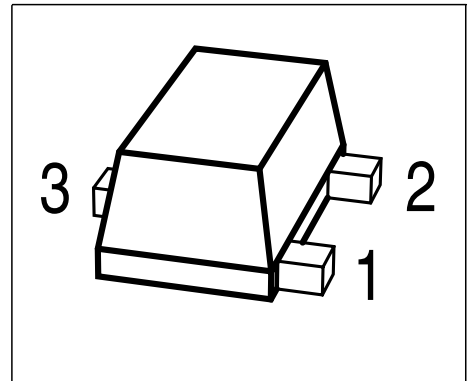


**PNP Silicon AF Transistor**

- 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 <sup>1)</sup>	$R_{thJS}$	$\leq 90$	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 $V_{CB} = 30\text{ V}$ , $I_E = 0\text{ A}$ $V_{CB} = 30\text{ V}$ , $I_E = 0\text{ A}$ , $T_A = 150\text{ }^\circ\text{C}$	$I_{CBO}$	- -	- -	0.015 5	$\mu\text{A}$
DC current gain <sup>2)</sup> $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5\text{ V}$ $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$	$h_{FE}$	- 220	250 290	- 475	-
Collector-emitter saturation voltage <sup>2)</sup> $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{CEsat}$	- -	75 250	300 650	mV
Base emitter saturation voltage <sup>2)</sup> $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ $I_C = 100\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{BEsat}$	- -	700 850	- -	
Base-emitter voltage <sup>2)</sup> $I_C = 2\text{ mA}$ , $V_{CE} = 5\text{ V}$ $I_C = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$	$V_{BE(ON)}$	600 -	650 -	750 820	

<sup>1</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

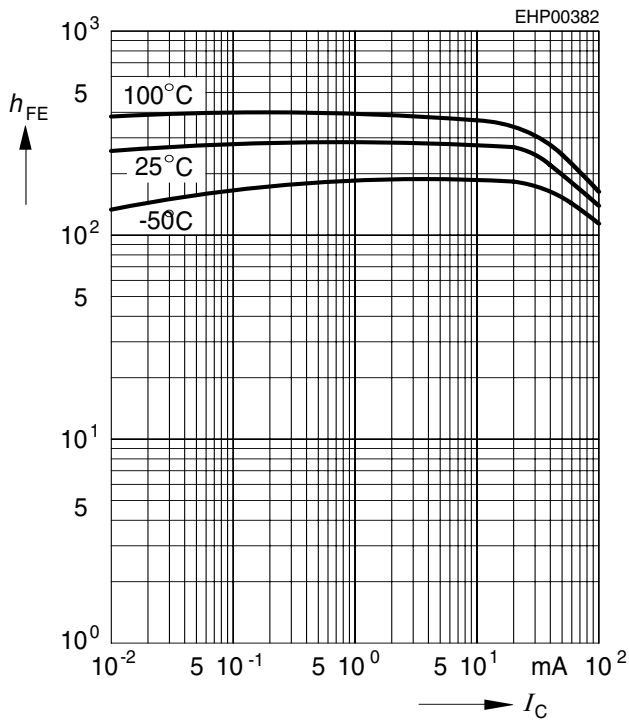
<sup>2</sup>Pulse test:  $t < 300\mu\text{s}$ ;  $D < 2\%$

**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 $\Omega$
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	-	$\mu\text{S}$
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	4	dB
		-	1	4	
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	$\mu\text{V}$

