

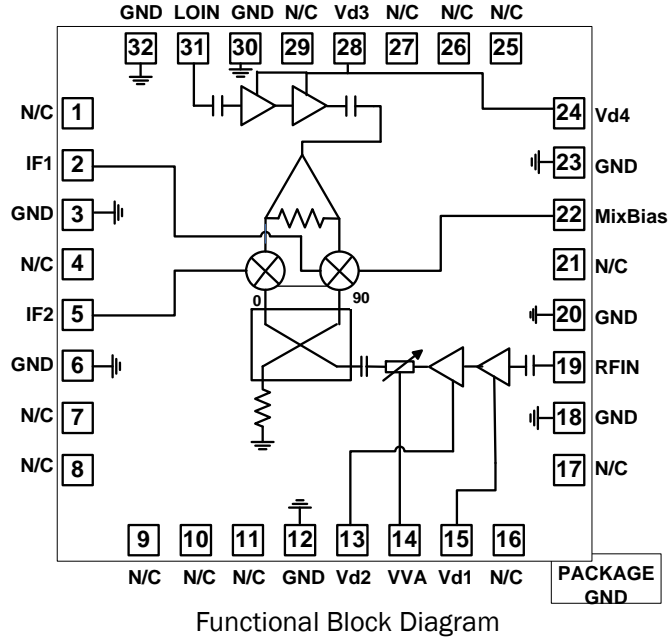


**Features**

- RF Frequency= 10 GHz to 15.4GHz
- LO Frequency=6GHz to 19.4GHz
- IF Frequency=DC to 4GHz
- Conversion Gain= 12dB
- Noise Figure=2.1dB
- IIP3=4 dBm
- OIP3= 16dBm
- Image Rejection= 15dBc
- Low Cost 5mmx5mm QFN Package

**Applications**

- Point-to-Point
- VSAT



**Product Description**

The RFRX1001 is a 10GHz to 15.4GHz 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 RFRX1001 a cost effective solution, ideally suited to both current and next generation Point-to-Point and VSAT applications. RFRX1001 is packaged in a 5mmx5mm 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     |

RF MICRO DEVICES®, RFMD®, Optimum Technology Matching®, Enabling Wireless Connectivity™, PowerStar®, POLARIS™ TOTAL RADIO™ and UltimateBlue™ 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.

## 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  |
| $T_{OPER}$                  | 150         | °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.

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.

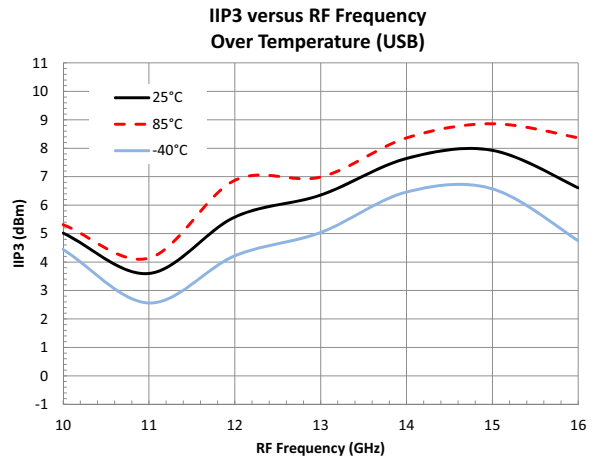
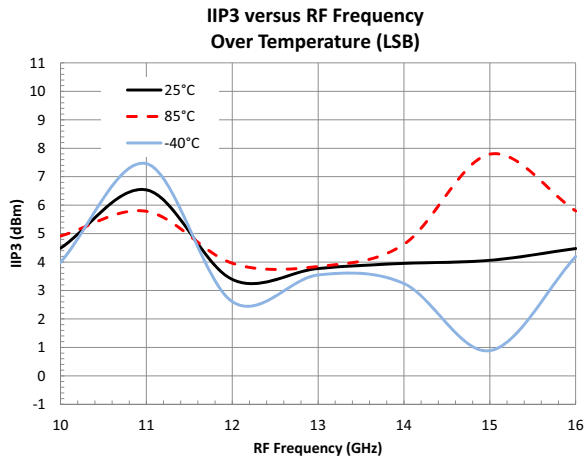
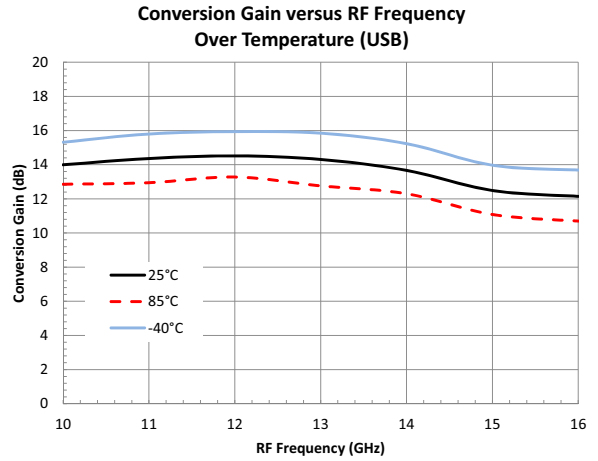
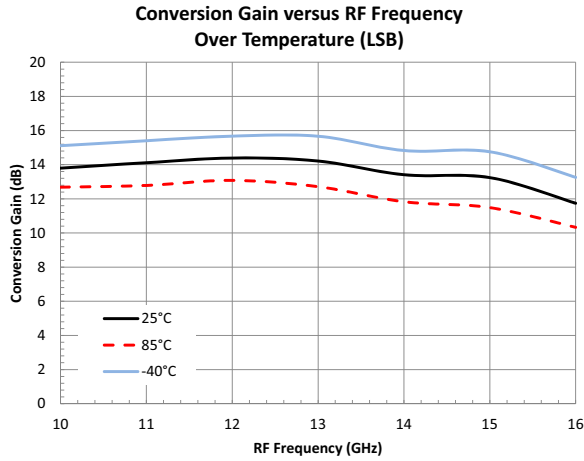


