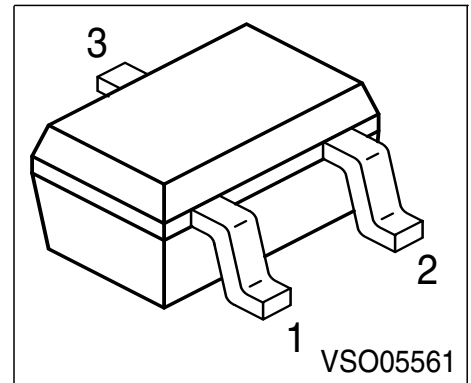**NPN Silicon AF Transistors**

- 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 856W, BC 857W, BC 858W
  BC 959W, BC 860W (PNP)

VSO05561

Type	Marking	Pin Configuration			Package
BC 846AW	1As	1 = B	2 = E	3 = C	SOT-323
BC 846BW	1Bs	1 = B	2 = E	3 = C	SOT-323
BC 847AW	1Es	1 = B	2 = E	3 = C	SOT-323
BC 847BW	1Fs	1 = B	2 = E	3 = C	SOT-323
BC 847CW	1Gs	1 = B	2 = E	3 = C	SOT-323
BC 848AW	1Js	1 = B	2 = E	3 = C	SOT-323
BC 848BW	1Ks	1 = B	2 = E	3 = C	SOT-323
BC 848CW	1Ls	1 = B	2 = E	3 = C	SOT-323
BC 849BW	2Bs	1 = B	2 = E	3 = C	SOT-323
BC 849CW	2Cs	1 = B	2 = E	3 = C	SOT-323
BC 850BW	2Fs	1 = B	2 = E	3 = C	SOT-323
BC 850CW	4Gs	1 = B	2 = E	3 = C	SOT-323

Sep-28-1999

Maximum Ratings

Parameter	Symbol	BC 846W BC 850W	BC 847W BC 849W	BC 848W	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	V
Emitter-base voltage	V_{EBO}	6	6	5	V
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 = 124 °C	P_{tot}		250		mW
Junction temperature	T_j		150		°C
Storage temperature	T_{stg}		-65 ... 150		

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction ambient [1]	R_{thJA}	≤ 240	K/W
Junction - soldering point	R_{thJS}	≤ 105	

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 BC846W		65	-	-	
BC847/850W		45	-	-	
BC848/849W		30	-	-	
Collector-base breakdown voltage	$V_{(BR)CBO}$				
I_C = 10 µA, I_B = 0 BC 846W		80	-	-	
BC 847/850W		50	-	-	
BC 848/849W		30	-	-	

1) Package mounted on pcb 40mm x 40mm x 1.5mm / 1cm^2 Cu

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	BC 846W		80	-	-	
	BC 847/850W		50	-	-	
	BC 848/849W		30	-	-	
Emitter-base breakdown voltage		$V_{(BR)EBO}$				
I_E = 1 µA, I_C = 0	BC 846/847W		6	-	-	
	BC 848-850W		5	-	-	
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**		110	180	220	
	h_{FE}-group **B**		200	290	450	
	h_{FE}-group **C**		420	520	800	
Collector-emitter saturation voltage1)		V_{CEsat}				mV
I_C = 10 mA, I_B = 0.5 mA			-	90	250	
I_C = 100 mA, I_B = 5 mA			-	200	600	
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			-	900	-	
Base-emitter voltage 1)		$V_{BE(ON)}$				
I_C = 2 mA, V_{CE} = 5 V			580	660	700	
I_C = 10 mA, V_{CE} = 5 V			-	-	770	

