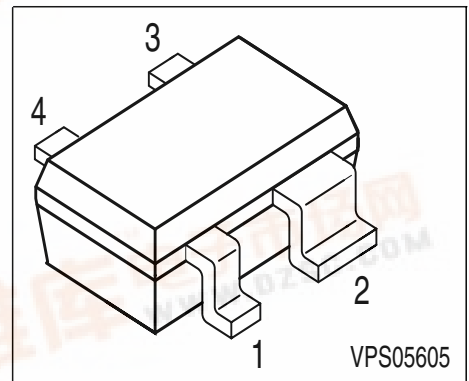




BFP620_E7764

NPN Silicon Germanium RF Transistor

- High gain low noise RF transistor
- Provides outstanding performance for a wide range of wireless applications
- Ideal for CDMA and WLAN applications
- Outstanding noise figure $F = 0.7$ dB at 1.8 GHz
Outstanding noise figure $F = 1.3$ dB at 6 GHz
- Maximum stable gain
 $G_{ms} = 21.5$ dB at 1.8 GHz
 $G_{ma} = 11$ dB at 6 GHz
- Gold metallization for extra high reliability



ESD: Electrostatic discharge sensitive device, observe handling precaution!

Type	Marking	Pin Configuration						Package
BFP620_E7764	R2s	1=B	2=E	3=C	4=E	-	-	SOT343

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	2.3	V
Collector-emitter voltage	V_{CES}	7.5	V
Collector-base voltage	V_{CBO}	7.5	V
Emitter-base voltage	V_{EBO}	1.2	V
Collector current	I_C	80	mA
Base current	I_B	3	mA
Total power dissipation ¹⁾ $T_S \leq 95^\circ\text{C}$	P_{tot}	185	mW
Junction temperature	T_j	150	$^\circ\text{C}$
Ambient temperature	T_A	-65 ... 150	$^\circ\text{C}$
Storage temperature	T_{stg}	-65 ... 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ²⁾	R_{thJS}	≤ 300	K/W

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

²⁾ For calculation of R_{thJA} please refer to Application Note Thermal Resistance



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 $I_C = 1 \text{ mA}, I_B = 0$	$V_{(BR)CEO}$	2.3	2.8	-	V
Collector-emitter cutoff current $V_{CE} = 7.5 \text{ V}, V_{BE} = 0$	I_{CES}	-	-	10	μA
Collector-base cutoff current $V_{CB} = 5 \text{ V}, I_E = 0$	I_{CBO}	-	-	100	nA
Emitter-base cutoff current $V_{EB} = 0.5 \text{ V}, I_C = 0$	I_{EBO}	-	-	3	μA
DC current gain $I_C = 50 \text{ mA}, V_{CE} = 1.5 \text{ V}$	h_{FE}	100	180	320	-

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (verified by random sampling)					
Transition frequency $I_C = 50\text{ mA}$, $V_{CE} = 1.5\text{ V}$, $f = 1\text{ GHz}$	f_T	-	65	-	GHz
Collector-base capacitance $V_{CB} = 2\text{ V}$, $f = 1\text{ MHz}$	C_{cb}	-	0.12	0.2	pF
Collector emitter capacitance $V_{CE} = 2\text{ V}$, $f = 1\text{ MHz}$	C_{ce}	-	0.22	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$	C_{eb}	-	0.46	-	
Noise figure $I_C = 5\text{ mA}$, $V_{CE} = 1.5\text{ V}$, $f = 1.8\text{ GHz}$, $Z_S = Z_{Sopt}$ $I_C = 5\text{ mA}$, $V_{CE} = 1.5\text{ V}$, $f = 6\text{ GHz}$, $Z_S = Z_{Sopt}$	F	-	0.7 1.3	-	dB
Power gain, maximum stable ¹⁾ $I_C = 50\text{ mA}$, $V_{CE} = 1.5\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$	G_{ms}	-	21.5	-	dB
Power gain, maximum available ¹⁾ $I_C = 50\text{ mA}$, $V_{CE} = 1.5\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 6\text{ GHz}$	G_{ma}	-	11	-	dB
Transducer gain $I_C = 50\text{ mA}$, $V_{CE} = 1.5\text{ V}$, $Z_S = Z_L = 50\ \Omega$, $f = 1.8\text{ GHz}$ $I_C = 50\text{ mA}$, $V_{CE} = 1.5\text{ V}$, $Z_S = Z_L = 50\ \Omega$, $f = 6\text{ GHz}$	$ S_{21e} ^2$	-	20 9.5	-	dB
Third order intercept point at output ²⁾ $V_{CE} = 2\text{ V}$, $I_C = 50\text{ mA}$, $f = 1.8\text{ GHz}$, $Z_S = Z_L = 50\ \Omega$	IP_3	-	25	-	dBm
1dB Compression point at output $I_C = 50\text{ mA}$, $V_{CE} = 2\text{ V}$, $Z_S = Z_L = 50\ \Omega$, $f = 1.8\text{ GHz}$	P_{-1dB}	-	15	-	