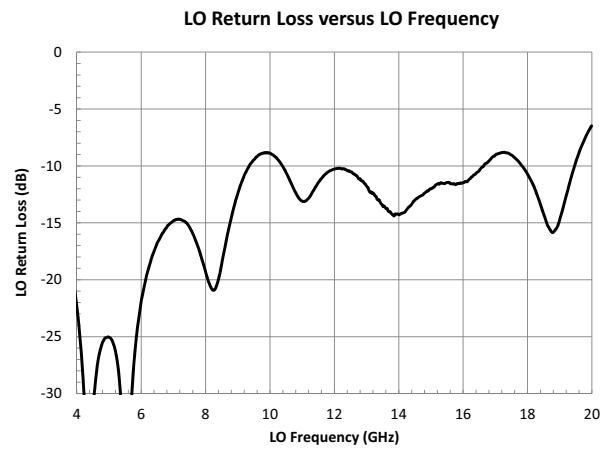
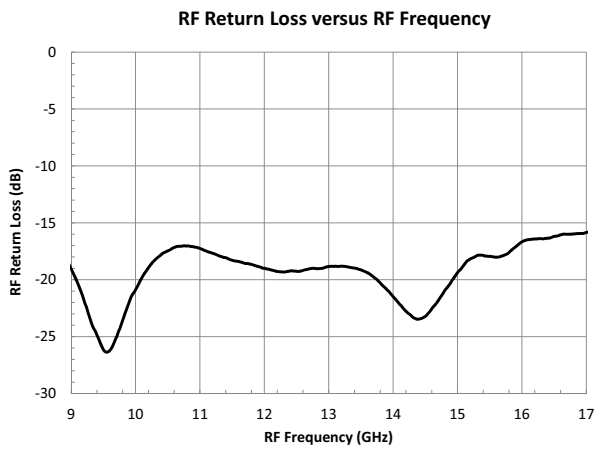
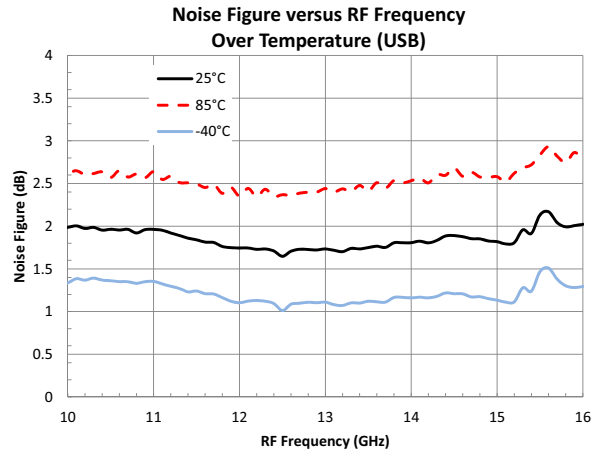
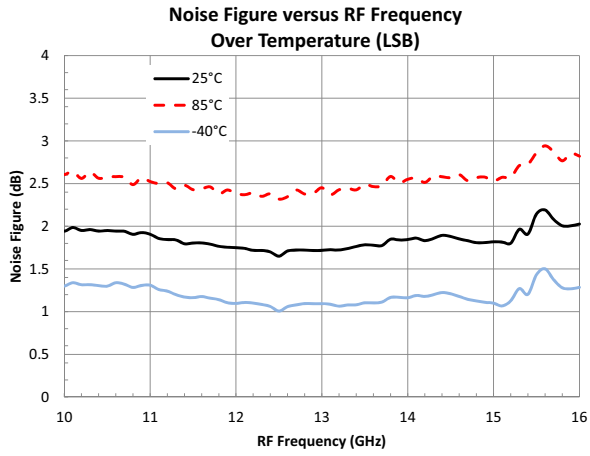
RFMD Green: RoHS compliant per EU Directive 2002/95/EC, halogen free per IEC 61249-2-21, < 1000ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

