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RF3861

WIDE BANDWIDTH, HIGH LINEARITY LOW NOISE AMPLIFIER

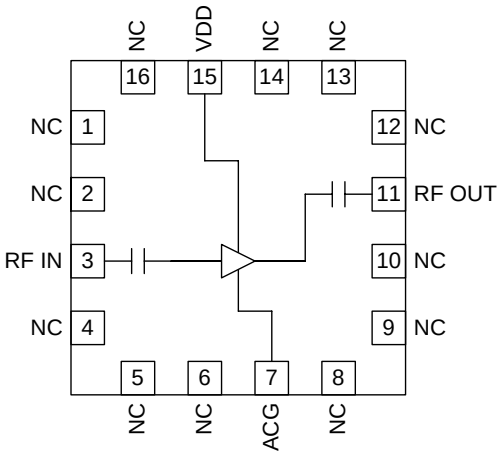
Package Style: QFN, 16-Pin, 3mmx3mm

Features

- Low Noise and High Intercept Point
- Adjustable Bias Current
- Single 2.5V to 6.0V Power Supply
- 700MHz to 3800MHz Operation
- Extremely Small QFN16 3mmx3mm Package

Applications

- CDMA, PCS, ECS, UMTS LNA/Linear Driver
- WLAN LNA/Linear Driver
- WiMAX LNA/Linear Driver
- 900MHz LNA/Linear Driver
- General Purpose Amplification



Functional Block Diagram

Product Description

The RF3861 is a low noise amplifier with a high output IP3. The amplifier is self-biased from a single voltage supply with 50Ω input and output ports. The useful frequency range is from 700MHz to 3800MHz. A 1dB noise figure and 36dBm OIP3 performance is achieved with a 5V V_{DD}, 90mA. Current can be increased to raise OIP3 while having minimal effect on noise figure. The IC is featured in a standard QFN, 16-pin, 3mmx3mm package.

Ordering Information

RF3861	Wide Bandwidth, High Linearity Low Noise Amplifier
RF3861PCK-410	Fully Assembled Evaluation Board with 5 Sample Parts 1.5GHz to 2.7GHz
RF3861PCK-411	3.3GHz to 3.8GHz
RF3861PCK-412	700MHz to 1100MHz

Optimum Technology Matching® Applied

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

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Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage	0 to +7	V_{DC}
Input RF Level	+10	dBm
Current Drain, I_{DD}	150	mA
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C

Note 1: Max continuous RF IN is +10dBm. The max transient RF IN is +20dBm.

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 EUDirective2002/95/EC (at time of this document revision).

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
High Band					
Frequency	3.3	3.5	3.8	GHz	V_{DD}=5V
Current		90	110	mA	
Gain		10		dB	At 3.5GHz
Noise Figure		1.1		dB	+25°C, V_{DD}=5V, I_{DD}=90mA, 3500MHz unless specified
OIP3		37.0		dBm	
OP1dB		22.0		dBm	
S11		-12		dB	f_1=3500MHz, f_2=3501MHz
S22		-18		dB	
Mid Band					
Frequency	1500		2700	MHz	
Current		90	110	mA	V_{DD}=5V
Gain	13.5	14.5	16.5	dB	+25°C, V_{DD}=5V, I_{DD}=90mA, 2000MHz unless specified
Noise Figure		1.0	1.2	dB	
OIP3	33.0	35.5		dBm	f_1=2000MHz, f_2=2001MHz
OP1dB	21.0	22.5	25.0	dBm	
S11		-10		dB	
S22		-20		dB	
Low Band					
Frequency	700		1100	MHz	
Current		90	110	mA	V_{DD}=5V
Gain		16		dB	+25°C, V_{DD}=5V, I_{DD}=90mA, 850MHz unless specified
Noise Figure		1.2		dB	
OIP3		36.0		dBm	f_1=850MHz, f_2=851MHz
OP1dB		22.5		dBm	
S11		-14		dB	
S22		-18		dB	

