FCC Test Report

FCC EVALUATION REPORT FOR CERTIFICATE	
Project Reference No.	316509
Product	2.4G Wireless Keyboard
Brand Name	Heng Yu
Model	CK82B-RF
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	2016-10-14 to 2016-11-01	
Issued date	2016-11-10	
Name and address	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		2016-11-10
	Juno Wong	***date***
Verified by		2016-11-10
	Zone Peng	***date***

Contents of This Report

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:	2.4G Wireless Keyboard
Model Name:	CK82B-RF
Alternate model:	N/A
Brand name:	Heng Yu

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: 39
Data rate: 1Mbps

Rating(s): 4X1.5VDC AAA battery 4pcs

2.3 Additional Information Related to Testing

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

Remark: New battery is used during all test.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 : New batteries used during testing.

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.

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=1MHz,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 2017	ESU26	GTS203	R&S
☒	BiConiLog Antenna	Feb. 26 2017	VULB9163	GTS214	SCHWARZBECK
☒	Horn Antenna	Feb. 26 2017	BBHA9120D	GTS215	SCHWARZBECK
☒	Horn Antenna	Feb. 26 2017	BBHA9170	GTS216	SCHWARZBECK
☒	Coaxial Cable	Apr. 01 2017	N/A	GTS213	GTS
☒	Coaxial Cable	Apr. 01 2017	N/A	GTS211	GTS
☒	Coaxial cable	Apr. 01 2017	N/A	GTS210	GTS
☒	Coaxial Cable	Apr. 01 2017	N/A	GTS212	GTS
☒	Amplifier	Jul. 04 2017	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.

Test Mode	Freq range	Channel	Test ANT. polarity	Diagram	Test Result
TX mode: GFSK	30MHz-1GHz	CH LOW	H	5-1	Pass
	30MHz-1GHz	CH LOW	V	5-2	Pass
	30MHz-1GHz	CH MID	H	5-3	Pass
	30MHz-1GHz	CH MID	V	5-4	Pass
	30MHz-1GHz	CH HIGH	H	5-5	Pass
	30MHz-1GHz	CH HIGH	V	5-6	Pass
TX mode: GFSK	1GHz-18GHz:	CH LOW	H	5-7	Pass
	1GHz-18GHz:	CH LOW	V	5-8	Pass
	1GHz-18GHz:	CH MID	H	5-9	Pass
	1GHz-18GHz:	CH MID	V	5-10	Pass
	1GHz-18GHz:	CH HIGH	H	5-11	Pass
	1GHz-18GHz:	CH HIGH	V	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

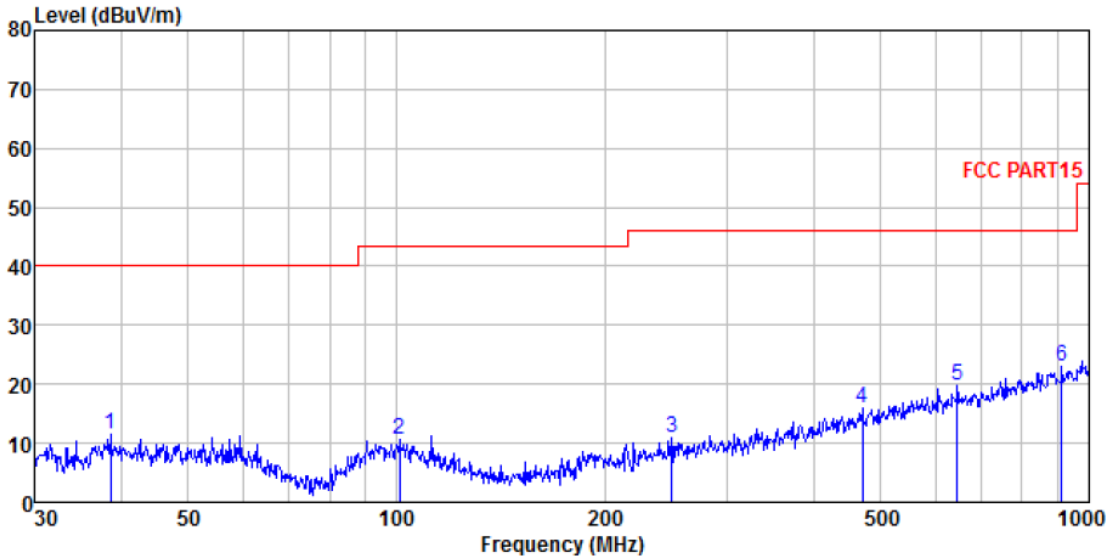
Frequency MHz	Distance m	Field strength		Distance m	Field strength
		μV/m	dBμV/m(QP)		dBμV/m(QP)
30-88	3	100	40.0	10	30.0
88-216	3	150	43.5	10	33.5
216-960	3	200	46.0	10	36.0
960-1000	3	500	54.0	10	44.0
Above 1000	3	74.0 dBμV/m (PK) 54.0 dBμV/m (AV)		/	/

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

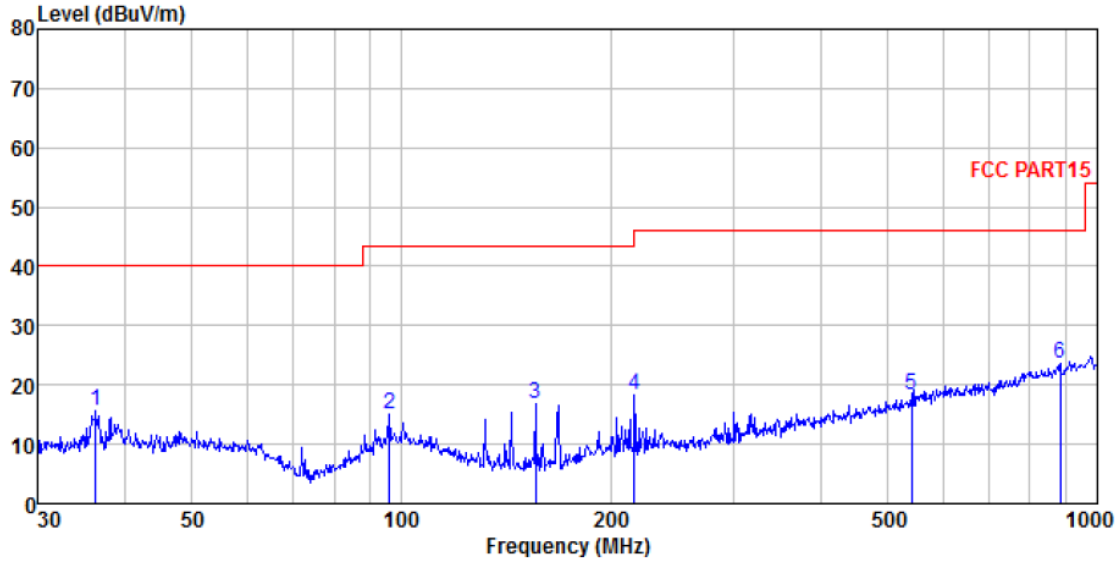
5.3.1 Diagram 5-1



Site : 3m chamber
Condition : FCC PART15 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
: 2404MHz

	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	38.616	25.70	15.25	0.65	30.05	11.55	40.00	-28.45	Peak
2	100.934	23.93	15.06	1.20	29.70	10.49	43.50	-33.01	Peak
3	249.425	24.43	14.07	2.12	29.64	10.98	46.00	-35.02	Peak
4	470.523	24.38	17.83	3.18	29.36	16.03	46.00	-29.97	Peak
5	645.120	24.55	20.61	3.89	29.25	19.80	46.00	-26.20	Peak
6	912.862	24.08	23.18	4.90	29.10	23.06	46.00	-22.94	Peak

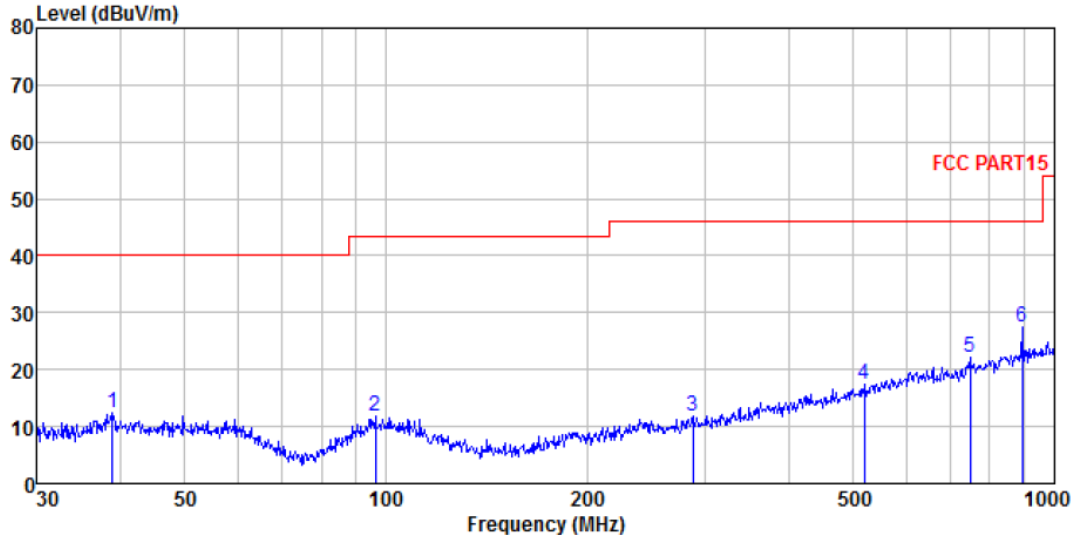
5.3.2 Diagram 5-2



Site : 3m chamber
Condition : FCC PART15 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
: 2404MHz

