

# FCC & IC REPORT

## (WIFI)

**Applicant:** Solaborate LLC

**Address of Applicant:** 8300 Utica Ave #283, Rancho Cucamonga, CA 91730

**Equipment Under Test (EUT)**

Product Name: HELLO 2

Model No.: HELLO2

**FCC ID:** 2ALUI-HELLO2

**IC ID:** 24458-HELLO2

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247  
RSS-Gen Issue 5, April 2018  
RSS-247 Issue 2, February 2017

**Date of sample receipt:** 26 Oct., 2018

**Date of Test:** 26 Oct., to 21 Dec., 2018

**Date of report issued:** 23 Dec., 2018

**Test Result:** PASS \*

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

Authorized Signature:



Bruce Zhang  
Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the CCIS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

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## 2 Version

Version No.	Date	Description
00	23 Dec., 2018	Original

**Tested by:**

*Carey Chen*  
 \_\_\_\_\_  
**Test Engineer**

**Date:**

23 Dec., 2018  
 \_\_\_\_\_

**Reviewed by:**

*Wimer Zhang*  
 \_\_\_\_\_  
**Project Engineer**

**Date:**

23 Dec., 2018  
 \_\_\_\_\_

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## 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
<i>Pass: The EUT complies with the essential requirements in the standard.</i>			

## 5 General Information

### 5.1 Client Information

Applicant:	Solaborate LLC
Address:	8300 Utica Ave #283, Rancho Cucamonga, CA 91730
Manufacturer:	Shenzhen YITOA Digital Appliance CO.,LTD
Address:	5/F,Yitoe Building,Keji South Road 5th,Hi-tech Industrial Park,Nanshan District, Shenzhen

### 5.2 General Description of E.U.T.

Product Name:	HELLO 2
Model No.:	HELLO2
Operation Frequency:	2412MHz~2462MHz (802.11b/802.11g/802.11n(H20))
Channel numbers:	11 for 802.11b/802.11g/802.11(H20)
Channel separation:	5MHz
Modulation technology: (IEEE 802.11b)	Direct Sequence Spread Spectrum (DSSS)
Modulation technology: (IEEE 802.11g/802.11n)	Orthogonal Frequency Division Multiplexing(OFDM)
Data speed (IEEE 802.11b):	1Mbps, 2Mbps, 5.5Mbps, 11Mbps
Data speed (IEEE 802.11g):	6Mbps, 9Mbps, 12Mbps, 18Mbps, 24Mbps, 36Mbps, 48Mbps, 54Mbps
Data speed (IEEE 802.11n):	Up to 144.4Mbps
Antenna Type:	FPC (EUT belongs to MIMO with dual antenna)
Antenna gain:	1.5 dBi
AC adapter with two plugs :	Model: EA1019AVRS-050 Input: AC100-240V, 50/60Hz, 0.8A Output: DC 5.0V, 3A
Remarks:	EUT has camera cable from two different manufacturers. Their manufacturers and models are: Unison is HELLO2-274-V8.0, and Seasons is HELLO2-274-V8.0.1. They have the same lens, but the Camera cable is different.
Test Sample Condition:	The applicant provided engineering samples for staying in continuously transmitting for testing.

Operation Frequency each of channel for 802.11b/g/n(H20)							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2412MHz	4	2427MHz	7	2442MHz	10	2457MHz
2	2417MHz	5	2432MHz	8	2447MHz	11	2462MHz
3	2422MHz	6	2437MHz	9	2452MHz		

Note: Channel 1, 6 & 11 selected for 802.11b/g/n-HT20 as Lowest, Middle and Highest channel.  
802.11b/g is SISO, 802.11n-HT20 is MIMO.

### 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
<p>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 &amp; 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.</p> <p>We have verified the construction and function in typical operation. All the test modes were carried out with the EUT in transmitting operation, which was shown in this test report and defined as follows:</p>	
Per-scan all kind of data rate, the follow list were the worst case.	
Mode	Data rate
802.11b	1Mbps
802.11g	6Mbps
802.11n(H20)	6.5Mbps

### 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)	±2.22 dB (k=2)
Radiated Emission (9kHz ~ 30MHz)	±2.76 dB (k=2)
Radiated Emission (30MHz ~ 1000MHz)	±4.28 dB (k=2)
Radiated Emission (1GHz ~ 18GHz)	±5.72 dB (k=2)
Radiated Emission (18GHz ~ 40GHz)	±2.88 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

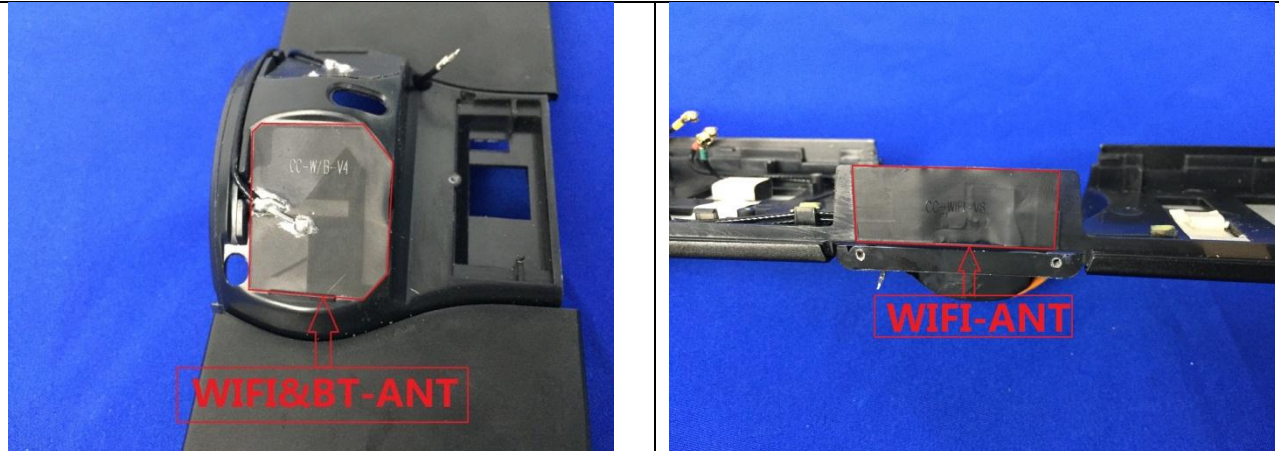
Radiated Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
3m SAC	SAEMC	9m*6m*6m	966	07-22-2017	07-21-2020
Loop Antenna	SCHWARZBECK	FMZB1519B	00044	03-16-2018	03-15-2019
BiConiLog Antenna	SCHWARZBECK	VULB9163	497	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA9120D	916	03-16-2018	03-15-2019
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170582	11-21-2017	11-20-2018
				11-21-2018	11-20-2019
EMI Test Software	AUDIX	E3	6.110919b	N/A	N/A
Pre-amplifier	HP	8447D	2944A09358	03-07-2018	03-06-2019
Pre-amplifier	CD	PAP-1G18	11804	03-07-2018	03-06-2019
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-07-2018	03-06-2019
				11-21-2017	11-20-2018
Spectrum analyzer	Rohde & Schwarz	FSP40	100363	11-21-2018	11-20-2019
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-07-2018	03-06-2019
Cable	ZDECL	Z108-NJ-NJ-81	1608458	03-07-2018	03-06-2019
Cable	MICRO-COAX	MFR64639	K10742-5	03-07-2018	03-06-2019
Cable	SUHNER	SUCOFLEX100	58193/4PE	03-07-2018	03-06-2019

Conducted Emission:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
EMI Test Receiver	Rohde & Schwarz	ESCI	101189	03-07-2018	03-06-2019
Pulse Limiter	SCHWARZBECK	OSRAM 2306	9731	03-07-2018	03-06-2019
LISN	CHASE	MN2050D	1447	03-19-2018	03-18-2019
LISN	Rohde & Schwarz	ESH3-Z5	8438621/010	07-21-2018	07-20-2019

Cable	HP	10503A	N/A	03-07-2018	03-06-2019
EMI Test Software	AUDIX	E3	6.110919b	N/A	N/A

## 6 Test results and Measurement Data

### 6.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part 15 C Section 15.203 /247(c)
<p>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.</p> <p>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.</p>	
<b>E.U.T Antenna:</b>	
<p>The WiFi antenna is an FPC antenna which cannot replace by end-user, the best case gain of the antenna is 1.5 dBi.</p>	
	

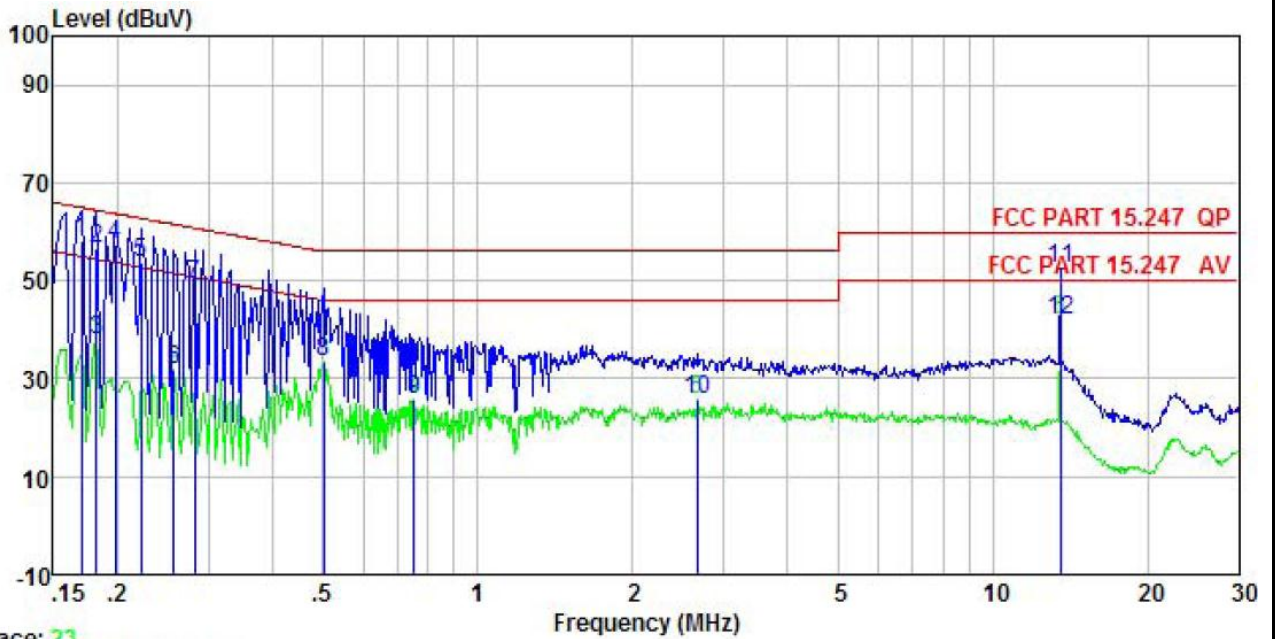


## 6.2 Conducted Emission

Test Requirement:	FCC Part 15 C Section 15.207 RSS-GEN Section 8.8		
Test Method:	ANSI C63.10: 2013		
Test Frequency Range:	150 kHz to 30 MHz		
Class / Severity:	Class B		
Receiver setup:	RBW=9 kHz, VBW=30 kHz		
Limit:	Frequency range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
	0.15-0.5	66 to 56*	56 to 46*
	0.5-5	56	46
	5-30	60	50
	* Decreases with the logarithm of the frequency.		
Test procedure	<ol style="list-style-type: none"> <li>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.</li> <li>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).</li> <li>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.</li> </ol>		
Test setup:	<p><i>Remark:</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>		
Test Instruments:	Refer to section 5.8 for details		
Test mode:	Refer to section 5.3 for details		
Test results:	Passed		

**Measurement Data:**

**Neutral:**



Trace: 23

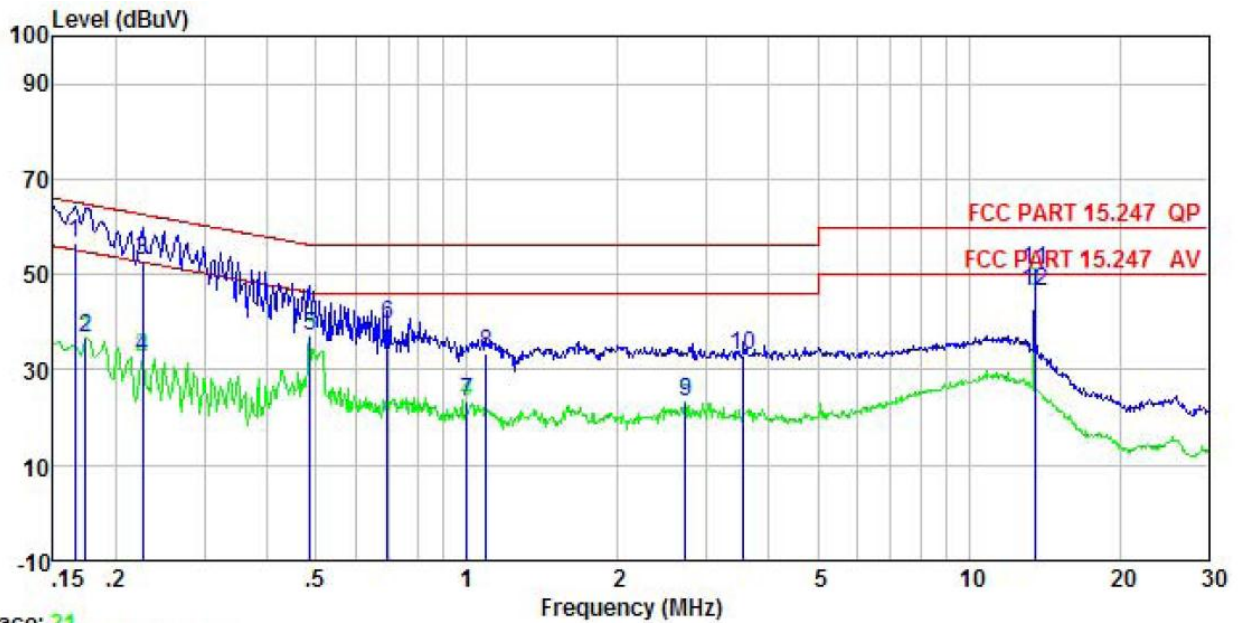
Site : CCIS Shielding Room  
 Condition : FCC PART 15.247 QP LISN NEUTRAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test Mode : WIFI mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa  
 Test Engineer: Carey  
 Remark :

	Freq	Read	LISN	Cable	Level	Limit	Over	
	MHz	Level	Factor	Loss	Level	Line	Limit	Remark
		dBuV	dB	dB	dBuV	dBuV	dB	
1	0.170	46.58	0.96	10.77	58.31	64.94	-6.63	QP
2	0.182	44.98	0.94	10.77	56.69	64.42	-7.73	QP
3	0.182	26.20	0.94	10.77	37.91	54.42	-16.51	Average
4	0.198	45.53	0.92	10.76	57.21	63.71	-6.50	QP
5	0.222	41.85	0.93	10.76	53.54	62.74	-9.20	QP
6	0.258	20.03	0.95	10.75	31.73	51.51	-19.78	Average
7	0.282	37.54	0.96	10.74	49.24	60.76	-11.52	QP
8	0.502	21.59	0.97	10.76	33.32	46.00	-12.68	Average
9	0.751	13.80	0.97	10.79	25.56	46.00	-20.44	Average
10	2.664	13.98	0.99	10.93	25.90	46.00	-20.10	Average
11	13.551	40.62	0.93	10.91	52.46	60.00	-7.54	QP
12	13.551	30.13	0.93	10.91	41.97	50.00	-8.03	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.

Line:



Trace: 21

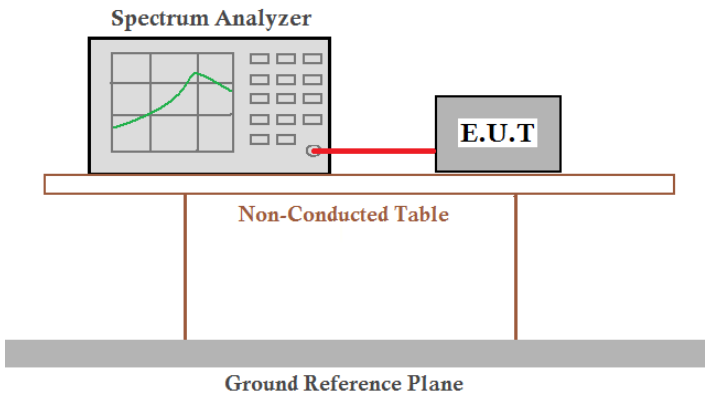
Site : CCIS Shielding Room  
 Condition : FCC PART 15.247 QP LISN LINE  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test Mode : WIFI mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp: 23 °C Humi:56% Atmos:101KPa  
 Test Engineer: Carey  
 Remark :

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.166	45.77	0.17	10.77	56.71	65.16	-8.45	QP
2	0.174	25.79	0.16	10.77	36.72	54.77	-18.05	Average
3	0.226	42.10	0.14	10.75	52.99	62.61	-9.62	QP
4	0.226	21.71	0.14	10.75	32.60	52.61	-20.01	Average
5	0.486	26.30	0.12	10.76	37.18	46.23	-9.05	Average
6	0.694	28.43	0.13	10.77	39.33	56.00	-16.67	QP
7	1.000	12.36	0.13	10.87	23.36	46.00	-22.64	Average
8	1.094	22.37	0.13	10.88	33.38	56.00	-22.62	QP
9	2.721	12.18	0.16	10.93	23.27	46.00	-22.73	Average
10	3.565	21.90	0.17	10.90	32.97	56.00	-23.03	QP
11	13.551	39.49	0.32	10.91	50.72	60.00	-9.28	QP
12	13.551	35.18	0.32	10.91	46.41	50.00	-3.59	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.

