FCC PART 15.249

MEASUREMENT AND TEST REPORT

FOR

SHENZHEN COLCO MODEL CO., LTD

West building 3, HuangJiangYuan Ind Park QiaoLi North Gate ChangPing

Town Dongguan China

FCC ID: TZMD-EC135

Report Concerns: Original Report	**Equipment Type:** 2.4G 4CH RC Helicopter

Model: D-EC135

Report No.: STR10128167I

Test Date: 2011-01-17 to 2011-03-17

Issue Date: 2011-03-22

Tested By: Seven Song / Engineer

Reviewed By: Lahm Peng / EMC Manager

Approved & Authorized By: Jandy so / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	SHENZHEN COLCO MODEL CO., LTD
Address of applicant:	West building 3, HuangJiangYuan Ind Park QiaoLi North Gate ChangPing Town Dongguan China
Manufacturer:	SHENZHEN COLCO MODEL CO., LTD
Address of manufacturer:	West building 3, HuangJiangYuan Ind Park QiaoLi North Gate ChangPing Town Dongguan China

General Description of E.U.T

Items	Description
EUT Description:	2.4G 4CH RC Helicopter
Trade Name:	COLCO
Model No.:	D-EC135
Rated Voltage:	DC 12V
Frequency Range:	2442 MHz
RF Output Power:	<10 m W
Antenna Type:	Integral Antenna
Size:	19.0X23.0X9.0 cm (Tx)
Comment:	Manual Operation Device
For more information refer to the circuit diagram form and the user's manual.	

The test data is gathered from a production sample, provided by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of the SHENZHEN COLCO MODEL CO., LTD in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which results in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted according to the Operating Instructions and let the EUT keep transmitting.

1.4 Test Facility

- **FCC – Registration No.: 994117**
  SEM.Test Compliance Services 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 and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**
  The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
DC Power Cable	1.2	Unshielded	Without Core
/	/	/	/

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emission	Compliant
§15.205	Restricted Band of Operation	Compliant
§15.209	Radiated Emission	Compliant
§15.249(a)	Field Strength	Compliant
§15.249(d)	Out of Band Emission	Compliant

3. CONDUCTED EMISSIONS

3.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

3.2 Test Equipment List and Details

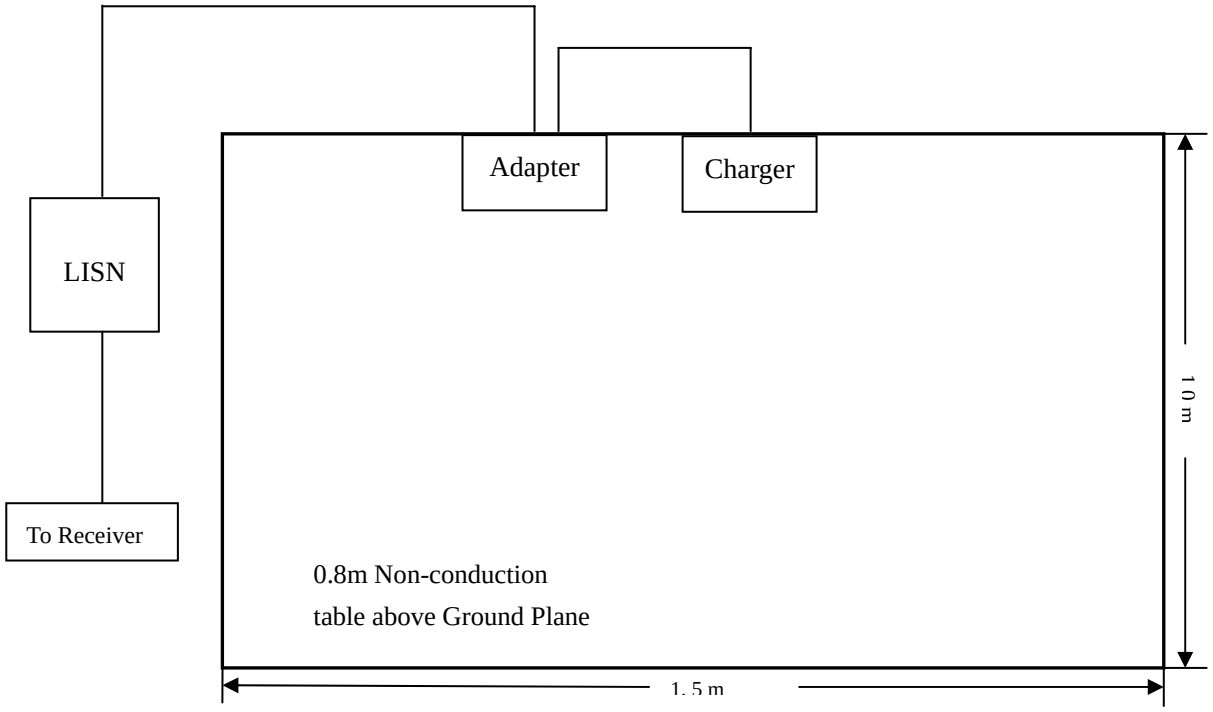
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2010-12-20	2011-12-19
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2010-12-20	2011-12-19
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2010-12-20	2011-12-19

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

3.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2003, 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.

