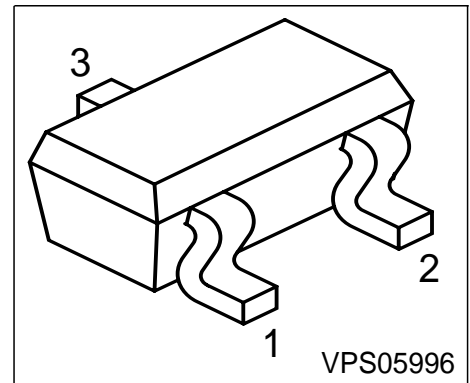## NPN Silicon RF Transistor

Preliminary data

- For broadband amplifiers up to 2 GHz and
  fast non-saturated switches at collector currents
  from 0.5 mA to 20 mA

- Complementary type: BFT92T (PNP)

VPS05996

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

Type	Marking	Pin Configuration			Package
BFR92T	GFs	1 = B	2 = E	3 = C	SC75

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	15	V
Collector-emitter voltage	V_{CES}	20	
Collector-base voltage	V_{CBO}	20	
Emitter-base voltage	V_{EBO}	2.5	
Collector current	I_C	30	mA
Base current	I_B	4	
Total power dissipation $T_S \leq 69°C$ [1]	P_{tot}	280	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}	$\leq$ 290	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

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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	$V_{(BR)CEO}$	15	-	-	V
Collector-emitter cutoff current V_{CE} = 20 V, V_{BE} = 0	I_{CES}	-	-	10	µA
Collector-base cutoff current V_{CB} = 10 V, I_E = 0	I_{CBO}	-	-	100	nA
Emitter-base cutoff current V_{EB} = 2.5 V, I_C = 0	I_{EBO}	-	-	100	µA
DC current gain I_C = 15 mA, V_{CE} = 8 V	h_{FE}	40	100	200	-

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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} = 8 V, f = 500 MHz	f_T	3.5	5	-	GHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	0.38	0.6	pF
Collector-emitter capacitance V_{CE} = 10 V, f = 1 MHz	C_{ce}	-	0.2	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	0.7	-	
Noise figure I_C = 2 mA, V_{CE} = 6 V, Z_S = Z_{Sopt} , f = 900 MHz f = 1.8 GHz	F	- -	1.8 2.9	- -	dB
Power gain, maximum available [1] I_C = 15 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 900 MHz f = 1.8 GHz	G_{ma}	- -	16 10.5	- -	
Transducer gain I_C = 15 mA, V_{CE} = 8 V, Z_S = Z_L = 50Ω , f = 900 MHz f = 1.8 GHz	$\lvert S_{21e}\rvert^2$	- -	13.5 8	- -	

