

FCC PART 15.249
MEASUREMENT AND TEST REPORT
FOR
SHEN ZHEN WFLY TECHNOLOGY DEVELOPMENT
CO., LTD.

Flat 618-619, 6/F Chuangye Building No.1 Qilin Road, Nanshan District,
Shenzhen, P.R. China

FCC ID: TZVWFT06II

Report Concerns: Original Report	Equipment Type: RADIO CONTROL SYSTEM
Model:	<u>WFT06 II</u>
Report No.:	<u>STR11068170I</u>
Test Date:	<u>2011-06-18 to 2011-07-20</u>
Issue Date:	<u>2011-07-20</u>
Tested By:	<u>Silin Chen / Engineer</u> <i>Silin chen</i>
Reviewed By:	<u>Lahm Peng / EMC Manager</u> <i>Lahm peng</i>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u> <i>Jandyso</i>
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: SHEN ZHEN WFLY TECHNOLOGY DEVELOPMENT CO., LTD.

Address of applicant: Flat 618-619, 6/F Chuangye Building No.1 Qilin Road, Nanshan District, Shenzhen, P.R. China

Manufacturer: SHEN ZHEN WFLY TECHNOLOGY DEVELOPMENT CO., LTD.

Address of manufacturer: Flat 618-619, 6/F Chuangye Building No.1 Qilin Road, Nanshan District, Shenzhen, P.R. China

General Description of E.U.T

Items	Description
EUT Description:	RADIO CONTROL SYSTEM
Trade Name:	WFLY
Model No.:	WFT06 II
Rated Voltage:	DC 4.8V
Rated Current:	200 mA
Frequency Range:	2411MHz~2469MHz
Antenna Type:	Integral Antenna
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 SHEN ZHEN WFLY TECHNOLOGY DEVELOPMENT 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
N/A	N/A	N/A	N/A

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
N/A	N/A	N/A	N/A

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emission	N/A
§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. §15.203 - ANTENNA REQUIREMENT

3.1 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.

3.2 Test Result

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

4. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

4.1 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.

4.2 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.

4.3 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

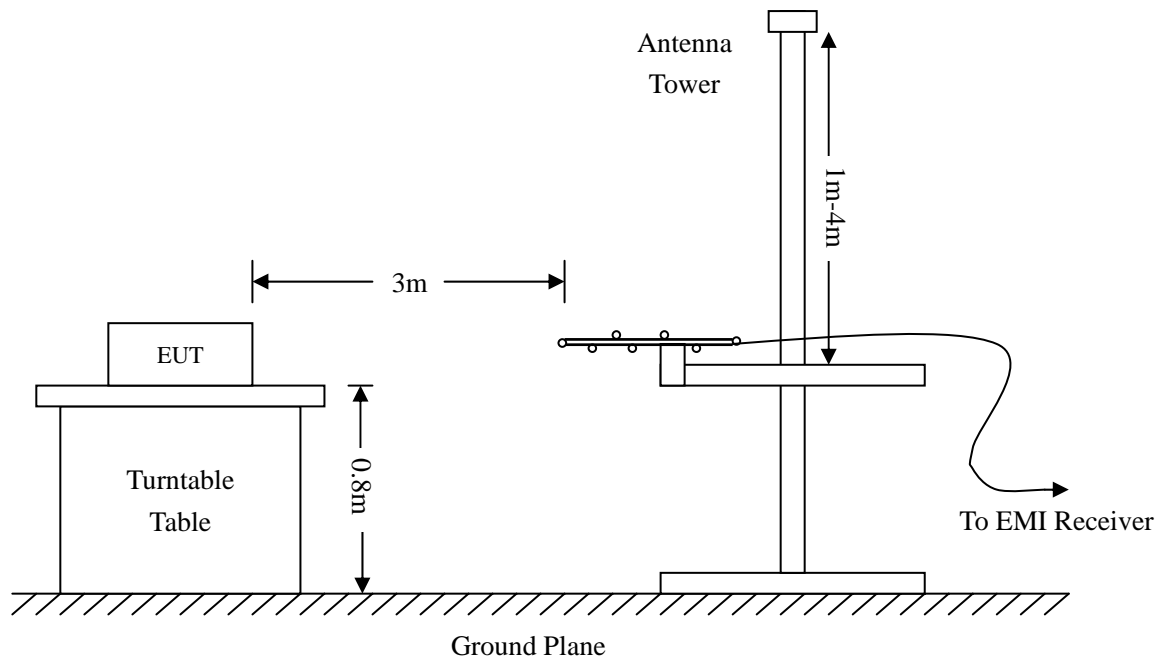
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.4 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 15.249(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.



