

FCC TEST REPORT

FCC ID : KE3-3001103
Applicant : Radio Systems Corporation
Address : 10427 Electric Ave.Knoxville, TN 37932 USA


Equipment Under Test (EUT) :


Product Name : Remote Trainer with Vibration PLUS
Model No. : RFA-462, RFA-460

Standards : FCC CFR47 Part 95:2009

Date of Test : October 28, 2011 ~ October 30, 2011

Date of Issue : October 31, 2011

Test Engineer : Hunk yan 

Reviewed By : Philo zhong 

Test Result	: PASS
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Prepared By:
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☆ The sample detailed above has been tested to the requirements of Council Directives TIA/EIA-603-2004. The test results have been reviewed against the Directives above and found to meet their essential requirements.

2 Test Summary

Test Items	Test Requirement	Test Method	Result
Emission Bandwidth	95.633	TIA/EIA-603-2004	PASS
Frequency Stability	95.623	TIA/EIA-603-2004	PASS
Maximum transmitter power	95.639	TIA/EIA-603-2004	PASS
Unwanted radiation	95.635	TIA/EIA-603-2004	PASS
Conducted Emission	15.107	ANSI C63.4:2003	PASS

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4 General Information

4.1 Client Information

Applicant : Radio Systems Corporation
Address of Applicant : 10427 Electric Ave.Knoxville, TN 37932 USA

Manufacturer : Radio Systems Corporation
Address of Manufacturer : 10427 Electric Ave.Knoxville, TN 37932 USA

4.2 General Description of E.U.T.

Product Name : Remote Trainer with Vibration PLUS
Model No. : RFA-462, RFA-460
Differences describe : Both model are the same except the model number & button of appliances, so we choose “RFA-462” as the test sample.
Operation Frequency : 27.145MHz

4.3 Details of E.U.T.

Technical Data: : Adapter Input: 100-240VAC, 50/60Hz, 0.3A Max
Adapter Output: 9.0VDC, 0.125A
9.0VDC, 0.125A
Internal Battery: 4.8V Ni-MH Battery

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Standards Applicable for Testing

The customer requested FCC tests for a Remote Trainer with Vibration PLUS. The standards used were FCC CFR47 Part 95 and Part 15.

4.6 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: IC7760A**

Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A, August 3, 2010.

- **FCC – Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

4.7 Test Location

All the tests were performed at:

Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd., Songgang Street, Baoan District, Shenzhen, China

5 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No.	Internal No.	Specification	Cal. Date	Due Date	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY45114 943	W20080 01	9k- 26.5GHz	Aug.2, 2011	Aug.1, 2012	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZB ECK MESS- ELEKTROM / VULB9163	336	W20080 02	30-3000 MHz	Aug.2, 2011	Aug.1, 2012	±1dB
10m 50 Ohm Coaxial Cable with N-plug, individual length, usable up to 3(5)GHz, Connector	SCHWARZB ECK MESS- ELEKTROM /AK 9513	-	-	-	Aug.2, 2011	Aug.1, 2012	-
Positioning Controller	C&C LAB/ CC-C-IF	-	-	-	Aug.2, 2011	Aug.1, 2012	-
Color Monitor	SUNSP0/ SP-14C	-	-	-	Aug.2, 2011	Aug.1, 2012	-
Test Receiver	ROHDE&SC HWARZ/ ESPI	101155	W20050 01	9k-3GHz	Aug.2, 2011	Aug.1, 2012	±1dB
Two-Line V-Network	ROHDE&SC HWARZ/ ENV216	100115	W20050 02	50Ω/50μ H	Aug.2, 2011	Aug.1, 2012	±10%
V-LISN	SCHWARZB ECK MESS- ELEKTRON IK	NSLK 8128	8128- 259	9k-30MHz	Aug.2, 2011	Aug.1, 2012	-
10m 50 Ohm Coaxial Cable with N-plug, individual length, usable up to 3(5)GHz, Connectors	SCHWARZB ECK MESS- ELEKTROM / AK 9514	-	-	-	Aug.2, 2011	Aug.1, 2012	-
Active Loop Antenna	Beijing Dazhi / ZN30900A	-	-	-	Aug.2, 2011	Aug.1, 2012	±1dB

