

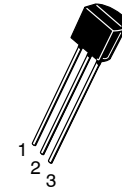
Low Noise Transistors

NPN Silicon

BC550C

MAXIMUM RATINGS

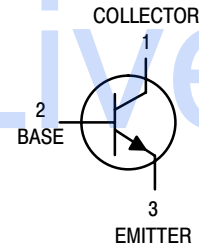
Rating	Symbol	Value	Unit
Collector – Emitter Voltage	V_{CEO}	45	Vdc
Collector – Base Voltage	V_{CBO}	50	Vdc
Emitter – Base Voltage	V_{EBO}	5.0	Vdc
Collector Current — Continuous	I_C	100	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0	mW mW/ $^\circ\text{C}$
Total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



CASE 29-11, STYLE 17
TO-92 (TO-226AA)

THERMAL CHARACTERISTICS

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



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

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector – Emitter Breakdown Voltage ($I_C = 10 \text{ mAdc}, I_B = 0$)	$V_{(BR)CEO}$	45	—	—	Vdc
Collector – Base Breakdown Voltage ($I_C = 10 \text{ }\mu\text{Adc}, I_E = 0$)	$V_{(BR)CBO}$	50	—	—	Vdc
Emitter – Base Breakdown Voltage ($I_E = 10 \text{ }\mu\text{Adc}, I_C = 0$)	$V_{(BR)EBO}$	5.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30 \text{ V}, I_E = 0$) ($V_{CB} = 30 \text{ V}, I_E = 0, T_A = +125^\circ\text{C}$)	I_{CBO}	—	—	15 5.0	nAdc μAdc
Emitter Cutoff Current ($V_{EB} = 4.0 \text{ Vdc}, I_C = 0$)	I_{EBO}	—	—	15	nAdc

BC550C

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

Characteristic	Symbol	Min	Typ	Max	Unit
ON CHARACTERISTICS					
DC Current Gain ($I_C = 10 \mu\text{Adc}$, $V_{CE} = 5.0 \text{ Vdc}$) ($I_C = 2.0 \text{ mAdc}$, $V_{CE} = 5.0 \text{ Vdc}$)	h_{FE}	100 420	270 500	— 800	—
Collector–Emitter Saturation Voltage ($I_C = 10 \text{ mAdc}$, $I_B = 0.5 \text{ mAdc}$) ($I_C = 10 \text{ mAdc}$, $I_B = \text{see note 1}$) ($I_C = 100 \text{ mAdc}$, $I_B = 5.0 \text{ mAdc}$, see note 2)	$V_{CE(\text{sat})}$	— — —	0.075 0.3 0.25	0.25 0.6 0.6	Vdc
Base–Emitter Saturation Voltage ($I_C = 100 \text{ mAdc}$, $I_B = 5.0 \text{ mAdc}$)	$V_{BE(\text{sat})}$	—	1.1	—	Vdc
Base–Emitter On Voltage ($I_C = 10 \mu\text{Adc}$, $V_{CE} = 5.0 \text{ Vdc}$) ($I_C = 100 \mu\text{Adc}$, $V_{CE} = 5.0 \text{ Vdc}$) ($I_C = 2.0 \text{ mAdc}$, $V_{CE} = 5.0 \text{ Vdc}$)	$V_{BE(\text{on})}$	— — 0.55	0.52 0.55 0.62	— — 0.7	Vdc

SMALL–SIGNAL CHARACTERISTICS

Current–Gain — Bandwidth Product ($I_C = 10 \text{ mAdc}$, $V_{CE} = 5.0 \text{ Vdc}$, $f = 100 \text{ MHz}$)	f_T	—	250	—	MHz
Collector–Base Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$)	C_{cbo}	—	2.5	—	pF
Small–Signal Current Gain ($I_C = 2.0 \text{ mAdc}$, $V_{CE} = 5.0 \text{ V}$, $f = 1.0 \text{ kHz}$)	h_{fe}	450	600	900	—
Noise Figure ($I_C = 200 \mu\text{Adc}$, $V_{CE} = 5.0 \text{ Vdc}$, $R_S = 2.0 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$) ($I_C = 200 \mu\text{Adc}$, $V_{CE} = 5.0 \text{ Vdc}$, $R_S = 100 \text{ k}\Omega$, $f = 1.0 \text{ kHz}$)	NF_1 NF_2	— —	0.6 —	2.5 10	dB

NOTES:

- I_B is value for which $I_C = 11 \text{ mA}$ at $V_{CE} = 1.0 \text{ V}$.
- Pulse test = $300 \mu\text{s}$ – Duty cycle = 2%.

