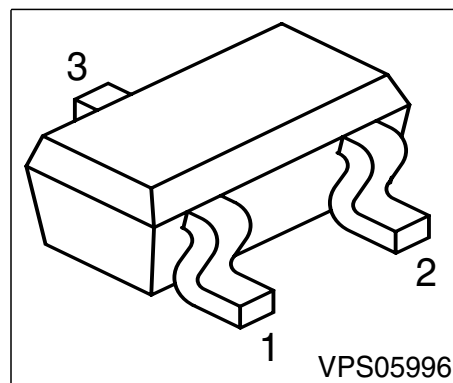


NPN Silicon AF Transistors

- 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:
 - BC856T, BC857T,
 - BC858T, BC859T, BC860T



Type	Marking	Pin Configuration			Package
BC846AT	1As	1 = B	2 = E	3 = C	SC75
BC846BT	1Bs	1 = B	2 = E	3 = C	SC75
BC847AT	1Es	1 = B	2 = E	3 = C	SC75
BC847BT	1Fs	1 = B	2 = E	3 = C	SC75
BC847CT	1Gs	1 = B	2 = E	3 = C	SC75
BC848AT	1Js	1 = B	2 = E	3 = C	SC75
BC848BT	1Ks	1 = B	2 = E	3 = C	SC75
BC848CT	1Ls	1 = B	2 = E	3 = C	SC75
BC849BT	2Bs	1 = B	2 = E	3 = C	SC75
BC849CT	2cs	1 = B	2 = E	3 = C	SC75
BC850BT	2Fs	1 = B	2 = E	3 = C	SC75
BC850CT	2Gs	1 = B	2 = E	3 = C	SC75

Maximum Ratings

Parameter	Symbol	BC846T	BC847T BC850T	BC848T BC849T	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, $T_S = 109\text{ }^{\circ}\text{C}$	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}	≤165	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	$V_{(BR)CEO}$				V
$I_C = 10\text{ mA}$, $I_B = 0$ BC846T		65	-	-	
$I_C = 10\text{ mA}$, $I_B = 0$ BC847T/BC850T		45	-	-	
$I_C = 10\text{ mA}$, $I_B = 0$ BC848T/BC849T		30	-	-	
Collector-base breakdown voltage	$V_{(BR)CBO}$				
$I_C = 10\text{ }\mu\text{A}$, $I_E = 0$ BC846T		80	-	-	
$I_C = 10\text{ }\mu\text{A}$, $I_E = 0$ BC847T/850T		50	-	-	
$I_C = 10\text{ }\mu\text{A}$, $I_E = 0$ BC848T/849T		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 $I_C = 10\text{ }\mu\text{A}$, $V_{BE} = 0$ BC846T $I_C = 10\text{ }\mu\text{A}$, $V_{BE} = 0$ BC847T/850T $I_C = 10\text{ }\mu\text{A}$, $V_{BE} = 0$ BC848T/849T	$V_{(BR)CES}$	65 50 30	- - -	- - -	V	
Emitter-base breakdown voltage $I_E = 1\text{ }\mu\text{A}$, $I_C = 0$ BC846T $I_E = 1\text{ }\mu\text{A}$, $I_C = 0$ BC847T/BC850T $I_E = 1\text{ }\mu\text{A}$, $I_C = 0$ BC848T/BC849T	$V_{(BR)EBO}$	6 6 5	- - -	- - -		
Collector cutoff current $V_{CB} = 30\text{ V}$, $I_E = 0$	I_{CBO}	-	-	15		nA
Collector cutoff current $V_{CB} = 30\text{ V}$, $I_E = 0$, $T_A = 150\text{ }^{\circ}\text{C}$	I_{CBO}	-	-	5		μA
DC current gain 1) $I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$ h_{FE} -group A $I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$ h_{FE} -group B $I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5\text{ V}$ 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 $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$ h_{FE} -group B $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$ 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: $t \leq 300\mu\text{s}$, $D = 2\%$

