## NPN Silicon RF Transistor

- For low noise, high-gain broadband amplifiers at collector currents from 0.5 mA to 12 mA

- f_T = 8 GHz

  F = 1.45 dB at 900 MHz

VS005796
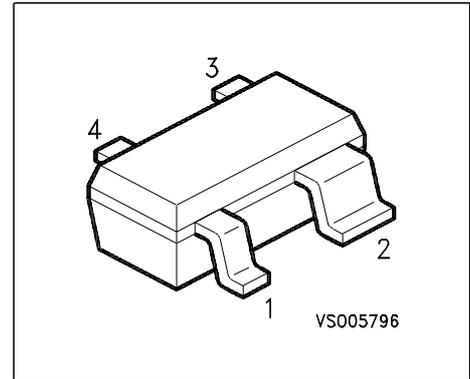
ESD: **E**lectro**s**tatic **d**ischarge sensitive device, observe handling precaution!

Type	Marking	Pin Configuration				Package
BFP181R	RFs	1 = E	2 = C	3 = E	4 = B	SOT143R

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	20	mA
Base current	I_B	2	
Total power dissipation $T_S \leq 75\ °C$ [1]	P_{tot}	175	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}	≤ 430	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

Jun-21-2001

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 = 5 mA, V_{CE} = 8 V	h_{FE}	50	100	200	-

Jun-21-2001

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 = 10 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}	-	0.21	0.4	pF
Collector-emitter capacitance V_{CE} = 10 V, f = 1 MHz	C_{ce}	-	0.27	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	0.32	-	
Noise figure I_C = 2 mA, V_{CE} = 8 V, Z_S = Z_{Sopt} , f = 900 MHz f = 1.8 GHz	F	- -	1.45 1.8	- -	dB
Power gain, maximum stable [1] I_C = 5 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 900 MHz f = 1.8 GHz	G_{ms}	- -	20 16.5	- -	
Transducer gain I_C = 5 mA, V_{CE} = 8 V, Z_S = Z_L = 50Ω , f = 900 MHz f = 1.8 GHz	$|S_{21e}|^2$	- -	16.5 11.5	- -	

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

Jun-21-2001

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

Transistor Chip Data

|									
IS =	0.0010519	fA	BF =	96.461	-	NF =	0.90617	-
VAF =	22.403	V	IKF =	0.12146	A	ISE =	12.603	fA
NE =	1.7631	-	BR =	16.504	-	NR =	0.87757	-
VAR =	5.1127	V	IKR =	0.24951	A	ISC =	0.01195	fA
NC =	1.6528	-	RB =	9.9037	Ω	IRB =	0.69278	mA
RBM =	6.6315	Ω	RE =	2.1372		RC =	2.2171	Ω
CJE =	1.8168	fF	VJE =	0.73155	V	MJE =	0.43619	-
TF =	17.028	ps	XTF =	0.33814	-	VTF =	0.12571	V
ITF =	1.0549	mA	PTF =	0	deg	CJC =	319.69	fF
VJC =	1.1633	V	MJC =	0.30013	-	XCJC =	0.082903	-
TR =	2.7449	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.99768	-	TNOM	300	K

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

Package Equivalent Circuit:

L_{BI} =	0.89	nH
L_{BO} =	0.73	nH
L_{EI} =	0.4	nH
L_{EO} =	0.15	nH
L_{CI} =	0	nH
L_{CO} =	0.42	nH
C_{BE} =	189	fF
C_{CB} =	15	fF
C_{CE} =	187	fF

