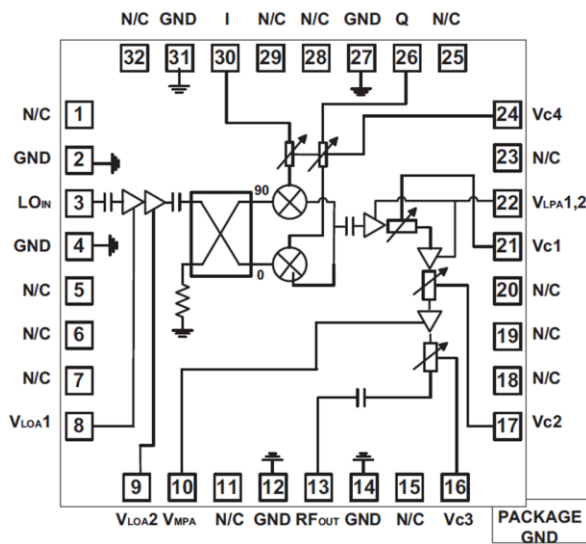


RFUV1003

GaAs MMIC IQ UpConverter
12GHz to 16GHz

RFMD's RFUV1003 is a 12GHz to 16GHz GaAs pHEMT upconverter, incorporating an integrated LO buffer amplifier, a balanced single-side band (image rejection) mixer followed by a variable gain amplifier and DC decoupling capacitors. The combination of high performance part and low cost packaging makes the RFUV1003 a cost effective solution, ideally suited to both current and next generation Point-to-Point and VSAT applications. RFUV1003 is packaged in a 5mm x 5mm QFN to simplify both system level board design and volume assembly.



Functional Block Diagram

Ordering Information

| | |
|-----------------|--|
| RFUV1003S2 | Sample bag with 2 pieces |
| RFUV1003SB | Bag with 5 pieces |
| RFUV1003SQ | Bag with 25 pieces |
| RFUV1003SR | 7" Reel with 100 pieces |
| RFUV1003TR7 | 7" Reel with 750 pieces |
| RFUV1003TR13 | 13" Reel with 2500 pieces |
| RFUV1003PCK-410 | Evaluation Board with 2-piece sample bag |



Package: QFN, 32-pin,
5mm x 5mm x 0.95mm

Features

- RF Frequency: 12GHz to 16GHz
- LO Frequency: 8GHz to 20GHz
- IF Frequency: DC to 4GHz
- Maximum Conversion Gain: 23dB
- Minimum Conversion Gain: -10dB
- Noise Figure (Maximum Gain): 11dB
- Noise Figure (Minimum Gain): 17dB
- OIP3 (Maximum Gain): +28dBm
- OIP3 (Minimum Gain): +12dBm
- Image Rejection: 20dBc

Applications

- Point-to-Point
- VSAT

Absolute Maximum Ratings

| Parameter | Rating | Unit |
|-------------------------|-------------|------|
| LPA Drain Voltage V_d | 6 | V |
| LOA Drain Voltage | 6 | V |
| RF Input Power | 15 | dBm |
| LO Input Power | 15 | dBm |
| T_{OPER} | -40 to +85 | °C |
| T_{STOR} | -65 to +150 | °C |
| ESD Human Body Model | Class 1A | |



Caution! ESD sensitive device.



RFMD Green: RoHS compliant per EU Directive 2011/65/EU, 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 solder.

