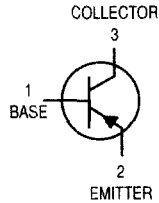


General Purpose Transistors

PNP Silicon



BC856ALT1, BLT1
BC857ALT1, BLT1
BC858ALT1, BLT1,
CLT1

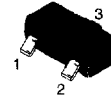
Motorola Preferred Devices

MAXIMUM RATINGS

Rating	Symbol	BC856	BC857	BC858	Unit
Collector–Emitter Voltage	V_{CEO}	-65	-45	-30	V
Collector–Base Voltage	V_{CBO}	-80	-50	-30	V
Emitter–Base Voltage	V_{EBO}	-5.0	-5.0	-5.0	V
Collector Current — Continuous	I_C	-100	-100	-100	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (1) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, (2) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$



CASE 318-08, STYLE 6
SOT-23 (TO-236AB)

DEVICE MARKING

BC856ALT1 = 3A; BC856BLT1 = 3B; BC857ALT1 = 3E; BC857BLT1 = 3F;
BC858ALT1 = 3J; BC858BLT1 = 3K; BC858CLT1 = 3L

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage ($I_C = -10\text{ mA}$)	$V_{(BR)CEO}$	-65 -45 -30	— — —	— — —	V
Collector–Emitter Breakdown Voltage ($I_C = -10\ \mu\text{A}, V_{EB} = 0$)	$V_{(BR)CES}$	-80 -50 -30	— — —	— — —	V
Collector–Base Breakdown Voltage ($I_C = -10\ \mu\text{A}$)	$V_{(BR)CBO}$	-80 -50 -30	— — —	— — —	V
Emitter–Base Breakdown Voltage ($I_E = -1.0\ \mu\text{A}$)	$V_{(BR)EBO}$	-5.0 -5.0 -5.0	— — —	— — —	V
Collector Cutoff Current ($V_{CB} = -30\text{ V}$) ($V_{CB} = -30\text{ V}, T_A = 150^\circ\text{C}$)	I_{CBO}	— —	— —	-15 -4.0	nA μA

1. FR-5 = 1.0 x 0.75 x 0.062 in 2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

Preferred devices are Motorola recommended choices for future use and best overall value.

BC856ALT1,BLT1 BC857ALT1,BLT1 BC858ALT1,BLT1,CLT1

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = -10 \mu\text{A}$, $V_{CE} = -5.0 \text{ V}$)	BC856A, BC857A, BC858A BC856A, BC857A, BC858A BC858C	h_{FE}	—	90	—
			—	150	—
($I_C = -2.0 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$)	BC856A, BC857A, BC858A BC856B, BC857B, BC858B BC858C		—	270	—
			125	180	250
			220	290	475
		420	520	800	
Collector–Emitter Saturation Voltage ($I_C = -10 \text{ mA}$, $I_B = -0.5 \text{ mA}$) ($I_C = -100 \text{ mA}$, $I_B = -5.0 \text{ mA}$)	$V_{CE(sat)}$	—	—	—0.3 —0.65	V
Base–Emitter Saturation Voltage ($I_C = -10 \text{ mA}$, $I_B = -0.5 \text{ mA}$) ($I_C = -100 \text{ mA}$, $I_B = -5.0 \text{ mA}$)	$V_{BE(sat)}$	—	—0.7 —0.9	—	V
Base–Emitter On Voltage ($I_C = -2.0 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$) ($I_C = -10 \text{ mA}$, $V_{CE} = -5.0 \text{ V}$)	$V_{BE(on)}$	—0.6 —	—	—0.75 —0.82	V
SMALL–SIGNAL CHARACTERISTICS					
Current–Gain — Bandwidth Product ($I_C = -10 \text{ mA}$, $V_{CE} = -5.0 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	100	—	—	MHz
Output Capacitance ($V_{CB} = -10 \text{ V}$, $f = 1.0 \text{ MHz}$)	C_{ob}	—	—	4.5	pF
Noise Figure ($I_C = -0.2 \text{ mA}$, $V_{CE} = -5.0 \text{ Vdc}$, $R_S = 2.0 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$, $BW = 200 \text{ Hz}$)	NF	—	—	10	dB

