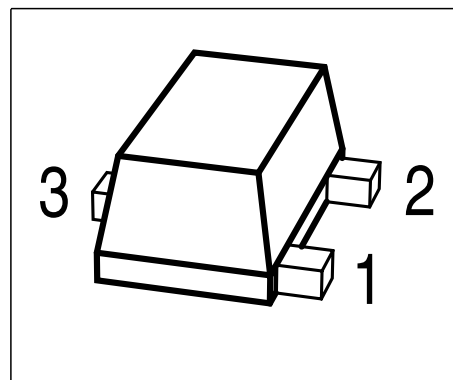


PNP Silicon AF Transistor

- 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: BC847BF, BC848BF
BC849BF, BC850BF (NPN)



Type	Marking	Pin Configuration			Package
BC857BF	3Fs	1 = B	2 = E	3 = C	TSFP-3
BC858BF	3Ks	1 = B	2 = E	3 = C	TSFP-3
BC859BF	4Bs	1 = B	2 = E	3 = C	TSFP-3
BC860BF	4Fs	1 = B	2 = E	3 = C	TSFP-3

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}		V
BC857BF, BC860BF		45	
BC858BF, BC859BF		30	
Collector-emitter voltage	V_{CES}		
BC857BF, BC860BF		50	
BC858BF, BC859BF		30	
Collector-base voltage	V_{CBO}		
BC857BF, BC860BF		50	
BC858BF, BC859BF		30	
Emitter-base voltage	V_{EBO}		
BC857BF, BC860BF		5	
BC858BF, BC859BF		5	
Collector current	I_C	100	mA
Peak collector current	I_{CM}	200	
Peak base current	I_{BM}	200	
Peak emitter current	I_{EM}	200	mA
Total power dissipation, $T_S \leq 128^\circ\text{C}$	P_{tot}	250	mW
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R_{thJS}	≤ 90	K/W

