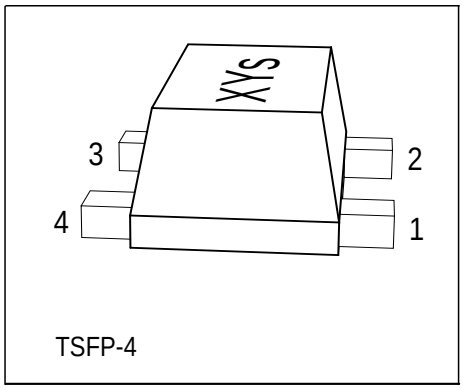
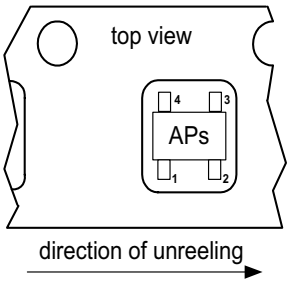
NPN Silicon RF Transistor

Preliminary data

- For highest gain low noise amplifier
  at 1.8 GHz and 2 mA / 2 V
  Outstanding G_{ms} = 23 dB
  Noise Figure F = 0.95 dB
- For oscillators up to 15 GHz
- Transition frequency f_T = 45 GHz
- Gold metallization for high reliability
- **SIEGET ® 45 - Line**
  45 GHz f_T - **Line**





direction of unreeling

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

Type	Marking	Pin Configuration				Package
BFP520F	APs	1 = B	2 = E	3 = C	4 = E	TSFP-4

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CEO}	2.5	V
Collector-base voltage	V_{CBO}	10	
Emitter-base voltage	V_{EBO}	1	
Collector current	I_C	40	mA
Base current	I_B	4	
Total power dissipation $T_S \leq 107°C$	P_{tot}	100	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}	≤ 430	K/W

[1]For calculation of R_{thJA} please refer to Application Note Thermal Resistance

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	$V_{(BR)CEO}$	2.5	3	3.5	V
Collector-base cutoff current V_{CB} = 5 V, I_E = 0	I_{CBO}	-	-	200	nA
Emitter-base cutoff current V_{EB} = 1 V, I_C = 0	I_{EBO}	-	-	35	µA
DC current gain I_C = 20 mA, V_{CE} = 2 V	h_{FE}	70	110	200	-
AC characteristics (verified by random sampling)					
Transition frequency I_C = 30 mA, V_{CE} = 2 V, f = 2 GHz	f_T	-	45	-	GHz
Collector-base capacitance V_{CB} = 2 V, f = 1 MHz	C_{cb}	-	0.07	-	pF
Collector-emitter capacitance V_{CE} = 2 V, f = 1 MHz	C_{ce}	-	0.25	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz	C_{eb}	-	0.31	-	
Noise figure I_C = 2 mA, V_{CE} = 2 V, Z_S = Z_{Sopt} , f = 1.8 GHz	F	-	0.95	-	dB
Power gain, maximum stable [1)] I_C = 20 mA, V_{CE} = 2 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt} , f = 1.8 GHz	G_{ms}	-	23	-	
Insertion power gain I_C = 20 mA, V_{CE} = 2 V, f = 1.8 GHz, Z_S = Z_L = 50Ω	$\lvert S_{21}\rvert^2$	-	20.5	-	dB
Third order intercept point at output[2)] V_{CE} = 2 V, f = 1.8 GHz, Z_S=Z_L=50Ω, I_C = 20 mA	IP_3	-	23.5	-	dBm
1dB compression point[3)] V_{CE} = 2 V, f = 1.8 GHz, Z_S=Z_L=50Ω, I_C = 20 mA	P_{-1dB}	-	10.5	-	

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

[2] IP3 value depends on termination of all intermodulation frequency components. Termination used for this measurement is 50Ω from 0.1MHz to 6GHz.

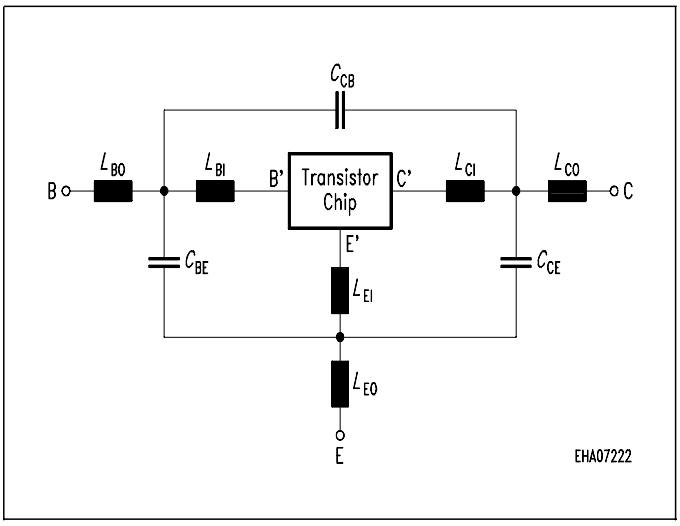
[3] DC current at no input power

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

Transistor Chip Data

IS =	15	aA	BF =	235	-	NF =	1	-
VAF =	25	V	IKF =	0.4	A	ISE =	25	fA
NE =	2	-	BR =	1.5	-	NR =	1	-
VAR =	2	V	IKR =	0.01	A	ISC =	20	fA
NC =	2	-	RB =	11	Ω	IRB =	-	A
RBM =	7.5	Ω	RE =	0.6		RC =	7.6	Ω
CJE =	235	fF	VJE =	0.958	V	MJE =	0.335	-
TF =	1.7	ps	XTF =	10	-	VTF =	5	V
ITF =	0.7	mA	PTF =	50	deg	CJC =	93	fF
VJC =	0.661	V	MJC =	0.236	-	XCJC =	1	-
TR =	50	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0.333	-	XTB =	-0.25	-	EG =	1.11	eV
XTI =	0.035	-	FC =	0.5	-	TNOM	298	K

Package Equivalent Circuit:



L_{BO} =	0.22	nH	L_{BI} =	0.42	nH
L_{EO} =	0.28	nH	R_{LBI} =	0.15	Ω
L_{CO} =	0.22	nH	L_{EI} =	0.26	nH
K_{BO-EO} =	0.10	-	R_{LEI} =	0.11	Ω
K_{BO-CO} =	0.01	-	L_{CI} =	0.35	nH
K_{EO-CO} =	0.11	-	R_{LCI} =	0.13	Ω
C_{BE} =	34	fF	K_{CI-EI} =	-0.05	-
C_{BC} =	2	fF	K_{BI-CI} =	-0.08	-
C_{CE} =	33	fF	K_{BI-EI} =	0.20	-

Valid up to 6GHz

The TSFP-4 package has two emitter leads. To avoid high complexity of the package equivalent circuit, both leads are combined in one electrical connection.
R_{LxI} are series resistors for the inductances L_{xI} and $K_{xa\text{-}yb}$ are the coupling coefficients between the inductances L_{xa} and L_{yb}. The referencepins for the coupled ports are B, E, C, B`, E`, C`.

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/silicondiscretes