

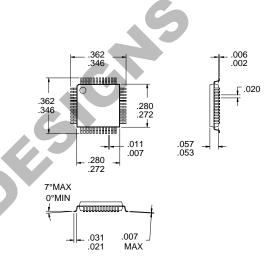
### UHF DUAL CONVERSION TRANSCEIVER

### Typical Applications

- Wireless Meter Reading
- Keyless Entry Systems
- 433/868/915MHz ISM Band Systems
- Wireless Data Transceiver
- Wireless Security Systems
- Battery Powered Portable Devices

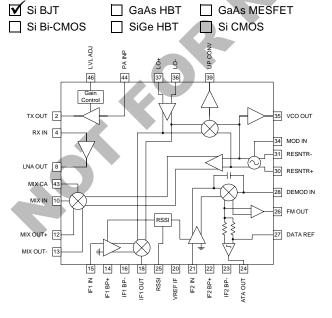
### **Product Description**

The RF2926 is a monolithic integrated circuit intended for use as a low cost FM transceiver. The device is provided in 48-lead plastic TQFP packaging and is designed to provide a dual conversion, half-duplex transceiver. The chip is intended for linear (AM, FM) or digital (ASK, FSK, OOK) applications in the North American 915MHz and European 433/868MHz ISM bands. The integrated VCO has a buffered output to feed the RF signal back to the PLL IC to form the frequency synthesizer. Separate RX ENABL, TX ENABL, and PLL ENABL lines allow for half duplex operation as well as turning on the VCO to give the synthesizer time to settle and complete power downmode.



Package Style: LQFP-48

### Optimum Technology Matching® Applied



Functional Block Diagram

### **Features**

- Monolithic Integrated Transceiver
- 2.7V to 5.0V Supply Voltage
- Narrow Band and Wide Band FM/FSK
- 300MHz to 1000MHz Frequency Range
- 130MHz Bandwidth in First IF
- 5mW Output Power at 433MHz

#### Ordering Information

RF2926 UHF Dual Conversion Transceiver RF2926 PCBA Fully Assembled Evaluation Board

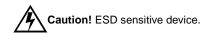
RF Micro Devices, Inc. 7625 Thorndike Road Greensboro, NC 27409, USA Tel (336) 664 1233 Fax (336) 664 0454 http://www.rfmd.com

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### RF2926

### **Absolute Maximum Ratings**

| Parameter                     | Ratings      | Unit     |
|-------------------------------|--------------|----------|
| Supply Voltage                | -0.5 to +5.5 | $V_{DC}$ |
| Control Voltages              | -0.5 to +5.0 | $V_{DC}$ |
| Input RF Level                | +10          | dBm      |
| Output Load VSWR              | 50:1         |          |
| Operating Ambient Temperature | -40 to +85   | °C       |
| Storage Temperature           | -40 to +150  | °C       |



