

FCC Test Report

FCC EVALUATION REPORT FOR CERTIFICATE	
Project Reference No.	308467
Product	Wireless Mouse Dongle
Brand Name	N/A
Model	WMD
Alternate Model	N/A
Tested according to	FCC Rules and Regulations Part 15 Subpart C, 15.249 ANSI C63.4-2014 and ANSI C63.10-2013

Tested in period	2016-05-04
Issued date	2016-05-06
Name and address of the Test House	 Nemko Shanghai Ltd. Shenzhen Branch Unit CD, Floor 10, Tower 2, Kefa Road 8#, Hi-Technology Park, Nanshan District, Shenzhen, China Phone : +86 755 8221 0420 Fax : +86 755 8221 3363
Tested by	 2016-05-10 Juno Wong date
Verified by	 2016-05-10 Zone Peng date

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1. Client Information

1.1 Applicant

Company Name: Heng Yu Electronic Manufacturing Co., Ltd.
Company Address: Room 1503-5, 15/F, Nan Fung Commercial Center, 19 Lam Lok Street, Kowloon Bay, Hong Kong.

1.2 Manufacturer

Company Name: Zhuhai Heng Yu New Technology Company Limited
Company Address: Jin Hai Avenue, Sanzao, Jinwan District, Zhuhai, Guangdong, China.

1.3 Scope

●Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.249.



2. Equipment under Test (EUT)

2.1 Identification of EUT

Category:	DXX
Name:	Wireless Mouse Dongle
Model Name:	WMD
Alternate model:	N/A
Brand name:	N/A

2.2 Detail spec:

Operation Frequency: 2408 MHz -2474MHz

Type of Modulation : GFSK

Antenna Type: Integral Antenna

Antenna Number : 1

Antenna gain: 0dBi

Channel number: 67

Data rate: 1Mbps

Input: 5VDC from PC USB port

2.3 Additional Information Related to Testing

CH LOW:2408MHz

CH MID:2440MHz

CH HIGH:2474MHz

Remark: Only the worse case found by prescan is listed

3. General Test Conditions

3.1 Location

Global United Technology Services Co., Ltd. -- Nemko ELA 632

2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

FCC Registration No.:600491

Note: all test are witnessed by NEMKO engineer

3.2 Operating Environment

All tests and measurements were performed in a shielded enclosure or a controlled environment suitable for the tests conducted. The climatic conditions in the test area are automatically controlled and recorded continuously.

Parameters	Recording during test	Accepted deviation
Ambient temperature	24-25°C	15 – 35 °C
Relative humidity	50-55%	30 - 60%
Atmospheric pressure	101.2 kPa -101.3kPa	86-106kPa

3.3 Operating During Test

Test mode

TM1 : TX MODE continuous transmitter

Remark : DC 5V from PC.

3.4 Test Equipment

The test equipments used in testing are calibrated on a regular basis. For most of the testing equipments accredited calibration is conducted once a year. For certain equipment the calibration interval is longer. Between the calibrations all test equipment are controlled and verified on a regular basis. The test equipments used are defined in each test section of this report.

A.E. used during testing:

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
Apple	PC	A1278	C1MN99ERDTY3	DoC
DELTA	ADAPTER	ADP-60ADT	N/A	VoC
DELL	KEYBOARD	SK-8115	N/A	DoC
DELL	MOUSE	MOC5UO	N/A	DoC

4. Measurement Uncertainty

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95 %.

Conducted Emission : 0.15~30MHz 3.45dB

Radiated Emission: 30MHz~1000MHz 4.50dB

1GHz-18GHz 4.70dB

5. Radiated Electromagnetic Disturbances Test

5.1 Test Procedure

For below 1GHz:

The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast.

The EUT were rotated 0 to 360 degree and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. The test result are reported as below.

RBW=120 kHz; VBW=300KHz QP detector, The frequency range from 30MHz to 1000MHz is checked.

For above 1GHz:

The EUT was placed on a non-metallic table, 150 cm above the ground plane inside a full-anechoic chamber. An antenna was located 3m from the EUT on an adjustable mast.

The EUT were rotated 0 to 360 degree and the antenna height was varied between 1m and 4m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. The test result are reported as below.

The frequency range from 1GHz to 25GHz(10th harmonics) is checked. RBW=1MHz ;

VBW=3MHz, PK detector for peak emissions measurement above 1GHz

RBW=1MHz ; VBW=3MHz, RMS detector for average emissions measurement above 1GHz.

For fundamental:

RBW=3MHz, VBW=10MHz, PK Detector for peak emissions measurement.

RBW=3MHz, VBW=10MHz, RMS Detector for average emissions measurement.

5.2 Measurement Equipment

	Equipment	Calibration due	Type	Serial No.	Manufacturer
<input checked="" type="checkbox"/>	EMI Test Receiver	Jul. 04 2016	ESU26	GTS203	R&S
<input checked="" type="checkbox"/>	BiConiLog Antenna	Feb. 26 2017	VULB9163	GTS214	SCHWARZBECK
<input checked="" type="checkbox"/>	Horn Antenna	Feb. 26 2017	BBHA9120D	GTS215	SCHWARZBECK
<input checked="" type="checkbox"/>	Horn Antenna	Feb. 26 2017	BBHA9170	GTS216	SCHWARZBECK
<input checked="" type="checkbox"/>	Coaxial Cable	Apr. 01 2017	N/A	GTS213	GTS
<input checked="" type="checkbox"/>	Coaxial Cable	Apr. 01 2017	N/A	GTS211	GTS
<input checked="" type="checkbox"/>	Coaxial cable	Apr. 01 2017	N/A	GTS210	GTS
<input checked="" type="checkbox"/>	Coaxial Cable	Apr. 01 2017	N/A	GTS212	GTS
<input checked="" type="checkbox"/>	Amplifier	Jul. 04 2016	8347A	GTS204	HP

5.3 Test Result

Remark: If PK value is lower than AV limit , only show PK diagram as below.

From 18GHz to 25GHz, Spurious Emission can not be found .

For restriction band test :Only list the restriction band test which there found emission.

For other restriction band: no emission found.

For Radiated emission test : The EUT have been tested at X,Y,Z axial direction, Only list the worse mode.

Worse result are reported:

Connect mode	Antenna Polarity	Remark	Test Data	Test Result
GFSK CHL	Horizontal	30-1000MHz	Diagram 5-1	Pass
	Vertical	30-1000MHz	Diagram 5-2	Pass
GFSK CHM	Horizontal	30-1000MHz	Diagram 5-3	Pass
	Vertical	30-1000MHz	Diagram 5-4	Pass
GFSK CHH	Horizontal	30-1000MHz	Diagram 5-5	Pass
	Vertical	30-1000MHz	Diagram 5-6	Pass
GFSK CHL	Horizontal	1GHz-18GHz	Diagram 5-7	Pass
	Vertical	1GHz-18GHz	Diagram 5-8	Pass
GFSK CHM	Horizontal	1GHz-18GHz	Diagram 5-9	Pass
	Vertical	1GHz-18GHz	Diagram 5-10	Pass
GFSK CHH	Horizontal	1GHz-18GHz	Diagram 5-11	Pass
	Vertical	1GHz-18GHz	Diagram 5-12	Pass

NOTES:

1. All modes were measured and only the worst case emission was reported.
2. H =Horizontal V=Vertical
3. Emission = Reading +Antenna Factor + Cable Loss –Amp Factor
4. Emission level dB μ V = 20 log Emission level μ V/m
5. The lower limit shall apply at the transition frequencies.
6. The fundamental and harmonics field strength emission from intentional radiators within the frequency band 2400-2483.5 MHz should comply with:

Field strength of Fundamental	94dBuV/m for AV (@3m) 114dBuV/m for peak (@3m)
Field strength of Harmonics	54dBuV/m for AV (@3m) 74dBuV/m for peak (@3m)

7. 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 Section 15.209[#], whichever is the lesser attenuation.

Remark : The limit of “#” of 3 meter distance is

Frequency MHz	Distance m	Field strength		Distance m	Field strength dB μ V/m(QP)
		μ V/m	dB μ V/m(QP)		
30-88	3	100	40.0	10	30.0
88-216	3	150	43.5	10	33.5
216-960	3	200	46.0	10	36.0
960-1000	3	500	54.0	10	44.0
Above 1000	3	74.0 dB μ V/m (PK) 54.0 dB μ V/m (AV)		/	/

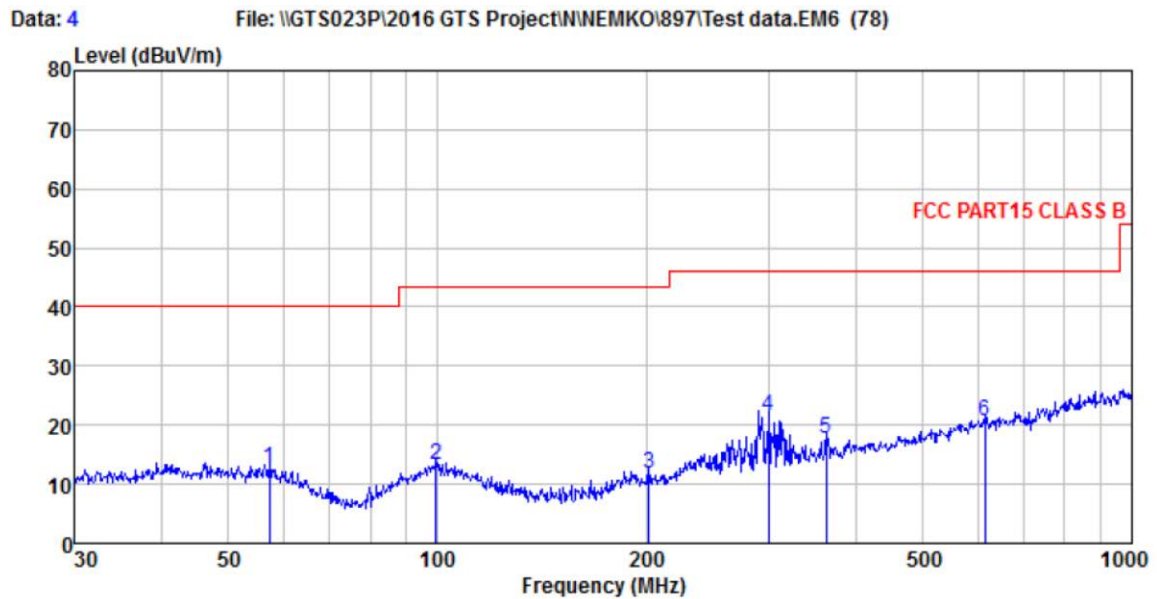
15.205 Restricted bands:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

