

## SP4T High Power 2.5V GSM Antenna Switch

### Features:

- SLIM-17 Packaged PHEMT GaAs MMIC Die
- Small Footprint 2.5 x 2.5 mm
- Asymmetric Design for Lowest TX Insertion Loss: 0.5dB typ
- Thin Package: 0.6mm max for LTCC modules
- Excellent Harmonic Performance
  - -75dBc 2<sup>nd</sup> Harmonic at GSM 850/900, +35dBm
  - -72dBc 2<sup>nd</sup> Harmonic at DCS/PCS, +33 dBm
  - -76dBc 3<sup>rd</sup> Harmonic at GSM 850/900, +35dBm
  - -75dBc 3<sup>rd</sup> Harmonic at DCS/PCS, +33 dBm
- High Isolation:- 33dB typ
- Very Low Control Current

### Applications:

- GSM Antenna Switch Modules (ASM).

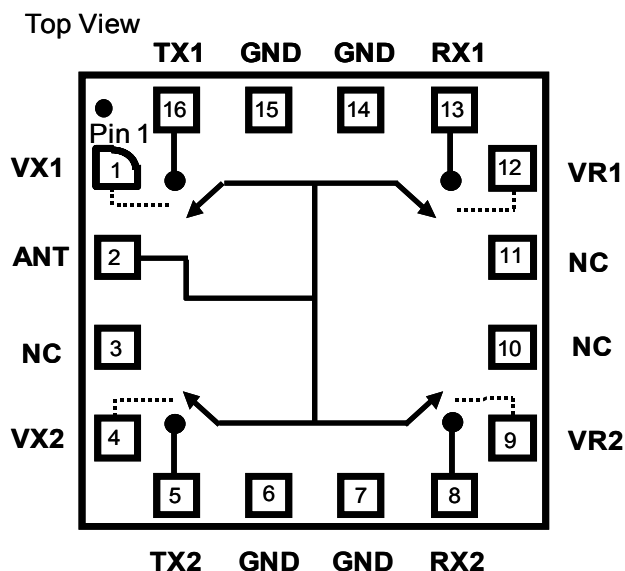
### Description:

TriQuint's TQP4M4004 is a high power antenna switch in a single pole four throw (SP4T) configuration. The die utilizes TriQuint's PHEMT MMIC switch process to provide optimized harmonic performance for use in GSM applications. PHEMT Switches are a very low DC current replacement for classic PIN diode based switches. The SLIM-17 package is 0.6mm thick with a 2.5 x 2.5 mm footprint, which is ideally suited to replace package PIN diodes on height critical LTCC modules. The TQP4M4004 can be combined with a Low Pass TX Filter and SAW RX filters to form a GSM Antenna Switch Module. Also available as Bare Die TQP4M4004.

**Electrical Performance: Ta = 25°C, Zo=50 Ohms, Vcontrol = 0V / 2.5V<sup>1</sup>**

Parameter	Test Conditions	Units	Min	Typ	Max
Tx Insertion Loss	GSM850/900	dB		0.48	
Tx Insertion Loss	DCS/PCS	dB		0.53	
Rx Insertion Loss	GSM850/900	dB		0.55	
Rx Insertion Loss	DCS/PCS	dB		0.60	
Isolation Rx to Rx	GSM850/900, DCS/PCS	dB		-34	
Isolation Tx to Rx	GSM850/900, DCS/PCS	dB		-33	
Isolation Tx to Tx	GSM850/900, DCS/PCS	dB		-33	
2 <sup>nd</sup> Harmonic	GSM850	dBc		-75	
2 <sup>nd</sup> Harmonic	GSM900	dBc		-75	
2 <sup>nd</sup> Harmonic	DCS	dBc		-75	
2 <sup>nd</sup> Harmonic	PCS	dBc		-71	
3 <sup>rd</sup> Harmonic	GSM850	dBc		-76	
3 <sup>rd</sup> Harmonic	GSM900	dBc		-77	
3 <sup>rd</sup> Harmonic	DCS	dBc		-76	
3 <sup>rd</sup> Harmonic	PCS	dBc		-74	

### SLIM17 Package Outline:



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Electrical Performance (continued): Ta = 25°C, Zo=50 Ohms, Vcontrol = 0V / 2.5V <sup>1</sup>

