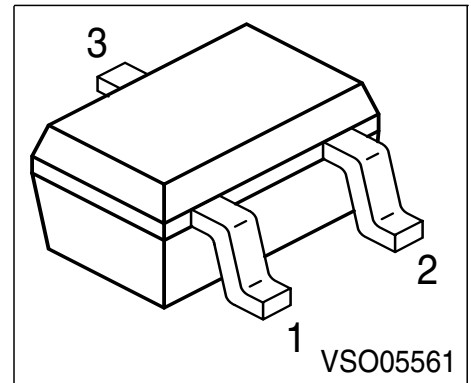


NPN Silicon AF Transistors

- 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:
BC856W, BC857W, BC858W
BC859W, BC860W (PNP)



Type	Marking	Pin Configuration			Package
BC846AW	1As	1 = B	2 = E	3 = C	SOT323
BC846BW	1Bs	1 = B	2 = E	3 = C	SOT323
BC847AW	1Es	1 = B	2 = E	3 = C	SOT323
BC847BW	1Fs	1 = B	2 = E	3 = C	SOT323
BC847CW	1Gs	1 = B	2 = E	3 = C	SOT323
BC848AW	1Js	1 = B	2 = E	3 = C	SOT323
BC848BW	1Ks	1 = B	2 = E	3 = C	SOT323
BC848CW	1Ls	1 = B	2 = E	3 = C	SOT323
BC849BW	2Bs	1 = B	2 = E	3 = C	SOT323
BC849CW	2Cs	1 = B	2 = E	3 = C	SOT323
BC850BW	2Fs	1 = B	2 = E	3 = C	SOT323
BC850CW	4Gs	1 = B	2 = E	3 = C	SOT323

Maximum Ratings

Parameter	Symbol	BC846W	BC847W BC850W	BC848W BC849W	Unit
Collector-emitter voltage	V_{CEO}	65	45	30	V
Collector-base voltage	V_{CBO}	80	50	30	
Collector-emitter voltage	V_{CES}	80	50	30	
Emitter-base voltage	V_{EBO}	6	6	5	
DC collector current	I_{C}	100			mA
Peak collector current	I_{CM}	200			mA
Peak base current	I_{BM}	200			
Peak emitter current	I_{EM}	200			
Total power dissipation, $T_{\text{S}} = 124\text{ }^{\circ}\text{C}$	P_{tot}	250			mW
Junction temperature	T_{j}	150			$^{\circ}\text{C}$
Storage temperature	T_{sta}	-65 ... 150			

Thermal Resistance

Junction - soldering point ¹⁾	R_{thJS}	≤105	K/W
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Electrical Characteristics at $T_A = 25\text{ °C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC Characteristics

Collector-emitter breakdown voltage $I_C = 10\text{ mA}$, $I_B = 0$	BC846W	$V_{(BR)CEO}$	65	-	-	V
	BC847/850W		45	-	-	
	BC848/849W		30	-	-	
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$, $I_E = 0$	BC846W	$V_{(BR)CBO}$	80	-	-	
	BC847/850W		50	-	-	
	BC848/849W		30	-	-	

