

General Purpose Transistors

PNP Silicon

- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: >4000 V
– Machine Model: >400 V
- Pb-Free Packages are Available

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

Rating	Symbol	Value	Unit
Collector-Emitter Voltage LBC856 LBC857 LBC858, LBC859	V_{CEO}	-65 -45 -30	V
Collector-Base Voltage LBC856 LBC857 LBC858, LBC859	V_{CBO}	-80 -50 -30	V
Emitter-Base Voltage	V_{EBO}	-5.0	V
Collector Current – Continuous	I_C	-100	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board, (Note 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	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate, (Note 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	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

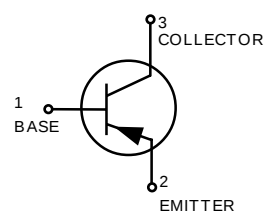
1. FR-5 = 1.0 x 0.75 x 0.062 in

2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

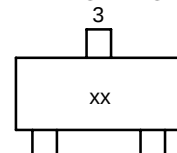
LBC856ALT1 Series



SOT-23



MARKING DIAGRAM



xx= Device Marking
(See Table Below)

LBC856ALT1 Series**DEVICE MARKING AND ORDERING INFORMATION**

Device	Marking	Package	Shipping
LBC856ALT1	3A	SOT-23	3000/Tape&Reel
LBC856ALT1G	3A (Pb-Free)	SOT-23	3000/Tape&Reel
LBC856BLT1	3B	SOT-23	3000/Tape&Reel
LBC856BLT1G	3B (Pb-Free)	SOT-23	3000/Tape&Reel
LBC857ALT1	3E	SOT-23	3000/Tape&Reel
LBC857ALT1G	3E (Pb-Free)	SOT-23	3000/Tape&Reel
LBC857BLT1	3F	SOT-23	3000/Tape&Reel
LBC857BLT1G	3F (Pb-Free)	SOT-23	3000/Tape&Reel
LBC857CLT1	3G	SOT-23	3000/Tape&Reel
LBC857CLT1G	3G (Pb-Free)	SOT-23	3000/Tape&Reel
LBC858ALT1	3J	SOT-23	3000/Tape&Reel
LBC858ALT1G	3J (Pb-Free)	SOT-23	3000/Tape&Reel
LBC858BLT1	3K	SOT-23	3000/Tape&Reel
LBC858BLT1G	3K (Pb-Free)	SOT-23	3000/Tape&Reel
LBC858CLT1	3L	SOT-23	3000/Tape&Reel
LBC858CLT1G	3L (Pb-Free)	SOT-23	3000/Tape&Reel
LBC859BLT1	4B	SOT-23	3000/Tape&Reel
LBC859BLT1G	4B (Pb-Free)	SOT-23	3000/Tape&Reel
LBC859CLT1	4C	SOT-23	3000/Tape&Reel
LBC859CLT1G	4C (Pb-Free)	SOT-23	3000/Tape&Reel

LBC856ALT1 Series

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage ($I_C = -10\text{ mA}$)	LBC856 Series LBC857 Series LBC858, LBC859 Series	$V_{(BR)CEO}$	-65 -45 -30	– – –	V
Collector–Emitter Breakdown Voltage ($I_C = -10\text{ }\mu\text{A}$, $V_{EB} = 0$)	LBC856 Series LBC857 Series LBC858, LBC859 Series	$V_{(BR)CES}$	-80 -50 -30	– – –	V
Collector–Base Breakdown Voltage ($I_C = -10\text{ }\mu\text{A}$)	LBC856 Series LBC857 Series LBC858, LBC859 Series	$V_{(BR)CBO}$	-80 -50 -30	– – –	V
Emitter–Base Breakdown Voltage ($I_E = -1.0\text{ }\mu\text{A}$)	LBC856 Series LBC857 Series LBC858, LBC859 Series	$V_{(BR)EBO}$	-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

