BGA461

Silicon Germanium GPS Low Noise Amplifier

RF & Protection Devices



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BGA461

Revision History: 2009-01-22, Rev.1.1 (Preliminary Data Sheet)

Subjects (major changes since last revision)				
	all			
Marking code defined: BU				
Thermal resistance and maximum rating for total power dissipation corrected				
adjusted, IIP3 specified	6			
	7			
	7			



Silicon Germanium GPS Low Noise Amplifier

1 Silicon Germanium GPS Low Noise Amplifier

Features

• Optimized for 1575 MHz Operation

High gain: 19.5 dBLow Noise Figure: 1.1 dB

Supply voltage: 2.4 V to 3.2 V

4mA current consumption

· Power off function

1 kV HBM ESD protection at all pins

B7HFM Silicon Germanium technology

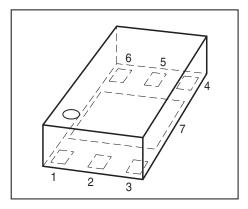
• RF output internally matched to 50 Ω

· Low external component count

Tiny TSLP-7-4 leadless package

Moisture sensitivity level: MSL 1

Pb-free (RoHS compliant) package



TSLP-7-4



Application

· 1575 MHz GPS, Galileo, GPS phone

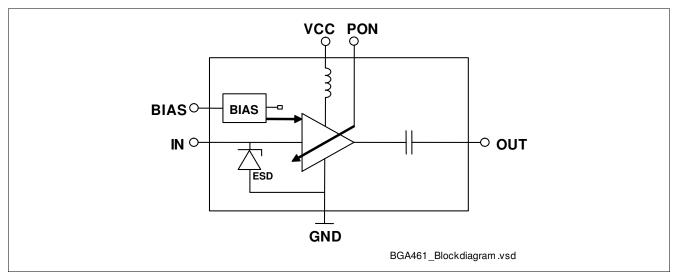


Figure 1 Blockdiagram

2 Description

The BGA461 is a front-end low noise amplifier for Global Positioning System (GPS) applications. The LNA provides 19.5 dB gain and 1.1 dB noise figure at a current consumption of 4 mA in the application configuration described in **Chapter 4**. The BGA461 is based upon Infineon Technologies' B7HFM Silicon Germanium technology. It operates over a 2.4 V to 3.2 V supply range.



Description

Туре	Package	Marking
BGA461	TSLP-7-4	BU

Pin Definition and Function

Table 1 Pin Definition and Function

Pin No.	Symbol	Function		
1	IN	LNA RF input		
2	BIAS	DC bias		
3	n.c.	not used		
4	PON	Power on control		
5	VCC	DC Supply		
6	OUT	LNA RF output		
7	GND	DC & RF ground		

Maximum Ratings

Table 2 Maximum Ratings

Parameter ¹⁾	Symbol	Value	Unit
Voltage at pin VCC	$V_{\sf CC}$	-0.3 3.6	V
Voltage at pin IN	V_{IN}	-0.3 0.9	V
Voltage at pin BIAS	V_{BIAS}	-0.3 0.9	V
Voltage at pin OUT	V_{OUT}	-0.3 V _{CC} + 0.3	V
Voltage at pin PON	V_{PON}	-0.3 V _{CC} + 0.3	V
Current into pin VCC	I_{CC}	10	mA
RF input power	P_{IN}	10	dBm
Total power dissipation, $T_{\rm S}$ < 139 °C ²⁾	P_{tot}	90	mW
Junction temperature	T_{J}	150	∞
Ambient temperature range	T_{A}	-30 85	∞
Storage temperature range	T_{STG}	-65 150	∞
ESD capability all pins (HBM: JESD22A-114)	V_{ESD}	1000	V

¹⁾ All voltages refer to GND-Node.

Thermal resistance

Table 3 Thermal resistance

Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R_{thJS}	125	K/W

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

²⁾ $T_{\rm S}$ is measured on the ground lead at the soldering point



Electrical Characteristics

3 Electrical Characteristics

Table 4 Electrical Characteristics¹⁾: T_A = 25 °C, V_{CC} = 2.8 V, $V_{PON,ON}$ = 2.8 V, $V_{PON,OFF}$ = 0 V, f = 1575 MHz