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC Characteristics

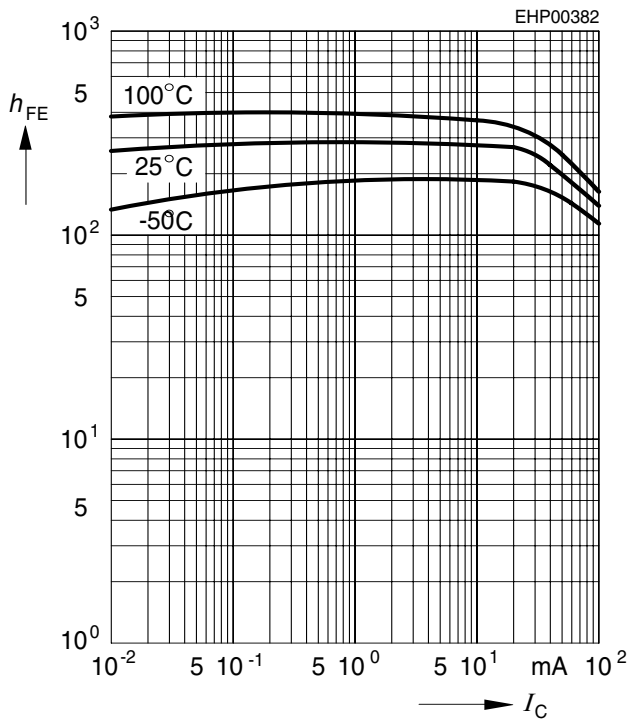
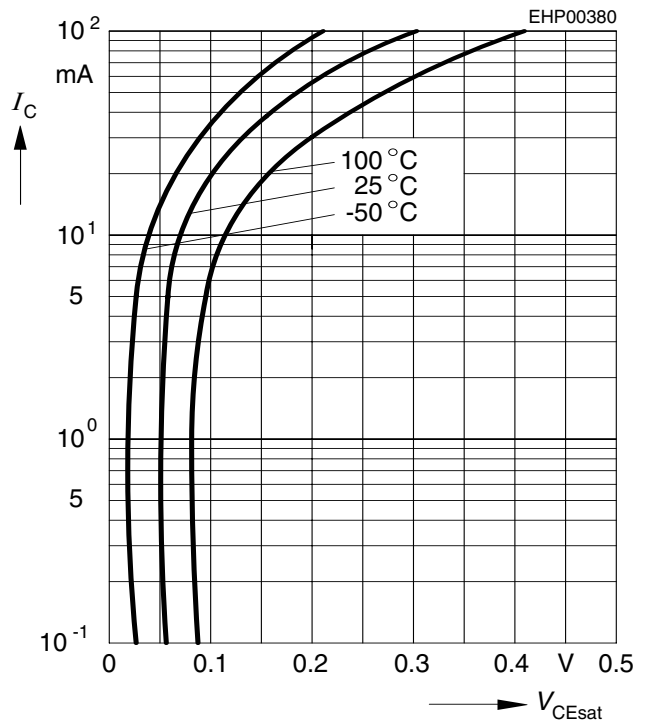
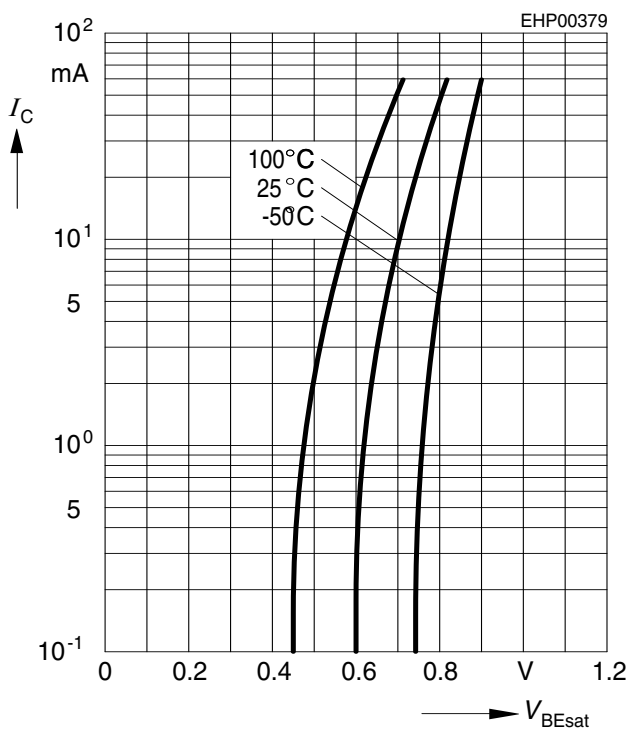
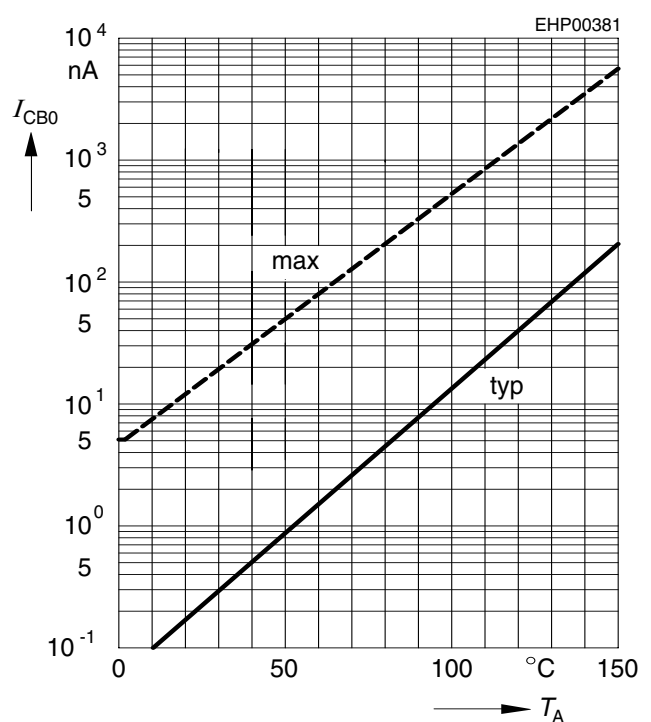
Collector-emitter breakdown voltage $I_C = 10\text{ mA}$, $I_B = 0\text{ mA}$, BC857BF, BC860BF $I_C = 10\text{ mA}$, $I_B = 0\text{ mA}$, BC858BF, BC859BF	$V_{(BR)CEO}$	45 30	- -	- -	V
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$, $I_E = 0\text{ mA}$, BC857BF, BC860BF $I_C = 10\text{ }\mu\text{A}$, $I_E = 0\text{ mA}$, BC858BF, BC859BF	$V_{(BR)CBO}$	50 30	- -	- -	
Collector-emitter breakdown voltage $I_C = 10\text{ }\mu\text{A}$, $V_{BE} = 0\text{ V}$, BC857BF, BC860BF $I_C = 10\text{ }\mu\text{A}$, $V_{BE} = 0\text{ V}$, BC858BF, BC859BF	$V_{(BR)CES}$	50 30	- -	- -	
Emitter-base breakdown voltage $I_E = 1\text{ }\mu\text{A}$, $I_C = 0\text{ }\mu\text{A}$	$V_{(BR)EBO}$	5	-	-	
Collector-base cutoff current $V_{CB} = 30\text{ V}$, $I_E = 0\text{ A}$ $V_{CB} = 30\text{ V}$, $I_E = 0\text{ A}$, $T_A = 150^\circ\text{C}$	I_{CBO}	- -	- -	0.015 5	μA
DC current gain ²⁾ $I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$ $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$	h_{FE}	- 220	250 290	- 475	-
Collector-emitter saturation voltage ²⁾ $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$, $I_B = 5\text{ mA}$	V_{CEsat}	- -	75 250	300 650	mV
Base emitter saturation voltage ²⁾ $I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$, $I_B = 5\text{ mA}$	V_{BEsat}	- -	700 850	- -	
Base-emitter voltage ²⁾ $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$, $V_{CE} = 5\text{ V}$	$V_{BE(ON)}$	600 -	650 -	750 820	

