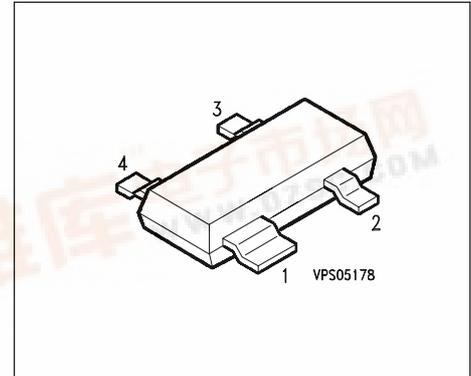# SIEMENS

BFP 93A

NPN Silicon RF Transistor

• For low distortion broadband amplifiers and
oscillators up to 2GHz at collector currents from
5 mA to 30 mA

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

Type	Marking	Ordering Code	Pin Configuration				Package
BFP 93A	FEs	Q62702-F1144	1 = C	2 = E	3 = B	4 = E	SOT-143

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	50	mA
Base current	I_B	6	
Total power dissipation $T_S \leq 78\,°C$	P_{tot}	300	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}	≤ 240	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, $I_B = 0$	$V_{(BR)CEO}$	12	-	-	V
Collector-emitter cutoff current $V_{CE} = 20$ 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 $I_C = 30$ mA, $V_{CE} = 8$ V	h_{FE}	50	100	200	-

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics					
Transition frequency	f_T				GHz
I_C = 30 mA, V_{CE} = 8 V, f = 500 MHz		4.5	6	-	
Collector-base capacitance	C_{cb}				pF
V_{CB} = 10 V, f = 1 MHz		-	0.5	0.8	
Collector-emitter capacitance	C_{ce}				
V_{CE} = 10 V, f = 1 MHz		-	0.33	-	
Emitter-base capacitance	C_{eb}				
V_{EB} = 0.5 V, f = 1 MHz		-	1.7	-	
Noise figure	F				dB
I_C = 5 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}					
f = 900 MHz		-	2	-	
f = 1.8 GHz		-	3.3	-	
Power gain [2]	G_{ma}				
I_C = 30 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}					
Z_L = Z_{Lopt}					
f = 900 MHz		-	18	-	
f = 1.8 GHz		-	12	-	
Transducer gain	$|S_{21e}|^2$				
I_C = 30 mA, V_{CE} = 8 V, Z_S =Z_L= 50 Ω					
f = 900 MHz		-	14.5	-	
f = 1.8 GHz		-	8.5	-	

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 =	8.6752	fA	BF =	137.63	-	NF =	0.93633	-
VAF =	20.011	V	IKF =	0.33395	A	ISE =	2619.3	fA
NE =	1.5466	-	BR =	59	-	NR =	0.88761	-
VAR =	26.834	V	IKR =	0.015129	A	ISC =	0.70823	fA
NC =	1.95	-	RB =	7.2326	Ω	IRB =	0.043806	mA
RBM =	3.4649	Ω	RE =	1.0075	Ω	RC =	0.13193	Ω
CJE =	3.1538	fF	VJE =	0.70393	V	MJE =	0.5071	-
TF =	33.388	ps	XTF =	0.28319	-	VTF =	0.17765	V
ITF =	2.5184	mA	PTF =	0	deg	CJC =	1039.5	fF
VJC =	0.72744	V	MJC =	0.34565	-	XCJC =	0.21422	-
TR =	1.1061	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.75935	-	TNOM	300	K

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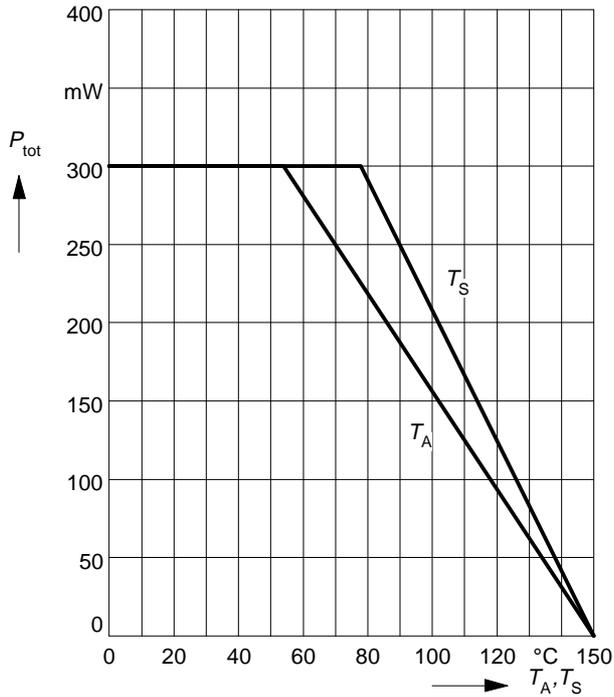Institut für Mobil-und Satellitenfunktechnik (IMST)
© 1996 SIEMENS AG