6 Conducted Emissions

Test Requirement:	FCC CFR47 Part 15 Section 15.107
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dB μ V between 0.15MHz & 0.5MHz 56 dB μ V between 0.5MHz & 5MHz 60 dB μ V between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

6.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C
Humidity: 51 % RH
Atmospheric Pressure: 1012 mbar

EUT Operation:

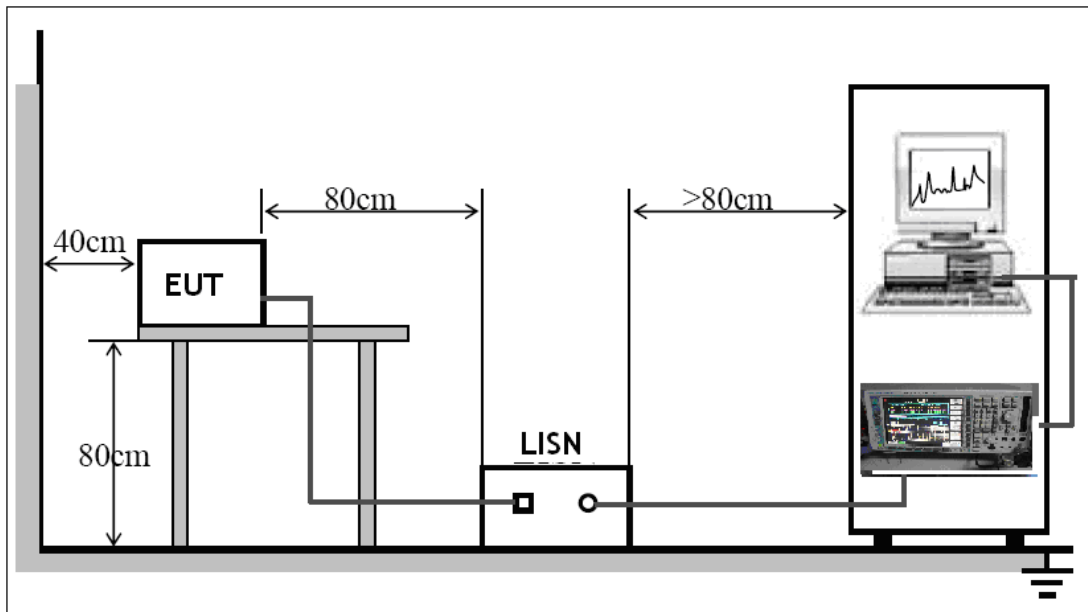
The EUT was test in Charging mode.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

6.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15 Section 15.107 limits.

