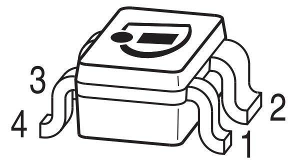
NPN Silicon RF Transistor



- Low current device suitable e.g. for handhelds
- For high frequency oscillators e.g. DRO for LNB
- For ISM band applications like
  Automatic Meter Reading, Sensors etc.
- Transit frequency f_T = 25 GHz
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101

ESD (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!

Type	**Marking**	**Pin Configuration**						**Package**
BFP410	AKs	1=B	2=E	3=C	4=E	-	-	SOT343

Maximum Ratings at T_A = 25 °C, unless otherwise specified

Parameter	**Symbol**	**Value**	**Unit**
Collector-emitter voltage	V_{CEO}		V
T_A = 25 °C		4.5	
T_A = -55 °C		4.1	
Collector-emitter voltage	V_{CES}	13	
Collector-base voltage	V_{CBO}	13	
Emitter-base voltage	V_{EBO}	1.5	
Collector current	I_C	40	mA
Base current	I_B	6	
Total power dissipation[1)]	P_{tot}	150	mW
$T_S \leq$ 100 °C			
Junction temperature	T_J	150	°C
Ambient temperature	T_A	-55 ... 150	
Storage temperature	T_{Stg}	-55 ... 150	

[1] T_S is measured on the emitter lead at the soldering point to the pcb

Thermal Resistance

Parameter	**Symbol**	**Value**	**Unit**
Junction - soldering point[1)]	R_{thJS}	335	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 I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	4.5	5	-	V
Collector-emitter cutoff current V_{CE} = 2 V, V_{BE} = 0 V_{CE} = 5 V, V_{BE} = 0 , T_A = 85 °C (verified by random sampling)	I_{CES}	 - -	 1 2	 30 50	nA
Collector-base cutoff current V_{CB} = 2 V, I_E = 0	I_{CBO}	-	1	30	
Emitter-base cutoff current V_{EB} = 0.5 V, I_C = 0	I_{EBO}	-	0.001	0.6	µA
DC current gain I_C = 13 mA, V_{CE} = 2 V, pulse measured	h_{FE}	60	95	130	-

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

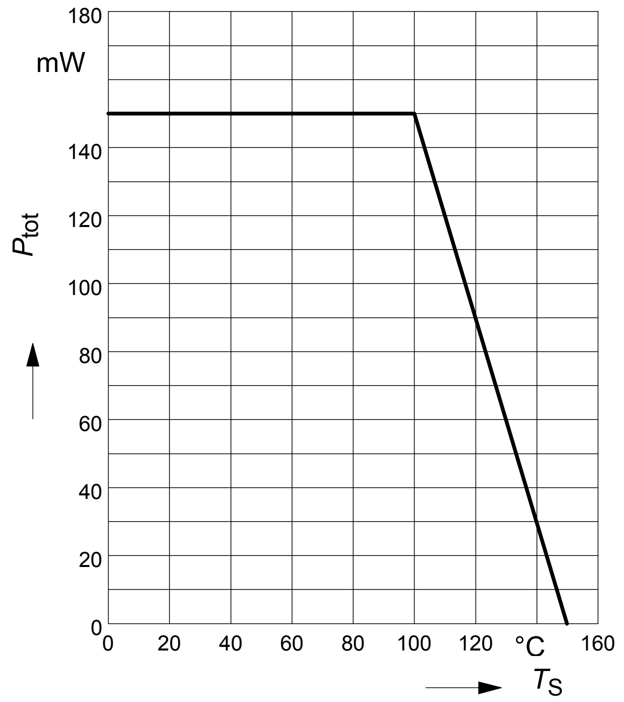
Electrical Characteristics at T_A = 25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency I_C = 20 mA, V_{CE} = 2 V, f = 2 GHz	f_T	18	25	-	GHz
Collector-base capacitance V_{CB} = 2 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.09	0.17	pF
Collector emitter capacitance V_{CE} = 2 V, f = 1 MHz, V_{BE} = 0 , base grounded	C_{ce}	-	0.35	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	C_{eb}	-	0.45	-	
Noise figure I_C = 2 mA, V_{CE} = 2 V, f = 2 GHz, Z_S = Z_{Sopt}	F	-	1.2	-	dB
Power gain, maximum stable[1)] I_C = 20 mA, V_{CE} = 2 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 2 GHz	G_{ms}	-	21.5	-	dB
Insertion power gain V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz, Z_S = Z_L = 50 Ω	$\|S_{21}\|^2$	-	18.5	-	
Third order intercept point at output[2)] V_{CE} = 2 V, I_C = 20 mA, f = 2 GHz, Z_S = Z_L = 50 Ω	IP_3	-	23.5	-	dBm
1dB Compression point at output I_C = 20 mA, V_{CE} = 2 V, Z_S = Z_L = 50 Ω, f = 2 GHz	P_{-1dB}	-	10.5	-	