3.4 Basic Test Setup Block Diagram



3.5 Environmental Conditions

Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

3.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-4.8 dBμV at **0.15 MHz** in the **Neutral QP** Detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15.207	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	QP/Ave/Pk	Line/Neutral	dBμV	dB
0.15	61.2	QP	Neutral	66	-4.8
0.15	58.1	QP	Line	66	-8.0
29.98	39.8	AV	Neutral	50	-10.2
23.98	38.2	AV	Line	50	-11.8
0.16	39.3	AV	Neutral	55.46	-16.2
29.98	43.0	QP	Neutral	60	-17.0
0.16	35.4	AV	Line	55.46	-20.0
0.38	38.2	QP	Neutral	58.28	-20.1
0.24	31.1	AV	Line	52.1	-21.0
0.38	36.8	QP	Line	58.28	-21.4
0.71	21.9	AV	Neutral	46	-24.1

Plot of Conducted Emissions Test Data

Conducted Disturbance

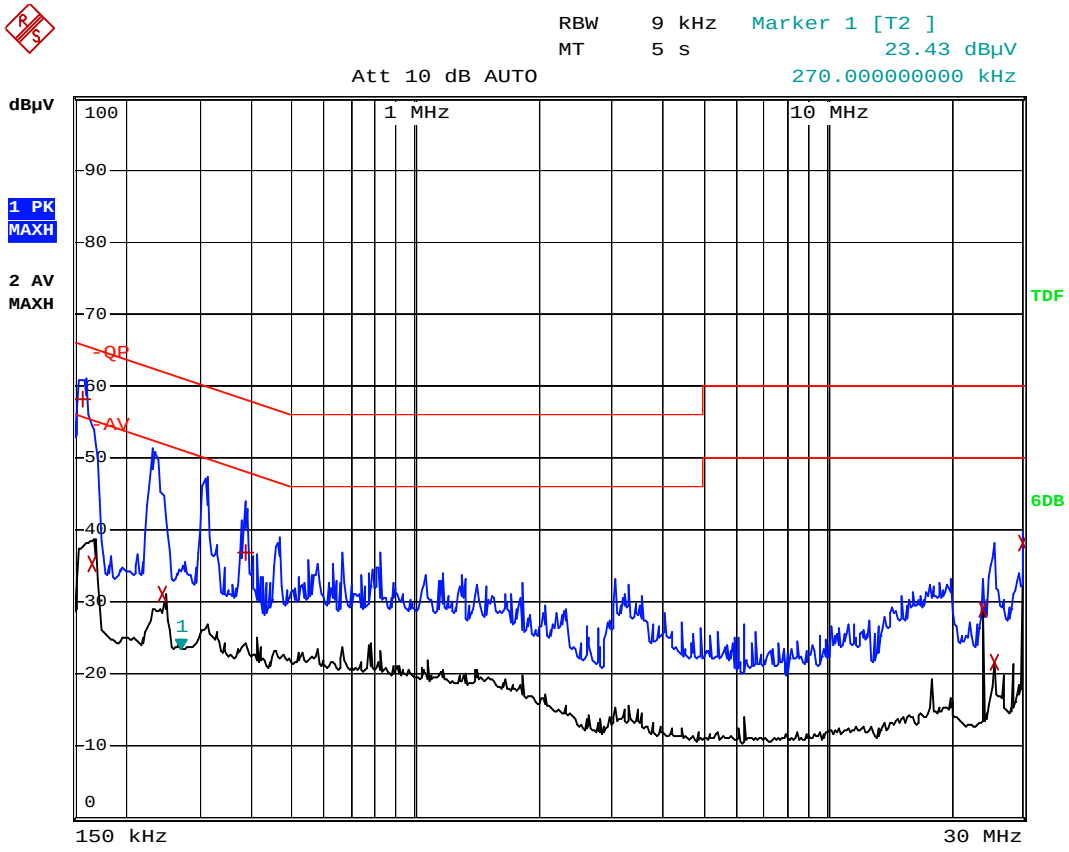
EUT: 2.4G 4CH RC Helicopter

M/N: D-EC135

Operating Condition: Power supply

Test Specification: N

Comment: AC 120V/60Hz/DC 12V



Plot of Conducted Emissions Test Data

