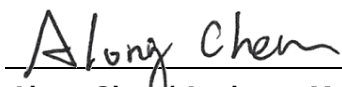


FCC Test Report

FCC ID : 2ARUV-MWF82S01
Equipment : 802.11bgn module
Model No. : PT7682W-SAOPTC0
Brand Name : PTCOM
Applicant : PTCOM Technology CO.,LTD.
Address : 8F., No.89, Sec. 4, Chongxin Rd., Sanchong
Dist., New Taipei City 24161, Taiwan (R.O.C.).
Standard : 47 CFR FCC Part 15.247
Received Date : Oct. 31, 2018
Tested Date : Nov. 04 ~ Dec. 04, 2018

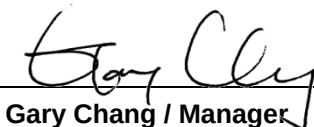
We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval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



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Release Record

Report No.	Version	Description	Issued Date
FR8O3102	Rev. 01	Initial issue	Jan. 15, 2019
FR8O3102	Rev. 02	Modified model name and applicant.	Jan. 24, 2019

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.150MHz 49.66 (Margin -16.34dB) - QP	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 139.82MHz 42.45 (Margin -1.05dB) - QP	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 25.14	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared values of gain for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of the gain.

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
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	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.	Model	Type	Gain (dBi)	Connector
1	ACX AT3216-B2R7HAA_	Chip	0.5	---

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host
-------------------	------------------

1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	USB cable	0.93m non-shielded without core

1.1.5 Channel List

Frequency band (MHz)		2400~2483.5	
802.11 b / g / n HT20		802.11n HT40	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2412	3	2422
2	2417	4	2427
3	2422	5	2432
4	2427	6	2437
5	2432	7	2442
6	2437	8	2447
7	2442	9	2452
8	2447	---	---
9	2452	---	---
10	2457	---	---
11	2462	---	---

1.1.6 Test Tool and Duty Cycle

Test Tool	QA_Tool, V3.1.2		
Duty Cycle and Duty Factor	Mode	Duty Cycle (%)	Duty Factor (dB)
	11b	100.00%	0.00
	11g	100.00%	0.00
	HT20	100.00%	0.00
	HT40	100.00%	0.00

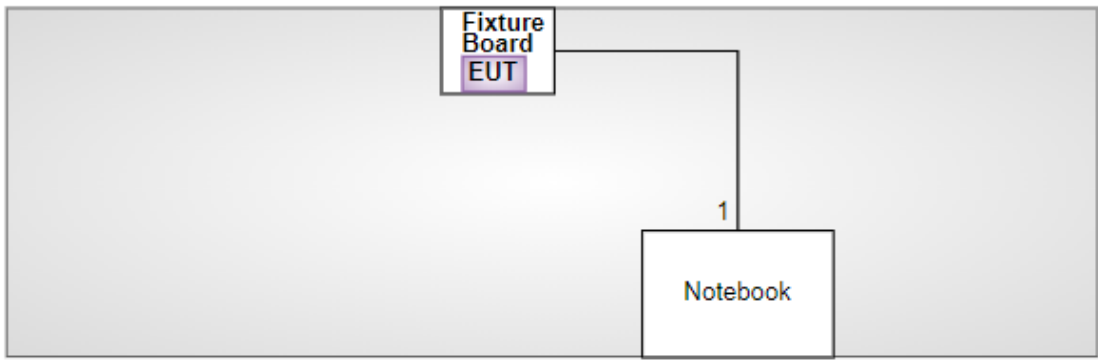
1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
11b	2412	20
11b	2437	21
11b	2462	22
11g	2412	20
11g	2437	24
11g	2462	25
HT20	2412	20
HT20	2437	26
HT20	2462	27
HT40	2422	20
HT40	2437	28
HT40	2452	26

1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude E6430	DoC	---
2	Fixture Board	---	---	---	Provided by applicant.

1.3 Test Setup Chart

Test Setup Diagram	
 The diagram shows a large rectangular area representing the test setup. Inside this area, there is a box labeled 'Fixture Board EUT' at the top left and a box labeled 'Notebook' at the bottom right. A line connects the two boxes, with the number '1' placed near the connection point.	
No.	Signal cable / Length (m)
1	USB, 0.93m non-shielded without core

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Dec. 04, 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-BM-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 1 / (03CH01-WS)				
Tested Date	Nov. 04 ~ Nov. 18, 2018				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Spectrum Analyzer	R&S	FSV40	101498	Dec. 04, 2017	Dec. 03, 2018
Receiver	Agilent	N9038A	MY53290044	Sep. 17, 2018	Sep. 16, 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. 20, 2017	Dec. 19, 2018
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	16052	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)				
Tested Date	Dec. 01 ~ Dec. 04, 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.

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 15.247 Meas Guidance v05

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	± 34.134 Hz
Conducted power	± 0.808 dB
Power density	± 0.463 dB
Conducted emission	± 2.670 dB
AC conducted emission	± 2.90 dB
Radiated emission ≤ 1 GHz	± 3.66 dB
Radiated emission > 1 GHz	± 5.63 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	24°C / 59%	Steve QIN
Radiated Emissions	03CH01-WS	24-25°C / 64-66%	Akun Chung Aska Huang
RF Conducted	TH01-WS	22°C / 64%	Aska Huang

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	HT20	2437	MCS 0	---
Radiated Emissions ≤1GHz	HT20	2437	MCS 0	---
Radiated Emissions >1GHz	11b	2412 / 2437 / 2462	1 Mbps	---
Maximum Output Power	11g	2412 / 2437 / 2462	6 Mbps	
6dB bandwidth	HT20	2412 / 2437 / 2462	MCS 0	
Power spectral density	HT40	2422 / 2437 / 2452	MCS 0	

NOTE: 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

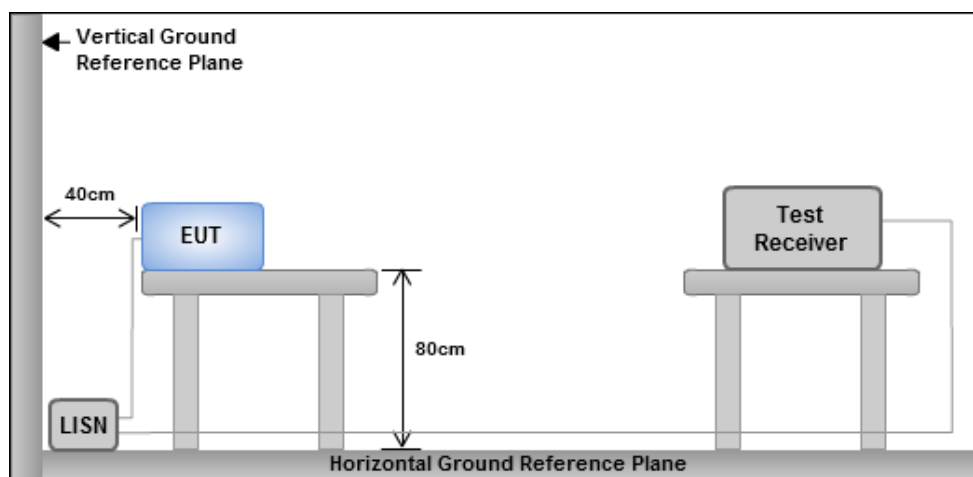
Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

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.

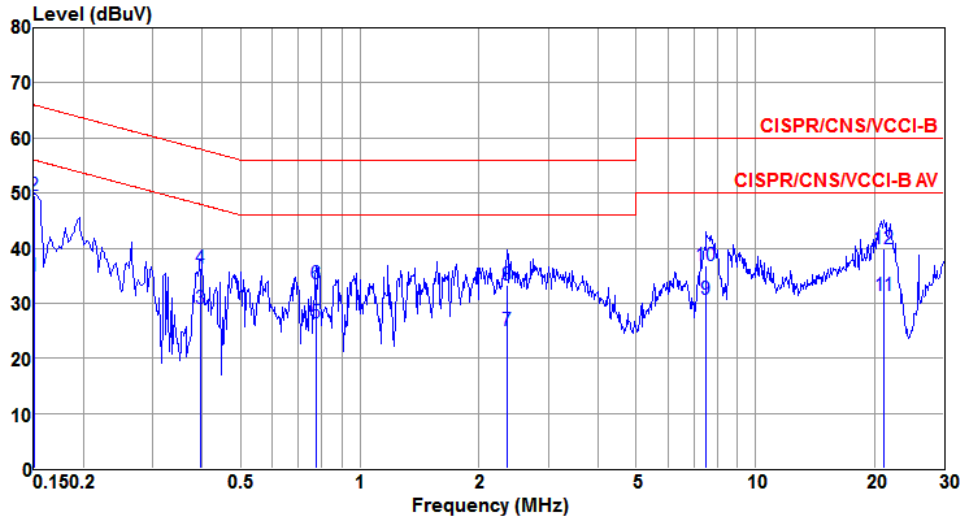
3.1.3 Test Setup



- 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

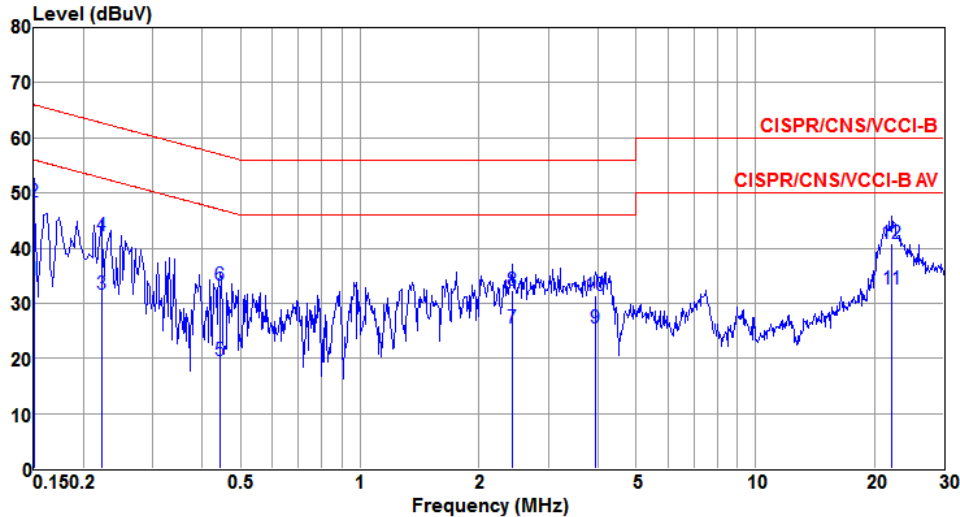
Modulation	HT20	Test Freq. (MHz)	2437
Power Phase	Line		



	Freq	Level	Limit	Over	Read	LISN	cable	
	MHz	dBuV	Line	Limit	Level	factor	loss	Remark
			dBuV	dB	dBuV	dB	dB	
1	0.150	34.85	56.00	-21.15	34.77	0.07	0.01	Average
2*	0.150	49.66	66.00	-16.34	49.58	0.07	0.01	QP
3	0.396	29.08	47.95	-18.87	29.00	0.06	0.02	Average
4	0.396	36.41	57.95	-21.54	36.33	0.06	0.02	QP
5	0.775	26.49	46.00	-19.51	26.39	0.07	0.03	Average
6	0.775	33.54	56.00	-22.46	33.44	0.07	0.03	QP
7	2.358	24.92	46.00	-21.08	24.70	0.09	0.13	Average
8	2.358	33.39	56.00	-22.61	33.17	0.09	0.13	QP
9	7.526	30.73	50.00	-19.27	30.28	0.16	0.29	Average
10	7.526	36.73	60.00	-23.27	36.28	0.16	0.29	QP
11	21.147	31.28	50.00	-18.72	30.68	0.25	0.35	Average
12	21.147	39.86	60.00	-20.14	39.26	0.25	0.35	QP

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

Modulation	HT20	Test Freq. (MHz)	2437
Power Phase	Neutral		



The graph displays the measured level in dBuV against frequency in MHz. The y-axis ranges from 0 to 80 dBuV, and the x-axis ranges from 0.150 to 30 MHz. Two red limit lines are shown: CISPR/CNS/VCCI-B (upper) and CISPR/CNS/VCCI-B AV (lower). The measured signal is a blue line with several peaks labeled 1 through 12. The table below provides the numerical data for these peaks.

	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	LISN factor dB	cable loss dB	Remark
1	0.150	34.31	56.00	-21.69	34.25	0.05	0.01	Average
2	0.150	48.27	66.00	-17.73	48.21	0.05	0.01	QP
3	0.222	31.64	52.74	-21.10	31.57	0.04	0.03	Average
4	0.222	42.32	62.74	-20.42	42.25	0.04	0.03	QP
5	0.442	19.64	47.02	-27.38	19.57	0.05	0.02	Average
6	0.442	33.31	57.02	-23.71	33.24	0.05	0.02	QP
7	2.435	25.53	46.00	-20.47	25.32	0.08	0.13	Average
8	2.435	32.40	56.00	-23.60	32.19	0.08	0.13	QP
9	3.943	25.57	46.00	-20.43	25.26	0.09	0.22	Average
10	3.943	31.50	56.00	-24.50	31.19	0.09	0.22	QP
11*	22.180	32.64	50.00	-17.36	32.00	0.28	0.36	Average
12	22.180	40.75	60.00	-19.25	40.11	0.28	0.36	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB).

Note 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

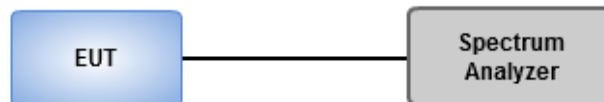
6dB Bandwidth

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)_1TX	9.13M	14.399M	14M4G1D	8.551M	14.327M
802.11g_Nss1,(6Mbps)_1TX	16.377M	16.498M	16M5D1D	16.304M	16.425M
802.11n HT20_Nss1,(MCS0)_1TX	17.536M	17.583M	17M6D1D	17.536M	17.511M
802.11n HT40_Nss1,(MCS0)_1TX	36.087M	36.179M	36M2D1D	35.942M	35.89M

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

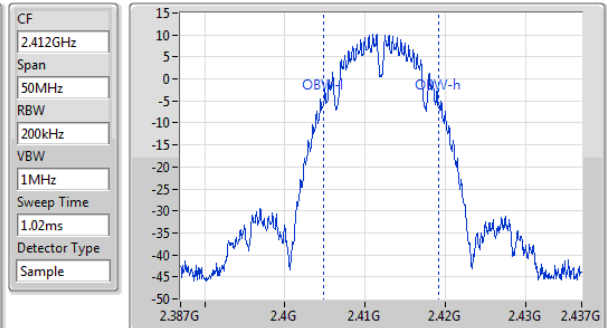
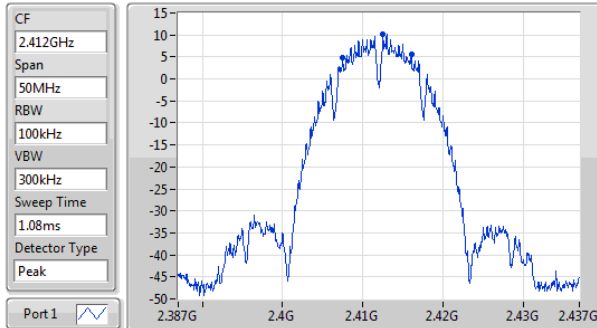
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	8.551M	14.399M
2437MHz	Pass	500k	9.13M	14.327M
2462MHz	Pass	500k	8.551M	14.327M
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-
2412MHz	Pass	500k	16.377M	16.425M
2437MHz	Pass	500k	16.304M	16.498M
2462MHz	Pass	500k	16.377M	16.498M
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-
2412MHz	Pass	500k	17.536M	17.511M
2437MHz	Pass	500k	17.536M	17.583M
2462MHz	Pass	500k	17.536M	17.583M
802.11n HT40_Nss1,(MCS0)_1TX	-	-	-	-
2422MHz	Pass	500k	36.087M	35.89M
2437MHz	Pass	500k	35.942M	36.179M
2452MHz	Pass	500k	35.942M	36.035M

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

802.11b_Nss1,(1Mbps)_1TX

EBW

2412MHz

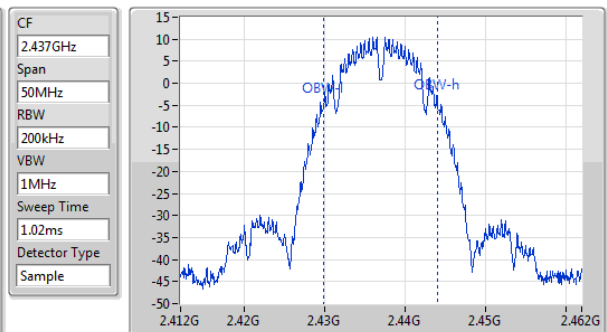
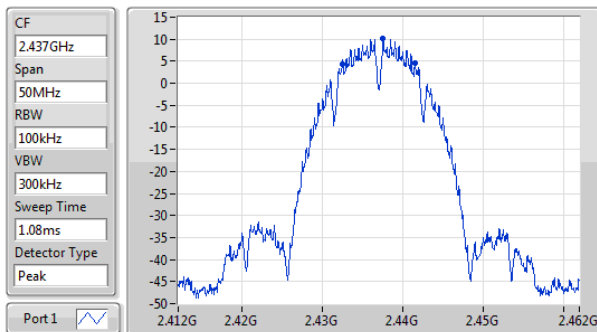


