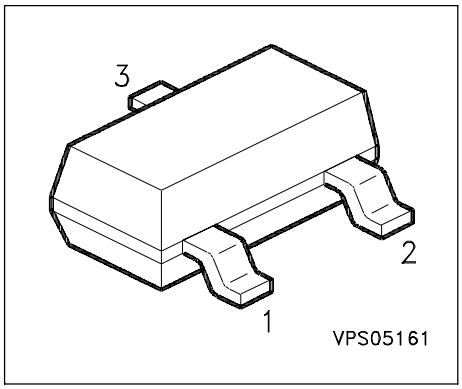
NPN Silicon RF Transistor

- For low-noise amplifiers up to 2GHz and broadband analog and digital applications in telecommunications systems at collector currents from 0.5 mA to 20 mA.



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

Type	Marking	Ordering Code	Pin Configuration			Package
BFQ 81	RAs	Q62702-F1049	1 = B	2 = E	3 = C	SOT-23

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CEO}	16	V
Collector-emitter voltage	V_{CES}	25	
Collector-base voltage	V_{CBO}	25	
Emitter-base voltage	V_{EBO}	2	
Collector current	I_C	30	mA
Base current	I_B	4	
Total power dissipation $T_S \leq 59$ °C	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 [1)]	R_{thJS}	≤ 325	K/W

1) T_S is measured on the collector lead at the soldering point to the pcb.

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	$V_{(BR)CEO}$	16	-	-	V
Collector-emitter cutoff current V_{CE} = 25 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} = 2 V, I_C = 0	I_{EBO}	-	-	10	µA
DC current gain I_C = 15 mA, V_{CE} = 8 V	h_{FE}	50	120	200	-

Electrical Characteristics at T_A = 25°C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency I_C = 15 mA, V_{CE} = 8 V, f = 500 MHz	f_T	4.5	5.8	-	GHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	0.39	0.6	pF
Collector-emitter capacitance V_{CE} = 10 V, f = 1 MHz	C_{ce}	-	0.19	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	0.9	-	
Noise figure I_C = 5 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}	F				dB
f = 900 MHz		-	1.45	-	
f = 1.8 GHz		-	2.2	-	
Power gain [2)] I_C = 15 mA, V_{CE} = 8 V, Z_S = Z_{Sopt} Z_L = Z_{Lopt}	G_{ma}				
f = 900 MHz		-	16	-	
f = 1.8 GHz		-	10.5	-	
Transducer gain I_C = 15 mA, V_{CE} = 8 V, Z_S =Z_L= 50 Ω	$\lvert S_{21e}\rvert^2$				
f = 900 MHz		-	13	-	
f = 1.8 GHz		-	7.5	-	

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

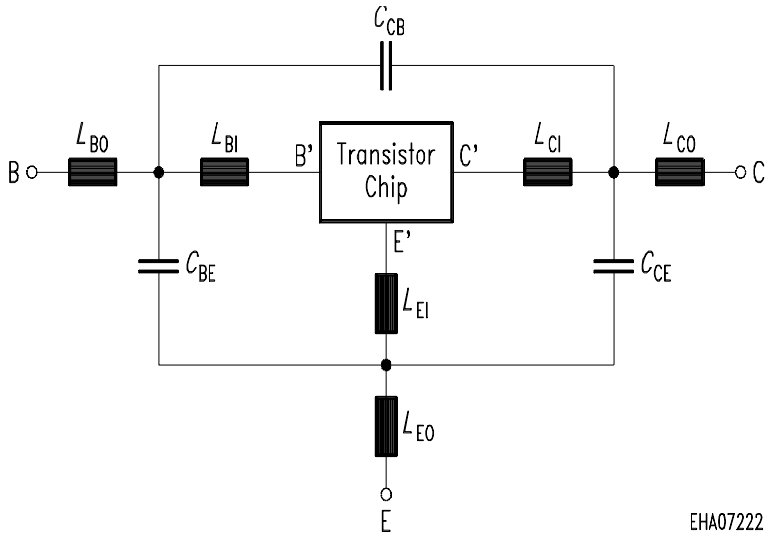
SPICE Parameters (Gummel-Poon Model, Berkeley-SPICE 2G.6 Syntax) :