Package Equivalent Circuit:

LBI =	0.89	nH
LBO =	0.73	nH
LEI =	0.4	nH
LEO =	0.5	nH
LCI =	0	nH
LCO =	0.42	nH
CBE =	189	fF
CCB =	15	fF
CCE =	187	fF

EHA07222

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
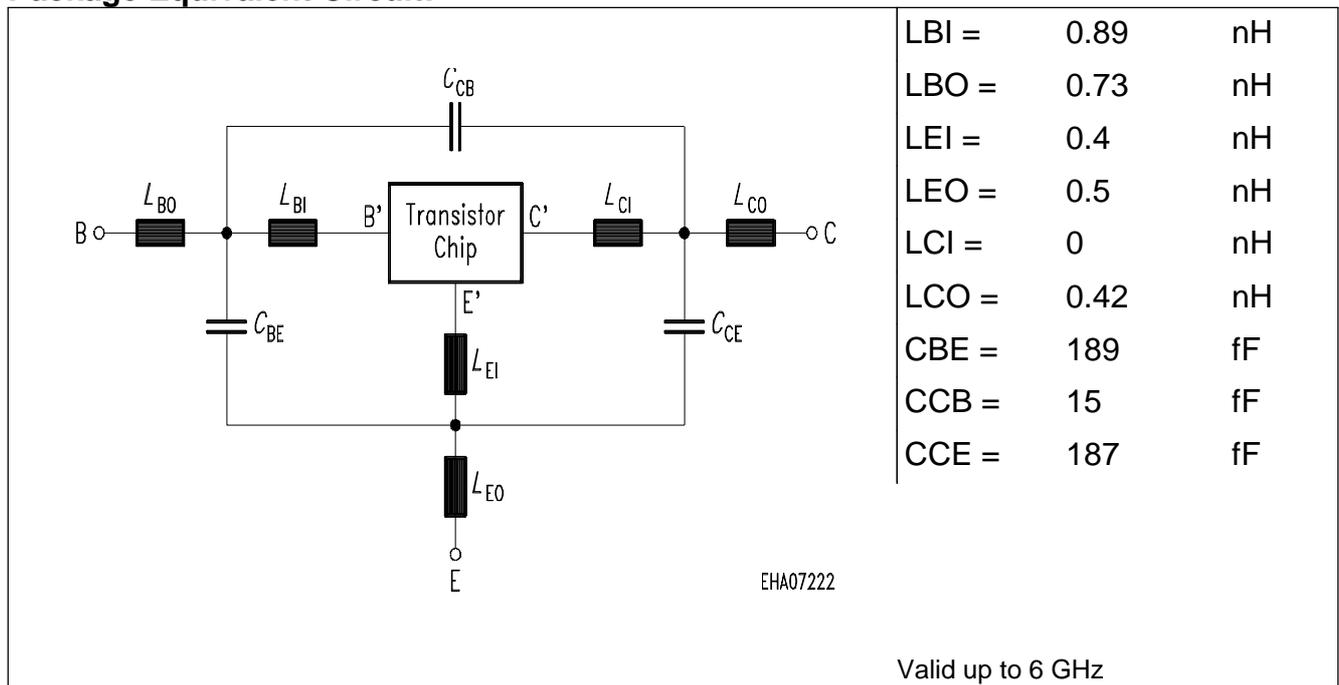
Total power dissipation $P_{tot} = f(T_A*, T_S)$
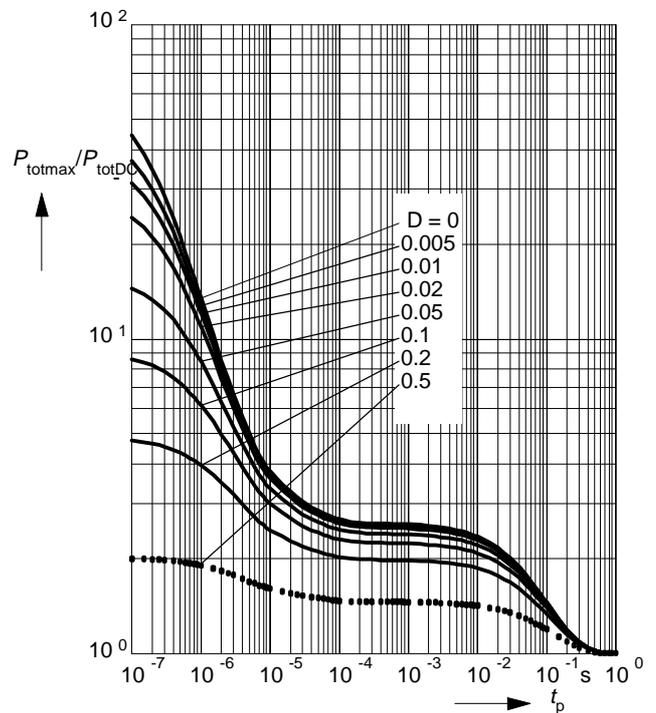
* Package mounted on epoxy
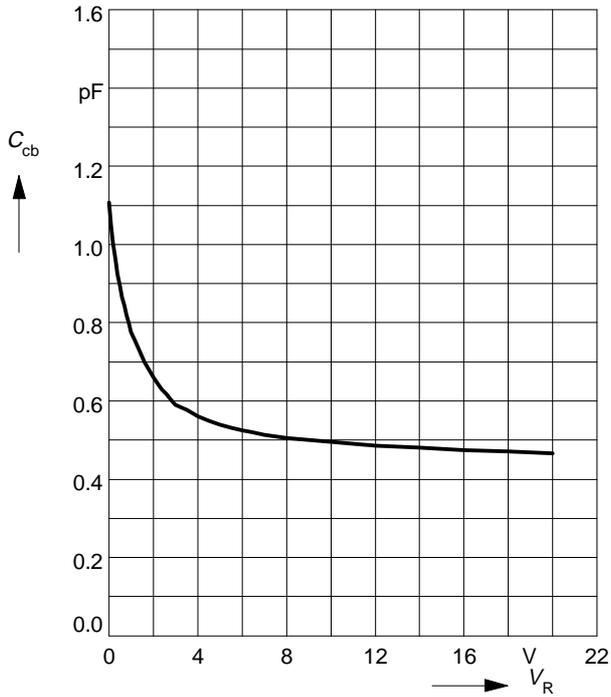

