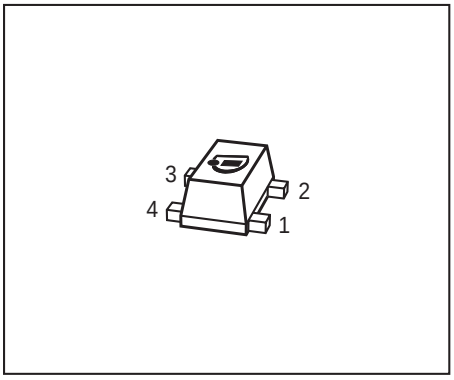
NPN Silicon RF Transistor*



- 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 metallisation for high reliability
- **SIEGET ® 45 - Line**
- Pb-free (RoHS compliant) package[1)]
- Qualified according AEC Q101

* Short term description

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}		V
T_A > 0 °C		2.5	
T_A ≤ 0 °C		2.4	
Collector-emitter voltage	V_{CES}	10	
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[2)] T_S ≤ 107 °C	P_{tot}	100	mW
Junction temperature	T_j	150	°C
Ambient temperature	T_A	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

[1]Pb-containing package may be available upon special request
[2]T_S is measured on the collector lead at the soldering point to pcb

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Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[1)]	R_{thJS}	≤ 430	K/W

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-emitter cutoff current V_{CE} = 10 V, V_{BE} = 0	I_{CES}	-	-	10	µA
Collector-base cutoff current V_{CB} = 5 V, I_E = 0	I_{CBO}	-	-	200	mA
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, pulse measured	h_{FE}	70	110	170	-

[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.	
AC Characteristics (verified by random sampling)					
Transition frequency I_C = 30 mA, V_{CE} = 2 V, f = 2 GHz	f_T	32	45	-	GHz
Collector-base capacitance V_{CB} = 2 V, f = 1 MHz, V_{BE} = 0 , emitter grounded	C_{cb}	-	0.07	0.14	pF
Collector emitter capacitance V_{CE} = 2 V, f = 1 MHz, V_{BE} = 0 , base grounded	C_{ce}	-	0.25	-	
Emitter-base capacitance V_{EB} = 0.5 V, f = 1 MHz, V_{CB} = 0 , collector grounded	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}	-	22.5	-	dB
Insertion power gain V_{CE} = 2 V, I_C = 20 mA, f = 1.8 GHz, Z_S = Z_L = 50 Ω	$\lvert S_{21}\rvert^2$	-	20.5	-	
Third order intercept point at output V_{CE} = 2 V, I_C = 20 mA, f = 1.8 GHz, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}	IP_3	-	23.5	-	dBm
1dB Compression point I_C = 20 mA, V_{CE} = 2 V, Z_S = Z_{Sopt}, Z_L = Z_{Lopt}, f = 1.8 GHz	P_{-1dB}	-	10.5	-	

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

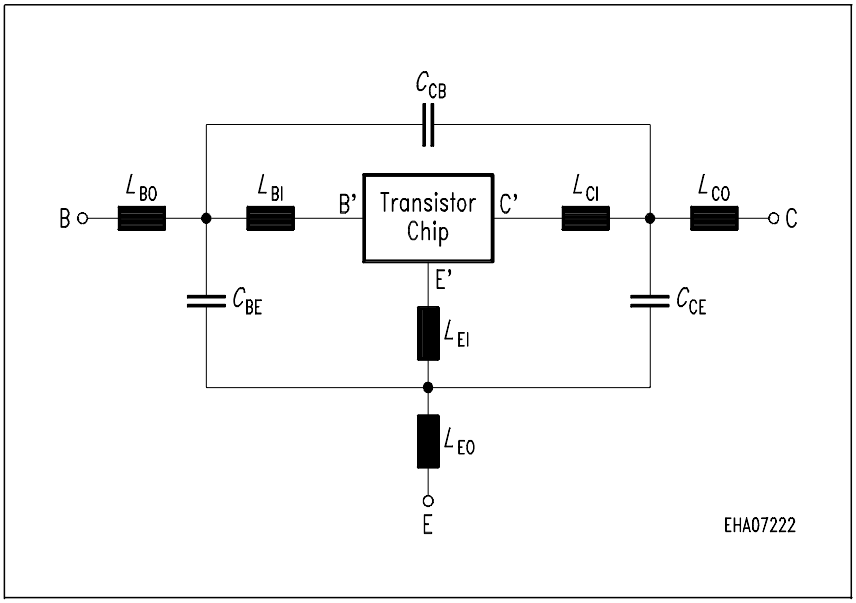
SPICE Parameter (Gummel-Poon Model, Berkley-SPICE 2G.6 Syntax):