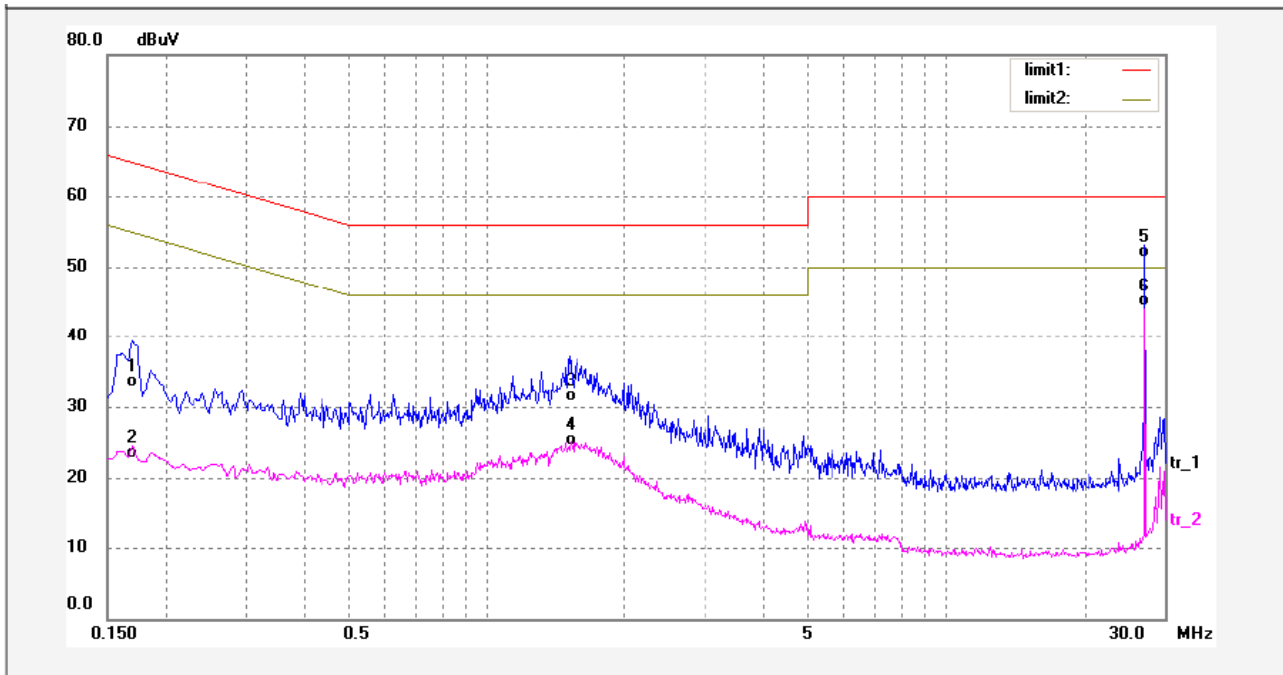


The EUT was placed on the test table in shielding room

6.3 Conducted Emission Test Result

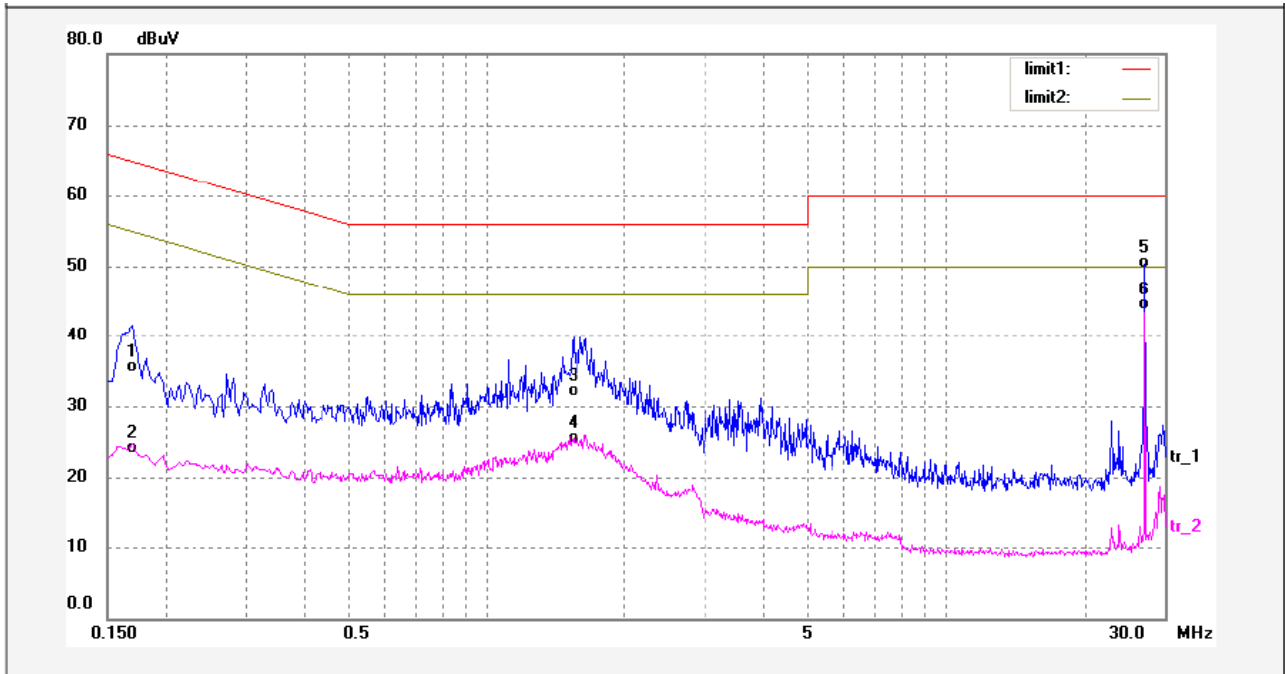
An initial pre-scan was performed on the live and neutral lines.

