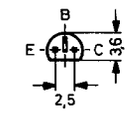
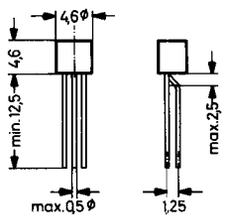
BC413, BC414

NPN Silicon Epitaxial Planar Transistors
for use in high-quality, low-noise AF and DC amplifiers. Complementary types are the PNP transistors BC415 and BC416.

These types are subdivided into two groups B and C according to their current gain.





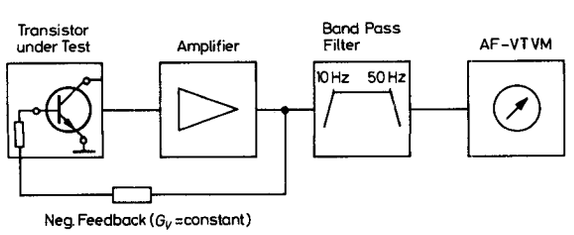
Plastic package ≈ JEDEC TO-92
TO-18 compatible
The case is impervious to light

Weight approximately 0.18 g
Dimensions in mm

Absolute Maximum Ratings

		Symbol	Value	Unit
Collector Base Voltage	**BC414** **BC413**	V_{CBO} V_{CBO}	50 45	V V
Collector Emitter Voltage	**BC414** **BC413**	V_{CEO} V_{CEO}	45 30	V V
Emitter Base Voltage		V_{EBO}	5	V
Collector Current		I_C	100	mA
Base Current		I_B	20	mA
Power Dissipation at T_{amb} = 25 °C		P_{tot}	300[1)]	mW
Junction Temperature		T_j	150	°C
Storage Temperature Range		T_S	−65 . . . +150	°C

