

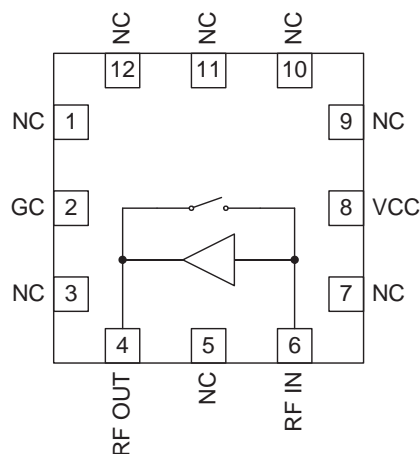


Features

- Broadband Operation: 45MHz to 2500MHz
- ESD Protection: >2kV HBM
- Best-In-Class Linearity

Applications

- FM Receiver LNA
- UMTS LNA
- Cellular CDMA LNA
- General Purpose Amplification
- Commercial and Consumer Systems



Functional Block Diagram

Product Description

The RF2884 is a low noise amplifier with a very high dynamic range designed for a broad range of applications. This part is ideal for use as a FM LNA in cellular applications. The device functions as an outstanding front end low noise amplifier, featuring very low noise figure combined with high gain, high IIP3, and low current consumption. The product is packaged in a Pb-free, 3mmx3mm, QFN plastic package.

Ordering Information

| | |
|----------------|--|
| RF2884 | Broadband LoW Noise Amplifier |
| RF2884PCBA-410 | Fully Assembled Evaluation Board (LNA) |
| RF2884PCBA-411 | Fully Assembled Evaluation Board, FM LNA |

Optimum Technology Matching® Applied

- | | | | |
|--------------------------------------|---|-------------------------------------|-----------------------------------|
| <input type="checkbox"/> GaAs HBT | <input checked="" type="checkbox"/> SiGe BiCMOS | <input 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"/> InGaP HBT | <input type="checkbox"/> SiGe HBT | <input type="checkbox"/> Si BJT | |

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|-----------------------|--------------|-----------------|
| Supply Voltage | -0.5 to +5.0 | V _{DC} |
| Input RF Level | +6.0 | dBm |
| Operating Temperature | -40 to +85 | °C |
| Storage Temperature | -40 to +150 | °C |



Caution! ESD sensitive device.

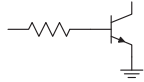
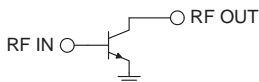

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute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

