



Product Service

FCC&IC - TEST REPORT

Report Number : **68.950.12.182.01** Date of Issue: 6 January 2013

Model : **339918**

Product Type : MP7FSv1 Module

Applicant : ICON Health & Fitness Inc.

Address : 1500 South 1000 West, Logan, UT 84321, USA

Production Facility : Wanlida Group Co., Ltd.

Address : Wanlida Industry Zone, Nanjing, Fujian, China 363601

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including Appendices : 45

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test site1:

Company name: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch
6th Floor, H Hall,
Century Craftwork Culture Square,
No. 4001, Fuqiang Road,
Futian District 518048,
Shenzhen,P.R.C.

Telephone: 86 755 8828 6998

Fax: 86 755 8828 5299

Test site2:

Company name: Audix Technology (shenzhen) Co.,Ltd
Block Shenzhen, Science & Industry Park,
Nantou, Shenzhen,
Guangdong,
China

Telephone: 86 755 2663 9496

Fax: 86 755 2663 2877

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product: MP7FSv1 Module

Model no.: 339918

Options and accessories: NIL

Rating: DC 12V
Powered by external adaptor:
Adaptor Input: 100-240VAC, 50/60Hz, 1.5A Max
Adaptor Output: 12VDC, 3.3A

Antenna: Unique Antenna, NOT accessible by end user
Max. Gain: 1dBi

RF Transmission Frequency: 2412-2462MHz

Description of the EUT: NIL

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenovo	T400	----

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C, Intentional Radiators, 10-1-12 Edition	PART 15 – RADIO FREQUENCY DEVICES Subpart C – Intentional Radiators
RSS-210, Issue 8	RSS-210 — Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment
RSS-Gen, Issue 3	General Requirements and Information for the Certification of Radio Apparatus

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C 10-1-12 Edition, RSS-210 Issue 8, RSS-Gen Issue 3					
Test Condition	Pages	Test Result			Test Location
		Pass	Fail	N/A	
15.207 & RSSGEN 7.2.4 Conducted Emission AC Power Port	8	☒	☐	☐	Test Site2
15.247 (b) (1) & RSS-210 A8.4 Conducted peak output power	11	☒	☐	☐	Test Site2
15.247(d) & RSS-210 A8.5 Band edge compliance of RF emissions	12	☒	☐	☐	Test Site2
15.247(d) & RSS-210 A8.5 Spurious RF conducted emissions	25	☒	☐	☐	Test Site2
15.247(d) & 15.209 & RSS-210 2.5 & RSSGEN 7.2.5 & RSSGEN 6.1 Spurious radiated emissions for transmitter and receiver	31	☒	☐	☐	Test Site2
15.247(a)(2) & RSS-210 A8.2(a) 6dB bandwidth	36	☒	☐	☐	Test Site2
RSSGEN 4.6.1 99% Occupied Bandwidth	36	☒	☐	☐	Test Site2
15.247(e) & RSS-210 A8.2(b) Power spectral density	43	☒	☐	☐	Test Site2

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: OMC339918 and IC ID: 3673A-339918 comply with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules, and RSS-210, RSS-GEN.

SUMMARY:

All tests according to the regulations cited on page 5 were

☒ - Performed

☐ - **Not** Performed

The Equipment Under Test

☒ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: 20 November 2012

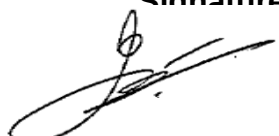
Testing Start Date: 25 November 2012

Testing End Date: 25 December 2012

- Jiangsu TÜV Product Service Ltd. – Shenzhen Branch -

Tested By EMC Project Engineer	<u>2012-12-25</u>	<u>Sunny Lu</u>	 Signature
	Date	Name	

Prepared By EMC Project Engineer	<u>2012-12-25</u>	<u>Peter Kang</u>	 Signature
	Date	Name	

Approved by EMC Project Manager	<u>2012-12-25</u>	<u>Ken Li</u>	 Signature
	Date	Name	

7 Technical Requirement

7.1 Conducted Emission

Test Method

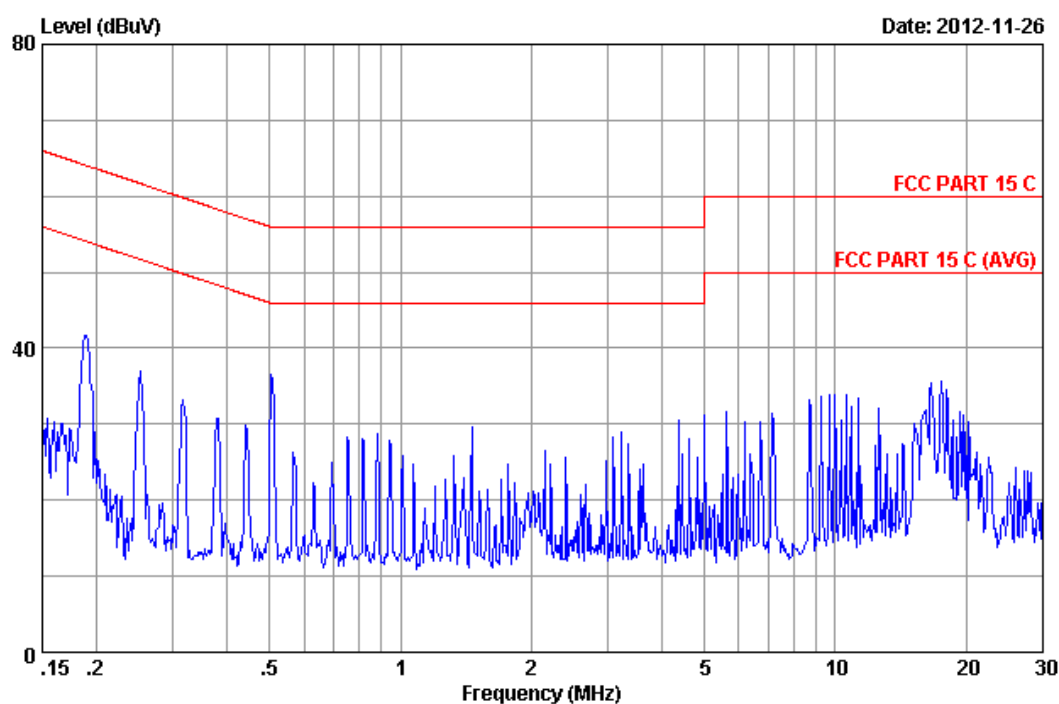
- 1 The EUT was placed on a table, which is 0.8m above ground plane
- 2 The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
- 3 Maximum procedure was performed to ensure EUT compliance
- 4 A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

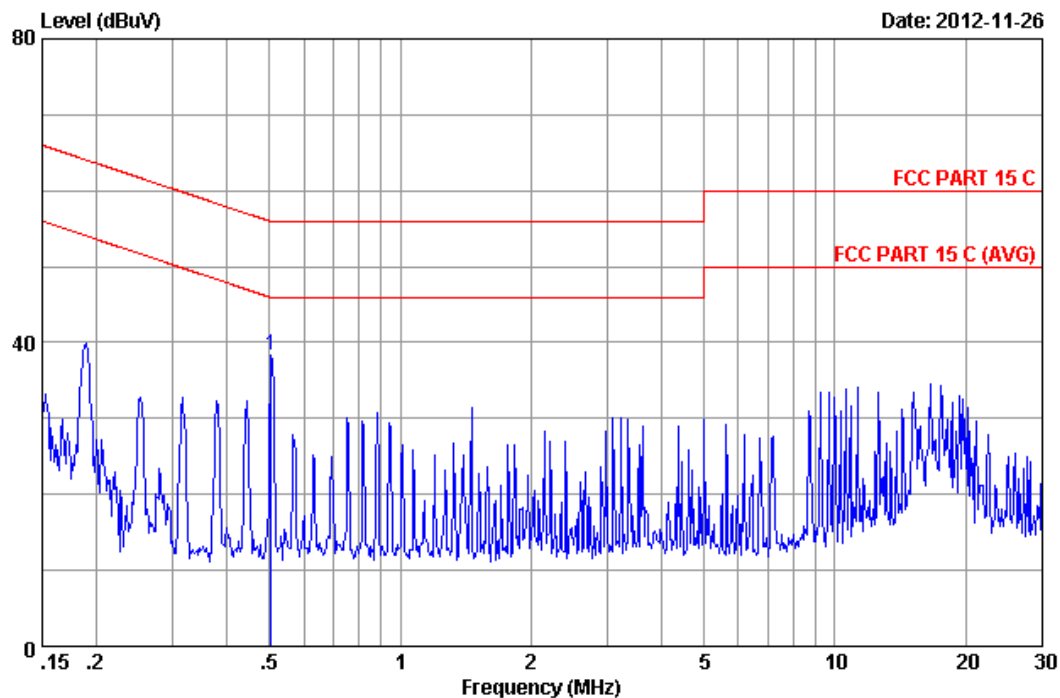
“*”Decreasing linearly with logarithm of the frequency

Conducted Emission



Site no	:1#conduction	Data No	:4
Dis./Ant.	:** 2012 ESH2-Z5 LINE		
Limit	:FCC PART 15 C		
Env./Ins.	:Temp:22.9' Humi:52%	Engineer	:Jerry
EUT	:339918		
Power Rating	:DC 12V From adaptor		
Test Mode	:WIFI Transmitting		
	:L1		

Conducted Emission



Site no :1#conduction Data No :3
 Dis./Ant. :** 2012 ESH2-25 NEUTRAL
 Limit :FCC PART 15 C
 Env./Ins. :Temp:22.9° Humi:52% Engineer :Jerry
 EUT :339918
 Power Rating :DC 12V From adaptor
 Test Mode :NI3421-A01 hitting
 :L1

No	Freq (MHz)	LISN Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Emission Level (dBuV)	Limits (dBuV)	Margin (dB)	Remark
1	0.50500	0.15	9.95	28.20	38.30	46.00	7.70	Average

Remarks: 1.Emission Level=LISN Factor+Cable Loss(Include 10dB pulse limit)
 +Reading.
 2.If the average limit is met when using a quasi-peak detector.
 the EUT shall be deemed to meet both limits and measurement
 with average detector is unnecessary.

7.2 Conducted peak output power

Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Limits for conducted peak output power measurements

Frequency Range MHz	Limit W	Limit dBm
2400-2483	≤1	≤30

Conducted peak output power

WIFI Mode IEEE 802.11b modulation (1Mbps) Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
CH1 2412MHz	16.12	Pass
CH6 2437MHz	16.76	Pass
CH11 2462MHz	17.20	Pass

WIFI Mode IEEE 802.11g modulation (6Mbps) Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
CH1 2412MHz	21.38	Pass
CH6 2437MHz	21.98	Pass
CH11 2462MHz	22.35	Pass

WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
CH1 2412MHz	21.18	Pass
CH6 2437MHz	21.80	Pass
CH11 2462MHz	22.21	Pass

7.3 Band edge compliance of RF emissions

Test Method

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBW to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.

The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100kHz, to measure the conducted peak band edge.

