

# 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 <sub>CEO</sub> (V)	V <sub>CES</sub> (V)	V <sub>CE0</sub> (V)	V <sub>EB0</sub> (V)	I <sub>C(DC)</sub> (mA)	P <sub>tot</sub> (mW) *	T <sub>j</sub> , T <sub>stg</sub>
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<sub>A</sub> ≤ 25°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	$BV_{CBO}$	↑ Note 1 ↓			V	$I_C=10\mu\text{A}$ $I_E=0$
Collector-Emitter Breakdown Voltage	$LV_{CEO} *$		V			$I_C=2\text{mA}$ $I_B=0$
Emitter-Base Breakdown Voltage	$BV_{EBO}$		V			$I_E=1\mu\text{A}$ $I_C=0$
Collector Cutoff Current BC107, 108, 109 } only BC167, 168, 169 } BC237, 238, 239 }	$IC_{ES}$			15 4	nA $\mu\text{A}$	$V_{CE}=V_{CES}$ $V_{BE}=0$ $V_{CE}=V_{CES}$ $V_{BE}=0$ $T_A=125^{\circ}\text{C}$
Collector Cutoff Current BC317, 318, 319 only	$IC_{BO}$			30 15	nA $\mu\text{A}$	$V_{CB}=20\text{V}$ $I_E=0$ $V_{CB}=20\text{V}$ $I_E=0$ $T_A=100^{\circ}\text{C}$
Collector-Emitter Saturation Voltage BC107, 108, 109 } only BC167, 168, 169 } BC237, 238, 239 }	$V_{CE(sat)} *$		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	$V_{CE(sat)} *$		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 } only BC167, 168, 169 } BC237, 238, 239 }	$V_{BE(sat)} *$		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 BC317, 318, 319 only	$V_{BE} *$	0.55	0.63	0.7	V	$I_C=2\text{mA}$ $V_{CE}=5\text{V}$
			0.68	0.77	V	$I_C=10\text{mA}$ $V_{CE}=5\text{V}$
Current Gain-Bandwidth Product BC107, 108, 109 } only BC167, 168, 169 } BC237, 238, 239 }	$f_T$		150	250	MHz	$I_C=10\text{mA}$ $V_{CE}=5\text{V}$
Collector-Base Capacitance BC107, 108, 109	$C_{ob}$		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.

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PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITIONS
Noise Figure	NF		1.5	4	dB	$I_C=0.2mA$ $V_{CE}=5V$ $R_C=2K\Omega$ $f=1kHz$ $\Delta f=200Hz$
			1.2	4	dB	$I_C=0.2mA$ $V_{CE}=5V$ $R_C=2K\Omega$ $f=30Hz-15KHz$

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

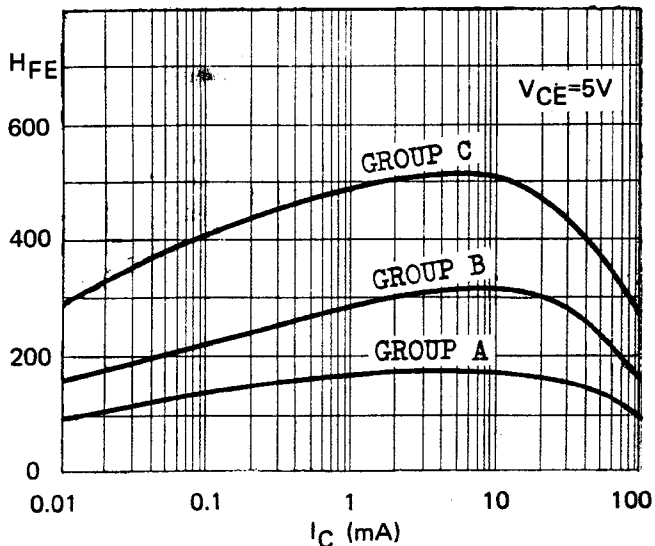
at $I_C$ (Pulsed)	HFE GROUP A			HFE GROUP B			HFE GROUP C		
	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
0.01mA	40	90		40	170		100	290	
2mA	110	170	220	200	300	450	420	520	800
100mA		100			160			270	