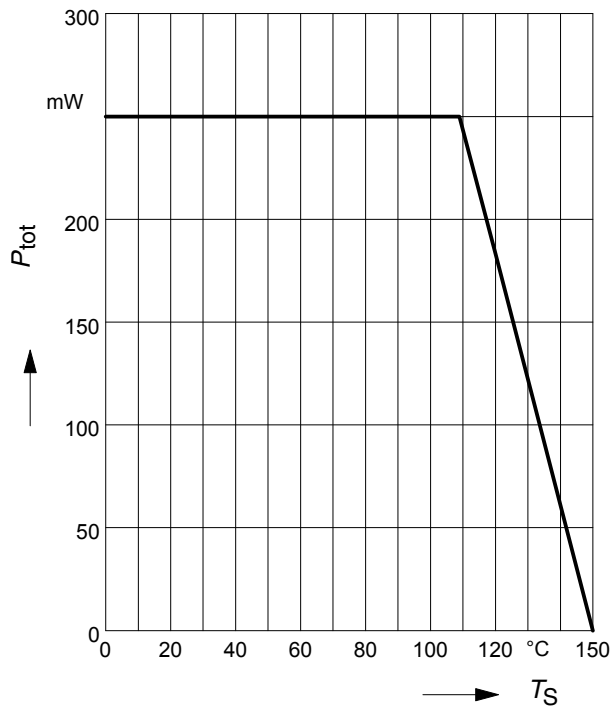
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

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}	-	3	-	pF
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$	C_{eb}	-	8	-	
Short-circuit input impedance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group A $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group B $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group C	h_{11e}	- - -	2.7 4.7 8.7	- - -	kΩ
Open-circuit reverse voltage transf.ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group A $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group B $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group C	h_{12e}	- - -	1.5 2 3	- - -	
Short-circuit forward current transf.ratio $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group A $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group B $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group C	h_{21e}	- - -	200 330 600	- - -	-
Open-circuit output admittance $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group A $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group B $I_C = 2\text{ mA}$, $V_{CE} = 5\text{ V}$, $f = 1\text{ kHz}$ hFE-group C	h_{22e}	- - -	18 30 60	- - -	μS

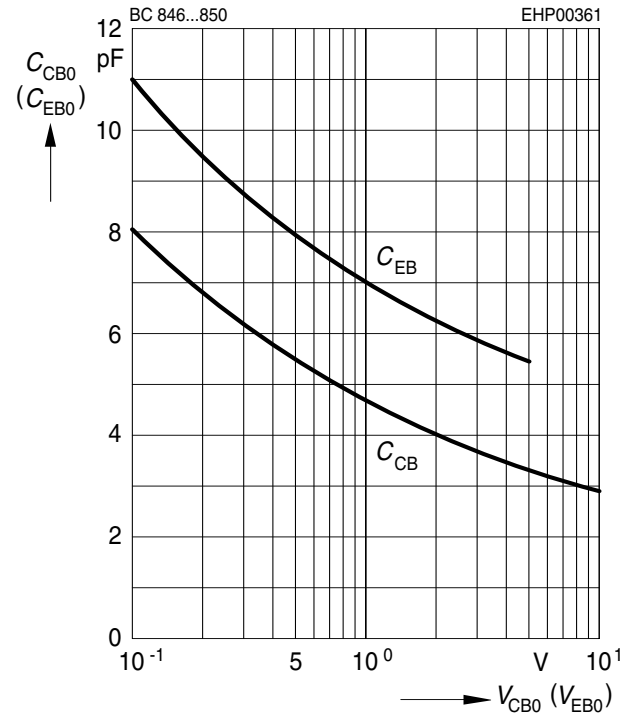
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Noise figure $I_C = 200\ \mu\text{A}$, $V_{CE} = 5\ \text{V}$, $R_S = 2\ \text{k}\Omega$, $f = 1\ \text{kHz}$, $\Delta f = 200\ \text{Hz}$ BC849T $I_C = 200\ \mu\text{A}$, $V_{CE} = 5\ \text{V}$, $R_S = 2\ \text{k}\Omega$, $f = 1\ \text{kHz}$, $\Delta f = 200\ \text{Hz}$ BC850T	F				dB
		-	1.2	4	
		-	1	4	
Equivalent noise voltage $I_C = 200\ \mu\text{A}$, $V_{CE} = 5\ \text{V}$, $R_S = 2\ \text{k}\Omega$, $f = 10 \dots 50\ \text{Hz}$ BC850T	V_n	-	-	0.135	μV

