

# MICRO

ELECTRONICS

BC177,8,9  
BC257,8,9  
BC307,8,9  
BC320,1,2

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

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

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

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

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

## CASE

TO-18



CBE

BC177,8,9

TO-92B



ECB

BC257,8,9

TO-92F



CEB

BC307,8,9

TO-92A



EBC

BC320,1,2

## ABSOLUTE MAXIMUM RATINGS

TYPE	$-V_{CBO}$ (V)	$-V_{CES}$ (V)	$-V_{CEO}$ (V)	$-V_{EBO}$ (V)	$-I_C$ (DC) (mA)	$P_{tot}$ * (mW)	$T_j, T_{stg}$
BC177	50	50	45	5	100	300	-55 to 175°C
BC178	30	30	25	5	100	300	
BC179	25	25	20	5	100	300	
BC257	50	50	45	5	100	300	-55 to 150°C
BC258	30	30	25	5	100	300	
BC259	25	25	20	5	100	300	
BC307	50	50	45	5	100	300	-55 to 150°C
BC308	30	30	25	5	100	300	
BC309	25	25	20	5	100	300	
BC320	50		45	6	150	310	-55 to 150°C
BC321	45		30	5	150	310	
BC322	30		20	5	150	310	

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



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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 <sub>CB0</sub>	↑ Note 1 ↓			V	-I <sub>C</sub> =10 $\mu$ A I <sub>E</sub> =0
Collector-Emitter Breakdown Voltage	-LV <sub>CEO</sub> *				V	-I <sub>C</sub> =2mA I <sub>B</sub> =0
Emitter-Base Breakdown Voltage	-BV <sub>EB0</sub>				V	-I <sub>E</sub> =1 $\mu$ A I <sub>C</sub> =0
Collector Cutoff Current BC177, 178, 179 } BC257, 258, 259 } only BC307, 308, 309 }	-I <sub>CES</sub>			15	nA	V <sub>CE</sub> =V <sub>CES</sub> V <sub>BE</sub> =0
				4	$\mu$ A	V <sub>CE</sub> =V <sub>CES</sub> V <sub>BE</sub> =0 T <sub>A</sub> =125 $^{\circ}\text{C}$
Collector Cutoff Current BC320, 321, 322 only	-I <sub>CBO</sub>			30	nA	-V <sub>CB</sub> =20V I <sub>E</sub> =0
				15	$\mu$ A	-V <sub>CB</sub> =20V I <sub>E</sub> =0 T <sub>A</sub> =100 $^{\circ}\text{C}$
Collector-Emitter Saturation Voltage  All types	-V <sub>CE(sat)</sub> *		0.1	0.3	V	-I <sub>C</sub> =10mA -I <sub>B</sub> =0.5mA
			0.25		V	-I <sub>C</sub> =100mA -I <sub>B</sub> =5mA
Collector-Emitter Knee Voltage BC177, 178, 179 } only BC307, 308, 309 }	-V <sub>CEK</sub>		0.3	0.6	V	-I <sub>C</sub> =10mA, I <sub>B</sub> =value at which -I <sub>C</sub> =11mA -V <sub>CE</sub> =1V
Base-Emitter Saturation Voltage  All types	-V <sub>BE(sat)</sub> *		0.72		V	-I <sub>C</sub> =10mA -I <sub>B</sub> =0.5mA
			0.92		V	-I <sub>C</sub> =100mA -I <sub>B</sub> =5mA
Base-Emitter Voltage All types	-V <sub>BE</sub> *	0.6	0.65	0.75	V	-I <sub>C</sub> =2mA -V <sub>CE</sub> =5V
BC320, 321, 322 only	-V <sub>BE</sub> *		0.7	0.77	V	-I <sub>C</sub> =10mA -V <sub>CE</sub> =5V
Current Gain-Bandwidth Product	f <sub>T</sub>		180		MHz	-I <sub>C</sub> =10mA -V <sub>CE</sub> =5V
Collector-Base Capacitance BC177, 178, 179 BC257, 258, 259 BC307, 308, 309 BC320, 321, 322	C <sub>ob</sub>		3.6	7	pF	-V <sub>CB</sub> =10V I <sub>E</sub> =0 f=1MHz
					pF	
			3.2	6	pF	
			3.2	6	pF	
			3.2	4	pF	
Noise Figure BC177, 178  BC257, 258 BC307, 308 BC320, 321	NF		2	10	dB	-I <sub>C</sub> =0.2mA -V <sub>CE</sub> =5V R <sub>G</sub> =2K $\Omega$ f=1kHz $\Delta f$ =200Hz
					dB	
			2	10	dB	
			2	10	dB	
			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	NF		1.2	4	dB	$-I_C=0.2\text{mA}$ $-V_{CE}=5\text{V}$ $R_G=2\text{K}\Omega$ $f=1\text{KHz}$ $\Delta f=200\text{Hz}$
BC179 } BC259 } only BC309 } BC322 }			1.2	4	dB	$-I_C=0.2\text{mA}$ $-V_{CE}=5\text{V}$ $R_G=2\text{K}\Omega$ $f=30\text{Hz}-15\text{KHz}$