Transistor Chip Data

IS =	17.03	fA	BF =	110	-	NF =	0.80846	-
VAF =	35	V	IKF =	0.22241	A	ISE =	5.8728	fA
NE =	1.0668	-	BR =	25.974	-	NR =	0.36321	-
VAR =	2.3785	V	IKR =	0.011566	A	ISC =	169.77	fA
NC =	1.2237	-	RB =	5.7058	Ω	IRB =	0.11894	mA
RBM =	1.5489	Ω	RE =	1.1731	Ω	RC =	0.3715	Ω
CJE =	33.977	fF	VJE =	0.4318	V	MJE =	1.7707	-
TF =	21.842	ps	XTF =	0.26781	-	VTF =	0.48042	V
ITF =	14.701	mA	PTF =	0	deg	CJC =	693.81	fF
VJC =	0.26339	V	MJC =	0.24448	-	XCJC =	0.1254	-
TR =	1.2554	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.74346	-	TNOM	300	K

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

Package Equivalent Circuit:



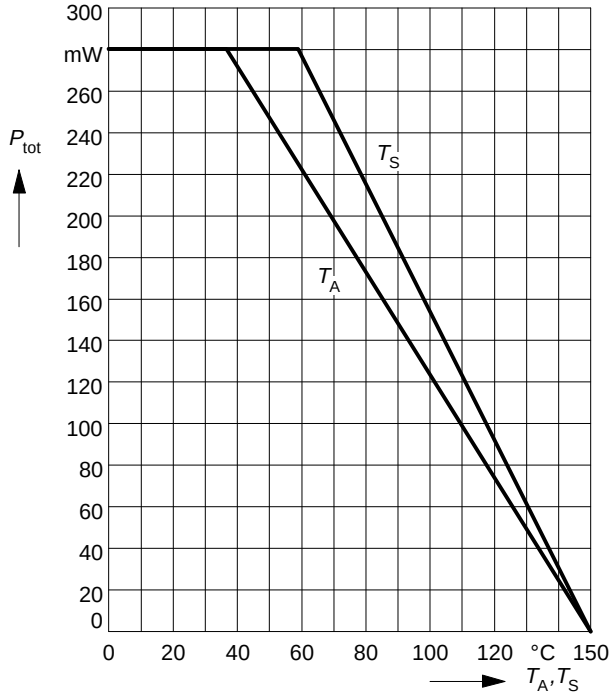
LBI =	0.85	nH
LBO =	0.51	nH
LEI =	0.69	nH
LEO =	0.61	nH
LCI =	0	nH
LCO =	0.49	nH
CBE =	73	fF
CCB =	84	fF
CCE =	165	fF

Valid up to 6 GHz

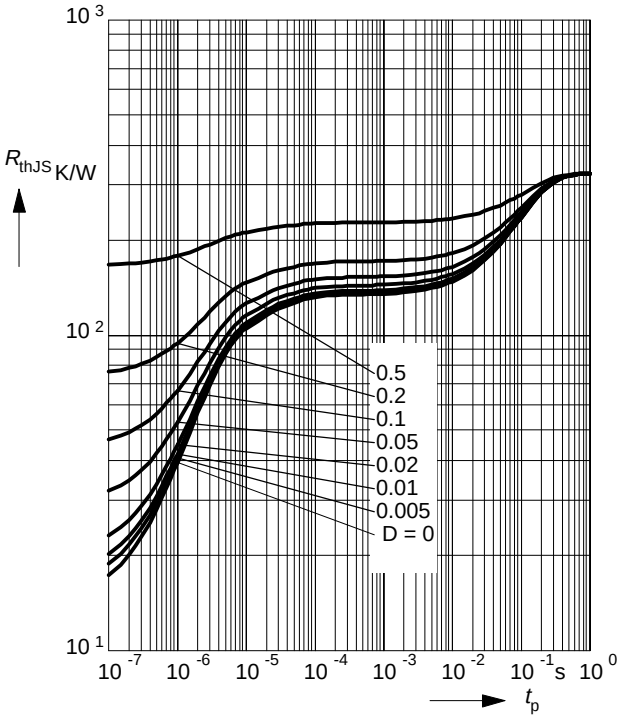
For examples and ready to use parameters please contact your local Siemens distributor or sales office to obtain a Siemens CD-ROM or see Internet: http://www.siemens.de/Semiconductor/products/35/35.htm

