FCC/IC REPORT
(BLE)

Applicant:	Lightwave Technology
Address of Applicant:	400 Rue Wright, Saint-Laurent, Quebec, Canada, H4N 1M6
Equipment Under Test (EUT)	
Product Name:	Connected, CarLink
Model No.:	RX3200, CL3200
FCC ID:	2ABSL3200
Canada IC:	11732A-LWRTX3200
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 RSS-Gen Issue 4, November 2014 RSS-247 Issue 2, February 2017
Date of sample receipt:	19 Jan., 2018
Date of Test:	22 Jan., 27 to Feb., 2018
Date of report issued:	28 Feb., 2018
Test Result:	PASS *

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

Authorized Signature:

Bruce Zhang
Laboratory Manager

2 Version

Version No.	Date	Description
00	*28 Feb., 2018*	*Original*

Tested by: YT Yang ***Date:*** *28 Feb., 2018*

Test Engineer

Reviewed by: Winner Zhang ***Date:*** *28 Feb., 2018*

Project Engineer

3 Contents

4 Test Summary

Test Items	Section		Result
	FCC	IC	
Antenna Requirement	15.203/15.247 (c)	/	Pass
AC Power Line Conducted Emission	15.207	RSS-GEN Section 8.8	Pass
Conducted Peak Output Power	15.247 (b)(3)	RSS-247 Section 5.4 (d)	Pass
6dB Emission Bandwidth 99% Occupied Bandwidth	15.247 (a)(2)	RSS-247 Section 5.2 (a)	Pass
Power Spectral Density	15.247 (e)	RSS-247 Section 5.2 (b)	Pass
Band Edge	15.247(d)	RSS-GEN Section 8.10 RSS-247 Section 5.5	Pass
Conducted and Radiated Spurious Emission	15.205 & 15.209	RSS-GEN Section 6.13 RSS-247 Section 5.5	Pass
Pass: The EUT complies with the essential requirements in the standard.			

5 General Information

5.1 Client Information

Applicant:	Lightwave Technology
Address:	400 Rue Wright, Saint-Laurent, Quebec, Canada, H4N 1M6
Manufacturer/Factory:	DONGGUAN PORTMAN ELECTRONIC SCIENCE AND TECHNOLOGY CO., LTD
Address:	NO.10, LUYI 2 ROAD, TANGXIA TOWN, DONGGUAN CITY, GUANGDONG PROVINCE CHINA

5.2 General Description of E.U.T.

Product Name:	Connected, CarLink
Model No.:	RX3200, CL3200
Operation Frequency:	2402-2480 MHz
Channel numbers:	40
Channel separation:	2 MHz
Modulation technology:	GFSK
Data speed :	1Mbps
Antenna Type:	Internal Antenna
Antenna gain:	0.5 dBi
Power supply:	Rechargeable Li-ion Battery DC3.7V-130mAh
Remark:	The No.: Rx3200, CL3200, Advanced were identical inside, the electrical circuit design, layout, components used and internal wiring, with only difference being product name, model name and shell, for different customer

Operation Frequency each of channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402MHz	10	2422MHz	20	2442MHz	30	2462MHz
1	2404MHz	11	2424MHz	21	2444MHz	31	2464MHz
2	2406MHz	12	2426MHz	22	2446MHz	32	2466MHz
3	2408MHz	13	2428MHz	23	2448MHz	33	2468MHz
4	2410MHz	14	2430MHz	24	2450MHz	34	2470MHz
5	2412MHz	15	2432MHz	25	2452MHz	35	2472MHz
6	2414MHz	16	2434MHz	26	2454MHz	36	2474MHz
7	2416MHz	17	2436MHz	27	2456MHz	37	2476MHz
8	2418MHz	18	2438MHz	28	2458MHz	38	2478MHz
9	2420MHz	19	2440MHz	29	2460MHz	39	2480MHz

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. Channel No. 0, 20 & 39 were selected as Lowest, Middle and Highest channel.

5.3 Test environment and test mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Transmitting mode	Keep the EUT in continuous transmitting with modulation
The sample was placed 0.8m (below 1GHz)/1.5m (above 1GHz) above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages. Duty cycle setting during the transmission is 100% with maximum power setting for all modulations.	

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Measurement Uncertainty

Parameters	Expanded Uncertainty
Conducted Emission (9kHz ~ 30MHz)	2.14 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	4.24 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	4.35 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	4.44 dB (k=2)
Radiated Emission (18GHz ~ 26.5GHz)	4.56 dB (k=2)

5.6 Laboratory Facility

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

- **FCC - Registration No.: 727551**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The Registration No. is 727551.

- **IC - Registration No.: 10106A-1**

The 3m Semi-anechoic chamber of Shenzhen Zhongjian Nanfang Testing Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

- **CNAS - Registration No.: CNAS L6048**

Shenzhen Zhongjian Nanfang Testing Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6048.

- **A2LA - Registration No.: 4346.01**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.
Address: No. B-C, 1/F., Building 2, Laodong No.2 Industrial Park, Xixiang Road,
Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755-23118282, Fax: +86-755-23116366
Email: info@ccis-cb.com, Website: http://www.ccis-cb.com

5.8 Test Instruments list

Radiated Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
1	3m SAC	SAEMC	9(L)*6(W)* 6(H)	CCIS0001	08-23-2014	08-22-2020
2	BiConiLog Antenna	SCHWARZBECK	VULB9163	CCIS0005	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
3	Horn Antenna	SCHWARZBECK	BBHA9120D	CCIS0006	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
4	Pre-amplifier (10kHz-1.3GHz)	HP	8447D	CCIS0003	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
5	Pre-amplifier (1GHz-18GHz)	Compliance Direction Systems Inc.	PAP-1G18	CCIS0011	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
6	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
8	Spectrum analyzer 9k-30GHz	Rohde & Schwarz	FSP30	CCIS0023	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
9	EMI Test Receiver	Rohde & Schwarz	ESRP7	CCIS0167	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
10	Loop antenna	Laplace instrument	RF300	EMC0701	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
11	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

Conducted Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongShuo Electron	11.0(L)x4.0(W)x3.0(H)	CCIS0061	07-22-2017	07-21-2020
2	EMI Test Receiver	Rohde & Schwarz	ESCI	CCIS0002	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
3	LISN	CHASE	MN2050D	CCIS0074	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
4	LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2017	07-20-2018
5	Coaxial Cable	CCIS	N/A	CCIS0086	02-25-2017	02-24-2018
					02-20-2018	02-19-2019
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
7	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO27	11-10-2017	11-09-2018
8	Power Sensor	D.A.R.E	RPR3006W	17I00015SNO28	11-10-2017	11-09-2018

6 Test results and Measurement Data

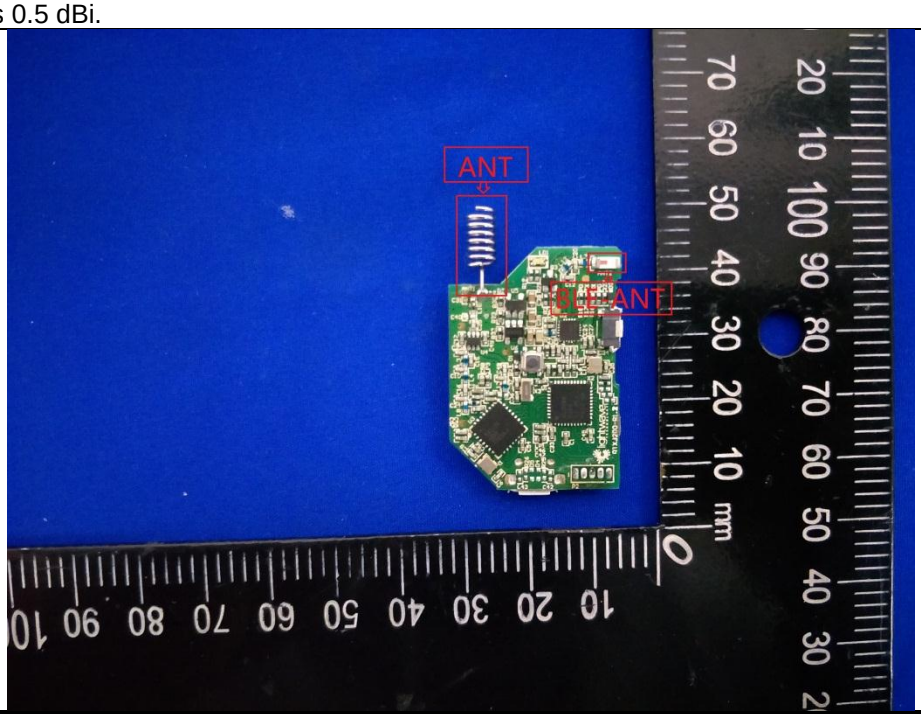
6.1 Antenna requirement:

Standard requirement:	FCC Part 15 C Section 15.203 /247(c)

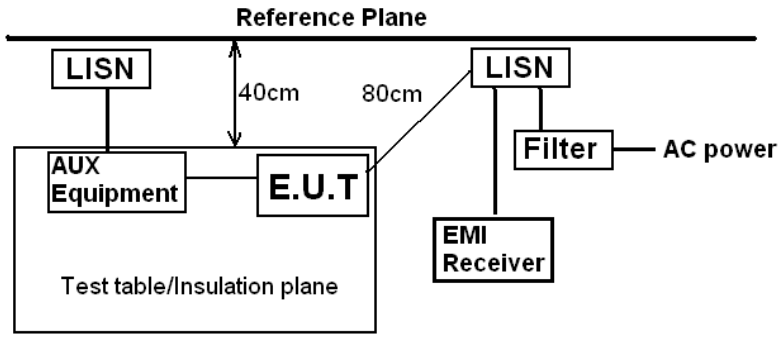
15.203 requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer 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.
15.247(c) (1)(i) requirement:
(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:	

The BLE antenna is an internal antenna which cannot replace by end-user, the best-case gain of the antenna is 0.5 dBi.



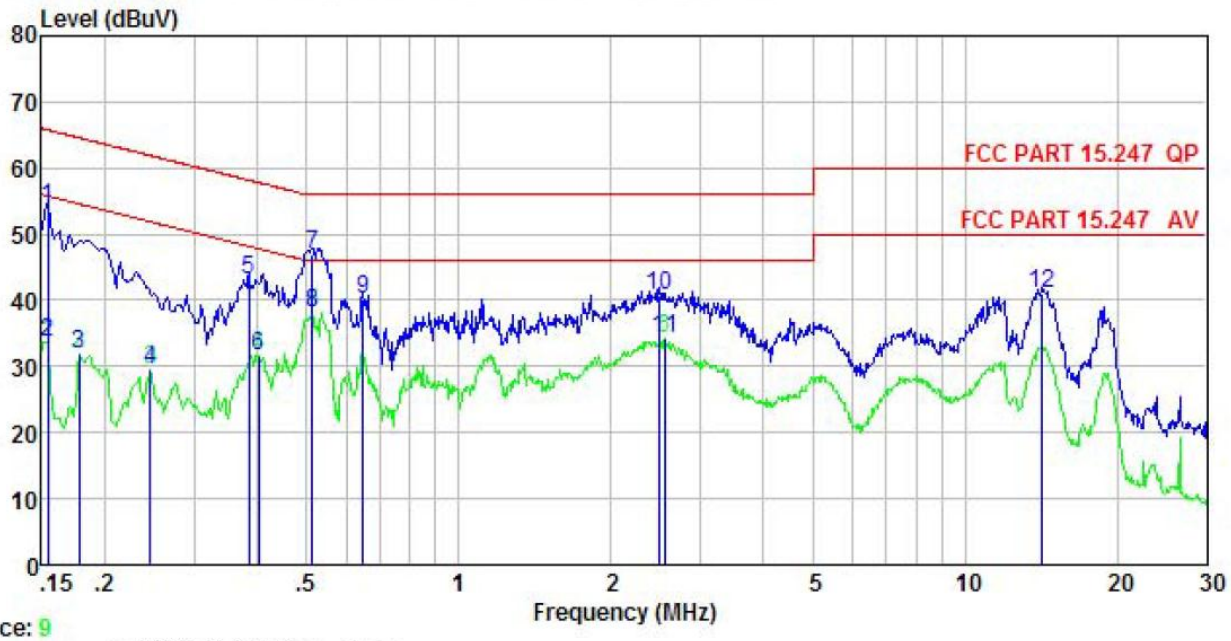
6.2 Conducted Emission

<table>
<tr><td>Test Requirement:</td><td colspan="3">FCC Part 15 C Section 15.207
RSS-GEN Section 8.8</td></tr>
<tr><td>Test Method:</td><td colspan="3">ANSI C63.10: 2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="3">150 kHz to 30 MHz</td></tr>
<tr><td>Class / Severity:</td><td colspan="3">Class B</td></tr>
<tr><td>Receiver setup:</td><td colspan="3">RBW=9kHz, VBW=30kHz</td></tr>
<tr><td rowspan="5">Limit:</td><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>
<tr><td colspan="3">* Decreases with the logarithm of the frequency.</td></tr>
<tr><td>Test procedure</td><td colspan="3">1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.), which provides a 50ohm/50uH coupling impedance for the measuring equipment.
2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).
3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.</td></tr>
<tr><td>Test setup:</td><td colspan="3"> 

Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m</td></tr>
<tr><td>Test Instruments:</td><td colspan="3">Refer to section 5.8 for details</td></tr>
<tr><td>Test mode:</td><td colspan="3">Refer to section 5.3 for details</td></tr>
<tr><td>Test results:</td><td colspan="3">Passed</td></tr>
</table>

Measurement Data:

Neutral:



Trace: 9

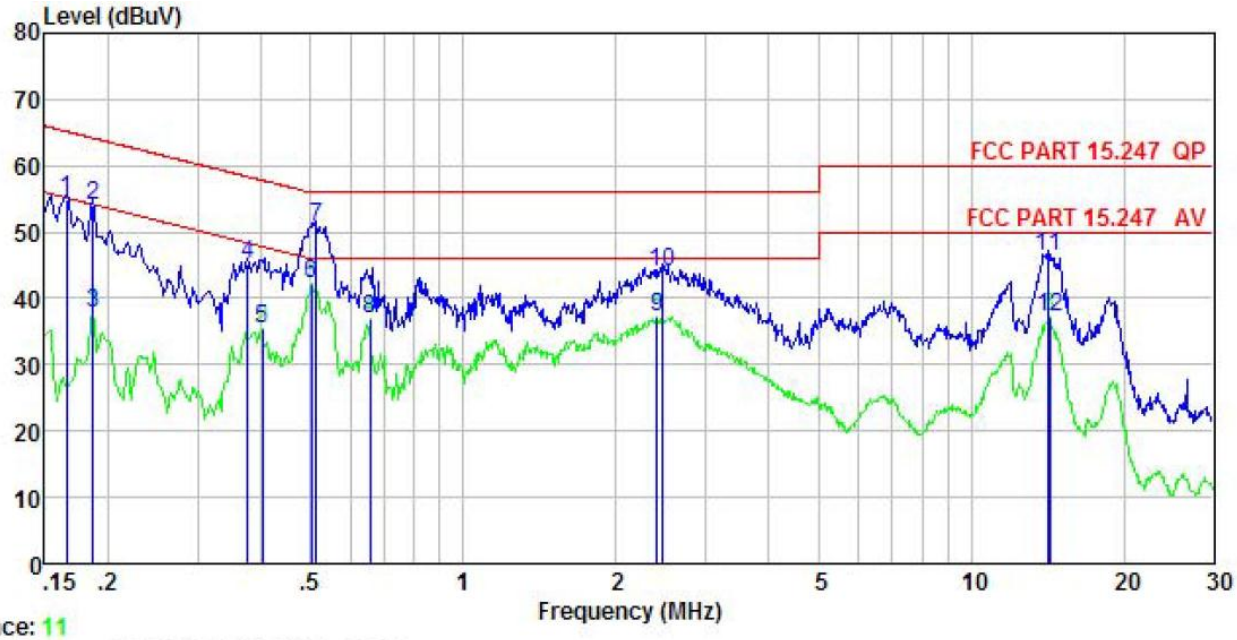
Site : CCIS Shielding Room
Condition : FCC PART 15.247 QP LISN(RS) NEUTRAL
EUT : Connected
Model : RX3200
Test Mode : BLE mode
Power Rating : AC 120V/60Hz
Environment : Temp: 23 .5℃ Huni:57% Atmos:101KPa
Test Engineer: YT
Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	42.66	0.70	10.78	54.14	65.78	-11.64	QP
2	0.154	22.09	0.70	10.78	33.57	55.78	-22.21	Average
3	0.178	20.39	0.66	10.77	31.82	54.59	-22.77	Average
4	0.246	18.08	0.65	10.75	29.48	51.91	-22.43	Average
5	0.385	31.89	0.62	10.72	43.23	58.17	-14.94	QP
6	0.402	20.26	0.62	10.72	31.60	47.81	-16.21	Average
7	0.513	35.58	0.61	10.76	46.95	56.00	-9.05	QP
8	0.513	26.69	0.61	10.76	38.06	46.00	-7.94	Average
9	0.647	28.64	0.63	10.77	40.04	56.00	-15.96	QP
10	2.487	29.18	0.68	10.94	40.80	56.00	-15.20	QP
11	2.554	22.63	0.68	10.94	34.25	46.00	-11.75	Average
12	14.213	29.32	0.69	10.91	40.92	60.00	-19.08	QP

