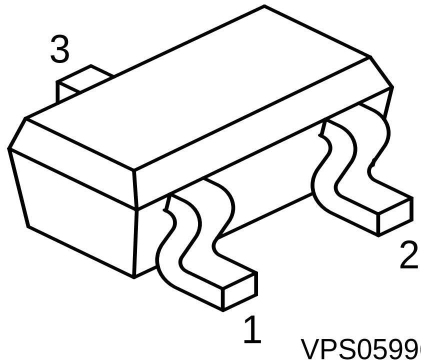
NPN Silicon RF Transistor

Preliminary data

- For low-noise, high-gain broadband amplifiers at collector currents from 2 mA to 30 mA
- f_T = 8 GHz
  F = 1.2 dB at 900 MHz



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

Type	Marking	Pin Configuration			Package
BFR183T	RHs	1 = B	2 = E	3 = C	SC75

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	12	V
Collector-emitter voltage	V_{CES}	20	
Collector-base voltage	V_{CBO}	20	
Emitter-base voltage	V_{EBO}	2	
Collector current	I_C	65	mA
Base current	I_B	5	
Total power dissipation $T_S \leq 83°C$ 1)	P_{tot}	250	mW
Junction temperature	T_j	150	°C
Ambient temperature	T_A	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point 2)	R_{thJS}	≤ 270	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	$V_{(BR)CEO}$	12	-	-	V
Collector-emitter cutoff current V_{CE} = 20 V, V_{BE} = 0	I_{CES}	-	-	100	µA
Collector-base cutoff current V_{CB} = 10 V, I_E = 0	I_{CBO}	-	-	100	nA
Emitter-base cutoff current V_{EB} = 1 V, I_C = 0	I_{EBO}	-	-	1	µA
DC current gain I_C = 15 mA, V_{CE} = 8 V	h_{FE}	50	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 = 25 mA, V_{CE} = 8 V, f = 500 MHz	f_T	6	8	-	GHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	0.4	0.6	pF
Collector-emitter capacitance V_{CE} = 10 V, f = 1 MHz	C_{ce}	-	0.18	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	1	-	
Noise figure I_C = 5 mA, V_{CE} = 8 V, $Z_S = Z_{Sopt}$, f = 900 MHz f = 1.8 GHz	F	 - -	 1.2 2	 - -	dB
Power gain, maximum stable [1)] I_C = 15 mA, V_{CE} = 8 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 900 MHz	G_{ms}	-	19.5	-	
Power gain, maximum available [2)] I_C = 15 mA, V_{CE} = 8 V, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, f = 1.8 GHz	G_{ma}	-	12.5	-	
Transducer gain I_C = 15 mA, V_{CE} = 8 V, $Z_S = Z_L = 50\Omega$, f = 900 MHz f = 1.8 GHz	$\|S_{21e}\|^2$	 - -	 15.5 10	 - -	

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

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

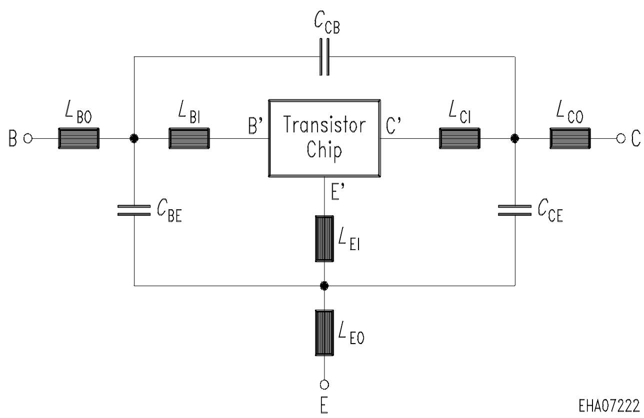
SPICE Parameters (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax) :

