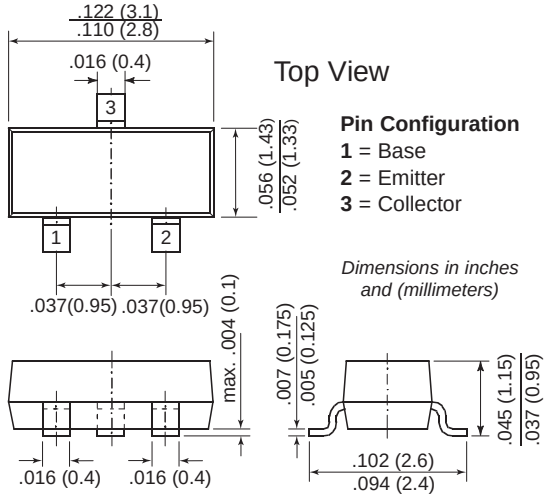
Small Signal Transistors (NPN)

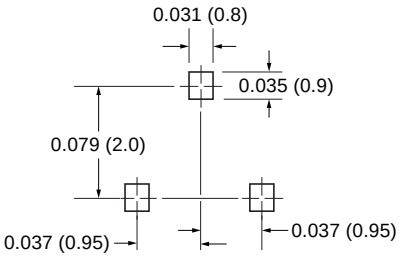
TO-236AB (SOT-23)



Pin Configuration
1 = Base
2 = Emitter
3 = Collector

Dimensions in inches and (millimeters)

Mounting Pad Layout



Type	Marking
BC846A	1A
B	1B
BC847A	1E
B	1F
C	1G

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

Mechanical Data

Case: SOT-23 Plastic Package
Weight: approx. 0.008g
Packaging Codes/Options:
E8/10K per 13” reel (8mm tape), 30K/box
E9/3K per 7” reel (8mm tape), 30K/box

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.

Maximum Ratings and Thermal Characteristics (T_A = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Collector-Base Voltage	BC846 BC847 BC848, BC849	V_{CBO}	80 50 30	V
Collector-Emitter Voltage	BC846 BC847 BC848, BC849	V_{CES}	80 50 30	V
Collector-Emitter Voltage	BC846 BC847 BC848, BC849	V_{CEO}	65 45 30	V
Emitter-Base Voltage	BC846, BC847 BC848, BC849	V_{EBO}	6 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
Thermal Resistance Junction to Ambiant Air		$R_{\theta JA}$	450(1)	°C/W
Thermal Resistance Junction to Substrate Backside		$R_{\theta SB}$	320(1)	°C/W
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_S	–65 to +150	°C

Note: (1) Device on fiberglass substrate, see layout on third page.

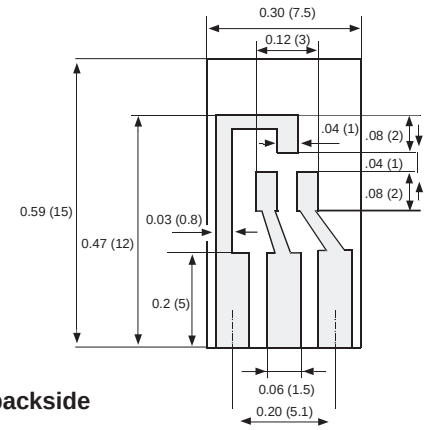
Electrical Characteristics (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Small Signal Current Gain						
Current Gain Group A	h_{fe}	V_{CE} = 5V, I_C = 2mA f = 1kHz	—	220	—	—
B			—	330	—	—
C			—	600	—	—
Input Impedance						
Current Gain Group A	h_{ie}	V_{CE} = 5V, I_C = 2mA f = 1kHz	1.6	2.7	4.5	kΩ
B			3.2	4.5	8.5	
C			6.0	8.7	15.0	
Output Admittance						
Current Gain Group A	h_{oe}	V_{CE} = 5V, I_C = 2mA f = 1kHz	—	18	30	µS
B			—	30	60	
C			—	60	110	
Reverse Voltage Transfer Ratio						
Current Gain Group A	h_{re}	V_{CE} = 5 V, I_C = 2mA f = 1kHz	—	$1.5 \cdot 10^{-4}$	—	—
B			—	$2 \cdot 10^{-4}$	—	—
C			—	$3 \cdot 10^{-4}$	—	—
DC Current Gain						
Current Gain Group A	h_{FE}	V_{CE} = 5V, I_C = 10µA	—	90	—	—
B			—	150	—	—
C			—	270	—	—
Current Gain Group A	h_{FE}	V_{CE} = 5V, I_C = 2mA	110	180	220	—
B			200	290	450	—
C			420	520	800	—
Collector Saturation Voltage	V_{CEsat}	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5mA	— —	90 200	250 600	mV
Base Saturation Voltage	V_{BEsat}	I_C = 10mA, I_B = 0.5mA I_C = 100mA, I_B = 5mA	— —	700 900	— —	mV
Base-Emitter Voltage	V_{BEon}	V_{CE} = 5V, I_C = 2mA V_{CE} = 5V, I_C = 10mA	580 —	660 —	700 770	mV
Collector-Base Cutoff Current	I_{CBO}	V_{CB} = 30V V_{CB} = 30V, T_J = 150°C	— —	— —	15 5	nA µA
Gain-Bandwidth Product	f_T	V_{CE} = 5V, I_C = 10mA f = 100MHz	—	300	—	MHz
Collector-Base Capacitance	C_{CBO}	V_{CB} = 10V, f = 1MHz	—	3.5	6	pF
Emitter-Base Capacitance	C_{EBO}	V_{EB} = 0.5V, f = 1MHz	—	9	—	pF
BC846, BC847, BC848	F	V_{CE} = 5V, I_C = 200µA	—	2	10	dB
BC849		R_G = 2kΩ, f = 1kHz, Δf = 200 Hz	—	1.2	4	dB
Noise Figure						
BC849		V_{CE} = 5V, I_C = 200µA R_G = 2kΩ, f = 30...15000Hz	—	1.4	4	dB

