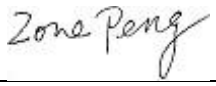
FCC Test Report

FCC EVALUATION REPORT FOR CERTIFICATE	
Project Reference No.	281776
Product	2.4G Wireless USB Dongle
Brand Name	Purekeys
Model	PK-KRF-01
Alternate Model	N/A
Tested according to	FCC Rules and Regulations Part 15 Subpart C 2013, 15.249 ANSI C63.4-2009 and ANSI C63.10:2013

Tested in period	2015-04-10 to 2015-04-19	
Issued date	2015-04-21	
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		2015-04-21
	Juno Wong	***date***
Verified by		2015-04-22
	Zone Peng	***date***

Contents of This Report

1. Client Information

1.1 Applicant

Company Name:	Purekeys BV
Company Address:	Rouaanstraat 23 C, 9723 CC Groningen, The Netherlands

1.2 Manufacturer

Company Name:	Zhuhai Heng Yu New Technology Company Limited
Company Address:	Heng Ke Technology Campus, Jin Hai Avenue, Sanzao, Jinwan District,Zhuhai, Guangdong, PRC

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:	2.4G Wireless USB Dongle
Model Name:	PK-KRF-01
Alternate model:	N/A
Brand name:	Purekeys

2.2 Detail spec:

Operation Frequency：2404 MHz -2480MHz
Type of Modulation : GFSK

Antenna Type：Integral Antenna
Antenna Number : 1
Antenna gain: 0dBi
Channel number: 77
Data rate: 1Mbps

Input: 5VDC from PC USB port

2.3 Additional Information Related to Testing

CH LOW:2404MHz
CH MID:2442MHz
CH HIGH:2480MHz

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 ºC
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 : 85% to 115% input voltage have been adjusted ,no influence found.

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(10^{th} 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
☒	EMI Test Receiver	Jul. 04 2015	ESU26	GTS203	R&S
☒	BiConiLog Antenna	Feb. 26 2016	VULB9163	GTS214	SCHWARZBECK
☒	Horn Antenna	Feb. 26 2016	BBHA9120D	GTS215	SCHWARZBECK
☒	Horn Antenna	Feb. 26 2016	BBHA9170	GTS216	SCHWARZBECK
☒	Coaxial Cable	Apr. 01 2016	N/A	GTS213	GTS
☒	Coaxial Cable	Apr. 01 2016	N/A	GTS211	GTS
☒	Coaxial cable	Apr. 01 2016	N/A	GTS210	GTS
☒	Coaxial Cable	Apr. 01 2016	N/A	GTS212	GTS
☒	Amplifier	Jul. 04 2015	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, No Emission found .

For 30MHz to 1GHz test ,CH L ,M ,H all have been tested ,CH L is the worst case found and only reported.

Worse result are reported:

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

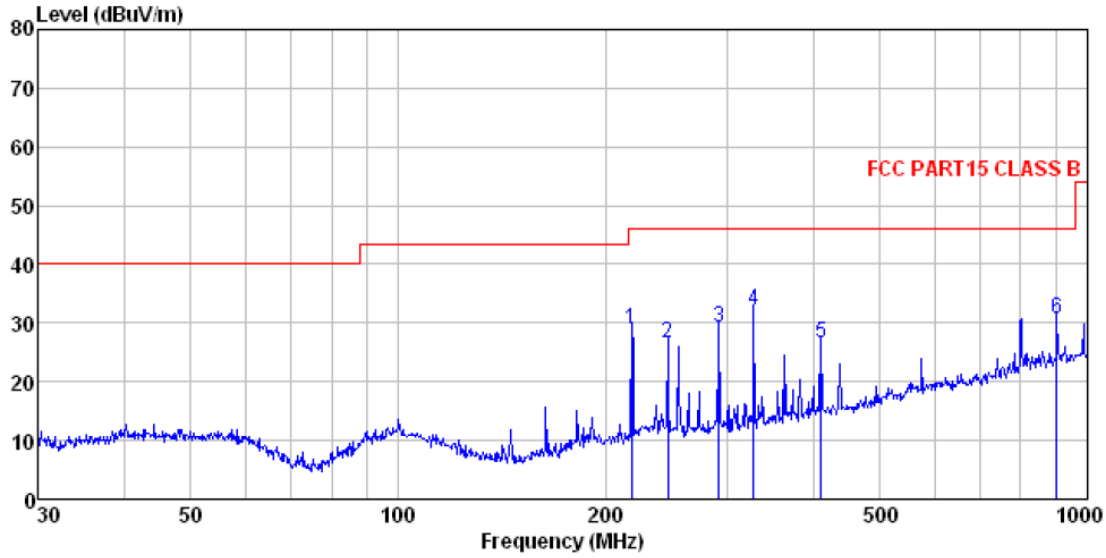
Frequency MHz	Distance m	Field strength		Distance m	Field strength
		μV/m	dBμV/m(QP)		dBμV/m(QP)
30-88	3	100	40.0	10	30.0
88-216	3	150	43.5	10	33.5
216-960	3	200	46.0	10	36.0
960-1000	3	500	54.0	10	44.0
Above 1000	3	74.0 dBμV/m (PK) 54.0 dBμV/m (AV)		/	/

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

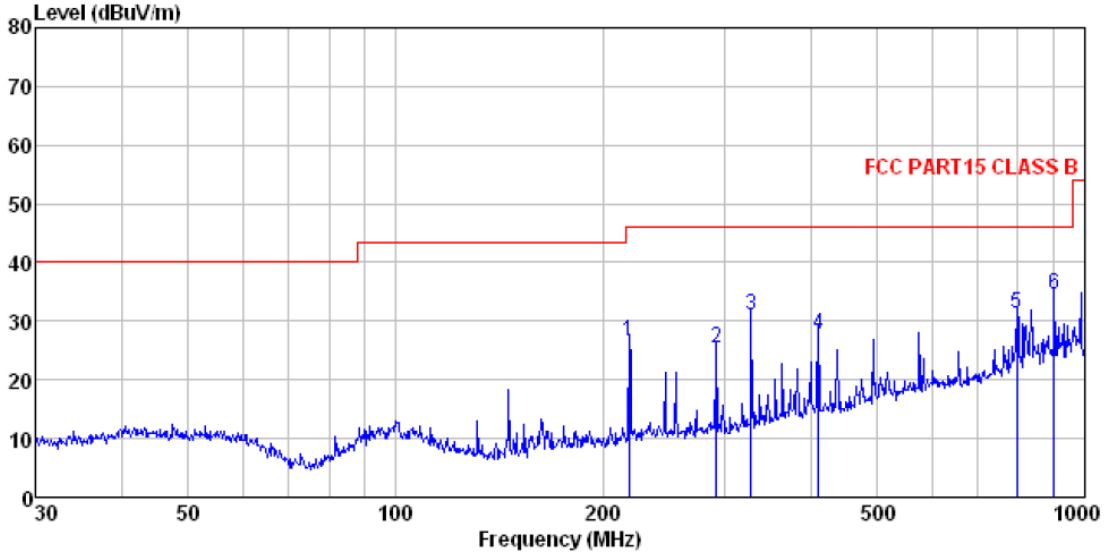
5.3.1 Diagram 5-1



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163-2013M HORIZONTAL
Job No. : 0278RF
Test Mode : TX Mode
Test Engineer: Chen

	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	218.309	43.36	13.13	1.95	29.38	29.06	46.00	-16.94	QP
2	245.951	40.09	14.08	2.10	29.61	26.66	46.00	-19.34	QP
3	292.058	42.08	14.89	2.32	29.95	29.34	46.00	-16.66	QP
4	327.887	43.75	15.66	2.51	29.84	32.08	46.00	-13.92	QP
5	410.383	35.75	17.26	2.91	29.48	26.44	46.00	-19.56	QP
6	903.309	31.83	23.12	4.87	29.10	30.72	46.00	-15.28	QP

