SILICON N-P-N PLANAR EPITAXIAL TRANSISTORS

BC107
BC108
BC109

N-P-N silicon planar epitaxial transistors in TO-18 encapsulation.
The BC107 is primarily intended for use in audio driver stages and television signal processing circuits.
The BC108 is a general purpose l.f. transistor.
The BC109 is primarily intended for low noise audio input stages.

QUICK REFERENCE DATA

		BC107	BC108	BC109		
V_{CES} max.		50	30	30		V
V_{CEO} max.		45	20	20		V
I_{CM} max.					200	mA
P_{tot} max. ($T_{amb} \leq 25^{o}C$)					300	mW
T_j max.					175	^{o}C
h_{fe} ($I_C = 2mA$, $V_{CE} = 5V$, f = 1kHz)		125-500	125-500	240-900		
f_T typ. ($I_C = 10mA$, $V_{CE} = 5V$)					300	MHz
N ($I_C = 200\mu A$, $V_{CE} = 5V$, $R_s = 2k\Omega$)						
f = 30Hz to 15kHz	typ.	-	-	1.8		dB
	max.	-	-	4.0		dB
f = 1kHz, B = 200Hz	typ.	2.0	2.0	-		dB

Unless otherwise stated data is applicable to all types

OUTLINE AND DIMENSIONS

Conforms to J.E.D.E.C. TO-18
B.S. 3934 SO-12A/SB3-6A

For details see page 4.

RATINGS

Limiting values of operation according to the absolute maximum system.

Electrical

	BC107	BC108	BC109	
V_{CBO} max.	50	30	30	V
V_{CES} max.	50	30	30	V
V_{CEO} max.	45	20	20	V
V_{EBO} max.	6.0	5.0	5.0	V
I_C max.			100	mA
I_{CM} max.			200	mA
$-I_{EM}$ max.			200	mA
I_{BM} max.			200	mA
P_{tot} max. ($T_{amb} \leq 25^oC$)			300	mW

Temperature

T_{stg} min.	-65	^oC
T_{stg} max.	175	^oC
T_j max.	175	^oC

THERMAL CHARACTERISTICS

$R_{th(j-amb)}$	0.5	degC/mW
$R_{th(j-case)}$	0.2	degC/mW

ELECTRICAL CHARACTERISTICS ($T_j = 25^oC$ unless otherwise stated)

		Min.	Typ.	Max.	
I_{CBO}	Collector cut-off current $V_{CB}=20V$, $I_E=0$, $T_j=150^oC$	-	-	15	μA
V_{BE}	*Base-emitter voltage $I_C=2.0mA$, $V_{CE}=5.0V$	550	620	700	mV
	$I_C=10mA$, $V_{CE}=5.0V$	-	-	770	mV
$V_{CE(sat)}$	Collector-emitter saturation voltage $I_C=10mA$, $I_B=0.5mA$	-	90	250	mV
	$I_C=100mA$, $I_B=5.0mA$	-	200	600	mV
$V_{BE(sat)}$	†Base-emitter saturation voltage $I_C=10mA$, $I_B=0.5mA$	-	700	-	mV
	$I_C=100mA$, $I_B=5.0mA$	-	900	-	mV

*V_{BE} decreases by about 2mV/degC with increasing temperature.

†$V_{BE(sat)}$ decreases by about 1.7mV/degC with increasing temperature.

ELECTRICAL CHARACTERISTICS (cont'd)

			Min.	Typ.	Max.	
V_{CEK}	Collector knee voltage (see Fig.1) I_C=10mA, I_B=the value for which I_C=11mA at V_{CE}=1.0V		-	300	600	mV
h_{FE}	Static forward current transfer ratio I_C=10μA, V_{CE}=5.0V	BC107, BC108	-	120	-	
		BC109	-	210	-	
	I_C=2.0mA, V_{CE}=5.0V	BC107, BC108	110	240	450	
		BC109	200	410	800	
f_T	Transition frequency I_C=10mA, V_{CE}=5.0V		-	300	-	MHz
C_{tc}	Collector capacitance I_E=I_e=0, V_{CB}=10V, f=1.0MHz		-	2.5	4.5	pF
C_{te}	Emitter capacitance I_C= I_c=0, V_{EB}=0.5V, f=1.0MHz		-	9.0	-	pF
N	Noise figure I_C=200μA, V_{CE}=5.0V, R_s=2.0kΩ f=30Hz to 15kHz	BC109	-	1.8	4.0	dB
	f= 1.0kHz, B=200Hz	BC107, BC108	-	2.0	10	dB
		BC109	-	2.0	4.0	dB

