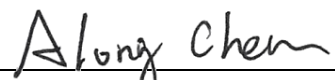


FCC Test Report

FCC ID : YQMLLS090
Equipment : Focus Premium
Model No. : Focus Premium
Brand Name : FARO
Applicant : FARO Technologies, Inc.
Address : 250 Technology Park, Lake Mary, Florida,
United States, 32746
Standard : 47 CFR FCC Part 15.247
Received Date : Dec. 16, 2022
Tested Date : Dec. 29, 2021 ~ Feb. 22, 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:


Along Chen / Assistant Manager

Approved by:

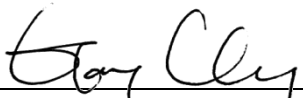

Gary Chang / Manager

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Release Record

Report No.	Version	Description	Issued Date
FR1D1602AC	Rev. 01	Initial issue	May 04, 2022

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	Note ¹	N/A
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2390.00MHz 52.92 (Margin -1.08dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 20.49	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

N/A means Not Applicable.

Note¹: The EUT consumes DC power, so the test is not required.

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 Conducted (Average) 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	Connector	Gain (dBi)
1	Dipole	IPEX	2.55

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	14.4Vdc from battery
-------------------	----------------------

1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	Battery	Brand: Akku Power GmbH Model: ACCS-PWR-0014 Power Rating: Nom. Voltage: 14.4V Capacity: 6.8Ah Watt Hour: 97.92Wh Serial Number: 01562
2	3D_AC_LS_SD Card Reader	Brand: Transcend Model: G23758
3	SD Card	Brand: SanDisk Extreme PRO (170MB/s) Capacity: 64GB
4	Status Indicator	Model: 900-000038-001

1.1.5 Test Sample Information

Serial Number of Test Sample	Radiated Emission: LLS092125011 Antenna Port Conducted: LLS092125011
------------------------------	---

1.1.6 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	---	---

1.1.7 Test Tool and Duty Cycle

Test Tool	QRCT_CONN, Version: v30161		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	11b	99.99%	0.00
	11g	96.31%	0.16
	HT20	96.06%	0.17
	HT40	91.74%	0.37

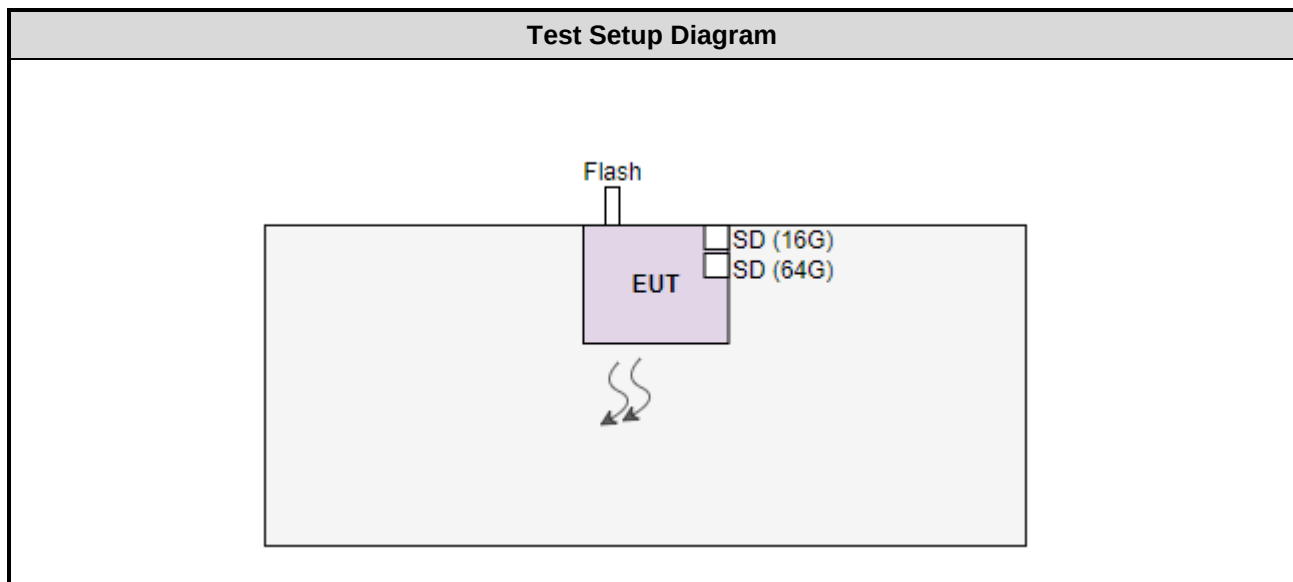
1.1.8 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	16
11b	2437	16
11b	2462	16
11g	2412	15
11g	2437	16.5
11g	2462	14.5
HT20	2412	14
HT20	2437	17.5
HT20	2462	13.5
HT40	2422	11.5
HT40	2437	16
HT40	2452	10.5

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude 5400	DoC	---
2	USB to RJ45	---	---	---	Provided by applicant.
3	USB 3.1 Flash	pqi	Connect 313/16GB	---	---
4	SD Card	SanDisk	16GB	---	Provided by applicant.

1.3 Test Setup Chart



Note: The notebook & USB to RJ45 cable is disconnected from EUT and removed from test table when EUT is set to transmit continuously.

1.4 The Equipment List

Test Item	Radiated Emission Below 1GHz				
Test Site	966 chamber3 / (03CH03-WS)				
Tested Date	Dec. 29, 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	VULB9168-685	May 06, 2021	May 05, 2022
Preamplifier	EMC	EMC02325	980187	Jul. 26, 2021	Jul. 25, 2022
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 05, 2021	Oct. 04, 2022
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Sep. 24, 2021	Sep. 23, 2022
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 24, 2021	Sep. 23, 2022
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 24, 2021	Sep. 23, 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 chamber3 / (03CH03-WS)				
Tested Date	Jan. 25, 2022				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101499	Mar. 02, 2021	Mar. 01, 2022
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 20, 2021	Dec. 19, 2022
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Jan. 11, 2022	Jan. 10, 2023
Preamplifier	Agilent	83017A	MY39501309	Sep. 06, 2021	Sep. 05, 2022
Preamplifier	EMC	EMC184045B	980192	Jul. 14, 2021	Jul. 13, 2022
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 24, 2021	Sep. 23, 2022
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 24, 2021	Sep. 23, 2022
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	Feb. 22, 2022				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
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 ≤ 1 GHz	± 3.96 dB
Radiated emission > 1 GHz	± 4.51 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	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.)
Test Site	03CH03-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 333, Taiwan (R.O.C.)

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISSED#: 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
Radiated Emissions ≤1GHz	HT20	2437	MCS 0	---
Maximum Output Power	11b 11g HT20 HT40	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 HT20 HT40	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 2422 / 2437 / 2452	1 Mbps 6 Mbps MCS 0 MCS 0	---

3 Transmitter Test Results

3.1 6dB and Occupied Bandwidth

3.1.1 Limit of 6dB Bandwidth

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

3.1.2 Test Procedures

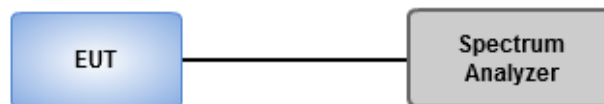
6dB Bandwidth

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.

3.1.3 Test Setup



3.1.4 Test Result of 6dB and Occupied Bandwidth

Ambient Condition	22°C / 68%	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	8.043M	13.459M	13M5G1D	7.174M	13.314M
802.11g_Nss1,(6Mbps)_2TX	15.652M	16.281M	16M3D1D	14.71M	16.281M
802.11n HT20_Nss1,(MCS0)_2TX	15.725M	17.583M	17M6D1D	14.058M	17.366M
802.11n HT40_Nss1,(MCS0)_2TX	35.072M	35.89M	35M9D1D	33.913M	35.745M

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

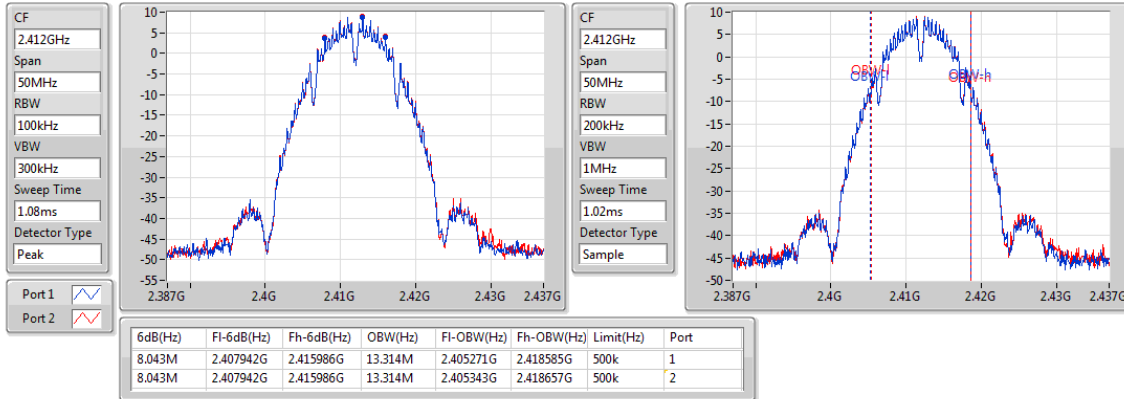
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)	Port 2-N dB (Hz)	Port 2-OBW (Hz)
802.11b_Nss1,(1Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	8.043M	13.314M	8.043M	13.314M
2437MHz	Pass	500k	7.174M	13.314M	8.043M	13.314M
2462MHz	Pass	500k	8.043M	13.459M	8.043M	13.386M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.072M	16.281M	14.71M	16.281M
2437MHz	Pass	500k	15.58M	16.281M	15.652M	16.281M
2462MHz	Pass	500k	15.29M	16.281M	15.29M	16.281M
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	14.058M	17.366M	14.13M	17.438M
2437MHz	Pass	500k	14.71M	17.511M	14.928M	17.583M
2462MHz	Pass	500k	15.725M	17.438M	15M	17.438M
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	500k	33.913M	35.745M	35.072M	35.745M
2437MHz	Pass	500k	34.058M	35.89M	33.913M	35.89M
2452MHz	Pass	500k	33.913M	35.745M	33.913M	35.745M

