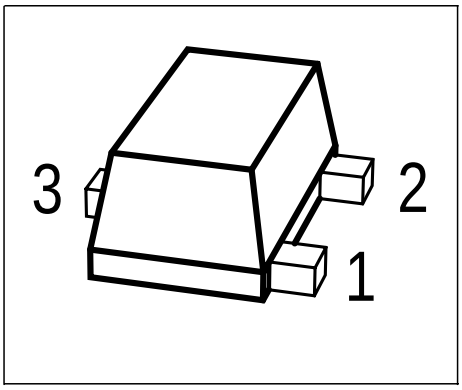
NPN Silicon RFTransistor

Preliminary data

- High current capability and low noise figure for wide dynamic range application
- Low voltage operation
- Ideal for low phase noise oscillators up to 3.5 GHz
- Low noise figure: 1.1dB at 1.8GHz



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

Type	Marking	Pin Configuration			Package
BFR380F	FCs	1 = B	2 = E	3 = C	TSFP-3

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	6	V
Collector-base voltage	V_{CBO}	17	
Emitter-base voltage	V_{EBO}	2	
Collector current	I_C	80	mA
Base current	I_B	14	
Total power dissipation[1)], T_S = 95 °C	P_{tot}	380	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}	≤ 145	K/W

[1] T_S is measured on the collector 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	$V_{(BR)CEO}$	6	8	-	V
Collector-base cutoff current V_{CB} = 5 V, I_E = 0	I_{CBO}	-	-	100	nA
Emitter-base cutoff current V_{EB} = 1 V, I_C = 0	I_{EBO}	-	-	100	µA
DC current gain I_C = 50 mA, V_{CE} = 2 V	h_{FE}	70	100	200	-

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 = 40 mA, V_{CE} = 3 V, f = 1 GHz	f_T	12	14	-	GHz
Collector-base capacitance V_{CB} = 5 V, 1 MHz, emitter grounded	C_{cb}	-	0.5	0.7	pF
Collector-emitter capacitance V_{CE} = 5 V, 1 MHz, base grounded	C_{ce}	-	0.2	-	
Emitter-base capacitance V_{EB} = 0.5 V, 1 MHz, collector grounded	C_{eb}	-	1.1	-	
Noise figure V_{CE} = 3 V, I_C = 8 mA, f = 1.8 GHz, $Z_S = Z_{Sopt}$	F_{min}	-	1.1	-	dB
Power gain[1)] V_{CE} = 3 V, I_C = 20 mA, f = 1.8 GHz V_{CE} = 3 V, I_C = 20 mA, f = 3 GHz	G_{ma}	 - -	 13.5 9	 - -	
Insertion power gain V_{CE} = 3 V, I_C = 20 mA, f = 1.8 GHz V_{CE} = 3 V, I_C = 20 mA, f = 3 GHz	$\lvert S_{21}\rvert^2$	 - -	 11 6.5	 - -	
Third order intercept piont at output[2)] V_{CE} = 3 V, I_C = 20 mA, f = 1.8 GHz	OIP_3	-	27	-	dBm
1 dB Compression point at output[3)] V_{CE} = 3 V, I_C = 20 mA, f = 1.8 GHz	P_{-1dB}	-	12	-	

[1] $G_{ma} = |S_{21} / S_{12}| (k-(k^2-1)^{1/2})$

[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

[3] DC current at no input power

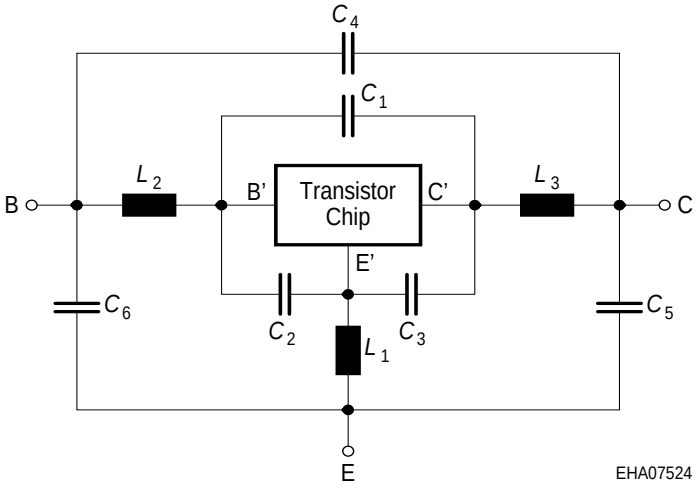
SPICE Parameters (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax) :

