

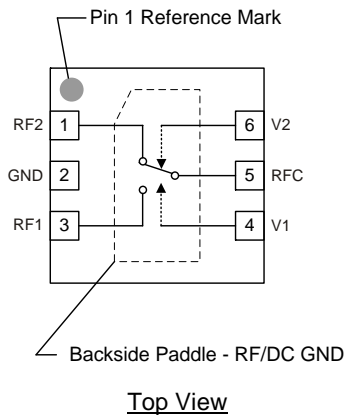
### Product Overview

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</sub> , t <sub>ON</sub> (50% CTL to 10/90% RF)		110		ns
	t <sub>OFF</sub> , t <sub>ON</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

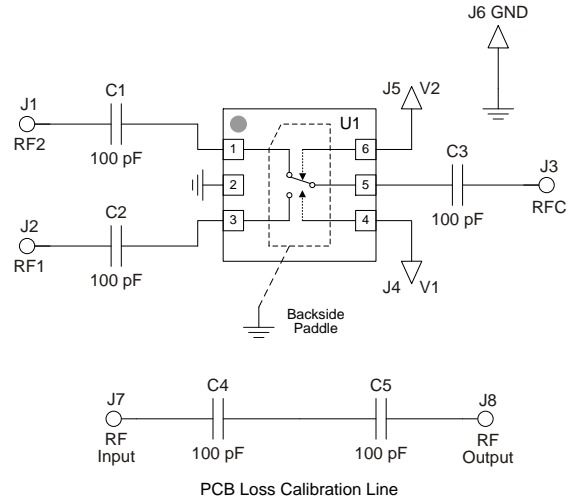
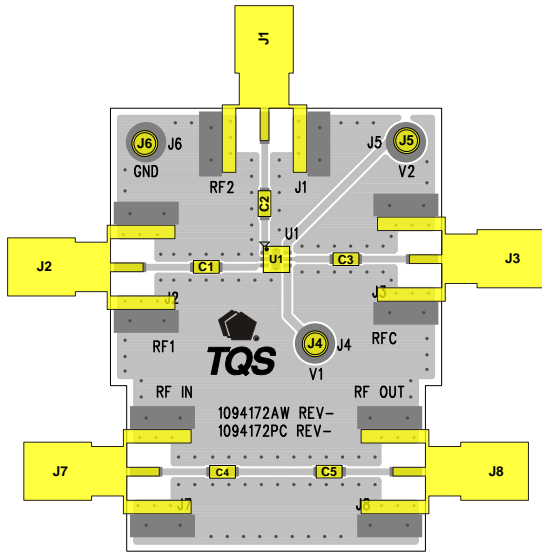
Notes:

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)