4.5 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

4.6 Environmental Conditions

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

4.7 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:

-4.4 dB μ V at 4822.0 MHz in the Vertical polarization, Low Channel, 30 MHz to 25 GHz, 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: RADIO CONTROL SYSTEM

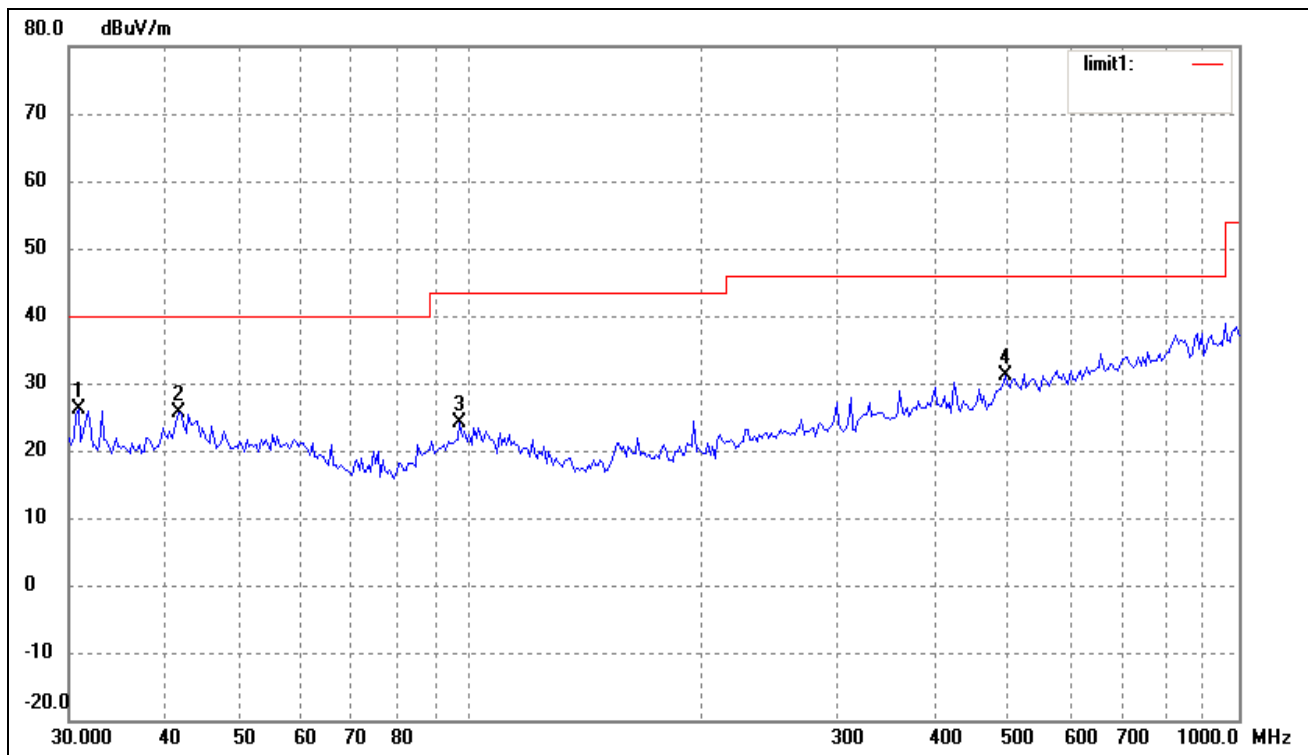
M/N: WFT06 II

Operating Condition: Transmitting Low Channel (2411MHz)

EUT Places: Standing

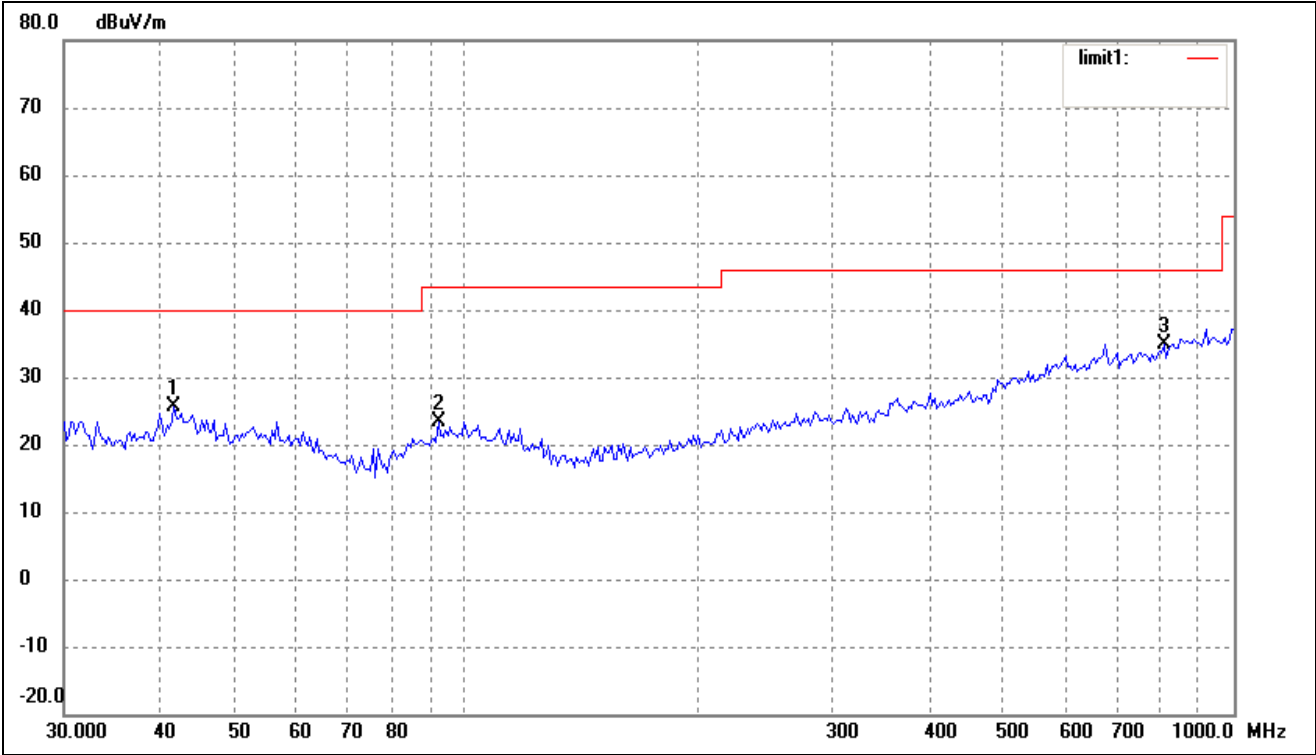
Test Specification: Horizontal & Vertical