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| Doromotor                      | Specification |                    | Unit  | Condition |  |
|--------------------------------|---------------|--------------------|-------|-----------|--|
| Parameter                      | Min.          | Тур.               | Max.  | Unit      | Condition  |
| Overall                        |               |                    |       |           | T=25 °C, V <sub>CC</sub> =3.6 V, Freq=433 MHz      |
| RF Frequency Range             |               | 300 to 1000        |       | MHz       |  |
| VCO                            |               |                    |       |           |  |
| VCO Frequency Range            |               | 300 to 1000        |       | MHz       |  |
| VCO OUT Level                  |               | -18                |       | dBm       | $50\Omega$ load impedance                          |
| VCO OUT Impedance              |               | 50                 |       | Ω         |  |
| Transmit Section               |               |                    |       |           |  |
| Max Modulation Frequency       | 2             |                    |       | MHz       | ·  |
| Min Modulation Frequency       | Set I         | y loop filter band | width |           |  |
| Maximum Power Level            |               | +2                 |       | dBm       | Freq=433MHz  |
| Power Control Range            | 20            |                    |       | dB        |  |
| Power Control Sensitivity      |               | TBD                |       | dB/V      | See plot   |
| Max FM Deviation               | 200           |                    |       | kHz       | Instantaneous frequency deviation is               |
|                                |               |                    |       |           | inversely proportional with the modulation voltage |
| Antenna Port Impedance         |               | 50                 |       | Ω         | TX ENABL="1"                                       |
| Antenna Port Impedance         |               | TBD                |       | $\Omega$  | TX ENABL="0"                                       |
| Antenna Port VSWR              |               | TOD                | 1.5:1 | 52        | TX Mode  |
| Modulation Input Impedance     | 4             |                    | 1.5.1 | kΩ        | 1 X Mode   |
| Harmonics                      | _             |                    | -50   | dBm       | Measured on eval board with RF filters in          |
| Tid. Tid. Tid.                 |               |                    | 00    | u Diii    | system.  |
| Spurious                       |               | TBD                |       | dBc       |  |
| Overall Receive Section        |               |                    |       |           |  |
| Frequency Range                |               | 300 to 1000        |       | MHz       |  |
| RX Sensitivity                 |               | -99                |       | dBm       | IF BW=400kHz, Freq=915MHz, S/N=8dB                 |
| RSSI DC Output Range           |               | 0.7 to 2.2         |       | V         | $R_{LOAD} = 51 k\Omega$                            |
| RSSI Sensitivity               |               | 25                 |       | mV/dB     | See plot   |
| RSSI Dynamic Range             | 70            | 80                 |       | dB        | ·  |
| LNA and Mixer                  |               |                    |       |           |  |
| Cascaded Gain                  |               | 18                 |       | dB        | Freq=915MHz; RX current 12mA                       |
| Cascaded Noise Figure          |               | 7                  |       | dB        | Freq=915MHz; RX current 12mA                       |
| Cascaded Input IP <sub>3</sub> |               | -18.5              |       | dBm       | Freq=915MHz; RX current 12mA                       |
| LO Leakage                     |               |                    | -70   | dBm       |  |
| First IF Section               |               |                    |       |           |  |
| IF 3dB Bandwidth               |               | 130                |       | MHz       |  |
| Voltage Gain                   |               | 34                 |       | dB        | IF=110.6MHz, $Z_L$ =330 $\Omega$                   |
| Noise Figure                   |               | 13                 |       | dB        |  |
| Input IP <sub>3</sub>          |               | TBD                |       | $mV_{PP}$ |  |
| IF1 Input Impedance            |               | 330                |       | Ω         |  |
| IF1 Output Impedance           |               | 330                |       | Ω         |  |

