

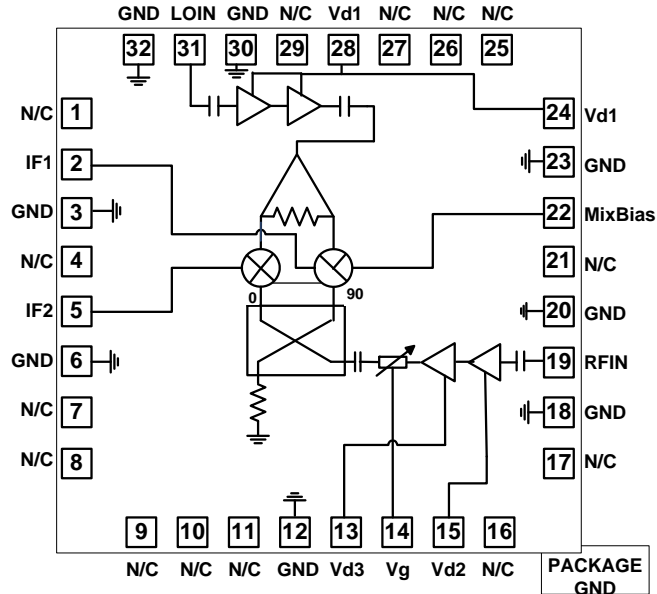


### Features

- RF Frequency: 9GHz to 14GHz
- LO Frequency: 5GHz to 18GHz
- IF Frequency: DC to 4GHz
- LO Input Drive: +5dBm
- Conversion Gain: 14dB
- Noise Figure: 1.7dB
- IIP3: 4dBm
- OIP3: 18dBm
- Image Rejection: 15dBc

### Applications

- Point-to-Point
- VSAT



Functional Block Diagram

### Product Description

RFMD's RFRX1002 is a 9GHz to 14GHz GaAs pHEMT Downconverter, incorporating an integrated LNA, image rejection mixer, LO buffer amplifier, and DC decoupling capacitors. The combination of high performance and low cost packaging makes the RFRX1002 a cost effective solution, ideally suited to both current and next generation Point-to-Point and VSAT applications. RFRX1002 is packaged in a 5mm x 5mm QFN to simplify both system level board design and volume assembly.

### Optimum Technology Matching® Applied

- |                                      |                                      |  |                                    |
|--------------------------------------|--------------------------------------|--|------------------------------------|
| <input type="checkbox"/> GaAs HBT    | <input type="checkbox"/> SiGe BiCMOS | <input checked="" type="checkbox"/> GaAs pHEMT | <input type="checkbox"/> GaN HEMT  |
| <input type="checkbox"/> GaAs MESFET | <input type="checkbox"/> Si BiCMOS   | <input type="checkbox"/> Si CMOS               | <input type="checkbox"/> BiFET HBT |
| <input type="checkbox"/> InGaP HBT   | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT                | <input type="checkbox"/> LDMOS     |

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## Absolute Maximum Ratings

Parameter	Rating	Unit
LNA Drain Voltage ( $V_D$ )	7	V
LOA Drain Voltage ( $V_D$ )	7	V
RF Input Power	0	dBm
LO Input Power	15	dBm
$T_{OPER}$	-40 to +85	°C
$T_{STOR}$	-65 to +150	°C
ESD Human Body Model	Class 1A	



