

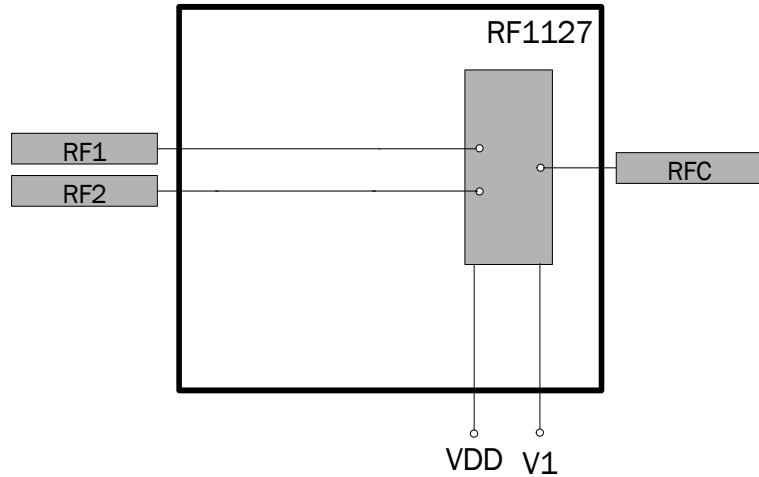


### Features

- Broadband Performance  
Low Frequency to 3.5GHz
- 1-Bit Control: Requires Single Control Line to Switch Between Two RF Paths
- Compatible With Low Voltage Logic (1.8V)
- Very Low Insertion Loss:
  - 0.3dB at 1GHz (Typ)
  - 0.4dB at 2GHz (Typ)
- Excellent Linearity:
  - IIP2 > 100dBm (Typ)
  - IIP3 > 63dBm (Typ)
- P0.1dB: 23dBm (Typ)
- Compact Footprint
- 2.0mmx1.3mmx0.385mm, 6-Pin, QFN

### Applications

- Cellular Handset Applications
- Antenna Tuning Applications
- IEEE802.11b/g WLAN Applications



Functional Block Diagram

### Product Description

The RF1127 is a single pole double throw (SPDT) switch designed for general purpose switching applications which require very low insertion loss and low power handling capability. The RF1127 features low insertion loss, good isolation, and excellent linearity performance which makes it ideally suited for battery operated applications requiring high performance switching with very low DC power consumption. The RF1127 builds upon RFMD's GaAs pHEMT process and is packaged in a very compact, low profile 2mmx1.3mmx0.385mm, leadless QFN package.

### Ordering Information

|                |                                  |
|----------------|----------------------------------|
| RF1127         | Broadband Low Power SPDT Switch  |
| RF1127PCBA-410 | Fully Assembled Evaluation Board |

### 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"/> RF MEMS  |
| <input type="checkbox"/> InGaP HBT   | <input type="checkbox"/> SiGe HBT    | <input type="checkbox"/> Si BJT                | <input type="checkbox"/> LDMS     |

## Absolute Maximum Ratings

| Parameter   | Rating      | Unit |
|---|-------------|------|
| Voltage ( $V_{DD}$ , $V_1$ )                      | 6.0         | V    |
| Maximum Input Power (450MHz to 3500MHz), RF1, RF2 | +28         | dBm  |
| Operating Temperature                             | -30 to +85  | °C   |
| Storage Temperature                               | -65 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 EUDirective2002/95/EC (at time of this document revision).