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
8.551M	2.407507G	2.416058G	14.399M	2.404764G	2.419164G	500k	1

802.11b_Nss1,(1Mbps)_1TX

EBW

2437MHz

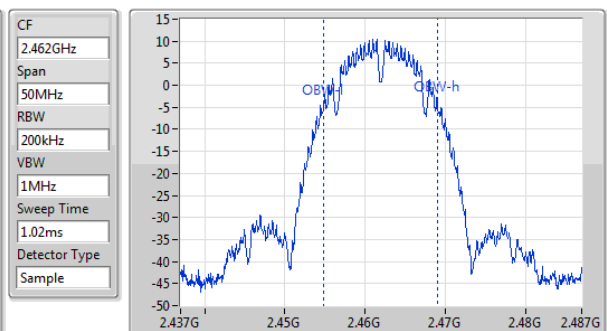
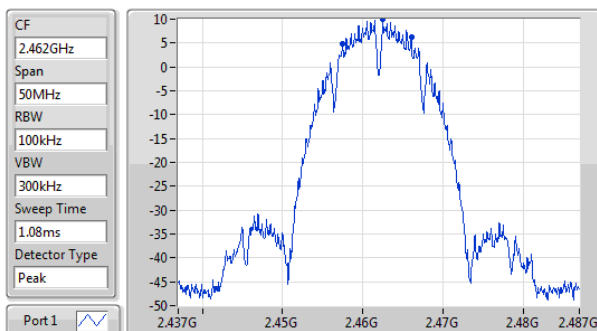


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
9.13M	2.432435G	2.441565G	14.327M	2.429764G	2.444091G	500k	1

802.11b_Nss1,(1Mbps)_1TX

EBW

2462MHz

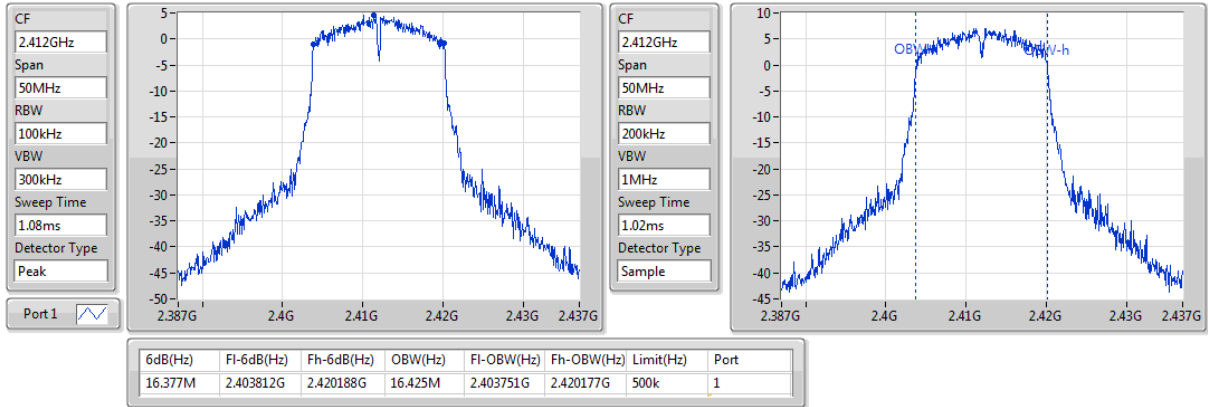


6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
8.551M	2.457507G	2.466058G	14.327M	2.454764G	2.469091G	500k	1

802.11g_Nss1,(6Mbps)_1TX

EBW

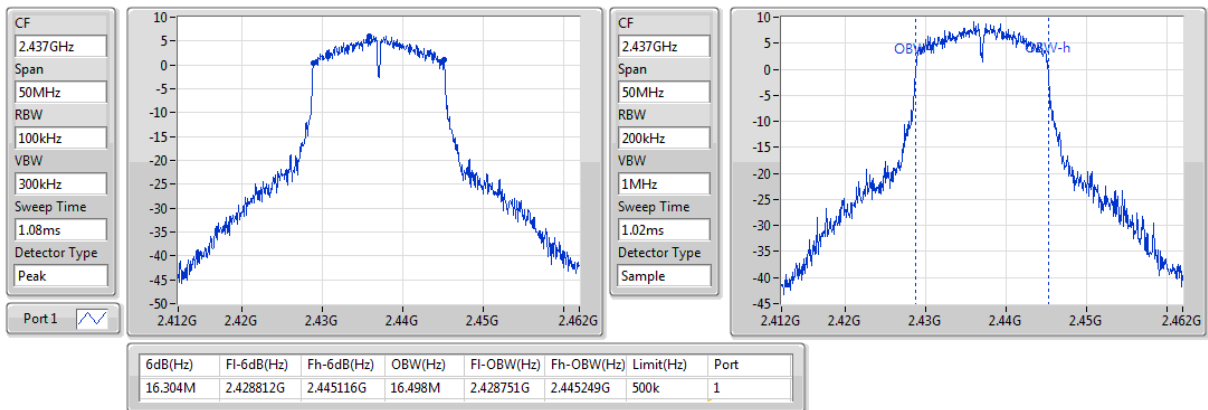
2412MHz



802.11g_Nss1,(6Mbps)_1TX

EBW

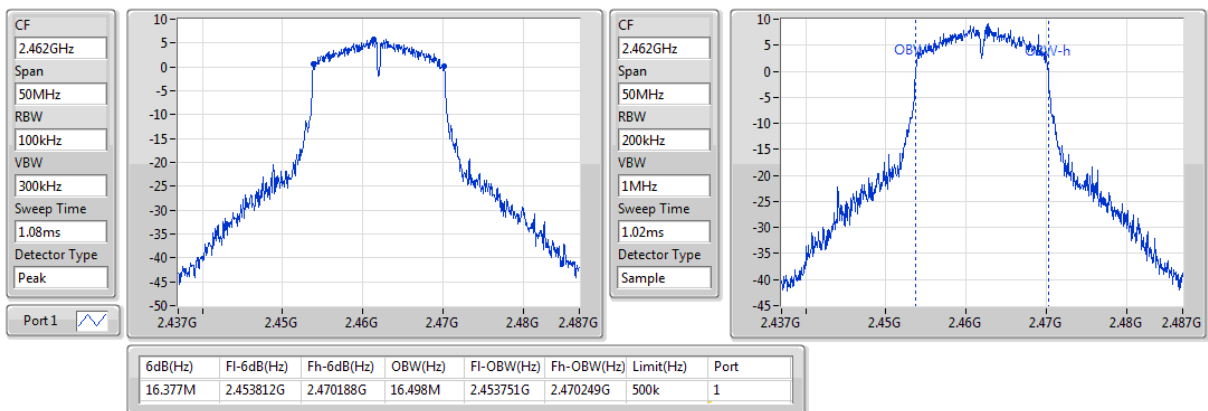
2437MHz



802.11g_Nss1,(6Mbps)_1TX

EBW

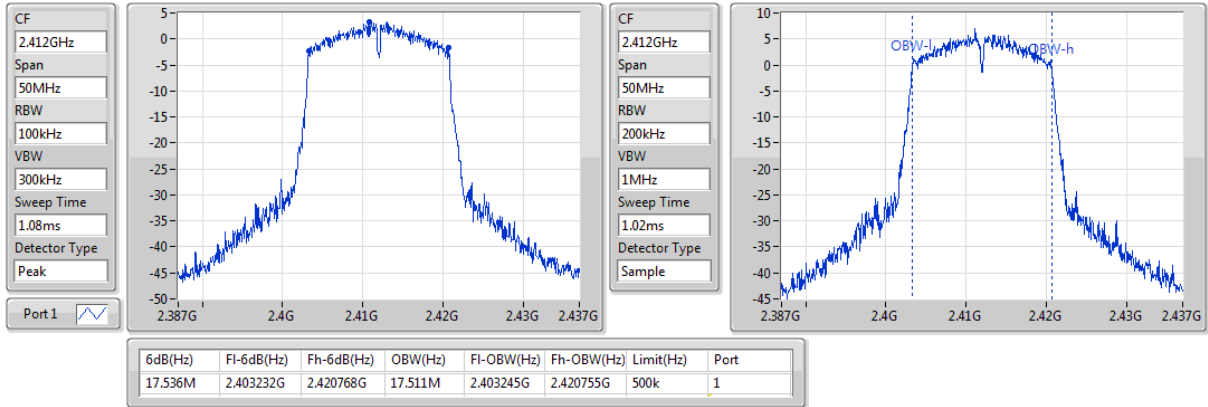
2462MHz



802.11n HT20_Nss1,(MCS0)_1TX

EBW

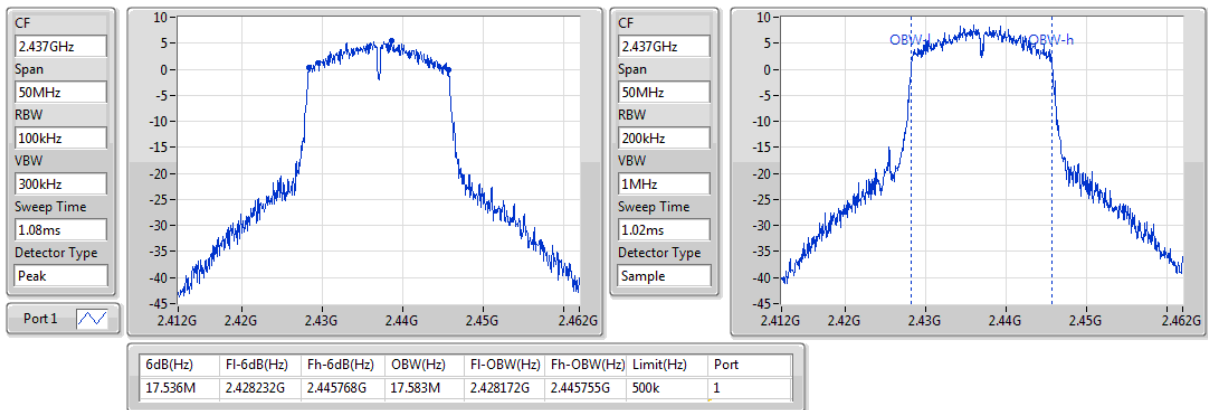
2412MHz



802.11n HT20_Nss1,(MCS0)_1TX

EBW

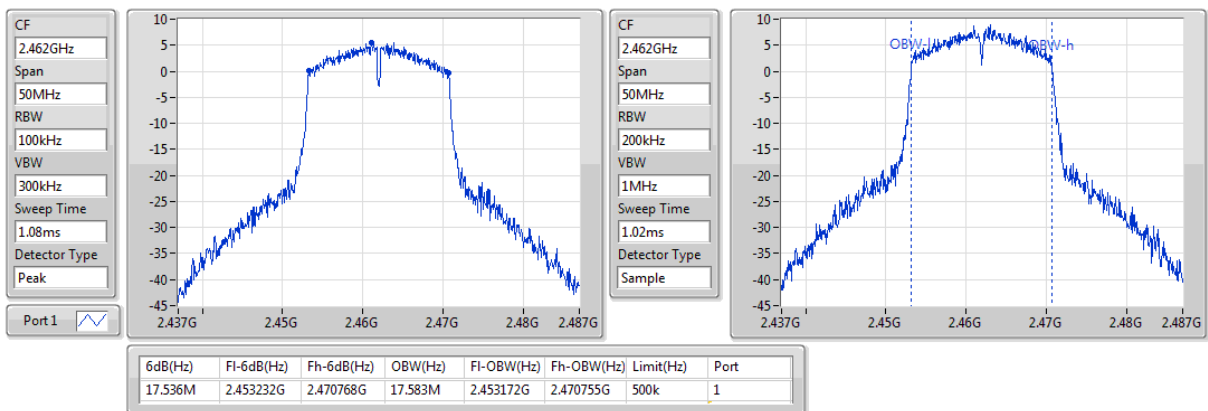
2437MHz



802.11n HT20_Nss1,(MCS0)_1TX

EBW

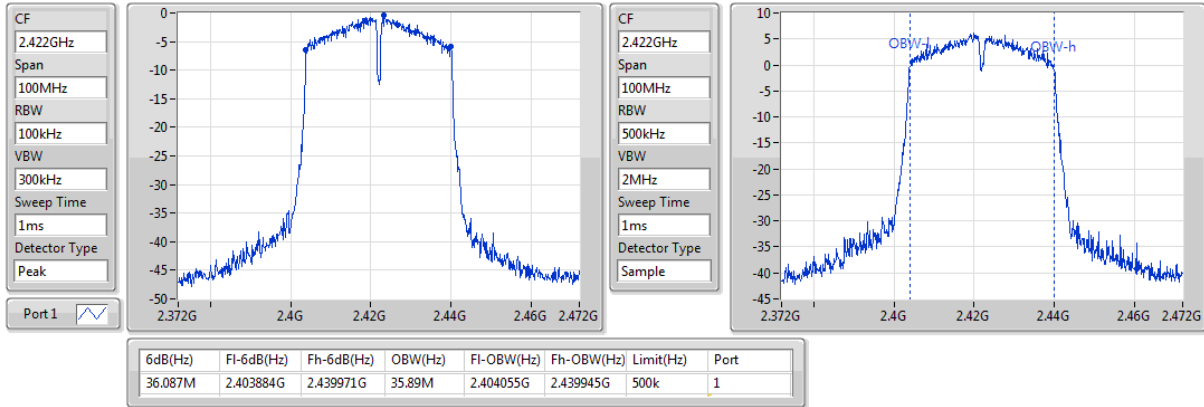
2462MHz



802.11n HT40_Nss1,(MCS0)_1TX

EBW

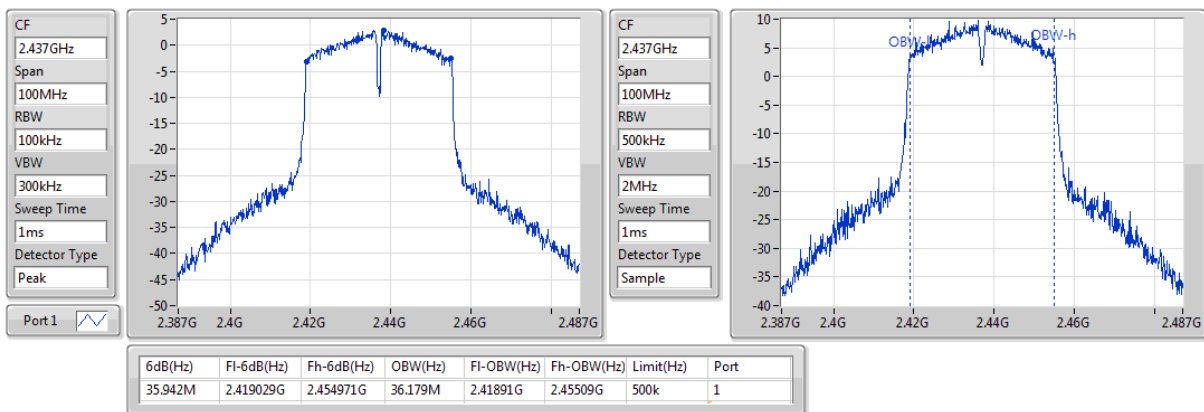
2422MHz



802.11n HT40_Nss1,(MCS0)_1TX

EBW

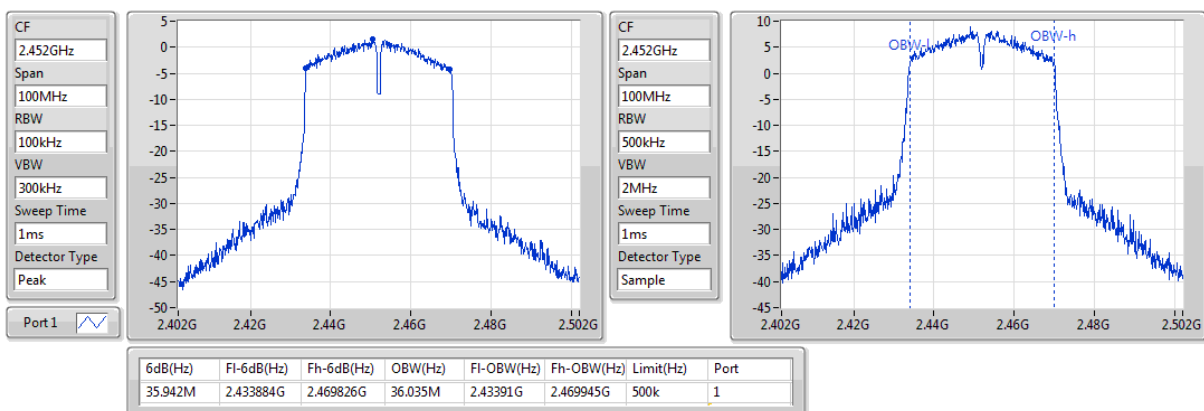
2437MHz



802.11n HT40_Nss1,(MCS0)_1TX

EBW

2452MHz



3.3 RF Output Power

3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

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

Antenna gain $> 6\text{dBi}$

Non Fixed, point to point operations.

