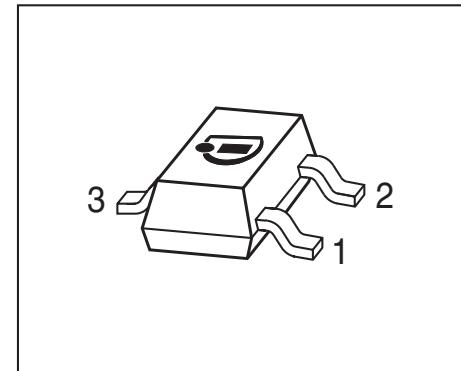


PNP Silicon AF Transistors

- 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: BCW60, BCX70 (NPN)
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



Type	Marking	Pin Configuration			Package
BCW61A	BAs	1=B	2=E	3=C	SOT23
BCW61B	BBs	1=B	2=E	3=C	SOT23
BCW61C	BCs	1=B	2=E	3=C	SOT23
BCW61D	BDs	1=B	2=E	3=C	SOT23
BCX71G	BGs	1=B	2=E	3=C	SOT23
BCX71H	BHs	1=B	2=E	3=C	SOT23
BCX71J	BJs	1=B	2=E	3=C	SOT23
BCX71K	BKs	1=B	2=E	3=C	SOT23

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage BCW61...	V_{CEO}	32	V
BCX71...		45	
Collector-base voltage BCW61...	V_{CBO}	32	
BCX71...		45	
Emitter-base voltage	V_{EBO}	5	
Collector current	I_C	100	mA
Peak collector current, $t_p \leq 10$ ms	I_{CM}	200	
Peak base current	I_{BM}	200	
Total power dissipation- $T_S \leq 71$ °C	P_{tot}	330	mW
Junction temperature	T_j	150	-
Storage temperature	T_{stg}	-65 ... 150	°C

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R_{thJS}	≤ 240	K/W

¹For calculation of R_{thJA} please refer to Application Note AN077 (Thermal Resistance Calculation)

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 $I_C = 10 \text{ mA}, I_B = 0$, BCW61...	$V_{(\text{BR})\text{CEO}}$	32	-	-	V
$I_C = 10 \text{ mA}, I_B = 0$, BCX71...		45	-	-	
Collector-base breakdown voltage $I_C = 10 \mu\text{A}, I_E = 0$, BCW61...	$V_{(\text{BR})\text{CBO}}$	32	-	-	
$I_C = 10 \mu\text{A}, I_E = 0$, BCX71...		45	-	-	
Emitter-base breakdown voltage $I_E = 1 \mu\text{A}, I_C = 0$	$V_{(\text{BR})\text{EBO}}$	5	-	-	
Collector-base cutoff current $V_{CB} = 32 \text{ V}, I_E = 0$ $V_{CB} = 45 \text{ V}, I_E = 0$ $V_{CB} = 32 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$, BCW61... $V_{CB} = 45 \text{ V}, I_E = 0, T_A = 150^\circ\text{C}$, BCX71...	I_{CBO}	-	-	0.02	μA
Emitter-base cutoff current $V_{EB} = 4 \text{ V}, I_C = 0$	I_{EBO}	-	-	20	nA
DC current gain ¹⁾ $I_C = 10 \mu\text{A}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. A/G}$ $I_C = 10 \mu\text{A}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. B/H}$ $I_C = 10 \mu\text{A}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. C/J}$ $I_C = 10 \mu\text{A}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. D/K}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. A/G}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. B/H}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. C/J}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, h_{FE}\text{-grp. D/K}$ $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}, h_{FE}\text{-grp. A/G}$ $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}, h_{FE}\text{-grp. B/H}$ $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}, h_{FE}\text{-grp. C/J}$ $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}, h_{FE}\text{-grp. D/K}$	h_{FE}	20 30 40 100 120 180 250 380 60 80 100 110	140 200 300 460 170 250 350 500 - - -	- - - - 220 310 460 630 - - -	-

