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Report Template Version: V03
Report Template Revision Date: Mar.1st, 2017

Test Report

Report No. :	CQAS20190500394E-01
Applicant:	DongGuan Mae Tay Electronic Co.,Ltd
Address of Applicant:	Beihuanlu Industrial Area, Changping Town Dongguan, Guangdong, China
Manufacturer:	DongGuan Mae Tay Electronic Co.,Ltd
Address of Manufacturer:	Beihuanlu Industrial Area, Changping Town Dongguan, Guangdong, China

Equipment Under Test (EUT):

Product:	USB Dongle
Model No.:	DX-PNC2019
Brand Name:	N/A
FCC ID:	2AAIL-DG007
Standards:	47 CFR Part 15, Subpart C
Date of Test:	2019-05-30 to 2019-06-03
Date of Issue:	2019-06-03
Test Result :	**PASS***

Tested By: (Daisy Qin)

Reviewed By: (Aaron Ma)

Approved By: (Jack Ai)

* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQAS20190500394E-01	Rev.01	Initial report	2019-06-03

3 Test Summary

Test Item	FCC Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203	ANSI C63.10-2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10-2013	PASS
Field Strength of the Fundamental Signal	47 CFR Part 15, Subpart C Section 15.249 (a)	ANSI C63.10-2013	PASS
Spurious Emissions	47 CFR Part 15, Subpart C Section	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency	47 CFR Part 15, Subpart C Section 15.249 (d), (e)/15.209	ANSI C63.10-2013	PASS
20dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.215 (c)	ANSI C63.10-2013	PASS

4 Contents

5 General Information

5.1 Client Information

Applicant:	DongGuan Mae Tay Electronic Co.,Ltd
Address of Applicant:	Beihuanlu Industrial Area, Changping Town Dongguan, Guangdong, China
Manufacturer:	DongGuan Mae Tay Electronic Co.,Ltd
Address of Manufacturer:	Beihuanlu Industrial Area, Changping Town Dongguan, Guangdong, China

5.2 General Description of EUT

Name:	USB Dongle
Model No.:	DX-PNC2019
Trade Mark :	N/A
Hardware Version:	V0.1
Software Version:	V0.1
Frequency Range:	2408MHz ~ 2474MHz
Modulation Type:	FSK
Number of Channels:	34 (declared by the client)
Sample Type:	Portable product
Antenna Type:	PCB antenna
Antenna Gain:	1.5dBi
Power Supply:	DC5.0V from PC

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2408MHz	10	2426MHz	19	2444MHz	28	2462MHz
2	2410MHz	11	2428MHz	20	2446MHz	29	2464MHz
3	2412MHz	12	2430MHz	21	2448MHz	30	2466MHz
4	2414MHz	13	2432MHz	22	2450MHz	31	2468MHz
5	2416MHz	14	2434MHz	23	2452MHz	32	2470MHz
6	2418MHz	15	2436MHz	24	2454MHz	33	2472MHz
7	2420MHz	16	2438MHz	25	2456MHz	34	2474MHz
8	2422MHz	17	2440MHz	26	2458MHz	/	/
9	2424MHz	18	2442MHz	27	2460MHz	/	/

Note:

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

Channel	Frequency
The Lowest channel(CH1)	2408MHz
The Middle channel(CH17)	2440MHz
The Highest channel(CH34)	2474MHz

5.3 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 mbar
Test Mode:	Use test software (RF test) to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.

5.4 Description of Support Units

The EUT has been tested with associated equipment below.

Description	Manufacturer	Model No.	Remark	FCC certification
PC	Lenovo	ThinkPad E450c	Provide by lab	ID
AC/DC Adapter	Lenovo	ADLX65NLC3A	Provide by lab	DOC

5.5 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 „Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd** quality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for **CQA** laboratory is reported:

No.	Item	Uncertainty	Notes
1	Radiated Emission (Below 1GHz)	±5.12dB	(1)
2	Radiated Emission (Above 1GHz)	±4.60dB	(1)
3	Conducted Disturbance (0.15~30MHz)	±3.34dB	(1)
4	Radio Frequency	3×10^{-8}	(1)
5	Duty cycle	0.6 %.	(1)
6	Occupied Bandwidth	1.1%	(1)
7	RF conducted power	0.86dB	(1)
8	RF power density	0.74	(1)
9	Conducted Spurious emissions	0.86dB	(1)
10	Temperature test	0.8℃	(1)
11	Humidity test	2.0%	(1)
12	Supply voltages	0.5 %.	(1)
13	time	0.6 %.	(1)
14	Frequency Error	5.5 Hz	(1)

(1)This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

5.6 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.,

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

5.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L5785)**

CNAS has accredited Shenzhen Huaxia Testing Technology Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **ISED No.: 22984**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements

- **A2LA (Certificate No. 4742.01)**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

- **FCC Registration No.: 522263**

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

5.8 Deviation from Standards

None.

5.9 Abnormalities from Standard Conditions

None.

5.10 Other Information Requested by the Customer

None.

5.11 Equipment List

Test Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
EMI Test Receiver	R&S	ESR7	CQA-005	2018/9/26	2019/9/25
Spectrum analyzer	R&S	FSU26	CQA-038	2018/10/28	2019/10/27
Preamplifier	MITEQ	AFS4-00010300-18-10P-4	CQA-035	2018/9/26	2019/9/25
Preamplifier	MITEQ	AMF-6D-02001800-29-20P	CQA-036	2018/11/2	2019/11/1
Loop antenna	Schwarzbeck	FMZB1516	CQA-060	2018/10/28	2020/10/27
Bilog Antenna	R&S	HL562	CQA-011	2018/9/26	2020/9/25
Horn Antenna	R&S	HF906	CQA-012	2018/9/26	2020/9/25
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2018/9/26	2020/9/25
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2018/9/26	2019/9/25
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2018/9/26	2019/9/25
Antenna Connector	CQA	RFC-01	CQA-080	2018/9/26	2019/9/25
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2018/9/26	2019/9/25
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2018/9/26	2019/9/25
EMI Test Receiver	R&S	ESPI3	CQA-013	2018/9/26	2019/9/25
LISN	R&S	ENV216	CQA-003	2018/11/5	2019/11/4
Coaxial cable	CQA	N/A	CQA-C009	2018/9/26	2019/9/25

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.

6 Test results and Measurement Data

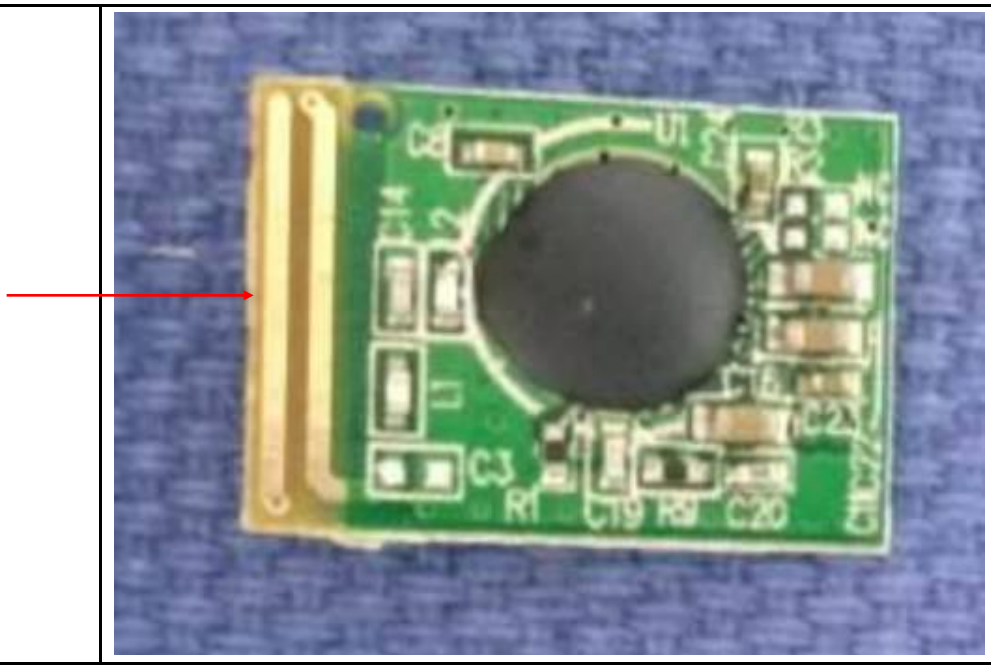
6.1 Antenna Requirement

Standard requirement:	47 CFR Part 15C Section 15.203;

15.203 requirement:

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.