The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB

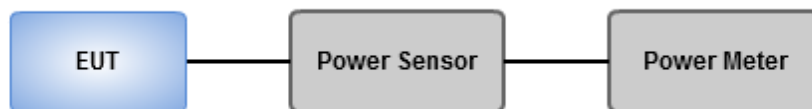
Fixed, point to point operations

Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

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)_1TX	20.90	0.12303
802.11g_Nss1,(6Mbps)_1TX	25.12	0.32509
802.11n HT20_Nss1,(MCS0)_1TX	25.14	0.32659
802.11n HT40_Nss1,(MCS0)_1TX	24.93	0.31117

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	0.50	20.79	20.79	30.00	21.29	36.00
2437MHz	Pass	0.50	20.90	20.90	30.00	21.40	36.00
2462MHz	Pass	0.50	20.82	20.82	30.00	21.32	36.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	0.50	24.50	24.50	30.00	25.00	36.00
2437MHz	Pass	0.50	25.12	25.12	30.00	25.62	36.00
2462MHz	Pass	0.50	25.01	25.01	30.00	25.51	36.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	0.50	24.47	24.47	30.00	24.97	36.00
2437MHz	Pass	0.50	25.14	25.14	30.00	25.64	36.00
2462MHz	Pass	0.50	24.92	24.92	30.00	25.42	36.00
802.11n HT40_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2422MHz	Pass	0.50	23.67	23.67	30.00	24.17	36.00
2437MHz	Pass	0.50	24.93	24.93	30.00	25.43	36.00
2452MHz	Pass	0.50	24.36	24.36	30.00	24.86	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)_1TX	18.93	0.07816
802.11g_Nss1,(6Mbps)_1TX	18.85	0.07674
802.11n HT20_Nss1,(MCS0)_1TX	18.84	0.07656
802.11n HT40_Nss1,(MCS0)_1TX	18.70	0.07413

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	0.50	18.85	18.85	-	19.35	-
2437MHz	Pass	0.50	18.93	18.93	-	19.43	-
2462MHz	Pass	0.50	18.84	18.84	-	19.34	-
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	0.50	16.75	16.75	-	17.25	-
2437MHz	Pass	0.50	18.85	18.85	-	19.35	-
2462MHz	Pass	0.50	18.75	18.75	-	19.25	-
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2412MHz	Pass	0.50	16.61	16.61	-	17.11	-
2437MHz	Pass	0.50	18.84	18.84	-	19.34	-
2462MHz	Pass	0.50	18.70	18.70	-	19.20	-
802.11n HT40_Nss1,(MCS0)_1TX	-	-	-	-	-	-	-
2422MHz	Pass	0.50	15.20	15.20	-	15.70	-
2437MHz	Pass	0.50	18.70	18.70	-	19.20	-
2452MHz	Pass	0.50	17.29	17.29	-	17.79	-

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

Peak PSD

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

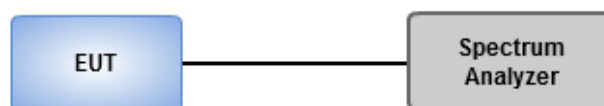
Average PSD, duty cycle $\geq 98\%$

1. Set the RBW = 30 kHz, VBW = 100 kHz.
2. Detector = RMS, Sweep time = auto couple.
3. Sweep time = auto couple.
4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
5. Use the peak marker function to determine the maximum amplitude level.

Average PSD, duty cycle $< 98\%$

1. Set the RBW = 30 kHz, VBW = 100 kHz. Detector = RMS.
2. Set the sweep time to: ≥ 10 (number of measurement points in sweep) $\times$ (total on/off period of the transmitted signal).
3. Perform the measurement over a single sweep.
4. Use the peak marker function to determine the maximum amplitude level.
5. Add $10 \log (1/x)$, where x is the duty cycle.

3.4.3 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	-3.28
802.11g_Nss1,(6Mbps)_1TX	-5.83
802.11n HT20_Nss1,(MCS0)_1TX	-5.75
802.11n HT40_Nss1,(MCS0)_1TX	-8.91

Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
802.11b_Nss1,(1Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	0.50	-4.16	-4.16	8.00
2437MHz	Pass	0.50	-4.27	-4.27	8.00
2462MHz	Pass	0.50	-3.28	-3.28	8.00
802.11g_Nss1,(6Mbps)_1TX	-	-	-	-	-
2412MHz	Pass	0.50	-6.92	-6.92	8.00
2437MHz	Pass	0.50	-5.86	-5.86	8.00
2462MHz	Pass	0.50	-5.83	-5.83	8.00
802.11n HT20_Nss1,(MCS0)_1TX	-	-	-	-	-
2412MHz	Pass	0.50	-6.95	-6.95	8.00
2437MHz	Pass	0.50	-5.75	-5.75	8.00
2462MHz	Pass	0.50	-6.28	-6.28	8.00
802.11n HT40_Nss1,(MCS0)_1TX	-	-	-	-	-
2422MHz	Pass	0.50	-12.16	-12.16	8.00
2437MHz	Pass	0.50	-8.91	-8.91	8.00
2452MHz	Pass	0.50	-9.53	-9.53	8.00

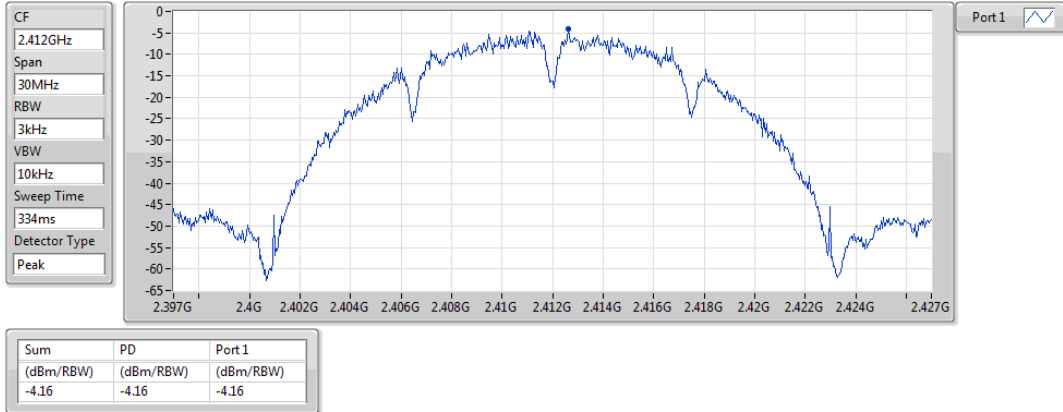
DG = Directional Gain;