1) Pulse test: t $\leq$ 300µs, D = 2%

Sep-28-1999

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}	-	2	3	pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	10	15	
Short-circuit input impedance I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz h_{FE}-gr.**A** h_{FE}-gr.**B** h_{FE}-gr.**C**	h_{11e}	- - -	2.7 4.5 8.7	- - -	kΩ
Open-circuit reverse voltage transf.ratio I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz h_{FE}-gr.**A** h_{FE}-gr.**B** h_{FE}-gr.**C**	h_{12e}	- - -	1.5 2 3	- - -	10^{-4}
Short-circuit forward current transf.ratio I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz h_{FE}-gr.**A** h_{FE}-gr.**B** h_{FE}-gr.**C**	h_{21e}	- - -	200 330 600	- - -	-
Open-circuit output admittance I_C = 2 mA, V_{CE} = 5 V, f = 1 kHz h_{FE}-gr.**A** h_{FE}-gr.**B** h_{FE}-gr.**C**	h_{22e}	- - -	18 30 60	- - -	µS
Noise figure I_C = 200 µA, V_{CE} = 5 V, R_S = 2 kΩ, f = 1 kHz, Δ f = 200 Hz BC 846W BC 847W BC 848W	F	-	-	10	dB
Noise figure I_C = 200 µA, V_{CE} = 5 V, R_S = 2 kΩ, f = 1 kHz, Δ f = 200 Hz BC 849W BC 850W	F	- -	1.2 1	4 4	
Equivalent noise voltage I_C = 200 µA, V_{CE} = 5 V, R_S = 2 kΩ, f = 10 ... 50 Hz BC 850W	V_n	-	-	0.135	µV

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

* Package mounted on epoxy

Permissible pulse load

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

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

Emitter-base capacitance $C_{\text{EB}} = f(V_{\text{EBO}})$
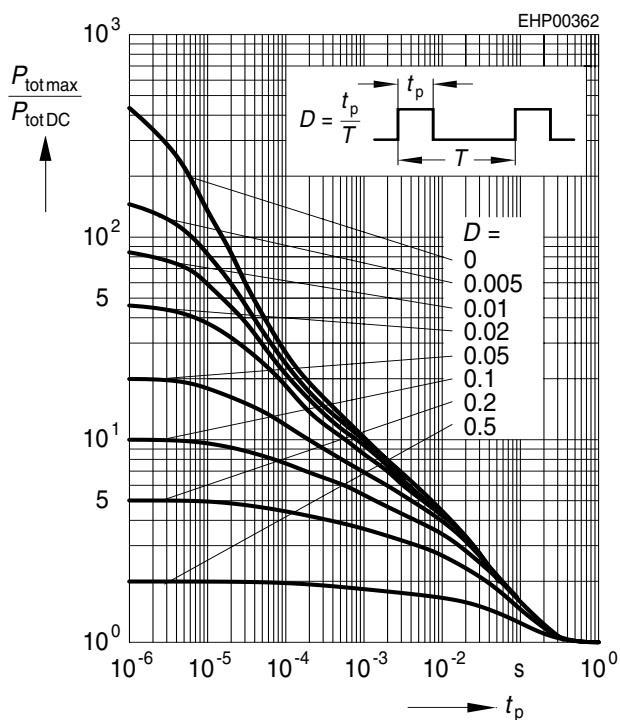
Transition frequency $f_T = f(I_C)$

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

5
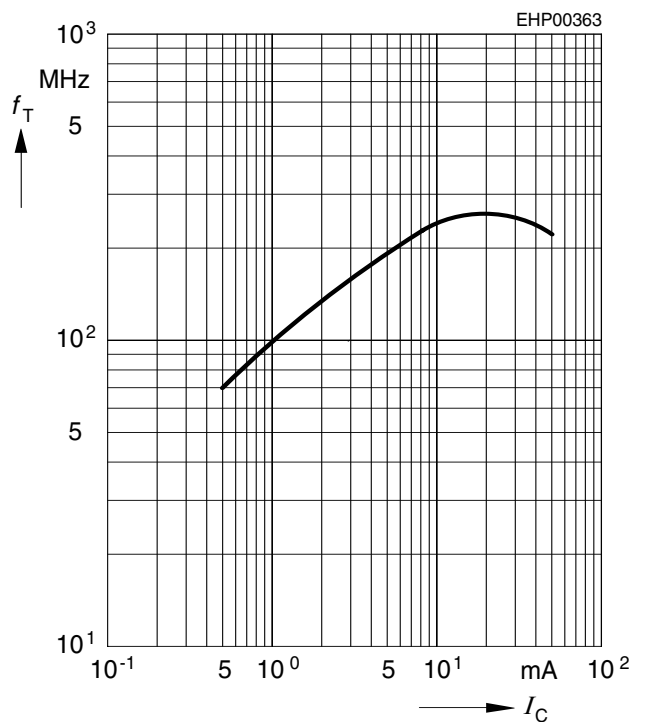
Collector cutoff current $I_{CBO} = f(T_A)$

