

RADIO TEST REPORT

The device described below is tested by Dongguan Nore Testing Center Co., Ltd. to determine the maximum emission levels emanating from the device, the severe levels which the device can endure and E.U.T.'s performance criterion. The test results, data evaluation, test procedures, and equipment of configurations shown in this report were made in accordance with the procedures in ANSI C63.10(2013).

Applicant : Acrox Technologies Co., Ltd
Address : 4F., No.89, Minshan St., Neihu Dist., Taipei City 114, Taiwan
Manufacturer / Factory : Acrox Technologies Co., Ltd
Address : Hsinmin Industrial, Changan Town, Dongguan City, Guangdong, China
E.U.T. : WIRELESS MOUSE
Brand Name : Acrox, onn
Model No. : G2W, ONA19HO015 (For model difference refer to section 1)
FCC ID : PRDMU71
Measurement Standard : FCC PART 15.249
Date of Receiver : March 05, 2019
Date of Test : March 05, 2019 to March 12, 2019
Date of Report : March 12, 2019

This Test Report is Issued Under the Authority of :

Prepared by


Rose Hu / Engineer

Approved & Authorized Signer


Iori Fan / Authorized Signatory

This test report is for the customer shown above and their specific product only. This report applies to above tested sample only and shall not be reproduced in part without written approval of Dongguan Nore Testing Center Co., Ltd.

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Revision History of This Test Report

Report Number	Description	Issued Date
NTC1903050FV00	Initial Issue	2019-03-13

1. GENERAL INFORMATION

1.1 Product Description for Equipment under Test

Product Name	: WIRELESS MOUSE
Main model number	: ONA19HO015
Additional Model number	: G2W
Brand Name	: Acrox, onn
Power Supply	: 2 * DC 1.5V AAA battery
Adapter	: N/A
Test voltage	: DC 3.0V
Cable	: N/A
Operating Temperature Range	: 0°C to 40°C (Declaration by manufacturer)
Model Difference Description	: 1. Both of models have the same circuit schematic, PCB layout and construction. Their difference in model name are only for trading purpose. 2. According to the model difference, all tests performed on model ONA19HO015.
Hardware version	: V01
Software version	: V01
Note	: This product consists of two parts, mouse and dongle, this report only applies to Mouse.

Technical Specification:

2.4G Function:

Frequency Range : 2404~2478MHz
Modulation Type : GFSK
Number of Channel : 20
Antenna Type : PCB Antenna
Antenna Gain : -1dBi (Declaration by manufacturer)

Channel List:

Channel	1	2	3	4	5
Frequency(MHz)	2404	2414	2478	2408	2454
Channel	6	7	8	9	10
Frequency(MHz)	2406	2456	2410	2405	2474
Channel	11	12	13	14	15
Frequency(MHz)	2425	2450	2470	2458	2477
Channel	16	17	18	19	20
Frequency(MHz)	2452	2460	2435	2466	2441

Note: The Lowest, Middle and the Highest frequency of channel were selected to perform the test. The frequency selected see below:

The Lowest frequency: 2404MHz
The middle frequency: 2441MHz
The Highest frequency: 2478MHz

1.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: PRDMU71** filing to comply with Section 15.249 of the FCC Part 15 (2017), Subpart C Rule.

1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters.

1.4 Equipment Modifications

Not available for this EUT intended for grant.

1.5 Support Device

N/A

1.6 Test Facility and Location

Site Description

EMC Lab : Listed by CNAS, August 13, 2018
The certificate is valid until August 13, 2024
The Laboratory has been assessed and proved to
be in compliance with CNAS/CL01
The Certificate Registration Number is L5795.

Listed by A2LA, November 01, 2017
The certificate is valid until December 31, 2019
The Laboratory has been assessed and proved to
be in compliance with ISO17025
The Certificate Registration Number is 4429.01

Listed by FCC, November 06, 2017
The Designation Number is CN1214
Test Firm Registration Number: 907417

Listed by Industry Canada, June 08, 2017
The Certificate Registration Number. Is 46405-9743

Name of Firm : Dongguan Nore Testing Center Co., Ltd.
(Dongguan NTC Co., Ltd.)

Site Location : Building D, Gaosheng Science and Technology
Park, Hongtu Road, Nancheng District, Dongguan
City, Guangdong Province, China

