BGA715L7

Silicon Germanium GPS Low Noise Amplifier

Small Signal Discretes

Never stop thinking

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BGA715L7

Revision History: 2009-10-9, Rev.2.1

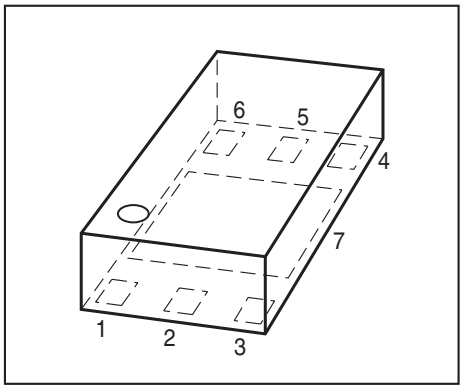
Previous Version: 2008-09-12, Rev.2.0

Page	Subjects (major changes since last revision)
5	Ambient temperature range is extended down to -40°C

1 Silicon Germanium GPS Low Noise Amplifier

Features

- High gain: 20 dB
- Low Noise Figure: 0.7 dB
- Low current consumption: 3.3 mA
- Supply voltage: 1.5 V to 3.3 V
- High input compression point -15.5 dBm at 1.8 V supply
- High input 3rd intercept point -7 dBm at 1.8 V supply
- B7HFM Silicon Germanium technology
- RF output internally matched to 50 Ω
- Low external part count
- 2kV HBM ESD protection (including AI-pin)
- Tiny TSLP-7-1 leadless package
- Moisture sensitivity level: MSL 1
- Pb-free (RoHS compliant) package



TSLP-7-1

RoHS

Application

- 1575 MHz GPS, Galileo, GPS phone

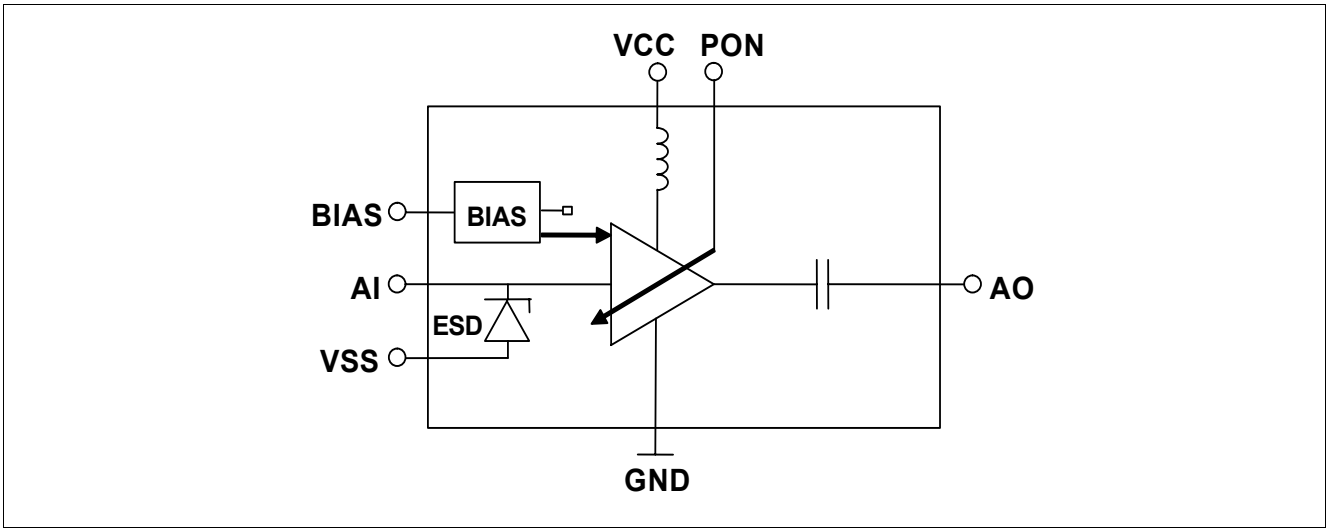


Figure 1 Blockdiagram

2 Description

The BGA715L7 is a front-end low noise amplifier for Global Positioning System (GPS) applications. The LNA provides 20 dB gain, 0.7 dB noise figure and high linearity performance in the application configuration described in **Chapter 4**. Current consumption is as low as 3.3 mA. The BGA715L7 is based upon Infineon Technologies' B7HFM Silicon Germanium technology. It operates over a 1.5 V to 3.3 V supply range.

If an ultra low noise figure of 0.6 dB is required, please refer to Infineon BGA715L7 Application Note AN161.

