

# MICRO ELECTRONICS

BC107,8,9  
BC167,8,9  
BC237,8,9  
BC317,8,9

THE ABOVE TYPES ARE NPN SILICON PLANAR EPITAXIAL TRANSISTORS FOR USE IN AF SMALL SIGNAL AMPLIFIER STAGES AND DIRECT COUPLED CIRCUITS.

BC107, 8, 9 are complementary to BC177, 8, 9.

BC167, 8, 9 are complementary to BC257, 8, 9.

BC237, 8, 9 are complementary to BC307, 8, 9.

BC317, 8, 9 are complementary to BC320, 1, 2.

CASE

TO-18



CBE

BC107,8,9

TO-92B



ECB

BC167,8,9

TO-92F



CEB

BC237,8,9

TO-92A



EBC

BC317,8,9

## ABSOLUTE MAXIMUM RATINGS

TYPE	$V_{CE0}$ (V)	$V_{CES}$ (V)	$V_{CEO}$ (V)	$V_{EBO}$ (V)	$I_C(DC)$ (mA)	$P_{tot}$ (mW) *	$T_j, T_{stg}$
BC107	50	50	45	6	100	300	-55 to 175°C
BC108	30	30	20	5	100	300	
BC109	30	30	20	5	100	300	
BC167	50	50	45	6	100	300	-55 to 150°C
BC168	30	30	20	5	100	300	
BC169	30	30	20	5	100	300	
BC237	50	50	45	6	100	300	-55 to 150°C
BC238	30	30	20	5	100	300	
BC239	30	30	20	5	100	300	
BC317	50		45	6	150	310	-55 to 150°C
BC318	45		30	5	150	310	
BC319	30		20	5	150	310	

\* Total Power Dissipation @  $T_A \leq 25^\circ C$



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

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITIONS
Collector-Base Breakdown Voltage	BVCBO	Note 1			V	$I_C=10\mu\text{A}$ $I_E=0$
Collector-Emitter Breakdown Voltage	LVCEO *				V	$I_C=2\text{mA}$ $I_B=0$
Emitter-Base Breakdown Voltage	BVEBO				V	$I_E=1\mu\text{A}$ $I_C=0$
Collector Cutoff Current BC107, 108, 109 } BC167, 168, 169 } only BC237, 238, 239 }	ICES			15	nA	$V_{CE}=V_{CES}$ $V_{BE}=0$
				4	$\mu\text{A}$	$V_{CE}=V_{CES}$ $V_{BE}=0$ $T_A=125^{\circ}\text{C}$
Collector Cutoff Current BC317, 318, 319 only	ICBO			30	nA	$V_{CB}=20\text{V}$ $I_E=0$
				15	$\mu\text{A}$	$V_{CB}=20\text{V}$ $I_E=0$ $T_A=100^{\circ}\text{C}$
Collector-Emitter Saturation Voltage BC107, 108, 109 } BC167, 168, 169 } only BC237, 238, 239 }	$V_{CE}(\text{sat})^*$		0.07	0.25	V	$I_C=10\text{mA}$ $I_B=0.5\text{mA}$
			0.22	0.6	V	$I_C=100\text{mA}$ $I_B=5\text{mA}$
BC317, 318, 319 only	$V_{CE}(\text{sat})^*$		0.07	0.2	V	$I_C=10\text{mA}$ $I_B=0.5\text{mA}$
			0.2	0.5	V	$I_C=100\text{mA}$ $I_B=5\text{mA}$
Base-Emitter Saturation Voltage BC107, 108, 109 } BC167, 168, 169 } only BC237, 238, 239 }	$V_{BE}(\text{sat})^*$		0.7	0.83	V	$I_C=10\text{mA}$ $I_B=0.5\text{mA}$
			0.9	1.05	V	$I_C=100\text{mA}$ $I_B=5\text{mA}$
Base-Emitter Voltage All types	$V_{BE}^*$	0.55	0.63	0.7	V	$I_C=2\text{mA}$ $V_{CE}=5\text{V}$
BC317, 318, 319 only		0.68	0.77		V	$I_C=10\text{mA}$ $V_{CE}=5\text{V}$
Current Gain-Bandwidth Product BC107, 108, 109 } BC167, 168, 169 } only BC237, 238, 239 }	$f_T$	150	250		MHz	$I_C=10\text{mA}$ $V_{CE}=5\text{V}$
Collector-Base Capacitance BC107, 108, 109	Cob	3.2	6.0		pF	$V_{CB}=10\text{V}$ $I_E=0$ $f=1\text{MHz}$
BC167, 168, 169		2.7	4.5		pF	
BC237, 238, 239		2.7	4.5		pF	
BC317, 318, 319		2.7	4.0		pF	
Noise Figure BC107, 108	NF	2	10		dB	$I_C=0.2\text{mA}$ $V_{CE}=5\text{V}$ $R_G=2\text{K}\Omega$ $f=1\text{kHz}$ $\Delta f=200\text{Hz}$
BC167, 168		2	10		dB	
BC237, 238		2	10		dB	
BC317, 318		2	6		dB	

