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Low Noise Transistors

NPN Silicon

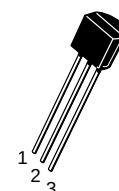
BC549B,C
BC550B,C

MAXIMUM RATINGS

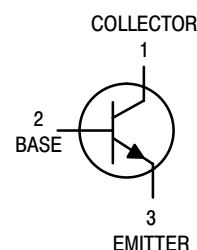
Rating	Symbol	BC549	BC550	Unit
Collector–Emitter Voltage	V_{CEO}	30	45	Vdc
Collector–Base Voltage	V_{CBO}	30	50	Vdc
Emitter–Base Voltage	V_{EBO}	5.0		Vdc
Collector Current — Continuous	I_C	100		mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	625	5.0	mW mW/ $^\circ\text{C}$
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		$^\circ\text{C}$

THERMAL CHARACTERISTICS

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



CASE 29–04, STYLE 17
TO–92 (TO–226AA)



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 ($I_C = 10 \text{ mAdc}$, $I_B = 0$)	BC549B,C BC550B,C	$V_{(BR)CEO}$	30 45	— —	— —	Vdc
Collector–Base Breakdown Voltage ($I_C = 10 \text{ } \mu\text{Adc}$, $I_E = 0$)	BC549B,C BC550B,C	$V_{(BR)CBO}$	30 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

BC549B,C BC550B,C

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}	100 100 200 420	150 270 290 500	— — 450 800	—
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)	$V_{CE(sat)}$	— — —	0.075 0.3 0.25	0.25 0.6 0.6	Vdc
Base–Emitter Saturation Voltage ($I_C = 100\ \text{mAdc}$, $I_B = 5.0\ \text{mAdc}$)	$V_{BE(sat)}$	—	1.1	—	Vdc
Base–Emitter On Voltage ($I_C = 10\ \mu\text{Adc}$, $V_{CE} = 5.0\ \text{Vdc}$) ($I_C = 100\ \mu\text{Adc}$, $V_{CE} = 5.0\ \text{Vdc}$) ($I_C = 2.0\ \text{mAdc}$, $V_{CE} = 5.0\ \text{Vdc}$)	$V_{BE(on)}$	— — 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}	240 450	330 600	500 900	—
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%.