Type	Package	Marking
BGA715L7	TSLP-7-1	UG

Pin Definition and Function

Table 1 Pin Definition and Function

Pin No.	Symbol	Function
1	AI	LNA input
2	BIAS	DC bias
3	GND	RF ground
4	PON	Power on control
5	VCC	DC supply
6	AO	LNA output
7	VSS	DC ground

Maximum Ratings

Table 2 Maximum Ratings

Parameter[1)]	Symbol	Value	Unit
Voltage at pin VCC	V_{CC}	-0.3 ... 3.6	V
Voltage at pin AI	V_{AI}	-0.3 ... 0.9	V
Voltage at pin BIAS	V_{BIAS}	-0.3 ... 0.9	V
Voltage at pin AO	V_{AO}	-0.3 ... V_{CC}+ 0.3	V
Voltage at pin PON	V_{PON}	-0.3 ... V_{CC}+ 0.3	V
Voltage at pin GND	V_{GND}	-0.3 ... 0.3	V
Current into pin VCC	I_{CC}	10	mA
RF input power	P_{IN}	10	dBm
Total power dissipation	P_{tot}	36	mW
Junction temperature	T_J	150	°C
Ambient temperature range	T_A	-40 ... 85	°C
Storage temperature range	T_{STG}	-65 ... 150	°C
[2)]Human Body Model ESD capability, all pin to all pin	V_{ESD_HBM}	2000	V
[3)]Machine Model ESD capability, all pin to all pin	V_{ESD_MM}	100	V

1) All voltages refer to VSS-Node.
2) According to JEDS22A-114
3) According to JEDS22A-115

Thermal resistance

Table 3 Thermal resistance

Parameter	Symbol	Value	Unit
Junction - soldering point[1)]	R_{thJS}	159	K/W

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

3 Electrical Characteristics

Table 4 Electrical Characteristics[1]: T_A = 25 °C, V_{CC} = 1.8 V, $V_{PON,ON}$ = 1.8 V, $V_{PON,OFF}$ = 0 V, f = 1575 MHz

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_{CC}	1.5	1.8	3.6	V	
Supply current	I_{CC}	-	3.3	-	mA	ON-mode
		-	0.2	3	µA	OFF-mode
Gain switch control voltage	V_{pon}	1.0	-	Vcc	V	ON-mode
		0	-	0.4	V	OFF-mode
Gain switch control current	I_{pon}	-	5		µA	ON-mode
		-		1	µA	OFF-mode
Power gain	$\|S_{21}\|^2$	-	20	-	dB	High-gain Mode
Noise figure[2]	NF	-	0.7	-	dB	Z_S = 50 Ω
Input return loss	RL_{in}	-	14	-	dB	
Output return loss	RL_{out}	-	13	-	dB	
Reverse isolation	$1/\|S_{12}\|^2$	-	43	-	dB	
Power gain settling time[3]	t_S	-	5	-	µs	OFF- to ON-mode
		-	5	-	µs	ON- to OFF-mode
Inband input 1dB compression point	IP_{1dB}	-	-15.5	-	dBm	
Inband input 3rd order intercept point[4]	IIP_3	-	-7	-	dBm	f_1 = 1575 MHz $f_2 = f_1$ +/-1 MHz
Stability	k	-	> 1	-		f = 20 MHz ... 20 GHz

1) Measured on BGA715L7 application board according to application schematic on page 7, including PCB losses (unless noted otherwise)

