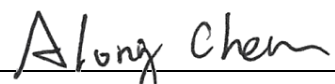


NCC Test Report

Equipment : GPS 心率跑錶
Model No. : FORERUNNER 245 MUSIC
Brand Name : GARMIN
Applicant : 台灣國際航電股份有限公司
Address : 新北市汐止區樟樹二路 68 號 6 樓
Standard : LP0002 Section 3.10.1 (2018-01-10)
Received Date : Aug. 30, 2018
Tested Date : Nov. 20 ~ Nov. 23, 2018

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:

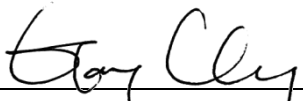

Gary Chang / Manager



Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Local Support Equipment List	7
1.3	Test Setup Chart	7
1.4	The Equipment List	8
1.5	Test Standards	9
1.6	Measurement Uncertainty	9
2	TEST CONFIGURATION	10
2.1	Testing Condition	10
2.2	The Worst Test Modes and Channel Details	10
3	TRANSMITTER TEST RESULTS.....	11
3.1	Conducted Emissions.....	11
3.2	6dB and Occupied Bandwidth	14
3.3	RF Output Power	19
3.4	Power Spectral Density	22
3.5	Unwanted Emissions into Restricted Frequency Bands	27
3.6	Emissions in Non-Restricted Frequency Bands.....	51
4	RECEIVER TEST RESULTS	55
4.1	Radiated Emissions.....	55
5	TEST LABORATORY INFORMATION	61

Release Record

Report No.	Version	Description	Issued Date
TR883003AC	Rev. 01	Initial issue	Nov. 29, 2018

Summary of Test Results

NCC Rules	Test Items	Measured	Result
2.3	Conducted Emissions	[dBuV]: 0.731MHz 28.65(Margin -17.35dB) - AV	Pass
3.10.1.5 2.8	Radiated Emissions	[dBuV/m at 3m]: 2390.00MHz 69.50 (Margin -4.50dB) - PK	Pass
3.10.1.2(1)(C)	Maximum Output Power	Max Power [dBm]: 14.43	Pass
3.10.1.6(2)(A)	6dB Bandwidth	Meet the requirement of limit	Pass
3.10.1.6(2)(B)	Power Spectral Density	Meet the requirement of limit	Pass
3.10.1.4	Antenna Requirement	Meet the requirement of limit	Pass

Declaration of Conformity:

The judgement of conformity in the report is based on the measurement results excluding the measurement uncertainty.

Comments and Explanations:

None

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]	1	1-11 Mbps
2400-2483.5	g	2412-2462	1-11 [11]	1	6-54 Mbps
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	1	MCS 0-7
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	Connector	Gain (dBi)	Remarks
1	IFA	---	-2.23392	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	5Vdc, 550mA 3.8Vdc, 180mAh
-------------------	-------------------------------

1.1.4 Accessories

No.	Equipment	Description
1	内建電池 01	Brand: Garmin Model: 361-00086-11 Power Rating: 3.8Vdc, 180mAh, 0.68Wh
2	内建電池 02	Brand: Garmin Model: 361-00086-21 Power Rating: 3.8Vdc, 178mAh
3	USB cable	0.52m non-shielded without core

1.1.5 Channel List

Channel	Frequency(MHz)
1	2412
2	2417
3	2422
4	2427
5	2432
6	2437
7	2442
8	2447
9	2452
10	2457
11	2462

1.1.6 Test Tool and Duty Cycle

Test Tool	自體控制發射		
Duty Cycle and Duty Factor	Mode	Duty cycle (%)	Duty factor (dB)
	11b	100.00%	0.00
	11g	98.48%	0.07
	HT20	98.91%	0.05

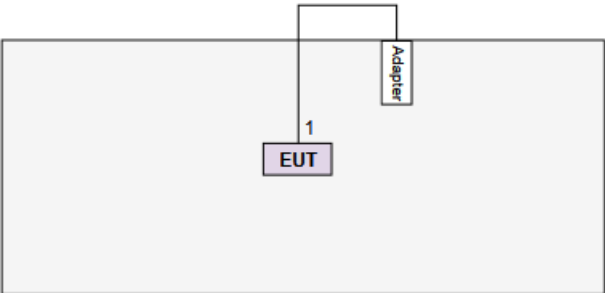
1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
11b	2412	Default
11b	2437	Default
11b	2462	Default
11g	2412	Default
11g	2437	Default
11g	2462	Default
HT20	2412	Default
HT20	2437	Default
HT20	2462	Default

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Adapter	Apple	A1385	---	---

1.3 Test Setup Chart

Test Setup Diagram (Charging mode)	
	
No.	Signal cable / Length (m)
1	USB, 0.52m shielded.

Test Setup Diagram (Battery mode)	
	

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Nov. 22, 2018				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Jan. 05, 2018	Jan. 04, 2019
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 05, 2018	Nov. 04, 2019
RF Cable-CON	EMC	EMCCFD300-BM-B M-6000	50821	Dec. 18, 2017	Dec. 17, 2018
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 chamber 3 / (03CH03-WS)				
Tested Date	Nov. 20, 2018				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101499	Jan. 03, 2018	Jan. 02, 2019
Receiver	R&S	ESR3	101657	Jan. 05, 2018	Jan. 04, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 19, 2018	Apr. 18, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Jan. 18, 2018	Jan. 17, 2019
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2018	Nov. 14, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Dec. 07, 2017	Dec. 06, 2018
Preamplifier	EMC	EMC02325	980187	Aug. 24, 2018	Aug. 23, 2019
Preamplifier	Agilent	83017A	MY53270014	Aug. 09, 2018	Aug. 08, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019
RF cable-3M	EMC	EMC104-SM-SM-80 00	181107	Oct. 30, 2018	Oct. 29, 2019
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY32487/4	Oct. 30, 2018	Oct. 29, 2019
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Oct. 30, 2018	Oct. 29, 2019
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800 -001	Oct. 30, 2018	Oct. 29, 2019
LF cable-3M	EMC	EMC8D-NM-NM-300 0	131103	Oct. 30, 2018	Oct. 29, 2019
LF cable-13M	EMC	EMC8D-NM-NM-130 00	131104	Oct. 30, 2018	Oct. 29, 2019
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	Nov. 23, 2018				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 16, 2018	Apr. 15, 2019
Power Meter	Anritsu	ML2495A	1241002	Oct. 09, 2018	Oct. 08, 2019
Power Sensor	Anritsu	MA2411B	1207366	Oct. 09, 2018	Oct. 08, 2019
DC POWER SOURCE	GW INSTEK	GPC-6030D	EM892433	Oct. 25, 2018	Oct. 24, 2019
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

LP0002 Section 3.10.1 (2018-01-10)

ANSI C63.10-2013

ANSI C63.4-2014

FCC KDB 558074 D01 15.247 Meas Guidance v05

1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ($k=2$))

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	± 34.134 Hz
Conducted power	± 0.808 dB
Power density	± 0.463 dB
Conducted emission	± 2.670 dB
Radiated emission ≤ 1 GHz	± 3.66 dB
Radiated emission > 1 GHz	± 5.37 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	24°C / 56%	Alex Tsai
Radiated Emissions	03CH03-WS	25°C / 66%	Roger Lu
RF Conducted	TH01-WS	23°C / 65%	Felix Sung

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- IC site registration No.: 10807C-1

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Mode
Conducted Emissions	---	---	---	Charging mode
Radiated Emissions ≤1GHz	---	---	---	Charging mode
	11g	2412	6 Mbps	Battery mode (TX)
Radiated Emissions >1GHz				
Maximum Output Power	11b	2412 / 2437 / 2462	1 Mbps	Battery mode (TX)
6dB bandwidth	11g	2412 / 2437 / 2462	6 Mbps	
Power spectral density	HT20	2412 / 2437 / 2462	MCS 0	

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.

2. 內建電池 01 和 內建電池 02 had been pretested and found that 內建電池 01 was the worst case and was selected for final testing. (內建電池 01: 361-00086-11， 內建電池 02: 361-00086-21)

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Mode
Radiated Emissions	11g	2412	6 Mbps	Battery mode (RX)
NOTE: 1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The Y-plane results were found as the worst case and were shown in this report. 2. 內建電池 01 and 內建電池 02 had been pretested and found that 內建電池 01 was the worst case and was selected for final testing. (內建電池 01: 361-00086-11, 內建電池 02: 361-00086-21)				

3 Transmitter Test Results

3.1 Conducted Emissions

3.1.1 Limit of Conducted Emissions

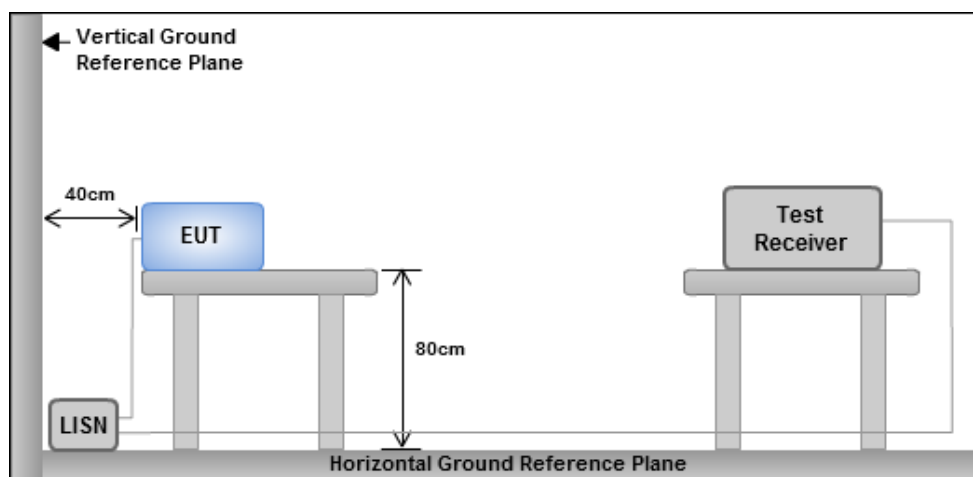
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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

Mode	Charging mode	Power Phase	Line																																																																																																																																							
Level (dBuV) <table><tr><th></th><th>Freq</th><th>Level</th><th>Limit</th><th>Over</th><th>Read</th><th>LISN</th><th>cable</th><th></th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>Line</th><th>Limit</th><th>Level</th><th>factor</th><th>loss</th><th>Remark</th></tr><tr><th></th><th></th><th></th><th>dBuV</th><th>dB</th><th>dBuV</th><th>dB</th><th>dB</th><th></th></tr><tr><td>1</td><td>0.168</td><td>33.66</td><td>55.08</td><td>-21.42</td><td>33.47</td><td>0.07</td><td>0.02</td><td>Average</td></tr><tr><td>2</td><td>0.168</td><td>34.03</td><td>65.08</td><td>-31.05</td><td>33.84</td><td>0.07</td><td>0.02</td><td>QP</td></tr><tr><td>3</td><td>0.240</td><td>32.34</td><td>52.08</td><td>-19.74</td><td>32.13</td><td>0.06</td><td>0.03</td><td>Average</td></tr><tr><td>4</td><td>0.240</td><td>38.92</td><td>62.08</td><td>-23.16</td><td>38.71</td><td>0.06</td><td>0.03</td><td>QP</td></tr><tr><td>5*</td><td>0.731</td><td>28.65</td><td>46.00</td><td>-17.35</td><td>28.36</td><td>0.07</td><td>0.03</td><td>Average</td></tr><tr><td>6</td><td>0.731</td><td>38.44</td><td>56.00</td><td>-17.56</td><td>38.15</td><td>0.07</td><td>0.03</td><td>QP</td></tr><tr><td>7</td><td>2.271</td><td>21.26</td><td>46.00</td><td>-24.74</td><td>20.81</td><td>0.09</td><td>0.12</td><td>Average</td></tr><tr><td>8</td><td>2.271</td><td>28.68</td><td>56.00</td><td>-27.32</td><td>28.23</td><td>0.09</td><td>0.12</td><td>QP</td></tr><tr><td>9</td><td>6.168</td><td>22.50</td><td>50.00</td><td>-27.50</td><td>21.82</td><td>0.14</td><td>0.27</td><td>Average</td></tr><tr><td>10</td><td>6.168</td><td>29.94</td><td>60.00</td><td>-30.06</td><td>29.26</td><td>0.14</td><td>0.27</td><td>QP</td></tr><tr><td>11</td><td>9.922</td><td>20.30</td><td>50.00</td><td>-29.70</td><td>19.51</td><td>0.18</td><td>0.32</td><td>Average</td></tr><tr><td>12</td><td>9.922</td><td>28.31</td><td>60.00</td><td>-31.69</td><td>27.52</td><td>0.18</td><td>0.32</td><td>QP</td></tr></table>					Freq	Level	Limit	Over	Read	LISN	cable			MHz	dBuV	Line	Limit	Level	factor	loss	Remark				dBuV	dB	dBuV	dB	dB		1	0.168	33.66	55.08	-21.42	33.47	0.07	0.02	Average	2	0.168	34.03	65.08	-31.05	33.84	0.07	0.02	QP	3	0.240	32.34	52.08	-19.74	32.13	0.06	0.03	Average	4	0.240	38.92	62.08	-23.16	38.71	0.06	0.03	QP	5*	0.731	28.65	46.00	-17.35	28.36	0.07	0.03	Average	6	0.731	38.44	56.00	-17.56	38.15	0.07	0.03	QP	7	2.271	21.26	46.00	-24.74	20.81	0.09	0.12	Average	8	2.271	28.68	56.00	-27.32	28.23	0.09	0.12	QP	9	6.168	22.50	50.00	-27.50	21.82	0.14	0.27	Average	10	6.168	29.94	60.00	-30.06	29.26	0.14	0.27	QP	11	9.922	20.30	50.00	-29.70	19.51	0.18	0.32	Average	12	9.922	28.31	60.00	-31.69	27.52	0.18	0.32	QP
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12	9.922	28.31	60.00	-31.69	27.52	0.18	0.32	QP																																																																																																																																		
Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB). 2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).																																																																																																																																										

