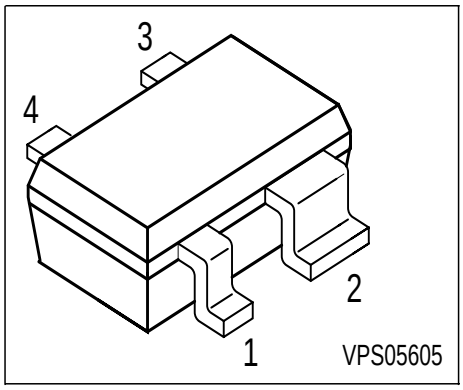
NPN Silicon Germanium RF Transistor



- High gain low noise RF transistor
- Provides outstanding performance for a wide range of wireless applications
- Ideal for CDMA and WLAN applications
- Outstanding noise figure F = 0.7 dB at 1.8 GHz
  Outstanding noise figure F = 1.4 dB at 6 GHz
- High maximum stable gain
  G_{ms} = 21.5 dB at 1.8 GHz
- Gold metallization for extra high reliability

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

Type	Marking	Pin Configuration				Package
BFP620	ACs	1 = B	2 = E	3 = C	4 = E	SOT343

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	2.3	V
Collector-base voltage	V_{CBO}	7.5	
Emitter-base voltage	V_{EBO}	1.2	
Collector current	I_C	80	mA
Base current	I_B	3	
Total power dissipation $T_S \leq 95$ [1)]	P_{tot}	185	mW
Junction temperature	T_j	150	°C
Ambient temperature	T_A	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Junction - soldering point[2)]	R_{thJS}	≤ 300	K/W

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

[2] 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 I_C = 1 mA, I_B = 0	$V_{(BR)CEO}$	2.3	2.8	-	V
Collector-base cutoff current V_{CB} = 5 V, I_E = 0	I_{CBO}	-	-	200	nA
Emitter-base cutoff current V_{EB} = 1 V, I_C = 0	I_{EBO}	-	-	10	µA
DC current gain I_C = 20 mA, V_{CE} = 1.5 V	h_{FE}	100	180	250	-
AC characteristics (verified by random sampling)					
Transition frequency I_C = 60 mA, V_{CE} = 1.5 V, f = 1 GHz	f_T	-	65	-	GHz
Collector-base capacitance V_{CB} = 2 V, f = 1 MHz	C_{cb}	-	0.12	0.2	pF
Collector-emitter capacitance V_{CE} = 2 V, f = 1 MHz	C_{ce}	-	0.22	-	pF
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	0.5	-	
Noise figure I_C = 5 mA, V_{CE} = 2 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 1.8 GHz	F	-	0.7	-	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}	-	21.5	-	
Insertion power gain I_C = 20 mA, V_{CE} = 2 V, f = 1.8 GHz, Z_S = Z_L = 50Ω	$\|S_{21}\|^2$	-	19	-	dB
Third order intercept point at output [2)] V_{CE} = 2 V, f = 1.8 GHz, Z_S= Z_L= 50Ω, I_C = 20 mA	IP_3	-	25	-	dBm
1dB compression point at output V_{CE} = 2 V, f = 1.8 GHz, Z_S= Z_L= 50Ω, I_C = 20 mA	P_{-1dB}	-	11	-	

[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 0.1MHz to 6GHz.

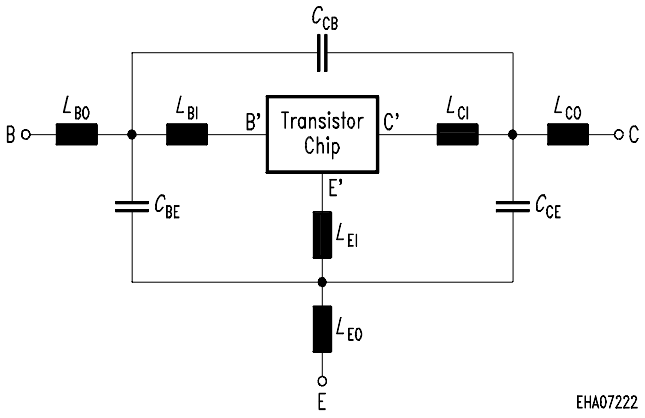
SPICE Parameters (Gummel-Poon Model, Berkley-SPICE 2G6 Syntax) :

