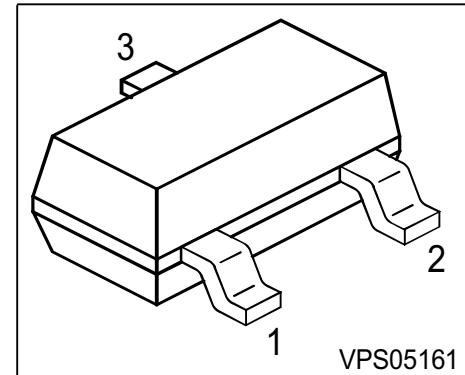


NPN Silicon AF Transistors

- 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: BC856, BC857, BC858
BC859, BC860 (PNP)



Type	Marking	Pin Configuration			Package
BC846A	1As	1 = B	2 = E	3 = C	SOT23
BC846B	1Bs	B = 1	2 = E	3 = C	SOT23
BC847A	1Es	B = 1	2 = E	3 = C	SOT23
BC847B	1Fs	1 = B	2 = E	3 = C	SOT23
BC847C	1Gs	1 = B	2 = E	3 = C	SOT23
BC848A	1Js	1 = B	2 = E	3 = C	SOT23
BC848B	1Ks	1 = B	2 = E	3 = C	SOT23
BC848C	1Ls	1 = B	2 = E	3 = C	SOT23
BC849B	2Bs	1 = B	2 = E	3 = C	SOT23
BC849C	2Cs	1 = B	2 = E	3 = C	SOT23
BC850B	2Fs	1 = B	2 = E	3 = C	SOT23
BC850C	2Gs	1 = B	2 = E	3 = C	SOT23

Maximum Ratings

Parameter	Symbol	BC846	BC847 BC850	BC848 BC849	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, $T_S = 71\text{ }^\circ\text{C}$	P_{tot}		330		mW
Junction temperature	T_j		150		$^\circ\text{C}$
Storage temperature	T_{stg}		-65 ... 150		

Thermal Resistance

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

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	

DC Characteristics

Collector-emitter breakdown voltage $I_C = 10\text{ mA}, I_B = 0$	$V_{(BR)CEO}$ BC846 BC847/850 BC848/849	65 45 30	-	-	V
Collector-base breakdown voltage $I_C = 10\text{ }\mu\text{A}, I_B = 0$	$V_{(BR)CBO}$ BC846 BC847/850 BC848/849	80 50 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.

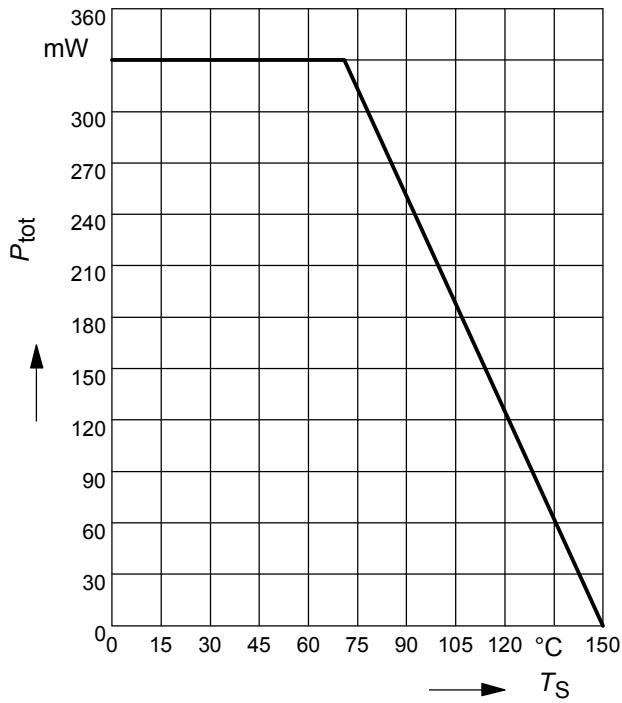
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 10 \mu\text{A}, V_{BE} = 0$	$V_{(\text{BR})\text{CES}}$	80	-	-	V
		50	-	-	
		30	-	-	
Emitter-base breakdown voltage $I_E = 1 \mu\text{A}, I_C = 0$	$V_{(\text{BR})\text{EBO}}$	6	-	-	
		5	-	-	
		-	-	15	
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}	-	140	-	
		-	250	-	
		-	480	-	
DC current gain 1) $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}$	h_{FE}	110	180	220	
		200	290	450	
		420	520	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	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) $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 5 \text{ V}$	$V_{\text{BE(ON)}}$	580	660	700	
		-	-	770	
		-	-	-	