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

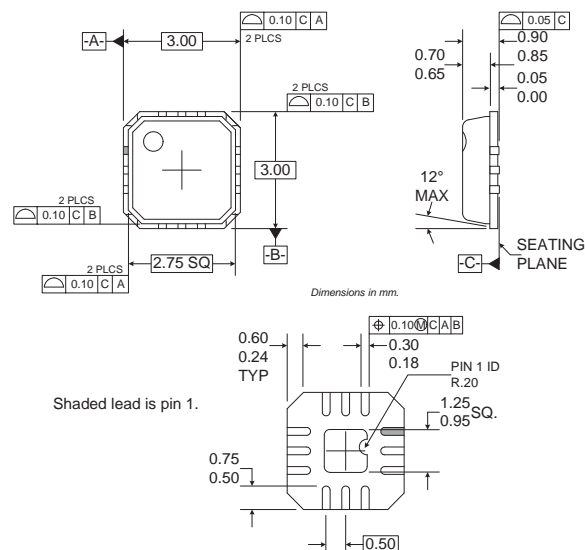
The information in this publication is believed to be accurate and reliable. However, no responsibility is assumed by RF Micro Devices, Inc. ("RFMD") for its use, nor for any infringement of patents, or other rights of third parties, resulting from its use. No license is granted by implication or otherwise 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 |
|-------------------------------------|---------------|------------|-------|------|--|
| | Min. | Typ. | Max. | | |
| Overall | | | | | T _{AMB} = -20 °C to +85 °C, V _{CC} = 2.65V _{DC} to 3.0V _{DC} (unless otherwise specified) |
| Frequency Range | 45 | 869 to 894 | 2500 | MHz | |
| Cellular Low Noise Amplifier | | | | | |
| Frequency | 869 | | 894 | MHz | |
| HIGH GAIN MODE | | | | | GC < 0.8V |
| Gain | 13.25 | 15.0 | 16.25 | dB | |
| Noise Figure | | 1.2 | 1.7 | dB | 1.7 dB max, -20 °C to +65 °C |
| | | 1.2 | 1.85 | dB | 1.85 dB max, -20 °C to +85 °C |
| Input IP3 | -2.0 | +4.0 | | dBm | |
| Current | | 6.0 | 8.5 | mA | |
| S11 | | -15.5 | -10.5 | dB | |
| S22 | | -15.5 | -9.5 | dB | |
| Input P1dB | -16.0 | -10.0 | | dBm | |
| Reverse Isolation | | | -20 | dB | |
| Single Tone IIP2 | +7.0 | +11.0 | | | F ₁ = 440 MHz, ST IIP2 = 2 * P _{IN} - P _{OUT} + Gain |
| Single Tone IIP3 | -8.6 | -6.5 | | | F ₁ = 293.3 MHz, ST IIP3 = P _{IN} - (P _{OUT} + Gain - P _{IN})/2 |
| Double Tone IIP2 | -1.0 | +5.0 | | | F ₁ = 835 MHz, F ₂ = 1715 MHz, TT IIP2 = P _{IN1} + P _{IN2} - P _{OUT} + Gain |
| Double Tone IIP3 | -6.3 | -3.5 | | | F ₁ = 835 MHz, F ₂ = 2550 MHz, TT IIP3 = P _{IN} - (P _{OUT} - Gain - P _{IN})/2 |
| BYPASS MODE | | | | | GC > 1.8V |
| Gain | -7.0 | -4.0 | -2.0 | dB | |
| Input IP3 | | +20.0 | | dBm | |
| Current | | 0.0 | 0.003 | mA | |
| S11 | | -11.5 | -10.5 | dB | |
| S22 | | -10.5 | -8.5 | dB | |
| FM LNA | | | | | |
| Frequency Range | 70 | | 110 | MHz | |
| HIGH GAIN MODE | | | | | |
| Gain | | 15.9 | | dB | |
| Noise Figure | | 1.5 | | dB | |
| Input IP3 | | +1 | | dBm | |
| S11 | | -16 | | dB | |

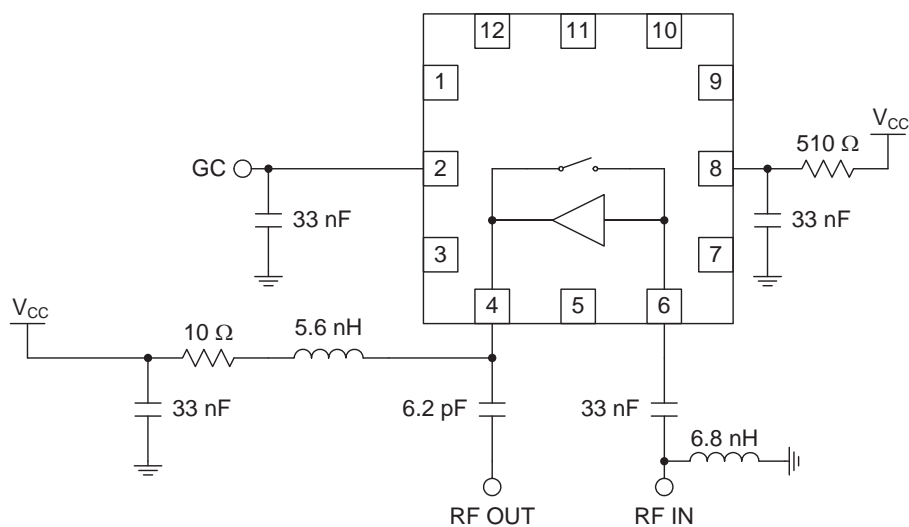
| Parameter | Specification | | | Unit | Condition |
|----------------------|---------------|------|------|------|-----------|
| | Min. | Typ. | Max. | | |
| FM LNA, cont. | | | | | |
| S22 | | -15 | | dB | |
| BYPASS MODE | | | | | |
| Gain | | -12 | | dB | |
| Input IP3 | | 25 | | dBm | |
| Current | | 0 | | mA | |
| S11 | | -3.0 | | dB | |
| S22 | | -2.2 | | dB | |

