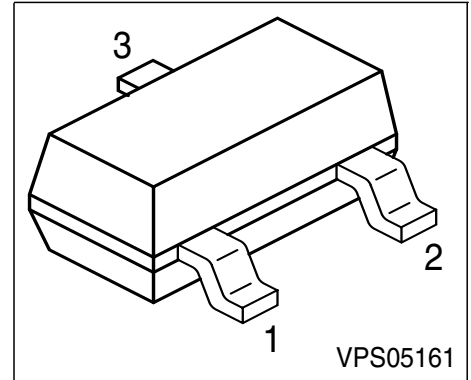**PNP Silicon AF Transistors**

- 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: BC846, BC847, BC848
  BC849, BC850 (NPN)

VPS05161

Type	Marking	Pin Configuration			Package
BC856A	3As	1 = B	2 = E	3 = C	SOT23
BC856B	3Bs	1 = B	2 = E	3 = C	SOT23
BC857A	3Es	1 = B	2 = E	3 = C	SOT23
BC857B	3Fs	1 = B	2 = E	3 = C	SOT23
BC857C	3Gs	1 = B	2 = E	3 = C	SOT23
BC858A	3Js	1 = B	2 = E	3 = C	SOT23
BC858B	3Ks	1 = B	2 = E	3 = C	SOT23
BC858C	3Ls	1 = B	2 = E	3 = C	SOT23
BC859A	4As	1 = B	2 = E	3 = C	SOT23
BC859B	4Bs	1 = B	2 = E	3 = C	SOT23
BC859C	4Cs	1 = B	2 = E	3 = C	SOT23
BC860B	4Fs	1 = B	2 = E	3 = C	SOT23
BC860C	4Gs	1 = B	2 = E	3 = C	SOT23

Dec-11-2001

Maximum Ratings

Parameter	Symbol	BC856 BC860	BC857 BC860	BC858 BC859	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}	5	5	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 °C	P_{tot}	330			mW
Junction temperature	T_j	150			°C
Storage temperature	T_{stg}	-65 ... 150			

Thermal Resistance

Junction - soldering point [1]	R_{thJS}	$\leq$240	K/W

Electrical Characteristics at T_A = 25°C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage	$V_{(BR)CEO}$				V
I_C = 10 mA, I_B = 0 BC856		65	-	-	
BC857/860		45	-	-	
BC858/859		30	-	-	
Collector-base breakdown voltage	$V_{(BR)CBO}$				
I_C = 10 µA, I_E = 0 BC856		80	-	-	
BC857/860		50	-	-	
BC858/859		30	-	-	

