SP4T High Power 2.5V GSM Antenna Switch

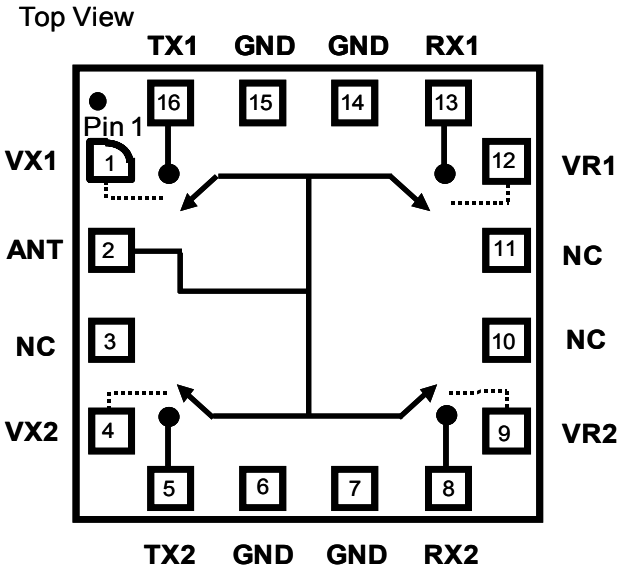
Features:

- 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 2nd Harmonic at GSM 850/900, +35dBm
  - -72dBc 2nd Harmonic at DCS/PCS, +33 dBm
  - -76dBc 3rd Harmonic at GSM 850/900, +35dBm
  - -75dBc 3rd Harmonic at DCS/PCS, +33 dBm
- High Isolation:- 33dB typ
- Very Low Control Current

Applications:

- GSM Antenna Switch Modules (ASM).

SLIM17 Package Outline:



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 TQ4M4004.

Electrical Performance: Ta = 25°C, Zo=50 Ohms, Vcontrol = 0V / 2.5V [1]

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	
2nd Harmonic	GSM850	dBc		-75	
2nd Harmonic	GSM900	dBc		-75	
2nd Harmonic	DCS	dBc		-75	
2nd Harmonic	PCS	dBc		-71	
3rd Harmonic	GSM850	dBc		-76	
3rd Harmonic	GSM900	dBc		-77	
3rd Harmonic	DCS	dBc		-76	
3rd Harmonic	PCS	dBc		-74	

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

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: [2, 3]

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:

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

Absolute Maximum Ratings[4]:

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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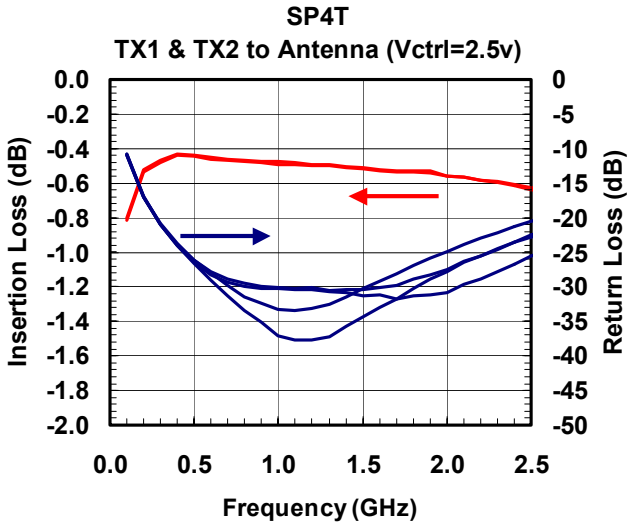
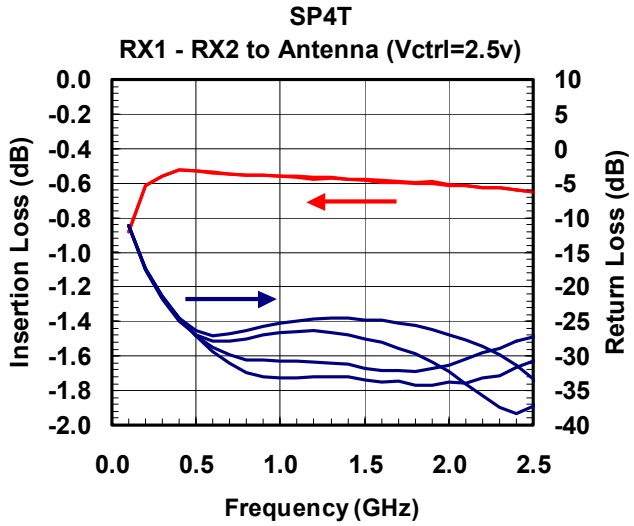
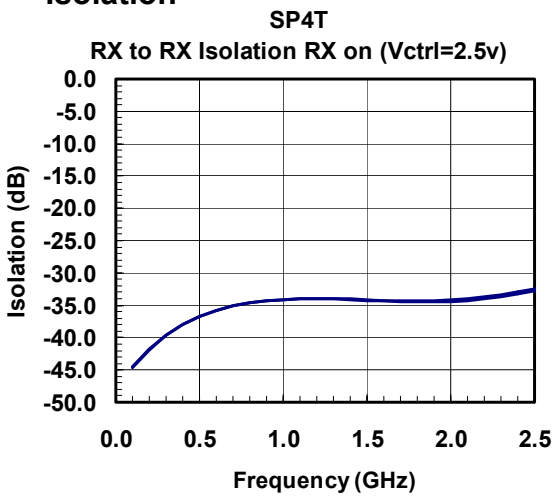
Typical Performance Curves:

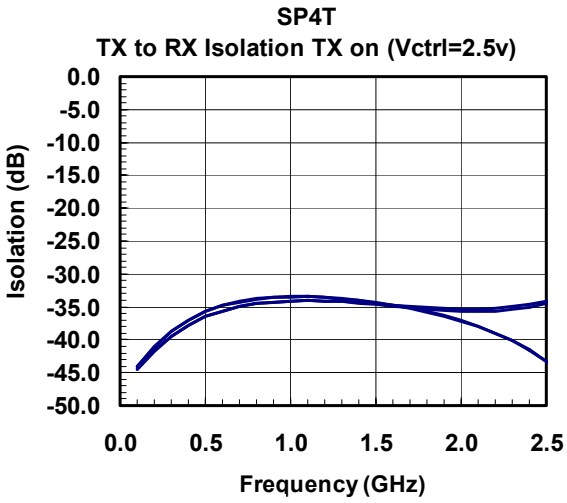
Insertion Loss and Match

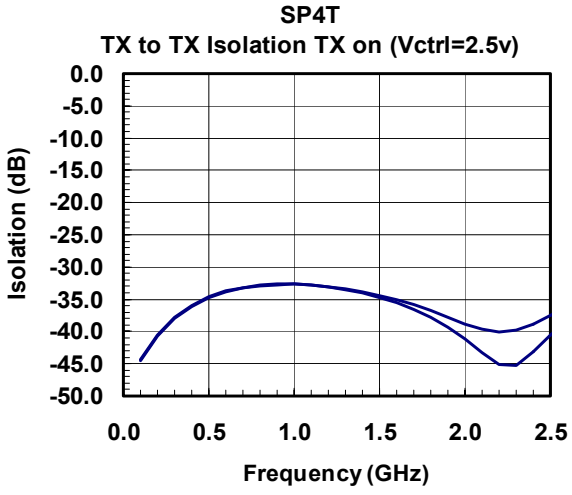




Isolation







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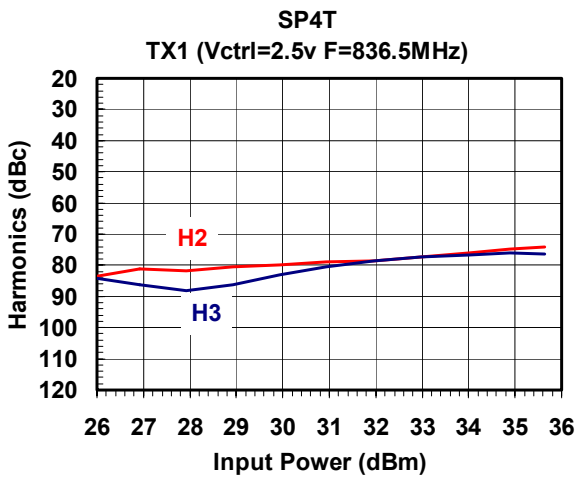
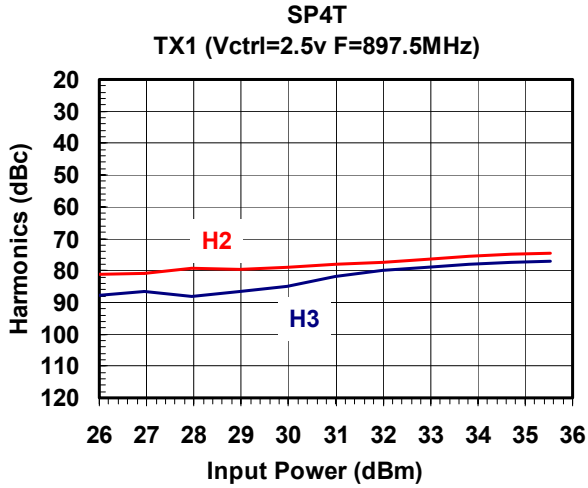
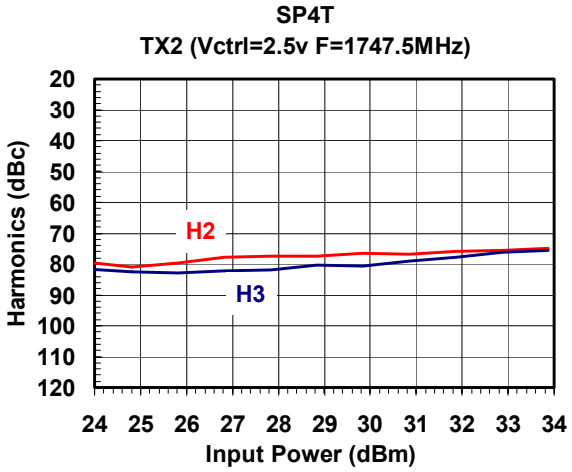
Harmonics GSM850