Horizontal:

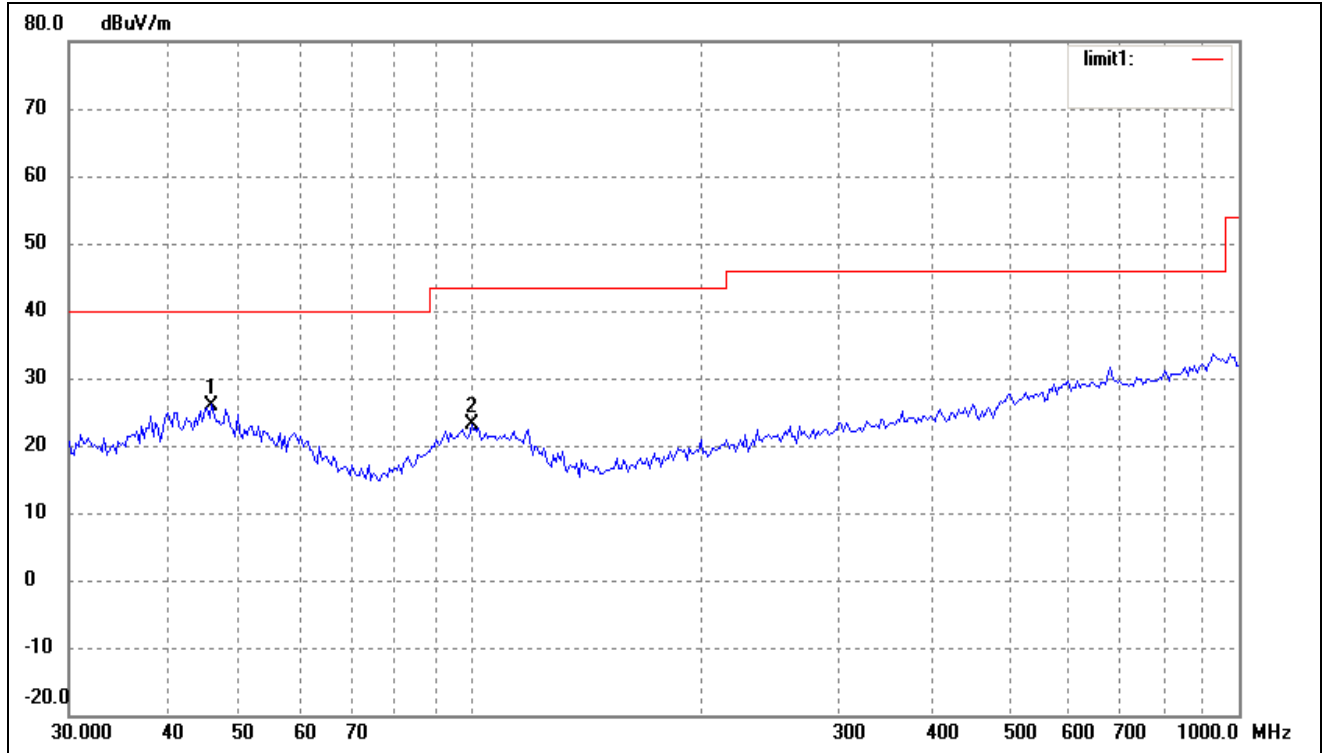


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	30.8535	19.40	6.77	26.17	40.00	-13.83	360	100	peak
2	41.7130	17.55	8.17	25.72	40.00	-14.28	360	100	peak
3	96.7749	16.04	8.19	24.23	43.50	-19.27	360	100	peak
4	495.9344	17.10	14.01	31.11	46.00	-14.89	360	100	peak

Vertical:

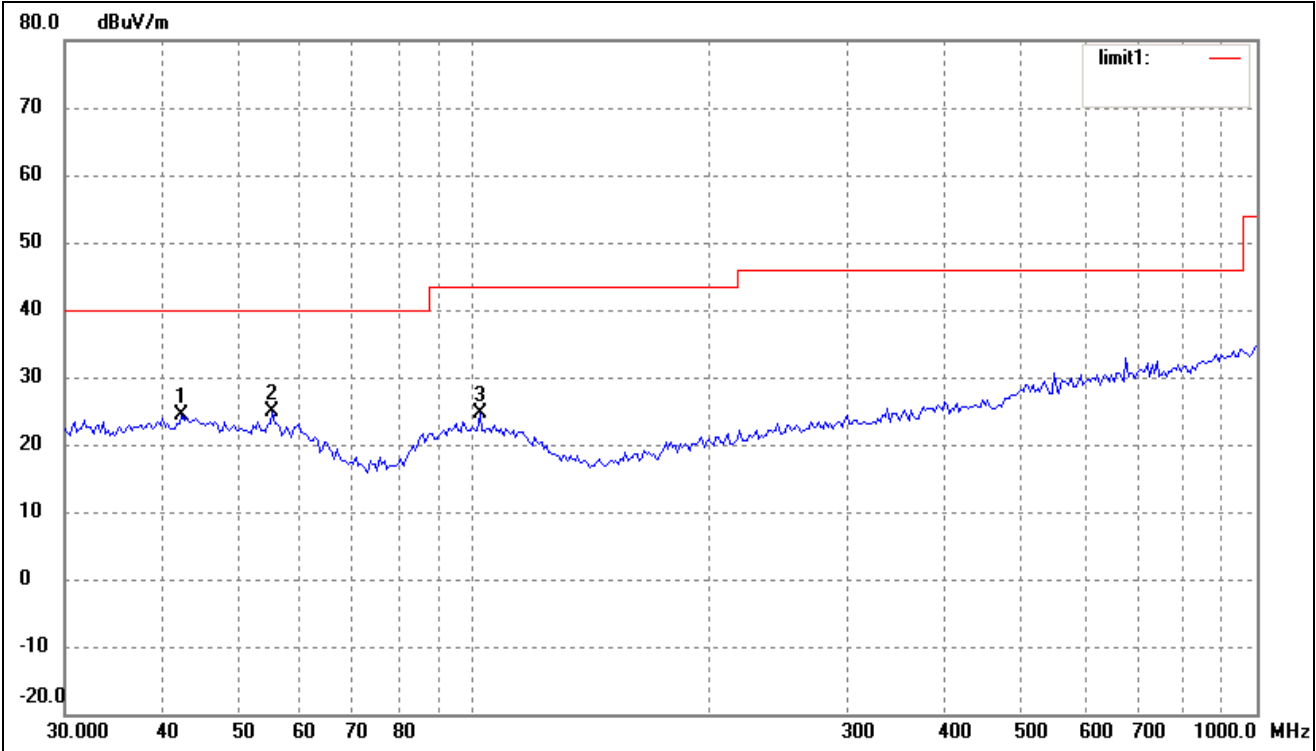


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	41.7130	17.43	8.17	25.60	40.00	-14.40	360	100	peak
2	92.1388	15.89	7.50	23.39	43.50	-20.11	360	100	peak
3	810.2654	15.78	19.20	34.98	46.00	-11.02	360	100	peak