BC857/BC858

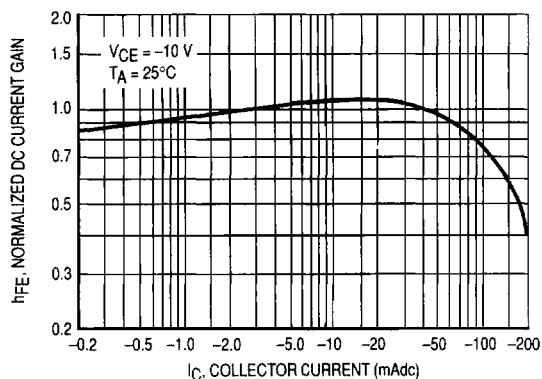


Figure 1. Normalized DC Current Gain

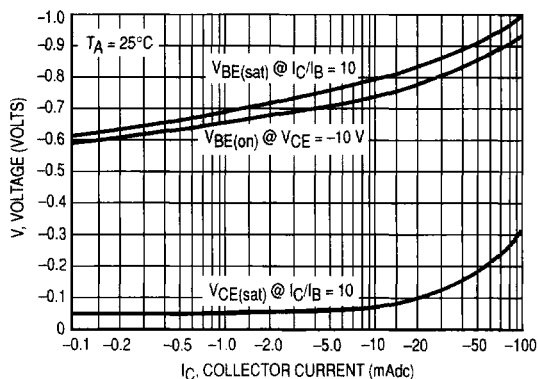


Figure 2. "Saturation" and "On" Voltages

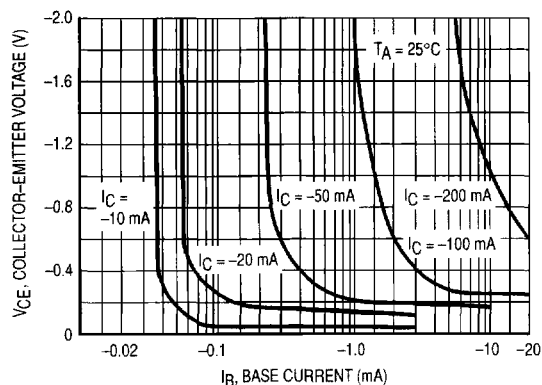


Figure 3. Collector Saturation Region

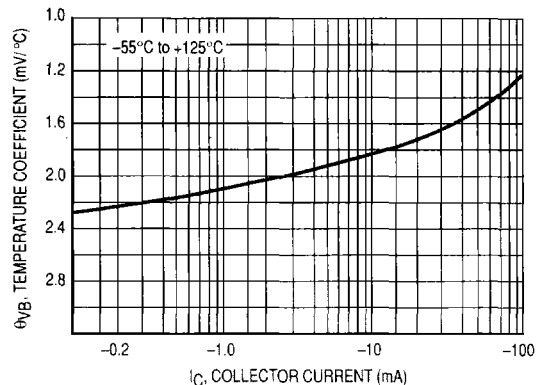


Figure 4. Base-Emitter Temperature Coefficient

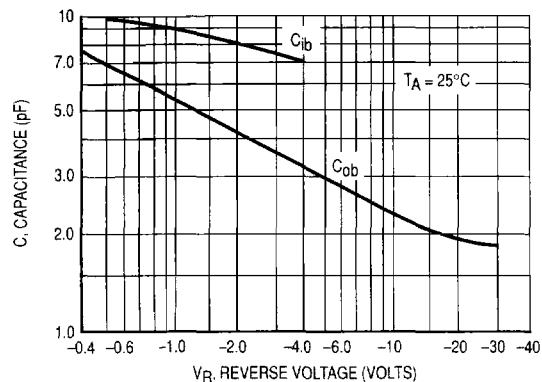


Figure 5. Capacitances

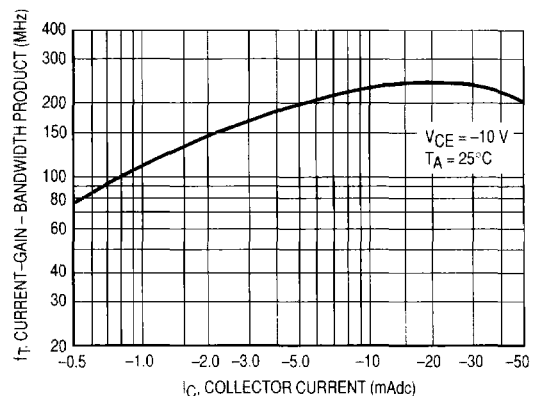


