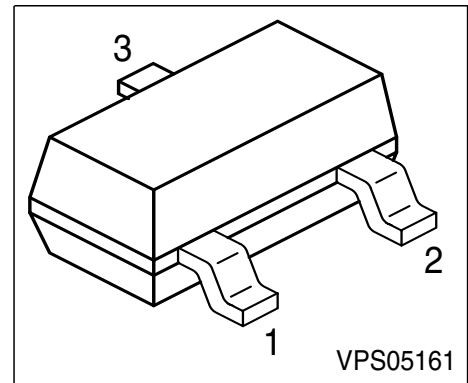


**NPN Silicon RF Transistor**

- For low noise, high-gain broadband amplifiers at collector currents from 1 mA to 20 mA
- $f_T = 8 \text{ GHz}$   
 $F = 1.2 \text{ dB at } 900 \text{ MHz}$



**ESD:** Electrostatic discharge sensitive device, observe handling precaution!

Type	Marking	Pin Configuration			Package
BFR 182	RGs	1 = B	2 = E	3 = C	SOT-23

**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	$I_C$	35	mA
Base current	$I_B$	4	
Total power dissipation, $T_S \leq 93 \text{ }^\circ\text{C}$ <sup>F)</sup>	$P_{tot}$	250	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Ambient temperature	$T_A$	-65 ... 150	
Storage temperature	$T_{stg}$	-65 ... 150	

**Thermal Resistance**

Junction - soldering point	$R_{thJS}$	$\leq 230$	K/W
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<sup>1</sup> $T_S$  is measured on the collector lead at the soldering point to the pcb

**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>DC characteristics</b>					
Collector-emitter breakdown voltage $I_C = 1\text{ mA}, I_B = 0$	$V_{(BR)CEO}$	12	-	-	V
Collector-emitter cutoff current $V_{CE} = 20\text{ V}, V_{BE} = 0$	$I_{CES}$	-	-	100	$\mu\text{A}$
Collector-base cutoff current $V_{CB} = 10\text{ V}, I_E = 0$	$I_{CBO}$	-	-	100	nA
Emitter-base cutoff current $V_{EB} = 1\text{ V}, I_C = 0$	$I_{EBO}$	-	-	1	$\mu\text{A}$
DC current gain $I_C = 10\text{ mA}, V_{CE} = 8\text{ V}$	$h_{FE}$	50	100	200	-

**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC characteristics</b> (verified by random sampling)					
Transition frequency $I_C = 15 \text{ mA}, V_{CE} = 8 \text{ V}, f = 500 \text{ MHz}$	$f_T$	6	8	-	GHz
Collector-base capacitance $V_{CB} = 10 \text{ V}, f = 1 \text{ MHz}$	$C_{cb}$	-	0.33	0.5	pF
Collector-emitter capacitance $V_{CE} = 10 \text{ V}, f = 1 \text{ MHz}$	$C_{ce}$	-	0.2	-	
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}, f = 1 \text{ MHz}$	$C_{eb}$	-	0.6	-	
Noise figure $I_C = 3 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{Sopt},$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	$F$	-	1.2	-	dB
		-	1.9	-	
Power gain, maximum available <sup>F)</sup> $I_C = 10 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{Sopt}, Z_L = Z_{Lopt},$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	$G_{ma}$	-	17.5	-	
		-	11.5	-	
Transducer gain $I_C = 10 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_L = 50\Omega,$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	$ S_{21e} ^2$	-	14.5	-	
		-	9	-	