Conducted Disturbance

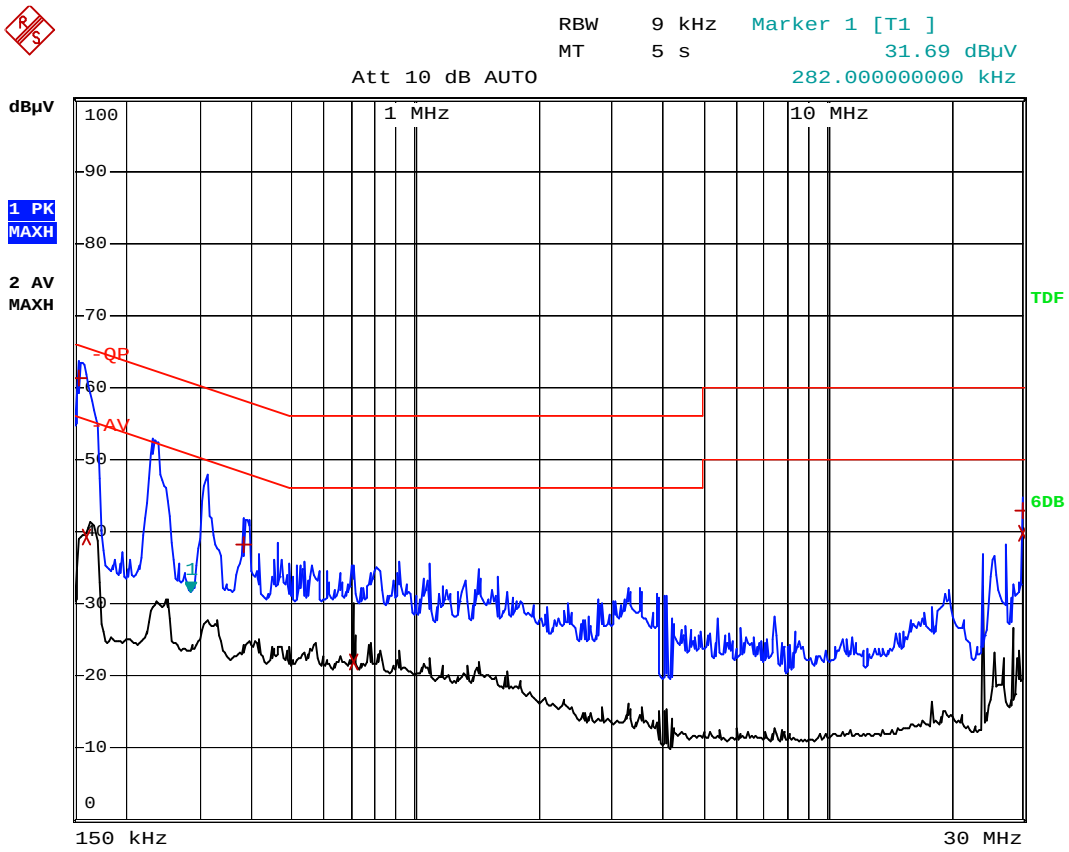
EUT: 2.4G 4CH RC Helicopter

M/N: D-EC135

Operating Condition: Power supply

Test Specification: L

Comment: AC 120V/60Hz/DC 12V



4. §15.203 - ANTENNA REQUIREMENT

4.1 Standard Applicable

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

4.2 Test Result

This product has an integral antenna, fulfill the requirement of this section.

5. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

5.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.10 dB.

5.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (milli-volts/meter)	Field strength of fundamental (micro-volts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209,WHICHEVER IS THE LESSER ATTENUATION.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

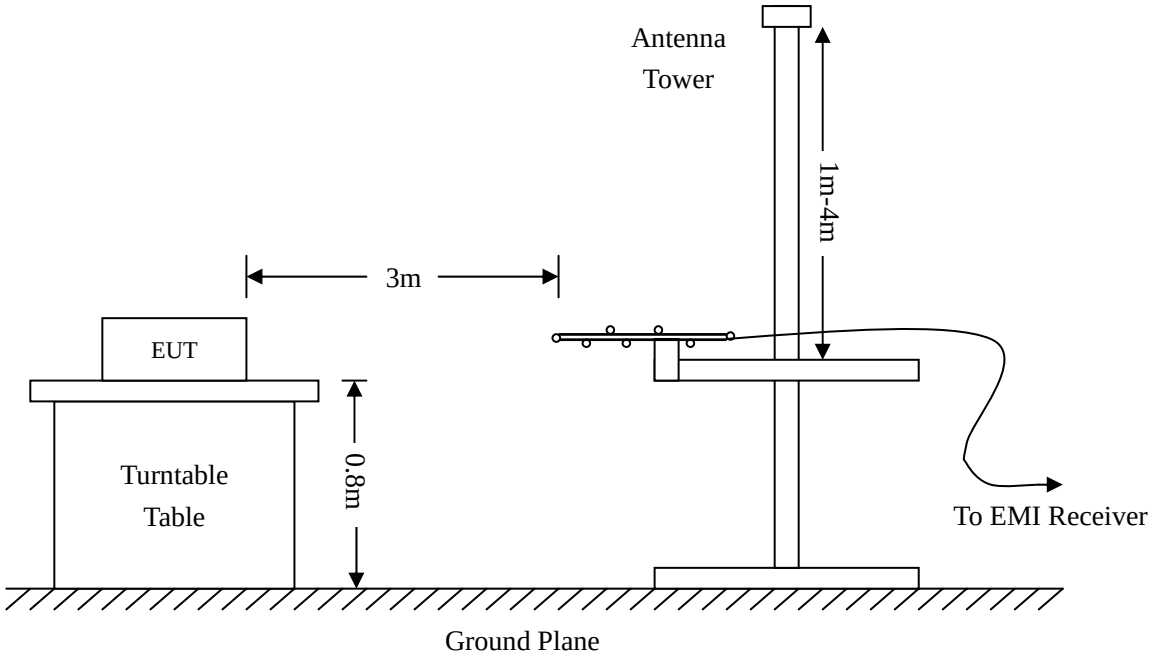
5.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.
The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.
The spacing between the peripherals was 10 cm.