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| Parameter                  | Specification |      |       | Unit | Condition  |
|----------------------------|---------------|------|-------|------|--|
|                            | Min.          | Typ. | Max.  |      |  |
|                            |               |      |       |      | $V_{DD}=2.6V$ , $V_1=High=1.8V$ , $V_1=Low=0V$ ,<br>Temp = 25 °C, unless otherwise specified |
| Operating Frequency        | 450           |      | 3500  | MHz  |  |
| <b>Insertion Loss</b>      |               |      |       |      |  |
| RFC-RF1, RFC-RF2           |               | 0.3  | 0.4   | dB   | RF ON, 824MHz to 960MHz  |
|                            |               | 0.35 | 0.5   | dB   | RF ON, 1850MHz to 1990MHz  |
|                            |               | 0.4  | 0.65  | dB   | RF ON, 2170MHz to 2500MHz  |
|                            |               | 0.50 |       | dB   | RF ON, 3500MHz   |
| <b>RF Isolation</b>        |               |      |       |      |  |
| RF1-RF2, RF2-RF1           | 27            | 29   |       | dB   | RF1-ANT, RF2-ANT, 824MHz to 960MHz   |
|                            | 19            | 20   |       | dB   | RF1-ANT, RF2-ANT, 1850MHz to 1990MHz   |
|                            | 17            | 19   |       | dB   | RF1-ANT, RF2-ANT, 2170MHz to 2500MHz   |
|                            |               | 18   |       | dB   | RF1-ANT, RF2-ANT, 3500MHz  |
| RFC-RF1, RFC-RF2           | 27            | 29   |       | dB   | RF1-ANT, RF2-ANT, 824MHz to 960MHz   |
|                            | 19            | 20   |       | dB   | RF1-ANT, RF2-ANT, 1850MHz to 1900MHz   |
|                            | 17            | 19   |       | dB   | RF1-ANT, RF2-ANT, 2170MHz to 2500MHz   |
|                            |               | 18   |       | dB   | RF1-ANT, RF2-ANT, 3500MHz  |
| <b>RF Port Return Loss</b> |               |      |       |      |  |
| VSWR                       |               |      | 1.5:1 |      |  |
| <b>880MHz Harmonics</b>    |               |      |       |      |  |
| Second Harmonic            | 69            | 92   |       | dBc  | Pin = 16dBm; $F_0=880MHz$  |
| Third Harmonic             | 69            | 105  |       | dBc  | Pin = 16dBm; $F_0=880MHz$  |
| <b>1880MHz Harmonics</b>   |               |      |       |      |  |
| Second Harmonic            | 70            | 100  |       | dBc  | Pin = 16dBm; $F_0=1880MHz$   |
| Third Harmonic             | 70            | 107  |       | dBc  | Pin = 16dBm; $F_0=1880MHz$   |
| <b>2500MHz Harmonics</b>   |               |      |       |      |  |
| Second Harmonic            | 70            | 89   |       | dBc  | Pin = 16dBm; $F_0=2500MHz$   |
| Third Harmonic             | 70            | 92   |       | dBc  | Pin = 16dBm; $F_0=2500MHz$   |

| Parameter                                     | Specification |      |      | Unit | Condition   |
|---|---------------|------|------|------|---|
|   | Min.          | Typ. | Max. |      |   |
| <b>IIP2</b>                                   |               |      |      |      |   |
| RF1, RF2-ANT Cell                             |               | 100  |      | dBm  | Tone 1: 836.5MHz at 16dBm,<br>Tone 2: 1718MHz at -20dBm<br>Receive Freq: 881.5MHz   |
| RF1, RF2-ANT AWS                              |               | 99   |      | dBm  | Tone 1: 1732.5MHz at 16dBm,<br>Tone 2: 3865MHz at -20dBm<br>Receive Freq: 2132.5MHz |
| RF1, RF2-ANT PCS                              |               | 100  |      | dBm  | Tone 1: 1880MHz at 16dBm,<br>Tone 2: 3840MHz at -20dBm<br>Receive Freq: 1960MHz     |
| <b>IIP3</b>                                   |               |      |      |      |   |
| IIP3 RF1, RF2-ANT Cell                        |               | 65   |      | dBm  | Tone 1: 836.5MHz at 16dBm,<br>Tone 2: 791.5MHz at -20dBm<br>Receive Freq: 881.5MHz  |
| IIP3 RF1, RF2-ANT IMT                         |               | 63   |      | dBm  | Tone 1: 1950MHz at 16dBm,<br>Tone 2: 1760MHz at -20dBm<br>Receive Freq: 2140MHz     |
| <b>Input Power at 0.1dB Compression Point</b> |               |      |      |      |   |
|   | 19            | 23   |      | dBm  |   |
| <b>Switching Speed</b>                        |               |      |      |      |   |
|   |               |      | 600  | ns   | 50% to 90% RFon, 50% to 10% RF off.   |
| <b>DC Supply</b>                              |               |      |      |      |   |
| VDD   | 2.50          | 2.60 | 3.30 | V    |   |
| V1 (H)  |               | 1.80 | 3.60 | V    |   |
| V1 (L)  | 0.00          |      | 0.40 | V    |   |
| Supply Current                                |               | 120  | 250  | uA   | Pin = 16dBm   |
| Control Current                               |               | 14   | 25   | uA   | Pin = 16dBm   |

Note: Parameters hold at 25 °C and VDD=2.5V.