Mode	Charging mode	Power Phase	Neutral																																																																																																																																							
Level (dBuV) Frequency (MHz) <table><thead><tr><th></th><th>Freq</th><th>Level</th><th>Limit</th><th>Over</th><th>Read</th><th>LISN</th><th>cable</th><th></th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>Line</th><th>Limit</th><th>Level</th><th>factor</th><th>loss</th><th>Remark</th></tr><tr><th></th><th></th><th></th><th>dBuV</th><th>dB</th><th>dBuV</th><th>dB</th><th>dB</th><th></th></tr></thead><tbody><tr><td>1*</td><td>0.159</td><td>36.44</td><td>55.52</td><td>-19.08</td><td>36.18</td><td>0.05</td><td>0.01</td><td>Average</td></tr><tr><td>2</td><td>0.159</td><td>37.81</td><td>65.52</td><td>-27.71</td><td>37.55</td><td>0.05</td><td>0.01</td><td>QP</td></tr><tr><td>3</td><td>0.252</td><td>29.56</td><td>51.69</td><td>-22.13</td><td>29.26</td><td>0.04</td><td>0.03</td><td>Average</td></tr><tr><td>4</td><td>0.252</td><td>26.17</td><td>61.69</td><td>-35.52</td><td>25.87</td><td>0.04</td><td>0.03</td><td>QP</td></tr><tr><td>5</td><td>0.415</td><td>21.92</td><td>47.55</td><td>-25.63</td><td>21.59</td><td>0.05</td><td>0.02</td><td>Average</td></tr><tr><td>6</td><td>0.415</td><td>20.63</td><td>57.55</td><td>-36.92</td><td>20.30</td><td>0.05</td><td>0.02</td><td>QP</td></tr><tr><td>7</td><td>0.739</td><td>25.19</td><td>46.00</td><td>-20.81</td><td>24.81</td><td>0.06</td><td>0.03</td><td>Average</td></tr><tr><td>8</td><td>0.739</td><td>34.24</td><td>56.00</td><td>-21.76</td><td>33.86</td><td>0.06</td><td>0.03</td><td>QP</td></tr><tr><td>9</td><td>2.268</td><td>19.98</td><td>46.00</td><td>-26.02</td><td>19.47</td><td>0.07</td><td>0.12</td><td>Average</td></tr><tr><td>10</td><td>2.268</td><td>27.37</td><td>56.00</td><td>-28.63</td><td>26.86</td><td>0.07</td><td>0.12</td><td>QP</td></tr><tr><td>11</td><td>6.029</td><td>20.70</td><td>50.00</td><td>-29.30</td><td>19.96</td><td>0.13</td><td>0.26</td><td>Average</td></tr><tr><td>12</td><td>6.029</td><td>28.24</td><td>60.00</td><td>-31.76</td><td>27.50</td><td>0.13</td><td>0.26</td><td>QP</td></tr></tbody></table>					Freq	Level	Limit	Over	Read	LISN	cable			MHz	dBuV	Line	Limit	Level	factor	loss	Remark				dBuV	dB	dBuV	dB	dB		1*	0.159	36.44	55.52	-19.08	36.18	0.05	0.01	Average	2	0.159	37.81	65.52	-27.71	37.55	0.05	0.01	QP	3	0.252	29.56	51.69	-22.13	29.26	0.04	0.03	Average	4	0.252	26.17	61.69	-35.52	25.87	0.04	0.03	QP	5	0.415	21.92	47.55	-25.63	21.59	0.05	0.02	Average	6	0.415	20.63	57.55	-36.92	20.30	0.05	0.02	QP	7	0.739	25.19	46.00	-20.81	24.81	0.06	0.03	Average	8	0.739	34.24	56.00	-21.76	33.86	0.06	0.03	QP	9	2.268	19.98	46.00	-26.02	19.47	0.07	0.12	Average	10	2.268	27.37	56.00	-28.63	26.86	0.07	0.12	QP	11	6.029	20.70	50.00	-29.30	19.96	0.13	0.26	Average	12	6.029	28.24	60.00	-31.76	27.50	0.13	0.26	QP
	Freq	Level	Limit	Over	Read	LISN	cable																																																																																																																																			
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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).																																																																																																																																										

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

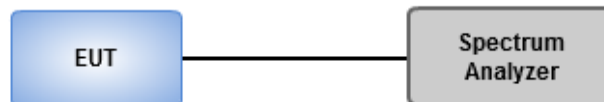
6dB Bandwidth

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 MHz, Video bandwidth = 3 MHz.
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

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)_1TX	12.174M	13.965M	14M0G1D	12.101M	13.893M
802.11g_Nss1,(6Mbps)_1TX	16.449M	16.715M	16M7D1D	16.449M	16.643M
802.11n HT20_Nss1,(MCS0)_1TX	17.754M	17.728M	17M7D1D	17.681M	17.656M

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

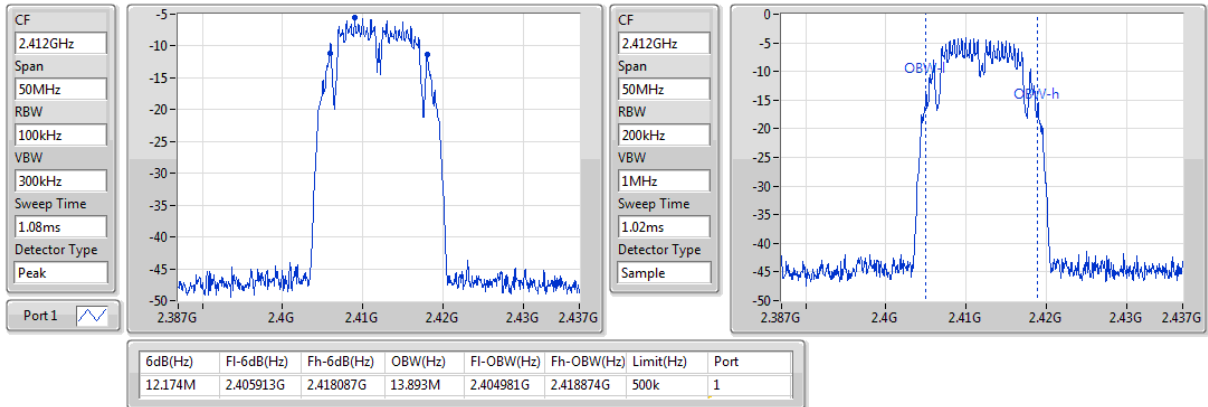
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	12.174M	13.893M
2437MHz	Pass	500k	12.101M	13.965M
2462MHz	Pass	500k	12.101M	13.965M
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	16.449M	16.715M
2437MHz	Pass	500k	16.449M	16.643M
2462MHz	Pass	500k	16.449M	16.643M
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-
2412MHz	Pass	500k	17.681M	17.656M
2437MHz	Pass	500k	17.754M	17.656M
2462MHz	Pass	500k	17.754M	17.728M

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

802.11b_Nss1,(1Mbps)_1TX

EBW

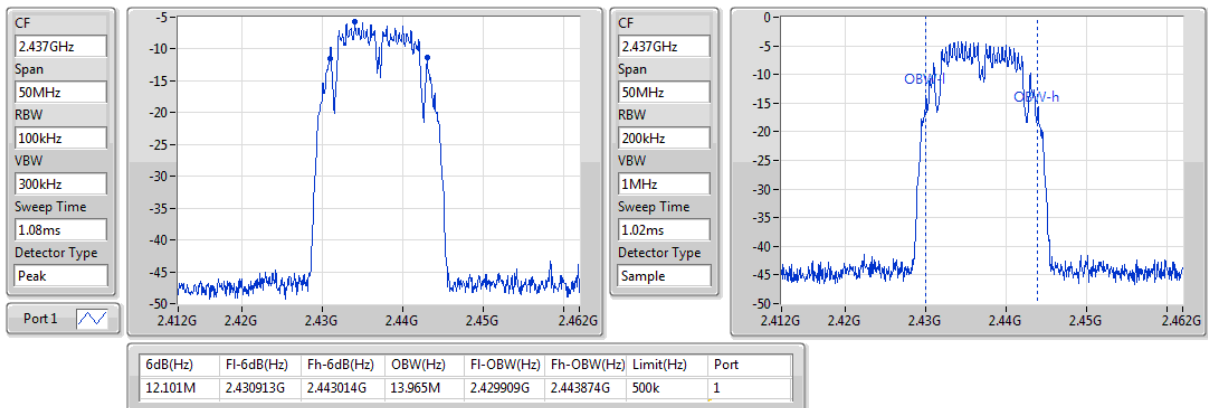
2412MHz



802.11b_Nss1,(1Mbps)_1TX

EBW

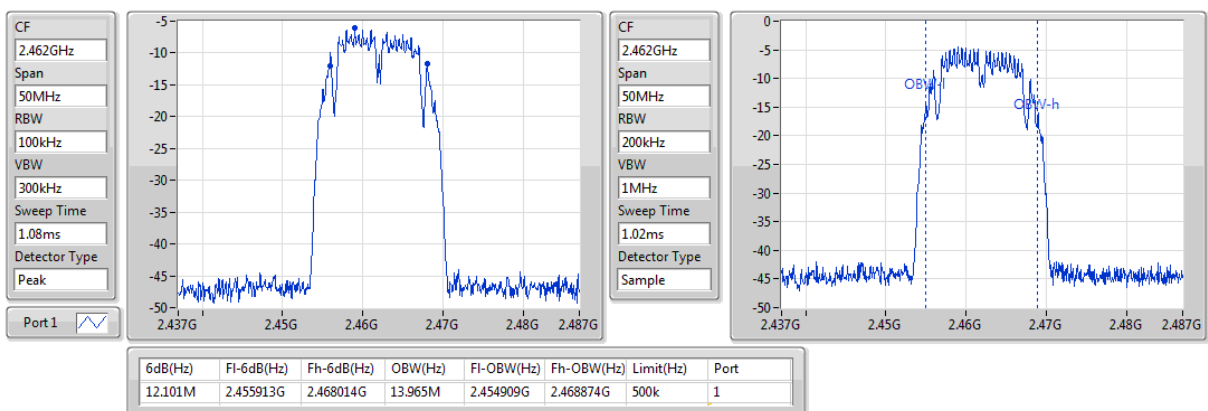
2437MHz



802.11b_Nss1,(1Mbps)_1TX

EBW

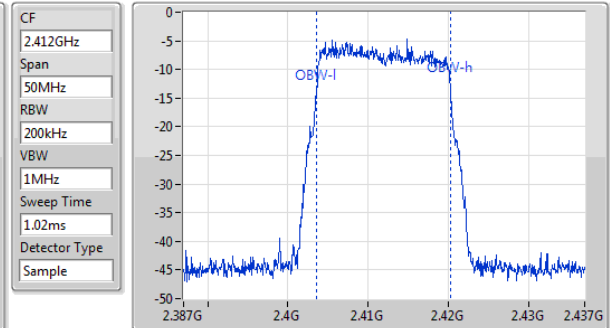
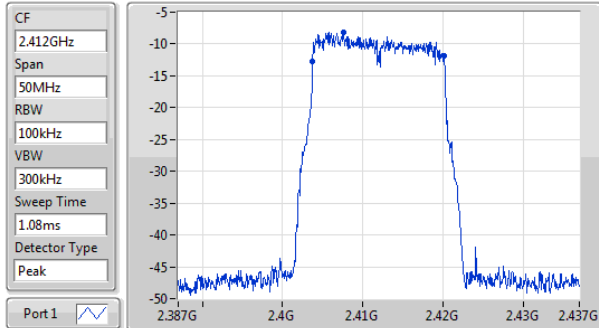
2462MHz



802.11g_Nss1,(6Mbps)_1TX

EBW

2412MHz

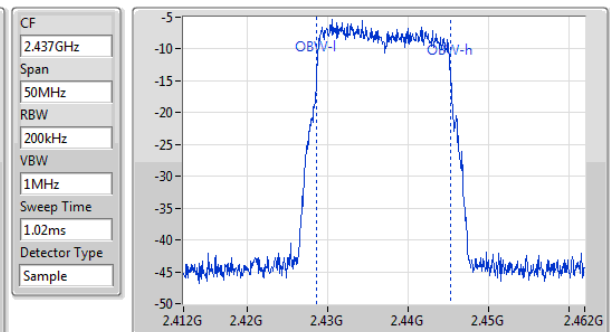
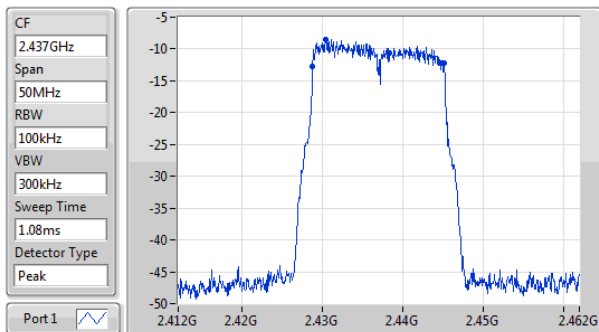


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
16.449M	2.403739G	2.420188G	16.715M	2.403534G	2.420249G	500k	1

802.11g_Nss1,(6Mbps)_1TX

EBW

2437MHz

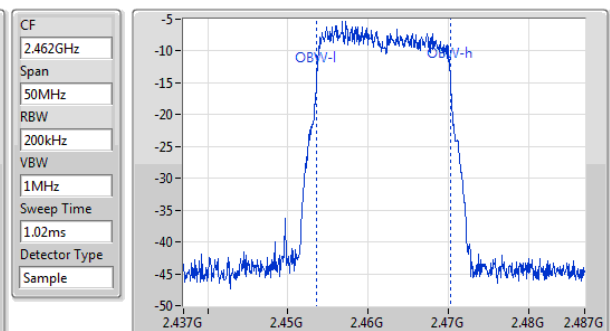
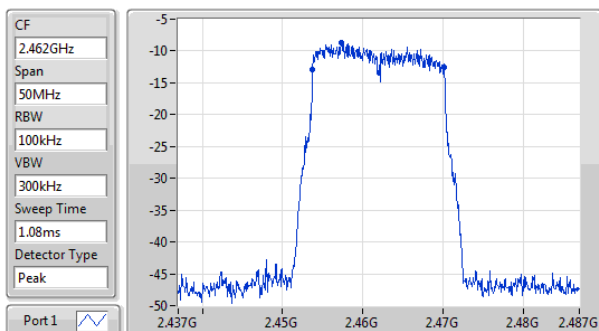


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
16.449M	2.428739G	2.445188G	16.643M	2.428606G	2.445249G	500k	1

802.11g_Nss1,(6Mbps)_1TX

EBW

2462MHz

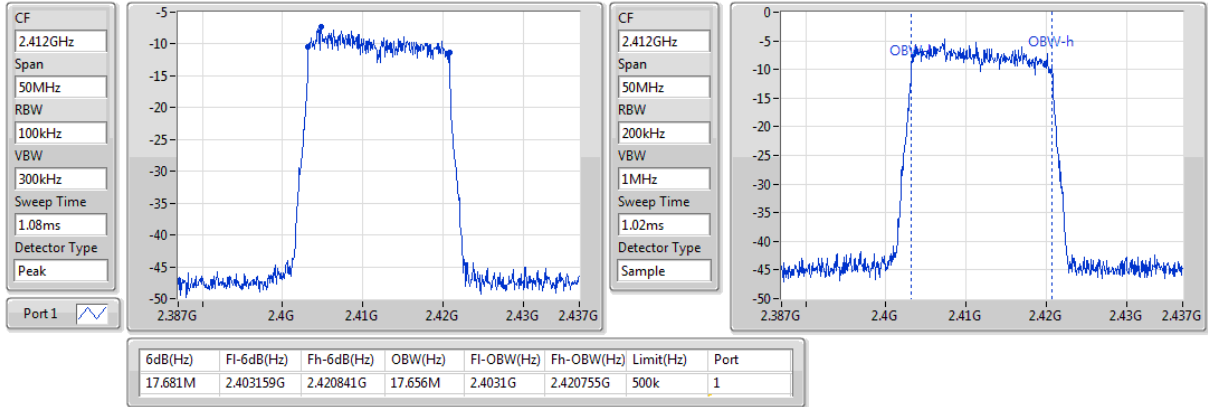


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
16.449M	2.453739G	2.470188G	16.643M	2.453606G	2.470249G	500k	1

