RF TEST REPORT

For

Dongguan Lingjie Electronics & Technology Co., Ltd

Product Name: Wireless Mouse

Test Model(s).: i360, MW350

Report Reference No.	:	**POCE231207004RF001**
FCC ID	:	**2ANBU-I360**
Applicant's Name	:	Dongguan Lingjie Electronics & Technology Co., Ltd
Address	:	Building 3, No. 23 Zhenxing North Road, Taiyuan Community, Xiegang Town, Dongguan City, Guangdong Province, 523590, P.R.C.
Testing Laboratory	:	Shenzhen POCE Testing Technology Co., Ltd.
Address	:	101-102, H5 Building & floor 1, Building H, Hongfa Science and Technology Park, Tangtou, Shiyan, Bao'An District, Shenzhen, China
Test Specification Standard	:	**47 CFR Part 15.249 & ANSI C63.10-2013**
Date of Receipt	:	December 7, 2023
Date of Test	:	December 7, 2023 to December 14, 2023
Data of Issue	:	December 14, 2023
Result	:	**Pass**

Revision History Of Report

Version	Description	REPORT No.	Issue Date
V1.0	Original	POCE231207004RF001	December 14, 2023

NOTE1:
The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

Compiled by:	Supervised by:	Approved by:
Keren Huang	Stone Yin	Tom chen
Keren Huang / Test Engineer	Stone Yin / Project Engineer	Tom Chen / Manager

CONTENTS

1 TEST SUMMARY

1.1 Test Standards

The tests were performed according to following standards:

47 CFR Part 15.249: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHZ, and 24.0-24.25 GHz

1.2 Summary of Test Result

Item	Standard	Method	Requirement	Result
Antenna requirement	47 CFR Part 15.249	/	47 CFR Part 15.203	Pass
Occupied Bandwidth	47 CFR Part 15.249	ANSI C63.10-2013, section 6.9.2	47 CFR 15.215(c)	Pass
Field strength of fundamental	47 CFR Part 15.249	ANSI C63.10-2013 section 6.6	47 CFR 15.249(a) 47 CFR 15.249(b)(1)	Pass
Band edge emissions (Radiated)	47 CFR Part 15.249	ANSI C63.10-2013 section 6.6.4	47 CFR 15.249(d)	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.249	ANSI C63.10-2013 section 6.5	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.249	ANSI C63.10-2013 section 6.6	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)	Pass

Note: 1.N/A -this device(EUT) is not applicable to this testing item

2. RF-conducted test results including cable loss.

2 GENERAL INFORMATION

2.1 Client Information

Applicant's Name	:	Dongguan Lingjie Electronics & Technology Co., Ltd
Address	:	Building 3, No. 23 Zhenxing North Road, Taiyuan Community, Xiegang Town, Dongguan City, Guangdong Province, 523590, P.R.C.
Manufacturer	:	Dongguan Lingjie Electronics & Technology Co., Ltd
Address	:	Building 3, No. 23 Zhenxing North Road, Taiyuan Community, Xiegang Town, Dongguan City, Guangdong Province, 523590, P.R.C.

2.2 Description of Device (EUT)

Product Name:	Wireless Mouse
Sample number:	Q231204012-1
Model/Type reference:	i360
Series Model:	MW350
Model Difference:	The only difference is the name, everything else is the same, which does not affect the EMC and RF performance of the product
Trade Mark:	N/A
Product Description:	mouse
Power Supply:	DC1.5V
Operation Frequency:	2403.85--2479.85MHz
Number of Channels:	16
Modulation Type:	GFSK
Antenna Type:	PCB ANTENNA
Antenna Gain:	2.34dBi
Hardware Version:	VER4.0
Software Version:	/

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2403.85MHz	5	2422.85MHz	9	2441.85MHz	13	2463.85MHz
2	2407.85MHz	6	2426.85MHz	10	2445.85MHz	14	2466.85MHz
3	2414.85MHz	7	2436.85MHz	11	2453.85MHz	15	2473.85MHz
4	2419.85MHz	8	2439.85MHz	12	2459.85MHz	16	2479.85MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Test channel	**Frequency (MHz)**
Lowest channel	2403.85MHz
Middle channel	2441.85MHz
Highest channel	2479.85MHz

2.3 Description of Test Modes

No	Title	Description
TM1	TX-GFSK	Keep the EUT in continuously transmitting mode with GFSK modulation.

Title	Description
TX mode	Keep the EUT works in continuously transmitting mode with GFSK modulation.
	☐Special software is used. ☐Through engineering command into the engineering mode. engineering command: *#*#3646633#*#* ☒Other method: Simultaneously press and hold the three buttons "left+center+right", then power on and enter the testing mode with the mouse (after entering the testing mode, the default transmission is 2403.85MHz empty carrier signal). Press the left mouse button to switch the status (transmission or reception)
	Special software: /

2.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Description	Manufacturer	Model No.	Remark	Certification
1	PC	Lenovo	Air 14 Plus	Provide by lab	SDOC
2					

2.5 Equipments Used During The Test

Emissions in restricted frequency bands and RF					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Test Receiver	R&S	ESCI	102109	2023/6/13	2024/6/12
Spectrum Analyzer	R&S	FSP30	1321.3008K40-101729-jR	2023/6/14	2024/6/13
966 Chamber	CY	9*6*6	20160101	2023/1/26	2025/1/25
Bore-sighting Antenna rack	PBB	1308503	16033	/	/
Loop antenna	ZHINAN	ZN30900C	ZN30900C	2021/7/5	2024/7/4
Broadband Antenna	Sunol Sciences	JB6 Antenna	A090414	2023/5-21	2025/5-20
Horn Antenna	Sunol Sciences	DRH-118	A091114	2023/5/13	2025/5/12
Horn antenna	COM-POWER	AH-1840(40G)	10100008	2023/4/5	2025/4/4
Power APM(LF)	Schwarzbeck	BBV9743	9743-151	2023/6/13	2024/6/12
Power APM(HF)	Schwarzbeck	BBV9718	9718-282	2023/6/13	2024/6/12
Cable(LF)#2	Schwarzbeck	/	/	2023/2/27	2024/2/26
Cable(LF)#1	Schwarzbeck	/	/	2023/2/27	2024/2/26
Cable(HF)#2	Schwarzbeck	AK9515E	96250	2023/2/28	2024/2/27

Cable(HF)#1	Schwarzbeck	SYV-50-3-1	/	2023/2/27	2024/2/26
Power divider	MIDEWEST	PWD-2533	SMA-79	2023/5/11	2026/5/10
signal generator	Keysight	N5181A	MY48180415	2022/12/10	2023/12/9
signal generator	Keysight	N5182A	MY50143455	2022/12/29	2023/12/28
Spectrum Analyzer	Keysight	N9020A	MY53420323	2022/12/29	2023/12/28
RF Sensor Unit	TACHOY	TR1029-2	000001	/	/
RF Control Unit	TACHOY	TR1029-1	000001	/	/
Position Controller	MF	MF-7802	/	/	/
EMI Testsoftware	Farad	EZ -EMC	V1.1.42	/	/
RF TestSoftware	TACHOY	RTS-01	V2.0.0.0	/	/

2.6 Statement Of The Measurement Uncertainty

Test Item	**Measurement Uncertainty**
Conducted Disturbance (0.15~30MHz)	±3.41dB
Occupied Bandwidth	±3.63%
RF power density	±0.234%
Radio Frequency	2×10-7
RF conducted power	±0.733dB
Duty cycle	±3.1%
Conducted Spurious emissions	±1.98dB
Radiated Emission (Above 1GHz)	±5.46dB
Radiated Emission (Below 1GHz)	±5.79dB
Note: (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	

2.7 Identification of Testing Laboratory

Company Name:	Shenzhen POCE Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252

Identification of the Responsible Testing Location

Company Name:	Shenzhen POCE Technology Co., Ltd.
Address:	101-102 Building H5 & 1/F., Building H, Hongfa Science & Technology Park, Tangtou, Shiyan, Bao'an District, Shenzhen, Guangdong, China
Phone Number:	+86-13267178997
Fax Number:	86-755-29113252
FCC Registration Number:	0032847402
Designation Number:	CN1342
Test Firm Registration No.:	778666
A2LA Certificate Number:	6270.01

2.8 Announcement

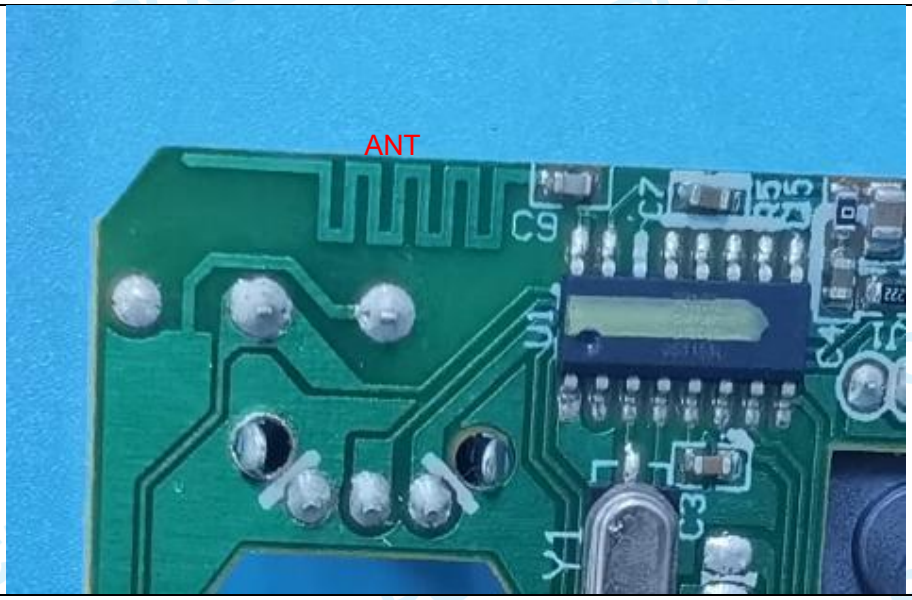
(1) The test report reference to the report template version v0.
(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
(3) The test report is invalid if there is any evidence and/or falsification.
(4) This document may not be altered or revised in any way unless done so by POCE and all revisions are duly noted in the revisions section.
(5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
(6) We hereby declare that the laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant. the laboratory is not responsible for the accuracy of the information provided by the client. When the information provided by the customer may affect the effectiveness of the results, the responsibility lies with the customer, and the laboratory does not assume any responsibility.

