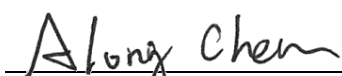


FCC Test Report

FCC ID : 2AAS9-MO10
Equipment : Wi-Fi 6 AX6600 Tri-Radio Outdoor Mesh Router
Model No. : MO10
Brand Name : PRISM
Applicant : Browan Communications Incorporation
Address : No.15-1, Zhonghua Rd., Hsinchu Industrial Park, Hukou Hsinchu Hsien Taiwan 303
Standard : 47 CFR FCC Part 15.247
Received Date : Oct. 12, 2021
Tested Date : Oct. 15 ~ Nov. 23, 2021

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 may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:



Along Chen / Assistant Manager

Approved by:



Gary Chang / Manager



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Local Support Equipment List	8
1.3	Test Setup Chart	8
1.4	The Equipment List	9
1.5	Test Standards	10
1.6	Reference Guidance	10
1.7	Deviation from Test Standard and Measurement Procedure.....	10
1.8	Measurement Uncertainty	11
2	TEST CONFIGURATION.....	12
2.1	Testing Facility	12
2.2	The Worst Test Modes and Channel Details	12
3	TRANSMITTER TEST RESULTS	13
3.1	Conducted Emissions.....	13
3.2	6dB and Occupied Bandwidth.....	16
3.3	RF Output Power.....	22
3.4	Power Spectral Density	25
3.5	Unwanted Emissions into Restricted Frequency Bands	31
3.6	Emissions in Non-Restricted Frequency Bands.....	59
4	TEST LABORATORY INFORMATION	64

Release Record

Report No.	Version	Description	Issued Date
FR1O1201AC	Rev. 01	Initial issue	Dec. 16, 2021

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.474MHz 35.43 (Margin -11.02dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz 52.99 (Margin -1.01dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 28.11	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 _{TX})	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	n (HT40)	2422-2452	3-9 [7]	2	MCS 0-15
2400-2483.5	ax (HE20)	2412-2462	1-11 [11]	2	MCS 0-11
2400-2483.5	ax (HE40)	2422-2452	3-9 [7]	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.

1.1.2 Antenna Details

Ant. No.	Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)		
				2400~2483.5	5150~5250	5725~5850
1	ANT3	Dipole	N type	5.6	4.3	--
2	ANT1	Dipole	N type	7.4	5.3	--
3	ANT6	Dipole	N type	--	--	4.9
4	ANT2	Dipole	N type	--	--	6.8
5	ANT5	Dipole	N type	--	--	4.8
6	ANT4	Dipole	N type	--	--	6.3

1.1.3 Radio Details

Radio	Function
1	5.15 GHz ~ 5.35 GHz, 2T2R
2	5.725 GHz ~ 5.85 GHz, 4T4R
3	2.4 GHz, 2T2R

1.1.4 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	56Vdc from POE I/P: 100-240V~ 1.5A, 50-60Hz O/P: 56V= 0.805A
--------------------------	--

Note: The above power supply is not bundled in market.

1.1.5 Accessories

Accessories		
No.	Equipment	Description
1	Core	Brand: King core Model: KCF-130-B
2	Toolkit	--

1.1.6 Channel List

Frequency band (MHz)		2400~2483.5	
802.11bg / n HT20 / ax HE20		802.11n HT40 / 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	---	---

1.1.7 Test Tool and Duty Cycle

Test Tool	QPSR, V5.0-00199		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	11b	65.03%	1.87
	11g	96.11%	0.17
	ax (HE20)-OFDMA	86.24%	0.64
	ax (HE40)-OFDMA	85.07%	0.70

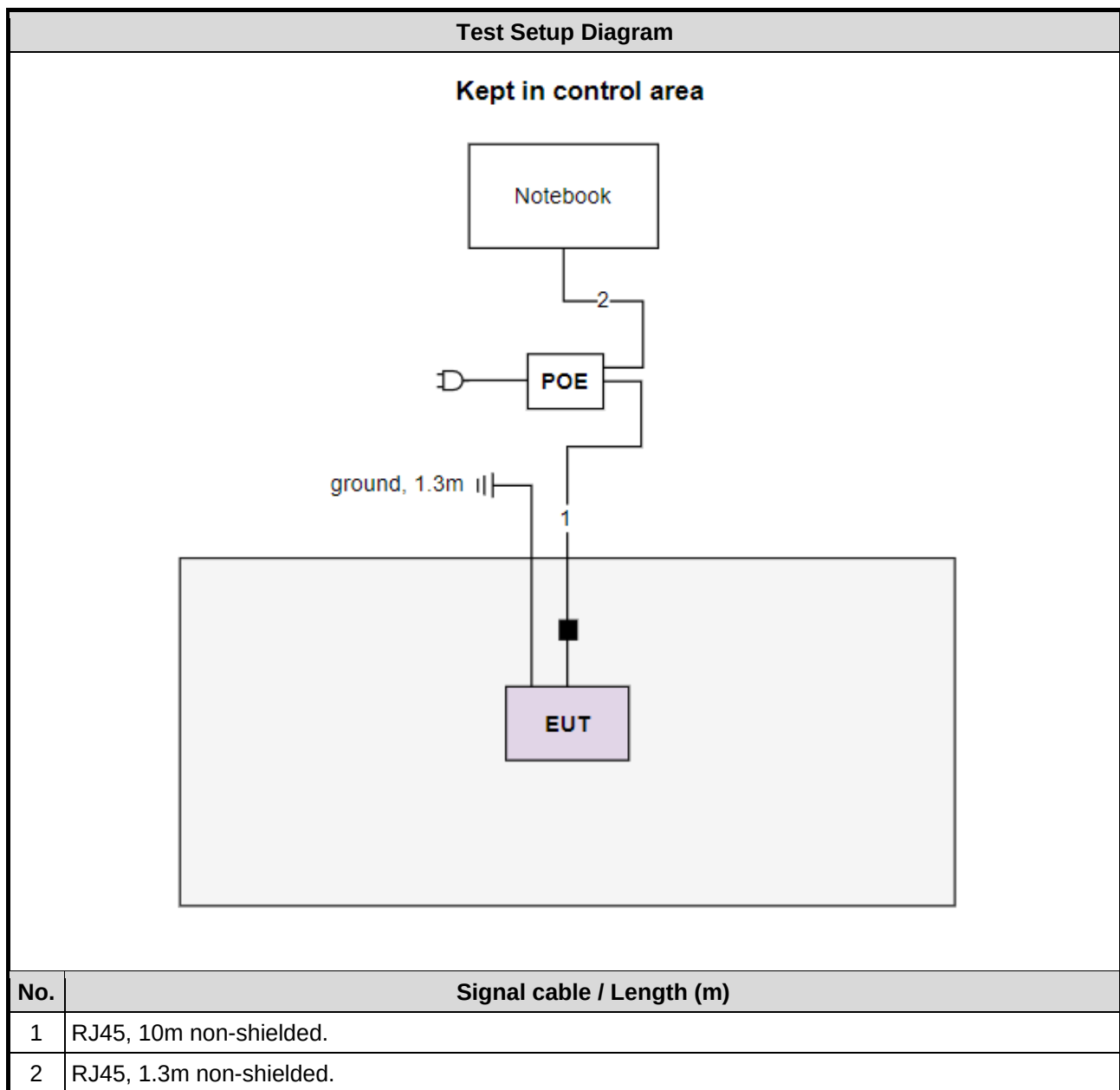
1.1.8 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	23.5
11b	2437	23.5
11b	2462	22.5
11g	2412	23
11g	2437	26.5
11g	2462	21
ax (HE20)-OFDMA	2412	21
ax (HE20)-OFDMA	2437	23
ax (HE20)-OFDMA	2462	17.5
ax (HE40)-OFDMA	2422	18
ax (HE40)-OFDMA	2437	15.5
ax (HE40)-OFDMA	2452	12.5

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude E5470	DoC	---
2	POE	DELTA	ADH-45AR B	---	Provided by applicant.

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Radiated Emission Below 1GHz				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Nov. 23, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 12, 2021	Mar. 11, 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
Preamplifier	EMC	EMC02325	980225	Jun. 29, 2021	Jun. 28, 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
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission Above 1GHz				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Oct. 15 ~ Oct. 18, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2020	Dec. 03, 2021
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 11, 2020	Dec. 10, 2021
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Dec. 31, 2020	Dec. 30, 2021
Preamplifier	Agilent	83017A	MY39501308	Sep. 28, 2021	Sep. 27, 2022
Preamplifier	EMC	EMC184045B	980192	Jul. 14, 2021	Jul. 13, 2022
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 05, 2021	Oct. 04, 2022
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 05, 2021	Oct. 04, 2022
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Nov. 23, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
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	Schwarzbeck 8127	8127-666	Dec. 29, 2020	Dec. 28, 2021
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.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Nov. 12, 2021				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2020	Dec. 03, 2021
Power Meter	Anritsu	ML2495A	1218007	Jan. 26, 2021	Jan. 25, 2022
Power Sensor	Anritsu	MA2411B	1207367	Jan. 26, 2021	Jan. 25, 2022
Measurement Software	Sporton	SENSE-15247_DTS	V5.10	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 ≤ 1 GHz	± 3.41 dB
Radiated emission > 1 GHz	± 4.59 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-WS, TH01-WS
Address of Test Site	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
Non-beamforming mode				
Conducted Emissions	11g	2437	6 Mbps	--
Radiated Emissions ≤1GHz	11g	2437	6 Mbps	--
Maximum Output Power	11b 11g ax HE20-OFDMA ax HE40-OFDMA	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 2422 / 2437 / 2452	1 Mbps 6 Mbps MCS 0 MCS 0	--
Radiated Emissions >1GHz 6dB bandwidth Power spectral density	11b 11g ax HE20-OFDMA ax HE40-OFDMA	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 2422 / 2437 / 2452	1 Mbps 6 Mbps MCS 0 MCS 0	--
Beamforming mode				
Maximum Output Power	ax HE20-OFDMA ax HE40-OFDMA	2412 / 2437 / 2462 2422 / 2437 / 2452	MCS 0 MCS 0	--

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

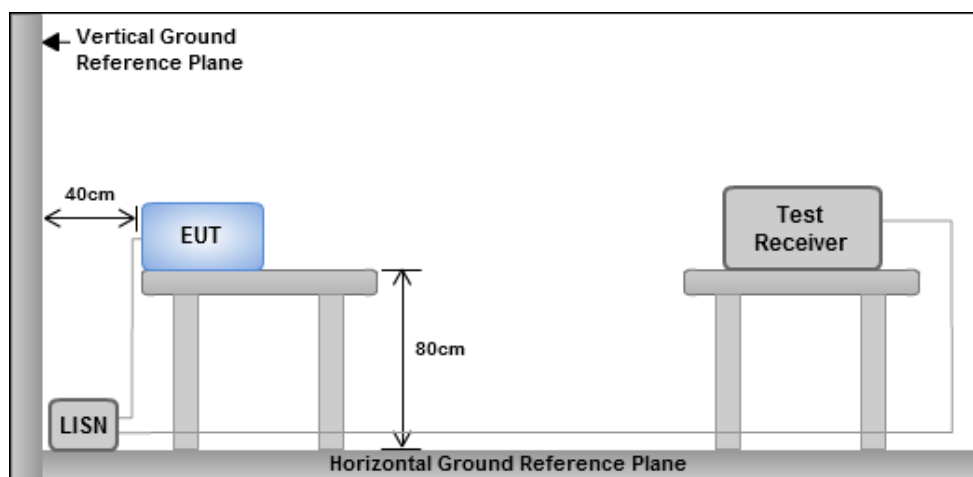
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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 Ω 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