802.11n HT20_Nss1,(MCS0)_1TX

EBW

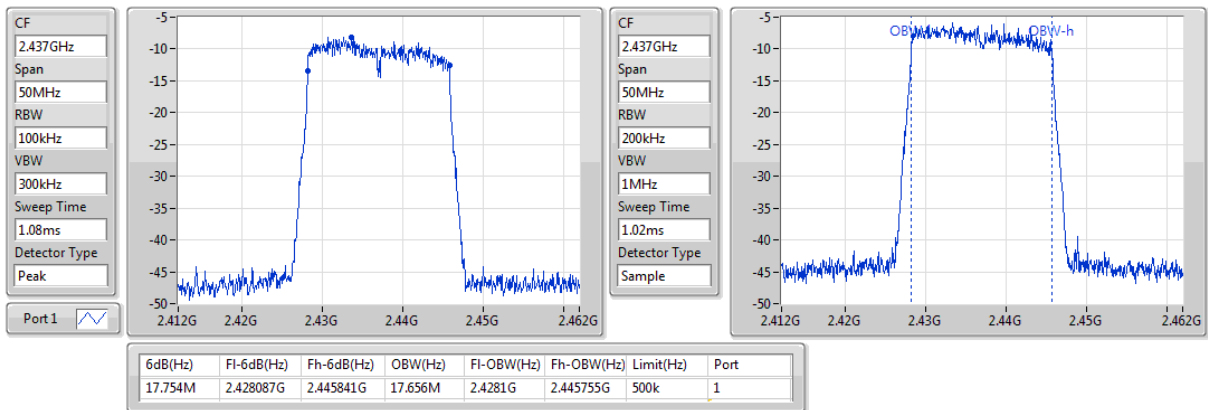
2412MHz



802.11n HT20_Nss1,(MCS0)_1TX

EBW

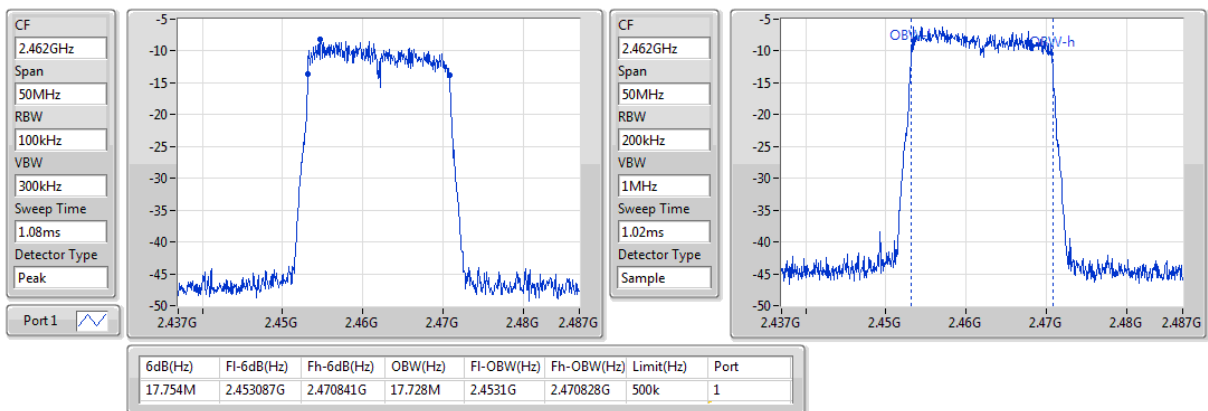
2437MHz



802.11n HT20_Nss1,(MCS0)_1TX

EBW

2462MHz



3.3 RF Output Power

3.3.1 Limit of RF Output Power

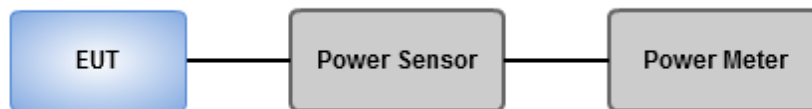
Conducted power shall not exceed 1Watt.

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

3.3.2 Test Procedures

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

3.3.3 Test Setup



3.3.4 Test Result of Maximum Output Power

Peak Power Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_1TX	8.75	0.00750
802.11g_Nss1,(6Mbps)_1TX	14.43	0.02773
802.11n HT20_Nss1,(MCS0)_1TX	14.39	0.02748

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	-2.23392	8.75	8.75	30.00	6.52	36.00
2437MHz	Pass	-2.23392	8.56	8.56	30.00	6.33	36.00
2462MHz	Pass	-2.23392	8.38	8.38	30.00	6.15	36.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	-2.23392	14.43	14.43	30.00	12.20	36.00
2437MHz	Pass	-2.23392	14.21	14.21	30.00	11.98	36.00
2462MHz	Pass	-2.23392	14.02	14.02	30.00	11.79	36.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	-2.23392	14.39	14.39	30.00	12.16	36.00
2437MHz	Pass	-2.23392	14.17	14.17	30.00	11.94	36.00
2462MHz	Pass	-2.23392	14.03	14.03	30.00	11.80	36.00

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

Average PowerSummary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_1TX	5.69	0.00371
802.11g_Nss1,(6Mbps)_1TX	5.53	0.00357
802.11n HT20_Nss1,(MCS0)_1TX	5.44	0.00350

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)	EIRP (dBm)	EIRP Limit (dBm)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	-2.23392	5.69	5.69	-	3.46	-
2437MHz	Pass	-2.23392	5.42	5.42	-	3.19	-
2462MHz	Pass	-2.23392	5.23	5.23	-	3.00	-
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	-2.23392	5.53	5.53	-	3.30	-
2437MHz	Pass	-2.23392	5.31	5.31	-	3.08	-
2462MHz	Pass	-2.23392	5.16	5.16	-	2.93	-
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	-2.23392	5.44	5.44	-	3.21	-
2437MHz	Pass	-2.23392	5.24	5.24	-	3.01	-
2462MHz	Pass	-2.23392	5.02	5.02	-	2.79	-

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

Note : Conducted average output power is for reference only

3.4 Power Spectral Density

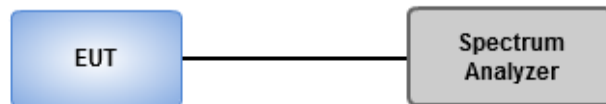
3.4.1 Limit of Power Spectral Density

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 = 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.

3.4.3 Test Setup



3.4.4 Test Result of Power Spectral Density

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_1TX	-14.33
802.11g_Nss1,(6Mbps)_1TX	-14.66
802.11n HT20_Nss1,(MCS0)_1TX	-14.34

RBW=3kHz.

Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	-2.23392	-14.33	-14.33	8.00
2437MHz	Pass	-2.23392	-14.52	-14.52	8.00
2462MHz	Pass	-2.23392	-15.45	-15.45	8.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	-2.23392	-14.66	-14.66	8.00
2437MHz	Pass	-2.23392	-15.21	-15.21	8.00
2462MHz	Pass	-2.23392	-14.96	-14.96	8.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-
2412MHz	Pass	-2.23392	-14.34	-14.34	8.00
2437MHz	Pass	-2.23392	-14.88	-14.88	8.00
2462MHz	Pass	-2.23392	-15.39	-15.39	8.00

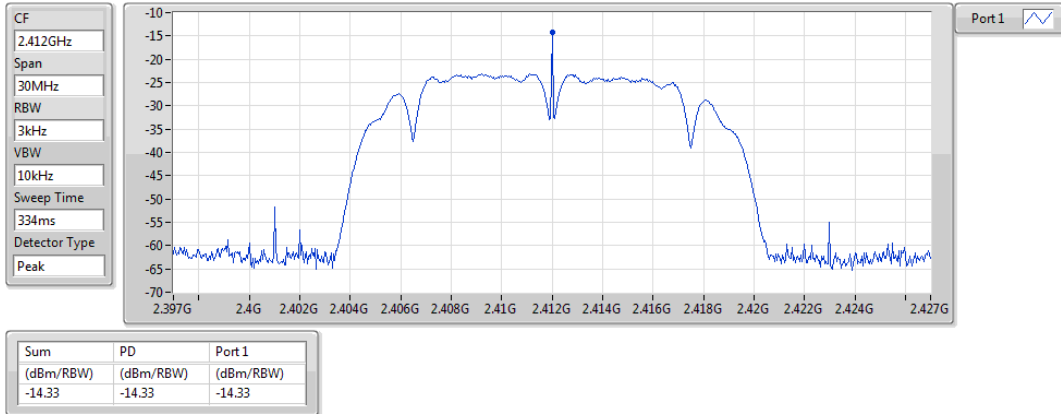
DG = Directional Gain;

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)_1TX

PSD

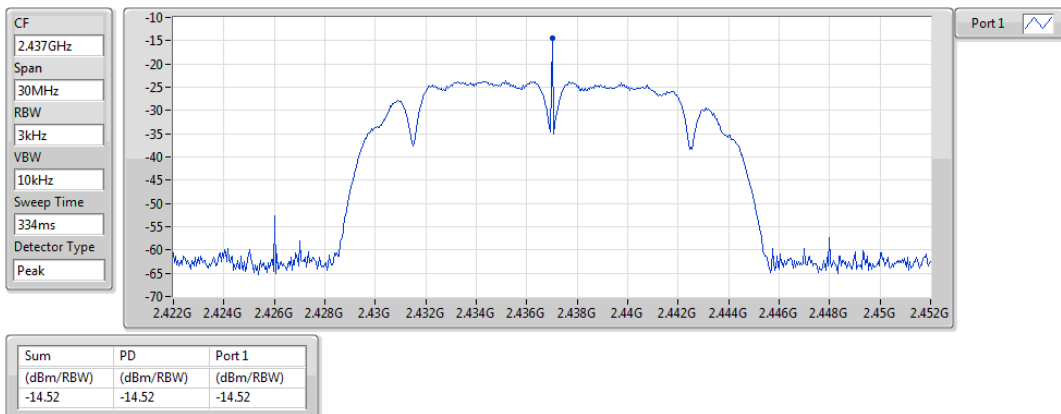
2412MHz



802.11b_Nss1,(1Mbps)_1TX

PSD

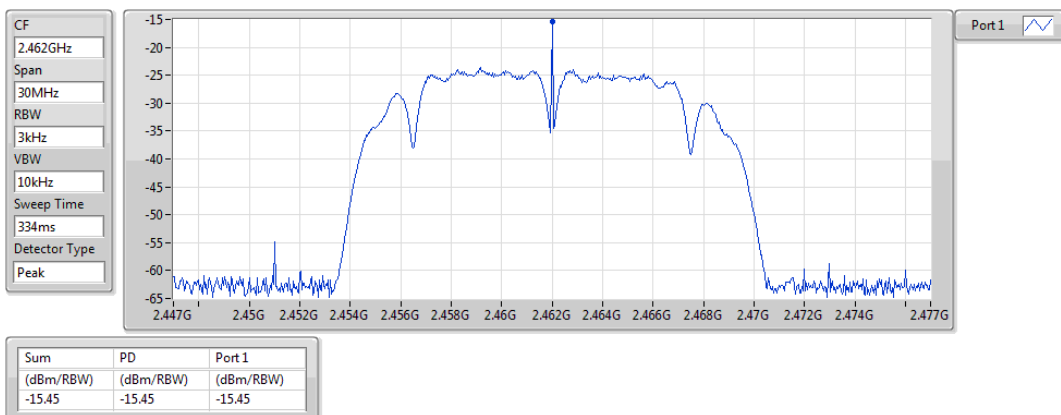
2437MHz



802.11b_Nss1,(1Mbps)_1TX

PSD

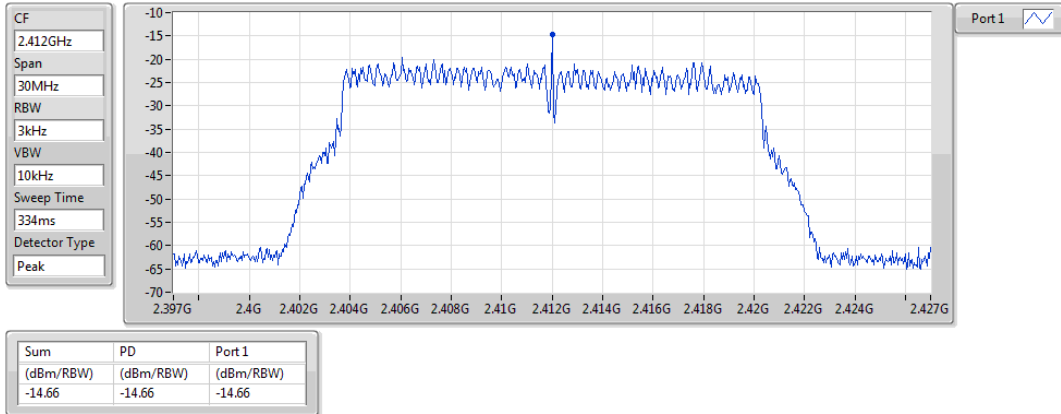
2462MHz



802.11g_Nss1,(6Mbps)_1TX

PSD

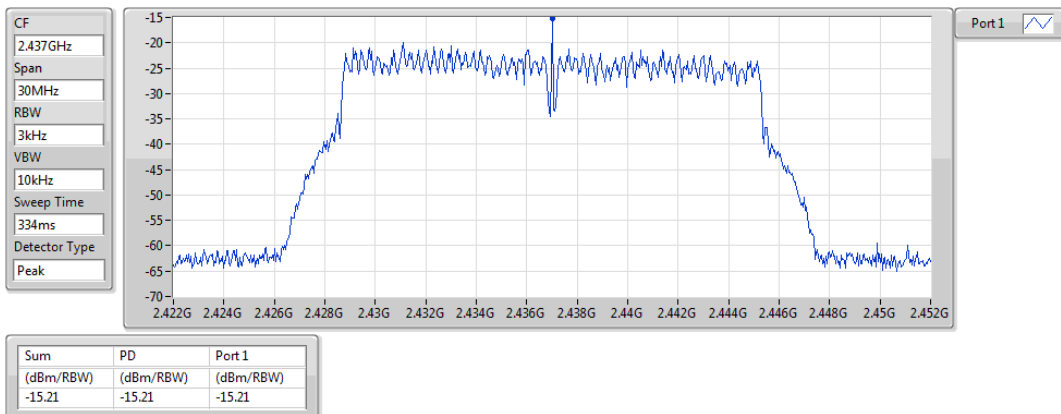
2412MHz



802.11g_Nss1,(6Mbps)_1TX

PSD

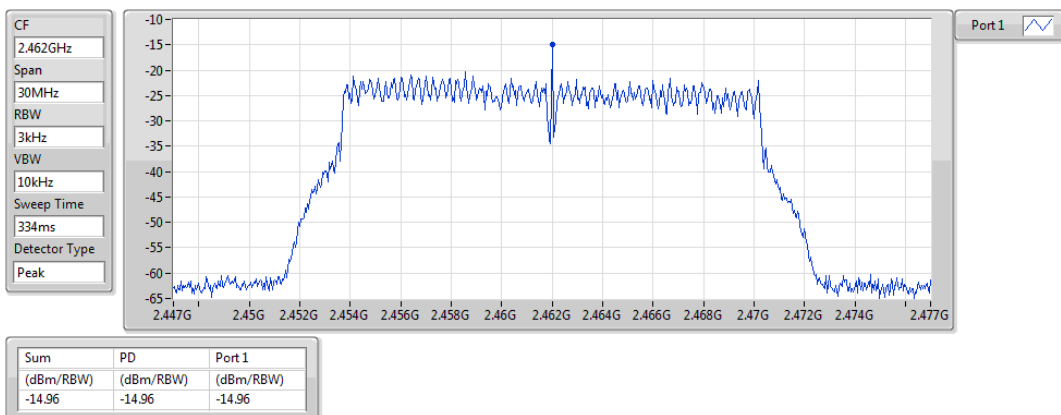
2437MHz



802.11g_Nss1,(6Mbps)_1TX

PSD

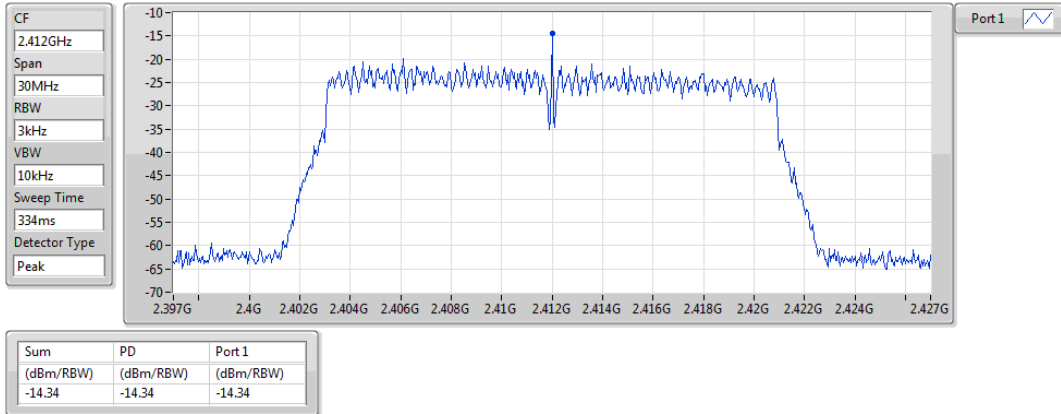
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802.11n HT20_Nss1,(MCS0)_1TX