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	A	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 =	0.35	-	FC =	0.5		TNOM	298	K

All parameters are ready to use, no scalling is necessary. Extracted on behalf of Infineon Technologies AG by: Institut für Mobil- und Satellitentechnik (IMST)

Package Equivalent Circuit:



L_{BO} =	0.22	nH
L_{EO} =	0.28	nH
L_{CO} =	0.22	nH
L_{BI} =	0.42	nH
L_{EI} =	0.26	nH
L_{CI} =	0.35	nH
K_{BO-EO}=	0.1	-
K_{BO-CO} =	0.01	-
K_{EO-CO}=	0.11	-
K_{CI-EI}=	-0.05	-
K_{BI-CI} =	-0.08	-
K_{BI-EI}=	0.2	-
C_{BE} =	34	fF
C_{BC} =	2	fF
C_{CE} =	33	fF
R_{LBI} =	0.11	Ω
R_{LEI} =	0.13	Ω

Valid up to 6GHz

The TSFP-4 package has two emitter leads. To avoid high complexity fo the package equivalent circuit, both leads are combined in one electrical connection.
RLXI are series resistors for the inductances L_{XI} and K_{xa-by} are the coupling coefficients between the inductances L_{ax} and L_{yb}. The referencepin for the couple 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 InfineonTechnologies CD-ROM or see Internet: http//www.infineon.com/silicondiscretes

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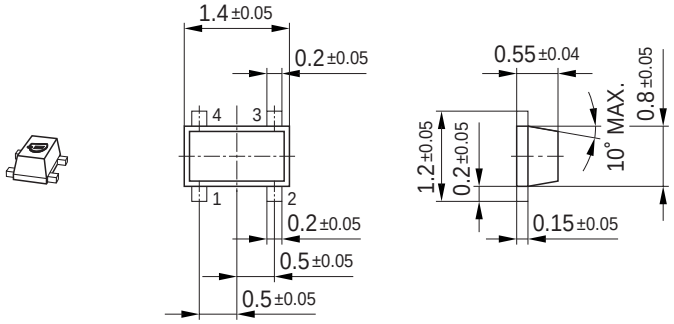
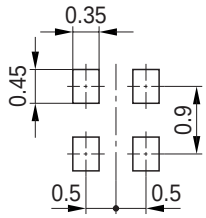
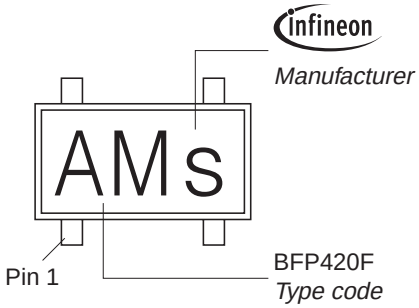
Package Outline



Foot Print

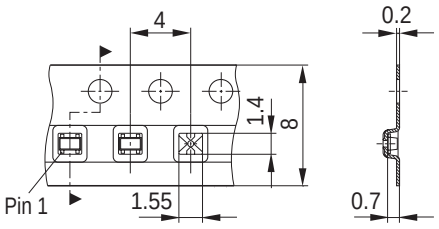


Marking Layout (Example)



Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel



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