

RADIO TEST REPORT

For

Navico Auckland Limited

WIFI Router

Model No.: GoFreeWIFI-1

Prepared for : Navico Auckland Limited
Address : 3-5 Omega Street, Building A Albany 0632, Auckland, New Zealand

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd., Bao'an District, Shenzhen, Guangdong, China

Date of receipt of test sample : September 24, 2012
Number of tested samples : 1
Serial number : Prototype
Date of Test : September 24, 2012 – October 22, 2012
Date of Report : October 22, 2012

RADIO TEST REPORT

**FCC CFR 47 PART 15 C(15.247)
IC RSS-210 Issue 8**

Report Reference No. : LCS120924131TF

Date of Issue : October 22, 2012

Testing Laboratory Name..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Address : 1F., Xingyuan Industrial Park, Tongda Road, Bao'an Blvd.,
Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure..... : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐

Applicant's Name..... : Navico Auckland Limited

Address : 3-5 Omega Street, Building A Albany 0632, Auckland, New
Zealand

Test Specification

Standard : FCC CFR 47 PART 15 Subpart C: 2011, ANSI C63.4-2009,
IC RSS-210 Issue 8

Test Report Form No..... : LCSEMC-1.0

TRF Originator : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF : Dated 2011-03

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Test Item Description. : WIFI Router

Trade Mark : NAVICO

Model/ Type reference..... : GoFreeWIFI-1

Ratings : DC 12V, Current: 0.2A

Result : **Positive**

Compiled by:

Ada Liang

Ada Liang / File administrators

Supervised by:

Vito Cao

Vito Cao/ Technique principal

Approved by:

Gavin Liang

Gavin Liang/ Manager

RADIO -- TEST REPORT

Test Report No. : LCS120924131TF

October 22, 2012

Date of issue

Type / Model..... : WIFI Router

EUT..... : GoFreeWIFI-1

Applicant..... : Navico Auckland Limited

Address..... : 3-5 Omega Street, Building A Albany 0632, Auckland, New Zealand

Telephone..... : /

Fax..... : /

Manufacturer..... : New Energy Technology Ltd.

Address..... : Room 1301, 13/F., David House, 8-20 Nanking Street, Jordan,
Kowloon, HK

Telephone..... : /

Fax..... : /

Factory..... : China Legend Technology Limited

Address..... : 602 East Building, No.13 Mai An Road, Huicheng, Huizhou, GD,
China

Telephone..... : /

Fax..... : /

Test Result:

Positive

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT : WIFI Router

Model Number : GoFreeWIFI-1

Power Supply : DC 12V, Current: 0.2A

Frequency Range : 2412.00-2462.00MHz, (Channel Number: 11, Channel
Frequency=2412+5(K-1), K=1, 2, 311)

Modulation Technology : IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK)

Data Rates : IEEE 802.11b: 1-11Mbps
IEEE 802.11g: 6-54Mbps

Antenna Gain : 3.0dBi

1.2. Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	Certificate
N/A	N/A	N/A	N/A	N/A

1.3. External I/O Cable

Cable Description	Length (M)	From/Port	To
Power	1.05	EUT	Battery
Signal	0.8	EUT	Notebook/PC

1.4. Description of Test Facility

Site Description

EMC Lab.

: Accredited by CNAS, June 04, 2010

The Certificate Registration Number. is L4595.

Accredited by FCC, July 14, 2011

The Certificate Registration Number. is 899208.

Accredited by Industry Canada, May. 02, 2011

The Certificate Registration Number. is 9642A-1

1.5. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	30MHz~200MHz	$\pm 2.96\text{dB}$	(1)
	:	200MHz~1000MHz	$\pm 3.10\text{dB}$	(1)
	:	1GHz~26.5GHz	$\pm 3.80\text{dB}$	(1)
Conduction Uncertainty	:	150kHz~30MHz	$\pm 1.63\text{dB}$	(1)
Power disturbance	:	30MHz~300MHz	$\pm 1.60\text{dB}$	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

1.7. Description Of Test Modes

The EUT has been tested under operating condition.

Worst-case mode and channel used for 150kHz-30 MHz power line conducted emissions was the mode and channel with the highest output power, that was determined to be 802.11b/g mode, mid channel.

Worst-case mode and channel used for 9kHz-26.5GHz radiated and power line conducted emissions was the mode and channel with the highest output power, that was determined to be 802.11b/g mode, mid channel.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

802.11b Mode : 1 Mbps, DSSS.

802.11g Mode : 6 Mbps, OFDM.

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd..

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure KDB558074 is required to be used for this kind of FCC 15.247 digital modulation device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C and IC RSS-210 Issue 8.

2.3. General Test Procedures

2.3.1 Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a typical fashion.

3.2. EUT Exercise Software

N/A.

3.3. Special Accessories

N/A.

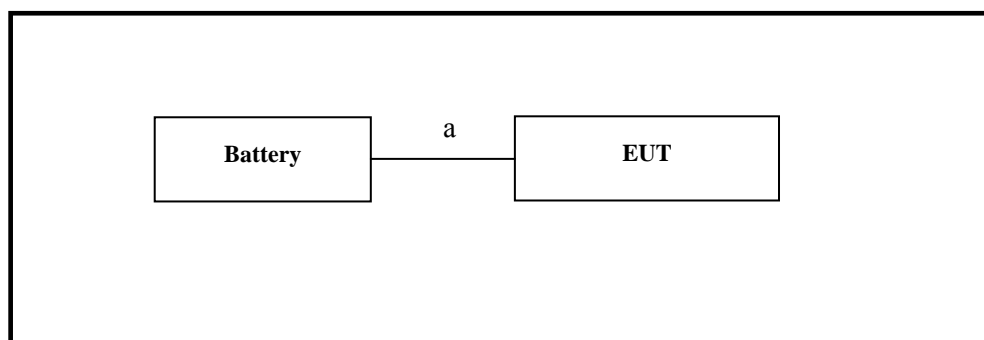
3.4. Block Diagram/Schematics

Please refer to the report.

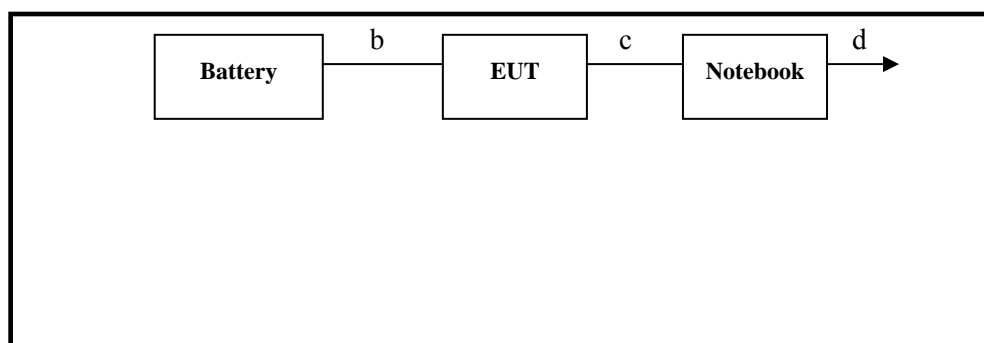
3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Block Diagram of Test Setup



Radiation emission Test



Conducted emission Test

Note: a- dc line, b - DC line, c- Lane Cable, d- AC line

4. SUMMARY OF TEST RESULTS

Applied Standard: 47 CFR FCC Part 15 Subpart C, IC RSS-210 Issue 8			
FCC Part 15 Rules	RSS-210 Rules	Description of Test	Result
§15.247(b)	RSS-210[A8.4(4)]	Maximum Conducted Output Power	Compliant
§15.247(e)	RSS-210[A8.2(2)]	Power Spectral Density	Compliant
§15.247(a)(2)	RSS-210[A8.2(1)]	6dB Bandwidth	Compliant
§15.209, §15.247(d)	RSS-210[A8.5]	Radiated and Conducted Spurious Emissions	Compliant
§15.205	RSS-210[A8.5]	Emissions at Restricted Band	Compliant
§15.207(a)	RSS-Gen[7.2.4]	Conducted Emissions	Compliant
§15.203	/	Antenna Requirements	Compliant
§15.247(i)§2.1093	RSS-102	RF Exposure	Compliant

N/A is not applicable.

5. TEST RESULT

5.1. Maximum Conducted Output Power Measurement

5.1.1. Standard Applicable

According to §15.247(b), RSS-210[A8.4(4)]: For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limit has to be reduced by the amount in dB that the gain of the antenna exceeds 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

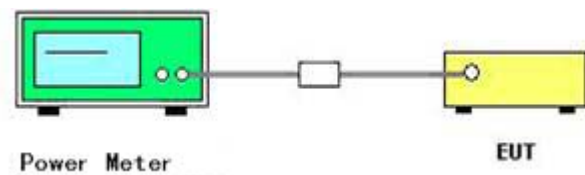
5.1.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report.

5.1.3. Test Procedures

- The transmitter output (antenna port) was connected to a Power meter.
- Detector= Peak.

5.1.4. Test Setup Layout



5.1.5. Test Result of Maximum Conducted Output Power

Temperature	25°C	Humidity	60%
Test Engineer	Vito Cao	Configurations	802.11b,g

802.11b

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412	17.19	30	Complies
6	2437	16.69	30	Complies
11	2462	16.90	30	Complies

802.11g

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412	14.48	30	Complies
6	2437	15.55	30	Complies
11	2462	15.82	30	Complies

5.2. Power Spectral Density Measurement

5.2.1. Standard Applicable

According to §15.247(e), RSS-210[A8.2(2)]: For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

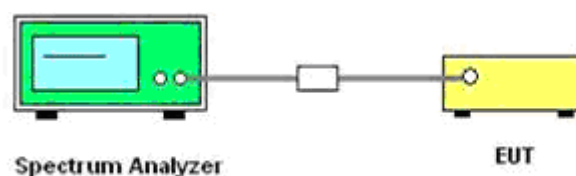
5.2.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report.

5.2.3. Test Procedures

1. The transmitter was connected directly to a Spectrum Analyzer through a directional couple.
2. The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
3. Set the RBW = 100 kHz.
4. Set the VBW \geq 300 kHz.
5. Set the span to a value that is 5-30 % greater than the EBW.
6. Detector = peak.
7. Sweep time = auto couple.
8. Trace mode = max hold.
9. Allow trace to fully stabilize.
10. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

5.2.4. Test Setup Layout



5.2.5. Test Result of Power Spectral Density

Temperature	25°C	Humidity	60%
Test Engineer	Vito Cao	Configurations	802.11b,g

802.11b

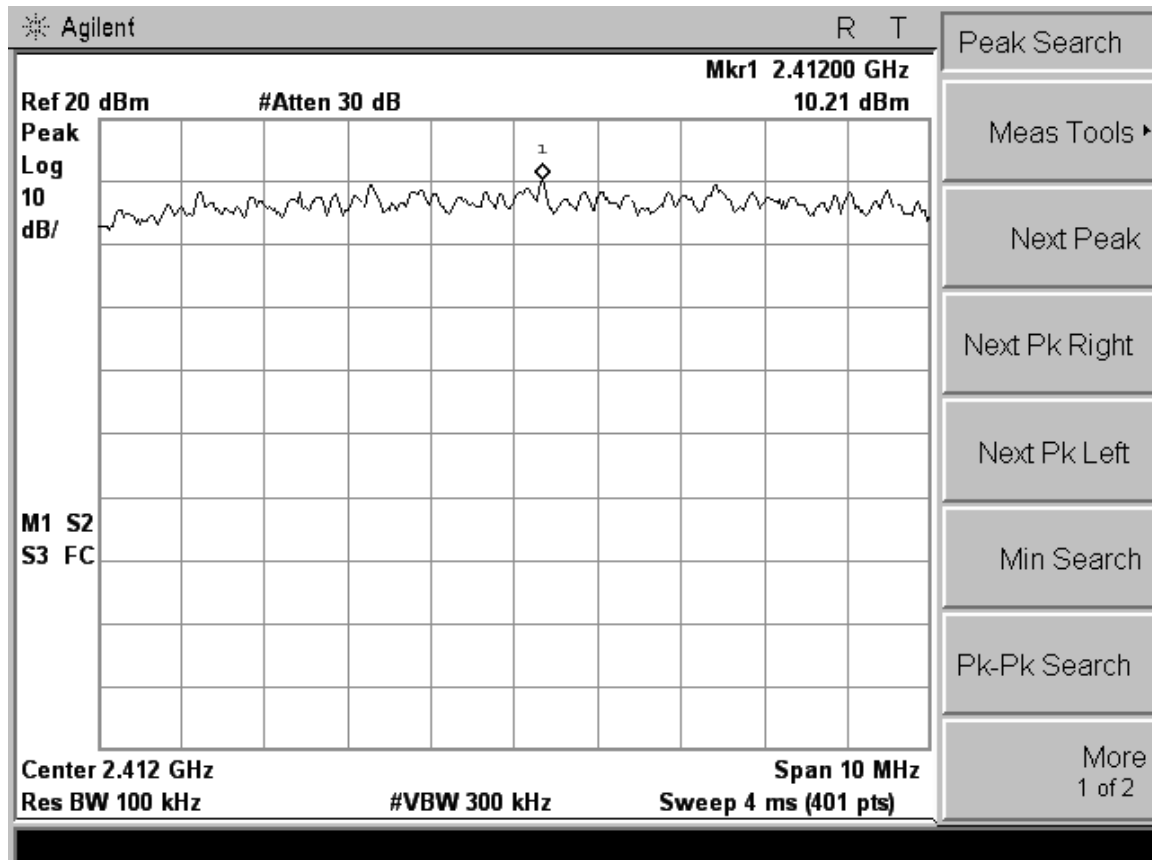
Channel	Frequency	Power Density (dBm)	BWCF (dB)	Max. Limit (dBm)	Result
1	2412	10.21	-15.2	8	Complies
6	2437	11.53	-15.2	8	Complies
11	2462	12.00	-15.2	8	Complies

802.11g

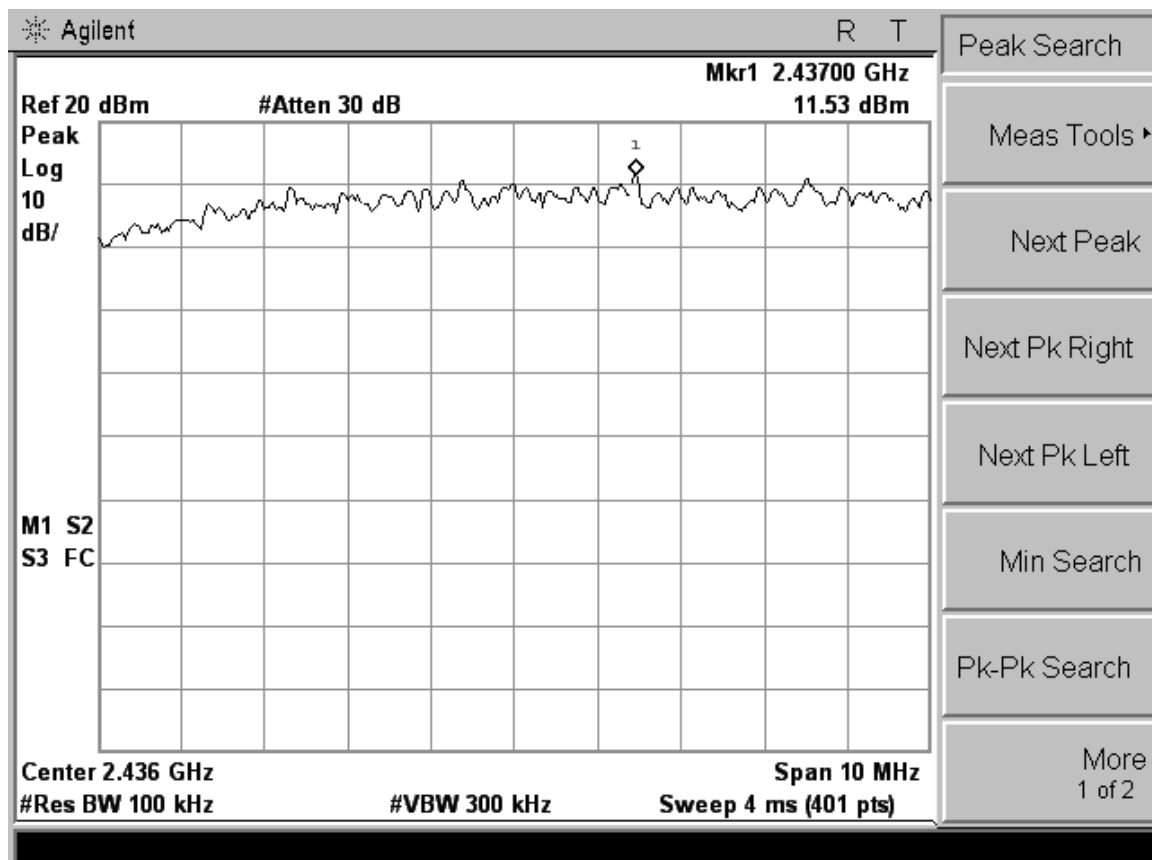
Channel	Frequency	Power Density (dBm)	BWCF (dB)	Max. Limit (dBm)	Result
1	2412	5.976	-15.2	8	Complies
6	2437	6.934	-15.2	8	Complies
11	2462	7.337	-15.2	8	Complies