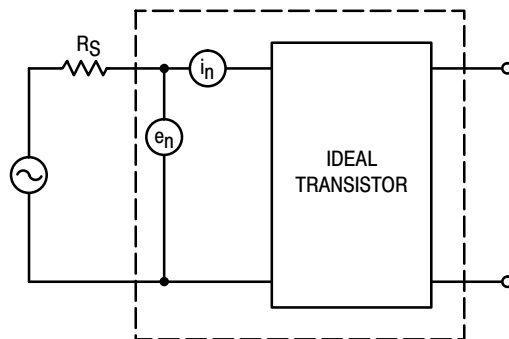


Figure 1. Transistor Noise Model

BC550C

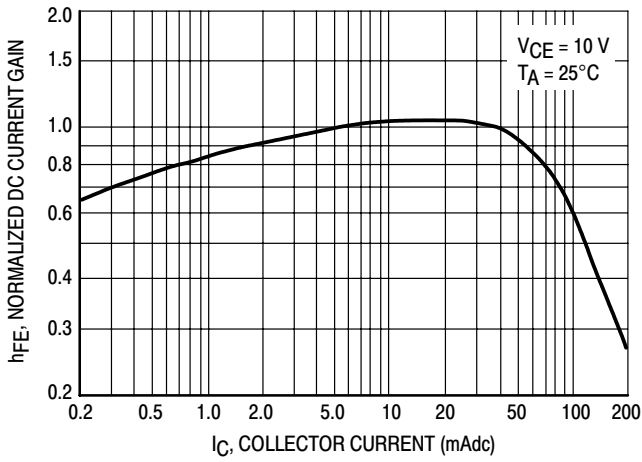


Figure 2. Normalized DC Current Gain

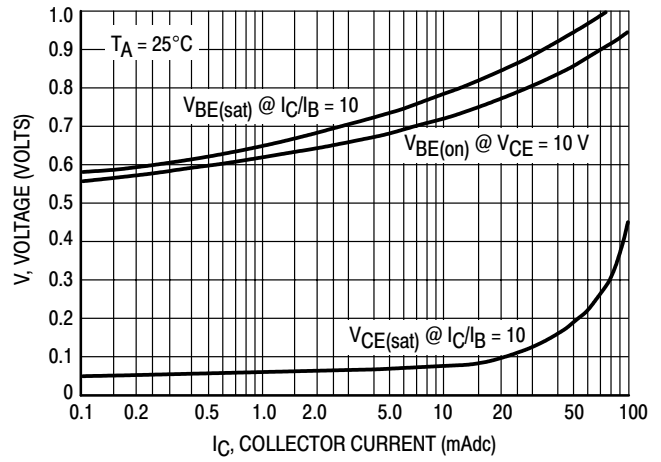


Figure 3. "Saturation" and "On" Voltages

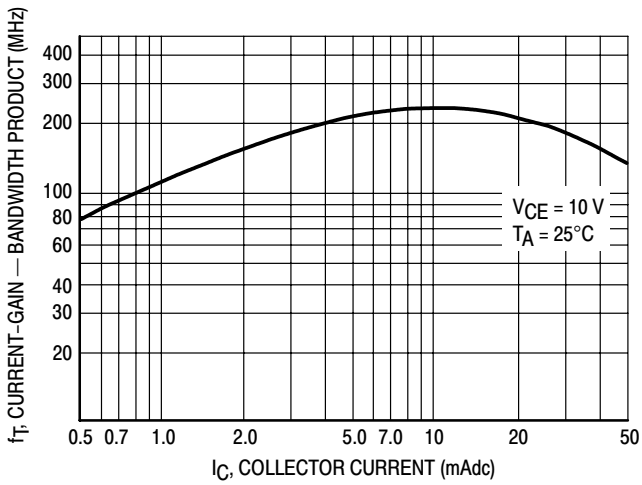


Figure 4. Current-Gain — Bandwidth Product

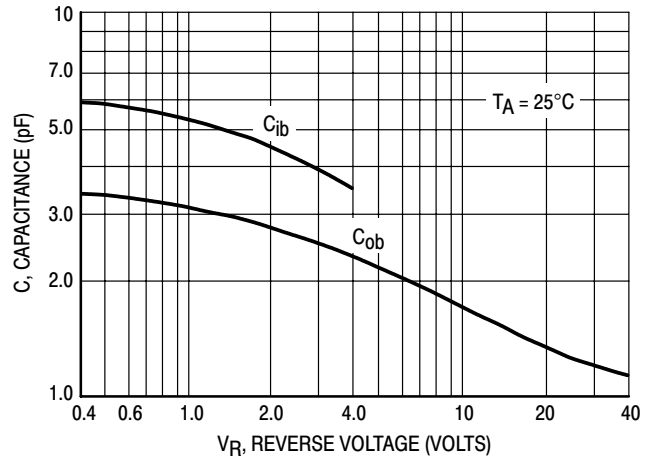


Figure 5. Capacitance

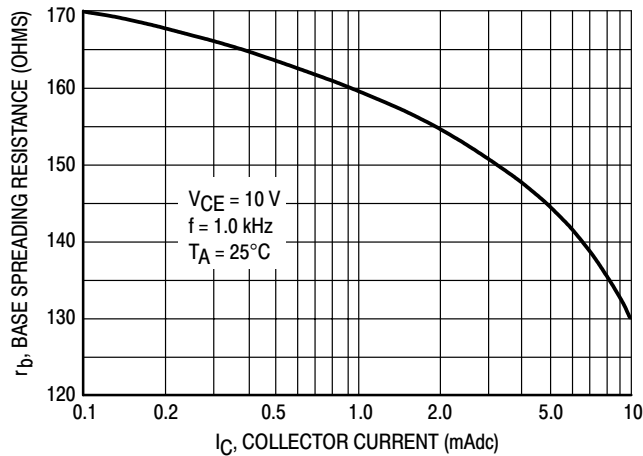


Figure 6. Base Spreading Resistance

BC556B, BC557A, B, C, BC558B

Amplifier Transistors

PNP Silicon

Features

- Pb-Free Package is Available*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage BC556 BC557 BC558	V_{CEO}	-65 -45 -30	Vdc
Collector-Base Voltage BC556 BC557 BC558	V_{CBO}	-80 -50 -30	Vdc
Emitter-Base Voltage	V_{EBO}	-5.0	Vdc
Collector Current – Continuous – Peak	I_C I_{CM}	-100 -200	mAdc
Base Current – Peak	I_{BM}	-200	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625 5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.5 12	Watts mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to +150	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

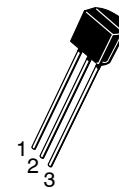
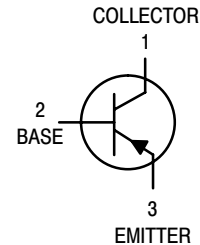
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	200	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

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TO-92
CASE 29
STYLE 17

MARKING DIAGRAM



BC55xx = Specific Device Code
Y = Year
WW = Work Week
▪ = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 334 of this data sheet.