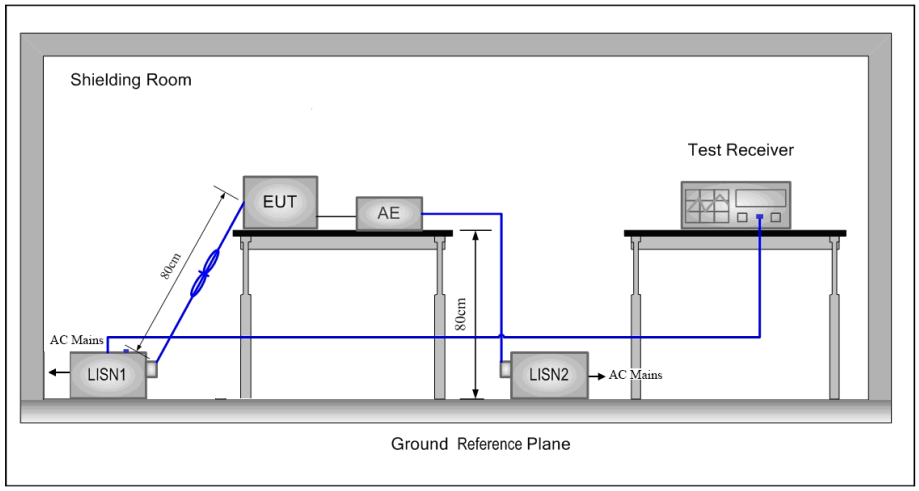
EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 1.5dBi.

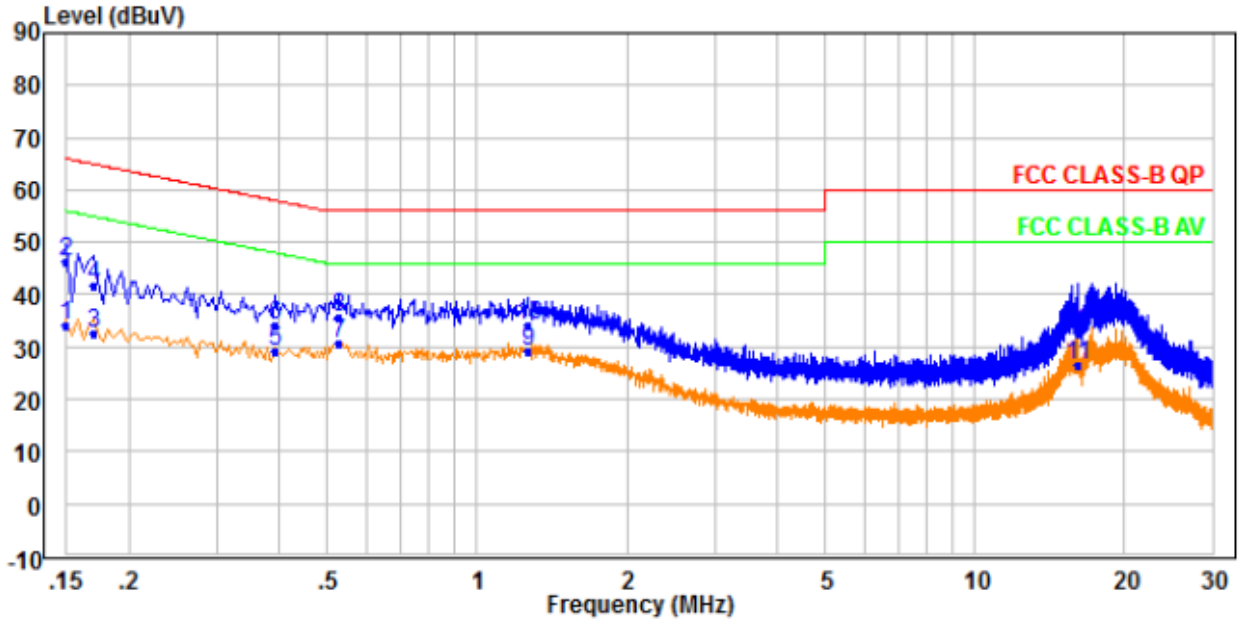
6.2 Conducted Emissions

<table>
<tr><td>Test Requirement:</td><td>47 CFR Part 15C Section 15.207;</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td>150kHz to 30MHz</td></tr>
<tr><td>Limit:</td><td>
<table>
<tr><td rowspan="2">Frequency range (MHz)</td><td colspan="2">Limit (dBuV)</td></tr>
<tr><td>Quasi-peak</td><td>Average</td></tr>
<tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr>
<tr><td>0.5-5</td><td>56</td><td>46</td></tr>
<tr><td>5-30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Test Procedure:</td><td>1) The mains terminal disturbance voltage test was conducted in a shielded room.
2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,
4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0.4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0.8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0.8 m from the LISN 2.
5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10: 2013 on conducted measurement.</td></tr>
</table>

Test Setup:	
Exploratory Test Mode:	Transmitting with FSK at lowest, middle and highest channel.
Final Test Mode:	Through Pre-scan, find at highest channel is the worst case. Only the worst case is recorded in the report.
Test Voltage:	AC120V/60Hz
Test Results:	Pass

Measurement Data

Live Line:

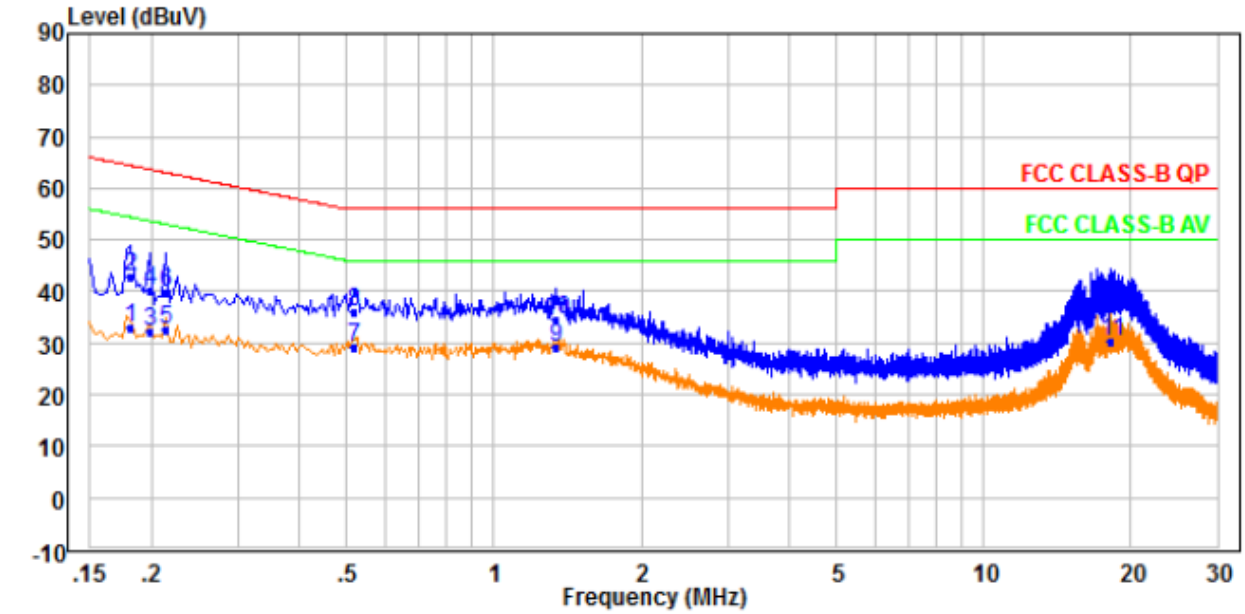


		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.150	24.47	9.49	33.96	56.00	-22.04	Average	Line
2	QP	0.150	36.82	9.49	46.31	66.00	-19.69	QP	Line
3		0.170	22.96	9.49	32.45	54.96	-22.51	Average	Line
4		0.170	32.19	9.49	41.68	64.96	-23.28	QP	Line
5		0.394	19.73	9.51	29.24	47.98	-18.74	Average	Line
6		0.394	24.47	9.51	33.98	57.98	-24.00	QP	Line
7	PP	0.530	21.02	9.58	30.60	46.00	-15.40	Average	Line
8		0.530	26.21	9.58	35.79	56.00	-20.21	QP	Line
9		1.266	19.49	9.52	29.01	46.00	-16.99	Average	Line
10		1.266	24.52	9.52	34.04	56.00	-21.96	QP	Line
11		16.037	16.66	9.93	26.59	50.00	-23.41	Average	Line
12		16.037	22.49	9.93	32.42	60.00	-27.58	QP	Line

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

Neutral Line:



		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.182	23.31	9.48	32.79	54.39	-21.60	Average	Neutral
2		0.182	33.33	9.48	42.81	64.39	-21.58	QP	Neutral
3		0.198	22.62	9.48	32.10	53.69	-21.59	Average	Neutral
4		0.198	30.68	9.48	40.16	63.69	-23.53	QP	Neutral
5		0.214	22.93	9.48	32.41	53.05	-20.64	Average	Neutral
6		0.214	30.17	9.48	39.65	63.05	-23.40	QP	Neutral
7		0.518	19.65	9.61	29.26	46.00	-16.74	Average	Neutral
8	QP	0.518	26.27	9.61	35.88	56.00	-20.12	QP	Neutral
9	PP	1.338	19.56	9.72	29.28	46.00	-16.72	Average	Neutral
10		1.338	24.64	9.72	34.36	56.00	-21.64	QP	Neutral
11		18.233	20.24	10.01	30.25	50.00	-19.75	Average	Neutral
12		18.233	26.63	10.01	36.64	60.00	-23.36	QP	Neutral

Remark:

1. The following Quasi-Peak and Average measurements were performed on the EUT:
2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
3. If the Peak value under Average limit, the Average value is not recorded in the report.

6.3 Radiated Spurious Emission & Field strength of fundamental

Test Requirement:	47 CFR Part 15C Section 15.249 (a), (d), (e) and 15.209
Test Method:	ANSI C63.10
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Note: For fundamental frequency, RBW=5MHz, VBW=5MHz, Peak detector is for PK value, RMS detector is for Average value.

Limit:
(Spurious Emissions and band edge)

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 1) 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

2) 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.

Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)	Remark
	2400MHz-2483.5MHz	94.0	Average Value
		114.0	Peak Value

Test Setup:	

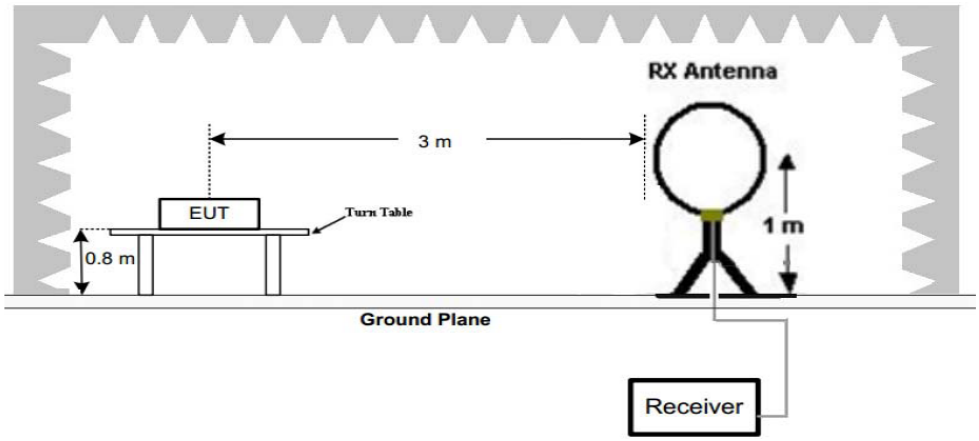


Figure 1. Below 30MHz

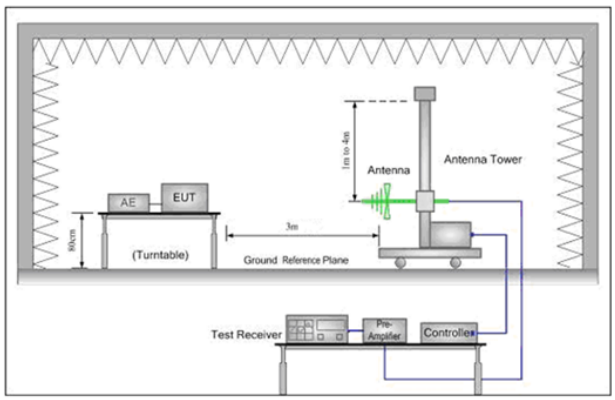


Figure 2. 30MHz to 1GHz

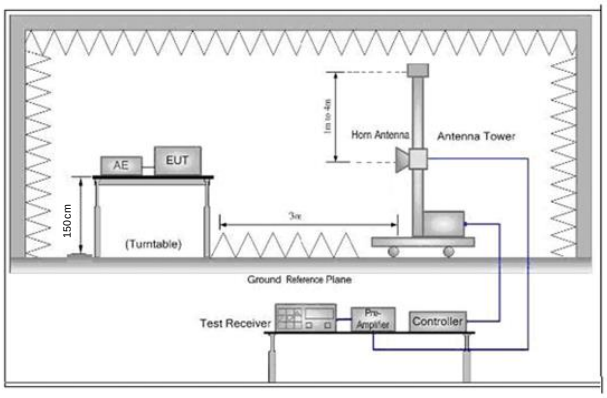


Figure 3. Above 1 GHz

Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz: 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. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. The antenna height 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. d. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. g. Test the EUT in the lowest channel,the middle channel,the Highest channel h. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode,And found the X axis positioning which it is worse case. i. Repeat above procedures until all frequencies measured was complete.
Exploratory Test Mode:	Transmitting with FSK at lowest, middle and highest channel.
Final Test Mode:	Pretest the EUT at Transmitting mode, For below 1GHz part, through pre-scan, the worst case is the highest channel. Only the worst case is recorded in the report.
Test Voltage:	DC5.0V form PC
Test Results:	Pass