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

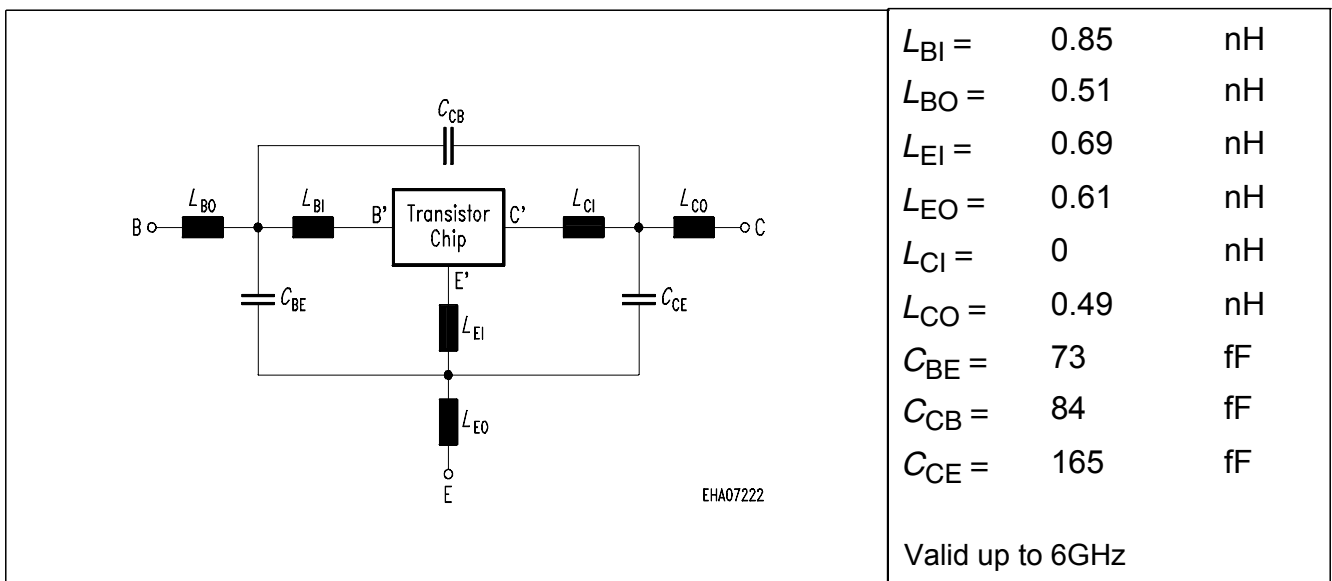
**SPICE Parameters (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax) :**

**Transistor Chip Data**

IS =	4.8499	fA	BF =	84.113	-	NF =	0.56639	-
VAF =	21.742	V	IKF =	0.14414	A	ISE =	8.4254	fA
NE =	0.91624	-	BR =	10.004	-	NR =	0.54818	-
VAR =	2.2595	V	IKR =	0.03978	A	ISC =	5.9438	fA
NC =	0.5641	-	RB =	2.8263	$\Omega$	IRB =	0.071955	mA
RBM =	3.4217	$\Omega$	RE =	2.1858		RC =	1.8159	$\Omega$
CJE =	8.8619	fF	VJE =	1.0378	V	MJE =	0.40796	-
TF =	22.72	ps	XTF =	0.43147	-	VTF =	0.34608	V
ITF =	6.5523	mA	PTF =	0	deg	CJC =	490.25	fF
VJC =	1.0132	V	MJC =	0.31068	-	XCJC =	0.19281	-
TR =	1.7541	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.64175	-	TNOM	300	K

All parameters are ready to use, no scaling is necessary.  
 Extracted on behalf of SIEMENS Small Signal Semiconductors by:  
 Institut für Mobil-und Satellitentechnik (IMST)  
 © 1996 SIEMENS AG