	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	36.381	30.42	14.68	0.62	30.06	15.66	40.00	-24.34	Peak
2	96.099	28.58	14.90	1.16	29.72	14.92	43.50	-28.58	Peak
3	155.910	34.13	10.51	1.60	29.38	16.86	43.50	-26.64	Peak
4	216.024	32.76	13.07	1.93	29.36	18.40	46.00	-27.60	Peak
5	541.373	24.61	19.41	3.49	29.30	18.21	46.00	-27.79	Peak
6	884.503	25.00	22.96	4.79	29.11	23.64	46.00	-22.36	Peak

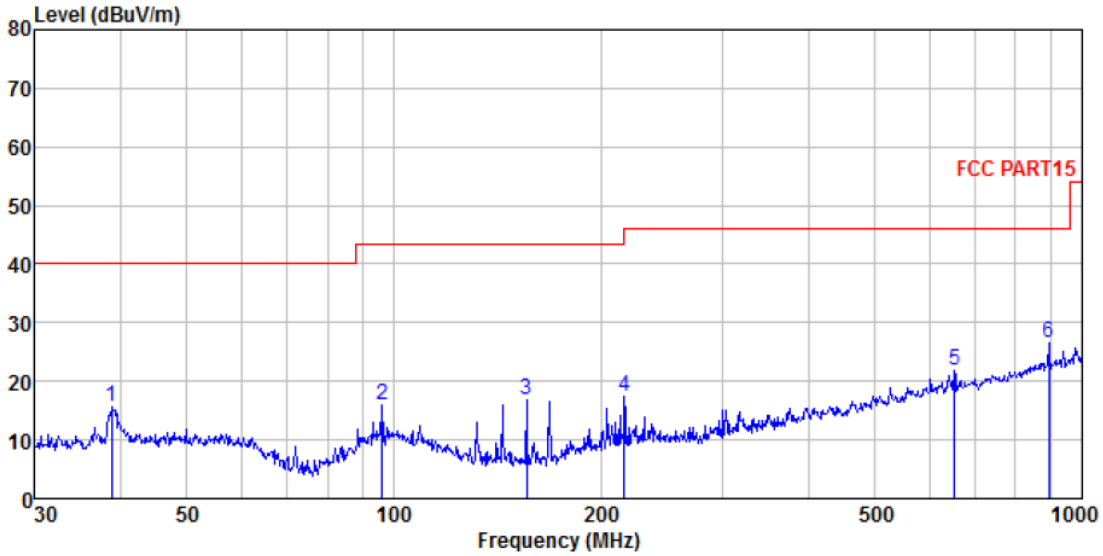
5.3.3 Diagram 5-3



Site : 3m chamber
Condition : FCC PART15 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
: 2442MHz

	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	39.024	26.58	15.34	0.65	30.05	12.52	40.00	-27.48	Peak
2	96.436	25.28	14.94	1.16	29.72	11.66	43.50	-31.84	Peak
3	287.990	24.54	14.84	2.31	29.92	11.77	46.00	-34.23	Peak
4	519.065	24.27	19.00	3.39	29.30	17.36	46.00	-28.64	Peak
5	747.483	25.50	21.43	4.27	29.20	22.00	46.00	-24.00	Peak
6	893.857	28.70	23.05	4.83	29.10	27.48	46.00	-18.52	Peak

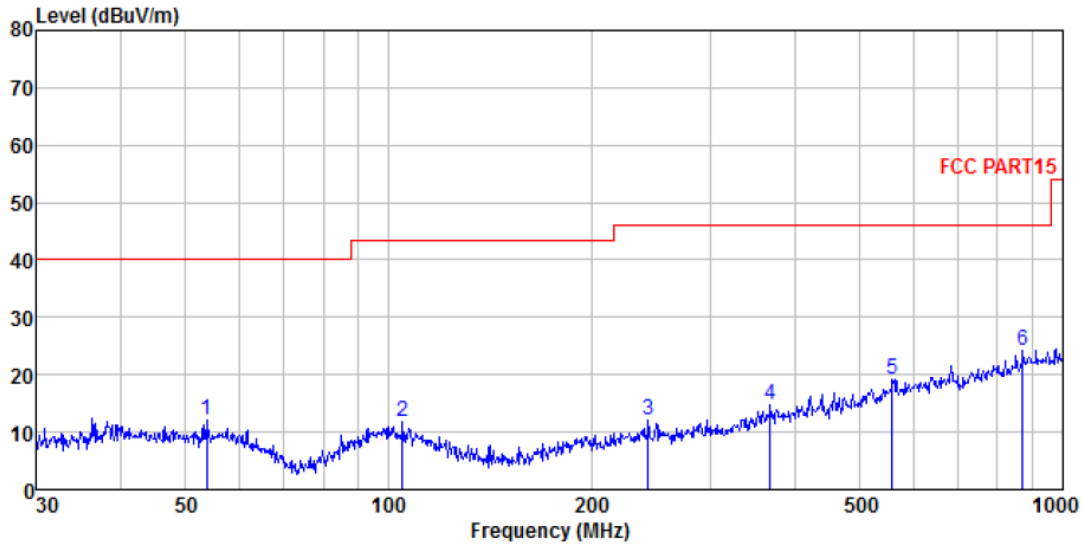
5.3.4 Diagram 5-4



Site : 3m chamber
Condition : FCC PART15 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
: 2442MHz

	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	38.888	29.60	15.30	0.65	30.05	15.50	40.00	-24.50	Peak
2	96.099	29.63	14.90	1.16	29.72	15.97	43.50	-27.53	Peak
3	155.910	34.23	10.51	1.60	29.38	16.96	43.50	-26.54	Peak
4	216.024	31.90	13.07	1.93	29.36	17.54	46.00	-28.46	Peak
5	651.942	26.44	20.65	3.92	29.25	21.76	46.00	-24.24	Peak
6	893.857	27.93	23.05	4.83	29.10	26.71	46.00	-19.29	Peak

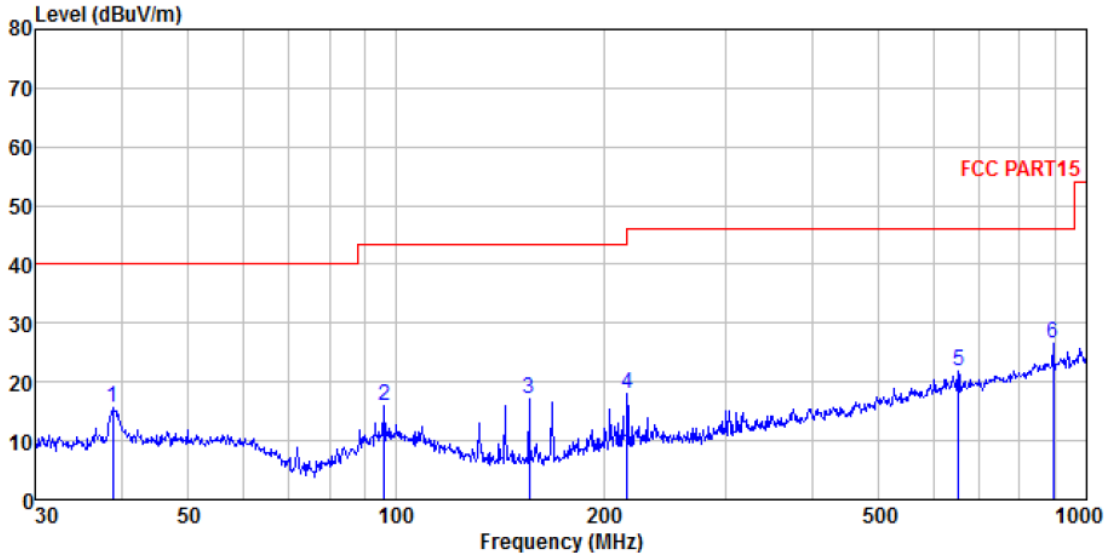
5.3.5 Diagram 5-5



Site : 3m chamber
Condition : FCC PART15 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
: 2480MHz

