SP6T High Power 2.5V Antenna Switch

Quad-Band GSM850/GSM900/DCS/PCS

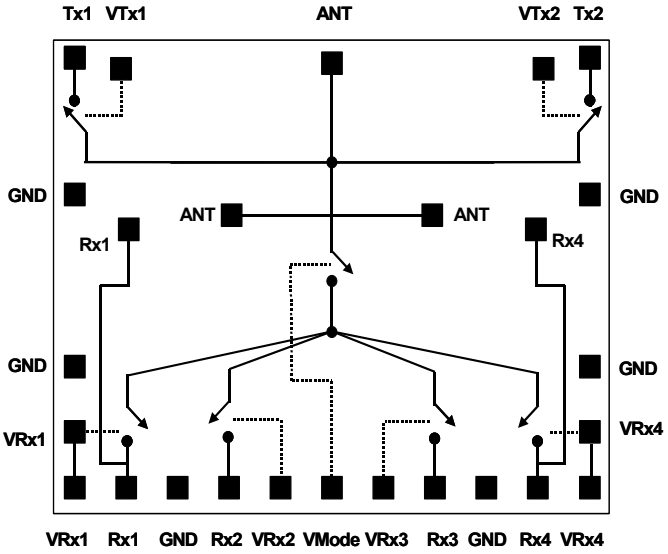
Features:

- Unpackaged PHEMT GaAs MMIC Die
- Excellent Harmonic Performance
  - –80 dBc 2nd Harmonic at 1GHz / +34dBm
  - –81 dBc 2nd Harmonic at 2GHz / +32 dBm
- Low Control Voltage Operation to +2.0V
- High Tx to Rx Isolation: -40dB typ
- Low Insertion Loss: Tx Path 0.45dB typ at 1 GHz
- Very Low Control Current: 40 μA Typ
- Flexible Bonding Options

Application:

- Quad Band for GSM Handset Antenna Switch Modules (ASM) and Front End Modules (FEM)
- Dual and Tri-Band GSM Capable

Schematic Layout:



Description:

TriQuint's TQ4M4006 is a high power antenna switch die in a single pole six throw (SP6T) configuration. The die utilizes TriQuint's PHEMT MMIC switch process to provide optimized performance for use in GSM Quad Band Modules. PHEMT Switches are a very low DC current replacement for classic PIN diode based switches . The die is ideally suited to applications where the antenna of a GSM headset is to be routed to the two separate Tx ports and up to four separate Rx inputs. Use of 2 or 3 of the Rx ports allows the same switch die to be used in dual and tri-band GSM applications. The TQ4M4006 finds applications in Antenna Switch modules combined with Tx Low Pass Filters and Rx SAW Filters. It is also suitable for use in Front End PA Modules that integrate PA, CMOS controller/decoder, and filters together. Robust operation is available with stable harmonic performance down to 2.0 V of control voltage.

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		0.45	
Tx Insertion Loss	DCS/PCS	dB		0.5	
Rx Insertion Loss	GSM850/900	dB		0.7	
Rx Insertion Loss	DCS/PCS	dB		1.0	
Isolation Rx to Rx	Rx On	dB		-30	
Isolation Tx to Rx	Tx On	dB		-42	
Isolation Tx to Tx	Tx On	dB		-32	
2nd Harmonic	GSM850/900, Pin = +34dBm	dBc		-80	
2nd Harmonic	DCS/PCS, Pin = +32 dBm	dBc		-81	
3rd Harmonic	GSM850/900, Pin = +34dBm	dBc		-75	
3rd Harmonic	DCS/PCS, Pin = +32 dBm	dBc		-73	
Return Loss	0.5 to 2.0GHz	dB		-20	
Leakage Current	-	μA			100
Trise, TFall	10% to 90% RF , 90% to 10% RF	μS			1
Ton , Toff	50% control to 90% RF, and 50% control to 10% RF	μS			1