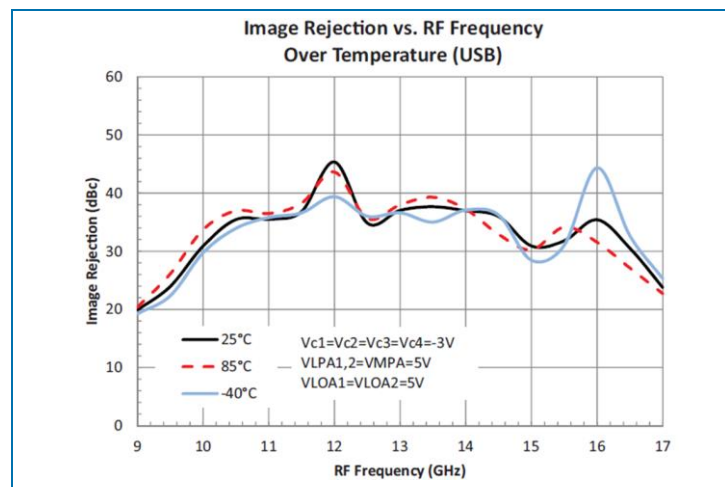
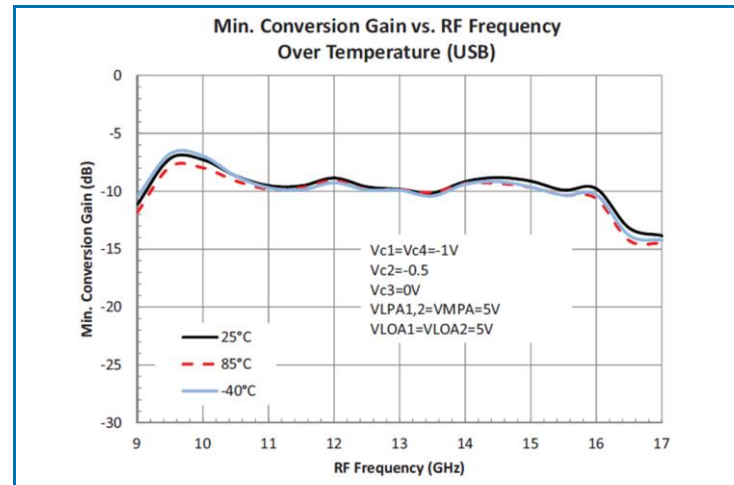
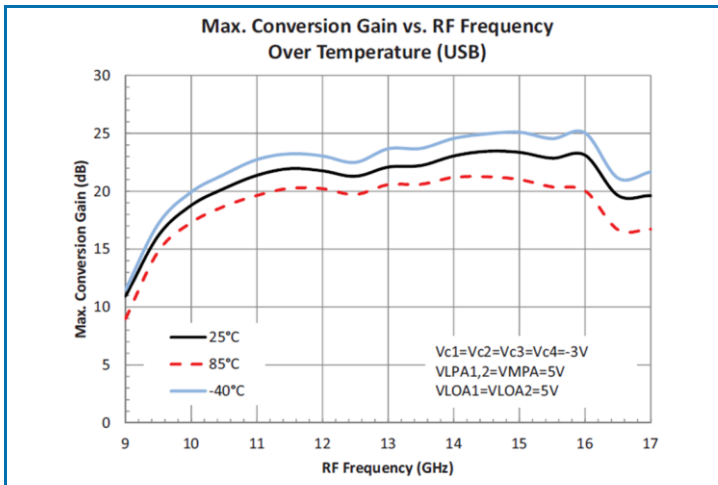
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute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