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

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

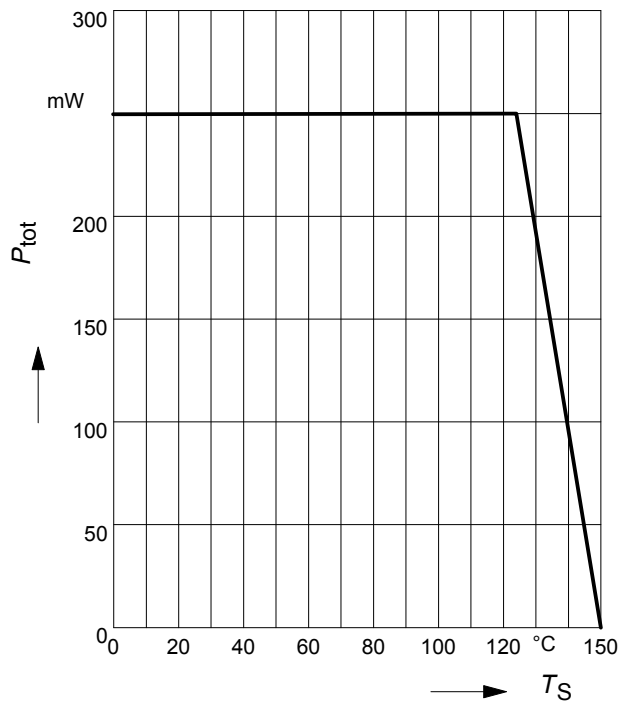
Parameter	Symbol	Values			Unit	
		min.	typ.	max.		
DC Characteristics						
Collector-emitter breakdown voltage $I_C = 10\ \mu\text{A}$, $V_{BE} = 0$ BC846W BC847/850W BC848/849W	$V_{(BR)CES}$	80 50 30	- - -	- - -	V	
Emitter-base breakdown voltage $I_E = 1\ \mu\text{A}$, $I_C = 0$ BC846/847W BC848-850W	$V_{(BR)EBO}$	6 5	- -	- -		
Collector cutoff current $V_{CB} = 30\ \text{V}$, $I_E = 0$	I_{CBO}	-	-	15		nA
Collector cutoff current $V_{CB} = 30\ \text{V}$, $I_E = 0$, $T_A = 150\ ^\circ\text{C}$	I_{CBO}	-	-	5	μA	
DC current gain 1) $I_C = 10\ \mu\text{A}$, $V_{CE} = 5\ \text{V}$ h_{FE}-group A h_{FE}-group B h_{FE}-group C	h_{FE}	- - -	140 250 480	- - -	-	
DC current gain 1) $I_C = 2\ \text{mA}$, $V_{CE} = 5\ \text{V}$ h_{FE}-group A h_{FE}-group B h_{FE}-group C	h_{FE}	110 200 420	180 290 520	220 450 800		
Collector-emitter saturation voltage1) $I_C = 10\ \text{mA}$, $I_B = 0.5\ \text{mA}$ $I_C = 100\ \text{mA}$, $I_B = 5\ \text{mA}$	V_{CEsat}	- -	90 200	250 600		mV
Base-emitter saturation voltage 1) $I_C = 10\ \text{mA}$, $I_B = 0.5\ \text{mA}$ $I_C = 100\ \text{mA}$, $I_B = 5\ \text{mA}$	V_{BEsat}	- -	700 900	- -		
Base-emitter voltage 1) $I_C = 2\ \text{mA}$, $V_{CE} = 5\ \text{V}$ $I_C = 10\ \text{mA}$, $V_{CE} = 5\ \text{V}$	$V_{BE(ON)}$	580 -	660 -	700 770		

