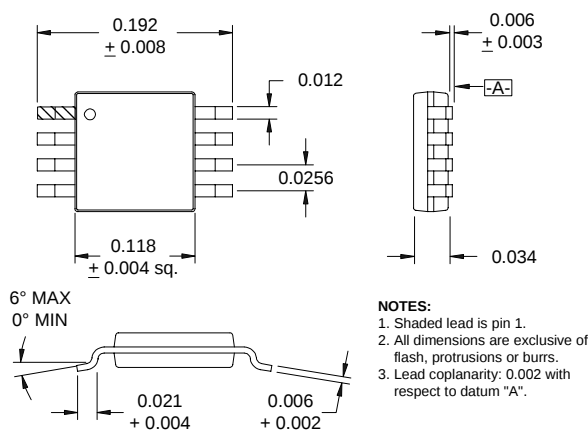


## Typical Applications

- W-CDMA Systems
- PCS/Cellular CDMA Systems
- PHS 1500/WLAN 2400 Systems
- General Purpose Upconverter
- BPSK Modulation
- Micro-Cell PCS Base Stations

## Product Description

The RF2638 is a complete upconverter designed for cellular, PCS and W-CDMA applications. This device may also be used to directly BPSK modulate a carrier. The unit operates at 3.0V and is designed as part of the RFMD PCS/Cellular CDMA and W-CDMA Chip Sets.



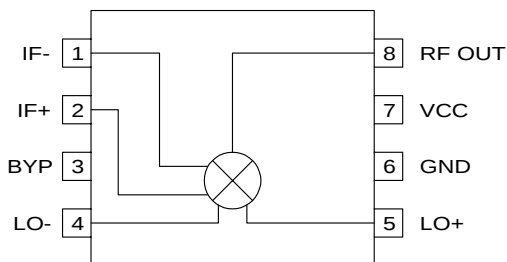
6

MIXERS

## Optimum Technology Matching® Applied

- |                                            |                                   |                                      |
|--------------------------------------------|-----------------------------------|--------------------------------------|
| <input checked="" type="checkbox"/> Si BJT | <input type="checkbox"/> GaAs HBT | <input type="checkbox"/> GaAs MESFET |
| <input type="checkbox"/> Si Bi-CMOS        | <input type="checkbox"/> SiGe HBT | <input type="checkbox"/> Si CMOS     |

Package Style: MSOP-8



Functional Block Diagram

## Features

- Supports Dual Mode Operation
- +10dBm Output IP3 (1950MHz)
- +13dBm Output IP3 (830MHz)
- Single 3.0V Power Supply
- Miniature 8-Pin Package
- Double-Balanced Mixer

## Ordering Information

|                     |                                             |
|---------------------|---------------------------------------------|
| RF2638              | W-CDMA and CDMA Upconverter/ BPSK Modulator |
| RF2638 PCBA-PCS/CEL | Fully Assembled Evaluation Board            |
| RF2638 PCBA-DO      | Fully Assembled Evaluation Board            |
| RF2638 PCBA-W       | Fully Assembled Evaluation Board            |

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<http://www.rfmd.com>

# RF2638

## Absolute Maximum Ratings

| Parameter                     | Rating       | Unit            |
|-------------------------------|--------------|-----------------|
| Supply Voltage                | -0.5 to +5.0 | V <sub>DC</sub> |
| Input RF Power                | +3           | dBm             |
| Operating Ambient Temperature | -30 to +80   | °C              |
| Storage Temperature           | -30 to +150  | °C              |



**Caution!** ESD sensitive device.

RF Micro Devices believes the furnished information is correct and accurate at the time of this printing. However, RF Micro Devices reserves the right to make changes to its products without notice. RF Micro Devices does not assume responsibility for the use of the described product(s).

