

# Amplifier Transistors

## NPN Silicon

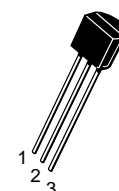
**BC237,A,B,C**  
**BC238B,C**  
**BC239C**

### MAXIMUM RATINGS

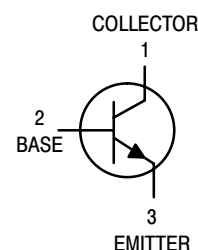
Rating	Symbol	BC237	BC238	BC239	Unit
Collector–Emitter Voltage	$V_{CEO}$	45	25	25	Vdc
Collector–Emitter Voltage	$V_{CES}$	50	30	30	Vdc
Emitter–Base Voltage	$V_{EBO}$	6.0	5.0	5.0	Vdc
Collector Current — Continuous	$I_C$	100			mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	350 2.8			mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.0 8.0			Watts 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	$R_{\theta JA}$	357	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	125	$^\circ\text{C}/\text{W}$



CASE 29–11, 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 ( $I_C = 2.0\text{ mA}$ , $I_B = 0$ )	BC237 BC238 BC239	$V_{(BR)CEO}$	45 25 25	— — —	— — —	V
Emitter–Base Breakdown Voltage ( $I_E = 100\text{ }\mu\text{A}$ , $I_C = 0$ )	BC237 BC238 BC239	$V_{(BR)EBO}$	6.0 5.0 5.0	— — —	— — —	V
Collector Cutoff Current ( $V_{CE} = 30\text{ V}$ , $V_{BE} = 0$ )	BC238 BC239	$I_{CES}$	— —	0.2 0.2	15 15	nA
( $V_{CE} = 50\text{ V}$ , $V_{BE} = 0$ )	BC237		—	0.2	15	
( $V_{CE} = 30\text{ V}$ , $V_{BE} = 0$ ) $T_A = 125^\circ\text{C}$	BC238 BC239		— —	0.2 0.2	4.0 4.0	$\mu\text{A}$
( $V_{CE} = 50\text{ V}$ , $V_{BE} = 0$ ) $T_A = 125^\circ\text{C}$	BC237		—	0.2	4.0	

# BC237,A,B,C BC238B,C BC239C

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted) (Continued)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>ON CHARACTERISTICS</b>					
DC Current Gain (I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)	h <sub>FE</sub>	—	90	—	—
BC237A		—	150	—	
BC237B/238B		—	270	—	
BC237C/238C/239C					
(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)		120	—	800	
BC237		120	170	220	
BC237A		200	290	460	
BC237B/238B		380	500	800	
BC237C/238C/239C					
(I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 5.0 V)		—	120	—	
BC237A		—	180	—	
BC237B/238B		—	300	—	
BC237C/238C/239C					
Collector–Emitter On Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)	V <sub>CE(sat)</sub>	—	0.07	0.2	V
(I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)		—	0.2	0.6	
BC238				0.8	
Base–Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)	V <sub>BE(sat)</sub>	—	0.6	0.83	V
(I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)		—	—	1.05	
Base–Emitter On Voltage (I <sub>C</sub> = 100 μA, V <sub>CE</sub> = 5.0 V)	V <sub>BE(on)</sub>	—	0.5	—	V
(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)		0.55	0.62	0.7	
(I <sub>C</sub> = 100 mA, V <sub>CE</sub> = 5.0 V)		—	0.83	—	
<b>DYNAMIC CHARACTERISTICS</b>					
Current–Gain — Bandwidth Product (I <sub>C</sub> = 0.5 mA, V <sub>CE</sub> = 3.0 V, f = 100 MHz)	f <sub>T</sub>	—	100	—	MHz
BC237		—	120	—	
BC238		—	140	—	
BC239					
(I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V, f = 100 MHz)		150	200	—	
BC237		150	240	—	
BC238		150	280	—	
BC239					
Collector–Base Capacitance (V <sub>CB</sub> = 10 V, I <sub>C</sub> = 0, f = 1.0 MHz)	C <sub>obo</sub>	—	—	4.5	pF
Emitter–Base Capacitance (V <sub>EB</sub> = 0.5 V, I <sub>C</sub> = 0, f = 1.0 MHz)	C <sub>ibo</sub>	—	8.0	—	pF
Noise Figure (I <sub>C</sub> = 0.2 mA, V <sub>CE</sub> = 5.0 V, R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz)	NF	—	2.0	4.0	dB
BC239					
(I <sub>C</sub> = 0.2 mA, V <sub>CE</sub> = 5.0 V, R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz, Δf = 200 Hz)		—	2.0	10	
BC237		—	2.0	10	
BC238		—	2.0	10	
BC239		—	2.0	4.0	