Parameter	Test Conditions	Units	Min	Typ	Max
IIP3	Two tones; +20dBm each; 1 MHz spacing; 1950 MHz	dBm		+53.5	
P-0.1 dB	DCS/PCS	dBm		+38	
Return Loss	0.5 to 2.0GHz	dB		-20	
Leakage Current	-	μA		30	100
Trise, TFall	10% to 90% RF , 90% to 10% RF	μS		0.2	
Ton , Toff	50% control to 90% RF, and 50% control to 10% RF	μS		0.3	

## Truth Table: <sup>2, 3</sup>

VX1	VR1	VR2	VX2	Switch Position
1	0	0	0	TX1 → Ant
0	1	0	0	RX1 → Ant
0	0	1	0	RX2 → Ant
0	0	0	1	TX2 → Ant

## Notes:

- External DC blocking capacitors are required at all RF ports
- State 1 = +2.0V to +5.0V, State 0 = 0V to +0.2V
- Differential voltage from State 1 to State 2 must be a minimum of 2.0V
- Exceeding any parameter either individually or in combination may cause permanent damage.

## Absolute Maximum Ratings<sup>4</sup>:

Parameter	Absolute Maximum
Max Input Power	+37dBm
Control Voltage	+/-5V
Operating Temp	-40°C to +85°C
Storage Temp	-65°C to +150°C

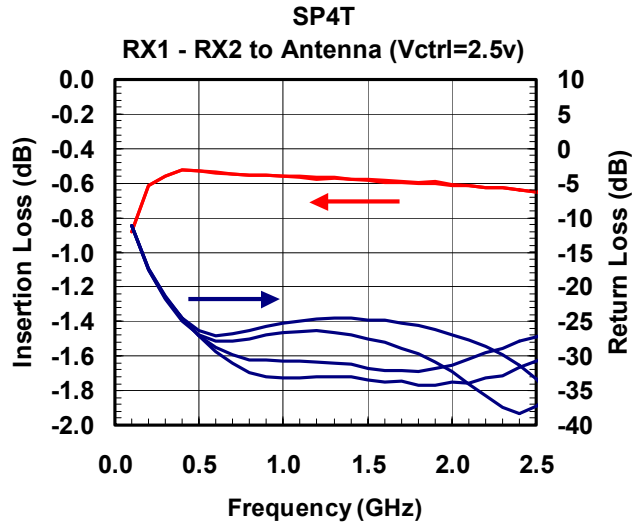
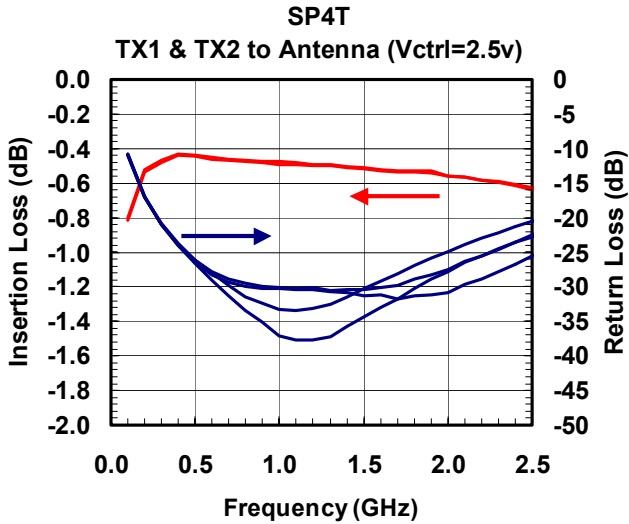
## Pin Descriptions:

Pad Number	Pad Name	Description
1	VX1	Control TX Port 1
2	ANT	Antenna
3	NC	No Connection
4	VX2	Control TX Port 2
5	TX2	TX Port 2
6	GND	Ground
7	GND	Ground
8	RX2	RX Port 2
9	VR2	Control RX Port 2
10	NC	No Connection
11	NC	No Connection
12	VR1	Control RX Port 1
13	RX1	RX Port 1
14	GND	Ground
15	GND	Ground
16	TX1	TX Port 1
Package Paddle	NC	No Connection