Note: Power Spectral Density = Power Density + BWCF \leq 8dBm

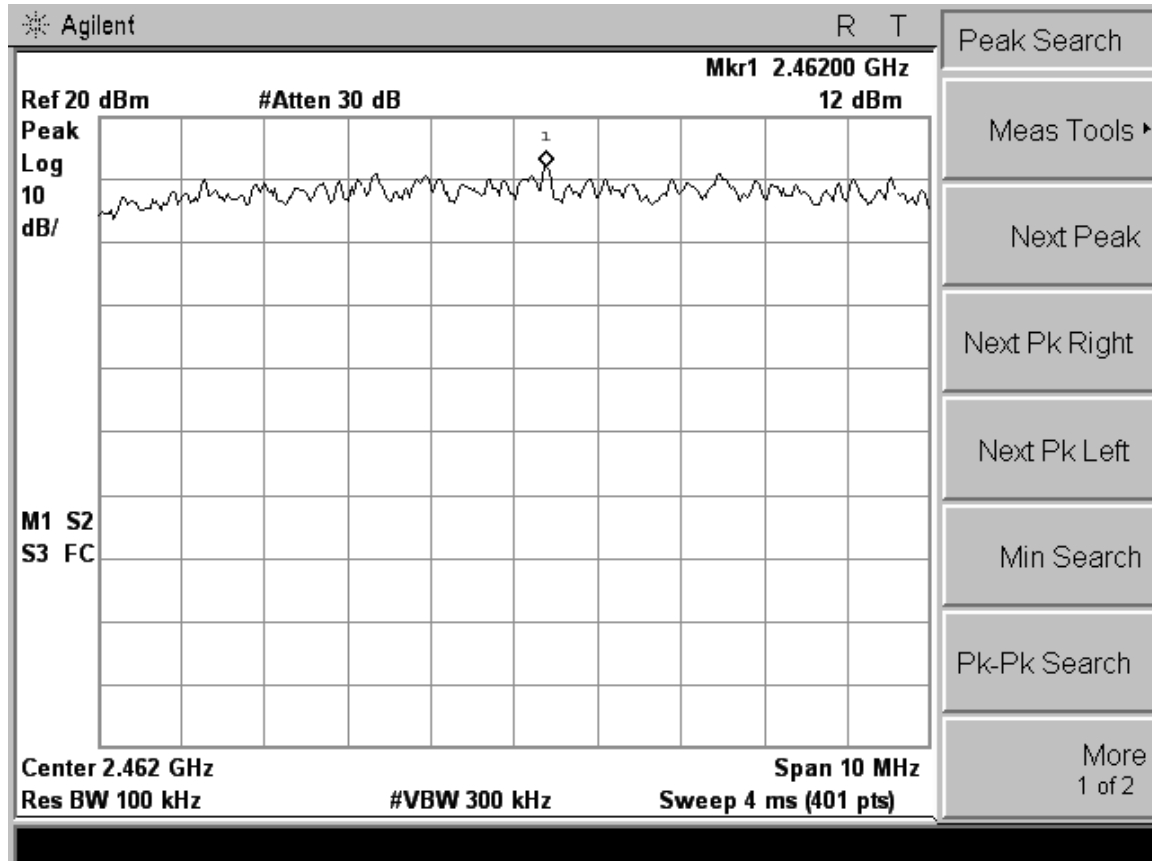
802.11b Low channel power density



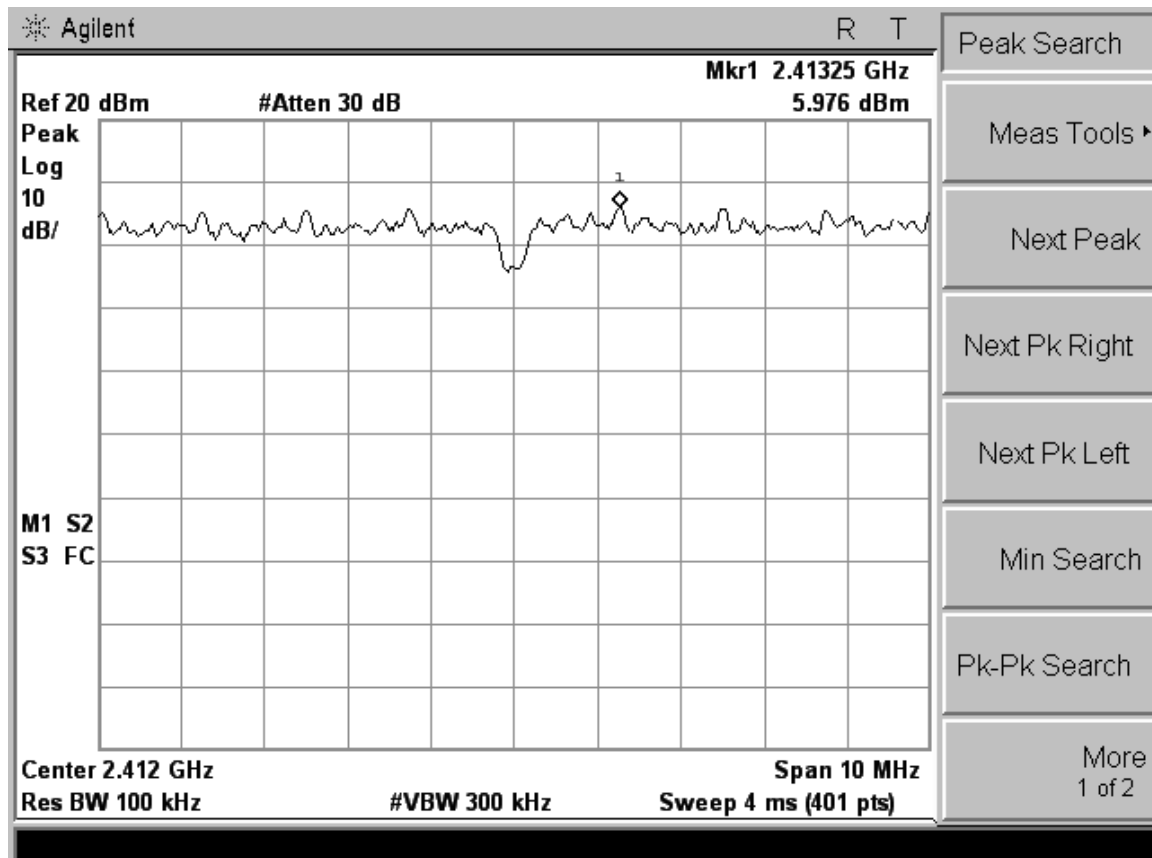
802.11b Middle channel power density



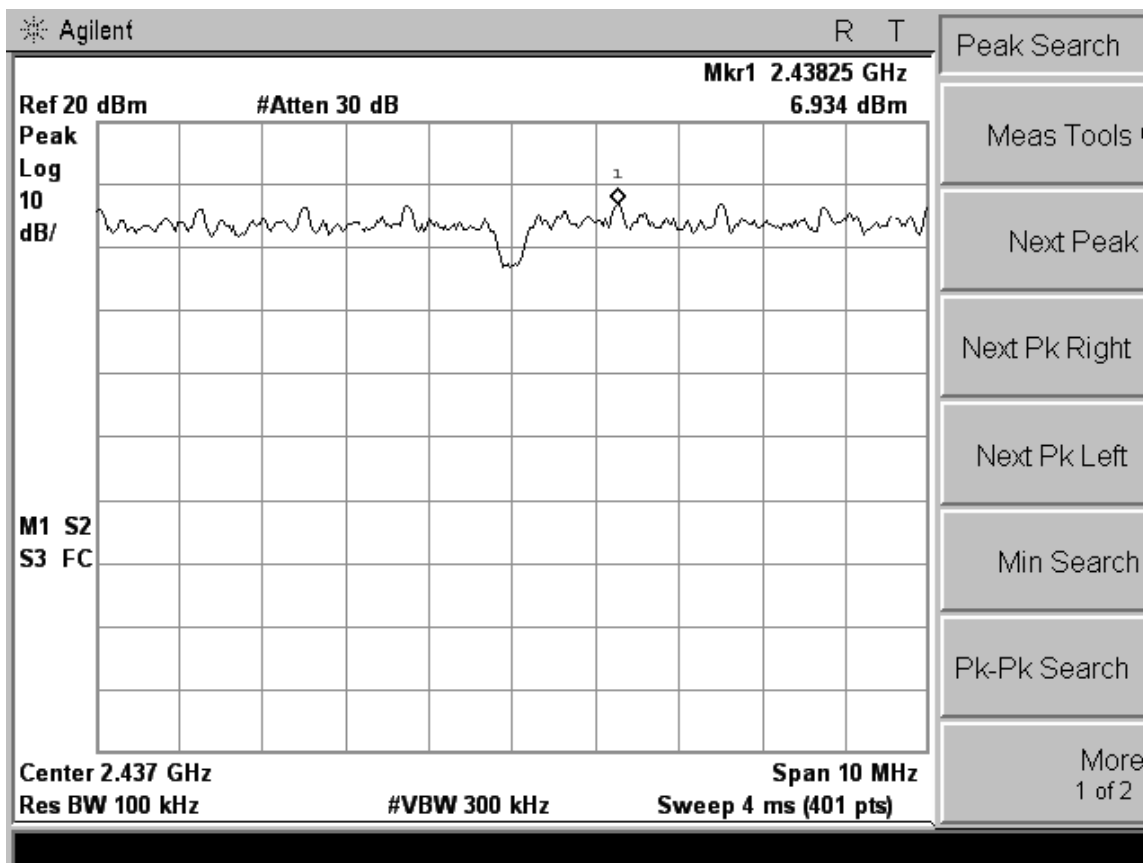
802.11b High channel power density



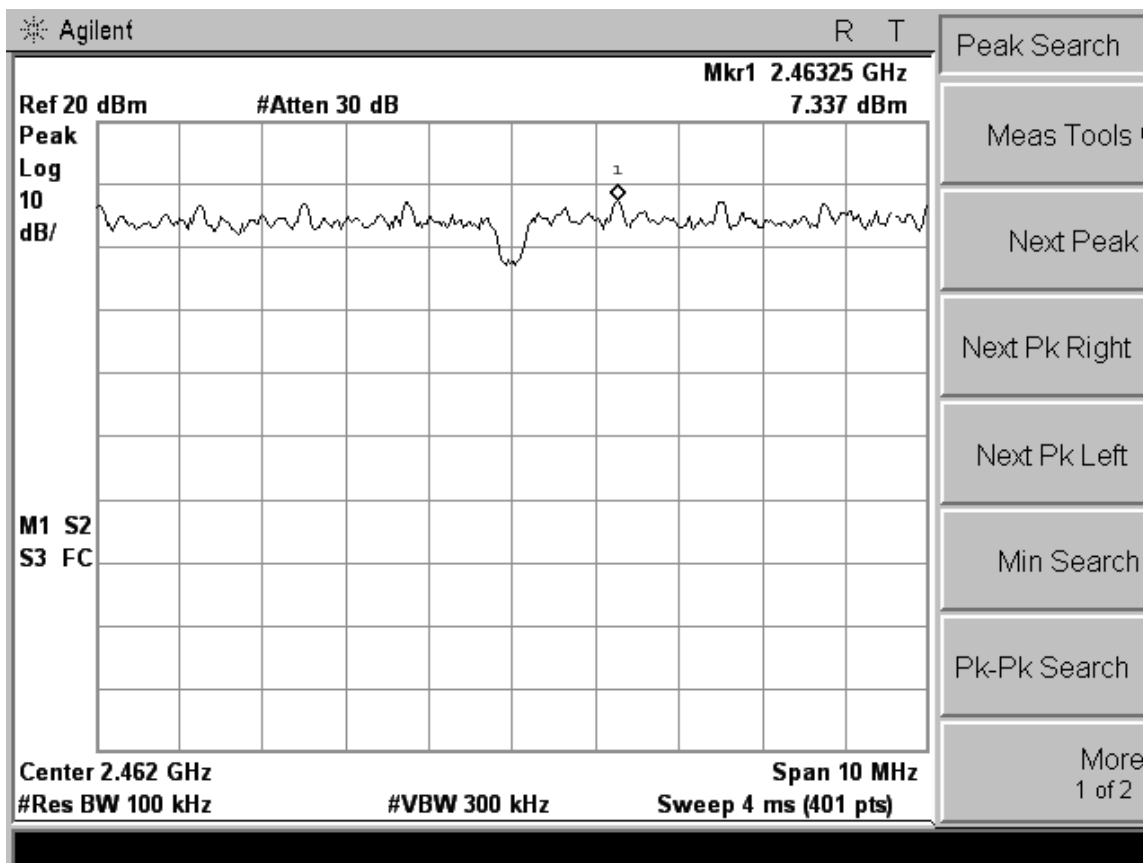
802.11g Low channel power density



802.11g Middle channel power density



802.11g High channel power density



5.3. 6 dB Spectrum Bandwidth Measurement

5.3.1. Standard Applicable

According to §15.247(a)(2), RSS-210[A8.2(1)]: For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

5.3.2. Measuring Instruments and Setting

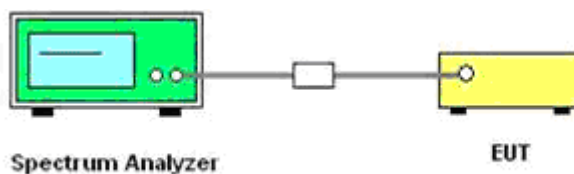
Please refer to section 6 of equipments list in this report. The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