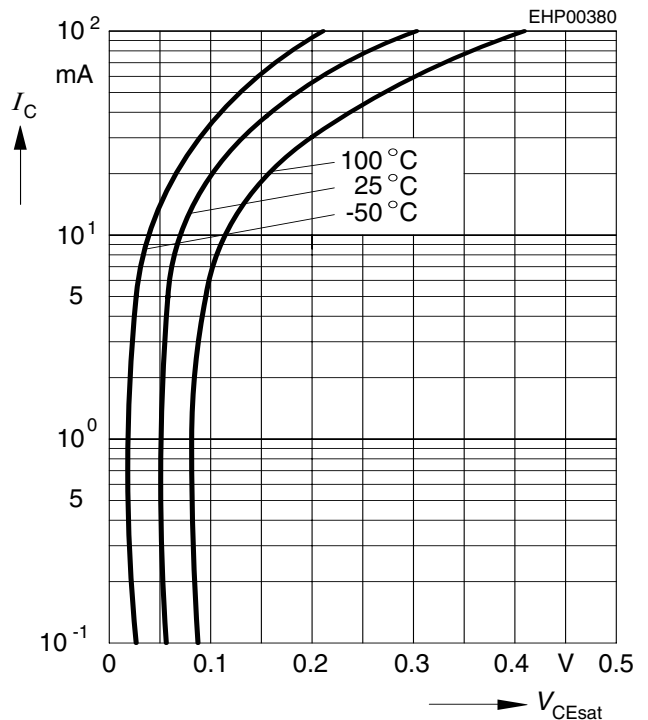
**DC current gain  $h_{FE} = f(I_C)$**

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



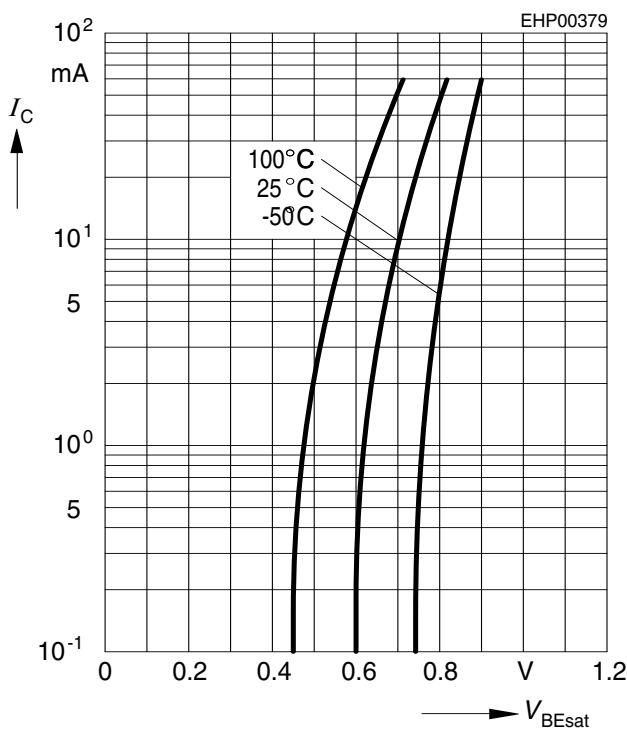
**Collector-emitter saturation voltage**