Transistor Chip Data

IS =	354	aA	BF =	557.1	-	NF =	1.021	-
VAF =	1000	V	IKF =	2.262	A	ISE =	2.978	pA
NE =	3.355	-	BR =	100	-	NR =	1	-
VAR =	1.2	V	IKR =	6.31	mA	ISC =	19.23	fA
NC =	2.179	-	RB =	2.674	Ω	IRB =	18	µA
RBM =	2.506	Ω	RE =	0.472		RC =	2.105	Ω
CJE =	371.6	fF	VJE =	0.898	V	MJE =	0.315	-
TF =	1.306	ps	XTF =	2.71	-	VTF =	0.492	V
ITF =	2.444	A	PTF =	0	deg	CJC =	225.6	fF
VJC =	0.739	V	MJC =	0.3926	-	XCJC =	1	-
TR =	0.3884	ns	CJS =	60	fF	VJS =	0.5	V
MJS =	0.5	-	XTB =	-0.9	-	EG =	1.114	eV
XTI =	3.43	-	FC =	0.821	-	TNOM	298	K

All parameters are ready to use, no scaling is necessary

Package Equivalent Circuit:



L_{BI} =	0.47	nH
L_{BO} =	0.53	nH
L_{EI} =	0.23	nH
L_{EO} =	0.05	nH
L_{CI} =	0.56	nH
L_{CO} =	0.58	nH
C_{BE} =	136	fF
C_{CB} =	6.9	fF
C_{CE} =	134	fF
Valid up to 6GHz		

The SOT-343 package has two emitter leads. To avoid high complexity of the package equivalent circuit, both leads are combined in one electrical connection.

For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: http://www.infineon.com/silicondiscretes

For non-linear simulation:

- Use transistor chip parameters in Berkeley SPICE 2G6 syntax for all simulators.

- Simulation of the package is not necessary for frequencies < 100MHz.
  For higher frequencies please add the wiring of the package equivalent circuit around the non-linear transistor.

Advantages of the common emitter configuration:

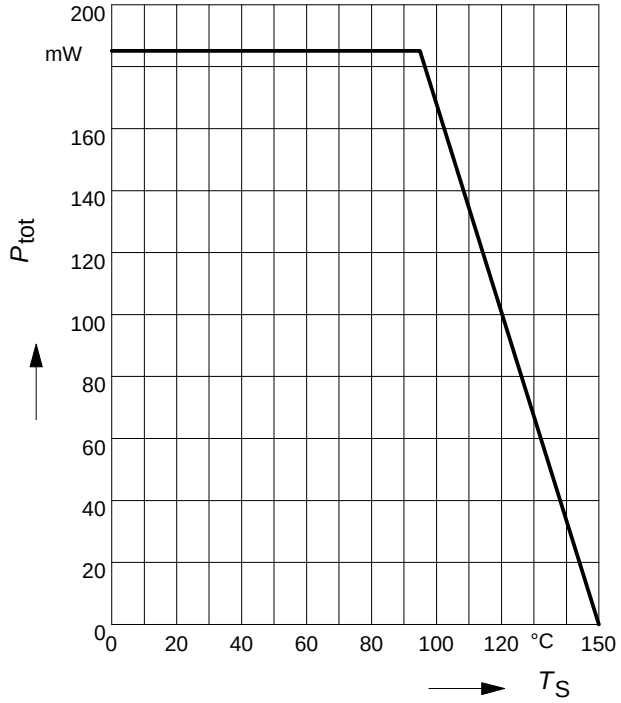
- Higher gain because of lower emitter inductance.
- Power is dissipated via the grounded emitter leads, because the chip is mounted on the copper emitter leadframe.

