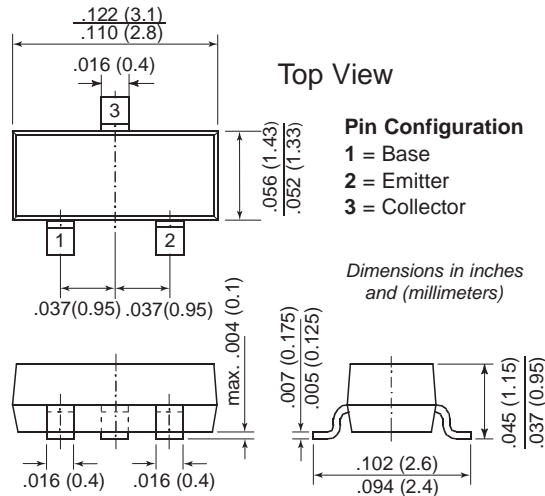


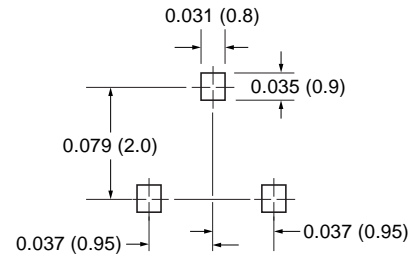


## Small Signal Transistors (NPN)

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

## 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. 0.008g**Packaging Codes/Options:**

E8/10K per 13" reel (8mm tape), 30K/box

E9/3K per 7" reel (8mm tape), 30K/box

Maximum Ratings and Thermal Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Collector-Base Voltage	BC846 BC847 BC848, BC849	V <sub>CBO</sub>	80 50 30	V
Collector-Emitter Voltage	BC846 BC847 BC848, BC849	V <sub>CES</sub>	80 50 30	V
Collector-Emitter Voltage	BC846 BC847 BC848, BC849	V <sub>CEO</sub>	65 45 30	V
Emitter-Base Voltage	BC846, BC847 BC848, BC849	V <sub>EBO</sub>	6 5	V
Collector Current		I <sub>C</sub>	100	mA
Peak Collector Current		I <sub>CM</sub>	200	mA
Peak Base Current		I <sub>BM</sub>	200	mA
Peak Emitter Current		-I <sub>EM</sub>	200	mA
Power Dissipation at T <sub>SB</sub> = 50°C		P <sub>tot</sub>	310 <sup>(1)</sup>	mW
Thermal Resistance Junction to Ambient Air		R <sub>θJA</sub>	450 <sup>(1)</sup>	°C/W
Thermal Resistance Junction to Substrate Backside		R <sub>θSB</sub>	320 <sup>(1)</sup>	°C/W
Junction Temperature		T <sub>j</sub>	150	°C
Storage Temperature Range		T <sub>s</sub>	-65 to +150	°C

