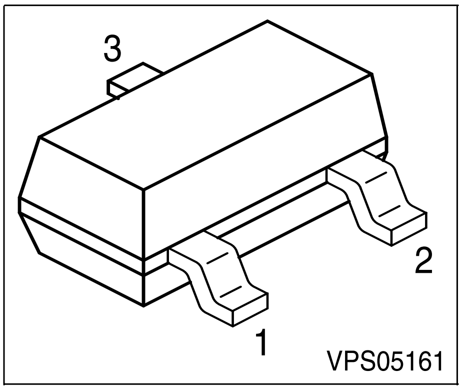
PNP Silicon AF Transistor

- For AF input stages and driver applications
- High current gain
- Low collector-emitter saturation voltage
- Low noise between 30 Hz and 15 kHz
- Complementary types: BCW60, BCX70 (NPN)



Type	Marking	Pin Configuration			Package
BCW 61A	BAs	1 = B	2 = E	3 = C	SOT23
BCW 61B	BBs	1 = B	2 = E	3 = C	SOT23
BCW 61C	BCs	1 = B	2 = E	3 = C	SOT23
BCW 61D	BDs	1 = B	2 = E	3 = C	SOT23
BCW 61FF	BFs	1 = B	2 = E	3 = C	SOT23
BCW 61FN	BNs	1 = B	2 = E	3 = C	SOT23
BCX 71G	BGs	1 = B	2 = E	3 = C	SOT23
BCX 71H	BHs	1 = B	2 = E	3 = C	SOT23
BCX 71J	BJs	1 = B	2 = E	3 = C	SOT23
BCX 71K	BKs	1 = B	2 = E	3 = C	SOT23

Maximum Ratings

Parameter	**Symbol**	BCW61	BCW61FF	BCX71	**Unit**
Collector-emitter voltage	V_{CEO}	32	32	45	V
Collector-base voltage	V_{CBO}	32	32	45	
Emitter-base voltage	V_{EBO}	5	5	5	
DC collector current	I_C	100			mA
Peak collector current	I_{CM}	200			mA
Peak base current	I_{BM}	200			
Total power dissipation, T_S = 71 °C	P_{tot}	330			mW
Junction temperature	T_j	150			°C
Storage temperature	T_{stg}	-65 ... 150			

Thermal Resistance

Junction - soldering point1)	R_{thJS}	≤240	K/W

Electrical Characteristics at T_A = 25°C, unless otherwise specified.

Parameter	**Symbol**	**Values**			**Unit**
		min.	**typ.**	**max.**	
DC Characteristics					
Collector-emitter breakdown voltage	$V_{(BR)CEO}$				V
I_C = 10 mA, I_B = 0 **BCW61/61FF**		32	-	-	
BCX71		45	-	-	
Collector-base breakdown voltage	$V_{(BR)CBO}$				
I_C = 10 µA, I_B = 0 **BCW61/61FF**		32	-	-	
BCX71		45	-	-	
Emitter-base breakdown voltage I_E = 1 µA, I_C = 0	$V_{(BR)EBO}$	5	-	-	

[1] For calculation of R_{thJA} please refer to Application Note Thermal Resistance

Electrical Characteristics at T_A = 25°C, unless otherwise specified.