| Parameter       | Specification |      |      | Unit | Condition |
|-----------------|---------------|------|------|------|-----------|
|                 | Min.          | Typ. | Max. |      |           |
| <b>Overall</b>  |               |      |      |      |           |
| RF Frequency    | 10.0          |      | 15.4 | GHz  |           |
| LO Frequency    | 6.0           |      | 19.4 | GHz  |           |
| IF Frequency    | DC            |      | 4.0  | GHz  |           |
| LO Input Drive  | 0             | +5   |      | dBm  |           |
| Conversion Gain | 10            | 12   |      | dB   |           |
| Noise Figure    |               | 2.1  | 2.3  | dB   |           |
| IIP3            |               | +4   |      | dBm  |           |
| OIP3            |               | +16  |      | dBm  |           |
| Image Rejection | 12            | 15   |      | dBc  |           |
| LO-RF Isolation |               | 30   |      | dB   |           |
| LO-IF Isolation |               | 15   |      | dB   |           |
| LO Return Loss  | 8             | 12   |      | dB   |           |
| RF Return Loss  | 10            | 15   |      | dB   |           |
| $V_D$           |               | 4    |      | V    |           |
| $I_D$           |               | 210  | 220  | mA   |           |
| VVA             | -2            |      | 0    | V    |           |
| Mixer Bias      |               | -0.8 |      | V    |           |

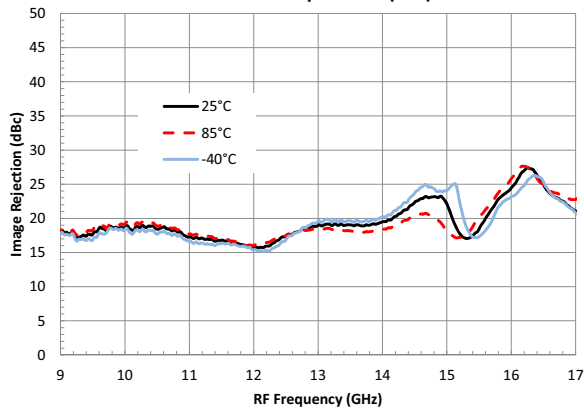
**Typical Electrical Performance**

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.

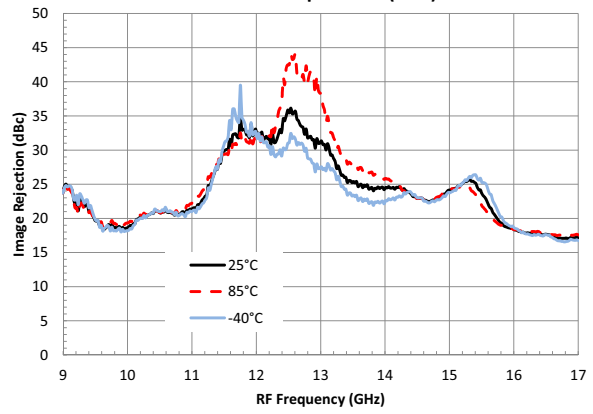




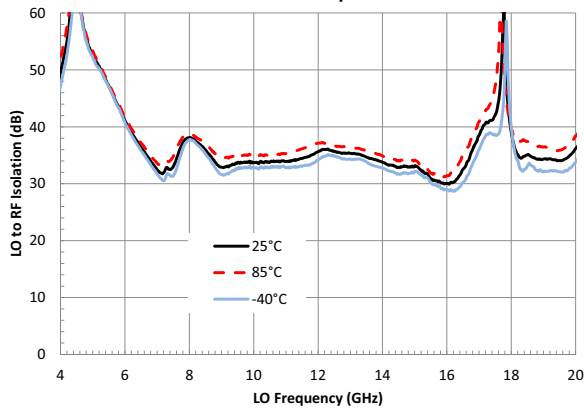
**Image Rejection versus RF Frequency Over Temperature (LSB)**



