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October 20, 2011

Gary DeWitt  
Traxxas, LLP  
1100 Klein Road  
Plano, TX 75074

Dear Gary:

Enclosed is the Wireless Test Report for the Traxxas, LLP Remote Transceiver. This report can be used to demonstrate compliance with FCC requirements for wireless devices in the United States.

If you have any questions, please contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey A. Lenk", with a stylized flourish at the end.

Jeffrey A. Lenk  
President

Enclosure

Project 12770-10

**Traxxas, LLP**  
**Remote Transceiver**

**Wireless Certification Report**

Prepared for:  
Traxxas, LLP  
1100 Klein Road  
Plano, TX 75074

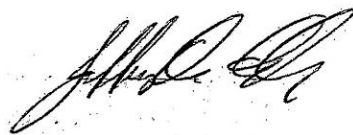
By

Professional Testing (EMI), Inc.  
1601 N. A.W. Grimes Blvd., Suite B  
Round Rock, Texas 78665

October 20, 2011

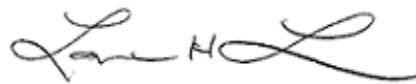
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Reviewed by



Jeffrey A. Lenk  
President

Written by



Layne Lueckemeyer  
Product Development Engineer

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***THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF PROFESSIONAL TESTING (EMI), INC.***

NOTICE: (1) This Report must not be used to claim product endorsement, by NVLAP, NIST, the FCC or any other Agency. This report also does not warrant certification by NVLAP or NIST.

(2) This report shall not be reproduced except in full, without the written approval of Professional Testing (EMI), Inc.

(3) The significance of this report is dependent on the representative character of the test sample submitted for evaluation and the results apply only in reference to the sample tested. The manufacturer must continuously implement the changes shown herein to attain and maintain the required degree of compliance.



Applicant: Traxxas, LLP  
 Applicant's Address: 1100 Klein Road  
 Plano, TX 75074  
 FCC ID: XVE-SA10044  
 Project Number: 12770-10  
 Test Dates: July 14 – 18, September 27, 2011

The **Traxxas Remote** was tested to and found to be in compliance with FCC 47 CFR Part 15 and IC RSS-210 issue 8.

The highest emissions generated by the above equipment are listed below:

Parameter	Frequency (MHz)	Level	Limit	Margin (dB)
Transmitter: Output Power @ 1 m	2426	-3.93 dBm Conducted	30 dBm	-33.93
Transmitter: Radiated Spurious	841.6	30.1 dB $\mu$ V/m @ 10 m	35.6 dB $\mu$ V/m	-5.5
Occupied Bandwidth				
<b>6 dB</b>		<b>20 dB</b>		
890 kHz		1.48 MHz		

I, Layne Lueckemeyer, for Professional Testing (EMI), Inc., being familiar with the FCC rules and test procedures have reviewed the test setup, measured data, and this report. I believe them to be true and accurate.

Layne Lueckemeyer  
 Product Development Engineer

This report has been reviewed and accepted by Traxxas, LLP. The undersigned is responsible for ensuring that this device will continue to comply with the FCC rules.

---

Representative of Traxxas, LLP

## 1.0 Introduction

### 1.2 Scope

This report describes the extent of the equipment under test (EUT) conformance to the intentional radiator requirements of the United States.

Professional Testing (EMI), Inc. (PTI), follows the guidelines of NIST for all uncertainty calculations, estimates, and expressions thereof for EMC testing. The procedure of ANSI C63.4: 2009 were utilized for making all emissions measurements.

### 1.3 EUT Description

The Traxxas 2.4GHz transceiver is a single board system with an 8 bit micro controller used to control the Cypress CYRF6936/7936 radio module. The radio module has an integrated power amplifier (PA) that is firmware selectable from -35dbm to +4dbm in 8 steps. The radio operates in the unlicensed Worldwide Industrial, Scientific, and medical (ISM) band (2.400GHz to 2.438Ghz), in Direct Sequence Spread Spectrum (DSSS) mode.

The EUT was tested while in a continuous transmit mode. The EUT was tuned to a low, middle, and high channel to perform power, occupied bandwidth, and harmonic tests. The EUT was tuned to a middle channel to perform spurious tests. The EUT continuously transmitted at maximum power. The system tested consisted of the following:

Manufacturer	Model	FCC ID Number
Traxxas, LLP	Receiver Remote	XVE-SA10044

The following rules apply to the operation of the EUT:

Guidelines	FCC Rules Part 15
Transmitter Characteristics	15.247
Spurious Radiated Power	15.209
Antenna Requirement	15.203

### 1.4 Modifications

No modifications were made to the EUT during the performance of the test program.

### 1.5 Test Site

Measurements were made at the PTI semi-anechoic facility designated Site 45 (FCC 459644, IC 3036B-1) in Austin, Texas. This site is registered with the FCC under Section 2.948 and Industry Canada per RS-212, and is subsequently confirmed by laboratory accreditation (NVLAP). The test site is located at 11400 Burnet Road, Austin, Texas, 78758, while the main office is located at 1601 N. A.W. Grimes Blvd., Suite B, Round Rock, Texas, 78665.

**1.6 Applicable Documents**

<b>Document</b>	<b>Title</b>	<b>Release</b>
ANSI C63.4	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment	2009
ANSI C63.10	American National Standard for Testing Unlicensed Wireless Devices	2009
47 CFR	Part 15 – Radio Frequency Devices Subpart C -Intentional Radiators	
KDB Publication No. 718828	Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247)	2011

**1.7 Applicable Tests**

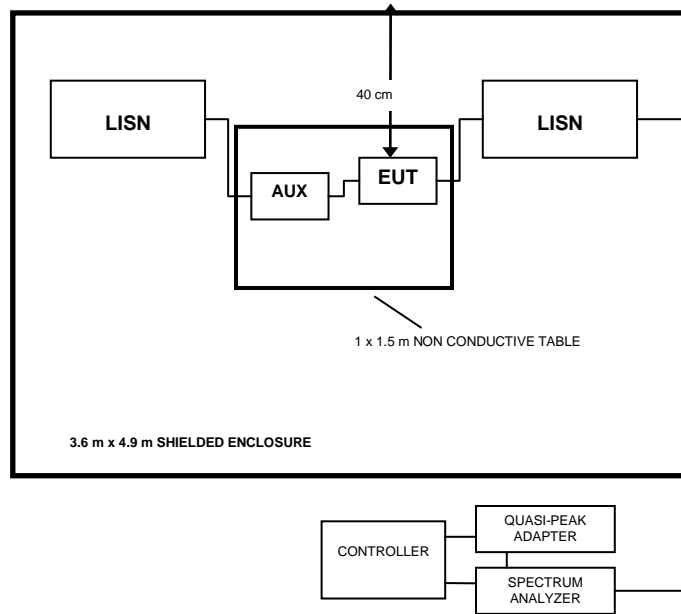
<b>Test</b>	<b>Rule</b>
Power Line Conducted Emissions	15.207(a)
Output Power	15.247(b)(3)
Occupied Bandwidth	15.247(a)(2)
Power Spectral Density	15.247(e)
Radiated Emissions, Harmonic, Spurious, Fundamental, Band Edge	15.205(a), 15.209(a), 15.247(d)
Antenna Requirements	15.203

## 2.0 Power Line Conducted Emissions

### 2.2 Test Procedure

The EUT was configured and operated in a manner consistent with typical applications. The EUT power cord in excess of one meter was folded back and forth forming a bundle 30 to 40 cm long in the approximate center of the cable. Power supply cords for the peripheral equipment were powered from an auxiliary LISN. Excess interface cable lengths were separately bundled in a non-inductive arrangement at the approximate center of the cable with the bundle 30 to 40 centimeters in length. The conducted emissions were maximized, by varying the operating states and configuration of the EUT.

The tests were performed in an 8' x 8' RayProof modular shielded room. The EUT was placed on a non-metallic table 0.4 meters from a vertical metal reference plane and 0.8 meters from a horizontal metal reference plane. A drawing showing the test setup is given as Figure 2.1.1.



**Figure 2.1.1 Conducted Emissions Test Setup**

## 2.3 Test Criteria

The FCC Part 15 Class B conduction limits are given below.

Frequency (MHz)	Conducted Limits (dBuV)	
	Average	Quasi-Peak
0.15 – .50	66-56*	56 – 46*
.50 - 5	56	46
5 – 30	60	50

The tighter limit shall apply at the edge between two frequency bands.

\*Decreases with the logarithm of the frequency

## 2.4 Test Results

Conducted emissions measurements for the EUT were taken on September 27, 2011, and the EUT was found to be in compliance with applicable requirements.

**Table 2.4.1 Conducted Emissions Test Equipment – Bandwidth and Measurement Time Used for Testing**

Professional Testing, EMI, Inc.				
<b>Test Method:</b>	ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators,			
<b>In accordance with:</b>	Conducted Emissions Limits			
<b>Section:</b>	15.107			
<b>Test Date(s):</b>	9/27/2011	<b>EUT Serial #:</b>	n/a	
<b>Customer:</b>	Traxxas	<b>EUT Part #:</b>	n/a	
<b>Project Number:</b>	12770-10	<b>Test Technician:</b>	Dave Kohutek	
<b>Purchase Order #:</b>	GMD110707-2	<b>Supervisor:</b>	Jason Haley	
<b>Equip. Under Test:</b>	Remote Transceiver	<b>Witness' Name:</b>	n/a	
Conducted Emissions Bandwidth and Measurement Time Used for Testing				
Frequency Band Start (MHz)	Frequency Band Stop (MHz)	6dB Bandwidth (kHz)	Number of ranges used	Measurement Time per Range
0.01	0.15	0.3	7	Five 1 second sweeps
0.15	30	9	20	Five 1 second sweeps
*Notes:				
1. The settings above are specifically calculated for the HP856X series of spectrum analyzers, which have 1000 data points per range.				
2. The measurement receiver resolution bandwidth setting was 300Hz for Quasi-peak measurements from 10-150kHz.				
3. The measurement receiver resolution bandwidth setting was 9kHz for Quasi-peak measurements from 0.15-30MHz.				



