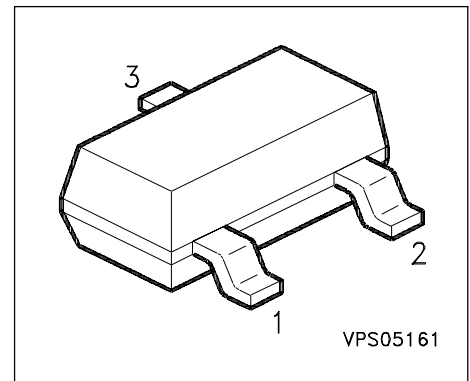


PNP Silicon RF Transistor

- For low distortion broadband amplifiers in antenna and telecommunications systems up to 1.5 GHz at collector currents from 20mA to 80mA
- Complementary type: BFR 106 (NPN)



ESD: Electrostatic discharge sensitive device, observe handling precaution!

Type	Marking	Ordering Code	Pin Configuration			Package
BFR 194	RKs	Q62702-F1346	1 = B	2 = E	3 = C	SOT-23

Maximum Ratings

Parameter	Symbol	Values	Unit
Collector-emitter voltage	V_{CEO}	15	V
Collector-base voltage	V_{CBO}	20	
Emitter-base voltage	V_{EBO}	3	
Collector current	I_C	100	mA
Base current	I_B	10	
Total power dissipation $T_S \leq 73^\circ\text{C}$	P_{tot}	700	mW
Junction temperature	T_j	150	
Ambient temperature	T_A	- 65 ... + 150	
Storage temperature	T_{stg}	- 65 ... + 150	

Thermal Resistance

Junction - soldering point ¹⁾	R_{thJS}	≤ 110	K/W
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1) 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.	
DC Characteristics					
Collector-emitter breakdown voltage $I_C = 1\text{ mA}, I_B = 0$	$V_{(BR)CEO}$	15	-	-	V
Collector-base cutoff current $V_{CB} = 10\text{ V}, I_E = 0$	I_{CBO}	-	-	100	nA
Emitter-base cutoff current $V_{EB} = 2\text{ V}, I_C = 0$	I_{EBO}	-	-	1	μA
DC current gain $I_C = 70\text{ mA}, V_{CE} = 8\text{ V}$	h_{FE}	15	50	-	-

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency $I_C = 70\text{ mA}$, $V_{CE} = 8\text{ V}$, $f = 500\text{ MHz}$	f_T	3.5	5	-	GHz
Collector-base capacitance $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{cb}	-	1.47	2	pF
Collector-emitter capacitance $V_{CE} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{ce}	-	0.28	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$	C_{eb}	-	4.4	-	
Noise figure $I_C = 20\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$ $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$	F	- -	2.8 4.7	- -	dB
Power gain 2) $I_C = 70\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$ $Z_L = Z_{Lopt}$ $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$	G_{ma}	- -	10 5.5	- -	
Transducer gain $I_C = 70\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_L = 50\text{ }\Omega$ $f = 900\text{ MHz}$ $f = 1.8\text{ MHz}$	$ S_{21e} ^2$	- -	8 3	- -	

