



Package: QFN, 16-Pin, 3mm x 3mm

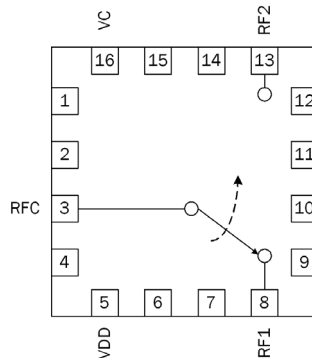


### Product Description

The RF3021 is a high isolation single-pole double-throw (SPDT) reflective switch designed for general purpose switching applications requiring moderate insertion loss and power handling capability. It features single-bit control with operation as low as 3V. This GaAs pHEMT switch is housed in a compact 3mm, 16-pin, leadless QFN package.

#### Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☐ SiGe HBT
- ☒ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ InP HBT
- ☐ RF MEMS
- ☐ LDMOS



### Features

- 10MHz to 6GHz Operation
- 0.5dB Insertion Loss at 1GHz
- 0.9dB Insertion Loss at 6GHz
- 68dB Isolation at 1GHz
- 40dBm Isolation at 6GHz
- 3V Minimum Voltage
- 50dBm IP3 at 5V

### Applications

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

| Parameter                             | Specification |      |      | Unit | Condition   |
|---------------------------------------|---------------|------|------|------|---|
|                                       | Min.          | Typ. | Max. |      |   |
| Insertion Loss                        |               | 0.5  |      | dB   | Freq = 10MHz to 1.0GHz                              |
|                                       |               | 0.55 | 0.8  | dB   | Freq = 1.0GHz to 2.0GHz                             |
|                                       |               | 0.6  |      | dB   | Freq = 2.0GHz to 3.0GHz                             |
|                                       |               | 0.7  |      | dB   | Freq = 3.0GHz to 5.0GHz                             |
|                                       |               | 0.9  |      | dB   | Freq = 5.0GHz to 6.0GHz                             |
| Return Loss                           |               | 18   |      | dB   | Freq = 10MHz to 1.0GHz                              |
|                                       |               | 18   |      | dB   | Freq = 1.0GHz to 3.0GHz                             |
|                                       |               | 14   |      | dB   | Freq = 3.0GHz to 6.0GHz                             |
| Isolation                             |               | 68   |      | dB   | Freq = 0.5GHz to 1.0GHz                             |
|                                       | 53            | 58   |      | dB   | Freq = 1.0GHz to 2.0GHz                             |
|                                       |               | 50   |      | dB   | Freq = 2.0GHz to 3.0GHz                             |
|                                       |               | 43   |      | dB   | Freq = 3.0GHz to 5.0GHz                             |
|                                       |               | 40   |      | dB   | Freq = 5.0GHz to 6.0GHz                             |
| PO.1dB*                               |               | 30   |      | dBm  | Freq = 1.8GHz                                       |
| IP3*                                  |               | 50   |      | dBm  | Freq = 0.5GHz to 2.5GHz, 1MHz spacing, 10 dBm/ tone |
| I <sub>DD</sub> , Supply Current      |               | 200  | 300  | uA   |   |
| I <sub>C</sub> , Control Current      |               | 20   |      | uA   |   |
| T <sub>ON</sub> , T <sub>OFF</sub>    |               | 120  |      | nS   | 50% of V <sub>CTRL</sub> to 10/90% of RF            |
| T <sub>RISE</sub> , T <sub>FALL</sub> |               | 35   |      | nS   | 10/90% RF   |

Test Conditions: V<sub>DD</sub> = 5V, 25 °C, 50Ω, with application circuit with 100pF DC blocking capacitors

\*Note: Performance degrades below 50MHz.

Absolute Maximum Ratings

| Parameter                      | Rating      | Unit |
|--------------------------------|-------------|------|
| Supply Voltage $V_{DD}$        | 5.5         | V    |
| Control Voltage ( $V_C$ )      | 5.5         | V    |
| RF Input Power (on state)      | 32          | dBm  |
| Operating Temp Range ( $T_L$ ) | -40 to +85  | °C   |
| Storage Temp                   | -65 to +150 | °C   |
| ESD Rating (HBM)               | Class 0     |      |
| Moisture Sensitivity Level     | MSL 2       |      |



Caution! ESD sensitive device.