Permissible Pulse Load $R_{thJS} = f(t_p)$
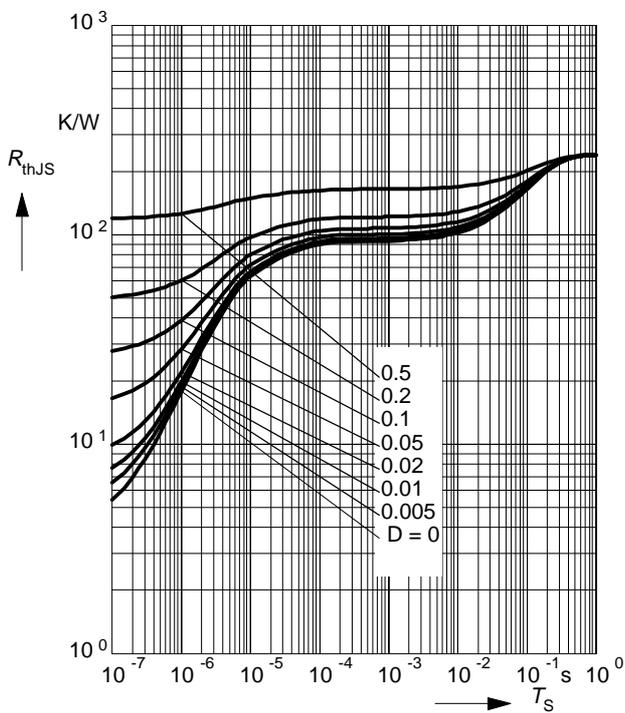
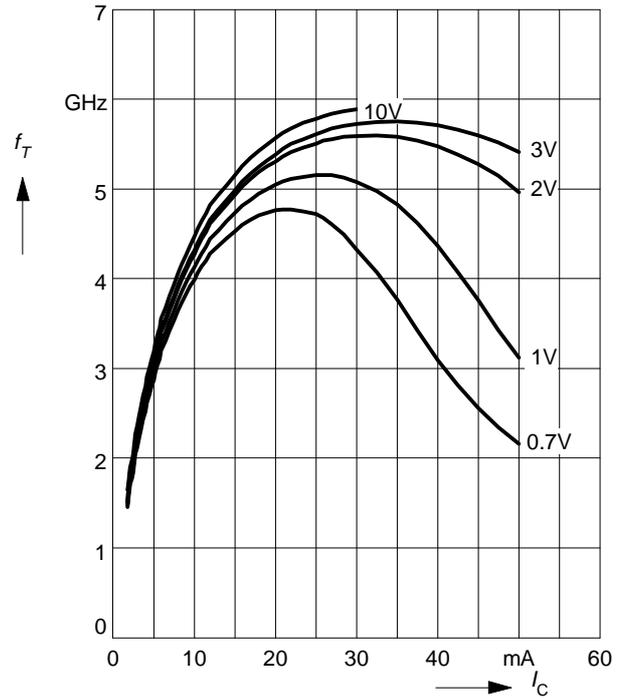