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**

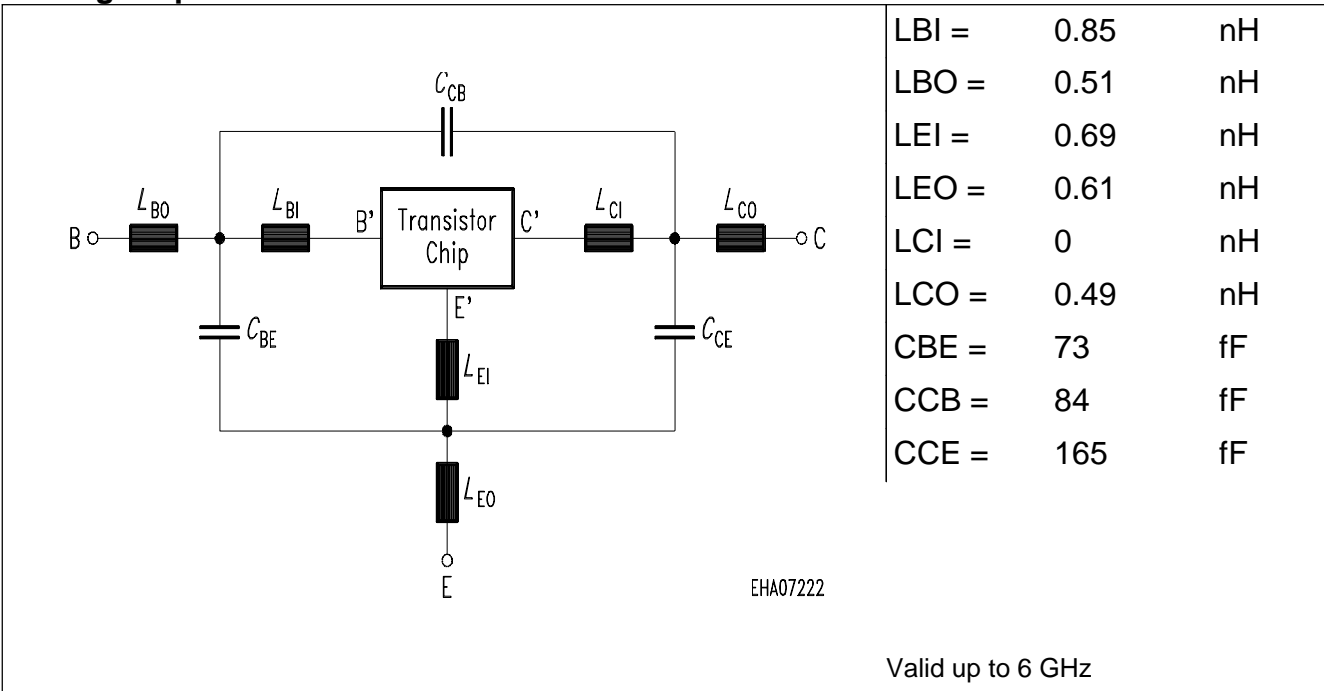
IS =	4.574	fA	BF =	111.78	-	NF =	0.66503	-
VAF =	9.1007	V	IKF =	0.84785	A	ISE =	21.629	fA
NE =	0.841	-	BR =	92.296	-	NR =	0.43618	-
VAR =	1.7871	V	IKR =	0.012843	A	ISC =	0.0078447	fA
NC =	1.6	-	RB =	0.75304	Ω	IRB =	0.061674	mA
RBM =	4.1356	Ω	RE =	0.15908	Ω	RC =	0.10833	Ω
CJE =	17.699	fF	VJE =	0.84843	V	MJE =	0.48212	-
TF =	53.11	ps	XTF =	0.65766	-	VTF =	0.10323	V
ITF =	0.010453	mA	PTF =	0	deg	CJC =	3585.6	fF
VJC =	0.71631	V	MJC =	0.40003	-	XCJC =	0.063742	-
TR =	0.97481	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.90755	-	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 Satellitenfunktechnik (IMST)

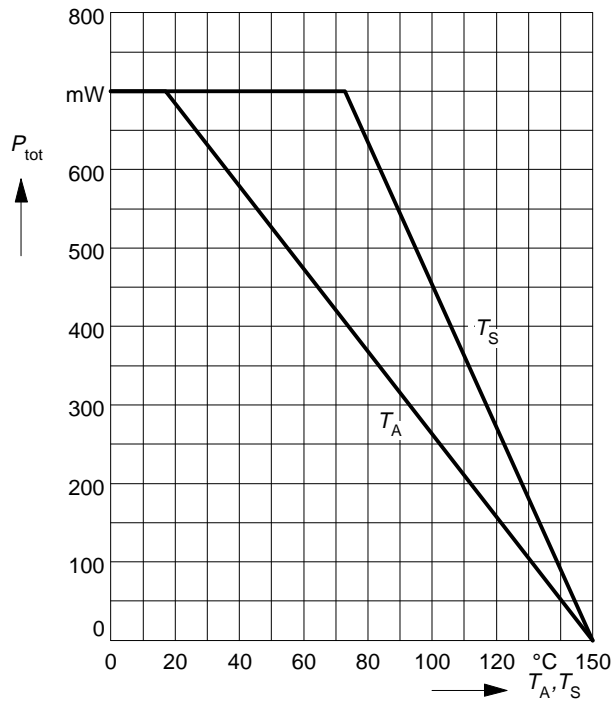
© 1996 SIEMENS AG

Package Equivalent Circuit:

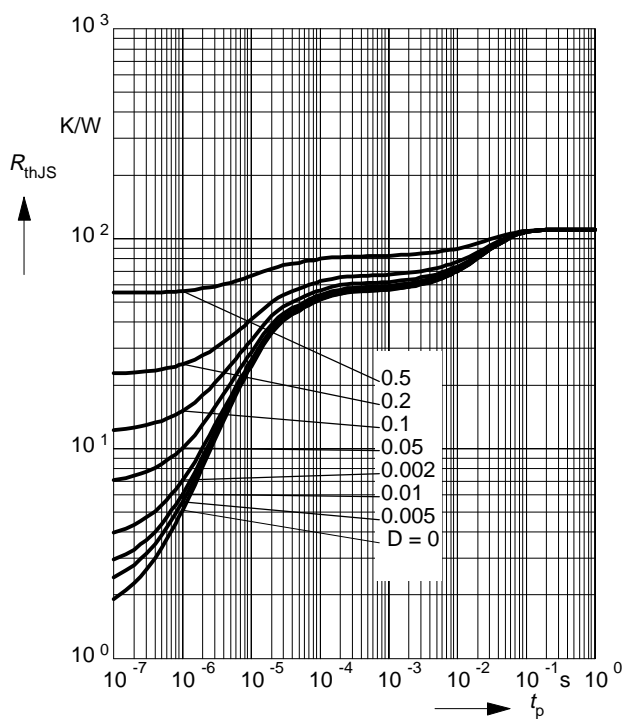
For examples and ready to use parameters please contact your local Siemens distributor or sales office to obtain a Siemens CD-ROM or see Internet: <http://www.siemens.de/Semiconductor/products/35/35.htm>