Live line:



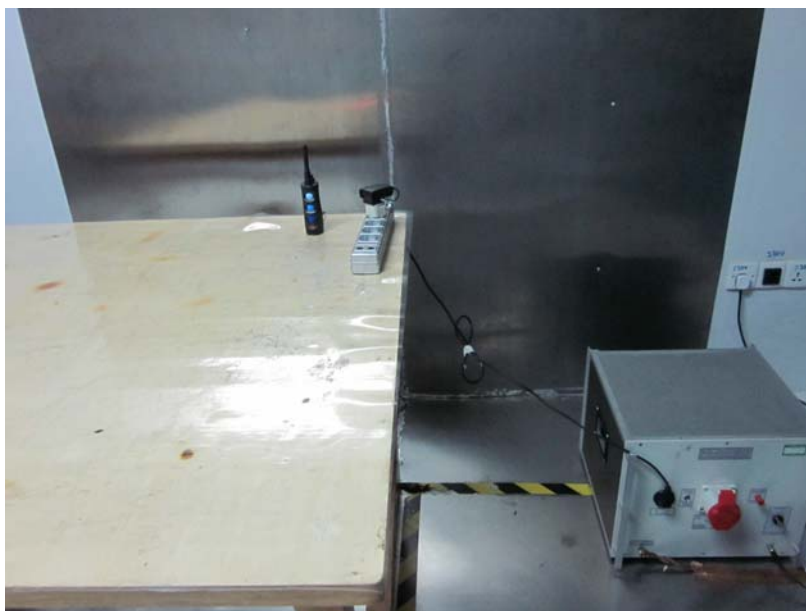
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1700	21.98	10.68	32.66	64.96	-32.30	QP	
2	0.1700	12.05	10.68	22.73	54.96	-32.23	AVG	
3	1.5180	18.48	12.19	30.67	56.00	-25.33	QP	
4	1.5180	12.33	12.19	24.52	46.00	-21.48	AVG	
5	27.1460	38.39	12.90	51.29	60.00	-8.71	QP	
6	27.1460	31.41	12.90	44.31	50.00	-5.69	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1700	23.96	10.68	34.64	64.96	-30.32	QP	
2	0.1700	12.64	10.68	23.32	54.96	-31.64	AVG	
3	1.5460	19.11	12.20	31.31	56.00	-24.69	QP	
4	1.5460	12.53	12.20	24.73	46.00	-21.27	AVG	
5	27.1460	36.88	12.90	49.78	60.00	-10.22	QP	
6	27.1460	30.76	12.90	43.66	50.00	-6.34	AVG	

6.4 Photograph – Conducted Emission Test Setup



7 Maximum Transmitter Power

Test requirement: FCC CFR47 Part 95 Section 95.639

Test method: Based on TIA/EIA-603-2004

Limit:

According to 95.639 (b), no R/C transmitter, under any condition of modulation, shall exceed a carrier power or peak envelope TP (single-sideband only) of:

- (1) 4 W in the 26–27 MHz frequency band, except on channel frequency 27.255 MHz;
- (2) 25 W on channel frequency 27.255 MHz;
- (3) 0.75 W in the 72–76 MHz frequency band.

7.1 Test Equipment

Please refer to Section 5 of this report.

7.2 Test result

Output Power: 0.54dBm (1.1324 mW) < 4W

8 Unwanted radiation

Test requirement: FCC CFR47 Part 95 Section 95.635

Test method: Based on TIA/EIA-603-2004

Limit:

According to 95.635 (b), the power of each unwanted emission shall be less than transmitter power (TP) by at least $43 + 10 \log_{10} (TP)$ dB on any frequency removed from the center of the authorized bandwidth by more than 250%.

Calculation of FCC Limit: $FS - [43 + 10 \log_{10}(TP)]$

Where, TP = measured transmitter power (W); FS = Fundamental field strength (dBuV/m)