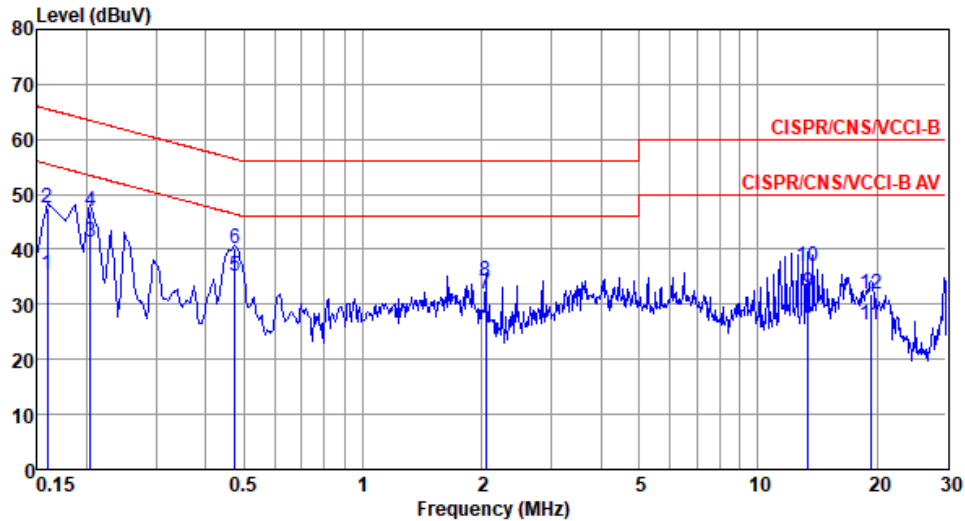
Modulation	11g	Test Freq. (MHz)	2437																																																																																																																																												
Power Phase	Line																																																																																																																																														
Test by : Brad Wu Temperature: 22°C Humidity: 62%																																																																																																																																															
Level (dBUV) <table><thead><tr><th></th><th>Freq</th><th>Level</th><th>Limit</th><th>Over</th><th>Read</th><th>Factor</th><th>Cable</th><th>Aux</th><th>Remark</th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>Line</th><th>Limit</th><th>Level</th><th>dB</th><th>loss</th><th>dB</th><th></th></tr></thead><tbody><tr><td>1</td><td>0.150</td><td>34.10</td><td>56.00</td><td>-21.90</td><td>24.36</td><td>9.66</td><td>0.08</td><td>0.00</td><td>Average</td></tr><tr><td>2</td><td>0.150</td><td>49.97</td><td>66.00</td><td>-16.03</td><td>40.23</td><td>9.66</td><td>0.08</td><td>0.00</td><td>QP</td></tr><tr><td>3*</td><td>0.474</td><td>35.43</td><td>46.45</td><td>-11.02</td><td>25.70</td><td>9.64</td><td>0.09</td><td>0.00</td><td>Average</td></tr><tr><td>4</td><td>0.474</td><td>40.38</td><td>56.45</td><td>-16.07</td><td>30.65</td><td>9.64</td><td>0.09</td><td>0.00</td><td>QP</td></tr><tr><td>5</td><td>2.044</td><td>31.92</td><td>46.00</td><td>-14.08</td><td>22.06</td><td>9.66</td><td>0.20</td><td>0.00</td><td>Average</td></tr><tr><td>6</td><td>2.044</td><td>34.62</td><td>56.00</td><td>-21.38</td><td>24.76</td><td>9.66</td><td>0.20</td><td>0.00</td><td>QP</td></tr><tr><td>7</td><td>4.874</td><td>29.24</td><td>46.00</td><td>-16.76</td><td>19.30</td><td>9.68</td><td>0.26</td><td>0.00</td><td>Average</td></tr><tr><td>8</td><td>4.874</td><td>33.86</td><td>56.00</td><td>-22.14</td><td>23.92</td><td>9.68</td><td>0.26</td><td>0.00</td><td>QP</td></tr><tr><td>9</td><td>12.988</td><td>33.74</td><td>50.00</td><td>-16.26</td><td>23.52</td><td>9.70</td><td>0.52</td><td>0.00</td><td>Average</td></tr><tr><td>10</td><td>12.988</td><td>37.33</td><td>60.00</td><td>-22.67</td><td>27.11</td><td>9.70</td><td>0.52</td><td>0.00</td><td>QP</td></tr><tr><td>11</td><td>19.021</td><td>28.95</td><td>50.00</td><td>-21.05</td><td>18.63</td><td>9.68</td><td>0.64</td><td>0.00</td><td>Average</td></tr><tr><td>12</td><td>19.021</td><td>34.05</td><td>60.00</td><td>-25.95</td><td>23.73</td><td>9.68</td><td>0.64</td><td>0.00</td><td>QP</td></tr></tbody></table>					Freq	Level	Limit	Over	Read	Factor	Cable	Aux	Remark		MHz	dBuV	Line	Limit	Level	dB	loss	dB		1	0.150	34.10	56.00	-21.90	24.36	9.66	0.08	0.00	Average	2	0.150	49.97	66.00	-16.03	40.23	9.66	0.08	0.00	QP	3*	0.474	35.43	46.45	-11.02	25.70	9.64	0.09	0.00	Average	4	0.474	40.38	56.45	-16.07	30.65	9.64	0.09	0.00	QP	5	2.044	31.92	46.00	-14.08	22.06	9.66	0.20	0.00	Average	6	2.044	34.62	56.00	-21.38	24.76	9.66	0.20	0.00	QP	7	4.874	29.24	46.00	-16.76	19.30	9.68	0.26	0.00	Average	8	4.874	33.86	56.00	-22.14	23.92	9.68	0.26	0.00	QP	9	12.988	33.74	50.00	-16.26	23.52	9.70	0.52	0.00	Average	10	12.988	37.33	60.00	-22.67	27.11	9.70	0.52	0.00	QP	11	19.021	28.95	50.00	-21.05	18.63	9.68	0.64	0.00	Average	12	19.021	34.05	60.00	-25.95	23.73	9.68	0.64	0.00	QP
	Freq	Level	Limit	Over	Read	Factor	Cable	Aux	Remark																																																																																																																																						
	MHz	dBuV	Line	Limit	Level	dB	loss	dB																																																																																																																																							
1	0.150	34.10	56.00	-21.90	24.36	9.66	0.08	0.00	Average																																																																																																																																						
2	0.150	49.97	66.00	-16.03	40.23	9.66	0.08	0.00	QP																																																																																																																																						
3*	0.474	35.43	46.45	-11.02	25.70	9.64	0.09	0.00	Average																																																																																																																																						
4	0.474	40.38	56.45	-16.07	30.65	9.64	0.09	0.00	QP																																																																																																																																						
5	2.044	31.92	46.00	-14.08	22.06	9.66	0.20	0.00	Average																																																																																																																																						
6	2.044	34.62	56.00	-21.38	24.76	9.66	0.20	0.00	QP																																																																																																																																						
7	4.874	29.24	46.00	-16.76	19.30	9.68	0.26	0.00	Average																																																																																																																																						
8	4.874	33.86	56.00	-22.14	23.92	9.68	0.26	0.00	QP																																																																																																																																						
9	12.988	33.74	50.00	-16.26	23.52	9.70	0.52	0.00	Average																																																																																																																																						
10	12.988	37.33	60.00	-22.67	27.11	9.70	0.52	0.00	QP																																																																																																																																						
11	19.021	28.95	50.00	-21.05	18.63	9.68	0.64	0.00	Average																																																																																																																																						
12	19.021	34.05	60.00	-25.95	23.73	9.68	0.64	0.00	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).																																																																																																																																															

Modulation	11g	Test Freq. (MHz)	2437
Power Phase	Neutral		

Test by : Brad Wu

Temperature: 22°C

Humidity: 62%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.159	35.32	55.52	-20.20	25.55	9.69	0.08	0.00	Average
2	0.159	47.55	65.52	-17.97	37.78	9.69	0.08	0.00	QP
3	0.204	41.42	53.45	-12.03	31.66	9.68	0.08	0.00	Average
4	0.204	46.87	63.45	-16.58	37.11	9.68	0.08	0.00	QP
5*	0.474	35.02	46.45	-11.43	25.26	9.67	0.09	0.00	Average
6	0.474	40.06	56.45	-16.39	30.30	9.67	0.09	0.00	QP
7	2.044	32.02	46.00	-13.98	22.13	9.69	0.20	0.00	Average
8	2.044	34.19	56.00	-21.81	24.30	9.69	0.20	0.00	QP
9	13.408	32.18	50.00	-17.82	21.86	9.79	0.53	0.00	Average
10	13.408	36.97	60.00	-23.03	26.65	9.79	0.53	0.00	QP
11	19.326	26.30	50.00	-23.70	15.81	9.84	0.65	0.00	Average
12	19.326	31.97	60.00	-28.03	21.48	9.84	0.65	0.00	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

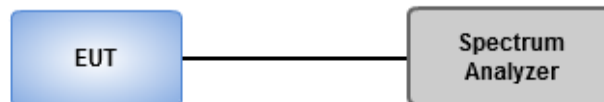
6dB Bandwidth

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

Ambient Condition	21°C / 65%	Tested By	Brad Wu
--------------------------	------------	------------------	---------

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	8.043M	13.025M	13M0G1D	7.029M	13.025M
802.11g_Nss1,(6Mbps)_2TX	15.072M	16.208M	16M2D1D	12.536M	16.208M
802.11ax HEW20_Nss1,(MCS0)_2TX-OFDMA	18.261M	18.669M	18M7D1D	11.377M	18.669M
802.11ax HEW40_Nss1,(MCS0)_2TX-OFDMA	37.536M	37.337M	37M3D1D	30.435M	37.337M