	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	53.693	26.16	15.07	0.81	29.97	12.07	40.00	-27.93	Peak
2	104.903	25.59	14.68	1.23	29.67	11.83	43.50	-31.67	Peak
3	242.525	25.46	14.08	2.08	29.58	12.04	46.00	-33.96	Peak
4	368.112	25.18	16.49	2.71	29.65	14.73	46.00	-31.27	Peak
5	558.730	25.30	19.72	3.56	29.30	19.28	46.00	-26.72	Peak
6	872.183	25.63	22.82	4.74	29.13	24.06	46.00	-21.94	Peak

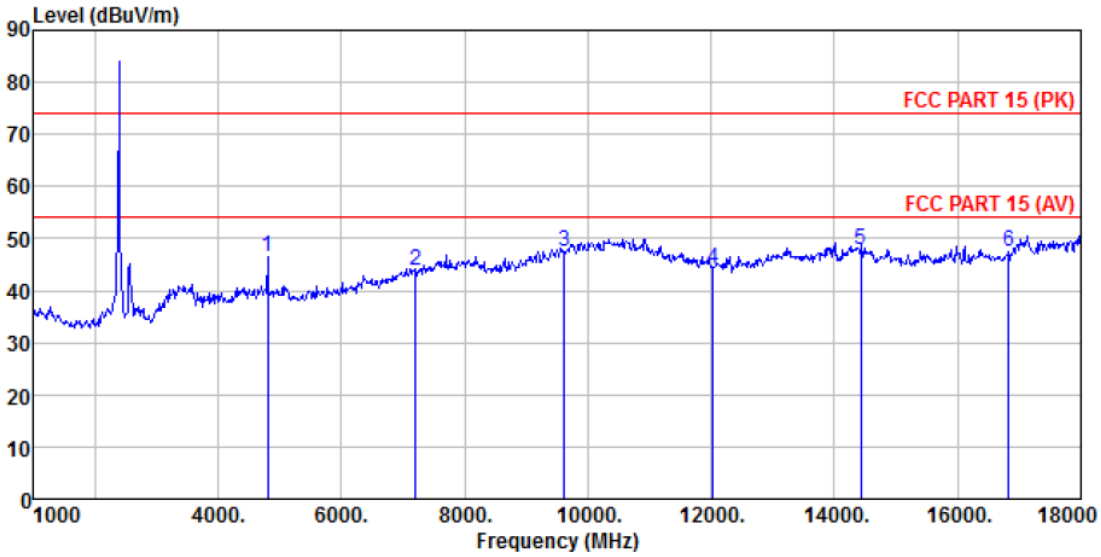
5.3.6 Diagram 5-6



Site : 3m chamber
Condition : FCC PART15 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
: 2480MHz

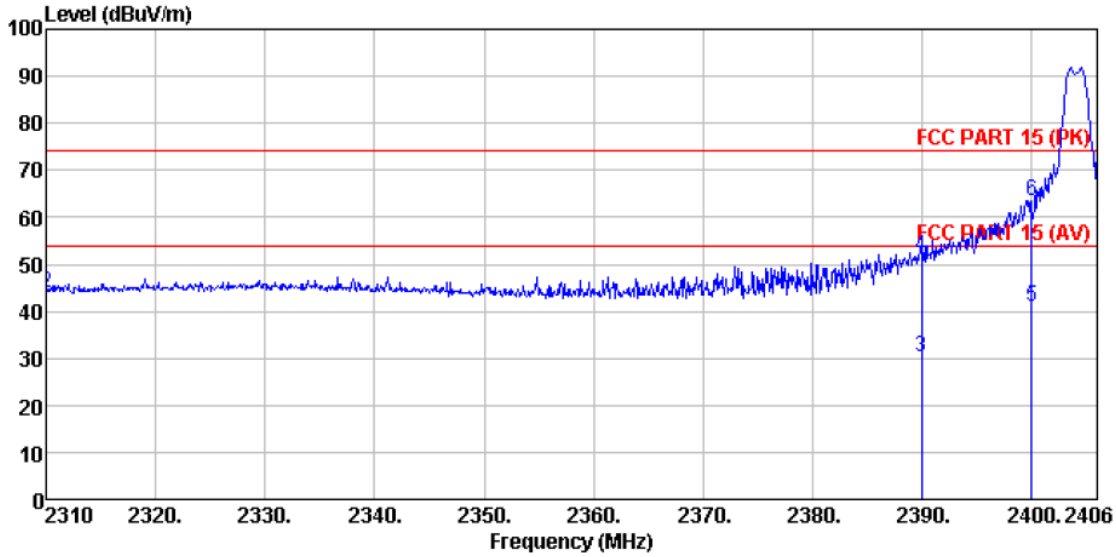
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	38.888	29.60	15.30	0.65	30.05	15.50	40.00	-24.50	Peak
2	96.099	29.63	14.90	1.16	29.72	15.97	43.50	-27.53	Peak
3	155.910	34.34	10.51	1.60	29.38	17.07	43.50	-26.43	Peak
4	216.024	32.26	13.07	1.93	29.36	17.90	46.00	-28.10	Peak
5	651.942	26.44	20.65	3.92	29.25	21.76	46.00	-24.24	Peak
6	893.857	27.93	23.05	4.83	29.10	26.71	46.00	-19.29	Peak

5.3.7 Diagram 5-7



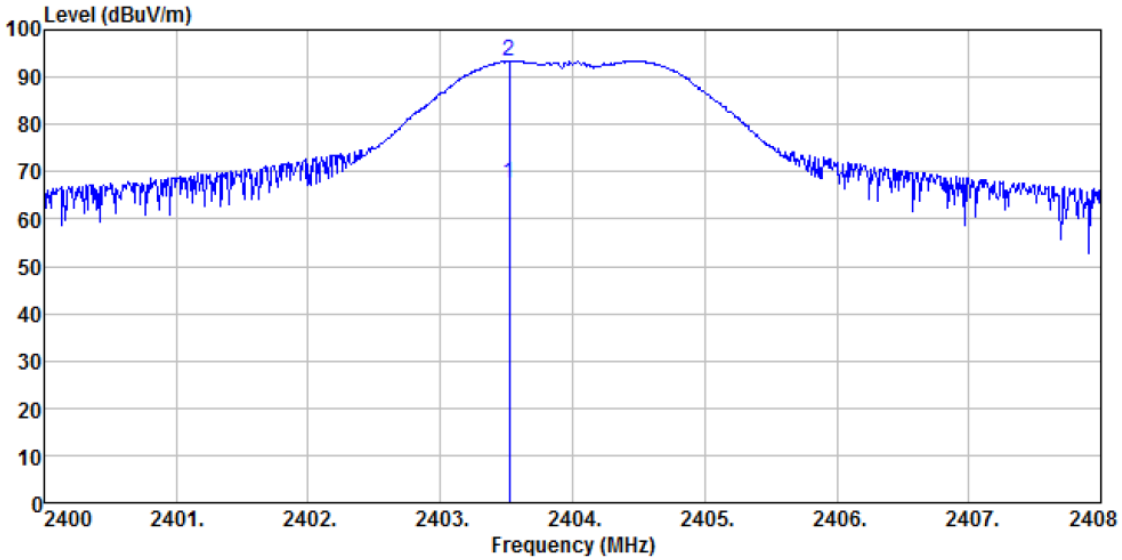
Site : 3m chamber
Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2404MHz

	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	38.29	31.78	8.60	32.09	46.58	74.00	-27.42	Peak
2	7212.000	27.88	36.15	11.66	32.00	43.69	74.00	-30.31	Peak
3	9616.000	26.90	38.01	14.14	31.60	47.45	74.00	-26.55	Peak
4	12026.000	25.65	39.08	15.03	35.54	44.22	74.00	-29.78	Peak
5	14424.000	21.46	42.46	17.15	33.41	47.66	74.00	-26.34	Peak
6	16828.000	20.27	42.13	18.82	33.74	47.48	74.00	-26.52	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2404MHz