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

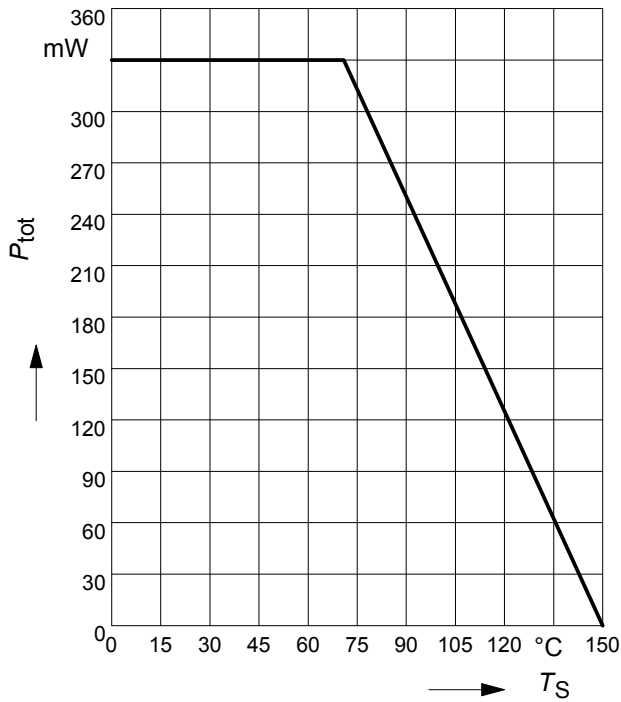**Electrical Characteristics** at T_A = 25°C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Collector-emitter breakdown voltage	$V_{(BR)CES}$				V
I_C = 10 µA, V_{BE} = 0 BC856		80	-	-	
BC857/860		50	-	-	
BC858/859		30	-	-	
Emitter-base breakdown voltage	$V_{(BR)EBO}$	5	-	-	
I_E = 1 µA, I_C = 0					
Collector cutoff current	I_{CBO}	-	-	15	nA
V_{CB} = 30 V, I_E = 0					
Collector cutoff current	I_{CBO}	-	-	5	µA
V_{CB} = 30 V, I_E = 0 , T_A = 150 °C					
DC current gain 1)	h_{FE}				-
I_C = 10 µA, V_{CE} = 5 V h_{FE}-group **A**		-	140	-	
h_{FE}-group **B**		-	250	-	
h_{FE}-group **C**		-	480	-	
DC current gain 1)	h_{FE}				
I_C = 2 mA, V_{CE} = 5 V h_{FE}-group **A**		125	180	250	
h_{FE}-group **B**		220	290	475	
h_{FE}-group **C**		420	520	800	
Collector-emitter saturation voltage1)	V_{CEsat}				mV
I_C = 10 mA, I_B = 0.5 mA		-	75	300	
I_C = 100 mA, I_B = 5 mA		-	250	650	
Base-emitter saturation voltage 1)	V_{BEsat}				
I_C = 10 mA, I_B = 0.5 mA		-	700	-	
I_C = 100 mA, I_B = 5 mA		-	850	-	
Base-emitter voltage 1)	$V_{BE(ON)}$				
I_C = 2 mA, V_{CE} = 5 V		600	650	750	
I_C = 10 mA, V_{CE} = 5 V		-	-	820	

1) Pulse test: t ≤ 300µs, D = 2%

Dec-11-2001

Electrical Characteristics at T_A = 25°C, unless otherwise specified.

| Parameter	Symbol		Values		Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency I_C = 20 mA, V_{CE} = 5 V, f = 100 MHz	f_T	-	250	-	MHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	3	-	pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	8	-	
Short-circuit input impedance I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz	h_{11e}				kΩ
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 mA, V_{CE} = 5 V, f = 1 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 mA, V_{CE} = 5 V, f = 1 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 mA, V_{CE} = 5 V, f = 1 kHz	h_{22e}				μS
h_{FE}-gr.**A**		-	18	-	
h_{FE}-gr.**B**		-	30	-	
h_{FE}-gr.**C**		-	60	-	
Noise figure I_C = 0.2 mA, V_{CE} = 5 V, R_S = 2 kΩ, f = 1 kHz, Δ f = 200 Hz BC 859 BC 860	F	-	1	4	dB
Equivalent noise voltage I_C = 200 μA, V_{CE} = 5 V, R_S = 2 kΩ, f = 10 ... 50 Hz BC 860	V_n	-	-	0.11	μV