**Table 2.4.2 Conducted Emissions Test Equipment**

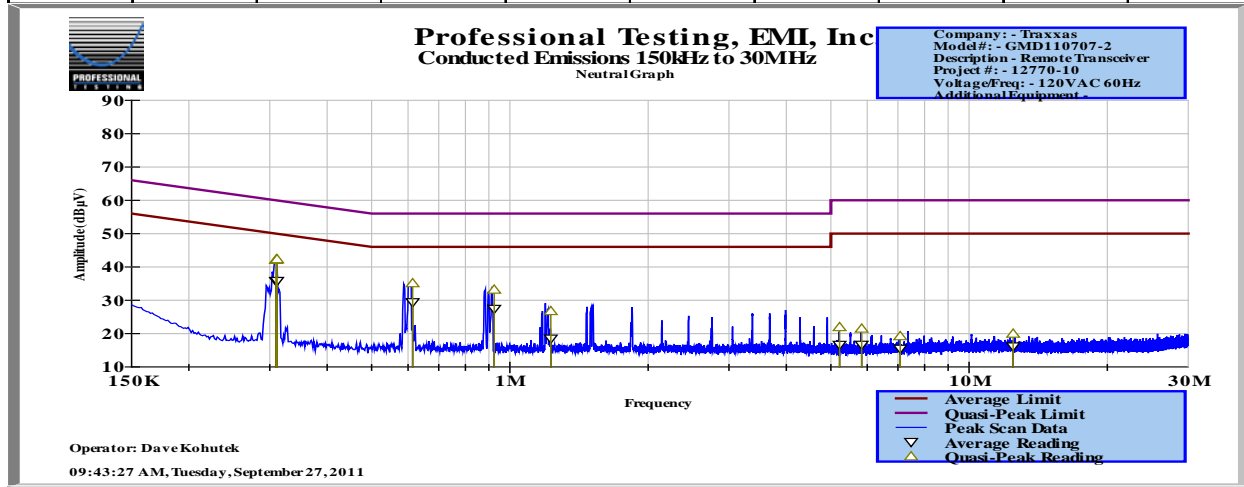
<b>Professional Testing, EMI, Inc.</b>					
<b>Test Method:</b>	ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators,				
<b>In accordance with:</b>	Conducted Emissions Limits				
<b>Section:</b>	15.107				
<b>Test Date(s):</b>	9/27/2011	<b>EUT Serial #:</b>	n/a		
<b>Customer:</b>	Traxxas	<b>EUT Part #:</b>	n/a		
<b>Project Number:</b>	12770-10	<b>Test Technician:</b>	Dave Kohutek		
<b>Purchase Order #:</b>	GMD110707-2	<b>Supervisor:</b>	Jason Haley		
<b>Equip. Under Test:</b>	Remote Transceiver	<b>Witness' Name:</b>	n/a		
<b>Conducted Emissions Test Equipment List</b>					<b>Page: 1 of 1</b>
<b>Tile! Software Version:</b>		4.1.A.0, April 14, 2009, 11:01:00PM			
<b>Test Profile:</b>		Profile#: CE_2010.til, dated December 16, 2010			
<b>Asset#</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Equipment Nomenclature</b>	<b>Serial Number</b>	<b>Calibration Due Date</b>
1129	HP	8568B	Spectrum Analyzer 100Hz-1.5GHz	2140A01754	10/5/2011
1629	HP	85662A	Spec Anal Display for AN1129	3001A18433	N/A
1277	HP	85650A	Quasi Peak Adapter	2811A01117	11/11/2011
1173	PTI	100k HPF	Filter, High Pass, 100kHz	none	1/25/2012
1087	PTI	PTI-ALF4	Attenuator Limiter Filter	none	4/18/2012
C109	HP	None	Cable, BNC, 19"	none	6/21/2012
C107	Pomona	RG-58	Cable, BNC, 10.5'	none	6/21/2012
C108	Pomona	RG-223	Cable, BNC, 5.5'	none	6/21/2012
939	EMCO	3825/2	LISN, 10kHz-100MHz	9603-2521	11/8/2011

**Table 2.4.3 Conducted Emissions Test Results – 120 VAC / 60 Hz Neutral Lead**

<b>Professional Testing, EMI, Inc.</b>	
<b>Test Method:</b>	ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by reference, see §15.38).
<b>In accordance with:</b>	FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Emissions Limits
<b>Section:</b>	15.107
<b>Test Date(s):</b>	9/27/2011
<b>Customer:</b>	Traxxas
<b>Project Number:</b>	12770-10
<b>Purchase Order #:</b>	GMD110707-2
<b>Equip. Under Test:</b>	Remote Transceiver
<b>EUT Serial #:</b>	n/a
<b>EUT Part #:</b>	n/a
<b>Test Technician:</b>	Dave Kohutek
<b>Supervisor:</b>	Jason Haley
<b>Witness' Name:</b>	n/a

Conducted Emissions Test Results Data Sheet - Neutral Lead Page: 1 of 2

EUT Line Voltage:		120 VAC			EUT Line Frequency:		60 Hz		
Frequency Measured (MHz)	Peak Detector Reading (dBµV)	Quasi-peak Detector Reading (dBµV)	Quasi-peak Detector Limit (dBµV)	Quasi-peak Detector Margin (dB)	Quasi-peak Detector Test Results	Average Detector Reading (dBµV)	Average Detector Limit (dBµV)	Average Detector Margin (dB)	Average Detector Test Results
0.30946	42.5	42.1	60	-17.9	PASS	35.8	50	-14.2	PASS
0.3103	42.5	42.3	60	-17.7	PASS	35.8	50	-14.2	PASS
0.31115	42.5	42.3	59.9	-17.6	PASS	35.8	49.9	-14.2	PASS
0.6142	37.1	35.1	56	-20.9	PASS	29.4	46	-16.6	PASS
0.9245	35.3	33.2	56	-22.8	PASS	27.4	46	-18.6	PASS
1.2278	35.2	26.7	56	-29.3	PASS	18.5	46	-27.5	PASS
5.2234	28	21.9	60	-38.1	PASS	16.6	50	-33.4	PASS
5.8359	28.1	21.5	60	-38.5	PASS	16.7	50	-33.3	PASS
7.0783	27.2	19.2	60	-40.8	PASS	15.5	50	-34.5	PASS
12.4709	28.4	20	60	-40	PASS	16.1	50	-33.9	PASS



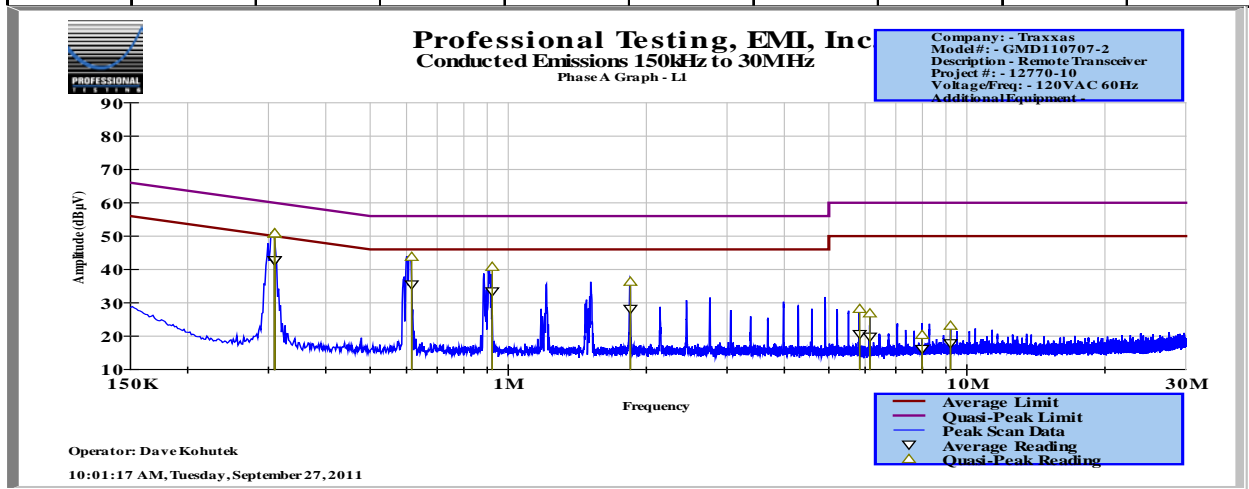
**Measured Conducted Emissions - Neutral Lead**

**Table 2.4.4 Conducted Emissions Test Results – 120 VAC / 60 Hz Phase Lead**

<b>Professional Testing, EMI, Inc.</b>	
<b>Test Method:</b>	ANSI C63.4-2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by reference, see §15.38).
<b>In accordance with:</b>	FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Conducted Emissions Limits
<b>Section:</b>	15.107
<b>Test Date(s):</b>	9/27/2011
<b>Customer:</b>	Traxxas
<b>Project Number:</b>	12770-10
<b>Purchase Order #:</b>	GMD110707-2
<b>Equip. Under Test:</b>	Remote Transceiver
<b>EUT Serial #:</b>	n/a
<b>EUT Part #:</b>	n/a
<b>Test Technician:</b>	Dave Kohutek
<b>Supervisor:</b>	Jason Haley
<b>Witness' Name:</b>	n/a