Limits

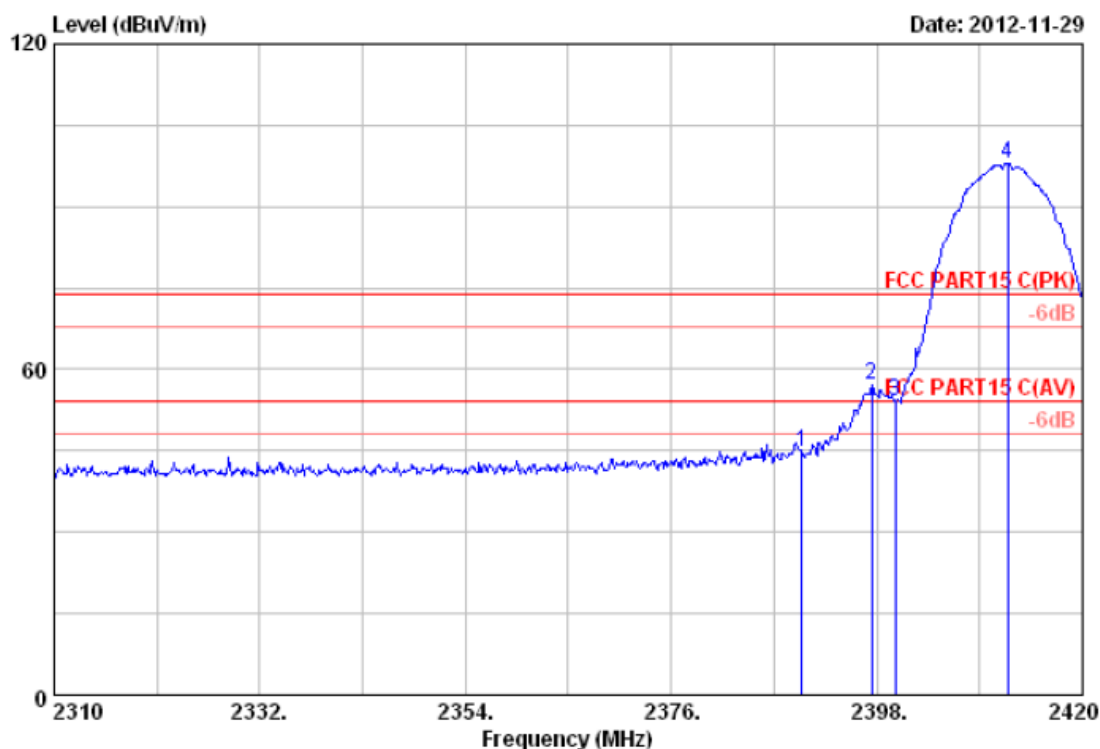
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

Frequency MHz	Limit Average dBuV/m	Limit Peak dBuV/m
Below 2390 Above 2483.5	54	74

Band edge compliance of RF emissions

WIFI Mode IEEE 802.11b modulation (1 Mbps) Test Result

Peak Low Edge plot:



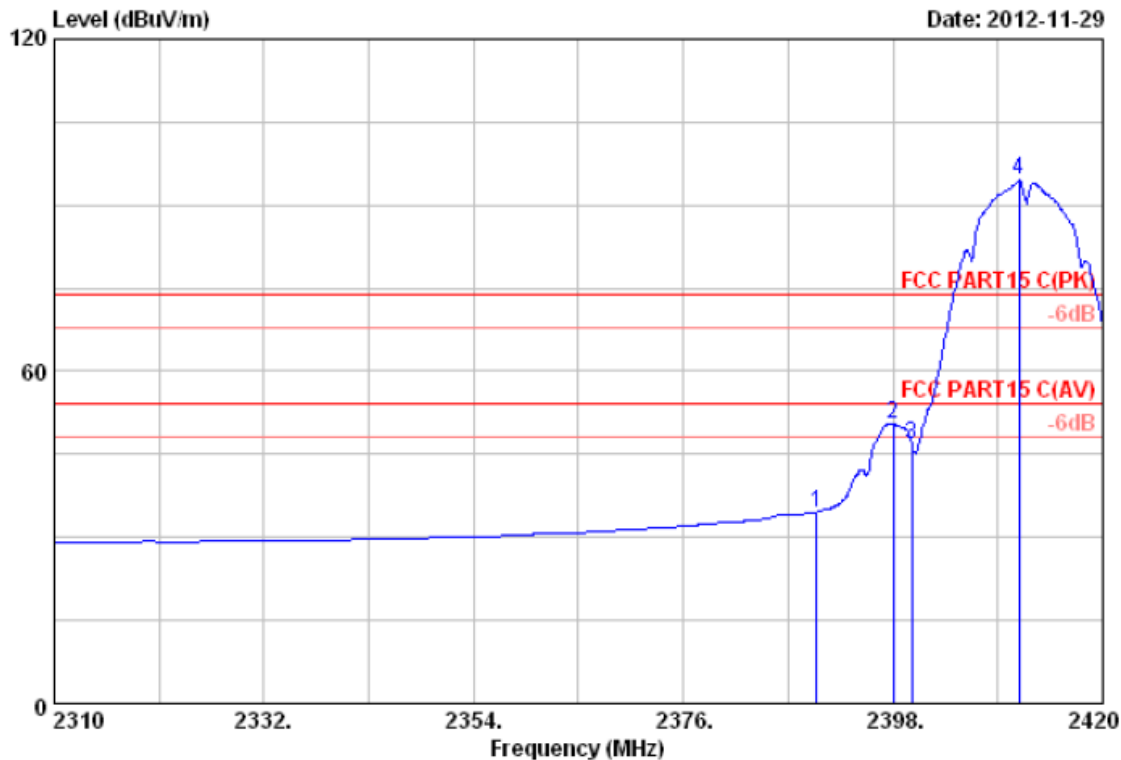
Site no. : 3m Chamber Data no. : 23
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART15 C (PK)
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : 339918
 Power supply : DC 12V From Adapter
 Test mode : Tx Mode 802.11b 2412MHz
 M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	48.03	44.81	74.00	29.19	Peak
2	2397.450	26.74	6.01	35.92	60.26	57.09	74.00	16.91	Peak
3	2400.000	26.76	6.02	35.92	57.26	54.12	74.00	19.88	Peak
4	2411.970	26.84	6.04	35.92	101.09	98.05	74.00	-24.05	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Average Low Edge plot:



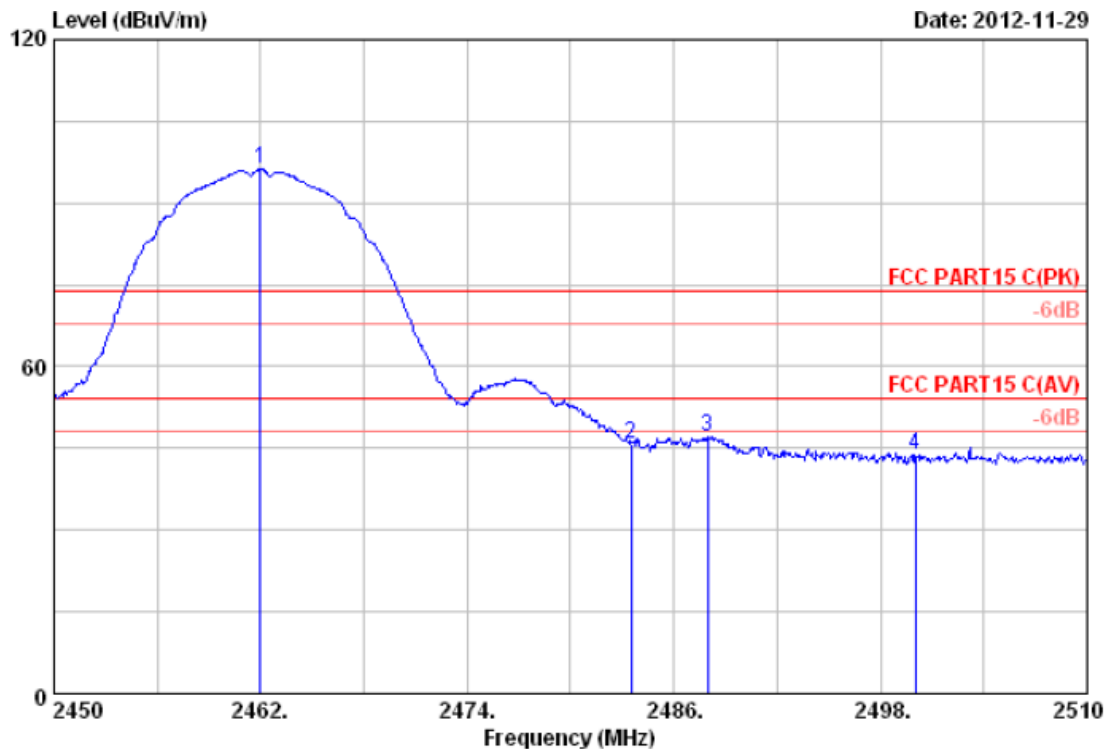
Site no. : 3m Chamber Data no. : 26
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART15 C(PK)
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : 339918
 Power supply : DC 12V From Adapter
 Test mode : Tx Mode 802.11b 2412MHz
 M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	37.80	34.58	54.00	19.42	Average
2	2398.000	26.75	6.01	35.92	53.68	50.52	54.00	3.48	Average
3	2400.000	26.76	6.02	35.92	49.89	46.75	54.00	7.25	Average
4	2411.200	26.83	6.04	35.92	97.51	94.46	54.00	-40.46	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Peak High Edge plot:



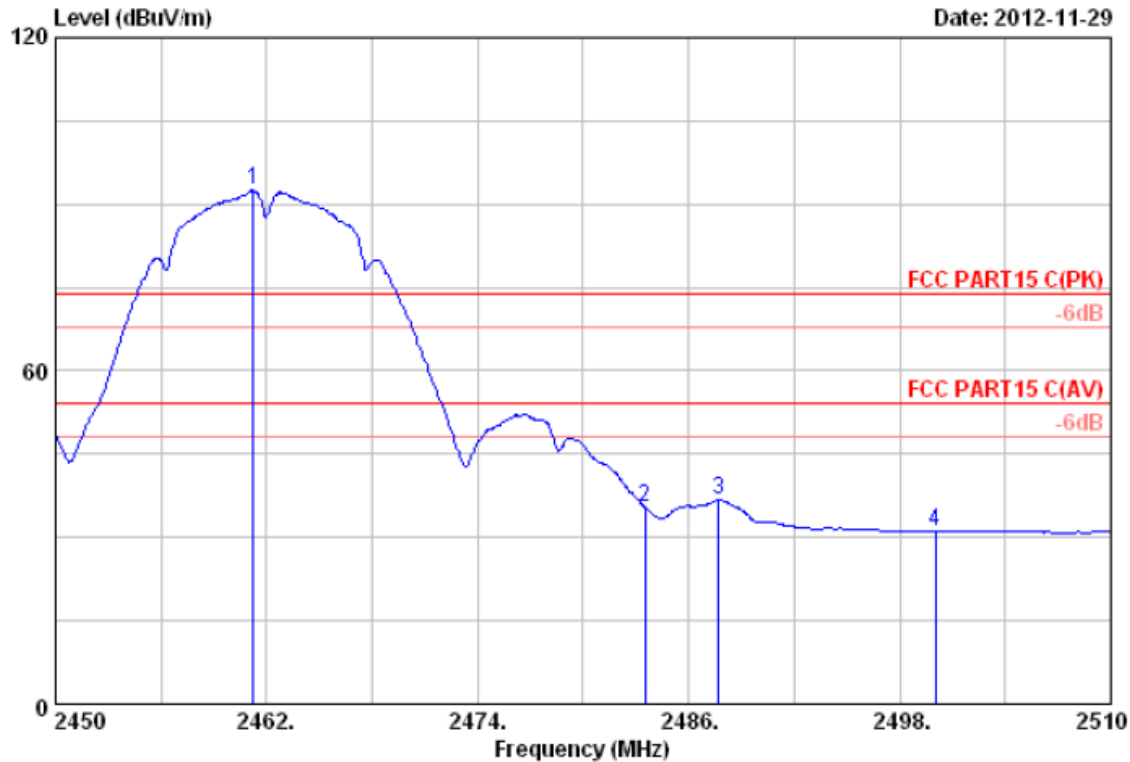
Site no. : 3m Chamber Data no. : 29
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART15 C (PK)
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : 339918
 Power supply : DC 12V From Adapter
 Test mode : Tx Mode 802.11b 2462MHz
 M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2462.000	27.16	6.12	35.92	98.86	96.22	74.00	-22.22	Peak
2	2483.500	27.29	6.16	35.92	48.43	45.96	74.00	28.04	Peak
3	2487.980	27.32	6.17	35.92	49.69	47.26	74.00	26.74	Peak
4	2500.000	27.40	6.19	35.93	46.28	43.94	74.00	30.06	Peak

Remarks:

- Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- The emission levels that are 20dB below the official limit are not reported.