Note: (1) Device on fiberglass substrate, see layout on next page

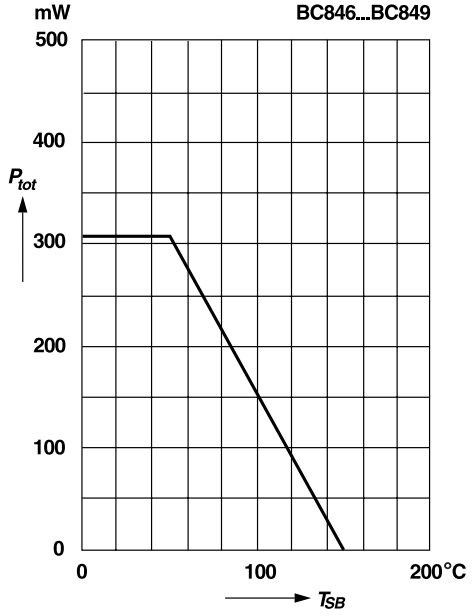
Layout for $R_{\Theta JA}$ test

Thickness:
Fiberglass 0.059 in. (1.5 mm)
Copper leads 0.012 in. (0.3 mm)

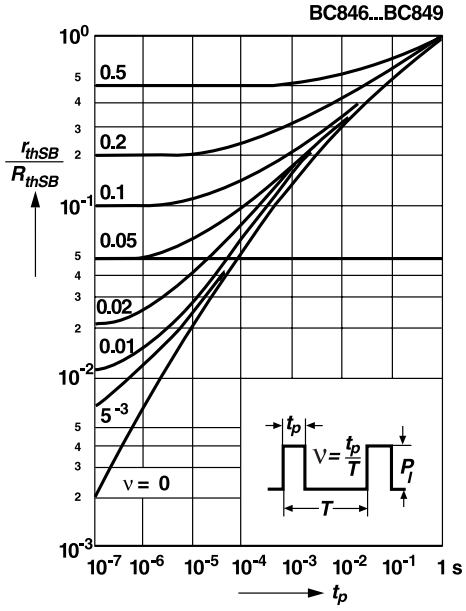


Dimensions in inches (millimeters)

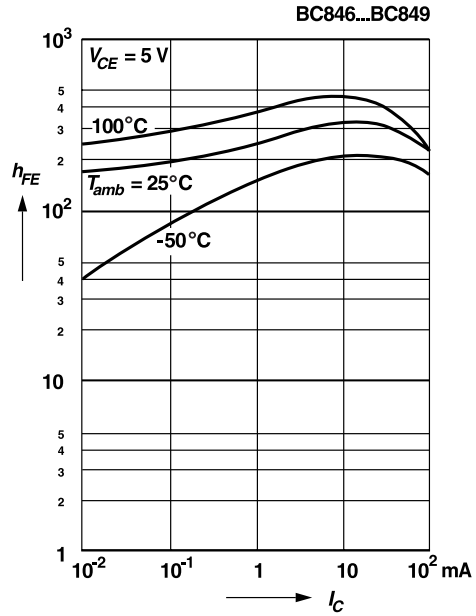
Admissible power dissipation versus temperature of substrate backside
Device on fiblerglass substrate, see layout



