

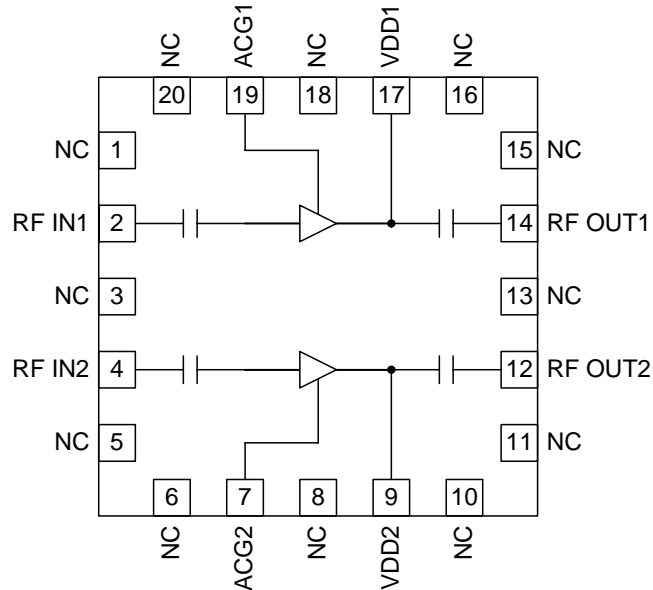


**Features**

- Dual-Channel
- Low Noise and High Intercept Point
- Adjustable Bias Current
- Single 2.5V to 6.0V Power Supply
- 700MHz to 3800MHz Operation
- Small QFN20 5mmx5mm Package

**Applications**

- CDMA, PCS, DCS, UMTS LNA
- WLAN LNA
- General Purpose Amplification



Functional Block Diagram

**Product Description**

The RF3867 is a dual-channel version of the RF3863 with a low noise amplifier and a high output IP3. The amplifier is self-biased from a single voltage supply with 50Ω input and output ports. The useful frequency range is from 700MHz to 3800MHz. A 0.8dB noise figure and 36dBm OIP3 performance is achieved with a 5V V<sub>DD</sub>, 180mA. Current can be increased to raise OIP3 while having minimal effect on noise figure. The IC is featured in a standard QFN, 20-pin, 5mmx5mm package.

**Ordering Information**

|               |   |
|---------------|---|
| RF3867        | Dual-Channel, Wide Bandwidth, High Linearity Low Noise Amplifier          |
| RF3867PCK-410 | Fully Assembled Evaluation Board with 5 Sample Parts<br>1.5GHz to 2.7 GHz |
| RF3867PCK-411 | 3.3GHz to 3.8GHz  |
| RF3867PCK-412 | 700MHz to 1100MHz   |

**Optimum Technology Matching® Applied**

- |                                      |                                      |  |                                   |
|--------------------------------------|--------------------------------------|--|-----------------------------------|
| <input type="checkbox"/> GaAs HBT    | <input type="checkbox"/> SiGe BiCMOS | <input checked="" type="checkbox"/> GaAs pHEMT | <input type="checkbox"/> GaN HEMT |
| <input type="checkbox"/> GaAs MESFET | <input type="checkbox"/> Si BiCMOS   | <input type="checkbox"/> Si CMOS               |                                   |
| <input type="checkbox"/> InGaP HBT   | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT                |                                   |

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## Absolute Maximum Ratings

| Parameter                      | Rating          | Unit            |
|--------------------------------|-----------------|-----------------|
| Supply Voltage                 | 0 to +7.0       | V <sub>DC</sub> |
| Input RF Level                 | +10             | dBm             |
| Current Drain, I <sub>DD</sub> | 150 per Channel | mA              |
| Operating Ambient Temperature  | -40 to +85      | °C              |
| Storage Temperature            | -40 to +150     | °C              |

Note 1: Max continous RF IN is +10dBm. The max transient RF IN is +20dBm.