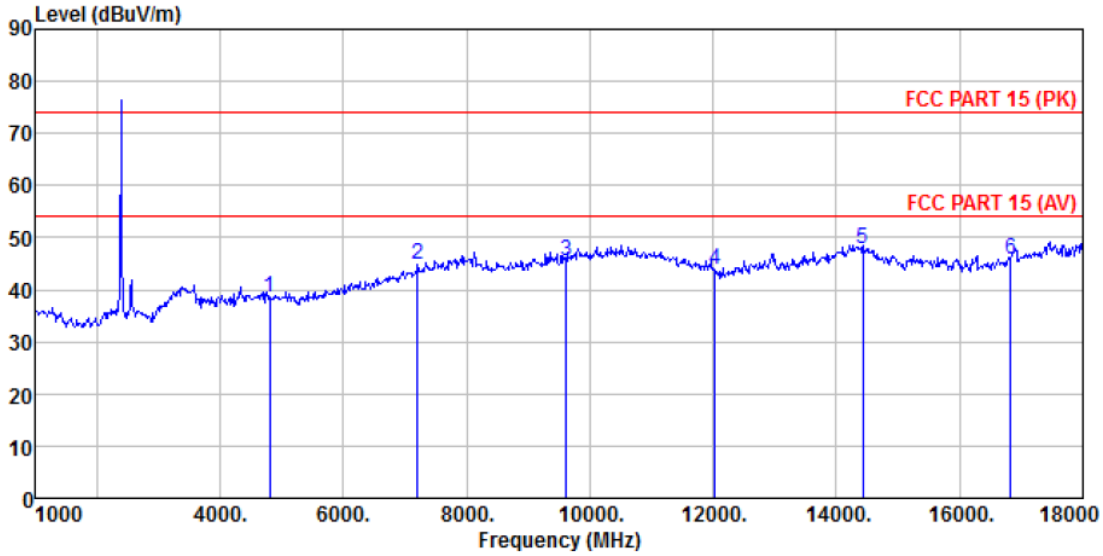
	Freq	ReadAntenna Level	Factor	Preamp Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	14.27	27.91	24.64	5.30	22.84	54.00	-31.16	Average
2	2310.000	35.50	27.91	24.64	5.30	44.07	74.00	-29.93	Peak
3	2389.968	22.09	27.59	24.71	5.38	30.35	54.00	-23.65	Average
4	2389.968	43.55	27.59	24.71	5.38	51.81	74.00	-22.19	Peak
5	2400.000	32.62	27.58	24.72	5.39	40.87	54.00	-13.13	Average
6	2400.000	55.28	27.58	24.72	5.39	63.53	74.00	-10.47	Peak



Site : 3m chamber
Condition : 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2404MHz

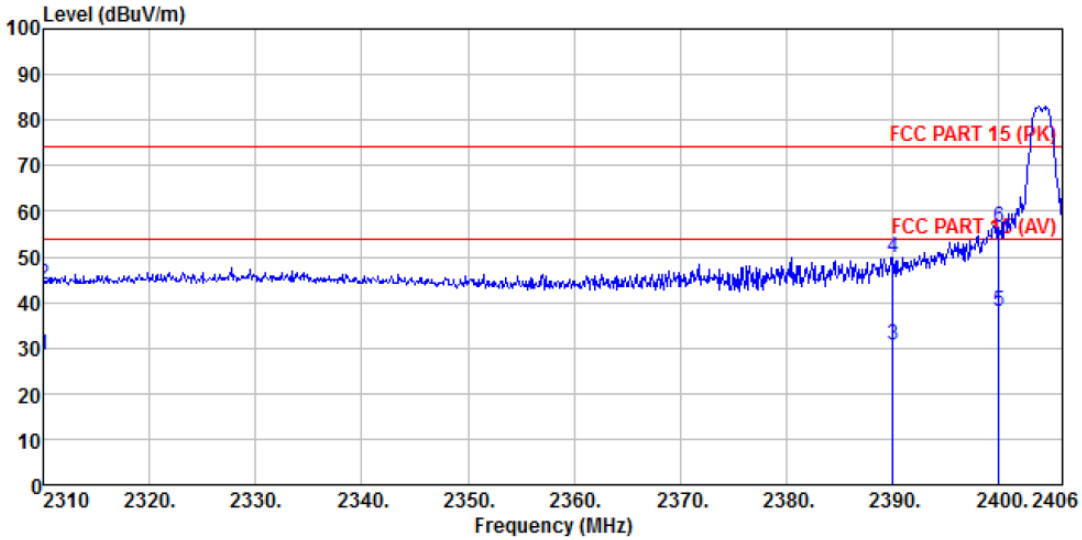
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2403.520	59.23	27.57	5.39	24.73	67.46	------	------	Average
2	2403.520	85.21	27.57	5.39	24.73	93.44	------	------	Peak

5.3.8 Diagram 5-8



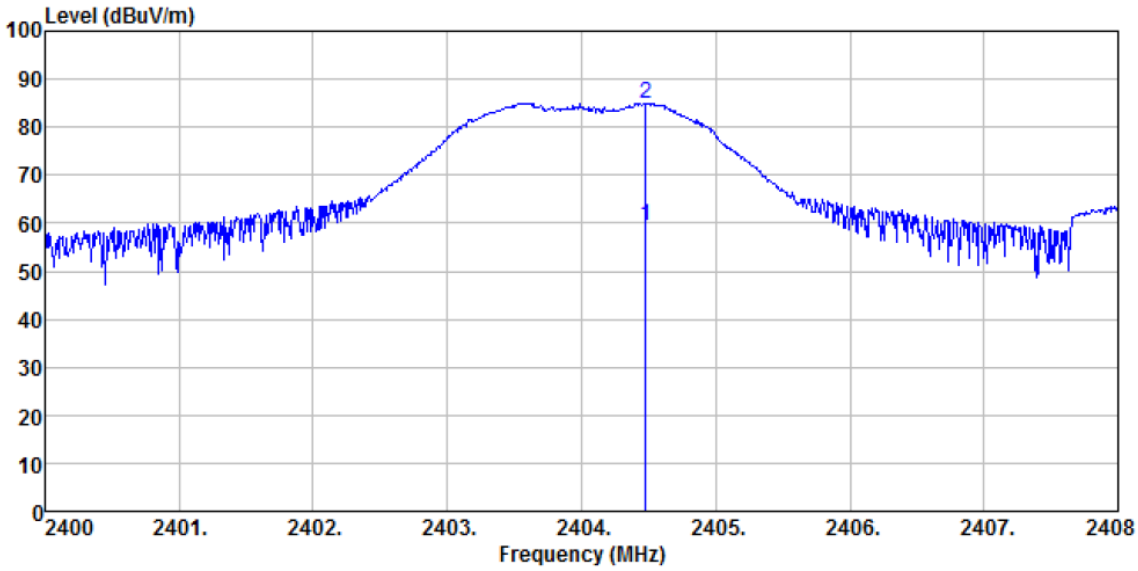
Site : 3m chamber
Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2404MHz

	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	4808.000	30.11	31.78	8.60	32.09	38.40	74.00	-35.60	Peak
2	7212.000	28.96	36.15	11.66	32.00	44.77	74.00	-29.23	Peak
3	9616.000	25.01	38.01	14.14	31.60	45.56	74.00	-28.44	Peak
4	12026.000	25.13	39.08	15.03	35.54	43.70	74.00	-30.30	Peak
5	14424.000	21.55	42.46	17.15	33.41	47.75	74.00	-26.25	Peak
6	16828.000	18.54	42.13	18.82	33.74	45.75	74.00	-28.25	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2404MHz

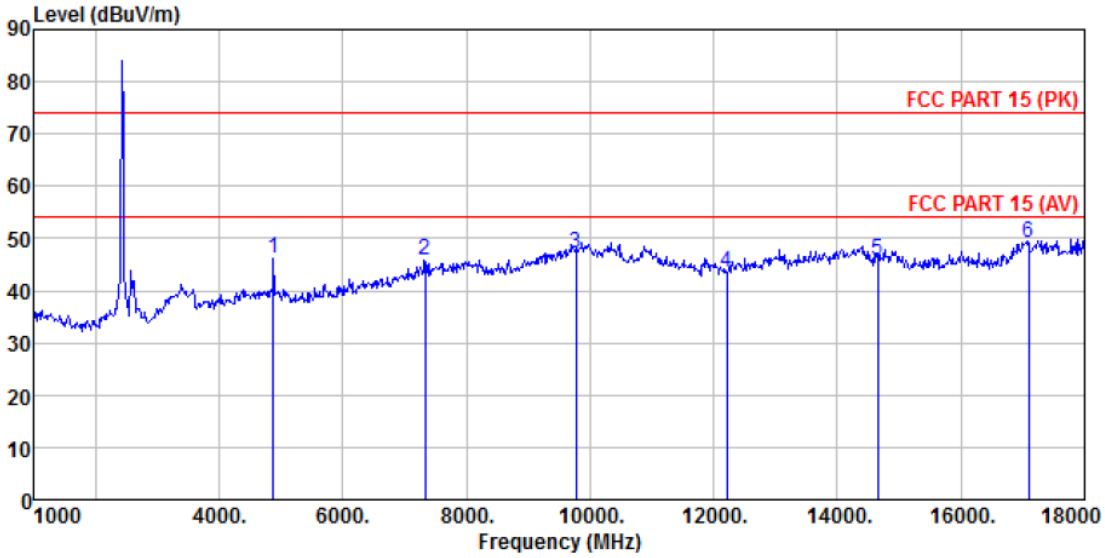
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2310.000	19.89	27.91	5.30	24.64	28.46	54.00	-25.54	Average
2	2310.000	35.39	27.91	5.30	24.64	43.96	74.00	-30.04	Peak
3	2390.000	22.31	27.59	5.38	24.71	30.57	54.00	-23.43	Average
4	2390.000	41.55	27.59	5.38	24.71	49.81	74.00	-24.19	Peak
5	2400.000	29.89	27.58	5.39	24.72	38.14	54.00	-15.86	Average
6	2400.000	48.28	27.58	5.39	24.72	56.53	74.00	-17.47	Peak



