



Package Style: QFN, 16-Pin, 3mm x 3mm x 0.45mm

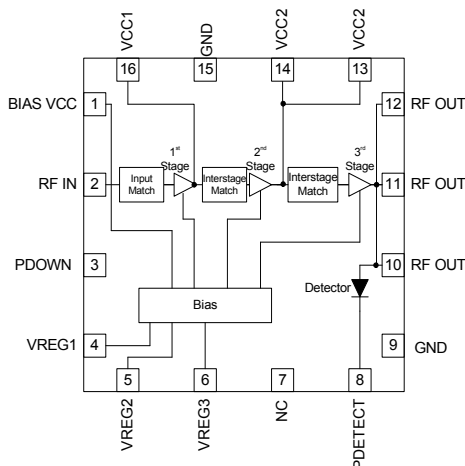


## Features

- 32dB to 34dB Small Signal Gain
- 2.5% EVM (RMS) at 27dBm, 5.0V
- 2.5% EVM (RMS) at 25.5dBm, 4.2V
- 2.5% EVM (RMS) at 24dBm, 3.3V
- Integrated Power Detector on Die
- Multiple Frequency Ranges
- High Impedance Control

## Applications

- IEEE 802.11b/g/n WiFi Systems
- 2.4GHz ISM Band Applications
- Commercial and Consumer Systems
- WiBro 2.3GHz to 2.4GHz Band Applications
- WiFi 2.4GHz to 2.5GHz Band Applications
- WiMAX 2.5GHz to 2.7GHz Band Applications



Functional Block Diagram

## Product Description

The RF5602 is a linear power amplifier IC designed specifically for medium power applications. The device is manufactured on an advanced InGaP Heterojunction Bipolar Transistor (HBT) process, and has been designed for use as the final RF amplifier in 802.11b/g/n access point transmitters. The device is provided in a 3mm x 3mm x 0.45mm, 16-pin, leadless chip carrier with a backside ground. The RF5602 is designed to maintain linearity over a wide range of supply voltages and power outputs.

### Optimum Technology Matching® Applied

- |   |                                      |                                     |                                    |
|---|--------------------------------------|-------------------------------------|------------------------------------|
| <input type="checkbox"/> GaAs HBT             | <input 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"/> BiFET HBT |
| <input checked="" 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            |
|-------------------------------|---------------|-----------------|
| Supply Voltage, RF applied    | -0.5 to +5.25 | V <sub>DC</sub> |
| Supply Voltage, no RF applied | -0.5 to +6.0  | V <sub>DC</sub> |
| DC Supply Current             | 800           | mA              |
| Input RF Power                | +10*          | dBm             |
| Operating Ambient Temperature | -40 to +85    | °C              |
| Storage Temperature           | -40 to +150   | °C              |
| Moisture Sensitivity          | MSL1          |                 |

\*Maximum Input Power with a 50Ω load

**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>WiFi IEEE 802.11b/g/n</b>  |               |      |      |      | Nominal Condition T = 25 °C, V <sub>CC</sub> = 3.3V, 4.2V, and 5V, V <sub>REG</sub> = 2.9V, Freq = 2450MHz, Duty Cycle 10 to 100% unless otherwise noted |
| Frequency Range               | 2400          |      | 2500 | MHz  |  |
| Compliance                    |               |      |      |      | IEEE 802.11g/n and IEEE 802.11b  |
| Output Power                  | 26            | 27   |      | dBm  | With a standard IEEE 802.11g waveform (54Mbit/s), V <sub>CC</sub> = 5.0V   |
| EVM                           |               | 2.5  | 3    | %    | RMS, Mean (at 100% duty cycle over Full V <sub>REG</sub> and frequency ranges)   |
| IEEE 802.11b P <sub>OUT</sub> | 28            | 28.5 |      | dBm  |  |
| ACP1                          |               | -34  | -30  |      | using a standard IEEE 802.11b waveform at 1Mbps  |
| ACP2                          |               | -54  | -50  |      | using a standard IEEE 802.11b waveform at 1Mbps  |
| Output Power                  | 25            | 25.5 |      | dBm  | With a standard IEEE 802.11g waveform (54Mbit/s), V <sub>CC</sub> = 4.2V   |
| EVM                           |               | 2.5  | 3    | %    | RMS, Mean (at 100% duty cycle over Full V <sub>REG</sub> and frequency ranges)   |
| IEEE 802.11b P <sub>OUT</sub> |               | 27   |      | dBm  |  |
| ACP1                          |               | -34  | -30  |      | using a standard IEEE 802.11b waveform at 1Mbps  |
| ACP2                          |               | -54  | -50  |      | using a standard IEEE 802.11b waveform at 1Mbps  |
| Output Power                  | 23.5          | 24   |      | dBm  | With a standard IEEE 802.11g waveform (54Mbit/s), V <sub>CC</sub> = 3.3V   |
| EVM                           |               | 2.5  | 3.5  | %    | RMS, Mean (at 100% duty cycle over Full V <sub>REG</sub> and frequency ranges)   |
| IEEE 802.11b P <sub>OUT</sub> |               | 25.5 |      | dBm  |  |
| ACP1                          |               | -34  | -30  |      | using a standard IEEE 802.11b waveform at 1Mbps  |
| ACP2                          |               | -54  | -50  |      | using a standard IEEE 802.11b waveform at 1Mbps  |

| Parameter   | Specification |        |      | Unit            | Condition   |
|---|---------------|--------|------|-----------------|---|
|   | Min.          | Typ.   | Max. |                 |   |
| <b>WiFi IEEE 802.11b/g/n, cont.</b>               |               |        |      |                 | Nominal Condition T = 25 °C, V <sub>CC</sub> = 3.3V, 4.2V, and 5V, V <sub>REG</sub> = 2.9V, Freq = 2450MHz, Duty Cycle 10 to 100% unless otherwise noted    |
| Gain  | 31            | 34     |      | dB              | At nominal condition and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and Frequency)   |
|   | 31            | 34     |      | dB              | At nominal condition and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and Frequency)   |
|   | 31            | 34     |      | dB              | At nominal condition and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and Frequency)   |
| Gain Variation over Temperature                   | -2            |        | 2    | dB              | -40 °C to +85 °C  |
| Power Detector                                    | +10           |        | +29  | dBm             | Power detector usable range   |
| Input Impedance                                   |               | 50     |      | Ω               | Input matched to 50Ω  |
| Output P1dB                                       |               | 33     |      | dBm             | At nominal conditions with CW signal and V <sub>CC</sub> = 5.0V   |
|   |               | 32     |      | dBm             | At nominal conditions with CW signal and V <sub>CC</sub> = 4.2V   |
|   |               | 30.5   |      | dBm             | At nominal conditions with CW signal and V <sub>CC</sub> = 3.3V   |
| <b>Power Down</b>                                 |               |        |      |                 |   |
| PA is "OFF"                                       |               |        | 0.6  | V <sub>CC</sub> |   |
| PA is "ON"  | 1.75          | 2.9    | 5.0  | V <sub>DC</sub> |   |
| <b>Power Supply</b>                               |               |        |      |                 |   |
| Operating Voltage                                 |               | 3 to 5 |      | V               |   |
| Current Consumption                               |               | 450    | 600  | mA              | RF P <sub>OUT</sub> = +26dBm and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and frequency)   |
|   |               | 175    | 225  | mA              | Idle current, No RF and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and frequency)  |
|   |               | 400    | 475  | mA              | RF P <sub>OUT</sub> = +25dBm and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and frequency)   |
|   |               | 160    | 210  | mA              | Idle current, No RF and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and frequency)  |
|   |               | 350    | 400  | mA              | RF P <sub>OUT</sub> = +23.5dBm and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and frequency)   |
|   |               | 150    | 180  | mA              | Idle current, No RF and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and frequency)  |
| Power Down Current                                |               |        | 10   | mA              | P <sub>DOWN</sub> = Low, V <sub>REG</sub> = High (I <sub>CC</sub> + I <sub>BIAS</sub> + I <sub>REG</sub> )  |
| Leakage Current                                   |               | 0.2    | 1    | mA              | V <sub>REG</sub> = P <sub>DOWN</sub> = 0V, V <sub>CC</sub> = 3.3V, RF = OFF (I <sub>CC</sub> + I <sub>BIAS</sub> + I <sub>REG</sub> )                       |
| V <sub>REG</sub> Voltage (at Eval Board VREG pin) | 2.8           | 2.9    | 3.0  | VDC             | Higher V <sub>REG</sub> voltage is possible but with adjusting the series resistors to keep the voltage constant at VREG pin of Eval board at R1, R2 and R3 |
|   |               | 5      | 10   | mA              | I <sub>REG</sub> Current  |

