NCC Test Report

Equipment	:	**WLAN/BT Module**
Model No.	:	**DHUR-SY63**
Brand Name	:	**Wistron NeWeb Corporation**
Applicant	:	台灣索尼股份有限公司
Address	:	臺北市中山區長春路 **145** 號 **5** 樓
Standard	:	**LP0002 Section 3.10.1 (2018-01-10)**
Received Date	:	**May 13, 2019**
Tested Date	:	**May 17 ~ Jun. 28, 2019**

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: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Testing Laboratory 2732

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Release Record

Report No.	Version	Description	Issued Date
TR950701AC	Rev. 01	Initial issue	Jul. 22, 2019

Summary of Test Results

NCC Rules	Test Items	Measured	Result
2.3	Conducted Emissions	[dBuV]: 0.156MHz 53.60 (Margin -12.09dB) - QP	Pass
3.10.1.5 2.8	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz 52.60 (Margin -1.40dB) - AV	Pass
3.10.1.2(1)(C)	Maximum Output Power	Max Power [dBm]: 28.13	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 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
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

Model	Type	Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)				
			2412-2472	**5150~5250**	**5250~5350**	**5500~5700**	**5725~5850**
Wi-Fi ANT-0	Printed	No	1.58	2.43	3.4	4.35	4.26
Wi-Fi ANT-1	Printed	No	1.55	2.58	2.55	2.51	2.65

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host

1.1.4 Accessories

N/A

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	MT7663 QA, v0.0.2.6		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	11b	100.00%	0.00
	11g	98.39%	0.07
	HT20	99.00%	0.04

1.1.7 Power Index of Test Tool

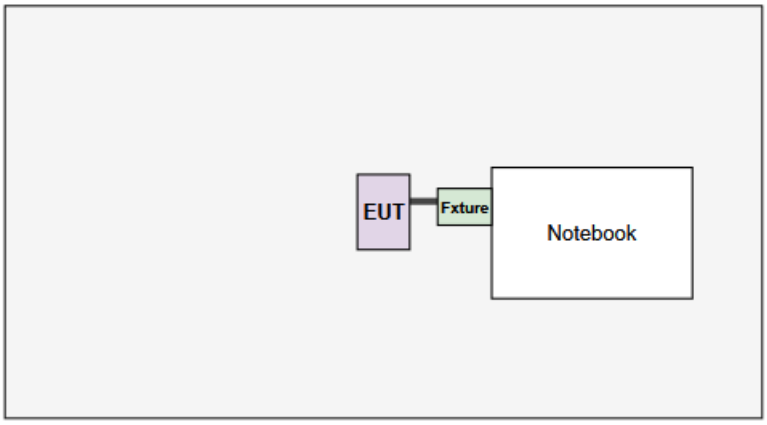
Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	25
11b	2437	26
11b	2462	25
11g	2412	20
11g	2437	21
11g	2462	20
HT20	2412	21
HT20	2437	23
HT20	2462	21

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E5470	DoC	---
2	Fixture	---	---	---	Provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram



1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Jan. 08, 2019	Jan. 07, 2020
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 05, 2018	Nov. 04, 2019
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 23, 2018	Oct. 23, 2019
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Dec. 27, 2018	Dec. 26, 2019
Receiver	R&S	ESR3	101658	Dec. 11, 2018	Dec. 10, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jul. 18, 2018	Jul. 17, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 18, 2018	Dec. 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	Oct. 08, 2018	Oct. 07, 2019
Preamplifier	EMC	EMC02325	980225	Jul. 20, 2018	Jul. 19, 2019
Preamplifier	Agilent	83017A	MY39501308	Oct. 04, 2018	Oct. 03, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019
RF Cable	EMC	EMC104-SM-SM-8000	181106	Oct. 08, 2018	Oct. 07, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 08, 2018	Oct. 07, 2019
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Oct. 08, 2018	Oct. 07, 2019
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 08, 2018	Oct. 07, 2019
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 08, 2018	Oct. 07, 2019
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Oct. 08, 2018	Oct. 07, 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)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101063	Apr. 17, 2019	Apr. 16, 2020
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	--	SENSE-15247_DTS	V5.10	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
FCC KDB 558074 D01 15.247 Meas Guidance v05r02
FCC KDB 662911 D01 Multiple Transmitter Output v02r01

1.6 Deviation from Test Standard and Measurement Procedure

None

1.7 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	±34.130 Hz
Conducted power	±0.808 dB
Power density	±0.583 dB
Conducted emission	±2.715 dB
AC conducted emission	±2.92 dB
Radiated emission ≤ 1GHz	±3.41 dB
Radiated emission > 1GHz	±4.59 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	24°C / 59%	Alex Tsai
Radiated Emissions	03CH01-WS	24-26°C / 68-69%	Akun Chung
RF Conducted	TH01-WS	22°C / 63%	Brad Wu

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

2.2 The Worst Test Modes and Channel Details

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

NOTE:

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

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Mode
Conducted Emissions	11g	2437	6 Mbps	RX
Radiated Emissions	11g	2437	6 Mbps	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 **X-plane** results were found as the worst case and were shown in this report.

3 Transmitter Test Results

3.1 Conducted Emissions

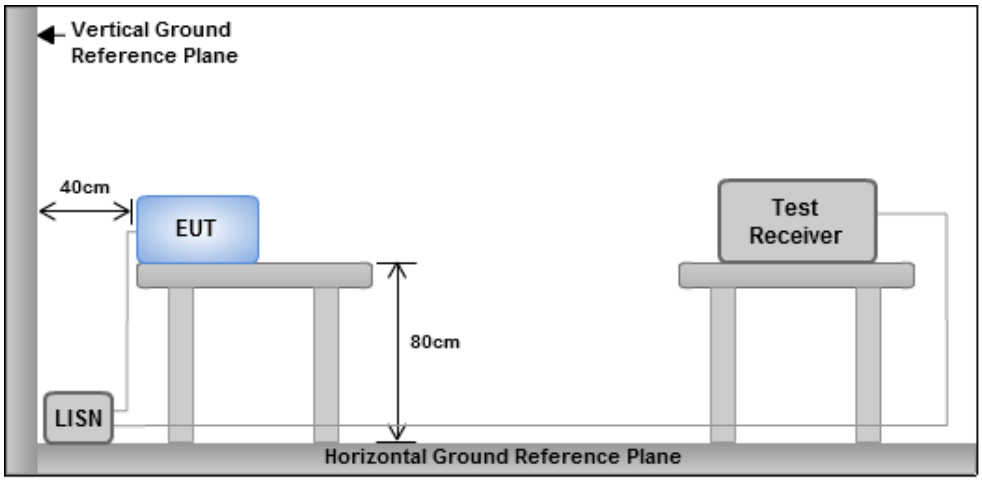
3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Test Procedures

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

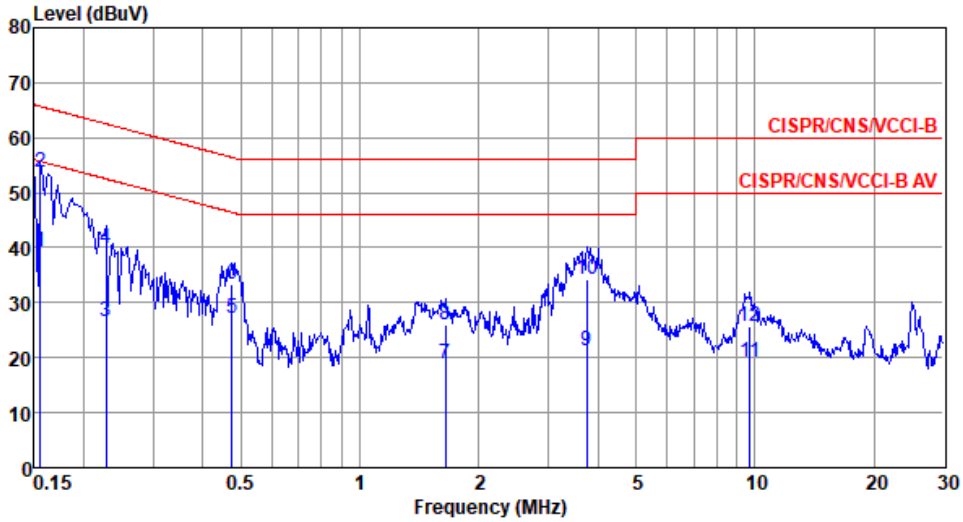
3.1.3 Test Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.1.4 Test Result of Conducted Emissions

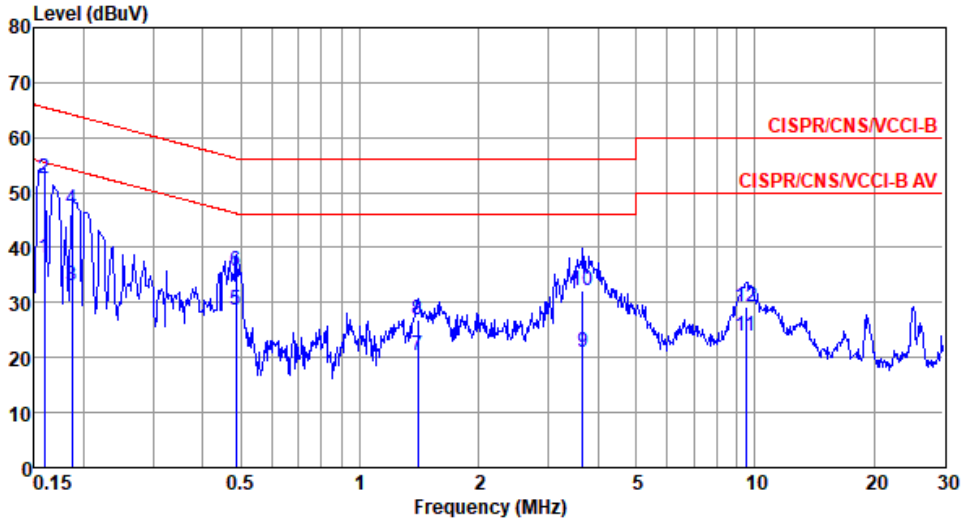
Modulation	11g	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.156	39.25	55.69	-16.44	29.67	9.53	0.05	Average
2*	0.156	53.60	65.69	-12.09	44.02	9.53	0.05	QP
3	0.228	26.55	52.52	-25.97	16.93	9.55	0.07	Average
4	0.228	39.71	62.52	-22.81	30.09	9.55	0.07	QP
5	0.474	27.27	46.45	-19.18	17.61	9.58	0.08	Average
6	0.474	33.50	56.45	-22.95	23.84	9.58	0.08	QP
7	1.645	18.94	46.00	-27.06	9.20	9.60	0.14	Average
8	1.645	25.90	56.00	-30.10	16.16	9.60	0.14	QP
9	3.759	21.40	46.00	-24.60	11.52	9.61	0.27	Average
10	3.759	34.25	56.00	-21.75	24.37	9.61	0.27	QP
11	9.705	19.31	50.00	-30.69	9.23	9.65	0.43	Average
12	9.705	25.70	60.00	-34.30	15.62	9.65	0.43	QP

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

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



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.159	38.03	55.52	-17.49	28.41	9.57	0.05	Average
2*	0.159	52.44	65.52	-13.08	42.82	9.57	0.05	QP
3	0.186	33.03	54.20	-21.17	23.38	9.58	0.07	Average
4	0.186	46.83	64.20	-17.37	37.18	9.58	0.07	QP
5	0.486	28.76	46.23	-17.47	19.06	9.62	0.08	Average
6	0.486	35.77	56.23	-20.46	26.07	9.62	0.08	QP
7	1.403	20.32	46.00	-25.68	10.55	9.64	0.13	Average
8	1.403	26.86	56.00	-29.14	17.09	9.64	0.13	QP
9	3.661	21.01	46.00	-24.99	11.09	9.66	0.26	Average
10	3.661	32.22	56.00	-23.78	22.30	9.66	0.26	QP
11	9.502	24.02	50.00	-25.98	13.88	9.71	0.43	Average
12	9.502	29.17	60.00	-30.83	19.03	9.71	0.43	QP

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

3.2 6dB and Occupied Bandwidth

3.2.1 Limit of 6dB Bandwidth

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

3.2.2 Test Procedures

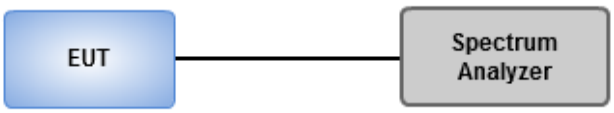
6dB Bandwidth

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

Occupied Bandwidth

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

3.2.3 Test Setup



3.2.4 Test Result of 6dB and Occupied Bandwidth

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	9.13M	14.11M	14M1G1D	8.623M	13.821M
802.11g_Nss1,(6Mbps)_2TX	15.29M	16.498M	16M5D1D	13.478M	16.353M
802.11n HT20_Nss1,(MCS0)_2TX	17.536M	17.583M	17M6D1D	14.42M	17.511M

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;

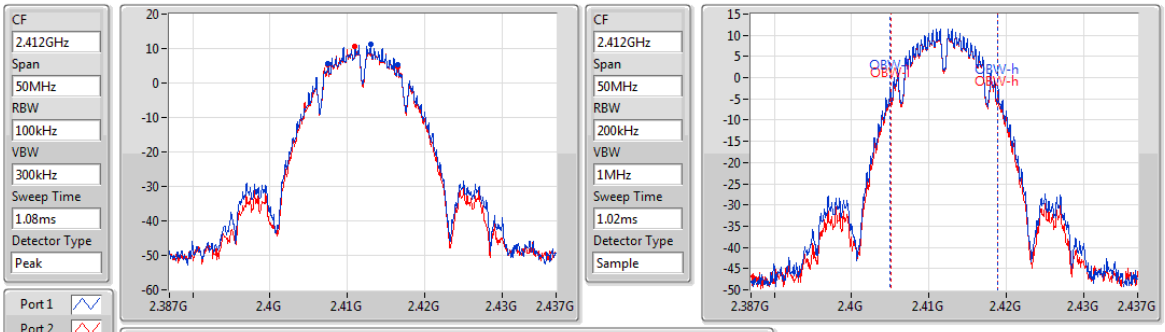
Result

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	9.058M	13.965M	9.058M	13.821M
2437MHz	Pass	500k	9.13M	14.11M	9.058M	13.965M
2462MHz	Pass	500k	8.623M	13.965M	8.623M	13.821M
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	15.145M	16.425M	15.072M	16.498M
2437MHz	Pass	500k	13.478M	16.498M	15.072M	16.425M
2462MHz	Pass	500k	15.29M	16.425M	15.072M	16.353M
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	500k	14.42M	17.511M	15.072M	17.583M
2437MHz	Pass	500k	17.536M	17.583M	15.29M	17.583M
2462MHz	Pass	500k	15.362M	17.583M	15.652M	17.583M

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

802.11b_Nss1,(1Mbps)_2TX EBW

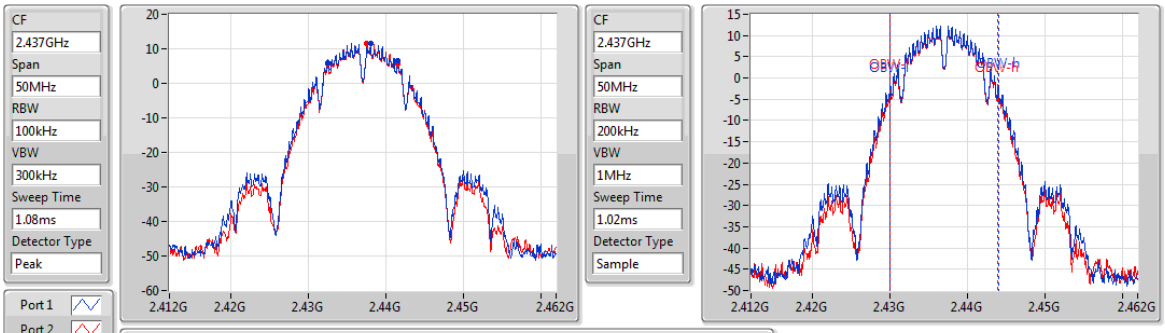
2412MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
9.058M	2.407507G	2.416565G	13.965M	2.404981G	2.418946G	500k	1
9.058M	2.407507G	2.416565G	13.821M	2.405054G	2.418874G	500k	2