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

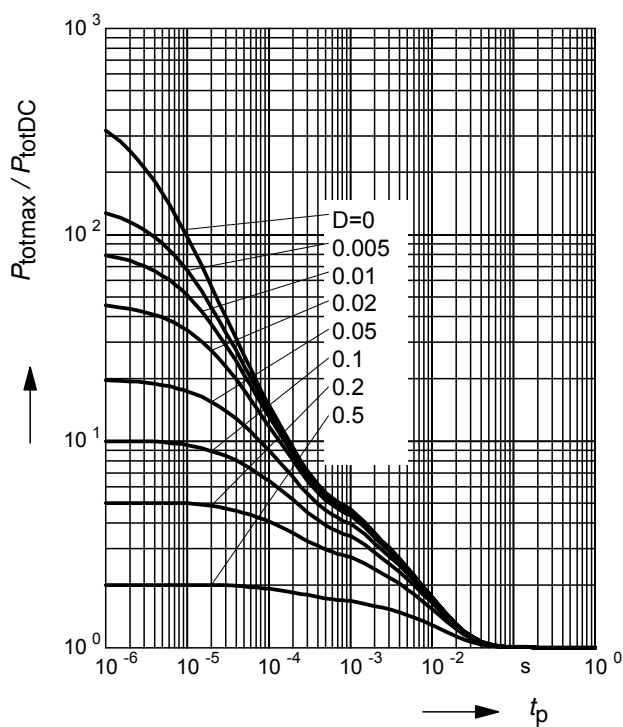


Collector-base capacitance $C_{\text{CB}} = f(V_{\text{CBO}})$
Emitter-base capacitance $C_{\text{EB}} = f(V_{\text{EBO}})$



