

rfmd.com

# **RF3861** WIDE BANDWIDTH, HIGH LINEARITY LOW NOISE AMPLIFIER

Package Style: QFN, 16-Pin, 3mmx3mm

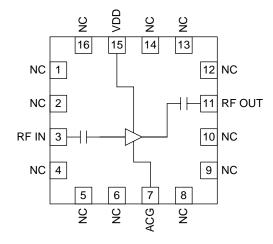


### **Features**

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

## **Applications**

- CDMA, PCS, ECS, UMTS LNA/Linear Driver
- WLAN LNA/Linear Driver
- WiMAX LNA/Linear Driver
- 900 MHz 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 50 $\Omega$  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
	1.5 GHz to 2.7 GHz
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	

RF MICRO DEVICES®, RFMD®, Optimum Technology Matching®, Enabling Wireless Connectivity<sup>w</sup>, PowerStar®, POLARIS<sup>w</sup> TOTAL RADIO<sup>w</sup> and UttimateBlue<sup>w</sup> are trademarks of RFMD, LLC. BLUETOOTH is a trademark owned by Bluetooth SIG, Inc., U.S.A. and licensed for use by RFMD. All other trade names, trademarks and registered trademarks are the property of their respective owners. ©2006, RF Micro Devices, Inc.

# **RF3861**

# RFMD rfmd.com

### **Absolute Maximum Ratings**

Parameter	Rating	Unit	
Supply Voltage	0 to +7	V <sub>DC</sub>	
Input RF Level	+10	dBm	
Current Drain, I <sub>DD</sub>	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.



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 perfor-mance or functional operation of the device under Absolute Maximum Rating condi-tions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by RF Micro Devices, Inc. ("RFMD") for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise under any patent or patent rights of RFMD. RFMD reserves the right to change component circuitry, recommended application circuitry and specifications at any time without prior notice.

Parameter		Specification		Unit	Condition	
Farameter	Min.	Тур.	Max.	Unit	Condition	
High Band						
Frequency	3.3	3.5	3.8	GHz	V <sub>DD</sub> =5V	
Current		90	110	mA		
Gain		10		dB	At 3.5GHz	
Noise Figure		1.1		dB	+25°C, V <sub>DD</sub> =5V, I <sub>DD</sub> =90mA, 3500MHz unless specified	
OIP3		37.0		dBm		
OP1dB		22.0		dBm		
S11		-12		dB	f <sub>1</sub> =3500MHz, f <sub>2</sub> =3501MHz	
S22		-18		dB		
Mid Band						
Frequency	1500		2700	MHz		
Current		90	110	mA	V <sub>DD</sub> =5V	
Gain	13.5	14.5	16.5	dB	+25°C, V <sub>DD</sub> =5V, I <sub>DD</sub> =90mA, 2000MHz unless specified	
Noise Figure		1.0	1.2	dB		
OIP3	33.0	35.5		dBm	f <sub>1</sub> =2000MHz, f <sub>2</sub> =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 <sub>DD</sub> =5V	
Gain		16		dB	+25°C, V <sub>DD</sub> =5V, I <sub>DD</sub> =90mA, 850MHz unless specified	
Noise Figure		1.2		dB		
OIP3		36.0		dBm	f <sub>1</sub> =850MHz, f <sub>2</sub> =851MHz	
OP1dB		22.5	1	dBm		
S11		-14		dB		
S22		-18		dB		

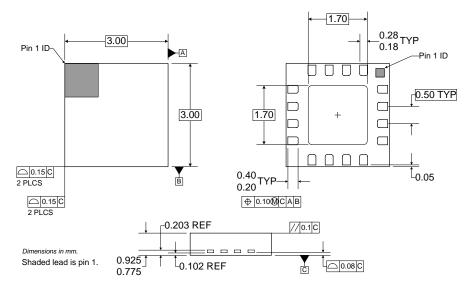


rfmd.com



Pin	Function	Description	Interface Schematic
1	NC	Not connected.	
2	NC	Not connected.	
3	RF IN	RF input pin. 50 $\Omega$ 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 $\mathrm{I}_{\mathrm{DD}}.$	
8	NC	Not connected.	
9	NC	Not connected.	
10	NC	Not connected.	
11	RF OUT	RF output pin. 50 $\Omega$ 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.	

