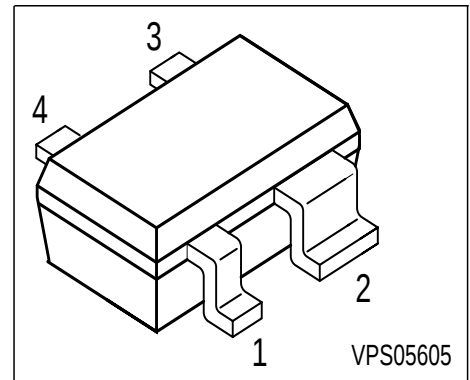
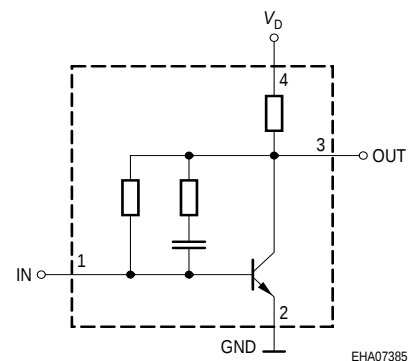


Si-MMIC-Amplifier in SIEGET 25-Technologie

- Cascadable 50 Ω -gain block
- Unconditionally stable
- Gain $|S_{21}|^2 = 13$ dB at 1.8 GHz
 $IP_{3out} = +9$ dBm at 1.8 GHz
 $(V_D = 3$ V, $I_D = \text{typ. } 6.4$ mA)
- Noise figure $NF = 2.2$ dB at 1.8 GHz
- Reverse isolation > 28 dB and
return loss $IN / OUT > 12$ dB at 1.8 GHz



Circuit Diagram



ESD: Electrostatic discharge sensitive device, observe handling precaution!

Type	Marking	Pin Configuration				Package
BGA420	BLs	1, IN	2, GND	3, OUT	4, VD	SOT343

Maximum Ratings

Parameter	Symbol	Value	Unit
Device current	I_D	15	mA
Device voltage	V_D	6	V
Total power dissipation $T_S = 120$ °C	P_{tot}	90	mW
RF input power	P_{RFIn}	0	dBm
Junction temperature	T_j	150	°C
Ambient temperature	T_A	-65 ... 150	
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

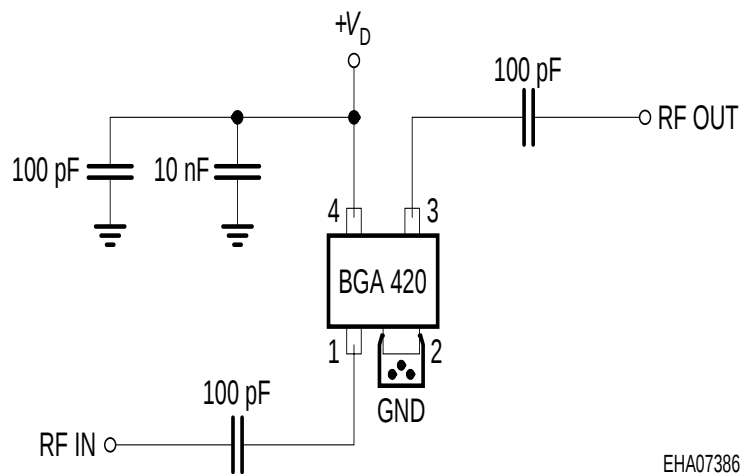
Junction - soldering point ¹⁾	R_{thJS}	≤ 530	K/W
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¹⁾For calculation of R_{thJA} please refer to Application Note Thermal Resistance