**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.

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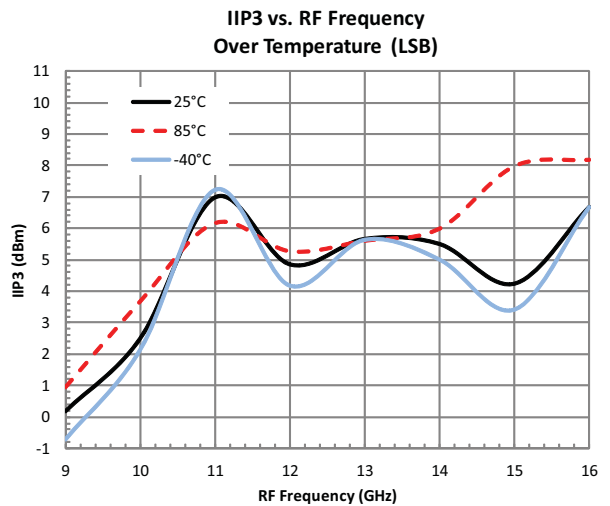
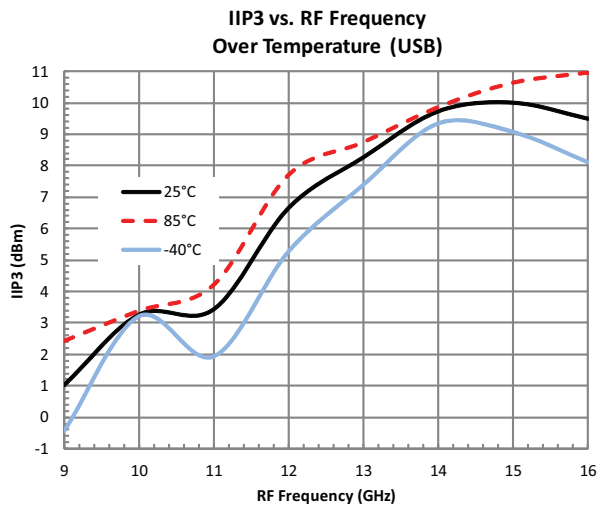
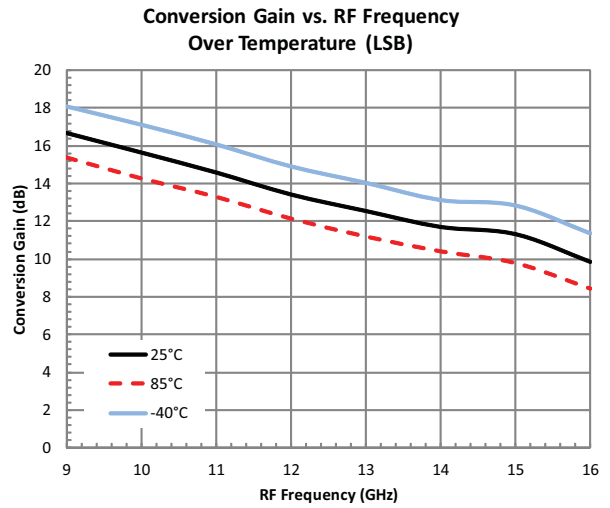
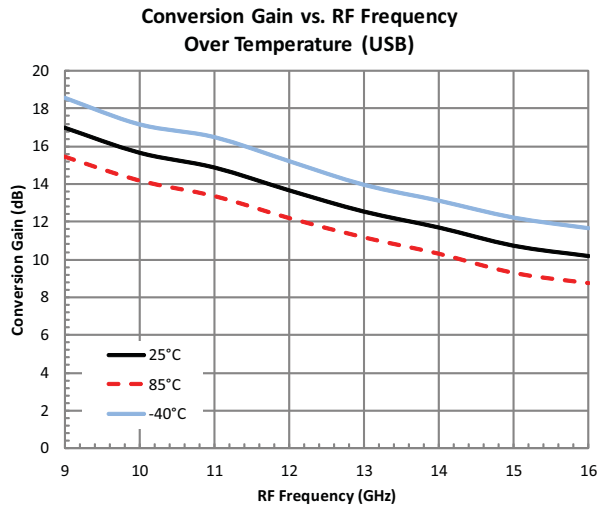


RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
<b>Overall</b>					
RF Frequency	9		14	GHz	
LO Frequency	5		18	GHz	
IF Frequency	DC		4.0	GHz	
LO Input Drive	0	+5		dBm	
Conversion Gain	10	+14		dB	
Noise Figure		1.7	2.4	dB	
IIP3		+4		dBm	
OIP3		+18		dBm	
Image Rejection	12	15		dBc	
LO-RF Isolation		30		dB	
LO-IF Isolation		20		dB	
LO Return Loss	8	12		dB	
RF Return Loss	10	12		dB	
$V_D$		4		V	
$I_D$		210	220	mA	
VVA	-2		0	V	
Mixer Bias		-0.8		V	

### Typical Electrical Performance

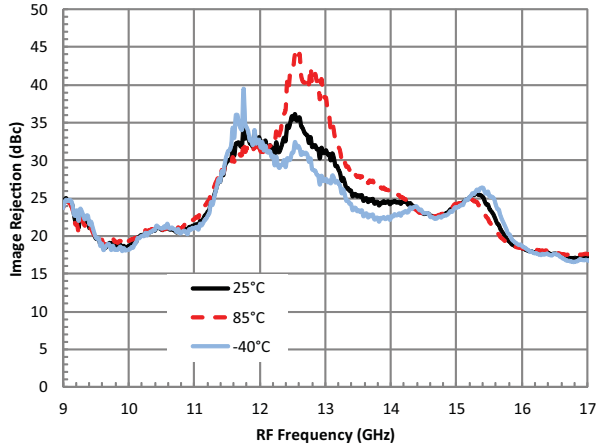
Measurements performed with I and Q ports connected to an external 90° Hybrid Combiner and Bias Voltage of +4V, and LO Power of +5 dBm, unless otherwise stated.