[1)] Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case



Test circuit for equivalent noise EMF

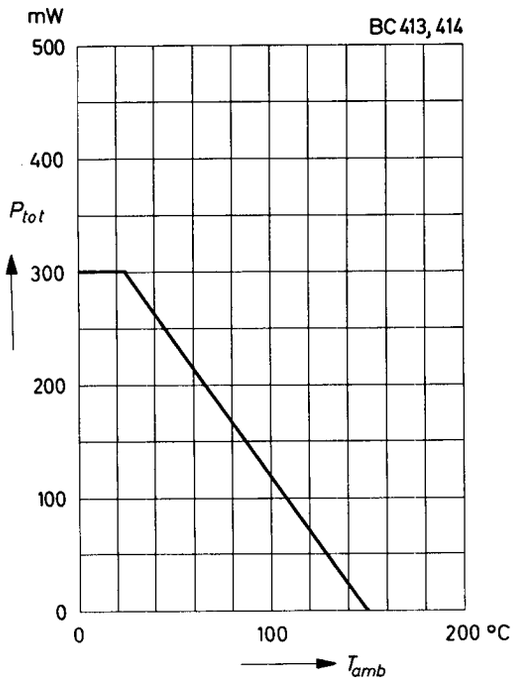
Characteristics at T_{amb} = 25 °C

	Symbol	Min.	Typ.	Max.	Unit
h-Parameters at V_{CE} = 5 V, I_C = 2 mA, f = 1 kHz					
Small Signal Current Gain **Current Gain Group B**	h_{fe}	240	330	500	–
C	h_{fe}	450	600	900	–
Input Impedance **Current Gain Group B**	h_{ie}	3.2	4.5	8.5	kΩ
C	h_{ie}	6	8.7	15	kΩ
Output Admittance **Current Gain Group B**	h_{oe}	–	30	60	µS
C	h_{oe}	–	60	110	µS
Reverse Voltage Transfer Ratio **Current Gain Group B**	h_{re}	–	$2 \cdot 10^{-4}$	–	–
C	h_{re}	–	$3 \cdot 10^{-4}$	–	–
DC Current Gain					
at V_{CE} = 5 V, I_C = 0.01 mA **Current Gain Group B**	h_{FE}	100	150	–	–
C	h_{FE}	100	270	–	–
at V_{CE} =5 V, I_C = 2 mA **Current Gain Group B**	h_{FE}	180	290	460	–
C	h_{FE}	380	500	800	–
Thermal Resistance Junction to Ambient	R_{thA}	–	–	420[1]	K/W
Collector Saturation Voltage					
at I_C = 10 mA, I_B = 0.5 mA	V_{CEsat}	–	0.075	0.25	V
at I_C = 100 mA, I_B = 5 mA	V_{CEsat}	–	0.25	0.6	V
Base Saturation Voltage at I_C = 100 mA, I_B = 5 mA	V_{BEsat}	–	0.9	–	V
Base Emitter Voltage					
at V_{CE} = 5 V, I_C = 0.01 mA	V_{BE}	–	0.52	–	V
at V_{CE} = 5 V, I_C = 0.1 mA	V_{BE}	–	0.55	–	V
at V_{CE} = 5 V, I_C = 2 mA	V_{BE}	0.55	0.62	0.75	V
Collector Cutoff Current					
at V_{CB} = 30 V	I_{CBO}	–	–	15	nA
at V_{CB} = 30 V, T_{amb} = 150 °C	I_{CBO}	–	–	5	µA
Emitter Cutoff Current at V_{EB} = 4 V	I_{EBO}	–	–	15	nA
Collector Emitter Breakdown Voltage					
at I_C = 10 mA **BC414**	$V_{(BR)CEO}$	45	–	–	V
BC413	$V_{(BR)CEO}$	30	–	–	V
Collector Base Breakdown Voltage					
at I_C = 10 µA **BC414**	$V_{(BR)CBO}$	50	–	–	V
BC413	$V_{(BR)CBO}$	45	–	–	V
Emitter Base Breakdown Voltage at I_E = 10 µA	$V_{(BR)EBO}$	5	–	–	V
Gain Bandwidth Product at V_{CE} = 5 V, I_C = 10 mA, f = 100 MHz	f_T	–	250	–	MHz
Collector Base Capacitance at V_{CBO} = 10 V, f = 1 MHz	C_{CBO}	–	2.5	–	pF
Noise Figure at V_{CE} = 5 V, I_C = 0.2 mA, R_G = 2 kΩ, f = 30 Hz . . . 15 kHz	F	–	–	3	dB
Equivalent Noise EMF (referred to base) at V_{CE} = 5 V, I_C = 0.2 mA, R_G = 2 kΩ, f = 10 . . . 50 Hz	v_r	–	–	0.135	µV

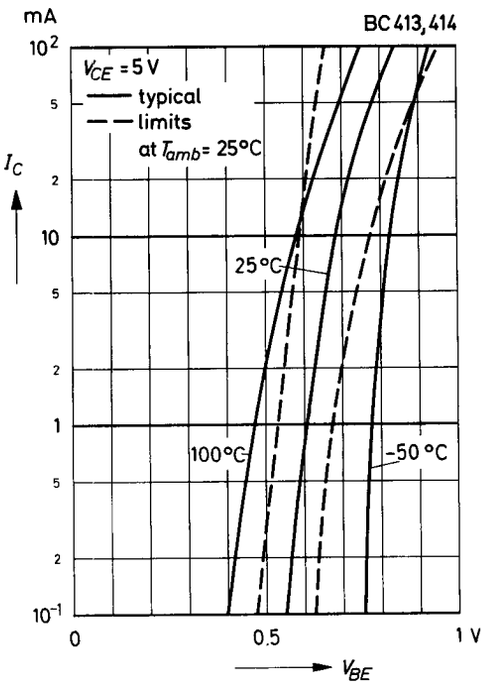
[1] Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