Conducted Emissions Test Results Data Sheet - Phase Lead (Line 1) Page: 2 of 2

EUT Line Voltage:		120 VAC			EUT Line Frequency:		60 Hz		
Frequency Measured (MHz)	Peak Detector Reading (dBµV)	Quasi-peak Detector Reading (dBµV)	Quasi-peak Detector Limit (dBµV)	Quasi-peak Detector Margin (dB)	Quasi-peak Detector Test Results	Average Detector Reading (dBµV)	Average Detector Limit (dBµV)	Average Detector Margin (dB)	Average Detector Test Results
0.30928	51.4	50.8	60	-9.2	PASS	42.8	50	-7.2	PASS
0.30929	51.4	50.8	60	-9.2	PASS	42.8	50	-7.2	PASS
0.30958	51.5	50.8	60	-9.2	PASS	42.8	50	-7.2	PASS
0.6159	44.7	43.8	56	-12.2	PASS	35.5	46	-10.5	PASS
0.9226	41.8	40.8	56	-15.2	PASS	33.4	46	-12.6	PASS
1.8461	38.2	36.3	56	-19.7	PASS	28.2	46	-17.8	PASS
5.838	31.8	28.1	60	-31.9	PASS	20.7	50	-29.3	PASS
6.1445	31	26.8	60	-33.2	PASS	19.9	50	-30.1	PASS
7.9907	28.8	20.3	60	-39.7	PASS	16.2	50	-33.8	PASS
9.2133	29	23.1	60	-36.9	PASS	17.9	50	-32.1	PASS



**Measured Conducted Emissions - Phase Lead (Line 1)**

**Table 2.4.5 Conducted Emissions Test Setup Photos**

<b>Professional Testing, EMI, Inc.</b>			
<b>Test Method:</b>	ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by FCC Part 15.107 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators,		
<b>In accordance with:</b>	Conducted Emissions Limits		
<b>Section:</b>	15.107		
<b>Test Date(s):</b>	9/27/2011	<b>EUT Serial #:</b>	n/a
<b>Customer:</b>	Traxxas	<b>EUT Part #:</b>	n/a
<b>Project Number:</b>	12770-10	<b>Test Technician:</b>	Dave Kohutek
<b>Purchase Order #:</b>	GMD110707-2	<b>Supervisor:</b>	Jason Haley
<b>Equip. Under Test:</b>	Remote Transceiver	<b>Witness' Name:</b>	n/a
<b>Conducted Emissions Photographs</b>			
			<b>Page: 1 of 1</b>
			
<b>CE View Rear of Table</b>		<b>CE View Front</b>	

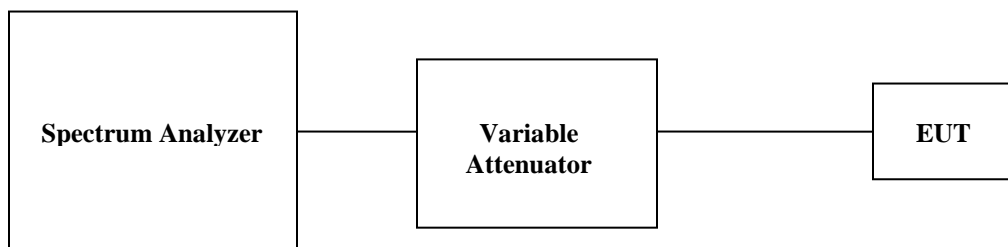
### 3.0 Output Power

Output power measurements were made on selected fundamental transmit frequencies of the EUT for the lowest, most center, and highest transmit frequency.

### 3.2 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable, which allows 360-degree rotation. For measurements of the fundamental signal, the output antenna was connected directly to the input of a spectrum analyzer. When necessary, external attenuation was utilized. A spectrum analyzer with peak detection was used to find the maximum output power. RBW used is recorded.

A diagram showing the test setup is given as Figure 3.1.1.



**Figure 3.1.1: Output Power Test Setup**

### 3.3 Test Criteria

The maximum output power is 1 W for devices operating in the frequency range 2400 -2483.5 MHz according to FCC 15.247.

### 3.4 Test Results

Conducted measurements of the output power level for the EUT were taken on July 18, 2011, and the EUT was found to be in compliance with applicable requirements.

#### Calculations:

Cable Loss (dB) = 1.87

External Attenuation (dB) = 0

Antenna gain (dBi) = 0.5

Total = 2.37

E.I.R.P. calculated by adding Cable Loss + External Attenuation + Antenna gain to Measured Power

**Table 3.3.1: Output Power, Occupied Bandwidth, PSD Measurements Test Equipment**

<b>Professional Testing, EMI, Inc.</b>					
<b>In accordance with: FCC 47 CFR 15 Subpart C</b>					
<b>Section 15.247</b>					
<b>Test Date(s):</b>	<b>7/15/2011</b>	<b>EUT Serial #:</b>	<b>N/A</b>		
<b>Customer:</b>	<b>Traxxas</b>	<b>EUT Part #:</b>	<b>N/A</b>		
<b>Project Number:</b>	<b>12769-10</b>	<b>Test Technician:</b>	<b>Layne Lueckemeyer</b>		
<b>Purchase Order #:</b>	<b>GMD110707-1</b>	<b>Supervisor:</b>	<b>Larry Finn</b>		
<b>Equip. Under Test:</b>	<b>Receiver Remote</b>	<b>Witness' Name:</b>	<b>Chris Russell</b>		
Test Equipment List					Page: 1 of 1
Asset#	Manufacturer	Model	Equipment Nomenclature	Serial Number	Calibration Due Date
C117	Times Microwave	SLU18-SMSM-05.00F	Cable, RF, SMA-SMA, 60", Brown	none	9/22/2011
856	Narda	702-60	Attenuator, Step, 60dB, DC-12.4GHz	4105	CBU
ALN-077	Rohde & Schwarz	FSP30	Spectrum Analyzer	100218	12/22/2012
C046	N/A	N/A	Cable Coax, SMA-N, 0.9m	none	CBU

**Table 3.3.2: Output Power Test Results**

<b>Professional Testing, EMI, Inc.</b>				
<b>In accordance with:</b>		<b>FCC 47 CFR 15 Subpart C</b>		
		<b>Section 15.247</b>		
<b>Test Date(s):</b>	<b>7/15/2011</b>	<b>EUT Serial #:</b>	<b>N/A</b>	
<b>Customer:</b>	<b>Traxxas</b>	<b>EUT Part #:</b>	<b>N/A</b>	
<b>Project Number:</b>	<b>12770-10</b>	<b>Test Technician:</b>	<b>Layne Lueckemeyer</b>	
<b>Purchase Order #:</b>	<b>GMD110707-1</b>	<b>Supervisor:</b>	<b>Larry Finn</b>	
<b>Equip. Under Test:</b>	<b>Receiver Remote</b>	<b>Witness' Name:</b>	<b>Chris Russell</b>	
<b>Transmit Power Test Results Data Sheet</b>				
				<b>Page: 1 of 1</b>
<b>EUT Line Voltage:</b>	<b>6.1</b>	<b>VDC</b>	<b>EUT Line Frequency:</b>	<b>N/A</b> <b>Hz</b>
<b>EUT Mode of Operation:</b>		<b>Lowest Frequency 2407 MHz</b>		
<b>Test Conditions</b>	<b>Measured Power (dBm)</b>	<b>E.I.R.P. (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
Tnom +20 °C	-6.39	-4.02	30	-34.02
<b>EUT Mode of Operation:</b>		<b>Middle Frequency 2426 MHz</b>		
<b>Test Conditions</b>	<b>Measured Power (dBm)</b>	<b>E.I.R.P. (dBm)</b>	<b>E.I.R.P. Limit (dBm)</b>	<b>Margin (dB)</b>
Tnom +20 °C	-6.30	-3.93	30	-33.93
<b>EUT Mode of Operation:</b>		<b>Highest Frequency 2453 MHz</b>		
<b>Test Conditions</b>	<b>Measured Power (dBm)</b>	<b>E.I.R.P. (dBm)</b>	<b>E.I.R.P. Limit (dBm)</b>	<b>Margin (dB)</b>
Tnom +20 °C	-6.45	-4.08	30	-34.08

## **4.0 Occupied Bandwidth**

Occupied bandwidth measurements were performed on the EUT to determine compliance with FCC 15.247.

### **4.2 Test Procedure**

The occupied bandwidth was measured with a spectrum analyzer connected to a double-ridged guide horn while the EUT was operating in continuous transmit mode at the appropriate center frequency. The analyzer center frequency was set to the EUT carrier frequency.

Display line and marker delta functions were used to measure the occupied bandwidth of the EUT. However, the 20 dB bandwidth is referenced to a peak power measurement taken at the entire bandwidth or more for RBW, then using 1% RBW for the 20 dB bandwidth.

A diagram showing the test setup is given as Figure 3.1.1.

### **4.3 Test Criteria**

The minimum 6 dB occupied bandwidth for the EUT is 500 kHz as stated in 15.247(a)(2) and RSS-210. The 20 dB bandwidth must be measured and reported for the FCC.

### **4.4 Test Results**

Occupied bandwidth measurements were taken on July 15, 2011, and the EUT was found to be in compliance with applicable requirements. Test equipment used to perform this test is given in Tables 3.3.1.