1) Pulse test: $t \leq 300\ \mu\text{s}$, $D = 2\%$

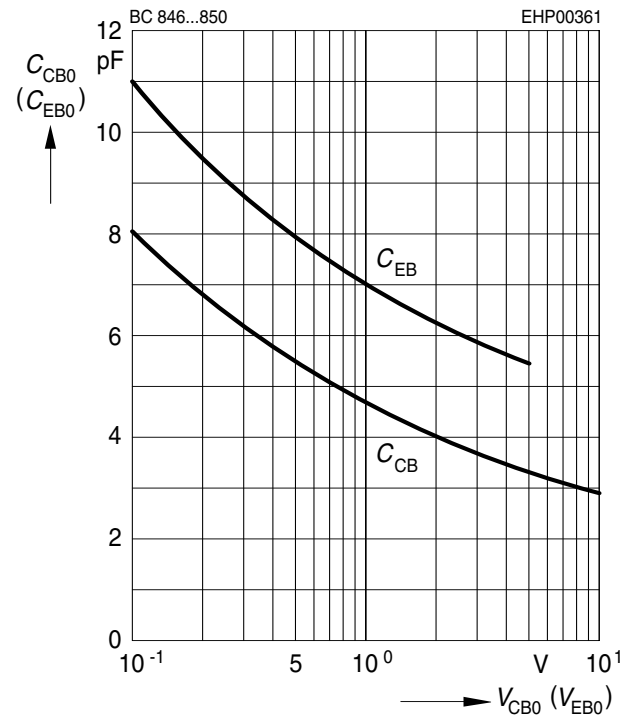
Electrical Characteristics at $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
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}	-	2	3	pF
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$	C_{eb}	-	10	15	
Short-circuit input impedance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$	h_{11e}				kΩ
$h_{FE}\text{-gr.A}$		-	2.7	-	
$h_{FE}\text{-gr.B}$		-	4.5	-	
$h_{FE}\text{-gr.C}$		-	8.7	-	
Open-circuit reverse voltage transf.ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$	h_{12e}				10^{-4}
$h_{FE}\text{-gr.A}$		-	1.5	-	
$h_{FE}\text{-gr.B}$		-	2	-	
$h_{FE}\text{-gr.C}$		-	3	-	
Short-circuit forward current transf.ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$	h_{21e}				-
$h_{FE}\text{-gr.A}$		-	200	-	
$h_{FE}\text{-gr.B}$		-	330	-	
$h_{FE}\text{-gr.C}$		-	600	-	
Open-circuit output admittance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$	h_{22e}				μS
$h_{FE}\text{-gr.A}$		-	18	-	
$h_{FE}\text{-gr.B}$		-	30	-	
$h_{FE}\text{-gr.C}$		-	60	-	
Noise figure $I_C = 200\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$, $R_S = 2\text{ k}\Omega$, $f = 1\text{ kHz}$, $\Delta f = 200\text{ Hz}$	F	-	-	10	dB
BC846W					
BC847W					
BC848W					
Noise figure $I_C = 200\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$, $R_S = 2\text{ k}\Omega$, $f = 1\text{ kHz}$, $\Delta f = 200\text{ Hz}$	F				
BC849W		-	1.2	4	
BC850W		-	1	4	
Equivalent noise voltage $I_C = 200\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$, $R_S = 2\text{ k}\Omega$, $f = 10 \dots 50\text{ Hz}$	V_n	-	-	0.135	μV

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

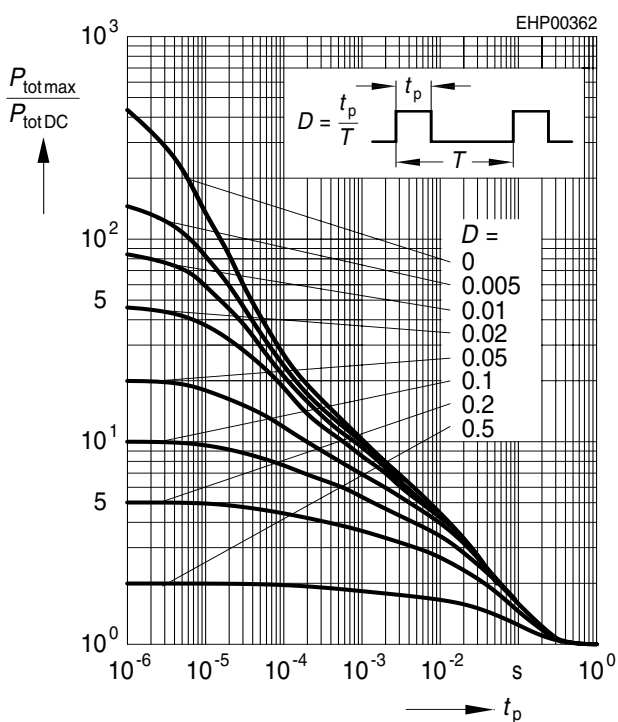


Collector-base capacitance $C_{\text{CB}} = f(V_{\text{CB0}})$
Emitter-base capacitance $C_{\text{EB}} = f(V_{\text{EB0}})$