BC556B, BC557A, B, C, BC558B

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Breakdown Voltage (I _C = –2.0 mA, I _B = 0)	V _{(BR)CEO}	–65	–	–	V
BC556		–45	–	–	
BC557		–30	–	–	
BC558		–	–	–	
Collector–Base Breakdown Voltage (I _C = –100 μA)	V _{(BR)CBO}	–80	–	–	V
BC556		–50	–	–	
BC557		–30	–	–	
BC558		–	–	–	
Emitter–Base Breakdown Voltage (I _E = –100 μA, I _C = 0)	V _{(BR)EBO}	–5.0	–	–	V
BC556		–5.0	–	–	
BC557		–5.0	–	–	
BC558		–	–	–	
Collector–Emitter Leakage Current (V _{CE} = –40 V)	I _{CES}	–	–2.0	–100	nA
(V _{CE} = –20 V)		–	–2.0	–100	
		–	–2.0	–100	
(V _{CE} = –20 V, T _A = 125°C)		–	–	–4.0	μA
		–	–	–4.0	
		–	–	–4.0	

ON CHARACTERISTICS

DC Current Gain (I _C = –10 μA, V _{CE} = –5.0 V)	h _{FE}	–	90	–	–
A Series Device		–	150	–	
B Series Devices		–	270	–	
C Series Devices		–	–	–	
(I _C = –2.0 mA, V _{CE} = –5.0 V)		120	–	800	
A Series Device		120	170	220	
B Series Devices		180	290	460	
C Series Devices		420	500	800	
(I _C = –100 mA, V _{CE} = –5.0 V)		–	120	–	
A Series Device		–	180	–	
B Series Devices		–	300	–	
C Series Devices		–	–	–	
Collector–Emitter Saturation Voltage (I _C = –10 mA, I _B = –0.5 mA)	V _{CE(sat)}	–	–0.075	–0.3	V
(I _C = –10 mA, I _B = see Note 1)		–	–0.3	–0.6	
(I _C = –100 mA, I _B = –5.0 mA)		–	–0.25	–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)		–	–1.0	–	
Base–Emitter On Voltage (I _C = –2.0 mA, V _{CE} = –5.0 V)	V _{BE(on)}	–0.55	–0.62	–0.7	V
(I _C = –10 mA, V _{CE} = –5.0 V)		–	–0.7	–0.82	

SMALL–SIGNAL CHARACTERISTICS

Current–Gain – Bandwidth Product (I _C = –10 mA, V _{CE} = –5.0 V, f = 100 MHz)	f _T	–	280	–	MHz
BC556		–	320	–	
BC557		–	360	–	
BC558		–	–	–	
Output Capacitance (V _{CB} = –10 V, I _C = 0, f = 1.0 MHz)	C _{ob}	–	3.0	6.0	pF
Noise Figure (I _C = –0.2 mA, V _{CE} = –5.0 V, R _S = 2.0 kΩ, f = 1.0 kHz, Δf = 200 Hz)	NF	–	2.0	10	dB
BC556		–	2.0	10	
BC557		–	2.0	10	
BC558		–	2.0	10	
Small–Signal Current Gain (I _C = –2.0 mA, V _{CE} = 5.0 V, f = 1.0 kHz)	h _{fe}	125	–	900	–
BC557		125	–	260	
A Series Device		240	–	500	
B Series Devices		450	–	900	
C Series Devices		–	–	–	

