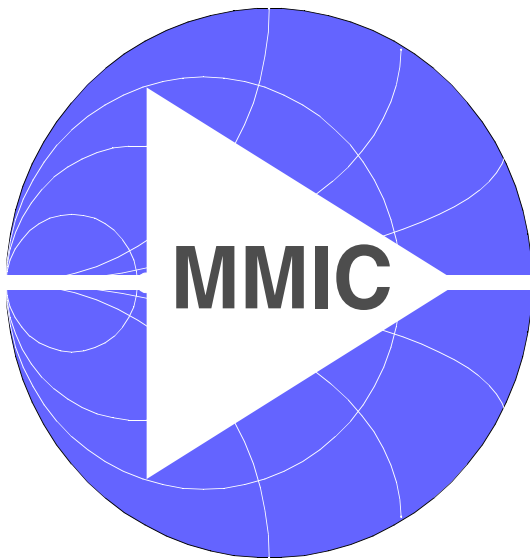


# BGA428

BGA428 High Gain, Low Noise  
Amplifier



Wireless  
Silicon Discretes



Never stop thinking.

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**BGA428****Data sheet****Revision History:           2002-03-26**Previous Version:           2000-11-15

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Page	Subjects (major changes since last revision)
4	dot size for pin 1 package marking increased

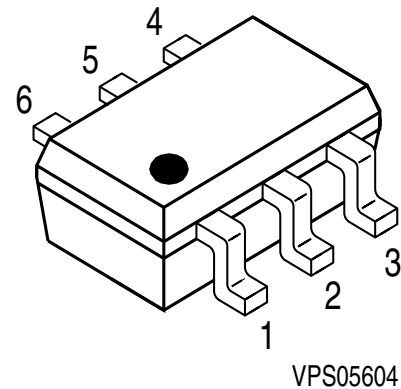
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# BGA428 High Gain, Low Noise Amplifier

BGA428

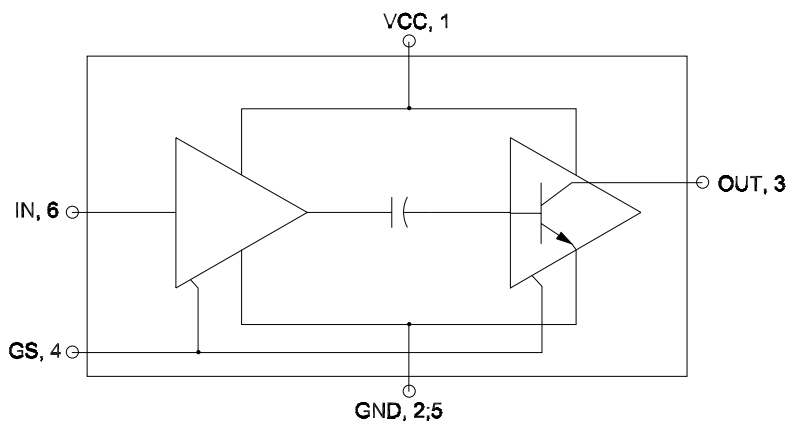
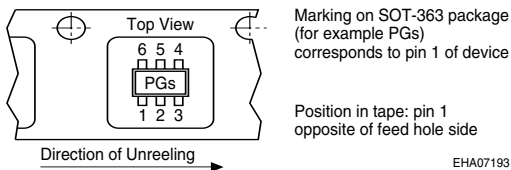
## Features

- High gain,  $G_{MA}=20\text{dB}$  at 1.8GHz
- Low noise figure,  $NF=1.4\text{dB}$  at 1.8GHz
- Prematched
- Ideal for GSM, DCS1800, PCS1900
- Open collector output
- Typical supply voltage: 2.4-3V
- SIEGET<sup>®</sup>-45 technology



VPS05604

## Tape loading orientation



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

Type	Package	Marking	Chip
BGA428	SOT363	PGs	T0527

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Device voltage	$V_{CC}$	4	V
Total Device Current <sup>3)</sup>	$I_{tot}$	12	mA
Voltage at pin <i>Out</i>	$V_{Out}$	4	V
Current into pin <i>In</i>	$I_{IN}$	0.5	mA
Voltage at pin <i>GS</i>	$V_{GS}$	3.5	V
Total power dissipation, $T_s < 125^{\circ}C^{1)}$	$P_{tot}$	50	mW
Junction temperature	$T_j$	150	$^{\circ}C$
Operating temperature range	$T_{OP}$	-40 ..+85	$^{\circ}C$
Storage temperature range	$T_{STG}$	-65 ... +150	$^{\circ}C$
Thermal resistance: junction-soldering point	$R_{th JS}$	220	K/W
Input power <sup>2)</sup>	$P_{IN}$	8	dBm