Site : 3m chamber
Condition : 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2404MHz

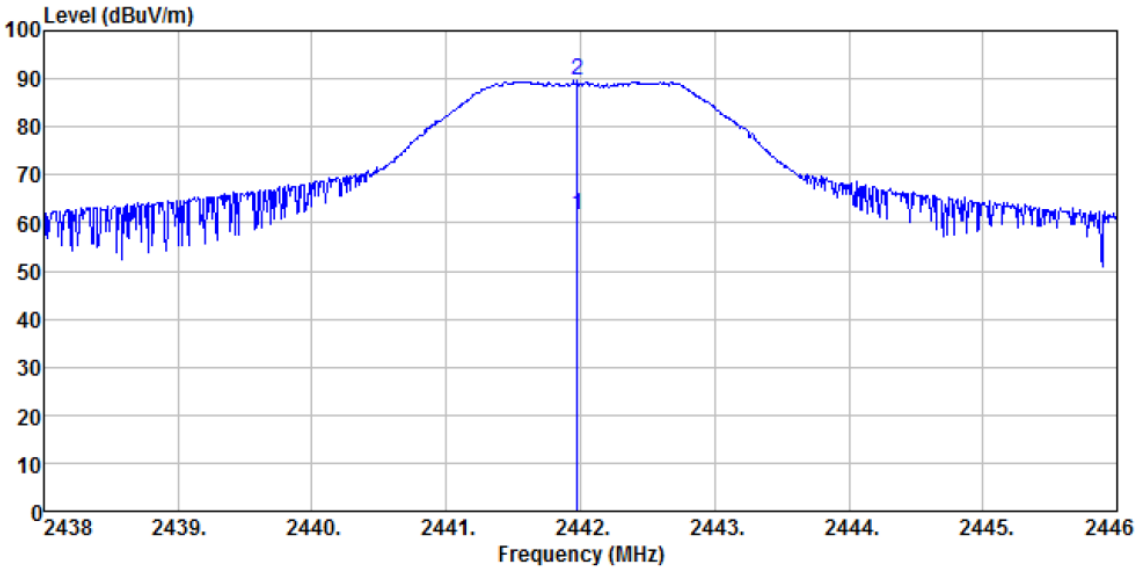
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2404.480	51.28	27.57	5.40	24.73	59.52	------	------	Average
2	2404.480	76.73	27.57	5.40	24.73	84.97	------	------	Peak

5.3.9 Diagram 5-9



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2442MHz

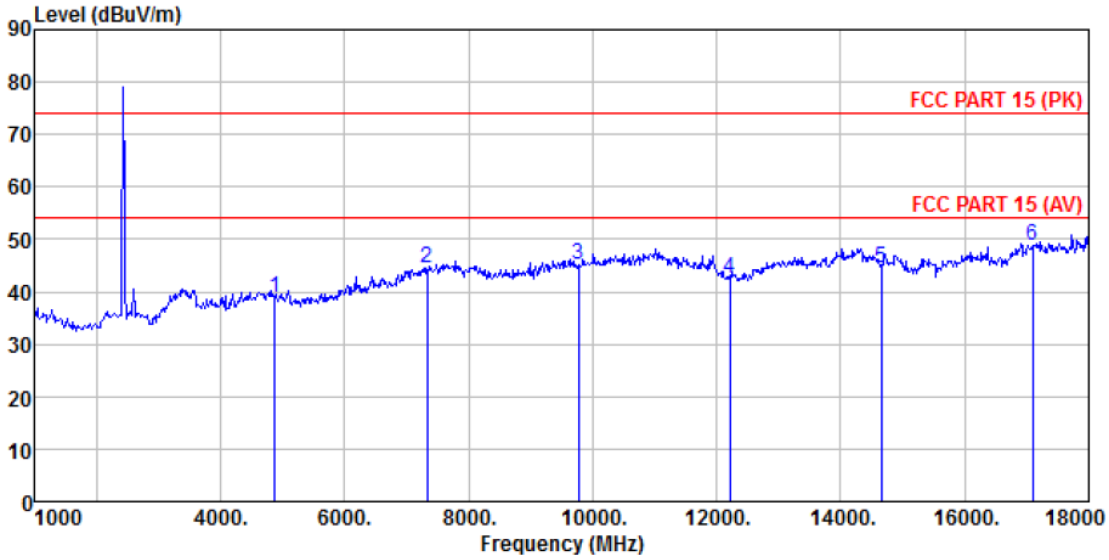
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4884.000	37.63	31.86	8.67	32.12	46.04	74.00	-27.96	Peak
2	7326.000	29.49	36.41	11.72	31.89	45.73	74.00	-28.27	Peak
3	9768.000	26.32	38.35	14.27	31.62	47.32	74.00	-26.68	Peak
4	12210.000	25.15	38.89	15.16	35.65	43.55	74.00	-30.45	Peak
5	14652.000	20.59	42.21	17.28	34.39	45.69	74.00	-28.31	Peak
6	17094.000	19.23	44.30	18.99	33.38	49.14	74.00	-24.86	Peak



Site : 3m chamber
Condition : 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2442MHz

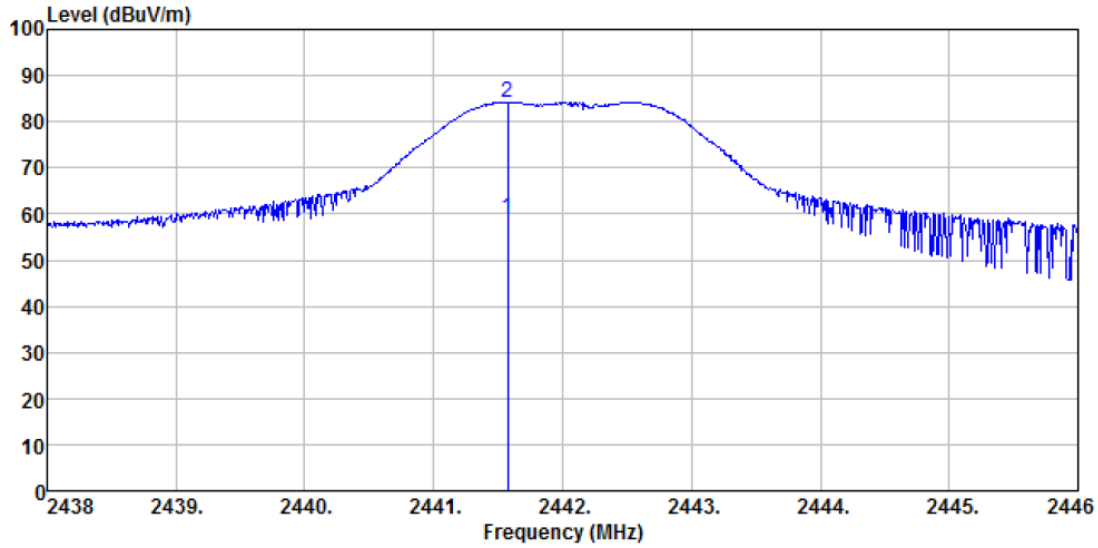
	Freq	ReadAntenna Level	Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2441.976	53.30	27.48	5.43	24.76	61.45	------	------	Average
2	2441.976	81.49	27.48	5.43	24.76	89.64	------	------	Peak

5.3.10 Diagram 5-10



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2442MHz

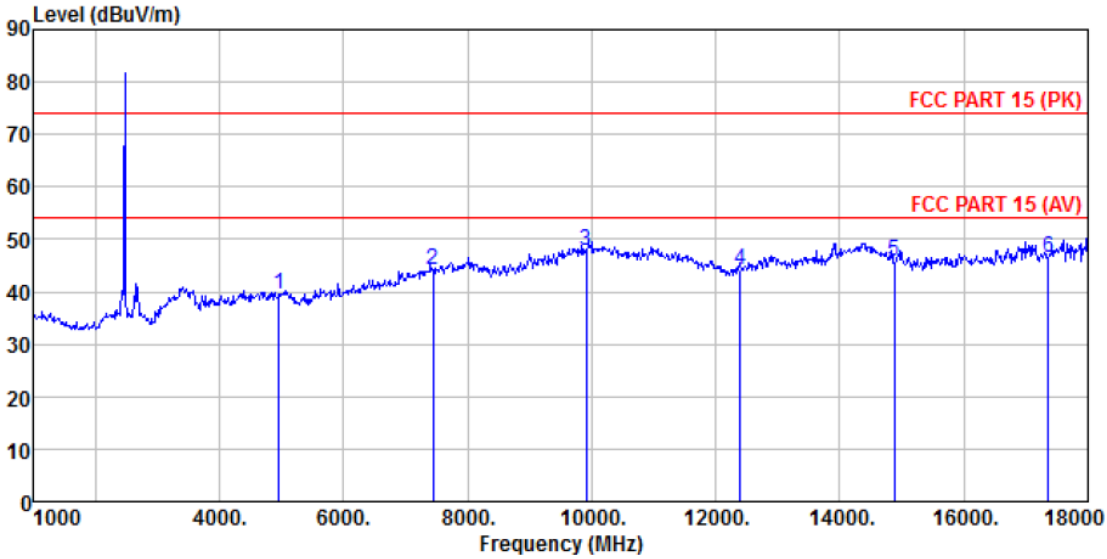
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	4884.000	30.40	31.86	8.67	32.12	38.81	74.00	-35.19	Peak
2	7326.000	28.22	36.41	11.72	31.89	44.46	74.00	-29.54	Peak
3	9768.000	24.13	38.35	14.27	31.62	45.13	74.00	-28.87	Peak
4	12210.000	24.02	38.89	15.16	35.65	42.42	74.00	-31.58	Peak
5	14652.000	19.43	42.21	17.28	34.39	44.53	74.00	-29.47	Peak
6	17094.000	18.89	44.30	18.99	33.38	48.80	74.00	-25.20	Peak