[1] $G_{ms} = |S_{21} / S_{12}|$

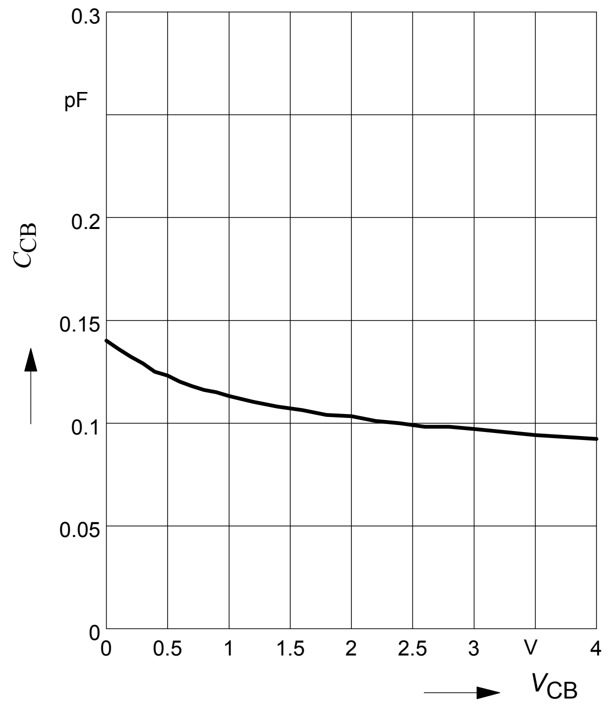
[2] IP3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is 50Ω from 0.1 MHz to 6 GHz