$V_{CB} = 30V$

EHP00381
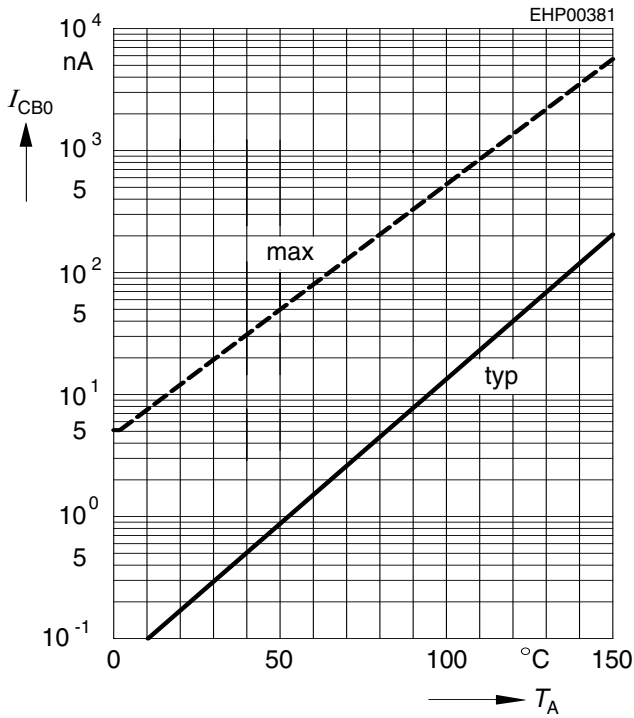
Collector-emitter saturation voltage

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

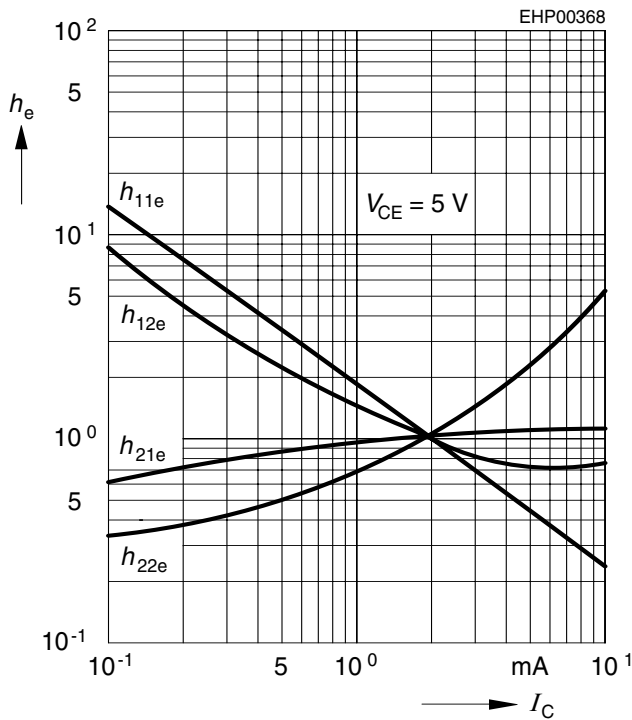EHP00367
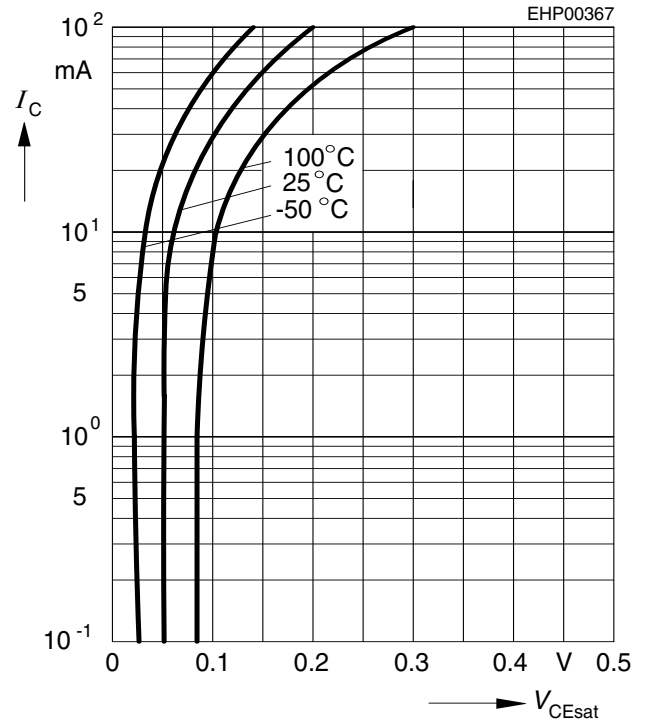
DC current gain $h_{FE} = f(I_C)$