Transistor Chip Data

IS =	1.0345	fA	BF =	115.98	-	NF =	0.80799	-
VAF =	14.772	V	IKF =	0.14562	A	ISE =	16.818	fA
NE =	1.2149	-	BR =	10.016	-	NR =	0.99543	-
VAR =	3.4276	V	IKR =	0.013483	A	ISC =	1.3559	fA
NC =	0.85331	-	RB =	2.5426	Ω	IRB =	0.43801	mA
RBM =	1.0112	Ω	RE =	1.3435		RC =	0.20486	Ω
CJE =	23.077	fF	VJE =	1.0792	V	MJE =	0.45354	-
TF =	22.746	ps	XTF =	0.36823	-	VTF =	0.50905	V
ITF =	1.8773	mA	PTF =	0	deg	CJC =	460.11	fF
VJC =	1.1967	V	MJC =	0.3	-	XCJC =	0.053823	-
TR =	1.0553	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.54852	-	TNOM	300	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:

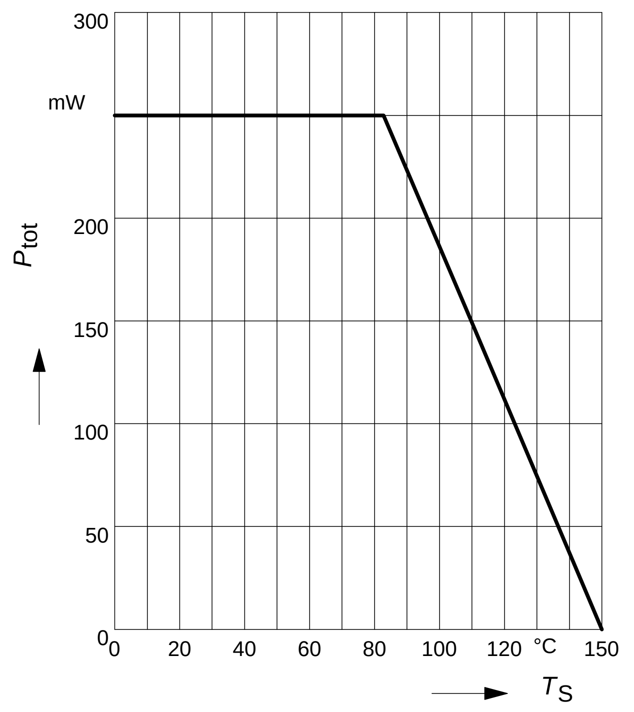


L_1 =	0.762	nH
L_2 =	0.706	nH
L_3 =	0.382	nH
C_1 =	62	fF
C_2 =	84	fF
C_3 =	180	fF
C_4 =	7	
C_5 =	40	fF
C_6 =	48	fF

