

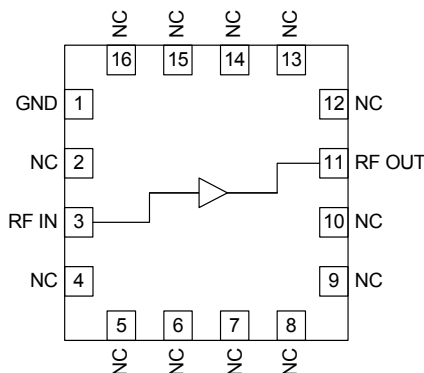


### Features

- For Use in Both 50Ω and 75Ω Systems
- 5 MHz to 1500MHz Operation
- Internally Matched Input and Output
- 20dB Small Signal Gain
- 1.2dB Noise Figure
- +24dBm Output Power
- Single 5V to 9V Positive Power Supply

### Applications

- Linear LNA/Driver
- CATV Distribution Amplifiers
- Cable Modems
- Broadband Gain Blocks
- Laser Diode Driver
- Return Channel Amplifier
- Base Stations



Functional Block Diagram

### Product Description

The RF3827 is a general purpose, low-cost, high-linearity RF amplifier IC. The device is manufactured on a Gallium Arsenide process and is featured in a 3mmx3mm, 16-pin, QFN package. It is ideally suited for use as a linear/low noise amplifier, with OIP3 equal to 38dBm and noise figure less than 1.5dB.

### Ordering Information

|               |  |
|---------------|--|
| RF3827SQ      | Sample bag with 25 pieces                    |
| RF3827SR      | 7" Sample reel with 100 pieces               |
| RF3827TR7     | 7" Reel with 2500 pieces                     |
| RF3827PCK-410 | 5MHz to 1500MHz PCBA with 5-piece sample bag |

### 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 checked="" type="checkbox"/> GaAs MESFET | <input type="checkbox"/> Si BiCMOS   | <input type="checkbox"/> Si CMOS    | <input type="checkbox"/> RF MEMS  |
| <input type="checkbox"/> InGaP HBT              | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT     | <input type="checkbox"/> LDMOS    |

## Absolute Maximum Ratings

| Parameter                     | Rating      | Unit |
|-------------------------------|-------------|------|
| Device Current                | 175         | mA   |
| Device Voltage                | 9           | V    |
| Input RF Power                | +13         | dBm  |
| Output Load VSWR              | 20:1        |      |
| Ambient Operating Temperature | -40 to +85  | °C   |
| Storage Temperature           | -40 to +150 | °C   |



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.

RoHS status based on EU Directive 2011/65/EU (at time of this document revision).

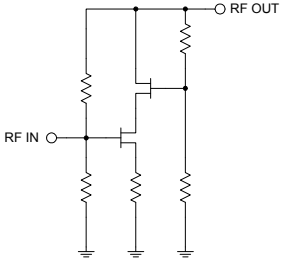
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RFMD Green: RoHS compliant per EU Directive 2011/65/EU, halogen free per IEC 61249-2-21, < 1000 ppm each of antimony trioxide in polymeric materials and red phosphorus as a flame retardant, and <2% antimony in solder.

