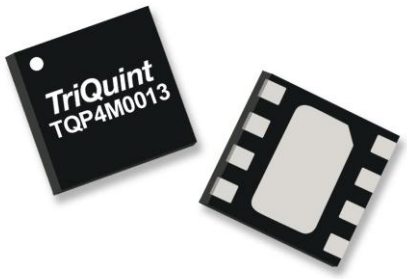
TQP4M0013

High Isolation Absorptive SPST Switch

Applications

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

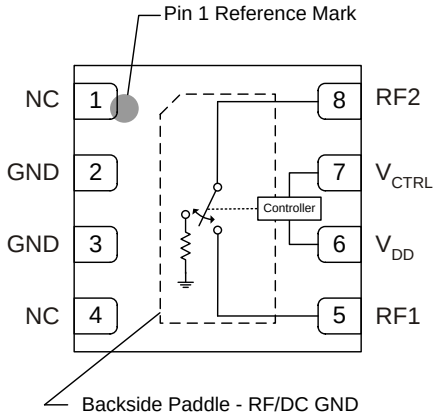


8-pin 2x2 mm DFN Package

Product Features

- General Purpose
- Low Insertion Loss
- +49 dBm Input IP3
- High Isolation
- Absorptive
- Single Positive Voltage Control
- Small 2x2 mm SMT Package

Functional Block Diagram



General Description

The TQP4M0013 is a GaAs FET single-pole, single throw (SPST) high isolation absorptive switch. The TQP4M0013 may be operated using a DC supply range from 3 to 5 Volts and with control signals operating from 3 to 5 Volts. The TQP4M0013 has 100-4000 MHz broadband performance.

The TQP4M0013 is packaged in a RoHS-compliant, compact 2x2 mm surface-mount leadless package.

This SPDT switch is targeted for use in wireless infrastructure, test and measurement, or can be used for any general purpose RF application.

Pin Configuration

Pin No.	Label
1, 4	NC
2, 3	GND
5	RF1
6	V_{DD}
7	V_{CTRL}
8	RF2

Ordering Information

Part No.	Description
TQP4M0013	SPST Absorptive Switch
TQP4M0013-PCB	0.1-4.0 GHz Evaluation Board

Standard T/R size = 2500 pieces on a 7” reel

© 2013 TriQuint

Absolute Maximum Ratings

Parameter	Rating
Storage Temperature	-65 to 165°C
RF Input Power, CW, 50Ω, T = 25°C	+33 dBm
Supply Voltage (V_{DD})	+6 V
Control Voltage (V_{CTRL})	V_{DD}+0.5 V

Operation of this device outside the parameter ranges given above may cause permanent damage.

Recommended Operating Conditions

Parameter	Min	Typ	Max	Units
V_{DD}	3.0		5.0	V
Operating Temp. Range	-40		+85	°C

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

Electrical Specifications

Test conditions unless otherwise noted: V_{DD} = +5 V, V_{CTRL} = 0 V (low) or 3.3 V (high), Temp.=+25°C, 50 Ω system

Parameter	Conditions	Min	Typ	Max	Units
Operational Frequency Range		100		4000	MHz
Control Voltage (V_{CTRL})	Low	0		0.2	V
	High	1.8		V_{DD}	V
Insertion Loss	1 GHz 2 GHz 3 GHz		0.55 0.71 0.77	0.87	dB
Isolation	1 GHz 2 GHz 3 GHz	38	50 43 37		dB
RF1/RF2 Return Loss Insertion Loss State	1 GHz 2 GHz 3 GHz		15 15 17		dB
RF2 Return Loss Isolation Loss State	1 GHz 2 GHz 3 GHz		16 15 17		dB
Input P1dB	f=1 GHz		+35		dBm
Input IP3	f=1 GHz Pin=+15 dBm/tone, Δf= 1 MHz		+49		dBm
Switching Speed	t_{ON},t_{OFF} (50% CTL to 10/90% RF)		150		ns
	t_{ON},t_{OFF} (50% CTL to 2/98% RF)		150		ns
Total Supply current (I_{DD})			82		uA