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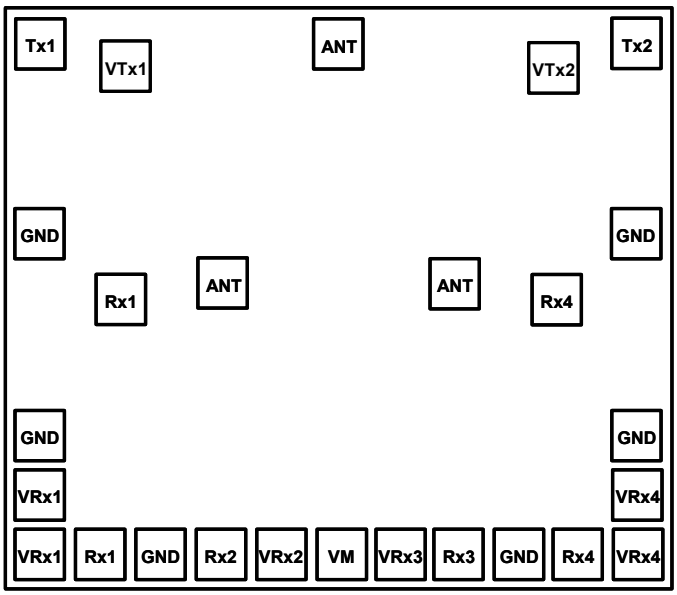
Truth Table: [2, 3]

VTx1	VTx2	Vmode	VRx1	VRx2	VRx3	VRx4	ANT-Tx1	ANT-Tx2	ANT-Rx1	ANT-Rx2	ANT-Rx3	ANT-Rx4
1	0	0	0	0	0	0	On	Off	Off	Off	Off	Off
0	1	0	0	0	0	0	Off	On	Off	Off	Off	Off
0	0	1	1	0	0	0	Off	Off	On	Off	Off	Off
0	0	1	0	1	0	0	Off	Off	Off	On	Off	Off
0	0	1	0	0	1	0	Off	Off	Off	Off	On	Off
0	0	1	0	0	0	1	Off	Off	Off	Off	Off	On

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.

Die Layout:



Absolute Maximum Ratings[4]:

Parameter	Absolute Maximum
Max Input Power	+38dBm
Control Voltage	+/-5V
Operating Temp	-40°C to +85°C
Storage Temp	-65°C to +150°C

Pad Number	Pad Name	Description
1	Tx1	Transmit RF Port 1
2	VTx1	Control Tx1
3	ANT	Main RF ANT Port
4	VTx2	Control Tx2
5	Tx2	Transmit RF Port 2
6	GND	Ground
7	Rx4	Redundant Receive RF Port 4
8	ANT	Redundant RF ANT
9	GND	Ground
10	VRx4	Redundant Control
11	VRx4	Control Rx4
12	Rx4	Receive RF Port 4
13	GND	Ground
14	Rx3	Receive RF Port 3
15	VRx3	Control Rx3
16	VM	Control TX/RX Mode
17	VRx2	Control Rx2
18	Rx2	Receive RF Port 2
19	GND	Ground
20	Rx1	Receive RF Port 1
21	VRx1	Control Rx1
22	VRx1	Redundant Control
23	GND	Ground
24	ANT	Redundant RF ANT
25	Rx1	Redundant Receive RF Port 1
26	GND	Ground

