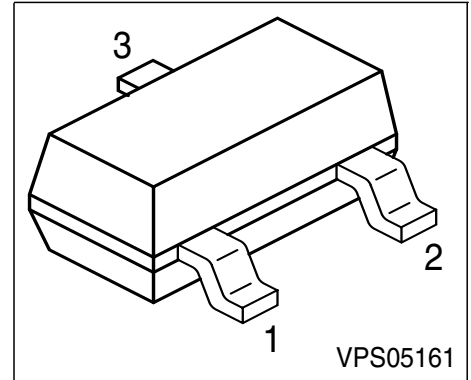


NPN Silicon AF Transistors

- 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: BC 856, BC 857, BC 858
BC 859, BC 860 (PNP)



Type	Marking	Pin Configuration			Package
BC 846A	1As	1 = B	2 = E	3 = C	SOT-23
BC 846B	1Bs	B = 1	2 = E	3 = C	SOT-23
BC 847A	1Es	B = 1	2 = E	3 = C	SOT-23
BC 847B	1Fs	1 = B	2 = E	3 = C	SOT-23
BC 847C	1Gs	1 = B	2 = E	3 = C	SOT-23
BC 848A	1Js	1 = B	2 = E	3 = C	SOT-23
BC 848B	1Ks	1 = B	2 = E	3 = C	SOT-23
BC 848C	1Ls	1 = B	2 = E	3 = C	SOT-23
BC 849B	2Bs	1 = B	2 = E	3 = C	SOT-23
BC 849C	2Cs	1 = B	2 = E	3 = C	SOT-23
BC 850B	2Fs	1 = B	2 = E	3 = C	SOT-23
BC 850C	2Gs	1 = B	2 = E	3 = C	SOT-23

Maximum Ratings

Parameter	Symbol	BC 846	Values		Unit
			BC 847 BC 850	BC 848 BC 849	
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, $T_S = 71\text{ °C}$	P_{tot}	330			mW
Junction temperature	T_j	150			°C
Storage temperature	T_{stg}	-65 ... 150			

Thermal Resistance

Junction ambient ¹⁾	R_{thJA}	≤310	K/W
Junction - soldering point	R_{thJS}	≤240	

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

Parameter	Symbol	Values			Unit	
		min.	typ.	max.		
DC Characteristics						
Collector-emitter breakdown voltage $I_C = 10\text{ mA}$, $I_B = 0$	$V_{(BR)CEO}$	BC 846	65	-	-	V
		BC 847/850	45	-	-	
		BC 848/849	30	-	-	
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}$, $I_B = 0$	$V_{(BR)CBO}$	BC 846	80	-	-	
		BC 847/850	50	-	-	
		BC 848/849	30	-	-	

1) Package mounted on pcb 40mm x 40mm x 1.5mm / 6cm² Cu

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 $I_C = 10 \mu\text{A}$, $V_{BE} = 0$	$V_{(BR)CES}$	BC 846	80	-	-	V
		BC 847/850	50	-	-	
		BC 848/849	30	-	-	
Emitter-base breakdown voltage $I_E = 1 \mu\text{A}$, $I_C = 0$	$V_{(BR)EBO}$	BC 846/847	6	-	-	
		BC 848-850	5	-	-	
Collector cutoff current $V_{CB} = 40 \text{ V}$, $I_E = 0$	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}	h_{FE} -group A	-	140	-	-
		h_{FE} -group B	-	250	-	
		h_{FE} -group C	-	480	-	
DC current gain 1) $I_C = 2 \text{ mA}$, $V_{CE} = 5 \text{ V}$	h_{FE}	h_{FE} -group A	110	180	220	
		h_{FE} -group B	200	290	450	
		h_{FE} -group C	420	520	800	
Collector-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_{CEsat}		-	90	250	mV
			-	200	600	
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	

