NPN Silicon RF Transistor
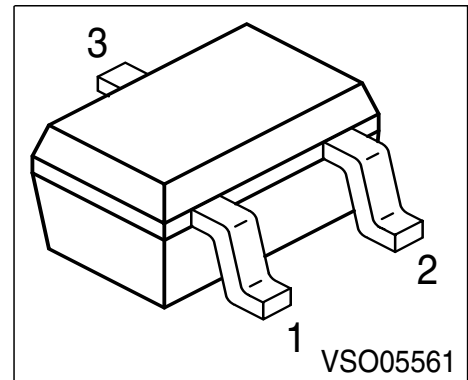
- For low distortion broadband amplifiers and oscillators up to 2 GHz at collector currents from 5 mA to 30 mA

VSO05561

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

Type	Marking	Pin Configuration			Package
BFR 93AW	R2s	1 = B	2 = E	3 = C	SOT-323

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	50	mA
Base current	I_B	6	
Total power dissipation, $T_S \leq 104\ °C$ [F]	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	R_{thJS}	≤ 155	K/W

[1]T_S is measured on the collector lead at the soldering point to the pcb

Oct-13-1999

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	-

Oct-13-1999

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC characteristics (verified by random sampling)					
Transition frequency I_C = 30 mA, V_{CE} = 8 V, f = 500 MHz	f_T	4.5	6	-	GHz
Collector-base capacitance V_{CB} = 10 V, f = 1 MHz	C_{cb}	-	0.62	0.9	pF
Collector-emitter capacitance V_{CE} = 10 V, f = 1 MHz	C_{ce}	-	0.28	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	1.7	-	
Noise figure I_C = 5 mA, V_{CE} = 8 V, Z_S = Z_{Sopt} , f = 900 MHz f = 1.8 GHz	F	- -	2 3.3	- -	dB
Power gain, maximum available [F] I_C = 30 mA, V_{CE} = 8 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 900 MHz f = 1.8 GHz	G_{ma}	- -	15 10	- -	
Transducer gain I_C = 30 mA, V_{CE} = 8 V, Z_S = Z_L = 50Ω , f = 900 MHz f = 1.8 GHz	$|S_{21e}|^2$	- -	13 7.5	- -	

[1] G_{ma} = $|S_{21} / S_{12}|$ (k-(k²-1)$^{1/2}$)

Oct-13-1999

SPICE Parameters (Gummel-Poon Model, Berkley-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		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:
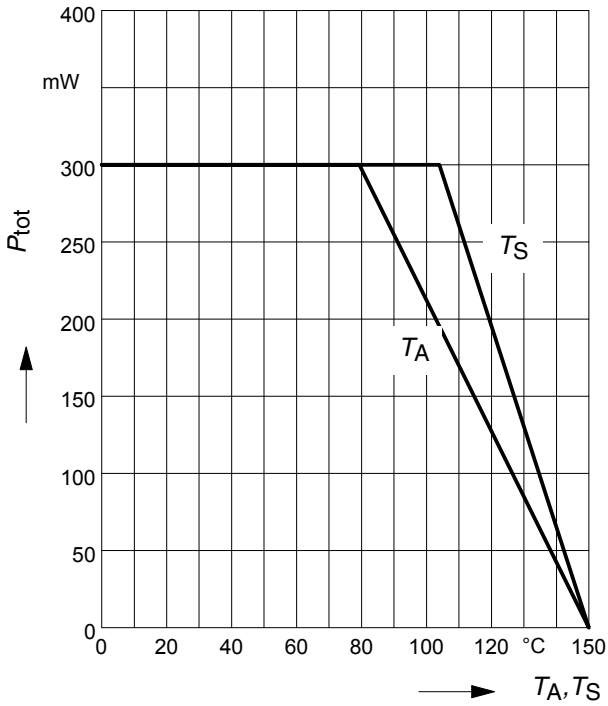Institut für Mobil-und Satellitentechnik (IMST)
© 1996 SIEMENS AG

Package Equivalent Circuit:

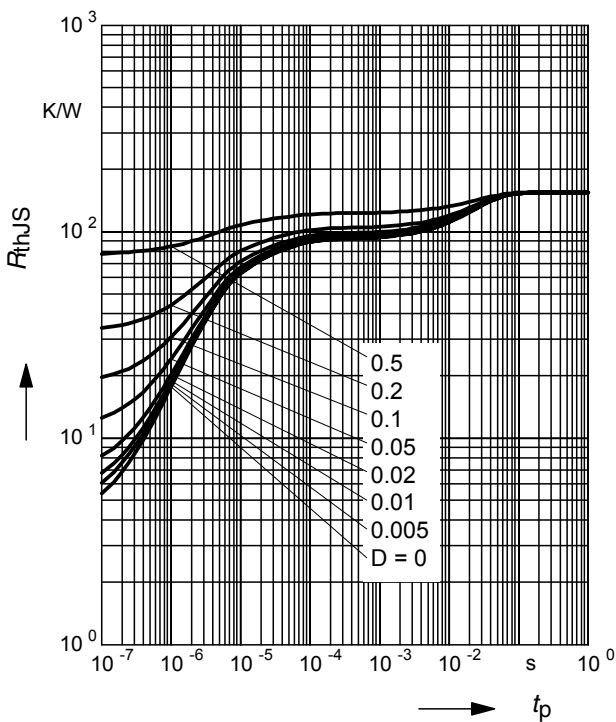|		
L_{BI} =	0.57	nH
L_{BO} =	0.4	nH
L_{EI} =	0.43	nH
L_{EO} =	0.5	nH
L_{CI} =	0	nH
L_{CO} =	0.41	nH
C_{BE} =	61	fF
C_{CB} =	101	fF
C_{CE} =	175	fF

Valid up to 6GHz

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 $P_{tot} = f(T_A*, T_S)$

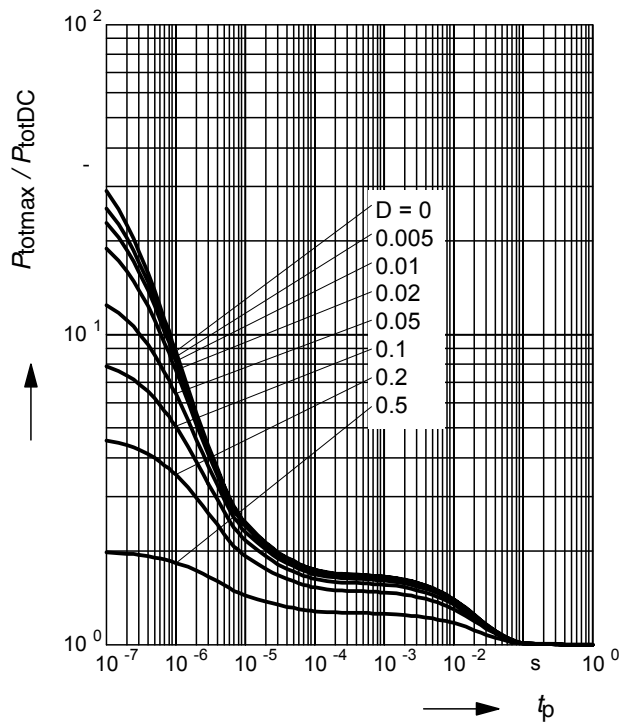* Package mounted on epoxy
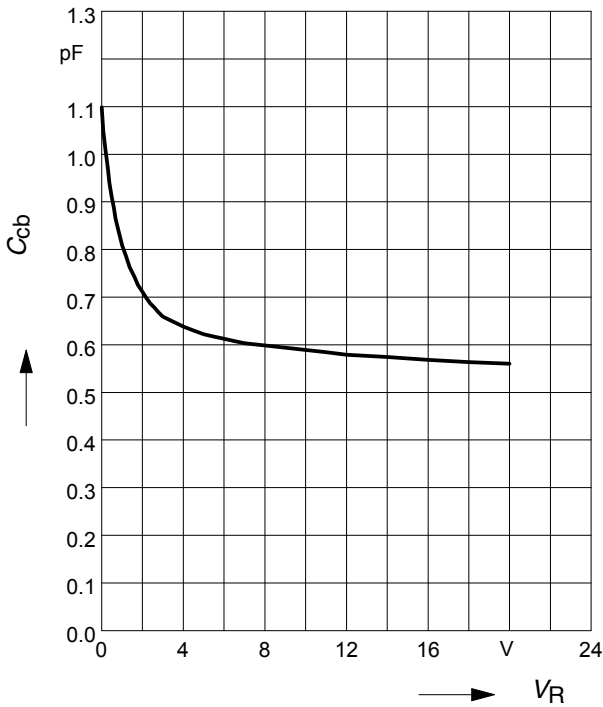