DC Electrical Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Collector-emitter saturation voltage ¹⁾ $I_C = 10 \text{ mA}, I_B = 0.25 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 1.25 \text{ mA}$	V_{CEsat}	-	0.12 0.2	0.25 0.55	V
Base emitter saturation voltage ¹⁾ $I_C = 10 \text{ mA}, I_B = 0.25 \text{ mA}$ $I_C = 50 \text{ mA}, I_B = 1.25 \text{ mA}$	V_{BEsat}	-	0.7 0.83	0.85 1.05	
Base-emitter voltage ¹⁾ $I_C = 10 \mu\text{A}, V_{CE} = 5 \text{ V}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}$ $I_C = 50 \text{ mA}, V_{CE} = 1 \text{ V}$	$V_{BE(ON)}$	- 0.55 -	0.52 0.65 0.78	- 0.75 -	

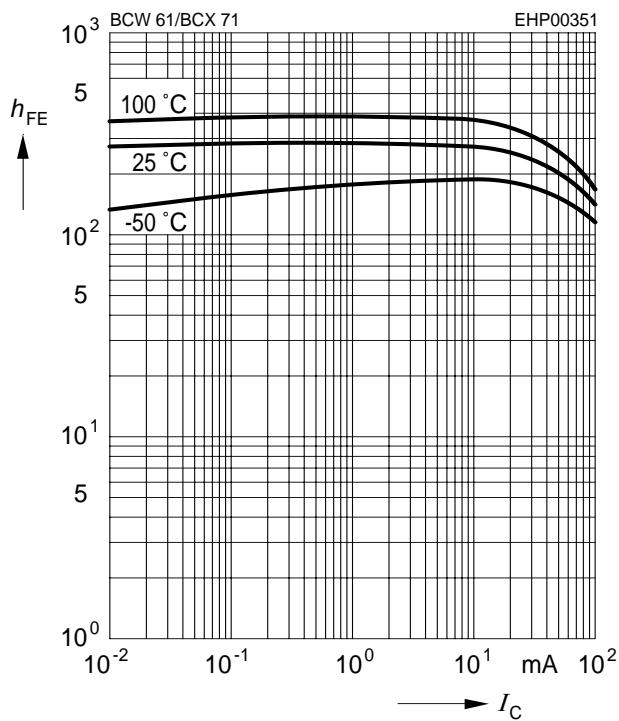
¹⁾Pulse test: t < 300μs; D < 2%

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}	-	1.5	-	pF
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}, f = 1 \text{ MHz}$	C_{eb}	-	8	-	
Short-circuit input impedance $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. A/B}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. B/H}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. C/J}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. D/K}$	h_{11e}	-	2.7 3.6 4.5 7.5	-	kΩ
Open-circuit reverse voltage transf. ratio $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. A/B}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. B/H}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. C/J}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. D/K}$	h_{12e}	-	1.5 2 2 3	-	10^{-4}
Short-circuit forward current transf. ratio $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. A/B}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. B/H}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. C/J}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. D/K}$	h_{21e}	-	200 260 330 520	-	-
Open-circuit output admittance $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. A/B}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. B/H}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. C/J}$ $I_C = 2 \text{ mA}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz}, h_{FE}-\text{grp. D/K}$	h_{22e}	-	18 24 30 50	-	μS
Noise figure $I_C = 200 \mu\text{A}, V_{CE} = 5 \text{ V}, f = 1 \text{ kHz},$ $\Delta f = 200 \text{ Hz}, R_S = 2 \text{ kΩ}, h_{FE}-\text{grp. A/K}$	F	-	2	-	dB