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

Collector-base capacitance $C_{CB} = f(V_{CBO})$
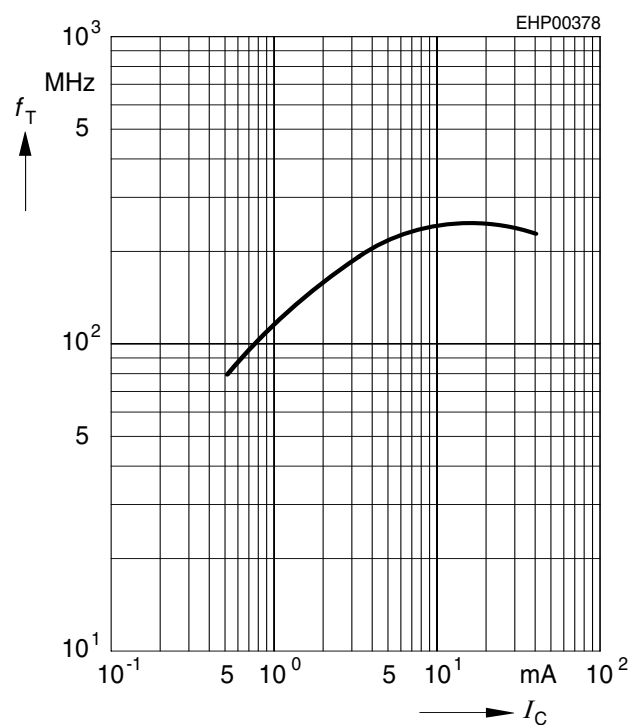## Emitter-base capacitance $C_{EB} = f(V_{EBO})$
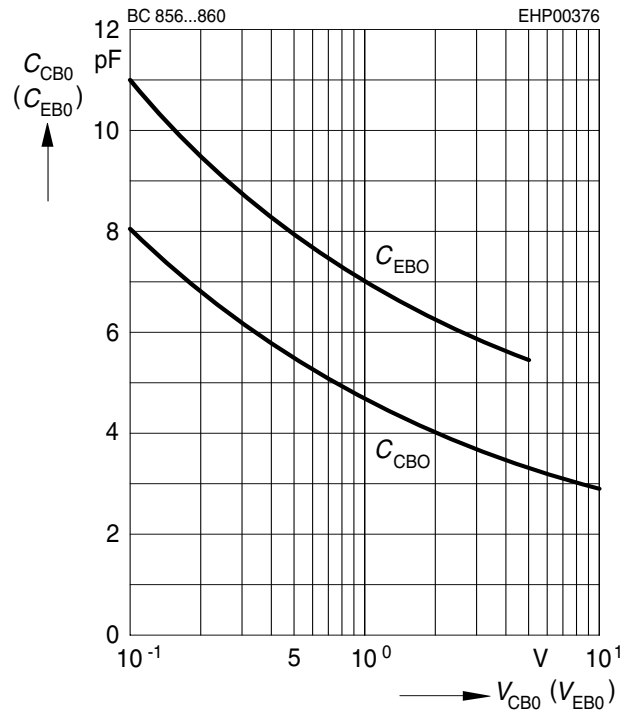
Permissible pulse load
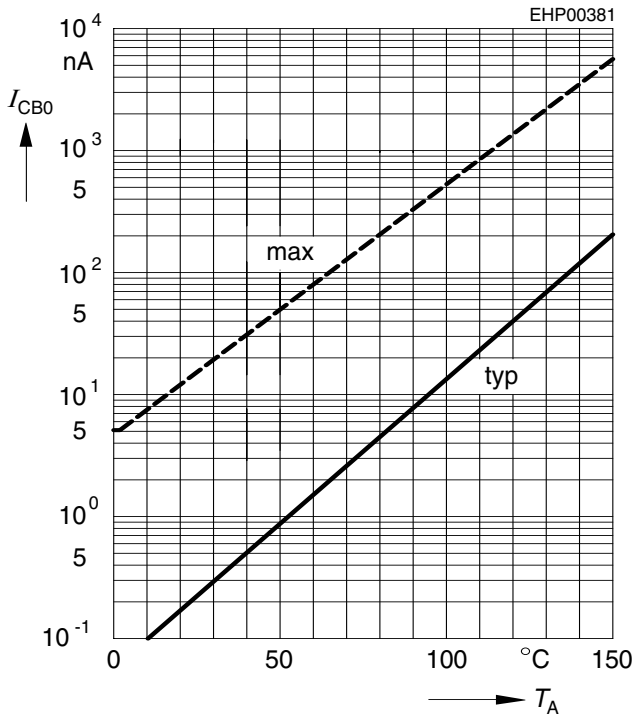$P_{totmax} / P_{totDC} = f(t_p)$
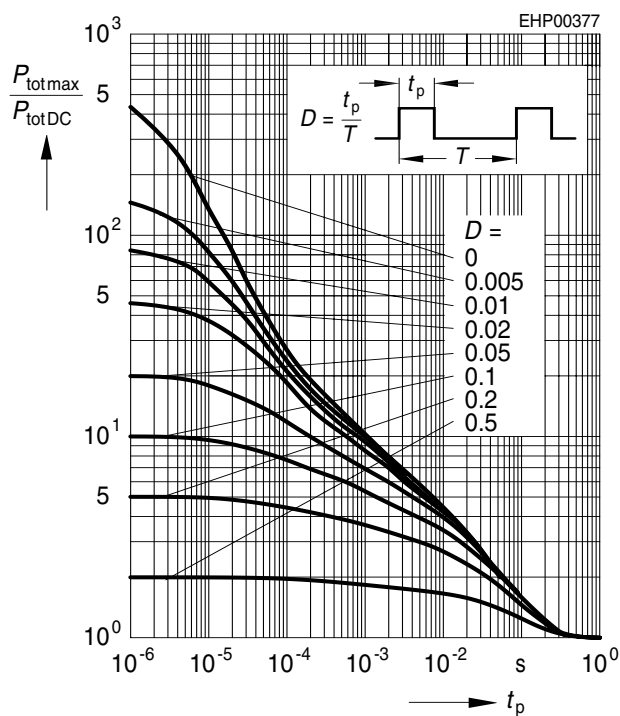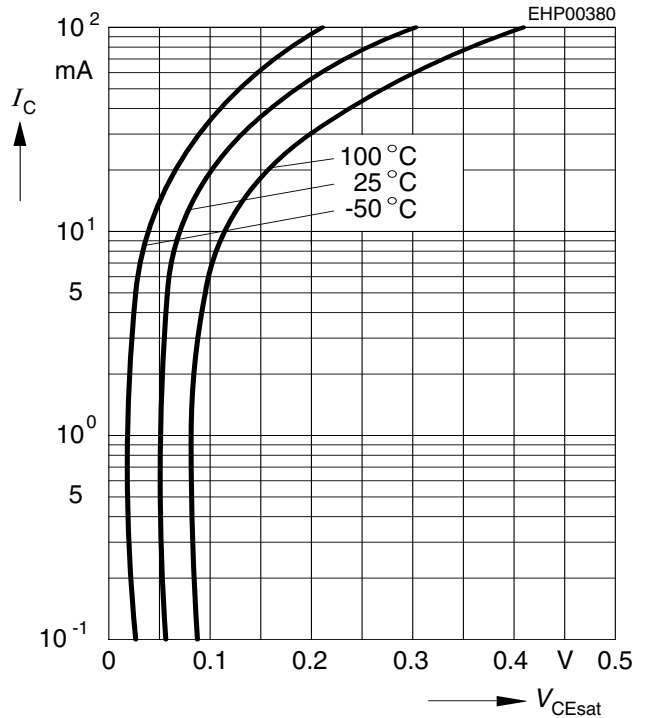