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

## Electrical Characteristics (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Small Signal Current Gain						
Current Gain Group A	h <sub>fe</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA f = 1kHz	—	220	—	—
B			—	330	—	—
C			—	600	—	—
Input Impedance						
Current Gain Group A	h <sub>ie</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 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 <sub>oe</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA f = 1kHz	—	18	30	μS
B			—	30	60	
C			—	60	110	
Reverse Voltage Transfer Ratio						
Current Gain Group A	h <sub>re</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA f = 1kHz	—	1.5 · 10 <sup>-4</sup>	—	—
B			—	2 · 10 <sup>-4</sup>	—	—
C			—	3 · 10 <sup>-4</sup>	—	—
DC Current Gain						
Current Gain Group A	h <sub>FE</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10μA	—	90	—	—
B			—	150	—	—
C			—	270	—	—
Current Gain Group A	h <sub>FE</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA	110	180	220	—
B			200	290	450	—
C			420	520	800	—
Collector Saturation Voltage	V <sub>CEsat</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA	— —	90 200	250 600	mV
Base Saturation Voltage	V <sub>BEsat</sub>	I <sub>C</sub> = 10mA, I <sub>B</sub> = 0.5mA I <sub>C</sub> = 100mA, I <sub>B</sub> = 5mA	— —	700 900	— —	mV
Base-Emitter Voltage V <sub>BEon</sub>		V <sub>CE</sub> = 5V, I <sub>C</sub> = 2mA 580 V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA	660 —	700 —	770 mV	
Collector-Base Cutoff Current	I <sub>CBO</sub>	V <sub>CB</sub> = 30V V <sub>CB</sub> = 30V, T <sub>J</sub> = 150°C	— —	— —	15 5	nA μA
Gain-Bandwidth Product	f <sub>T</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA f = 100MHz	—	300	—	MHz
Collector-Base Capacitance	C <sub>CBO</sub>	V <sub>CB</sub> = 10V, f = 1MHz	—	3.5	6	pF
Emitter-Base Capacitance	C <sub>EBO</sub>	V <sub>EB</sub> = 0.5V, f = 1MHz	—	9	—	pF
Noise Figure						
BC846, BC847, BC848	F	V <sub>CE</sub> = 5V, I <sub>C</sub> = 200μA	—	2	10	dB
BC849		R <sub>G</sub> = 2kΩ, f = 1kHz, Δf = 200Hz	—	1.2	4	dB
BC849		V <sub>CE</sub> = 5V, I <sub>C</sub> = 200μA R <sub>G</sub> = 2kΩ, f = 30...15000Hz	—	1.4	4	dB

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

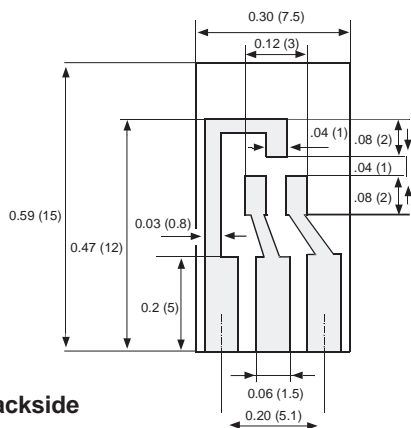


## Layout for R<sub>θJA</sub> test

Thickness:

Fiberglass 0.059 in. (1.5 mm)

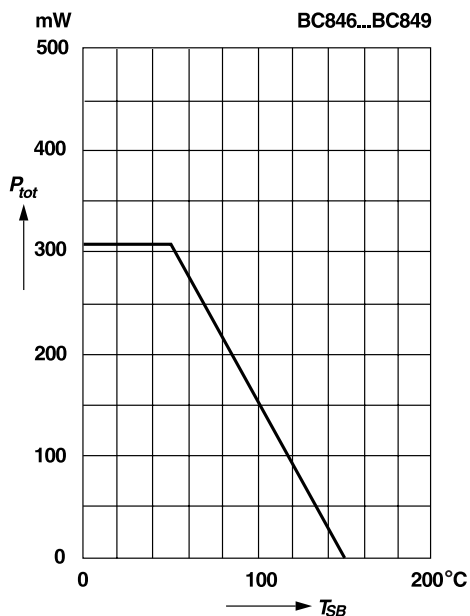
Copper leads 0.012 in. (0.3 mm)



Dimensions in inches (millimeters)

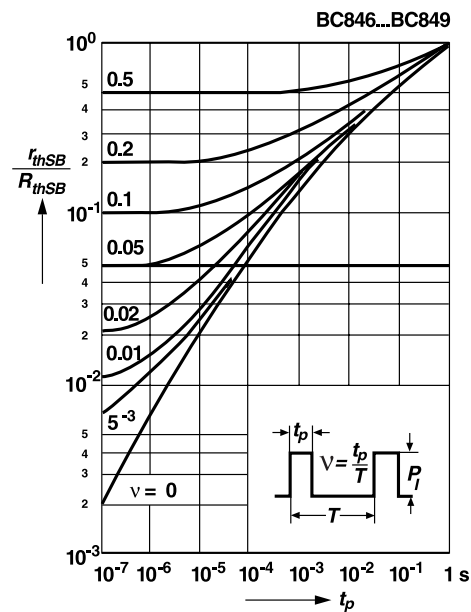
## Admissible power dissipation versus temperature of substrate backside

