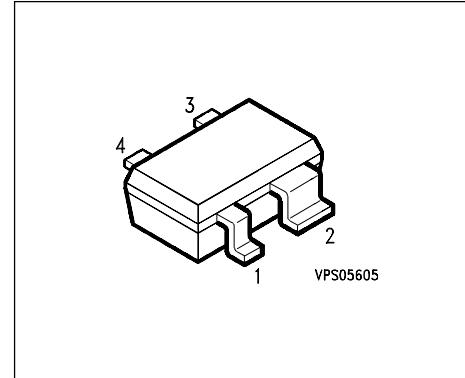


NPN Silicon RF Transistor

- For low noise, high-gain broadband amplifiers at collector currents from 0.5mA to 12mA
- $f_T = 8\text{GHz}$
- $F = 1.45\text{dB}$ at 900MHz

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

Type	Marking	Ordering Code	Pin Configuration				Package
BFP 181W	RFs	Q62702-F1501	1 = E	2 = C	3 = E	4 = B	SOT-343

Maximum Ratings

Parameter	Symbol	Values	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	20	mA
Base current	I_B	2	
Total power dissipation $T_S \leq 91^\circ\text{C}$	P_{tot}	175	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}	≤ 340	K/W
--	------------	------------	-----

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 $I_C = 1 \text{ mA}, I_B = 0$	$V_{(\text{BR})\text{CEO}}$	12	-	-	V
Collector-emitter cutoff current $V_{\text{CE}} = 20 \text{ V}, V_{\text{BE}} = 0$	I_{CES}	-	-	100	μA
Collector-base cutoff current $V_{\text{CB}} = 10 \text{ V}, I_E = 0$	I_{CBO}	-	-	100	nA
Emitter-base cutoff current $V_{\text{EB}} = 1 \text{ V}, I_C = 0$	I_{EBO}	-	-	1	μA
DC current gain $I_C = 5 \text{ mA}, V_{\text{CE}} = 8 \text{ V}$	h_{FE}	50	100	200	-

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency $I_C = 10 \text{ mA}, V_{CE} = 8 \text{ V}, f = 500 \text{ MHz}$	f_T	6	8	-	GHz
Collector-base capacitance $V_{CB} = 10 \text{ V}, V_{BE} = v_{be} = 0, f = 1 \text{ MHz}$	C_{cb}	-	0.24	0.4	pF
Collector-emitter capacitance $V_{CE} = 10 \text{ V}, V_{BE} = v_{be} = 0, f = 1 \text{ MHz}$	C_{ce}	-	0.27	-	
Emitter-base capacitance $V_{EB} = 0.5 \text{ V}, V_{CB} = v_{cb} = 0, f = 1 \text{ MHz}$	C_{eb}	-	0.32	-	
Noise figure $I_C = 2 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{Sopt}$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	F	-	1.45	-	dB
-		-	1.8	-	
Power gain ¹⁾ $I_C = 5 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_{Sopt}$ $Z_L = Z_{Lopt}$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	G_{ms}	-	20	-	
-		-	16.5	-	
Transducer gain $I_C = 5 \text{ mA}, V_{CE} = 8 \text{ V}, Z_S = Z_L = 50 \Omega$ $f = 900 \text{ MHz}$ $f = 1.8 \text{ GHz}$	$ S_{21e} ^2$	-	16.5	-	
-		-	11.5	-	