PSD

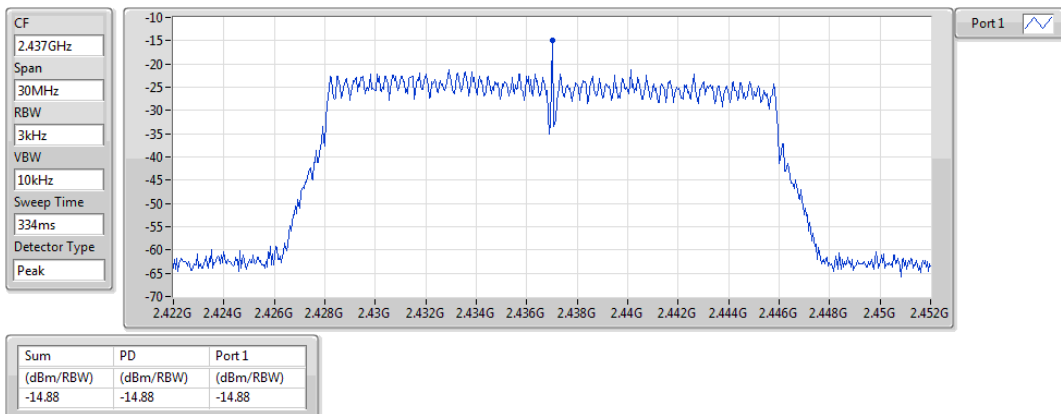
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802.11n HT20_Nss1,(MCS0)_1TX

PSD

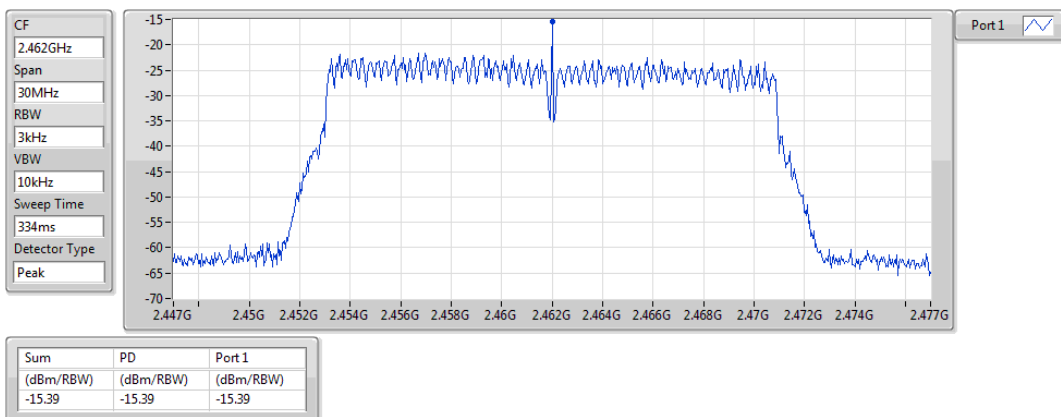
2437MHz



802.11n HT20_Nss1,(MCS0)_1TX

PSD

2462MHz



3.5 Unwanted Emissions into Restricted Frequency Bands

3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

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

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

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

3.5.2 Test Procedures

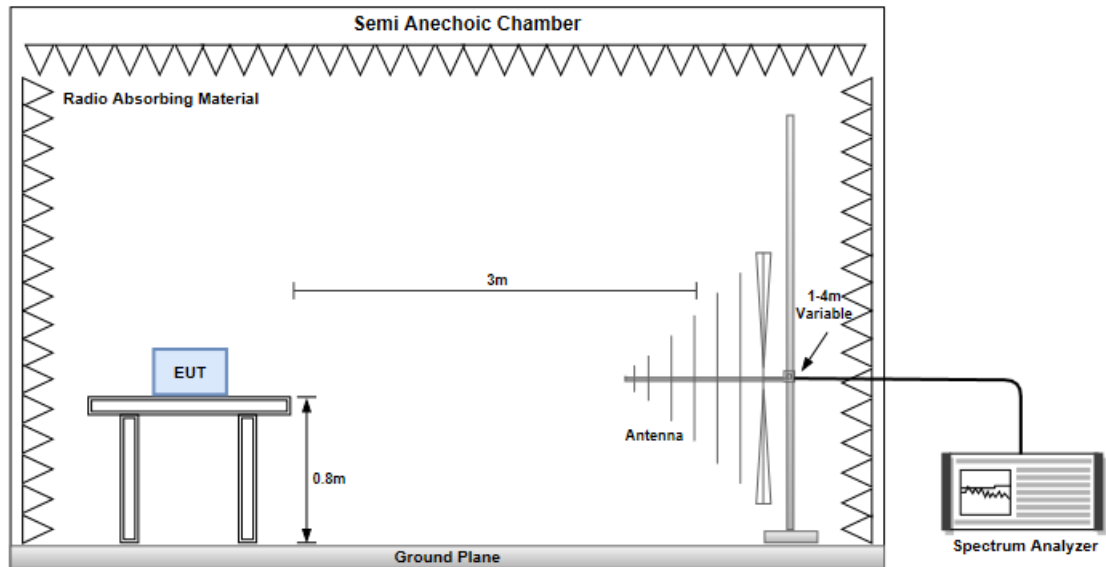
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

Note:

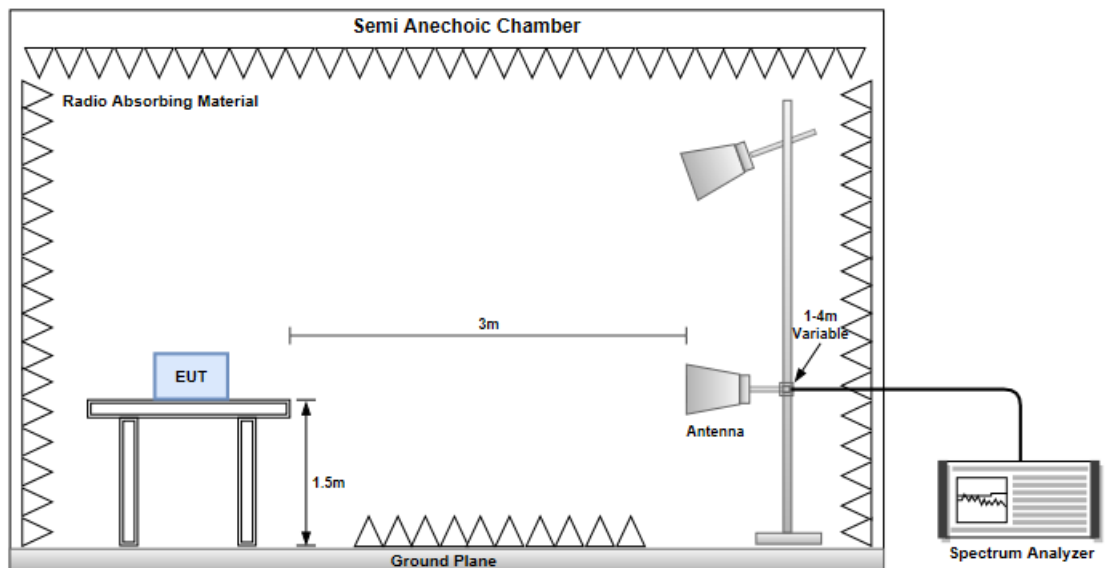
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz

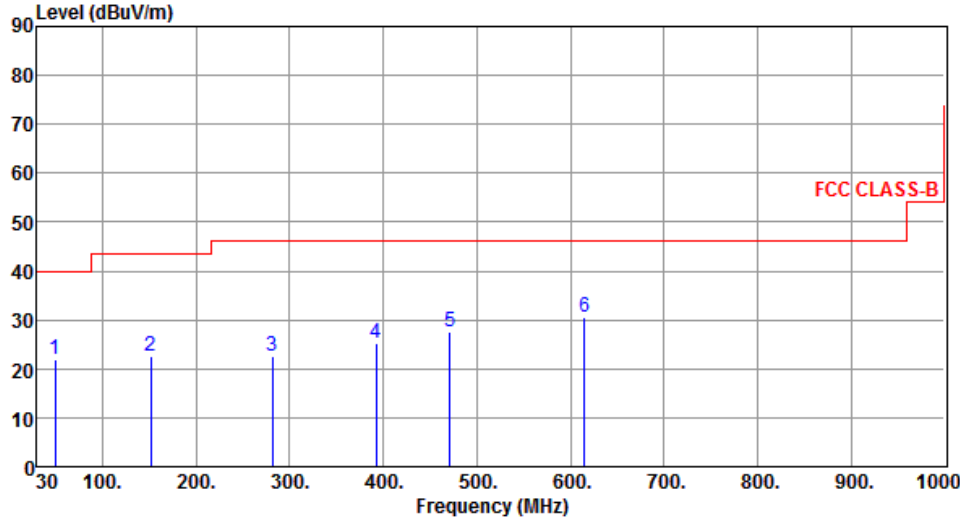


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	11g	Test Freq. (MHz)	-
Polarization	Horizontal	Mode	Charge Mode

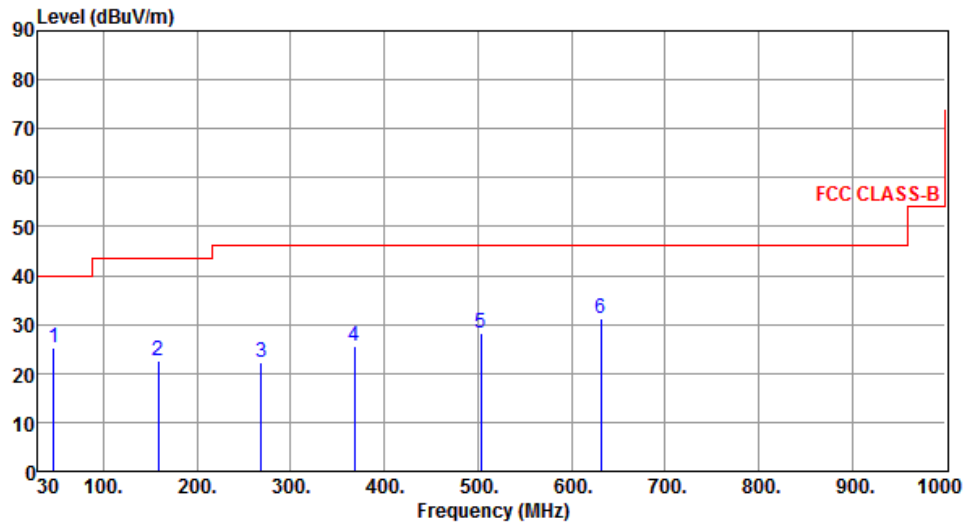


The graph displays the Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (30 to 1000). A red line represents the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 200 MHz, and 55 dBuV/m from 200 to 1000 MHz. Six blue vertical lines indicate measured peaks at 49.36, 151.35, 281.23, 392.68, 471.47, and 614.91 MHz, with levels ranging from approximately 22 to 31 dBuV/m.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	49.36	21.97	40.00	-18.03	29.87	-7.90	Peak	---	---
2	151.35	22.47	43.50	-21.03	30.71	-8.24	Peak	---	---
3	281.23	22.49	46.00	-23.51	30.62	-8.13	Peak	---	---
4	392.68	25.37	46.00	-20.63	30.56	-5.19	Peak	---	---
5	471.47	27.41	46.00	-18.59	30.77	-3.36	Peak	---	---
6	614.91	30.55	46.00	-15.45	30.73	-0.18	Peak	---	---

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

Modulation	11g	Test Freq. (MHz)	-
Polarization	Vertical	Mode	Charge Mode



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	46.58	25.37	40.00	-14.63	33.41	-8.04	Peak	---	---
2	158.12	22.48	43.50	-21.02	30.71	-8.23	Peak	---	---
3	268.49	22.38	46.00	-23.62	31.05	-8.67	Peak	---	---
4	368.53	25.48	46.00	-20.52	31.34	-5.86	Peak	---	---
5	503.41	28.27	46.00	-17.73	31.09	-2.82	Peak	---	---
6	631.38	31.27	46.00	-14.73	31.20	0.07	Peak	---	---

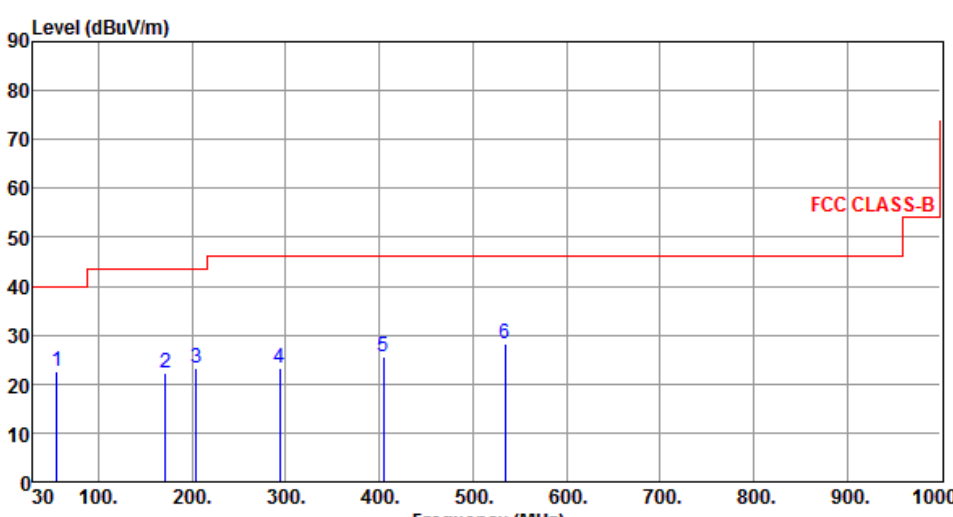
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

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

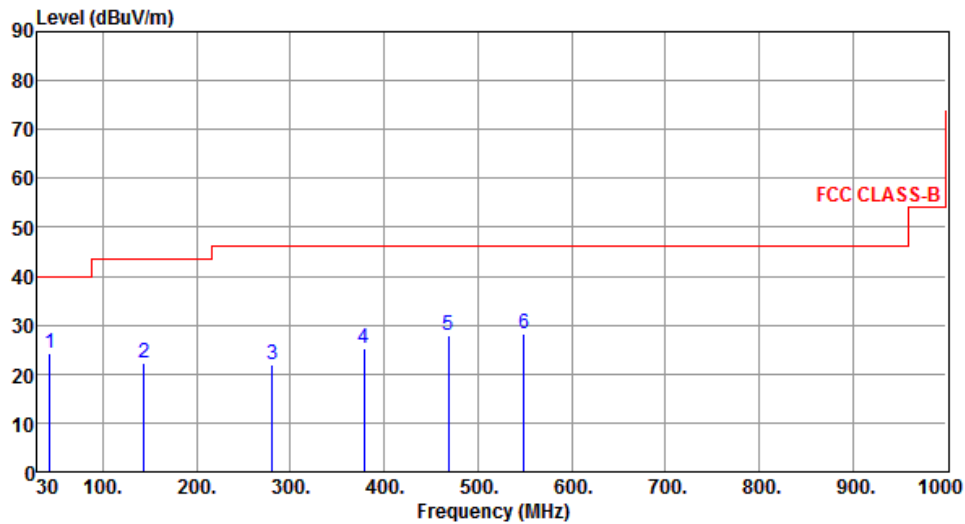
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal	Mode	Battery Mode



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	55.22	22.62	40.00	-17.38	30.92	-8.30	Peak	---	---
2	171.62	22.20	43.50	-21.30	30.90	-8.70	Peak	---	---
3	204.60	23.38	43.50	-20.12	34.39	-11.01	Peak	---	---
4	293.84	23.41	46.00	-22.59	31.24	-7.83	Peak	---	---
5	404.42	25.54	46.00	-20.46	30.40	-4.86	Peak	---	---
6	534.40	28.36	46.00	-17.64	30.55	-2.19	Peak	---	---

