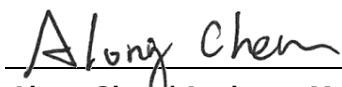


FCC Test Report

FCC ID : MXF-WLTFGT145CBSD
Equipment : WLTFGT-145ACN LTE Cat 12 B48 Indoor CPE
Model No. : WLTFGT-145ACN
Brand Name : Gemtek
Applicant : Gemtek Technology Co., Ltd.
Address : No. 15-1 Zhonghua Road, Hsinchu Industrial
Park, Hukou, Hsinchu, Taiwan, 30352.
Standard : 47 CFR FCC Part 15.247
Received Date : Nov. 19, 2020
Tested Date : Nov. 25 ~ Dec. 31, 2020

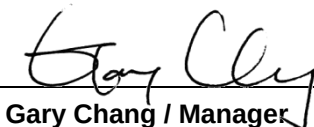
We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval 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



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Release Record

Report No.	Version	Description	Issued Date
FR0N1901AC	Rev. 01	Initial issue	Feb. 03, 2021

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.258MHz 46.53 (Margin -14.98dB) - QP	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz 52.98 (Margin -1.02dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 26.10	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
Note 1: RF output power specifies that Maximum Peak Conducted Output Power. Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation. Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.					

1.1.2 Antenna Details

Ant. No.	Type	Gain (dBi)	Connector	Remark
1	dipole	2.45	I-PEX	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from adapter
-------------------	--------------------

1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	AC adapter	Brand: MOSO Model: MSA-C 1500CS12.0-18G-US Power Rating: I/P: 100-240Vac, 50/60Hz, 0.6A max O/P: 12Vdc, 1.5A Power Line: 1.5m non-shielded without core.
2	AC adapter	Brand: APD Model: WB-18Q12FU Power Rating: I/P: 100-240Vac, 50-60Hz, 0.6A max O/P: 12Vdc, 1.5A Power Line: 1.5m non-shielded without core.
3	RJ45	1.5m non-shielded, without core.

1.1.5 Channel List

Frequency band (MHz)		2400~2483.5	
802.11 b / g / n HT20		802.11n HT40	
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	Putty, V0.60.0.0		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	11b	100.00%	0.00
	11g	100.00%	0.00
	HT20	100.00%	0.00
	HT40	100.00%	0.00

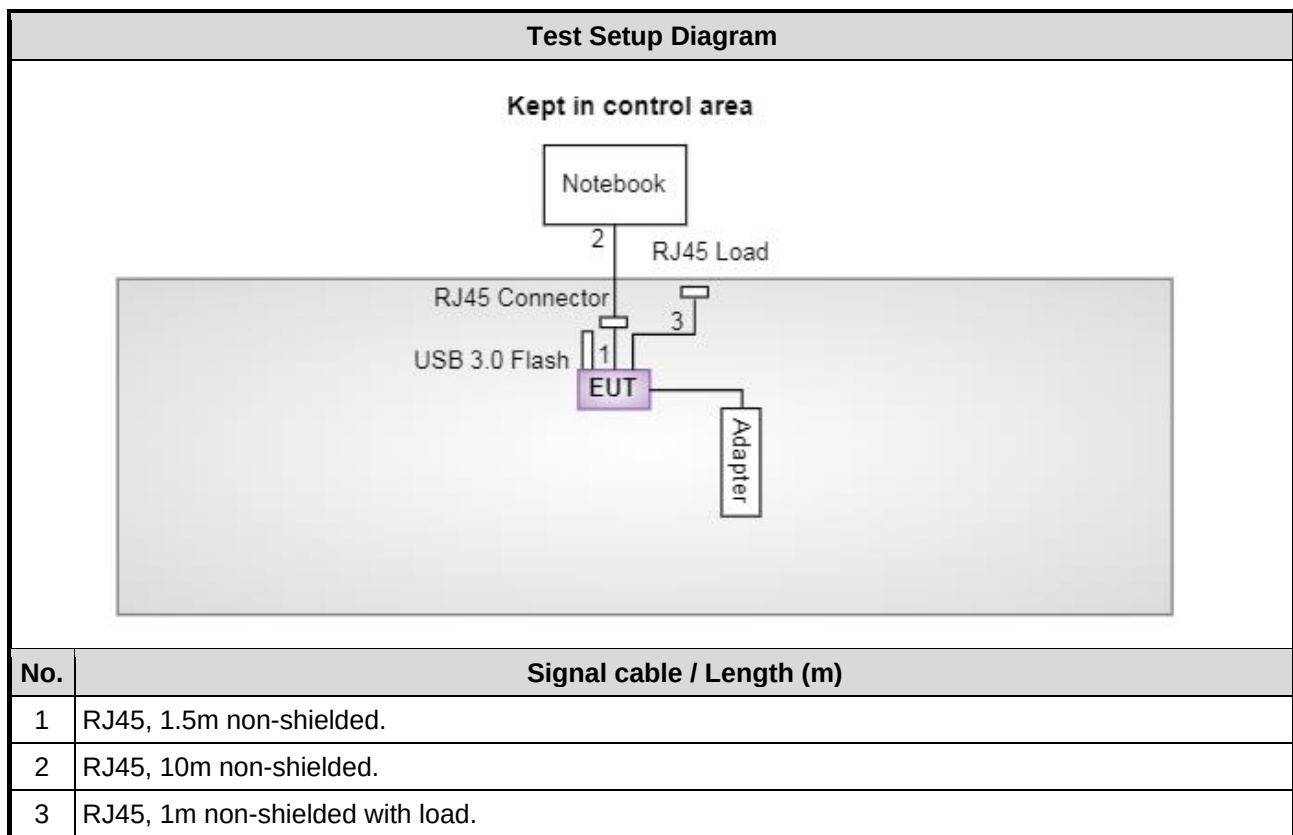
1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	44/47
11b	2437	46/49
11b	2462	45/48
11g	2412	47/49
11g	2437	59/61
11g	2462	45/47
HT20	2412	46/48
HT20	2437	59/61
HT20	2462	42/44
HT40	2422	42/44
HT40	2437	47/49
HT40	2452	40/42

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude E5470	DoC	---
2	RJ45 Load	ICC	---	---	---
3	USB 3.0 Flash	Transcend	JetFlash 700	---	---

1.3 Test Setup Chart



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Dec. 24, 2020				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021
LISN	R&S	ENV216	101579	Mar. 12, 2020	Mar. 11, 2021
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 21, 2020	Oct. 20, 2021
Measurement Software	AUDIX	e3	6.120210k	NA	NA

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

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Nov. 25 ~ Dec. 10, 2020				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101499	Jan. 09, 2020	Jan. 08, 2021
Receiver	R&S	ESR3	101657	Feb. 14, 2020	Feb. 13, 2021
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 10, 2020	Jul. 09, 2021
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 12, 2019	Dec. 11, 2020
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 06, 2020	Nov. 05, 2021
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 17, 2020	Nov. 16, 2021
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 06, 2020	Oct. 05, 2021
Preamplifier	EMC	EMC02325	980225	Jul. 03, 2020	Jul. 02, 2021
Preamplifier	Agilent	83017A	MY39501308	Sep. 26, 2020	Sep. 25, 2021
Preamplifier	EMC	EMC184045B	980192	Jul. 21, 2020	Jul. 20, 2021
RF Cable	EMC	EMC104-SM-SM-8000	181106	Oct. 06, 2020	Oct. 05, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 06, 2020	Oct. 05, 2021
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 06, 2020	Oct. 05, 2021
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 06, 2020	Oct. 05, 2021
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 06, 2020	Oct. 05, 2021
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 06, 2020	Oct. 05, 2021
Measurement Software	AUDIX	e3	6.120210g	NA	NA

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

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Dec. 31, 2020				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 30, 2020	Apr. 29, 2021
Power Meter	Anritsu	ML2495A	1241002	Nov. 04, 2020	Nov. 03, 2021
Power Sensor	Anritsu	MA2411B	1207366	Nov. 04, 2020	Nov. 03, 2021
AC POWER SOURCE	APC	AFC-500W	F312060012	Dec. 04, 2020	Dec. 03, 2021
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 Corp.
Test Site	CO01-WS, 03CH01-WS, TH01-WS
Address of Test Site	No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan District, Tao Yuan City 333, 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	Test Configuration
Conducted Emissions	11g	2437	6 Mbps	1
Radiated Emissions ≤1GHz	11g	2437	6 Mbps	2
Radiated Emissions >1GHz	11b	2412 / 2437 / 2462	1 Mbps	2
Maximum Output Power	11g	2412 / 2437 / 2462	6 Mbps	
6dB bandwidth	HT20	2412 / 2437 / 2462	MCS 0	
Power spectral density	HT40	2422 / 2437 / 2452	MCS 0	
Note: 1. The Adapter had been tested by following test configurations. 1) Configuration 1: MOSO Adapter mode 2) Configuration 2: APD Adapter				

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

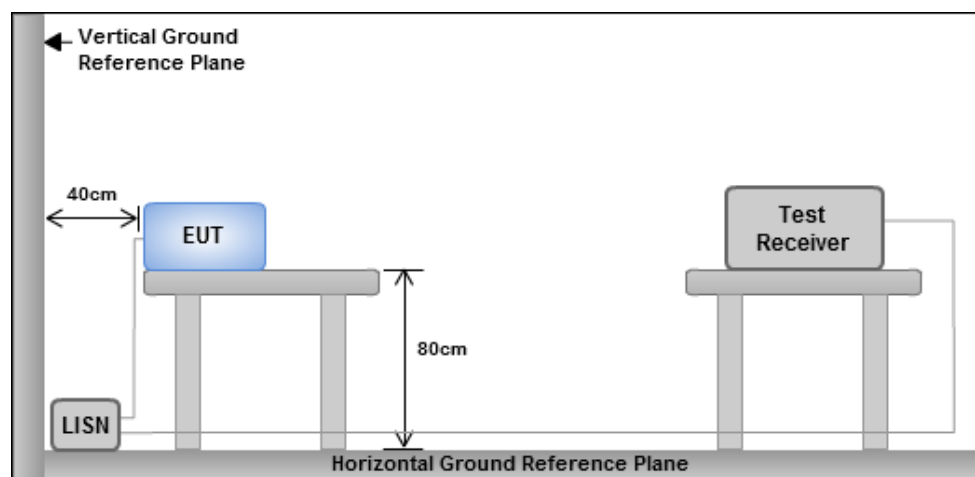
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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.