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

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

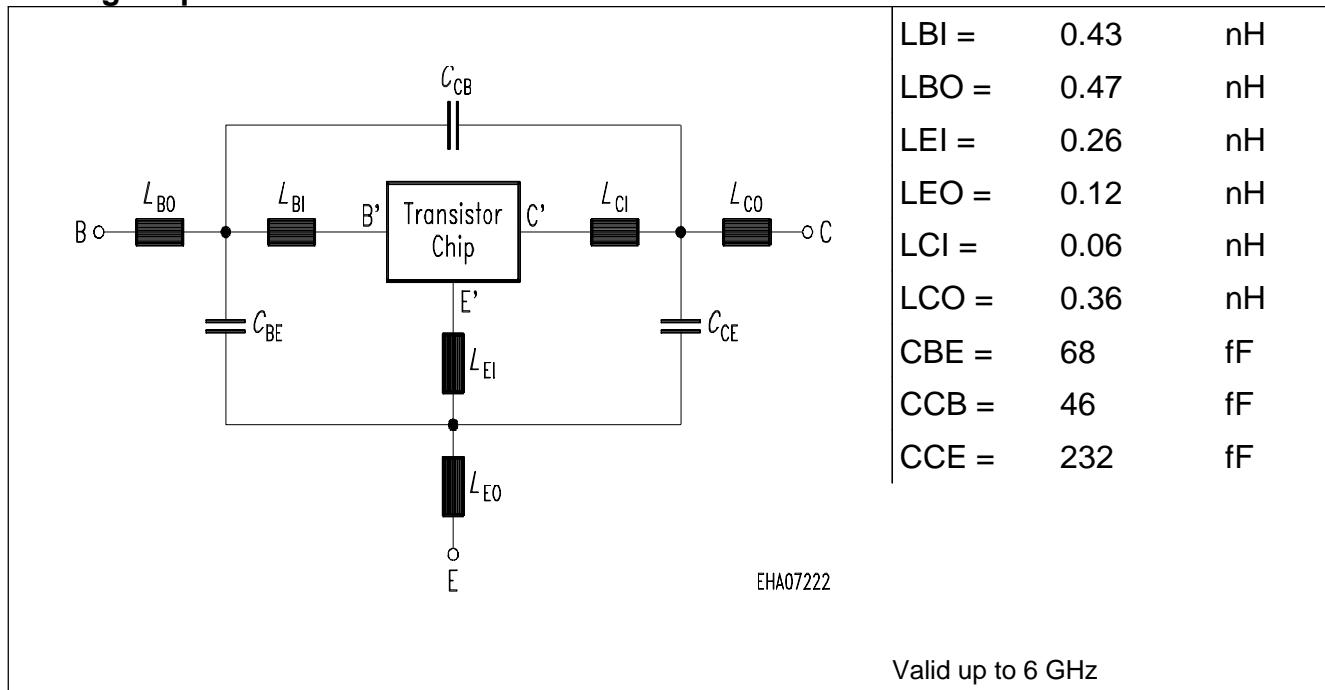
IS =	0.0010519 fA	BF =	96.461	-	NF =	0.90617	-
VAF =	22.403 V	IKF =	0.12146 A		ISE =	12.603 fA	
NE =	1.7631 -	BR =	16.504	-	NR =	0.87757	-
VAR =	5.1127 V	IKR =	0.24951 A		ISC =	0.01195 fA	
NC =	1.6528 -	RB =	9.9037 Ω		IRB =	0.69278 mA	
RBM =	6.6315 Ω	RE =	2.1372 Ω		RC =	2.2171 Ω	
CJE =	1.8168 fF	VJE =	0.73155 V		MJE =	0.43619	-
TF =	17.028 ps	XTF =	0.33814	-	VTF =	0.12571 V	
ITF =	1.0549 mA	PTF =	0 deg		CJC =	319.69 fF	
VJC =	1.1633 V	MJC =	0.30013	-	XCJC =	0.082903	-
TR =	2.7449 ns	CJS =	0 fF		VJS =	0.75 V	
MJS =	0 -	XTB =	0	-	EG =	1.11 eV	
XTI =	3 -	FC =	0.99768	-	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)

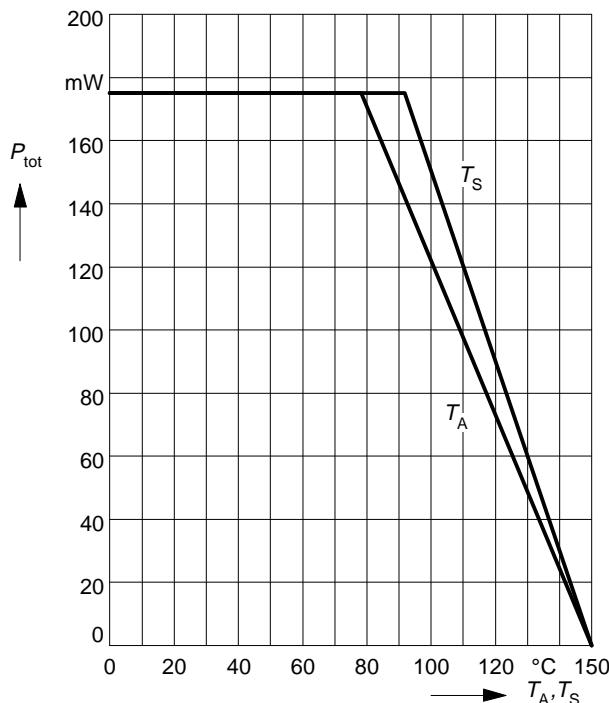
© 1996 SIEMENS AG

Package Equivalent Circuit:

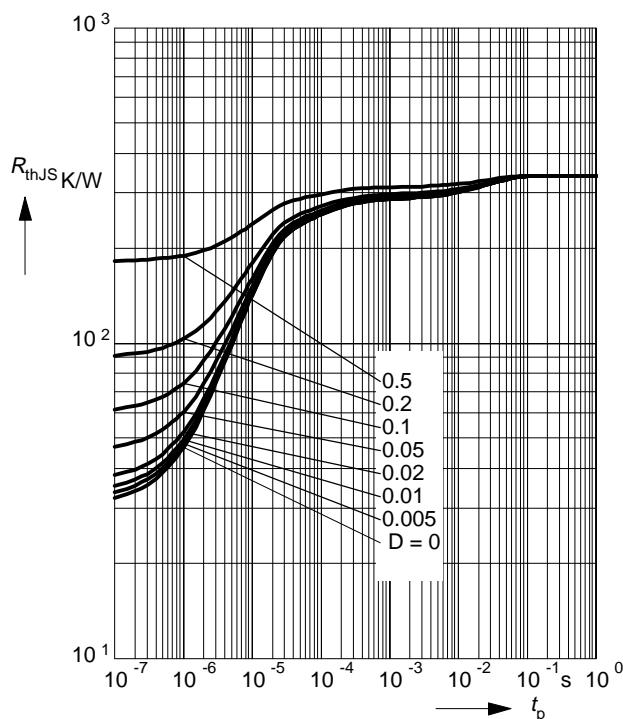
For examples and ready to use parameters please contact your local Siemens distributor or sales office to obtain a Siemens CD-ROM or see Internet: <http://www.siemens.de/Semiconductor/products/35/357.htm>

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

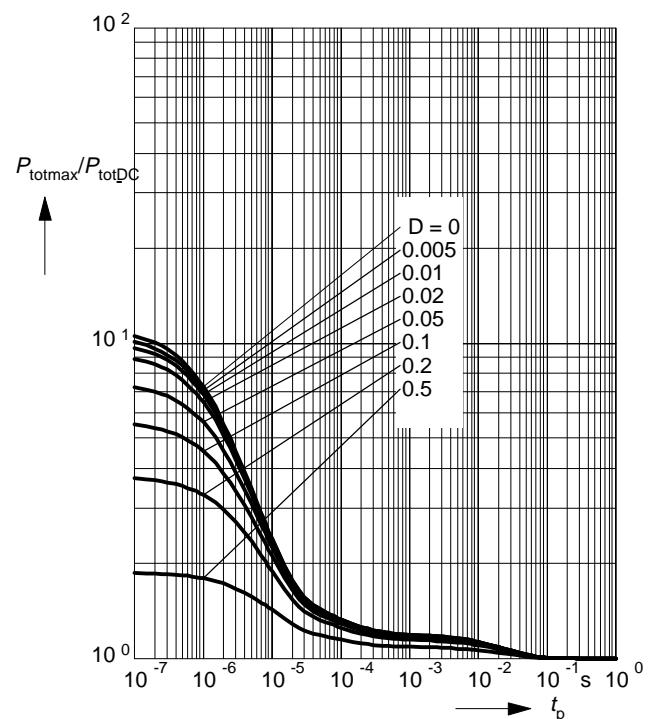
* Package mounted on epoxy



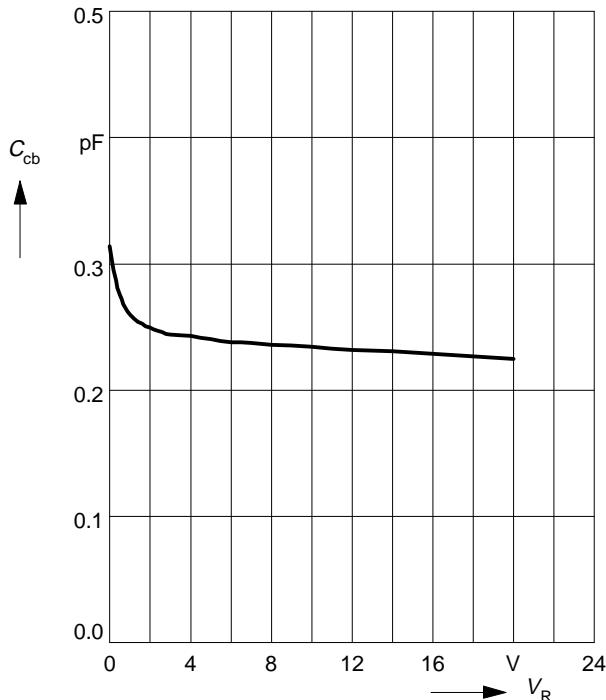
Permissible Pulse Load $R_{\text{thJS}} = f(t_p)$