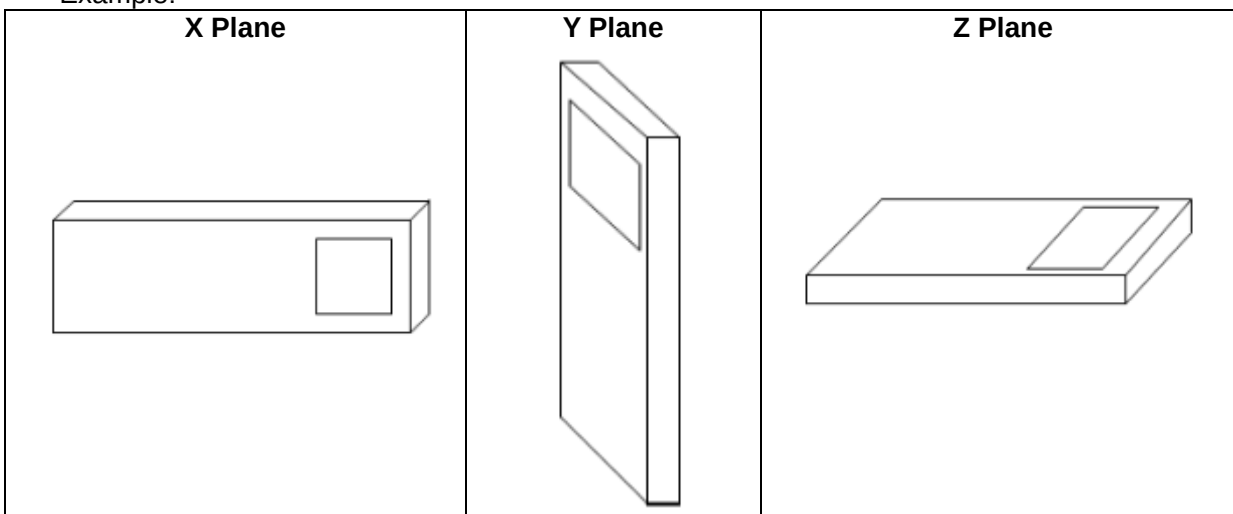
1.7 Summary of Test Results

FCC Rules	Description Of Test	Uncertainty	Result
§15.207(a)	AC Power Conducted Emission	±1.06dB	Not applicable
§15.249(a)/ 15.209	Radiated Emissions	±3.70dB	Compliant
§15.249(d)/ 15.205	Band Edge	±1.70dB	Compliant
§15.215(c)	20dB Bandwidth	±1.42 x10 ⁻⁴ %	Compliant
§15.203	Antenna Requirement	±0.60dB	Compliant

Note: 1. The EUT powered by battery and operating multiple positions, so the EUT shall be performed three orthogonal planes. The worst plane is X.

2. Due to the EUT is powered by battery, so the AC Power Conducted Emission is not applicable.

Example:



2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 Special Accessories

Not available for this EUT intended for grant.

2.3 Description of test modes

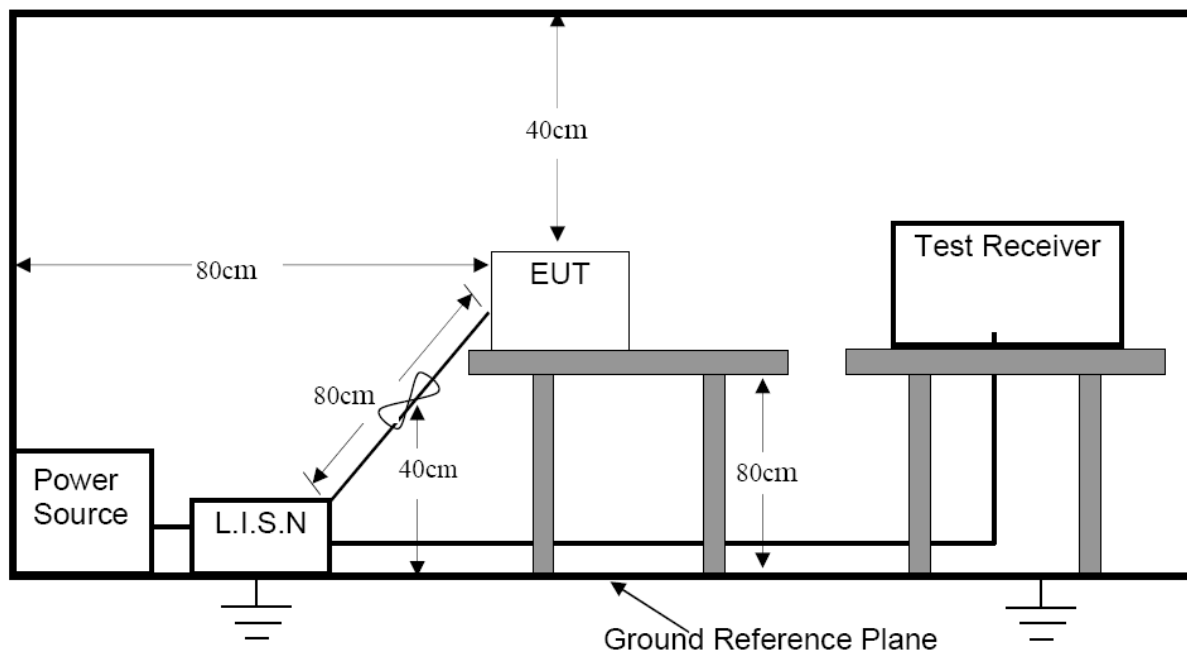
The EUT has been tested under operating condition. The Lowest, Middle and Highest frequencies were chosen for testing.

