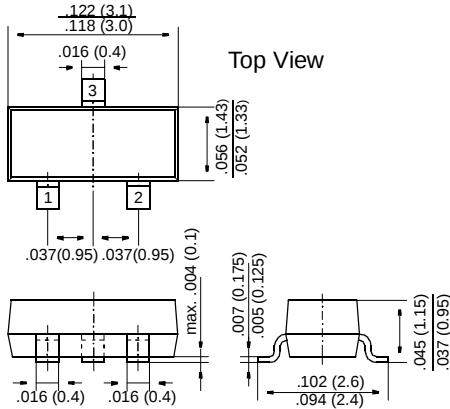


BC856 THRU BC859

Small Signal Transistors (PNP)

SOT-23



Dimensions in inches and (millimeters)

Pin configuration

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

FEATURES

- ◆ PNP 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 BC856 is available in groups A and B, however, the types BC857, BC858 and BC859 can be supplied in all three groups. The BC859 is a low noise type.
- ◆ As complementary types, the NPN transistors BC846 ... BC849 are recommended.



MECHANICAL DATA

Case: SOT-23 Plastic Package

Weight: approx. 0.008 g

Marking code

Type	Marking	Type	Marking
BC856A	3A	BC859A	4A
B	3B	B	4B
BC857A	3E	C	4C
B	3F		
C	3G		
BC858A	3J		
B	3K		
C	3L		

MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

	Symbol	Value	Unit
Collector-Base Voltage	BC856 BC857 BC858, BC859	$-V_{CBO}$ $-V_{CBO}$ $-V_{CBO}$	V V V
Collector-Emitter Voltage	BC856 BC857 BC858, BC859	$-V_{CES}$ $-V_{CES}$ $-V_{CES}$	V V V
Collector-Emitter Voltage	BC856 BC857 BC858, BC859	$-V_{CEO}$ $-V_{CEO}$ $-V_{CEO}$	V V V
Emitter-Base Voltage		$-V_{EBO}$	V
Collector Current		$-I_C$	mA
Peak Collector Current		$-I_{CM}$	mA
Peak Base Current		$-I_{BM}$	mA
Peak Emitter Current		I_{EM}	mA
Power Dissipation at $T_{SB} = 50\text{ °C}$		P_{tot}	mW
Junction Temperature		T_j	°C
Storage Temperature Range		T_S	°C

BC856 THRU BC859

ELECTRICAL CHARACTERISTICS

Ratings at 25 °C ambient temperature unless otherwise specified

	Symbol	Min.	Typ.	Max.	Unit
h-Parameters at $-V_{CE} = 5\text{ V}$, $-I_C = 2\text{ mA}$, $f = 1\text{ kHz}$					
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	$k\Omega$
B	h_{ie}	3.2	4.5	8.5	$k\Omega$
C	h_{ie}	6	8.7	15	$k\Omega$
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 $-V_{CE} = 5\text{ V}$, $-I_C = 10\text{ }\mu A$					
Current Gain Group A	h_{FE}	—	90	—	—
B	h_{FE}	—	150	—	—
C	h_{FE}	—	270	—	—
at $-V_{CE} = 5\text{ V}$, $-I_C = 2\text{ mA}$					
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 $-I_C = 10\text{ mA}$, $-I_B = 0.5\text{ mA}$ at $-I_C = 100\text{ mA}$, $-I_B = 5\text{ mA}$	$-V_{CEsat}$ $-V_{CEsat}$	— —	90 250	300 650	mV mV
Base Saturation Voltage at $-I_C = 10\text{ mA}$, $-I_B = 0.5\text{ mA}$ at $-I_C = 100\text{ mA}$, $-I_B = 5\text{ mA}$	$-V_{BEsat}$ $-V_{BEsat}$	— —	700 900	— —	mV mV
Base-Emitter Voltage at $-V_{CE} = 5\text{ V}$, $-I_C = 2\text{ mA}$ at $-V_{CE} = 5\text{ V}$, $-I_C = 10\text{ mA}$	$-V_{BE}$ $-V_{BE}$	600 —	660 —	750 800	mV mV
Collector-Emitter Cutoff Current at $-V_{CE} = 80\text{ V}$ at $-V_{CE} = 50\text{ V}$ at $-V_{CE} = 30\text{ V}$ at $-V_{CE} = 80\text{ V}$, $T_j = 125\text{ }^\circ C$ at $-V_{CE} = 50\text{ V}$, $T_j = 125\text{ }^\circ C$ at $-V_{CE} = 30\text{ V}$, $T_j = 125\text{ }^\circ C$ at $-V_{CB} = 30\text{ V}$ at $-V_{CB} = 30\text{ V}$, $T_j = 150\text{ }^\circ C$	BC856 $-I_{CES}$ BC857 $-I_{CES}$ BC858, BC859 $-I_{CES}$ BC856 $-I_{CES}$ BC857 $-I_{CES}$ BC858, BC859 $-I_{CES}$ $-I_{CBO}$ $-I_{CBO}$	— — — — — — — —	0.2 0.2 0.2 — — — — —	15 15 15 4 4 4 15 5	nA nA nA μA μA μA nA μA
Gain-Bandwidth Product at $-V_{CE} = 5\text{ V}$, $-I_C = 10\text{ mA}$, $f = 100\text{ MHz}$	f_T	—	150	—	MHz