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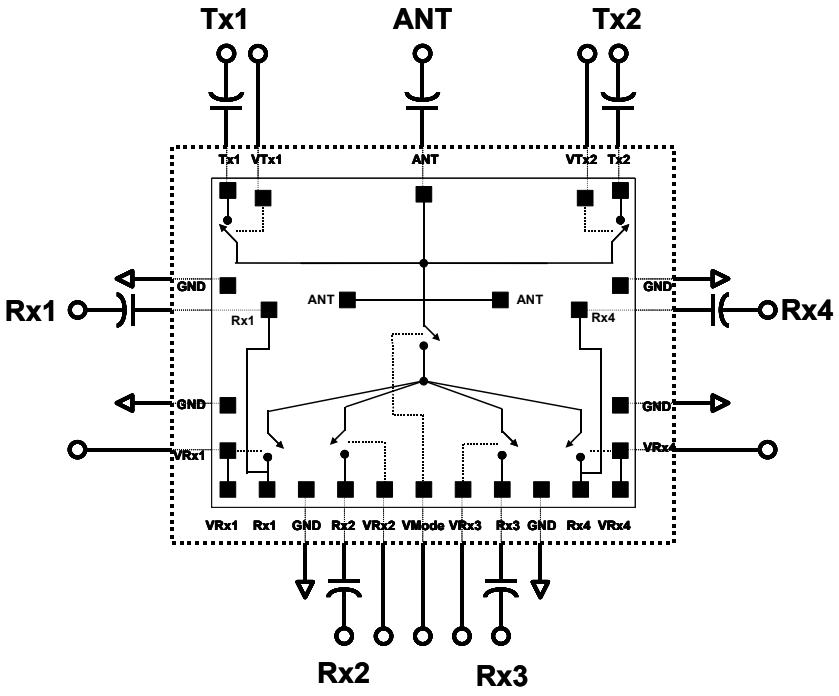
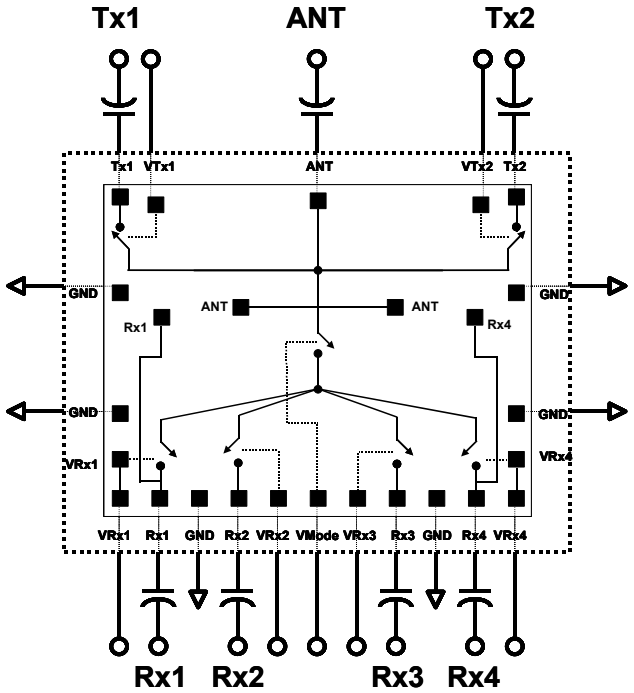
Flexible Bonding Configurations:

External DC Blocking Capacitors are required on all RF ports.
Three Alternate Antenna Bonding Pads



Rx1, Rx4, VRx1 and VRx4 Bonded from Sides

(as used on TriQuint Application Board)