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



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

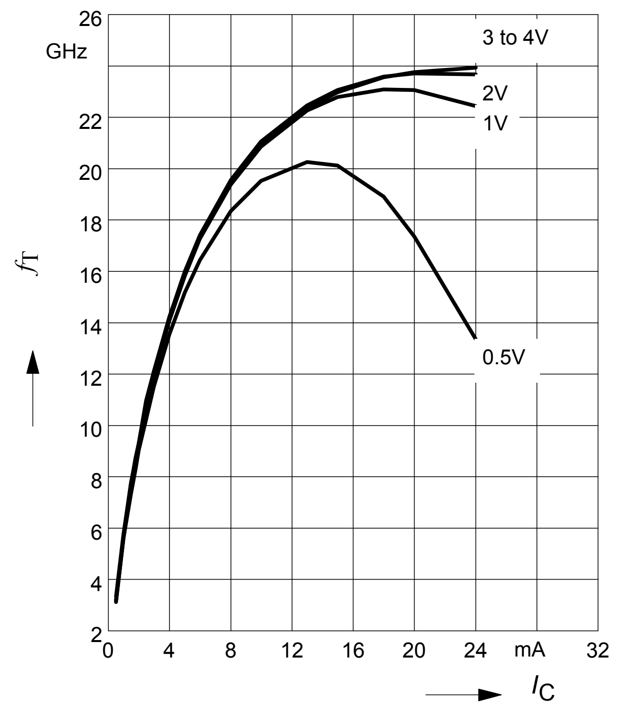
f = 1MHz



Transition frequency $f_T = f(I_C)$

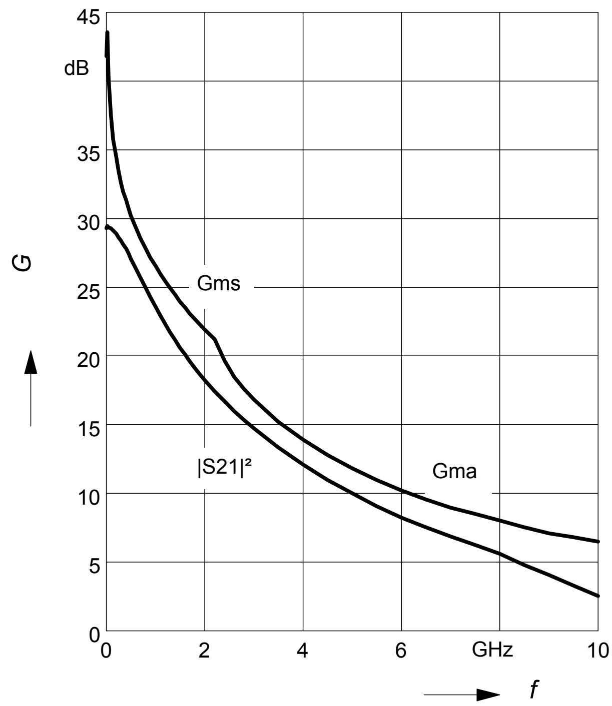
f = 2 GHz

V_{CE} = parameter in V



Power gain G_{ma}, G_{ms}, $|S_{21}|^2 = f\ (f)$

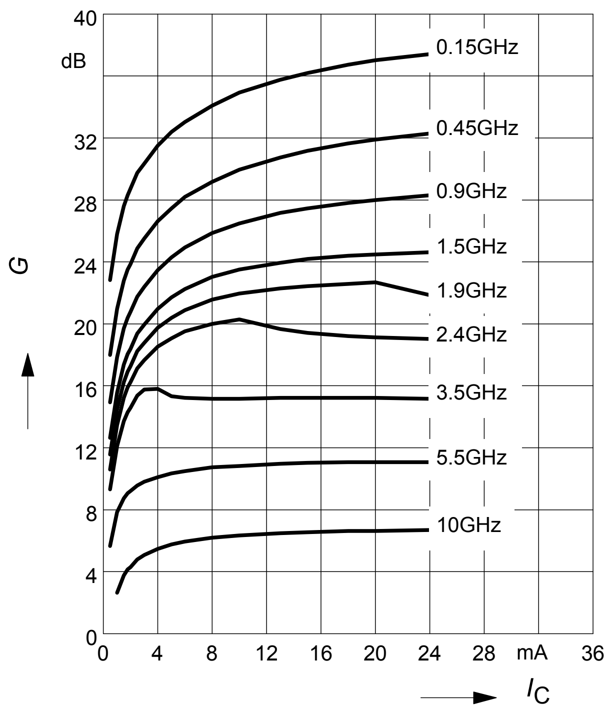
V_{CE} = 2 V, I_C = 13 mA



Power gain G_{ma}, G_{ms} = f (I_C)

