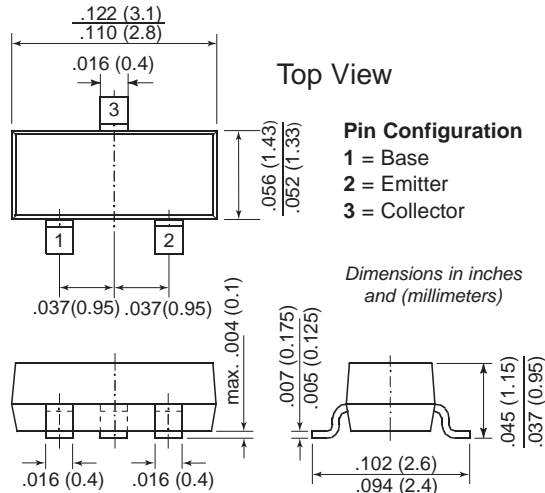


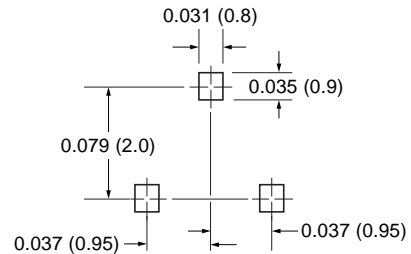
Small Signal Transistors (NPN)



TO-236AB (SOT-23)



Mounting Pad Layout



Type	Marking	Type	Marking
BC846A	1A	BC848A	1J
B	1B	B	1K
BC847A	1E	C	1L
B	1F	BC849B	2B
C	1G	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	V _{CBO}	80	V
	BC847		50	
	BC848, BC849		30	
Collector-Emitter Voltage	BC846	V _{CES}	80	V
	BC847		50	
	BC848, BC849		30	
Collector-Emitter Voltage	BC846	V _{CEO}	65	V
	BC847		45	
	BC848, BC849		30	
Emitter-Base Voltage	BC846, BC847	V _{EBO}	6	V
	BC848, BC849		5	
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 Ambient Air		R _{θJA}	450 ⁽¹⁾	°C/W
Thermal Resistance Junction to Substrate Backside		R _{θSB}	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.

Small Signal Transistors (NPN)

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

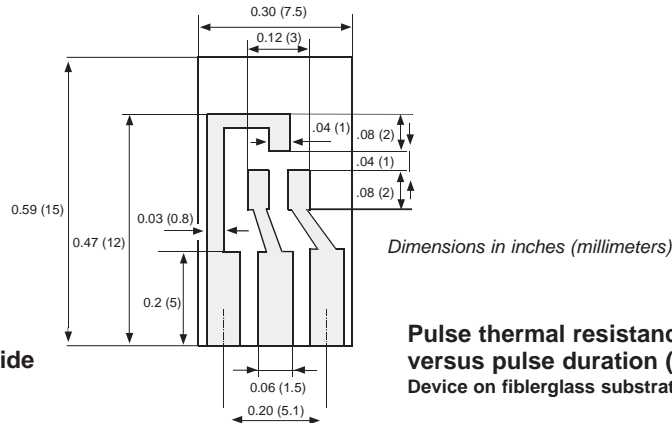
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Small Signal Current Gain						
Current Gain Group A	h _{fe}	V _{CE} = 5V, I _C = 2mA f = 1kHz	—	220	—	—
B			—	330	—	—
C			—	600	—	—
Input Impedance						
Current Gain Group A	h _{ie}	V _{CE} = 5V, I _C = 2mA f = 1kHz	1.6	2.7	4.5	kΩ
B			3.2	4.5	8.5	
C			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 · 10 ⁻⁴	—	—
B			—	2 · 10 ⁻⁴	—	—
C			—	3 · 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 _{CB0}	V _{CB} = 10V, f = 1MHz	—	3.5	6	pF
Emitter-Base Capacitance	C _{EB0}	V _{EB} = 0.5V, f = 1MHz	—	9	—	pF
Noise Figure	F	V _{CE} = 5V, I _C = 200μA R _G = 2kΩ, f = 1kHz, Δf = 200Hz	— —	2 1.2	10 4	dB dB
		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