2) PCB tranmission line- and connector losses of 0.05dB are subtracted

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

4) Input Power = -30 dBm for each tone

4 Application Information

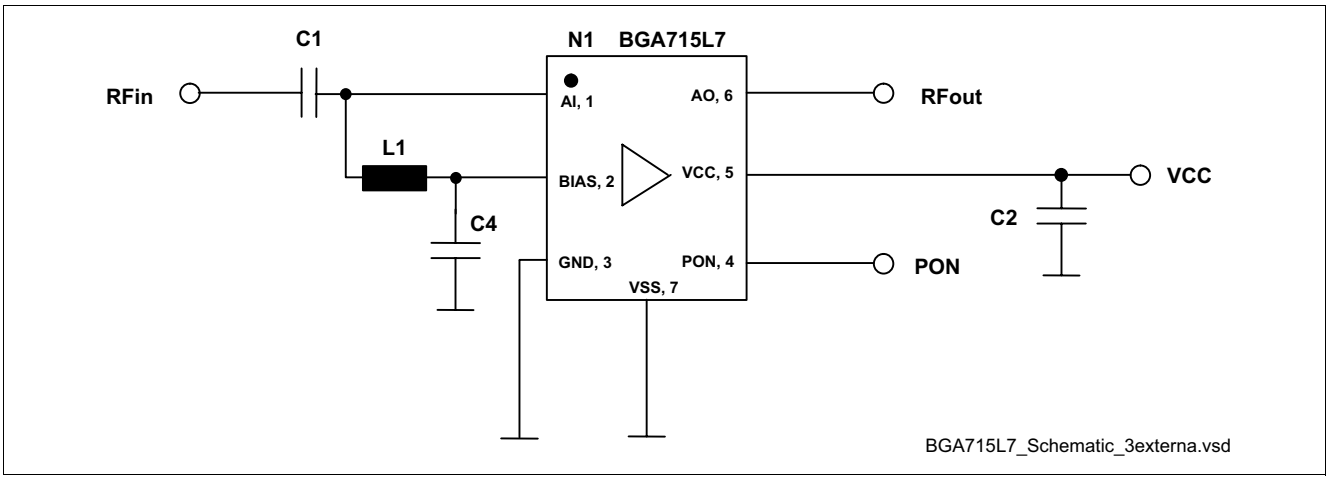


Figure 2 Application Schematic BGA715L7

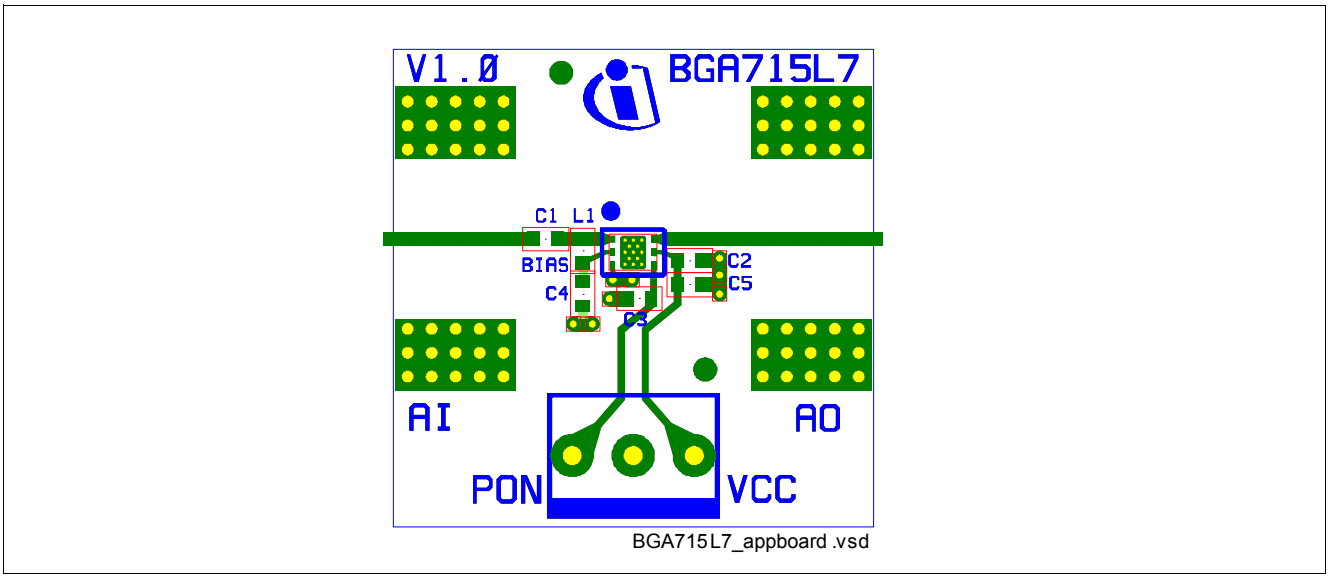


Figure 3 Application Board Drawing BGA715L7

Table 5 Bill of Materials

Name	Value	Package	Manufacturer	Function
C1	1.8 pF	0402	Various	DC blocking and input matching
C2	1 µF	0402	Various	RF block
C4	15 pF	0402	Various	RF block
L1	4.7 nH LQW15A series	0402	Murata	Bias feed and input matching
N1	BGA715L7	TSLP-7-1	Infineon	SiGe LNA

A list of all application notes is available at **http://goto.infineon.com/smallsignaldiscretes-appnotes**.

