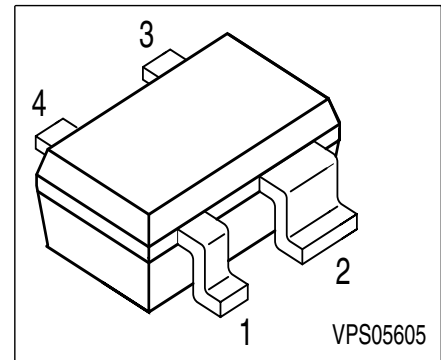
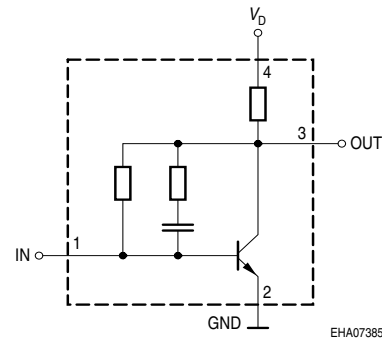


**Si-MMIC-Amplifier in SIEGET 25-Technologie**

- Cascadable 50 Ω-gain block
- Unconditionally stable
- Gain  $|S_{21}|^2 = 13$  dB at 1.8 GHz  
 $IP_{3out} = +13$  dBm at 1.8 GHz  
 $(V_D = 3$  V,  $I_D =$  typ. 6.7 mA)
- Noise figure  $NF = 2.3$  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 $T_S = 110$ °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**

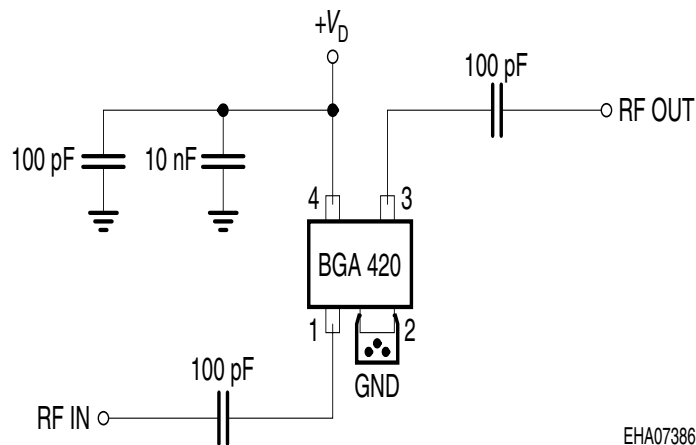
Junction - soldering point <sup>1)</sup>	$R_{thJS}$	≤ 410	K/W
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<sup>1</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC characteristics</b> $V_D = 3\text{ V}$ , $Z_0 = 50\ \Omega$					
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	S12	25	28	-	
$f = 1.8\text{ GHz}$					
Noise figure	NF				
$f = 0.1\text{ GHz}$		-	1.9	2.3	
$f = 1\text{ GHz}$		-	2.2	2.6	
$f = 1.8\text{ GHz}$		-	2.3	2.7	
Intercept point at the output	$IP_{3out}$	10	13	-	dBm
$f = 1\text{ GHz}$					
1dB compression point	$P_{-1dB}$	-6	-2.5	-	
$f = 1\text{ GHz}$					
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

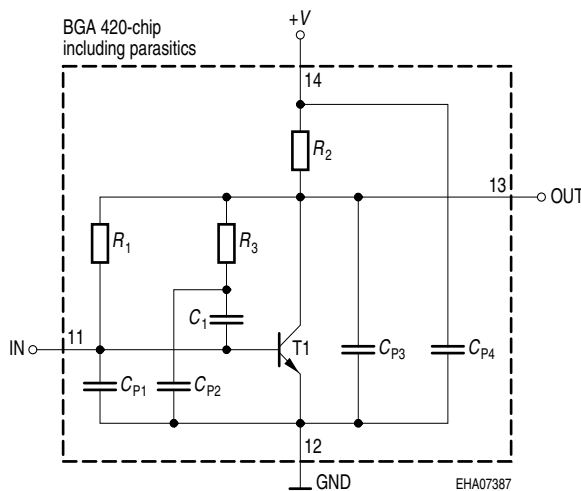


- Note: 1) Large-value capacitors should be connected from pin 4 to ground right at the device to provide a low impedance path.  
 2) The use of plated through holes right at pin 2 is essential for pc-board-applications. Thin boards are recommended to minimize the parasitic inductance to ground.