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

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical	Mode	Battery Mode



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	43.58	24.14	40.00	-15.86	32.35	-8.21	Peak	---	---
2	143.49	22.31	43.50	-21.19	30.85	-8.54	Peak	---	---
3	280.26	21.92	46.00	-24.08	30.08	-8.16	Peak	---	---
4	378.23	25.38	46.00	-20.62	30.97	-5.59	Peak	---	---
5	468.44	27.96	46.00	-18.04	31.37	-3.41	Peak	---	---
6	548.95	28.23	46.00	-17.77	30.12	-1.89	Peak	---	---

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

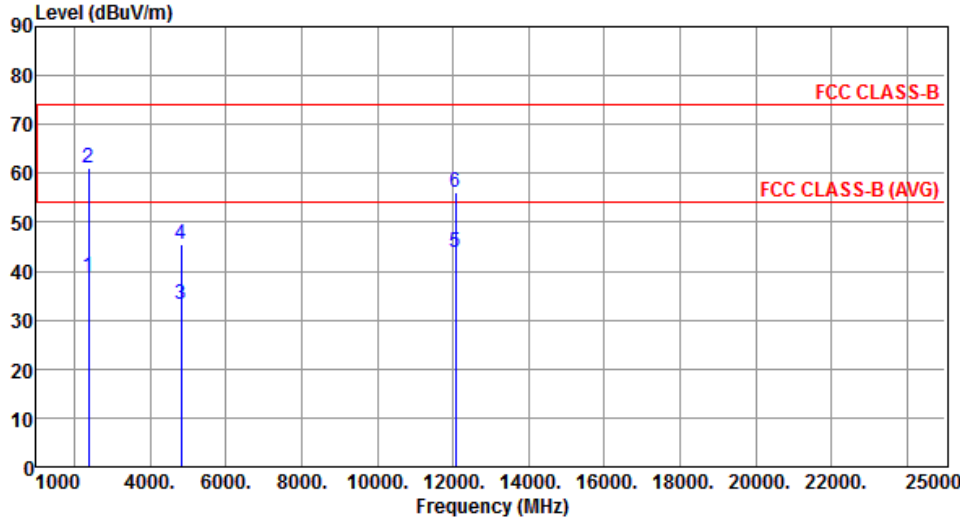
*Factor includes antenna factor , cable loss and amplifier gain

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

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

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

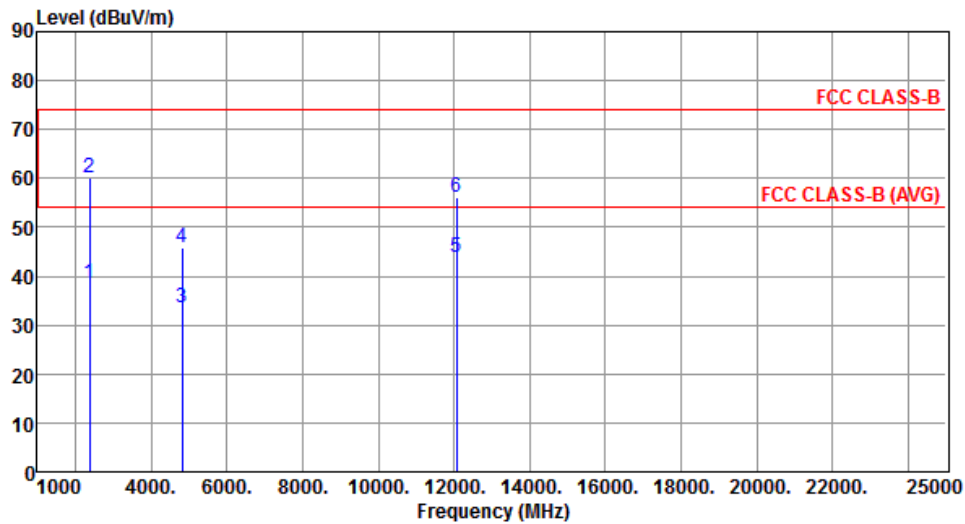
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal	Mode	Battery Mode



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.78	54.00	-15.22	40.02	-1.24	Average	318	25
2	2390.00	61.20	74.00	-12.80	62.44	-1.24	Peak	318	25
3	4824.00	33.24	54.00	-20.76	27.68	5.56	Average	100	70
4	4824.00	45.58	74.00	-28.42	40.02	5.56	Peak	100	70
5	12060.00	43.80	54.00	-10.20	28.13	15.67	Average	100	70
6	12060.00	56.12	74.00	-17.88	40.45	15.67	Peak	100	70

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	Mode	Battery Mode



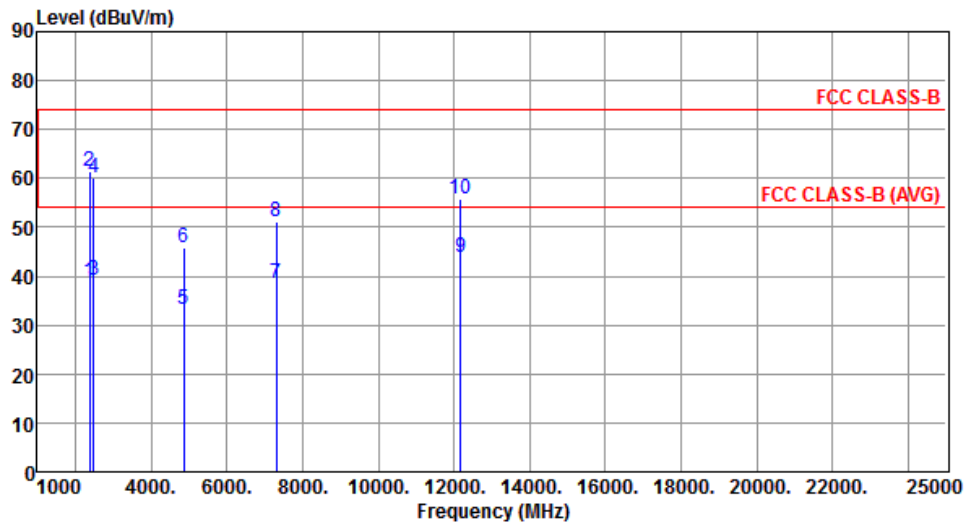
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.52	54.00	-15.48	39.76	-1.24	Average	100	274
2	2390.00	60.11	74.00	-13.89	61.35	-1.24	Peak	100	274
3	4824.00	33.51	54.00	-20.49	27.95	5.56	Average	100	60
4	4824.00	45.68	74.00	-28.32	40.12	5.56	Peak	100	60
5	12060.00	43.81	54.00	-10.19	28.14	15.67	Average	100	50
6	12060.00	56.05	74.00	-17.95	40.38	15.67	Peak	100	50

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)	2437
Polarization	Horizontal	Mode	Battery Mode



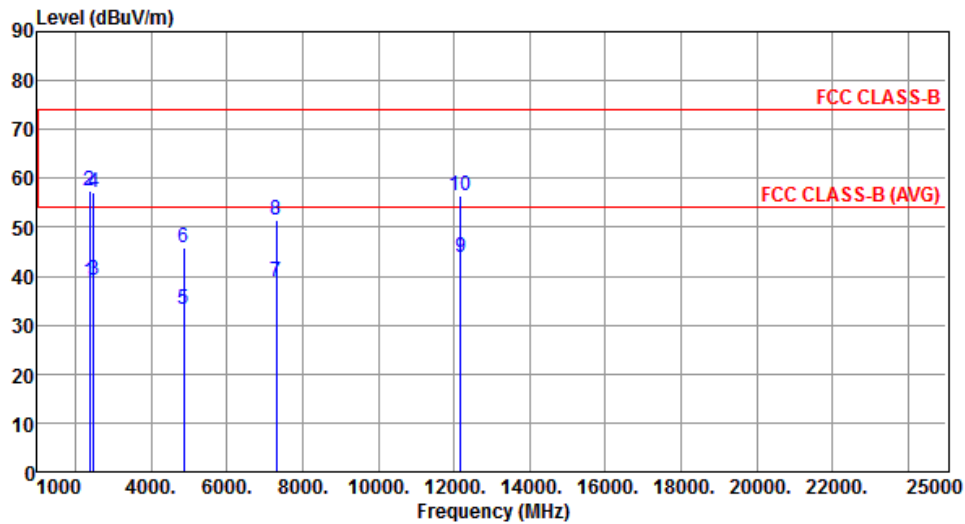
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.99	54.00	-15.01	40.23	-1.24	Average	134	18
2	2390.00	61.36	74.00	-12.64	62.60	-1.24	Peak	134	18
3	2483.50	39.19	54.00	-14.81	40.07	-0.88	Average	134	18
4	2483.50	60.12	74.00	-13.88	61.00	-0.88	Peak	134	18
5	4874.00	33.14	54.00	-20.86	27.45	5.69	Average	100	40
6	4874.00	45.72	74.00	-28.28	40.03	5.69	Peak	100	40
7	7311.00	38.68	54.00	-15.32	27.80	10.88	Average	100	90
8	7311.00	51.08	74.00	-22.92	40.20	10.88	Peak	100	90
9	12185.00	43.70	54.00	-10.30	28.21	15.49	Average	100	40
10	12185.00	55.88	74.00	-18.12	40.39	15.49	Peak	100	40

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)	2437
Polarization	Vertical	Mode	Battery Mode



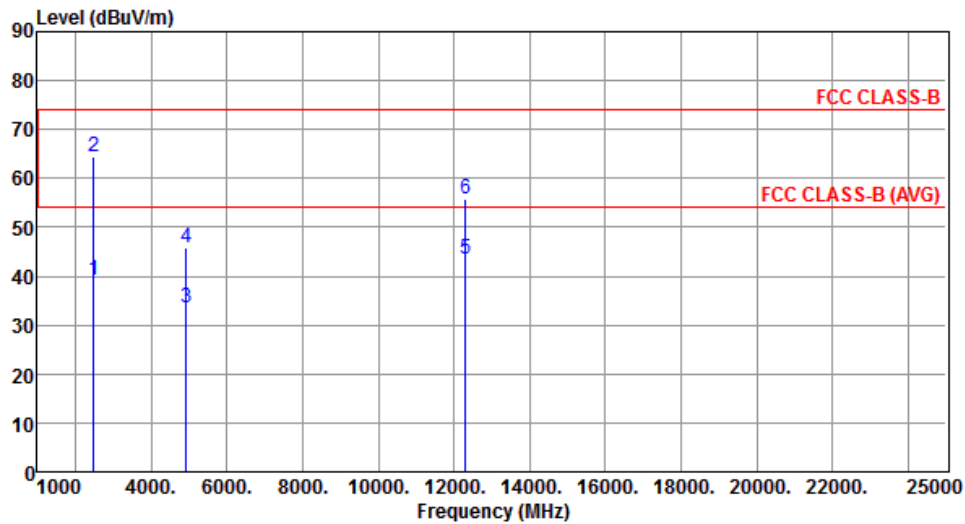
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.92	54.00	-15.08	40.16	-1.24	Average	100	301
2	2390.00	57.56	74.00	-16.44	58.80	-1.24	Peak	100	301
3	2483.50	39.17	54.00	-14.83	40.05	-0.88	Average	100	301
4	2483.50	57.02	74.00	-16.98	57.90	-0.88	Peak	100	301
5	4874.00	33.14	54.00	-20.86	27.45	5.69	Average	100	30
6	4874.00	45.81	74.00	-28.19	40.12	5.69	Peak	100	30
7	7311.00	38.89	54.00	-15.11	28.01	10.88	Average	100	50
8	7311.00	51.40	74.00	-22.60	40.52	10.88	Peak	100	50
9	12185.00	43.81	54.00	-10.19	28.32	15.49	Average	100	40
10	12185.00	56.41	74.00	-17.59	40.92	15.49	Peak	100	40

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)	2462
Polarization	Horizontal	Mode	Battery Mode



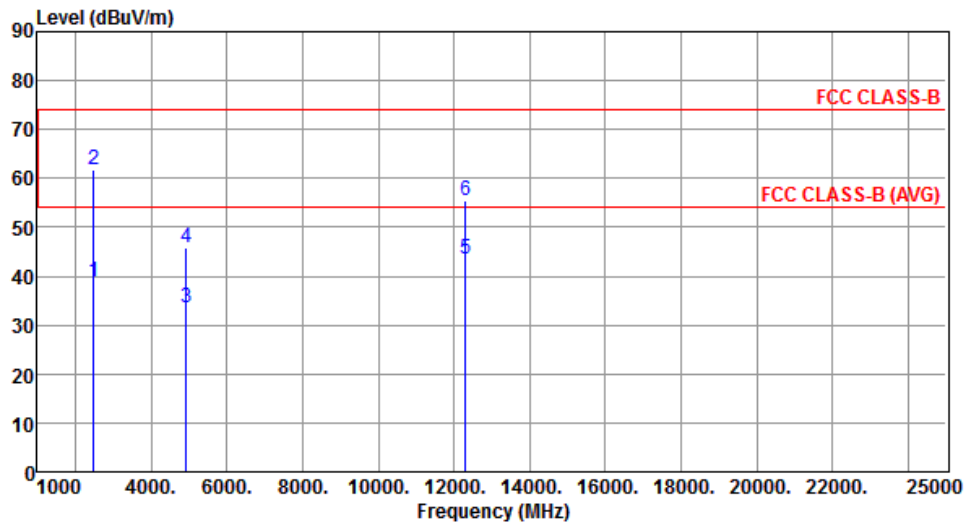
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	39.03	54.00	-14.97	39.91	-0.88	Average	218	22
2	2483.50	64.48	74.00	-9.52	65.36	-0.88	Peak	218	22
3	4924.00	33.52	54.00	-20.48	27.70	5.82	Average	100	30
4	4924.00	45.95	74.00	-28.05	40.13	5.82	Peak	100	30
5	12310.00	43.48	54.00	-10.52	28.16	15.32	Average	100	50
6	12310.00	55.71	74.00	-18.29	40.39	15.32	Peak	100	50

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)	2462
Polarization	Vertical	Mode	Battery Mode



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	38.97	54.00	-15.03	39.85	-0.88	Average	100	268
2	2483.50	61.66	74.00	-12.34	62.54	-0.88	Peak	100	268
3	4924.00	33.47	54.00	-20.53	27.65	5.82	Average	100	200
4	4924.00	45.89	74.00	-28.11	40.07	5.82	Peak	100	200
5	12310.00	43.35	54.00	-10.65	28.03	15.32	Average	100	100
6	12310.00	55.60	74.00	-18.40	40.28	15.32	Peak	100	100

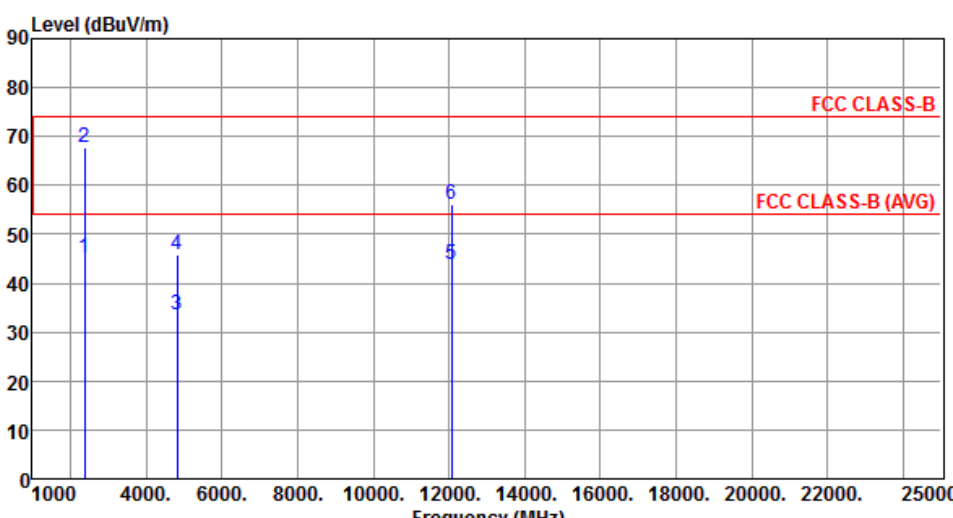
Note 1: Emission Level (dBUV/m) = SA Reading (dBUV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