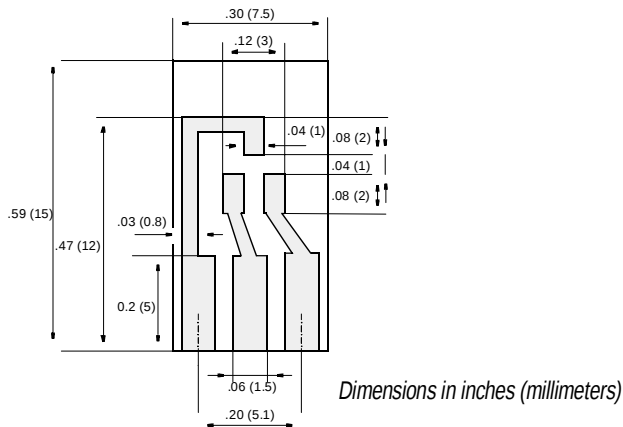
¹⁾ Device on fiberglass substrate, see layout

BC856 THRU BC859

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}	—	—	6	pF
Noise Figure at $-V_{CE} = 5\text{ V}$, $-I_C = 200\text{ }\mu\text{A}$, $R_G = 2\text{ k}\Omega$, $f = 1\text{ kHz}$, $\Delta f = 200\text{ Hz}$ BC856, BC857, BC858	F	—	2	10	dB
BC859	F	—	1	4	dB
Noise Figure at $-V_{CE} = 5\text{ V}$, $-I_C = 200\text{ }\mu\text{A}$, $R_G = 2\text{ k}\Omega$, $f = 30 \dots 15000\text{ Hz}$ BC859	F	—	1.2	4	dB



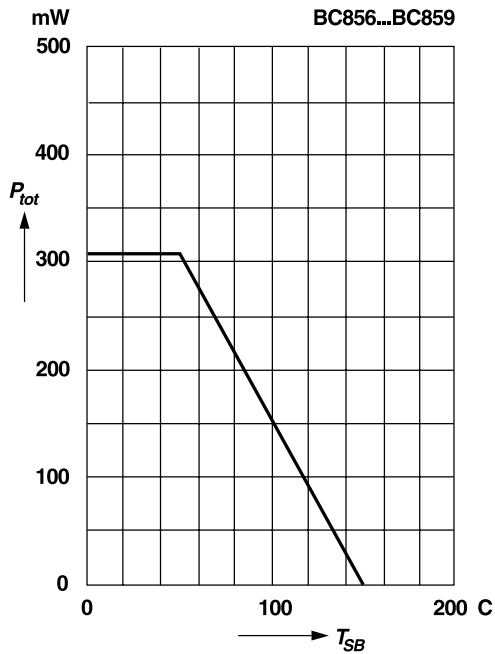
Layout for R_{thJA} test

Thickness: Fiberglass 0.059 in (1.5 mm)