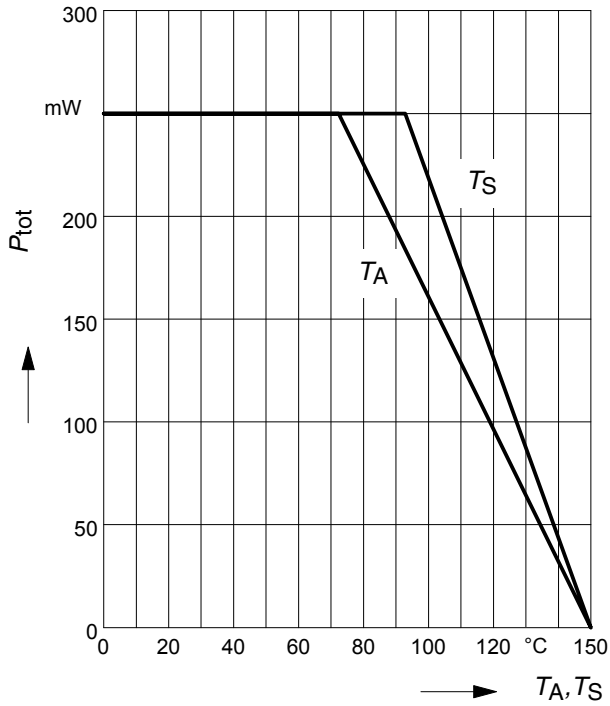
**Package Equivalent Circuit:**



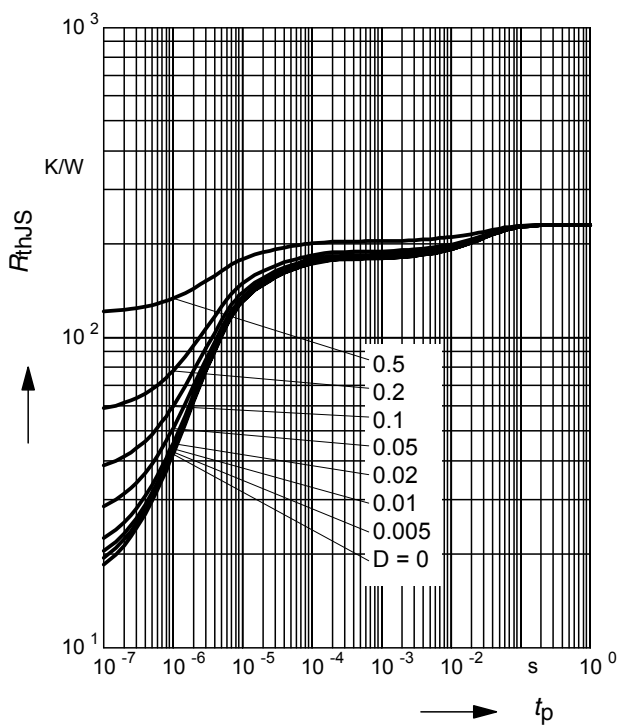
For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: <http://www.infineon.com/products/discrete/index.htm>

