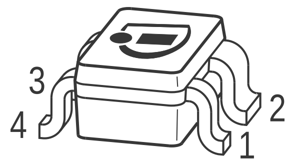
NPN Silicon RF Transistor



- Low noise amplifier designed for low voltage applications, ideal for 1.2 V or 1.8 V supply voltage. Supports 2.9 V V_{cc} with enough external collector resistance.
- High gain and low noise at high frequencies due to high transit frequency f_T = 45 GHz
- Finds usage e.g. in cordless phones and satellite receivers
- Pb-free (RoHS compliant) standard package with visible leads
- Qualified according AEC Q101

AEC Qualified RoHS

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

Type	Marking	Pin Configuration						Package
BFP520	APs	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
		2.5	
T_A = -55 °C		2.4	
Collector-emitter voltage	V_{CES}	10	
Collector-base voltage	V_{CBO}	10	
Emitter-base voltage	V_{EBO}	1	
Collector current	I_C	40	mA
Base current	I_B	4	
Total power dissipation[1)] $T_S \leq 105$ °C	P_{tot}	100	mW
Junction temperature	T_J	150	°C
Storage temperature	T_{Stg}	-55 ... 150	

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

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[1)]	R_{thJS}	≤ 450	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	$V_{(BR)CEO}$	2.5	3	3.5	V
Collector-emitter cutoff current V_{CE} = 2 V, V_{BE} = 0 V_{CE} = 10 V, V_{BE} = 0	I_{CES}	 - -	 1 -	 30 1000	nA
Collector-base cutoff current V_{CB} = 2 V, I_E = 0	I_{CBO}	-	-	30	
Emitter-base cutoff current V_{EB} = 0.5 V, I_C = 0	I_{EBO}	-	100	3000	
DC current gain I_C = 20 mA, V_{CE} = 2 V, pulse measured	h_{FE}	70	110	170	-

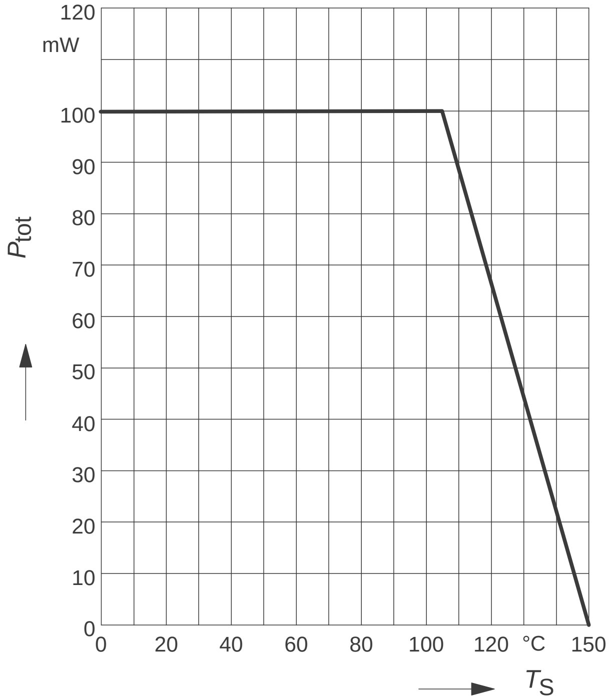
[1]For calculation of R_{thJA} please refer to Application Note AN077 Thermal Resistance

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 = 30 mA, V_{CE} = 2 V, f = 2 GHz	f_T	32	45	-	GHz
Collector-base capacitance V_{CB} = 2 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.07	0.13	pF
Collector emitter capacitance V_{CE} = 2 V, f = 1 MHz, V_{BE} = 0 , base grounded	C_{ce}	-	0.3	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	C_{eb}	-	0.33	-	
Minimum noise figure I_C = 2 mA, V_{CE} = 2 V, $Z_S = Z_{Sopt}$, f = 1.8 GHz	NF_{min}	-	0.95	-	dB
Power gain, maximum stable[1)] I_C = 20 mA, V_{CE} = 2 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 1.8 GHz	G_{ms}	-	24	-	dB
Insertion power gain V_{CE} = 2 V, I_C = 20 mA, f = 1.8 GHz, $Z_S = Z_L$ = 50 Ω	$\|S_{21}\|^2$	-	21.5	-	
Third order intercept point at output V_{CE} = 2 V, I_C = 20 mA, f = 1.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ V_{CE} = 2 V, I_C = 7 mA, f = 1.8 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$	IP_3	 - -	 25 17	 - -	dBm
1dB Compression point at output I_C = 20 mA, V_{CE} = 2 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 1.8 GHz I_C = 7 mA, V_{CE} = 2 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 1.8 GHz	P_{-1dB}	 - -	 12 5	 - -	