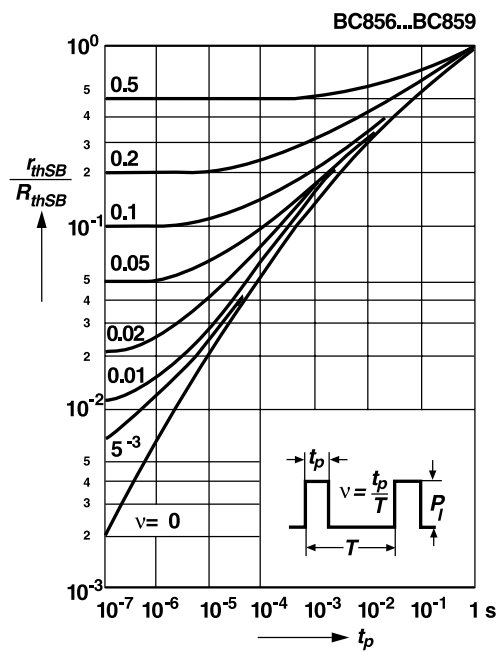
Copper leads 0.012 in (0.3 mm)

RATINGS AND CHARACTERISTIC CURVES BC856 THRU BC859

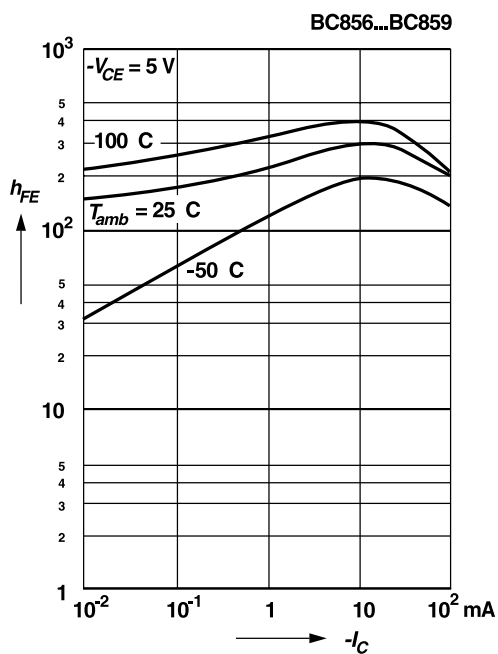
**Admissible power dissipation
versus temperature of substrate backside**
Device on fiberglass substrate, see layout



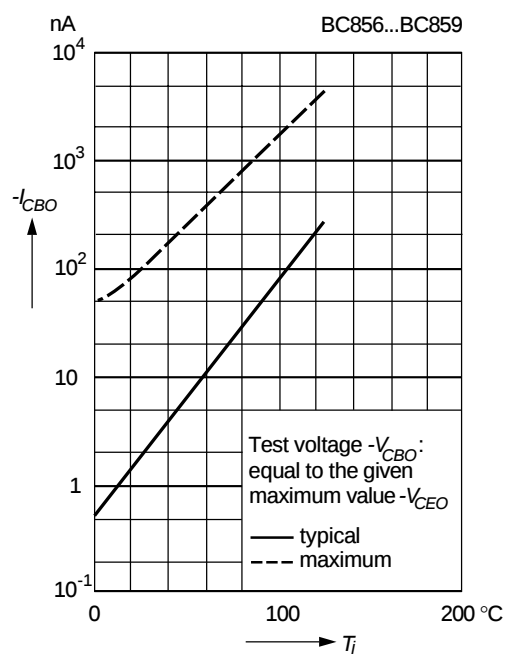
**Pulse thermal resistance
versus pulse duration (normalized)**
Device on fiberglass substrate, see layout