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

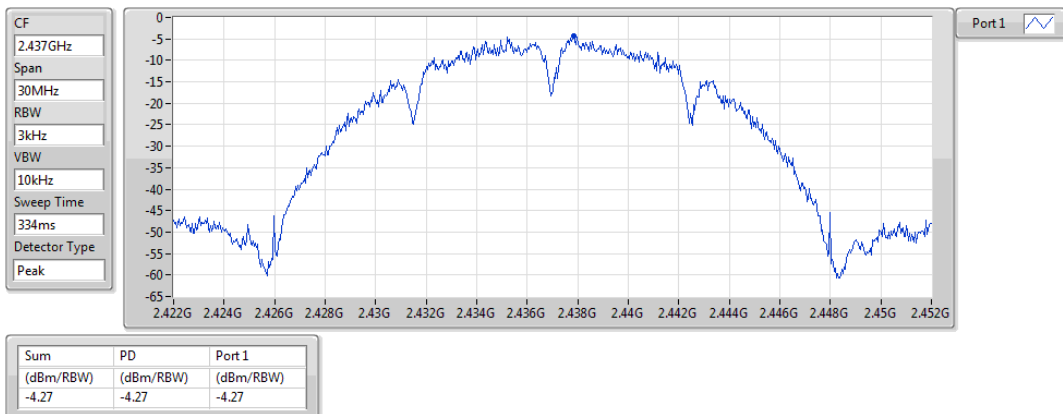
2412MHz



802.11b_Nss1,(1Mbps)_1TX

PSD

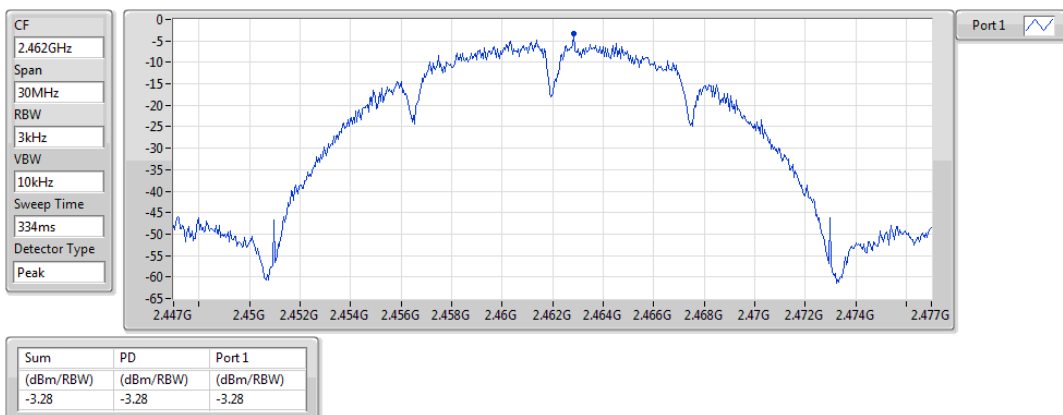
2437MHz



802.11b_Nss1,(1Mbps)_1TX

PSD

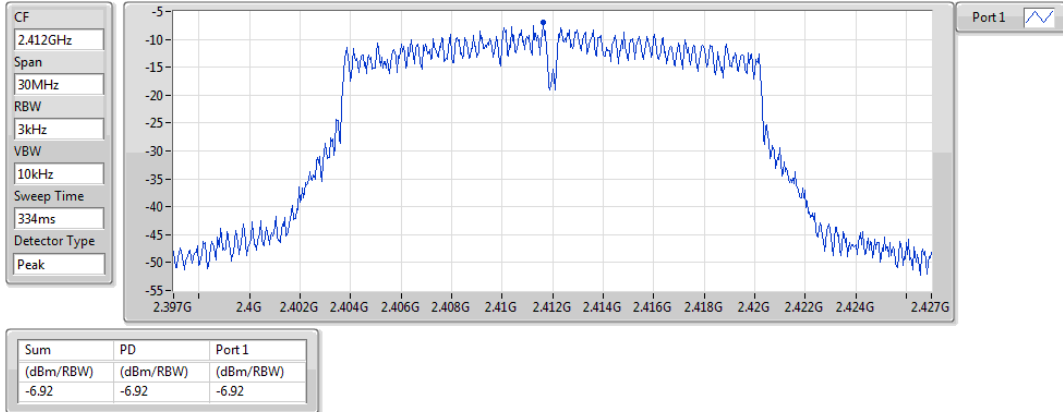
2462MHz



802.11g_Nss1,(6Mbps)_1TX

PSD

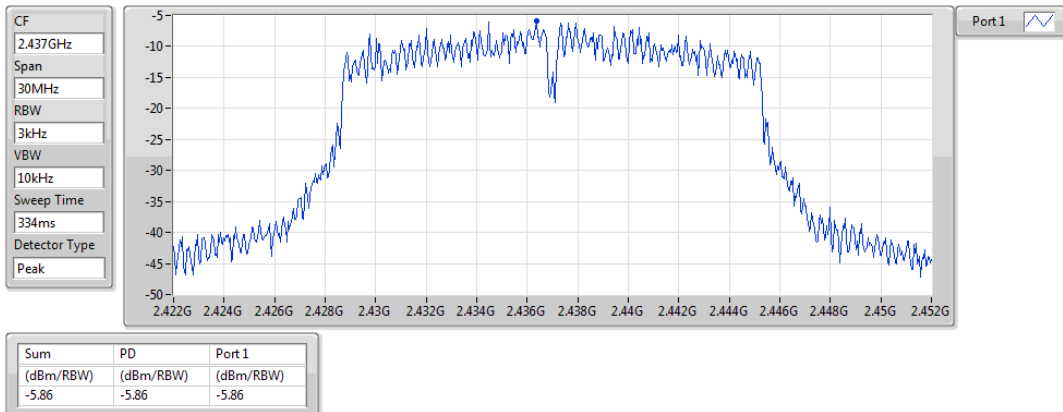
2412MHz



802.11g_Nss1,(6Mbps)_1TX

PSD

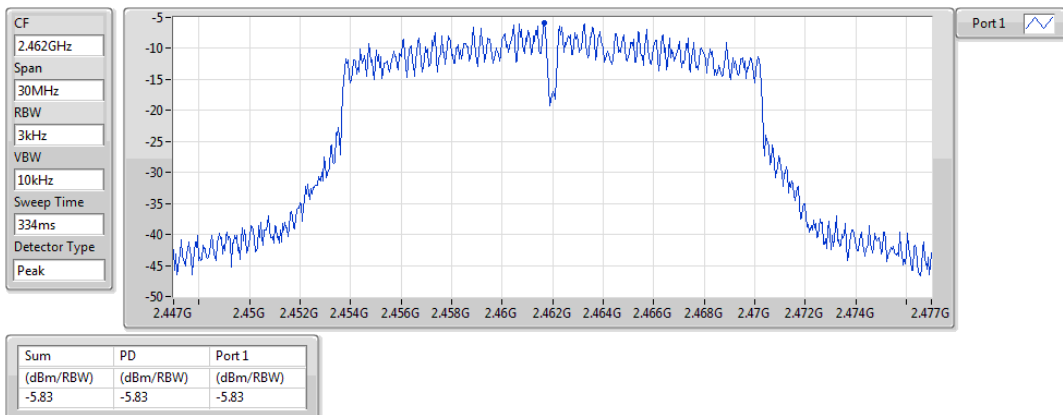
2437MHz



802.11g_Nss1,(6Mbps)_1TX

PSD

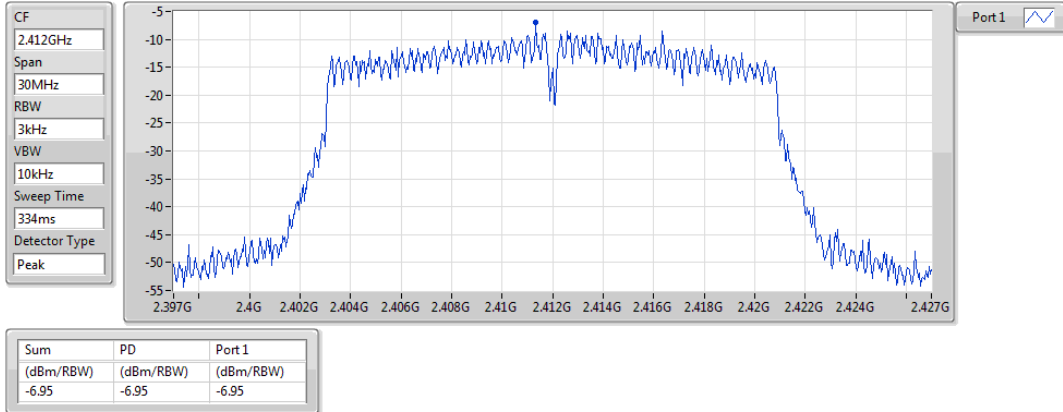
2462MHz



802.11n HT20_Nss1,(MCS0)_1TX

PSD

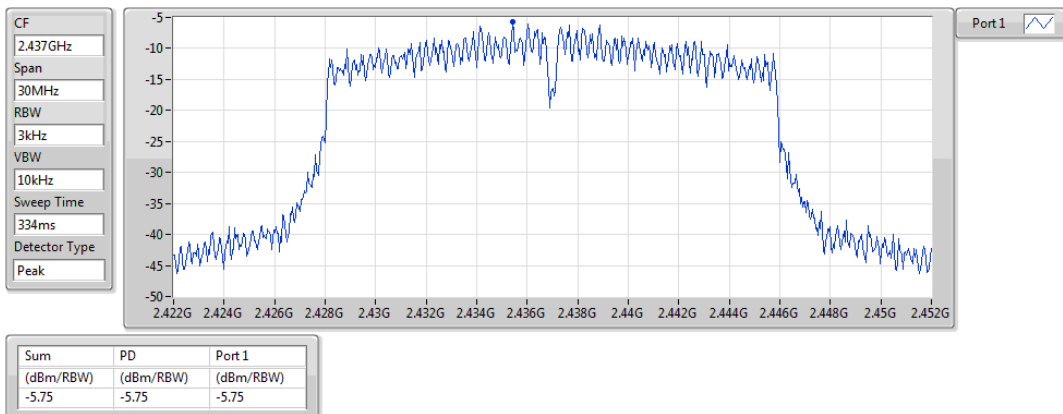
2412MHz



802.11n HT20_Nss1,(MCS0)_1TX

PSD

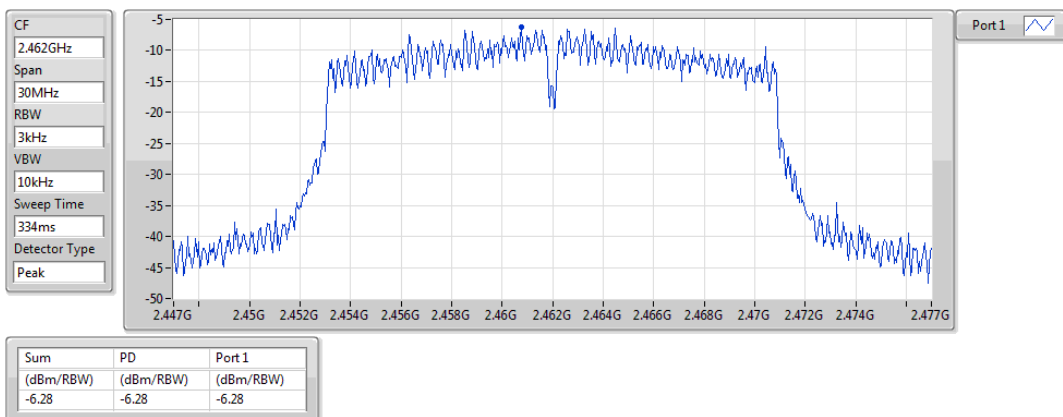
2437MHz



802.11n HT20_Nss1,(MCS0)_1TX

PSD

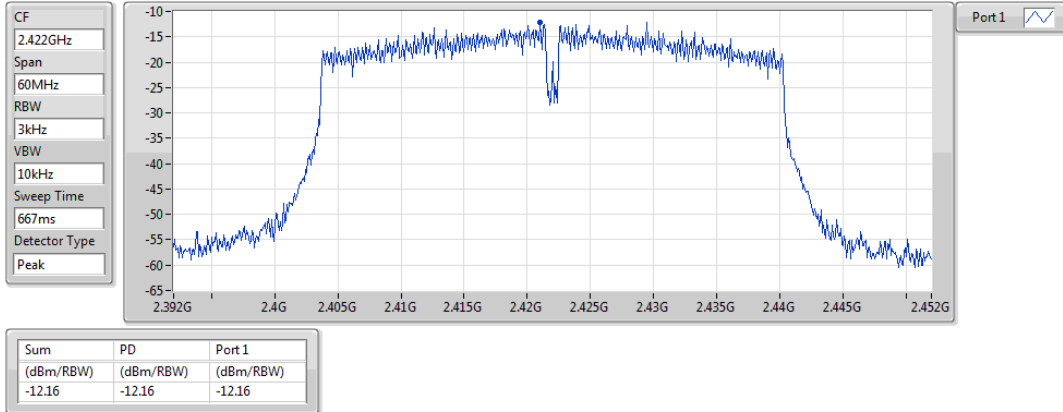
2462MHz



802.11n HT40_Nss1,(MCS0)_1TX

PSD

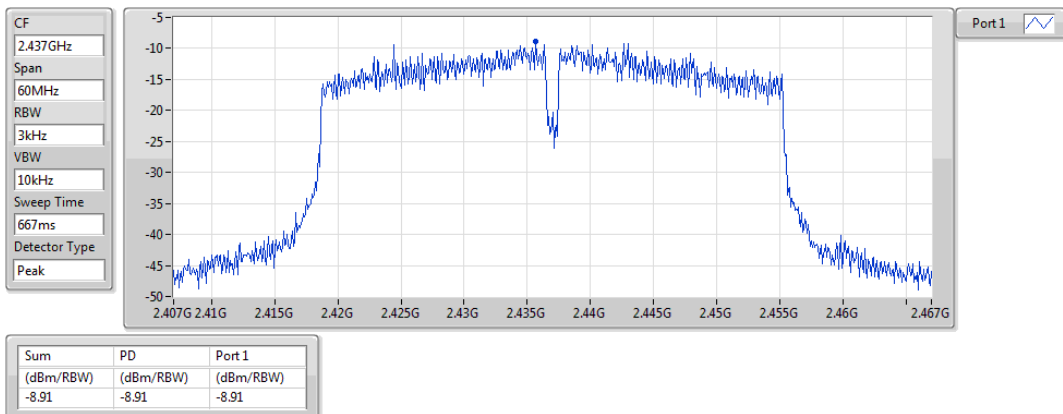
2422MHz



802.11n HT40_Nss1,(MCS0)_1TX

PSD

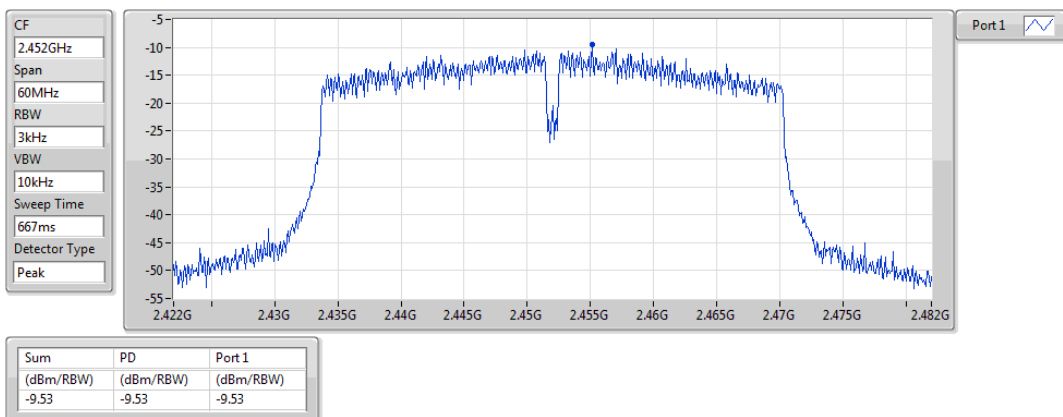
2437MHz



802.11n HT40_Nss1,(MCS0)_1TX

PSD

2452MHz



3.5 Unwanted Emissions into Restricted Frequency Bands

3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

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

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

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

3.5.2 Test Procedures

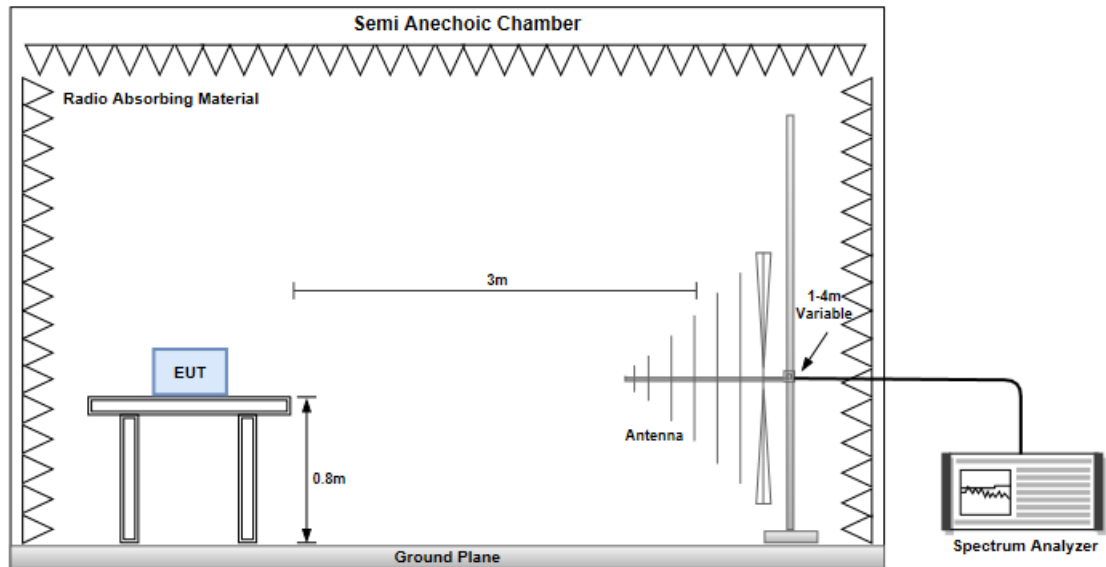
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission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

Note:

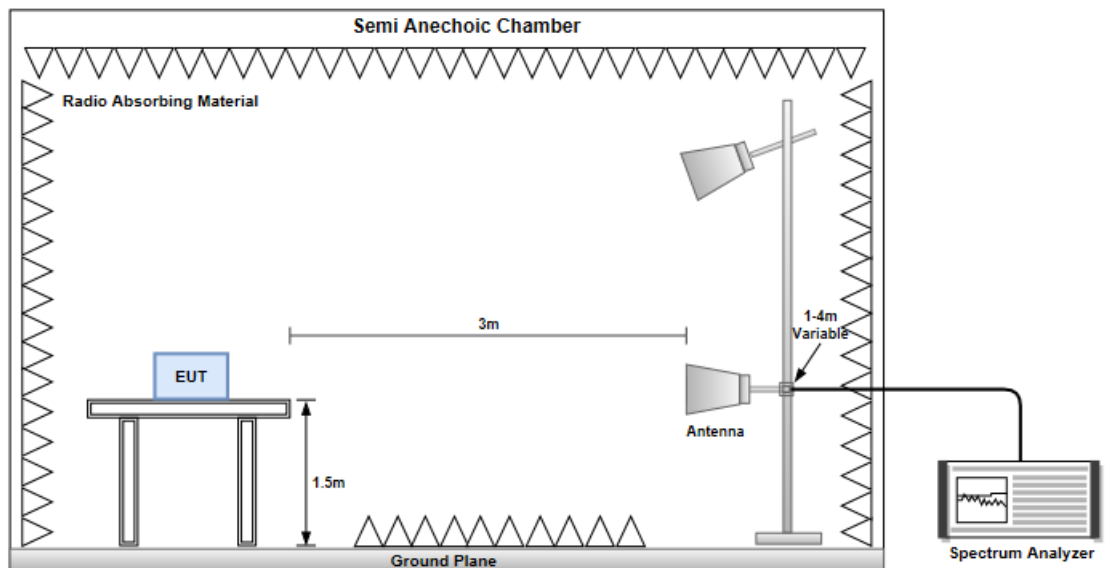
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.5.3 Test Setup

Radiated Emissions below 1 GHz

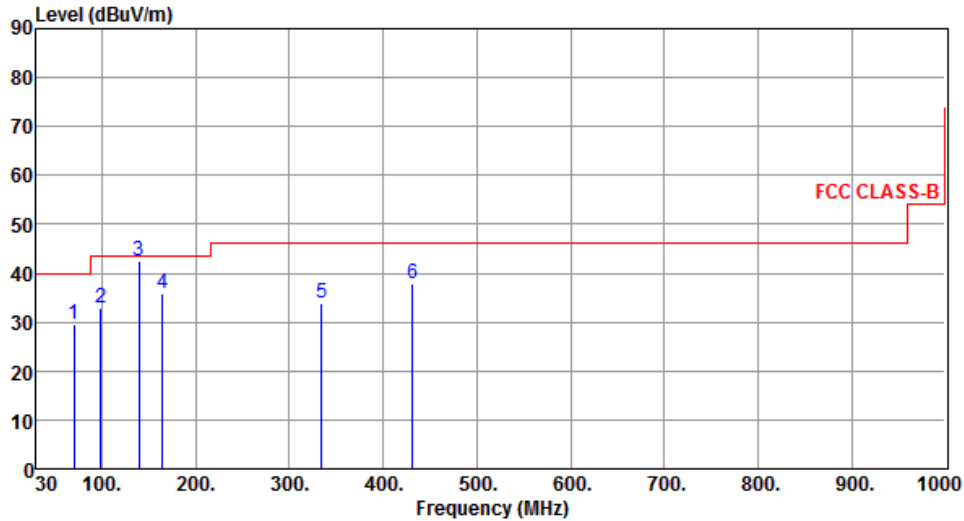


Radiated Emissions above 1 GHz



3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		

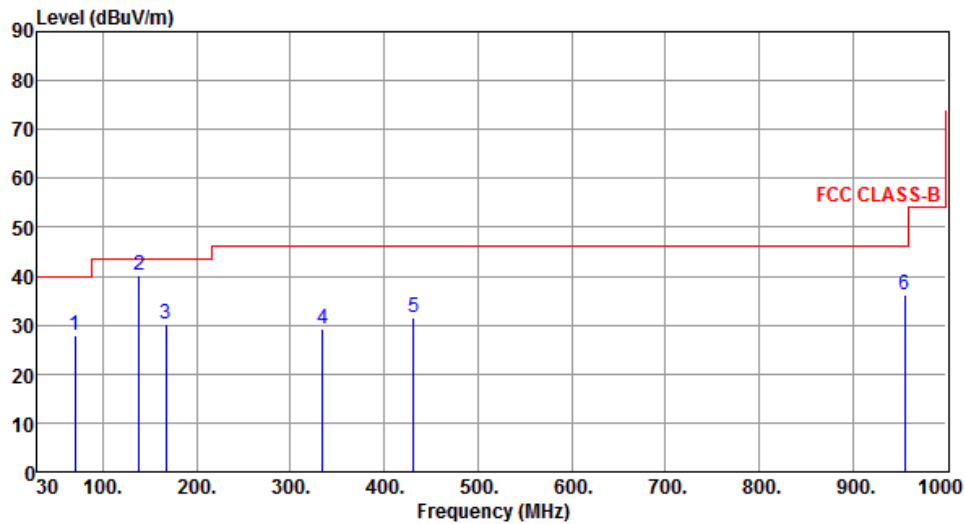


The graph displays the emission level in dBuV/m on the y-axis (0 to 90) against frequency in MHz on the x-axis (30 to 1000). A red line represents the FCC CLASS-B limit, which is 40 dBuV/m from 30 to 100 MHz, 45 dBuV/m from 100 to 300 MHz, and 55 dBuV/m from 300 to 1000 MHz. Six blue vertical lines represent measured emissions at 69.77, 98.87, 139.82, 164.83, 334.58, and 431.58 MHz, labeled 1 through 6 respectively.

	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	69.77	29.43	40.00	-10.57	40.24	-10.81	Peak	---	---
2	98.87	32.91	43.50	-10.59	46.25	-13.34	Peak	---	---
3	139.82	42.45	43.50	-1.05	51.21	-8.76	QP	200	242
4	164.83	35.75	43.50	-7.75	44.17	-8.42	Peak	---	---
5	334.58	33.94	46.00	-12.06	40.93	-6.99	Peak	---	---
6	431.58	37.87	46.00	-8.13	42.40	-4.53	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	69.77	28.04	40.00	-11.96	38.85	-10.81	Peak	---	---
2	138.64	40.04	43.50	-3.46	48.84	-8.80	Peak	---	---
3	166.77	30.28	43.50	-13.22	38.71	-8.43	Peak	---	---
4	334.58	29.21	46.00	-16.79	36.20	-6.99	Peak	---	---
5	431.58	31.64	46.00	-14.36	36.17	-4.53	Peak	---	---
6	955.38	36.21	46.00	-9.79	32.12	4.09	Peak	---	---

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

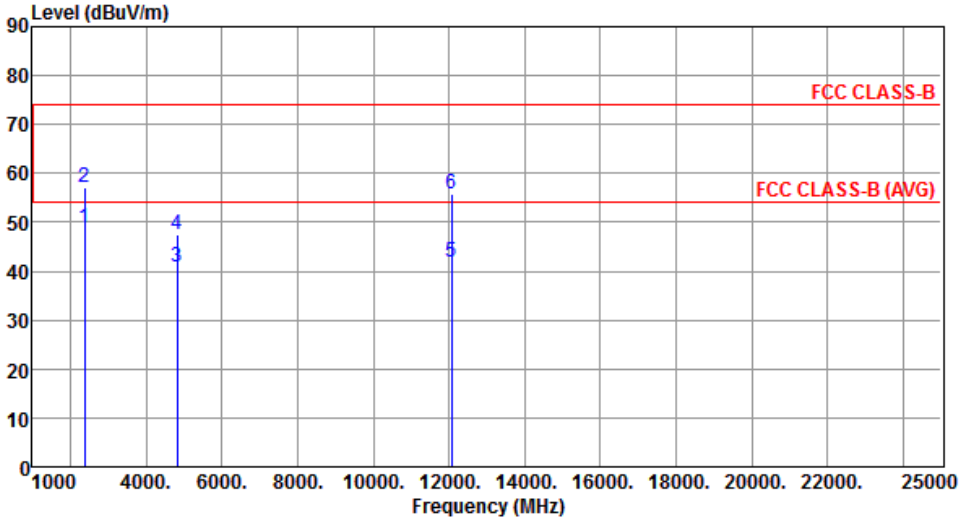
*Factor includes antenna factor , cable loss and amplifier gain

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

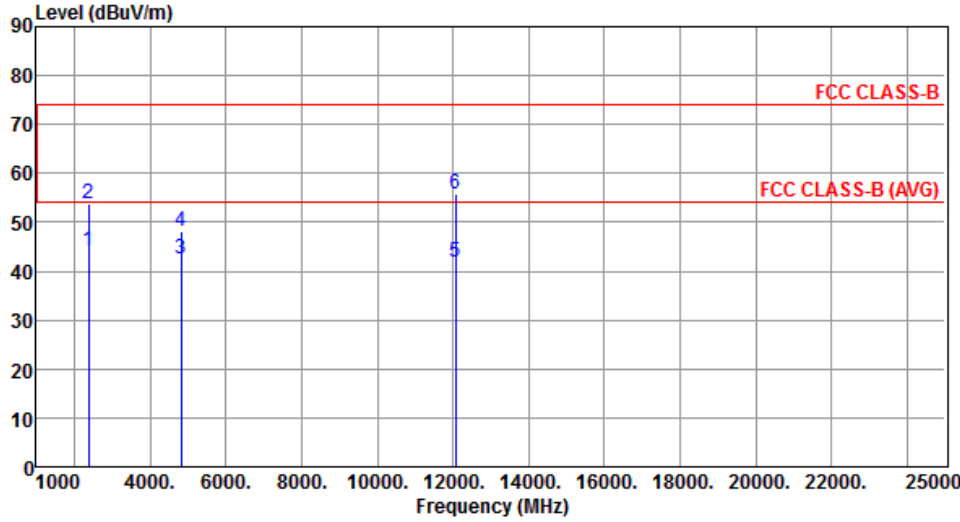
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	48.86	54.00	-5.14	52.23	-3.37	Average	100	53
2	2390.00	57.25	74.00	-16.75	60.62	-3.37	Peak	100	53
3	4824.00	40.94	54.00	-13.06	36.99	3.95	Average	100	245
4	4824.00	47.47	74.00	-26.53	43.52	3.95	Peak	100	245
5	12060.00	42.00	54.00	-12.00	28.64	13.36	Average	100	260
6	12060.00	55.94	74.00	-18.06	42.58	13.36	Peak	100	260

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).