$^1 G_{ma} = \lvert S_{21} / S_{12}\rvert \; (k-(k^2-1)^{1/2})$

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

Transistor Chip Data

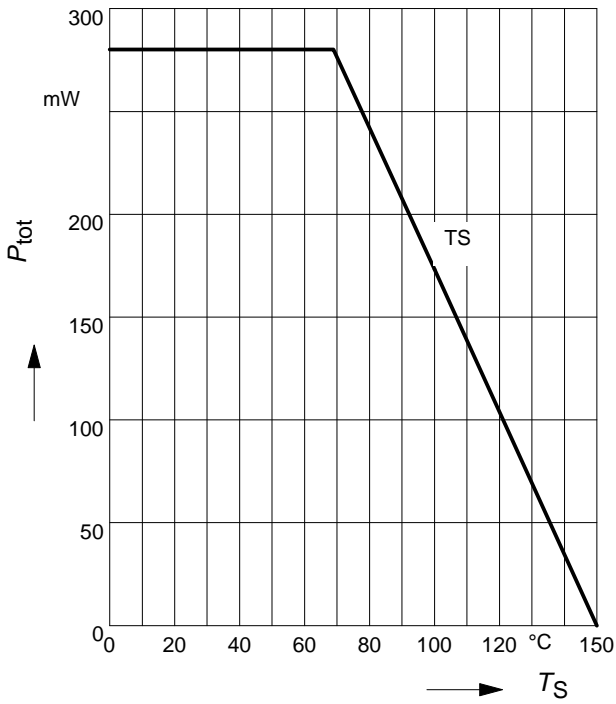|										
IS =	0.1213	fA	BF =	94.733	-	NF =	1.0947	-
VAF =	30	V	IKF =	0.46227	A	ISE =	129.55	fA
NE =	1.9052	-	BR =	10.729	-	NR =	0.8983	-
VAR =	14.599	V	IKR =	0.01	A	ISC =	0.75557	fA
NC =	1.371	-	RB =	14.998	Ω	IRB =	0.01652	mA
RBM =	7.8145	Ω	RE =	0.29088	Ω	RC =	0.13793	Ω
CJE =	10.416	fF	VJE =	0.70618	V	MJE =	0.34686	-
TF =	26.796	ps	XTF =	0.3817	-	VTF =	0.32861	V
ITF =	4.4601	mA	PTF =	0	deg	CJC =	946.47	fF
VJC =	0.84079	V	MJC =	0.4085	-	XCJC =	0.13464	-
TR =	1.2744	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.99545	-	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:

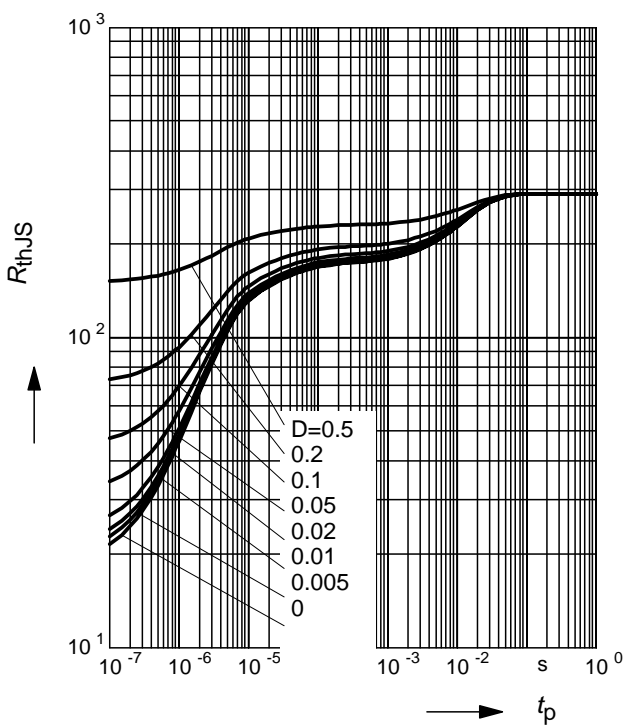|		
L_1 =	0.762	nH
L_2 =	0.706	nH
L_3 =	0.382	nH
C_1	62	fF
C_2	84	fF
C_3	180	fF
C_4 =	7	
C_5 =	40	fF
C_6 =	48	fF

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

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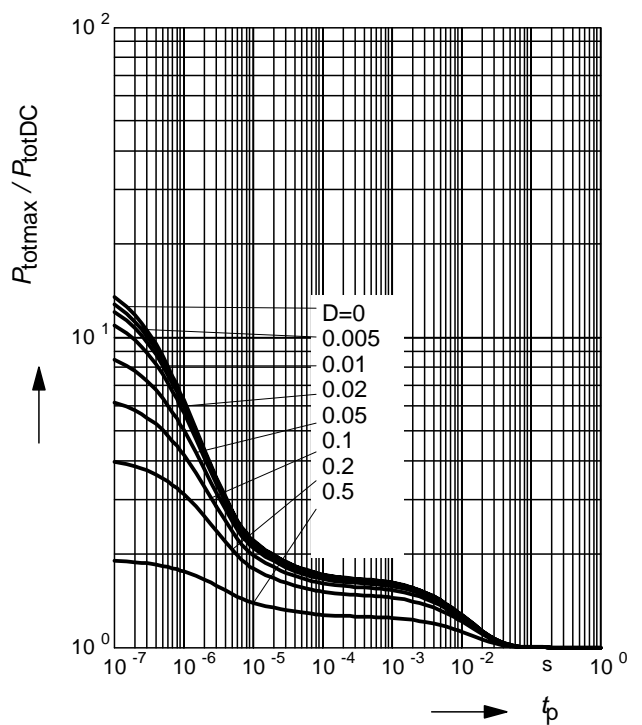**Total power dissipation** $P_{tot} = f(T_S)$