**Table 4.3.1: Low Channel 6 dB Occupied Bandwidth Test Results**

<b>Professional Testing, EMI, Inc.</b>					
In accordance with: FCC 47 CFR 15 Subpart C					
Section 15.247					
Test Date(s):	7/15/2011	EUT Serial #:	N/A		
Customer:	Traxxas	EUT Part #:	N/A		
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer		
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn		
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell		
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz				Page:	1 of 1
EUT Line Voltage:	6	VDC	EUT Line Frequency:	N/A	Hz
EUT Mode of Operation:			Transmit Low Channel		
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 110 dBµV      Att 40 dB</span> <span>*RBW 100 kHz    Delta 2 [T1 ]</span> <span>-VBW 100 kHz    0.05 dB</span> <span>SWT 2.5 ms      860.000000000 kHz</span> </div> <p style="margin-top: 10px;">162.025 MHz Date: 15.JUL.2011 12:17:52</p>					
<b>6 dB Occupied Bandwidth</b>					

**Table 4.3.2: Low Channel 20 dB Occupied Bandwidth Test Results**

<b>Professional Testing, EMI, Inc.</b>				
In accordance with: FCC 47 CFR 15 Subpart C				
Section 15.247				
Test Date(s):	7/15/2011	EUT Serial #:	N/A	
Customer:	Traxxas	EUT Part #:	N/A	
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer	
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn	
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell	
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz				Page: 1 of 1
EUT Line Voltage:	6	VDC	EUT Line Frequency:	N/A Hz
EUT Mode of Operation:		Transmit Low Channel		
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 110 dBµV</span> <span>Att 40 dB</span> <span>*RBW 100 kHz Delta 2 [T1 ]</span> <span>-0.36 dB</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span>*VBW 100 kHz</span> <span>SWT 2.5 ms</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span>1.270000000 MHz</span> <span></span> </div> <div style="display: flex; justify-content: space-between; font-size: small; margin-top: 10px;"> <span>162.025 MHz</span> <span>Date: 15.JUL.2011 12:18:32</span> </div>				
<b>20 dB Occupied Bandwidth</b>				

**Table 4.3.3: Mid Channel 6 dB Occupied Bandwidth Test Results**

<b>Professional Testing, EMI, Inc.</b>					
In accordance with: FCC 47 CFR 15 Subpart C					
Section 15.247					
Test Date(s):	7/15/2011	EUT Serial #:	N/A		
Customer:	Traxxas	EUT Part #:	N/A		
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer		
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn		
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell		
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz				Page:	1 of 1
EUT Line Voltage:	6	VDC	EUT Line Frequency:	N/A	Hz
EUT Mode of Operation:			Transmit Mid Channel		
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 110 dBµV</span> <span>Att 40 dB</span> <span>*RBW 100 kHz</span> <span>Delta 2 [T1]</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span>*VBW 100 kHz</span> <span>-0.76 dB</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span>SWT 2.5 ms</span> <span>870.000000000 kHz</span> </div> <div style="margin-top: 10px; font-size: x-small;"> <span>1 PK</span>  <span>D1 94.1 dBµV</span>  <span>Marker 1 [T1]</span>  <span>94.52 dBµV</span>  <span>2.425580000 GHz</span> </div>					
162.025 MHz					
Date: 15.JUL.2011 12:38:04					
<b>6 dB Occupied Bandwidth</b>					

**Table 4.3.4: Mid Channel 20 dB Occupied Bandwidth Test Results**

<b>Professional Testing, EMI, Inc.</b>				
In accordance with: FCC 47 CFR 15 Subpart C				
Section 15.247				
Test Date(s):	7/15/2011	EUT Serial #:	N/A	
Customer:	Traxxas	EUT Part #:	N/A	
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer	
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn	
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell	
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz				Page: 1 of 1
EUT Line Voltage:	6	VDC	EUT Line Frequency:	N/A Hz
EUT Mode of Operation:		Transmit Mid Channel		
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 110 dBµV      Att 40 dB</span> <span>*RBW 100 kHz    Delta 2 [T1 ]</span> <span>-VBW 100 kHz    -1.58 dB</span> <span>SWT 2.5 ms      1.360000000 MHz</span> </div> <p style="font-size: x-small; margin-top: 10px;">1 PK MATCH</p> <p style="font-size: x-small; margin-top: 10px;">Marker 1 [T1 ] 80.48 dBµV 2.425330000 GHz</p> <p style="font-size: x-small; margin-top: 10px;">D1 80.1 dBµV</p> <p style="font-size: x-small; margin-top: 10px;">162.025 MHz</p> <p style="font-size: x-small; margin-top: 10px;">Date: 15.JUL.2011 12:38:45</p>				
<b>20 dB Occupied Bandwidth</b>				

**Table 4.3.5: High Channel 6 dB Occupied Bandwidth Test Results**

<b>Professional Testing, EMI, Inc.</b>					
In accordance with: FCC 47 CFR 15 Subpart C					
Section 15.247					
Test Date(s):	7/15/2011	EUT Serial #:	N/A		
Customer:	Traxxas	EUT Part #:	N/A		
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer		
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn		
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell		
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz				Page:	1 of 1
EUT Line Voltage:	6	VDC	EUT Line Frequency:	N/A	Hz
EUT Mode of Operation:			Transmit High Channel		
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 110 dBµV      Att 40 dB</span> <span>*RBW 100 kHz    Delta 2 [T1 ]</span> <span>-0.38 dB</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span>*VBW 100 kHz</span> <span>890.000000000 kHz</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span>SWT 2.5 ms</span> <span></span> </div>					
<p>1. PK MATCH</p> <p>D1 93.88 dBµV</p> <p>Marker 1 [T1 ]</p> <p>94.16 dBµV</p> <p>2.452570000 GHz</p>					
<p>162.025 MHz</p> <p>Date: 15.JUL.2011 13:30:10</p>					
<b>6 dB Occupied Bandwidth</b>					

**Table 4.3.6: High Channel 20 dB Occupied Bandwidth Test Results**

<b>Professional Testing, EMI, Inc.</b>					
In accordance with: FCC 47 CFR 15 Subpart C					
Section 15.247					
Test Date(s):	7/15/2011	EUT Serial #:	N/A		
Customer:	Traxxas	EUT Part #:	N/A		
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer		
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn		
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell		
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz				Page:	1 of 1
EUT Line Voltage:	6	VDC	EUT Line Frequency:	N/A	Hz
EUT Mode of Operation:			Transmit High Channel		
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 110 dBµV</span> <span>Att 40 dB</span> <span>*RBW 100 kHz</span> <span>Delta 2 [T1]</span> <span>-0.07 dB</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span>*VBW 100 kHz</span> <span>SWT 2.5 ms</span> <span>1.480000000 MHz</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span></span> <span></span> <span>Marker 1 [T1]</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span></span> <span></span> <span>79.28 dBµV</span> </div> <div style="display: flex; justify-content: space-between; font-size: small;"> <span></span> <span></span> <span></span> <span></span> <span>2.452340000 GHz</span> </div>					
<p>162.025 MHz</p> <p>Date: 15.JUL.2011 13:30:45</p>					
<b>20 dB Occupied Bandwidth</b>					

## 5.0 Power Spectral Density

Power spectral density measurements were performed on the EUT to determine compliance with FCC 15.247(e).

### 5.2 Test Procedure

The fundamental emission of the EUT is maximized and the spectrum analyzer is tuned to the highest point as measured in max-hold with peak detection. The analyzer is then centered on the maximum peak and set with the following parameters: RBW = 3 kHz, VBW > RBW, span = 300 kHz, and sweep time = 100s. The peak level is obtained after the sweep completes. The Measurement Procedure PKPSD from KDB718828 was used to measure the PSD. A diagram showing the test setup is given as Figure 2.1.1.

### 5.3 Test Criteria and Methodology

According to section FCC 15.247(e) the maximum power spectral density is +8 dBm in any 3 kHz bandwidth.

The calculation for deriving power spectral density is as follows:

#### Calculations:

Cable Loss (dB) = 1.87

External Attenuation (dB) = 0

Antenna gain (dBi) = 0.5

Total = 2.37

E.I.R.P. calculated by adding Cable Loss + External Attenuation + Antenna gain to Measured Power

### 5.4 Test Results

Power spectral density measurements were taken on July 15, 2011, and the EUT was found to be in compliance with applicable requirements. Test equipment used to perform this test is given in Table 3.3.1.

**Table 5.3.1 Power Spectral Density – Low Channel - Test Results**

<b>Professional Testing, EMI, Inc.</b>		
In accordance with: FCC 47 CFR 15 Subpart C		
Section 15.247		
Test Date(s):	7/15/2011	EUT Serial #: N/A
Customer:	Traxxas	EUT Part #: N/A
Project Number:	12770-10	Test Technician: Layne Lueckemeyer
Purchase Order #:	GMD110707-1	Supervisor: Larry Finn
Equip. Under Test:	Receiver Remote	Witness' Name: Chris Russell
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz		Page: 1 of 1
EUT Line Voltage:	6 VDC	EUT Line Frequency: N/A Hz
EUT Mode of Operation:		Transmit Low Channel
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 110 dBµV      Att 40 dB</span> <span>*RBW 3 kHz      Marker 1 [T1]      86.54 dBµV</span> <span>*VBW 300 kHz</span> <span>*SWT 100 s      2.406024600 GHz</span> </div> <p>162.025 MHz</p> <p>Date: 15.JUL.2011 12:25:10</p>		
<b>PSD Low</b>		

Frequency (MHz)	E.I.R.P (dBm / 3 kHz)	Limit (dBm / 3 kHz)
2406	-20.5	8



**Table 5.3.2 Power Spectral Density – Mid Channel - Test Results**

<b>Professional Testing, EMI, Inc.</b>		
In accordance with: FCC 47 CFR 15 Subpart C		
Section 15.247		
Test Date(s):	7/15/2011	EUT Serial #: N/A
Customer:	Traxxas	EUT Part #: N/A
Project Number:	12770-10	Test Technician: Layne Lueckemeyer
Purchase Order #:	GMD110707-1	Supervisor: Larry Finn
Equip. Under Test:	Receiver Remote	Witness' Name: Chris Russell
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz		Page: 1 of 1
EUT Line Voltage:	6 VDC	EUT Line Frequency: N/A Hz
EUT Mode of Operation:		Transmit Mid Channel
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 100 dBµV      Att 30 dB</span> <span>*RBW 3 kHz      Marker 1 [T1]      86.88 dBµV</span> <span>*VBW 300 kHz</span> <span>*SWT 100 s      2.426025200 GHz</span> </div> <p>162.025 MHz Date: 15.JUL.2011 12:42:36</p>		
<b>PSD Mid</b>		