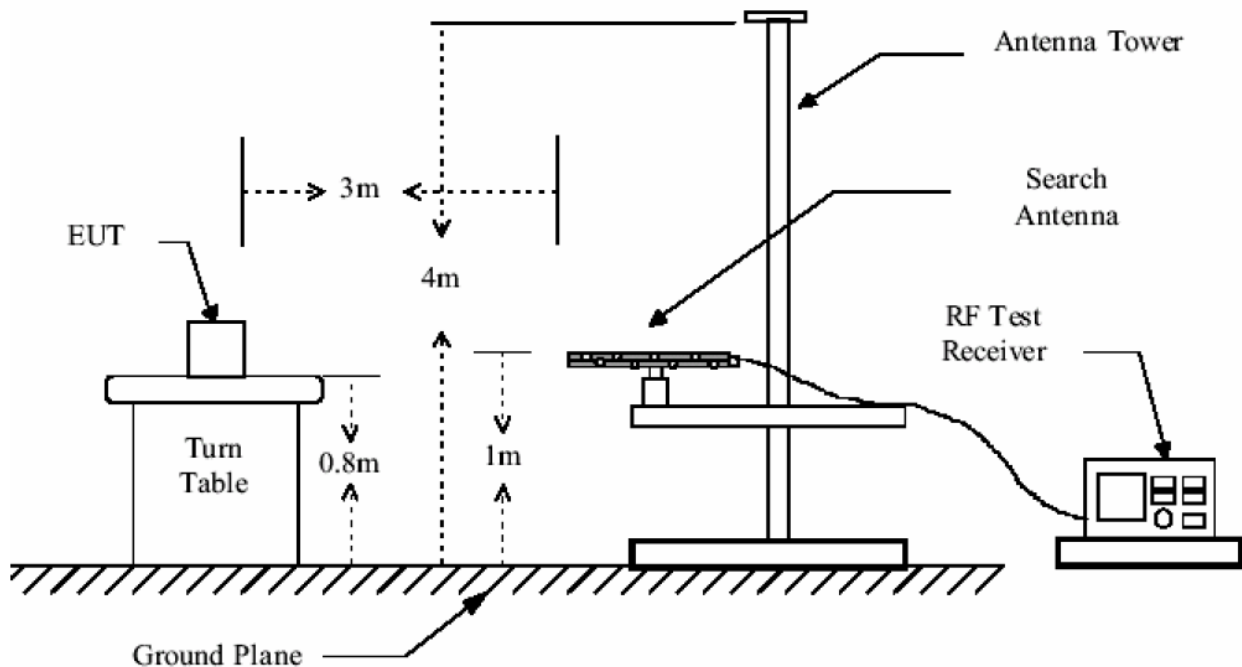
$106.60 \text{ dB}\mu\text{V/m} - [43 + 10 \log_{10}(1.1324\text{mW}/1000)] = 93.06\text{dB}\mu\text{V/m}$

The field strength of the spurious emissions should not exceed 93.06dB μ V/m

8.1 Test Equipment

Please refer to Section 5 of this report.

8.2 Test Setup



8.3 Test Procedure

Below 30MHz

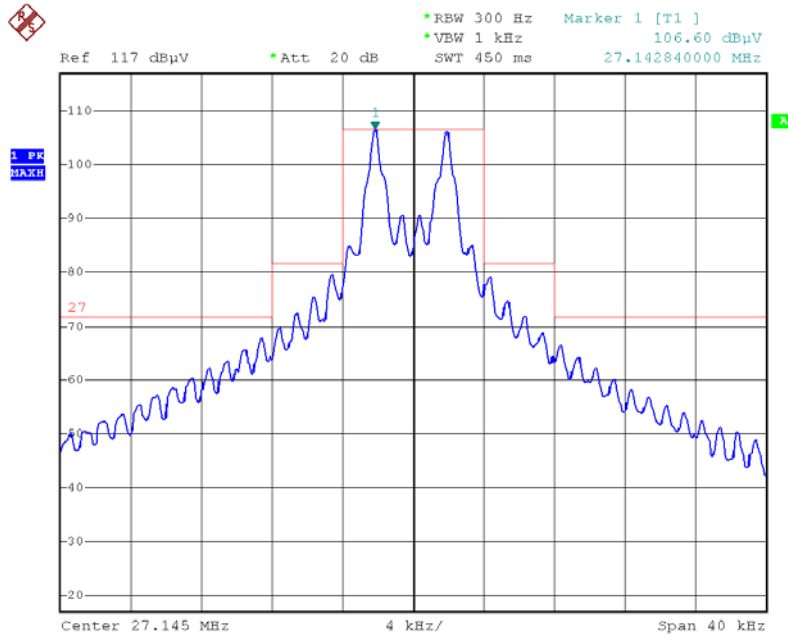
Test Procedure: For testing performed with the loop antenna, testing was performed in accordance to TIA/EIA-603. The center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specied distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

Above 30MHz

The procedure used was TIA/EIA-603. The receive was scanned from 30MHz to 1GHz. When an emission was found, the table was roated to produce the maximum signal strength. An initial pre-scan was performed for in peak detection mode using the receiver. The EUT was measured for both the Horizontal and Vertical polarities and performed a pre-test three orthogonal planes. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. The worst case emissions were reported.