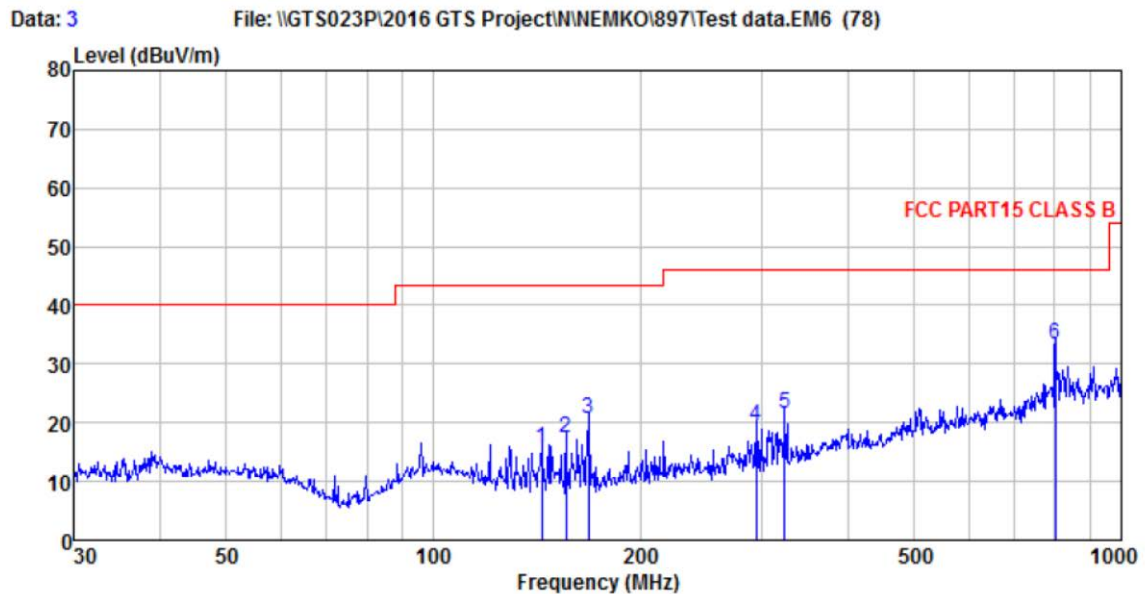
5.3.1 Diagram 5-1



Condition : FCC PART15 CLASS B VULB9163-2013M HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2408MHz

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	57.191	27.04	14.87	0.84	29.94	12.81	40.00	-27.19	QP
2	99.528	26.54	15.13	1.19	29.70	13.16	43.50	-30.34	QP
3	201.393	26.47	12.60	1.85	29.21	11.71	43.50	-31.79	QP
4	299.316	34.18	15.03	2.35	30.00	21.56	46.00	-24.44	QP
5	362.985	28.27	16.45	2.68	29.67	17.73	46.00	-28.27	QP
6	614.214	25.69	20.51	3.77	29.29	20.68	46.00	-25.32	QP

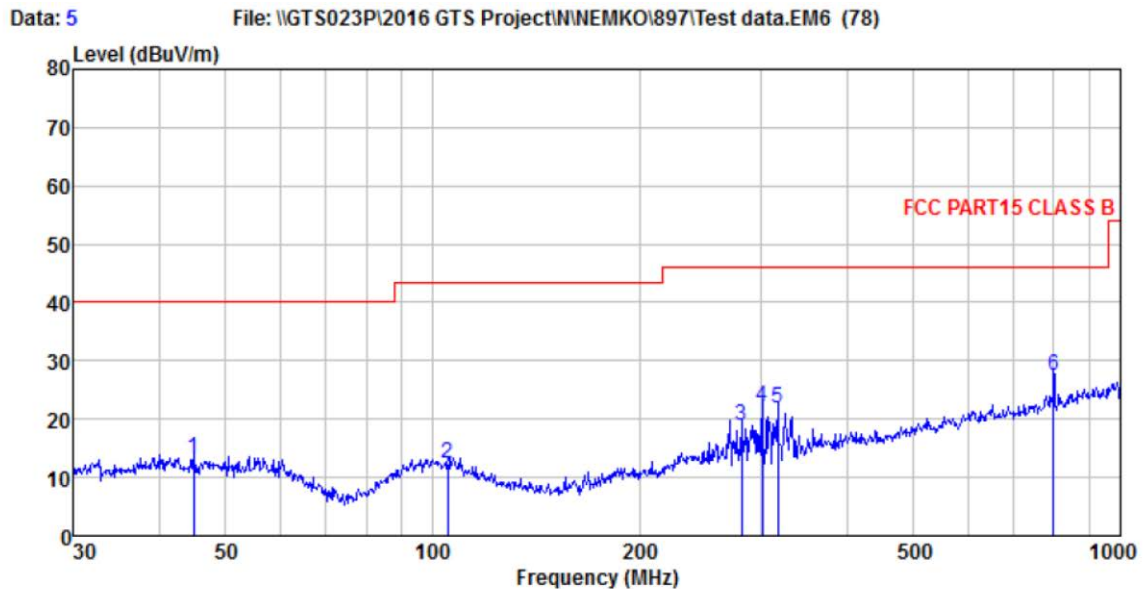
5.3.2 Diagram 5-2



Condition : FCC PART15 CLASS B VULB9163-2013M VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2408MHz

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	143.830	33.31	10.22	1.53	29.44	15.62	43.50	-27.88	QP
2	155.910	34.82	10.51	1.60	29.38	17.55	43.50	-25.95	QP
3	167.824	37.36	10.90	1.67	29.33	20.60	43.50	-22.90	QP
4	294.114	32.10	14.95	2.33	29.97	19.41	46.00	-26.59	QP
5	324.456	33.43	15.53	2.49	29.86	21.59	46.00	-24.41	QP
6	801.786	36.08	22.06	4.46	29.20	33.40	46.00	-12.60	QP

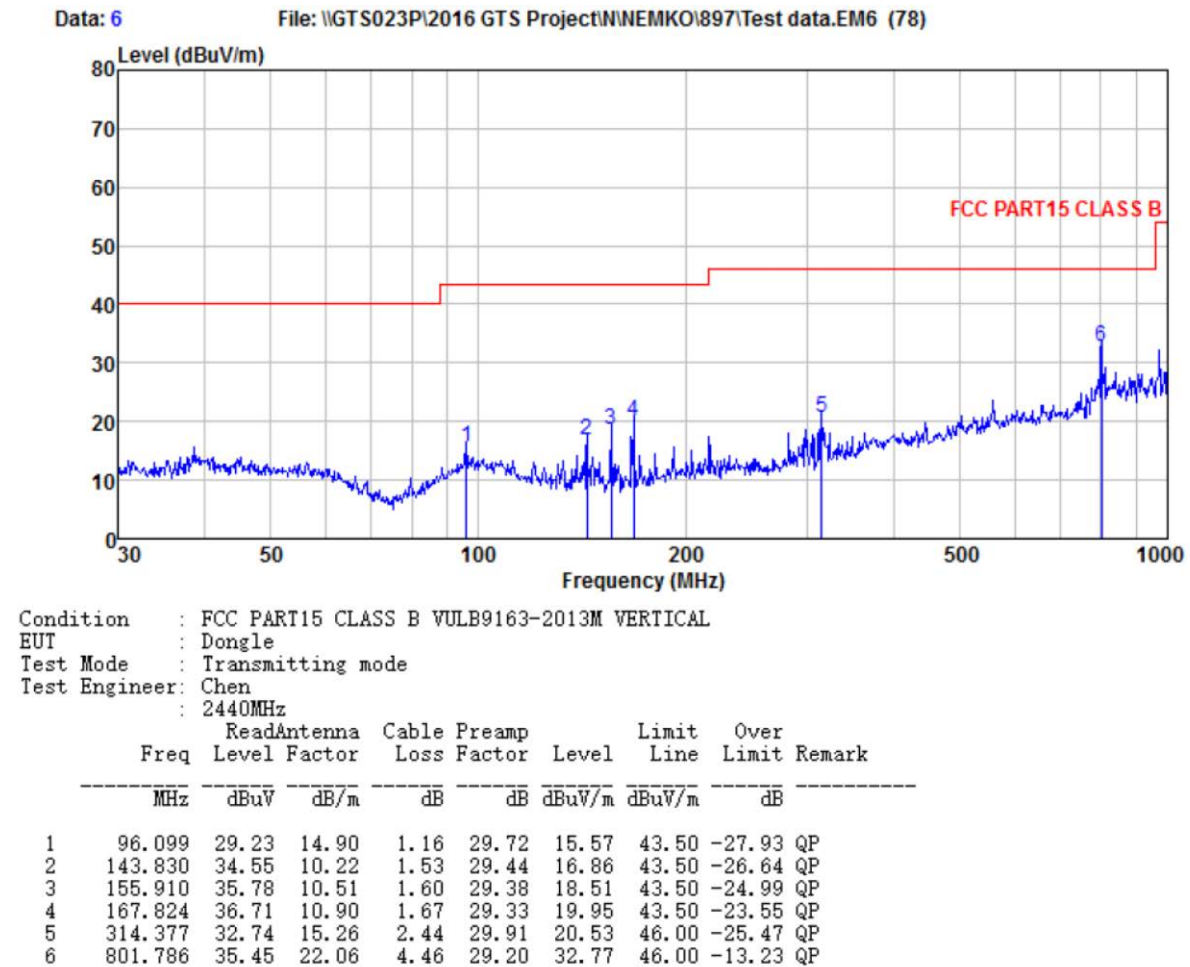
5.3.3 Diagram 5-3



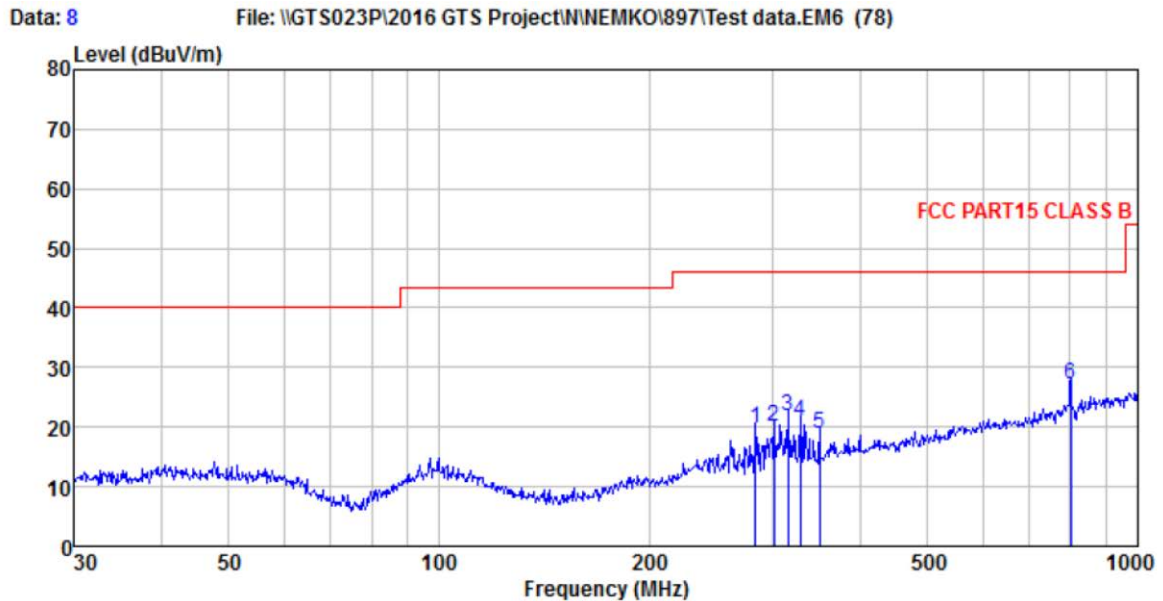
Condition : FCC PART15 CLASS B VULB9163-2013M HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2440MHz

