

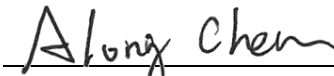
# FCC Test Report

**FCC ID** : ACQ-VIP7802ATSC  
**Equipment** : WiFi Set Top Box  
**Model No.** : VIP7802ATSC  
**Brand Name** : ARRIS  
**Applicant** : ARRIS  
**Address** : 101 Tournament Drive, Horsham, Pennsylvania,  
United States 19044  
**Standard** : 47 CFR FCC Part 15.247  
**Received Date** : Nov. 30, 2021  
**Tested Date** : Dec. 29, 2021 ~ Jan. 18, 2022

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Approved by:

  
\_\_\_\_\_  
Along Chen / Assistant Manager

  
\_\_\_\_\_  
Gary Chang / Manager

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## Release Record

Report No.	Version	Description	Issued Date
FR1N3001AC	Rev. 01	Initial issue	Feb. 10, 2022

## Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 1.411MHz 41.85 (Margin -4.15dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 7386.00MHz 53.00 (Margin -1.00dB) – AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: <b>Non-beamforming mode</b> 27.58dBm <b>Beamforming mode</b> 24.52dBm	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

### Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

### Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

# 1 General Description

## 1.1 Information

### 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	Data Rate / MCS
2400-2483.5	b	2412-2462	1-11 [11]	2	1-11 Mbps
2400-2483.5	g	2412-2462	1-11 [11]	2	6-54 Mbps
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	MCS 0-15
2400-2483.5	ac (VHT20)	2412-2462	1-11 [11]	2	MCS 0-9
2400-2483.5	ax (HE20)	2412-2462	1-11 [11]	2	MCS 0-11

Note 1: RF output power specifies that Maximum Conducted (Average) Output Power.  
 Note 2: DSSS-DBPSK, DQPSK, CCK modulation  
 OFDM/OFDMA- BPSK, QPSK, 16QAM, 64QAM, 256QAM and 1024QAM modulation.  
 Note 3: 802.11ax supports beamforming function.  
 Note 4: 802.11ax supports full and partial loaded RU configuration.

### 1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)				
				2400~2483.5	5150~5250	5250~5350	5470~5725	5725~5850
1	Ant 1	Dipole	U.FL	4.5	3.8	4.5	5.1	5
2	Ant 2	Dipole	U.FL	4.5	4.3	4.6	4.1	4.8

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

<b>Power Supply Type</b>	12Vdc from adapter
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### 1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	Adapter	Brand: APD Model: WB-18R12FU-ABAK Power Rating: I/P: 100-120Vac, 60Hz O/P: 12V=1.5A Power Line: 1.75m non-shielded without core
2	Remote Control	Model: T4HU2120/36K

### 1.1.5 Channel List

Frequency band (MHz)		2400~2483.5	
802.11bg / n HT20 / ac VHT20 / ax HE20		802.11n HT40 / ac VHT40 / ax HE40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	3	2422
2	2417	4	2427
3	2422	5	2432
4	2427	6	2437
5	2432	7	2442
6	2437	8	2447
7	2442	9	2452
8	2447	---	---
9	2452	---	---
10	2457	---	---
11	2462	---	---

### 1.1.6 Test Tool and Duty Cycle

Test Tool	accessMTool, Version:3.1.0.2		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	11b	96.33%	0.16
	11g	96.00%	0.18
	ax HE20	99.04%	0.04

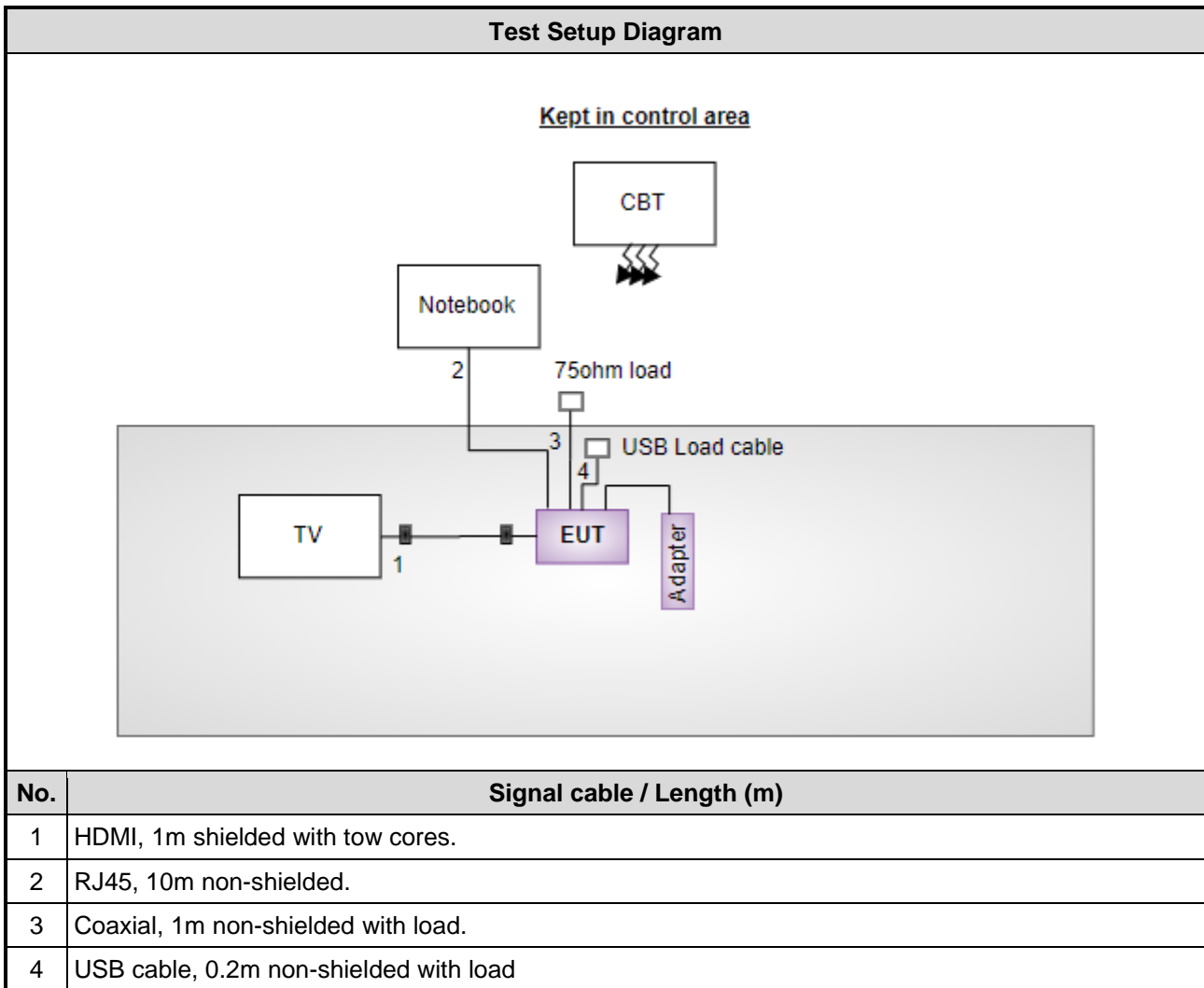
### 1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	90
11b	2437	86
11b	2462	86
11g	2412	58
11g	2437	78
11g	2462	56
ax HE20	2412	52
ax HE20	2437	70
ax HE20	2462	50

## 1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude E5470	---	---
2	TV	CHIMEI	TL-24LF500D	---	---
3	75ohm load	ICC	75 ohm load	---	Provided by applicant.
4	Debug Board	---	---	---	---
5	USB Load cable	---	---	---	Provided by applicant.

## 1.3 Test Setup Chart





## 1.4 The Equipment List

<b>Test Item</b>	Conducted Emission				
<b>Test Site</b>	Conduction room 1 / (CO01-WS)				
<b>Tested Date</b>	Jan. 18, 2022				
<b>Instrument</b>	<b>Brand</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Receiver	R&S	ESR3	101658	Feb. 08, 2021	Feb. 07, 2022
LISN	R&S	ENV216	101579	Mar. 17, 2021	Mar. 16, 2022
LISN (Support Unit)	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127477	Feb. 25, 2021	Feb. 24, 2022
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 19, 2021	Oct. 18, 2022
50 ohm terminal (Support Unit)	NA	50	04	May 25, 2021	May 24, 2022
Measurement Software	AUDIX	e3	6.120210k	NA	NA

Note: Calibration Interval of instruments listed above is one year.

<b>Test Item</b>	Radiated Emission				
<b>Test Site</b>	966 chamber1 / (03CH01-WS)				
<b>Tested Date</b>	Dec. 29, 2021 ~ Jan. 06, 2022				
<b>Instrument</b>	<b>Brand</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Receiver	R&S	ESR3	101657	Mar. 12, 2021	Mar. 11, 2022
Spectrum Analyzer	R&S	FSV40	101063	Apr. 19, 2021	Apr. 18, 2022
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 08, 2021	Nov. 07, 2022
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jun. 30, 2021	Jun. 29, 2022
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 03, 2021	Dec. 02, 2022
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2021	Nov. 03, 2022
Preamplifier	EMC	EMC02325	980225	Jun. 29, 2021	Jun. 28, 2022
Preamplifier	Agilent	83017A	MY39501308	Sep. 28, 2021	Sep. 27, 2022
Preamplifier	EMC	EMC184045B	980192	Jul. 14, 2021	Jul. 13, 2022
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 05, 2021	Oct. 04, 2022
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 05, 2021	Oct. 04, 2022
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 05, 2021	Oct. 04, 2022
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 05, 2021	Oct. 04, 2022
RF Cable	EMC	EMC104-35M-35M- 8000	210920	Oct. 05, 2021	Oct. 04, 2022
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 05, 2021	Oct. 04, 2022
Measurement Software	AUDIX	e3	6.120210g	NA	NA

Note: Calibration Interval of instruments listed above is one year.

<b>Test Item</b>	RF Conducted				
<b>Test Site</b>	(TH01-WS)				
<b>Tested Date</b>	Jan. 18, 2022				
<b>Instrument</b>	<b>Brand</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Spectrum Analyzer	R&S	FSV40	101498	Nov. 29, 2021	Nov. 28, 2022
Power Meter	Anritsu	ML2495A	1241002	Nov. 07, 2021	Nov. 06, 2022
Power Sensor	Anritsu	MA2411B	1207366	Nov. 07, 2021	Nov. 06, 2022
Measurement Software	Sporton	SENSE-15247_FS	V5.10.7.11	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

## 1.5 Test Standards

47 CFR FCC Part 15.247

ANSI C63.10-2013

## 1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

## 1.7 Deviation from Test Standard and Measurement Procedure

None

## 1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	±34.130 Hz
Conducted power	±0.808 dB
Power density	±0.583 dB
Conducted emission	±2.715 dB
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.41 dB
Radiated emission > 1GHz	±4.59 dB

## 2 Test Configuration

### 2.1 Testing Facility

<b>Test Laboratory</b>	International Certification Corporation
<b>Test Site</b>	CO01-WS, 03CH01-WS, TH01-WS
<b>Address of Test Site</b>	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

### 2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate (Mbps) / MCS	Test Configuration
<b>Non-beamforming mode</b>				
Conducted Emissions	11g	2437	6 Mbps	--
Radiated Emissions ≤1GHz	11g	2437	6 Mbps	--
Maximum Output Power	11b 11g ax HE20	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462	1 Mbps 6 Mbps MCS 0	--
Radiated Emissions >1GHz 6dB bandwidth Power spectral density	11b 11g ax HE20	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462	1 Mbps 6 Mbps MCS 0	--
<b>Beamforming mode</b>				
Maximum Output Power	ax HE20	2412 / 2437 / 2462	MCS 0	--

## 3 Transmitter Test Results

### 3.1 Conducted Emissions

#### 3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: \* Decreases with the logarithm of the frequency.

#### 3.1.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

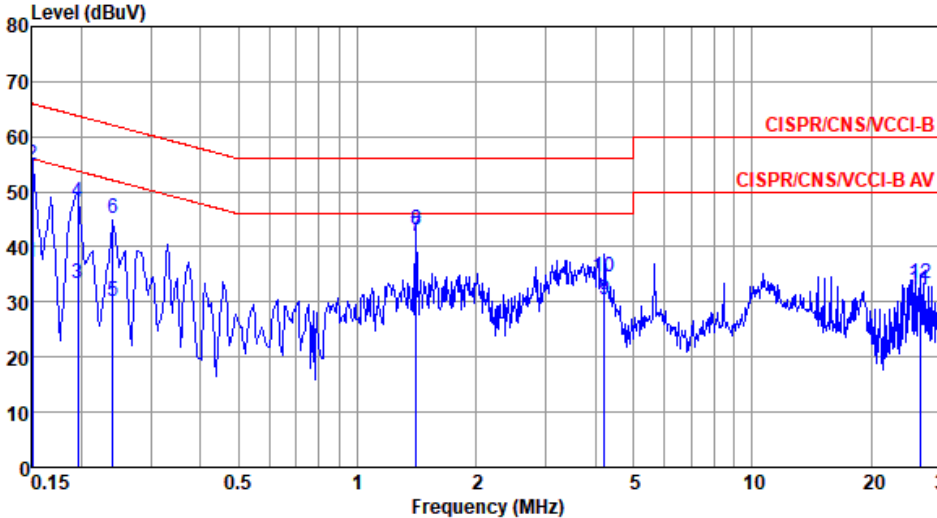
#### 3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.