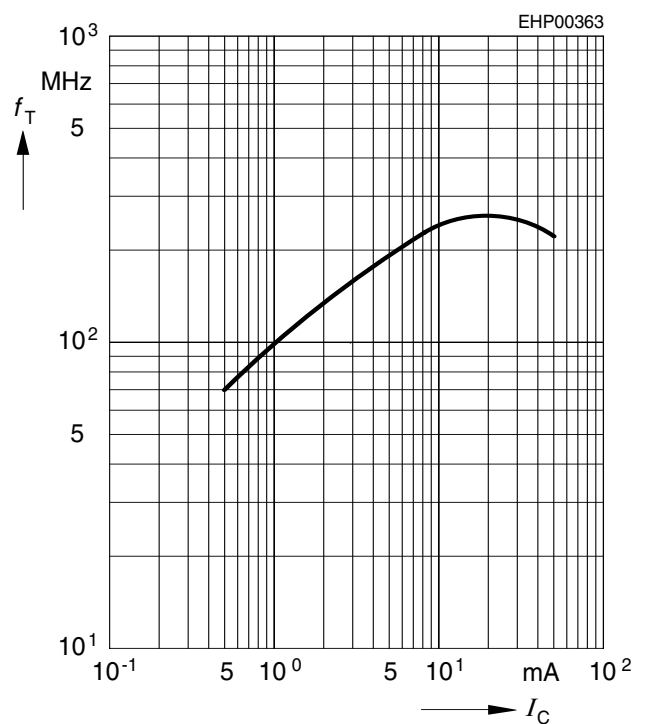
Permissible pulse load

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



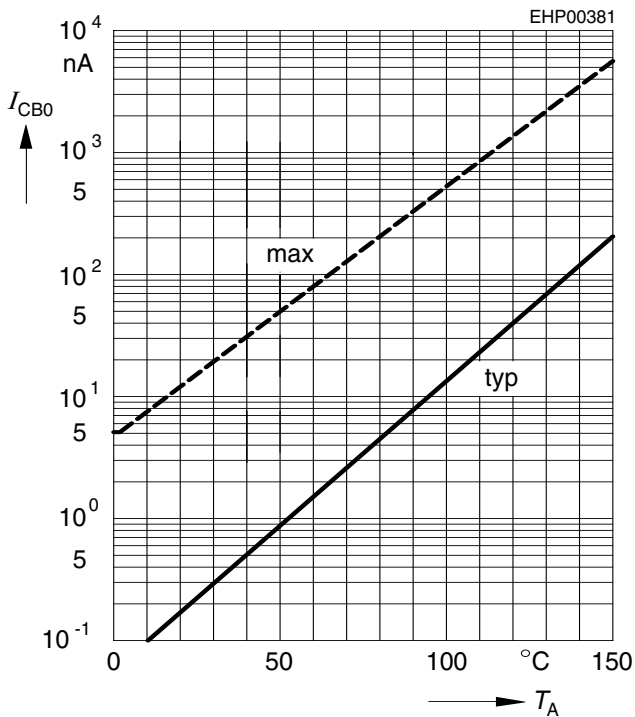
Transition frequency $f_T = f(I_C)$

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



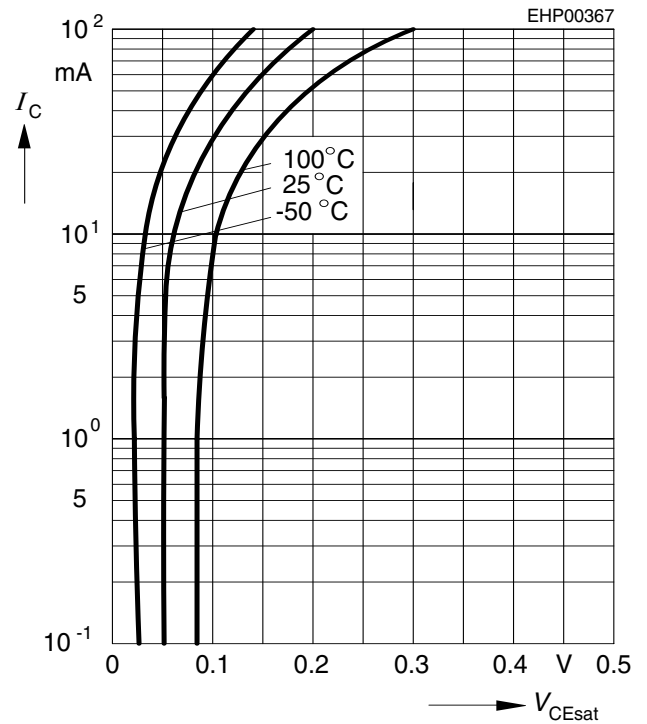
Collector cutoff current $I_{CBO} = f(T_A)$