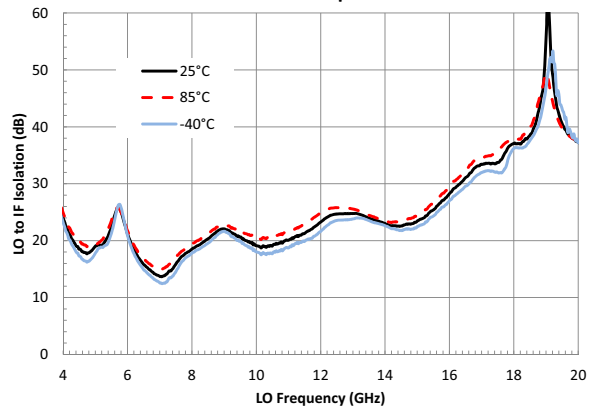
**Image Rejection versus RF Frequency Over Temperature (USB)**



**LO to RF Isolation versus LO Frequency Over Temperature**



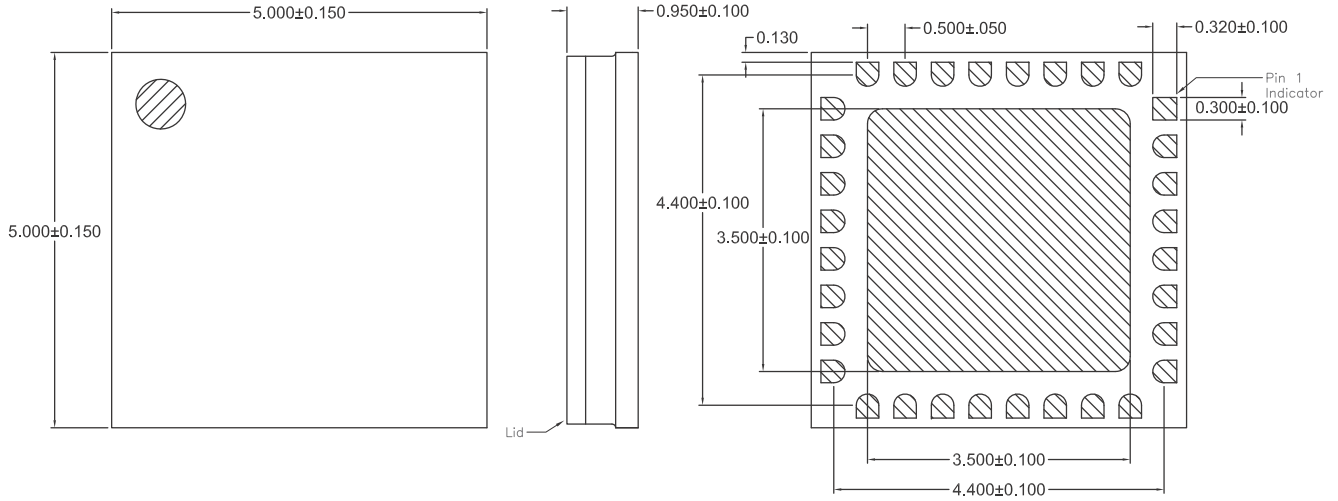
**LO to IF Isolation versus LO Frequency Over Temperature**



