Data Sheet, April 2004

BGA619

Silicon Germanium
High IP3 PCS Low Noise Amplifier

Wireless
Silicon Discretes

Never stop thinking.

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Data Sheet
Revision History: April 2004

Previous Version:	February 2004

Page	Subjects (major changes since last revision)
4	Marking corrected

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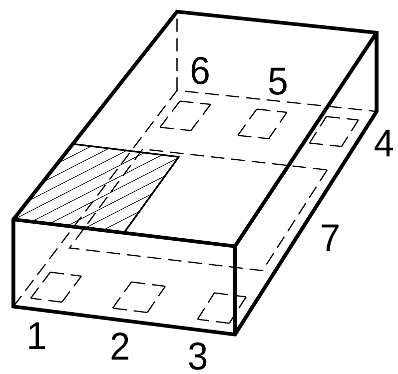
Silicon Germanium
High IP3 PCS Low Noise Amplifier

BGA619

Features

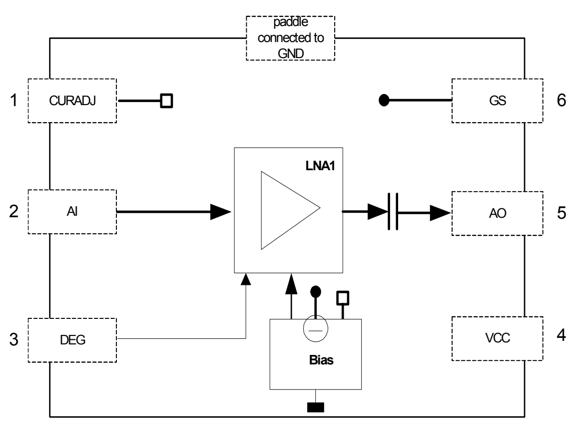
- B7HF silicon germanium technology
- Tiny P-TSLP-7-1 leadless package
- RF output-port internally pre-matched to 50Ω
- Low external component count
- Three gain steps
- Power off function
- High IP3 in all modes
- Typical supply voltage: 2.78 V



P-TSLP-7-1

Applications

- 1.9 GHz PCS wireless frontends (CDMA2000)



Description

The BGA619 is a high IP3 PCS low noise amplifier, designed for 1.9GHz applications.

Internal biasing provides stabile current conditions for all gain modes over temperature range.

Using the pin GS the BGA619 can be switched between three gain modes (HIGH, MID & LOW) and the OFF mode.

ESD: Electrostatic discharge sensitive device, observe handling precaution!

Type	Package	Marking	Chip
BGA619	P-TSLP-7-1	BT	T1544

Pin Definition and Function

Pin No.	Symbol	Function
1	CURADJ	Current adjust LNA
2	AI	LNA input
3	DEG	RF ground
4	VCC	Supply voltage LNA
5	AO	LNA output
6	GS	Gain step control
7	GND	Ground

Maximum Rating

Parameter	Symbol	Limit value	Unit
Voltage at pin VCC	VCC	-0.3 ... 3.6	V
Voltage at pin AI (LNA input)	AI	-0.3 (min.)	V
Voltage at pin AO (LNA output)	AO	-0.3 ... V_{VCC}+0.3 3.6 (max.)	V
External resistor	R_{CURADJ}	6 (min.)	kΩ
Current into VCC	ICC	11	mA
Junction temperature	T_j	150	°C
Ambient temperature range	T_A	-35... 85	°C
Storage temperature range	T_{STG}	-40 ... 150	°C
ESD capability (HBM: JESD22A-114) RF pin AI all other pins	V_{ESD}	 <500 1000	V

Notes:
All Voltages refer to GND-Node

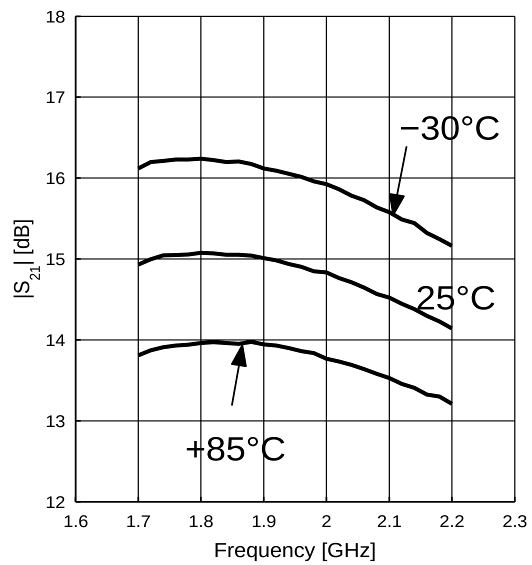
Electrical Characteristics

T_A=25°C: VCC=2.78V , R_{LNA_Curadj} = 15kΩ, frequency=1.96GHz, HIGH: GS=2.3V, MID: GS=1.7V, LOW: GS=1.0V, unless otherwise noted; measured on BGA619 Appl. Board V1.0 including PCB losses