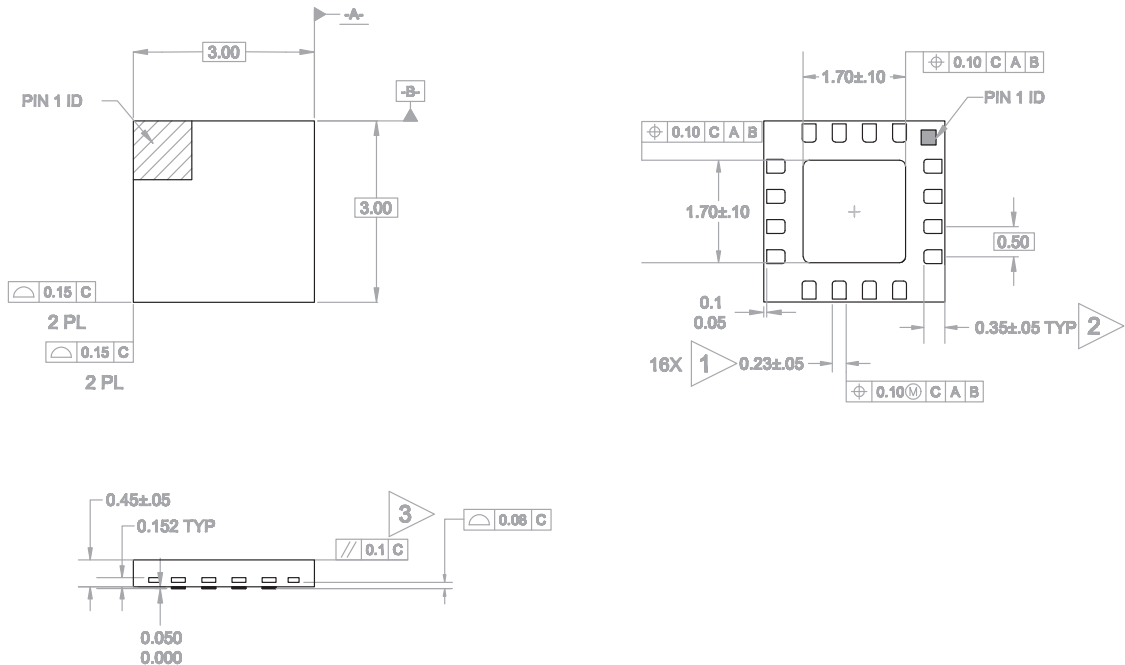
| Parameter                       | Specification |        |      | Unit            | Condition   |
|---------------------------------|---------------|--------|------|-----------------|---|
|                                 | Min.          | Typ.   | Max. |                 |   |
| <b>WiMax IEEE 802.16e</b>       |               |        |      |                 | Nominal Condition T = 25 °C, V <sub>CC</sub> = 3.3V, 4.2V, 5V, V <sub>REG</sub> = 2.9V, Freq = 2600MHz, Duty Cycle 1 to 100% unless otherwise noted   |
| Frequency Range                 | 2500          |        | 2700 | MHz             |   |
| Compliance                      |               |        |      |                 | IEEE 802.16e  |
| Output Power                    | 26            | 26.5   |      | dBm             | Measured standard IEEE 802.16e waveform (16QAM, 10MHz BW), V <sub>CC</sub> = 5.0V   |
| EVM                             |               | 2.5    | 3    | %               | RMS, Mean   |
| Output Power                    | 25            | 25.5   |      | dBm             | Measured standard IEEE 802.16e waveform (16QAM, 10MHz BW), V <sub>CC</sub> = 4.2V   |
| EVM                             |               | 2      | 3.0  | %               | RMS, Mean   |
| Output Power                    | 23.5          | 24     |      | dBm             | Measured standard IEEE 802.16e waveform (16QAM, 10MHz BW), V <sub>CC</sub> = 3.3V   |
| EVM                             |               | 3      | 4    | %               | RMS, Mean   |
| Gain                            | 31            | 32     |      | dB              | At nominal condition and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and frequency)   |
|                                 | 31            | 32     |      | dB              | At nominal condition and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and frequency)   |
|                                 | 31            | 32     |      | dB              | At nominal condition and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and frequency)   |
| Gain variation over temperature | -2            |        | 2    | dB              | -40 °C to +85 °C  |
| Power Detector                  | +10           |        | +29  | dB              | Power detector usable range   |
| Low Gain Mode (Gain Reduction)  |               | 33     |      | dB              | At V <sub>CC</sub> = 5.0V, V <sub>REG</sub> 1 and 3 = 2.9V, V <sub>REG</sub> 2 = Low, and Temp = 25 °C (In this mode, the gain of the power amplifier drops by 33dB typical from its original gain) |
| Input Impedance                 |               | 50     |      | Ω               | Input matched to 50Ω  |
| Output P1dB                     |               | 33     |      | dBm             | At nominal conditions with CW Signal and V <sub>CC</sub> = 5.0V   |
|                                 |               | 32     |      | dBm             | At nominal conditions with CW Signal and V <sub>CC</sub> = 4.2V   |
|                                 |               | 30.5   |      | dBm             | At nominal conditions with CW Signal and V <sub>CC</sub> = 3.3V   |
| <b>Power Down</b>               |               |        |      |                 |   |
| PA is "OFF"                     |               |        | 0.6  | V <sub>CC</sub> |   |
| PA is "ON"                      | 1.75          | 2.9    | 5.0  | V <sub>DC</sub> |   |
| <b>Power Supply</b>             |               |        |      |                 |   |
| Operating Voltage               |               | 3 to 5 |      | V               |   |
| Current Consumption             |               | 500    | 600  | mA              | RF P <sub>OUT</sub> = +26dBm and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and frequency)   |
|                                 |               | 175    | 225  | mA              | Idle current, No RF and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and frequency)  |
|                                 |               | 400    | 475  | mA              | RF P <sub>OUT</sub> = +25dBm and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and frequency)   |
|                                 |               | 160    | 210  | mA              | Idle current, No RF and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and frequency)  |
|                                 |               | 350    | 400  | mA              | RF P <sub>OUT</sub> = +23.5dBm and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and frequency)   |
|                                 |               | 150    | 180  | mA              | Idle current, No RF and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and frequency)  |

| Parameter                       | Specification |      |      | Unit            | Condition   |
|---------------------------------|---------------|------|------|-----------------|---|
|                                 | Min.          | Typ. | Max. |                 |   |
| Power Supply, cont.             |               |      |      |                 |   |
| Power Down Current              |               |      | 10   | mA              | P <sub>DOWN</sub> = Low, V <sub>REG</sub> = High (I <sub>CC</sub> + I <sub>BIAS</sub> + I <sub>REG</sub> )  |
| Leakage Current                 |               | 0.2  | 1    | mA              | V <sub>REG</sub> = P <sub>DOWN</sub> = 0V, V <sub>CC</sub> = 3.3V, RF = OFF (I <sub>CC</sub> + I <sub>BIAS</sub> + I <sub>REG</sub> )   |
| VREG1, 2, 3 Voltage             | 2.8           | 2.9  | 3.0  | V <sub>DC</sub> | Higher V <sub>REG</sub> voltage is possible but with adjusting the series resistors to keep the voltage constant at the pins.   |
|                                 |               | 5    | 10   | mA              | I <sub>REG</sub> Current  |
| WiBro IEEE 802.16e              |               |      |      |                 | Nominal Condition T = 25 °C, V <sub>CC</sub> = 3.3V, 4.2V, 5.0V, V <sub>REG</sub> = 2.9V, Freq = 2350MHz, Duty Cycle 1 to 100% unless otherwise noted   |
| Frequency Range                 | 2300          |      | 2400 | MHz             |   |
| Compliance                      |               |      |      |                 | IEEE 802.16e  |
| Output Power                    | 26            | 26.5 |      | dBm             | Measured standard IEEE 802.16e waveform (16QAM, 10MHz BW), V <sub>CC</sub> = 5.0V   |
| EVM                             |               | 2    | 3    | %               | RMS, Mean (Over V <sub>REG</sub> and frequency)   |
| Output Power                    | 25            | 25.5 |      | dBm             | Measured standard IEEE 802.16e waveform (16QAM, 10MHz BW), V <sub>CC</sub> = 4.2V   |
| EVM                             |               | 2    | 3    | %               | RMS, Mean (Over V <sub>REG</sub> and frequency)   |
| Output Power                    | 23.5          | 24   |      | dBm             | Measured standard IEEE 802.16e waveform (16QAM, 10MHz BW), V <sub>CC</sub> = 3.3V   |
| EVM                             |               | 3    | 4    | %               | RMS, Mean (Over V <sub>REG</sub> and frequency)   |
| Gain                            | 32            | 34   |      | dB              | At nominal condition and V <sub>CC</sub> = 5.0V   |
|                                 | 32            | 34   |      | dB              | At nominal condition and V <sub>CC</sub> = 4.2V   |
|                                 | 32            | 34   |      | dB              | At nominal condition and V <sub>CC</sub> = 3.3V   |
| Gain variation over temperature | -2            |      | 2    | ±dB             | -40 °C to +85 °C  |
| Power Detector                  | +10           |      | +29  |                 | Power detector usable range   |
| Low Gain Mode (Gain Reduction)  |               | 33   |      | dB              | At V <sub>CC</sub> = 5.0V, V <sub>REG</sub> 1 and 3 = 2.9V, V <sub>REG</sub> 2 = Low, and Temp = 25 °C (In this mode, the gain of the power amplifier drops by 33dB typical from its original gain) |
| Input Impedance                 |               | 50   |      | Ω               | Input matched to 50Ω  |
| Output P1dB                     |               | 33   |      | dBm             | At nominal conditions with CW Signal and V <sub>CC</sub> = 5.0V   |
|                                 |               | 32   |      | dBm             | At nominal conditions with CW Signal and V <sub>CC</sub> = 4.2V   |
|                                 |               | 30.5 |      | dBm             | At nominal conditions with CW Signal and V <sub>CC</sub> = 3.3V   |
| Power Down                      |               |      |      |                 |   |
| PA is OFF                       |               |      | 0.6  | V <sub>CC</sub> |   |
| PA is ON                        | 1.75          | 2.9  | 5.0  | V <sub>DC</sub> |   |