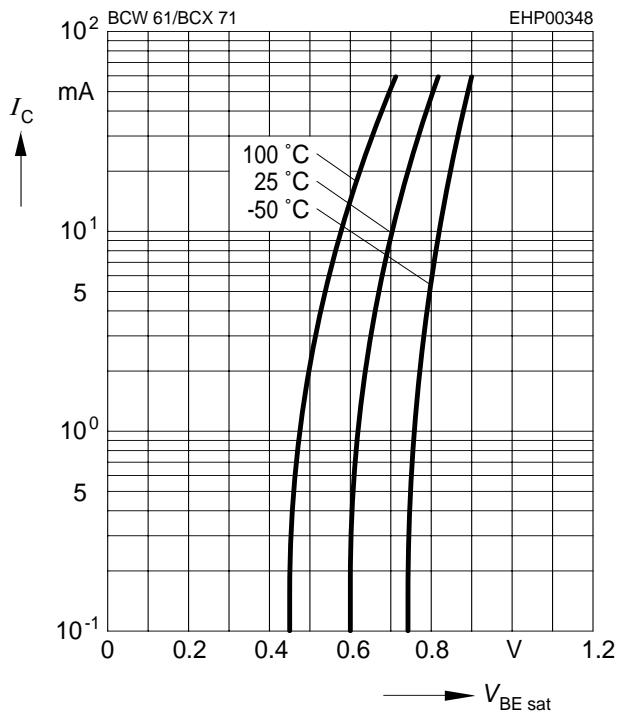
DC current gain $h_{FE} = f(I_C)$

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



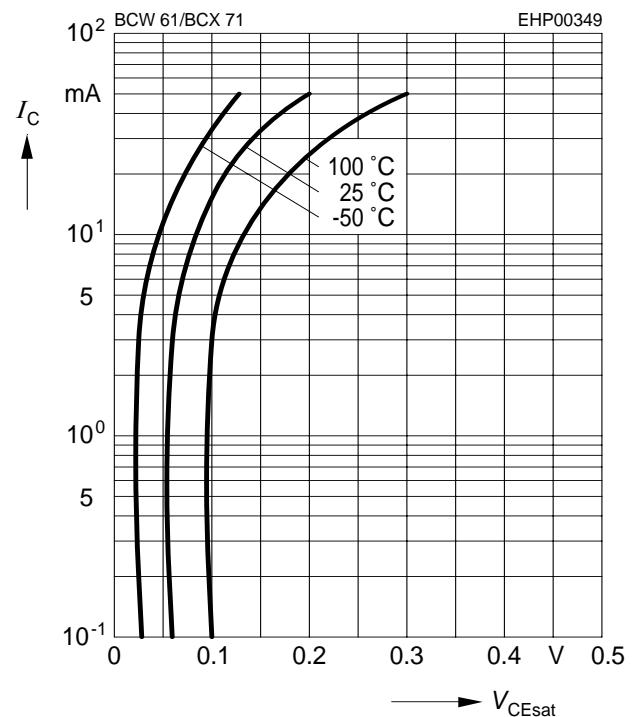
Base-emitter saturation voltage

$I_C = f(V_{BEsat}), h_{FE} = 40$



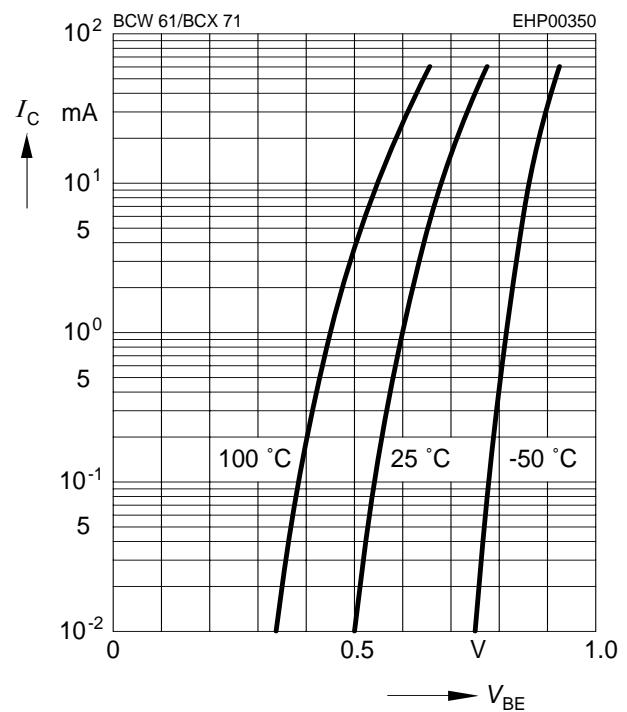
Collector-emitter saturation voltage