$V_{CE} = 5V$

EHP00365
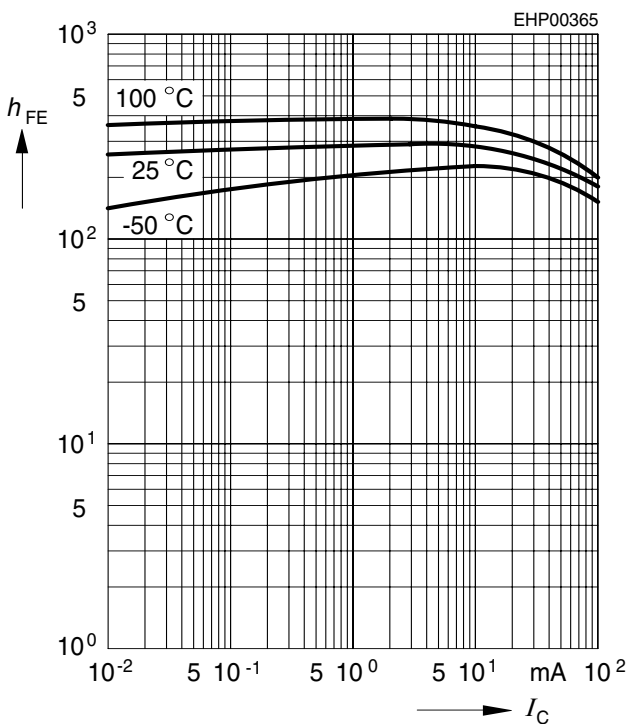
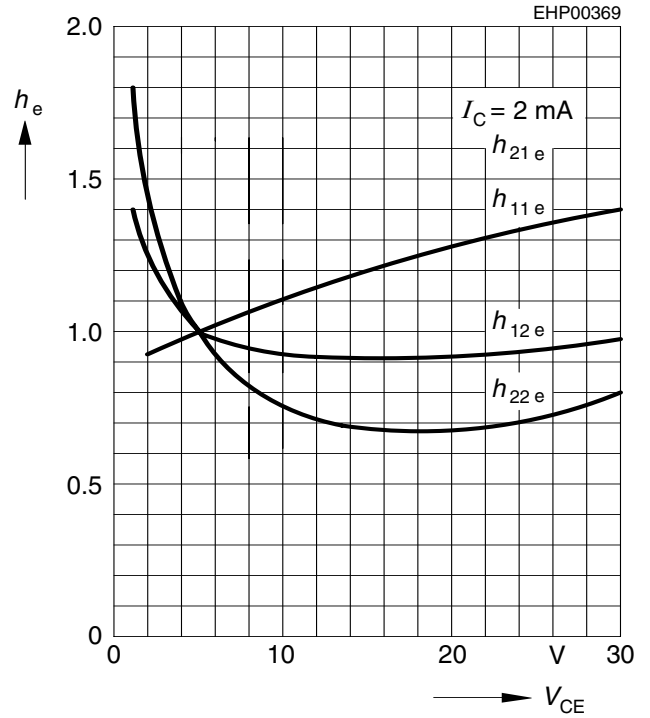**Base-emitter saturation voltage**