3 Evaluation Results (Evaluation)

3.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 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.

3.1.1 Conclusion:



4 Radio Spectrum Matter Test Results (RF)

4.1 Occupied Bandwidth

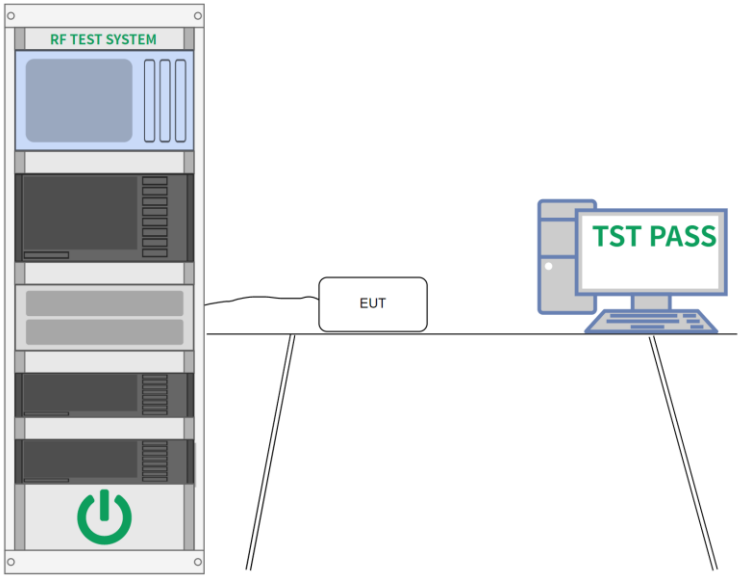
Test Requirement:	47 CFR 15.215(c)
Test Limit:	Refer to 47 CFR 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the 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 Method:	ANSI C63.10-2013, section 6.9.2
Procedure:	a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the "−xx dB down amplitude" using [(reference value) − xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "-xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The occupied bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral display, such that the marker is at or slightly below the "-xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth. k) The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

4.1.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	46.7 %	Atmospheric Pressure:	101 kPa

Pre test mode:	TM1
Final test mode:	TM1

4.1.2 Test Setup Diagram:



4.1.3 Test Data:

Please Refer to Appendix for Details.

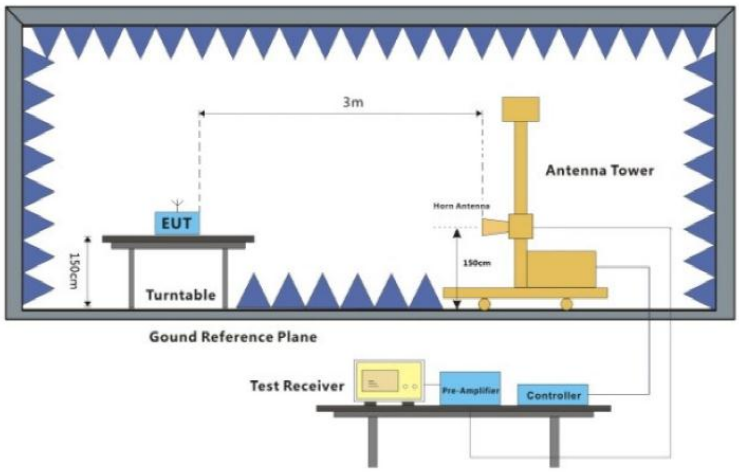
4.2 Field strength of fundamental

Test Requirement:	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 The field strength of emissions in this band shall not exceed 2500 millivolts/meter.
Test Method:	ANSI C63.10-2013 section 6.6
Procedure:	ANSI C63.10-2013 section 6.6

4.2.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	46.7 %	Atmospheric Pressure:	101 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.2.2 Test Setup Diagram:



4.2.3 Test Data:

Frequency	Emission Level	Limits	Margin	Detector	Polarization
(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(PK/AV)	(H/V)
2403.85	83.70	114.00	-30.30	PK	H
2403.85	76.47	94.00	-17.53	AV	H
2403.85	84.70	114.00	-29.30	PK	V
2403.85	75.56	94.00	-18.44	AV	V

Frequency	Emission Level	Limits	Margin	Detector	Polarization
(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(PK/AV)	(H/V)
2441.85	84.20	114.00	-29.80	PK	H
2441.85	76.71	94.00	-17.29	AV	H
2441.85	85.20	114.00	-28.80	PK	V
2441.85	75.60	94.00	-18.40	AV	V

Frequency	Emission Level	Limits	Margin	Detector	Polarization
(MHz)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(PK/AV)	(H/V)
2479.85	84.82	114.00	-29.18	PK	H
2479.85	76.04	94.00	-17.96	AV	H
2479.85	85.03	114.00	-28.97	PK	V
2479.85	75.41	94.00	-18.59	AV	V

Note: Margin = Emission Level - Limit

4.3 Band edge emissions (Radiated)

Test Requirement:	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.
Test Limit:	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.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

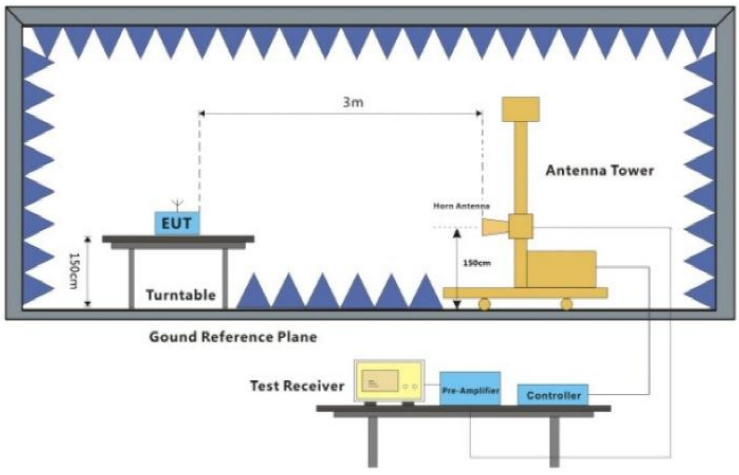
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Test Method:	ANSI C63.10-2013 section 6.6.4
Procedure:	ANSI C63.10-2013 section 6.6.4

4.3.1 E.U.T. Operation:

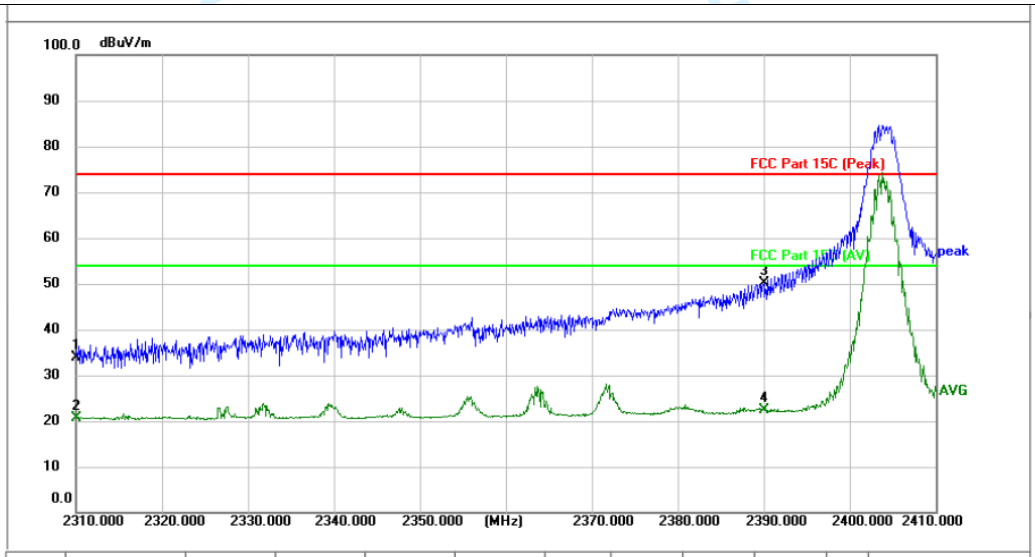
Operating Environment:					
Temperature:	22.4 °C	Humidity:	46.7 %	Atmospheric Pressure:	101 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.3.2 Test Setup Diagram:



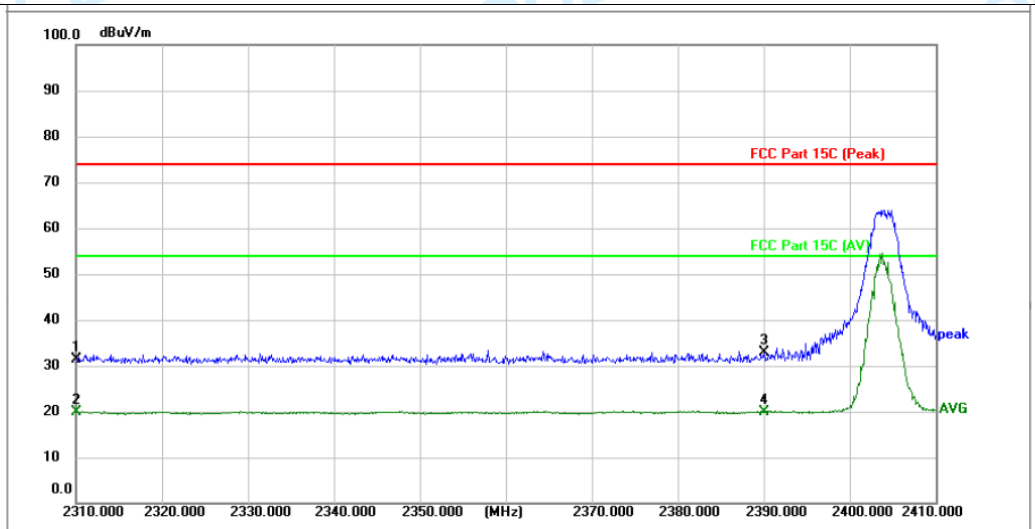
4.3.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 3 / CH: L



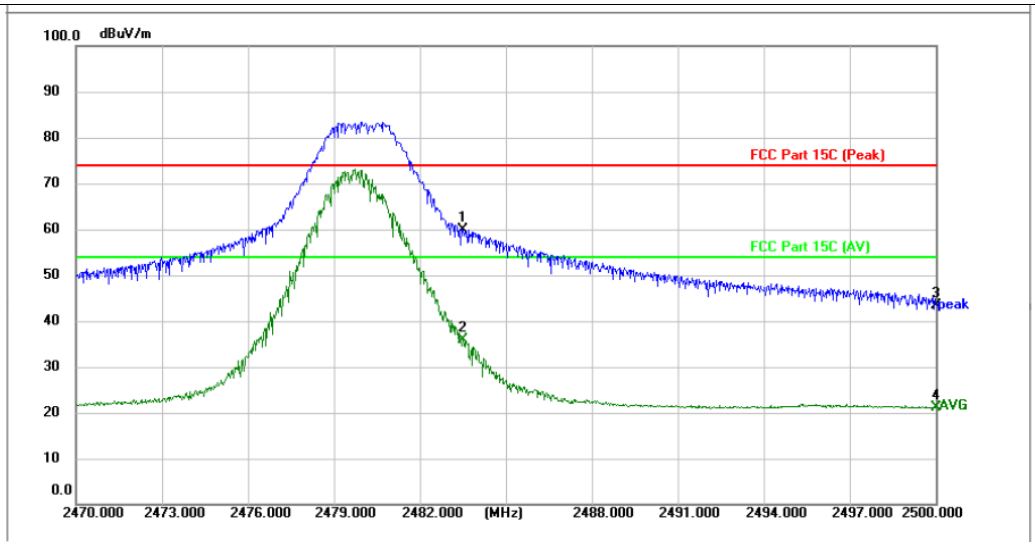
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	40.88	-6.93	33.95	74.00	-40.05	peak	150		P	
2	2310.000	27.61	-6.93	20.68	54.00	-33.32	AVG	150		P	
3 *	2390.000	56.94	-6.72	50.22	74.00	-23.78	peak	150		P	
4	2390.000	29.13	-6.72	22.41	54.00	-31.59	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 3 / CH: L



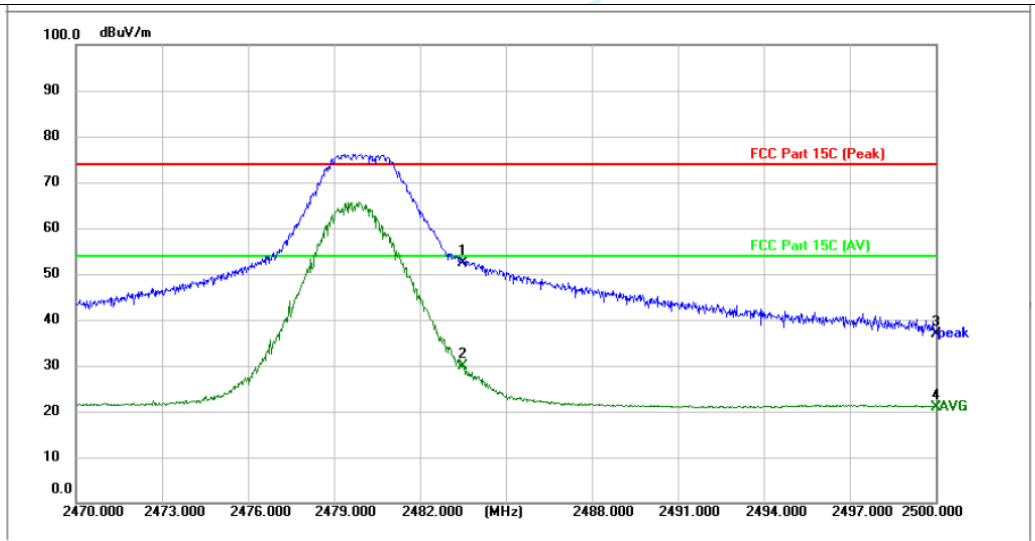
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	2310.000	39.59	-8.23	31.36	74.00	-42.64	peak	150		P	
2	2310.000	28.08	-8.23	19.85	54.00	-34.15	AVG	150		P	
3	2390.000	40.90	-7.91	32.99	74.00	-41.01	peak	150		P	
4 *	2390.000	27.79	-7.91	19.88	54.00	-34.12	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 3 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	2483.500	66.36	-6.47	59.89	74.00	-14.11	peak	150		P	
2	2483.500	42.31	-6.47	35.84	54.00	-18.16	AVG	150		P	
3	2500.000	49.84	-6.43	43.41	74.00	-30.59	peak	150		P	
4	2500.000	27.68	-6.43	21.25	54.00	-32.75	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 3 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1 *	2483.500	60.00	-7.54	52.46	74.00	-21.54	peak	150		P	
2	2483.500	37.30	-7.54	29.76	54.00	-24.24	AVG	150		P	
3	2500.000	44.40	-7.48	36.92	74.00	-37.08	peak	150		P	
4	2500.000	28.46	-7.48	20.98	54.00	-33.02	AVG	150		P	

Remark:

1.Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.

2.Mesurement Level = Reading + Correct Factor, Margin=Limit- Mesurement Level

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

4.4 Emissions in frequency bands (below 1GHz)

Test Requirement:	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)
Test Limit:	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

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.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

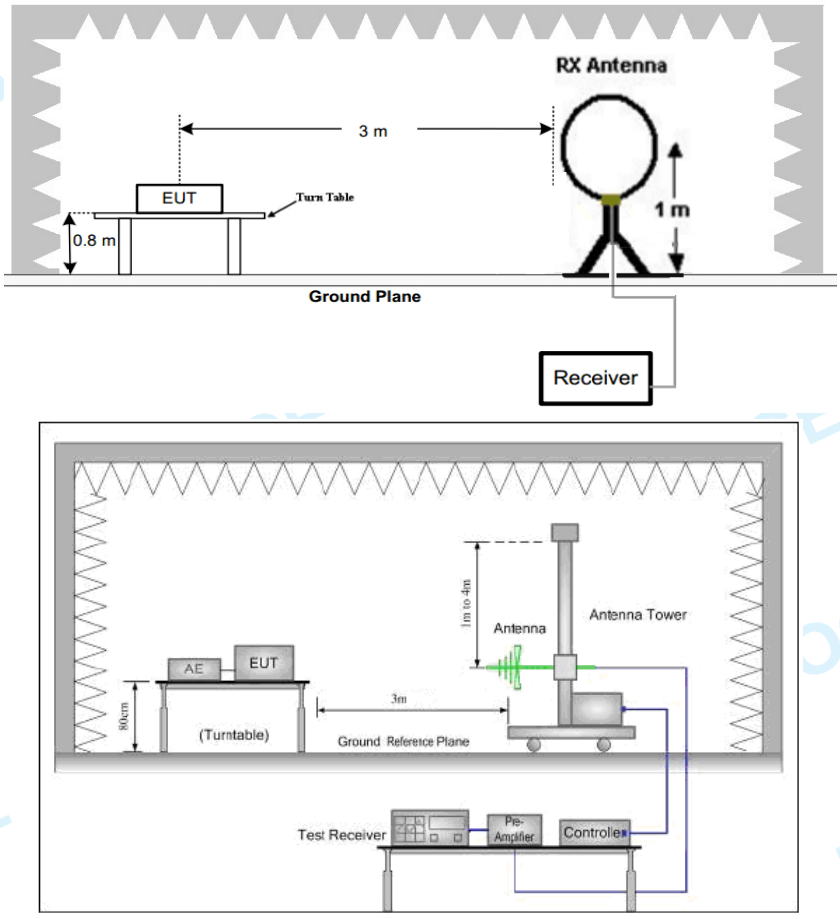
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a)and (b)of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b)of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Test Method:	ANSI C63.10-2013 section 6.5
Procedure:	ANSI C63.10-2013 section 6.5