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

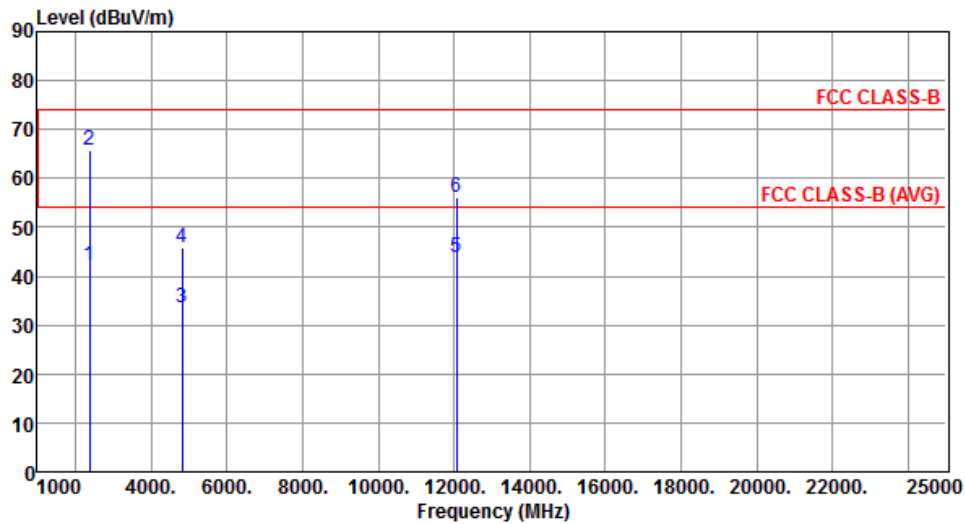
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal	Mode	Battery Mode



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	45.29	54.00	-8.71	46.53	-1.24	Average	228	18
2	2390.00	67.75	74.00	-6.25	68.99	-1.24	Peak	228	18
3	4824.00	33.45	54.00	-20.55	27.89	5.56	Average	100	20
4	4824.00	45.81	74.00	-28.19	40.25	5.56	Peak	100	20
5	12060.00	43.81	54.00	-10.19	28.14	15.67	Average	100	50
6	12060.00	56.25	74.00	-17.75	40.58	15.67	Peak	100	50

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	11g	Test Freq. (MHz)	2412
Polarization	Vertical	Mode	Battery Mode



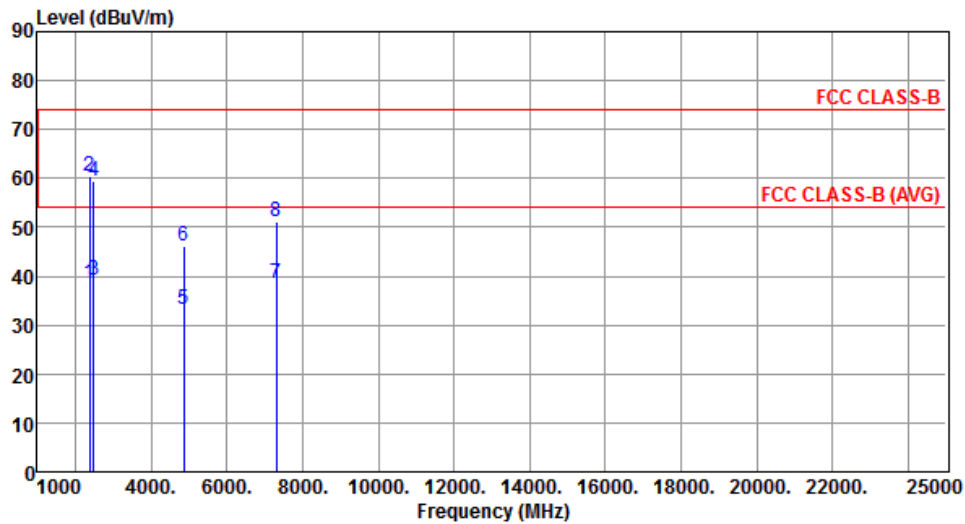
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	42.17	54.00	-11.83	43.41	-1.24	Average	100	270
2	2390.00	65.76	74.00	-8.24	67.00	-1.24	Peak	100	270
3	4824.00	33.42	54.00	-20.58	27.86	5.56	Average	100	140
4	4824.00	45.79	74.00	-28.21	40.23	5.56	Peak	100	140
5	12060.00	43.92	54.00	-10.08	28.25	15.67	Average	100	90
6	12060.00	56.24	74.00	-17.76	40.57	15.67	Peak	100	90

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	11g	Test Freq. (MHz)	2437
Polarization	Horizontal	Mode	Battery Mode



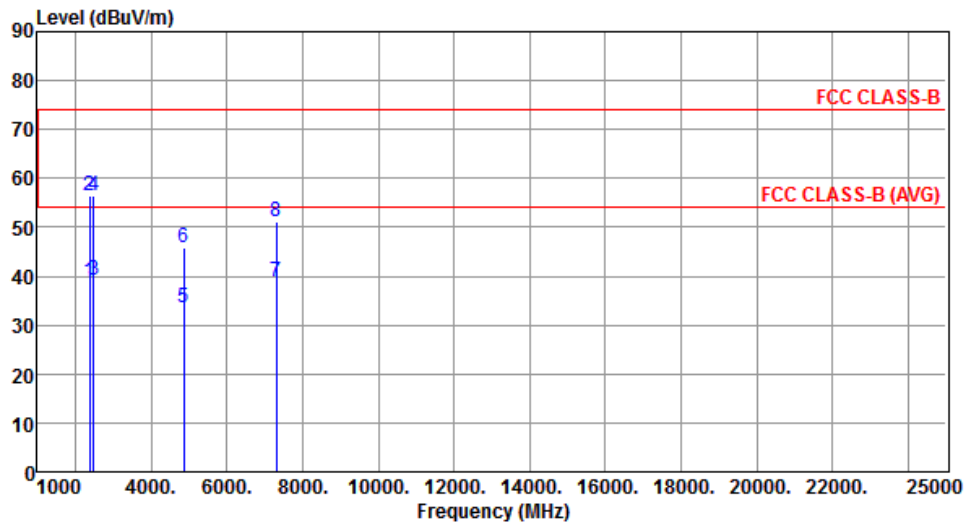
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.51	54.00	-15.49	39.75	-1.24	Average	100	16
2	2390.00	60.28	74.00	-13.72	61.52	-1.24	Peak	100	16
3	2483.50	39.14	54.00	-14.86	40.02	-0.88	Average	100	16
4	2483.50	59.38	74.00	-14.62	60.26	-0.88	Peak	100	16
5	4874.00	33.25	54.00	-20.75	27.56	5.69	Average	100	70
6	4874.00	46.15	74.00	-27.85	40.46	5.69	Peak	100	70
7	7311.00	38.47	54.00	-15.53	27.59	10.88	Average	100	80
8	7311.00	51.26	74.00	-22.74	40.38	10.88	Peak	100	80

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	11g	Test Freq. (MHz)	2437
Polarization	Vertical	Mode	Battery Mode



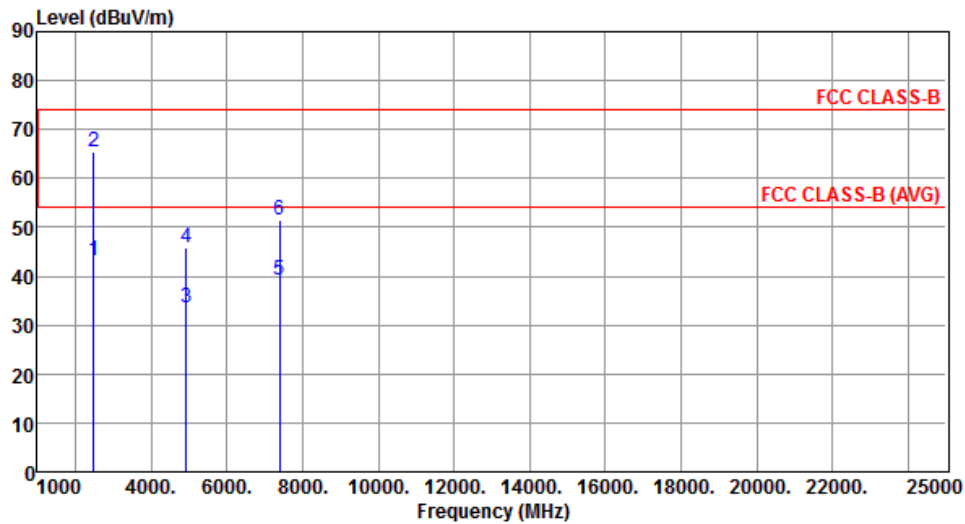
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.79	54.00	-15.21	40.03	-1.24	Average	100	266
2	2390.00	56.49	74.00	-17.51	57.73	-1.24	Peak	100	266
3	2483.50	39.18	54.00	-14.82	40.06	-0.88	Average	100	266
4	2483.50	56.56	74.00	-17.44	57.44	-0.88	Peak	100	266
5	4874.00	33.38	54.00	-20.62	27.69	5.69	Average	100	80
6	4874.00	45.85	74.00	-28.15	40.16	5.69	Peak	100	80
7	7311.00	38.77	54.00	-15.23	27.89	10.88	Average	100	90
8	7311.00	51.14	74.00	-22.86	40.26	10.88	Peak	100	90

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	11g	Test Freq. (MHz)	2462
Polarization	Horizontal	Mode	Battery Mode



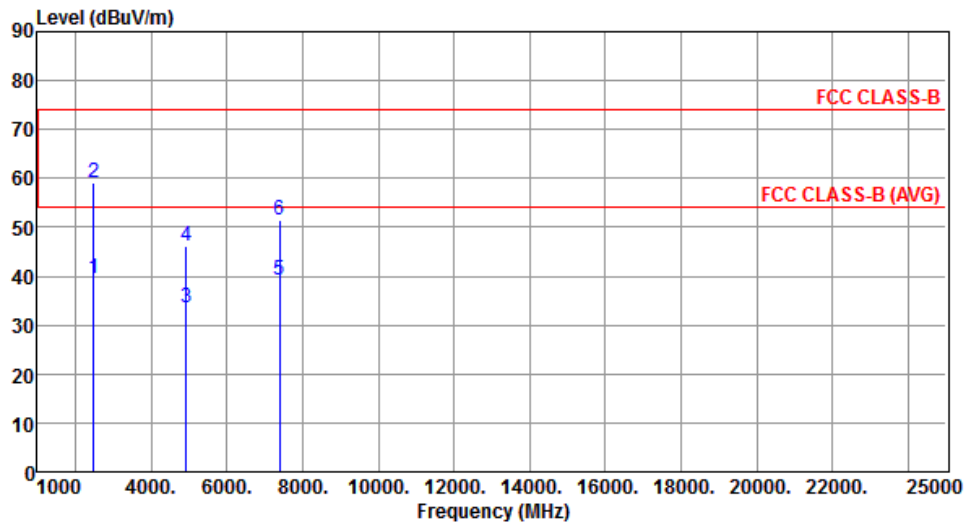
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	43.09	54.00	-10.91	43.97	-0.88	Average	221	16
2	2483.50	65.57	74.00	-8.43	66.45	-0.88	Peak	221	16
3	4924.00	33.68	54.00	-20.32	27.86	5.82	Average	100	20
4	4924.00	45.96	74.00	-28.04	40.14	5.82	Peak	100	20
5	7386.00	39.18	54.00	-14.82	27.98	11.20	Average	100	30
6	7386.00	51.47	74.00	-22.53	40.27	11.20	Peak	100	30

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	11g	Test Freq. (MHz)	2462
Polarization	Vertical	Mode	Battery Mode



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	39.57	54.00	-14.43	40.45	-0.88	Average	100	269
2	2483.50	59.24	74.00	-14.76	60.12	-0.88	Peak	100	269
3	4924.00	33.47	54.00	-20.53	27.65	5.82	Average	100	150
4	4924.00	46.30	74.00	-27.70	40.48	5.82	Peak	100	150
5	7386.00	39.07	54.00	-14.93	27.87	11.20	Average	100	20
6	7386.00	51.59	74.00	-22.41	40.39	11.20	Peak	100	20

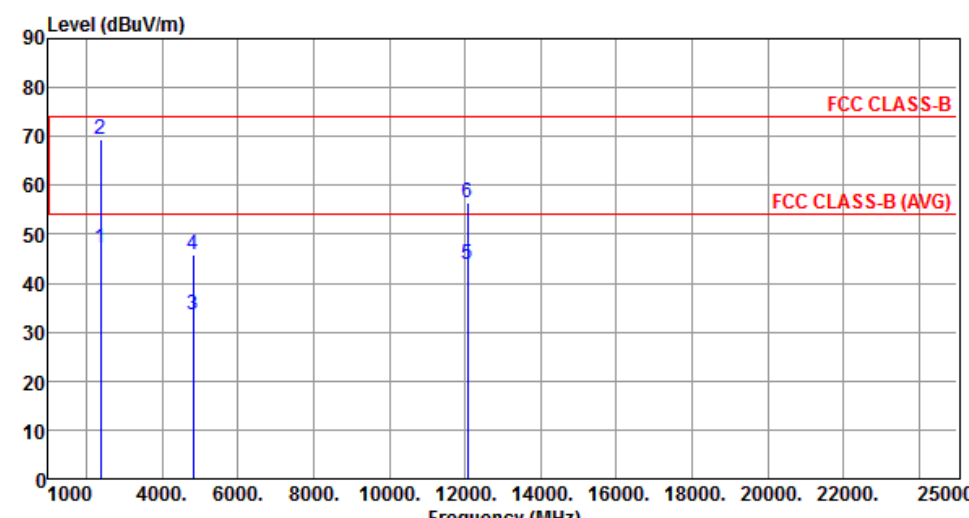
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)

*Factor includes antenna factor , cable loss and amplifier gain

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

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

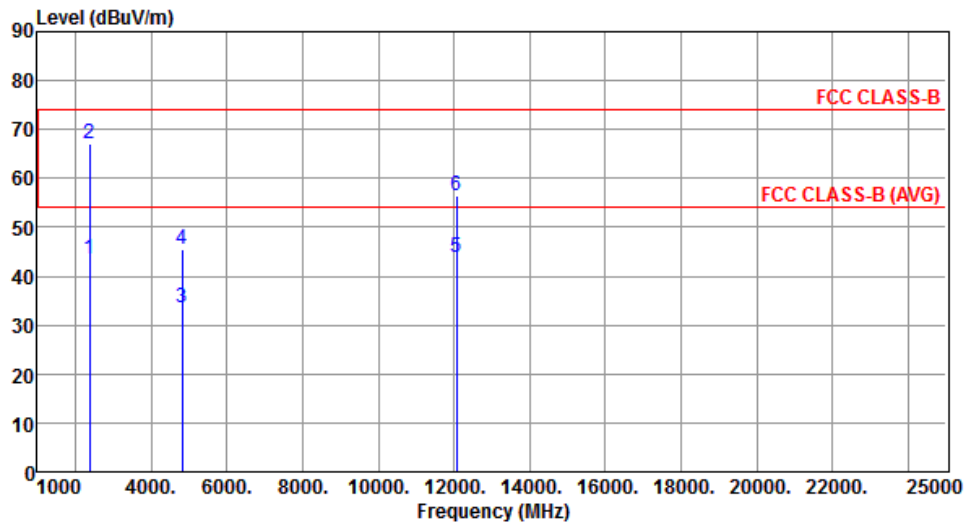
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Horizontal	Mode	Battery Mode