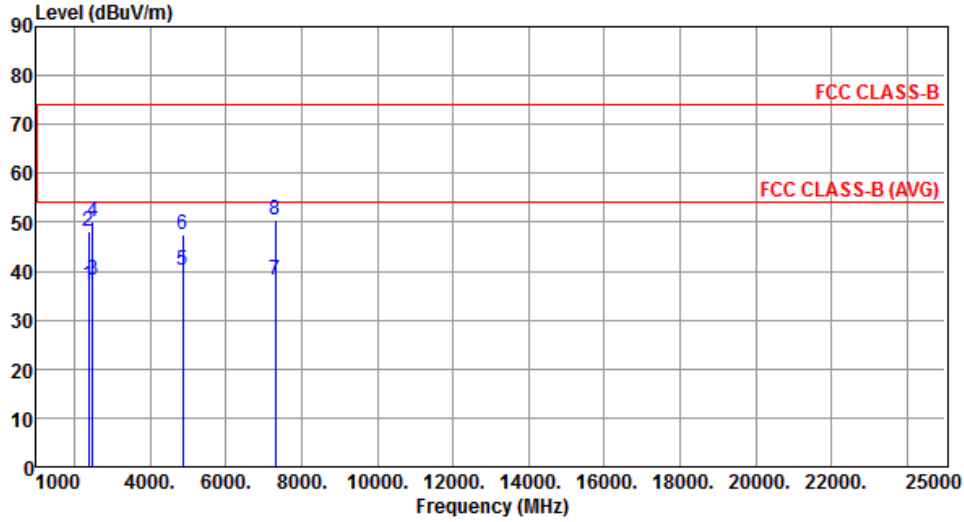
Modulation	11b	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	44.12	54.00	-9.88	47.49	-3.37	Average	315	104
2	2390.00	53.81	74.00	-20.19	57.18	-3.37	Peak	315	104
3	4824.00	42.52	54.00	-11.48	38.57	3.95	Average	258	243
4	4824.00	48.16	74.00	-25.84	44.21	3.95	Peak	258	243
5	12060.00	41.97	54.00	-12.03	28.61	13.36	Average	100	251
6	12060.00	55.72	74.00	-18.28	42.36	13.36	Peak	100	251

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		

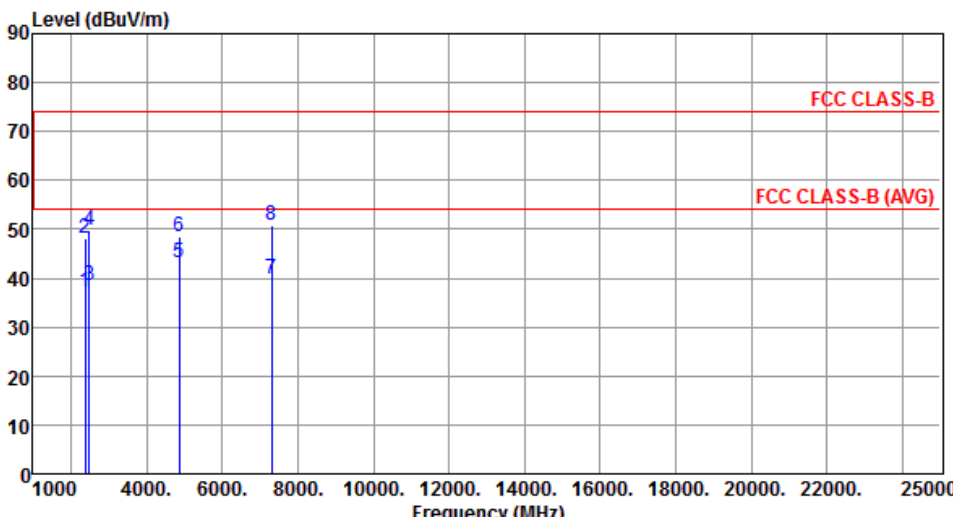


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.20	54.00	-16.80	40.57	-3.37	Average	202	106
2	2390.00	48.21	74.00	-25.79	51.58	-3.37	Peak	202	106
3	2483.50	38.29	54.00	-15.71	41.25	-2.96	Average	202	106
4	2483.50	50.25	74.00	-23.75	53.21	-2.96	Peak	202	106
5	4874.00	40.26	54.00	-13.74	36.16	4.10	Average	104	240
6	4874.00	47.50	74.00	-26.50	43.40	4.10	Peak	104	240
7	7311.00	38.09	54.00	-15.91	29.46	8.63	Average	205	327
8	7311.00	50.60	74.00	-23.40	41.97	8.63	Peak	205	327

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		

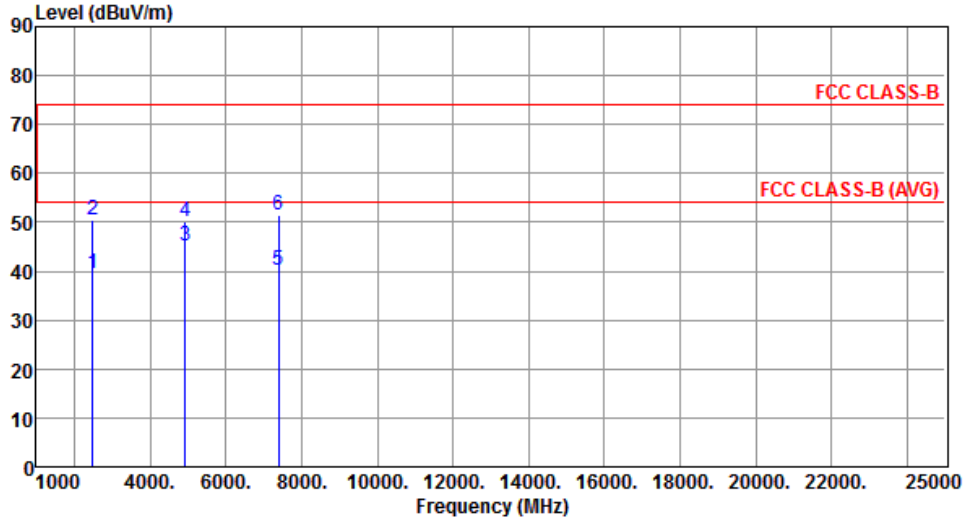


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2390.00	37.32	54.00	-16.68	40.69	-3.37	Average	312	108
2	2390.00	48.21	74.00	-25.79	51.58	-3.37	Peak	312	108
3	2483.50	38.40	54.00	-15.60	41.36	-2.96	Average	312	108
4	2483.50	49.73	74.00	-24.27	52.69	-2.96	Peak	312	108
5	4874.00	43.23	54.00	-10.77	39.13	4.10	Average	312	108
6	4874.00	48.45	74.00	-25.55	44.35	4.10	Peak	312	108
7	7311.00	39.79	54.00	-14.21	31.16	8.63	Average	294	302
8	7311.00	50.98	74.00	-23.02	42.35	8.63	Peak	294	302

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		
Level (dBUV/m) </			

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

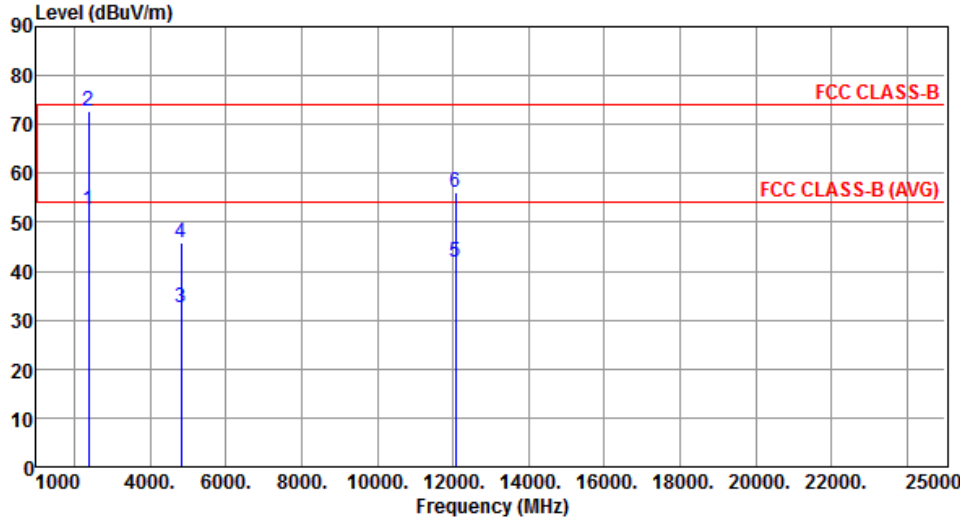


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	39.63	54.00	-14.37	42.59	-2.96	Average	285	107
2	2483.50	50.37	74.00	-23.63	53.33	-2.96	Peak	285	107
3	4924.00	45.00	54.00	-9.00	40.75	4.25	Average	248	226
4	4924.00	49.98	74.00	-24.02	45.73	4.25	Peak	248	226
5	7386.00	40.25	54.00	-13.75	31.49	8.76	Average	288	312
6	7386.00	51.37	74.00	-22.63	42.61	8.76	Peak	288	312

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

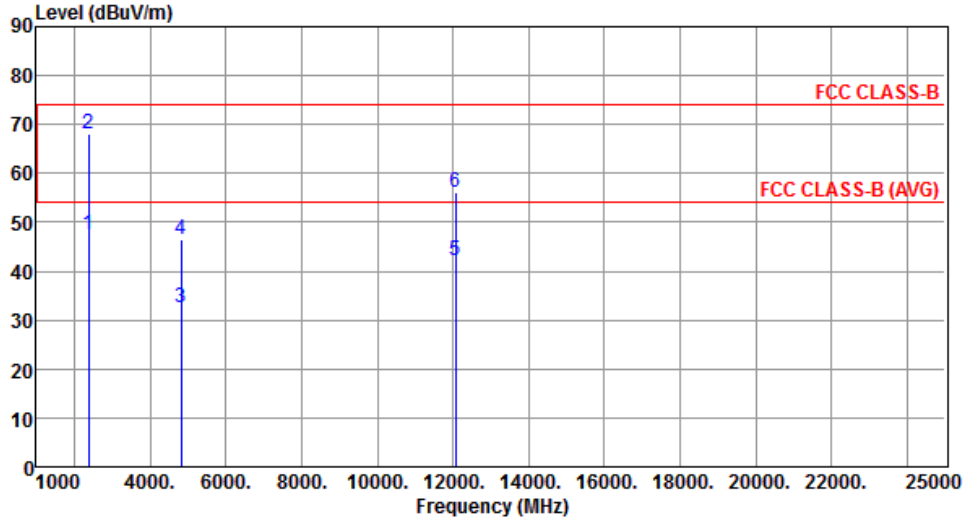
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	52.62	54.00	-1.38	55.99	-3.37	Average	100	54
2	2390.00	72.78	74.00	-1.22	76.15	-3.37	Peak	100	54
3	4824.00	32.40	54.00	-21.60	28.45	3.95	Average	100	245
4	4824.00	45.91	74.00	-28.09	41.96	3.95	Peak	100	245
5	12060.00	41.91	54.00	-12.09	28.55	13.36	Average	100	253
6	12060.00	56.16	74.00	-17.84	42.80	13.36	Peak	100	253

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).

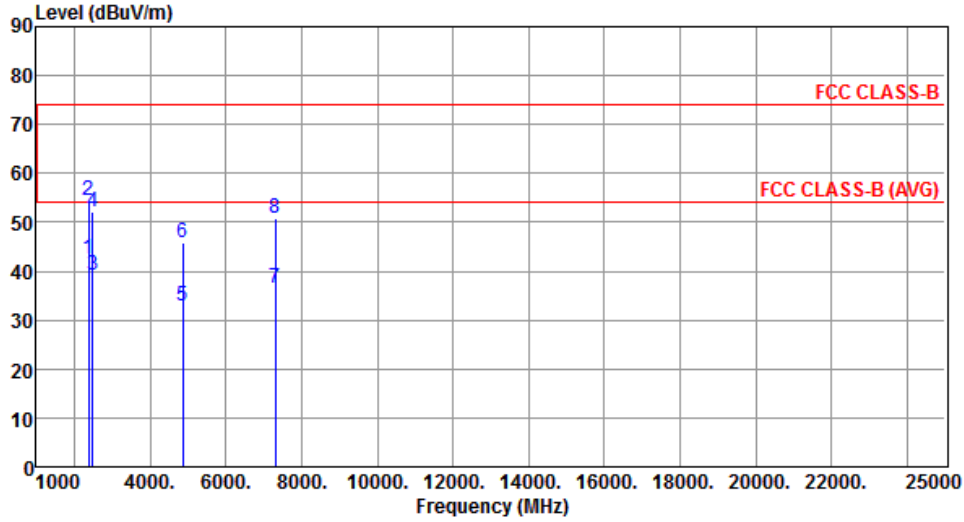
Modulation	11g	Test Freq. (MHz)	2412
Polarization	Vertical		



	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	47.40	54.00	-6.60	50.77	-3.37	Average	263	106
2	2390.00	67.93	74.00	-6.07	71.30	-3.37	Peak	263	106
3	4824.00	32.62	54.00	-21.38	28.67	3.95	Average	100	234
4	4824.00	46.64	74.00	-27.36	42.69	3.95	Peak	100	234
5	12060.00	42.04	54.00	-11.96	28.68	13.36	Average	100	251
6	12060.00	56.03	74.00	-17.97	42.67	13.36	Peak	100	251

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).

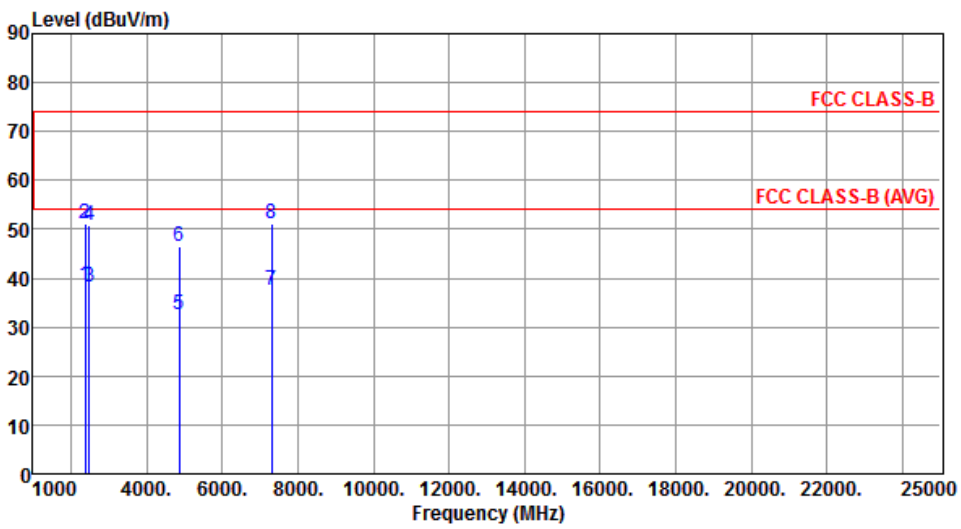
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	42.54	54.00	-11.46	45.91	-3.37	Average	100	53
2	2390.00	54.50	74.00	-19.50	57.87	-3.37	Peak	100	53
3	2483.50	39.05	54.00	-14.95	42.01	-2.96	Average	100	53
4	2483.50	52.12	74.00	-21.88	55.08	-2.96	Peak	100	53
5	4874.00	32.79	54.00	-21.21	28.69	4.10	Average	100	236
6	4874.00	45.79	74.00	-28.21	41.69	4.10	Peak	100	236
7	7311.00	36.59	54.00	-17.41	27.96	8.63	Average	100	330
8	7311.00	50.93	74.00	-23.07	42.30	8.63	Peak	100	330

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).

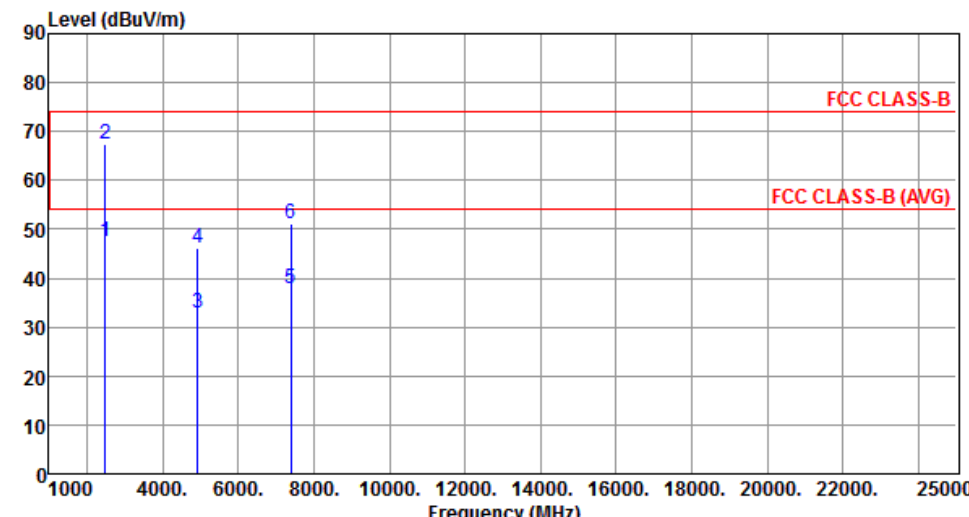
Modulation	11g	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	38.50	54.00	-15.50	41.87	-3.37	Average	271	101
2	2390.00	51.17	74.00	-22.83	54.54	-3.37	Peak	271	101
3	2483.50	38.15	54.00	-15.85	41.11	-2.96	Average	271	101
4	2483.50	50.74	74.00	-23.26	53.70	-2.96	Peak	271	101
5	4874.00	32.57	54.00	-21.43	28.47	4.10	Average	100	231
6	4874.00	46.44	74.00	-27.56	42.34	4.10	Peak	100	231
7	7311.00	37.38	54.00	-16.62	28.75	8.63	Average	100	299
8	7311.00	51.10	74.00	-22.90	42.47	8.63	Peak	100	299

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).