$I_C = f(V_{CEsat}), h_{FE} = 40$

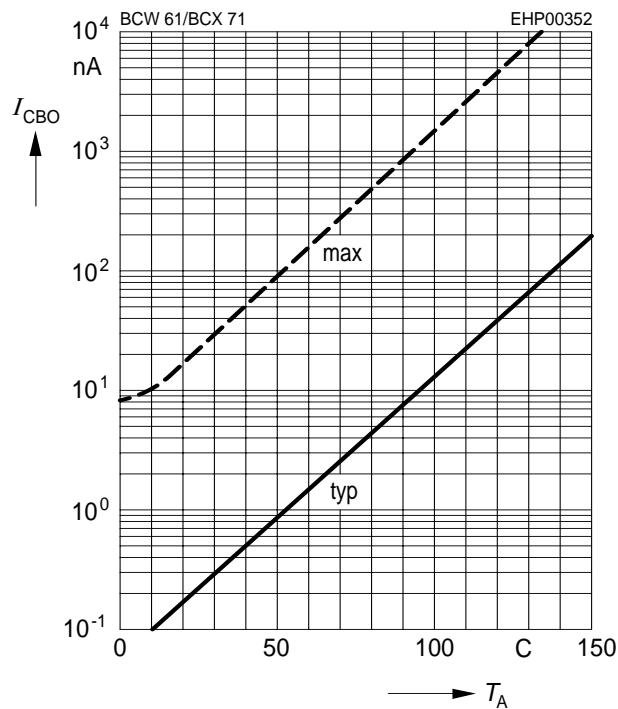


Collector current $I_C = f(V_{BE})$

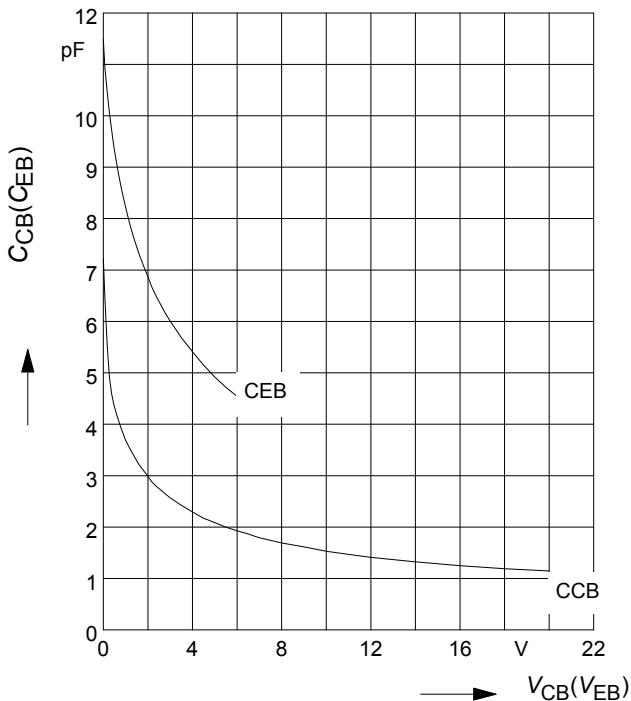
$V_{CE} = 5 \text{ V}$



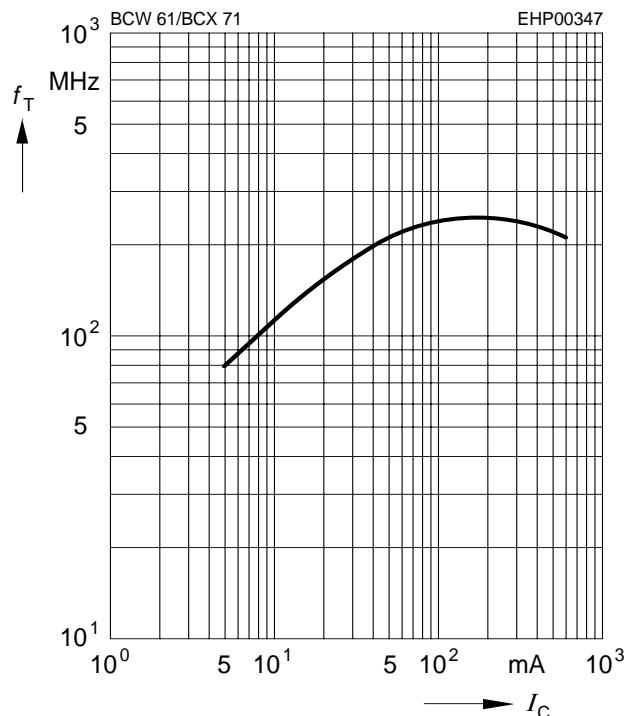
Collector cutoff current $I_{CBO} = f(T_A)$
 $V_{CB} = V_{CEmax}$