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

802.11b_Nss1,(1Mbps)_2TX

EBW

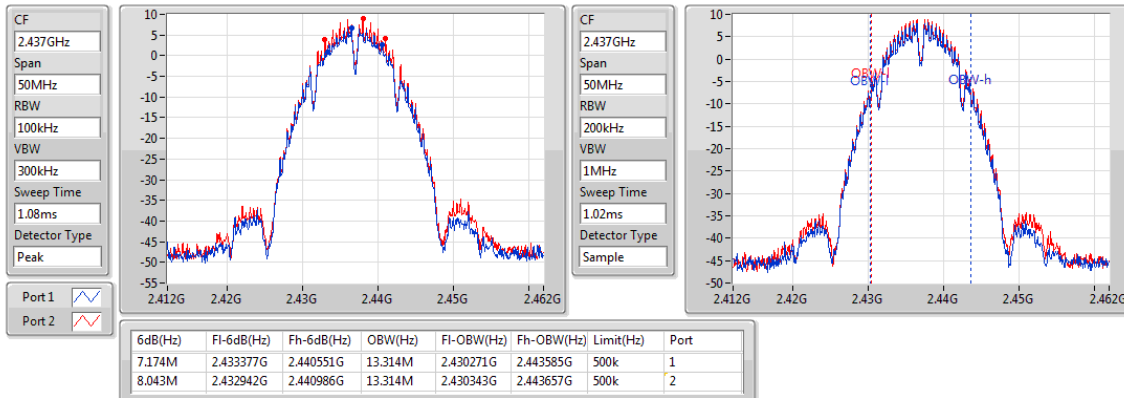
2412MHz



802.11b_Nss1,(1Mbps)_2TX

EBW

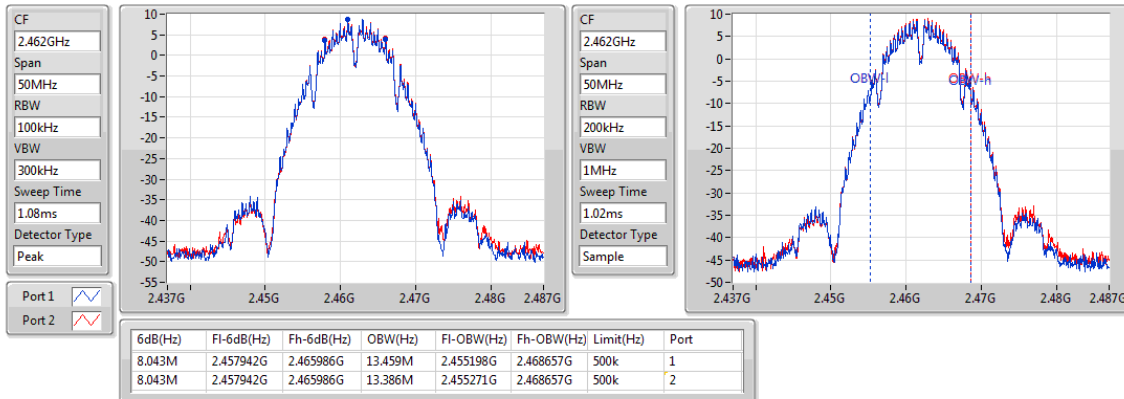
2437MHz



802.11b_Nss1,(1Mbps)_2TX

EBW

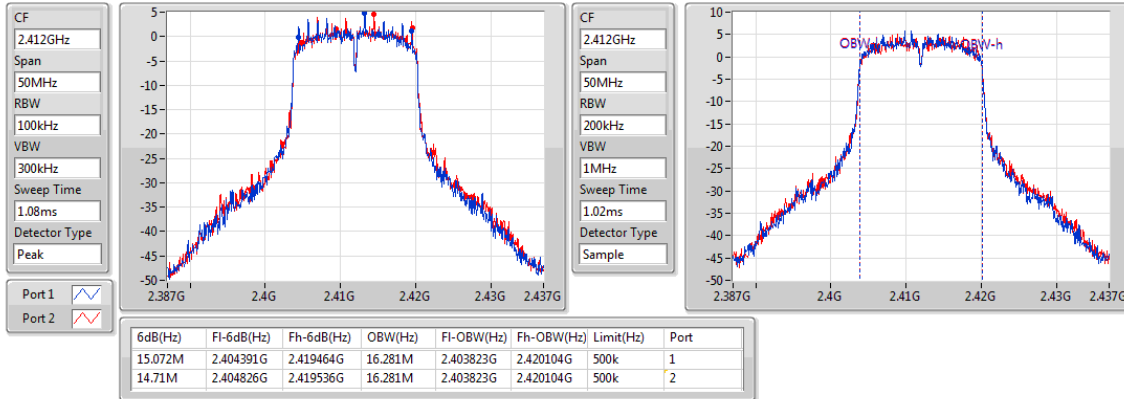
2462MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

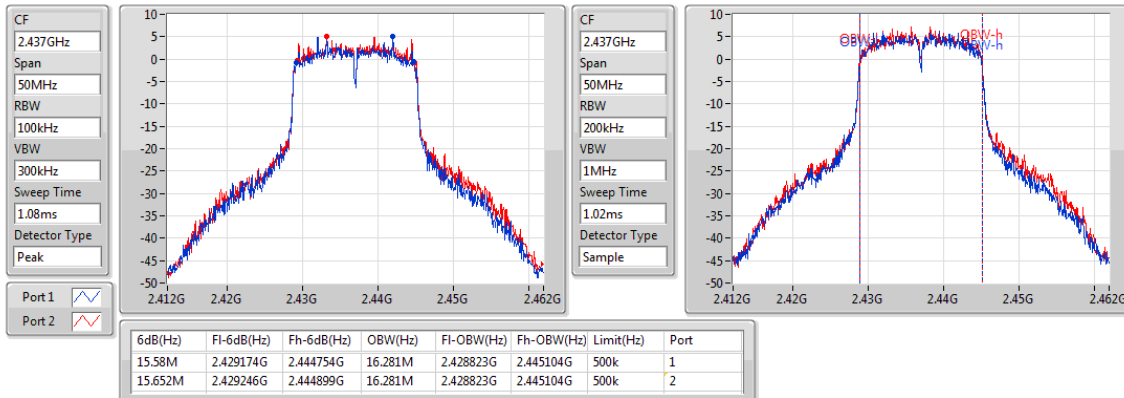
2412MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