¹⁾ $G_{ma} = |S_{21e} / S_{12e}| (k - (k^2 - 1)^{1/2})$, $G_{ms} = |S_{21e} / S_{12e}|$
²⁾ IP_3 value depends on termination of all intermodulation frequency components.
Termination used for this measurement is $50\ \Omega$ from 0.1 MHz to 6 GHz

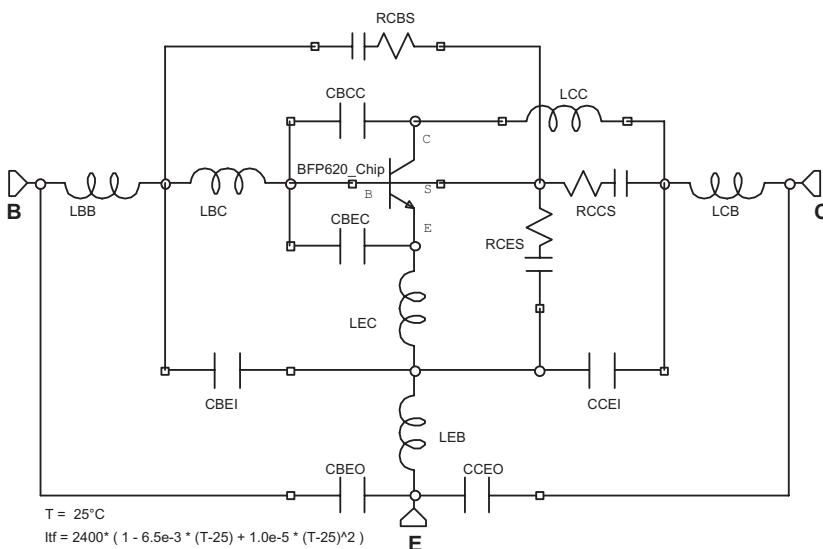
SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):

Transistor Chip Data:

IS =	0.22	fA	BF =	425	-	NF =	1.025	-
VAF =	1000	V	IKF =	0.25	A	ISE =	21	fA
NE =	2	-	BR =	50	-	NR =	1	-
VAR =	2	V	IKR =	10	mA	ISC =	18	pA
NC =	2	-	RB =	3.129	Ω	IRB =	1.522	mA
RBM =	2.707	Ω	RE =	0.6	-	RC =	2.364	Ω
CJE =	250.7	fF	VJE =	0.75	V	MJE =	0.3	-
TF =	1.43	ps	XTF =	10	-	VTF =	1.5	V
ITF =	2.4	A	PTF =	0	deg	CJC =	124.9	fF
VJC =	0.6	V	MJC =	0.5	-	XCJC =	1	-
TR =	0.2	ns	CJS =	128.1	fF	VJS =	0.52	V
MJS =	0.5	-	NK =	-1.42	-	EG =	1.078	eV
XTI =	3	-	FC =	0.8	-	TNOM =	298	K
AF =	2	-	KF =	7.291E-11	-			
TITF1 =	-0.0065	-	TITF2 =	1.0E-5	-			

All parameters are ready to use, no scaling is necessary.