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
		Level Factor	Loss Factor		Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	44.901	27.18	15.55	0.72	30.02	13.43	40.00 -26.57 QP
2	105.272	26.20	14.68	1.24	29.66	12.46	43.50 -31.04 QP
3	281.008	31.67	14.70	2.27	29.88	18.76	46.00 -27.24 QP
4	301.422	34.81	15.08	2.37	29.99	22.27	46.00 -23.73 QP
5	317.701	34.04	15.31	2.45	29.90	21.90	46.00 -24.10 QP
6	798.980	30.11	22.06	4.45	29.20	27.42	46.00 -18.58 QP

5.3.4 Diagram 5-4



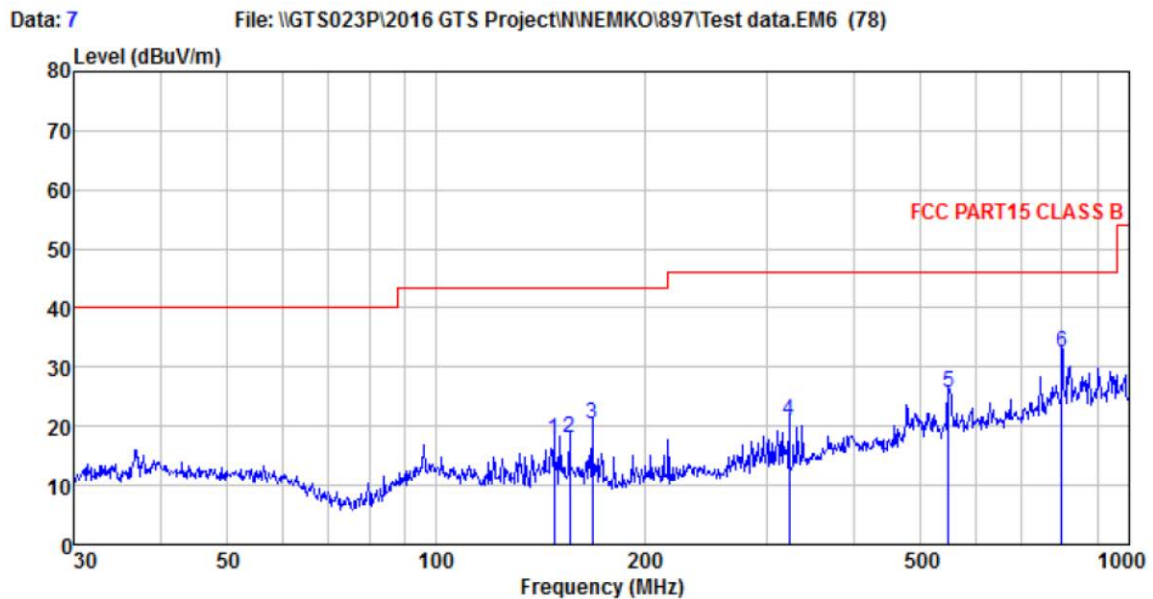
5.3.5 Diagram 5-5



Condition : FCC PART15 CLASS B VULB9163-2013M HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2474MHz

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	283.979	32.65	14.75	2.29	29.90	19.79	46.00	-26.21	QP
2	301.422	32.47	15.08	2.37	29.99	19.93	46.00	-26.07	QP
3	315.481	34.07	15.28	2.44	29.91	21.88	46.00	-24.12	QP
4	329.039	32.54	15.73	2.52	29.83	20.96	46.00	-25.04	QP
5	350.477	29.85	16.27	2.62	29.73	19.01	46.00	-26.99	QP
6	801.786	29.73	22.06	4.46	29.20	27.05	46.00	-18.95	QP

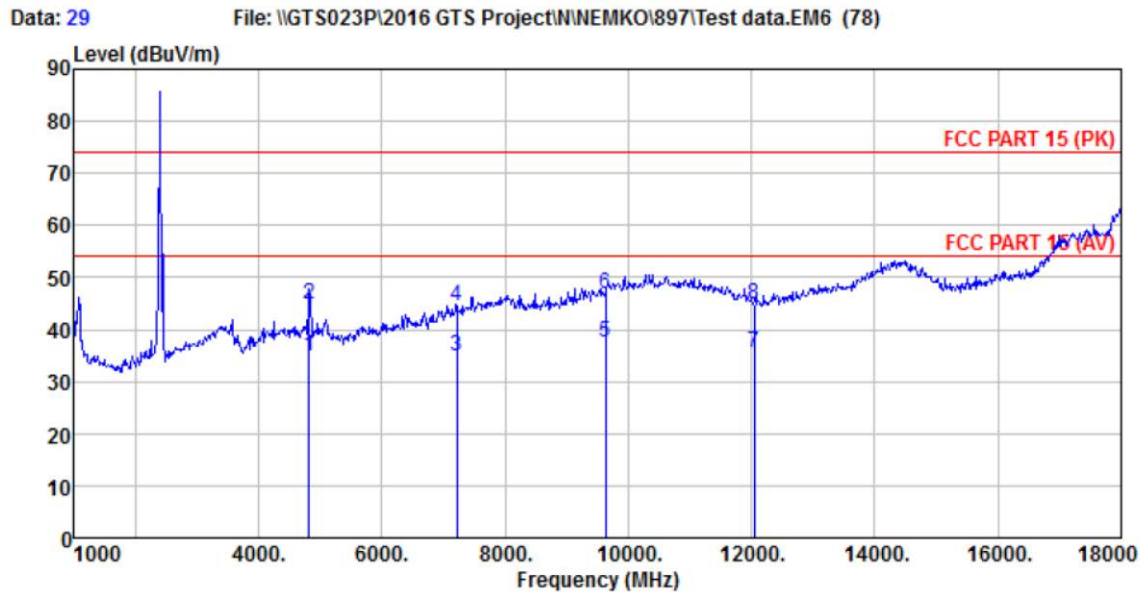
5.3.6 Diagram 5-6



Condition : FCC PART15 CLASS B VULB9163-2013M VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2474MHz

	ReadAntenna	Cable Preamp	Limit	Over				
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	147.921	35.40	10.24	1.56	29.42	17.78	43.50	-25.72 QP
2	155.910	35.30	10.51	1.60	29.38	18.03	43.50	-25.47 QP
3	167.824	37.02	10.90	1.67	29.33	20.26	43.50	-23.24 QP
4	323.320	33.01	15.46	2.49	29.87	21.09	46.00	-24.91 QP
5	549.020	31.79	19.57	3.52	29.30	25.58	46.00	-20.42 QP
6	798.980	35.25	22.06	4.45	29.20	32.56	46.00	-13.44 QP

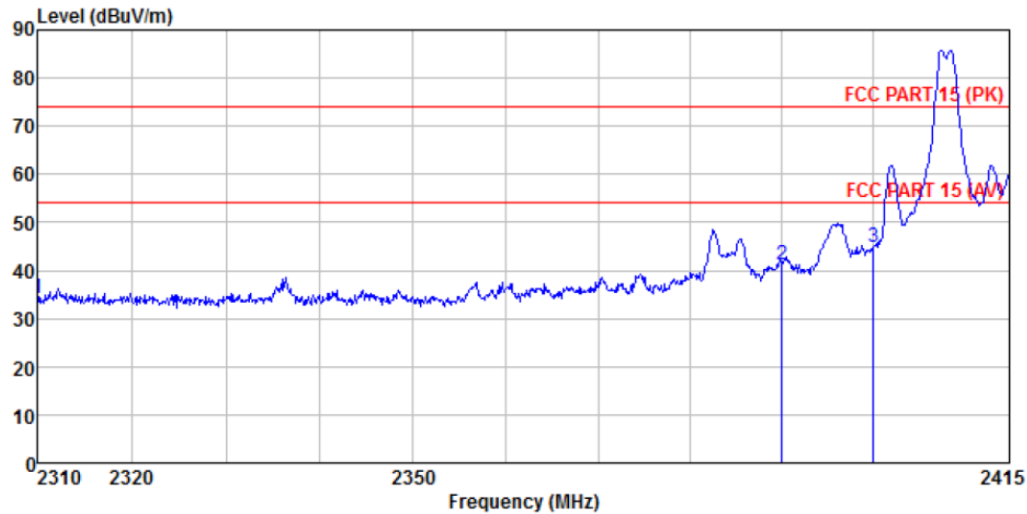
5.3.7 Diagram 5-7



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2408MHz

	Freq	ReadAntenna	Cable Preamp		Limit	Over		
	Level	Factor	Loss Factor	Level	Line	Limit	Remark	
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB	
1	4816.000	26.59	31.79	8.61	32.09	34.90	54.00	-19.10 Average
2	4816.000	36.65	31.79	8.61	32.09	44.96	74.00	-29.04 Peak
3	7224.000	18.98	36.19	11.66	31.99	34.84	54.00	-19.16 Average
4	7224.000	28.53	36.19	11.66	31.99	44.39	74.00	-29.61 Peak
5	9632.000	16.85	38.01	14.16	31.58	37.44	54.00	-16.56 Average
6	9632.000	26.32	38.01	14.16	31.58	46.91	74.00	-27.09 Peak
7	12040.000	16.84	39.05	15.05	35.54	35.40	54.00	-18.60 Average
8	12040.000	26.42	39.05	15.05	35.54	44.98	74.00	-29.02 Peak

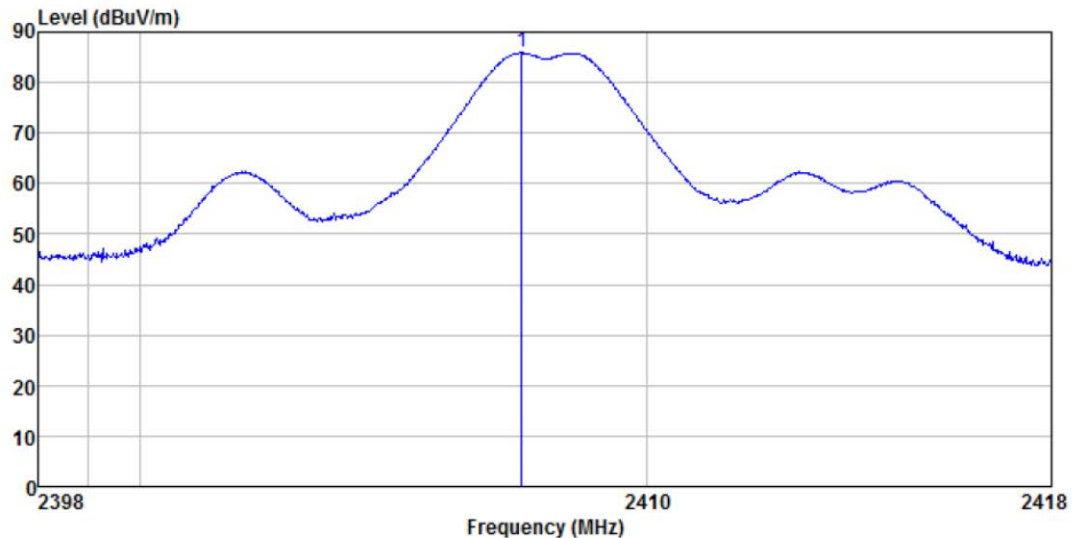
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Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
2408MHz