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

²⁾Pulse test: $t < 300\mu\text{s}$; $D < 2\%$

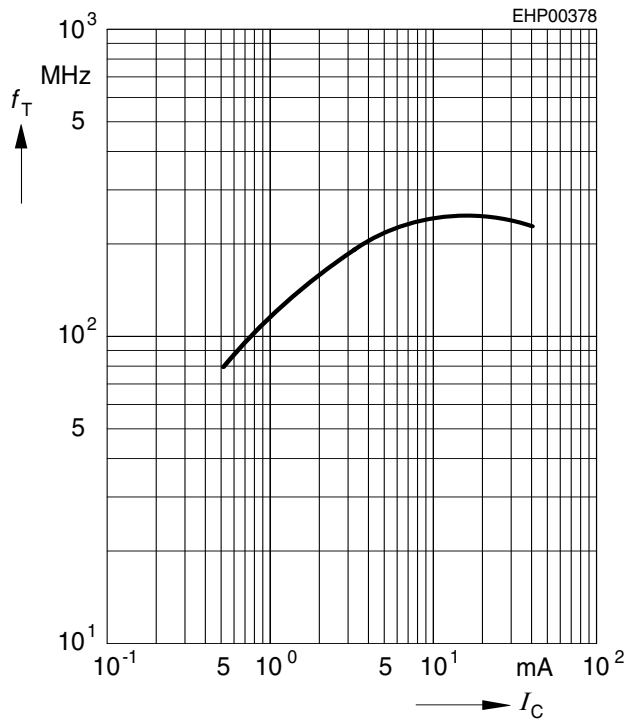
AC Characteristics

Transition frequency $I_C = 20 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $f = 100 \text{ MHz}$	f_T	-	250	-	MHz
Collector-base capacitance $V_{CB} = 10 \text{ V}$, $f = 1 \text{ MHz}$	C_{cb}	-	3	-	pF
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}$, $f = 1 \text{ MHz}$	C_{eb}	-	10	-	
Short-circuit input impedance $I_C = 2 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $f = 1 \text{ kHz}$	h_{11e}	-	4.5	-	k Ω
Open-circuit reverse voltage transf. ratio $I_C = 2 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $f = 1 \text{ kHz}$	h_{12e}	-	2	-	10^{-4}
Short-circuit forward current transf. ratio $I_C = 2 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $f = 1 \text{ kHz}$	h_{21e}	-	330	-	-
Open-circuit output admittance $I_C = 2 \text{ mA}$, $V_{CE} = 5 \text{ V}$, $f = 1 \text{ kHz}$	h_{22e}	-	30	-	μS
Noise figure $I_C = 200 \mu\text{A}$, $V_{CE} = 5 \text{ V}$, $f = 1 \text{ kHz}$, $\Delta f = 200 \text{ Hz}$, $R_S = 2 \text{ k}\Omega$, BC859BF $I_C = 200 \mu\text{A}$, $V_{CE} = 5 \text{ V}$, $f = 1 \text{ kHz}$, $\Delta f = 200 \text{ Hz}$, $R_S = 2 \text{ k}\Omega$, BC860BF	F	- -	1 1	4 4	dB
Equivalent noise voltage $I_C = 200 \mu\text{A}$, $V_{CE} = 5 \text{ V}$, $R_S = 2 \text{ k}\Omega$, $f = 10...50 \text{ Hz}$, BF860BF	V_n	-	-	0.11	μV