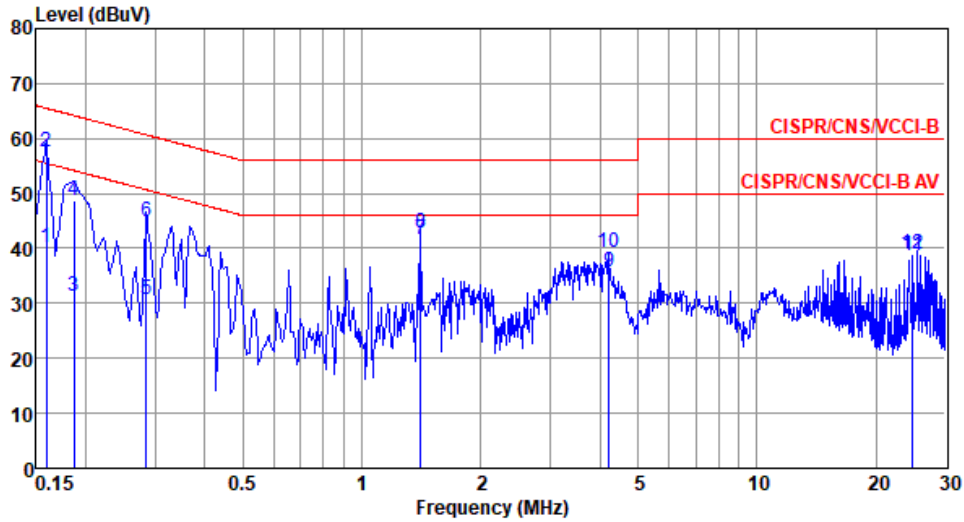
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.1.4 Test Result of Conducted Emissions

Modulation	11g	Test Freq. (MHz)	2437																																																																																																																																		
Power Phase	Line																																																																																																																																				
<p>Test by : Joe Liao      Temperature: 20°C      Humidity: 60%</p>																																																																																																																																					
																																																																																																																																					
<table border="1"> <thead> <tr> <th></th> <th>Freq MHz</th> <th>Level dBuV</th> <th>Limit Line dBuV</th> <th>Over Limit dB</th> <th>Read Level dBuV</th> <th>Factor dB</th> <th>Cable loss dB</th> <th>Aux dB</th> <th>Remark</th> </tr> </thead> <tbody> <tr><td>1</td><td>0.150</td><td>37.26</td><td>56.00</td><td>-18.74</td><td>27.32</td><td>9.66</td><td>0.08</td><td>0.20</td><td>Average</td></tr> <tr><td>2</td><td>0.150</td><td>54.77</td><td>66.00</td><td>-11.23</td><td>44.83</td><td>9.66</td><td>0.08</td><td>0.20</td><td>QP</td></tr> <tr><td>3</td><td>0.195</td><td>33.33</td><td>53.80</td><td>-20.47</td><td>23.38</td><td>9.65</td><td>0.08</td><td>0.22</td><td>Average</td></tr> <tr><td>4</td><td>0.195</td><td>47.98</td><td>63.80</td><td>-15.82</td><td>38.03</td><td>9.65</td><td>0.08</td><td>0.22</td><td>QP</td></tr> <tr><td>5</td><td>0.240</td><td>30.04</td><td>52.08</td><td>-22.04</td><td>20.05</td><td>9.65</td><td>0.08</td><td>0.26</td><td>Average</td></tr> <tr><td>6</td><td>0.240</td><td>45.09</td><td>62.08</td><td>-16.99</td><td>35.10</td><td>9.65</td><td>0.08</td><td>0.26</td><td>QP</td></tr> <tr><td>7*</td><td>1.411</td><td>41.85</td><td>46.00</td><td>-4.15</td><td>31.64</td><td>9.65</td><td>0.18</td><td>0.38</td><td>Average</td></tr> <tr><td>8</td><td>1.411</td><td>43.22</td><td>56.00</td><td>-12.78</td><td>33.01</td><td>9.65</td><td>0.18</td><td>0.38</td><td>QP</td></tr> <tr><td>9</td><td>4.224</td><td>30.30</td><td>46.00</td><td>-15.70</td><td>19.99</td><td>9.67</td><td>0.22</td><td>0.42</td><td>Average</td></tr> <tr><td>10</td><td>4.224</td><td>34.63</td><td>56.00</td><td>-21.37</td><td>24.32</td><td>9.67</td><td>0.22</td><td>0.42</td><td>QP</td></tr> <tr><td>11</td><td>26.655</td><td>32.32</td><td>50.00</td><td>-17.68</td><td>21.19</td><td>9.65</td><td>0.73</td><td>0.75</td><td>Average</td></tr> <tr><td>12</td><td>26.655</td><td>33.47</td><td>60.00</td><td>-26.53</td><td>22.34</td><td>9.65</td><td>0.73</td><td>0.75</td><td>QP</td></tr> </tbody> </table>					Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark	1	0.150	37.26	56.00	-18.74	27.32	9.66	0.08	0.20	Average	2	0.150	54.77	66.00	-11.23	44.83	9.66	0.08	0.20	QP	3	0.195	33.33	53.80	-20.47	23.38	9.65	0.08	0.22	Average	4	0.195	47.98	63.80	-15.82	38.03	9.65	0.08	0.22	QP	5	0.240	30.04	52.08	-22.04	20.05	9.65	0.08	0.26	Average	6	0.240	45.09	62.08	-16.99	35.10	9.65	0.08	0.26	QP	7*	1.411	41.85	46.00	-4.15	31.64	9.65	0.18	0.38	Average	8	1.411	43.22	56.00	-12.78	33.01	9.65	0.18	0.38	QP	9	4.224	30.30	46.00	-15.70	19.99	9.67	0.22	0.42	Average	10	4.224	34.63	56.00	-21.37	24.32	9.67	0.22	0.42	QP	11	26.655	32.32	50.00	-17.68	21.19	9.65	0.73	0.75	Average	12	26.655	33.47	60.00	-26.53	22.34	9.65	0.73	0.75	QP
	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark																																																																																																																												
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11	26.655	32.32	50.00	-17.68	21.19	9.65	0.73	0.75	Average																																																																																																																												
12	26.655	33.47	60.00	-26.53	22.34	9.65	0.73	0.75	QP																																																																																																																												
<p>Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).            Note 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).</p>																																																																																																																																					

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2437
<b>Power Phase</b>	Neutral		

Test by : Joe Liao      Temperature: 20°C      Humidity: 60%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.159	40.11	55.52	-15.41	30.18	9.69	0.08	0.16	Average
2	0.159	57.54	65.52	-7.98	47.61	9.69	0.08	0.16	QP
3	0.186	31.36	54.20	-22.84	21.43	9.68	0.08	0.17	Average
4	0.186	48.78	64.20	-15.42	38.85	9.68	0.08	0.17	QP
5	0.285	30.78	50.68	-19.90	20.84	9.67	0.08	0.19	Average
6	0.285	44.91	60.68	-15.77	34.97	9.67	0.08	0.19	QP
7*	1.411	41.66	46.00	-4.34	31.51	9.68	0.18	0.29	Average
8	1.411	42.78	56.00	-13.22	32.63	9.68	0.18	0.29	QP
9	4.224	35.59	46.00	-10.41	25.34	9.70	0.22	0.33	Average
10	4.224	39.12	56.00	-16.88	28.87	9.70	0.22	0.33	QP
11	24.792	38.58	50.00	-11.42	27.52	9.85	0.69	0.52	Average
12	24.792	39.05	60.00	-20.95	27.99	9.85	0.69	0.52	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).  
 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

## 3.2 6dB and Occupied Bandwidth

### 3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

### 3.2.2 Test Procedures

#### 6dB Bandwidth

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

#### Occupied Bandwidth

1. Set resolution bandwidth (RBW) = 1% ~ 5 % of OBW, Video bandwidth = 3 x RBW
2. Detector = Sample, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

### 3.2.3 Test Setup



### 3.2.4 Test Result of 6dB and Occupied Bandwidth

<b>Ambient Condition</b>	21°C / 66%	<b>Tested By</b>	Aska Huang
--------------------------	------------	------------------	------------

#### Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
802.11b_Nss1,(1Mbps)_2TX	8.551M	14.761M	14M8G1D	7.101M	12.735M
802.11g_Nss1,(6Mbps)_2TX	16.377M	19.537M	19M5D1D	15.942M	16.425M
802.11ax HEW20_Nss1,(MCS0)_2TX	18.841M	19.175M	19M2D1D	17.826M	18.886M

**Max-N dB** = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;  
**Min-N dB** = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

#### Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)	Port 2-N dB (Hz)	Port 2-OBW (Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	8.551M	14.761M	7.536M	13.965M
2437MHz	Pass	500k	7.609M	13.097M	7.536M	12.735M
2462MHz	Pass	500k	7.101M	13.314M	7.609M	12.88M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.942M	16.57M	16.377M	16.498M
2437MHz	Pass	500k	16.304M	18.452M	16.377M	19.537M
2462MHz	Pass	500k	16.304M	16.498M	16.304M	16.425M
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	18.551M	18.886M	18.188M	18.886M
2437MHz	Pass	500k	18.841M	19.103M	17.826M	19.175M
2462MHz	Pass	500k	18.768M	18.886M	18.043M	18.886M

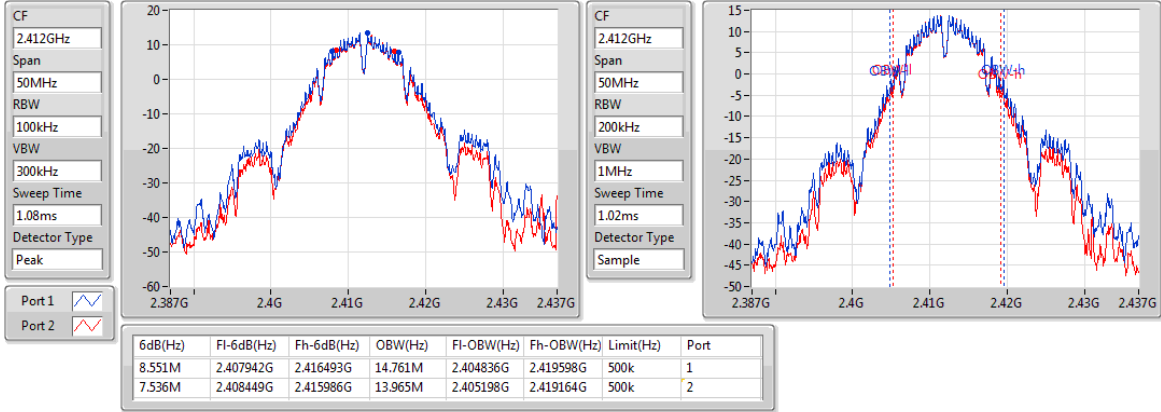
**Port X-N dB** = Port X 6dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;