Frequency (MHz)	E.I.R.P (dBm / 3 kHz)	Limit (dBm / 3 kHz)
2426	-20.1	8

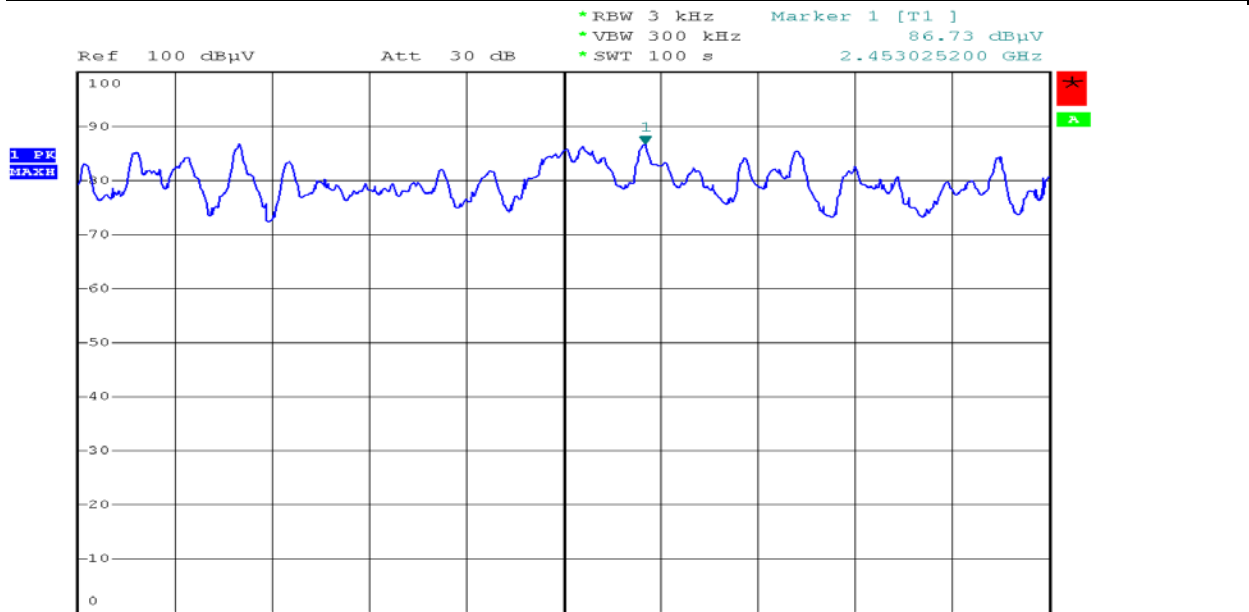
**Table 5.3.3 Power Spectral Density – High Channel - Test Results**

<b>Professional Testing, EMI, Inc.</b>			
In accordance with: FCC 47 CFR 15 Subpart C			
Section 15.247			
Test Date(s):	7/15/2011	EUT Serial #:	N/A
Customer:	Traxxas	EUT Part #:	N/A
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell

Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz Page: 1 of 1

EUT Line Voltage:	6	VDC	EUT Line Frequency:	N/A	Hz
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EUT Mode of Operation: Transmit High Channel



162.025 MHz  
Date: 15.JUL.2011 13:33:32

**PSD High**

Frequency (MHz)	E.I.R.P (dBm / 3 kHz)	Limit (dBm / 3 kHz)
2453	-20.3	8

## **6.0 Band Edge Spurious Emissions**

Band edge spurious emissions measurements were performed on the EUT to determine compliance to FCC 15.247(d).

### **6.2 Test Procedure**

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a motorized turntable, which allows 360-degree rotation. For measurements of the fundamental signal, a measurement antenna was positioned at a distance of 1 meter as measured from the closest point of the EUT. Rotating the EUT maximized the emissions.

The spectrum analyzer was set for peak detection using a 300 kHz resolution bandwidth. The span is set wide enough to show the band edge and the edge of the emission of the screen. Measurement is made at the band edge using the marker delta method while transmitting on the channels nearest the band edge to determine if the EUT meets the test criteria. A diagram showing the test setup is given as Figure 2.1.1.

### **6.3 Test Criteria**

According to FCC 15.247(d) the band edge spurious emissions must be 20 dB below the highest peak in the operating band in any 100 kHz bandwidth. If the frequency falls in the restricted bands of 15.205 the maximum permitted average must be below the field strength listed in 15.209.

Alternatively, the band edge spurious emissions will meet criteria if they are attenuated below the limits specified in FCC 15.209 Table 3

### **6.4 Test Results**

Band edge spurious emissions measurements were taken on July 15, 2011, and the EUT was found to be in compliance with applicable requirements. Test equipment used to perform this test is given in Tables 2.3.1.

**Table 6.3.1 Band Edge Spurious Emissions Test Results Data Sheet**

<b>Professional Testing, EMI, Inc.</b>					
<b>In accordance with: FCC 47 CFR 15 Subpart C</b>					
<b>Section 15.247</b>					
<b>Test Date(s):</b>	<b>7/15/2011</b>	<b>EUT Serial #:</b>	<b>N/A</b>		
<b>Customer:</b>	<b>Traxxas</b>	<b>EUT Part #:</b>	<b>N/A</b>		
<b>Project Number:</b>	<b>12770-10</b>	<b>Test Technician:</b>	<b>Layne Lueckemeyer</b>		
<b>Purchase Order #:</b>	<b>GMD110707-1</b>	<b>Supervisor:</b>	<b>Larry Finn</b>		
<b>Equip. Under Test:</b>	<b>Receiver Remote</b>	<b>Witness' Name:</b>	<b>Chris Russell</b>		
<b>Band Edge Spurious Emissions</b>					
<b>EUT Line Voltage:</b>		<b>6</b>	<b>VDC</b>	<b>EUT Line Frequency</b>	
				<b>n/a</b>	<b>Hz</b>
<b>EUT Mode of Operation:</b>			<b>Transmit</b>		
<b>Frequency Measured (MHz)</b>	<b>Recorded Level (dB)</b>	<b>Limit (dB) down from fundamental</b>	<b>Margin (dB)</b>	<b>Detector Function</b>	<b>RBW / VBW</b>
2400	-36.15	-20	-16.15	Peak	300 kHz / 300 kHz
2483.5	-39.49	-20	-19.49	Peak	300 kHz / 300 kHz

**Table 6.3.2 Band Edge Spurious Emissions (Restricted Bands) Test Results Data Sheet**

<b>Professional Testing, EMI, Inc.</b>								
<b>In accordance with: FCC 47 CFR 15 Subpart C</b>								
<b>Section 15.247</b>								
<b>Test Date(s):</b>	<b>7/15/2011</b>				<b>EUT Serial #:</b>	<b>N/A</b>		
<b>Customer:</b>	<b>Traxxas</b>				<b>EUT Part #:</b>	<b>N/A</b>		
<b>Project Number:</b>	<b>12770-10</b>				<b>Test Technician:</b>	<b>Layne Lueckemeyer</b>		
<b>Purchase Order #:</b>	<b>GMD110707-1</b>				<b>Supervisor:</b>	<b>Larry Finn</b>		
<b>Equip. Under Test:</b>	<b>Receiver Remote</b>				<b>Witness' Name:</b>	<b>Chris Russell</b>		
<b>Band Edge Spurious Emissions (Investigated Restricted Bands at 2390 and 2483.5 MHz)</b>								
<b>EUT Line Voltage:</b>		<b>6</b>	<b>VDC</b>		<b>EUT Line Frequency</b>		<b>n/a</b>	<b>Hz</b>
<b>EUT Mode of Operation:</b>					<b>Transmit</b>			
<b>Frequency Measured (MHz)</b>	<b>Recorded Level (dBuV)</b>	<b>Amplifier Gain (dB)</b>	<b>Antenna Factor (dB/m)</b>	<b>Cable Loss (dB)</b>	<b>Corrected Level (dBμV/m)</b>	<b>Limit Level (dBμV/m)</b>	<b>Margin (dB)</b>	<b>Detector Function</b>
2390	57.4	26.4	28.1	2.8	61.9	83.5	-21.6	Peak Hold
2390	43.6	26.4	28.1	2.8	48.1	63.5	-15.4	Average
2483.5	53.5	24.4	29.0	2.8	60.9	83.5	-22.6	Peak Hold
2483.5	42.8	24.4	29.0	2.8	50.2	63.5	-13.3	Average

## 7.0 Out of Band Spurious Emissions

Out of band spurious/harmonic emissions measurements were performed on the EUT to determine compliance to FCC sections 15.247(d), 15.209.

### 7.2 Test Procedure

The EUT was placed on a non-conductive table 0.8 meters above the ground plane. The table was centered on a rotating turntable at a distance of 10 meters from the measurement antenna.

For spurious emissions below 1 GHz, quasi-peak detection was used with a resolution bandwidth of 120 kHz. All measurements below 1 GHz were normalized to 3 meters using a 20 dB/decade distance extrapolation. The emissions were maximized by rotating the EUT and raising and lowering the measurement antenna from 1 to 4 meters.

Spurious/harmonic emissions above 1 GHz peak were measured with average and peak detection with a resolution bandwidth of 1 MHz and measured at a distance of 1 meter. Average detection was used to determine compliance of the EUT if the peak did not meet the average limit. Non-harmonic emissions must satisfy the average limit and the peak limit (20 dB above average). Above 1 GHz, testing was completed at the transmit frequency to determine compliance. A diagram showing the test setup is given as Figure 7.1.1.