5.3.4. Test Setup Layout



5.3.5. Test Result of 6dB Spectrum Bandwidth

Temperature	25℃	Humidity	60%
Test Engineer	Vito Cao	Configurations	802.11b,g

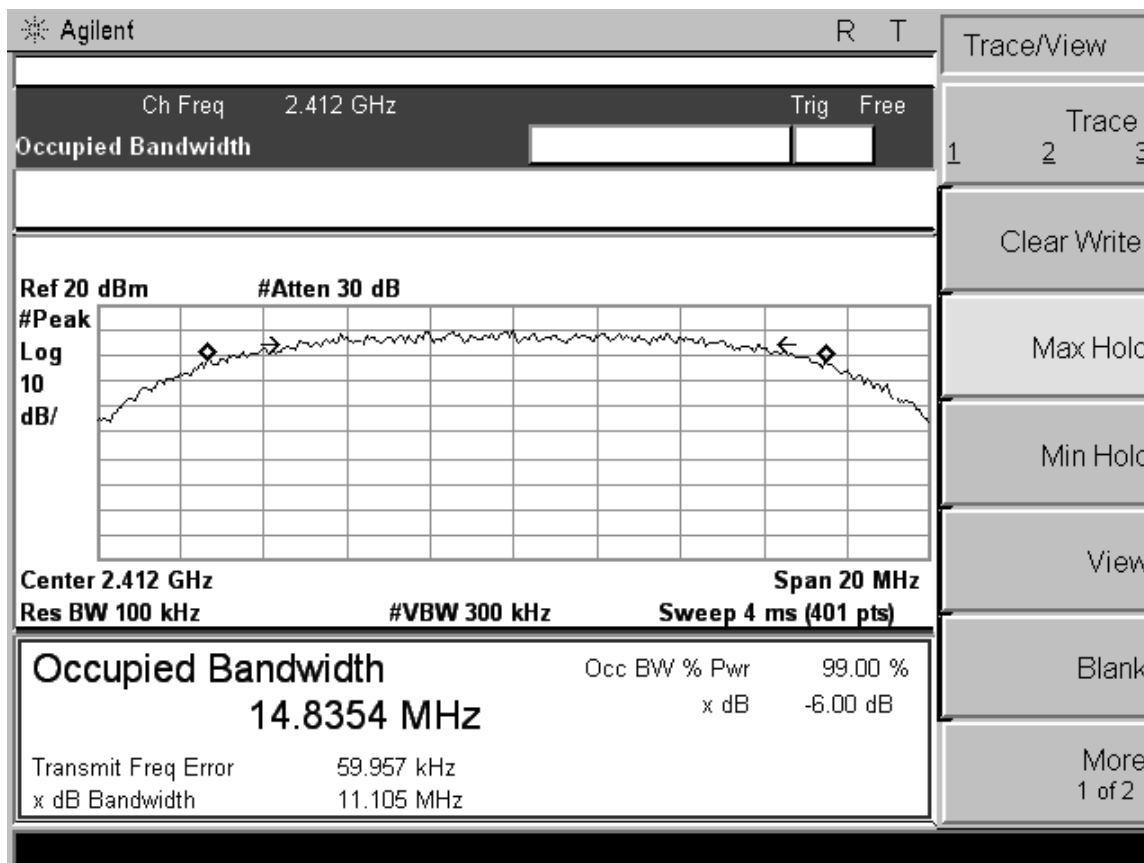
802.11b

Channel	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	11.105	500	Complies
6	2437	10.245	500	Complies
11	2462	11.099	500	Complies

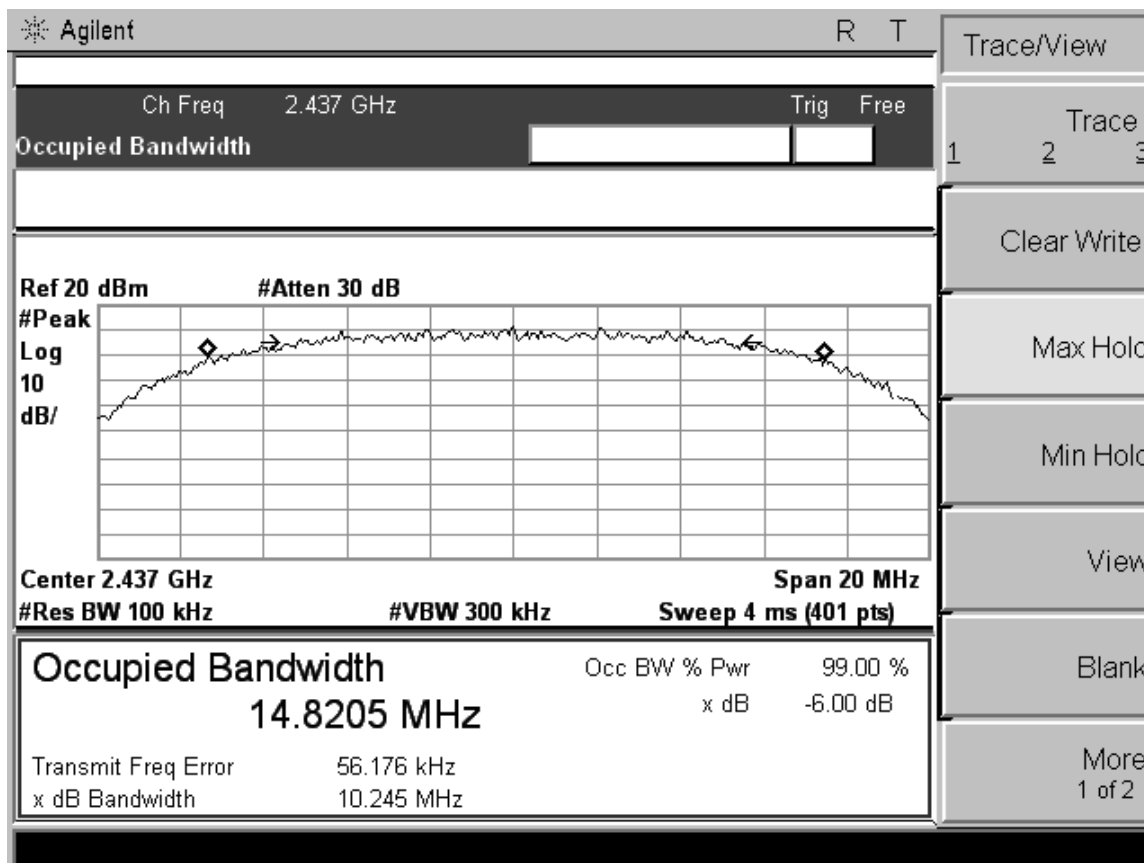
802.11g

Channel	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Result
1	2412	16.507	500	Complies
6	2437	16.481	500	Complies
11	2462	16.488	500	Complies