Package Equivalent Circuit:



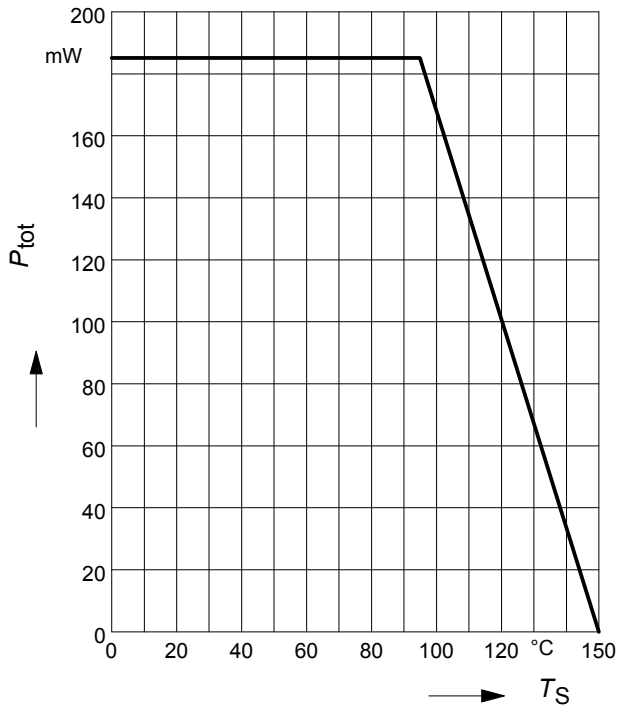
T = 25°C
 $I_{if} = 2400 * (1 - 6.5e-3 * (T-25) + 1.0e-5 * (T-25)^2)$

LBC =	60	pH
LCC =	50	pH
LEC =	15	pH
LBB =	764.5	pH
LCB =	725.4	pH
LEB =	259.6	pH
CBEC =	98.4	fF
CBCC =	55.9	fF
CES =	140	fF
CBS =	54	fF
CCS =	50	fF
CCEO =	106.5	fF
CBEO =	106.7	fF
CCEI =	132.4	fF
CBEI =	99.6	fF
RBS =	1200	Ω
RCS =	1200	Ω
RES =	300	Ω

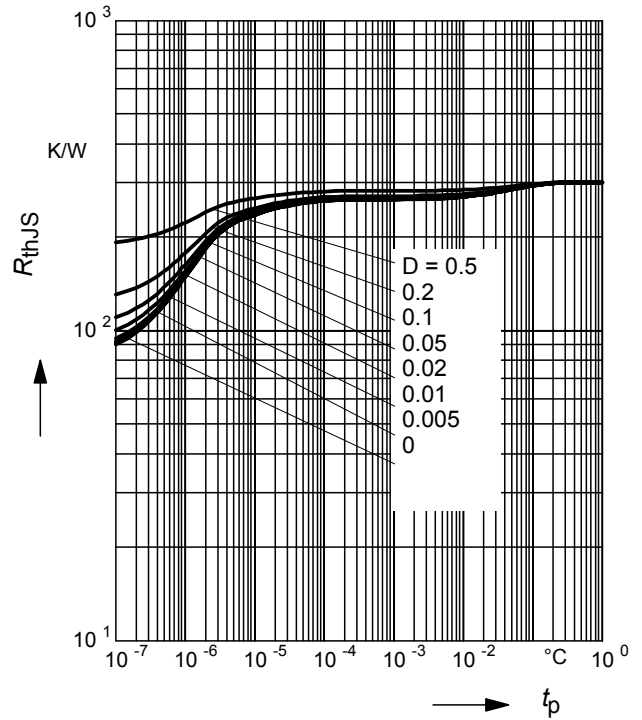
For examples and ready to use parameters please contact your local Infineon Technologies distributor or sales office to obtain a Infineon Technologies CD-ROM or see Internet: <http://www.infineon.com/silicondiscretet>