3. I_C = –10 mA on the constant base current characteristics, which yields the point I_C = –11 mA, V_{CE} = –1.0 V.

BC556B, BC557A, B, C, BC558B

BC557/BC558

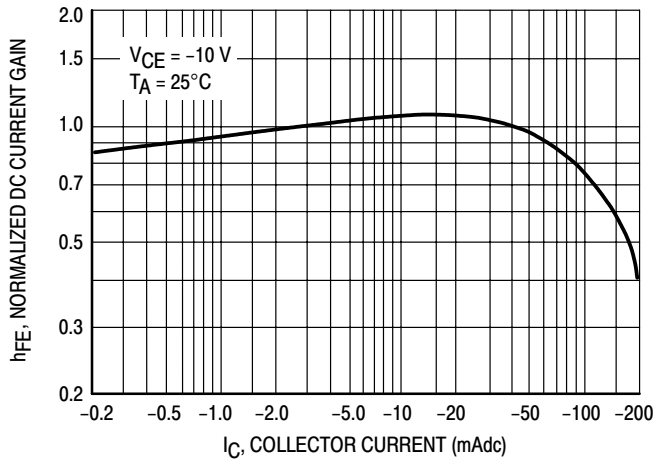


Figure 1. Normalized DC Current Gain

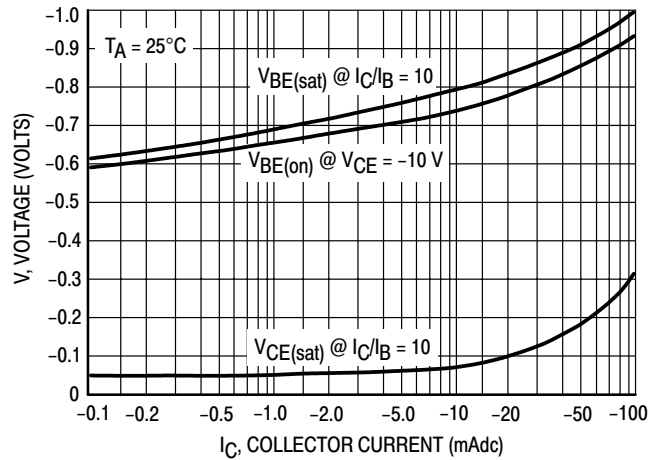


Figure 2. "Saturation" and "On" Voltages

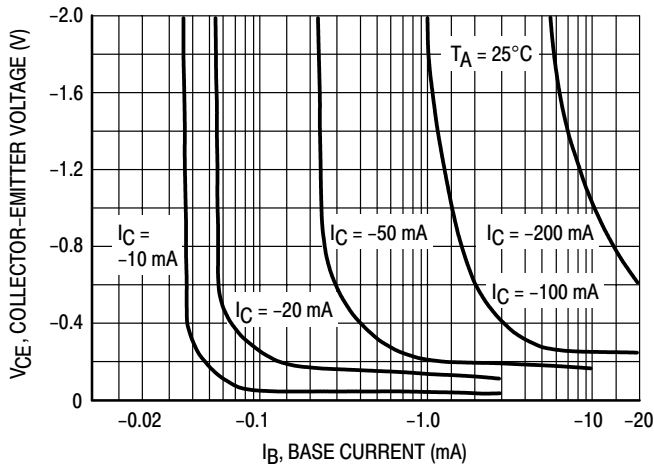


Figure 3. Collector Saturation Region

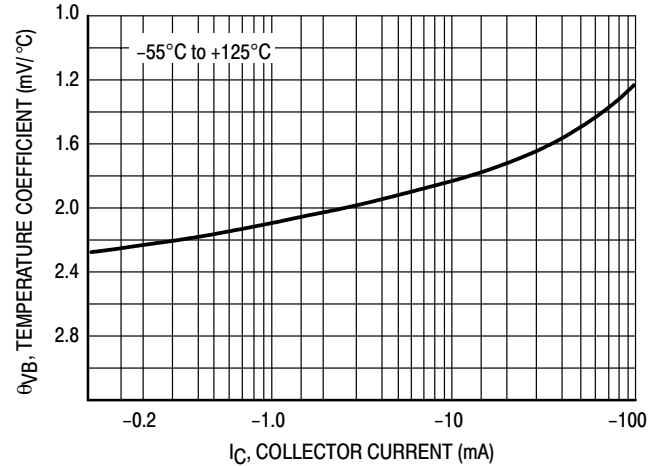


Figure 4. Base-Emitter Temperature Coefficient