5.5 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

5.6 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

5.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

-19.43 dBμV at **99.5281 MHz** in the **Horizontal** polarization, **30 MHz to 1 GHz (Power Supply Mode), 3Meters**

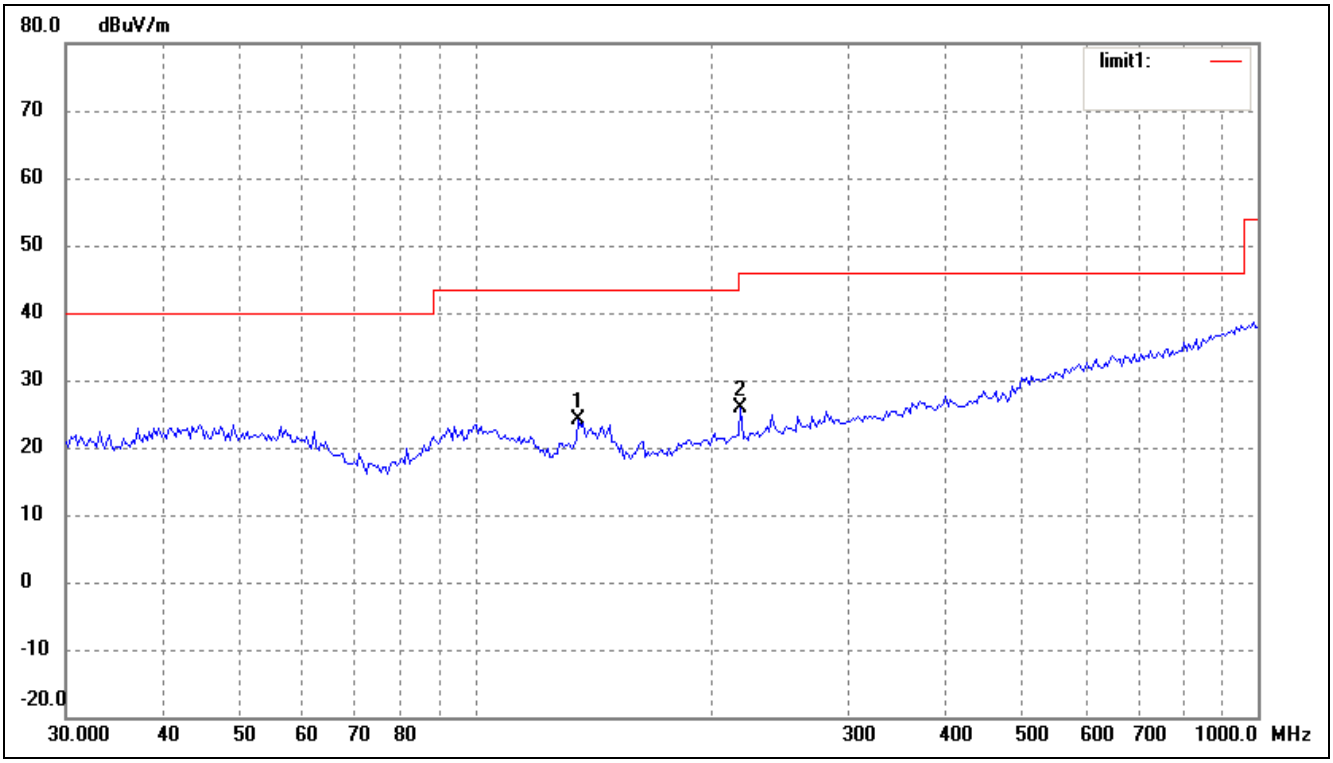
-3.8 dBμV at **4884.00 MHz** in the **Vertical** polarization, **30 MHz to 25 GHz(Transmitting Mode), 3Meters**