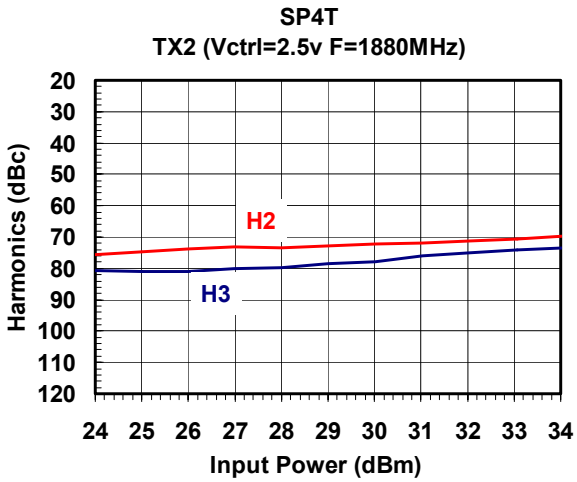
Harmonics GSM900



Harmonics DCS

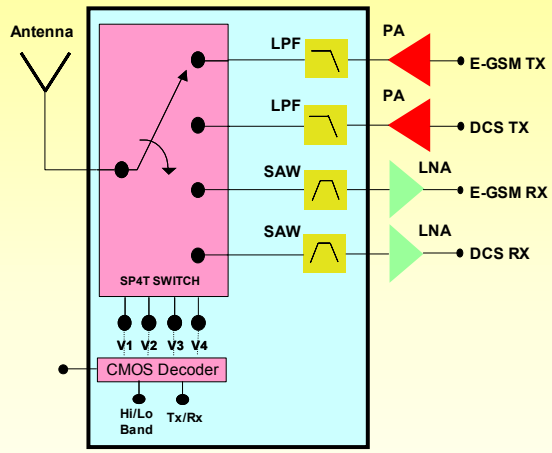


Harmonics PCS



Application Example

Dual Band GSM/DCS Antenna Switch Module
TQP4M4004 Application



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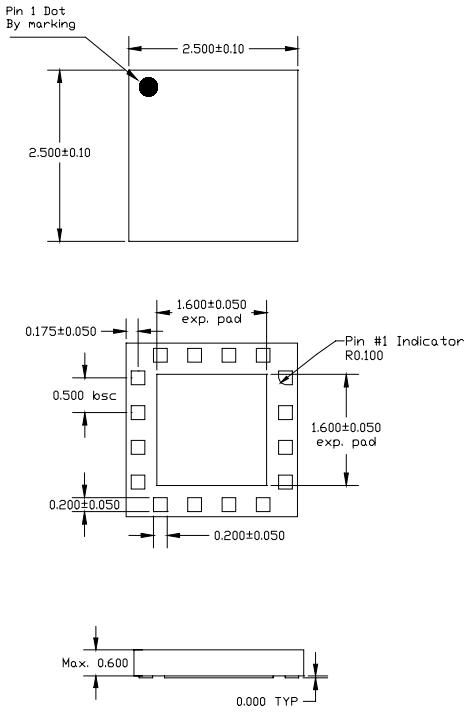
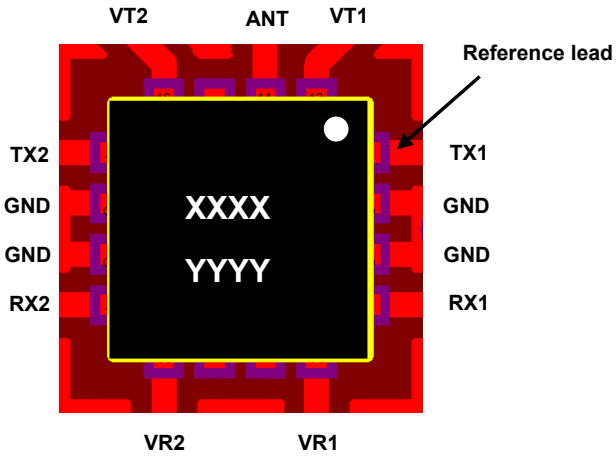
SLIM-17 Package

0.60 Max Thickness



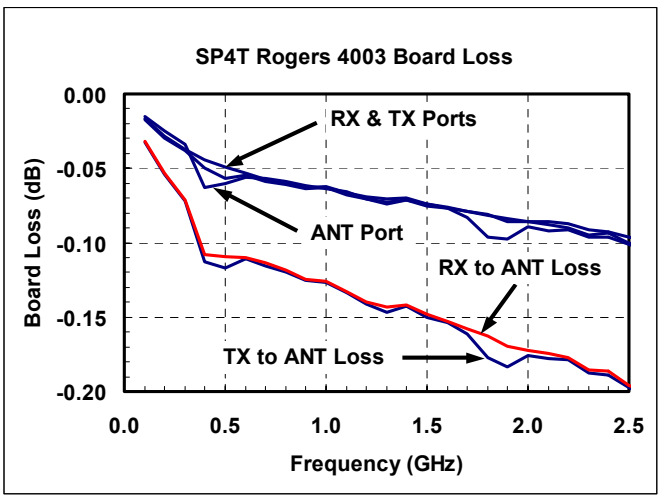
NOTES
1.1 All dimensions are in Millimeter (mm)
1.2 Package surface is mirror finish.
1.3 Dimensions are exclusive of mold flash and gate burr.
1.4 Lead finish is gold.