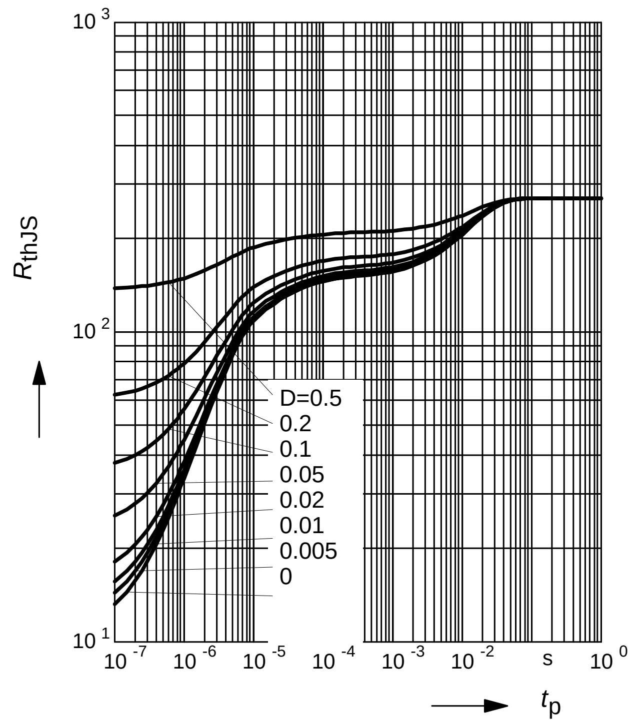
Valid up to 6GHz

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/silicondiscretes

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

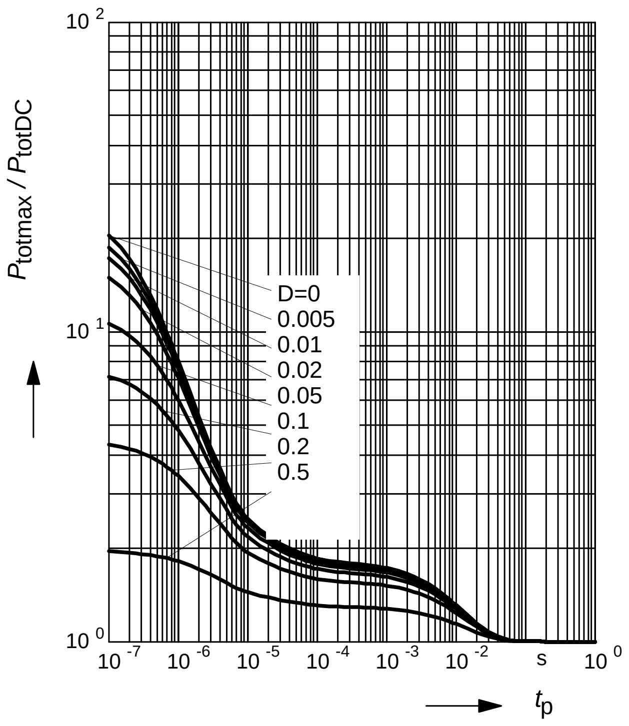


Permissible Pulse Load $R_{thJS} = f(t_p)$



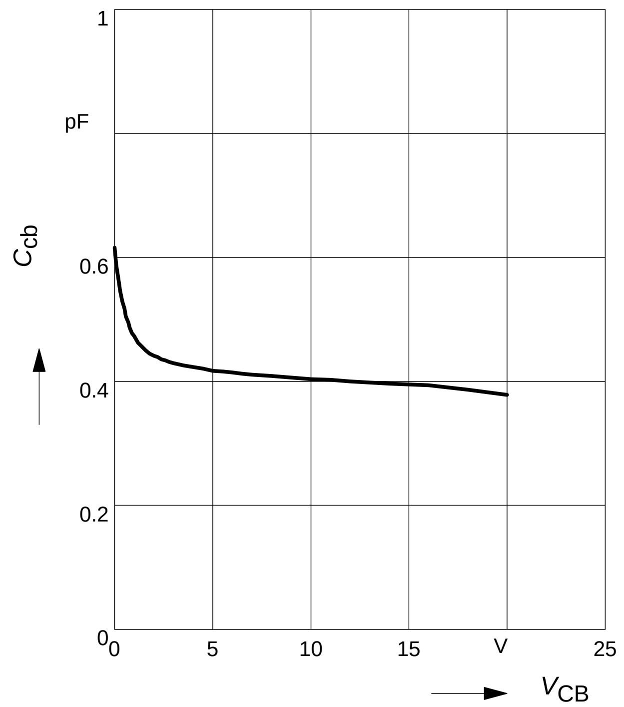
Permissible Pulse Load

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



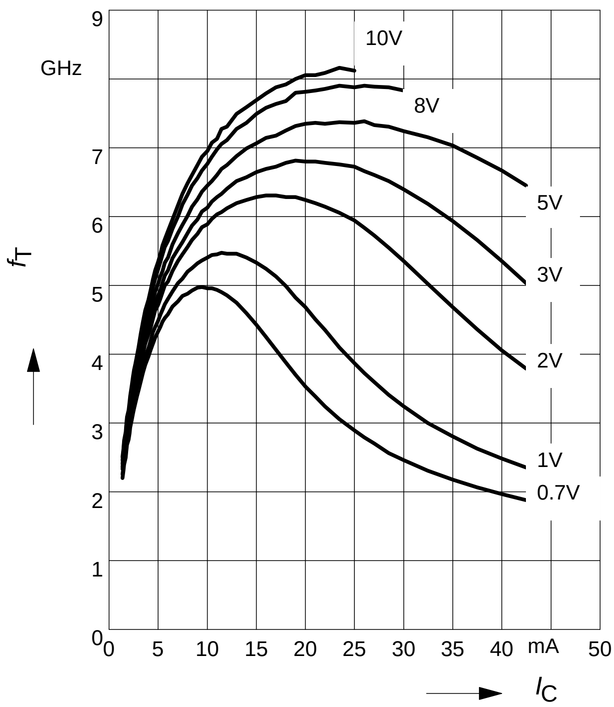
Collector-base capacitance $C_{cb} = f(V_{CB})$

