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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
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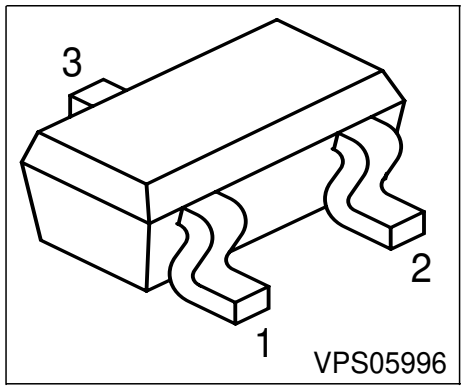
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

NPN Silicon RF Transistor

Preliminary data

- For low noise, high-gain broadband amplifiers at collector currents from 1 mA to 20 mA
- f_T = 9 GHz
  F = 1.0 dB at 1 GHz



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

Type	Marking	Pin Configuration			Package
BFR949T	RKs	1 = B	2 = E	3 = C	SC75

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	10	V
Collector-emitter voltage	V_{CES}	20	
Collector-base voltage	V_{CBO}	20	
Emitter-base voltage	V_{EBO}	1.5	
Collector current	I_C	35	mA
Base current	I_B	4	
Total power dissipation $T_S \leq 75°C$ 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

Junction - soldering point2)	R_{thJS}	≤ 300	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	$V_{(BR)CEO}$	10	-	-	V
Base-emitter forward voltage I_E = 25mA	V_{BEF}	-	-	1.05	
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}	-	-	0.1	µA
DC current gain I_C = 5 mA, V_{CE} = 6 V	h_{FE}	100	140	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 = 15 mA, V_{CE} = 6 V, f = 1 GHz	f_T	7	9	-	GHz
Collector-base capacitance V_{CB} = 10 V, f = 1MHz	C_{cb}	-	0.33	0.4	pF
Collector-emitter capacitance V_{CE} = 10 V, f = 1MHz	C_{ce}	-	0.2	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1MHz	C_{eb}	-	0.6	-	
Noise figure I_C = 5 mA, V_{CE} = 6 V, Z_S = Z_{Sopt} , f = 1 GHz I_C = 3 mA, V_{CE} = 8 V, Z_S = Z_{Sopt} , f = 1.8 GHz	F	 - -	 1 1.5	 2.5 -	dB
Power gain, maximum stable [1)] I_C = 10 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 900 MHz	G_{ms}	-	20	-	
Power gain, maximum available [2)] I_C = 10 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 1.8 GHz	G_{ma}	-	14	-	
Transducer gain I_C = 15 mA, V_{CE} = 6 V, Z_S = Z_L = 50Ω , f = 1 GHz I_C = 10 mA, V_{CE} = 8 V, Z_S = Z_L = 50Ω , f = 1.8 GHz	$\lvert S_{21e}\rvert^2$	 13 -	 16 11	 - -	

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

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

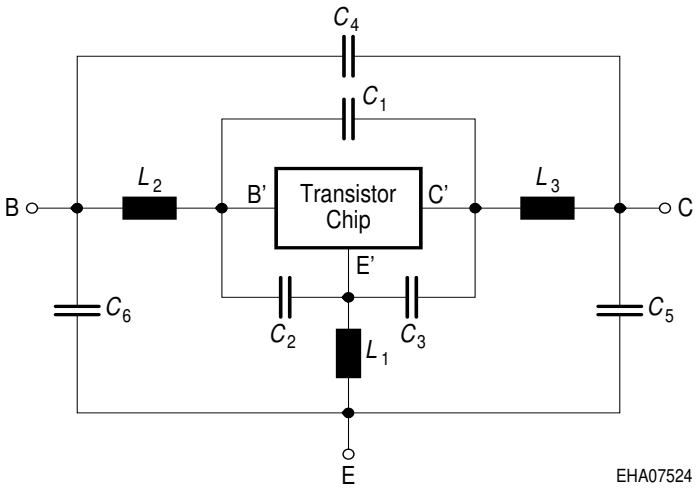
SPICE Parameters (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax) :

Transistor Chip Data

IS =	4.36	fA	BF =	120	-	NF =	1.085	-
VAF =	30	V	IKF =	0.152	A	ISE =	1.86	pA
NE =	1.998	-	BR =	33.322	-	NR =	1.095	-
VAR =	41.889	V	IKR =	0.063	A	ISC =	3.68	pA
NC =	1.569	-	RB =	20.766	Ω	IRB =	72.2	µA
RBM =	0.823	Ω	RE =	0.101		RC =	0.849	Ω
CJE =	291	fF	VJE =	0.586	V	MJE =	0.456	-
TF =	8.77	ps	XTF =	0.00894	-	VTF =	0.198	V
ITF =	1.336	mA	PTF =	0	deg	CJC =	459	fF
VJC =	1.048	V	MJC =	0.334	-	XCJC =	0.217	-
TR =	1.39	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	NK =	0.5	-	EG =	1.11	eV
.	-		FC =	0.924	-	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:

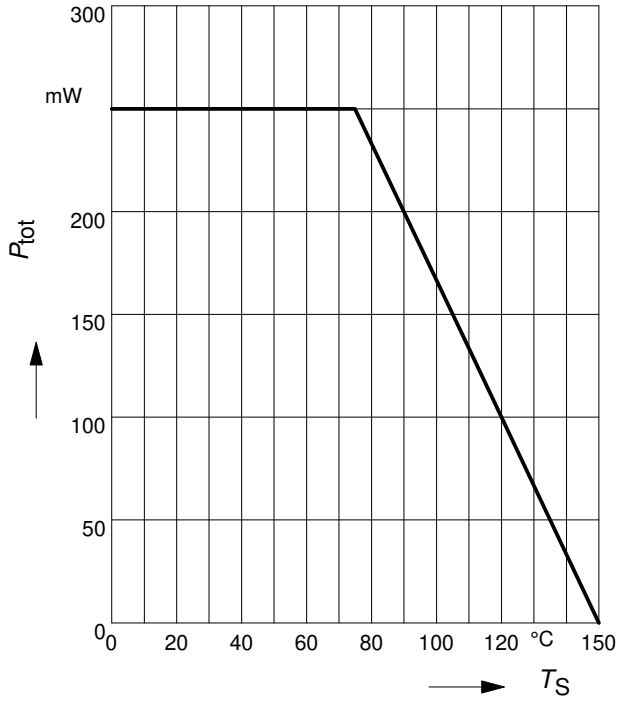


L_1 =	0.762	nH
L_2 =	0.706	nH
L_3 =	0.382	nH
C_1 =	62	fF
C_2 =	84	fF
C_3 =	180	fF
C_4 =	7	fF
C_5 =	40	fF
C_6 =	48	fF

