

FCC PART 15.249

TEST REPORT

For

Radiolink Electronic Limited

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FCC ID: U2BRL037T001A

Report Type: Original Report	Product Type: 2.4G Digital Proportional R/C System
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP*, NIST, or any agency of the Federal Government.

* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The Radiolink Electronic Limited's product, model T7F (FCC ID: U2BRL037T001A) (the "EUT") in this report is a 2.4G Digital Proportional R/C System, which was measured approximately: 20.0 cm (L) x 20.0 cm (W) x 10.0 cm (H), rated input voltage: 1.5×8 AA battery.

All measurement and test data in this report was gathered from production sample serial number: 1204810 (Assigned by BACL, Shenzhen). The EUT was received on 2012-04-17.

Objective

This report is prepared on behalf of Radiolink Electronic Limited in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No related submittal(s)

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

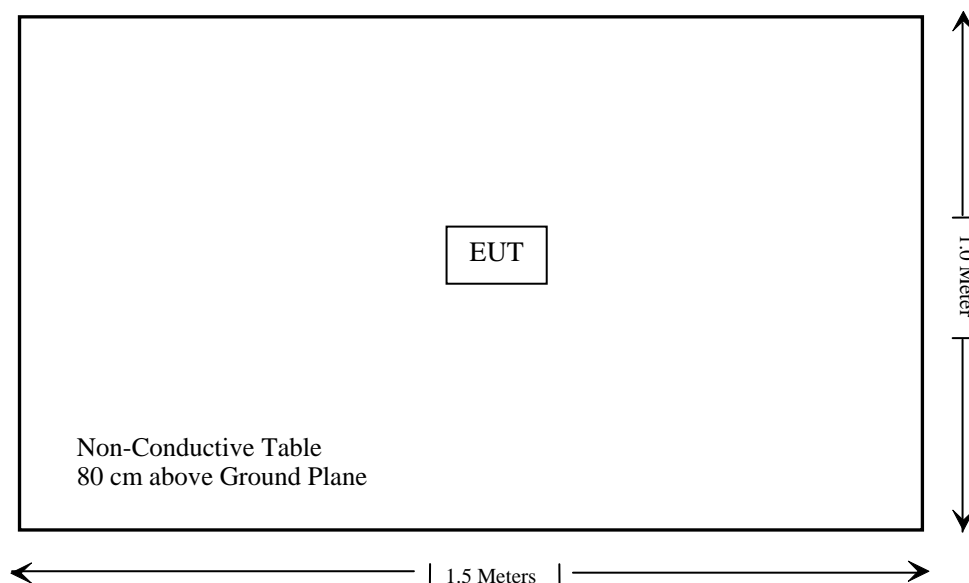
Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Equipment Modifications

No modifications were made to the unit tested.

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conduction Emissions	N/A*
15.205, §15.209, §15.249	Radiated Emissions	Compliance

Note: EUT is powered by battery only.

FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT has an omni-directional antenna soldered to PCB, which in accordance to section 15.203 is considered sufficient to comply with the provisions of this section.

Result: Compliant, Please refer to the EUT photos.

FCC§15.205, §15.209&§15.249- RADIATED EMISSIONS**Applicable Standard**

As per FCC§15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000MHz:

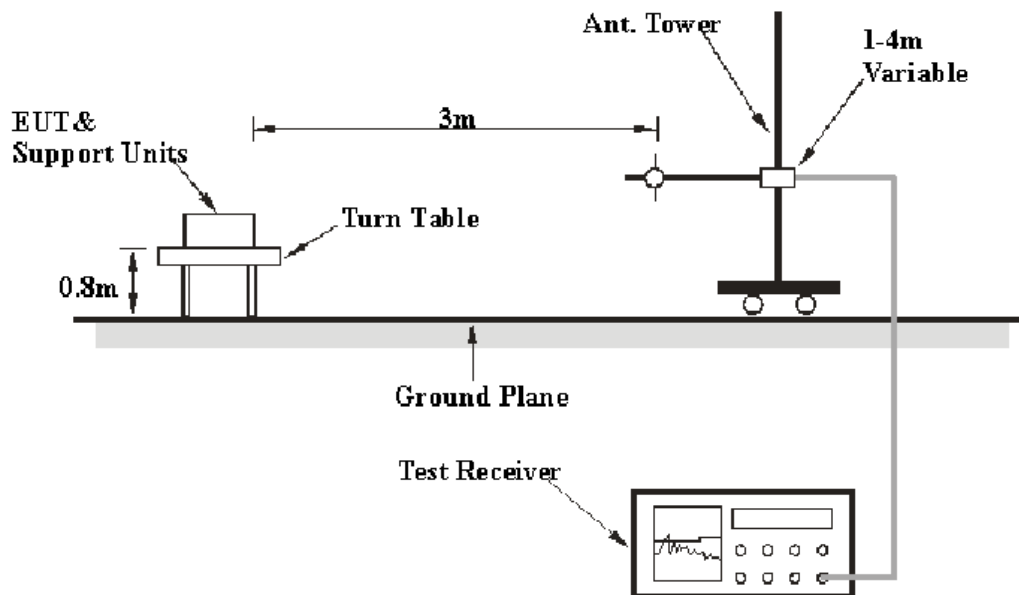
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2011-11-24	2012-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2011-11-17	2012-11-16
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2012-03-17	2013-03-18
Mini-Circuits	Amplifier	ZVA-213+	T-E27H	2011-11-24	2012-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2012-12-01
Rohde & Schwarz	Signal Analyzer	FSIQ 26	8386001028	2011-11-24	2012-11-23
Electro-Mechanics	Horn antenna	3116	9510-2270	2011-10-14	2012-10-13