	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	46.99	54.00	-7.01	48.23	-1.24	Average	260	16
2	2390.00	69.50	74.00	-4.50	70.74	-1.24	Peak	260	16
3	4824.00	33.45	54.00	-20.55	27.89	5.56	Average	100	30
4	4824.00	45.71	74.00	-28.29	40.15	5.56	Peak	100	30
5	12060.00	43.94	54.00	-10.06	28.27	15.67	Average	100	60
6	12060.00	56.36	74.00	-17.64	40.69	15.67	Peak	100	60

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	HT20	Test Freq. (MHz)	2412
Polarization	Vertical	Mode	Battery Mode



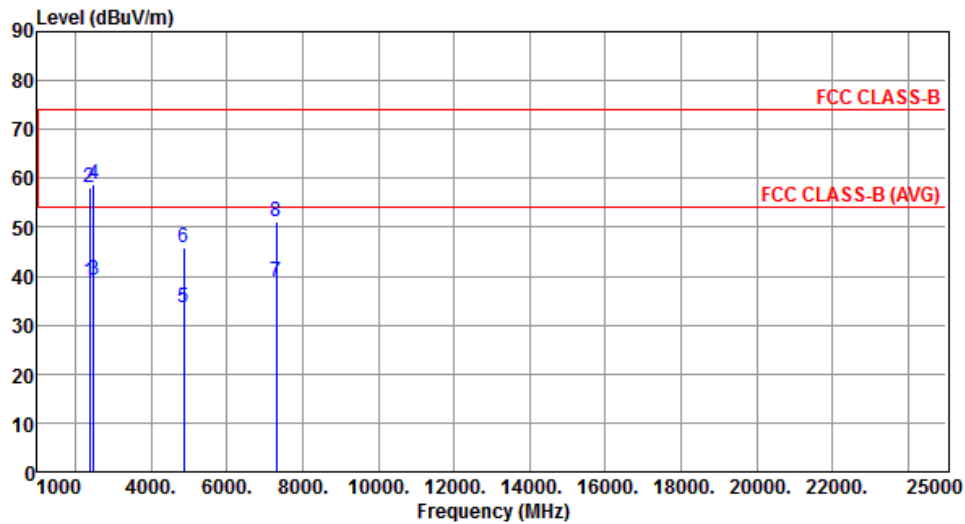
	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	43.55	54.00	-10.45	44.79	-1.24	Average	118	275
2	2390.00	67.07	74.00	-6.93	68.31	-1.24	Peak	118	275
3	4824.00	33.40	54.00	-20.60	27.84	5.56	Average	100	70
4	4824.00	45.58	74.00	-28.42	40.02	5.56	Peak	100	70
5	12060.00	43.80	54.00	-10.20	28.13	15.67	Average	100	70
6	12060.00	56.34	74.00	-17.66	40.67	15.67	Peak	100	70

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	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal	Mode	Battery Mode



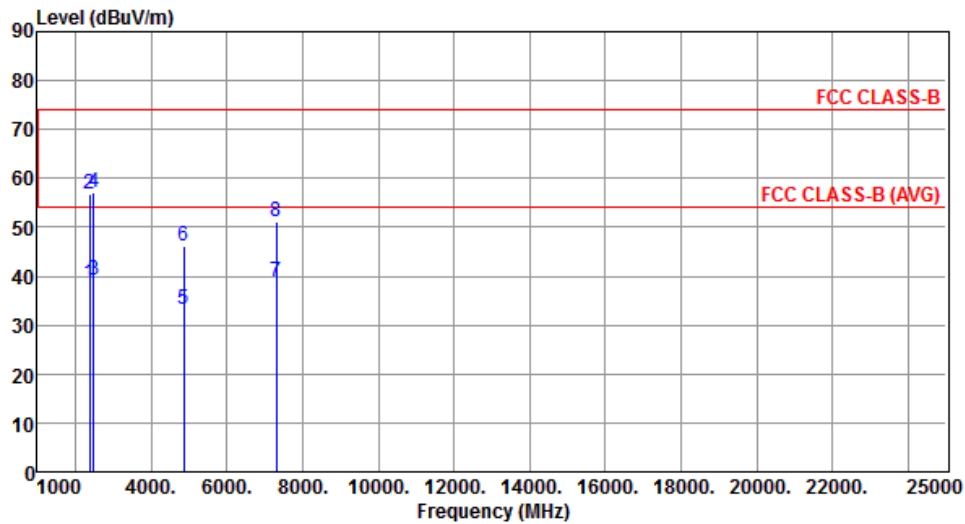
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.78	54.00	-15.22	40.02	-1.24	Average	221	18
2	2390.00	58.02	74.00	-15.98	59.26	-1.24	Peak	221	18
3	2483.50	39.10	54.00	-14.90	39.98	-0.88	Average	221	18
4	2483.50	58.89	74.00	-15.11	59.77	-0.88	Peak	221	18
5	4874.00	33.38	54.00	-20.62	27.69	5.69	Average	100	20
6	4874.00	45.82	74.00	-28.18	40.13	5.69	Peak	100	20
7	7311.00	38.82	54.00	-15.18	27.94	10.88	Average	100	30
8	7311.00	51.26	74.00	-22.74	40.38	10.88	Peak	100	30

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	HT20	Test Freq. (MHz)	2437
Polarization	Vertical	Mode	Battery Mode



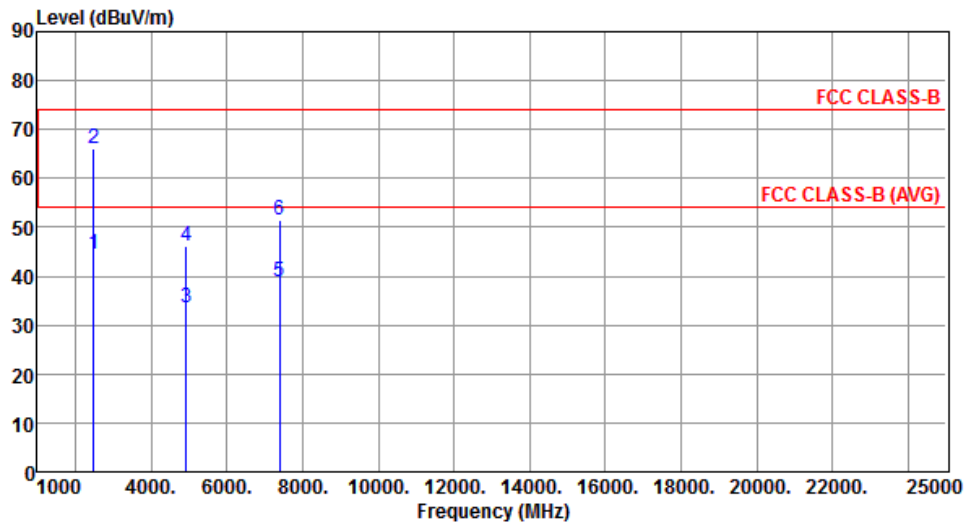
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	38.50	54.00	-15.50	39.74	-1.24	Average	100	270
2	2390.00	56.64	74.00	-17.36	57.88	-1.24	Peak	100	270
3	2483.50	39.10	54.00	-14.90	39.98	-0.88	Average	100	270
4	2483.50	57.08	74.00	-16.92	57.96	-0.88	Peak	100	270
5	4874.00	33.37	54.00	-20.63	27.68	5.69	Average	100	50
6	4874.00	46.05	74.00	-27.95	40.36	5.69	Peak	100	50
7	7311.00	38.73	54.00	-15.27	27.85	10.88	Average	100	60
8	7311.00	51.26	74.00	-22.74	40.38	10.88	Peak	100	60

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	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal	Mode	Battery Mode



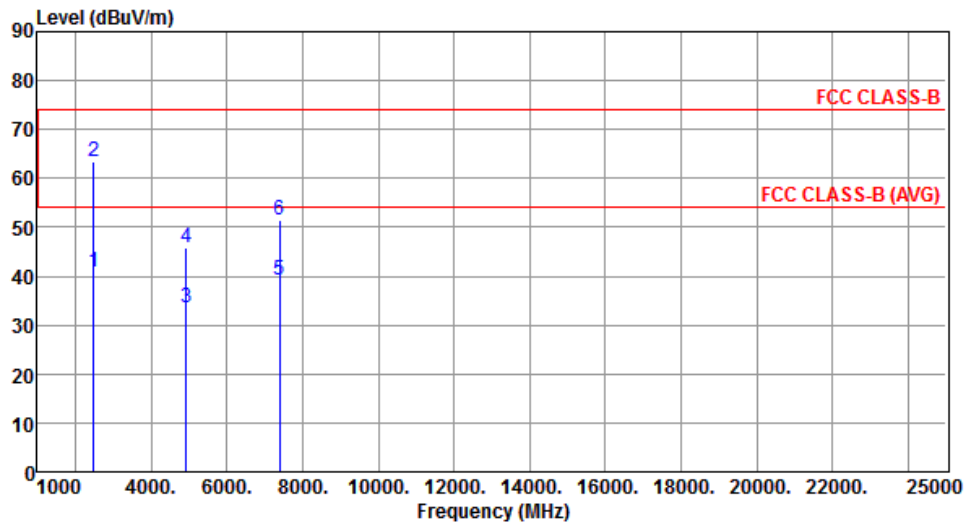
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	44.55	54.00	-9.45	45.43	-0.88	Average	251	17
2	2483.50	66.17	74.00	-7.83	67.05	-0.88	Peak	251	17
3	4924.00	33.49	54.00	-20.51	27.67	5.82	Average	100	70
4	4924.00	46.22	74.00	-27.78	40.40	5.82	Peak	100	70
5	7386.00	38.85	54.00	-15.15	27.65	11.20	Average	100	80
6	7386.00	51.52	74.00	-22.48	40.32	11.20	Peak	100	80

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	HT20	Test Freq. (MHz)	2462
Polarization	Vertical	Mode	Battery Mode



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	40.77	54.00	-13.23	41.65	-0.88	Average	100	266
2	2483.50	63.48	74.00	-10.52	64.36	-0.88	Peak	100	266
3	4924.00	33.69	54.00	-20.31	27.87	5.82	Average	100	30
4	4924.00	45.96	74.00	-28.04	40.14	5.82	Peak	100	30
5	7386.00	39.16	54.00	-14.84	27.96	11.20	Average	100	50
6	7386.00	51.58	74.00	-22.42	40.38	11.20	Peak	100	50

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).

3.6 Emissions in Non-Restricted Frequency Bands

3.6.1 Emissions in Non-Restricted Frequency Bands Limit

The peak output power measured 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