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| Second   F Section     F Frequency Range   0.1   10.7   22   MHz   IF Frequency Range   0.1   10.7   If Frequency Range   0.1   10.7   If Frequency Range   0.1   10.7   If Range  | Parameter                               | Specification |          |                      | Unit      | Condition   |  |
|--|---|---------------|----------|----------------------|-----------|---|--|
| FFrequency Range Voltage Gain   10.7   60   60   152   0   1   10.7   60   152   10   1   10.7   160   152   10   1   10.7   160   152   10   1   10.7   160   162   10   162   10   162   10   162   10   162   10   162   10   162   10   162   10   162   10   10   10   10   10   10   10   1  | Parameter                               | Min.          | Тур.     | Max.                 | Unit      | Condition   |  |
| Voltage Gain     60     dB     IF=10.7MHz       IF2 Input Impedance     1     kΩ       Demod Input Impedance     10     kΩ       FM Output Impedance     500     Ω       PM Output Bandwidth     1.6     MHz       Data Output Bandwidth     1.4     MHz       Data Output Bandwidth     1.4     MHz       Data Output Bandwidth     1.4     MHz       Data Output Bandwidth     2.6     V     Z <sub>LOAD</sub> =1MΩ [I 3pF; Output voltage is proportional with the instantaneous frequency deviation.       FM Output AC Level     2.6     V     Z <sub>LOAD</sub> =10kΩ       Power Down Control     2.0     V     Voltage supplied to the input Control Input Impedance       Power Supply     3.6     V     Specifications Operating limits       Current Consumption     37.3     mA     TX Mode, LVL ADJ=3.6V       MA TX Mode, LVL ADJ=0V     MA     Power Down Mode       NA TX Mode, Current is adjustable Power Down Mode       PLL Only Mode  | Second IF Section                       |               |          |                      |           |   |  |
| IF2 Input Impedance   IF2 Output Impedance   IF2 Output Impedance   IF2 Output Impedance   IF2 Output Impedance   IF3 Output Impedance   IF4 Output Impedance   IF6 Output Impedance   IF6 Output Bandwidth   IF6 Output Impedance  | IF Frequency Range                      | 0.1           | 10.7     | 22                   | MHz       |   |  |
| IF2 Output Impedance Demod Input Impedance Demod Input Impedance Data Output Impedance PM Output Bandwidth Data Output Bandwidth 1.4 Data Output Bandwidth 1.4 Data Output Level 0.3 VCc-0.3 VZco-0.3 VZco-0.   |   |               | 60       |                      | dB        | IF=10.7MHz  |  |
| Demod Input Impedance FM Output Impedance FM Output Impedance FM Output Bandwidth Data Output Bandwidth Data Output Level Data Output Level Data Output Level  Data Output DC Level FM Output DC Level FM Output AC Level  Power Down Control Logical Controls "OFF" Control Input Impedance Power Supply Voltage  Current Consumption  Demodify Demodif  | IF2 Input Impedance                     |               | 330      |                      | Ω         |   |  |
| FM Output Impedance Data Output Impedance Data Output Impedance PM Output Bandwidth Data Output Level Data Output DC Level FM Output AC Level Data Output AC Level Degical Controls "ON" Logical Controls "OFF" Control Input Impedance Dewr Supply Voltage  Power Supply Voltage Data Output Impedance Data Output DC Level Data Output AC Level Data Output AC Level Data Output Mac Level Data Output Mac Level Data Output Impedance Data Output Impe  | IF2 Output Impedance                    |               | 1        |                      | kΩ        | At IF2 OUT pin  |  |
| Data Output Impedance   FM Output Bandwidth   1.4   0.3   V   V <sub>CC</sub> -0.3   V   Z <sub>LOAD</sub> =1MΩ    3pF; Output voltage is proportional with the instantaneous frequency deviation.   Z <sub>LOAD</sub> =10kΩ   T <sub>LOAD</sub> = |   |               | 10       |                      | kΩ        |   |  |
| FM Output Bandwidth Data Output Bandwidth Data Output Level  Data Output Level  Data Output Level  Data Output DC Level FM Output DC Level FM Output AC Level  Power Down Control Logical Controls "ON" Control Input Impedance  Power Supply Voltage  Current Consumption  Data Output Bandwidth Data Output Level  Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output Voltage Supplied to the input Data Output DC Level Data Output Voltage supplied to the input Data Output DC Level Data Output Voltage supplied to the input Data Output DC Level Data Output Voltage Supplied to the input Data Output DC Level Data Data Data Output Voltage Supplied to the input Data Output DC Level Data Data Data Data Data Data Data Data   | FM Output Impedance                     |               | 500      |                      | Ω         | . 63  |  |
| FM Output Bandwidth Data Output Bandwidth Data Output Level  Data Output Level  Data Output Level  Data Output DC Level FM Output DC Level FM Output AC Level  Power Down Control Logical Controls "ON" Control Input Impedance  Power Supply Voltage  Current Consumption  Data Output Bandwidth Data Output Level  Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output DC Level Data Output Voltage Supplied to the input Data Output DC Level Data Output Voltage supplied to the input Data Output DC Level Data Output Voltage supplied to the input Data Output DC Level Data Output Voltage Supplied to the input Data Output DC Level Data Data Data Output Voltage Supplied to the input Data Output DC Level Data Data Data Data Data Data Data Data   | Data Output Impedance                   |               | >1       |                      | $M\Omega$ |   |  |