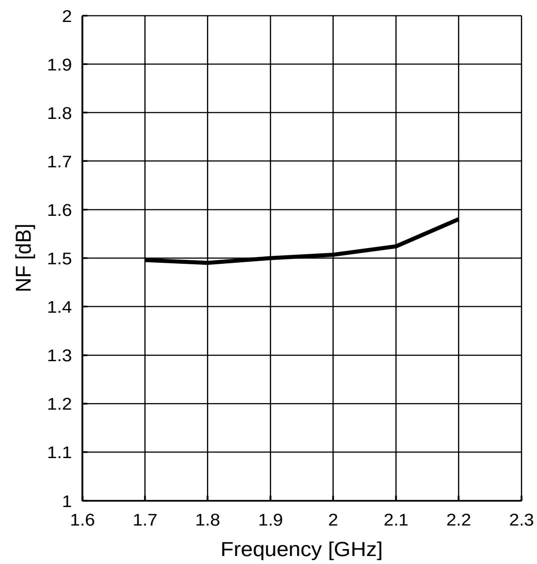
Parameter	Symbol	GS mode	min.	typ.	max.	Unit
Supply current	I_{cc}	HIGH MID LOW OFF		6.5 4.5 2.9 280		mA µA
Power gain	S_{21}	HIGH MID LOW		14.9 2.2 -9.5		dB
Noise figure (Zs = 50Ω)	*NF*	HIGH MID LOW		1.5 8 16		dB
Input Return Loss	S_{11}	HIGH MID LOW		10.5 8.5 12.5		dB
Output Return Loss	S_{22}	HIGH MID LOW		11.5 13 13		dB
Reverse isolation	S_{12}	HIGH MID LOW		25 21 23		dB
Power gain settling time (within 1dB of the final gain)	t_s	ALL		70		µs
3rd order input intercept point f1= 1950MHz, f2= f1 +/-1MHz P(f1,f2)= -30dBm P(f1,f2)= -27dBm P(f1,f2)= -15dBm	IIP_3	 HIGH MID LOW		 7 6.5 15		dBm
Gain step input voltage	*GS*	HIGH MID LOW OFF	2.2 1.6 0.9 0.0		2.4 1.8 1.1 0.3	V
Gain control current	I_{GS}	HIGH OFF			95 -55	µA

Typical measurement results HIGH Gain Mode; T_A = 25°C

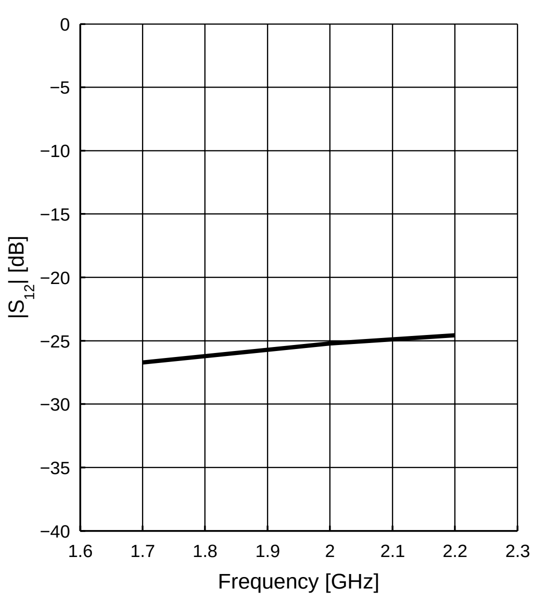
Gain $|S_{21}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 6.5mA