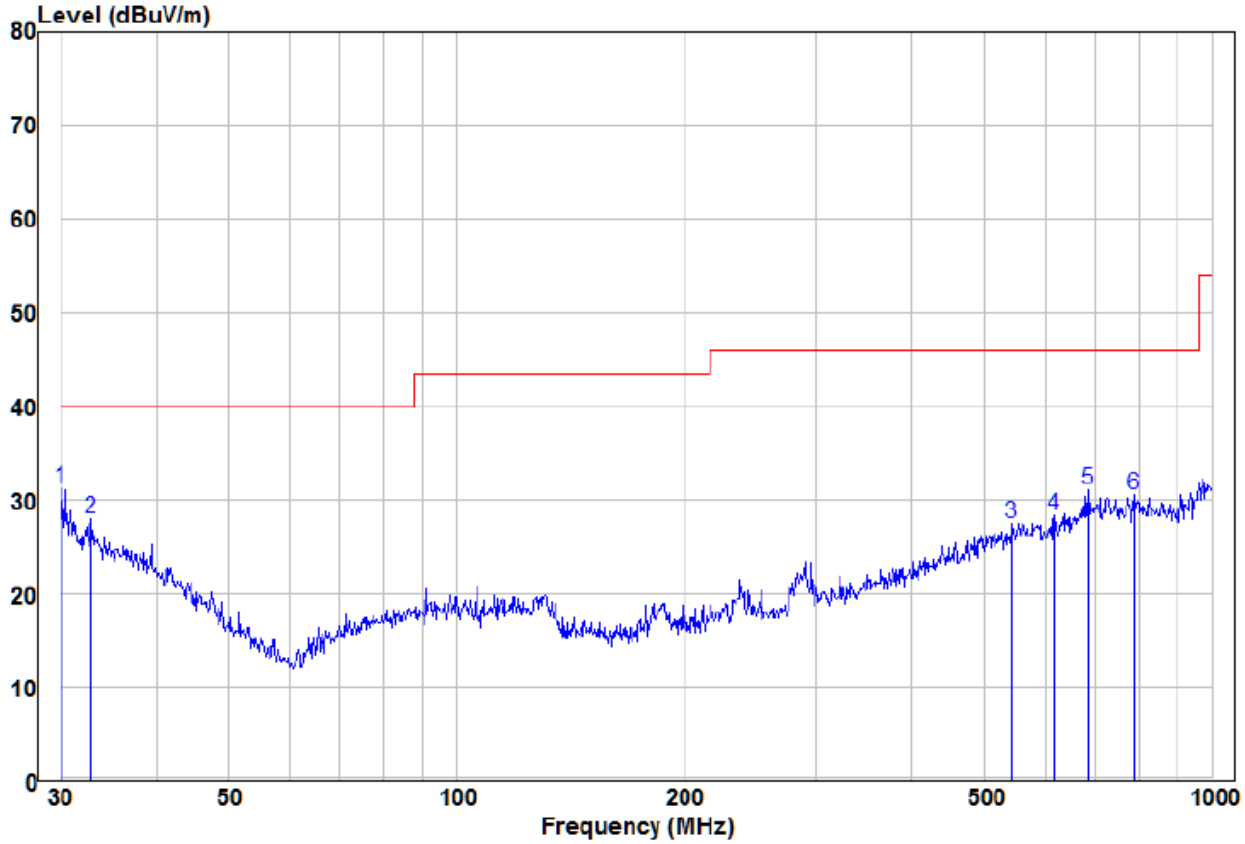
Measurement Data

Field Strength Of The Fundamental Signal

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
2408	101	-9.02	91.98	114	-22.02	Peak	H
2408	99.76	-9.02	90.74	94	-3.26	AVG	H
2408	96.49	-9.02	87.47	114	-26.53	Peak	V
2408	94.62	-9.02	85.60	94	-8.40	AVG	V
2440	100.88	-8.96	91.92	114	-22.08	Peak	H
2440	98.94	-8.96	89.98	94	-4.02	AVG	H
2440	95.8	-8.96	86.84	114	-27.16	Peak	V
2440	94.17	-8.96	85.21	94	-8.79	AVG	V
2474	101.31	-8.74	92.57	114	-21.43	Peak	H
2474	**99.68**	**-8.74**	**90.94**	**94**	**-3.06**	**AVG**	**H**
2474	94.8	-8.74	86.06	114	-27.94	Peak	V
2474	93.23	-8.74	84.49	94	-9.51	AVG	V

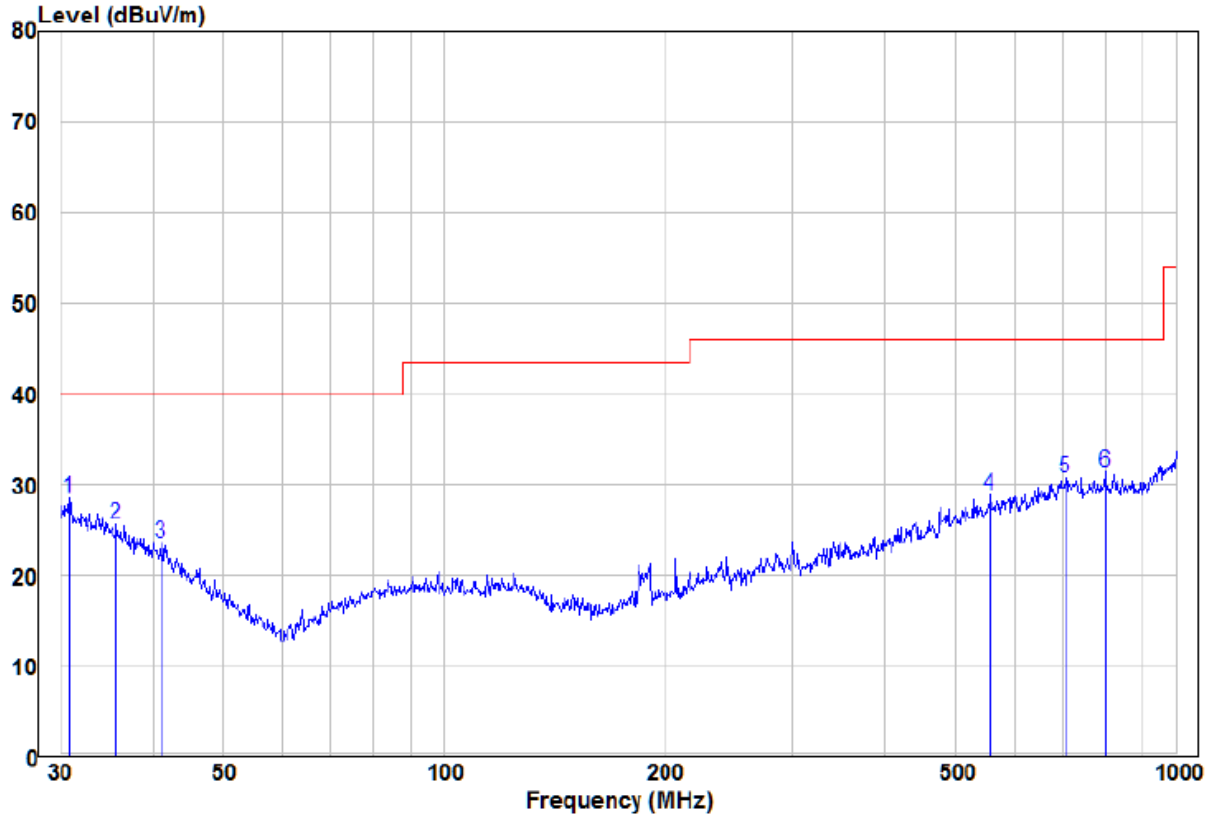
Spurious Emissions

30MHz~1GHz (the worst case)		
Test mode:	Transmitting (Highest channel)	Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	30.00	2.87	28.31	31.18	40.00	-8.82	Peak	VERTICAL
2	32.86	0.63	27.28	27.91	40.00	-12.09	Peak	VERTICAL
3	543.27	-0.15	27.68	27.53	46.00	-18.47	Peak	VERTICAL
4	618.54	-0.23	28.57	28.34	46.00	-17.66	Peak	VERTICAL
5	684.75	1.26	29.74	31.00	46.00	-15.00	Peak	VERTICAL
6	790.62	-0.19	30.68	30.49	46.00	-15.51	Peak	VERTICAL

30MHz~1GHz (the worst case)		
Test mode:	Transmitting (Highest channel)	Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	30.85	0.56	28.00	28.56	40.00	-11.44	Peak	HORIZONTAL
2	35.75	-0.57	26.23	25.66	40.00	-14.34	Peak	HORIZONTAL
3	40.99	-0.53	24.14	23.61	40.00	-16.39	Peak	HORIZONTAL
4	556.77	0.98	27.81	28.79	46.00	-17.21	Peak	HORIZONTAL
5	706.70	0.70	30.06	30.76	46.00	-15.24	Peak	HORIZONTAL
6	798.98	0.58	30.75	31.33	46.00	-14.67	Peak	HORIZONTAL