802.11b_Nss1,(1Mbps)_2TX EBW

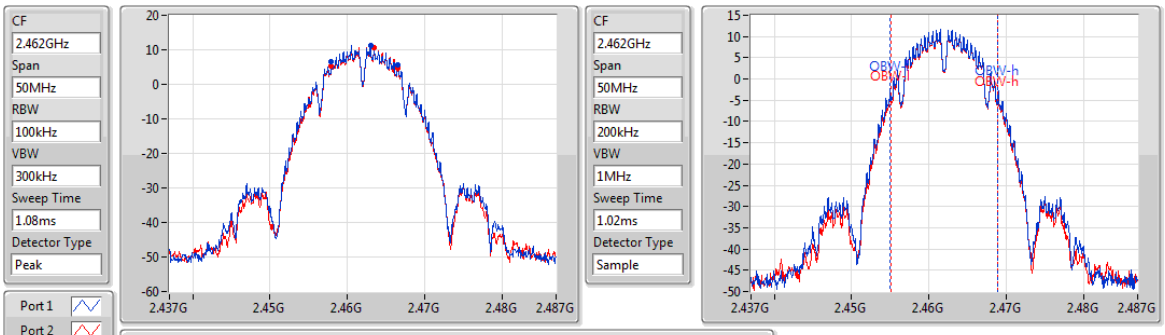
2437MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
9.13M	2.432435G	2.441565G	14.11M	2.429909G	2.444019G	500k	1
9.058M	2.432507G	2.441565G	13.965M	2.429981G	2.443946G	500k	2

802.11b_Nss1,(1Mbps)_2TX EBW

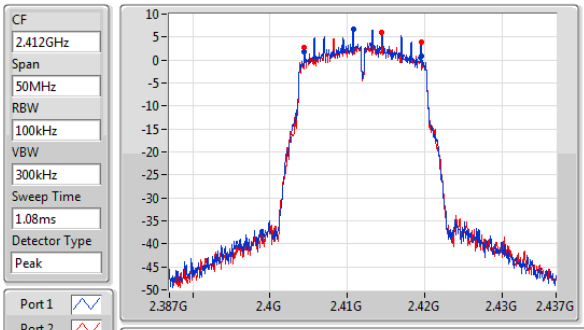
2462MHz

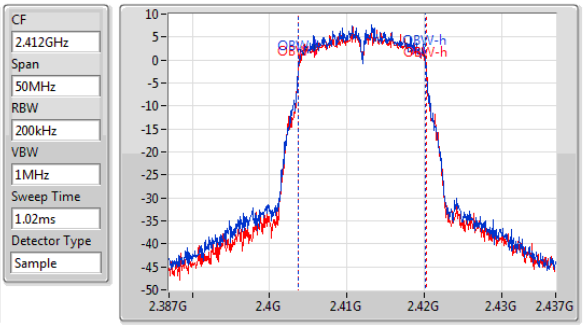


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
8.623M	2.457942G	2.466565G	13.965M	2.454981G	2.468946G	500k	1
8.623M	2.457942G	2.466565G	13.821M	2.455054G	2.468874G	500k	2

802.11g_Nss1,(6Mbps)_2TX EBW

2412MHz

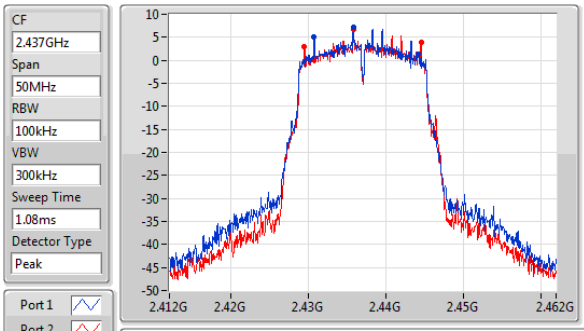


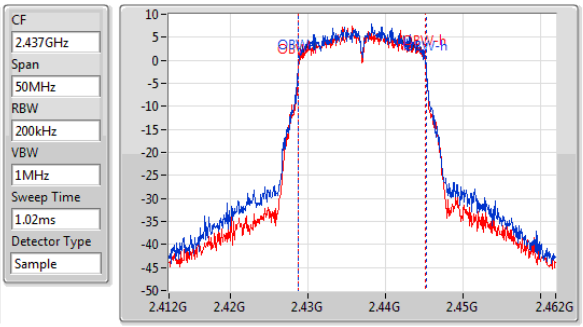


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
15.145M	2.404464G	2.419609G	16.425M	2.403751G	2.420177G	500k	1
15.072M	2.404464G	2.419536G	16.498M	2.403751G	2.420249G	500k	2

802.11g_Nss1,(6Mbps)_2TX EBW

2437MHz

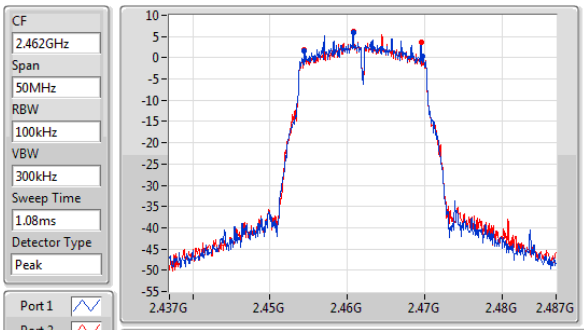


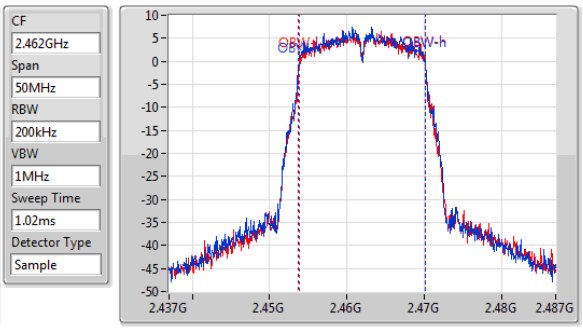


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
13.478M	2.430696G	2.444174G	16.498M	2.428751G	2.445249G	500k	1
15.072M	2.429464G	2.444536G	16.425M	2.428751G	2.445177G	500k	2

802.11g_Nss1,(6Mbps)_2TX EBW

2462MHz

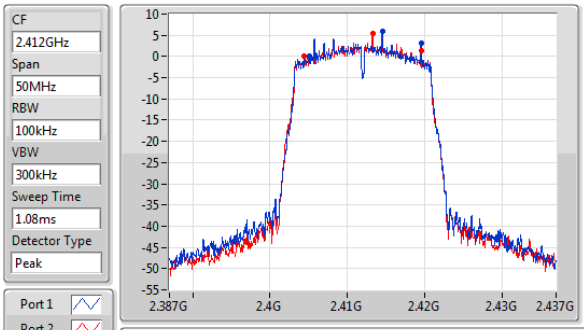


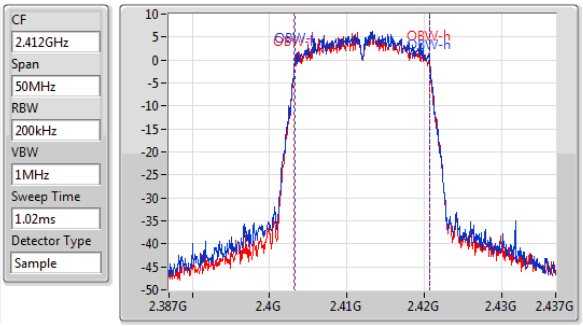


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
15.29M	2.454464G	2.469754G	16.425M	2.453751G	2.470177G	500k	1
15.072M	2.454464G	2.469536G	16.353M	2.453823G	2.470177G	500k	2

802.11n HT20_Nss1,(MCS0)_2TX EBW

2412MHz

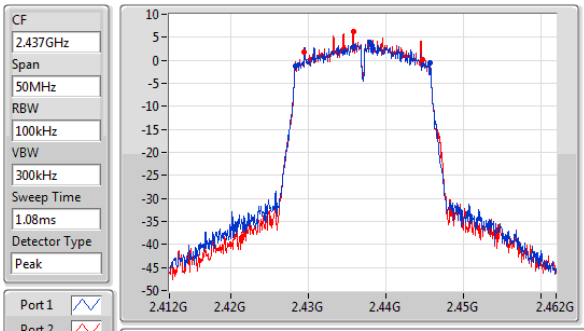


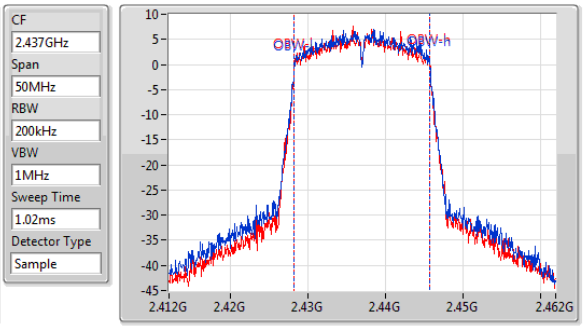


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
14.42M	2.405116G	2.419536G	17.511M	2.403245G	2.420755G	500k	1
15.072M	2.404464G	2.419536G	17.583M	2.403172G	2.420755G	500k	2

802.11n HT20_Nss1,(MCS0)_2TX EBW

2437MHz

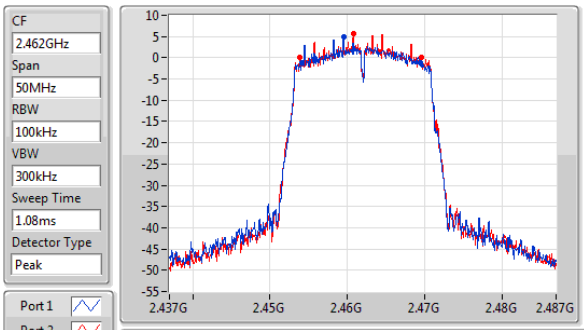


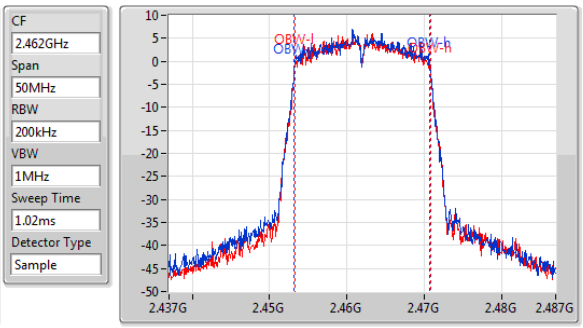


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
17.536M	2.428232G	2.445768G	17.583M	2.428172G	2.445755G	500k	1
15.29M	2.429464G	2.444754G	17.583M	2.428172G	2.445755G	500k	2

802.11n HT20_Nss1,(MCS0)_2TX EBW

2462MHz





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
15.362M	2.454101G	2.469464G	17.583M	2.453172G	2.470755G	500k	1
15.652M	2.453884G	2.469536G	17.583M	2.453245G	2.470828G	500k	2

3.3 RF Output Power

3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

Antenna gain <= 6dBi, 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

Summary of Peak Conducted Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	26.51	0.44771
802.11g_Nss1,(6Mbps)_2TX	28.13	0.65013
802.11n HT20_Nss1,(MCS0)_2TX	28.07	0.64121

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	1.58	22.95	22.82	25.90	30.00	27.48	36.00
2437MHz	Pass	1.58	23.57	23.43	26.51	30.00	28.09	36.00
2462MHz	Pass	1.58	22.90	22.76	25.84	30.00	27.42	36.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	1.58	25.05	24.85	27.96	30.00	29.54	36.00
2437MHz	Pass	1.58	25.03	25.20	28.13	30.00	29.71	36.00
2462MHz	Pass	1.58	24.98	24.81	27.91	30.00	29.49	36.00
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	1.58	24.97	24.69	27.84	30.00	29.42	36.00
2437MHz	Pass	1.58	25.01	25.11	28.07	30.00	29.65	36.00
2462MHz	Pass	1.58	24.73	24.72	27.74	30.00	29.32	36.00

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

Summary of Conducted (Average) Output Power

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
802.11b_Nss1,(1Mbps)_2TX	24.52	0.28314
802.11g_Nss1,(6Mbps)_2TX	21.29	0.13459
802.11n HT20_Nss1,(MCS0)_2TX	21.17	0.13092

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	1.58	20.91	20.72	23.83	-	25.41	-
2437MHz	Pass	1.58	21.62	21.40	24.52	-	26.10	-
2462MHz	Pass	1.58	20.92	20.71	23.83	-	25.41	-
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	1.58	18.05	17.78	20.93	-	22.51	-
2437MHz	Pass	1.58	18.41	18.15	21.29	-	22.87	-
2462MHz	Pass	1.58	17.81	17.76	20.80	-	22.38	-
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-	-	-
2412MHz	Pass	1.58	17.47	17.25	20.37	-	21.95	-
2437MHz	Pass	1.58	18.23	18.08	21.17	-	22.75	-
2462MHz	Pass	1.58	17.25	17.06	20.17	-	21.75	-

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

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 ≥ 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.

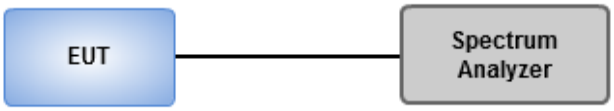
2 Set the sweep time to: ≥ 10 (number of measurement points in sweep) x (total on/off period of the transmitted signal).

