MOTOROLA
SEMICONDUCTOR TECHNICAL DATA

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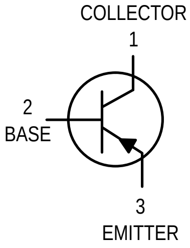
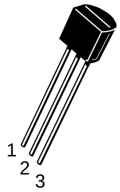
Amplifier Transistors

PNP Silicon

BC556,B
BC557A,B,C
BC558B





CASE 29–04, STYLE 17
TO–92 (TO–226AA)

MAXIMUM RATINGS

Rating	Symbol	BC 556	BC 557	BC 558	Unit
Collector–Emitter Voltage	V_{CEO}	–65	–45	–30	Vdc
Collector–Base Voltage	V_{CBO}	–80	–50	–30	Vdc
Emitter–Base Voltage	V_{EBO}	–5.0			Vdc
Collector Current — Continuous	I_C	–100			mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	625 5.0			mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	1.5 12			Watt mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +150			°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–Emitter Breakdown Voltage		$V_{(BR)CEO}$				V
(I_C = –2.0 mAdc, I_B = 0)	BC556		–65	—	—	
	BC557		–45	—	—	
	BC558		–30	—	—	
Collector–Base Breakdown Voltage		$V_{(BR)CBO}$				V
(I_C = –100 µAdc)	BC556		–80	—	—	
	BC557		–50	—	—	
	BC558		–30	—	—	
Emitter–Base Breakdown Voltage		$V_{(BR)EBO}$				V
(I_E = –100 µAdc, I_C = 0)	BC556		–5.0	—	—	
	BC557		–5.0	—	—	
	BC558		–5.0	—	—	
Collector–Emitter Leakage Current		I_{CES}				
(V_{CES} = –40 V)	BC556		—	–2.0	–100	nA
(V_{CES} = –20 V)	BC557		—	–2.0	–100	
	BC558		—	–2.0	–100	
(V_{CES} = –20 V, T_A = 125°C)	BC556		—	—	–4.0	µA
	BC557		—	—	–4.0	
	BC558		—	—	–4.0	

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

Characteristic		Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS						
DC Current Gain		h_{FE}				—
(I_C = –10 µAdc, V_{CE} = –5.0 V)	BC557A		—	90	—	
	BC556B/557B/558B		—	150	—	
	BC557C		—	270	—	
(I_C = –2.0 mAdc, V_{CE} = –5.0 V)	BC556		120	—	500	
	BC557		120	—	800	
	BC558		120	—	800	
	BC557A		120	170	220	
	BC556B/557B/558B		180	290	460	
	BC557C		420	500	800	
(I_C = –100 mAdc, V_{CE} = –5.0 V)	BC557A		—	120	—	
	BC556B/557B/558B		—	180	—	
	BC557C		—	300	—	
Collector–Emitter Saturation Voltage		$V_{CE(sat)}$				V
(I_C = –10 mAdc, I_B = –0.5 mAdc)			—	–0.075	–0.3	
(I_C = –10 mAdc, I_B = see Note 1)			—	–0.3	–0.6	
(I_C = –100 mAdc, I_B = –5.0 mAdc)			—	–0.25	–0.65	
Base–Emitter Saturation Voltage		$V_{BE(sat)}$				V
(I_C = –10 mAdc, I_B = –0.5 mAdc)			—	–0.7	—	
(I_C = –100 mAdc, I_B = –5.0 mAdc)			—	–1.0	—	
Base–Emitter On Voltage		$V_{BE(on)}$				V
(I_C = –2.0 mAdc, V_{CE} = –5.0 Vdc)			–0.55	–0.62	–0.7	
(I_C = –10 mAdc, V_{CE} = –5.0 Vdc)			—	–0.7	–0.82	
SMALL–SIGNAL CHARACTERISTICS						
Current–Gain — Bandwidth Product		f_T				MHz
(I_C = –10 mA, V_{CE} = –5.0 V, f = 100 MHz)	BC556		—	280	—	
	BC557		—	320	—	
	BC558		—	360	—	
Output Capacitance (V_{CB} = –10 V, I_C = 0, f = 1.0 MHz)		C_{ob}	—	3.0	6.0	pF
Noise Figure		NF				dB
(I_C = –0.2 mAdc, V_{CE} = –5.0 V,	BC556		—	2.0	10	
R_S = 2.0 kΩ, f = 1.0 kHz, Δf = 200 Hz)	BC557		—	2.0	10	
	BC558		—	2.0	10	
Small–Signal Current Gain		h_{fe}				—
(I_C = –2.0 mAdc, V_{CE} = –5.0 V, f = 1.0 kHz)	BC556		125	—	500	
	BC557/558		125	—	900	
	BC557A		125	220	260	
	BC556B/557B/558B		240	330	500	
	BC557C		450	600	900	

Note 1: I_C = –10 mAdc on the constant base current characteristics, which yields the point I_C = –11 mAdc, V_{CE} = –1.0 V.