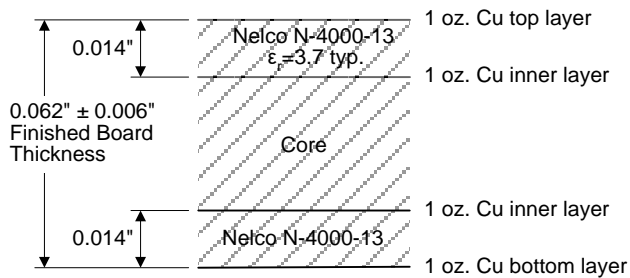
**TQP4M0008-PCB Evaluation Board**



**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

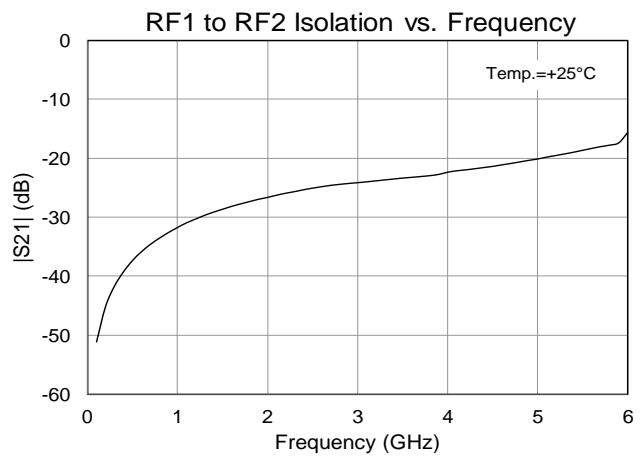
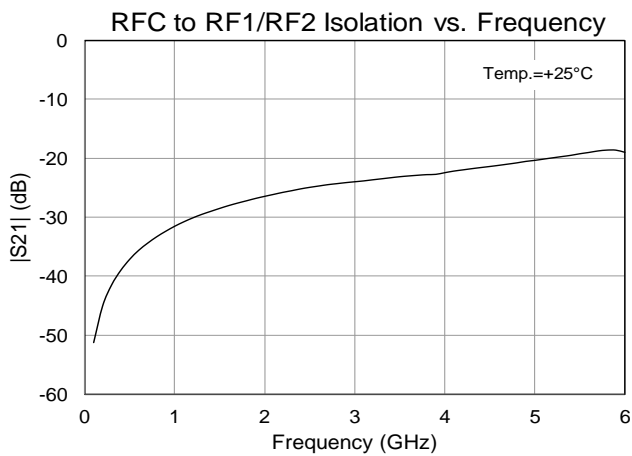
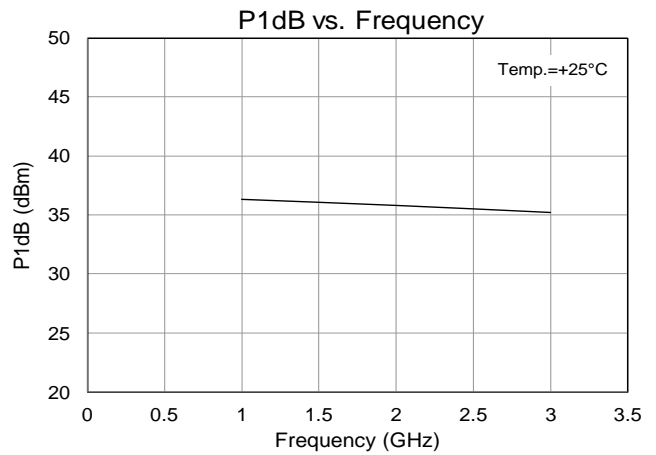
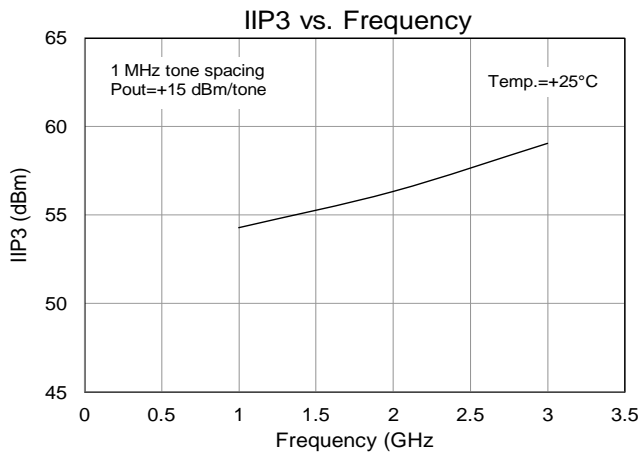
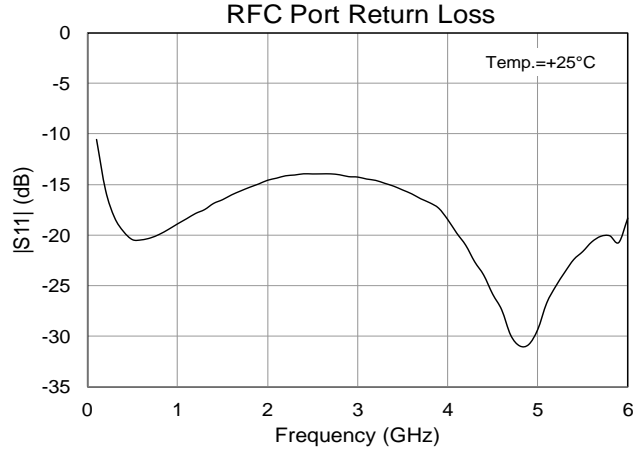
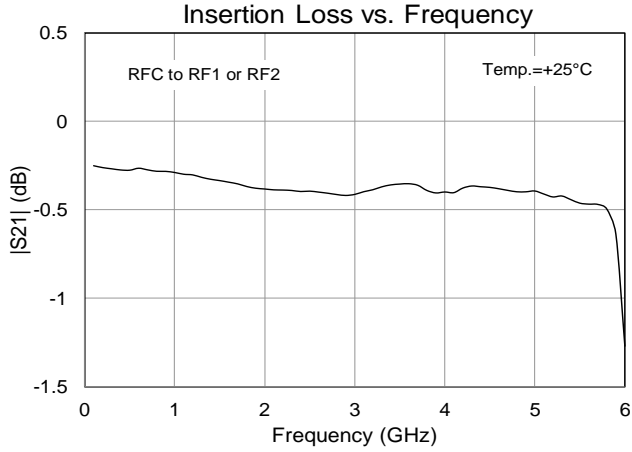
Parameter	Typical Value			Units
	1	2	3	
Frequency	1	2	3	GHz
Insertion Loss <sup>(1)</sup>	0.3	0.4	0.45	dB
RFC Port Return Loss	19	15	14	dB
RFC to RF1/RF2 Isolation	32	26	24	dB
RF1 to RF2 Isolation	33	26	25	dB
Input P1dB	+36	+35.5	+35	dBm
Input IP3 (f=1 GHz, 1 MHz tone spacing, Pout=+15 dBm/tone)	+54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