Above 1GHz							
Test mode:		Transmitting		Test channel:		Lowest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4816	48.92	-1.24	47.68	74	-26.32	Peak	H
4816	34.56	-1.24	33.32	54	-20.68	AVG	H
7224	50.24	5.98	56.22	74	-17.78	Peak	H
7224	36.12	5.98	42.1	54	-11.9	AVG	H
4816	49.49	-1.24	48.25	74	-25.75	peak	V
4816	33.79	-1.24	32.55	54	-21.45	AVG	V
7224	47.27	5.98	53.25	74	-20.75	peak	V
7224	34.56	5.98	40.54	54	-13.46	AVG	V
Test mode:		Transmitting		Test channel:		Middle	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4880	49.66	-0.82	48.84	74	-25.16	peak	H
4880	37.12	-0.82	36.3	54	-17.7	AVG	H
7320	51.47	5.91	57.38	74	-16.62	peak	H
7320	37.14	5.91	43.05	54	-10.95	AVG	H
4880	49.84	-0.82	49.02	74	-24.98	peak	V
4880	34.56	-0.82	33.74	54	-20.26	AVG	V
7320	49.29	5.91	55.2	74	-18.8	peak	V
7320	36.78	5.91	42.69	54	-11.31	AVG	V
Test mode:		Transmitting		Test channel:		Highest	
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Over (dB)	Detector Type	Ant. Pol. H/V
4948	51.04	-0.49	50.55	74	-23.45	peak	H
4948	35.32	-0.49	34.83	54	-19.17	AVG	H
7422	52.76	5.74	58.5	74	-15.5	peak	H
7422	40.09	5.74	45.83	54	-8.17	AVG	H
4948	49.08	-0.49	48.59	74	-25.41	peak	V
4948	34.45	-0.49	33.96	54	-20.04	AVG	V
7422	49.09	5.74	54.83	74	-19.17	peak	V
7422	36.69	5.74	42.43	54	-11.57	AVG	V

Remark:

1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
Final Test Level =Receiver Reading + Antenna Factor + Cable Factor – Preamplifier Factor

2) Scan from 9kHz to 25GHz,The disturbance above 10GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .

6.4 Restricted bands around fundamental frequency

Test Requirement: 47 CFR Part 15C Section 15.249 (d), 15.209 and 15.205;
Test Method: ANSI C63.10 :2013
Test Site: Measurement Distance: 3m (Semi-Anechoic Chamber)

Limit(Band Edge): 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.

Frequency	Limit (dBμV/m @3m)	Remark
30MHz-88MHz	40.0	Quasi-peak Value
88MHz-216MHz	43.5	Quasi-peak Value
216MHz-960MHz	46.0	Quasi-peak Value
960MHz-1GHz	54.0	Quasi-peak Value
Above 1GHz	54.0	Average Value
	74.0	Peak Value

Test Setup:

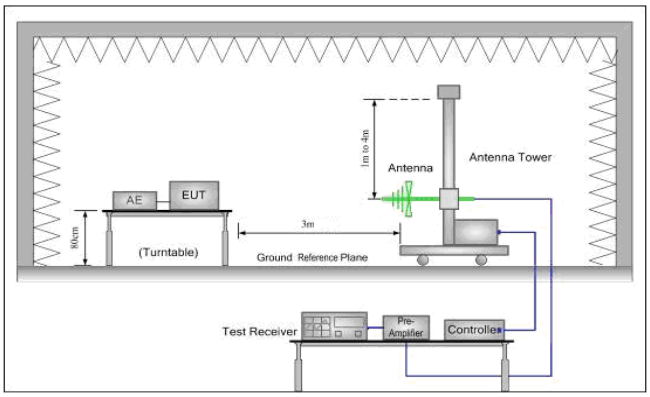


Figure 1. 30MHz to 1GHz

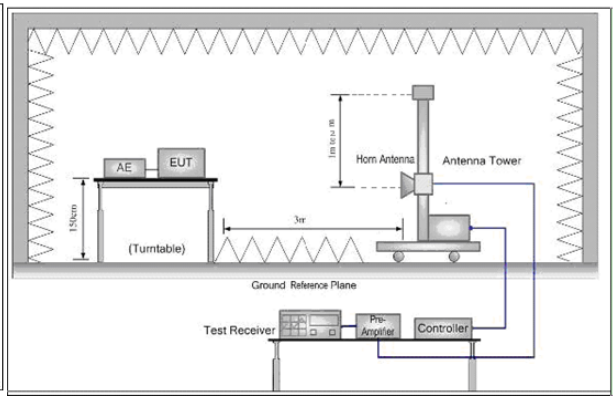


Figure 2. Above 1 GHz

Test Procedure:

Below 1GHz test procedure as below:

j. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation.

k. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

l. The antenna height 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.

m. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

n. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

o. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

p. Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

q. Test the EUT in the lowest channel , the Highest channel

r. The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.

s. Repeat above procedures until all frequencies measured was complete.

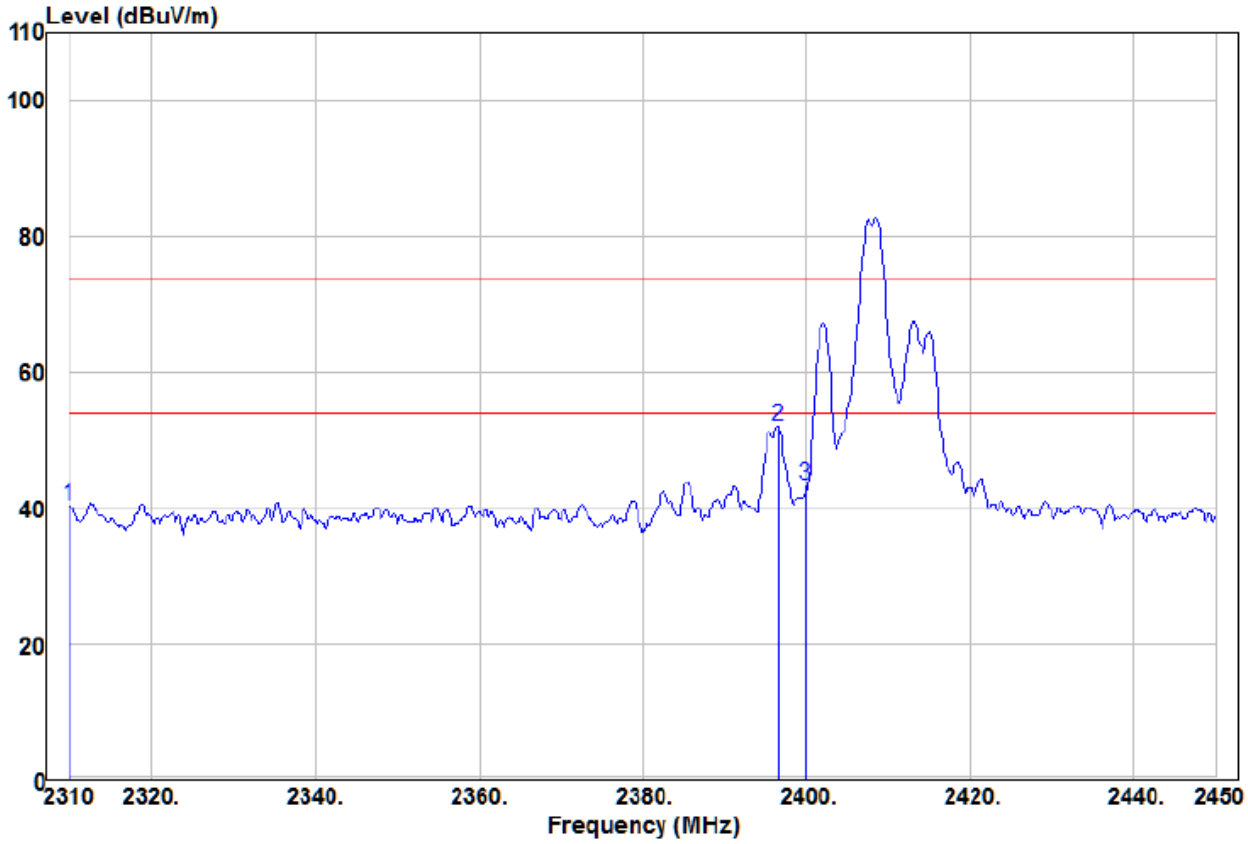
Test Mode: Transmitting with FSK at lowest, middle and highest channel.