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

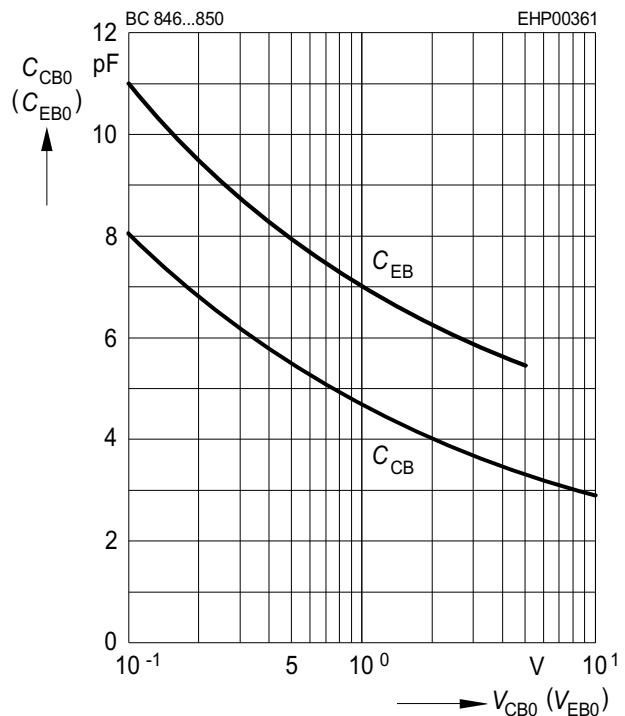
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

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}	-	2.7	-	k Ω
	$h_{FE-\text{gr.A}}$	-	4.5	-	
	$h_{FE-\text{gr.B}}$	-	8.7	-	
Open-circuit reverse voltage transf.ratio $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$	h_{12e}	-	1.5	-	10^{-4}
	$h_{FE-\text{gr.A}}$	-	2	-	
	$h_{FE-\text{gr.B}}$	-	3	-	
Short-circuit forward current transf.ratio $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$	h_{21e}	-	200	-	-
	$h_{FE-\text{gr.A}}$	-	330	-	
	$h_{FE-\text{gr.B}}$	-	600	-	
Open-circuit output admittance $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}$	h_{22e}	-	18	-	μS
	$h_{FE-\text{gr.A}}$	-	30	-	
	$h_{FE-\text{gr.B}}$	-	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
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 $P_{\text{tot}} = f(T_S)$

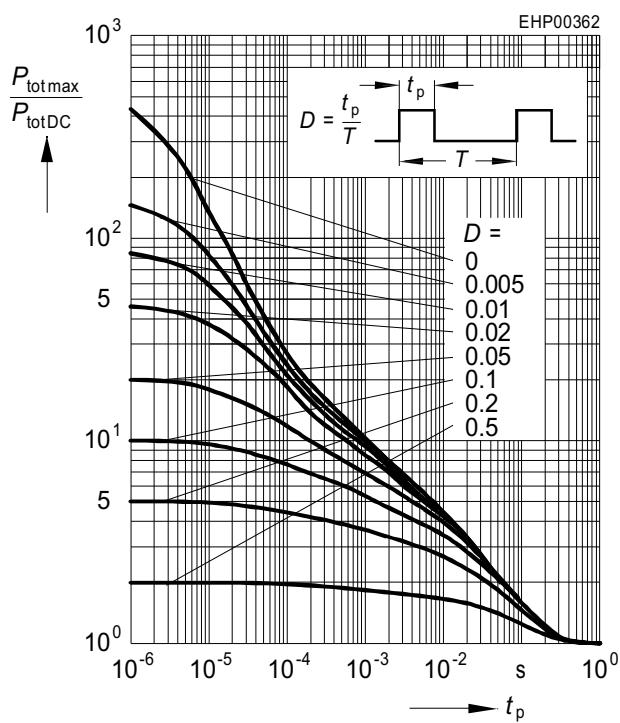


Collector-base capacitance $C_{\text{CB}} = f(V_{\text{CBO}})$
Emitter-base capacitance $C_{\text{EB}} = f(V_{\text{EBO}})$