ON CHARACTERISTICS

DC Current Gain ($I_C = -10\text{ }\mu\text{A}$, $V_{CE} = -5.0\text{ V}$)	LBC856A, LBC857A, LBC858A LBC856B, LBC857B, LBC858B, LBC859B LBC857C, LBC858C, LBC859C	h_{FE}	– – –	90 150 270	– – –	–
($I_C = -2.0\text{ mA}$, $V_{CE} = -5.0\text{ V}$)	LBC856A, LBC857A, LBC858A LBC856B, LBC857B, LBC858B, LBC859B LBC857C, LBC858C, LBC859C		125 220 420	180 290 520	250 475 800	
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 ($I_C = -0.2\text{ mA}$, $V_{CE} = -5.0\text{ Vdc}$, $R_S = 2.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$, $BW = 200\text{ Hz}$) LBC856, LBC857, LBC858 Series LBC859 Series	NF	– –	– –	10 4.0	dB

LBC856ALT1 Series

LBC857/ LBC858

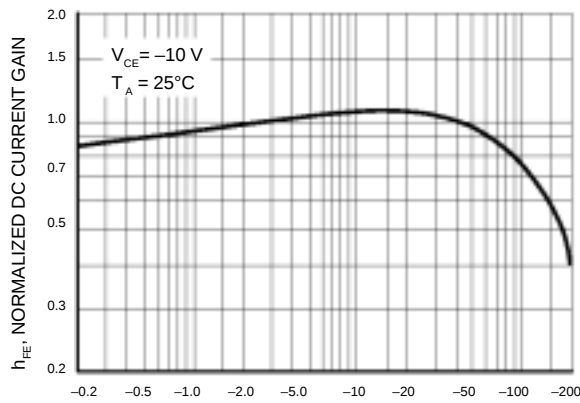


Figure 1. Normalized DC Current Gain

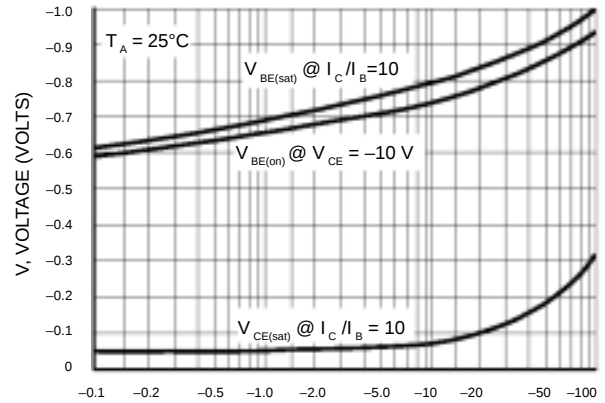


Figure 2. "Saturation" and "On" Voltages

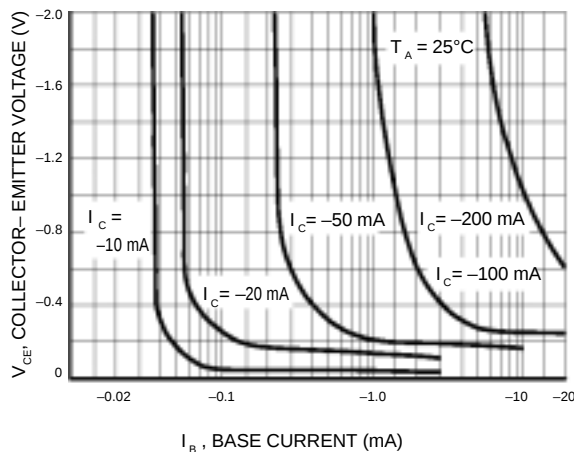


Figure 3. Collector Saturation Region

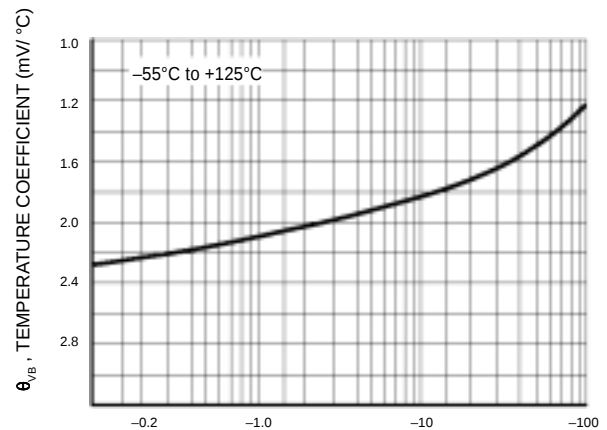


Figure 4. Base-Emitter Temperature Coefficient

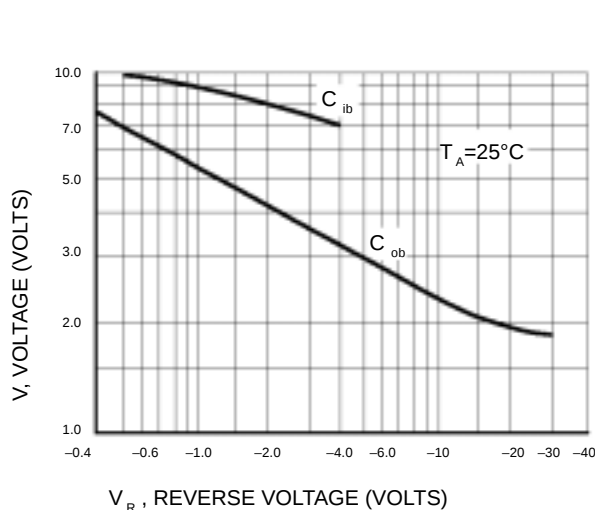


Figure 5. Capacitances

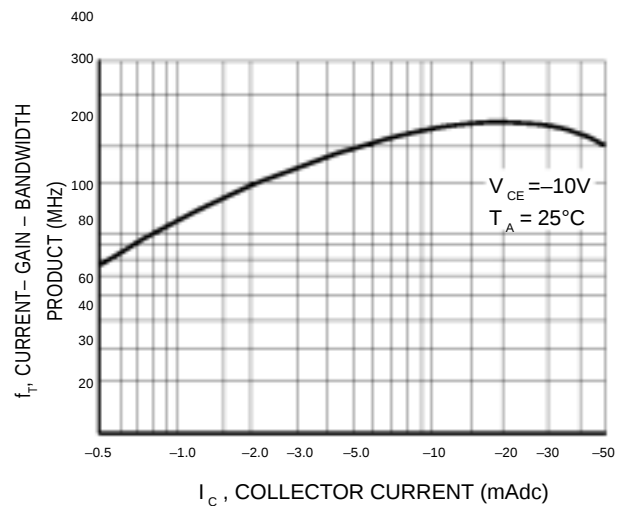


