BGA758L7

5-6 GHz LNA for WLAN

Data Sheet

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Preliminary

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BGA758L7 5-6 GHz LNA for WLAN

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Page	Subjects (major changes since last revision)
all	Preliminary data sheet
all	New document layout
7, 8, 10	Electrical Characteristics adjusted

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Last Trademarks Update 2009-10-19

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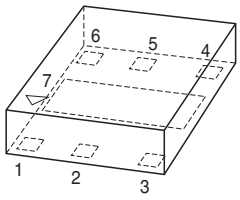
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Features

- Gain, $|S_{21}|^2$= 12.5 dB at 5.5 GHz
- High Linearity, Input P_{-1dB} = -3.5 dBm at 5.5 GHz
- Low noise figure, NF = 1.3 dB at 5.5 GHz
- Internal output matching on chip
- AC coupled RF output port
- Temperature compensated internal biasing circuit
- Digital On/Off switch on chip
- Low external part count
- 1 kV HBM ESD protection for IN-pin
- 2 kV HBM ESD protection for all other pins
- B7HFM silicon germanium technology
- Tiny TSLP-7-8 leadless package
- Pb-free (RoHS compliant) package



TSLP-7-8

RoHS

Application

- Low noise amplifier for WLAN application

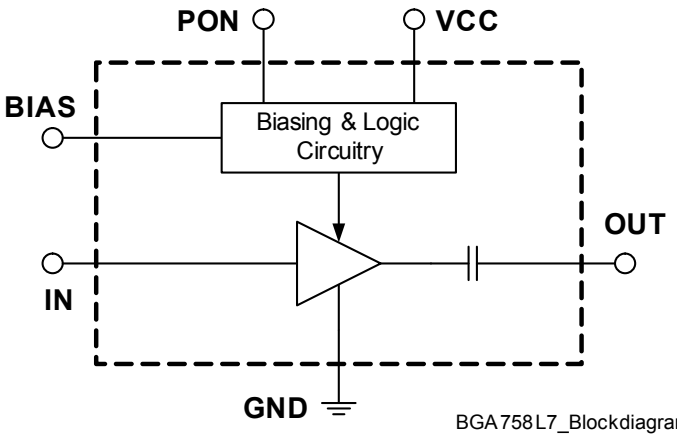


Figure 1 Block Diagram

Product Name	Marking	Package
BGA758L7	BA	TSLP-7-8

Description

The BGA758L7 is a 5 - 6 GHz Silicon Germanium low noise amplifier MMIC in tiny TSLP-7-8 package. The LNA delivers a gain of 12.5 dB while giving an excellent noise figure of 1.3 dB in the application configuration described in **Chapter 3**. The supply current of 7.0 mA is chosen to maintain a high input compression point of -3.5 dBm.

The temperature compensated internal biasing circuit provides stable current conditions over temperature range. Output matching is done by on chip matching circuits in combination with the bonding wire inductances. The application circuit requires only three external elements.

With only one additional external element an ultra low noise figure of 1.1 dB can be achieved. For detailed information please refer to Infineon BGA758L7 Application Note.

Pin Definition and Function

Table 1 Pin Definition and Function

Pin No.	Name	Function
1	PON	Power on control
2	IN	RF input
3	BIAS	DC bias
4	n.c.	not connected
5	VCC	DC Supply
6	OUT	RF output
7	GND	RF ground and DC ground for bias and logic circuity

1 Maximum Ratings

Table 2 Maximum Ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Voltage at pin VCC	V_{CC}	-0.3	–	4	V	1)
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	–
Voltage at pin GND	V_{GND}	-0.3	–	0.3	V	–
Current into pin VCC	I_{CC}	–	–	12	mA	–
RF input power	P_{IN}	–	–	0	dBm	–
Total power dissipation, T_S < 120°C 2)	T_J	–	–	48	mW	–
Junction temperature	P_{tot}	–	–	150	°C	–
Ambient temperature range	T_A	-30	–	85	°C	–
Storage temperature range	T_{STG}	-65	–	150	°C	–
ESD capability all pins	$V_{ESD-HBM}$	–	–	1000	V	according to JESD22A-114
ESD capability all pins, excluding pin IN	$V_{ESD-HBM}$	–	–	2000	V	according to JESD22A-114, w/o pin IN
ESD capability all pins	V_{ESD-MM}	–	–	100	V	according to JESD22A-115