Nominal Operating Parameters

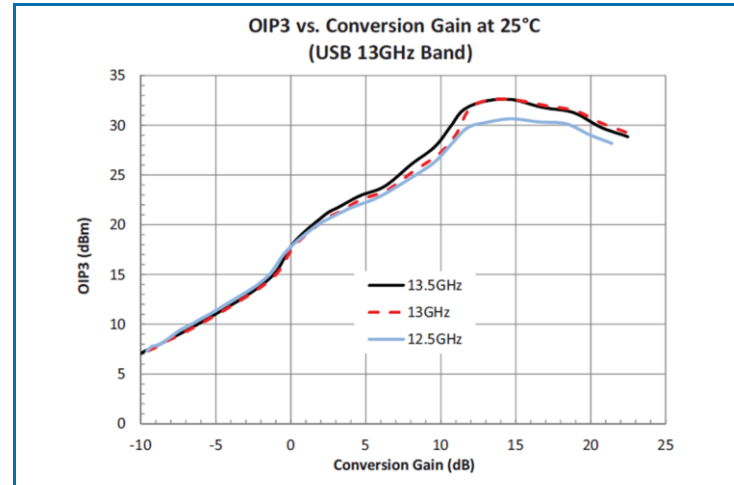
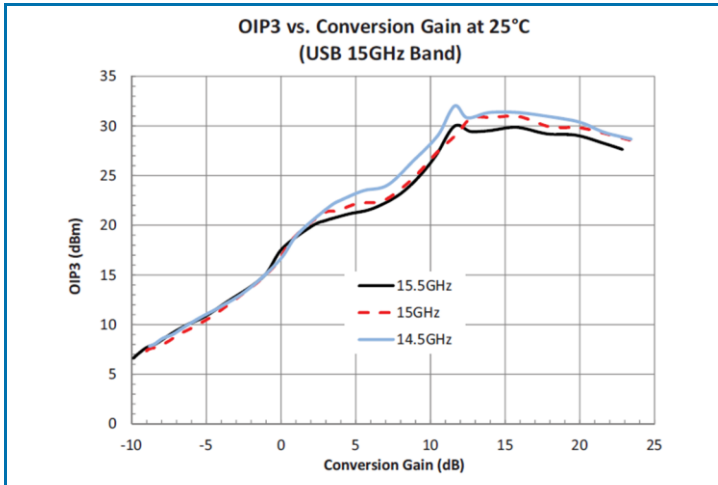
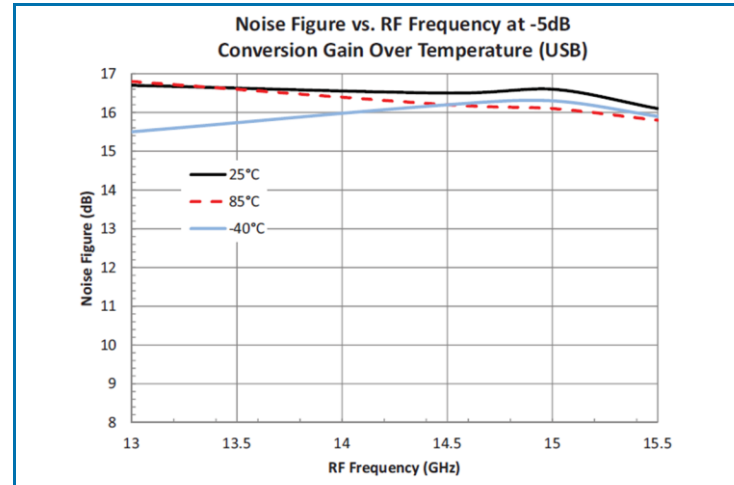
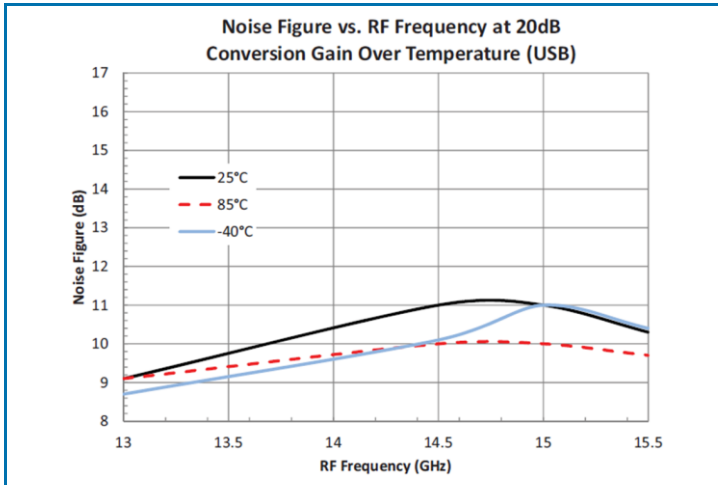
| Parameter | Specification | | | Unit | Condition |
|--------------------------------------|---------------|-----|-----|------|--------------|
| | Min | Typ | Max | | |
| General Performance | | | | | |
| RF Frequency | 12 | | 16 | GHZ | |
| LO Frequency | 8 | | 20 | GHZ | |
| IF Frequency | DC | | 4 | GHZ | |
| LO input Drive | -1 | 0 | +5 | dBm | |
| Conversion Gain (Max.) | 20 | 23 | 24 | dB | |
| Conversion Gain (Min.) | -9 | -10 | -11 | dB | |
| NF (max. Gain) | | 11 | 13 | dB | |
| NF (min. Gain) | | 17 | 21 | dB | |
| OIP3 (max. Gain) | 25 | 28 | | dBm | |
| OIP3 (min. Gain) | 9 | 12 | | dBm | |
| Image Rejection | 15 | 20 | | dBc | |
| LO Leakage at RF-Port (Maximum Gain) | | -5 | 5 | dBm | With IQ bias |
| LO Return Loss | | 10 | | dB | |
| RF Return Loss | | 10 | | dB | |
| V_D | | 5 | | V | |
| I_D | | 380 | 500 | mA | |
| VVA | -4 | | 0 | V | |