**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.

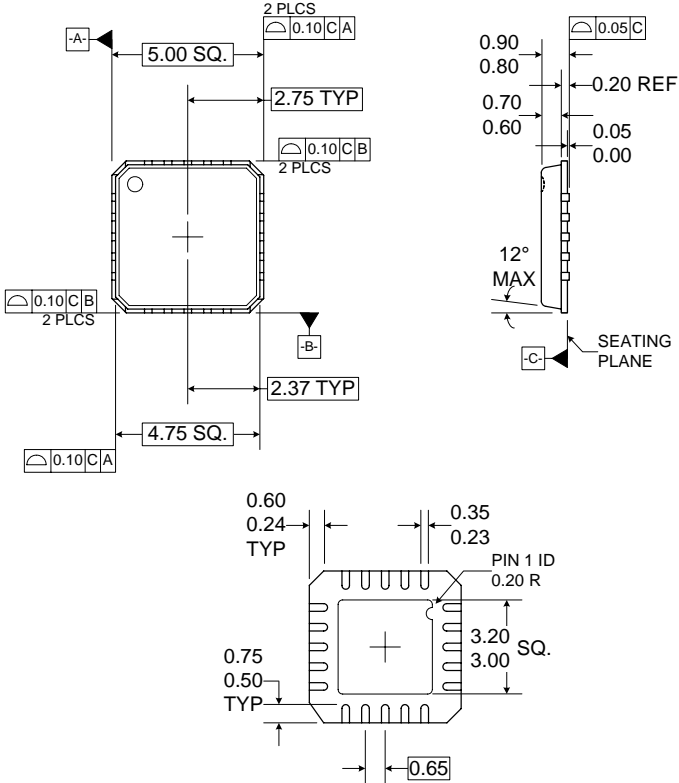
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| Parameter        | Specification |      |      | Unit | Condition  |
|------------------|---------------|------|------|------|--|
|                  | Min.          | Typ. | Max. |      |  |
| <b>High Band</b> |               |      |      |      |  |
| Frequency        | 3.3           |      | 3.8  | GHz  |  |
| Current          |               | 180  |      | mA   | V <sub>DD</sub> = 5V   |
| Gain             |               | 10   |      | dB   | Temp = +25 °C, V <sub>DD</sub> = 5V, I <sub>DD</sub> = 180 mA, 3500 MHz unless specified |
| Noise Figure     |               | 0.8  |      | dB   |  |
| OIP3             |               | 36   |      | dBm  | f <sub>1</sub> = 3500 MHz, f <sub>2</sub> = 3501 MHz                                     |
| OP1dB            |               | 21   |      | dBm  |  |
| S11              |               | -10  |      | dB   |  |
| S22              |               | -12  |      | dB   |  |
| <b>Mid Band</b>  |               |      |      |      |  |
| Frequency        | 1500          |      | 2700 | MHz  |  |
| Current          |               | 180  |      | mA   | V <sub>DD</sub> = 5V   |
| Gain             | 13.5          | 15.0 | 16.5 | dB   | +25 °C, V <sub>DD</sub> = 5V, I <sub>DD</sub> = 180 mA, 2000 MHz unless specified        |
| Noise Figure     |               | 0.8  | 1.1  | dB   |  |
| OIP3             | 33.0          | 35.5 |      | dBm  | f <sub>1</sub> = 2000 MHz, f <sub>2</sub> = 2001 MHz                                     |
| OP1dB            | 21.0          | 22.5 | 25.0 | dBm  |  |
| S11              |               | -10  |      | dB   |  |
| S22              |               | -14  |      | dB   |  |
| <b>Low Band</b>  |               |      |      |      |  |
| Frequency        | 700           |      | 1100 | MHz  |  |
| Current          |               | 180  |      | mA   | V <sub>DD</sub> = 5V   |
| Gain             |               | 18.5 |      | dB   | +25 °C, V <sub>DD</sub> = 5V, I <sub>DD</sub> = 180 mA, 850 MHz unless specified         |
| Noise Figure     |               | 1    |      | dB   |  |
| OIP3             |               | 35   |      | dBm  | f <sub>1</sub> = 850 MHz, f <sub>2</sub> = 851 MHz                                       |
| OP1dB            |               | 22   |      | dBm  |  |
| S11              |               | -10  |      | dB   |  |
| S22              |               | -10  |      | dB   |  |