Figure 6. Current-Gain - Bandwidth Product

BC856

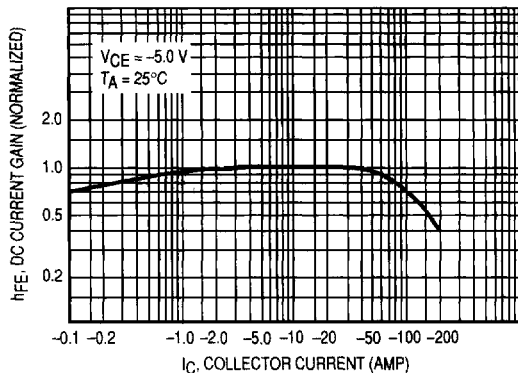


Figure 7. DC Current Gain

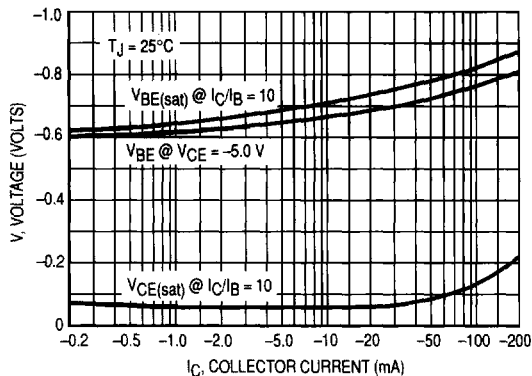


Figure 8. "On" Voltage

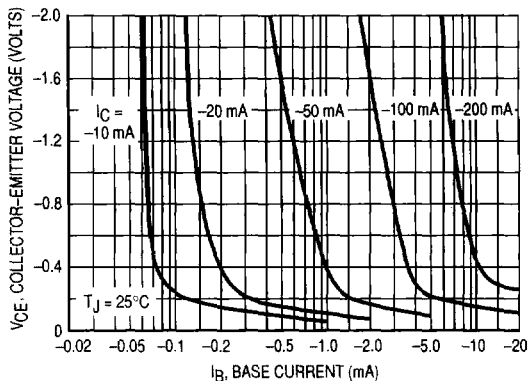


Figure 9. Collector Saturation Region

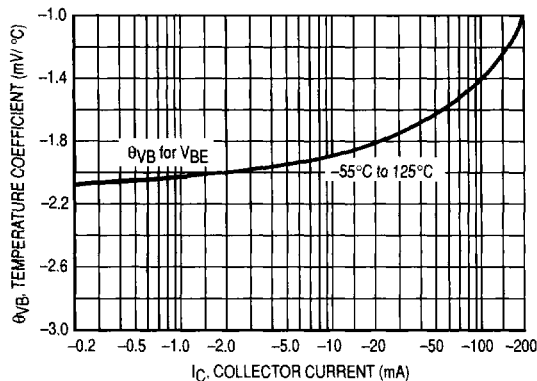


Figure 10. Base-Emitter Temperature Coefficient

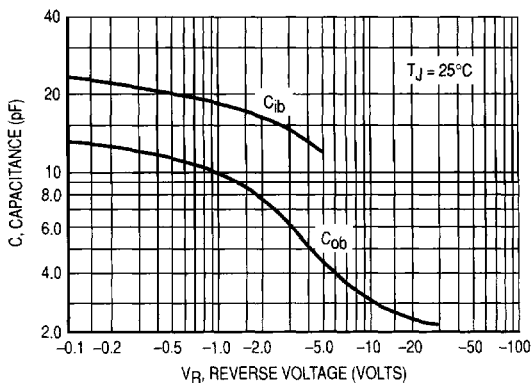


Figure 11. Capacitance

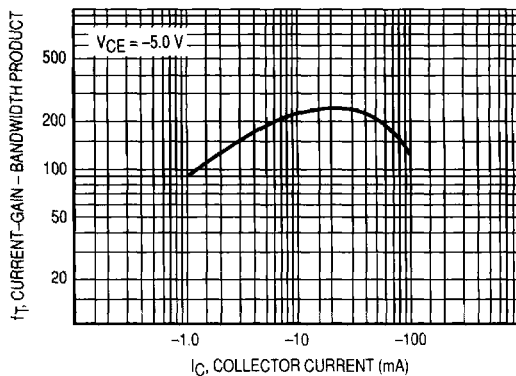