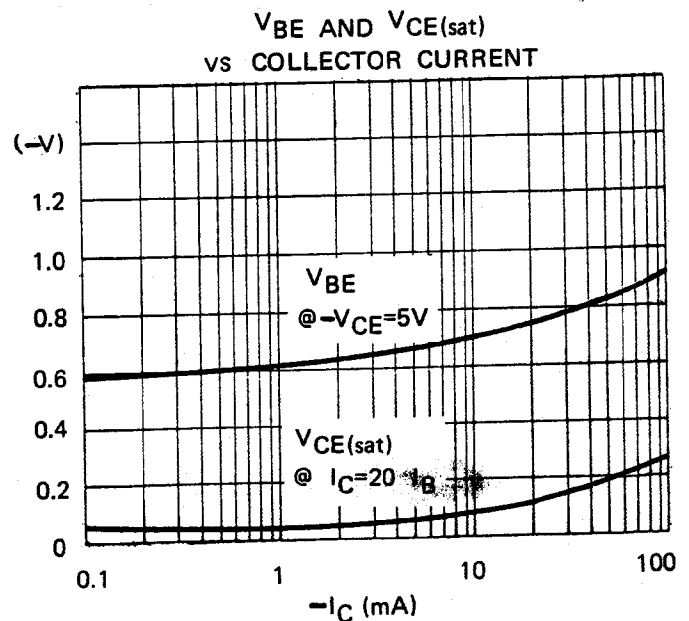
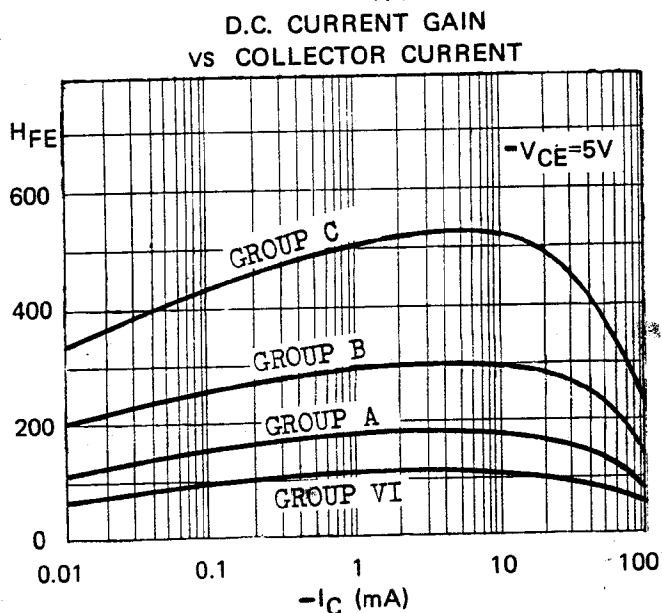
D.C. CURRENT GAIN ( $H_{FE}$ ) @  $-V_{CE}=5\text{V}$   $T_A=25^\circ\text{C}$

at $-I_C$	HFE GROUP VI			HFE GROUP A			HFE GROUP B			HFE GROUP C		
(Pulsed)	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
0.01mA		70			110			200			330	
2mA	70	110	140	110	170	220	200	300	450	420	520	800
100mA		60			80			140			240	