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



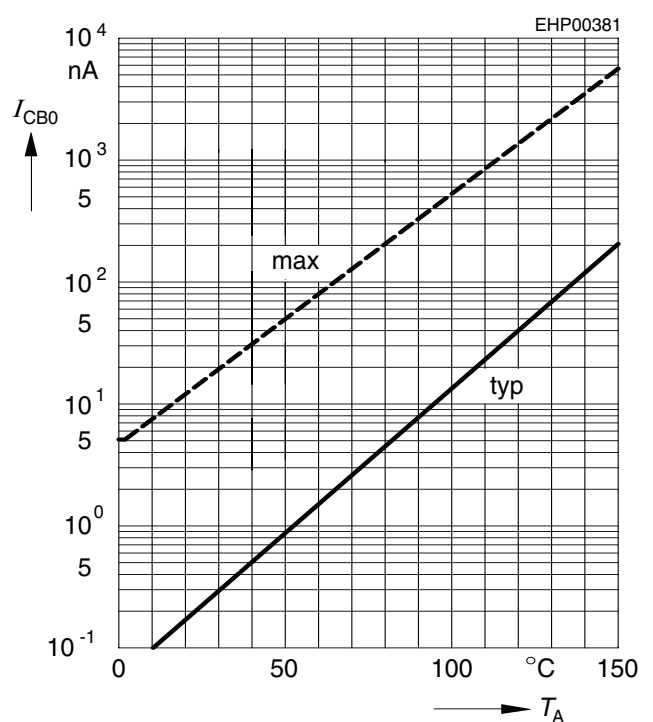
**Base-emitter saturation voltage**

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



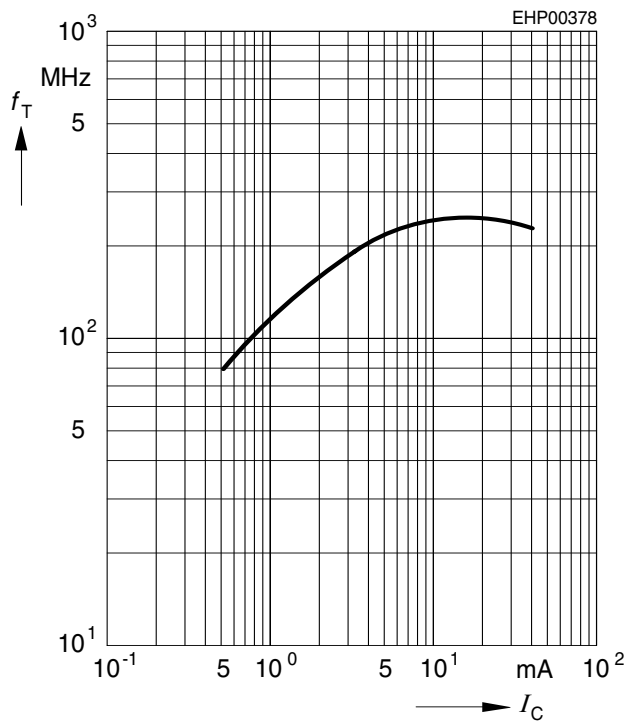
**Collector cutoff current  $I_{CBO} = f(T_A)$**