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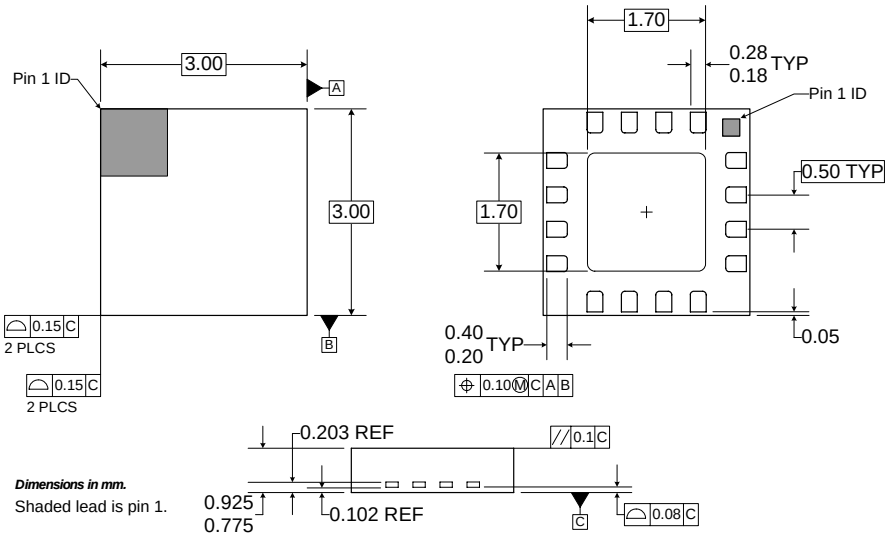
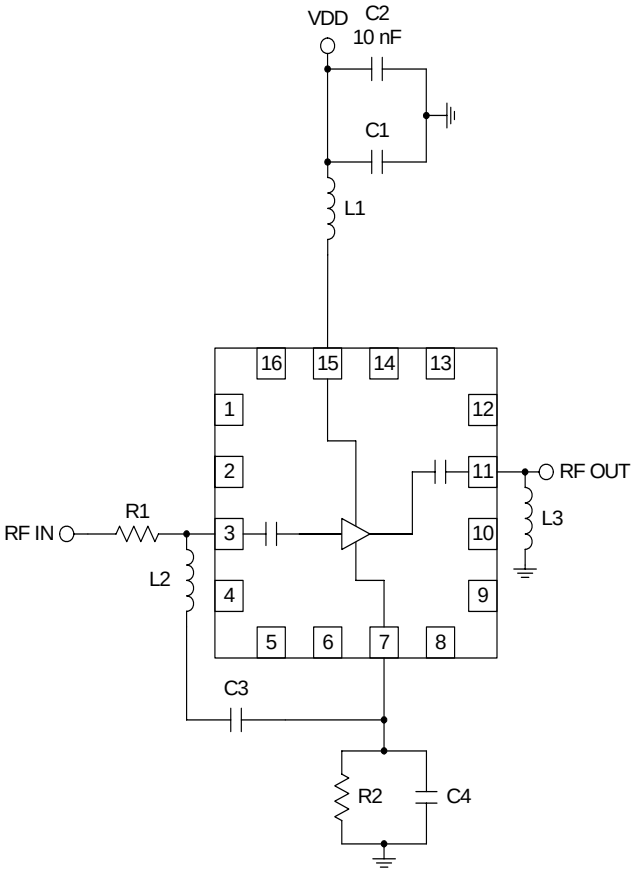
Pin	Function	Description	Interface Schematic
1	NC	Not connected.	
2	NC	Not connected.	
3	RF IN	RF input pin. 50Ω matched. This pin is DC-blocked.	
4	NC	Not connected.	
5	NC	Not connected.	
6	NC	Not connected.	
7	ACG	AC ground. Shunt cap may be added for tuning. Shunt resistor may be added to increase I_{DD}.	
8	NC	Not connected.	
9	NC	Not connected.	
10	NC	Not connected.	
11	RF OUT	RF output pin. 50Ω matched. This pin is DC-blocked.	
12	NC	Not connected.	
13	NC	Not connected.	
14	NC	Not connected.	
15	VD	Bias voltage. 2.5V to 6.0V applied through bias inductor.	
16	NC	Not connected.	
Pkg Base	GND	Ground connection.	

Package Drawing



Evaluation Board Schematic
700 MHz to 3800 MHz



Components	700-1100 MHz	1.5-2.7 GHz	3.3-3.8 GHz
C1 (pF)	10	10	10
C3 (pF)	100	100	100
C4 (pF)	10	DNP	DNP
L1 (nH)	39	3.9	2.2
L2 (nH)	18	4.7	4.7
R1 (ohm)	0	0	0
R2 (ohm)	DNP	DNP	DNP
L3 (nH)	DNP	DNP	DNP

R2 is DNP for standard 90 mA current draw. If R2 is added, the I_{DD} will increase. A 20 Ω R2 will raise the current to achieve higher linearity.