Transition frequency $f_T = f(I_C)$
$V_{CE} = 5V$

Dec-11-2001

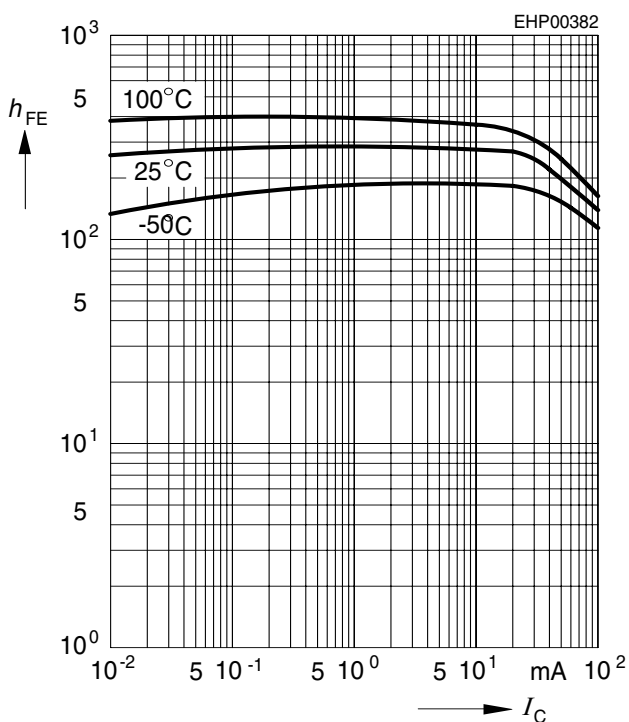**Collector cutoff current** $I_{CBO} = f(T_A)$