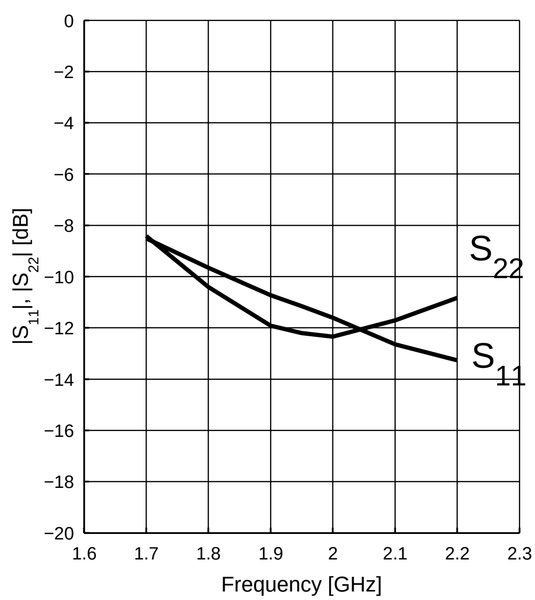
Noise Figure NF = f(f)
V_{CC} = 2.78V, I_{CC} = 6.5mA, Gain = 14.9dB



Reverse Isolation $|S_{12}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 6.5mA

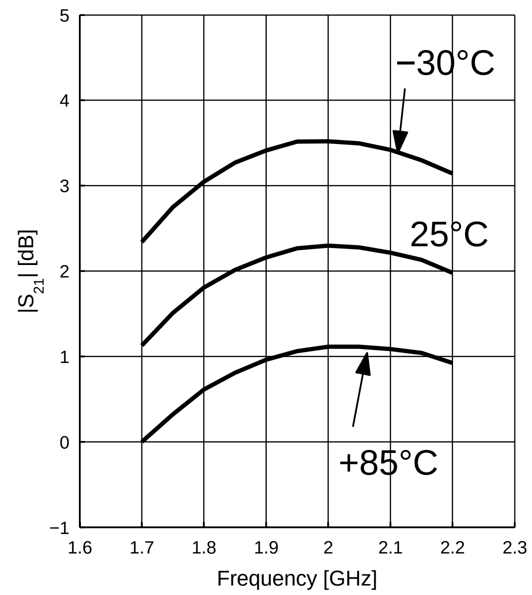


Matching $|S_{11}|, |S_{22}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 6.5mA

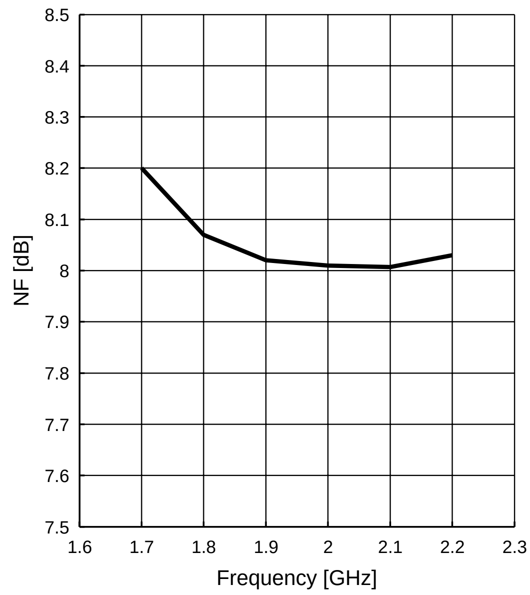


Typical measurement results MID Gain Mode; T_A = 25°C

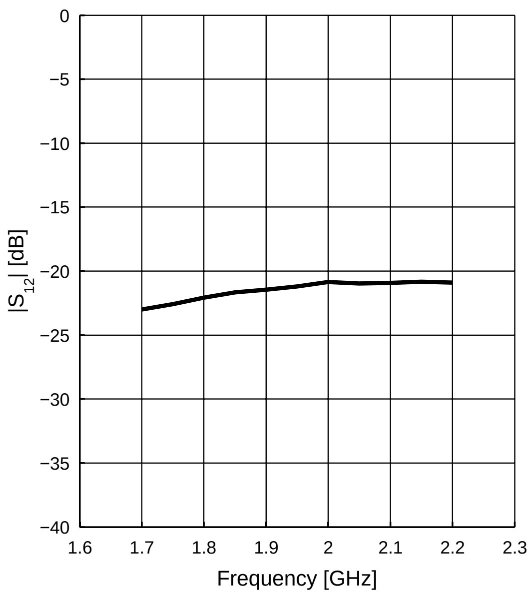
Gain $|S_{21}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 4.5mA