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

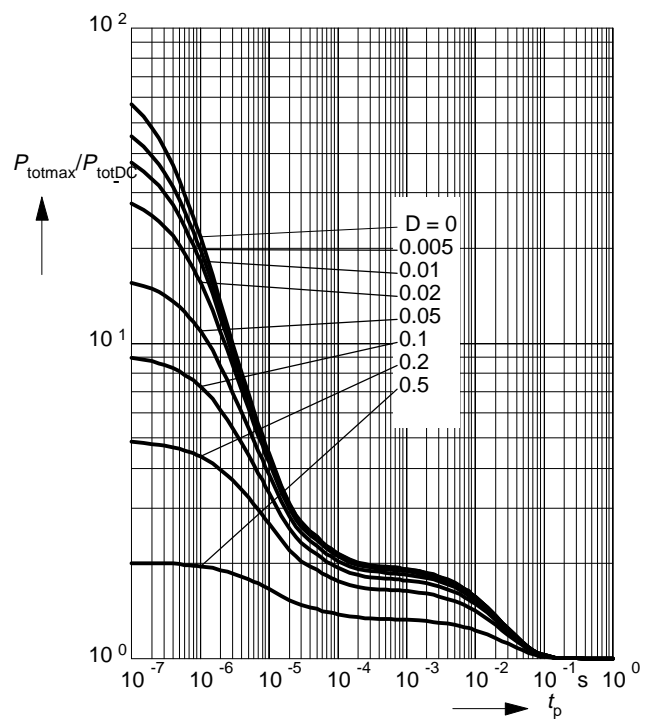
* Package mounted on epoxy



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

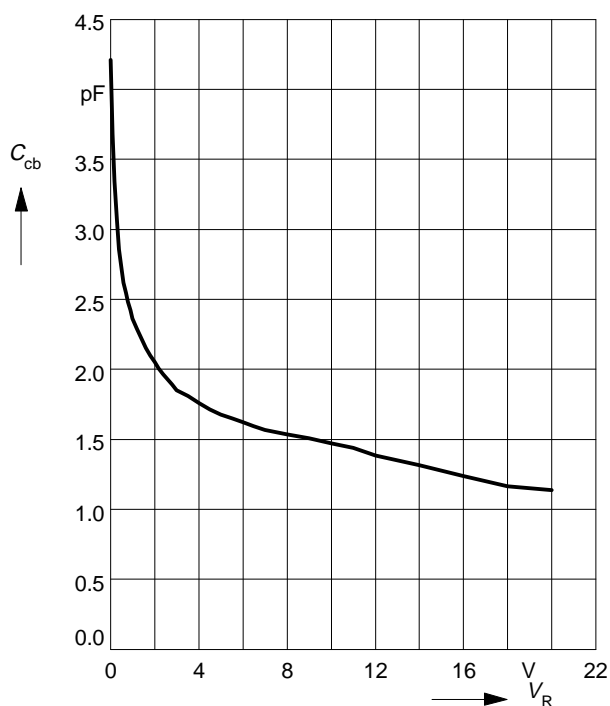


Permissible Pulse Load $P_{\text{totmax}}/P_{\text{totDC}} = f(t_p)$



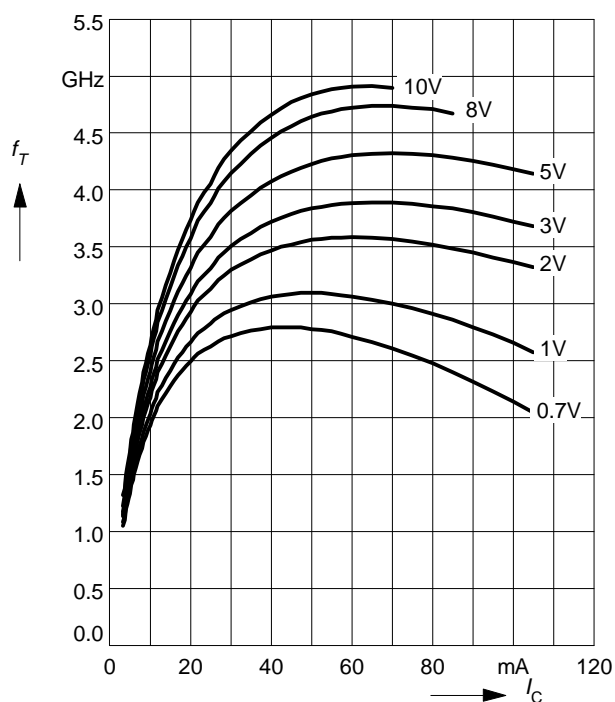
Collector-base capacitance $C_{cb} = f(V_{CB})$

