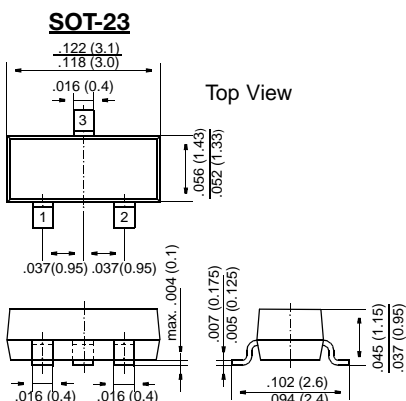


# BC846 THRU BC849

## Small Signal Transistors (NPN)



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	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	<b>BC846</b> <b>BC847</b> <b>BC848, BC849</b>	$V_{CB0}$ $V_{CB0}$ $V_{CB0}$	V V V
Collector-Emitter Voltage	<b>BC846</b> <b>BC847</b> <b>BC848, BC849</b>	$V_{CES}$ $V_{CES}$ $V_{CES}$	V V V
Collector-Emitter Voltage	<b>BC846</b> <b>BC847</b> <b>BC848, BC849</b>	$V_{CEO}$ $V_{CEO}$ $V_{CEO}$	V V V
Emitter-Base Voltage	<b>BC846, BC847</b> <b>BC848, BC849</b>	$V_{EBO}$ $V_{EBO}$	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 <sup>1)</sup>	mW
Junction Temperature	$T_j$	150	°C
Storage Temperature Range	$T_S$	-65 to +150	°C

<sup>1)</sup> Device on fiberglass substrate, see layout

# BC846 THRU BC849

## ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

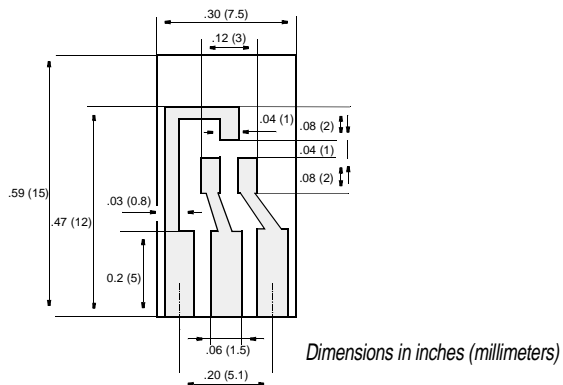
	Symbol	Min.	Typ.	Max.	Unit
h-Parameters at $V_{CE} = 5\text{ V}$ , $I_C = 2\text{ mA}$ , $f = 1\text{ kHz}$ , Small Signal Current Gain					
Current Gain Group	<b>A</b>	$h_{fe}$	220	–	–
	<b>B</b>	$h_{fe}$	330	–	–
	<b>C</b>	$h_{fe}$	600	–	–
Input Impedance	<b>A</b>	$h_{ie}$	1.6	2.7	4.5
	<b>B</b>	$h_{ie}$	3.2	4.5	8.5
	<b>C</b>	$h_{ie}$	6	8.7	15
Output Admittance	<b>A</b>	$h_{oe}$	18	30	$\mu\text{S}$
	<b>B</b>	$h_{oe}$	30	60	$\mu\text{S}$
	<b>C</b>	$h_{oe}$	60	110	$\mu\text{S}$
Reverse Voltage Transfer Ratio	<b>A</b>	$h_{re}$	$1.5 \cdot 10^{-4}$	–	–
	<b>B</b>	$h_{re}$	$2 \cdot 10^{-4}$	–	–
	<b>C</b>	$h_{re}$	$3 \cdot 10^{-4}$	–	–
DC Current Gain at $V_{CE} = 5\text{ V}$ , $I_C = 10\text{ }\mu\text{A}$					
Current Gain Group	<b>A</b>	$h_{FE}$	90	–	–
	<b>B</b>	$h_{FE}$	150	–	–
	<b>C</b>	$h_{FE}$	270	–	–
at $V_{CE} = 5\text{ V}$ , $I_C = 2\text{ mA}$					
Current Gain Group	<b>A</b>	$h_{FE}$	110	180	220
	<b>B</b>	$h_{FE}$	200	290	450
	<b>C</b>	$h_{FE}$	420	520	800
Thermal Resistance Junction to Substrate Backside	$R_{thSB}$	–	–	320 <sup>1)</sup>	K/W
Thermal Resistance Junction to Ambient Air	$R_{thJA}$	–	–	450 <sup>1)</sup>	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 $V_{CE} = 80\text{ V}$	<b>BC846</b>	–	0.2	15	nA
at $V_{CE} = 50\text{ V}$	<b>BC847</b>	–	0.2	15	nA
at $V_{CE} = 30\text{ V}$	<b>BC848, BC849</b>	–	0.2	15	nA
at $V_{CE} = 80\text{ V}$ , $T_j = 125\text{ }^\circ\text{C}$	<b>BC846</b>	–	–	4	$\mu\text{A}$
at $V_{CE} = 50\text{ V}$ , $T_j = 125\text{ }^\circ\text{C}$	<b>BC847</b>	–	–	4	$\mu\text{A}$
at $V_{CE} = 30\text{ V}$ , $T_j = 125\text{ }^\circ\text{C}$	<b>BC848, BC849</b>	–	–	4	$\mu\text{A}$
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 $V_{CE} = 5 \text{ V}$ , $I_C = 200 \mu\text{A}$ , $R_G = 2 \text{ k}\Omega$ , $f = 1 \text{ kHz}$ , $\Delta f = 200 \text{ Hz}$ <b>BC846, BC847, BC848</b>	F	–	2	10	dB
	F	–	1.2	4	dB
at $V_{CE} = 5 \text{ V}$ , $I_C = 200 \mu\text{A}$ , $R_G = 2 \text{ k}\Omega$ , $f = 30 \dots 15000 \text{ Hz}$ <b>BC849</b>	F	–	1.4	4	dB