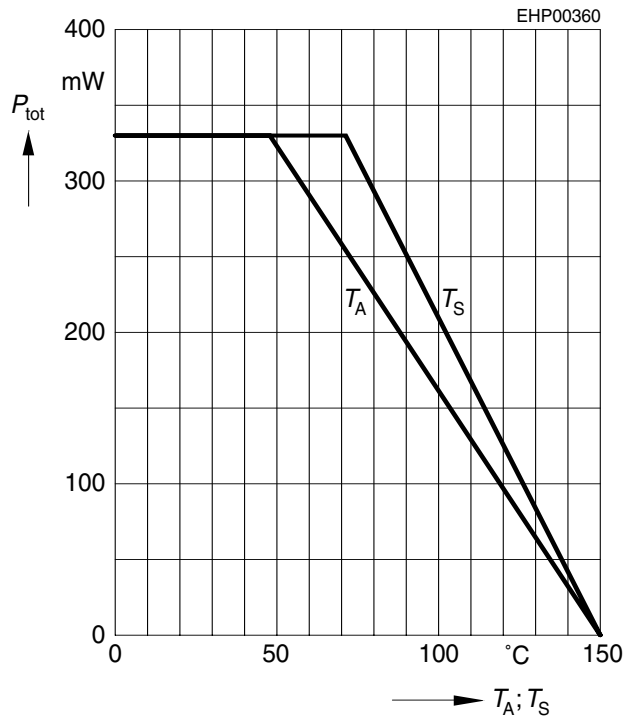
 1) Pulse test: $t \leq 300 \mu\text{s}$, $D = 2\%$

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency $I_C = 10\text{ mA}, V_{CE} = 5\text{ V}, f = 100\text{ MHz}$	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}	-	8	-	
Short-circuit input impedance $I_C = 2\text{ mA}, V_{CE} = 5\text{ V}, f = 1\text{ kHz}$	h_{11e}				k Ω
$h_{FE-gr.A}$		-	2.7	-	
$h_{FE-gr.B}$		-	4.5	-	
$h_{FE-gr.C}$		-	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}
$h_{FE-gr.A}$		-	1.5	-	
$h_{FE-gr.B}$		-	2	-	
$h_{FE-gr.C}$		-	3	-	
Short-circuit forward current transf.ratio $I_C = 2\text{ mA}, V_{CE} = 5\text{ V}, f = 1\text{ kHz}$	h_{21e}				-
$h_{FE-gr.A}$		-	200	-	
$h_{FE-gr.B}$		-	330	-	
$h_{FE-gr.C}$		-	600	-	
Open-circuit output admittance $I_C = 2\text{ mA}, V_{CE} = 5\text{ V}, f = 1\text{ kHz}$	h_{22e}				μS
$h_{FE-gr.A}$		-	18	-	
$h_{FE-gr.B}$		-	30	-	
$h_{FE-gr.C}$		-	60	-	
Noise figure $I_C = 100\text{ }\mu\text{A}, V_{CE} = 5\text{ V}, R_S = 1\text{ k}\Omega,$ $f = 1\text{ kHz}, \Delta f = 200\text{ Hz}$	F	-	1.2	4	dB
					BC 849
					BC 850
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
					BC 850

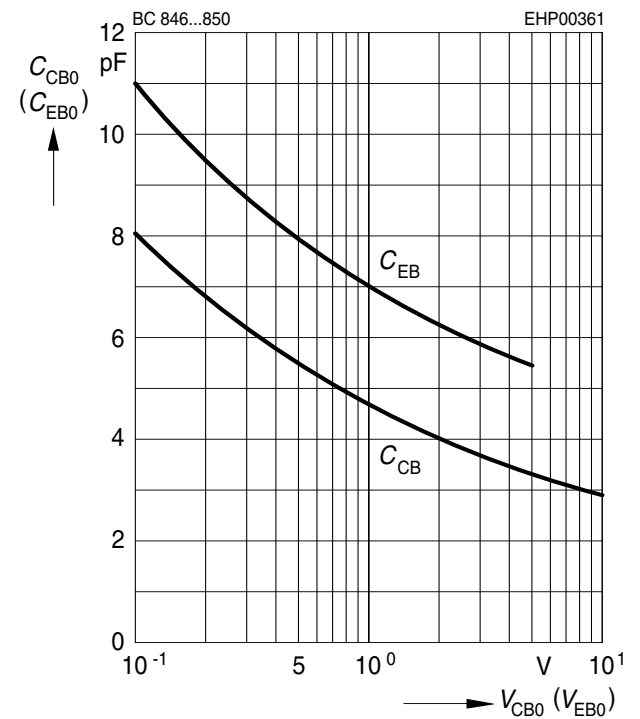
Total power dissipation $P_{tot} = f(T_A^*; T_S)$