Admissible power dissipation versus ambient temperature

Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case

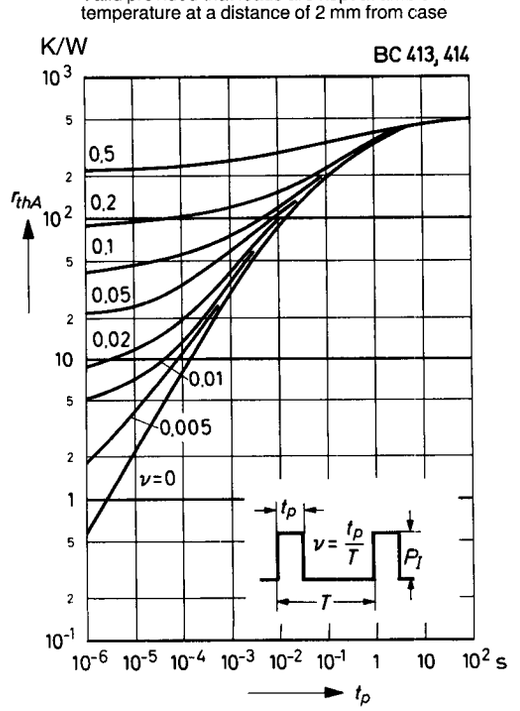


Collector current versus base emitter voltage

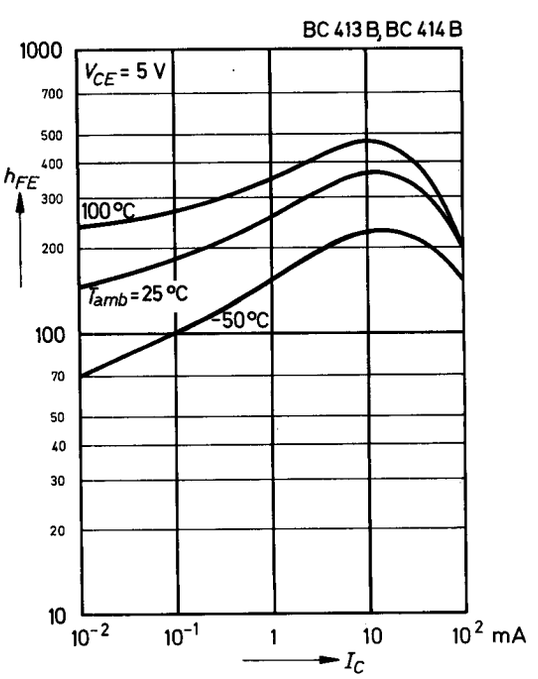


Pulse thermal resistance versus pulse duration

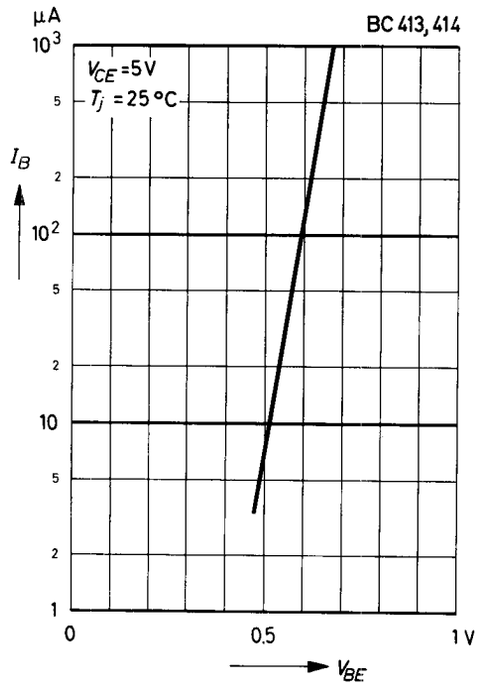
Valid provided that leads are kept at ambient temperature at a distance of 2 mm from case



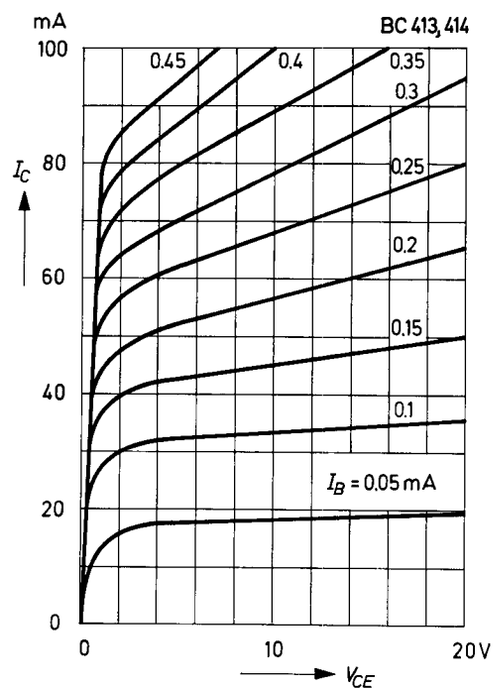
DC current gain versus collector current