2.4 EUT Exercise

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

3. Conducted Emissions Test

3.1 Test SET-UP (Block Diagram of Configuration)



3.2 Test Condition

Test Requirement: FCC Part 15.207

Frequency Range: 150KHz ~ 30MHz

Detector: RBW 9KHz, VBW 30KHz

Operation Mode: TX

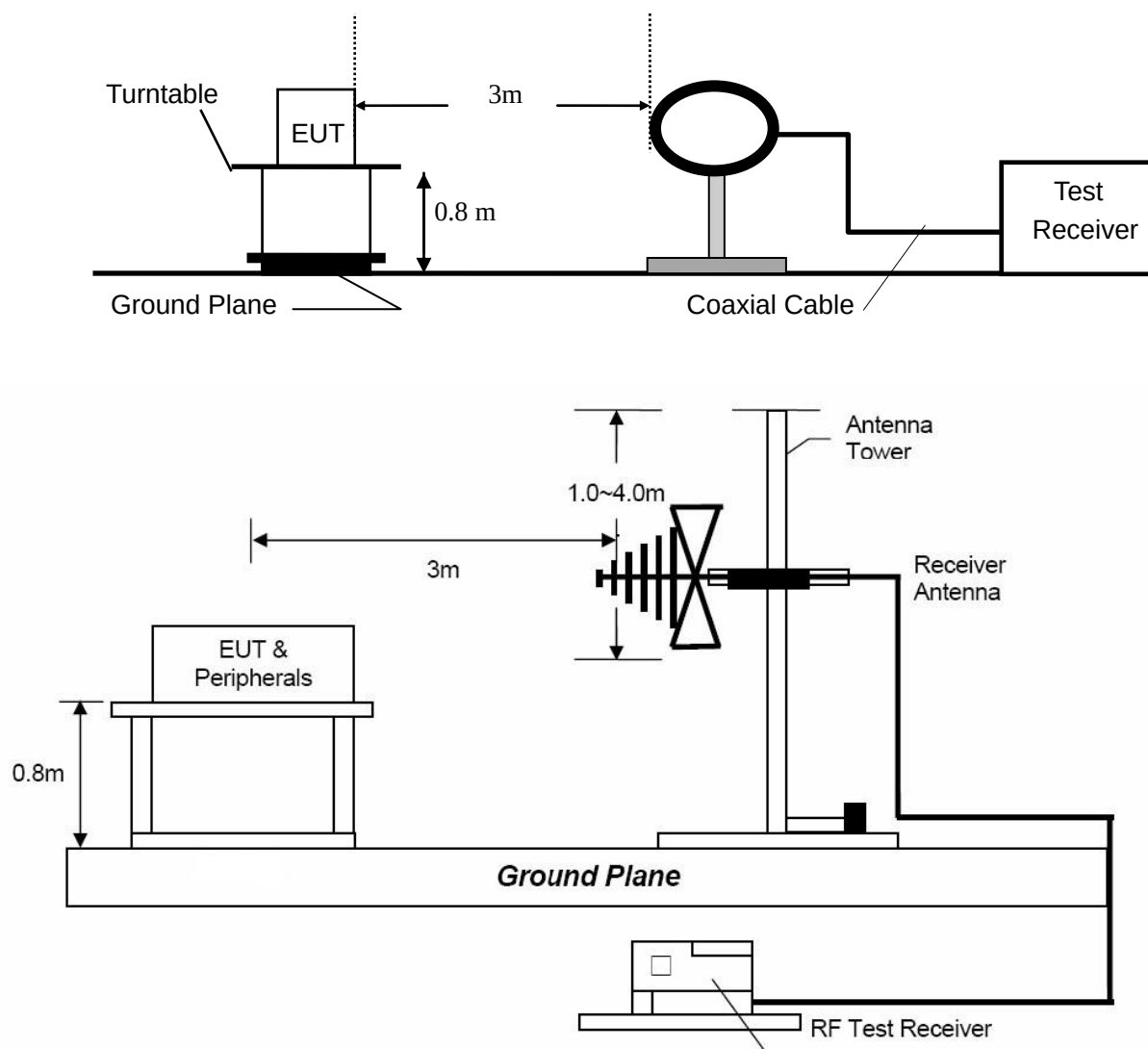
3.3 Measurement Results

Not applicable.

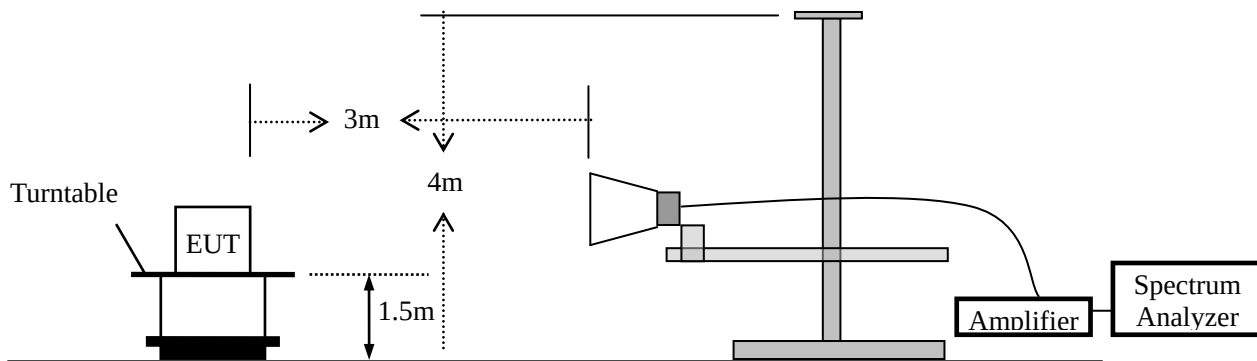
4. Radiated Emission Test

4.1 Test SET-UP (Block Diagram of Configuration)

4.1.1 Radiated Emission Test Set-Up, Frequency Below 30MHz



4.1.2 Radiated Emission Test Set-Up, Frequency above 1GHz



4.2 Measurement Procedure

- Blow 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic chamber room.
- For the radiated emission test above 1GHz:
The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter full anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna 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.
- 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode.
- A Quasi-peak measurement was then made for that frequency point for below 1GHz test. PK and AV for above 1GHz emission test.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Band (MHz)	Level	Resolution Bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	3 MHz
	Average	1 MHz	10 Hz

4.3 Limit

Frequency range MHz	Distance Meters	Field Strengths Limit (15.209)	
		$\mu\text{V/m}$	
0.009 ~ 0.490	300	$2400/F(\text{kHz})$	
0.490 ~ 1.705	30	$24000/F(\text{kHz})$	
1.705 ~ 30	30	30	
30 ~ 88	3	100	
88 ~ 216	3	150	
216 ~ 960	3	200	
Above 960	3	500	
Frequency range MHz	Distance Meters	Field Strengths Limit (15.249)	
		mV/m (Field strength of fundamental)	$\mu\text{V/m}$ (Field strength of Harmonics)
902 ~ 928	3	50	500
2400 ~ 2483.5	3	50	500
5725 ~ 5875	3	50	500
24000 ~ 2425000	3	250	2500

- Remark: (1) Emission level $(\text{dB})\mu\text{V} = 20 \log \text{Emission level } \mu\text{V/m}$
(2) The smaller limit shall apply at the cross point between two frequency bands.
(3) As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.
(4) The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

4.4 Measurement Results

Please refer to the following page of the worst case: Low channel



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Radiated Emission Measurement