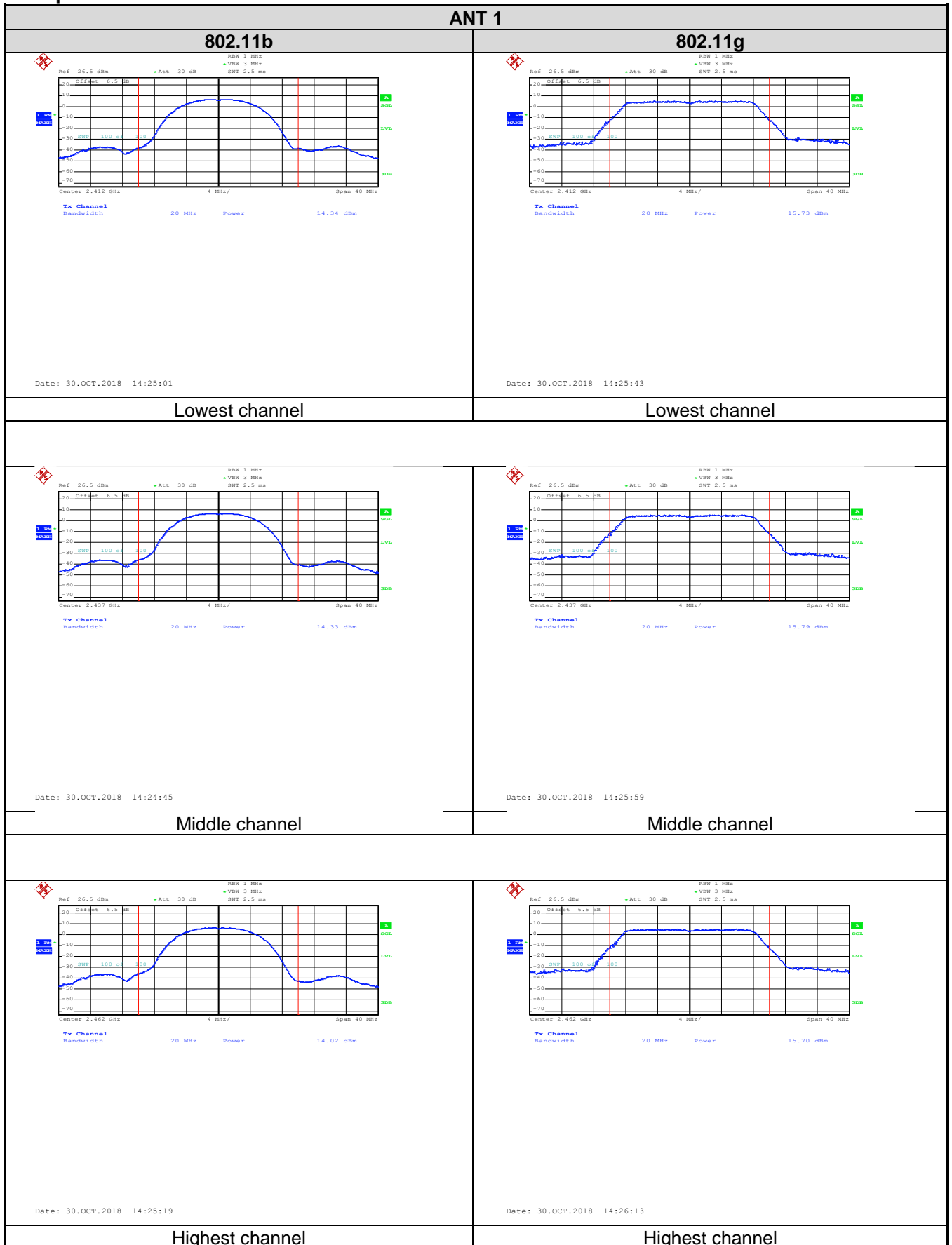
## 6.3 Conducted Output Power

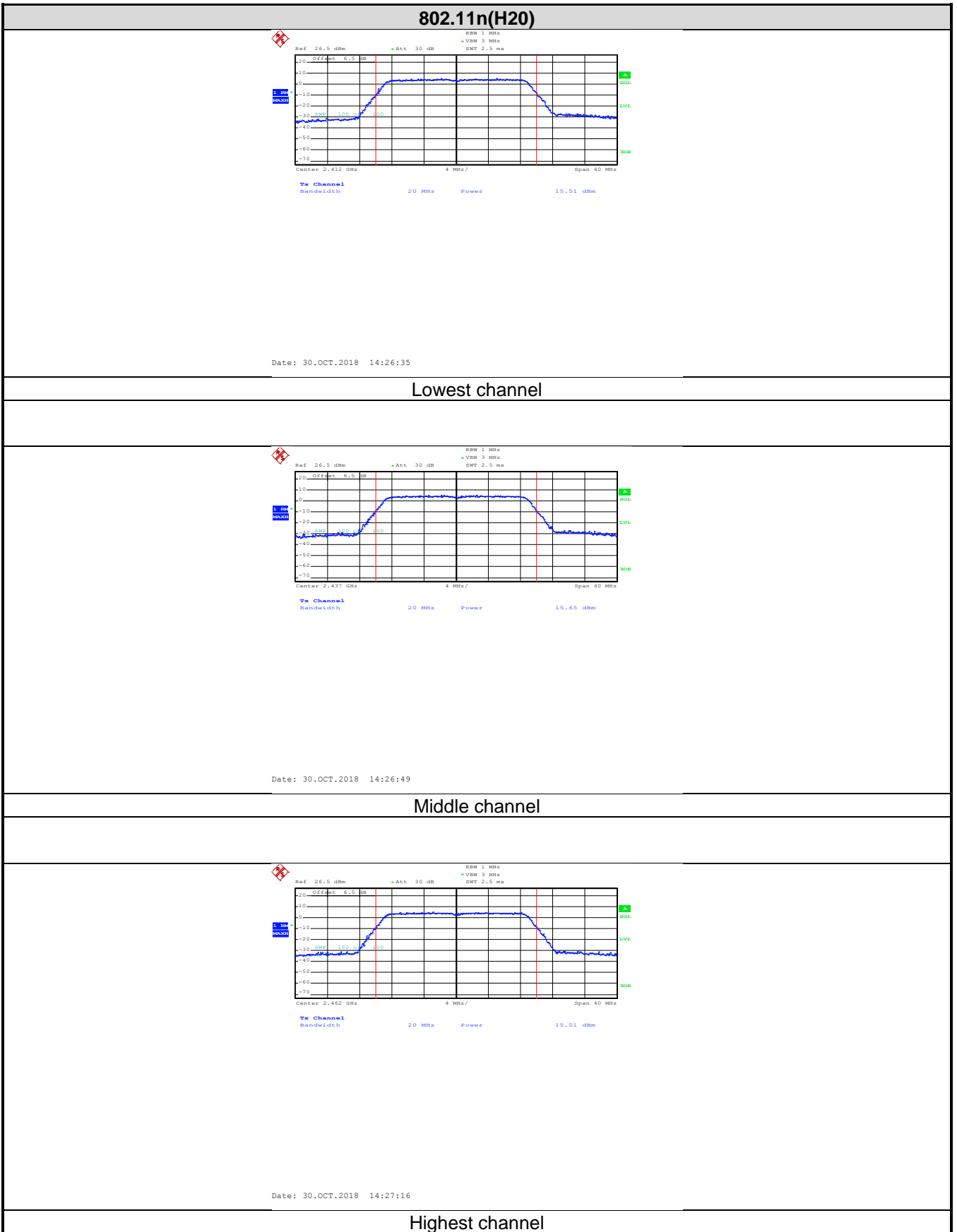
Test Requirement:	FCC Part 15 C Section 15.247 (b)(3) RSS-247 section 5.4(d)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	30dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

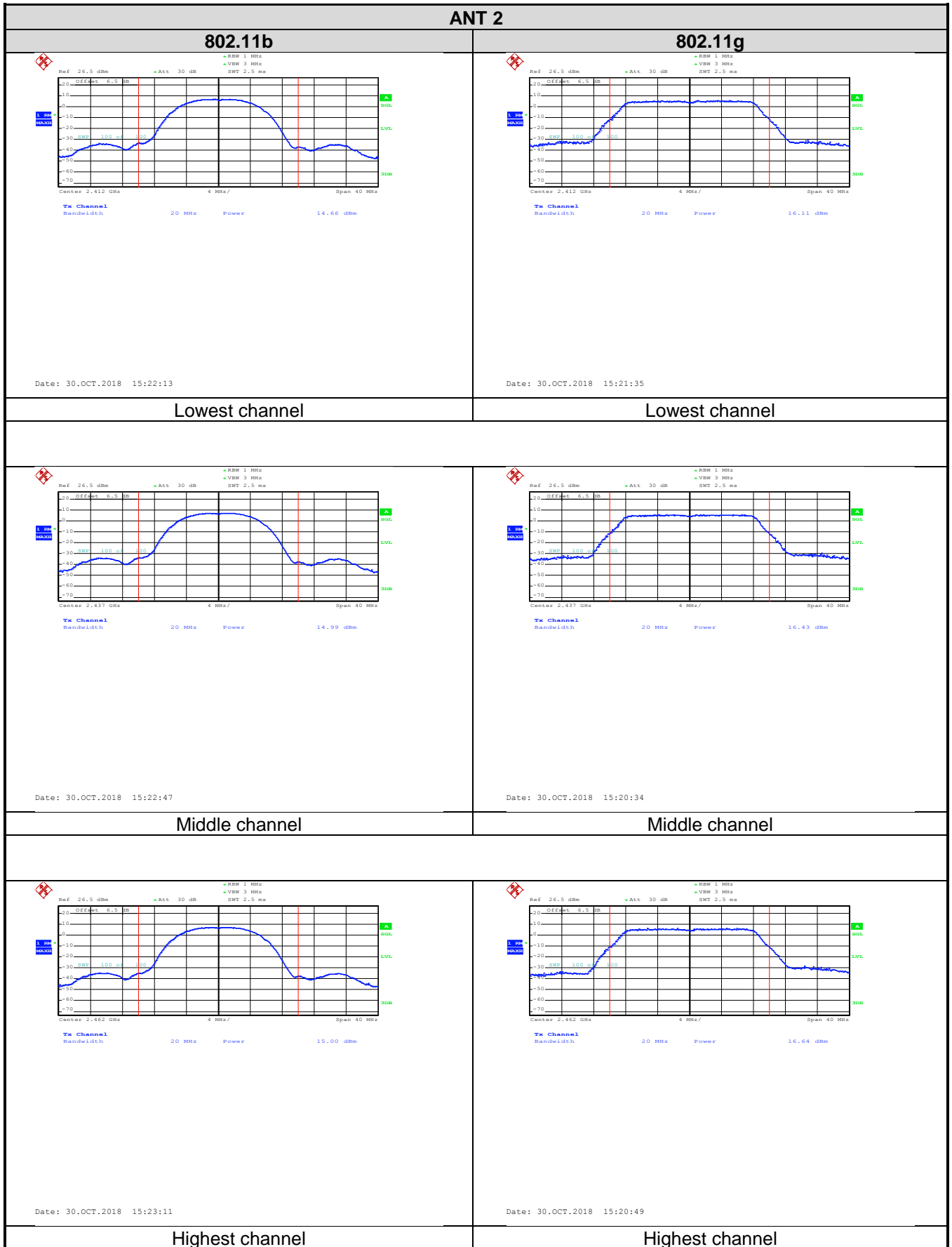
### Measurement Data:

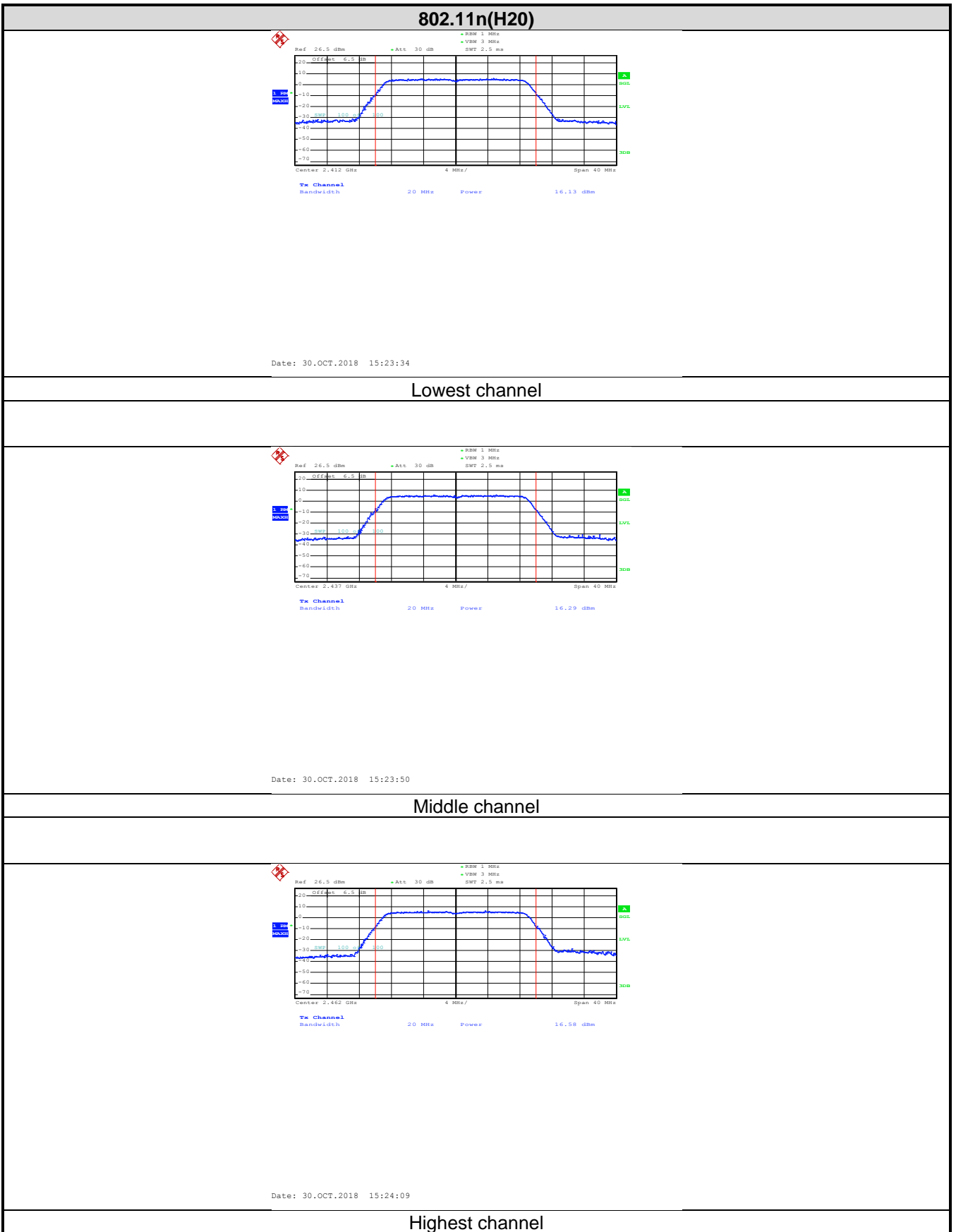
Test mode	Test channel	ANT port	Measured Power (dBm)	Total Power (dBm)	Limit(dBm)	Result
802.11b SISO	Lowest	ANT 1	14.34	/	30	Pass
		ANT 2	14.66			
	Middle	ANT 1	14.33	/		
		ANT 2	14.99			
	Highest	ANT 1	14.02	/		
		ANT 2	15.00			
802.11g SISO	Lowest	ANT 1	15.73	/	30	
		ANT 2	16.11			
	Middle	ANT 1	15.79	/		
		ANT 2	16.43			
	Highest	ANT 1	15.70	/		
		ANT 2	16.64			
802.11n(H20) MIMO	Lowest	ANT 1	15.51	18.84	30	
		ANT 2	16.13			
	Middle	ANT 1	15.65	18.99		
		ANT 2	16.29			
	Highest	ANT 1	15.51	19.09		
		ANT 2	16.58			

Test plot as follows:



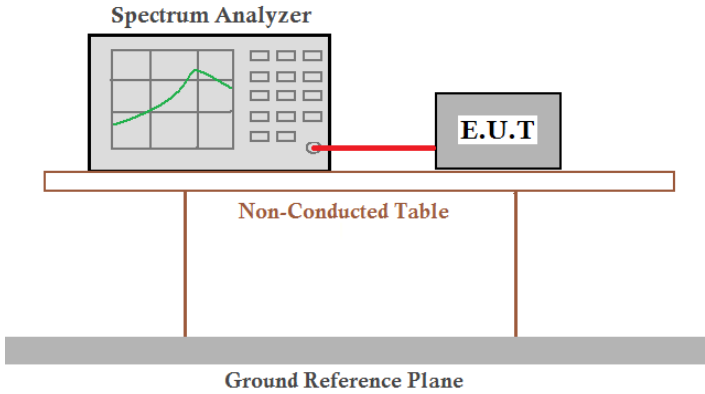








## 6.4 Occupy Bandwidth

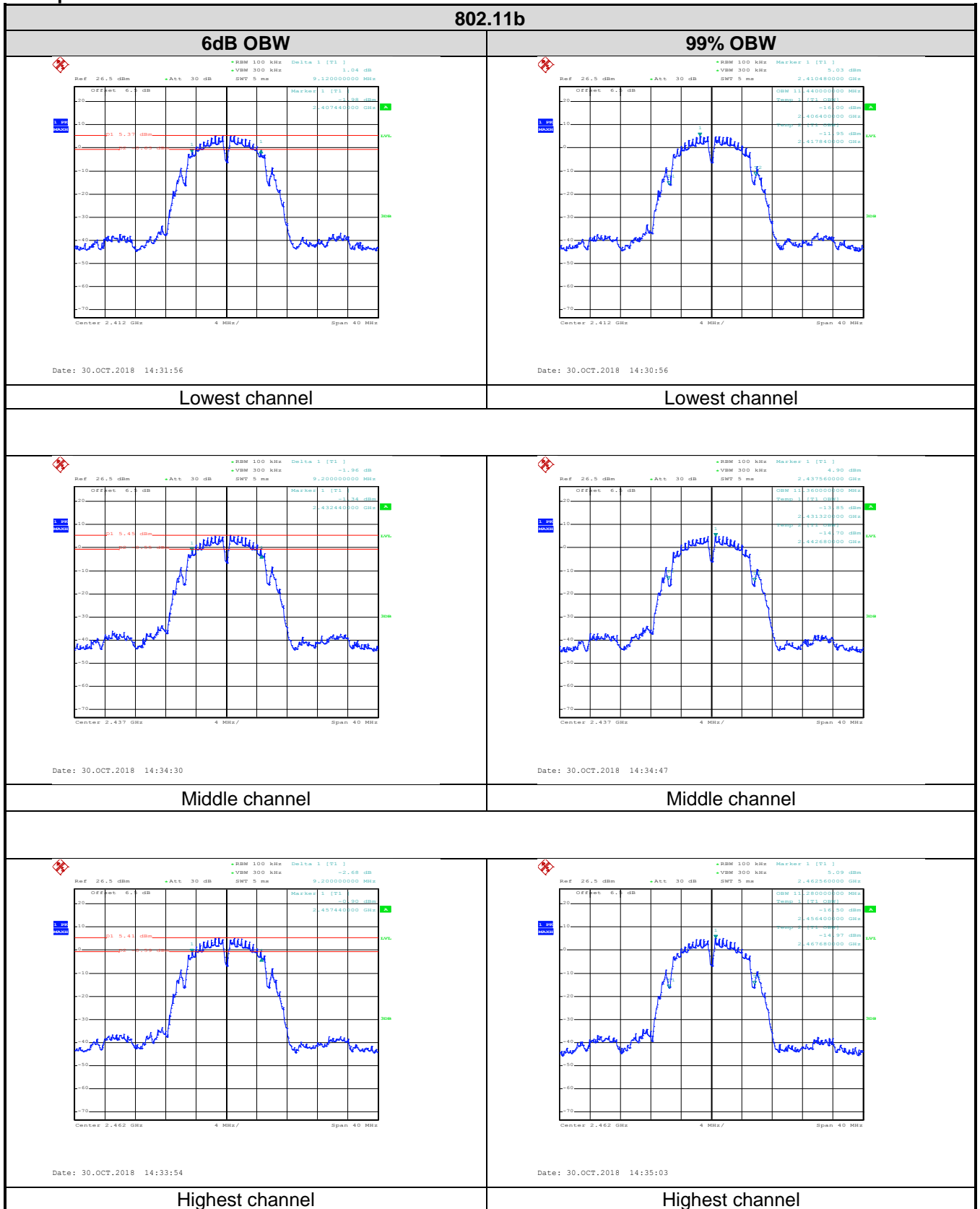
Test Requirement:	FCC Part 15 C Section 15.247 (a)(2) RSS-247 section 5.2(a)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	>500kHz
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

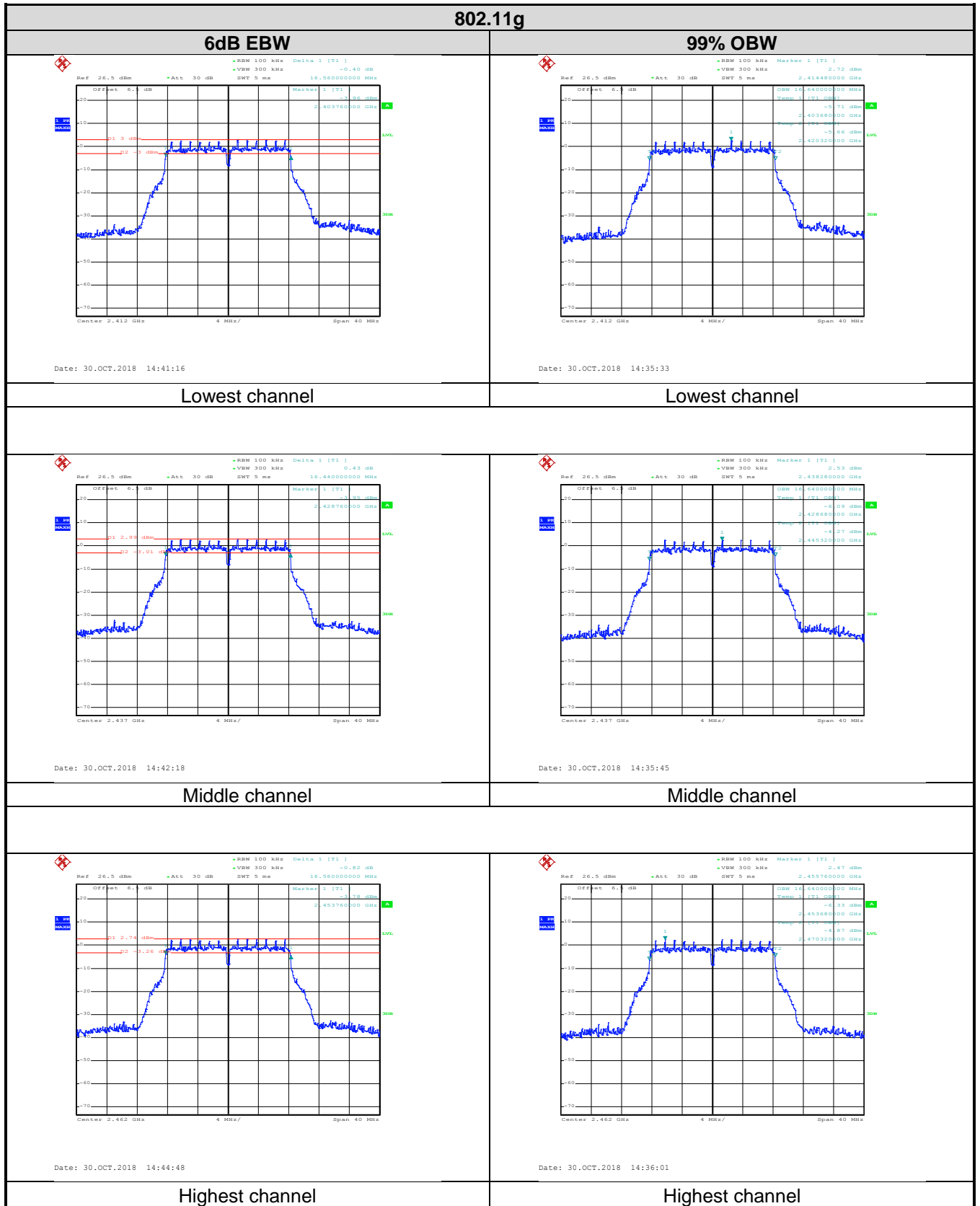
### Measurement Data:

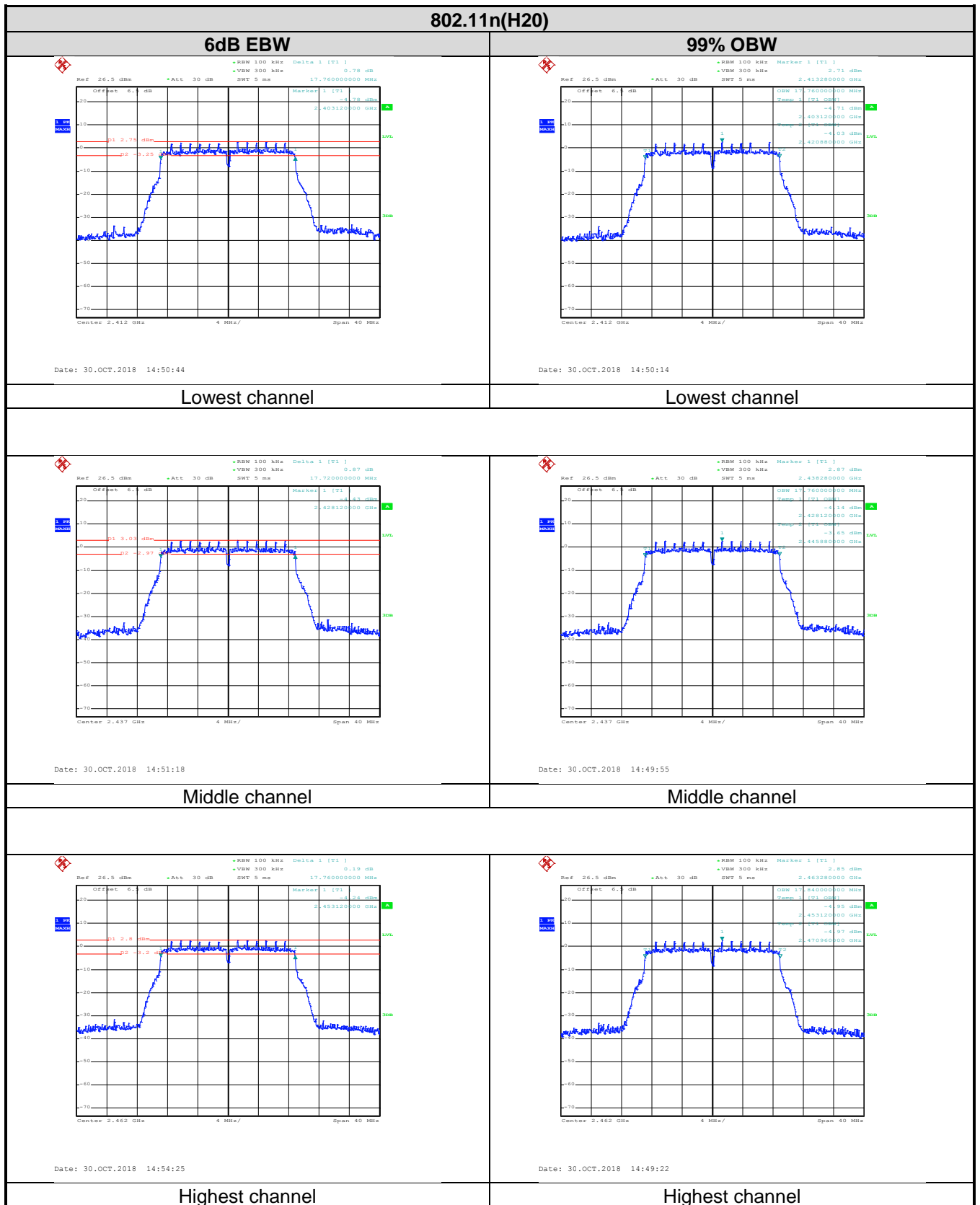
#### ANT 1:

Test CH	6dB Emission Bandwidth (MHz)			Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)		
Lowest	9.12	16.56	17.76	>500	Pass
Middle	9.20	16.44	17.72		
Highest	9.20	16.56	17.76		
Test CH	99% Occupy Bandwidth (MHz)			Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)		
Lowest	11.44	16.64	17.76	N/A	N/A
Middle	11.36	16.64	17.76		
Highest	11.28	16.64	17.84		

Test plot as follows:





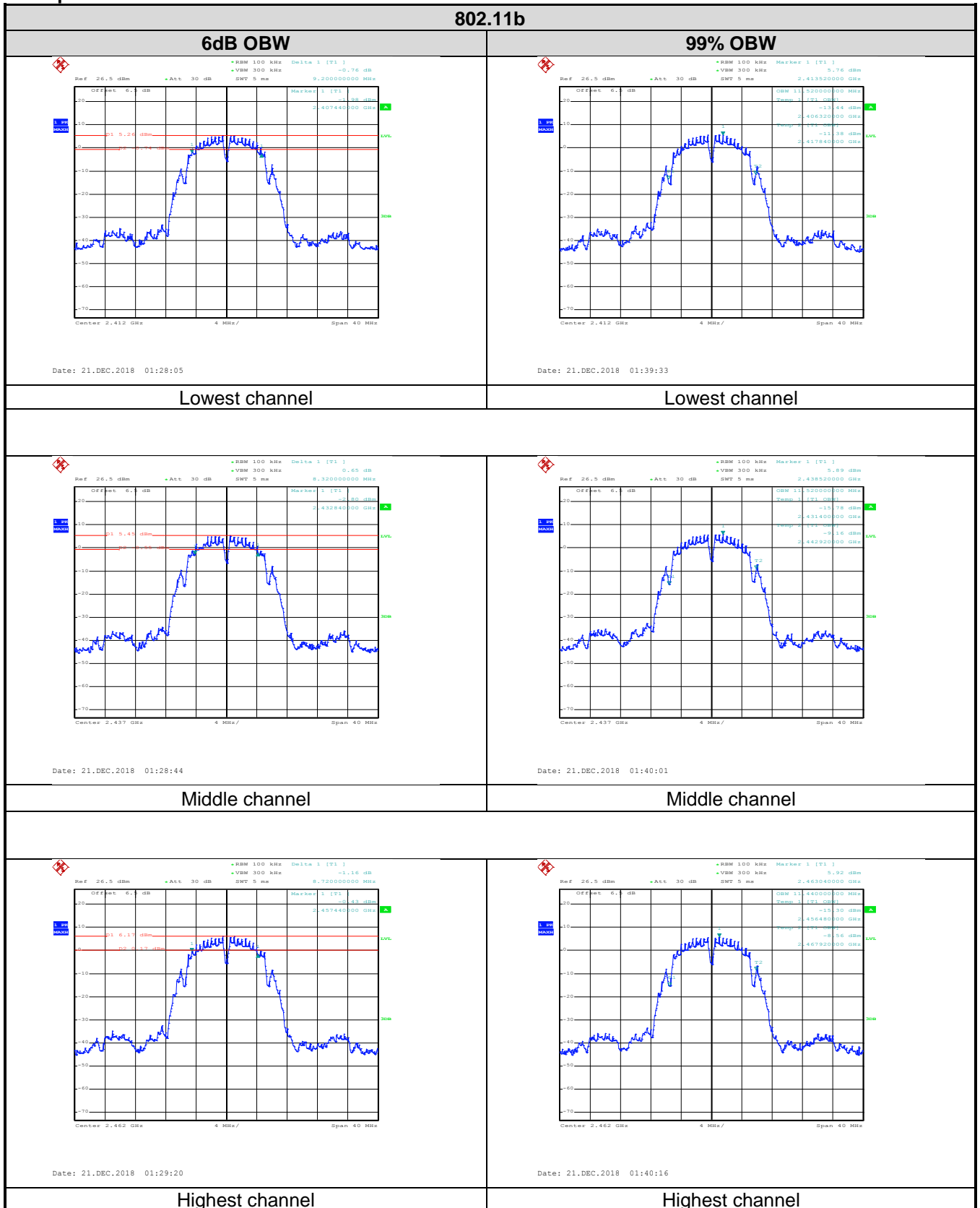


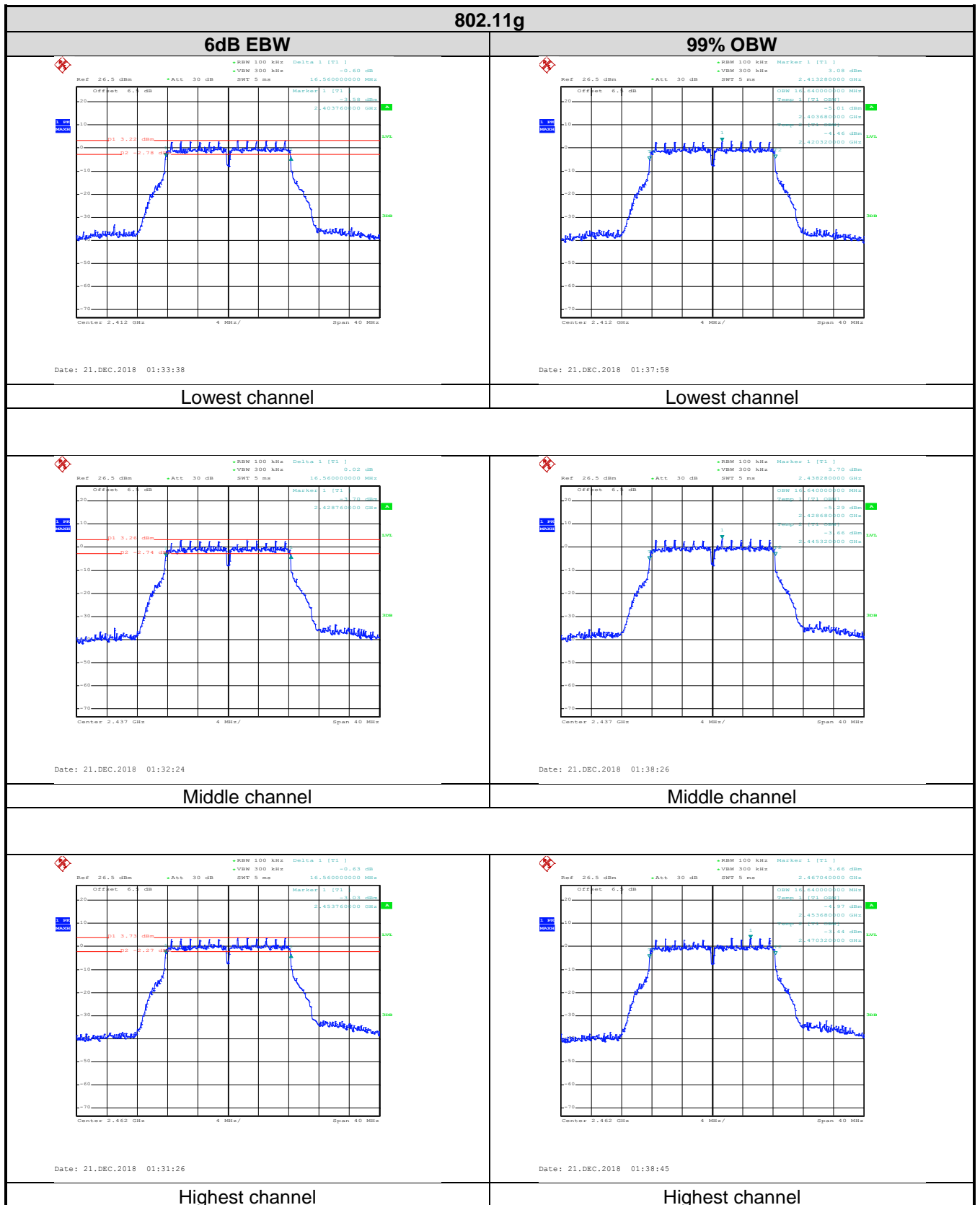
**Measurement Data:**

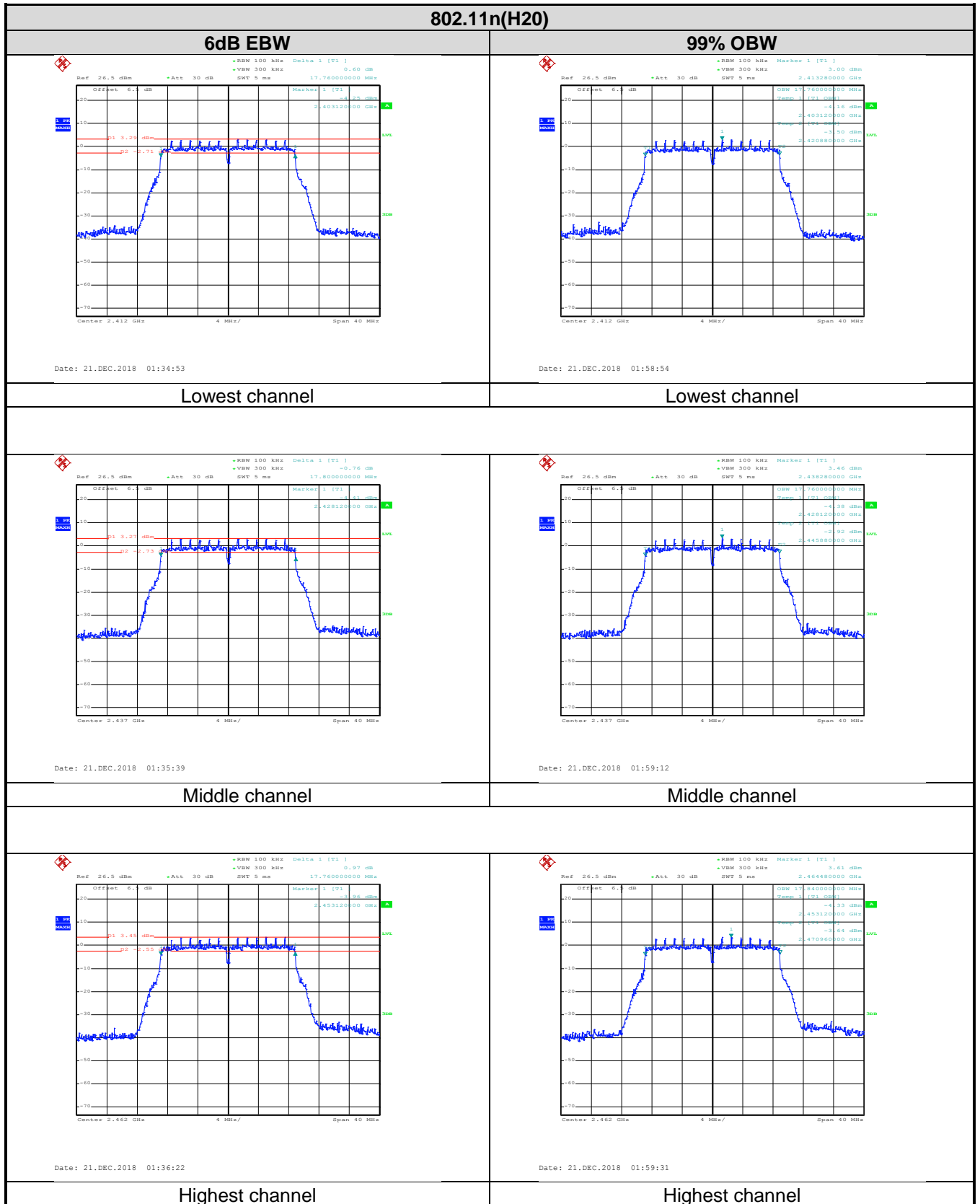
**ANT 2:**

Test CH	6dB Emission Bandwidth (MHz)			Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)		
Lowest	9.20	16.56	17.76	>500	Pass
Middle	8.32	16.56	17.80		
Highest	8.72	16.56	17.76		
Test CH	99% Occupy Bandwidth (MHz)			Limit(kHz)	Result
	802.11b	802.11g	802.11n(H20)		
Lowest	11.52	16.64	17.76	N/A	N/A
Middle	11.52	16.64	17.76		
Highest	11.44	16.64	17.84		

Test plot as follows:

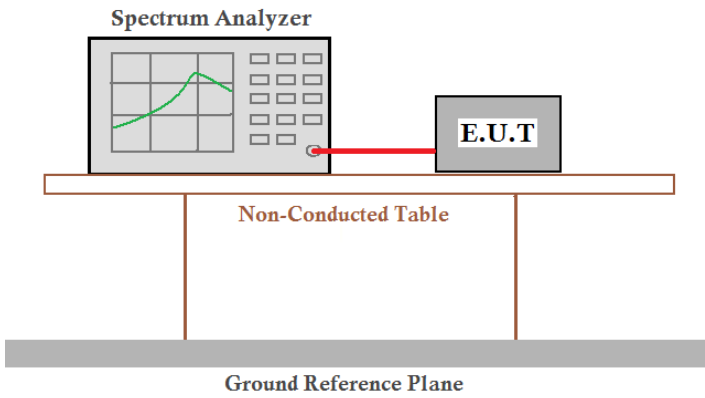








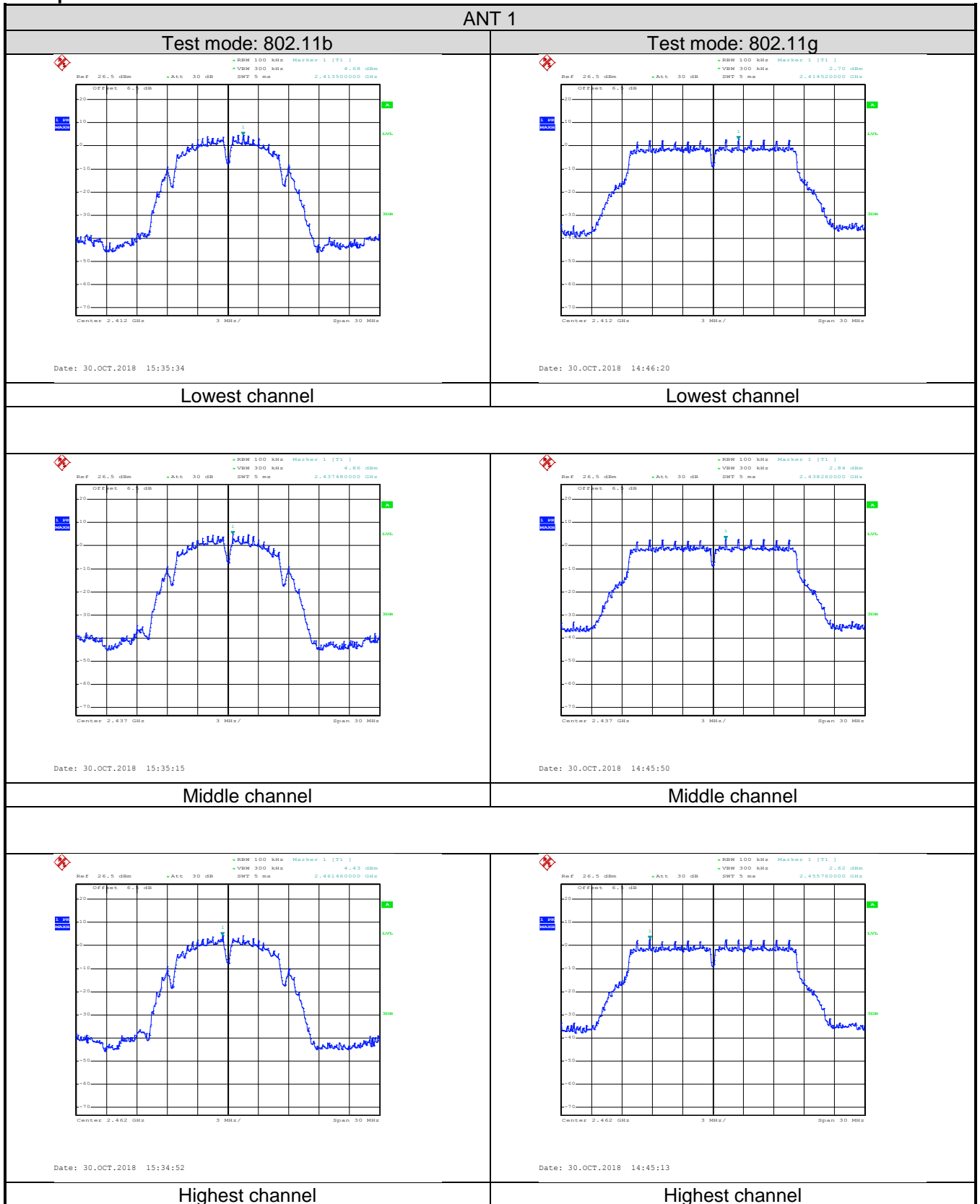
## 6.5 Power Spectral Density

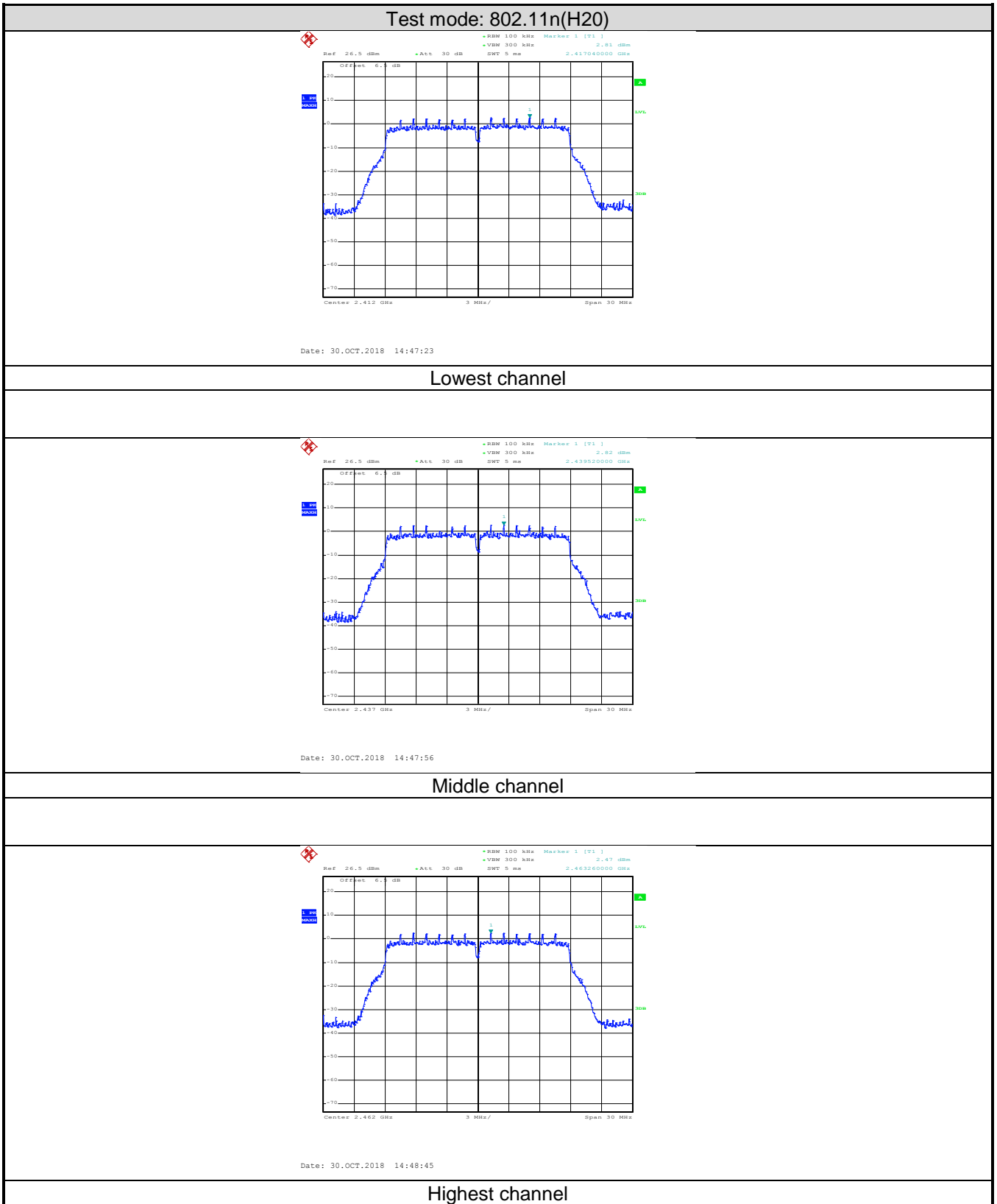
Test Requirement:	FCC Part 15 C Section 15.247 (e) RSS-247 section 5.2(b)
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	8dBm
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Passed

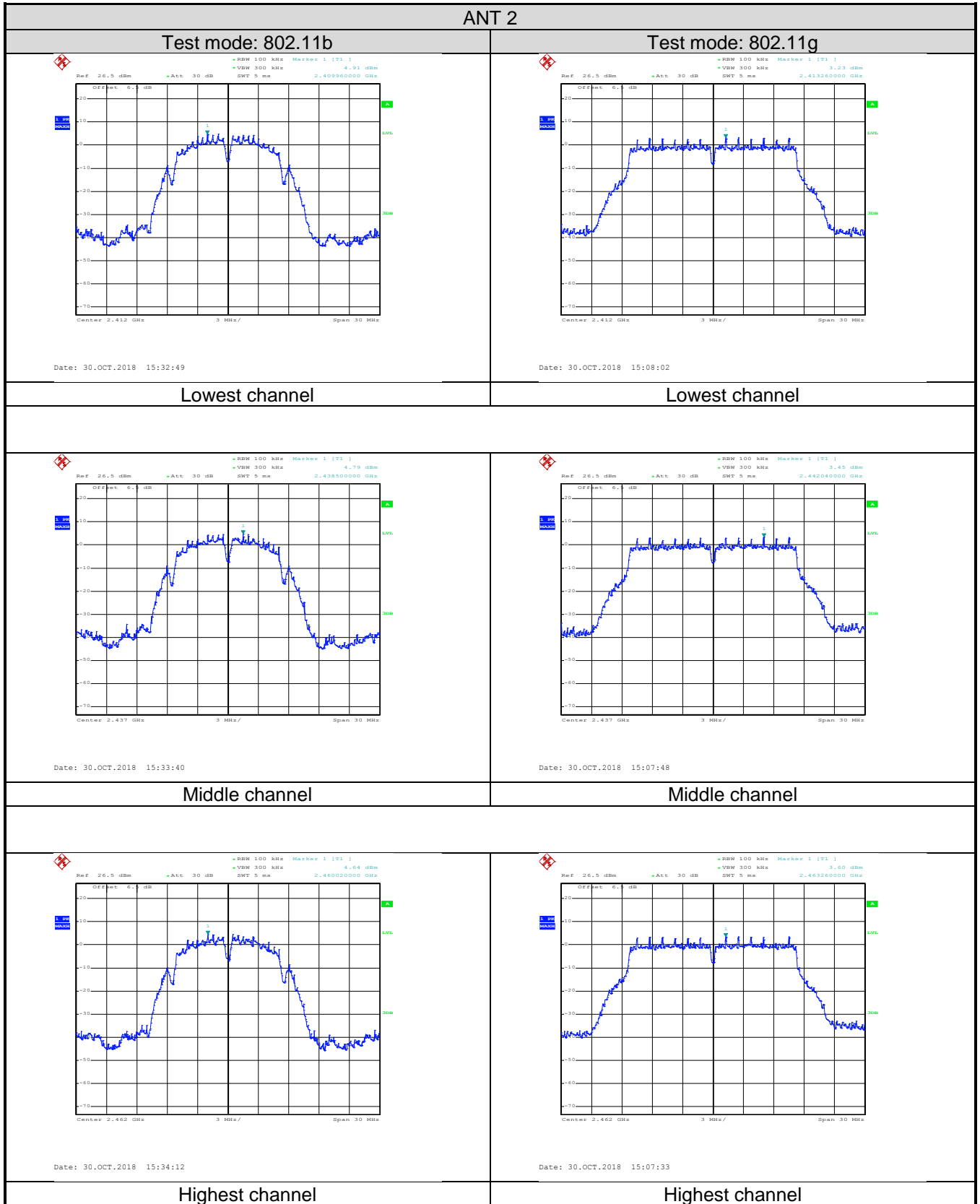
### Measurement Data:

Test mode	Test channel	ANT port	Measured Power (dBm)	Total Power (dBm)	Limit(dBm)	Result
802.11b SISO	Lowest	ANT 1	4.68	/	8	Pass
		ANT 2	4.91			
	Middle	ANT 1	4.86	/		
		ANT 2	4.79			
	Highest	ANT 1	4.43	/		
		ANT 2	4.64			
802.11g SISO	Lowest	ANT 1	2.70	/	8	
		ANT 2	3.23			
	Middle	ANT 1	2.84	/		
		ANT 2	3.45			
	Highest	ANT 1	2.62	/		
		ANT 2	3.60			
802.11n(H20) MIMO	Lowest	ANT 1	2.81	5.92	8	
		ANT 2	3.01			
	Middle	ANT 1	2.82	6.11		
		ANT 2	3.35			
	Highest	ANT 1	2.47	6.18		
		ANT 2	3.77			

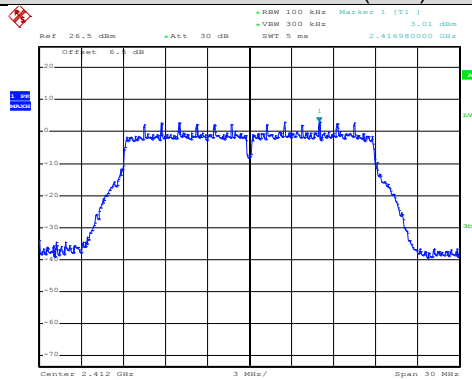
Test plot as follows:





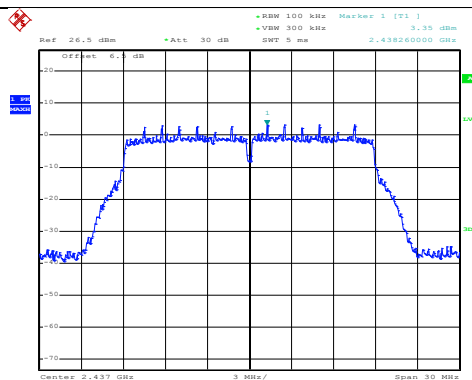


Test mode: 802.11n(H20)



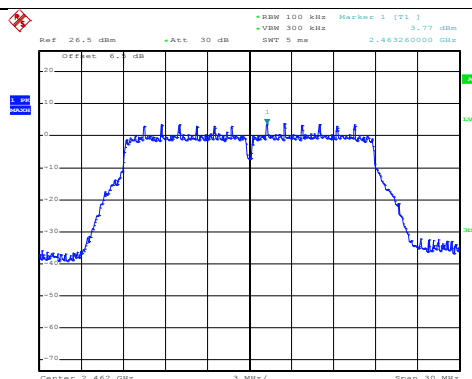
Date: 30.OCT.2018 15:04:29

Lowest channel



Date: 30.OCT.2018 15:04:43

Middle channel

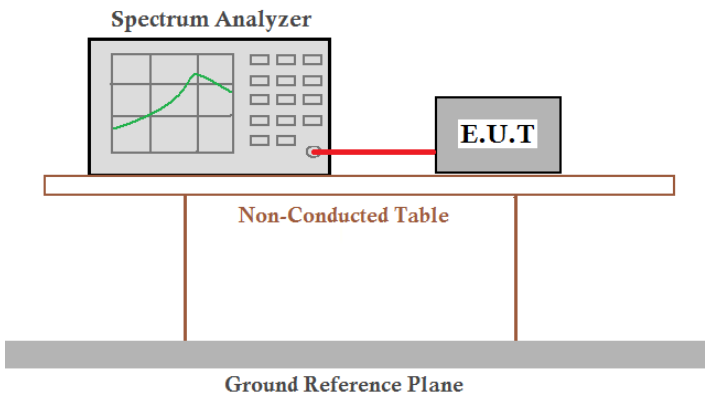


Date: 30.OCT.2018 15:05:10

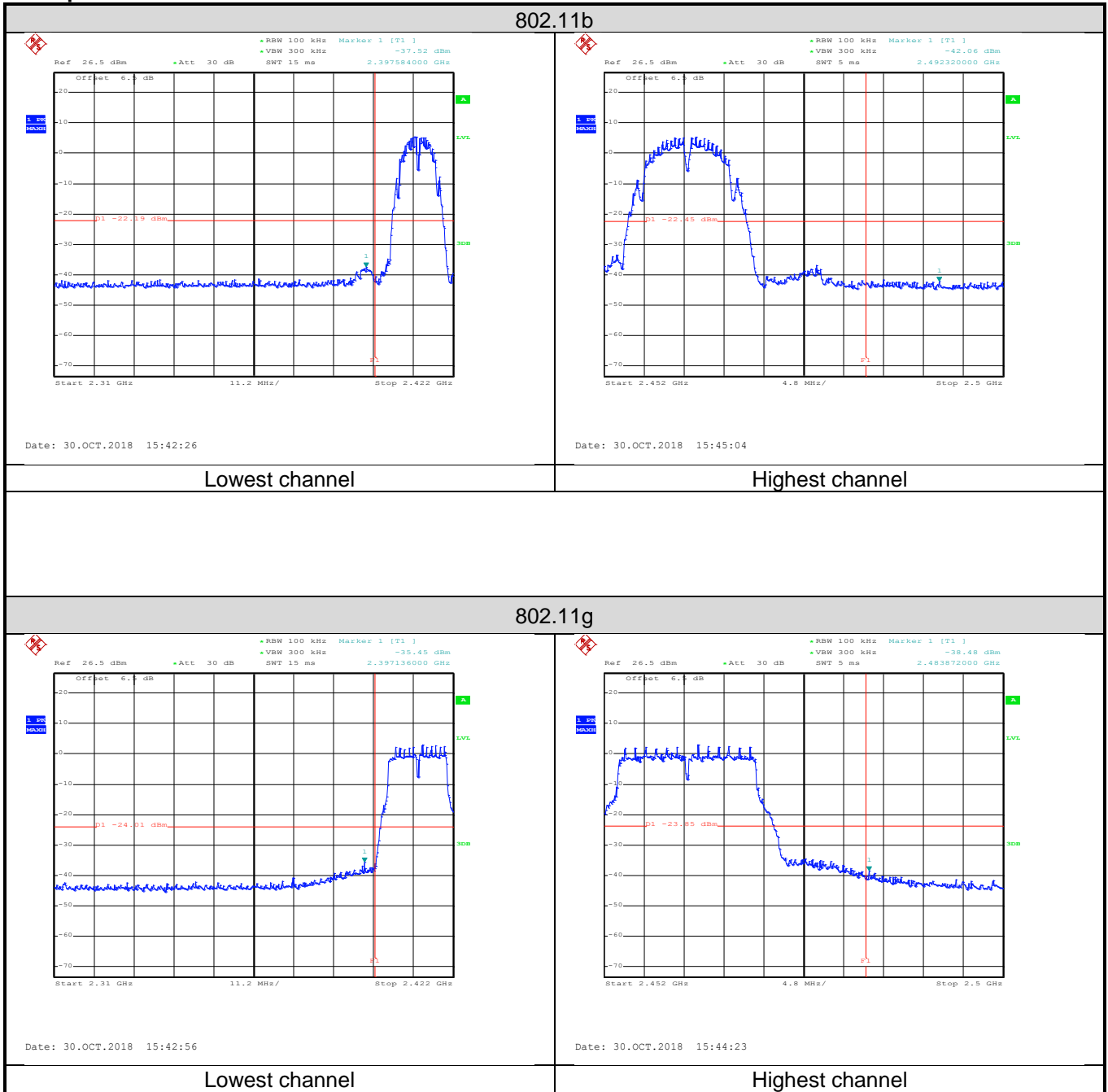
Highest channel

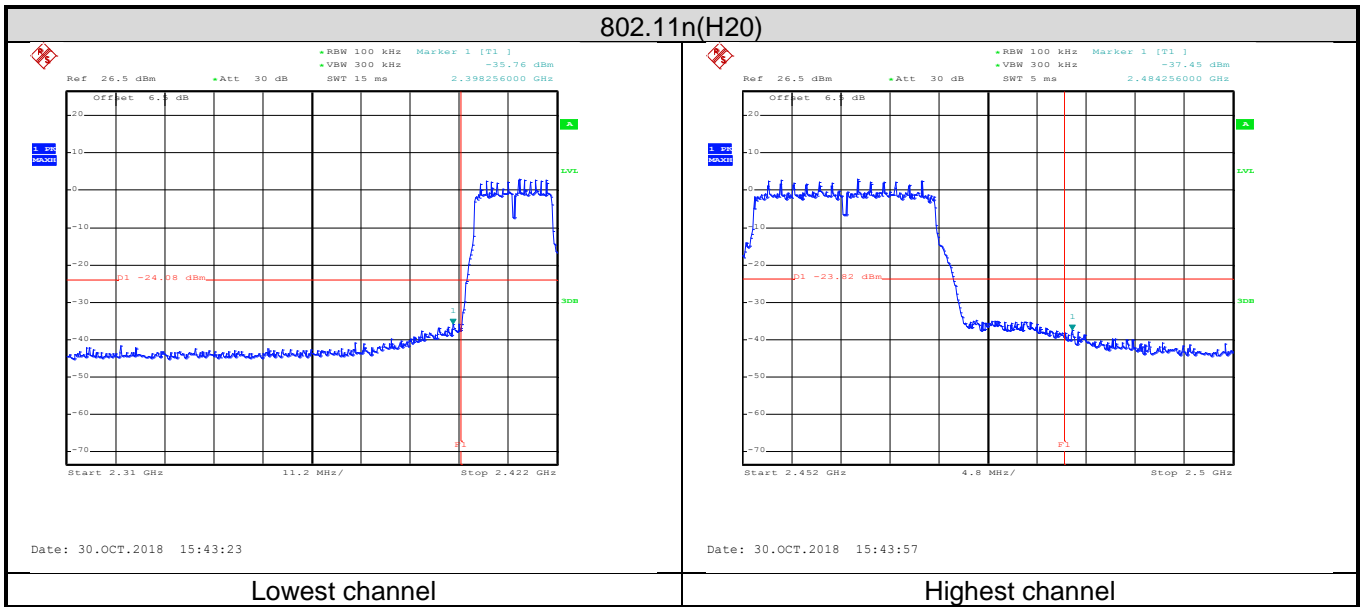
## 6.6 Band Edge

### 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 30 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:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by two legs. Below the table is a Ground Reference Plane.</p>
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:







## 6.6.2 Radiated Emission Method

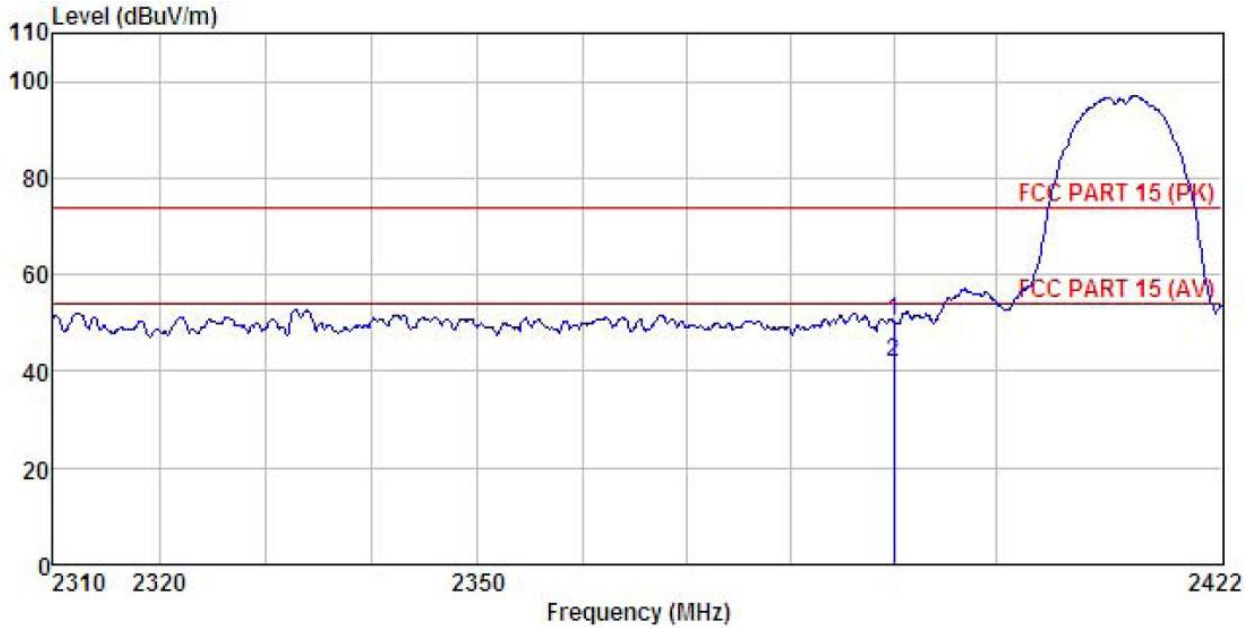
Test Requirement:	FCC Part 15 C Section 15.209 and 15.205 RSS-GEN section 8.10				
Test Method:	ANSI C63.10: 2013 and KDB558074				
Test Frequency Range:	2.3GHz to 2.5GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		RMS	1MHz	3MHz	Average Value
Limit:	Frequency	Limit (dBuV/m @3m)		Remark	
	Above 1GHz	54.00		Average Value	
		74.00		Peak Value	
Test Procedure:	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. 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.</li> </ol>				
Test setup:					
Test Instruments:	Refer to section 5.8 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Passed				