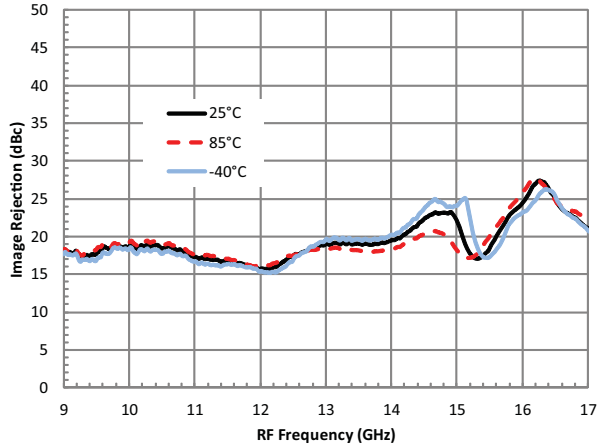
## Typical Electrical Performance

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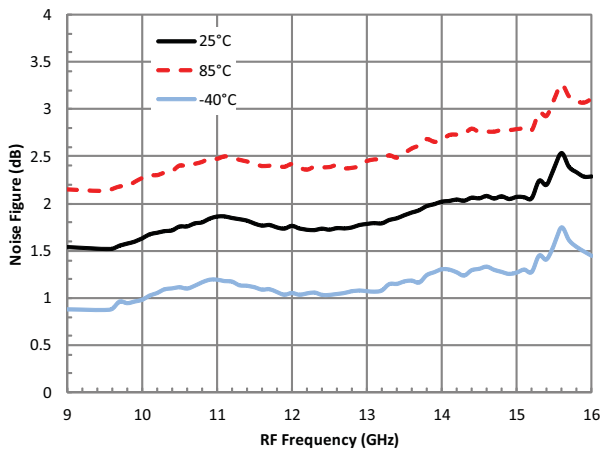
**Image Rejection vs. RF Frequency Over Temperature (USB)**



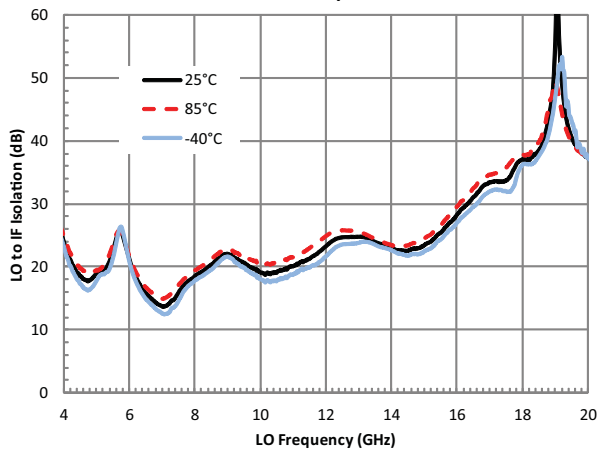
**Image Rejection vs. RF Frequency Over Temperature (LSB)**



**Noise Figure vs. RF Frequency Over Temperature (USB)**



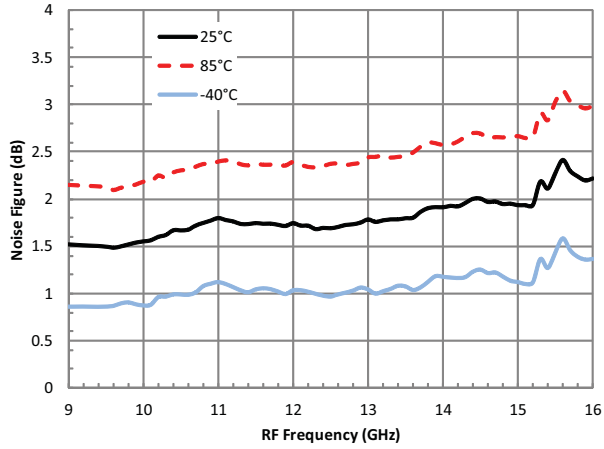
**LO to IF Isolation vs. LO Frequency Over Temperature**