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

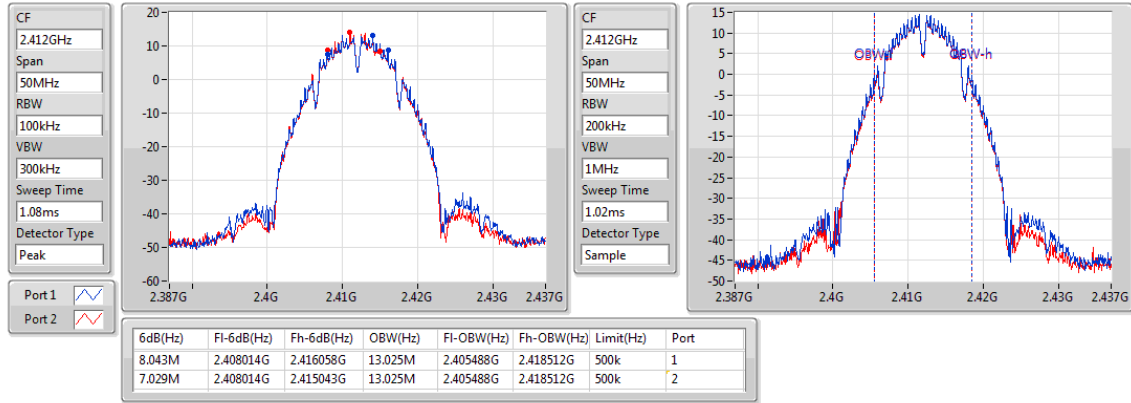
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)	Port 2-N dB (Hz)	Port 2-OBW (Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	8.043M	13.025M	7.029M	13.025M
2437MHz	Pass	500k	7.971M	13.025M	7.536M	13.025M
2462MHz	Pass	500k	7.101M	13.025M	7.029M	13.025M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	13.841M	16.208M	13.768M	16.208M
2437MHz	Pass	500k	12.536M	16.208M	15.072M	16.208M
2462MHz	Pass	500k	13.841M	16.208M	13.841M	16.208M
802.11ax HEW20_Nss1,(MCS0)_2TX-OFDMA	-	-	-	-	-	-
2412MHz	Pass	500k	17.101M	18.669M	11.377M	18.669M
2437MHz	Pass	500k	18.261M	18.669M	18.116M	18.669M
2462MHz	Pass	500k	17.536M	18.669M	16.594M	18.669M
802.11ax HEW40_Nss1,(MCS0)_2TX-OFDMA	-	-	-	-	-	-
2422MHz	Pass	500k	30.58M	37.337M	35.942M	37.337M
2437MHz	Pass	500k	37.536M	37.337M	36.232M	37.337M
2452MHz	Pass	500k	30.435M	37.337M	36.377M	37.337M

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

802.11b_Nss1,(1Mbps)_2TX

EBW

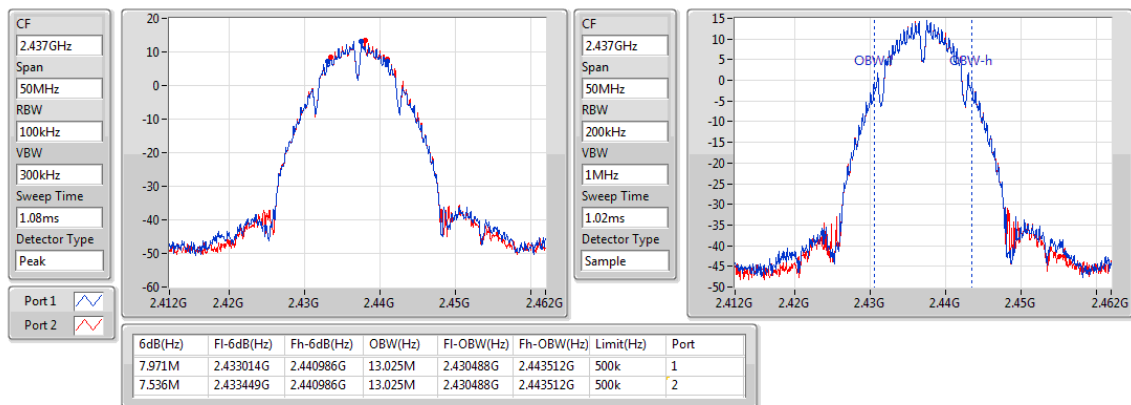
2412MHz



802.11b_Nss1,(1Mbps)_2TX

EBW

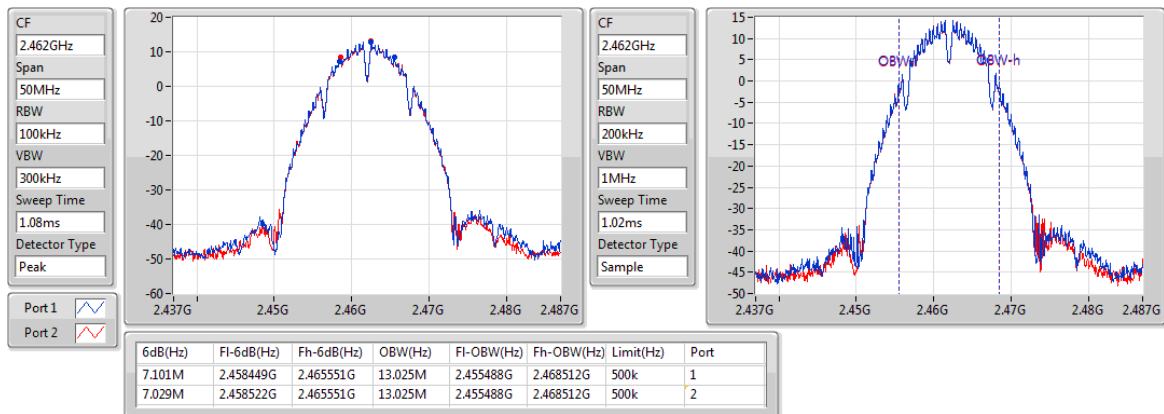
2437MHz



802.11b_Nss1,(1Mbps)_2TX

EBW

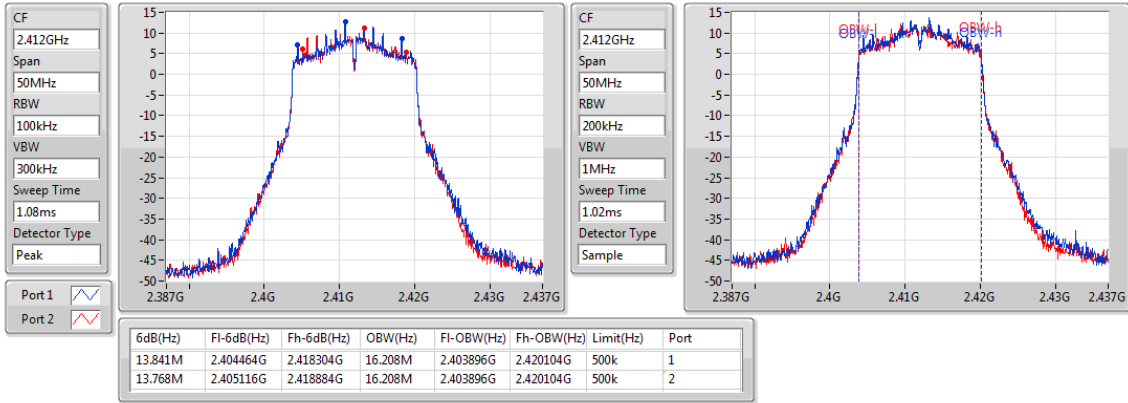
2462MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

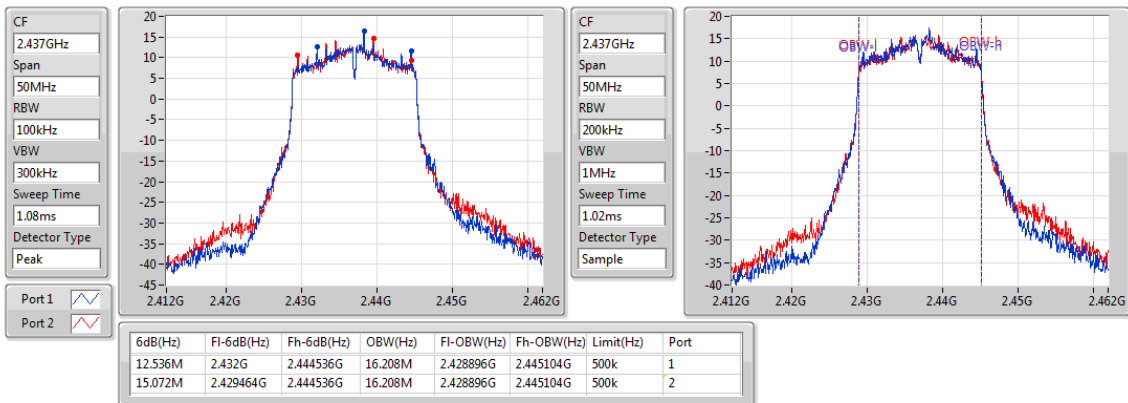
2412MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

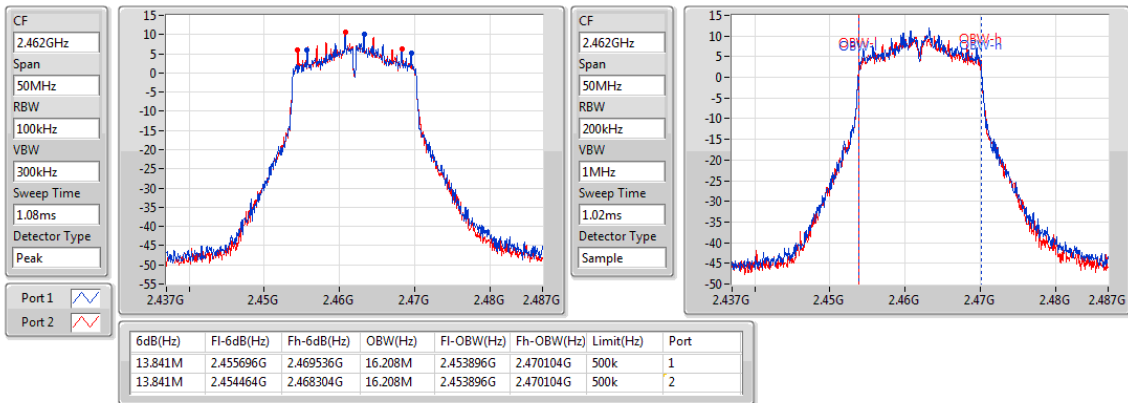
2437MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

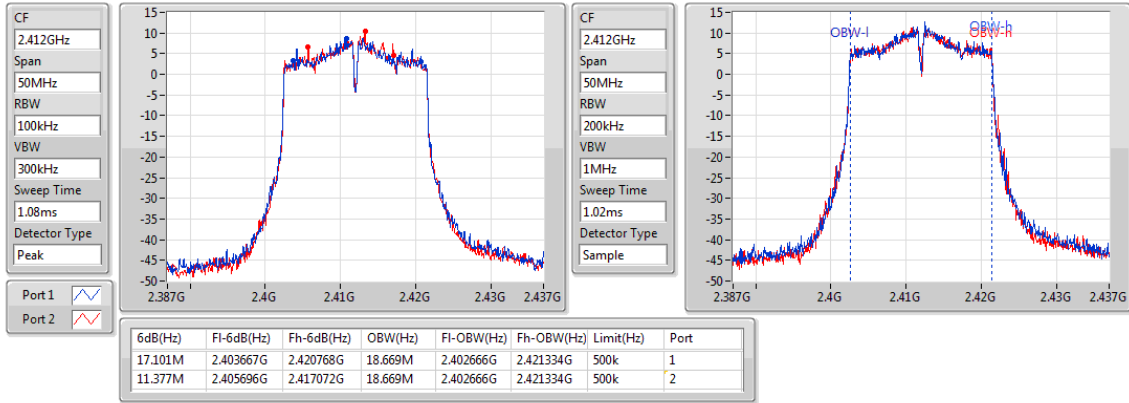
2462MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