V_{CE} = 2V

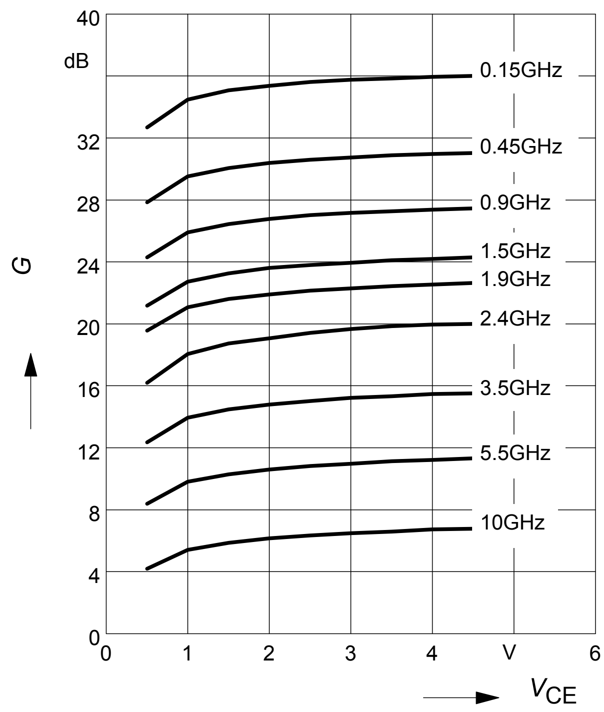
f = parameter in GHz



Power gain G_{ma}, G_{ms} = f (V_{CE})