DC current gain $h_{FE} = f(I_C)$
 $V_{CE} = 5 \text{ V}$

Collector-emitter saturation voltage
 $I_C = f(V_{CEsat}), h_{FE} = 20$

Base-emitter saturation voltage
 $I_C = f(V_{BEsat}), h_{FE} = 20$

Collector cutoff current $I_{CBO} = f(T_A)$
 $V_{CB} = 30 \text{ V}$


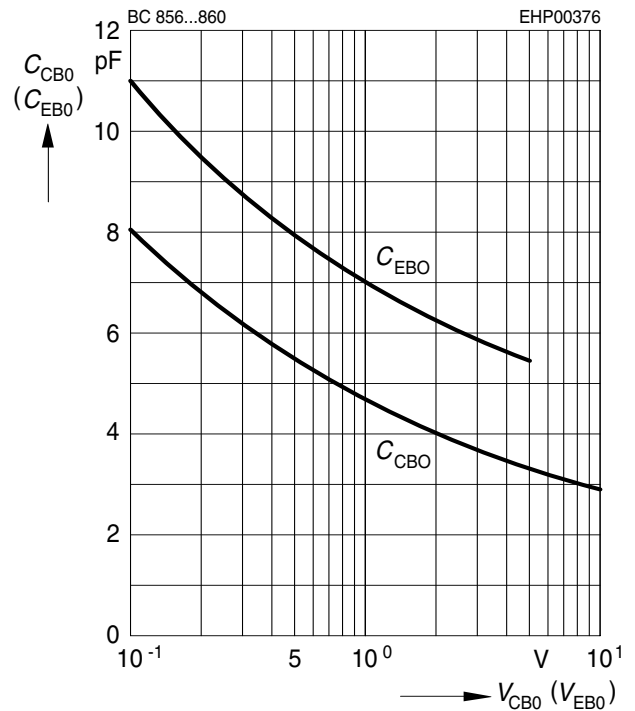
Transition frequency $f_T = f(I_C)$

$V_{CE} = 5\text{ V}$

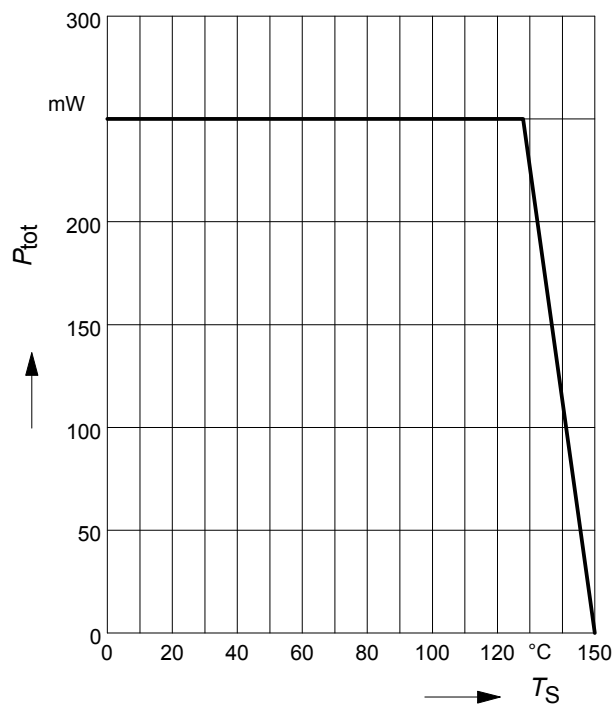


Collector-base capacitance $C_{CB} = f(V_{CB0})$

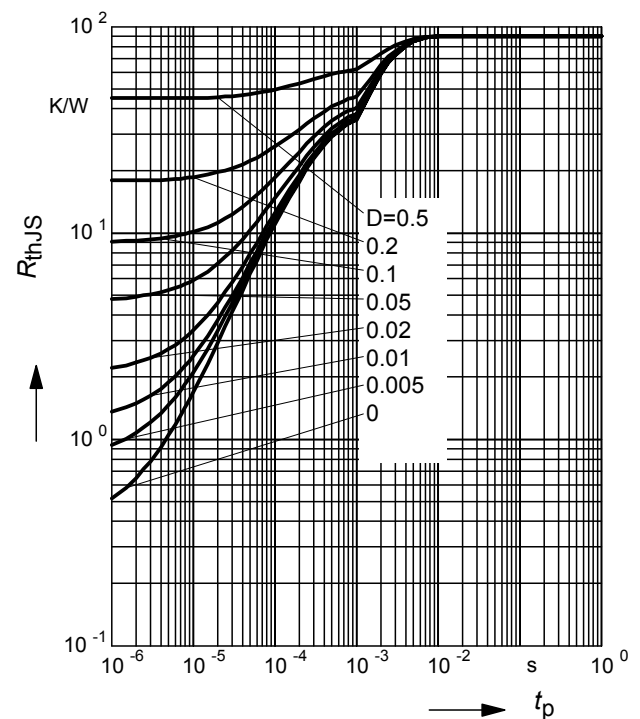
Emitter-base capacitance $C_{EB} = f(V_{EB0})$