3 Perform the measurement over a single sweep.

4 Use the peak marker function to determine the maximum amplitude level.

5 Add 10 log (1/x), where x is the duty cycle.

3.4.3 Test Setup



3.4.4 Test Result of Power Spectral Density

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
802.11b_Nss1,(1Mbps)_2TX	-0.11
802.11g_Nss1,(6Mbps)_2TX	-4.69
802.11n HT20_Nss1,(MCS0)_2TX	-4.97

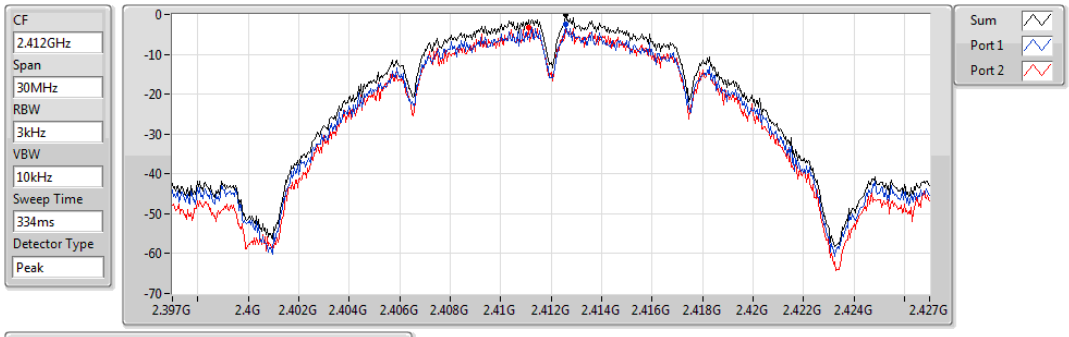
Result

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	4.58	-2.41	-3.38	-0.11	8.00
2437MHz	Pass	4.58	-2.66	-2.47	-0.29	8.00
2462MHz	Pass	4.58	-3.28	-2.95	-0.60	8.00
802.11g_Nss1,(6Mbps)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.58	-8.03	-6.79	-5.33	8.00
2437MHz	Pass	4.58	-6.70	-6.97	-4.69	8.00
2462MHz	Pass	4.58	-8.07	-7.96	-5.65	8.00
802.11n HT20_Nss1,(MCS0)_2TX	-	-	-	-	-	-
2412MHz	Pass	4.58	-7.79	-8.41	-5.96	8.00
2437MHz	Pass	4.58	-7.49	-7.12	-5.46	8.00
2462MHz	Pass	4.58	-7.22	-8.51	-4.97	8.00

DG = Directional Gain = $10 * \log((10^{1.58/20}+10^{1.55/20})^2/2)=4.58$ dBi;
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; **Port X** = Port X power density;

802.11b_Nss1,(1Mbps)_2TX **PSD**

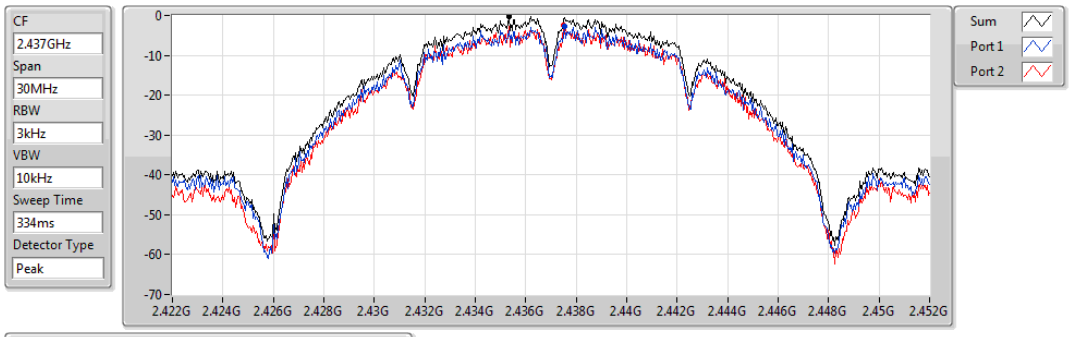
2412MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-0.11	-0.11	-2.41	-3.38

802.11b_Nss1,(1Mbps)_2TX **PSD**

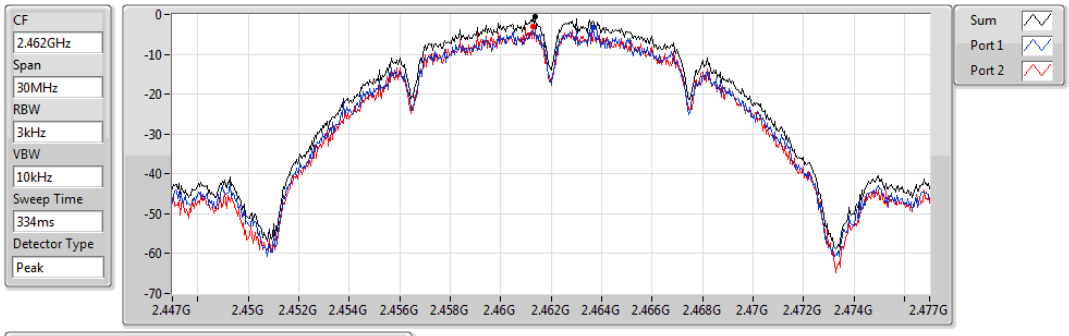
2437MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-0.29	-0.29	-2.66	-2.47

802.11b_Nss1,(1Mbps)_2TX **PSD**

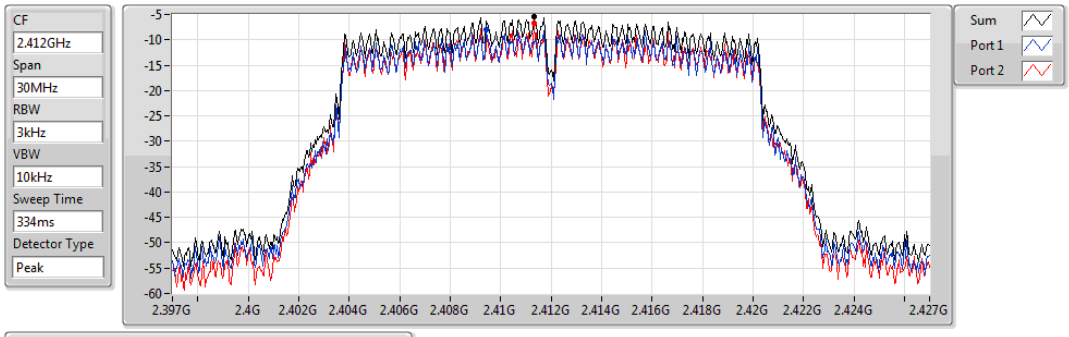
2462MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-0.60	-0.60	-3.28	-2.95

802.11g_Nss1,(6Mbps)_2TX **PSD**

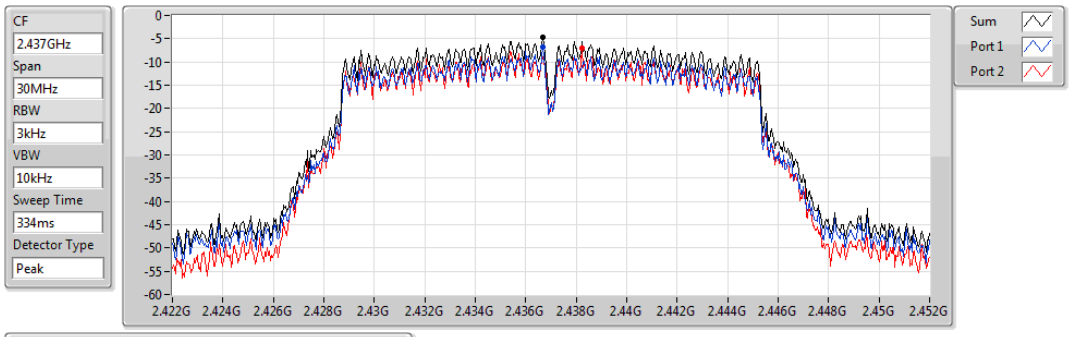
2412MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.33	-5.33	-8.03	-6.79

802.11g_Nss1,(6Mbps)_2TX **PSD**

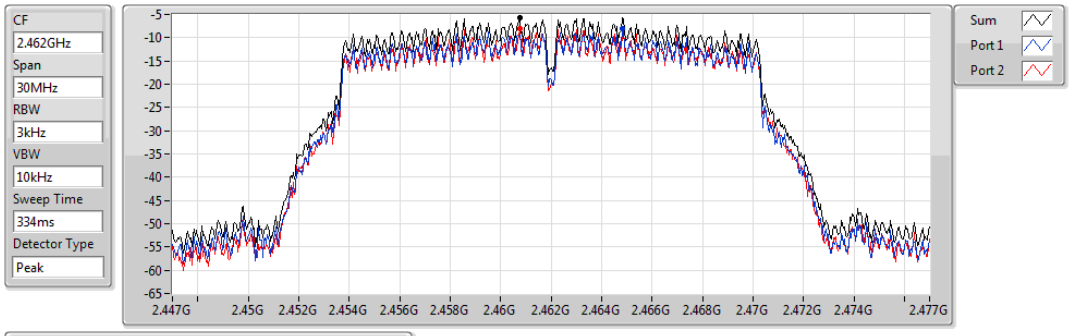
2437MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-4.69	-4.69	-6.70	-6.97

802.11g_Nss1,(6Mbps)_2TX **PSD**

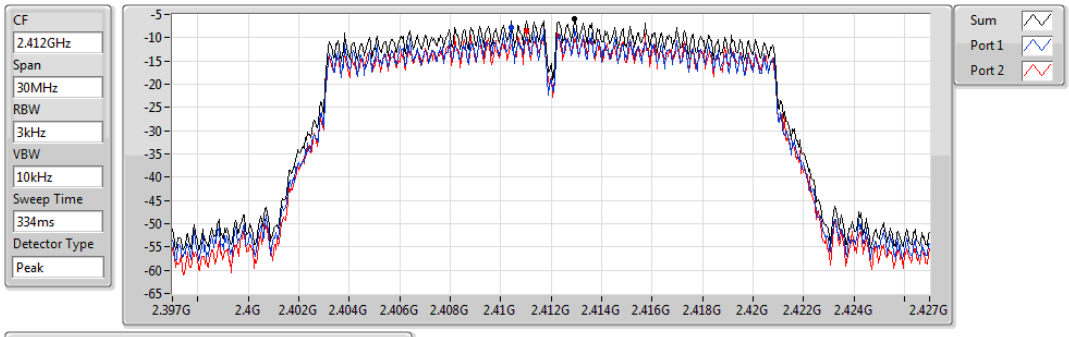
2462MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.65	-5.65	-8.07	-7.96

802.11n HT20_Nss1,(MCS0)_2TX **PSD**

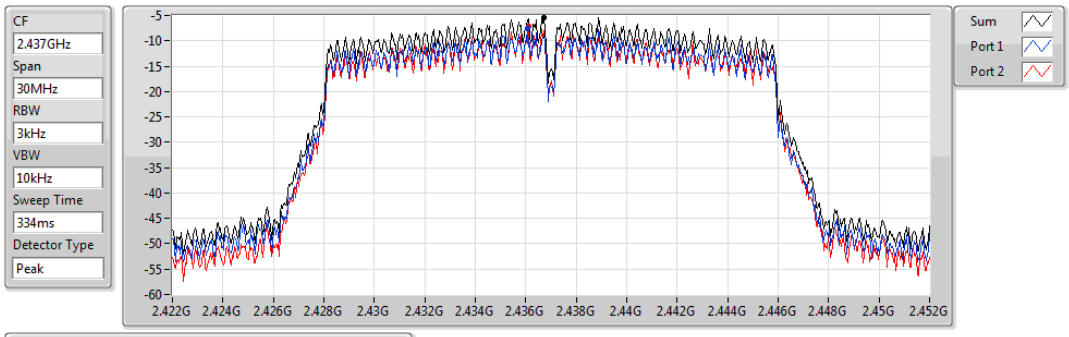
2412MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.96	-5.96	-7.79	-8.41

802.11n HT20_Nss1,(MCS0)_2TX **PSD**

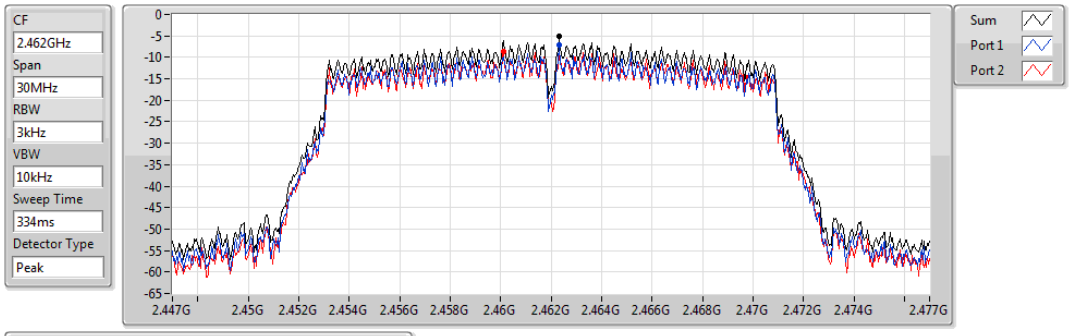
2437MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-5.46	-5.46	-7.49	-7.12

802.11n HT20_Nss1,(MCS0)_2TX **PSD**

2462MHz



Sum	PD	Port 1	Port 2
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-4.97	-4.97	-7.22	-8.51

3.5 Unwanted Emissions into Restricted Frequency Bands

3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

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

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.5.2 Test Procedures

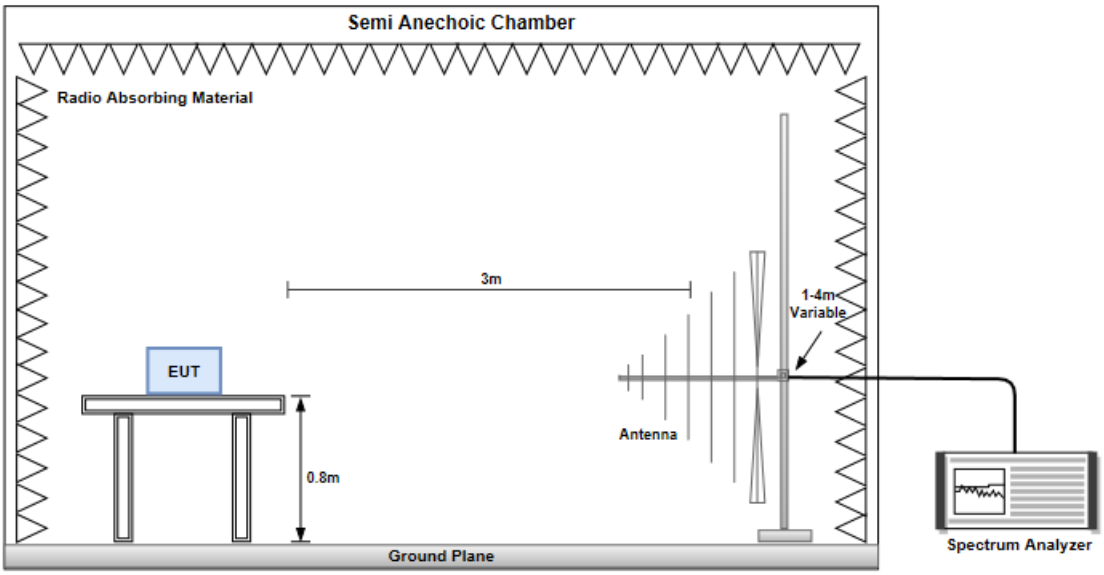
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

Note:

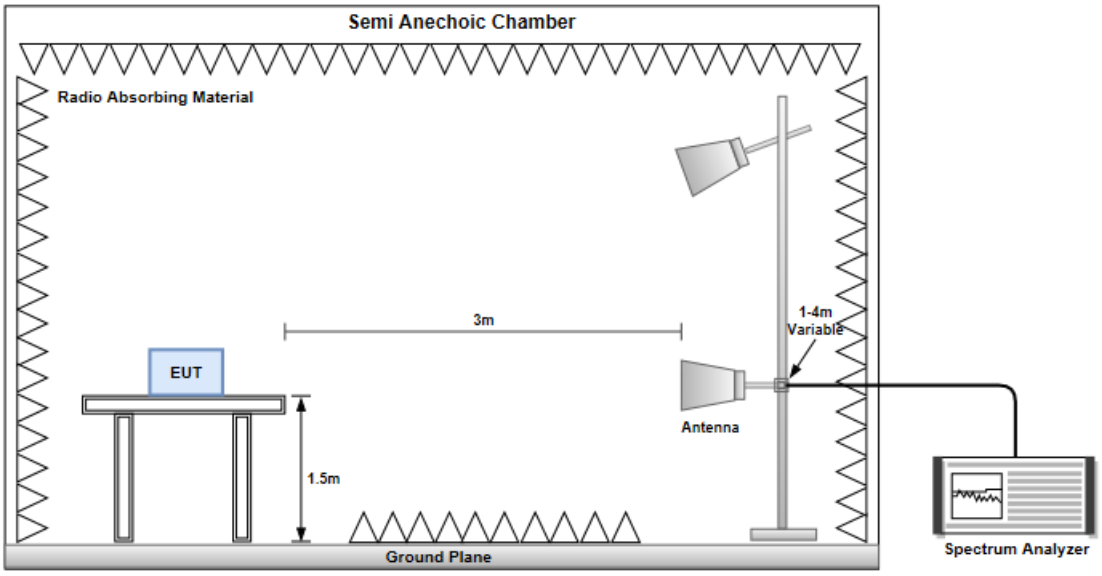
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz

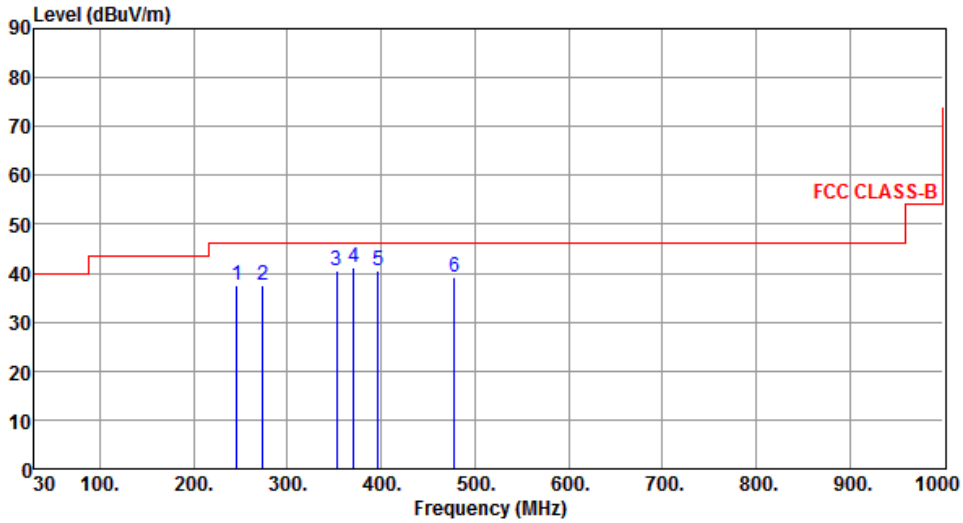


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

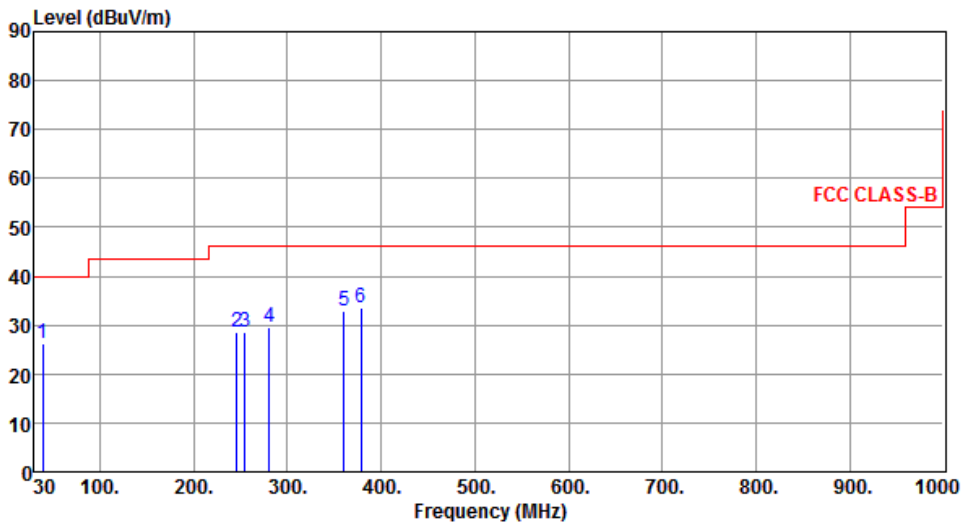
Modulation	HT20	**Test Freq. (MHz)**	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	246.31	37.41	46.00	-8.59	46.86	-9.45	Peak	---	---
2	273.47	37.54	46.00	-8.46	45.91	-8.37	Peak	---	---
3	353.01	40.55	46.00	-5.45	46.94	-6.39	Peak	---	---
4	370.47	41.34	46.00	-4.66	47.12	-5.78	Peak	---	---
5	396.66	40.55	46.00	-5.45	45.72	-5.17	Peak	---	---
6	478.14	39.33	46.00	-6.67	42.68	-3.35	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	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		

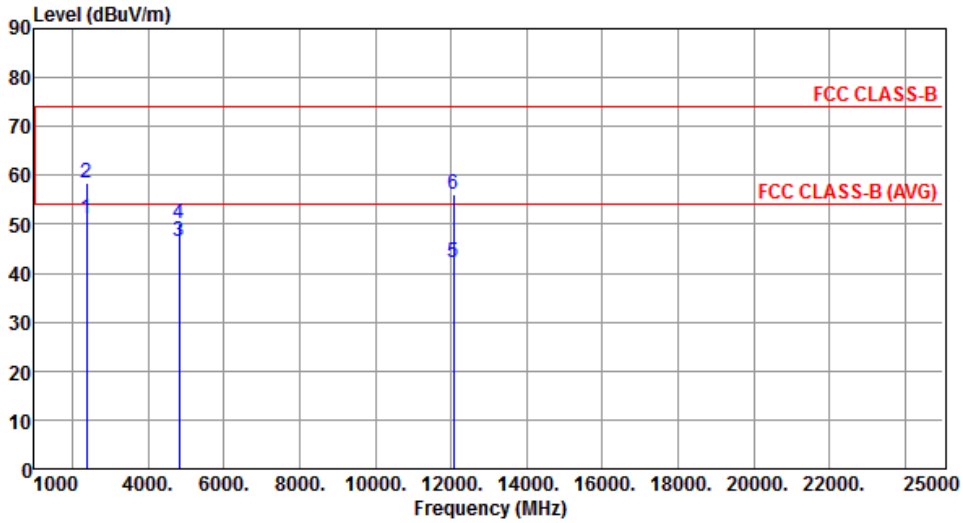


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	38.73	26.25	40.00	-13.75	34.51	-8.26	Peak	---	---
2	246.31	28.53	46.00	-17.47	37.98	-9.45	Peak	---	---
3	255.04	28.71	46.00	-17.29	37.85	-9.14	Peak	---	---
4	280.26	29.44	46.00	-16.56	37.59	-8.15	Peak	---	---
5	360.56	32.92	46.00	-13.08	39.03	-6.11	Peak	---	---
6	378.23	33.38	46.00	-12.62	38.99	-5.61	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

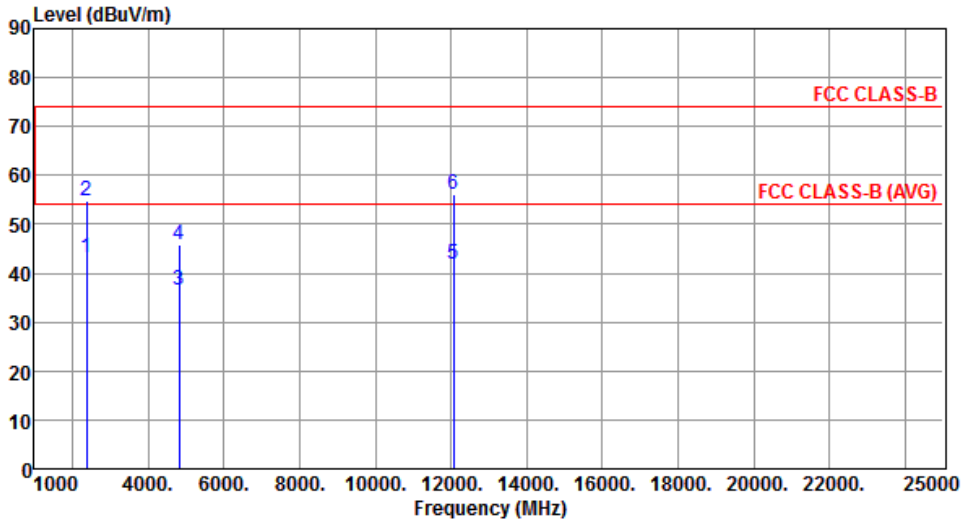
Modulation	11b	**Test Freq. (MHz)**	2412
Polarization	Horizontal		



	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	51.01	54.00	-2.99	54.08	-3.07	Average	149	85
2	2390.00	58.31	74.00	-15.69	61.38	-3.07	Peak	149	85
3	4824.00	46.38	54.00	-7.62	42.85	3.53	Average	332	110
4	4824.00	50.22	74.00	-23.78	46.69	3.53	Peak	332	110
5	12060.00	42.22	54.00	-11.78	28.95	13.27	Average	100	52
6	12060.00	56.13	74.00	-17.87	42.86	13.27	Peak	100	52

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).

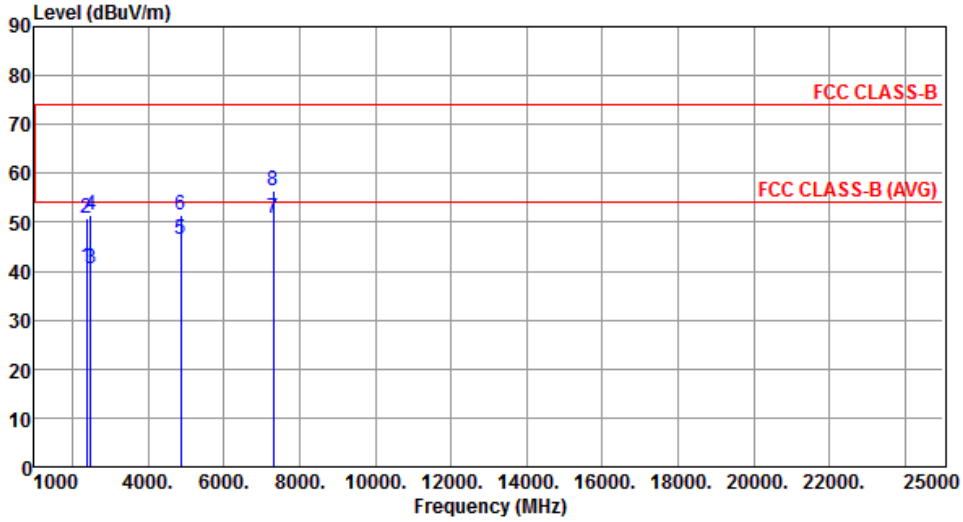
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	43.25	54.00	-10.75	46.32	-3.07	Average	362	26
2	2390.00	54.78	74.00	-19.22	57.85	-3.07	Peak	362	26
3	4824.00	36.49	54.00	-17.51	32.96	3.53	Average	100	176
4	4824.00	45.73	74.00	-28.27	42.20	3.53	Peak	100	176
5	12060.00	41.76	54.00	-12.24	28.49	13.27	Average	100	47
6	12060.00	56.12	74.00	-17.88	42.85	13.27	Peak	100	47

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).

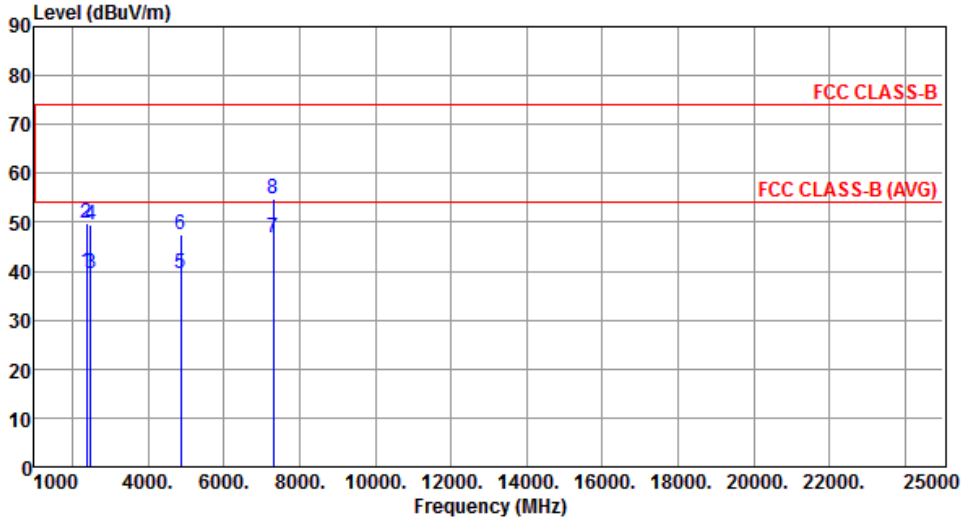
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	40.79	54.00	-13.21	43.86	-3.07	Average	217	73
2	2390.00	50.78	74.00	-23.22	53.85	-3.07	Peak	217	73
3	2483.50	40.63	54.00	-13.37	43.85	-3.22	Average	217	73
4	2483.50	51.63	74.00	-22.37	54.85	-3.22	Peak	217	73
5	4874.00	46.55	54.00	-7.45	42.95	3.60	Average	100	126
6	4874.00	51.50	74.00	-22.50	47.90	3.60	Peak	100	126
7	7311.00	50.96	54.00	-3.04	42.14	8.82	Average	210	305
8	7311.00	56.47	74.00	-17.53	47.65	8.82	Peak	210	305

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).

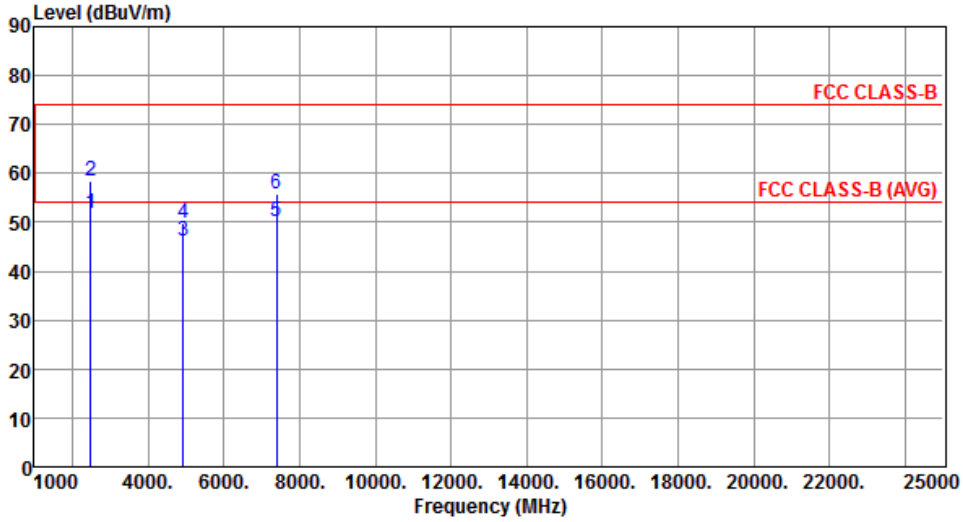
Modulation	11b	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	39.79	54.00	-14.21	42.86	-3.07	Average	390	56
2	2390.00	49.79	74.00	-24.21	52.86	-3.07	Peak	390	56
3	2483.50	39.44	54.00	-14.56	42.66	-3.22	Average	390	56
4	2483.50	49.52	74.00	-24.48	52.74	-3.22	Peak	390	56
5	4874.00	39.66	54.00	-14.34	36.06	3.60	Average	100	162
6	4874.00	47.55	74.00	-26.45	43.95	3.60	Peak	100	162
7	7311.00	46.84	54.00	-7.16	38.02	8.82	Average	338	118
8	7311.00	54.77	74.00	-19.23	45.95	8.82	Peak	338	118

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).