Figure 6. Current-Gain - Bandwidth Product

LBC856ALT1 Series

LBC856

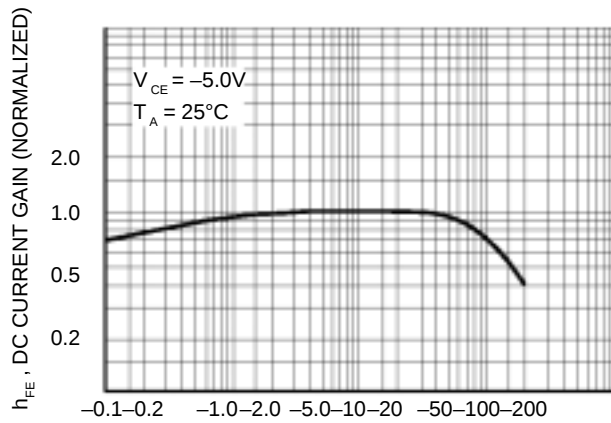


Figure 7. DC Current Gain

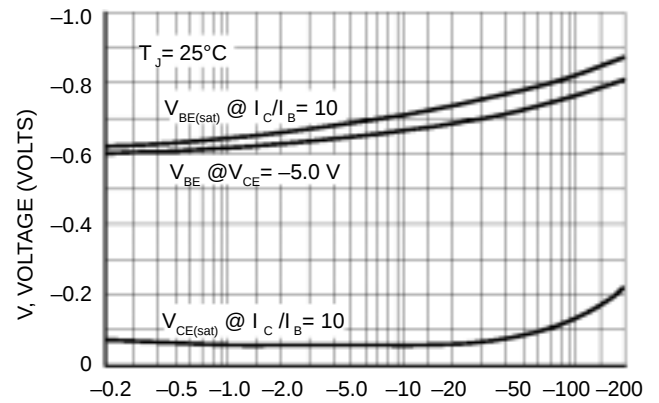


Figure 8. "On" Voltage

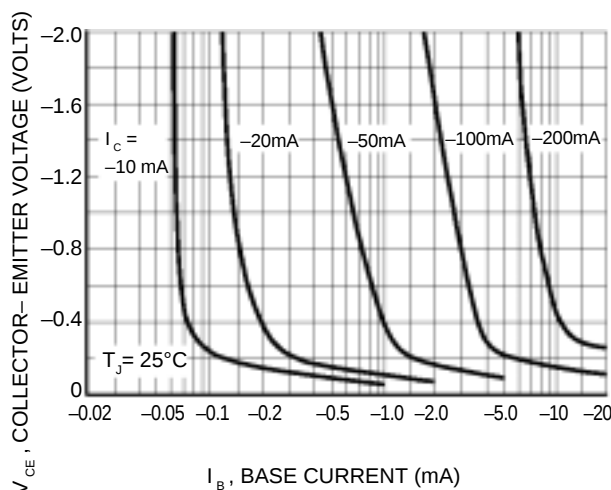


Figure 9. Collector Saturation Region

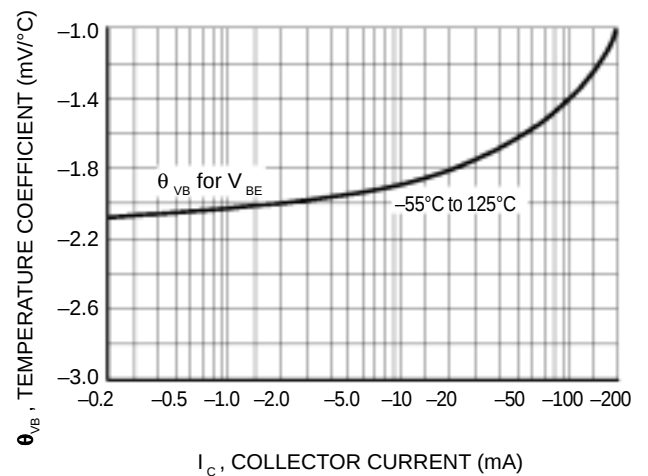


Figure 10. Base-Emitter Temperature Coefficient

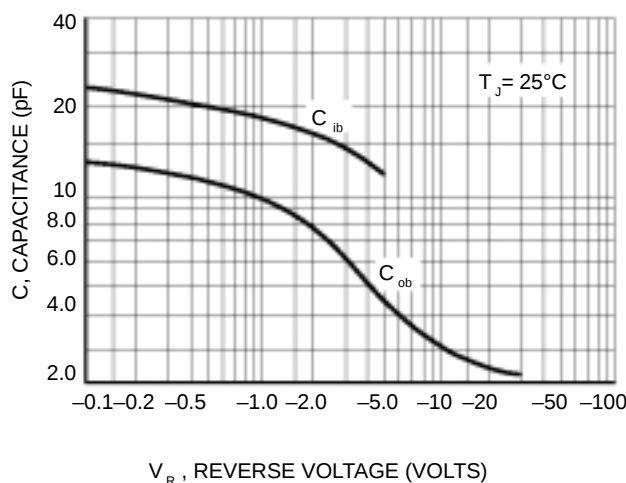


Figure 11. Capacitance

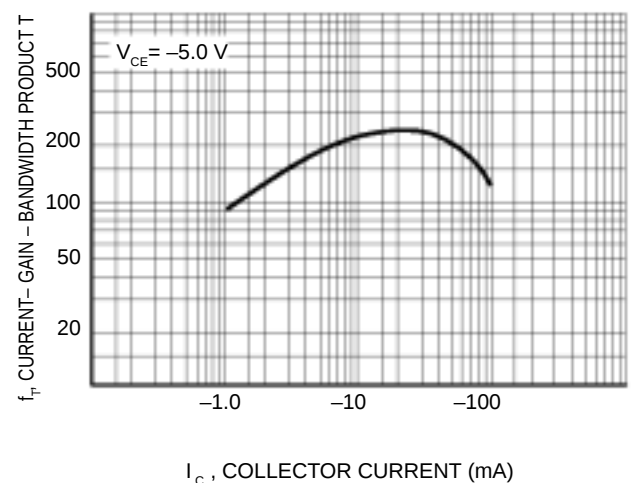


Figure 12. Current-Gain - Bandwidth Product

LBC856ALT1 Series