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

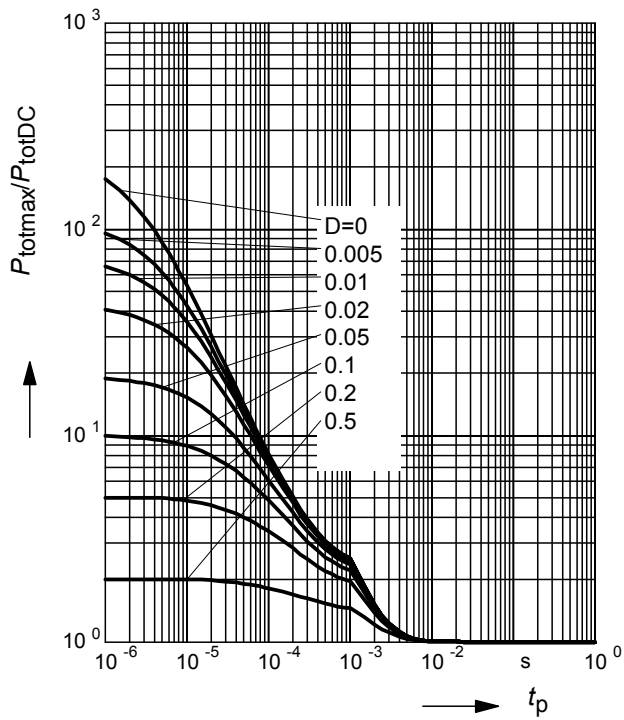


Permissible Pulse Load $R_{thJS} = f(t_p)$



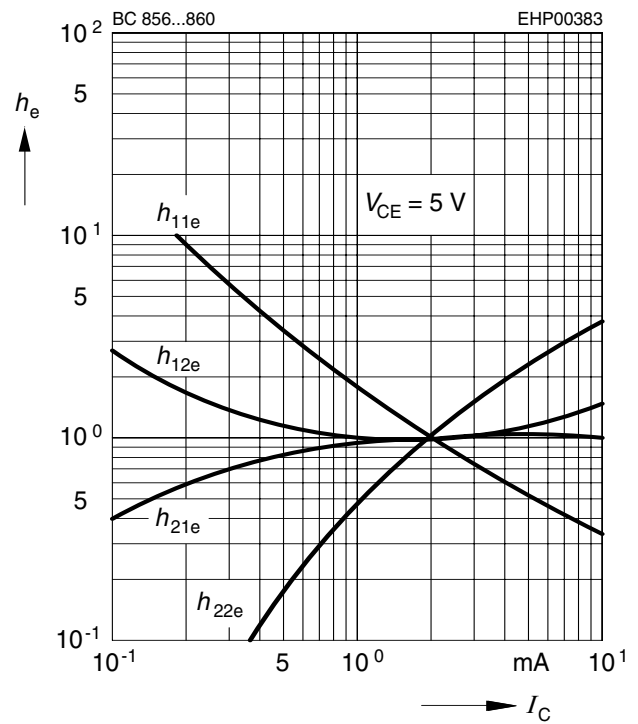
Permissible Pulse Load

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



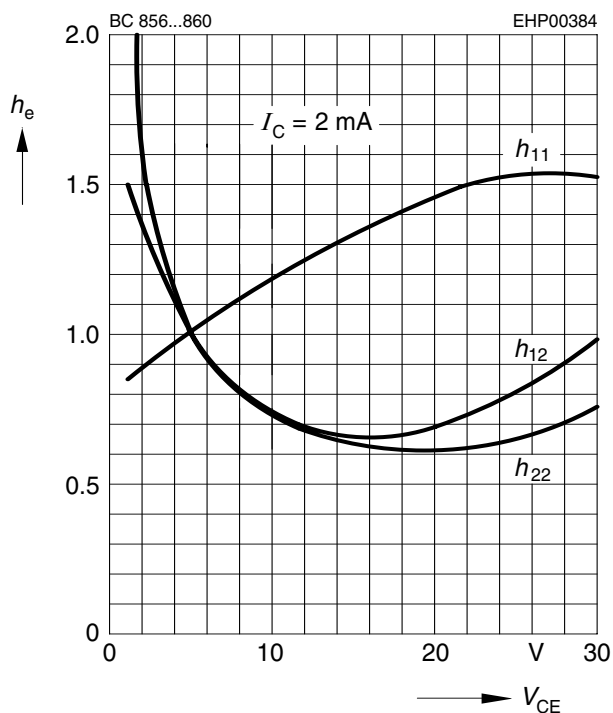
h parameter $h_e = f(I_C)$ normalized

$$V_{CE} = 5V$$



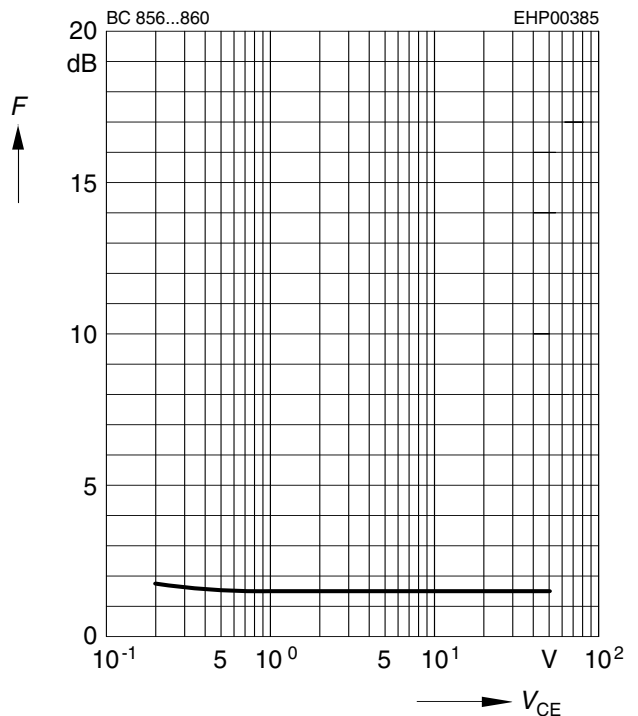
h parameter $h_e = f(V_{CE})$ normalized