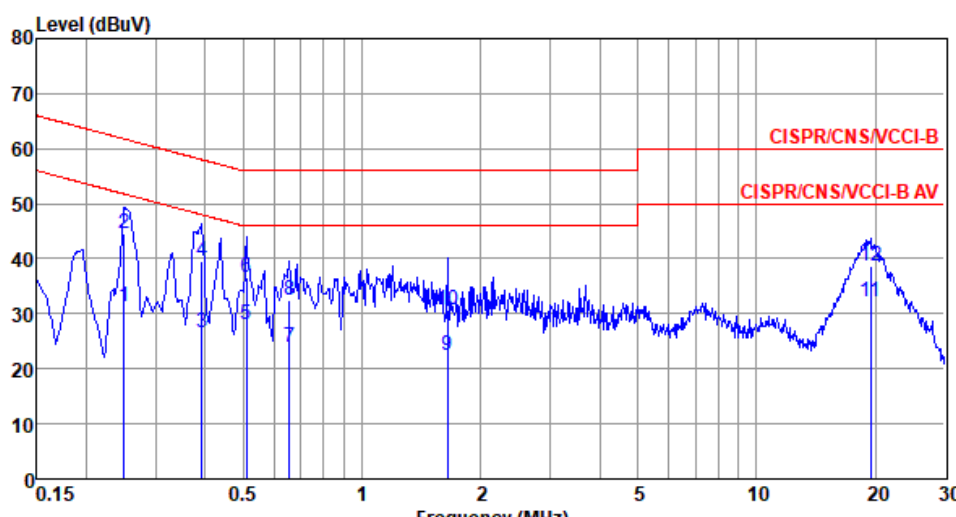
3.1.3 Test Setup



- 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 : Alex Tsai Temperature: 22°C Humidity: 65%																																																																																																																								
Level (dBUV) <table><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>LISN factor dB</th><th>cable loss dB</th><th>Remark</th></tr><tr><td>1</td><td>0.258</td><td>34.33</td><td>51.51</td><td>-17.18</td><td>24.42</td><td>9.63</td><td>0.07</td><td>Average</td></tr><tr><td>2*</td><td>0.258</td><td>46.53</td><td>61.51</td><td>-14.98</td><td>36.62</td><td>9.63</td><td>0.07</td><td>QP</td></tr><tr><td>3</td><td>0.393</td><td>27.08</td><td>47.99</td><td>-20.91</td><td>17.12</td><td>9.63</td><td>0.08</td><td>Average</td></tr><tr><td>4</td><td>0.393</td><td>39.71</td><td>57.99</td><td>-18.28</td><td>29.75</td><td>9.63</td><td>0.08</td><td>QP</td></tr><tr><td>5</td><td>0.428</td><td>23.82</td><td>47.29</td><td>-23.47</td><td>13.85</td><td>9.63</td><td>0.08</td><td>Average</td></tr><tr><td>6</td><td>0.428</td><td>35.61</td><td>57.29</td><td>-21.68</td><td>25.64</td><td>9.63</td><td>0.08</td><td>QP</td></tr><tr><td>7</td><td>0.510</td><td>27.84</td><td>46.00</td><td>-18.16</td><td>17.85</td><td>9.63</td><td>0.09</td><td>Average</td></tr><tr><td>8</td><td>0.510</td><td>38.93</td><td>56.00</td><td>-17.07</td><td>28.94</td><td>9.63</td><td>0.09</td><td>QP</td></tr><tr><td>9</td><td>0.914</td><td>23.60</td><td>46.00</td><td>-22.40</td><td>13.54</td><td>9.63</td><td>0.12</td><td>Average</td></tr><tr><td>10</td><td>0.914</td><td>35.64</td><td>56.00</td><td>-20.36</td><td>25.58</td><td>9.63</td><td>0.12</td><td>QP</td></tr><tr><td>11</td><td>19.122</td><td>32.18</td><td>50.00</td><td>-17.82</td><td>21.22</td><td>9.72</td><td>0.65</td><td>Average</td></tr><tr><td>12</td><td>19.122</td><td>39.74</td><td>60.00</td><td>-20.26</td><td>28.78</td><td>9.72</td><td>0.65</td><td>QP</td></tr></table>					Freq MHz	Level dBUV	Limit Line dBUV	Over Limit dB	Read Level dBUV	LISN factor dB	cable loss dB	Remark	1	0.258	34.33	51.51	-17.18	24.42	9.63	0.07	Average	2*	0.258	46.53	61.51	-14.98	36.62	9.63	0.07	QP	3	0.393	27.08	47.99	-20.91	17.12	9.63	0.08	Average	4	0.393	39.71	57.99	-18.28	29.75	9.63	0.08	QP	5	0.428	23.82	47.29	-23.47	13.85	9.63	0.08	Average	6	0.428	35.61	57.29	-21.68	25.64	9.63	0.08	QP	7	0.510	27.84	46.00	-18.16	17.85	9.63	0.09	Average	8	0.510	38.93	56.00	-17.07	28.94	9.63	0.09	QP	9	0.914	23.60	46.00	-22.40	13.54	9.63	0.12	Average	10	0.914	35.64	56.00	-20.36	25.58	9.63	0.12	QP	11	19.122	32.18	50.00	-17.82	21.22	9.72	0.65	Average	12	19.122	39.74	60.00	-20.26	28.78	9.72	0.65	QP
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Note 1: Level (dBUV) = Read Level (dBUV) + LISN Factor (dB) + Cable Loss (dB). 2: Over Limit (dB) = Level (dBUV) – Limit Line (dBUV).																																																																																																																								

Modulation	11g	Test Freq. (MHz)	2437																																																																																																																					
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2*	0.249	44.68	61.78	-17.10	34.80	9.65	0.07	QP																																																																																																																
3	0.393	26.51	47.99	-21.48	16.61	9.65	0.08	Average																																																																																																																
4	0.393	39.61	57.99	-18.38	29.71	9.65	0.08	QP																																																																																																																
5	0.510	28.11	46.00	-17.89	18.19	9.65	0.09	Average																																																																																																																
6	0.510	36.59	56.00	-19.41	26.67	9.65	0.09	QP																																																																																																																
7	0.654	23.92	46.00	-22.08	13.98	9.65	0.10	Average																																																																																																																
8	0.654	32.49	56.00	-23.51	22.55	9.65	0.10	QP																																																																																																																
9	1.645	22.38	46.00	-23.62	12.32	9.66	0.16	Average																																																																																																																
10	1.645	30.73	56.00	-25.27	20.67	9.66	0.16	QP																																																																																																																
11	19.428	32.04	50.00	-17.96	21.04	9.84	0.65	Average																																																																																																																
12	19.428	38.61	60.00	-21.39	27.61	9.84	0.65	QP																																																																																																																
Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (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

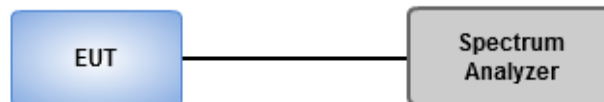
6dB Bandwidth

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	18°C / 63%	Tested By	Aska Huang
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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	10.145M	15.051M	15M1G1D	9.565M	14.906M
802.11g_Nss1,(6Mbps)_2TX	16.594M	21.997M	22M0D1D	16.449M	16.643M
802.11n HT20_Nss1,(MCS0)_2TX	17.826M	24.24M	24M2D1D	17.754M	17.8M
802.11n HT40_Nss1,(MCS0)_2TX	36.522M	36.324M	36M3D1D	36.377M	36.179M

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

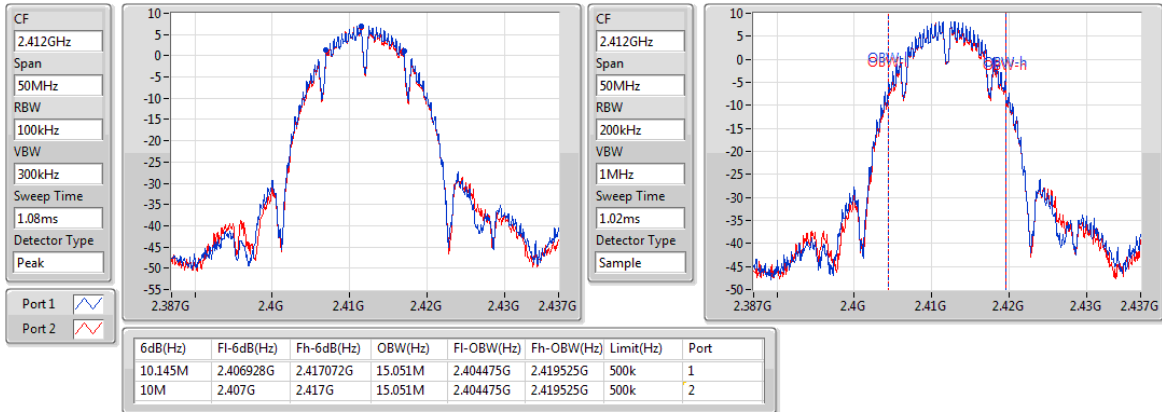
Mode	Result	Limit (Hz)	Port 1- N dB (Hz)	Port 1- OBW (Hz)	Port 2- N dB (Hz)	Port 2- OBW (Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	10.145M	15.051M	10M	15.051M
2437MHz	Pass	500k	10M	15.051M	9.565M	14.906M
2462MHz	Pass	500k	10M	15.051M	10M	15.051M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	16.522M	16.787M	16.594M	16.643M
2437MHz	Pass	500k	16.522M	21.997M	16.449M	20.622M
2462MHz	Pass	500k	16.594M	16.715M	16.594M	16.787M
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	17.826M	17.873M	17.826M	17.8M
2437MHz	Pass	500k	17.826M	24.24M	17.754M	22.287M
2462MHz	Pass	500k	17.826M	17.873M	17.826M	17.873M
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	36.377M	36.179M	36.377M	36.324M
2437MHz	Pass	500k	36.377M	36.179M	36.377M	36.324M
2452MHz	Pass	500k	36.522M	36.179M	36.377M	36.324M