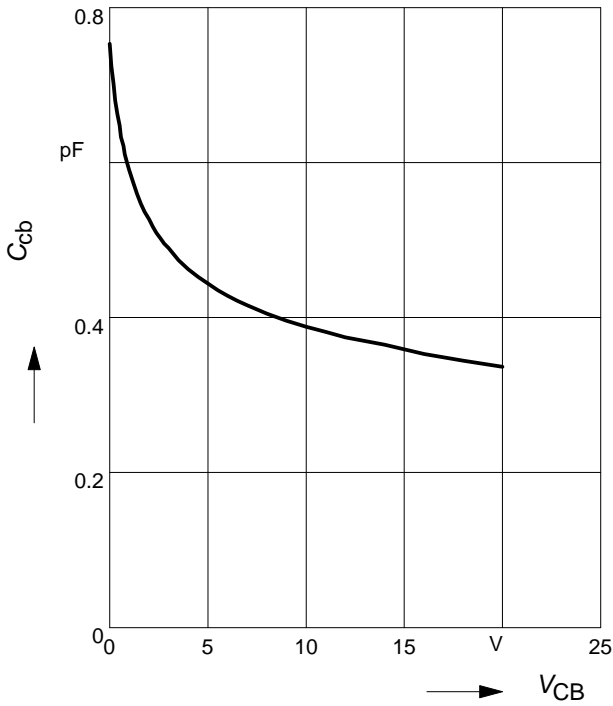**Permissible Pulse Load** $R_{thJS} = f(t_p)$