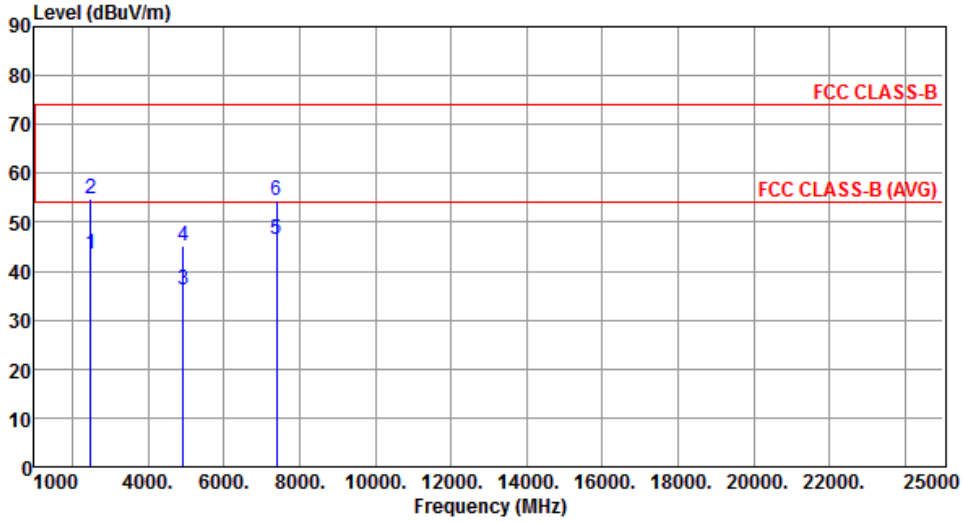
Modulation	11b	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	51.72	54.00	-2.28	54.94	-3.22	Average	100	119
2	2483.50	58.59	74.00	-15.41	61.81	-3.22	Peak	100	119
3	4924.00	46.22	54.00	-7.78	42.51	3.71	Average	330	109
4	4924.00	49.92	74.00	-24.08	46.21	3.71	Peak	330	109
5	7386.00	50.20	54.00	-3.80	41.65	8.55	Average	207	304
6	7386.00	55.87	74.00	-18.13	47.32	8.55	Peak	207	304

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		

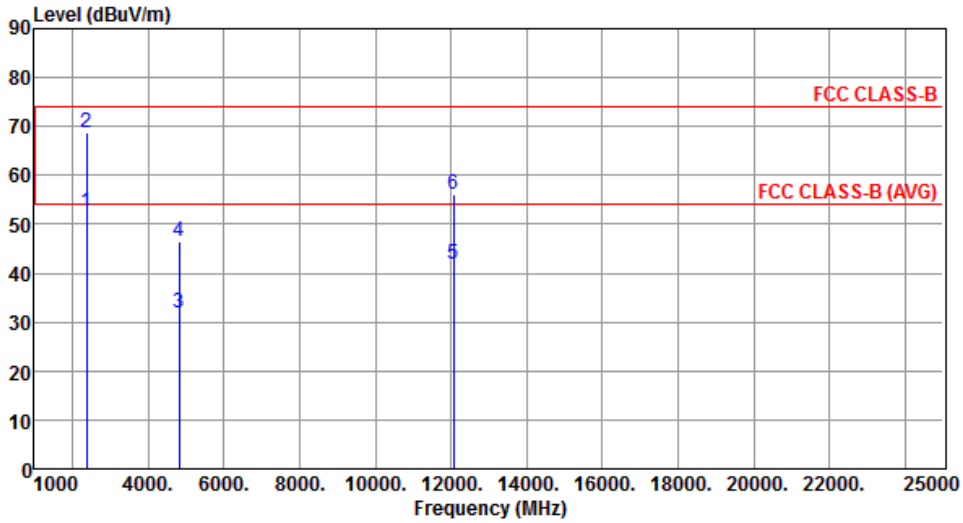


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	43.60	54.00	-10.40	46.82	-3.22	Average	366	11
2	2483.50	54.67	74.00	-19.33	57.89	-3.22	Peak	366	11
3	4924.00	36.21	54.00	-17.79	32.50	3.71	Average	100	175
4	4924.00	45.14	74.00	-28.86	41.43	3.71	Peak	100	175
5	7386.00	46.52	54.00	-7.48	37.97	8.55	Average	342	122
6	7386.00	54.33	74.00	-19.67	45.78	8.55	Peak	342	122

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

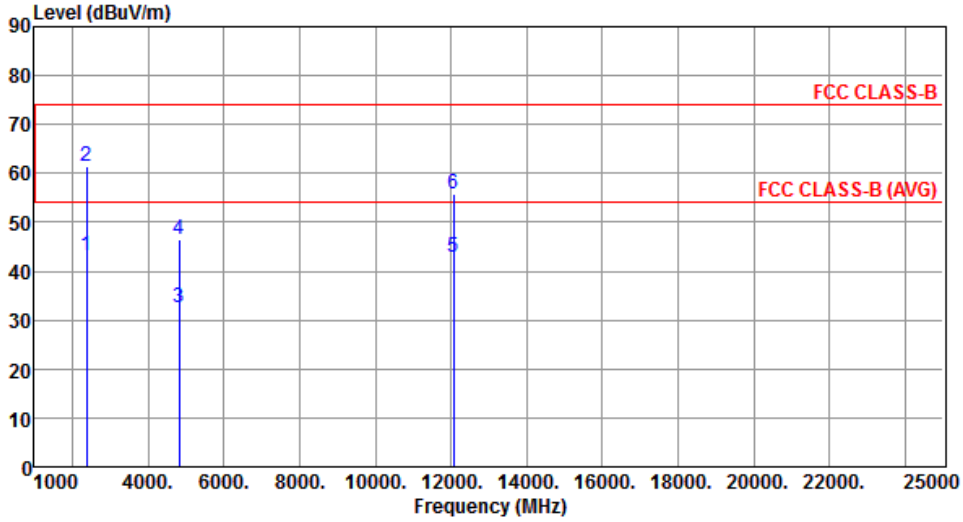
Modulation	11g	**Test Freq. (MHz)**	2412
Polarization	Horizontal		



	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	52.45	54.00	-1.55	55.52	-3.07	Average	100	111
2	2390.00	68.90	74.00	-5.10	71.97	-3.07	Peak	100	111
3	4824.00	31.84	54.00	-22.16	28.31	3.53	Average	100	100
4	4824.00	46.38	74.00	-27.62	42.85	3.53	Peak	100	100
5	12060.00	41.91	54.00	-12.09	28.64	13.27	Average	100	44
6	12060.00	56.13	74.00	-17.87	42.86	13.27	Peak	100	44

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).

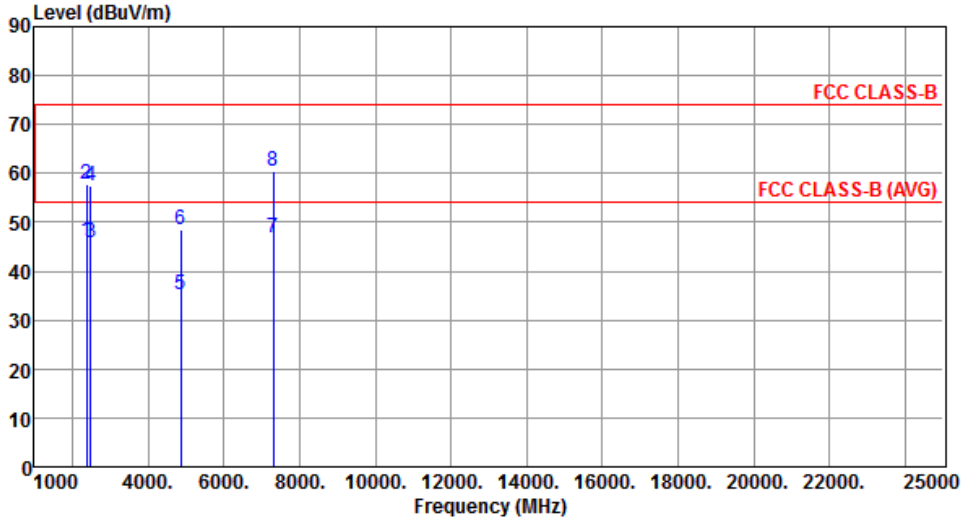
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	43.17	54.00	-10.83	46.24	-3.07	Average	334	123
2	2390.00	61.55	74.00	-12.45	64.62	-3.07	Peak	334	123
3	4824.00	32.49	54.00	-21.51	28.96	3.53	Average	100	177
4	4824.00	46.36	74.00	-27.64	42.83	3.53	Peak	100	177
5	12060.00	42.78	54.00	-11.22	29.51	13.27	Average	100	52
6	12060.00	55.90	74.00	-18.10	42.63	13.27	Peak	100	52

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).

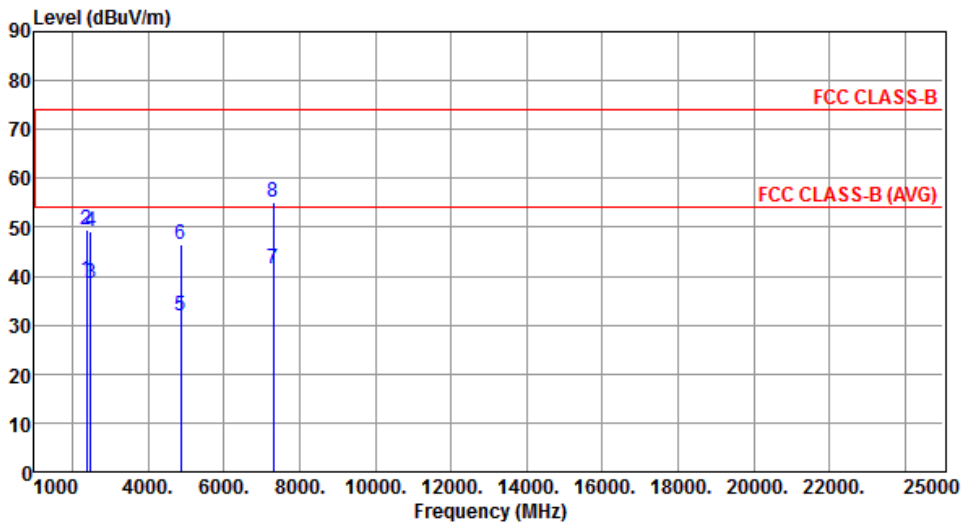
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	46.14	54.00	-7.86	49.21	-3.07	Average	208	96
2	2390.00	57.81	74.00	-16.19	60.88	-3.07	Peak	208	96
3	2483.50	45.90	54.00	-8.10	49.12	-3.22	Average	208	96
4	2483.50	57.38	74.00	-16.62	60.60	-3.22	Peak	208	96
5	4874.00	35.22	54.00	-18.78	31.62	3.60	Average	333	107
6	4874.00	48.34	74.00	-25.66	44.74	3.60	Peak	333	107
7	7311.00	46.71	54.00	-7.29	37.89	8.82	Average	212	308
8	7311.00	60.34	74.00	-13.66	51.52	8.82	Peak	212	308

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).

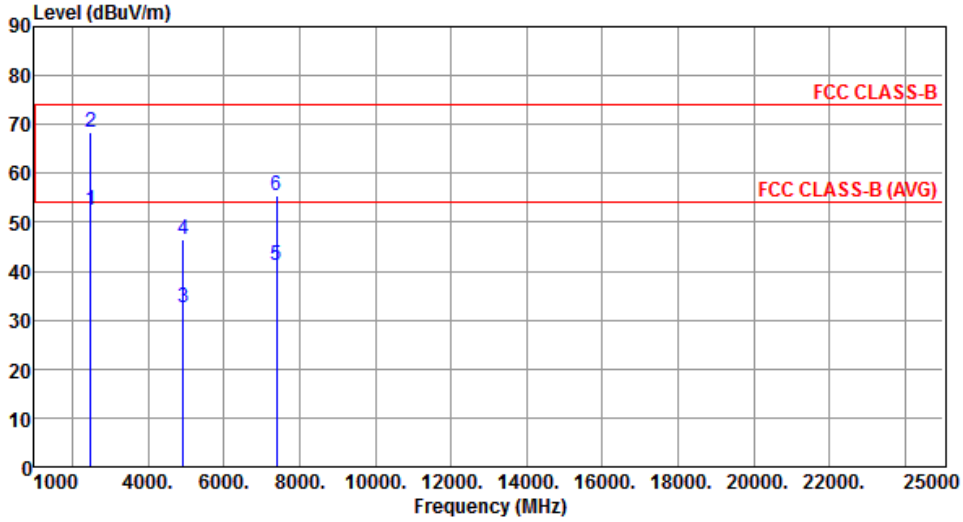
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	39.17	54.00	-14.83	42.24	-3.07	Average	331	120
2	2390.00	49.55	74.00	-24.45	52.62	-3.07	Peak	331	120
3	2483.50	38.69	54.00	-15.31	41.91	-3.22	Average	331	120
4	2483.50	49.19	74.00	-24.81	52.41	-3.22	Peak	331	120
5	4874.00	31.87	54.00	-22.13	28.27	3.60	Average	100	180
6	4874.00	46.46	74.00	-27.54	42.86	3.60	Peak	100	180
7	7311.00	41.47	54.00	-12.53	32.65	8.82	Average	330	66
8	7311.00	55.12	74.00	-18.88	46.30	8.82	Peak	330	66

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).

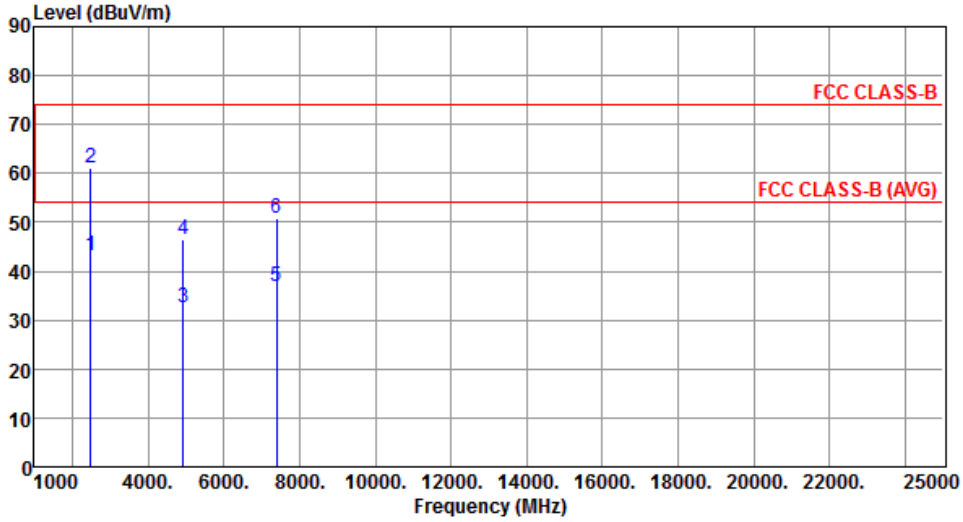
Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	52.48	54.00	-1.52	55.70	-3.22	Average	100	115
2	2483.50	68.35	74.00	-5.65	71.57	-3.22	Peak	100	115
3	4924.00	32.68	54.00	-21.32	28.97	3.71	Average	100	106
4	4924.00	46.54	74.00	-27.46	42.83	3.71	Peak	100	106
5	7386.00	41.13	54.00	-12.87	32.58	8.55	Average	204	304
6	7386.00	55.40	74.00	-18.60	46.85	8.55	Peak	204	304

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		

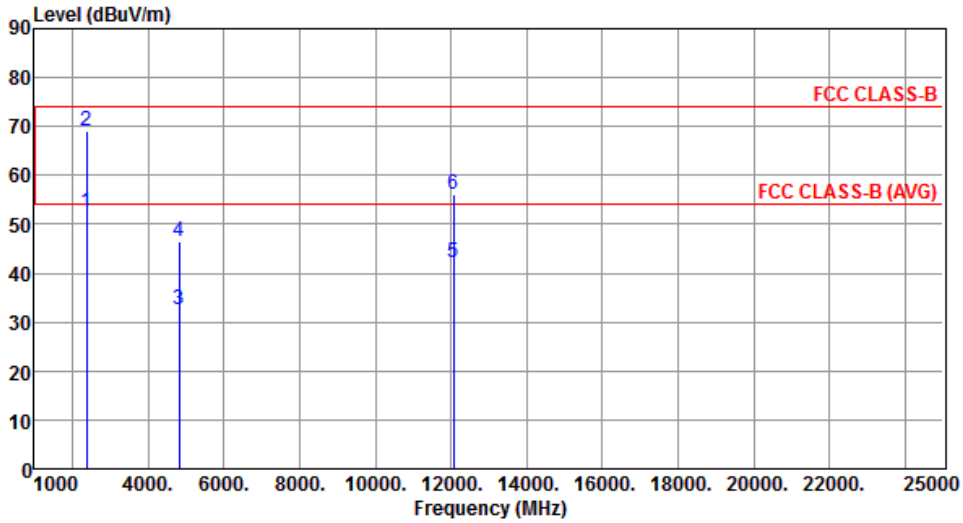


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	43.05	54.00	-10.95	46.27	-3.22	Average	331	116
2	2483.50	61.12	74.00	-12.88	64.34	-3.22	Peak	331	116
3	4924.00	32.64	54.00	-21.36	28.93	3.71	Average	100	186
4	4924.00	46.57	74.00	-27.43	42.86	3.71	Peak	100	186
5	7386.00	36.76	54.00	-17.24	28.21	8.55	Average	100	65
6	7386.00	50.72	74.00	-23.28	42.17	8.55	Peak	100	65