| Parameter  | Specification |        |      | Unit            | Condition   |
|--|---------------|--------|------|-----------------|---|
|  | Min.          | Typ.   | Max. |                 |   |
| Power Supply   |               |        |      |                 |   |
| Operating Voltage  |               | 3 to 5 |      | V               |   |
| Current Consumption  |               | 410    | 600  | mA              | RF P <sub>OUT</sub> = +26dBm and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and frequency)   |
|  |               | 175    | 225  | mA              | Idle Current, No RF and V <sub>CC</sub> = 5.0V (Over V <sub>REG</sub> and frequency)  |
|  |               | 400    | 475  | mA              | RF P <sub>OUT</sub> = +25dBm and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and frequency)   |
|  |               | 160    | 210  | mA              | Idle Current, No RF and V <sub>CC</sub> = 4.2V (Over V <sub>REG</sub> and frequency)  |
|  |               | 350    | 400  | mA              | RF P <sub>OUT</sub> = +23.5dBm and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and frequency)   |
|  |               | 150    | 180  | mA              | Idle Current, No RF and V <sub>CC</sub> = 3.3V (Over V <sub>REG</sub> and frequency)  |
| Power Down Current   |               |        | 10   | mA              | P <sub>DOWN</sub> = Low, V <sub>REG</sub> = High (I <sub>CC</sub> + I <sub>BIAS</sub> + I <sub>REG</sub> )  |
| Leakage Current  |               | 0.2    | 1    | mA              | V <sub>REG</sub> = P <sub>DOWN</sub> = 0V, V <sub>CC</sub> = 3.3V, RF = OFF (I <sub>CC</sub> + I <sub>BIAS</sub> + I <sub>REG</sub> )   |
| V <sub>REG</sub> Voltage (at Eval Board VREG pin)                          | 2.8           | 2.9    | 3    | V <sub>DC</sub> | Higher V <sub>REG</sub> voltage is possible but with adjusting the series resistors to keep the voltage constant at VREG pin of the Eval board at R1, R2 and R3   |
|  |               | 5      | 10   | mA              | I <sub>REG</sub> Current  |
| Thermal Data   |               |        |      |                 |   |
| Maximum Junction Temperature for long term reliability, T <sub>J</sub> Max |               | 150    |      | °C              | P <sub>OUT</sub> = 26dBm, Using a standard IEEE802.11g waveform, 54Mbps, 64QAM Duty Cycle = 100%, V <sub>CC</sub> = 5VDC, V <sub>REG</sub> = 2.85VDC. T <sub>REF</sub> = 85 °C                                    |
| Thermal Resistance, $\Theta_{jc}$  |               | 22     |      | °C/W            | P <sub>OUT</sub> = 26dBm, Using a standard IEEE802.11g waveform, 54Mbps, 64QAM Duty Cycle = 100%, V <sub>CC</sub> = 5VDC, V <sub>REG</sub> = 2.85VDC, Junction to bottom of QFN package. T <sub>REF</sub> = 85 °C |
| Thermal Resistance, $\Theta_{j-Ref}$                                       |               | 28     |      | °C/W            | P <sub>OUT</sub> = 26dBm, Using a standard IEEE802.11g waveform, 54Mbps, 64QAM Duty Cycle = 100%, V <sub>CC</sub> = 5VDC, V <sub>REG</sub> = 2.85VDC, Junction to bottom of PCB. T <sub>REF</sub> = 85 °C         |
| ESD  |               |        |      |                 |   |
| Human Body Model   | 500           |        |      | V               |   |
| Charge Device Model  | 750           |        |      | V               |   |

| Pin                 | Function                | Description   |
|---------------------|-------------------------|---|
| <b>1</b>            | <b>BIAS VCC</b>         | Supply voltage for the bias reference and control circuits. May be connected with VCC1 and VCC2 as long as $V_{CC}$ does not exceed $5.0V_{DC}$ in this configuration.                            |
| <b>2</b>            | <b>RF IN</b>            | RF input.   |
| <b>3</b>            | <b>PDOWN</b>            | Power down pin. Apply $<0.6V_{DC}$ to power down the three power amplifier stages. Apply $1.75V_{DC}$ to $5.0V_{DC}$ to power up. If function is not desired, pin may be connected to $V_{REG}$ . |
| <b>4</b>            | <b>VREG1</b>            | First stage input bias voltage. This pin requires a regulated supply to maintain nominal bias current.  |
| <b>5</b>            | <b>VREG2</b>            | Second stage input bias voltage. This pin requires a regulated supply to maintain nominal bias current.   |
| <b>6</b>            | <b>VREG3</b>            | Third stage input bias voltage. This pin requires a regulated supply to maintain nominal bias current.  |
| <b>7</b>            | <b>NC</b>               | Not connected. May be connected to ground.  |
| <b>8</b>            | <b>P DETECT</b>         | Power detector provides an output voltage proportional to the RF output power level.  |
| <b>9</b>            | <b>NC</b>               | Not connected. May be connected to ground.  |
| <b>10</b>           | <b>VCC3/<br/>RF OUT</b> | RF output and bias for the output stage. Output is externally matched to $50\Omega$ and needs DC block.   |
| <b>11</b>           | <b>VCC3/<br/>RF OUT</b> | Same as pin 10.   |
| <b>12</b>           | <b>VCC3/<br/>RF OUT</b> | Same as pin 10.   |
| <b>13</b>           | <b>VCC2</b>             | Second stage supply voltage.  |
| <b>14</b>           | <b>VCC2</b>             | Same as pin 13.   |
| <b>15</b>           | <b>NC</b>               | Not connected. May be connected to ground.  |
| <b>16</b>           | <b>VCC1</b>             | First stage supply voltage.   |
| <b>Pkg<br/>Base</b> | <b>GND</b>              | Ground connection. The back side of the package should be connected to the ground plane through as short a connection as possible, e.g., PCB vias under the device are recommended.               |

## Package Outline



Notes:

1. Dimension applies to metallized terminal and is measured between 0.25mm and 0.30mm from terminal tip.
2. Dimension represents terminal pull back from package edge up to 0.1mm is acceptable.
3. Complanarity applies to the exposed heat slug, as well as the terminal.
4. Radius on terminal is optional.

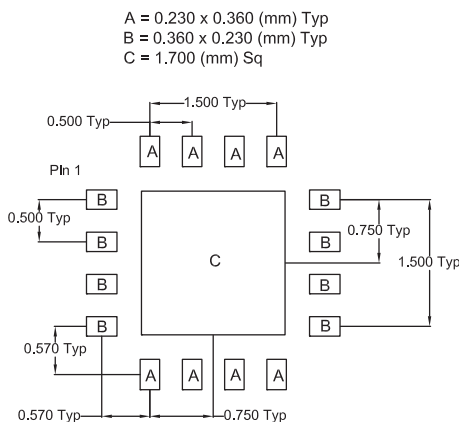
### PCB Surface Finish

The PCB surface finish used for RFMD's qualification process is electroless nickel, immersion gold. Typical thickness is 3 micro-inch to 8 micro-inch gold over 180 micro-inch nickel.

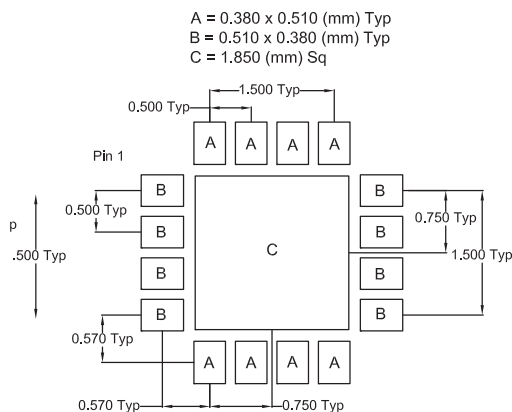
### PCB Land Pattern Recommendation \*

PCB land patterns for RFMD components are based on IPC-7351 standards and RFMD empirical data. The pad pattern shown has been developed and tested for optimized assembly at RFMD. The PCB land pattern has been developed to accommodate lead and package tolerances. Since surface mount processes vary from company to company, careful process development is recommended.