4.4.1 E.U.T. Operation:

Operating Environment:					
Temperature:	22.4 °C	Humidity:	46.7 %	Atmospheric Pressure:	101 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.4.2 Test Setup Diagram:



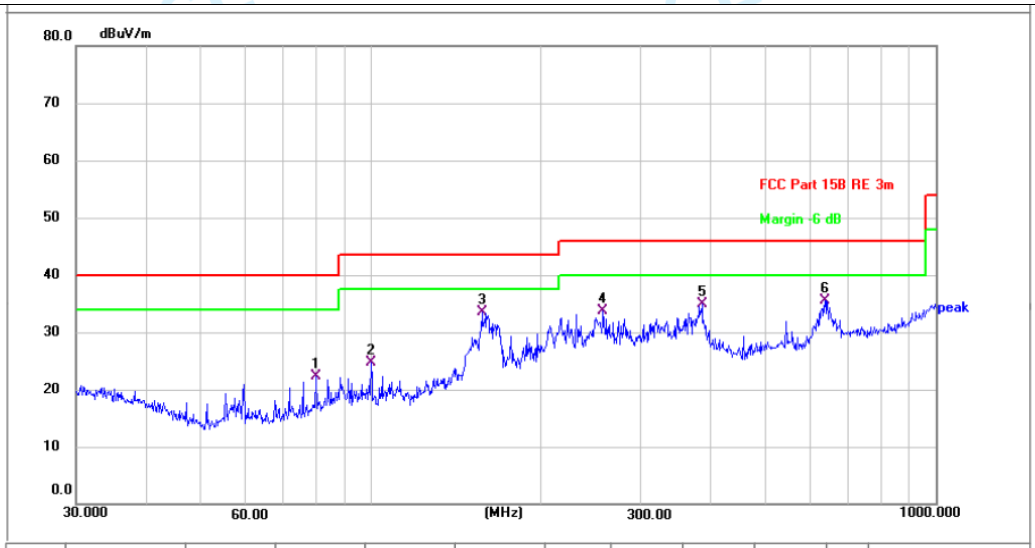
4.4.3 Test Data:

Between 9KHz – 30MHz
The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o) & RSS-Gen 6.13, the test result no need to reported.

Between 30MHz—1000MHz:

NOTE: The test results only show the worst mode or worst channel.

TM1 / Polarization: Horizontal / Band: 2.4G / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	79.8003	30.13	-7.75	22.38	40.00	-17.62	QP	100		P	
2	99.8777	30.30	-5.55	24.75	43.50	-18.75	QP	100		P	
3 *	157.0074	37.07	-3.59	33.48	43.50	-10.02	QP	100		P	
4	257.4222	35.55	-1.82	33.73	46.00	-12.27	QP	100		P	
5	385.2805	33.70	1.20	34.90	46.00	-11.10	QP	100		P	
6	636.1340	31.44	4.07	35.51	46.00	-10.49	QP	100		P	

TM1 / Polarization: Vertical / Band: 2.4G / CH: H

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	55.2207	31.86	-9.42	22.44	40.00	-17.56	QP	100		P	
2	99.8777	30.54	-5.55	24.99	43.50	-18.51	QP	100		P	
3	166.0680	38.94	-3.41	35.53	43.50	-7.97	QP	100		P	
4 *	189.0743	40.04	-3.03	37.01	43.50	-6.49	QP	100		P	
5	312.1794	37.16	0.95	38.11	46.00	-7.89	QP	100		P	
6	382.5879	34.29	1.51	35.80	46.00	-10.20	QP	100		P	

Remark: Margin= Measurement Level - Limit

Measurement Level=Test reading + correction factor

Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

4.5 Emissions in frequency bands (above 1GHz)

Test Requirement:	47 CFR 15.249(a) 47 CFR 15.249(d) 47 CFR 15.249(e)
Test Limit:	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

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.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

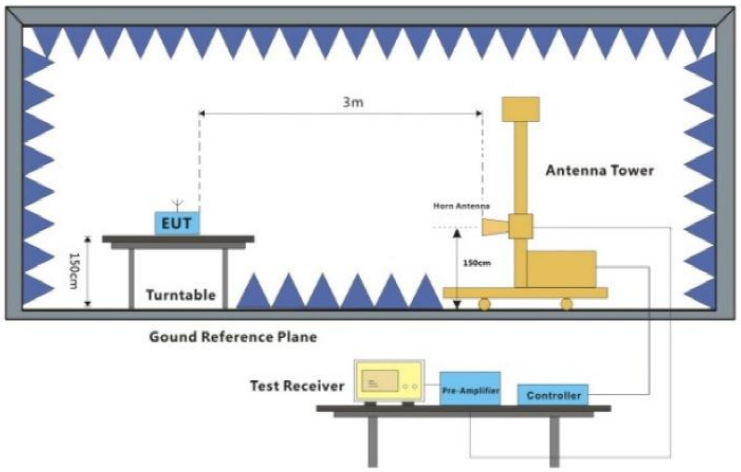
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a)and (b)of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For point-to-point operation under paragraph (b)of this section, the peak field strength shall not exceed 2500 millivolts/meter at 3 meters along the antenna azimuth.

Test Method:	ANSI C63.10-2013 section 6.6
Procedure:	ANSI C63.10-2013 section 6.6

4.5.1 E.U.T. Operation:

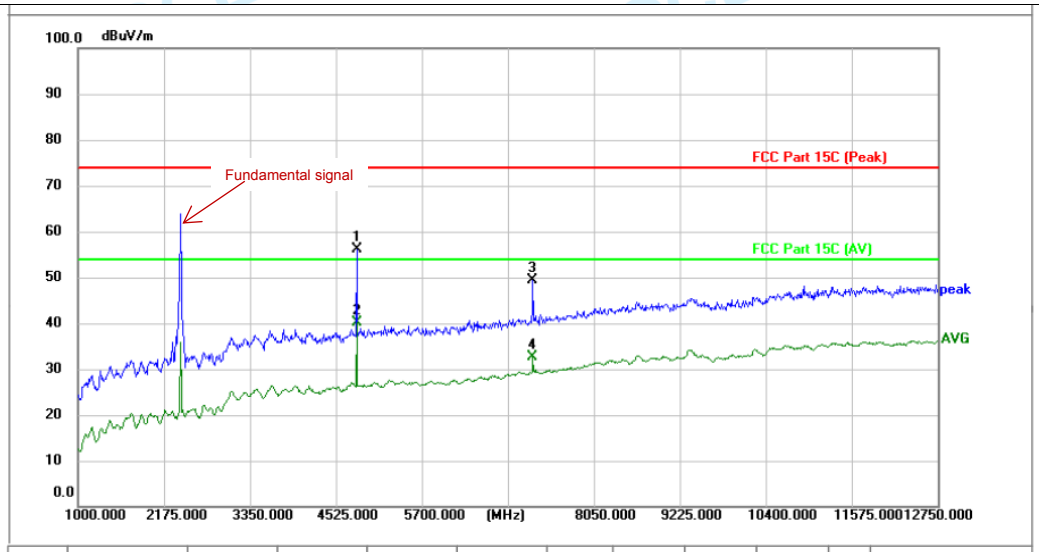
Operating Environment:					
Temperature:	22.4 °C	Humidity:	46.7 %	Atmospheric Pressure:	101 kPa
Pre test mode:	TM1				
Final test mode:	TM1				