All Rx Control Lines and Rx Ports Bonded off Lower Edge

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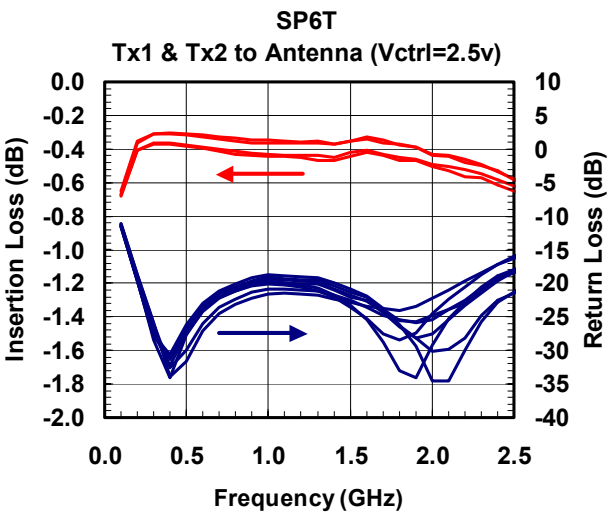
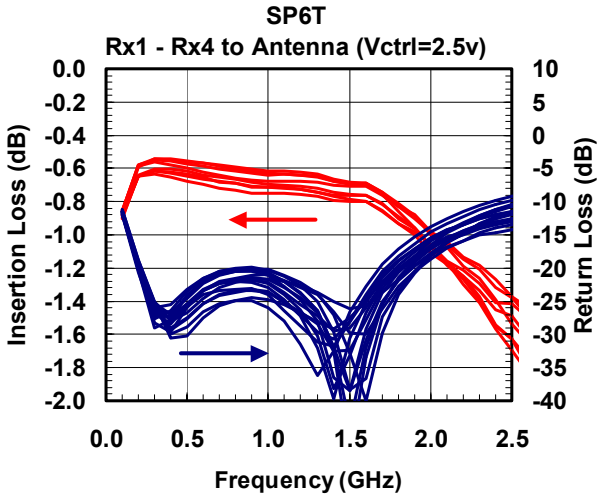
Typical Performance Curves:

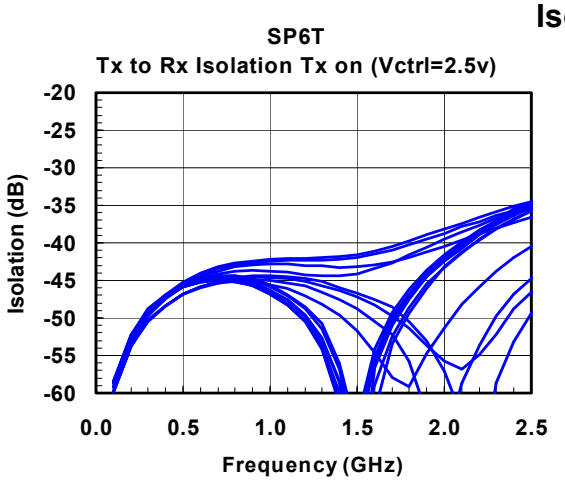
Tx Insertion Loss

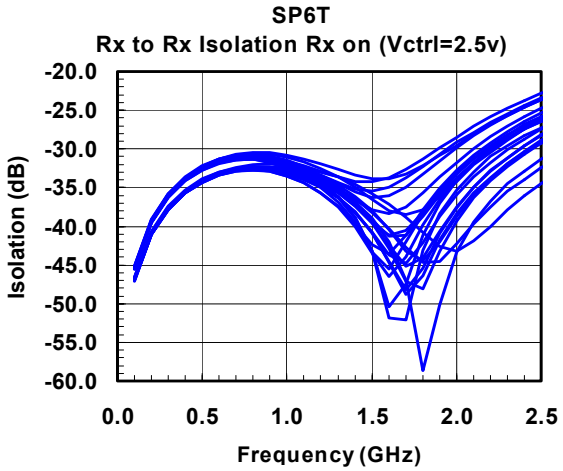


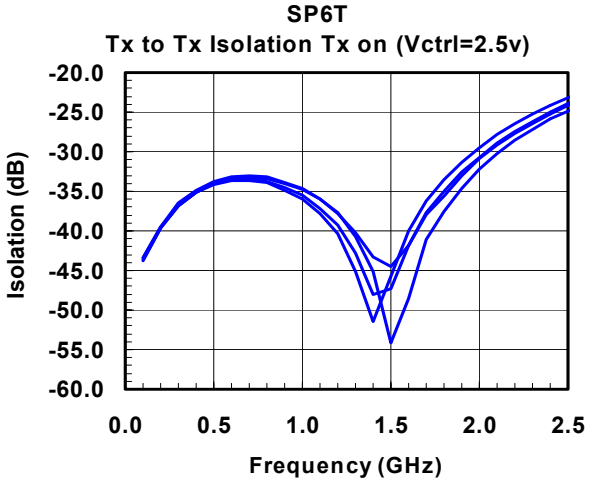
Rx Insertion Loss



Isolation Curves