Transistor Chip Data

IS =	9,965 e-15	fA	BF =	116.376	-	NF =	1.107	-
VAF =	27.69	V	IKF =	0.736	A	ISE =	2,676 e-08	fA
NE =	1.64	-	BR =	22.802	-	NR =	1.056	-
VAR =	30	V	IKR =	0.011	A	ISC =	6,973 e-09	fA
NC =	1.678	-	RB =	9.71	Ω	IRB =	0.0003	A
RBM =	1.322	Ω	RE =	0.221		RC =	0.101	Ω
CJE =	1,167 e-13	fF	VJE =	0.782	V	MJE =	0.5	-
TF =	8,79 e-11	ps	XTF =	0.496	-	VTF =	0.338	V
ITF =	0.0015	mA	PTF =	0	deg	CJC =	8,4 e-13	fF
VJC =	0.649	V	MJC =	0.472	-	XCJC =	0.202	-
TR =	6,949 e-09	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	0	-	FC =	0.975	-	TNOM	0.5	K

All parameters are ready to use, no scalling is necessary.
Extracted on behalf of Infineon Technologies AG by:
Institut für Mobil-und Satellitentechnik (IMST)

Package Equivalent Circuit:

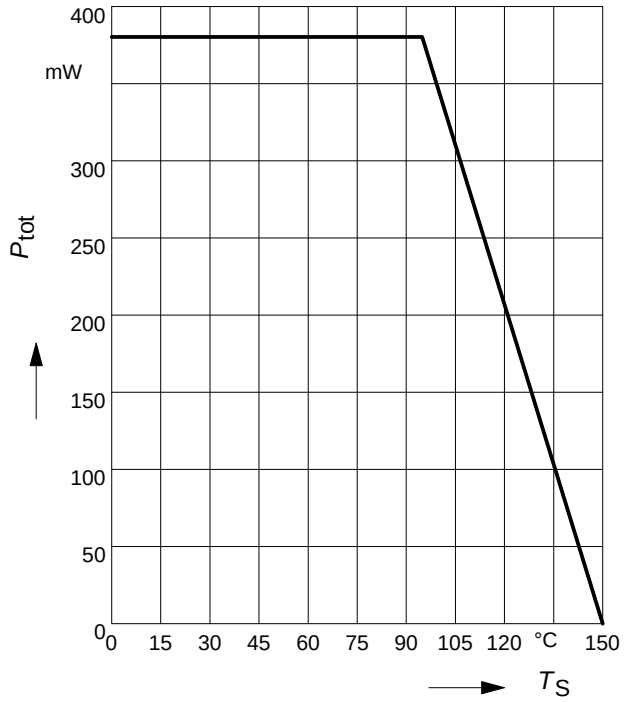


L_1 =	0.556	nH
L_2 =	0.657	nH
L_3 =	0.381	nH
C_1 =	43	fF
C_2 =	123	fF
C_3 =	66	fF
C_4 =	10	fF
C_5 =	36	fF
C_6 =	47	fF

Valid up to 6GHz

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/products/discrete/index.htm

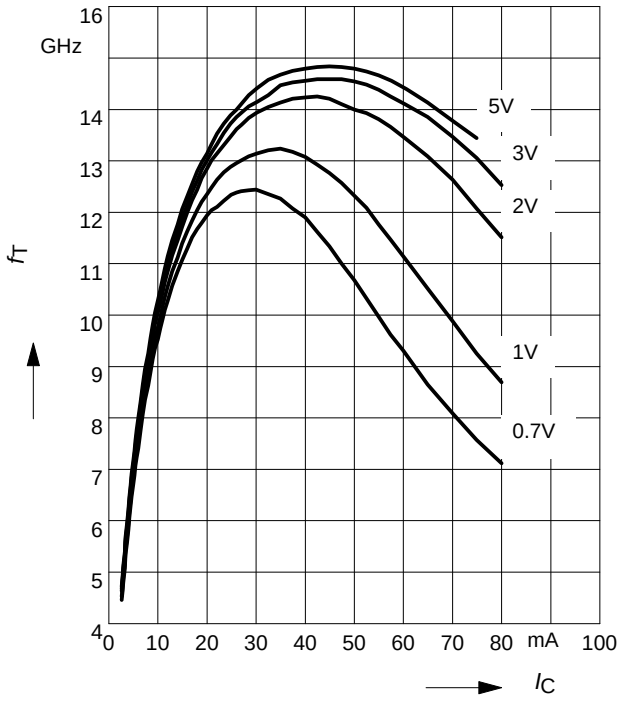
Total power dissipation $P_{tot} = f(T_A^*, T_S)$