Valid up to 6GHz
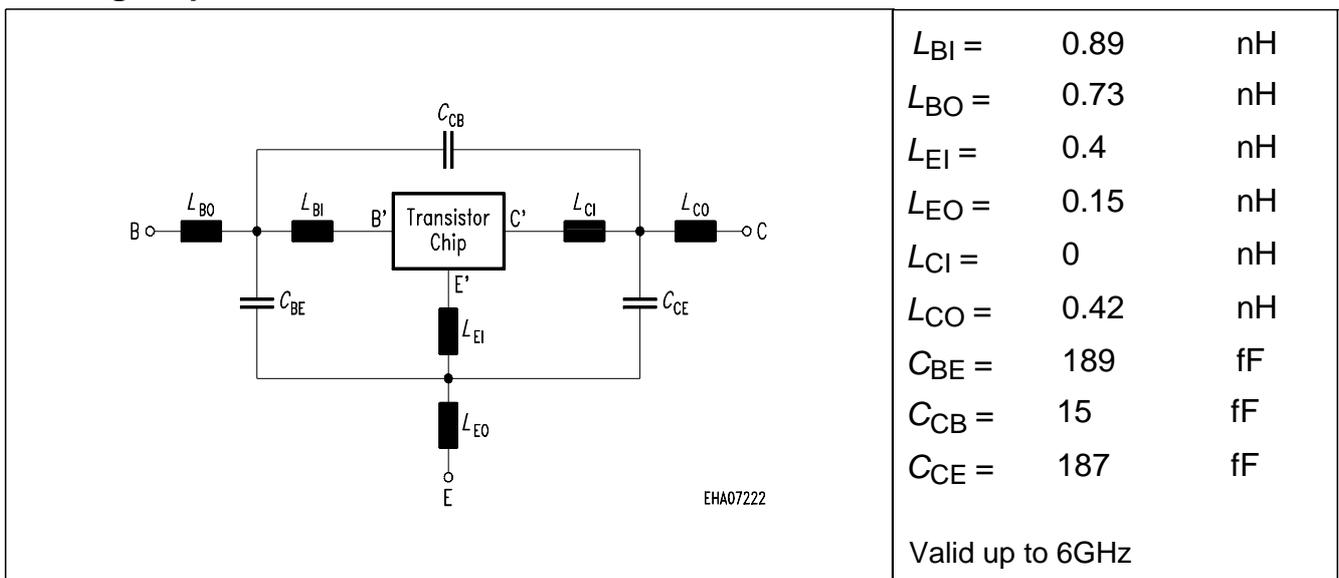
For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: http://www.infineon.com/products/discrete/index.htm

Jun-21-2001

## Total power dissipation $P_{tot} = f(T_S)$
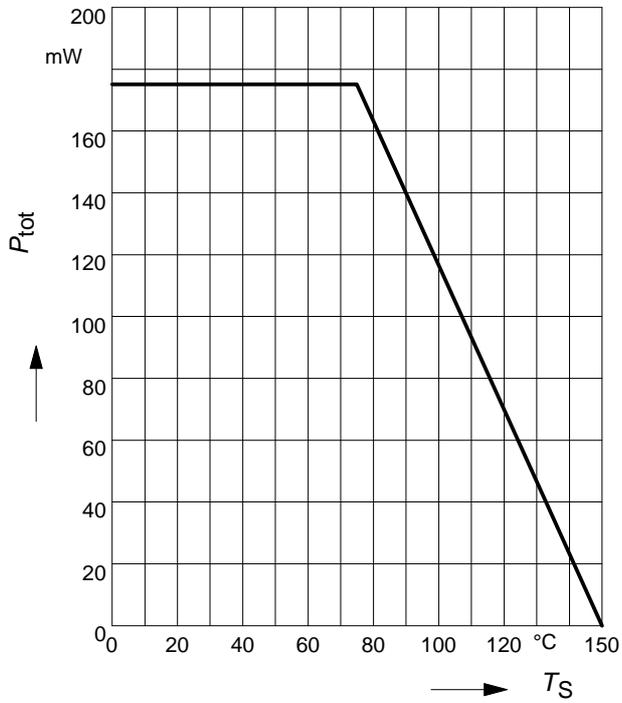
Permissible Pulse Load $R_{thJS} = f(t_p)$
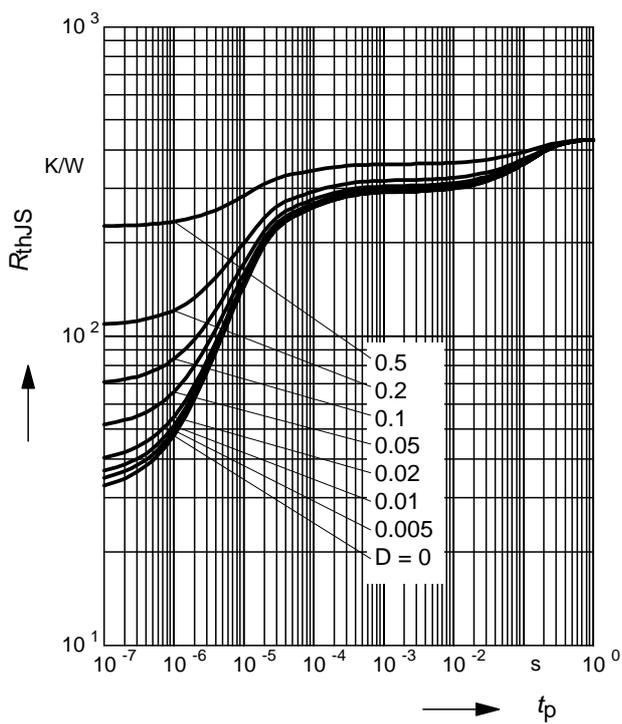
Permissible Pulse Load