	Freq	ReadAntenna	Cable	Preamp	Limit	Over	
		Level	Factor	Loss	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB
1	2310.000	34.98	27.91	5.30	34.11	34.08	74.00 -39.92 Peak
2	2390.000	42.30	27.59	5.38	34.01	41.26	74.00 -32.74 Peak
3	2400.000	45.93	27.58	5.39	34.01	44.89	74.00 -29.11 Peak

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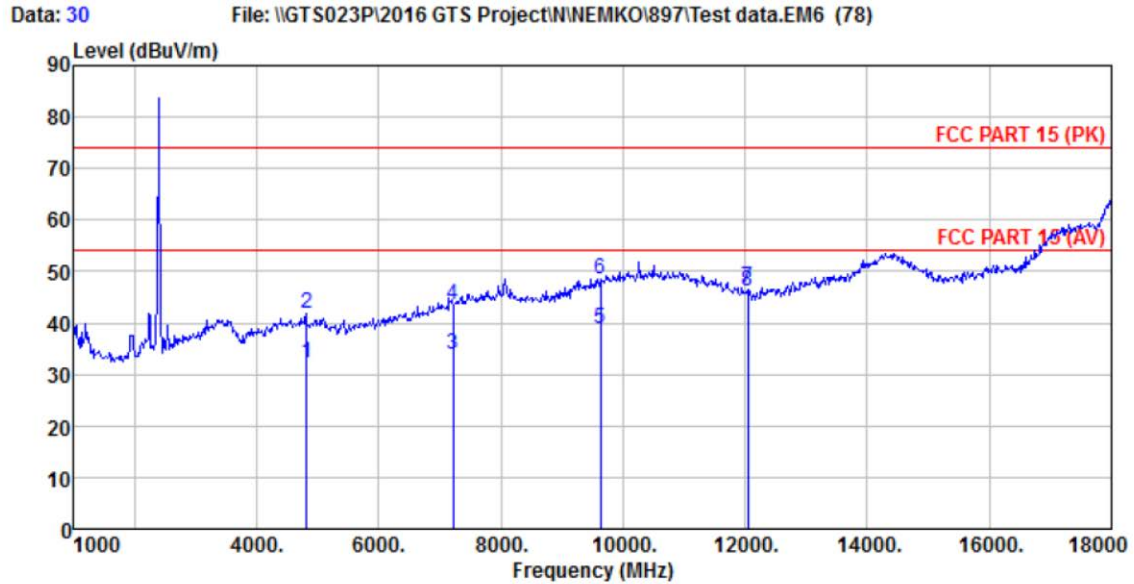


Condition : BBHA9120D ANT(>1GHZ) HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
2408MHz

	Freq	ReadAntenna	Cable	Preamp	Limit	Over	
		Level	Factor	Loss	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB
1	2407.519	86.89	27.57	5.40	33.99	85.87	----- Peak

Remark: Peak result is less than AV limit, then only peak result is reported.

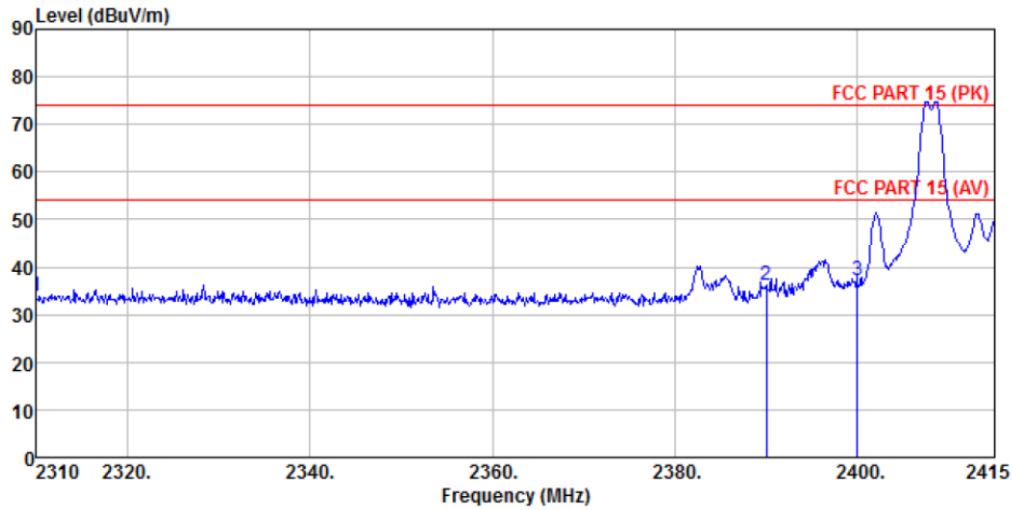
5.3.8 Diagram 5-8



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2408MHz

	Freq	Read	Antenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	dBuV/m	dBuV/m	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4816.000	23.85	31.79	8.61	32.09	32.16	54.00	-21.84	Average
2	4816.000	33.46	31.79	8.61	32.09	41.77	74.00	-32.23	Peak
3	7224.000	17.91	36.19	11.66	31.99	33.77	54.00	-20.23	Average
4	7224.000	27.50	36.19	11.66	31.99	43.36	74.00	-30.64	Peak
5	9632.000	18.35	38.01	14.16	31.58	38.94	54.00	-15.06	Average
6	9632.000	27.93	38.01	14.16	31.58	48.52	74.00	-25.48	Peak
7	12040.000	28.30	39.05	15.05	35.54	46.86	54.00	-7.14	Average
8	12040.000	27.53	39.05	15.05	35.54	46.09	74.00	-27.91	Peak

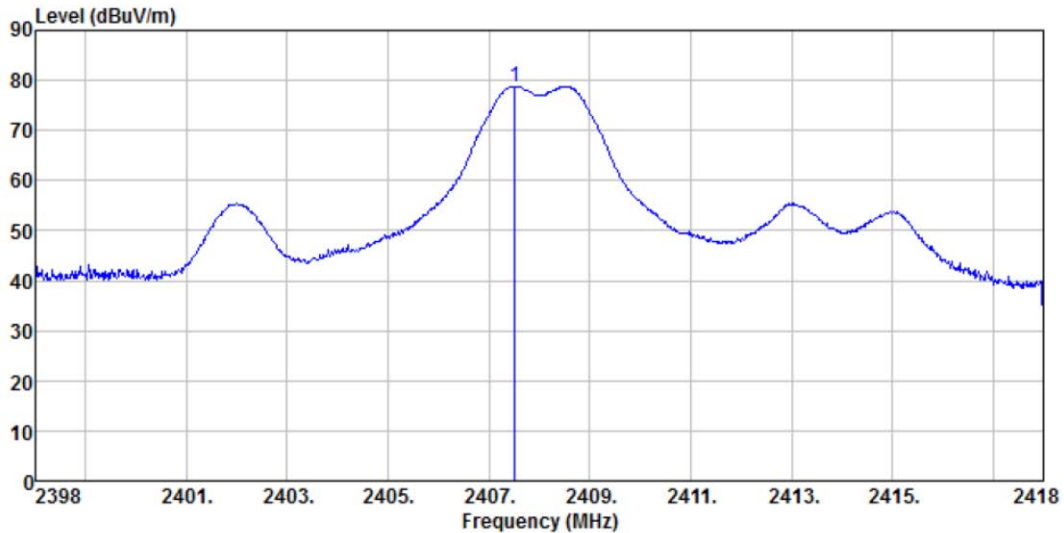
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Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2408MHz

	Freq	ReadAntenna		Cable	Preamp	Level	Limit	Over	Remark
		Level	Factor	Loss	Factor		Line	Limit	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	34.66	27.91	5.30	34.11	33.76	74.00	-40.24	Peak
2	2390.000	37.32	27.59	5.38	34.01	36.28	74.00	-37.72	Peak
3	2400.000	38.37	27.58	5.39	34.01	37.33	74.00	-36.67	Peak

File: \\GTS023P\2016 GTS Project\NINEMKO\897\Test data.EM6 (78)

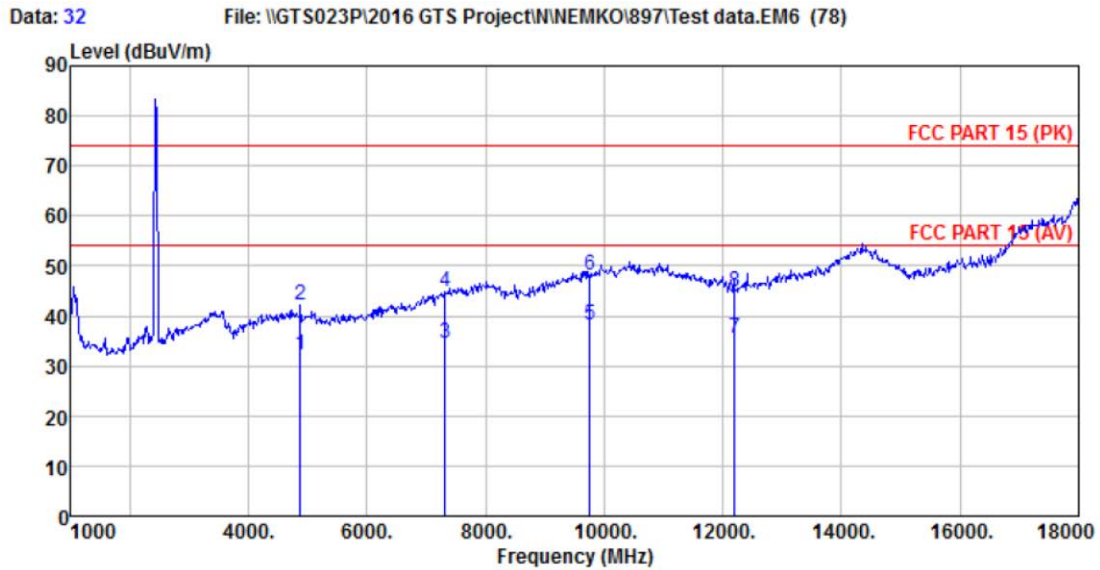


Condition : BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2408MHz

	Freq	ReadAntenna		Cable	Preamp		Limit	Over	
		Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2407.520	79.85	27.57	5.40	33.99	78.83	-----	-----	Peak

Remark: Peak result is less than AV limit, then only peak result is reported.