* Package mounted on epoxy



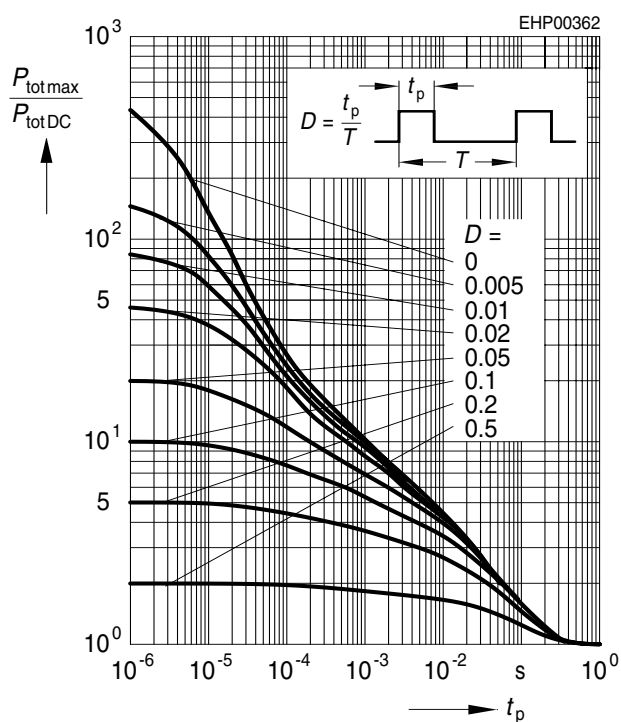
Collector-base capacitance $C_{CB} = f(V_{CB0})$

