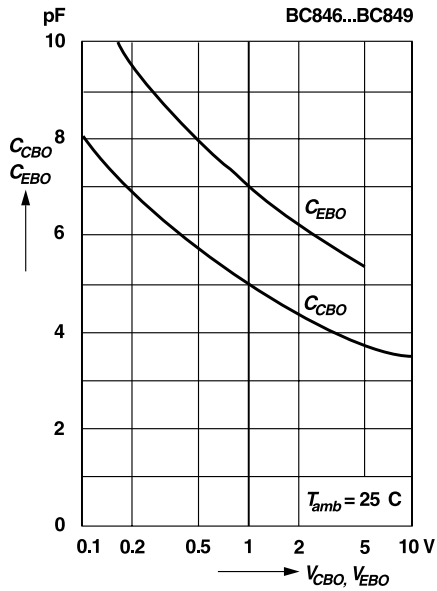
Collector current versus base-emitter voltage



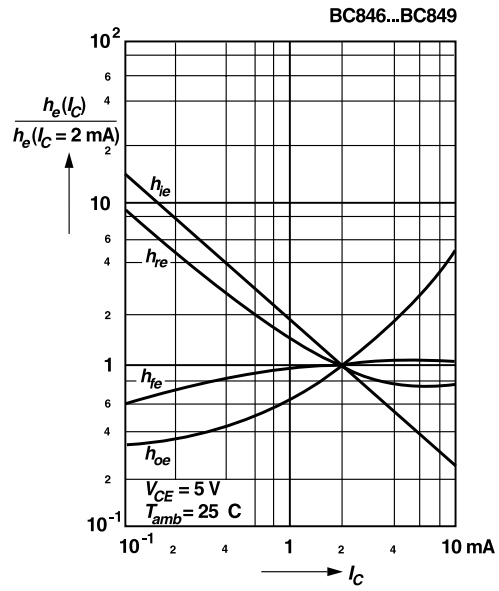
Collector saturation voltage versus collector current



Collector base capacitance, Emitter base capacitance versus reverse bias voltage

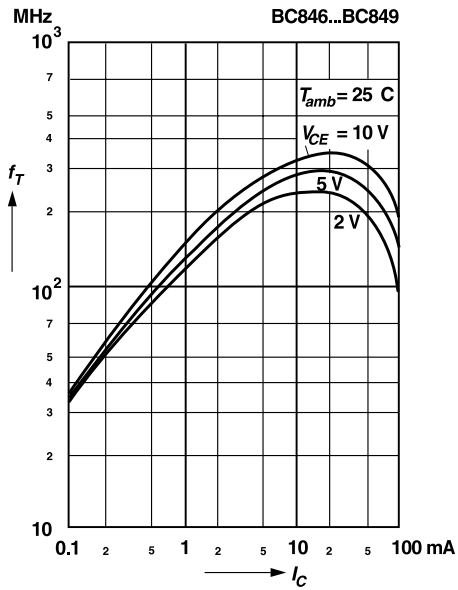


Relative h-parameters versus collector current

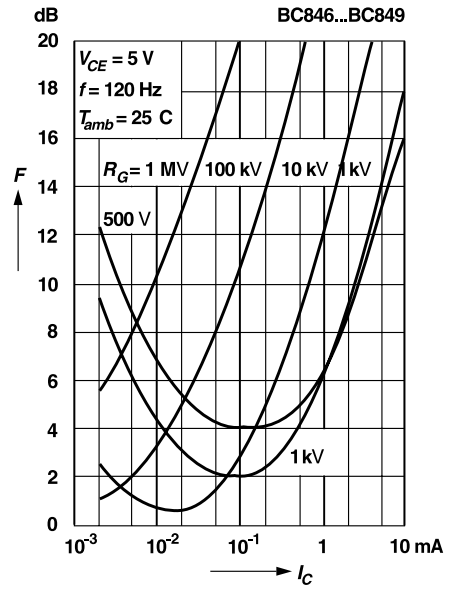


RATINGS AND CHARACTERISTIC CURVES BC846 THRU BC849

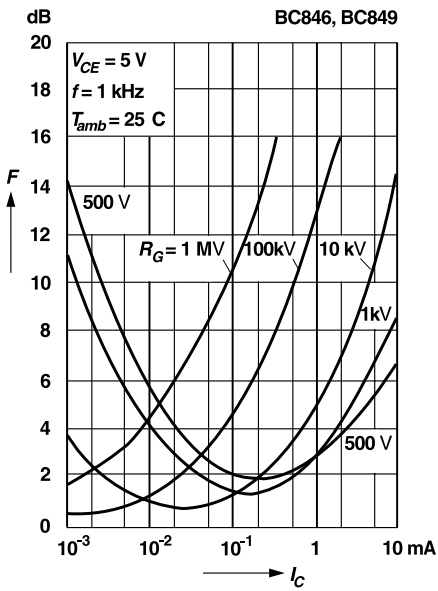
Gain-bandwidth product
versus collector current



Noise figure
versus collector current



Noise figure
versus collector current



Noise figure
versus collector emitter voltage