8.4 Test result

Below 30MHz



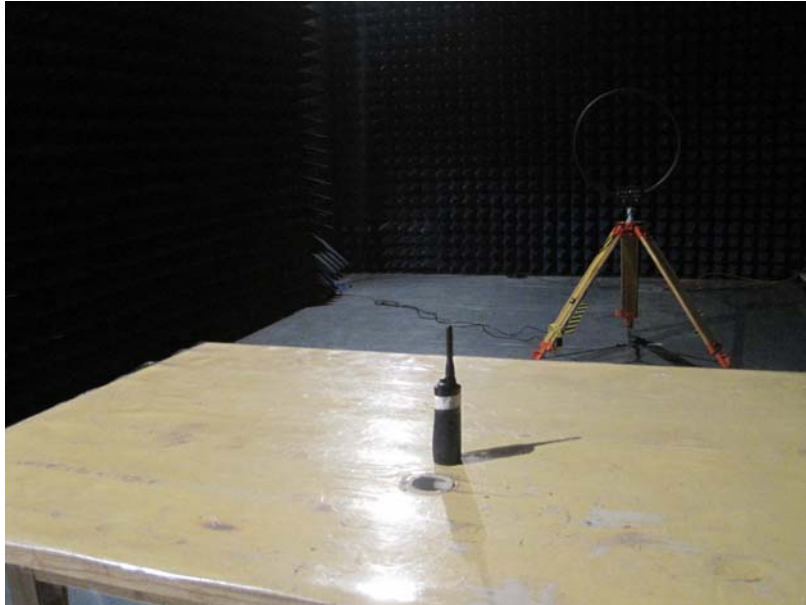
Above 30MHz

The EUT was pretested in charging mode and continuously transmit mode, the worse mode is continuously transmit mode, so the data show in the report is that mode's only.

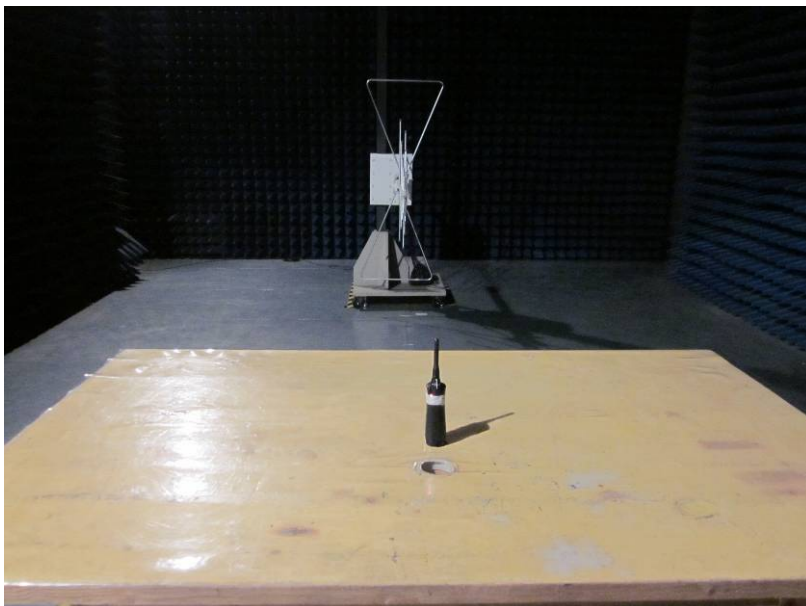
Frequency (MHz)	Detector	Ant. Pol	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
54.2900	Peak	V	51.64	93.06	-41.42	1.3	260
81.4350	Peak	V	42.16	93.06	-50.90	1.5	140
325.7400	Peak	V	35.60	93.06	-57.46	1.0	160
624.3350	Peak	V	47.47	93.06	-45.59	1.2	200
651.4800	Peak	V	48.33	93.06	-44.73	1.4	320
678.6250	Peak	V	48.77	93.06	-44.29	1.7	40
705.7700	Peak	V	48.51	93.06	-44.55	1.6	80
732.9150	Peak	V	48.38	93.06	-44.68	1.1	210
841.4950	Peak	V	43.95	93.06	-49.11	1.0	130
895.7850	Peak	V	45.69	93.06	-47.37	1.5	150
54.2900	Peak	H	40.50	93.06	-52.56	1.8	180
81.4350	Peak	H	24.10	93.06	-68.96	2.3	260
325.7400	Peak	H	47.39	93.06	-45.67	2.1	310
624.3350	Peak	H	25.43	93.06	-67.63	2.4	170
651.4800	Peak	H	33.01	93.06	-60.05	1.9	80
678.6250	Peak	H	34.08	93.06	-58.98	2.0	90
705.7700	Peak	H	34.59	93.06	-58.47	2.1	60
732.9150	Peak	H	35.99	93.06	-57.07	1.6	110
841.4950	Peak	H	37.03	93.06	-56.03	2.2	70
895.7850	Peak	H	39.54	93.06	-53.52	1.8	60