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

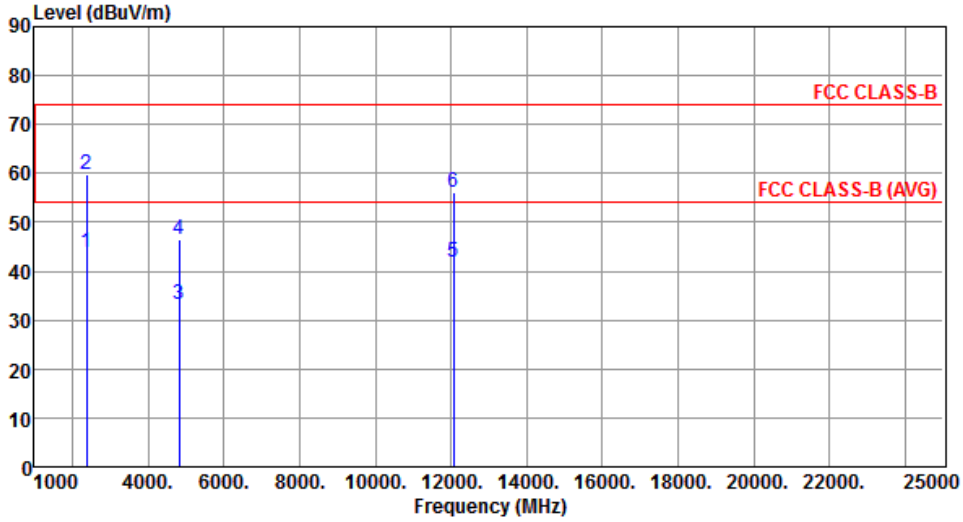
Modulation	HT20	**Test Freq. (MHz)**	2412
Polarization	Horizontal		



	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	52.51	54.00	-1.49	55.58	-3.07	Average	100	111
2	2390.00	68.94	74.00	-5.06	72.01	-3.07	Peak	100	111
3	4824.00	32.47	54.00	-21.53	28.94	3.53	Average	100	178
4	4824.00	46.38	74.00	-27.62	42.85	3.53	Peak	100	178
5	12060.00	42.20	54.00	-11.80	28.93	13.27	Average	100	42
6	12060.00	56.13	74.00	-17.87	42.86	13.27	Peak	100	42

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).

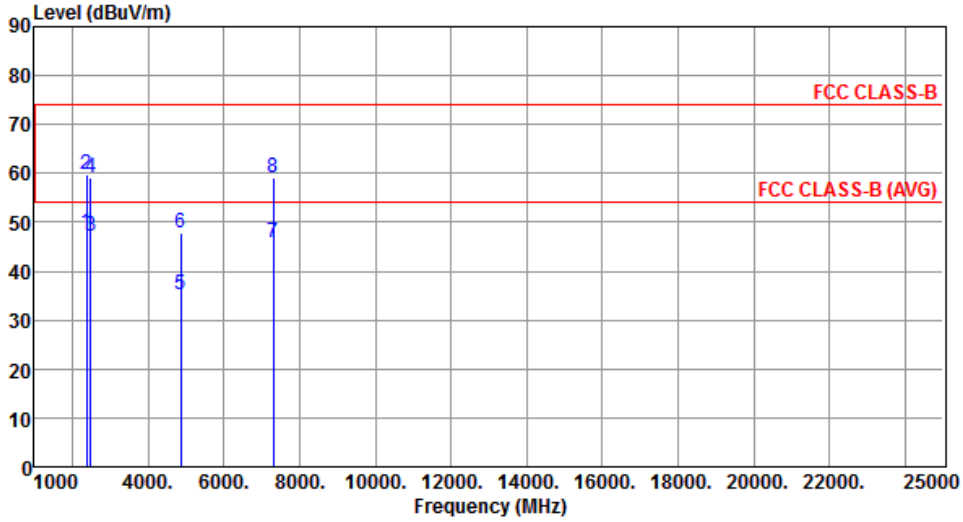
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	43.78	54.00	-10.22	46.85	-3.07	Average	345	119
2	2390.00	59.78	74.00	-14.22	62.85	-3.07	Peak	345	119
3	4824.00	33.35	54.00	-20.65	29.82	3.53	Average	100	109
4	4824.00	46.35	74.00	-27.65	42.82	3.53	Peak	100	109
5	12060.00	41.88	54.00	-12.12	28.61	13.27	Average	100	49
6	12060.00	56.09	74.00	-17.91	42.82	13.27	Peak	100	49

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).

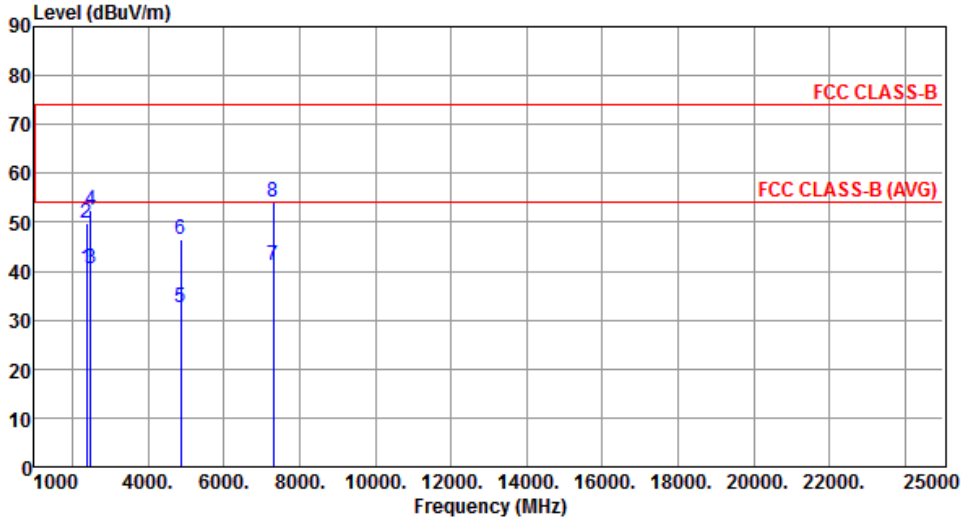
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	47.75	54.00	-6.25	50.82	-3.07	Average	100	113
2	2390.00	59.82	74.00	-14.18	62.89	-3.07	Peak	100	113
3	2483.50	47.11	54.00	-6.89	50.33	-3.22	Average	100	113
4	2483.50	58.96	74.00	-15.04	62.18	-3.22	Peak	100	113
5	4874.00	35.12	54.00	-18.88	31.52	3.60	Average	332	104
6	4874.00	47.85	74.00	-26.15	44.25	3.60	Peak	332	104
7	7311.00	45.93	54.00	-8.07	37.11	8.82	Average	207	305
8	7311.00	59.03	74.00	-14.97	50.21	8.82	Peak	207	305

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).

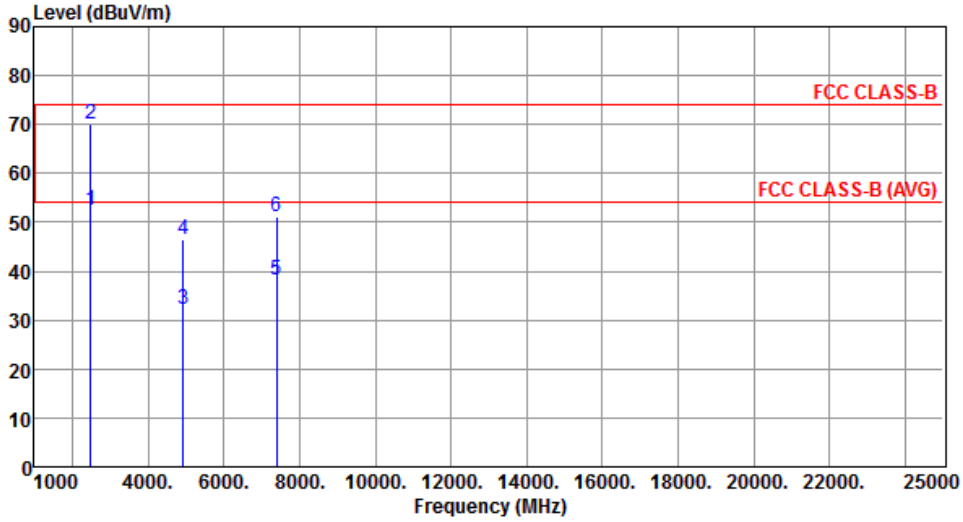
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	40.51	54.00	-13.49	43.58	-3.07	Average	335	124
2	2390.00	49.81	74.00	-24.19	52.88	-3.07	Peak	335	124
3	2483.50	40.63	54.00	-13.37	43.85	-3.22	Average	335	124
4	2483.50	52.60	74.00	-21.40	55.82	-3.22	Peak	335	124
5	4874.00	32.56	54.00	-21.44	28.96	3.60	Average	100	171
6	4874.00	46.45	74.00	-27.55	42.85	3.60	Peak	100	171
7	7311.00	41.06	54.00	-12.94	32.24	8.82	Average	321	68
8	7311.00	54.07	74.00	-19.93	45.25	8.82	Peak	321	68

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).

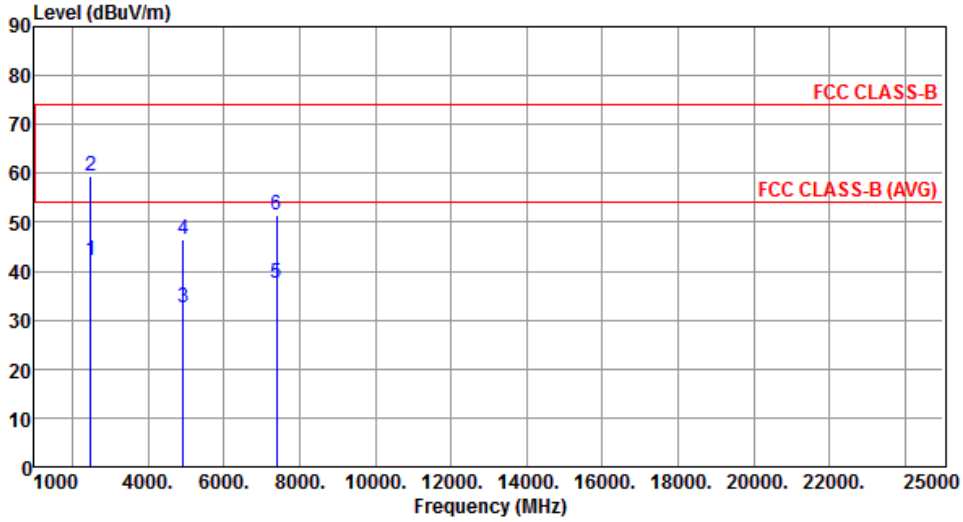
Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	52.60	54.00	-1.40	55.82	-3.22	Average	100	116
2	2483.50	70.07	74.00	-3.93	73.29	-3.22	Peak	100	116
3	4924.00	32.33	54.00	-21.67	28.62	3.71	Average	100	108
4	4924.00	46.50	74.00	-27.50	42.79	3.71	Peak	100	108
5	7386.00	38.18	54.00	-15.82	29.63	8.55	Average	100	311
6	7386.00	51.24	74.00	-22.76	42.69	8.55	Peak	100	311

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		



	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	42.02	54.00	-11.98	45.24	-3.22	Average	325	112
2	2483.50	59.47	74.00	-14.53	62.69	-3.22	Peak	325	112
3	4924.00	32.65	54.00	-21.35	28.94	3.71	Average	100	172
4	4924.00	46.54	74.00	-27.46	42.83	3.71	Peak	100	172
5	7386.00	37.47	54.00	-16.53	28.92	8.55	Average	100	62
6	7386.00	51.36	74.00	-22.64	42.81	8.55	Peak	100	62

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

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

3.6.2 Test Procedures

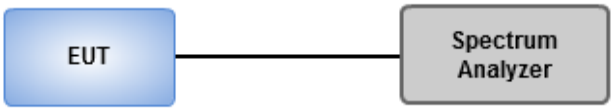
Reference level measurement

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

Emission level measurement

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

3.6.3 Test Setup



3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands

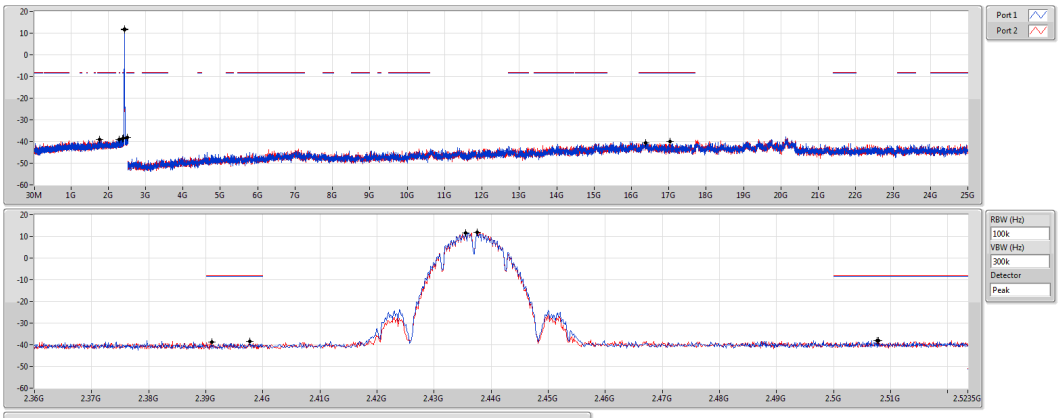
802.11b_Nss1,(1Mbps)_2TX **CSE NdB**

2412MHz

Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.41286G	11.38	-8.62	2.18059G	-38.71	2.39704G	-27.98	2.50526G	-37.59	16.32126G	-40.36	1
2.41253G	11.06	-8.94	2.14914G	-39.50	2.398G	-29.96	2.51982G	-37.46	16.32969G	-40.24	2

802.11b_Nss1,(1Mbps)_2TX **CSE NdB**

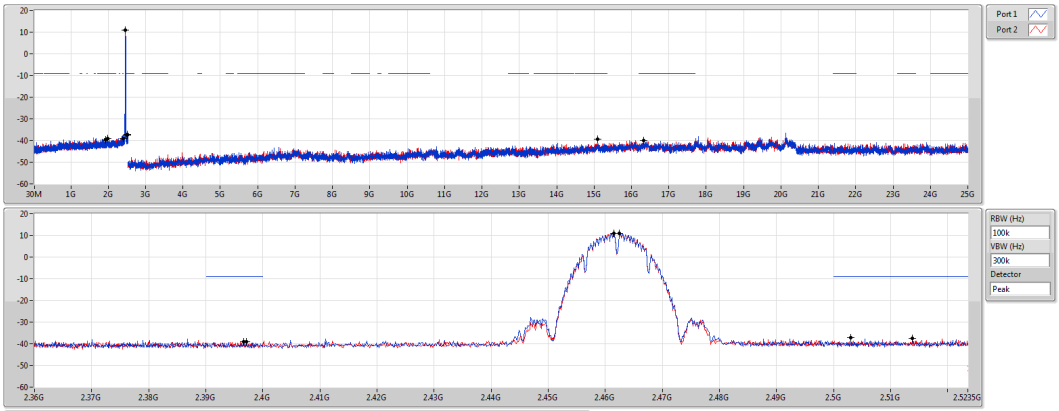
2437MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.43557G	11.47	-8.53	2.30059G	-39.09	2.39776G	-38.47	2.50766G	-38.10	16.38869G	-40.66	1
2.43758G	11.77	-8.23	1.77051G	-39.00	2.39104G	-38.80	2.50782G	-38.08	17.02927G	-39.98	2