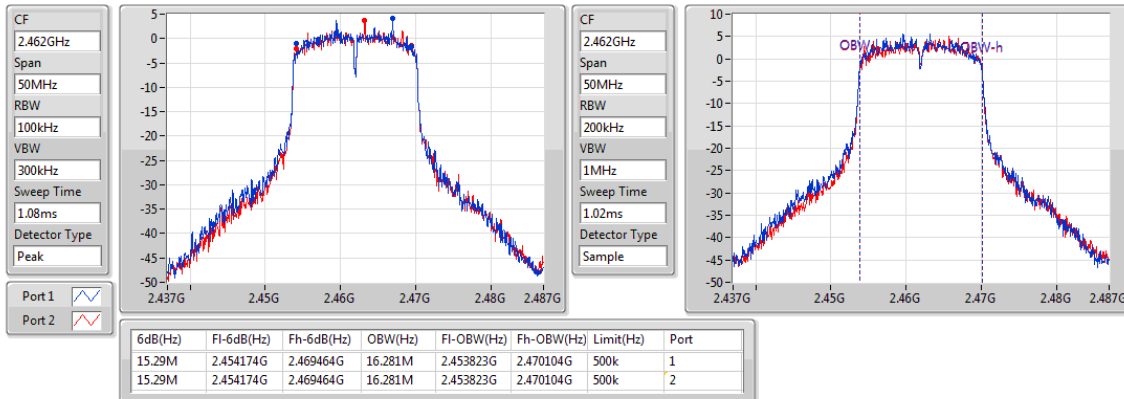
2437MHz



802.11g_Nss1,(6Mbps)_2TX

EBW

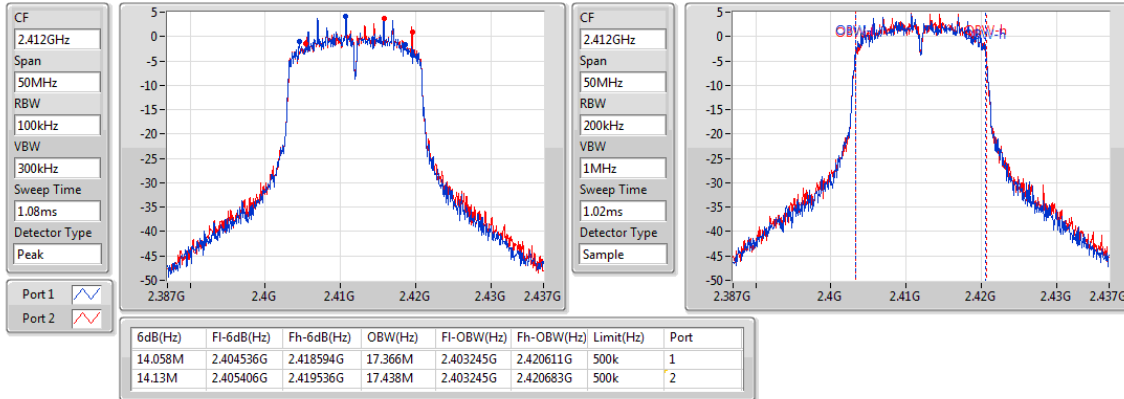
2462MHz



802.11n HT20_Nss1,(MCS0)_2TX

EBW

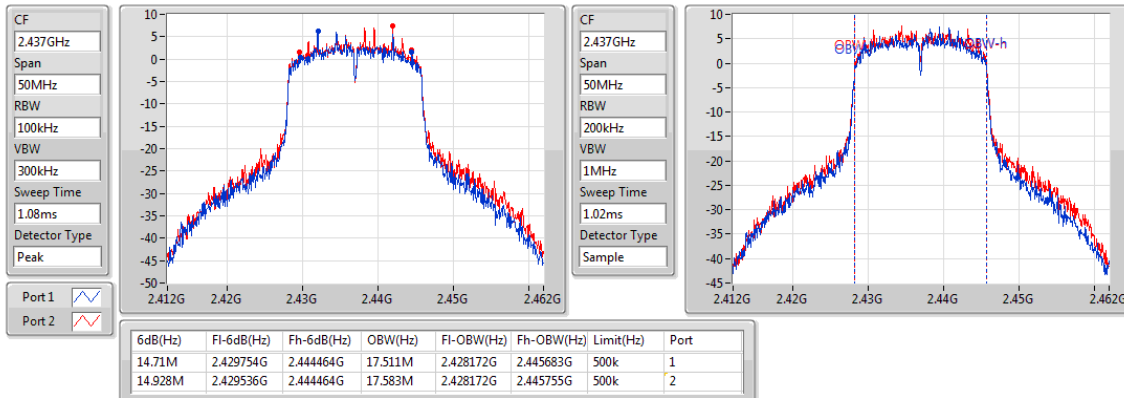
2412MHz



802.11n HT20_Nss1,(MCS0)_2TX

EBW

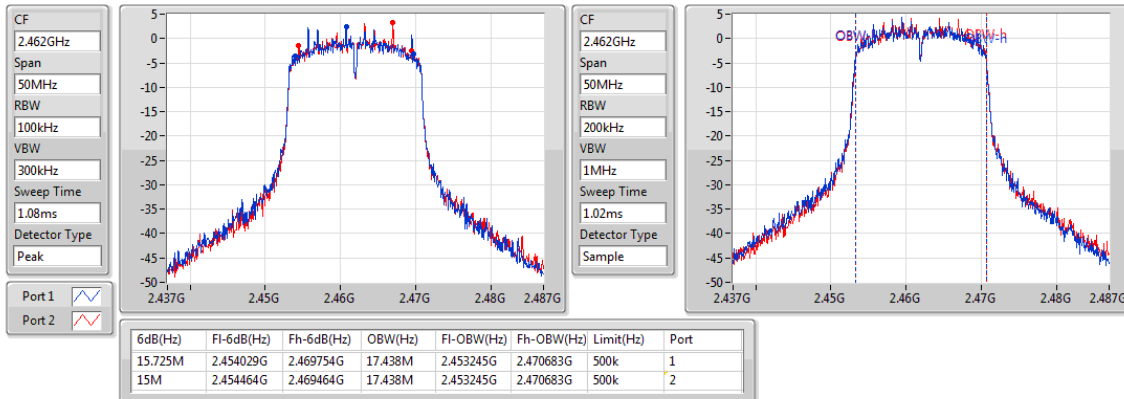
2437MHz



802.11n HT20_Nss1,(MCS0)_2TX

EBW

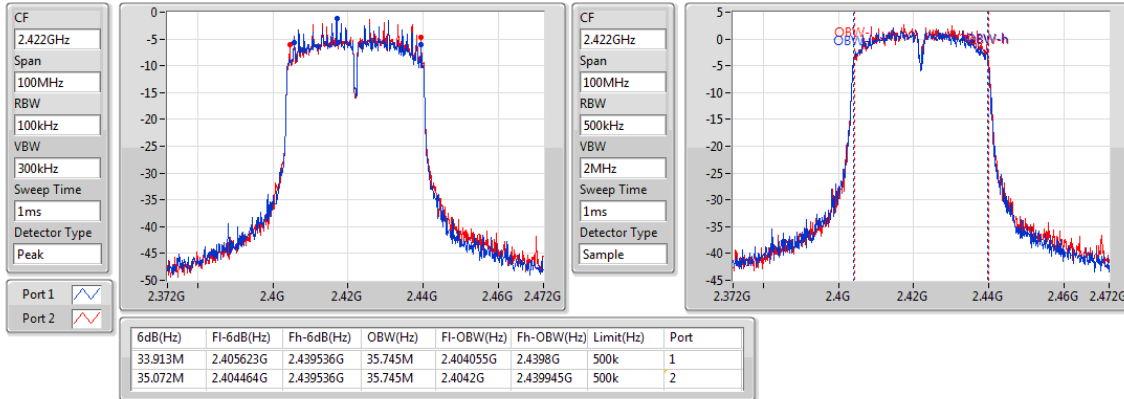
2462MHz



802.11n HT40_Nss1,(MCS0)_2TX

EBW

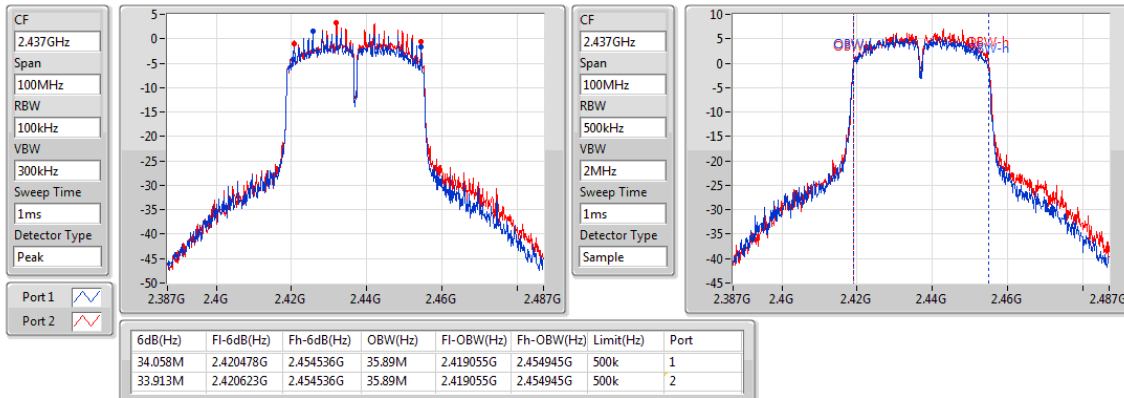
2422MHz



802.11n HT40_Nss1,(MCS0)_2TX

EBW

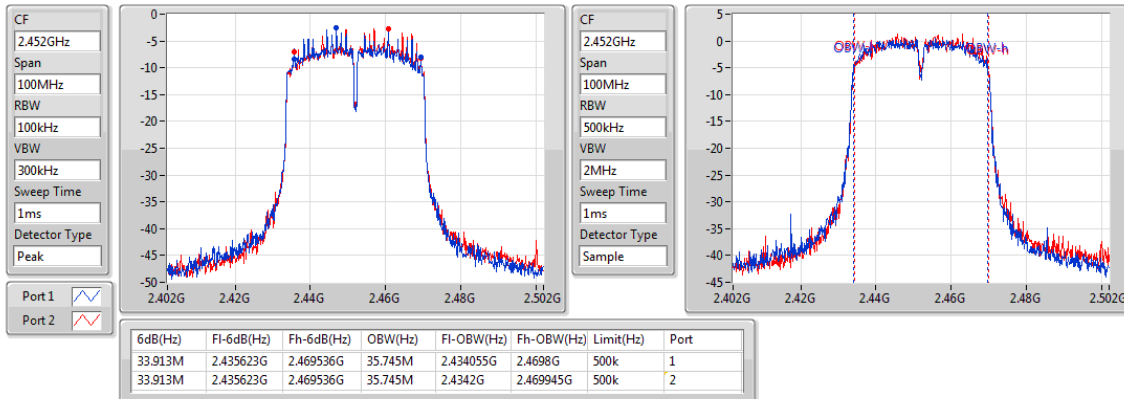
2437MHz



802.11n HT40_Nss1,(MCS0)_2TX

EBW

2452MHz



3.2 RF Output Power

3.2.1 Limit of RF Output Power

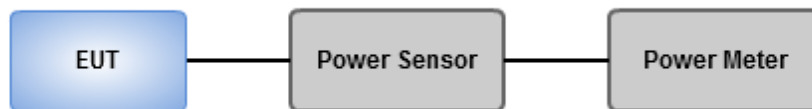
Conducted power shall not exceed 1Watt.

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

3.2.2 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.

3.2.3 Test Setup



3.2.4 Test Result of Maximum Output Power

Ambient Condition	22°C / 68%	Tested By	Aska Huang
--------------------------	------------	------------------	------------

Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	19.68	0.09290
802.11g_Nss1,(6Mbps)_2TX	19.55	0.09016
802.11n HT20_Nss1,(MCS0)_2TX	20.49	0.11194
802.11n HT40_Nss1,(MCS0)_2TX	18.86	0.07691

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	2.55	16.45	16.73	19.60	30	22.15	36
2437MHz	Pass	2.55	16.26	16.92	19.61	30	22.16	36
2462MHz	Pass	2.55	16.52	16.82	19.68	30	22.23	36
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	2.55	15.03	15.41	18.23	30	20.78	36
2437MHz	Pass	2.55	16.17	16.88	19.55	30	22.10	36
2462MHz	Pass	2.55	14.95	14.81	17.89	30	20.44	36
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	2.55	13.96	14.29	17.14	30	19.69	36
2437MHz	Pass	2.55	17.1	17.82	20.49	30	23.04	36
2462MHz	Pass	2.55	13.85	14.88	17.41	30	19.96	36
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2422MHz	Pass	2.55	11.68	12.15	14.93	30	17.48	36
2437MHz	Pass	2.55	15.65	16.04	18.86	30	21.41	36
2452MHz	Pass	2.55	10.82	10.85	13.85	30	16.40	36

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

3.3 Power Spectral Density

3.3.1 Limit of Power Spectral Density

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

3.3.2 Test Procedures

Peak PSD

1. Set the RBW = 3 kHz, VBW = 10 kHz.
2. Detector = Peak, Sweep time = auto couple.
3. Trace mode = max hold, allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

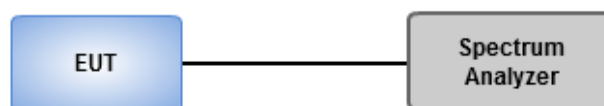
Average PSD, duty cycle $\geq 98\%$

1. Set the RBW = 30 kHz, VBW = 100 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.

Average PSD, duty cycle $< 98\%$

1. Set the RBW = 30 kHz, VBW = 100 kHz. Detector = RMS.
2. Set the sweep time to: ≥ 10 (number of measurement points in sweep) $\times$ (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.