8.5 Photograph – Radiation Emission Test Setup

Below 30MHz



Above 30MHz



9 Emission Bandwidth

Test requirement: FCC CFR47 Part 95 Section 95.633

Test method: Based on TIA/EIA-603-2004

Limit:

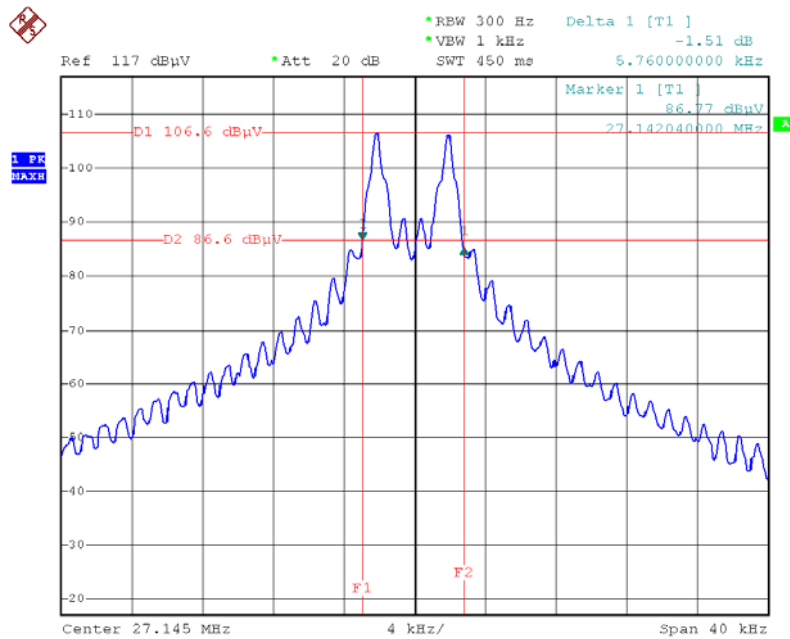
An R/C transmitter is allowed to transmit any appropriate non-voice emission, which meets the emission limitations for an R/C transmitter. The authorized bandwidth for any emission type transmitted by an R/C transmitter is 8kHz.

9.1 Test Equipment

Please refer to Section 5 of this report.

9.2 Test result

Emission Bandwidth = 5.76kHz < 8kHz



10 Frequency Stability

Test requirement: FCC CFR47 Part 95 Section 95.623

Test method: Based on TIA/EIA-603-2004

Limit:

Each R/C transmitter that transmits in the 26 – 27 MHz frequency band with a mean TP of 2.5 W or less and that is used solely by the operator to turn on and/or off a device at a remote location, other than a device used solely to attract attention, must be maintained within a frequency tolerance of 0.01%.

10.1 Test Equipment

Please refer to Section 5 in this report.

10.2 Test Method

(a) at 10 degree intervals of temperatures between -30°C and +50°C at the manufacturer's rated supply voltage, and

(b) at +20°C temperature and $\pm 15\%$ supply voltage variations.

Note, for handheld equipment that is only capable of operating from internal batteries, reduce the primary supply voltage to the battery operating end point. The manufacturer should specify the battery operating endpoint voltage of the equipment.

