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RF5515

4.9GHz TO 5.85GHZ LOW NOISE AMPLIFIER WITH ENABLE

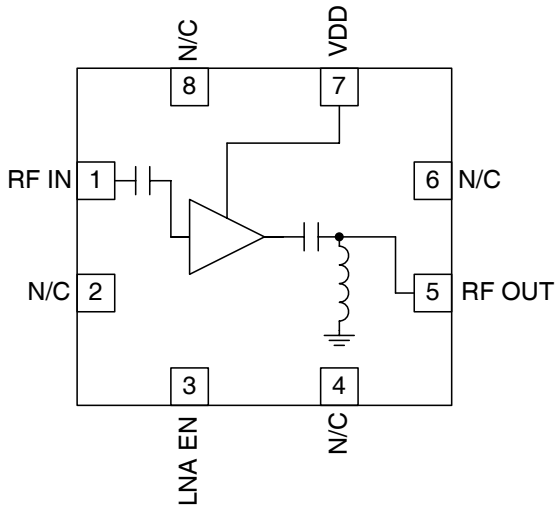
Package Style: 2.2mmx2.2mmx0.5mm

Features

- 4.9GHz to 5.85GHz Operation
- 2.3V to 4.8V Single Supply
- 1.6dB Noise Figure
- 11dB Typical Gain

Applications

- High Band WLAN LNA/Driver
- General Purpose Amplifier for Portable Applications



Functional Block Diagram

Product Description

The RF5515 is a high performance Low Noise Amplifier design for 802.11a applications (4.9GHz to 5.85GHz) and other portable consumer electronics. This miniature LNA features a high dynamic range and high intercept point with low current consumption around 12mA. The LNA is DC blocked and internally matched to 50Ω at input and output pins. The IC is featured in a 2.2mmx2.2mmx0.5mm module compatible plastic package.

Ordering Information

RF5515	4.9GHz to 5.85GHz Low Noise Amplifier with Enable (Sn-Pb finish)
RF5515 PCBA-410	Fully Assembled Evaluation Board, 5GHz

Optimum Technology Matching® Applied

☐ GaAs HBT	☐ SiGe BiCMOS	☑ GaAs pHEMT	☐ GaN HEMT
☐ GaAs MESFET	☐ Si BiCMOS	☐ Si CMOS	☐ RF MEMS
☐ InGaP HBT	☐ SiGe HBT	☐ Si BJT	☐ LDMOS

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Absolute Maximum Ratings

Parameter	Rating	Unit
DC Supply Voltage	5.5	V
Maximum Input Power (No Damage)	10	dBm
Operating Temperature	-15 to +75	°C
Extreme Operating Temperature	-40 to -15	°C
	+75 to +85	°C
Storage Temperature	-40 to +150	°C

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EU Directive 2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Typical Conditions					Temp=25°C, V_{DD}=3.3V, LNA_EN=3.3V, Frequency=4.9GHz to 5.85GHz unles otherwise noted in the condition column.
Frequency	4.9		5.85	GHz	
LNA Voltage Supply (V_{DD})	2.7	3.3	4.8	V	
LNA Enable Voltage (LNA_EN)	2.5		4.8	VDD	LNA Enabled
		0	0.2	V	LNA Off
LNA Current					
LNA V_{DD}		12	20	mA	LNA in "On" state, over operating temperature range, Full V_{DD} range, full LNA_EN range, and full frequency band.
	0		5	µA	LNA in "Off" state
LNA Enable			200	µA	
Gain					
WLAN RX Only	9	11	13	dB	WLAN RX Mode, Over full operating temperature range, full V_{CC} range, Full LNA_EN range, and full frequency range.
		TBD		dB	WLAN RX Mode LNA "Off", V_{DD}=3.3V and LNA_EN=0V.
Noise Figure					
WLAN RX		1.7	2.2	dB	WLAN RX Mode, Over Full V_{DD} range, full LNA_EN range, Full frequency range, and over operating temperature range.
Passband Ripple	-0.5		+0.5	dB	WLAN RX Mode
Input P1dB	-4	-1		dBm	Over operating temperature range, full voltage range, full LNA_EN range, and full frequency range.
WLAN RX Port Return Loss			-9.6	dB	4.9GHz to 5.85GHz
WLAN RX Port Impedance		50		Ω	No external matching