Parameter		Symbol	Values			Unit
			min.	typ.	max.	
AC Characteristics						
Collector cutoff current		I_{CBO}				nA
V_{CB} = 32 V, I_E = 0	**BCW61/61FF**		-	-	20	
V_{CB} = 45 V, I_E = 0	**BCX71**		-	-	20	
Collector cutoff current		I_{CBO}				µA
V_{CB} = 32 V, I_E = 0 , T_A = 150 °C	**BCW61/61FF**		-	-	20	
V_{CB} = 45 V, I_E = 0 , T_A = 150 °C	**BCX71**		-	-	20	
Emitter cutoff current V_{EB} = 4 V, I_C = 0		I_{EBO}	-	-	20	nA
DC current gain 1)		h_{FE}				-
I_C = 10 µA, V_{CE} = 5 V	h_{FE}-grp. **A/G**		20	140	-	
	h_{FE}-grp. **B/H**		30	200	-	
	h_{FE}-grp. **C/J/FF**		40	300	-	
	h_{FE}-grp. **D/K/FN**		100	460	-	
DC current gain 1)		h_{FE}				
I_C = 2 mA, V_{CE} = 5 V	h_{FE}-grp. **A/G**		120	170	220	
	h_{FE}-grp. **B/H**		180	250	310	
	h_{FE}-grp. **C/J/FF**		250	350	460	
	h_{FE}-grp. **D/K/FN**		380	500	630	
DC current gain 1)		h_{FE}				
I_C = 50 mA, V_{CE} = 1 V	h_{FE}-grp. **A/G**		60	-	-	
	h_{FE}-grp. **B/H**		80	-	-	
	h_{FE}-grp. **C/J/FF**		100	-	-	
	h_{FE}-grp. **D/K/FN**		110	-	-	

1) Pulse test: t ≤ 300µs, D = 2%

Electrical Characteristics at T_A = 25°C, unless otherwise specified.

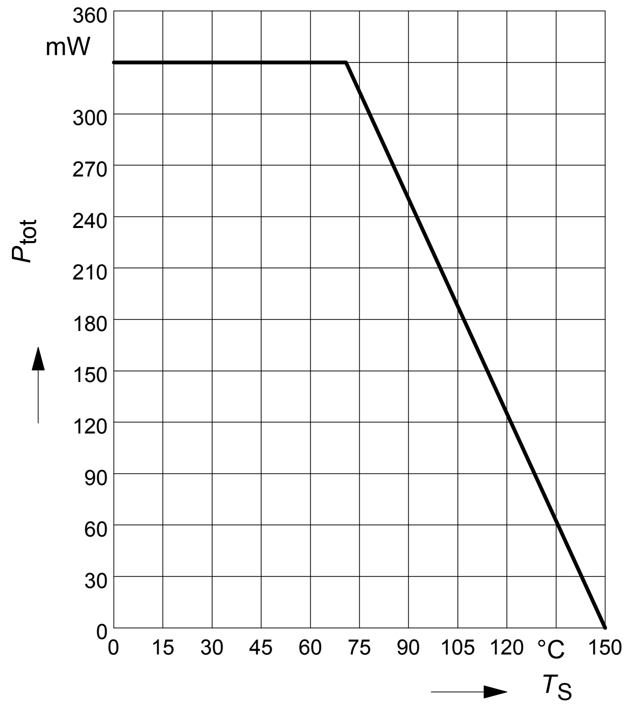
Parameter		Symbol	Values			Unit
			min.	typ.	max.	
Characteristics						
Collector-emitter saturation voltage1)		V_{CEsat}				V
I_C = 10 mA, I_B = 0.25 mA			-	0.12	0.25	
I_C = 50 mA, I_B = 1.25 mA			-	0.2	0.55	
Base-emitter saturation voltage 1)		V_{BEsat}				
I_C = 10 mA, I_B = 0.25 mA			-	0.7	0.85	
I_C = 50 mA, I_B = 1.25 mA			-	0.83	1.05	
Base-emitter voltage 1)		$V_{BE(ON)}$				
I_C = 10 µA, V_{CE} = 5 V			-	0.52	-	
I_C = 2 mA, V_{CE} = 5 V			0.55	0.65	0.75	
I_C = 50 mA, V_{CE} = 1 V			-	0.78	-	
AC Characteristics						
Transition frequency I_C = 20 mA, V_{CE} = 5 V, f = 100 MHz		f_T	-	250	-	MHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz		C_{cb}	-	3	-	pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz		C_{eb}	-	8	-	
Short-circuit input impedance	h_{FE}-grp.	h_{11e}				kΩ
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	**A/G**		-	2.7	-	
	B/H		-	3.6	-	
	C/J/FF		-	4.5	-	
	D/K/FN		-	7.5	-	
Open-circuit reverse voltage transf.ratio	h_{FE}-grp.	h_{12e}				10^{-4}
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	**A/G**		-	1.5	-	
	B/H		-	2	-	
	C/J/FF		-	2	-	
	D/K/FN		-	3	-	