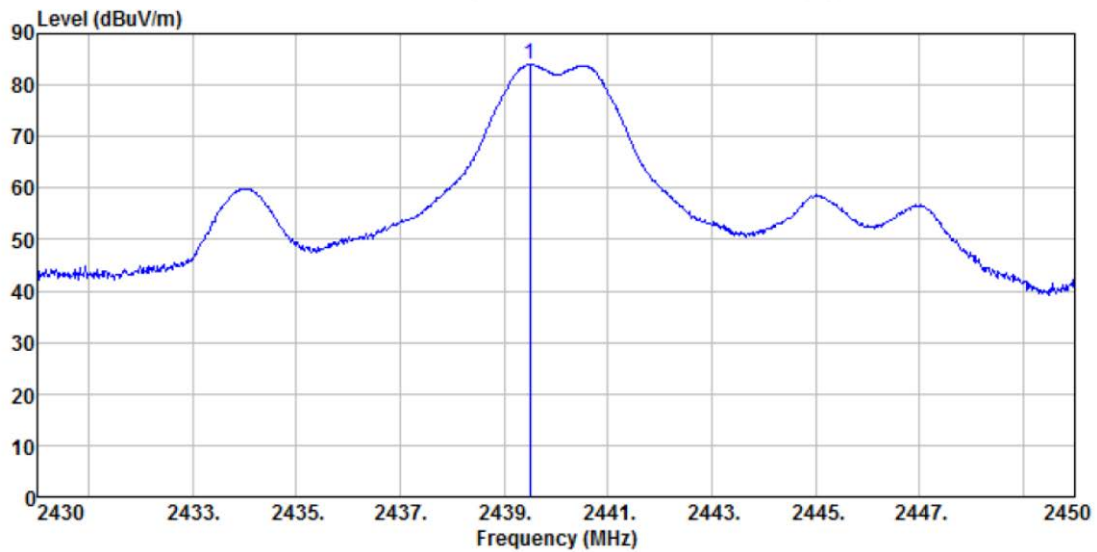
5.3.9 Diagram 5-9



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2440MHz

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dB
1	4880.000	23.98	31.85	8.66	32.12	32.37	54.00 -21.63 Average
2	4880.000	33.71	31.85	8.66	32.12	42.10	74.00 -31.90 Peak
3	7320.000	18.37	36.37	11.72	31.89	34.57	54.00 -19.43 Average
4	7320.000	28.76	36.37	11.72	31.89	44.96	74.00 -29.04 Peak
5	9760.000	17.26	38.35	14.25	31.59	38.27	54.00 -15.73 Average
6	9760.000	27.08	38.35	14.25	31.59	48.09	74.00 -25.91 Peak
7	12200.000	16.97	38.92	15.14	35.65	35.38	54.00 -18.62 Average
8	12200.000	26.58	38.92	15.14	35.65	44.99	74.00 -29.01 Peak

File: \\GTS023P\2016 GTS Project\NEMKO\897\Test data.EM6 (78)

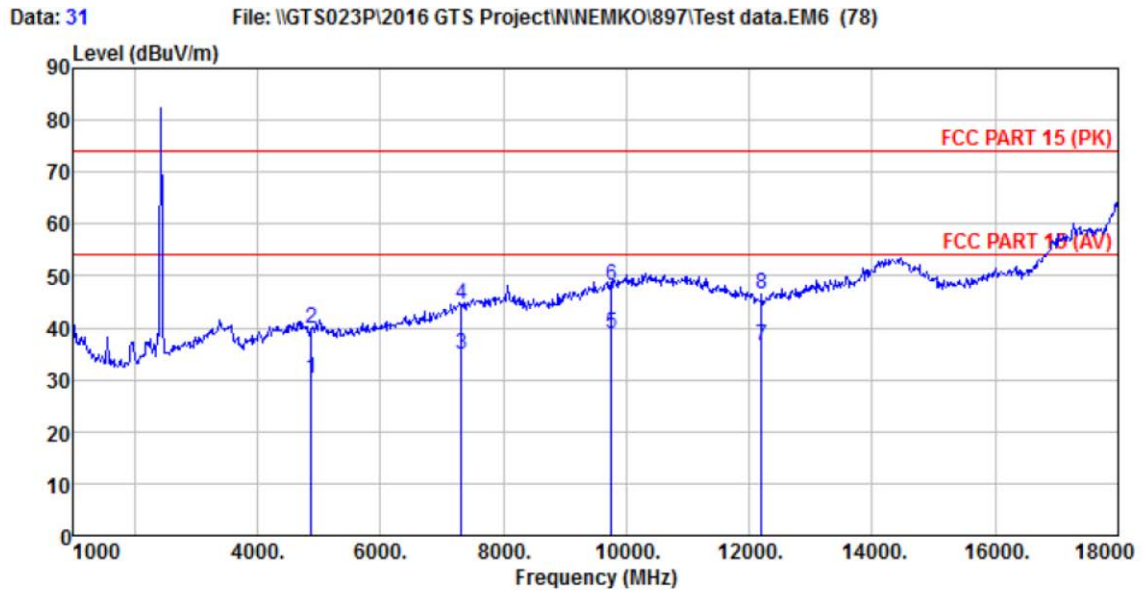


Condition : BBHA9120D ANT(>1GHZ) HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2440MHz

	ReadAntenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1 2439.500	85.02	27.48	5.43	33.96	83.97	-----	-----
							Peak

Remark: Peak result is less than AV limit, then only peak result is reported.

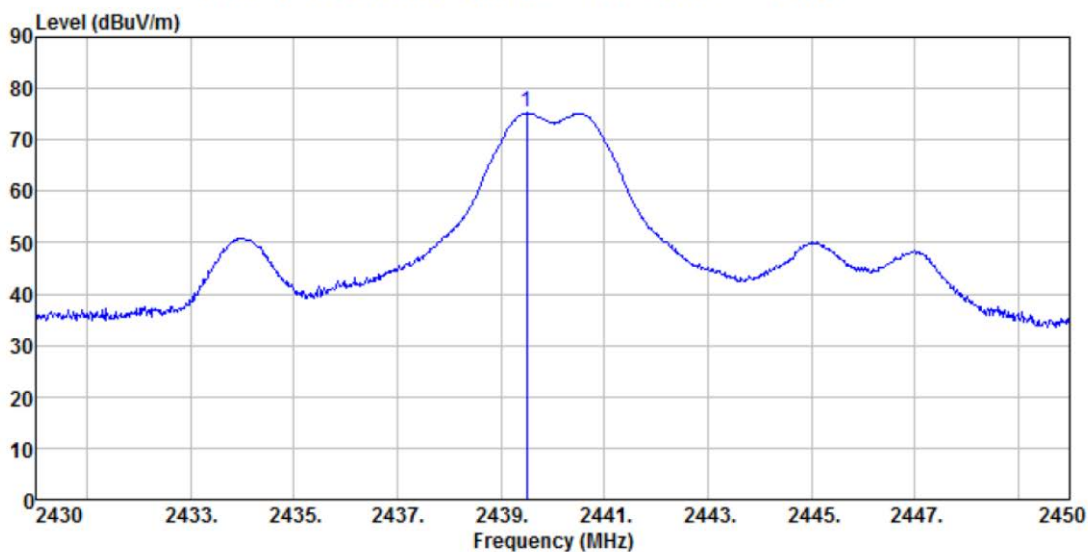
5.3.10 Diagram 5-10



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2440MHz

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4880.000	21.84	31.85	8.66	32.12	30.23	54.00	-23.77	Average
2	4880.000	31.42	31.85	8.66	32.12	39.81	74.00	-34.19	Peak
3	7320.000	18.70	36.37	11.72	31.89	34.90	54.00	-19.10	Average
4	7320.000	28.42	36.37	11.72	31.89	44.62	74.00	-29.38	Peak
5	9760.000	17.89	38.35	14.25	31.59	38.90	54.00	-15.10	Average
6	9760.000	27.26	38.35	14.25	31.59	48.27	74.00	-25.73	Peak
7	12200.000	18.00	38.92	15.14	35.65	36.41	54.00	-17.59	Average
8	12200.000	27.95	38.92	15.14	35.65	46.36	74.00	-27.64	Peak

File: \\GTS023P\2016 GTS Project\NEMKO\897\Test data.EM6 (78)

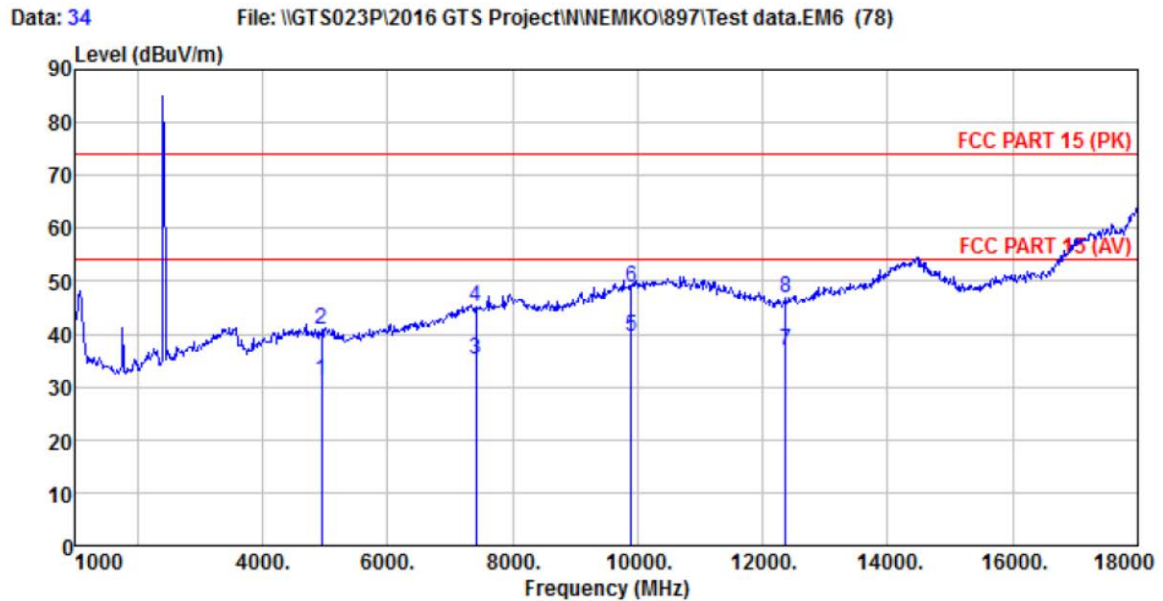


Condition : BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2440MHz

	Freq	ReadAntenna Level	Cable Factor	Preamp Loss	Level	Limit	Over	
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2439.500	76.28	27.48	5.43	33.96	75.23	-----	----- Peak

Remark: Peak result is less than AV limit, then only peak result is reported.