Average High Edge plot:



Site no. : 3m Chamber Data no. : 30
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART15 C (PK)
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : 339918
 Power supply : DC 12V From Adapter
 Test mode : Tx Mode 802.11b 2462MHz
 M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2461.220	27.15	6.12	35.92	95.10	92.45	54.00	-38.45	Average
2	2483.500	27.29	6.16	35.92	37.89	35.42	54.00	18.58	Average
3	2487.680	27.32	6.17	35.92	39.12	36.69	54.00	17.31	Average
4	2500.000	27.40	6.19	35.93	33.47	31.13	54.00	22.87	Average

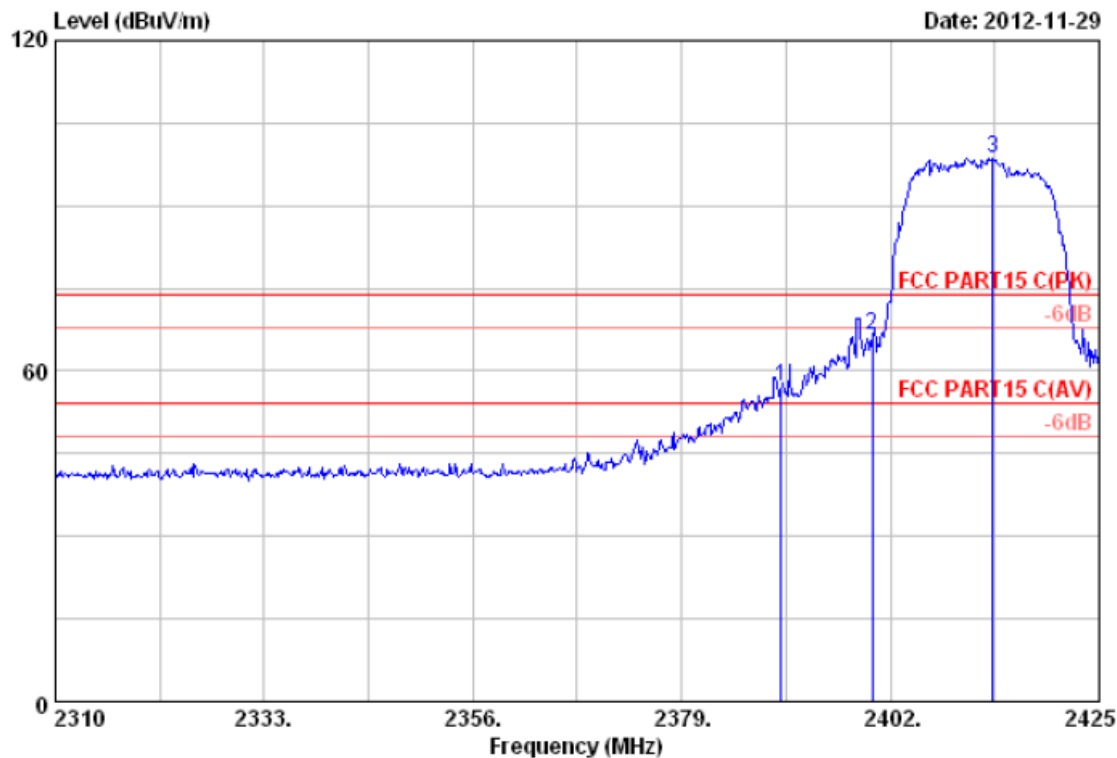
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

WIFI Mode IEEE 802.11g modulation (6 Mbps) Test Result

Peak Low Edge plot:



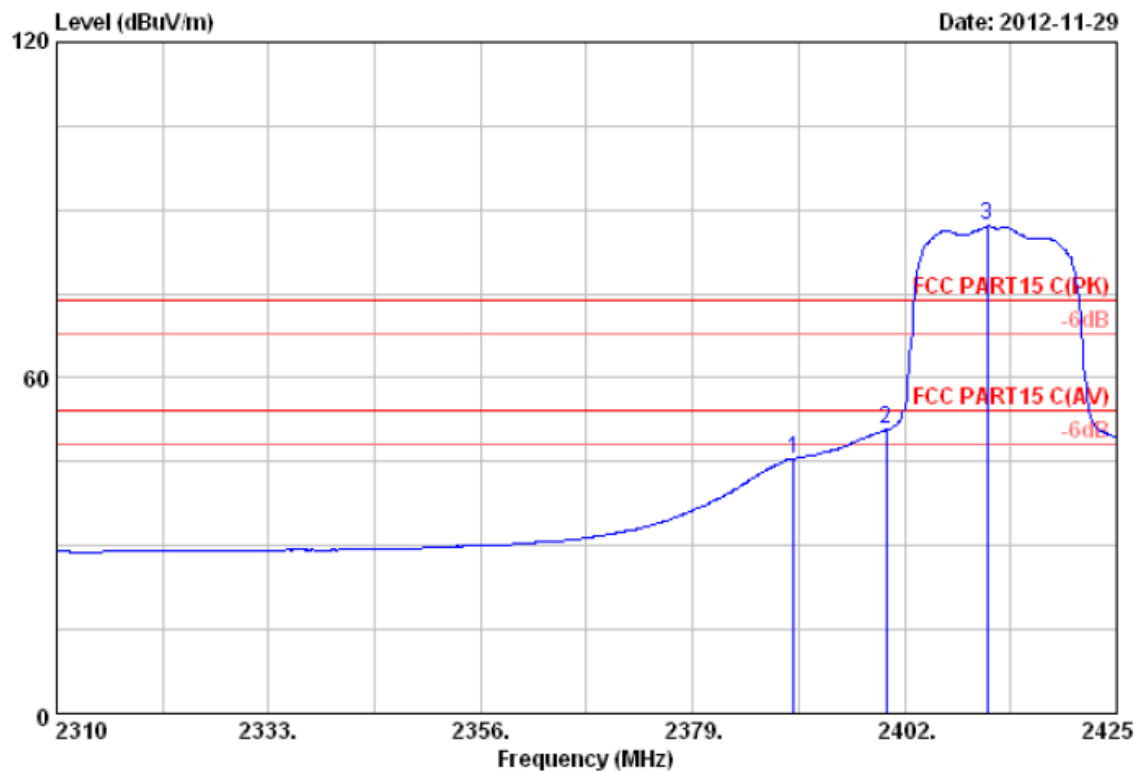
Site no. : 3m Chamber Data no. : 38
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART15 C (PK)
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : 339918
 Power supply : DC 12V From Adapter
 Test mode : Tx Mode 802.11g 2412MHz
 M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	60.45	57.23	74.00	16.77	Peak
2	2400.000	26.76	6.02	35.92	69.63	66.49	74.00	7.51	Peak
3	2413.270	26.84	6.04	35.92	101.68	98.64	74.00	-24.64	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Average Low Edge plot:



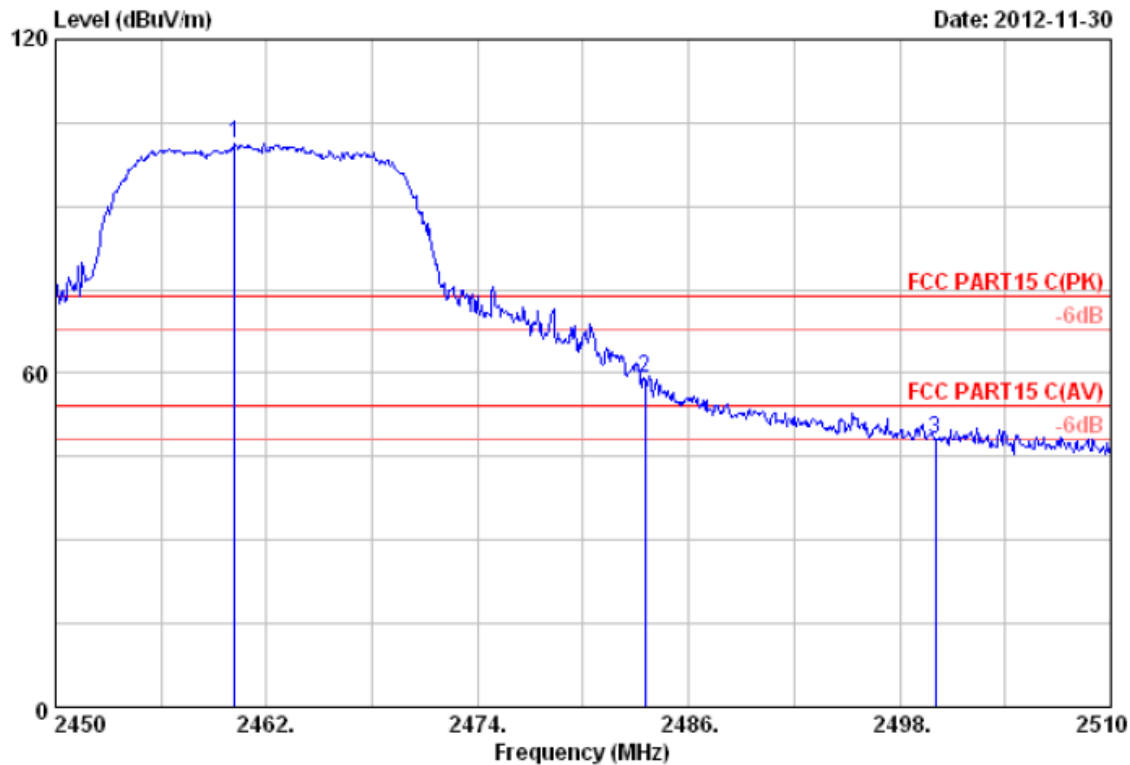
Site no.	: 3m Chamber	Data no.	: 39
Dis. / Ant.	: 3m 2012 3115 (4580)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART15 C(PK)		
Env. / Ins.	: 23°C/54%	Engineer	: Leo-Li
EUT	: 339918		
Power supply	: DC 12V From Adapter		
Test mode	: Tx Mode 802.11g 2412MHz		
M/N	:		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	48.81	45.59	54.00	8.41	Average
2	2400.000	26.76	6.02	35.92	53.88	50.74	54.00	3.26	Average
3	2410.970	26.83	6.04	35.92	90.20	87.15	54.00	-33.15	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Peak High Edge plot:



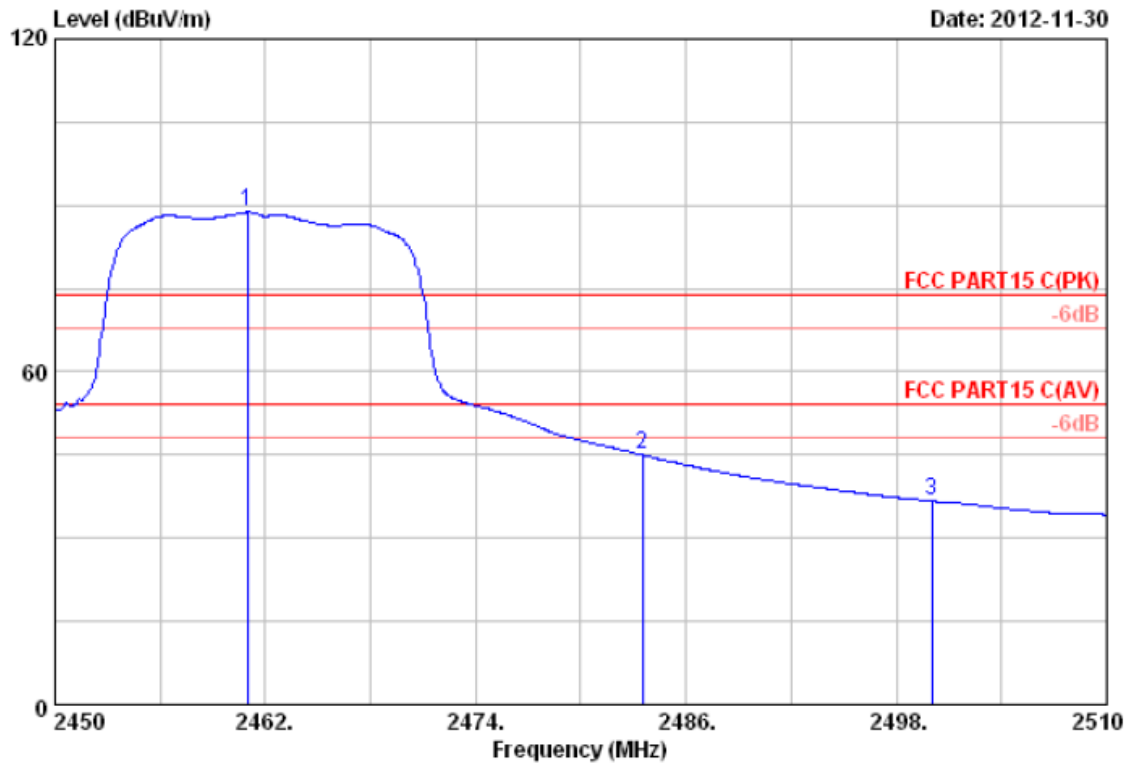
Site no. : 3m Chamber Data no. : 46
Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
Limit : FCC PART15 C(PK)
Env. / Ins. : 23°C/54% Engineer : Leo-Li
EUT : 339918
Power supply : DC 12V From Adapter
Test mode : Tx Mode 802.11g 2462MHz
M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2460.200	27.15	6.12	35.92	103.82	101.17	74.00	-27.17	Peak
2	2483.500	27.29	6.16	35.92	61.54	59.07	74.00	14.93	Peak
3	2500.000	27.40	6.19	35.93	50.63	48.29	74.00	25.71	Peak

Remarks:

- Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- The emission levels that are 20dB below the official limit are not reported.

