

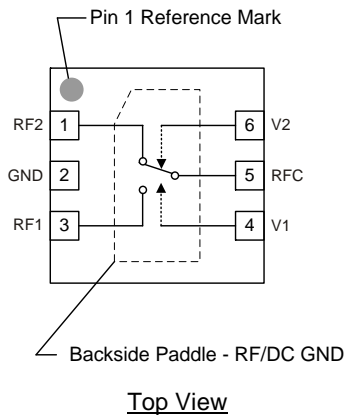
### Product Overview

The TQP4M0008 is a GaAs FET single-pole, double throw (SPDT) low loss reflective switch with good isolation. The TQP4M0008 may be operated DC control signals from +1.8 to +5 Volts. The TQP4M0008 has 100–6000 MHz broadband performance.

The TQP4M0008 is packaged in a RoHS-compliant, compact 6-pin 2 x 2 mm surface-mount leadless package.

The TQP4M0008 is an ideal choice for wireless infrastructure and test & measurement applications requiring low insertion loss and high input IP3. It can also be used for any general purpose of RF application.

### Functional Block Diagram



6-Pin 2 x 2 mm DFN Package

### Key Features

- General Purpose
- Broadband: 100–6000 MHz
- Low Insertion Loss: 0.3 dB at 1 GHz
- High Input IP3: +56 dBm at 1 GHz
- CMOS Compatible Dual Voltage Control
- Lead Free, RoHS Compliant SMT Package

### Applications

- WLAN
- Cellular Infrastructure
- Test and Measurement
- Smart Energy
- UHF/VHF
- LMR
- General Purpose Broadband Wireless

### Pin Configuration

| Pin No.         | Symbol    |
|-----------------|-----------|
| 1               | RF2       |
| 2               | GND       |
| 3               | RF1       |
| 4               | V1        |
| 5               | RFC       |
| 6               | V2        |
| Backside Paddle | RF/DC GND |

### Ordering Information

| Part No.      | Description                          |
|---------------|--------------------------------------|
| TQP4M0008     | 2,500 pieces on a 7" reel (standard) |
| TQP4M0008-PCB | 0.1–6 GHz Evaluation Board           |

## Absolute Maximum Ratings

| Parameter                         | Rating         |
|-----------------------------------|----------------|
| Storage Temperature               | -65 to +150 °C |
| RF Input Power, CW, 50 Ω, T=25 °C | +33 dBm        |
| Max RF Input Power, peak envelope | +37 dBm        |
| Control Voltage (V1, V2)          | +6 V           |

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 |
|-----------------------|------|------|------|-------|
| V1, V2 High State     | +1.8 | +3.3 | +5.0 | V     |
| Operating Temperature | -40  |      | +95  | °C    |

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

## Electrical Specifications

| Parameter                                       | Conditions <sup>(1)</sup>                   | Min | Typ  | Max  | Units |
|---|---|-----|------|------|-------|
| Operational Frequency Range                     |   | 100 |      | 6000 | MHz   |
| Insertion Loss                                  | 0.1 – 1.0 GHz                               |     | 0.35 | 0.75 | dB    |
|   | 1.0 – 2.5 GHz                               |     | 0.45 | 0.90 |       |
|   | 2.5 – 3.0 GHz                               |     | 0.55 | 0.95 |       |
|   | 3.0 – 4.5 GHz                               |     | 0.65 |      |       |
|   | 4.5 – 6.0 GHz                               |     | 0.85 |      |       |
| Isolation                                       | 0.1 – 1.0 GHz                               | 20  | 30   |      | dB    |
|   | 1.0 – 2.5 GHz                               | 18  | 25   |      |       |
|   | 2.5 – 3.0 GHz                               | 16  | 22   |      |       |
|   | 3.0 – 4.5 GHz                               |     | 20   |      |       |
|   | 4.5 – 6.0 GHz                               |     | 17   |      |       |
| Return Loss, RFC Port                           | 0.1 – 1.0 GHz                               |     | 20   |      | dB    |
|   | 1.0 – 2.5 GHz                               |     | 15   |      |       |
|   | 2.5 – 3.0 GHz                               |     | 15   |      |       |
|   | 3.0 – 4.5 GHz                               |     | 17   |      |       |
|   | 4.5 – 6.0 GHz                               |     | 15   |      |       |
| Input P1dB <sup>(2)</sup>                       | At 1 GHz                                    |     | 37   |      | dBm   |
| Input IP3 <sup>(2)</sup>                        | Pout = +15 dBm/tone, at 1 GHz, Δf = 1 MHz   | 45  | 56   |      | dBm   |
| Switch Time                                     | t <sub>OFF,tON</sub> (50% CTL to 10/90% RF) |     | 110  |      | ns    |
|   | t <sub>OFF,tON</sub> (50% CTL to 2/98% RF)  |     | 180  |      | ns    |
| Digital Control Voltage (V1, V2) <sup>(2)</sup> | Logic Low                                   | 0   |      | 0.45 | V     |
|   | Logic High                                  | 1.8 | 3.3  | 5.0  | V     |
| Control Pin Current                             | V1 or V2 at +5V                             |     |      | 60   | μA    |