| Pin | Function | Description | Interface Schematic |
|----------|----------|--|---|
| 1 | NC | No connection. Pin not used. | |
| 2 | GC | This pin selects high gain or bypass mode. GC ≤ 0.8V, high gain. GC ≥ 1.8V, low gain. |  |
| 3 | NC | No connection. Pin not used. | |
| 4 | RF OUT | Amplifier output pin. This pin is an open-collector output. It must be biased to V _{CC} through a choke or matching inductor. This pin is typically matched to 50Ω with a shunt bias/matching inductor and series blocking/matching capacitor. Refer to application schematics. | See pin 6. |
| 5 | NC | No connection. Pin not used. | |
| 6 | RF IN | RF input pin. A simple matching network is used to match to 50Ω. |  |
| 7 | NC | No connection. Pin not used. | |
| 8 | VCC | Supplies bias to control circuitry. An external bypass capacitor may be used to decouple bias. An external resistor also allows adjustment of the LNA operating current. A 0Ω resistor allows maximum operating current. Increasing series resistance lowers LNA current. The voltage at pin 8 must remain above 2.0V. |  |
| 9 | NC | No connection. Pin not used. | |
| 10 | NC | No connection. Pin not used. | |
| 11 | NC | No connection. Pin not used. | |
| 12 | NC | No connection. Pin not used. | |
| Pkg Base | GND | Ground connection. The backside of the package should be soldered to a top side ground pad which is connected to the ground plane with multiple vias. | |

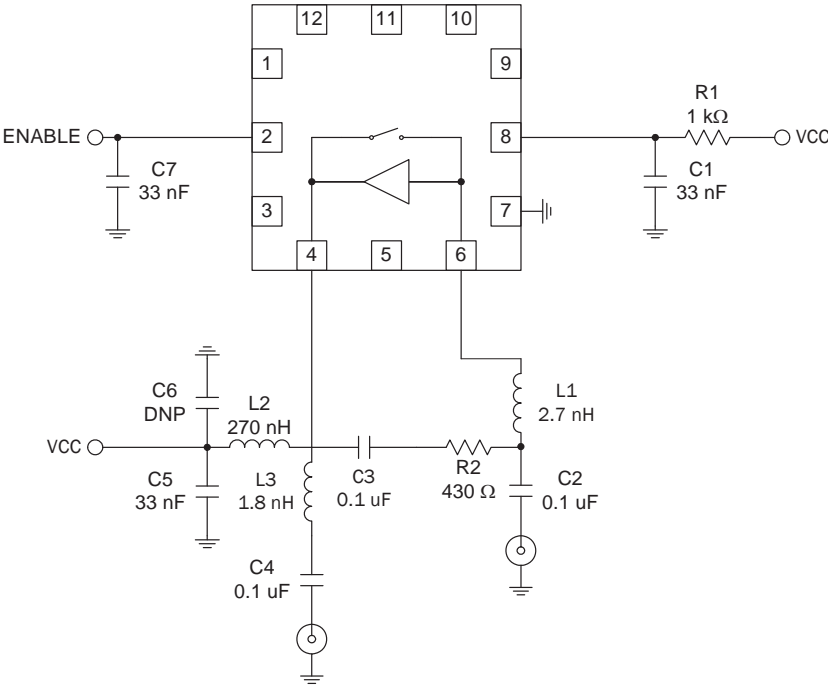
Package Drawing QFN, 12-Lead, 3x3



Application Schematic **(Cellular Low Noise Amplifier ~881MHz)**



Application Schematic (FM LNA)



A RC feedback network is introduced here to better broad band operation.
RF2884PCBA-411, Evaluation Board, FM LNA

Typical Data for FM LNA

| High Gain | Typical | Unit |
|--------------|---------|------|
| Gain | 15.9 | dB |
| Input IP3 | -1.58 | dBm |
| Noise Figure | 1.54 | dB |
| Current | 6.3 | mA |

| Low Gain | Typical | Unit |
|-----------|---------|------|
| Gain | -12 | dB |
| Input IP3 | 29 | dBm |
| Current | 0.003 | uA |

Test Condition: EVB 50Ω, V_{CC}=2.8V,
Room Temperature