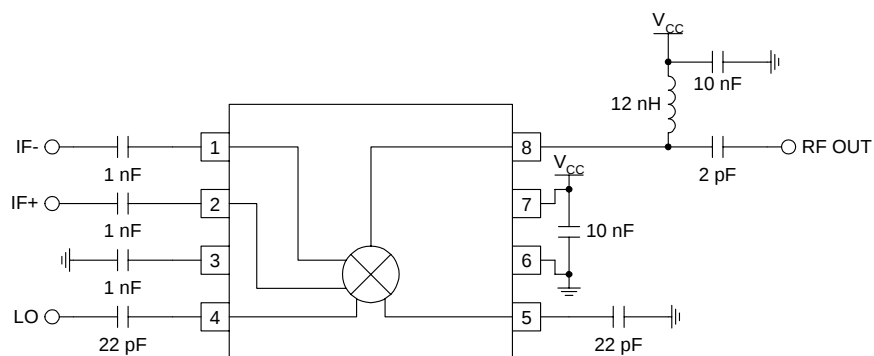
6

MIXERS

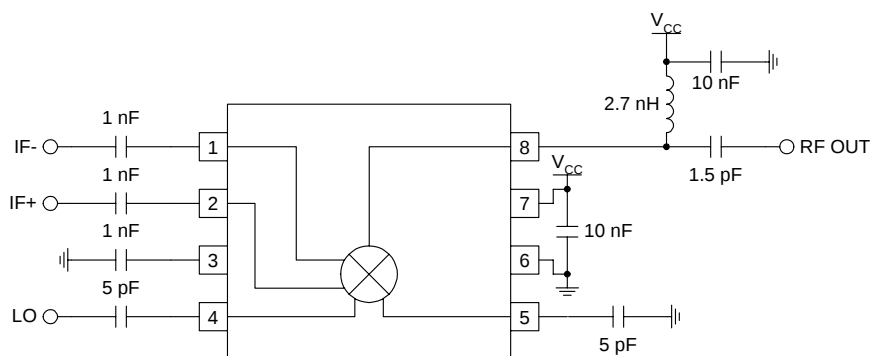
| Parameter                    | Specification |             |      | Unit | Condition                                                             |
|------------------------------|---------------|-------------|------|------|-----------------------------------------------------------------------|
|                              | Min.          | Typ.        | Max. |      |                                                                       |
| <b>Overall</b>               |               |             |      |      | T=25°C, V <sub>CC</sub> =3.0V                                         |
| RF Output Frequency Range    |               | 500 to 2500 |      | MHz  |                                                                       |
| Spurious Product Rejection   |               | 30          |      | dBc  | Referenced to RF output                                               |
| <b>Cellular</b>              |               |             |      |      | T=25°C, V <sub>CC</sub> =3.0V, LO=960MHz @ -3dBm, IF=130MHz @ -13dBm  |
| Conversion Gain              | -1            | -0.5        |      | dB   | RF <sub>OUT</sub> =830MHz                                             |
|                              | -2.2          | -1          |      | dB   | RF <sub>OUT</sub> =836MHz (Dual-Output board)                         |
| Noise Figure                 |               | 14          |      | dB   | RF <sub>OUT</sub> =830MHz                                             |
| Output IP3                   |               | +13         |      | dBm  | P <sub>IN</sub> =-13dBm per Tone, RF out=830MHz                       |
| <b>PCS</b>                   |               |             |      |      | T=25°C, V <sub>CC</sub> =3.0V, LO=1750MHz @ -3dBm, IF=130MHz @ -13dBm |
| Conversion Gain              | -3.0          | -1.5        |      | dB   | RF <sub>OUT</sub> =1880MHz                                            |
|                              | -3.5          | -2.5        |      | dB   | RF <sub>OUT</sub> =1880MHz (Dual-Output board)                        |
| Noise Figure                 |               | 15          |      | dB   | RF <sub>OUT</sub> =1880MHz                                            |
| Output IP3                   | +7            | +11         |      | dBm  | P <sub>IN</sub> =-13dBm per Tone, RF out=1880MHz                      |
| <b>W-CDMA</b>                |               |             |      |      | T=25°C, V <sub>CC</sub> =3.0V, LO=2330MHz @ -3dBm, IF=380MHz @ -13dBm |
| ACPR                         | -58           | -57         | -56  | dBc  |                                                                       |
| Conversion Gain              | -2.0          | -1.0        | 0    | dB   | RF <sub>OUT</sub> =1950MHz                                            |
| Noise Figure                 | 13            | 14          | 15   | dB   | RF <sub>OUT</sub> =1950MHz                                            |
| Output IP3                   | +8            | +10         |      | dBm  | P <sub>IN</sub> =-13dBm per Tone, RF <sub>OUT</sub> =1950MHz          |
| Max OIP3                     |               |             | 11   | dBm  |                                                                       |
| <b>IF Input</b>              |               |             |      |      |                                                                       |
| IF Frequency                 | DC            | 130/380     | 500  | MHz  |                                                                       |
| Differential Input Impedance | 220           | 260         | 300  | Ω    | IF=130MHz                                                             |
| IF to RF Output Isolation    |               | 30          |      | dB   |                                                                       |
| IF to LO Isolation           |               | 30          |      | dB   |                                                                       |
| <b>LO Input</b>              |               |             |      |      |                                                                       |
| LO Frequency Range           |               | 300 to 2700 |      | MHz  |                                                                       |
| LO Level                     |               | -6 to 0     |      | dBm  |                                                                       |
| LO to RF Output Leakage      | -18           | -25         |      | dBm  | At Cellular band, high side injection (Dual-Output board)             |
|                              | -15           | -17         |      | dBm  |                                                                       |
|                              | -14           | -15         |      | dBm  | At PCS band, low side injection (Dual-Output board)                   |
| RF to LO Isolation           |               | 30          |      | dB   |                                                                       |
| LO Input VSWR                |               | 2:1         |      |      | 50Ω                                                                   |
| <b>Power Supply</b>          |               |             |      |      |                                                                       |
| Voltage                      | 2.7           | 3.0         | 3.3  | V    |                                                                       |
| Current Consumption          |               | 25          |      | mA   |                                                                       |

