

SEMELAB LIMITED

* ORIG *

**BC237
BC238
BC239**

**CASE 29-02, STYLE 17
TO-92 (TO-226AA)
AMPLIFIER TRANSISTORS
NPN SILICON**

MAXIMUM RATINGS

Rating	Symbol	BC 237	BC 238	BC 239	Unit
Collector-Emitter Voltage	V _{CEO}	45	25	25	V _{dc}
Collector-Emitter Voltage	V _{CES}	50	30	30	V _{dc}
Emitter-Base Voltage	V _{EB0}	6.0	5.0	5.0	V _{dc}
Collector Current - Continuous	I _C	100			mA _{dc}
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	350 2.8			mW mW/°C
Total Device Dissipation @ T _C = 25°C Derate above 25°C	P _D	1.0 8.0			Watt 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 Case	R _{nJC}	125	°C/W
Thermal Resistance, Junction to Ambient	R _{nJC}	357	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Type	Symbol	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I _C = 2.0 mA, I _B = 0)	BC237 BC238 BC239	V _{(BR)CEO}	45 25 25			V
Emitter-Base Breakdown Voltage (I _E = 100 µA, I _C = 0)	BC237 BC238 BC239	V _{(BR)EBO}	6 5 5			V
Collector Cutoff Current (V _{CE} = 30 V, V _{BE} = 0) (V _{CE} = 50 V, V _{BE} = 0) (V _{CE} = 30 V, V _{BE} = 0) T _A = 125°C (V _{CE} = 50 V, V _{BE} = 0) T _A = 125°C	BC238 BC239 BC237 BC238 BC239 BC237	I _{CES}		0.20 0.20 0.20 0.20 0.20 0.20	15 15 15 4 4 4	nA µA

ON CHARACTERISTICS

DC Current Gain (I _C = 10 µA, V _{CE} = 5 V) (I _C = 2 mA, V _{CE} = 5 V) (I _C = 100 mA, V _{CE} = 5 V)	BC237A/238A BC237B/238B/239B BC237C/238C/239C BC237 BC238 BC239 BC237A/238A BC237B/238B/239B BC237C/238C/239C BC237A/238A BC237B/238B/239B BC237C/238C/239C	h _{FE}		90 150 270 120 120 120 120 180 380 120 180 300		800 800 800 220 460 800
Collector-Emitter On Voltage (I _C = 10 mA, I _B = 0.5 mA) (I _C = 100 mA, I _B = 5 mA)	BC237/BC238/BC239 BC237/BC239 BC238	V _{CE(sat)}		0.07 0.20	0.20 0.60 0.8	V
Base-Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.5 mA) (I _C = 100 mA, I _B = 5 mA)		V _{BE(sat)}		0.60	0.83 1.05	V
Base-Emitter On Voltage (I _C = 100 µA, V _{CE} = 5 V) (I _C = 2 mA, V _{CE} = 5 V) (I _C = 100 mA, V _{CE} = 5 V)		V _{BE(on)}	0.55	0.50 0.62 0.83	0.70	V

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BC237, BC238, BC239

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

Characteristic	Type	Symbol	Min	Typ	Max	Unit
DYNAMIC CHARACTERISTICS						
Current Gain Bandwidth Product ($I_C = 0.5\text{ mA}$, $V_{CE} = 3\text{ V}$, $f = 100\text{ MHz}$)	BC237 BC238 BC239	f_T		100 120 140		MHz
($I_C = 10\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 100\text{ MHz}$)	BC237 BC238 BC239		150 150 150	200 240 280		
Collector-Base Capacitance ($V_{CB} = 10\text{ V}$, $I_C = 0$, $f = 1\text{ MHz}$)		C_{cb}			4.50	pF
Emitter-Base Capacitance ($V_{BE} = 0.5\text{ V}$, $I_C = 0$, $f = 1\text{ MHz}$)		C_{be}		8.0		pF
Input Impedance ($I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$)	BC237A/238A BC237B/238B/239B BC237C/238C/239C	h_{ie}	1.6 3.2 6.0	2.2 6.0 8.7	4.5 8.5 15.0	k Ω
Voltage Feedback Ratio ($I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$)	BC237A/238A BC237B/238B/239B BC237C/238C/239C	h_{re}		1.5 2.0 3.0		$\times 10^{-4}$
Small-Signal Current Gain ($I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$)	BC237A/238A BC237B/238B/239B BC237C/238C/239C	h_{fe}	125 240 450	220 330 600	260 500 900	
Output Admittance ($I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$)	BC237A/238A BC237B/238B/239B BC237C/238C/239C	h_{oc}		8 10 12	30 60 110	μmhos
Noise Figure ($I_C = 0.2\text{ mA}$, $V_{CE} = 5\text{ V}$, $R_S = 2\text{ k}\Omega$, $f = 30\text{ Hz}$ to 15 kHz)	BC239	N_f		2	4	dB
($I_C = 0.2\text{ mA}$, $V_{CE} = 5\text{ V}$, $R_S = 2\text{ k}\Omega$, $f = 1\text{ kHz}$, $\Delta f = 200\text{ Hz}$)	BC237 BC238 BC239			2 2 2	10 10 4	