BGA428

Gain and PCS Low Noise Amplifier

RF & Protection Devices

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BGA428, Gain and PCS Low Noise Amplifier

Revision History: 2011-09-02, Rev. 2.3

Previous Version: 2007-11-06, Rev. 2.3

Page	Subjects (major changes since last revision)
6	Correction of typing error in **Table 3**, (IIP_3 is -9 dBm)

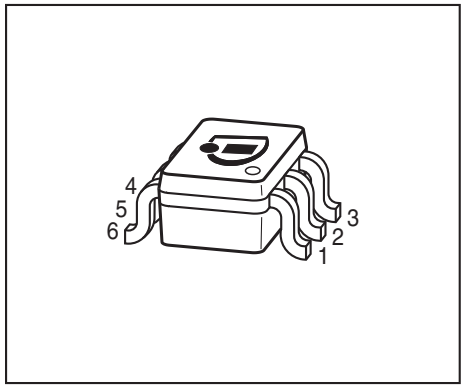
Trademarks

SIEGET® is a registered trademark of Infineon Technologies AG.

1 Silicon Germanium Broadband MMIC Amplifier

Feature

- High gain, G_{MA} = 20 dB at 1.8 GHz
- Low noise figure, NF = 1.4 dB at 1.8 GHz
- Prematched
- Ideal for GSM, DCS1800, PCS1900
- Open collector output
- Typical supply voltage: 2.4 - 3 V
- SIEGET®-45 technology
- Pb-free (RoHS compliant) package



SOT363

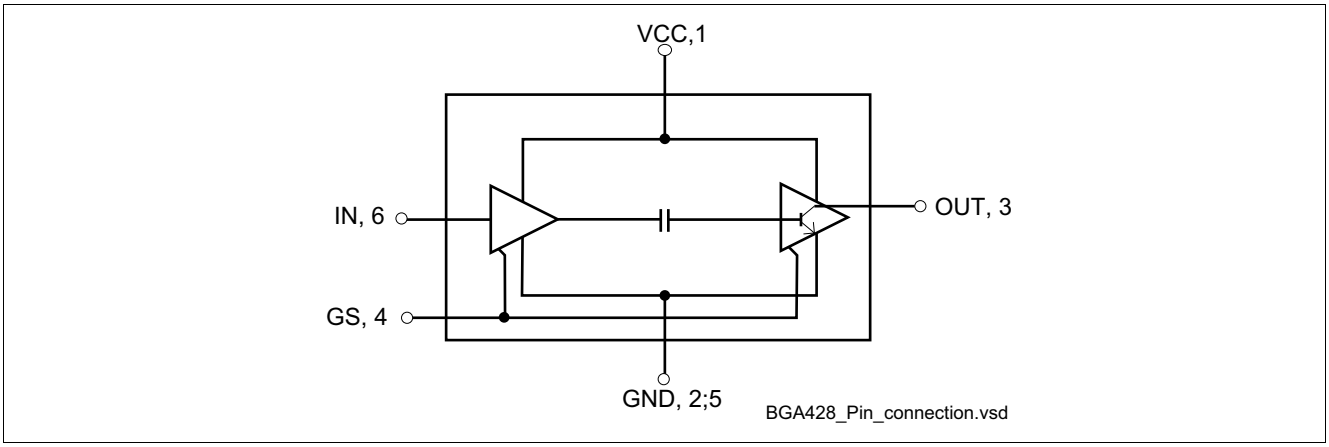


Figure 1 Pin connection

Description

BGA428 is a high gain, low noise amplifier.

Type	Package	Marking
BGA428	SOT363	PGs

*Note: **ESD:** Electrostatic discharge sensitive device, observe handling precaution*

Maximum Ratings

Table 1 Maximum ratings

Parameter	Symbol	Limit Value	Unit
Device voltage	V_{CC}	4	V
Voltage at pin Out	V_{out}	4	V
Voltage at pin GS	V_{GS}	3.5	V
Current into pin In	I_{in}	0.5	mA
Total device current[1)]	I_{tot}	12	mA
Input power[2)]	P_{in}	8	dBm
Total power dissipation, T_S < 125 °C[3)]	P_{tot}	50	mW
Junction temperature	T_J	150	°C
Operating temperature range	T_{OP}	-40... 85	°C
Storage temperature range	T_{STG}	-65... 150	°C