Please note, that the broadest lead is the emitter lead.

Common Emitter S- and Noise-parameter

For detailed S- and Noise-parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies Application Notes CD-ROM or see Internet: http://www.infineon.com/silicondiscretes

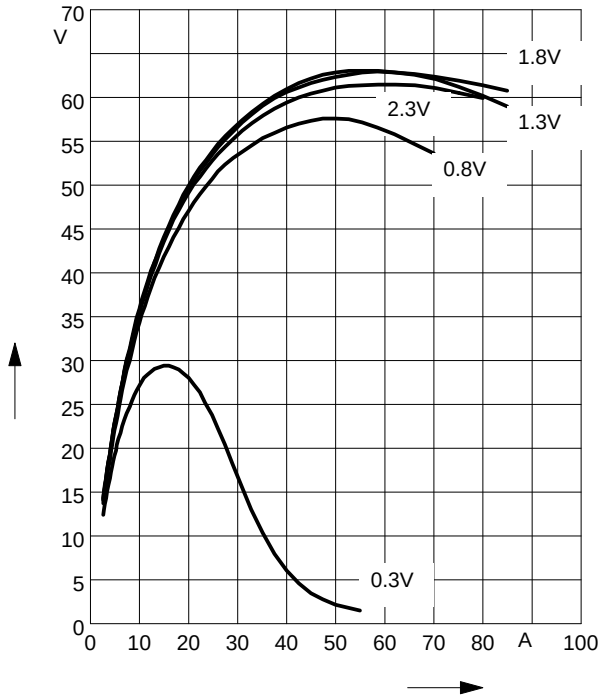
Total power dissipation $P_{tot} = f(T_S)$