### 802.11b\_Nss1,(1Mbps)\_2TX

EBW

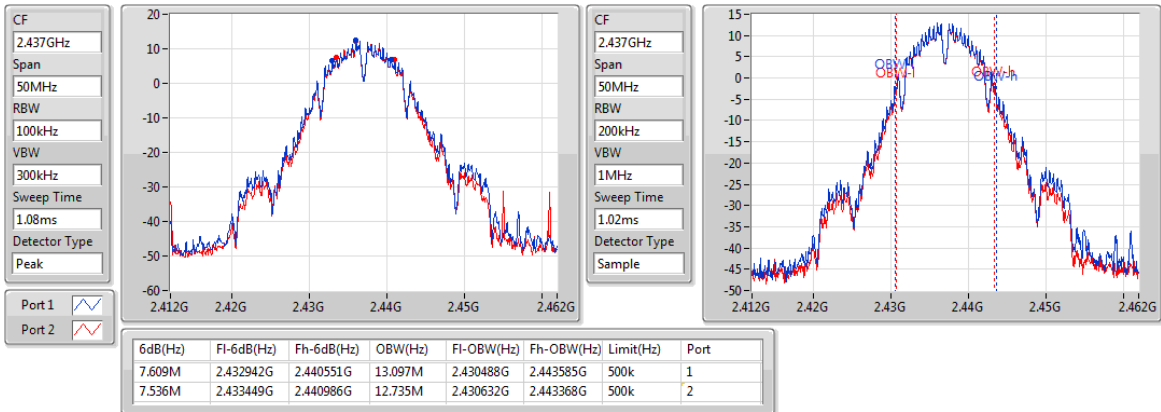
2412MHz



### 802.11b\_Nss1,(1Mbps)\_2TX

EBW

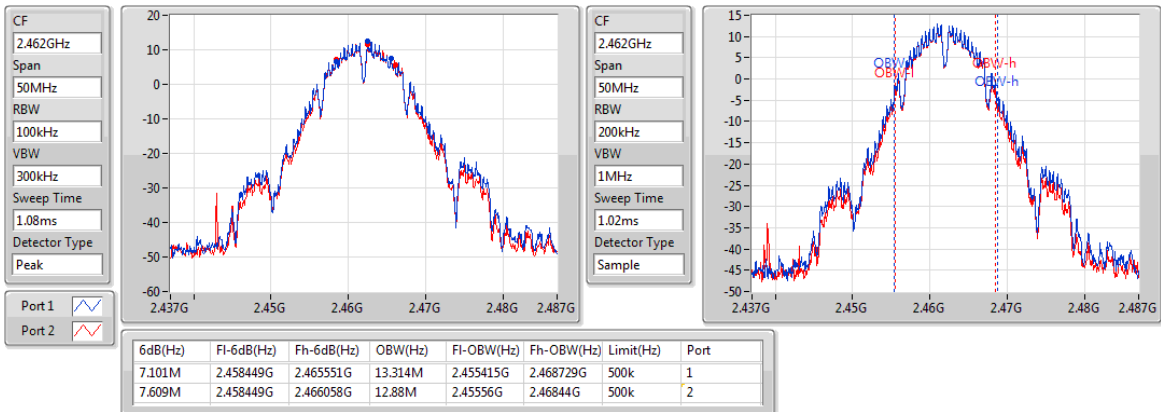
2437MHz



### 802.11b\_Nss1,(1Mbps)\_2TX

EBW

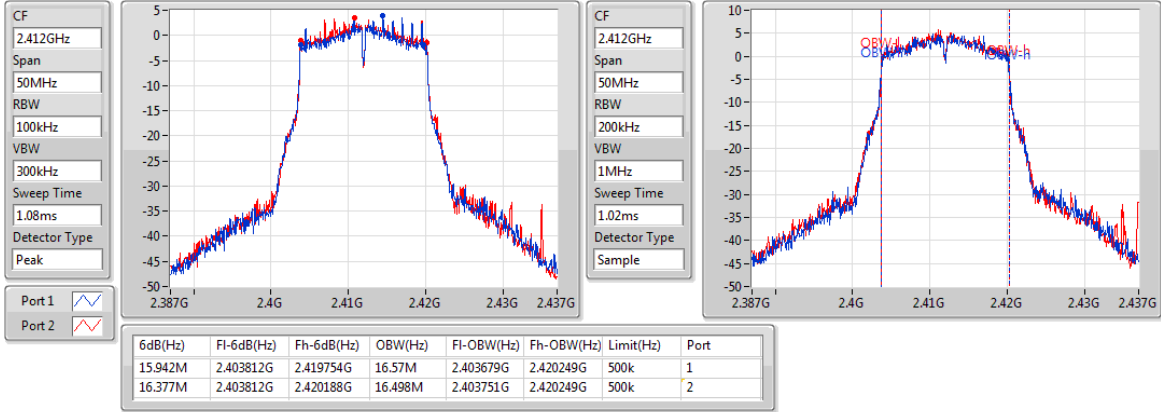
2462MHz



### 802.11g\_Nss1,(6Mbps)\_2TX

EBW

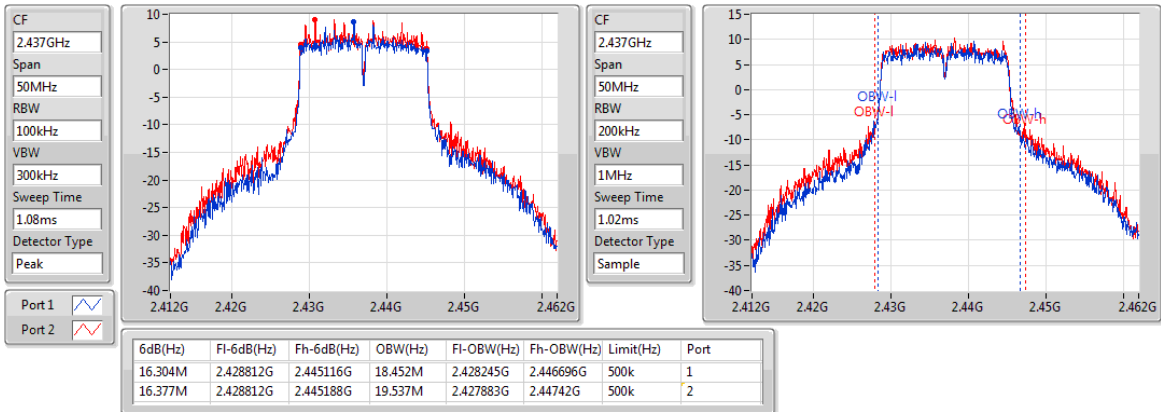
2412MHz



### 802.11g\_Nss1,(6Mbps)\_2TX

EBW

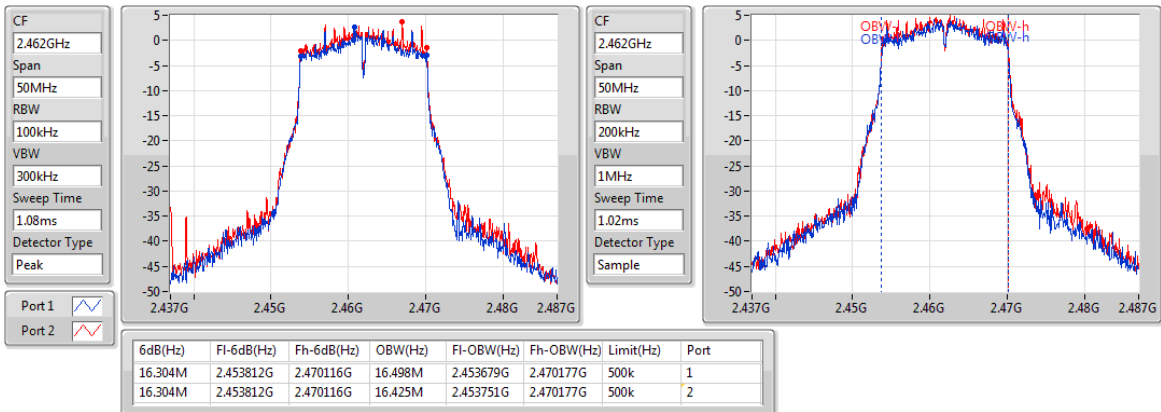
2437MHz



### 802.11g\_Nss1,(6Mbps)\_2TX

EBW

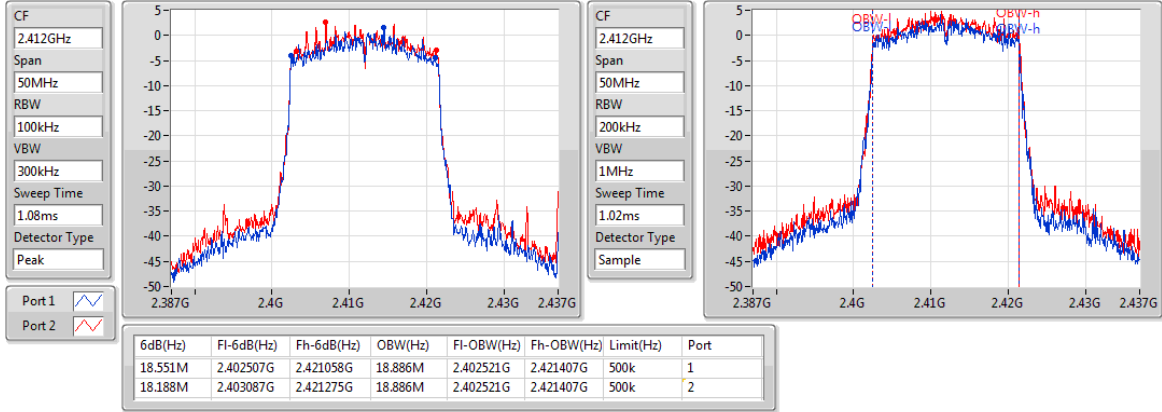
2462MHz



### 802.11ax HEW20\_Nss1,(MCS0)\_2TX

EBW

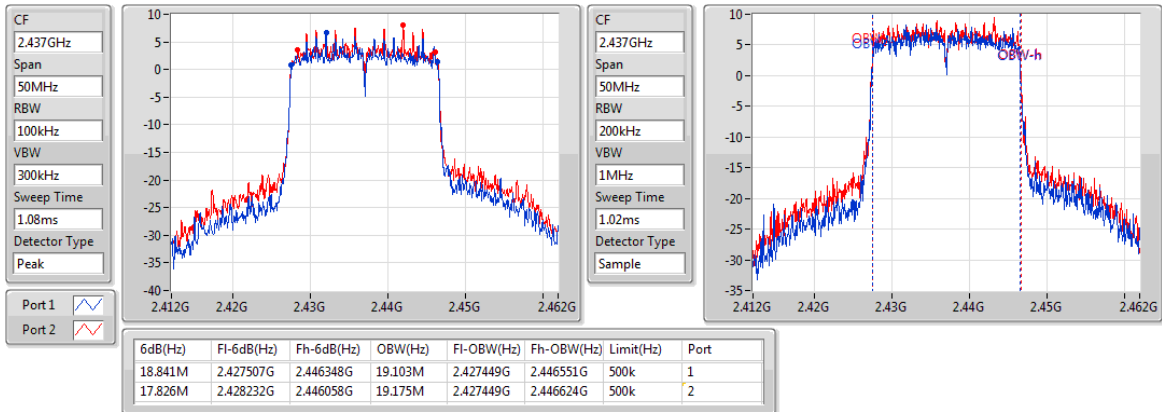
2412MHz



### 802.11ax HEW20\_Nss1,(MCS0)\_2TX

EBW

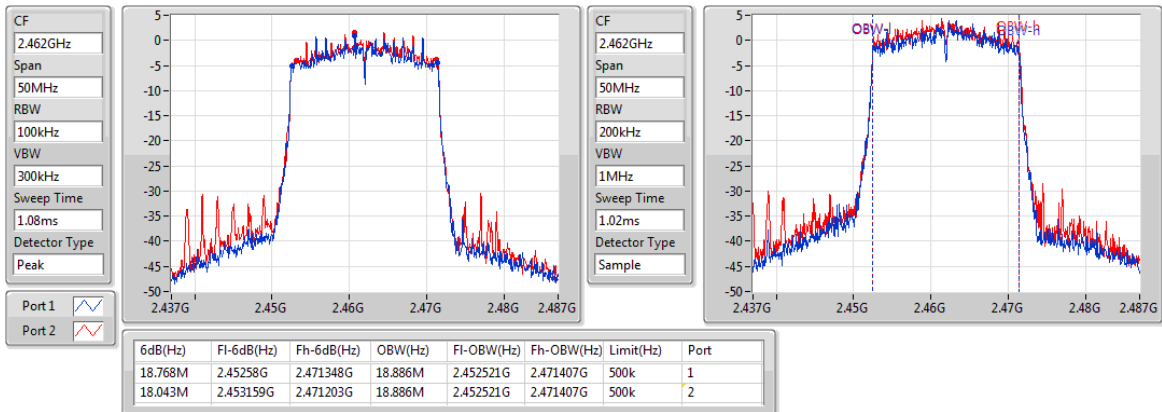
2437MHz



### 802.11ax HEW20\_Nss1,(MCS0)\_2TX

EBW

2462MHz



### 3.3 RF Output Power

#### 3.3.1 Limit of RF Output Power

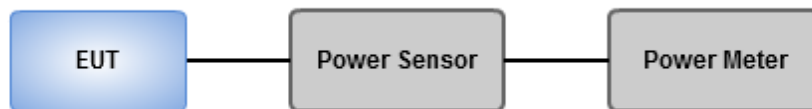
Conducted power shall not exceed 1Watt.

Antenna gain  $\leq 6\text{dBi}$ , no any corresponding reduction is in output power limit.

#### 3.3.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

#### 3.3.3 Test Setup



### 3.3.4 Test Result of Maximum Output Power

<b>Ambient Condition</b>	21°C / 66%	<b>Tested By</b>	Aska Huang
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#### *Non-beamforming mode*

#### Summary of Peak Conducted Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	26.94	0.49431
802.11g_Nss1,(6Mbps)_2TX	27.58	0.57280
802.11ax HEW20_Nss1,(MCS0)_2TX	27.53	0.56624

#### Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Port 2 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11b_Nss1, (1Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.50	23.95	23.91	26.94	30.00	31.44	36.00
2437MHz	Pass	4.50	22.91	22.98	25.96	30.00	30.46	36.00
2462MHz	Pass	4.50	22.89	22.83	25.87	30.00	30.37	36.00
802.11g_Nss1, (6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.50	23.06	23.68	26.39	30.00	30.89	36.00
2437MHz	Pass	4.50	24.45	24.68	27.58	30.00	32.08	36.00
2462MHz	Pass	4.50	23.14	23.52	26.34	30.00	30.84	36.00
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.50	22.24	23.15	25.73	30.00	30.23	36.00
2437MHz	Pass	4.50	24.41	24.62	27.53	30.00	32.03	36.00
2462MHz	Pass	4.50	22.32	23.05	25.71	30.00	30.21	36.00

**DG** = Directional Gain; **Port X** = Port X output power

### Summary of Conducted (Average) Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	24.73	0.29717
802.11g_Nss1,(6Mbps)_2TX	22.86	0.19320
802.11ax HEW20_Nss1,(MCS0)_2TX	21.29	0.13459

### Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Port 2 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11b_Nss1, (1Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.50	21.89	21.55	24.73	-	29.23	-
2437MHz	Pass	4.50	20.55	20.54	23.56	-	28.06	-
2462MHz	Pass	4.50	20.58	20.42	23.51	-	28.01	-
802.11g_Nss1, (6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.50	15.04	15.59	18.33	-	22.83	-
2437MHz	Pass	4.50	19.74	19.95	22.86	-	27.36	-
2462MHz	Pass	4.50	14.41	15.02	17.74	-	22.24	-
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	4.50	13.21	14.36	16.83	-	21.33	-
2437MHz	Pass	4.50	17.85	18.67	21.29	-	25.79	-
2462MHz	Pass	4.50	13.03	13.83	16.46	-	20.96	-

**DG** = Directional Gain; **Port X** = Port X output power

**Note : Conducted average output power is for reference only**

### Beamforming mode

#### Summary of Peak Conducted Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	24.52	0.28314

#### Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Port 2 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	7.51	19.23	20.14	22.72	28.49	30.23	36.00
2437MHz	Pass	7.51	21.4	21.61	24.52	28.49	32.03	36.00
2462MHz	Pass	7.51	19.31	20.04	22.70	28.49	30.21	36.00

**DG** = Directional Gain; **Port X** = Port X output power

Directional gain = 4.5 dBi + 10\*log(2/1) = 7.51 dBi

#### Summary of Conducted (Average) Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	18.28	0.06730

#### Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Port 2 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11ax HEW20-BF_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	7.51	10.2	11.35	13.82	-	21.33	-
2437MHz	Pass	7.51	14.84	15.66	18.28	-	25.79	-
2462MHz	Pass	7.51	10.02	10.82	13.45	-	20.96	-

**DG** = Directional Gain; **Port X** = Port X output power

Directional gain = 4.5 dBi + 10\*log(2/1) = 7.51 dBi

**Note : Conducted average output power is for reference only**

## 3.4 Power Spectral Density

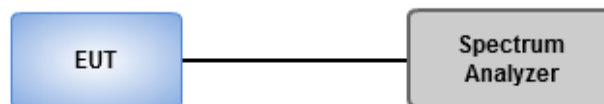
### 3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

### 3.4.2 Test Procedures

- 1 Set the RBW = 3 kHz, VBW = 10 kHz. Detector = RMS.
- 2 Sweep time = Auto
- 3 Employ trace averaging (rms) mode over a minimum of 100 traces
- 4 Use the peak marker function to determine the maximum amplitude level.
- 5 Add  $10 \log (1/x)$ , where x is the duty cycle.

### 3.4.3 Test Setup





### 3.4.4 Test Result of Power Spectral Density

<b>Ambient Condition</b>	21°C / 66%	<b>Tested By</b>	Aska Huang
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#### Summary

Mode	PD (dBm/3 kHz)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	3.13
802.11g_Nss1,(6Mbps)_2TX	-2.50
802.11ax HEW20_Nss1,(MCS0)_2TX	-5.02

#### Result

Mode	Result	DG (dBi)	Port 1 (dBm/3 kHz)	Port 2 (dBm/3 kHz)	PD (dBm/3 kHz)	PD Limit (dBm/3 kHz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.51	-0.48	-0.38	1.57	6.49
2437MHz	Pass	7.51	-1.06	1.53	3.13	6.49
2462MHz	Pass	7.51	-1.43	-1.15	0.87	6.49
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.51	-8.62	-8.92	-5.76	6.49
2437MHz	Pass	7.51	-5.97	-4.74	-2.50	6.49
2462MHz	Pass	7.51	-10.87	-8.42	-6.53	6.49
802.11ax HEW20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	7.51	-12.29	-11.45	-9.54	6.49
2437MHz	Pass	7.51	-8.53	-7.04	-5.02	6.49
2462MHz	Pass	7.51	-12.99	-12.33	-10.31	6.49

**DG** = Directional Gain;

Directional gain =  $4.5 \text{ dBi} + 10 \cdot \log(2/1) = 7.51 \text{ dBi} > 6 \text{ dBi}$ , Limit shall be reduced to  $8 \text{ dBm} - (7.51 \text{ dBi} - 6 \text{ dBi}) = 6.49 \text{ dBm}$

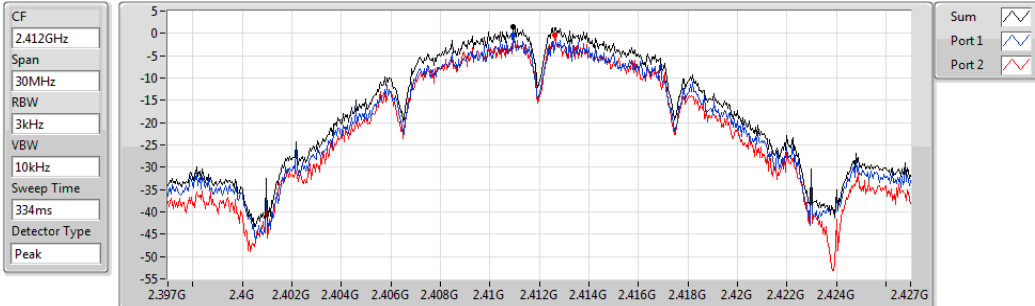
**PD** = trace bin-by-bin of each transmits port summing can be performed maximum power density;