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC characteristics $V_D = 3\text{ V}$, $Z_0 = 50\text{ }\Omega$					
Device current	I_D	5.4	6.7	8	mA
Insertion power gain	$ S_{21} ^2$				dB
$f = 0.1\text{ GHz}$		17	19	-	
$f = 1\text{ GHz}$		15	17	-	
$f = 1.8\text{ GHz}$		11	13	-	
Reverse isolation	S_{12}	25	28	-	
$f = 1.8\text{ GHz}$					
Noise figure	NF				
$f = 0.1\text{ GHz}$		-	1.9	2.2	
$f = 1\text{ GHz}$		-	2	2.3	
$f = 1.8\text{ GHz}$		-	2.2	2.5	
Intercept point at the output	IP_{3out}	7.5	9	-	dBm
$f = 1\text{ GHz}$					
1dB compression point	P_{-1dB}	-2.5	-1	-	
$f = 1\text{ GHz}$					
Return loss input	RL_{in}	8	11	-	dB
$f = 1.8\text{ GHz}$					
Return loss output	RL_{out}	12	16	-	
$f = 1.8\text{ GHz}$					

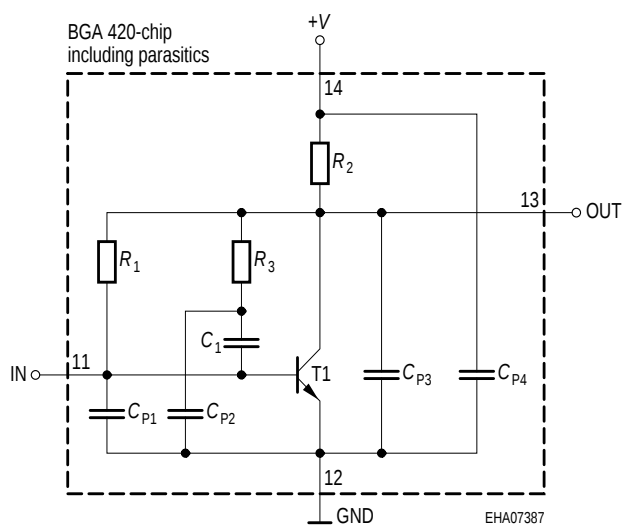
Typical biasing configuration



- Note: 1) Large-value capacitors should be connected from pin 4 to ground right at the device to provide a low impedance path.
- 2) The use of plated through holes right at pin 2 is essential for pc-board-applications. Thin boards are recommended to minimize the parasitic inductance to ground.

Typical S-Parameters at $T_A = 25\text{ }^{\circ}\text{C}$

f GHz	S_{11}		S_{21}		S_{12}		S_{22}	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
$V_D = 3\text{ V}, Z_0 = 50\text{ }\Omega$								
0.1	0.5686	-8.5	9.314	170.6	0.0268	12.7	0.2808	-8.6
0.5	0.5066	-19.2	8.393	149.4	0.0248	11.7	0.2613	-3.8
0.8	0.4404	-28.7	7.352	135.2	0.0236	25.6	0.2361	-6.7
1	0.3904	-34.6	6.69	126.8	0.024	35.9	0.2144	-9
1.5	0.2841	-50.5	5.244	111.1	0.0314	57.2	0.1398	-15
1.8	0.2343	-60.6	4.567	104	0.0378	63.5	0.0979	-18.2
1.9	0.2136	-64.1	4.355	102	0.0406	66.1	0.0838	-21.5
2	0.2062	-68.4	4.165	99.7	0.0426	67.2	0.0689	-22.2
2.4	0.1688	-89.7	3.417	91.7	0.0549	71.4	0.0224	-48
3	0.1558	-104.9	2.861	85.3	0.0682	73.1	0.0284	-147.5

Spice-model BGA 420


T1	T501
R_1	14.5k Ω
R_2	140 Ω
R_3	2.4k Ω
C_1	2.3pF
C_{P1}	0.2pF
C_{P2}	0.2pF
C_{P3}	0.6pF
C_{P4}	0.1pF