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

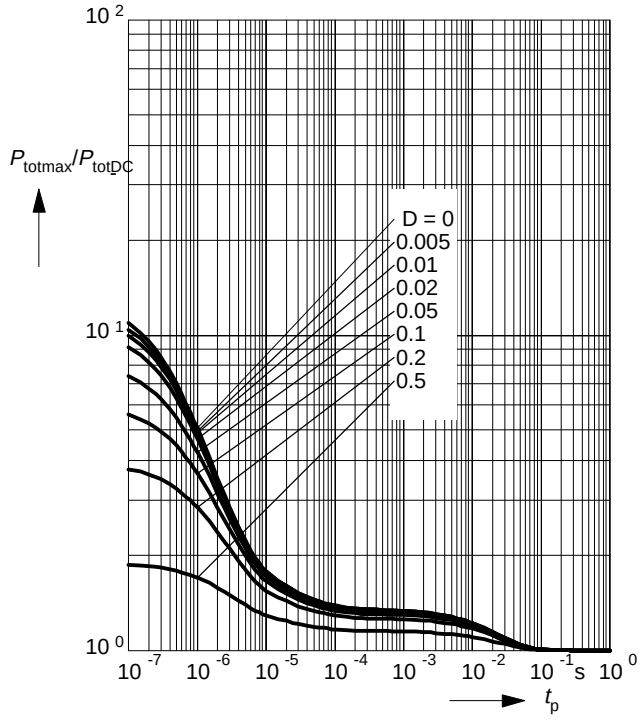
* Package mounted on epoxy



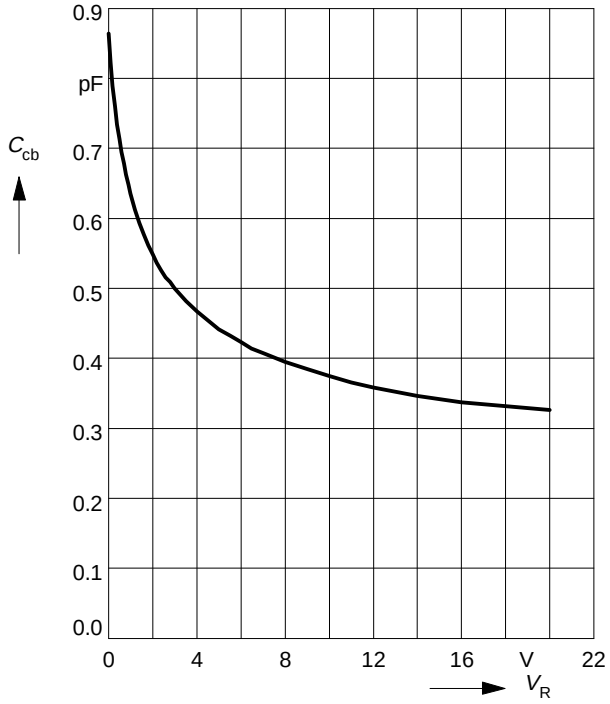
Permissible Pulse Load $R_{thJS} = f(t_p)$



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

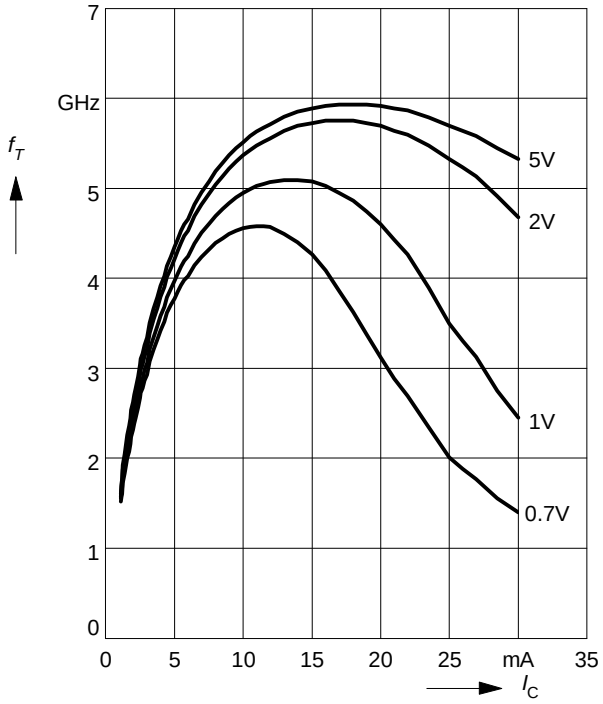


Collector-base capacitance $C_{cb} = f(V_{CB})$
$V_{BE} = v_{be} = 0$, $f = 1$MHz