| Data Output Level  Data Output DC Level FM Output DC Level FM Output AC Level Power Down Control Logical Controls "ON" Control Input Impedance  Power Supply Voltage  Current Consumption  Data Output Level  Douglar Control Supplies  Output AC Level  Douglar Control Supplies  Data Output DC Level Dugical Controls "ON" Douglar Control Supplies Data Output DC Level Dugical Controls "ON" Dugical Controls "OFF" Dontrol Input Impedance Data Output DC Level Dugical Controls "ON" Dugical Controls "OFF" Dontrol Input Impedance Data Output DC Level Dugical Controls "ON" Dugical Controls "OFF" Dontrol Input Impedance Data Output Voltage Supplied to the input Dugical Control Supplies Data Output Voltage Supplied to the input Voltage Supplied to the input Voltage Supplied to the input Dugical Control Supplies Data Output Voltage Supplied to the input Voltage Supplied to the input Dugical Control Supplies Supplied to the input Voltage Supplied to the input Dugical Control Supplies Supplied Supplies  |   |               | 1.6      |                      | MHz       |   |  |
| FM Output DC Level FM Output AC Level FM Output AC Level  Power Down Control Logical Controls "OF" Control Input Impedance  Power Supply Voltage  Current Consumption  Signature  A Specifications  A Specifications  A Specifications  A Specifications  A Operating limits  A TX Mode, LVL ADJ=3.6V  TX Mode, LVL ADJ=3.6V  TX Mode, LVL ADJ=0V  A RX Mode; Current is adjustable Power Down Mode PLL Only Mode  | Data Output Bandwidth                   | 1.4           |          |                      | MHz       |   |  |
| FM Output DC Level FM Output AC Level FM Output AC Level  Power Down Control Logical Controls "ON" Logical Controls "OFF" Control Input Impedance  Power Supply Voltage  3.6 2.7 to 5.0 Current Consumption  3.8  2.7 to 18 3.8  2.8   | Data Output Level                       | 0.3           |          | V <sub>CC</sub> -0.3 | V         | $Z_{I,OAD}=1M\Omega \parallel 3pF$ ; Output voltage is pro- |  |
| FM Output DC Level FM Output AC Level Power Down Control Logical Controls "OFF" Control Input Impedance  2.6  Power Supply Voltage  3.6  2.7 to 5.0  Current Consumption  2.0  3.8  2.7 to 5.8  2.7 to 5.8  3.8  2.7 to 5.8  2.8  2.9  2.9  2.0  3.6  2.7 to 5.8  2.7 to 5.8  3.6  2.7 to 5.8  3.7 3  10.9  10 to 18  3.8  1  3.8  1  3.8  1  3.8  2.7 to 5.9  4.0 V  Voltage supplied to the input Voltage  |   |               |          |                      |           |   |  |
| FM Output AC Level  Power Down Control Logical Controls "ON" Logical Controls "OFF" Control Input Impedance  Power Supply Voltage  Current Consumption  3.6 2.7 to 5.0 3.7.3 3.3 3.4 10.9 10 to 18 3.8  1  |   |               |          |                      |           | deviation.  |  |
| FM Output AC Level   200   mV <sub>PP</sub>   Z <sub>LOAD</sub> >10kΩ  | FM Output DC Level                      |               | 2.6      |                      | V         | $Z_{LOAD}$ >10k $\Omega$                                    |  |
| Power Down Control         Logical Controls "ON"       2.0         Logical Controls "OFF"       2.0         Control Input Impedance       25k         Power Supply       3.6         Voltage       V         Specifications       Operating limits         TX Mode, LVL ADJ=3.6V       TX Mode, LVL ADJ=3.6V         TX Mode, LVL ADJ=0V       MA         RX Mode; Current is adjustable       Power Down Mode         POWER Down Mode       PLL Only Mode   | FM Output AC Level                      |               | 200      |                      | $mV_{PP}$ |   |  |
| Logical Controls "ON"       2.0       1.0       V       Voltage supplied to the input Voltage Specifications         Current Consumption       3.6       V       Specifications Operating limits TX Mode, LVL ADJ=3.6V TX Mode, LVL ADJ=0V TX Mode TX Mod  | Power Down Control                      |               |          |                      |           | 20,10   |  |
| Logical Controls "OFF" Control Input Impedance  Power Supply Voltage  3.6 2.7 to 5.0 37.3 10.9 10 to 18 1  |   | 2.0           |          |                      | V         | Voltage supplied to the input                               |  |
| Control Input Impedance  Power Supply  Voltage  3.6 2.7 to 5.0 Current Consumption  37.3 10.9 10 to 18 1 μA Power Down Mode PLL Only Mode  |   |               |          | 1.0                  |           |   |  |
| Power Supply Voltage  3.6 2.7 to 5.0 Current Consumption  37.3 10.9 10 to 18 3.8  V Specifications Operating limits TX Mode, LVL ADJ=3.6V TX Mode, LVL ADJ=0V RX Mode; Current is adjustable Power Down Mode PLL Only Mode   |   | 25k           |          |                      |           | violage supplied to the input                               |  |
| Voltage  3.6 2.7 to 5.0 37.3 10.9 10 to 18 1 3.8 1 2.7 to 5.0 37.3 10.9 10 to 18 1 3.8 1 2.7 to 5.0 37.3 10.9 10 to 18 1 3.8 1 3.8 1 3.8 2.7 to 5.0 37.3 10.9 10 to 18 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   |   |               |          |                      |           |   |  |
| Current Consumption  2.7 to 5.0 37.3 10.9 10 to 18 1 2.7 to 5.0 37.3 10.9 10 to 18 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   |   |               | 3.6      |                      | V         | Specifications  |  |
| Current Consumption  37.3 10.9 10 to 18 1 μA Power Down Mode PLL Only Mode  TX Mode, LVL ADJ=3.6V TX Mode, LVL ADJ=0V RX Mode; Current is adjustable Power Down Mode PLL Only Mode   | vollago                                 |               |          |                      |           | 1 -   |  |
| 10.9 10 to 18 1 μA μA μA μL Only Mode 3.8  TX Mode, LVL ADJ=0V RX Mode; Current is adjustable Power Down Mode PLL Only Mode  | Current Consumption                     |               |          |                      |           |   |  |
| 10 to 18 1 μA μA PLL Only Mode  3.8 1 μΑ Power Down Mode PLL Only Mode   | , |               | 10.9     |                      |           |   |  |
| 3.8 Power Down Mode PLL Only Mode  |   |               | 10 to 18 |                      | mA        |   |  |
| 3.8 mA PLL Only Mode   |   |               |          | 1                    | μΑ        |   |  |
|  |   |               | 3.8      |                      |           | PLL Only Mode   |  |
|  |   |               |          |                      |           |   |  |