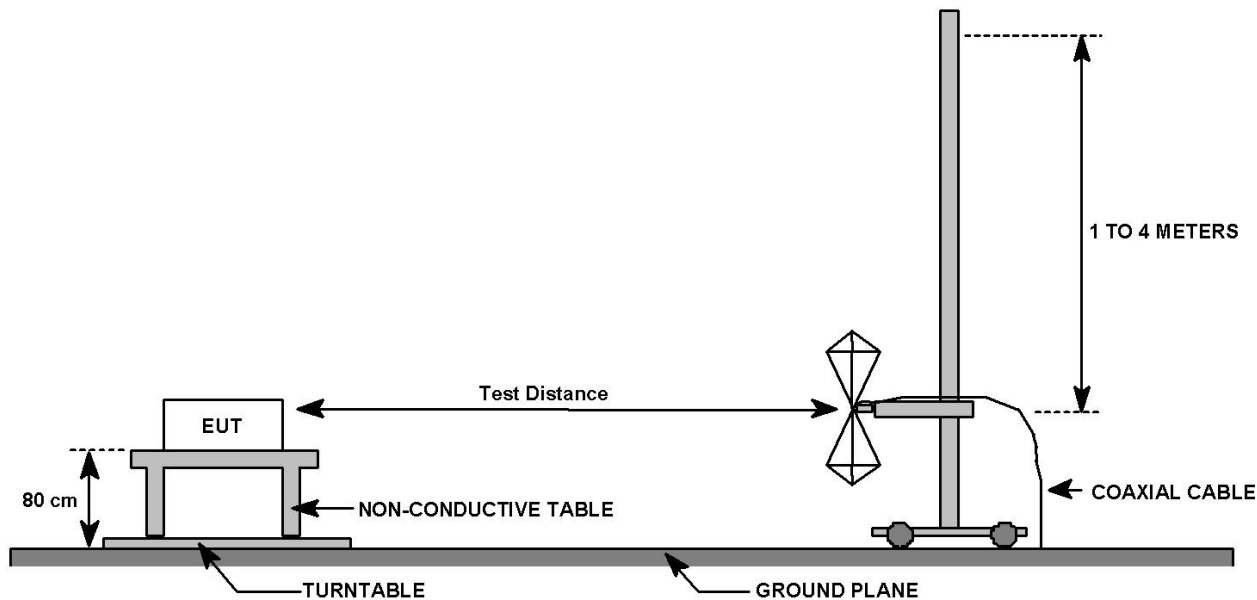


Figure 7.1.1 Radiated Emissions Test Setup

### 7.3 Test Criteria

The radiated limits of FCC 15.209 are shown below. The limits specified are at 3 meters. The limits are quasi-peak for emissions below 1 GHz and average for emissions above 1 GHz. Also above 1 GHz, the peak limit is 20 dB above the average limit.

Frequency MHz	Specification Distance (Meters)	Field Strength (dBuV/m)	Test Distance (Meters)	Field Strength (dBuV/m)
30 to 88	3	40.0	10	29.5
88 to 216	3	43.5	10	33
216 to 960	3	46.0	10	35.5
Above 960	3	54.0	1	63.5

### 7.4 Test Results

Out of band spurious emissions measurements were taken on July 14, 2011, and the EUT was found to be in compliance with applicable requirements. Test equipment used to perform this test is given in Tables 7.3.1.

**Table 7.3.1 Out of Band Spurious Emissions Test Equipment**

<b>Professional Testing, EMI, Inc.</b>					
<b>Test Method:</b>	ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators,				
<b>In accordance with:</b>	Radiated Emissions Limits				
<b>Section:</b>	15.109				
<b>Test Date(s):</b>	7/14/2011	<b>EUT Serial #:</b>	n/a		
<b>Customer:</b>	Traxxas	<b>EUT Part #:</b>	n/a		
<b>Project Number:</b>	12770-10	<b>Test Technician:</b>	Layne Lueckemeyer		
<b>Purchase Order #:</b>	GMD110707-2	<b>Supervisor:</b>	Jason Haley		
<b>Equip. Under Test:</b>	Remote Transceiver	<b>Witness' Name:</b>	Chris Russell		
<b>Radiated Emissions Test Equipment List</b>					<b>Page: 1 of 1</b>
<b>Tile! Software Version:</b>		3.4.K.11, June 7, 2006, 07:49:00 PM			
<b>Test Profile:</b>		Radiated Emissions_updated_12-16-10.til			
<b>Asset#</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Equipment Nomenclature</b>	<b>Serial Number</b>	<b>Calibration Due Date</b>
1509A	Braden	N/A	TDK 10M Chamber, NSA < 1 GHz	DAC-012915-005	8/10/2011
1278	HP	85650A	Quasi Peak Adapter	2811A01147	7/28/2011
1834	HP	85662A	Spec Anal Dsply	2349A06182	N/A
1145	HP	8568B	Spectrum Analyzer 100Hz-1.5GHz	2517A01821	7/28/2011
0238	HP	85685A	RF Preselector	2887A00841	7/27/2011
1497	EMCO	3108	Antenna, Bi Con, 30-300MHz	2121	8/4/2011
0085	HP	85650A	Quasi-Peak Adapter CISPR	3033A01458	7/28/2011
1526	HP	85662A	Spec Anal Dsply for AN 1525	2403A07220	N/A
1525	HP	8566B	Spectrum Analyzer 100Hz-22GHz	2532A02126	6/7/2012
1035	HP	85685A	RF Preselector	2901A00891	4/13/2012
1486	EMCO	3147	Antenna, Log Periodic, .2-5GHz	9112-1052	8/4/2011
C026	N/A	RG214	Cable Coax, N-N, 25m	none	8/10/2011
C027	N/A	RG214	Cable Coax, N-N, 25m	none	8/10/2011
1455	HP	8447D	Preamp	2944A06787	5/8/2012
0586	HP	8447D	Preamp	1726A011364	12/14/2011
1509B	Braden	N/A	TDK 10M Chamber, VSWR > 1 GHz	DAC-012915-005	4/7/2012
1594	Miteq	AFS4-01001800	Amplifier, 1-26.5GHz, 42dB	none	1/28/2012
1529	Miteq	AFS4-01001800	Amplifier, 1-26.5GHz, 36dB	none	7/16/2011
C030	N/A	0	Cable Coax, N-N, 30m	none	3/21/2012
1780	ETS-Lindgren	3117	Antenna, DRG Horn, 1 - 18 GHz	1110313	1/14/2012
948	EMCO	3301B	Antenna, Rod, Active, 30Hz-50MHz	29784	9/15/2011

**Table 7.3.2 Out of Band Spurious Emissions Test Equipment – Bandwidth and Measurement Time Used for Testing**


<b>Professional Testing, EMI, Inc.</b>				
<b>Test Method:</b>	<b>ANSI C63.4-2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz” (incorporated by</b>			
<b>In accordance with:</b>	<b>FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits</b>			
<b>Section:</b>	<b>15.109</b>			
<b>Test Date(s):</b>	<b>7/14/2011</b>	<b>EUT Serial #:</b>	<b>n/a</b>	
<b>Customer:</b>	<b>Traxxas</b>	<b>EUT Part #:</b>	<b>n/a</b>	
<b>Project Number:</b>	<b>12770-10</b>	<b>Test Technician:</b>	<b>Layne Lueckemeyer</b>	
<b>Purchase Order #:</b>	<b>GMD110707-2</b>	<b>Supervisor:</b>	<b>Jason Haley</b>	
<b>Equip. Under Test:</b>	<b>Remote Transceiver</b>	<b>Witness' Name:</b>	<b>Chris Russell</b>	
<b>Radiated Emissions Bandwidth and Measurement Time Used for Testing - Peak Scan</b>				
<b>Frequency Band Start (MHz)</b>	<b>Frequency Band Stop (MHz)</b>	<b>6dB Bandwidth (kHz)</b>	<b>Number of ranges used</b>	<b>Measurement Time per Range</b>
0.009	0.15	0.3	2	Multiple Sweeps
0.15	30	9	6	Multiple Sweeps
30	200	120	1	Multiple 800mS Sweeps
200	1000	120	1	Multiple 800mS Sweeps
1000	18000	1000	17	Multiple Sweeps
<b>*Notes:</b>				
1. The settings above are specifically calculated for the HP856X series of spectrum analyzers, which have 1000 data points per range.				
2. The measurement receiver resolution bandwidth setting was 300Hz for Quasi-peak measurements from 9-150kHz.				
3. The measurement receiver resolution bandwidth setting was 9kHz for Quasi-peak measurements from 0.15-30MHz.				
4. The measurement receiver resolution bandwidth setting was 120kHz for Quasi-peak measurements from 30-1000MHz.				
5. The measurement receiver resolution bandwidth setting was 1MHz for Average measurements from 1-18GHz.				