$V_{CB} = 30\text{ V}$



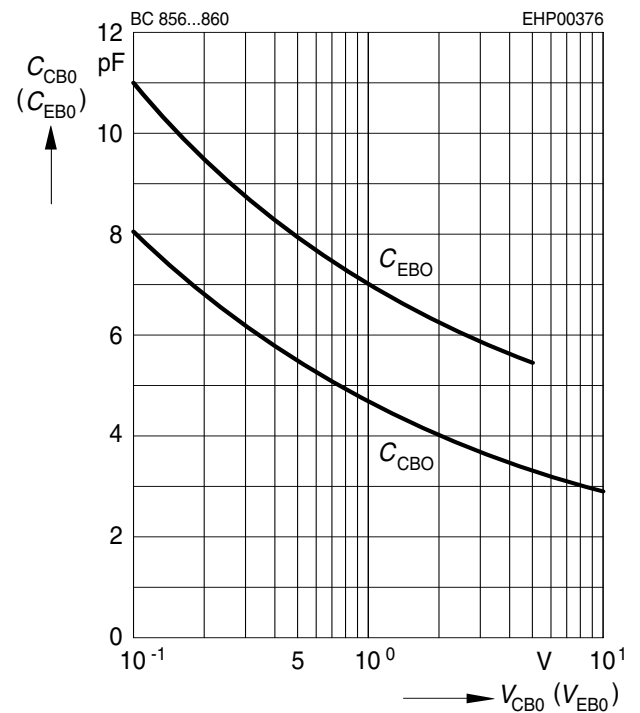
Transition frequency  $f_T = f(I_C)$

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

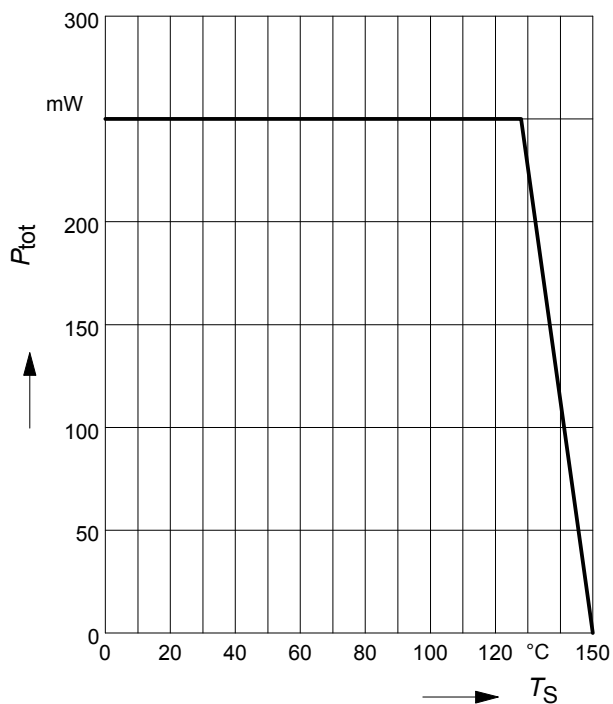


Collector-base capacitance  $C_{CB} = f(V_{CB0})$

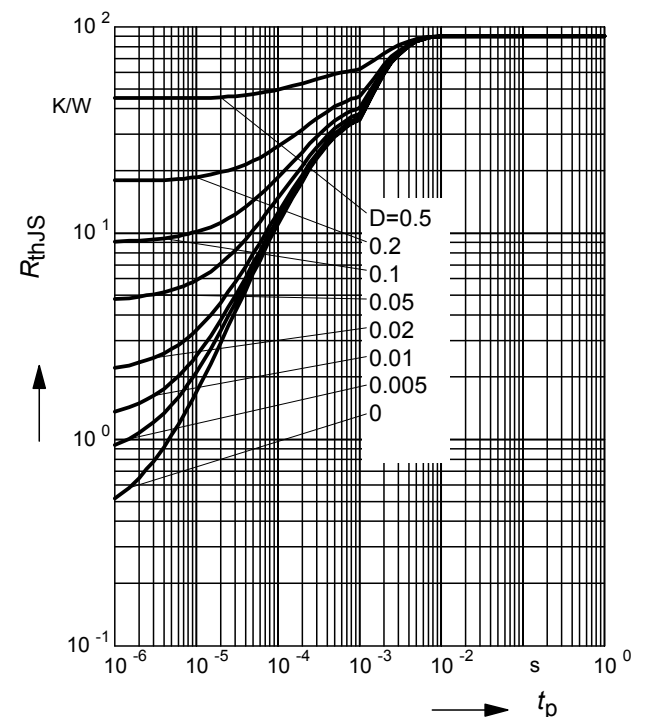
Emitter-base capacitance  $C_{EB} = f(V_{EB0})$