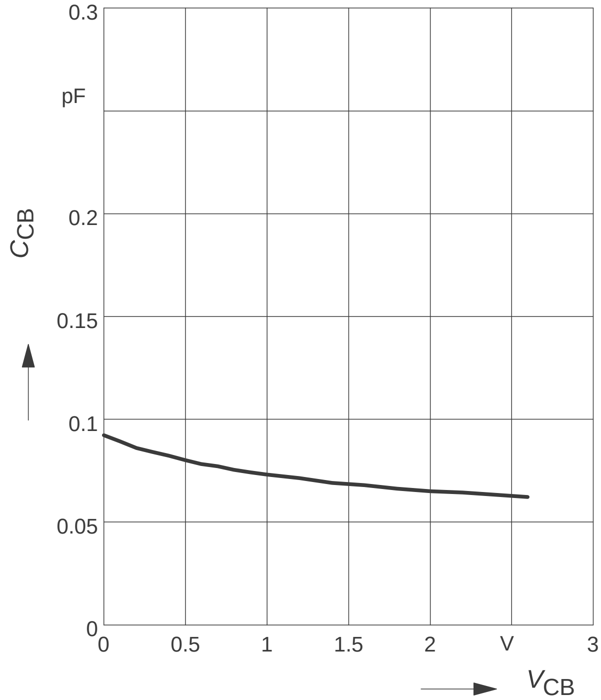
[1]$G_{ms} = \|S_{21} / S_{12}\|$

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



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

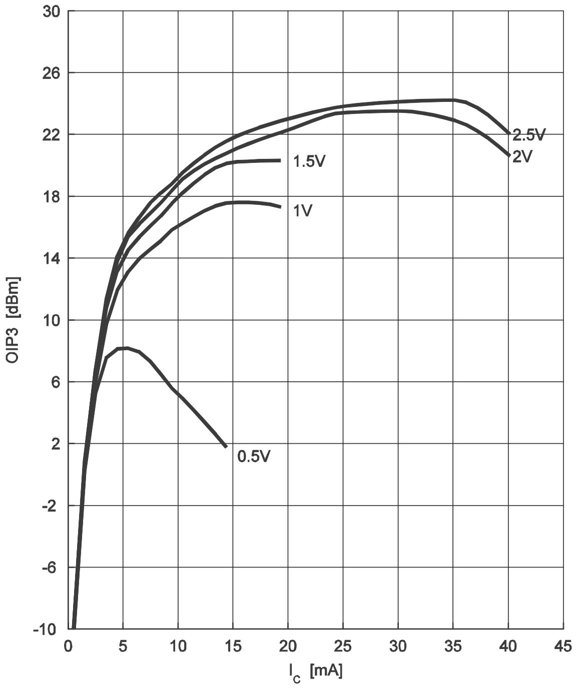
f = 1MHz



Third order Intercept Point $IP_3 = f(I_C)$

(Output, $Z_S = Z_L = 50\ \Omega$)