Site : 3m chamber
Condition : 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2442MHz

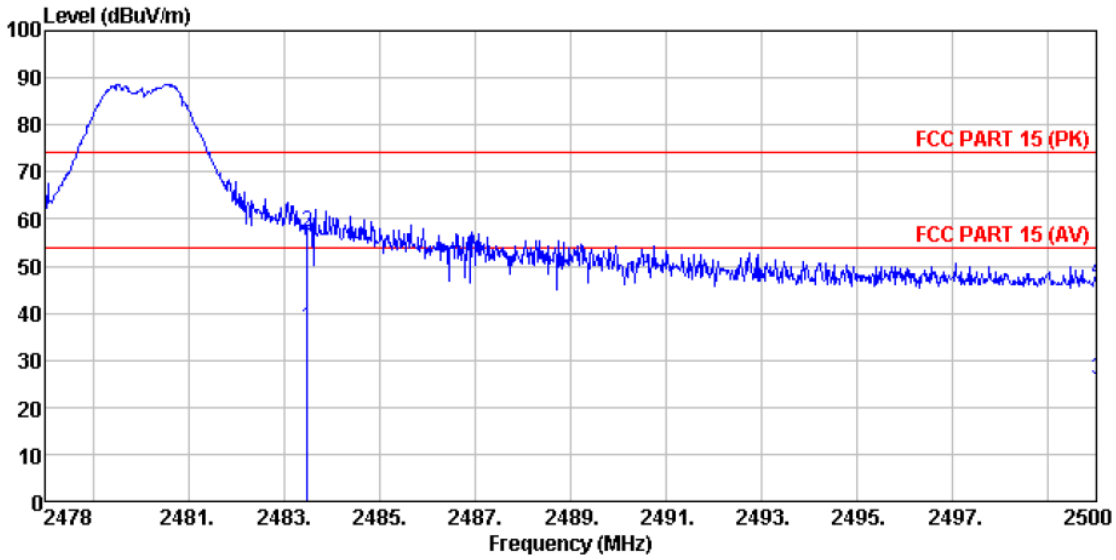
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2441.576	51.00	27.48	5.43	24.76	59.15	------	------	Average
2	2441.576	76.13	27.48	5.43	24.76	84.28	------	------	Peak

5.3.11 Diagram 5-11



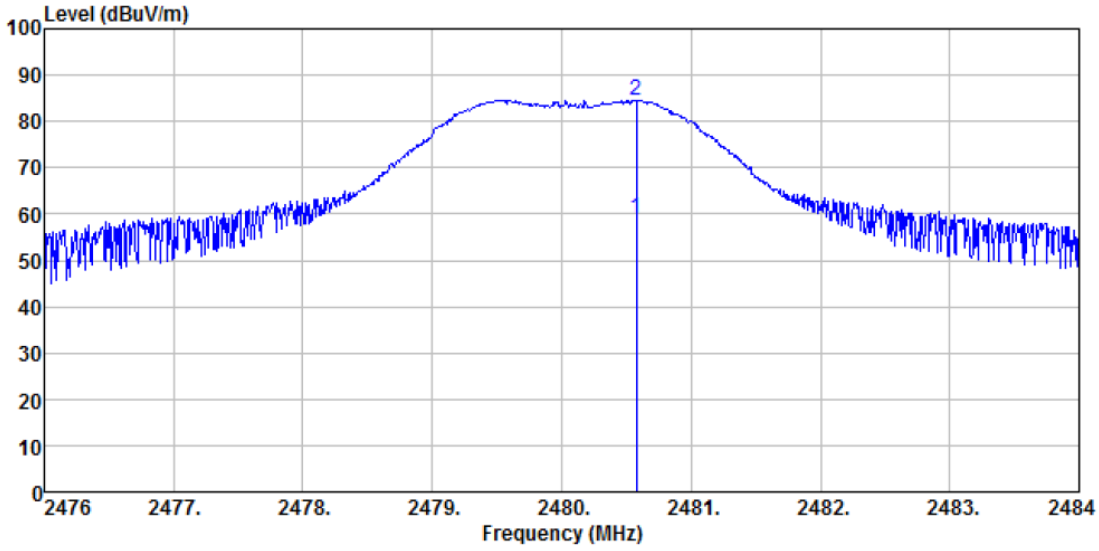
Site : 3m chamber
Condition : FCC PART 15 (PK) 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2480MHz

	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	4960.000	30.99	31.93	8.73	32.16	39.49	74.00	-34.51	Peak
2	7440.000	27.47	36.59	11.79	31.78	44.07	74.00	-29.93	Peak
3	9920.000	26.40	38.81	14.38	31.88	47.71	74.00	-26.29	Peak
4	12400.000	25.49	38.76	15.27	35.27	44.25	74.00	-29.75	Peak
5	14880.000	22.14	41.52	17.39	35.37	45.68	74.00	-28.32	Peak
6	17360.000	15.76	46.19	18.98	34.45	46.48	74.00	-27.52	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120D ANT(>1GHZ) HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2480MHz

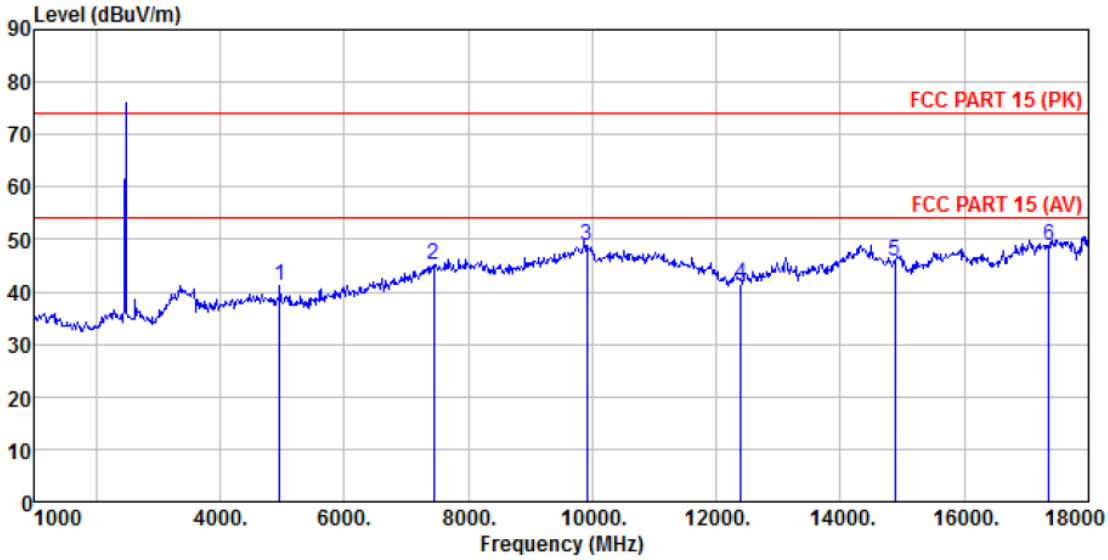
	Freq	Read Level	Antenna Factor	Preamp Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	28.74	27.53	24.80	5.47	36.94	54.00	-17.06	Average
2	2483.500	48.95	27.53	24.80	5.47	57.15	74.00	-16.85	Peak
3	2500.000	17.60	27.55	24.86	5.49	25.78	54.00	-28.22	Average
4	2500.000	38.60	27.55	24.86	5.49	46.78	74.00	-27.22	Peak



Site : 3m chamber
Condition : 3m HORIZONTAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2480MHz