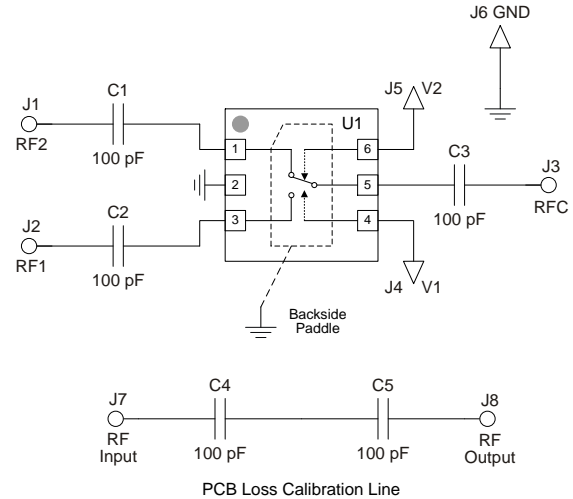
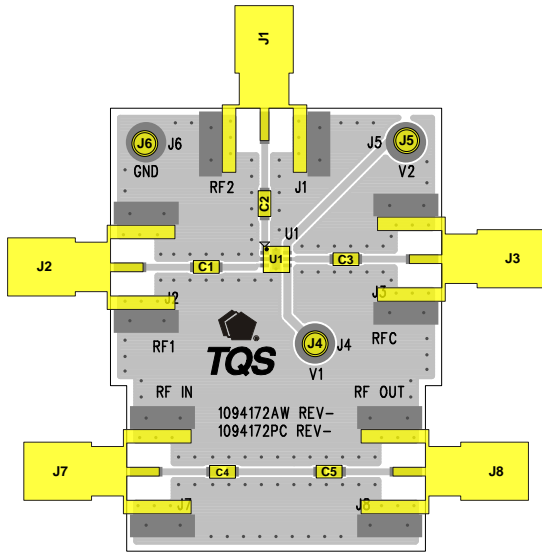
Notes:

1. Test conditions unless otherwise noted: V1 = +3.0V, V2 = 0 V, Temp = +25 °C, 50 Ω system.
2. Specified IP3 and P1dB at V1 or V2 ≥ +3.3V

## Switch Control Truth Table

| Control Voltages |      | Signal Path State   |                     |
|------------------|------|---------------------|---------------------|
| V1               | V2   | RFC to RF1          | RFC to RF2          |
| Low              | High | Off (isolation)     | On (Insertion Loss) |
| High             | Low  | On (Insertion Loss) | Off (isolation)     |

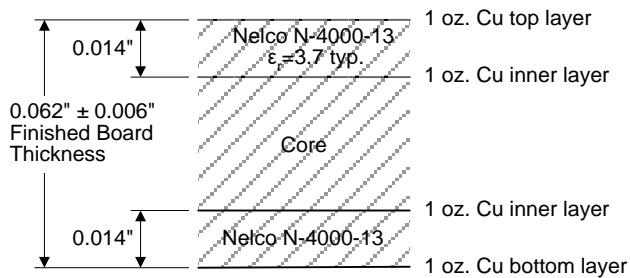
**TQP4M0008-PCB Evaluation Board**



**Notes:**

1. J7 to J8 thru line may be used to de-embed PCB losses to device.

**Qorvo PCB 1094172 Material and Stack-up**



50 ohm line dimensions: Width = .021"  
 Spacing = .006"