BC557/BC558

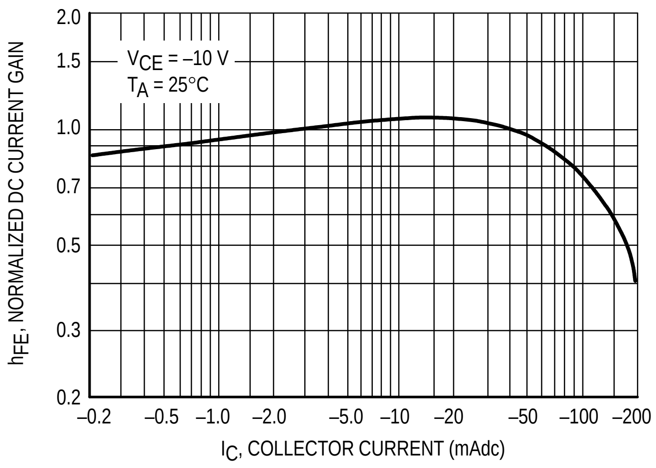


Figure 1. Normalized DC Current Gain

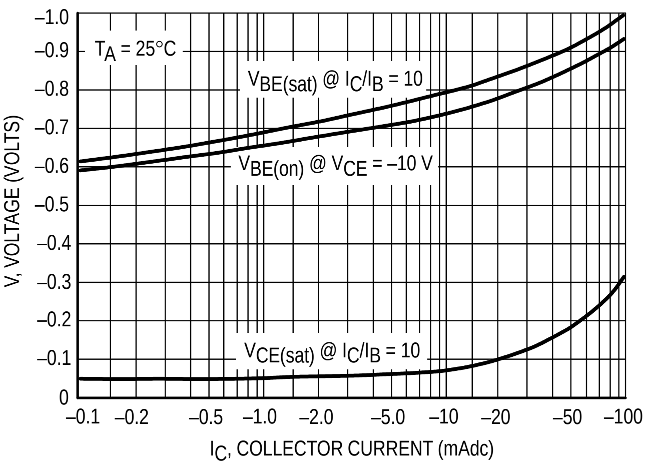


Figure 2. “Saturation” and “On” Voltages

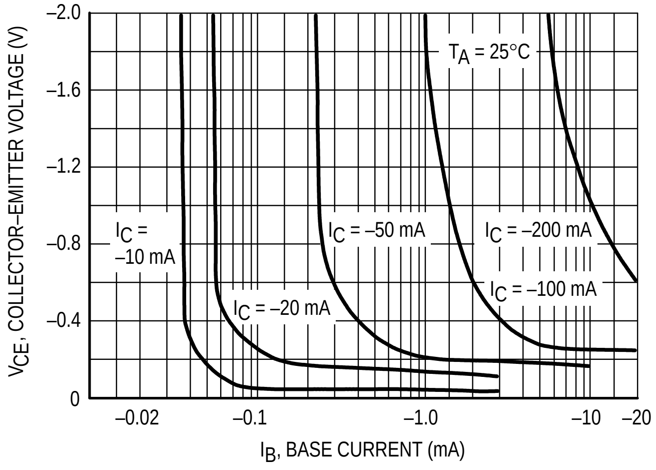


Figure 3. Collector Saturation Region

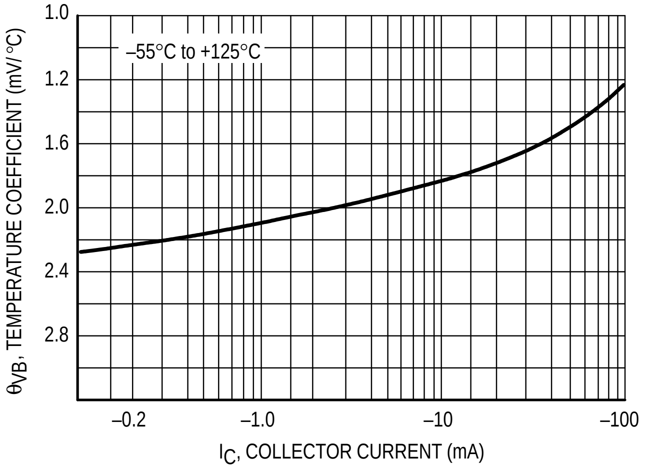


Figure 4. Base–Emitter Temperature Coefficient

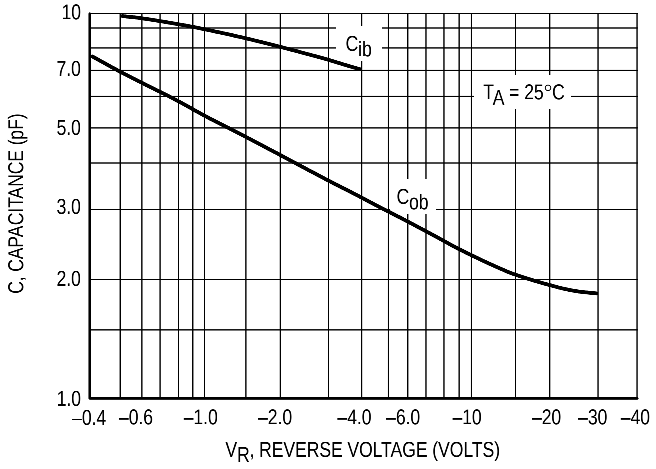


Figure 5. Capacitances

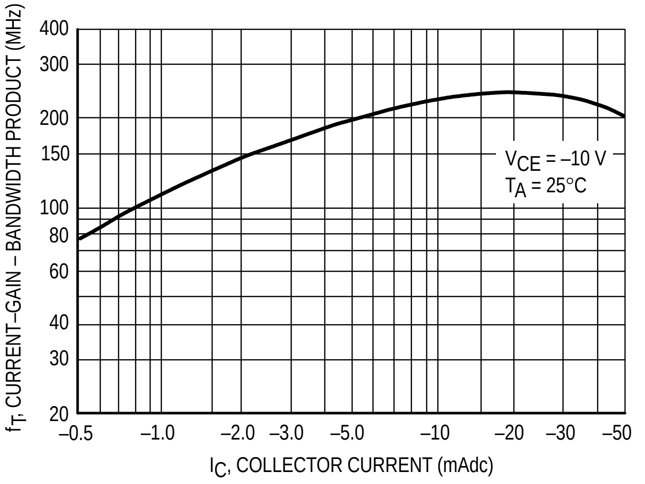