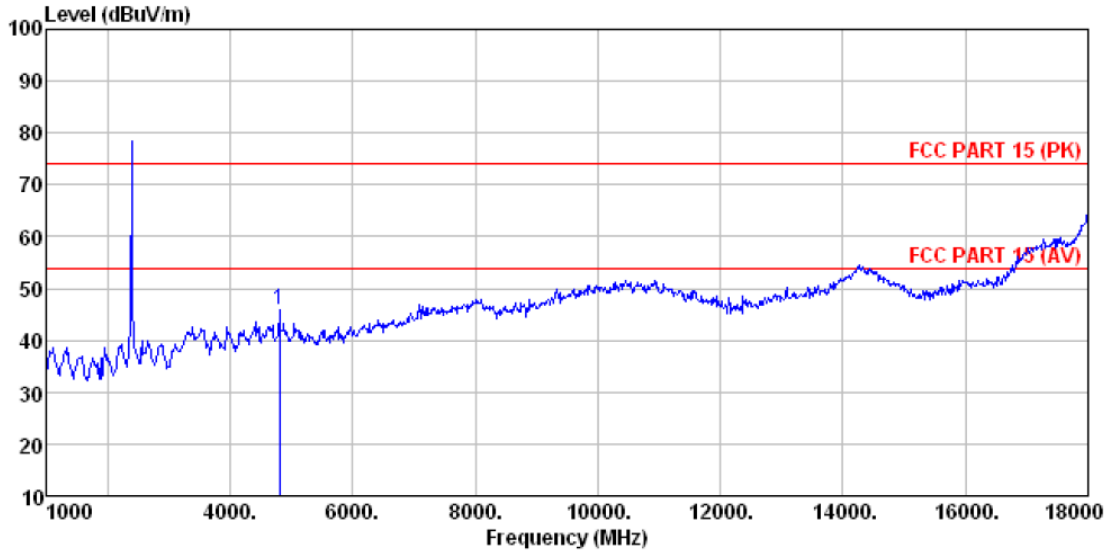
5.3.2 Diagram 5-2



Site : 3m chamber
Condition : FCC PART15 CLASS B 3m VULB9163-2013M VERTICAL
Job No. : 0278RF
Test Mode : TX Mode
Test Engineer: Chen

	Freq	ReadAntenna 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	218.309	40.92	13.13	1.95	29.38	26.62	46.00	-19.38	QP
2	292.058	38.11	14.89	2.32	29.95	25.37	46.00	-20.63	QP
3	327.887	42.80	15.66	2.51	29.84	31.13	46.00	-14.87	QP
4	410.383	36.98	17.26	2.91	29.48	27.67	46.00	-18.33	QP
5	796.183	34.07	22.01	4.45	29.20	31.33	46.00	-14.67	QP
6	903.309	35.73	23.12	4.87	29.10	34.62	46.00	-11.38	QP

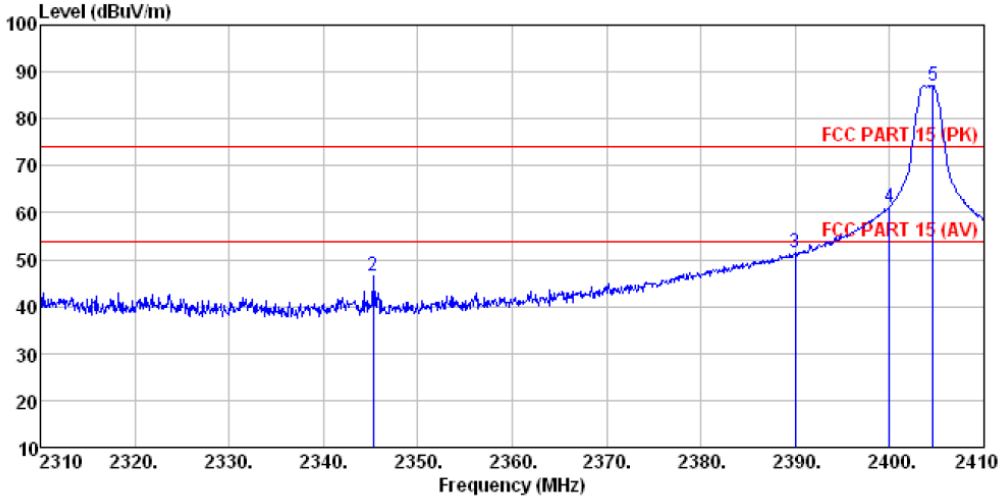
5.3.3 Diagram 5-3



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2404MHz
Test Engineer: Chen

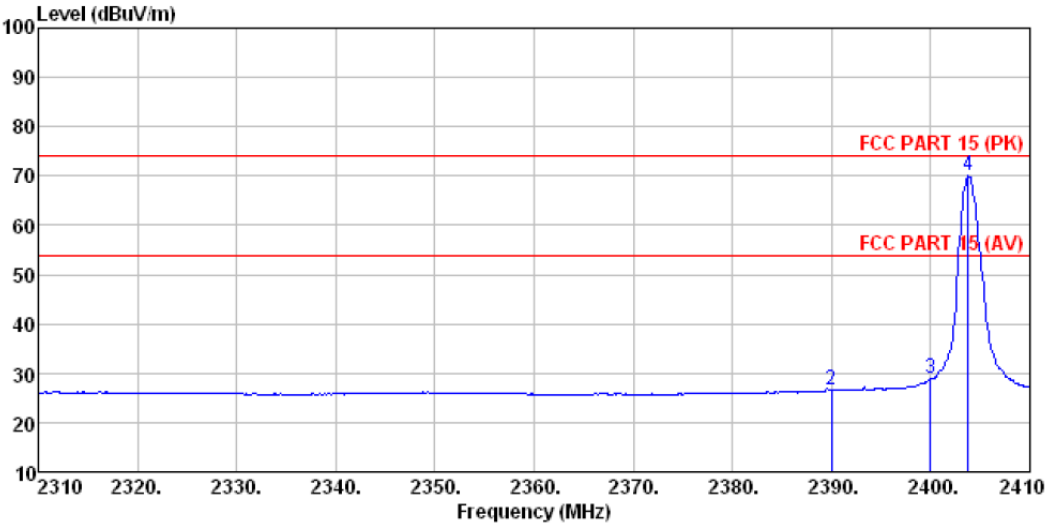
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4808.000	37.48	31.78	8.60	32.09	45.77	74.00	-28.23	Peak