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

802.11b_Nss1,(1Mbps)_2TX

EBW

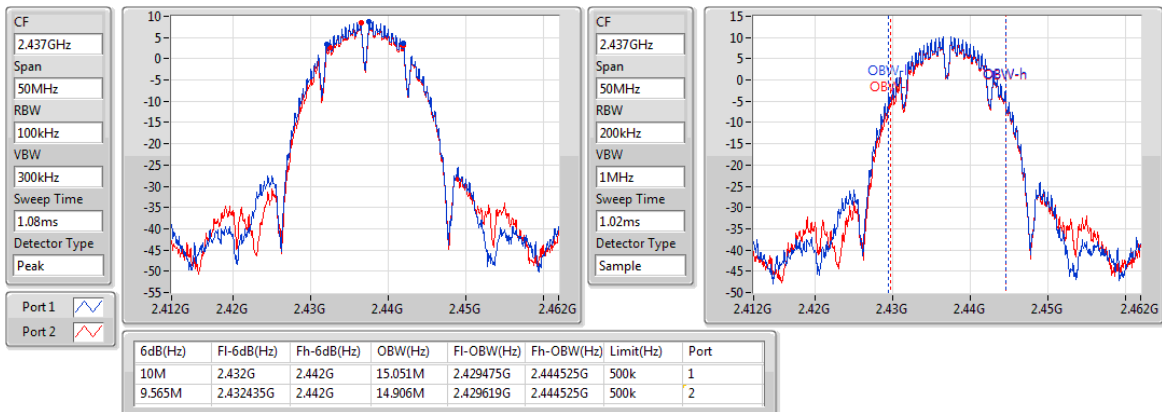
2412MHz



802.11b_Nss1,(1Mbps)_2TX

EBW

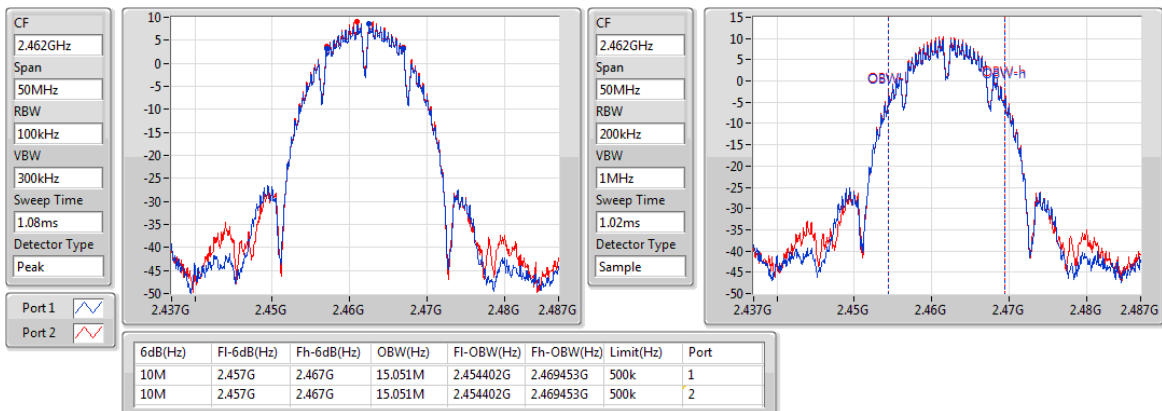
2437MHz



802.11b_Nss1,(1Mbps)_2TX

EBW

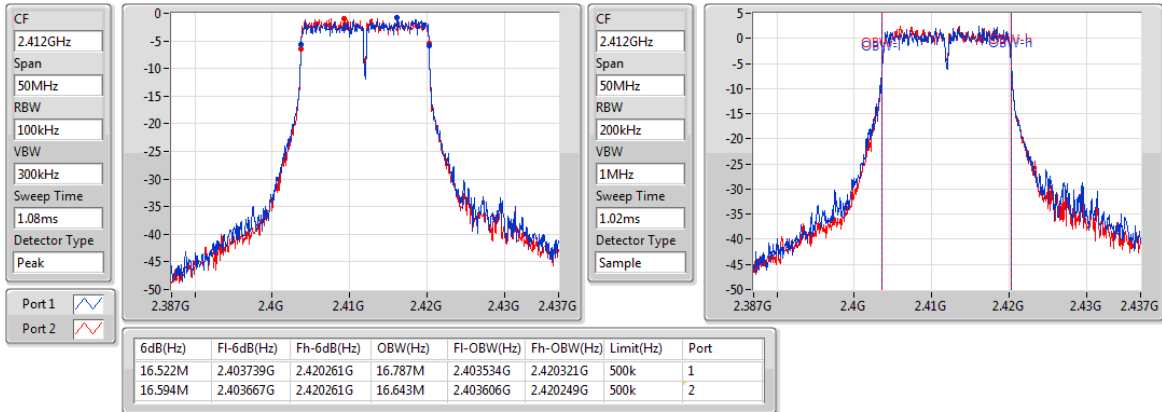
2462MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

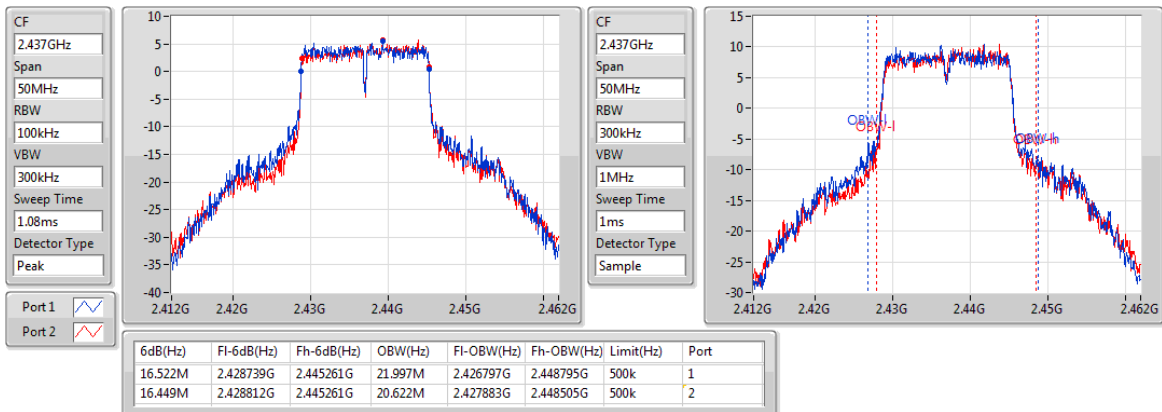
2412MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

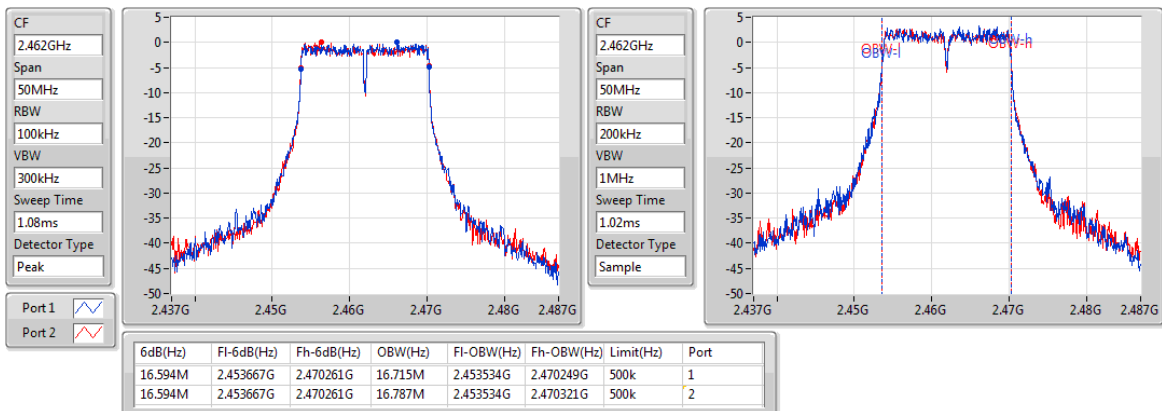
2437MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