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

f	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	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 <sub>1</sub>	14.5k $\Omega$
R <sub>2</sub>	140 $\Omega$
R <sub>3</sub>	2.4k $\Omega$
C <sub>1</sub>	2.3pF
C <sub>P1</sub>	0.2pF
C <sub>P2</sub>	0.2pF
C <sub>P3</sub>	0.6pF
C <sub>P4</sub>	0.1pF

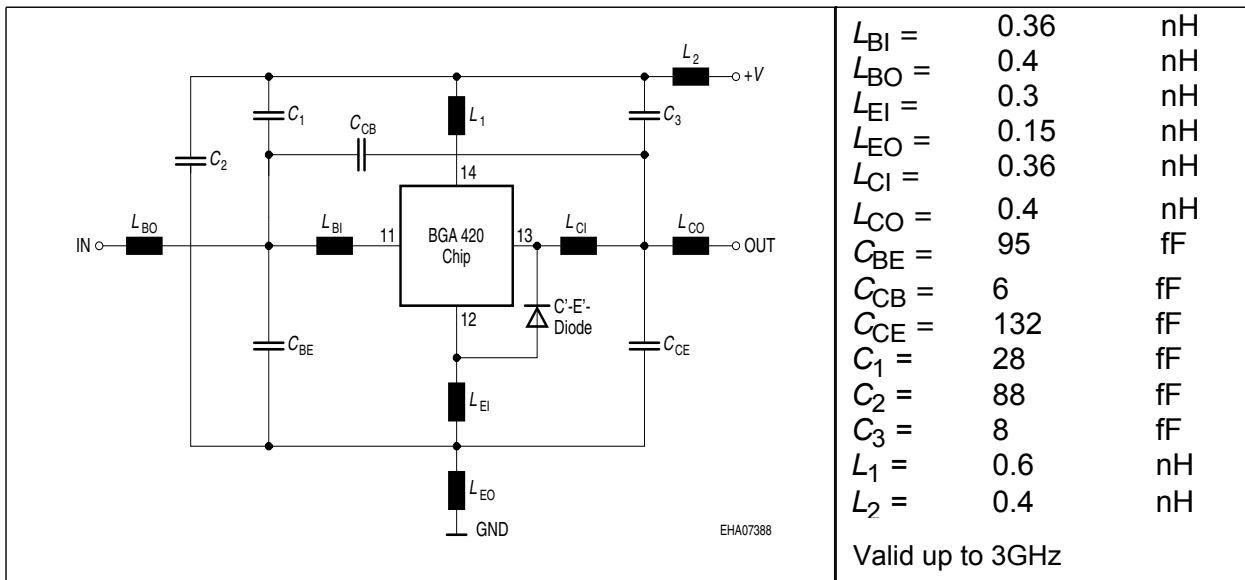
**Transistor Chip Data T1 (Berkley-SPICE 2G.6 Syntax) :**

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	$\Omega$	IRB =	0.21215	A
RBM =	1.3491	$\Omega$	RE =	1.9289		RC =	0.12691	$\Omega$
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	$\Omega$
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All parameters are ready to use, no scaling is necessary