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209 &15.205 & 15.249, with the worst margin reading of:

9.81 dB at 4820 MHz in the Vertical polarization

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.2 kPa

The testing was performed by Henry Ding on 2012-05-11.

*Test Mode: Transmitting***30 MHz ~25 GHz:**

Freq. (MHz)	S.A. Reading (dBμV)	Detector PK/QP/Ave	Direction Degree	Height (m)	Polar H/V	Ant. Loss (dB)	Cable loss (dB)	Amp. Gain (dB)	Corrected Amplitude (dBμV/m)	FCC 15.209/ FCC 15.249/15.205		
										Limit (dBμV/m)	Margin (dB)	Comment
Low Channel												
2410	95.33	PK	156	1.6	V	28.9	3.03	26.50	100.76	114	13.24	Fund.
2410	68.67	Ave.	156	1.6	V	28.9	3.03	26.50	74.10	94	19.90	Fund.
2410	86.56	PK	47	1.9	H	28.9	3.03	26.50	91.99	114	22.01	Fund.
2410	63.17	Ave.	47	1.9	H	28.9	3.03	26.50	68.60	94	25.40	Fund.
4820	31.89	Ave.	157	1.4	V	34.5	4.30	26.50	44.19	54	9.81	Harmonic
208.01	44.77	QP	127	2.0	V	9.3	0.83	25.20	29.7	43.5	13.80	Spurious
112.01	41.83	QP	239	1.0	V	10.9	0.57	25.80	27.5	43.5	16.00	Spurious
2395.4	55.84	PK	335	1.6	V	28.9	3.03	26.50	61.27	74	12.73	Spurious
2395.40	55.84	PK	335	1.6	V	28.9	3.03	26.50	61.27	74	12.73	Spurious
2487.8	34.36	Ave.	31	1.7	V	28.9	3.11	26.50	39.87	54	14.13	Spurious
4820	26.64	Ave.	96	1.8	H	34.5	4.30	26.50	38.94	54	15.06	Harmonic
2395.4	32.53	Ave.	335	1.6	V	28.9	3.03	26.50	37.96	54	16.04	Spurious
2395.40	32.53	Ave.	335	1.6	V	28.9	3.03	26.50	37.96	54	16.04	Spurious
2487.8	52.15	PK	31	1.7	V	28.9	3.11	26.50	57.66	74	16.34	Spurious
4820	42.4	PK	157	1.4	V	34.5	4.30	26.50	54.70	74	19.30	Harmonic
7230	18.25	Ave.	334	1.5	V	36.8	5.22	26.50	33.77	54	20.23	Harmonic
7230	17.68	Ave.	231	2.3	H	36.8	5.22	26.50	33.20	54	20.80	Harmonic
4820	37.31	PK	96	1.8	H	34.5	4.30	26.50	49.61	74	24.39	Harmonic
7230	33.45	PK	334	1.5	V	36.8	5.22	26.50	48.97	74	25.03	Harmonic
7230	32.88	PK	231	2.3	H	36.8	5.22	26.50	48.40	74	25.60	Harmonic
2398.37	19.7	Ave.	75	1.36	H	30	3.03	26.50	26.23	54	31.17	Spurious
2398.37	39.61	PK	75	1.36	H	30	3.03	26.50	46.14	74	31.26	Spurious
Middle Channel												
2450	93.77	PK	254	1.4	V	28.9	3.11	26.50	99.28	114	14.72	Fund.
2450	67.08	Ave.	254	1.4	V	28.9	3.11	26.50	72.59	94	21.41	Fund.
2450	85.05	PK	338	1.7	H	28.9	3.11	26.50	90.56	114	23.44	Fund.
2450	60.54	Ave.	338	1.7	H	28.9	3.11	26.50	66.05	94	27.95	Fund.
208.01	44.97	QP	102	2.2	V	9.3	0.83	25.2	29.9	43.5	13.60	Spurious
112.01	41.53	QP	135	1.5	V	10.9	0.57	25.8	27.2	43.5	16.30	Spurious