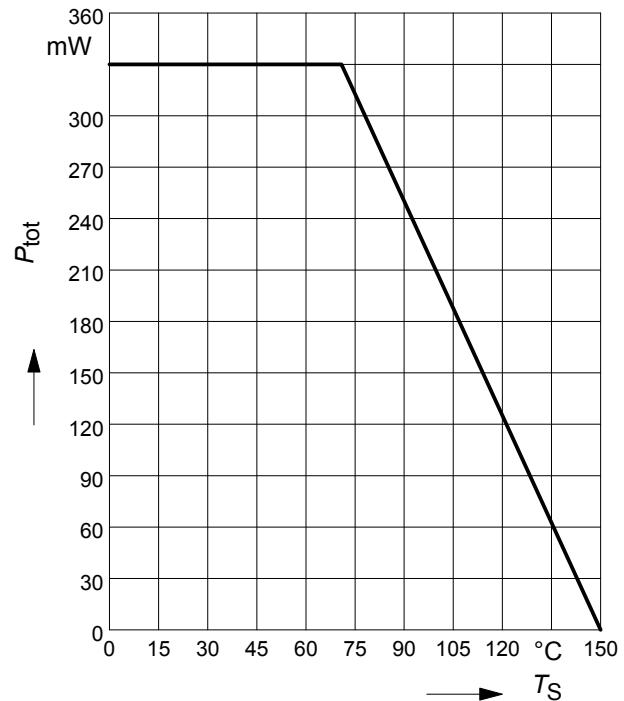
Collector-base capacitance $C_{cb} = f(V_{CB})$
Emitter-base capacitance $C_{eb} = f(V_{EB})$



Transition frequency $f_T = f(I_C)$
 $V_{CE} = \text{parameter in } V, f = 2 \text{ GHz}$