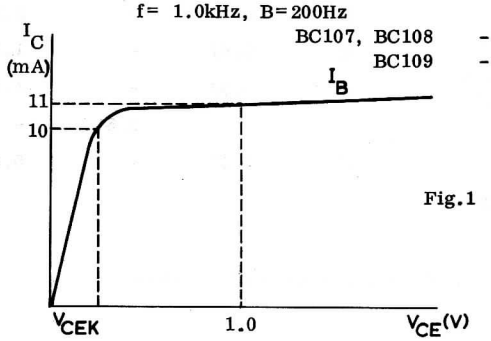


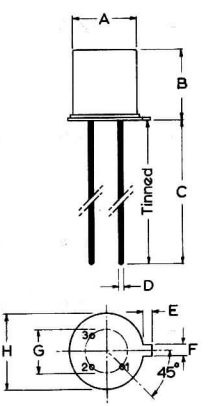
Fig.1

ELECTRICAL CHARACTERISTICS (cont'd)

			Min.	Typ.	Max.	
h-parameters (Common emitter)						
Measured at I_C = 2.0mA, V_{CE} = 5.0V, f = 1.0kHz						
h_{ie}	Input impedance	BC107, BC108	1.6	3.6	8.5	kΩ
		BC109	3.2	6.5	15	kΩ
h_{re}	Voltage feedback ratio					
		BC107, BC108	-	1.8	-	$\times 10^{-4}$
		BC109	-	2.5	-	$\times 10^{-4}$
h_{fe}	Small signal forward current transfer ratio					
		BC107, BC108	125	280	500	
		BC109	240	460	900	
h_{oe}	Output admittance	BC107, BC108	-	24	60	μmho
		BC109	-	45	110	μmho

OUTLINE AND DIMENSIONS

Conforms to J.E.D.E.C. TO-18
B.S. 3934 SO-12A/SB3-6A



Viewed from underside

Millimetres

	Min.	Nom.	Max.
A	4.53	-	4.8
B	4.66	-	5.33
C1	-	-	0.51
C2	12.7	-	-
C3	12.7	-	15
D1	-	-	1.01
D2	0.41	-	0.48
D3	-	-	0.53
E	0.84	-	1.17
F	0.92	-	1.16
G	-	2.54	-
H	5.31	-	5.84

Pin connections

1. Emitter 2. Base 3. Collector connected to envelope

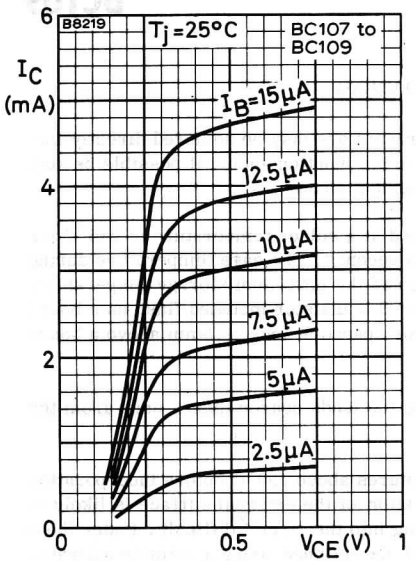
SOLDERING AND WIRING RECOMMENDATIONS

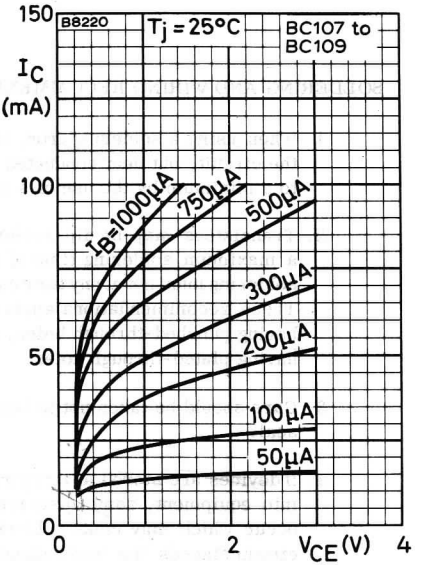
1. When using a soldering iron, transistors may be soldered directly into the circuit, but heat conducted to the junction should if possible be kept to a minimum by the use of a thermal shunt.

2. Transistors may be dip-soldered at a solder temperature of 245°C for a maximum soldering time of 5 seconds. The case temperature during soldering must not at any time exceed the maximum storage temperature. These recommendations apply to a transistor mounted flush on a board having punched-through holes, or spaced at least 1.5mm above a board having plated-through holes.