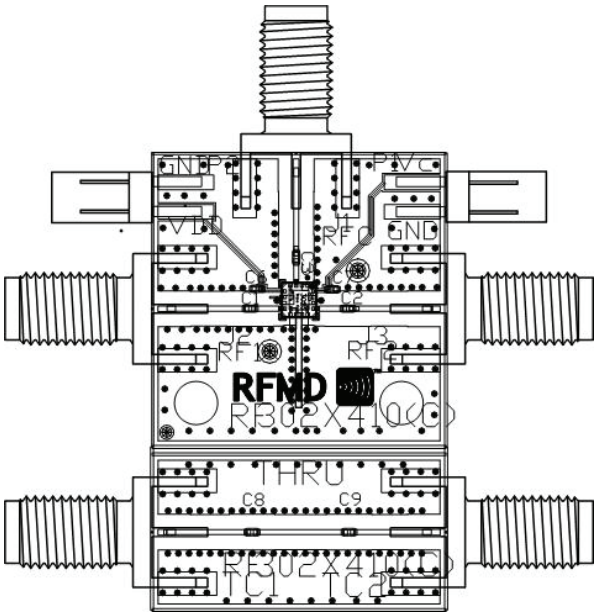
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute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

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RFMD Green: RoHS compliant per EU Directive 2002/95/EC, 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 in solder.

Evaluation Board Layout



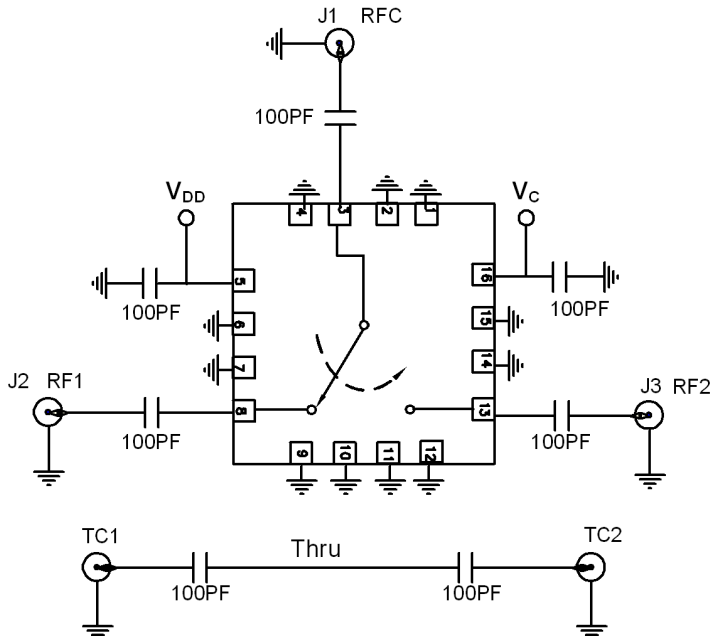
Broadband Application Circuit (500MHz to 4000MHz) - all capacitors are 100pF. Operation outside this band requires re-optimization of the capacitors.

Truth Table

| $V_C$ | RFC-RF1 | RFC-RF2 |
|-------|---------|---------|
| 0     | OFF     | ON      |
| 1     | ON      | OFF     |

Logic '0':  $0V < V_C \leq 1.0V$   
Logic '1':  $2V < V_C \leq 5V$

## Evaluation Board Schematic



Broadband Application Circuit (500MHz to 4000MHz) - all capacitors are 100pF. Operation outside this band requires re-optimization of the capacitors.

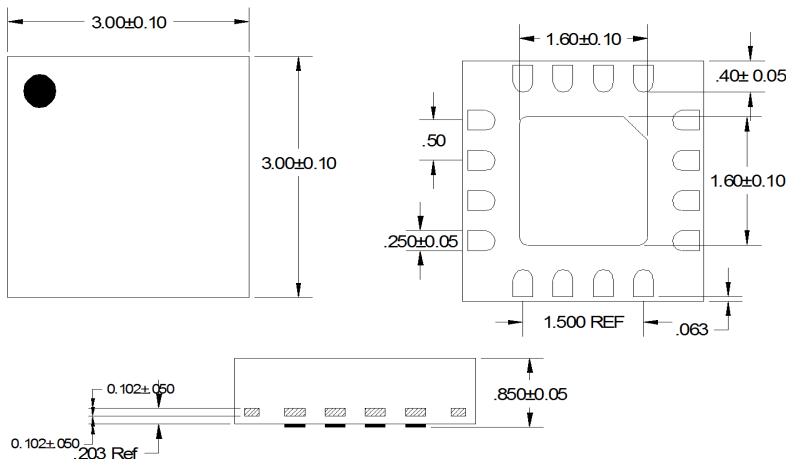
## Pin Names and Descriptions

| Pin | Name   | Description                            |
|-----|--------|--|
| 1   | GND    | Ground.                                |
| 2   | GND    | Ground.                                |
| 3   | RFC    | RF Common. External DC Block required. |
| 4   | GND    | Ground.                                |
| 5   | VDD    | Supply Voltage.                        |
| 6   | GND    | Ground.                                |
| 7   | GND    | Ground.                                |
| 8   | RF1    | RF Port 1. External DC Block required. |
| 9   | GND    | Ground.                                |
| 10  | GND    | Ground.                                |
| 11  | GND    | Ground.                                |
| 12  | GND    | Ground.                                |
| 13  | RF2    | RF Port 2. External DC Block required. |
| 14  | GND    | Ground.                                |
| 15  | GND    | Ground.                                |
| 16  | VC     | Control Voltage.                       |
| 17  | Paddle | Ground.                                |