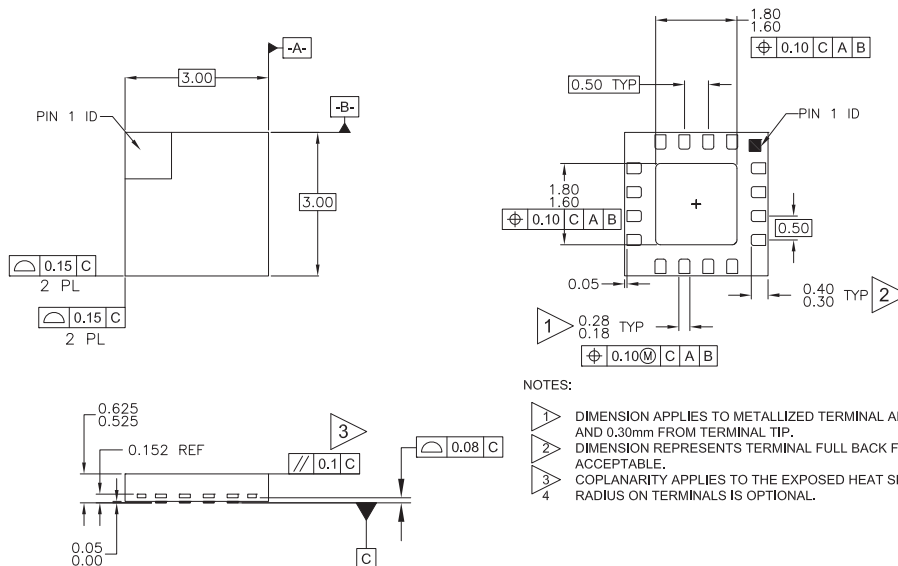
| Parameter               | Specification |          |      | Unit | Condition   |
|-------------------------|---------------|----------|------|------|---|
|                         | Min.          | Typ.     | Max. |      |   |
| <b>Overall (50Ω)</b>    |               |          |      |      | T = 25 °C, V <sub>DD</sub> = 8V, 50Ω Evaluation Board |
| Frequency Range         | 50            |          | 1000 | MHz  |   |
| Gain                    |               | 20.5     |      | dB   | At 500MHz   |
| Gain Flatness           |               | +/-1.0   |      | dB   | 50MHz to 1000MHz                                      |
| Noise Figure            |               | 1.3      |      | dB   | 50MHz to 1000MHz                                      |
| Output IP <sub>3</sub>  |               | 38       |      | dBm  | 50MHz to 1000MHz                                      |
| Output P <sub>1dB</sub> |               | 25 ± 1.0 |      | dBm  | 50MHz to 1000MHz                                      |
| Reverse Isolation       |               | 24       |      | dB   | 50MHz to 1000MHz                                      |

| Parameter                         | Specification |      |      | Unit | Condition                          |
|-----------------------------------|---------------|------|------|------|------------------------------------|
|                                   | Min.          | Typ. | Max. |      |                                    |
| Thermal                           |               |      |      |      |                                    |
| Theta JC                          |               | 40   |      | °C/W | Referenced to the GND via of Pin 1 |
| Maximum Junction Temperature      |               |      | 150  | °C   |                                    |
| Power Supply                      |               |      |      |      |                                    |
| Supply Voltage (V <sub>DD</sub> ) | 5             | 7    | 9    | V    |                                    |
| Operating Current Range           | 115           | 120  | 130  | mA   |                                    |

| Pin      | Function | Description  | Interface Schematic  |
|----------|----------|--|--|
| 1        | GND      | Keep traces physically short. Connect this pin to the ground plane with a via.   |  |
| 2        | NC       | No internal connection. Externally connected to RF input trace.  |  |
| 3        | RF IN    | RF input pin. This pin is internally DC blocked. An external DC blocking capacitor is not required.  |  |
| 4        | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 5        | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 6        | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 7        | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 8        | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 9        | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 10       | NC       | No internal connection. Externally connected to RF output trace.   |  |
| 11       | RF OUT   | RF output and bias pin. Because DC is present on this pin, a DC blocking capacitor, suitable for the frequency of operation, should be used in most applications. For biasing, only an RF choke is needed. |  |
| 12       | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 13       | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 14       | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 15       | NC       | No connection. This pin should be connected to the ground plane.   |  |
| 16       | NC       | No connection. This pin should be connected to the ground plane.   |  |
| Pkg Base | GND      |  |  |

