



FCC REPORT

Applicant: Xiamen Tenia Lighting & Electrical Co., Ltd

Address of Applicant: NO.575, Second Ring South Road, Tong'an District, Xiamen,
Fujian

Equipment Under Test (EUT)

Product Name: Remote

Model No.: RDNA042C

FCC ID: 2AV7W-RDNA042C

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249

Date of sample receipt: 16 June 2023

Date of Test: 16 June 2023 to 30 June 2023

Date of report issue: 30 June 2023

Test Result: PASS*

* In the configuration tested, the EUT complied with the standards specified above.

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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**1 Modified Information**

Version No.	Date	Description
00	30 June 2023	Original

Prepared by: Leo Zhang
Leo Zhang/Engineer

Date: 30 June 2023

Reviewed by: Louis Ye
Louis Ye/Manager

Date: 30 June 2023

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3 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Field strength of the fundamental signal	15.249	Pass
Spurious emissions	15.249/15.209	Pass
20dB Bandwidth	15.231(c)	Pass
Band Edge	15.205	Pass
Conducted Emission	15.207	N/A
Remarks: <i>1. Pass: The EUT complies with the essential requirements in the standard.</i> <i>2. N/A: The EUT not applicable of the test item.</i> <i>3. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB (provided by the customer).</i>		
Test Method:	ANSI C63.10-2013	

4 General Information

4.1 Client Information

Applicant:	Xiamen Tenia Lighting & Electrical Co., Ltd
Address:	NO.575, Second Ring South Road, Tong'an District, Xiamen, Fujian
Manufacturer:	Xiamen Tenia Lighting & Electrical Co., Ltd
Address:	NO.575, Second Ring South Road, Tong'an District, Xiamen, Fujian
Factory:	Xiamen Tenia Lighting & Electrical Co., Ltd
Address:	NO.575, Second Ring South Road, Tong'an District, Xiamen, Fujian

4.2 General Description of E.U.T.

Product Name:	Remote
Model No.:	RDNA042C
Operation Frequency:	2407MHz
Channel numbers:	1
Modulation type:	GFSK
Antenna Type:	PCB antenna
Antenna gain:	0.03dBi
Power supply:	DC 3V
Test Sample Condition:	The test samples were provided in good working order with no visible defects.

4.3 Test mode

Transmitting mode:	Keep the EUT in transmitting mode with modulation
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4.4 Description of Support Units

N/A

4.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Radiated Emission (9kHz ~ 30MHz)	3.8 dB
Radiated Emission (30MHz ~ 1000MHz)	4.0 dB
Radiated Emission (1GHz ~ 18GHz)	5.6 dB
Radiated Emission (18GHz ~ 40GHz)	4.8 dB

4.6 Additions to, deviations, or exclusions from the method

No

4.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

● **FCC - Designation No.: CN1279**

Jianyan Testing Group Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 892155.

● **ISED – CAB identifier.: CN0102**

Jianyan Testing Group Co., Ltd. has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements with ISED#:26114.

● **CNAS - Registration No.: CNAS L0658**

Jianyan Testing Group Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L0658.

●A2LA - Registration No.: 5568.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: <https://portal.a2la.org/scopepdf/5568-01.pdf>