Control Voltages

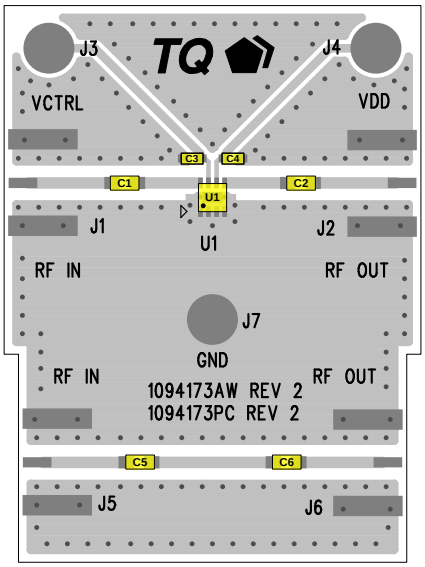
State	Bias Condition
Low	≤ 0.2 V
High	≥ 1.8 V

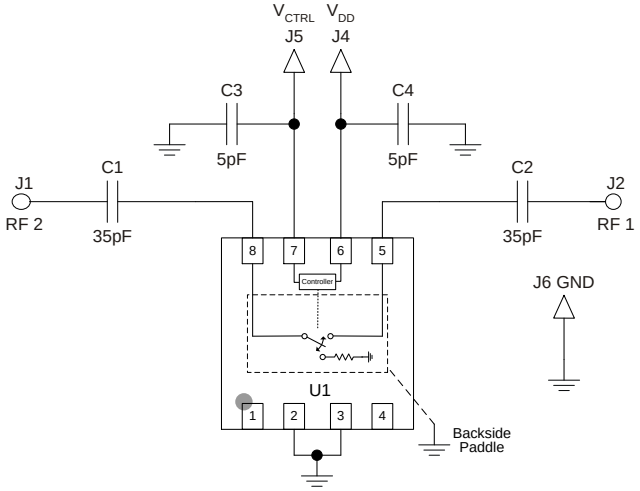
Switch Control Truth Table

V_{CTRL}	Signal Path State (RF1 to RF2)
Low	Off (isolation)
High	On (Insertion Loss)

© 2013 TriQuint

TQP4M0013-PCB Evaluation Board





Notes:
1. Capacitance values shown for C1, C2, C3 and C4 are required to achieve data sheet RF performance specifications.

Typical Performance – TQP4M0013-PCB

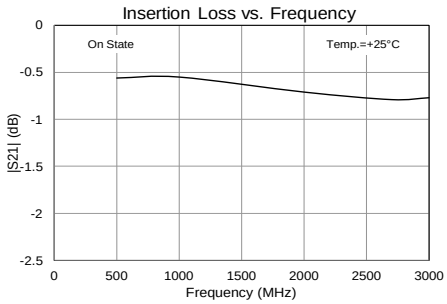
Test conditions unless otherwise noted: V_{DD} = +5 V, Temp=25°C, 50 Ω system

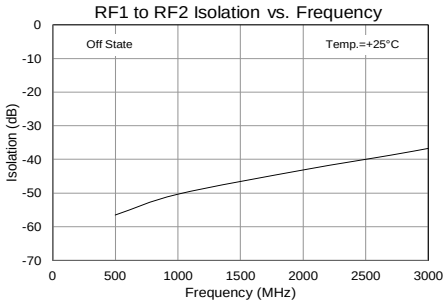
Parameter	Typical Value			Units
Frequency	1	2	3	GHz
Insertion Loss (1)	0.55	0.71	0.77	dB
RF1/RF2 Port Return Loss (Insertion Loss State)	15	15	17	dB
RF1 to RF2 Isolation	50	43	37	dB
Input P1dB	+35			dBm
Input IP3 (Pin=+15 dBm/tone, Δf=1 MHz)	+49	+50		dBm

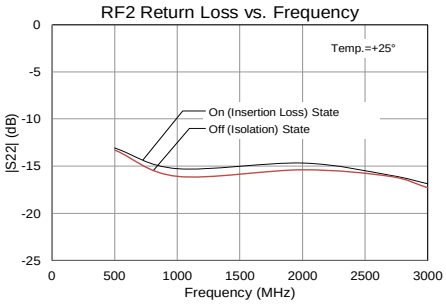
Notes:
1. Insertion loss values reflect de-embedding of eval board RF line losses.