## Package Drawing

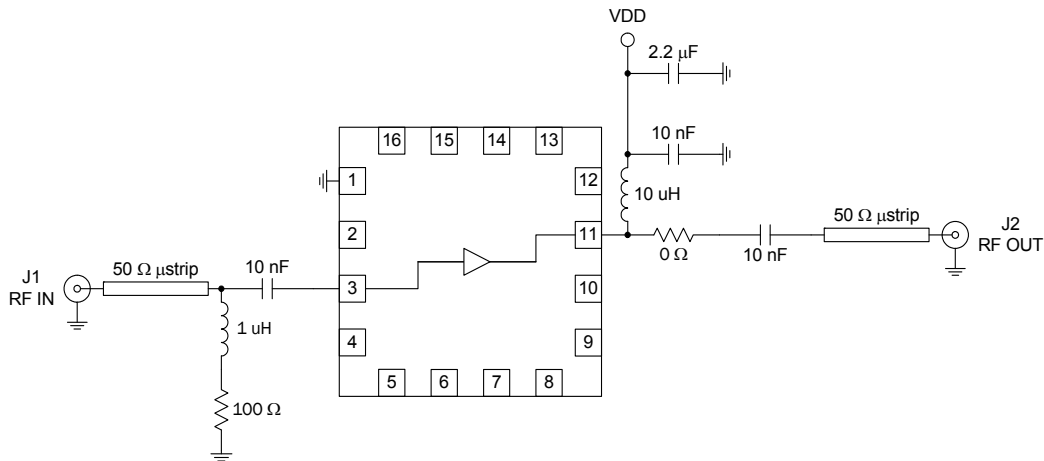
Package Style: QFN, 16-Pin, 3mmx3mm



### NOTES:

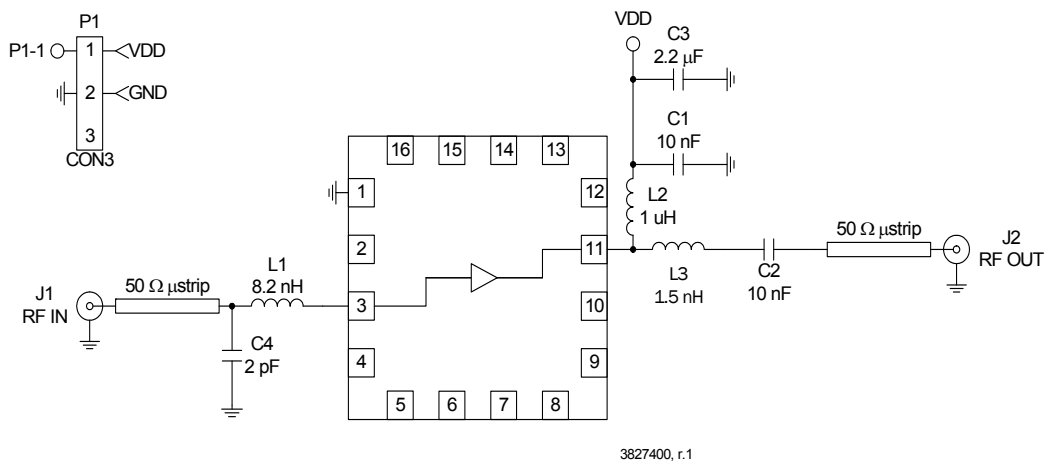
1. DIMENSION APPLIES TO METALLIZED TERMINAL AND IS MEASURED BETWEEN 0.25mm AND 0.30mm FROM TERMINAL TIP.
2. DIMENSION REPRESENTS TERMINAL FULL BACK FROM PACKAGE EDGE UP TO 0.1mm IS ACCEPTABLE.
3. COPLANARITY APPLIES TO THE EXPOSED HEAT SLUG AS WELL AS THE TERMINAL. RADIUS ON TERMINALS IS OPTIONAL.

Application Schematic - 50Ω  
5 MHz to 200 MHz Linear Driver

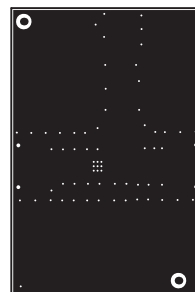
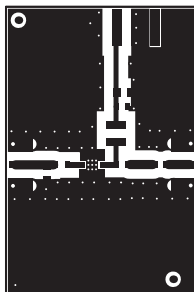
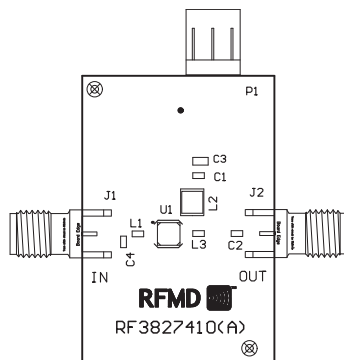


| VCC<br>(V) | Frequency<br>MHz | ICC<br>mA | Gain<br>dB | OIP3<br>dBm | OP1dB<br>dBm |
|------------|------------------|-----------|------------|-------------|--------------|
| 8          | 5                | 99.945    | 18.92      | 33.7        | 21.69        |
| 8          | 10               | 100.437   | 18.63      | 37.75       | 22.86        |
| 8          | 100              | 101.093   | 19.53      | 38.47       | 25.21        |
| 8          | 200              | 101.221   | 19.8       | 38.6        | 25.45        |