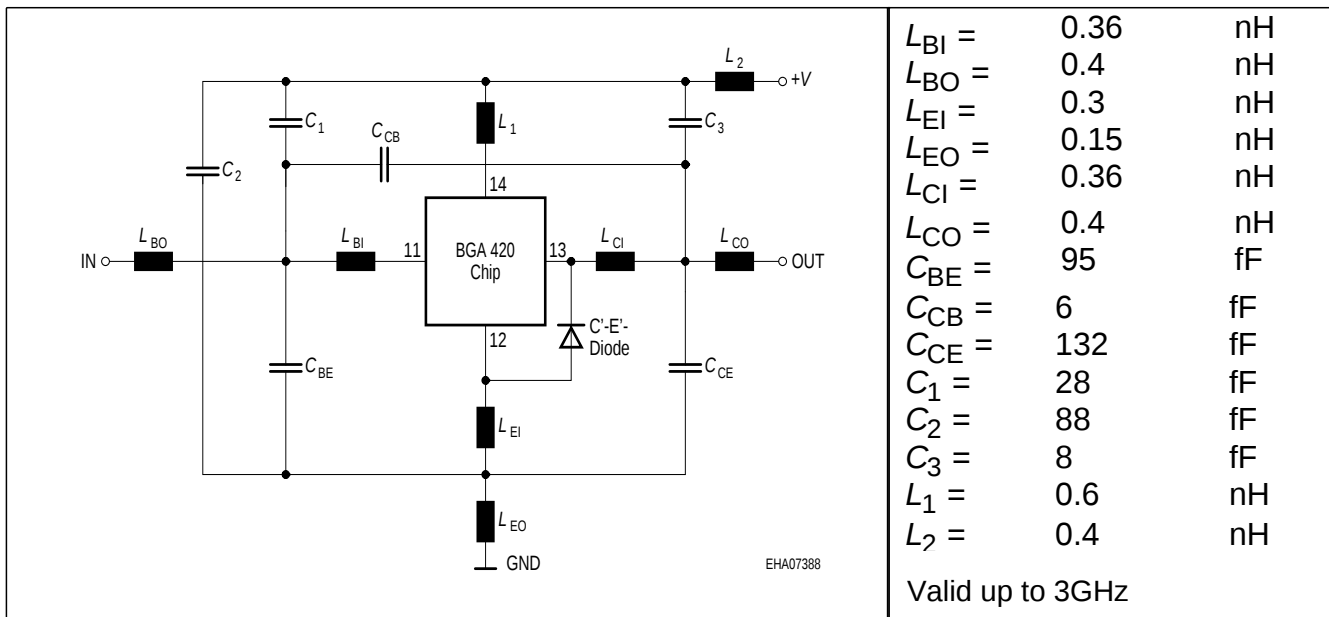
Transistor Chip Data T1 (Berkley-SPICE 2G.6 Syntax) :

IS =	0.21024	fA	BF =	83.23	-	NF =	1.0405	-
VAF =	39.251	V	IKF =	0.16493	A	ISE =	15.761	fA
NE =	1.7763	-	BR =	10.526	-	NR =	0.96647	-
VAR =	34.368	V	IKR =	0.25052	A	ISC =	0.037223	fA
NC =	1.3152	-	RB =	15	Ω	IRB =	0.21215	A
RBM =	1.3491	Ω	RE =	1.9289		RC =	0.12691	Ω
CJE =	3.7265	fF	VJE =	0.70367	V	MJE =	0.37747	-
TF =	4.5899	ps	XTF =	0.3641	-	VTF =	0.19762	V
ITF =	1.3364	mA	PTF =	0	deg	CJC =	96.941	fF
VJC =	0.99532	V	MJC =	0.48652	-	XCJC =	0.08161	-
TR =	1.4935	ns	CJS =	0	fF	VJS =	0.75	V
MJS =	0	-	XTB =	0	-	EG =	1.11	eV
XTI =	3	-	FC =	0.99469	-	TNOM	300	K

C'-E'-Diode Data (Berkley-SPICE 2G.6 Syntax) :

IS =	2	fA	N =	1.02	-	RS =	20	Ω
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All parameters are ready to use, no scaling is necessary