1) Pulse test: t ≤ 300µs, D = 2%

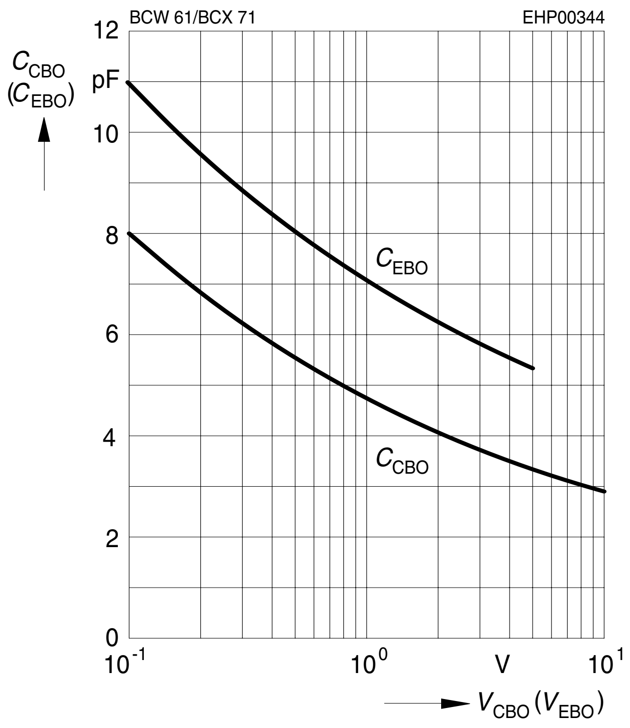
Electrical Characteristics at T_A = 25°C, unless otherwise specified.

Parameter		**Symbol**	**Values**			**Unit**
			min.	**typ.**	**max.**	
AC Characteristics						
Short-circuit forward current transf.ratio	h_{FE}-grp.	h_{21e}				-
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	**A/G**		-	200	-	
	B/H		-	260	-	
	C/J/FF		-	330	-	
	D/K/FN		-	520	-	
Open-circuit output admittance	h_{FE}-grp.	h_{22e}				µS
I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	**A/G**		-	18	-	
	B/H		-	24	-	
	C/J/FF		-	30	-	
	D/K/FN		-	50	-	
Noise figure	h_{FE}-grp.	F				dB
I_C = 200 µA, V_{CE} = 5 V, R_S = 2 kΩ,						
f = 1 kHz, Δ f = 200 Hz	**A/K**		-	2	-	
	FF/FN		-	1	2	
Equivalent noise voltage	h_{FE}-grp.	V_n	-	-	0.11	µV
I_C = 200 µA, V_{CE} = 5 V, R_S = 2 kΩ,						
f = 10 ... 50 Hz	**FF/FN**					