5 Package Information

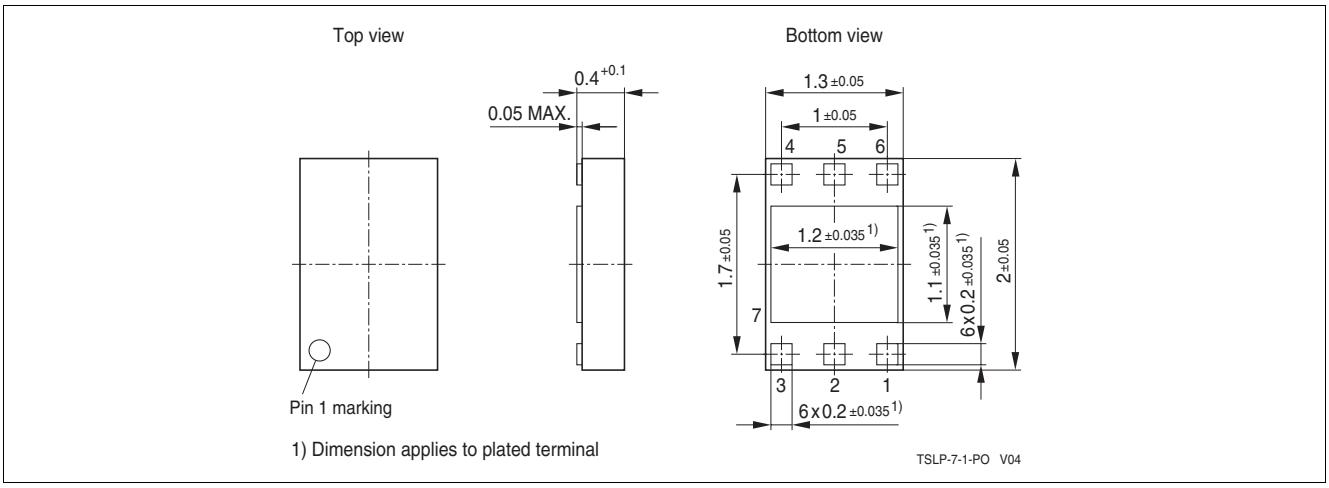


Figure 4 Package Dimensions for TSLP-7-1

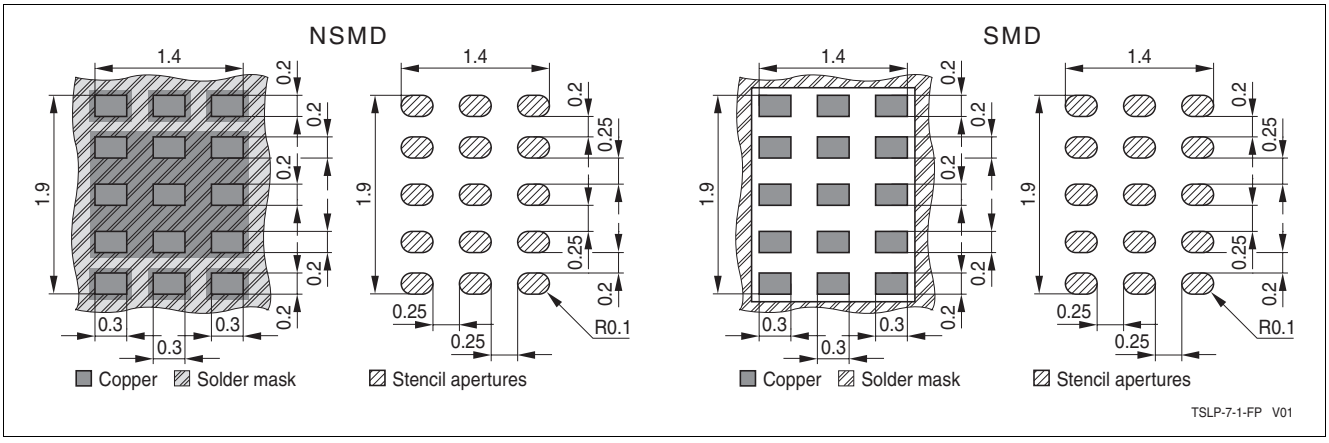


Figure 5 Footprint TSLP-7-1

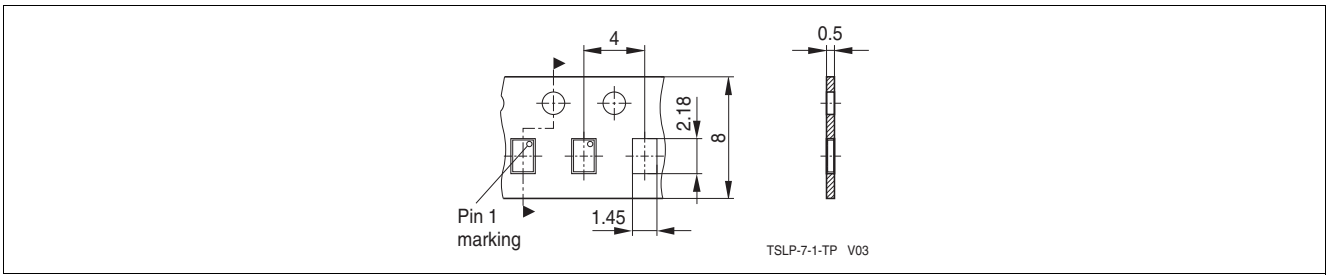


Figure 6 Tape & Reel Dimensions (Ø reel 180, pieces/reel 7500)