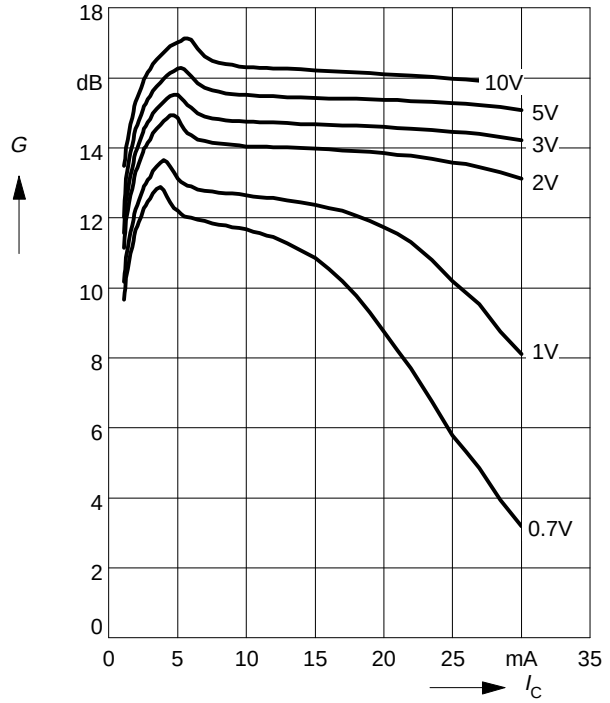


Transition frequency $f_T = f(I_C)$

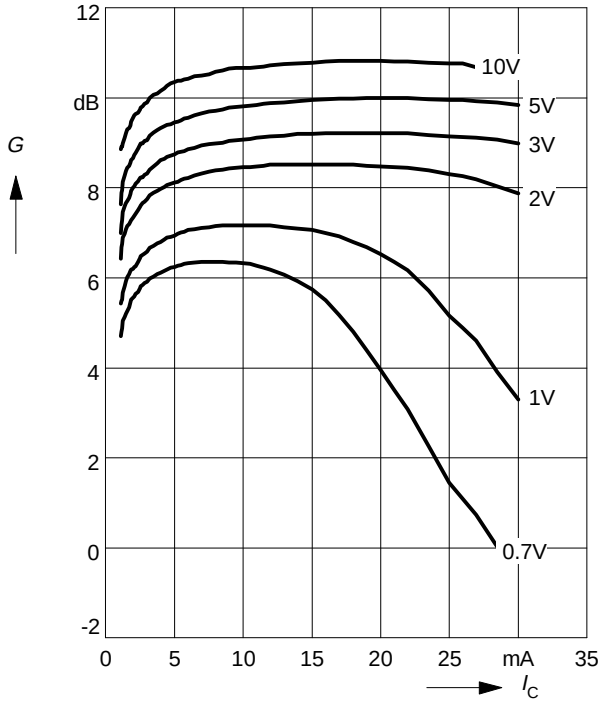
V_{CE} = Parameter



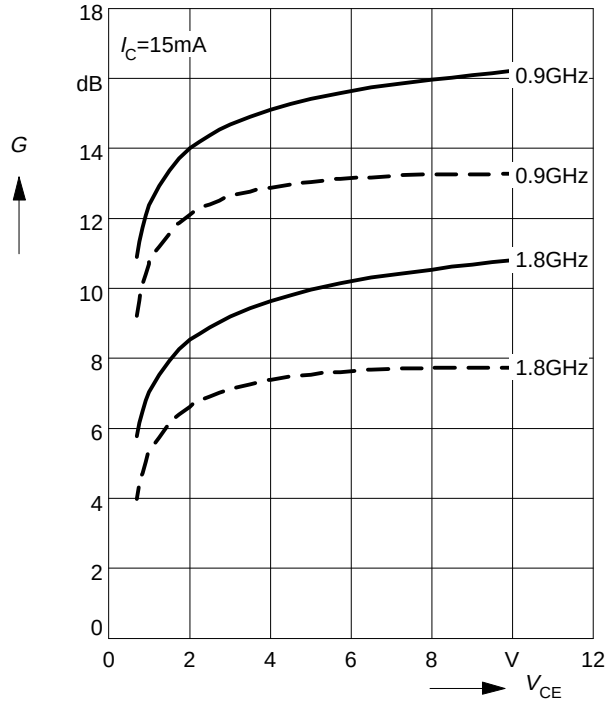
Power Gain G_{ma}, $G_{ms} = f(I_C)$
$f = 0.9$GHz
V_{CE} = Parameter



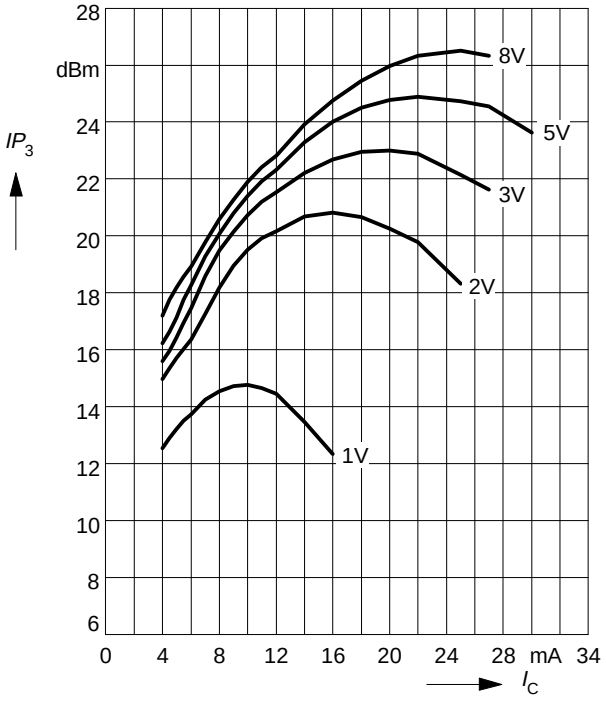
Power Gain G_{ma}, $G_{ms} = f(I_C)$
$f = 1.8$GHz
V_{CE} = Parameter



