

General Description

The RFFM4227 is a low noise amplifier (LNA) designed for Wi-Fi 802.11b/g/n systems. The integrated input and output 50Ω match minimizes layout area in the customer's application, reduces the bill of materials and manufacturability cost. Performance is focused on a balance of low noise and gain that increases the receive sensitivity.

The RFFM4227 integrates a bypass path that enables a defined gain step. The device is provided in a 1.6mm x 1.6mm x 0.5mm, 6-pin DFN package.

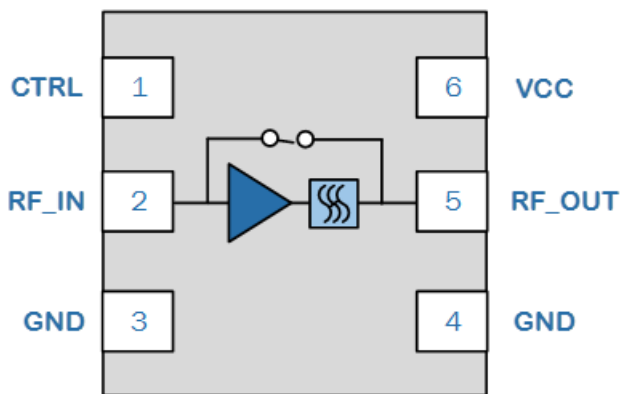


6 Pad 1.6 x 1.6 mm DFN Package

Product Features

- 2400 – 2500 MHz
- 15 dB LNA Gain
- 1.3 dB Noise Figure
- 6 dB Bypass Loss
- Input and Output Matched to 50 Ω
- Integrated 5 GHz Rejection Filter
- 1.6 x 1.6 mm DFN Package

Functional Block Diagram



Top View

Applications

- Wireless Routers
- Access Points
- Residential Gateways
- Customer Premise Equipment
- Internet of Things

Ordering Information

| Part No. | Description |
|------------------|------------------------------------|
| RFFM4227SB | Sample Bag with 5 pcs |
| RFFM4227SQ | Sample Bag with 25 pcs |
| RFFM4227SR | 7" Reel with 100 pcs |
| RFFM4227TR7 | 7" Reel with 2,500 pcs |
| RFFM4227TR13-10k | 13" Reel with 10,000 pcs |
| RFFM4227PCK-410 | Assembled Evaluation Board + 5 pcs |

Absolute Maximum Ratings

| Parameter | Rating |
|--|------------------------------|
| DC Supply Voltage (No RF Applied) | -0.3 to +5.5 V _{DC} |
| Control Voltage | -0.5 to +4 V _{DC} |
| Storage Temperature | -40 to +150 °C |
| RF Input Power into 50 Ω Load for 802.11b/g/ in LNA On Mode (No Damage) | +20 dBm |
| RF Input Power into 50 Ω Load for 802.11b/g/ in <u>Bypass</u> Mode (No Damage) | +30 dBm |

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.

Recommended Operating Conditions

| Parameter | Min | Typ | Max | Units |
|--------------------------------------|------|-----|------|-------|
| Operating Frequency | 2400 | | 2500 | MHz |
| Operating Temperature | -40 | | +85 | °C |
| Power Supply Voltage V _{CC} | 3 | 5 | 6 | V |
| Control Voltage - High | 2.8 | 3.1 | 3.3 | V |
| Control Voltage - Low | 0 | | 0.2 | V |

Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.