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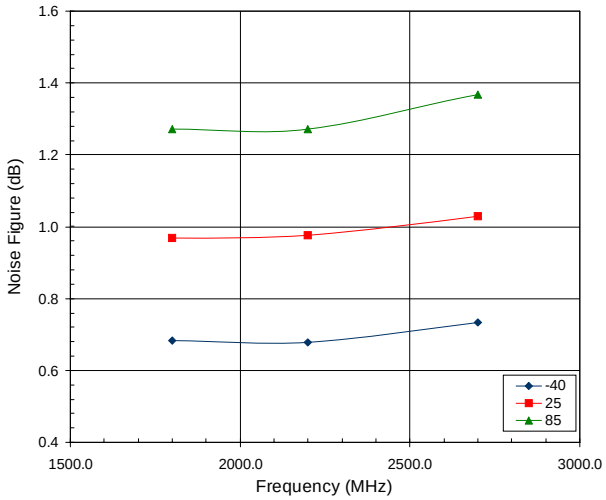
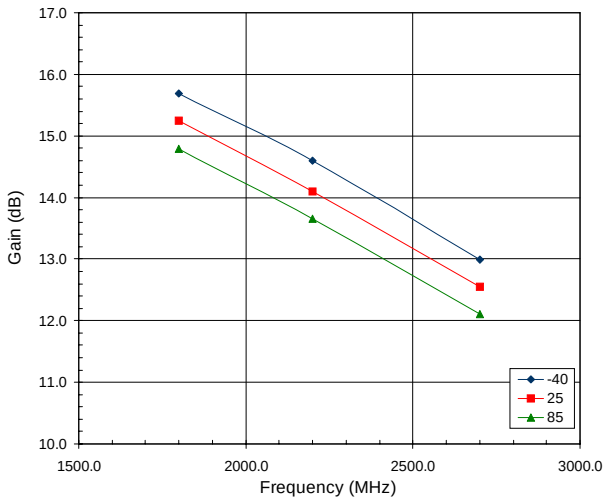
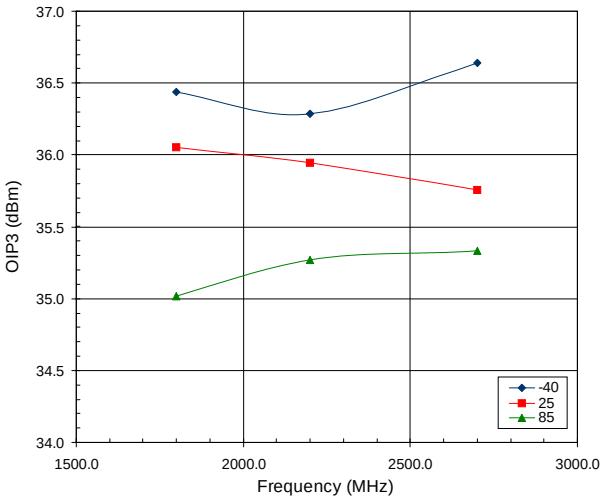
5V Noise Figure versus Temperature