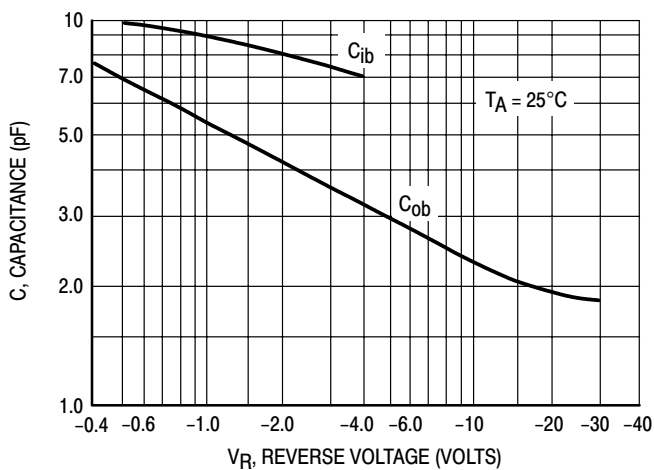


Figure 5. Capacitances

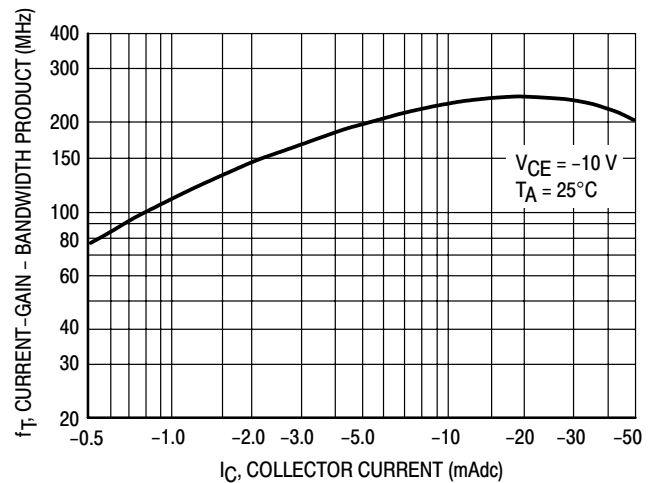


Figure 6. Current-Gain - Bandwidth Product

BC556

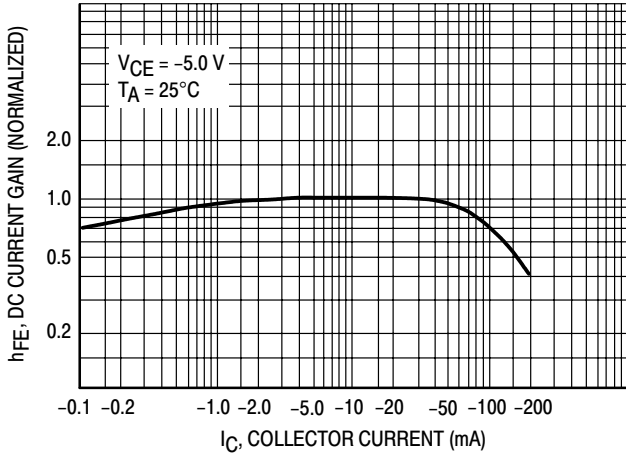


Figure 7. DC Current Gain

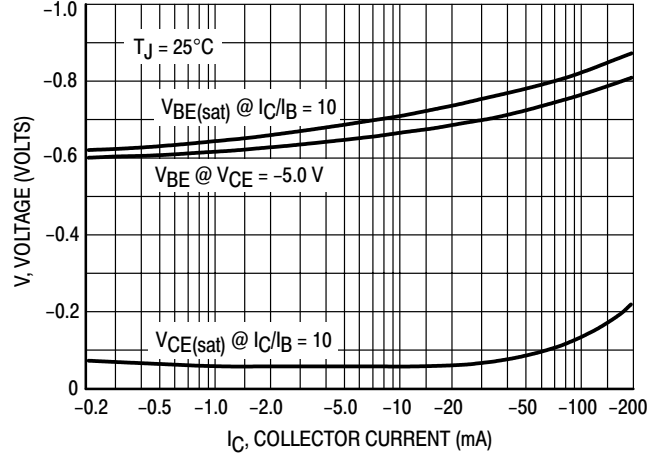


Figure 8. "On" Voltage

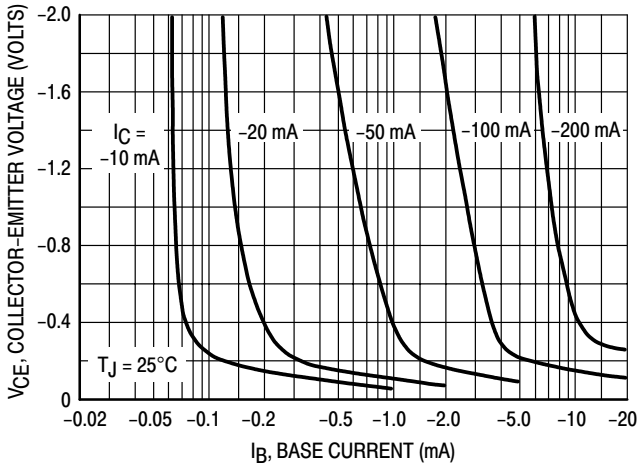


Figure 9. Collector Saturation Region

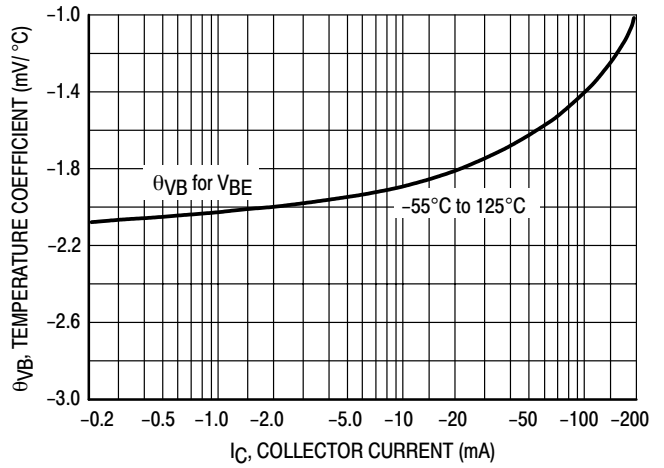


Figure 10. Base-Emitter Temperature Coefficient