**Notes:**

All Voltages refer to GND-Node

<sup>1)</sup>  $T_s$  is measured on the ground lead at the soldering point

<sup>2)</sup> Valid for a)  $Z_L=50\Omega$  and  $Z_S=50\Omega$ ,  $V_{CC}=2.7V$ ,  $V_{OUT}=2.7V$ ,  $V_{GS}=0.0V$ ,  $GND=0.0V$   
and b)  $Z_L=50\Omega$  and  $Z_S=50\Omega$ ,  $V_{CC}=0.0V$ ,  $V_{OUT}=0.0V$ ,  $V_{GS}=2.7V$ ,  $GND=0.0V$

<sup>3)</sup>  $I_{tot}$  = Current into OUT + Current into VCC

**Electrical Characteristics at  $T_A=25^{\circ}C$  (measured in test circuit specified in fig. 1)**

$V_{CC}=2.7V$ , Frequency=1.8GHz, unless otherwise specified

Parameter	Symbol	min.	typ.	max.	Unit
Maximum available power gain	$G_{MA}$		20		dB
Noise figure ( $Z_S=50\Omega$ )	NF		1.4		dB
Input power at 1dB 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 $V_{CC}=0.0V$ , $V_{CTRL}=2.7V$ , $R_{CTRL}=3k\Omega$	$L_{GS}$		13.5		dB

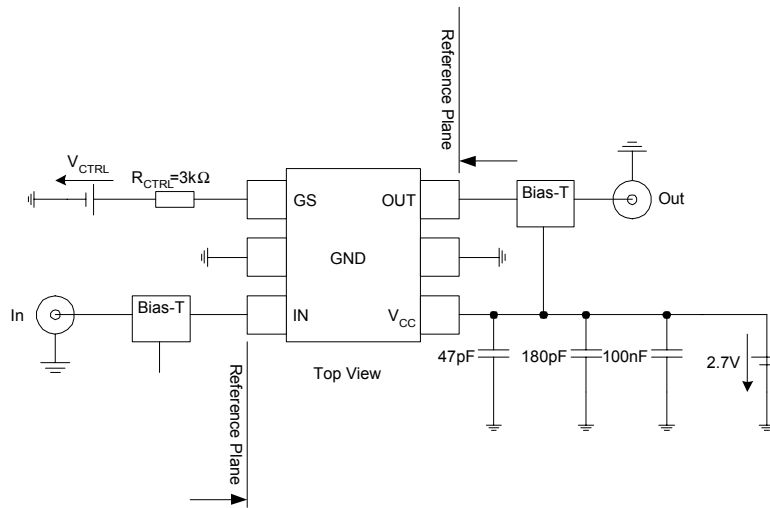


Fig.1: Test Circuit for Electrical Characteristics and S-Parameter

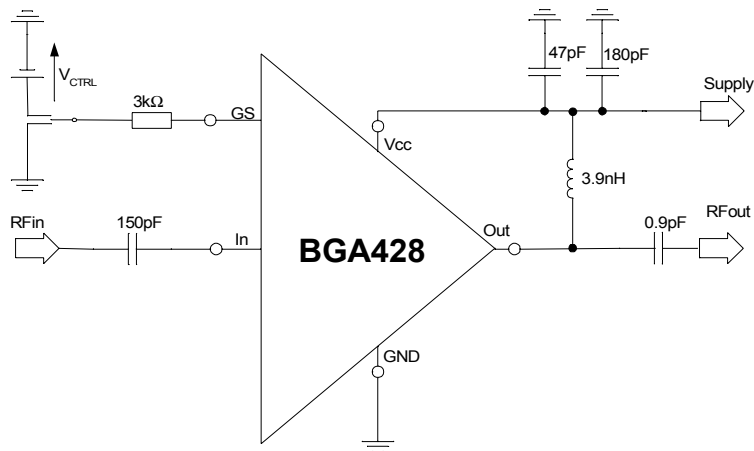


Fig. 2: Application Circuit for 1850MHz

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

Freq. [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	32.740	-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	-172.4	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

**Application Circuit Characteristics (measured in test circuit specified in fig. 2)**

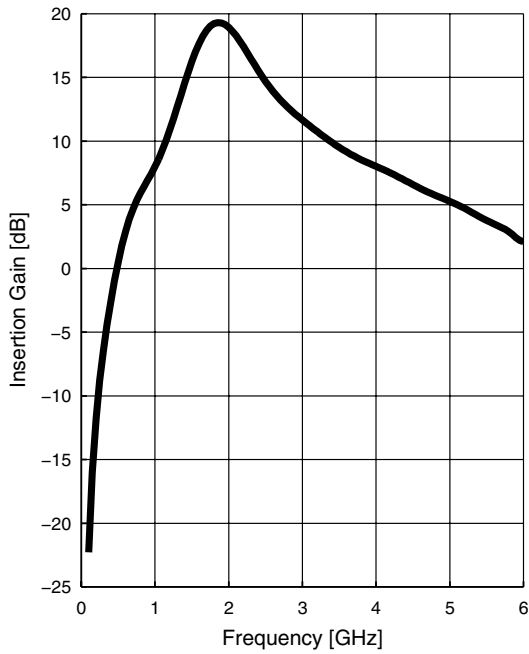
TA=25°C, Vcc=2.7V, Frequency=1.85GHz, unless otherwise specified