$$I_C = 2mA$$



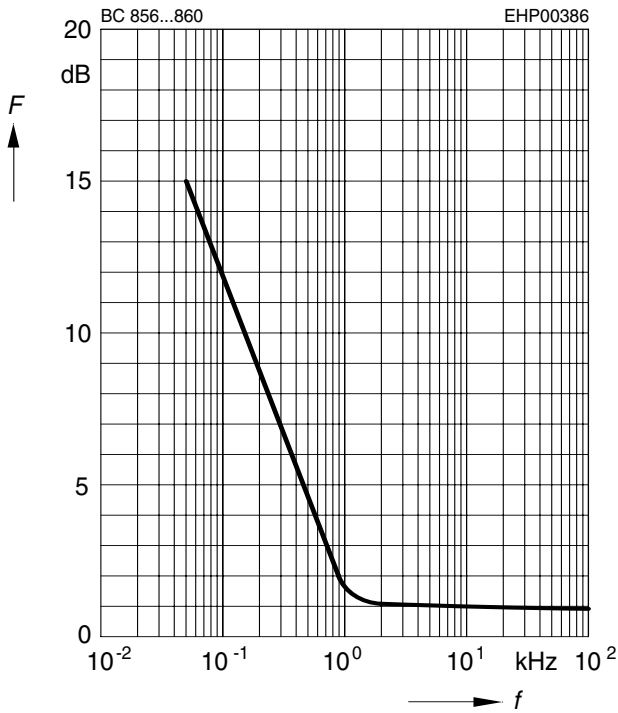
Noise figure $F = f(V_{CE})$

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



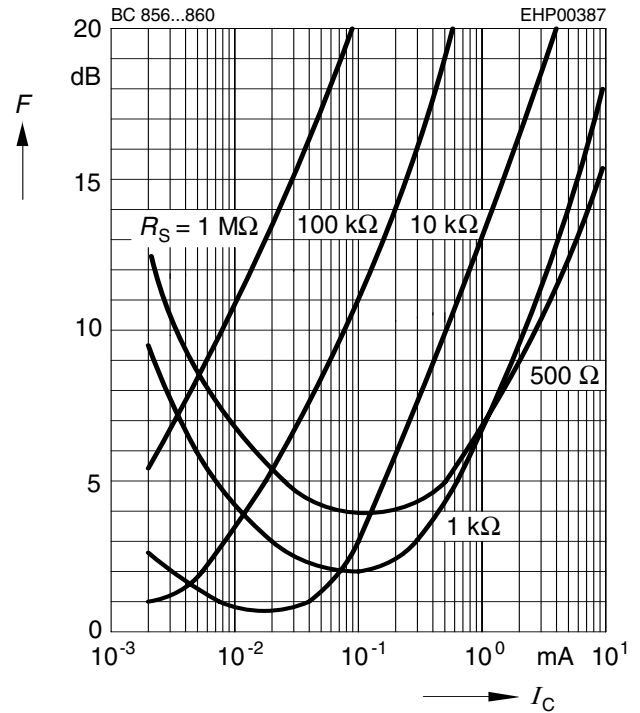
Noise figure $F = f(f)$

$I_C = 0.2\text{mA}$, $V_{CE} = 5\text{V}$, $R_S = 2\text{k}\Omega$



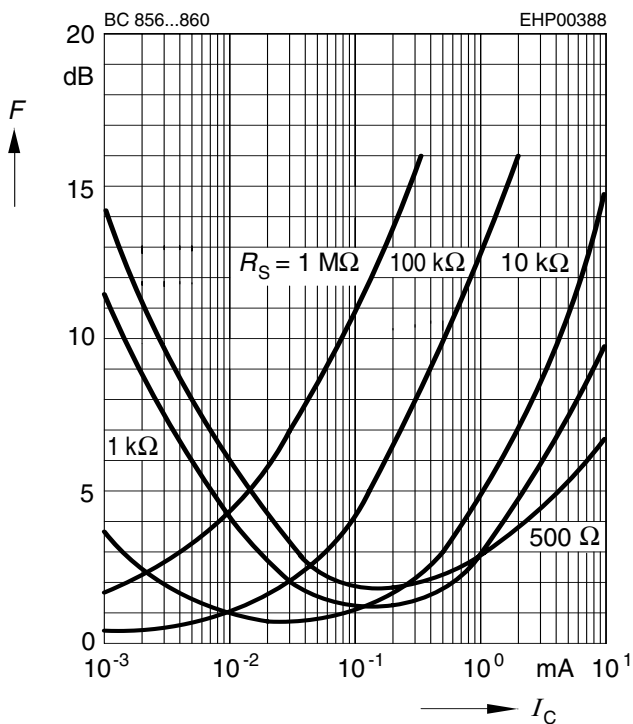