| Pin | Function | Description                                                                                                                                                                                                                                                                             | Interface Schematic |
|-----|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1   | IF-      | Balanced IF input pin. This pin is internally DC-biased and should be DC-blocked if connected to a device with a DC level present. For single-ended input operation, one pin is used as an input and the other IF input is AC-coupled to ground. The balanced, input impedance is 260Ω. |                     |
| 2   | IF+      | Same as pin 1, except complementary input.                                                                                                                                                                                                                                              | See pin 1.          |
| 3   | BYP      | Bypass pin for internal bias circuitry. Bypass with a 1nF capacitor.                                                                                                                                                                                                                    |                     |
| 4   | LO-      | Balanced LO input pin. This pin is internally DC-biased and should be DC-blocked if connected to a device with a DC level present. For single-ended input operation, one pin is used as an input and the other LO input is AC-coupled to ground.                                        |                     |
| 5   | LO+      | Same as pin 4, except complementary input.                                                                                                                                                                                                                                              | See pin 4.          |
| 6   | GND      | Ground connection. For best performance, keep traces physically short and connect immediately to ground plane.                                                                                                                                                                          |                     |
| 7   | VCC      | Supply voltage pin. External bypassing is required. External RF, LO, and IF bypassing is required. The trace length between the pin and the bypass capacitors should be minimized. The ground side of the bypass capacitors should connect immediately to ground plane.                 |                     |
| 8   | RF OUT   | RF output pin.                                                                                                                                                                                                                                                                          |                     |