Figure 6. Current–Gain – Bandwidth Product

BC556

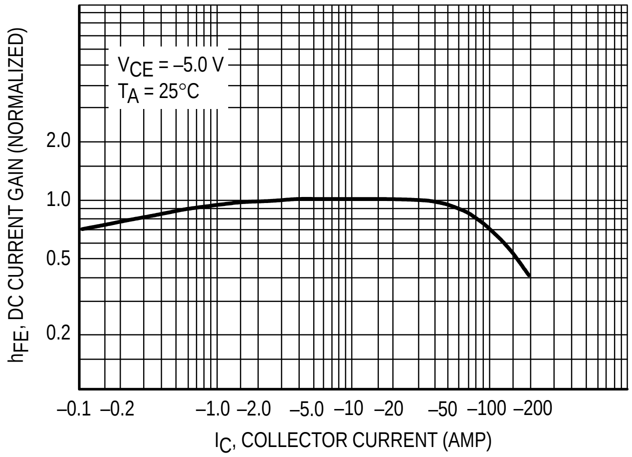


Figure 7. DC Current Gain

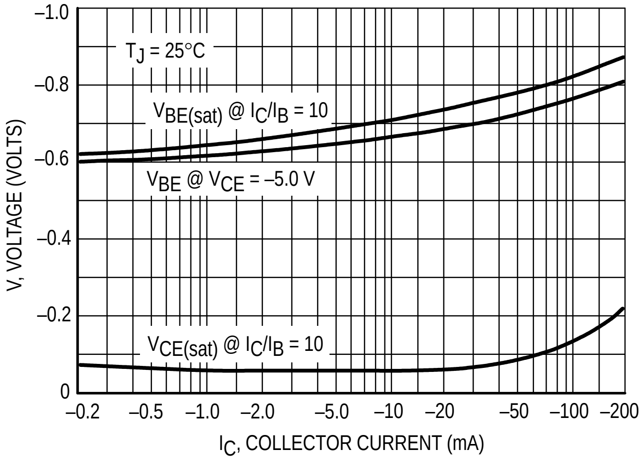


Figure 8. “On” Voltage

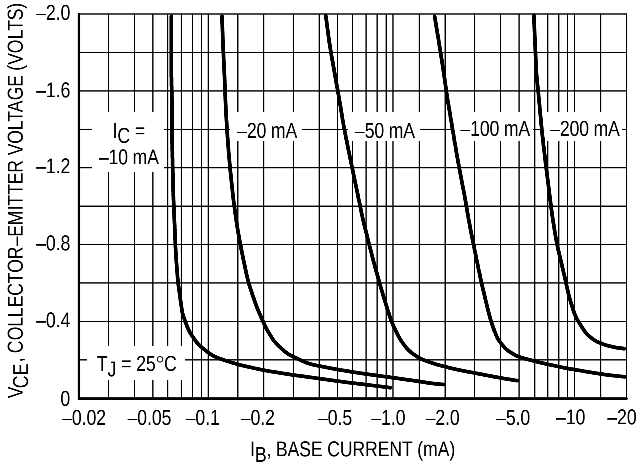


Figure 9. Collector Saturation Region

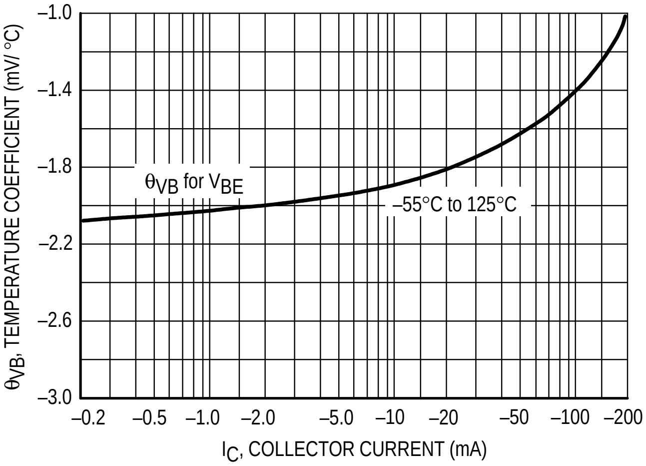


Figure 10. Base–Emitter Temperature Coefficient

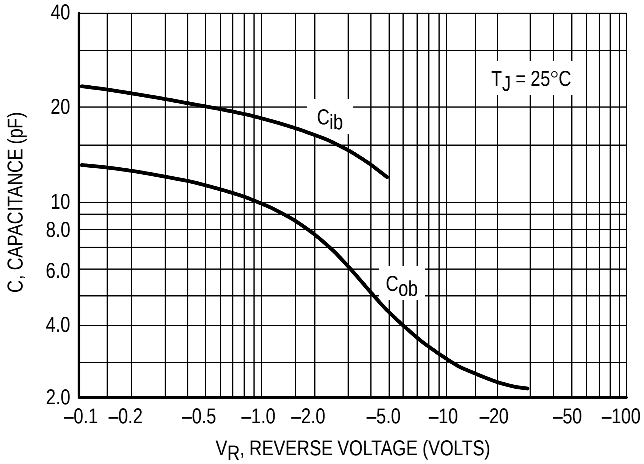


Figure 11. Capacitance

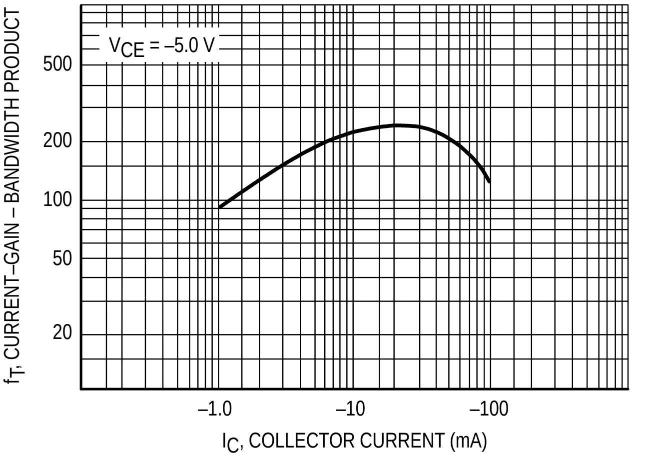


Figure 12. Current–Gain – Bandwidth Product