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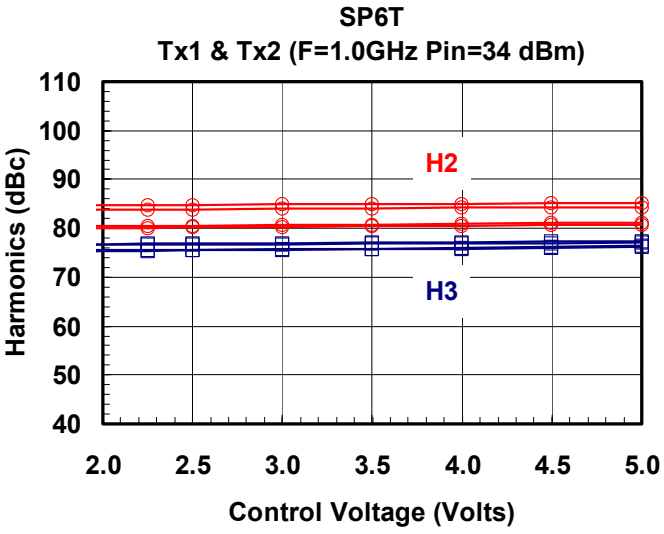
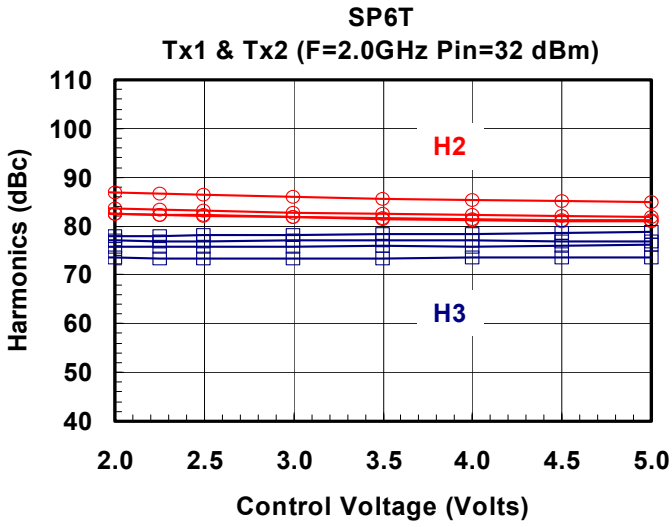
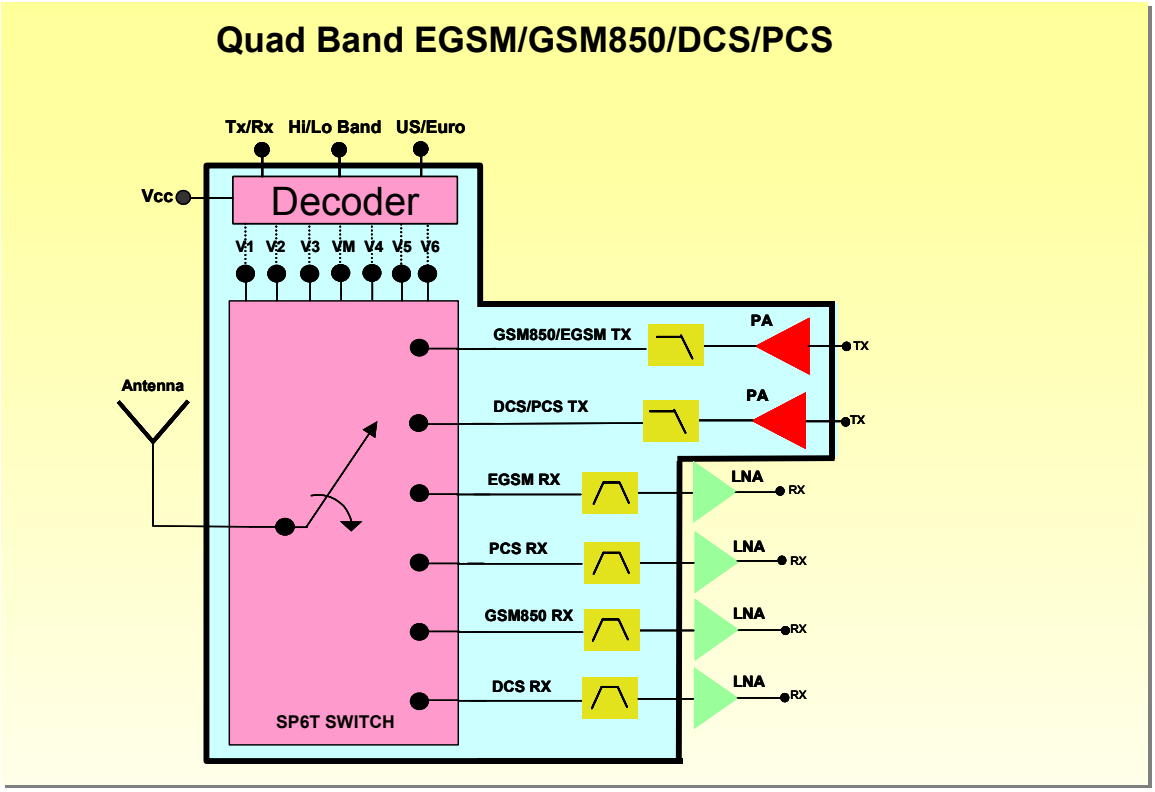
1GHz 2nd and 3rd Harmonics