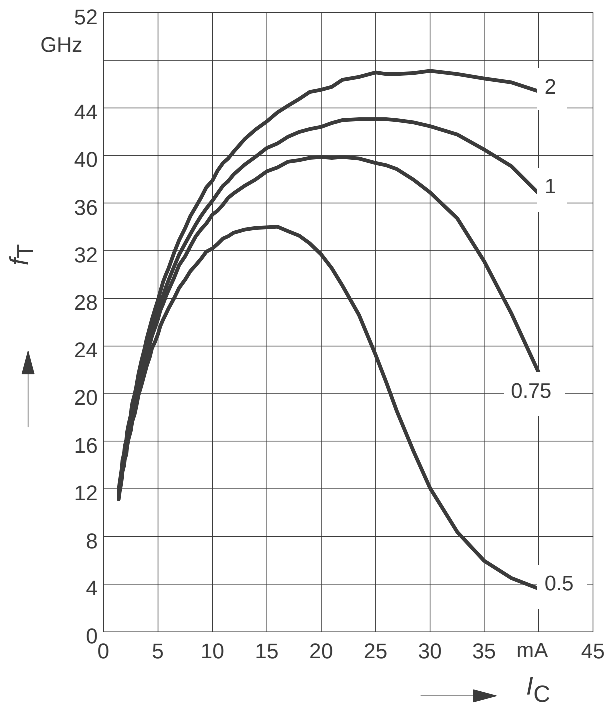
V_{CE} = parameter, f = 900 MHz



Transition frequency $f_T = f(I_C)$

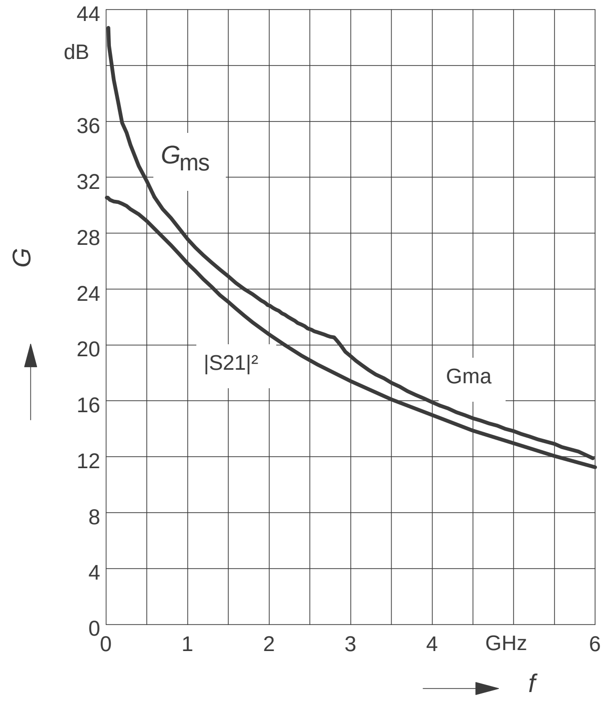
f = 2 GHz

V_{CE} = parameter in V



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

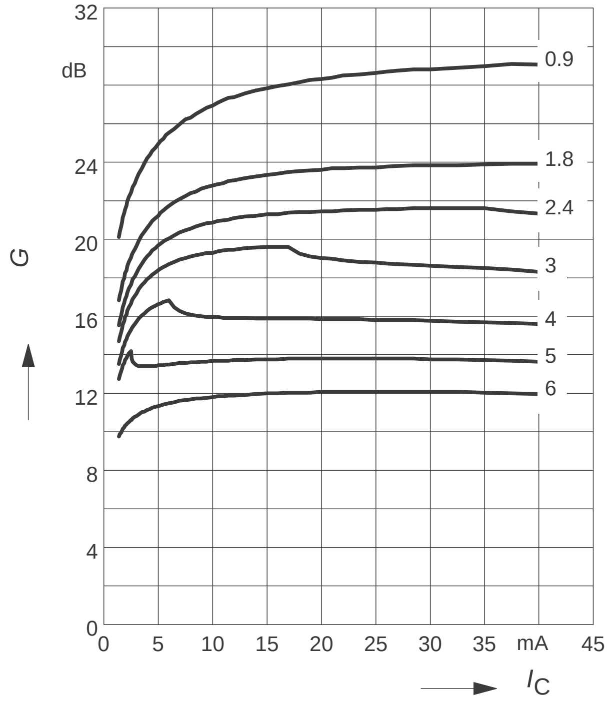
V_{CE} = 2 V, I_C = 20 mA