V_{CB} = 30V

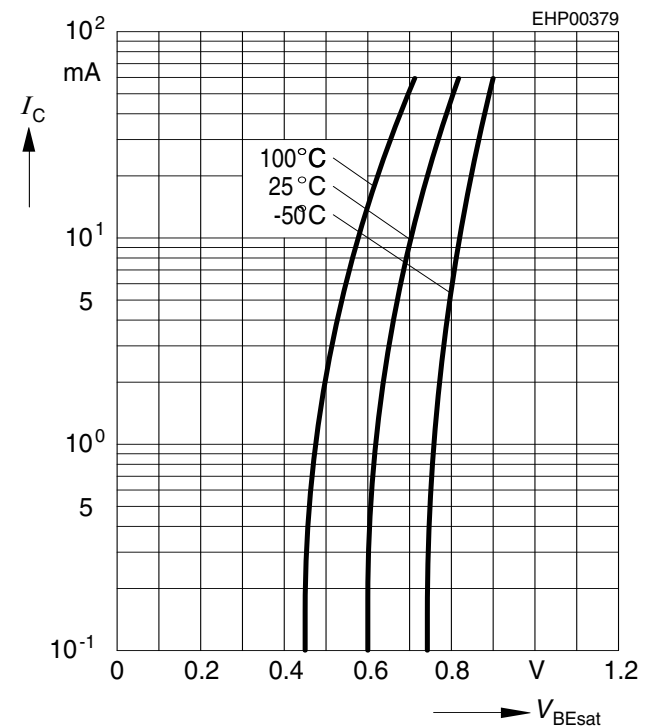**Collector-emitter saturation voltage**

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

EHP00381

10^4
nA

I_{CB0}

10^3
5

max

10^2
5

10^1
5

typ

10^0
5

10^{-1}

0　　　　50　　　　100　　$°C$　150

T_A

EHP00380

10^2
mA

I_C

10^1
5

100 $°C$
25 $°C$
-50 $°C$

10^0
5

10^{-1}

0　0.1　0.2　0.3　0.4　V　0.5

V_{CEsat}

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

V_{CE} = 5V

Base-emitter saturation voltage

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