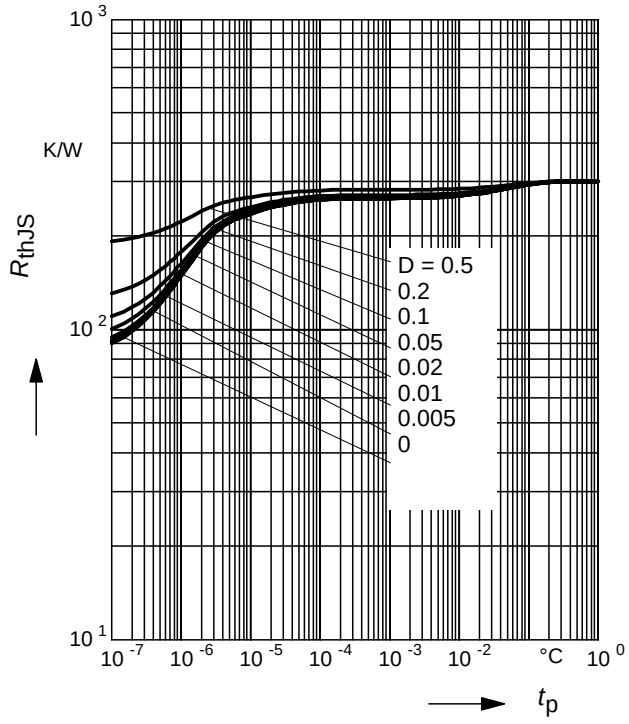
Transition frequency $f_T = f(I_C)$

f = 1GHz

V_{CE} = parameter in V

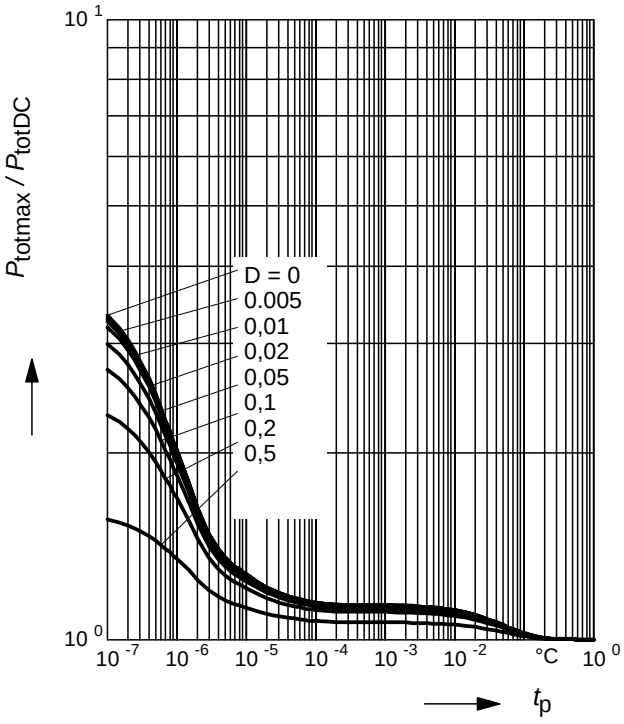


Permissible Pulse Load $R_{thJS} = f(t_p)$



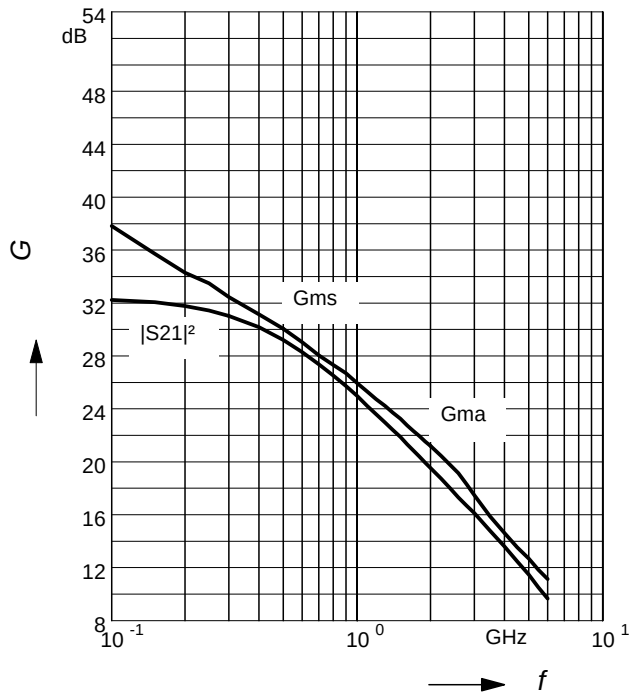
Permissible Pulse Load

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



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

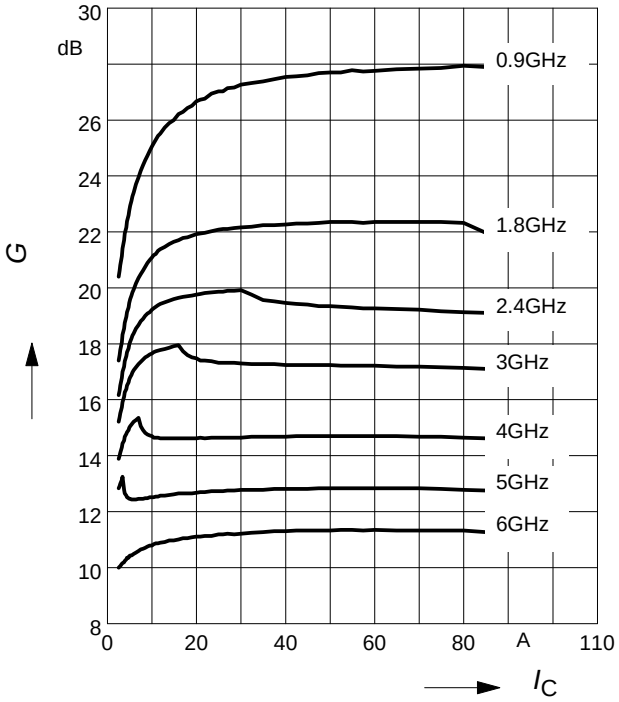