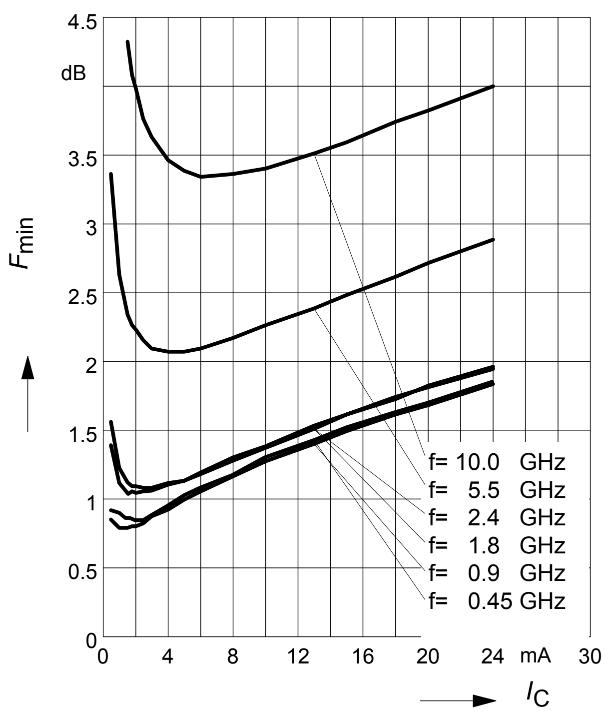
I_C = 13 mA

f = parameter in GHz



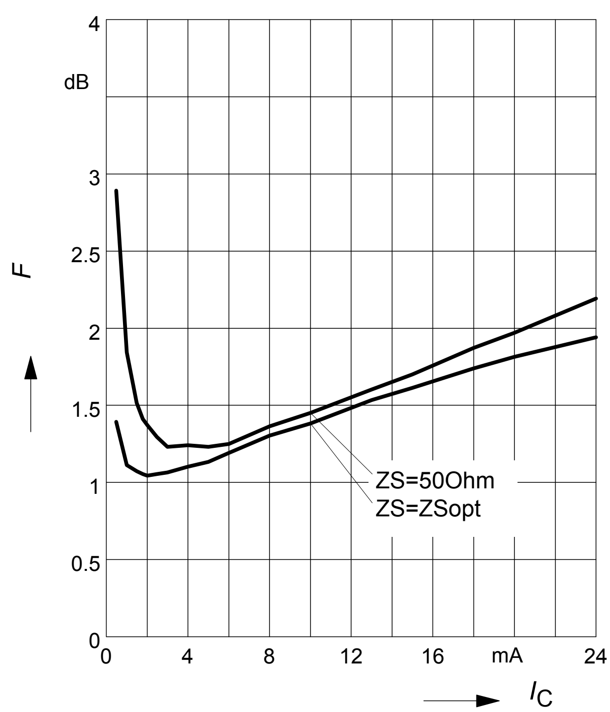
Noise figure F = $f(I_C)$

V_{CE} = 2 V, Z_S = Z_{Sopt}



Noise figure F = $f(I_C)$

V_{CE} = 2 V, f = 2 GHz



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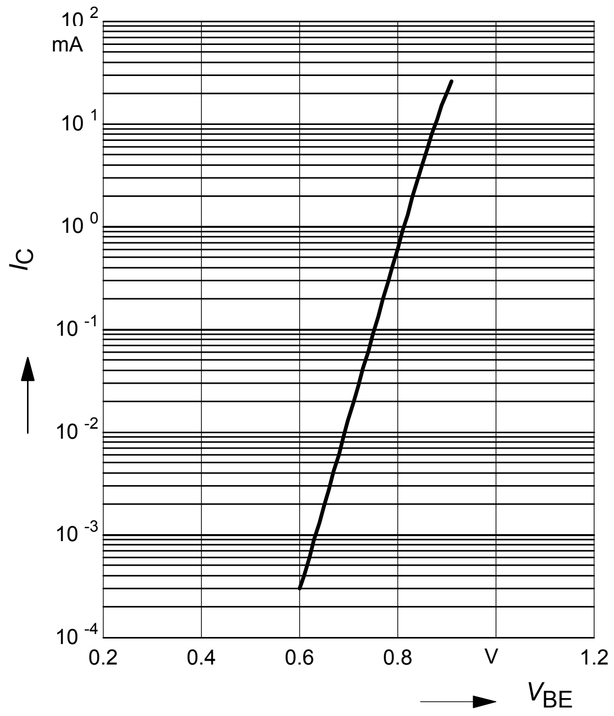
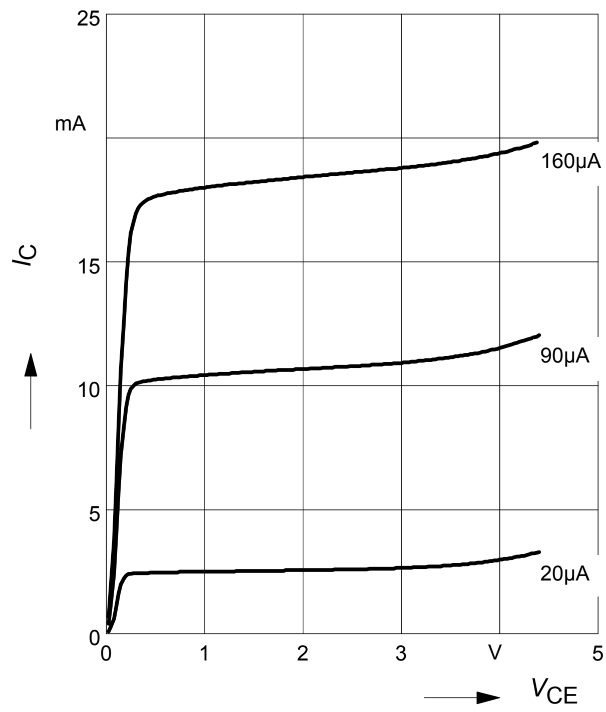
Collector current $I_C = f(V_{BE})$