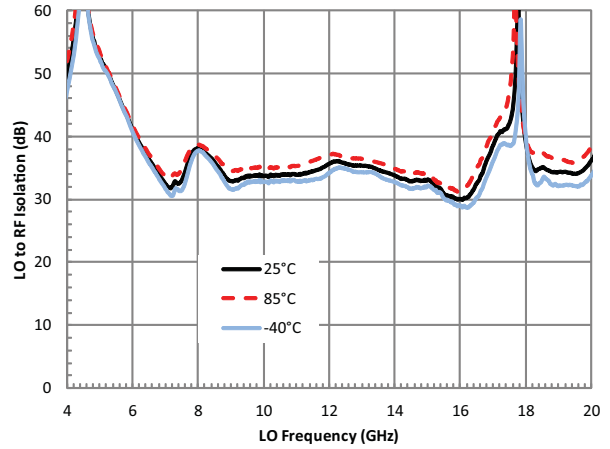
**Typical Electrical Performance**

Measurements performed with I and Q ports connected to an external 90° Hybrid Combiner and Bias Voltage of +4V, and LO Power of +5 dBm, unless otherwise stated.

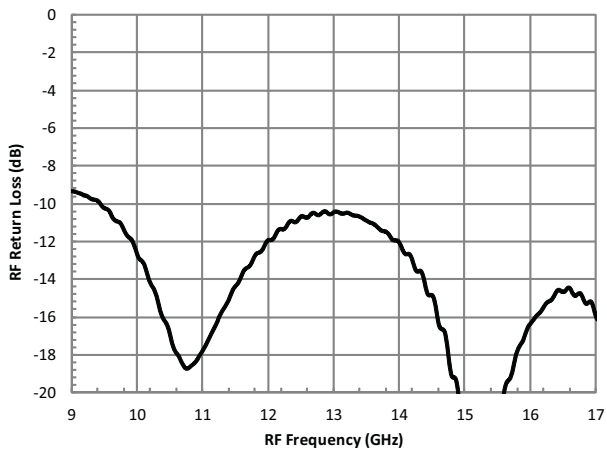
**Noise Figure vs. RF Frequency Over Temperature (LSB)**



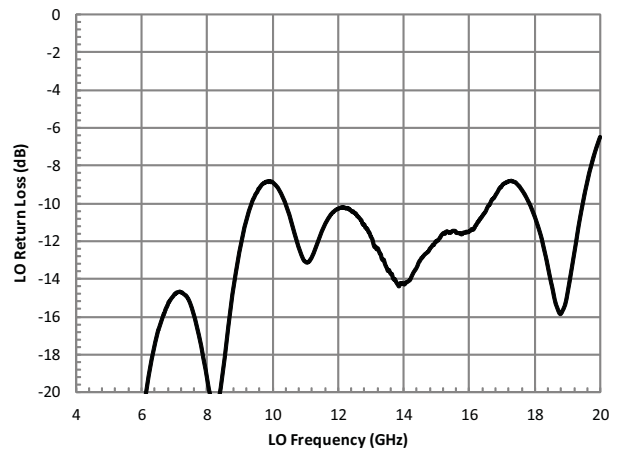
**LO to RF Isolation vs. LO Frequency Over Temperature**