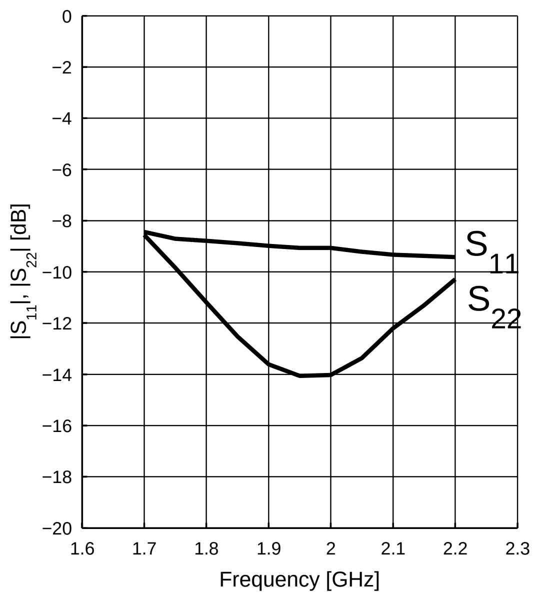
Noise Figure NF = f(f)
V_{CC} = 2.78V, I_{CC} = 4.5mA, Gain = 2.2dB



Reverse Isolation $|S_{12}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 4.5mA

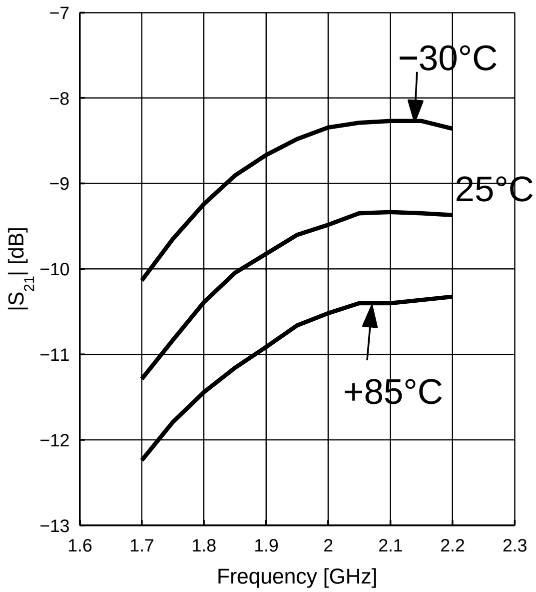


Matching $|S_{11}|, |S_{22}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 4.5mA

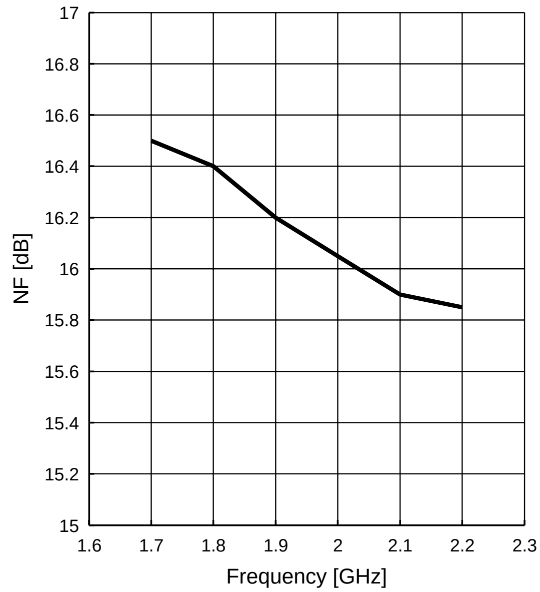


Typical measurement results LOW Gain Mode; T_A = 25°C

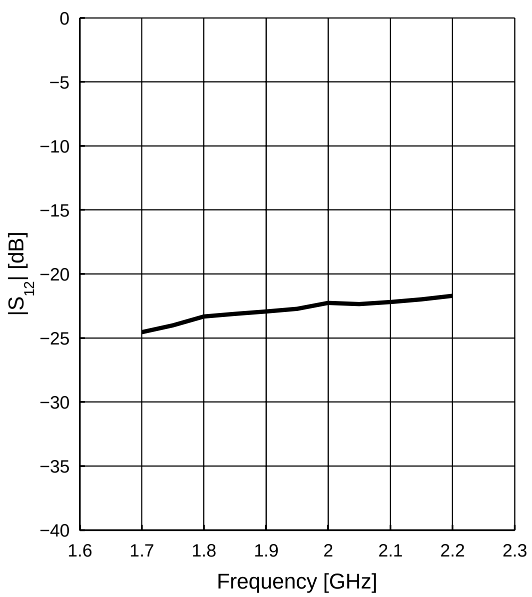
Gain $|S_{21}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 2.9mA