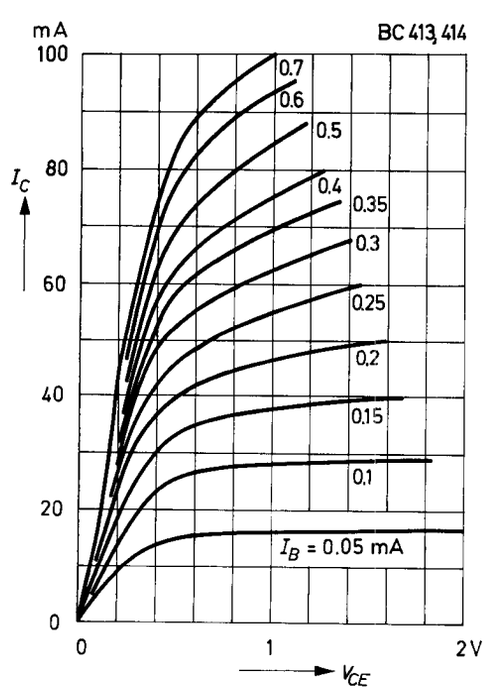
Common emitter input characteristic



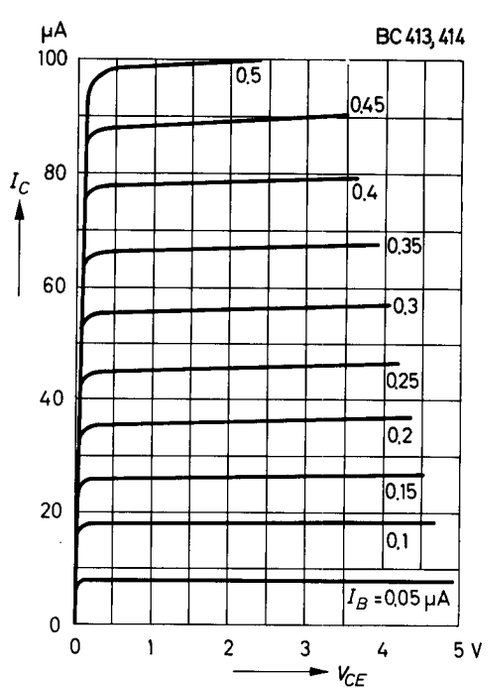
Common emitter collector characteristics



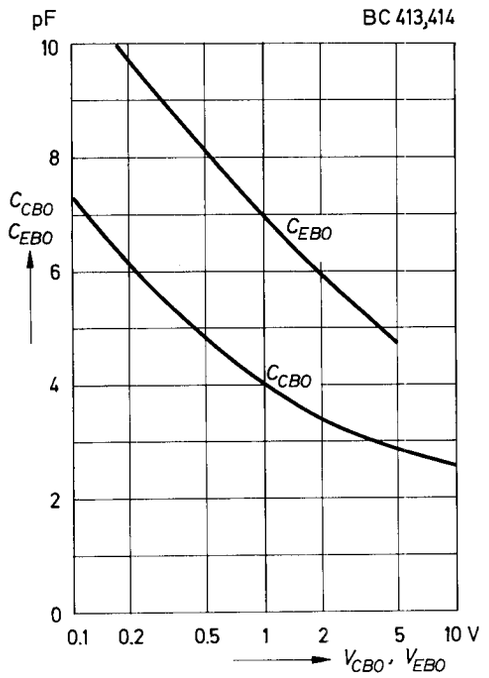
Common emitter collector characteristics