Typical Electrical Performance

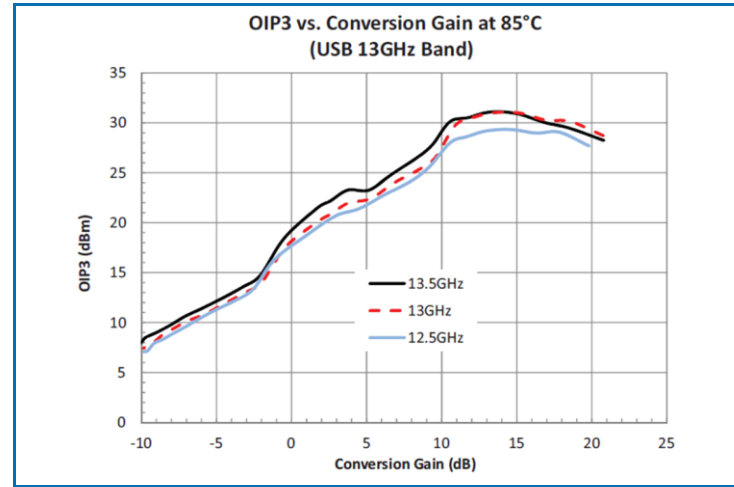
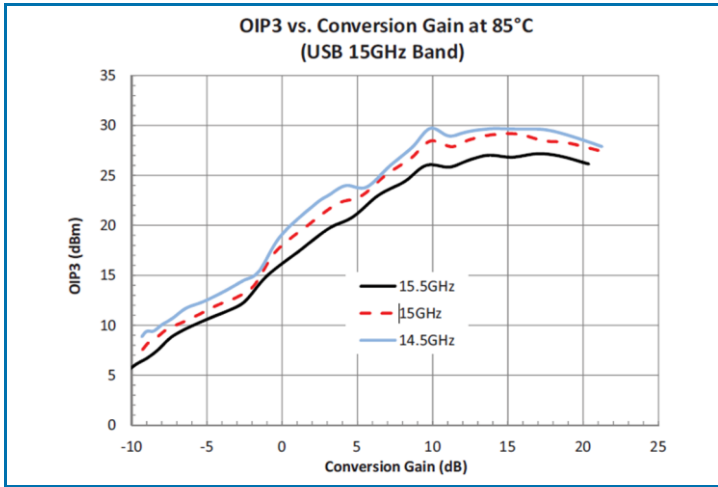
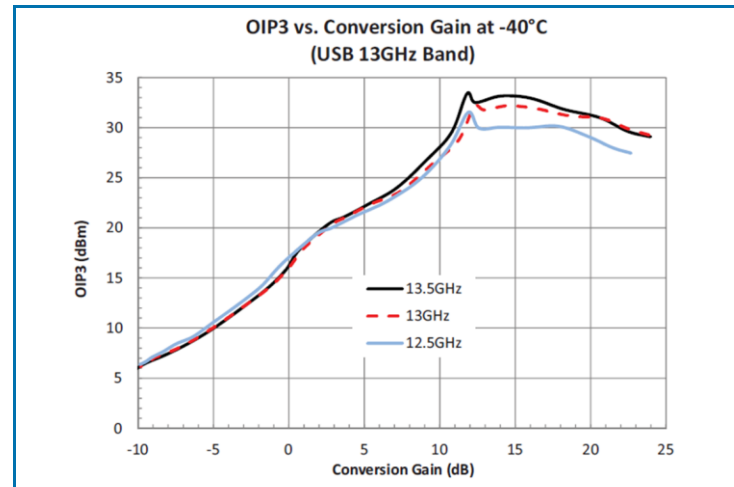
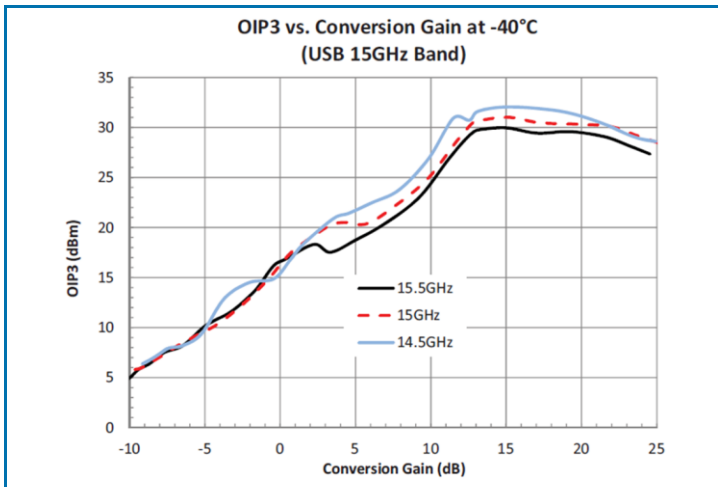
Measurements performed with I and Q (IF) ports connected to an external 90° Hybrid, LO Power = 0dBm and IF = 2.5GHz, -10dBm unless otherwise stated