\* Pulse Test : Pulse Width=0.3ms, Duty Cycle=1%

Note 1 : equal to the value of absolute maximum ratings.

- - - Continued - - -

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITIONS
Noise Figure <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> BC109 BC169  BC239 BC319 </div> <div style="font-size: 2em; margin-right: 10px;">}</div> <div>only</div> </div>	NF		1.5	4	dB	$I_C=0.2\text{mA}$ $V_{CE}=5\text{V}$ $R_G=2\text{K}\Omega$ $f=1\text{kHz}$ $\Delta f=200\text{Hz}$
			1.2	4	dB	$I_C=0.2\text{mA}$ $V_{CE}=5\text{V}$ $R_G=2\text{K}\Omega$ $f=30\text{Hz}-15\text{KHz}$

D.C. CURRENT GAIN (HFE) @  $V_{CE}=5\text{V}$   $T_A=25^\circ\text{C}$

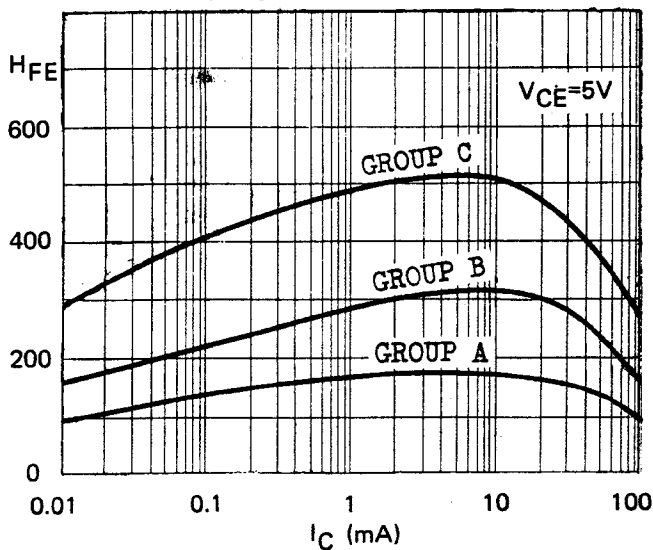
at $I_C$ (Pulsed)	HFE GROUP A			HFE GROUP B			HFE GROUP C		
	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
0.01mA	40	90		40	170		100	290	
2mA	110	170	220	200	300	450	420	520	800
100mA		100			160			270	

h-PARAMETERS @  $I_C=2\text{mA}$   $V_{CE}=5\text{V}$   $f=1\text{kHz}$   $T_A=25^\circ\text{C}$