# RF2926

| Pin | Function | Description  | Interface Schematic      |
|-----|----------|--|--------------------------|
| 1   | TX ENABL | Enables the transmitter circuits. TX ENABL>2.0V powers up all transmitter functions. TX ENABL<1.0V turns off all transmitter functions except the PLL functions.   | TX ENABL Ο 20 kΩ 40 kΩ = |
| 2   | TX OUT   | RF output pin for the transmitter electronics. TX OUT output impedance is a low impedance (see output impedance plot in Figure TBD) when the transmitter is enabled. TX OUT is a high impedance when the transmitter is disabled.  | 20 \$ O TX OUT           |
| 3   | GND2     | Ground connection for the 40 dB IF limiting amplifier and Tx PA functions. Keep traces physically short and connect immediately to ground plane for best performance.  |                          |
| 4   | RX IN    | RF input pin for the receiver electronics. RX IN input impedance is a low impedance (see input impedance plot in Figure TBD) when the receiver is enabled. RX IN is a high impedance when the receiver is disabled.  | S00 RX IN                |
| 5   | GND1     | Ground connection for RF receiver functions. Keep traces physically short and connect immediately to ground plane for best performance.  |                          |
| 6   | LNA GND  | Ground connection for the LNA.   |                          |
| 7   | LNA GND  | Ground connection for the LNA.   |                          |
| 8   | LNA OUT  | Output pin for the receiver RF low noise amplifier. This pin is an open collector output and requires an external pull up coil to provide bias and tune the LNA output. A capacitor in series with this output can be used to match the LNA to $50\Omega$ impedance image filters. | V C LNA OUT              |
| 9   | GND3     | Same as pin 4.   |                          |
| 10  | MIX IN   | RF input to the RF Mixer. An LC matching network between LNA OUT and MIX IN can be used to connect the LNA output to the RF mixer input in applications where an image filter is not needed or desired.  | MIX IN O GND5            |
| 11  | GND5     | GND5 is the ground connection shared by the input stage of the transmit power amplifier and the receiver RF mixer.   |                          |
| 12  | MIX OUT+ | Complementary (with respect to pin 13) IF output from the RF mixer. Alternately, an IF tank can be used to tailor the IF frequency and bandwidth to meet the needs of a given application.   | MIX OUT+ O MIX OUT-      |
| 13  | MIX OUT- | IF output from the RF mixer. For a balanced mixer output, pull-up inductors from pin 12 and 13 to $V_{\rm CC}$ and a capacitor between the pins should be used. The sum of the total pull-up inductance should be used to resonate the capacitor between pins 12 and 13.           | See pin 12.              |
| 14  | IF1 BP+  | DC feedback node for the 40dB limiting amplifier strip. A 10nF bypass capacitor from this pin to ground is required.   | See pin 16.              |
| 15  | IF1 IN   | IF input to the 40dB limiting amplifier strip. A DC blocking capacitor is required on this input. The value of this capacitor should be small enough as to not attenuate the IF frequency when terminated into the $330\Omega$ input impedance.                                    | IF1 BP+                  |