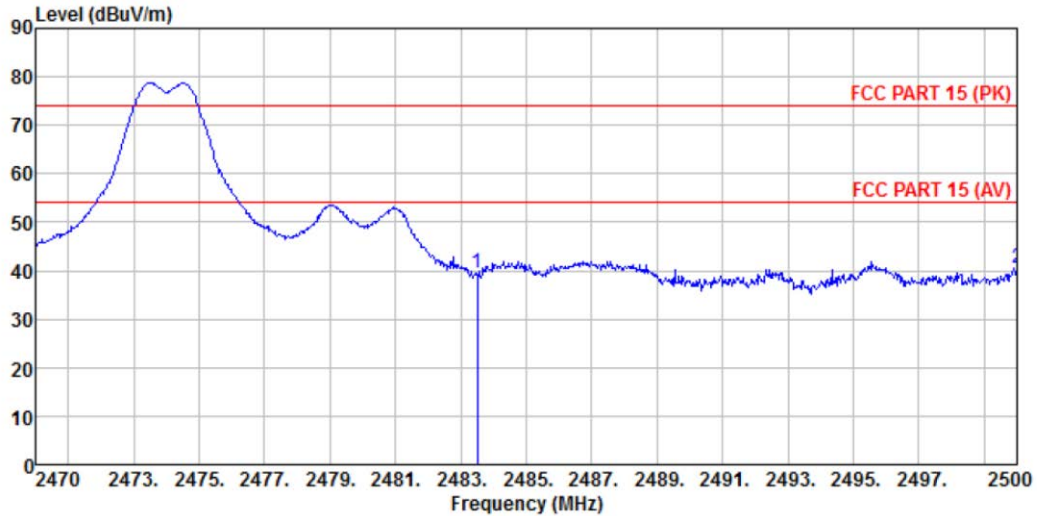
5.3.11 Diagram 5-11



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2474MHz

	Freq	ReadAntenna	Cable	Preamp	Level	Limit	Over	
	MHz	Level	Factor	Loss	Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	4948.000	22.85	31.91	8.71	32.16	31.31	54.00	-22.69 Average
2	4948.000	32.23	31.91	8.71	32.16	40.69	74.00	-33.31 Peak
3	7422.000	18.66	36.56	11.77	31.80	35.19	54.00	-18.81 Average
4	7422.000	28.52	36.56	11.77	31.80	45.05	74.00	-28.95 Peak
5	9896.000	18.07	38.81	14.35	31.82	39.41	54.00	-14.59 Average
6	9896.000	27.59	38.81	14.35	31.82	48.93	74.00	-25.07 Peak
7	12370.000	18.27	38.78	15.25	35.33	36.97	54.00	-17.03 Average
8	12370.000	28.05	38.78	15.25	35.33	46.75	74.00	-27.25 Peak

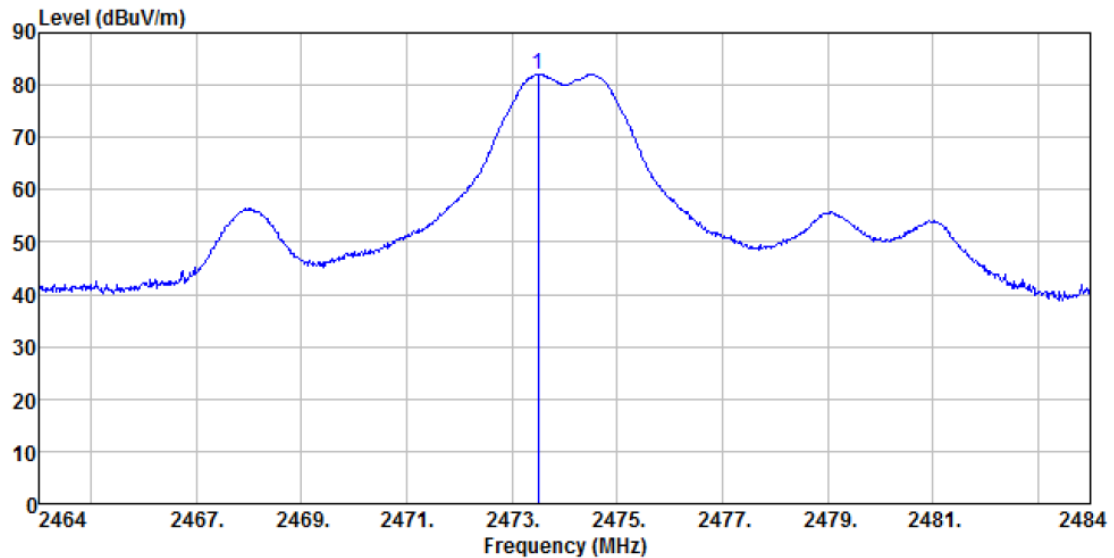
Data: 27 File: \\GTS023P\2016 GTS Project\NEMKO\897\Test data.EM6 (78)



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) HORIZONTAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
2474MHz

	Freq	ReadAntenna	Cable Preamp	Limit	Over	
		Level Factor	Loss Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m
1	2483.500	40.57	27.53	5.47	33.92	39.65
2	2500.000	41.36	27.55	5.49	33.90	40.50

File: \\GTS023P\2016 GTS Project\NEMKO\897\Test data.EM6 (78)

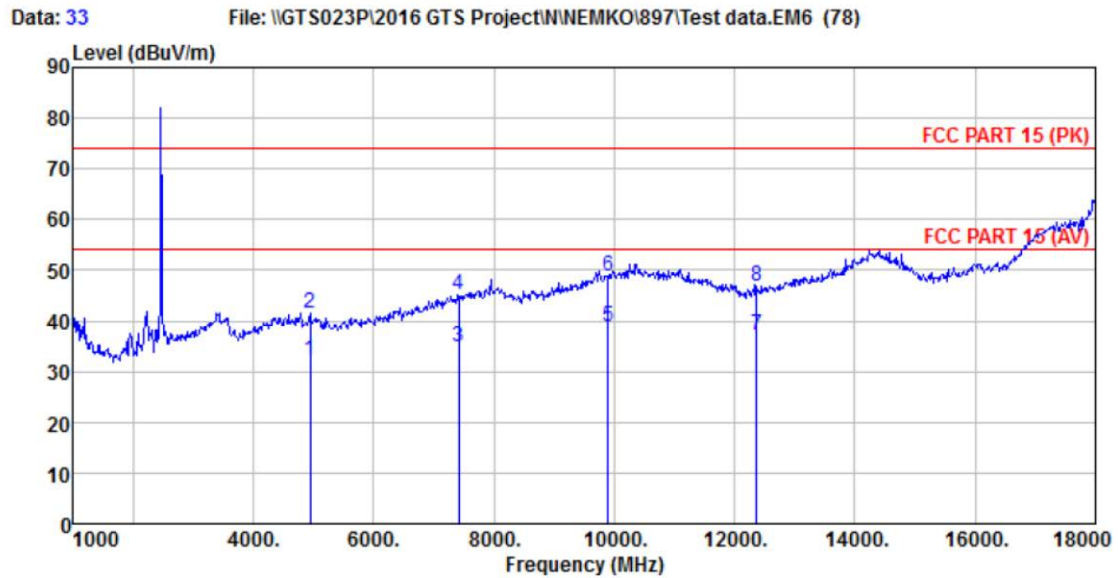


Condition : BBHA9120D ANT(>1GHZ) Horizontal
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
2474MHz

	Freq	ReadAntenna	Cable Preamp	Limit	Over	
		Level Factor	Loss Factor	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m
1	2473.500	82.99	27.50	5.46	33.92	82.03

Remark: Peak result is less than AV limit, then only peak result is reported.

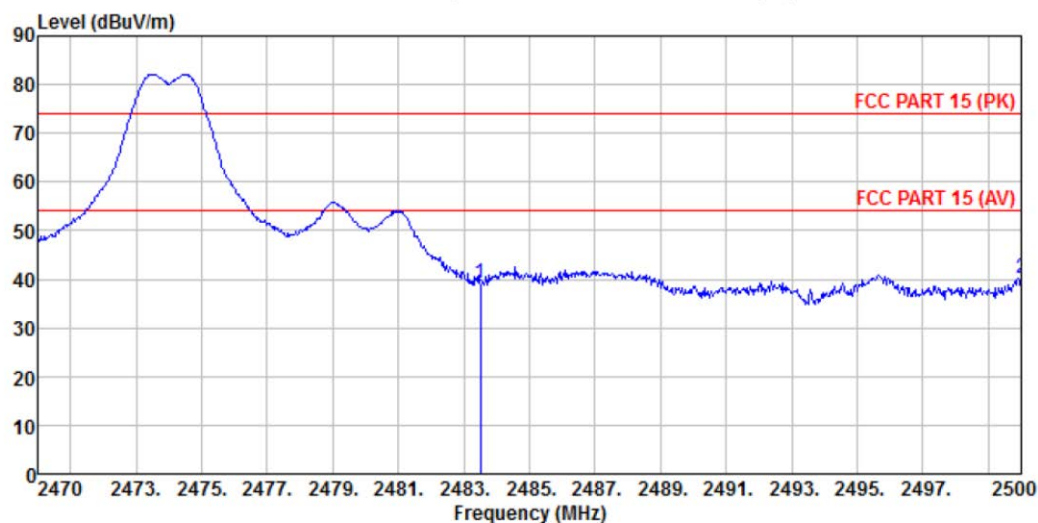
5.3.12 Diagram 5-12



Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
: 2474MHz

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level Factor	Loss Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	4948.000	23.71	31.91	8.71	32.16	54.00	-21.83 Average
2	4948.000	33.08	31.91	8.71	32.16	74.00	-32.46 Peak
3	7422.000	18.40	36.56	11.77	31.80	54.00	-19.07 Average
4	7422.000	28.63	36.56	11.77	31.80	74.00	-28.84 Peak
5	9896.000	17.59	38.81	14.35	31.82	54.00	-15.07 Average
6	9896.000	27.39	38.81	14.35	31.82	74.00	-25.27 Peak
7	12370.000	18.39	38.78	15.25	35.33	54.00	-16.91 Average
8	12370.000	28.09	38.78	15.25	35.33	74.00	-27.21 Peak