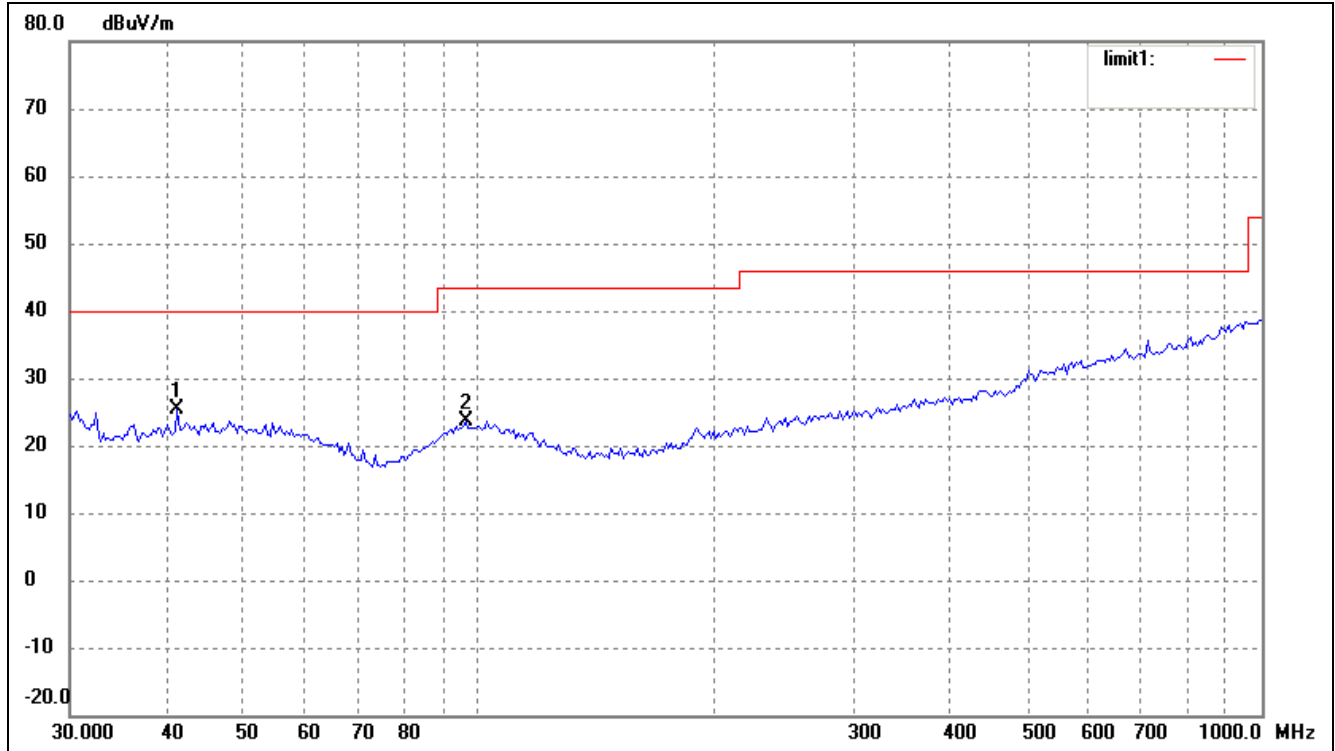
Plot of Radiation Emissions Test*Radiated Disturbance**EUT: RADIO CONTROL SYSTEM**M/N: WFT06 II**Operating Condition: Transmitting Low Channel (2441MHz)**EUT Places: Standing**Test Specification: Horizontal & Vertical**Horizontal:*

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	46.0164	18.07	7.93	26.00	40.00	-14.00	359	200	peak
2	100.2286	15.23	7.79	23.02	43.50	-20.48	359	200	peak

Vertical:

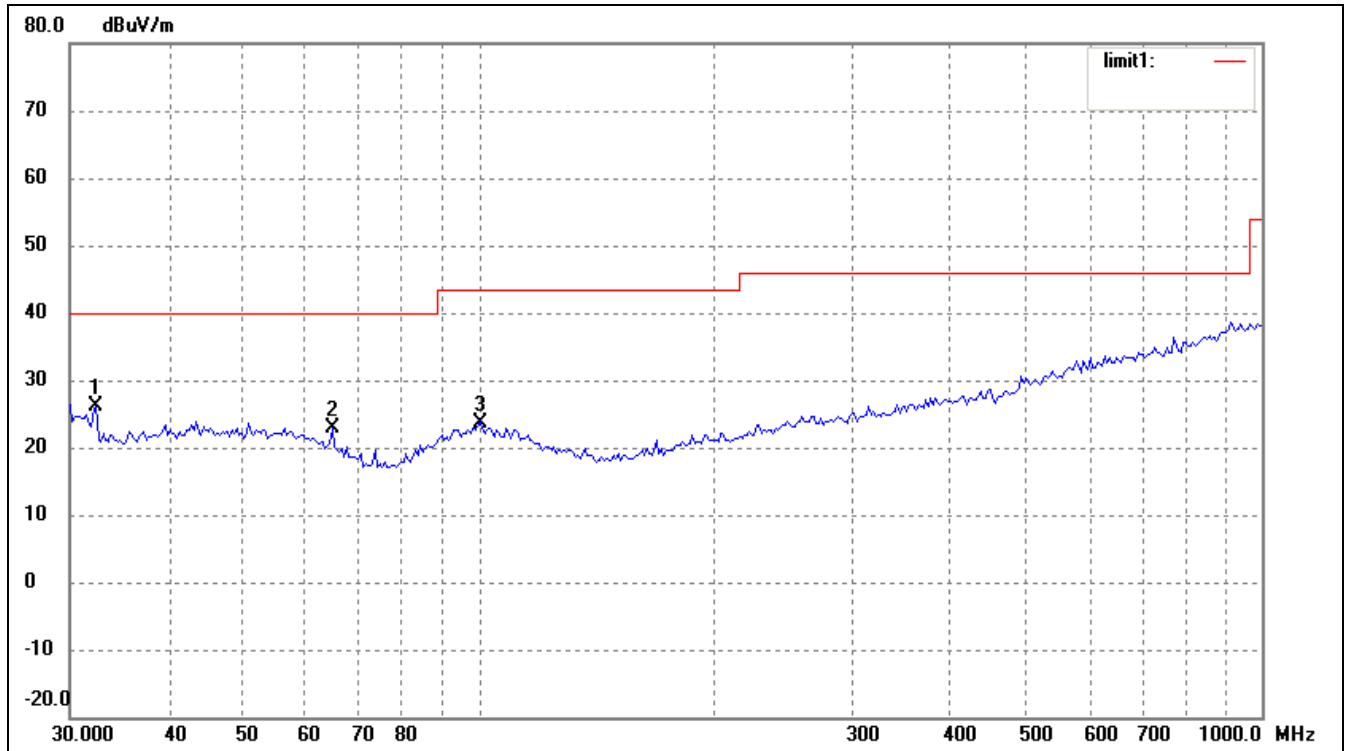


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	42.3022	16.40	7.96	24.36	40.00	-15.64	359	100	peak
2	55.2207	17.40	7.45	24.85	40.00	-15.15	359	100	peak
3	101.6443	16.84	7.67	24.51	43.50	-18.99	359	100	peak