V_{CE} =2 V



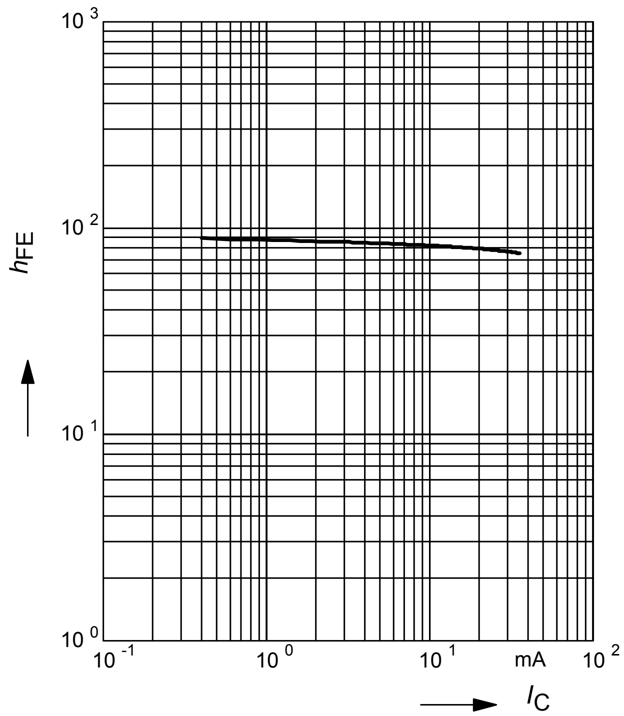
Collector current $I_C = f(V_{CE})$

Parameter I_B

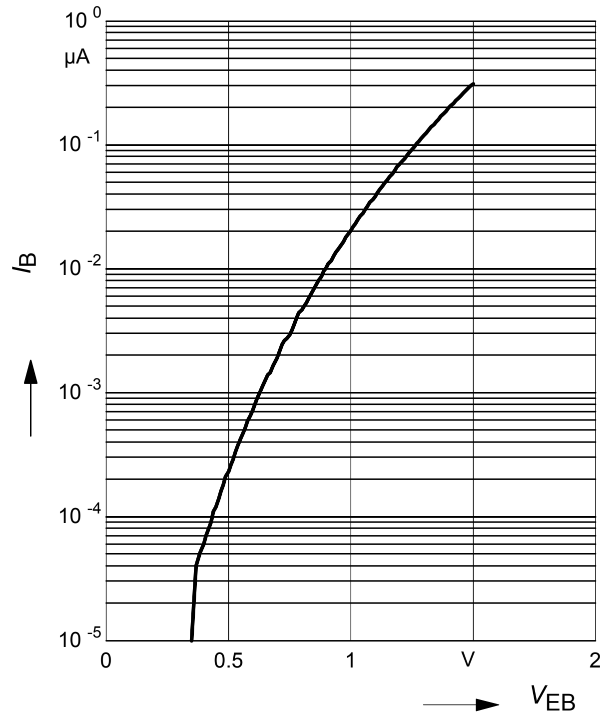


DC current gain $h_{FE} = f(I_C)$

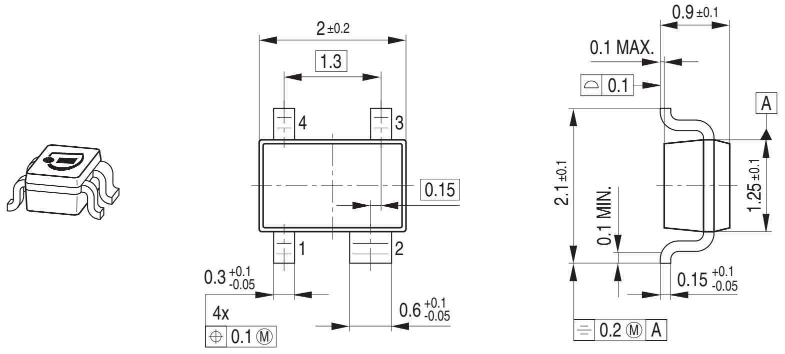
V_{CE} =2 V



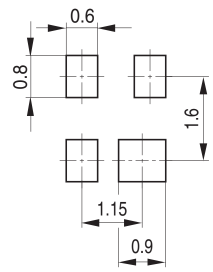
Base current reverse $I_B = f(V_{EB})$



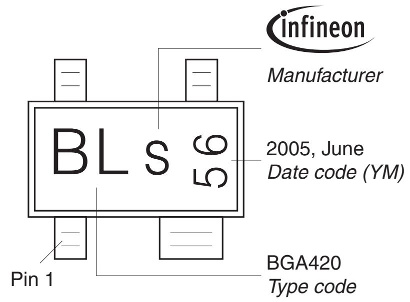
Package Outline



Foot Print

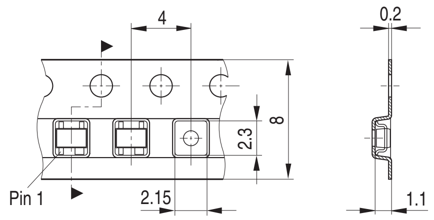


Marking Layout (Example)



Standard Packing

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



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