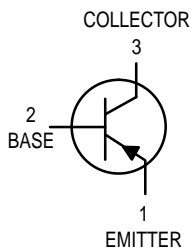
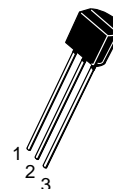


# Amplifier Transistors

## PNP Silicon



**BC212,B**  
**BC213**  
**BC214**



CASE 29-04, STYLE 17  
TO-92 (TO-226AA)

### MAXIMUM RATINGS

Rating	Symbol	BC 212	BC 213	BC 214	Unit
Collector–Emitter Voltage	$V_{CEO}$	–50	–30	–30	Vdc
Collector–Base Voltage	$V_{CBO}$	–60	–45	–45	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 $25^\circ\text{C}$	$P_D$	350 2.8			mW mW/°C
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0			Watts 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	$R_{\theta JA}$	357	°C/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	125	°C/W

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

Characteristic		Symbol	Min	Typ	Max	Unit
Collector–Emitter Breakdown Voltage ( $I_C = -2.0 \text{ mAdc}$ , $I_B = 0$ )	BC212	$V_{(BR)CEO}$	–50	—	—	Vdc
	BC213		–30	—	—	
	BC214		–30	—	—	
Collector–Base Breakdown Voltage ( $I_C = -10 \mu\text{A}$ , $I_E = 0$ )	BC212	$V_{(BR)CBO}$	–60	—	—	Vdc
	BC213		–45	—	—	
	BC214		–45	—	—	
Emitter–Base Breakdown Voltage ( $I_E = -10 \mu\text{Adc}$ , $I_C = 0$ )	BC212	$V_{(BR)EBO}$	–5	—	—	Vdc
	BC213		–5	—	—	
	BC214		–5	—	—	
Collector–Emitter Leakage Current ( $V_{CB} = -30 \text{ V}$ )	BC212	$I_{CBO}$	—	—	–15	nAdc
	BC213		—	—	–15	
	BC214		—	—	–15	
Emitter–Base Leakage Current ( $V_{EB} = -4.0 \text{ V}$ , $I_C = 0$ )	BC212	$I_{EBO}$	—	—	–15	nAdc
	BC213		—	—	–15	
	BC214		—	—	–15	

**BC212,B BC213 BC214****ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>						
DC Current Gain ( $I_C = -10\ \mu\text{Adc}$ , $V_{CE} = -5.0\ \text{Vdc}$ )  ( $I_C = -2.0\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ )  ( $I_C = -100\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ )(1)	BC212	$h_{FE}$	40	—	—	—
	BC213		40	—	—	
	BC214		100	—	—	
	BC212		60	—	—	
	BC213		80	—	—	
	BC214		140	—	600	
	BC212, BC214		—	120	—	
	BC213		—	140	—	
Collector–Emitter Saturation Voltage ( $I_C = -10\ \text{mAdc}$ , $I_B = -0.5\ \text{mAdc}$ ) ( $I_C = -100\ \text{mAdc}$ , $I_B = -5.0\ \text{mAdc}$ )(1)		$V_{CE(sat)}$	— —	–0.10 –0.25	— –0.6	Vdc
Base–Emitter Saturation Voltage ( $I_C = -100\ \text{mAdc}$ , $I_B = -5.0\ \text{mAdc}$ )		$V_{BE(sat)}$	—	–1.0	–1.4	Vdc
Base–Emitter On Voltage ( $I_C = -2.0\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ )		$V_{BE(on)}$	–0.6	–0.62	–0.72	Vdc
<b>DYNAMIC CHARACTERISTICS</b>						
Current–Gain — Bandwidth Product ( $I_C = -10\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $f = 100\ \text{MHz}$ )	BC212 BC214 BC213	$f_T$	— — —	280 320 360	— — —	MHz
Common–Base Output Capacitance ( $V_{CB} = -10\ \text{Vdc}$ , $I_C = 0$ , $f = 1.0\ \text{MHz}$ )		$C_{ob}$	—	—	6.0	pF
Noise Figure ( $I_C = -0.2\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $R_S = 2.0\ \text{k}\Omega$ , $f = 1.0\ \text{kHz}$ ) ( $I_C = -0.2\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $R_S = 2.0\ \text{k}\Omega$ , $f = 1.0\ \text{kHz}$ , $f = 200\ \text{Hz}$ )	BC214 BC212, BC213	NF	— —	— —	2 10	dB
Small–Signal Current Gain ( $I_C = -2.0\ \text{mAdc}$ , $V_{CE} = -5.0\ \text{Vdc}$ , $f = 1.0\ \text{kHz}$ )	BC212 BC213 BC214 BC212B	$h_{fe}$	60 80 140 200	— — — —	— — — 400	—

