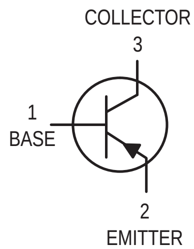
MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

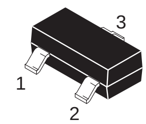
General Purpose Transistors

PNP Silicon

BC856ALT1,BLT1
BC857ALT1,BLT1
BC858ALT1,BLT1,
CLT1

Motorola Preferred Devices





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

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°C Derate above 25°C	P_D	 225 1.8	 mW mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	°C/W
Total Device Dissipation Alumina Substrate, (2) T_A = 25°C Derate above 25°C	P_D	 300 2.4	 mW mW/°C
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	°C/W
Junction and Storage Temperature	T_J, T_{stg}	–55 to +150	°C

DEVICE MARKING

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–Emitter Breakdown Voltage (I_C = –10 mA)	BC856 Series BC857 Series BC858 Series	$V_{(BR)CEO}$	–65 –45 –30	— — —	— — —	V
Collector–Emitter Breakdown Voltage (I_C = –10 µA, V_{EB} = 0)	BC856 Series BC857 Series BC858 Series	$V_{(BR)CES}$	–80 –50 –30	— — —	— — —	V
Collector–Base Breakdown Voltage (I_C = –10 µA)	BC856 Series BC857 Series BC858 Series	$V_{(BR)CBO}$	–80 –50 –30	— — —	— — —	V
Emitter–Base Breakdown Voltage (I_E = –1.0 µA)	BC856 Series BC857 Series BC858 Series	$V_{(BR)EBO}$	–5.0 –5.0 –5.0	— — —	— — —	V
Collector Cutoff Current (V_{CB} = –30 V) (V_{CB} = –30 V, T_A = 150°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.

REV 1

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain (I_C = –10 µA, V_{CE} = –5.0 V)	BC856A, BC857A, BC585A	h_{FE}	—	90	—	—
	BC856A, BC857A, BC858A		—	150	—	
	BC858C		—	270	—	
(I_C = –2.0 mA, V_{CE} = –5.0 V)	BC856A, BC857A, BC858A		125	180	250	
	BC856B, BC857B, BC858B		220	290	475	
	BC858C		420	520	800	
Collector–Emitter Saturation Voltage (I_C = –10 mA, I_B = –0.5 mA)		$V_{CE(sat)}$	—	—	–0.3	V
(I_C = –100 mA, I_B = –5.0 mA)			—	—	–0.65	
Base–Emitter Saturation Voltage (I_C = –10 mA, I_B = –0.5 mA)		$V_{BE(sat)}$	—	–0.7	—	V
(I_C = –100 mA, I_B = –5.0 mA)			—	–0.9	—	
Base–Emitter On Voltage (I_C = –2.0 mA, V_{CE} = –5.0 V)		$V_{BE(on)}$	–0.6	—	–0.75	V
(I_C = –10 mA, V_{CE} = –5.0 V)			—	—	–0.82	
SMALL–SIGNAL CHARACTERISTICS						
Current–Gain — Bandwidth Product (I_C = –10 mA, V_{CE} = –5.0 Vdc, f = 100 MHz)		f_T	100	—	—	MHz
Output Capacitance (V_{CB} = –10 V, f = 1.0 MHz)		C_{ob}	—	—	4.5	pF
Noise Figure (I_C = –0.2 mA, V_{CE} = –5.0 Vdc, R_S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)		NF	—	—	10	dB