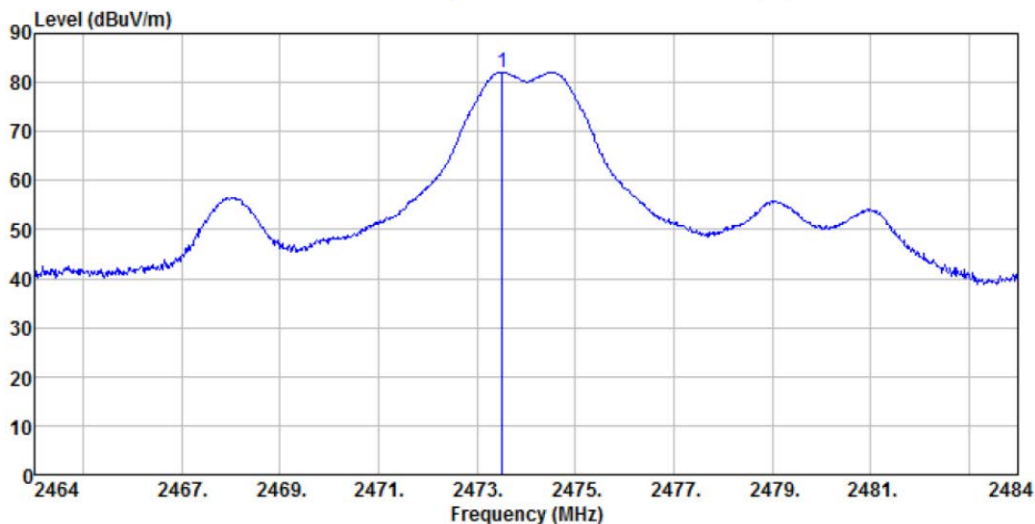
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Condition : FCC PART 15 (PK) BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
2474MHz

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level Factor	Loss Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	2483.500	40.21	27.53	5.47	33.92	39.29	74.00 -34.71 Peak
2	2500.000	41.19	27.55	5.49	33.90	40.33	74.00 -33.67 Peak

File: \\GTS023P\2016 GTS Project\N\NEMKO\897\Test data.EM6 (78)



Condition : BBHA9120D ANT(>1GHZ) VERTICAL
EUT : Dongle
Test Mode : Transmitting mode
Test Engineer: Chen
2474MHz

	Freq	ReadAntenna	Cable Preamp	Level	Limit	Over	
	MHz	Level Factor	Loss Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB/m	dB	dBuV/m	dBuV/m	dB
1	2473.520	83.07	27.50	5.46	33.92	82.11	----- Peak

Remark: Peak result is less than AV limit, then only peak result is reported.

6. 20dB Bandwidth Test

6.1 Test Procedure

Section 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. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

1. Set resolution bandwidth (RBW) = 100 kHz.
2. Set the video bandwidth (VBW) \geq RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

6.2 Measurement Equipment

	Equipment	Calibration due	Type	Serial No.	Manufacturer
<input checked="" type="checkbox"/>	Spectrum	Jul. 04 2016	FSP30	GTS208	RS

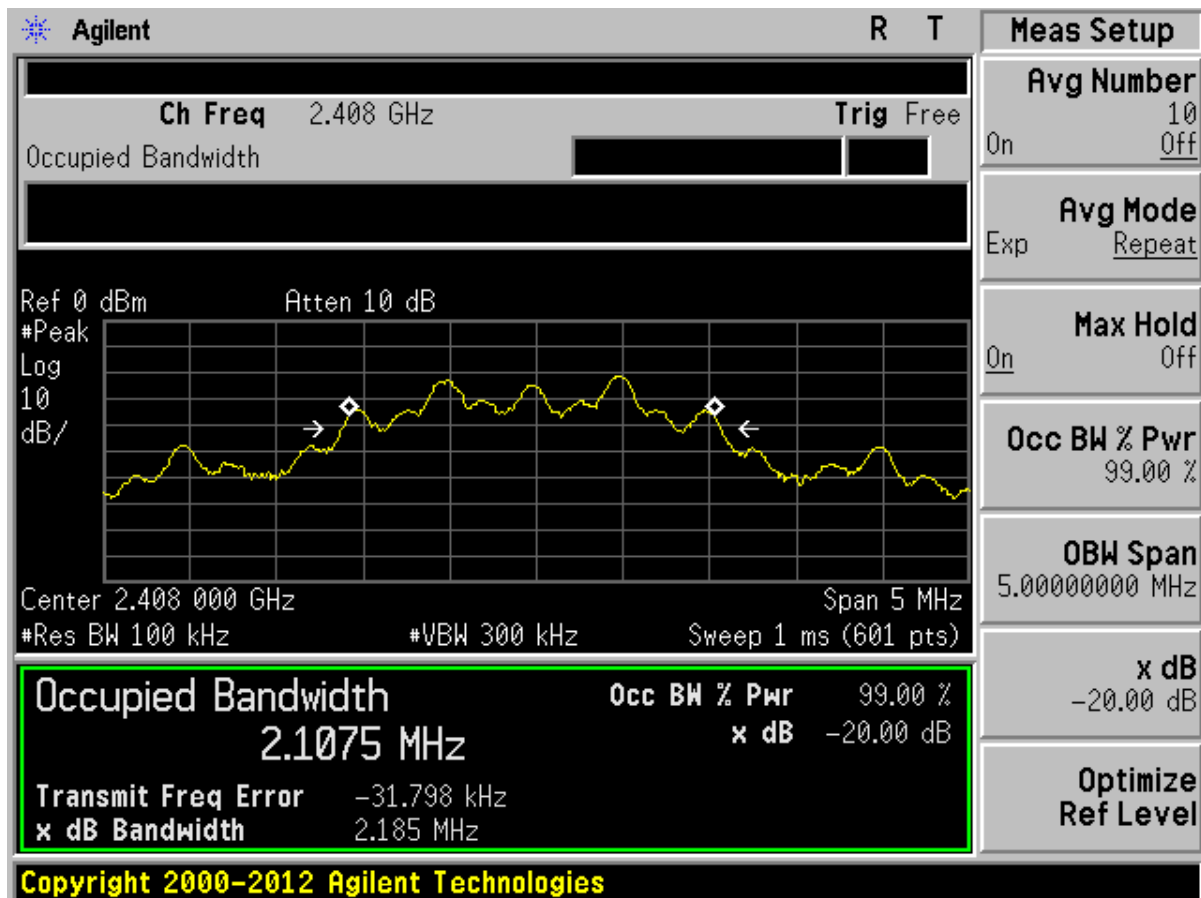
6.3 Test Result

Remark : Conducted measurement.

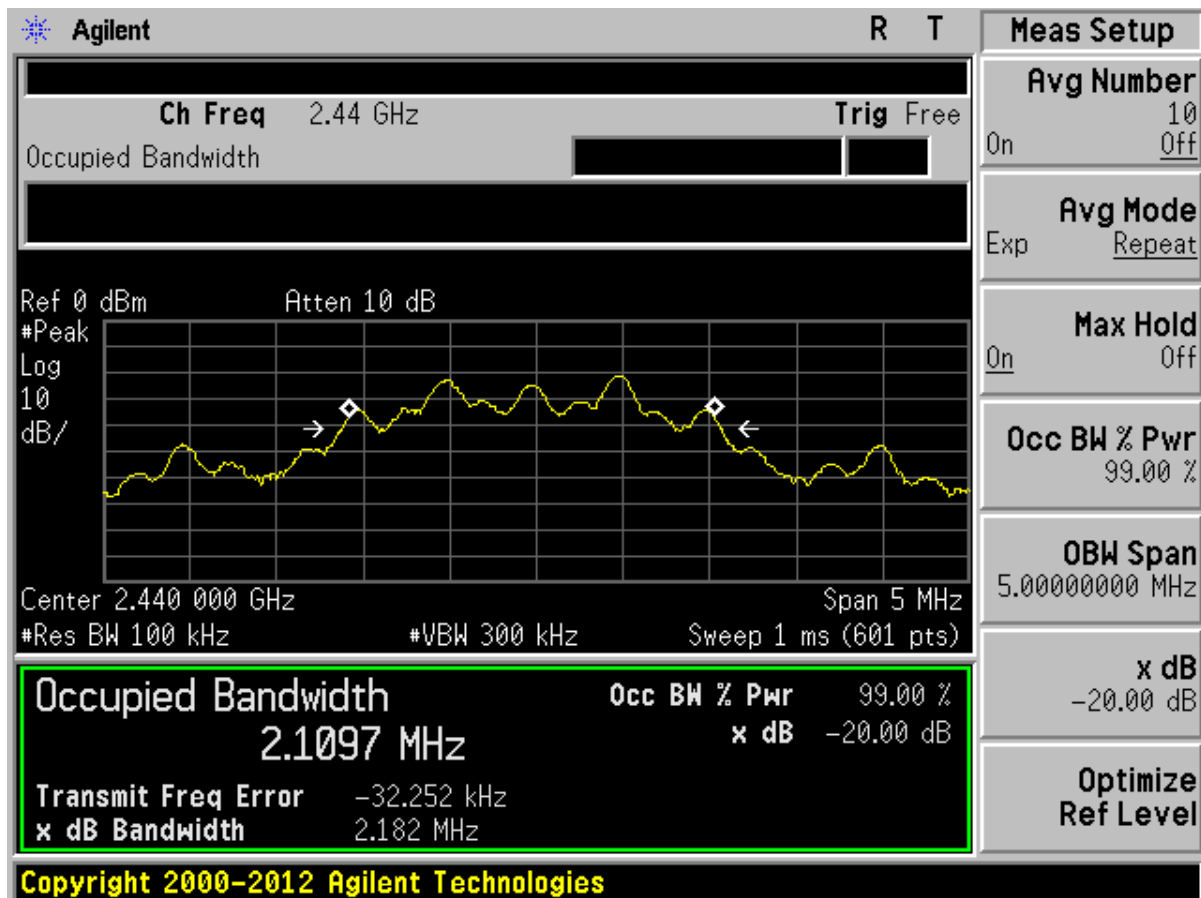
20dB Bandwidth:

GFSK			
Channel	Diagram	20dB bandwidth (MHz)	Result
CH LOW	6-1	2.185	PASS
CH MID	6-2	2.182	PASS
CH HIGH	6-3	2.189	PASS