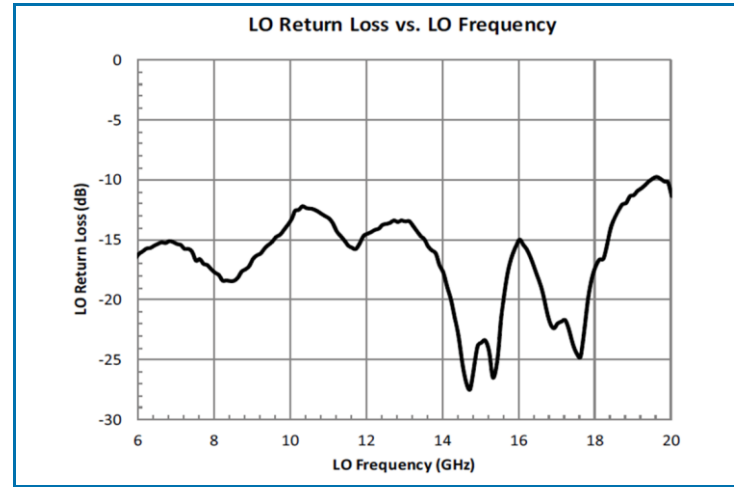
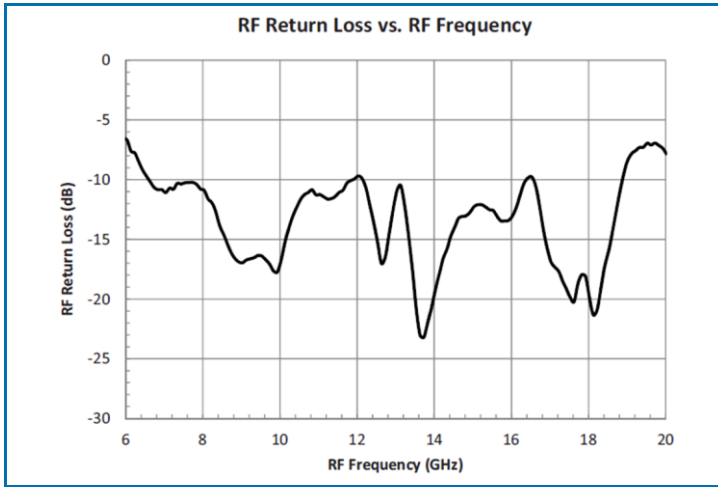
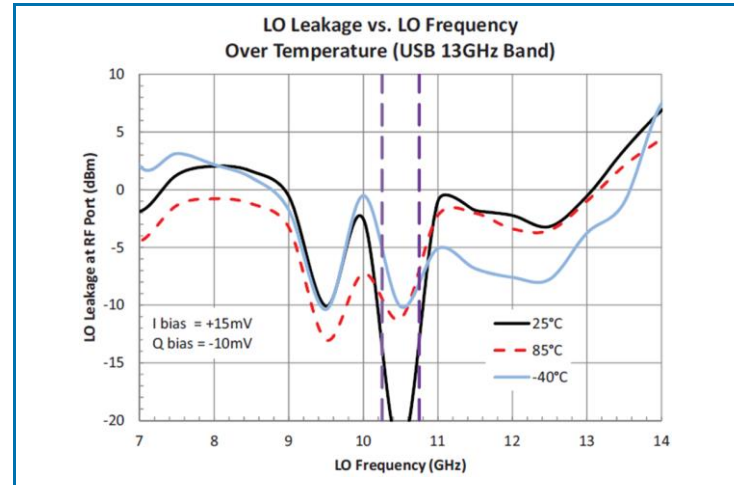
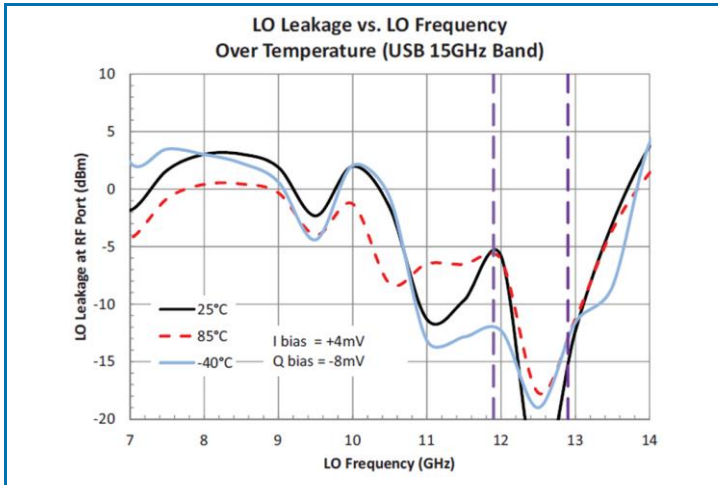
Typical Electrical Performance (continued)