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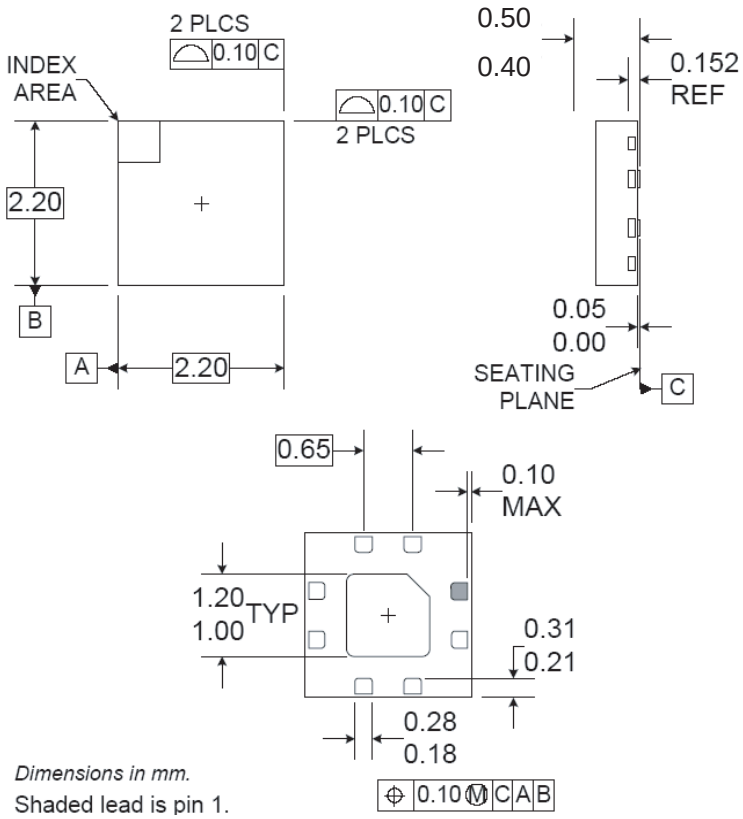
Pin	Function	Description
1	RF IN	RF Input. Input is matched to 50Ω and DC block is provided internally.
2	NC	No Connect
3	LNA_EN	LNA Enable. Voltage whihc is a high impedance pin could require bypassing depending on the nature of the supply voltage and the layout.
4	NC	No Connect
5	RF OUT	RF Output. This pin is matched to 50Ω internally and it is a DC short to GND. See functional block diagram for more details.
6	NC	No Connect
7	VDD	Supply Voltage for the LNA circuit. It is recommended that bypass capacitors are placed on this voltage line as needed depending on the nature of the supply voltage and layout.
8	NC	No Connect
Pkg Base	GND	The center metal base of the QFN package provides DC and RF ground as well as heat sink for the amplifier.