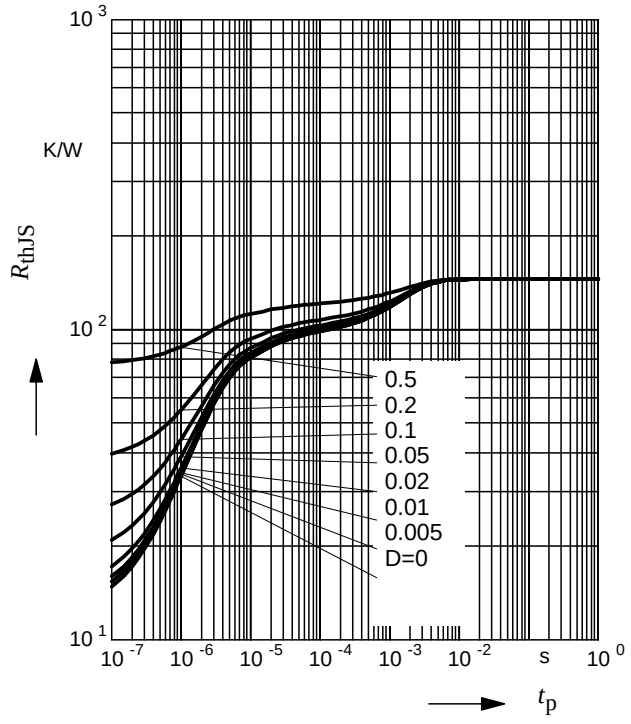
Transition frequency $f_T = f(I_C)$

f = 1GHz

V_{CE} = Parameter

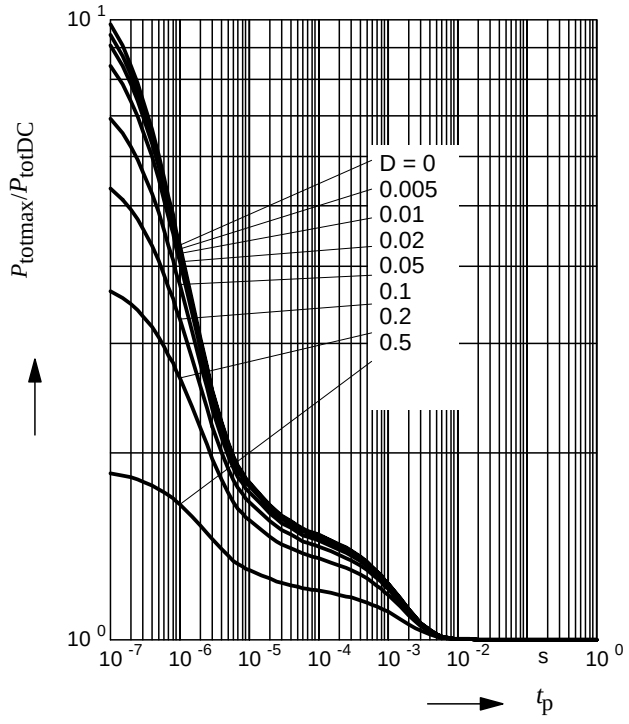


Permissible Pulse Load $R_{thJS} = f(t_p)$



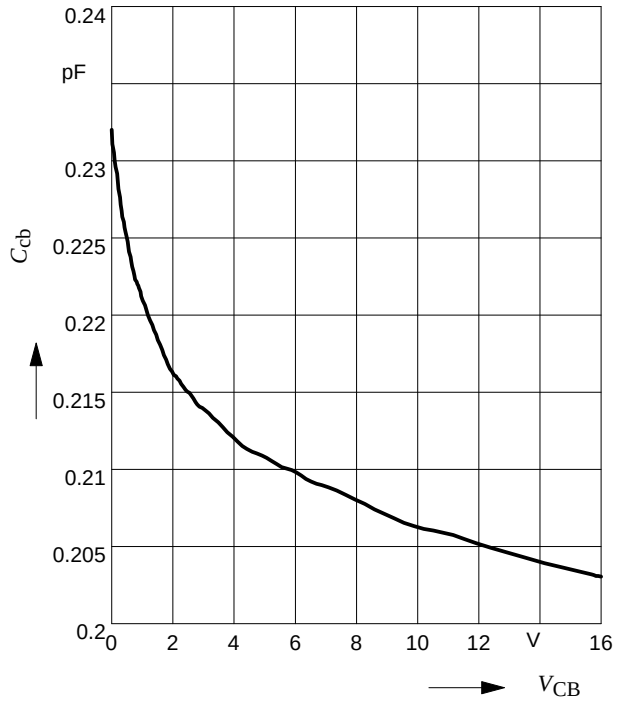
Permissible Pulse Load

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



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

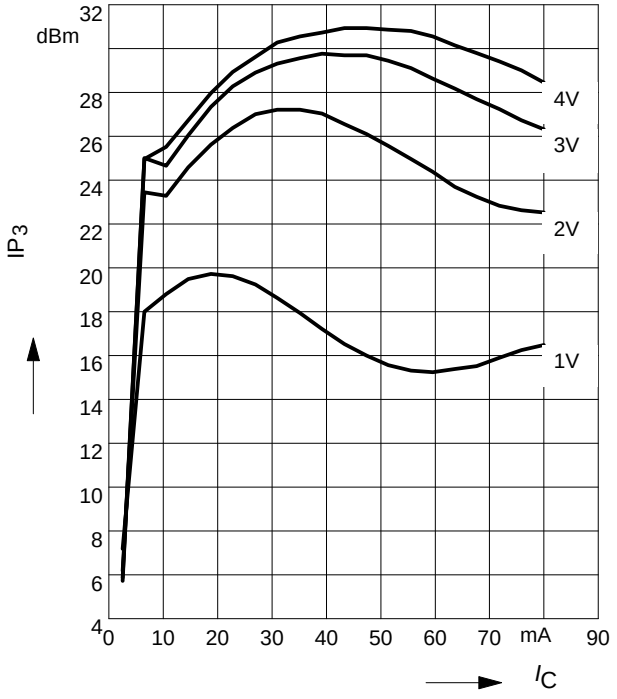
f = 1MHz



Intermodulation Intercept Point $IP_3 = f(I_C)$

(3rd order, Output, $Z_S = Z_L = 50\Omega$)