Device on fiberglass substrate, see layout

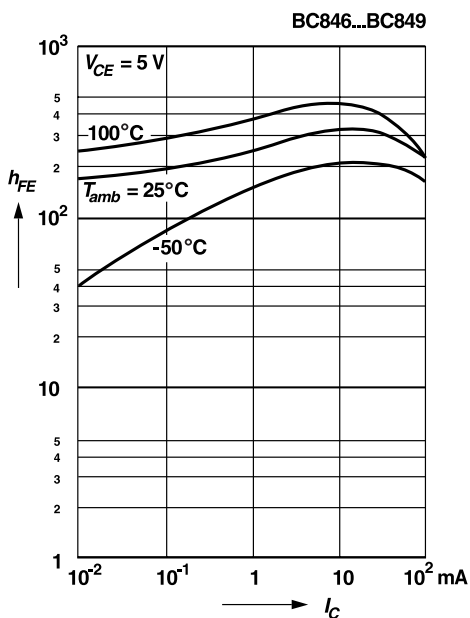


## Pulse thermal resistance versus pulse duration (normalized)

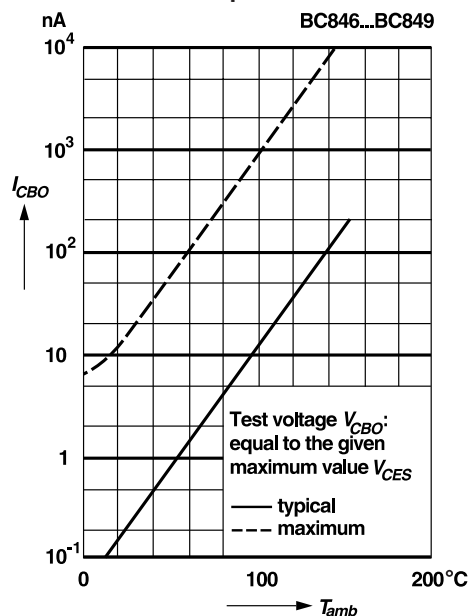
Device on fiberglass substrate, see layout