**Port X** = Port X power density;

### 802.11b\_Nss1,(1Mbps)\_2TX

PSD

2412MHz

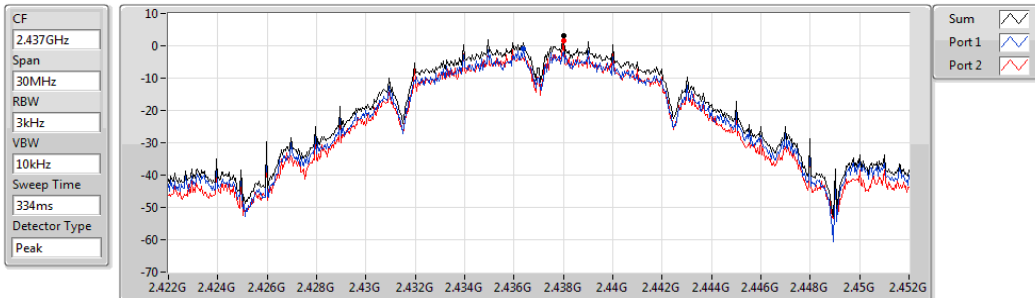


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
1.57	1.57	-0.48	-0.38

### 802.11b\_Nss1,(1Mbps)\_2TX

PSD

2437MHz

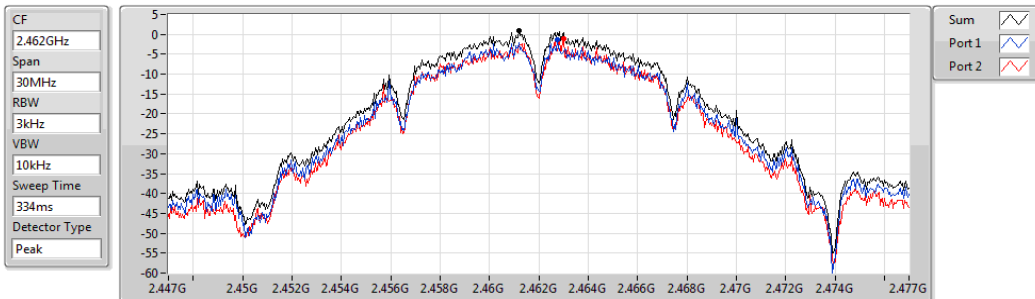


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
3.13	3.13	-1.06	1.53

### 802.11b\_Nss1,(1Mbps)\_2TX

PSD

2462MHz

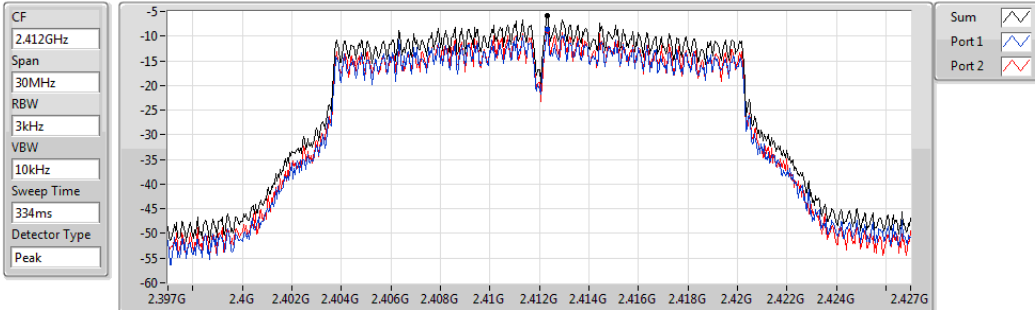


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
0.87	0.87	-1.43	-1.15

### 802.11g\_Nss1,(6Mbps)\_2TX

PSD

2412MHz

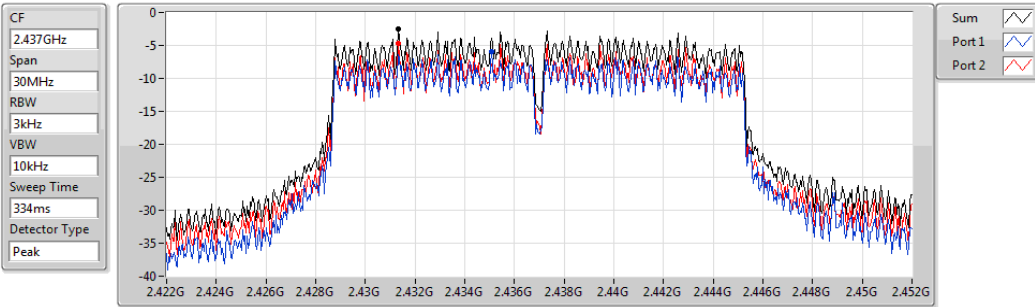


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.76	-5.76	-8.62	-8.92

### 802.11g\_Nss1,(6Mbps)\_2TX

PSD

2437MHz

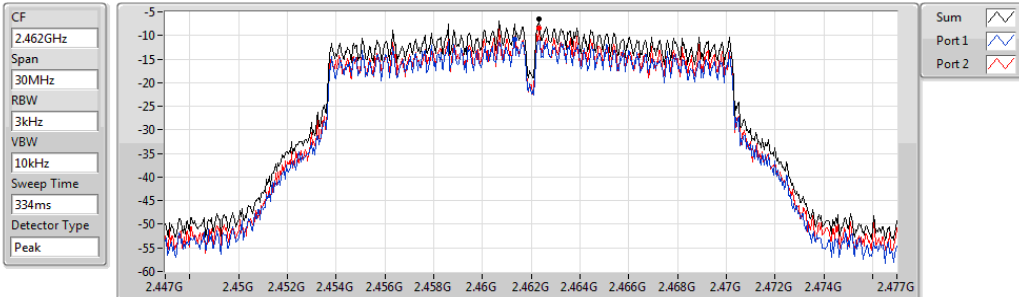


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-2.50	-2.50	-5.97	-4.74

### 802.11g\_Nss1,(6Mbps)\_2TX

PSD

2462MHz

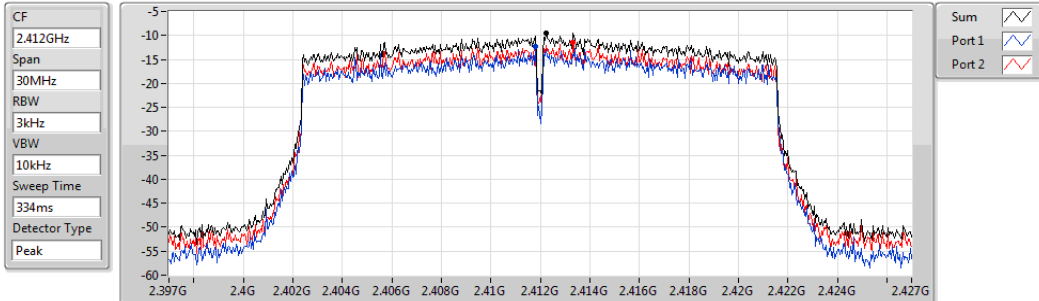


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-6.53	-6.53	-10.87	-8.42

### 802.11ax HEW20\_Nss1,(MCS0)\_2TX

PSD

2412MHz

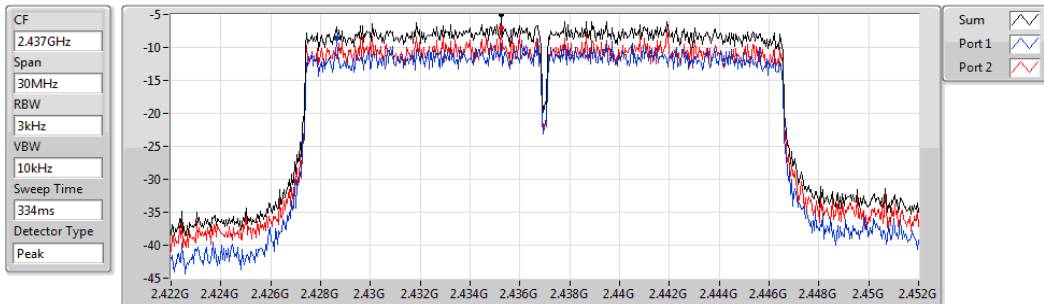


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-9.54	-9.54	-12.29	-11.45

### 802.11ax HEW20\_Nss1,(MCS0)\_2TX

PSD

2437MHz

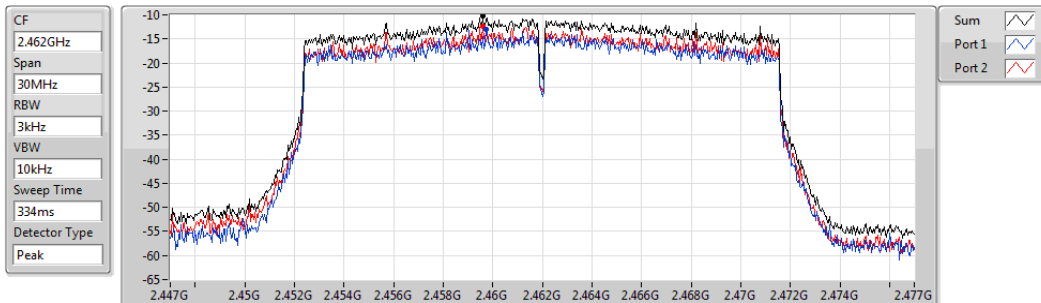


Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.02	-5.02	-8.53	-7.04

### 802.11ax HEW20\_Nss1,(MCS0)\_2TX

PSD

2462MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-10.31	-10.31	-12.99	-12.33

## 3.5 Unwanted Emissions into Restricted Frequency Bands

### 3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

**Note 1:**  
Quasi-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit

**Note 2:**  
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

### 3.5.2 Test Procedures

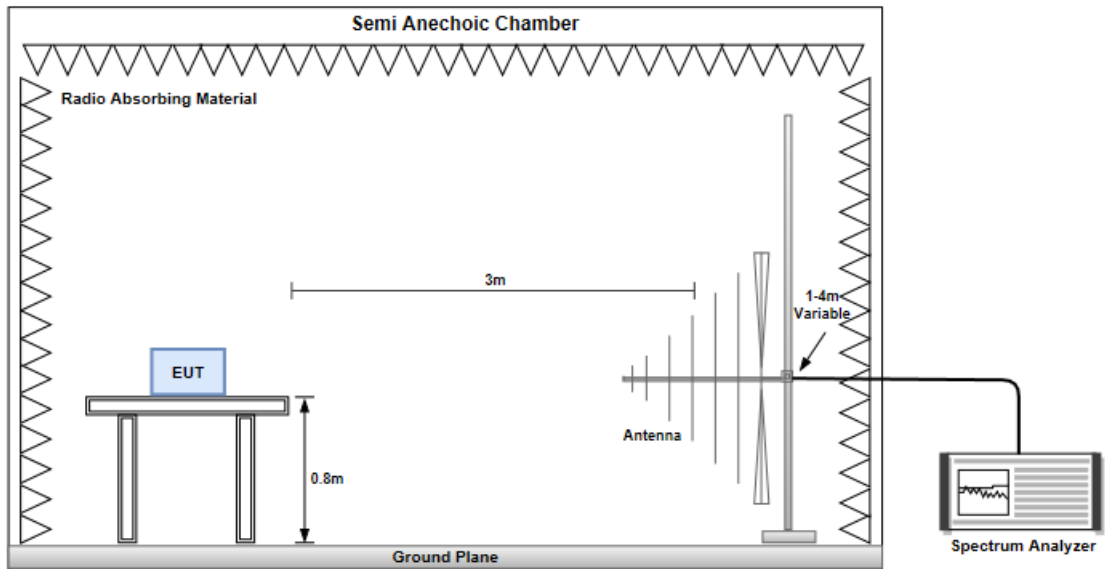
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

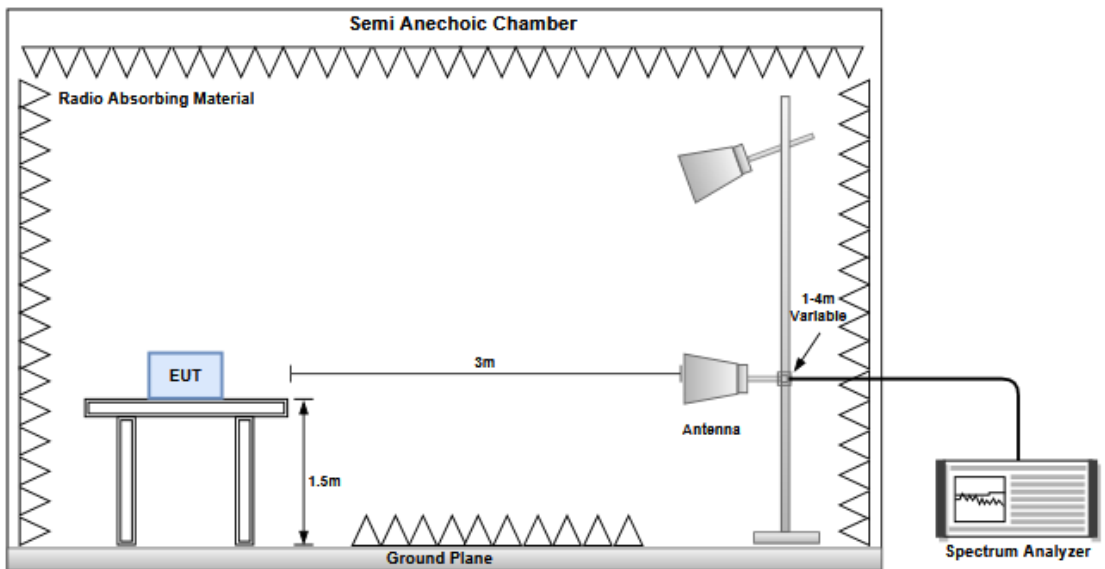
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

### 3.5.3 Test Setup

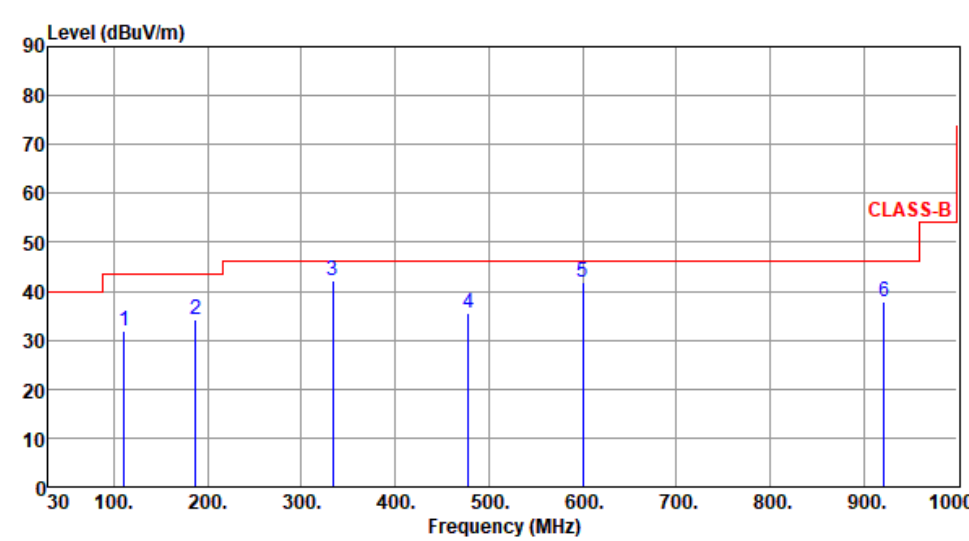
#### Radiated Emissions below 1 GHz



#### Radiated Emissions above 1 GHz

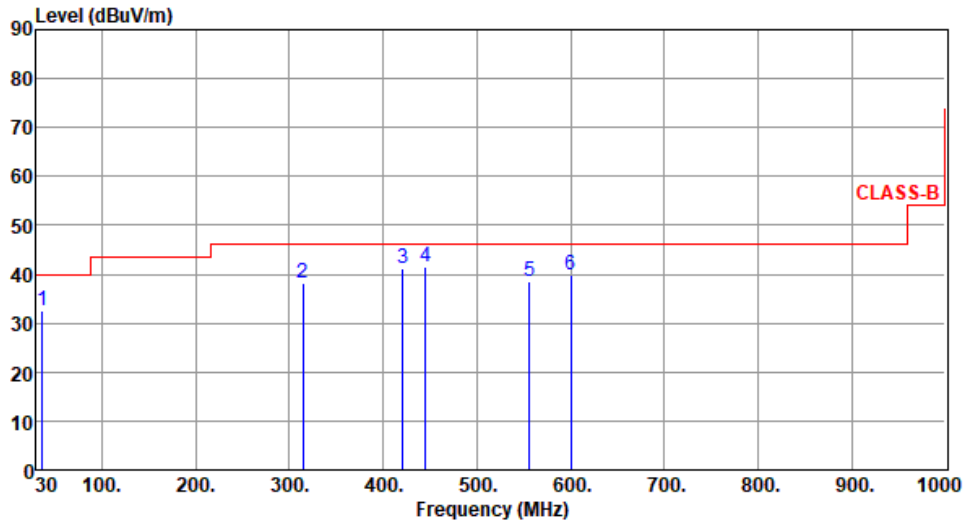


### 3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2437																																																																													
<b>Polarization</b>	Horizontal																																																																															
Test By : Roger Lu      Temperature(°C):23      Humidity(%):65																																																																																
																																																																																