4.8 Laboratory Location

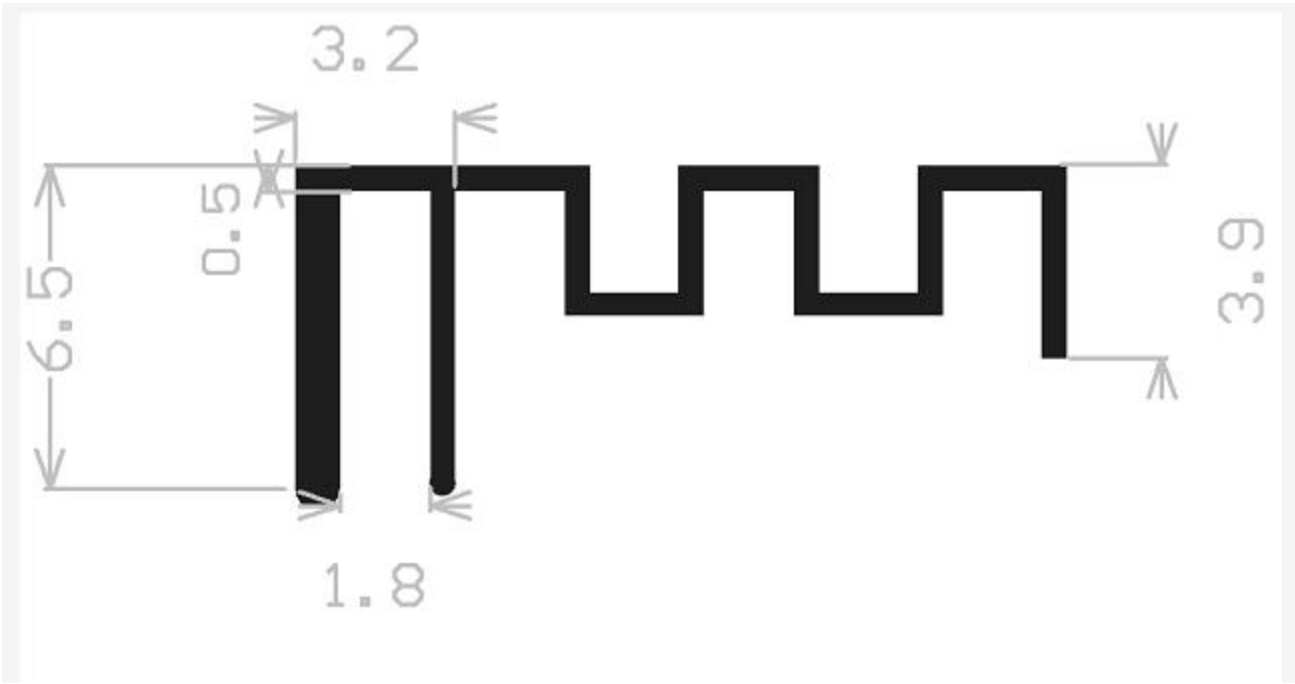
JianYan Testing Group Co., Ltd.
Address: No.760, Fengling Road, Tong'an District, Xiamen, Fujian, China
Tel: +86-592-2273071, Fax:+86-592-2273700
Email: info-JYTee@lets.com, Website: <http://jyt.lets.com>

4.9 Test Instrumentslist

Test Equipment	Manufacturer	Model No.	Equipment No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m Semi-Anechoic Chamber	BOST	CHC-966	SBE0001	2022-11-30	2027-11-30
EMI Test Receiver	R&S	ESR 3	SBE0007-1	2022-07-14	2023-07-13
Spectrum Analyzer	R&S	FSV40-N	SBE0023-2	2023-02-27	2024-02-26
Loop Antenna	ETS	6502	SBE0007-4	2023-03-03	2024-03-02
BiConiLog Antenna	SCHWARZBECK	VULB 9163	SBE0007-3	2022-12-02	2023-12-01
Horn Antenna	SCHWARZBECK	BBHA 9120 D	SBE0020	2023-03-03	2024-03-02
Pre-amplifier	SCHWARZBECK	BBV9743	SBE0007-2	2022-07-14	2023-07-03
Pre-amplifier	RF System	TRLA-010180G50B	SBE0021-1	2023-03-01	2024-02-29
EMI Test Software	Farad	EZ-EMC	Version: V.EMCE-3A1		