Average High Edge plot:



Site no. : 3m Chamber
 Dis. / Ant. : 3m 2012 3115 (4580)
 Limit : FCC PART15 C(PK)
 Env. / Ins. : 23°C/54%
 EUT : 339918
 Power supply : DC 12V From Adapter
 Test mode : Tx Mode 802.11g 2462MHz
 M/N :
 Data no. : 47
 Ant. pol. : HORIZONTAL
 Engineer : Leo-Li

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2460.980	27.15	6.12	35.92	91.43	88.78	54.00	-34.78	Average
2	2483.500	27.29	6.16	35.92	47.49	45.02	54.00	8.98	Average
3	2500.000	27.40	6.19	35.93	39.03	36.69	54.00	17.31	Average

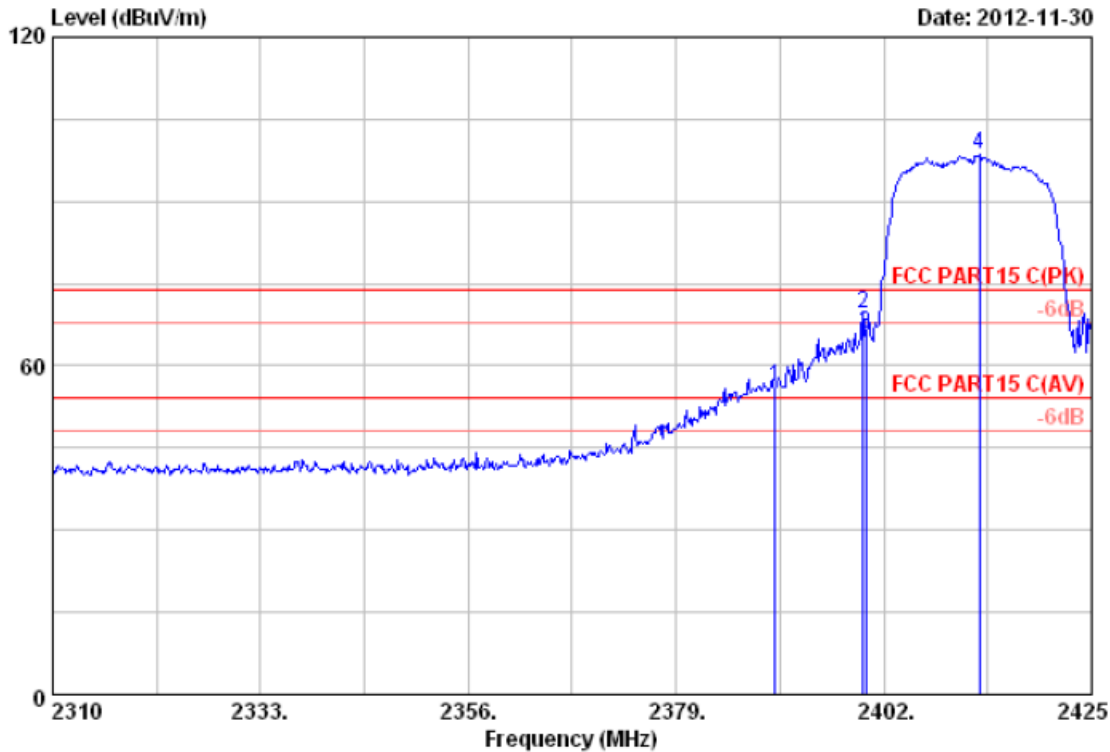
Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Band edge compliance of RF emissions

WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Peak Low Edge plot:



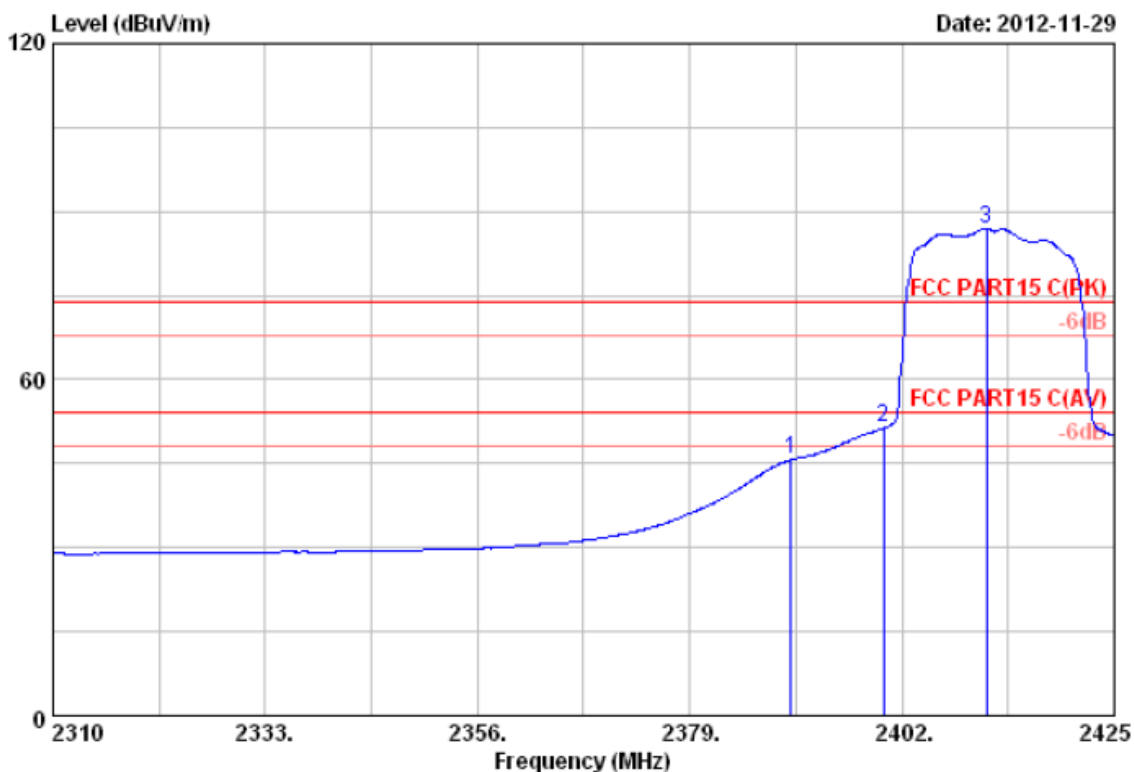
Site no.	: 3m Chamber	Data no.	: 65
Dis. / Ant.	: 3m 2012 3115 (4580)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART15 C(PK)		
Env. / Ins.	: 23°C/54%	Engineer	: Leo-Li
EUT	: 339918		
Power supply	: DC 12V From Adapter		
Test mode	: Tx Mode 802.11n 2412MHz		
M/N	:		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	59.33	56.11	74.00	17.89	Peak
2	2399.700	26.76	6.02	35.92	72.69	69.55	74.00	4.45	Peak
3	2400.000	26.76	6.02	35.92	69.07	65.93	74.00	8.07	Peak
4	2412.580	26.84	6.04	35.92	101.51	98.47	74.00	-24.47	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Average Low Edge plot:



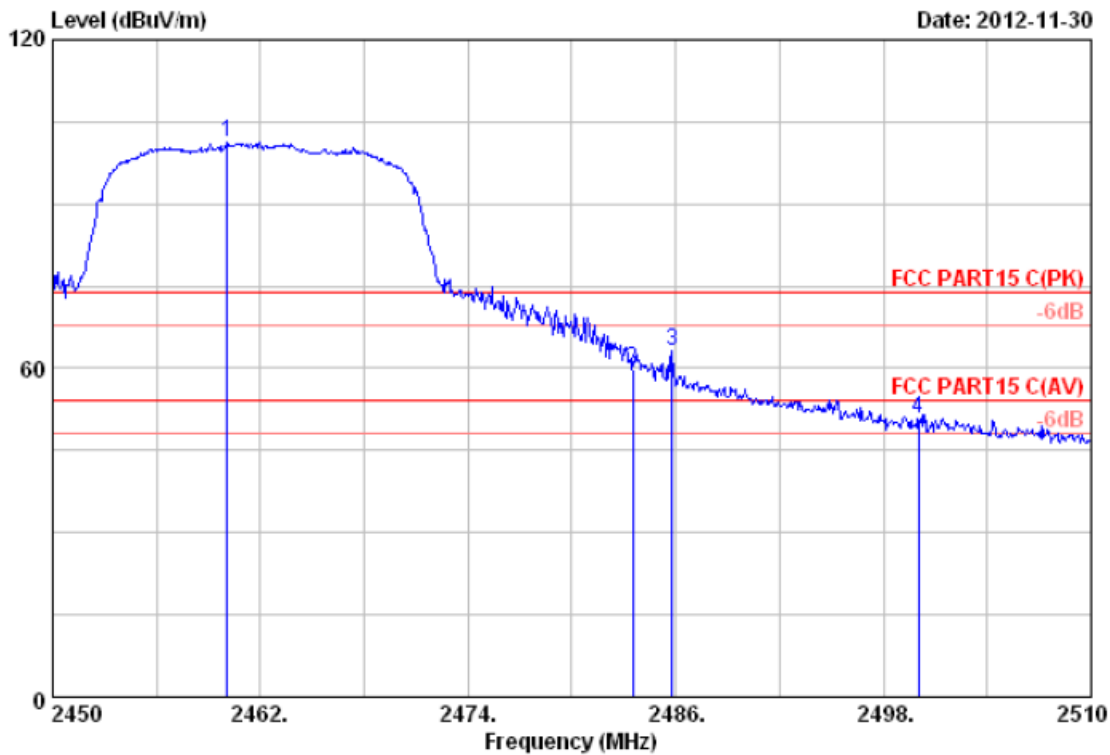
Site no.	: 3m Chamber	Data no.	: 50
Dis. / Ant.	: 3m 2012 3115 (4580)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART15 C (PK)		
Env. / Ins.	: 23°C/54%	Engineer	: Leo-Li
EUT	: 339918		
Power supply	: DC 12V From Adapter		
Test mode	: Tx Mode 802.11n 2412MHz		
M/N	:		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2390.000	26.70	6.00	35.92	48.91	45.69	54.00	8.31	Average
2	2400.000	26.76	6.02	35.92	54.50	51.36	54.00	2.64	Average
3	2411.200	26.83	6.04	35.92	90.04	86.99	54.00	-32.99	Average

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Peak High Edge plot:



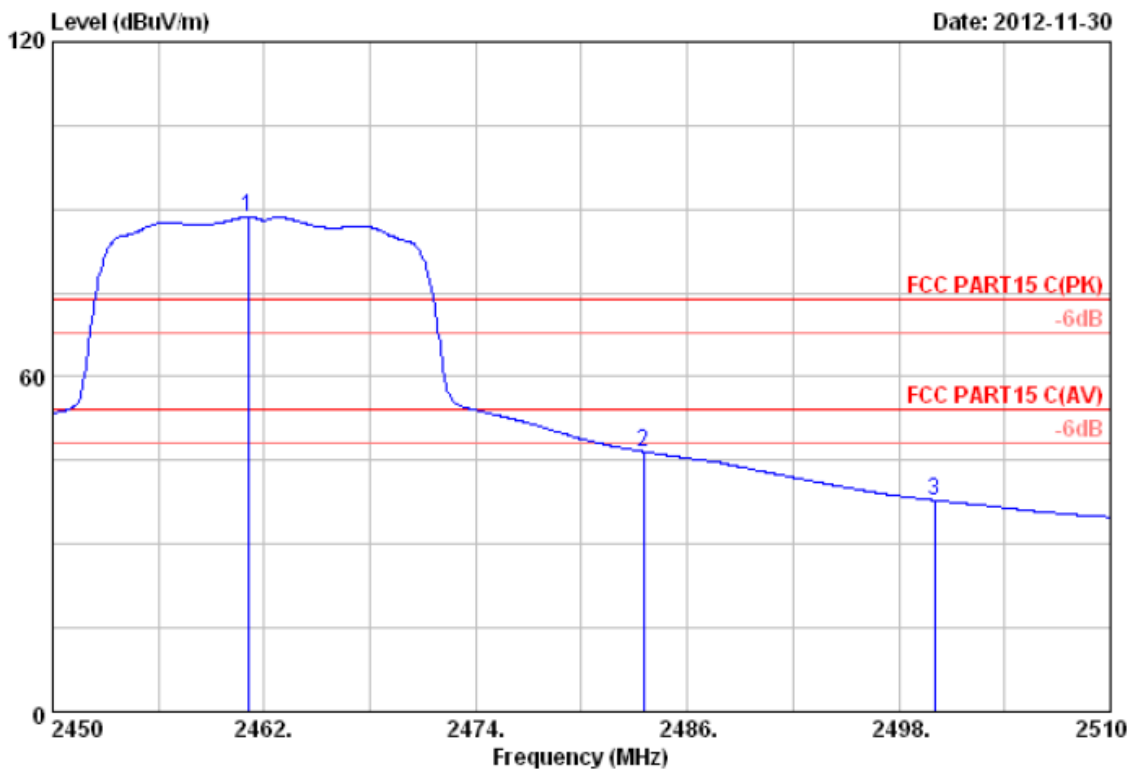
Site no.	: 3m Chamber	Data no.	: 61
Dis. / Ant.	: 3m 2012 3115 (4580)	Ant. pol.	: HORIZONTAL
Limit	: FCC PART15 C (PK)		
Env. / Ins.	: 23°C/54%	Engineer	: Leo-Li
EUT	: 339918		
Power supply	: DC 12V From Adapter		
Test mode	: Tx Mode 802.11n 2462MHz		
M/N	:		

