

# Low Noise Transistors

## PNP Silicon

### BC559, B, C BC560C

#### MAXIMUM RATINGS

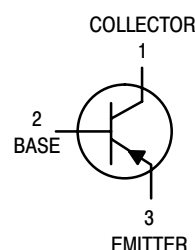
Rating	Symbol	BC559	BC560	Unit
Collector–Emitter Voltage	$V_{CEO}$	–30	–45	Vdc
Collector–Base Voltage	$V_{CBO}$	–30	–50	Vdc
Emitter–Base Voltage	$V_{EBO}$	–5.0		Vdc
Collector Current — Continuous	$I_C$	–100		mA dc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	625	5.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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 29–04, STYLE 17  
TO–92 (TO–226AA)

#### 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	$^\circ\text{C/W}$



#### 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 ( $I_C = -10 \text{ mA dc}, I_B = 0$ )	BC559 BC560	$V_{(BR)CEO}$	–30 –45	— —	— —	Vdc
Collector–Base Breakdown Voltage ( $I_C = -10 \text{ } \mu\text{A dc}, I_E = 0$ )	BC559 BC560	$V_{(BR)CBO}$	–30 –50	— —	— —	Vdc
Emitter–Base Breakdown Voltage ( $I_E = -10 \text{ } \mu\text{A dc}, I_C = 0$ )		$V_{(BR)EBO}$	–5.0	—	—	Vdc
Collector Cutoff Current ( $V_{CB} = -30 \text{ Vdc}, I_E = 0$ ) ( $V_{CB} = -30 \text{ Vdc}, I_E = 0, T_A = +125^\circ\text{C}$ )		$I_{CBO}$	— —	— —	–15 –5.0	nA dc $\mu\text{A dc}$
Emitter Cutoff Current ( $V_{EB} = -4.0 \text{ Vdc}, I_C = 0$ )		$I_{EBO}$	—	—	–15	nA dc

# BC559, B, C BC560C

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### ON CHARACTERISTICS

DC Current Gain ( $I_C = -10\ \mu\text{Adc}$ , $V_{CE} = -5.0\ \text{Vdc}$ )  ( $I_C = -2.0\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ )	BC559B BC559C/560C BC559B BC559C/560C BC559	$h_{FE}$	100 100 180 380 120	150 270 290 500 —	— — 460 800 800	—
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 —	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 ( $I_C = -2.0\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{V}$ , $f = 1.0\ \text{kHz}$ )	BC559B BC559C/BC560C	$h_{fe}$	240 450	330 600	500 900	—
Noise Figure ( $I_C = -200\ \mu\text{Adc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $R_S = 2.0\ \text{k}\Omega$ , $f = 1.0\ \text{kHz}$ ) ( $I_C = -200\ \mu\text{Adc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $R_S = 100\ \text{k}\Omega$ , $f = 1.0\ \text{kHz}$ , $\Delta f = 200\ \text{kHz}$ )		$NF_1$ $NF_2$	— —	0.5 —	2.0 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%.