## Evaluation Board Schematic - 50 $\Omega$ 50 MHz to 1000 MHz



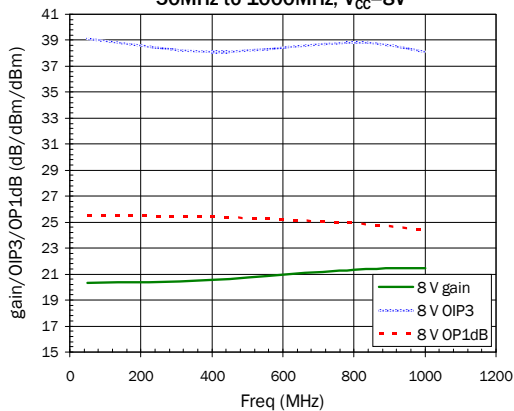
**Evaluation Board Layout - 50 $\Omega$**   
**Board Size 1.0" x 1.5"**  
**Board Thickness 0.031", Board Material FR-4**





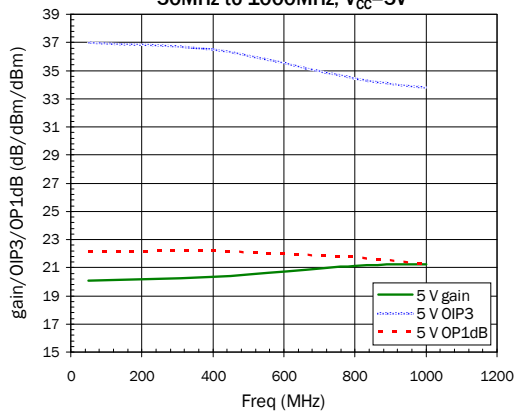
50 Ohm Evaluation Board

50MHz to 1000MHz,  $V_{CC}=8V$



50 Ohm Evaluation Board

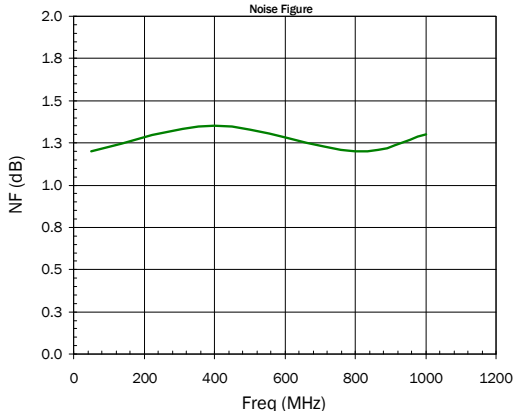
50MHz to 1000MHz,  $V_{CC}=5V$



50 Ohm Evaluation Board

50MHz to 1000MHz,  $V_{CC}=8V$

Noise Figure



## Theory of Operation

RF3827 can be used as both low noise amplifier and linear transmit driver. Internal matching is such that the part can be used effectively in both  $50\Omega$  and  $75\Omega$  systems. The standard evaluation board is  $50\Omega$ , as are the corresponding specifications shown within the data sheet. Perhaps more convenient for the  $75\Omega$  designer, would be alternate products RF2360 and CXE-2089Z. These two devices see very similar performance to RF3827, and standard  $75\Omega$  evaluation boards are available.

An important note concerning RF3827 layout would apply to package pins 2 and 10. These two pins have no internal connection. They are, however, connected externally to RF input and output traces on the standard evaluation board. Given their close proximity to the actual input and output pins, this is simply a matter of convenience.

The standard RF3827 evaluation board is matched to provide excellent performance from 50MHz to 1000MHz. An application schematic is also shown for 5MHz to 200MHz, in the event lower frequency operation is desired. Specifications are shown in the tabular sections for the condition  $V_{DD}=8V$ . Note that graphs are also provided herein for the common design case where  $V_{DD}=5V$ .

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