Typical Electrical Performance (continued)



Typical Electrical Performance (continued)



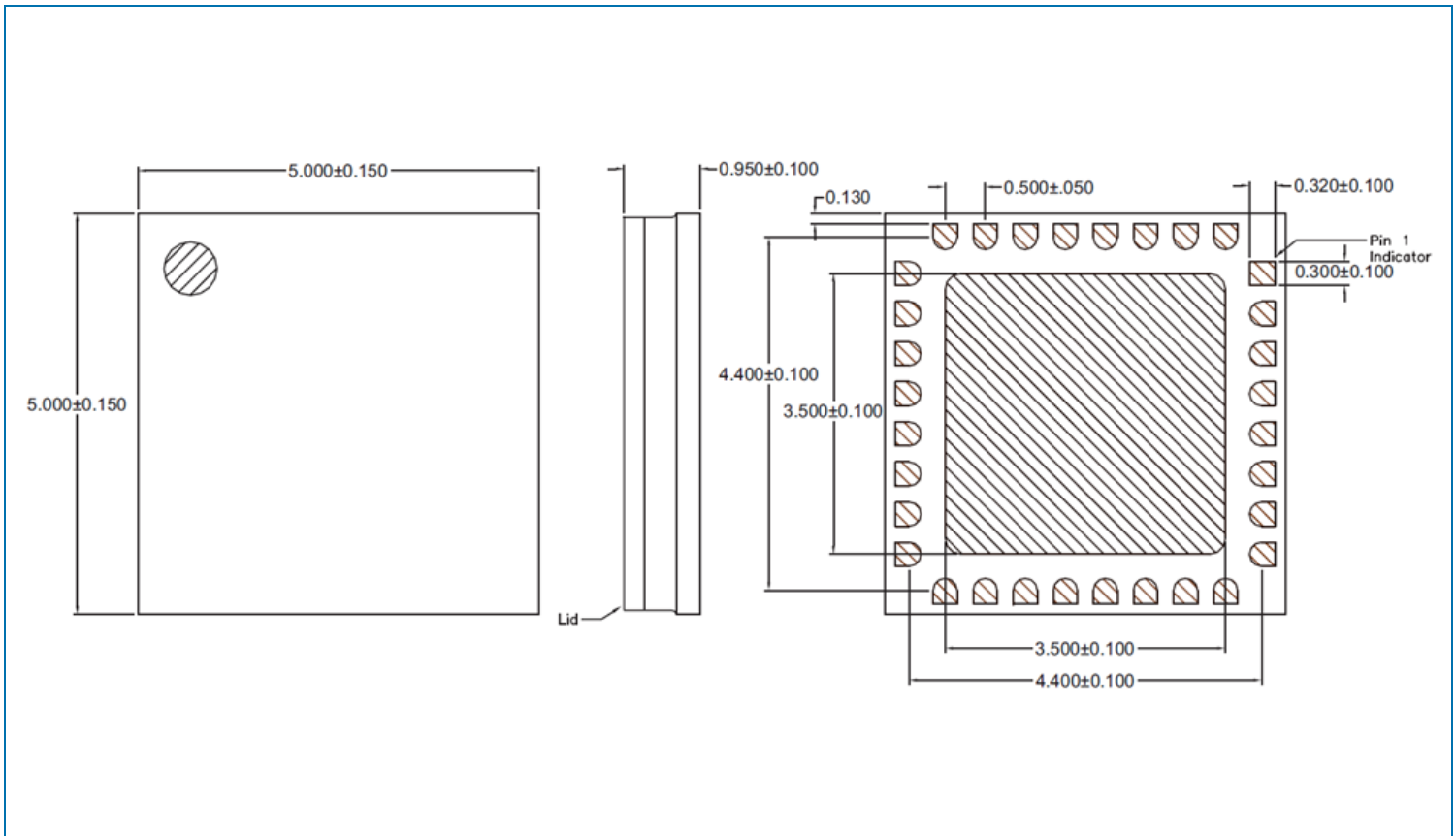
Typical Bias Sequence and Gain Control

Optimum linearity versus gain is achieved using sequential bias. At maximum gain (V_{C1} , V_{C4}), V_{C2} and V_{C3} are set at -4V. (V_{C1} , V_{C4}), V_{C2} and V_{C3} are biased in sequence. The first dynamic range is achieved by setting V_{C2} and V_{C3} at -4V and varying (V_{C1} , V_{C4}) over the (-4V to -1.25V) range as shown in the table below. Similarly second dynamic range is achieved by setting (V_{C1} , V_{C4}) at -1V, setting V_{C3} to -4V and varying V_{C2} over the (-2.5V to -1.25V) range. Finally third dynamic range is achieved by setting (V_{C1} , V_{C4}) and V_{C2} at -1V, and varying V_{C3} over the (-2.5V to -1V) range.

Bias Sequence 1 (Typical)

| | Gmax | | | | | | | | | | | | | | | | | | Gmin |
|----------|------|------|-------|----|-------|------|-------|------|-------|----|-------|------|-------|------|-------|----|-------|------|------|
| VC1, VC4 | -4 | -2.5 | -2.25 | -2 | -1.75 | -1.5 | -1.25 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| VC2 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -2.5 | -2.25 | -2 | -1.75 | -1.5 | -1.25 | -1 | -1 | -1 | -1 | -1 | -1 |
| VC3 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -4 | -2.5 | -2.25 | -2 | -1.75 | -1.5 | -1 |