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

Jun-21-2001
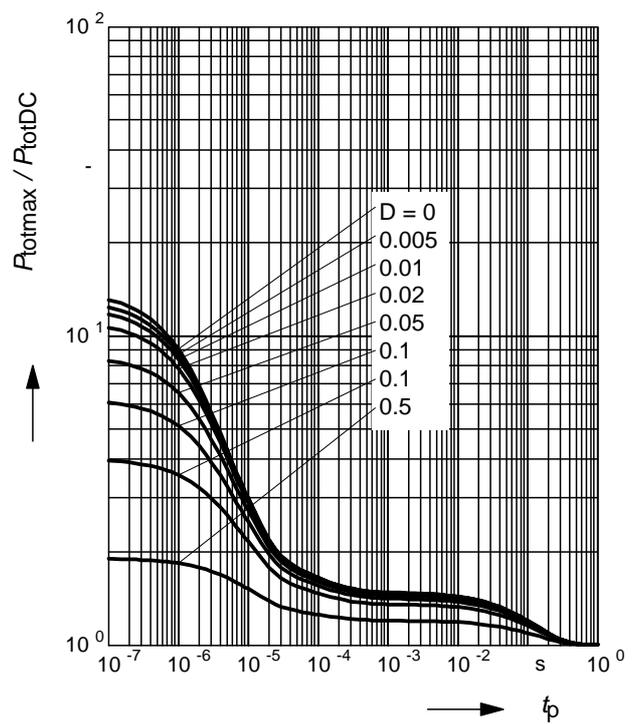
Collector-base capacitance $C_{cb} = f(V_{CB})$

f = 1MHz

V_{CB}
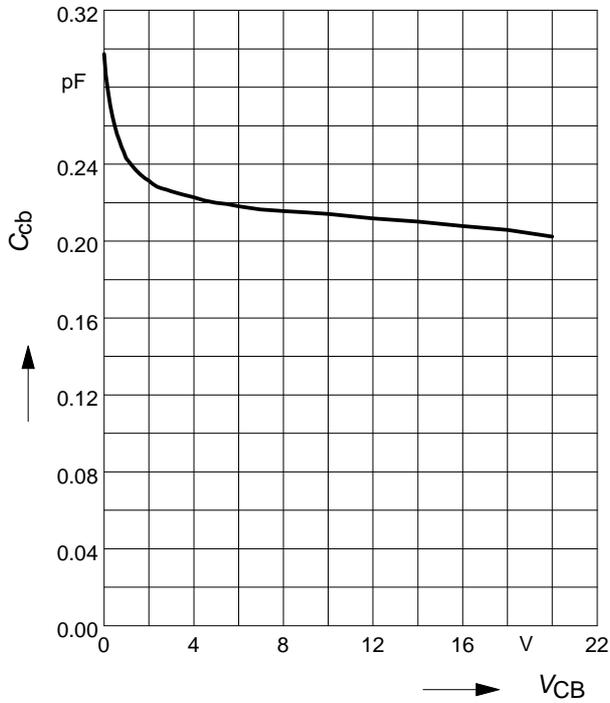
Transition frequency $f_T = f(I_C)$