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



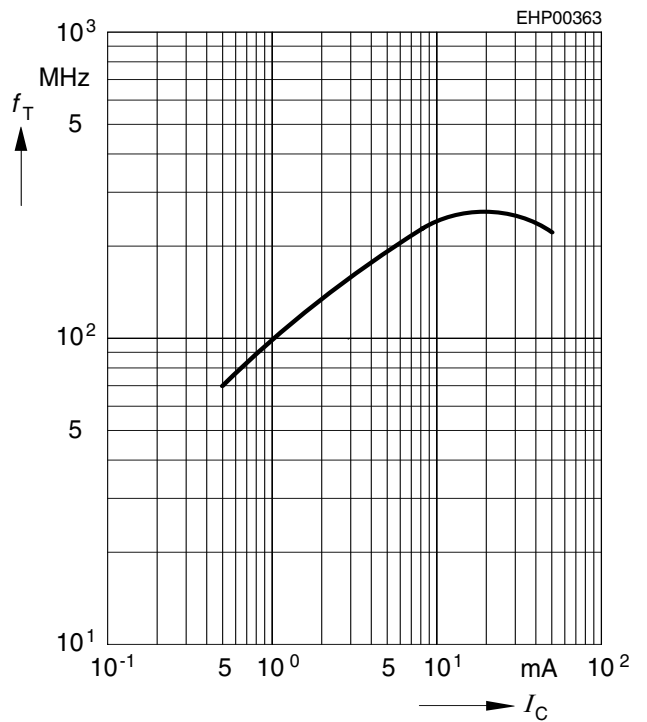
Permissible pulse load

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



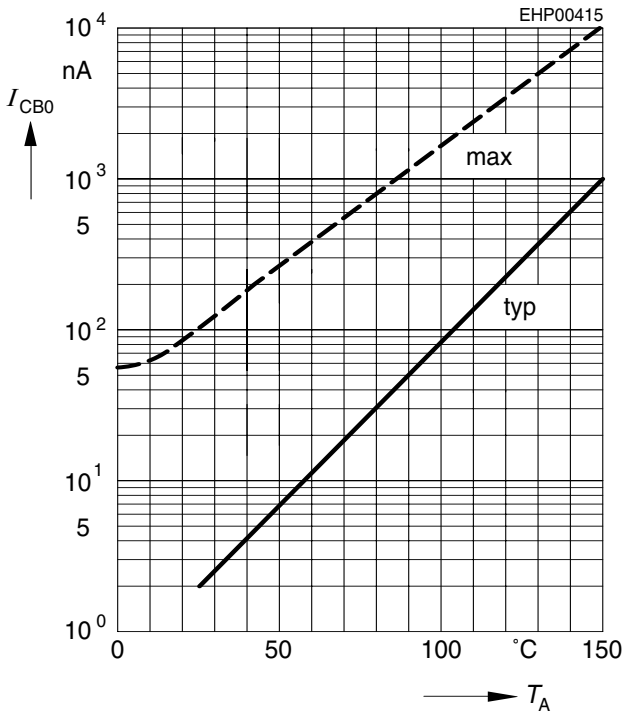
Transition frequency $f_T = f(I_C)$

$V_{CE} = 5V$



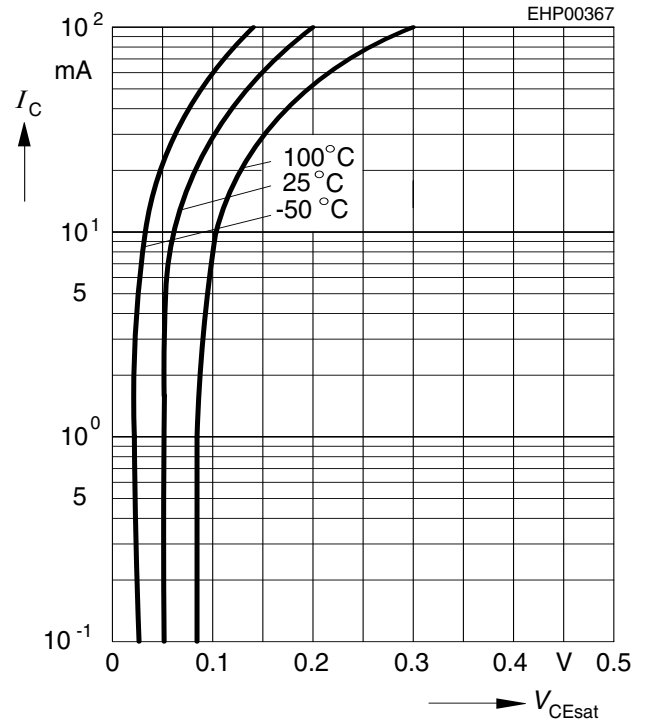
Collector cutoff current $I_{CBO} = f(T_A)$