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

EHP00364

6

Sep-28-1999
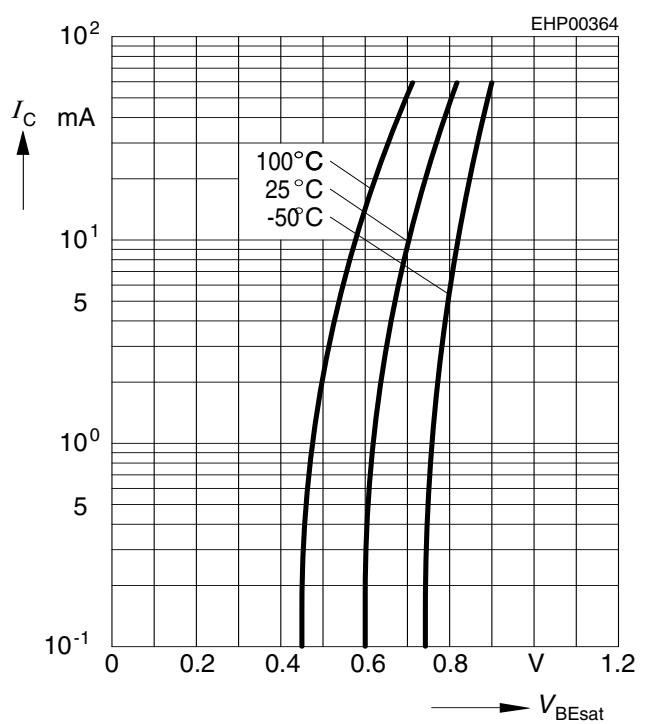
h parameter $h_e = f(I_C)$ **normalized**

$V_{CE} = 5V$

EHP00368

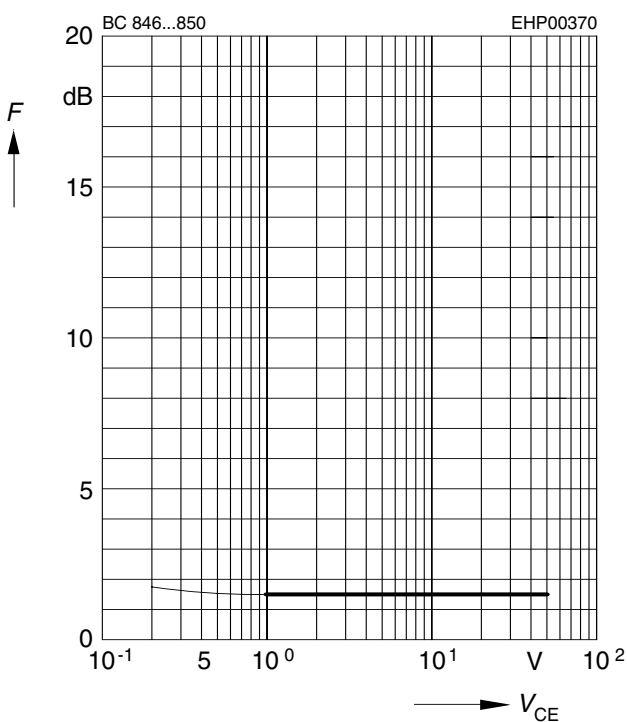**h parameter** $h_e = f(V_{CE})$ **normalized**