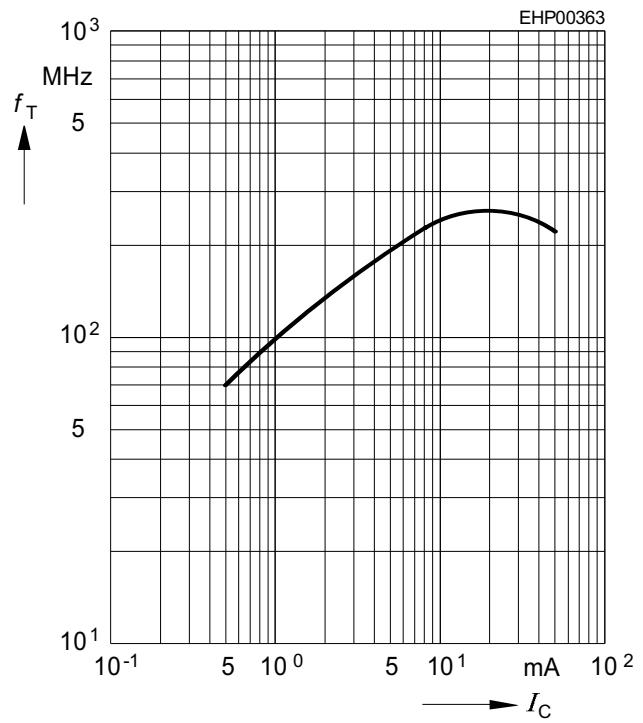
Permissible pulse load

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



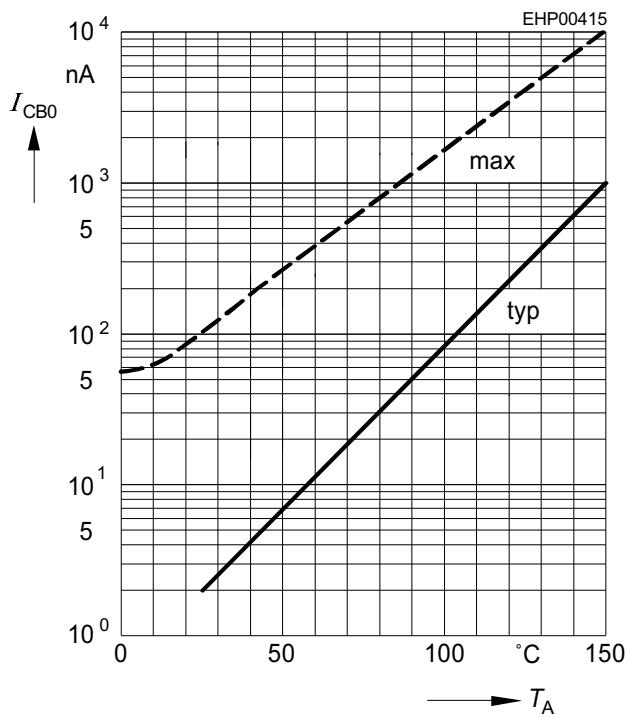
Transition frequency $f_T = f(I_C)$

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



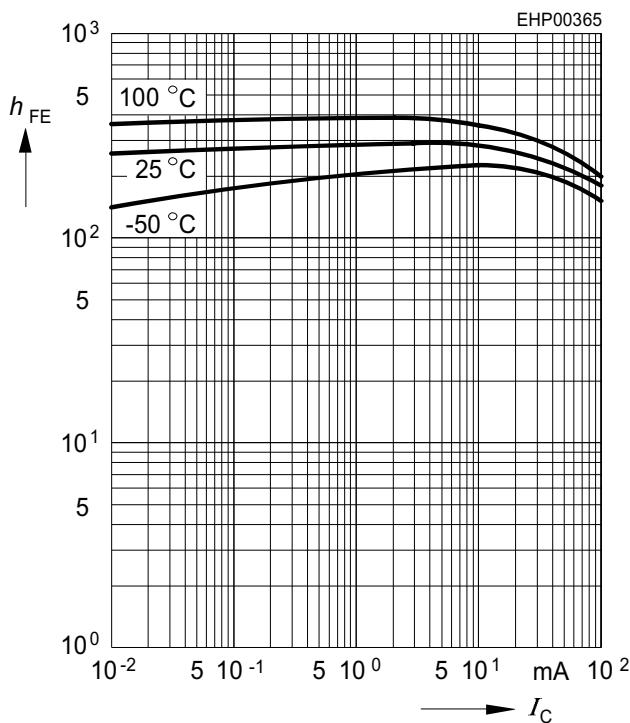
Collector cutoff current $I_{CBO} = f(T_A)$