1) I_{tot} = Current into Out + Current into V_{CC}

2) Valid for:
   a) Z_L = 50 Ω, Z_S = 50 Ω, V_{CC} = 2.7 V, V_{out} = 2.7 V, V_{GS} = 0.0 V, GND = 0.0 V
   b) Z_L = 50 Ω, Z_S = 50 Ω, V_{CC} = 0.0 V, V_{out} = 0.0 V, V_{GS} = 2.7 V, GND = 0.0 V

3) T_S is measured on the ground lead at the soldering point

Note: All Voltages refer to GND-Node

Thermal resistance

Table 2 Thermal resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[1)]	R_{thJS}	220	K/W

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

2 Electrical Characteristics

2.1 Electrical characteristics at T_A = 25 °C (measured in test circuit specified in Figure 2), V_{CC} = 2.7 V, Frequency = 1.8 GHz, unless otherwise specified

Table 3 Electrical Characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Maximum available power gain	G_{MA}		20		dB	
Noise figure (Z_S = 50 Ω)	NF		1.4		dB	
Input power at 1 dB gain compression	P_{-1dB}		-19		dBm	
Input third order intercept point	IIP_3		-9		dBm	
Total device current	I_{tot}		8.2		mA	
Insertion loss in gain-step-mode	L_{GS}		13.5		dB	V_{CC} = 0.0 V, V_{CTRL} = 2.7 V, R_{CRRL} = 3 kΩ

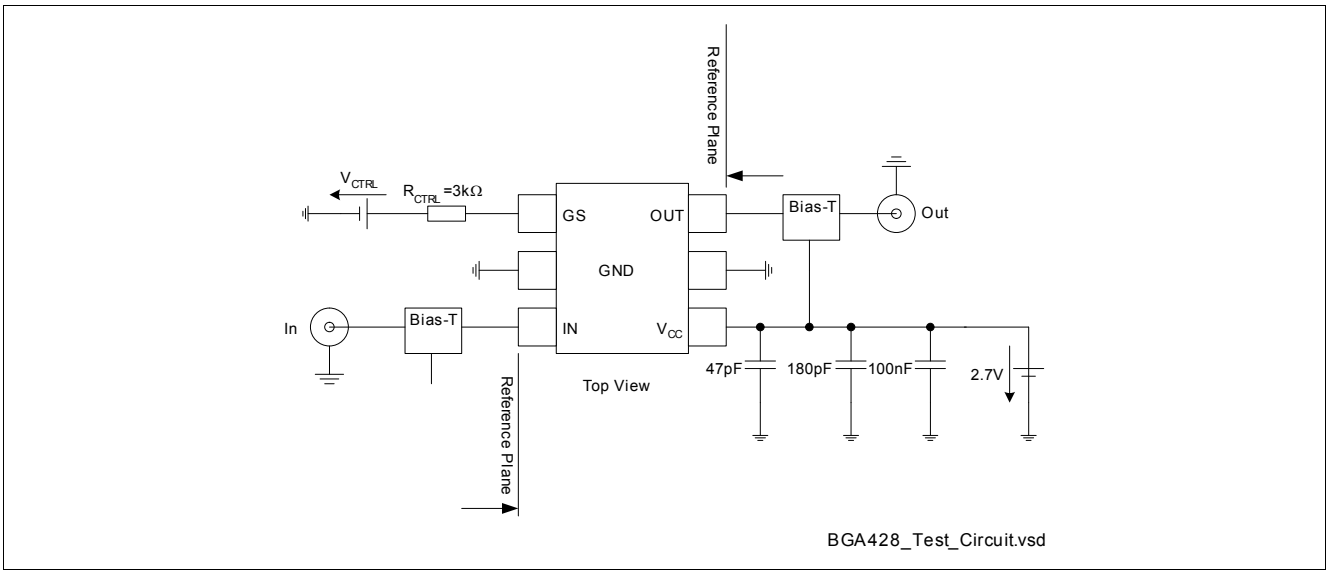


Figure 2 Test Circuit for Electrical Characteristics and S-Parameter

Table 4 S-Parameter at 2.7 V (see Electrical Characteristics for conditions)