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



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2404MHz
Test Engineer: Chen

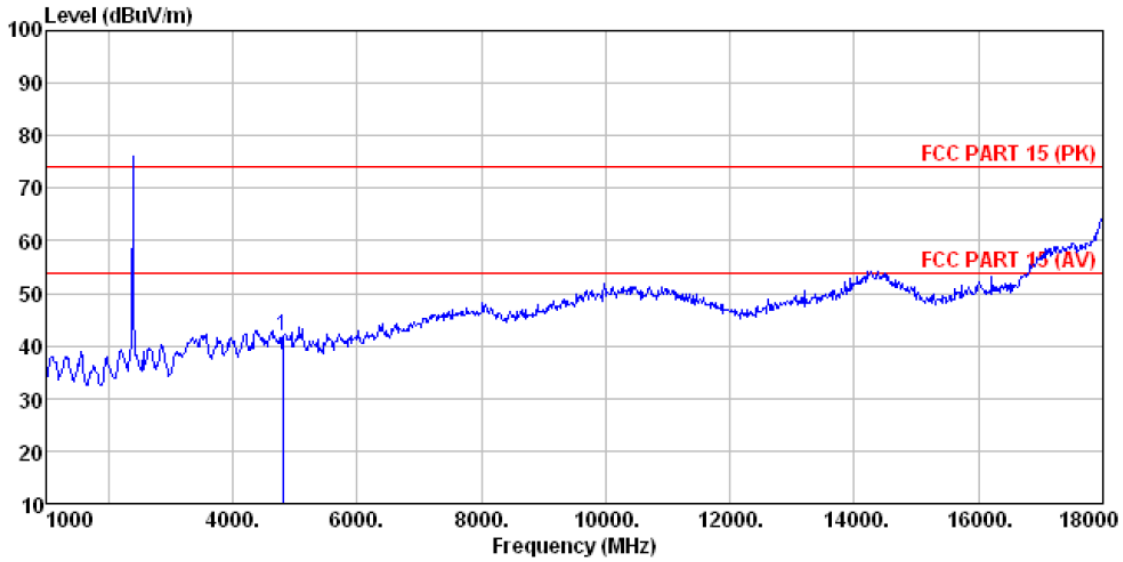
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	40.06	27.91	5.30	34.11	39.16	74.00	-34.84	Peak
2	2345.300	47.36	27.74	5.34	34.07	46.37	74.00	-27.63	Peak
3	2390.000	52.70	27.59	5.38	34.01	51.66	74.00	-22.34	Peak
4	2400.000	62.28	27.58	5.39	34.01	61.24	74.00	-12.76	Peak
5 *	2404.600	88.11	27.57	5.40	33.99	87.09	114.00	-26.91	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2404MHz
Test Engineer: Chen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	27.01	27.91	5.30	34.11	26.11	54.00	-27.89	Average
2	2390.000	27.64	27.59	5.38	34.01	26.60	54.00	-27.40	Average
3	2400.000	29.96	27.58	5.39	34.01	28.92	54.00	-25.08	Average
4 *	2403.800	70.99	27.57	5.39	33.99	69.96	94.00	-24.04	Average

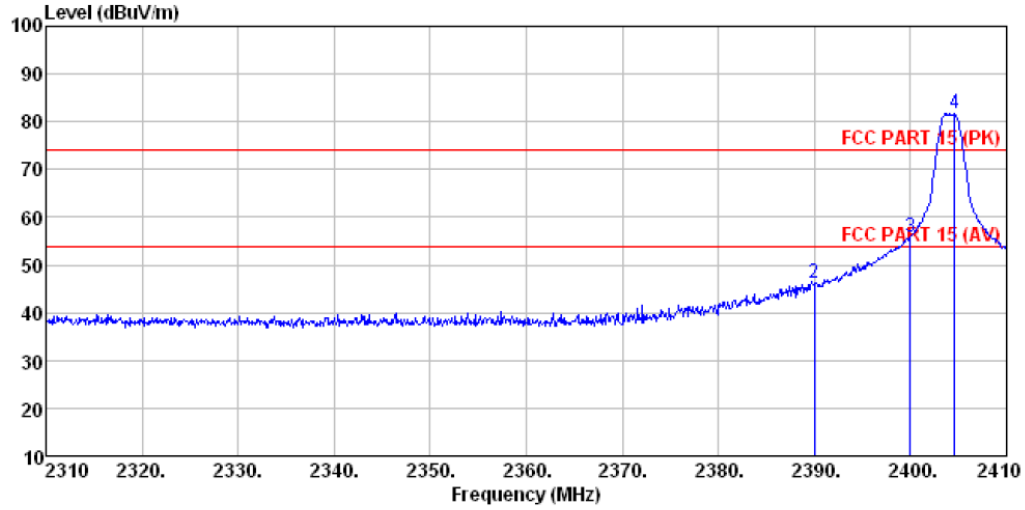
5.3.4 Diagram 5-4



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2404MHz
Test Engineer: Chen

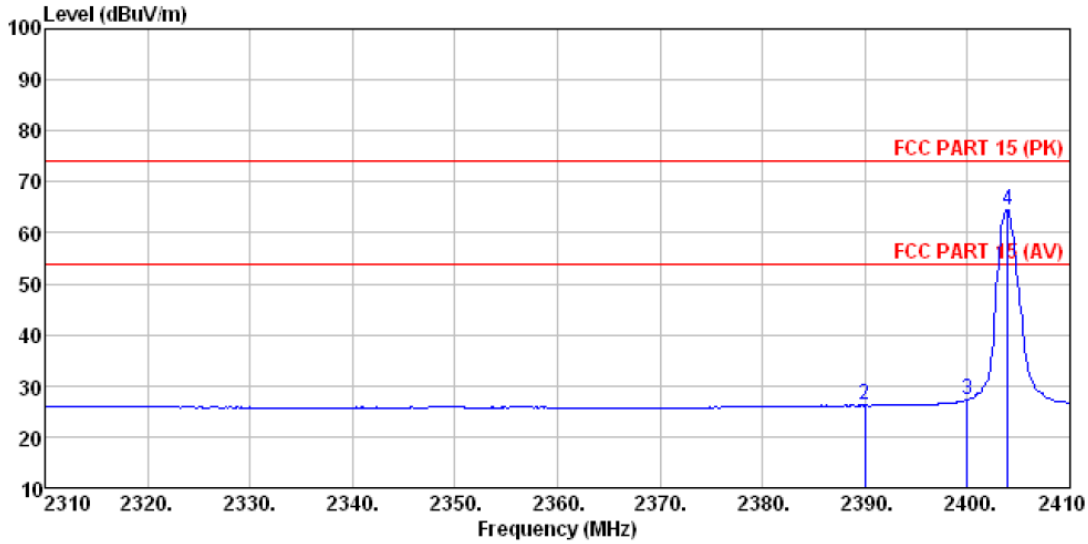
	Freq	ReadLevel	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4808.000	33.50	31.78	8.60	32.09	41.79	74.00	-32.21	Peak

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



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2404MHz
Test Engineer: Chen

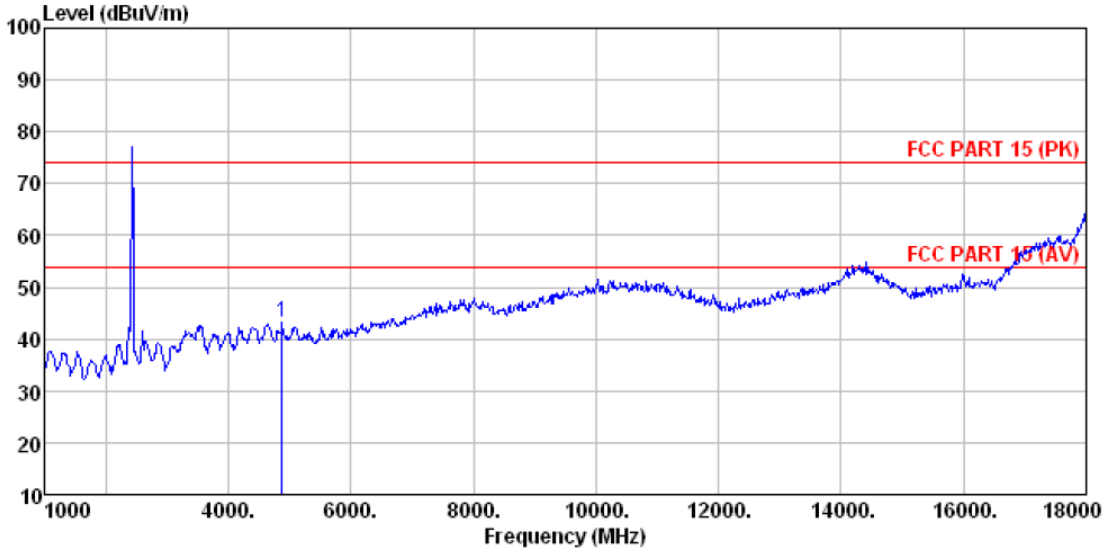
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	38.95	27.91	5.30	34.11	38.05	74.00	-35.95	Peak
2	2390.000	47.09	27.59	5.38	34.01	46.05	74.00	-27.95	Peak
3	2400.000	56.94	27.58	5.39	34.01	55.90	74.00	-18.10	Peak
4 *	2404.600	82.64	27.57	5.40	33.99	81.62	114.00	-32.38	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2404MHz
Test Engineer: Chen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	26.89	27.91	5.30	34.11	25.99	54.00	-28.01	Average
2	2390.000	27.18	27.59	5.38	34.01	26.14	54.00	-27.86	Average
3	2400.000	28.41	27.58	5.39	34.01	27.37	54.00	-26.63	Average
4 *	2403.900	65.58	27.57	5.39	33.99	64.55	94.00	-29.45	Average