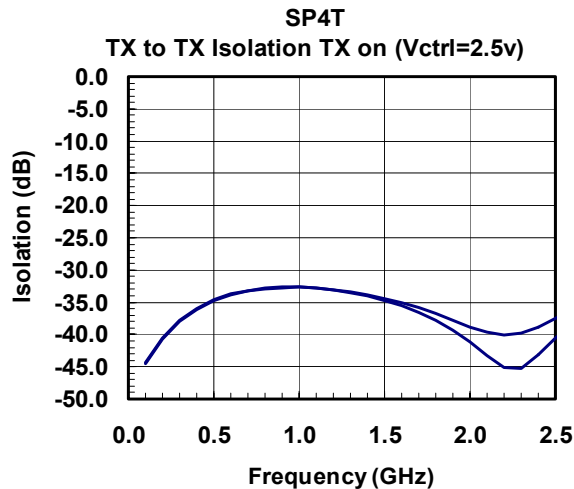
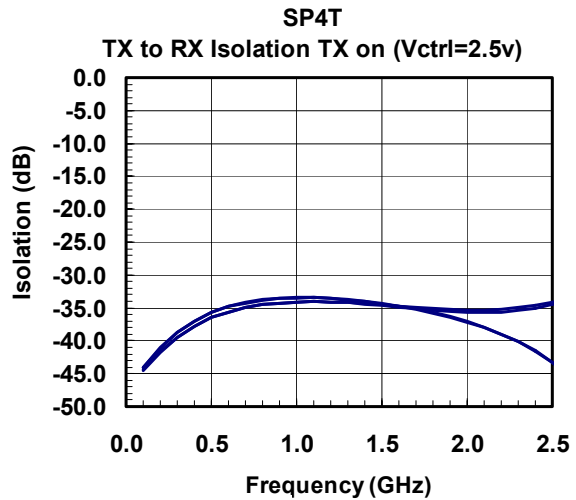
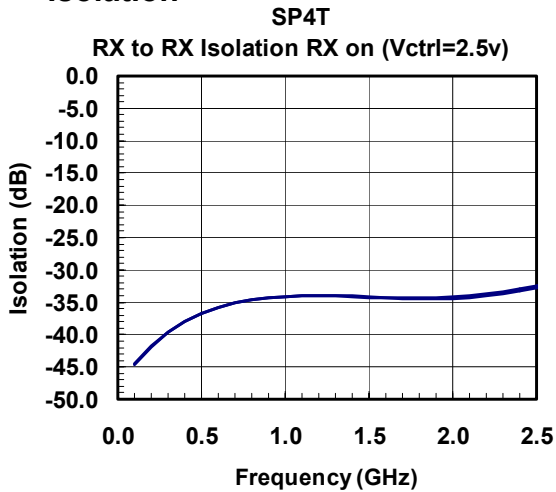
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## Typical Performance Curves:

### Insertion Loss and Match

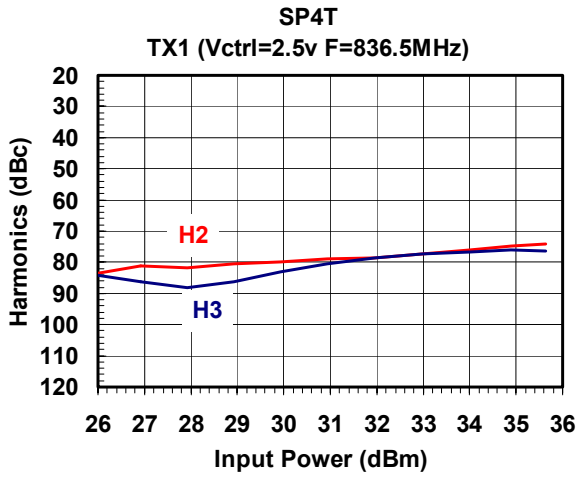


### Isolation

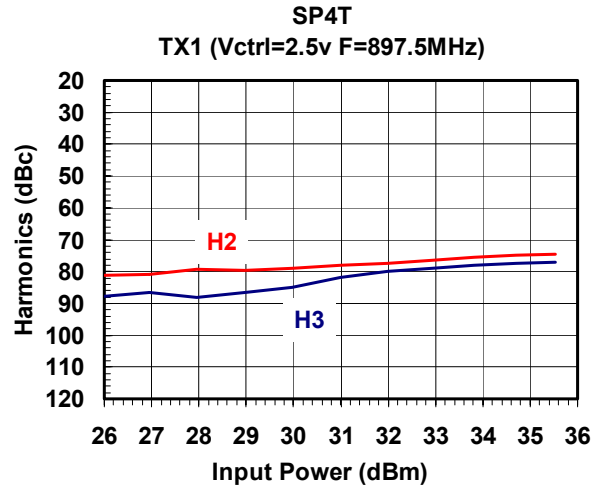


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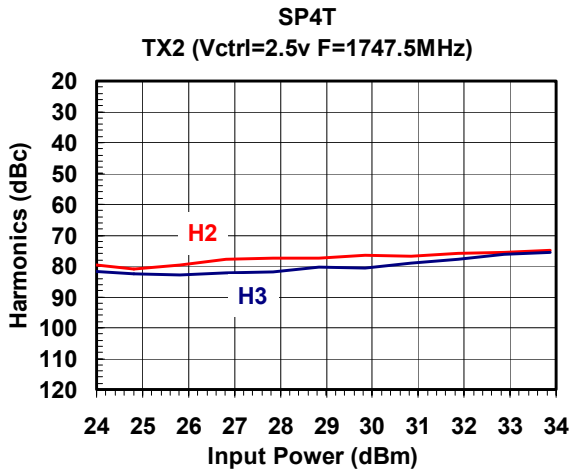
Harmonics GSM850