Frequency [GHz]	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
0.100	0.6756	-31.7	58.775	-19.6	0.0005	153.5	0.9491	-3.9
0.200	0.5936	-53.6	47.806	-43.1	0.0014	138.4	0.9327	-6.3
0.300	0.5150	-71.4	39.232	-59.5	0.0021	119.0	0.9174	-8.3
0.400	0.4587	-86.6	31.740	-71.8	0.0028	104.9	0.9035	-10.3
0.600	0.4004	-110.7	23.868	-89.6	0.0042	105.9	0.8807	-14.0
0.800	0.3743	-129.1	18.509	-103.2	0.0063	94.3	0.8593	-17.7
1.000	0.3743	-143.0	14.825	-114.5	0.0082	92.4	0.8352	-21.4
1.200	0.3816	-154.5	12.288	-124.7	0.0093	87.2	0.8116	-25.1
1.400	0.3922	-164.4	10.353	-134.2	0.0110	85.3	0.7865	-28.7
1.600	0.4086	-1.72.4	8.879	-143.2	0.0132	79.4	0.7597	-32.2
1.800	0.4265	-178.9	7.732	-151.4	0.0141	79.4	0.7309	-36.0
1.900	0.4314	-178.8	7.214	-155.2	0.0146	76.1	0.7199	-37.5
2.000	0.4371	176.1	6.771	-159.1	0.0150	77.0	0.7097	-39.1
2.200	0.4505	171.2	5.976	-166.6	0.0169	75.2	0.6791	-42.3
2.400	0.4640	167.2	5.298	-173.5	0.0181	73.2	0.6593	-45.6
3.000	0.4935	155.9	3.935	167.0	0.0217	68.3	0.5925	-53.3
4.000	0.5181	141.2	2.605	139.2	0.0282	65.1	0.5284	-64.9
5.000	0.5202	126.9	1.911	113.6	0.0319	62.2	0.4829	-75.1
6.000	0.5128	110.0	1.479	89.9	0.0489	56.0	0.4323	-81.7

2.2 Application Circuit Characteristics (measured in test circuit specified in Figure 3), T_A = 25 °C, V_{CC} = 2.7 V, Frequency = 1.85 GHz, unless otherwise specified

Table 5 Application Circuit Characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Insertion power gain	$\|S_{21}\|^2$		19		dB	
Noise figure (Z_S = 50 Ω)	NF		1.4		dB	
Input power at 1 dB gain compression	P_{-1dB}		-19		dBm	
Input third order intercept point	IIP_3		-9		dBm	
Total device current	I_{tot}		8.2		mA	
Insertion loss in gain-step-mode	L_{GS}		13.5		dB	V_{CC} = 0.0 V, V_{CTRL} = 2.7 V, R_{CRRL} = 3 kΩ