Permissible Pulse Load $R_{thJS} = f(t_p)$

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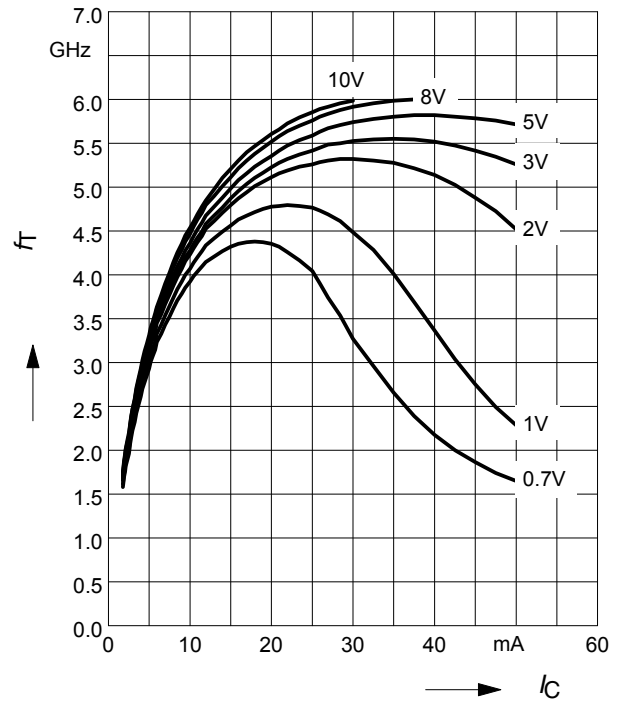
$P_{totmax}/P_{totDC} = f(t_p)$

Oct-13-1999

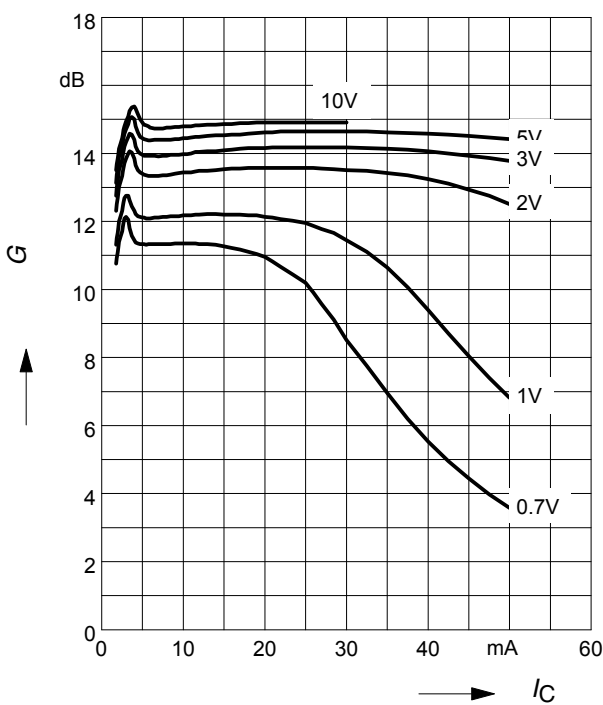**Collector-base capacitance** $C_{cb} = f(V_{CB})$