f = 1MHz



Transition frequency $f_T = f(I_C)$

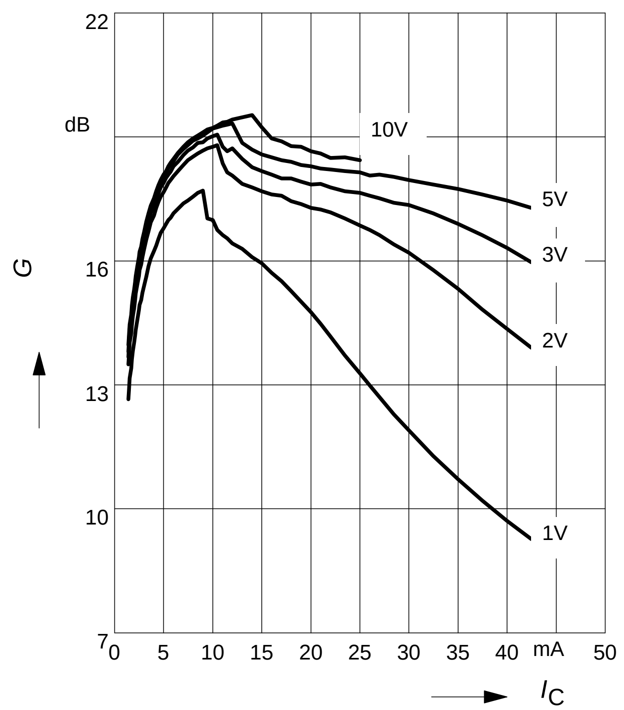
V_{CE} = Parameter



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

f = 0.9GHz

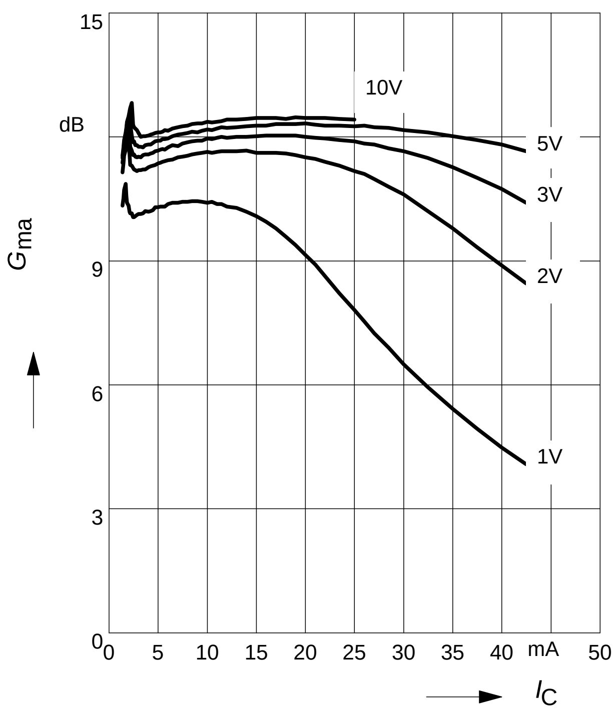
V_{CE} = Parameter



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

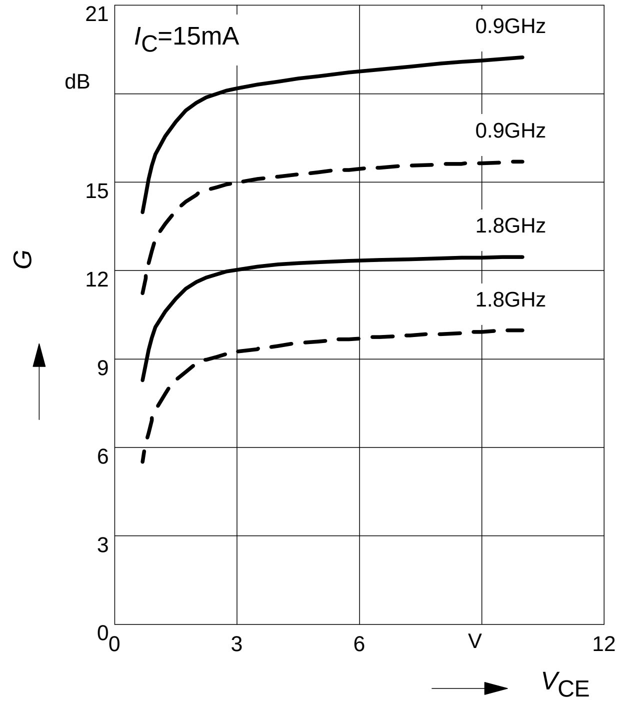
f = 1.8GHz

V_{CE} = Parameter



Power Gain G_{ma}, $G_{ms} = f(V_{CE})$: ______