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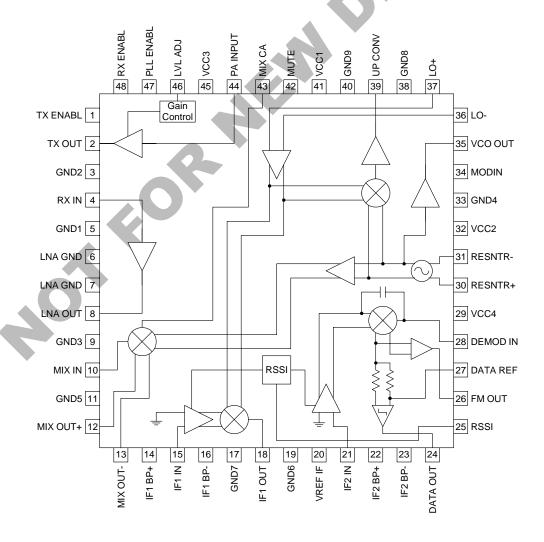
| Pin | Function | Description   | Interface Schematic  |
|-----|----------|---|--|
| 16  | IF1 BP-  | See pin 14.   | See pin 15.  |
| 17  | GND7     | Ground connection for 40dB IF limiting amplifier. Keep traces physically short and connect immediately to ground plane for best performance.  |  |
| 18  | IF1 OUT  | IF output from the 40dB limiting amplifier. The IF1 OUT output presents a nominal 330 $\Omega$ output resistance and interfaces directly to 10.7MHz ceramic filters.  | O IF1 OUT  |
| 19  | GND6     | Ground connection for 60dB IF limiting amplifier. Keep traces physically short and connect immediately to ground plane for best performance.  |  |
| 20  | VREF IF  | DC voltage reference for the IF limiting amplifiers. A 10nF capacitor from this pin to ground is required.  |  |
| 21  | IF2 IN   | IF input to the 60dB limiting amplifier strip. A 10nF DC blocking capacitor is required on this input. The IF2 IN input presents a nominal 330 $\Omega$ input resistance and interfaces directly to 10.7MHz ceramic filters.  | IF2 BP+ IF2 BP-<br>60 kΩ ○ ○ 60 kΩ<br>330 ≷ 330              |
| 22  | IF2 BP+  | DC feedback node for the 60dB limiting amplifier strip. A 10nF bypass capacitor from this pin to ground is required.  | See pin 20.  |
| 23  | IF2 BP-  | See pin 21.   | See pin 20.  |
| 24  | DATA OUT | Demodulated data output from the demodulator. Output levels on this are TTL/CMOS compatible. The magnitude of the load impedance is intended to be $1\text{M}\Omega$ or greater.  | DATA OUT   |
| 25  | RSSI     | A DC voltage proportional to the received signal strength is output from this pin. The output voltage range is 0.5V to 2.5V and increases with increasing signal strength.  | V <sub>CC</sub> O RSSI                                       |
| 26  | FM OUT   | Linear output from the FM demodulator. This pin is used in analog applications when signal fidelity is important.   | FM OUT   |
| 27  | DATA REF | This pin is used for setting the adaptive Data Slicer DC reference level. A capacitor from this pin to ground can be used to set the reference level at the average DC level of the data bit stream. The DC level determines the bit decision threshold.  | 50 kΩ<br>————————————————————————————————————                |
| 28  | DEMOD IN | This pin is the input to the FM demodulator. This pin is NOT AC coupled. Therefore, a DC blocking capacitor is required on this pin to avoid shorting the demodulator input with the LC tank. A ceramic discriminator or DC blocked LC tank resonant at the IF should be connected to this pin. | V <sub>CC</sub> IF Output  V <sub>CC</sub> 10 kΩ  DEMOD IN 0 |
| 29  | VCC4     | This pin is used is supply DC bias to the 60dB IF limiting amplifier. An IF bypass capacitor should be connected directly to this pin and returned to ground. A 10nF capacitor is recommended for 10.7MHz IF applications.  |  |