V_{CE} = 2V, I_C = 20 mA



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

V_{CE} = 2V

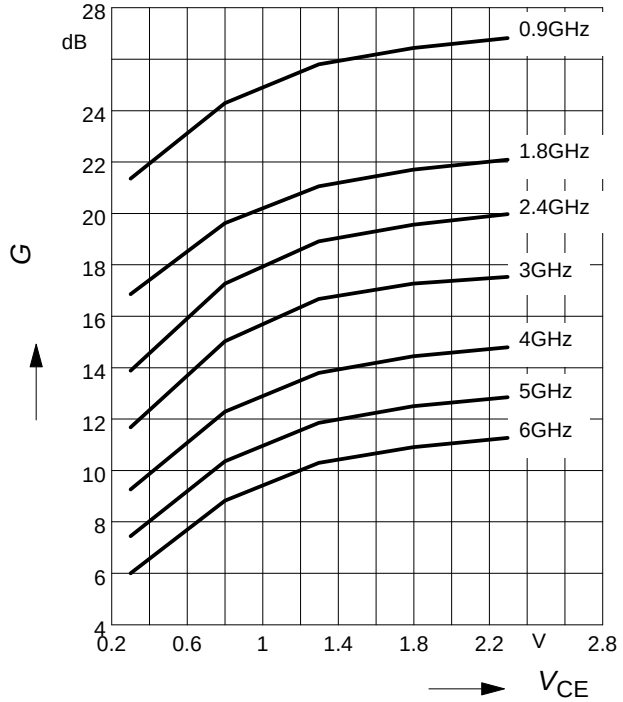
f = parameter in GHz



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

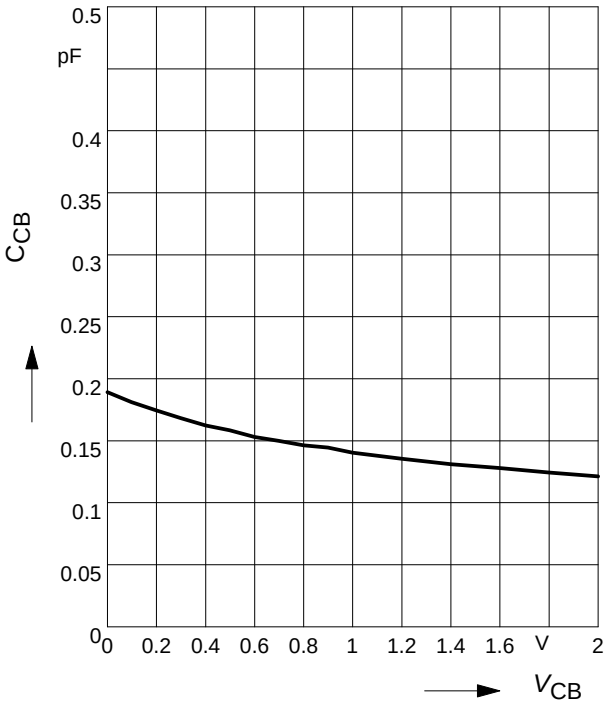
I_C = 20 mA

f = parameter in GHz



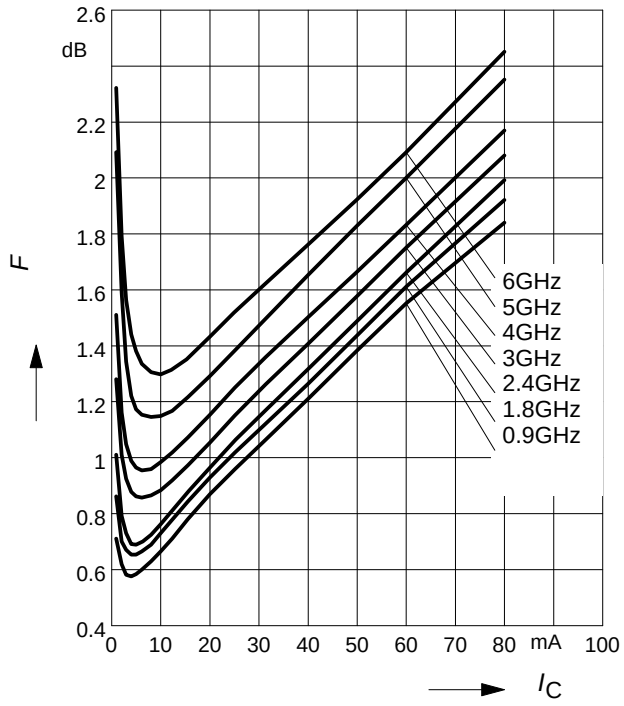
Collector-base capacitance $C_{cb} = f(V_{CB})$