Test Voltage: DC5.0V form PC

Test Results: Pass

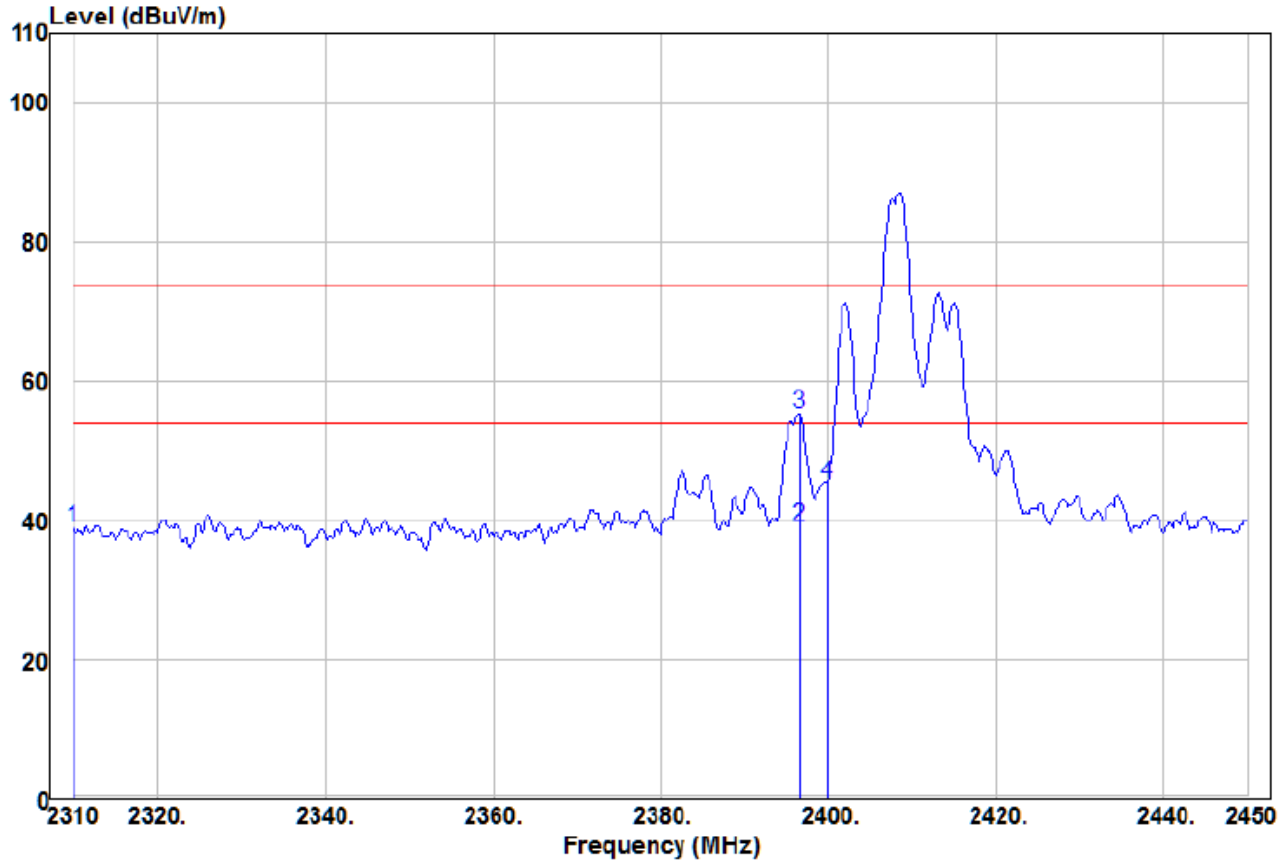
Test plot as follows:

Test mode:	Transmitting	Test channel:	Lowest	Remark:	Vertical



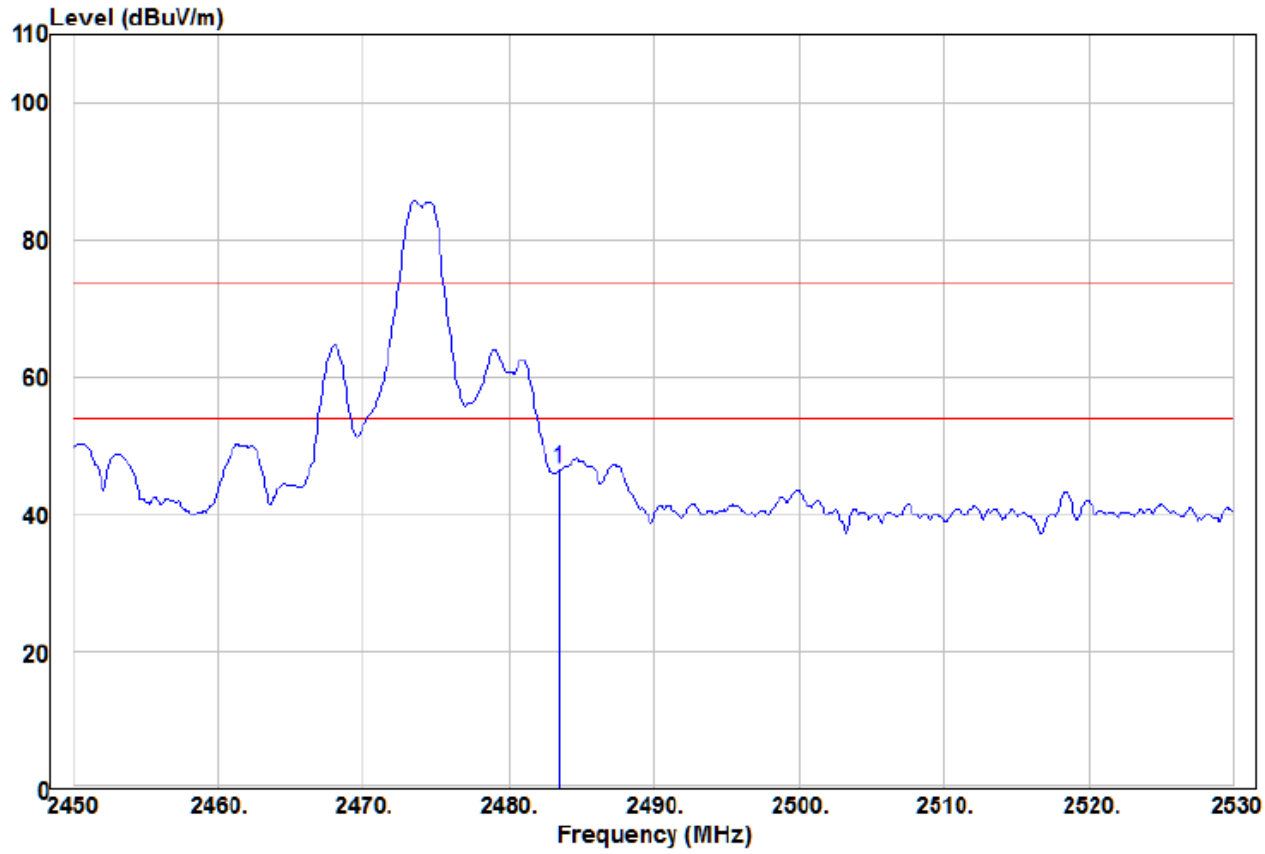
		Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1		2310.00	49.54	-9.25	40.29	74.00	-33.71	Peak	VERTICAL
2	pp	2396.52	61.22	-9.03	52.19	74.00	-21.81	Peak	VERTICAL
3		2400.00	52.41	-9.10	43.31	74.00	-30.69	Peak	VERTICAL