## DC current gain versus collector current



## Collector-Base cutoff current versus ambient temperature



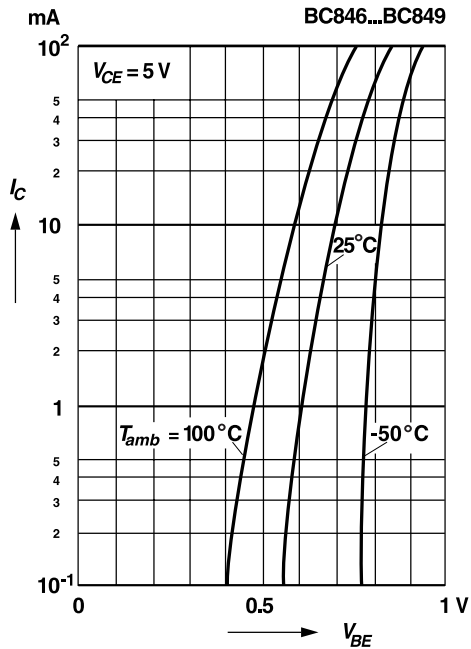
# BC846 thru BC849

Vishay Semiconductors  
formerly General Semiconductor

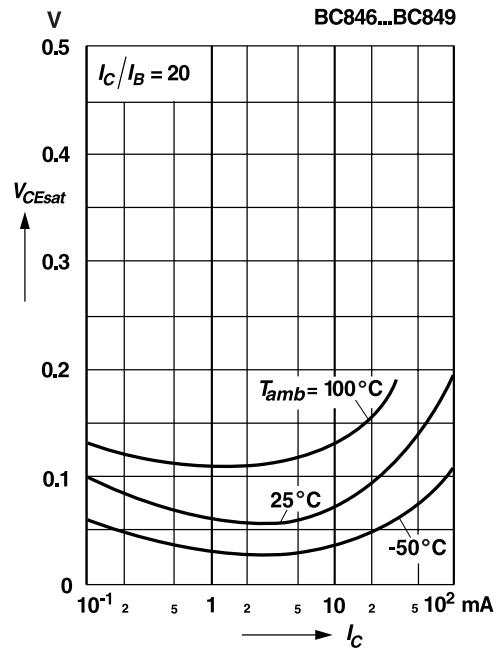


## Ratings and Characteristic Curves ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

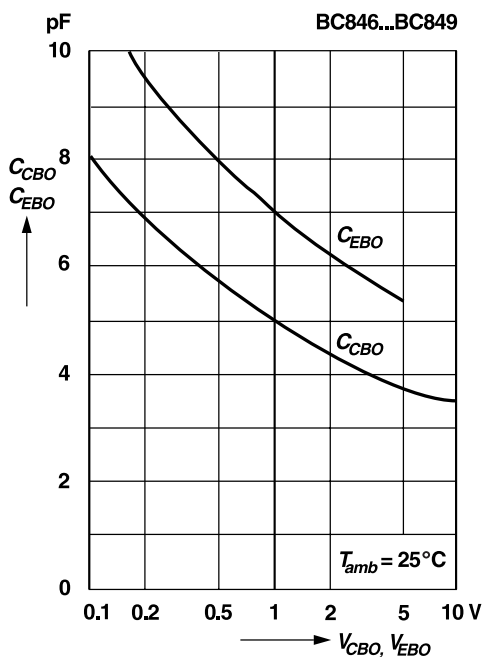
Collector current versus  
base-emitter voltage



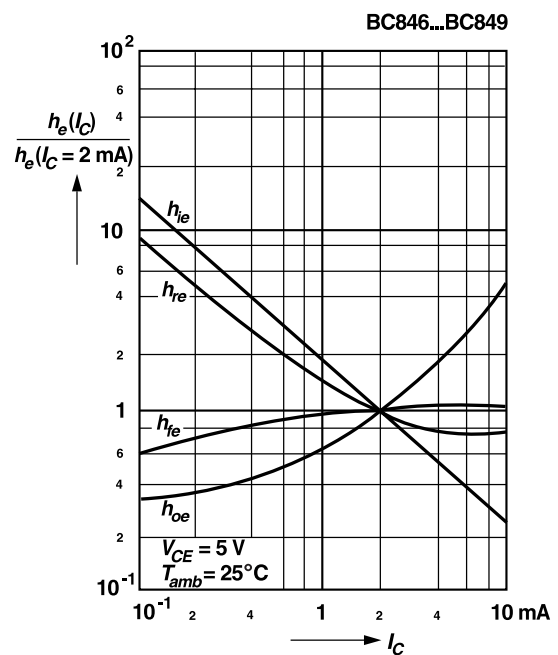
Collector saturation voltage  
versus collector current



Collector base capacitance,  
Emitter base capacitance  
versus reverse bias voltage



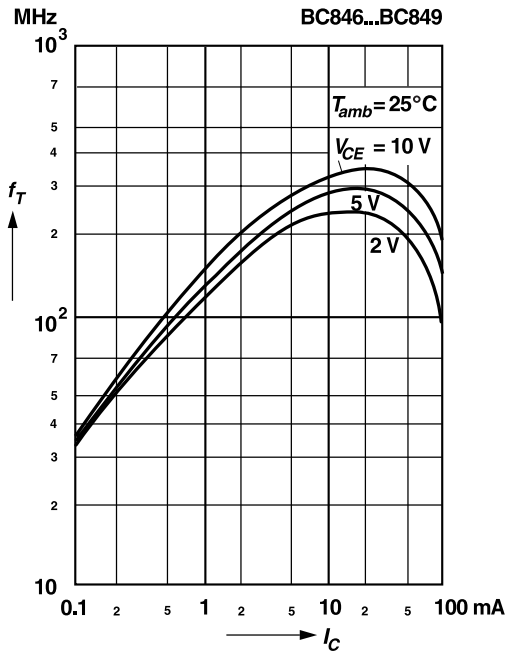
Relative h-parameters  
versus collector current