$V_{CB} = 30V$



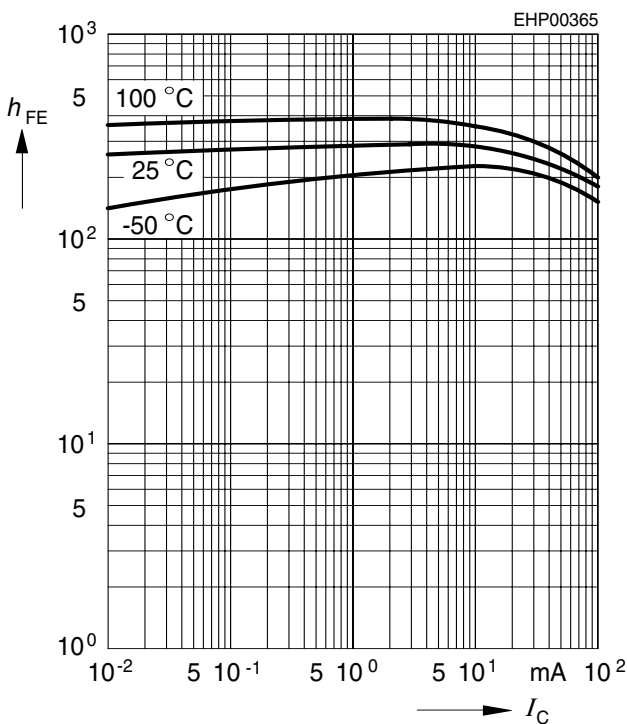
Collector-emitter saturation voltage

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



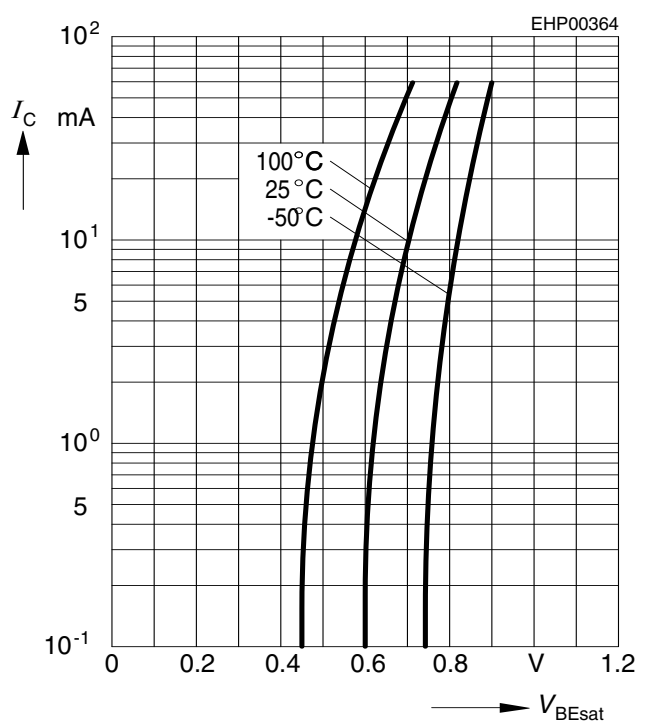
DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$