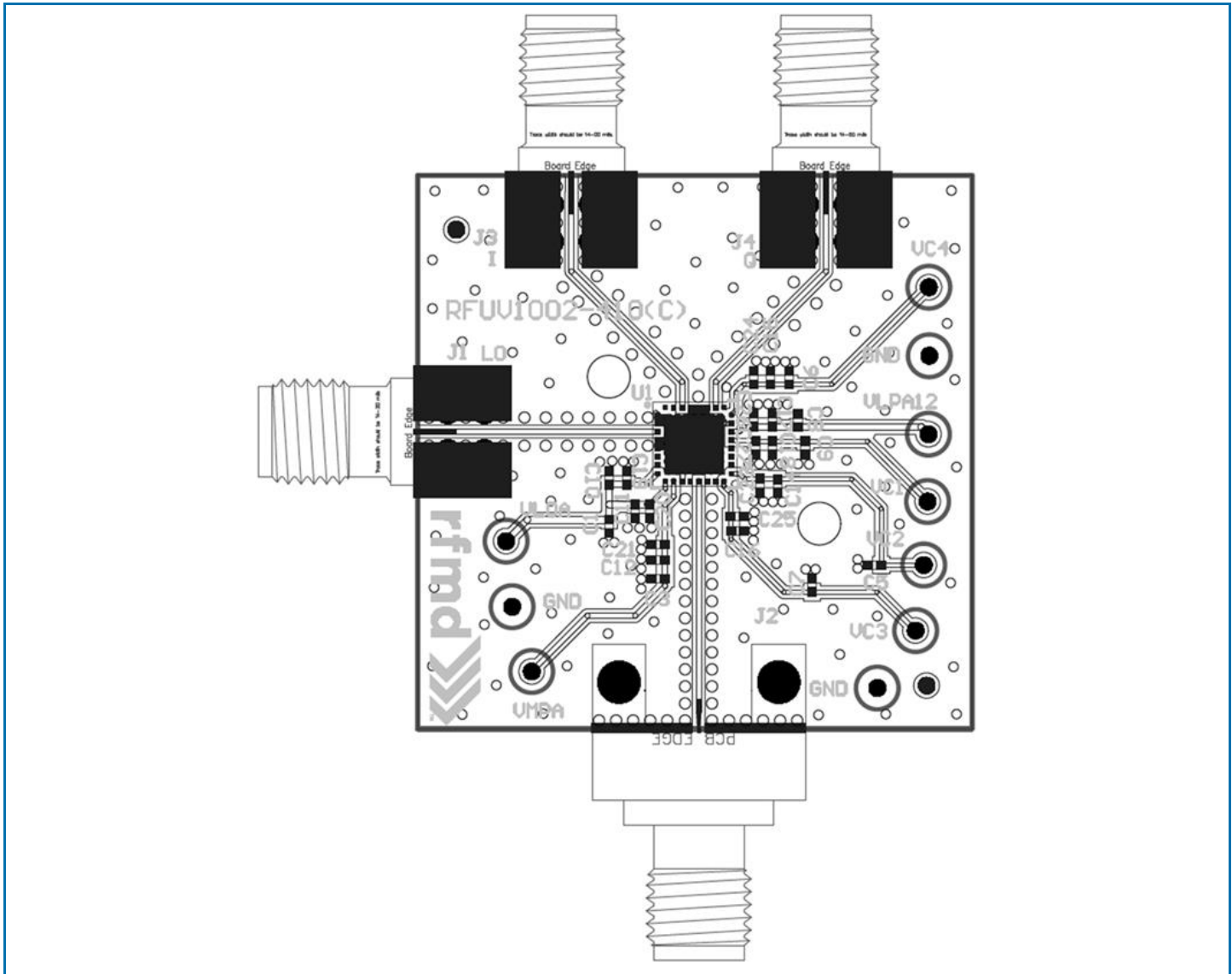
Package Outline Drawing (Dimensions in millimeters)



Pin Names and Descriptions

| Pin | Name | Description |
|-------|--------------|---|
| 1 | N/C | |
| 2 | GND | Ground |
| 3 | LO | Local oscillator input. AC coupled and matched to 50Ω |
| 4 | GND | Ground |
| 5-7 | N/C | |
| 8 | VLOA1 | LOA stage 1 drain bias |
| 9 | VLOA2 | LOA stage 2 drain bias |
| 10 | VMPA | MPA drain bias |
| 11 | N/C | |
| 12 | GND | Ground |
| 13 | RFOUT | RF output. AC coupled and matched to 50W |
| 14 | GND | Ground |
| 15 | N/C | |
| 16 | VC3 | Control line number 3 (See bias sequence description) |
| 17 | VC2 | Control line number 2 (See bias sequence description) |
| 18-20 | N/C | |
| 21 | VC1 | Control line number 1 (See bias sequence description) |
| 22 | VLPA1, VLPA2 | LPA stage 1,2 drain bias |
| 23 | N/C | |
| 24 | VC4 | Control line number 4 (See bias sequence description) |
| 25 | N/C | |
| 26 | Q | IF Q input |
| 27 | GND | Ground |
| 28-29 | N/C | |
| 30 | I | If I input |
| 31 | GND | Ground |
| 32 | N/C | |

Evaluation Board Layout



| Test Condition | |
|----------------------|-----------|
| LO Power | 0dBm |
| IF Power | -10dBm |
| VLOA1, VLOA2 | 5V |
| VLPA1, VLPA2, VMPPA | 5V |
| (Vc1, Vc4), Vc2, Vc3 | -4V to 0V |

| Sub-Band Frequency Ranges | |
|---------------------------|----------------------|
| Band | Frequency Range |
| 10GHz | 10GHz to 10.5GHz |
| 11GHz | 10.7GHz to 11.7GHz |
| 13GHz | 12.75GHz to 13.25GHz |
| 15GHz | 14.4GHz to 15.4GHz |

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- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
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- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
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«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

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«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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