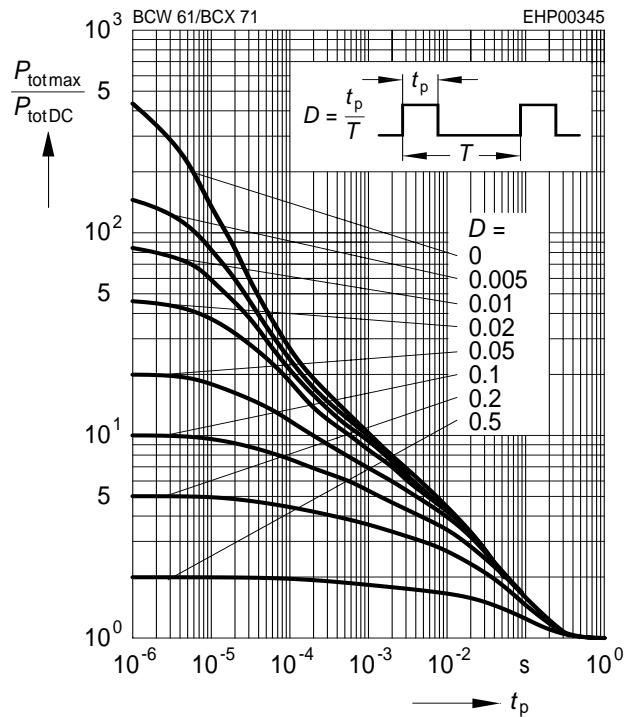


Total power dissipation $P_{tot} = f(T_S)$

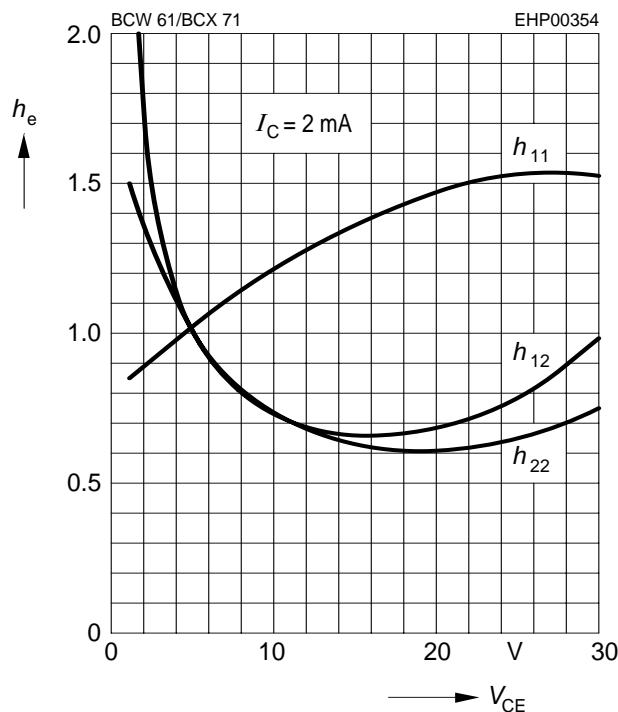


Permissible Pulse Load

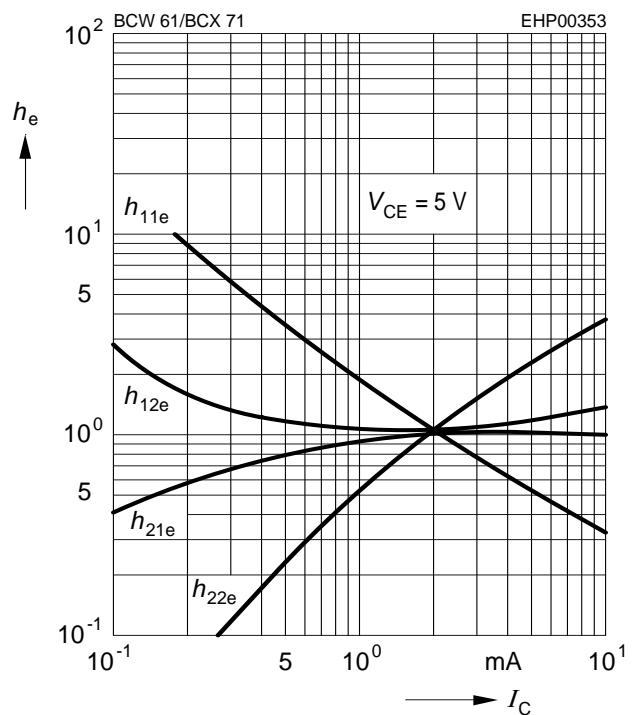
$$P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$$