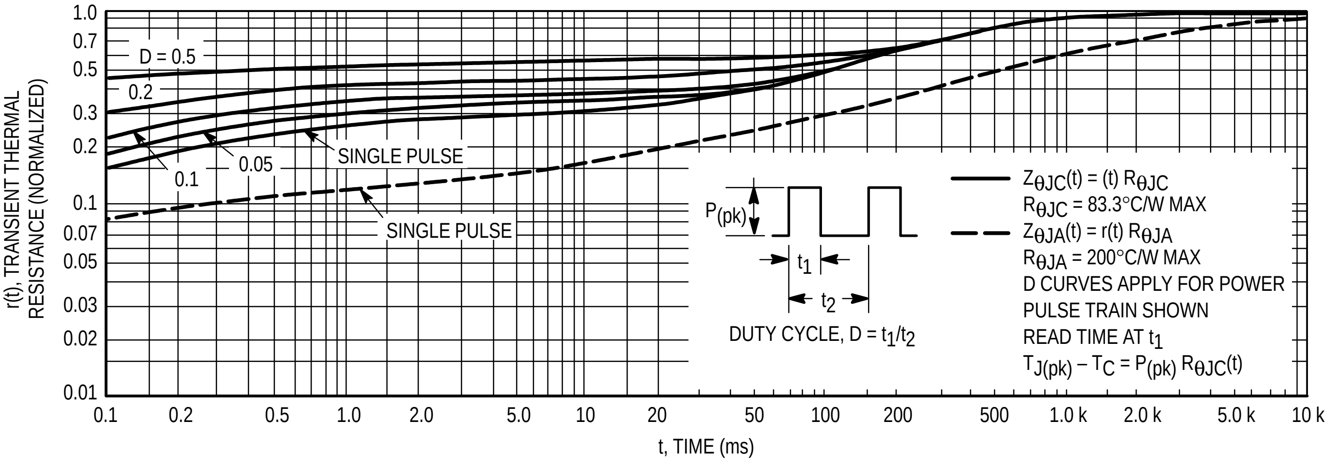


Figure 13. Thermal Response

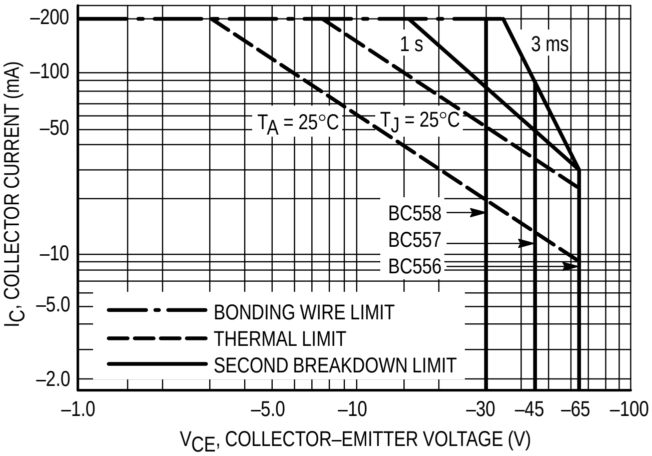
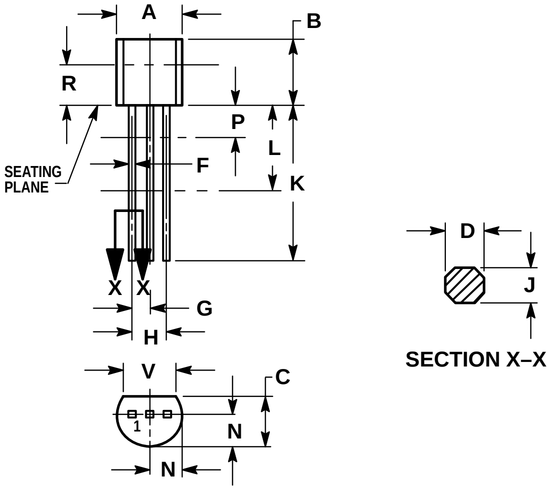


Figure 14. Active Region — Safe Operating Area

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 $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

PACKAGE DIMENSIONS



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSION D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

	INCHES		MILLIMETERS	
DIM	**MIN**	**MAX**	**MIN**	**MAX**
A	0.175	0.205	4.45	5.20
B	0.170	0.210	4.32	5.33
C	0.125	0.165	3.18	4.19
D	0.016	0.022	0.41	0.55
F	0.016	0.019	0.41	0.48
G	0.045	0.055	1.15	1.39
H	0.095	0.105	2.42	2.66
J	0.015	0.020	0.39	0.50
K	0.500	—	12.70	—
L	0.250	—	6.35	—
N	0.080	0.105	2.04	2.66
P	—	0.100	—	2.54
R	0.115	—	2.93	—
V	0.135	—	3.43	—

CASE 029–04
(TO–226AA)
ISSUE AD

STYLE 17:
PIN 1. COLLECTOR
2. BASE
3. EMITTER

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