EHP00382

10^3
5

h_{FE}

100$°C$

25$°C$

-50$°C$

10^2
5

10^1
5

10^0

10^{-2}　5　10^{-1}　5　10^0　5　10^1　mA　10^2

I_C

EHP00379

10^2
mA

I_C

100$°C$
25 $°C$
-50$°C$

10^1
5

10^0
5

10^{-1}

0　0.2　0.4　0.6　0.8　V　1.2
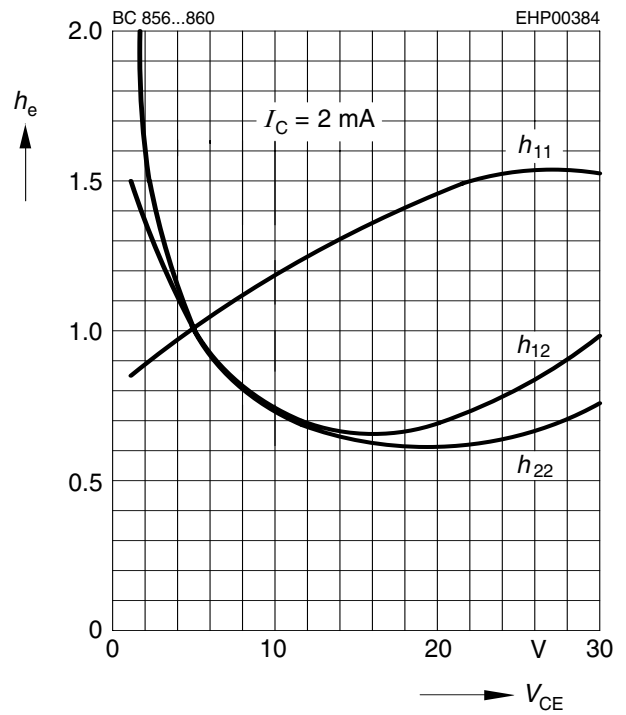
V_{BEsat}

Dec-11-2001

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

V_{CE} = 5V
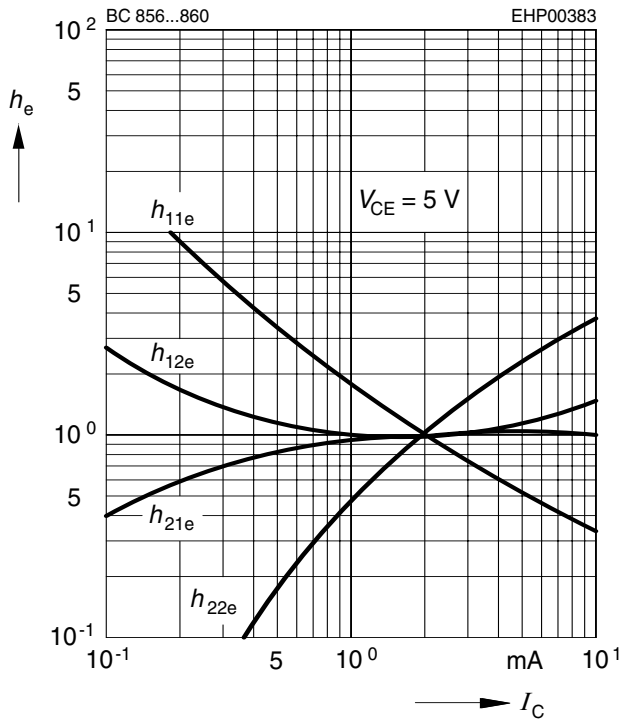
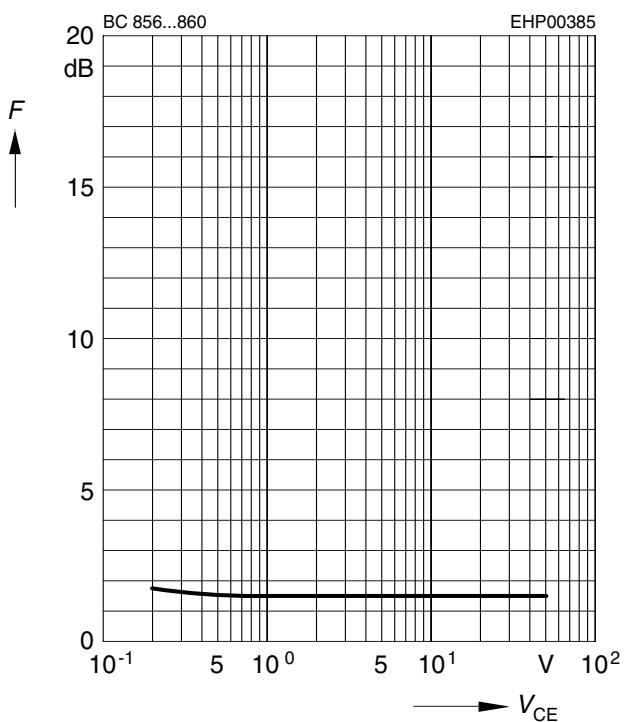

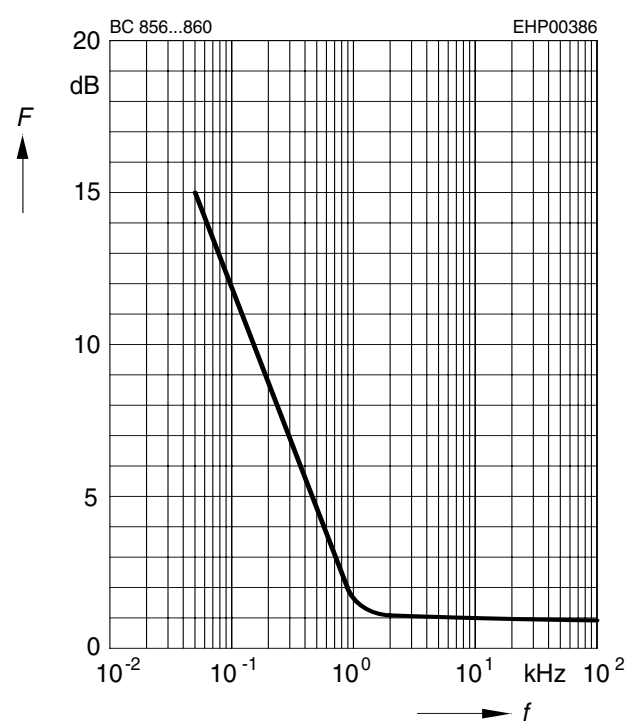**h parameter** $h_e = f(V_{CE})$ **normalized**