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

V_{CE} = 2V

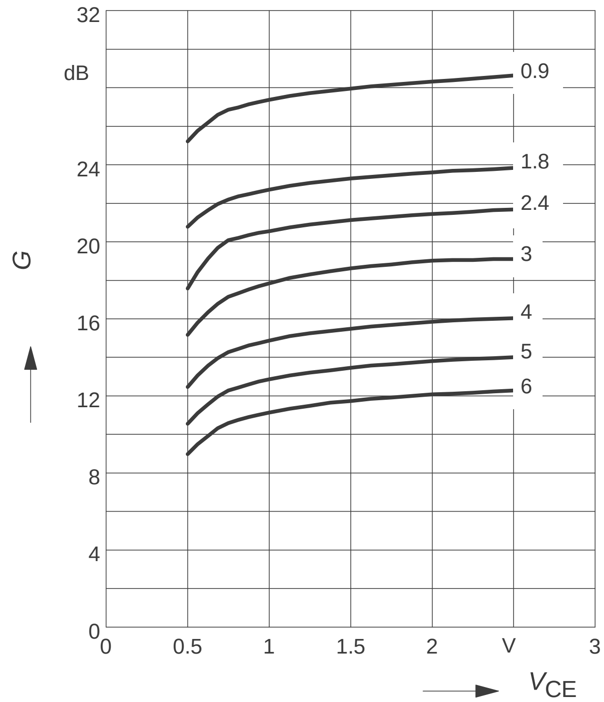
f = parameter in GHz



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

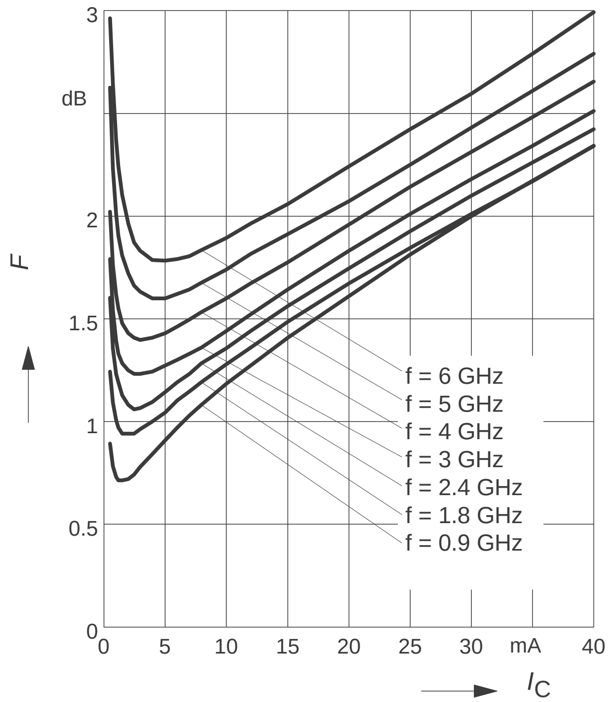
I_C = 20 mA

f = parameter in GHz



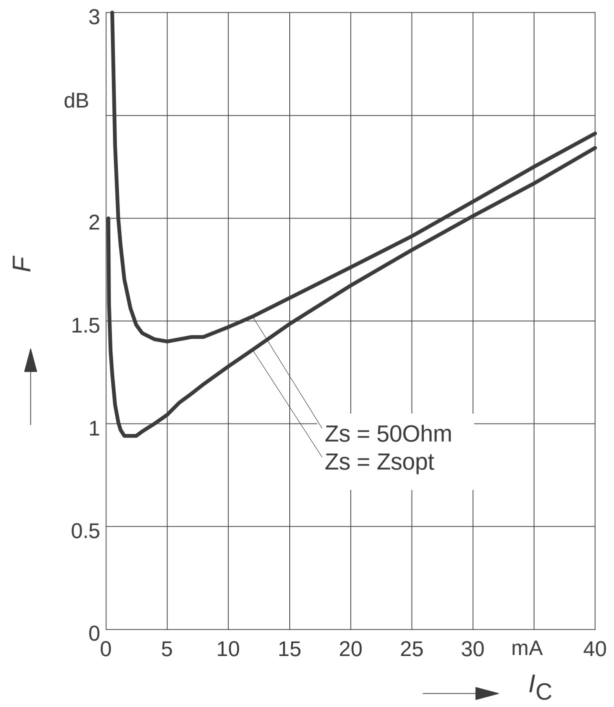
Minimum noise figure NF_{min} = $f(I_C)$