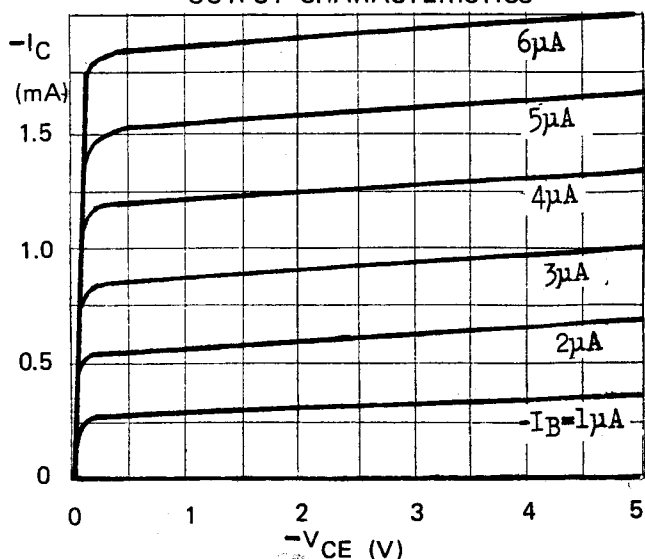
h - PARAMETERS @  $-I_C=2\text{mA}$   $-V_{CE}=5\text{V}$   $f=1\text{kHz}$   $T_A=25^\circ\text{C}$

h - PARAMETER	SYMBOL	HFE GROUP VI			HFE GROUP A			HFE GROUP B			HFE GROUP C			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
Input Impedance	$h_{ie}$		1.4			2.7			4.5			8.7		$\text{K}\Omega$
Voltage Feedback Ratio	$h_{re}$		2.5			3			3.5			4		$\times 10^{-4}$
Small Signal Current Gain	$h_{fe}$	75	110	150	125	190	260	240	330	500	450	580	900	
Output Admittance	$h_{oe}$		20			25			35			60		$\mu\text{S}$

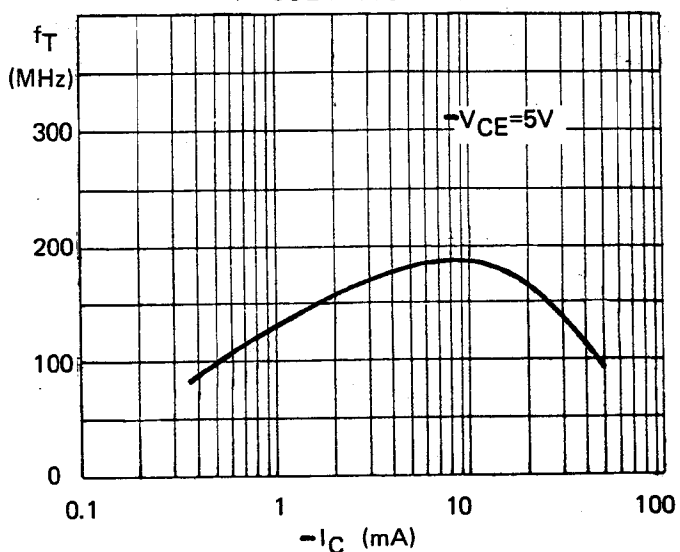
# TYPICAL CHARACTERISTICS AT $T_A=25^\circ\text{C}$ (Pulse Test)