$|S_{21}|^2 = f(V_{CE})$: ---------

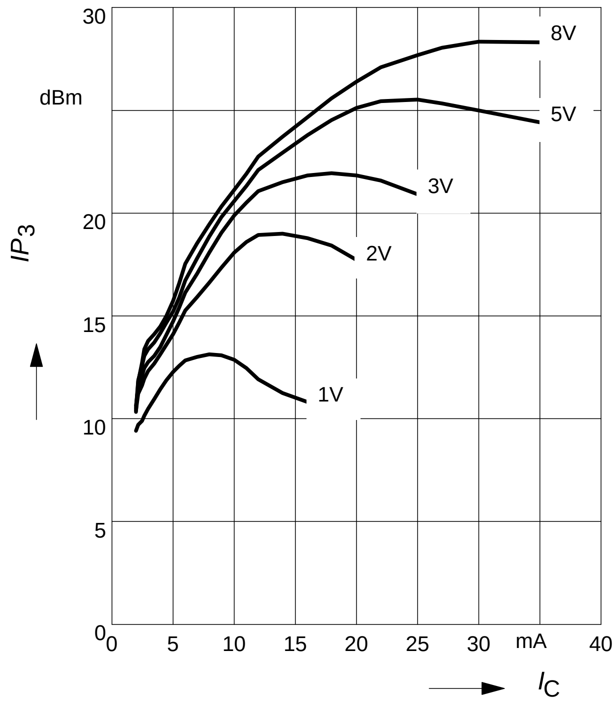
f = Parameter



Intermodulation Intercept Point $IP_3=f(I_C)$

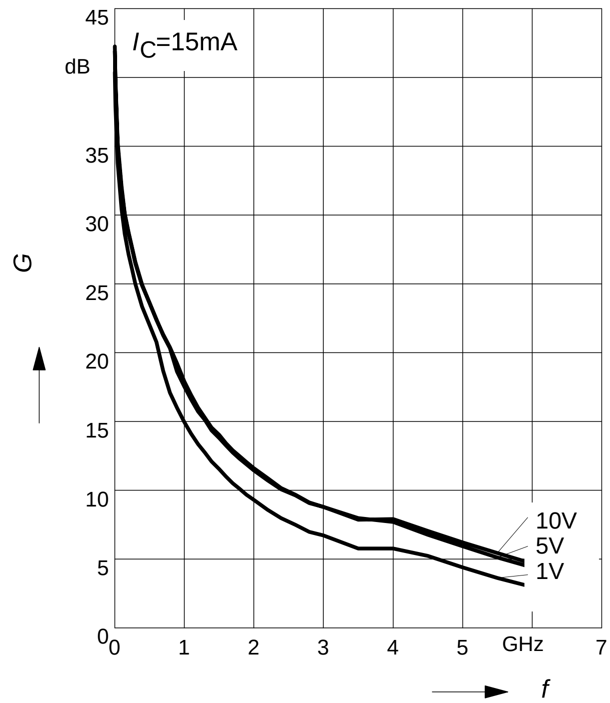
(3rd order, Output, $Z_S=Z_L=50\Omega$)

V_{CE} = Parameter, f = 900MHz



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

V_{CE} = Parameter



Power Gain $|S_{21}|^2= f(f)$

V_{CE} = Parameter