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

\* Package mounted on epoxy

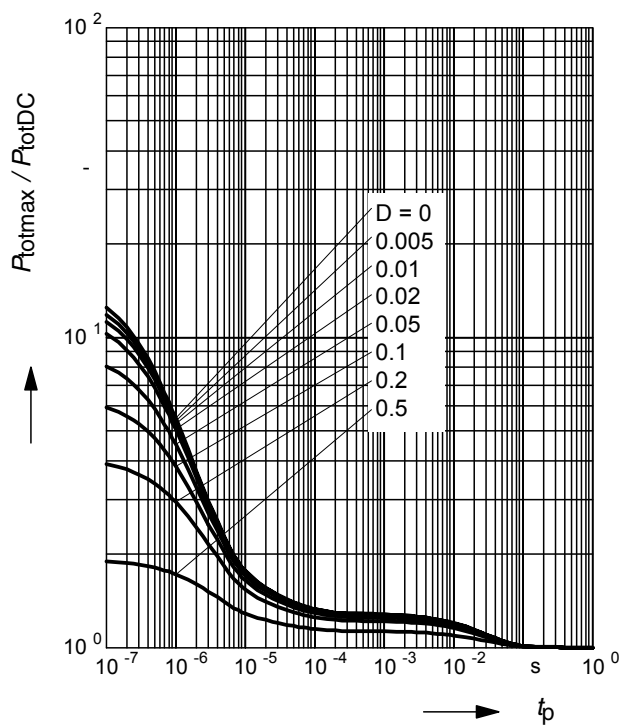


**Permissible Pulse Load  $R_{thJS} = f(t_p)$**



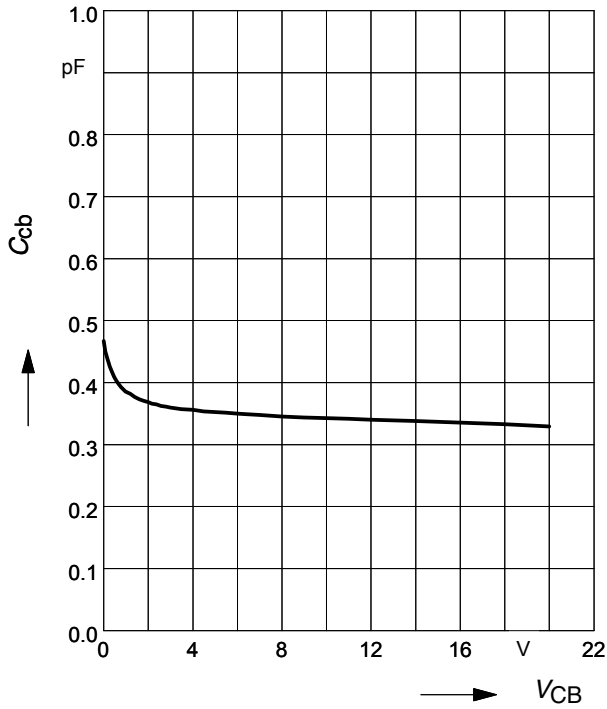
**Permissible Pulse Load**

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



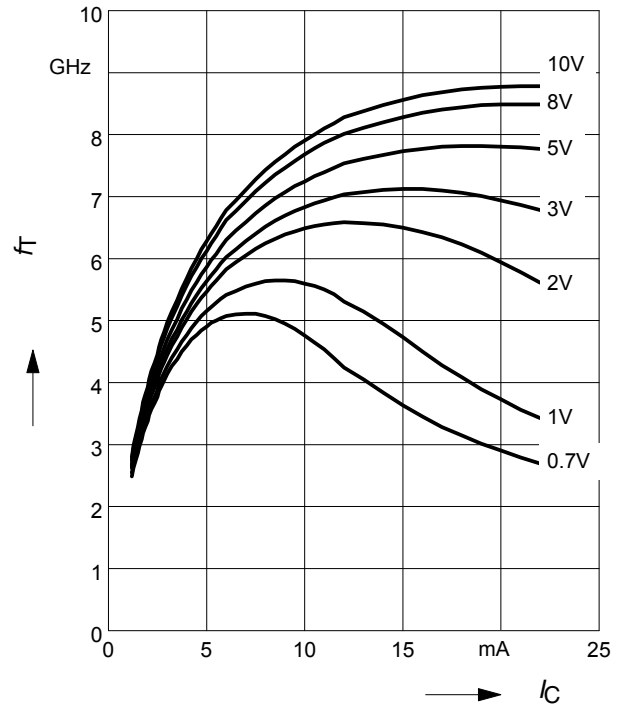
**Collector-base capacitance  $C_{cb} = f(V_{CB})$**

$f = 1\text{MHz}$



**Transition frequency  $f_T = f(I_C)$**

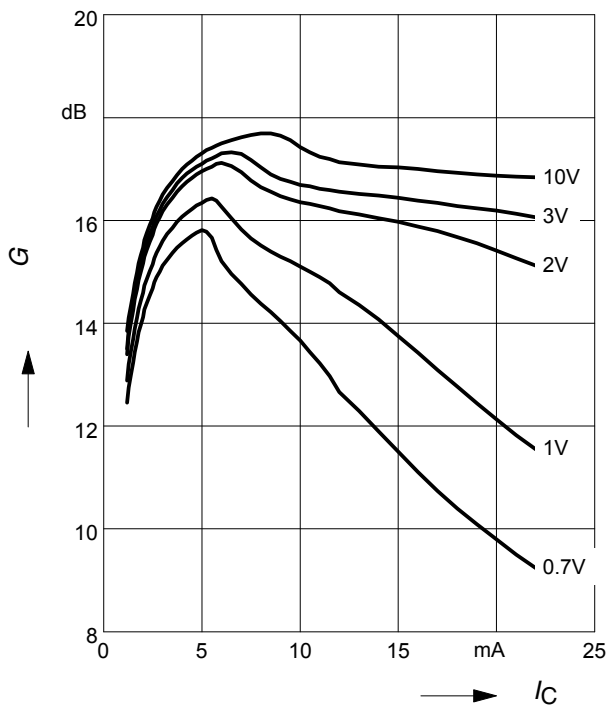
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

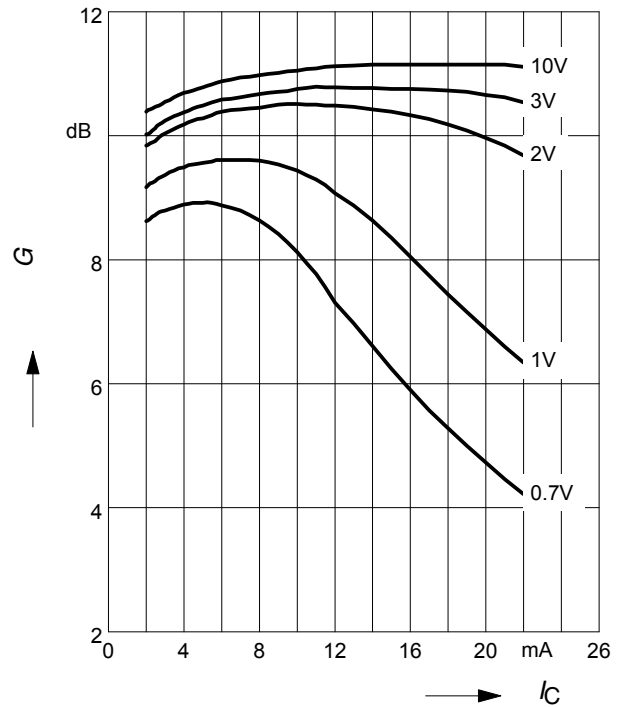
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