Permissible Pulse Load $P_{totmax}/P_{totDC} = f(t_p)$

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

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

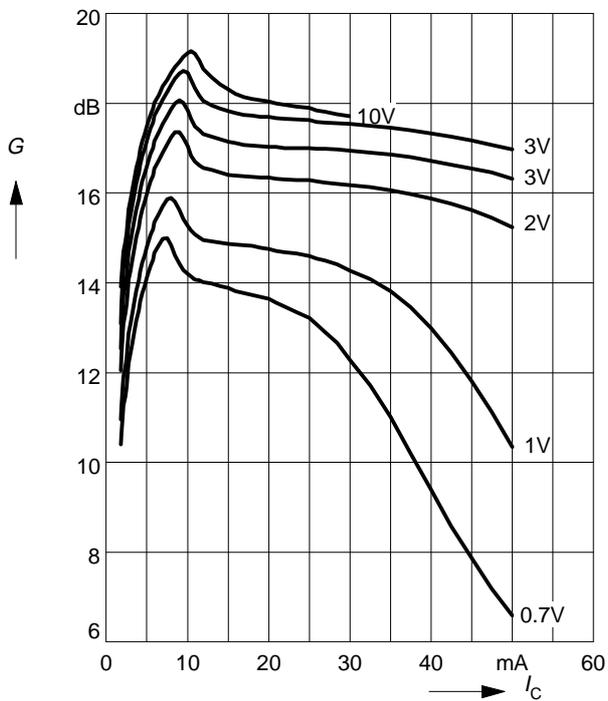## Transition frequency $f_T = f(I_C)$

V_{CE} = Parameter

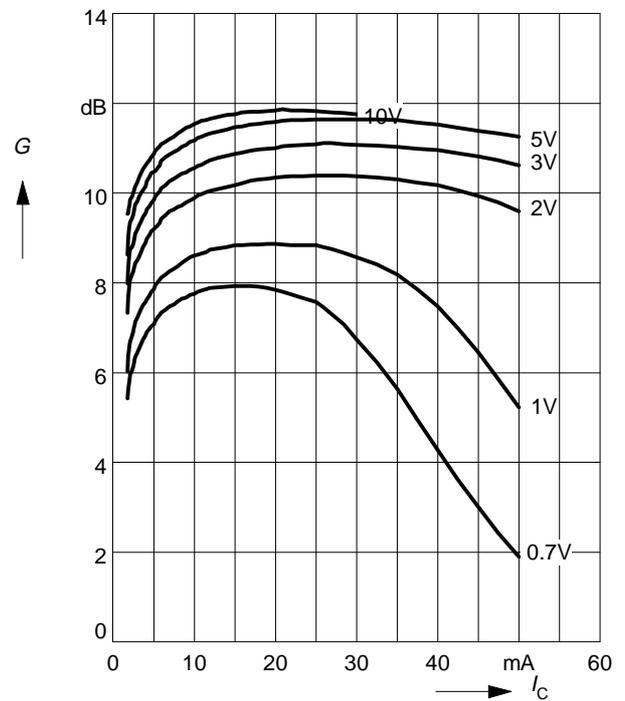## Power Gain G_{ma}, $G_{ms} = f(I_C)$

$f = 0.9\text{GHz}$