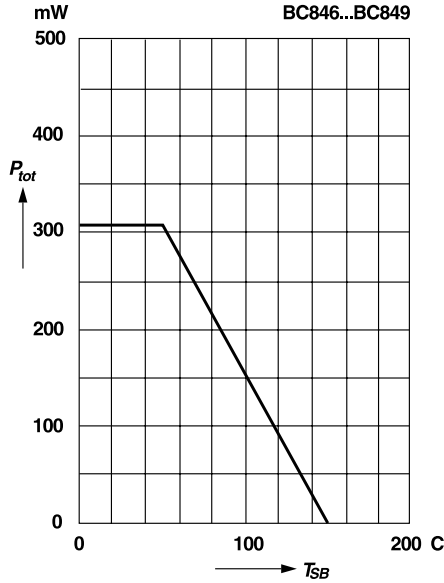
### Layout for $R_{thJA}$ test

Thickness: Fiberglass 0.059 in (1.5 mm)

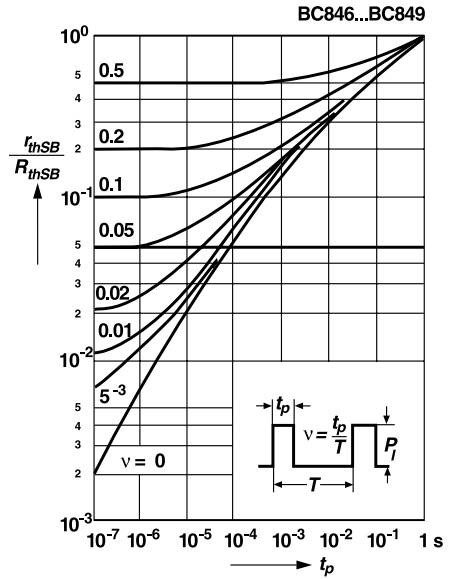
Copper leads 0.012 in (0.3 mm)

# RATINGS AND CHARACTERISTIC CURVES BC846 THRU BC849

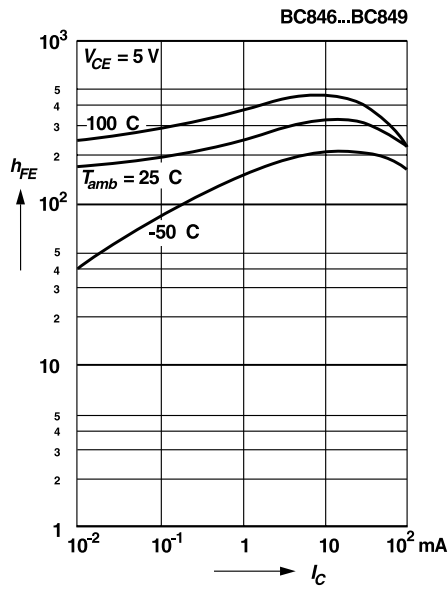
**Admissible power dissipation versus temperature of substrate backside**  
Device on fiberglass substrate, see layout