802.11b_Nss1,(1Mbps)_2TX **CSE NdB**

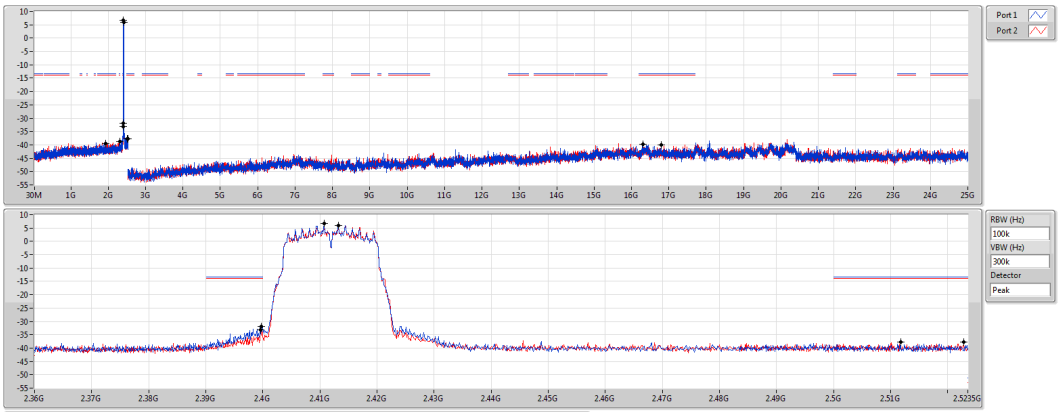
2462MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.46146G	11.03	-8.97	1.98604G	-39.13	2.39664G	-39.12	2.50302G	-37.30	16.32407G	-39.85	1
2.46246G	10.93	-9.07	1.93128G	-39.72	2.39712G	-39.13	2.51382G	-37.55	15.0991G	-39.52	2

802.11g_Nss1,(6Mbps)_2TX **CSE NdB**

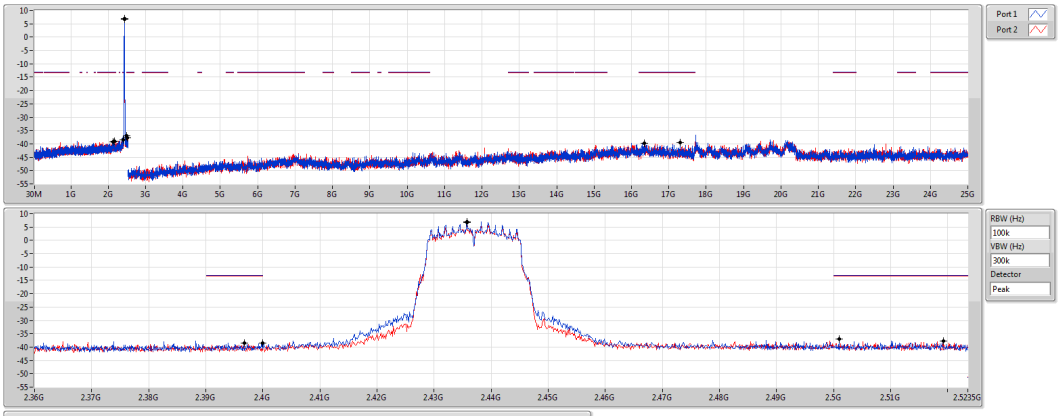
2412MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.41069G	6.65	-13.35	1.93944G	-39.59	2.39976G	-31.97	2.51174G	-37.74	16.79046G	-39.94	1
2.41319G	6.03	-13.97	2.30292G	-38.68	2.3996G	-33.11	2.52278G	-37.84	16.31564G	-39.84	2

802.11g_Nss1,(6Mbps)_2TX **CSE NdB**

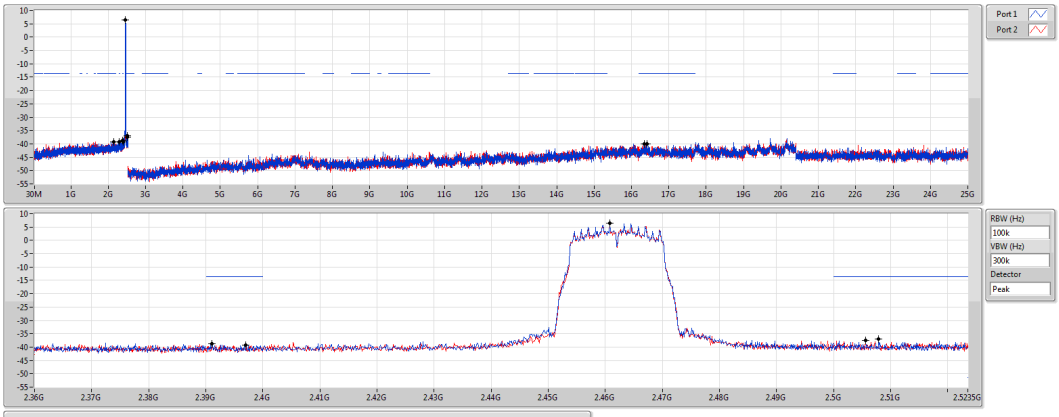
2437MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.43574G	6.96	-13.04	2.12933G	-39.22	2.39992G	-38.48	2.50094G	-36.87	17.30742G	-39.40	1
2.43574G	6.74	-13.26	2.16778G	-38.91	2.39672G	-38.56	2.51918G	-37.63	16.34936G	-39.75	2

802.11g_Nss1,(6Mbps)_2TX **CSE NdB**

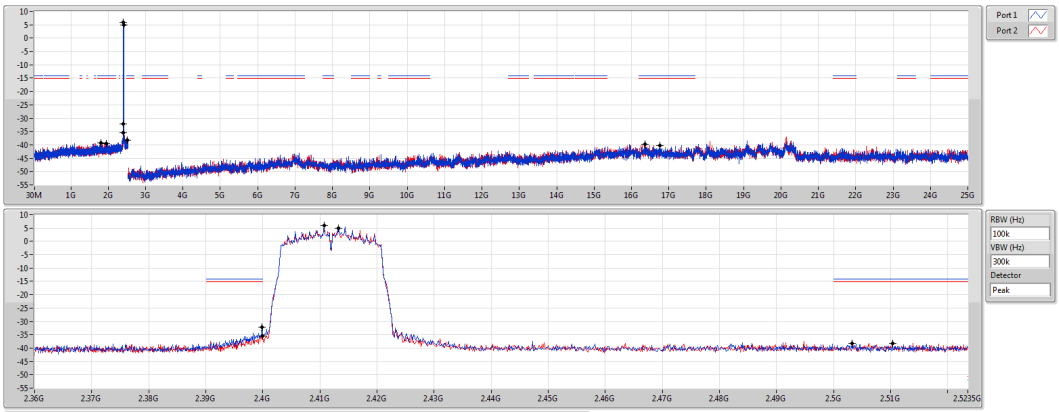
2462MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.46079G	6.38	-13.62	2.30059G	-39.33	2.39112G	-38.81	2.5079G	-37.08	16.41679G	-40.08	1
2.46079G	6.32	-13.68	2.13982G	-39.23	2.39704G	-39.34	2.50558G	-37.59	16.34655G	-39.92	2

802.11n HT20_Nss1,(MCS0)_2TX **CSE NdB**

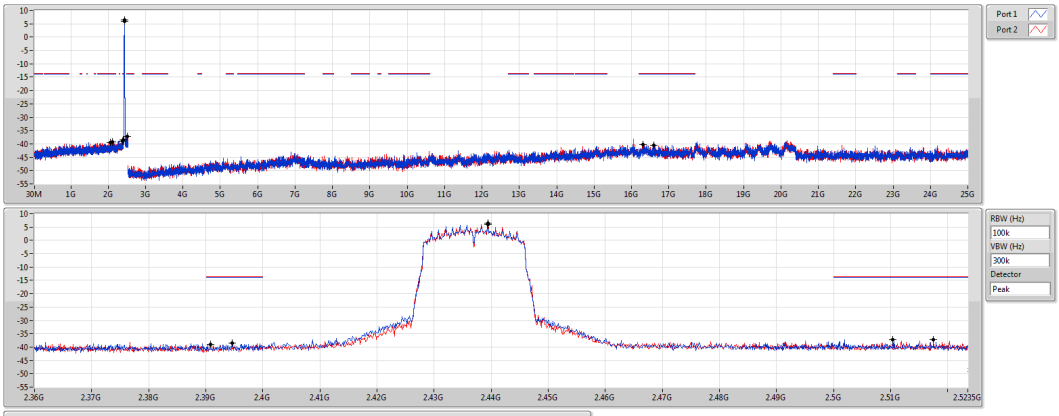
2412MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.41069G	6.00	-14.00	1.81012G	-39.37	2.39984G	-32.10	2.50326G	-38.23	16.75393G	-40.31	1
2.41319G	4.81	-15.19	1.95458G	-39.46	2.39992G	-35.37	2.5103G	-38.17	16.36902G	-39.73	2

802.11n HT20_Nss1,(MCS0)_2TX **CSE NdB**

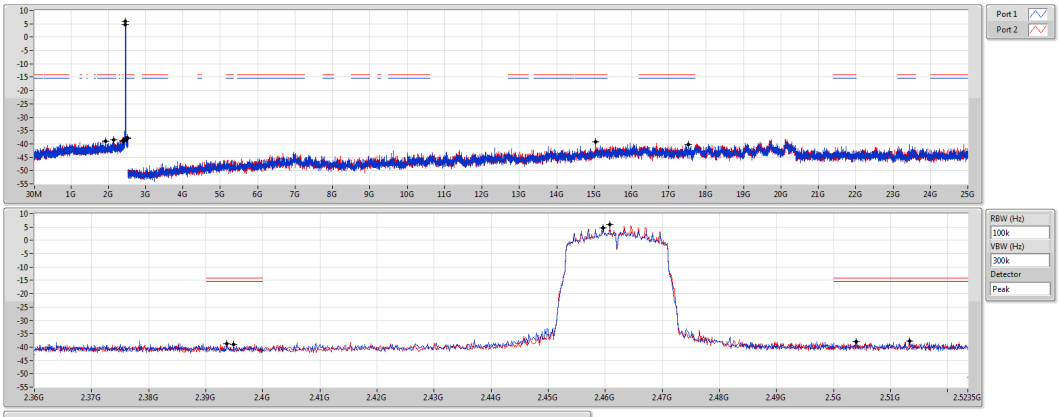
2437MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.43941G	6.03	-13.97	2.05477G	-39.63	2.39464G	-38.59	2.51038G	-37.11	16.31283G	-40.39	1
2.43941G	6.33	-13.67	2.12001G	-39.27	2.3908G	-39.02	2.5175G	-37.33	16.59098G	-40.46	2

802.11n HT20_Nss1,(MCS0)_2TX **CSE NdB**

2462MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.45962G	4.64	-15.36	2.13982G	-38.44	2.39488G	-38.93	2.51334G	-37.78	17.52094G	-40.29	1
2.46079G	5.85	-14.15	1.92429G	-38.99	2.39368G	-38.85	2.5039G	-38.07	15.04572G	-39.22	2

4 Receiver Test Results

4.1 Conducted Emissions

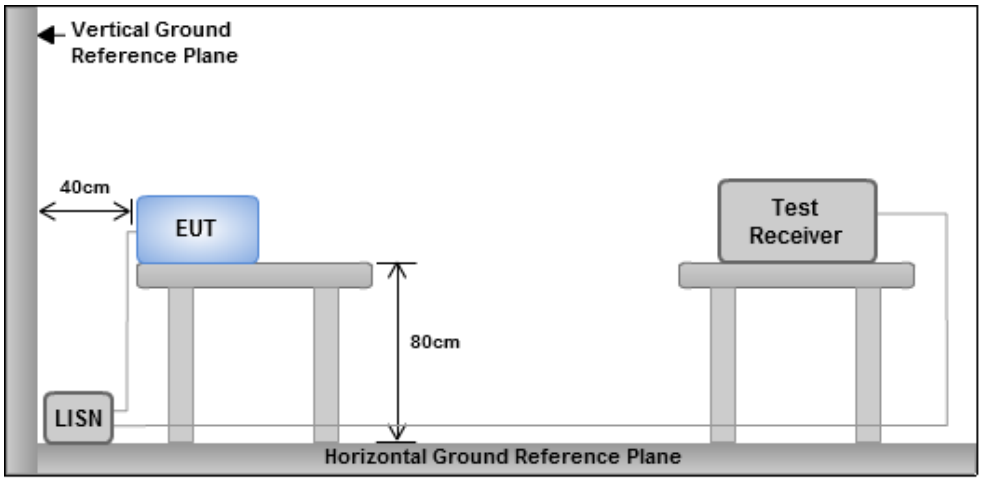
4.1.1 Limit of Conducted Emissions

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.		

4.1.2 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.

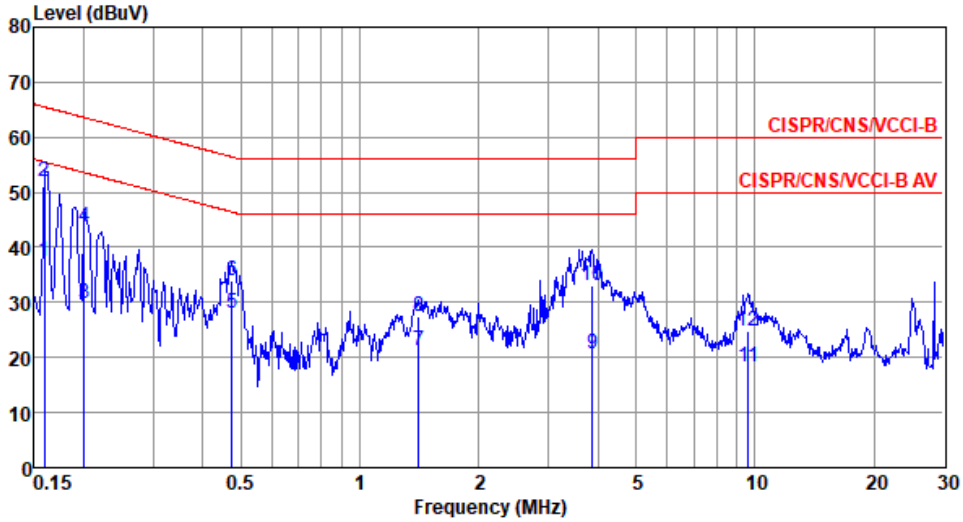
4.1.3 Test Setup



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

4.1.4 Test Result of Conducted Emissions

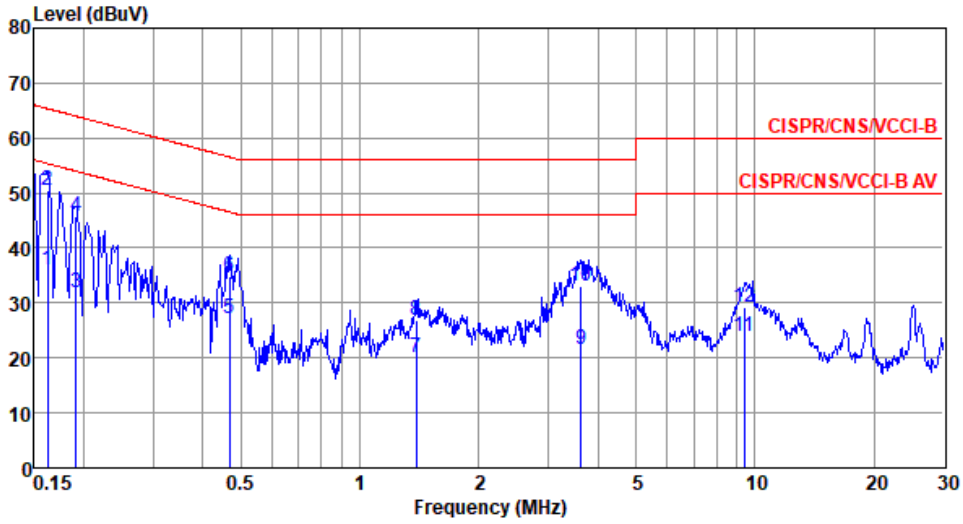
Modulation	11g	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.159	37.46	55.52	-18.06	27.88	9.53	0.05	Average
2*	0.159	52.04	65.52	-13.48	42.46	9.53	0.05	QP
3	0.201	29.73	53.58	-23.85	20.12	9.54	0.07	Average
4	0.201	43.73	63.58	-19.85	34.12	9.54	0.07	QP
5	0.474	27.98	46.45	-18.47	18.32	9.58	0.08	Average
6	0.474	33.92	56.45	-22.53	24.26	9.58	0.08	QP
7	1.411	21.18	46.00	-24.82	11.45	9.60	0.13	Average
8	1.411	27.53	56.00	-28.47	17.80	9.60	0.13	QP
9	3.881	20.81	46.00	-25.19	10.93	9.61	0.27	Average
10	3.881	33.15	56.00	-22.85	23.27	9.61	0.27	QP
11	9.603	18.43	50.00	-31.57	8.35	9.65	0.43	Average
12	9.603	24.71	60.00	-35.29	14.63	9.65	0.43	QP