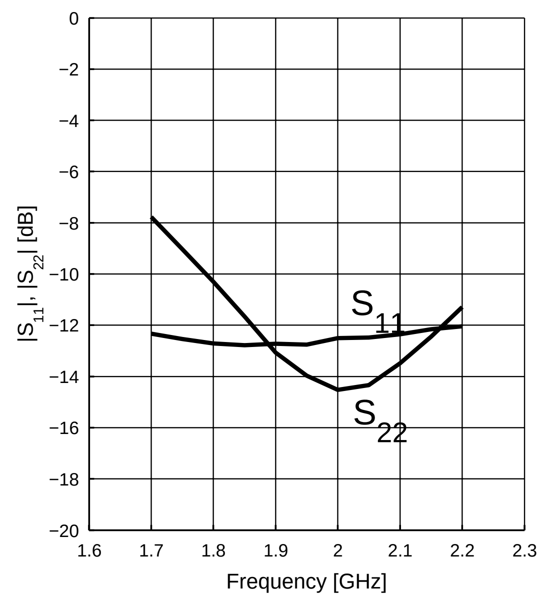
Noise Figure NF = f(f)
V_{CC} = 2.78V, I_{CC} = 2.9mA, Gain = −9.5dB



Reverse Isolation $|S_{12}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 2.9mA



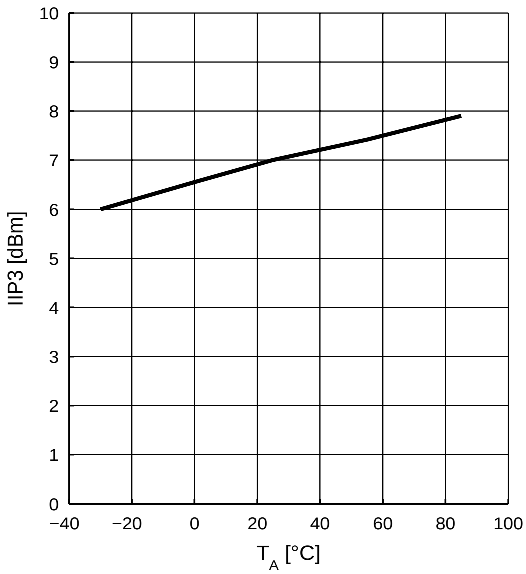
Matching $|S_{11}|, |S_{22}| = f(f)$
V_{CC} = 2.78V, I_{CC} = 2.9mA



Typical measurement results 3rd Order Intercept Point

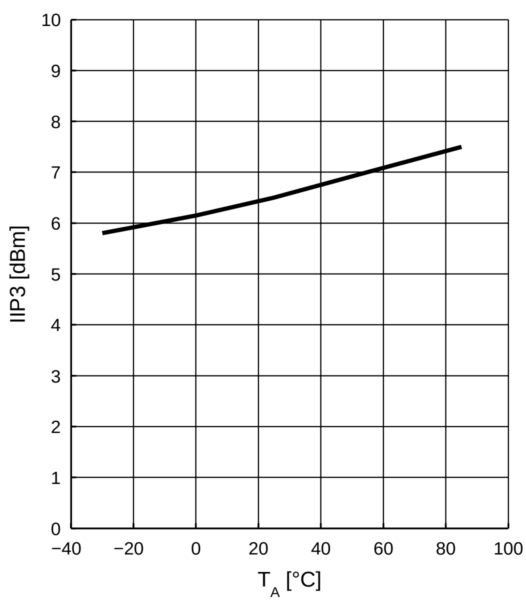
High Gain Mode

Intercept Point 3rd O. IIP3 = f(T_A)
V_{CC} = 2.78V, I_{CC} = 6.5mA, Gain = 14.9dB