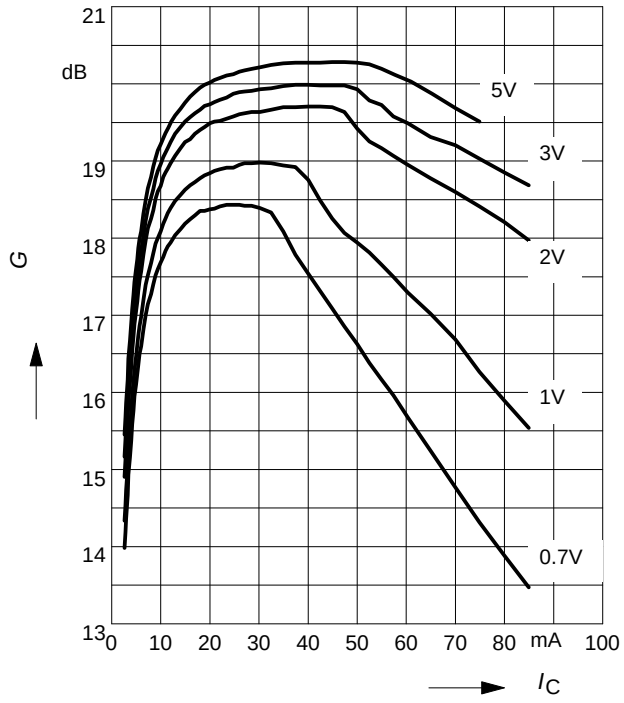
V_{CE} = Parameter, f = 1.8GHz



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

f = 0.9GHz

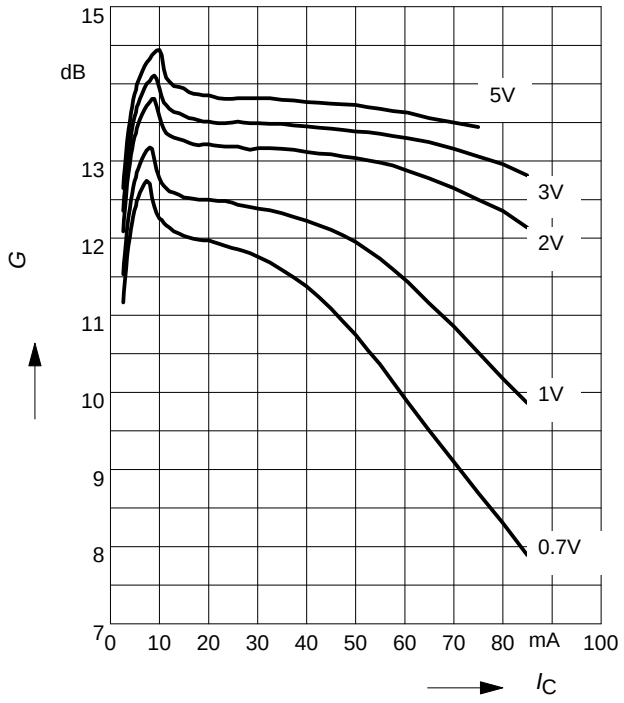
V_{CE} = Parameter



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

f = 1.8GHz

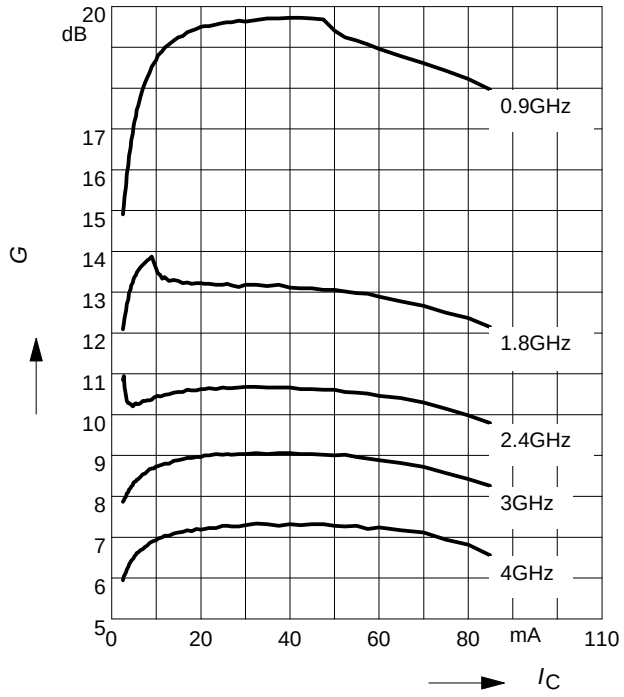