EBW

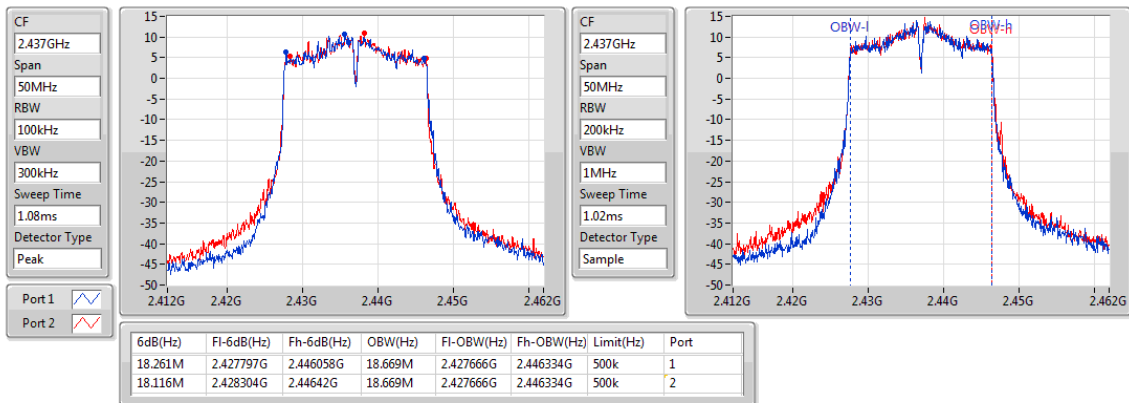
2412MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

EBW

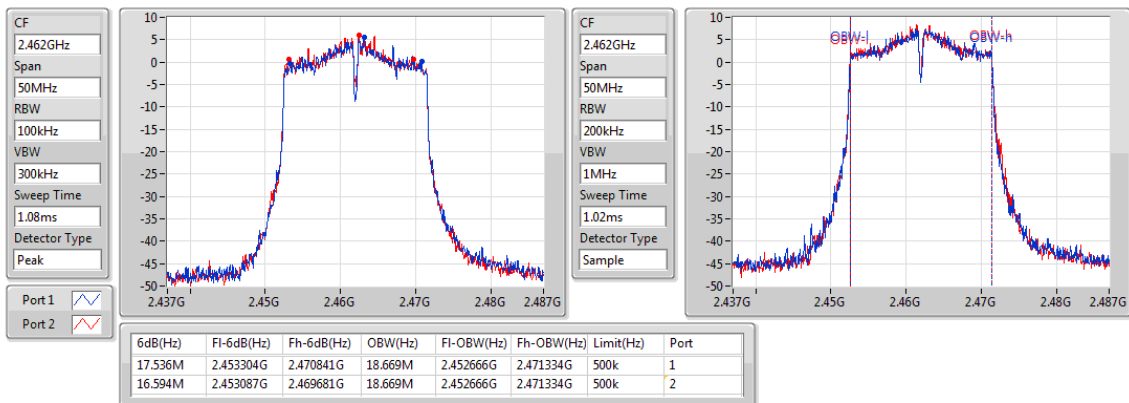
2437MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

EBW

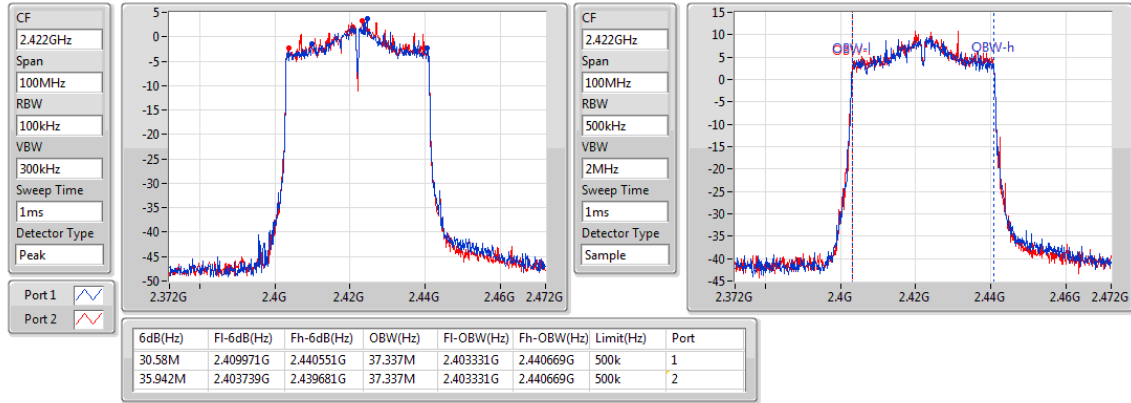
2462MHz



802.11ax HEW40_Nss1,(MCS0)_2TX

EBW

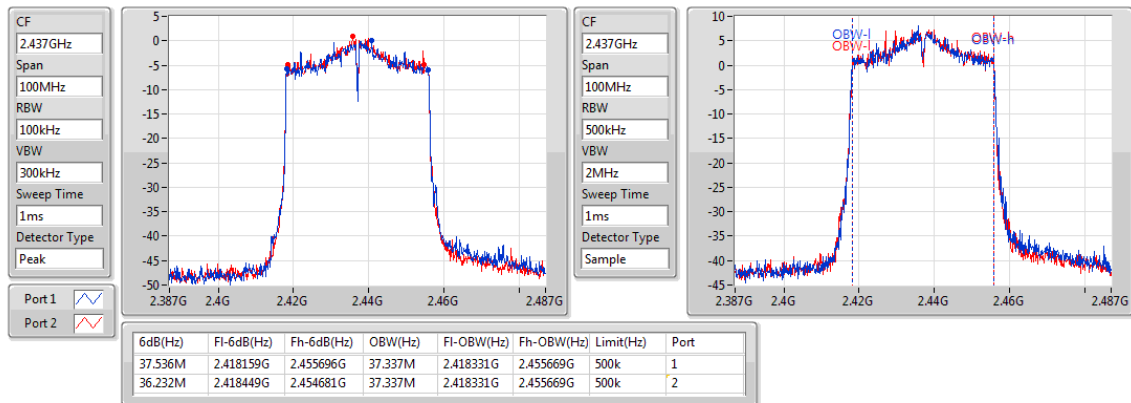
2422MHz



802.11ax HEW40_Nss1,(MCS0)_2TX

EBW

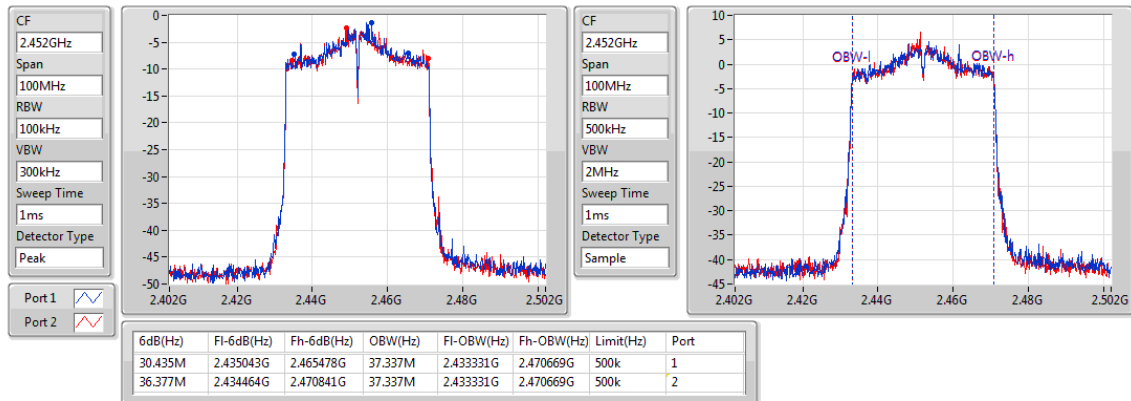
2437MHz



802.11ax HEW40_Nss1,(MCS0)_2TX

EBW

2452MHz



3.3 RF Output Power

3.3.1 Limit of RF Output Power

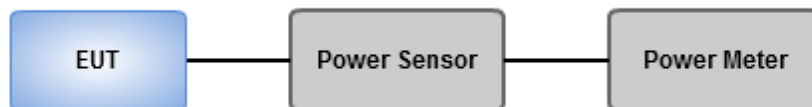
Conducted power shall not exceed 1Watt.

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

Ambient Condition	21°C / 65%	Tested By	Brad Wu
-------------------	------------	-----------	---------

Non-beamforming mode

Summary of Conducted (Average) Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	25.31	0.33963
802.11g_Nss1,(6Mbps)_2TX	28.11	0.64714
802.11ax HEW20_Nss1,(MCS0)_2TX-OFDMA	25.01	0.31696
802.11ax HEW40_Nss1,(MCS0)_2TX-OFDMA	19.72	0.09376

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	7.40	22.21	22.39	25.31	28.60	32.71	36.00
2437MHz	Pass	7.40	22.15	22.28	25.23	28.60	32.63	36.00
2462MHz	Pass	7.40	21.08	21.01	24.06	28.60	31.46	36.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	7.40	21.65	21.66	24.67	28.60	32.07	36.00
2437MHz	Pass	7.40	25.14	25.06	28.11	28.60	35.51	36.00
2462MHz	Pass	7.40	19.56	19.58	22.58	28.60	29.98	36.00
802.11ax HEW20_Nss1,(MCS0)_2TX-OFDMA	-	-	-	-	-	-	-	-
2412MHz	Pass	7.40	19.75	19.85	22.81	28.60	30.21	36.00
2437MHz	Pass	7.40	22.05	21.95	25.01	28.60	32.41	36.00
2462MHz	Pass	7.40	16.21	16.3	19.27	28.60	26.67	36.00
802.11ax HEW40_Nss1,(MCS0)_2TX-OFDMA	-	-	-	-	-	-	-	-
2422MHz	Pass	7.40	16.74	16.67	19.72	28.60	27.12	36.00
2437MHz	Pass	7.40	14.23	14.05	17.15	28.60	24.55	36.00
2452MHz	Pass	7.40	11.47	11.27	14.38	28.60	21.78	36.00

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

Note: The maximum antenna gain 7.4dBi is higher than 6dBi, so the limit shall be reduced to 30 dBm – (7.4dBi – 6dBi) = 28.6 dBm.

Beamforming mode

Summary of Conducted (Average) Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11ax HEW20-BF_Nss1,(MCS0)_2TX-OFDMA	22.00	0.15849
802.11ax HEW40-BF_Nss1,(MCS0)_2TX-OFDMA	16.71	0.04688

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 -OFDMA	-	-	-	-	-	-	-	-
2412MHz	Pass	9.56	16.74	16.84	19.80	26.44	29.36	36.00
2437MHz	Pass	9.56	19.04	18.94	22.00	26.44	31.56	36.00
2462MHz	Pass	9.56	13.2	13.29	16.26	26.44	25.82	36.00
802.11ax HEW40-BF_Nss1,(MCS0)_2TX -OFDMA	-	-	-	-	-	-	-	-
2422MHz	Pass	9.56	13.73	13.66	16.71	26.44	26.27	36.00
2437MHz	Pass	9.56	11.22	11.04	14.14	26.44	23.70	36.00
2452MHz	Pass	9.56	8.46	8.26	11.37	26.44	20.93	36.00

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

Directional gain = $10 \times \log((10^{5.6/20} + 10^{7.4/20})^2/2) = 9.56 \text{ dBi} > 6 \text{ Bi}$, Limit shall be reduced to 30 dBm – (9.56 dBi – 6 dBi) = 26.44 dBm.