Package Configuration On Board:



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

Application Board Loss De-Embedding Curve:



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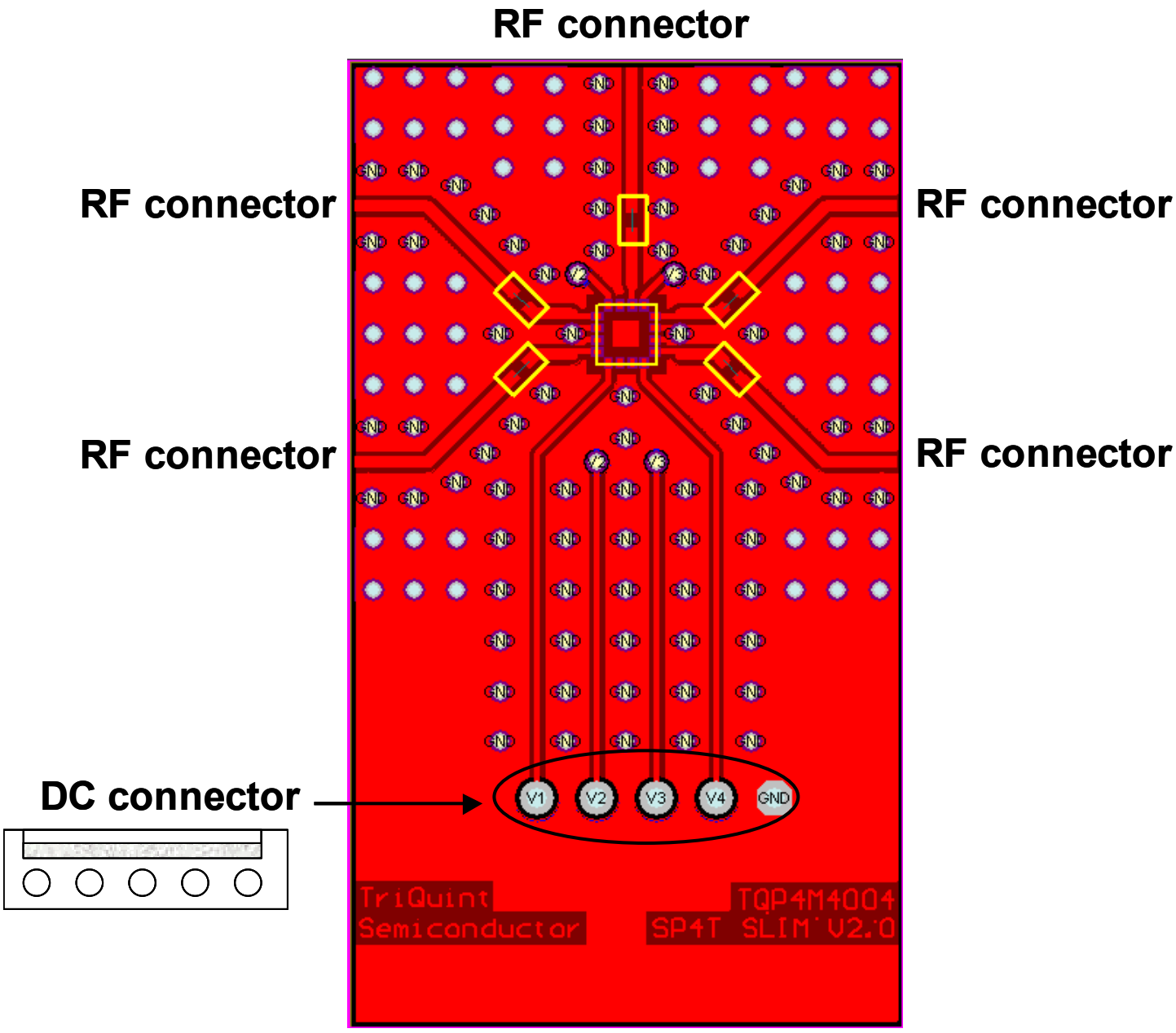
Application Board:



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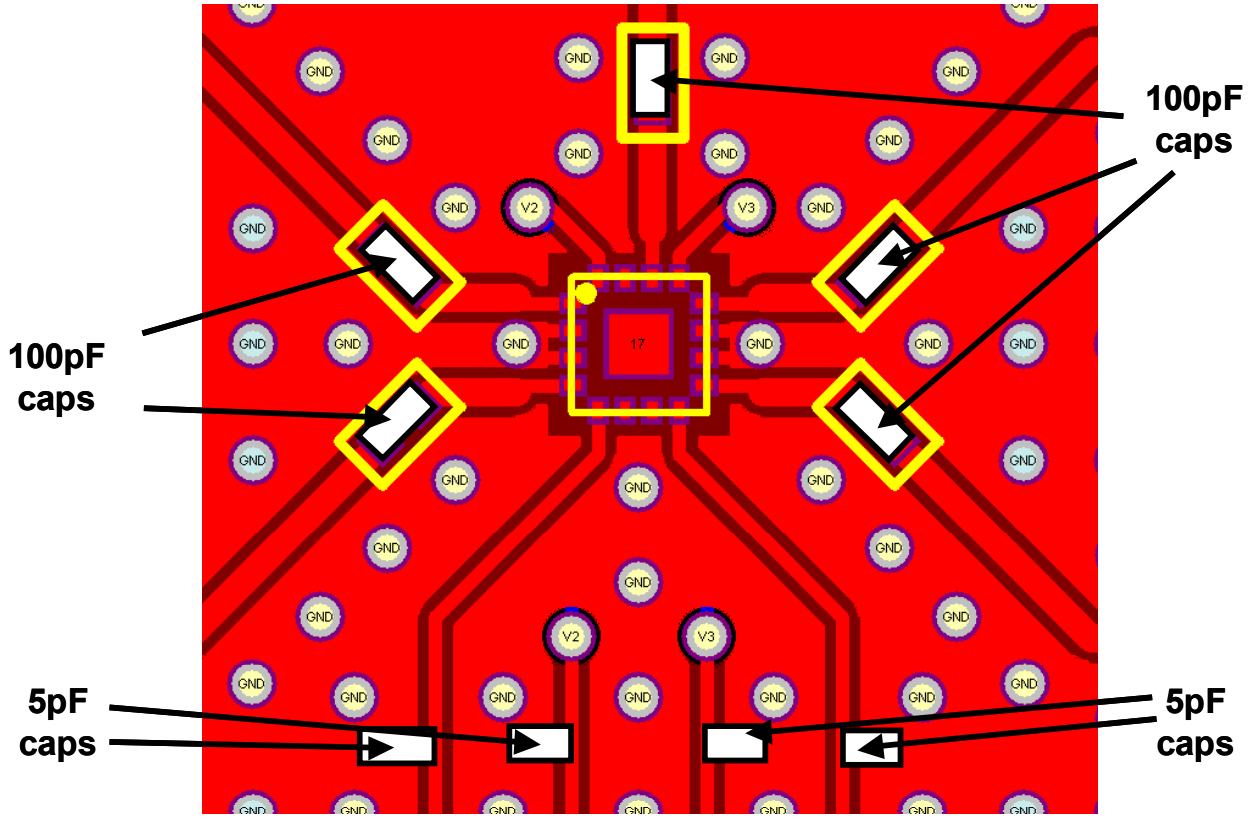
Application Board Capacitors and Locations:



Additional Information

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

Web: www.triquint.com **Tel: (503) 615-9000**
Email: info_wireless@tqs.com **Fax: (503) 615-8902**

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