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

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



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.162	36.01	55.34	-19.33	26.38	9.57	0.06	Average
2*	0.162	50.50	65.34	-14.84	40.87	9.57	0.06	QP
3	0.191	31.86	53.98	-22.12	22.21	9.58	0.07	Average
4	0.191	45.78	63.98	-18.20	36.13	9.58	0.07	QP
5	0.469	27.12	46.54	-19.42	17.42	9.62	0.08	Average
6	0.469	34.81	56.54	-21.73	25.11	9.62	0.08	QP
7	1.388	19.97	46.00	-26.03	10.20	9.64	0.13	Average
8	1.388	26.86	56.00	-29.14	17.09	9.64	0.13	QP
9	3.623	21.41	46.00	-24.59	11.49	9.66	0.26	Average
10	3.623	33.20	56.00	-22.80	23.28	9.66	0.26	QP
11	9.401	24.03	50.00	-25.97	13.89	9.71	0.43	Average
12	9.401	29.16	60.00	-30.84	19.02	9.71	0.43	QP

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

4.2 Radiated Emissions

4.2.1 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.

4.2.2 Test Procedures

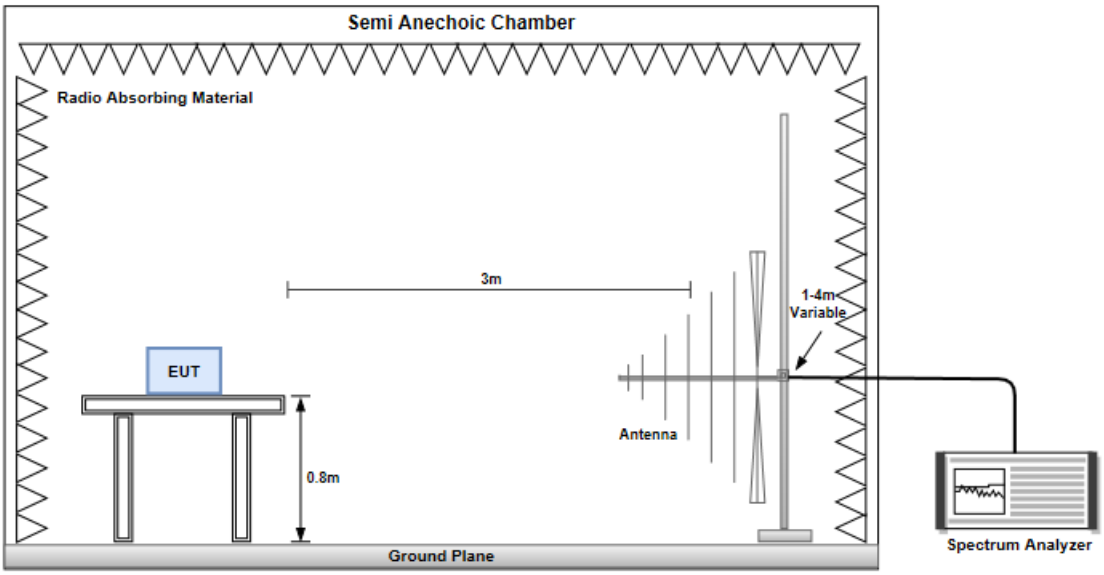
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

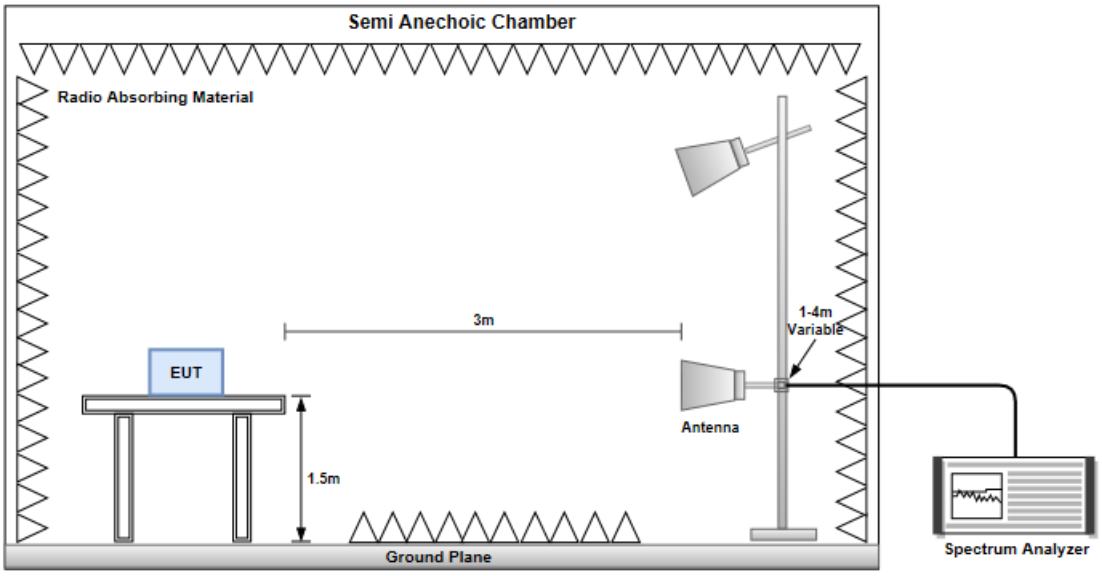
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=3MHz and RMS detector is for average measured value of radiated emission above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

4.2.3 Test Setup

Radiated Emissions below 1 GHz

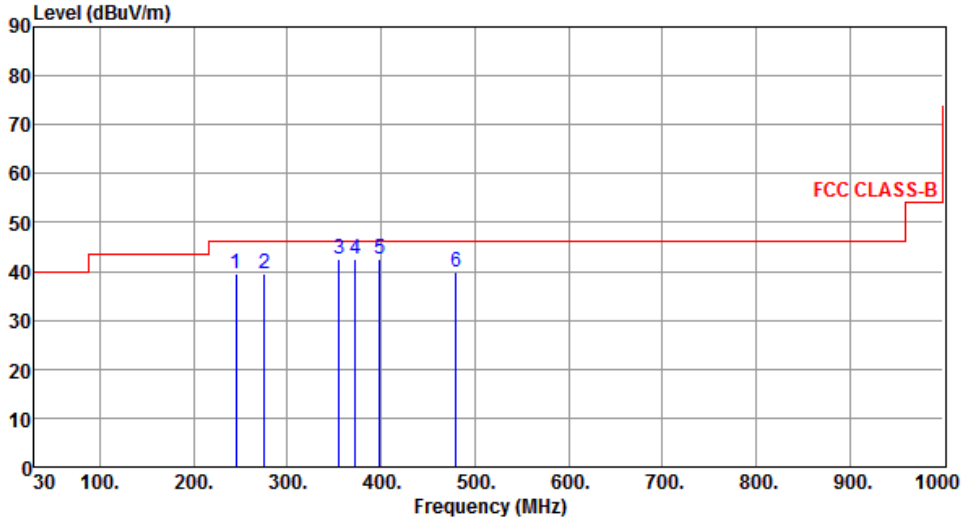


Radiated Emissions above 1 GHz



4.2.4 Receiver Radiated Emissions (Below 1GHz)

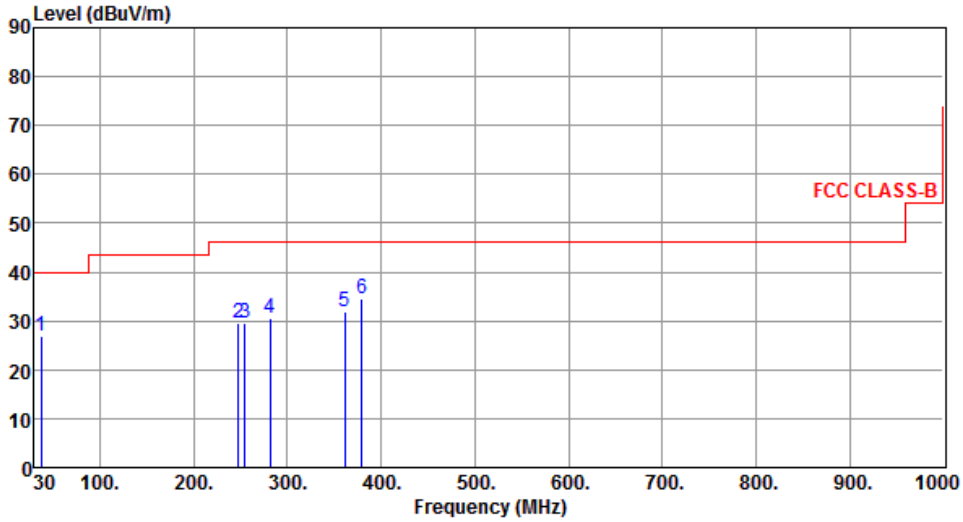
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	244.86	39.56	46.00	-6.44	49.05	-9.49	Peak	---	---
2	275.56	39.56	46.00	-6.44	47.83	-8.27	Peak	---	---
3	354.89	42.65	46.00	-3.35	49.00	-6.35	Peak	---	---
4	372.68	42.56	46.00	-3.44	48.29	-5.73	Peak	---	---
5	398.56	42.38	46.00	-3.62	47.50	-5.12	Peak	---	---
6	480.31	39.77	46.00	-6.23	43.07	-3.30	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)	2437
Polarization	Vertical		

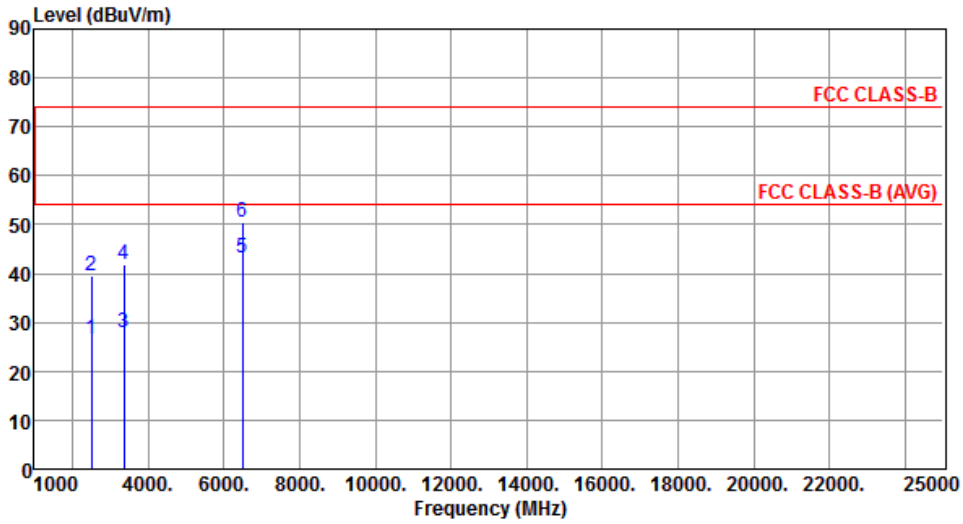


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	37.62	26.87	40.00	-13.13	35.28	-8.41	Peak	---	---
2	247.65	29.65	46.00	-16.35	39.08	-9.43	Peak	---	---
3	254.65	29.65	46.00	-16.35	38.81	-9.16	Peak	---	---
4	281.32	30.65	46.00	-15.35	38.78	-8.13	Peak	---	---
5	360.96	31.91	46.00	-14.09	38.00	-6.09	Peak	---	---
6	379.65	34.65	46.00	-11.35	40.22	-5.57	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.

4.2.5 Receiver Radiated Emissions (Above 1GHz)

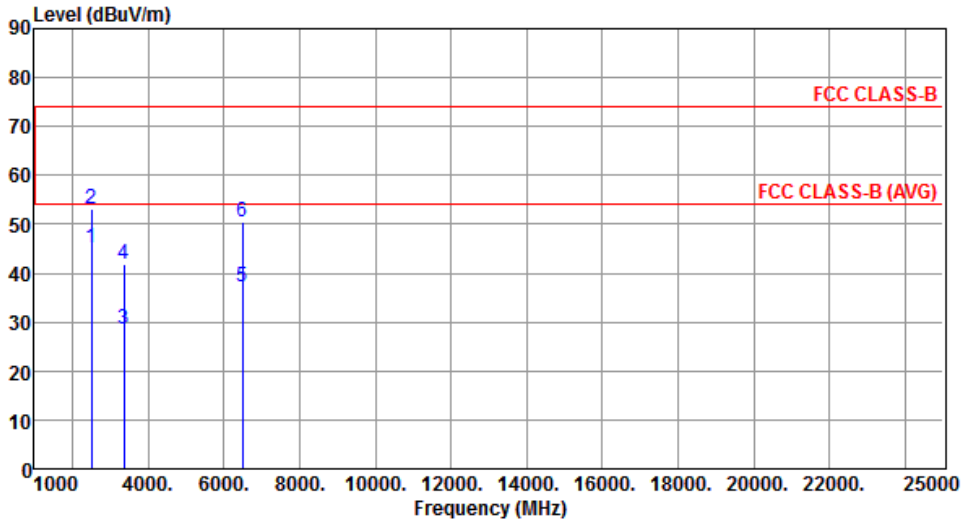
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2512.00	26.59	54.00	-27.41	29.84	-3.25	Average	100	322
2	2512.00	39.62	74.00	-34.38	42.87	-3.25	Peak	100	322
3	3359.00	27.88	54.00	-26.12	29.04	-1.16	Average	100	62
4	3359.00	41.69	74.00	-32.31	42.85	-1.16	Peak	100	62
5	6498.00	43.14	54.00	-10.86	35.67	7.47	Average	229	130
6	6498.00	50.45	74.00	-23.55	42.98	7.47	Peak	229	130

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		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2512.00	45.01	54.00	-8.99	48.26	-3.25	Average	100	102
2	2512.00	53.02	74.00	-20.98	56.27	-3.25	Peak	100	102
3	3359.00	28.69	54.00	-25.31	29.85	-1.16	Average	100	256
4	3359.00	41.80	74.00	-32.20	42.96	-1.16	Peak	100	256
5	6498.00	37.04	54.00	-16.96	29.57	7.47	Average	100	28
6	6498.00	50.36	74.00	-23.64	42.89	7.47	Peak	100	28

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).

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.

Linkou	**Kwei Shan**	**Kwei Shan Site II**
Tel: 886-2-2601-1640	Tel: 886-3-271-8666	Tel: 886-3-271-8640
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If you have any suggestion, please feel free to contact us as below information.

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