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2460.080	27.14	6.12	35.92	103.92	101.26	74.00	-27.26	Peak
2	2483.500	27.29	6.16	35.92	62.40	59.93	74.00	14.07	Peak
3	2485.820	27.31	6.16	35.92	65.63	63.18	74.00	10.82	Peak
4	2500.000	27.40	6.19	35.93	53.15	50.81	74.00	23.19	Peak

Remarks:

1. Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
2. The emission levels that are 20dB below the official limit are not reported.

Average High Edge plot:



Site no. : 3m Chamber Data no. : 60
 Dis. / Ant. : 3m 2012 3115 (4580) Ant. pol. : HORIZONTAL
 Limit : FCC PART15 C(PK)
 Env. / Ins. : 23°C/54% Engineer : Leo-Li
 EUT : 339918
 Power supply : DC 12V From Adapter
 Test mode : Tx Mode 802.11n 2462MHz
 M/N :

	Freq. (MHz)	Ant. Factor (dB/m)	Cable loss (dB)	Amp. Factor (dB)	Reading (dBuV)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
1	2461.100	27.15	6.12	35.92	91.31	88.66	54.00	-34.66	Average
2	2483.500	27.29	6.16	35.92	49.08	46.61	54.00	7.39	Average
3	2500.000	27.40	6.19	35.93	40.24	37.90	54.00	16.10	Average

Remarks:

- Emission Level= Antenna Factor + Cable Loss -Amp Factor + Reading.
- The emission levels that are 20dB below the official limit are not reported.

Remark: Both horizontal and vertical were tested, only worst data listed.

7.4 Spurious RF conducted emissions

Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

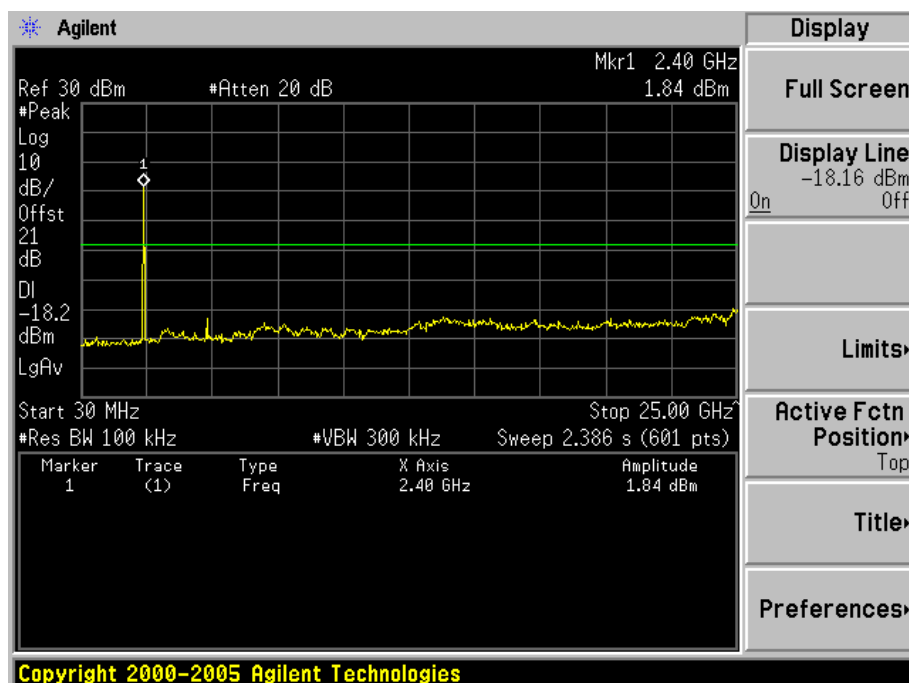
The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyzer were respectively set to 100 kHz and 100 kHz.

Limit

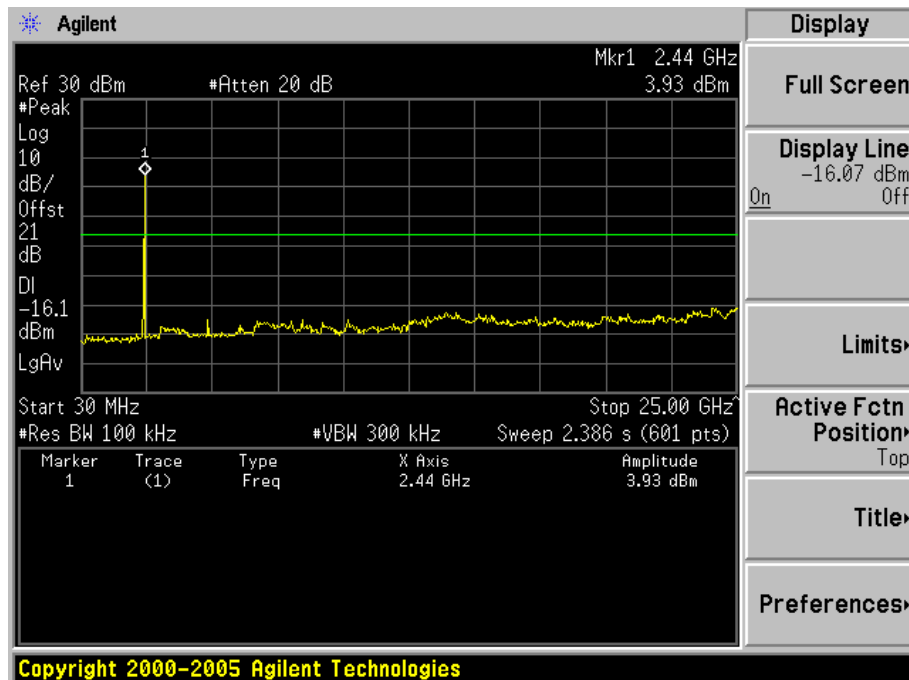
Frequency Range MHz	Limit (dBc)
1000-25000	-20

Spurious RF conducted emissions

WIFI Mode IEEE 802.11b modulation (1 Mbps) Test Result
2412MHz

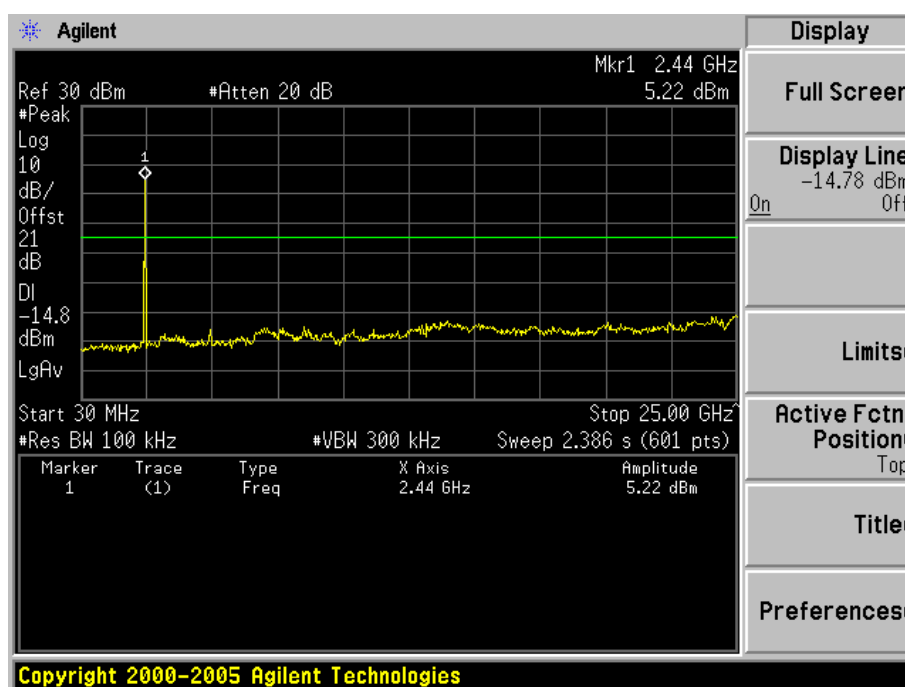


2437MHz



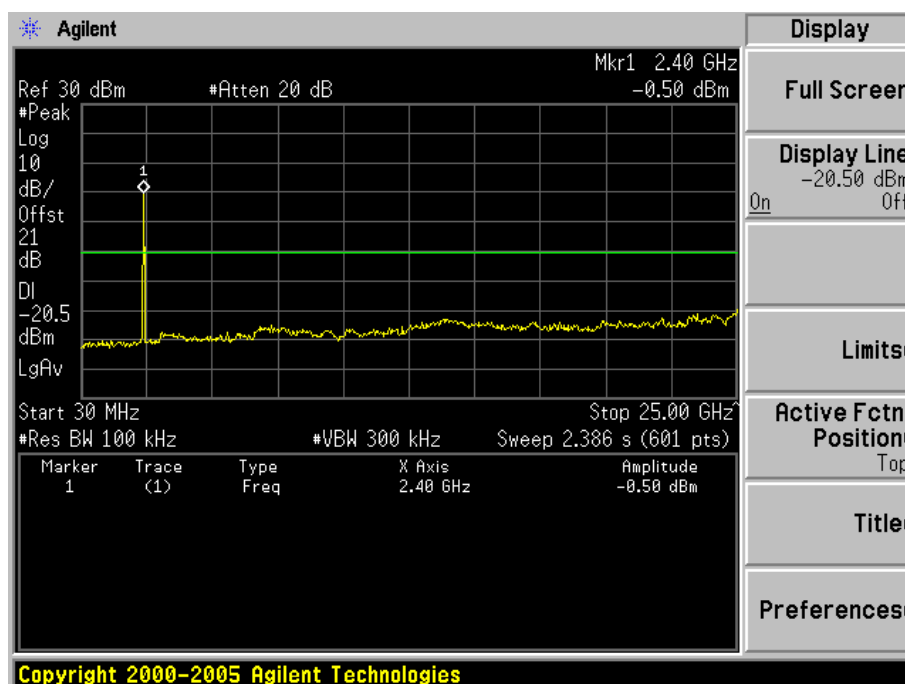
Spurious RF conducted emissions

2462MHz



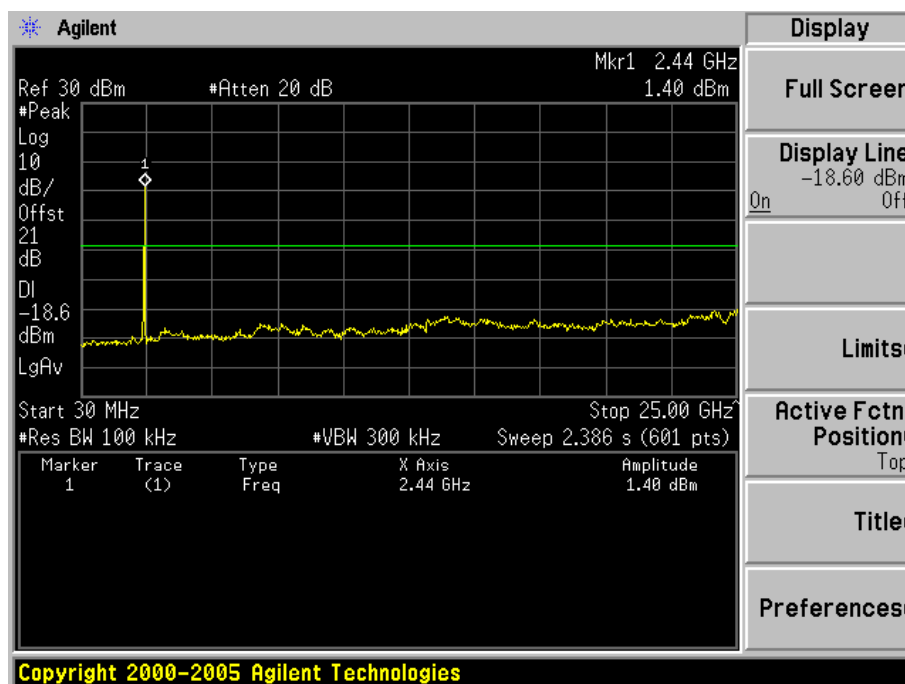
WIFI Mode IEEE 802.11g modulation (6 Mbps) Test Result