| Pin | Function | Description   | Interface Schematic   |
|-----|----------|---|---|
| 30  | RESNTR+  | This port is used to supply DC voltage to the VCO as well as to tune the center frequency of the VCO. Equal value inductors should be connected to this pin and pin 31 although a small imbalance can be used to tune in the proper frequency range.  | RESNTR+ $\bigcirc$ RESNTR- $\bigcirc$ RESNTR- $\bigcirc$ MOD IN |
| 31  | RESNTR-  | See RESNTR+ description.  | See pin 30.   |
| 32  | VCC2     | This pin is used is supply DC bias to the VCO and buffer amps. A 10nF capacitor is recommended for 10.7MHz IF applications.   |   |
| 33  | GND4     | GND4 is the ground shared on chip by the VCO, prescaler, and PLL electronics.   |   |
| 34  | MOD IN   | FM analog or digital modulation can be imparted to the VCO through this pin. The VCO varies in accordance to the voltage level presented to this pin. To set the deviation to a desired level, a voltage divider referenced to $V_{\rm CC}$ is the recommended. This deviation is also dependent upon the overall capacitance of the external resonant circuit. | See pin 30.   |
| 35  | VCO OUT  | This pin is used is supply a buffered VCO output to go to the PLL chip. This pin has a DC bias and needs to be AC coupled.  | O VCO OUT   |
| 36  | LO-      | Balanced input for the first LO. This signal is presented to both the receiver second downconverter and transmit upconvertor.   | TO- O- O- TO-   |
| 37  | LO+      | Complementary input of LO   | See pin 36.   |
| 38  | GND8     | Ground for LO amp and transmit upconvertor. Keep traces physically short and immediately to the ground plane for best performance.  |   |
| 39  | UP CONV  | The output of the transmit signal upconvertor. This signal should be filtered to remove the undesired sideband and spurs before being applied to the PA input, pin 45.  |   |
| 40  | GND9     | Same as pin 38.   | See pin 38.   |
| 41  | VCC1     | This pin is used to supply DC bias to the receiver RF electronics. A RF bypass capacitor should be connected directly to this pin and returned to ground. A 100pF capacitor is recommended for 915MHz applications. A 220pF capacitor is recommended for 433MHz applications.   |   |
| 42  | MUTE     | This pin is used to mute the data output (DATA OUT). MUTE>2.0V turns the DATA OUT signal on. MUTE<1.0V turns the DATA OUT signal off. The MUTE signal should be logic low in the Sleep Mode.  | MUTE Ο 75 kΩ  |
| 43  | MIX CA   | Mixer Current Adjust. This pin is used to adjust the current in the receiver. A resistor connected to ground controls the bias current in the mixer. The resistor should vary between $1\mathrm{k}\Omega$ to open circuit to vary the current from $18\mathrm{m}A$ to $10.6\mathrm{m}A$   |   |
| 44  | PA INP   | Input of the transmit power amplifier.  |   |
| 45  | VCC3     | This pin is used to supply DC bias to the transmitter PA. A RF bypass capacitor should be connected directly to this pin and returned to ground. A 100pF capacitor is recommended for 915MHz applications. A 220pF capacitor is recommended for 433MHz applications.  |   |