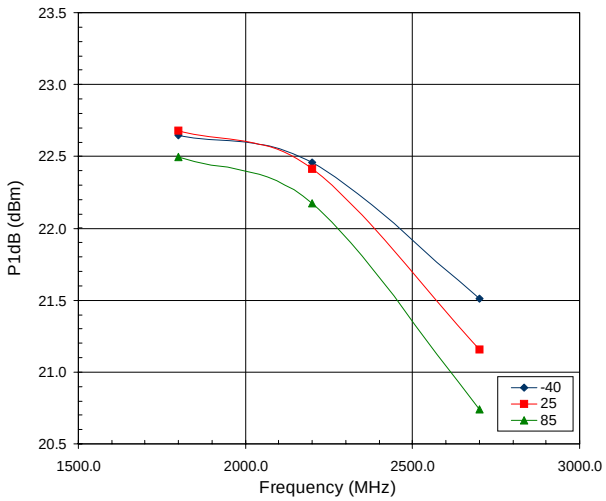
5V Gain versus Temperature



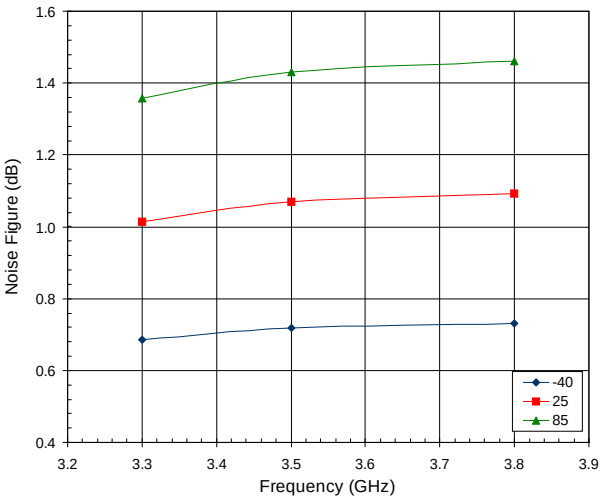
5V OIP3 versus Temperature



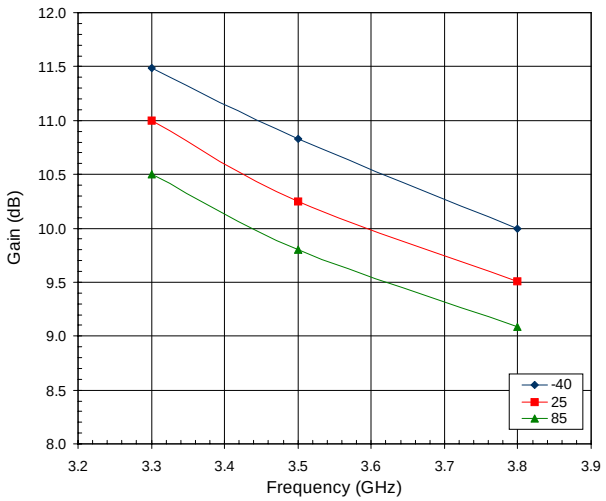
5V P1dB versus Temperature



5V Noise Figure versus Temperature



5V Gain versus Temperature



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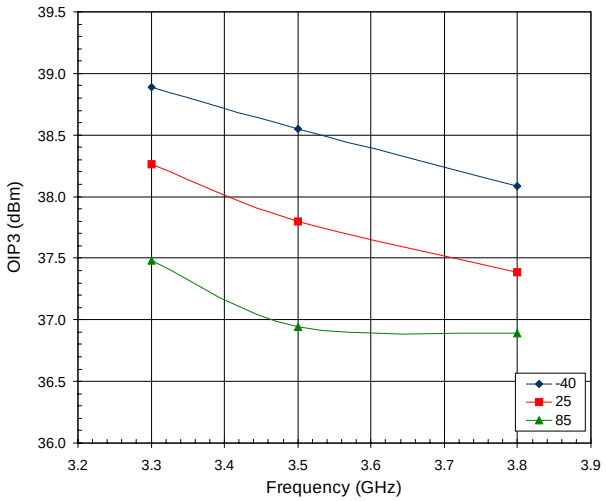
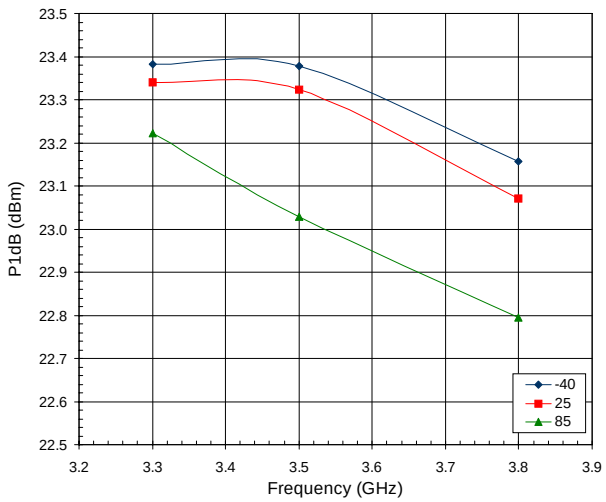
5V OIP2 versus Temperature



5V P1dB versus Temperature



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