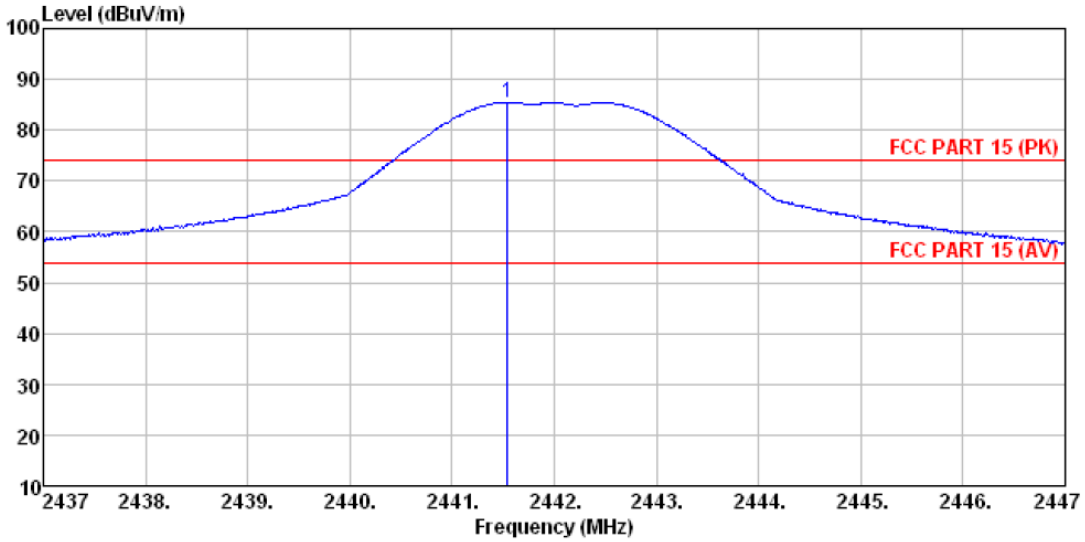
5.3.5 Diagram 5-5



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2442MHz
Test Engineer: Chen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4876.000	34.81	31.85	8.66	32.12	43.20	74.00	-30.80	Peak

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

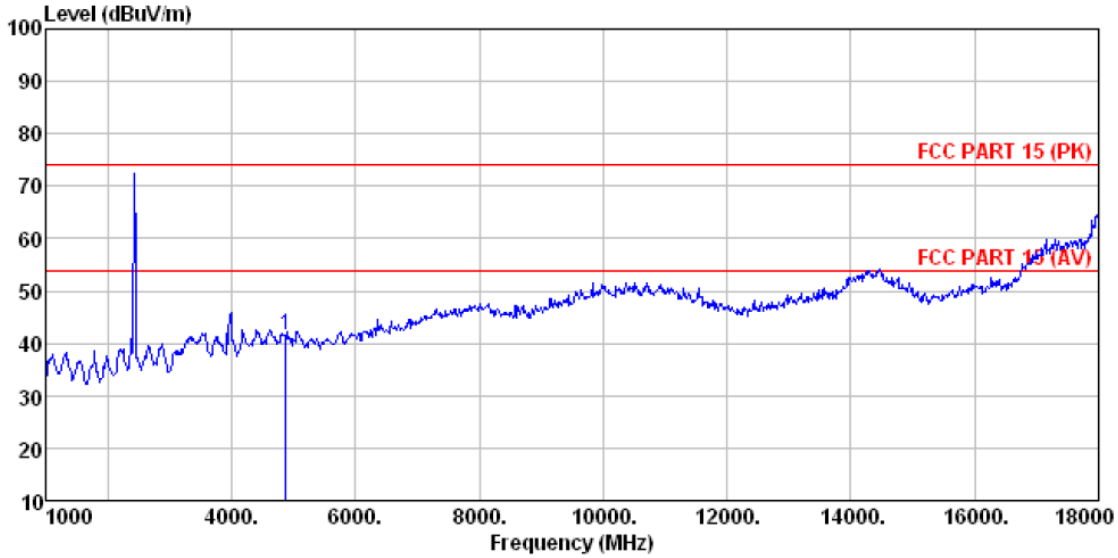


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2442MHz
Test Engineer: Chen

	Freq	ReadAntenna 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 *	2441.540	86.51	27.48	5.43	33.96	85.46	114.00	-28.54	Peak

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

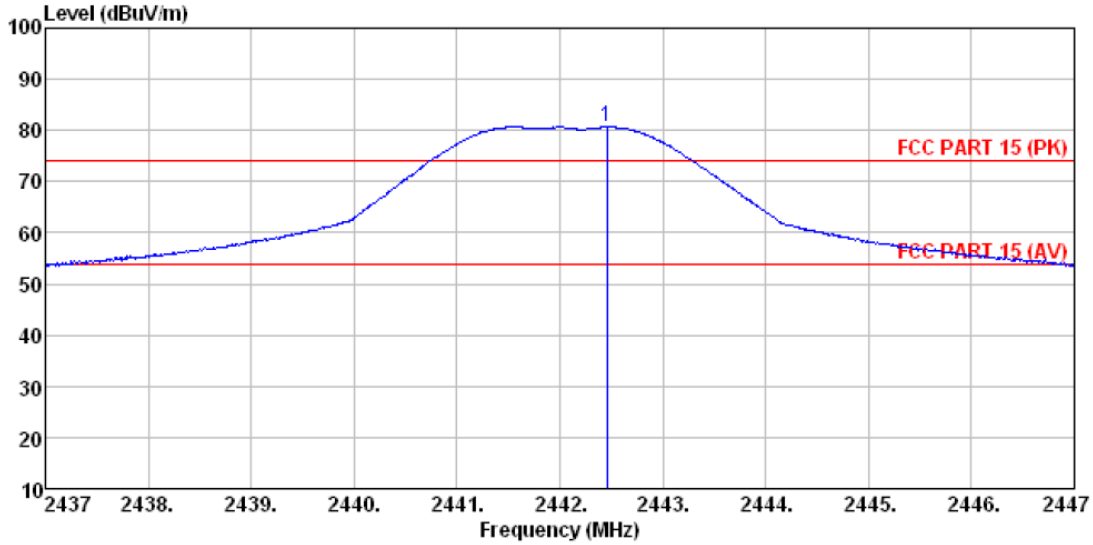
5.3.6 Diagram 5-6



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2442MHz
Test Engineer: Chen

	Freq	ReadAntenna 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	4876.000	33.28	31.85	8.66	32.12	41.67	74.00	-32.33	Peak