3.3.3 Test Setup



3.3.4 Test Result of Power Spectral Density

Ambient Condition	22°C / 68%	Tested By	Aska Huang
-------------------	------------	-----------	------------

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	-1.48
802.11g_Nss1,(6Mbps)_2TX	-4.71
802.11n HT20_Nss1,(MCS0)_2TX	-3.68
802.11n HT40_Nss1,(MCS0)_2TX	-8.14

RBW= 30 kHz

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	5.56	-4.38	-4.57	-1.72	8.00
2437MHz	Pass	5.56	-4.87	-4.31	-1.80	8.00
2462MHz	Pass	5.56	-4.38	-4.25	-1.48	8.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.56	-8.66	-8.17	-5.65	8.00
2437MHz	Pass	5.56	-7.22	-7.19	-4.71	8.00
2462MHz	Pass	5.56	-8.73	-8.88	-5.96	8.00
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	5.56	-9.91	-9.27	-6.88	8.00
2437MHz	Pass	5.56	-6.74	-6.49	-3.68	8.00
2462MHz	Pass	5.56	-9.70	-10.06	-7.25	8.00
802.11n HT40_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2422MHz	Pass	5.56	-14.74	-14.67	-12.21	8.00
2437MHz	Pass	5.56	-11.25	-10.95	-8.14	8.00
2452MHz	Pass	5.56	-16.07	-15.70	-13.00	8.00

DG = Directional Gain = $2.55 + 10 \cdot (2/1) = 5.56$ dBi ;

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

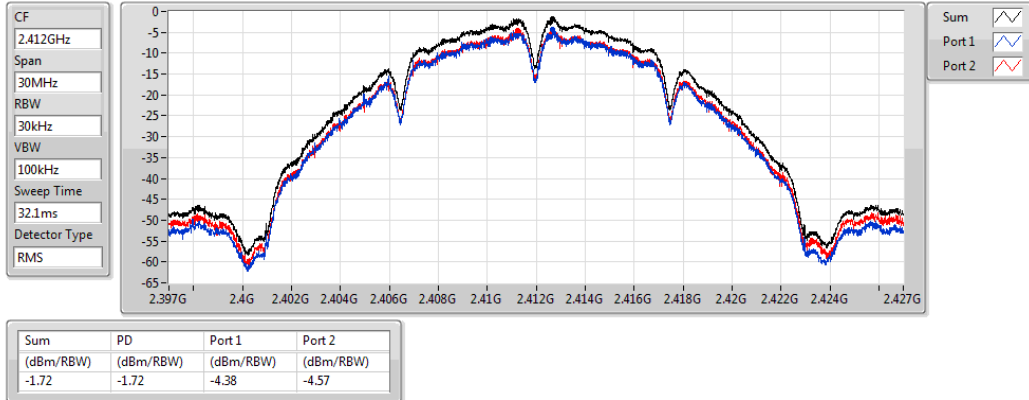
Port X = Port X power density;

RBW= 30 kHz

802.11b_Nss1,(1Mbps)_2TX

PSD

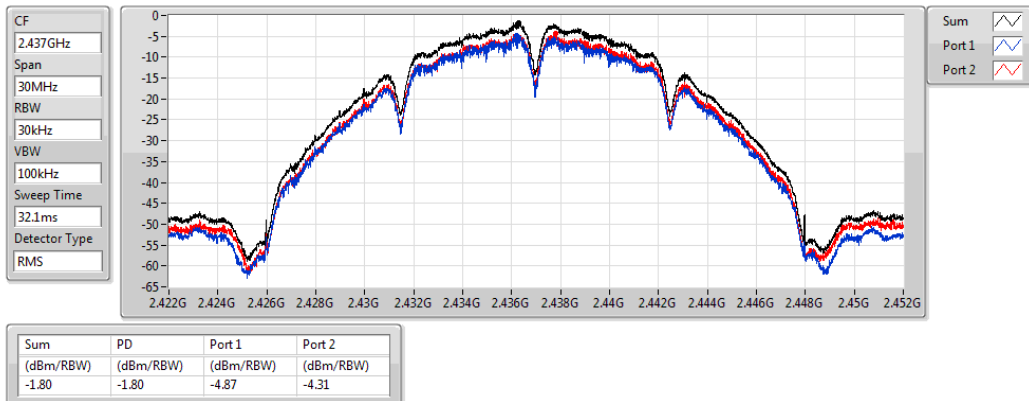
2412MHz



802.11b_Nss1,(1Mbps)_2TX

PSD

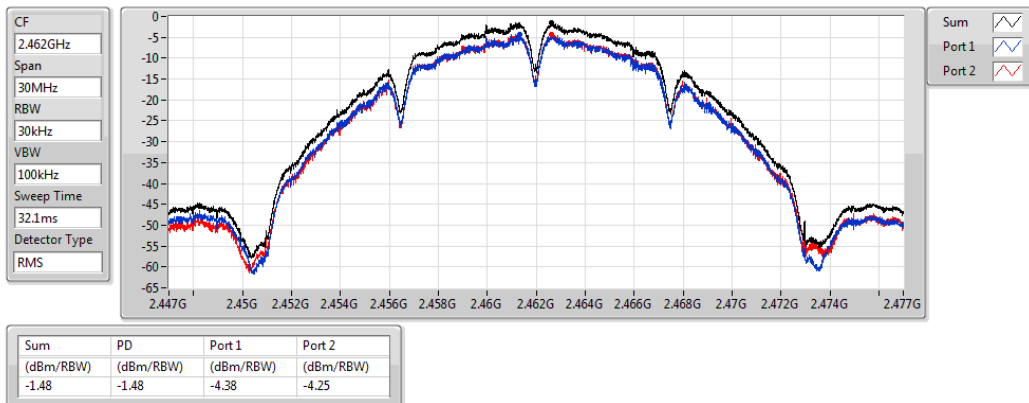
2437MHz



802.11b_Nss1,(1Mbps)_2TX

PSD

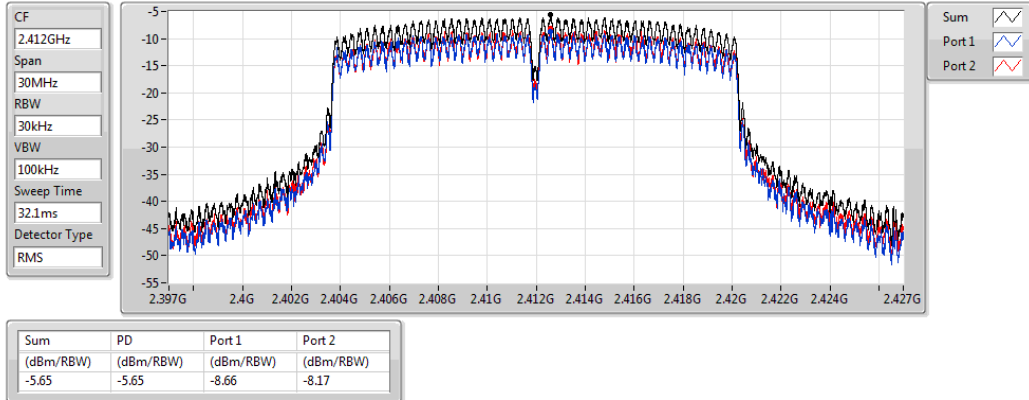
2462MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

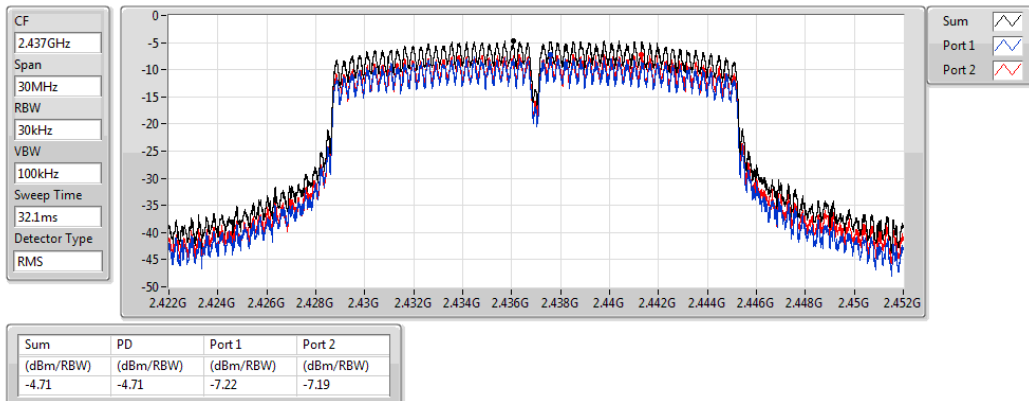
2412MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