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

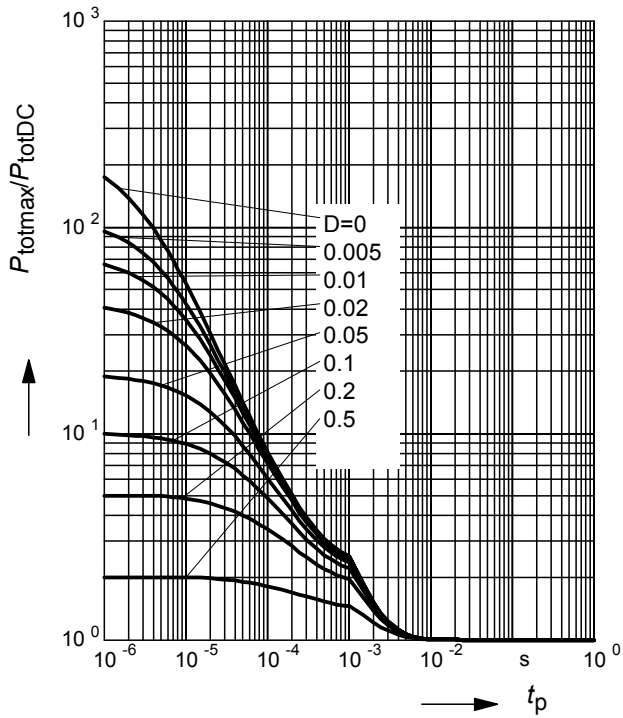


Permissible Pulse Load  $R_{thJS} = f(t_p)$



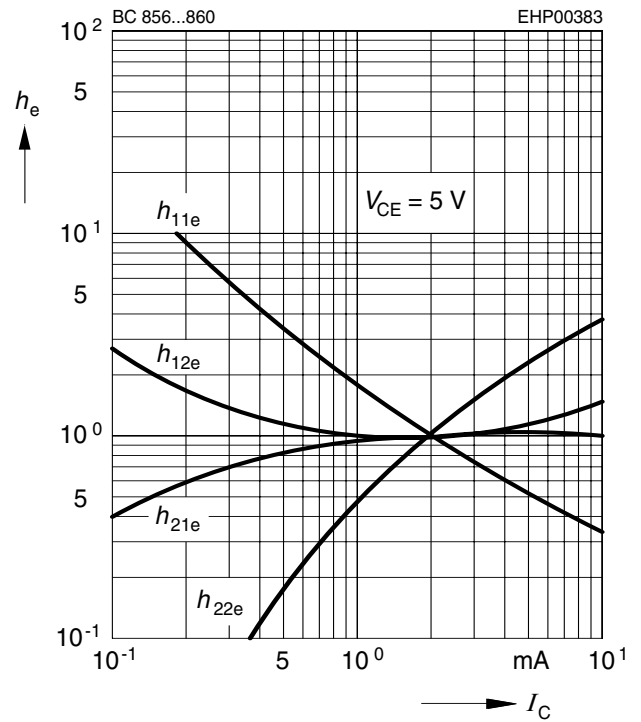
**Permissible Pulse Load**

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



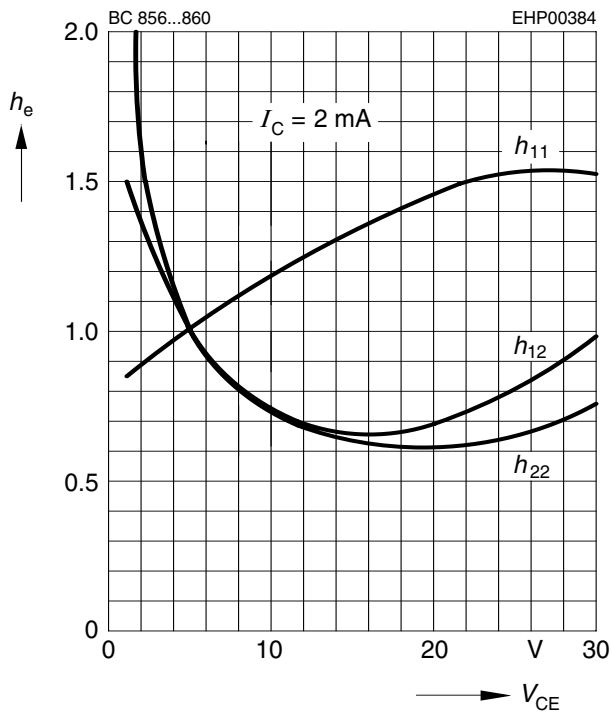
**h parameter  $h_e = f(I_C)$  normalized**