Note : Conducted average output power is for reference only

3.4 Power Spectral Density

3.4.1 Limit of Power Spectral Density

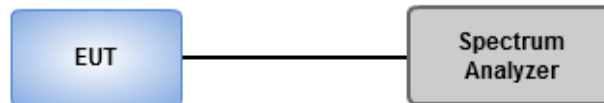
Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

3.4.2 Test Procedures

Average PSD, duty cycle < 98%

- 1 Set the RBW = 30 kHz, VBW = 100 kHz. Detector = RMS for 11B/11AX20/11AX40
Set the RBW = 10 kHz, VBW = 30 kHz. Detector = RMS for 11G
- 2 Set the sweep time to: ≥ 10 (number of measurement points in sweep) x (total on/off period of the transmitted signal).
- 3 Perform the measurement over a single sweep.
- 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

Ambient Condition	21°C / 65%	Tested By	Brad Wu
-------------------	------------	-----------	---------

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	4.18
802.11g_Nss1,(6Mbps)_2TX	1.22
802.11ax HEW20_Nss1,(MCS0)_2TX-OFDMA	1.55
802.11ax HEW40_Nss1,(MCS0)_2TX-OFDMA	-6.62

RBW for 11B/11AX20/11AX40

RBW = 30kHz

RBW for 11G

RBW = 10kHz

Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	Port 2 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	9.56	1.28	1.38	3.85	4.44
2437MHz	Pass	9.56	1.25	1.35	4.18	4.44
2462MHz	Pass	9.56	1.70	1.41	4.03	4.44
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	9.56	-4.46	-4.89	-1.94	4.44
2437MHz	Pass	9.56	-1.35	-1.82	1.22	4.44
2462MHz	Pass	9.56	-6.96	-6.99	-4.58	4.44
802.11ax HEW20_Nss1,(MCS0)_2TX-OFDMA	-	-	-	-	-	-
2412MHz	Pass	9.56	-3.35	-3.39	-0.83	4.44
2437MHz	Pass	9.56	-1.05	-1.38	1.55	4.44
2462MHz	Pass	9.56	-6.54	-6.54	-3.94	4.44
802.11ax HEW40_Nss1,(MCS0)_2TX-OFDMA	-	-	-	-	-	-
2422MHz	Pass	9.56	-9.39	-9.30	-6.62	4.44
2437MHz	Pass	9.56	-11.46	-11.28	-8.52	4.44
2452MHz	Pass	9.56	-14.09	-14.43	-11.60	4.44

DG = Directional Gain;

Directional gain = $10 \times \log((10^{5.6/20} + 10^{7.4/20})^2 / 2) = 9.56 \text{ dBi}$ > 6Bi , Limit shall be reduced to 8 dBm – (9.56 dBi – 6 dBi) = 4.44 dBm.

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

RBW for 11B/11AX20/11AX40

RBW = 30kHz

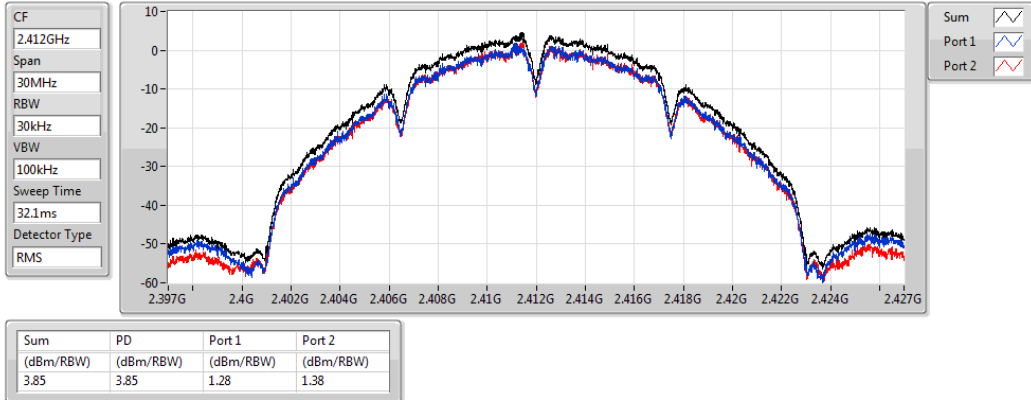
RBW for 11G

RBW = 10kHz

802.11b_Nss1,(1Mbps)_2TX

PSD

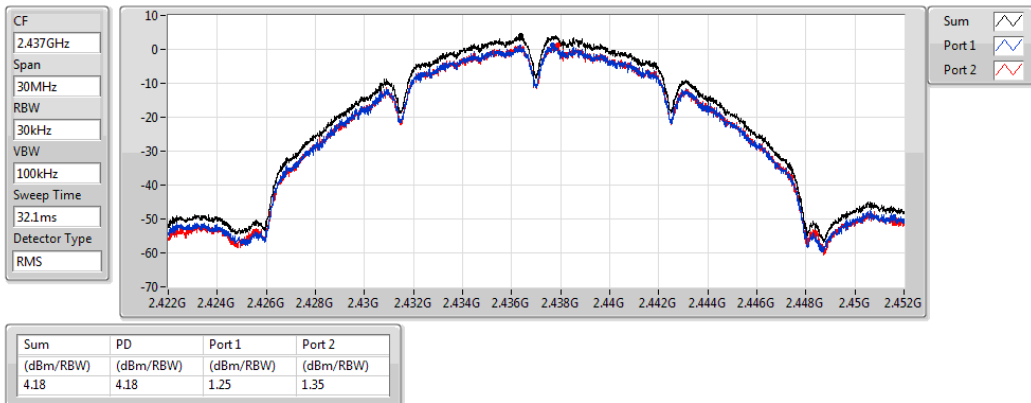
2412MHz



802.11b_Nss1,(1Mbps)_2TX

PSD

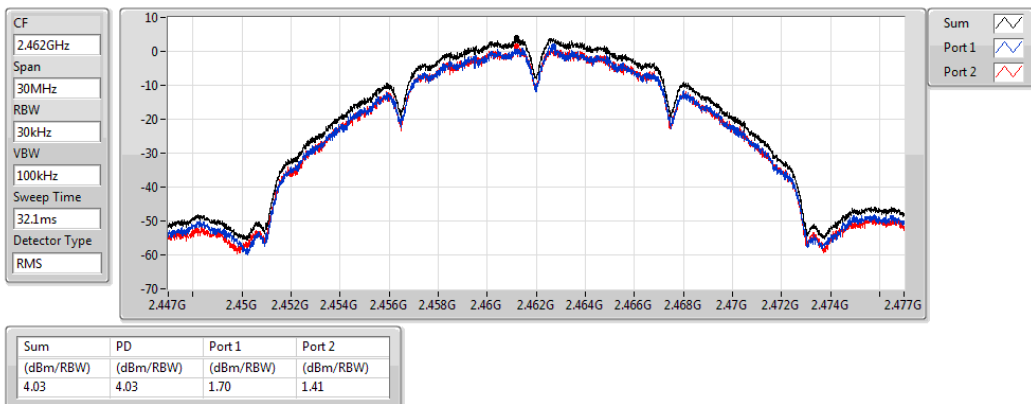
2437MHz



802.11b_Nss1,(1Mbps)_2TX

PSD

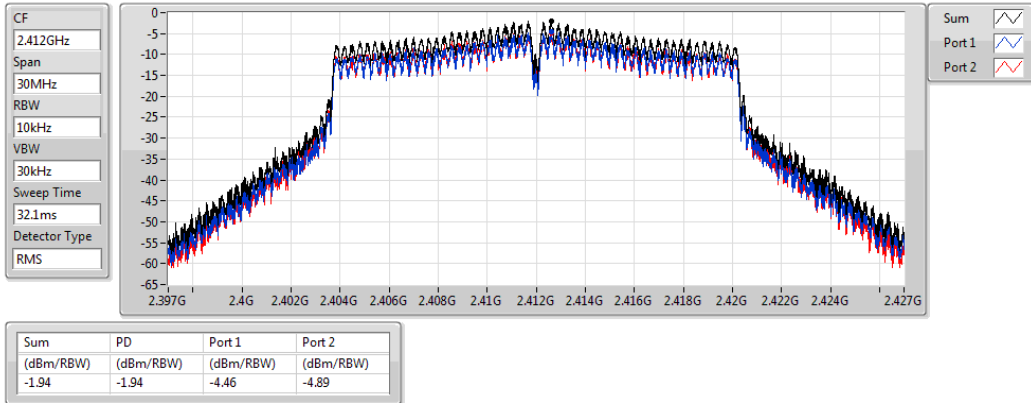
2462MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

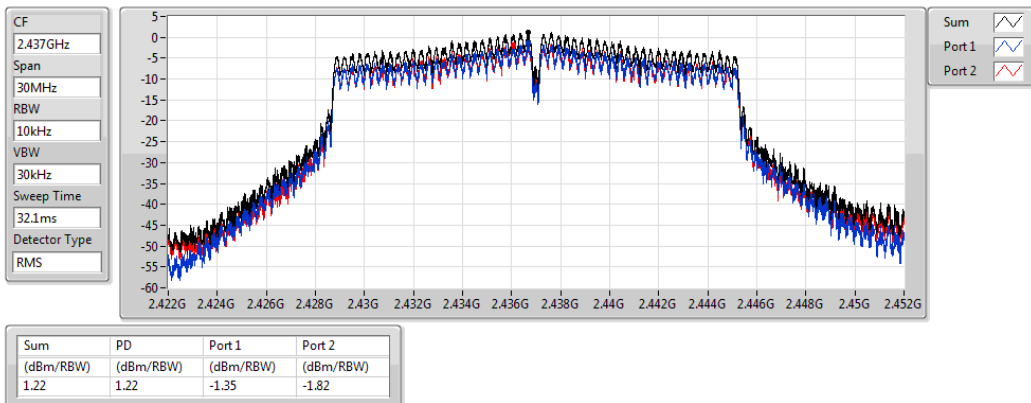
2412MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