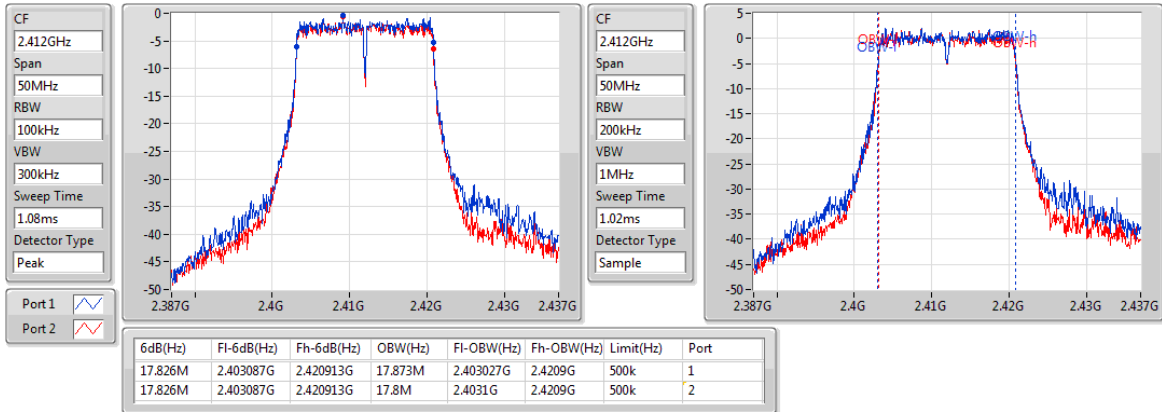
2462MHz



802.11n HT20_Nss1,(MCS0)_2TX

EBW

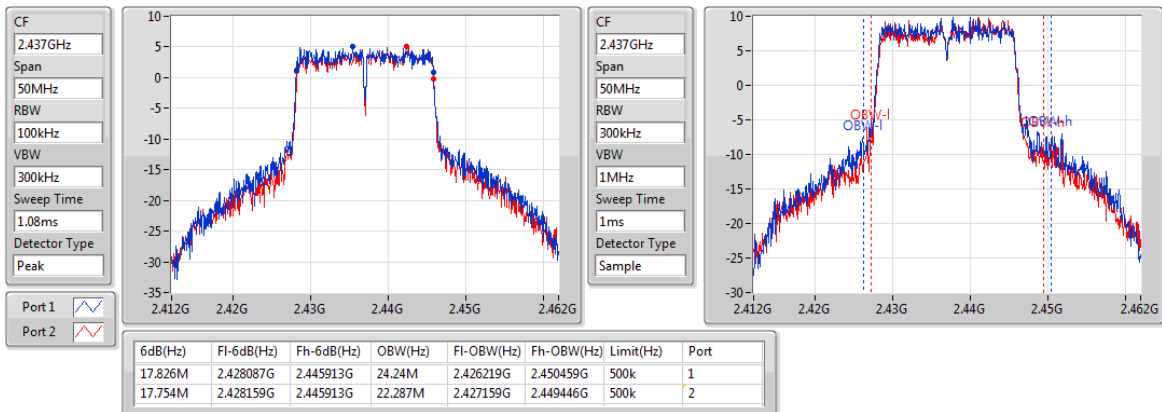
2412MHz



802.11n HT20_Nss1,(MCS0)_2TX

EBW

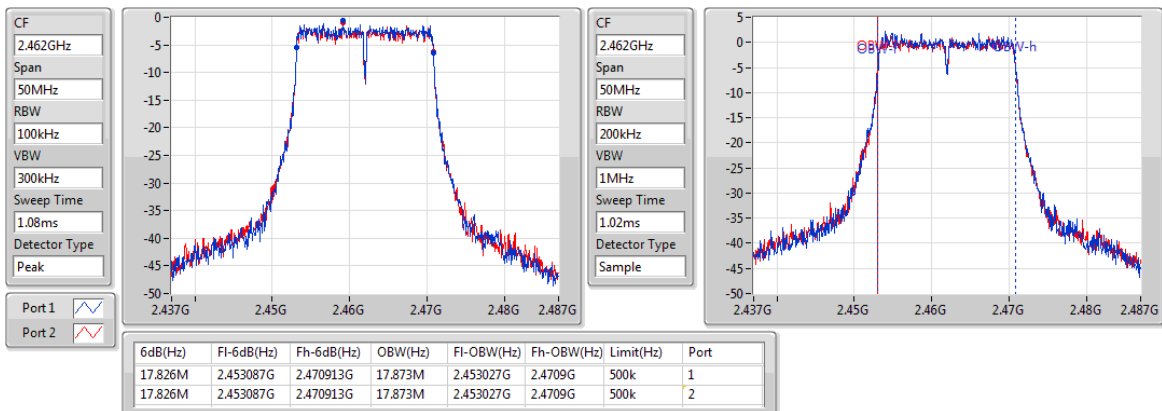
2437MHz



802.11n HT20_Nss1,(MCS0)_2TX

EBW

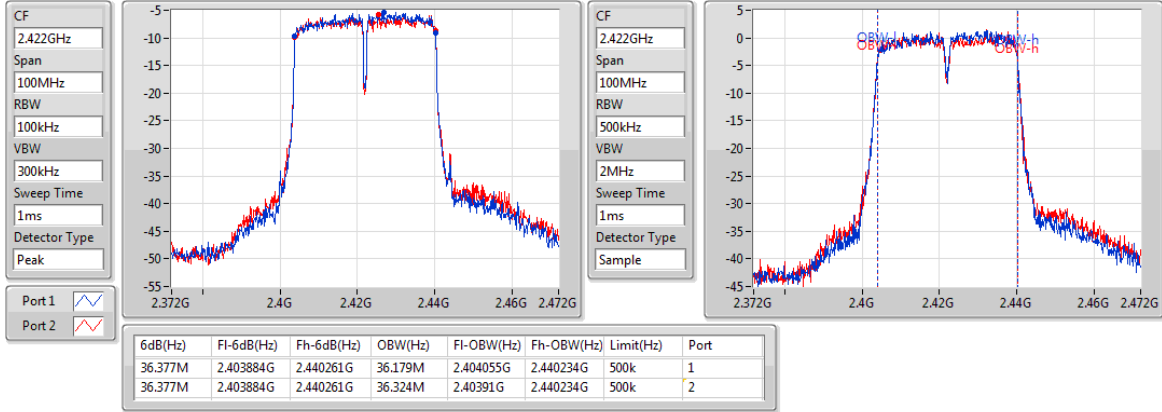
2462MHz



802.11n HT40_Nss1,(MCS0)_2TX

EBW

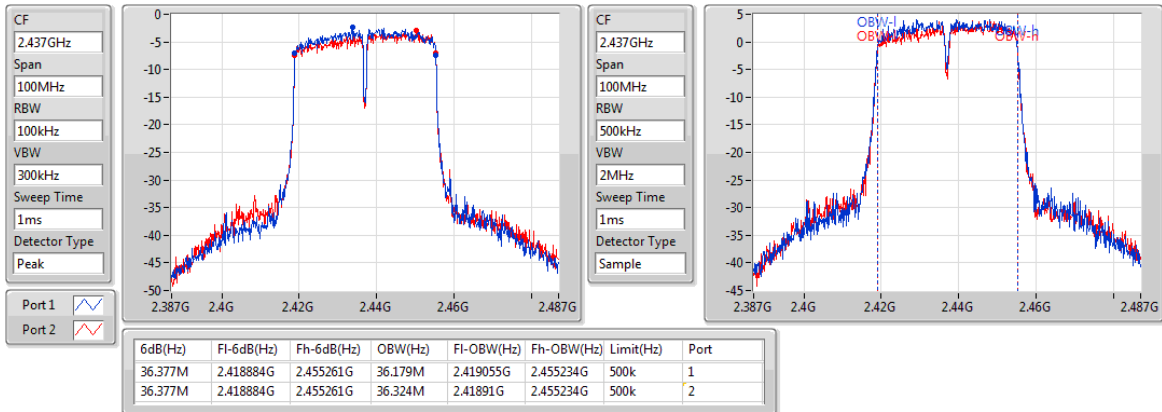
2422MHz



802.11n HT40_Nss1,(MCS0)_2TX

EBW

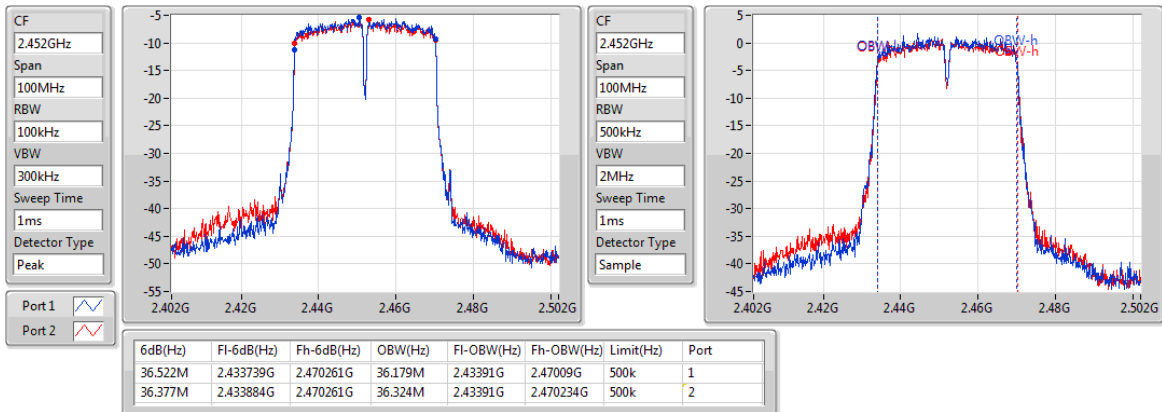
2437MHz



802.11n HT40_Nss1,(MCS0)_2TX

EBW

2452MHz



3.3 RF Output Power

3.3.1 Limit of RF Output Power

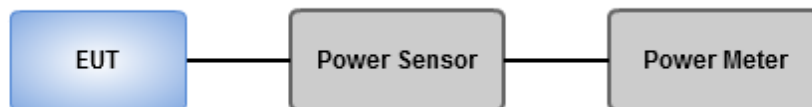
Conducted power shall not exceed 1Watt.

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	18°C / 63%	Tested By	Aska Huang
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Summary of Peak Conducted Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	23.58	0.22803
802.11g_Nss1,(6Mbps)_2TX	26.10	0.40738
802.11n HT20_Nss1,(MCS0)_2TX	26.07	0.40458
802.11n HT40_Nss1,(MCS0)_2TX	25.15	0.32734

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	2.45	19.20	18.81	22.02	30.00	24.47	36.00
2437MHz	Pass	2.45	20.67	20.46	23.58	30.00	26.03	36.00
2462MHz	Pass	2.45	20.43	20.49	23.47	30.00	25.92	36.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	2.45	21.75	22.17	24.98	30.00	27.43	36.00
2437MHz	Pass	2.45	23.05	23.12	26.10	30.00	28.55	36.00
2462MHz	Pass	2.45	22.37	22.73	25.56	30.00	28.01	36.00
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	2.45	21.32	21.56	24.45	30.00	26.90	36.00
2437MHz	Pass	2.45	23.03	23.08	26.07	30.00	28.52	36.00
2462MHz	Pass	2.45	21.62	21.97	24.81	30.00	27.26	36.00
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2422MHz	Pass	2.45	20.53	20.65	23.60	30.00	26.05	36.00
2437MHz	Pass	2.45	22.12	22.15	25.15	30.00	27.60	36.00
2452MHz	Pass	2.45	20.24	20.19	23.23	30.00	25.68	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	21.78	0.15066
802.11g_Nss1,(6Mbps)_2TX	22.28	0.16904
802.11n HT20_Nss1,(MCS0)_2TX	22.28	0.16904
802.11n HT40_Nss1,(MCS0)_2TX	17.51	0.05636

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	2.45	17.15	16.87	20.02	-	22.47	-
2437MHz	Pass	2.45	18.88	18.5	21.70	-	24.15	-
2462MHz	Pass	2.45	18.81	18.72	21.78	-	24.23	-
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	2.45	14.37	14.23	17.31	-	19.76	-
2437MHz	Pass	2.45	19.32	19.21	22.28	-	24.73	-
2462MHz	Pass	2.45	14.62	14.56	17.60	-	20.05	-
802.11n HT20_Nss1, (MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	2.45	13.86	13.59	16.74	-	19.19	-
2437MHz	Pass	2.45	19.28	19.26	22.28	-	24.73	-
2462MHz	Pass	2.45	13.59	13.31	16.46	-	18.91	-
802.11n HT40_Nss1, (MCS0)_2TX	-	-	-	-	-	-	-	-
2422MHz	Pass	2.45	11.82	11.51	14.68	-	17.13	-
2437MHz	Pass	2.45	14.65	14.34	17.51	-	19.96	-
2452MHz	Pass	2.45	11.53	11.25	14.40	-	16.85	-

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

Note : Conducted average output power is for reference only

3.4 Power Spectral Density

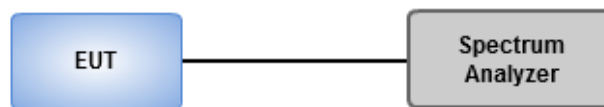
3.4.1 Limit of Power Spectral Density

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.
2. Detector = RMS, Sweep time = auto couple.
3. Sweep time = auto couple.
4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
5. Use the peak marker function to determine the maximum amplitude level.