**SISO ANT 1**

**802.11b**

Test channel: **Lowest**

Horizontal:



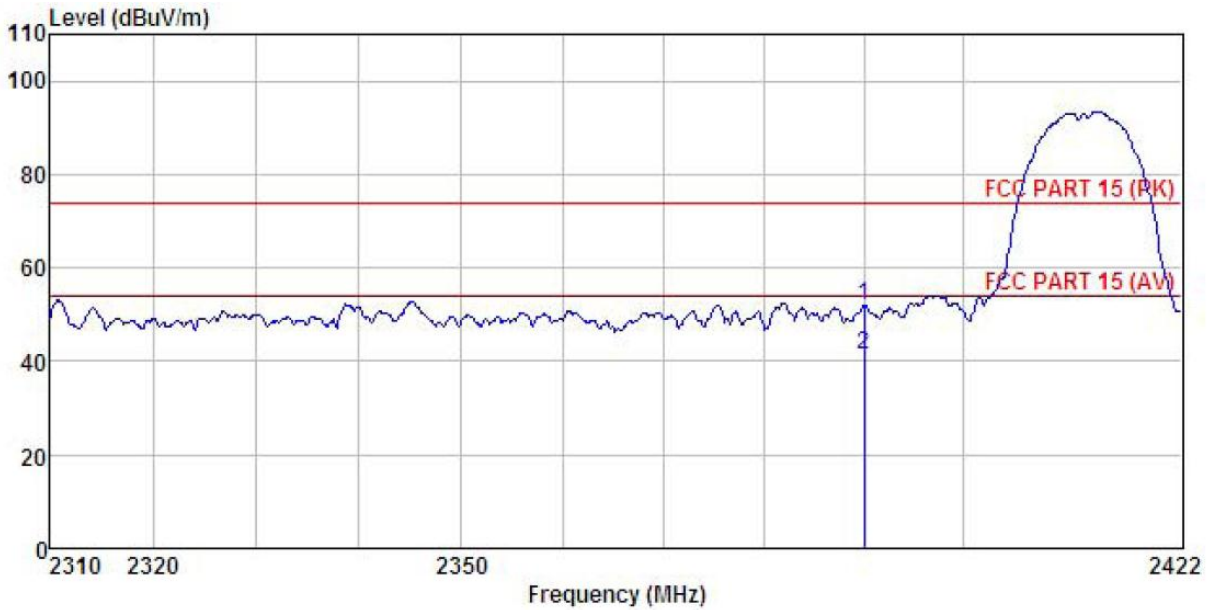
Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11b-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

	Read	Antenna	Cable	Preamp	Limit	Over			
1	2	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB		
1	2390.000	18.26	27.37	4.69	0.00	50.32	74.00	-23.68	Peak
2	2390.000	9.87	27.37	4.69	0.00	41.93	54.00	-12.07	Average

**Remark:**

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

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11b-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

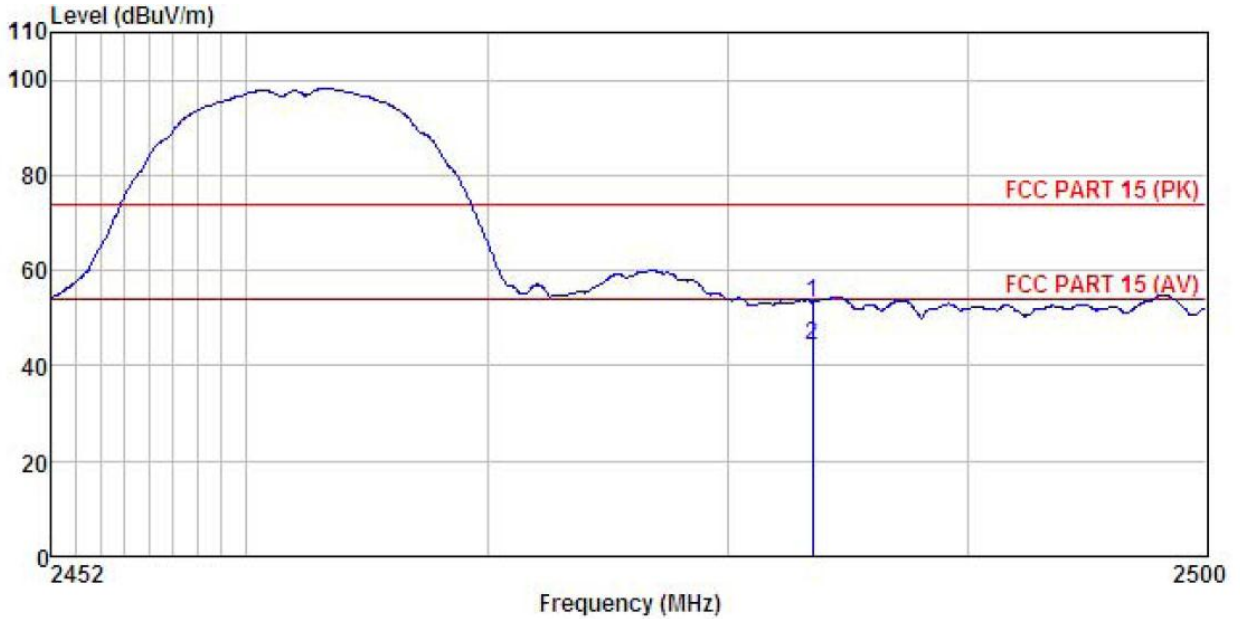
	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit Remark
-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2390.000	20.05	27.37	4.69	0.00	52.11	74.00 -21.89 Peak
2	2390.000	9.22	27.37	4.69	0.00	41.28	54.00 -12.72 Average

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.

**Test channel: Highest**

Horizontal:



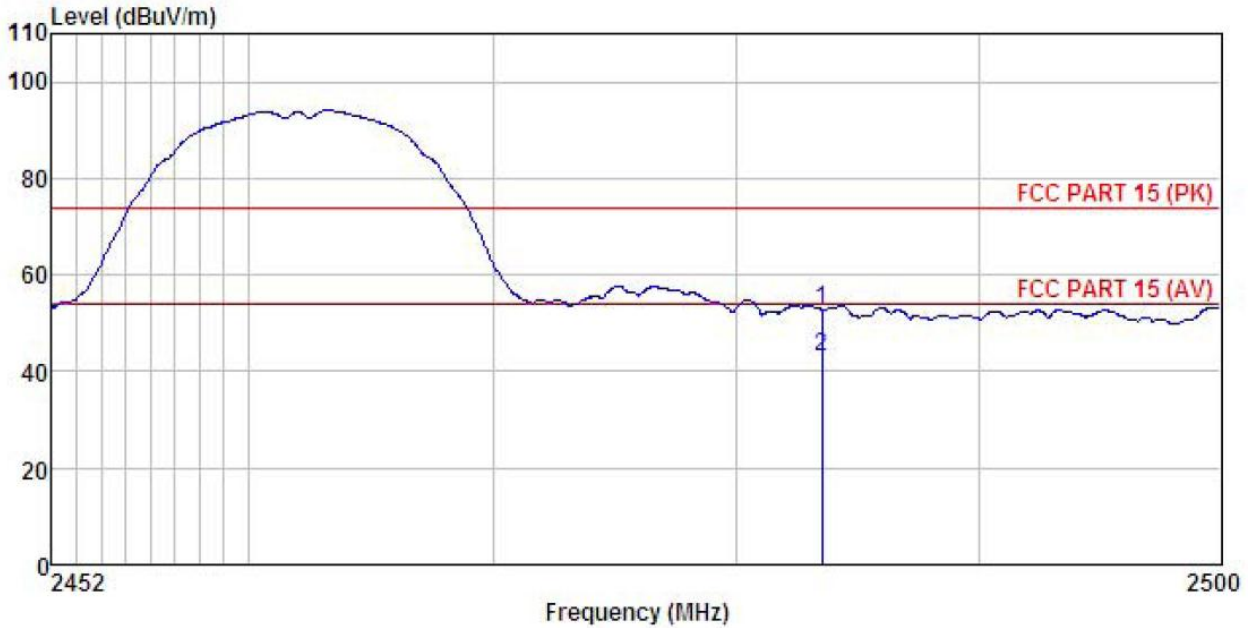
Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11b-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

	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	20.89	27.57	4.81	0.00	53.27	74.00	-20.73	Peak
2	2483.500	11.87	27.57	4.81	0.00	44.25	54.00	-9.75	Average

**Remark:**

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

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11b-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2483.500	20.47	27.57	4.81	0.00	52.85	74.00 -21.15 Peak
2	2483.500	10.60	27.57	4.81	0.00	42.98	54.00 -11.02 Average

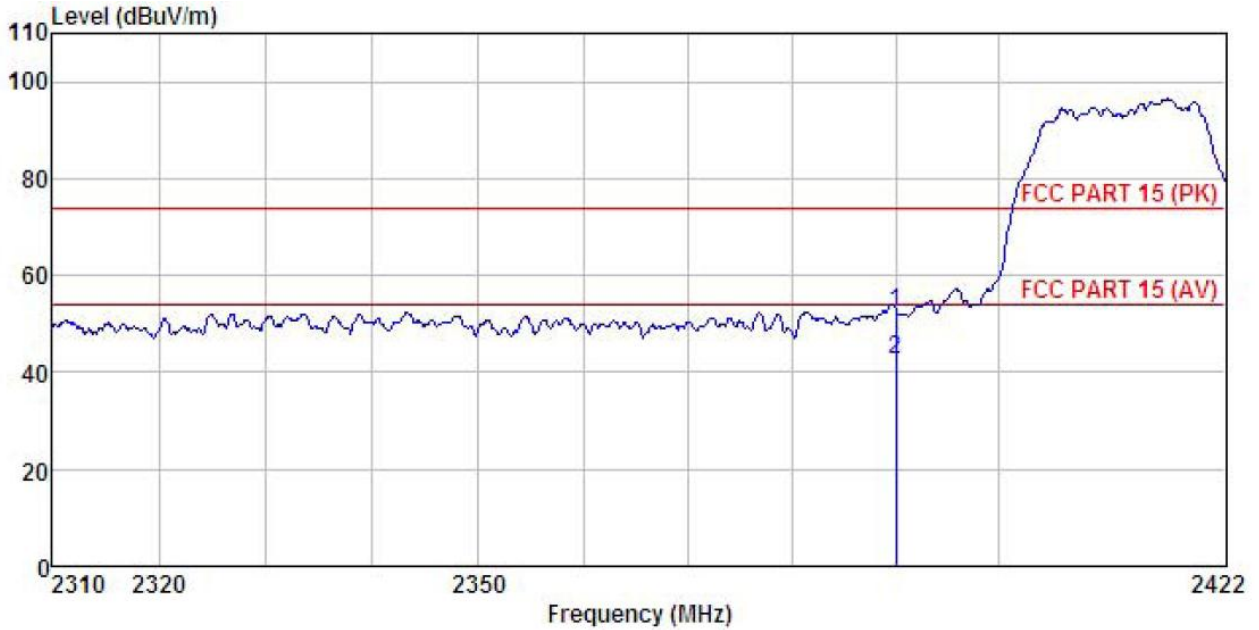
Remark:

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.

**802.11g**

Test channel: Lowest

Horizontal:



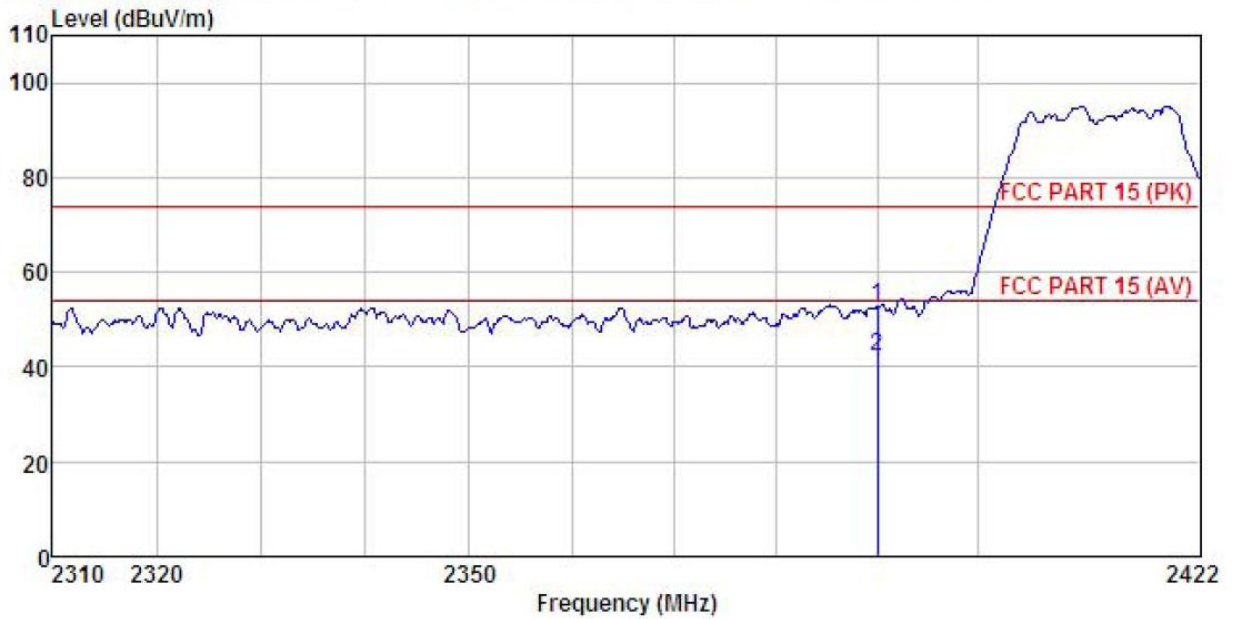
Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11g-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	20.45	27.37	4.69	0.00	52.51	74.00	-21.49 Peak
2	2390.000	10.55	27.37	4.69	0.00	42.61	54.00	-11.39 Average

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.

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11g-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3'C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

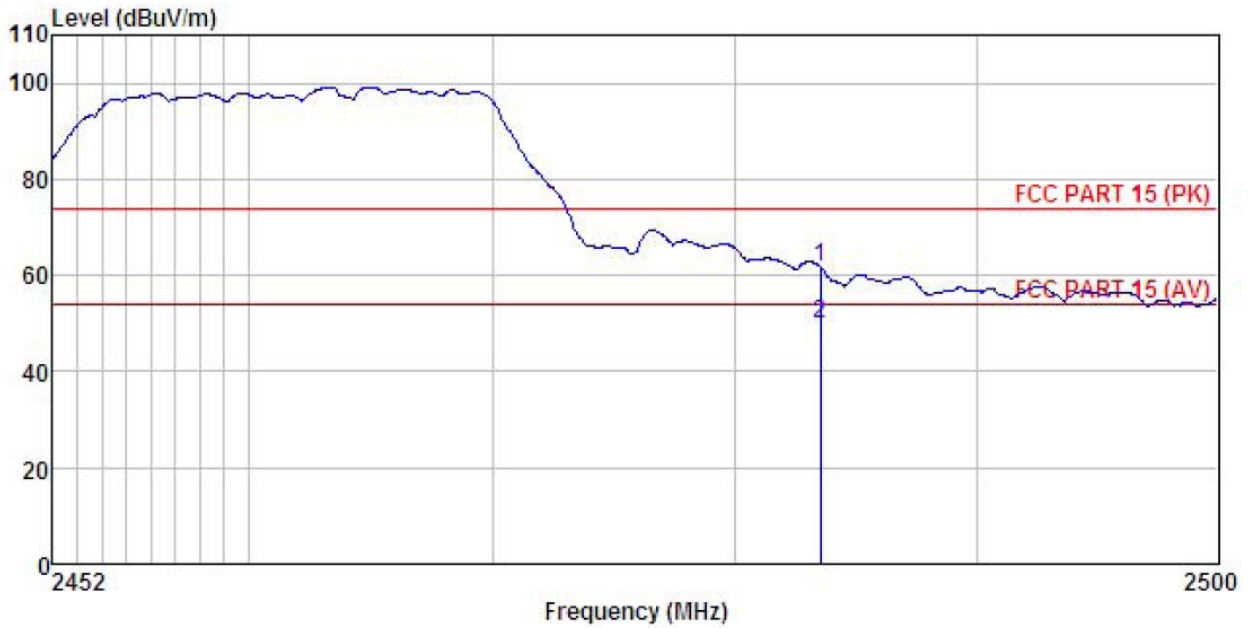
	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2390.000	20.65	27.37	4.69	0.00	52.71	74.00 -21.29 Peak
2	2390.000	10.25	27.37	4.69	0.00	42.31	54.00 -11.69 Average

Remark:

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

**Test channel: Highest**

Horizontal:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11g-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

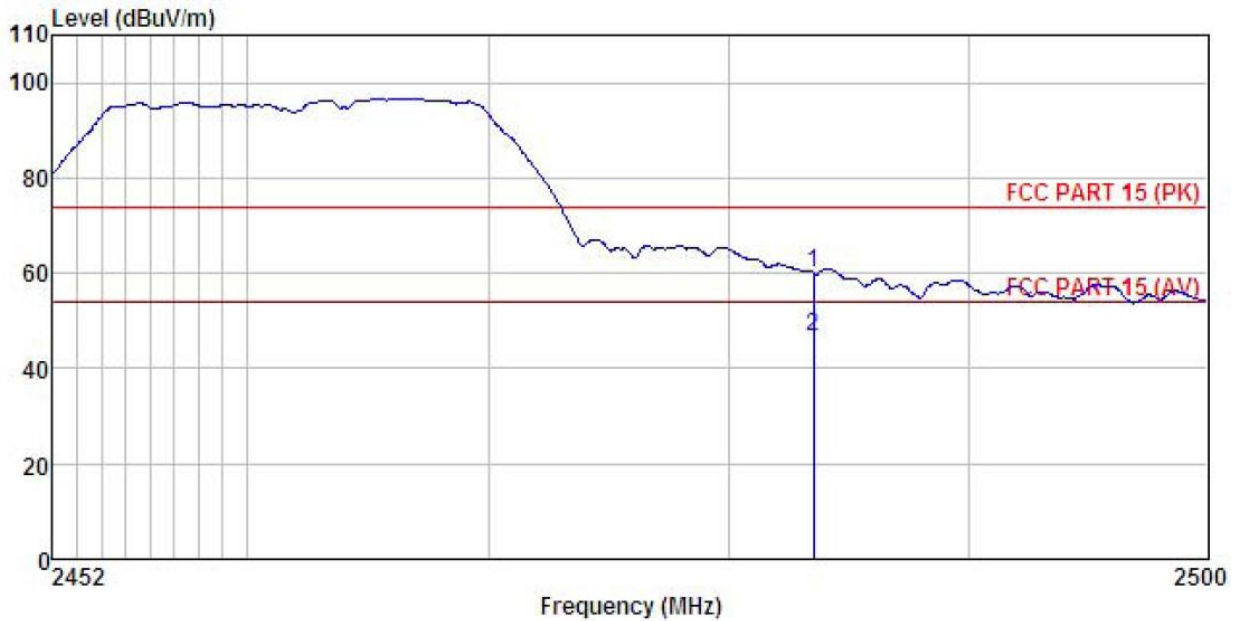
	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	29.29	27.57	4.81	0.00	61.67	74.00	-12.33 Peak
2	2483.500	17.64	27.57	4.81	0.00	50.02	54.00	-3.98 Average