	<table border="1"> <thead> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> </thead> <tbody> <tr> <td>110.51</td> <td>187.14</td> <td>333.61</td> <td>478.14</td> <td>600.36</td> <td>921.43</td> </tr> </tbody> </table>	1	2	3	4	5	6	110.51	187.14	333.61	478.14	600.36	921.43	<table border="1"> <thead> <tr> <th>Emission level</th> <th>Limit</th> <th>Margin</th> <th>SA reading</th> <th>Factor</th> <th>Remark</th> <th>ANT High</th> <th>Turn Table</th> </tr> <tr> <th>dBuV/m</th> <th>dBuV/m</th> <th>dB</th> <th>dBuV</th> <th>dB/m</th> <th></th> <th>cm</th> <th>deg</th> </tr> </thead> <tbody> <tr> <td>31.94</td> <td>43.50</td> <td>-11.56</td> <td>43.62</td> <td>-11.68</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>34.34</td> <td>43.50</td> <td>-9.16</td> <td>45.37</td> <td>-11.03</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>42.04</td> <td>46.00</td> <td>-3.96</td> <td>49.40</td> <td>-7.36</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>35.38</td> <td>46.00</td> <td>-10.62</td> <td>39.18</td> <td>-3.80</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>41.94</td> <td>46.00</td> <td>-4.06</td> <td>42.95</td> <td>-1.01</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> <tr> <td>38.00</td> <td>46.00</td> <td>-8.00</td> <td>34.03</td> <td>3.97</td> <td>Peak</td> <td>---</td> <td>---</td> </tr> </tbody> </table>	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table	dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg	31.94	43.50	-11.56	43.62	-11.68	Peak	---	---	34.34	43.50	-9.16	45.37	-11.03	Peak	---	---	42.04	46.00	-3.96	49.40	-7.36	Peak	---	---	35.38	46.00	-10.62	39.18	-3.80	Peak	---	---	41.94	46.00	-4.06	42.95	-1.01	Peak	---	---	38.00	46.00	-8.00	34.03	3.97	Peak	---	---		
1	2	3	4	5	6																																																																											
110.51	187.14	333.61	478.14	600.36	921.43																																																																											
Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table																																																																									
dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg																																																																									
31.94	43.50	-11.56	43.62	-11.68	Peak	---	---																																																																									
34.34	43.50	-9.16	45.37	-11.03	Peak	---	---																																																																									
42.04	46.00	-3.96	49.40	-7.36	Peak	---	---																																																																									
35.38	46.00	-10.62	39.18	-3.80	Peak	---	---																																																																									
41.94	46.00	-4.06	42.95	-1.01	Peak	---	---																																																																									
38.00	46.00	-8.00	34.03	3.97	Peak	---	---																																																																									
<p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)            *Factor includes antenna factor , cable loss and amplifier gain            Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).            Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.</p>																																																																																

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2437
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):23      Humidity(%):65



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	36.79	32.57	40.00	-7.43	41.73	-9.16	Peak	---	---
2	314.21	38.28	46.00	-7.72	45.98	-7.70	Peak	---	---
3	420.91	41.27	46.00	-4.73	46.37	-5.10	Peak	---	---
4	445.06	41.64	46.00	-4.36	46.00	-4.36	QP	100	155
5	555.74	38.56	46.00	-7.44	40.87	-2.31	Peak	---	---
6	600.36	39.95	46.00	-6.05	40.96	-1.01	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

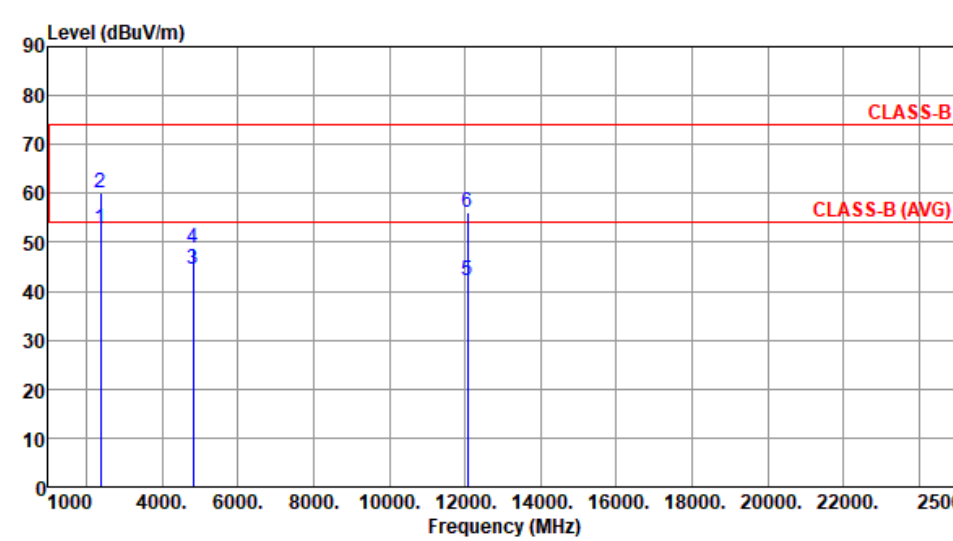
\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.



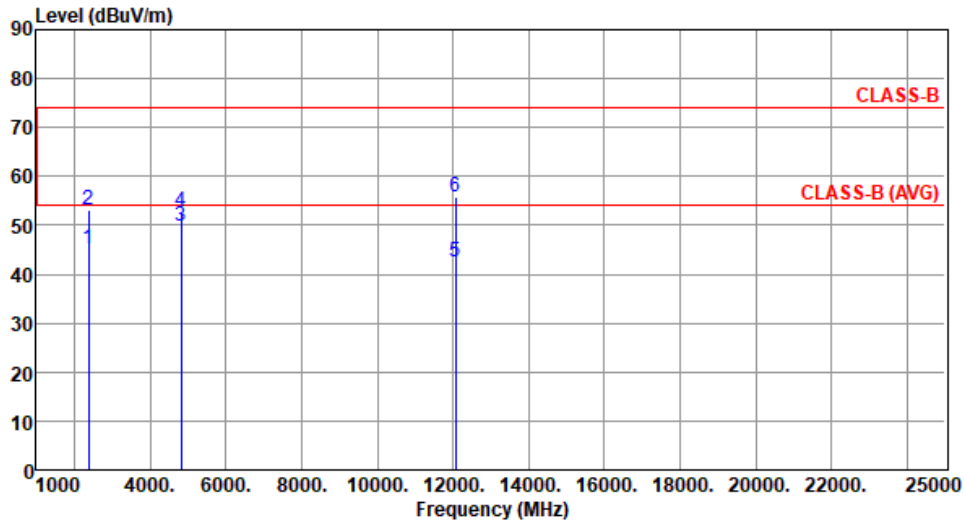
### 3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11b

<b>Modulation</b>	11b	<b>Test Freq. (MHz)</b>	2412						
<b>Polarization</b>	Horizontal								
Test By : Roger Lu      Temperature(°C):22      Humidity(%):67									
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg
1	2390.00	52.64	54.00	-1.36	55.39	-2.75	Average	378	342
2	2390.00	60.07	74.00	-13.93	62.82	-2.75	Peak	378	342
3	4824.00	44.36	54.00	-9.64	40.22	4.14	Average	100	330
4	4824.00	48.69	74.00	-25.31	44.55	4.14	Peak	100	330
5	12060.00	42.22	54.00	-11.78	28.43	13.79	Average	100	333
6	12060.00	56.23	74.00	-17.77	42.44	13.79	Peak	100	333

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)  
\*Factor includes antenna factor , cable loss and amplifier gain  
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11b	<b>Test Freq. (MHz)</b>	2412
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	45.13	54.00	-8.87	47.88	-2.75	Average	100	276
2	2390.00	53.13	74.00	-20.87	55.88	-2.75	Peak	100	276
3	4824.00	49.82	54.00	-4.18	45.68	4.14	Average	117	161
4	4824.00	52.89	74.00	-21.11	48.75	4.14	Peak	117	161
5	12060.00	42.44	54.00	-11.56	28.65	13.79	Average	100	116
6	12060.00	55.67	74.00	-18.33	41.88	13.79	Peak	100	116

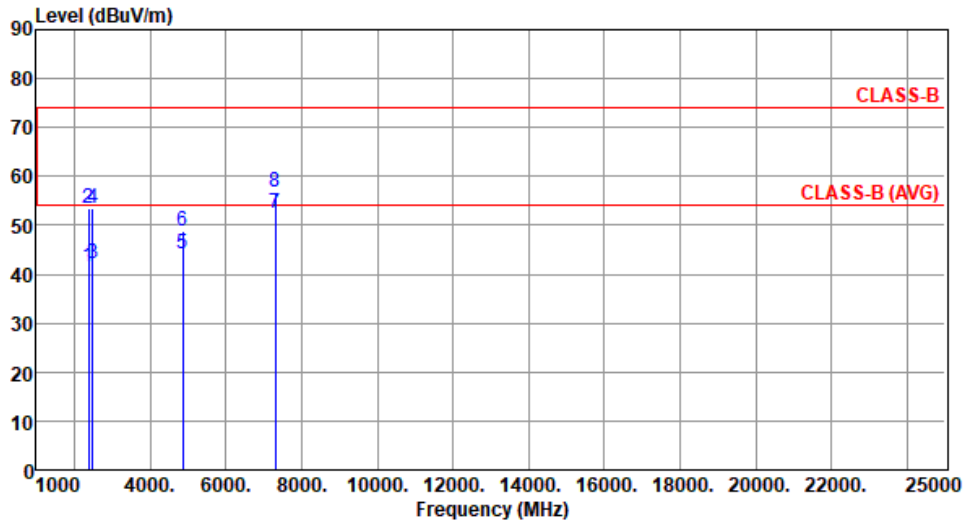
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11b	<b>Test Freq. (MHz)</b>	2437
<b>Polarization</b>	Horizontal		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	41.40	54.00	-12.60	44.15	-2.75	Average	348	289
2	2390.00	53.53	74.00	-20.47	56.28	-2.75	Peak	348	289
3	2483.50	42.12	54.00	-11.88	44.82	-2.70	Average	348	289
4	2483.50	53.39	74.00	-20.61	56.09	-2.70	Peak	348	289
5	4874.00	44.18	54.00	-9.82	40.05	4.13	Average	100	329
6	4874.00	48.89	74.00	-25.11	44.76	4.13	Peak	100	329
7	7311.00	52.42	54.00	-1.58	43.14	9.28	Average	100	116
8	7311.00	56.71	74.00	-17.29	47.43	9.28	Peak	100	116

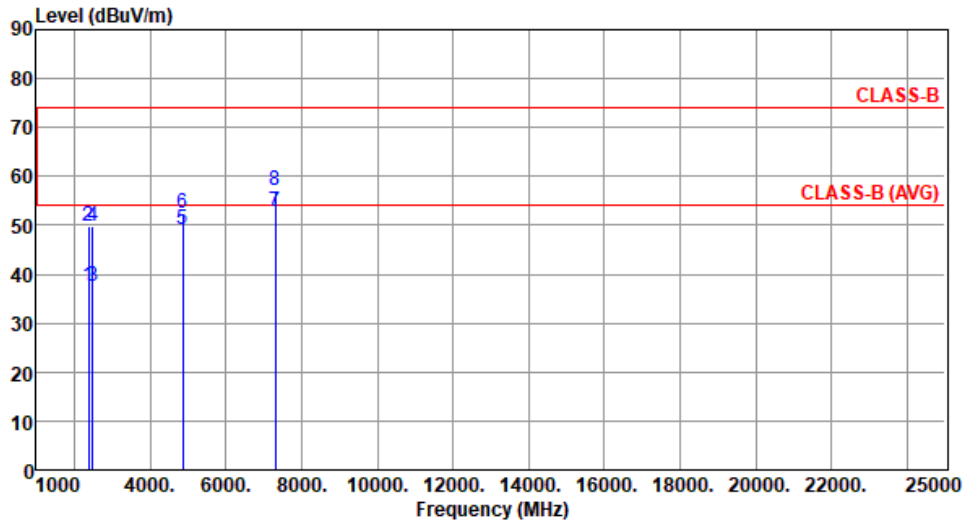
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11b	<b>Test Freq. (MHz)</b>	2437
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	37.51	54.00	-16.49	40.26	-2.75	Average	100	268
2	2390.00	49.81	74.00	-24.19	52.56	-2.75	Peak	100	268
3	2483.50	37.58	54.00	-16.42	40.28	-2.70	Average	100	268
4	2483.50	49.86	74.00	-24.14	52.56	-2.70	Peak	100	268
5	4874.00	49.26	54.00	-4.74	45.13	4.13	Average	100	161
6	4874.00	52.50	74.00	-21.50	48.37	4.13	Peak	100	161
7	7311.00	52.92	54.00	-1.08	43.64	9.28	Average	100	308
8	7311.00	56.99	74.00	-17.01	47.71	9.28	Peak	100	308

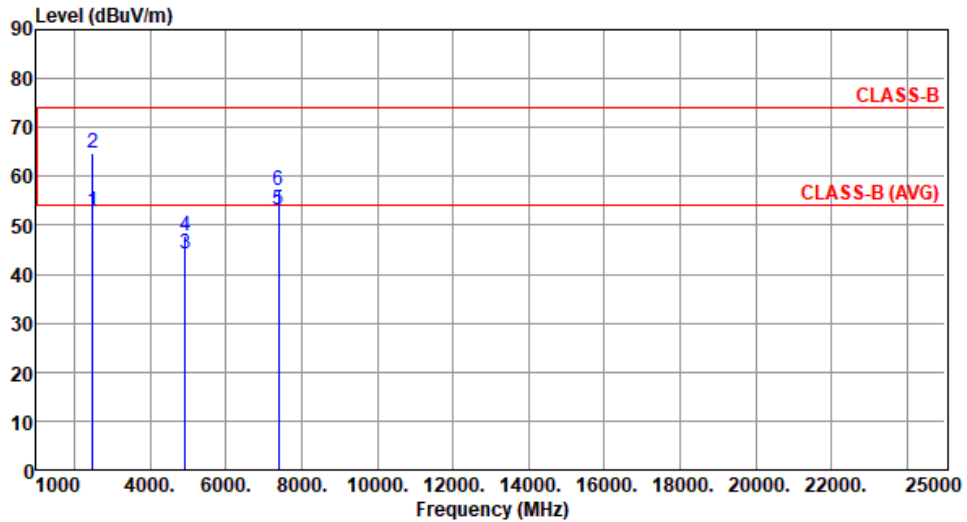
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11b	<b>Test Freq. (MHz)</b>	2462
<b>Polarization</b>	Horizontal		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2483.50	52.89	54.00	-1.11	55.59	-2.70	Average	347	281
2	2483.50	64.66	74.00	-9.34	67.36	-2.70	Peak	347	281
3	4924.00	44.17	54.00	-9.83	40.11	4.06	Average	100	331
4	4924.00	47.92	74.00	-26.08	43.86	4.06	Peak	100	331
5	7386.00	53.00	54.00	-1.00	43.75	9.25	Average	100	115
6	7386.00	57.09	74.00	-16.91	47.84	9.25	Peak	100	115