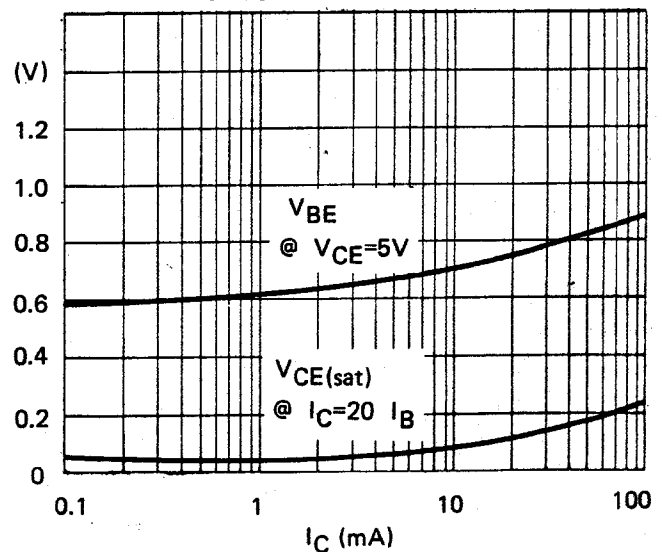
h - PARAMETER	SYMBOL	HFE GROUP A			HFE GROUP B			HFE GROUP C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Input Impedance	$h_{ie}$	1.6	2.7	4.5	3.2	4.5	8.5	6	8.7	15	$\text{K}\Omega$
Voltage Feedback Ratio	$h_{re}$		1.5			2			3		$\times 10^{-4}$
Small Signal Current Gain	$h_{fe}$	125	190	260	240	330	500	450	580	900	
Output Admittance	$h_{oe}$		18	30		30	60		60	110	$\mu\text{S}$

TYPICAL CHARACTERISTICS AT  $T_A=25^\circ\text{C}$  (Pulse Test)

D.C. CURRENT GAIN  
vs COLLECTOR CURRENT

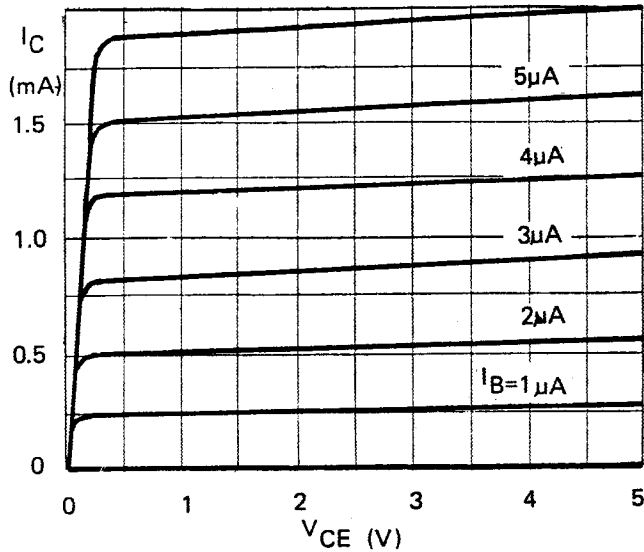


$V_{BE}$  AND  $V_{CE(sat)}$   
vs COLLECTOR CURRENT

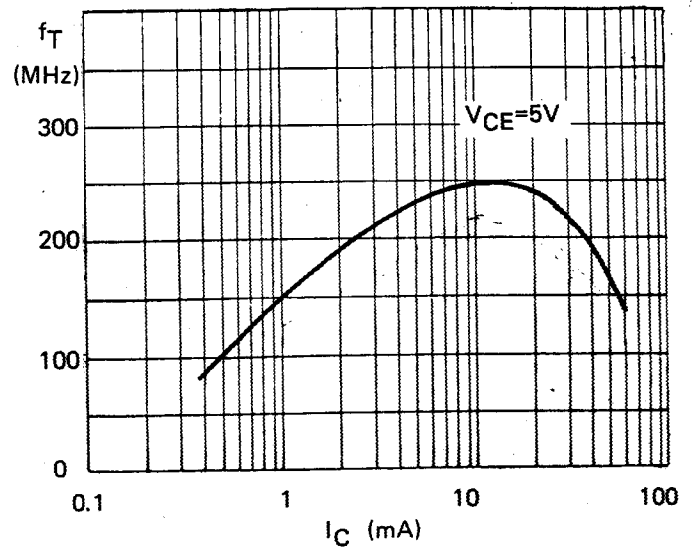


BC107 family  
TYPICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$  UNLESS OTHERWISE SPECIFIED)