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

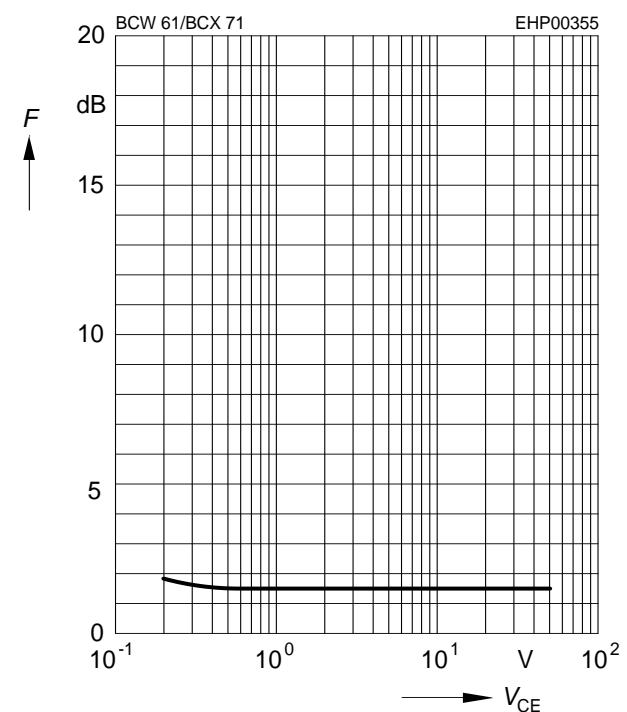
$$I_C = 2 \text{mA}$$


h parameter $h_e = f(I_C)$ normalized

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

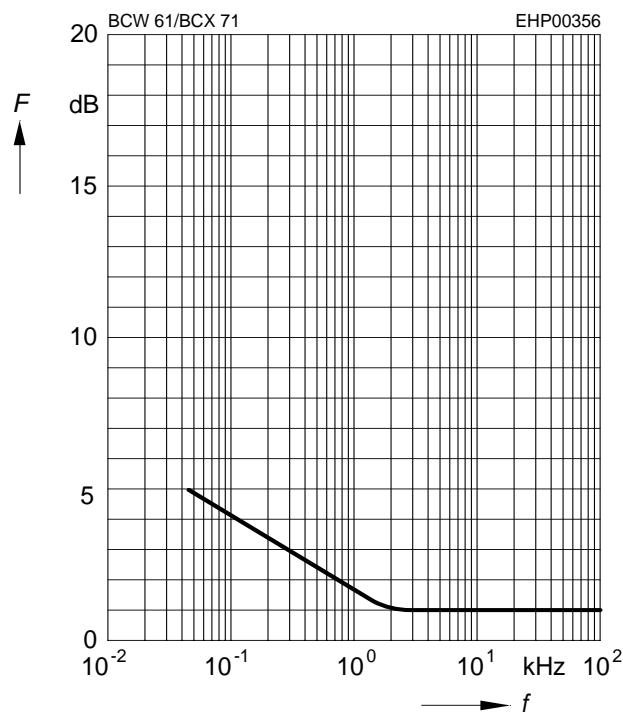

Noise figure $F = f(V_{CE})$

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



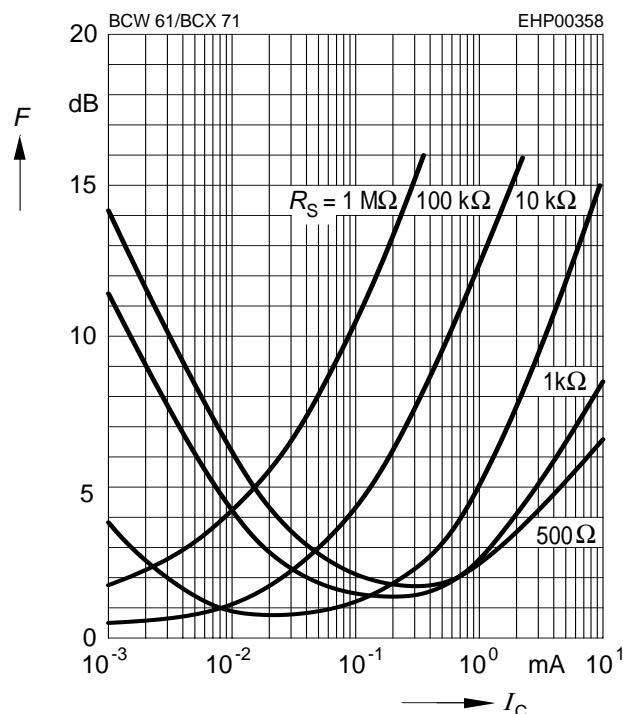
Noise figure $F = f(f)$

$V_{CE} = 5V, Z_S = Z_{Sopt}$



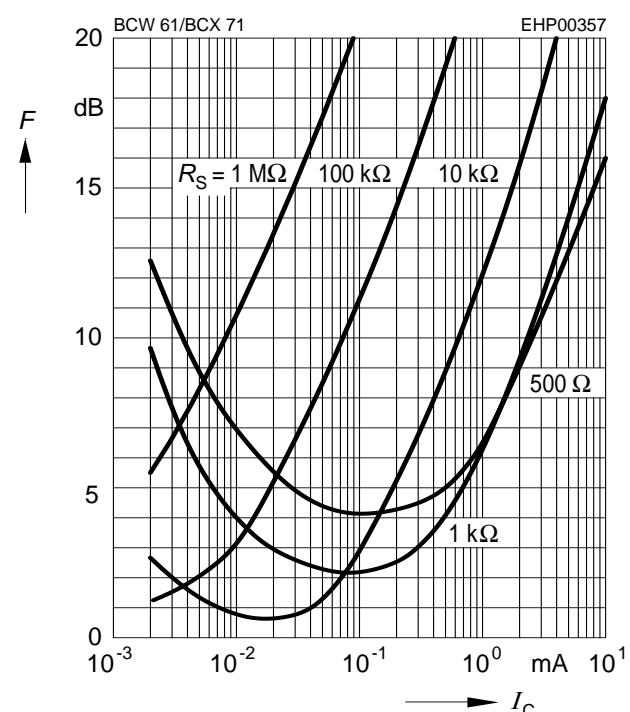
Noise figure $F = f(I_C)$

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