## Control Logic

|              | Control Signal | Signal Paths |         |
|--------------|----------------|--------------|---------|
|              | V1             | RF1-RFC      | RF2-RFC |
| Valid States | 1              | ON           | OFF     |
|              | 0              | OFF          | ON      |

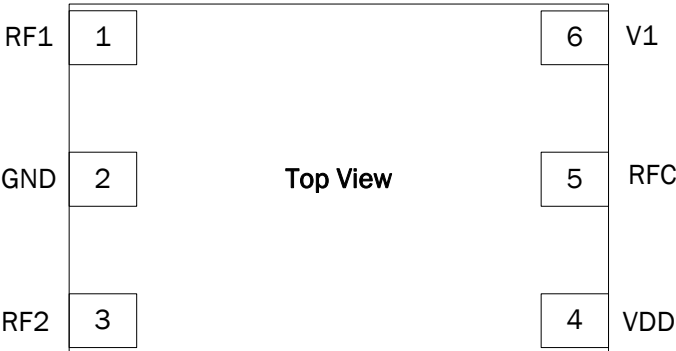
0: Logic level low, 0V~0.2V

1: Logic level high, 1.8V~3.6V

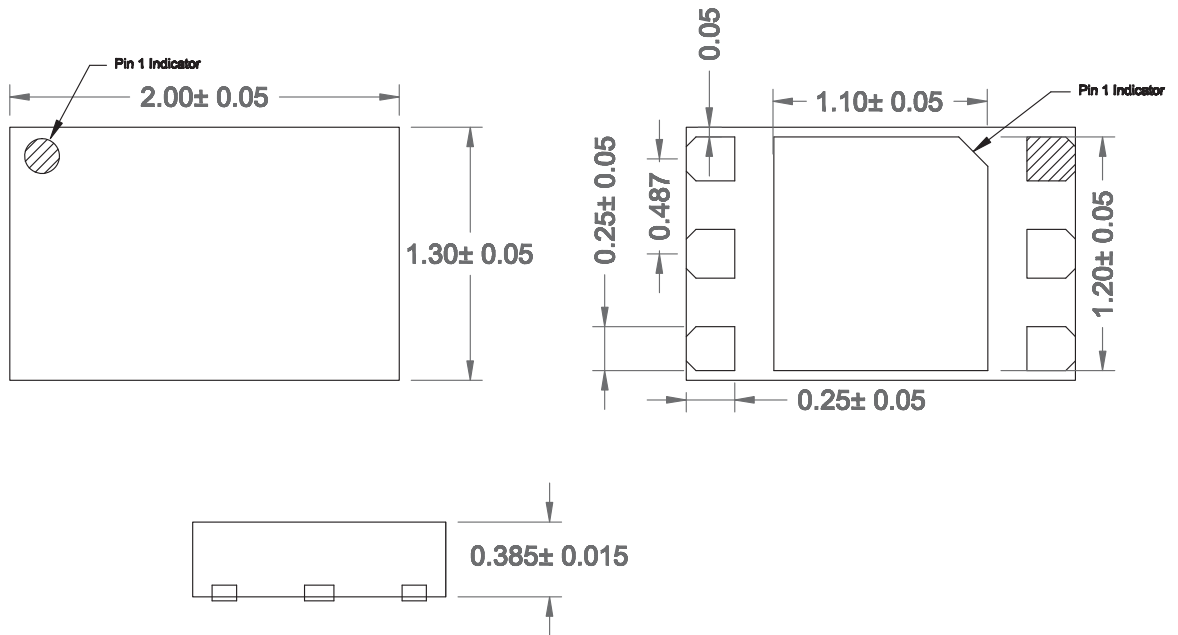
Note: In indeterminate states, both signal paths are ON with degraded performance.