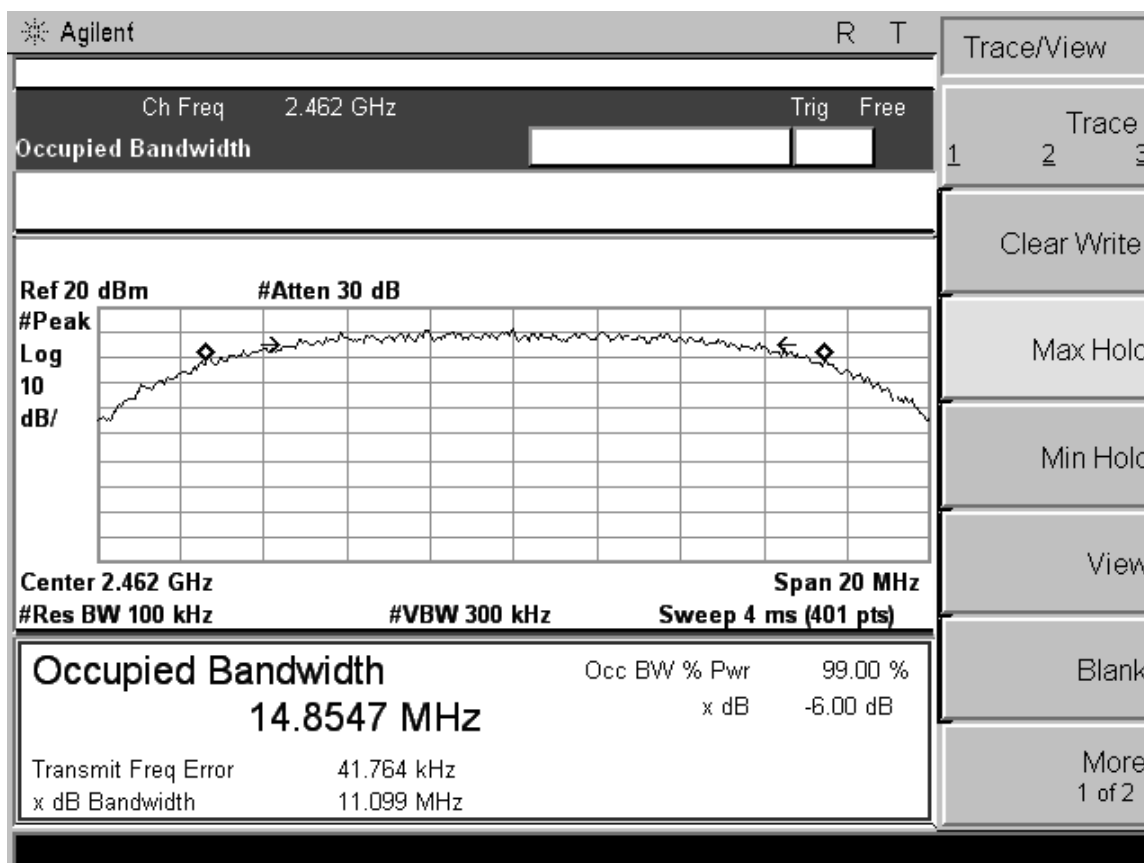
802.11b Low channel 6dB bandwidth



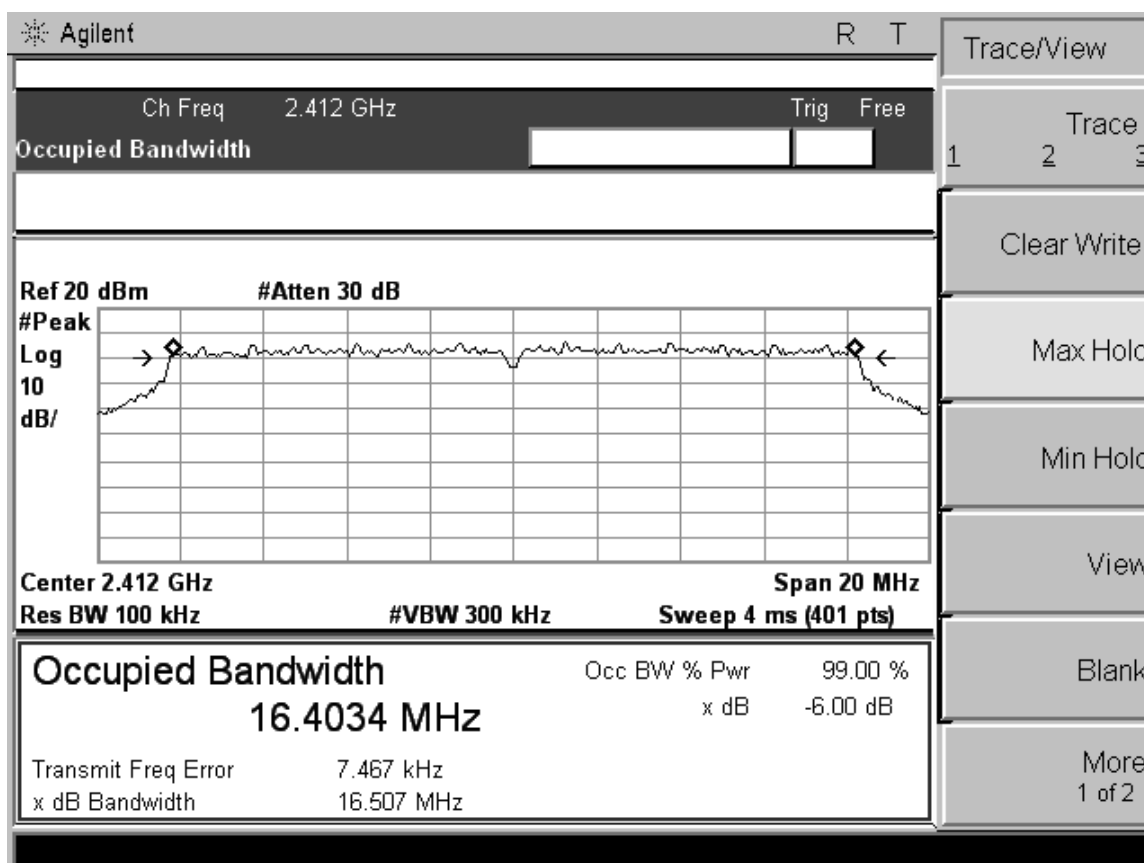
802.11b Middle channel 6dB bandwidth



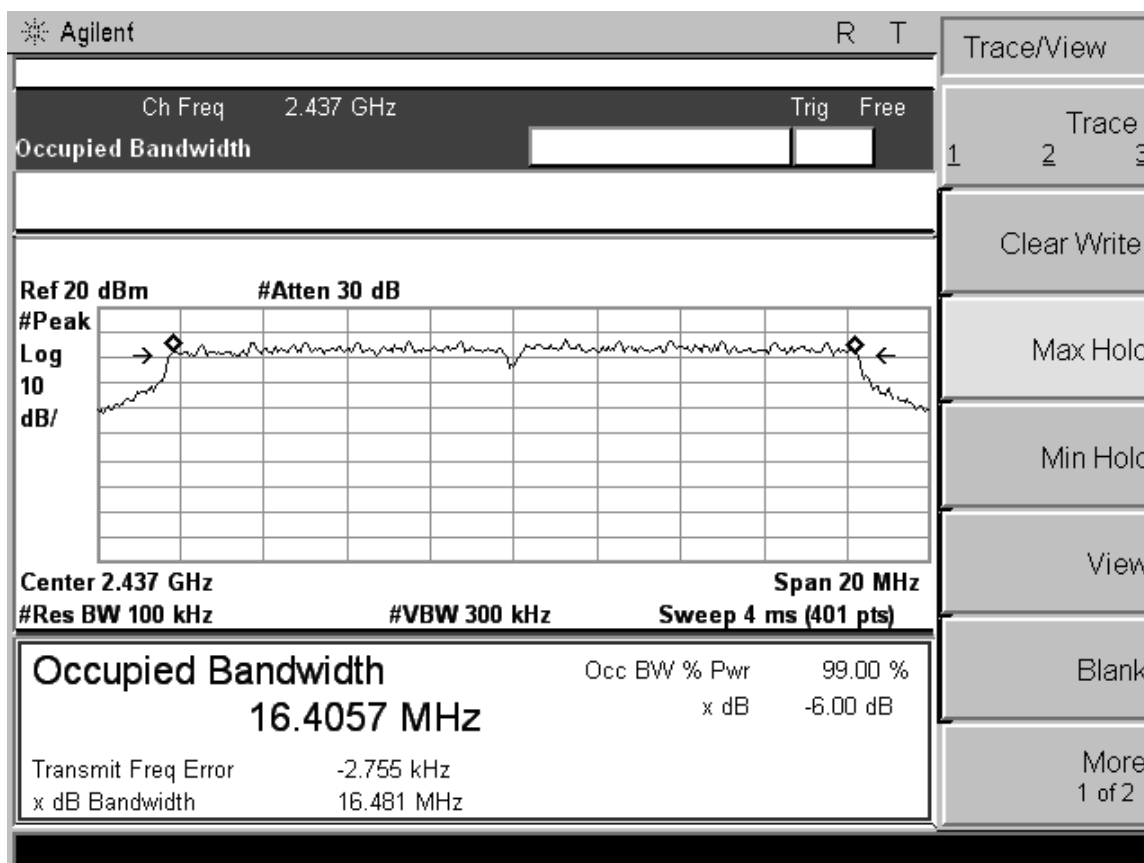
802.11b Middle channel 6dB bandwidth



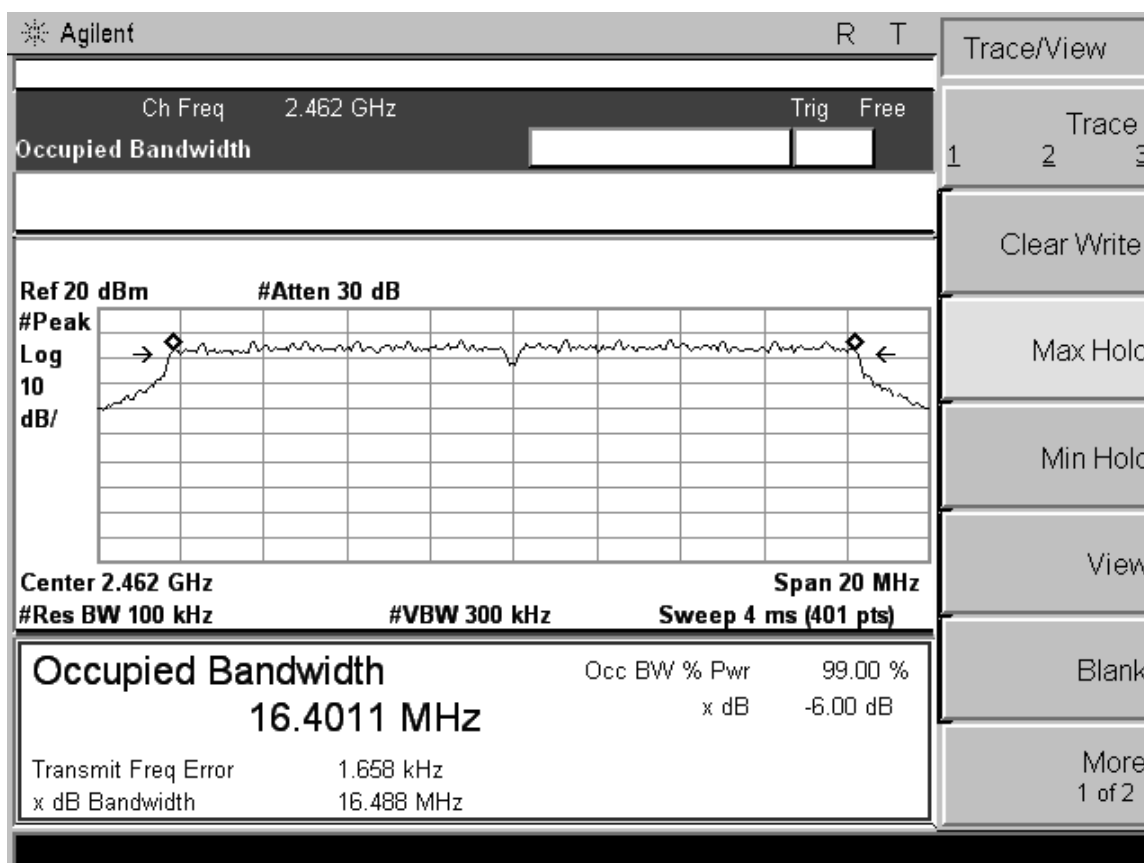
802.11g Low channel 6dB bandwidth



802.11g Middle channel 6dB bandwidth



802.11g High channel 6dB bandwidth



5.4. Radiated Emissions Measurement

5.4.1. Standard Applicable

According to §15.247 (d), RSS-210[A8.5]: 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies(MHz)	Field Strength(micorvolts/meter)	Measurement Distance(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

5.4.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Spectrum Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 100kHz for QP

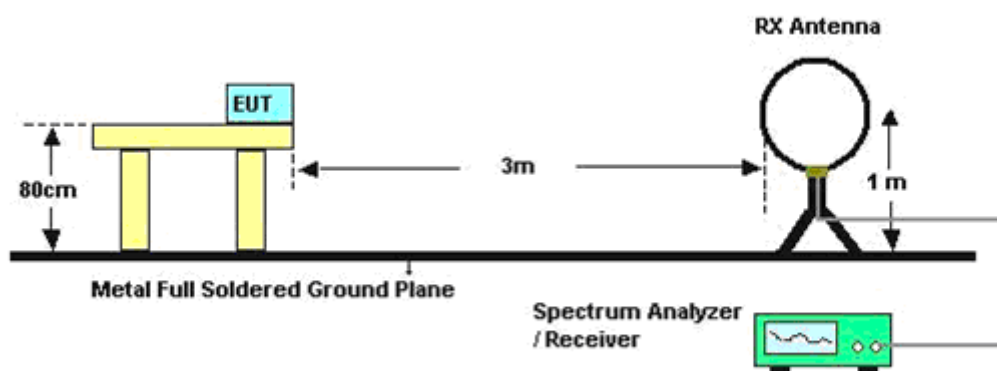
5.4.3. Test Procedures

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 m to 4 m) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading

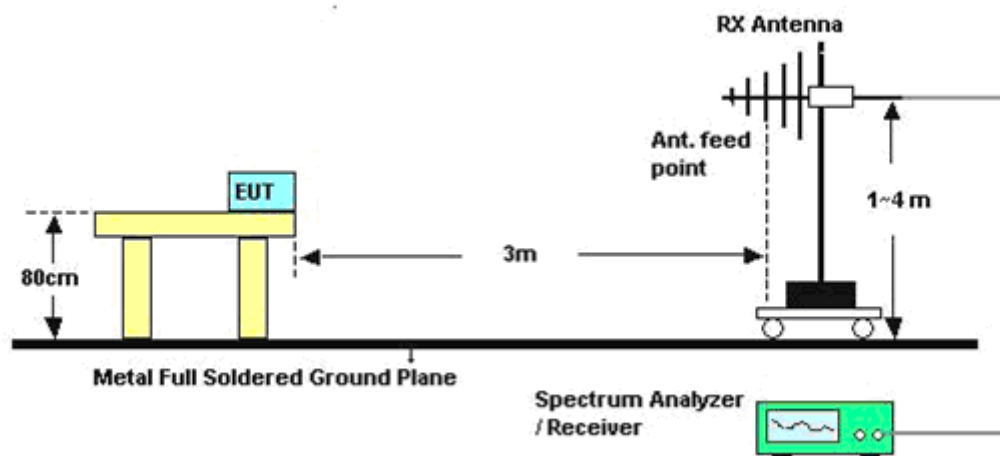
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

5.4.4. Test Setup Layout

For radiated emissions below 30MHz



For radiated emissions above 30MHz



Above 10 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1.5m.

Distance extrapolation factor = $20 \log (\text{specific distance [3m]} / \text{test distance [1.5m]})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor [6 dB].

5.4.5. Results of Radiated Emissions (9kHz~30MHz)

Temperature	25℃	Humidity	60%
Test Engineer	Vito Cao	Configurations	802.11b,g

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

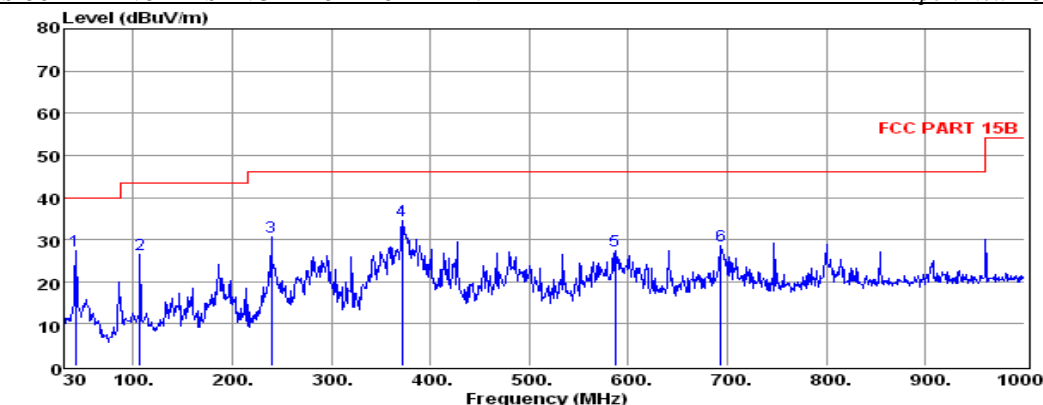
The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

5.4.6. Results of Radiated Emissions (30MHz~1GHz)

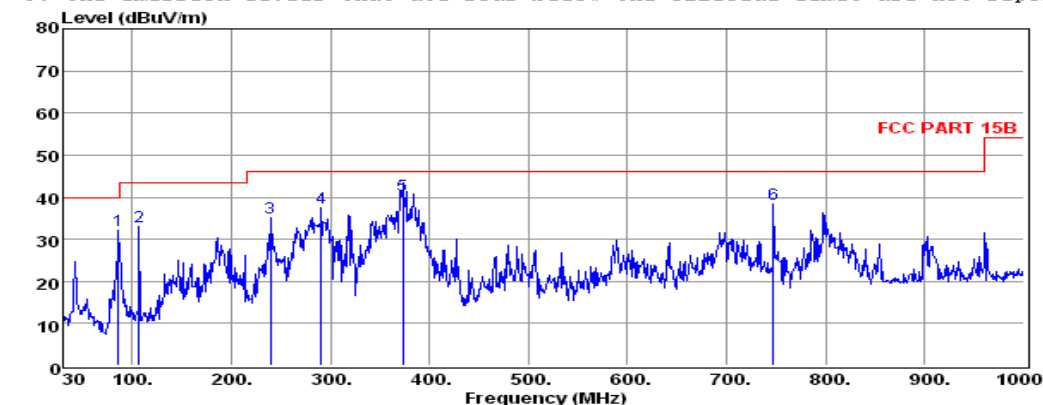
Temperature	25℃	Humidity	60%
Test Engineer	Vito Cao	Configurations	802.11b,g



Env. /Ins: 24°C/56%
 EUT: WIFI Router
 M/N: GoFreeWIFI-1
 Power Rating: DC 12V
 Test Mode: 802.11B/Middle Channel
 Operator: KEN
 Memo:
 pol: VERTICAL

	Freq.	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	41.64	43.43	0.50	13.57	30.14	27.36	40.00	-12.64	QP
2	106.63	43.47	0.68	12.56	30.20	26.51	43.50	-16.99	QP
3	239.52	47.73	1.01	12.07	30.18	30.63	46.00	-15.37	QP
4	371.44	48.77	1.20	14.52	30.11	34.38	46.00	-11.62	QP
5	586.78	37.70	1.50	18.20	30.01	27.39	46.00	-18.61	QP
6	693.48	38.09	1.66	18.79	30.05	28.49	46.00	-17.51	QP

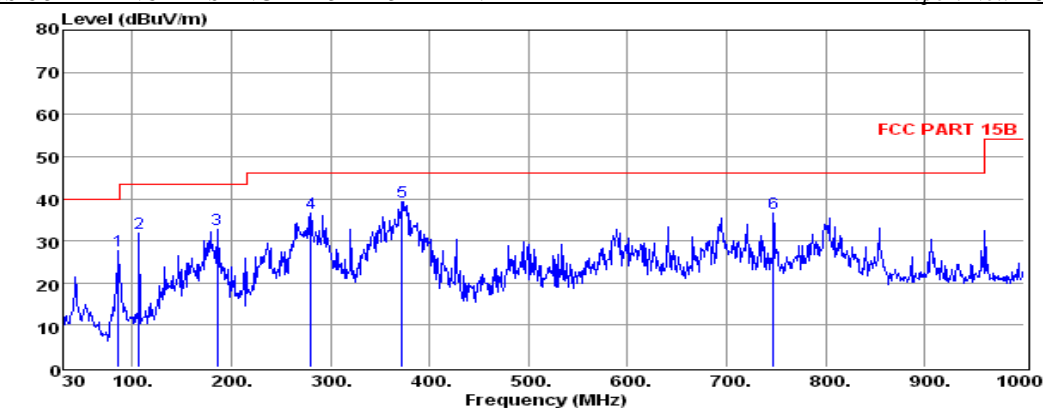
Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.



Env. /Ins: 24°C/56%
 EUT: WIFI Router
 M/N: GoFreeWIFI-1
 Power Rating: DC 12V
 Test Mode: 802.11B/Middle Channel
 Operator: KEN
 Memo:
 pol: HORIZONTAL

	Freq.	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	86.26	51.09	0.47	10.71	30.18	32.09	40.00	-7.91	QP
2	106.63	50.08	0.68	12.56	30.20	33.12	43.50	-10.38	QP
3	239.52	52.20	1.01	12.07	30.18	35.10	46.00	-10.90	QP
4	290.93	53.69	1.01	12.88	30.15	37.43	46.00	-8.57	QP
5	373.38	54.93	1.10	14.54	30.11	40.46	46.00	-5.54	QP
6	746.83	47.46	1.61	19.40	30.07	38.40	46.00	-7.60	QP

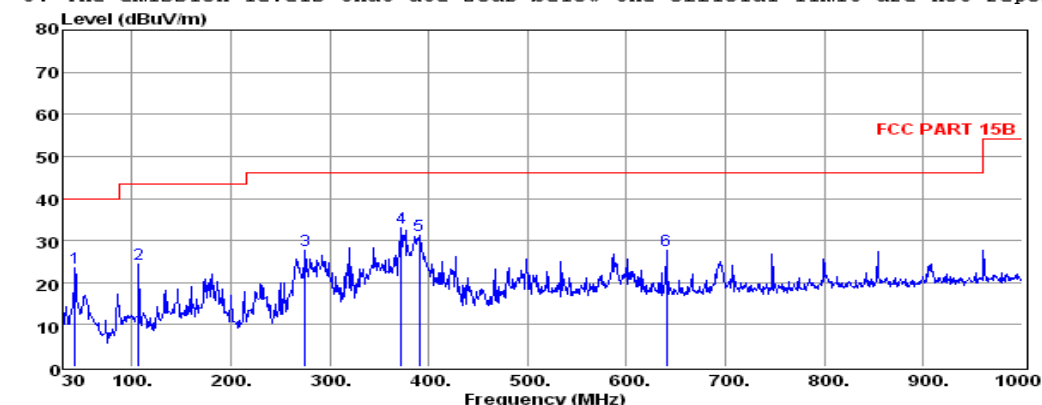
Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.



Env. / Ins: 24°C/56%
 EUT: WIFI Router
 M/N: GoFreeWIFI-1
 Power Rating: DC 12V
 Test Mode: 802.11G/Middle Channel
 Operator: KEN
 Memo:
 pol: HORIZONTAL

	Freq.	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	86.26	46.55	0.47	10.71	30.18	27.55	40.00	-12.45	QP
2	106.63	48.71	0.68	12.56	30.20	31.75	43.50	-11.75	QP
3	186.17	51.60	0.98	10.22	30.20	32.60	43.50	-10.90	QP
4	280.26	52.99	1.01	12.68	30.16	36.52	46.00	-9.48	QP
5	372.41	53.75	1.20	14.53	30.11	39.37	46.00	-6.63	QP
6	746.83	45.52	1.61	19.40	30.07	36.46	46.00	-9.54	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.



Env. / Ins: 24°C/56%
 EUT: WIFI Router
 M/N: GoFreeWIFI-1
 Power Rating: DC 12V
 Test Mode: 802.11G/Middle Channel
 Operator: KEN
 Memo:
 pol: VERTICAL

	Freq.	Reading	CabLos	AntFac	PreFac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dB	dBuV/m	dBuV/m	dB	
1	42.61	39.47	0.50	13.56	30.14	23.39	40.00	-16.61	QP
2	106.63	41.37	0.68	12.56	30.20	24.41	43.50	-19.09	QP
3	275.41	44.38	1.00	12.53	30.16	27.75	46.00	-18.25	QP
4	372.41	47.46	1.20	14.53	30.11	33.08	46.00	-12.92	QP
5	390.84	45.26	1.17	14.84	30.10	31.17	46.00	-14.83	QP
6	640.13	37.58	1.56	18.59	30.02	27.71	46.00	-18.29	QP

Note: 1. All readings are Quasi-peak values.
 2. Measured = Reading + Antenna Factor + Cable Loss - Amp Factor.
 3. The emission levels that are 20dB below the official limit are not reported.