V_{CE} = Parameter

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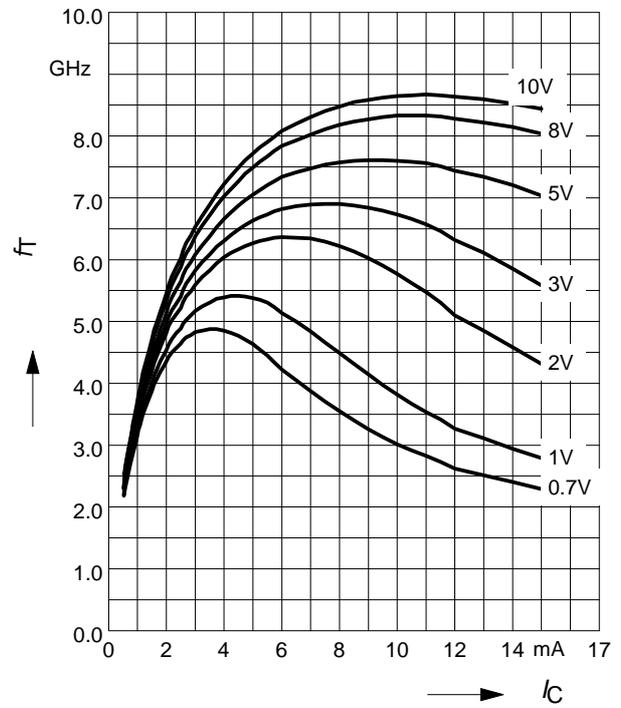
Power Gain G_{ma}, $G_{ms} = f(I_C)$

f = 0.9GHz

V_{CE} = Parameter

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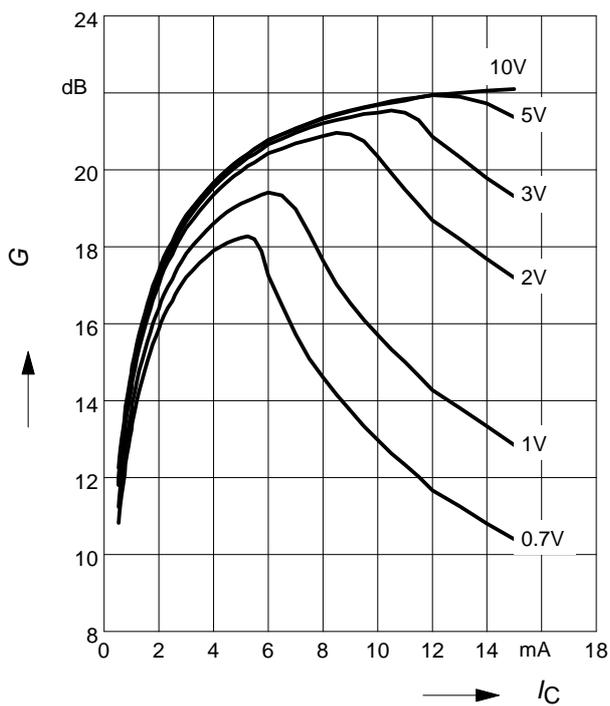
Power Gain G_{ma}, $G_{ms} = f(I_C)$

f = 1.8GHz

V_{CE} = Parameter

I_C

Jun-21-2001
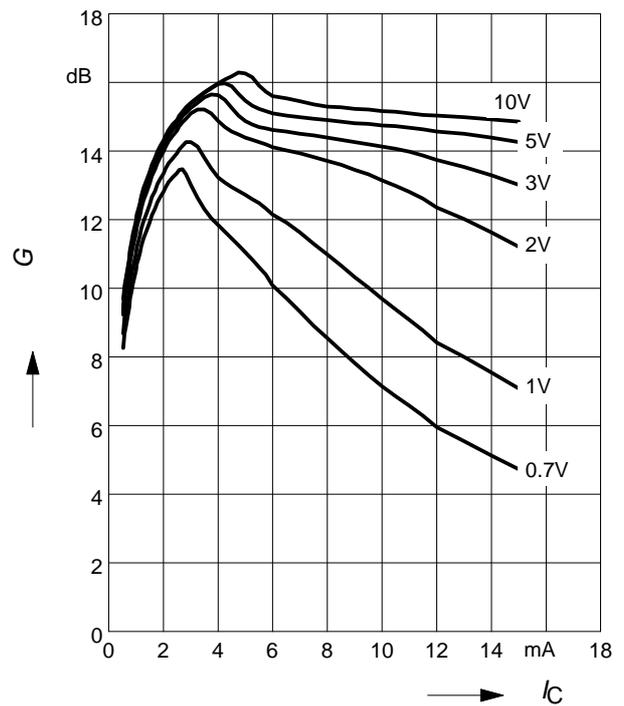
Power Gain G_{ma}, G_{ms} = $f(V_{CE})$: ———