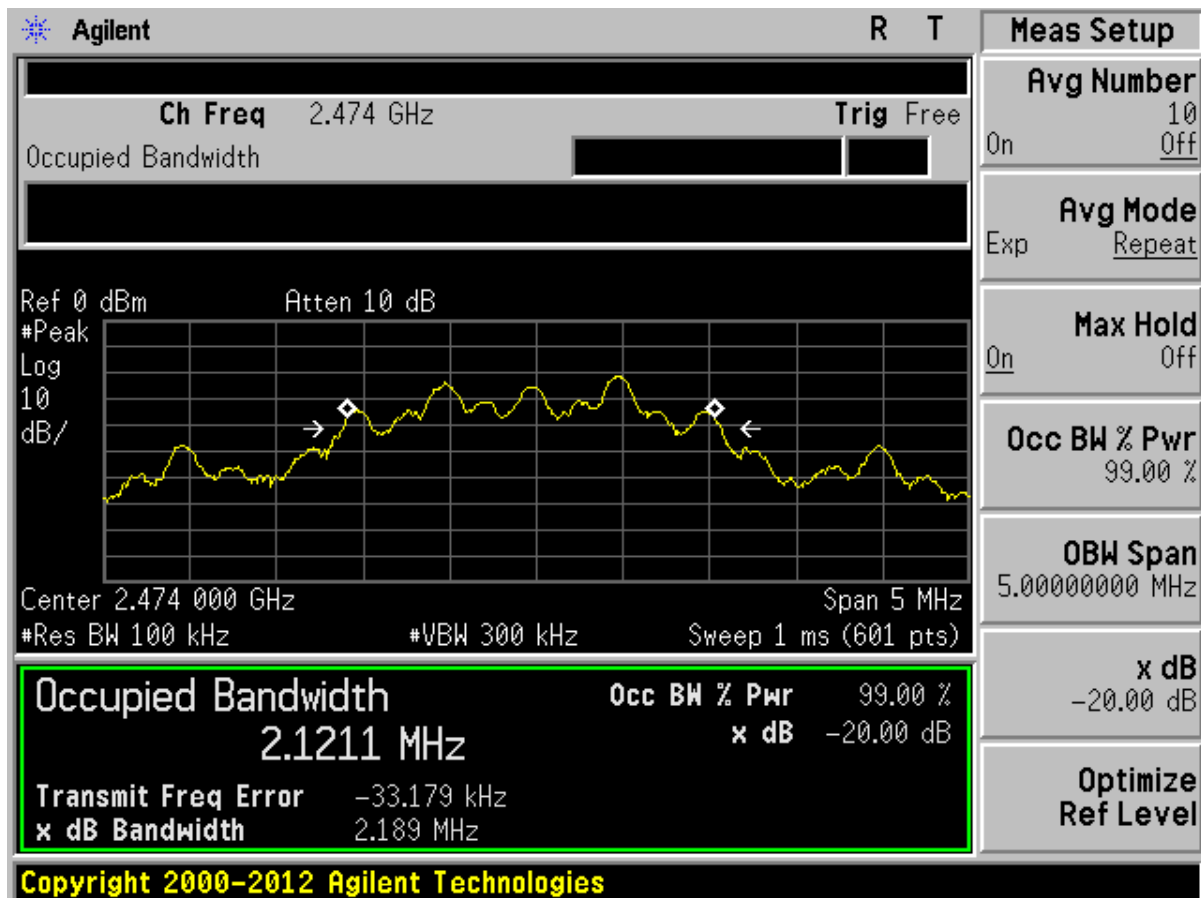
6.3.1 Diagram 6-1



6.3.2 Diagram 6-2



6.3.3 Diagram 6-3



7 POWER LINE CONDUCTED EMISSION TEST

7.1 Test Procedure

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50
*-Decreases with the logarithm of the frequency.		

7.2 Measurement Equipment

	Equipment	Calibration due	Type	Serial No.	Manufacturer
<input checked="" type="checkbox"/>	Shielding Room	Jul. 04 2016	7.0(L)x3.0(W)x3.0(H)	GTS252	ZhongYu Electron
<input checked="" type="checkbox"/>	EMI Test Receiver	Jul. 04 2016	ESCS30	1102.4500K30	Rohde & Schwarz
<input checked="" type="checkbox"/>	10dB Pulse Limita	Jul. 04 2016	N/A	GTS224	Rohde & Schwarz
<input checked="" type="checkbox"/>	LISN	Jul. 04 2016	NSLK 8127	8127549	SCHWARZBECK MESS-ELEKTRONIK
<input checked="" type="checkbox"/>	Coaxial Cable	Apr. 01 2017	N/A	N/A	GTS

7.3 Test Result

The EUT was placed on a non-metallic table, 80cm above the ground plane. The other peripheral devices power cord connected to the power mains through another line impedance stabilization network. In order to find the maximum emission, the relative positions of equipments and all of the interface cables were changed according to ANSI C63.4-2004 on conducted Emission test.

Preview measurements:

0.15 MHz to 30 MHz

Receiver settings: PK&AV detector

RBW:9 kHz

Final measurement:

0.15 MHz to 30 MHz

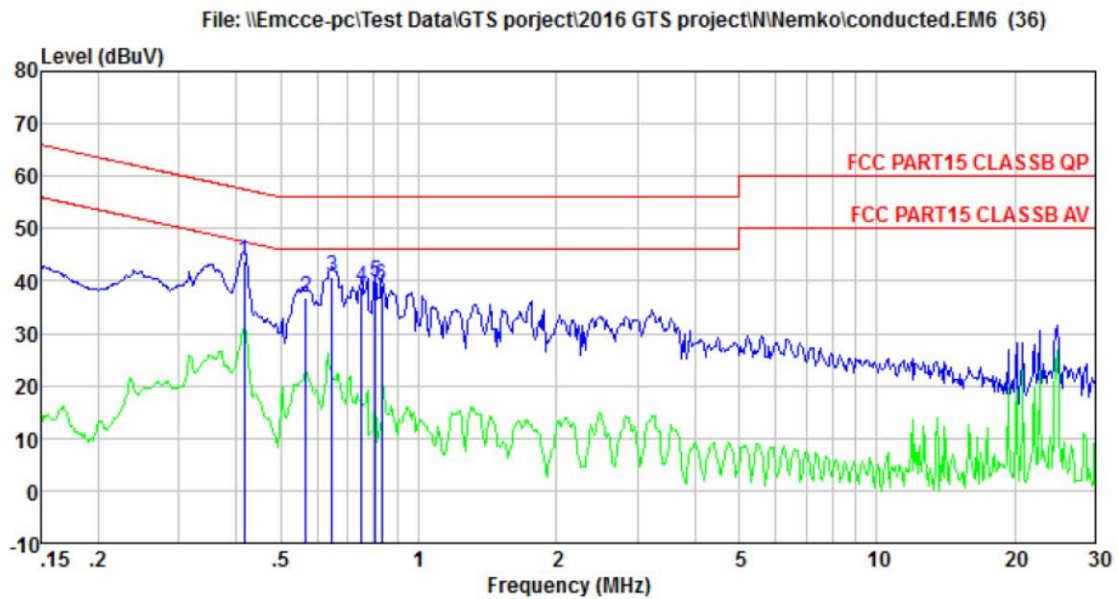
Receiver settings:QP&AV detector

Test mode	Power Line	Test Data	Test Result
TX MODE	Line	Diagram 7-1	Pass
	Neutral	Diagram 7-2	Pass

NOTES:

1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.
- 3: If PK value is lower than AV limit then QP and AV value are deemed to be complied with rules and only diagram will be shown as below.

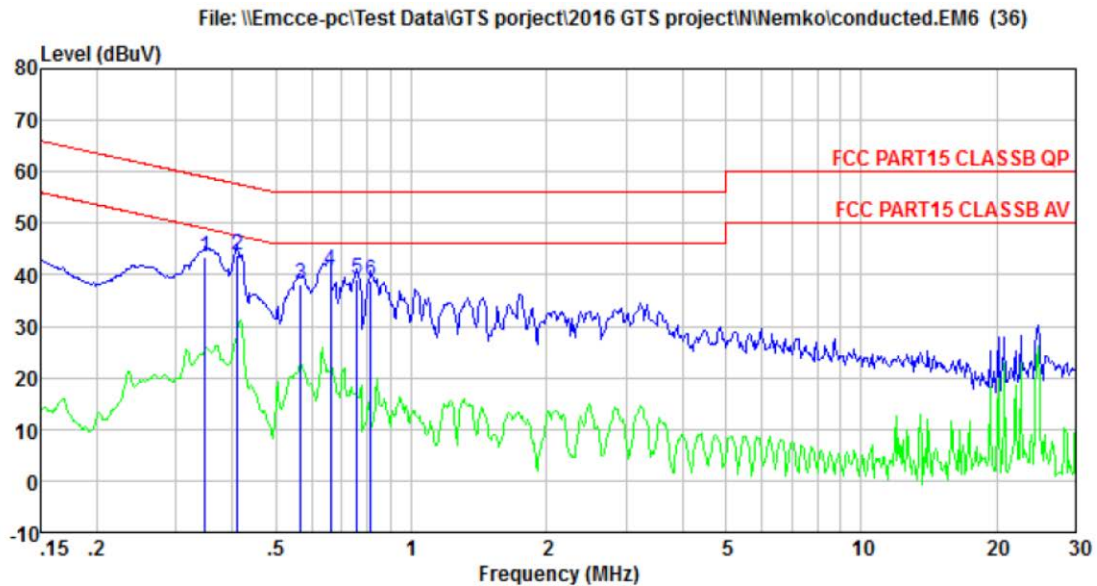
7.3.1 Diagram 7-1



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 LINE
EUT : Dongle
Test mode : Transmitting mode
Test Engineer: Sky

	Freq	Read Level	Cable Level	Cable Loss	LISN Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.417	43.43	43.66	0.11	0.12	57.51	-13.85	QP
2	0.567	36.68	36.93	0.12	0.13	56.00	-19.07	QP
3	0.647	40.61	40.87	0.13	0.13	56.00	-15.13	QP
4	0.751	38.42	38.69	0.13	0.14	56.00	-17.31	QP
5	0.804	39.42	39.69	0.13	0.14	56.00	-16.31	QP
6	0.830	38.77	39.04	0.13	0.14	56.00	-16.96	QP

7.3.2 Diagram 7-2



Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
EUT : Dongle
Test mode : Transmitting mode
Test Engineer: Sky

	Freq	Read Level	Level	Cable Loss	LISN Factor	Limit Line	Over Limit	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	dB	
1	0.348	43.21	43.37	0.10	0.06	59.00	-15.63	QP
2	0.410	43.68	43.85	0.11	0.06	57.64	-13.79	QP
3	0.567	38.07	38.26	0.12	0.07	56.00	-17.74	QP
4	0.661	40.64	40.84	0.13	0.07	56.00	-15.16	QP
5	0.759	38.86	39.06	0.13	0.07	56.00	-16.94	QP
6	0.813	38.73	38.93	0.13	0.07	56.00	-17.07	QP

8. Antenna requirement

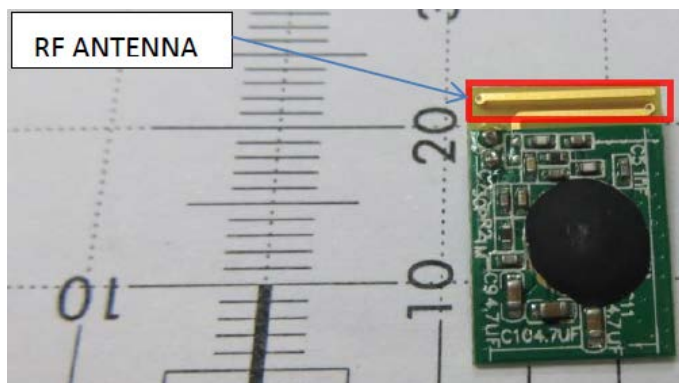
8.1 Requirement

For intentional device, according to FCC 47 CFR 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.

8.2 Result

The antenna used for this product is Internal Print PCB antenna that no antenna other than that furnished by the responsible party shall be used with the device.

The maximum peak gain of this antenna is 0dBi.



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