$V_{CB} = 30V$



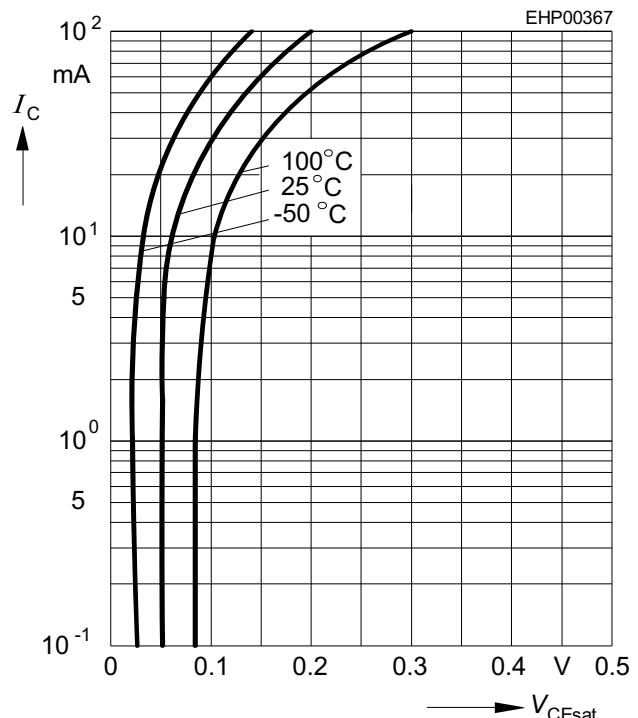
DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$