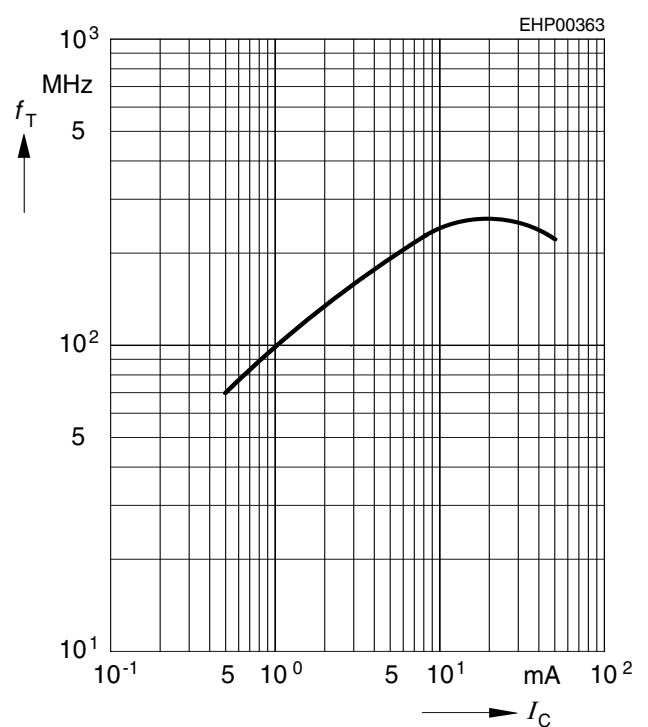
Permissible Pulse Load

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



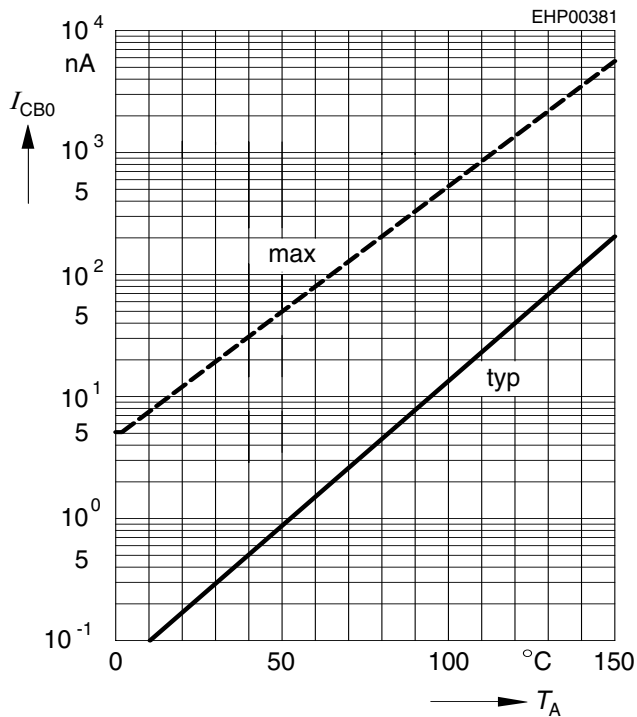
Transition frequency $f_T = f(I_C)$

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



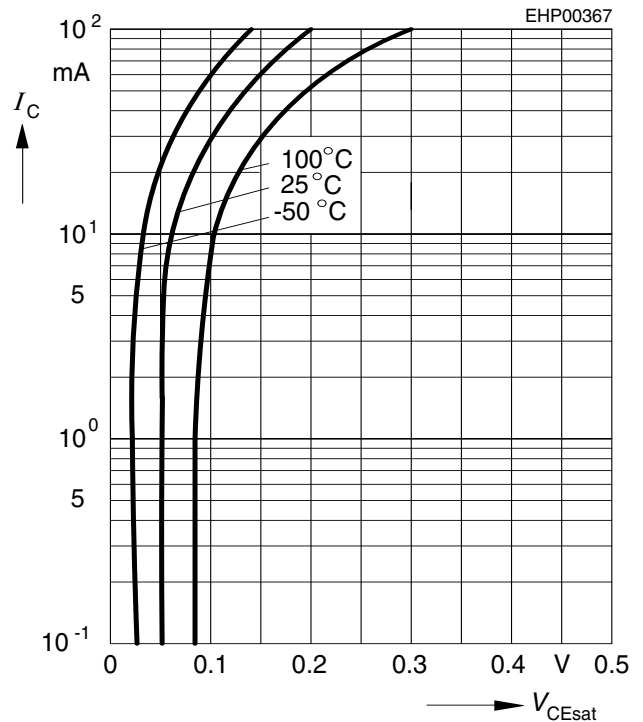
Collector cutoff current $I_{CBO} = f(T_A)$