$V_{CB} = 30V$



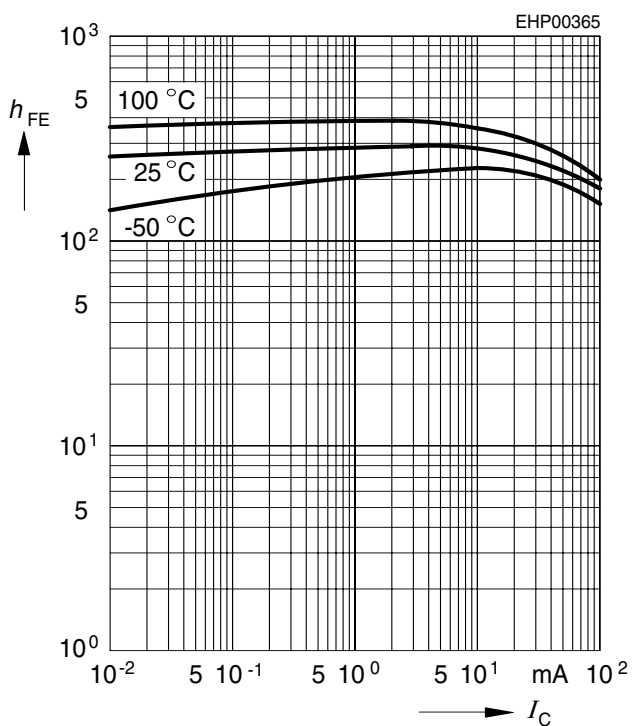
Collector-emitter saturation voltage

$I_C = f(V_{CEsat}), h_{FE} = 20$



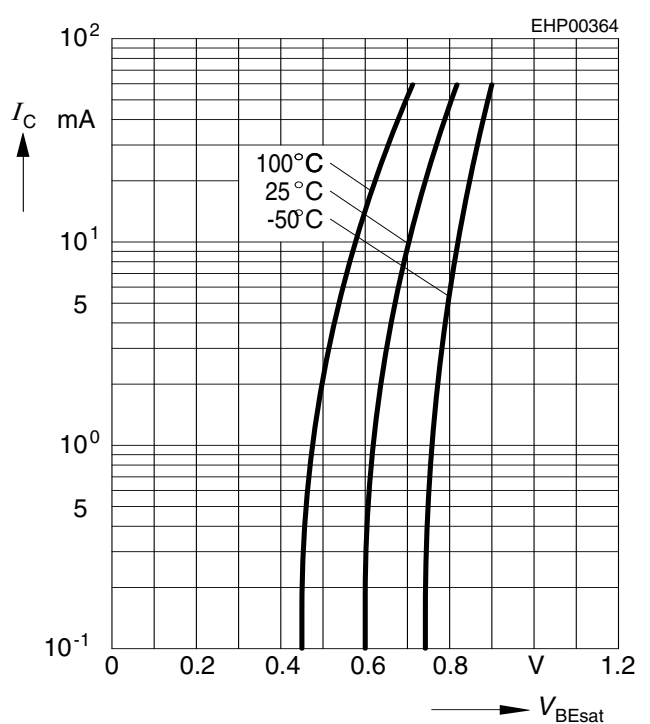
DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$



