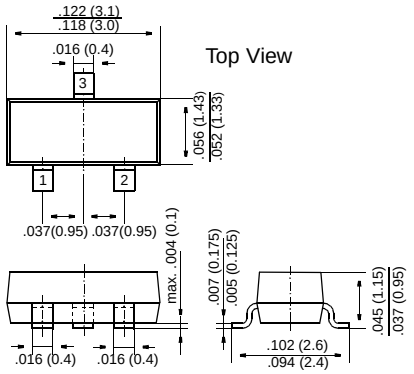
# BC846 THRU BC849

## Small Signal Transistors (NPN)

**SOT-23**




Pin configuration
1 = Base, 2 = Emitter, 3 = Collector.

### 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 |
|---|---|
| BC846A | 1A |
| B | 1B |
| BC847A | 1E |
| B | 1F |
| C | 1G |

| Type | Marking |
|---|---|
| BC848A | 1J |
| B | 1K |
| C | 1L |
| BC849B | 2B |
| C | 2C |

### MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

| | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | **BC846** | $V_{CBO}$ | 80 | V |
| | **BC847** | $V_{CBO}$ | 50 | V |
| | **BC848, BC849** | $V_{CBO}$ | 30 | V |
| Collector-Emitter Voltage | **BC846** | $V_{CES}$ | 80 | V |
| | **BC847** | $V_{CES}$ | 50 | V |
| | **BC848, BC849** | $V_{CES}$ | 30 | V |
| Collector-Emitter Voltage | **BC846** | $V_{CEO}$ | 65 | V |
| | **BC847** | $V_{CEO}$ | 45 | V |
| | **BC848, BC849** | $V_{CEO}$ | 30 | V |
| Emitter-Base Voltage | **BC846, BC847** | $V_{EBO}$ | 6 | V |
| | **BC848, BC849** | $V_{EBO}$ | 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 $T_{SB}$ = 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

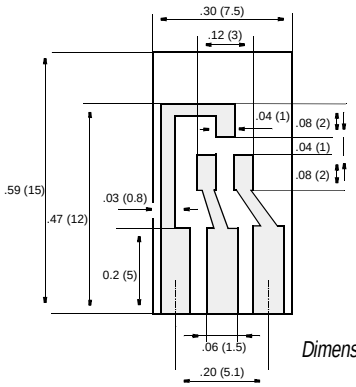
| | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| h-Parameters at $V_{CE}$ = 5 V, $I_C$ = 2 mA, f = 1 kHz, Small Signal Current Gain | | | | | |
| **Current Gain Group A** | $h_{fe}$ | – | 220 | – | – |
| **B** | $h_{fe}$ | – | 330 | – | – |
| **C** | $h_{fe}$ | – | 600 | – | – |
| 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 $V_{CE}$ = 5 V, $I_C$ = 10 µA | | | | | |
| **Current Gain Group A** | $h_{FE}$ | – | 90 | – | – |
| **B** | $h_{FE}$ | – | 150 | – | – |
| **C** | $h_{FE}$ | – | 270 | – | – |
| at $V_{CE}$ = 5 V, $I_C$ = 2 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 mA, $I_B$ = 0.5 mA | $V_{CEsat}$ | – | 90 | 250 | 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 **BC846** | $I_{CES}$ | – | 0.2 | 15 | nA |
| at $V_{CE}$ = 50 V **BC847** | $I_{CES}$ | – | 0.2 | 15 | nA |
| at $V_{CE}$ = 30 V **BC848, BC849** | $I_{CES}$ | – | 0.2 | 15 | nA |
| at $V_{CE}$ = 80 V, $T_j$ = 125 °C **BC846** | $I_{CES}$ | – | – | 4 | µA |
| at $V_{CE}$ = 50 V, $T_j$ = 125 °C **BC847** | $I_{CES}$ | – | – | 4 | µA |
| at $V_{CE}$ = 30 V, $T_j$ = 125 °C **BC848, BC849** | $I_{CES}$ | – | – | 4 | µA |
| Gain-Bandwidth Product at $V_{CE}$ = 5 V, $I_C$ = 10 mA, f = 100 MHz | $f_T$ | – | 300 | – | MHz |