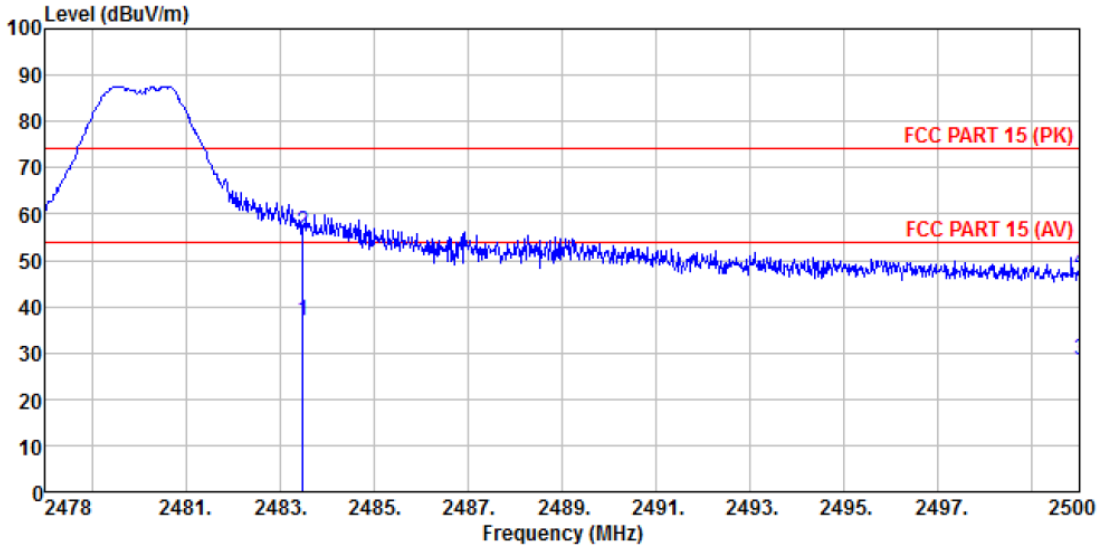
	Freq	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2480.576	50.80	27.52	5.47	24.80	58.99	------	------	Average
2	2480.576	76.42	27.52	5.47	24.80	84.61	------	------	Peak

5.3.12 Diagram 5-12



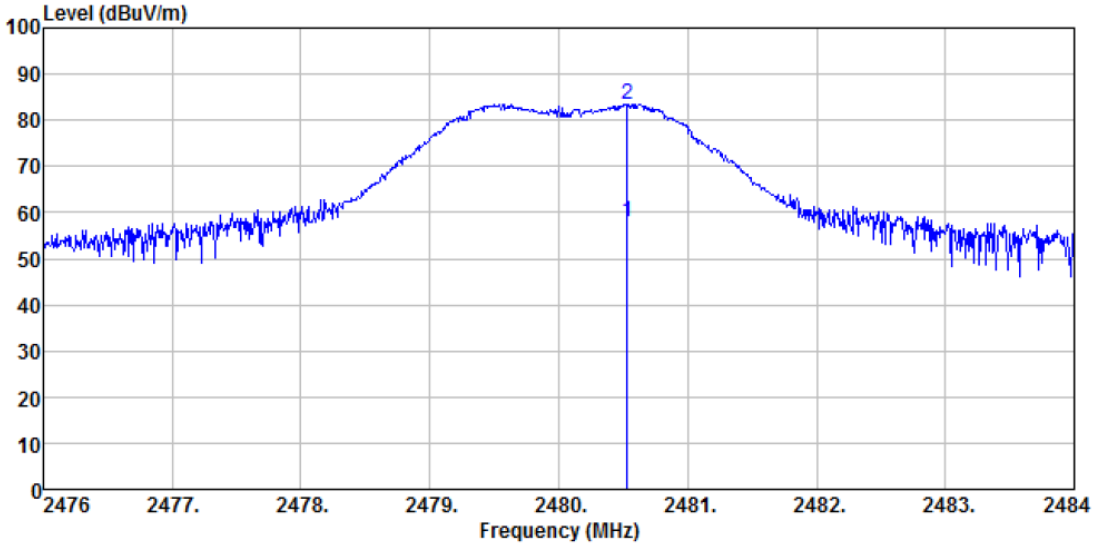
Site : 3m chamber
Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2480MHz

	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	4960.000	32.54	31.93	8.73	32.16	41.04	74.00	-32.96	Peak
2	7440.000	28.47	36.59	11.79	31.78	45.07	74.00	-28.93	Peak
3	9920.000	27.44	38.81	14.38	31.88	48.75	74.00	-25.25	Peak
4	12400.000	22.87	38.76	15.27	35.27	41.63	74.00	-32.37	Peak
5	14880.000	22.34	41.52	17.39	35.37	45.88	74.00	-28.12	Peak
6	17360.000	18.17	46.19	18.98	34.45	48.89	74.00	-25.11	Peak



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2480MHz

	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	2483.500	28.78	27.53	5.47	24.80	36.98	54.00	-17.02	Average
2	2483.500	47.95	27.53	5.47	24.80	56.15	74.00	-17.85	Peak
3	2500.000	20.06	27.55	5.49	24.86	28.24	54.00	-25.76	Average
4	2500.000	39.60	27.55	5.49	24.86	47.78	74.00	-26.22	Peak



Site : 3m chamber
Condition : 3m VERTICAL
Job No. : 0302
Test Mode : TX mode
Test Engineer: Sky
Remark : 2480MHz

	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	2480.528	49.90	27.52	5.47	24.80	58.09	------	------	Average
2	2480.528	75.12	27.52	5.47	24.80	83.31	------	------	Peak

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 2017	FSP30	GTS208	RS

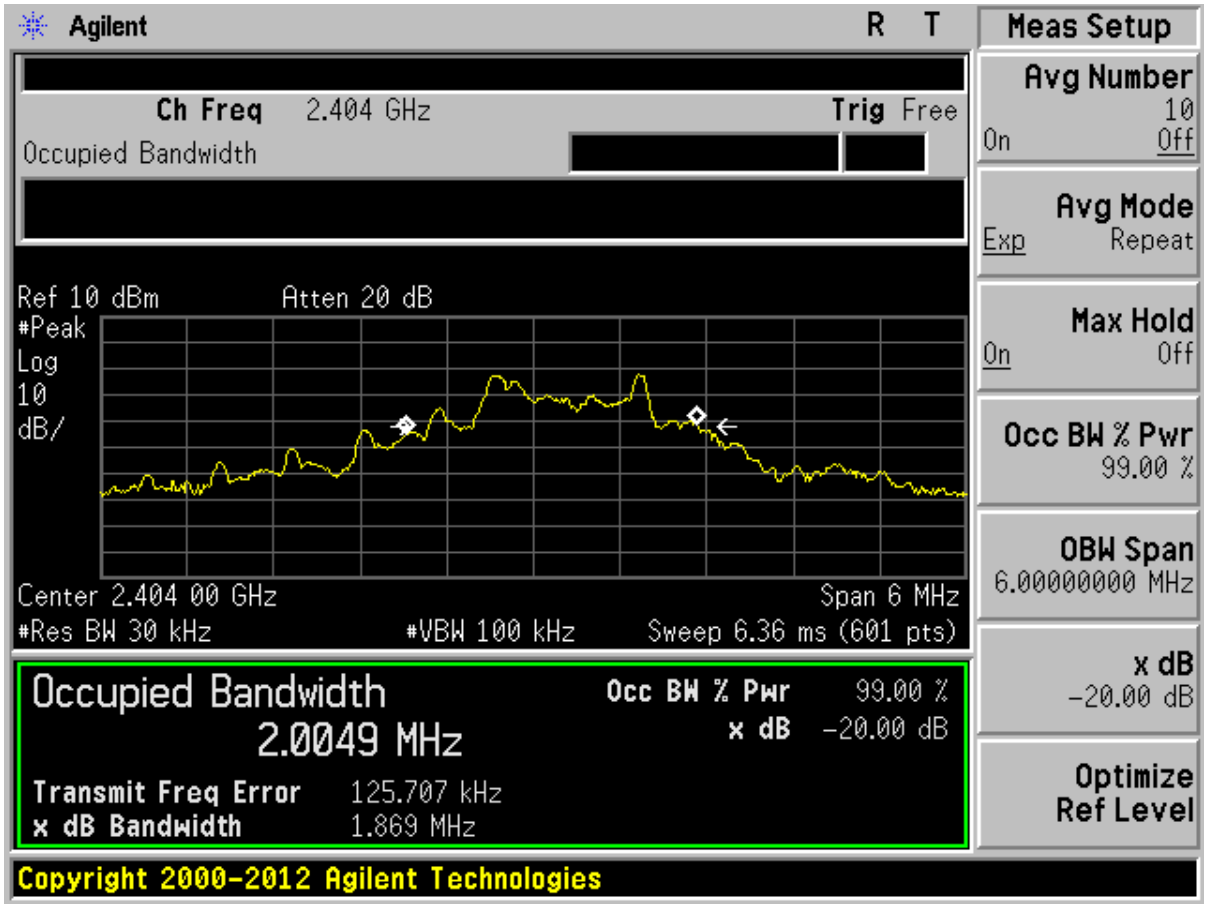
6.3 Test Result

Remark : Conducted measurement.