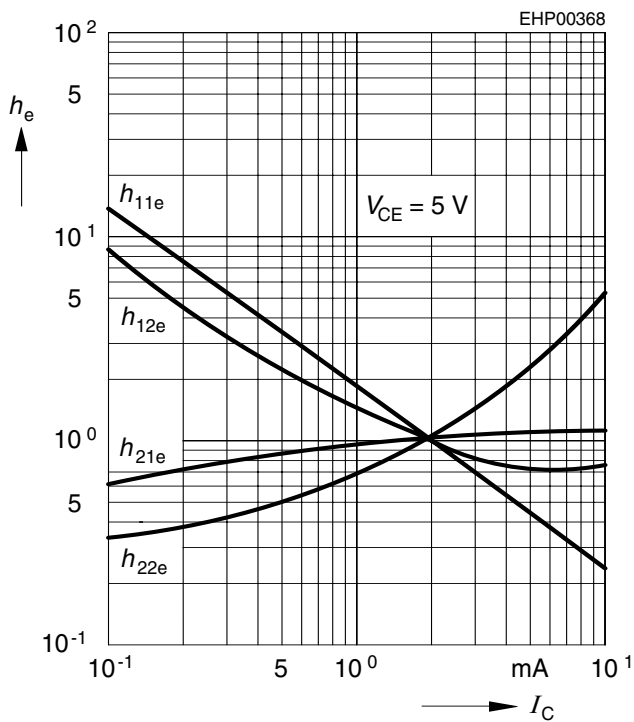
Base-emitter saturation voltage

$I_C = f(V_{BEsat}), h_{FE} = 20$



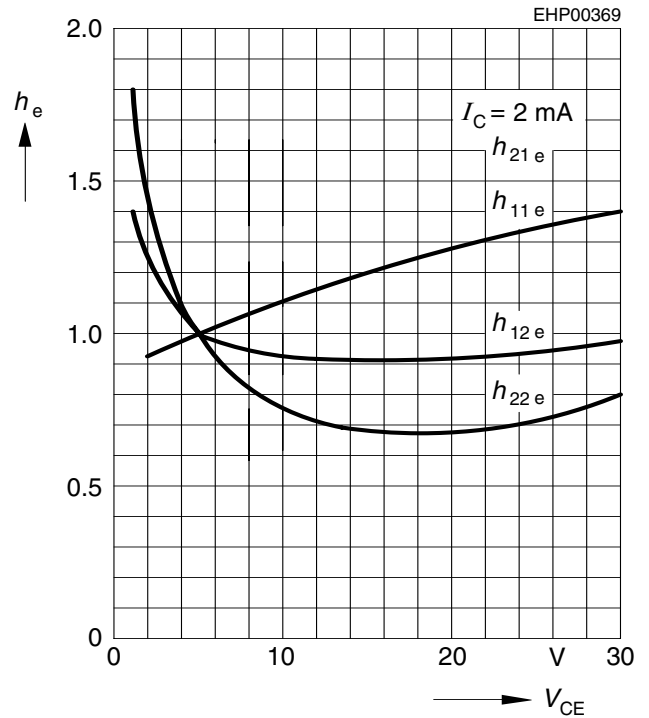
h parameter $h_e = f(I_C)$ normalized

$V_{CE} = 5V$



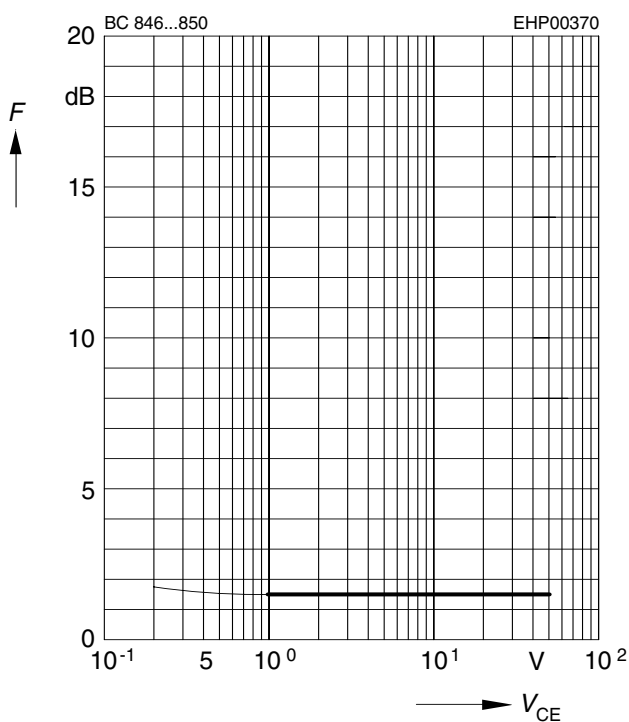
h parameter $h_e = f(V_{CE})$ normalized