4.5.2 Test Setup Diagram:



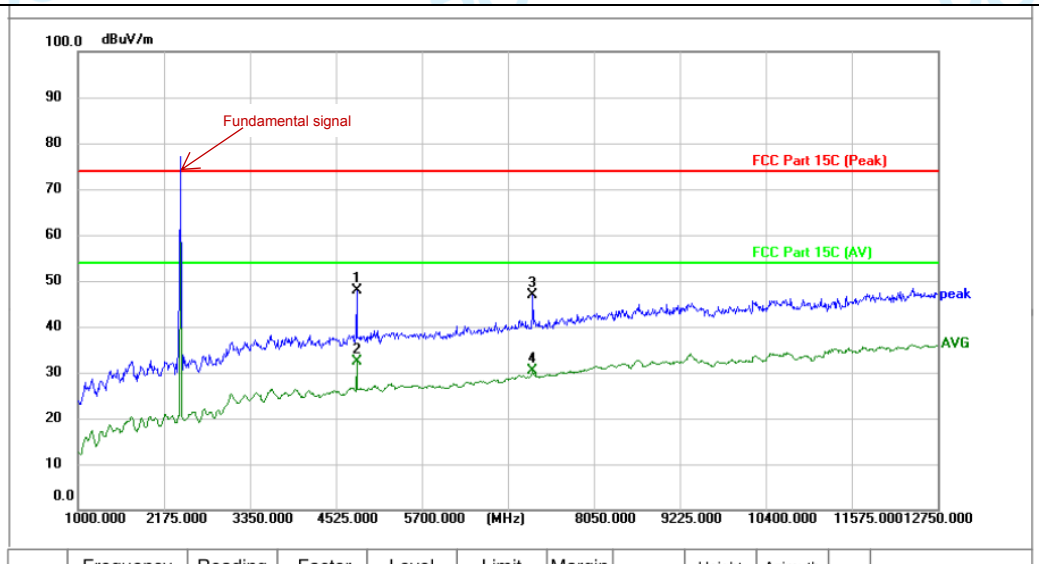
4.5.3 Test Data:

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 3 / CH: L



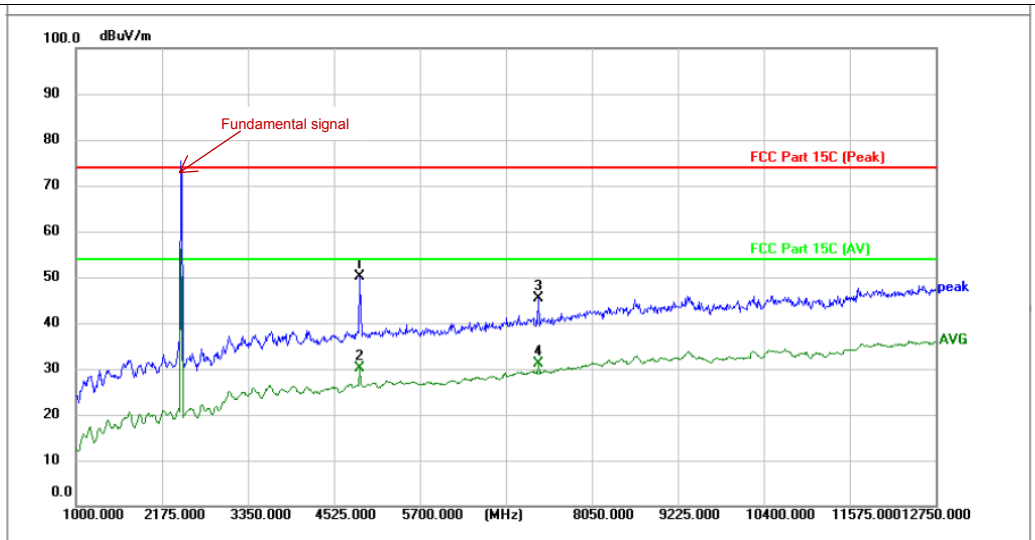
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4807.000	57.14	-0.89	56.25	74.00	-17.75	peak			P	
2 *	4807.000	40.92	-0.89	40.03	54.00	-13.97	AVG			P	
3	7215.750	45.27	4.14	49.41	74.00	-24.59	peak			P	
4	7215.750	28.50	4.14	32.64	54.00	-21.36	AVG			P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 3 / CH: L



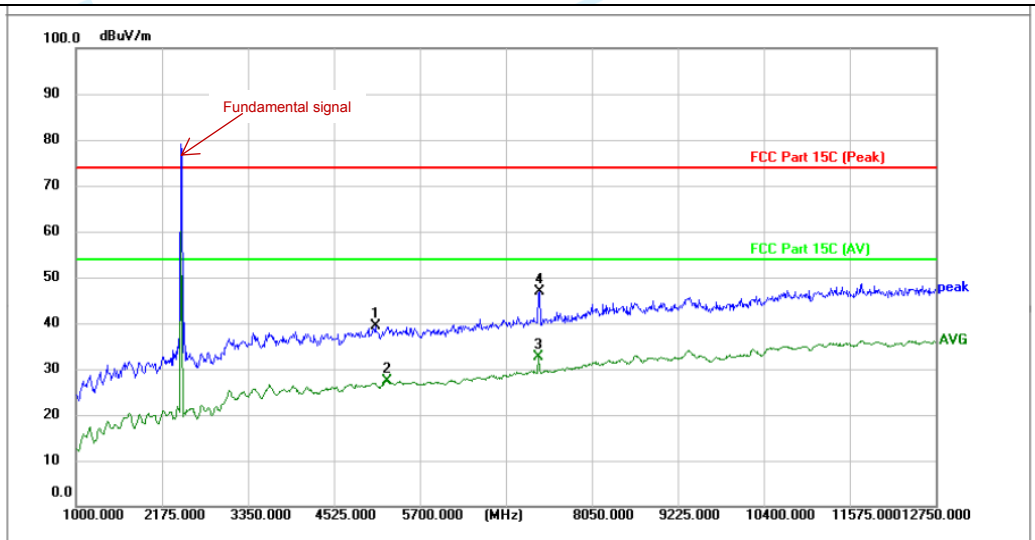
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4807.000	48.18	-0.27	47.91	74.00	-26.09	peak	150		P	
2 *	4807.000	32.73	-0.27	32.46	54.00	-21.54	AVG	150		P	
3	7215.750	42.85	4.11	46.96	74.00	-27.04	peak	150		P	
4	7215.750	26.22	4.11	30.33	54.00	-23.67	AVG	150		P	

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 3 / CH: M



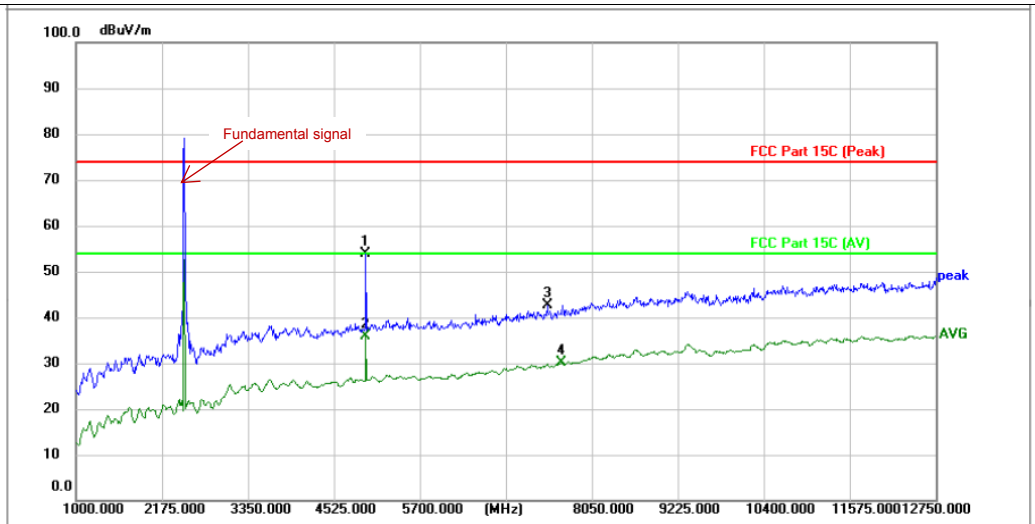
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4877.500	50.08	-0.04	50.04	74.00	-23.96	peak	150		P	
2	4877.500	30.18	-0.04	30.14	54.00	-23.86	AVG	150		P	
3	7321.500	40.97	4.36	45.33	74.00	-28.67	peak	150		P	
4 *	7321.500	26.84	4.36	31.20	54.00	-22.80	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 3 / CH: M



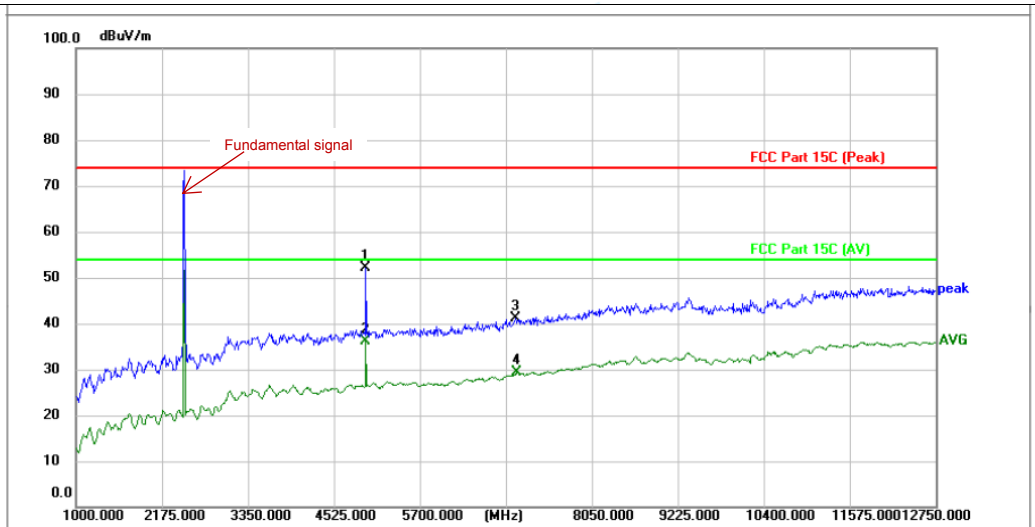
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	5089.000	39.36	-0.06	39.30	74.00	-34.70	peak			P	
2	5253.500	27.15	0.26	27.41	54.00	-26.59	AVG			P	
3 *	7321.500	28.38	4.31	32.69	54.00	-21.31	AVG			P	
4	7333.250	42.45	4.32	46.77	74.00	-27.23	peak			P	

