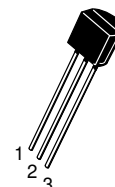
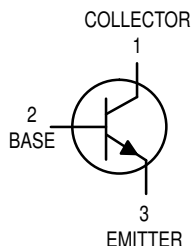


Amplifier Transistors

NPN Silicon

BC237,A,B,C
BC238B,C
BC239,C



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

MAXIMUM RATINGS

Rating	Symbol	BC 237	BC 238	BC 239	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°C	P_D	350 2.8			mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°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	$^\circ\text{C/W}$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	125	$^\circ\text{C/W}$

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 ($I_C = 2.0\text{ mA}, I_B = 0$)	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	μA
($V_{CE} = 50\text{ V}, V_{BE} = 0$) $T_A = 125^\circ\text{C}$	BC237		—	0.2	4.0	

BC237,A,B,C BC238B,C BC239,C**ELECTRICAL CHARACTERISTICS** ($T_A = 25^\circ\text{C}$ unless otherwise noted) (Continued)

Characteristic		Symbol	Min	Typ	Max	Unit			
ON CHARACTERISTICS									
DC Current Gain ($I_C = 10\ \mu\text{A}$, $V_{CE} = 5.0\ \text{V}$) ($I_C = 2.0\ \text{mA}$, $V_{CE} = 5.0\ \text{V}$) ($I_C = 100\ \text{mA}$, $V_{CE} = 5.0\ \text{V}$)	BC237A	h_{FE}	—	90	—	—			
	BC237B/238B		—	150	—				
	BC237C/238C/239C		—	270	—				
	BC237		120	—	800				
	BC239		120	—	800				
	BC237A		120	170	220				
	BC237B/238B		200	290	460				
	BC237C/238C/239C		380	500	800				
	BC237A		—	120	—				
	BC237B/238B		—	180	—				
	BC237C/238C/239C		—	300	—				
	Collector–Emitter On Voltage ($I_C = 10\ \text{mA}$, $I_B = 0.5\ \text{mA}$) ($I_C = 100\ \text{mA}$, $I_B = 5.0\ \text{mA}$)		BC237/BC238/BC239	$V_{CE(sat)}$	—		0.07	0.2	V
			BC237/BC239		—		0.2	0.6	
			BC238		—		—	0.8	
	Base–Emitter Saturation Voltage ($I_C = 10\ \text{mA}$, $I_B = 0.5\ \text{mA}$) ($I_C = 100\ \text{mA}$, $I_B = 5.0\ \text{mA}$)			$V_{BE(sat)}$	—		0.6	0.83	V
		—	—		1.05				
Base–Emitter On Voltage ($I_C = 100\ \mu\text{A}$, $V_{CE} = 5.0\ \text{V}$) ($I_C = 2.0\ \text{mA}$, $V_{CE} = 5.0\ \text{V}$) ($I_C = 100\ \text{mA}$, $V_{CE} = 5.0\ \text{V}$)		$V_{BE(on)}$	—	0.5	—	V			
			0.55	0.62	0.7				
			—	0.83	—				
DYNAMIC CHARACTERISTICS									
Current–Gain — Bandwidth Product ($I_C = 0.5\ \text{mA}$, $V_{CE} = 3.0\ \text{V}$, $f = 100\ \text{MHz}$) ($I_C = 10\ \text{mA}$, $V_{CE} = 5.0\ \text{V}$, $f = 100\ \text{MHz}$)	BC237	f_T	—	100	—	MHz			
	BC238		—	120	—				
	BC239		—	140	—				
	BC237		150	200	—				
	BC238		150	240	—				
	BC239		150	280	—				
Collector–Base Capacitance ($V_{CB} = 10\ \text{V}$, $I_C = 0$, $f = 1.0\ \text{MHz}$)		C_{obo}	—	—	4.5	pF			
Emitter–Base Capacitance ($V_{EB} = 0.5\ \text{V}$, $I_C = 0$, $f = 1.0\ \text{MHz}$)		C_{ibo}	—	8.0	—	pF			
Noise Figure ($I_C = 0.2\ \text{mA}$, $V_{CE} = 5.0\ \text{V}$, $R_S = 2.0\ \text{k}\Omega$, $f = 1.0\ \text{kHz}$) ($I_C = 0.2\ \text{mA}$, $V_{CE} = 5.0\ \text{V}$, $R_S = 2.0\ \text{k}\Omega$, $f = 1.0\ \text{kHz}$, $\Delta f = 200\ \text{Hz}$)	BC239	NF	—	2.0	4.0	dB			
	BC237		—	2.0	10				
	BC238		—	2.0	10				
	BC239		—	2.0	4.0				
			—	—	—				
			—	—	—				