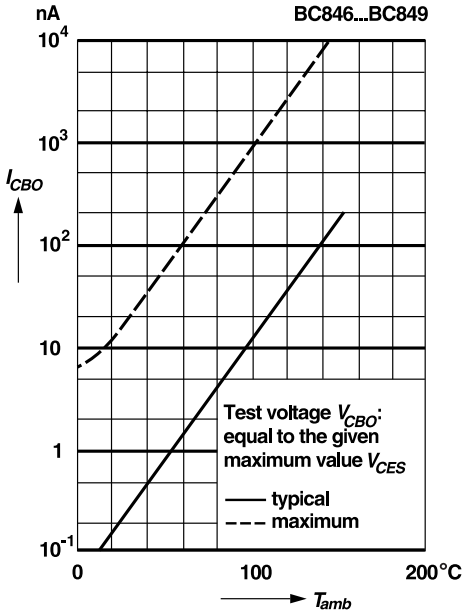
Pulse thermal resistance versus pulse duration (normalized)
Device on fiblerglass substrate, see layout



DC current gain versus collector current

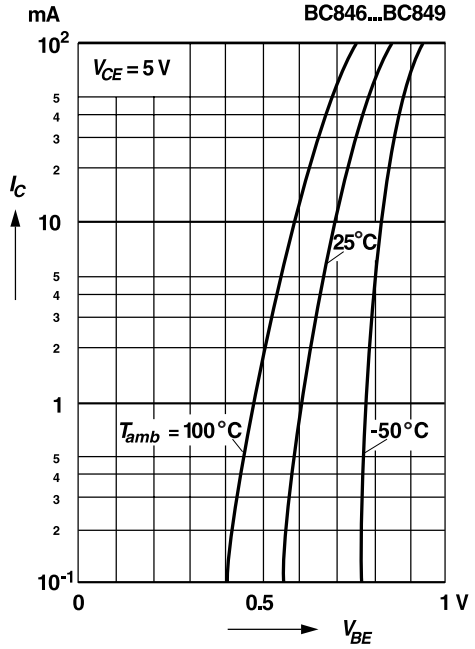


Collector-Base cutoff current versus ambient temperature

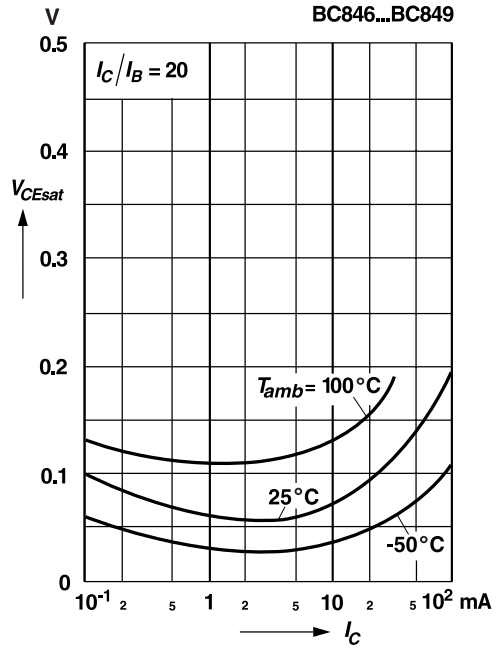


Ratings and Characteristic Curves (TA = 25°C unless otherwise noted)

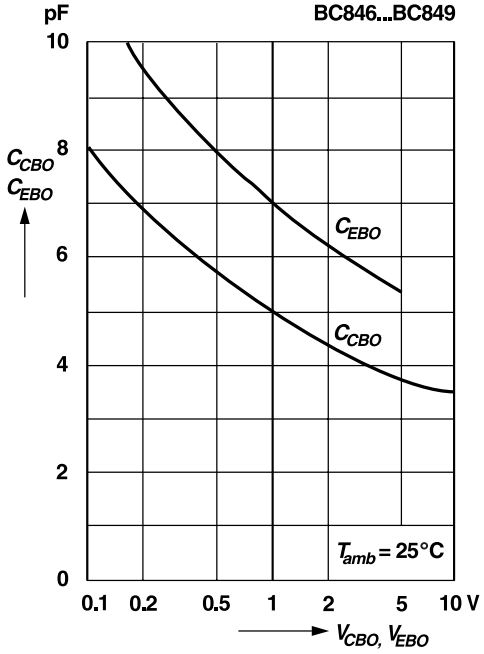
Collector current versus base-emitter voltage