Note: *this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*

Plot of Radiation Emissions Test

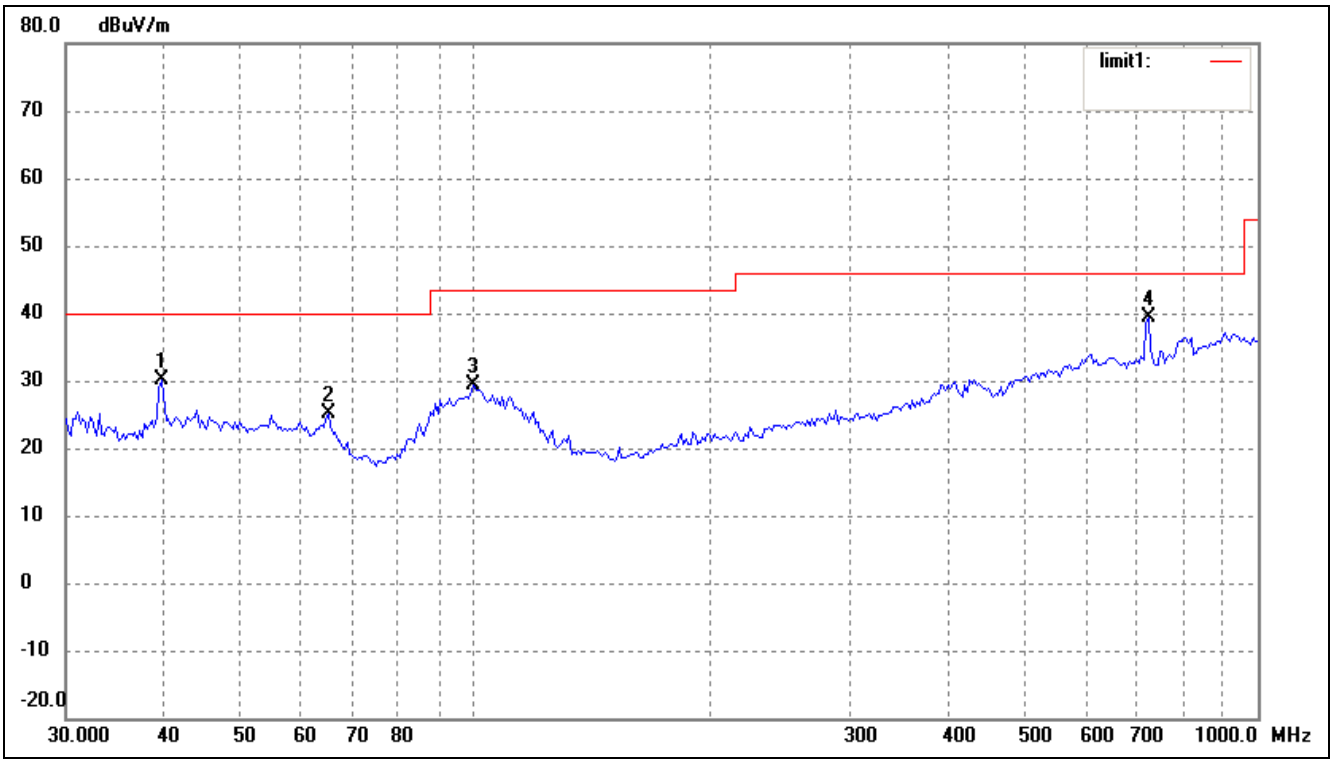
Radiated Disturbance
EUT: 2.4G 4CH RC Helicopter
M/N: D-EC135
Operating Condition: Power supply
Test Specification: Horizontal & Vertical

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	135.5062	19.82	4.24	24.06	43.50	-19.44	360	100	peak
2	218.3085	18.57	7.23	25.80	46.00	-20.20	134	100	peak

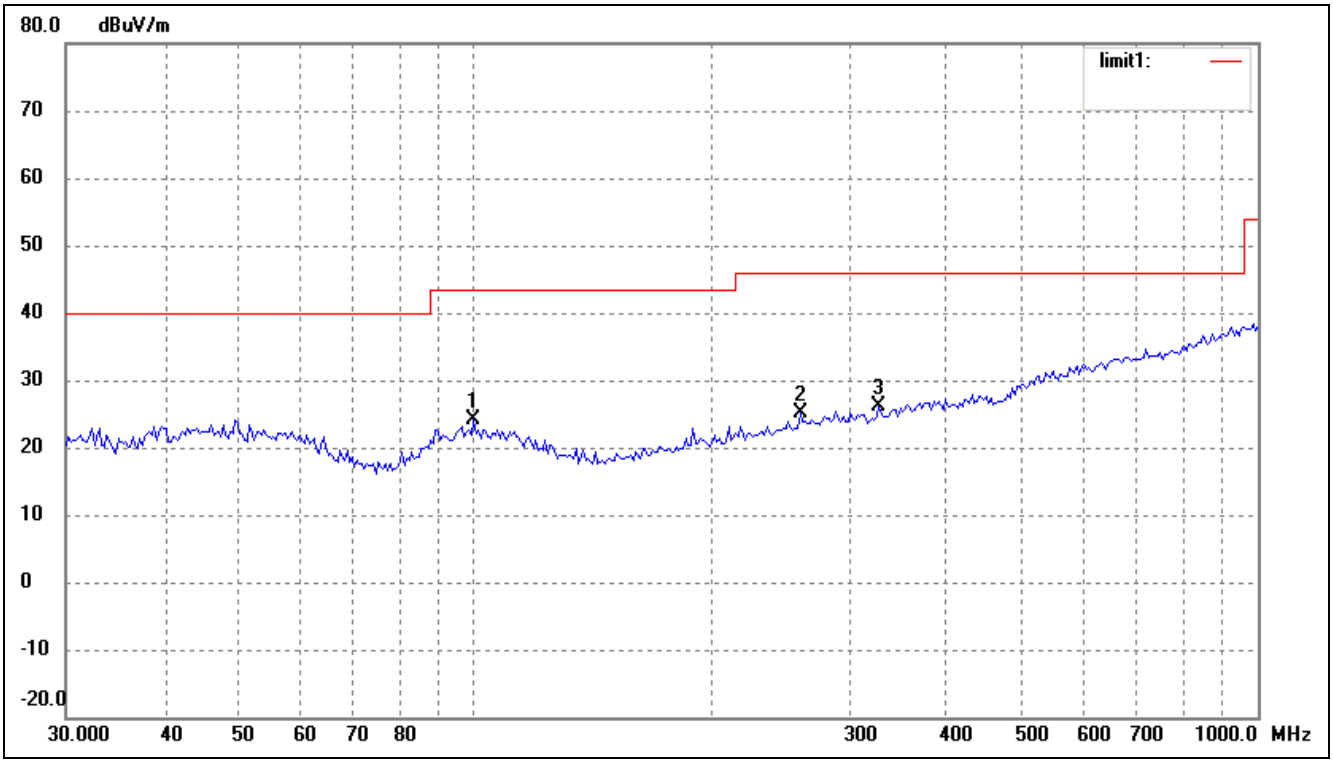
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	39.7146	22.29	7.86	30.15	40.00	-9.85	225	100	peak
2	64.8864	19.86	5.25	25.11	40.00	-14.89	132	100	peak
3	99.5279	21.58	7.78	29.36	43.50	-14.14	260	100	peak
4	724.2611	23.26	16.02	39.28	46.00	-6.72	187	100	peak