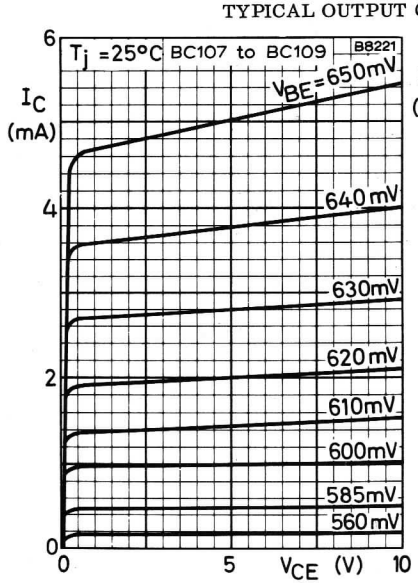
3. Care should be taken not to bend the leads nearer than 1.5mm from the seal.

4. If devices are stored at temperatures above 100°C before incorporation into equipment, some deterioration of the external surface is likely to occur which may make soldering into the circuit difficult. Under these circumstances the leads should be retinned using a suitable activated flux.

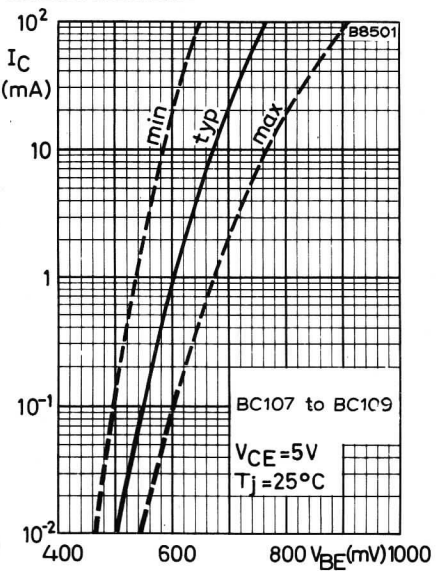




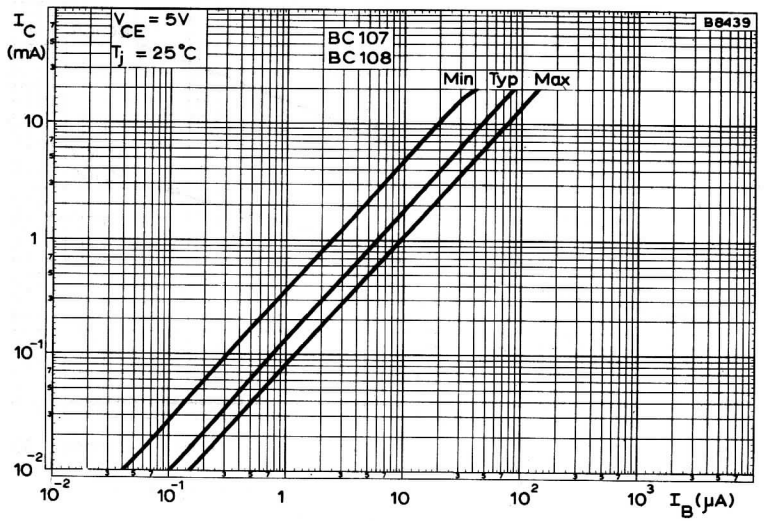
TYPICAL OUTPUT CHARACTERISTICS

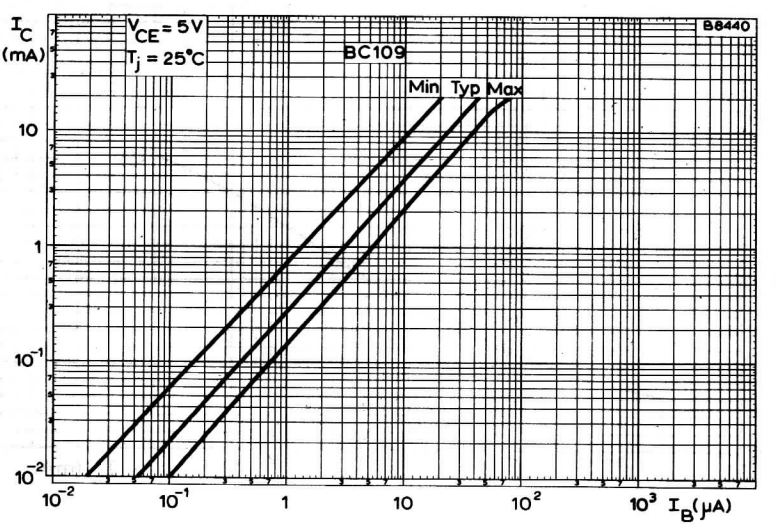


Typical output characteristic

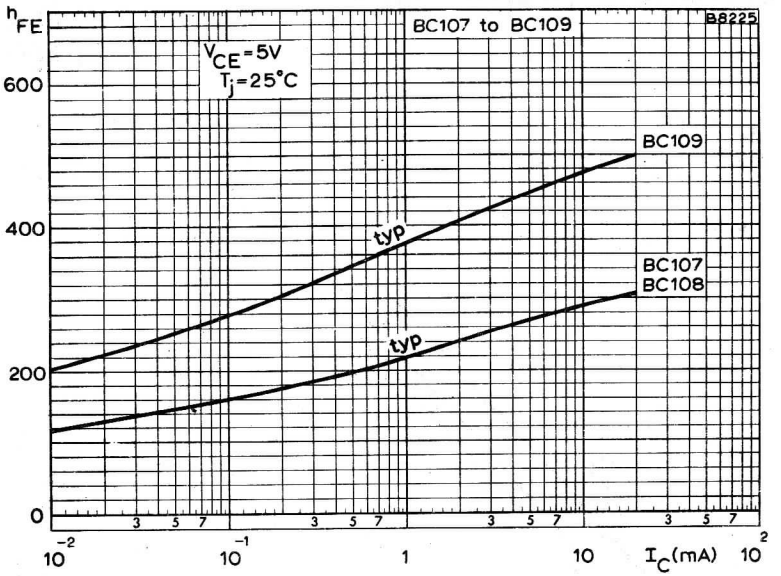


Spread of mutual characteristics

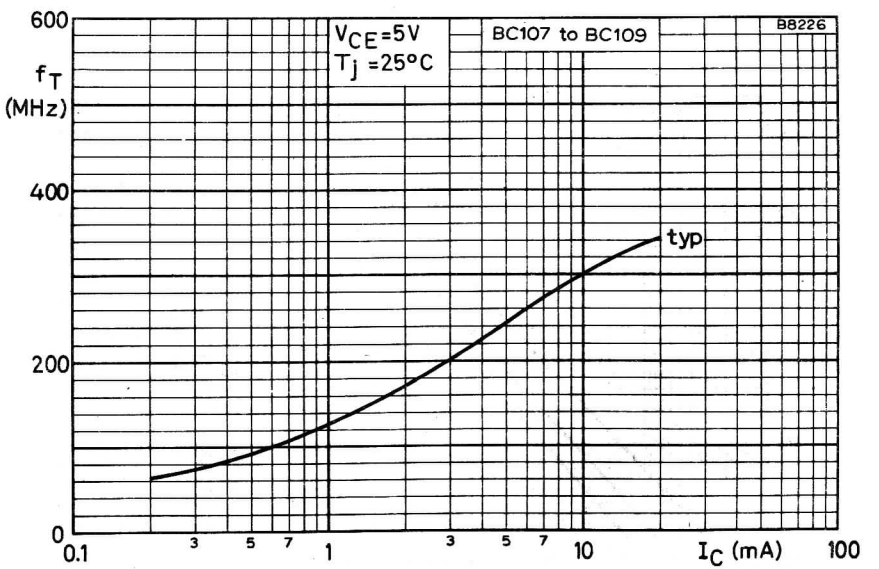