[1)] Device on fiberglass substrate, see layout

## ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

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



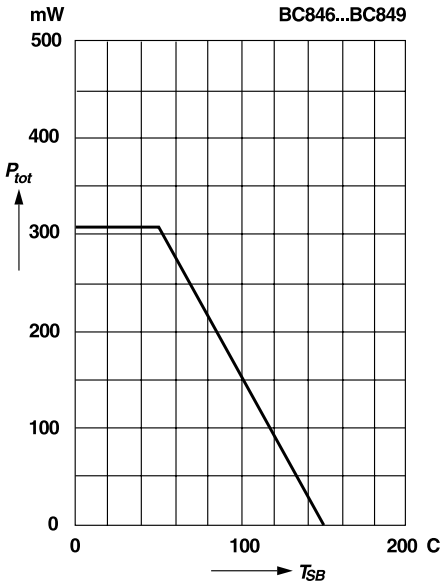

*Dimensions in inches (millimeters)*

**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

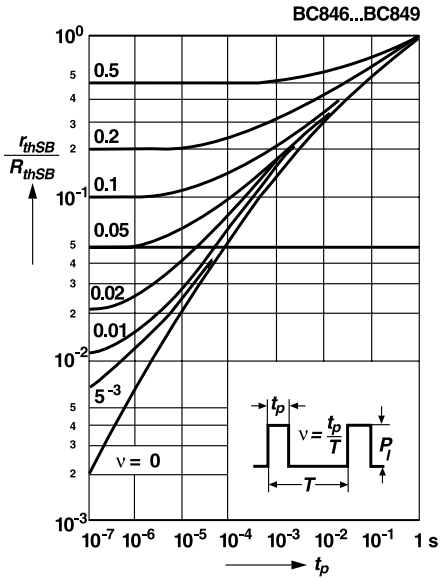
**Admissible power dissipation versus temperature of substrate backside**

Device on fiberglass substrate, see layout

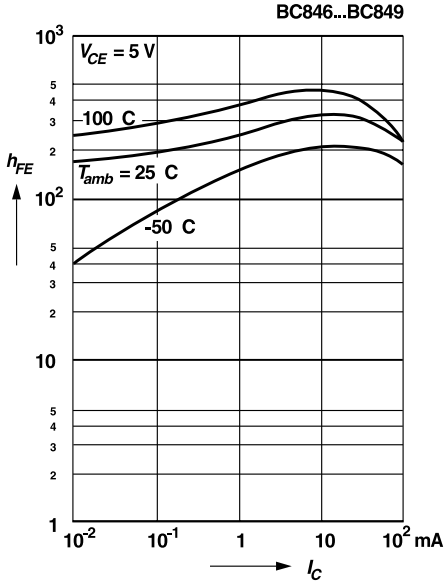



**Pulse thermal resistance versus pulse duration (normalized)**

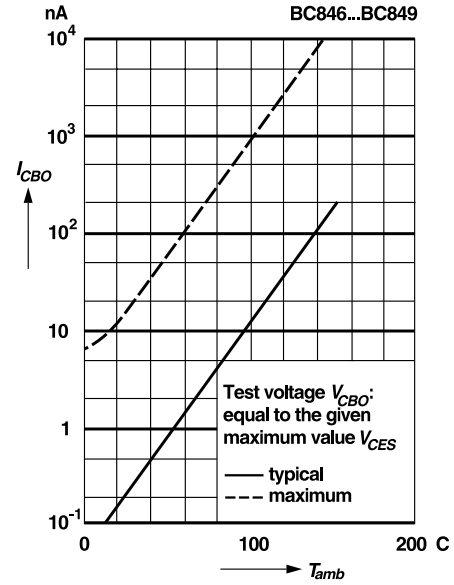
Device on fiberglass substrate, see layout




**DC current gain versus collector current**




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

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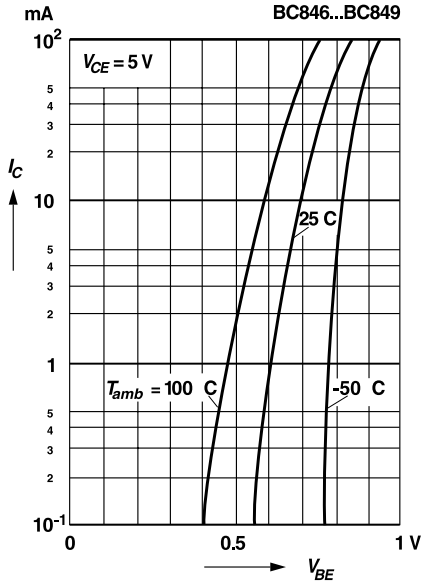
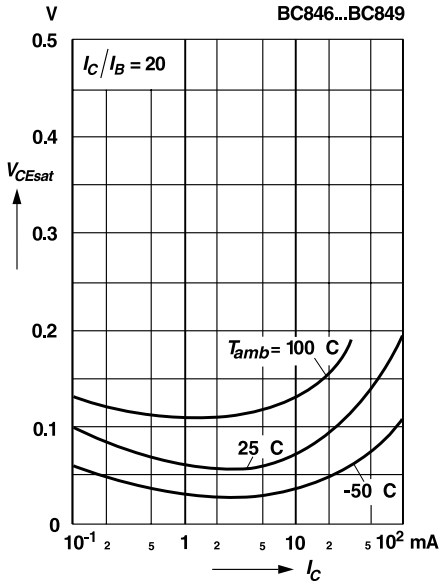
# RATINGS AND CHARACTERISTIC CURVES BC846 THRU BC849