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

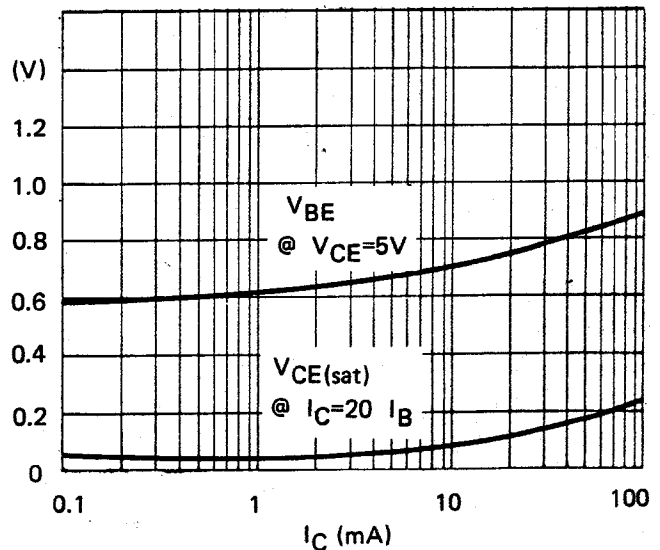
h - PARAMETER	SYMBOL	HFE GROUP A			HFE GROUP B			HFE GROUP C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Input Impedance	$h_{ie}$	1.6	2.7	4.5	3.2	4.5	8.5	6	8.7	15	$K\Omega$
Voltage Feedback Ratio	$h_{re}$		1.5			2			3		$\times 10^{-4}$
Small Signal Current Gain	$h_{fe}$	125	190	260	240	330	500	450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

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

D.C. CURRENT GAIN  
vs COLLECTOR CURRENT

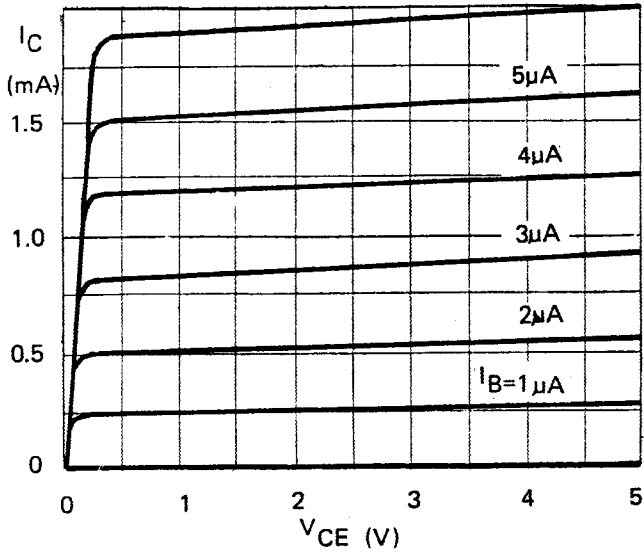


$V_{BE}$  AND  $V_{CE(sat)}$   
vs COLLECTOR CURRENT

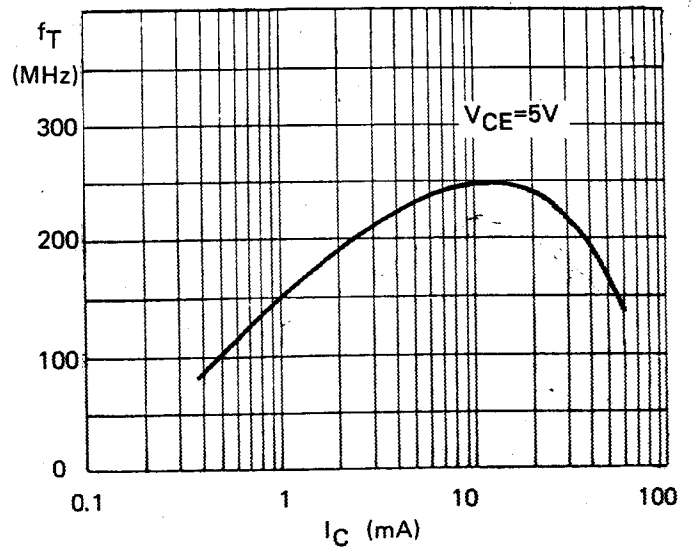


BC107 family  
 TYPICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$  UNLESS OTHERWISE SPECIFIED)