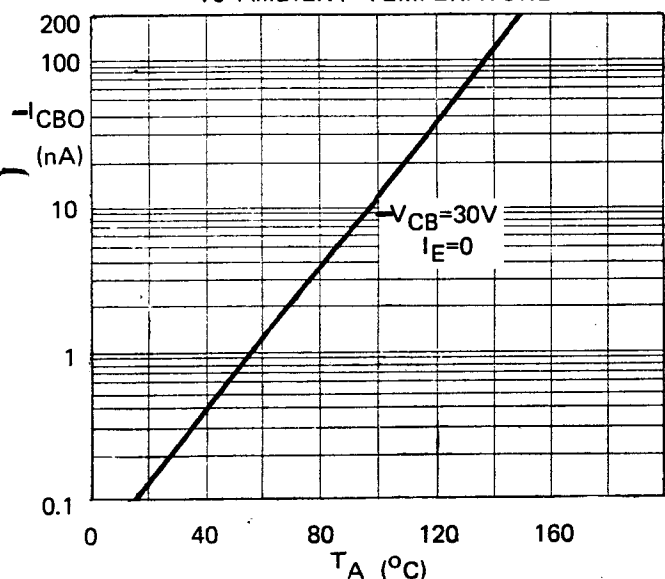
COMMON EMITTER  
OUTPUT CHARACTERISTICS



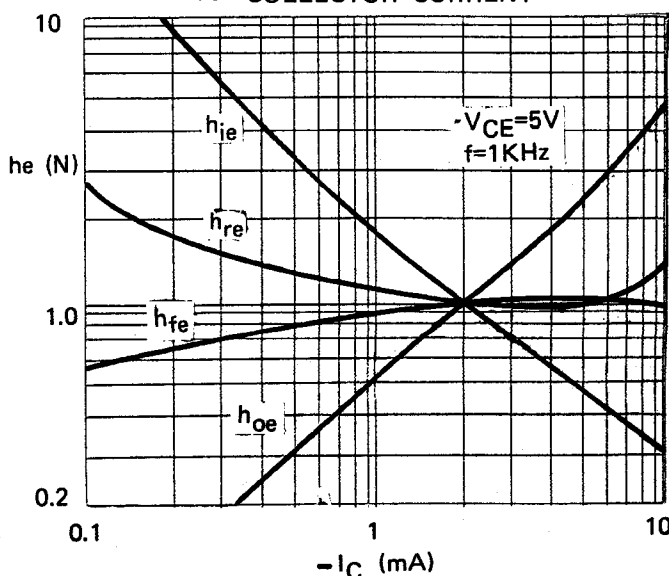
CURRENT GAIN - BANDWIDTH PRODUCT  
VS COLLECTOR CURRENT



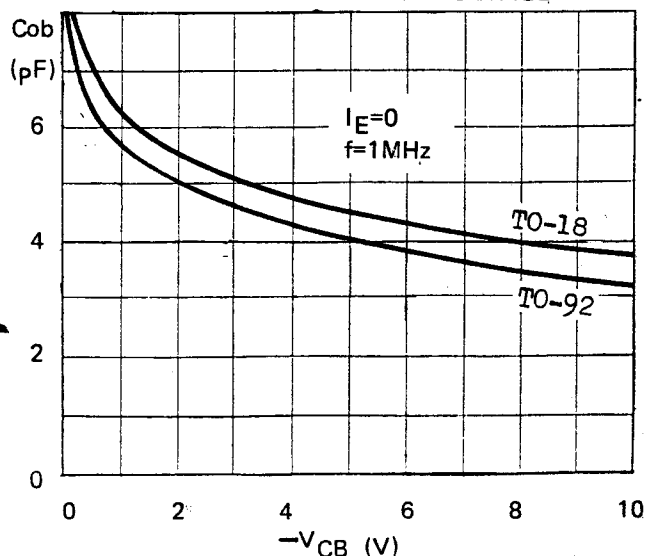
COLLECTOR CUTOFF CURRENT  
VS AMBIENT TEMPERATURE



h-PARAMETERS (NORMALIZED)  
VS COLLECTOR CURRENT



COLLECTOR-BASE CAPACITANCE  
VS COLLECTOR-BASE VOLTAGE



BROAD BAND NOISE FIGURE  
VS COLLECTOR CURRENT