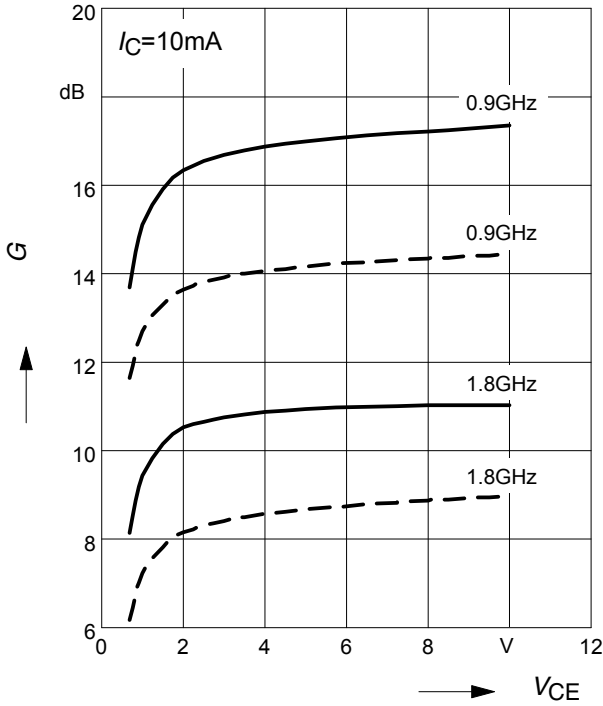
$V_{CE} = \text{Parameter}$



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

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

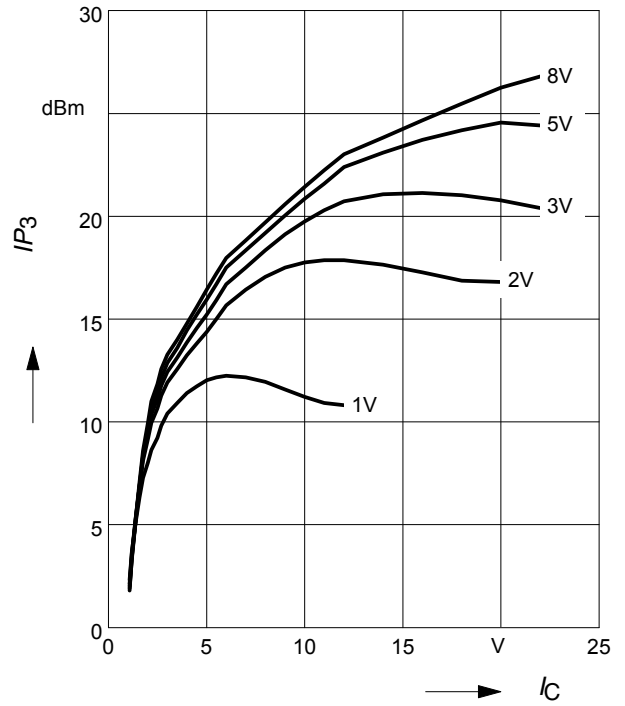
$f =$  Parameter



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

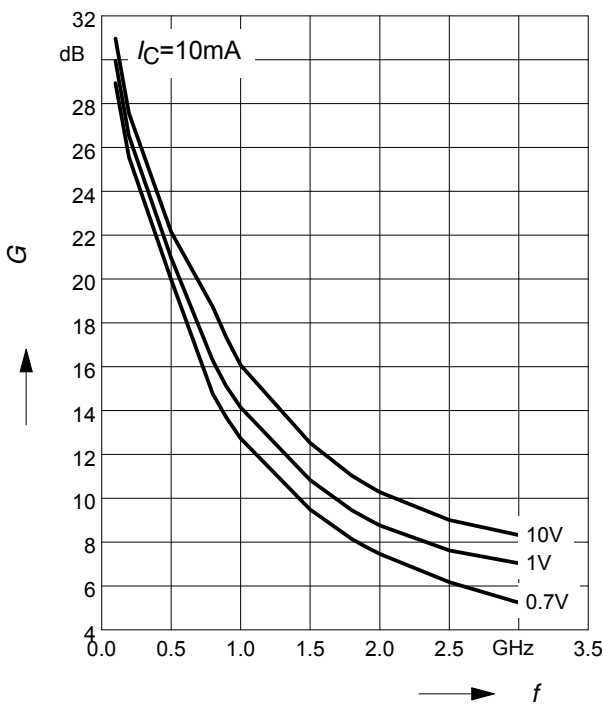
(3rd order, Output,  $Z_S = Z_L = 50\Omega$ )

$V_{CE} =$  Parameter,  $f = 900\text{MHz}$



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

$V_{CE} =$  Parameter



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

$V_{CE} =$  Parameter