$V_{CB} = 30V$



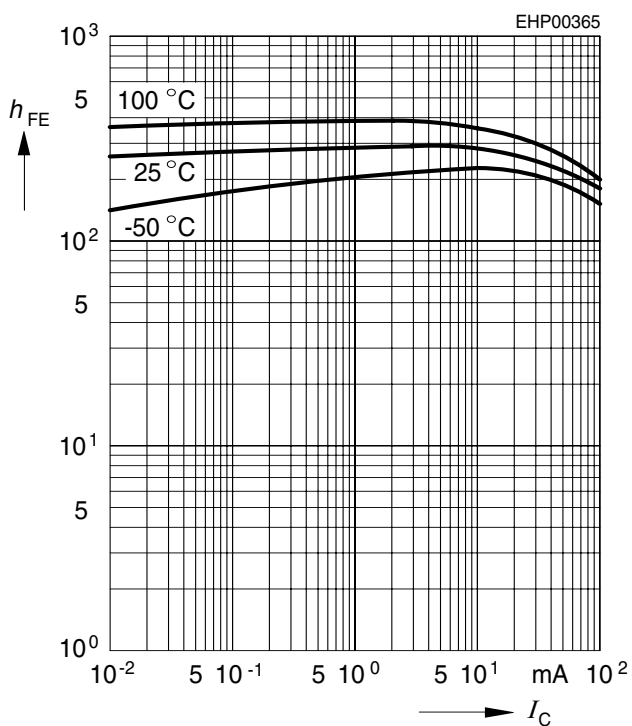
Collector-emitter saturation voltage

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



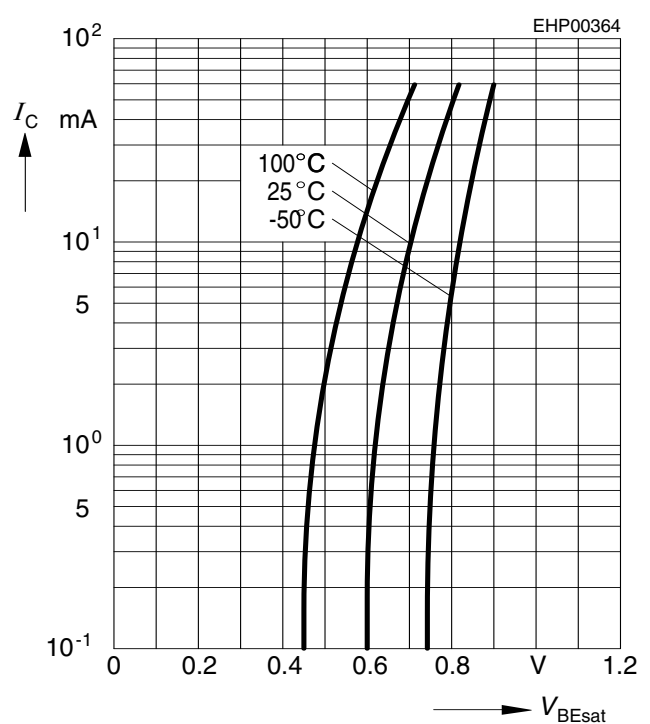
DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$