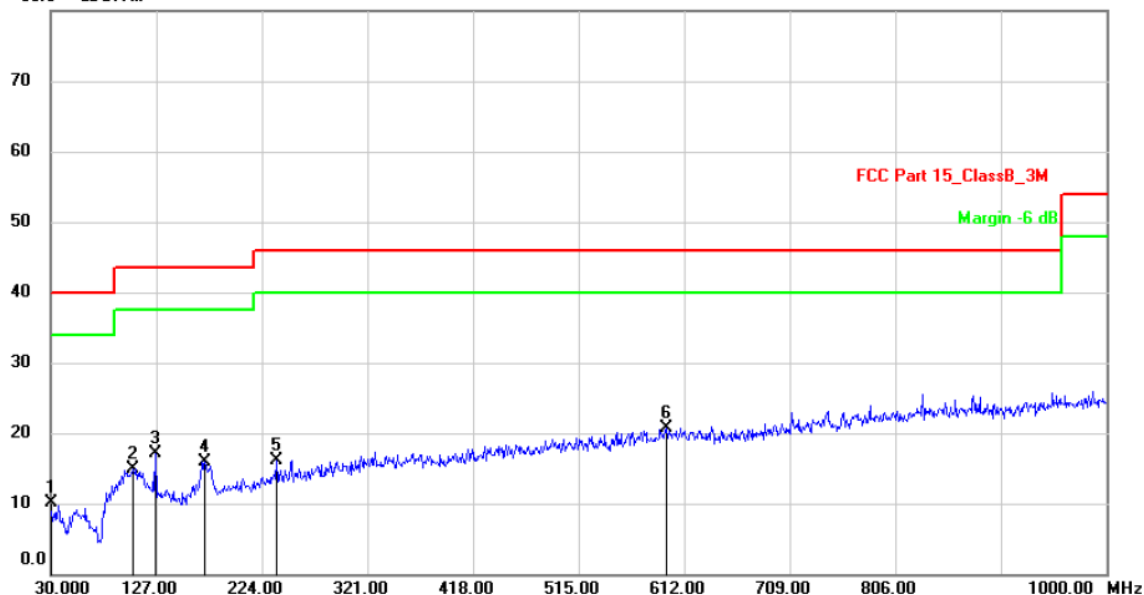
File :G2W

Data :#12

Date: 2019/3/8

Time: 15:59:03

80.0 dBuV/m



Site

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Part 15_ClassB_3M

Power: DC 3V

Humidity: 47 %

EUT: WIRELESS MOUSE

Distance: 3m

M/N: ONA19HO015

Mode: TX

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		30.0000	26.58	-16.57	10.01	40.00	-29.99	QP		
2		105.6600	27.05	-12.15	14.90	43.50	-28.60	QP		
3		126.0300	31.87	-14.73	17.14	43.50	-26.36	QP		
4		171.6200	30.66	-14.71	15.95	43.50	-27.55	QP		
5		237.5800	28.22	-12.13	16.09	46.00	-29.91	QP		
6	*	595.5100	25.88	-5.12	20.76	46.00	-25.24	QP		

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.



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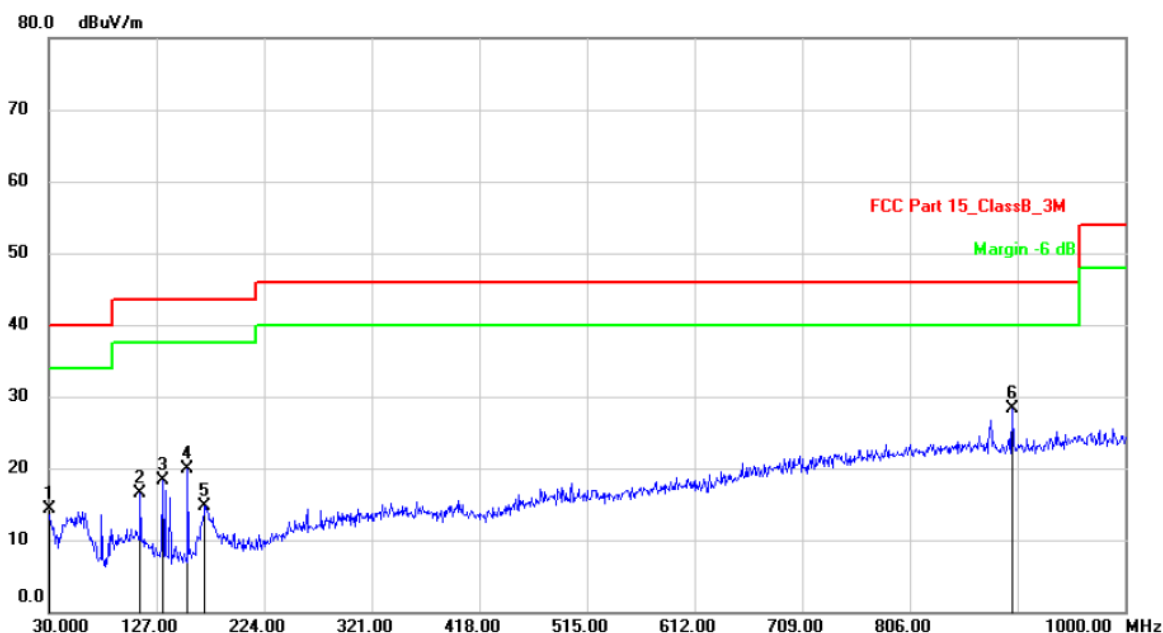
Radiated Emission Measurement

File : G2W

Data : #11

Date: 2019/3/8

Time: 15:52:33



Site

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part 15_ClassB_3M

Power: DC 3V

Humidity: 47 %

EUT: WIRELESS MOUSE

Distance: 3m

M/N: ONA19HO015

Mode: TX

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		30.0000	30.18	-15.90	14.28	40.00	-25.72	QP		
2		112.4500	32.56	-16.08	16.48	43.50	-27.02	QP		
3		132.8200	36.67	-18.28	18.39	43.50	-25.11	QP		
4		155.1300	38.26	-18.36	19.90	43.50	-23.60	QP		
5		170.6500	32.55	-17.76	14.79	43.50	-28.71	QP		
6	*	898.1500	29.55	-1.22	28.33	46.00	-17.67	QP		

Note: Below 30MHz, the emissions are lower than 20dB below the allowable limit.