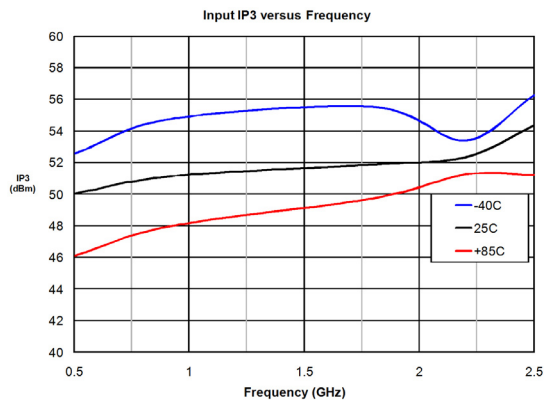
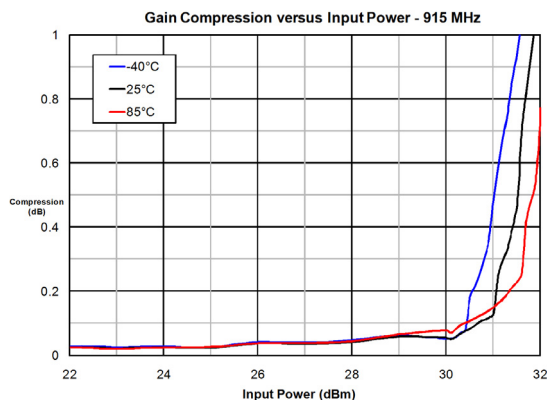
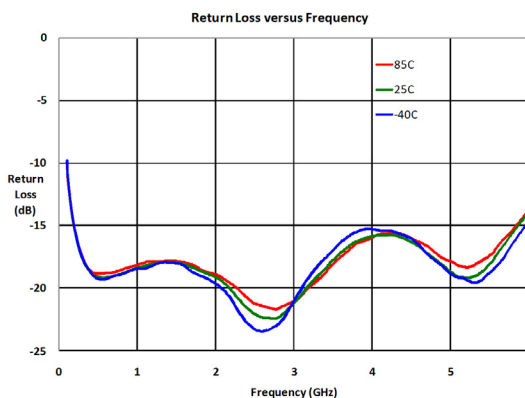
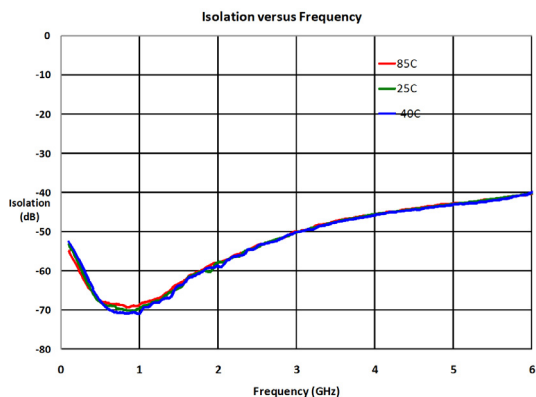
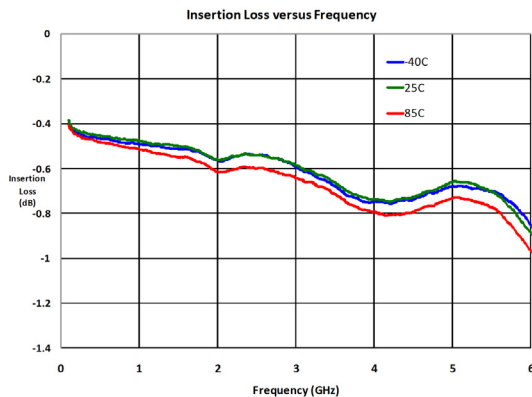
## Package Drawing

Dimensions in millimeters

Refer to drawing posted at [www.rfmd.com](http://www.rfmd.com) for tolerances.



## Typical Performance - Broadband Application Circuit, $V_{DD} = 5V$



Ordering Information

| Ordering Code | Description                                    |
|---------------|--|
| RF3021        | Sample bag with 25 pieces                      |
| RF3021SR      | 7" Reel with 100 pieces                        |
| RF3021TR7     | 7" Reel with 2500 pieces                       |
| RF3021PCK-410 | 500MHz to 4000MHz PCBA with 5-piece sample bag |