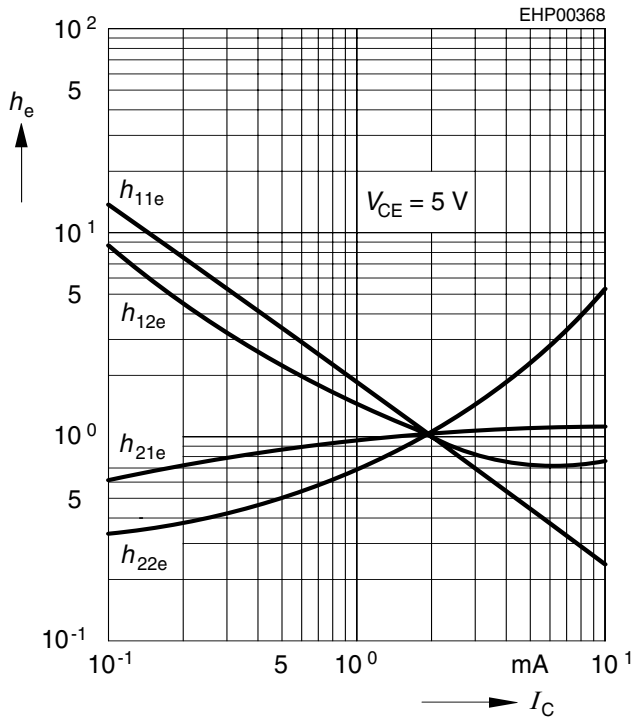
Base-emitter saturation voltage

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



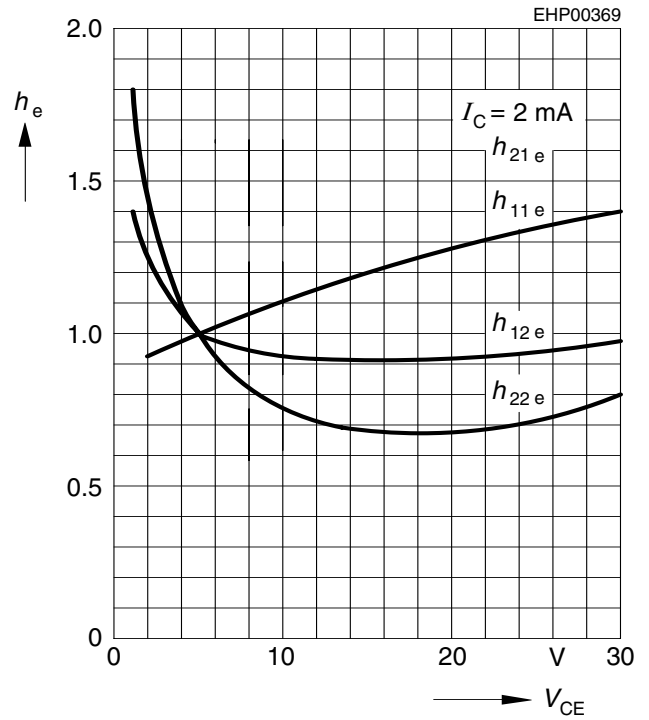
h parameter $h_e = f(I_C)$ normalized

$V_{CE} = 5V$



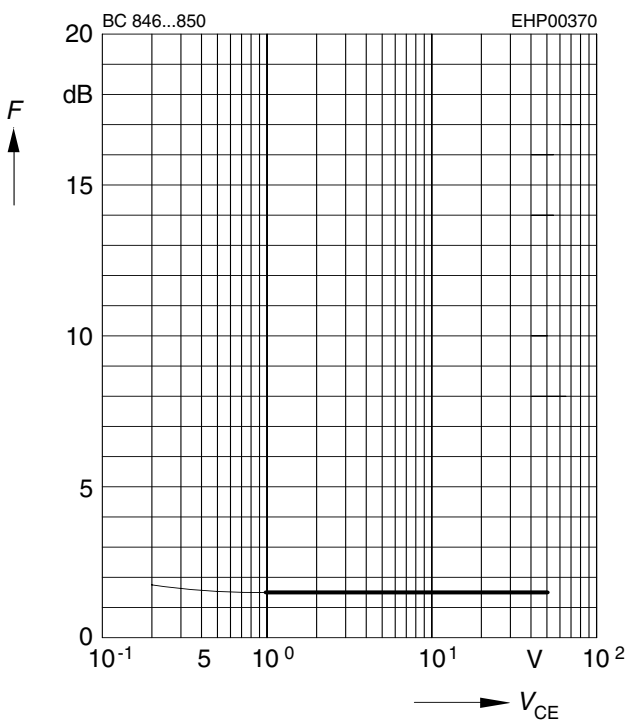
h parameter $h_e = f(V_{CE})$ normalized