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

f = Parameter
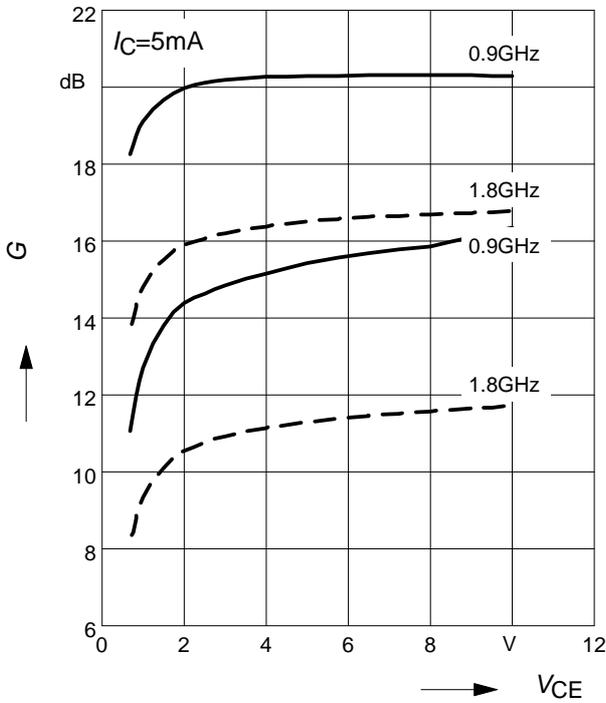

Intermodulation Intercept Point $IP_3=f(I_C)$

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

V_{CE} = Parameter, f = 900MHz
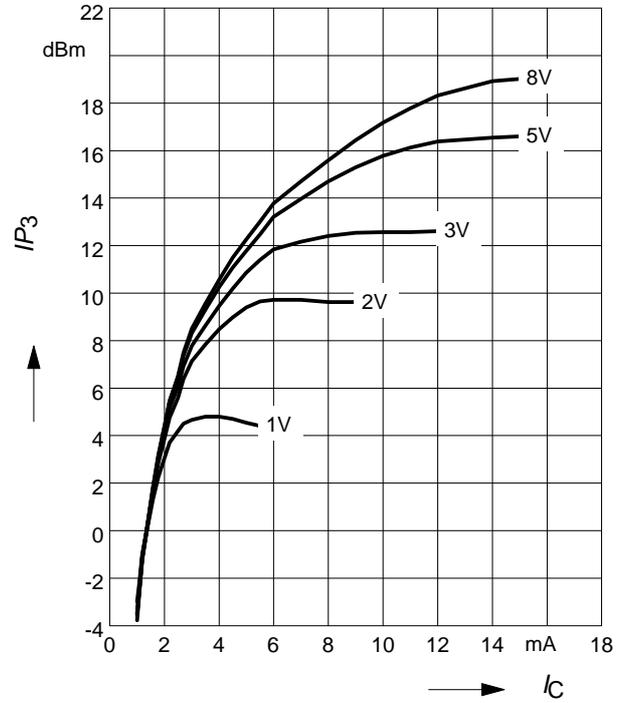
Power Gain G_{ma}, $G_{ms} = f(f)$

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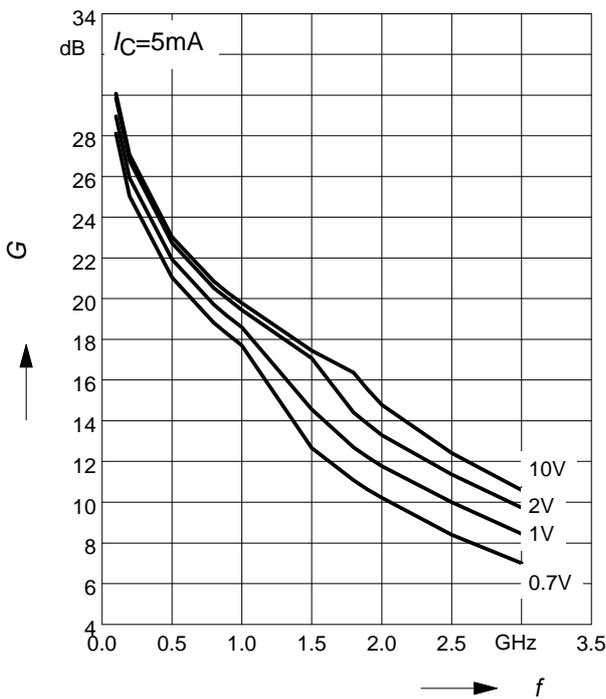
Power Gain $|S_{21}|^2 = f(f)$

V_{CE} = Parameter

Jun-21-2001