1) All voltages refer to GND-Node unless otherwise noted

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

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

Thermal Resistance

Table 3 Thermal Resistance

Parameter	Symbol	Value	Unit
Junction - soldering point1)	R_{thJS}	615	K/W

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

2 Electrical Characteristics

2.1 Electrical Parameter

Table 4 Electrical Characteristics[1]: T_A = 25 °C, V_{CC} = 3.3 V, $V_{PON,ON}$ = 3.3 V, $V_{PON,OFF}$ = 0 V, f = 5.5 GHz

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Pass band frequency range	F_{BW}	5.0	–	6.0	GHz	
Gain	$\|S_{21}\|^2$	–	12.5	–	dB	
Gain flatness	ΔG	–	0.3	–	dB	In any 50 MHz instantaneous bandwidth
Reverse isolation	$\|S_{12}\|$	–	21	–	dB	
Noise figure[2]	NF	–	1.3	–	dB	
Input return loss	RL_{in}	–	18	–	dB	50 Ω
Output return loss	RL_{out}	–	20	–	dB	50 Ω
Input power at 1dB compression point	P_{-1dB}	–	-3.5	–	dBm	
Maximum gain out of band	$\|S_{21}\|$	–	-3	–	dB	DC - 1.7 GHz
		–	1	–	dB	1.7 - 2.0 GHz
		–	6	–	dB	2.3 - 2.7 GHz
		–	12	–	dB	3.3 - 3.9 GHz
		–	4	–	dB	9.0 - 10 GHz
		–	3	–	dB	10 - 18 GHz
Minimum input 1dB compression out of band	P_{-1dB}	–	-4	–	dBm	0.8 - 1.0 GHz
		–	-12	–	dBm	1.7 - 2.0 GHz
		–	-9	–	dBm	2.3 - 4.0 GHz
		–	-8	–	dBm	4.4 - 4.5 GHz
		–	0	–	dBm	9.0 - 10 GHz
Turn-on time	t_{on}	–	0.2	–	µs	Measured from ON signal turns on (90%) to the point were LNA output power stabilizes to within 0.5 dB of final value
Supply current at V_{CC}	I_{CC}	5.0	7.0	9.0	mA	
Shutdown current	I_{off}	–		6	µA	V_{PON} = 0 V
Stability factor	k	–	>1	–		Unconditional stable for all frequencies

1) Measured on application board according to application schematic on page 12, including PCB losses (unless noted otherwise)

2) PCB losses subtracted

2.2 Digital Signals

Table 5 Digital Control Parameter

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Power on control voltage range	V_{PON}	-0.3	–	V_{CC}	V	–
Control voltage for power on	$V_{PON,on}$	2	–	V_{CC}	V	–
Control voltage for power off	$V_{PON,off}$	-0.3	–	1.1	V	–
Capacitance at power on pin	C_{in}	–	1	–	pF	–
Input current at power on pin	I_{PON}	–	10	–	µA	V_{PON} = 3.3 V