### PCB Metal Land Pattern

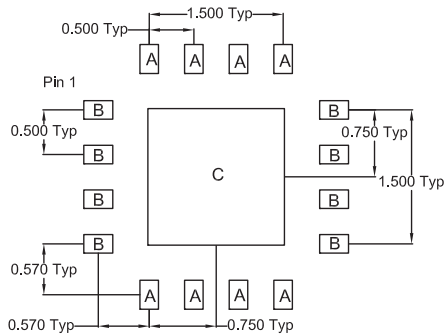


## PCB Solder Mask Pattern



## PCB Stencil Pattern

A = 0.207 x 0.324 (mm) Typ  
B = 0.324 x 0.207 (mm) Typ  
C = 1.530 (mm) Sq

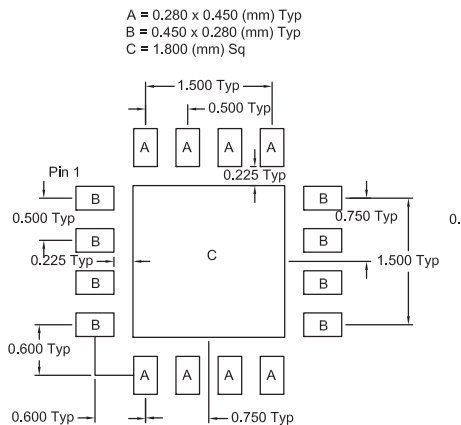


Note: Thermal vias for center slug “C” should be incorporated into the PCB design. The number and size of thermal vias will depend on the application. Example of the number and size of vias can be found on the RFMD evaluation board layout.

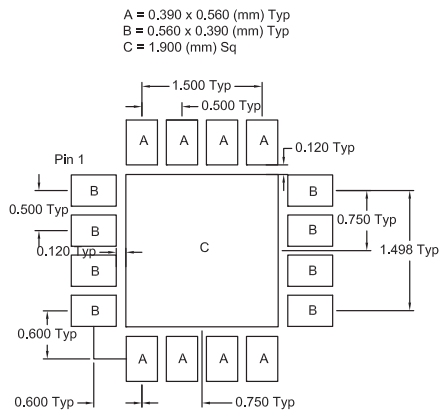
Note: If it is desired to build the same PCB to accommodate the RF5602 as well as the RF5623/RF5603 use the following PCB Patterns.

## PCB Design Requirements

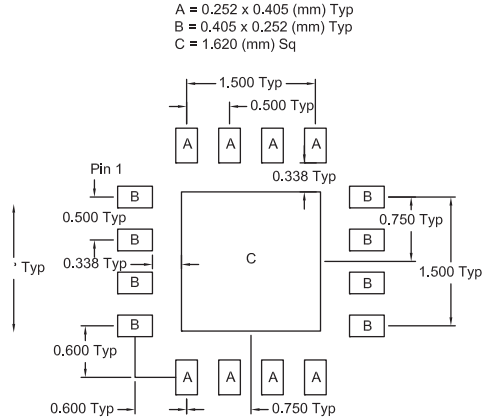
### PCB Metal Land Pattern



### PCB Solder Mask Pattern

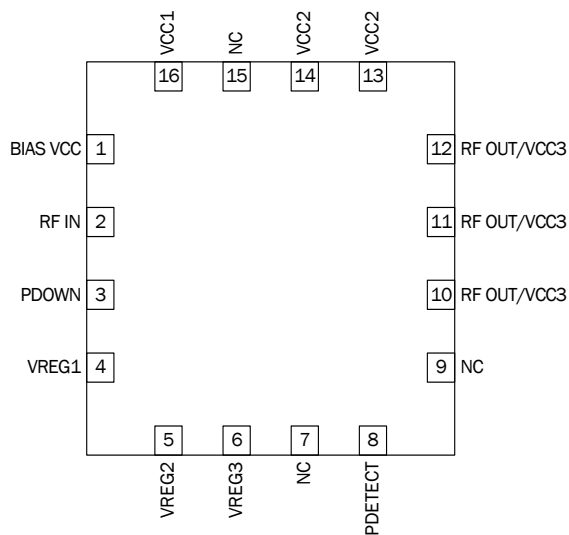


## PCB Stencil Pattern



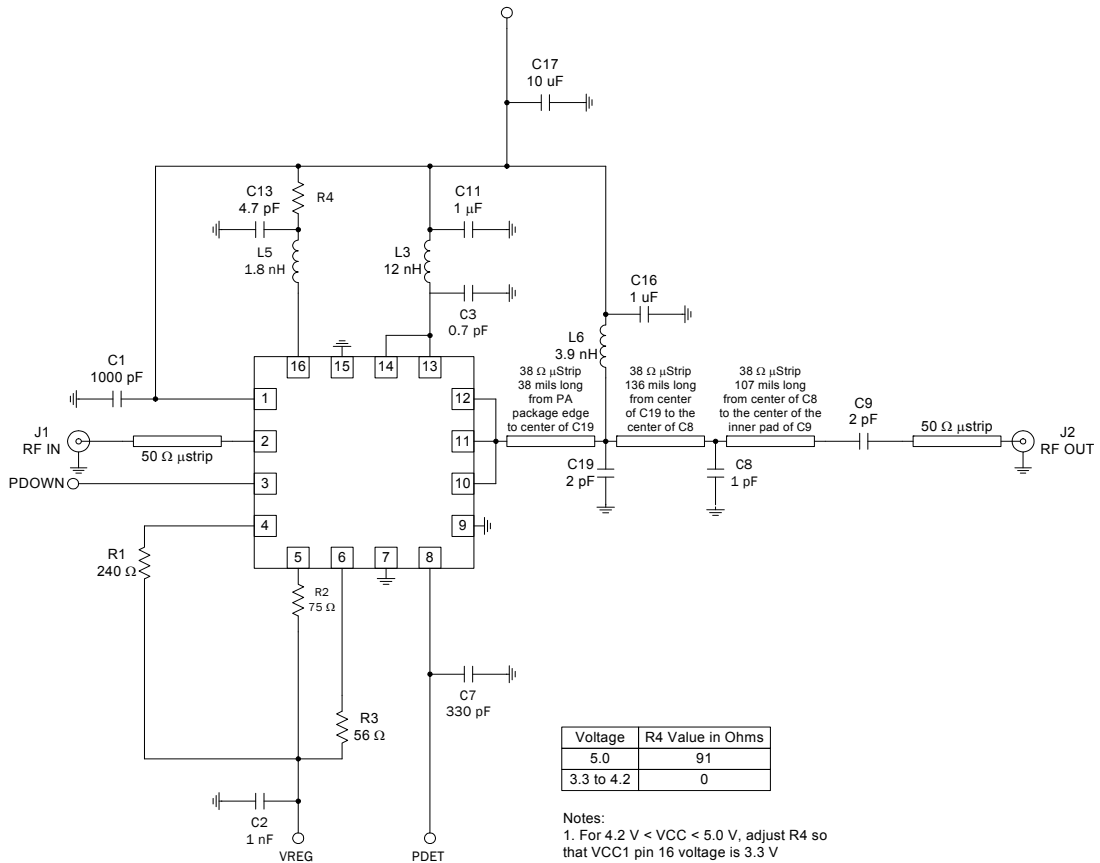
Note: Thermal vias for center slug “C” should be incorporated into the PCB design. The number and size of thermal vias will depend on the application. Example of the number and size of vias can be found on the RFMD evaluation board layout.