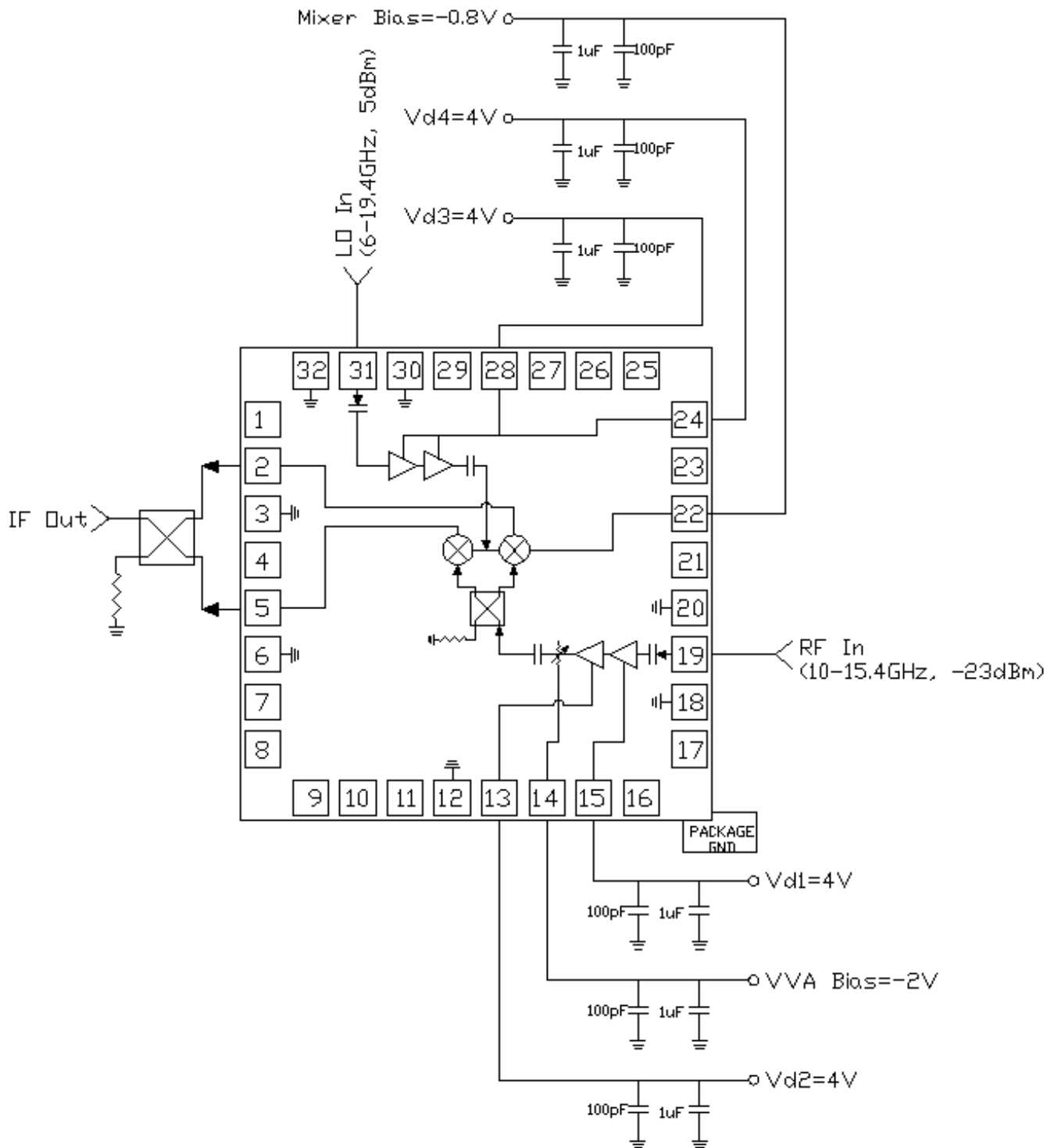
## Pin Names and Description

| Pin | Function   | Description   |
|-----|------------|---|
| 1   | N/C        | Not Connected   |
| 2   | IF1        | IF1 Output  |
| 3   | GND        | GND   |
| 4   | N/C        | Not Connected   |
| 5   | IF2        | IF2 Output  |
| 6   | GND        | GND   |
| 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        | GND   |
| 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        | GND   |
| 19  | RF Input   | RF input AC coupled and matched to 50Ω                |
| 20  | GND        | GND   |
| 21  | N/C        | Not Connected   |
| 22  | Mixer Bias | Mixer Bias = -0.8V                                    |
| 23  | GND        | GND   |
| 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        | GND   |
| 31  | LO Input   | Local oscillator input. AC coupled and matched to 50Ω |
| 32  | GND        | GND   |