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

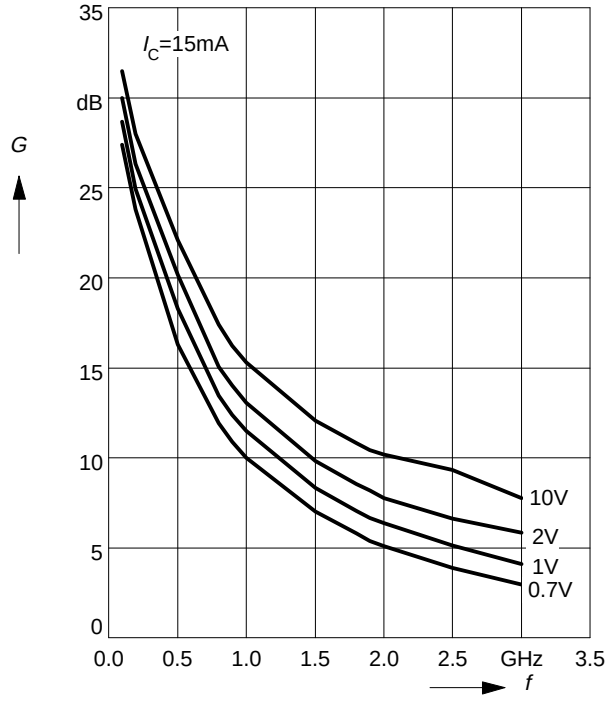


Intermodulation Intercept Point IP_3=$f(I_C)$
(3rd order, Output, Z_S=Z_L=50Ω)
V_{CE} = Parameter, f = 900MHz



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

V_{CE} = Parameter



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

V_{CE} = Parameter