**Typical Performance – TQP4M0008-PCB**

Test conditions unless otherwise noted: V1=+3 V, V2=0 V, Temp=25°C, 50 Ω system

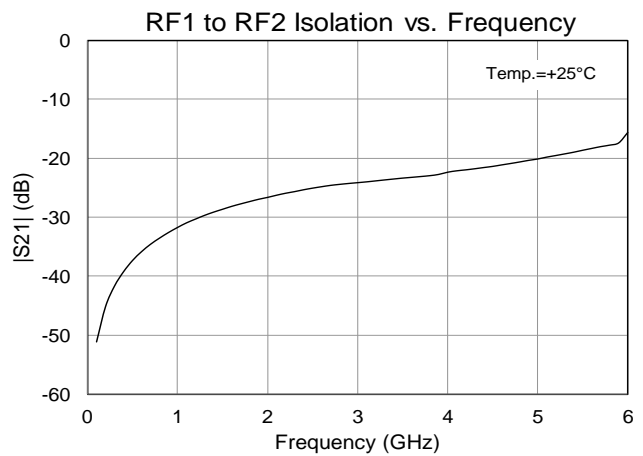
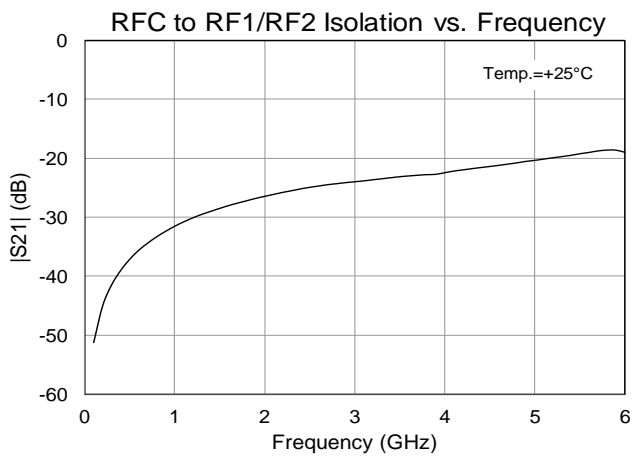
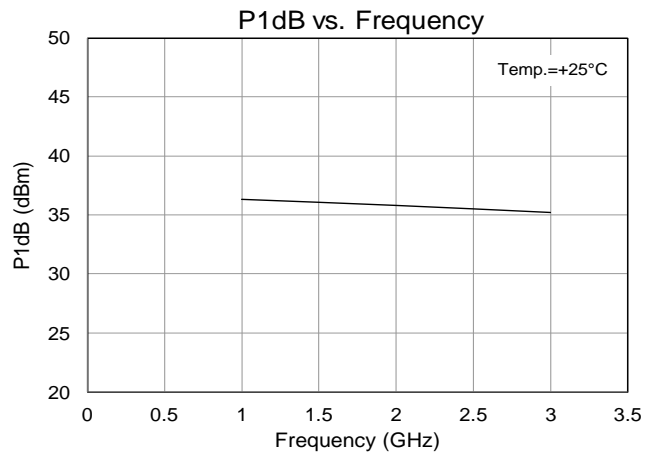
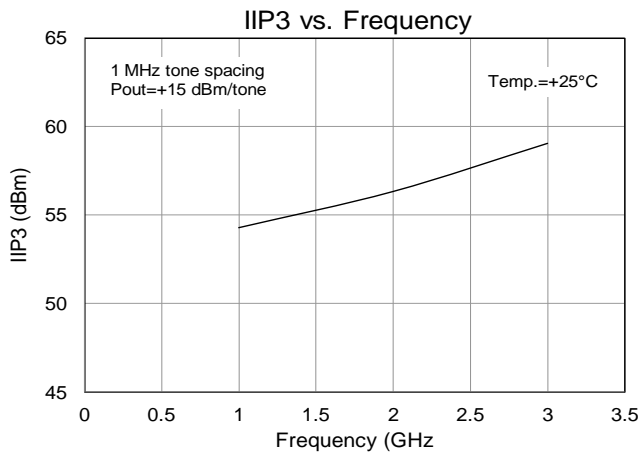
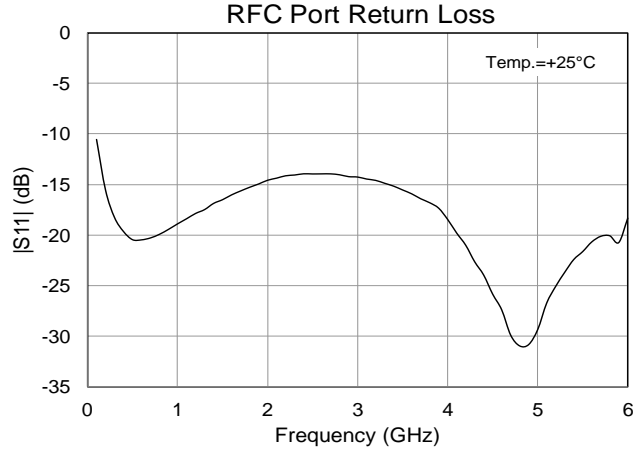
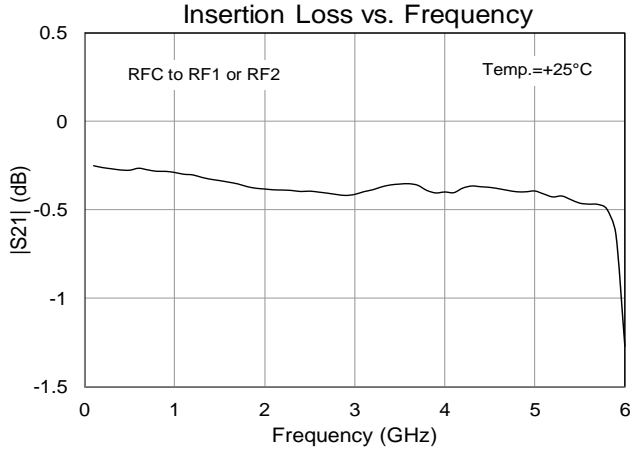
| Parameter  | Typical Value |       |      | Units |
|--|---------------|-------|------|-------|
|  | 1             | 2     | 3    |       |
| Frequency  | 1             | 2     | 3    | GHz   |
| Insertion Loss <sup>(1)</sup>                              | 0.3           | 0.4   | 0.45 | dB    |
| RFC Port Return Loss                                       | 19            | 15    | 14   | dB    |
| RFC to RF1/RF2 Isolation                                   | 32            | 26    | 24   | dB    |
| RF1 to RF2 Isolation                                       | 33            | 26    | 25   | dB    |
| Input P1dB   | +36           | +35.5 | +35  | dBm   |
| Input IP3 (f=1 GHz, 1 MHz tone spacing, Pout=+15 dBm/tone) | +54           | +57   | +59  | dBm   |