Total power dissipation $P_{tot} = f(T_S)$

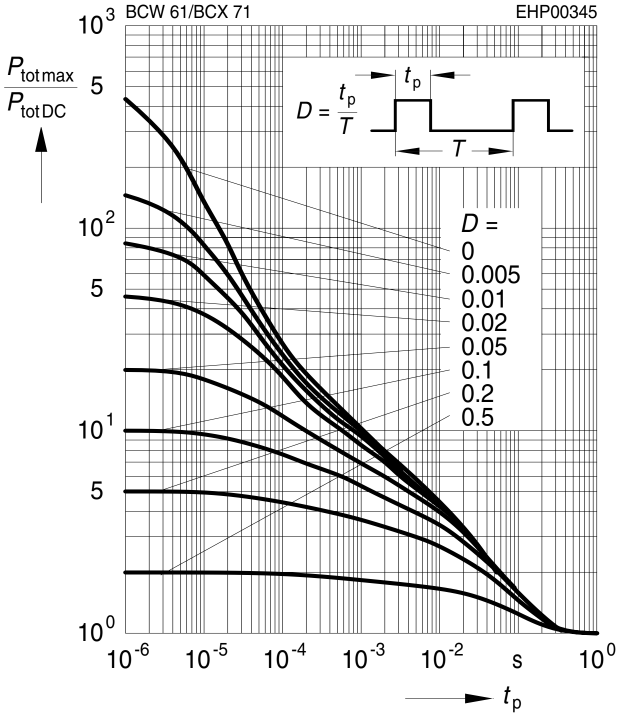


Collector-base capacitance $C_{CB} = f\,(V_{CBO}$
Emitter-base capacitance $C_{EB} = f\,(V_{EBO})$