Note:

Pre-scan all mode and recorded the worst case results in this report.

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.4.7. Results for Radiated Emissions (1GHz~10th Harmonic)

802.11b

Channel 1

Freq MHz	Level dBuV/m	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
4824.12	47.67	45.71	33.06	35.04	3.94	74	-26.33	Peak	Horizontal
4824.23	39.21	37.25	33.06	35.04	3.94	54	-14.79	Average	Horizontal
4824.12	48.24	46.28	33.06	35.04	3.94	74	-25.76	Peak	Vertical
4824.25	40.12	38.16	33.06	35.04	3.94	54	-13.88	Average	Vertical

Channel 6

Freq MHz	Level dBuV/m	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
4874.65	47.86	45.89	33.16	35.15	3.96	74	-26.14	Peak	Horizontal
4874.65	36.09	34.12	33.16	35.15	3.96	54	-17.91	Average	Horizontal
4874.65	46.28	44.31	33.16	35.15	3.96	74	-27.72	Peak	Vertical
4874.65	35.76	33.79	33.16	35.15	3.96	54	-18.24	Average	Vertical

Channel 11

Freq MHz	Level dBuV/m	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
4924.37	46.36	44.26	33.26	35.14	3.98	74	-27.64	Peak	Horizontal
4924.37	34.78	32.68	33.26	35.14	3.98	54	-19.22	Average	Horizontal
4924.37	45.27	43.17	33.26	35.14	3.98	74	-28.73	Peak	Vertical
4924.37	34.05	31.95	33.26	35.14	3.98	54	-19.95	Average	Vertical

802.11g

Channel 1

Freq MHz	Level dBuV/m	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
4824.75	47.33	45.37	33.06	35.04	3.94	74	-26.67	Peak	Horizontal
4824.96	37.58	35.62	33.06	35.04	3.94	54	-16.42	Average	Horizontal
4824.75	46.70	44.74	33.06	35.04	3.94	74	-27.3	Peak	Vertical
4824.96	35.65	33.69	33.06	35.04	3.94	54	-18.35	Average	Vertical

Channel 6

Freq MHz	Level dBuV/m	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
4874.38	48.25	46.28	33.16	35.15	3.96	74	-25.75	Peak	Horizontal
4874.38	40.13	38.16	33.16	35.15	3.96	54	-13.87	Average	Horizontal
4874.38	47.74	45.77	33.16	35.15	3.96	74	-26.26	Peak	Vertical
4874.38	41.42	39.45	33.16	35.15	3.96	54	-12.58	Average	Vertical

Channel 11

Freq MHz	Level dBuV/m	Read Level dBuV	Ant. Fac dB/m	Pre. Fac dB	Cab.Los dB	Limit Line dBuV/m	Over limit dB	Remark	Pol/Phase
4924.85	50.82	48.72	33.26	35.14	3.98	74	-23.18	Peak	Horizontal
4924.85	41.28	39.18	33.26	35.14	3.98	54	-12.72	Average	Horizontal
4924.85	48.32	46.22	33.26	35.14	3.98	74	-25.68	Peak	Vertical
4924.85	42.39	40.29	33.26	35.14	3.98	54	-11.61	Average	Vertical

Notes:

1. Measuring frequencies from 9k~10th harmonic (ex. 26GHz), No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 26GHz) were made with an instrument using Peak detector mode.
3. 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.

5.5. Conducted Spurious Emissions

5.5.1. Standard Applicable

According to §15.247 (d): Output power was measured based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

5.5.2. Measuring Instruments and Setting

Please refer to section 6 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Detector	Peak
Attenuation	Auto
RB / VB (Emission in restricted band)	100KHz/100KHz
RB / VB (Emission in non-restricted band)	100KHz/100KHz

5.5.3. Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz

The spectrum from 30 MHz to 26.5 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

Preliminary tests on individual chains, and on all chains with a combiner, were performed. The worst-case configuration was with a combiner, therefore final test were performed with all chains feeding a combiner.

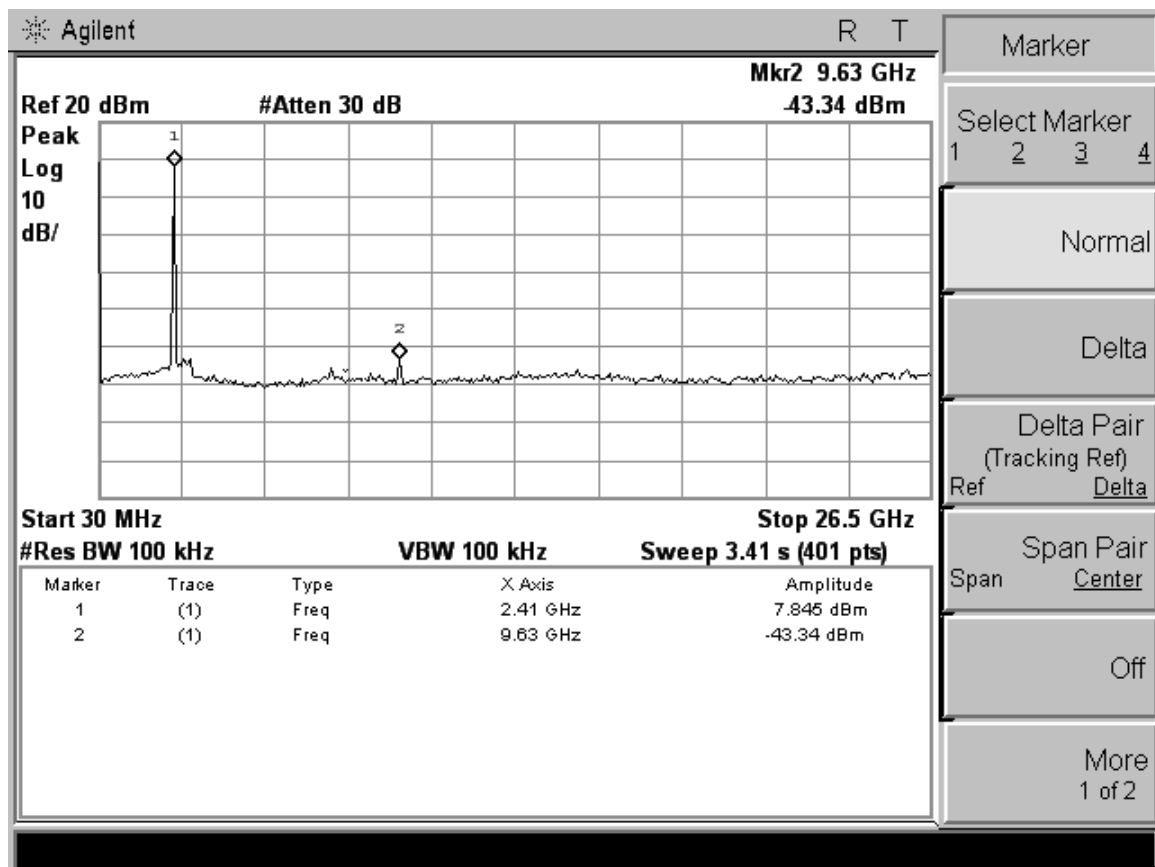
5.5.4. Test Setup Layout

This test setup layout is the same as that shown in section 5.4.4.

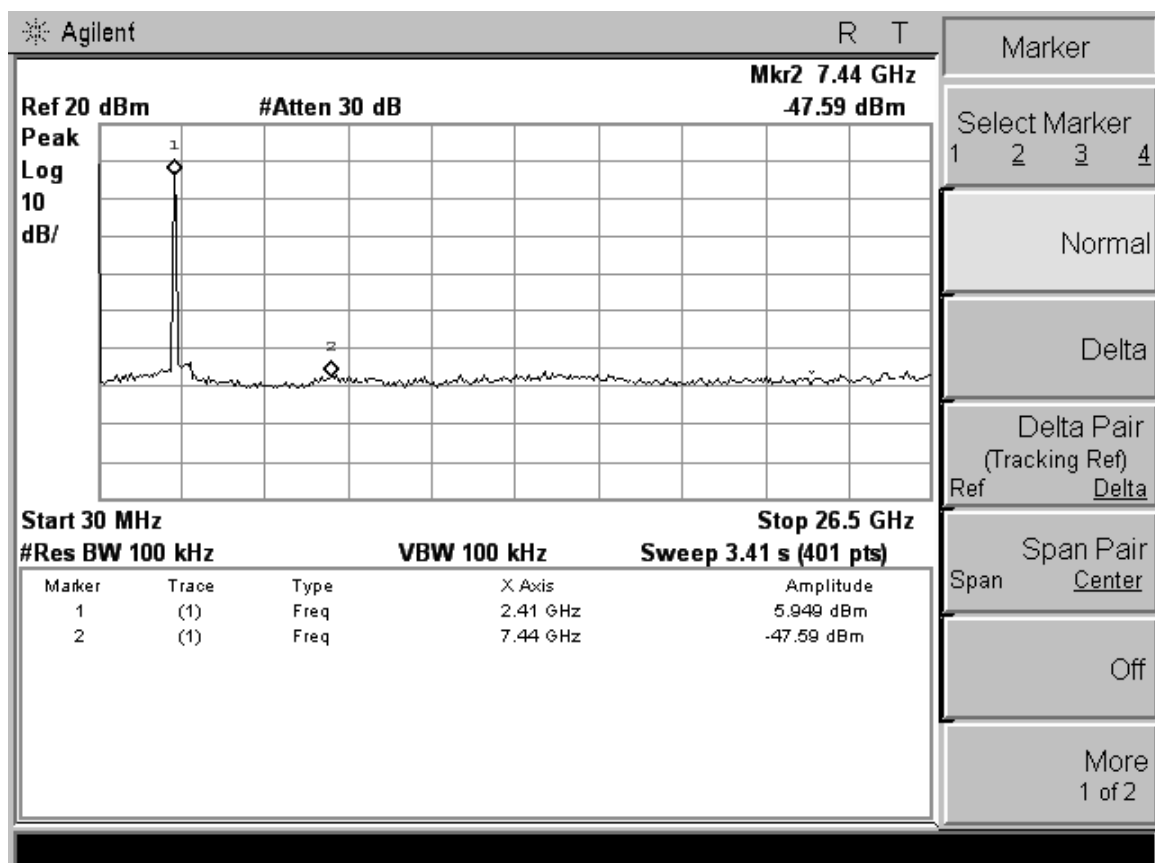
5.5.5. Test Results of Conducted Spurious Emissions