Figure 12. Current-Gain - Bandwidth Product

BC856ALT1,BLT1 BC857ALT1,BLT1 BC858ALT1,BLT1,CLT1

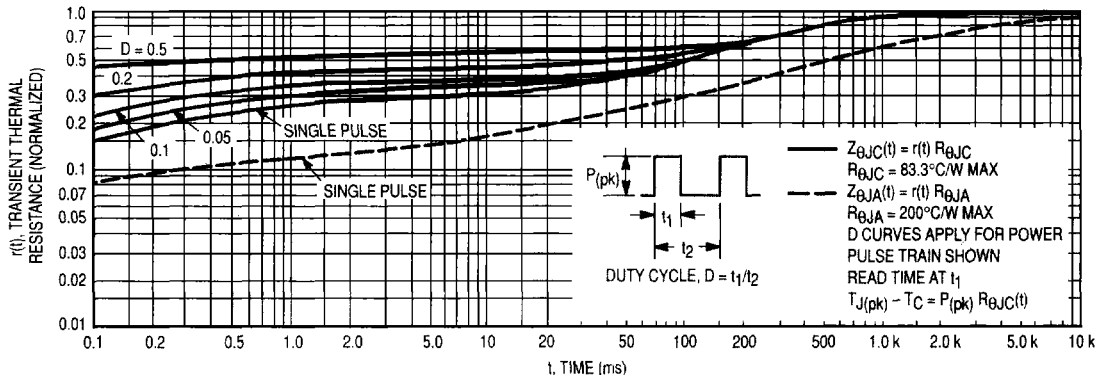


Figure 13. Thermal Response

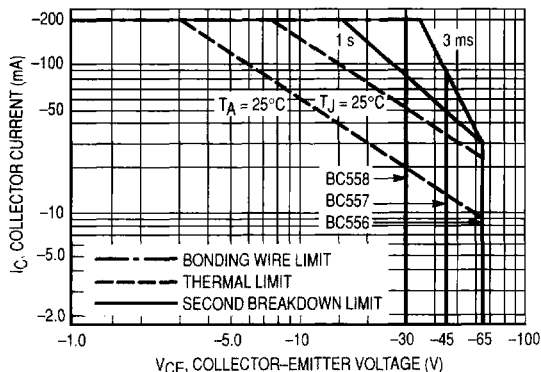


Figure 14. Active Region Safe Operating Area

The safe operating area curves indicate I_C - V_{CE} limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon $T_{J(pk)} = 150^\circ\text{C}$; T_C or T_A is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.