BC857/BC858

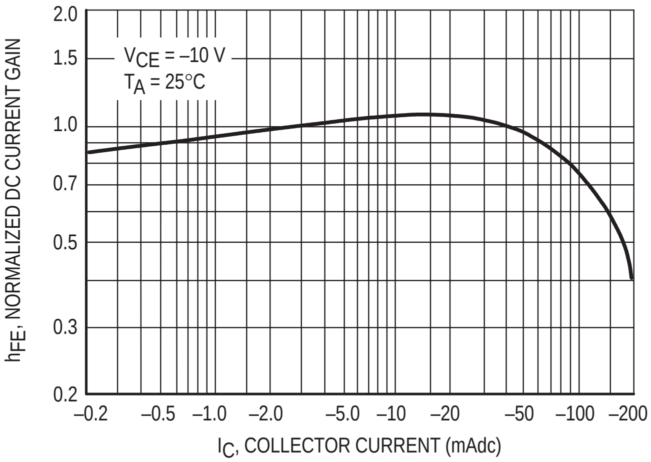


Figure 1. Normalized DC Current Gain

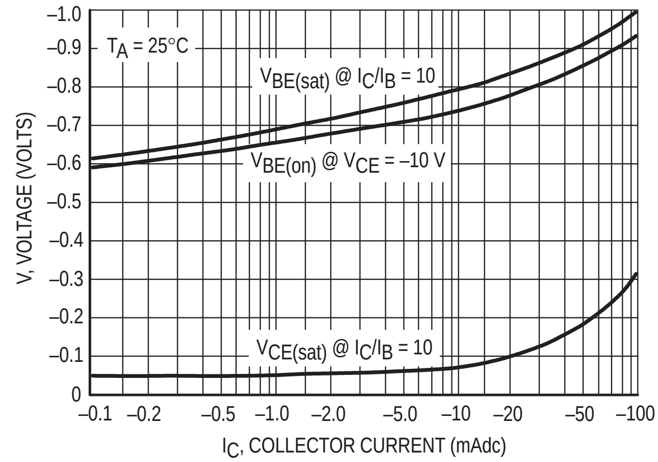


Figure 2. "Saturation" and "On" Voltages

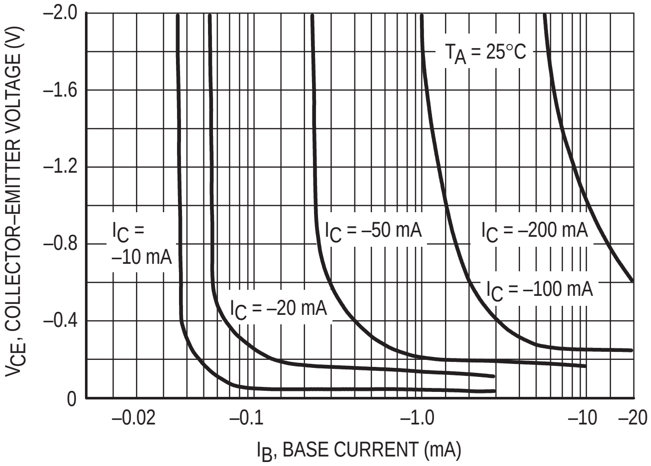


Figure 3. Collector Saturation Region

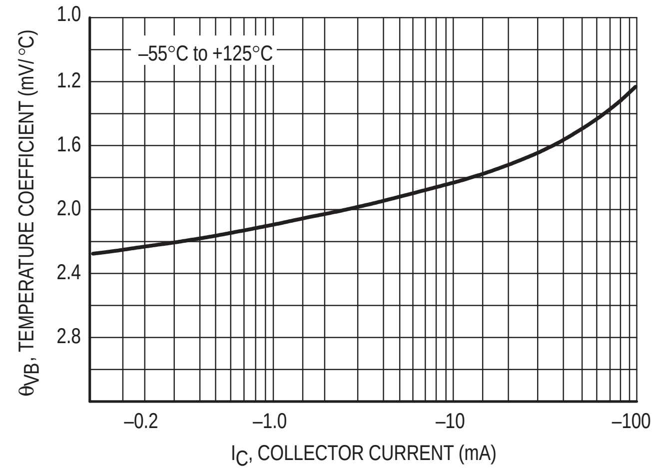


Figure 4. Base–Emitter Temperature Coefficient