**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.



Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11g-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-1

	Read	Antenna	Cable	Preamp	Level	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	27.82	27.57	4.81	0.00	60.20	74.00	-13.80 Peak
2	2483.500	14.48	27.57	4.81	0.00	46.86	54.00	-7.14 Average

Remark:

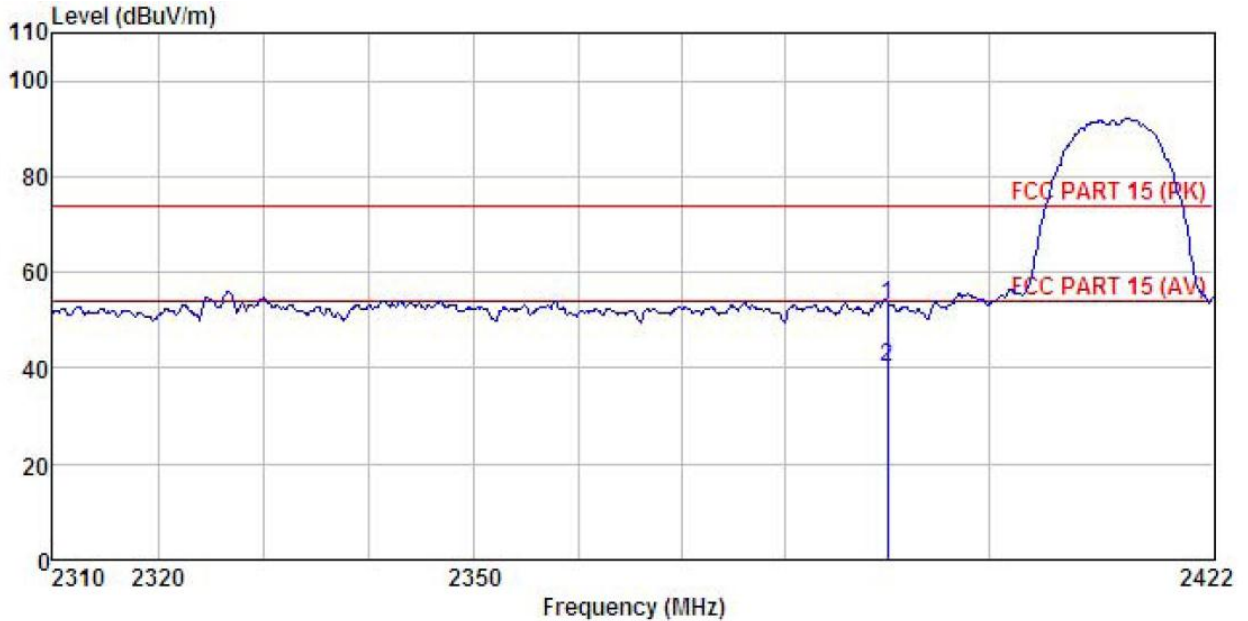
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

**SISO ANT 2**

**802.11b**

Test channel: Lowest

Horizontal:



```

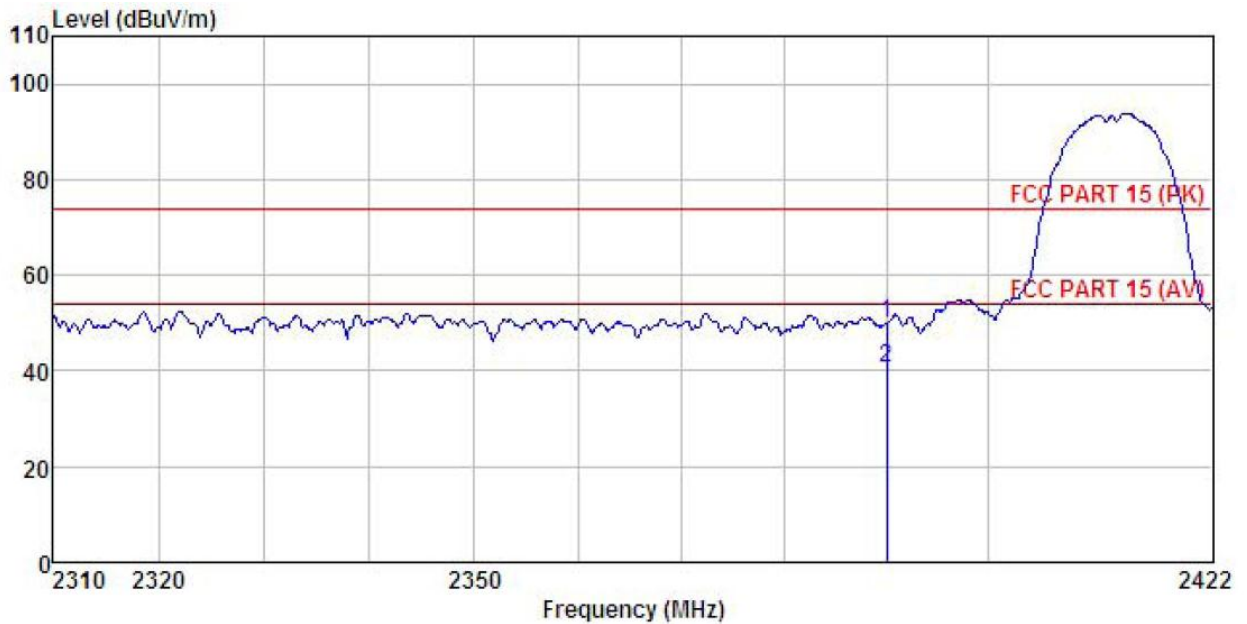
Site       : 3m chamber
Condition  : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL
EUT        : HELLO 2
Model      : HELLO 2
Test mode   : 802.11b-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.3°C Humi:57%
Test Engineer: Carey
REMARK     : ANT-2
    
```

	Read	Antenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	20.97	27.37	4.69	0.00	53.03	74.00	-20.97 Peak
2	2390.000	8.32	27.37	4.69	0.00	40.38	54.00	-13.62 Average

**Remark:**

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

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11b-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-2

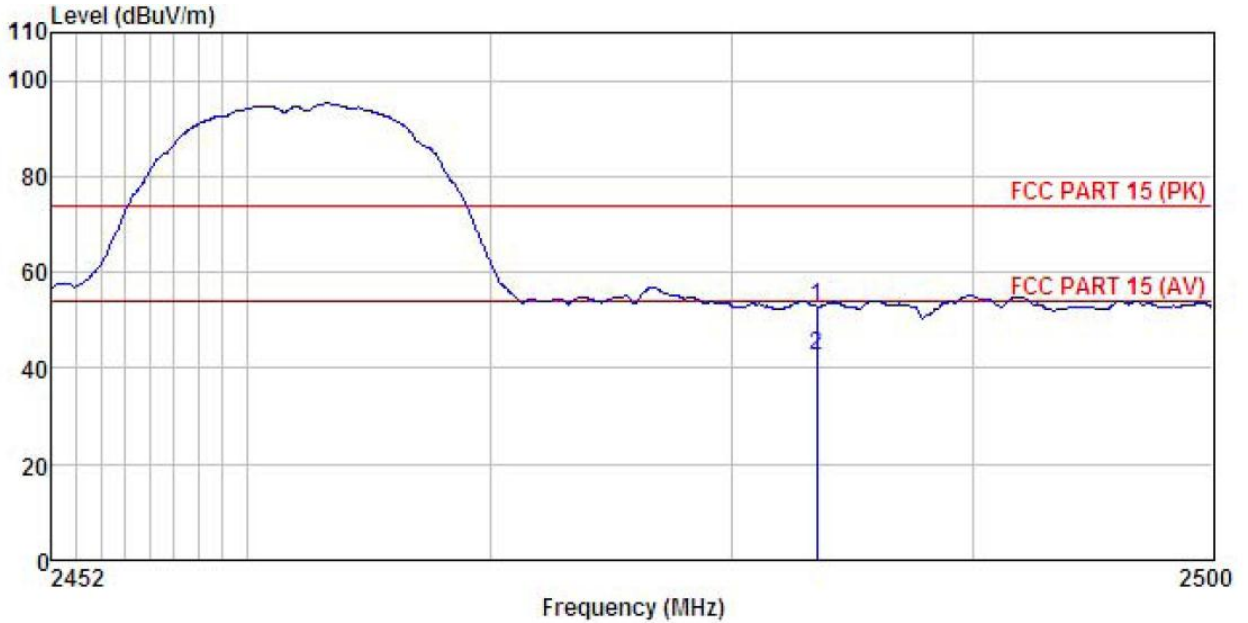
	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	17.93	27.37	4.69	0.00	49.99	74.00	-24.01 Peak
2	2390.000	8.73	27.37	4.69	0.00	40.79	54.00	-13.21 Average

Remark:

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

**Test channel: Highest**

Horizontal:



```

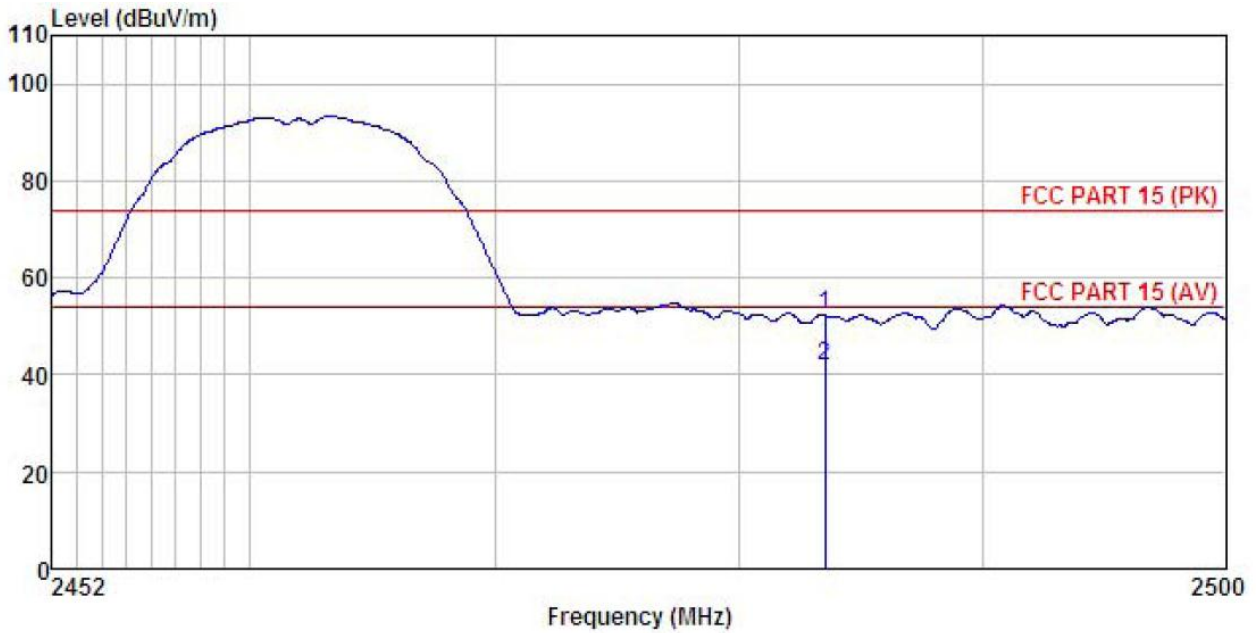
Site       : 3m chamber
Condition  : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL
EUT        : HELLO 2
Model      : HELLO 2
Test mode  : 802.11b-H mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.3°C Humi:57%
Test Engineer: Carey
REMARK     : ANT-2
    
```

	Read	Antenna	Cable	Preamp	Level	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	20.50	27.57	4.81	0.00	52.88	74.00	-21.12 Peak
2	2483.500	10.38	27.57	4.81	0.00	42.76	54.00	-11.24 Average

**Remark:**

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

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11b-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANI-2

	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	19.96	27.57	4.81	0.00	52.34	74.00	-21.66 Peak
2	2483.500	9.25	27.57	4.81	0.00	41.63	54.00	-12.37 Average

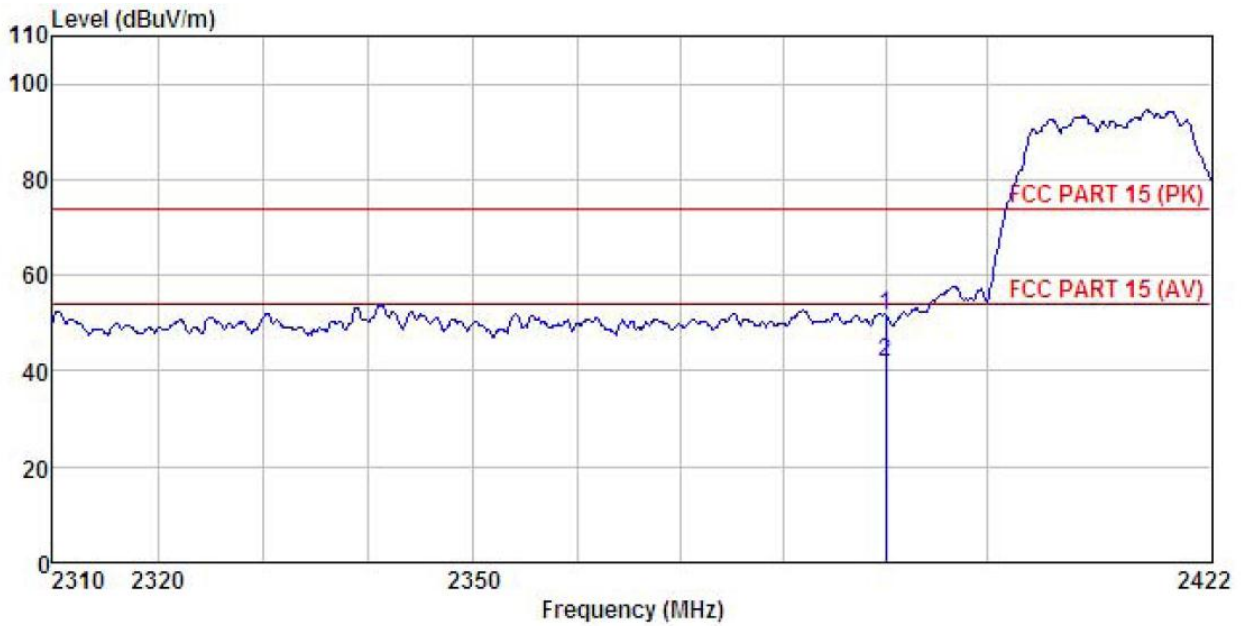
Remark:

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

**802.11g**

Test channel: Lowest

Horizontal:



```

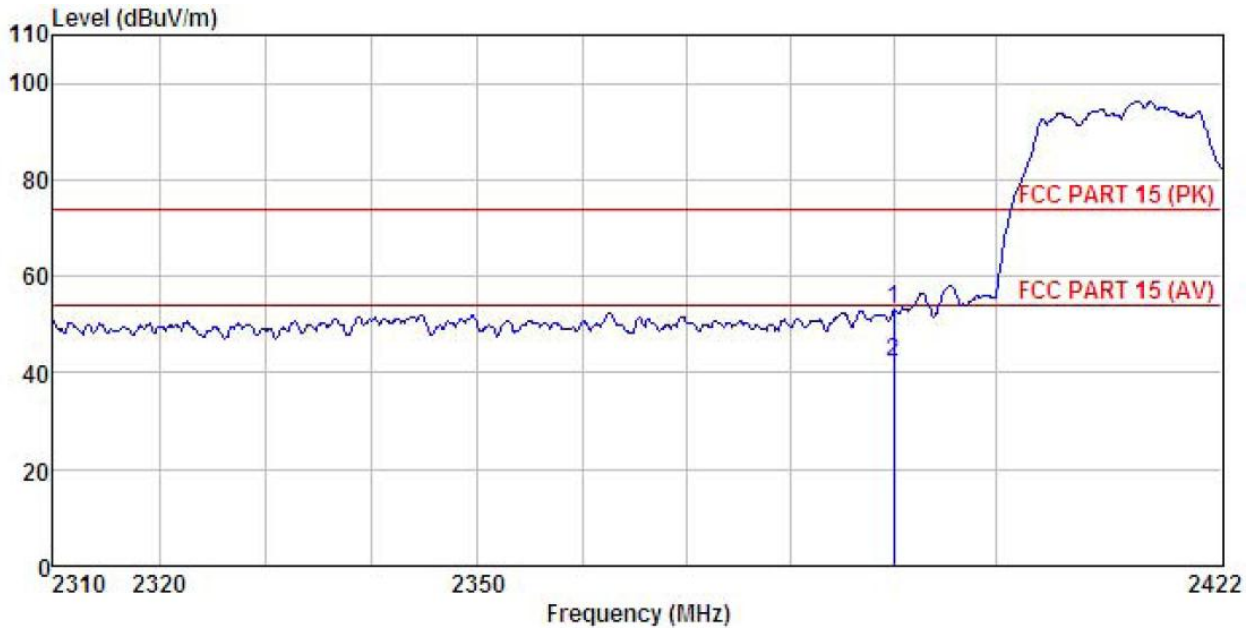
Site       : 3m chamber
Condition  : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL
EUT       : HELLO 2
Model     : HELLO 2
Test mode  : 802.11g-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.3'C Humi:57%
Test Engineer: Carey
REMARK    : ANT-2
    
```

	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
-----	-----	-----	-----	-----	-----	-----	-----	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	19.43	27.37	4.69	0.00	51.49	74.00	-22.51 Peak
2	2390.000	9.63	27.37	4.69	0.00	41.69	54.00	-12.31 Average

Remark:

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

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11g-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-2

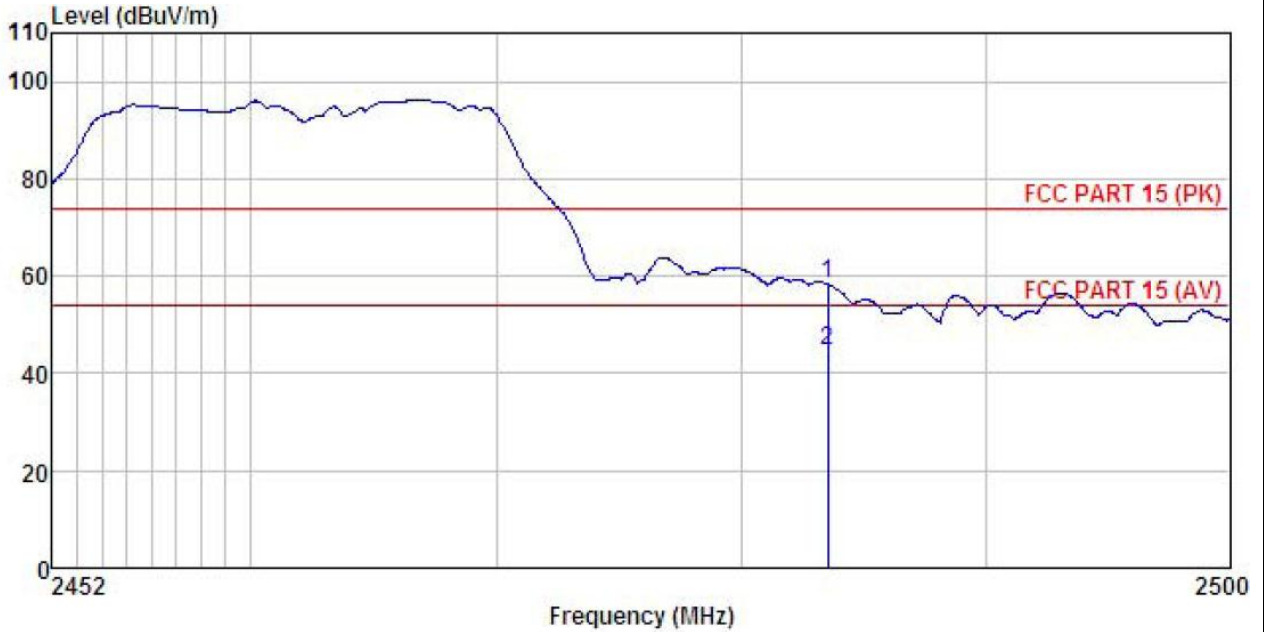
	Read	Antenna	Cable	Preamp		Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
-----	-----	-----	-----	-----	-----	-----	-----	-----
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	20.98	27.37	4.69	0.00	53.04	74.00	-20.96 Peak
2	2390.000	10.07	27.37	4.69	0.00	42.13	54.00	-11.87 Average

Remark:

3. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
4. The emission levels of other frequencies are very lower than the limit and not show in test report.