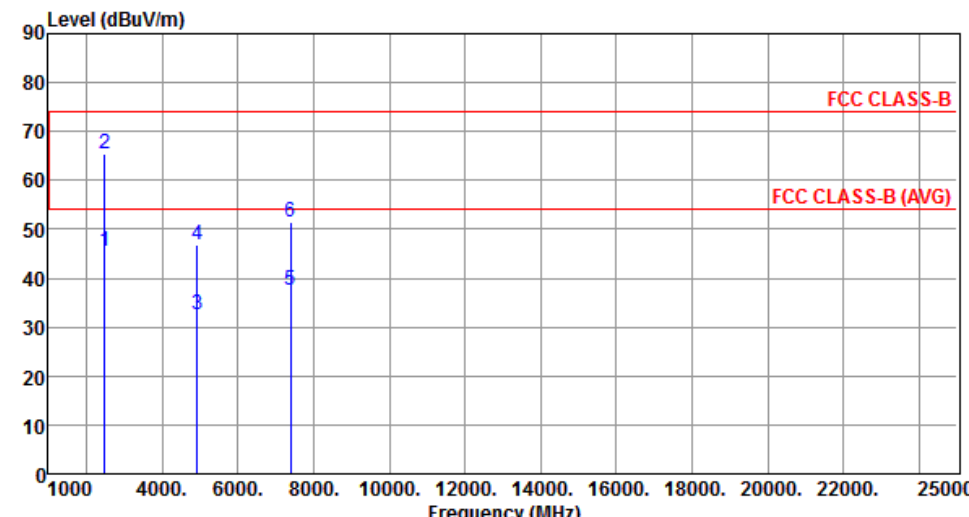
Modulation	11g	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	47.35	54.00	-6.65	50.31	-2.96	Average	312	62
2	2483.50	67.35	74.00	-6.65	70.31	-2.96	Peak	312	62
3	4924.00	32.79	54.00	-21.21	28.54	4.25	Average	100	250
4	4924.00	46.06	74.00	-27.94	41.81	4.25	Peak	100	250
5	7386.00	37.73	54.00	-16.27	28.97	8.76	Average	100	332
6	7386.00	51.29	74.00	-22.71	42.53	8.76	Peak	100	332

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		

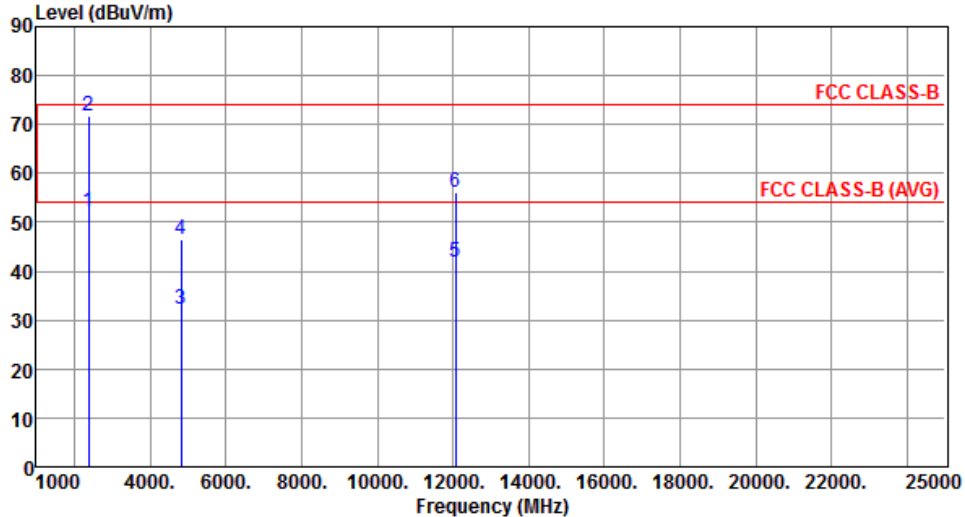


	Freq. MHz	Emission level dBUV/m	Limit dBUV/m	Margin dB	SA reading dBUV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	45.59	54.00	-8.41	48.55	-2.96	Average	289	105
2	2483.50	65.41	74.00	-8.59	68.37	-2.96	Peak	289	105
3	4924.00	32.66	54.00	-21.34	28.41	4.25	Average	100	253
4	4924.00	46.72	74.00	-27.28	42.47	4.25	Peak	100	253
5	7386.00	37.65	54.00	-16.35	28.89	8.76	Average	100	303
6	7386.00	51.42	74.00	-22.58	42.66	8.76	Peak	100	303

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

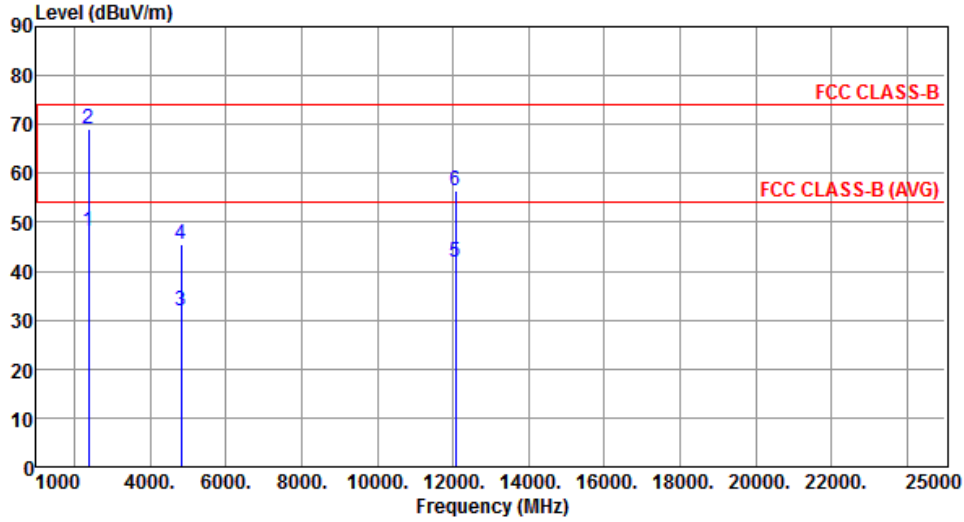
Modulation	HT20	Test Freq. (MHz)	2412
Polarization	Horizontal		



	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	52.09	54.00	-1.91	55.46	-3.37	Average	103	52
2	2390.00	71.88	74.00	-2.12	75.25	-3.37	Peak	103	52
3	4824.00	32.26	54.00	-21.74	28.31	3.95	Average	100	245
4	4824.00	46.62	74.00	-27.38	42.67	3.95	Peak	100	245
5	12060.00	42.00	54.00	-12.00	28.64	13.36	Average	100	248
6	12060.00	56.20	74.00	-17.80	42.84	13.36	Peak	100	248

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		

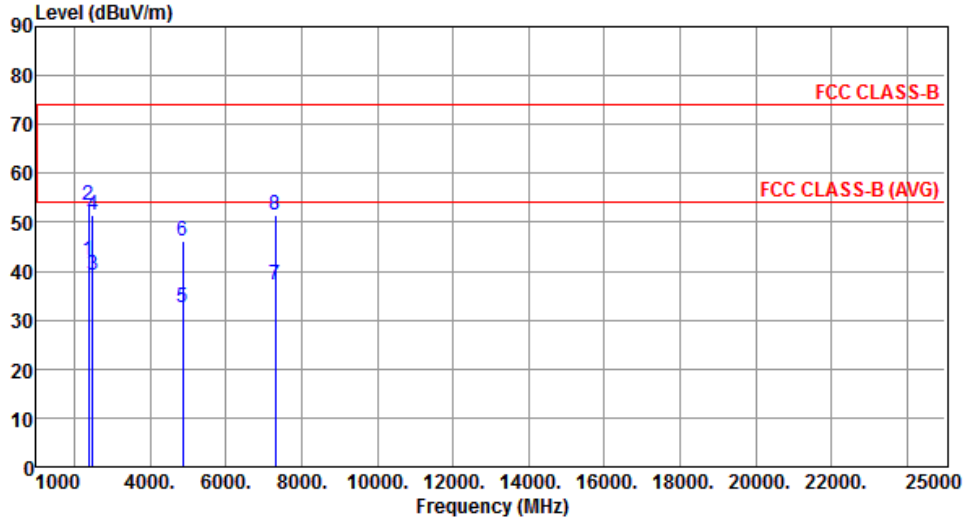


The graph displays the emission level in dBUV/m against frequency in MHz. Two horizontal red lines represent the FCC CLASS-B limit at approximately 74 dBUV/m and the FCC CLASS-B (AVG) limit at approximately 54 dBUV/m. Six data points are plotted as vertical blue lines with labels 1 through 6. Points 1 and 2 are at 2390 MHz, point 3 is at 4824 MHz, and points 4, 5, and 6 are at 12060 MHz. The peak levels for points 2, 4, and 6 exceed the FCC CLASS-B limit.

	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	48.30	54.00	-5.70	51.67	-3.37	Average	269	103
2	2390.00	68.94	74.00	-5.06	72.31	-3.37	Peak	269	103
3	4824.00	31.83	54.00	-22.17	27.88	3.95	Average	100	235
4	4824.00	45.61	74.00	-28.39	41.66	3.95	Peak	100	235
5	12060.00	41.94	54.00	-12.06	28.58	13.36	Average	100	236
6	12060.00	56.32	74.00	-17.68	42.96	13.36	Peak	100	236

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).

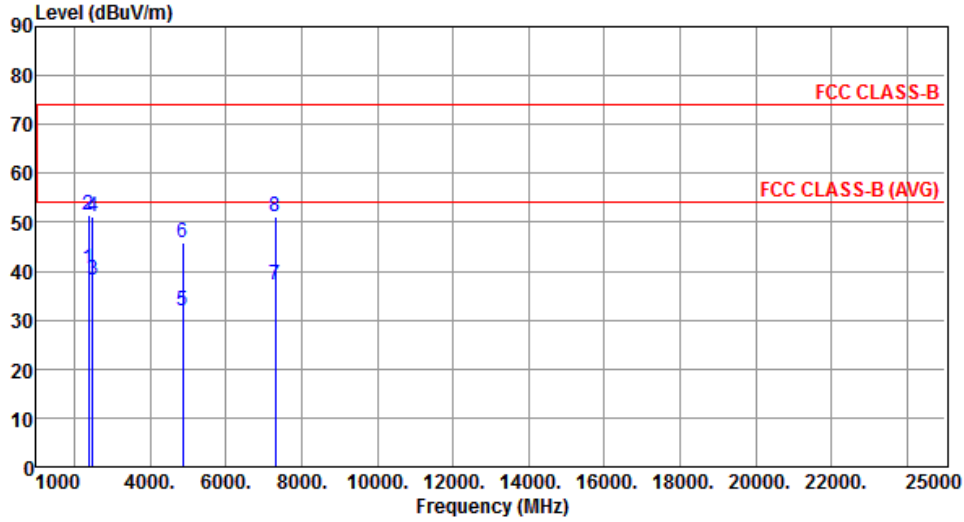
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Horizontal		



	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	42.19	54.00	-11.81	45.56	-3.37	Average	100	53
2	2390.00	53.47	74.00	-20.53	56.84	-3.37	Peak	100	53
3	2483.50	39.06	54.00	-14.94	42.02	-2.96	Average	100	53
4	2483.50	51.57	74.00	-22.43	54.53	-2.96	Peak	100	53
5	4874.00	32.51	54.00	-21.49	28.41	4.10	Average	100	238
6	4874.00	46.28	74.00	-27.72	42.18	4.10	Peak	100	238
7	7311.00	37.20	54.00	-16.80	28.57	8.63	Average	100	330
8	7311.00	51.60	74.00	-22.40	42.97	8.63	Peak	100	330

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).

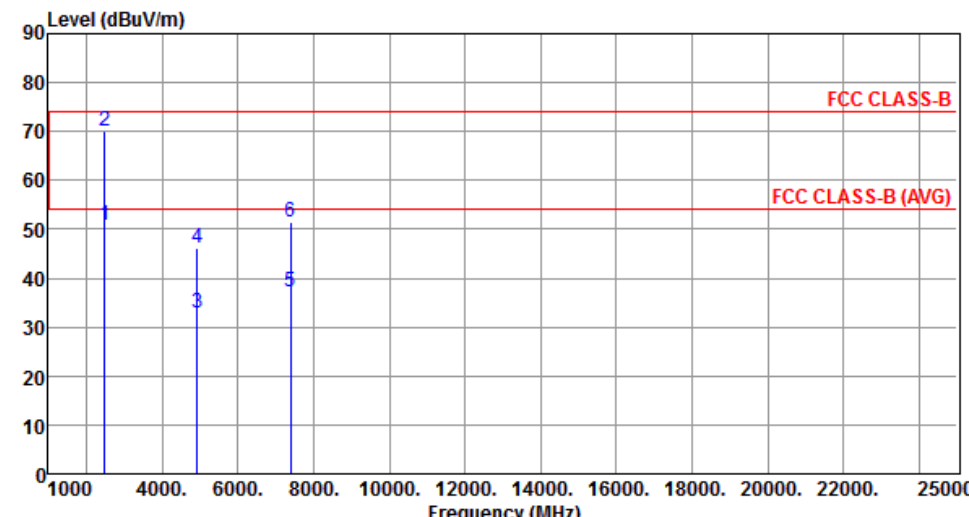
Modulation	HT20	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	40.37	54.00	-13.63	43.74	-3.37	Average	278	105
2	2390.00	51.58	74.00	-22.42	54.95	-3.37	Peak	278	105
3	2483.50	38.25	54.00	-15.75	41.21	-2.96	Average	278	105
4	2483.50	51.25	74.00	-22.75	54.21	-2.96	Peak	278	105
5	4874.00	31.88	54.00	-22.12	27.78	4.10	Average	100	238
6	4874.00	45.68	74.00	-28.32	41.58	4.10	Peak	100	238
7	7311.00	37.04	54.00	-16.96	28.41	8.63	Average	100	298
8	7311.00	51.10	74.00	-22.90	42.47	8.63	Peak	100	298

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).

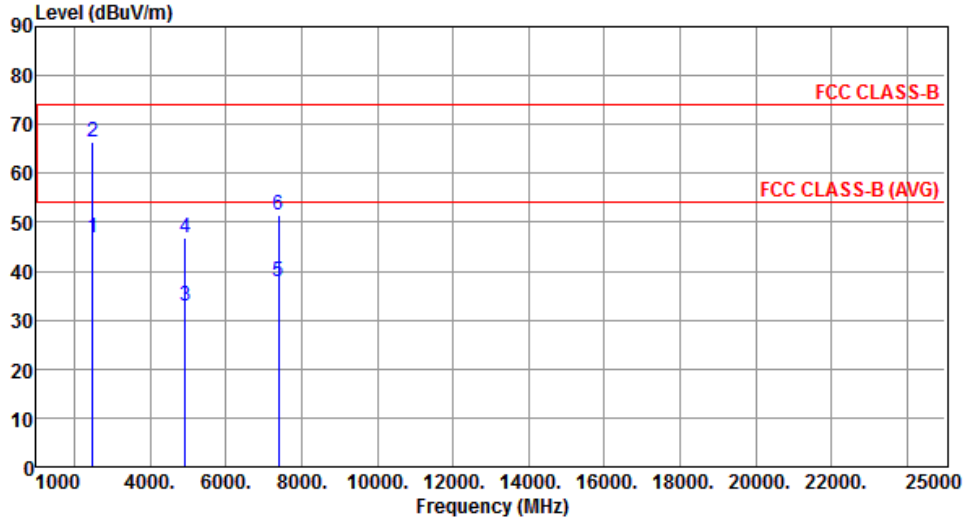
Modulation	HT20	Test Freq. (MHz)	2462
Polarization	Horizontal		



	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	50.69	54.00	-3.31	53.65	-2.96	Average	100	54
2	2483.50	70.09	74.00	-3.91	73.05	-2.96	Peak	100	54
3	4924.00	32.95	54.00	-21.05	28.70	4.25	Average	100	241
4	4924.00	46.12	74.00	-27.88	41.87	4.25	Peak	100	241
5	7386.00	37.17	54.00	-16.83	28.41	8.76	Average	100	321
6	7386.00	51.42	74.00	-22.58	42.66	8.76	Peak	100	321

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		

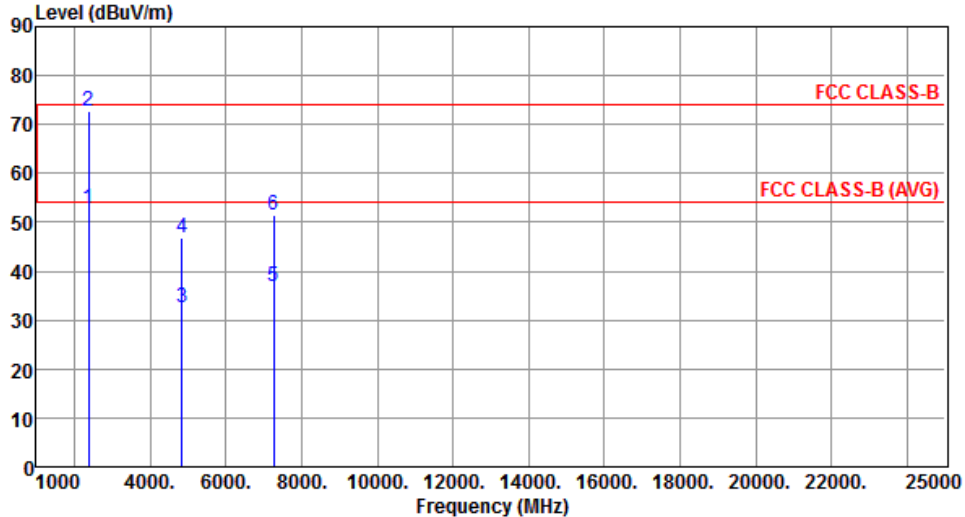


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	2483.50	46.79	54.00	-7.21	49.75	-2.96	Average	324	109
2	2483.50	66.27	74.00	-7.73	69.23	-2.96	Peak	324	109
3	4924.00	32.73	54.00	-21.27	28.48	4.25	Average	100	242
4	4924.00	46.94	74.00	-27.06	42.69	4.25	Peak	100	242
5	7386.00	37.71	54.00	-16.29	28.95	8.76	Average	100	301
6	7386.00	51.35	74.00	-22.65	42.59	8.76	Peak	100	301

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).