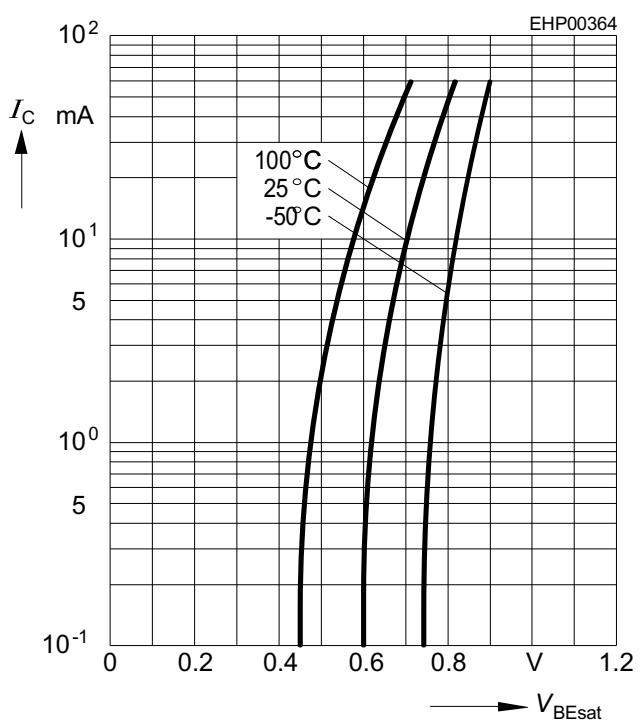
Collector-emitter saturation voltage

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



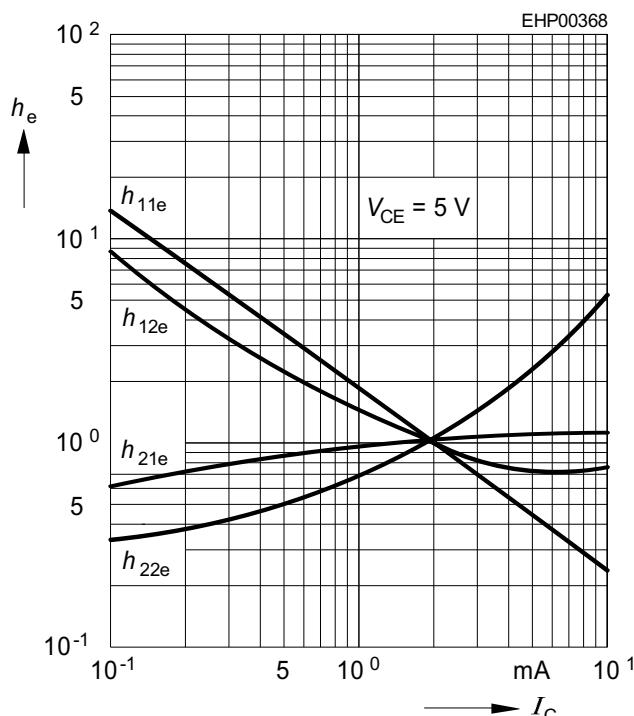
Base-emitter saturation voltage

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



h parameter $h_e = f(I_C)$ normalized

$V_{CE} = 5V$

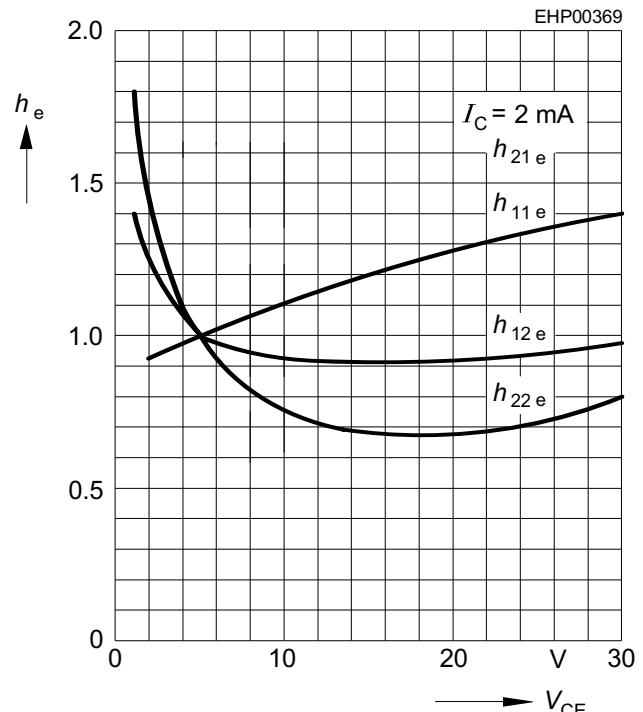


Noise figure $F = f(V_{CE})$

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

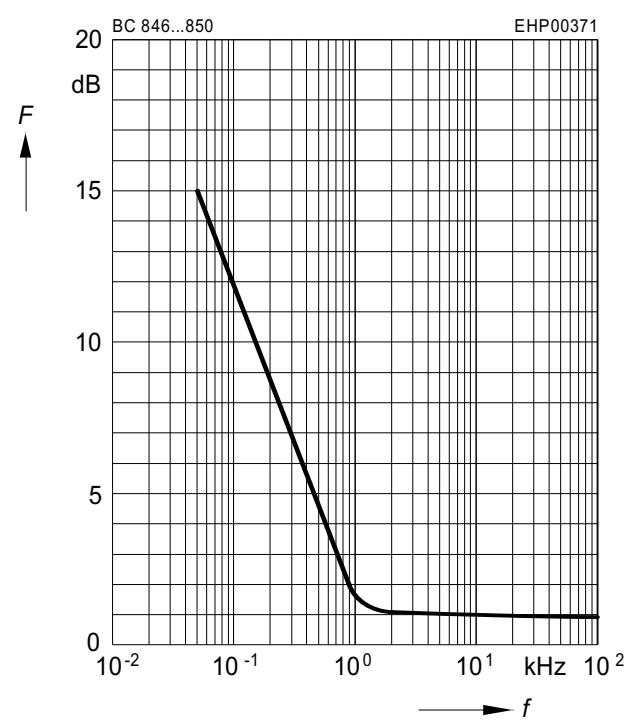
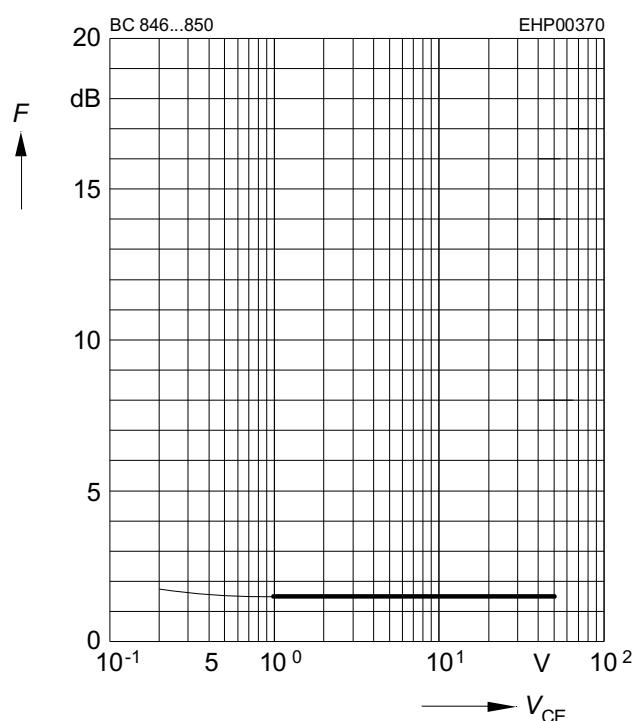
h parameter $h_e = f(V_{CE})$ normalized