V_{CE} = Parameter



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

V_{CE} = 2V

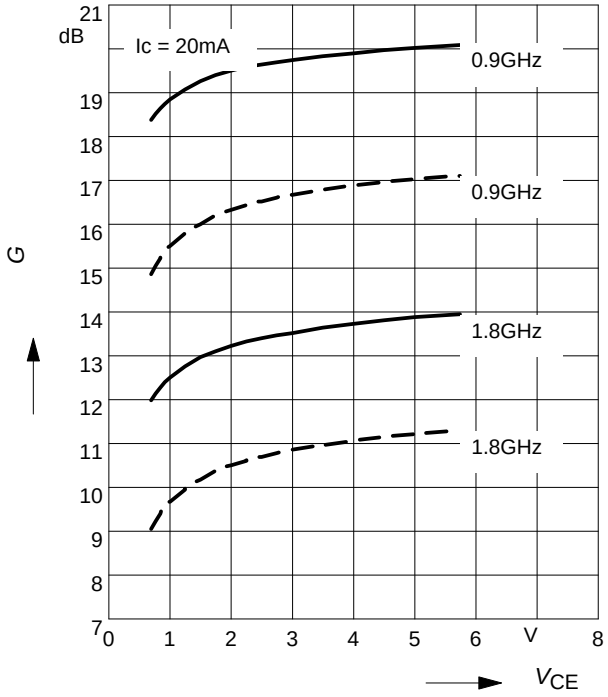
f = Parameter in GHz



Power Gain G_{ma}, G_{ms} = f(V_{CE}):_____

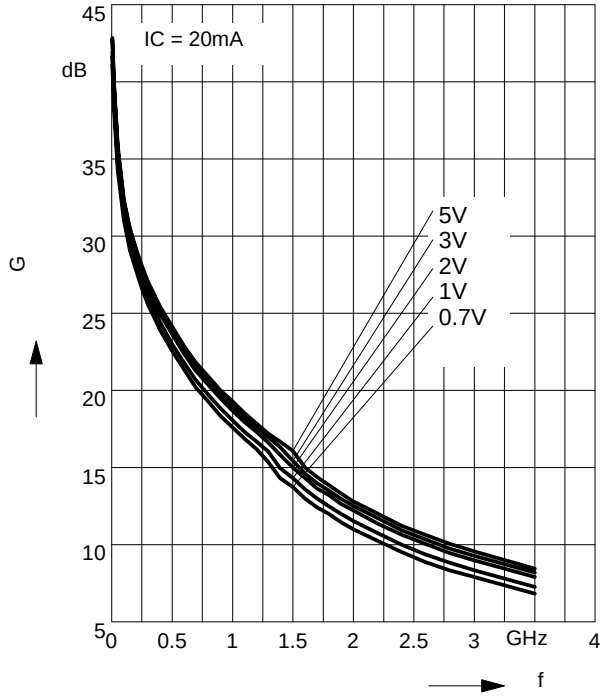
$|S_{21}|^2$ = f(V_{CE}):---------

f = Parameter