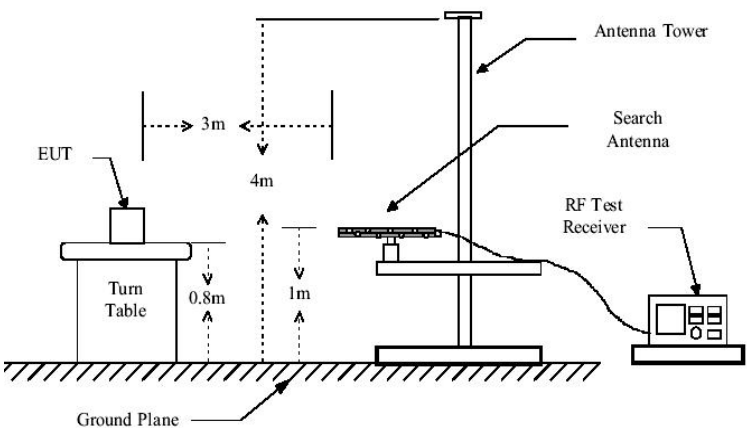
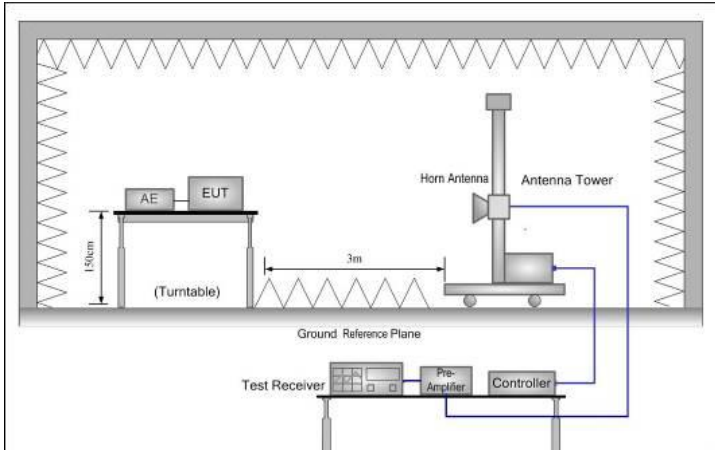
5 Test results and Measurement Data

5.1 Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203
<p>15.203 requirement: 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p>	
E.U.T Antenna:	
The EUT make use of an PCB antenna, The typical gain of the antenna is 0.03dBi.	
 <p>The diagram shows a PCB antenna layout with the following dimensions: a horizontal segment of 3.2, a vertical segment of 0.5, a total vertical height of 6.5, a horizontal segment of 1.8, and a final vertical segment of 3.9. The antenna is a meander line design.</p>	

5.2 Radiated Emission

Test Requirement:	FCC Part15 C Section 15.249 and 15.209				
Test Frequency Range:	9KHz to 24500MHz				
Test site:	Measurement Distance: 3m(Semi-Anechoic Chamber)				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Limit: (Field strength of the fundamental signal)	Frequency		Limit (dBuV/m @3m)		Remark
	2400~2483.5MHz		94		Average Value
			114		Peak Value
Limit: (Spurious Emissions)	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
			74.0		Peak Value
	Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength.				
Test Procedure:	<p>a. The EUT was placed on the top of a rotating table 0.8m(below 1GHz) /1.5m(above 1GHz) above the ground at a 3 meter chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</p> <p>b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</p> <p>c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</p> <p>d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotating table was turned from 0 degrees to 360 degrees to find the maximum reading.</p> <p>e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</p> <p>f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</p> <p>g. All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.</p> <p>h. 9 kHz~30 MHz Field Strength of Unwanted Emissions. Peak or Quasi-Peak measurement. The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.</p>				

<p>Test setup:</p>	<p>Below 1GHz</p>  <p>Above 1GHz</p> 
<p>Test Instruments:</p>	<p>Refer to section 4.9 for details</p>
<p>Test mode:</p>	<p>Refer to section 4.3 for details</p>
<p>Test results:</p>	<p>Pass</p>