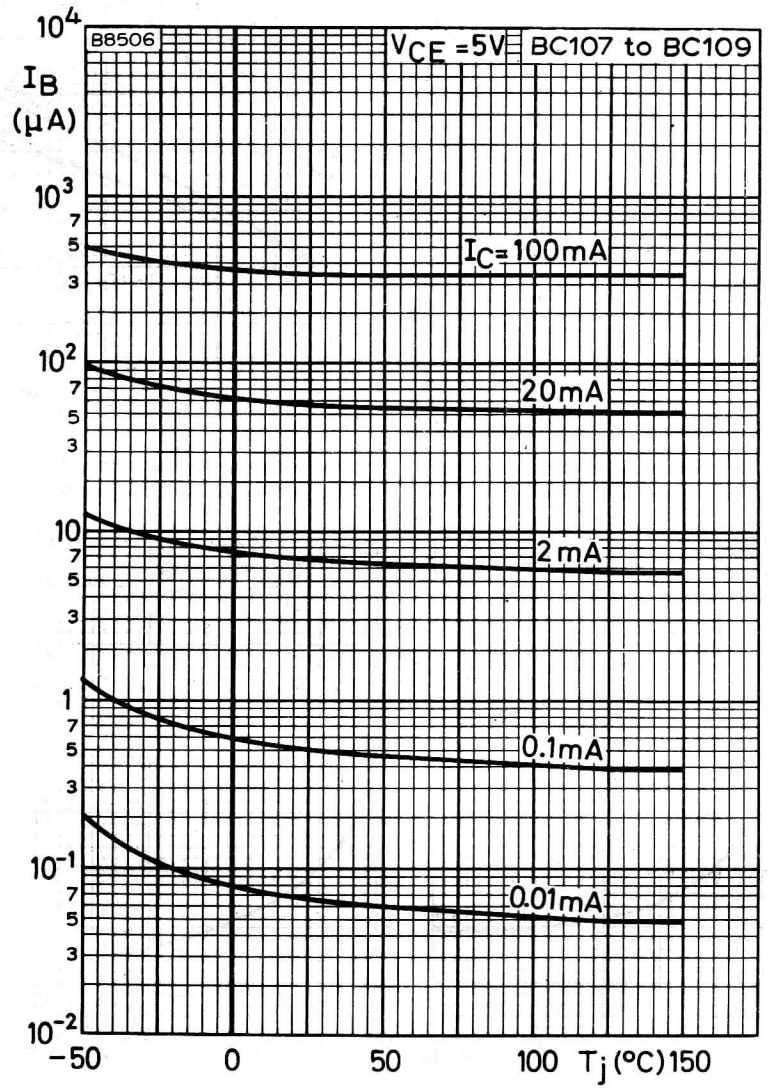
SPREAD OF TRANSFER CHARACTERISTICS



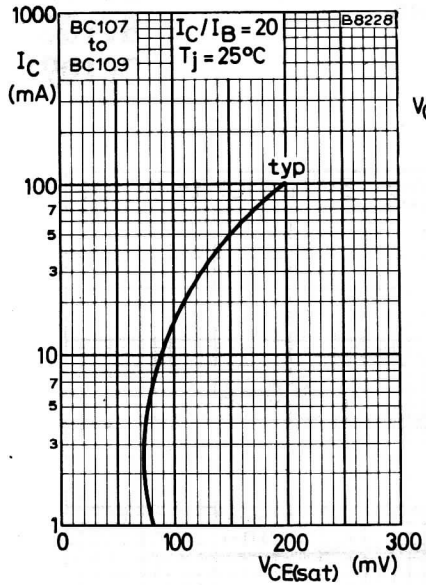
TYPICAL VARIATION OF FORWARD CURRENT TRANSFER RATIO WITH COLLECTOR CURRENT



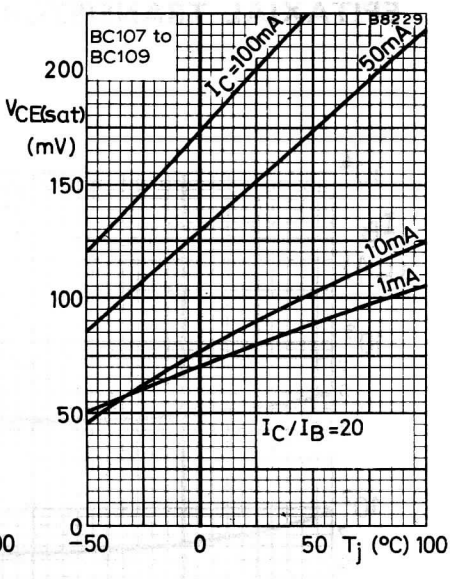
TYPICAL VARIATION OF TRANSITION FREQUENCY WITH COLLECTOR CURRENT



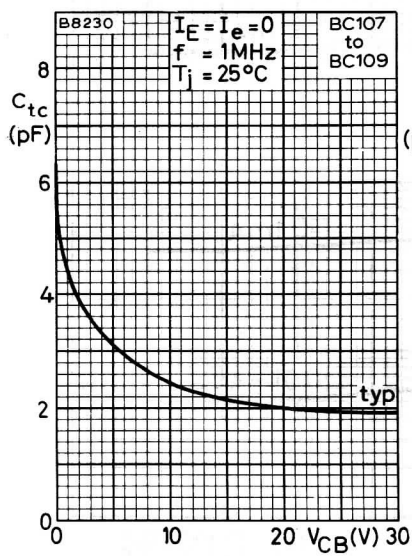