Notes:

1. *An initial pre-scan was performed on the live and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

Line:



Trace: 11

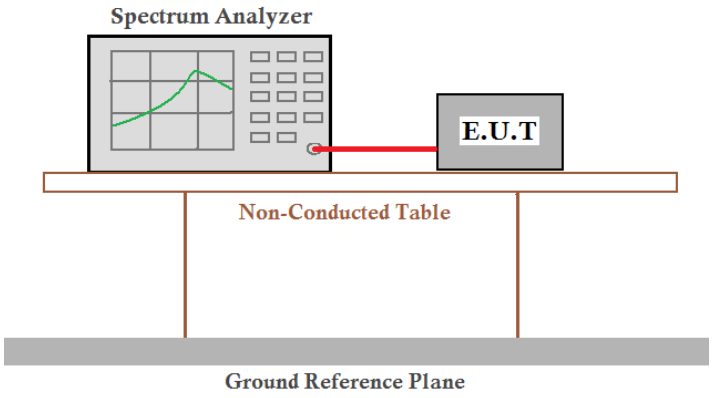
Site : CCIS Shielding Room
Condition : FCC PART 15.247 QP LISN(RS) LINE
EUT : Connected
Model : RX3200
Test Mode : BLE mode
Power Rating : AC 120V/60Hz
Environment : Temp: 23 .5℃ Huni:57% Atmos:101KPa
Test Engineer: YT
Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.166	43.45	0.71	10.77	54.93	65.16	-10.23	QP
2	0.186	42.40	0.73	10.76	53.89	64.20	-10.31	QP
3	0.186	26.19	0.73	10.76	37.68	54.20	-16.52	Average
4	0.377	33.70	0.75	10.72	45.17	58.34	-13.17	QP
5	0.402	23.93	0.75	10.72	35.40	47.81	-12.41	Average
6	0.502	30.65	0.76	10.76	42.17	46.00	-3.83	Average
7	0.513	39.15	0.76	10.76	50.67	56.00	-5.33	QP
8	0.654	25.29	0.77	10.77	36.83	46.00	-9.17	Average
9	2.409	25.54	0.78	10.94	37.26	46.00	-8.74	Average
10	2.474	32.37	0.78	10.94	44.09	56.00	-11.91	QP
11	14.138	34.62	0.70	10.91	46.23	60.00	-13.77	QP
12	14.288	25.52	0.70	10.90	37.12	50.00	-12.88	Average

Notes:

1. *An initial pre-scan was performed on the live and neutral lines with peak detector.*
2. *Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.*
3. *Final Level =Receiver Read level + LISN Factor + Cable Loss.*

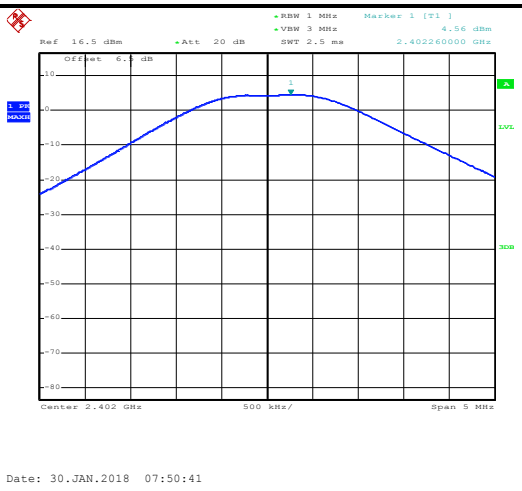
6.3 Conducted Output Power

Test Requirement:	FCC Part 15 C Section 15.247 (b)(3) RSS-247 section 5.4(d)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

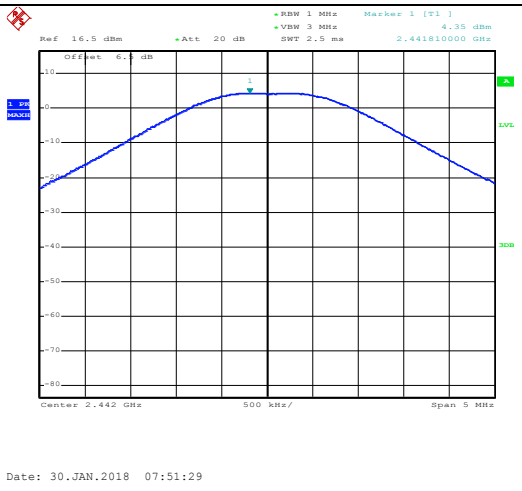
Measurement Data:

Test CH	Maximum Conducted Output Power (dBm)	Limit(dBm)	Result
Lowest	4.56	30.00	Pass
Middle	4.35		
Highest	4.22		

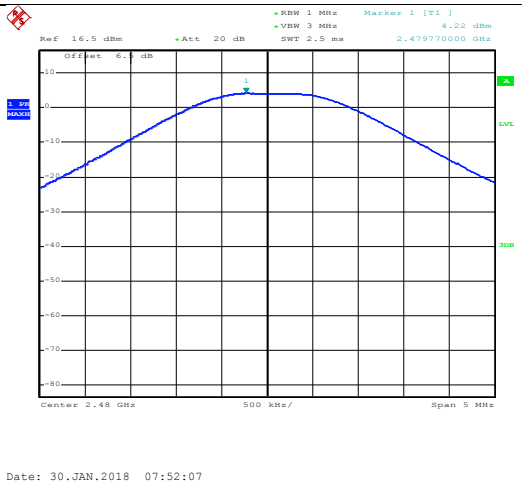
Test plot as follows:



Lowest channel

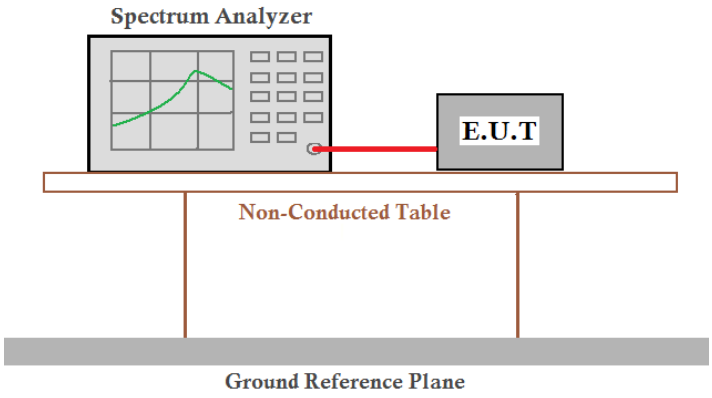


Middle channel



Highest channel

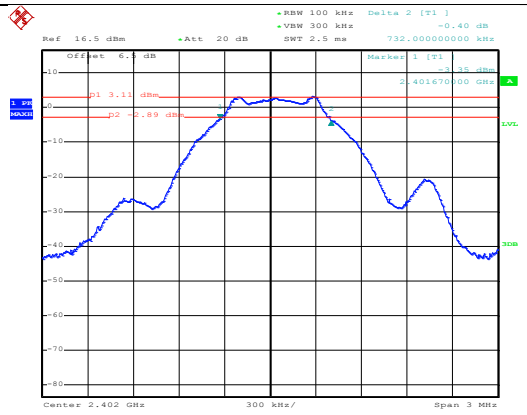
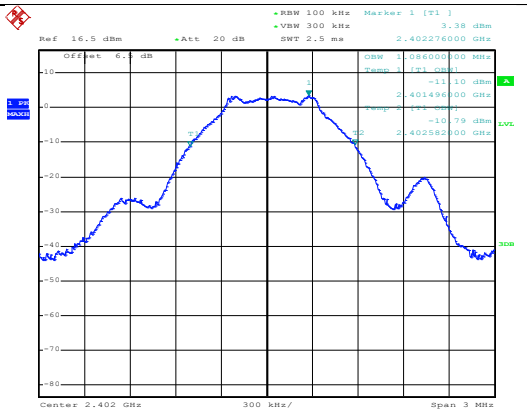
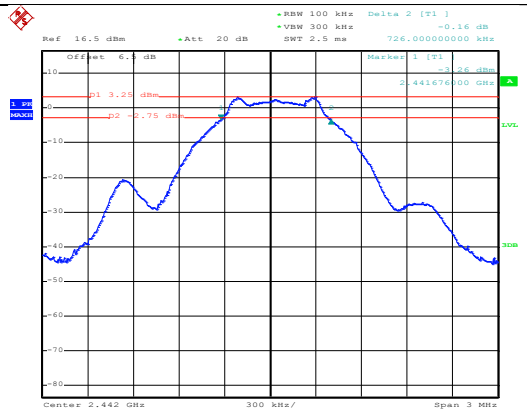
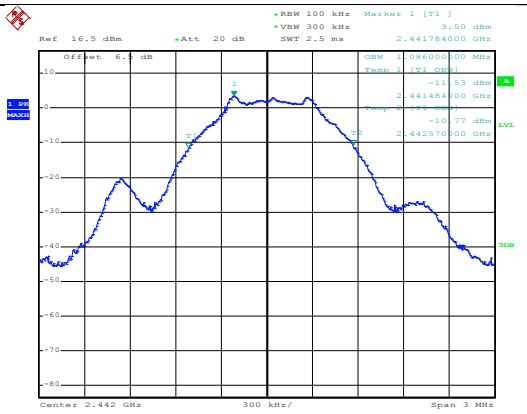
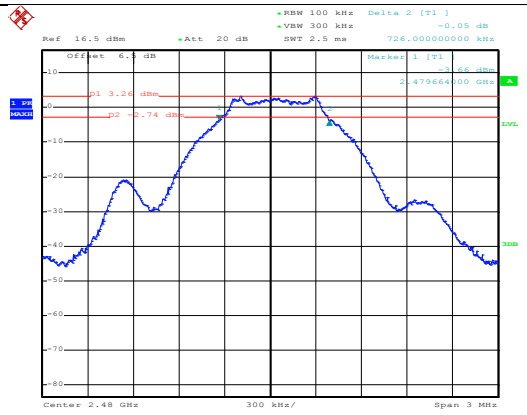
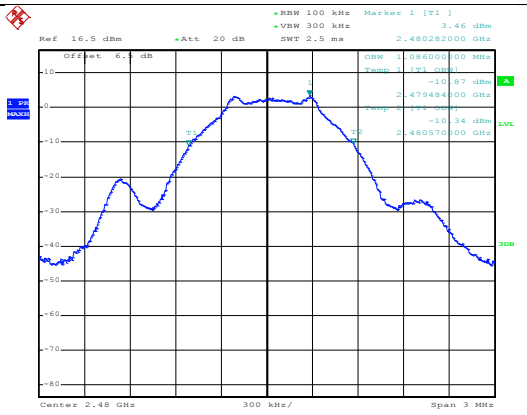
6.4 Occupy Bandwidth

Test Requirement:	FCC Part 15 C Section 15.247 (a)(2) RSS-247 section 5.2(a)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	>500kHz
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

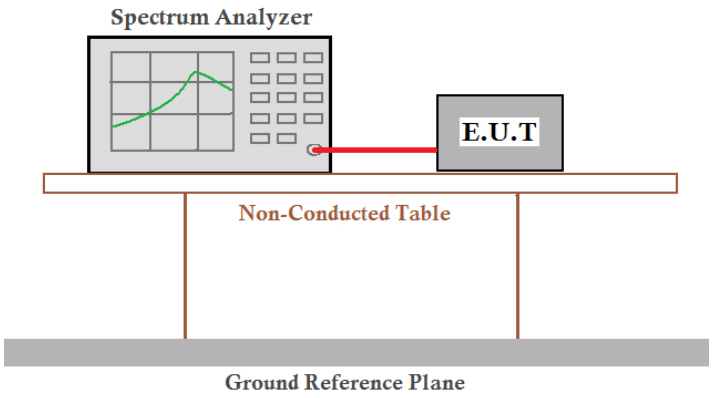
Measurement Data:

Test CH	6dB Emission Bandwidth (MHz)	Limit(kHz)	Result
Lowest	0.732	>500	Pass
Middle	0.726		
Highest	0.726		
Test CH	99% Occupy Bandwidth (MHz)	Limit(kHz)	Result
Lowest	1.086	N/A	N/A
Middle	1.086		
Highest	1.086		

Test plot as follows:

6dB EBW	99% OBW
	
Lowest channel	Lowest channel
	
Middle channel	Middle channel
	
Highest channel	Highest channel

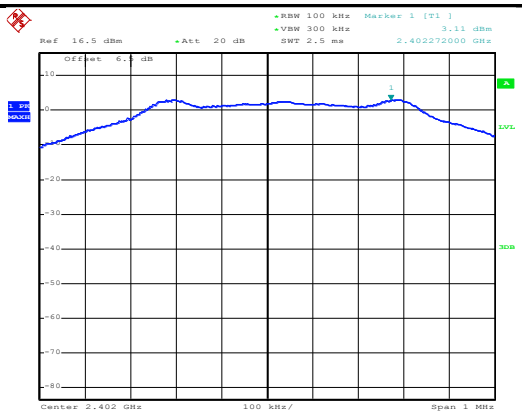
6.5 Power Spectral Density

Test Requirement:	FCC Part 15 C Section 15.247 (e) RSS-247 section 5.2(b)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	8 dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

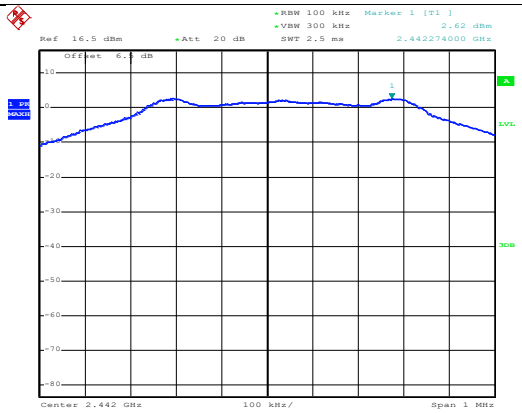
Measurement Data:

Test CH	Power Spectral Density (dBm)	Limit(dBm)	Result
Lowest	3.11	8.00	Pass
Middle	2.62		
Highest	2.45		

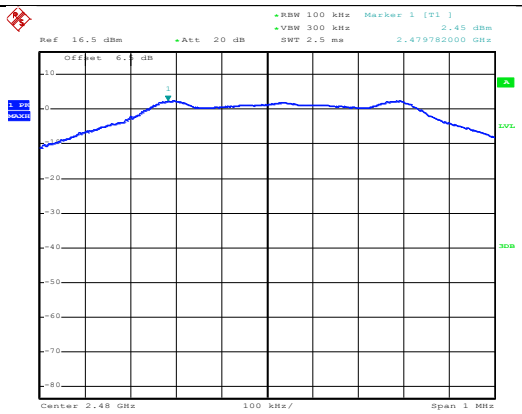
Test plots as follow:



Lowest channel



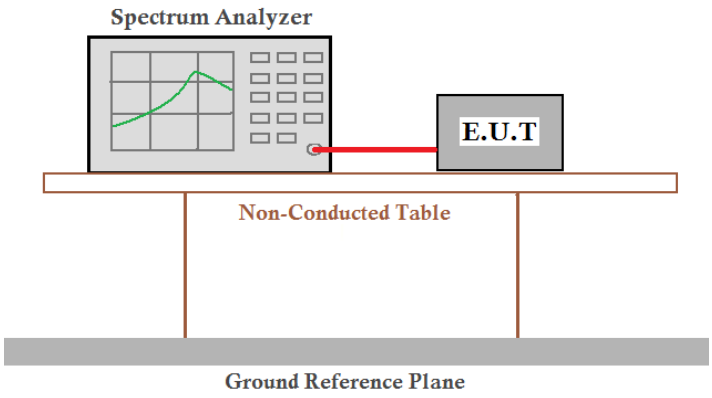
Middle channel



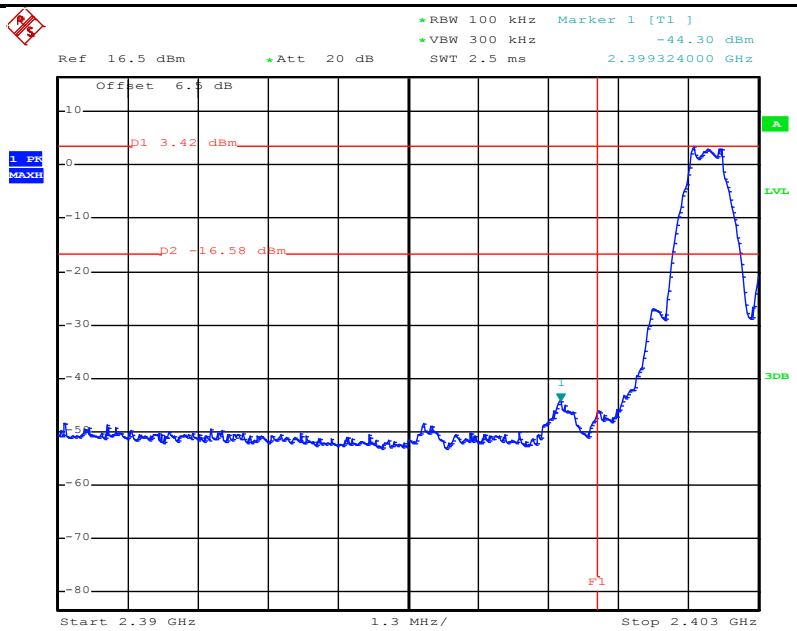
Highest channel

6.6 Band Edge

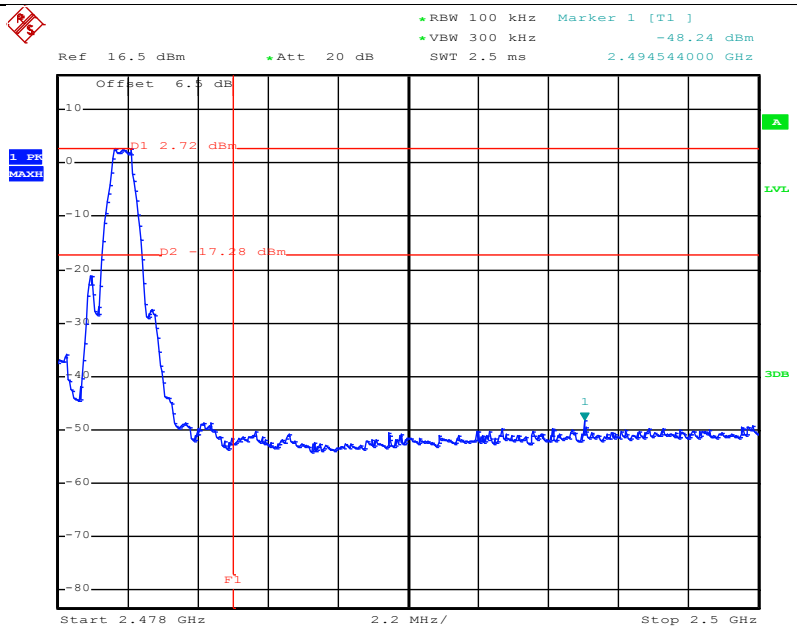
6.6.1 Conducted Emission Method

Test Requirement:	FCC Part 15 C Section 15.247 (d) RSS-247 section 5.5
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plots as follow:



Lowest channel



Highest channel

6.6.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205 RSS-GEN section 8.10
Test Method:	ANSI C63.10: 2013 and KDB558074
Test Frequency Range:	2.3GHz to 2.5GHz
Test Distance:	3m

Receiver setup:

Frequency	Detector	RBW	VBW	Remark
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	RMS	1MHz	3MHz	Average Value

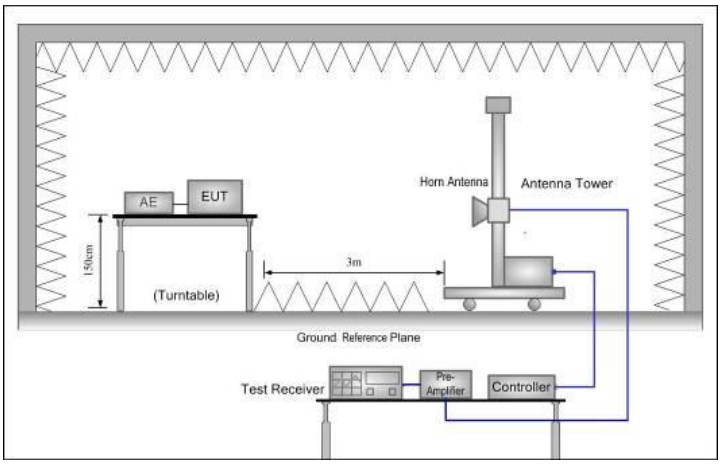
Limit:

Frequency	Limit (dBuV/m @3m)	Remark
Above 1GHz	54.00	Average Value
	74.00	Peak Value

Test Procedure:

1. The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB 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 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

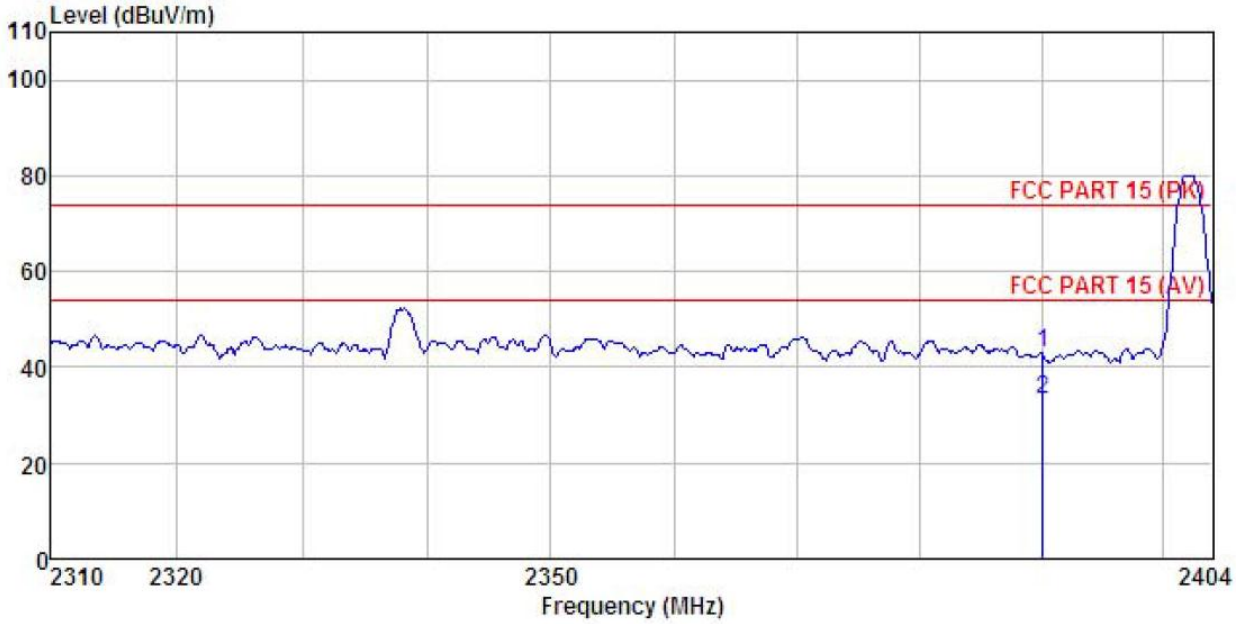
Test setup:



Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test channel: Lowest

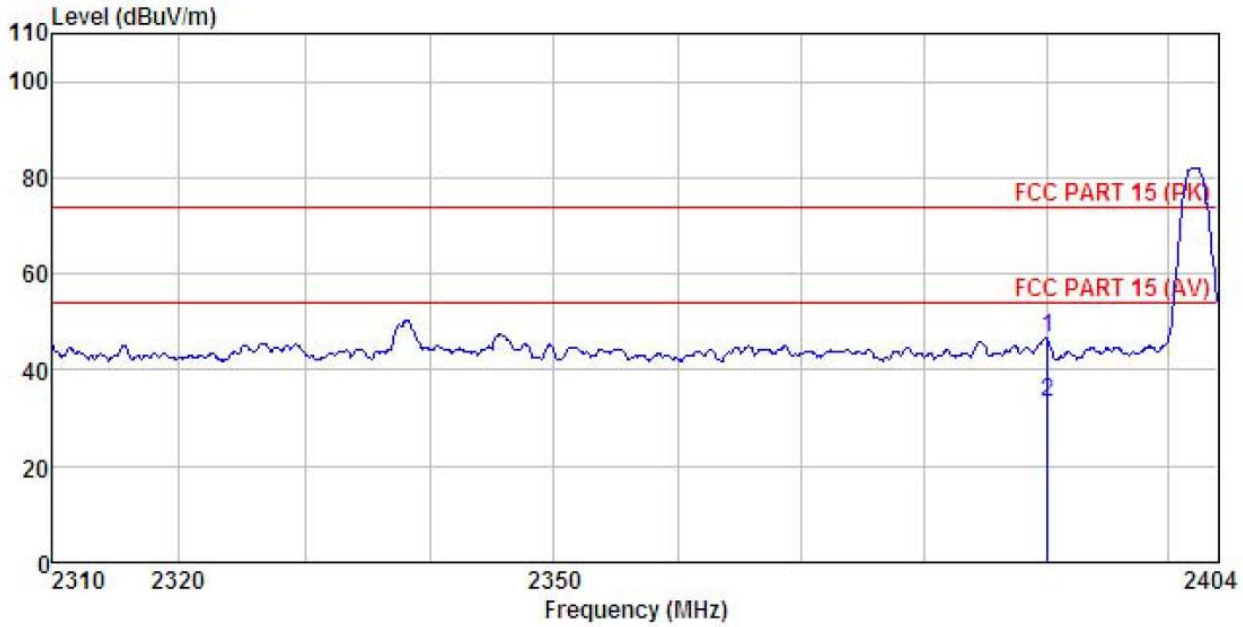
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL
EUT : Connected
Model : RX3200
Test mode : BLE-L mode
Power Rating : DC 3.7V
Environment : Temp:25.5'C Huni:55%
Test Engineer: YT
Remark :

	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	2390.000	17.55	25.45	0.00	0.00	43.00	74.00	-31.00	Peak
2	2390.000	7.64	25.45	0.00	0.00	33.09	54.00	-20.91	Average

Vertical:

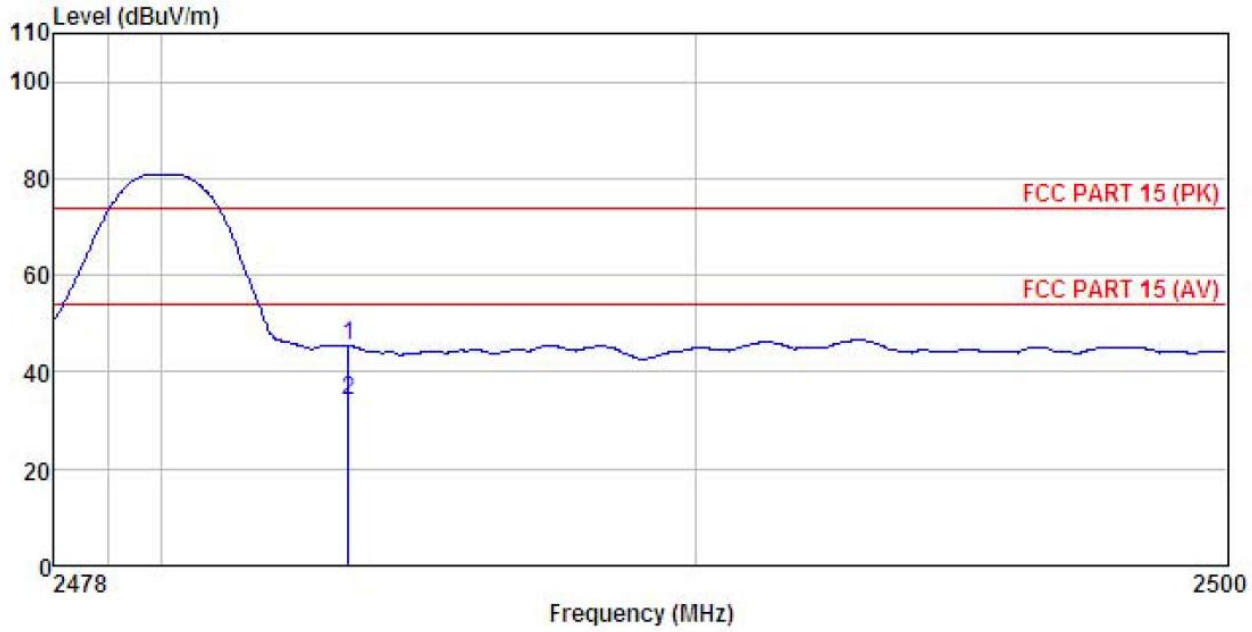


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL
EUT : Connected
Model : RX3200
Test mode : BLE-L mode
Power Rating : DC 3.7V
Environment : Temp:25.5℃ Huni:55%
Test Engineer: YT
Remark :

	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	2390.000	21.18	25.45	0.00	0.00	46.63	74.00	-27.37	Peak
2	2390.000	7.64	25.45	0.00	0.00	33.09	54.00	-20.91	Average

Test channel: Highest

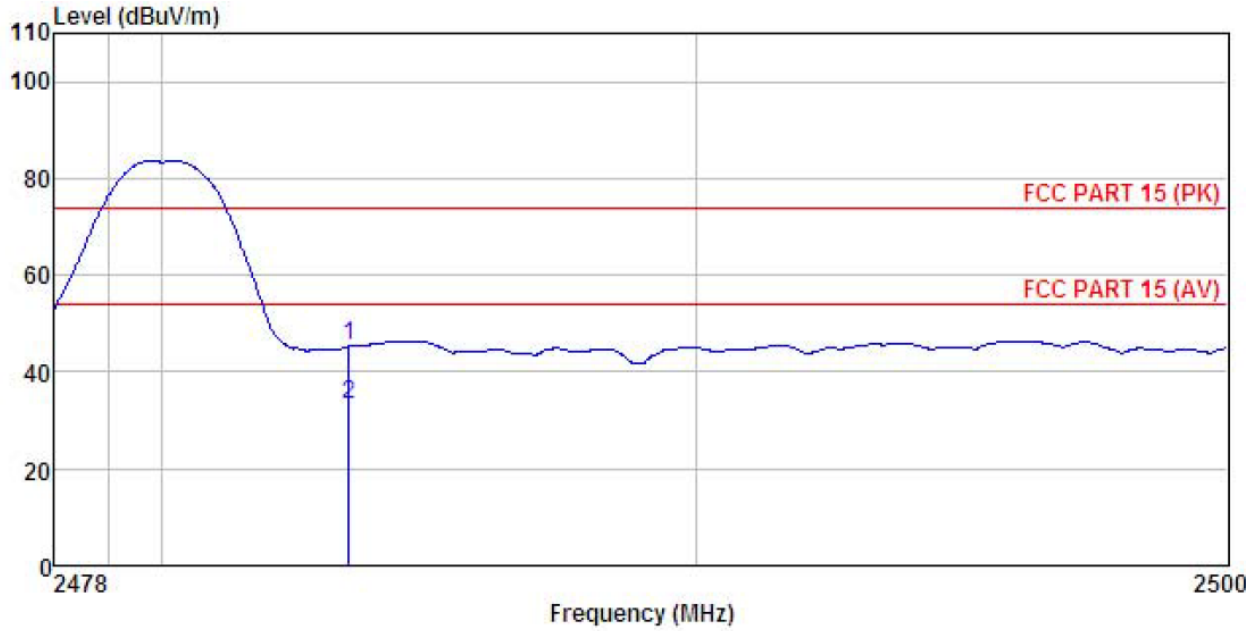
Horizontal:



Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL
EUT : Connected
Model : RX3200
Test mode : BLE-H mode
Power Rating : DC 3.7V
Environment : Temp:25.5℃ Huni:55%
Test Engineer: YT
Remark :

	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	2483.500	19.81	25.66	0.00	0.00	45.47	74.00	-28.53	Peak
2	2483.500	8.43	25.66	0.00	0.00	34.09	54.00	-19.91	Average

Vertical:

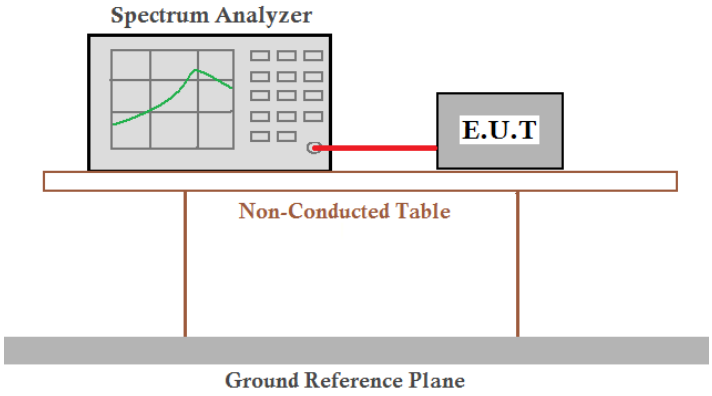


Site : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL
EUT : Connected
Model : RX3200
Test mode : BLE-H mode
Power Rating : DC 3.7V
Environment : Temp:25.5℃ Huni:55%
Test Engineer: YT
Remark :

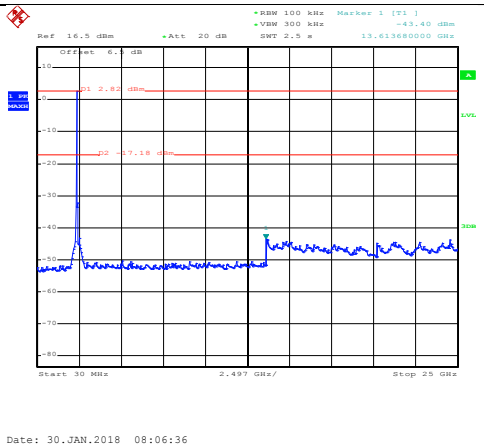
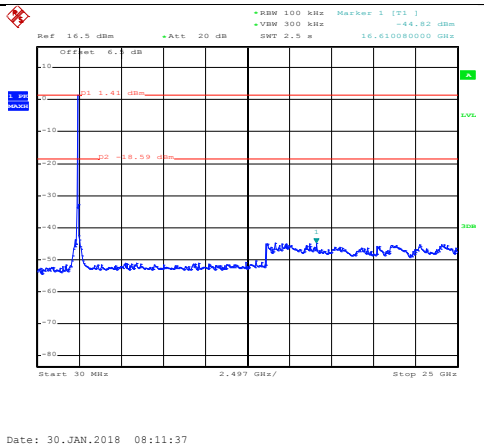
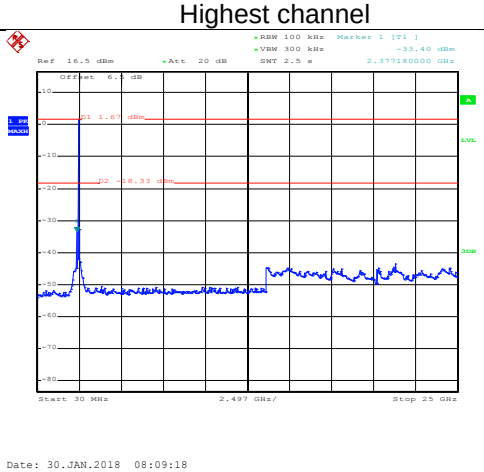
	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	19.64	25.66	0.00	0.00	45.30	74.00	-28.70	Peak
2	2483.500	7.45	25.66	0.00	0.00	33.11	54.00	-20.89	Average

6.7 Spurious Emission

6.7.1 Conducted Emission Method

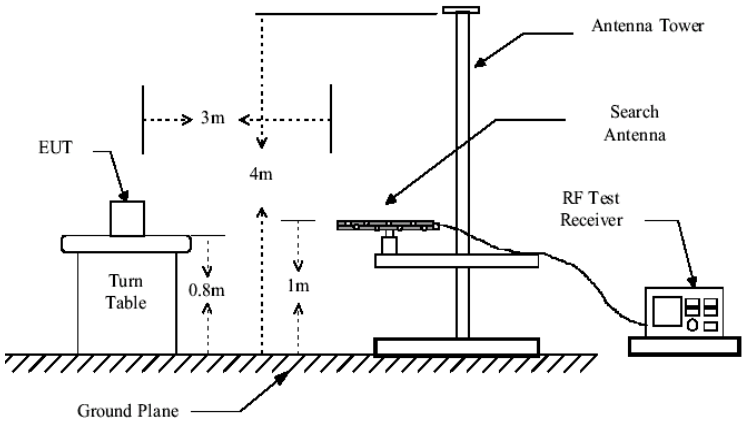
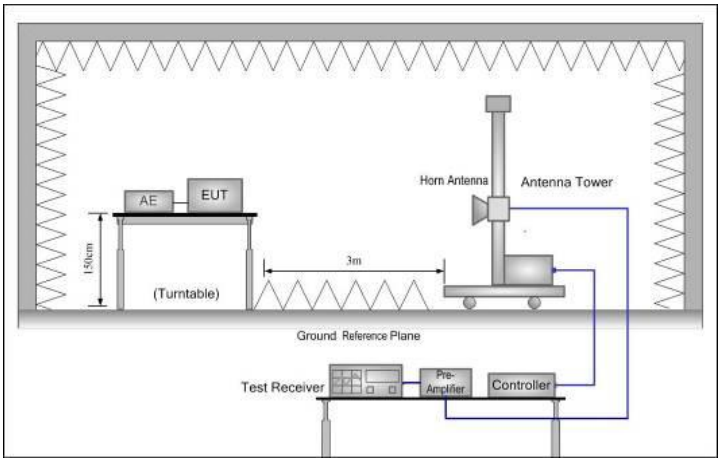
Test Requirement:	FCC Part 15 C Section 15.247 (d) RSS-247 section 5.5
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

Test plot as follows:

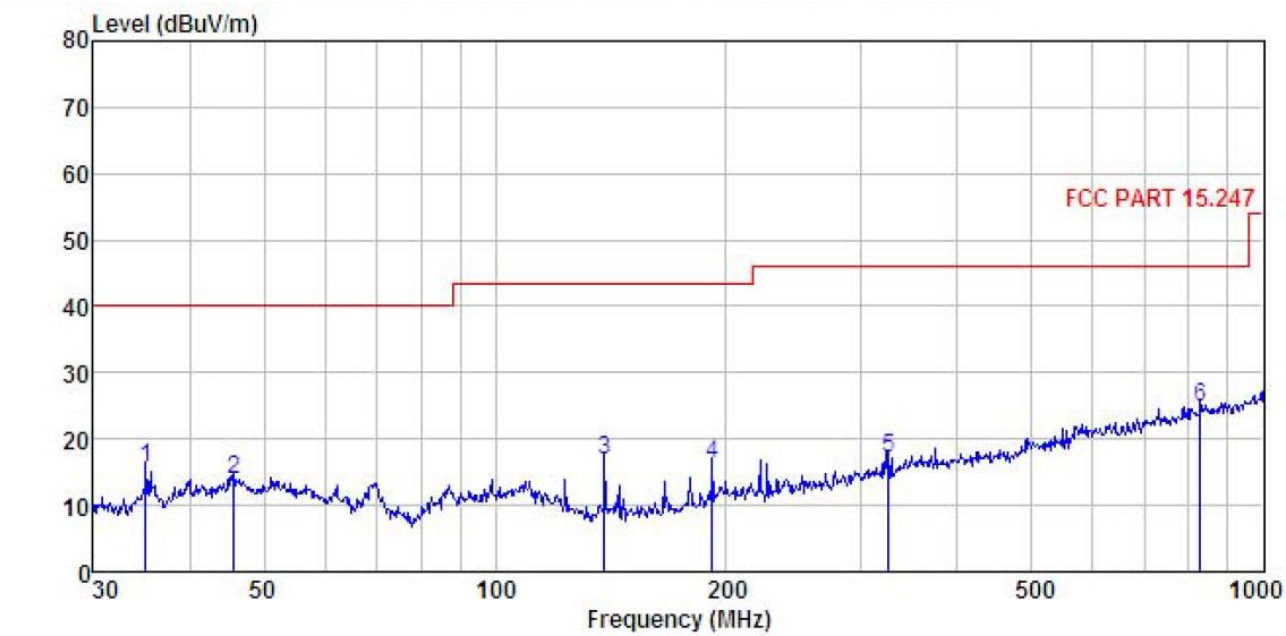
Lowest channel
 Date: 30.JAN.2018 08:06:36
30MHz~25GHz
Middle channel
 Date: 30.JAN.2018 08:11:37
30MHz~25GHz
Highest channel
 Date: 30.JAN.2018 08:09:18
30MHz~25GHz