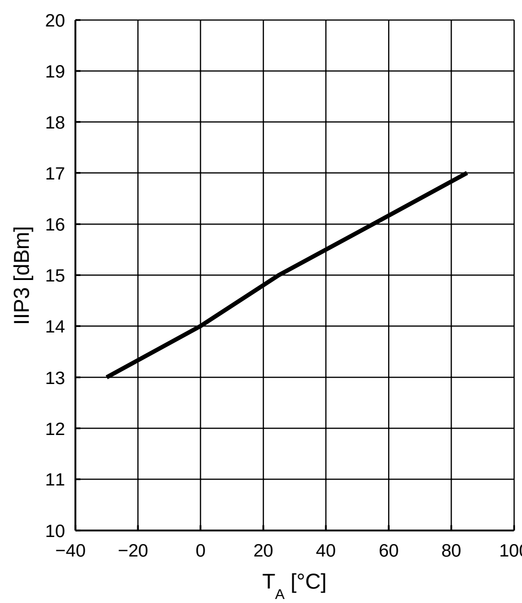
Mid Gain Mode

Intercept Point 3rd O. IIP3 = f(T_A)
V_{CC} = 2.78V, I_{CC} = 4.5mA, Gain = 2.2dB



Low Gain Mode

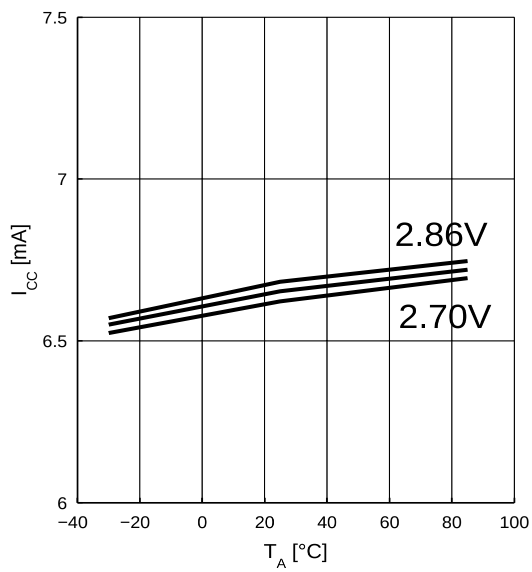
Intercept Point 3rd O. IIP3 = f(T_A)
V_{CC} = 2.78V, I_{CC} = 2.9mA, Gain = −9.5dB



Typical measurement results Supply Current vs.Temp & Supply (2.7..2.78..2.86V)