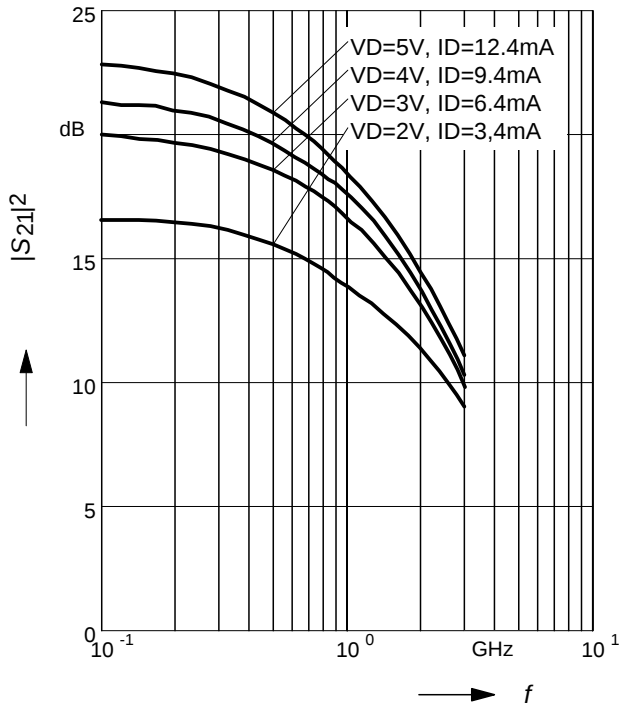
Package Equivalent Circuit:


Extracted on behalf of Infineon Technologies AG by:
Institut für Mobil-und Satellitentechnik (IMST)