Performance Plots – TQP4M0013-PCB

Test conditions unless otherwise noted: V_{DD} =+5 V, V_{CTRL} = +3.3 V, Temp=+25°C, 50 Ω system

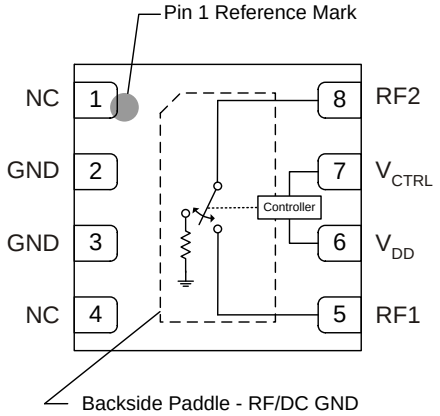






© 2013 TriQuint

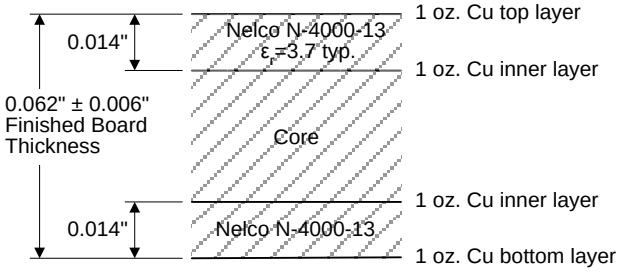
Pin Configuration and Description



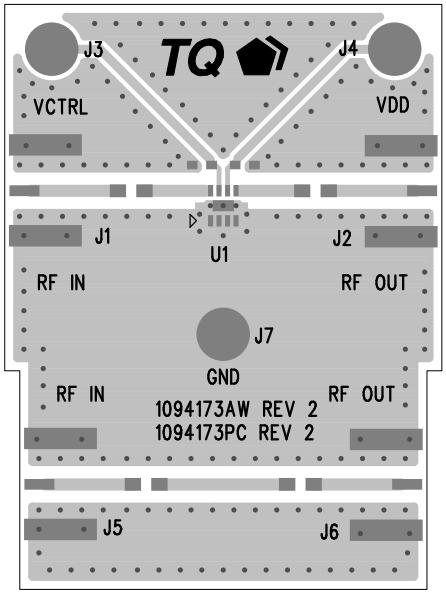
Pin No.	Symbol	Description
1, 4	N/C	No electrical connection. Provide grounded land pads for PCB mounting integrity.
2, 3	GND	RF/DC Ground
5	RF1	RF Port 1. DC block required.
6	V_{DD}	Bias Voltage
7	V_{CTL}	Control Voltage
8	RF2	RF Port 2. DC block required. Internal resistive termination in off (isolation) state.
Backside Paddle	RF/DC GND	RF/DC Ground. Use recommended via pattern and ensure good solder attach for best thermal and electrical performance.