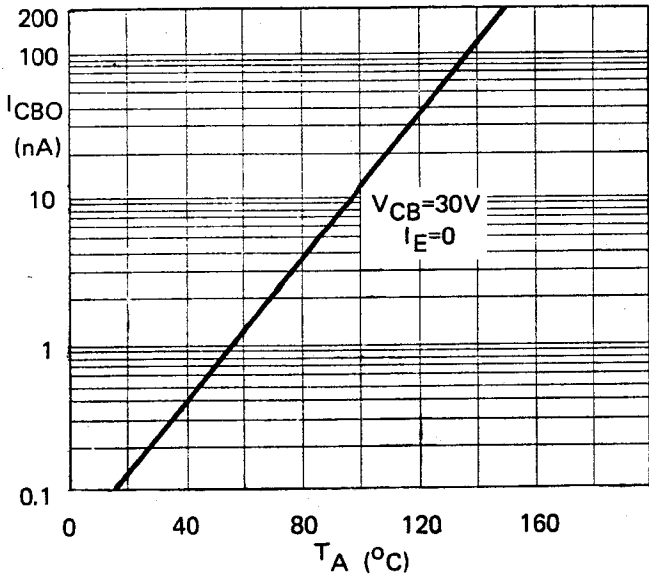
COMMON EMITTER  
 OUTPUT CHARACTERISTICS



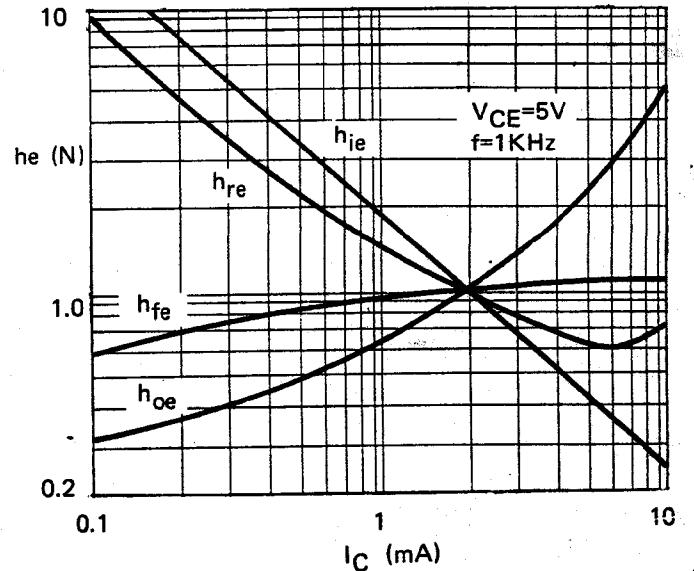
CURRENT GAIN - BANDWIDTH PRODUCT  
 VS COLLECTOR CURRENT



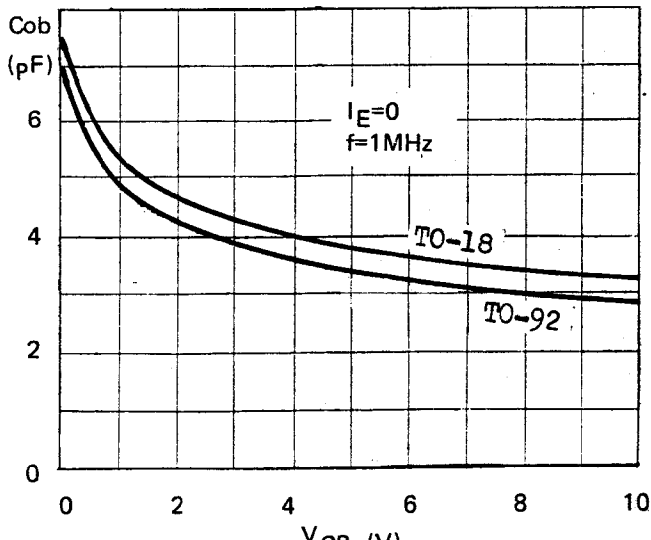
COLLECTOR CUTOFF CURRENT  
 VS AMBIENT TEMPERATURE



h-PARAMETERS (NORMALIZED)  
 VS COLLECTOR CURRENT



COLLECTOR-BASE CAPACITANCE  
 VS COLLECTOR-BASE VOLTAGE



BROAD BAND NOISE FIGURE  
 VS COLLECTOR CURRENT