802.11b

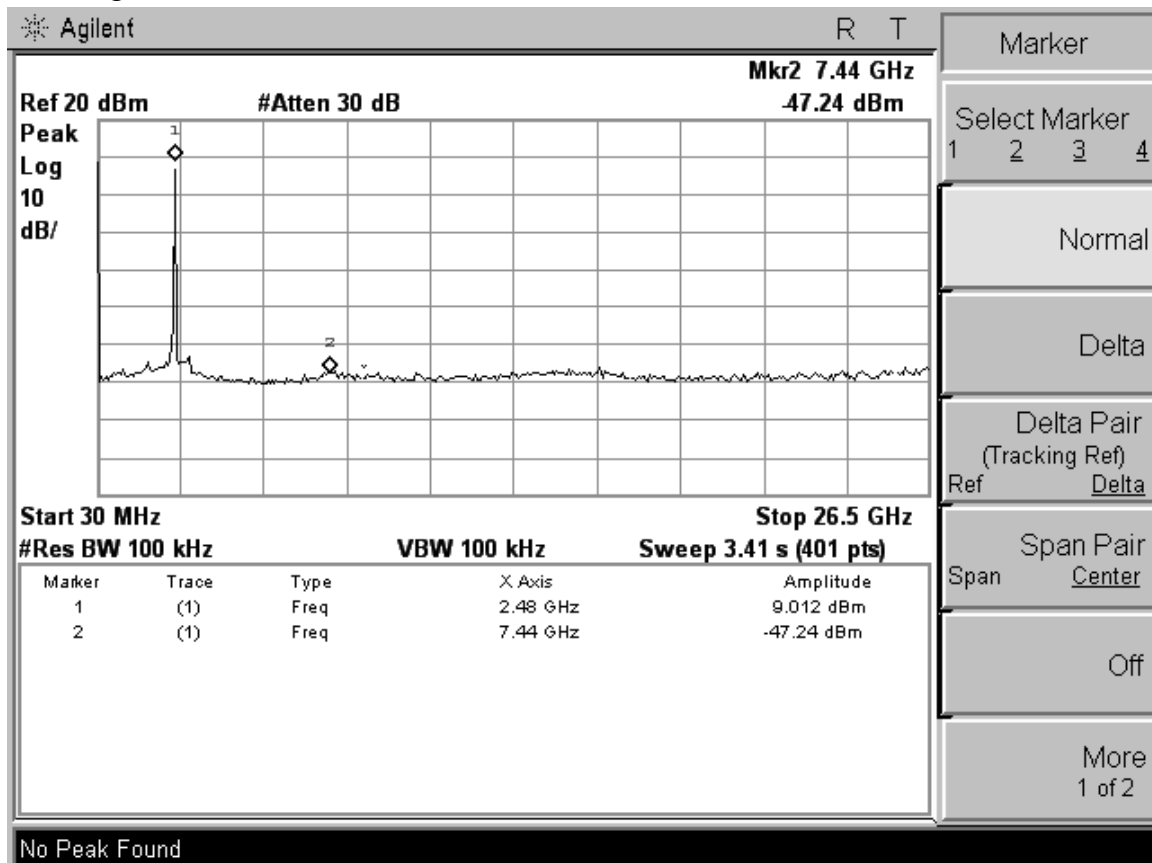
Low Channel



Middle Channel

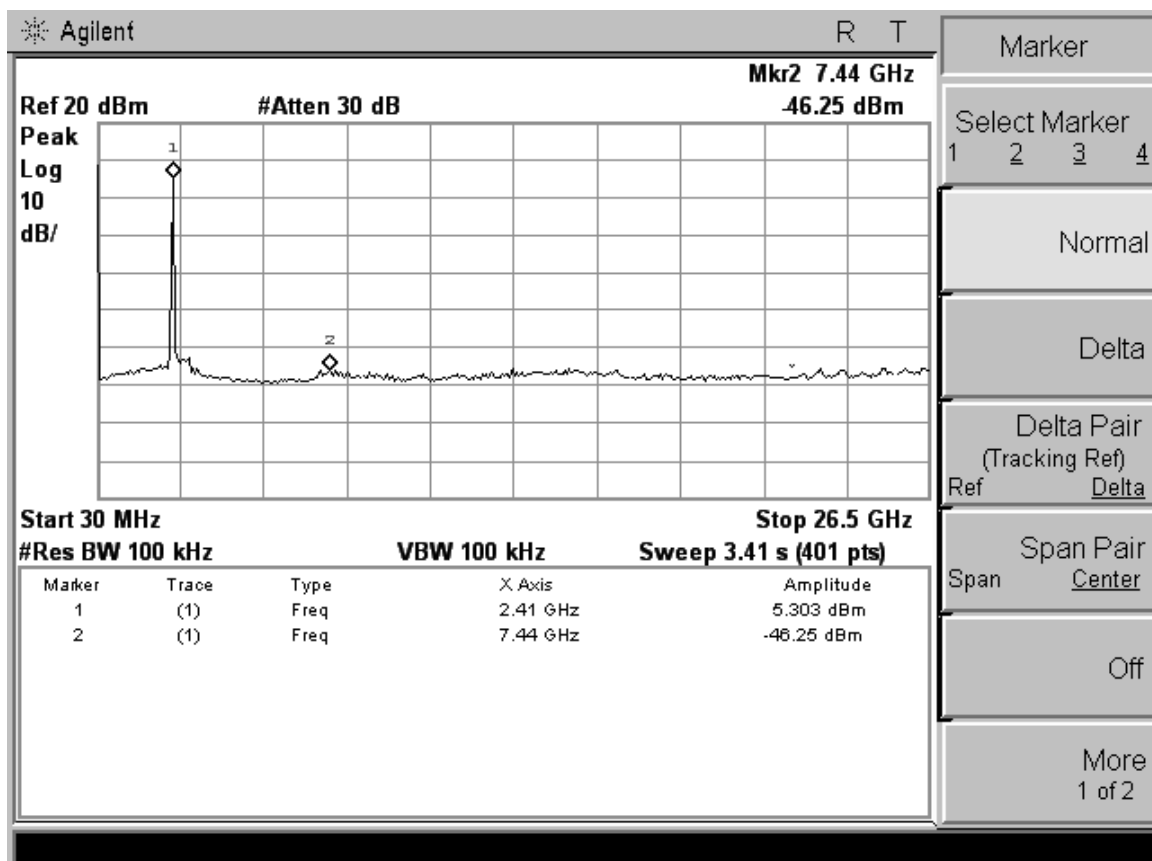


High Channel

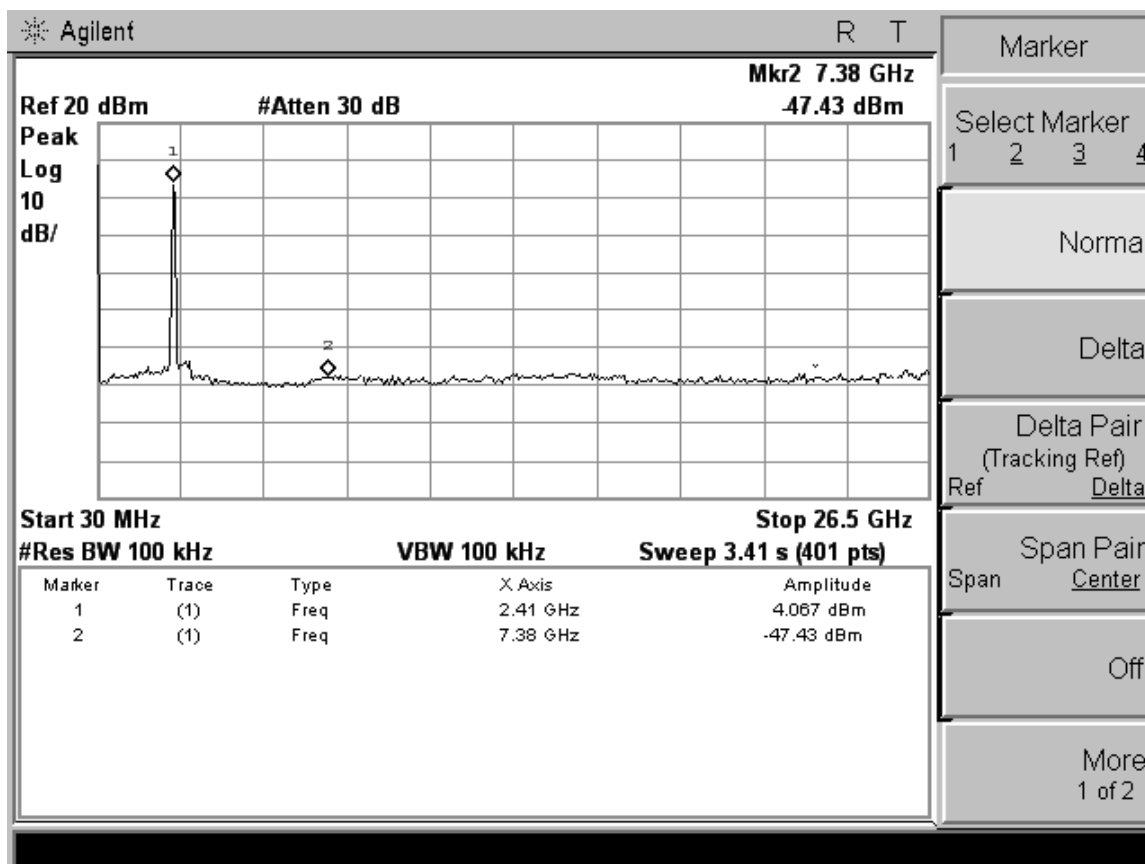


802.11g

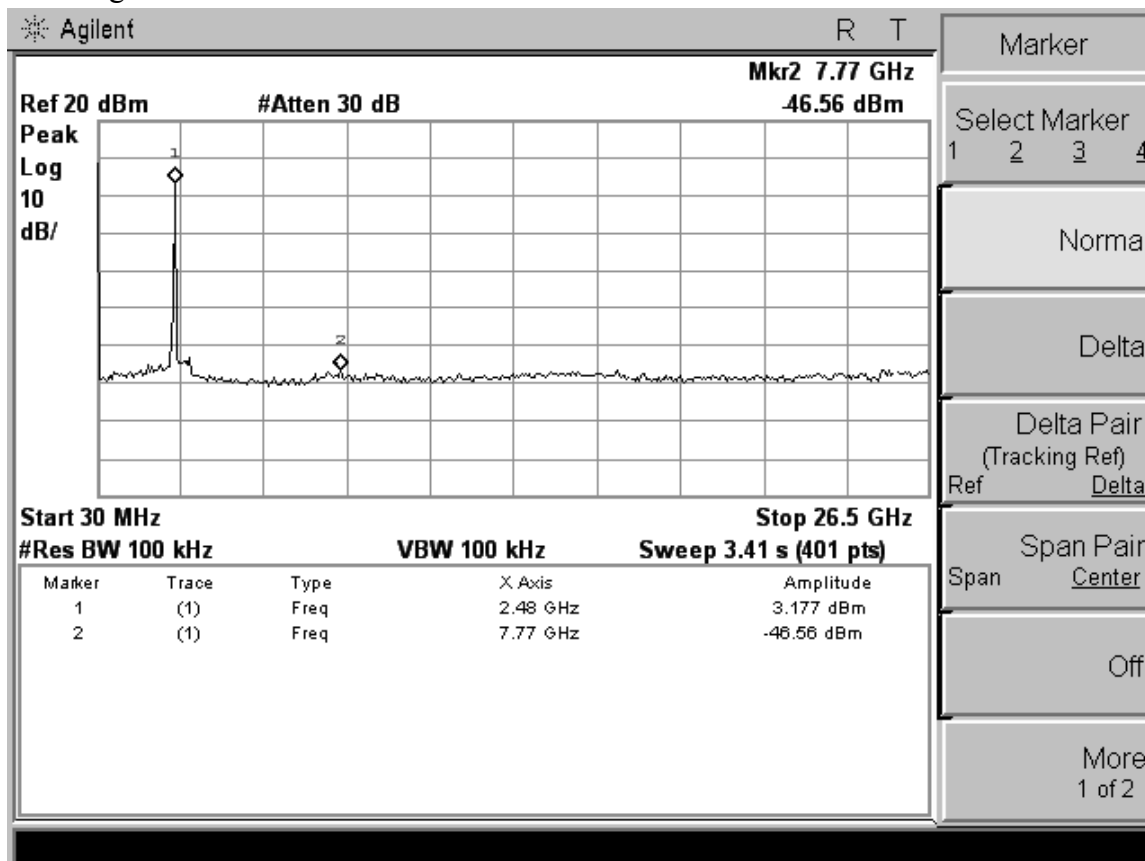
Low Channel



Middle Channel

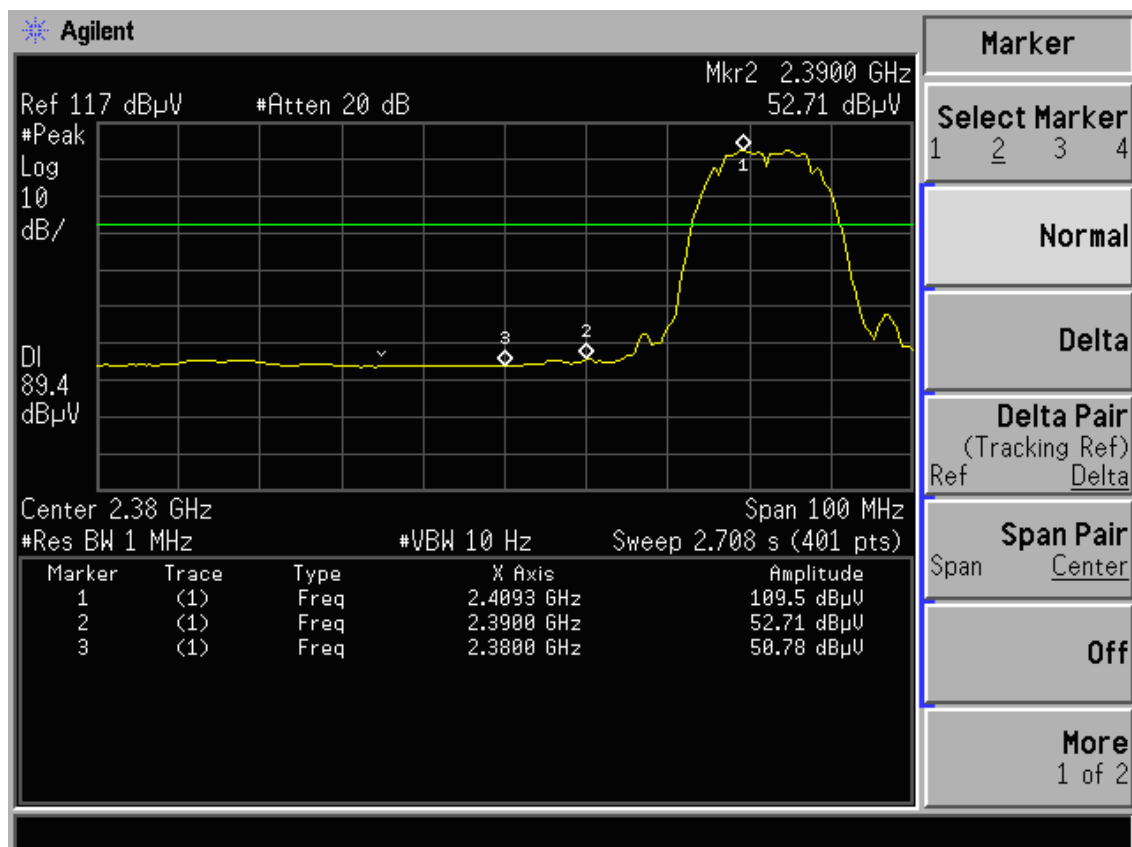
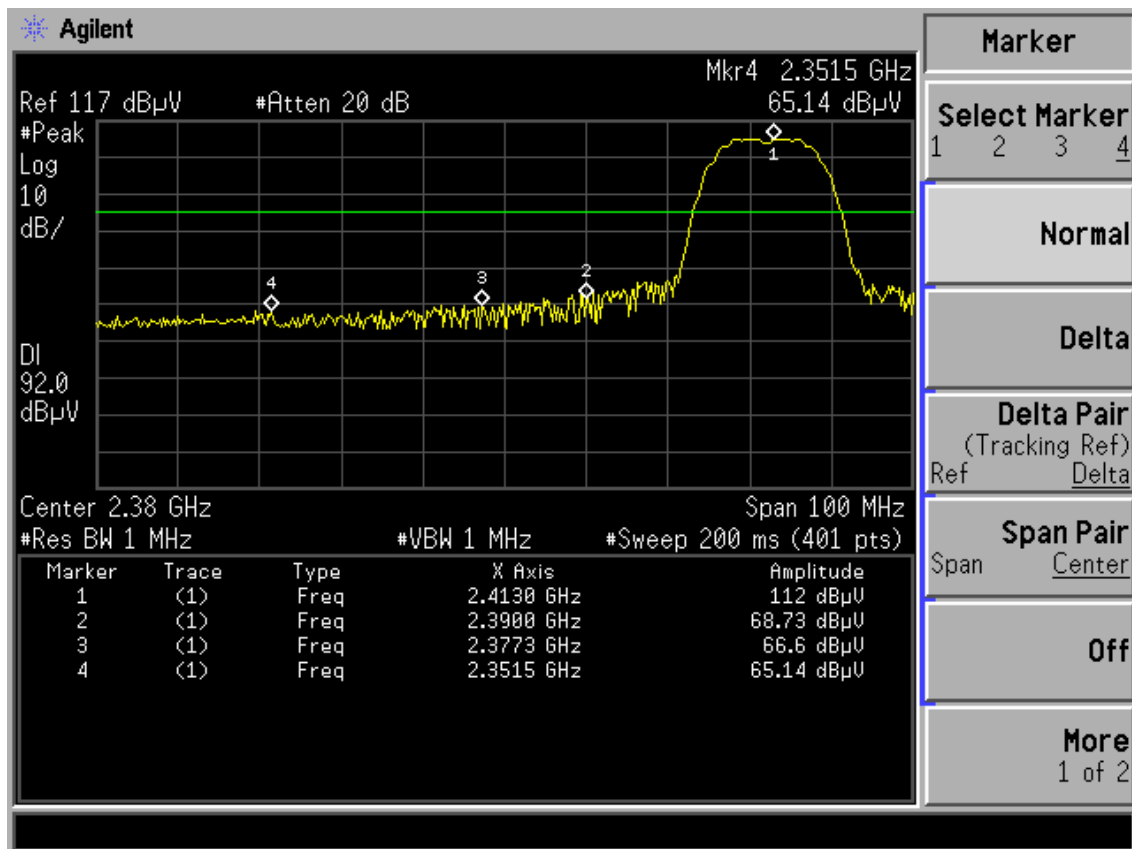