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



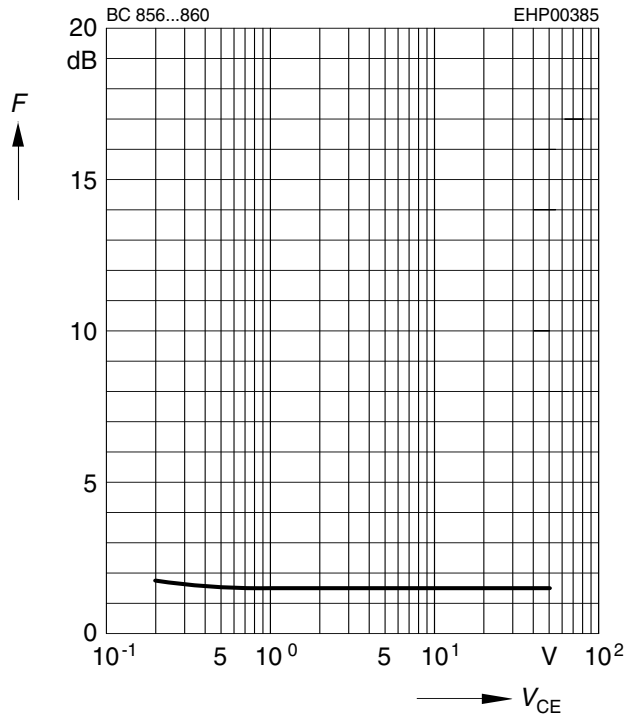
**h parameter  $h_e = f(V_{\text{CE}})$  normalized**

$$I_C = 2\text{mA}$$



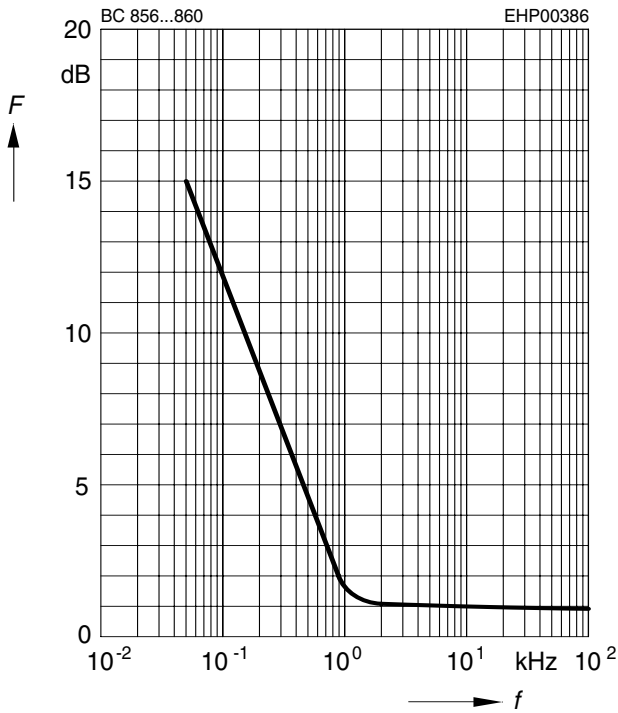
**Noise figure  $F = f(V_{\text{CE}})$**