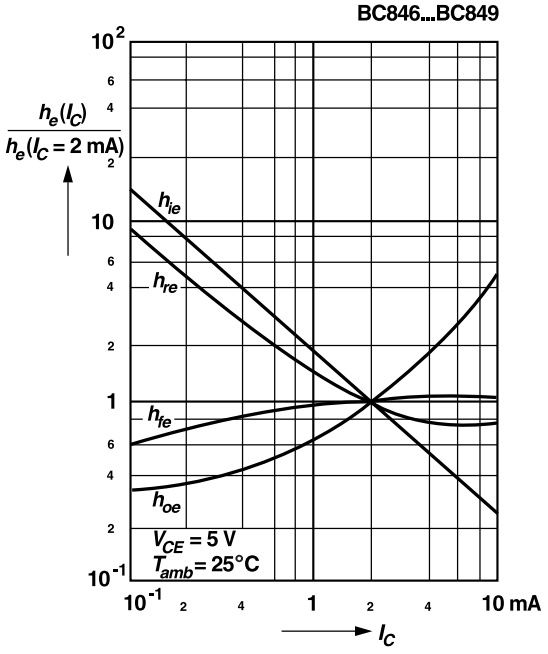
Collector saturation voltage versus collector current



Collector base capacitance, Emitter base capacitance versus reverse bias voltage

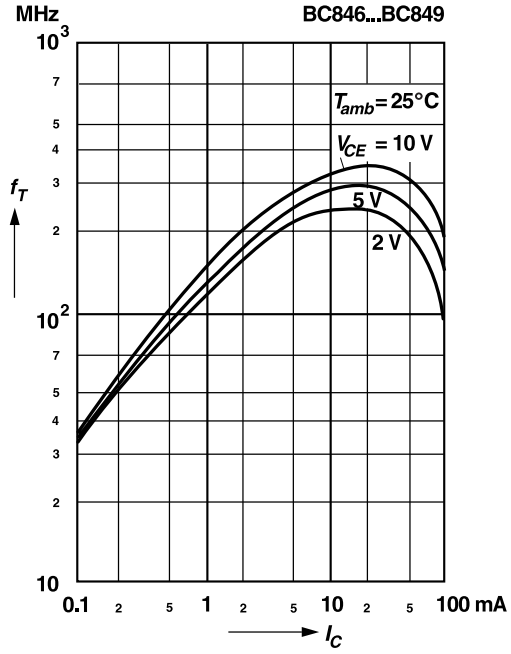


Relative h-parameters versus collector current

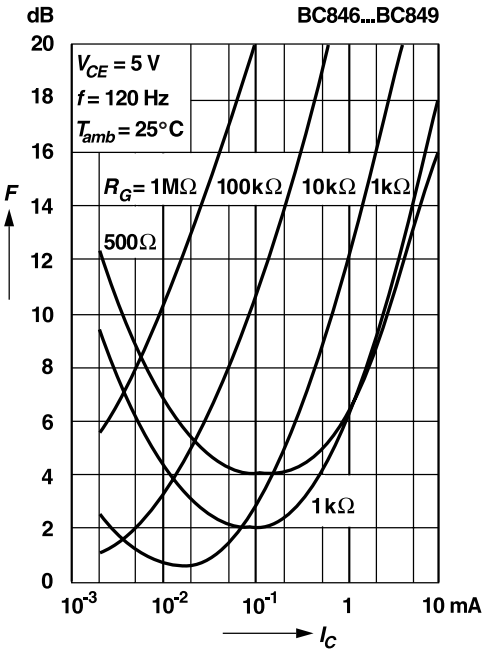


Ratings and Characteristic Curves (TA = 25°C unless otherwise noted)

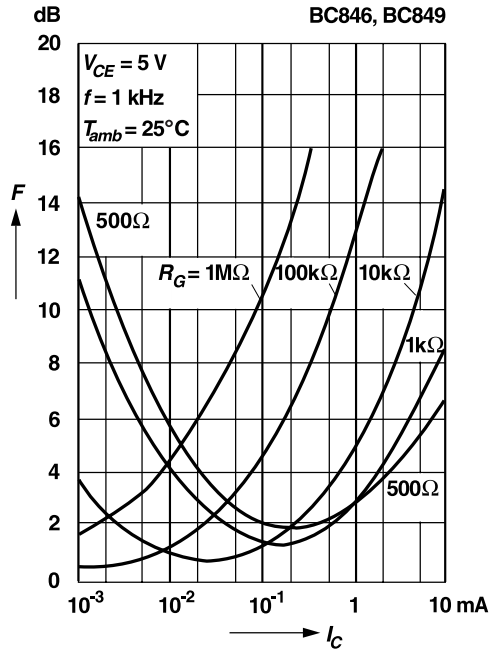
Gain-bandwidth product versus collector current



Noise figure versus collector current



Noise figure versus collector current



Noise figure versus collector emitter voltage