# BC237,A,B,C BC238B,C BC239C

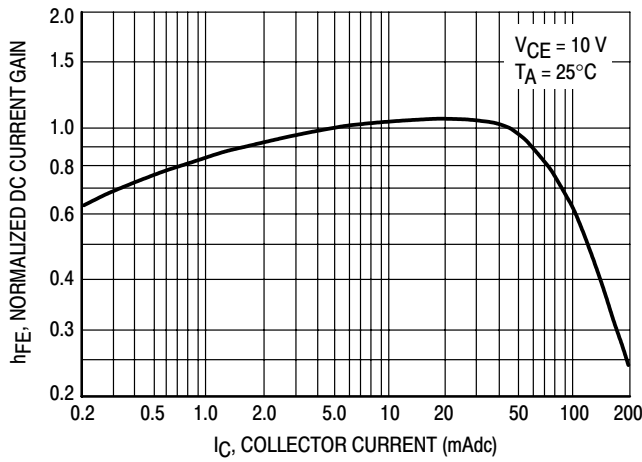


Figure 1. Normalized DC Current Gain

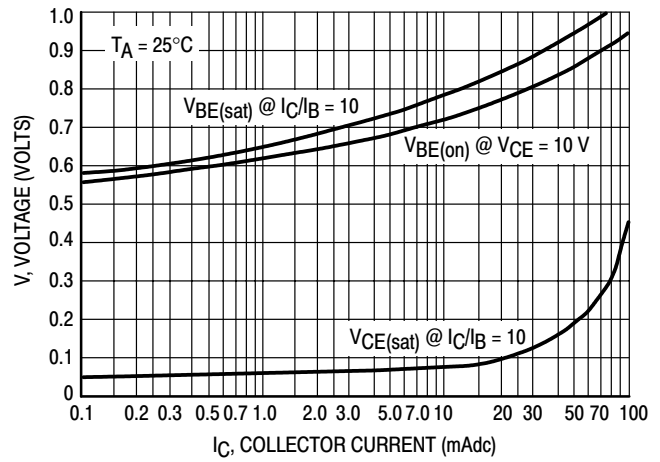


Figure 2. "Saturation" and "On" Voltages

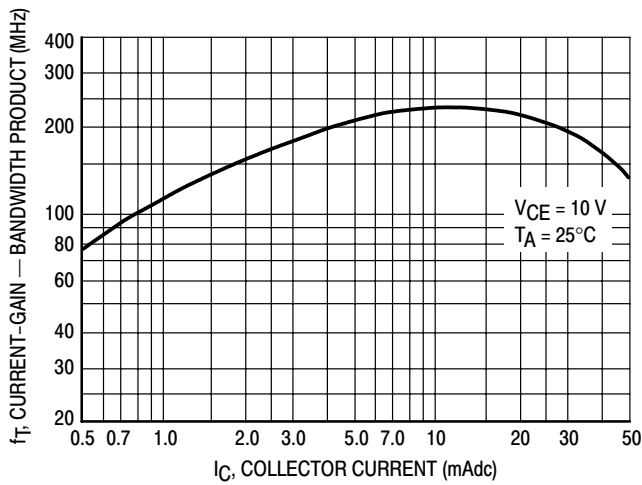


Figure 3. Current-Gain — Bandwidth Product

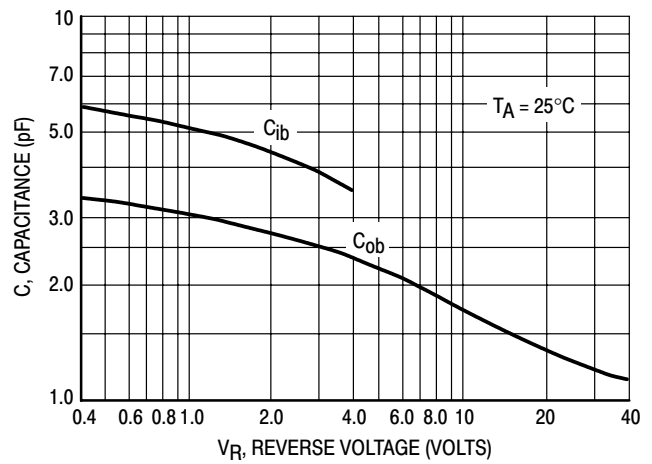


Figure 4. Capacitances

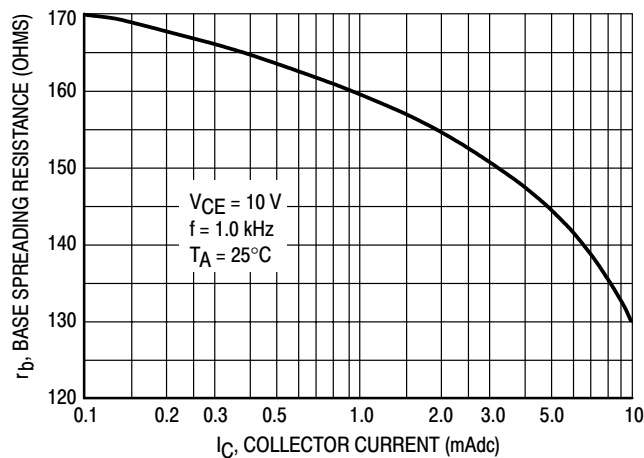
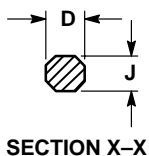
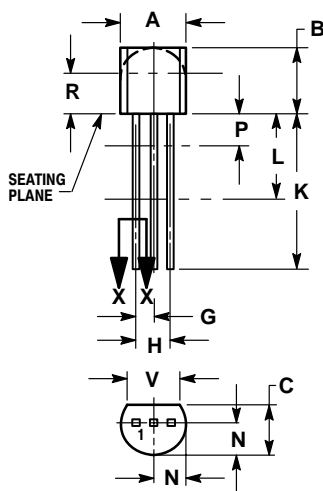


Figure 5. Base Spreading Resistance

# BC237,A,B,C BC238B,C BC239C

## PACKAGE DIMENSIONS

### TO-92 (TO-226) CASE 29-11 ISSUE AL




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

#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. 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	0.021	0.407	0.533
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	---

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