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



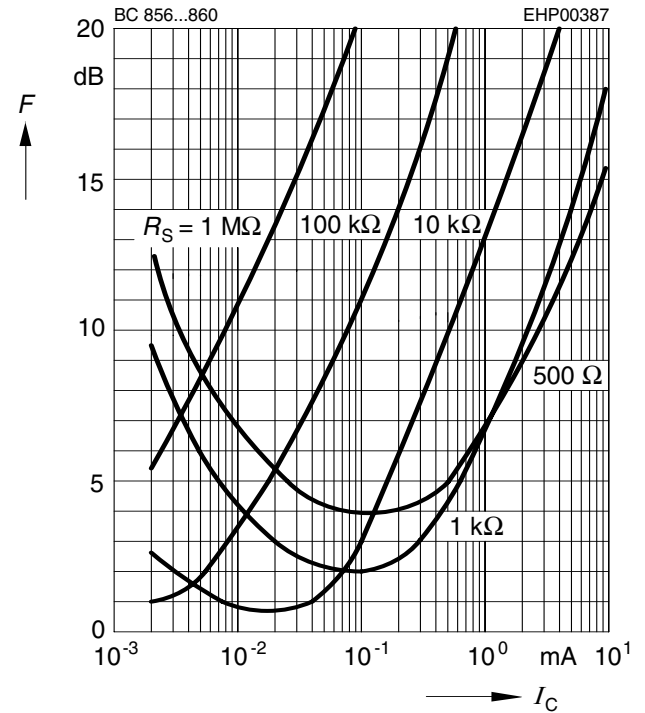
**Noise figure  $F = f(f)$**

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



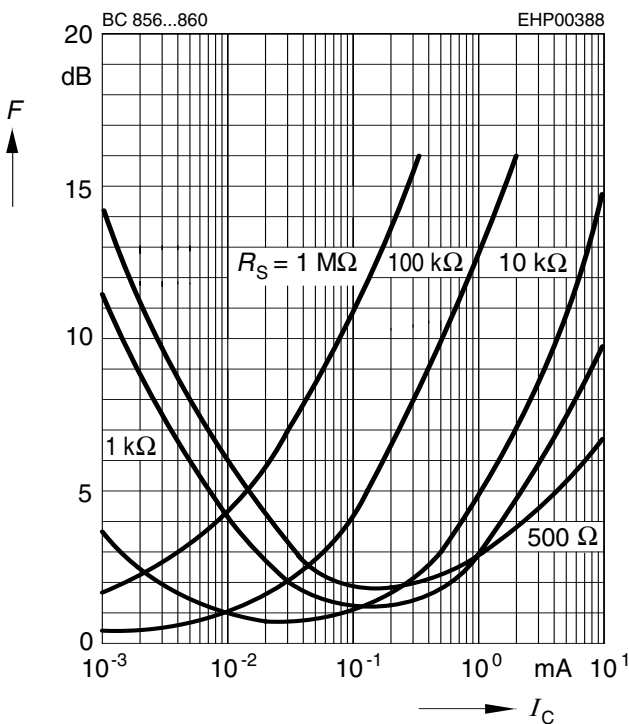
**Noise figure  $F = f(I_C)$**

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



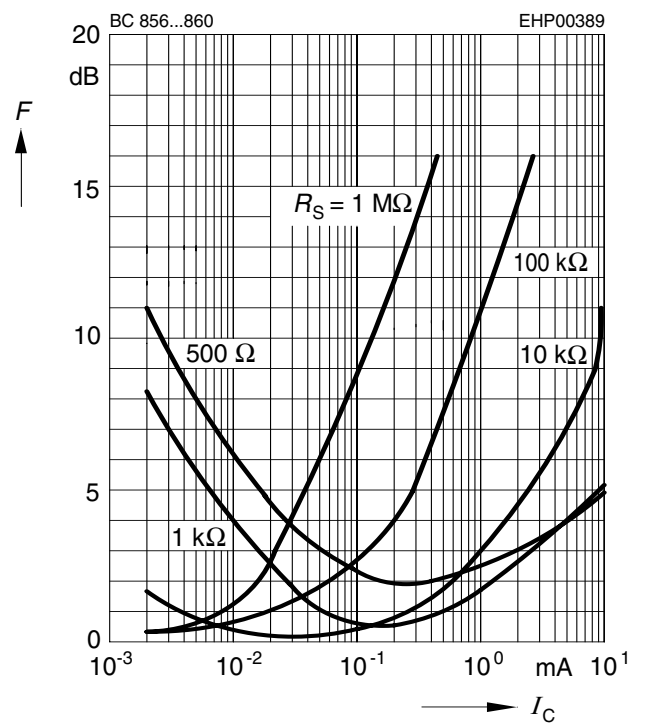
**Noise figure  $F = f(I_C)$**

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



**Noise figure  $F = f(I_C)$**

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



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