6.7.2 Radiated Emission Method

<table>
<tr><td>Test Requirement:</td><td colspan="5">FCC Part 15 C Section 15.209 and 15.205
RSS-Gen section 6.13</td></tr>
<tr><td>Test Method:</td><td colspan="5">ANSI C63.10:2013</td></tr>
<tr><td>Test Frequency Range:</td><td colspan="5">9kHz to 25GHz</td></tr>
<tr><td>Test Distance:</td><td colspan="5">3m</td></tr>
<tr><td>Receiver setup:</td><td>Frequency</td><td>Detector</td><td>RBW</td><td>VBW</td><td>Remark</td></tr>
<tr><td></td><td>30MHz-1GHz</td><td>Quasi-peak</td><td>120KHz</td><td>300KHz</td><td>Quasi-peak Value</td></tr>
<tr><td></td><td rowspan="2">Above 1GHz</td><td>Peak</td><td>1MHz</td><td>3MHz</td><td>Peak Value</td></tr>
<tr><td></td><td>RMS</td><td>1MHz</td><td>3MHz</td><td>Average Value</td></tr>
<tr><td>Limit:</td><td colspan="2">Frequency</td><td colspan="2">Limit (dBuV/m @3m)</td><td>Remark</td></tr>
<tr><td></td><td colspan="2">30MHz-88MHz</td><td colspan="2">40.0</td><td>Quasi-peak Value</td></tr>
<tr><td></td><td colspan="2">88MHz-216MHz</td><td colspan="2">43.5</td><td>Quasi-peak Value</td></tr>
<tr><td></td><td colspan="2">216MHz-960MHz</td><td colspan="2">46.0</td><td>Quasi-peak Value</td></tr>
<tr><td></td><td colspan="2">960MHz-1GHz</td><td colspan="2">54.0</td><td>Quasi-peak Value</td></tr>
<tr><td></td><td colspan="2" rowspan="2">Above 1GHz</td><td colspan="2">54.0</td><td>Average Value</td></tr>
<tr><td></td><td colspan="2">74.0</td><td>Peak Value</td></tr>
<tr><td>Test Procedure:</td><td colspan="5">1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. 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.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 dB 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 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</td></tr>
</table>

Test setup:	Below 1GHz  Above 1GHz 
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed
Remark:	1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case. 2. 9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report.

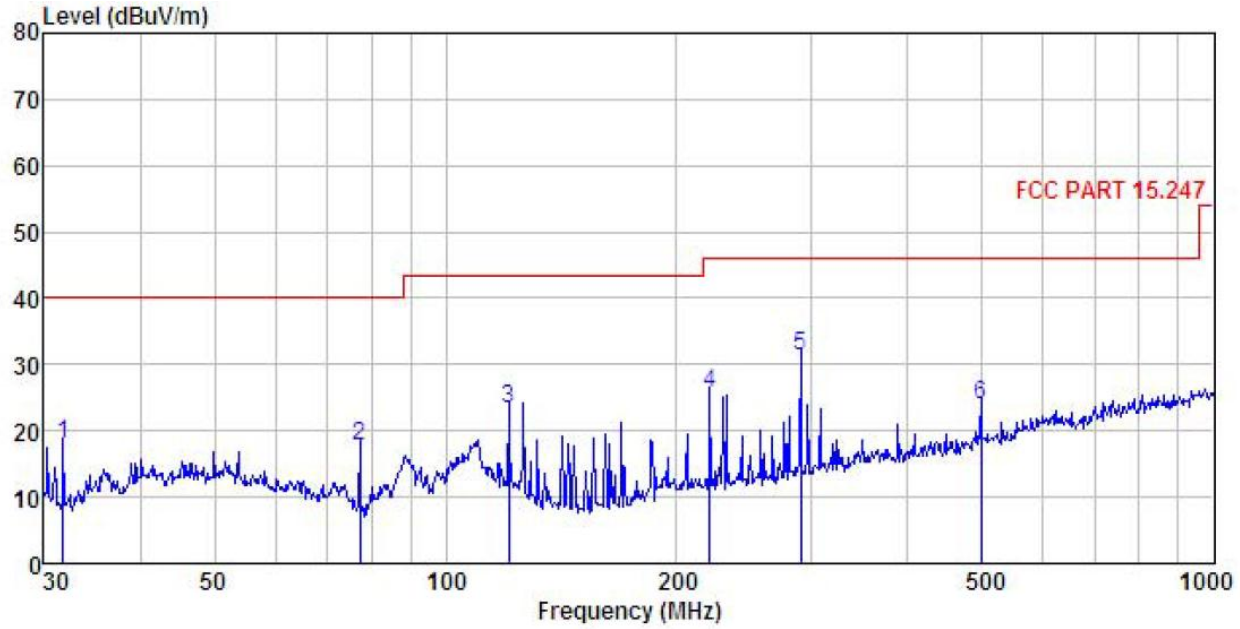
Below 1GHz:
Horizontal:



Site : 3m chamber
Condition : FCC PART 15.247 3m VULB9163(30M2G) HORIZONTAL
EUT : Connected
Model : RX3200
Test mode : BLE mode
Power Rating : DC 3.7V
Environment : Temp:25.5℃ Huni:55%
Test Engineer: YT
Remark :

	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	35.128	32.68	11.90	1.04	29.95	15.67	40.00	-24.33	QP
2	45.695	27.94	14.40	1.29	29.85	13.78	40.00	-26.22	QP
3	138.874	35.34	8.36	2.38	29.28	16.80	43.50	-26.70	QP
4	191.745	31.64	10.58	2.81	28.89	16.14	43.50	-27.36	QP
5	325.596	29.16	13.60	3.02	28.51	17.27	46.00	-28.73	QP
6	827.493	28.17	20.32	4.26	28.09	24.66	46.00	-21.34	QP

Vertical:



Site : 3m chamber
Condition : FCC PART 15.247 3m VULB9163(30M2G) VERTICAL
EUT : Connected
Model : RX3200
Test mode : BLE mode
Power Rating : DC 3.7V
Environment : Temp:25.5'C Huni:55%
Test Engineer: YT
Remark :

	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	31.731	35.67	11.43	0.85	29.97	17.98	40.00	-22.02	QP
2	77.321	36.86	8.84	1.64	29.66	17.68	40.00	-22.32	QP
3	120.699	40.35	10.30	2.18	29.39	23.44	43.50	-20.06	QP
4	220.617	40.24	11.30	2.85	28.70	25.69	46.00	-20.31	QP
5	290.017	43.83	13.09	2.91	28.47	31.36	46.00	-14.64	QP
6	497.677	32.84	16.52	3.60	28.95	24.01	46.00	-21.99	QP

Above 1GHz

Test channel:			Lowest		Level:		Peak	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	49.58	30.85	6.80	41.81	45.42	74.00	-28.58	Vertical
4804.00	48.48	30.85	6.80	41.81	44.32	74.00	-29.68	Horizontal
Test channel:			Lowest		Level:		Average	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4804.00	39.62	30.85	6.80	41.81	35.46	54.00	-18.54	Vertical
4804.00	40.11	30.85	6.80	41.81	35.95	54.00	-18.05	Horizontal

Test channel:			Middle		Level:		Peak	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	50.15	31.20	6.86	41.84	46.37	74.00	-27.63	Vertical
4884.00	49.82	31.20	6.86	41.84	46.04	74.00	-27.96	Horizontal
Test channel:			Middle		Level:		Average	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.00	39.62	31.20	6.86	41.84	35.84	54.00	-18.16	Vertical
4884.00	38.44	31.20	6.86	41.84	34.66	54.00	-19.34	Horizontal

Test channel:			Highest		Level:		Peak	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	49.86	31.63	6.91	41.87	46.53	74.00	-27.47	Vertical
4960.00	48.71	31.63	6.91	41.87	45.38	74.00	-28.62	Horizontal
Test channel:			Highest		Level:		Average	
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4960.00	39.62	31.63	6.91	41.87	36.29	54.00	-17.71	Vertical
4960.00	38.11	31.63	6.91	41.87	34.78	54.00	-19.22	Horizontal

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *The emission levels of other frequencies are very lower than the limit and not show in test report.*