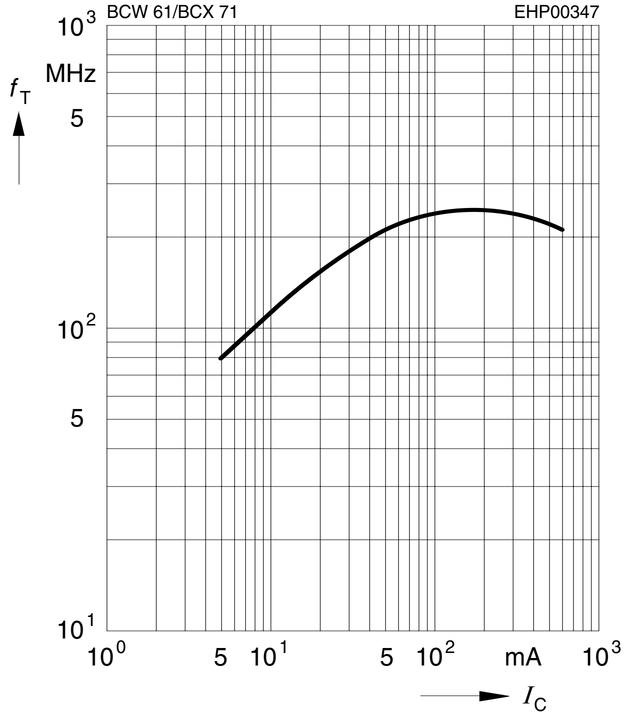
Permissible pulse load

$P_{totmax} / P_{totDC} = f\,(t_p)$



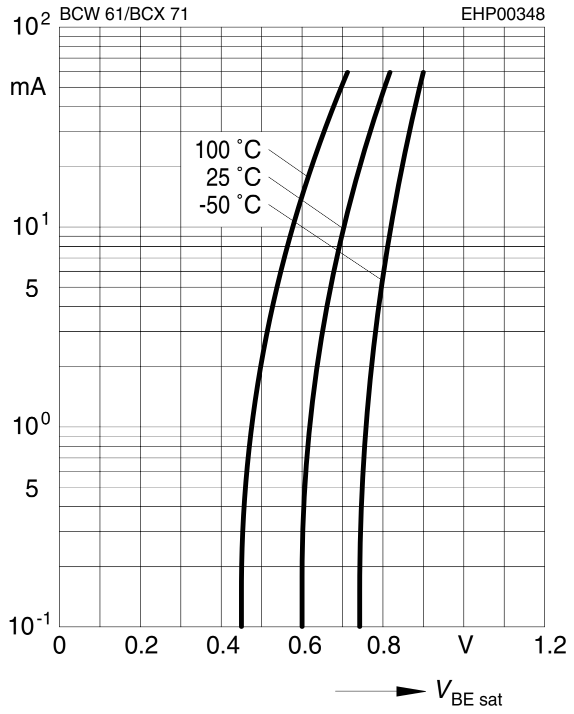
Transition frequency $f_T = f\,(I_C)$

$V_{CE} = 5V$



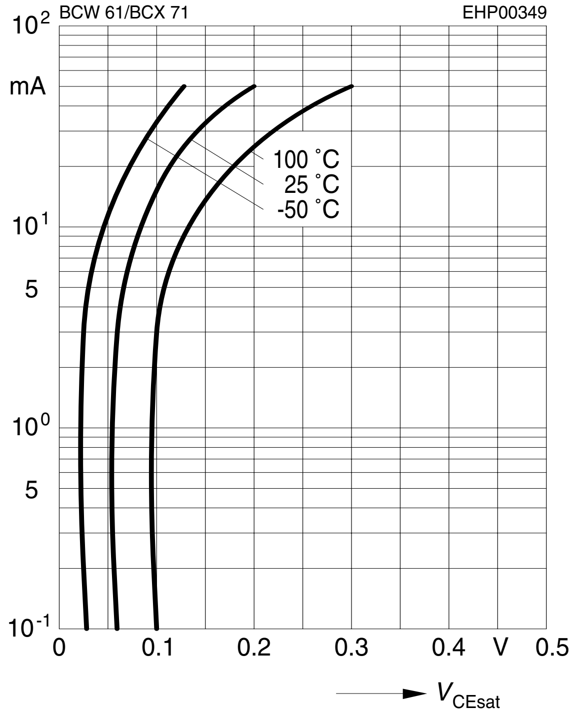
Base-emitter saturation voltage

$I_C = f(V_{BEsat})$, $h_{FE} = 40$



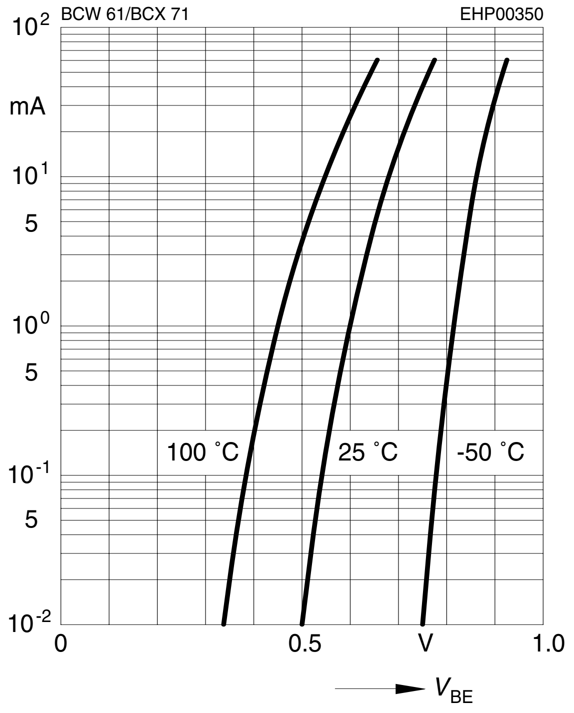