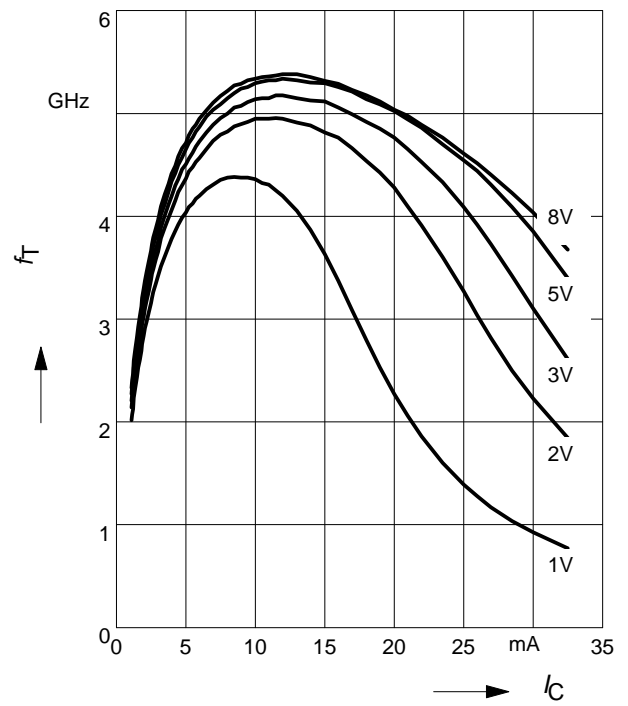**Permissible Pulse Load**

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

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Collector-base capacitance $C_{cb} = f(V_{CB})$
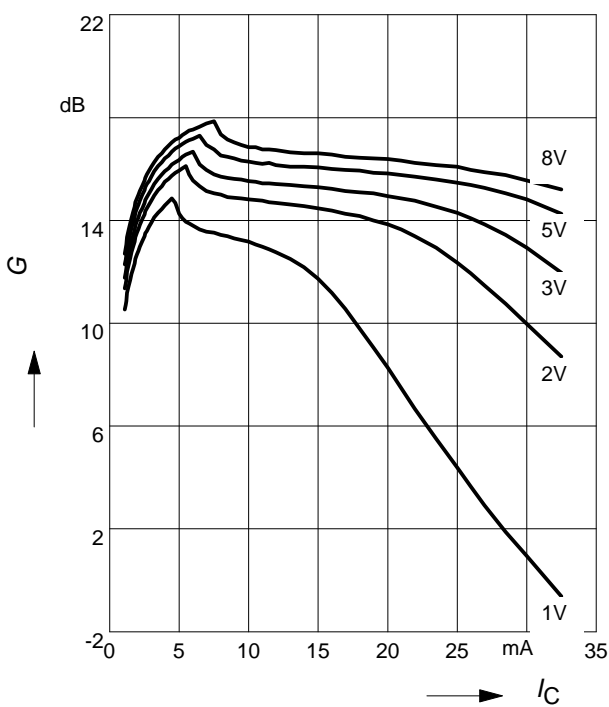
f = 1MHz