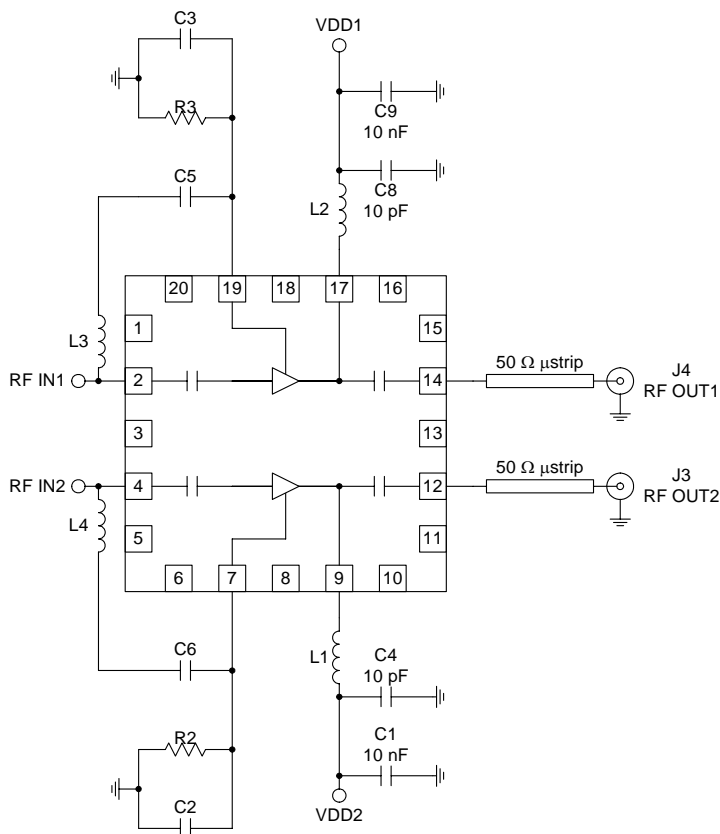
| Pin      | Function | Description   | Interface Schematic |
|----------|----------|---|---------------------|
| 1        | NC       | Not connected.  |                     |
| 2        | RF IN1   | Channel 1 RF input pin. 50Ω matched. This pin is DC-blocked.  |                     |
| 3        | NC       | Not connected.  |                     |
| 4        | RF IN2   | Channel 2 RF input pin. 50Ω matched. This pin is DC-blocked.  |                     |
| 5        | NC       | Not connected.  |                     |
| 6        | NC       | Not connected.  |                     |
| 7        | ACG2     | Channel 2 AC ground. Shunt cap may be added for tuning. Shunt resistor may be added to increase I <sub>DD</sub> . |                     |
| 8        | NC       | Not connected.  |                     |
| 9        | VDD2     | Channel 2 bias voltage. 2.5V to 6.0V applied through bias inductor.   |                     |
| 10       | NC       | Not connected.  |                     |
| 11       | NC       | Not connected.  |                     |
| 12       | RF OUT2  | Channel 2 RF output pin. 50Ω matched. This pin is DC-blocked.   |                     |
| 13       | NC       | Not connected.  |                     |
| 14       | RF OUT1  | Channel 1 RF output pin. 50Ω matched. This pin is DC-blocked.   |                     |
| 15       | NC       | Not connected.  |                     |
| 16       | NC       | Not connected.  |                     |
| 17       | VDD1     | Channel 1 bias voltage. 2.5V to 6.0V applied through bias inductor.   |                     |
| 18       | NC       | Not connected.  |                     |
| 19       | ACG1     | Channel 1 AC ground. Shunt cap may be added for tuning. Shunt resistor may be added to increase I <sub>DD</sub> . |                     |
| 20       | NC       | Not connected.  |                     |
| Pkg Base | GND      | Ground connection.  |                     |

Package Drawing



Dimensions in mm.