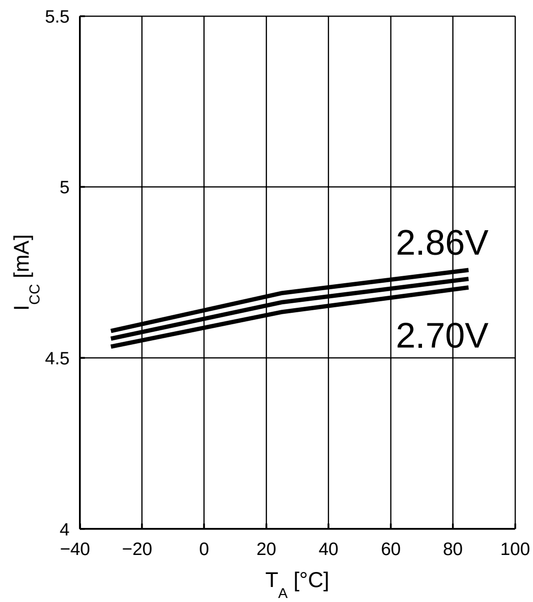
HIGH Gain Mode

Supply current vs. Temp. $I_{CC} = f(T_A, V_{CC})$



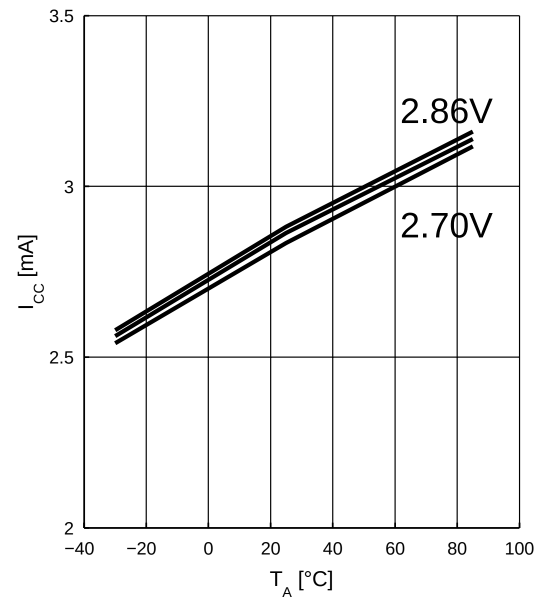
MID Gain Mode

Supply current vs. Temp. $I_{CC} = f(T_A, V_{CC})$



LOW Gain Mode

Supply current vs. Temp. $I_{CC} = f(T_A, V_{CC})$

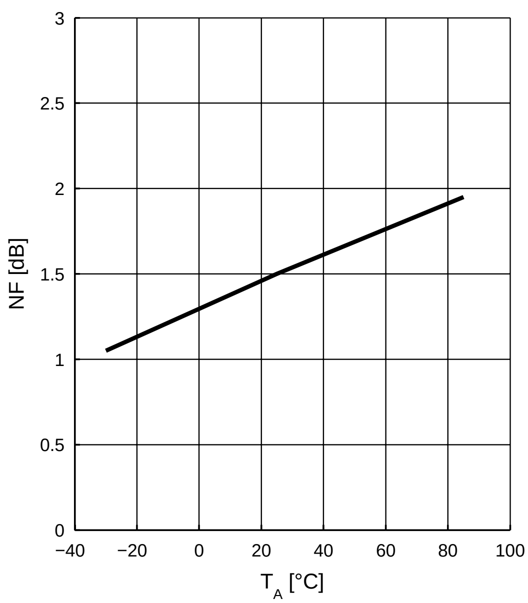


Typical measurement results Noise Figure

HIGH Gain Mode

Noise Figure NF = f(T_A)

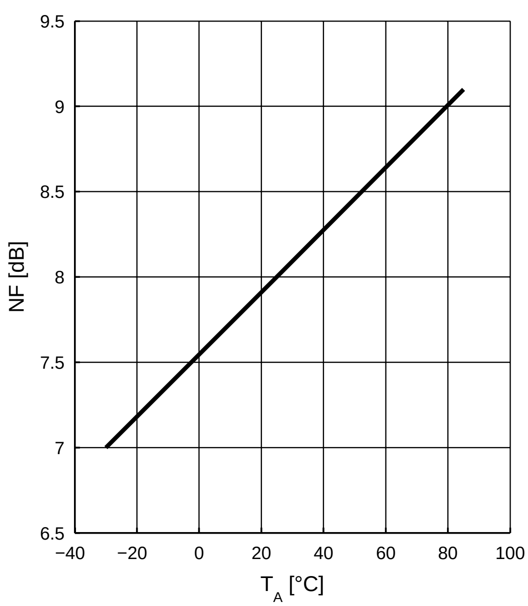
V_{CC} = 2.78V, I_{CC} = 6.5mA, Gain = 14.9dB



MID Gain Mode

Noise Figure NF = f(T_A)

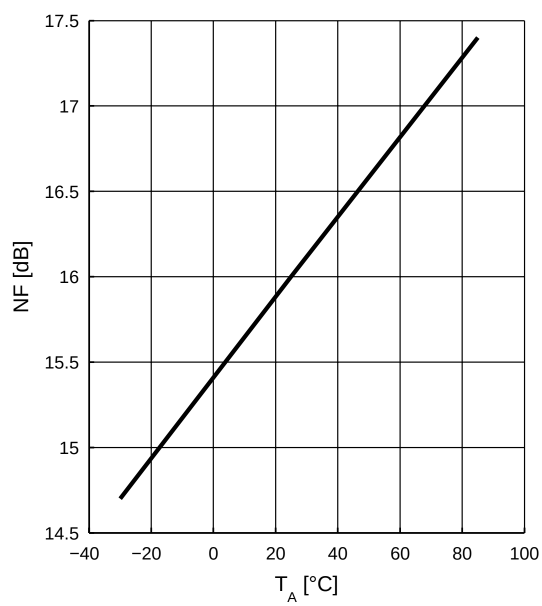
V_{CC} = 2.78V, I_{CC} = 4.5mA, Gain = 2.2dB