Collector-emitter saturation voltage

$I_C = f(V_{CEsat})$, $h_{FE} = 40$



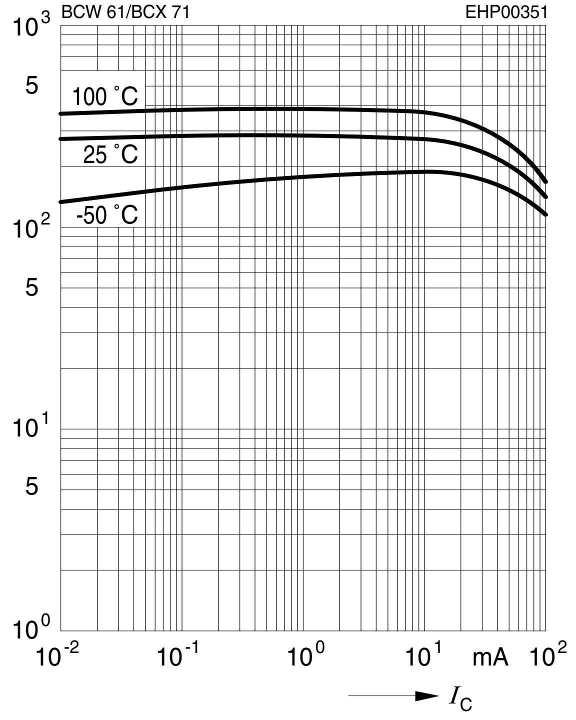
Collector current $I_C = f(V_{BE})$

V_{CE} = 5V



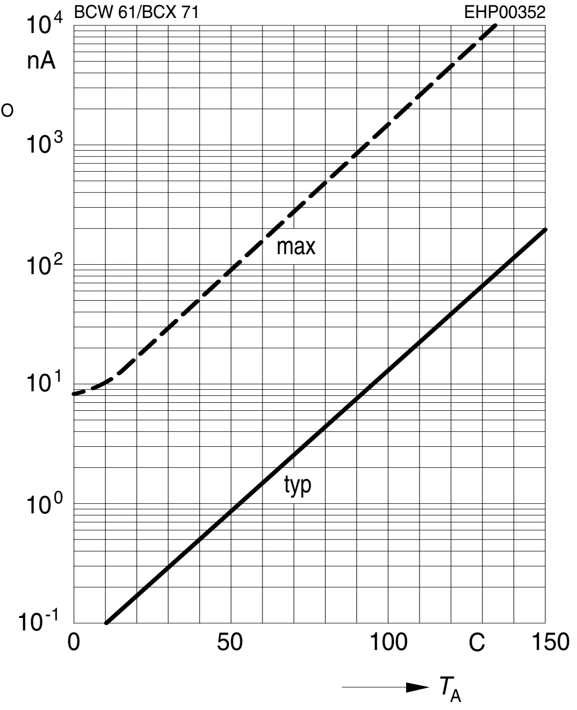
DC current gain $h_{FE} = f(I_C)$

V_{CE} = 5V



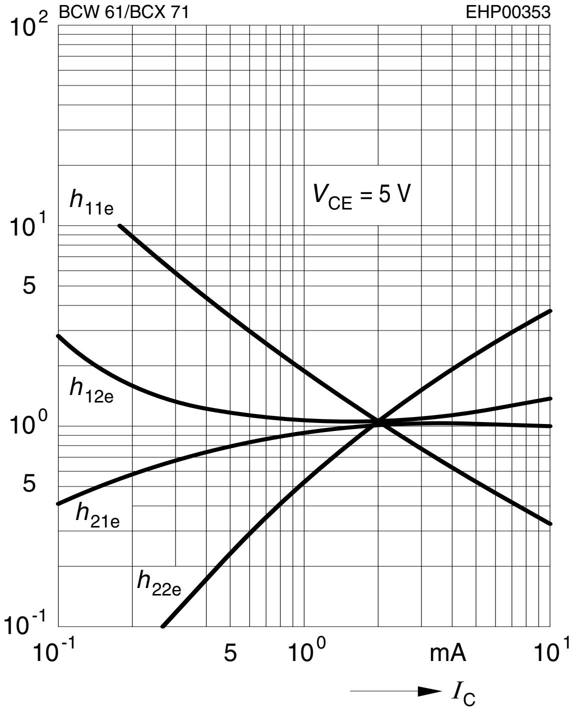
Collector cutoff current $I_{CBO} = f(T_A)$