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>

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

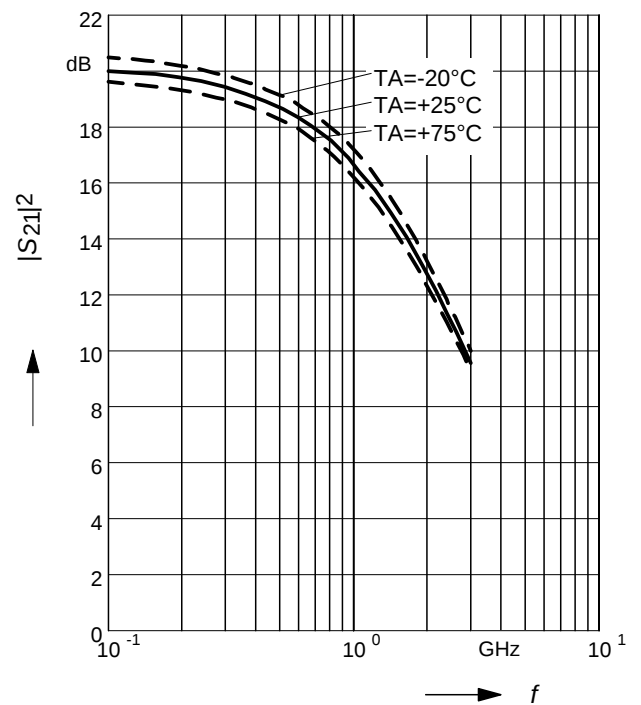
V_D, I_D = parameter



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

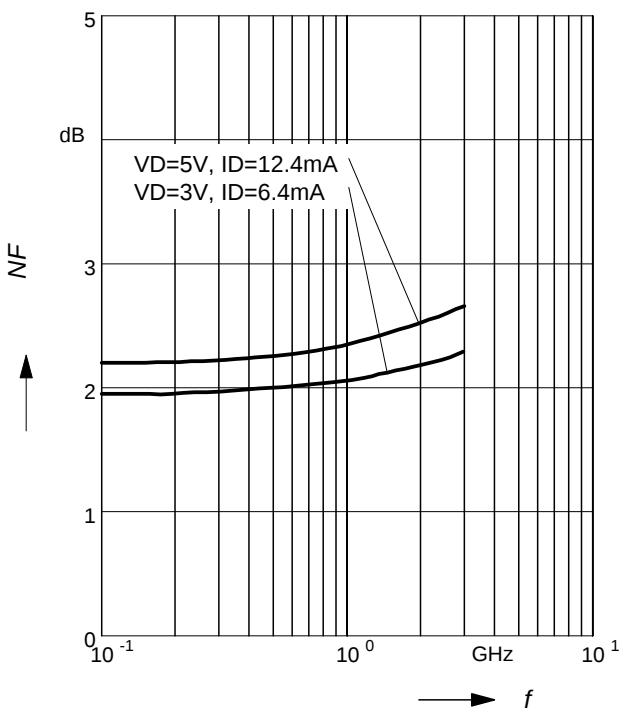
$V_D = 3\text{ V}$

T_A = parameter



Noise figure $NF = f(f)$

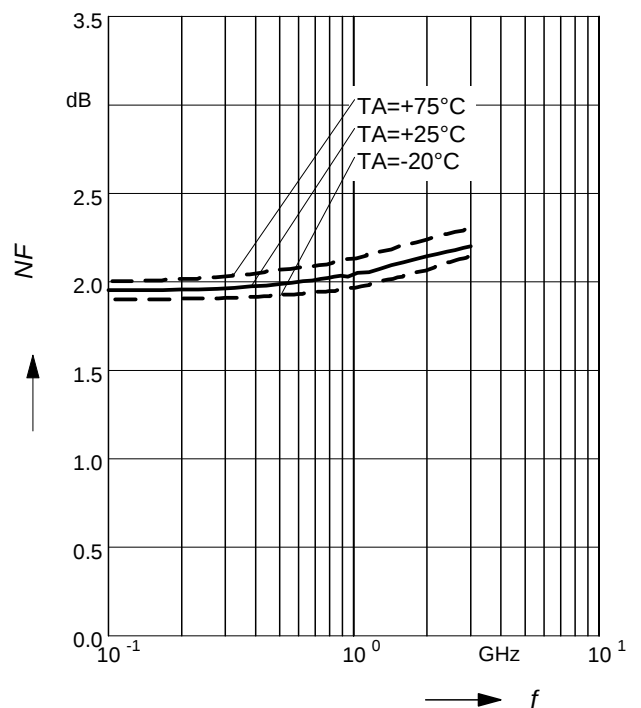
V_D, I_D = parameter



Noise figure $NF = f(f)$

$V_D = 3\text{ V}$

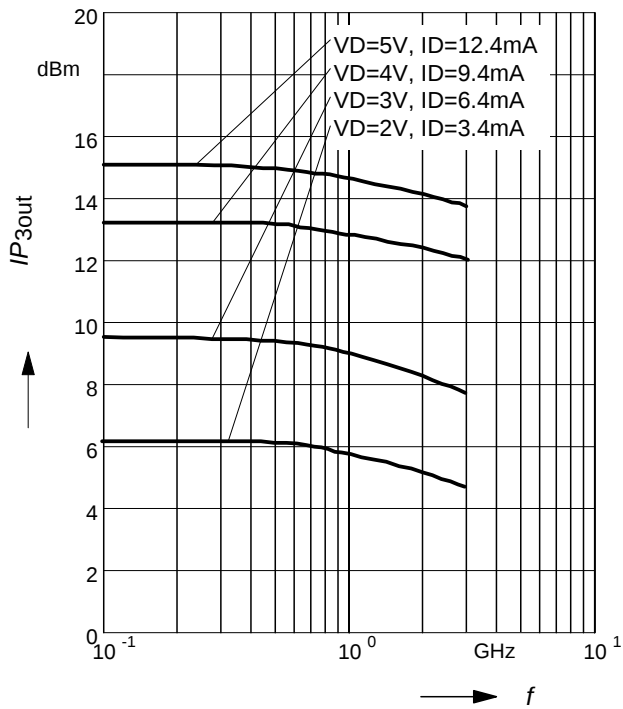
T_A = parameter



Intercept point at the output

$$IP_{3out} = f(f)$$

V_D, I_D = parameter



Intercept point at the output

$$IP_{3out} = f(f), V_D = 3V$$

T_A = parameter