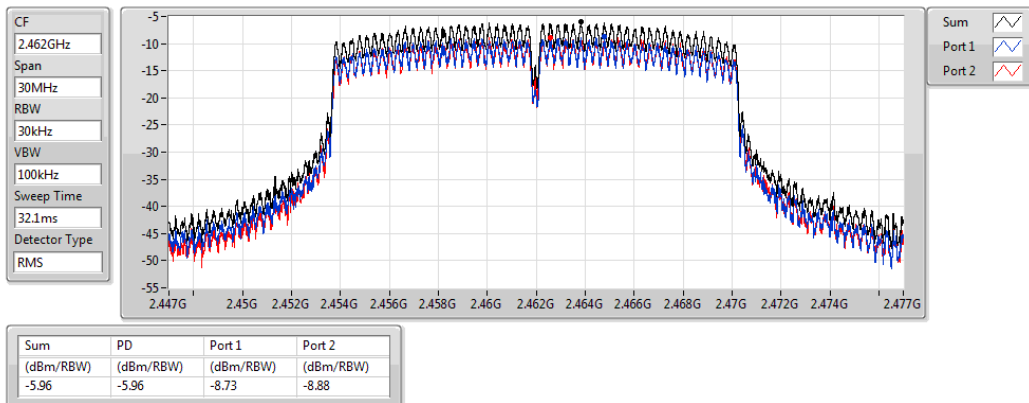
2437MHz



802.11g_Nss1,(6Mbps)_2TX

PSD

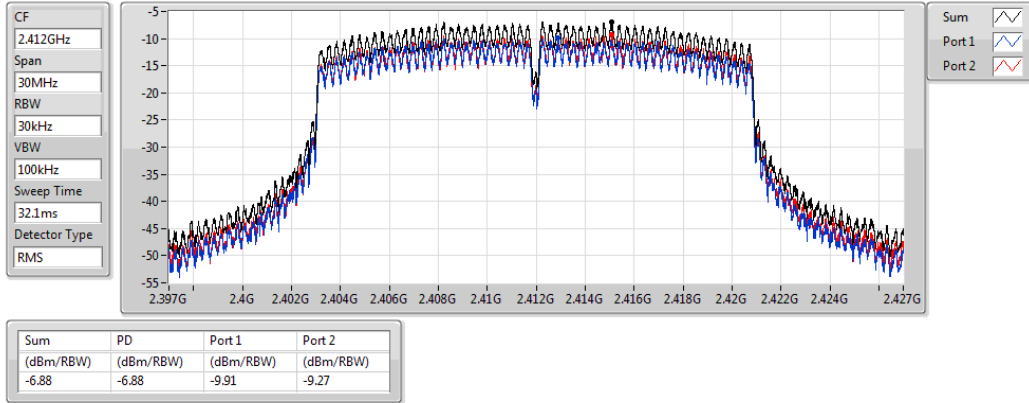
2462MHz



802.11n HT20_Nss1,(MCS0)_2TX

PSD

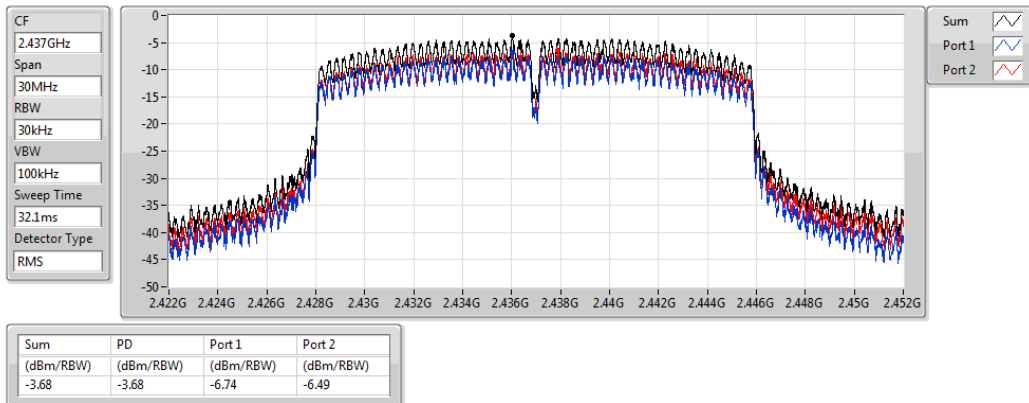
2412MHz



802.11n HT20_Nss1,(MCS0)_2TX

PSD

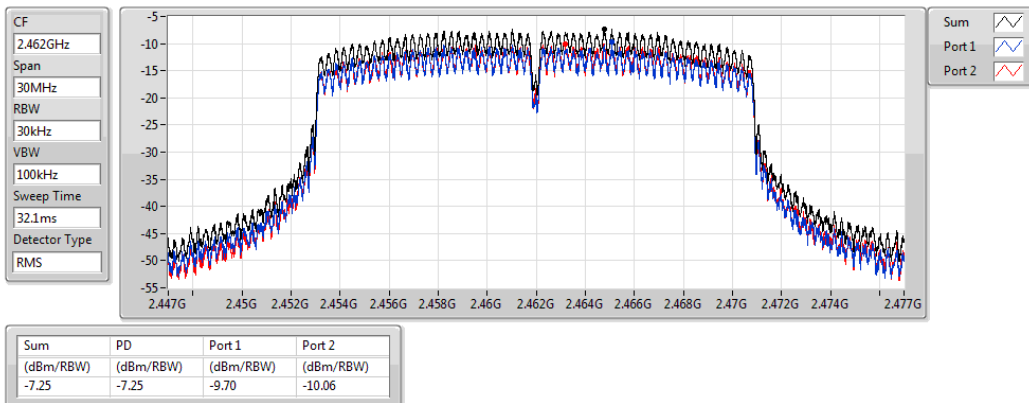
2437MHz



802.11n HT20_Nss1,(MCS0)_2TX

PSD

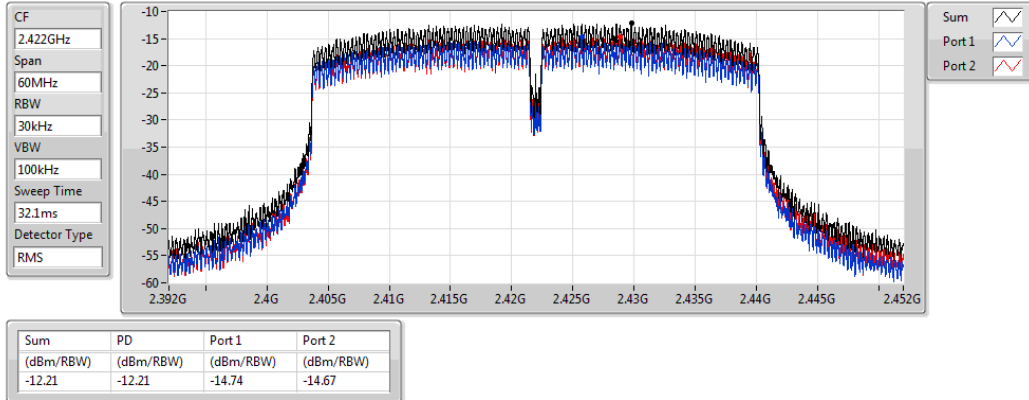
2462MHz



802.11n HT40_Nss1,(MCS0)_2TX

PSD

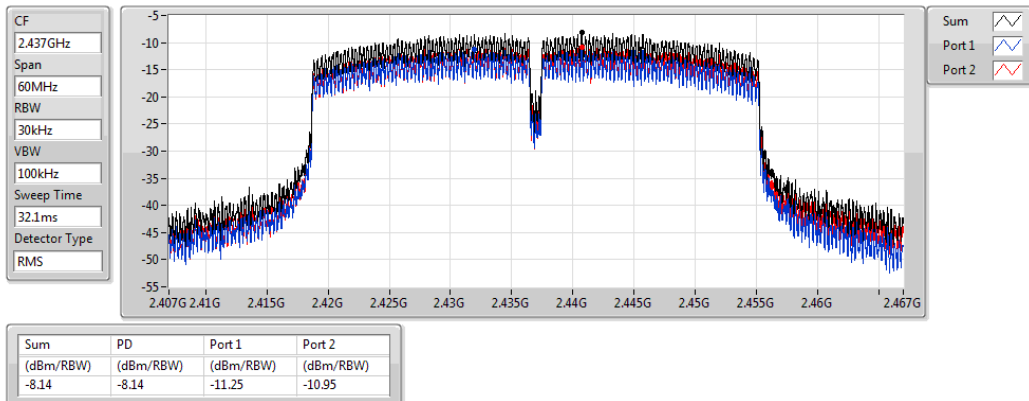
2422MHz



802.11n HT40_Nss1,(MCS0)_2TX

PSD

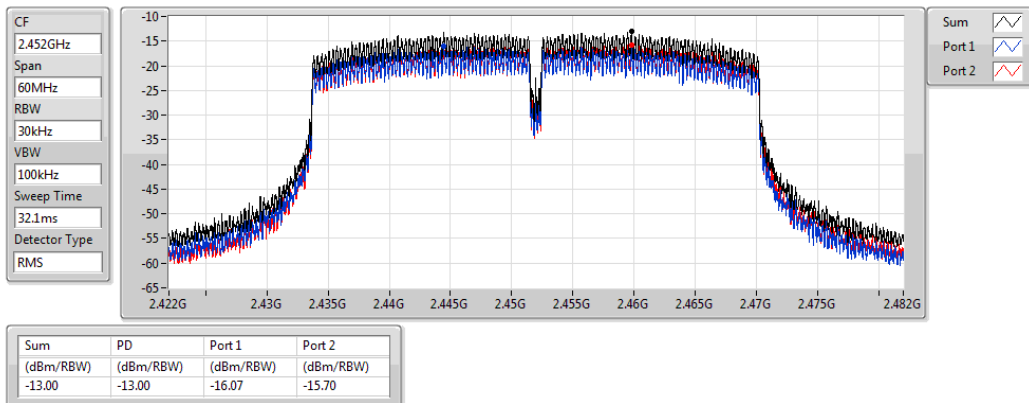
2437MHz



802.11n HT40_Nss1,(MCS0)_2TX

PSD

2452MHz



3.4 Unwanted Emissions into Restricted Frequency Bands

3.4.1 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.

3.4.2 Test Procedures

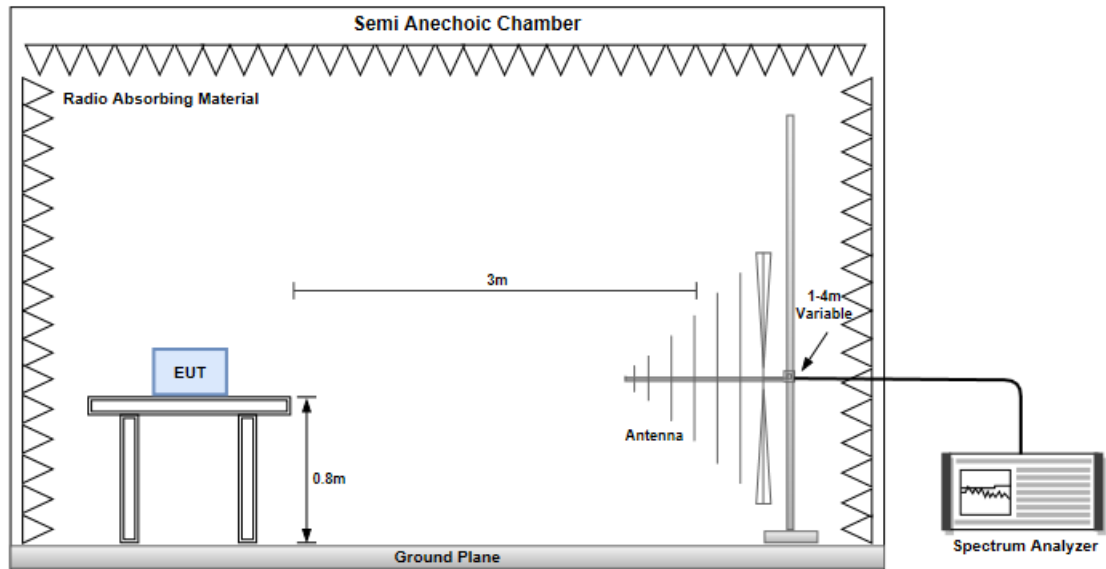
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

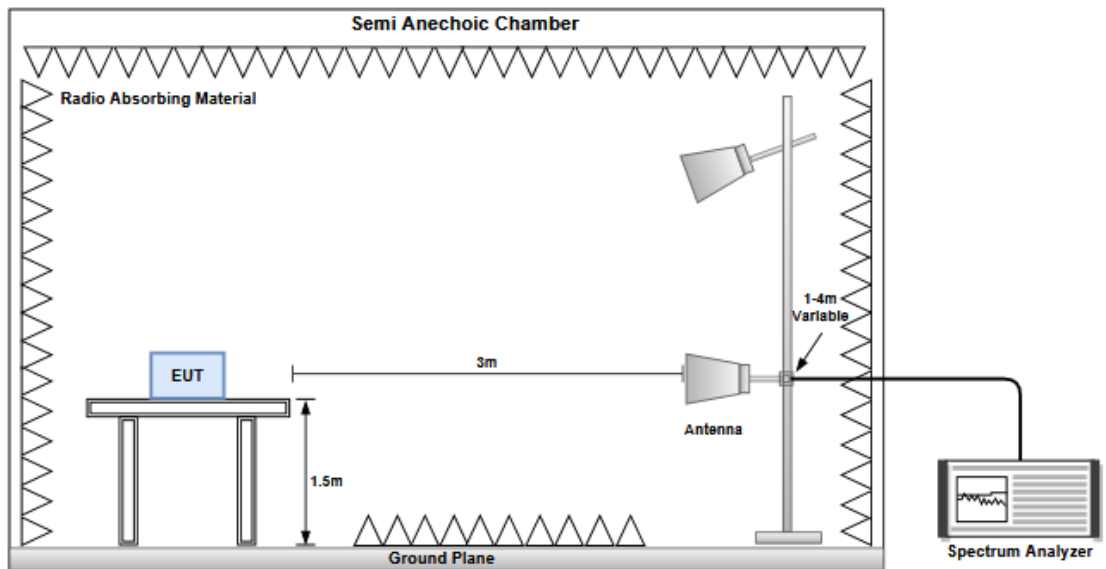
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.4.3 Test Setup