## Pin Out



## Evaluation Board Schematic

## WiFi 2.4GHz to 2.5GHz Operation



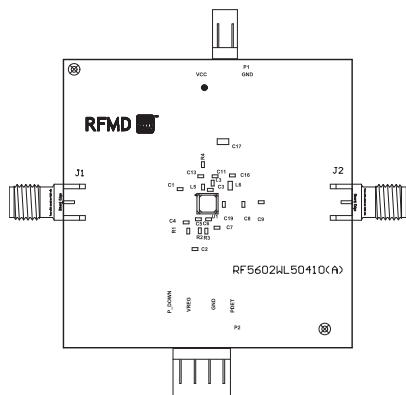
| Voltage    | R4 Value in Ohms |
|------------|------------------|
| 5.0        | 91               |
| 3.3 to 4.2 | 0                |

Notes:

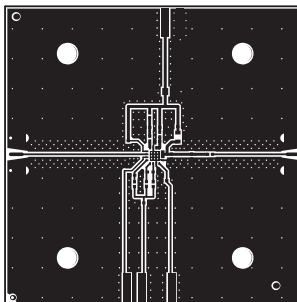
1. For  $4.2\text{ V} < \text{VCC} < 5.0\text{ V}$ , adjust R4 so that VCC1 pin 16 voltage is  $3.3\text{ V}$
2. C3, C19, C8 and C9 are RF output matching Cap, that might need fine tune for best performance on PCB with materials different to that of RFMD Eval board

## Evaluation Board Layout

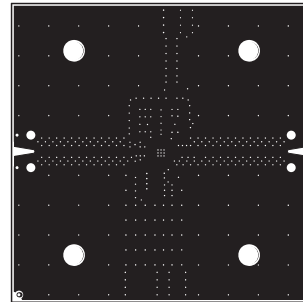
WiFi 2.4GHz to 2.5GHz Operation  
(FR4, 8mils thickness top layer)



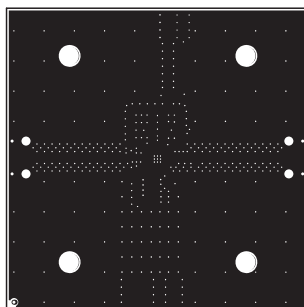
Assy



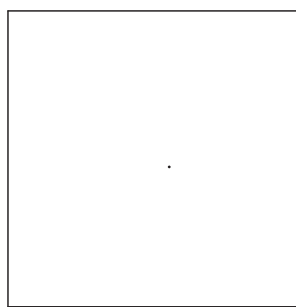
In 1



In 2



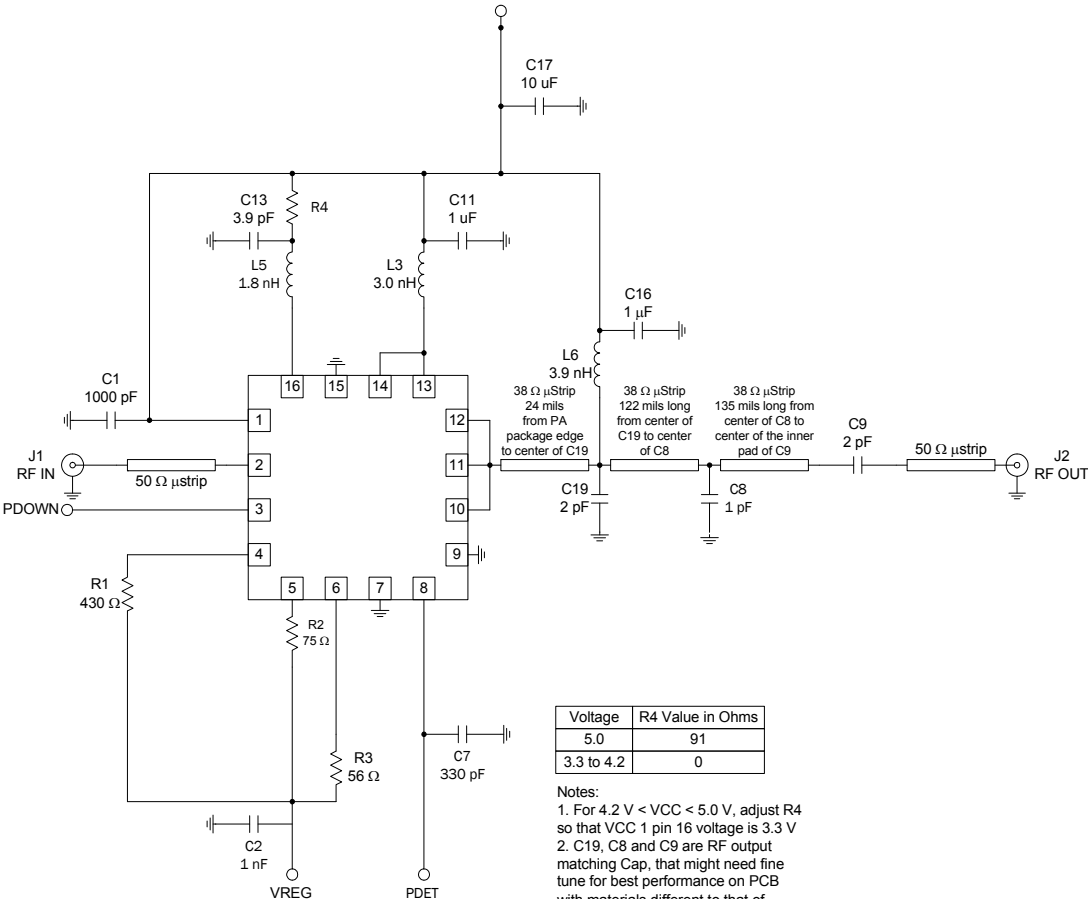
In 2



Back

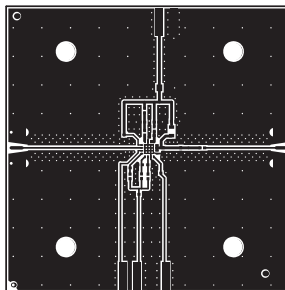
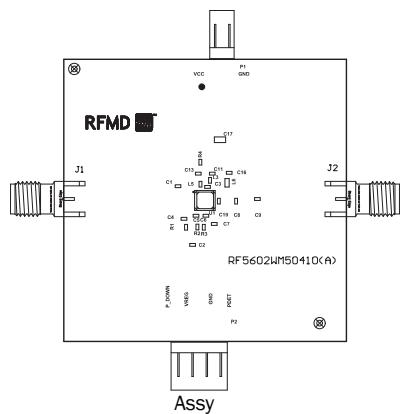
Evaluation Board Schematic

WiMAX 2.5GHz to 2.7GHz Operation

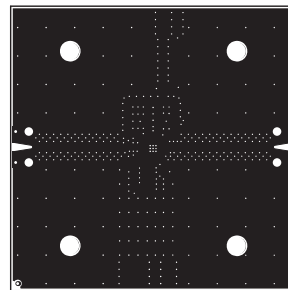


## Evaluation Board Layout

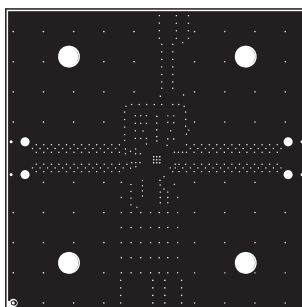
WiMAX 2.5GHz to 2.7GHz Operation  
(FR4, 8mils thickness top layer)



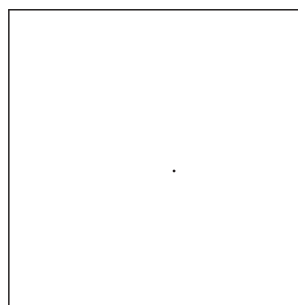
Top



In 1



In 2

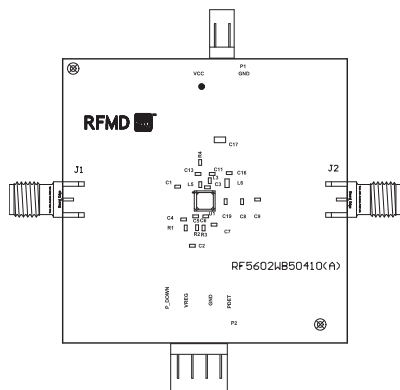


Back

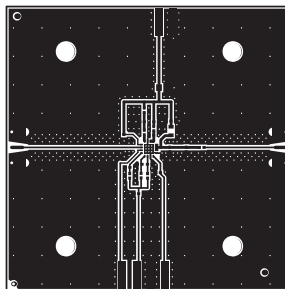


## Evaluation Board Layout

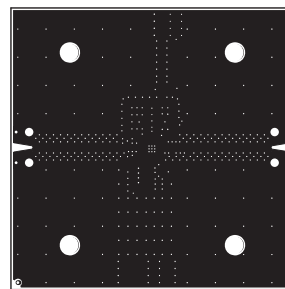
WiBro 2.3GHz to 2.4GHz Operation  
(FR4, 8mils thickness)