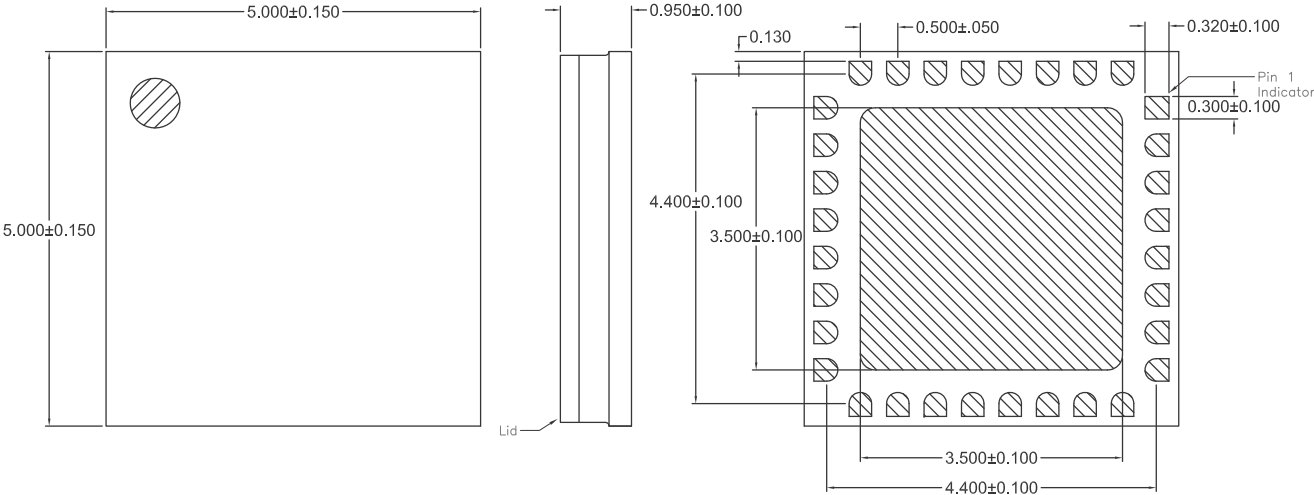
**RF Return Loss vs. RF Frequency**



**LO Return Loss vs. LO Frequency**



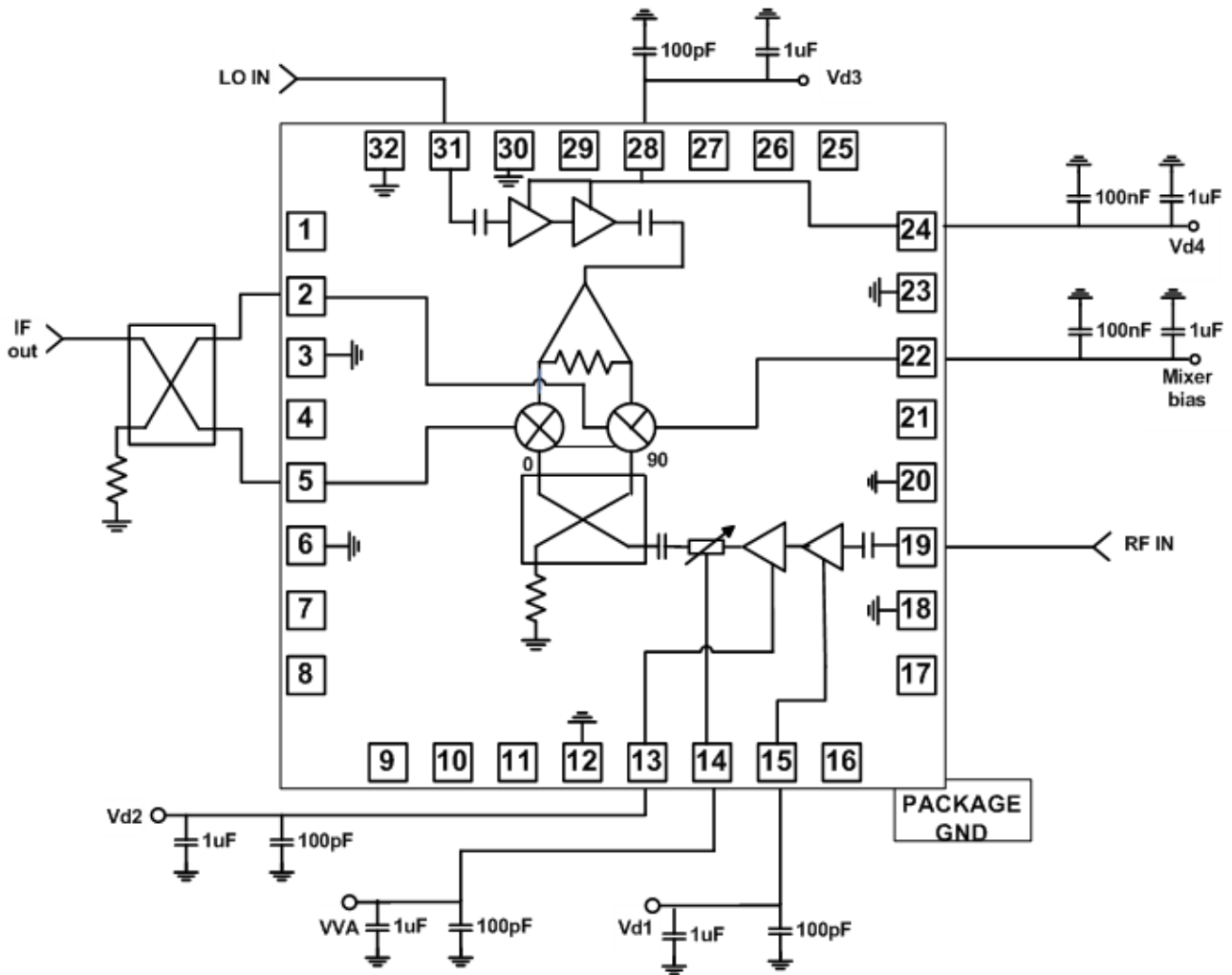
## Package Outline Drawing (QFN, 32-Pin, 5mmx5mmx0.95mm)