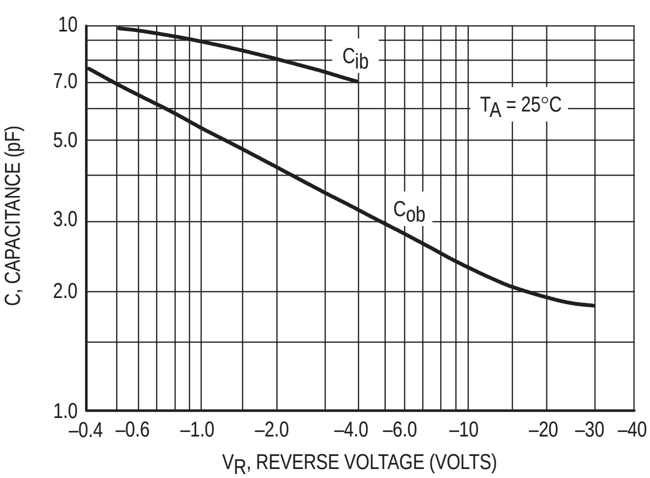


Figure 5. Capacitances

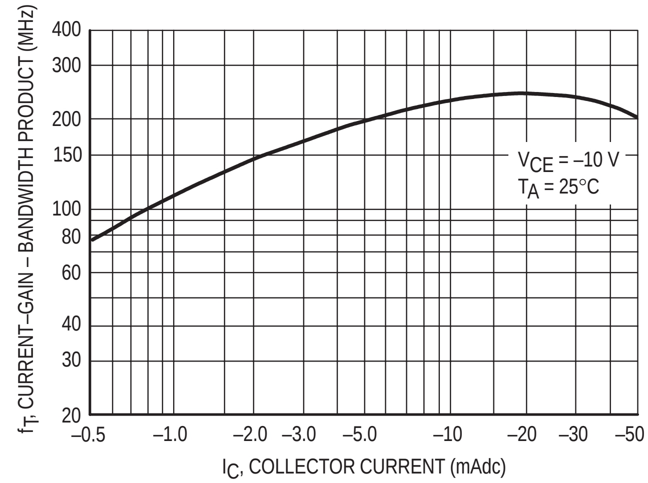


Figure 6. Current–Gain – Bandwidth Product

BC856

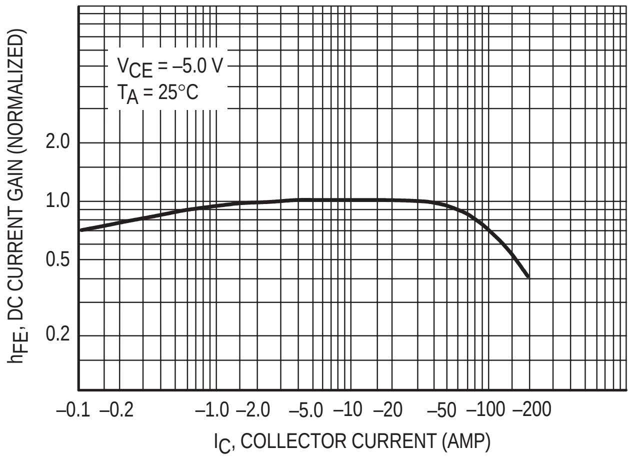


Figure 7. DC Current Gain

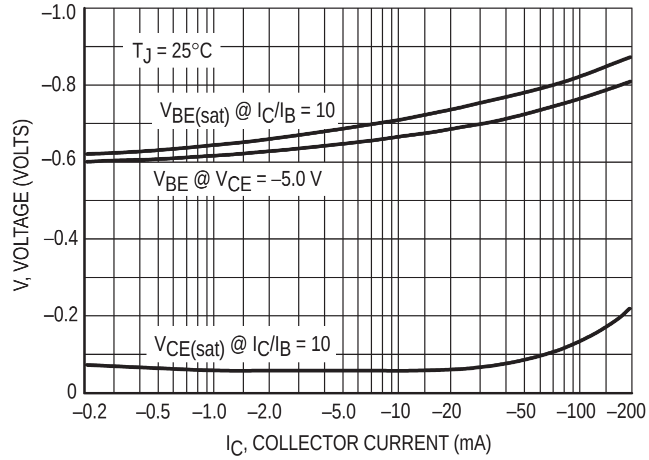


Figure 8. “On” Voltage

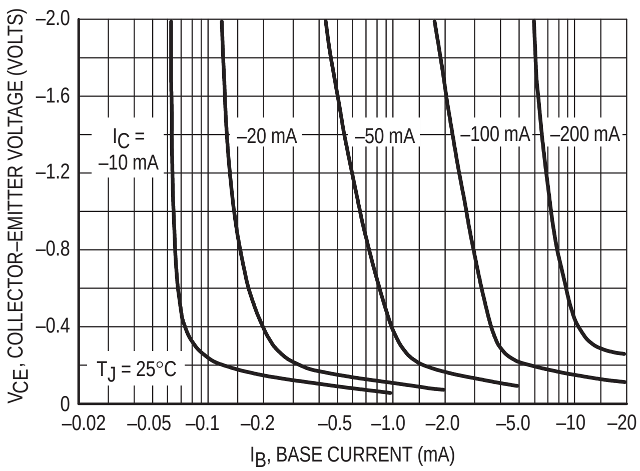