TM1 / Polarization: Horizontal / Band: 2.4G / BW: 3 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4959.750	54.17	-0.37	53.80	74.00	-20.20	peak	150		P	
2 *	4959.750	36.15	-0.37	35.78	54.00	-18.22	AVG	150		P	
3	7439.000	38.15	4.49	42.64	74.00	-31.36	peak	150		P	
4	7638.750	25.13	5.09	30.22	54.00	-23.78	AVG	150		P	

TM1 / Polarization: Vertical / Band: 2.4G / BW: 3 / CH: H



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	4959.750	51.94	0.23	52.17	74.00	-21.83	peak	150		P	
2 *	4959.750	35.84	0.23	36.07	54.00	-17.93	AVG	150		P	
3	7004.250	37.46	3.61	41.07	74.00	-32.93	peak	150		P	
4	7016.000	25.65	3.64	29.29	54.00	-24.71	AVG	150		P	

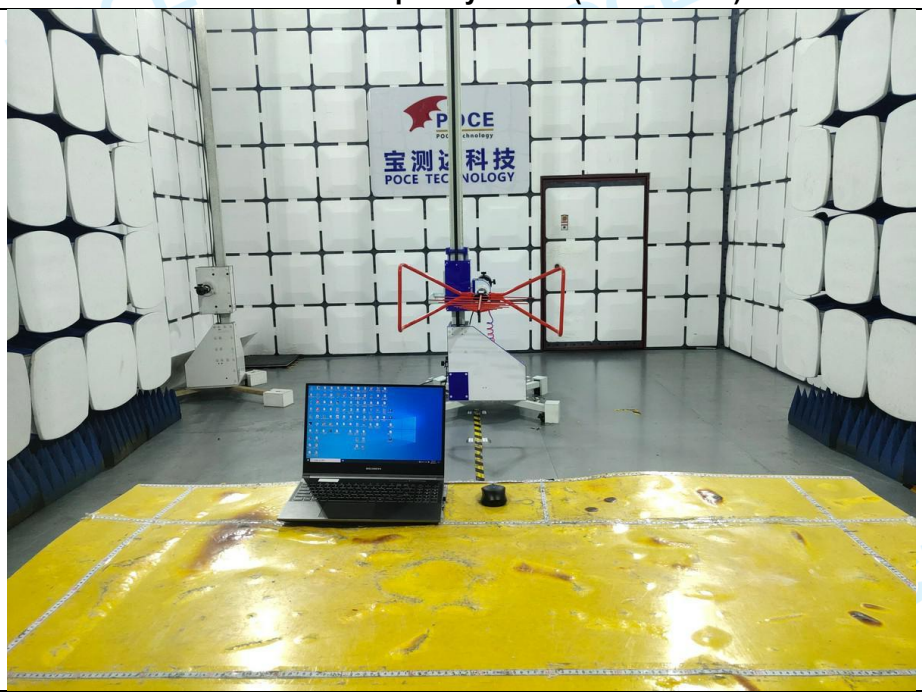
Remark: Margin= Measurement Level - Limit
Measurement Level=Test reading + correction factor
Correction Factor= Antenna Factor + Cable loss – Pre-amplifier

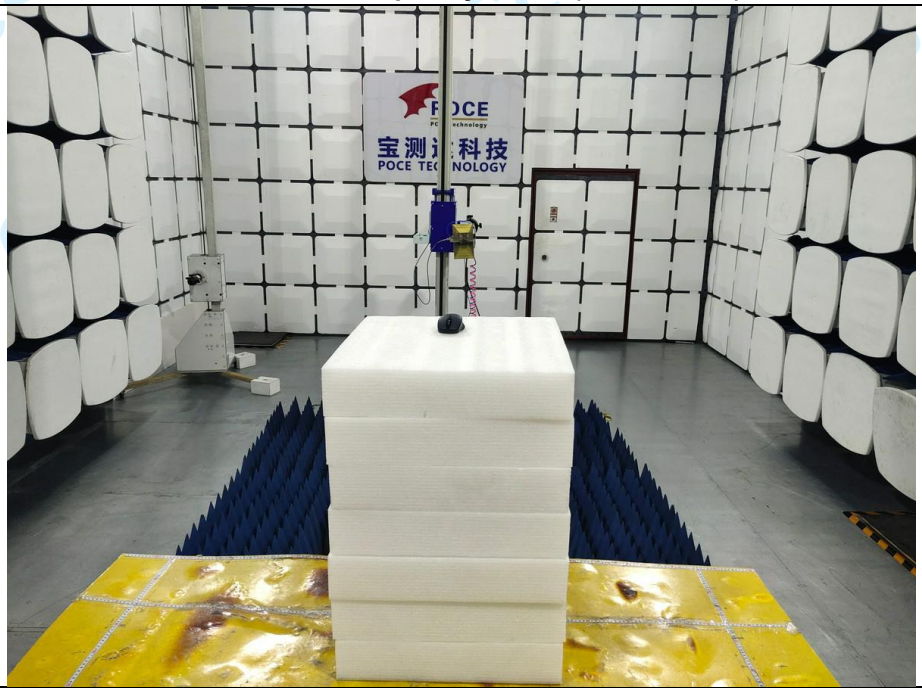
Note:
Per ANSI C63.10-2013, if there are two or more antnnas, the conducted powers at Core 0, Core 1,…, Core i were first measured separately, as shown in the section above(this product olny have one antenna). The measured values were then summed in linear power units then converted back to dBm.

Sample Multiple antennas Calculation: Core 0 + Core 1 +…Core i. = MIMO/CDD
(i is the number of antennas)

(#VALUE! mW + XX mW) = #VALUE! mW = XX dBm
Sample e.i.r.p. Calculation:
XX dBm= Conducted Power (dBm) + Ant gain (dBi)