**Notes:**

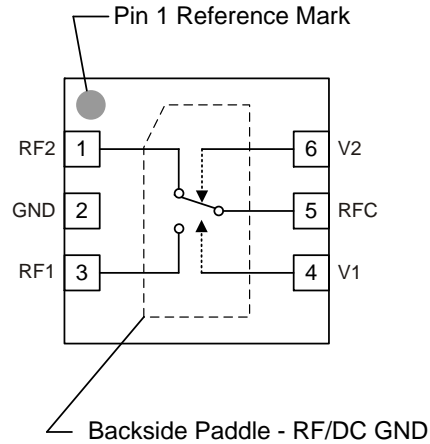
1. Insertion Loss values reflect de-embedding of evaluation board RF line and DC blocking capacitor losses.

**Performance Plots – TQP4M0008-PCB**

Test conditions unless otherwise noted: V1=+3 V, V2=0 V, Temp.=+25°C, 50 Ω system



## Pin Configuration and Description



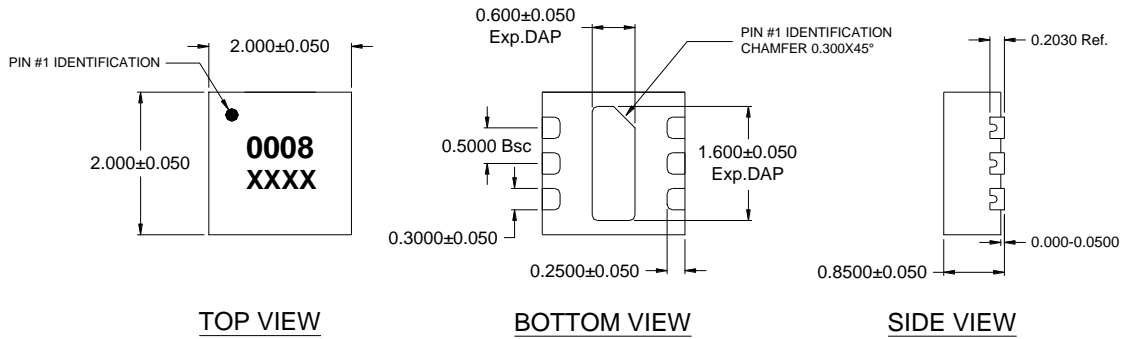
| Pin No.         | Symbol    | Description   |
|-----------------|-----------|---|
| 1               | RF2       | RF output 2, DC voltage present, DC block required.   |
| 2               | GND       | RF/DC Ground  |
| 3               | RF1       | RF output 1, DC voltage present, DC block required.   |
| 4               | V1        | Control Voltage   |
| 5               | RFC       | Antenna Input, DC voltage present, DC block required.   |
| 6               | V2        | Control Voltage   |
| Backside Paddle | RF/DC GND | RF/DC Ground. Use recommended via hole pattern and ensure good solder attach for best thermal and electrical performance. |

## Mechanical Information

### Package Marking and Dimensions

Marking: Part number – 0008

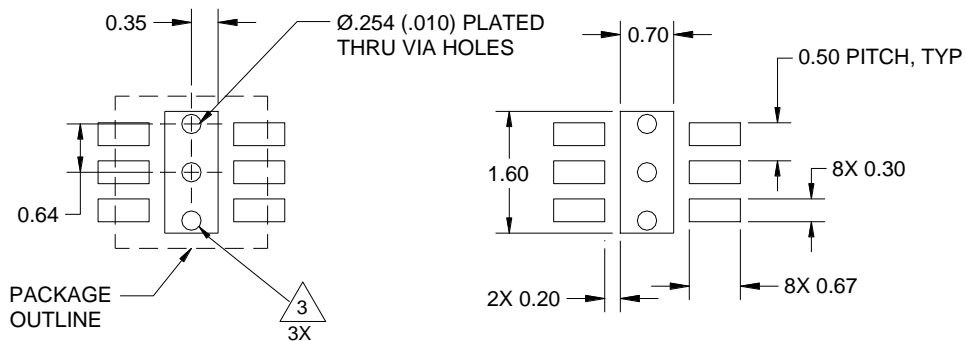
Trace code – XXXX (Up to 4 characters assigned by subcontractor)



**Notes:**

1. All dimensions are in millimeters. Angles are in degrees.
2. Dimension and tolerance formats conform to ASME Y14.4M-1994.
3. The terminal #1 identifier and terminal numbering conform to JESD 95-1 SPP-012

### PCB Mounting Pattern



**Notes:**

1. All dimensions are in millimeters. Angles are in degrees.
2. Use 1 oz. copper minimum for top and bottom layer metal.
3. We recommend a  $0.35\text{mm}$  (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of  $0.25$  mm ( $0.010$ ").
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

## Handling Precautions

| Parameter                        | Rating   | Standard                 |
|----------------------------------|----------|--------------------------|
| ESD – Human Body Model (HBM)     | Class 1B | ESDA / JEDEC JS-001-2012 |
| ESD – Charged Device Model (CDM) | Class C3 | JEDEC JESD22-C101F       |
| MSL – Moisture Sensitivity Level | Level 1  | IPC/JEDEC J-STD-020      |



Caution!  
ESD-Sensitive Device

## Solderability

Compatible with both lead-free (260°C max. reflow temp.) and tin/lead (245°C max. reflow temp.) soldering processes. Solder profiles available upon request.

Contact plating: NiPdAu

## RoHS Compliance

This part is compliant with 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) as amended by Directive 2015/863/EU.

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A (C<sub>15</sub>H<sub>12</sub>Br<sub>4</sub>O<sub>2</sub>) Free
- PFOS Free
- SVHC Free



## Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

**Web:** [www.qorvo.com](http://www.qorvo.com)

**Tel:** 1-844-890-8163

**Email:** [customer.support@qorvo.com](mailto:customer.support@qorvo.com)

For technical questions and application information:

**Email:** [appsupport@qorvo.com](mailto:appsupport@qorvo.com)

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