**Notes:**

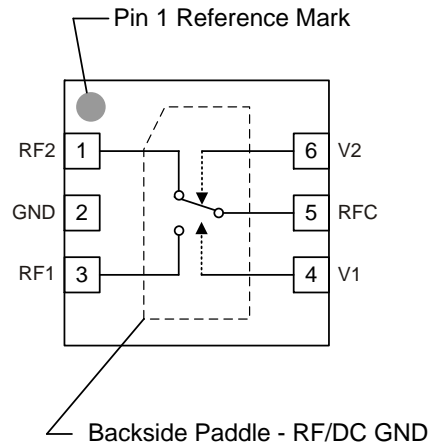
1. Insertion Loss values reflect de-embedding of evaluation board RF line and DC blocking capacitor losses.

**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



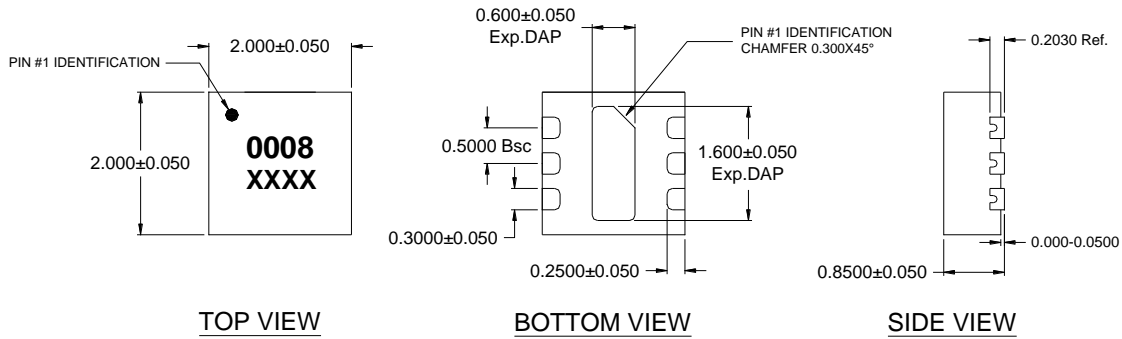
Pin No.	Symbol	Description
1	RF2	RF output 2, DC voltage present, DC block required.
2	GND	RF/DC Ground
3	RF1	RF output 1, DC voltage present, DC block required.
4	V1	Control Voltage
5	RFC	Antenna Input, DC voltage present, DC block required.
6	V2	Control Voltage
Backside Paddle	RF/DC GND	RF/DC Ground. 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

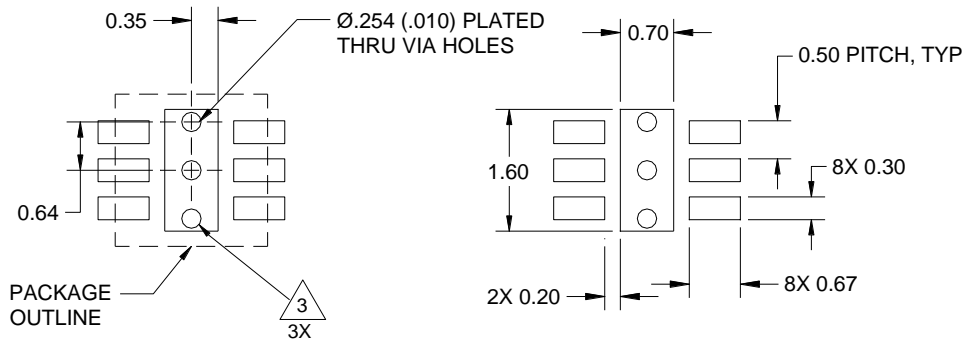
Trace code – XXXX (Up to 4 characters assigned by subcontractor)



#### 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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