I_C = 2mA

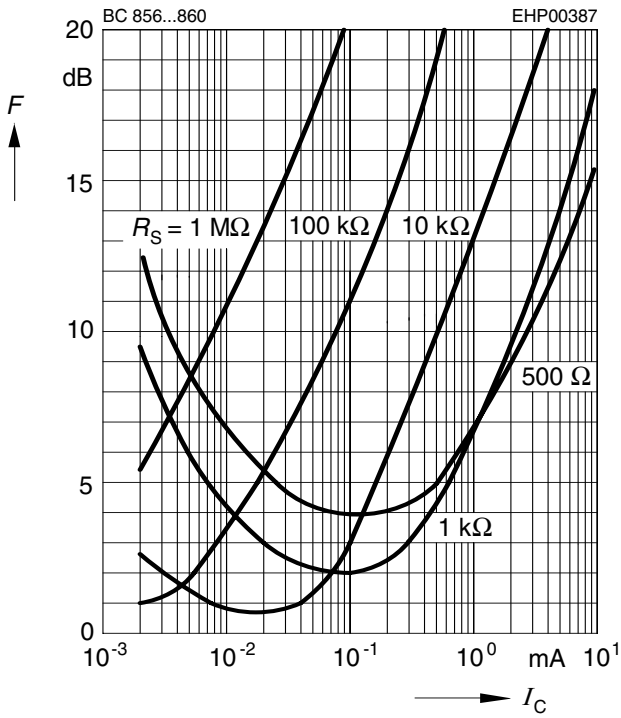**Noise figure** $F = f(V_{CE})$

I_C = 0.2mA, R_S = 2kΩ, f = 1kHz

Noise figure $F = f(f)$

I_C = 0.2mA, V_{CE} = 5V, R_S = 2kΩ
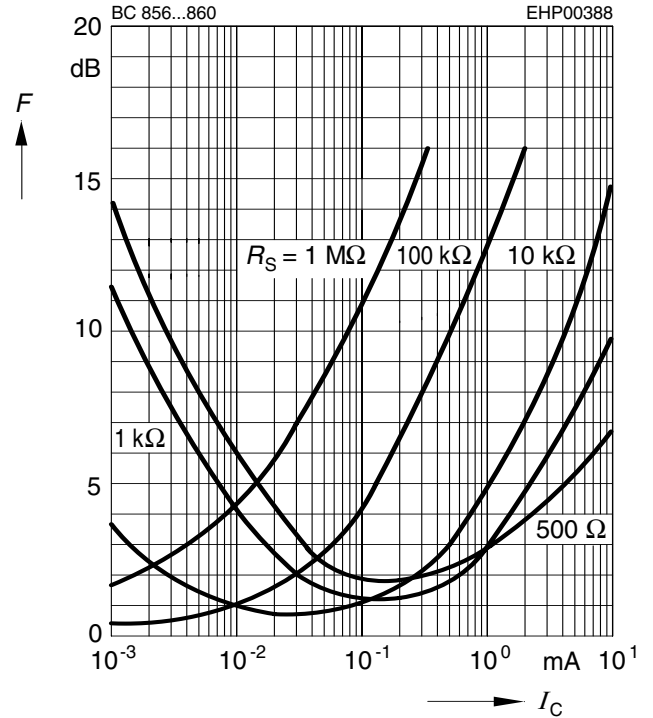
Dec-11-2001

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

Dec-11-2001