3.4.3 Test Setup



3.4.4 Test Result of Power Spectral Density

Ambient Condition	18°C / 63%	Tested By	Aska Huang
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Summary

Mode	PD (dBm/3kHz)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	-8.37
802.11g_Nss1,(6Mbps)_2TX	-6.79
802.11n HT20_Nss1,(MCS0)_2TX	-6.33
802.11n HT40_Nss1,(MCS0)_2TX	-11.61

Result

Mode	Result	DG (dBi)	Port 1 (dBm/3kHz)	Port 2 (dBm/3kHz)	PD (dBm/3kHz)	PD Limit (dBm/3kHz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	-13.14	-13.30	-10.28	8.00
2437MHz	Pass	5.46	-11.39	-11.79	-8.62	8.00
2462MHz	Pass	5.46	-11.70	-11.04	-8.37	8.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	-15.42	-14.99	-12.26	8.00
2437MHz	Pass	5.46	-9.46	-9.28	-6.79	8.00
2462MHz	Pass	5.46	-14.40	-13.99	-11.18	8.00
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.46	-14.21	-14.99	-11.57	8.00
2437MHz	Pass	5.46	-9.06	-9.32	-6.33	8.00
2462MHz	Pass	5.46	-14.77	-15.64	-12.45	8.00
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	5.46	-16.81	-18.75	-14.66	8.00
2437MHz	Pass	5.46	-15.03	-14.24	-11.61	8.00
2452MHz	Pass	5.46	-18.89	-16.93	-14.79	8.00

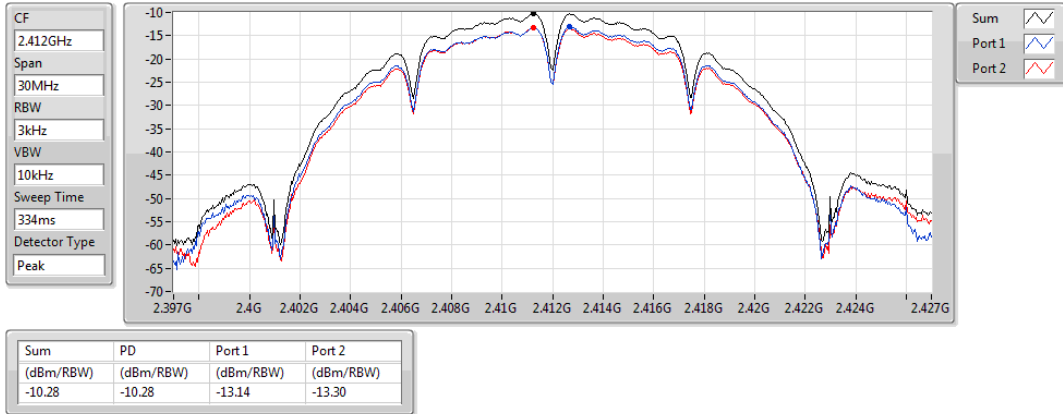
DG = Directional Gain = $2.45 + 10 \cdot \log(2/1) = 5.46$ dBi;

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

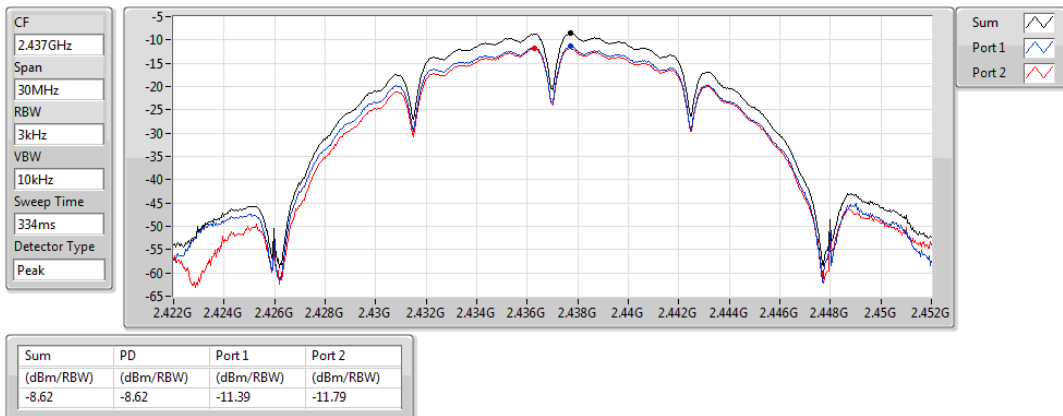
2412MHz



802.11b_Nss1,(1Mbps)_2TX

PSD

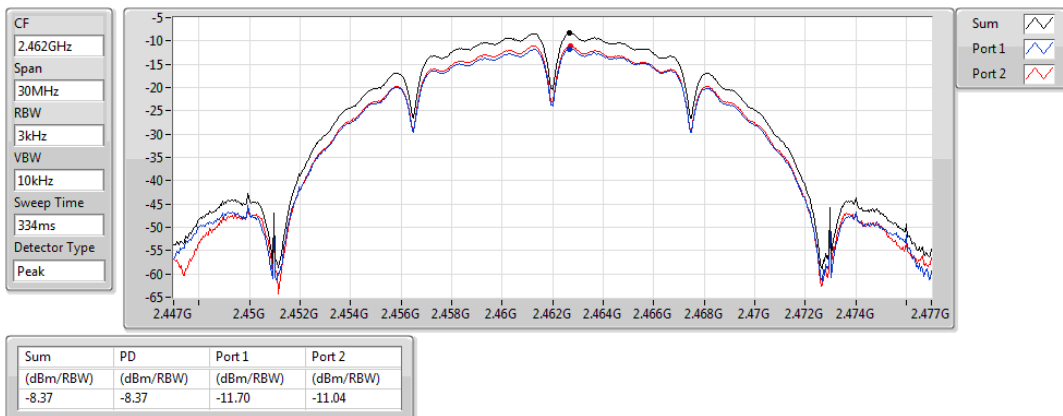
2437MHz



802.11b_Nss1,(1Mbps)_2TX

PSD

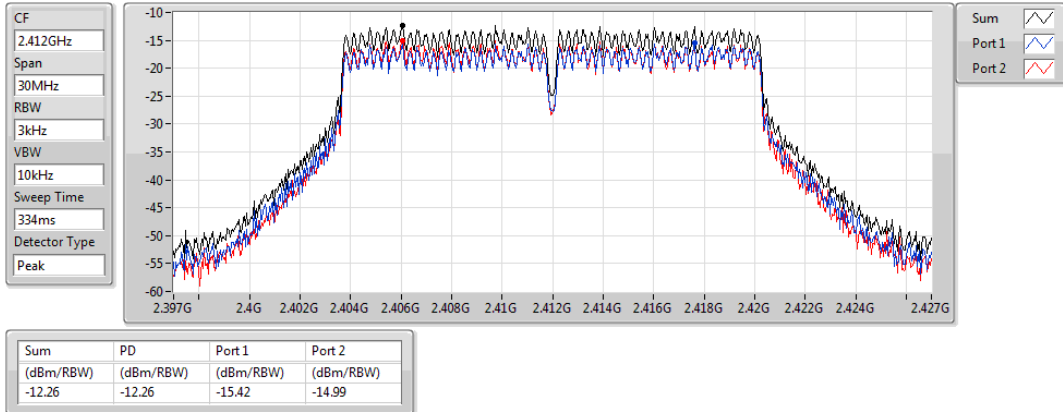
2462MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

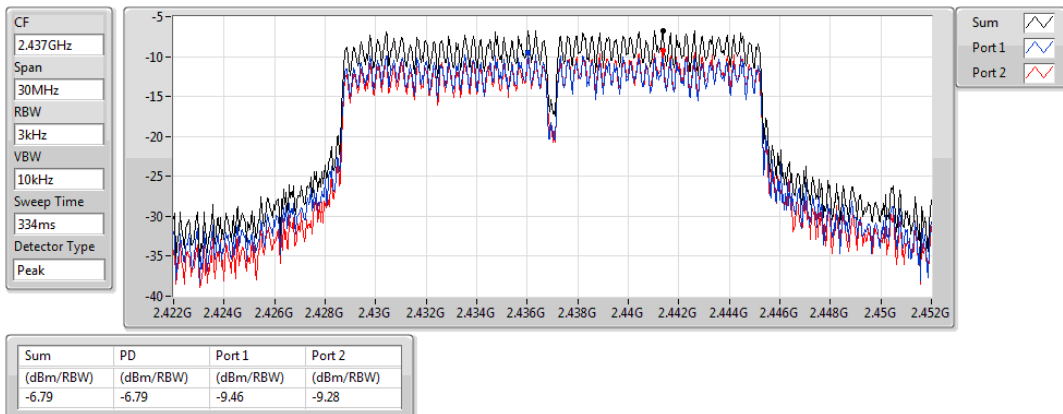
2412MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

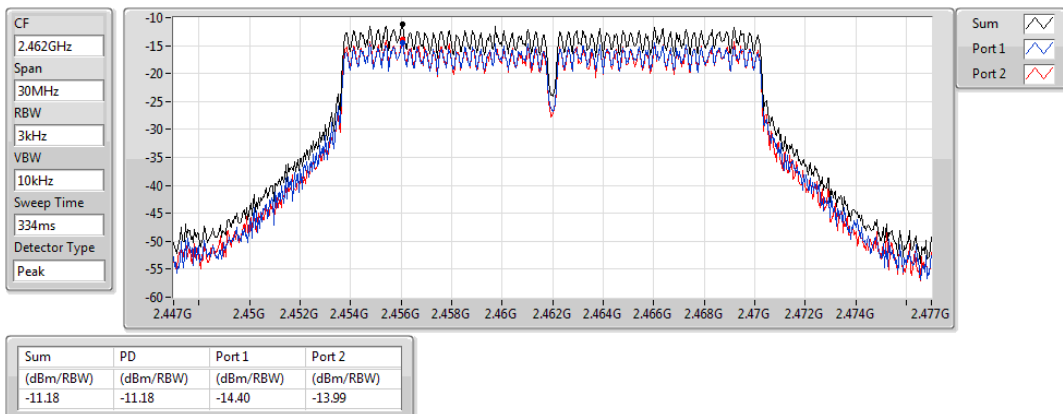
2437MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