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

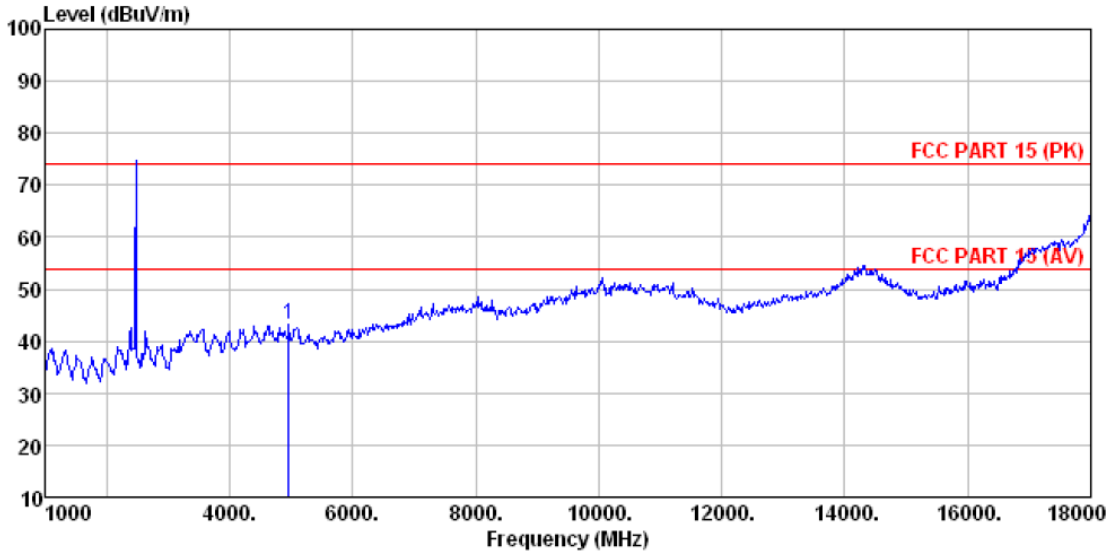


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2442MHz
Test Engineer: Chen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2442.460	81.71	27.48	5.43	33.96	80.66	114.00	-33.34	Peak

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

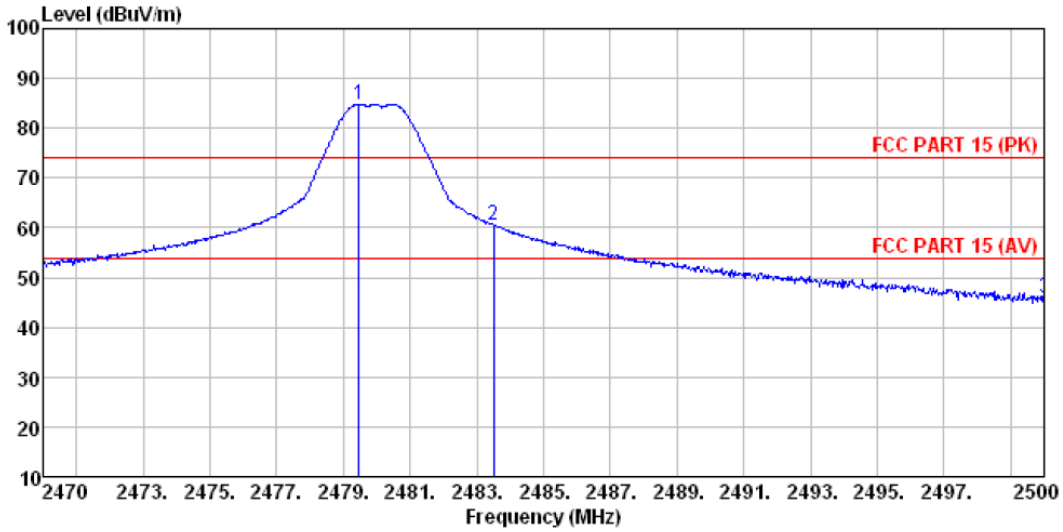
5.3.7 Diagram 5-7



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2480MHz
Test Engineer: Chen

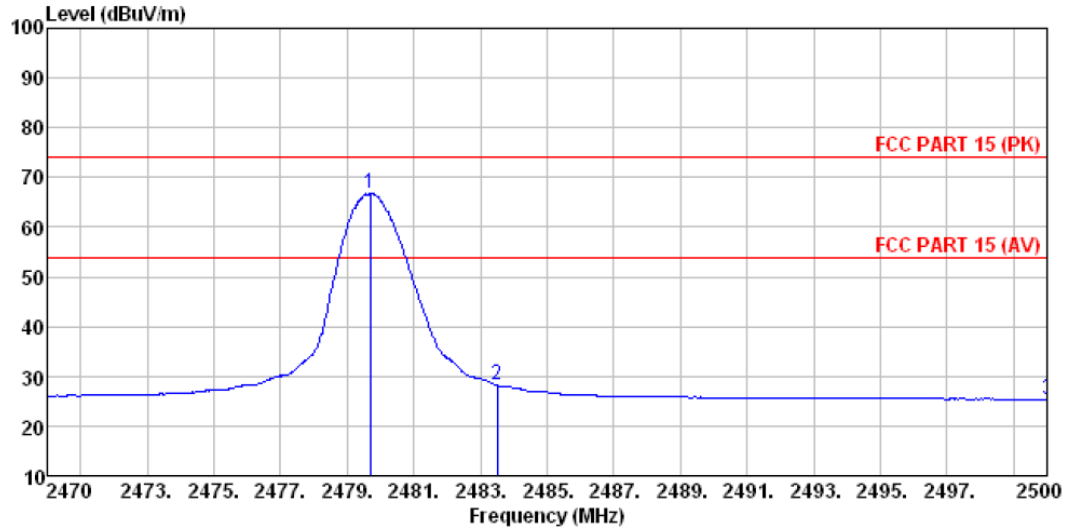
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4961.000	34.84	31.93	8.73	32.16	43.34	74.00	-30.66	Peak

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



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2480MHz
Test Engineer: Chen

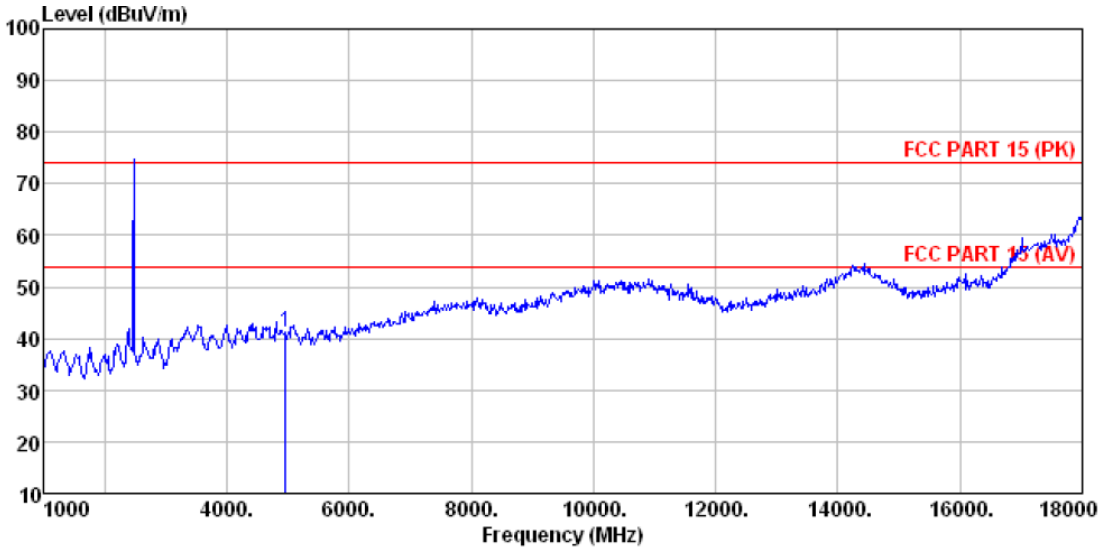
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2479.480	85.79	27.52	5.47	33.92	84.86	114.00	-29.14	Peak
2	2483.500	61.45	27.53	5.47	33.92	60.53	74.00	-13.47	Peak
3	2500.000	46.66	27.55	5.49	33.90	45.80	74.00	-28.20	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0278RF
Test Mode : TX-2480MHz
Test Engineer: Chen