$I_C = 2mA$



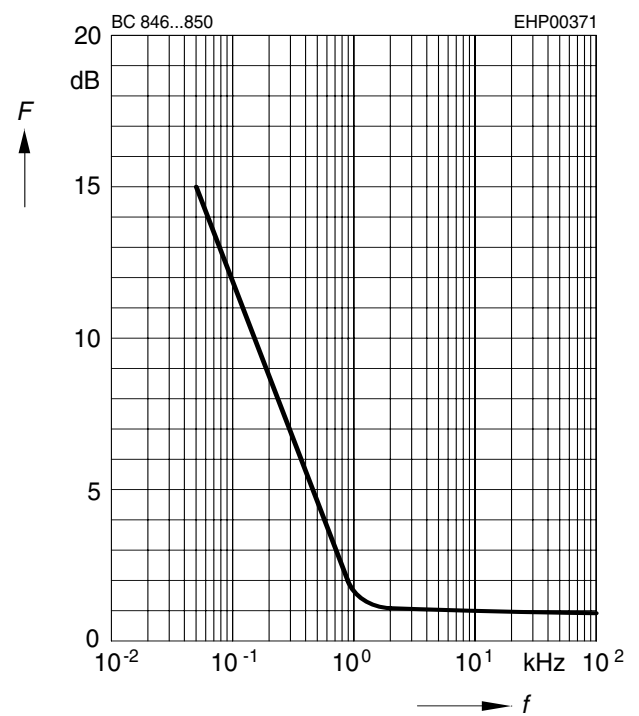
Noise figure $F = f(V_{CE})$

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



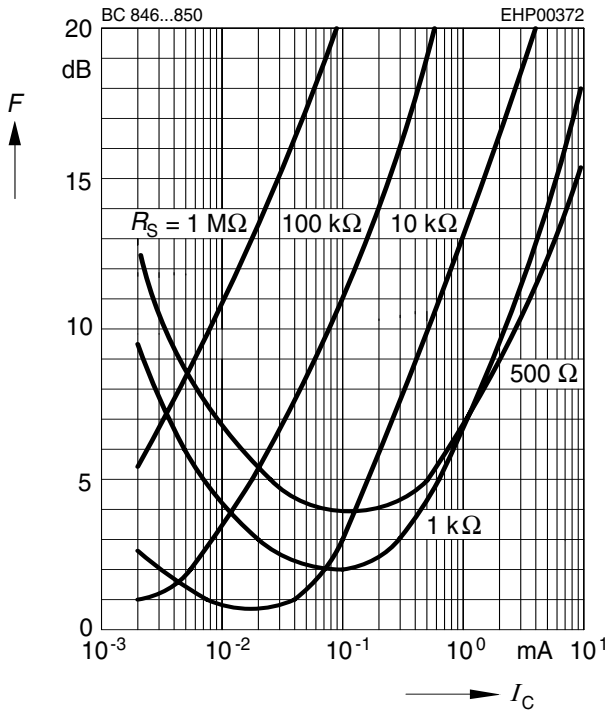
Noise figure $F = f(f)$

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



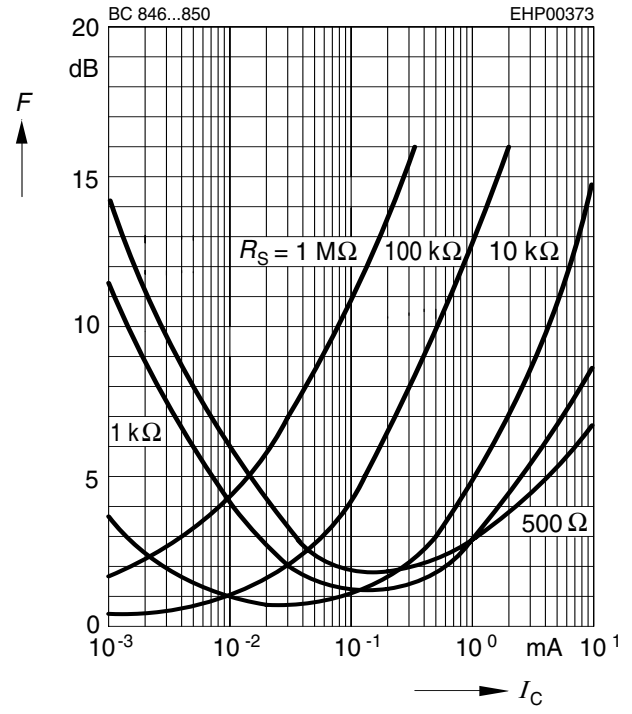
Noise figure $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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