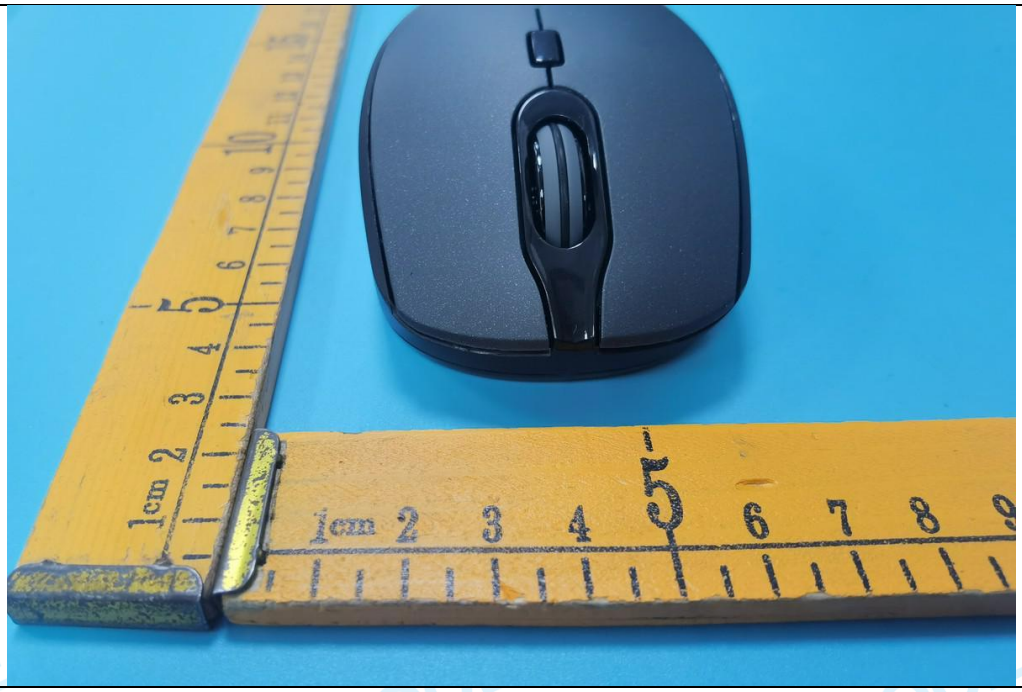
5 TEST SETUP PHOTOS

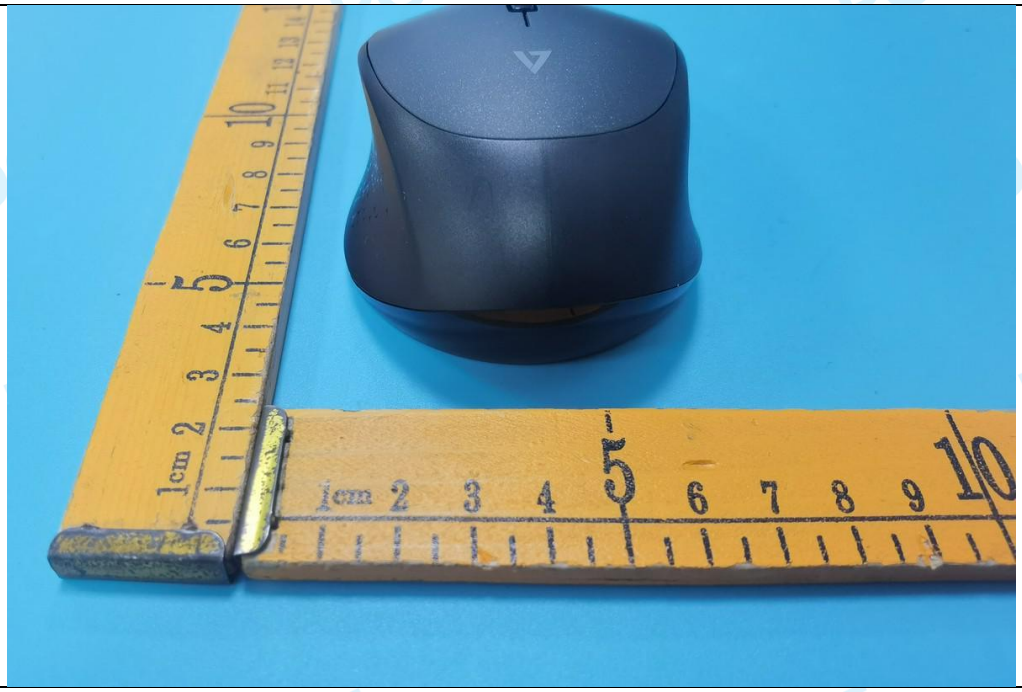
Emissions in frequency bands (below 1GHz)


Emissions in frequency bands (above 1GHz)