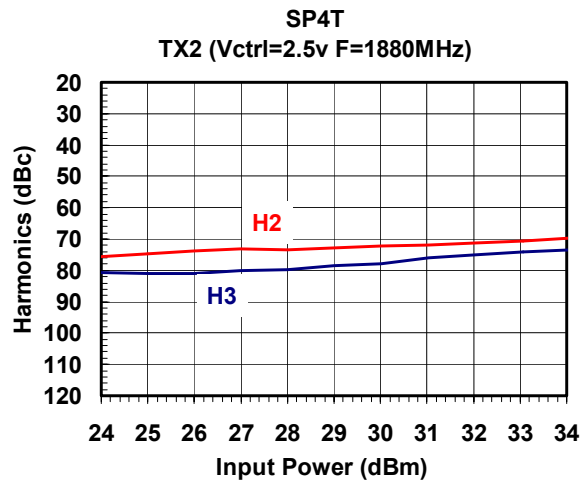
Harmonics GSM900



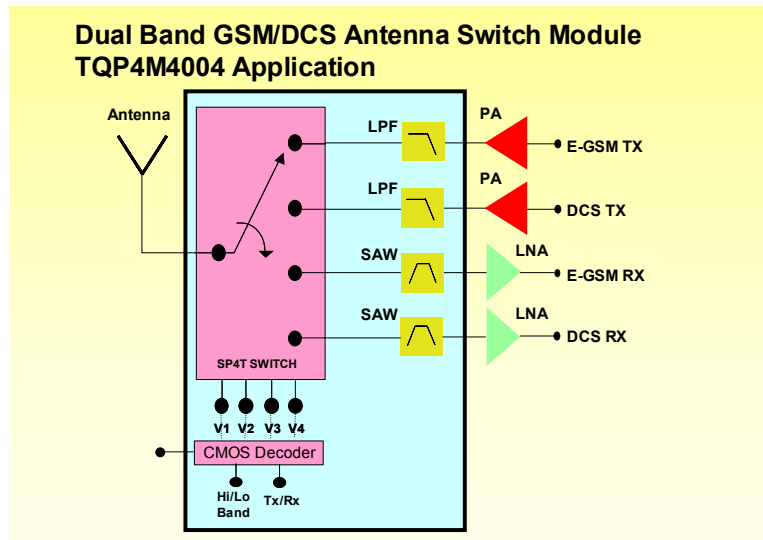
Harmonics DCS



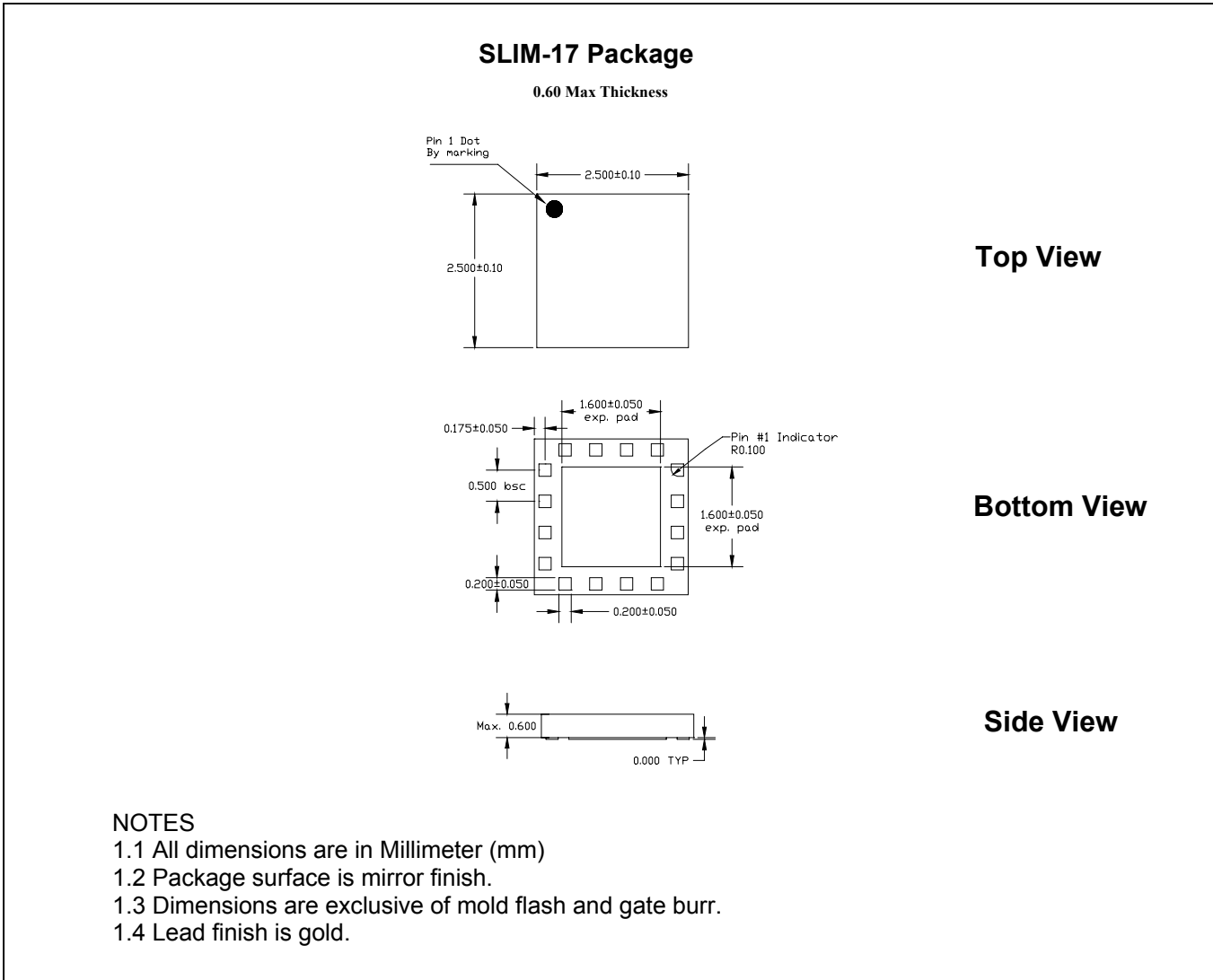
Harmonics PCS



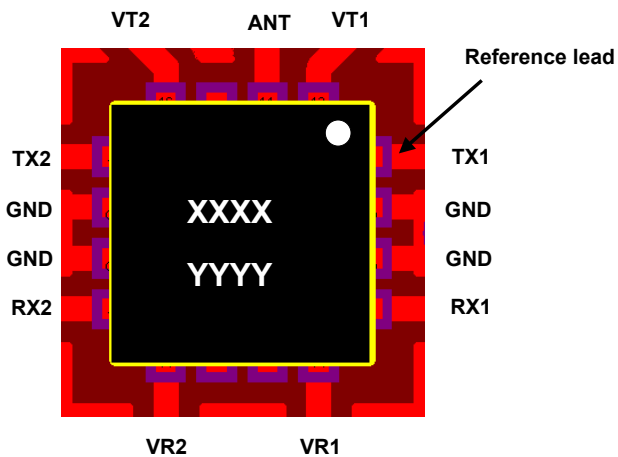
## Application Example



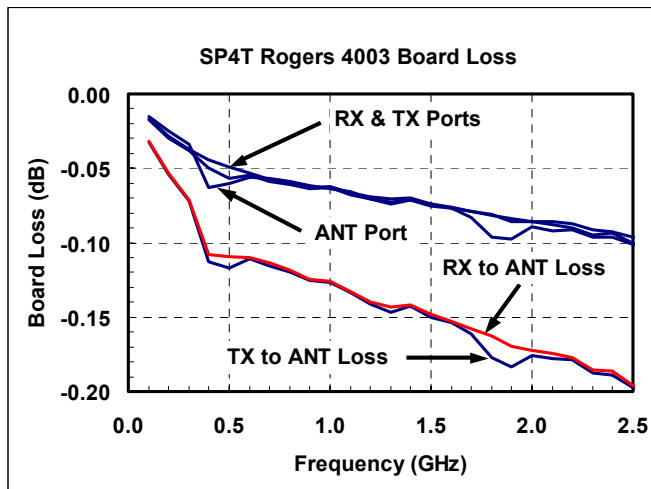