Test mode:	Transmitting	Test channel:	Lowest	Remark:	Horizontal



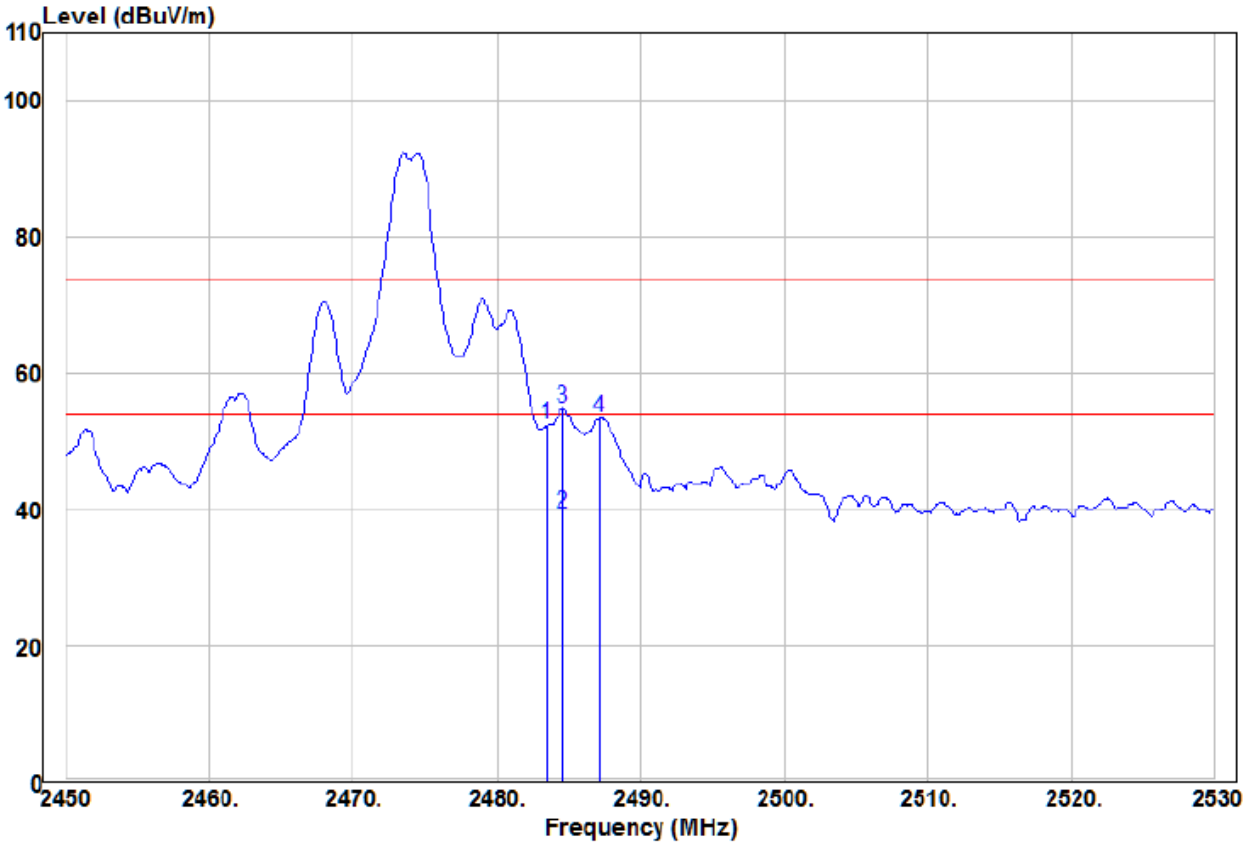
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	2310.00	48.17	-9.25	38.92	74.00	-35.08	Peak	HORIZONTAL
2 pp	2396.52	48.21	-9.03	39.18	54.00	-14.82	Average	HORIZONTAL
3 pk	2396.52	64.35	-9.03	55.32	74.00	-18.68	Peak	HORIZONTAL
4	2400.00	54.48	-9.10	45.38	74.00	-28.62	Peak	HORIZONTAL

Test mode:	Transmitting	Test channel:	Highest	Remark:	Vertical



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1 pp	2483.50	55.31	-8.68	46.63	74.00	-27.37	Peak	VERTICAL

Test mode:	Transmitting	Test channel:	Highest	Remark:	Horizontal



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		
1	2483.50	61.27	-8.68	52.59	74.00	-21.41	Peak	HORIZONTAL
2 pp	2484.56	48.09	-8.65	39.44	54.00	-14.56	Average	HORIZONTAL
3 pk	2484.56	63.47	-8.65	54.82	74.00	-19.18	Peak	HORIZONTAL
4	2487.20	62.08	-8.59	53.49	74.00	-20.51	Peak	HORIZONTAL

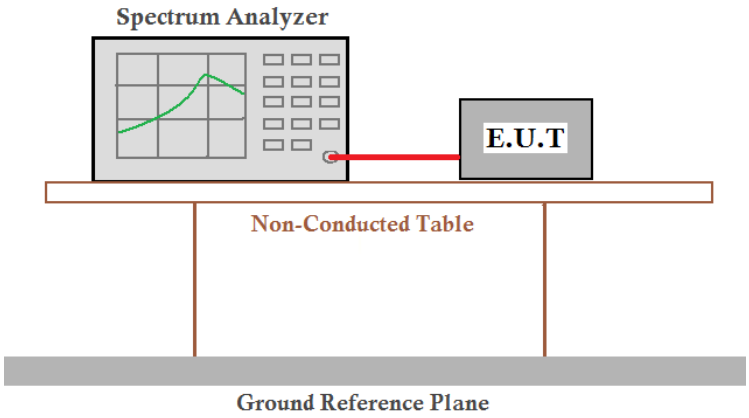
Remark:

The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:

Final Test Level =Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor– Antenna Factor–Cable Factor

6.5 20dB Bandwidth

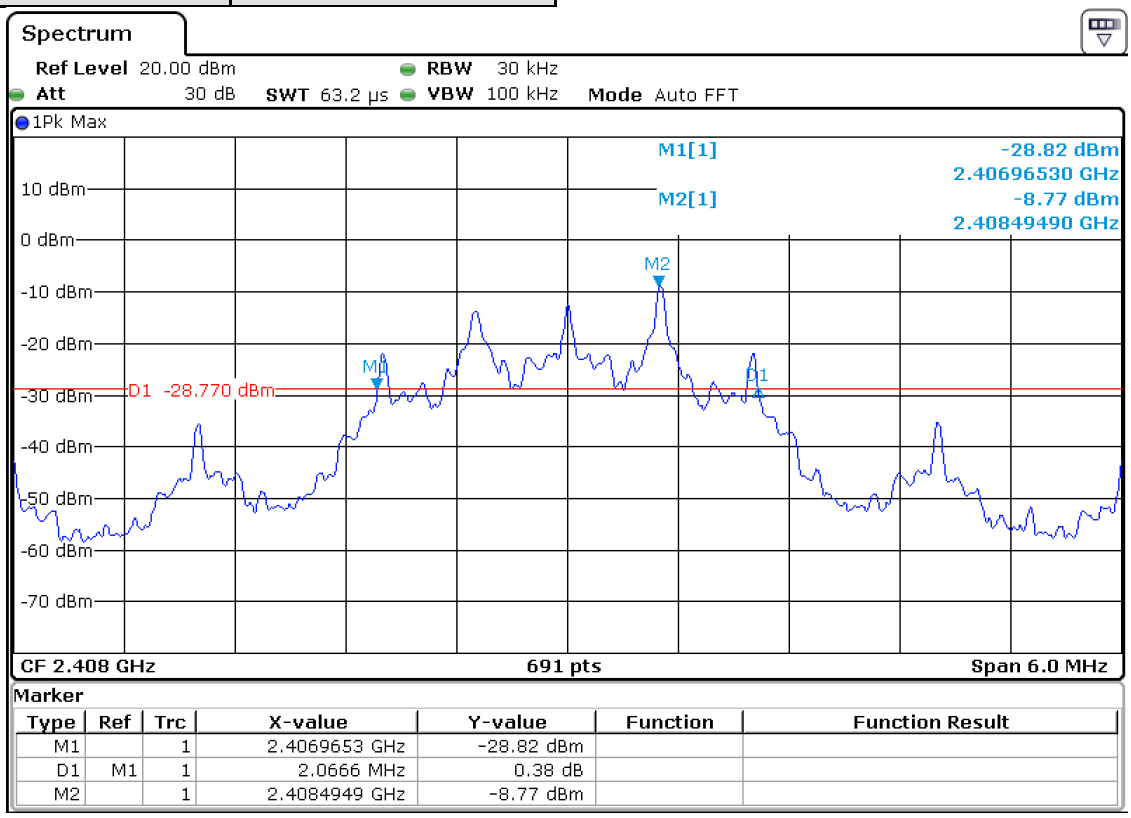
Test Requirement:	47 CFR Part 15C Section 15.215
Test Method:	ANSI C63.10:2013
Test Setup:	
Test Mode:	Transmitting with FSK at lowest, middle and highest channel.
Limit:	N/A
Test Results:	Pass