Figure 9. Collector Saturation Region

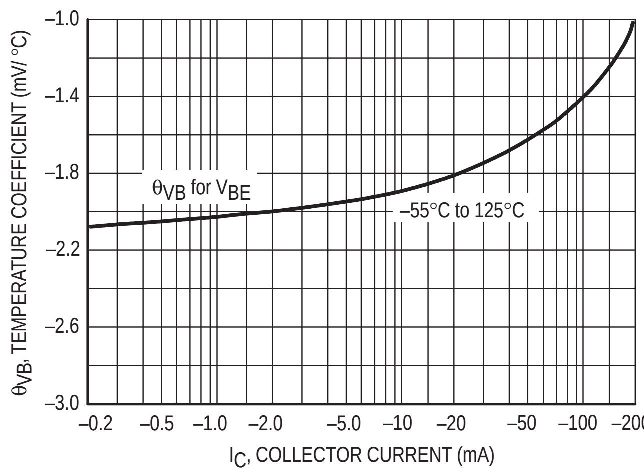


Figure 10. Base–Emitter Temperature Coefficient

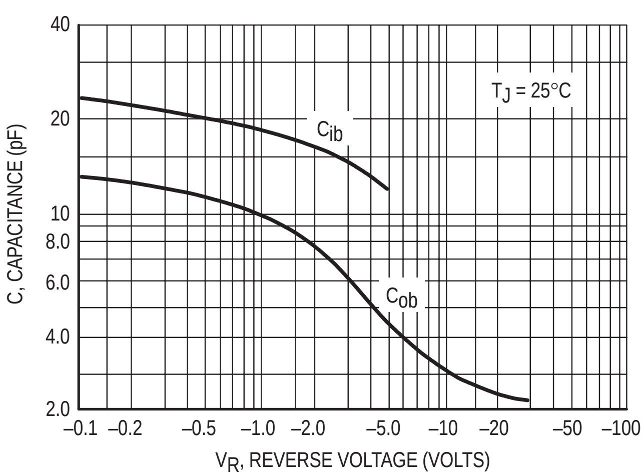


Figure 11. Capacitance

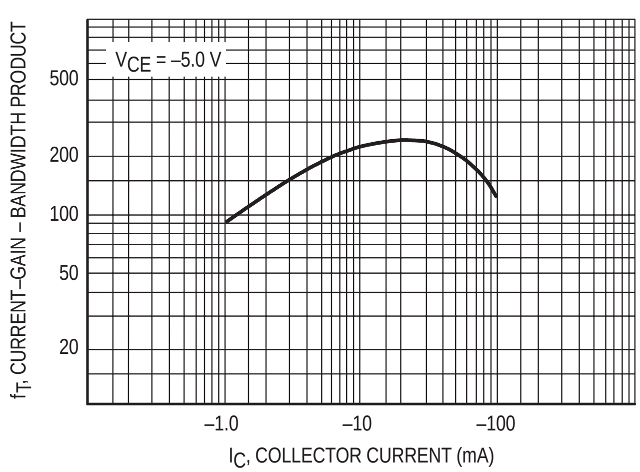


Figure 12. Current–Gain – Bandwidth Product

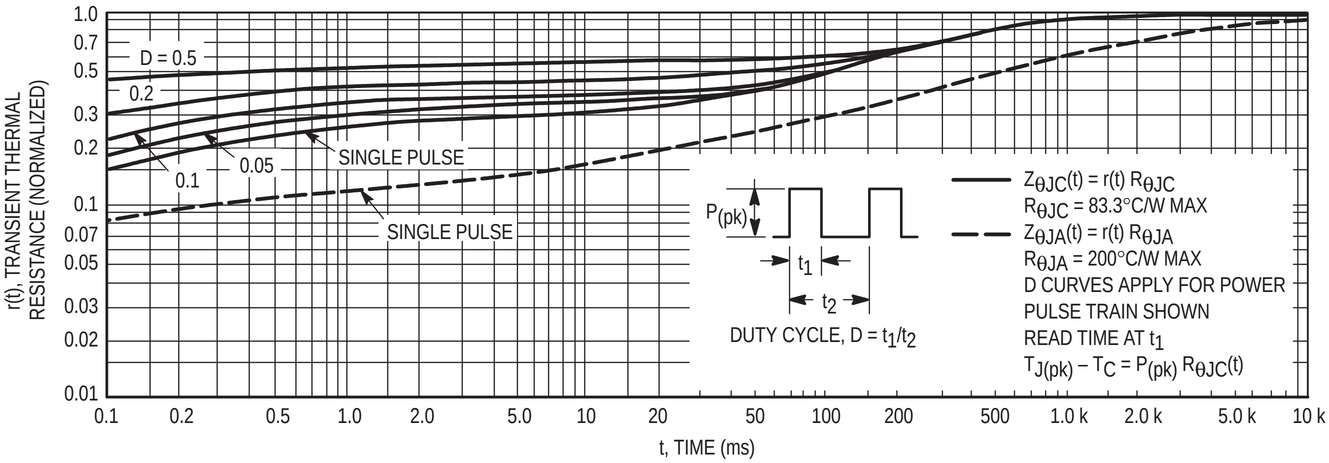


Figure 13. Thermal Response

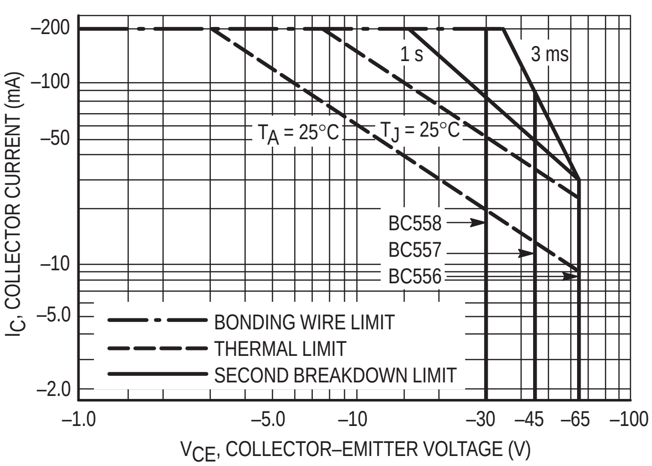


Figure 14. Active Region Safe Operating Area

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 $T_{J(pk)} = 150°C$; T_C or T_A is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \le 150°C$. $T_{J(pk)}$ 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.