Plot of Radiation Emissions Test*Radiated Disturbance**EUT: RADIO CONTROL SYSTEM**M/N: WFT06 II**Operating Condition: Transmitting High Channel (2469MHz)**EUT Places: Standing**Test Specification: Horizontal & Vertical**Horizontal:*

No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	41.1320	17.26	8.16	25.42	40.00	-14.58	359	200	peak
2	96.0986	15.50	8.14	23.64	43.50	-19.86	359	200	peak

Vertical:



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.4059	19.34	6.77	26.11	40.00	-13.89	359	100	peak
2	64.8865	17.35	5.63	22.98	40.00	-17.02	46	100	peak
3	100.2286	15.34	8.41	23.75	43.50	-19.75	189	100	peak

*Spurious Emission Above 1GHz**EUT Places: Standing*

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
Low Channel (2411MHz)										
4822.0	AV	40.0	57	H	34.1	5.2	33.0	46.25	54	-7.8
4822.0	AV	43.3	35	V	34.1	5.2	33.0	49.64	54	-4.4
4822.0	PK	49.6	65	H	34.1	5.2	33.0	55.93	74	-18.1
4822.0	PK	59.8	98	V	34.1	5.2	33.0	66.07	74	-7.9
7233.0	AV	36.0	60	H	37.4	6.1	33.5	46.01	54	-8.0
7233.0	AV	39.1	79	V	37.4	6.1	33.5	47.13	54	-6.9
7233.0	PK	45.4	256	H	37.4	6.1	33.5	55.35	74	-18.7
7233.0	PK	54.8	185	V	37.4	6.1	33.5	57.75	74	-16.3
2411.0	AV	58.3	45	H	29.1	3.7	34.0	57.12	94	-36.9
2411.0	AV	63.7	359	V	29.1	3.7	34.0	62.53	94	-31.5
2411.0	PK	93.2	78	H	29.1	3.7	34.0	91.99	114	-22.0
2411.0	PK	106.2	44	V	29.1	3.7	34.0	105.03	114	-9.0
Middle Channel (2441MHz)										
4882.0	AV	40	24	H	34.1	5.2	33	45.89	54	-8.1
4882.0	AV	43.3	341	V	34.1	5.2	33	47.68	54	-6.3
4882.0	PK	49.6	177	H	34.1	5.2	33	55.63	74	-18.4
4882.0	PK	59.8	28	V	34.1	5.2	33	64.75	74	-9.3
7323.0	AV	36	325	H	37.4	6.1	33.5	47.12	54	-6.9
7323.0	AV	39.1	91	V	37.4	6.1	33.5	46.14	54	-7.9
7323.0	PK	45.4	77	H	37.4	6.1	33.5	51.15	74	-22.9
7323.0	PK	54.8	267	V	37.4	6.1	33.5	56.10	74	-17.9
2441.0	AV	58.3	33	H	29.1	3.7	34.0	55.21	94	-38.8
2441.0	AV	63.7	34	V	29.1	3.7	34.0	62.00	94	-32.0
2441.0	PK	93.2	164	H	29.1	3.7	34.0	89.92	114	-24.1
2441.0	PK	106.2	159	V	29.1	3.7	34.0	104.55	114	-9.5

High Channel (2469MHz)										
4938.0	AV	40	17	H	34.1	5.2	33.0	45.88	54	-8.1
4938.0	AV	43.3	13	V	34.1	5.2	33.0	47.67	54	-6.3
4938.0	PK	49.6	50	H	34.1	5.2	33.0	55.46	74	-18.5
4938.0	PK	59.8	59	V	34.1	5.2	33.0	63.49	74	-10.5
7407.0	AV	36	355	H	37.4	6.1	33.5	46.54	54	-7.5
7407.0	AV	39.1	66	V	37.4	6.1	33.5	44.18	54	-9.8
7407.0	PK	45.4	269	H	37.4	6.1	33.5	51.10	74	-22.9
7407.0	PK	54.8	64	V	37.4	6.1	33.5	55.12	74	-18.9
2469.0	AV	58.3	63	H	29.1	3.7	34.0	54.65	94	-39.4
2469.0	AV	63.7	85	V	29.1	3.7	34.0	61.32	94	-32.7
2469.0	PK	93.2	85	H	29.1	3.7	34.0	88.79	114	-25.2
2469.0	PK	106.2	55	V	29.1	3.7	34.0	102.33	114	-11.7

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.