Transition frequency $f_T = f(I_C)$

V_{CE} = Parameter

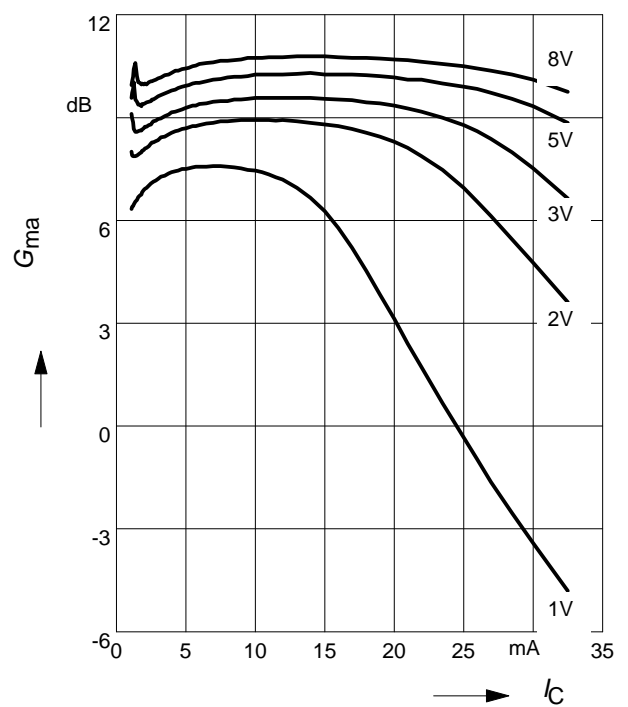**Power Gain** G_{ma}, $G_{ms} = f(I_C)$

f = 0.9GHz

V_{CE} = Parameter

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

f = 1.8GHz

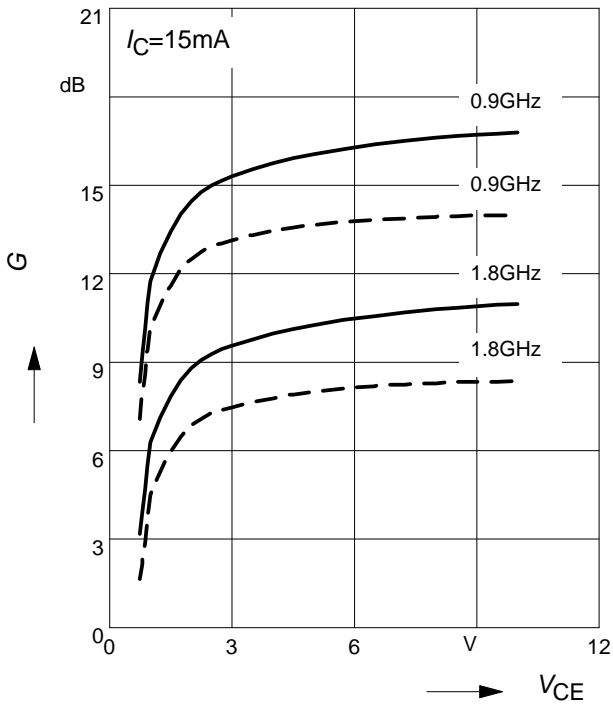V_{CE} = Parameter

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

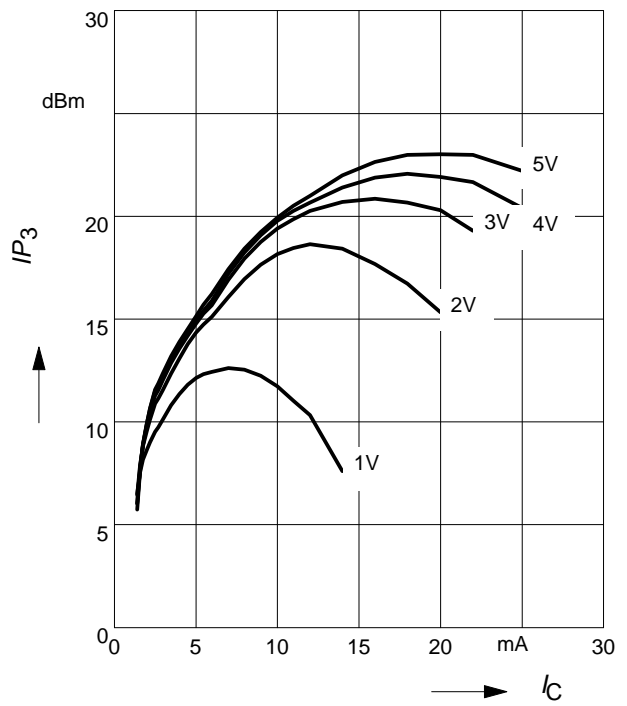$\qquad\qquad |S_{21}|^2 = f(V_{CE})$: - - - - - - -

f = Parameter

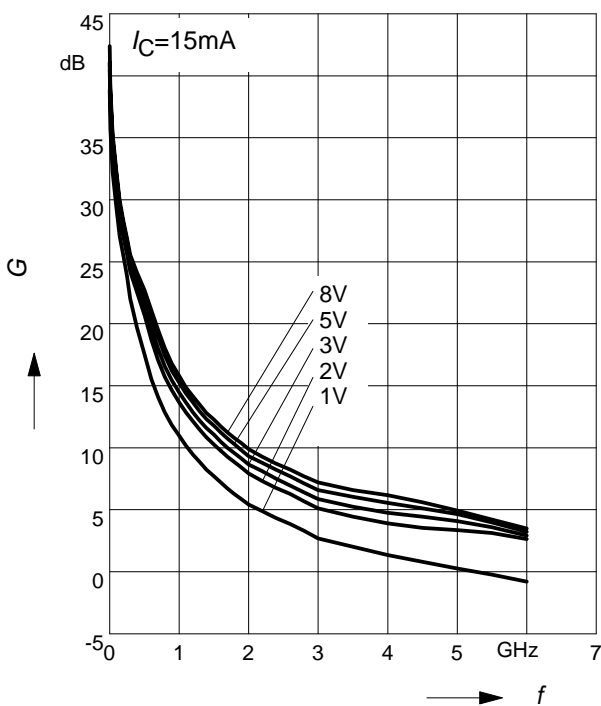**Intermodulation Intercept Point** $IP_3 = f(I_C)$

(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