$V_{CB} = V_{CEmax}$



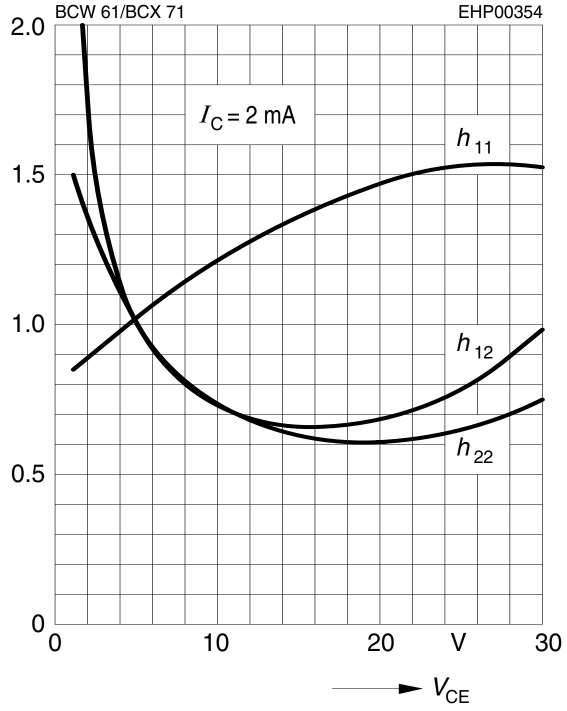
h parameter $h_e = f(I_C)$ normalized

$V_{CE} = 5V$



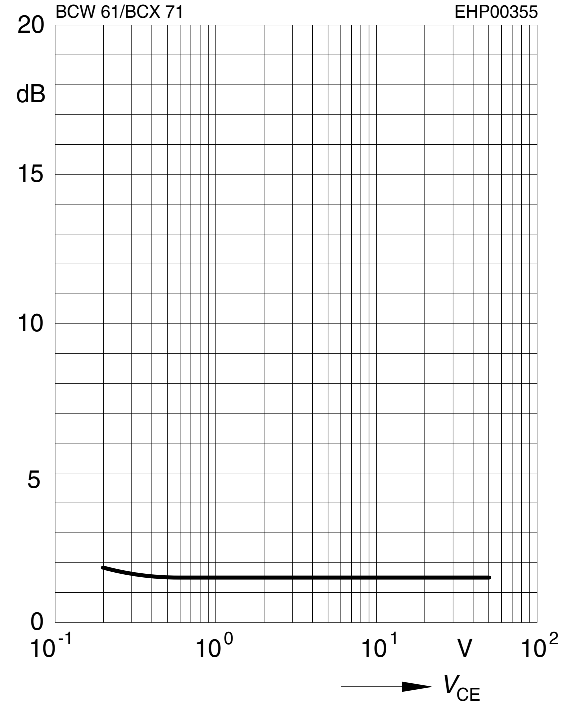
h parameter $h_e = f(V_{CE})$ normalized