**Table 7.3.3: Out of Band Spurious Emissions Test Results, 30 MHz to 1 GHz, Horizontal Polarization**

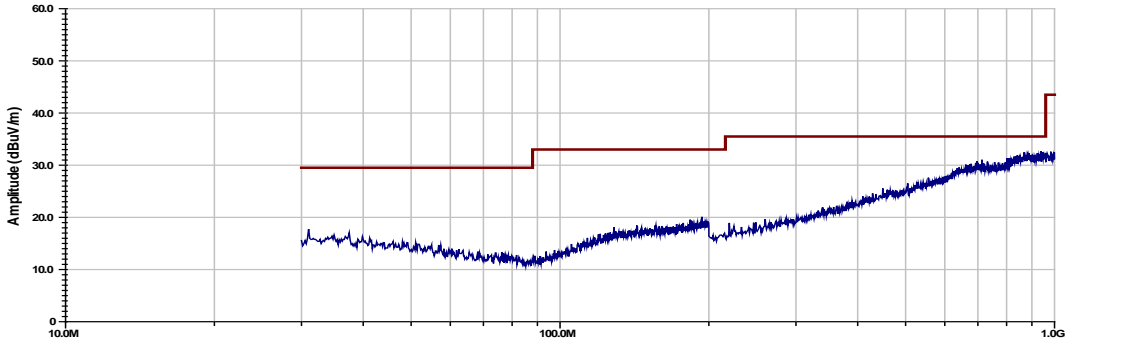
Professional Testing, EMI, Inc.									
Test Method:		ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"							
In accordance with:		FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits							
Section:		15.109							
Test Date(s):		7/14/2011		EUT Serial #:		n/a			
Customer:		Traxxas		EUT Part #:		n/a			
Project Number:		12770-10		Test Technician:		Layne Lueckemeyer			
Purchase Order #:		GMD110707-2		Supervisor:		Jason Haley			
Equip. Under Test:		Remote Transceiver		Witness' Name:		Chris Russell			
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity ≤ 1GHz							Page: 1 of 1		
EUT Line Voltage:		Battery		Vrms		EUT Line Frequency:		n/a Hz	
EUT Mode of Operation:					Transmit Middle Channel				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
31.53	10	1	1	Quasi-peak	21.8	9.4	29.5	-20.1	Pass
156.31	10	1	1	Quasi-peak	21.6	10.7	33.1	-22.4	Pass
199.83	10	1	1	Quasi-peak	21.4	12.1	33.1	-21.0	Pass
566.4	10	1	1	Quasi-peak	26.8	25.0	35.6	-10.6	Pass
841.6	10	1	1	Quasi-peak	26.1	30.1	35.6	-5.5	Pass
993.6	10	1	1	Quasi-peak	26.5	31.8	43.5	-11.7	Pass



**Professional Testing**  
10 Meter Radiated Emissions  
30-1000MHz Class B Horizontal Plot

Company - Traxxas  
Model# - Remote Transceiver  
Description - 2.4 GHz Transceiver  
Project # - 12770-10  
Voltage - Battery




Operator: Layne Lueckemeyer  
02:34:25 PM, Thursday, July 14, 2011

**30MHz to 1GHz, Horizontal Polarity**

**Table 7.3.4: Out of Band Spurious Emissions Test Results, 30 MHz to 1 GHz, Vertical Polarization**

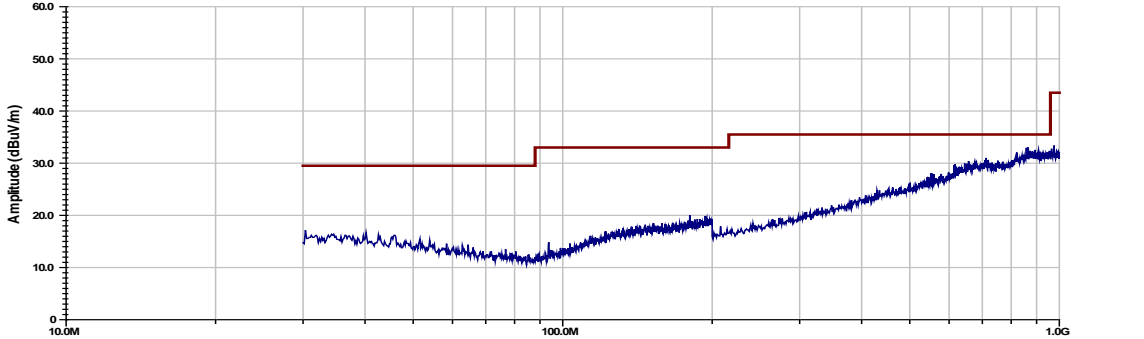
Professional Testing, EMI, Inc.									
Test Method:		ANSI C63.4–2003: “Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz”							
In accordance with:		FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits							
Section:		15.109							
Test Date(s):		7/14/2011		EUT Serial #:		n/a			
Customer:		Traxxas		EUT Part #:		n/a			
Project Number:		12770-10		Test Technician:		Layne Lueckemeyer			
Purchase Order #:		GMD110707-2		Supervisor:		Jason Haley			
Equip. Under Test:		Remote Transceiver		Witness' Name:		Chris Russell			
Radiated Emissions Test Results Data Sheet - Vertical Antenna Polarity ≤ 1GHz							Page: 1 of 1		
EUT Line Voltage:		Battery		Vrms		EUT Line Frequency:		n/a Hz	
EUT Mode of Operation:					Transmit Middle Channel				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
31.53	10	1	1	Quasi-peak	21.8	9.4	29.5	-20.1	Pass
156.31	10	1	1	Quasi-peak	21.6	10.7	33.1	-22.4	Pass
199.83	10	1	1	Quasi-peak	21.4	12.1	33.1	-21.0	Pass
566.4	10	1	1	Quasi-peak	26.8	25.0	35.6	-10.6	Pass
841.6	10	1	1	Quasi-peak	26.1	30.1	35.6	-5.5	Pass
993.6	10	1	1	Quasi-peak	26.5	31.8	43.5	-11.7	Pass



**Professional Testing**  
10 Meter Radiated Emissions  
30-1000MHz Class B Vertical Plot

Company - Traxxas  
Model# - Remote Transceiver  
Description - 2.4 GHz Transceiver  
Project # - 12770-10  
Voltage - Battery



Operator: Layne Lueckemeyer  
02:39:40 PM, Thursday, July 14, 2011


Transmit Middle Channel

**30MHz to 1GHz, Vertical Polarity**

**Table 7.3.5: Out of Band Spurious Emissions Test Results, 1 GHz to 18 GHz, Horizontal Polarization**

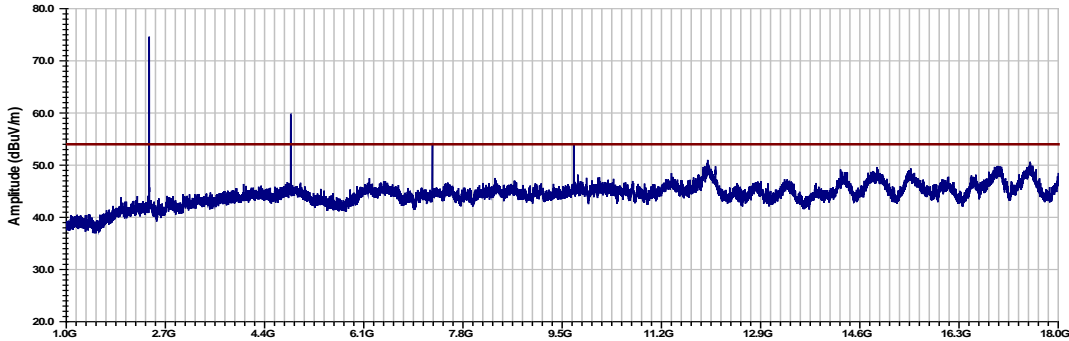
Professional Testing, EMI, Inc.									
Test Method:		ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"							
In accordance with:		FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits							
Section:		15.109							
Test Date(s):		7/14/2011		EUT Serial #:		n/a			
Customer:		Traxxas		EUT Part #:		n/a			
Project Number:		12770-10		Test Technician:		Layne Lueckemeyer			
Purchase Order #:		GMD110707-2		Supervisor:		Jason Haley			
Equip. Under Test:		Remote Transceiver		Witness' Name:		Chris Russell			
Radiated Emissions Test Results Data Sheet - Horizontal Antenna Polarity > 1GHz							Page: 1 of 1		
EUT Line Voltage:		Battery		Vrms		EUT Line Frequency:		n/a Hz	
EUT Mode of Operation:					Transmit Middle Channel				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4852	3	28	1	Average	64.9	38.1	54.0	-15.9	Pass
7278	3	128	1	Average	58.6	34.8	54.0	-19.1	Pass
9702	3	36	1	Average	54.1	37.2	54.0	-16.7	Pass
11995	3	1	1	Average	49.8	38.3	54.0	-15.6	Pass
14800	3	1	1	Average	48.7	38.8	54.0	-15.2	Pass
16900	3	1	1	Average	50.3	41.4	54.0	-12.6	Pass



**Professional Testing**  
3 Meter Radiated Emissions  
1-18GHz Class B Horizontal Plot

Company - Traxxas  
Model# - Remote Transceiver  
Description - 2.4 GHz Transceiver  
Project # - 12770-10  
Voltage - Battery



Operator: Layne Lueckemeyer  
02:55:14 PM, Thursday, July 14, 2011

Transmit Middle Channel

1GHz to 18GHz, Horizontal Polarity

**Table 7.3.6: Out of Band Spurious Emissions Test Results, 1 GHz to 18 GHz, Vertical Polarization**

Professional Testing, EMI, Inc.									
Test Method:		ANSI C63.4-2003: "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"							
In accordance with:		FCC Part 15.109 - Code of Federal Regulations Part 47, Subpart B - Unintentional Radiators, Radiated Emissions Limits							
Section:		15.109							
Test Date(s):		7/14/2011		EUT Serial #:		n/a			
Customer:		Traxxas		EUT Part #:		n/a			
Project Number:		12770-10		Test Technician:		Layne Lueckemeyer			
Purchase Order #:		GMD110707-2		Supervisor:		Jason Haley			
Equip. Under Test:		Remote Transceiver		Witness' Name:		Chris Russell			
Radiated Emissions Test Results Data Sheet - Vertical Antenna Polarity > 1GHz							Page: 1 of 1		
EUT Line Voltage:		Battery		Vrms		EUT Line Frequency:		n/a Hz	
EUT Mode of Operation:					Transmit Middle Channel				
Frequency Measured (MHz)	Test Distance (Meters)	EUT Direction (Degrees)	Antenna Height (Meters)	Detector Function	Recorded Amplitude (dBµV)	Corrected Level (dBµV/m)	Limit Level (dBµV/m)	Margin (dB)	Test Results
4852	3	123	1	Average	65.4	38.6	54.0	-15.4	Pass
7278	3	207	1	Average	58.9	35.1	54.0	-18.8	Pass
9702	3	256	1	Average	53.6	36.7	54.0	-17.2	Pass
11995	3	1	1	Average	49.8	38.3	54.0	-15.6	Pass
14800	3	1	1	Average	48.7	38.8	54.0	-15.2	Pass
16900	3	1	1	Average	50.3	41.4	54.0	-12.6	Pass