Measurement Data

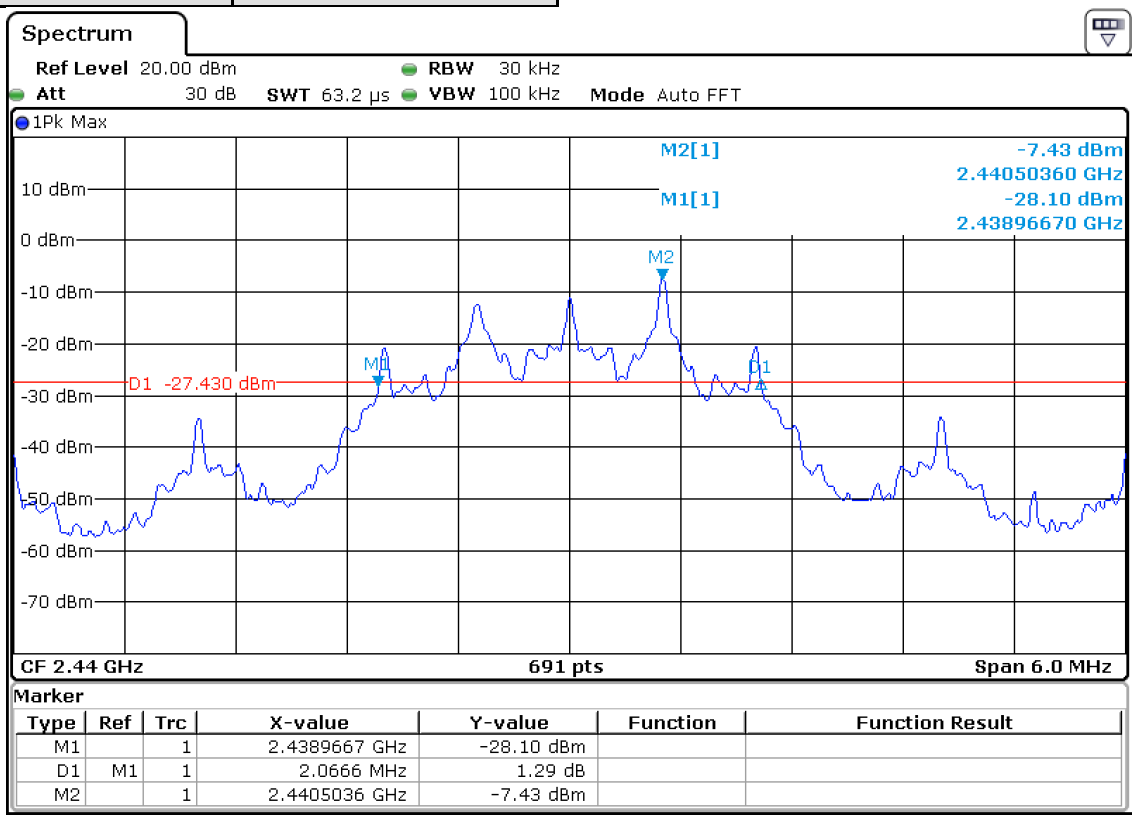
Test channel	20dB bandwidth (MHz)	Results
Lowest	2.0666	Pass
Middle	2.0666	Pass
Highest	2.0666	Pass

Test plot as follows:

Test channel:	Lowest



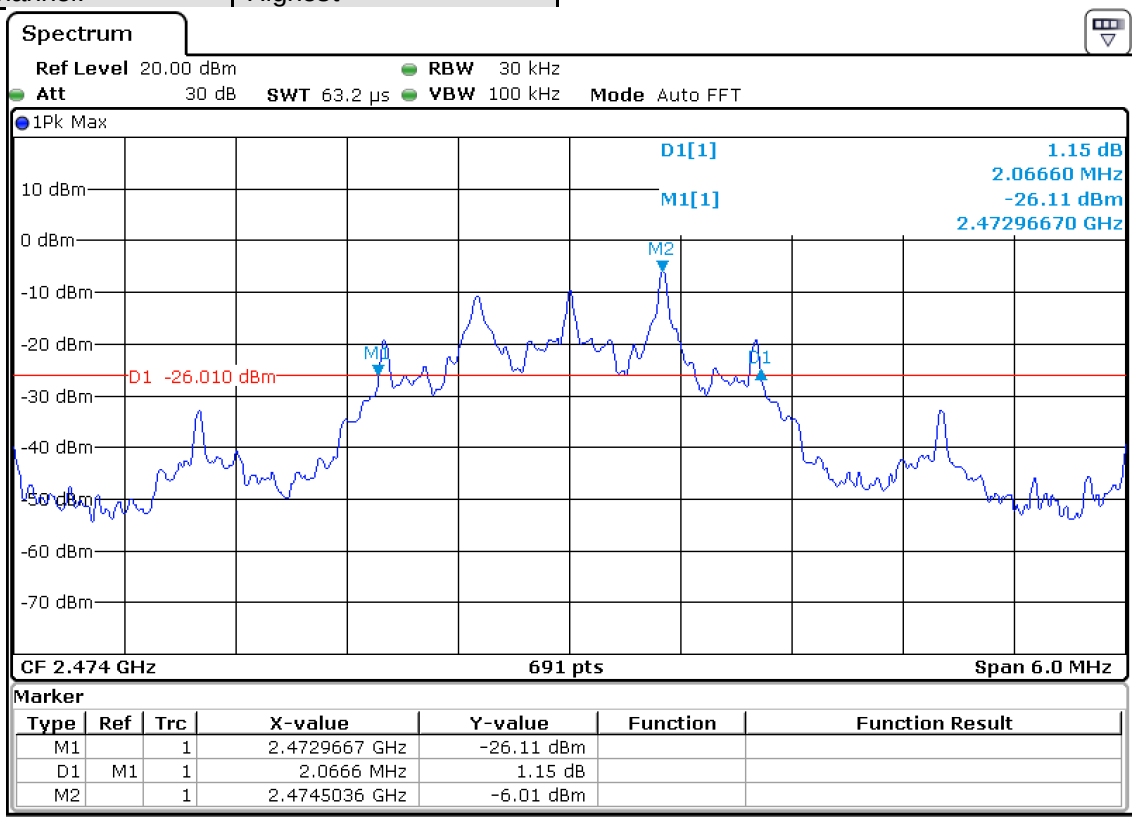
Test channel:	Middle



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4389667 GHz	-28.10 dBm		
D1	M1	1	2.0666 MHz	1.29 dB		
M2		1	2.4405036 GHz	-7.43 dBm		

Test channel:	Highest



Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.4729667 GHz	-26.11 dBm		
D1	M1	1	2.0666 MHz	1.15 dB		
M2		1	2.4745036 GHz	-6.01 dBm		