Small Signal Transistors (NPN)

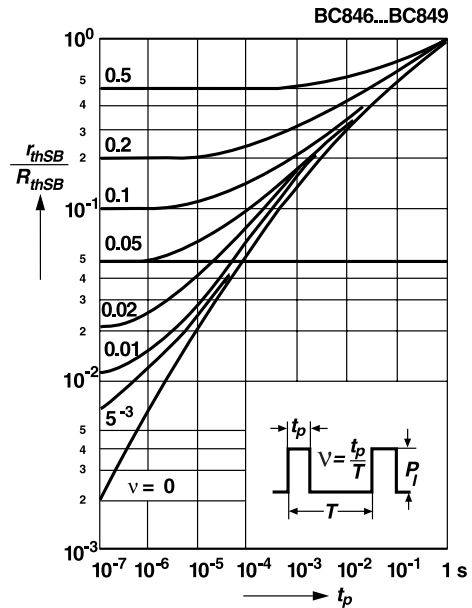
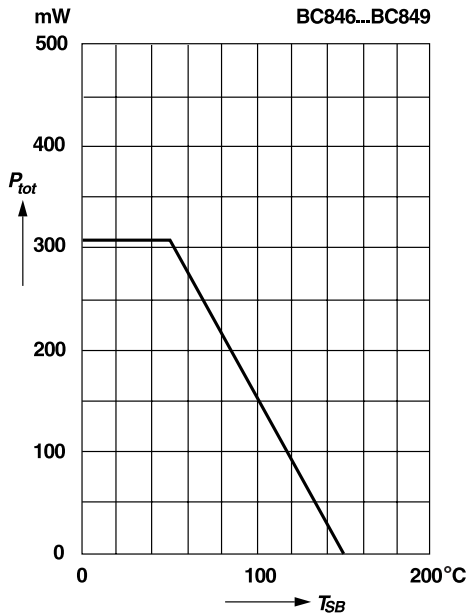
Layout for $R_{\theta JA}$ test

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

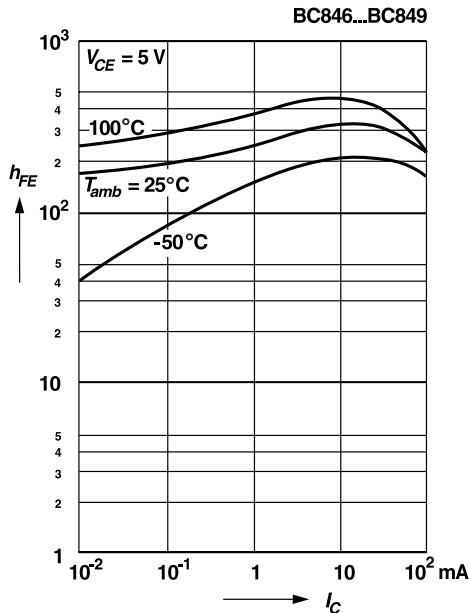


Admissible power dissipation versus temperature of substrate backside
 Device on fiberglass substrate, see layout

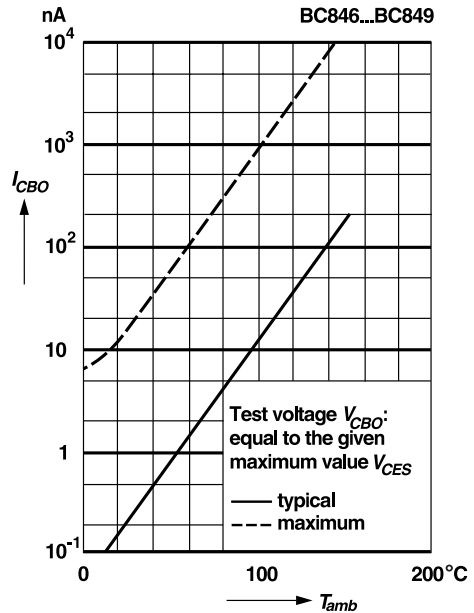
Pulse thermal resistance versus pulse duration (normalized)
 Device on fiberglass substrate, see layout