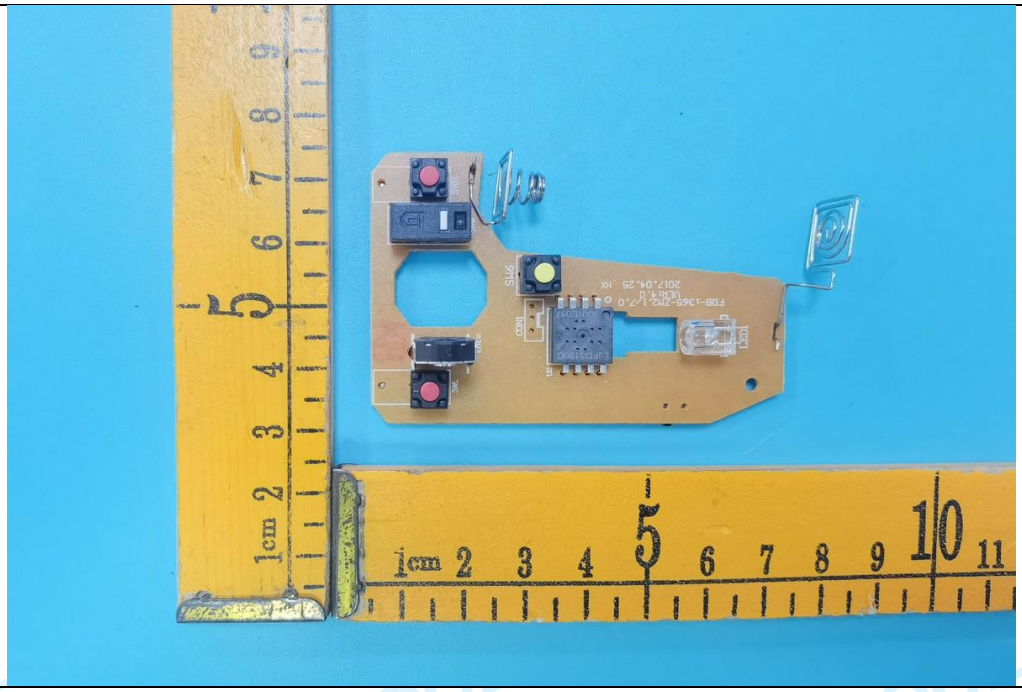
6 PHOTOS OF THE EUT

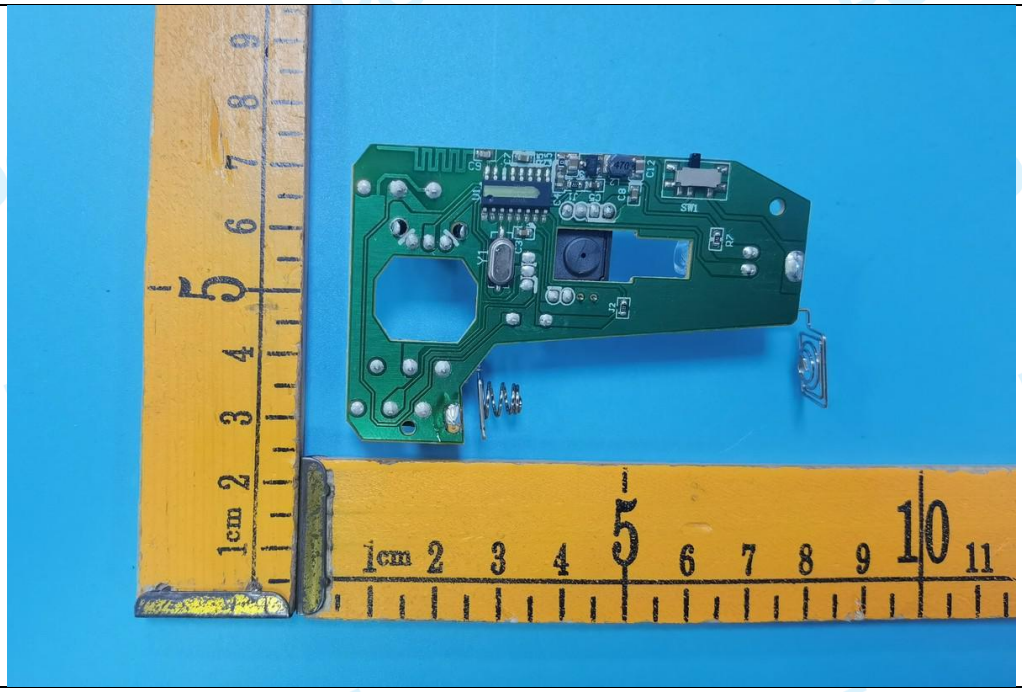
External



Internal



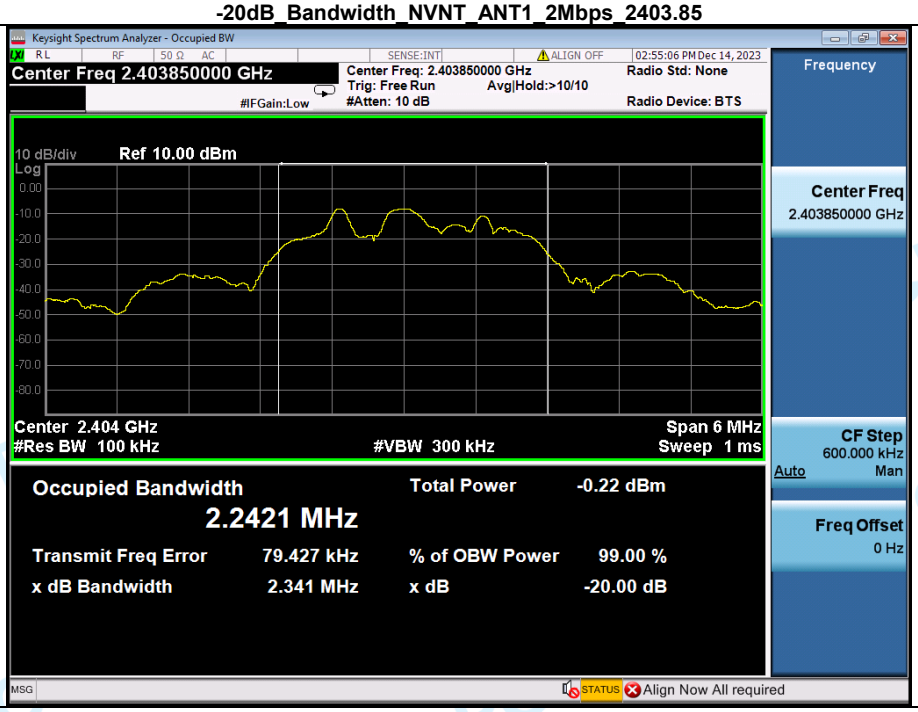


Appendix

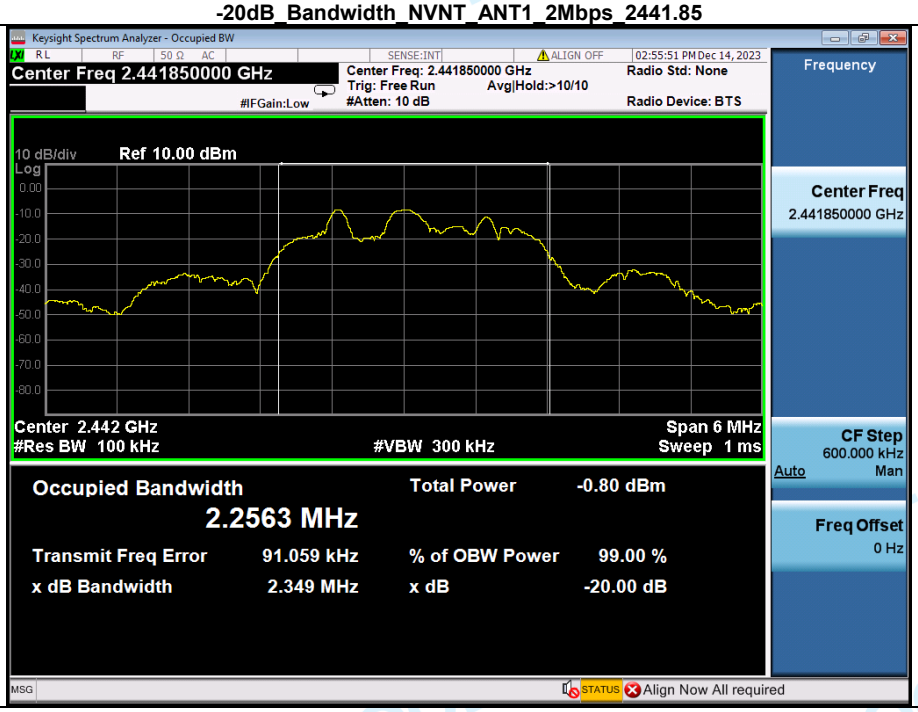
1. -20dB Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	-20dB BW(kHz)	Result
NVNT	ANT1	2Mbps	2403.85	2341	Pass
NVNT	ANT1	2Mbps	2441.85	2349	Pass
NVNT	ANT1	2Mbps	2479.85	2345	Pass

-20dB_Bandwidth_NVNT_ANT1_2Mbps_2403.85



-20dB_Bandwidth_NVNT_ANT1_2Mbps_2441.85

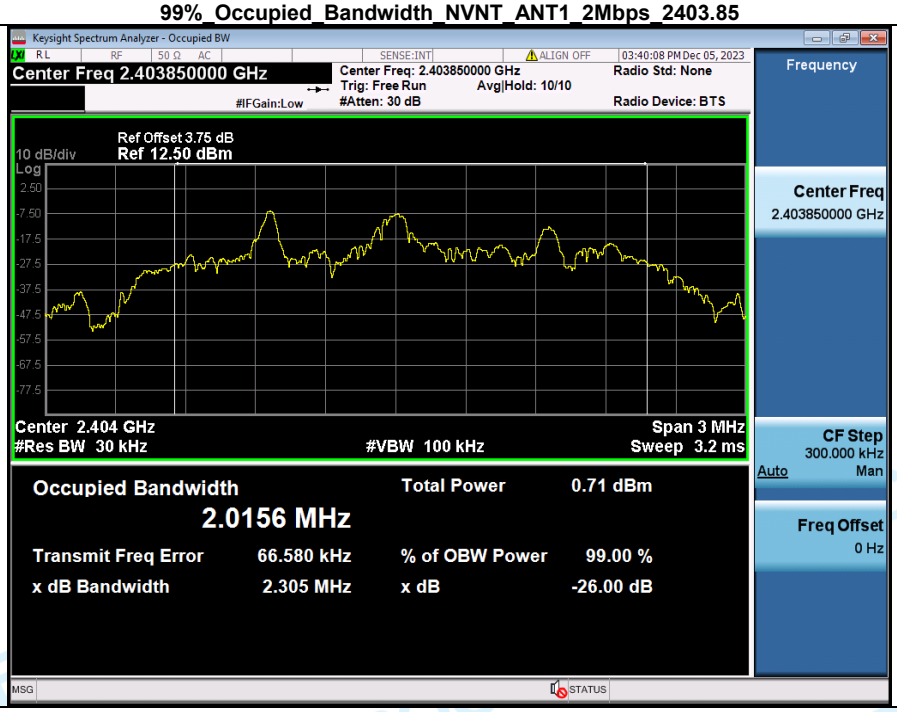


-20dB_Bandwidth_NVNT_ANT1_2Mbps_2479.85

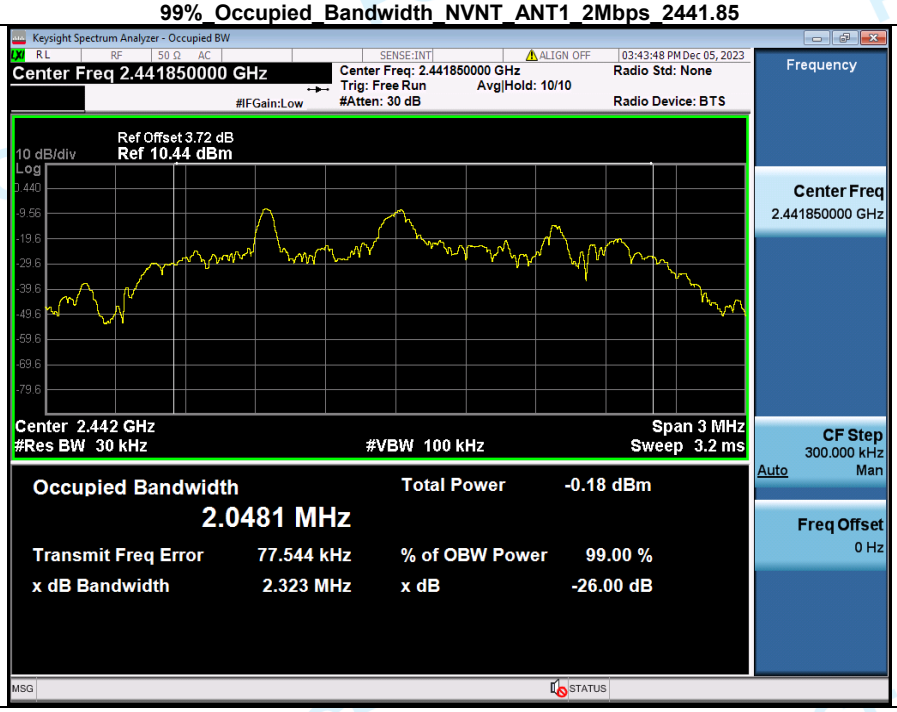
2. 99% Occupied Bandwidth

Condition	Antenna	Rate	Frequency (MHz)	99%%BW(MHz)
NVNT	ANT1	2Mbps	2403.85	2.016
NVNT	ANT1	2Mbps	2441.85	2.048
NVNT	ANT1	2Mbps	2479.85	2.065

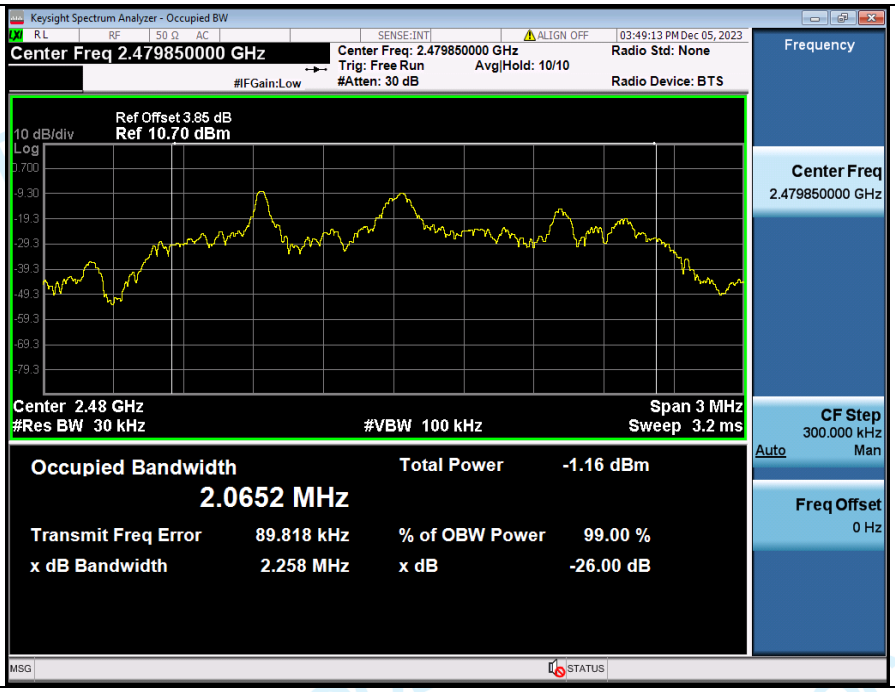
99%_Occupied_Bandwidth_NVNT_ANT1_2Mbps_2403.85



99%_Occupied_Bandwidth_NVNT_ANT1_2Mbps_2441.85



99%_Occupied_Bandwidth_NVNT_ANT1_2Mbps_2479.85



********** End of Report **********