2412MHz

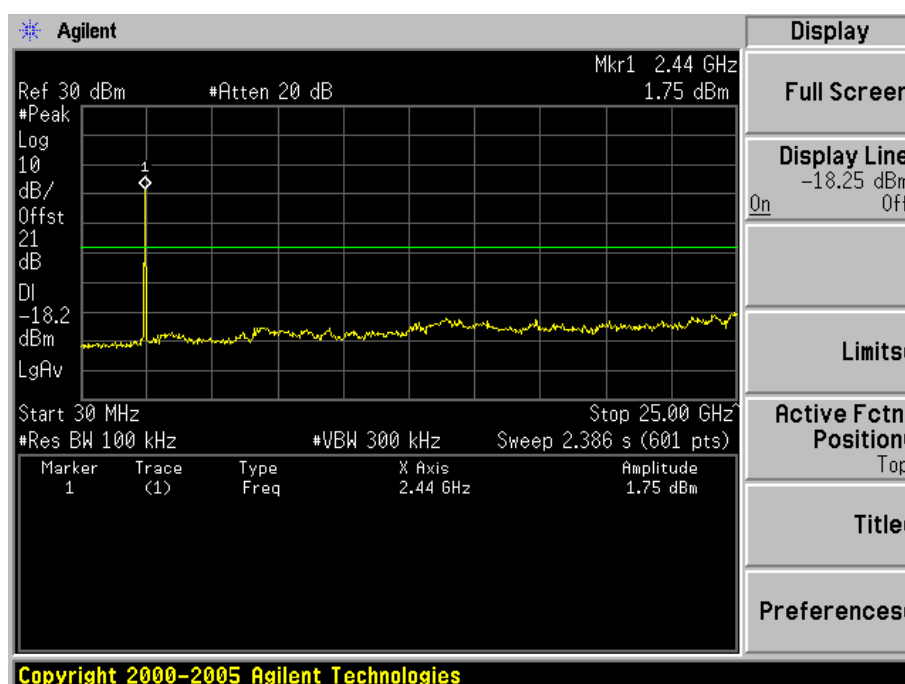


Spurious RF conducted emissions

2437MHz

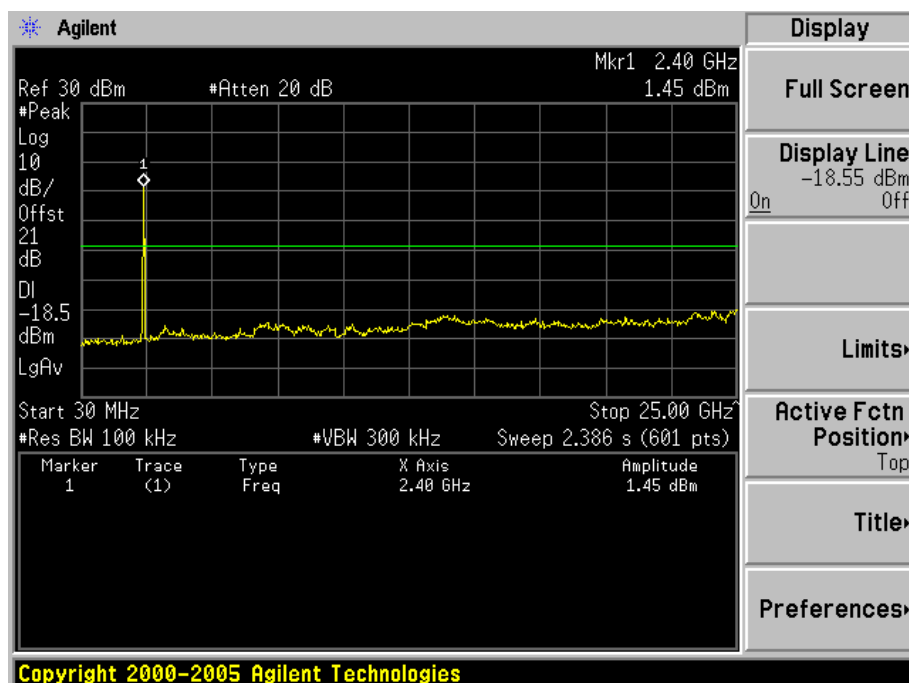


2462MHz

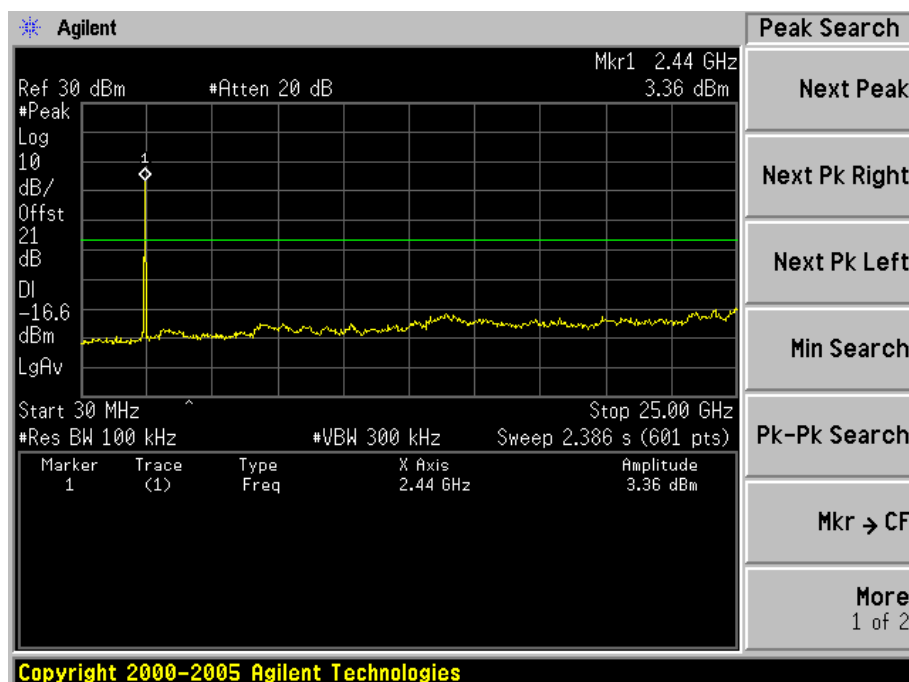


Spurious RF conducted emissions

WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) Test Result
2412MHz

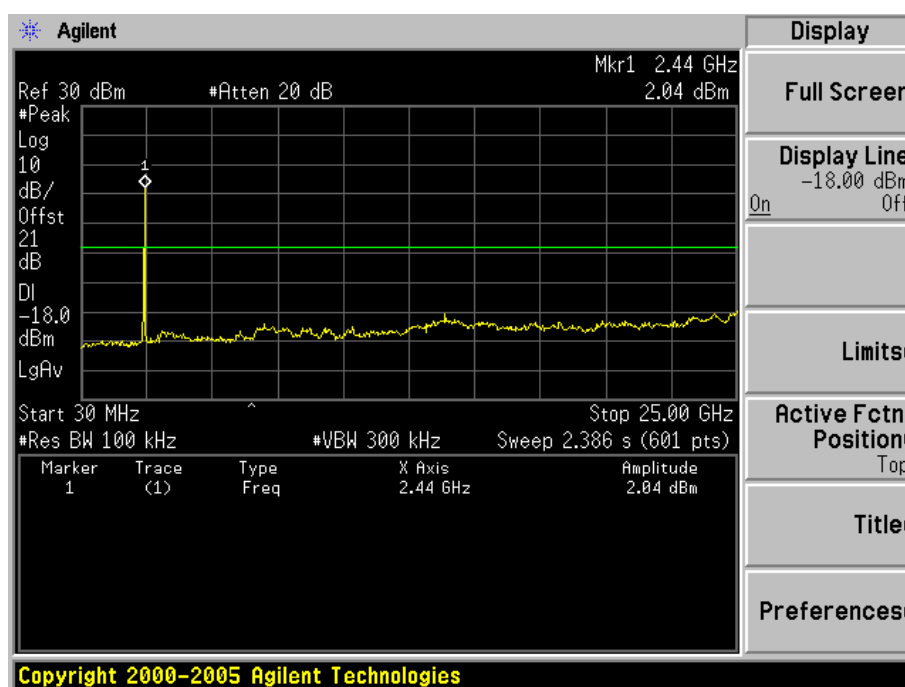


2437MHz



Spurious RF conducted emissions

2462MHz



7.5 Spurious radiated emissions for transmitter and receiver

Test Method

- 1 The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
- 3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5 Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Limit

Frequency MHz	Field Strength uV/m	Field Strength dBμV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Transmitter Spurious radiated emissions

WIFI Mode IEEE 802.11b modulation (1 Mbps) CH1 2412MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBμV	dBμV/m		dBμV/m		
4824.000	32.51	8.69	35.71	47.61	53.10	Horizontal	74	PK	Pass
4824.000	32.51	8.69	35.71	41.75	47.24	Horizontal	54	AV	Pass
4824.000	32.51	8.69	35.71	41.48	46.97	Vertical	74	PK	Pass
4824.000	32.51	8.69	35.71	38.64	44.13	Vertical	54	AV	Pass
7236.000	-	-	-	-	-	-	-	-	-
7236.000	-	-	-	-	-	-	-	-	-

WIFI Mode IEEE 802.11b modulation (1 Mbps) CH6 2437MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBμV	dBμV/m		dBμV/m		
4874.000	32.62	8.73	35.69	49.41	55.07	Horizontal	74	PK	Pass
4874.000	32.62	8.73	35.69	45.32	50.98	Horizontal	54	AV	Pass
7311.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-

WIFI Mode IEEE 802.11b modulation (1 Mbps) CH11 2462MHz Test Result

Frequency	Antenna Factor	Cable Loss	Amp. Factor	Reading	Emission Level	Polarization	Limit	Detector	Result
MHz	dB/m	dB	dB	dBμV	dBμV/m		dBμV/m		
366.86	15.87	1.46	0	25.00	42.33	Horizontal	46.0	QP	Pass
4924.000	32.73	8.78	35.68	48.11	53.94	Horizontal	74	PK	Pass
4924.000	32.73	8.78	35.68	43.40	49.23	Horizontal	54	AV	Pass
7386.000	-	-	-	-	-	-	-	-	-
7386.000	-	-	-	-	-	-	-	-	-

Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

Transmitter Spurious radiated emissions

WIFI Mode IEEE 802.11g modulation (6 Mbps) CH1 2412MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
4824.000	32.51	8.69	35.71	46.52	52.01	Horizontal	74	PK	Pass
4824.000	32.51	8.69	35.71	33.46	38.95	Horizontal	54	AV	Pass
7236.000	-	-	-	-	-	-	-	-	-
7236.000	-	-	-	-	-	-	-	-	-

WIFI Mode IEEE 802.11g modulation (6 Mbps) CH6 2437MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
4874.000	32.62	8.73	35.69	45.51	51.16	Horizontal	74	PK	Pass
4874.000	32.62	8.73	35.69	33.37	39.03	Horizontal	54	AV	Pass
7311.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-

WIFI Mode IEEE 802.11g modulation (6 Mbps) CH11 2462MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
366.86	15.87	1.46	0	25.40	42.73	Horizontal	46.0	QP	Pass
4924.000	32.73	8.78	35.68	45.65	51.48	Horizontal	74	PK	Pass
4924.000	32.73	8.78	35.68	33.12	38.95	Horizontal	54	AV	Pass
7386.000	-	-	-	-	-	-	-	-	-
7386.000	-	-	-	-	-	-	-	-	-

Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

Transmitter Spurious radiated emissions

WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) CH1 2412MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
4824.000	32.51	8.69	35.71	46.46	51.95	Horizontal	74	PK	Pass
4824.000	32.51	8.69	35.71	33.61	39.10	Horizontal	54	AV	Pass
7236.000	-	-	-	-	-	-	-	-	-
7236.000	-	-	-	-	-	-	-	-	-

WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) CH6 2437MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
4874.000	34.41	10.69	35.03	45.78	51.44	Horizontal	74	PK	Pass
4874.000	34.41	10.69	35.03	33.33	38.99	Horizontal	54	AV	Pass
7311.000	-	-	-	-	-	-	-	-	-
7311.000	-	-	-	-	-	-	-	-	-

WIFI Mode IEEE 802.11n HT20 modulation (6.5 Mbps) CH11 2462MHz Test Result

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
366.86	15.87	1.46	0	24.70	42.03	Horizontal	46.0	QP	Pass
4924.000	34.49	10.76	34.98	45.32	51.15	Horizontal	74	PK	Pass
4924.000	34.49	10.76	34.98	32.34	38.17	Horizontal	54	AV	Pass
7386.000	-	-	-	-	-	-	-	-	-
7386.000	-	-	-	-	-	-	-	-	-

Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

Receiver Spurious radiated emissions

WIFI Receiver Mode IEEE 802.11b/g/n modulation Test Result (Worst case)

Frequency MHz	Antenna Factor dB/m	Cable Loss dB	Amp. Factor dB	Reading dBμV	Emission Level dBμV/m	Polarization	Limit dBμV/m	Detector	Result
366.86	15.87	1.46	0	24.90	42.23	Horizontal	46.0	QP	Pass
Above 1GHz	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Remark:

- (1) Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
- (2) Data of measurement within this frequency range shown “-” in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.

7.6 6 dB bandwidth & 99% bandwidth

Test Method

- 1 Place the EUT on the table and set it in the transmitting mode.
- 2 Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3 Mark the peak frequency and –6dB (upper and lower) frequency.

Limit

Limit [kHz]

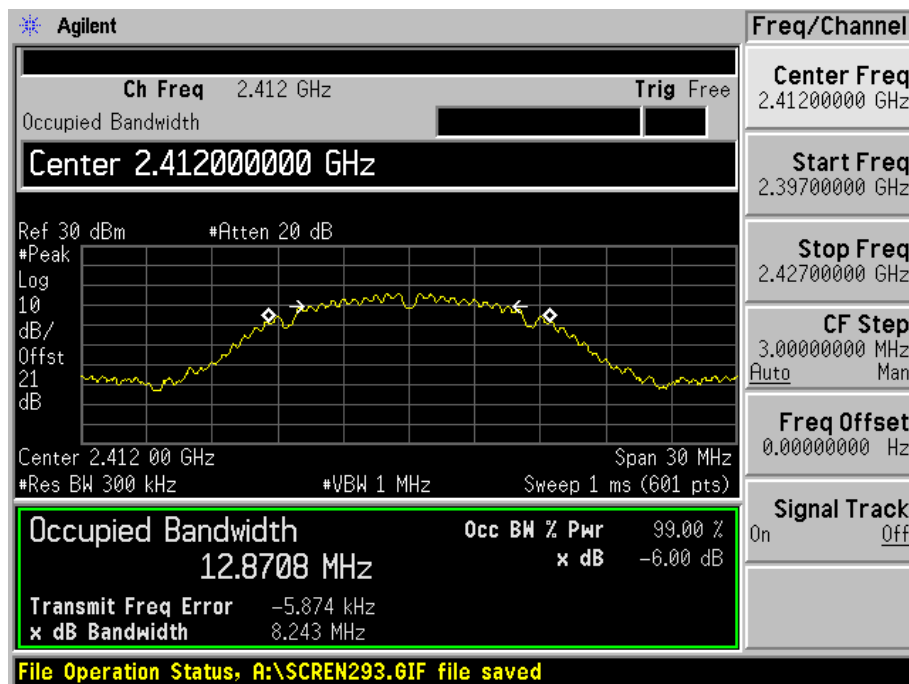
≥ 500

6 dB bandwidth & 99% bandwidth

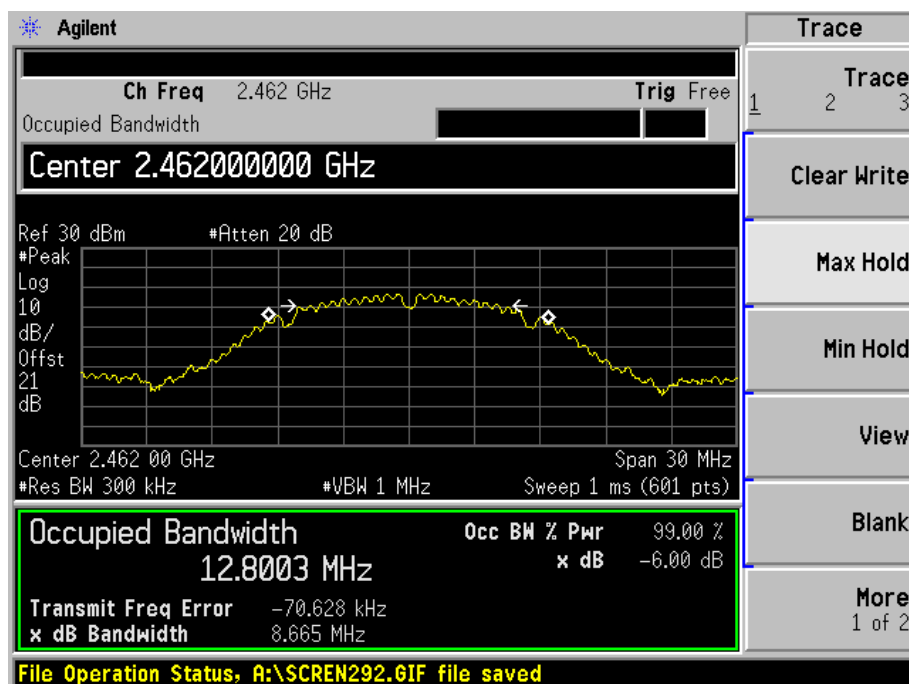
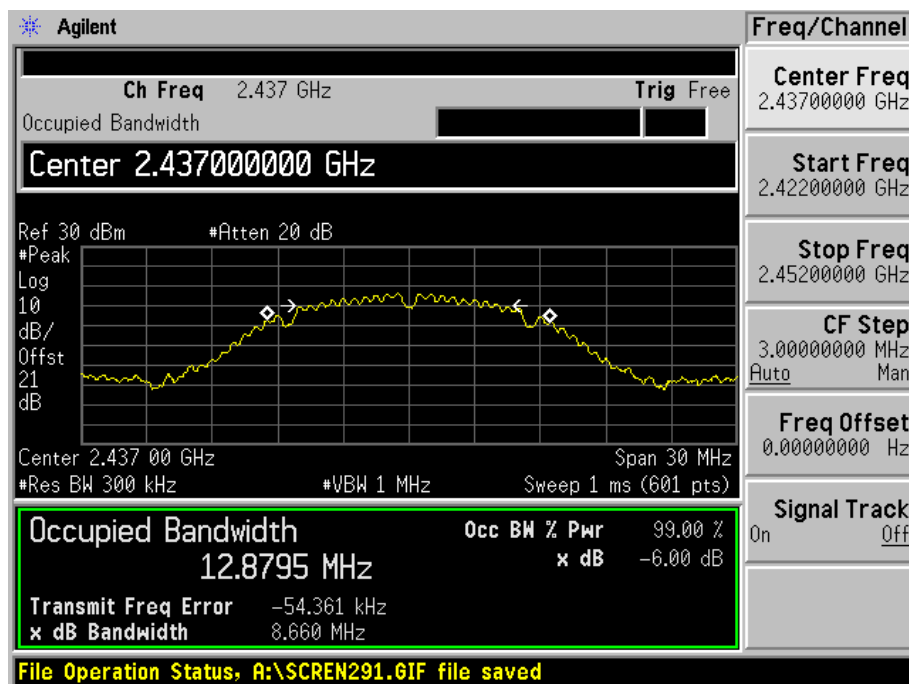
WIFI Mode IEEE 802.11b modulation (1Mbps) Test Result

Frequency MHz	6 dB Bandwidth kHz	Limit kHz	Result
2412	8243	≥ 500	Pass
2437	8660	≥ 500	Pass
2462	8665	≥ 500	Pass

Frequency MHz	%99 Bandwidth MHz	Limit kHz	Result
2412	12.8708	--	Pass
2437	12.8795	--	Pass
2462	12.8003	--	Pass