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**Package Configuration On Board:**



**Application Board Loss De-Embedding Curve:**



XXXX, YYYY last 4 digits of date code and batch code

# SP4T High Power 2.5V GSM Antenna Switch

Application Board:

RF connector

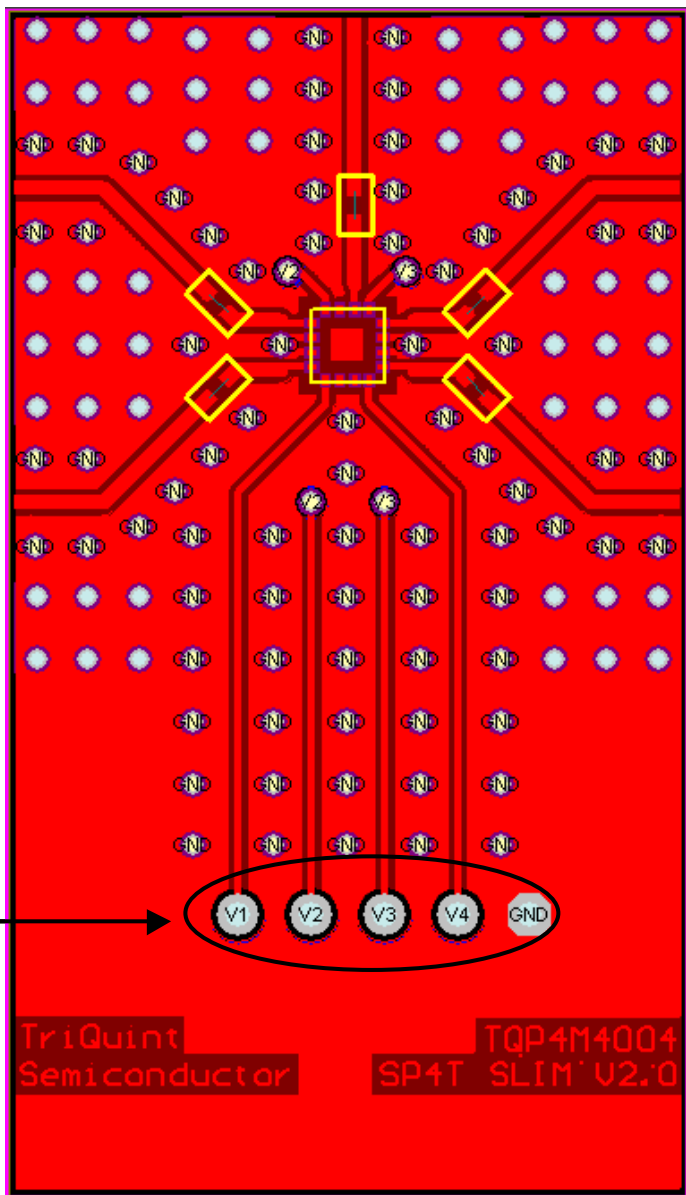
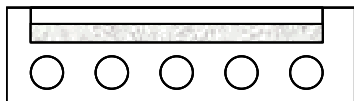
RF connector