Noise figure $F = f(I_C)$

$V_{CE} = 5\text{V}$, $f = 120\text{Hz}$



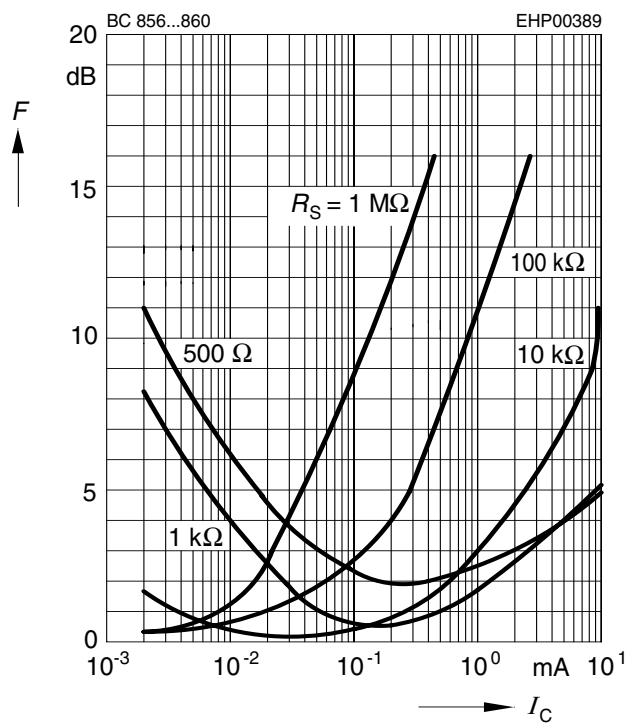
Noise figure $F = f(I_C)$

$V_{CE} = 5\text{V}$, $f = 1\text{kHz}$



Noise figure $F = f(I_C)$

$V_{CE} = 5\text{V}$, $f = 10\text{kHz}$



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