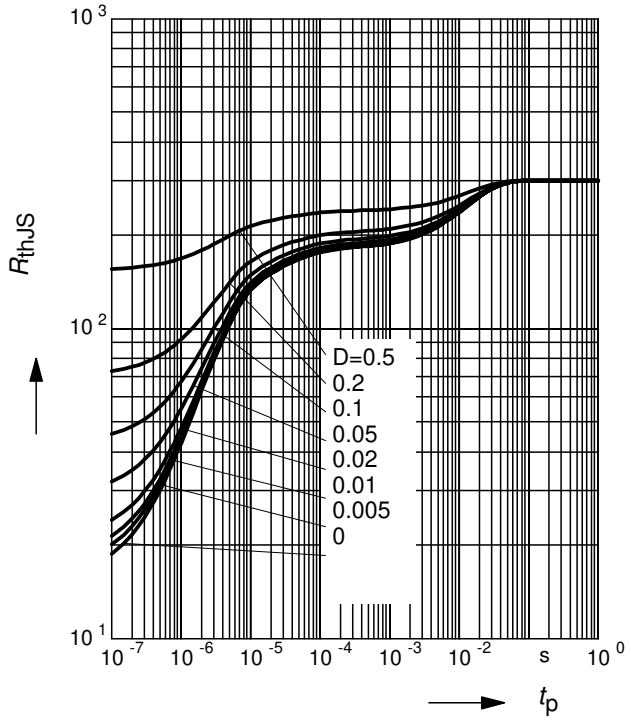
Valid up to 6GHz

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 $P_{tot} = f(T_S)$

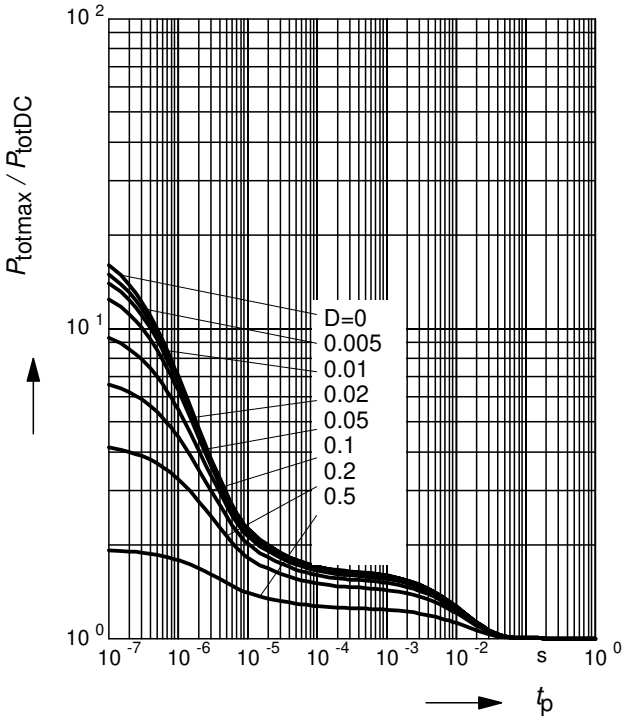


Permissible Pulse Load $R_{thJS} = f(t_p)$



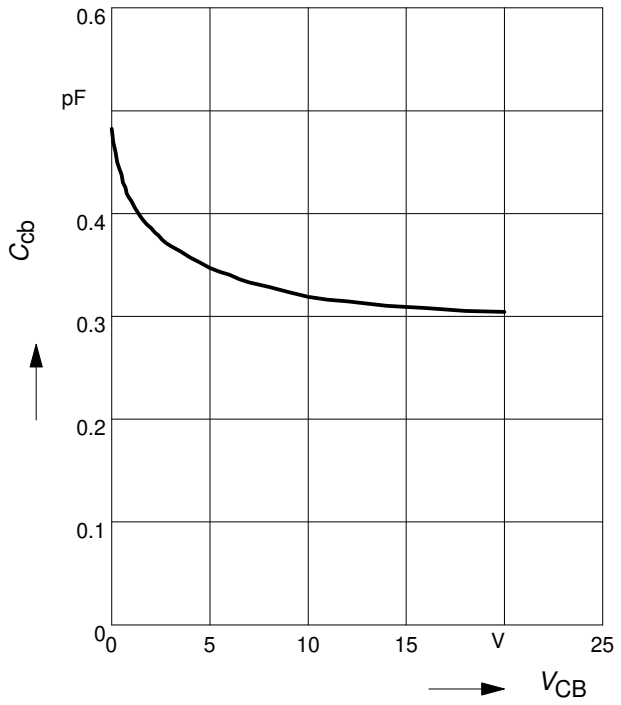
Permissible Pulse Load

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



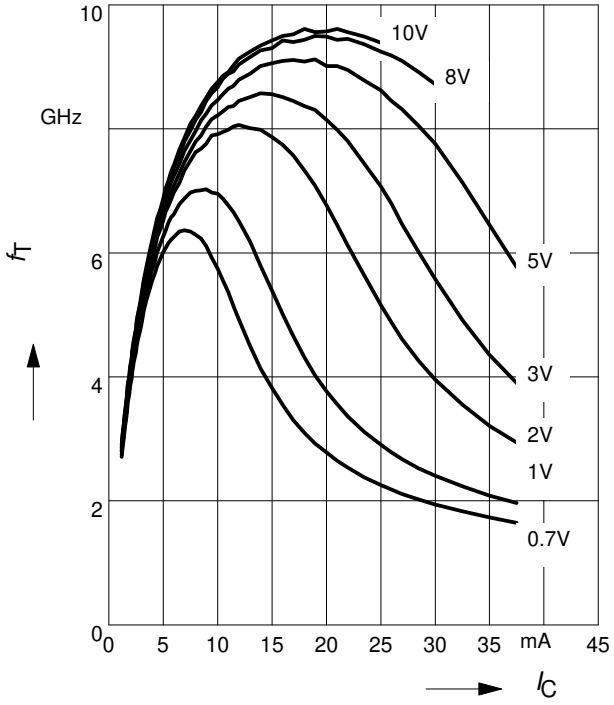
Collector-base capacitance $C_{cb} = f(V_{CB})$