6 dB bandwidth & 99% bandwidth

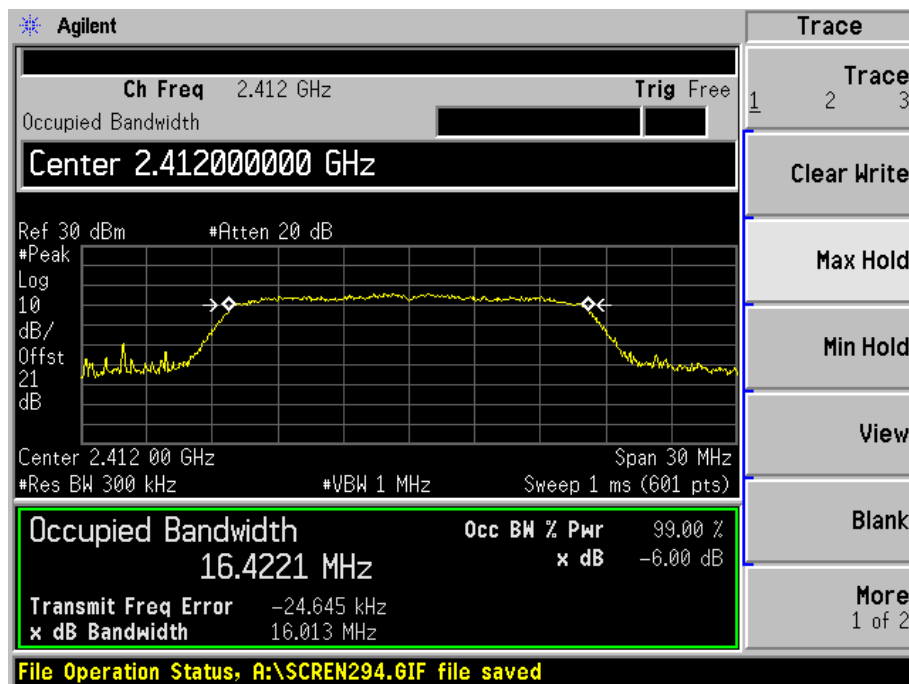


6 dB bandwidth & 99% bandwidth

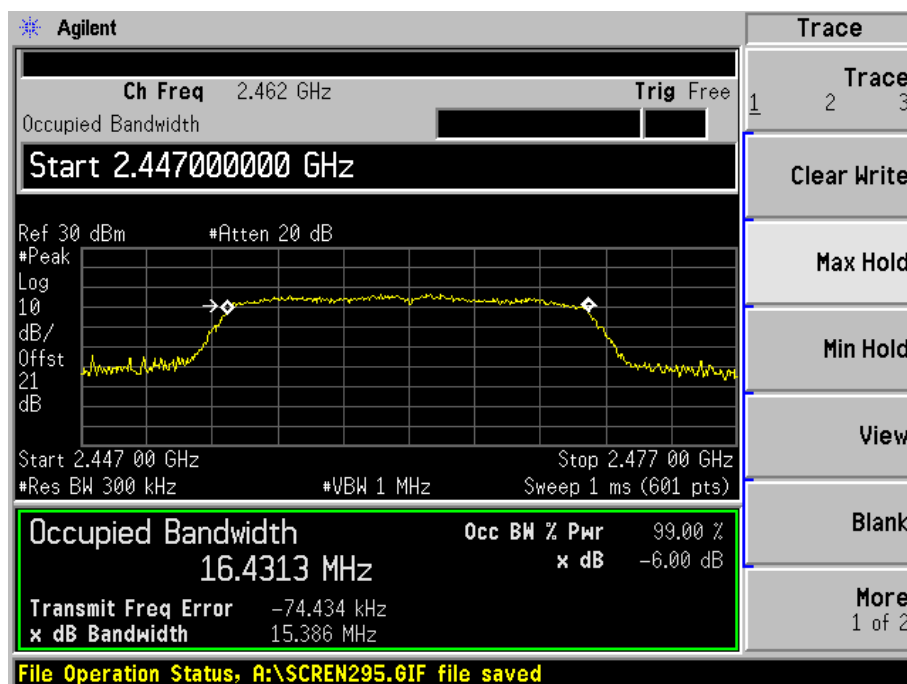
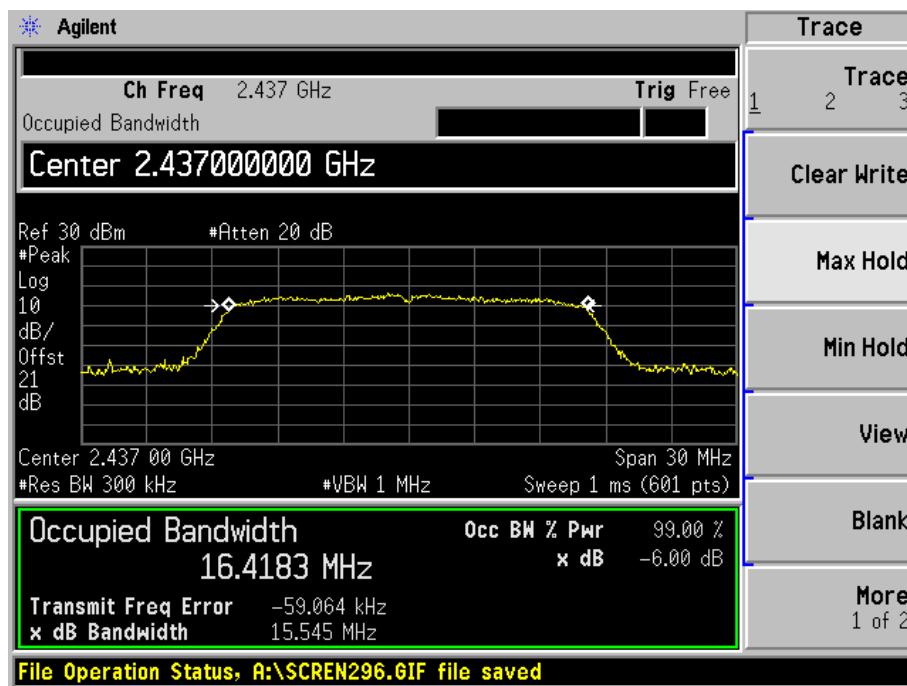
WIFI Mode IEEE 802.11g modulation (6Mbps) Test Result

Frequency MHz	Bandwidth kHz	Limit kHz	Result
2412	16013	≥ 500	Pass
2437	15545	≥ 500	Pass
2462	15386	≥ 500	Pass

Frequency MHz	%99 Bandwidth MHz	Limit kHz	Result
2412	16.4221	--	Pass
2437	16.4183	--	Pass
2462	16.4313	--	Pass



6 dB dB bandwidth & 99% bandwidth

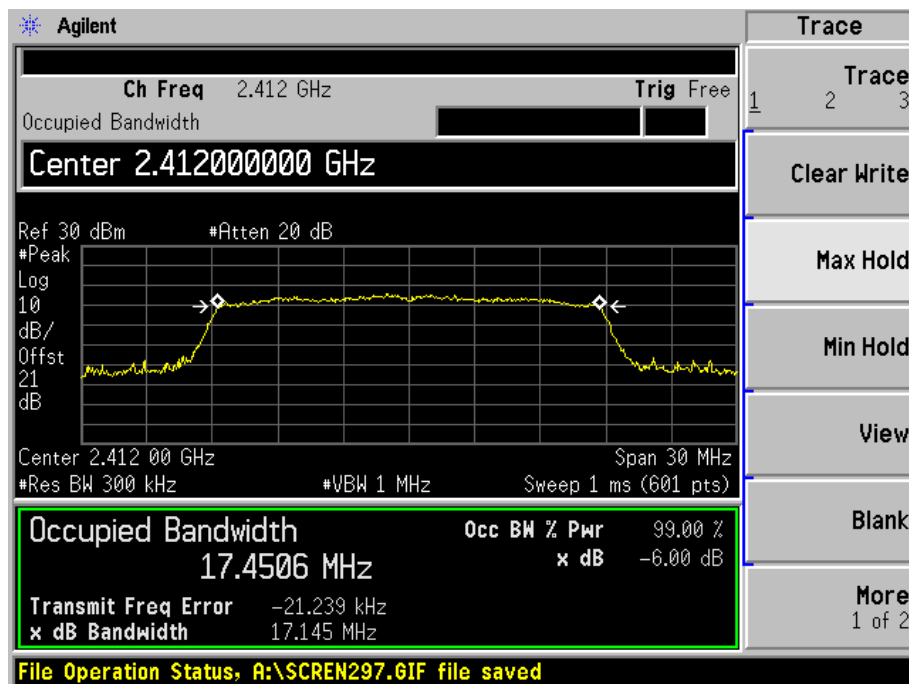


6 dB bandwidth & 99% bandwidth

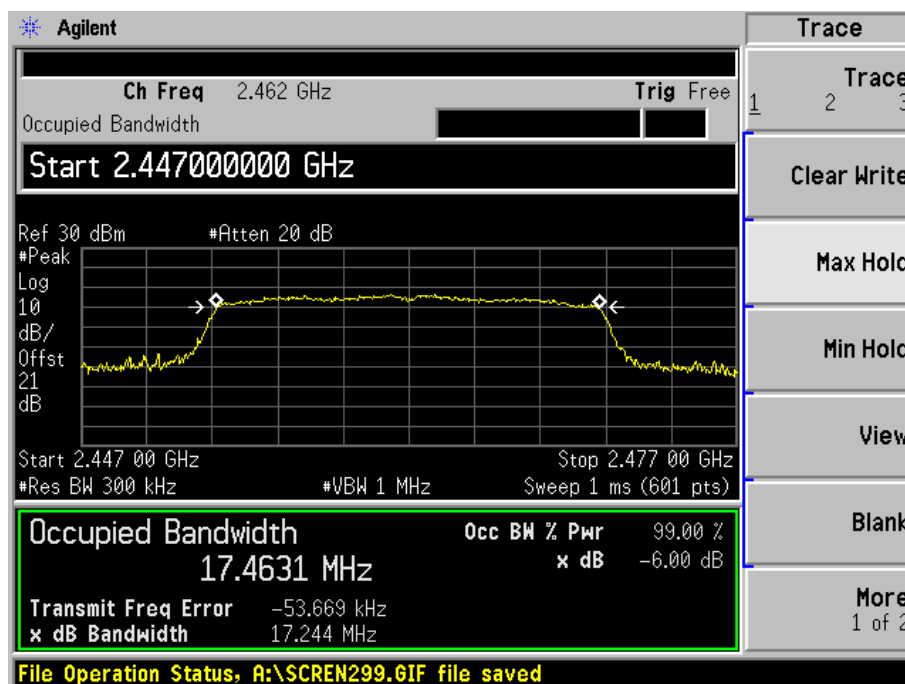
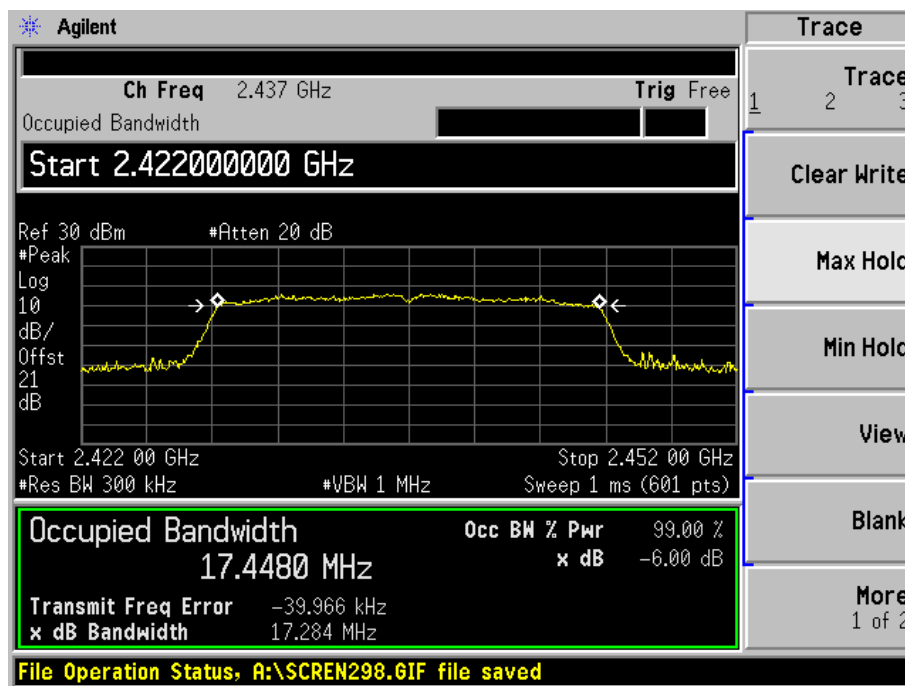
WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Frequency MHz	Bandwidth kHz	Limit kHz	Result
2412	17145	≥ 500	Pass
2437	17284	≥ 500	Pass
2462	17244	≥ 500	Pass

Frequency MHz	%99 Bandwidth MHz	Limit kHz	Result
2412	17.4506	--	Pass
2437	17.4480	--	Pass
2462	17.4631	--	Pass



6 dB bandwidth & 99% bandwidth



7.7 Power spectral density

Test Method

- 1 Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2 Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 1.5 times channel bandwidth, Sweep = auto couple.
- 3 Record the max reading.

Limit

Limit
dBm / 3 kHz

8

Power spectral density

WIFI Mode IEEE 802.11b modulation (1Mbps) Test Result

Frequency MHz	P dBm	Result
2412	-9.58	Pass
2437	-9.30	Pass
2462	-8.73	Pass

WIFI Mode IEEE 802.11g modulation (6Mbps) Test Result

Frequency MHz	P dBm	Result
2412	-12.08	Pass
2437	-11.70	Pass
2462	-10.86	Pass

WIFI Mode IEEE 802.11n HT20 modulation (6.5Mbps) Test Result

Frequency MHz	P dBm	Result
2412	-11.59	Pass
2437	-12.52	Pass
2462	-11.50	Pass

8 Test Equipment

TEST ITME	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
CE	Test Receiver	Rohde & Schwarz	ESHS10	838693/001	2013-12-17
	L.I.S.N.#1	Rohde & Schwarz	ESH2-Z5	834066/011	2013-05-07
	L.I.S.N.#3	Kyoritsu	KNW-242C	8-1920-1	2013-05-07
	Terminator	Hubersuhner	50Ω	No. 1	2013-05-07
	Terminator	Hubersuhner	50Ω	No. 2	2013-05-07
	RF Cable	Fujikura	3D-2W	LISN Cable 1#	2013-05-07
	Coaxial Switch	Anritsu	MP59B	M55367	2013-05-07
	Passive Probe	Rohde & Schwarz	ESH2-Z3	299.7810.52	2013-05-07
	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100341	2013-05-07
Peak Power	Spectrum Analyzer	Agilent	E4446A	US44300459	2013-05-07
Band Edge	Spectrum	Agilent	E4446A	US44300459	2013-05-07
	Amp	HP	8449B	3008A02495	2013-05-07
	Antenna	EMCO	3115	9607-4877	2013-05-16
	Bilog Antenna	Schaffner	CBL6111C	2598	2013-12-13
	HF Cable	Hubersuhne	Sucoflex104	---	2013-05-07
Conducted RF Emissions	Spectrum Analyzer	Agilent	E4446A	US44300459	2013-05-07
RSE	Spectrum	Agilent	E4446A	US44300459	2013-05-07
	Amp	HP	8449B	3008A02495	2013-05-07
	Antenna	EMCO	3115	9607-4877	2013-05-17
	Bilog Antenna	Schaffner	CBL6111C	2598	2013-12-14
	HF Cable	Hubersuhne	Sucoflex104	---	2013-05-07
Bandwidth	Spectrum Analyzer	Agilent	E4446A	MY41440292	2013-05-07
PSD	Spectrum Analyzer	Agilent	E4446A	MY41440292	2013-05-07

9 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=4.32dB (30MHz-25GHz)
CE	Disturbance Voltage (dB μ V)	U=2.40dB(150KHz-30MHz)