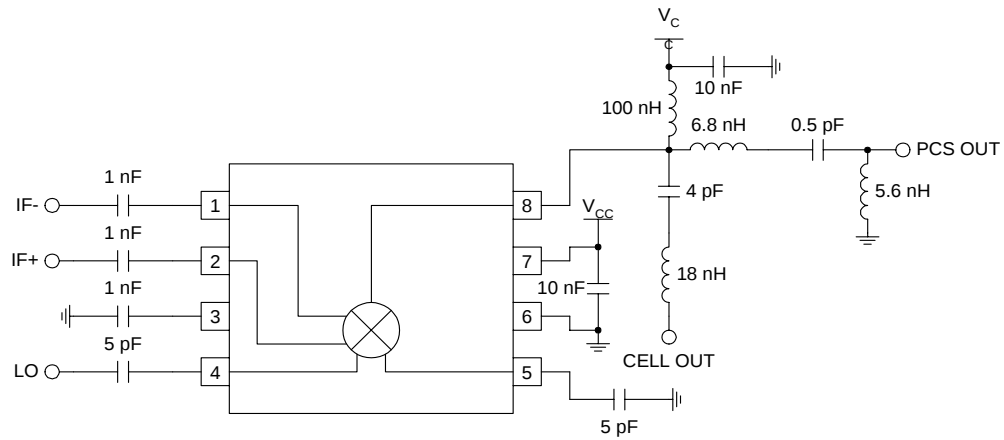
## Application Schematic 836 MHz



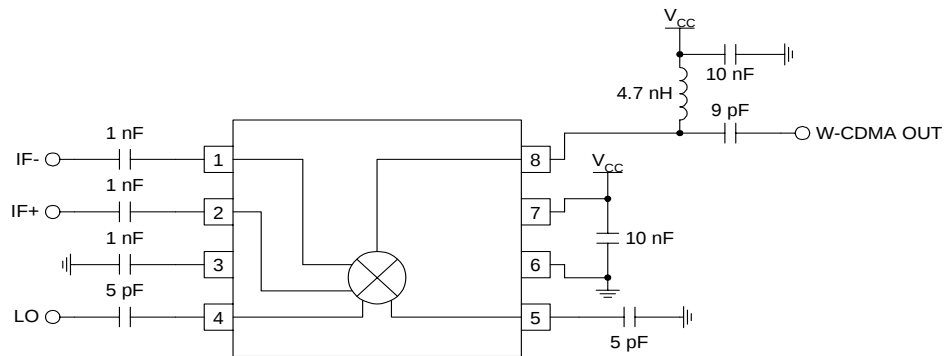
## Application Schematic 1880 MHz



# Application Schematic Dual-Band Output (836MHz/1880MHz)



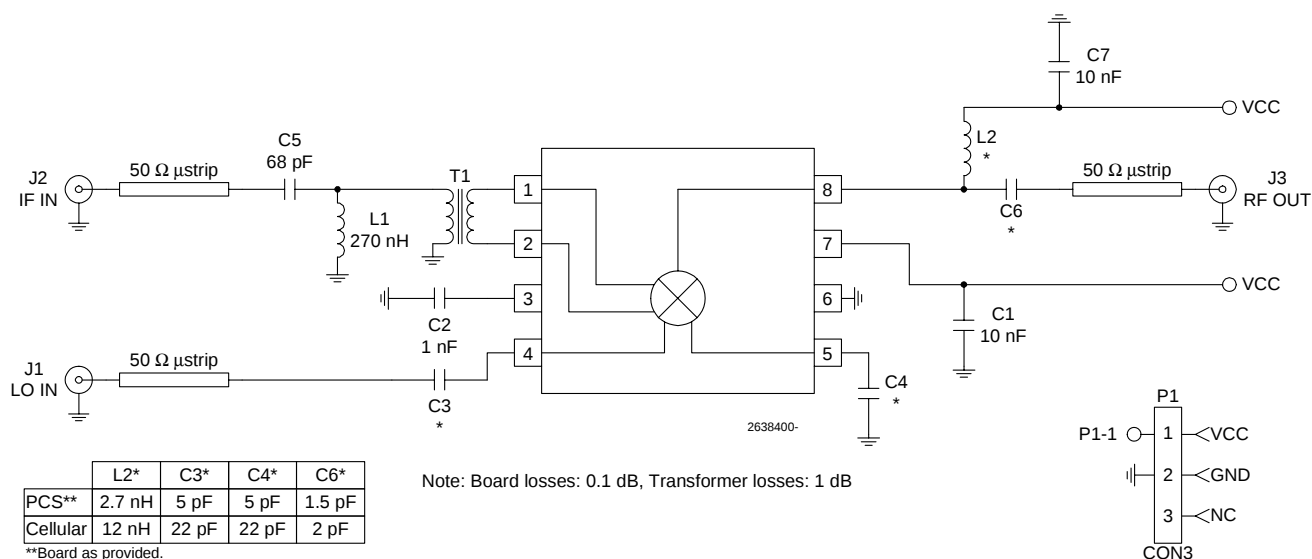
# Application Schematic W-CDMA (1950MHz)