5.2.1 Field Strength Of The Fundamental Signal

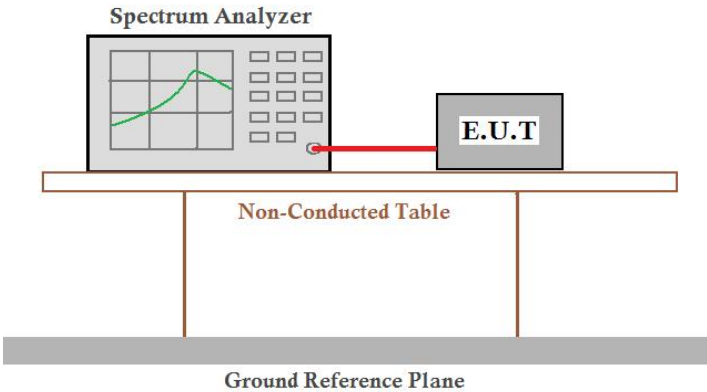
Peak value						
Frequency (MHz)	Read Level (dBuV)	Correct Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2407	83.92	-22.56	61.36	114	-52.64	Vertical
2407	106.44	-22.56	83.88	114	-30.12	Horizontal
Average value						
Frequency (MHz)	Read Level (dBuV)	Correct Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2407	62.25	-22.56	39.69	94	-54.31	Vertical
2407	83.35	-22.56	60.79	94	-33.21	Horizontal

5.2.2 Spurious Emissions

Below 1GHz (30MHz-1000MHz)							
Frequency (MHz)	Read Level (dBuV/m)	Correct Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Detector	polarization
46.49	21.25	-12.96	8.29	40	-31.71	QP	Vertical
109.54	22.52	-13.38	9.14	43.5	-34.36	QP	Vertical
783.69	24.51	-1.11	23.40	46	-22.60	QP	Vertical
46.49	22.06	-12.96	9.10	40	-30.90	QP	Horizontal
106.63	21.03	-13.63	7.40	43.5	-36.10	QP	Horizontal
781.75	23.52	-1.12	22.40	46	-23.60	QP	Horizontal

Above 1GHz						
Peak value						
Frequency (MHz)	Read Level (dBuV/m)	Correct Factor(dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4814	60.23	-15.66	44.57	74	-29.43	Vertical
7221	58.56	-8.10	50.46	74	-23.54	Vertical
4814	80.42	-15.66	64.76	74	-9.24	Horizontal
7221	78.16	-8.10	70.06	74	-3.94	Horizontal
Average value						
Frequency (MHz)	Level (dBuV/m)	Correct Factor(dB)	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
4814	49.55	-15.66	33.89	54	-20.11	Vertical
7221	47.70	-8.10	39.60	54	-14.40	Vertical
4814	58.61	-15.66	42.95	54	-11.05	Horizontal
7221	55.73	-8.10	47.63	54	-6.37	Horizontal