Parameter	Symbol	typ.	Unit
Insertion power gain	$ S_{21} ^2$	19	dB
Noise Figure ( $Z_S=50\Omega$ )	NF	1.4	dB
Input Power at 1dB Gain Compression	$P_{-1dB}$	-19	dBm
Input Third Order Intercept Point	IIP <sub>3</sub>	-9	dBm
Total Device Current	$I_{tot}$	8.2	mA
Insertion Loss in Gain-Step-Mode Vcc=0.0V, V <sub>CTRL</sub> =2.7V, R <sub>CTRL</sub> =3kΩ	L <sub>GS</sub>	13.5	dB

**The following data refers to the application circuit given in fig. 2**

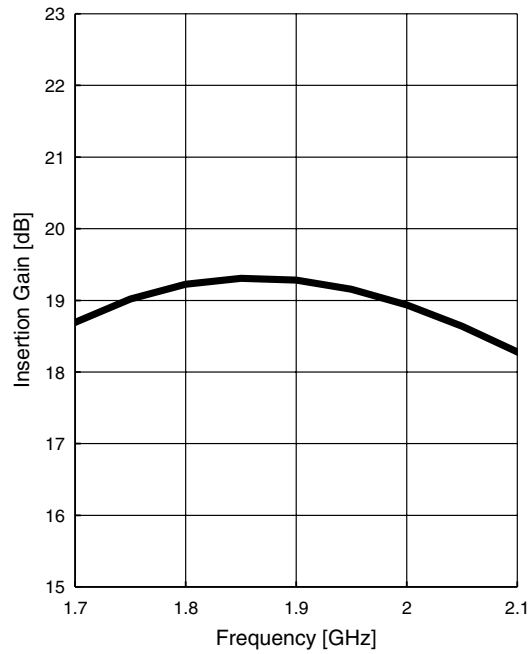
**Power Gain**  $|S_{21}|^2=f(f)$

$V_{CC} = 2.7V, V_{Out}=2.7V$



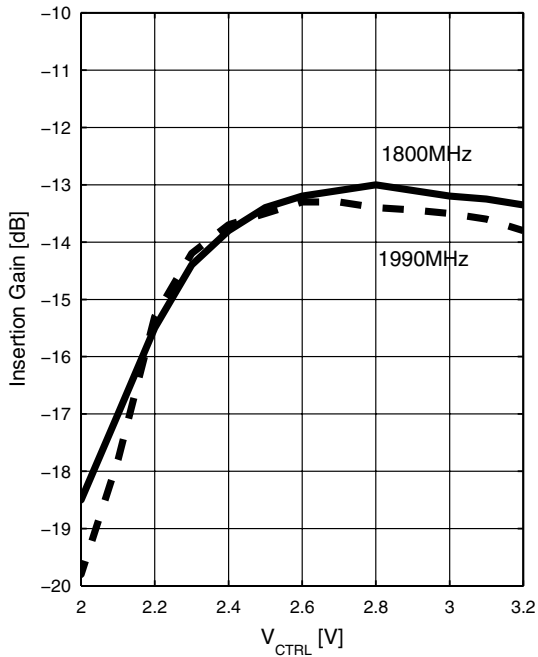