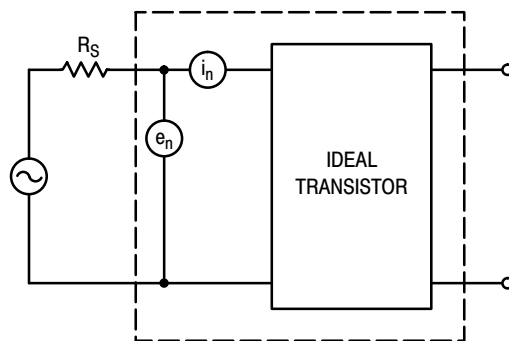


Figure 1. Transistor Noise Model

BC549B,C BC550B,C

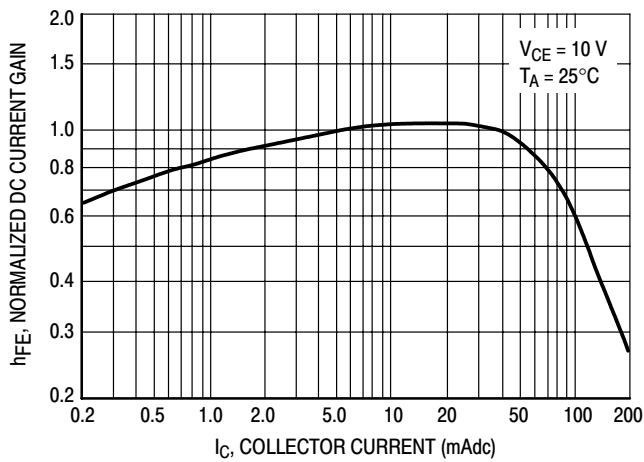


Figure 2. Normalized DC Current Gain

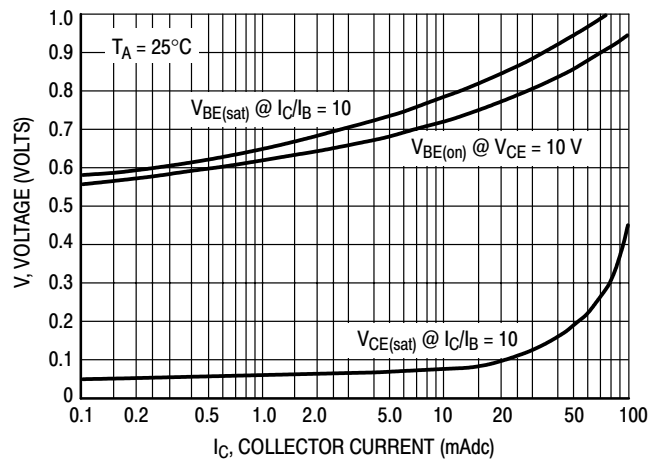


Figure 3. "Saturation" and "On" Voltages

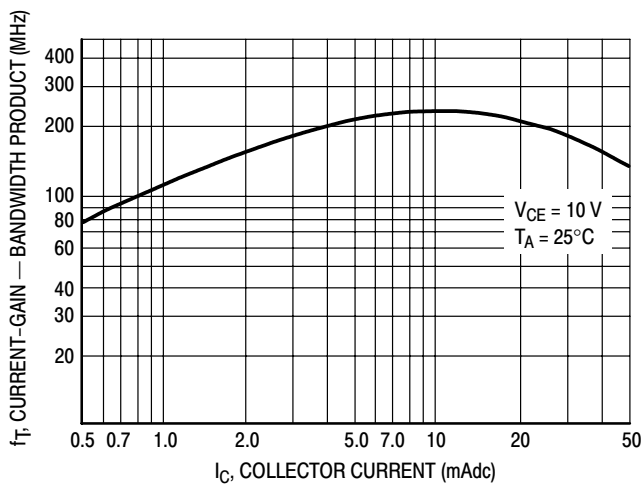


Figure 4. Current-Gain — Bandwidth Product

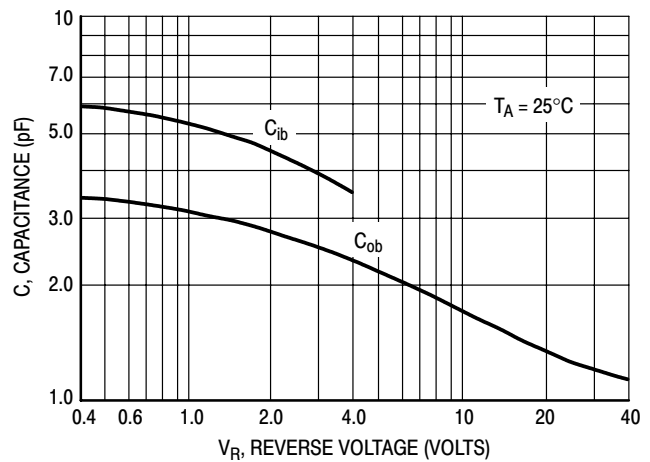


Figure 5. Capacitance

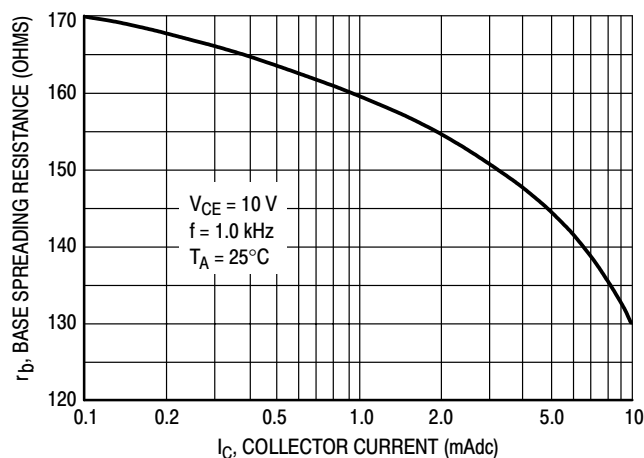
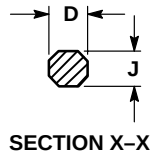
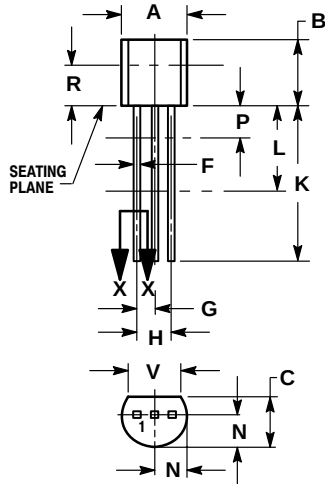


Figure 6. Base Spreading Resistance

BC549B,C BC550B,C

PACKAGE DIMENSIONS

CASE 029-04
(TO-226AA)
ISSUE AD



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.

DIM	INCHES		MILLIMETERS	
	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	---

STYLE 17:

1. COLLECTOR
2. BASE
3. EMITTER

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