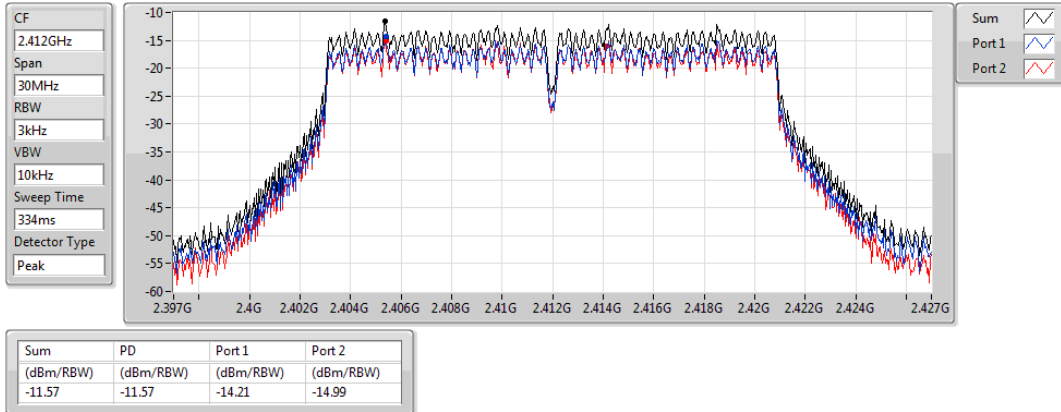
2462MHz



802.11n HT20_Nss1,(MCS0)_2TX

PSD

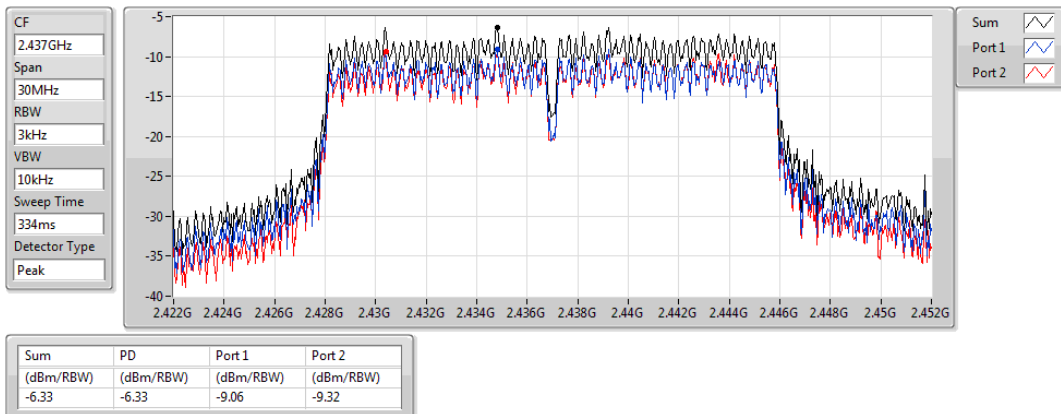
2412MHz



802.11n HT20_Nss1,(MCS0)_2TX

PSD

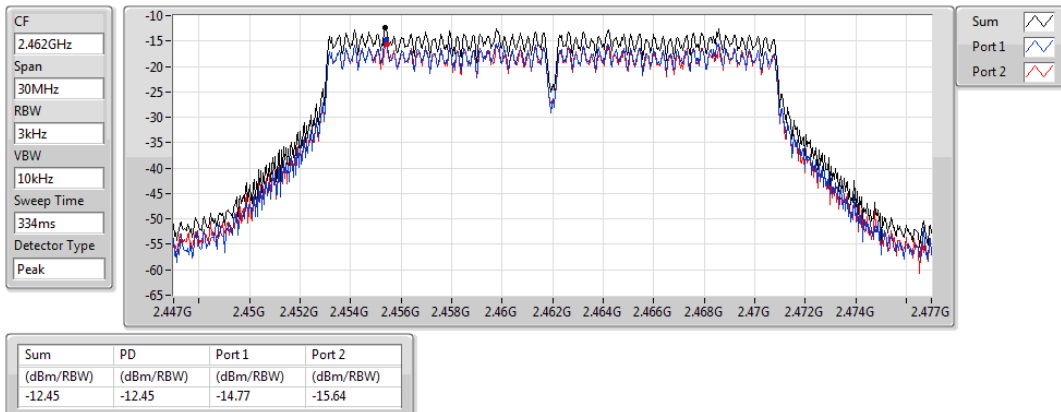
2437MHz



802.11n HT20_Nss1,(MCS0)_2TX

PSD

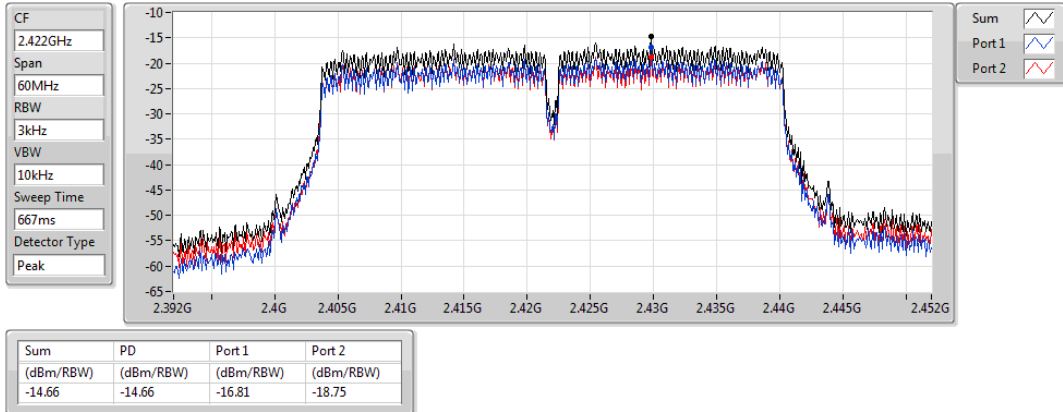
2462MHz



802.11n HT40_Nss1,(MCS0)_2TX

PSD

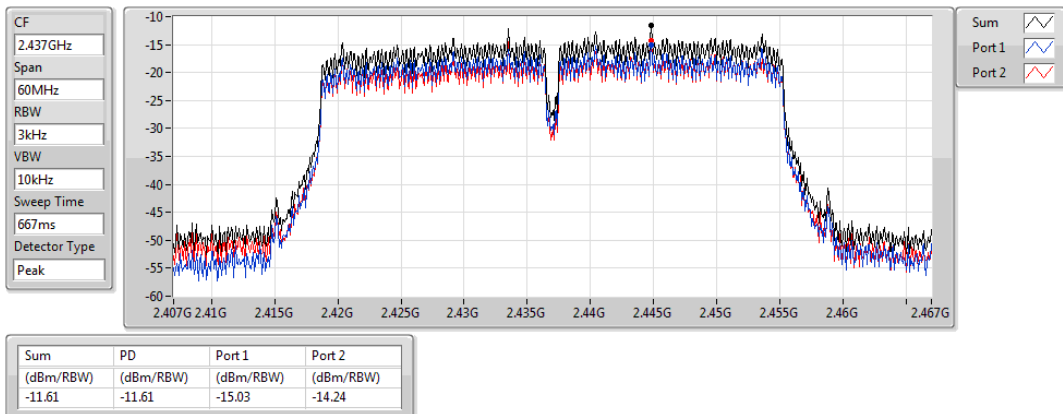
2422MHz



802.11n HT40_Nss1,(MCS0)_2TX

PSD

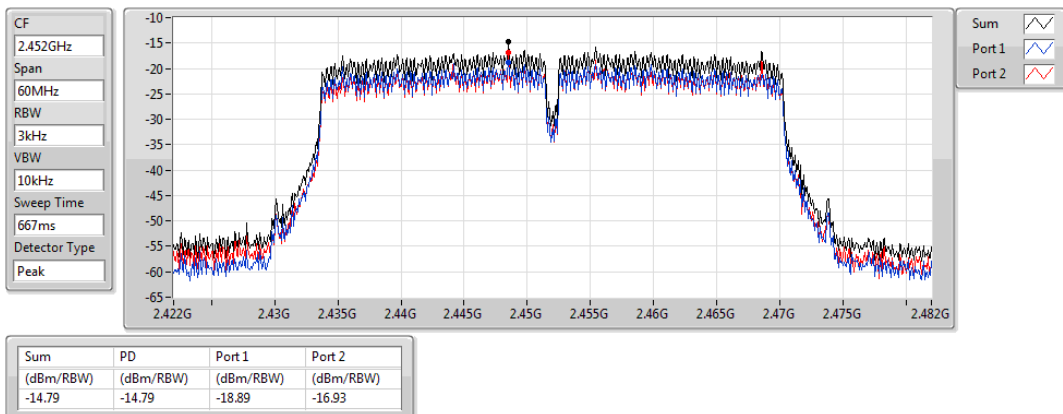
2437MHz



802.11n HT40_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

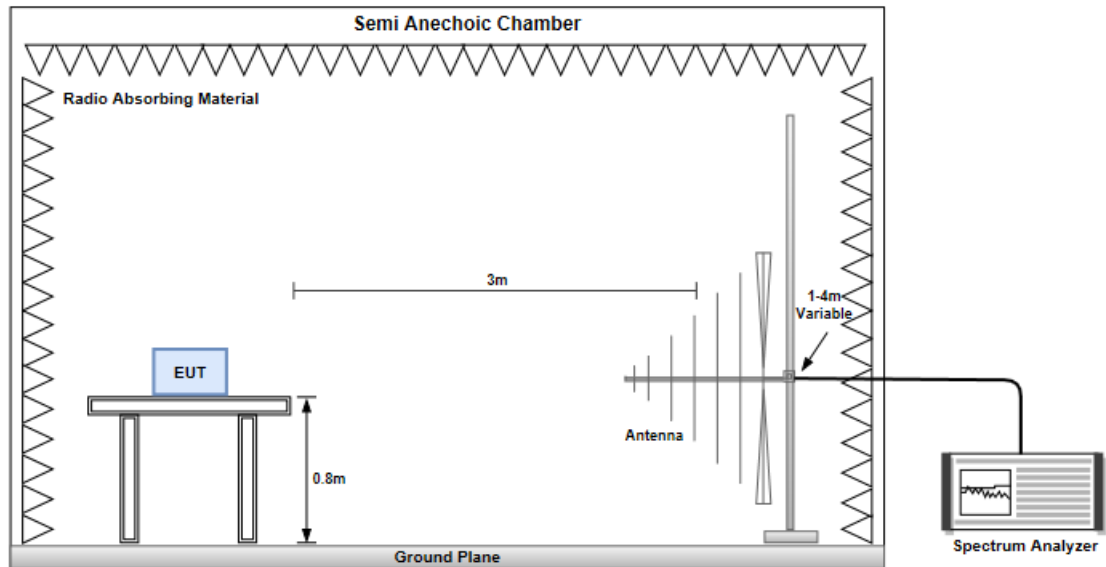
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