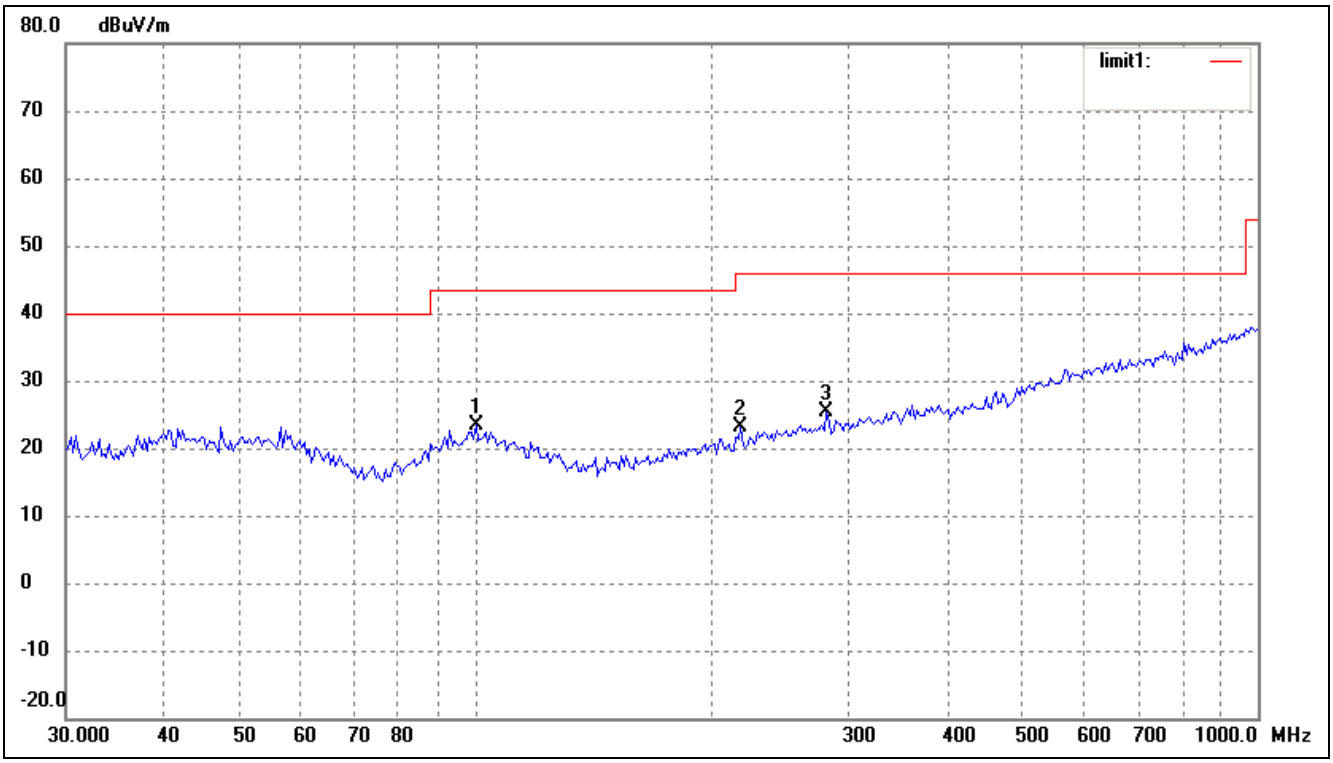
Radiated Disturbance
EUT: 2.4G 4CH RC Helicopter
M/N: D-EC135
Operating Condition: Transmitting
Test Specification: Horizontal & Vertical