DC current gain versus collector current



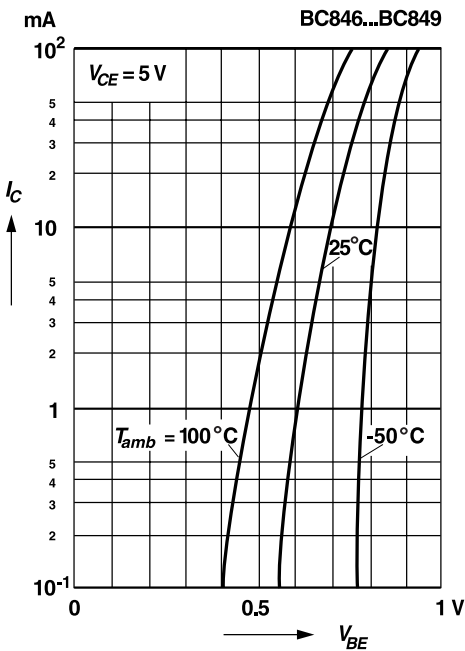
Collector-Base cutoff current versus ambient temperature



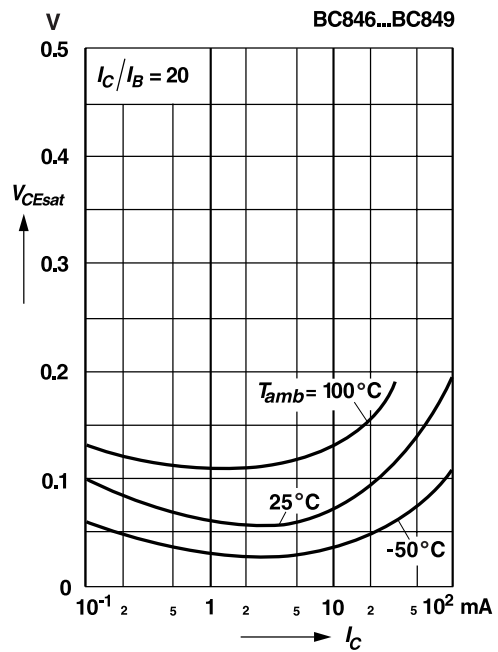
Small Signal Transistors (NPN)

Ratings and Characteristic Curves ($T_A = 25^\circ\text{C}$ unless otherwise noted)

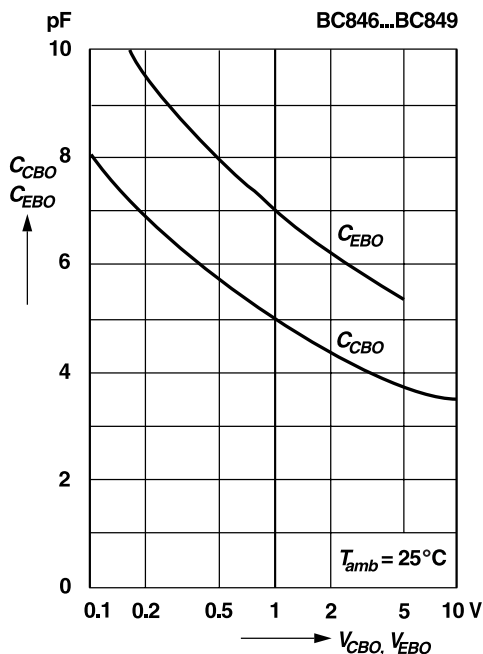
Collector current versus base-emitter voltage



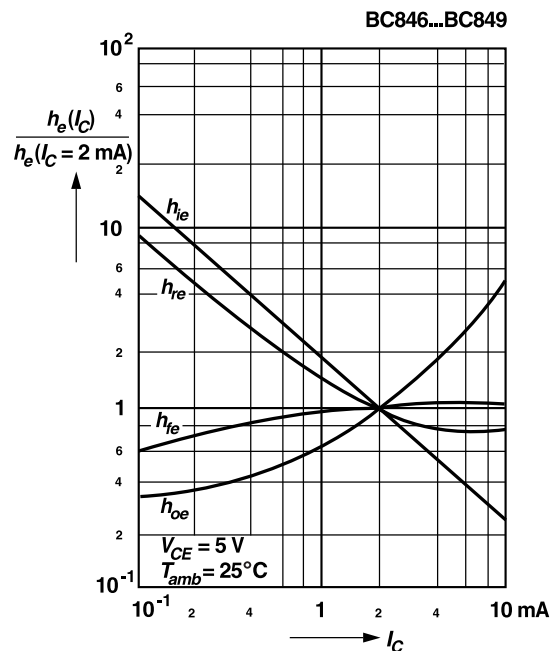
Collector saturation voltage versus collector current