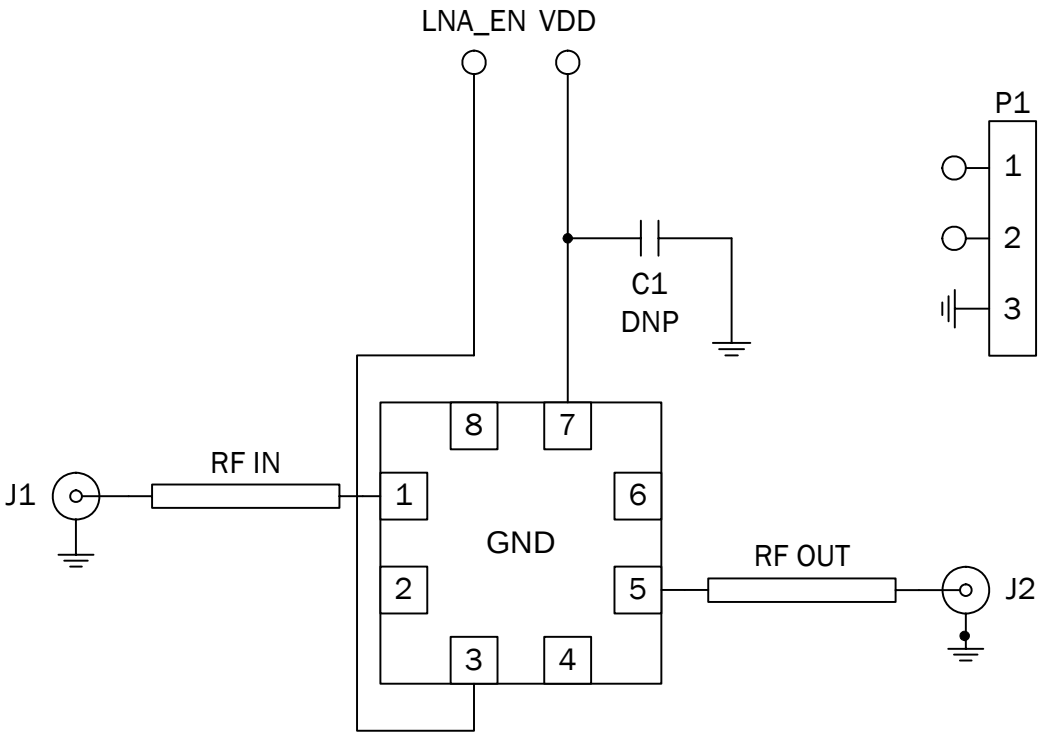
Package Drawing

2.2mmx2.2mmx0.5mm



Dimensions in mm.
Shaded lead is pin 1.

Evaluation Board Schematic



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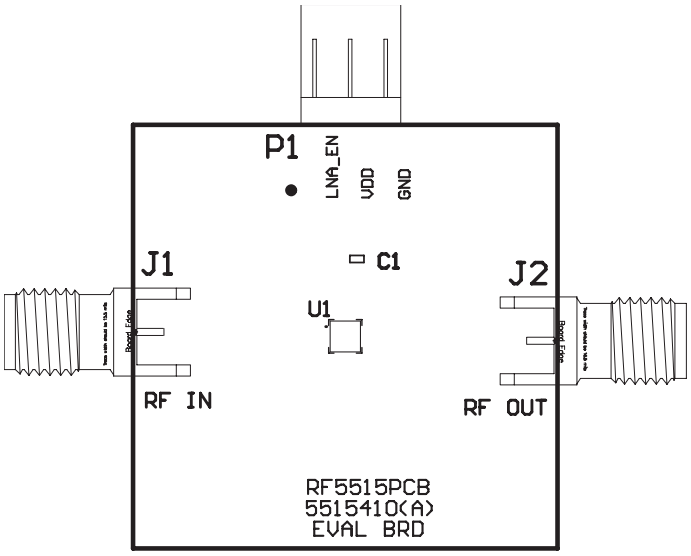
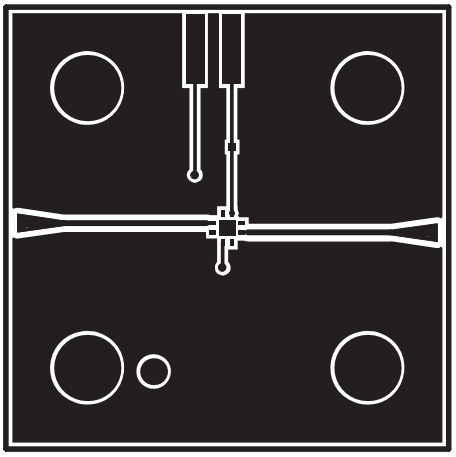
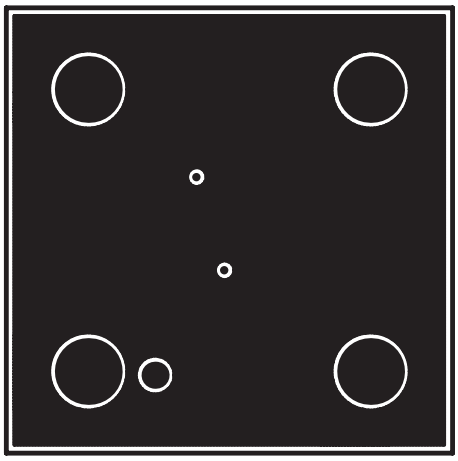
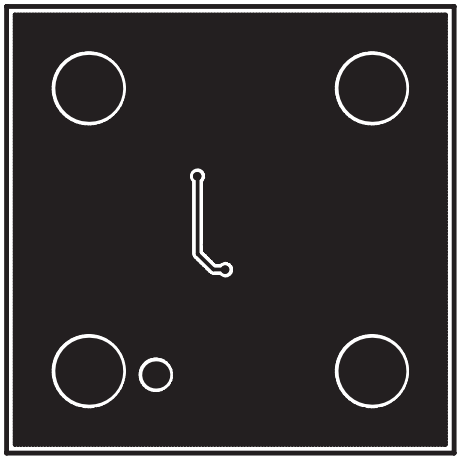
Evaluation Board Layout