TYPICAL VARIATION OF BASE CURRENT WITH JUNCTION TEMPERATURE



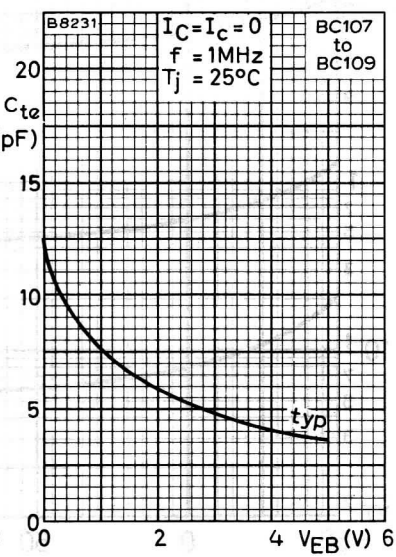
Typical collector current versus collector-emitter saturation voltage



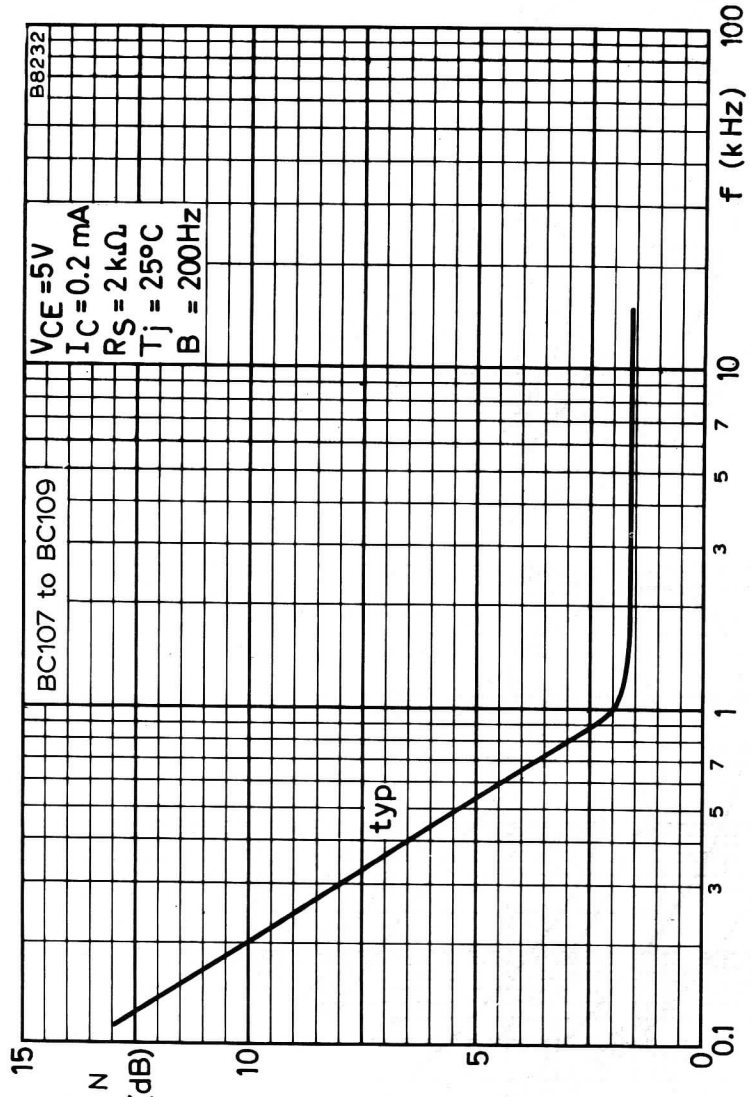
Typical collector-emitter saturation voltage versus junction temperature



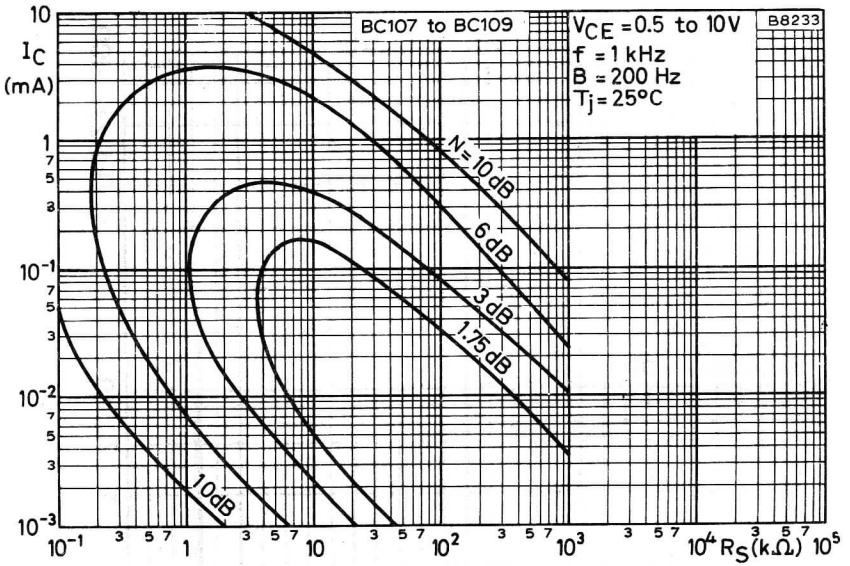
Typical collector capacitance versus collector-base voltage