$V_{BE} = v_{be} = 0, f = 1\text{MHz}$



Transition frequency $f_T = f(I_C)$

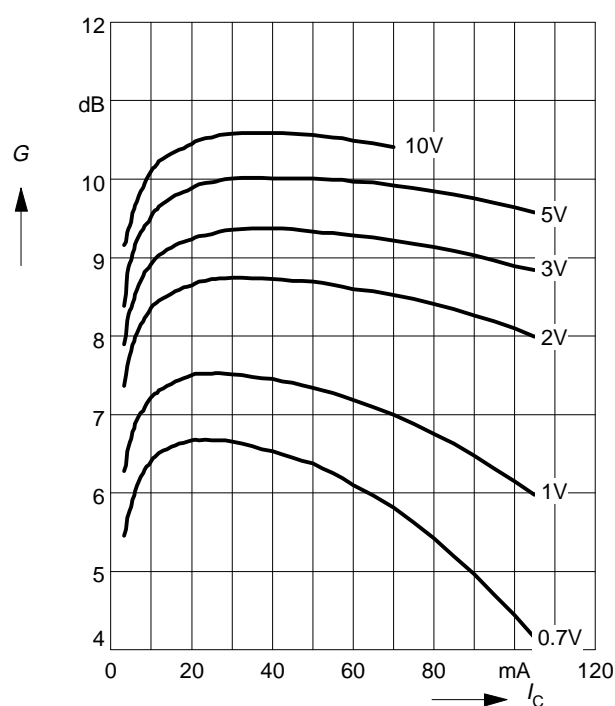
$V_{CE} = \text{Parameter}$



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

$f = 0.9\text{GHz}$

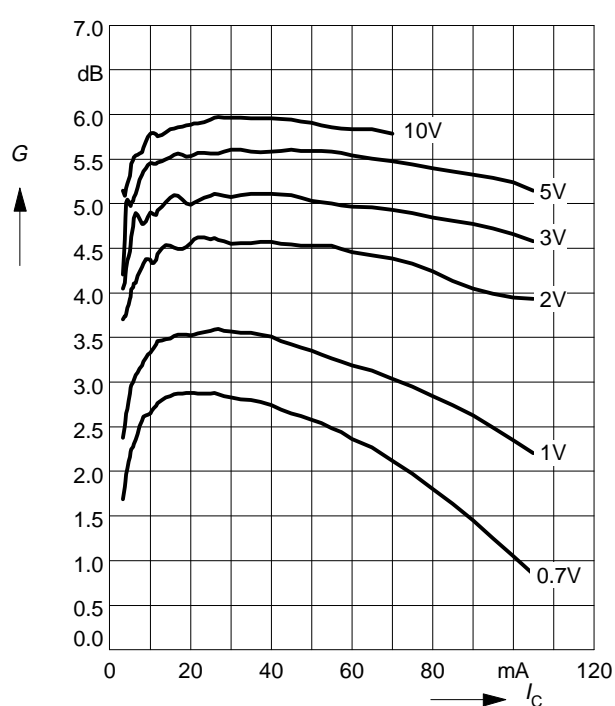
$V_{CE} = \text{Parameter}$



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

$f = 1.8\text{GHz}$

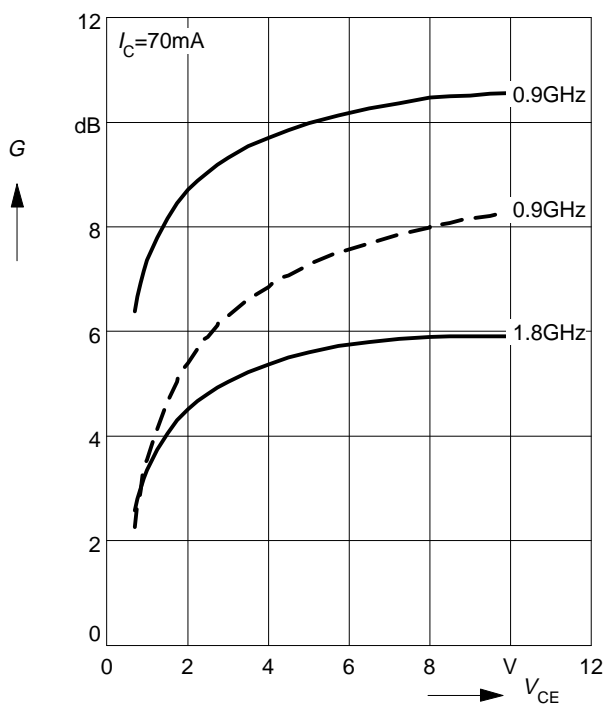
$V_{CE} = \text{Parameter}$



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

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

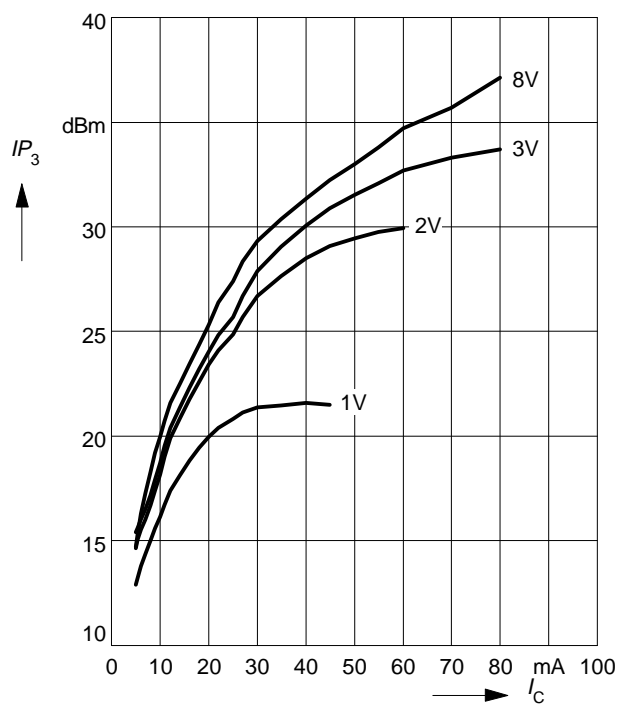
f = Parameter



Intermodulation Intercept Point $IP_3 = f(I_C)$

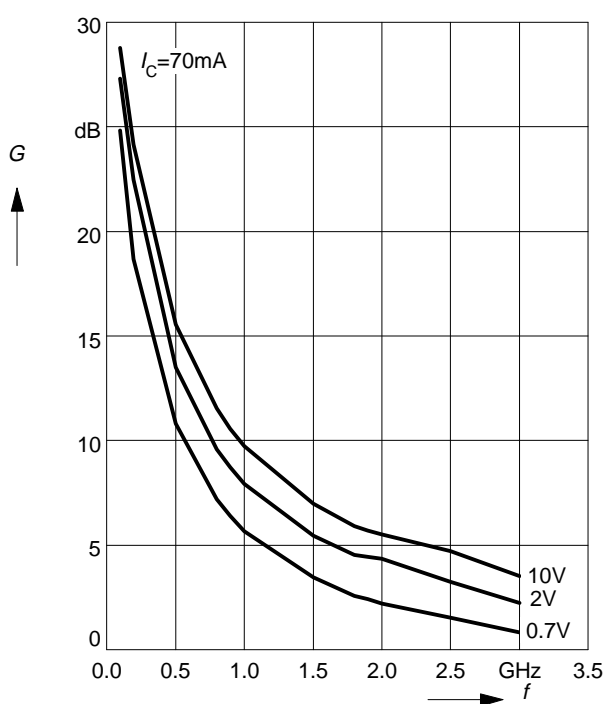
(3rd order, Output, $Z_S = Z_L = 50\Omega$)

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