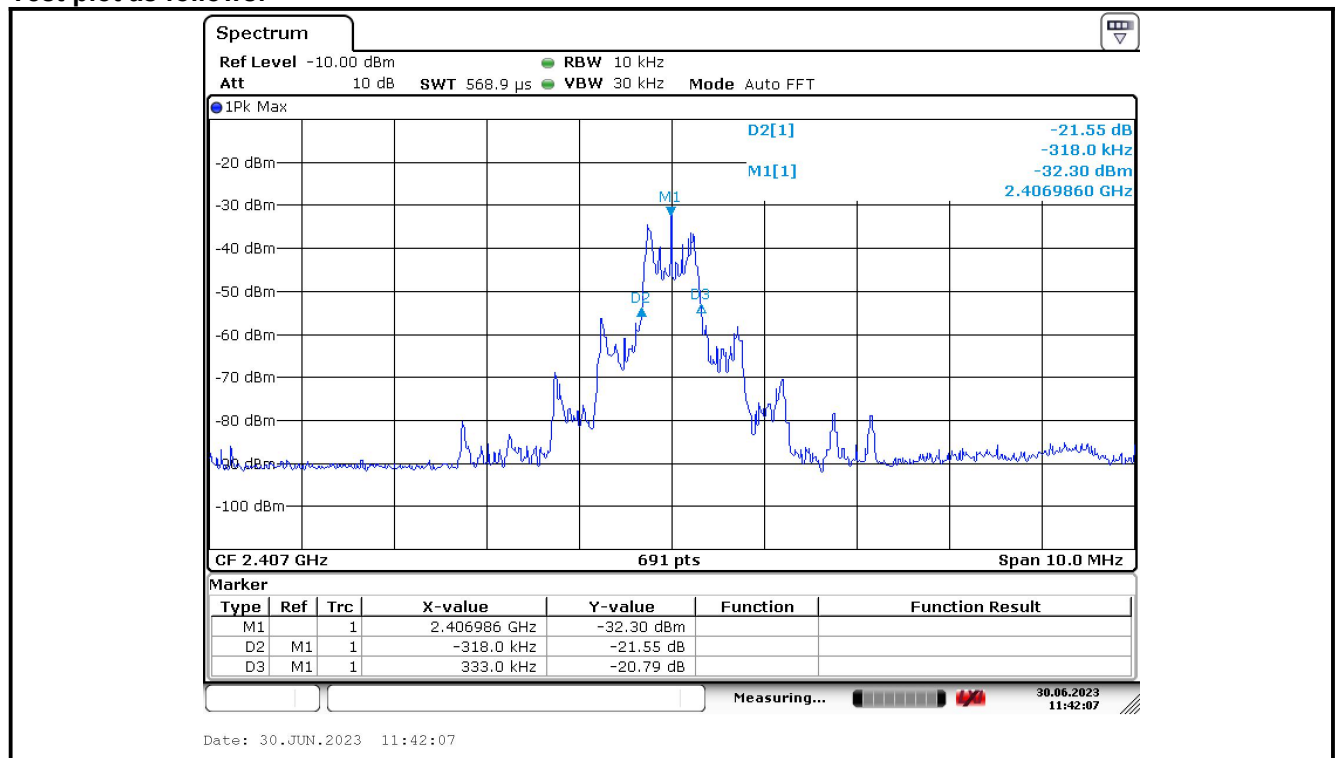
5.3 20dB Bandwidth

Test Requirement:	FCC Part15 C Section 15.215
Receiver setup:	RBW=10kHz, VBW=30kHz, detector: Peak
Limit:	Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Test Procedure:	<ol style="list-style-type: none"> 1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 4.9 for details
Test mode:	Refer to section 4.3 for details
Test results:	Pass

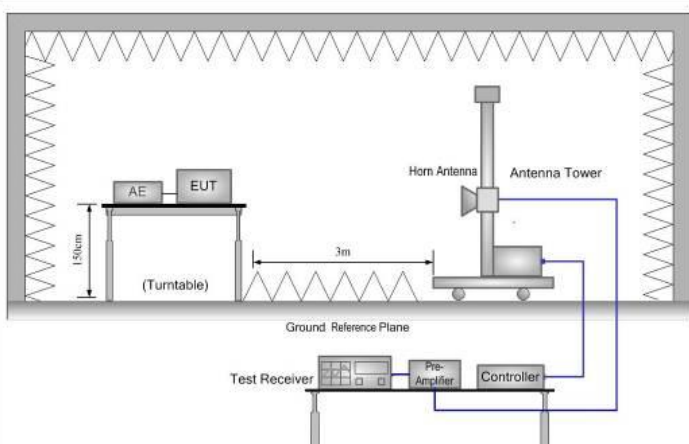
Measurement Data:

20dB bandwidth (MHz)	Limit (MHz)	Results
0.651	N/A	Pass

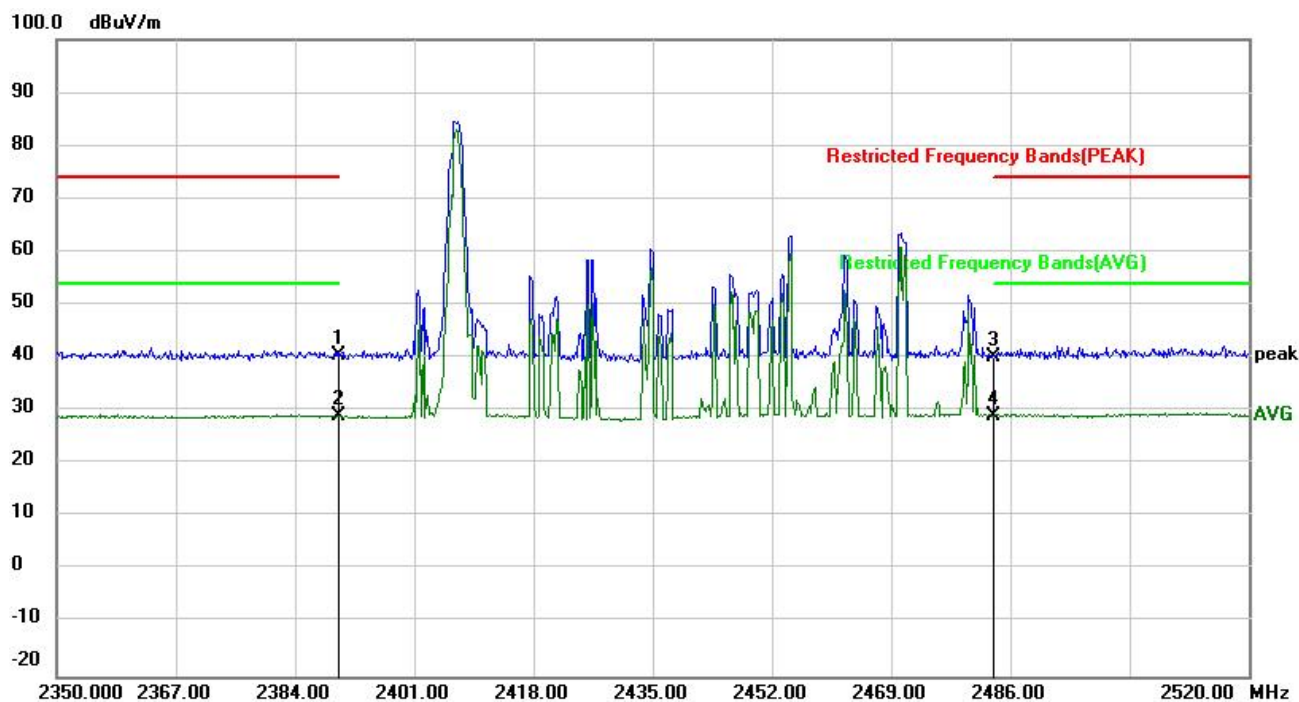
Test plot as follows:



5.4 Band Edge

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205				
Test Frequency Range:	2310 MHz to 2390 MHz and 2483.5 MHz to 2500 MHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	Above 1GHz		54.00		Average Value
			74.00		Peak Value
Test setup:					
Test Procedure:	<div>1. The EUT was placed on the top of a rotating table 1.5meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div>				
Test Instruments:	Refer to section 4.9 for details				
Test mode:	Refer to section 4.3 for details				
Test results:	Pass				

Product Name:	Remote	Product Model:	RDNA042C
Test By:	Leo Zhang	Test mode:	Transmitting mode
Test Frequency:	2407MHz	Polarization:	Vertical
Test Voltage:	DC 3V	Environment:	Temp.: 24.2℃ Humi.: 55%