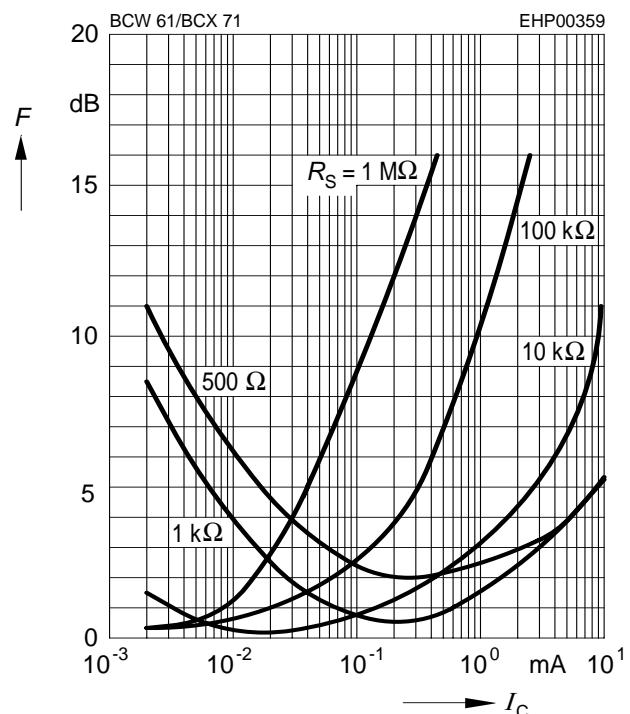
Noise figure $F = f(I_C)$

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

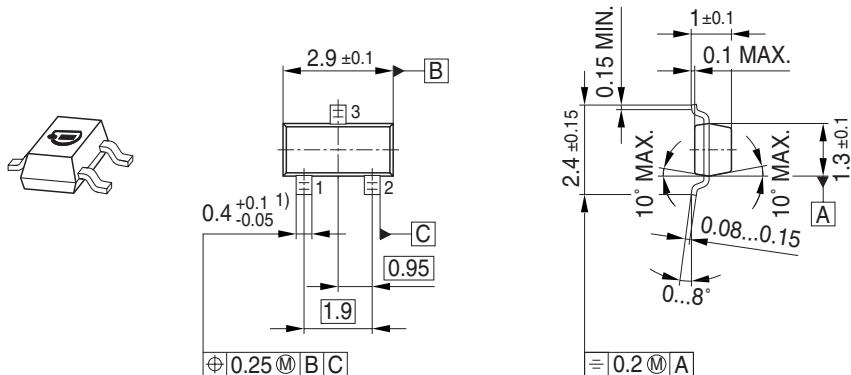


Noise figure $F = f(I_C)$

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

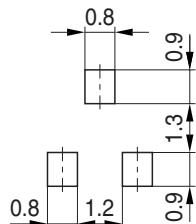


Package Outline

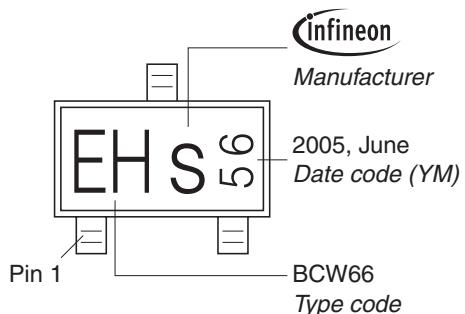


1) Lead width can be 0.6 max. in dambar area

Foot Print

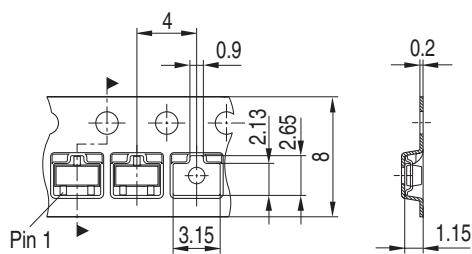


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel



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