f = 1MHz



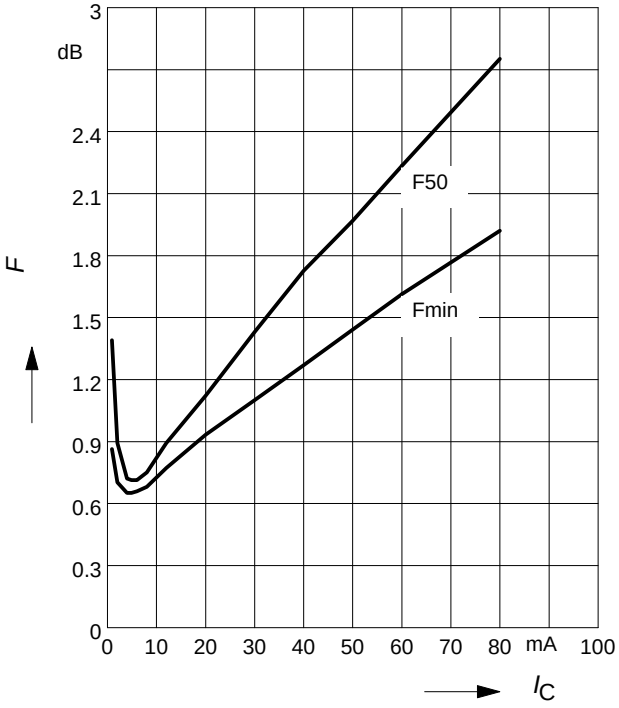
Noise figure $F = f(I_C)$

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



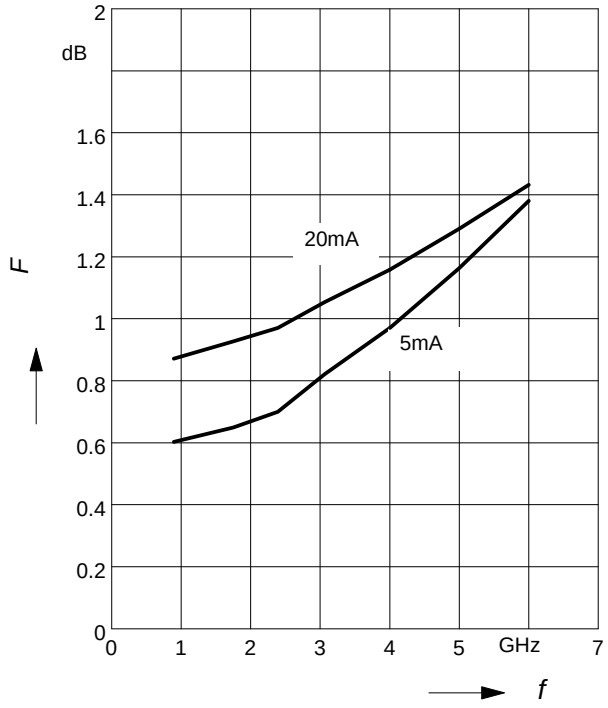
Noise figure $F = f(I_C)$

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



Noise figure $F = f(f)$

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



Source impedance for min. noise figure vs. Frequency

V_{CE} = 2V, I_C = 5 mA / 20 mA