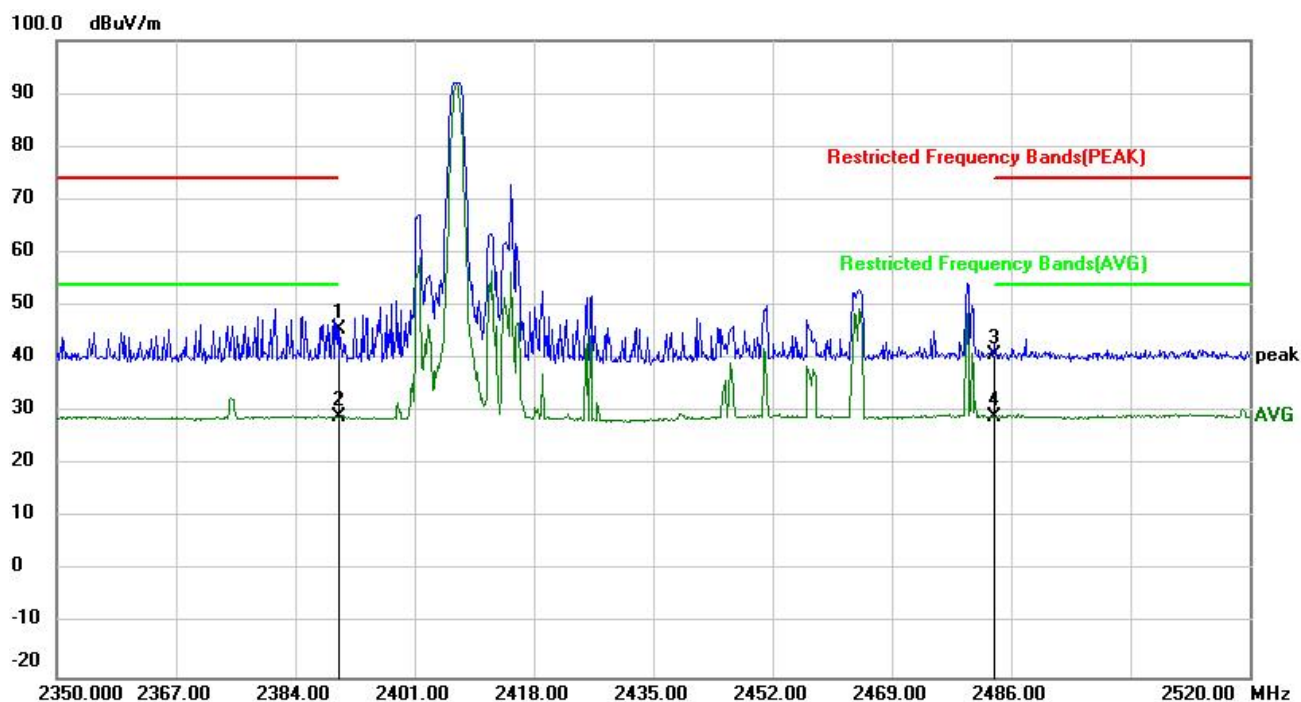


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	63.12	-22.62	40.50	74.00	-33.50	peak
2		2390.000	51.60	-22.62	28.98	54.00	-25.02	AVG
3		2483.500	62.61	-22.32	40.29	74.00	-33.71	peak
4	*	2483.500	51.44	-22.32	29.12	54.00	-24.88	AVG

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
- The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

Product Name:	Remote	Product Model:	RDNA042C
Test By:	Leo Zhang	Test mode:	Transmitting mode
Test Frequency:	2407MHz	Polarization:	Horizontal
Test Voltage:	DC 3V	Environment:	Temp.: 24.2℃ Humi.: 55%



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	68.19	-22.62	45.57	74.00	-28.43	peak
2		2390.000	51.62	-22.62	29.00	54.00	-25.00	AVG
3		2483.500	63.17	-22.32	40.85	74.00	-33.15	peak
4	*	2483.500	51.38	-22.32	29.06	54.00	-24.94	AVG

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor.
- The emission levels of other frequencies are lower than the limit 20dB and not show in test report.

-----End of report-----