1. Pulse Test:  $T_p$  300 s, Duty Cycle 2.0%.

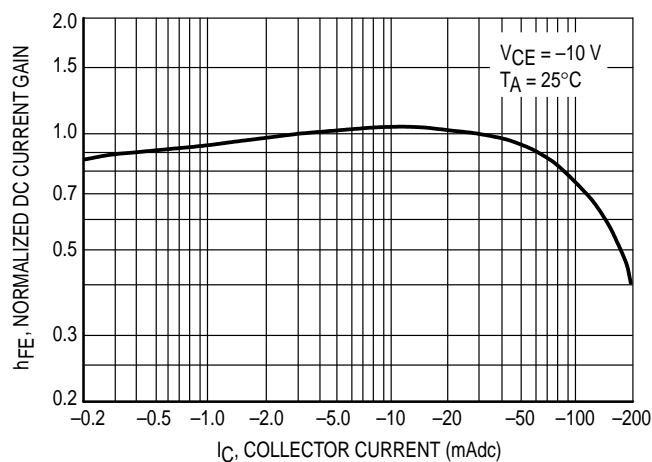


Figure 1. Normalized DC Current Gain

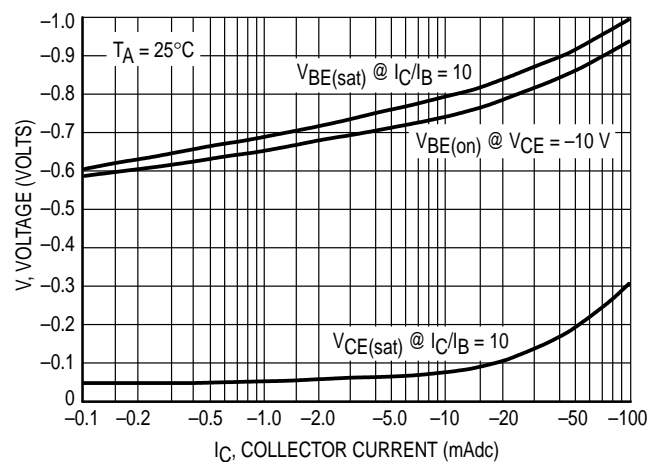


Figure 2. "Saturation" and "On" Voltages

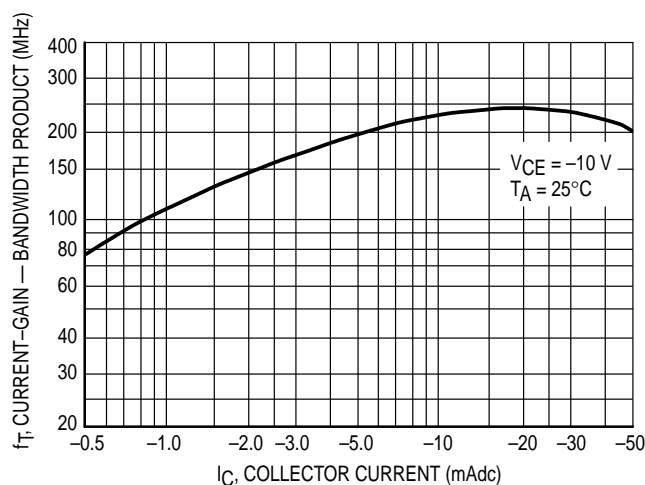


Figure 3. Current-Gain — Bandwidth Product

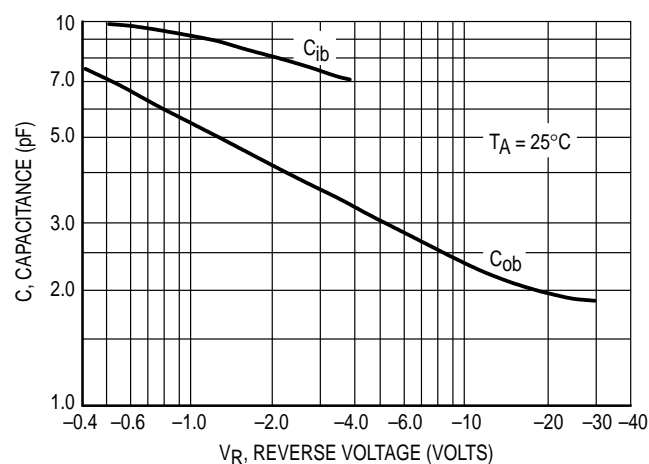