$I_C = 2mA$

EHP00369

Noise figure $F = f(V_{CE})$
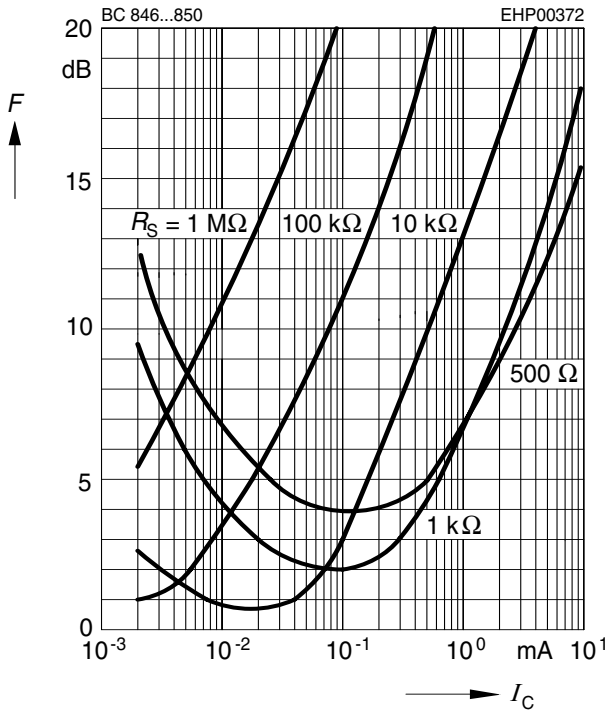
$I_C = 0.2mA$, $R_S = 2k\Omega$, $f = 1kHz$

BC 846...850 EHP00370

Noise figure $F = f(f)$

$I_C = 0.2mA$, $V_{CE} = 5V$, $R_S = 2k\Omega$
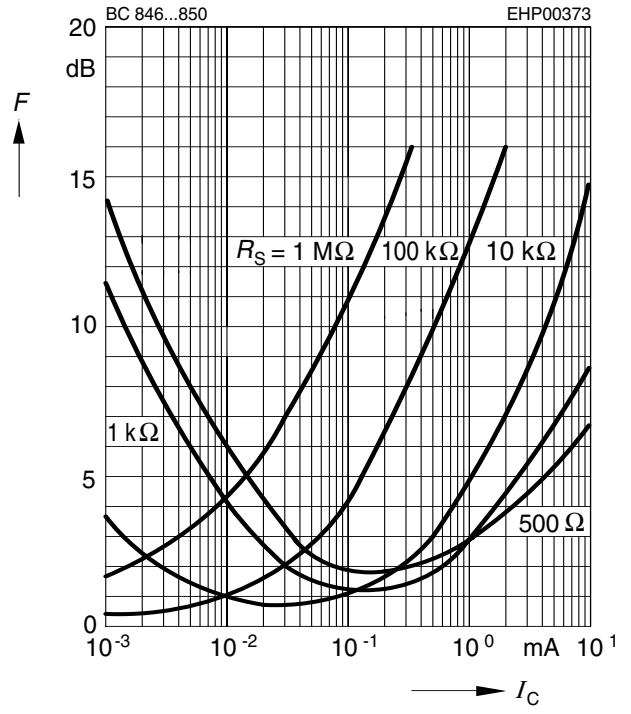
BC 846...850 EHP00371

7
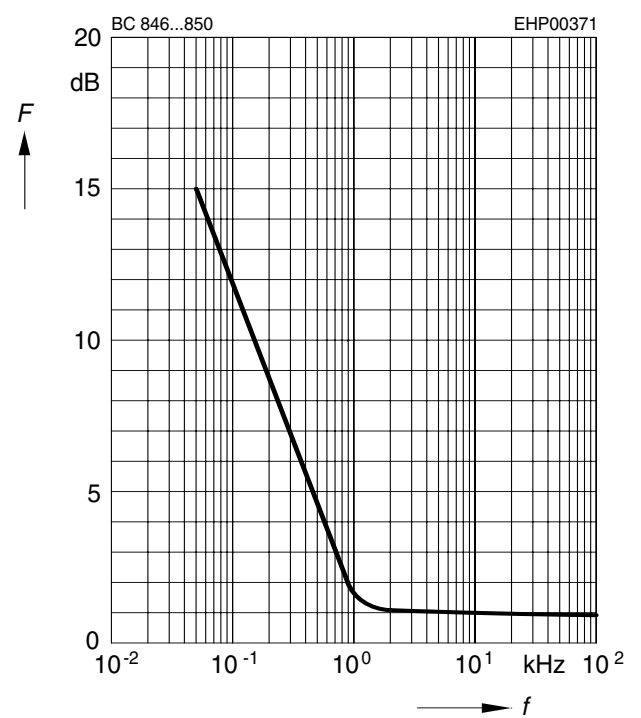
Noise figure $F = f(I_C)$

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

Sep-28-1999