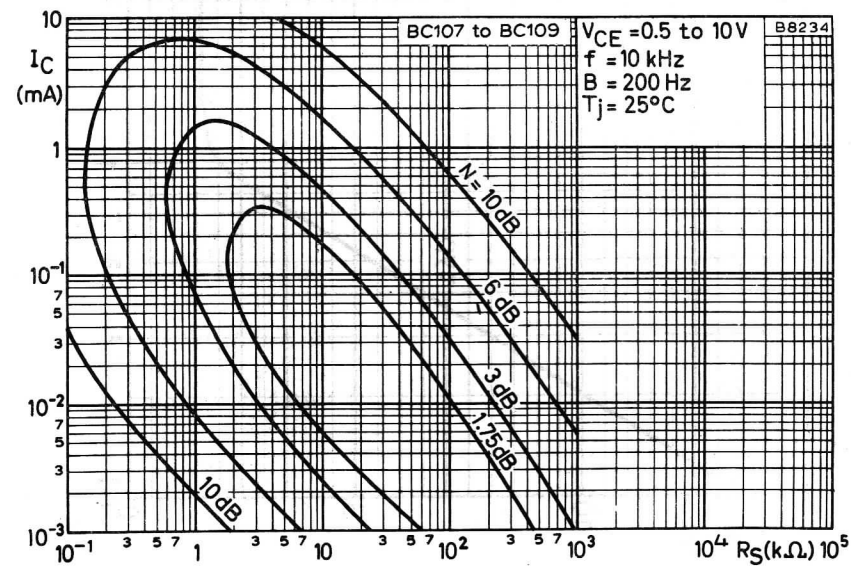


Typical emitter capacitance versus emitter-base voltage

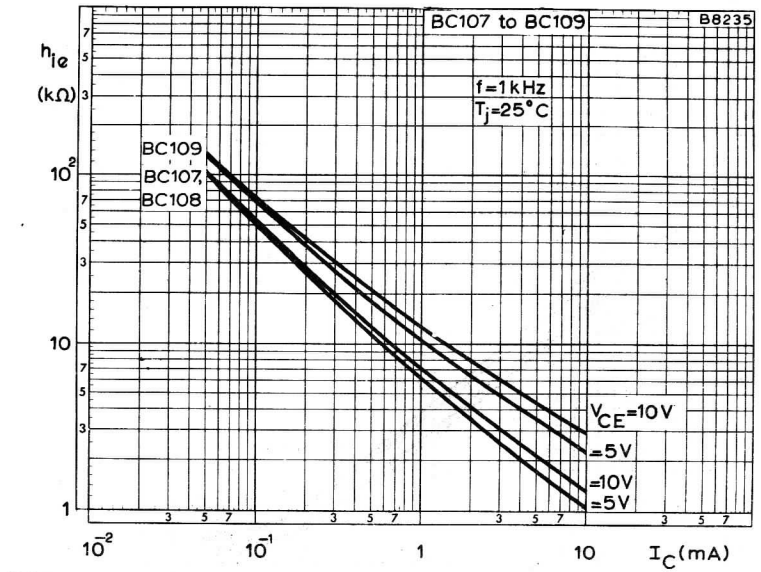


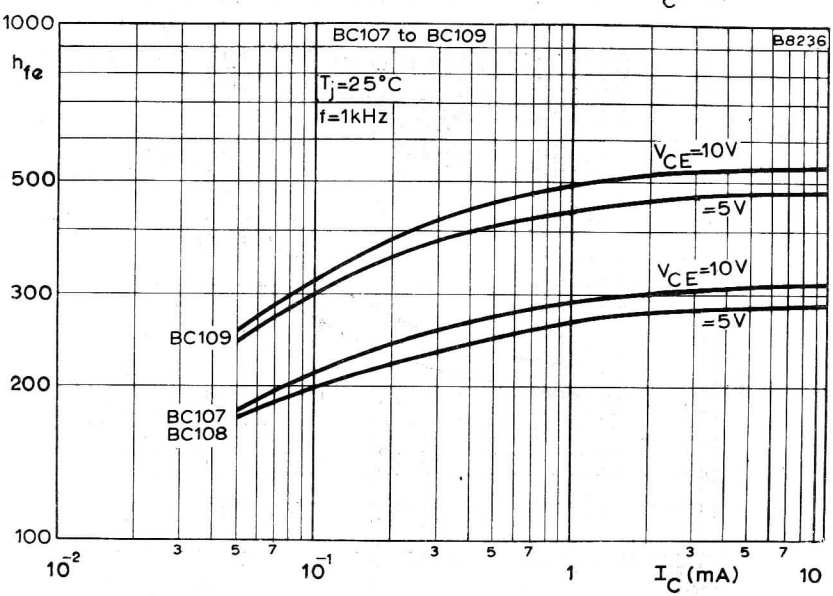
TYPICAL VARIATION OF NOISE FIGURE WITH FREQUENCY



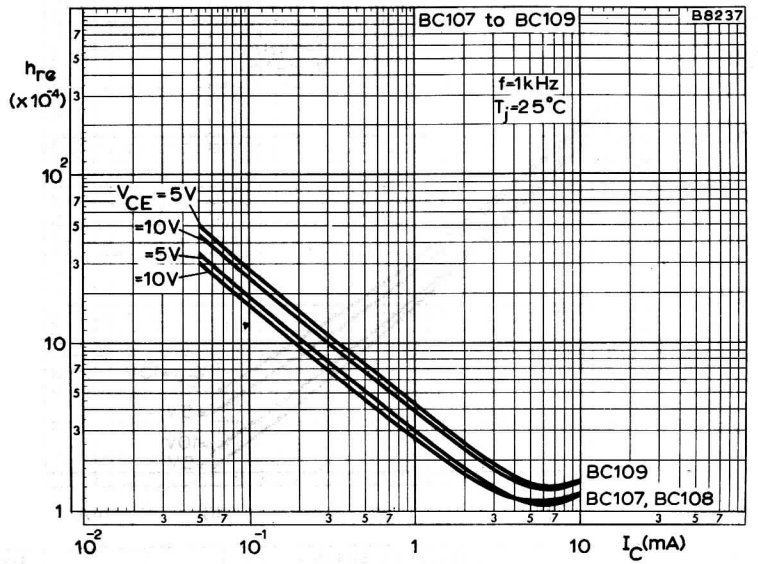