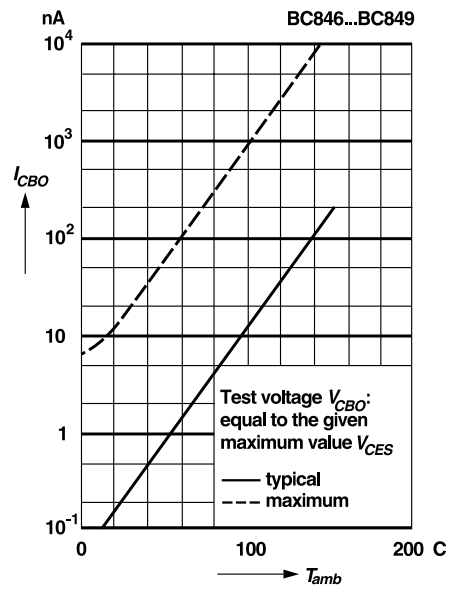
**Pulse thermal resistance versus pulse duration (normalized)**  
Device on fiberglass substrate, see layout



**DC current gain versus collector current**

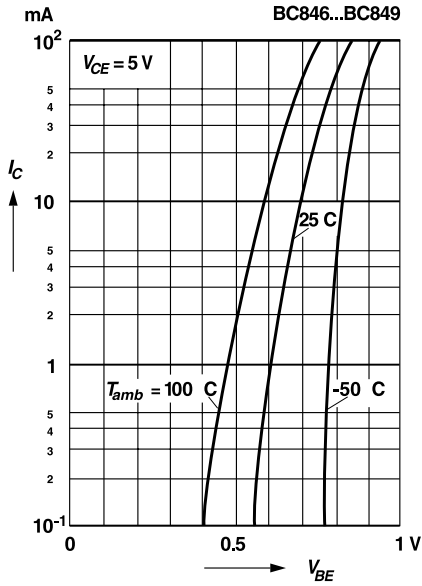


**Collector-Base cutoff current versus ambient temperature**

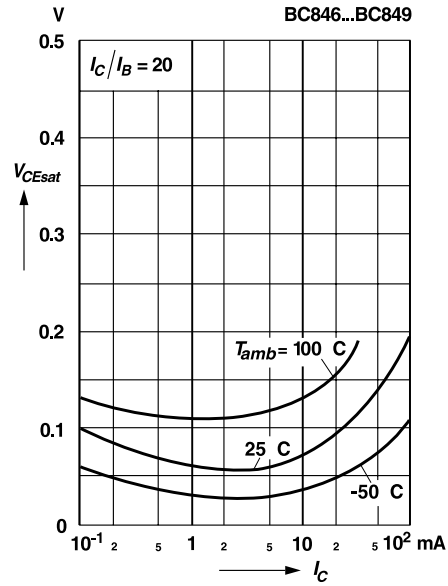


# RATINGS AND CHARACTERISTIC CURVES BC846 THRU BC849

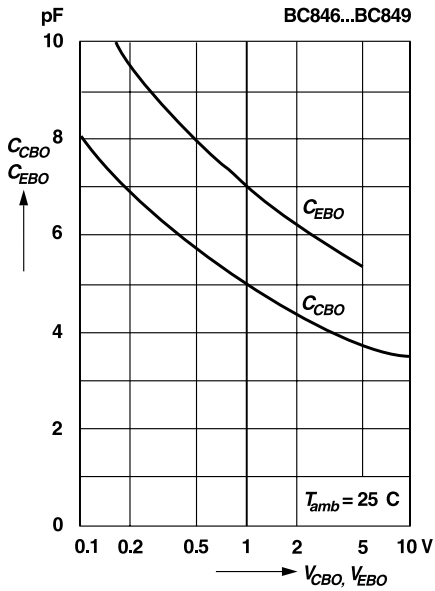
Collector current versus base-emitter voltage



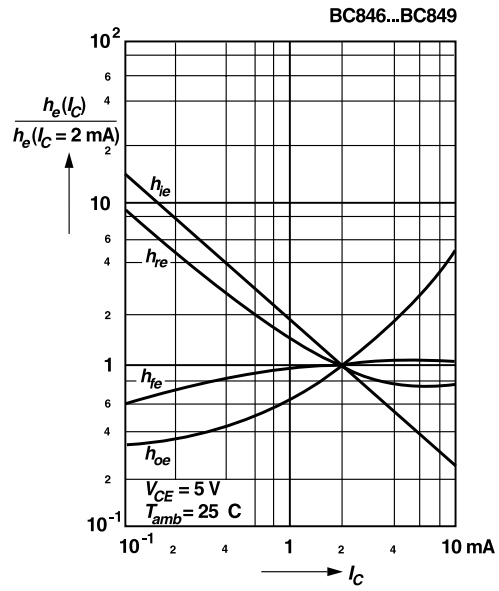
Collector saturation voltage versus collector current