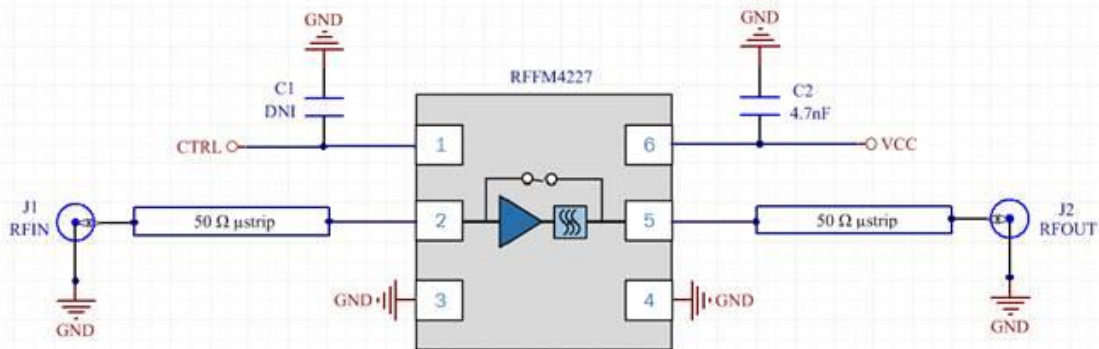
Electrical Specifications

| Parameter | Conditions | Min | Typ | Max | Units |
|---|-----------------------------------|------|-----|-----|-------|
| LNA MODE | | | | | |
| Unless otherwise noted: V _{CC} = 3.3V, T = +25 °C, CTRL = High | | | | | |
| Noise Figure | | | 1.3 | 1.6 | dB |
| Small Signal Gain | | 14 | 15 | | dB |
| Gain Flatness Across any 40 MHz Channel | | -0.2 | | 0.2 | dB |
| RF_IN Port Return Loss | | | 8 | 6 | dB |
| RF_OUT Port Return Loss | | | 15 | 10 | dB |
| Input P ^{1dB} | | -7 | -5 | | dBm |
| Input IP3 | P _{IN} = -20 dBm | | +3 | | dBm |
| RX Operating Current | | | 9 | 20 | mA |
| I _{CTRL} Current | | | 500 | | μA |
| BYPASS MODE | | | | | |
| Unless otherwise noted: V _{CC} = 3.3V, T = +25 °C, CTRL = High | | | | | |
| Bypass Loss | | | 6 | | dB |
| Loss Flatness Across any 40 MHz Channel | | -0.2 | | 0.2 | dB |
| RF_IN Port Return Loss | | | 8 | 7 | dB |
| RF_OUT Port Return Loss | | | 8 | 7 | dB |
| Input P ^{1dB} | | +18 | +20 | | dBm |
| Input IP3 | P _{IN} = -5 dBm | | +29 | | dBm |
| RX Operating Current | | | 20 | 50 | μA |
| GENERAL SPECIFICATIONS | | | | | |
| Gain Switch Time – 50 to 90% RF Output | Switching from Bypass to LNA Mode | | 325 | | nS |
| Gain Switch Time – 50 to 10% RF Output | Switching from LNA to Bypass Mode | | 100 | | nS |

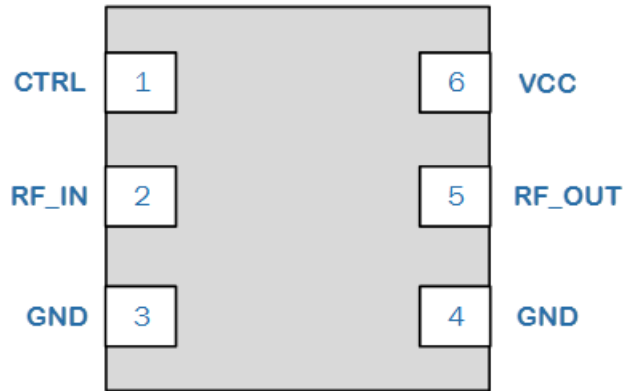
Control Logic Truth Table

| OPERATING MODE | CTRL |
|----------------|------|
| LNA Mode | High |
| Bypass Mode | Low |