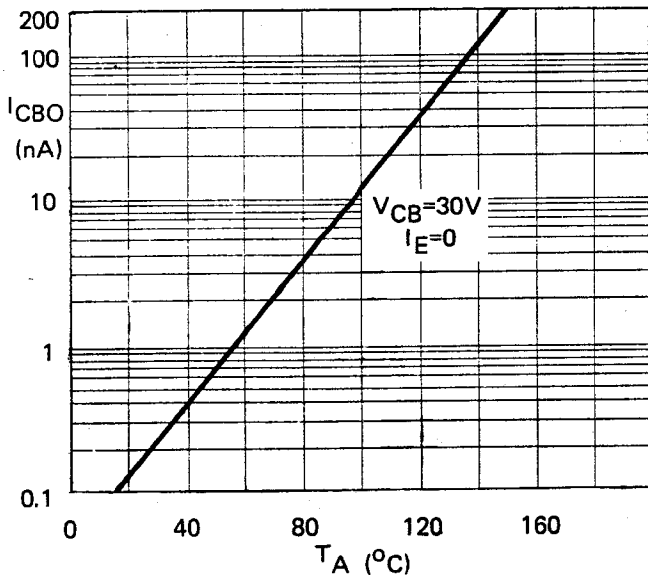
COMMON EMITTER  
OUTPUT CHARACTERISTICS



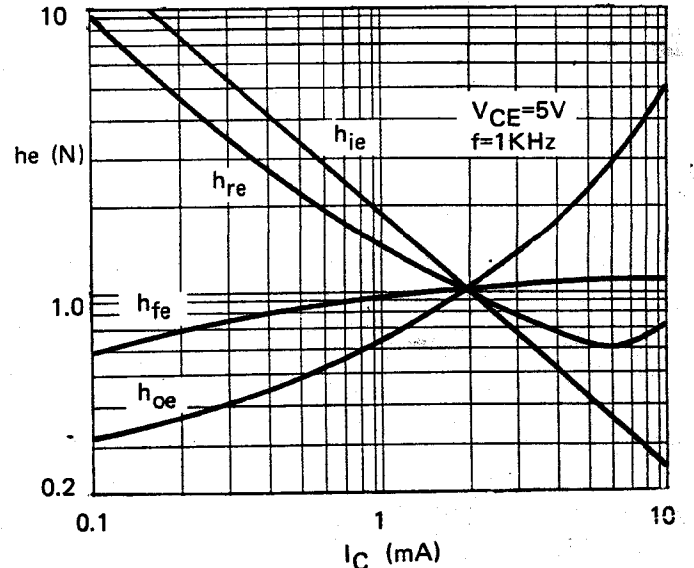
CURRENT GAIN - BANDWIDTH PRODUCT  
VS COLLECTOR CURRENT



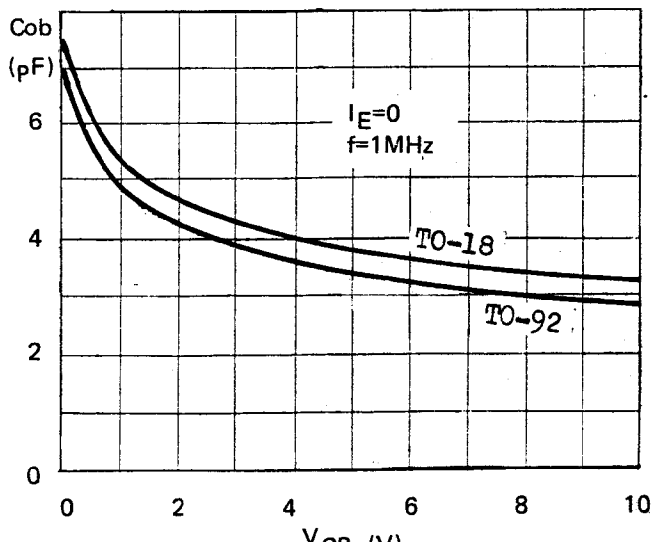
COLLECTOR CUTOFF CURRENT  
VS AMBIENT TEMPERATURE



h-PARAMETERS (NORMALIZED)  
VS COLLECTOR CURRENT



COLLECTOR-BASE CAPACITANCE  
VS COLLECTOR-BASE VOLTAGE



BROAD BAND NOISE FIGURE  
VS COLLECTOR CURRENT