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Тур.	Max.		
Supply voltage	$V_{\sf CC}$	2.4	2.8	3.2	V	
Supply current	$I_{\rm CC}$	-	4.0	-	mA	ON-mode
		-	0.2	3	μΑ	OFF-mode
Gain switch control voltage	$V_{\sf pon}$	1.5	-	3.2	V	ON-mode
		0	-	0.5	V	OFF-mode
Gain switch control current	I_{pon}	-	1.5	3	μΑ	ON-mode
		-	0	1	μΑ	OFF-mode
Insertion power gain	$ S_{21} ^2$	-	19.5	-	dB	High-gain Mode
Noise figure ²⁾	NF	-	1.1	-	dB	$Z_{\rm S}$ = 50 Ω
Input return loss	RL_{in}	-	11	-	dB	
Output return loss	RL_{out}	-	>12	-	dB	
Reverse isolation	$1/ S_{12} ^2$	-	35	-	dB	
Power gain settling time ³⁾	t_{S}	-	20	-	μs	OFF- to ON-mode
		-	50	-	μs	ON- to OFF-mode
Inband input 3rd order intercept point ⁴⁾	IIP_3	-	-11	-	dBm	$f_1 = 1575 \text{ MHz}$ $f_2 = f_1 + /-1 \text{ MHz}$
Inband input 1 dB compression point	IP_{1dB}	-	-14	-	dBm	
Stability	k	-	> 1.5	-		f = 20 MHz 10 GHz

¹⁾ Measured on BGA461 application board described in Chapter 4, including PCB losses (unless noted otherwise)

²⁾ PCB tranmission line- and connector losses subtracted

³⁾ To within 1 dB of the final gain OFF- to ON-mode; to within 3 dB of the final gain ON- to OFF-mode

⁴⁾ Input Power = -40 dBm for each tone



Application Information

4 Application Information

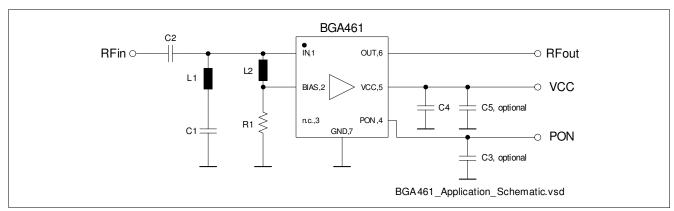


Figure 2 Application Schematic BGA461

Table 5 Bill of Materials

Name	Value	Package	Manufacturer	Function			
C1	10 nF	0402	Various	LF trap			
C2	2.7 pF	0402	Various	DC block and input matching			
C3	10 pF	0402	Various (optional) Control volta filtering				
C4	100 pF	0402	Various	Supply filtering			
C5	2.2 nF	0402	Various	(optional) Supply filtering			
L1	2.2 nH LQG15H series	0402	Murata	LF trap & input matching			
L2	33 nH LQG15H series	0402	Murata	Biasing			
R1	4.7 kΩ	0402	Various	Current adjustment			
N1	BGA461	TSLP-7-4	Infineon	SiGe LNA			

A list of all application notes is available at http://www.infineon.com/cms/en/product.



Package Information

5 Package Information

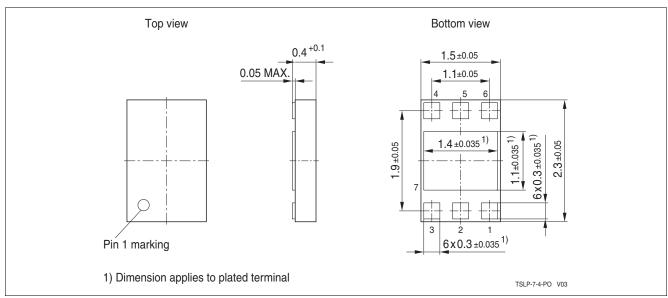


Figure 3 Package Dimensions for TSLP-7-4 (top, side and bottom view)

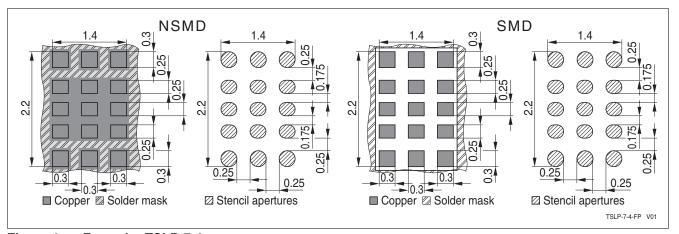


Figure 4 Footprint TSLP-7-4

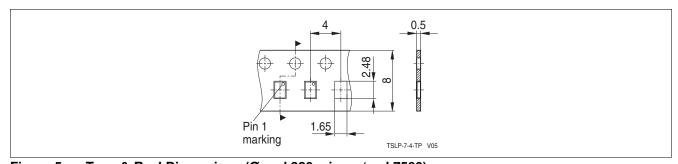


Figure 5 Tape & Reel Dimensions (Ø reel 330, pieces/reel 7500)