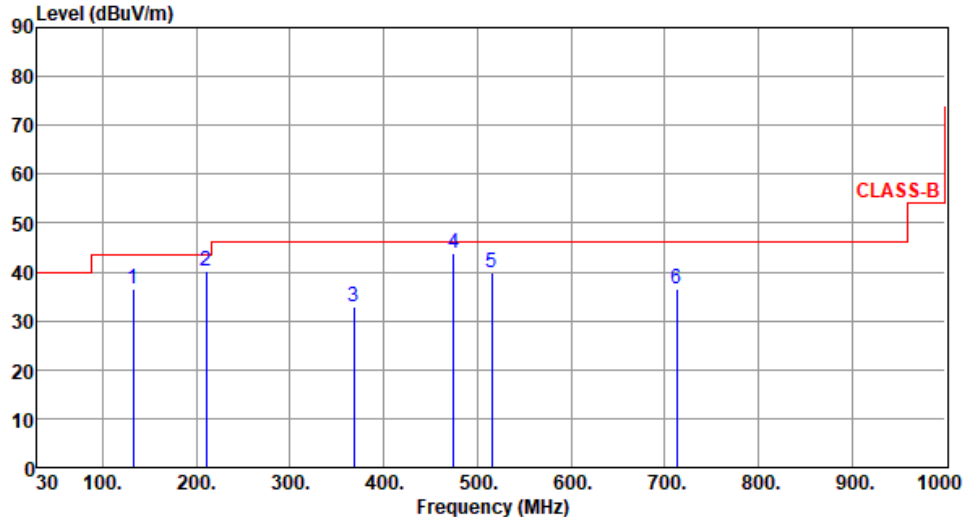
Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.4.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	HT20	Test Freq. (MHz)	2437																																																																						
Polarization	Horizontal																																																																								
Test By :Akun Chung Temperature(°C):22 Humidity(%):65																																																																									
Level (dBUV/m)  <table><tr><th></th><th>Freq. MHz</th><th>Emission level dBUV/m</th><th>Limit dBUV/m</th><th>Margin dB</th><th>SA reading dBUV</th><th>Factor dB/m</th><th>Remark</th><th>ANT High cm</th><th>Turn Table deg</th></tr><tr><td>1</td><td>132.82</td><td>36.60</td><td>43.50</td><td>-6.90</td><td>46.28</td><td>-9.68</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>2</td><td>210.42</td><td>40.26</td><td>43.50</td><td>-3.24</td><td>51.95</td><td>-11.69</td><td>QP</td><td>101</td><td>256</td></tr><tr><td>3</td><td>368.53</td><td>33.00</td><td>46.00</td><td>-13.00</td><td>39.38</td><td>-6.38</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>4</td><td>475.00</td><td>43.69</td><td>46.00</td><td>-2.31</td><td>46.83</td><td>-3.14</td><td>QP</td><td>177</td><td>197</td></tr><tr><td>5</td><td>515.00</td><td>39.89</td><td>46.00</td><td>-6.11</td><td>42.18</td><td>-2.29</td><td>Peak</td><td>---</td><td>---</td></tr><tr><td>6</td><td>712.88</td><td>36.69</td><td>46.00</td><td>-9.31</td><td>35.04</td><td>1.65</td><td>Peak</td><td>---</td><td>---</td></tr></table> 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.					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	132.82	36.60	43.50	-6.90	46.28	-9.68	Peak	---	---	2	210.42	40.26	43.50	-3.24	51.95	-11.69	QP	101	256	3	368.53	33.00	46.00	-13.00	39.38	-6.38	Peak	---	---	4	475.00	43.69	46.00	-2.31	46.83	-3.14	QP	177	197	5	515.00	39.89	46.00	-6.11	42.18	-2.29	Peak	---	---	6	712.88	36.69	46.00	-9.31	35.04	1.65	Peak	---	---
	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	132.82	36.60	43.50	-6.90	46.28	-9.68	Peak	---	---																																																																
2	210.42	40.26	43.50	-3.24	51.95	-11.69	QP	101	256																																																																
3	368.53	33.00	46.00	-13.00	39.38	-6.38	Peak	---	---																																																																
4	475.00	43.69	46.00	-2.31	46.83	-3.14	QP	177	197																																																																
5	515.00	39.89	46.00	-6.11	42.18	-2.29	Peak	---	---																																																																
6	712.88	36.69	46.00	-9.31	35.04	1.65	Peak	---	---																																																																

Modulation	HT20		Test Freq. (MHz)		2437	
Polarization	Vertical					
Test By :Akun Chung Temperature(°C):22 Humidity(%):65						
Level (dBUV/m) <						

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

Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m)			

Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m)			

Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m)			

Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m)			

Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m)			

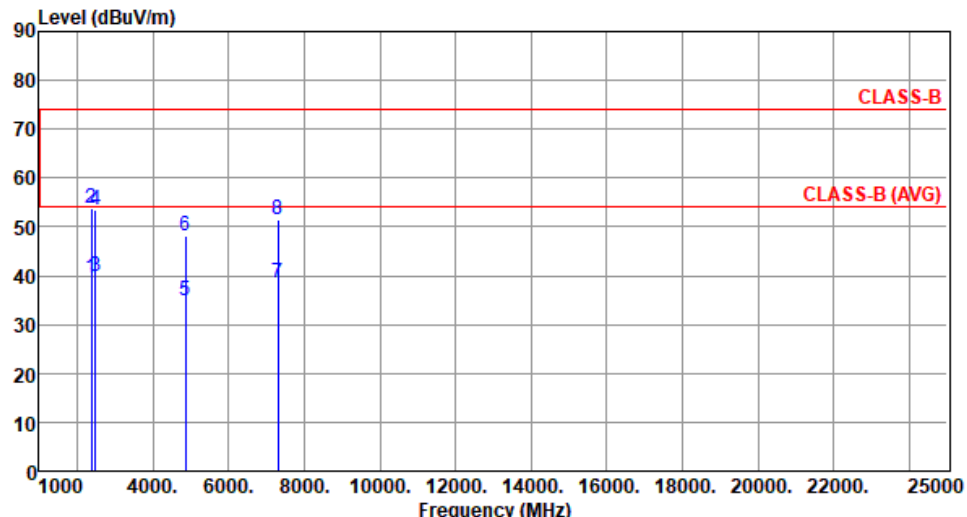
Modulation	11b	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m) <			

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

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m)			

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m) <			

Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m)			

Modulation	11g	Test Freq. (MHz)	2437																																																																																										
Polarization	Vertical																																																																																												
Test By :Roger Lu Temperature(°C):23 Humidity(%):68																																																																																													
Level (dBUV/m)  <table><tr><th></th><th>Freq. MHz</th><th>Emission level dBUV/m</th><th>Limit dBUV/m</th><th>Margin dB</th><th>SA reading dBUV</th><th>Factor dB/m</th><th>Remark</th><th>ANT High cm</th><th>Turn Table deg</th></tr><tr><td>1</td><td>2390.00</td><td>39.54</td><td>54.00</td><td>-14.46</td><td>41.03</td><td>-1.49</td><td>Average</td><td>217</td><td>339</td></tr><tr><td>2</td><td>2390.00</td><td>53.83</td><td>74.00</td><td>-20.17</td><td>55.32</td><td>-1.49</td><td>Peak</td><td>217</td><td>339</td></tr><tr><td>3</td><td>2483.50</td><td>40.01</td><td>54.00</td><td>-13.99</td><td>41.59</td><td>-1.58</td><td>Average</td><td>217</td><td>339</td></tr><tr><td>4</td><td>2483.50</td><td>53.54</td><td>74.00</td><td>-20.46</td><td>55.12</td><td>-1.58</td><td>Peak</td><td>217</td><td>339</td></tr><tr><td>5</td><td>4874.00</td><td>34.98</td><td>54.00</td><td>-19.02</td><td>29.65</td><td>5.33</td><td>Average</td><td>100</td><td>56</td></tr><tr><td>6</td><td>4874.00</td><td>48.13</td><td>74.00</td><td>-25.87</td><td>42.80</td><td>5.33</td><td>Peak</td><td>100</td><td>56</td></tr><tr><td>7</td><td>7311.00</td><td>38.41</td><td>54.00</td><td>-15.59</td><td>27.52</td><td>10.89</td><td>Average</td><td>100</td><td>59</td></tr><tr><td>8</td><td>7311.00</td><td>51.43</td><td>74.00</td><td>-22.57</td><td>40.54</td><td>10.89</td><td>Peak</td><td>100</td><td>59</td></tr></table>					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	39.54	54.00	-14.46	41.03	-1.49	Average	217	339	2	2390.00	53.83	74.00	-20.17	55.32	-1.49	Peak	217	339	3	2483.50	40.01	54.00	-13.99	41.59	-1.58	Average	217	339	4	2483.50	53.54	74.00	-20.46	55.12	-1.58	Peak	217	339	5	4874.00	34.98	54.00	-19.02	29.65	5.33	Average	100	56	6	4874.00	48.13	74.00	-25.87	42.80	5.33	Peak	100	56	7	7311.00	38.41	54.00	-15.59	27.52	10.89	Average	100	59	8	7311.00	51.43	74.00	-22.57	40.54	10.89	Peak	100	59
	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	39.54	54.00	-14.46	41.03	-1.49	Average	217	339																																																																																				
2	2390.00	53.83	74.00	-20.17	55.32	-1.49	Peak	217	339																																																																																				
3	2483.50	40.01	54.00	-13.99	41.59	-1.58	Average	217	339																																																																																				
4	2483.50	53.54	74.00	-20.46	55.12	-1.58	Peak	217	339																																																																																				
5	4874.00	34.98	54.00	-19.02	29.65	5.33	Average	100	56																																																																																				
6	4874.00	48.13	74.00	-25.87	42.80	5.33	Peak	100	56																																																																																				
7	7311.00	38.41	54.00	-15.59	27.52	10.89	Average	100	59																																																																																				
8	7311.00	51.43	74.00	-22.57	40.54	10.89	Peak	100	59																																																																																				
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).																																																																																													

Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m) <			

Modulation	11g	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m) </			

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

Modulation	HT20	Test Freq. (MHz)	2412						
Polarization	Horizontal								
Test By :Roger Lu Temperature(°C):23 Humidity(%):68									
Level (dBUV/m) Frequency (MHz)									
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
	MHz	level			reading			High	Table
		dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg
1	2390.00	52.86	54.00	-1.14	54.35	-1.49	Average	155	133
2	2390.00	65.21	74.00	-8.79	66.70	-1.49	Peak	155	133
3	4824.00	36.19	54.00	-17.81	30.92	5.27	Average	100	115
4	4824.00	48.18	74.00	-25.82	42.91	5.27	Peak	100	115
5	12060.00	45.68	54.00	-8.32	30.72	14.96	Average	100	120
6	12060.00	57.72	74.00	-16.28	42.76	14.96	Peak	100	120
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).									

Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m) <			

Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m)			

Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m) </			

Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m)			

Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m)			

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

Modulation	HT40	Test Freq. (MHz)	2422						
Polarization	Horizontal								
Test By :Roger Lu Temperature(°C):23 Humidity(%):68									
Level (dBuV/m)									
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
	level				reading			High	Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg
1	2390.00	52.92	54.00	-1.08	54.41	-1.49	Average	159	147
2	2390.00	69.05	74.00	-4.95	70.54	-1.49	Peak	159	147
3	4844.00	36.06	54.00	-17.94	30.73	5.33	Average	100	105
4	4844.00	48.07	74.00	-25.93	42.74	5.33	Peak	100	105
5	7266.00	40.98	54.00	-13.02	30.14	10.84	Average	100	102
6	7266.00	53.03	74.00	-20.97	42.19	10.84	Peak	100	102

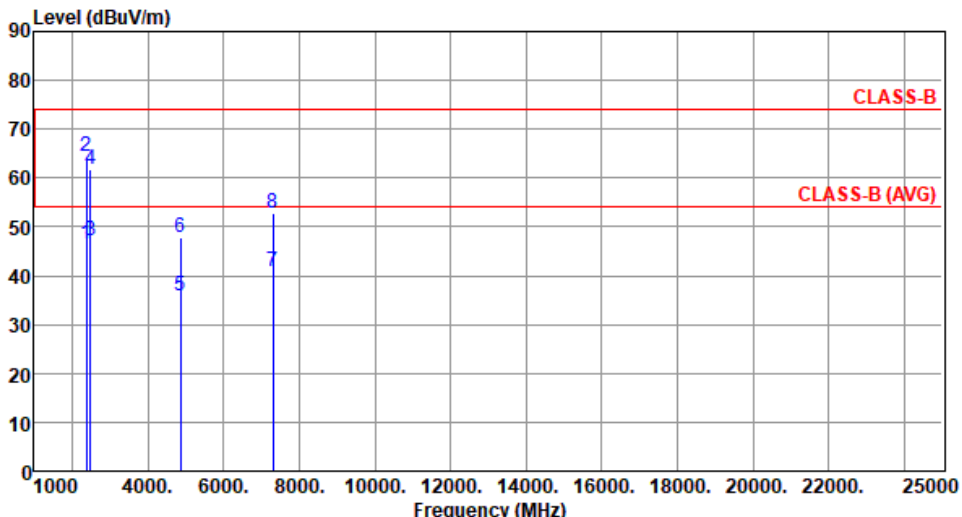
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m)

*Factor includes antenna factor , cable loss and amplifier gain

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

Modulation	HT40	Test Freq. (MHz)	2422
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m) </			

Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m)			

Modulation	HT40	Test Freq. (MHz)	2437																																																																																										
Polarization	Vertical																																																																																												
Test By :Roger Lu Temperature(°C):23 Humidity(%):68																																																																																													
Level (dBuV/m)  <table><thead><tr><th></th><th>Freq. MHz</th><th>Emission level dBuV/m</th><th>Limit dBuV/m</th><th>Margin dB</th><th>SA reading dBuV</th><th>Factor dB/m</th><th>Remark</th><th>ANT High cm</th><th>Turn Table deg</th></tr></thead><tbody><tr><td>1</td><td>2390.00</td><td>46.54</td><td>54.00</td><td>-7.46</td><td>48.03</td><td>-1.49</td><td>Average</td><td>216</td><td>346</td></tr><tr><td>2</td><td>2390.00</td><td>64.40</td><td>74.00</td><td>-9.60</td><td>65.89</td><td>-1.49</td><td>Peak</td><td>216</td><td>346</td></tr><tr><td>3</td><td>2483.50</td><td>47.21</td><td>54.00</td><td>-6.79</td><td>48.79</td><td>-1.58</td><td>Average</td><td>216</td><td>346</td></tr><tr><td>4</td><td>2483.50</td><td>61.91</td><td>74.00</td><td>-12.09</td><td>63.49</td><td>-1.58</td><td>Peak</td><td>216</td><td>346</td></tr><tr><td>5</td><td>4874.00</td><td>35.83</td><td>54.00</td><td>-18.17</td><td>30.50</td><td>5.33</td><td>Average</td><td>100</td><td>57</td></tr><tr><td>6</td><td>4874.00</td><td>47.87</td><td>74.00</td><td>-26.13</td><td>42.54</td><td>5.33</td><td>Peak</td><td>100</td><td>57</td></tr><tr><td>7</td><td>7311.00</td><td>40.69</td><td>54.00</td><td>-13.31</td><td>29.80</td><td>10.89</td><td>Average</td><td>100</td><td>50</td></tr><tr><td>8</td><td>7311.00</td><td>52.71</td><td>74.00</td><td>-21.29</td><td>41.82</td><td>10.89</td><td>Peak</td><td>100</td><td>50</td></tr></tbody></table>					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	46.54	54.00	-7.46	48.03	-1.49	Average	216	346	2	2390.00	64.40	74.00	-9.60	65.89	-1.49	Peak	216	346	3	2483.50	47.21	54.00	-6.79	48.79	-1.58	Average	216	346	4	2483.50	61.91	74.00	-12.09	63.49	-1.58	Peak	216	346	5	4874.00	35.83	54.00	-18.17	30.50	5.33	Average	100	57	6	4874.00	47.87	74.00	-26.13	42.54	5.33	Peak	100	57	7	7311.00	40.69	54.00	-13.31	29.80	10.89	Average	100	50	8	7311.00	52.71	74.00	-21.29	41.82	10.89	Peak	100	50
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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).																																																																																													

Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Horizontal		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBUV/m)			

Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Vertical		
Test By :Roger Lu Temperature(°C):23 Humidity(%):68			
Level (dBuV/m) <			

3.5 Emissions in Non-Restricted Frequency Bands

3.5.1 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 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.5.2 Test Procedures

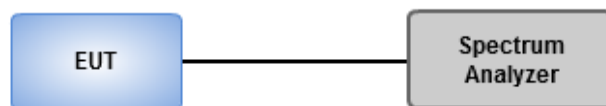
Reference level measurement

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

3.5.3 Test Setup



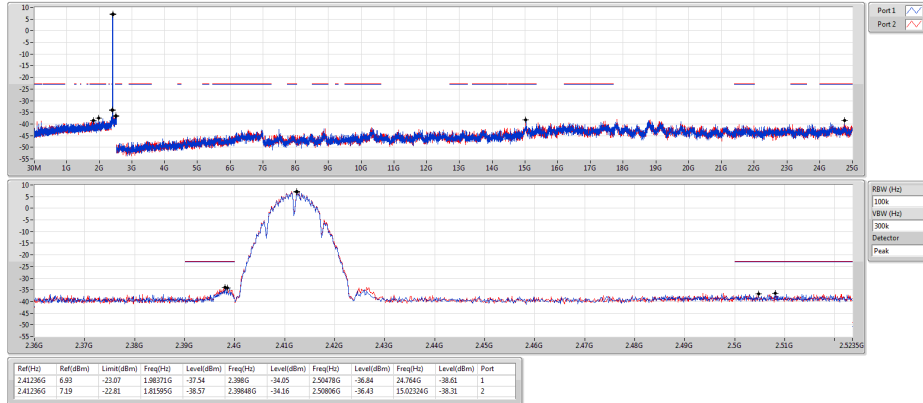
3.5.4 Unwanted Emissions into Non-Restricted Frequency Bands

Ambient Condition	22°C / 68%	Tested By	Aska Huang
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802.11b_Nss1,(1Mbps)_2TX