Evaluation Board PCB Specifications

PCB 1094173 Material and Stack-Up



<u>50 ohm input/output (I/O) line structure</u>
Width = 0.028”
Gap = 0.028”

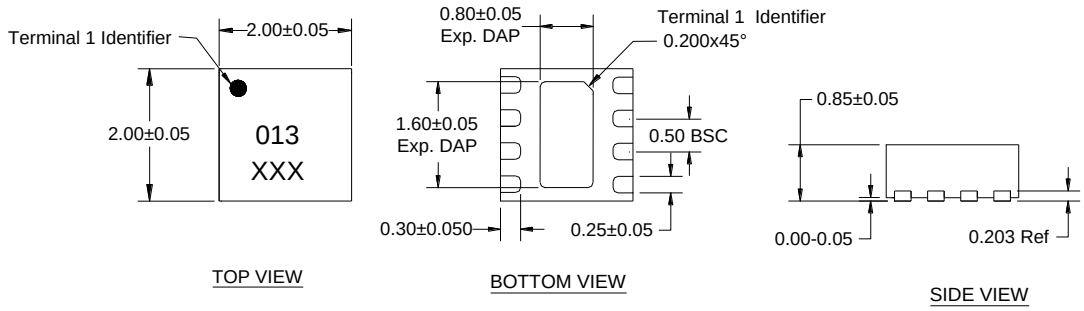


© 2013 TriQuint

Mechanical Information

Package Marking and Dimensions

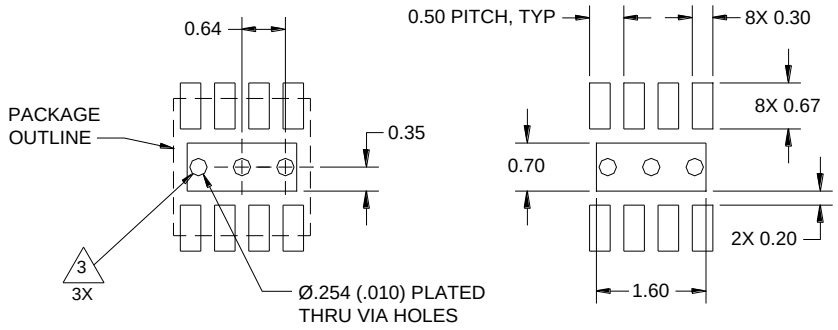
Marking: Product Code – 013
Assembly code - XXX



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 0.35mm (#80/.0135") diameter bit for drilling via holes and a final plated thru diameter of 0.25 mm (0.10”).
4. Ensure good package backside paddle solder attach for reliable operation and best electrical performance.

© 2013 TriQuint

Product Compliance Information

ESD Sensitivity Ratings



Caution! ESD-Sensitive Device

ESD Rating: Class 0
Value: Passes >125 V and < 250 V
Test: Human Body Model (HBM)
Standard: JEDEC Standard JESD22-A114

ESD Rating: Class IV
Value: Passes >1000 volts
Test: Charged Device Model (CDM)
Standard: JEDEC Standard JESD22-C101

MSL Rating

MSL Rating: Level 1
Test: 260°C convection reflow
Standard: JEDEC Standard IPC/JEDEC J-STD-020

Solderability

Compatible with both lead-free (260°C max. reflow temperature) and tin/lead (245°C max. reflow temperature) soldering processes.

Package contact plating: NiPdAu

RoHs Compliance

This part is compliant with EU 2002/95/EC RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).

This product also has the following attributes:

- Lead Free
- Halogen Free (Chlorine, Bromine)
- Antimony Free
- TBBP-A ($C_{15}H_{12}Br_4O_2$) Free
- PFOS Free
- SVHC Free

Important Notice

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

Web: www.triquint.com **Tel:** +1.503.615.9000
Email: info-sales@triquint.com **Fax:** +1.503.615.8902

For technical questions and application information:

Email: sjcapplications.engineering@triquint.com

Contact Information

The information contained herein is believed to be reliable. TriQuint makes no warranties regarding the information contained herein. TriQuint assumes no responsibility or liability whatsoever for any of the information contained herein. TriQuint assumes no responsibility or liability whatsoever for the use of the information contained herein. The information contained herein is provided "AS IS, WHERE IS" and with all faults, and the entire risk associated with such information is entirely with the user. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for TriQuint products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information.

TriQuint products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.

© 2013 TriQuint