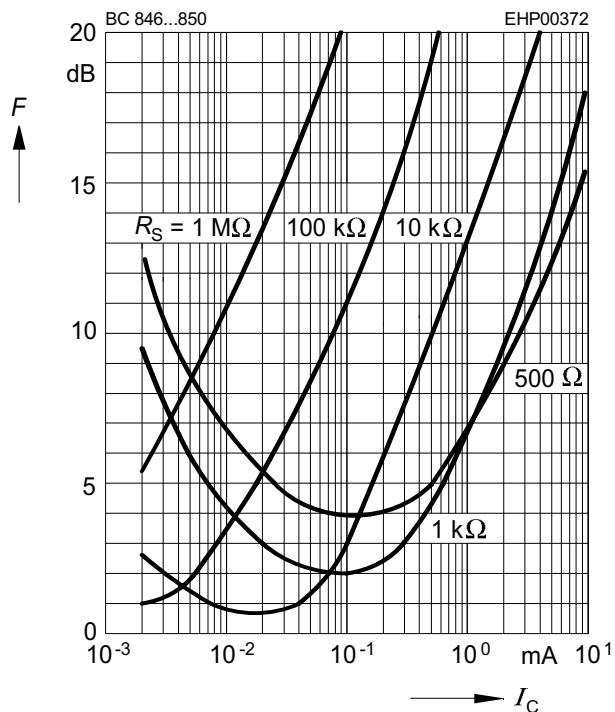
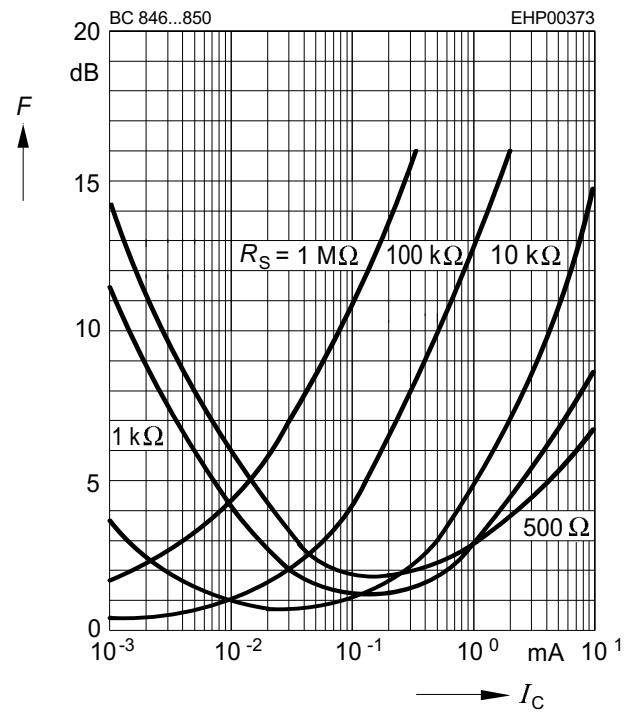
$I_C = 2mA$



Noise figure $F = f(f)$

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



Noise figure $F = f(I_C)$
 $V_{CE} = 5V, f = 120\text{Hz}$

Noise figure $F = f(I_C)$
 $V_{CE} = 5V, f = 1\text{kHz}$

Noise figure $F = f(I_C)$
 $V_{CE} = 5V, f = 10\text{kHz}$