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	99.5281	15.67	8.40	24.07	43.50	-19.43	135	100	peak
2	260.1444	16.14	8.95	25.09	46.00	-20.91	227	100	peak
3	327.8873	16.07	10.17	26.24	46.00	-19.76	146	200	peak

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	100.2286	14.93	8.41	23.34	43.50	-20.16	240	100	peak
2	218.3085	16.02	7.23	23.25	46.00	-22.75	136	100	peak
3	281.0075	15.90	9.53	25.43	46.00	-20.57	220	100	peak

Spurious Emission Above 1GHz

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
4884.00	AV	43.9	65	V	34.1	5.2	33	50.2	54	-3.8
4884.00	AV	40.0	138	H	34.1	5.2	33	46.3	54	-7.7
4884.00	PK	49.3	246	V	34.1	5.2	33	55.6	74	-18.4
4884.00	PK	44.5	155	H	34.1	5.2	33	50.8	74	-23.2
7326.00	AV	39.6	290	V	37.4	6.1	33.5	49.6	54	-4.4
7326.00	AV	35.8	137	H	37.4	6.1	33.5	45.8	54	-8.2
7326.00	PK	43.0	77	V	37.4	6.1	33.5	53.0	74	-21.0
7326.00	PK	40.3	217	H	37.4	6.1	33.5	50.3	74	-23.7
2442.00	AV	82.9	233	V	29.1	3.7	34	81.7	94	-12.3
2442.00	AV	83.1	134	H	29.1	3.7	34	81.9	94	-12.1
2442.00	PK	87.6	164	V	29.1	3.7	34	86.4	114	-27.6
2442.00	PK	88.1	159	H	29.1	3.7	34	86.9	114	-27.1

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4. Emissions 20dB lower than the limit are not reported.

6. §15.249(b) OUT OF BAND EMISSIONS

6.1 Standard Applicable

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.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, than mark the higher-level emission for comparing with the FCC rules.

6.4 Environmental Conditions

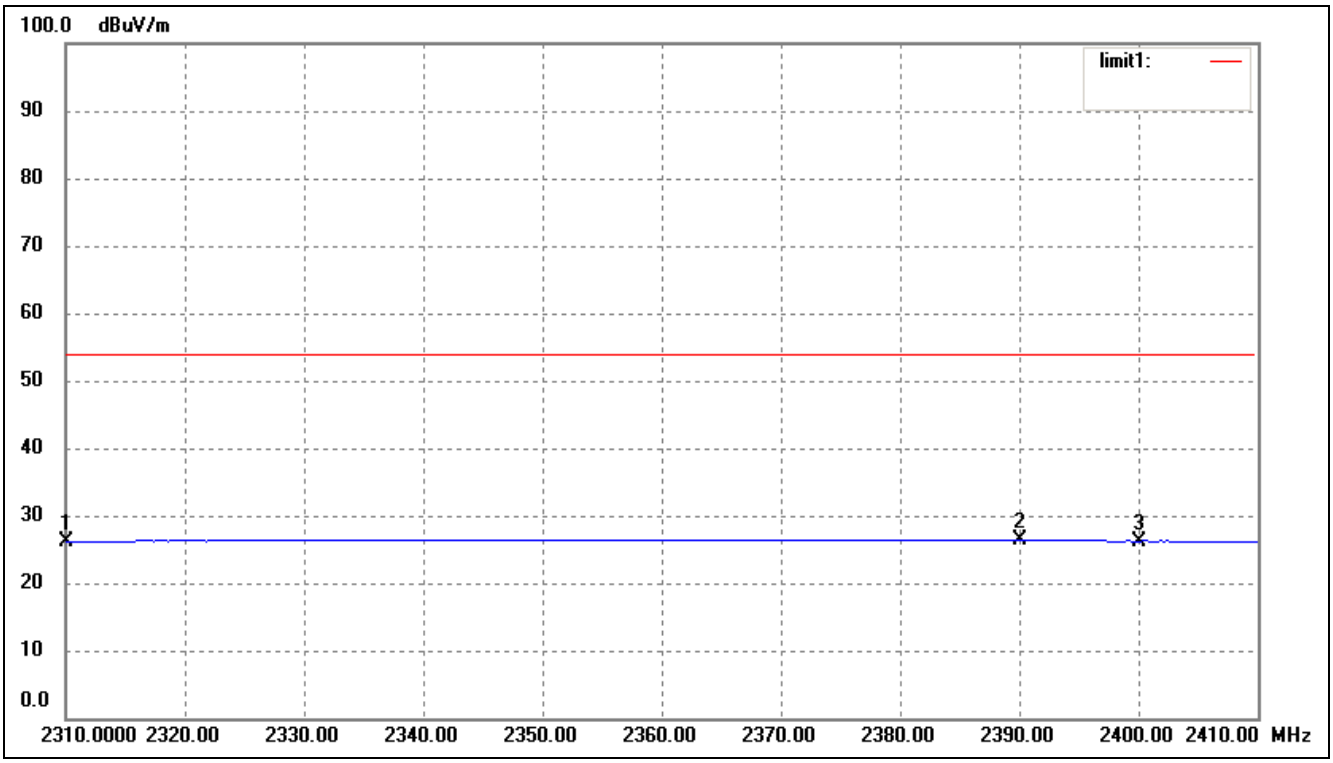
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