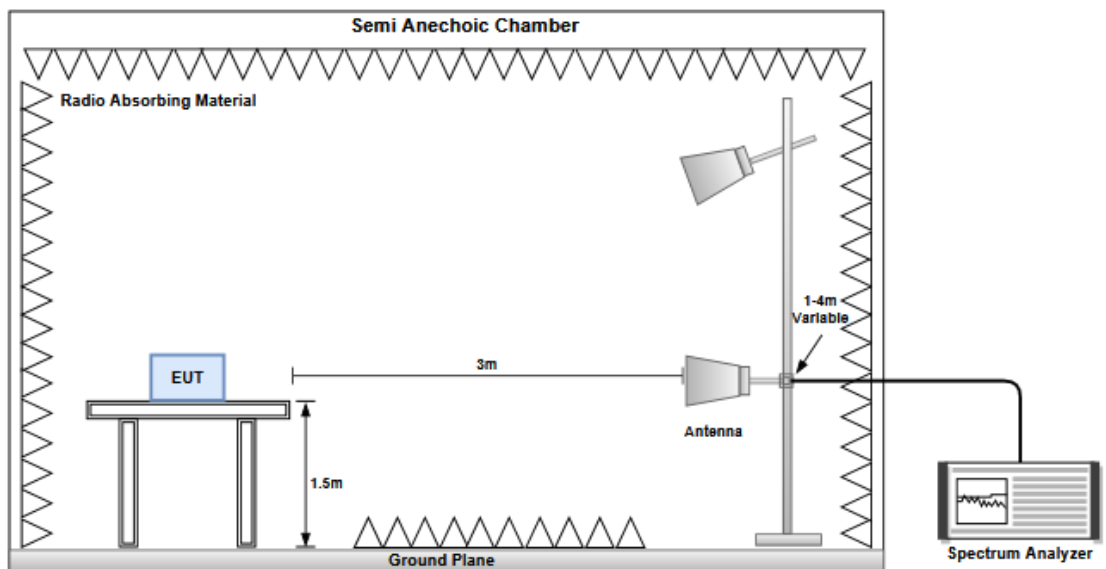
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz

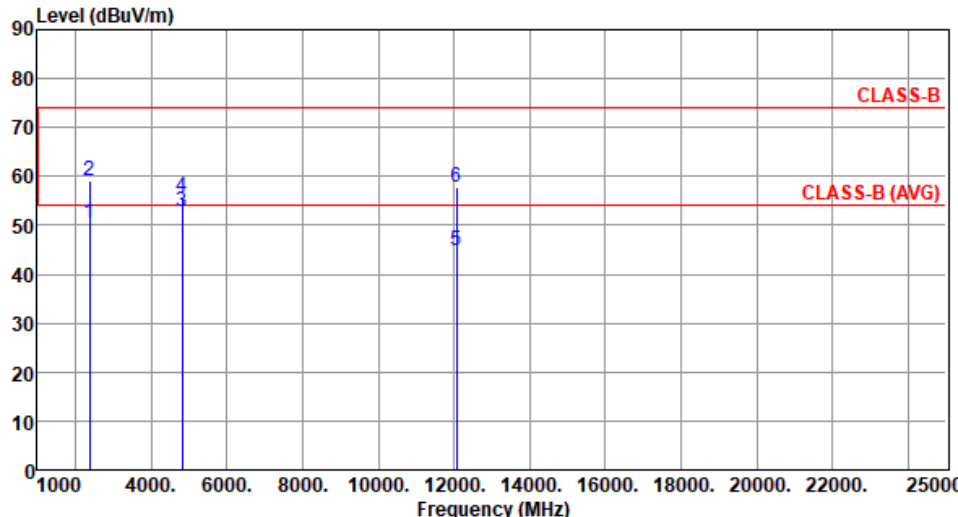


3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):22 Humidity(%):65			
Level (dBuV/m)			

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):22 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 :Roger Lu Temperature(°C):23 Humidity(%):64									
Level (dBuV/m)  Frequency (MHz)									
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2386.00	50.41	54.00	-3.59	53.14	-2.73	Average	162	15
2	2386.00	59.22	74.00	-14.78	61.95	-2.73	Peak	162	15
3	4824.00	52.90	54.00	-1.10	49.33	3.57	Average	171	269
4	4824.00	55.73	74.00	-18.27	52.16	3.57	Peak	171	269
5	12060.00	44.86	54.00	-9.14	30.58	14.28	Average	100	12
6	12060.00	57.89	74.00	-16.11	43.61	14.28	Peak	100	12

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

Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) <			

Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :BRAD WU Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	11b	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :BRAD WU Temperature(°C):23 Humidity(%):64			
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):23 Humidity(%):64			
Level (dBUV/m)			

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBUV/m) </			

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) </			

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) <			

Modulation	11g	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) <			

3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20

Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBUV/m)			

Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) <			

Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) </			

Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) <			

3.5.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40

Modulation	HT40	Test Freq. (MHz)	2422
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBUV/m) <			

Modulation	HT40	Test Freq. (MHz)	2422
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) <			

Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m) </			

Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Horizontal		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
Level (dBuV/m)			

Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Vertical		
Test By :Akun Chung Temperature(°C):23 Humidity(%):64			
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

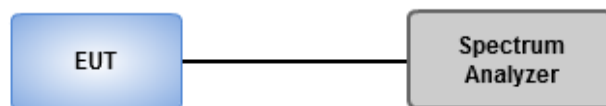
Reference level measurement

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

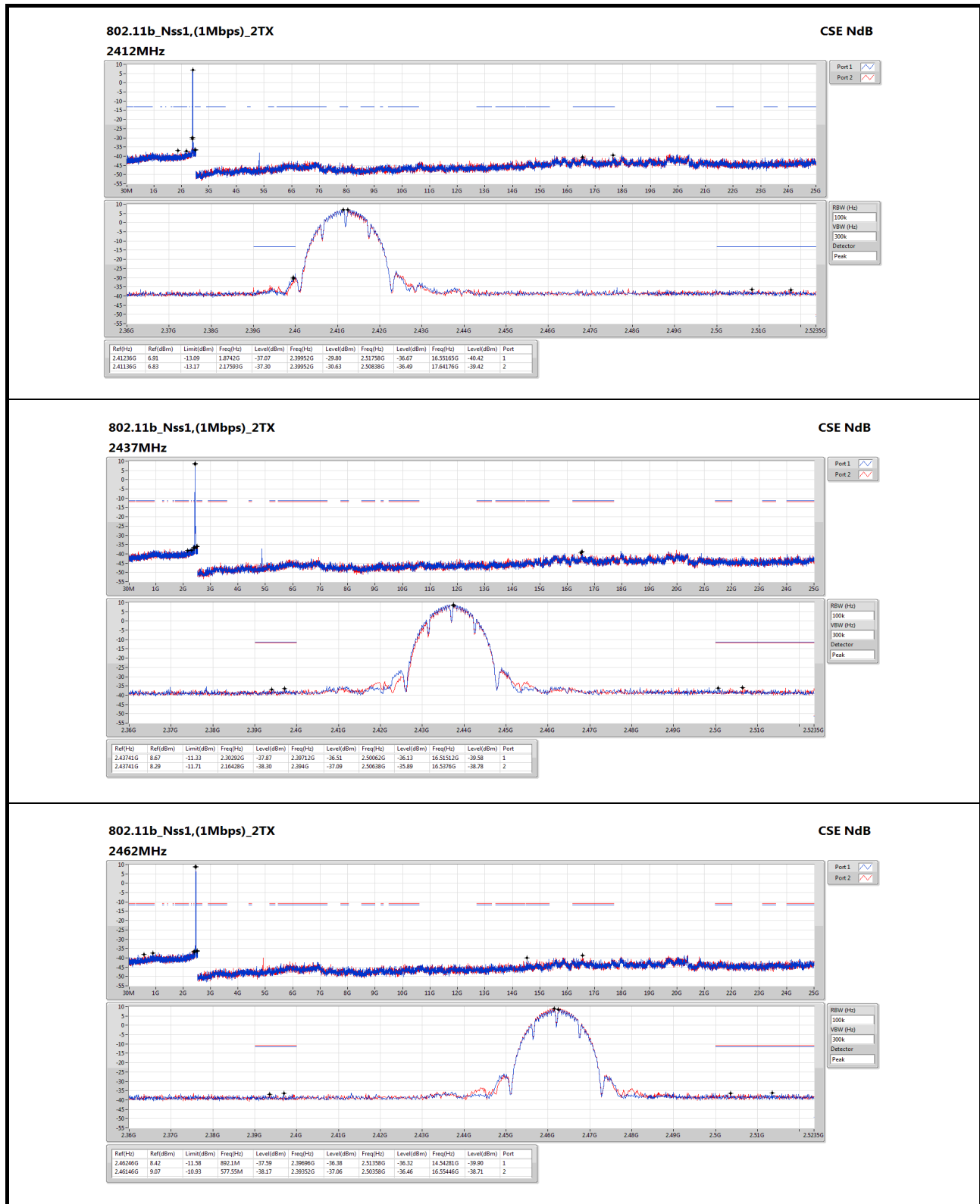
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

3.6.3 Test Setup



3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands

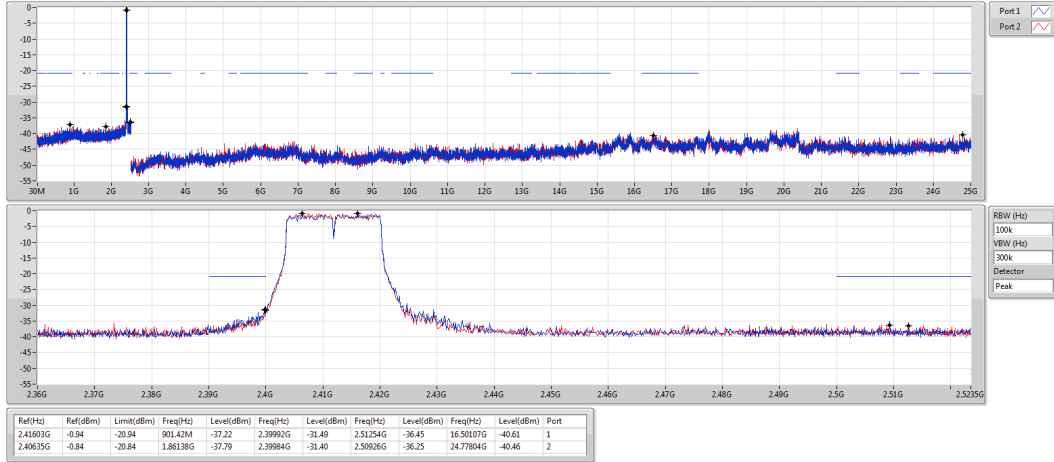
Ambient Condition	18°C / 63%	Tested By	Aska Huang
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802.11g_Nss1,(6Mbps)_2TX