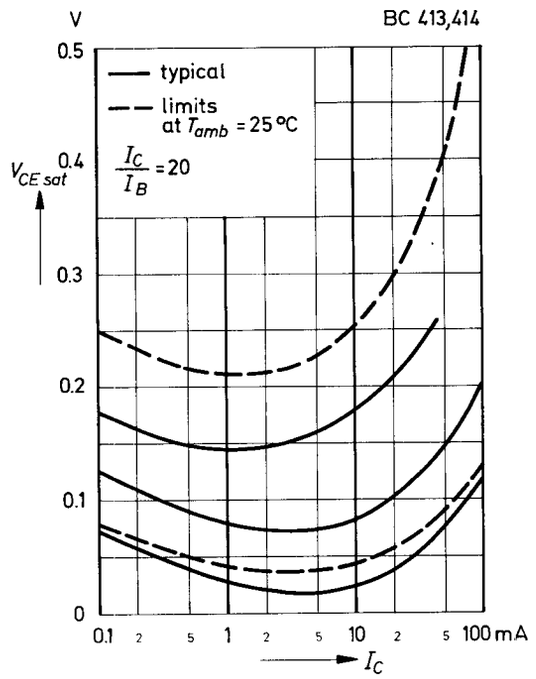
Common emitter input characteristic



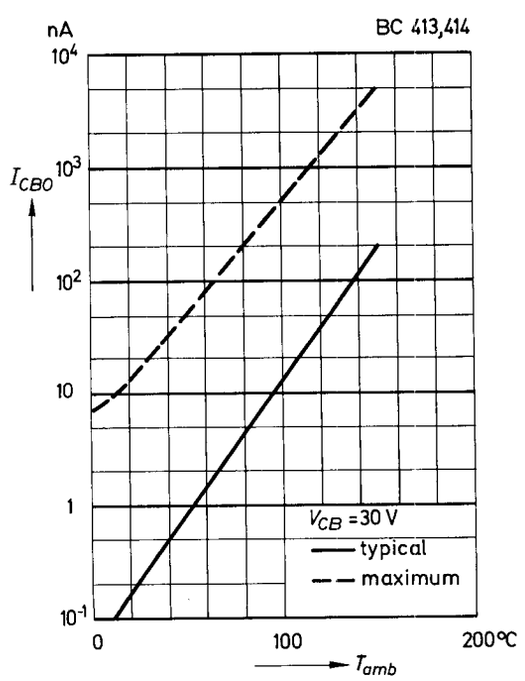
Collector base capacitance, Emitter base capacitance versus reverse bias voltage



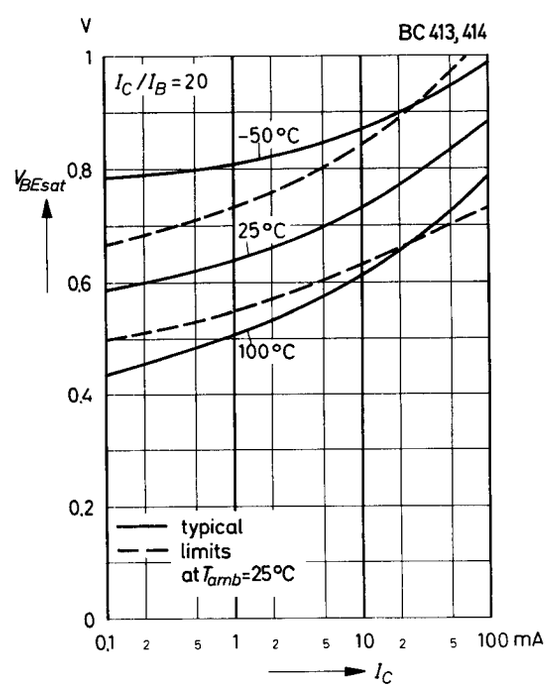
Collector saturation voltage versus collector current