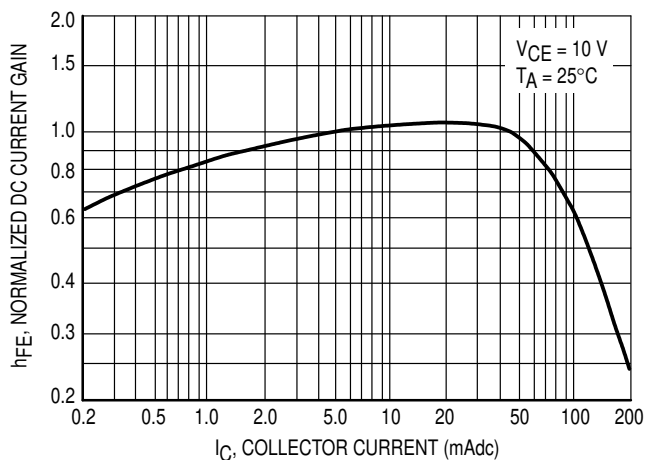


Figure 1. Normalized DC Current Gain

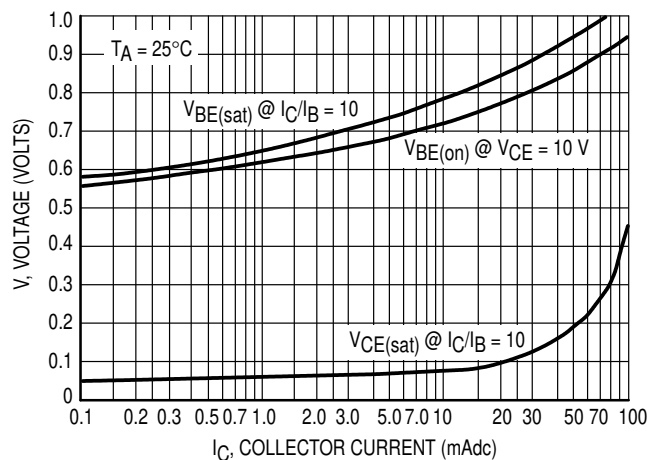


Figure 2. "Saturation" and "On" Voltages

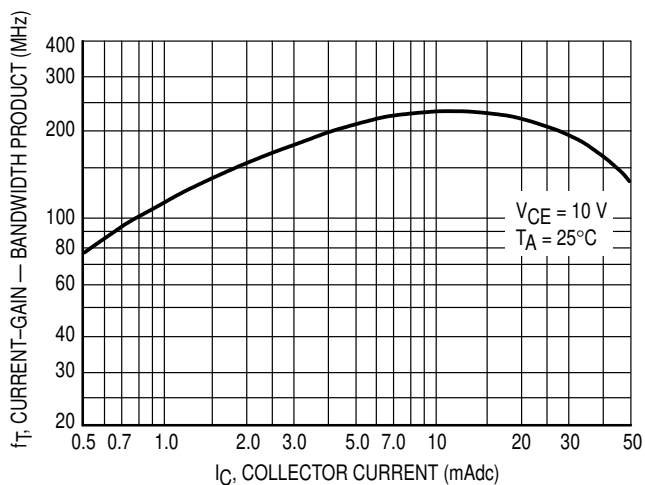


Figure 3. Current-Gain — Bandwidth Product

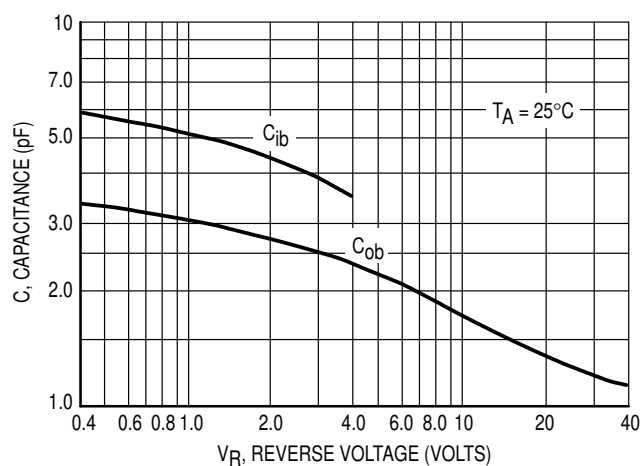


Figure 4. Capacitances

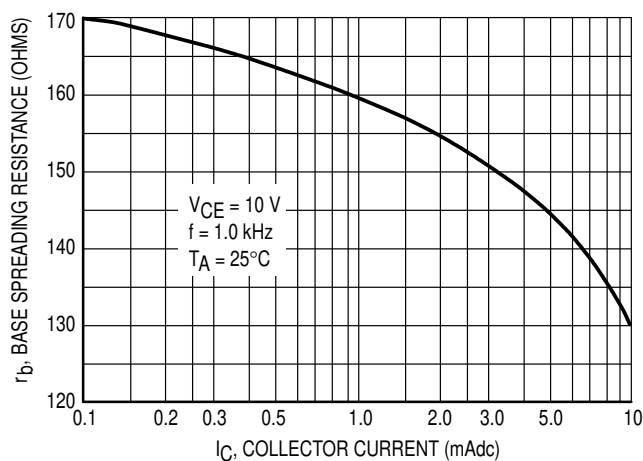
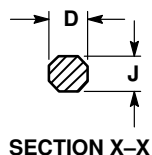
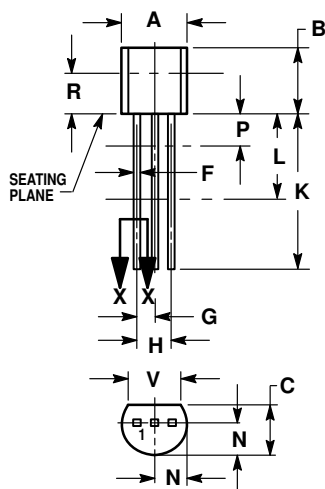


Figure 5. Base Spreading Resistance

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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