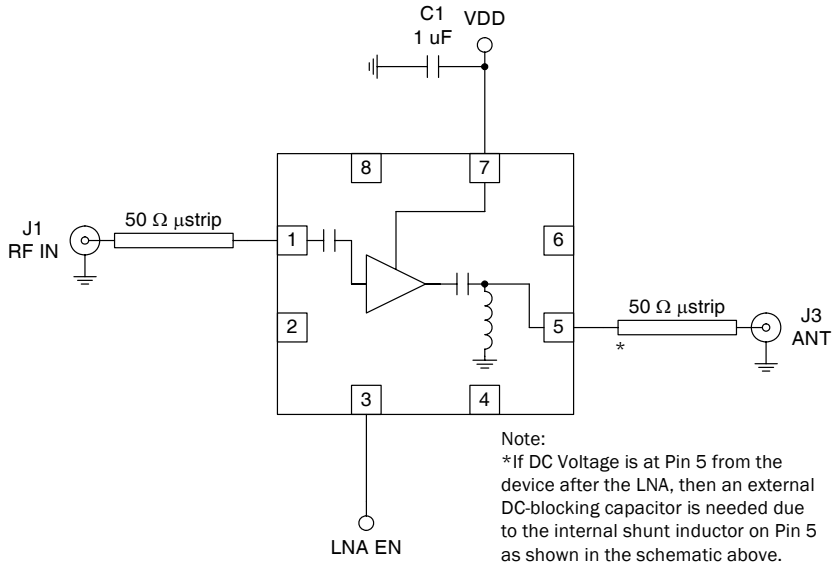








Application Schematic - 4.9GHz to 5.85GHz



Note:
*If DC Voltage is at Pin 5 from the device after the LNA, then an external DC-blocking capacitor is needed due to the internal shunt inductor on Pin 5 as shown in the schematic above.
** On the evaluation board adding C1, which is 1 uF, did not make any difference but could be needed depending on the layout and the nature of the supply voltage used in the system.

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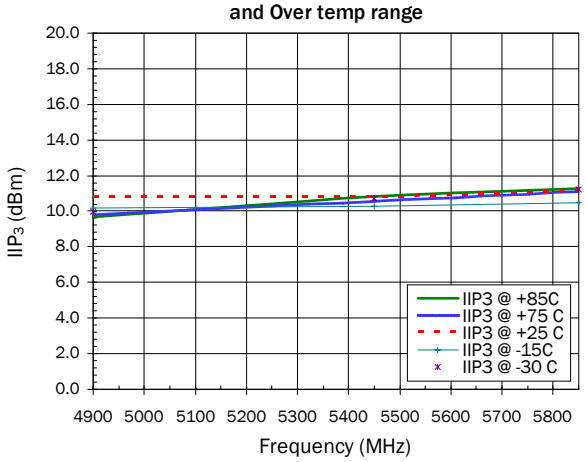
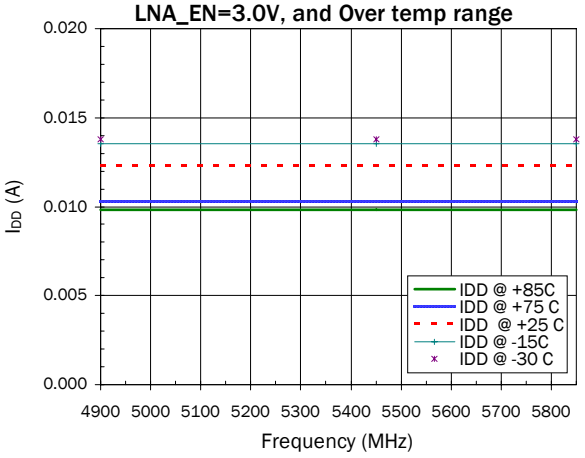
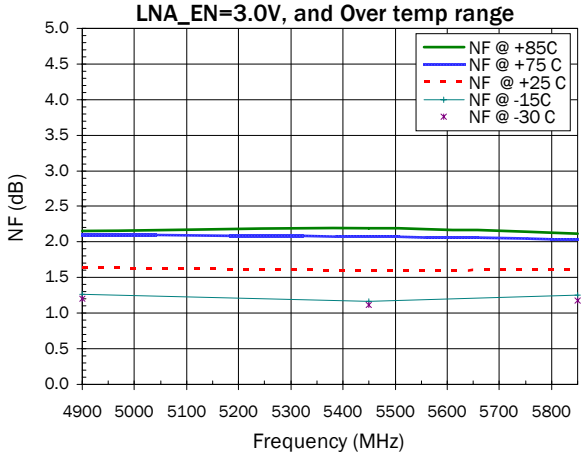
Typical IIP_3 versus Frequency V_{DD}=3.0, LNA_EN=3.0V, and Over temp range