$I_C = 2mA$



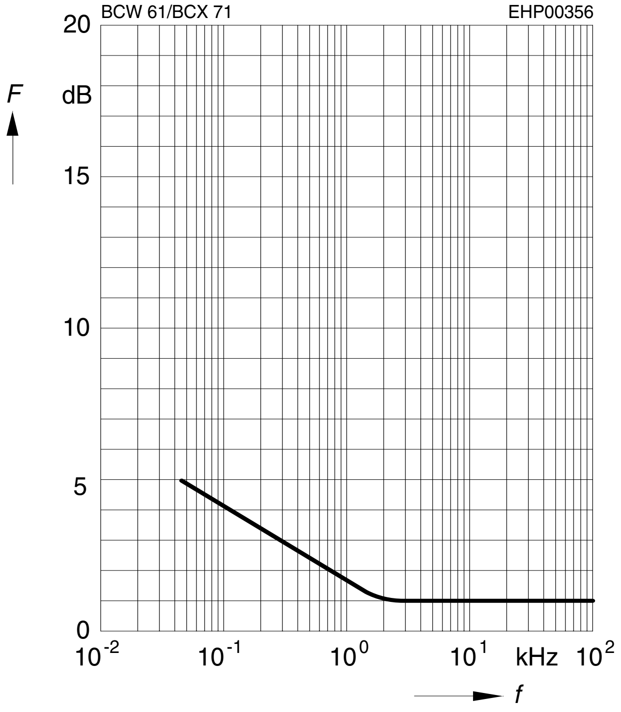
Noise figure $F = f(V_{CE})$

$I_C = 0.2mA$, $R_S = 2k\Omega$, $f = 1kHz$



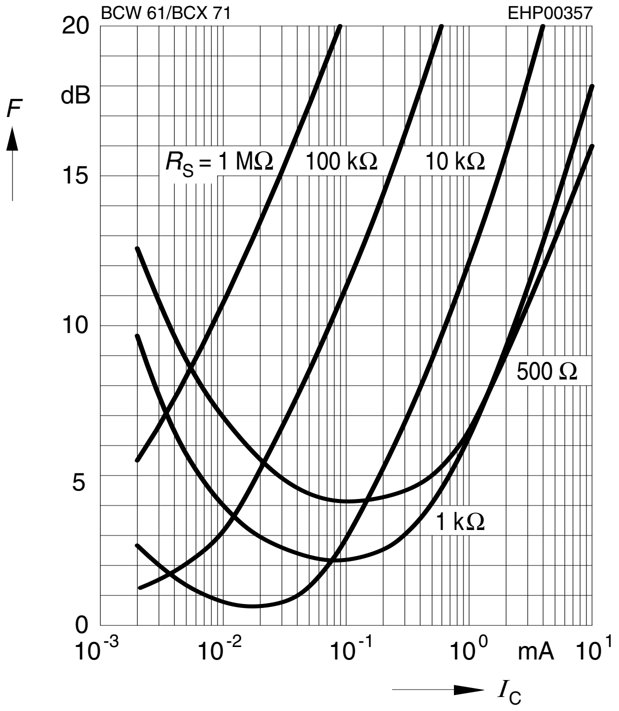
Noise figure $F = f\,(f)$

I_C = 0.2mA, V_{CE} = 5V, R_S = 2kΩ



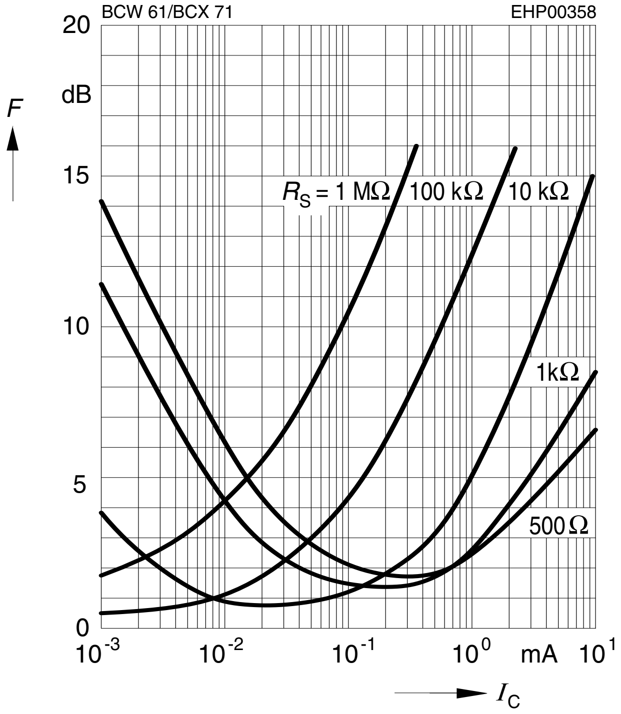
Noise figure $F = f\,(I_C)$

V_{CE} = 5V, f = 120Hz



Noise figure $F = f\,(I_C)$

V_{CE} = 5V, f = 1kHz



Noise figure $F = f\,(I_C)$

V_{CE} = 5V, f = 10kHz