## BC559, B, C BC560C

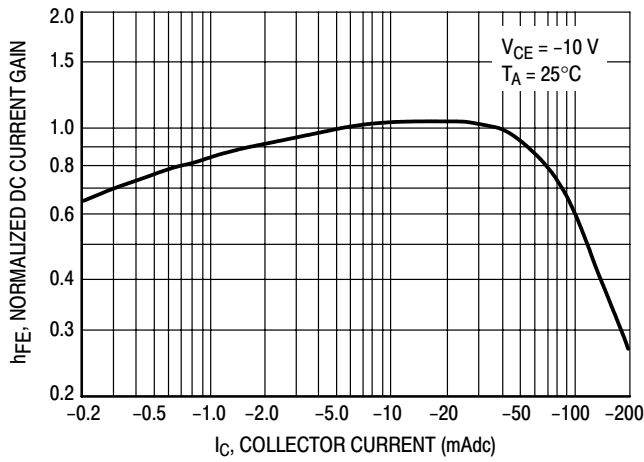


Figure 1. Normalized DC Current Gain

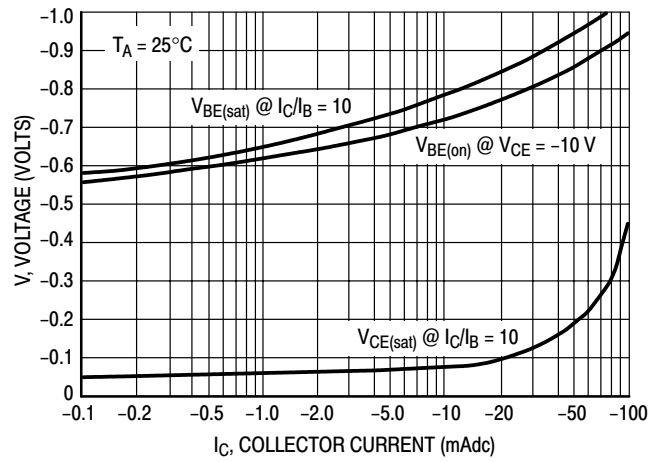


Figure 2. "Saturation" and "On" Voltages

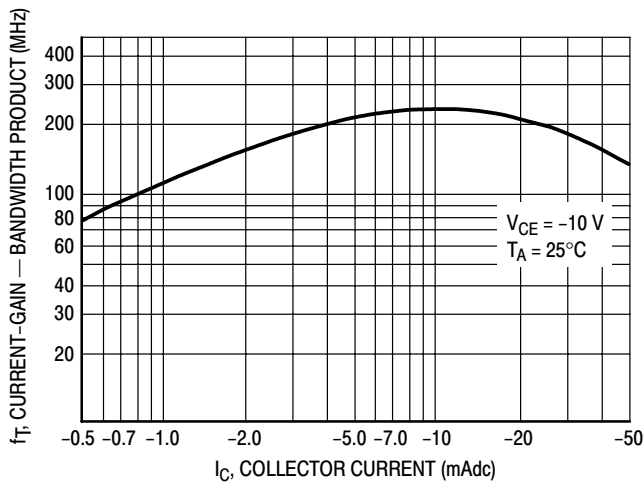


Figure 3. Current-Gain — Bandwidth Product

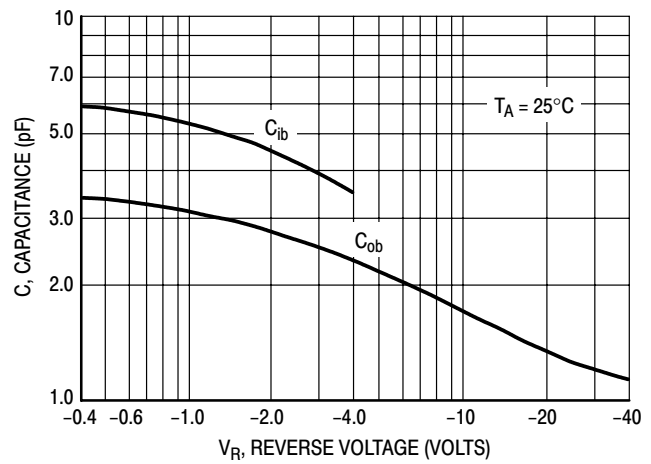


Figure 4. Capacitance

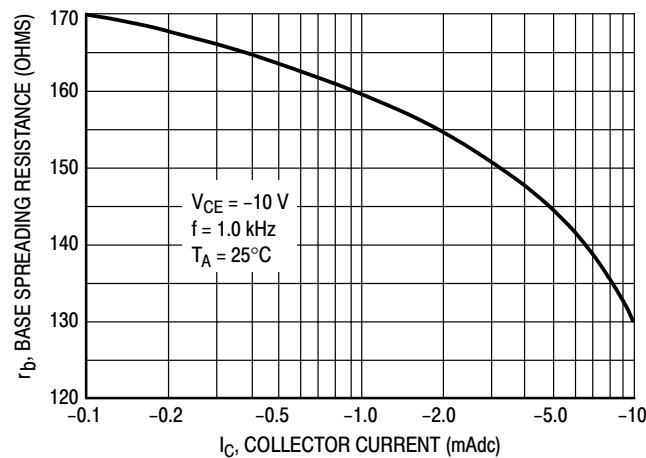
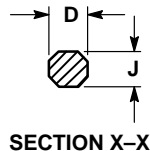
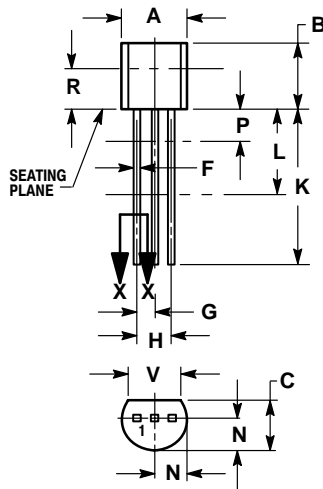


Figure 5. Base Spreading Resistance

# BC559, B, C BC560C

## 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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