RF connector

RF connector

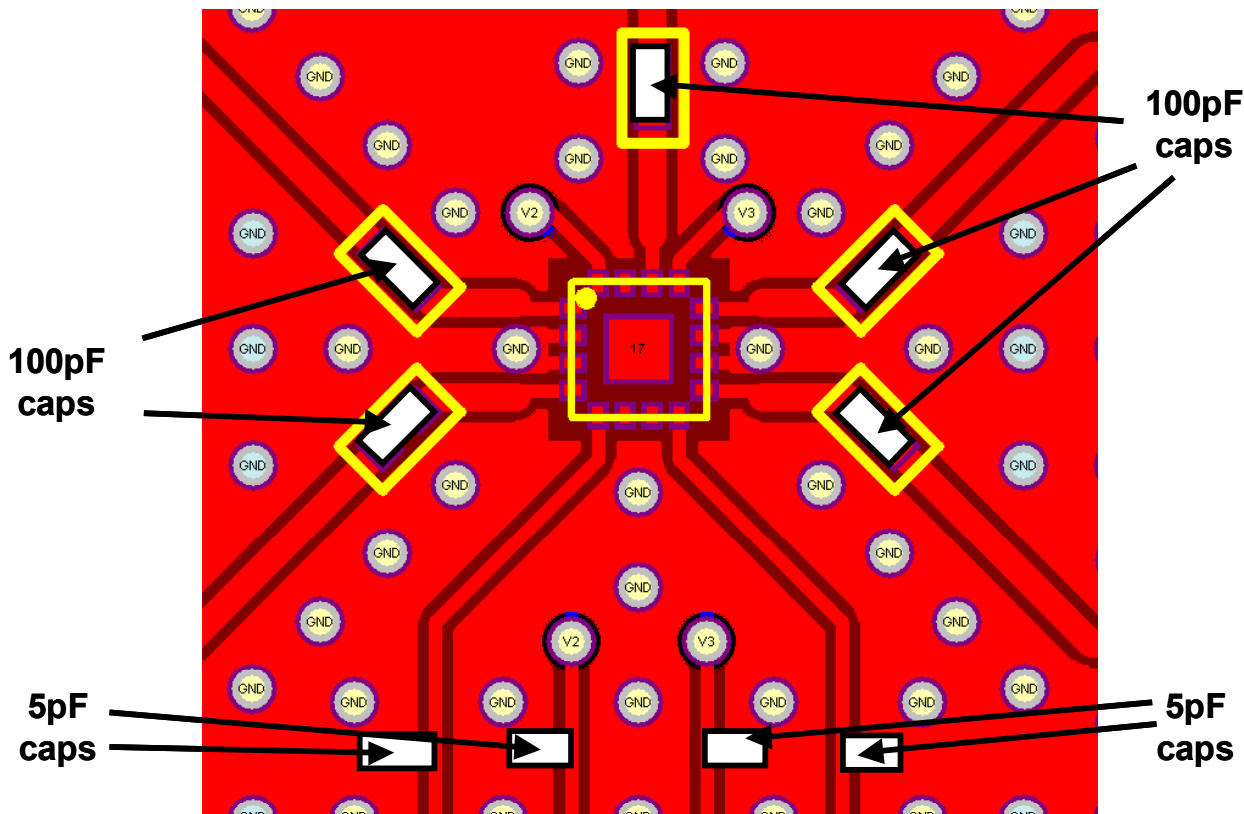
RF connector

DC connector



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## Application Board Capacitors and Locations:



### Additional Information

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

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

**Tel:** (503) 615-9000

**Email:** [info\\_wireless@tqs.com](mailto:info_wireless@tqs.com)

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For technical questions and additional information on specific applications:

**Email:** [info\\_wireless@tqs.com](mailto:info_wireless@tqs.com)

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