**Package Outline Drawing**  
(QFN, 32-Pin, 5 mmx5 mmx0.95 mm)

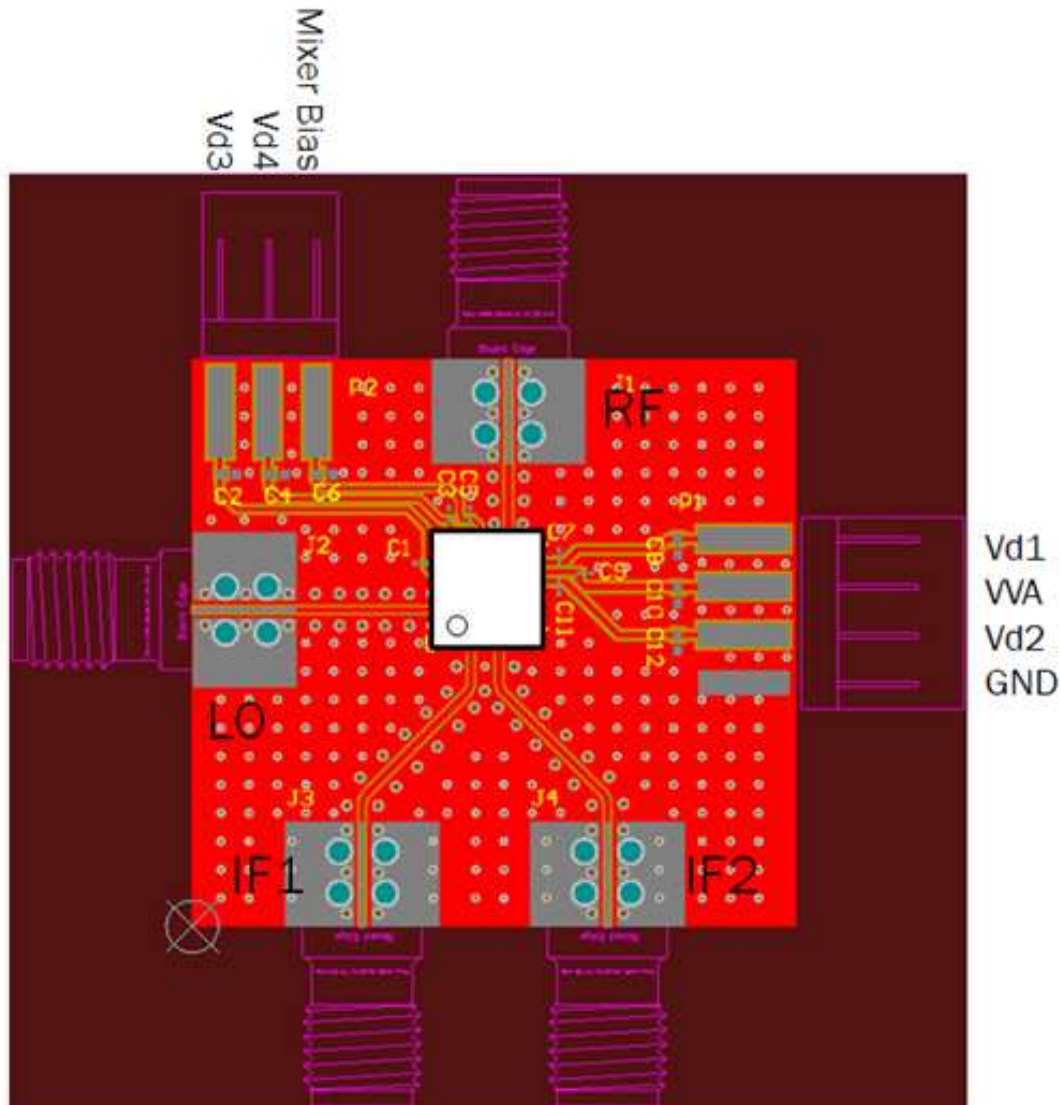


## Application Circuit Block Diagram





**Evaluation Board**



C1=C3=C5=C7=C9=C11=100pF  
C2=C4=C6=C8=C10=C12=1μF

**Test Condition**

|            |        |
|------------|--------|
| LO Power   | +5dBm  |
| RF Power   | -20dBm |
| Vd1, Vd2   | 4.0V   |
| Vd3, Vd4   | 4.0V   |
| VVA        | -2.0V  |
| Mixer Bias | -0.8V  |

### Ordering Information

| Ordering Code   | Description               |
|-----------------|---------------------------|
| RFRX1001S2      | 2-piece sample bag        |
| RFRX1001SB      | 5-piece bag               |
| RFRX1001SQ      | 25-piece bag              |
| RFRX1001SR      | 100 pieces on a 7" reel   |
| RFRX1001TR7     | 750 pieces on a 7" reel   |
| RFRX1001TR13    | 2500 pieces on a 13" reel |
| RFRX1001PCK-410 | Evaluation board          |