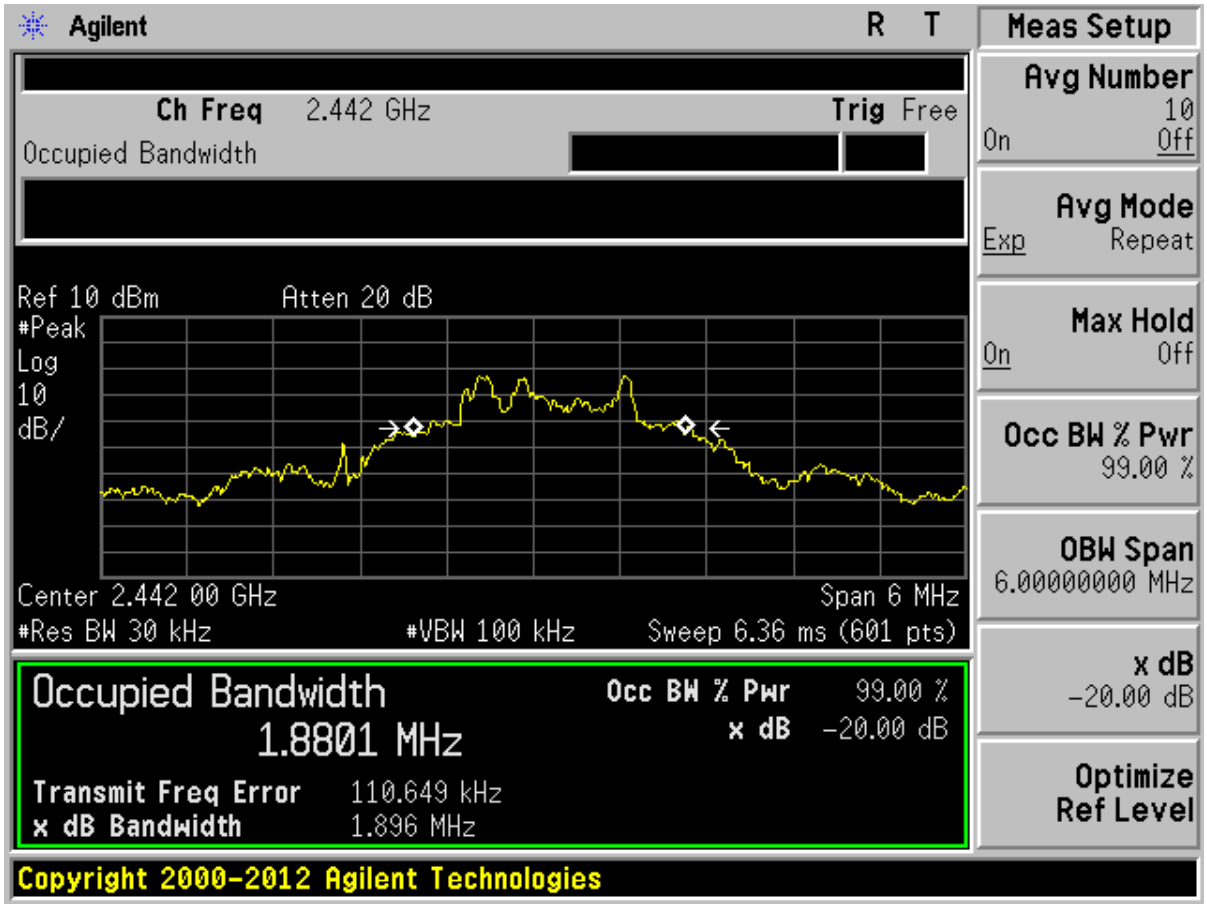
20dB Bandwidth:

GFSK			
Channel	Diagram	20dB bandwidth (MHz)	Result
CH LOW	6-1	1.869	PASS
CH MID	6-2	1.896	PASS
CH HIGH	6-3	1.758	PASS

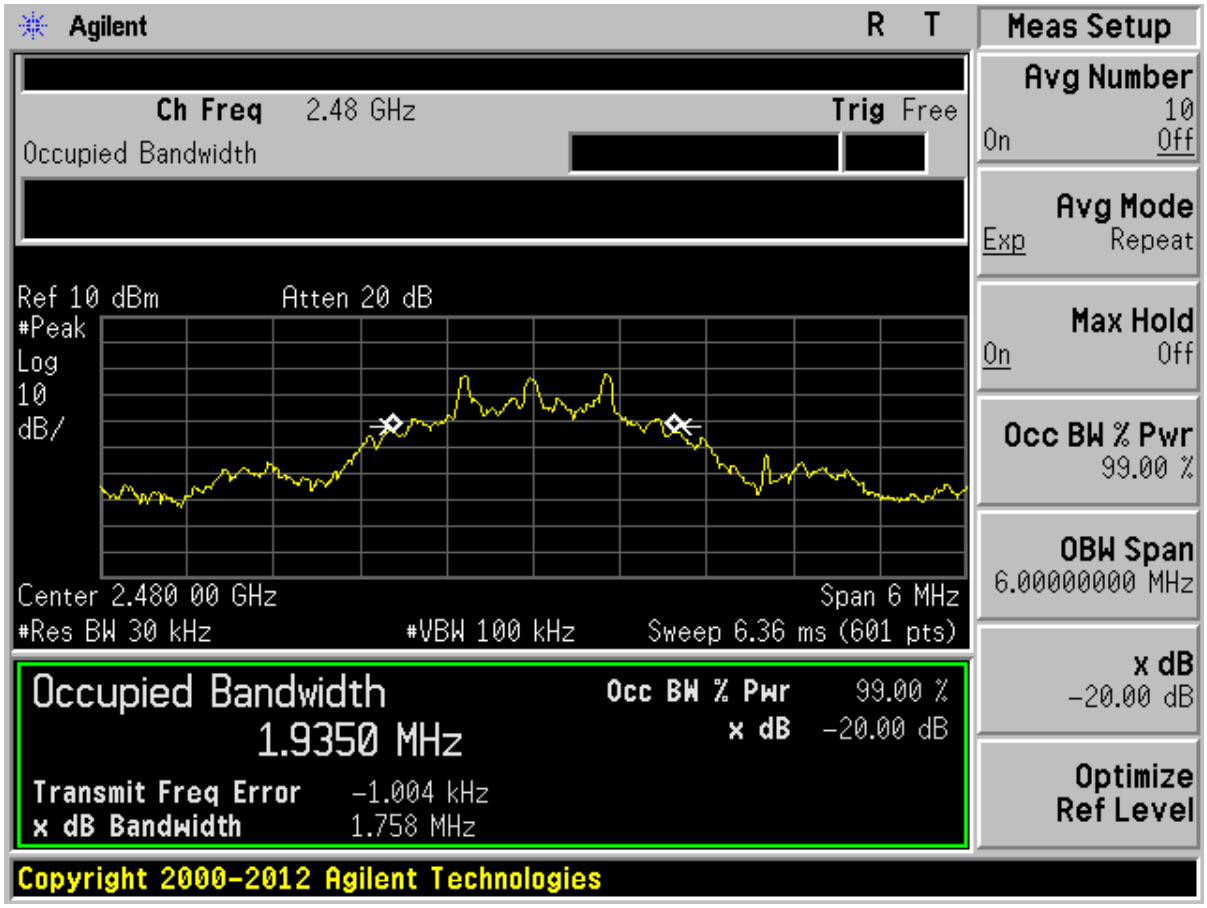
6.3.1 Diagram 6-1



6.3.2 Diagram 6-2



6.3.3 Diagram 6-3



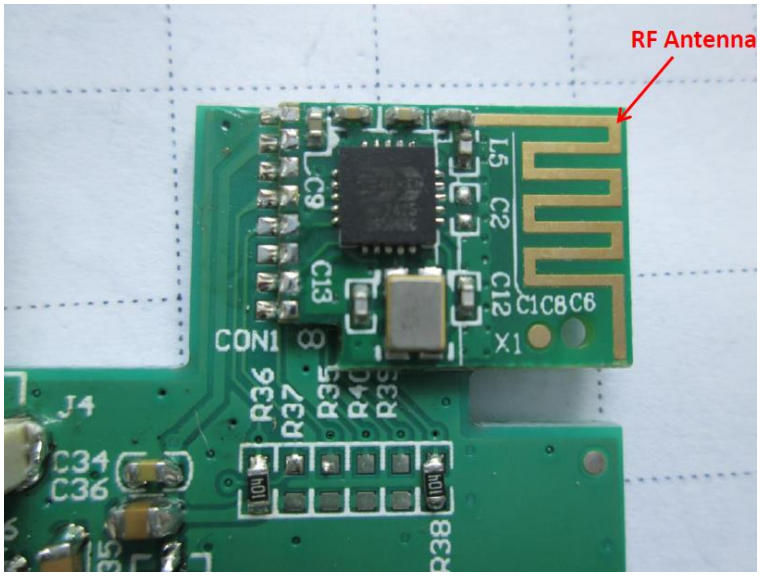
7. Antenna requirement

7.1 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.

7.2 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*****