## Evaluation Board Schematic - PCS/Cellular

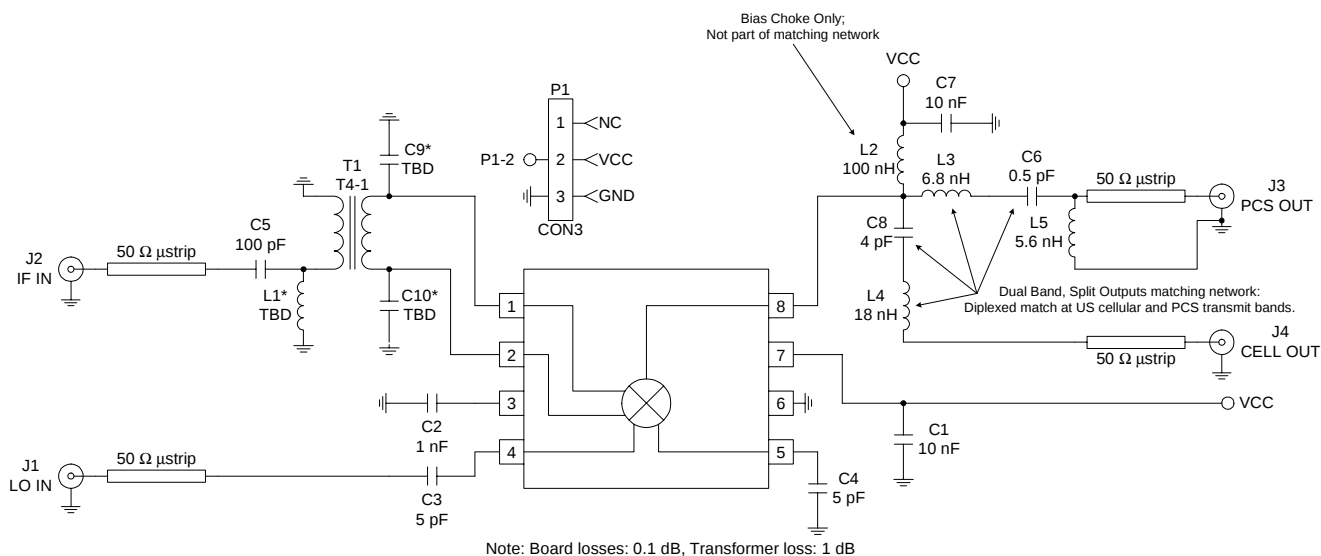
RF=1880 MHz, IF=130 MHz

(Download [Bill of Materials](http://www.rfmd.com) from [www.rfmd.com](http://www.rfmd.com).)



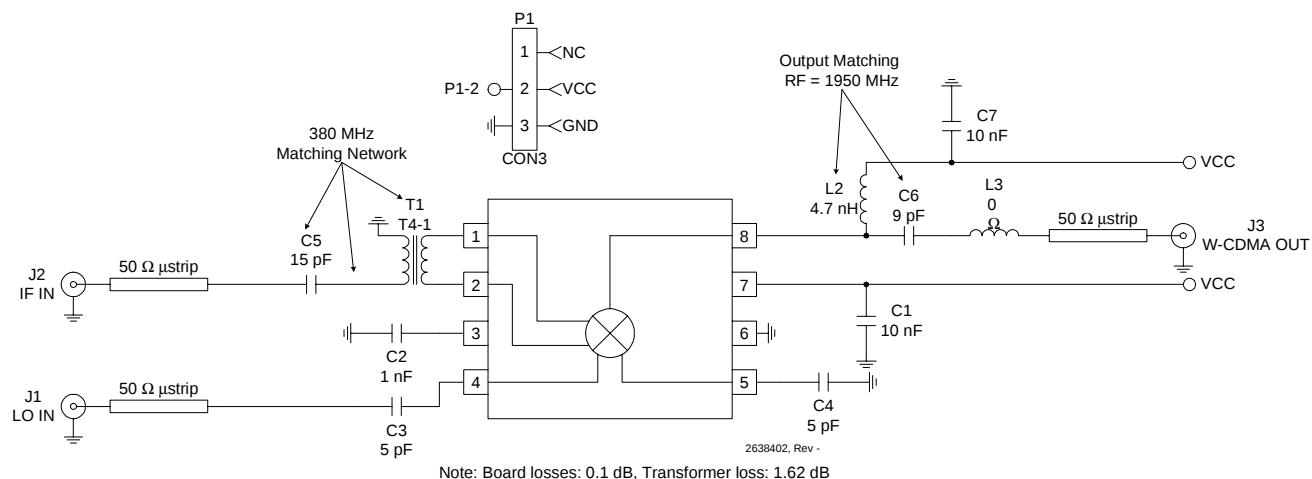
## Evaluation Board Schematic - Dual Output