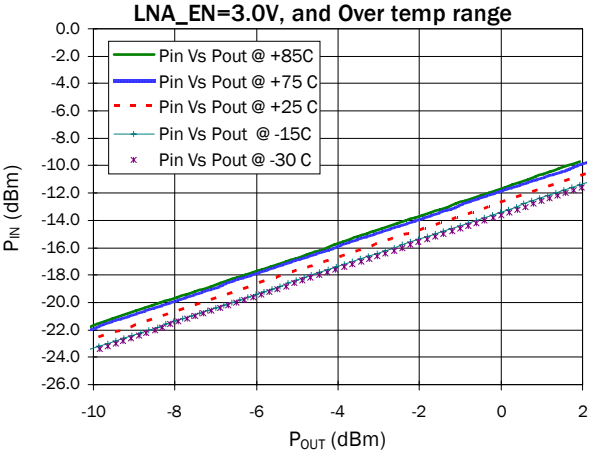
Typical I_{DD} versus Frequency V_{DD}=3.0, LNA_EN=3.0V, and Over temp range



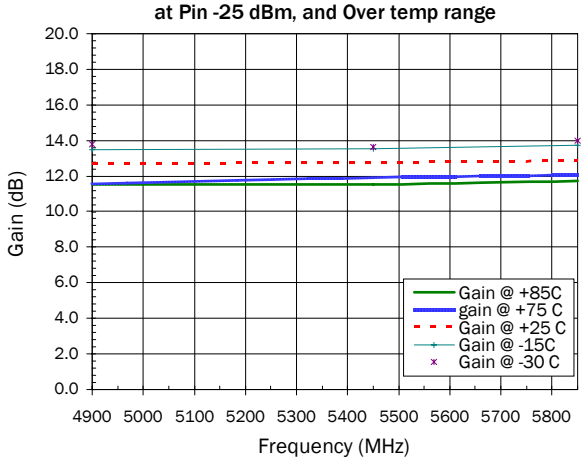
Typical NF versus Frequency V_{DD}=3.0, LNA_EN=3.0V, and Over temp range



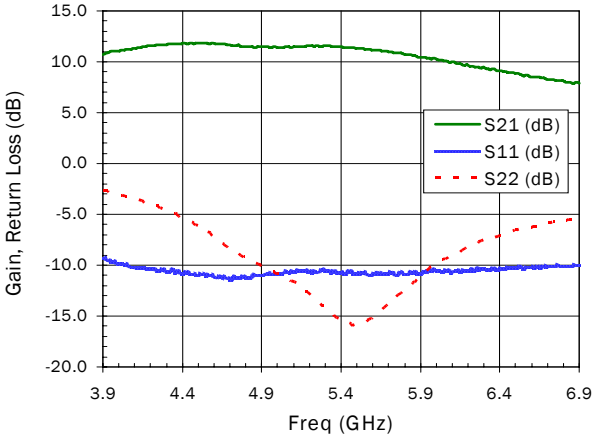
Typical P_{IN} versus P_{OUT} at 5.45 GHz at V_{DD}=3.0, LNA_EN=3.0V, and Over temp range



Typical Gain versus Frequency V_{DD}=3.0, LNA_EN=3.0V, at Pin -25 dBm, and Over temp range



Typical S-Plots at V_{DD}=3.0, LNA_EN=3.0V



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