**Evaluation Board Schematic**  
**700 MHz to 1100 MHz, 1500 MHz to 2700 MHz, and 3300 MHz to 3800 MHz**



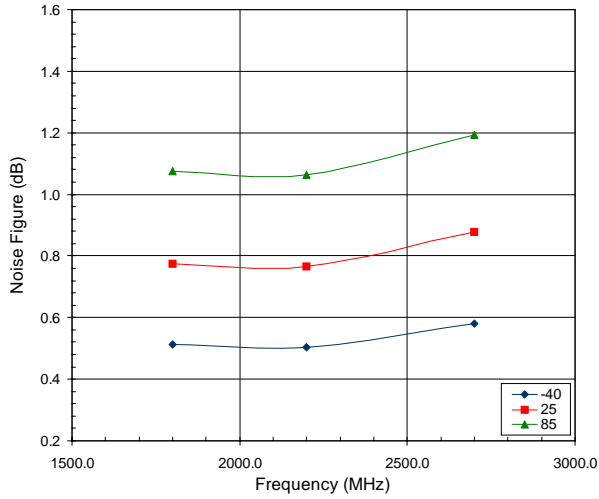
| Component           | High Band<br>3300 MHz to 3800 MHz | Mid Band<br>1500 MHz to 2700 MHz | Low Band<br>700 MHz to 1100 MHz |
|---------------------|-----------------------------------|----------------------------------|---------------------------------|
| L1, L2 (nH)         | 1.5                               | 12                               | 56                              |
| L4, L3 (nH)         | 100 pF                            | 100 pF                           | 22                              |
| C5, C6 (pF)         | 12 nH                             | 4.7 nH                           | 100                             |
| C2, C3 (pF)         | DNP                               | 12                               | 6.8                             |
| R2, R3 ( $\Omega$ ) | DNP                               | DNP                              | DNP                             |
| R1 ( $\Omega$ )     | 0                                 | 0                                | 0                               |
|                     |                                   |                                  | See note 1                      |

R2 and R3 are DNP for typical 90 mA per channel current draw. If R2 or R3 is added, the channel  $I_{DD}$  will increase. A 10  $\Omega$  R2 or R3 will raise the current of a channel to achieve higher linearity.

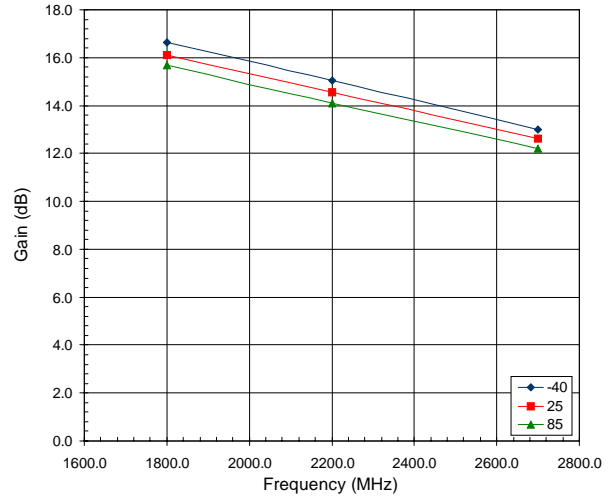
Note 1: For low band add a series 6.8 nH inductor on RF IN, and a shunt 15 nH inductor on RF OUT. Inductors should be placed as close as possible to the part.

Note 2: The topology of L3, L4, C5, and C6 in the mid and high bands. They must be as shown in the chart.