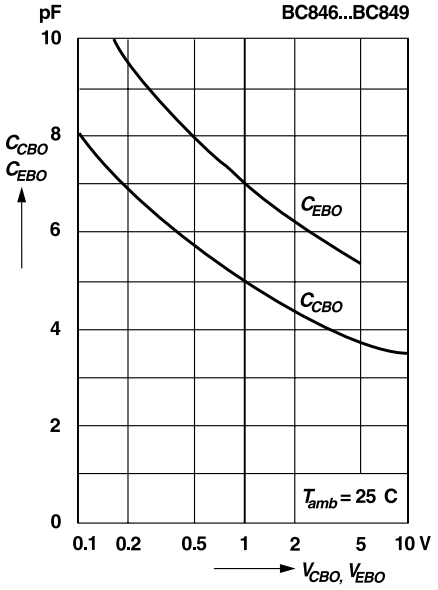
**Collector current versus base-emitter voltage**



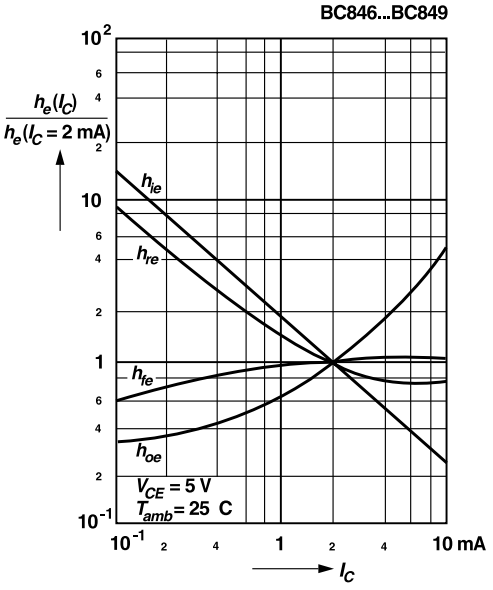

**Collector saturation voltage versus collector current**




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




**Relative h-parameters versus collector current**

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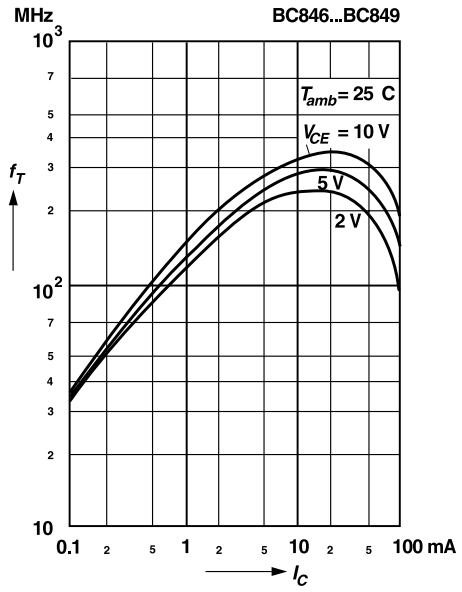
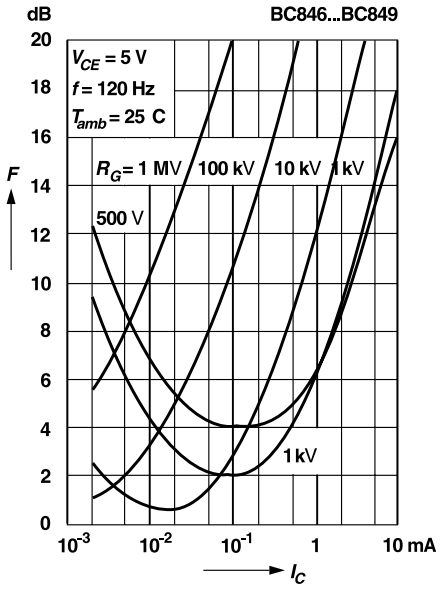
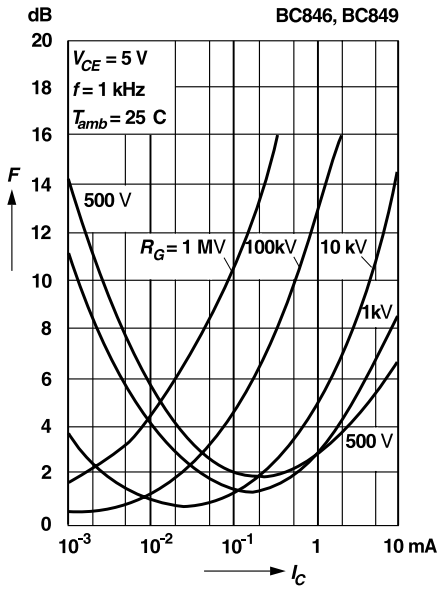
**Gain-bandwidth product versus collector current**




**Noise figure versus collector current**




**Noise figure versus collector current**




**Noise figure versus collector emitter voltage**