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



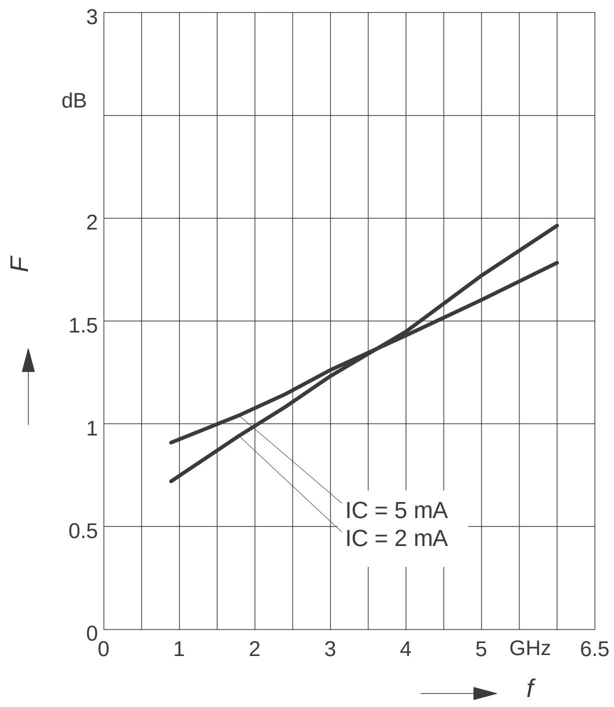
Noise figure $F = f(I_C)$

V_{CE} = 2 V, f = 1.8 GHz



Minimum noise figure $NF_{min} = f(f)$

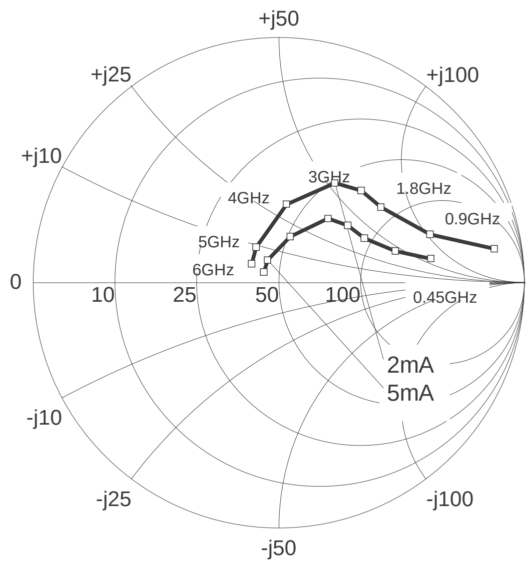
V_{CE} = 2 V, $Z_S = Z_{Sopt}$



Source impedance for min.

noise figure vs. frequency

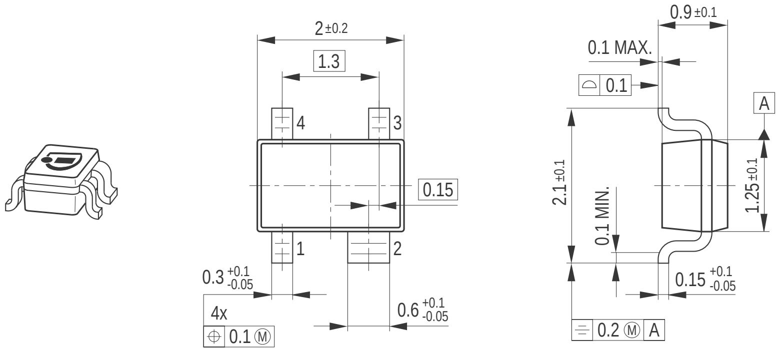
V_{CE} = 2 V, I_C = 2 mA / 5 mA



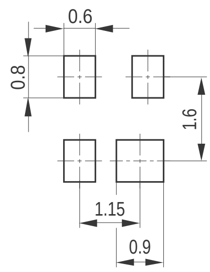
SPICE GP Model

For the SPICE Gummel Poon (GP) model as well as for the S-parameters (including noise parameters) please refer to our internet website www.infineon.com/rf.models.
Please consult our website and download the latest versions before actually starting your design. You find the BFP520 SPICE GP model in the internet in MWO- and ADS-format, which you can import into these circuit simulation tools very quickly and conveniently. The model already contains the package parasitics and is ready to use for DC and high frequency simulations. The terminals of the model circuit correspond to the pin configuration of the device. The model parameters have been extracted and verified up to 10 GHz using typical devices. The BFP520 SPICE GP model reflects the typical DC- and RF-performance within the limitations which are given by the SPICE GP model itself. Besides the DC characteristics all S-parameters in magnitude and phase, as well as noise figure (including optimum source impedance, equivalent noise resistance and flicker noise) and intermodulation have been extracted.

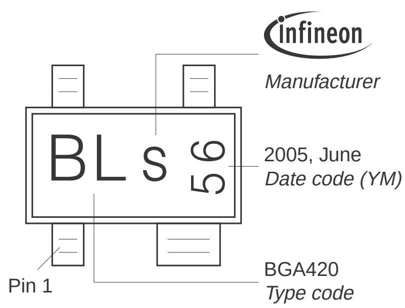
Package Outline



Foot Print

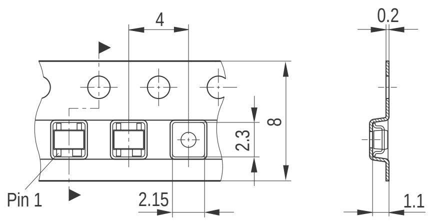


Marking Layout (Example)



Standard Packing

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



Datasheet Revision History: 16 August 2010

This datasheet replaces the revision from 30 March 2007 and 28 June 2010.
The product itself has not been changed and the device characteristics remain unchanged. Only the product description and information available in the datasheet has been expanded and updated.

Previous Revisions: 30 March 2007 and 28 June 2010	
Page	**Subject (changes since last revision)**
1	Feature list updated
2	Typical values for leakage currents included, values for maximum leakage currents reduced
4	OIP3 characteristic added
7	SPICE model parameters removed from the datasheet, link to the respective internet site added

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