	Freq	ReadAntenna 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 *	2479.690	67.83	27.52	5.47	33.92	66.90	94.00	-27.10	Average
2	2483.500	29.03	27.53	5.47	33.92	28.11	54.00	-25.89	Average
3	2500.000	26.28	27.55	5.49	33.90	25.42	54.00	-28.58	Average

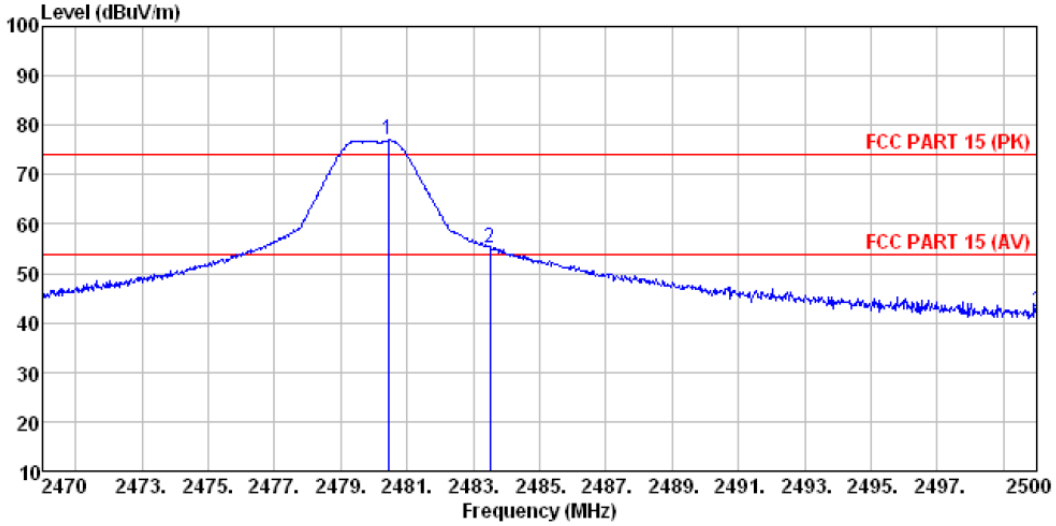
5.3.8 Diagram 5-8



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2480MHz
Test Engineer: Chen

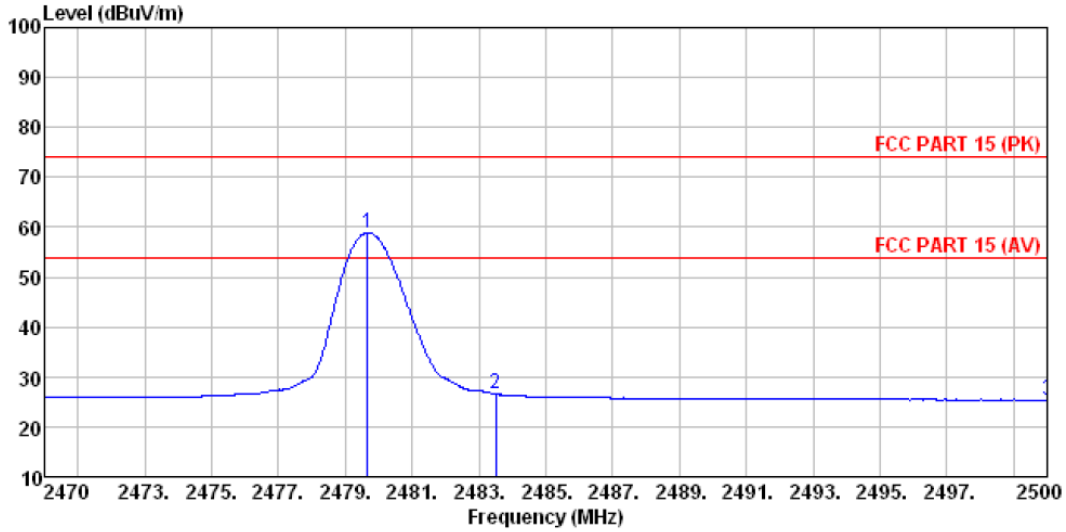
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4961.000	32.68	31.93	8.73	32.16	41.18	74.00	-32.82	Peak

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



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2480MHz
Test Engineer: Chen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2480.440	77.88	27.52	5.47	33.92	76.95	114.00	-37.05	Peak
2	2483.500	56.15	27.53	5.47	33.92	55.23	74.00	-18.77	Peak
3	2500.000	42.91	27.55	5.49	33.90	42.05	74.00	-31.95	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) VERTICAL
Job No. : 0278RF
Test Mode : TX-2480MHz
Test Engineer: Chen

	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1 *	2479.660	59.85	27.52	5.47	33.92	58.92	94.00	-35.08	Average
2	2483.500	27.48	27.53	5.47	33.92	26.56	54.00	-27.44	Average
3	2500.000	26.19	27.55	5.49	33.90	25.33	54.00	-28.67	Average

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)>= 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
☒	Spectrum	Jul. 04 2015	FSP30	GTS208	RS