Collector base capacitance, Emitter base capacitance versus reverse bias voltage



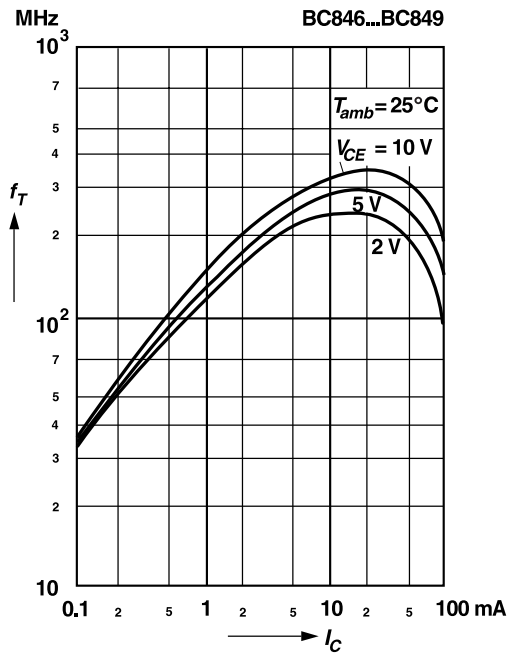
Relative h-parameters versus collector current



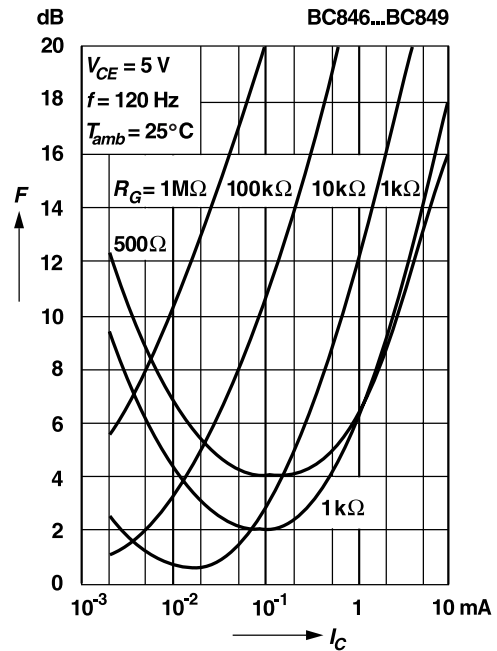
Small Signal Transistors (NPN)

Ratings and Characteristic Curves ($T_A = 25^\circ\text{C}$ unless otherwise noted)

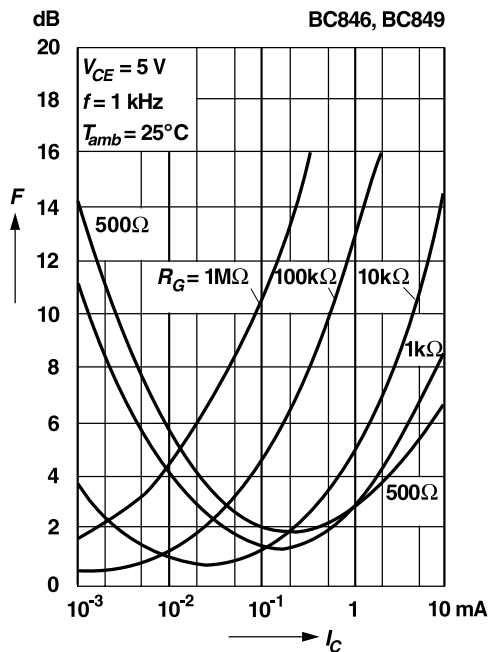
Gain-bandwidth product versus collector current



Noise figure versus collector current



Noise figure versus collector current



Noise figure versus collector emitter voltage