Figure 4. Capacitances

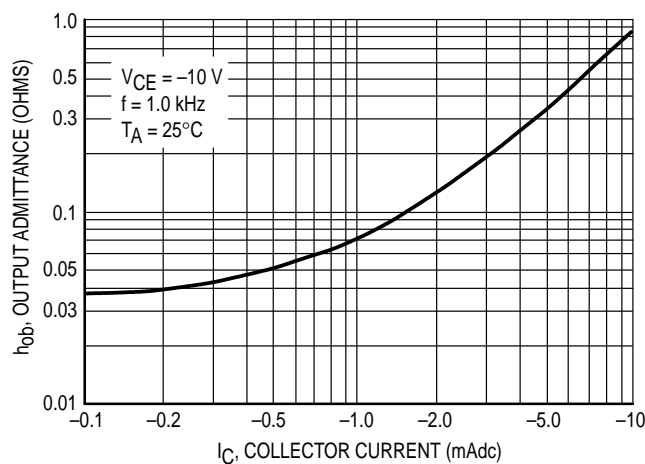


Figure 5. Output Admittance

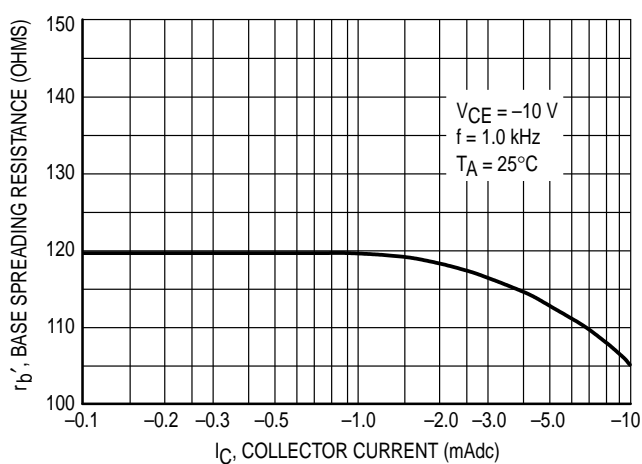
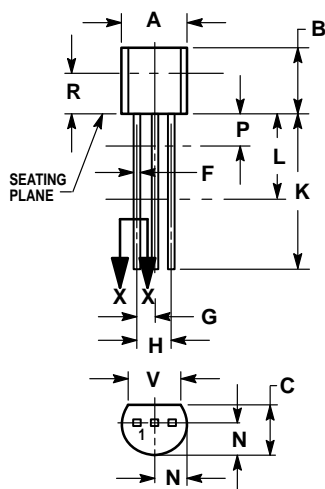


Figure 6. Base Spreading Resistance

## 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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