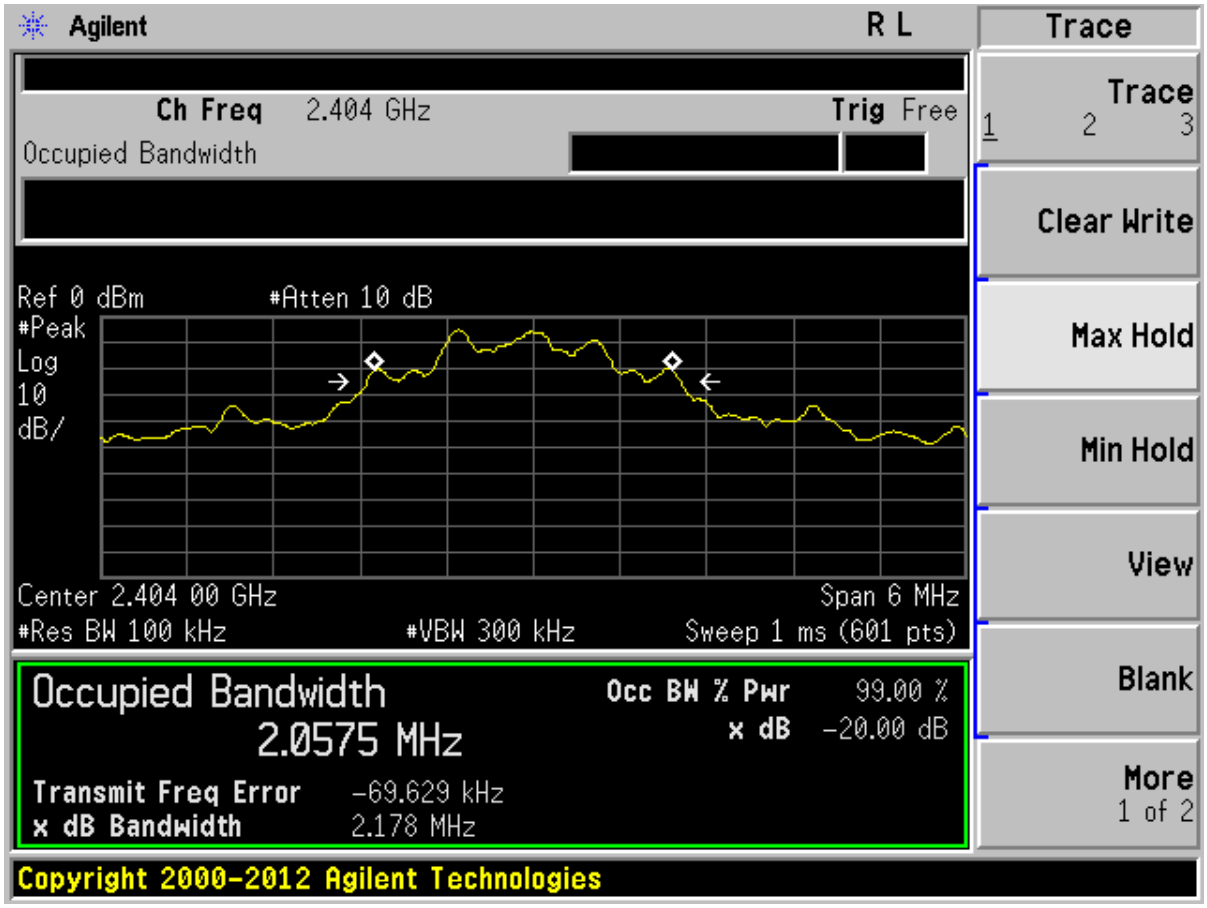
6.3 Test Result

Remark : Conducted measurement.

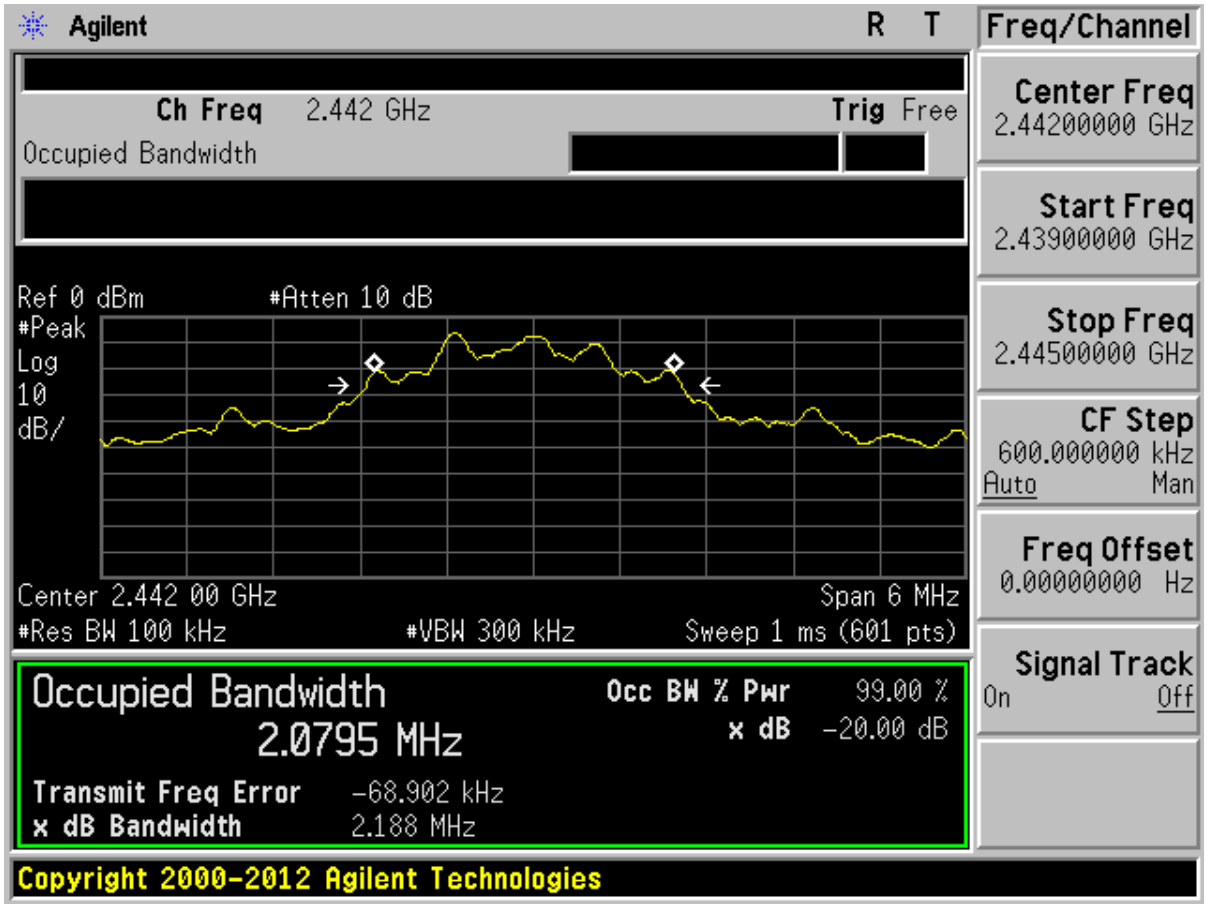
20dB Bandwidth:

GFSK			
Channel	Diagram	20dB bandwidth (MHz)	Result
CH LOW	6-1	2.178	PASS
CH MID	6-2	2.188	PASS
CH HIGH	6-3	2.209	PASS