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

Modulation	HT40	Test Freq. (MHz)	2422
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	52.78	54.00	-1.22	56.15	-3.37	Average	106	54
2	2390.00	72.69	74.00	-1.31	76.06	-3.37	Peak	106	54
3	4844.00	32.65	54.00	-21.35	28.63	4.02	Average	100	241
4	4844.00	46.70	74.00	-27.30	42.68	4.02	Peak	100	241
5	7266.00	36.85	54.00	-17.15	28.31	8.54	Average	100	312
6	7266.00	51.54	74.00	-22.46	43.00	8.54	Peak	100	312

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	HT40		Test Freq. (MHz)		2422	
Polarization	Vertical					
Level (dBuV/m)						

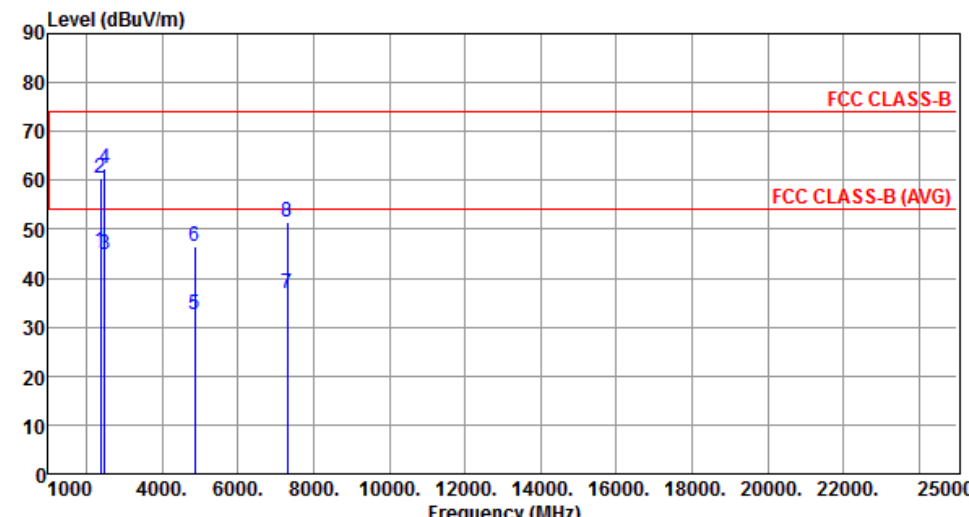
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Horizontal		

	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	50.96	54.00	-3.04	54.33	-3.37	Average	100	54
2	2390.00	68.38	74.00	-5.62	71.75	-3.37	Peak	100	54
3	2483.50	47.69	54.00	-6.31	50.65	-2.96	Average	100	54
4	2483.50	63.00	74.00	-11.00	65.96	-2.96	Peak	100	54
5	4874.00	31.90	54.00	-22.10	27.80	4.10	Average	100	238
6	4874.00	46.46	74.00	-27.54	42.36	4.10	Peak	100	238
7	7311.00	37.14	54.00	-16.86	28.51	8.63	Average	100	338
8	7311.00	51.21	74.00	-22.79	42.58	8.63	Peak	100	338

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).

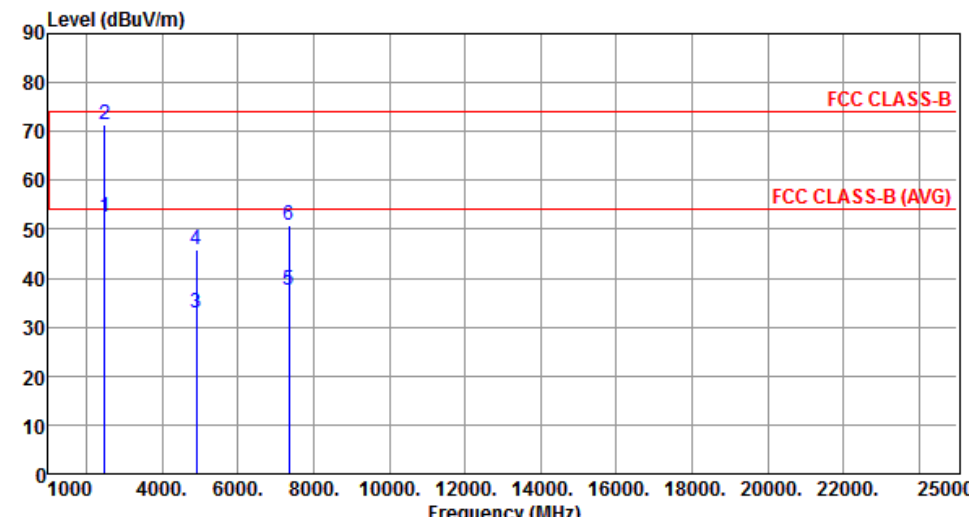
Modulation	HT40	Test Freq. (MHz)	2437
Polarization	Vertical		



	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	45.49	54.00	-8.51	48.86	-3.37	Average	282	109
2	2390.00	60.42	74.00	-13.58	63.79	-3.37	Peak	282	109
3	2483.50	44.84	54.00	-9.16	47.80	-2.96	Average	282	109
4	2483.50	62.54	74.00	-11.46	65.50	-2.96	Peak	282	109
5	4874.00	32.51	54.00	-21.49	28.41	4.10	Average	100	236
6	4874.00	46.36	74.00	-27.64	42.26	4.10	Peak	100	236
7	7311.00	36.77	54.00	-17.23	28.14	8.63	Average	100	303
8	7311.00	51.32	74.00	-22.68	42.69	8.63	Peak	100	303

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).

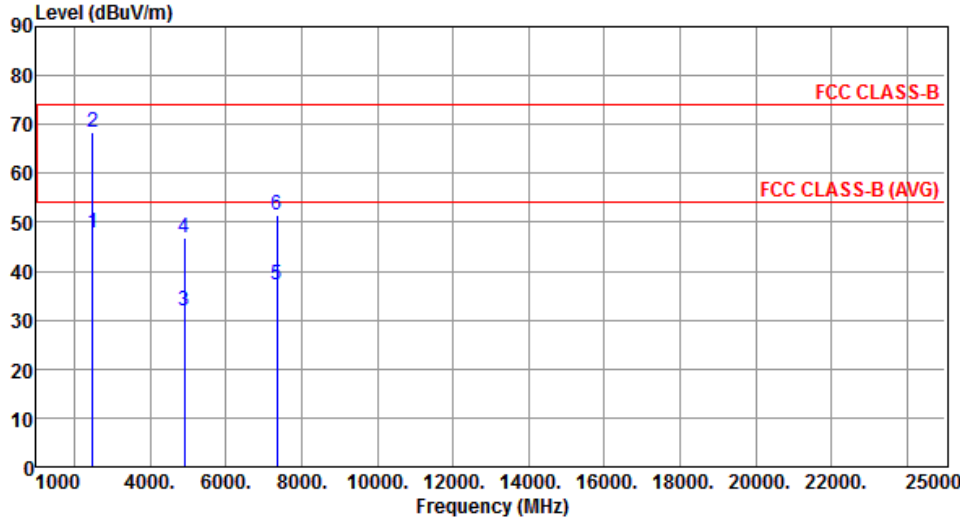
Modulation	HT40	Test Freq. (MHz)	2452
Polarization	Horizontal		



	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	52.38	54.00	-1.62	55.34	-2.96	Average	209	72
2	2483.50	71.39	74.00	-2.61	74.35	-2.96	Peak	209	72
3	4904.00	32.87	54.00	-21.13	28.67	4.20	Average	100	248
4	4904.00	45.84	74.00	-28.16	41.64	4.20	Peak	100	248
5	7356.00	37.69	54.00	-16.31	28.97	8.72	Average	100	320
6	7356.00	50.94	74.00	-23.06	42.22	8.72	Peak	100	320

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	HT40	Test Freq. (MHz)	2452
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	47.68	54.00	-6.32	50.64	-2.96	Average	299	106
2	2483.50	68.44	74.00	-5.56	71.40	-2.96	Peak	299	106
3	4904.00	31.99	54.00	-22.01	27.79	4.20	Average	100	242
4	4904.00	46.91	74.00	-27.09	42.71	4.20	Peak	100	242
5	7356.00	37.32	54.00	-16.68	28.60	8.72	Average	100	301
6	7356.00	51.55	74.00	-22.45	42.83	8.72	Peak	100	301

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

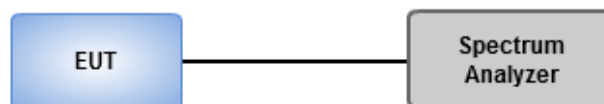
Reference level measurement

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

Summary

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
802.11b_Nss1 ,(1Mbps)_1TX	Pass	2.4123 6G	9.91	-10.09	2.1339 9G	-35.55	2.3965 6G	-29.31	2.5062 2G	-34.71	24.971 9G	-36.11	1
802.11g_Nss1 ,(6Mbps)_1TX	Pass	2.4113 6G	4.66	-15.34	2.1130 2G	-35.18	2.3992 G	-25.98	2.5079 8G	-34.29	24.980 33G	-36.47	1
802.11n HT20_Nss1 ,(MCS0)_1TX	Pass	2.4108 6G	3.50	-16.50	2.1141 9G	-35.62	2.398 G	-28.82	2.5139 G	-34.67	24.513 95G	-36.22	1
802.11n HT40_Nss1 ,(MCS0)_1TX	Pass	2.4203 7G	-0.30	-20.30	1.8448 3G	-35.46	2.3995 2G	-32.17	2.5587 G	-35.23	16.608 75G	-35.85	1

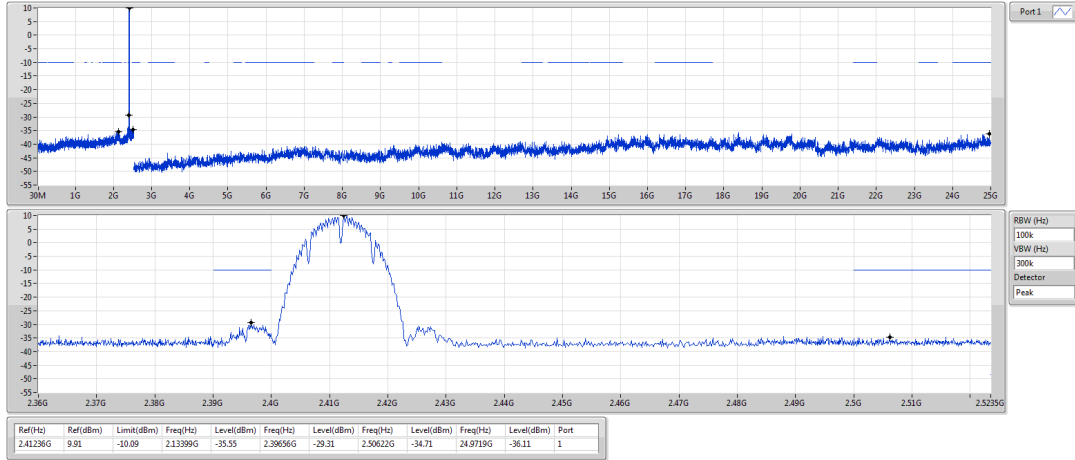
Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
802.11b_Nss1 ,(1Mbps)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.412 36G	9.91	-10.09	2.133 99G	-35.55	2.396 56G	-29.31	2.506 22G	-34.71	24.971 9G	-36.11	1
2437MHz	Pass	2.436 57G	9.88	-10.12	2.117 68G	-35.62	2.392 64G	-35.51	2.522 38G	-33.82	24.792 09G	-34.90	1
2462MHz	Pass	2.462 96G	9.70	-10.30	2.130 5G	-34.79	2.395 44G	-35.11	2.500 3G	-34.26	17.018 03G	-35.99	1
802.11g_Nss1 ,(6Mbps)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.411 36G	4.66	-15.34	2.113 02G	-35.18	2.399 2G	-25.98	2.507 98G	-34.29	24.980 33G	-36.47	1
2437MHz	Pass	2.436 41G	5.88	-14.12	2.114 19G	-36.32	2.393 6G	-34.68	2.516 46G	-34.25	16.284 74G	-35.90	1
2462MHz	Pass	2.462 63G	5.95	-14.05	2.110 69G	-36.12	2.394 4G	-35.07	2.511 5G	-33.76	16.950 6G	-35.99	1
802.11n HT20_Nss1 ,(MCS0)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2412MHz	Pass	2.410 86G	3.50	-16.50	2.114 19G	-35.62	2.398 G	-28.82	2.513 9G	-34.67	24.513 95G	-36.22	1
2437MHz	Pass	2.437 58G	5.61	-14.39	2.159 62G	-35.21	2.399 68G	-34.84	2.505 18G	-34.48	17.009 6G	-35.13	1
2462MHz	Pass	2.463 29G	5.64	-14.36	2.121 18G	-35.18	2.398 16G	-34.94	2.519 02G	-33.77	24.918 52G	-36.31	1
802.11n HT40_Nss1 ,(MCS0)_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
2422MHz	Pass	2.420 37G	-0.30	-20.30	1.844 83G	-35.46	2.399 52G	-32.17	2.558 7G	-35.23	16.608 75G	-35.85	1
2437MHz	Pass	2.435 4G	2.96	-17.04	2.131 08G	-35.21	2.399 84G	-31.95	2.505 74G	-34.87	15.071 85G	-35.52	1
2452MHz	Pass	2.454 28G	1.67	-18.33	2.123 06G	-35.32	2.392 48G	-36.02	2.516 3G	-34.99	17.035 04G	-36.19	1