6.5 Summary of Test Results/Plots

Frequency MHz	Limit dBuv	Result
Low Edge	<54	Pass
High Edge	<54	Pass

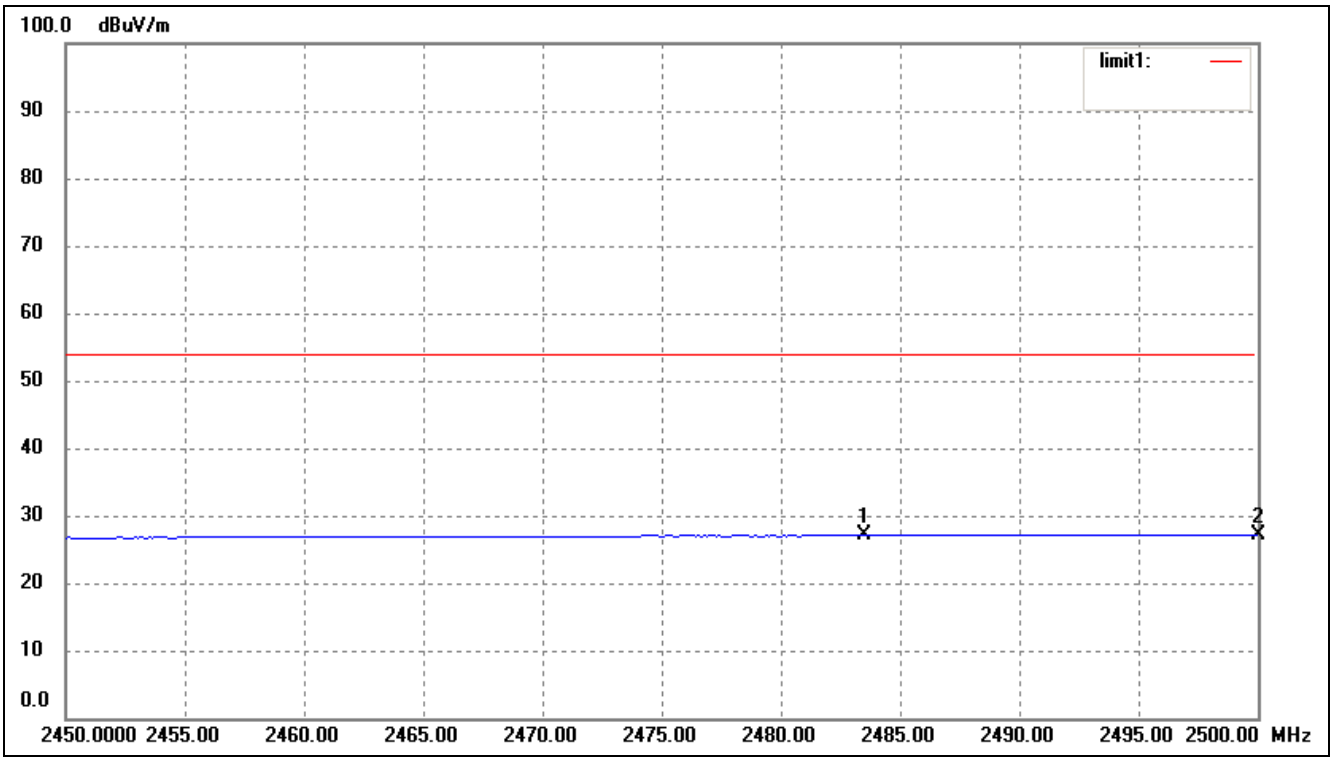
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	30.80	-4.65	26.15	54.00	-27.85	Ave Detector
	2310.000	41.90	-4.65	37.25	74.00	-36.75	Peak Detector
2	2390.000	30.80	-4.46	26.34	54.00	-27.66	Ave Detector
	2390.000	40.92	-4.46	36.46	74.00	-37.54	Peak Detector
3	2400.000	30.67	-4.43	26.24	54.00	-27.76	Ave Detector
	2400.000	39.61	-4.43	35.18	74.00	-38.82	Peak Detector

Highest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	31.29	-4.23	27.06	54.00	-26.94	Ave Detector
	2483.500	41.44	-4.23	37.21	74.00	-36.79	Peak Detector
2	2500.000	31.36	-4.18	27.18	54.00	-26.82	Ave Detector
	2500.000	40.72	-4.18	36.54	74.00	-37.46	Peak Detector

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