Valid up to 6GHz

Total power dissipation $P_{tot} = f(T_S)$

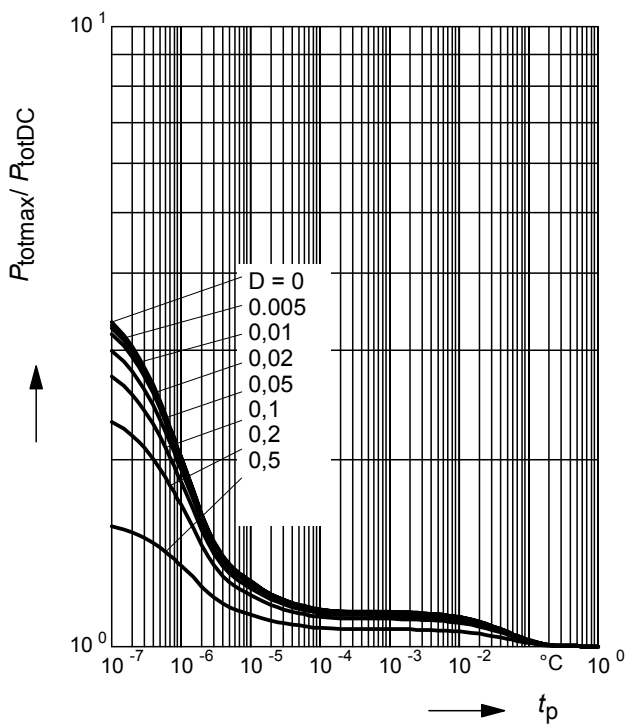


Permissible Pulse Load $R_{thJS} = f(t_p)$



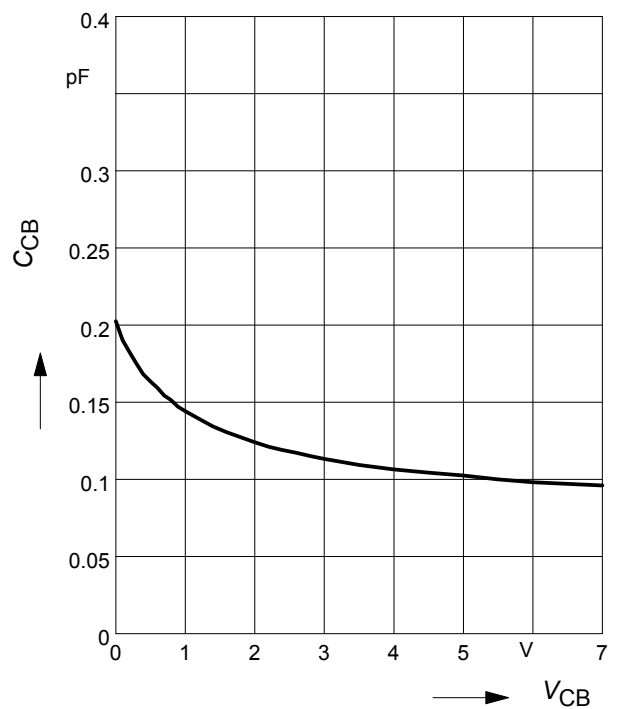
Permissible Pulse Load

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



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

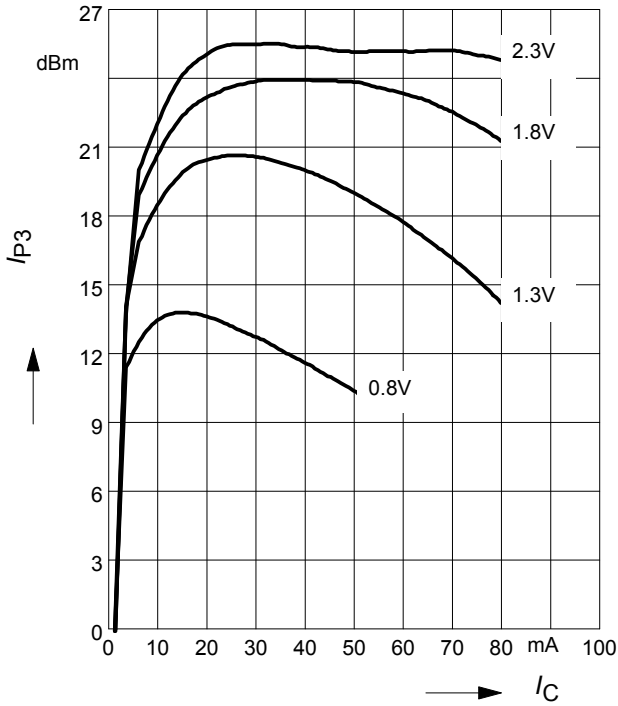
$f = 1\text{MHz}$



Third order Intercept Point $IP_3 = f(I_C)$

(Output, $Z_S = Z_L = 50\Omega$)