**DC current gain
versus collector current**

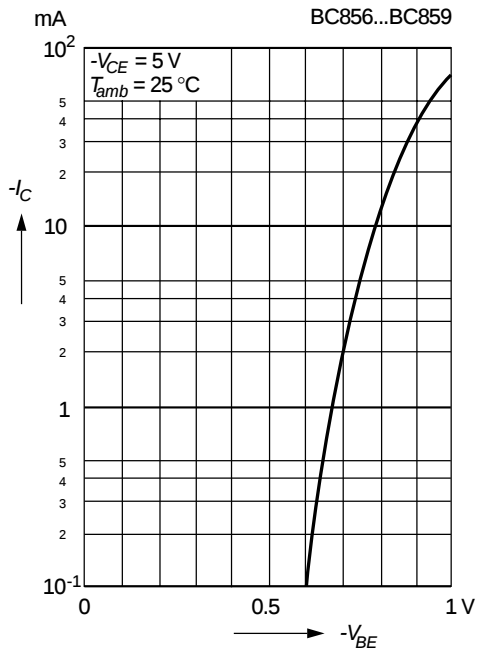


**Collector-base cutoff current
versus junction temperature**

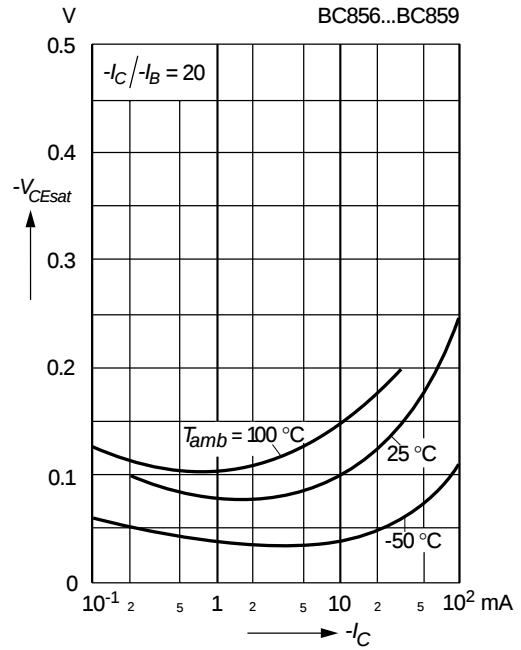


RATINGS AND CHARACTERISTIC CURVES BC856 THRU BC859

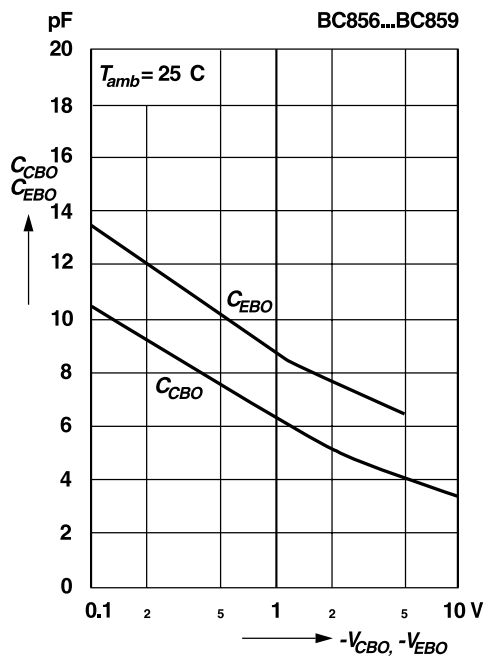
**Collector current
versus base-emitter voltage**



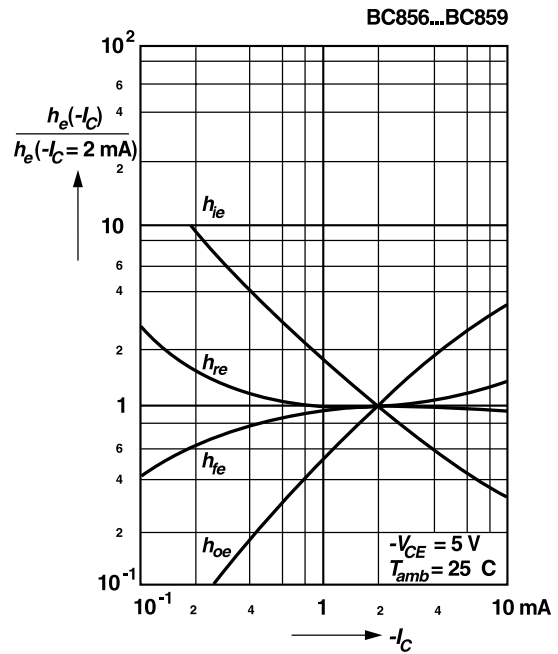
**Collector saturation voltage
versus collector current**