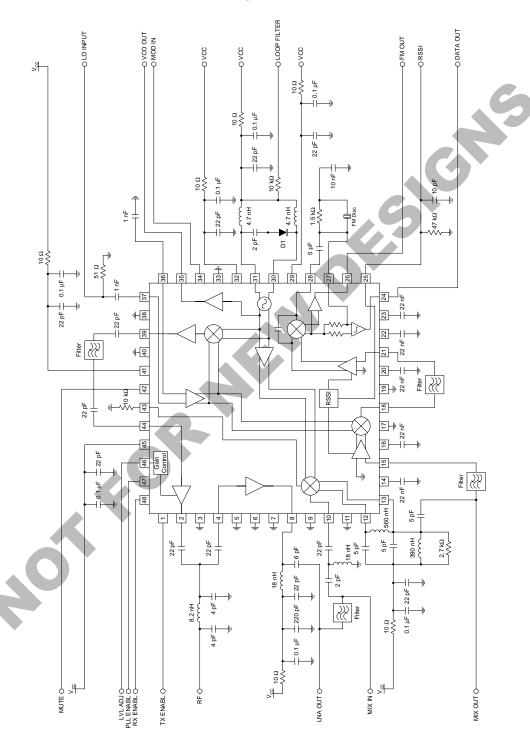
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| Pin | Function  | Description   | Interface Schematic  |
|-----|-----------|---|--|
| 46  | LVL ADJ   | This pin is used to vary the transmitter output power. An output level adjustment range greater than 12dB is provided through analog voltage control of this pin. DC current of the transmitter power amp is also reduced with output power. This pin MUST be low when the transmitter is disabled. | 40 kΩ<br>ΛΛΛ Ο LVL ADJ<br>2 400 2 4 kΩ                           |
| 47  | PLL ENABL | This pin is used to power up or down the VCO and PLL. A logic high (PLL ENABL>2.0V) powers up the VCO and PLL electronics. A logic low (PLL ENABL<1.0V) powers down the PLL and VCO.  | PLL ENABL Ο WW   |
| 48  | RX ENABL  | Enable pin for the receiver circuits. RX ENABL>2.0V powers up all receiver functions. RX ENABL<1.0V turns off all receiver functions except the PLL functions and the RF mixer.   | RX ENABL O $\longrightarrow$ $\longrightarrow$ $\longrightarrow$ |

### Pin Out



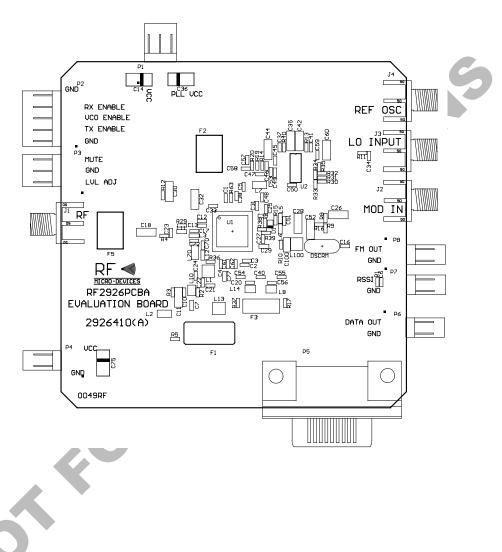
# Application Schematic 915MHz

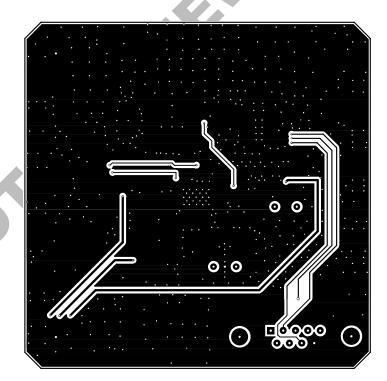


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## Evaluation Board Layout Board Size 3.04" x 3.04"

Board Thickness 0.031", Board Material FR-4





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