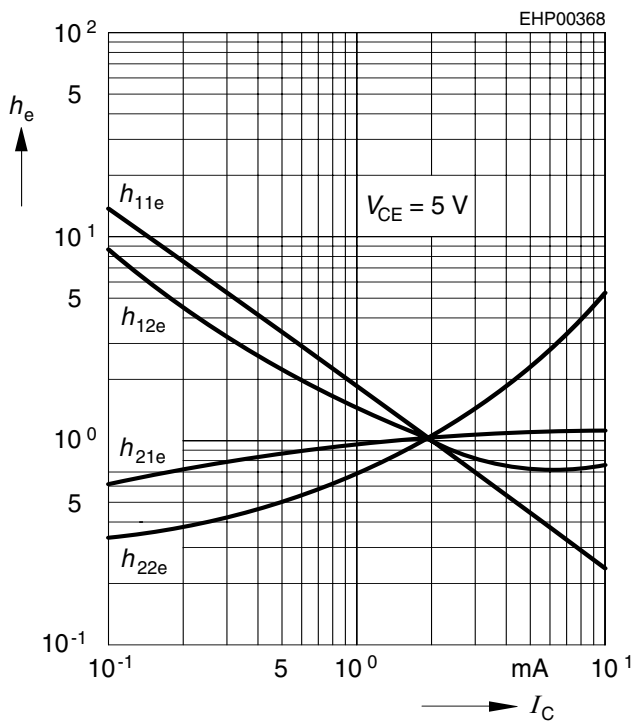
Base-emitter saturation voltage

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



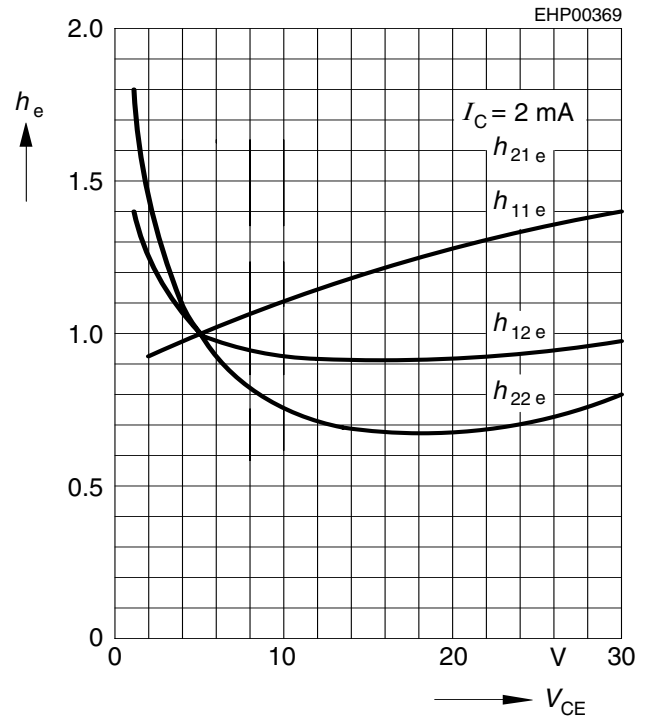
h parameter $h_e = f(I_C)$ normalized

$V_{CE} = 5V$



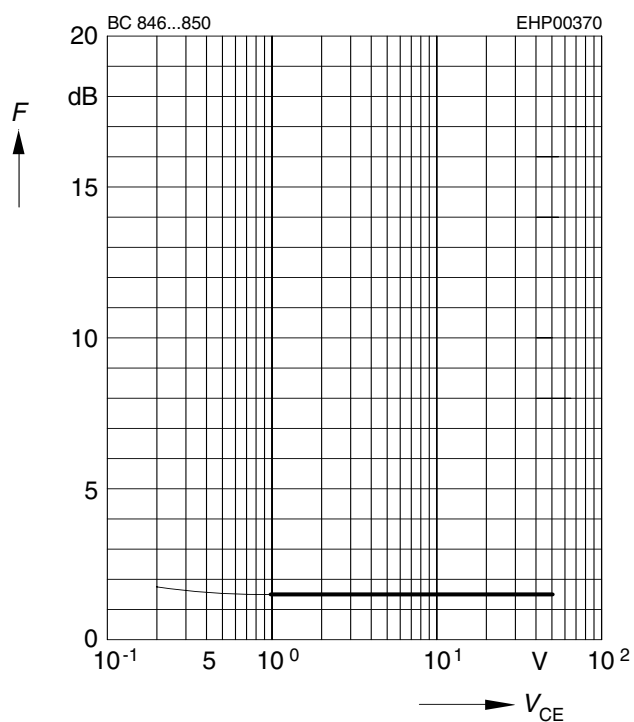
h parameter $h_e = f(V_{CE})$ normalized