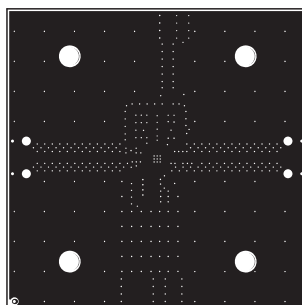
Assy



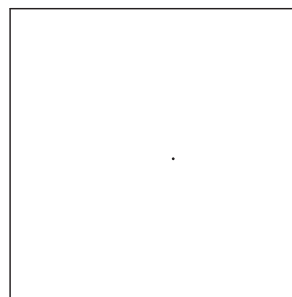
Top



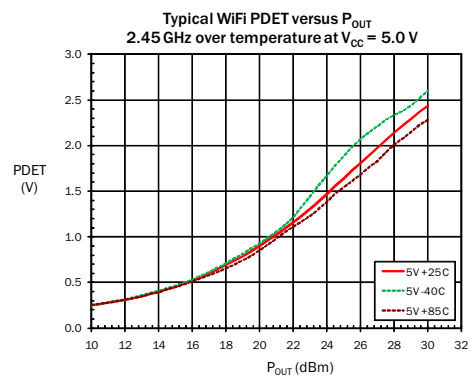
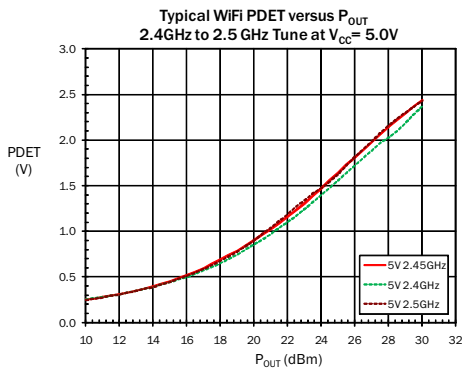
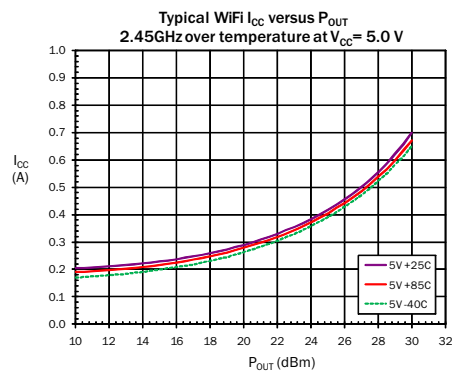
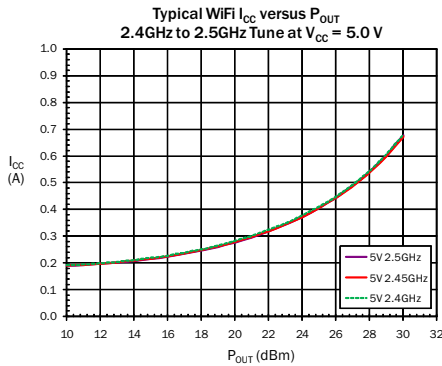
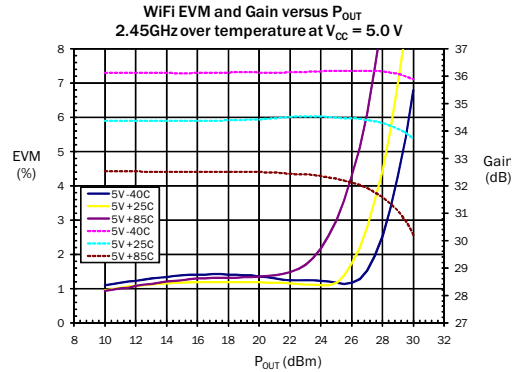
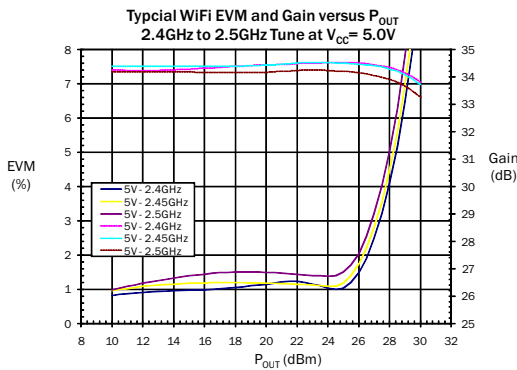
In 1

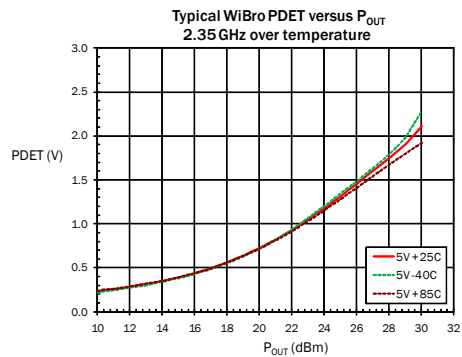
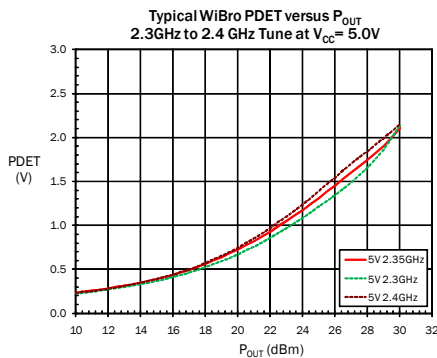
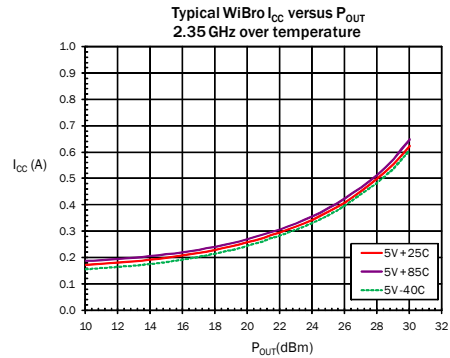
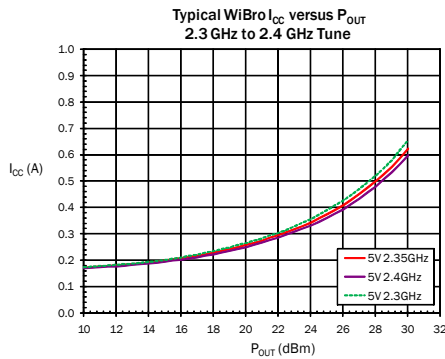
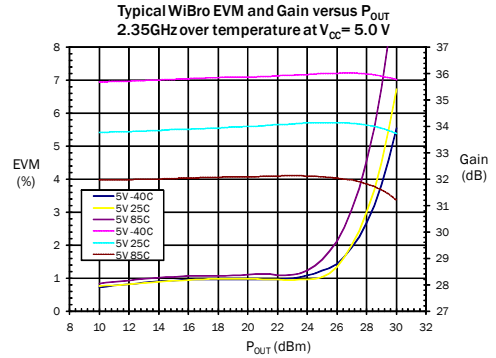
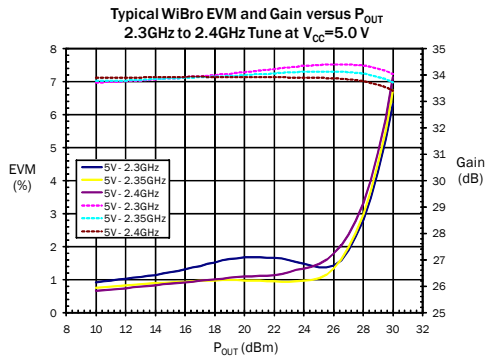


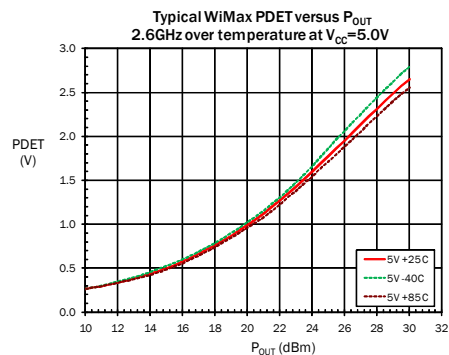
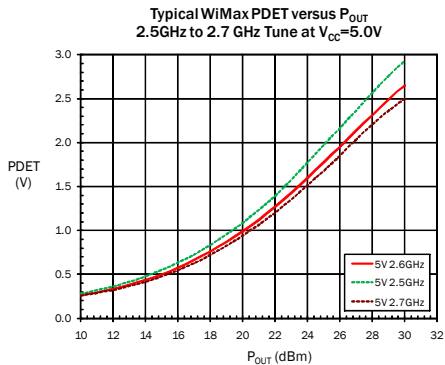
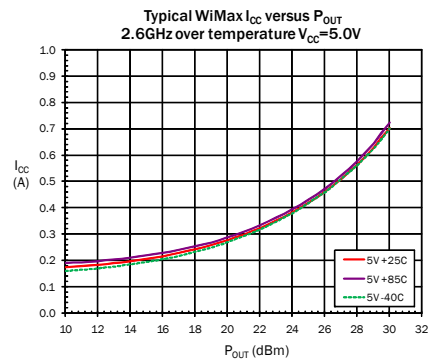
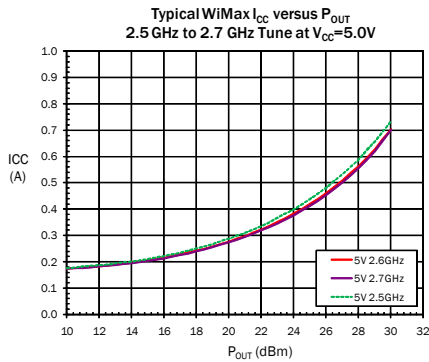
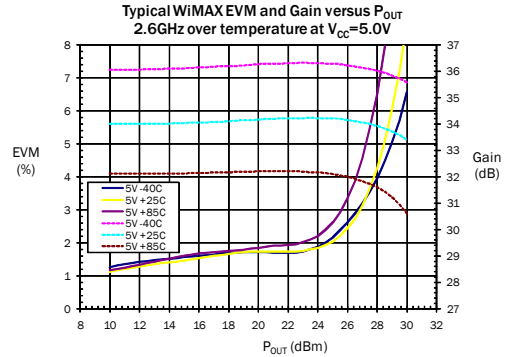
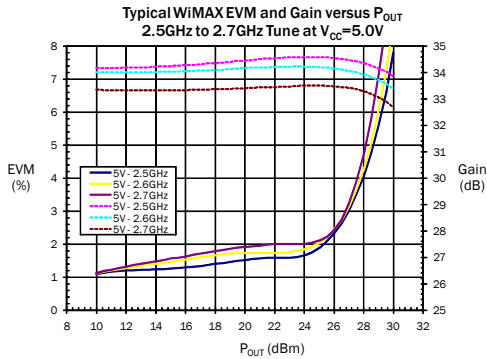
In 2