10.3 Test Result

a) Frequency stability versus environmental temperature

Reference Frequency: 27.145MHz, Limit: 0.01%			
Environment Temperature(°C)	Power Supply (V)	Frequency Deviation measured with time Elapse(30 minutes)	
		MHz	%
50	4.80	27.1437	0.0048
40	4.80	27.1432	0.0066
30	4.80	27.1441	0.0033
20	4.80	27.1454	0.0015
10	4.80	27.1447	0.0011
0	4.80	27.1439	0.0041
-10	4.80	27.1441	0.0033
-20	4.80	27.1431	0.0070
-30	4.80	27.1429	0.0077

b) Frequency stability versus input voltage

% Battery	Environment Temperature (°C)	Frequency Measured	Frequency Tolerance (%)
-15	20	27.1438	0.0044
+15	20	27.1449	0.0003

11 Photographs - Constructional Details

11.1 Product View



11.2 EUT – Appearance View

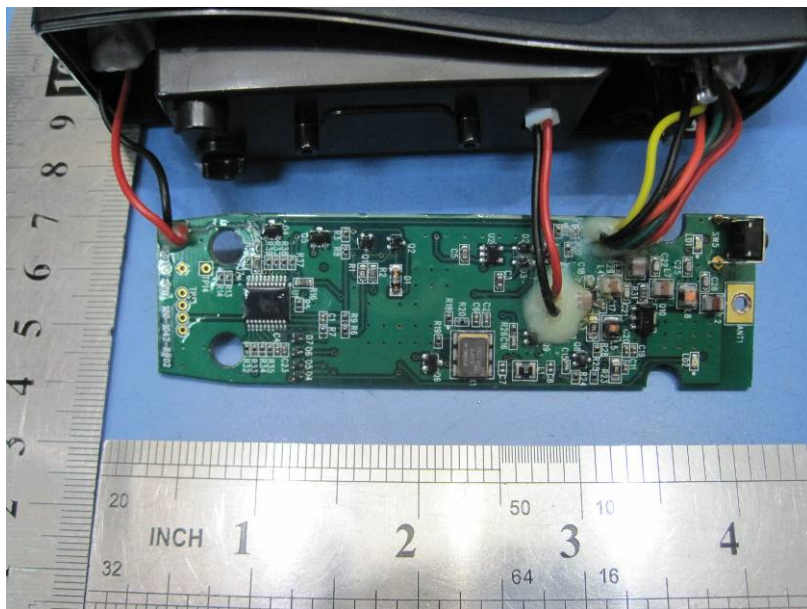
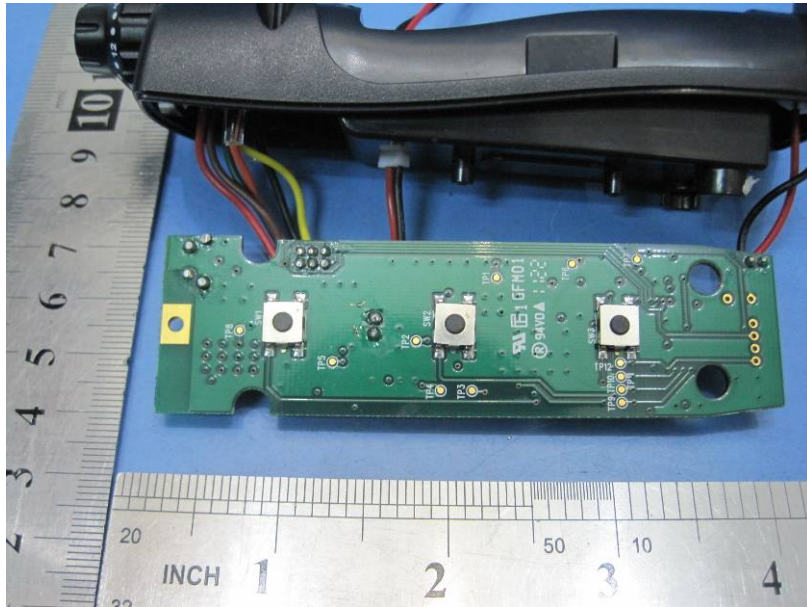




11.3 EUT – Open View



11.4 EUT – PCB View



12 FCC Label

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT
EUT Bottom View/ proposed FCC Label Location