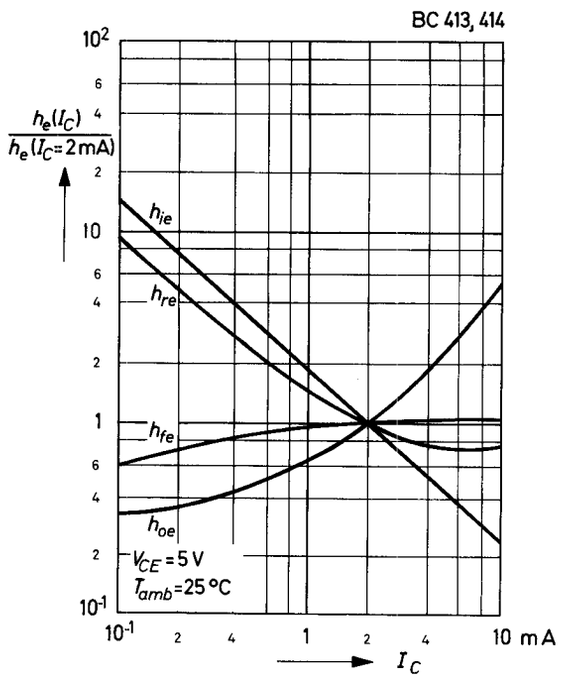
Collector cutoff current versus ambient temperature



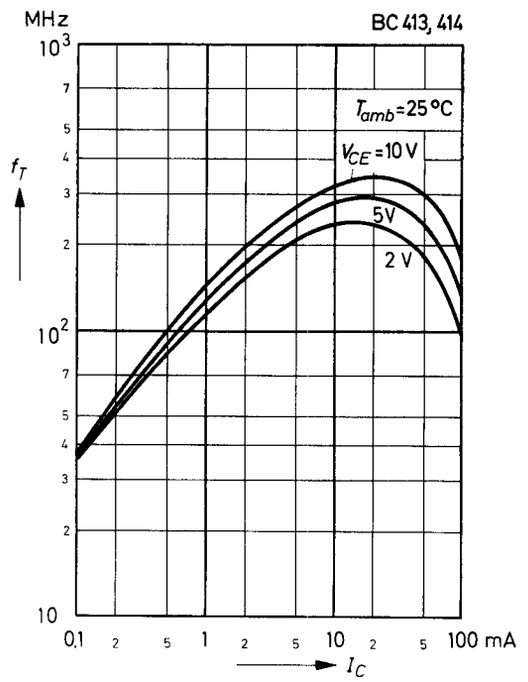
Base saturation voltage versus collector current



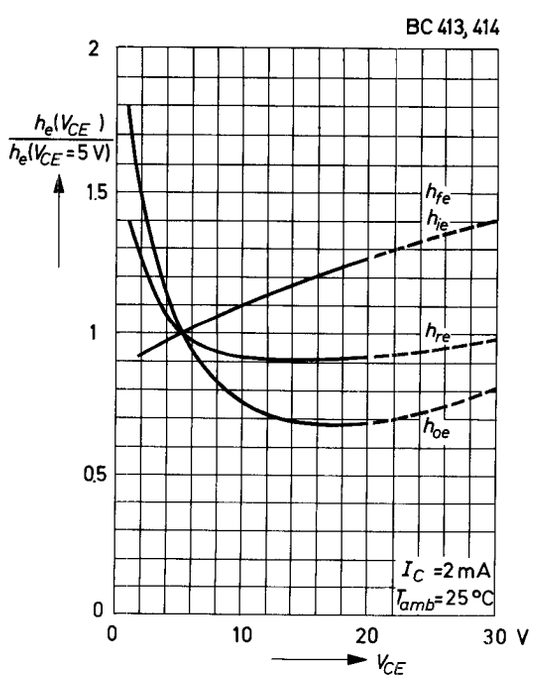
Relative h-parameters versus collector current



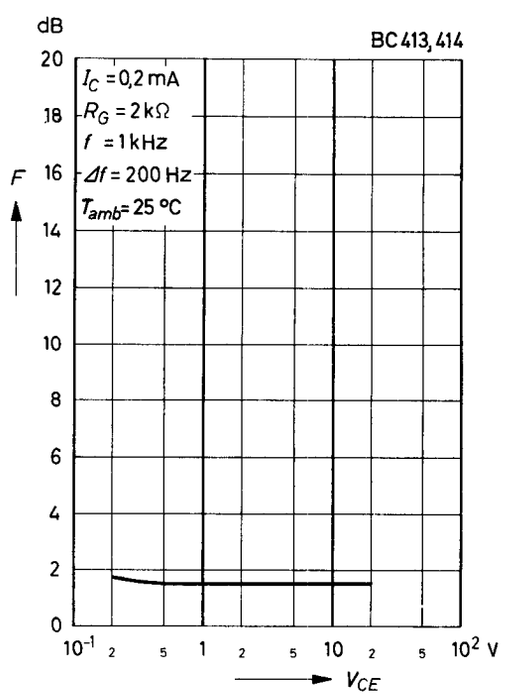
Gain bandwidth product versus collector current