Evaluation Board Schematic



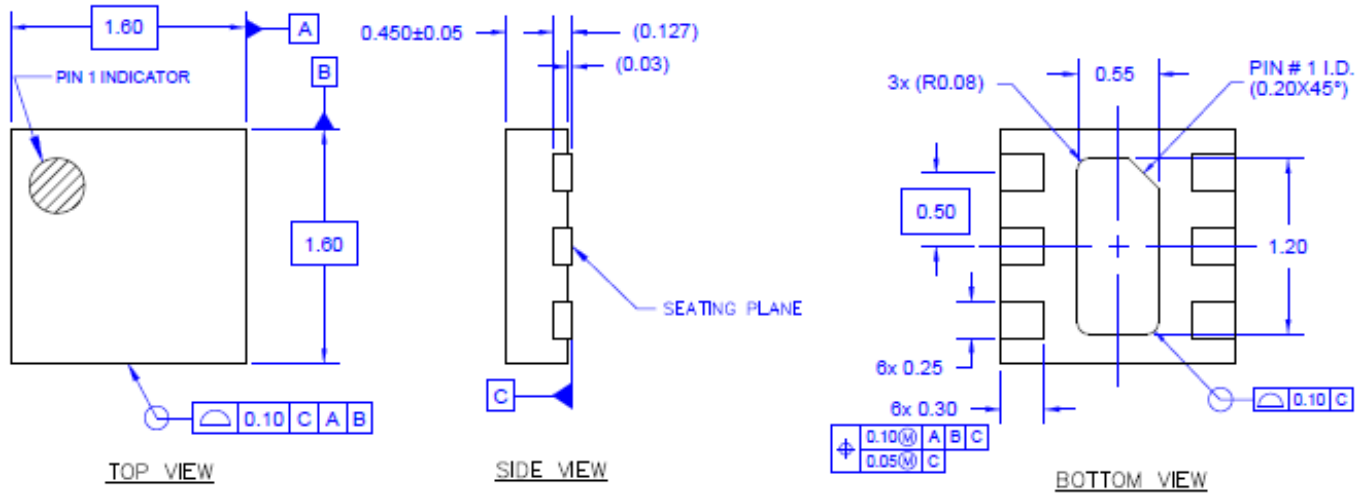
Pin Configuration and Description



Top View

| Pad No. | Label | Description |
|--------------|--------|--|
| 1 | CTRL | Control voltage |
| 2 | RF_IN | RF input. This port is matched to 50 Ω and DC blocked |
| 3 | GND | Ground connection |
| 4 | GND | Ground connection |
| 5 | RF_OUT | RF output. This port is matched to 50 Ω and DC blocked . |
| 6 | VCC | Supply voltage |
| Package Base | GND | RF/DC ground. Use recommended via pattern to minimize inductance and thermal resistance. See PCB Mounting Pattern for suggested footprint. |

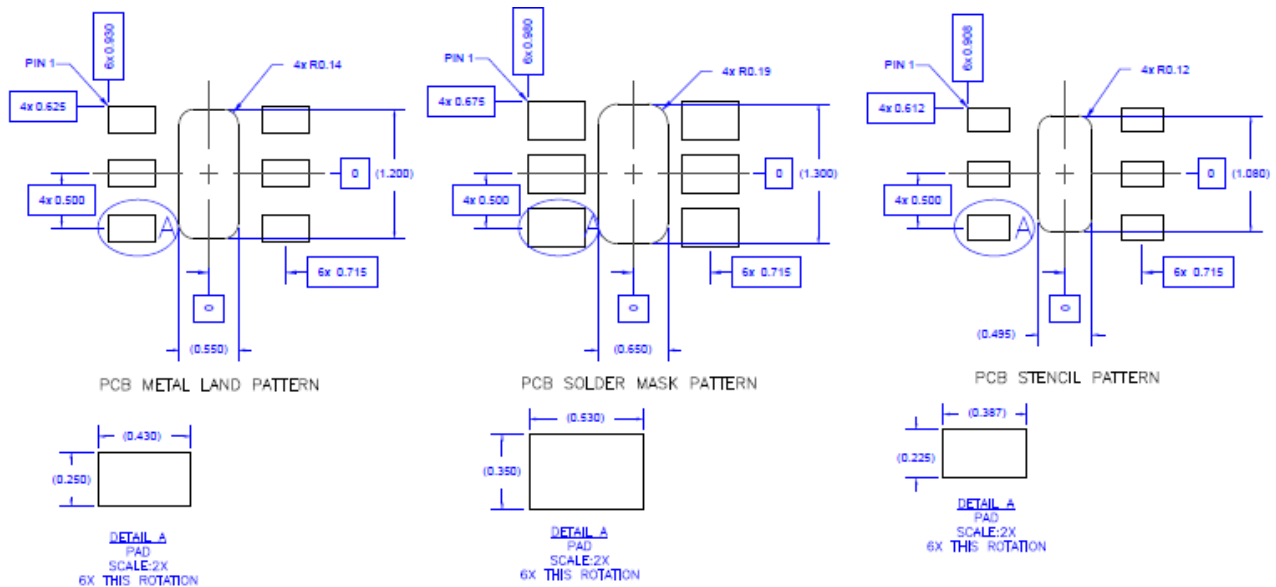
Package Dimensions



Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012.
3. Contact plating: NiPdAu

PCB Mounting Pattern



Thermal vias for center slug should be incorporated into the PCB design. The number and size of thermal vias will depend on the application, the power dissipation, and the electrical requirements. Example of the number and size of vias can be found on the evaluation board layout.

Notes:

1. All dimensions are in millimeters. Angles are in degrees.
2. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.