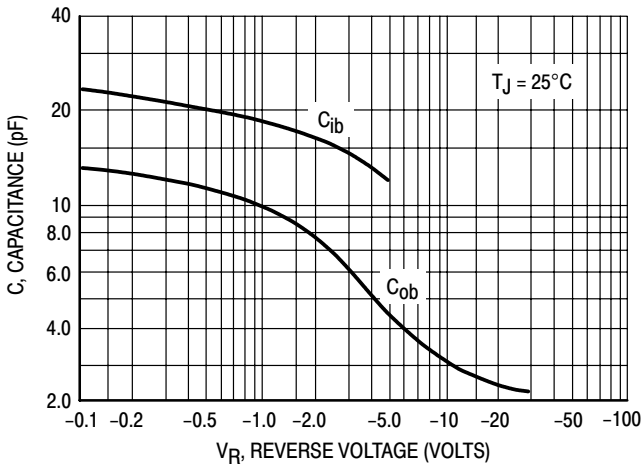


Figure 11. Capacitance

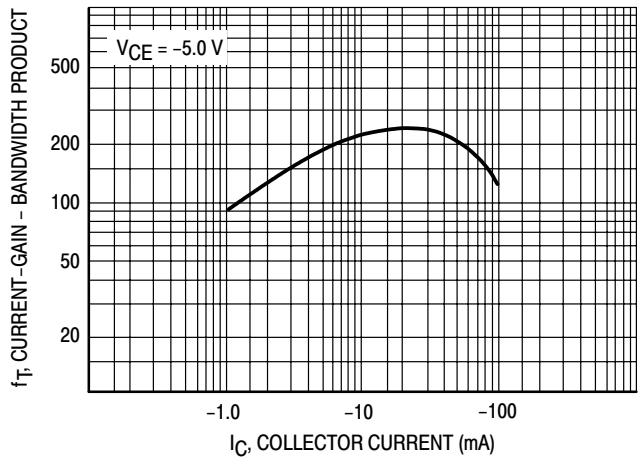


Figure 12. Current-Gain - Bandwidth Product

BC556B, BC557A, B, C, BC558B

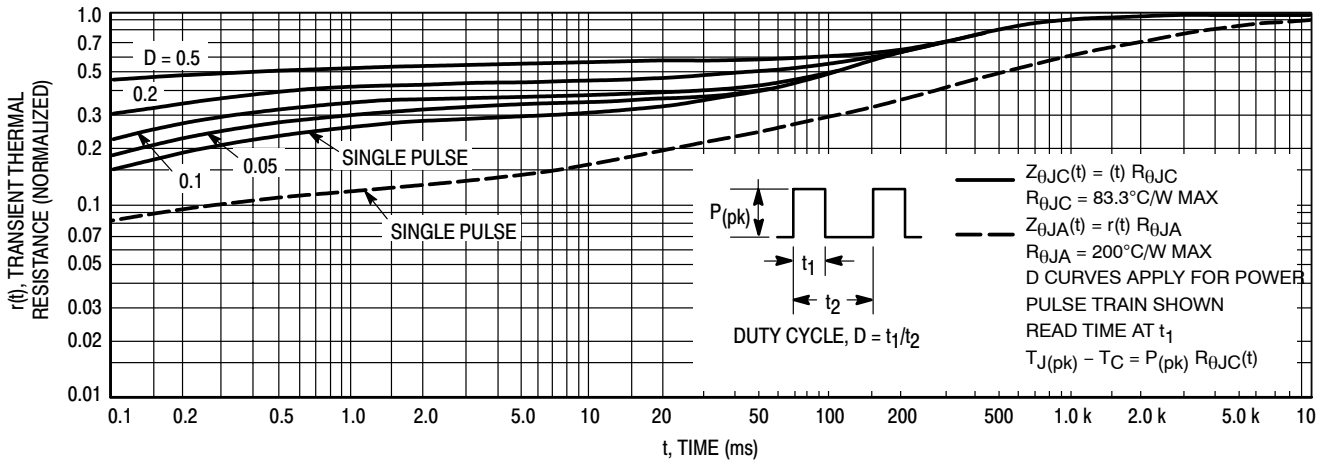


Figure 13. Thermal Response

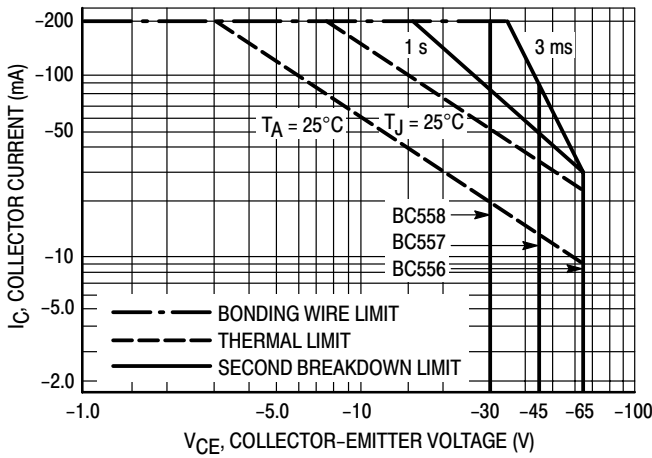


Figure 14. Active Region – Safe Operating Area

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 than can be handled to values less than the limitations imposed by second breakdown.

DEVICE ORDERING INFORMATION

Device	Package	Shipping [†]
BC556B	TO-92 (TO-226)	5000 Units / Bulk
BC556BZL1		2000 Tape & Ammo Box
BC557AZL1		2000 Tape & Ammo Box
BC557B		5000 Units / Bulk
BC557BRL1		2000 Tape & Reel
BC557BZL1		2000 Tape & Ammo Box
BC557BZL1G	TO-92 (TO-226) (Pb-Free)	
BC557CZL1	TO-92 (TO-226)	2000 Tape & Ammo Box
BC558BRL		2000 Tape & Reel
BC558BRL1		
BC558BZL1		2000 Tape & Ammo Box

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.