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



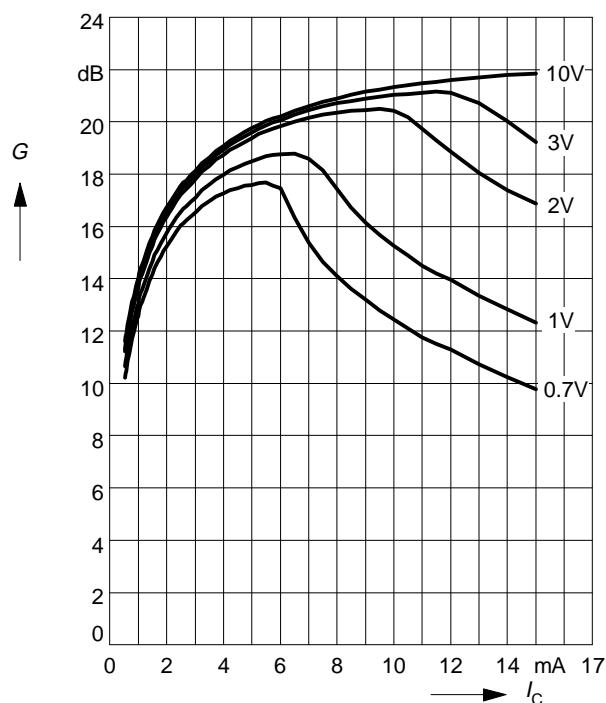
Collector-base capacitance $C_{cb} = f(V_{CB})$
 $V_{BE} = v_{be} = 0$, $f = 1\text{MHz}$