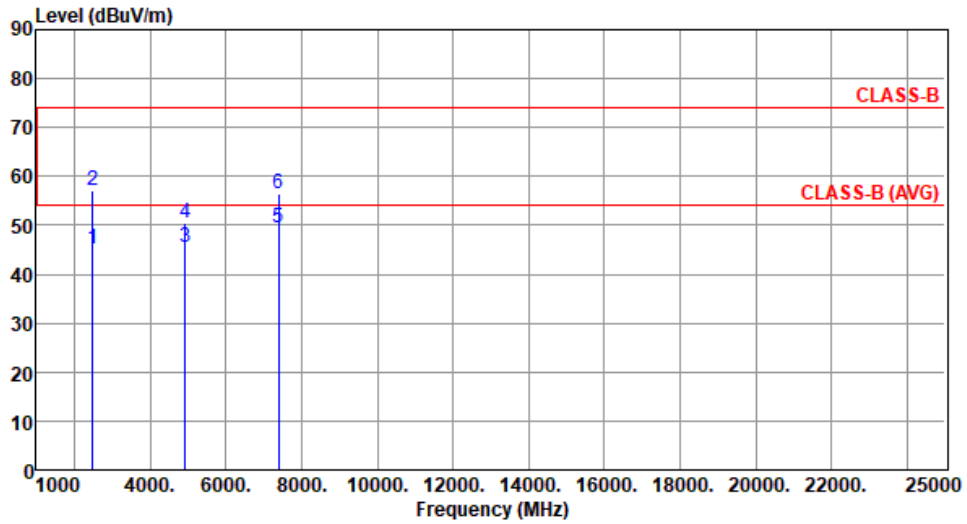
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11b	<b>Test Freq. (MHz)</b>	2462
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



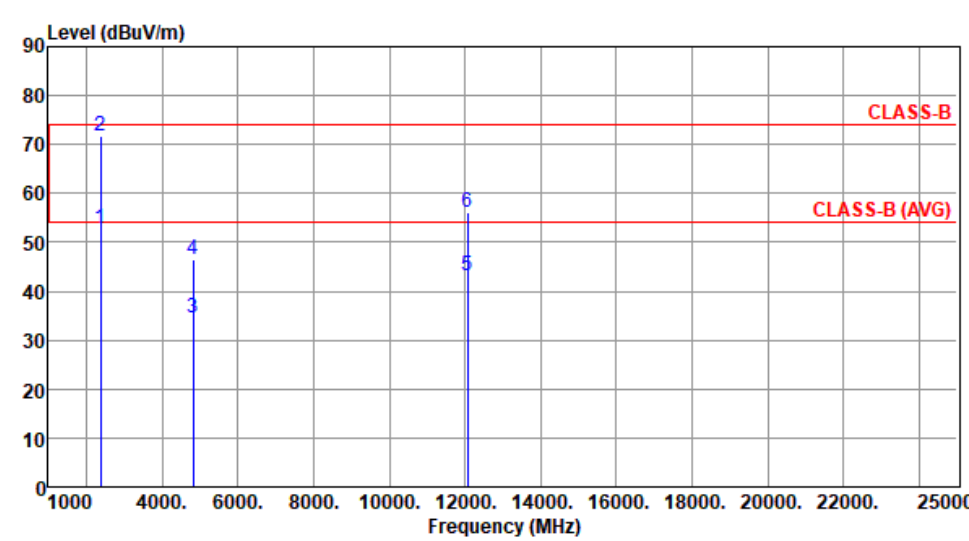
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2483.50	45.26	54.00	-8.74	47.96	-2.70	Average	100	271
2	2483.50	57.25	74.00	-16.75	59.95	-2.70	Peak	100	271
3	4924.00	45.63	54.00	-8.37	41.57	4.06	Average	100	159
4	4924.00	50.36	74.00	-23.64	46.30	4.06	Peak	100	159
5	7386.00	49.51	54.00	-4.49	40.26	9.25	Average	100	287
6	7386.00	56.50	74.00	-17.50	47.25	9.25	Peak	100	287

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

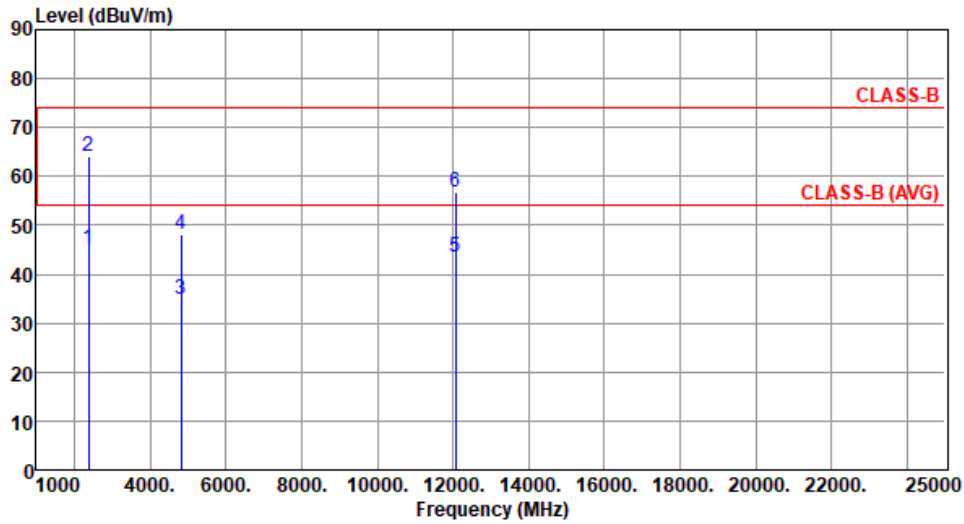
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

### 3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11g

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2412						
<b>Polarization</b>	Horizontal								
Test By : Roger Lu      Temperature(°C):22      Humidity(%):67									
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg
1	2390.00	52.91	54.00	-1.09	55.66	-2.75	Average	337	307
2	2390.00	71.72	74.00	-2.28	74.47	-2.75	Peak	337	307
3	4824.00	34.57	54.00	-19.43	30.43	4.14	Average	100	332
4	4824.00	46.42	74.00	-27.58	42.28	4.14	Peak	100	332
5	12060.00	43.18	54.00	-10.82	29.39	13.79	Average	100	303
6	12060.00	56.22	74.00	-17.78	42.43	13.79	Peak	100	303
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).									

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2412
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	45.23	54.00	-8.77	47.98	-2.75	Average	100	278
2	2390.00	64.13	74.00	-9.87	66.88	-2.75	Peak	100	278
3	4824.00	34.82	54.00	-19.18	30.68	4.14	Average	100	159
4	4824.00	48.02	74.00	-25.98	43.88	4.14	Peak	100	159
5	12060.00	43.55	54.00	-10.45	29.76	13.79	Average	100	165
6	12060.00	56.66	74.00	-17.34	42.87	13.79	Peak	100	165

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

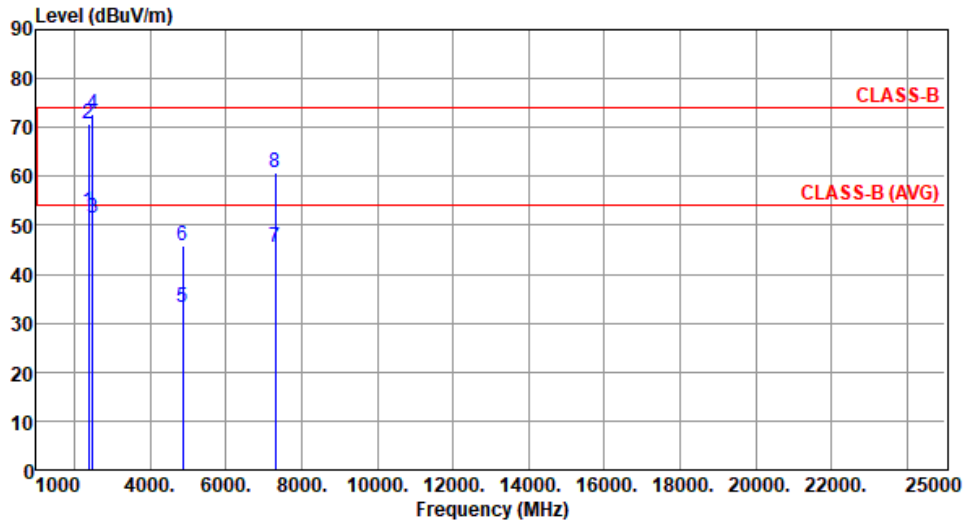
\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).



<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2437
<b>Polarization</b>	Horizontal		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	52.93	54.00	-1.07	55.68	-2.75	Average	286	302
2	2390.00	70.76	74.00	-3.24	73.51	-2.75	Peak	286	302
3	2483.50	51.40	54.00	-2.60	54.10	-2.70	Average	304	302
4	2483.50	72.58	74.00	-1.42	75.28	-2.70	Peak	304	302
5	4874.00	33.34	54.00	-20.66	29.21	4.13	Average	100	331
6	4874.00	45.81	74.00	-28.19	41.68	4.13	Peak	100	331
7	7311.00	45.33	54.00	-8.67	36.05	9.28	Average	100	118
8	7311.00	60.69	74.00	-13.31	51.41	9.28	Peak	100	118

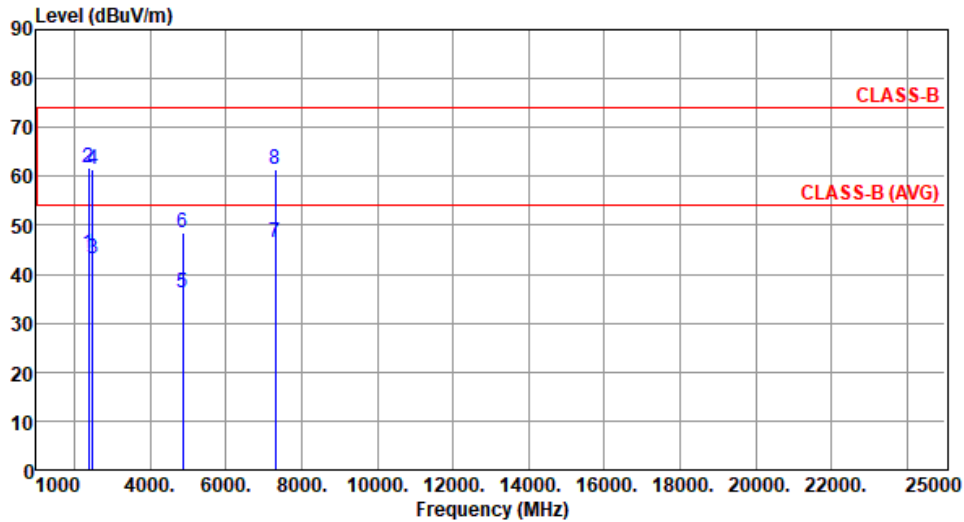
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2437
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	44.14	54.00	-9.86	46.89	-2.75	Average	105	264
2	2390.00	61.84	74.00	-12.16	64.59	-2.75	Peak	105	264
3	2483.50	43.09	54.00	-10.91	45.79	-2.70	Average	105	264
4	2483.50	61.46	74.00	-12.54	64.16	-2.70	Peak	105	264
5	4874.00	36.27	54.00	-17.73	32.14	4.13	Average	100	163
6	4874.00	48.51	74.00	-25.49	44.38	4.13	Peak	100	163
7	7311.00	46.47	54.00	-7.53	37.19	9.28	Average	100	305
8	7311.00	61.52	74.00	-12.48	52.24	9.28	Peak	100	305

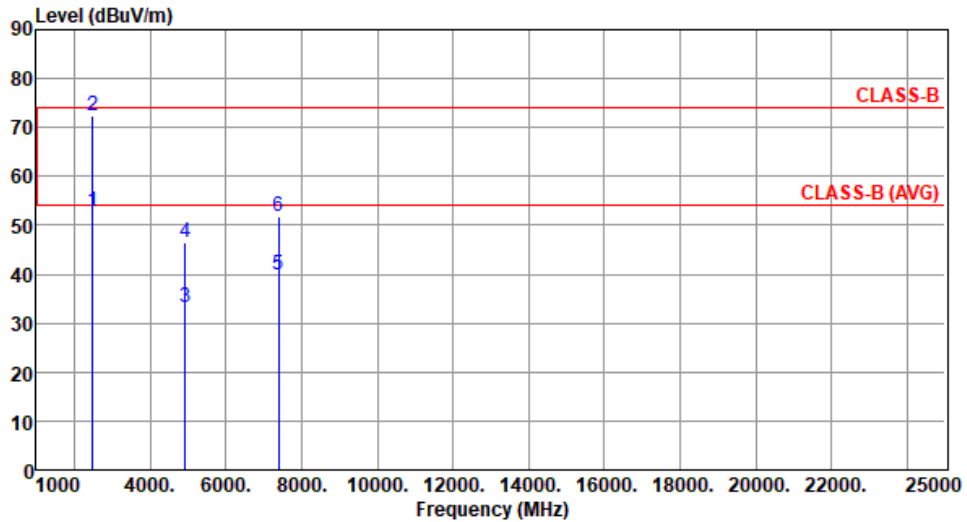
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2462
<b>Polarization</b>	Horizontal		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2483.50	52.94	54.00	-1.06	55.64	-2.70	Average	302	297
2	2483.50	72.44	74.00	-1.56	75.14	-2.70	Peak	302	297
3	4924.00	33.17	54.00	-20.83	29.11	4.06	Average	100	309
4	4924.00	46.51	74.00	-27.49	42.45	4.06	Peak	100	309
5	7386.00	39.80	54.00	-14.20	30.55	9.25	Average	100	114
6	7386.00	51.73	74.00	-22.27	42.48	9.25	Peak	100	114

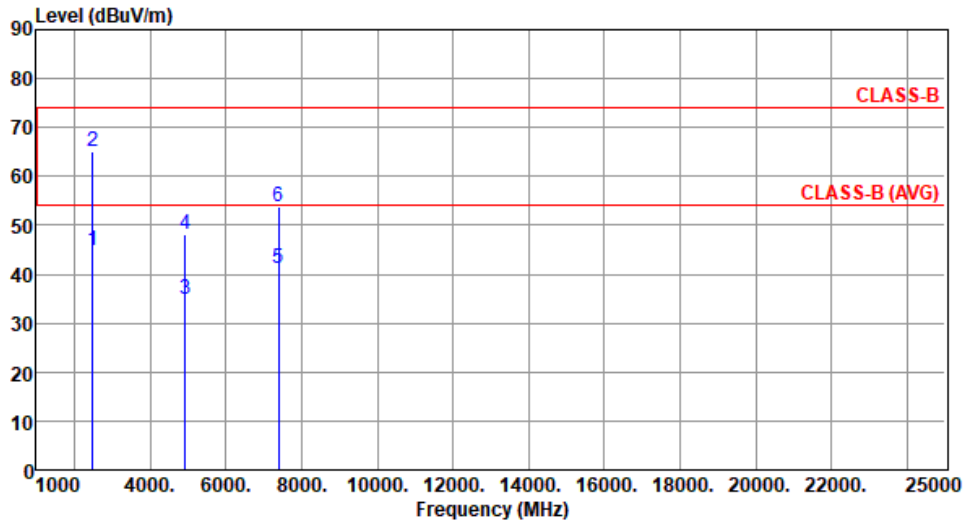
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	11g	<b>Test Freq. (MHz)</b>	2462
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