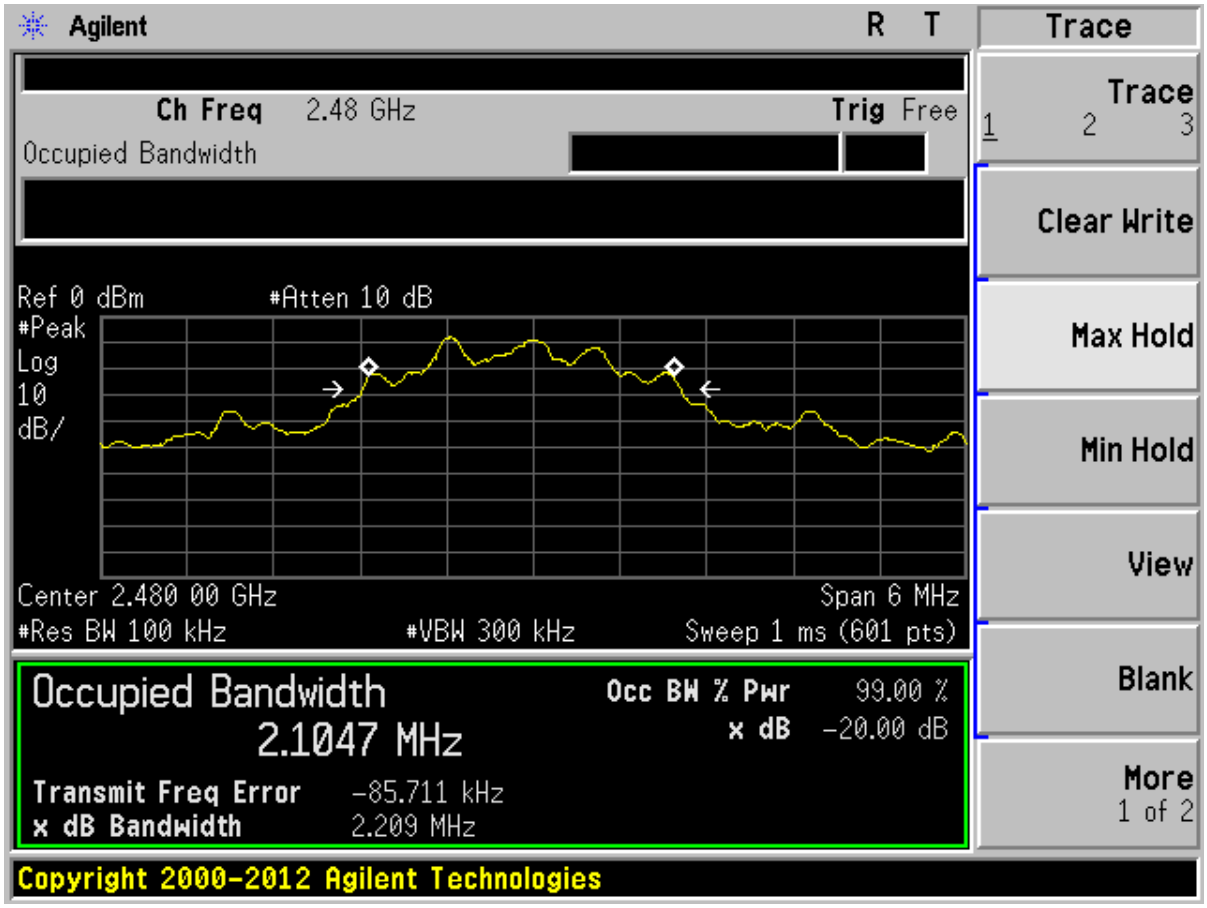
6.3.1 Diagram 6-1



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 μH/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 (dBμV)	
	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
☒	Shielding Room	Jul. 04 2015	7.0(L)x3.0(W)x3.0(H)	GTS252	ZhongYu Electron
☒	EMI Test Receiver	Jul. 04 2015	ESCS30	1102.4500K30	Rohde & Schwarz
☒	10dB Pulse Limita	Jul. 04 2015	N/A	GTS224	Rohde & Schwarz
☒	LISN	Jul. 04 2015	NSLK 8127	8127549	SCHWARZBECK MESS-ELEKTRONIK
☒	Coaxial Cable	Apr. 01 2016	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 C63.4-2009 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

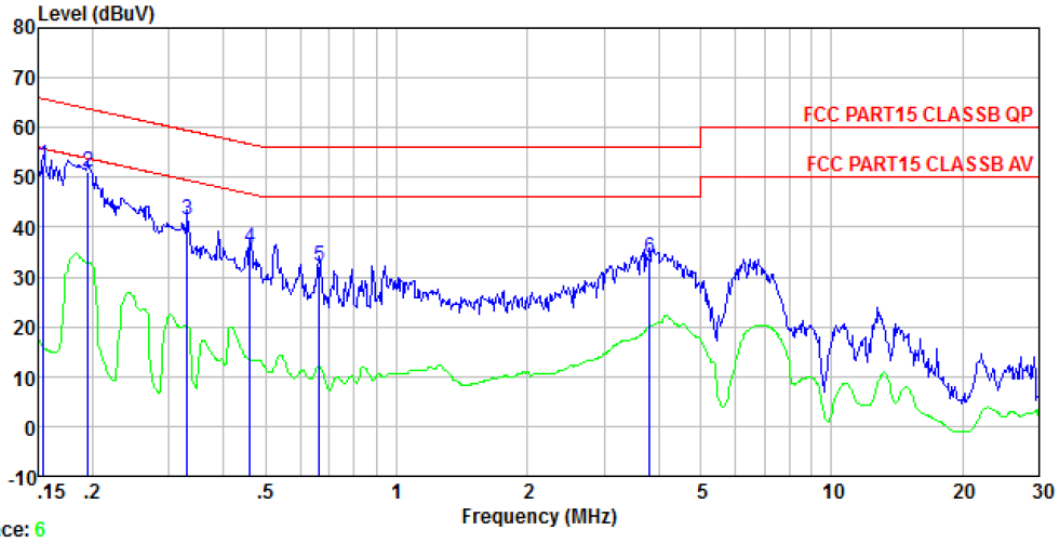
NOTES:

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

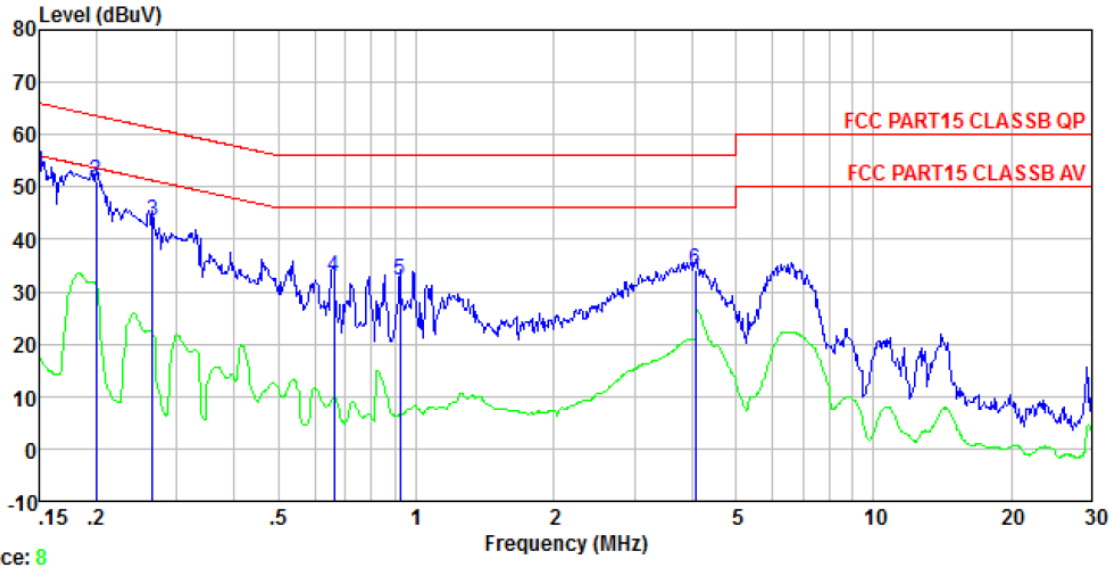


Trace: 6

Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 LINE
Job No. : 0278RF
Test mode : Transmitting mode
Test Engineer: Qing

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	52.18	0.15	0.12	52.45	65.78	-13.33	QP
2	0.195	50.94	0.14	0.13	51.21	63.80	-12.59	QP
3	0.330	41.13	0.11	0.10	41.34	59.44	-18.10	QP
4	0.461	35.75	0.12	0.11	35.98	56.67	-20.69	QP
5	0.665	31.96	0.14	0.13	32.23	56.00	-23.77	QP
6	3.820	33.41	0.19	0.15	33.75	56.00	-22.25	QP

7.3.2 Diagram 7-2



Trace: 8

Site : Shielded room
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL
Job No. : 0278RF
Test mode : Transmitting mode
Test Engineer: Qing

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.150	52.49	0.07	0.12	52.68	66.00	-13.32	QP
2	0.200	50.93	0.07	0.13	51.13	63.62	-12.49	QP
3	0.266	43.41	0.06	0.11	43.58	61.25	-17.67	QP
4	0.661	32.77	0.07	0.13	32.97	56.00	-23.03	QP
5	0.923	31.94	0.07	0.13	32.14	56.00	-23.86	QP
6	4.070	34.00	0.14	0.15	34.29	56.00	-21.71	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*****