Professional Testing		3 Meter Radiated Emissions		1-18GHz Class B Vertical Plot	
Company - Traxxas		Model# - Remote Transceiver		Description - 2.4 GHz Transceiver	
Project # - 12770-10		Voltage - Battery			

Operator: Layne Lueckemeyer  
03:08:16 PM, Thursday, July 14, 2011

1GHz to 18GHz, Vertical Polarity

**Table 7.3.7: Out of Band Spurious Emissions Test Results, 18 GHz to 25 GHz, Horizontal and Vertical Polarizations**

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
12770-10	July 14, 2011	FCC B	1 m	Horn	1 MHz	1 MHz	Average
COMMENT		Transmitting 2406 MHz Harmonics and spurious investigated up to 25 GHz					

**Horizontal Polarization**

Frequency Measured (MHz)	EUT Direction (Degrees)	Antenna Height (Meters)	Recorded Level (dB $\mu$ V)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dB $\mu$ V/m)	Limit Level (dB $\mu$ V/m)	Margin (dB)	Detector Function
19.248	Noise	Floor	39.7	43.2	36.6	8.8	41.9	63.5	-21.6	Avg
21.654	Noise	Floor	40.3	41.8	36.9	9.5	44.9	63.5	-18.6	Avg
24.060	Noise	Floor	42.6	42.2	37.1	10.4	47.9	63.5	-15.6	Avg

**Vertical Polarization**

Frequency Measured (MHz)	EUT Direction (Degrees)	Antenna Height (Meters)	Recorded Level (dB $\mu$ V)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dB $\mu$ V/m)	Limit Level (dB $\mu$ V/m)	Margin (dB)	Detector Function
19.248	Noise	Floor	39.7	43.2	36.6	8.8	41.9	63.5	-21.6	Avg
21.654	Noise	Floor	40.3	41.8	36.9	9.5	44.9	63.5	-18.6	Avg
24.060	Noise	Floor	42.6	42.2	37.1	10.4	47.9	63.5	-15.6	Avg

**Result = Pass**

**Table 7.3.8: Out of Band Spurious Emissions Test Results, 18 GHz to 25 GHz, Horizontal and Vertical Polarizations**

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
12770-10	July 14, 2011	FCC B	1 m	Horn	1 MHz	1 MHz	Average
COMMENT		Transmitting 2426 MHz Harmonics and spurious investigated up to 25 GHz					

**Horizontal Polarization**

Frequency Measured (MHz)	EUT Direction (Degrees)	Antenna Height (Meters)	Recorded Level (dB $\mu$ V)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dB $\mu$ V/m)	Limit Level (dB $\mu$ V/m)	Margin (dB)	Detector Function
19.408	Noise	Floor	39.7	43.5	36.5	6.7	39.4	63.5	-24.1	Avg
21.834	Noise	Floor	40.3	40.6	36.9	10.4	46.9	63.5	-16.6	Avg
24.26	Noise	Floor	42.6	42.2	37.2	10.3	47.8	63.5	-15.7	Avg

**Vertical Polarization**

Frequency Measured (MHz)	EUT Direction (Degrees)	Antenna Height (Meters)	Recorded Level (dB $\mu$ V)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dB $\mu$ V/m)	Limit Level (dB $\mu$ V/m)	Margin (dB)	Detector Function
19.408	Noise	Floor	39.7	43.5	36.5	6.7	39.4	63.5	-24.1	Avg
21.834	Noise	Floor	40.3	40.6	36.9	10.4	46.9	63.5	-16.6	Avg
24.26	Noise	Floor	42.6	42.2	37.2	10.3	47.8	63.5	-15.7	Avg

**Result = Pass**

**Table 7.3.9: Out of Band Spurious Emissions Test Results, 18 GHz to 25 GHz, Horizontal and Vertical Polarizations**

PROJECT #	DATE	CLASS	DISTANCE	ANTENNA	RBW	VBW	DETECTOR
12770-10	July 14, 2011	FCC B	1 m	Horn	1 MHz	1 MHz	Average
COMMENT		Transmitting 2453 MHz Harmonics and spurious investigated up to 25 GHz					

**Horizontal Polarization**

Frequency Measured (MHz)	EUT Direction (Degrees)	Antenna Height (Meters)	Recorded Level (dB $\mu$ V)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dB $\mu$ V/m)	Limit Level (dB $\mu$ V/m)	Margin (dB)	Detector Function
19.624	Noise	Floor	39.7	43.7	36.5	8.2	40.8	63.5	-22.7	Avg
22.077	Noise	Floor	40.3	40.5	37.1	9.4	46.3	63.5	-17.2	Avg
24.530	Noise	Floor	42.6	42.1	37.2	10.1	47.8	63.5	-15.7	Avg

**Vertical Polarization**

Frequency Measured (MHz)	EUT Direction (Degrees)	Antenna Height (Meters)	Recorded Level (dB $\mu$ V)	Amplifier Gain (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Corrected Level (dB $\mu$ V/m)	Limit Level (dB $\mu$ V/m)	Margin (dB)	Detector Function
19.624	Noise	Floor	39.7	43.7	36.5	8.2	40.8	63.5	-22.7	Avg
22.077	Noise	Floor	40.3	40.5	37.1	9.4	46.3	63.5	-17.2	Avg
24.530	Noise	Floor	42.6	42.1	37.2	10.1	47.8	63.5	-15.7	Avg

**Result = Pass**

**Table 7.3.10: Antenna Port Out of Band Spurious Emissions Test Results, 30 to 1000 MHz**

<b>Professional Testing, EMI, Inc.</b>			
In accordance with: FCC 47 CFR 15 Subpart C			
Section 15.247			
Test Date(s):	7/15/2011	EUT Serial #:	N/A
Customer:	Traxxas	EUT Part #:	N/A
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell
EUT Line Voltage:	6	VDC	EUT Line Frequency: n/a Hz
EUT Mode of Operation:		Transmit Middle Channel	
<div style="display: flex; justify-content: space-between;"> <div> <p>Ref 10 dBm      *Att 30 dB</p> <p>*RBW 100 kHz    *VBW 100 kHz    *SWT 5 s</p> </div> <div style="text-align: right;"> <p>Marker 1 [T1 ]</p> <p>-57.05 dBm</p> <p>447.10000000 MHz</p> </div> </div> <p>The spectrum plot displays a blue trace representing the signal level across a frequency range. The y-axis is labeled in dBm, ranging from 10 to -90. A horizontal red line is drawn at -36 dBm, labeled 'D1 -36 dBm'. A blue cursor is positioned at 447.10000000 MHz, with a marker value of -57.05 dBm. The plot shows a noisy baseline around -60 dBm, well below the -36 dBm limit line.</p>			
162.025 MHz			
Date: 19.JUL.2011 08:28:38			
30MHz to 1GHz			



**Table 7.3.11: Antenna Port Out of Band Spurious Emissions Test Results, 1 to 25 GHz**

<b>Professional Testing, EMI, Inc.</b>			
In accordance with: FCC 47 CFR 15 Subpart C			
Section 15.247			
Test Date(s):	7/15/2011	EUT Serial #:	N/A
Customer:	Traxxas	EUT Part #:	N/A
Project Number:	12770-10	Test Technician:	Layne Lueckemeyer
Purchase Order #:	GMD110707-1	Supervisor:	Larry Finn
Equip. Under Test:	Receiver Remote	Witness' Name:	Chris Russell
EUT Line Voltage:	6	VDC	EUT Line Frequency: n/a Hz
EUT Mode of Operation:		Transmit Middle Channel	
<div style="display: flex; justify-content: space-between; font-size: small;"> <span>Ref 10 dBm</span> <span>*Att 30 dB</span> <span>*RBW 100 kHz</span> <span>Marker 1 [T1 ]</span> </div> <div style="display: flex; justify-content: space-between; font-size: x-small;"> <span>*VBW 100 kHz</span> <span>-11.92 dBm</span> </div> <div style="display: flex; justify-content: space-between; font-size: x-small;"> <span>*SWT 5 s</span> <span>2.440000000 GHz</span> </div>			
<p>162.025 MHz</p> <p>Date: 19.JUL.2011 08:27:09</p>			
<b>1GHz to 25 GHz</b>			

## **8.0 Antenna Requirements**

An antenna evaluation was performed on the EUT to determine compliance with FCC sections 15.203.

## **8.2 Evaluation Procedure**

The design of the EUT antenna was evaluated for conformance to engineering requirements for gain and to prevent substitution of unapproved antennae. Gain of the antenna was assessed by reviewing the antenna manufacturer's data sheet.

## **8.3 Evaluation Criteria**

The antenna design must meet at least one of the following criteria:

- a) Antenna is permanently attached to the unit.
- b) Antenna must use a unique type of connector to attach to the EUT.
- c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

## **8.4 Evaluation Results**

The Traxxas Remote Transceiver met the criteria of this rule by virtue of having an internal antenna inaccessible to the user. Therefore, the EUT is compliant.

**End of Report**

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