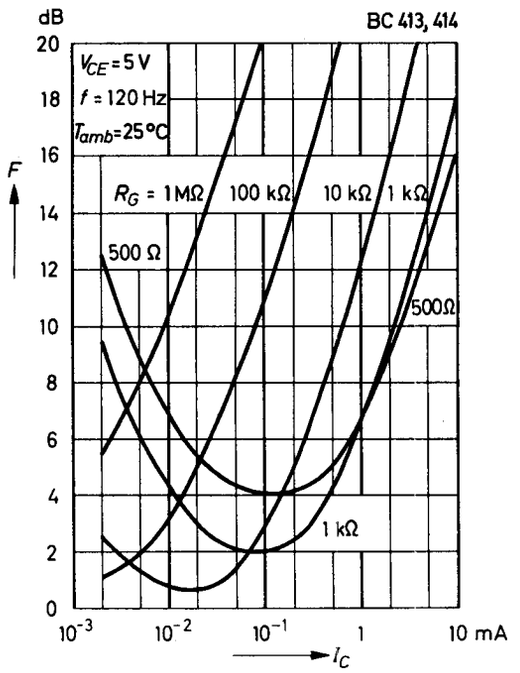
Relative h-parameters versus collector emitter voltage



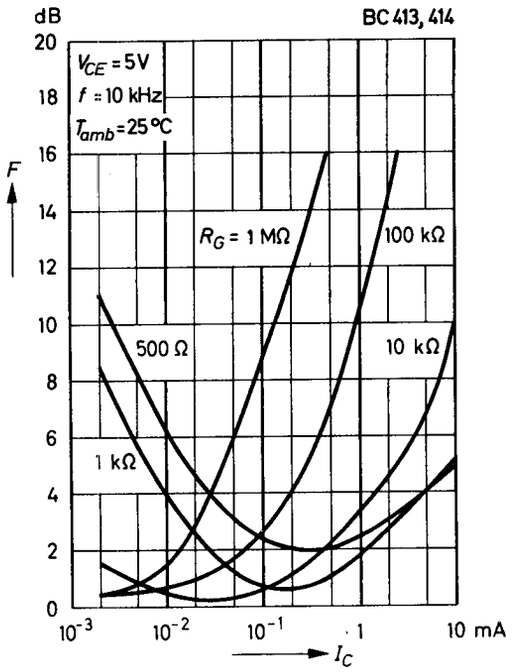
Noise figure versus collector emitter voltage



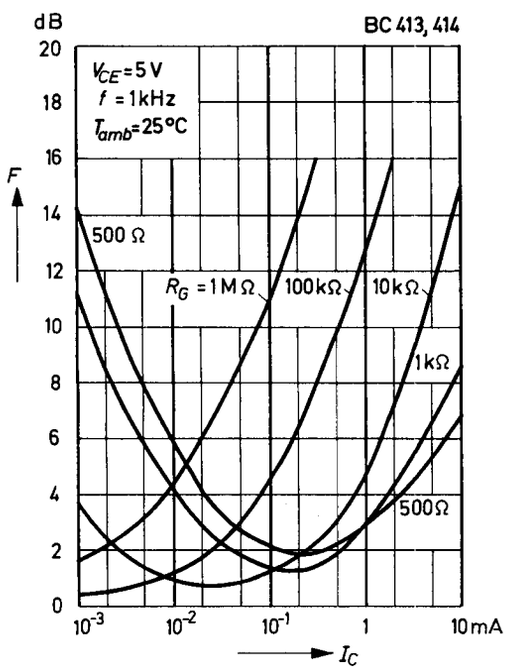
Noise figure versus collector current



Noise figure versus collector current



Noise figure versus collector current



Noise figure versus frequency