Collector base capacitance, Emitter base capacitance versus reverse bias voltage

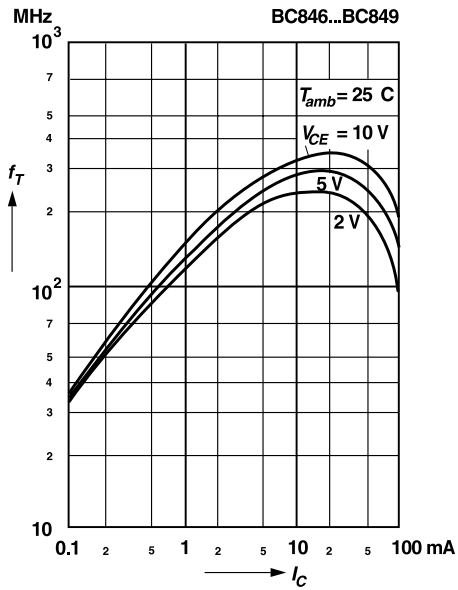


Relative h-parameters versus collector current

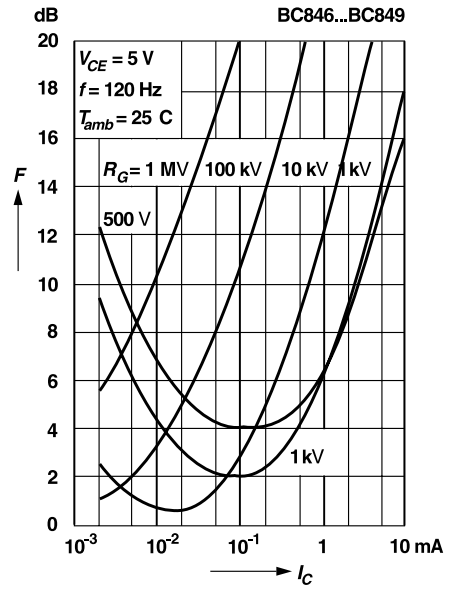


# RATINGS AND CHARACTERISTIC CURVES BC846 THRU BC849

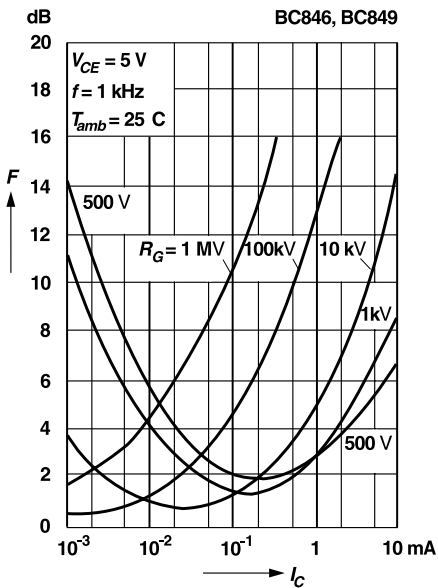
**Gain-bandwidth product  
versus collector current**



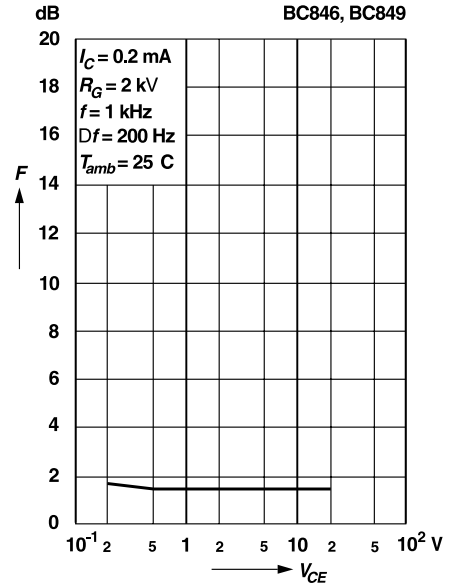
**Noise figure  
versus collector current**



**Noise figure  
versus collector current**



**Noise figure  
versus collector emitter voltage**



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