4900	26.38	Ave.	38	1.9	H	35.0	4.36	26.50	39.24	54	14.76	Harmonic
4900	26.22	Ave.	155	1.6	V	35.0	4.36	26.50	39.08	54	14.92	Harmonic
2371.8	31.79	Ave.	135	1.7	V	28.9	3.03	26.50	37.22	54	16.78	Spurious
2371.8	50.55	PK	135	1.7	V	28.9	3.03	26.50	55.98	74	18.02	Spurious
7350	20.32	Ave.	25	1.6	V	36.8	5.21	26.50	35.83	54	18.17	Harmonic
7350	19.27	Ave.	334	1.5	H	36.8	5.21	26.50	34.78	54	19.22	Harmonic
4900	38.54	PK	38	1.9	H	35.0	4.36	26.50	51.40	74	22.60	Harmonic
4900	38.08	PK	155	1.6	V	35.0	4.36	26.50	50.94	74	23.06	Harmonic
2499.3	23.77	Ave.	236	1.6	V	29.0	3.29	26.50	29.56	54	24.44	Spurious
7350	33.45	PK	25	1.6	V	36.8	5.21	26.50	48.96	74	25.04	Harmonic
7350	32.38	PK	334	1.5	H	36.8	5.21	26.50	47.89	74	26.11	Harmonic
2499.3	40.61	PK	236	1.6	V	29.0	3.29	26.50	46.40	74	27.60	Spurious
High Channel												
2478	90.34	PK	147	1.6	V	28.9	3.11	26.50	95.85	114	18.15	Fund.
2478	85.05	PK	244	2.4	H	28.9	3.11	26.50	90.56	114	23.44	Fund.
2478	63.74	Ave.	147	1.6	V	28.9	3.11	26.50	69.25	94	24.75	Fund.
2478	62.18	Ave.	244	2.4	H	28.9	3.11	26.50	67.69	94	26.31	Fund.
2483.8	58.55	PK	302	2.1	V	28.9	3.11	26.50	64.06	74	9.94	Spurious
208.01	44.57	QP	142	2.1	V	9.3	0.83	25.2	29.5	43.5	14.00	Spurious
112.01	41.43	QP	176	1.2	V	10.9	0.57	25.8	27.1	43.5	16.40	Spurious
2483.80	58.55	PK	302	2.1	V	28.9	3.11	26.50	64.06	74	9.94	Spurious
4956	23.38	Ave.	253	1.7	H	35.0	4.40	26.50	36.28	54	17.72	Harmonic
4956	23.15	Ave.	311	1.6	V	35.0	4.40	26.50	36.05	54	17.95	Harmonic
7434	20.33	Ave.	154	1.6	V	36.8	5.20	26.50	35.83	54	18.17	Harmonic
7434	19.56	Ave.	265	1.7	H	36.8	5.20	26.50	35.06	54	18.94	Harmonic
2399.8	26.26	Ave.	321	1.7	V	28.9	3.03	26.50	31.69	54	22.31	Spurious
2483.8	25.88	Ave.	302	2.1	V	28.9	3.11	26.50	31.39	54	22.61	Spurious
2483.80	25.88	Ave.	302	2.1	V	28.9	3.11	26.50	31.39	54	22.61	Spurious
4956	37.64	PK	253	1.7	H	35.0	4.40	26.50	50.54	74	23.46	Harmonic
4956	37.07	PK	311	1.6	V	35.0	4.40	26.50	49.97	74	24.03	Harmonic
7434	33.71	PK	154	1.6	V	36.8	5.20	26.50	49.21	74	24.79	Harmonic
7434	32.53	PK	265	1.7	H	36.8	5.20	26.50	48.03	74	25.97	Harmonic
2399.8	42.25	PK	321	1.7	V	28.9	3.03	26.50	47.68	74	26.32	Spurious

******* END OF REPORT *******