Frequency Range:	1-25GHz	Test Date :	March 07, 2019
Test Result:	PASS	Temperature :	21 °C
Measured Distance:	3m	Humidity :	55 %
Test By:	Sance		

Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
Operation Mode: TX Mode (Low)										
2404	V	72.26	59.92	0.14	72.40	60.06	114.00	94.00	-41.60	-33.94
4808	V	47.01	35.50	6.33	53.34	41.83	74.00	54.00	-20.66	-12.17
7212	V	46.06	30.86	10.44	56.50	41.30	74.00	54.00	-17.50	-12.70

2404	H	74.80	63.62	0.14	74.94	63.76	114.00	94.00	-39.06	-30.24
4808	H	49.30	36.73	6.33	55.63	43.06	74.00	54.00	-18.37	-10.94
7212	H	45.97	30.88	10.44	56.41	41.32	74.00	54.00	-17.59	-12.68

Operation Mode: TX Mode (Mid)										
2441	V	71.86	59.58	0.24	72.1	59.82	114.00	94.00	-41.90	-34.18
4882	V	47.15	34.91	6.60	53.75	41.51	74.00	54.00	-20.25	-12.49
7323	V	46.58	31.11	10.55	57.13	41.66	74.00	54.00	-16.87	-12.34

2441	H	72.54	60.16	0.24	72.78	60.40	114.00	94.00	-41.22	-33.60
4882	H	47.85	38.94	6.60	54.45	45.54	74.00	54.00	-19.55	-8.46
7323	H	46.88	31.07	10.55	57.43	41.62	74.00	54.00	-16.57	-12.38

Operation Mode: TX Mode (High)										
2478	V	73.56	62.12	0.34	73.90	62.46	114.00	94.00	-40.10	-31.54
4956	V	45.95	30.93	6.88	52.83	37.81	74.00	54.00	-21.17	-16.19
7434	V	46.58	31.23	10.59	57.17	41.82	74.00	54.00	-16.83	-12.18

2478	H	71.72	61.93	0.34	72.06	62.27	114.00	94.00	-41.94	-31.73
4956	H	46.17	30.95	6.88	53.05	37.83	74.00	54.00	-20.95	-16.17
7434	H	46.45	31.20	10.59	57.04	41.79	74.00	54.00	-16.96	-12.21

Note: (1) All Readings are Peak Value and AV.
(2) Emission Level= Reading Level + Factor
(3) Factor= Antenna Gain + Cable Loss – Amplifier Gain
(4) Data of measurement within this frequency range shown “ ---” in the table above means the reading of emissions are attenuated more than 10dB below the permissible limits.
(5) Measurement uncertainty : ±3.7dB.
(6) Horn antenna used for the emission over 1000MHz.
(7) Due to the highest Peak emission level below AVG limit, therefore, the AVG emission level is deemed to meet the requirements, no AVG result record.

5. 20dB Bandwidth

5.1 Measurement Procedure

The 20dB bandwidth of the emission was contained within the frequency band designated which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered, FCC Rule 15.215(c):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RBW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. Use the spectrum 20dB down delta function to measure the bandwidth.

5.2 Test SET-UP (Block Diagram of Configuration)



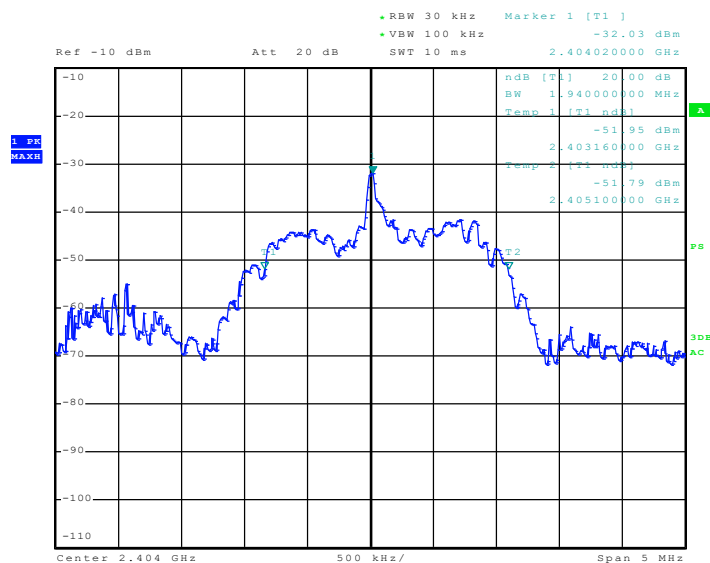
5.3 Measurement Results

Refer to attached data chart.

RBW:	100KHz	VBW:	300KHz
Spectrum Detector:	PK	Temperature :	22 °C
Test By:	Lee	Humidity :	54 %
Test Result:	PASS	Test Date :	March 12, 2019

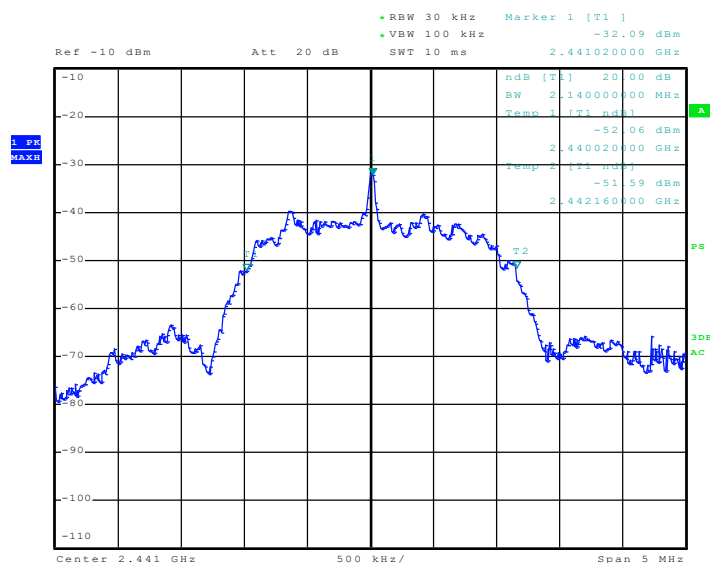
Channel frequency (MHz)	20dB Down BW(MHz)
2404	1.94
2441	2.14
2478	2.13