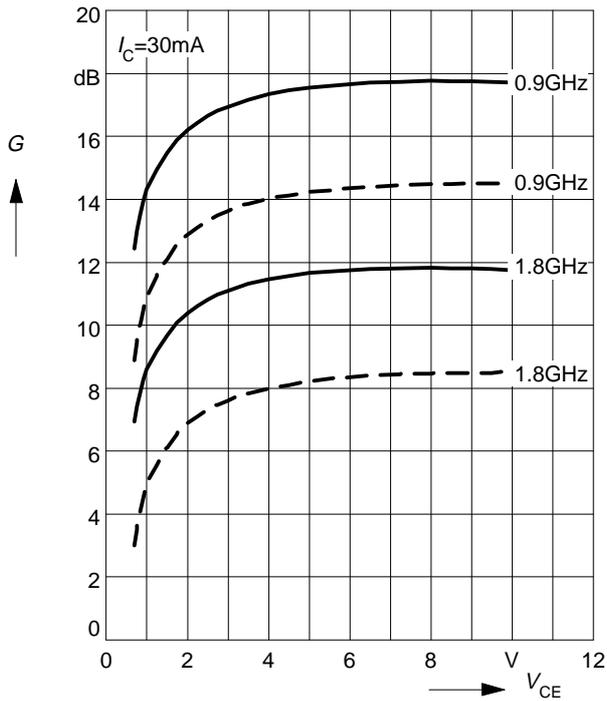V_{CE} = Parameter

Power Gain G_{ma}, $G_{ms} = f(I_C)$
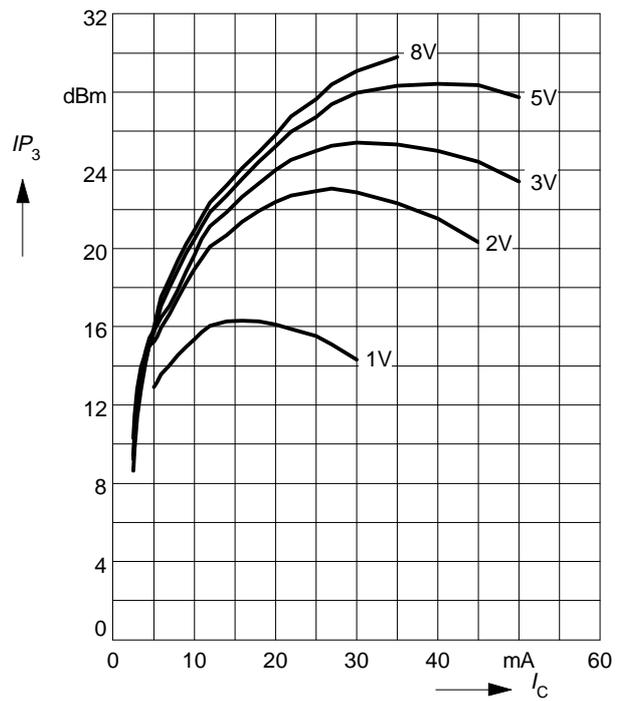
$f = 1.8\text{GHz}$

V_{CE} = Parameter

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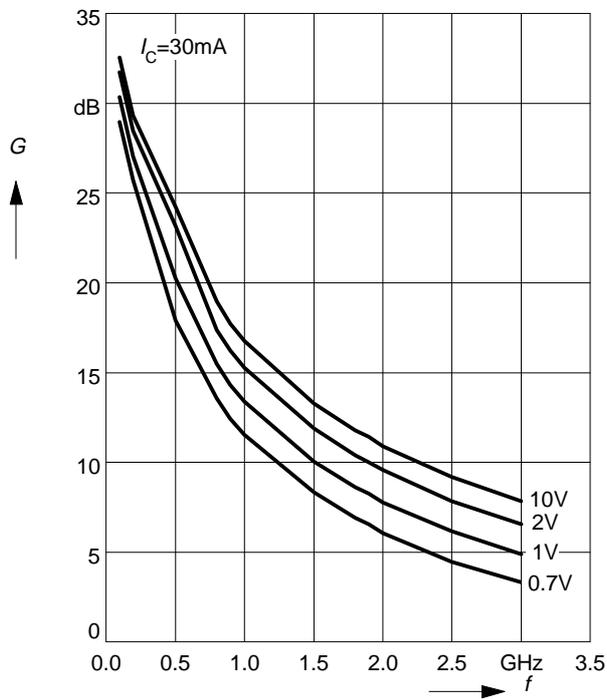$$|S_{21}|^2 = f(V_{CE}): \text{---------}$$
f = Parameter

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