3 Application Information

Application Board Configuration

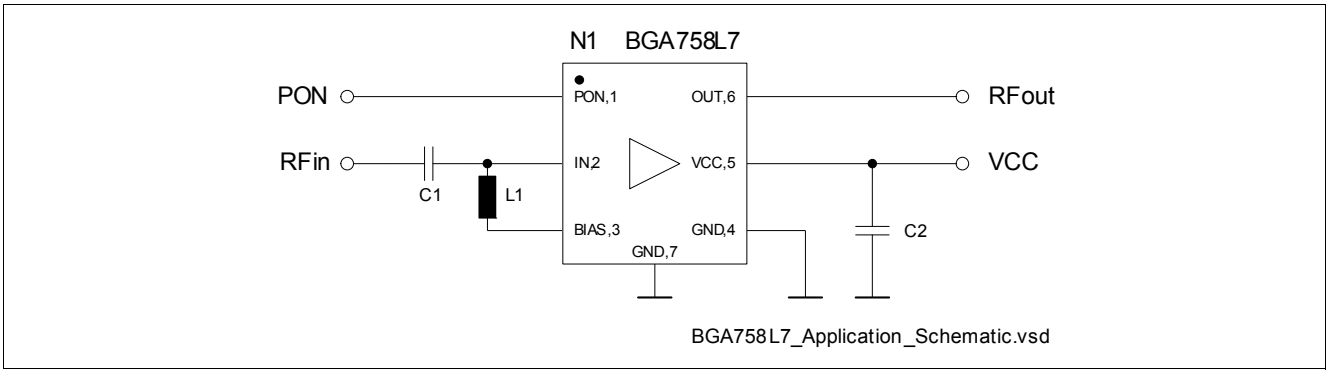


Figure 2 Application Schematic

Table 6 Bill of Materials

Name	Value	Package	Manufacturer	Function
C1	2.7 pF	0402	Various	DC blocking
C2	1 nF	0402	Various	Supply voltage filtering
L1	3.9 nH	0402	Murata LQW type	Bias feed and input matching
N1		TSLP-7-8	Infineon	5-6 GHz LNA