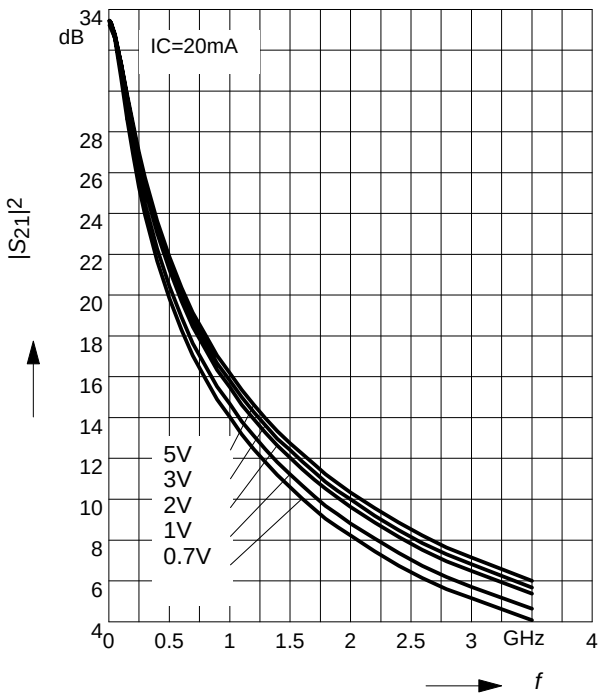


Power Gain G_{ma}, G_{ms} = f(f)

V_{CE} = Parameter

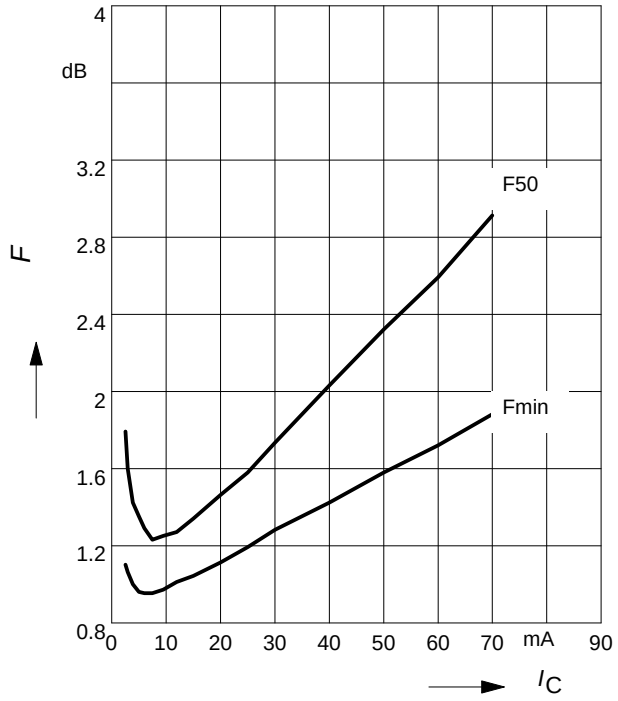


Insertion power gain $|S_{21}|^2$ = f (f)



Noise figure *NF* = *f* (*f*)

V_{CE} = 3V; *f* = 1.8GHz



Source impedance for min. noise figure vs. Frequency

V_{CE} = 3 V