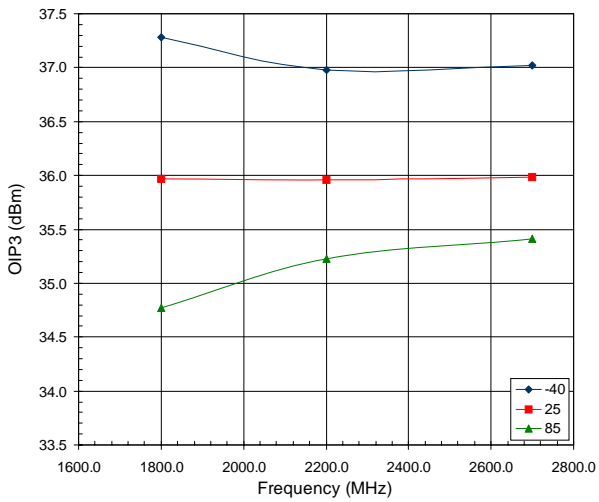
5V Noise Figure versus Temperature



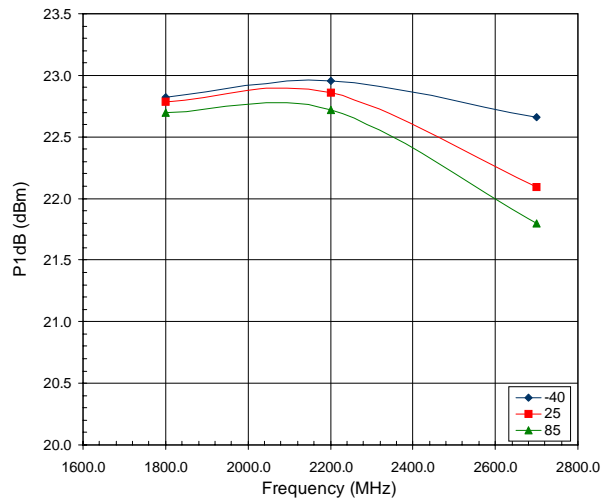
5V Gain versus Temperature



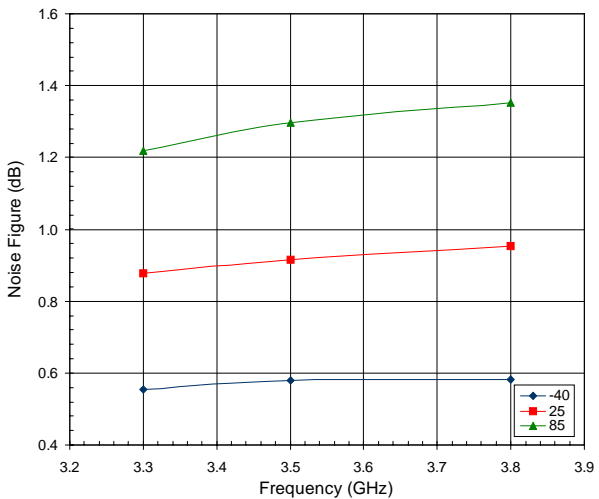
5V OIP3 versus Temperature



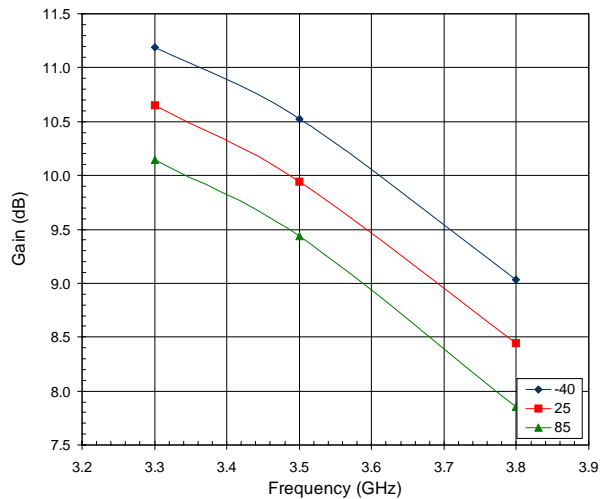
5V P1dB versus Temperature



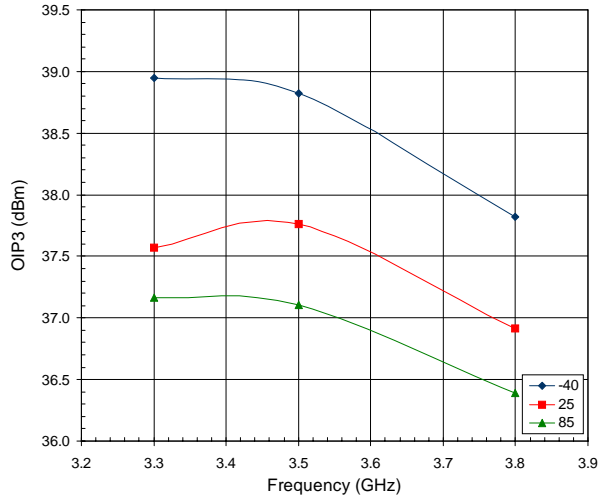
5V Noise Figure versus Temperature



5V Gain versus Temperature



5V OIP3 versus Temperature



5V P1dB versus Temperature