**Test channel: Highest**

Horizontal:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11g-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-2

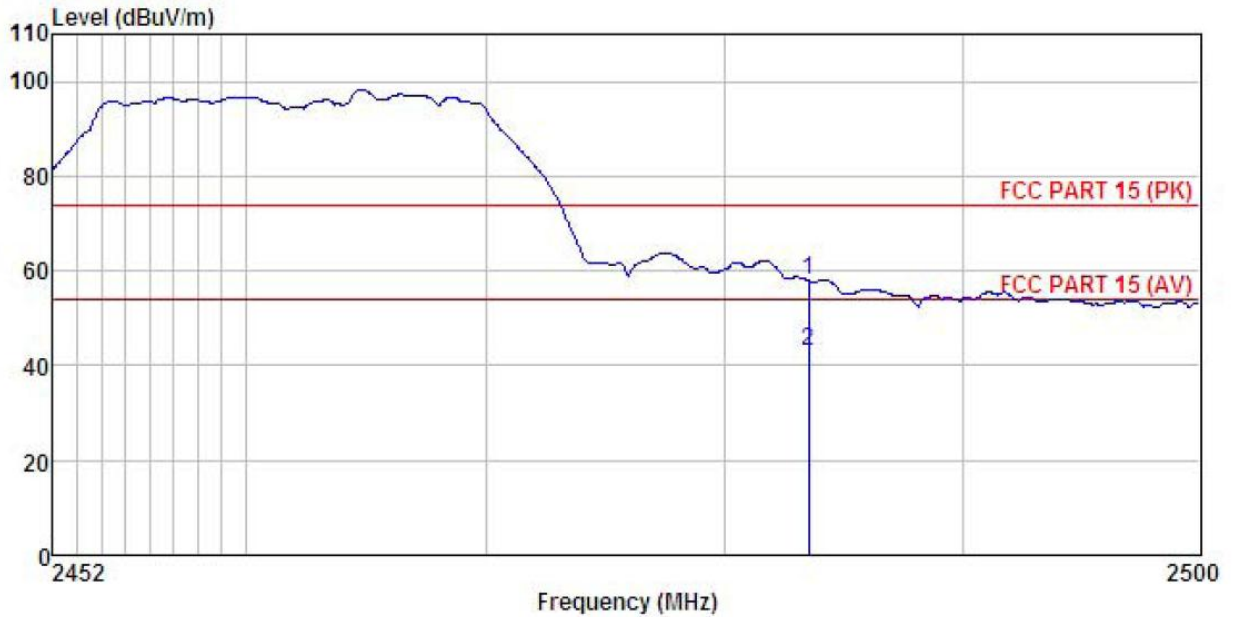
	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2483.500	25.93	27.57	4.81	0.00	58.31	74.00 -15.69 Peak
2	2483.500	12.37	27.57	4.81	0.00	44.75	54.00 -9.25 Average

**Remark:**

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



Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11g-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : ANT-2

	Read	Antenna	Cable	Preamp	Level	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	25.59	27.57	4.81	0.00	57.97	74.00	-16.03 Peak
2	2483.500	10.75	27.57	4.81	0.00	43.13	54.00	-10.87 Average

Remark:

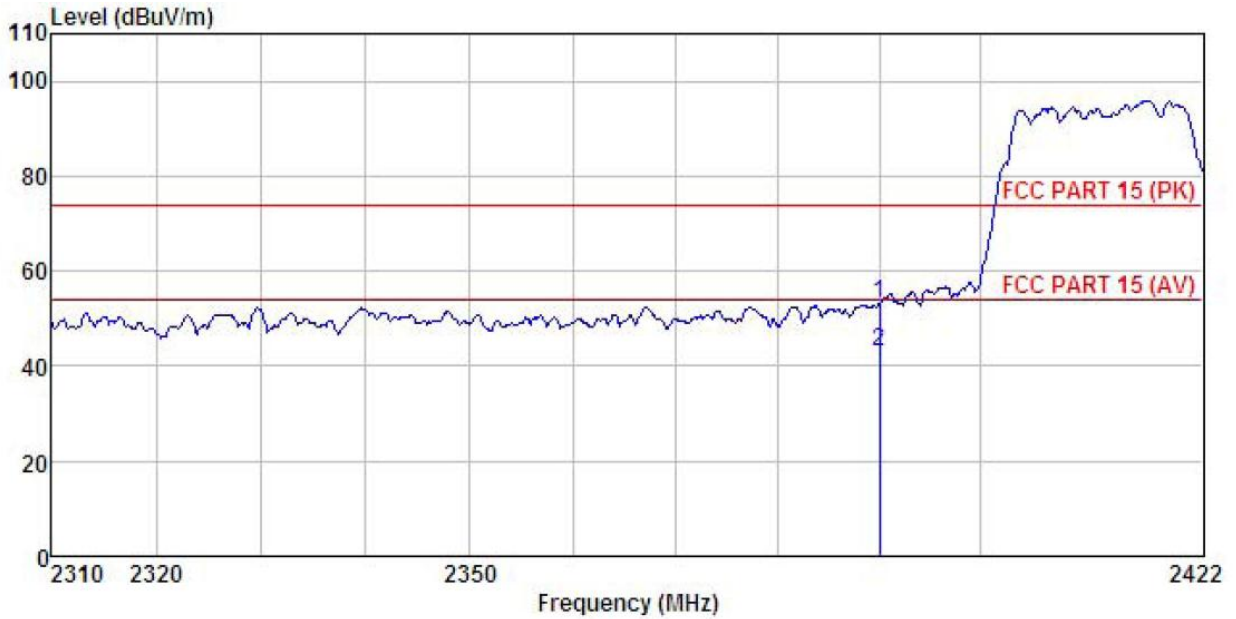
5. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor
6. The emission levels of other frequencies are very lower than the limit and not show in test report.

**MIMO :**

**802.11n (H20)**

Test channel: Lowest

Horizontal:



```

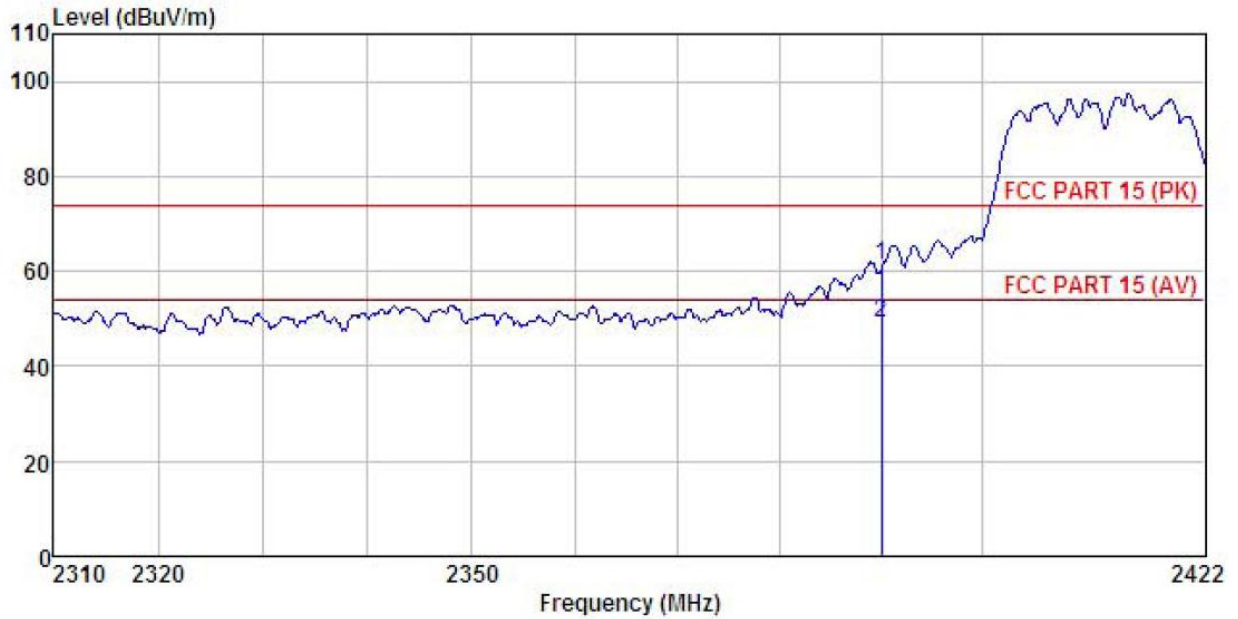
Site      : 3m chamber
Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL
EUT       : HELLO 2
Model     : HELLO 2
Test mode : 802.11n20-L mode
Power Rating : AC 120V/60Hz
Environment : Temp:25.3°C Humi:57%
Test Engineer: Carey
REMARK    : MIMO
    
```

	Read	Antenna	Cable	Preamp	Level	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	20.91	27.37	4.69	0.00	52.97	74.00	-21.03 Peak
2	2390.000	11.09	27.37	4.69	0.00	43.15	54.00	-10.85 Average

**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.

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11n20-L mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : MIMO

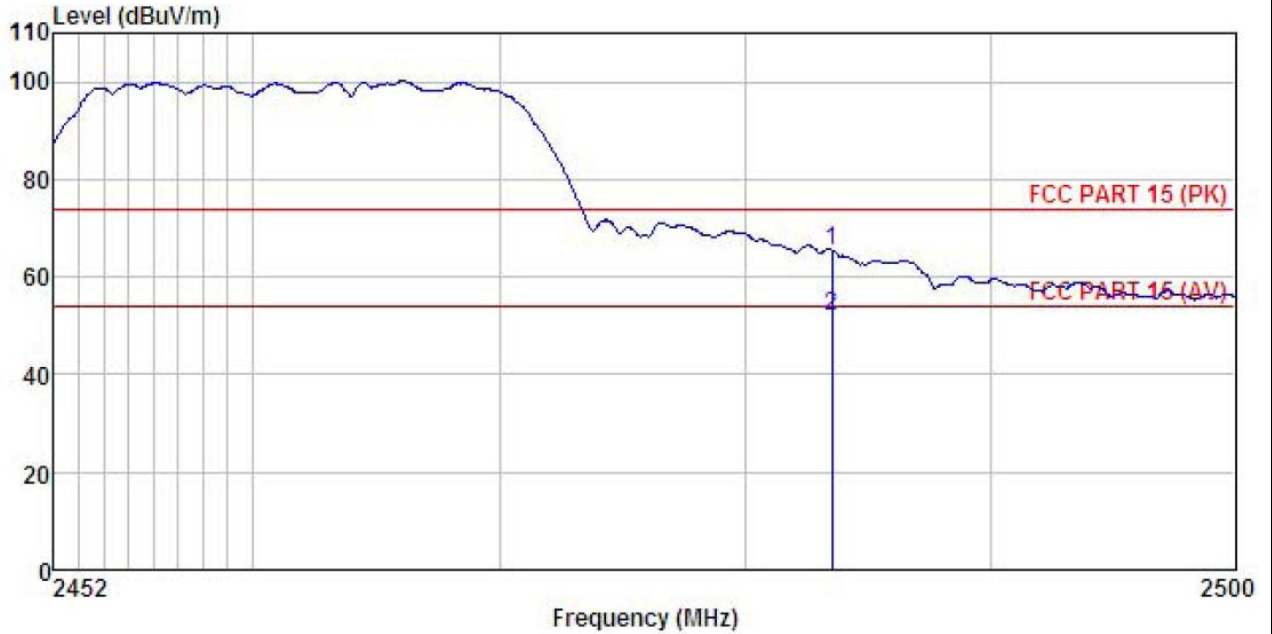
	Read	Antenna	Cable	Preamp	Level	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2390.000	29.08	27.37	4.69	0.00	61.14	74.00	-12.86 Peak
2	2390.000	16.93	27.37	4.69	0.00	48.99	54.00	-5.01 Average

Remark:

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

**Test channel: Highest**

Horizontal:



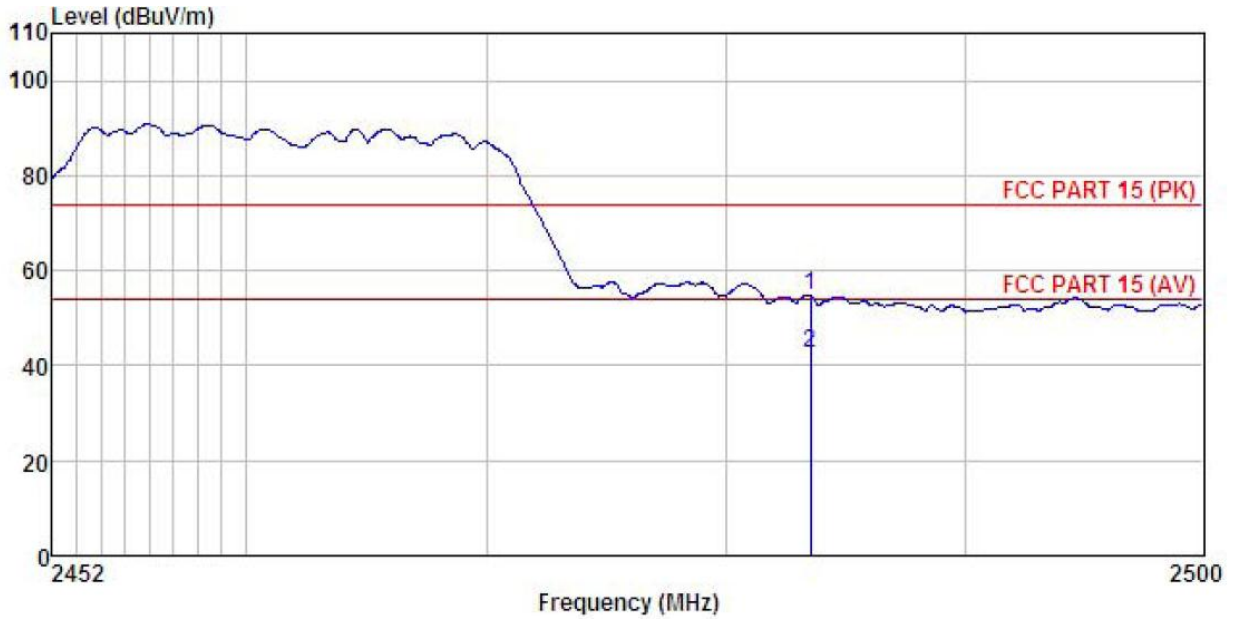
Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) HORIZONTAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11n20-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : MIMO

	Read	Antenna	Cable	Preamp	Limit	Over		
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark	
-----	-----	-----	-----	-----	-----	-----	-----	
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	2483.500	33.10	27.57	4.81	0.00	65.48	74.00	-8.52 Peak
2	2483.500	19.56	27.57	4.81	0.00	51.94	54.00	-2.06 Average

**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.

Vertical:



Site : 3m chamber  
 Condition : FCC PART 15 (PK) 3m BBHA9120(1G18G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : 802.11n20-H mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK : MIMO

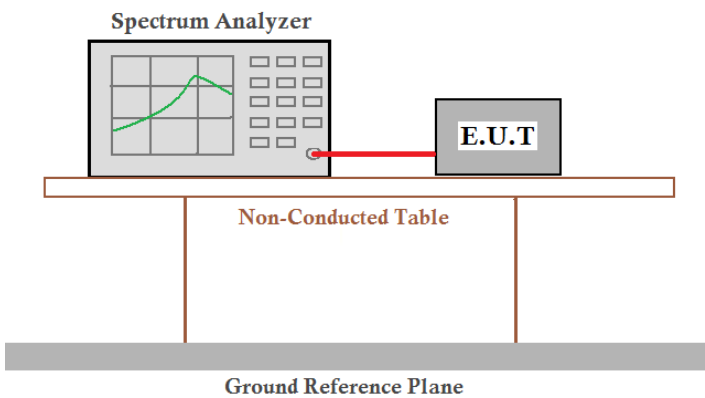
	Read	Antenna	Cable	Preamp	Limit	Over	
Freq	Level	Factor	Loss	Factor	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB
1	2483.500	22.24	27.57	4.81	0.00	54.62	74.00 -19.38 Peak
2	2483.500	10.39	27.57	4.81	0.00	42.77	54.00 -11.23 Average

Remark:

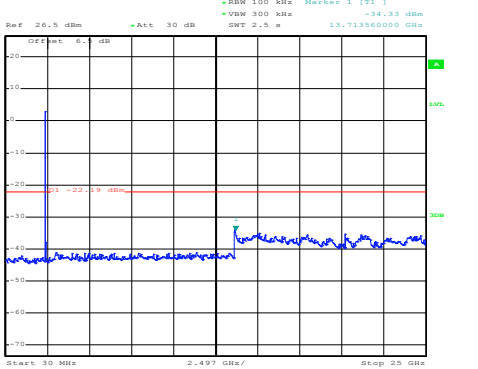
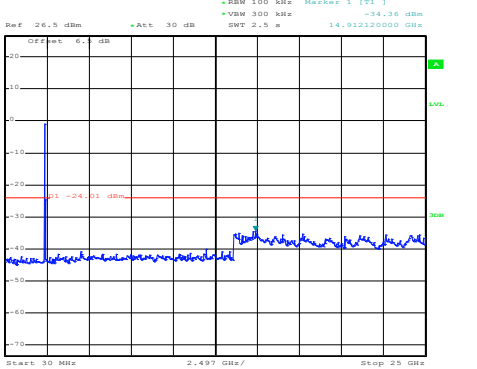
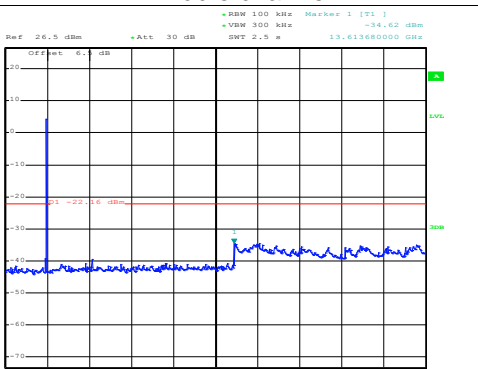
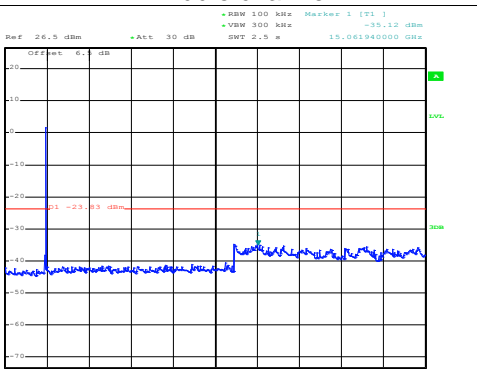
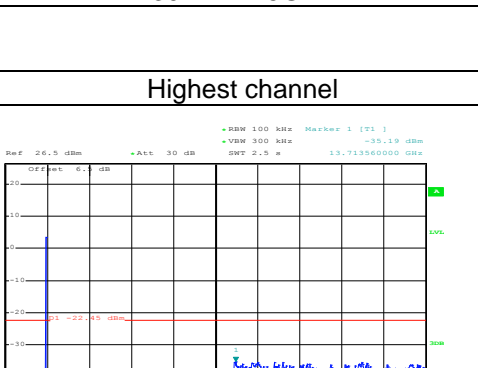
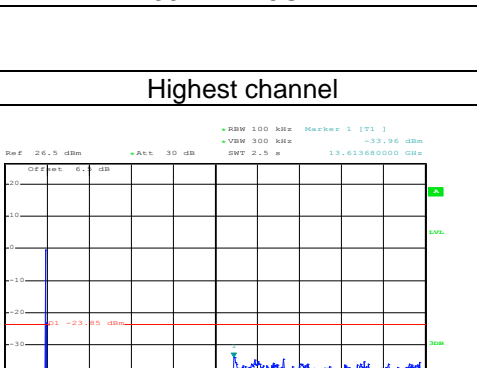
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss - Preamp Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 6.7 Spurious Emission

### 6.7.1 Conducted Emission Method

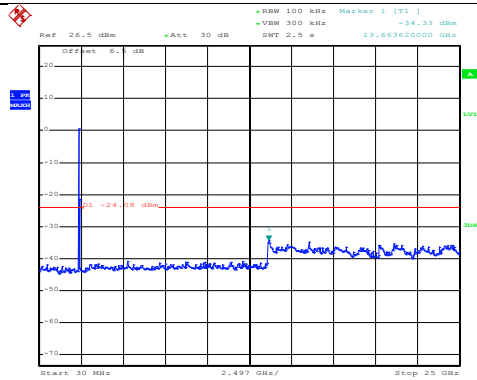
Test Requirement:	FCC Part 15 C Section 15.247 (d) RSS-247 section 5.5
Test Method:	ANSI C63.10:2013 and KDB558074
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph(b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by two vertical legs. Below the table is a Ground Reference Plane.</p>
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:

Test mode: 802.11b	Test mode: 802.11g
<p style="text-align: center;"><b>Lowest channel</b></p>  <p style="text-align: center;">30MHz~25GHz</p> <p>Date: 30.OCT.2018 15:46:21</p>	<p style="text-align: center;"><b>Lowest channel</b></p>  <p style="text-align: center;">30MHz~25GHz</p> <p>Date: 30.OCT.2018 15:48:29</p>
<p style="text-align: center;"><b>Middle channel</b></p>  <p style="text-align: center;">30MHz~25GHz</p> <p>Date: 30.OCT.2018 15:47:29</p>	<p style="text-align: center;"><b>Middle channel</b></p>  <p style="text-align: center;">30MHz~25GHz</p> <p>Date: 30.OCT.2018 15:49:01</p>
<p style="text-align: center;"><b>Highest channel</b></p>  <p style="text-align: center;">30MHz~25GHz</p> <p>Date: 30.OCT.2018 15:47:54</p>	<p style="text-align: center;"><b>Highest channel</b></p>  <p style="text-align: center;">30MHz~25GHz</p> <p>Date: 30.OCT.2018 15:49:24</p>

**Test mode: 802.11n(H20)**

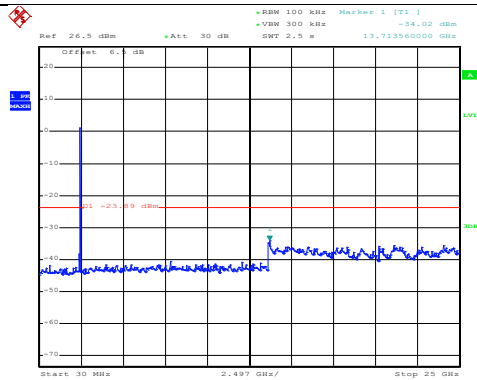
**Lowest channel**



Date: 30.OCT.2018 15:50:05

**30MHz~25GHz**

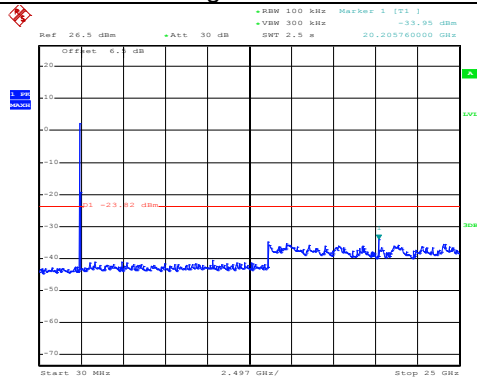
**Middle channel**



Date: 30.OCT.2018 15:50:30

**30MHz~25GHz**

**Highest channel**



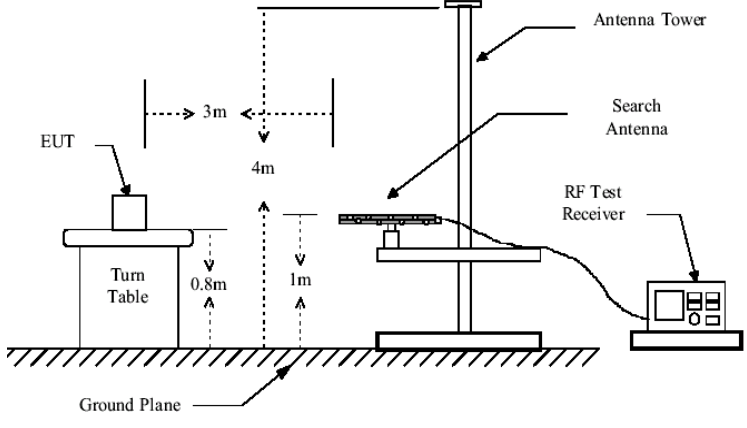
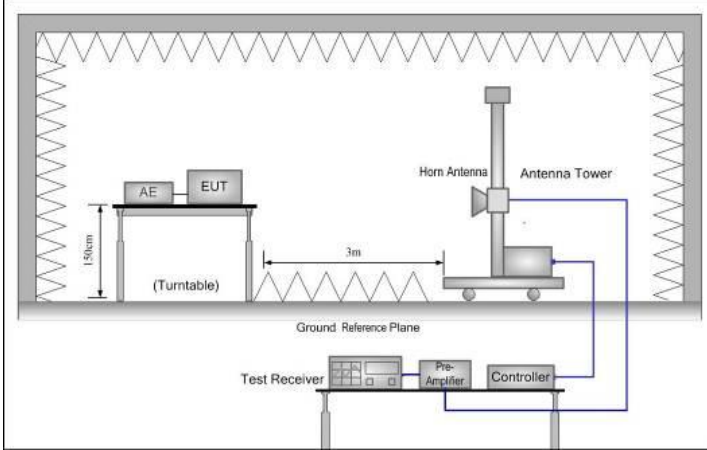
Date: 30.OCT.2018 15:50:58

**30MHz~25GHz**



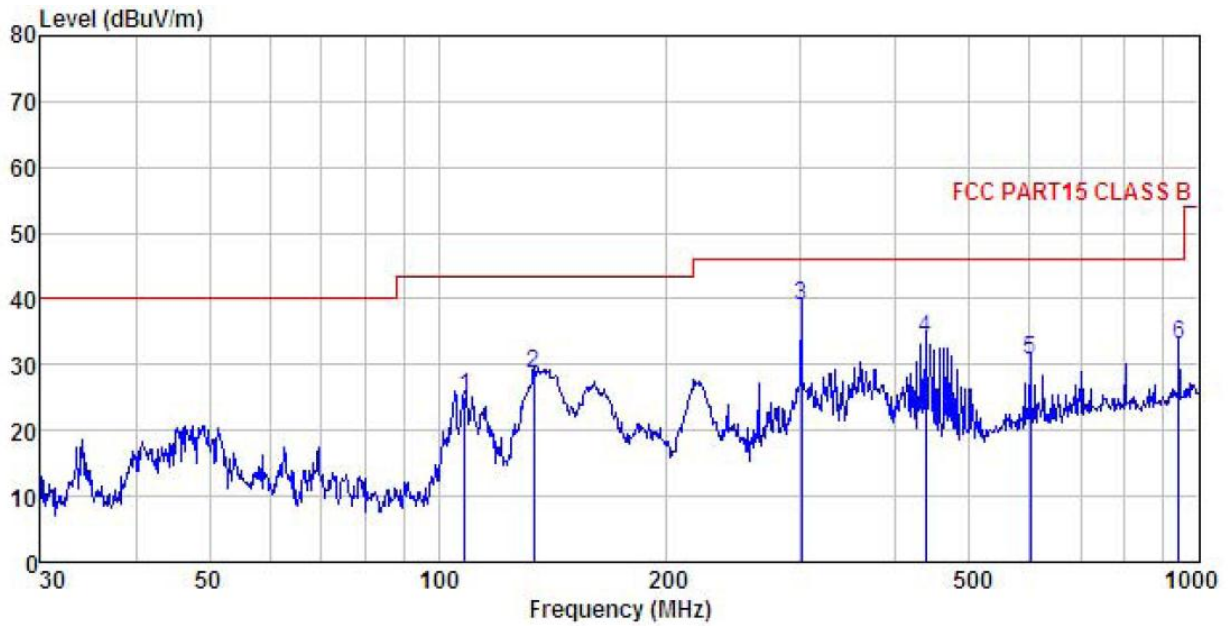
## 6.7.2 Radiated Emission Method

Test Requirement:	FCC Part 15 C Section 15.209 and 15.205 RSS-Gen section 6.13				
Test Method:	ANSI C63.10:2013				
Test Frequency Range:	9kHz to 25GHz				
Test Distance:	3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
RMS		1MHz	3MHz	Average Value	
Limit:	Frequency	Limit (dBuV/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 Procedure:	<ol style="list-style-type: none"> <li>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 chamber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. 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.</li> </ol>				
Test setup:	Below 1GHz				

	 <p>Above 1GHz</p> 
<p>Test Instruments:</p>	<p>Refer to section 5.8 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>
<p>Test results:</p>	<p>Passed</p>
<p>Remark:</p>	<ol style="list-style-type: none"> <li>1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis is the worst case.</li> <li>2. 9 kHz to 30MHz is too low, so only shows the data of above 30MHz in this report.</li> </ol>

**Below 1GHz**

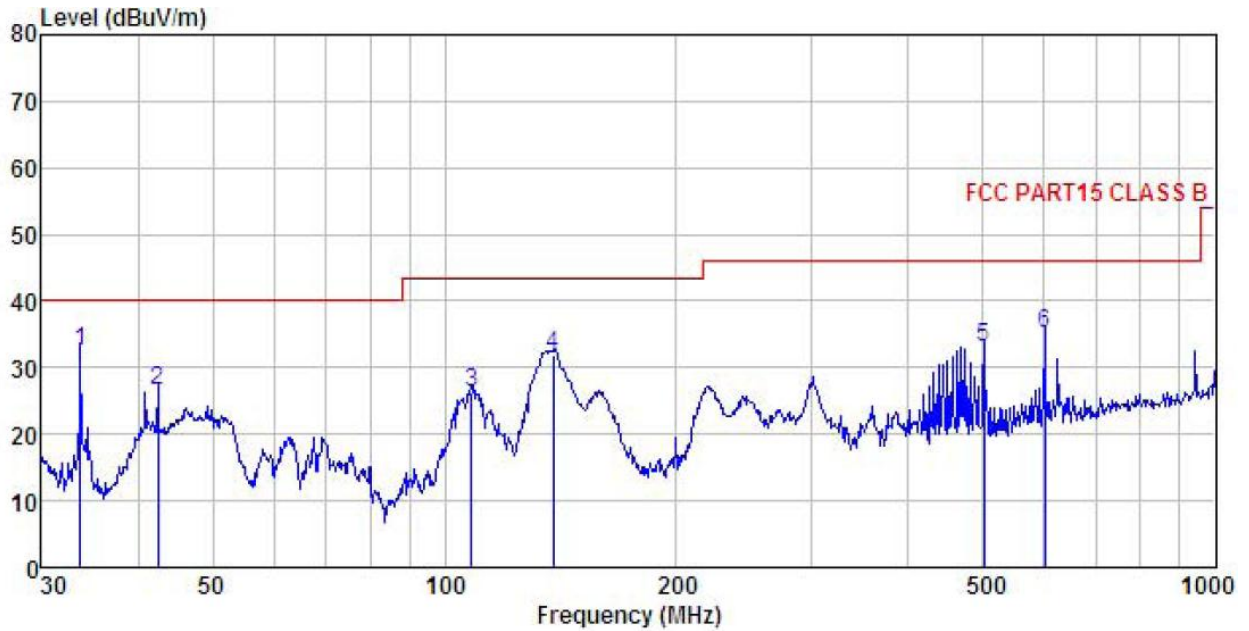
Horizontal:



Site : 3m chamber  
 Condition : FCC PART15 CLASS B 3m VULB9163(30M2G) HORIZONTAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : WIFI mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK :

	Read	Antenna	Cable	Preamp	Level	Limit	Over	
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	108.267	40.34	12.20	2.03	29.47	25.10	43.50	-18.40 QP
2	133.619	47.19	8.48	2.33	29.31	28.69	43.50	-14.81 QP
3	300.367	50.79	13.61	2.94	28.45	38.89	46.00	-7.11 QP
4	437.120	43.73	15.95	3.17	28.85	34.00	46.00	-12.00 QP
5	601.427	36.55	19.22	3.94	28.93	30.78	46.00	-15.22 QP
6	942.131	34.25	22.38	4.13	27.75	33.01	46.00	-12.99 QP

Vertical:



Site : 3m chamber  
 Condition : FCC PART15 CLASS B 3m VULB9163(30M2G) VERTICAL  
 EUT : HELLO 2  
 Model : HELLO 2  
 Test mode : WIFI mode  
 Power Rating : AC 120V/60Hz  
 Environment : Temp:25.3°C Humi:57%  
 Test Engineer: Carey  
 REMARK :

	ReadAntenna	Cable	Preamp		Limit	Over		
Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	
1	33.680	50.14	11.43	0.98	29.96	32.59	40.00	-7.41 QP
2	42.451	42.06	13.25	1.25	29.88	26.68	40.00	-13.32 QP
3	108.267	41.41	12.20	2.03	29.47	26.17	43.50	-17.33 QP
4	138.387	50.61	8.19	2.38	29.28	31.90	43.50	-11.60 QP
5	501.179	40.82	17.51	3.63	28.96	33.00	46.00	-13.00 QP
6	601.427	40.92	19.22	3.94	28.93	35.15	46.00	-10.85 QP

**SISO ANT 1:**

**Above 1GHz**

Test mode: 802.11b			Test channel: Lowest			Remark: 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)	Polar.
4824.00	54.27	31.63	6.81	41.82	50.89	74.00	-23.11	Vertical
4824.00	51.41	31.63	6.81	41.82	48.03	74.00	-25.97	Horizontal
Test mode: 802.11b			Test channel: Lowest			Remark: 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)	Polar.
4824.00	51.69	31.63	6.81	41.82	48.31	54.00	-5.69	Vertical
4824.00	48.21	31.63	6.81	41.82	44.83	54.00	-9.17	Horizontal

Test mode: 802.11b			Test channel: Middle			Remark: 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)	Polar.
4874.00	56.86	31.77	6.85	41.84	53.64	74.00	-20.36	Vertical
4874.00	54.27	31.77	6.85	41.84	51.05	74.00	-22.95	Horizontal
Test mode: 802.11b			Test channel: Middle			Remark: 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)	Polar.
4874.00	53.89	31.77	6.85	41.84	50.67	54.00	-3.33	Vertical
4874.00	51.69	31.77	6.85	41.84	48.47	54.00	-5.53	Horizontal

Test mode: 802.11b			Test channel: Highest			Remark: 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)	Polar.
4924.00	53.14	31.80	6.89	41.86	49.97	74.00	-24.03	Vertical
4924.00	54.78	31.80	6.89	41.86	51.61	74.00	-22.39	Horizontal
Test mode: 802.11b			Test channel: Highest			Remark: 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)	Polar.
4924.00	49.82	31.80	6.89	41.86	46.65	54.00	-7.35	Vertical
4924.00	50.51	31.80	6.89	41.86	47.34	54.00	-6.66	Horizontal

*Remark:*

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

Test mode: 802.11g			Test channel: Lowest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	51.36	31.63	6.81	41.82	47.98	74.00	-26.02	Vertical
4824.00	52.82	31.63	6.81	41.82	49.44	74.00	-24.56	Horizontal
Test mode: 802.11g			Test channel: Lowest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	45.36	31.63	6.81	41.82	41.98	54.00	-12.02	Vertical
4824.00	45.61	31.63	6.81	41.82	42.23	54.00	-11.77	Horizontal

Test mode: 802.11g			Test channel: Middle			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	51.69	31.77	6.85	41.84	48.47	74.00	-25.53	Vertical
4874.00	51.27	31.77	6.85	41.84	48.05	74.00	-25.95	Horizontal
Test mode: 802.11g			Test channel: Middle			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	46.63	31.77	6.85	41.84	43.41	54.00	-10.59	Vertical
4874.00	46.54	31.77	6.85	41.84	43.32	54.00	-10.68	Horizontal

Test mode: 802.11g			Test channel: Highest			Remark: 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)	Polar.
4924.00	51.82	31.80	6.89	41.86	48.65	74.00	-25.35	Vertical
4924.00	51.27	31.80	6.89	41.86	48.10	74.00	-25.90	Horizontal
Test mode: 802.11g			Test channel: Highest			Remark: 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)	Polar.
4924.00	46.78	31.80	6.89	41.86	43.61	54.00	-10.39	Vertical
4924.00	46.53	31.80	6.89	41.86	43.36	54.00	-10.64	Horizontal

Remark:

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

**SISO ANT 2:  
Above 1GHz**

Test mode: 802.11b			Test channel: Lowest			Remark: 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)	Polar.
4824.00	54.27	31.63	6.81	41.82	50.89	74.00	-23.11	Vertical
4824.00	52.36	31.63	6.81	41.82	48.98	74.00	-25.02	Horizontal
Test mode: 802.11b			Test channel: Lowest			Remark: 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)	Polar.
4824.00	51.53	31.63	6.81	41.82	48.15	54.00	-5.85	Vertical
4824.00	49.27	31.63	6.81	41.82	45.89	54.00	-8.11	Horizontal

Test mode: 802.11b			Test channel: Middle			Remark: 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)	Polar.
4874.00	56.24	31.77	6.85	41.84	53.02	74.00	-20.98	Vertical
4874.00	52.47	31.77	6.85	41.84	49.25	74.00	-24.75	Horizontal
Test mode: 802.11b			Test channel: Middle			Remark: 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)	Polar.
4874.00	53.63	31.77	6.85	41.84	50.41	54.00	-3.59	Vertical
4874.00	49.71	31.77	6.85	41.84	46.49	54.00	-7.51	Horizontal

Test mode: 802.11b			Test channel: Highest			Remark: 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)	Polar.
4924.00	51.57	31.80	6.89	41.86	48.40	74.00	-25.60	Vertical
4924.00	49.66	31.80	6.89	41.86	46.49	74.00	-27.51	Horizontal
Test mode: 802.11b			Test channel: Highest			Remark: 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)	Polar.
4924.00	48.89	31.80	6.89	41.86	45.72	54.00	-8.28	Vertical
4924.00	46.47	31.80	6.89	41.86	43.30	54.00	-10.70	Horizontal

Test mode: 802.11g			Test channel: Lowest			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	51.43	31.63	6.81	41.82	48.05	74.00	-25.95	Vertical
4824.00	51.92	31.63	6.81	41.82	48.54	74.00	-25.46	Horizontal
Test mode: 802.11g			Test channel: Lowest			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4824.00	45.93	31.63	6.81	41.82	42.55	54.00	-11.45	Vertical
4824.00	45.22	31.63	6.81	41.82	41.84	54.00	-12.16	Horizontal

Test mode: 802.11g			Test channel: Middle			Remark: Peak		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	52.14	31.77	6.85	41.84	48.92	74.00	-25.08	Vertical
4874.00	51.51	31.77	6.85	41.84	48.29	74.00	-25.71	Horizontal
Test mode: 802.11g			Test channel: Middle			Remark: Average		
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/)	Limit Line (dBuV/m)	Over Limit (dB)	Polar.
4874.00	46.61	31.77	6.85	41.84	43.39	54.00	-10.61	Vertical
4874.00	45.92	31.77	6.85	41.84	42.70	54.00	-11.30	Horizontal

Test mode: 802.11g			Test channel: Highest			Remark: 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)	Polar.
4924.00	51.63	31.80	6.89	41.86	48.46	74.00	-25.54	Vertical
4924.00	51.16	31.80	6.89	41.86	47.99	74.00	-26.01	Horizontal
Test mode: 802.11g			Test channel: Highest			Remark: 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)	Polar.
4924.00	45.88	31.80	6.89	41.86	42.71	54.00	-11.29	Vertical
4924.00	45.74	31.80	6.89	41.86	42.57	54.00	-11.43	Horizontal



**MIMO:**

**Above 1GHz**

Test mode: 802.11n(H40)			Test channel: Lowest			Remark: 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)	Polar.
4824.00	51.41	31.63	6.81	41.82	48.03	74.00	-25.97	Vertical
4824.00	51.27	31.63	6.81	41.82	47.89	74.00	-26.11	Horizontal
Test mode: 802.11n(H40)			Test channel: Lowest			Remark: 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)	Polar.
4824.00	46.74	31.63	6.81	41.82	43.36	54.00	-10.64	Vertical
4844.00	41.12	36.06	6.81	41.82	42.17	54.00	-11.83	Horizontal

Test mode: 802.11n(H40)			Test channel: Middle			Remark: 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)	Polar.
4874.00	51.31	31.77	6.85	41.84	48.09	74.00	-25.91	Vertical
4874.00	51.78	31.77	6.85	41.84	48.56	74.00	-25.44	Horizontal
Test mode: 802.11n(H40)			Test channel: Middle			Remark: 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)	Polar.
4874.00	46.69	31.77	6.85	41.84	43.47	54.00	-10.53	Vertical
4874.00	46.36	31.77	6.85	41.84	43.14	54.00	-10.86	Horizontal

Test mode: 802.11n(H40)			Test channel: Highest			Remark: 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)	Polar.
4924.00	51.41	31.80	6.89	41.86	48.24	74.00	-25.76	Vertical
4924.00	51.48	31.80	6.89	41.86	48.31	74.00	-25.69	Horizontal
Test mode: 802.11n(H40)			Test channel: Highest			Remark: 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)	Polar.
4924.00	46.53	31.80	6.89	41.86	43.36	54.00	-10.64	Vertical
4924.00	46.64	31.80	6.89	41.86	43.47	54.00	-10.53	Horizontal

Remark:

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