CSE NdB

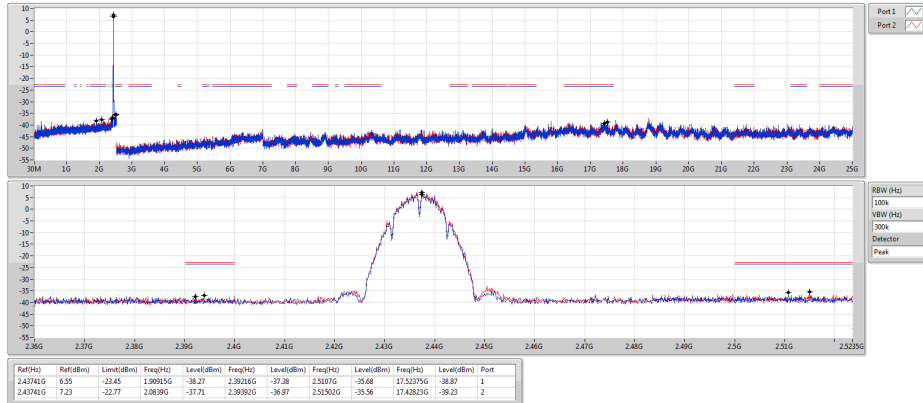
2412MHz



802.11b_Nss1,(1Mbps)_2TX

CSE NdB

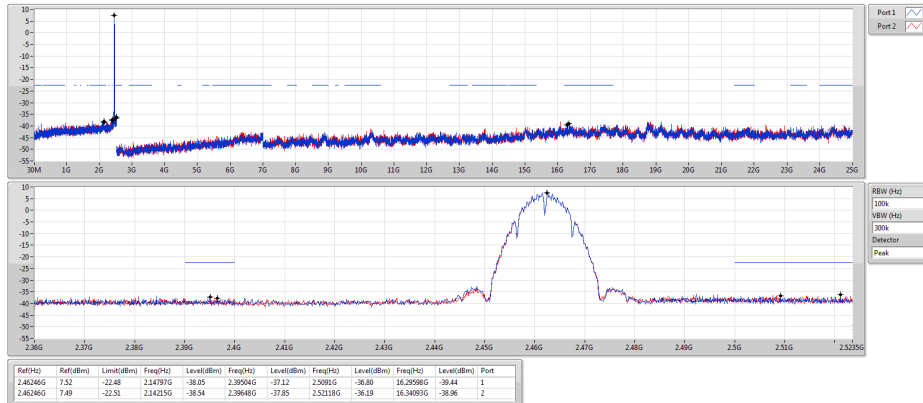
2437MHz



802.11b_Nss1,(1Mbps)_2TX

CSE NdB

2462MHz



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

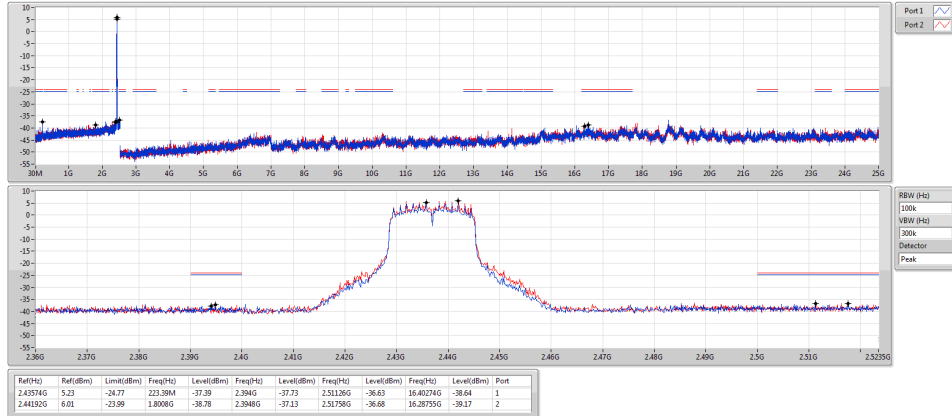
2412MHz



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

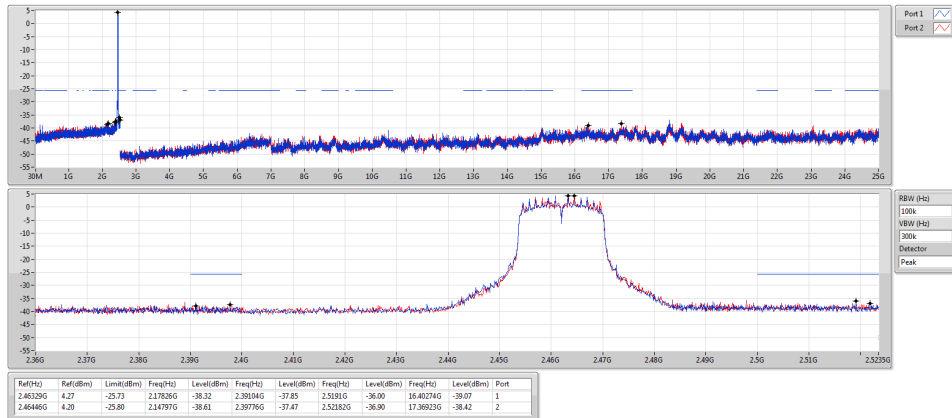
2437MHz



802.11g_Nss1,(6Mbps)_2TX

CSE NdB

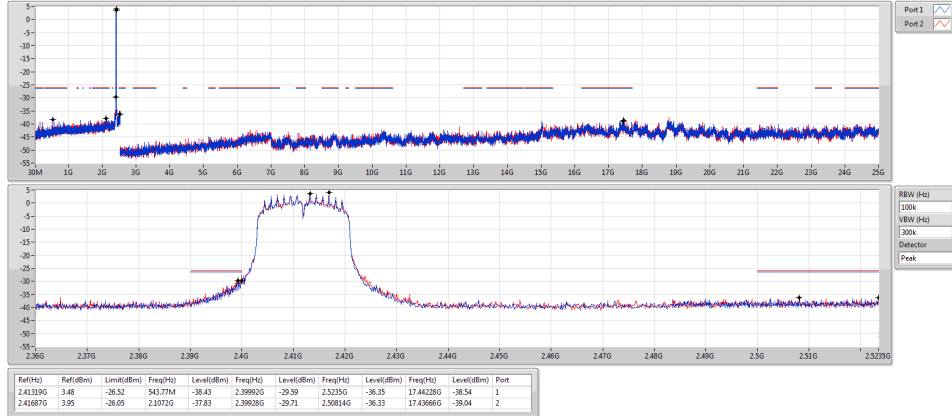
2462MHz



802.11n HT20_Nss1,(MCS0)_2TX

2412MHz

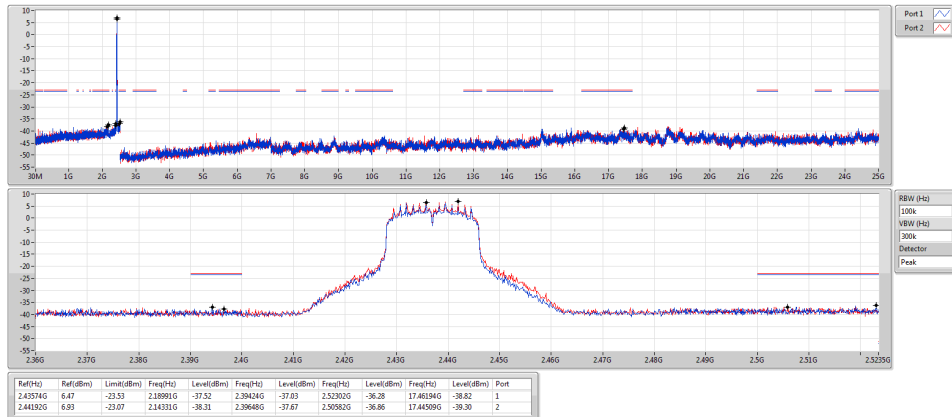
CSE NdB



802.11n HT20_Nss1,(MCS0)_2TX

2437MHz

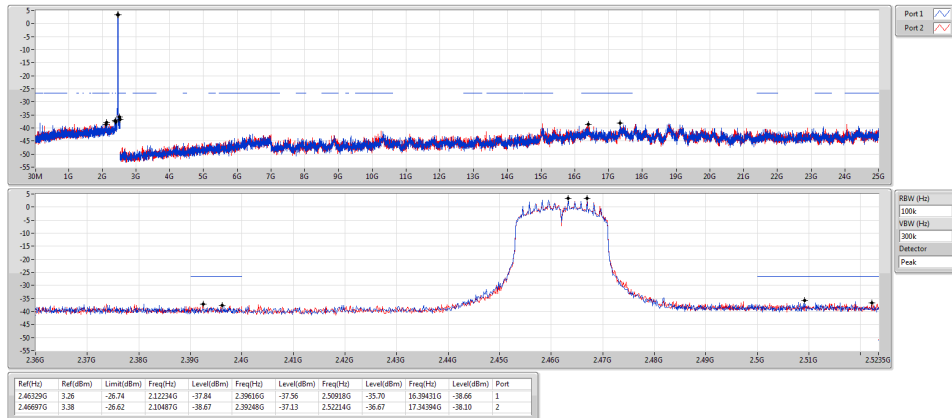
CSE NdB



802.11n HT20_Nss1,(MCS0)_2TX

2462MHz

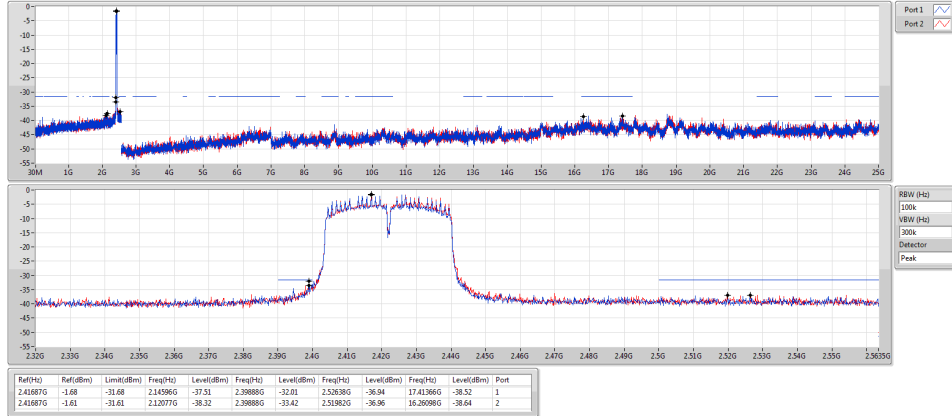
CSE NdB



802.11n HT40_Nss1,(MCS0)_2TX

CSE NdB

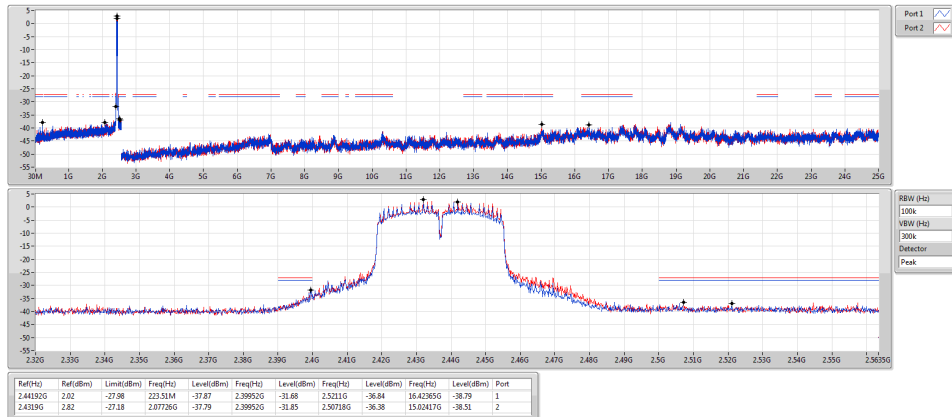
2422MHz



802.11n HT40_Nss1,(MCS0)_2TX

CSE NdB

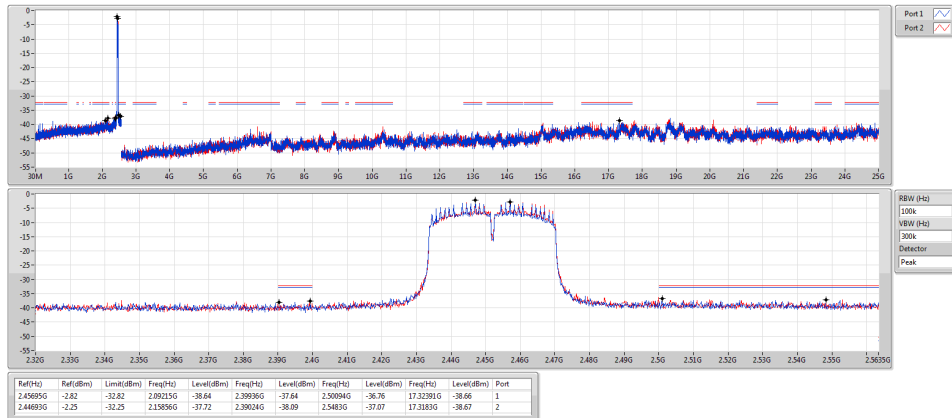
2437MHz



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 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==