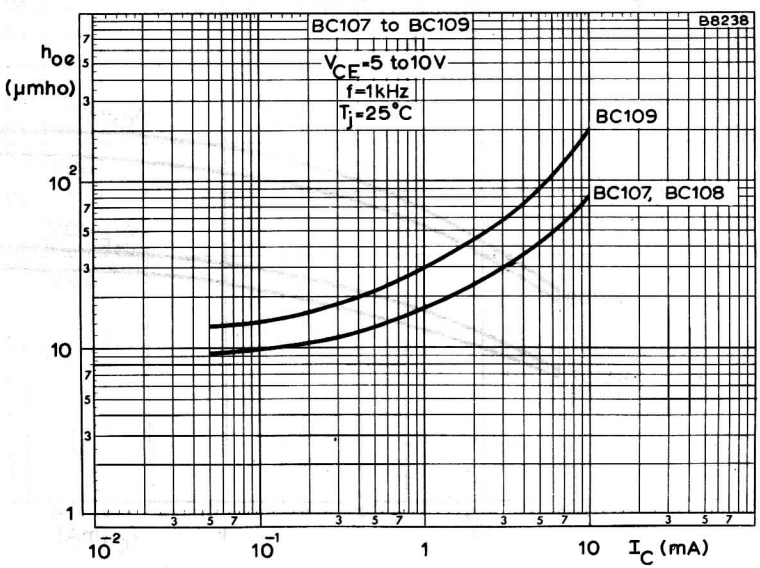
TYPICAL CURVES OF CONSTANT NOISE FIGURE





TYPICAL VARIATION OF INPUT IMPEDANCE AND SMALL SIGNAL FORWARD CURRENT TRANSFER RATIO WITH COLLECTOR CURRENT





TYPICAL VARIATION OF VOLTAGE FEEDBACK RATIO AND OUTPUT ADMITTANCE WITH COLLECTOR CURRENT