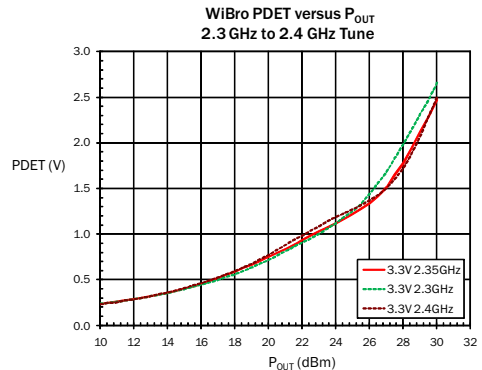
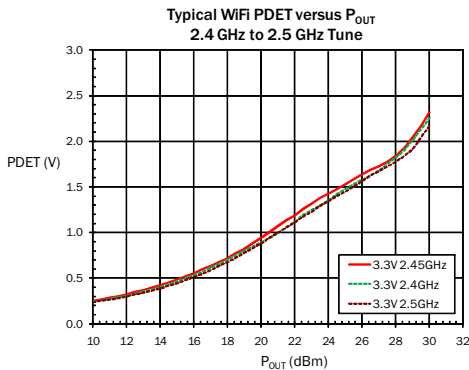
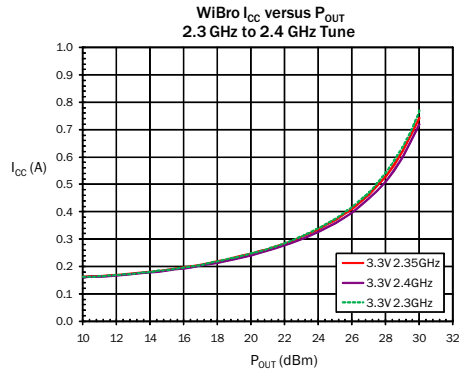
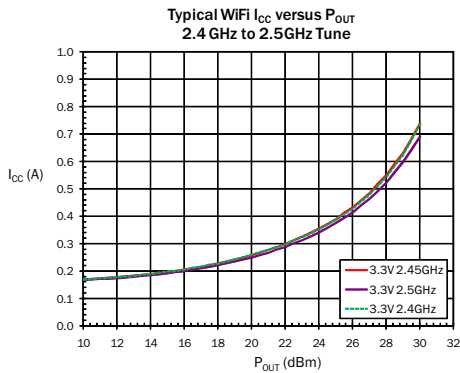
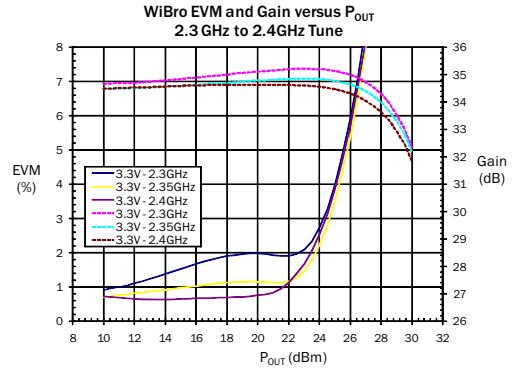
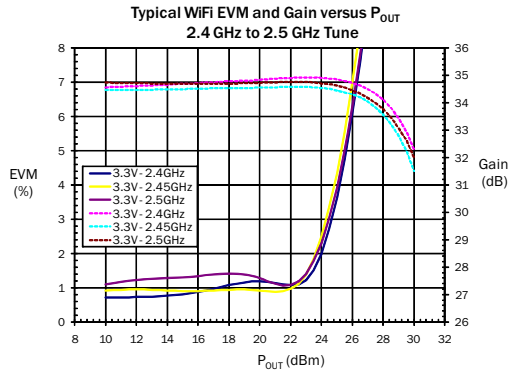


Back



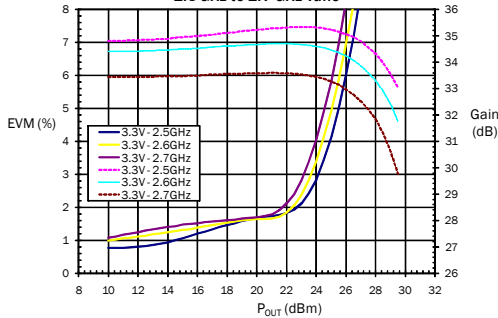




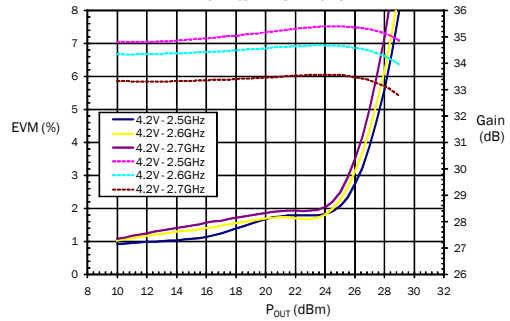




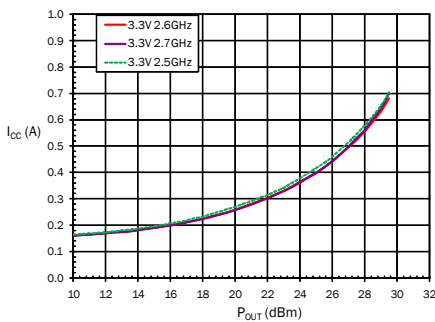
Typical WiMAX EVM and Gain versus P<sub>OUT</sub>  
2.5 GHz to 2.7 GHz Tune



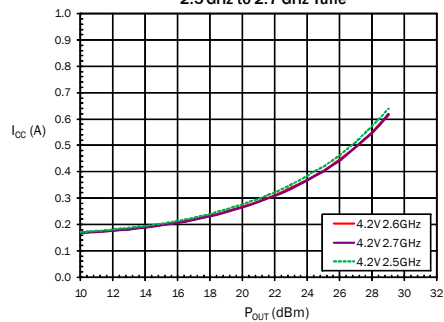
Typical WiMAX EVM and Gain versus P<sub>OUT</sub>  
2.5 GHz to 2.7 GHz Tune



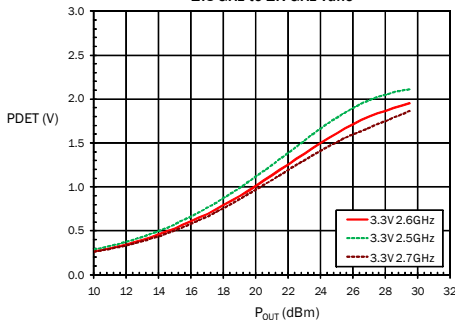
Typical WiMAX I<sub>CC</sub> versus P<sub>OUT</sub>  
2.5 GHz to 2.7 GHz Tune



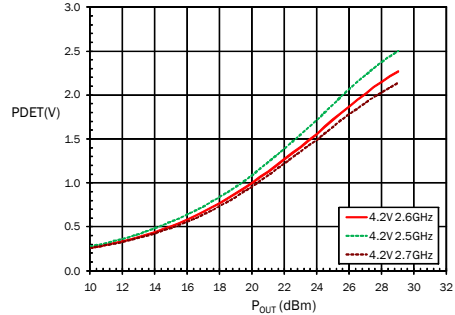
Typical WiMAX I<sub>CC</sub> versus P<sub>OUT</sub>  
2.5 GHz to 2.7 GHz Tune