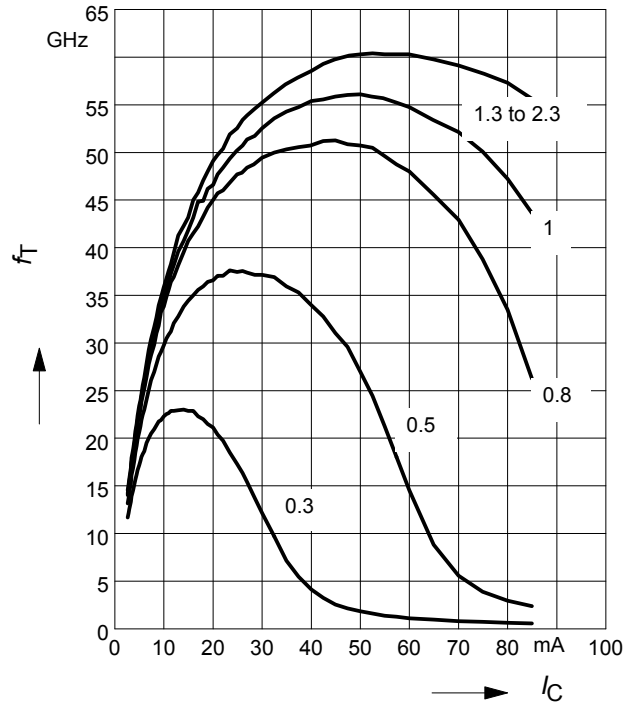
V_{CE} = parameter, $f = 900\text{MHz}$ -



Transition frequency $f_T = f(I_C)$

$f = 1\text{GHz}$

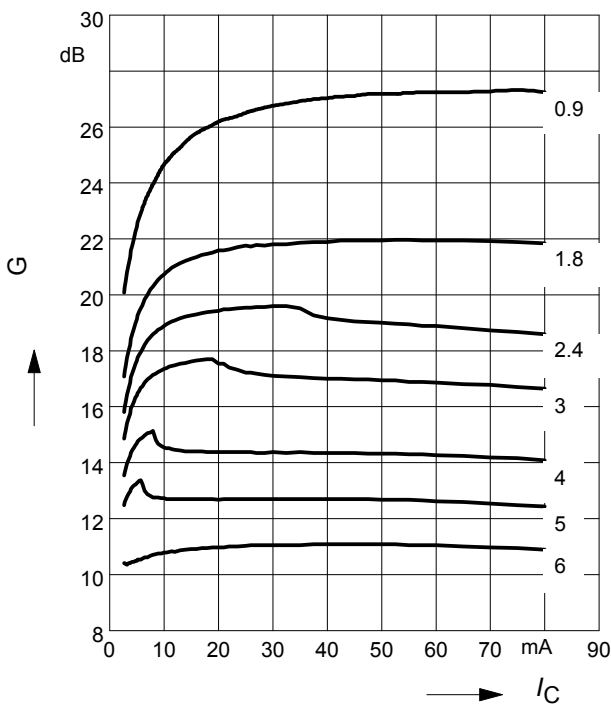
V_{CE} = Parameter in V



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

$V_{CE} = 1.5\text{V}$

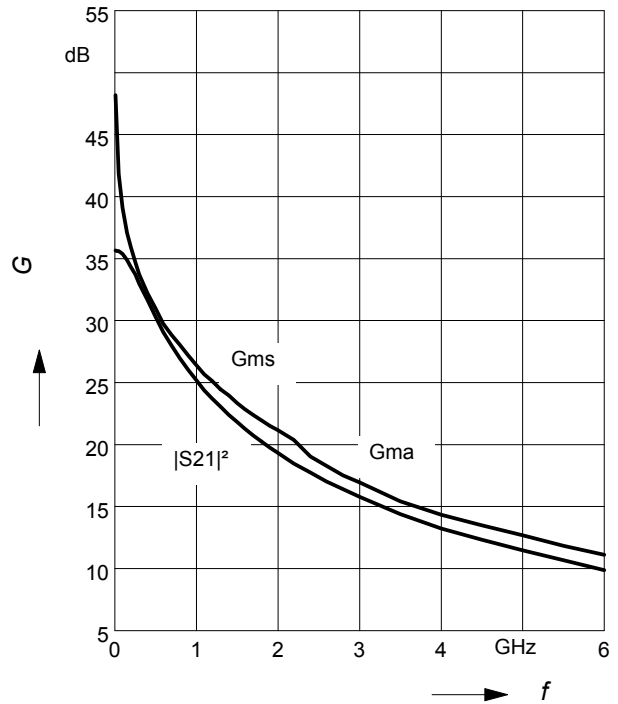
f = Parameter in GHz



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

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

$V_{CE} = 1.5\text{V}, I_C = 50\text{mA}$



Power gain G_{ma} , $G_{ms} = f(V_{CE})$

$I_C = 50\text{mA}$

$f = \text{Parameter in GHz}$