High Channel

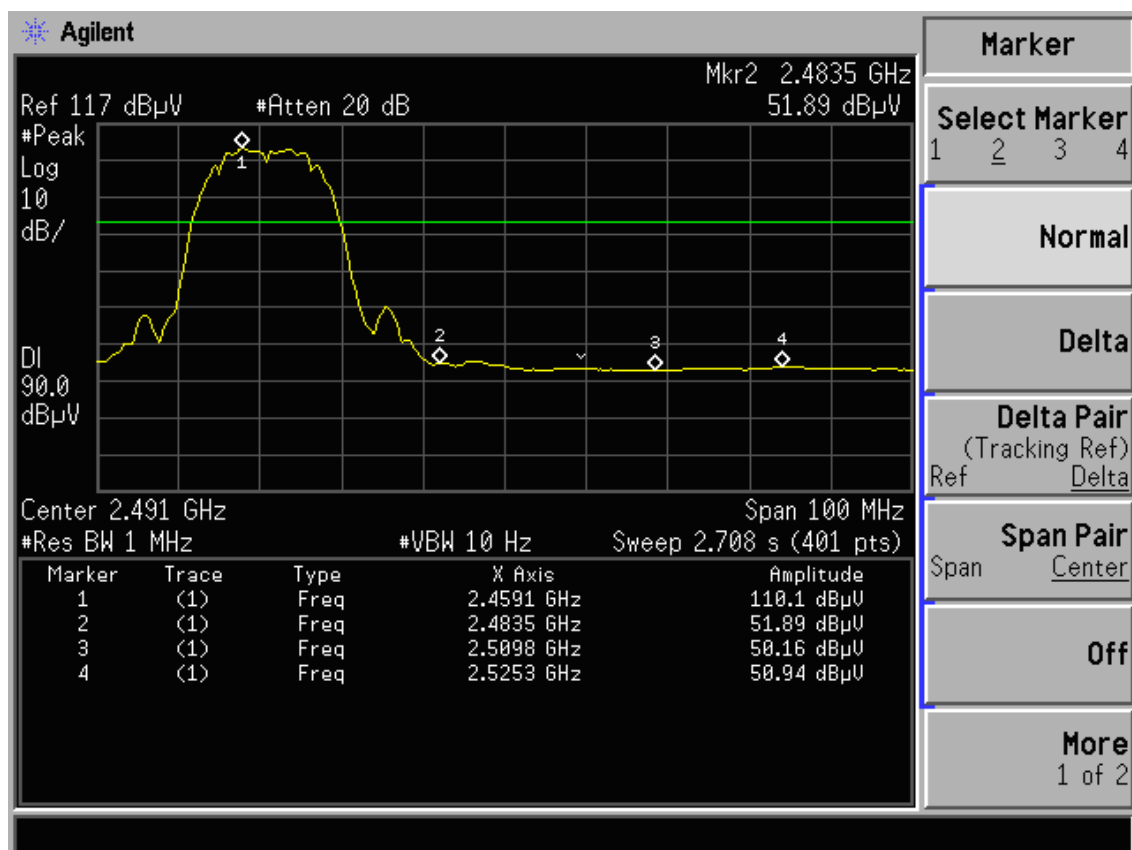
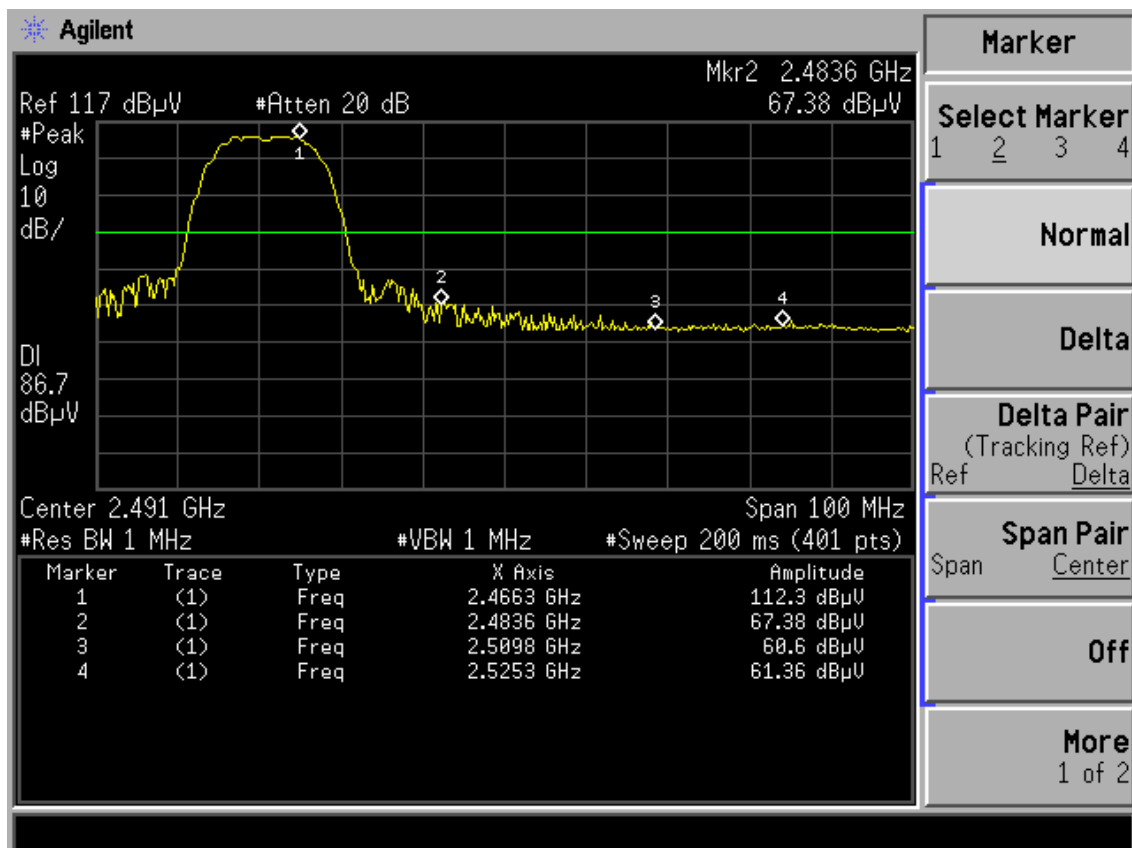


5.5.6. Test Results of Band Edge Emissions

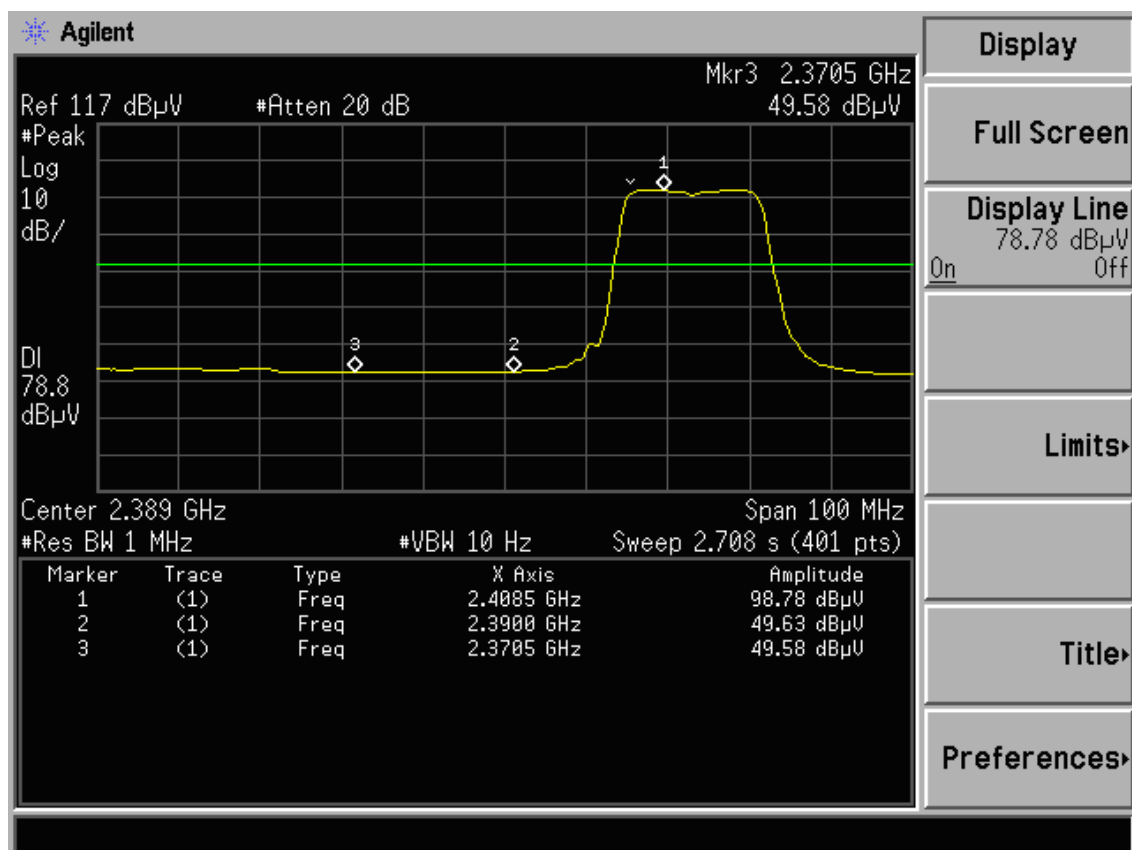
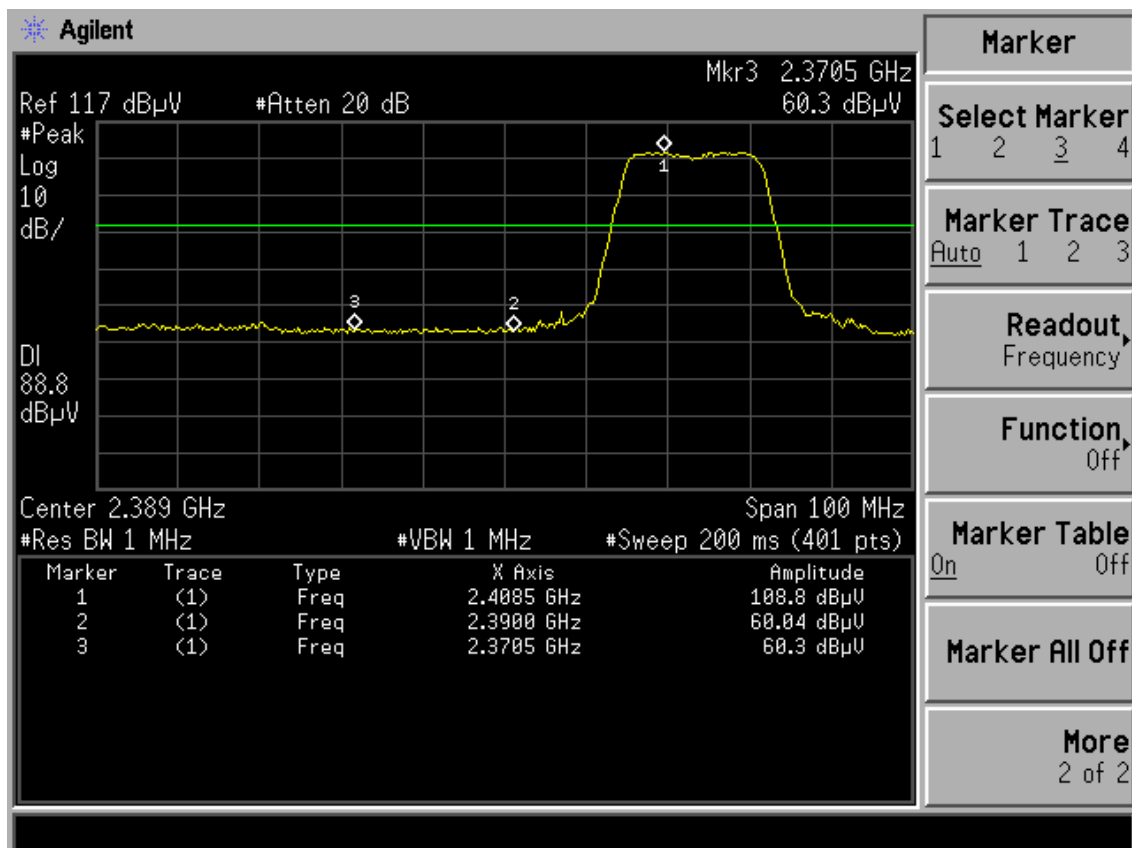
802.11b Low Channel



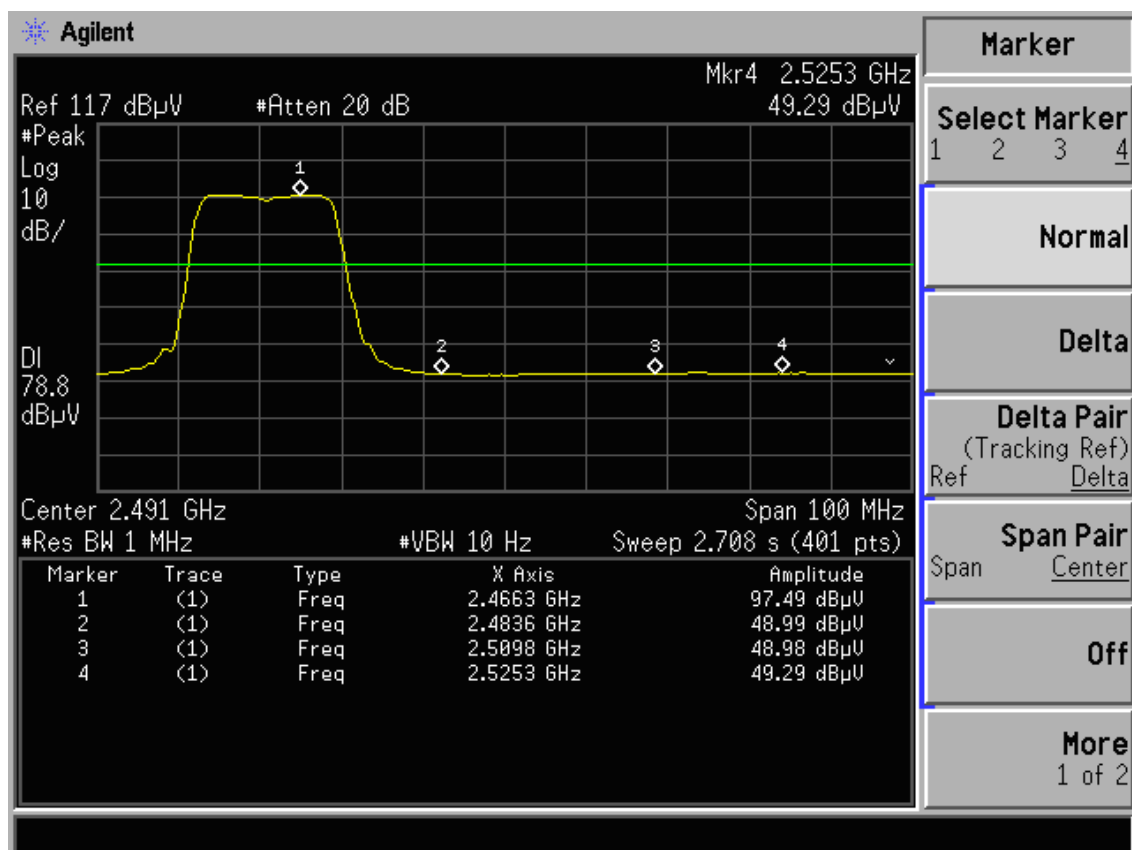
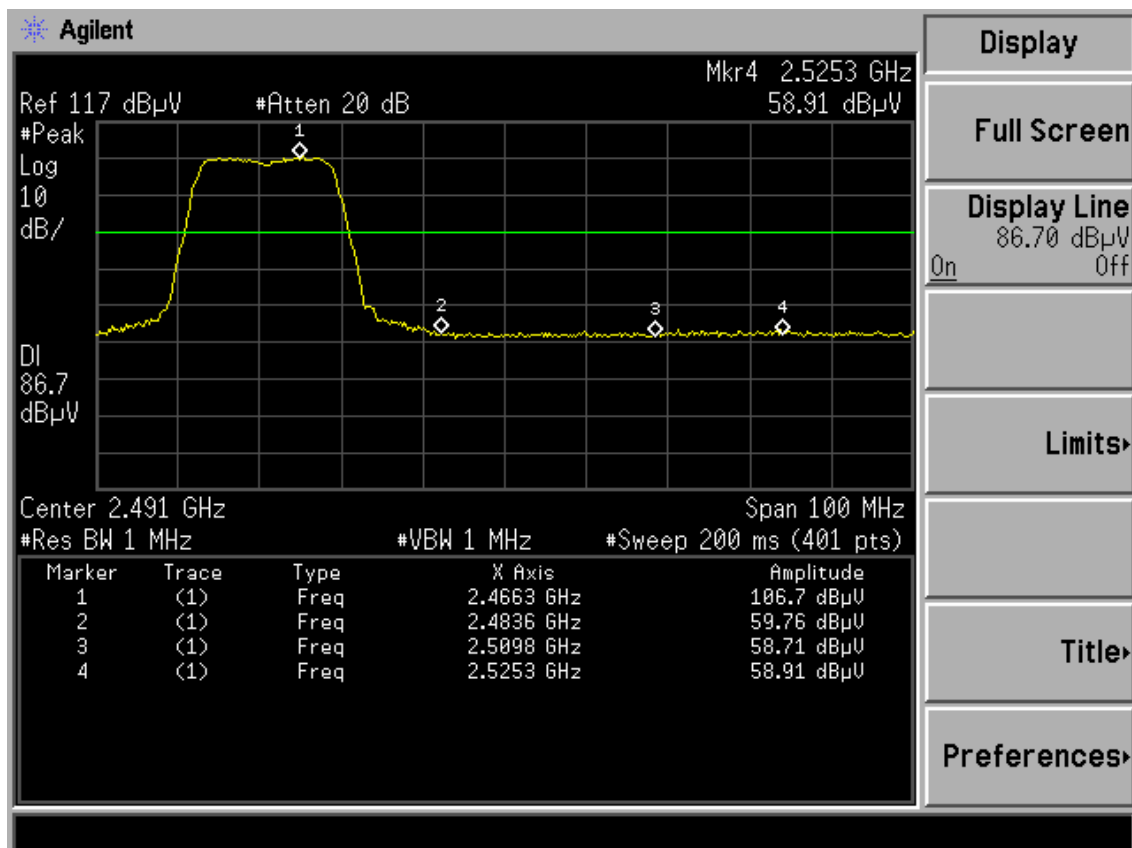
802.11b High Channel