CSE NdB

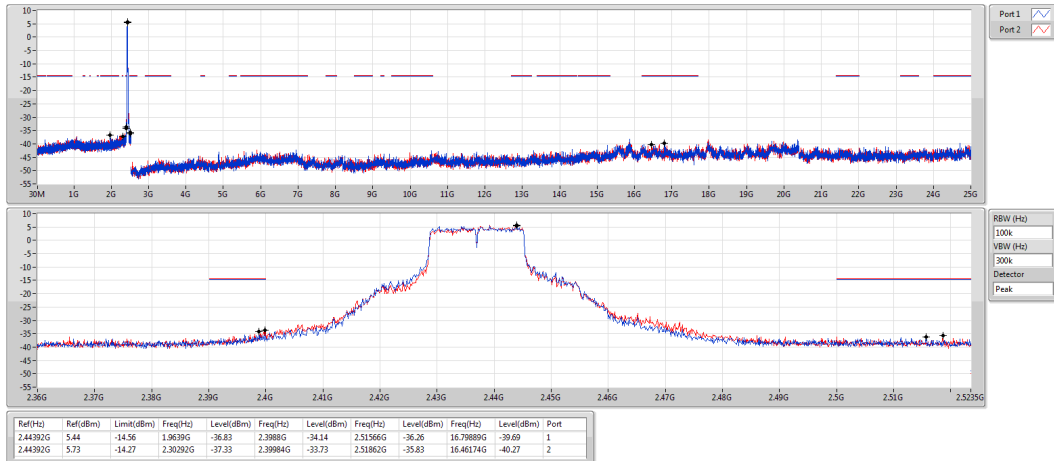
2412MHz



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

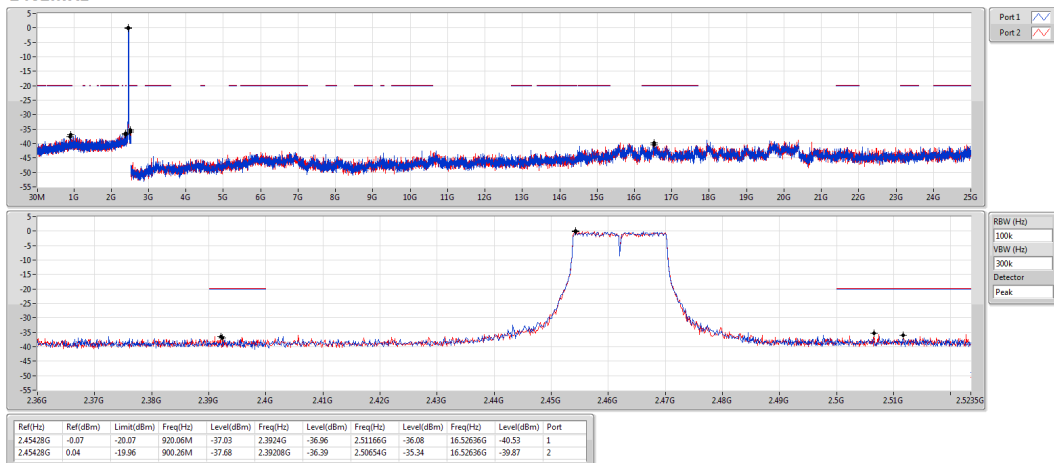
2437MHz



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

2462MHz



802.11n HT20_Nss1,(MCS0)_2TX

CSE NdB

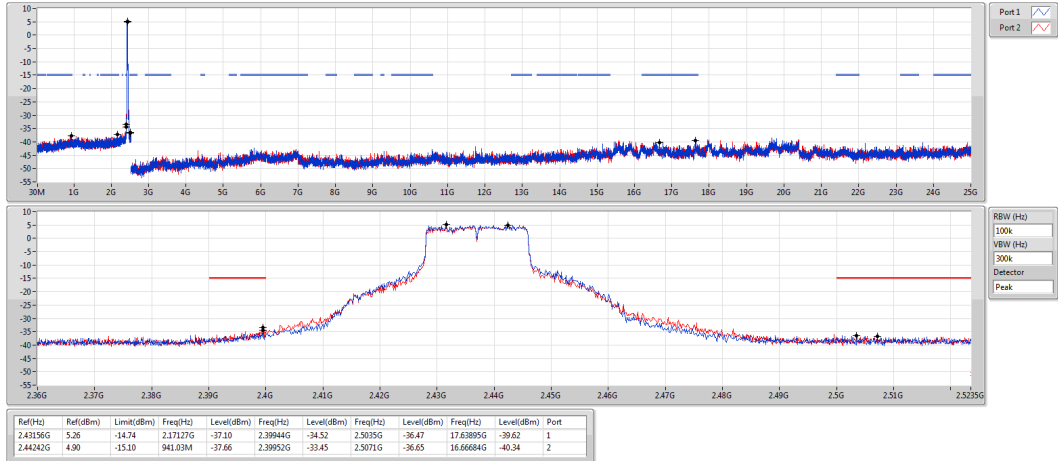
2412MHz



802.11n HT20_Nss1,(MCS0)_2TX

CSE NdB

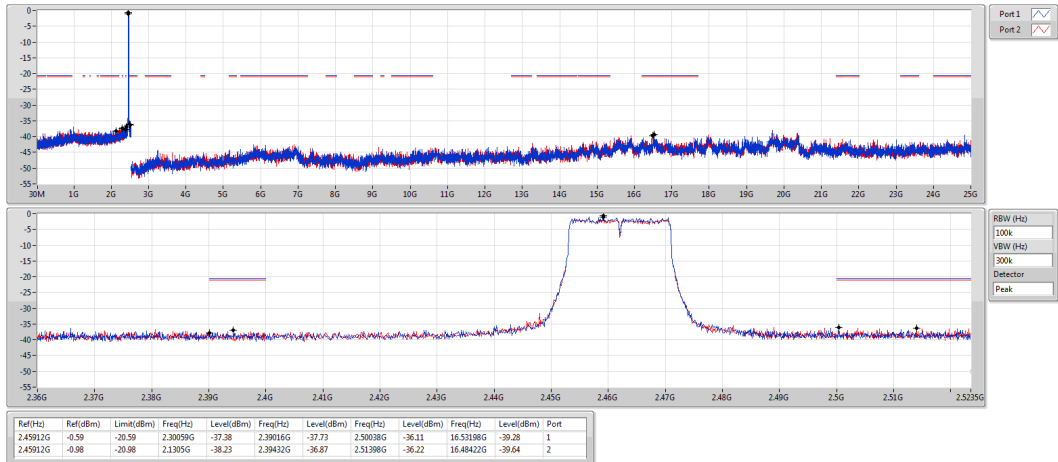
2437MHz



802.11n HT20_Nss1,(MCS0)_2TX

CSE NdB

2462MHz



802.11n HT40_Nss1,(MCS0)_2TX

CSE NdB

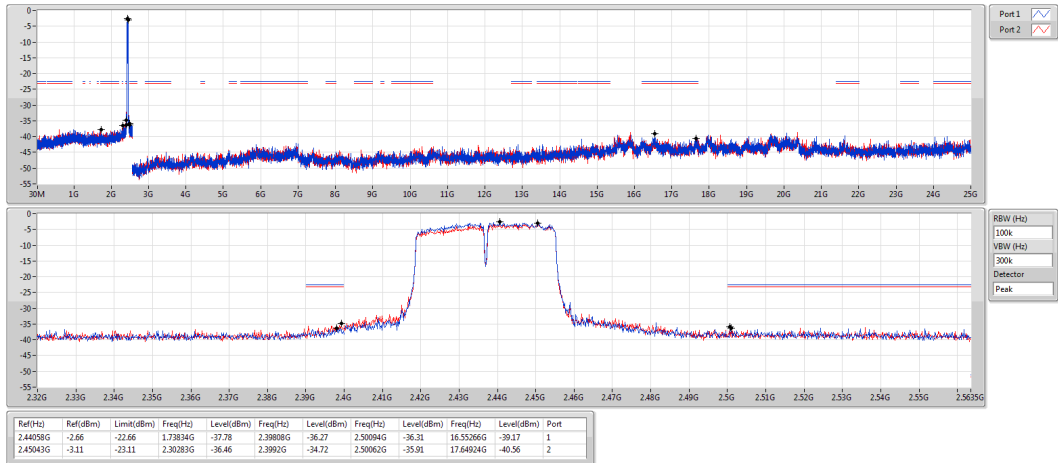
2422MHz



802.11n HT40_Nss1,(MCS0)_2TX

CSE NdB

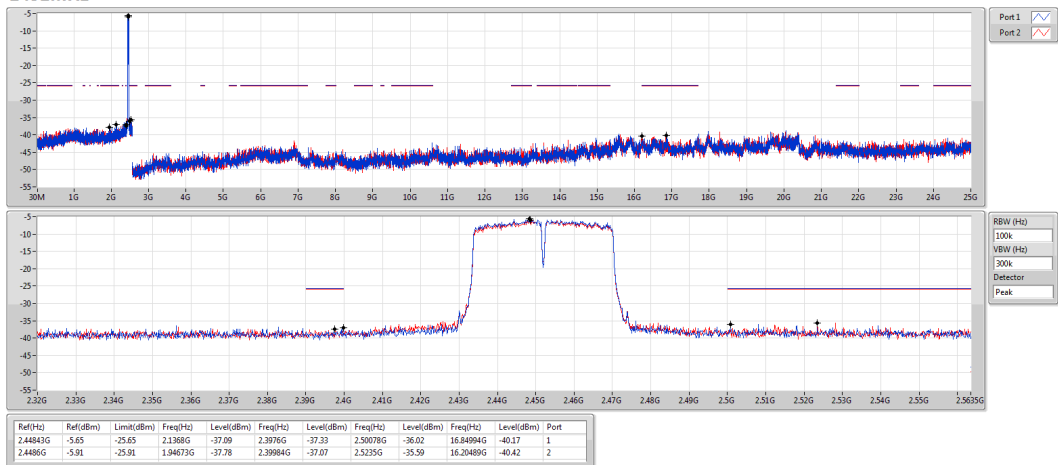
2437MHz



802.11n HT40_Nss1,(MCS0)_2TX

CSE NdB

2452MHz



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 Corp (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 District, Tao Yuan City
333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

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

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

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Email: ICC_Service@icertifi.com.tw

==END==