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

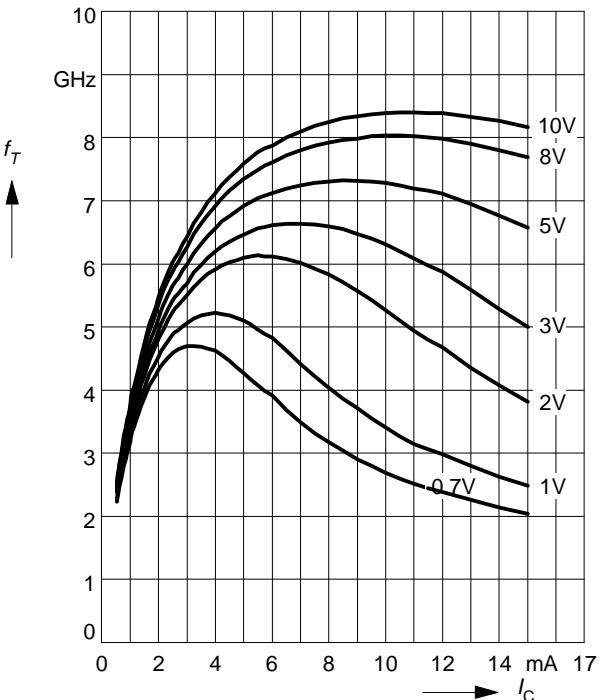
$f = 0.9\text{GHz}$

V_{CE} = Parameter



Transition frequency $f_T = f(I_C)$

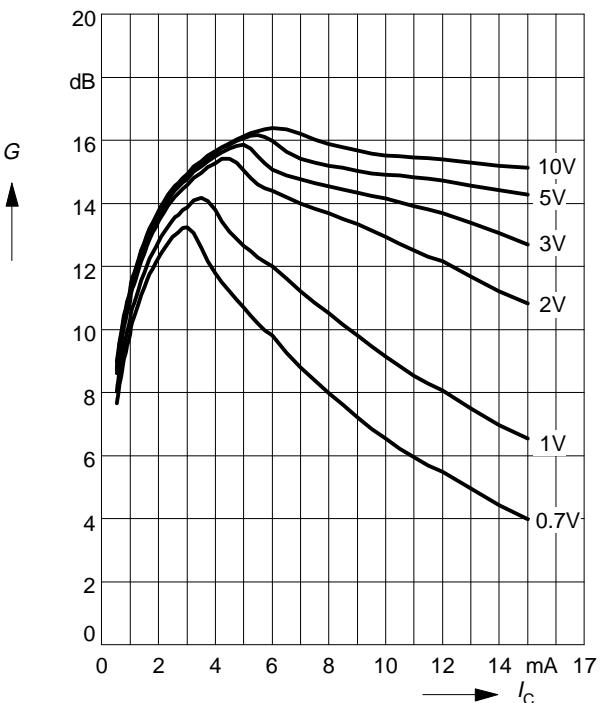
V_{CE} = Parameter



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

$f = 1.8\text{GHz}$

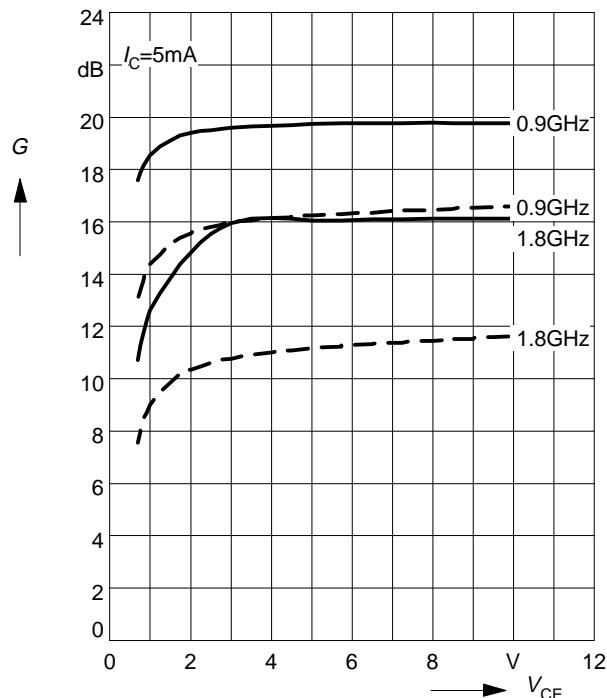
V_{CE} = Parameter



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

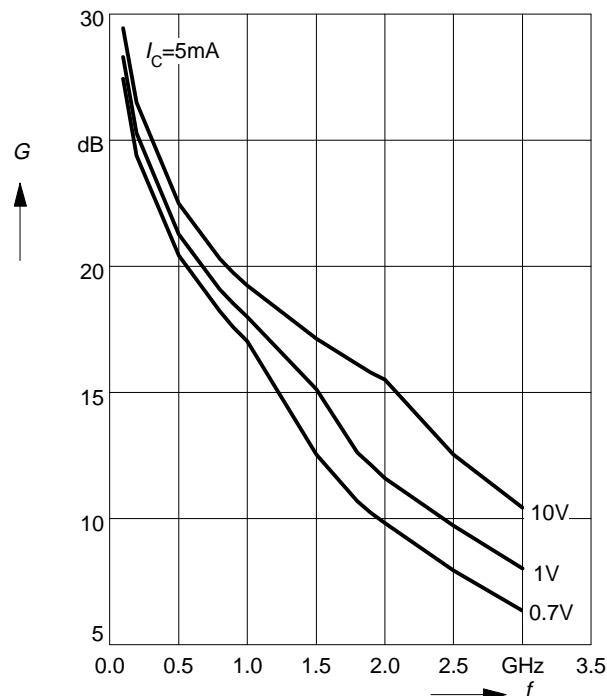
$|S_{21}|^2 = f(V_{CE})$: -----

f = Parameter



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

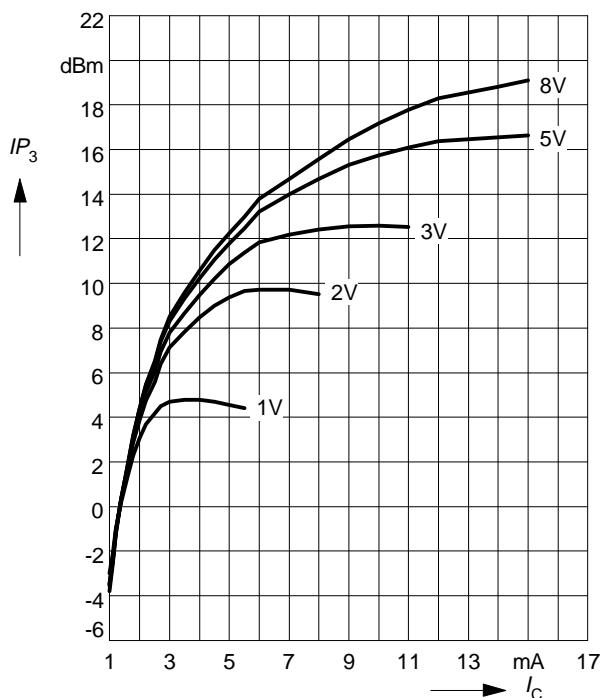
V_{CE} = Parameter



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

V_{CE} = Parameter