### Pin Description

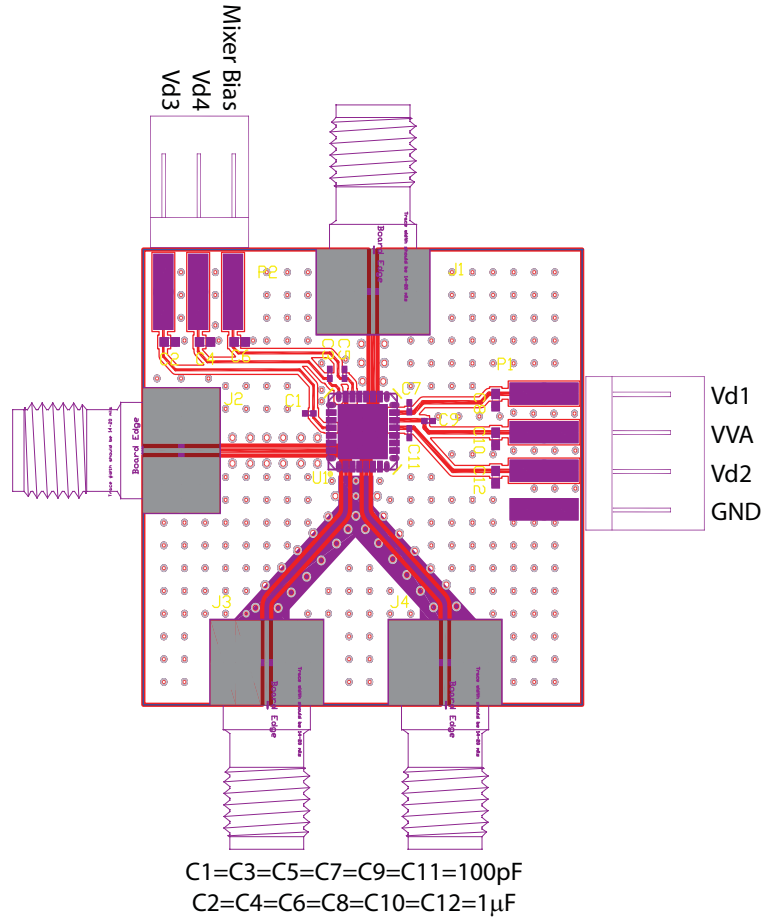
Pin	Function	Description
1	N/C	Not Connected
2	IF1	IF1 Output
3	GND	Ground
4	N/C	Not Connected
5	IF2	IF2 Output
6	GND	Ground
7	N/C	Not Connected
8	N/C	Not Connected
9	N/C	Not Connected
10	N/C	Not Connected
11	N/C	Not Connected
12	GND	Ground
13	Vd2	LNA stage 2 bias = 4V
14	VVA	VVA bias = -2V to 0V
15	Vd1	LNA stage 1 bias = 4V
16	N/C	Not Connected
17	N/C	Not Connected
18	GND	Ground
19	RF input	RF Input AC couples and matched to 50Ω
20	GND	Ground
21	N/C	Not Connected
22	Mixer Bias	Mixer Bias = -0.8V
23	GND	Ground
24	Vd4	LOA bias = 4V
25	N/C	Not Connected
26	N/C	Not Connected
27	N/C	Not Connected
28	Vd3	LOA bias = 4V (internally connected to Vd4)
29	N/C	Not Connected
30	GND	Ground
31	LO input	Local oscillator input. AC couples and matched to 50Ω
32	GND	Ground

## Application Circuit Block Diagram





**Evaluation Board**



**Test Conditions**

LO Power	+5dBm
RF Power	-20dBm
Vd1, Vd2	4V
Vd3, Vd4	4V
VVA	-2V
Mixer Bias	-0.8V

**Ordering Information**

Ordering Code	Description
RFRX1002S2	2-piece sample bag
RFRX1002SB	5-piece bag
RFRX1002SQ	25-piece bag
RFRX1002SR	100 pieces on a 7" reel
RFRX1002TR7	750 pieces on a 7" reel
RFRX1002TR13	2500 pieces on a 13" reel
RFRX1002PCK-410	Evaluation board