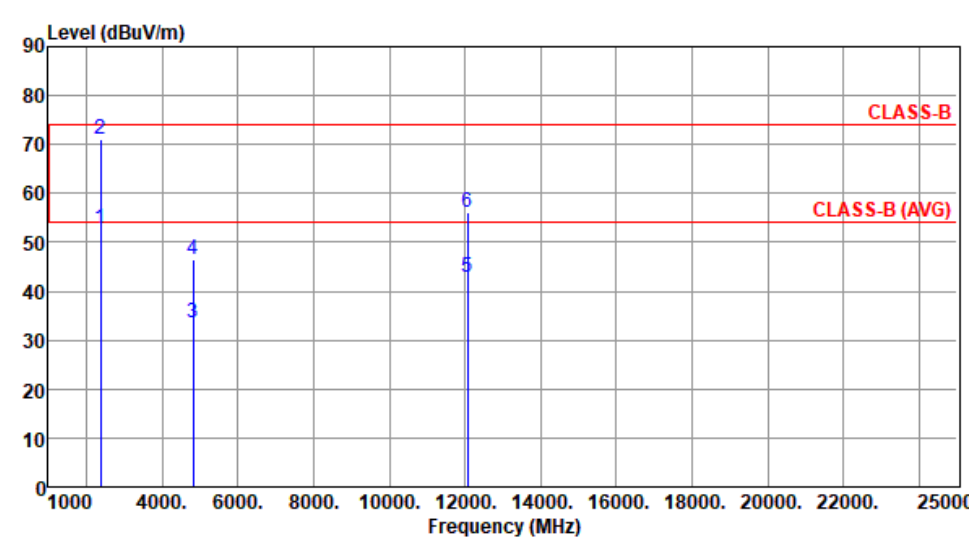
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2483.50	44.99	54.00	-9.01	47.69	-2.70	Average	100	280
2	2483.50	64.93	74.00	-9.07	67.63	-2.70	Peak	100	280
3	4924.00	34.75	54.00	-19.25	30.69	4.06	Average	100	155
4	4924.00	48.01	74.00	-25.99	43.95	4.06	Peak	100	155
5	7386.00	41.13	54.00	-12.87	31.88	9.25	Average	100	301
6	7386.00	53.80	74.00	-20.20	44.55	9.25	Peak	100	301

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

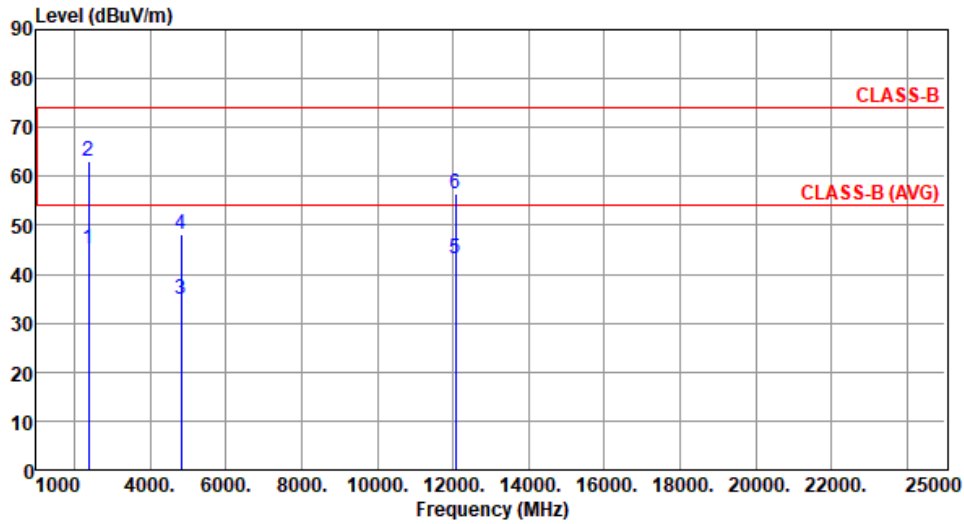
### 3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HE20

<b>Modulation</b>	HE20	<b>Test Freq. (MHz)</b>	2412						
<b>Polarization</b>	Horizontal								
Test By : Roger Lu      Temperature(°C):22      Humidity(%):67									
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg
1	2390.00	52.92	54.00	-1.08	55.67	-2.75	Average	327	286
2	2390.00	70.97	74.00	-3.03	73.72	-2.75	Peak	327	286
3	4824.00	33.44	54.00	-20.56	29.30	4.14	Average	100	336
4	4824.00	46.54	74.00	-27.46	42.40	4.14	Peak	100	336
5	12060.00	42.97	54.00	-11.03	29.18	13.79	Average	100	340
6	12060.00	56.06	74.00	-17.94	42.27	13.79	Peak	100	340

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)  
 \*Factor includes antenna factor , cable loss and amplifier gain  
 Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	HE20	<b>Test Freq. (MHz)</b>	2412
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	45.10	54.00	-8.90	47.85	-2.75	Average	100	275
2	2390.00	63.10	74.00	-10.90	65.85	-2.75	Peak	100	275
3	4824.00	35.02	54.00	-18.98	30.88	4.14	Average	100	180
4	4824.00	48.10	74.00	-25.90	43.96	4.14	Peak	100	180
5	12060.00	43.33	54.00	-10.67	29.54	13.79	Average	100	177
6	12060.00	56.33	74.00	-17.67	42.54	13.79	Peak	100	177

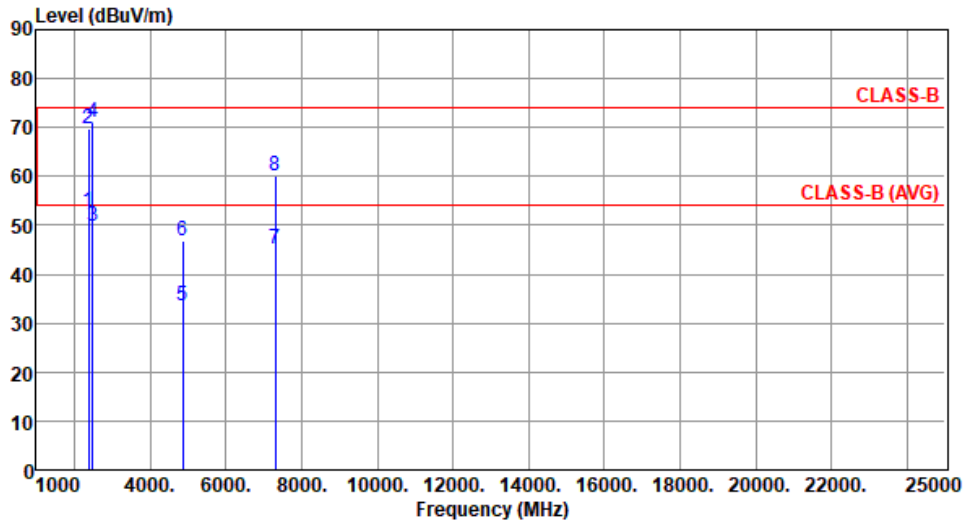
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBUV/m) – Limit (dBUV/m).

<b>Modulation</b>	HE20	<b>Test Freq. (MHz)</b>	2437
<b>Polarization</b>	Horizontal		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	52.81	54.00	-1.19	55.56	-2.75	Average	329	301
2	2390.00	69.79	74.00	-4.21	72.54	-2.75	Peak	329	301
3	2483.50	49.89	54.00	-4.11	52.59	-2.70	Average	312	289
4	2483.50	71.20	74.00	-2.80	73.90	-2.70	Peak	312	289
5	4874.00	33.63	54.00	-20.37	29.50	4.13	Average	100	338
6	4874.00	46.68	74.00	-27.32	42.55	4.13	Peak	100	338
7	7311.00	45.12	54.00	-8.88	35.84	9.28	Average	100	117
8	7311.00	60.14	74.00	-13.86	50.86	9.28	Peak	100	117

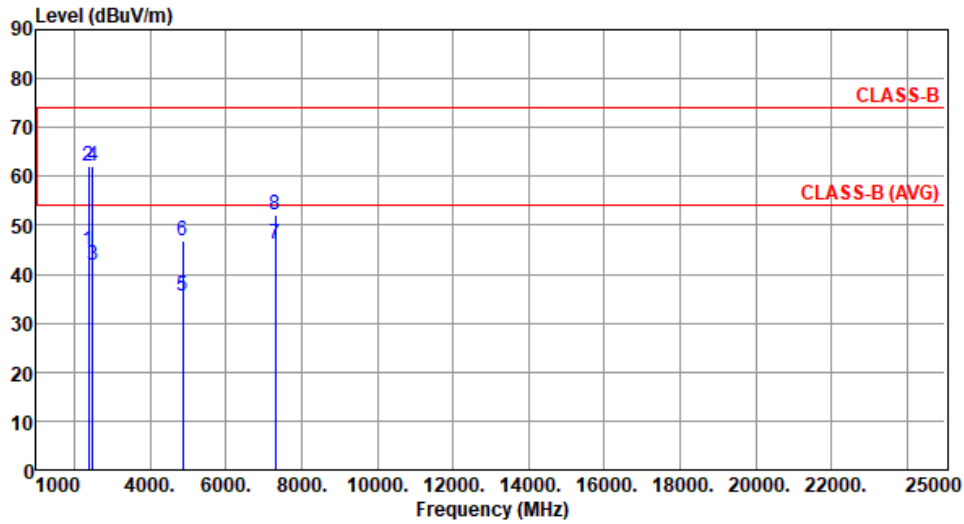
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	HE20	<b>Test Freq. (MHz)</b>	2437
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2390.00	44.82	54.00	-9.18	47.57	-2.75	Average	100	273
2	2390.00	62.13	74.00	-11.87	64.88	-2.75	Peak	100	273
3	2483.50	41.96	54.00	-12.04	44.66	-2.70	Average	100	273
4	2483.50	62.18	74.00	-11.82	64.88	-2.70	Peak	100	273
5	4874.00	35.68	54.00	-18.32	31.55	4.13	Average	100	155
6	4874.00	46.99	74.00	-27.01	42.86	4.13	Peak	100	155
7	7311.00	46.16	54.00	-7.84	36.88	9.28	Average	100	303
8	7311.00	52.05	74.00	-21.95	42.77	9.28	Peak	100	303

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

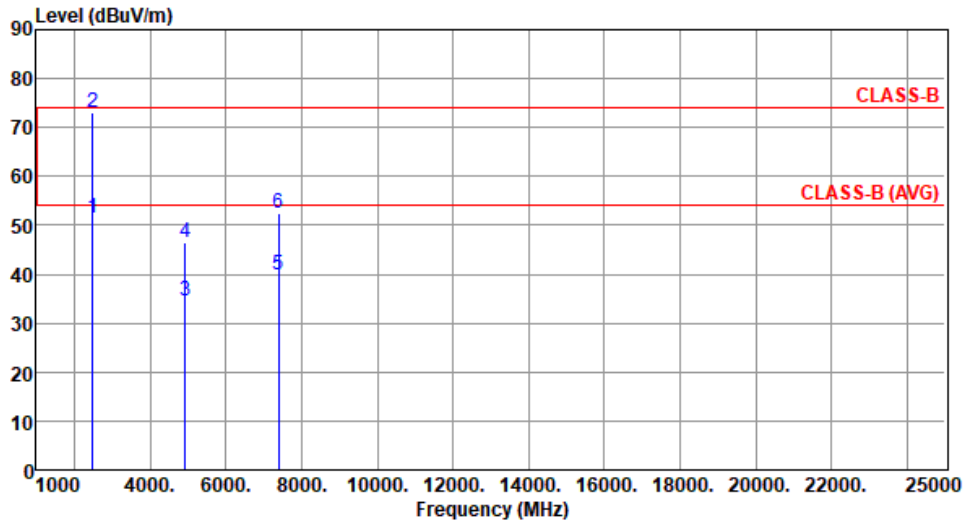
\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).



<b>Modulation</b>	HE20	<b>Test Freq. (MHz)</b>	2462
<b>Polarization</b>	Horizontal		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2483.58	51.32	54.00	-2.68	54.02	-2.70	Average	301	289
2	2483.58	72.91	74.00	-1.09	75.61	-2.70	Peak	301	289
3	4924.00	34.47	54.00	-19.53	30.41	4.06	Average	100	325
4	4924.00	46.38	74.00	-27.62	42.32	4.06	Peak	100	325
5	7386.00	39.83	54.00	-14.17	30.58	9.25	Average	100	117
6	7386.00	52.50	74.00	-21.50	43.25	9.25	Peak	100	117

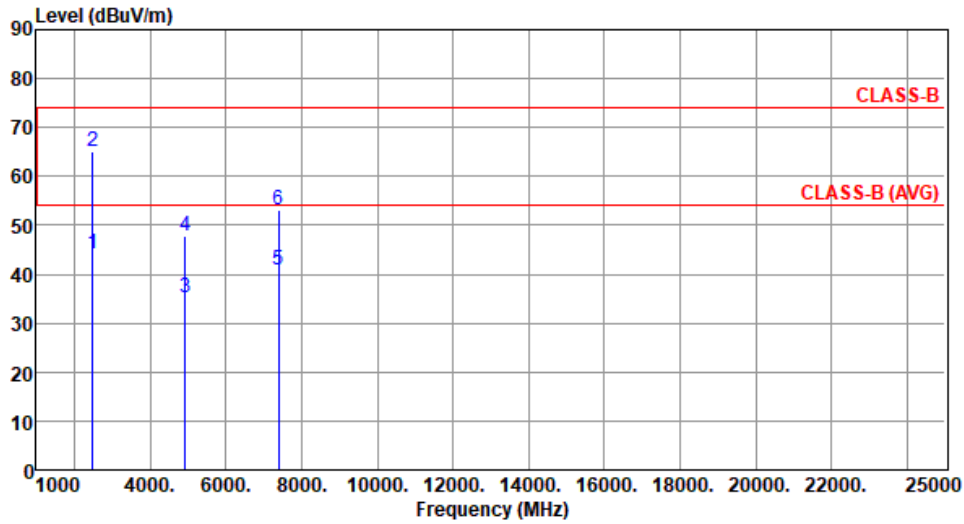
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation</b>	HE20	<b>Test Freq. (MHz)</b>	2462
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):22      Humidity(%):67



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2483.58	44.16	54.00	-9.84	46.86	-2.70	Average	100	277
2	2483.58	65.16	74.00	-8.84	67.86	-2.70	Peak	100	277
3	4924.00	35.05	54.00	-18.95	30.99	4.06	Average	100	159
4	4924.00	47.75	74.00	-26.25	43.69	4.06	Peak	100	159
5	7386.00	40.94	54.00	-13.06	31.69	9.25	Average	100	300
6	7386.00	53.10	74.00	-20.90	43.85	9.25	Peak	100	300

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor\* (dB/m)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

## 3.6 Emissions in Non-Restricted Frequency Bands

### 3.6.1 Emissions in Non-Restricted Frequency Bands Limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

### 3.6.2 Test Procedures

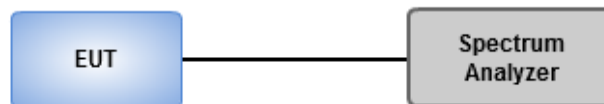
#### Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