Field strength of the fundamental (EUT Places: Lie and Side)

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
EUT Places: Lie										
2411.0	AV	60.6	0	H	29.1	3.7	34.0	59.4	94	-34.6
2411.0	AV	55.5	0	V	29.1	3.7	34.0	54.3	94	-39.7
2411.0	PK	103.8	0	H	29.1	3.7	34.0	102.6	114	-11.4
2411.0	PK	90	0	V	29.1	3.7	34.0	88.8	114	-25.2
2441.0	AV	58.5	0	H	29.1	3.7	34.0	57.3	94	-36.7
2441.0	AV	52.9	0	V	29.1	3.7	34.0	51.7	94	-42.3
2441.0	PK	101.3	0	H	29.1	3.7	34.0	100.1	114	-13.9
2441.0	PK	85.6	0	V	29.1	3.7	34.0	84.4	114	-29.6
2469.0	AV	58.9	0	H	29.1	3.7	34.0	57.7	94	-36.3
2469.0	AV	51.4	0	V	29.1	3.7	34.0	50.2	94	-43.8
2469.0	PK	100.3	0	H	29.1	3.7	34.0	99.1	114	-14.9
2469.0	PK	86.8	0	V	29.1	3.7	34.0	85.6	114	-28.4
EUT Places: Side										
2411.0	AV	60.4	0	H	29.1	3.7	34.0	59.2	94	-34.8
2411.0	AV	56	0	V	29.1	3.7	34.0	54.8	94	-39.2
2411.0	PK	104.4	0	H	29.1	3.7	34.0	103.2	114	-10.8
2411.0	PK	90.6	0	V	29.1	3.7	34.0	89.4	114	-24.6
2441.0	AV	59.7	0	H	29.1	3.7	34.0	58.5	94	-35.5
2441.0	AV	52.5	0	V	29.1	3.7	34.0	51.3	94	-42.7
2441.0	PK	102	0	H	29.1	3.7	34.0	100.8	114	-13.2
2441.0	PK	85.5	0	V	29.1	3.7	34.0	84.3	114	-29.7
2469.0	AV	59.3	0	H	29.1	3.7	34.0	58.1	94	-35.9
2469.0	AV	51.7	0	V	29.1	3.7	34.0	50.5	94	-43.5
2469.0	PK	100.7	0	H	29.1	3.7	34.0	99.5	114	-14.5
2469.0	PK	87.1	0	V	29.1	3.7	34.0	85.9	114	-28.1

5. §15.249(b) OUT OF BAND EMISSIONS

5.1 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.

5.2 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.

5.3 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.

5.4 Environmental Conditions

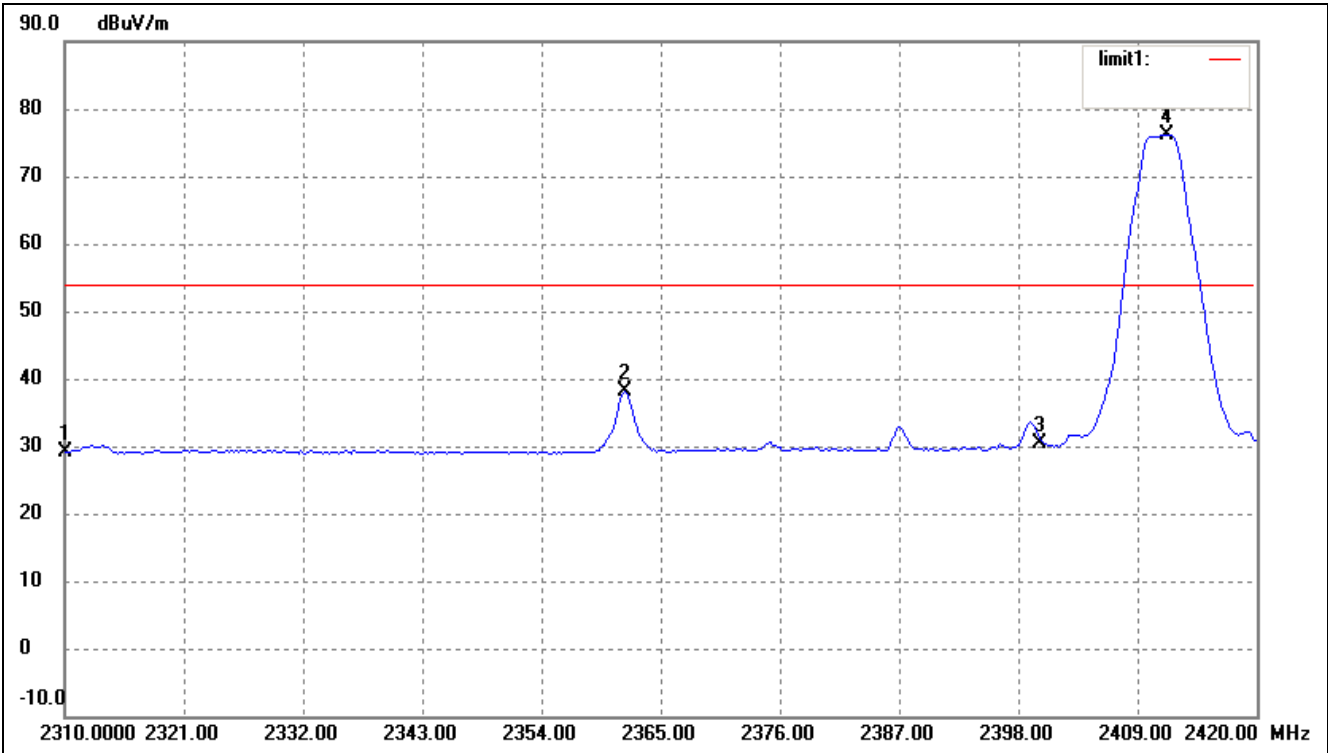
Temperature:	24 °C
Relative Humidity:	60 %
ATM Pressure:	1012 mbar