f = 1MHz
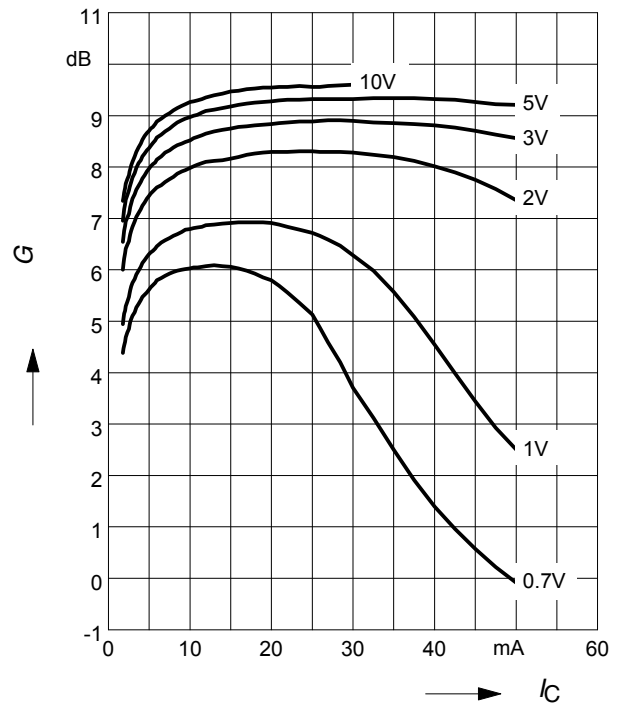

Transition frequency $f_T = f(I_C)$

V_{CE} = Parameter

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

f = 0.9GHz

V_{CE} = Parameter

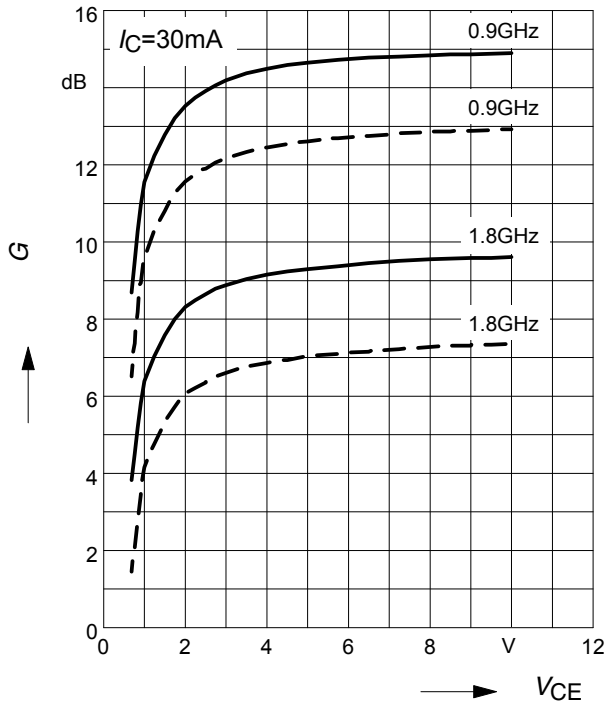**Power Gain** G_{ma}, $G_{ms} = f(I_C)$

f = 1.8GHz

V_{CE} = Parameter

6

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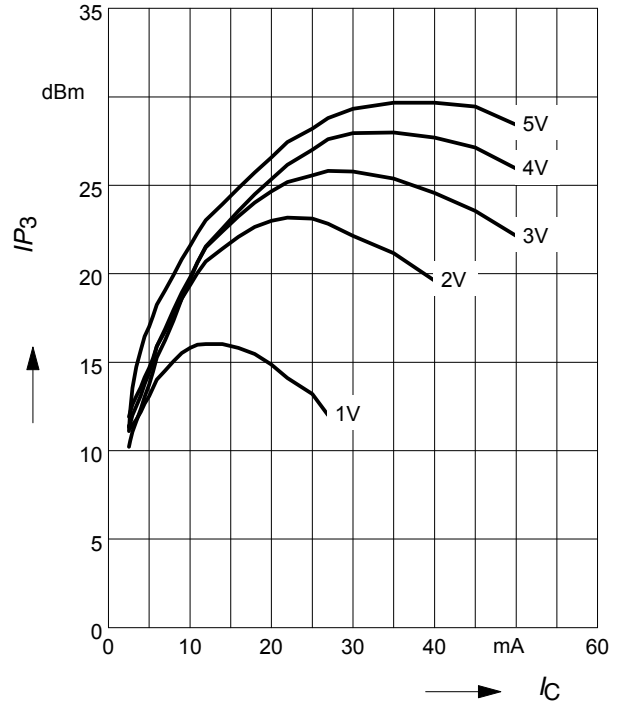
$|S_{21}|^2 = f(V_{CE})$:---------

f = Parameter

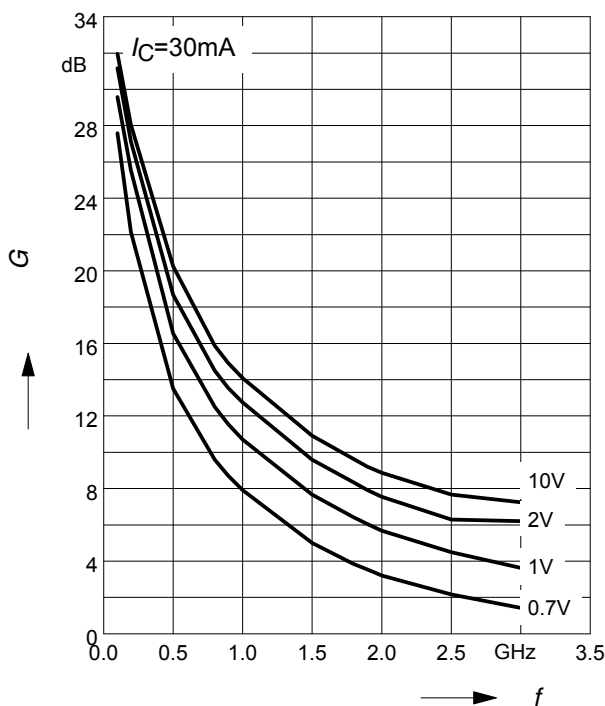**Intermodulation Intercept Point** $IP_3 = f(I_C)$

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

V_{CE} = Parameter, f = 900MHz

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

V_{CE} = Parameter

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

V_{CE} = Parameter

7