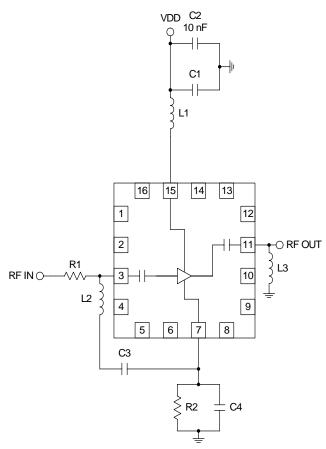
# **Package Drawing**







## Evaluation Board Schematic 700 MHz to 3800 MHz

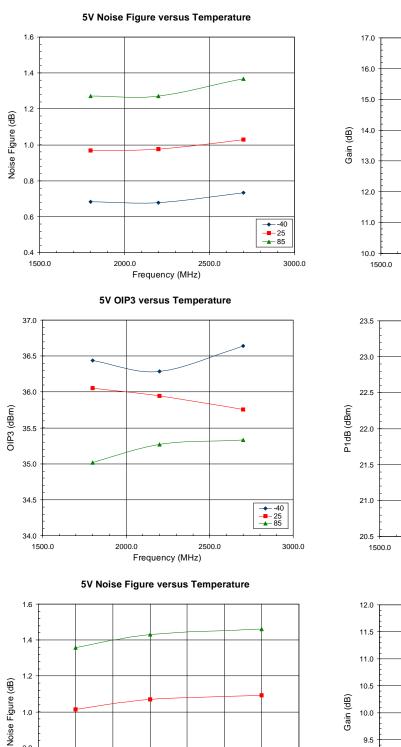


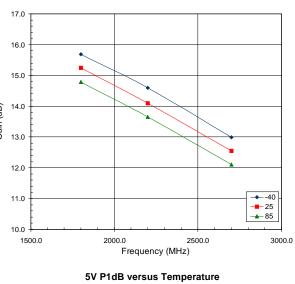
Components	700-1100 MHz	1.5-2.7 GHz	3.3-3.8 GHz
C1 (pF)	10	10	10
C3 (pF)	100	100	100
C4 (pF)	10	DNP	DNP
L1 (nH)	39	3.9	2.2
L2 (nH)	18	4.7	4.7
R1 (ohm)	0	0	0
R2 (ohm)	DNP	DNP	DNP
L3 (nH)	DNP	DNP	DNP

R2 is DNP for standard 90 mA current draw. If R2 is added, the I<sub>DD</sub> will increase. A 20  $\Omega$  R2 will raise the current to achieve higher linearity.

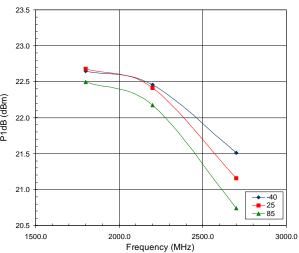


**RF3861** 

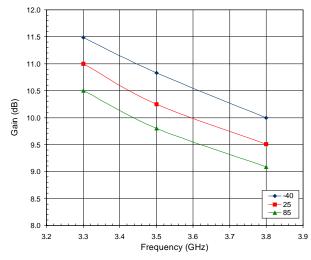




5V Gain versus Temperature







1.0

0.8

0.6

0.4

3.2

3.3

3.4

3.5

Frequency (GHz)

3.6

7628 Thorndike Road, Greensboro, NC 27409-9421 · For sales or technical support, contact RFMD at (+1) 336-678-5570 or sales-support@rfmd.com.

**a** 85

3.9

3.8

3.7





3.8

3.9

3.7

3.6

5V OIP2 versus Temperature 5V P1dB versus Temperature 39.5 23.5 23.4 39.0 23.3 38.5 23.2 23.1 OIP3 (dBm) P1dB (dBm) 38.0 23.0 37.5 22.9 22.8 37.0 22.7 36.5 22.6 36.0 22.5 3.5 3.6 3.7 3.2 3.3 3.4 3.8 3.9 3.2 3.3 3.4 3.5 Frequency (GHz) Frequency (GHz)