| Pin      | Function | Description          |
|----------|----------|----------------------|
| 1        | RF1      | RF Port 1.           |
| 2        | GND      | Ground.              |
| 3        | RF2      | RF Port 2.           |
| 4        | VDD      | Supply.              |
| 5        | RFC      | Antenna.             |
| 6        | V1       | Control Line.        |
| Pkg Base | GND      | Package base ground. |

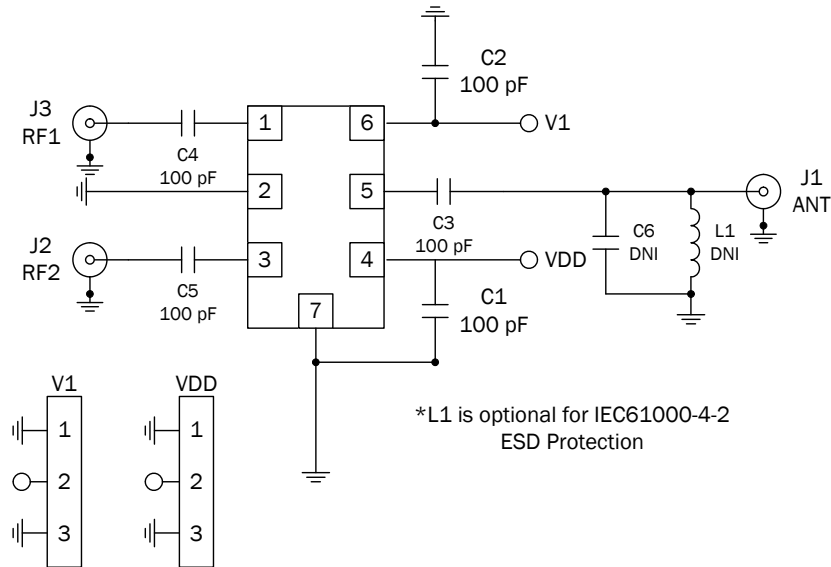
### Pin Out



**Package Drawing**



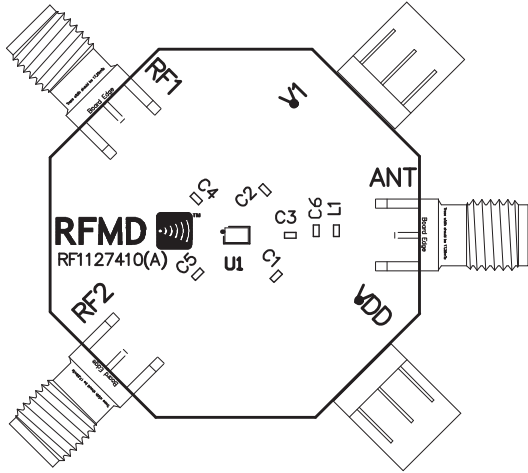
## Evaluation Board Schematic



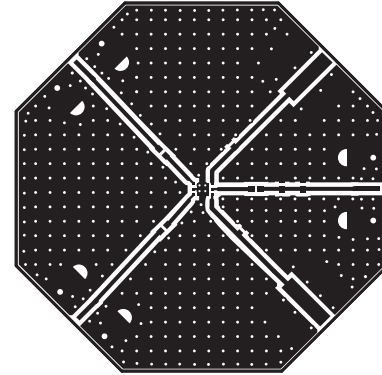
### Application Guidelines

The decoupling capacitors are optional and, if necessary, may be used for noise reduction. Decoupling capacitors on the control pins protect the control circuitry from possible RF leakage. For applications less than 300MHz the DC-blocking capacitors on ports RF1, RF2, and ANT need to be 10nF instead of 100pF for best performance.

**Evaluation Board Layout**  
**Board Thickness 0.0658", Board Material FR-4**



Assembly Layer



Top Layer

## Typical Performance Data on Evaluation Board

Fixture losses have been de-embedded (Temp=25°C, VDD=2.6V, V1=1.8V).