Cellular Out=836 MHz, PCS Out=1880 MHz, IF=130 MHz

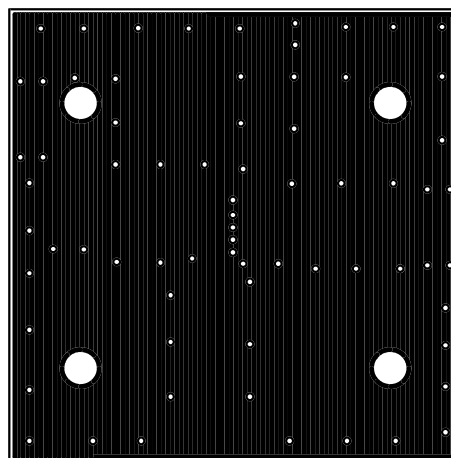
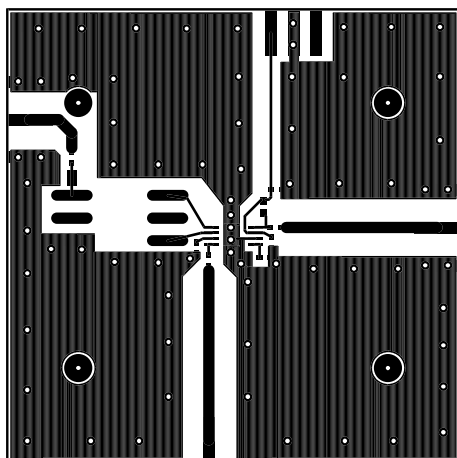
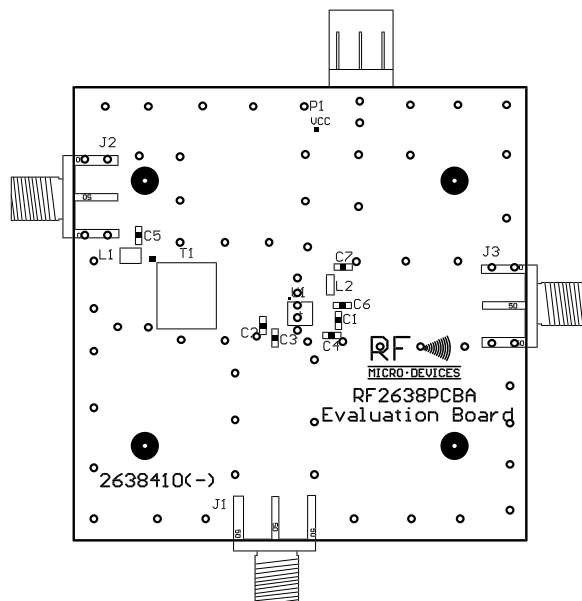


2638401, Rev 1

## Evaluation Board Schematic - W-CDMA RF=1950MHz, IF=380MHz



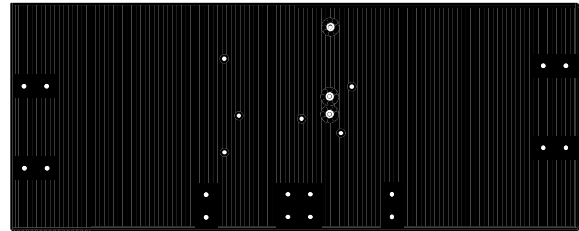
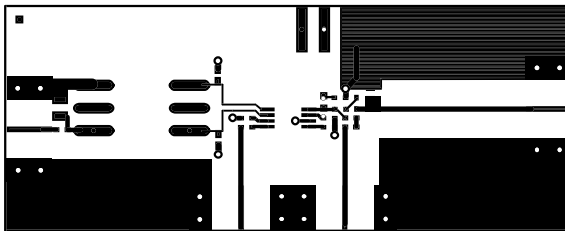
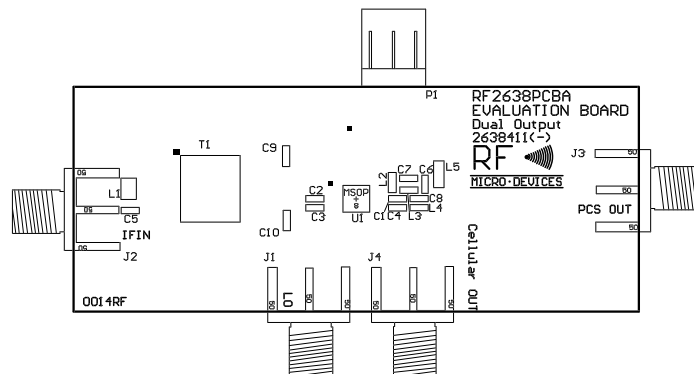
## Evaluation Board Layout PCS/Cellular Board Size 2.0" x 2.0" Board Thickness 0.031", Board Material FR-4



## Evaluation Board Layout Dual Output

Board Size 2.5" x 1.0"

Board Thickness 0.060", Board Material FR-4, Multi-Layer  
(Intermediate layers (Ground Plane and Power Plane [ $V_{CC1}$ ]) are not shown.)



## Evaluation Board Layout W-CDMA

Board Size 2.5" x 1.0"

Board Thickness 0.060", Board Material FR-4, Multi-Layer  
(Intermediate layers (Ground Plane and Power Plane [V<sub>CC1</sub>]) are not shown.)