Lowest Channel



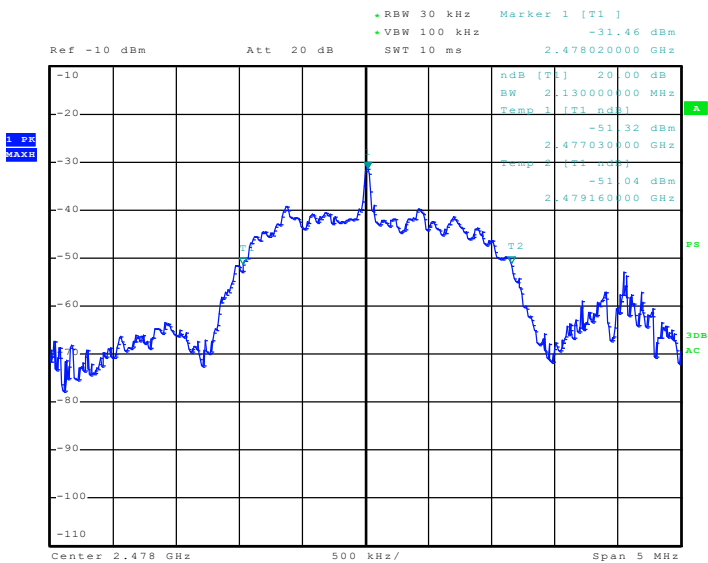
Date: 12.MAR.2019 16:16:38

Middle Channel



Date: 12.MAR.2019 16:16:55

Highest Channel



Date: 12.MAR.2019 16:17:15

6. Band Edge

6.1 Measurement Procedure

Same as Radiated Emission Test.

6.2 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.

6.3 Measurement Results

Operation Mode:	TX Mode	Test Date :	
Temperature :	21 °C	Humidity :	55 %
Test Result:	PASS	Test By:	Sance
Measured Distance:	3m		

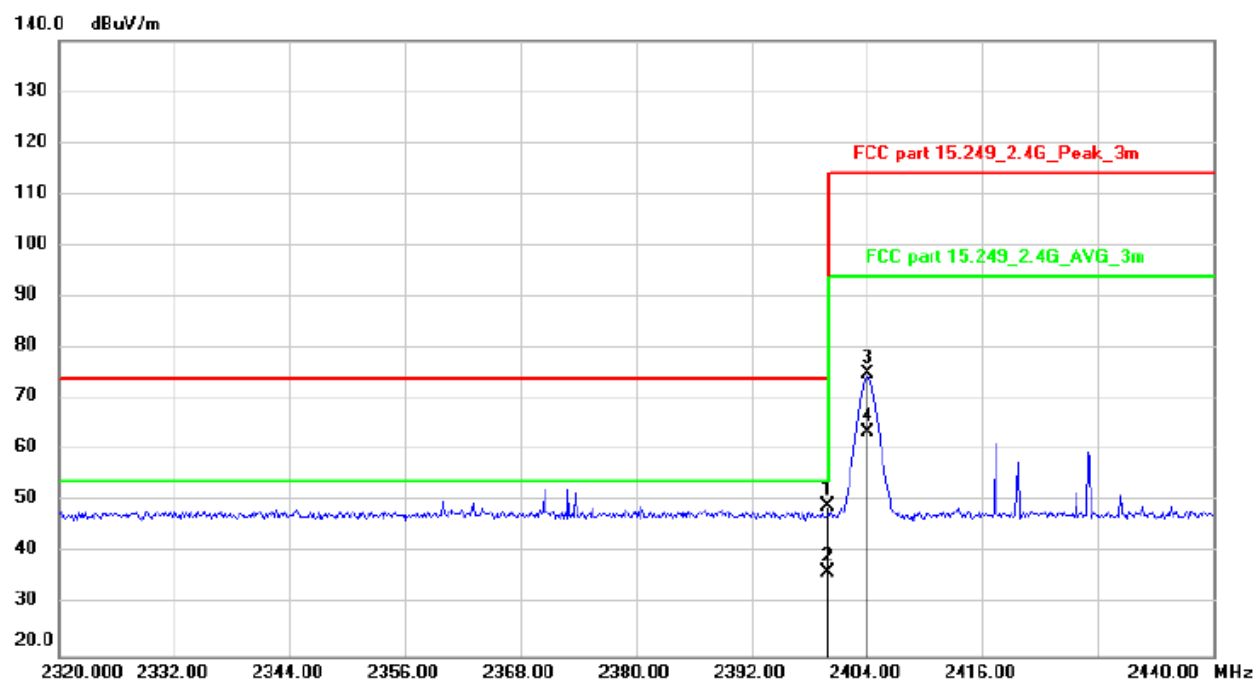
Freq. (MHz)	Ant.Pol. (H/V)	Reading Level(dBuV)		Factor (dB/m)	Emission Level (dBuV)		Limit 3m (dBuV/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
2399.000	H	49.16	36.23	0.13	49.29	36.36	74.00	54.00	-24.71	-17.64
2399.000	V	49.01	36.11	0.13	49.14	36.24	74.00	54.00	-24.86	-17.76
2483.500	H	46.83	34.55	0.34	47.17	34.89	74.00	54.00	-26.83	-19.11
2483.500	V	46.81	35.4	0.34	47.15	35.74	74.00	54.00	-26.85	-18.26

Note:

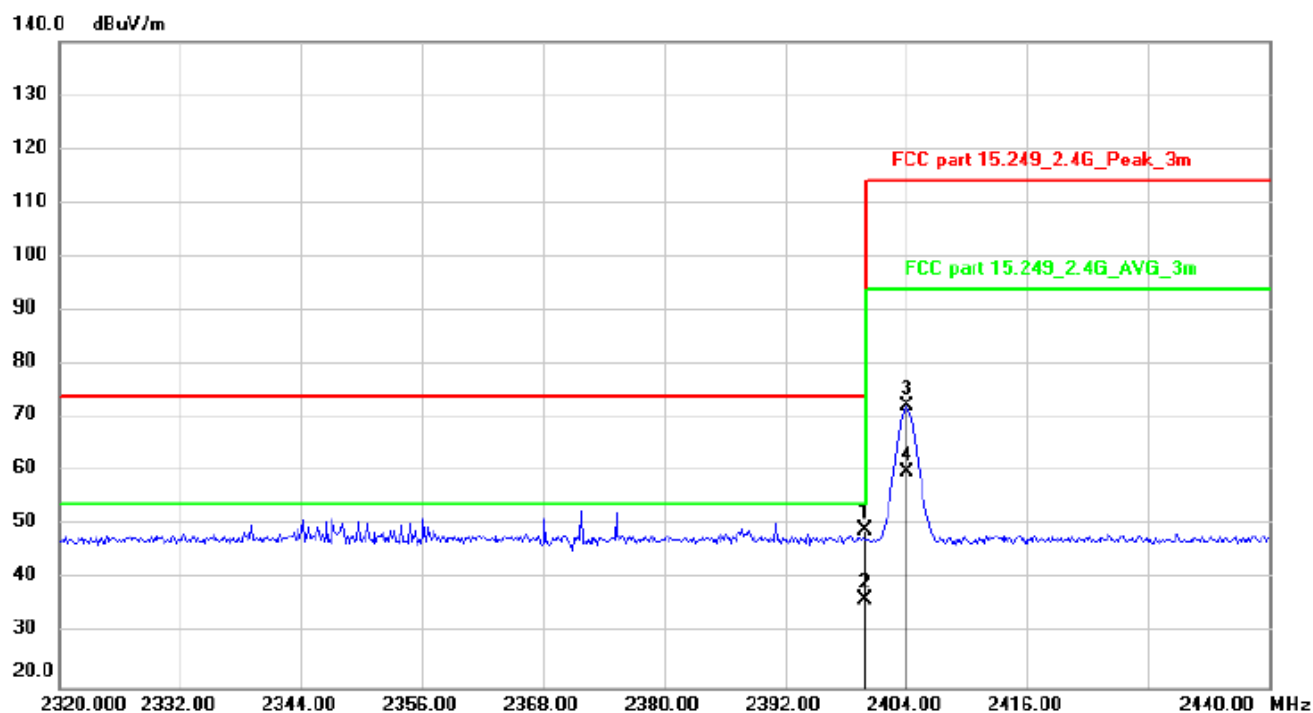
- (1) Emission Level= Reading Level + Factor
- (2) Factor= Antenna Gain + Cable Loss – Amplifier Gain
- (3) Horn antenna used for the emission over 1000MHz.