2 GHz 2nd and 3rd Harmonics



Application Example:



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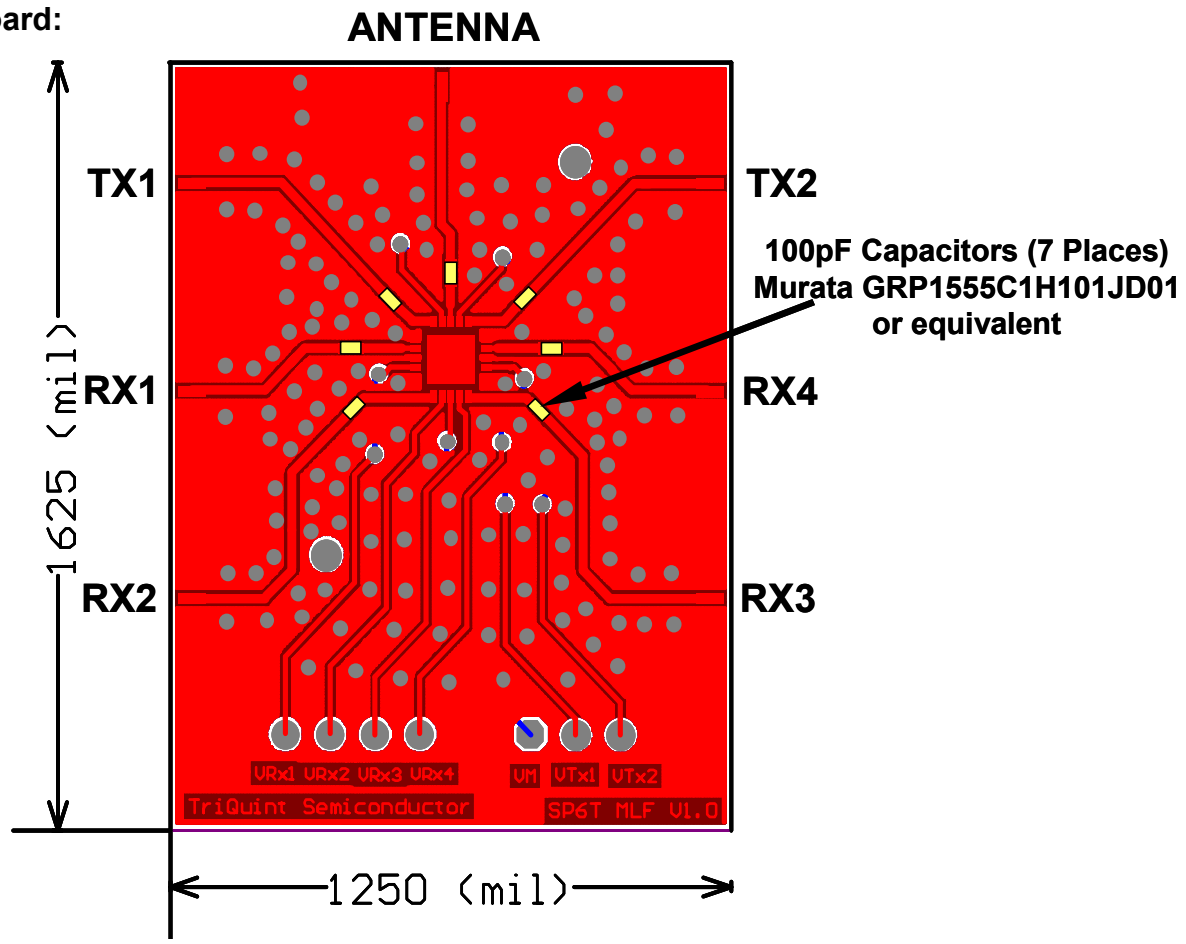
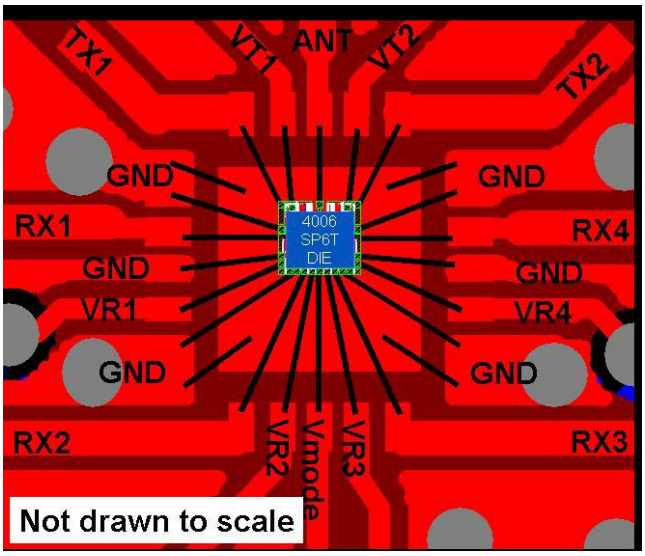
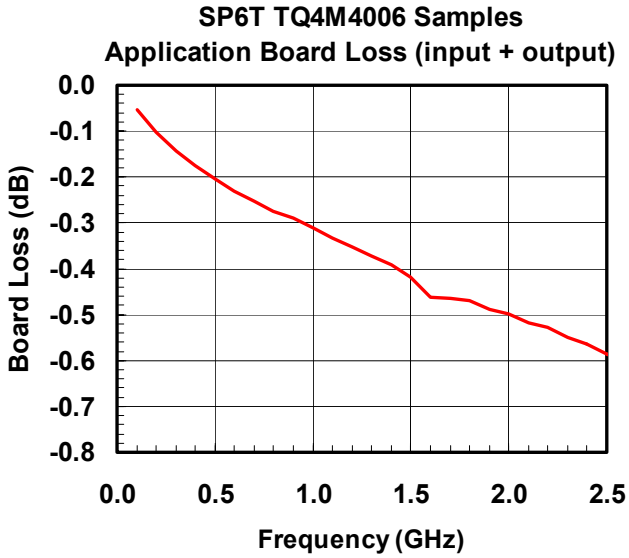
Application Board:



Bonding Configuration:



Application Board Loss De-Embedding Curve:



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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**

For technical questions and additional information on specific applications:

Email: info_wireless@tqs.com

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TriQuint SEMICONDUCTOR ***For additional information and latest specifications, see our website:*** *www.triquint.com*