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

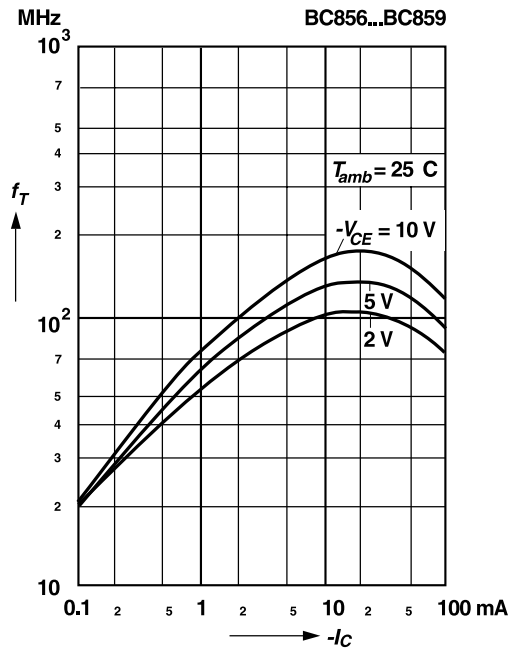


**Relative h-parameters
versus collector current**

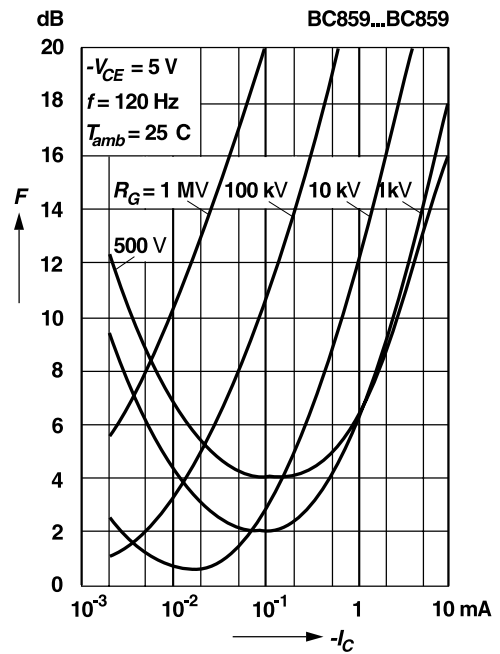


RATINGS AND CHARACTERISTIC CURVES BC856 THRU BC859

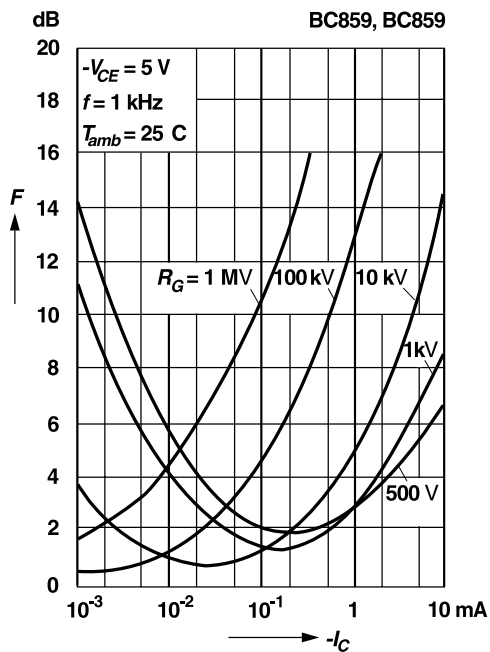
Gain-bandwidth product
versus collector current



Noise figure
versus collector current



Noise figure
versus collector current



Noise figure
versus collector-emitter voltage