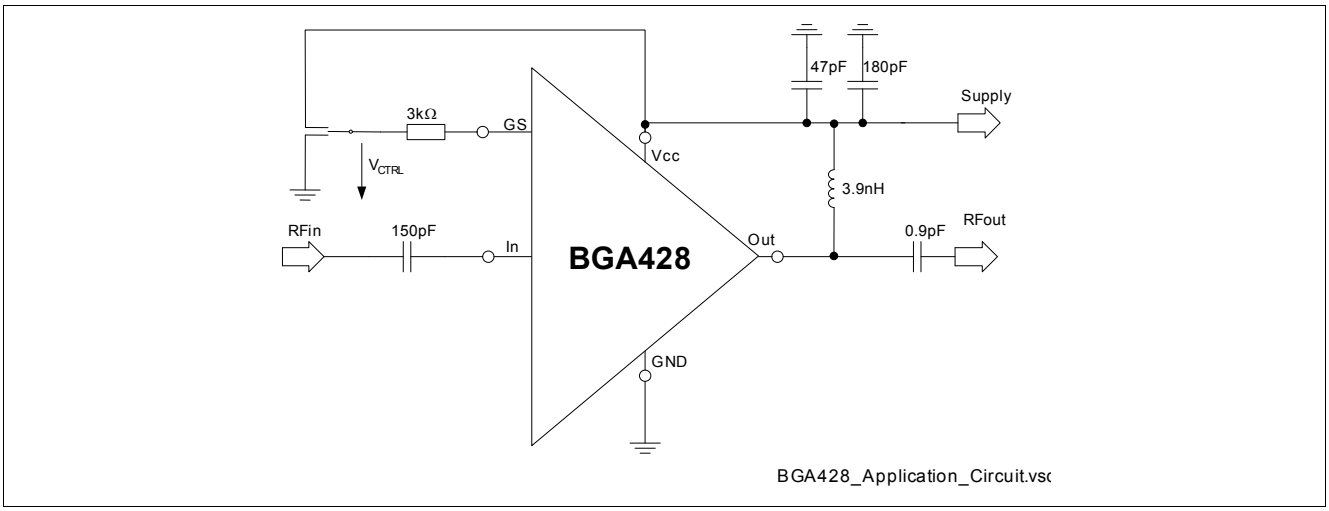
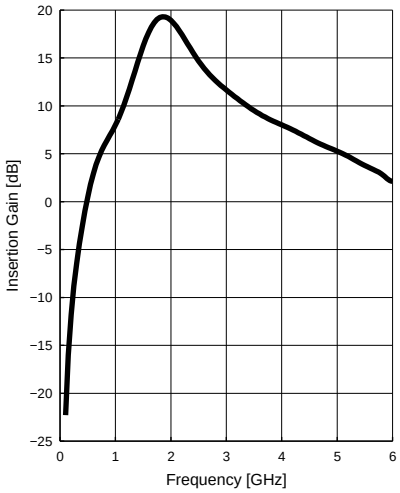


Figure 3 Application Circuit for 1850 MHz

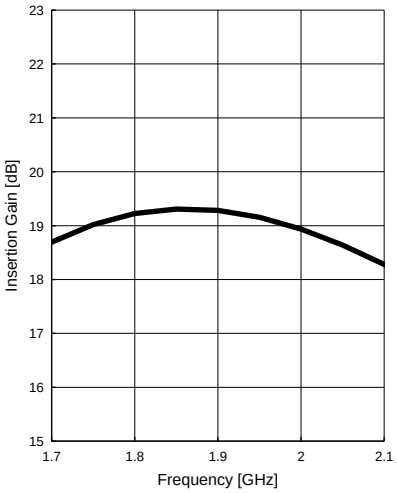
3 Measured Parameters

Refer to the application circuit given in **Figure 3**

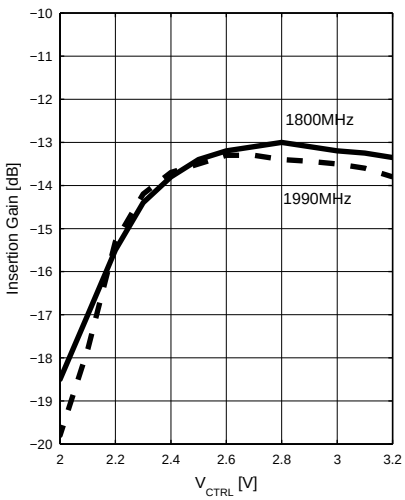
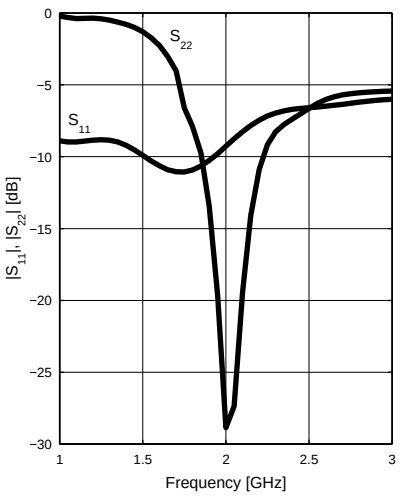
Power Gain $|S21|^2=f(f)$
V_{CC} = 2.7V, V_{Out}=2.7V



Power Gain $|S21|^2=f(f)$
V_{CC} = 2.7V, V_{Out}=2.7V



Off−Gain $|S_{21}|^2=f(V_{CTRL})$
V_{CC} = 0.0V, V_{Out}=0.0V,R_{CTRL}=2.7kΩ



Matching $|S_{11}|,|S_{22}|=f(f)$
V_{CC} = 2.7V, V_{Out}=2.7V