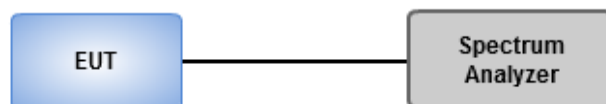
Reference level measurement

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

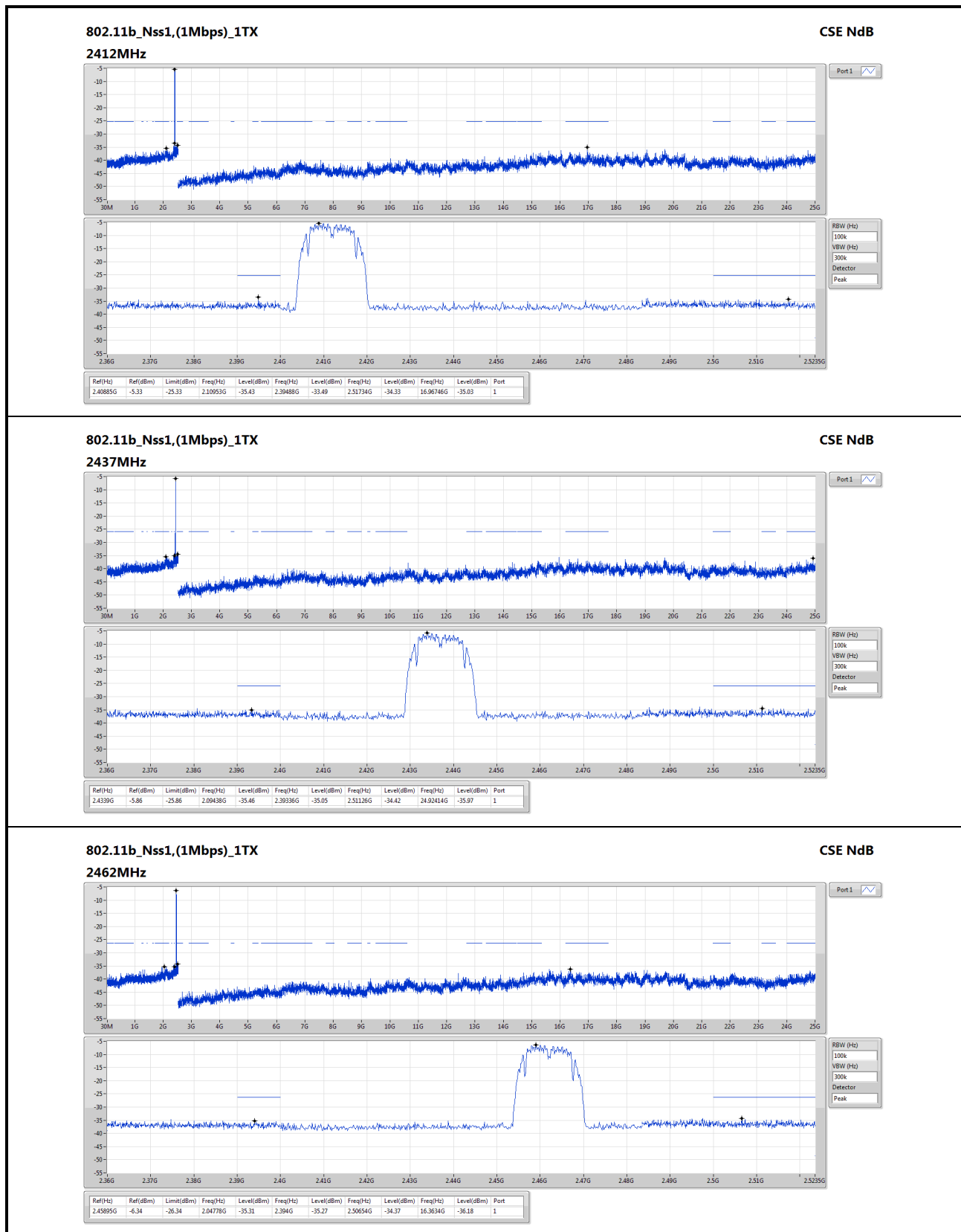
Emission level measurement

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

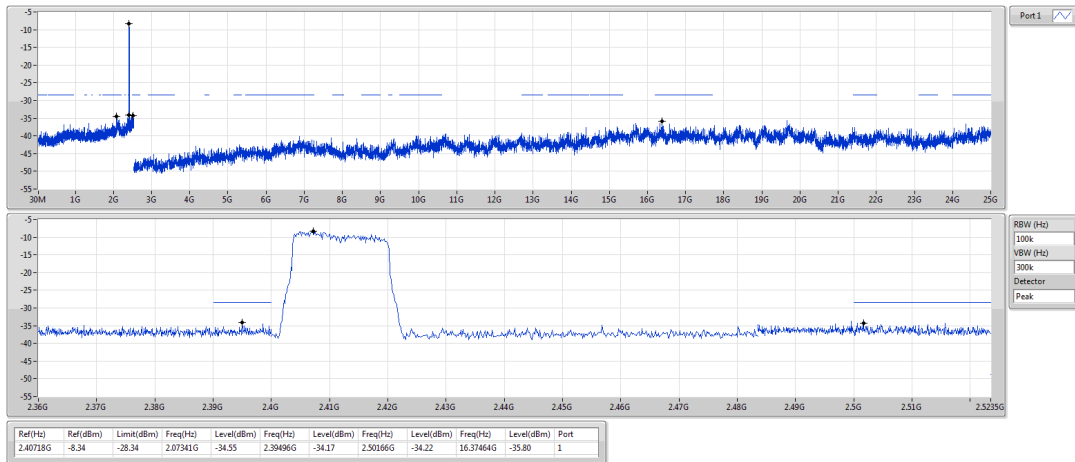


3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands



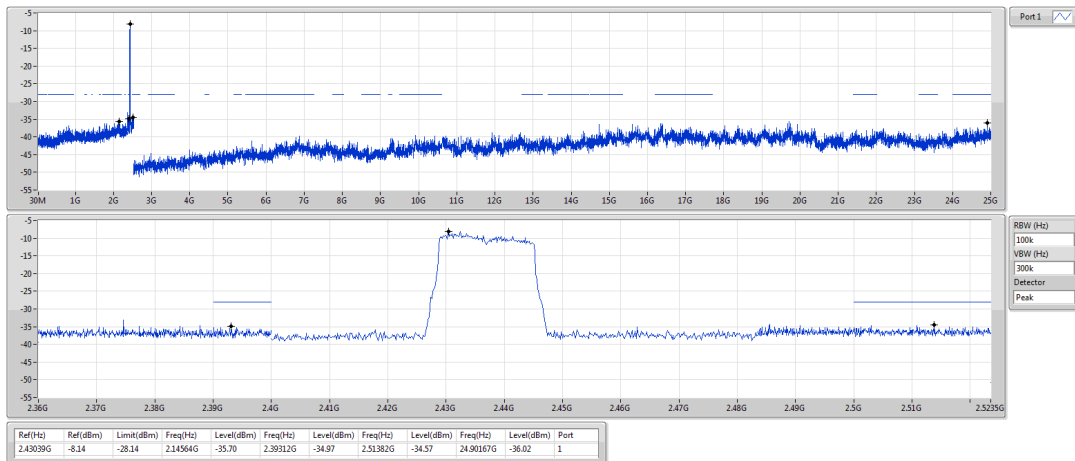
802.11g_Nss1,(6Mbps)_1TX
2412MHz

CSE NdB



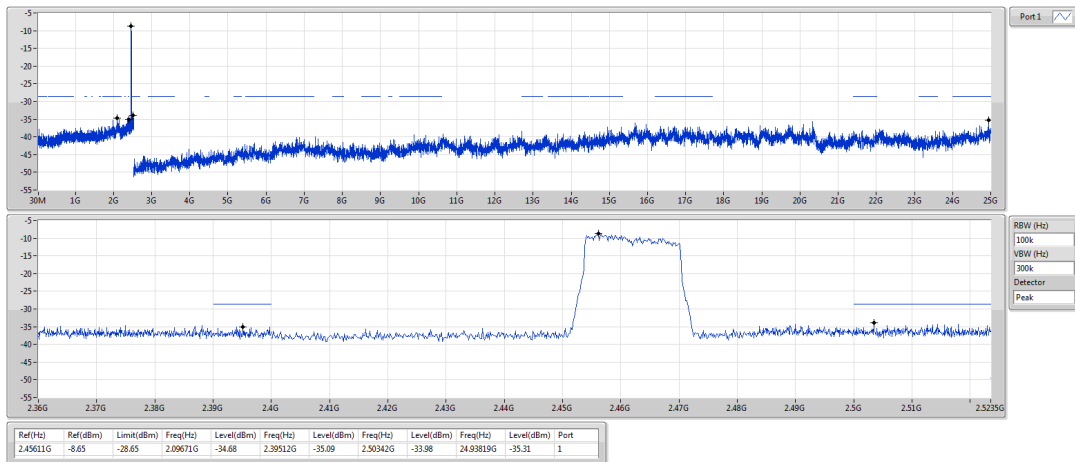
802.11g_Nss1,(6Mbps)_1TX
2437MHz

CSE NdB



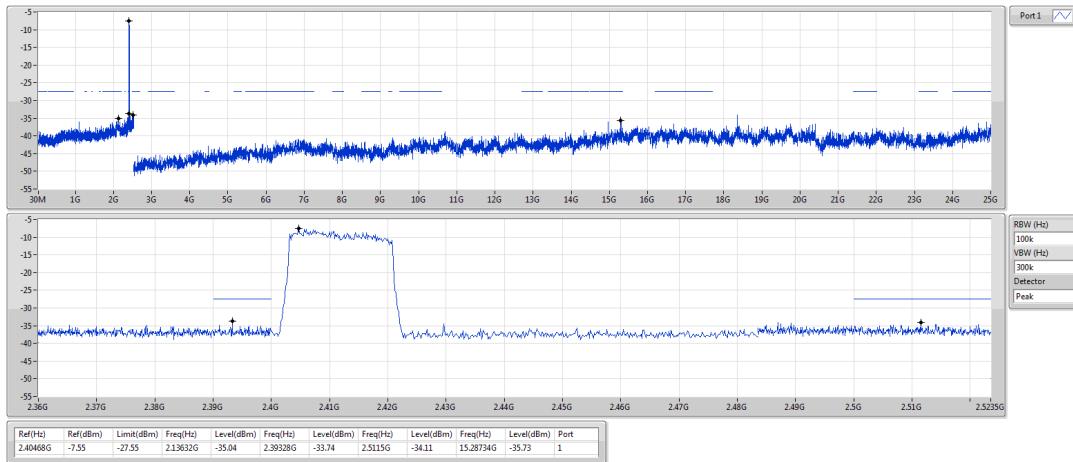
802.11g_Nss1,(6Mbps)_1TX
2462MHz

CSE NdB



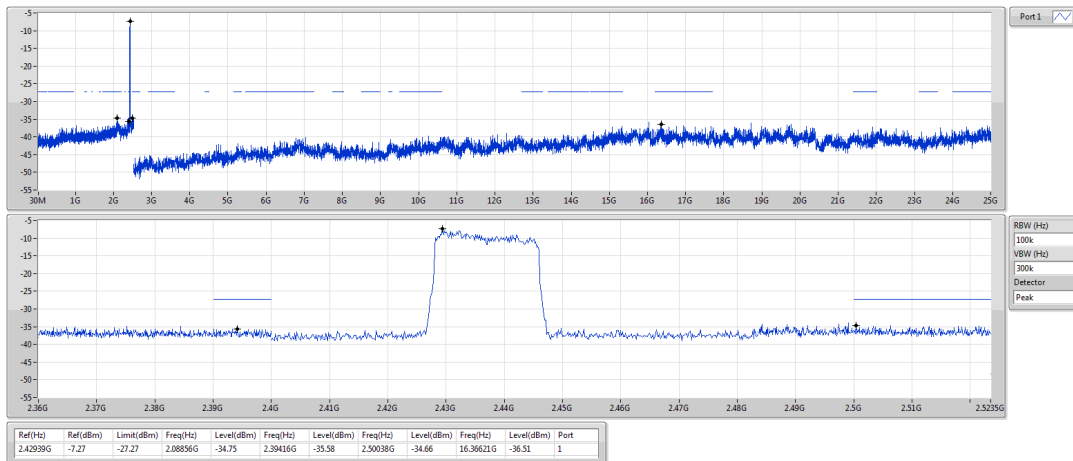
802.11n HT20_Nss1,(MCS0)_1TX
2412MHz

CSE NdB



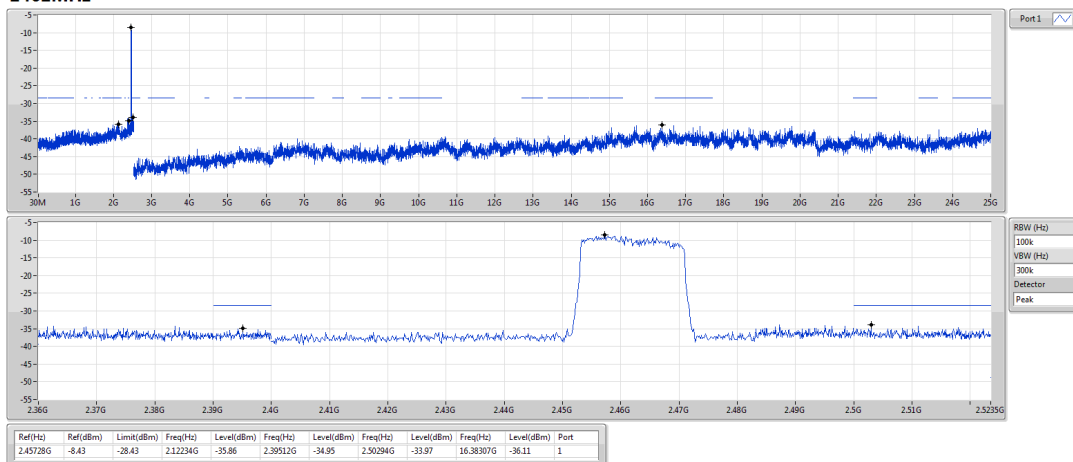
802.11n HT20_Nss1,(MCS0)_1TX
2437MHz

CSE NdB



802.11n HT20_Nss1,(MCS0)_1TX
2462MHz

CSE NdB



4 Receiver Test Results

4.1 Radiated Emissions

4.1.1 Limit of Radiated Emissions

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.

4.1.2 Test Procedures

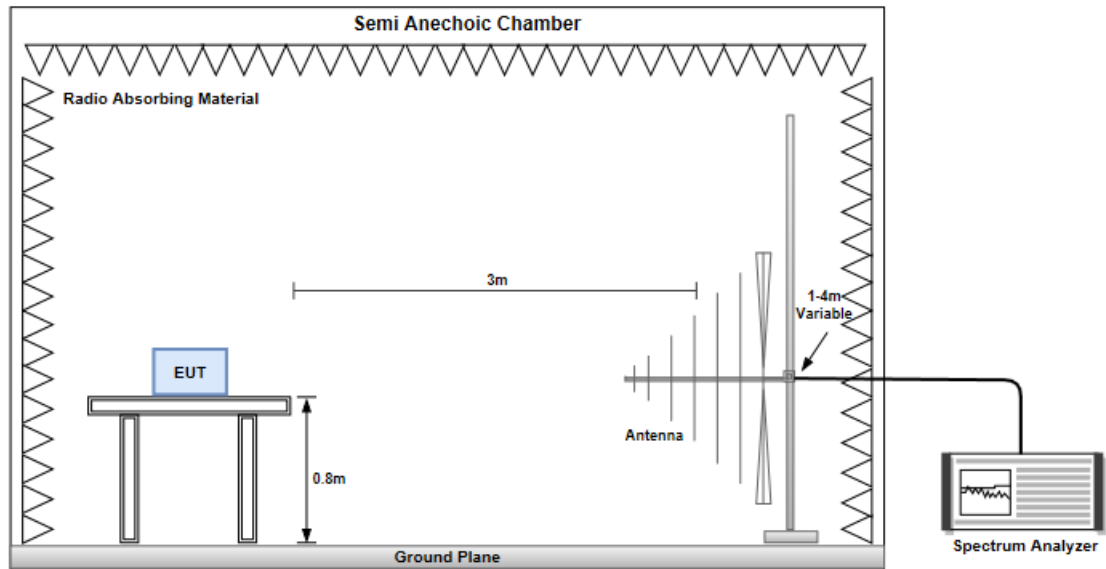
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

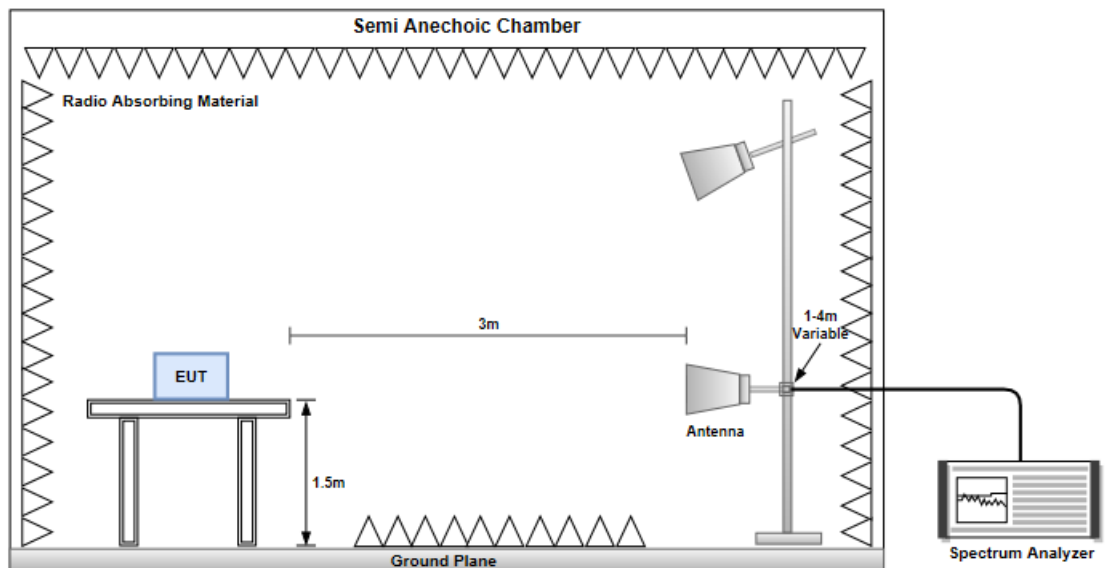
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=3MHz and RMS detector is for average measured value of radiated emission above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

4.1.3 Test Setup

Radiated Emissions below 1 GHz

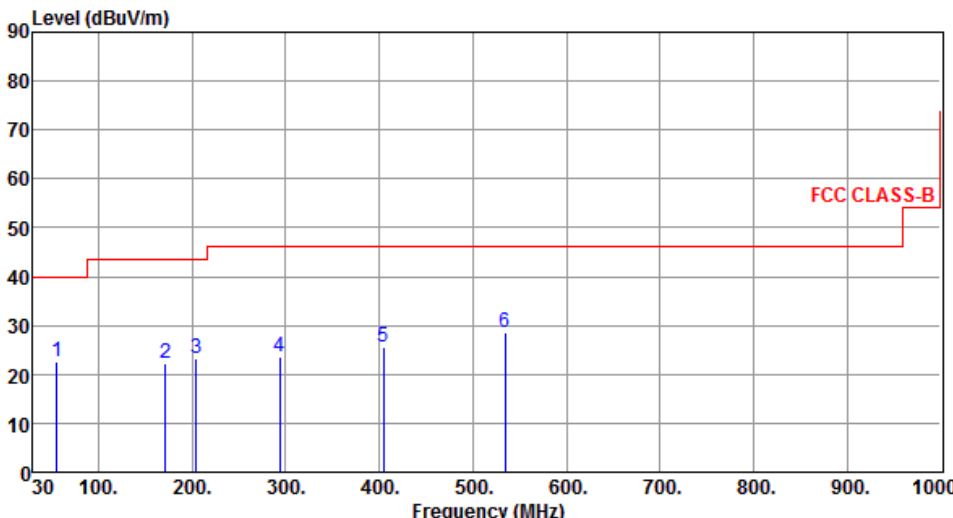


Radiated Emissions above 1 GHz



4.1.4 Receiver Emissions (Below 1GHz)

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	55.31	22.49	40.00	-17.51	30.79	-8.30	Peak	---	---
2	171.62	22.28	43.50	-21.22	30.98	-8.70	Peak	---	---
3	204.57	23.41	43.50	-20.09	34.42	-11.01	Peak	---	---
4	293.78	23.51	46.00	-22.49	31.34	-7.83	Peak	---	---
5	404.33	25.68	46.00	-20.32	30.54	-4.86	Peak	---	---
6	534.40	28.47	46.00	-17.53	30.66	-2.19	Peak	---	---

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

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		
Level (dBuV/m)			

4.1.5 Receiver Emissions (Above 1GHz)

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		
Level (dBuV/m)			

Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		
Level (dBuV/m) </			

5 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>.

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

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