f = 1MHz



Transition frequency $f_T = f(I_C)$

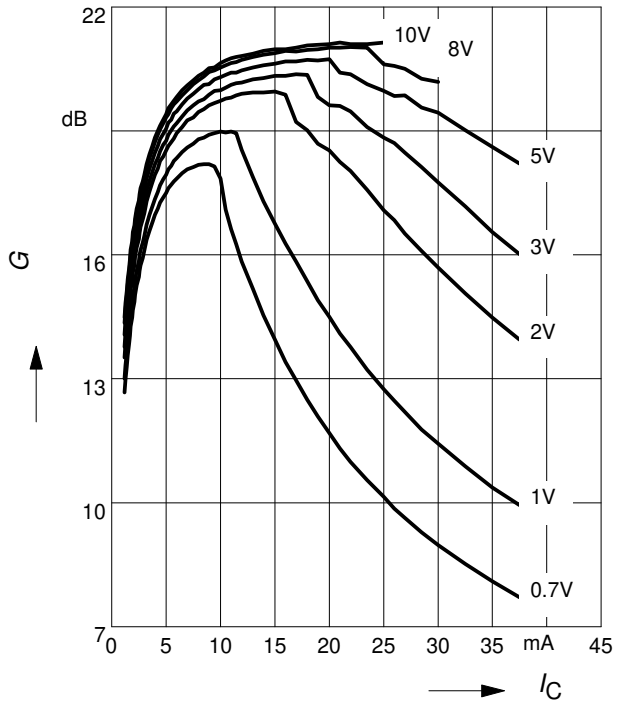
V_{CE} = Parameter



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

f = 0.9GHz

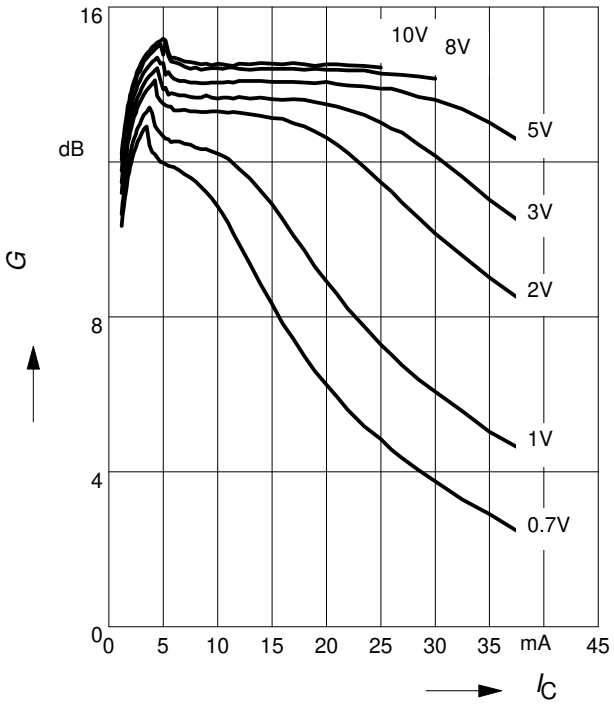
V_{CE} = Parameter



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

f = 1.8GHz

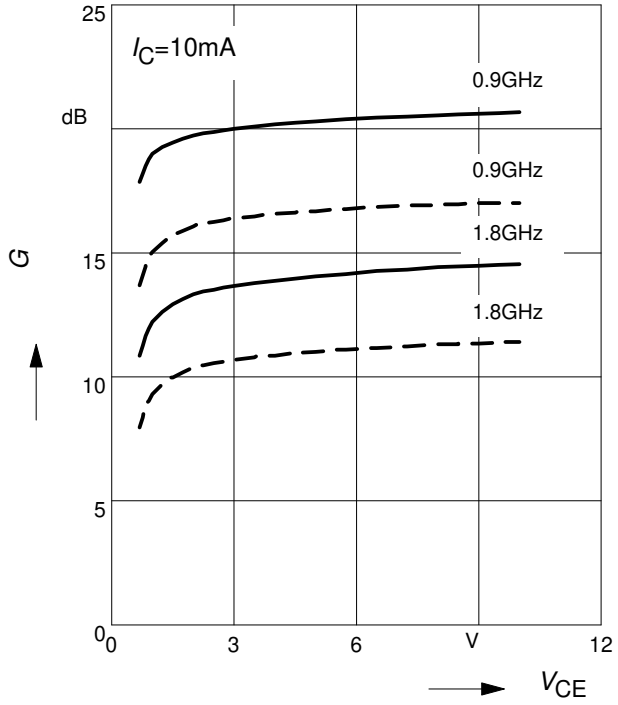
V_{CE} = Parameter



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

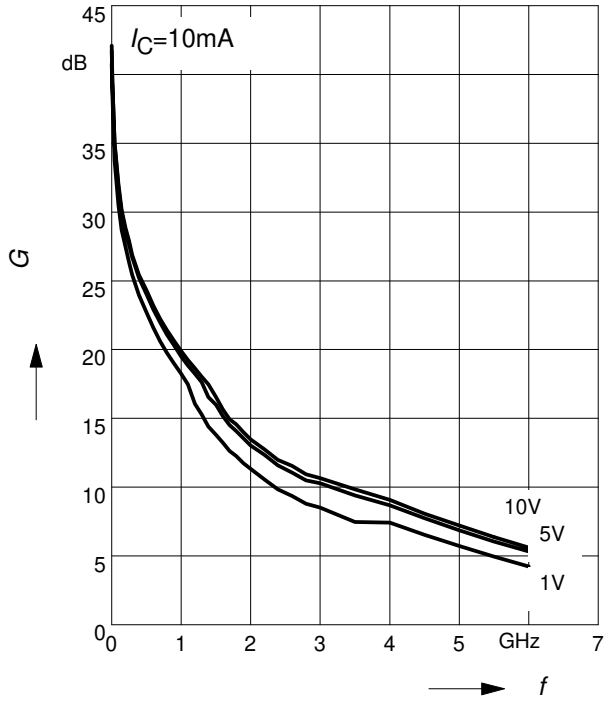
$|S_{21}|^2$ = $f(V_{CE})$:---------

f = Parameter



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

V_{CE} = Parameter



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

V_{CE} = Parameter