802.11g Low Channel



802.11g High Channel



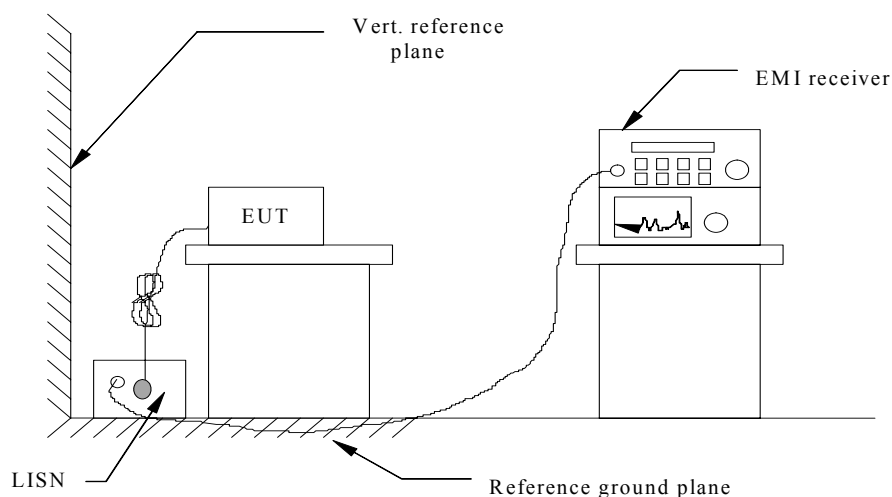
5.6. Power line conducted emissions

5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

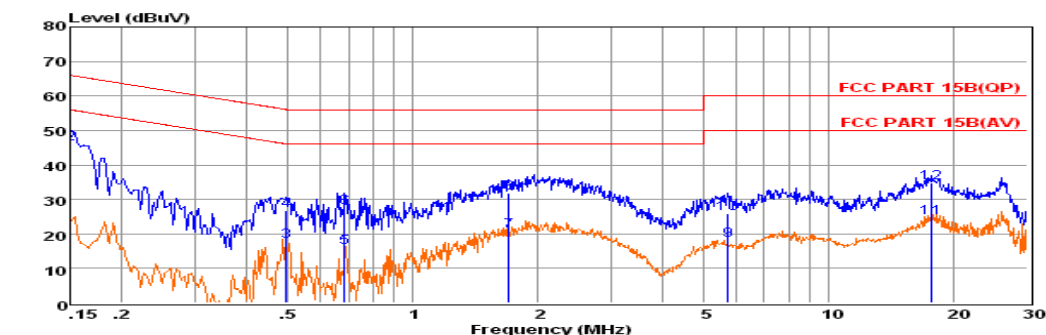
5.6.2 Block Diagram of Test Setup



5.6.3 Test Results

PASS.

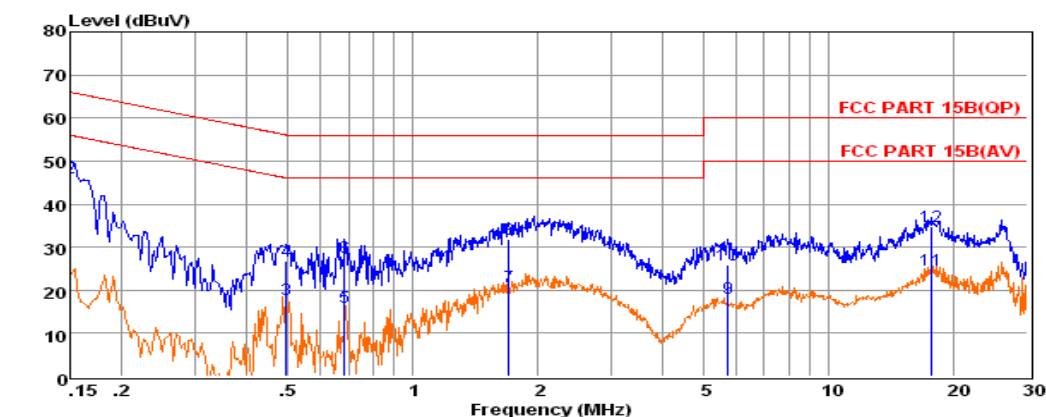
The test data please refer to following page.



Env. Ins: 24*/56%
EUT: WIFI Router
M/N: GoFreeWIFI-1
Power Rating: DC 12V Connect PC Input AC 120V/60Hz
Test Mode: 802.11b
Operator: Fox
Memo:
Pol: LINE

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.15	13.98	9.57	0.02	23.57	56.00	-32.43	Average
2	0.15	36.50	9.57	0.02	46.09	66.00	-19.91	QP
3	0.50	8.26	9.62	0.04	17.92	46.05	-28.13	Average
4	0.50	17.03	9.62	0.04	26.69	56.05	-29.36	QP
5	0.69	6.34	9.64	0.04	16.02	46.00	-29.98	Average
6	0.69	18.04	9.64	0.04	27.72	56.00	-28.28	QP
7	1.70	11.17	9.64	0.05	20.86	46.00	-25.14	Average
8	1.70	22.02	9.64	0.05	31.71	56.00	-24.29	QP
9	5.71	8.40	9.66	0.06	18.12	50.00	-31.88	Average
10	5.71	16.25	9.66	0.06	25.97	60.00	-34.03	QP
11	17.57	14.69	9.74	0.11	24.54	50.00	-25.46	Average
12	17.57	24.97	9.74	0.11	34.82	60.00	-25.18	QP

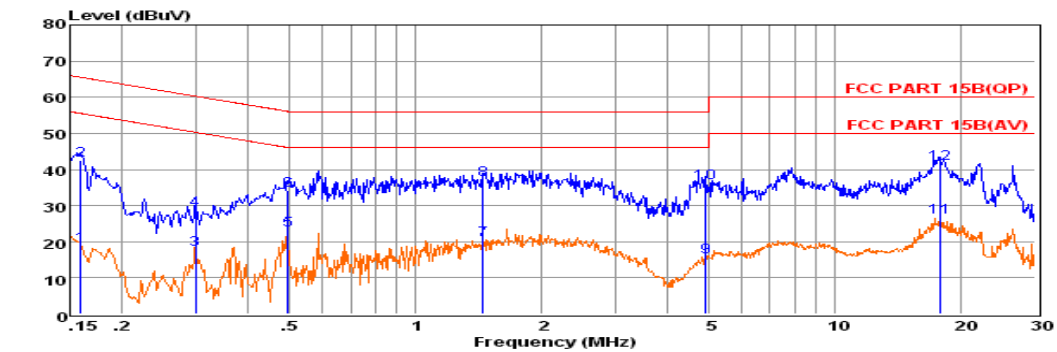
Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
EUT: WIFI Router
M/N: GoFreeWIFI-1
Power Rating: DC 12V Connect PC Input AC 120V/60Hz
Test Mode: 802.11b
Operator: Fox
Memo:
Pol: LINE

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.15	13.98	9.57	0.02	23.57	56.00	-32.43	Average
2	0.15	36.50	9.57	0.02	46.09	66.00	-19.91	QP
3	0.50	8.26	9.62	0.04	17.92	46.05	-28.13	Average
4	0.50	17.03	9.62	0.04	26.69	56.05	-29.36	QP
5	0.69	6.34	9.64	0.04	16.02	46.00	-29.98	Average
6	0.69	18.04	9.64	0.04	27.72	56.00	-28.28	QP
7	1.70	11.17	9.64	0.05	20.86	46.00	-25.14	Average
8	1.70	22.02	9.64	0.05	31.71	56.00	-24.29	QP
9	5.71	8.40	9.66	0.06	18.12	50.00	-31.88	Average
10	5.71	16.25	9.66	0.06	25.97	60.00	-34.03	QP
11	17.57	14.69	9.74	0.11	24.54	50.00	-25.46	Average
12	17.57	24.97	9.74	0.11	34.82	60.00	-25.18	QP

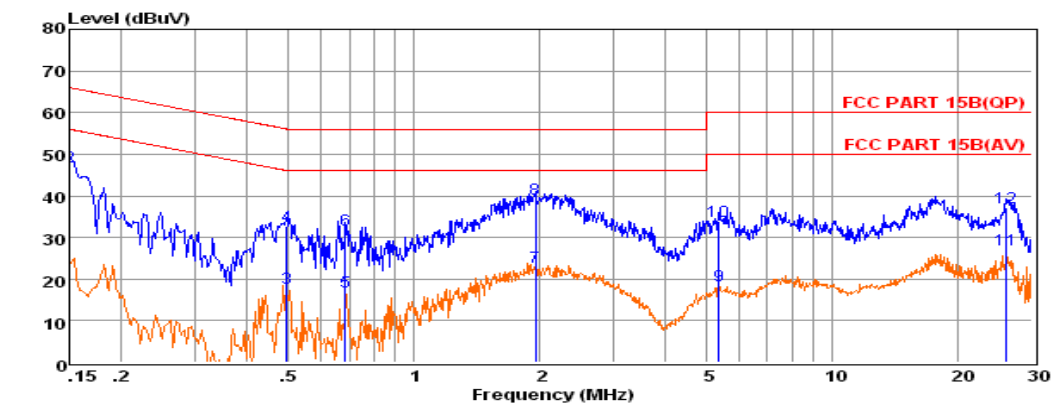
Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
EUT: WIFI Router
M/N: GoFreeWIFI-1
Power Rating: DC 12V Connect PC Input AC 120V/60Hz
Test Mode: 802.11g
Operator: Fox
Memo:
Pol: NEUTRAL

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.16	9.19	9.68	0.02	18.89	55.52	-36.63	Average
2	0.16	32.92	9.68	0.02	42.62	65.52	-22.90	QP
3	0.30	8.31	9.60	0.03	17.94	50.28	-32.34	Average
4	0.30	19.23	9.60	0.03	28.86	60.28	-31.42	QP
5	0.50	13.51	9.62	0.04	23.17	46.05	-22.88	Average
6	0.50	24.44	9.62	0.04	34.10	56.05	-21.95	QP
7	1.45	10.71	9.63	0.05	20.39	46.00	-25.61	Average
8	1.45	27.37	9.63	0.05	37.05	56.00	-18.95	QP
9	4.93	5.90	9.66	0.06	15.62	46.00	-30.38	Average
10	4.93	26.49	9.66	0.06	36.21	56.00	-19.79	QP
11	17.75	16.93	9.79	0.11	26.83	50.00	-23.17	Average
12	17.75	31.60	9.79	0.11	41.50	60.00	-18.50	QP

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.



Env. Ins: 24*/56%
EUT: WIFI Router
M/N: GoFreeWIFI-1
Power Rating: DC 12V Connect PC Input AC 120V/60Hz
Test Mode: 802.11g
Operator: Fox
Memo:
Pol: LINE

	Freq	Reading	LisnFac	CabLos	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.15	13.98	9.57	0.02	23.57	56.00	-32.43	Average
2	0.15	37.50	9.57	0.02	47.09	66.00	-18.91	QP
3	0.50	8.26	9.62	0.04	17.92	46.05	-28.13	Average
4	0.50	23.03	9.62	0.04	32.69	56.05	-23.36	QP
5	0.69	7.34	9.64	0.04	17.02	46.00	-28.98	Average
6	0.69	22.04	9.64	0.04	31.72	56.00	-24.28	QP
7	1.95	13.17	9.64	0.05	22.86	46.00	-23.14	Average
8	1.95	29.42	9.64	0.05	39.11	56.00	-16.89	QP
9	5.36	8.70	9.66	0.06	18.42	50.00	-31.58	Average
10	5.36	24.27	9.66	0.06	33.99	60.00	-26.01	QP
11	26.00	17.20	9.71	0.13	27.04	50.00	-22.96	Average
12	26.00	27.42	9.71	0.13	37.26	60.00	-22.74	QP

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss.
2. The emission levels that are 20dB below the official limit are not reported.

Note: Pre-scan all mode and recorded the worst case results in this report (TX middle mode)

5.7. Antenna Requirements

5.7.1. Standard Applicable

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

5.7.2. Antenna Construction

Section 15.203 of the rules states that the subject device must meet at least one of the following criteria:

- (a) Antenna must be permanently attached to the unit.
- (b) Antenna must use a unique type of connector to attach to the EUT.
- (c) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

5.7.3. Results

The antenna can't be replaced by the user for it has been fixed with special glue (see EUT photo), The maximum peak gain of this antenna is only 3dBi.

5.8. Deviation to test specifications

[NONE]

6. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	June 18,2012	June 17,2013
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18,2012	June 17,2013
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18,2012	June 17,2013
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 29,2012	June 28,2013
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18,2012	June 17,2013
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-1GHz 3m	June 18,2012	June 17,2013
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHz	June 18,2012	June 17,2013
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	June 18,2012	June 17,2013
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	June 18,2012	June 17,2013
Spectrum Analyzer	Agilent	E4446A	MY41440289	9k-26.5GHz	June 18,2012	June 17,2013
Spectrum Analyzer	Agilent	E4407B	MY41440292	9k-26.5GHz	June 18,2012	June 17,2013
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	July 07,2012	July 06,2013
By-log Antenna	SCHAFFNER	CBL 6112D	22237	30MHz-1GHz	July 07,2012	July 06,2013
Horn Antenna	EMCO	3115	4580	1GHz-18GHz	July 07,2012	July 06,2013
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz-40GHz	July 07,2012	July 06,2013
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 29,2012	June 28,2013
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 29,2012	June 28,2013
Spectrum Meter	R&S	FSP 30	100023	9kHz-30GHz	June 25,2012	June 24,2013
Power Meter	R&S	NRVS	100444	DC-40GHz	June 25,2012	June 24,2013
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	June 18,2012	June 17,2013
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	June 18,2012	June 17,2013
AC Power Source	HPC	HPA-500E	HPA-9100024	AC 0~300V	June 25,2012	June 24,2013
DC power Source	GW	GPC-6030D	C671845	DC 1V-60V	June 25,2012	June 24,2013
Temp. and Humidigy	Giant Force	GTH-225-20-S	MAB0103-00	N/A	June 18,2012	June 17,2013
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 29,2012	June 28,2013
RF CABLE-2m	JYE Bao	RG142	CB)35-2m	20MHz-1GHz	June 29,2012	June 28,2013
Vector signal Generator	R&S	SMU200A	102098	100kHz~6GHz	June 25,2012	June 24,2013
Signal Generator	R&S	SMR40	10016	10MHz~40GHz	June 25,2012	June 24,2013
Oscilloscope	Tektonix	TDS380	B016197	400MHz/2GRS	June 18,2012	June 17,2013

7. MANUFACTURER/ APPROVAL HOLDER DECLARATION

The following identical model(s):

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Belong to the tested device:

Product description : WIFI Router

Model name : GoFreeWIFI-1

No additional models were tested.

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