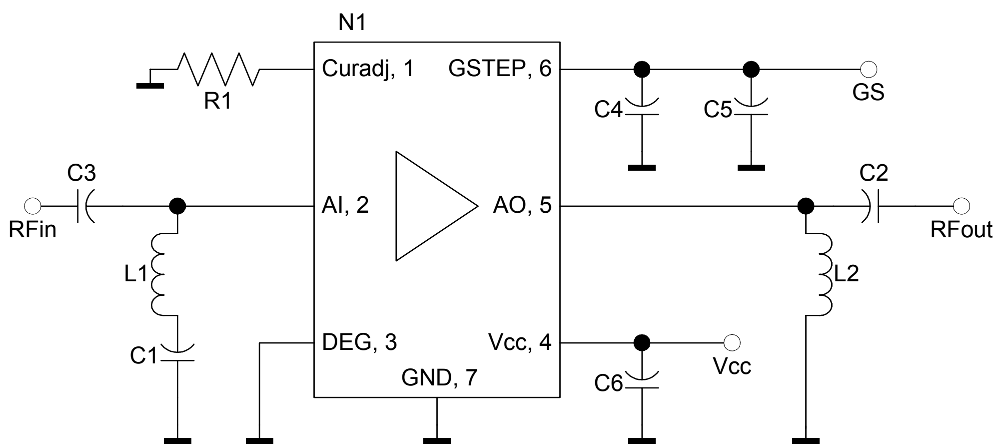
LOW Gain Mode

Noise Figure NF = f(T_A)

V_{CC} = 2.78V, I_{CC} = 2.9mA, Gain = −9.5dB



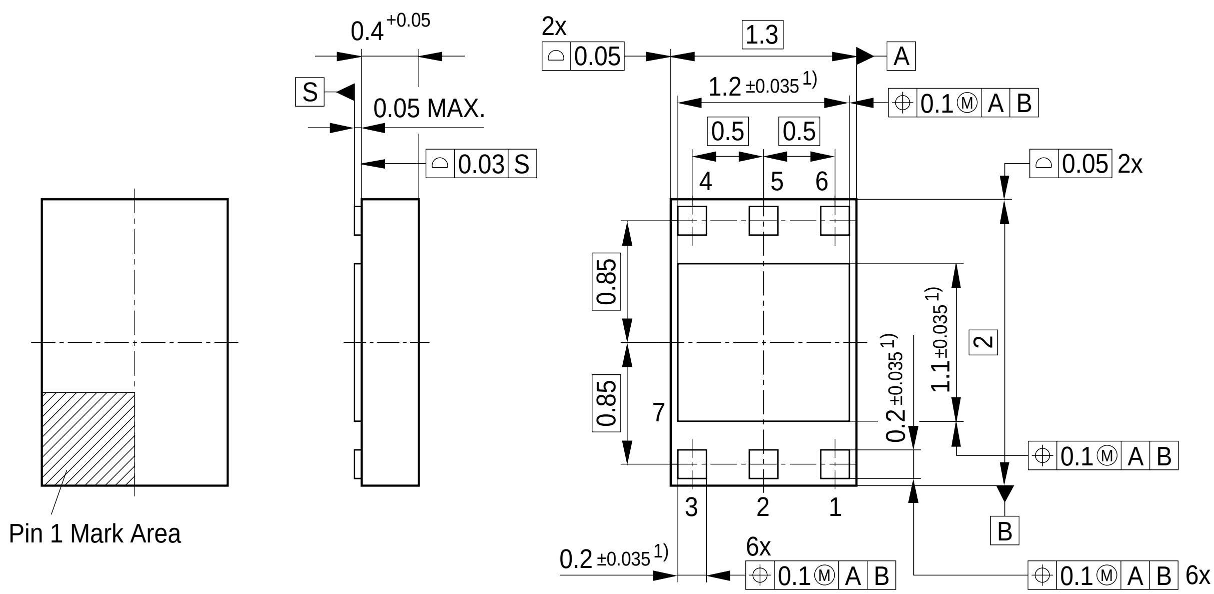
PCB Board Configuration



Bill of Materials

Name	Value	Package	Manufacturer	Function
R1	15 kΩ	0402	various	bias resistance
L1	3.3 nH	0402	various	LF trap & input matching
L2	4.7 nH	0402	various	output matching
C1	10 nF	0402	various	LF trap
C2	10 pF	0402	various	DC block
C3	10 pF	0402	various	DC block
C4	10p	0402	various	control voltage filtering - OPTIONAL
C5	1 nF	0402	various	control voltage filtering - OPTIONAL
C6	1 nF	0402		supply filtering
N1	BGA619	P-TSLP-7-1	Infineon	SiGe LNA

Package Outline



1) Dimension applies to plated terminals

Tape & Reel Outline