Low channel

Horizontal



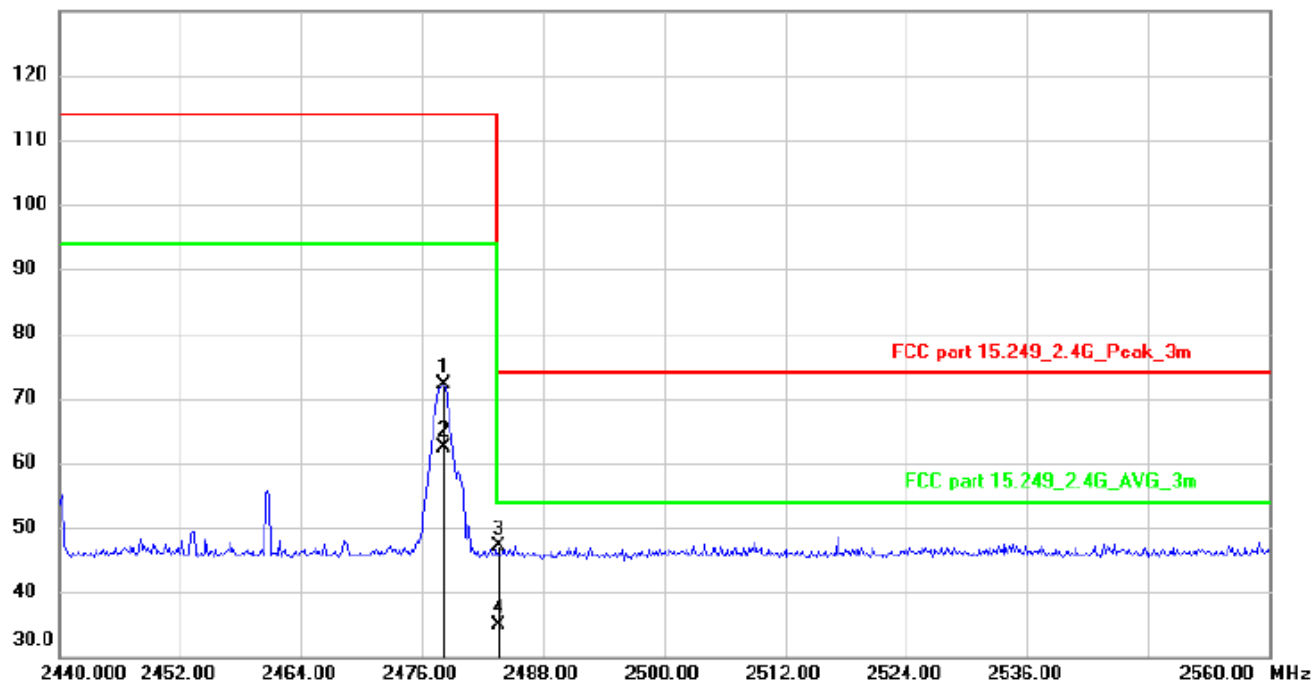
Vertical



High channel

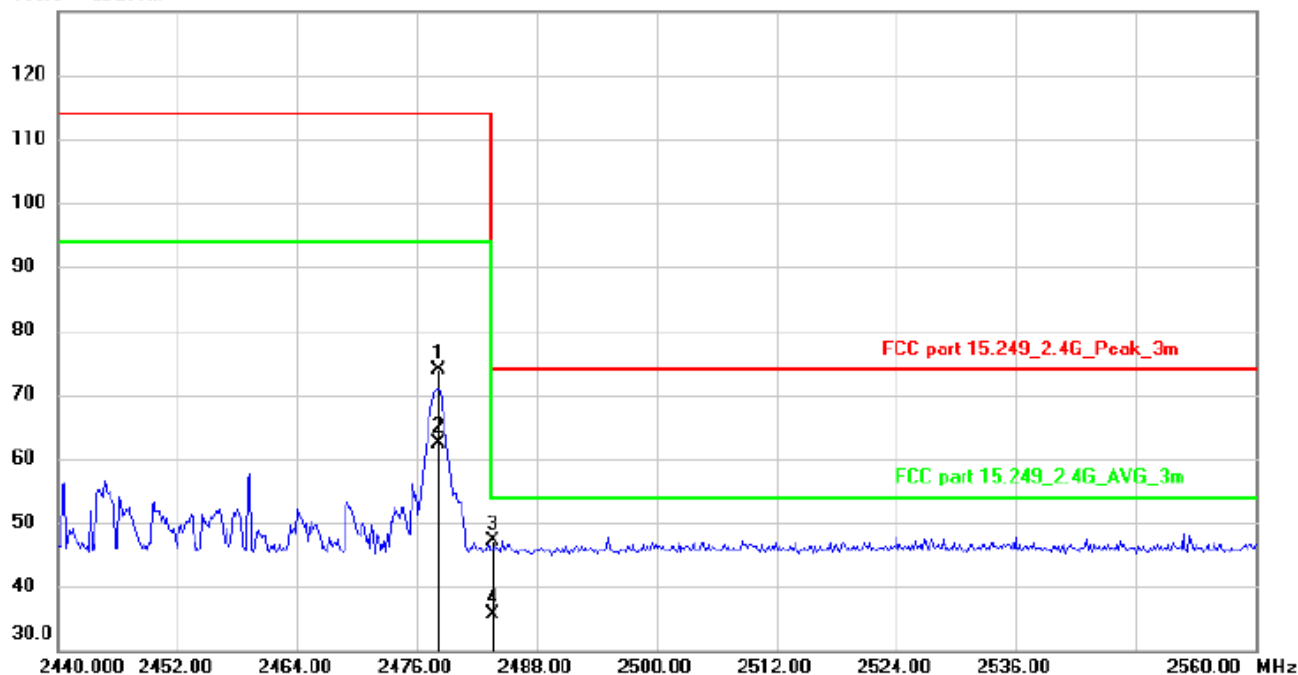
Horizontal

130.0 dBuV/m



Vertical

130.0 dBuV/m



7. Antenna requirement

7.1 Measurement Procedure

According to of FCC part 15C section 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, 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.

Systems operating in the 2400-2483.5MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

7.2 Measurement Results

The antenna is PCB antenna and no consideration of replacement, and the best case gain of the antenna is -1 dBi. So, the antenna is consider meet the requirement.

8. Test Equipment List

No.	Equipment	Manufacturer	Model No.	Serial No.	Characteristics	Last Cal.	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCI7	100837	9KHz~7GHz	Mar. 14, 2018	Mar. 13, 2019
2.	Antenna	Schwarzbeck	VULB9162	9162-010	30MHz~7GHz	Mar. 23, 2018	Mar. 22, 2019
3.	Spectrum Analyzer	Rohde & Schwarz	FSU26	200409/026	20Hz~26.5GHz	Mar. 14, 2018	Mar. 13, 2019
4.	Spectrum Analyzer	Keysight	N9020A	MY54200831	20Hz~26.5GHz	Apr. 24, 2018	Apr. 23, 2019
5.	Horn Antenna	Schwarzbeck	BBHA9170	9170-372	15GHz~40GHz	Mar. 23, 2018	Mar. 22, 2019
6.	Pre-Amplifier	EMCI	EMC 184045	980102	18GHz~40GHz	Apr. 24, 2018	Apr. 23, 2019
7.	Power Sensor	DARE	RPR3006W	15I00041SN064	100MHz~6GHz	Mar. 14, 2018	Mar. 13, 2019
8.	Horn Antenna	COM-Power	AH-118	071078	500MHz~18GHz	Mar. 23, 2018	Mar. 22, 2019
9.	Pre-Amplifier	HP	HP 8449B	3008A00964	1GHz~26.5GHz	Mar. 14, 2018	Mar. 13, 2019
10.	Pre-Amplifier	HP	HP 8447D	1145A00203	100KHz~1.3GHz	Mar. 14, 2018	Mar. 13, 2019
11.	Loop Antenna	Schwarzbeck	FMZB 1513	1513-272	9KHz~30MHz	Apr. 24, 2018	Apr. 23, 2019
12.	Temperature & Humidity Chamber	REMAFEE	SYHR225L	N/A	-40~150°C	Apr. 24, 2018	Apr. 23, 2019
13.	DC Source	MY	MY8811	N/A	0~30V	Mar. 23, 2018	Mar. 22, 2019
14.	Temporary antenna connector	TESCOM	SS402	N/A	9KHz~25GHz	N/A	N/A
15.	Test Receiver	Rohde & Schwarz	ESCI	101152	9KHz~3GHz	Mar. 14, 2018	Mar. 13, 2019
16.	L.I.S.N	Rohde & Schwarz	ENV 216	101317	N/A	Mar. 14, 2018	Mar. 13, 2019
17.	L.I.S.N	Schwarzbeck	NNLK8129	8129212	N/A	Mar. 06, 2019	Mar. 05, 2020
18.	RF Switching Unit	Compliance Direction Systems Inc.	RSU-M2	38311	N/A	Mar. 14, 2018	Mar. 13, 2019
19.	Test Software	EZ	EZ_EMC	N/A	N/A	N/A	N/A

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

---End---