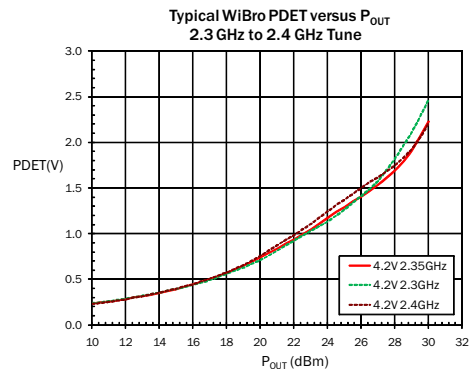
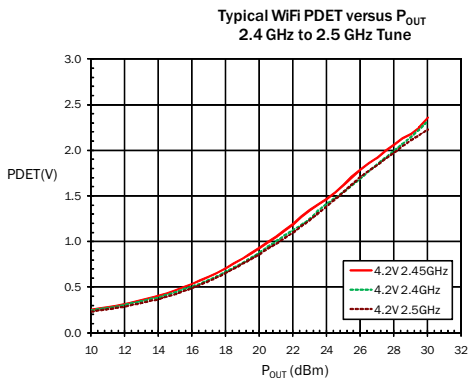
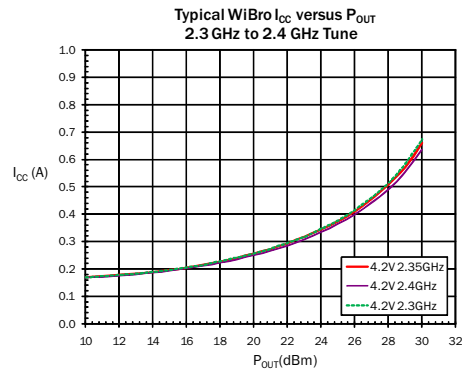
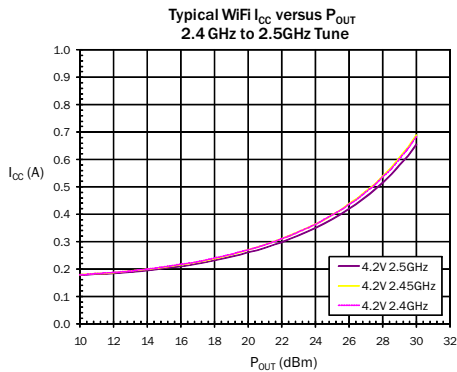
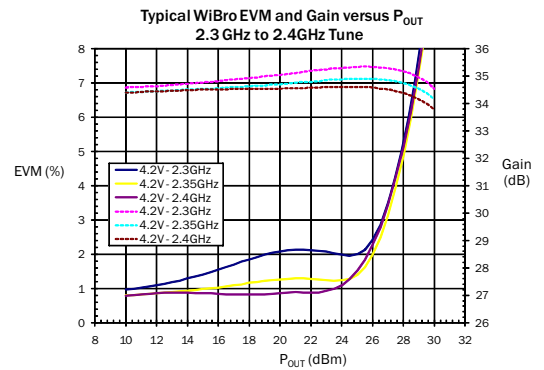
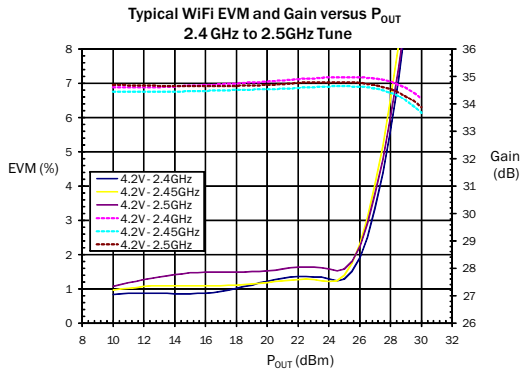


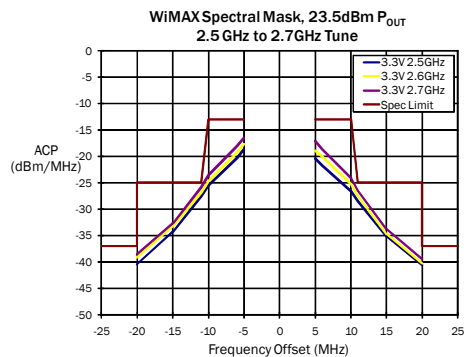
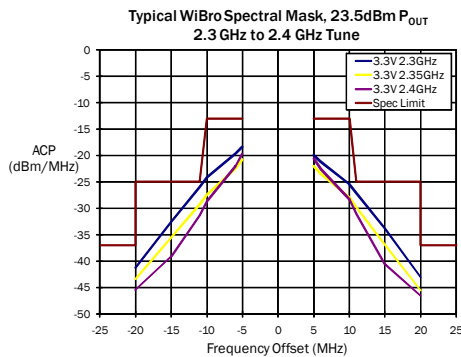
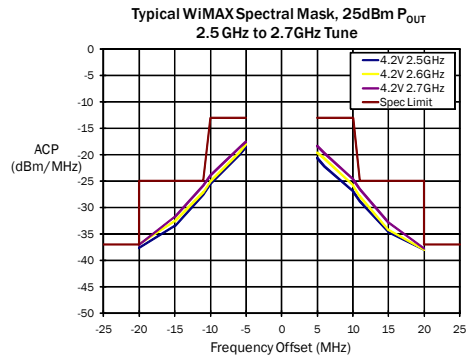
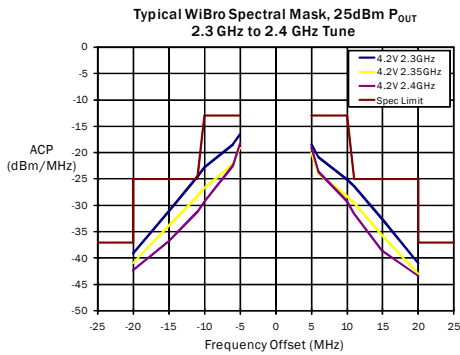
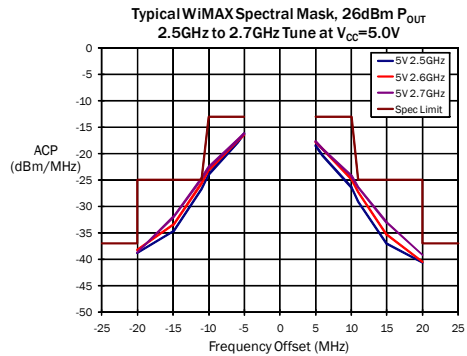
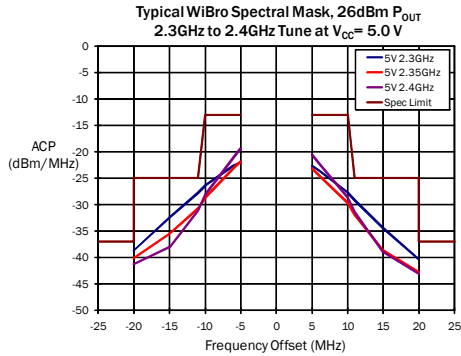
Typical WiMAX PDET versus P<sub>OUT</sub>  
2.5 GHz to 2.7 GHz Tune



Typical WiMAX PDET versus P<sub>OUT</sub>  
2.5 GHz to 2.7 GHz Tune







## Ordering Information

| Part Number       | Description   |
|-------------------|---|
| RF5602            | Standard 25 piece bag   |
| RF5602SR          | Standard 100 piece reel   |
| RF5602TR7         | Standard 2500 piece reel  |
| RF5602WM50PCK-410 | Fully assembled RF5602WM50410 5.0 volts tune PCBA and 5 loose pcs for WiMAX tune 2.5GHz to 2.7GHz |
| RF5602WM33PCK-410 | Fully assembled RF5602WM33410 3.3 volts tune PCBA and 5 loose pcs for WiMAX tune 2.5GHz to 2.7GHz |
| RF5602WL50PCK-410 | Fully assembled RF5602WL50410 5.0 volts tune PCBA and 5 loose pcs for WiFi tune 2.4GHz to 2.5GHz  |
| RF5602WL33PCK-410 | Fully assembled RF5602WL33410 3.3 volts tune PCBA and 5 loose pcs for WiFi tune 2.4GHz to 2.5GHz  |
| RF5602WB50PCK-410 | Fully assembled RF5602WB50410 5.0 volts tune PCBA and 5 loose pcs for WiBro tune 2.3GHz to 2.4GHz |
| RF5602WB33PCK-410 | Fully assembled RF5602WB33410 3.3 volts tune PCBA and 5 loose pcs for WiBro tune 2.3GHz to 2.4GHz |
| RF5602HWBPCK-410  | Fully assembled balanced evaluation board with 5 loose samples tuned for 2.3 to 2.4GHz            |
| RF5602HWLPCK-410  | Fully assembled balanced evaluation board with 5 loose samples tuned for 2.4 to 2.5GHz            |
| RF5602HWPCK-410   | Fully assembled balanced evaluation board with 5 loose samples tuned for 2.5 to 2.7GHz            |

# Mouser Electronics

Authorized Distributor

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[RF5602](#) [RF5602TR7](#) [RF5602SR](#)