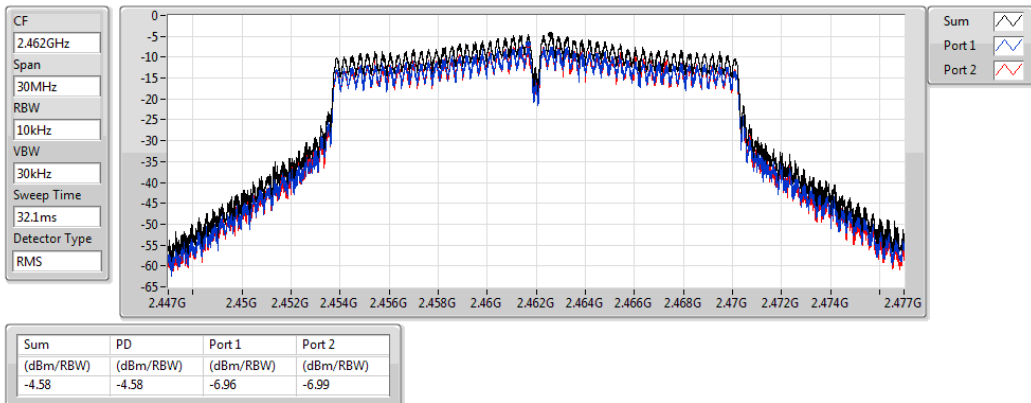
2437MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

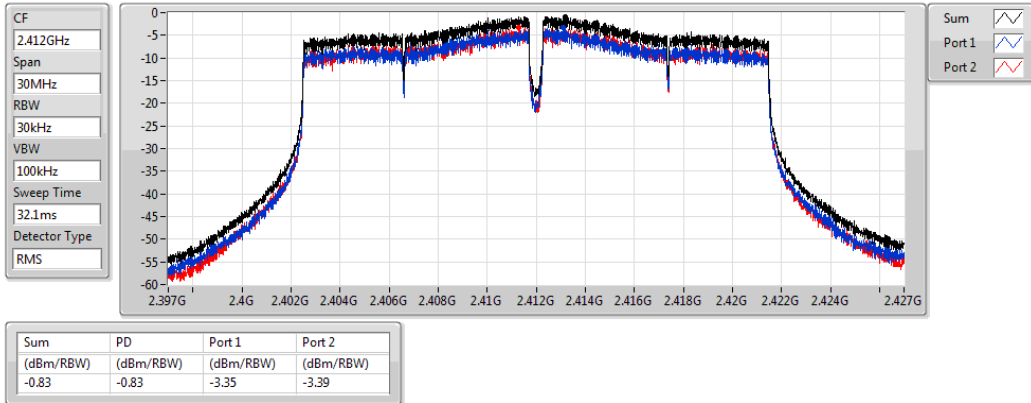
2462MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

PSD

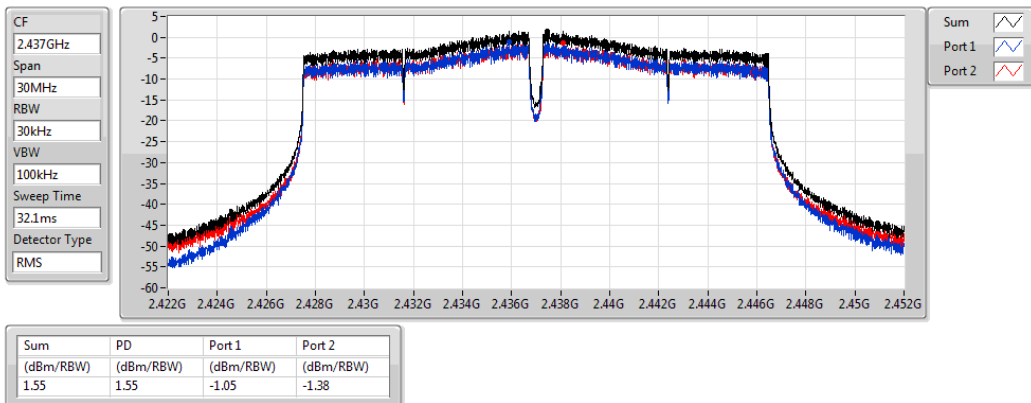
2412MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

PSD

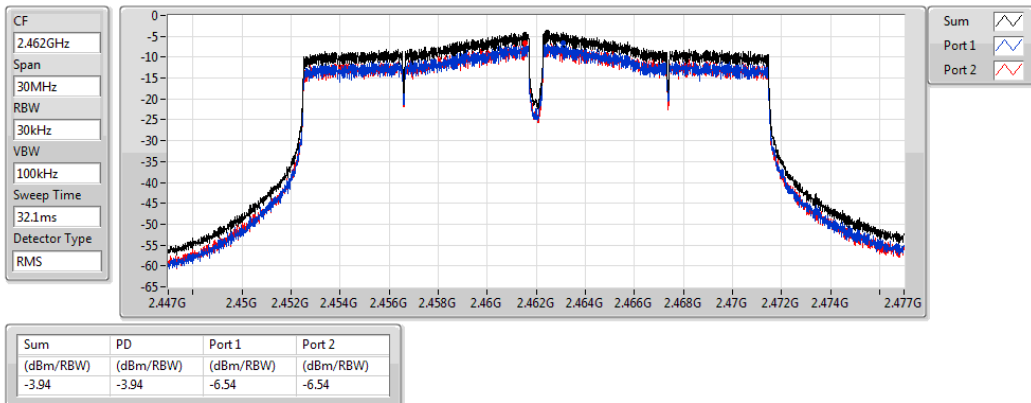
2437MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

PSD

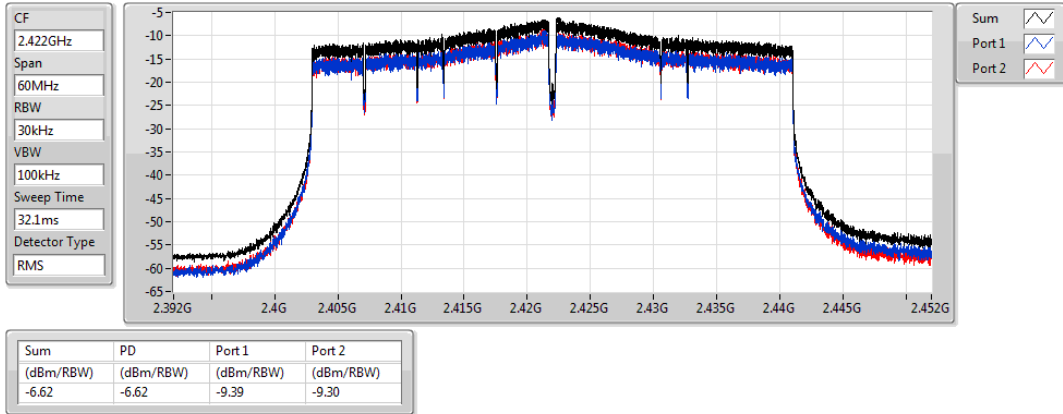
2462MHz



802.11ax HEW40_Nss1,(MCS0)_2TX

PSD

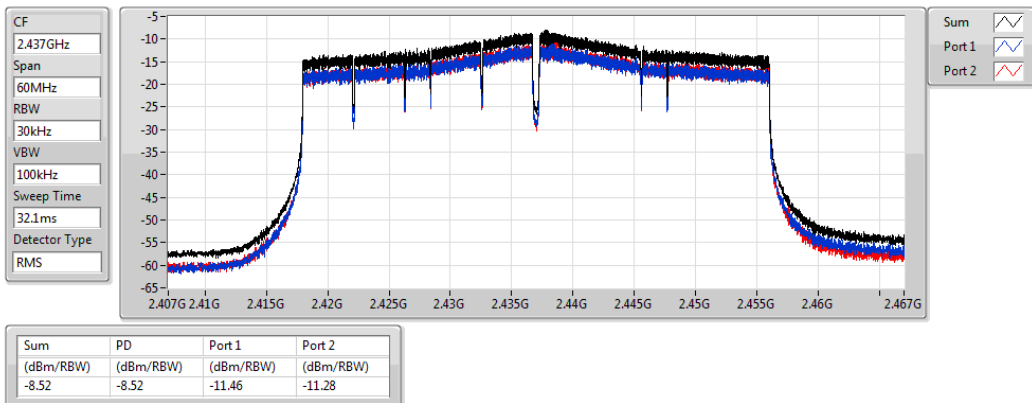
2422MHz



802.11ax HEW40_Nss1,(MCS0)_2TX

PSD

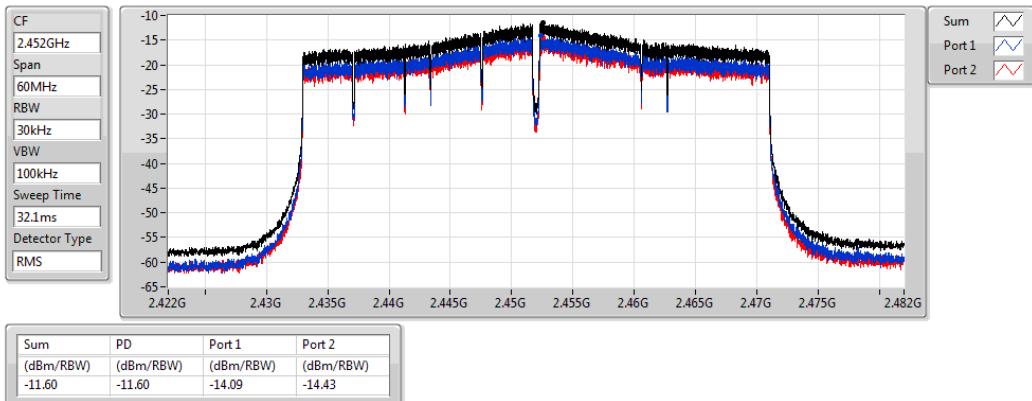
2437MHz



802.11ax HEW40_Nss1,(MCS0)_2TX

PSD

2452MHz



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:
Qusai-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

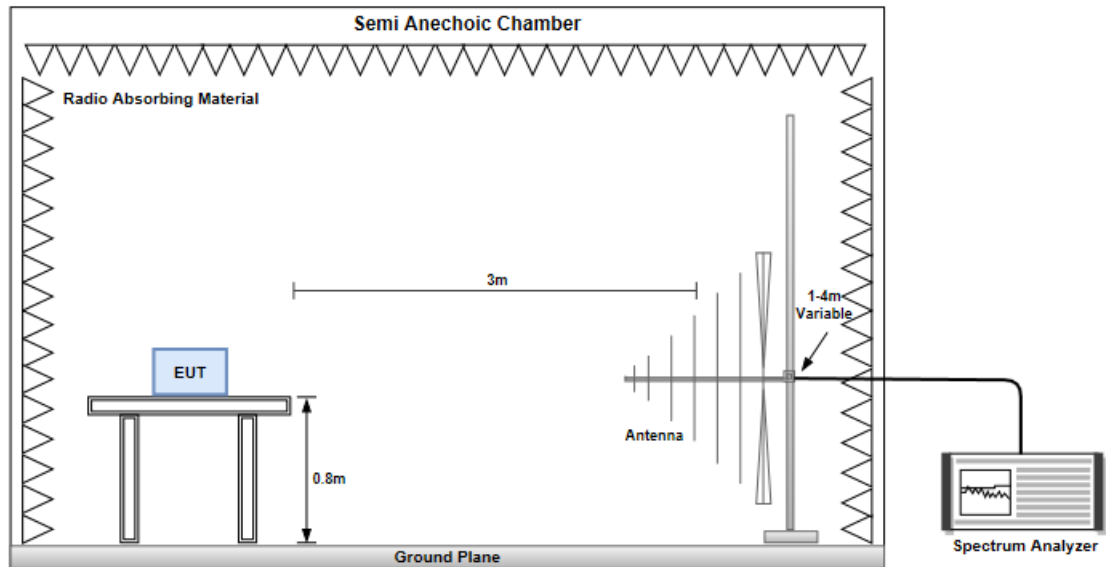
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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:

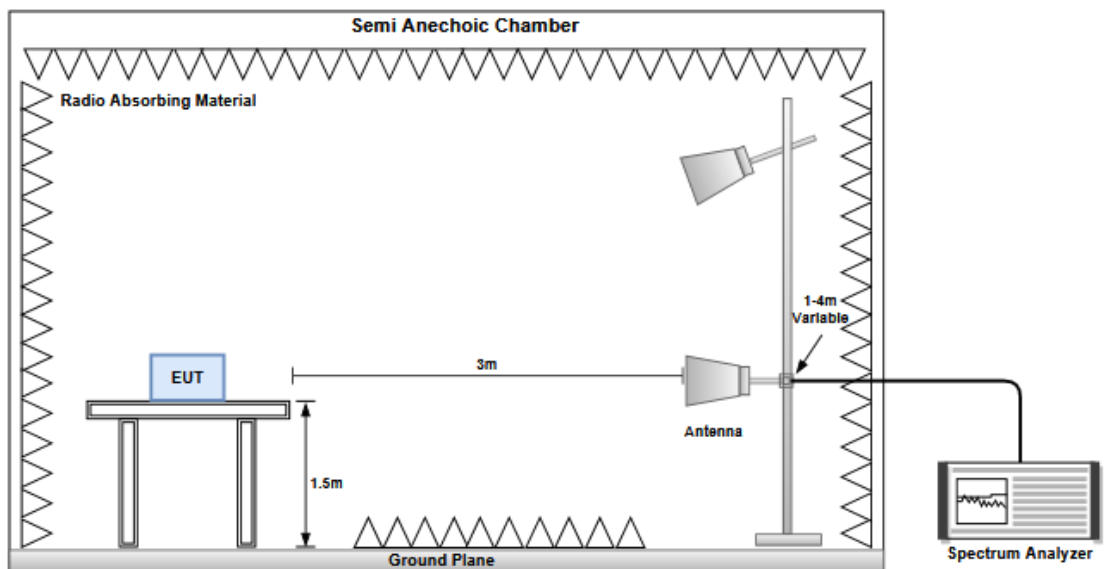
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):65			
Level (dBUV/m) </			

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):65			
Level (dBuV/m)			

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

Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBUV/m) <			

Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m)			

Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m)			

Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m)			

Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m) </			

Modulation	11b	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m)			

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

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBUV/m)			

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m) <			

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m)			

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m)			

Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m)			

Modulation	11g	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):24 Humidity(%):65			
Level (dBuV/m) <			

3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for ax HE20-OFDMA

Modulation	ax HE20-OFDMA		Test Freq. (MHz)	2412	
Polarization	Horizontal				
Test By :Akun Chung Temperature(°C):25 Humidity(%):63					
Level (dBUV/m)					

Modulation	ax HE20-OFDMA		Test Freq. (MHz)	2412	
Polarization	Vertical				
Test By :Akun Chung Temperature(°C):25 Humidity(%):63					
Level (dBUV/m) <					

Modulation	ax HE20-OFDMA	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (dBuV/m)			

Modulation	ax HE20-OFDMA	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (dBuV/m)			

Modulation	ax HE20-OFDMA	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (dBuV/m) <			

Modulation	ax HE20-OFDMA		Test Freq. (MHz)	2462	
Polarization	Vertical				
Test By :Akun Chung Temperature(°C):25 Humidity(%):63					
Level (dBUV/m) </					

3.5.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for ax HE40-OFDMA

Modulation	ax HE40-OFDMA	Test Freq. (MHz)	2422
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (dBuV/m)			

Modulation	ax HE40-OFDMA	Test Freq. (MHz)	2422
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (dBuV/m)			

Modulation	ax HE40-OFDMA	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (dBuV/m)			

Modulation	ax HE40-OFDMA	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (dBuV/m)			

Modulation	ax HE40-OFDMA		Test Freq. (MHz)		2452	
Polarization	Horizontal					
Test By :Akun Chung Temperature(°C):25 Humidity(%):63						
Level (dBuV/m)						

Modulation	ax HE40-OFDMA	Test Freq. (MHz)	2452
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):25 Humidity(%):63			
Level (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

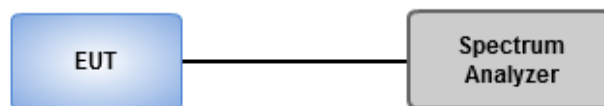
Reference level measurement

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

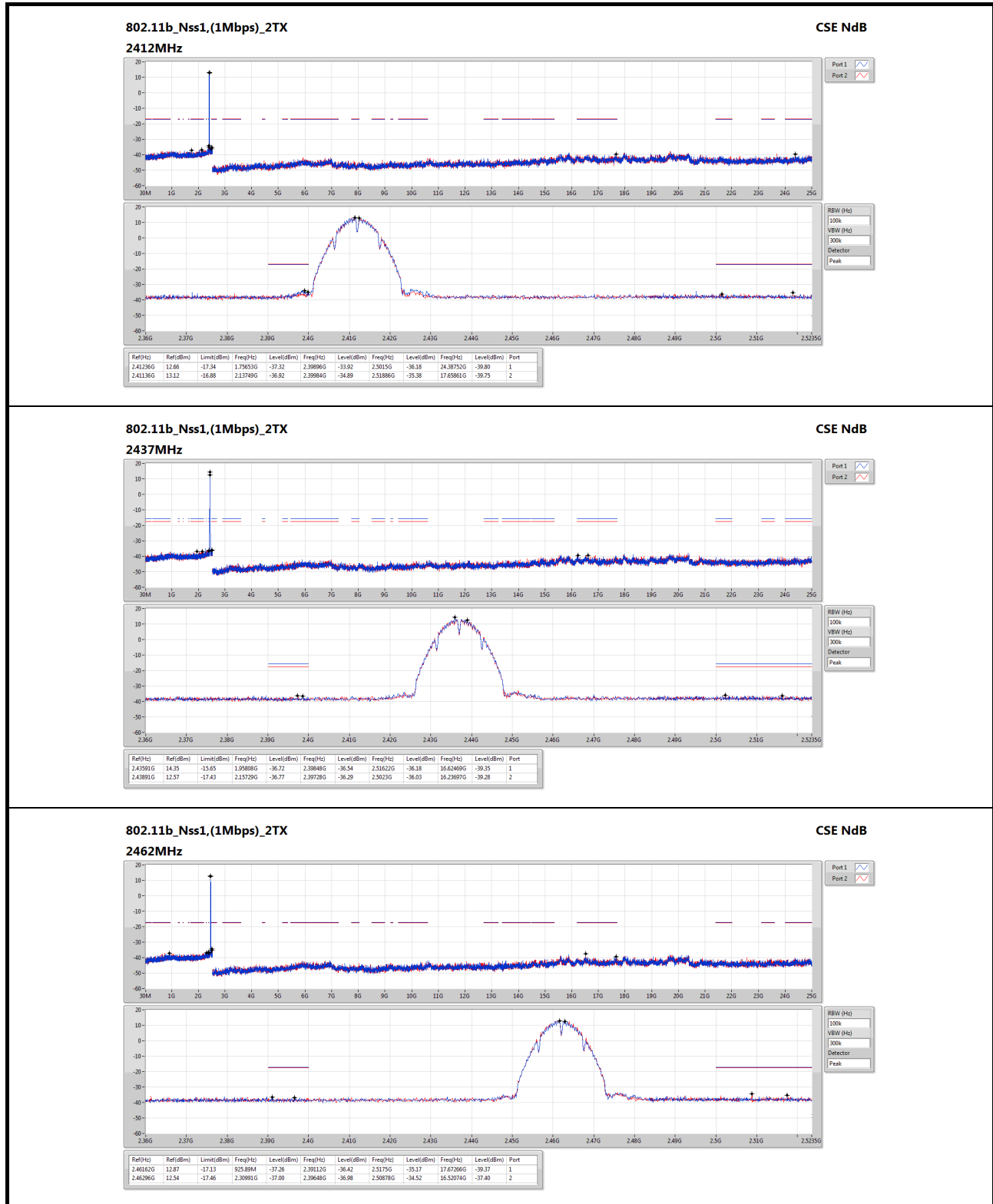
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

3.6.3 Test Setup



3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands

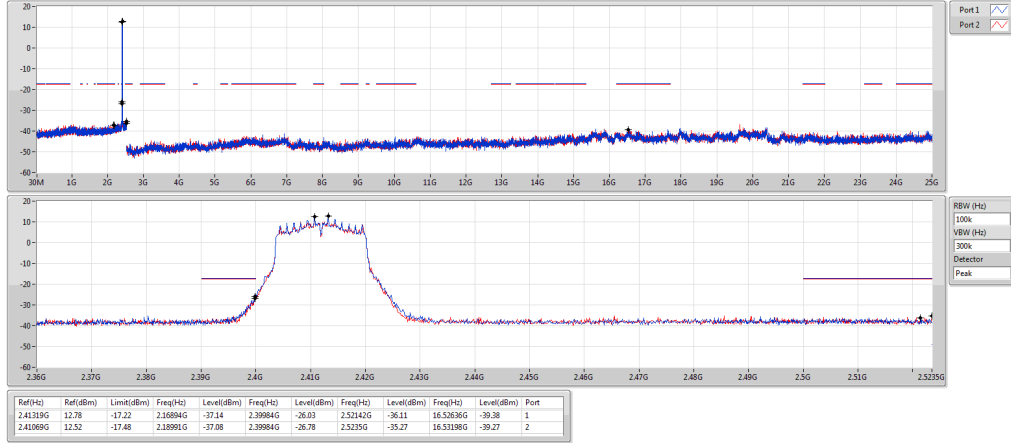
Ambient Condition	21°C / 65%	Tested By	Brad Wu
-------------------	------------	-----------	---------