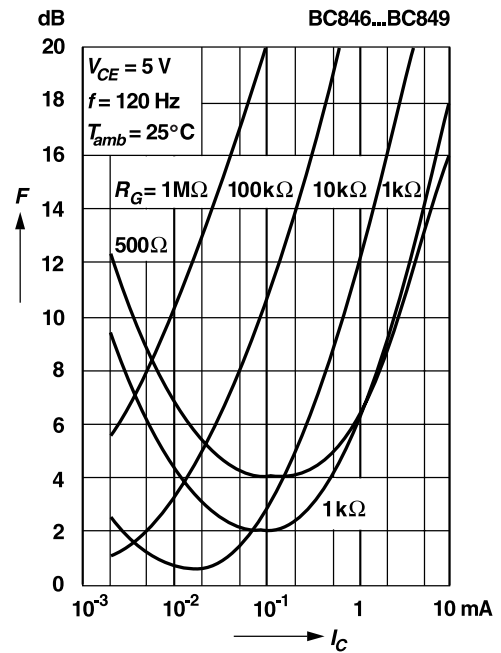


## Ratings and Characteristic Curves ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

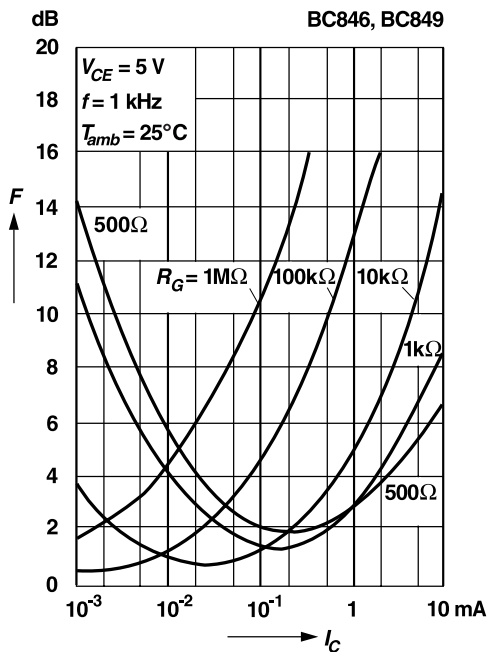
Gain-bandwidth product  
versus collector current



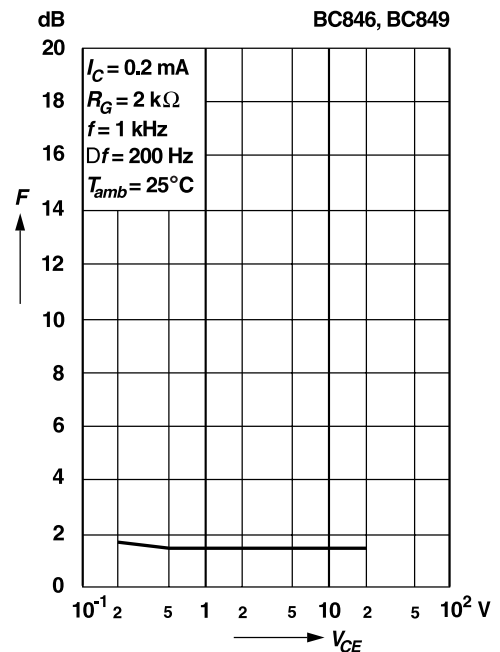
Noise figure  
versus collector current



Noise figure  
versus collector current



Noise figure  
versus collector emitter voltage



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