#### Emission level measurement

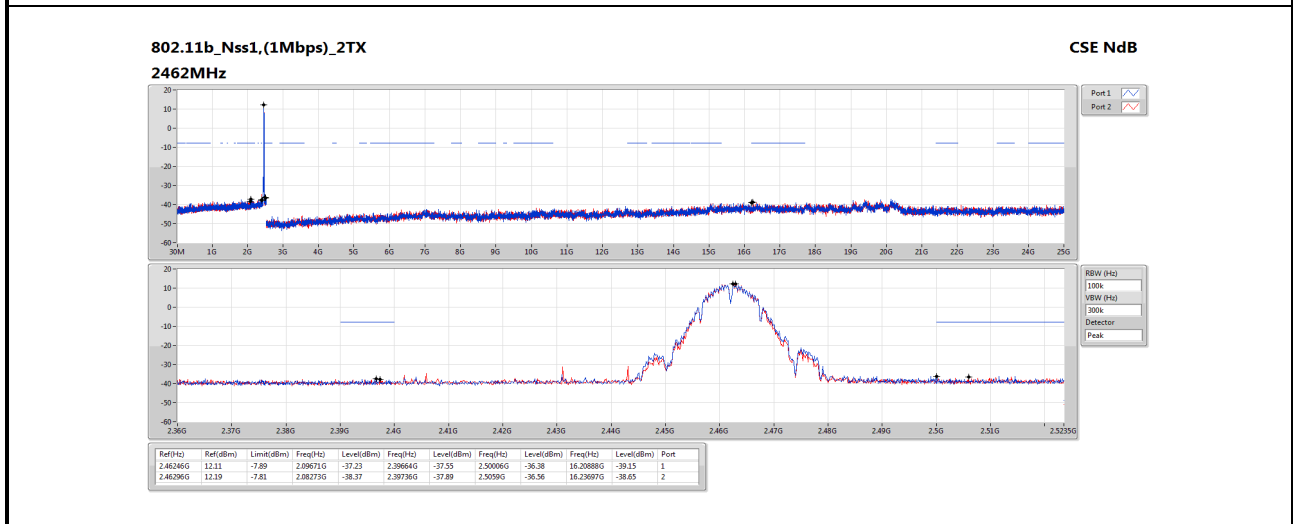
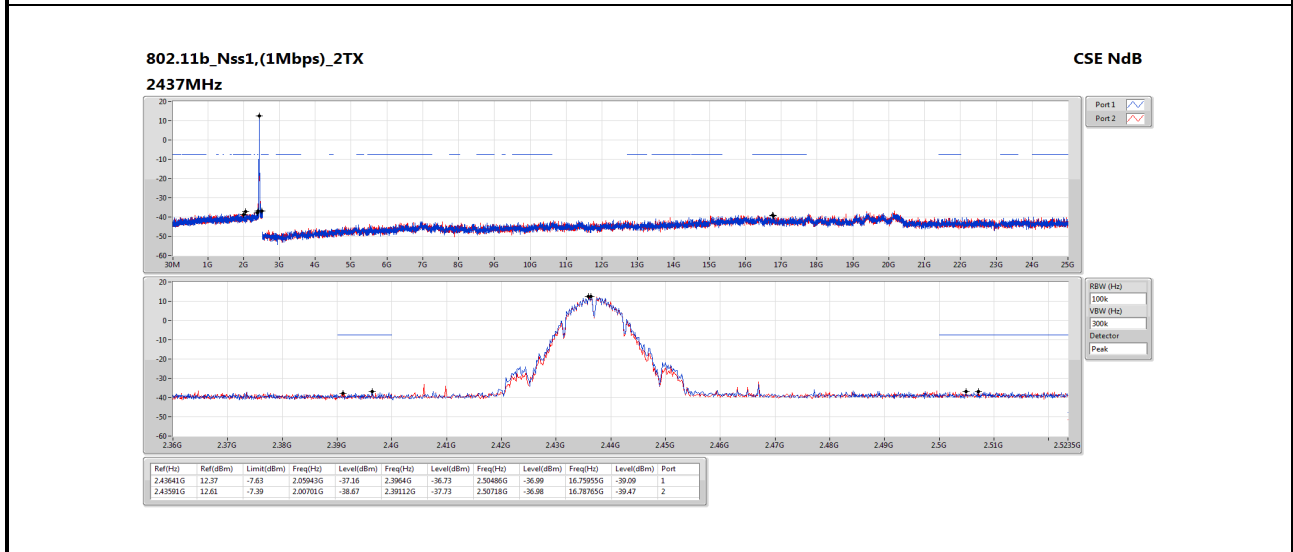
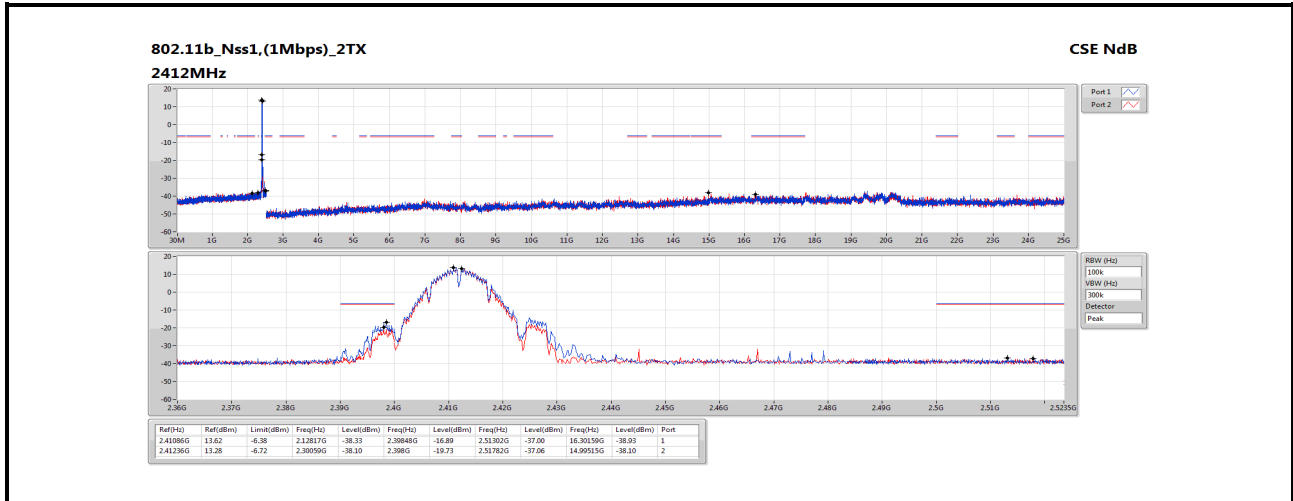
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

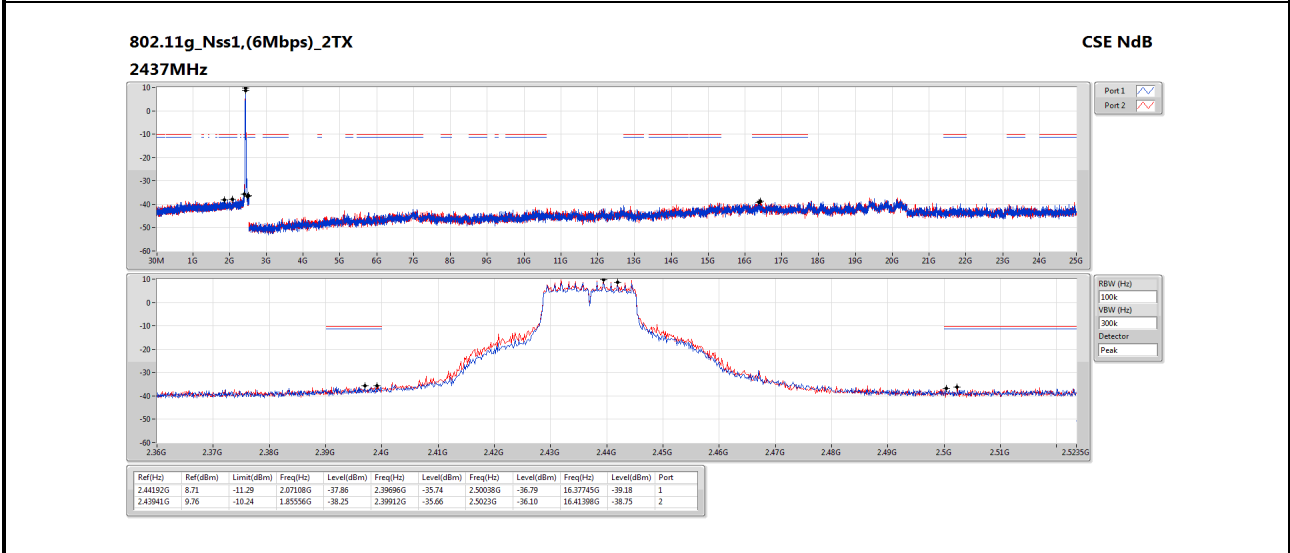
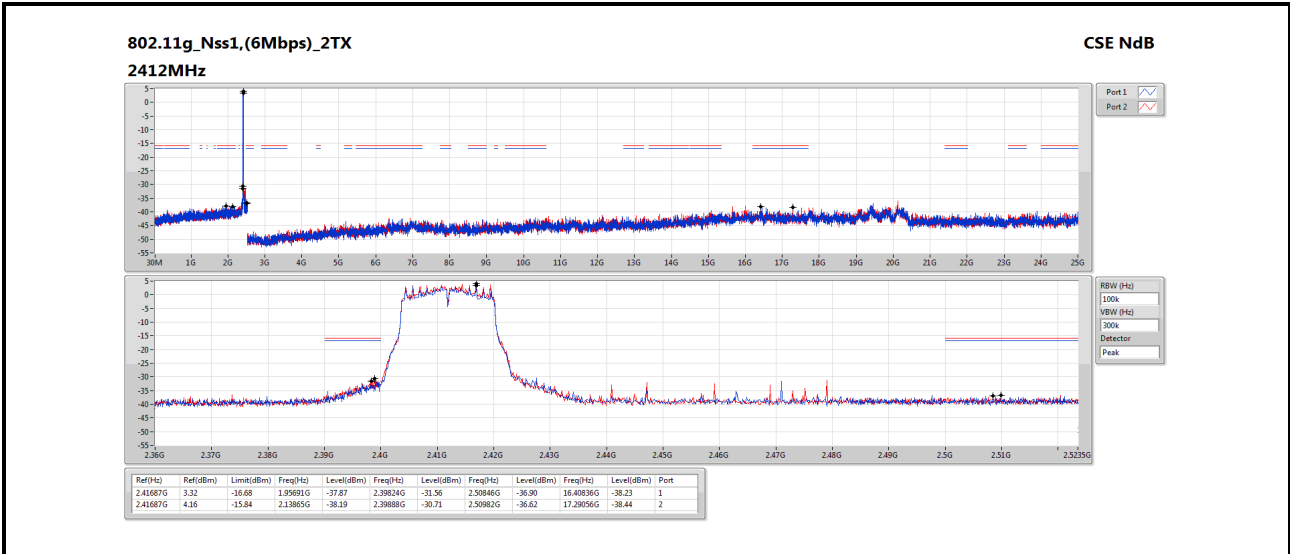
### 3.6.3 Test Setup

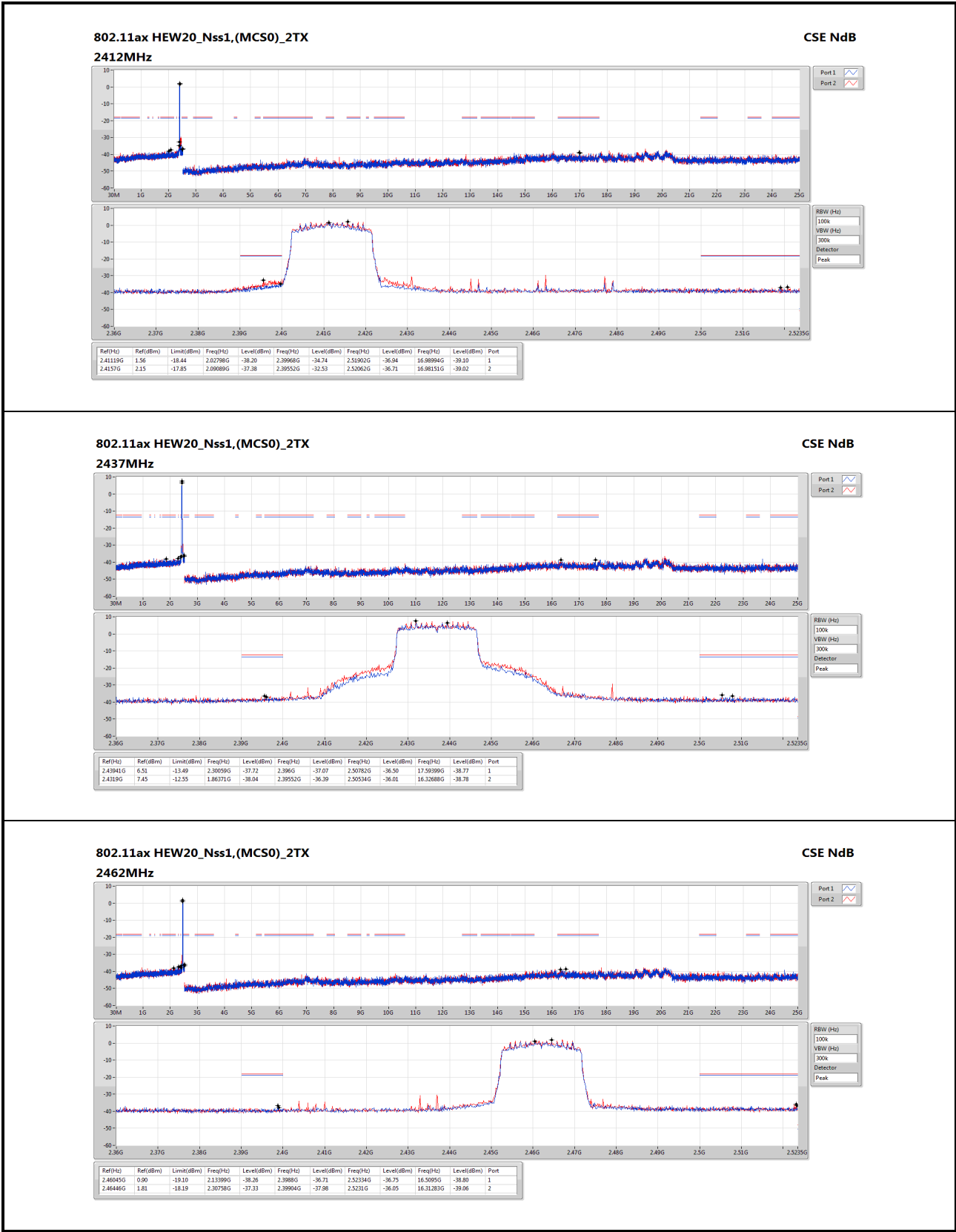


### 3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands

Ambient Condition	21°C / 66%	Tested By	Aska Huang
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## 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

### **Linkou**

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou  
District, New Taipei City, Taiwan  
(R.O.C.)

### **Kwei Shan**

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)  
No.2-1, Lane 6, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 33381, Taiwan (R.O.C.)

### **Kwei Shan Site II**

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd  
St., Kwei Shan Dist., Tao Yuan  
City 333, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC\_Service@icertifi.com.tw

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