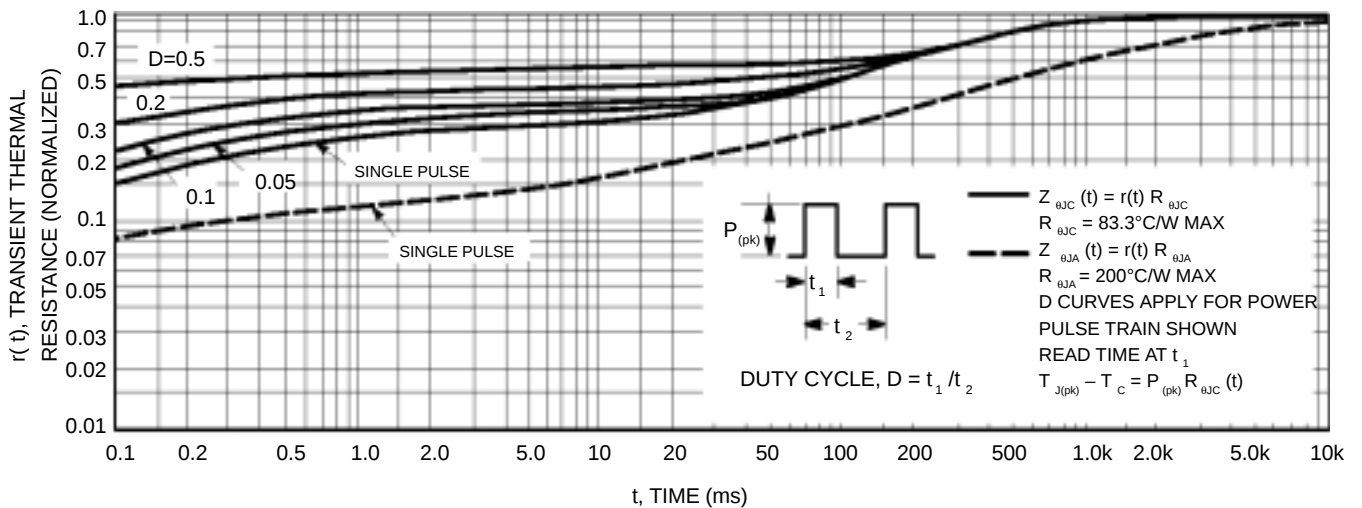


Figure 13. Thermal Response

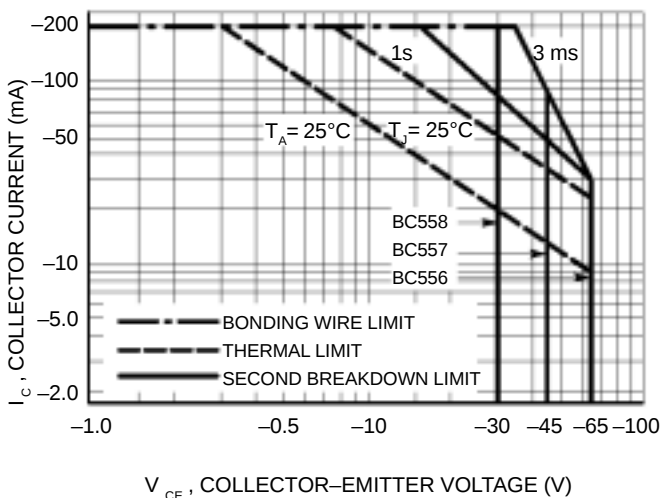


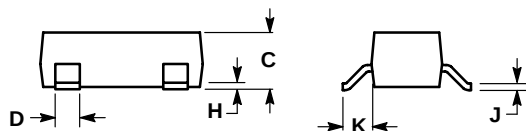
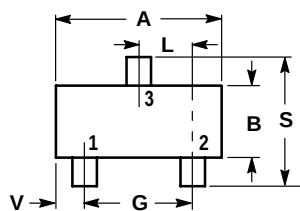
Figure 14. Active Region Safe Operating Area

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.

LBC856ALT1 Series

SOT-23



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
E	0.0701	0.0807	1.78	2.04
F	0.0005	0.0040	0.013	0.100
G	0.0034	0.0070	0.085	0.177
H	0.0140	0.0285	0.35	0.69
I	0.0350	0.0401	0.89	1.02
J	0.0830	0.1039	2.10	2.64
K	0.0177	0.0236	0.45	0.60