**Power Gain**  $|S_{21}|^2=f(f)$

$V_{CC} = 2.7V, V_{Out}=2.7V$



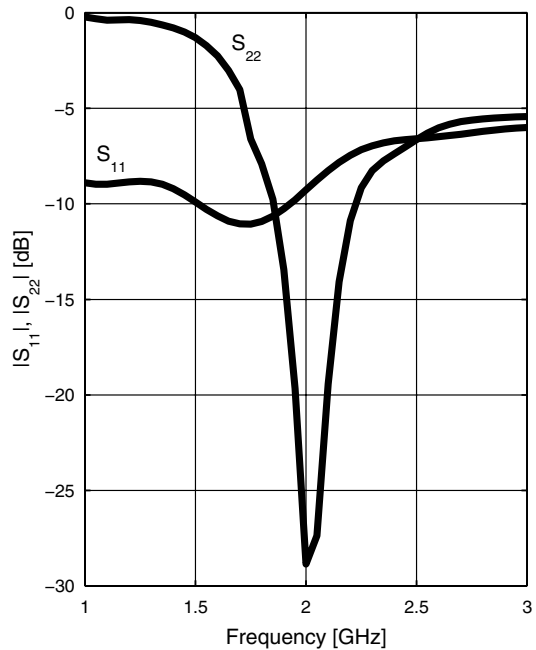
**Off-Gain**  $|S_{21}|^2=f(V_{CTRL})$

$V_{CC} = 0.0V, V_{Out}=0.0V, R_{CTRL}=2.7k\Omega$



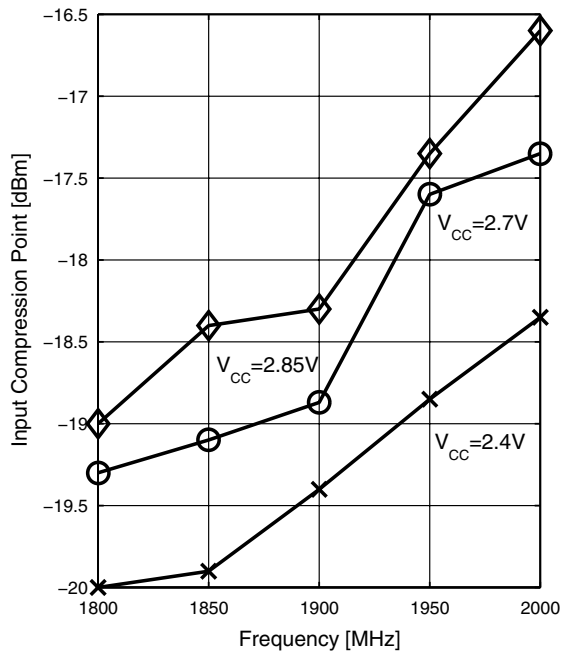
**Matching**  $|S_{11}|, |S_{22}|=f(f)$

$V_{CC} = 2.7V, V_{Out}=2.7V$



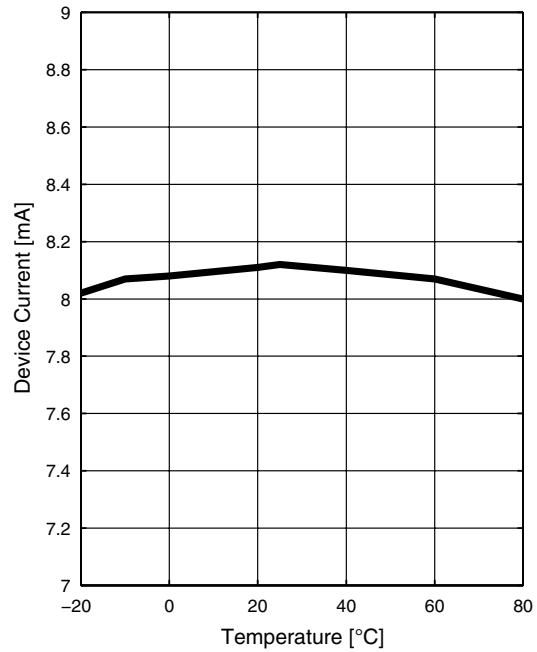


**Input Compression Point  $P_{-1dB} = f(f)$**



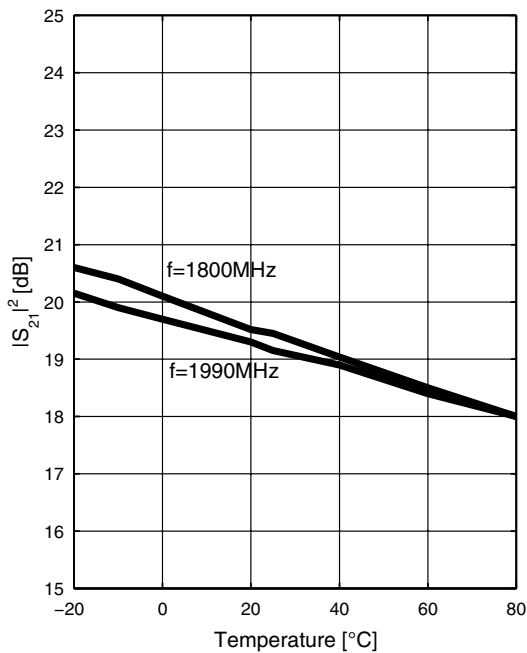
**Device Current  $I = f(\vartheta)$**

$V_{CC} = 2.7V, V_{Out} = 2.7V$



**Insertion Gain  $|S_{21}|^2 = f(\vartheta)$**

$V_{CC} = 2.7V, V_{Out} = 2.7V$



**Package Outline**