5.5 Summary of Test Results/Plots

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

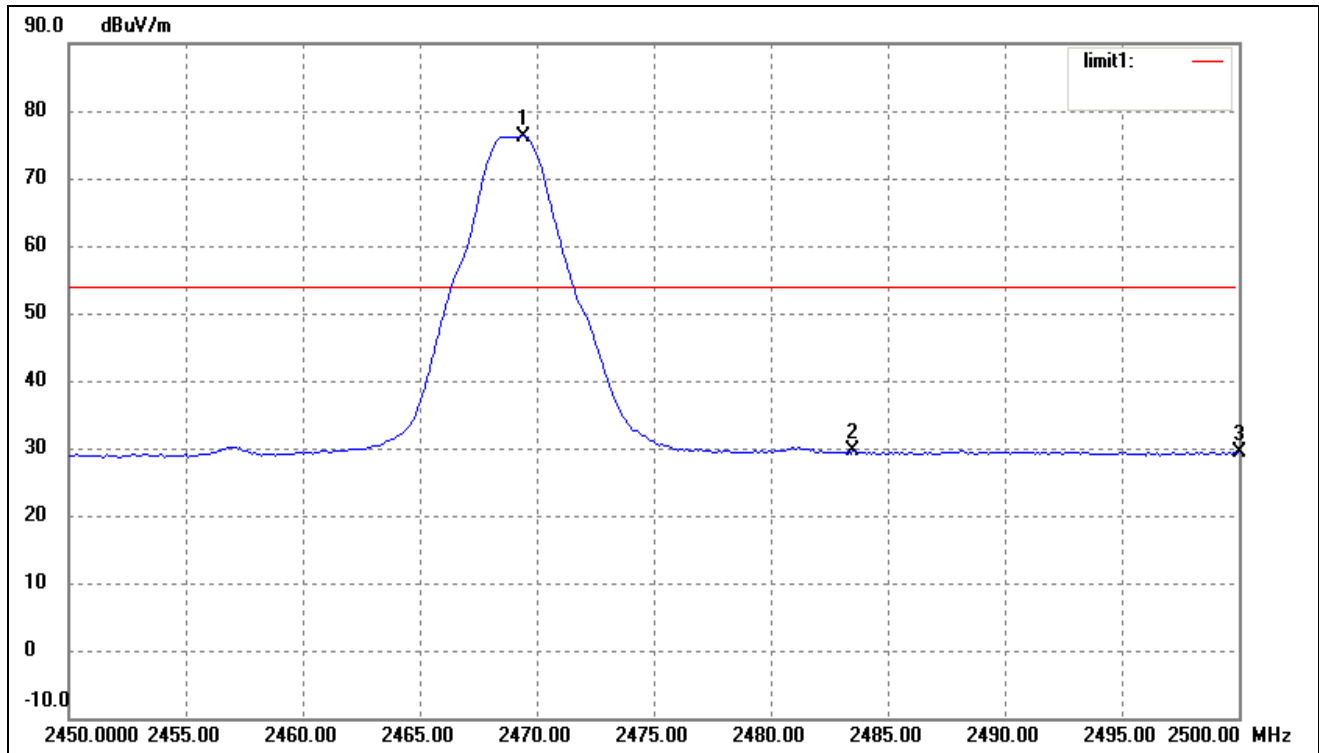
The edge emissions are below the FCC Part 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	36.56	-7.51	29.05	54.00	-24.95	Ave Detector
	2310.000	49.81	-7.51	48.32	74.00	-25.68	Peak Detector
2	2361.063	45.41	-7.39	38.02	54.00	-15.98	Ave Detector
	2361.063	47.66	-7.39	55.05	74.00	-18.95	Peak Detector
3	2400.000	37.64	-7.31	30.33	54.00	-23.67	Ave Detector
	2400.000	45.79	-7.31	53.21	74.00	-20.79	Peak Detector
4	2411.684	83.46	-7.28	76.18			Ave Detector

Highest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2469.400	83.40	-7.15	76.25			Ave Detector
2	2483.500	36.65	-7.13	29.52	54.00	-24.48	Ave Detector
	2483.500	41.11	-7.13	48.24	74.00	-25.76	Peak Detector
3	2500.000	36.42	-7.08	29.34	54.00	-24.66	Ave Detector
	2500.000	39.18	-7.08	46.26	74.00	-27.74	Peak Detector

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