802.11b_Nss1,(1Mbps)_1TX

CSE NdB

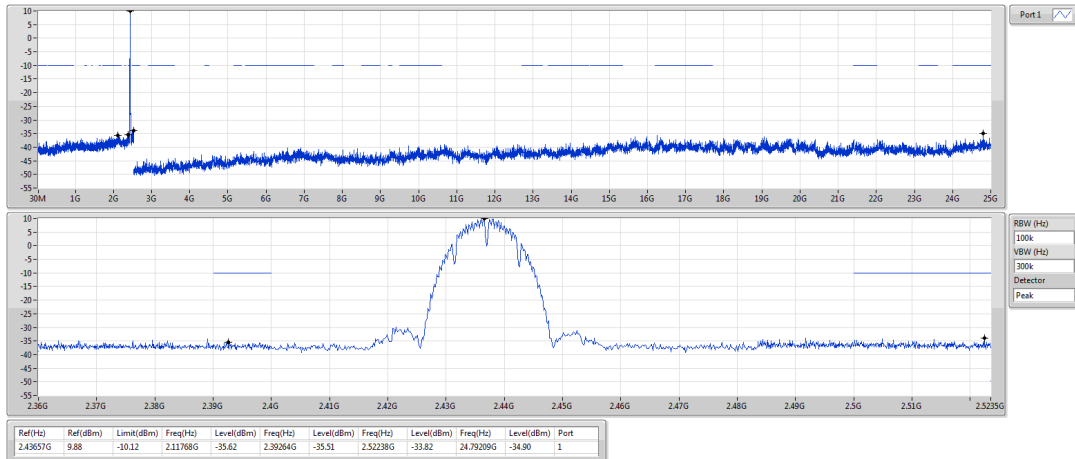
2412MHz



802.11b_Nss1,(1Mbps)_1TX

CSE NdB

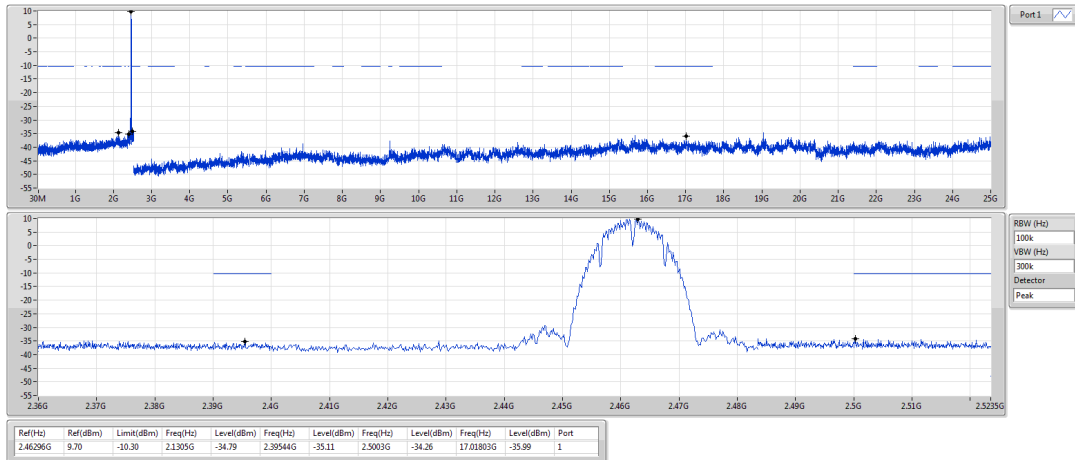
2437MHz



802.11b_Nss1,(1Mbps)_1TX

CSE NdB

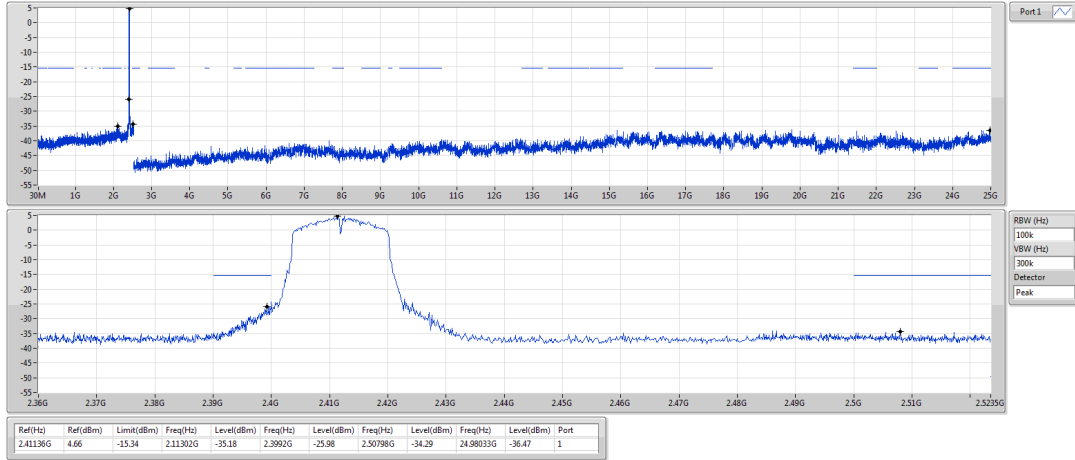
2462MHz



802.11g_Nss1,(6Mbps)_1TX

CSE NdB

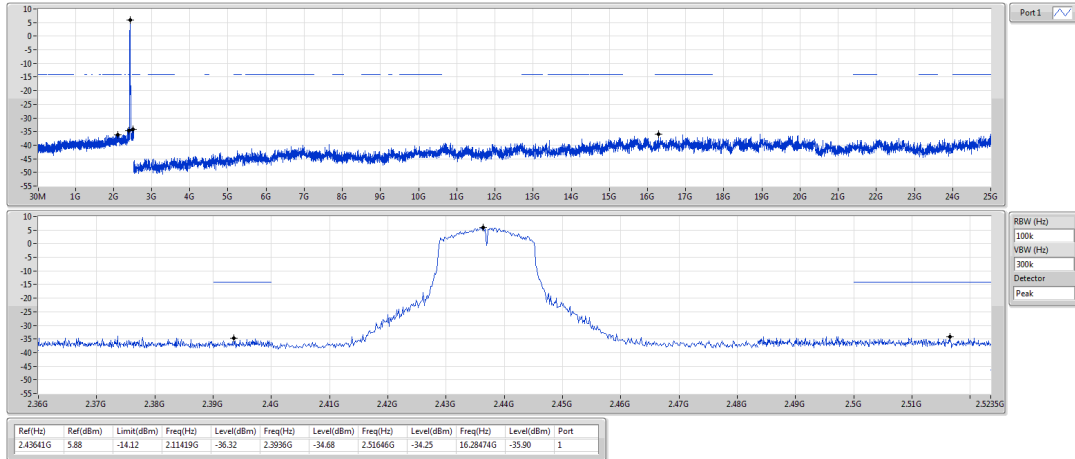
2412MHz



802.11g_Nss1,(6Mbps)_1TX

CSE NdB

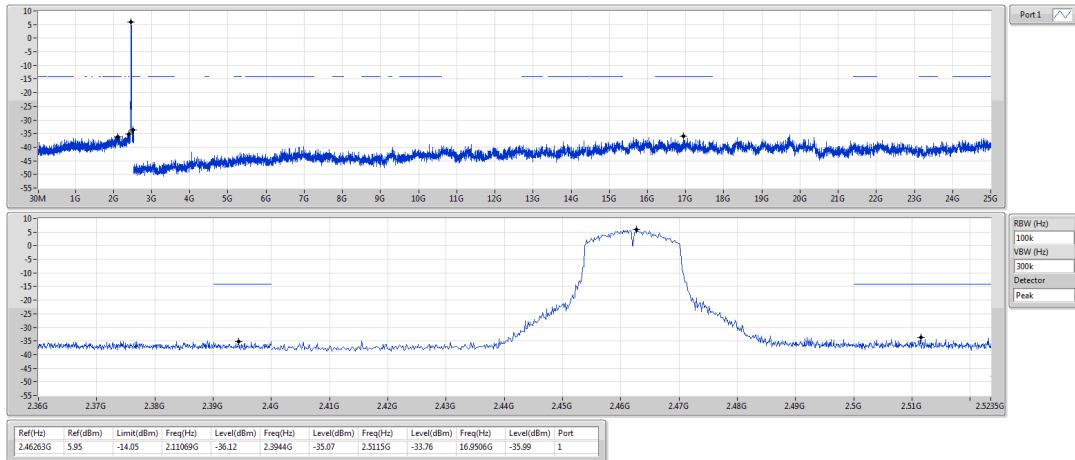
2437MHz



802.11g_Nss1,(6Mbps)_1TX

CSE NdB

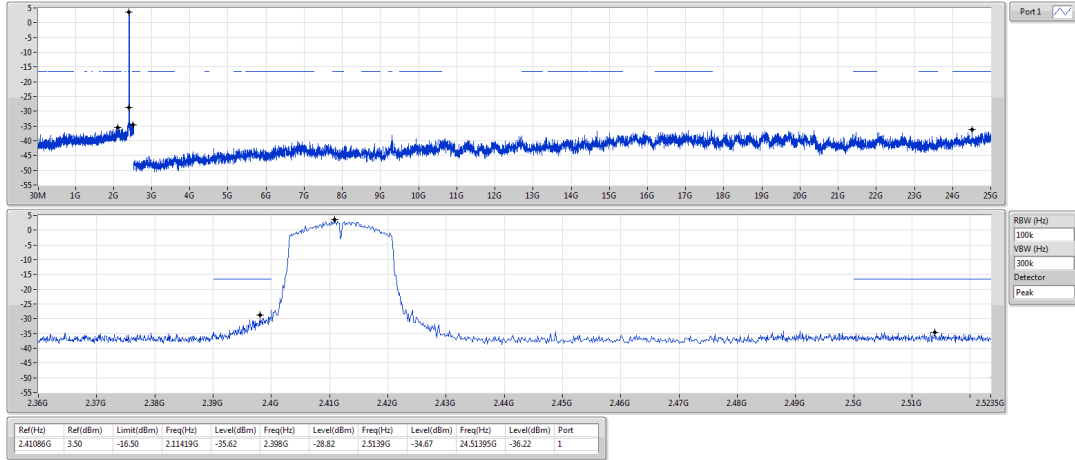
2462MHz



802.11n HT20_Nss1,(MCS0)_1TX

CSE NdB

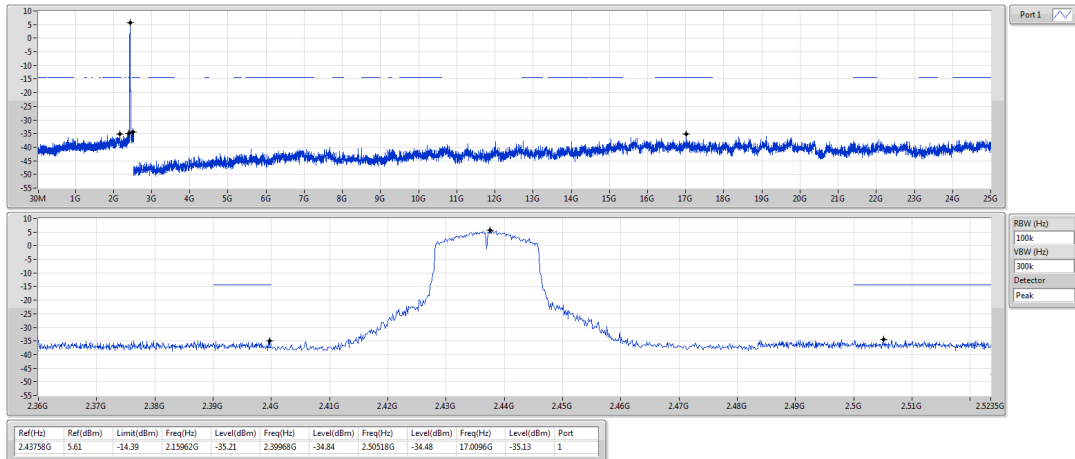
2412MHz



802.11n HT20_Nss1,(MCS0)_1TX

CSE NdB

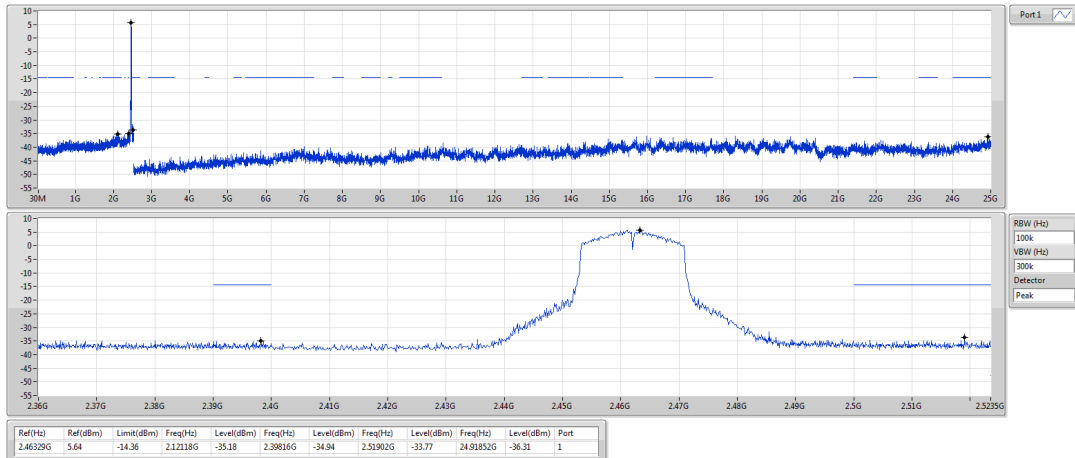
2437MHz



802.11n HT20_Nss1,(MCS0)_1TX

CSE NdB

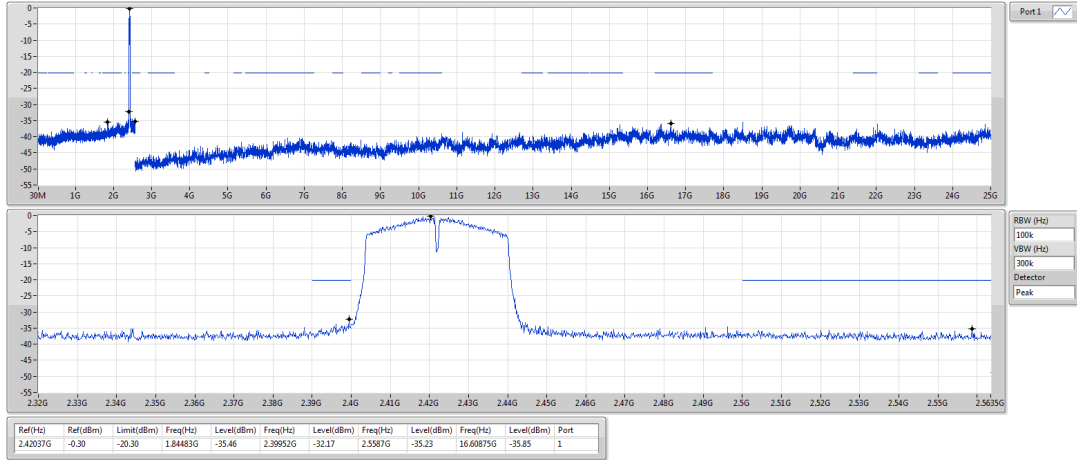
2462MHz



802.11n HT40_Nss1,(MCS0)_1TX

CSE NdB

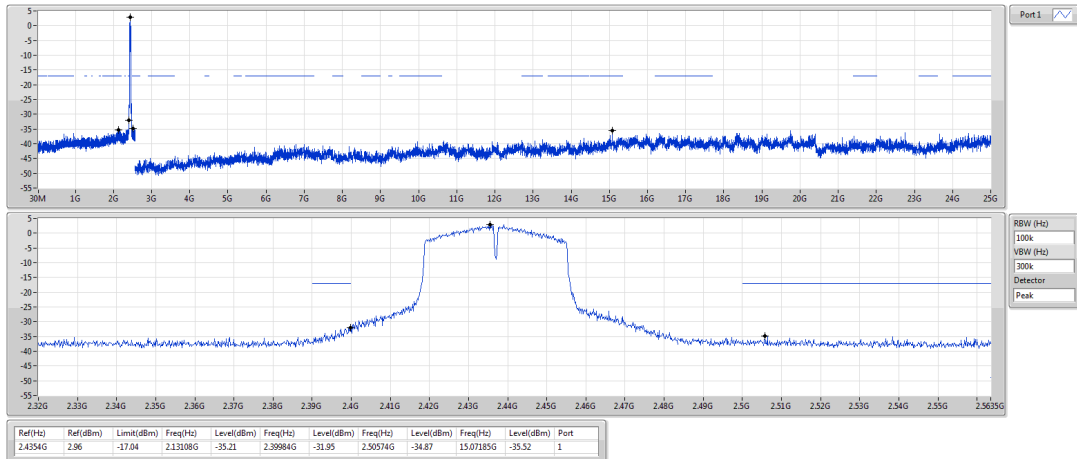
2422MHz



802.11n HT40_Nss1,(MCS0)_1TX

CSE NdB

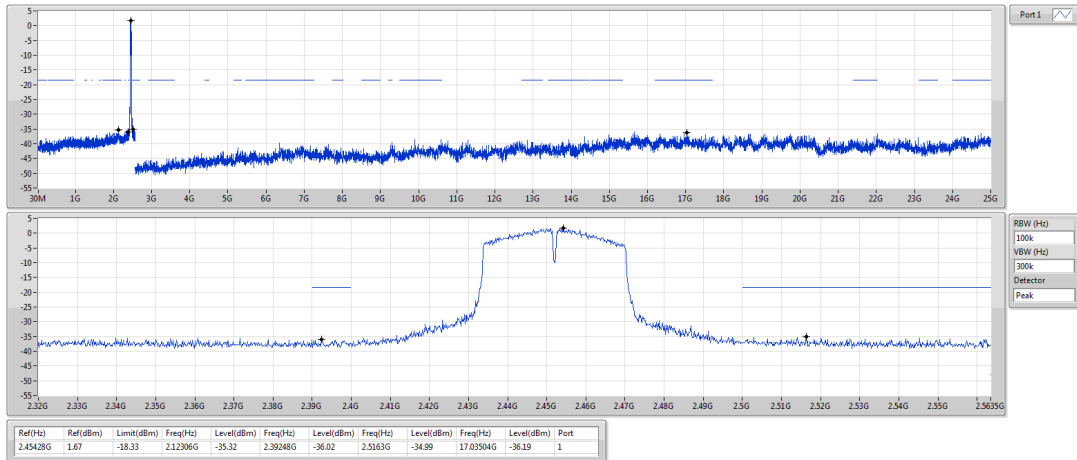
2437MHz



802.11n HT40_Nss1,(MCS0)_1TX

CSE NdB

2452MHz



4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

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No. 30-2, Ding Fwu Tsuen, Lin
Kou District, New Taipei City,
Taiwan, R.O.C.

Kwei Shan

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No. 3-1, Lane 6, Wen San 3rd St.,
Kwei Shan District, Tao Yuan City
333, Taiwan, R.O.C.

Kwei Shan Site II

Tel: 886-3-271-8640

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

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

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Fax: 886-3-318-0155

Email: ICC_Service@icertifi.com.tw

==END==