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

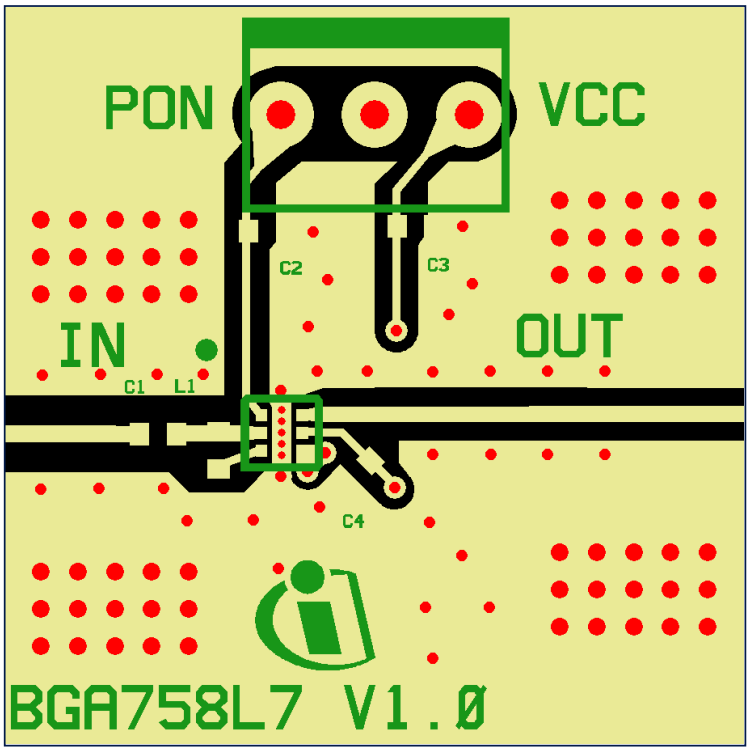


Figure 3 Drawing of Application Board

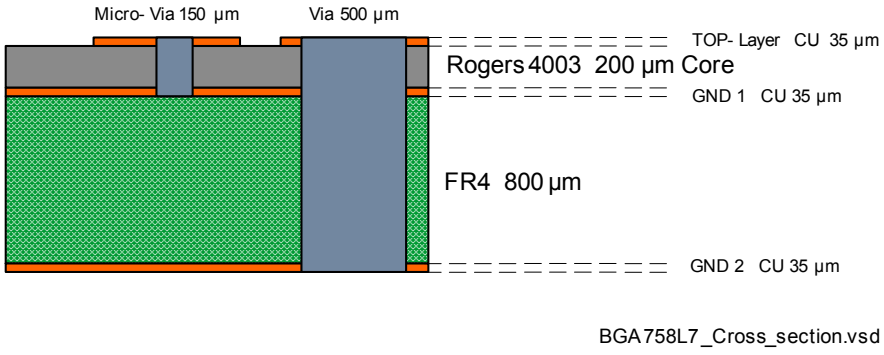


Figure 4 Cross-section of Application Board

4 Package Information

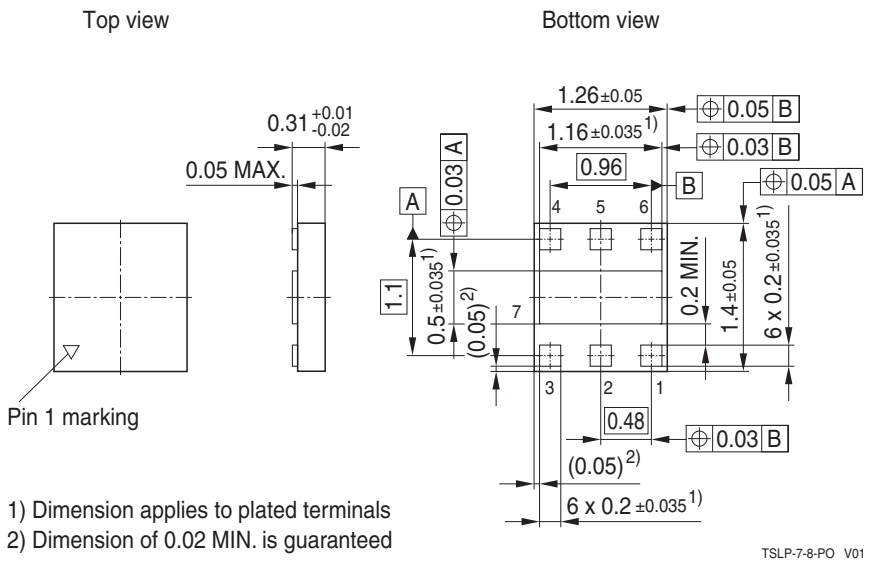


Figure 5 Package Outline TSLP-7-8 (side and bottom view)

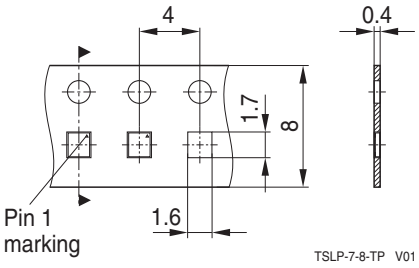


Figure 6 Marking Layout (top view)

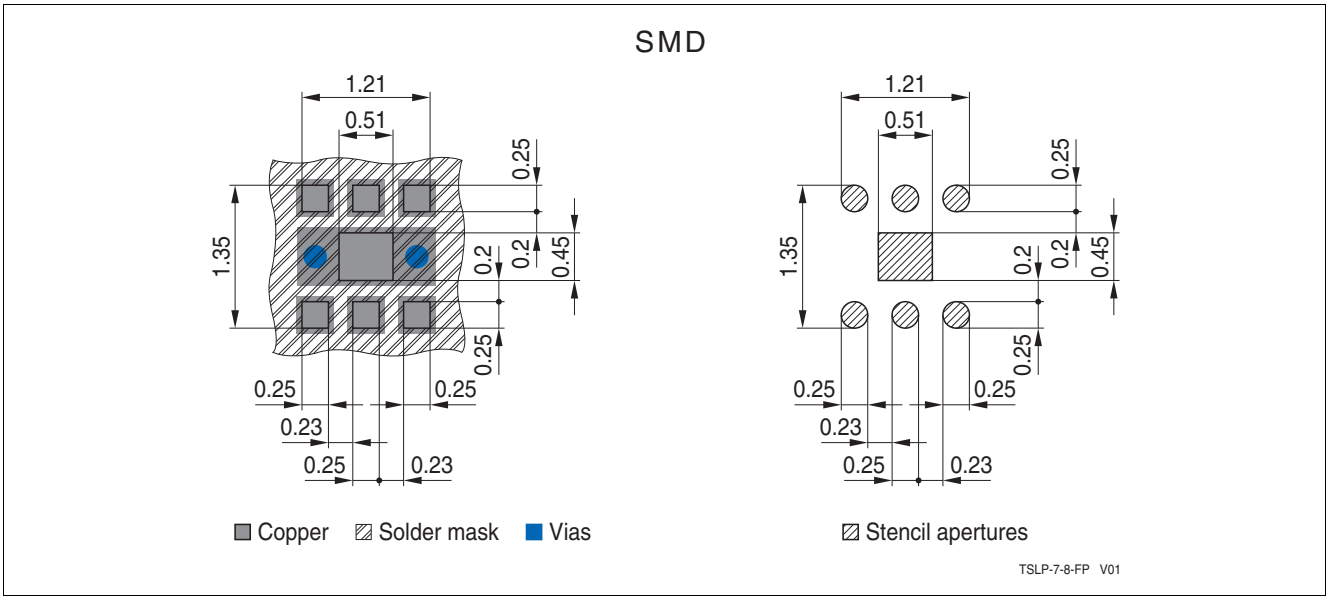


Figure 7 Footprint TSLP-7-8

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