$I_C = 2mA$



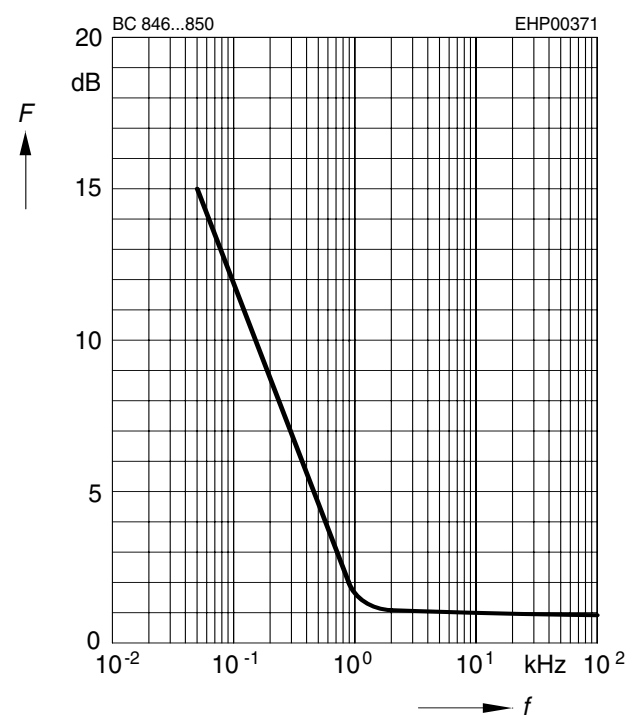
Noise figure $F = f(V_{CE})$

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



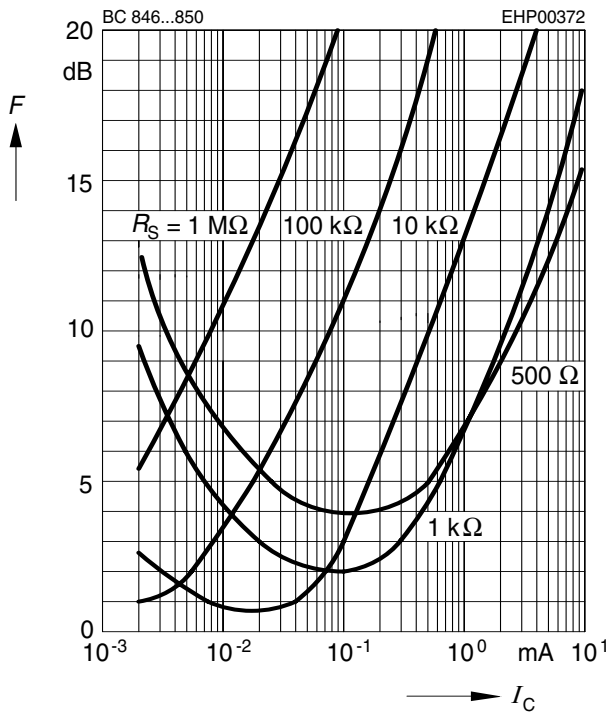
Noise figure $F = f(f)$

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



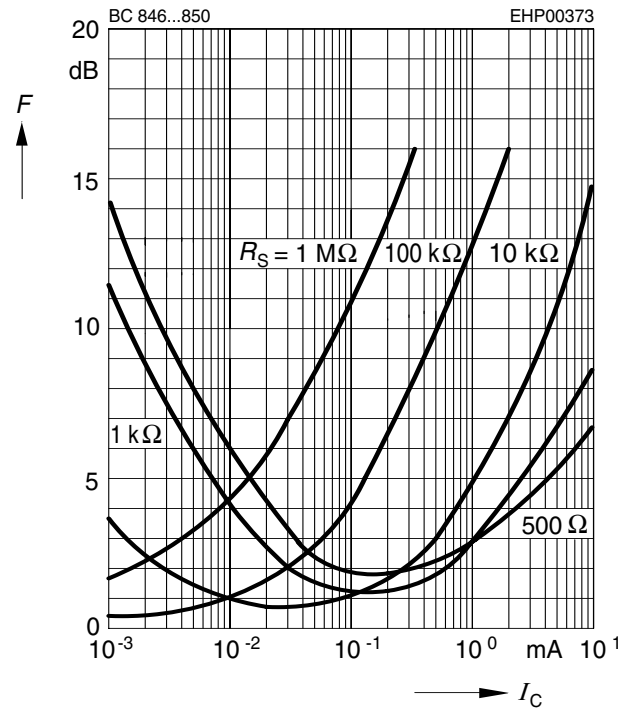
Noise figure $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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



Noise figure $F = f(I_C)$

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