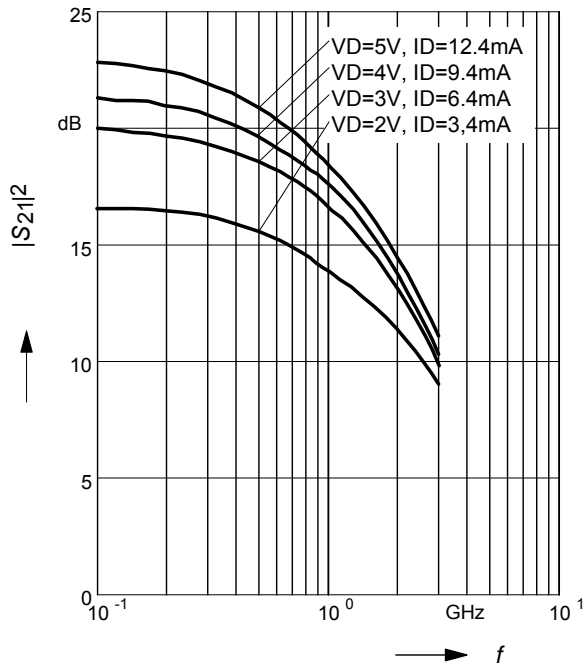
**Package Equivalent Circuit:**


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/silicondiscretres>

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

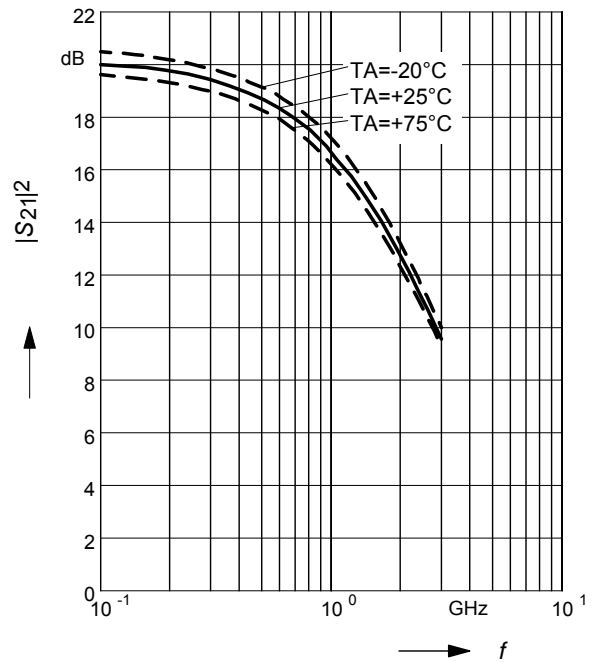
$V_D, I_D = \text{parameter}$



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

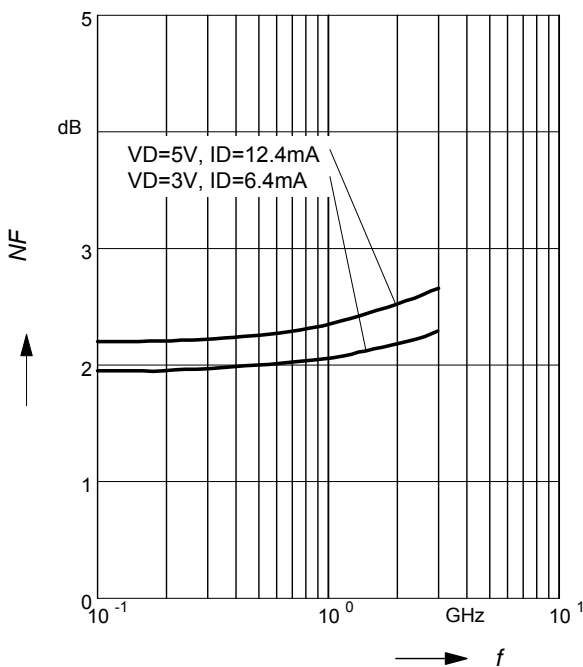
$V_D = 3V$

$T_A = \text{parameter}$



**Noise figure  $NF = f(f)$**

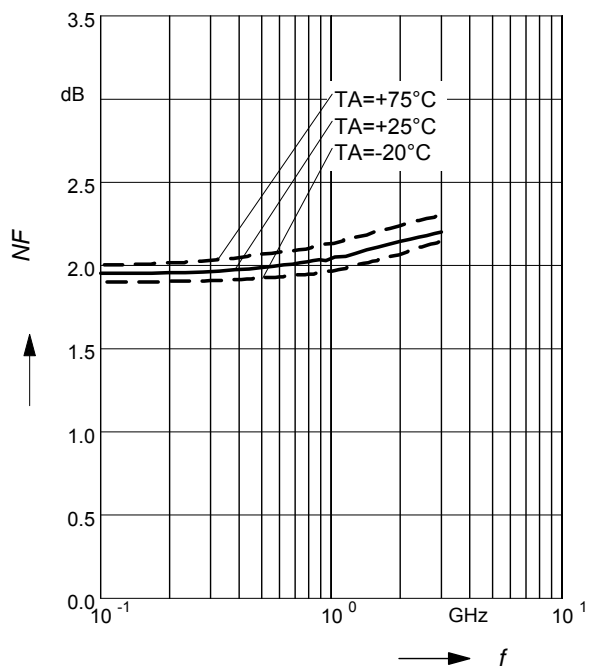
$V_D, I_D = \text{parameter}$



**Noise figure  $NF = f(f)$**

$V_D = 3V$

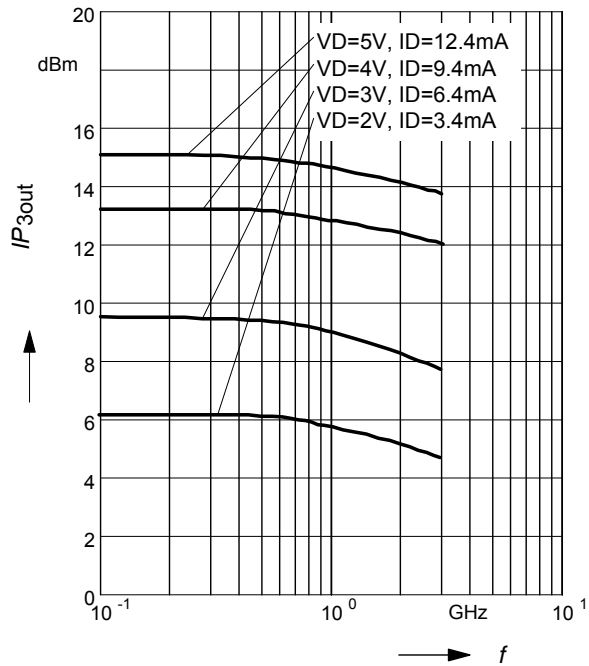
$T_A = \text{parameter}$



**Intercept point at the output**

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

$V_D, I_D = \text{parameter}$



**Intercept point at the output**

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

$T_A = \text{parameter}$