$I_C = 2mA$



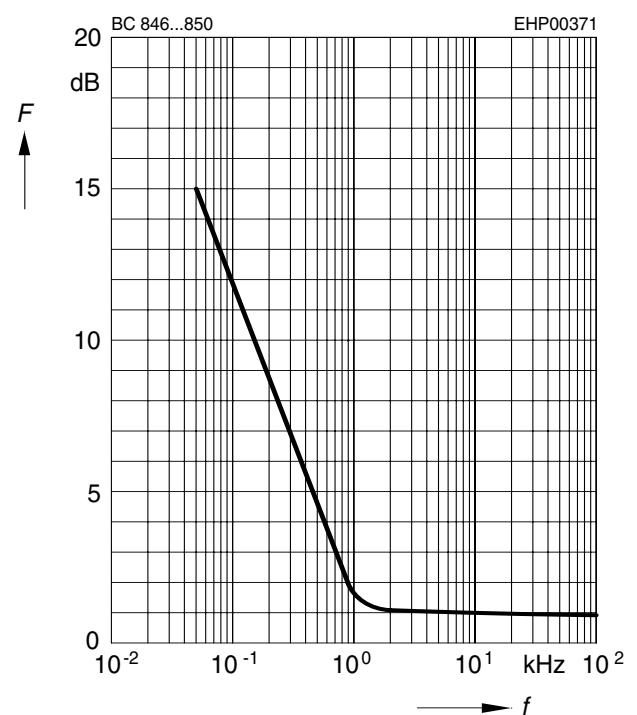
Noise figure $F = f(V_{CE})$

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



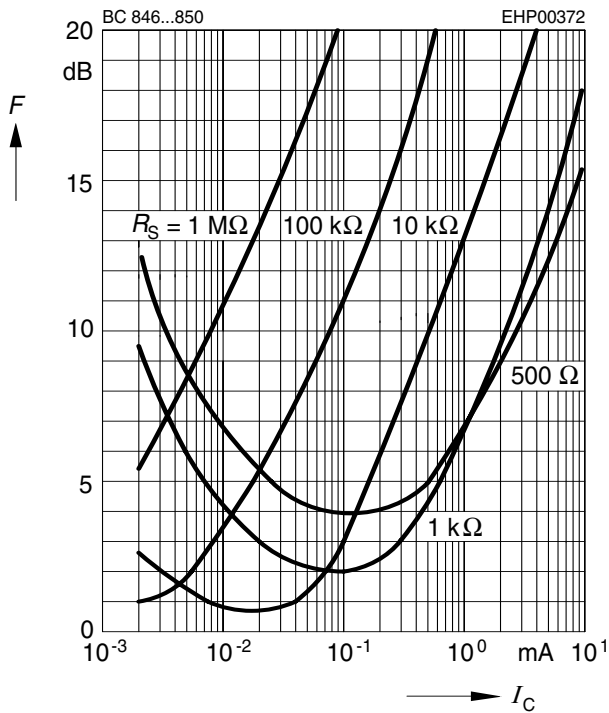
Noise figure $F = f(f)$

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



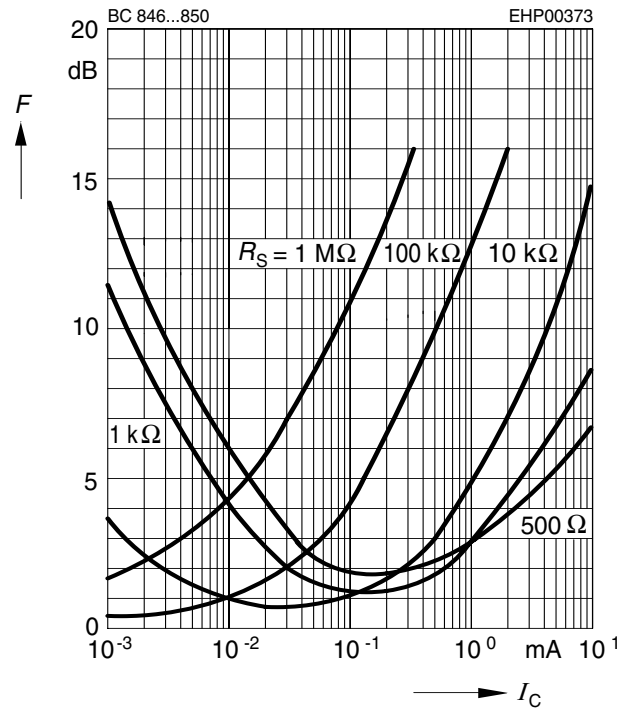
Noise figure $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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