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

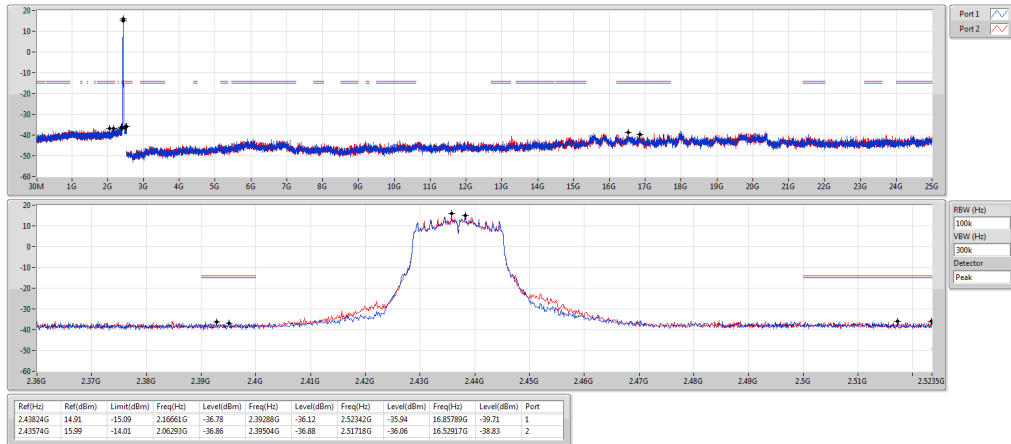
2412MHz



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

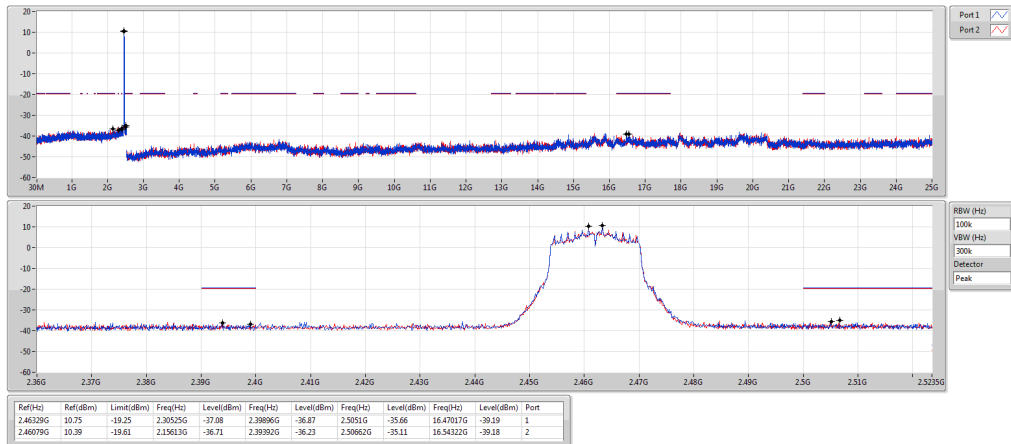
2437MHz



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

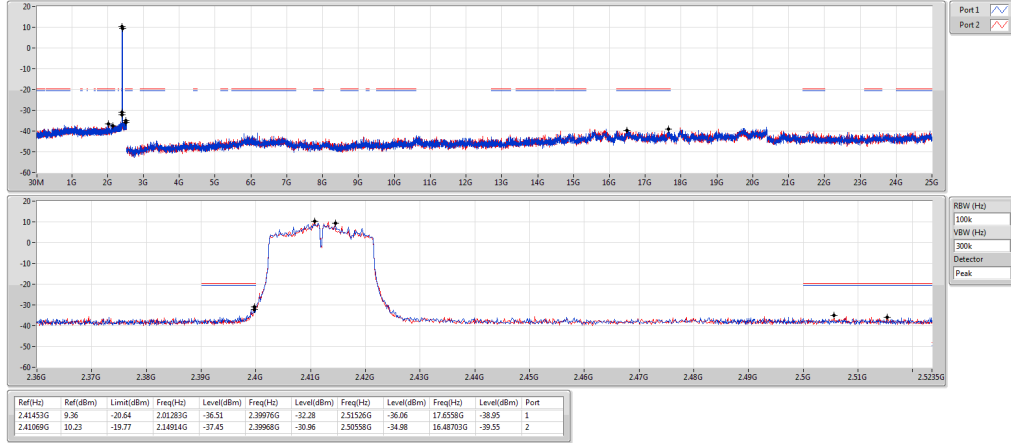
2462MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

CSE NdB

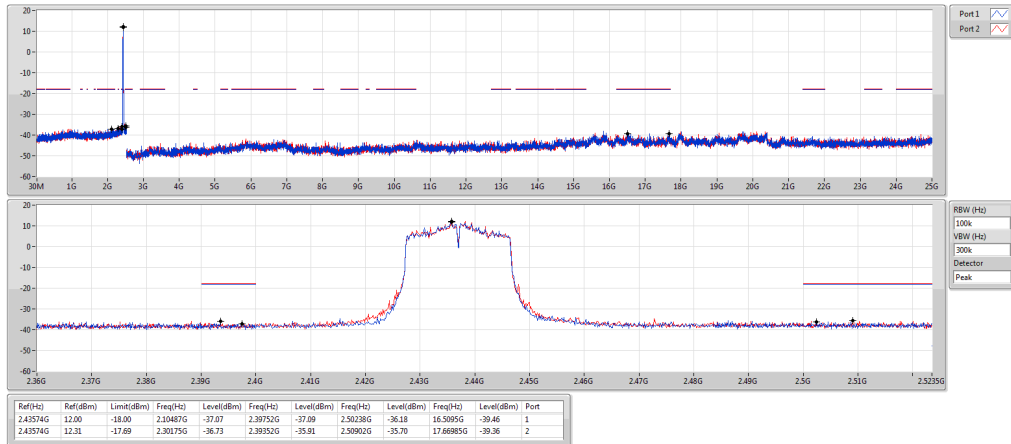
2412MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

CSE NdB

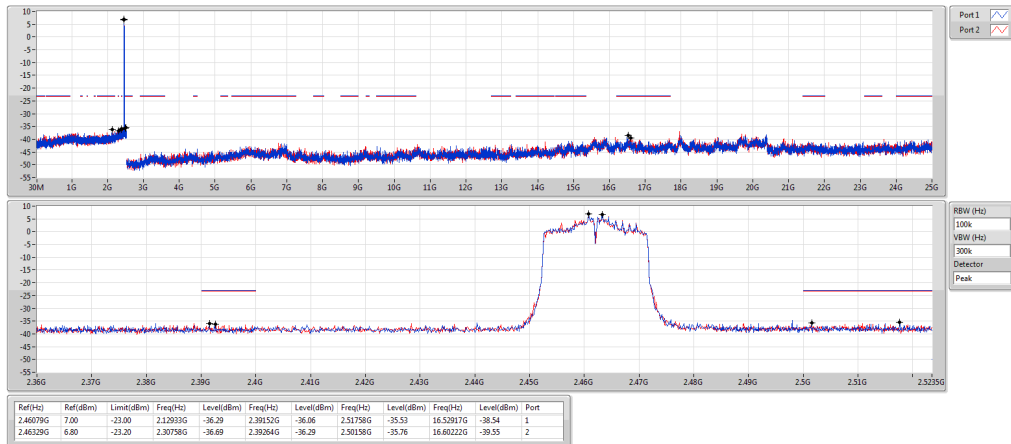
2437MHz



802.11ax HEW20_Nss1,(MCS0)_2TX

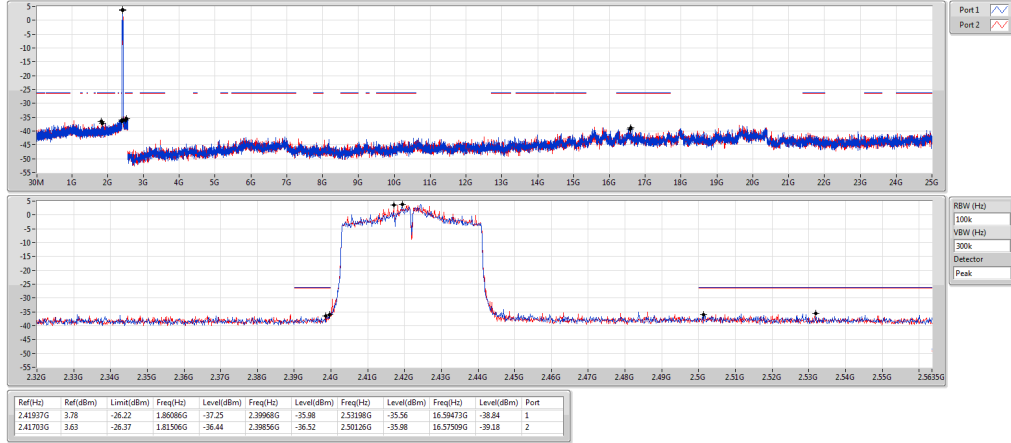
CSE NdB

2462MHz



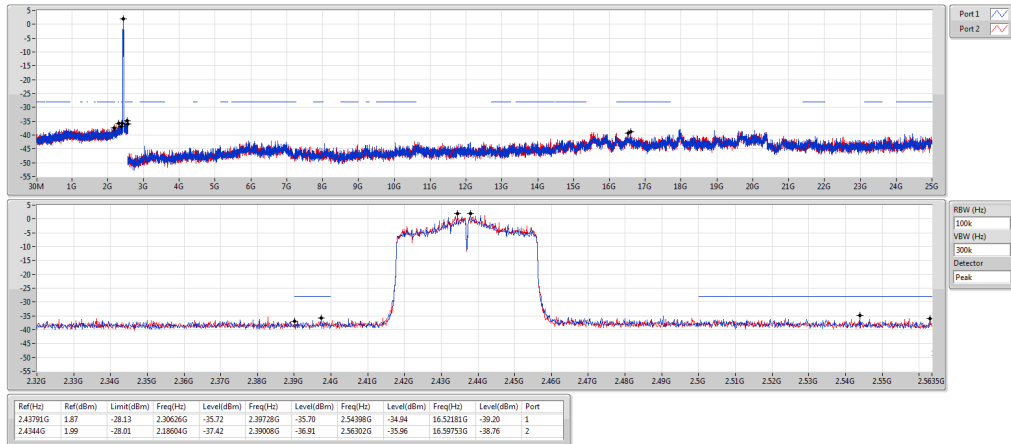
802.11ax HEW40_Nss1,(MCS0)_2TX
2422MHz

CSE NdB



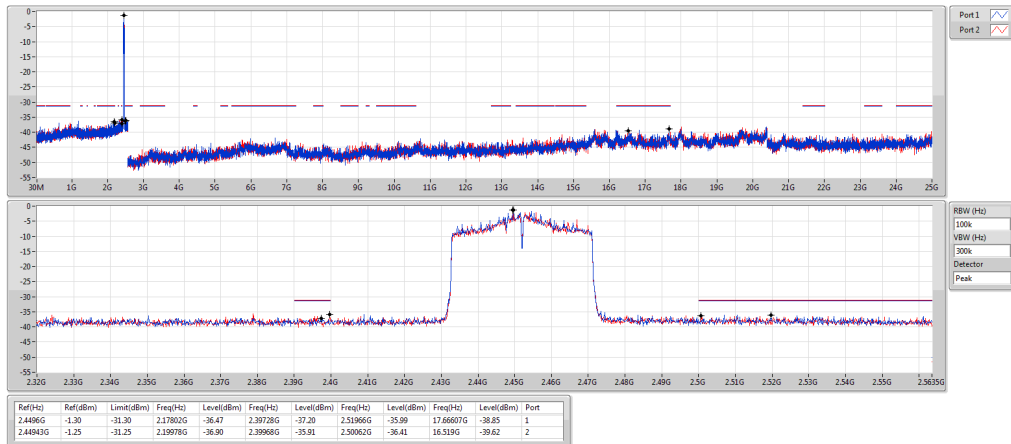
802.11ax HEW40_Nss1,(MCS0)_2TX
2437MHz

CSE NdB



802.11ax HEW40_Nss1,(MCS0)_2TX
2452MHz

CSE NdB



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

==END==