FCC PART 15 SUBPART C
IC RSS-210, ISSUE 8, DEC 2010

TEST AND MEASUREMENT REPORT

For

Wi2Wi, Inc.

2107 North 1st Street, Suite 540,

San Jose, CA 95131, USA

FCC ID: U9R-W2CBW0016
IC: 7089A-W2CBW0016

Report Type:	**Product Type:**
Original Report	Wi-Fi and BT Combo Module

Prepared By: Victor Zhang

Report Number: R1302143-247DTS

Report Date: 2013-06-14

Reviewed By: Quinn Jiang, Test Engineer

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TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1302143-247DTS	Original Report	2013-06-14

1 General Description

1.1 Product Description for Equipment Under Test (EUT)

This test and measurement report was prepared on behalf of *Wi2Wi, Inc.* and their product, *model: W2CBW0016, FCC ID: U9R-W2CBW0016, IC: 7089A-W2CBW0016* or the "EUT" as referred to this report. The EUT is Bluetooth and 802.11b/g/n Wi-Fi combo module.

1.2 Mechanical Description of EUT

The EUT measures approximately 10 mm (L) x 10 mm (W) x 1 mm (H) and weighs approximately 0.5 g.

The data gathered are from a typical production sample provided by the manufacturer with serial number: GCI-072565

1.3 Objective

This report is prepared on behalf of *Wi2Wi, Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts B and C of the Federal Communication Commissions rules and IC RSS-210 Issue 8, Dec 2010.

The objective is to determine compliance with FCC Part 15.247 and IC RSS-210 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

DSS filing of FCC Part 15.247/IC RSS-210 with FCC ID: U9R-W2CBW0016 and IC: 7089A-W2CBW0016.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2009, 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.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR16-4-2:2007, The Treatment of Uncertainty in EMC Measurements, the values ranging from $\pm$2.0 dB for Conducted Emissions tests and $\pm$4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to ANSI C63.4-2009.

The EUT was tested in a testing mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The software is provided by customer. The EUT exercise program used during radiated testing was designed to exercise the system components.

The EUT had been tested with the following data rate settings:

Radio Mode	Bandwidth (MHz)	Frequency/Data rate		
		Low CH (MHz/Mbps)	Mid CH (MHz/Mbps)	High CH (MHz)
802.11b	20	2412/1	2437/1	2462/1
802.11g	20	2412/6	2437/6	2462/6
802.11n HT20	20	2412/MCS0	2437/ MCS0	2462/MCS0
802.11n HT40	40	2422/MCS0	2437/MCS0	2452/MCS0

2.3 Special Accessories

N/A

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
IBM	Laptop	X41	LV-K5206 06/05

2.6 Power Supply and Line Filters

N/A

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF Cable	<1	EUT	Spectrum Analyzer

2.8 Supporting Parts List and Details

Manufacturers	Descriptions	Models	Serial Numbers
Marvell	Test Board	W2CBW0016 Test Board	GCI-072565

3 Summary of Test Results

FCC & IC Rules	Description of Test	Result (s)
FCC §15.247(i), §2.1091 IC RSS-102	RF Exposure	Compliant
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.4	Conducted Emissions	Compliant
FCC §15.247 (d) IC RSS-210 §A8.5	Spurious Emissions at Antenna Port	Compliant
FCC §15.205 IC RSS-210 §2.2	Restricted Bands	Compliant
FCC §15.209, §15.247 (d) IC RSS-210 §A8.5	Radiated Spurious Emissions	Compliant
FCC §15.247(a)(2) IC RSS-210 §A8.2	6 dB Bandwidth	Compliant
FCC §15.247(b)(3) IC RSS-210 §A8.4	Maximum Peak Output Power	Compliant
FCC §15.247(d) IC RSS-210 §A8.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
FCC §15.247(e) IC RSS-210 §A8.2(b)	Power Spectral Density	Compliant
IC RSS-210 §2.3 & RSS-Gen §6.1	Receiver Spurious Emission	Compliant

4 FCC §15.247 (i), §2.1091 & IC RSS-102 - RF Exposure

4.1 Applicable Standard

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	* (100)	30
1.34-30	824/f	2.19/f	* ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF fields.

According to IC RSS-102 Issue 2 section 4.1, RF limits used for general public will be applied to the EUT.

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m2)	Time Averaging (min)
0.003 - 1	280	2.19	-	6
1 - 10	280 / f	2.19 / f	-	6
10 - 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 – 1 500	$1.585\ f^{0.5}$	$0.0042\ f^{0.5}$	f / 150	6
1 500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	$616000/f^{1.2}$
150 000- 300 000	$0.158\ f^{0.5}$	$4.21 \times 10\ -4\ f^{0.5}$	$6.67 \times 10^{-5}\ f$	$616000/f^{1.2}$

Note: *f* is frequency in MHz
* = Power density limit is applicable at frequencies greater than 100 MHz

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

4.3 MPE Results

Maximum peak output power at antenna input terminal (dBm):	14.98
Maximum peak output power at antenna input terminal (mW):	31.477
Prediction distance (cm):	20
Prediction frequency (MHz):	2437
Maximum Antenna Gain, typical (dBi):	3.1
Maximum Antenna Gain (numeric):	2.042
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.0128
Power density of prediction frequency at 20.0 cm (W/m^2):	0.128
MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0
MPE limit for uncontrolled exposure at prediction frequency (W/m^2):	10

The device is compliant with the requirement MPE limit for uncontrolled exposure.

5 FCC §15.203 & IC RSS-Gen §7.1.2 – Antenna Description

5.1 Applicable Standard

According to FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to IC RSS-Gen §7.1.2: A transmitter can only be sold or operated with antennas with which it was approved. Transmitter may be approved with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest gain antenna of each combination of transmitter and antenna type for which approval is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type having equal or lesser gain as an antenna that had been successfully tested with the transmitter, will also be considered approved with the transmitter, and may be used and marketed with the transmitter. For Category I transmitters, the manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. For transmitters of RF output power of 10 milliwatts or less, only the portion of the antenna gain that is in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power to demonstrate compliance with the radiated power limits specified in the applicable standard. For transmitters of output power greater than 10 milliwatts, the total antenna gain shall be added to the measured RF output power to demonstrate compliance to the specified radiated power limits.

5.2 Antenna Connector Construction

The EUT has one chip antenna with 3.1 dBi max antenna gain and will be soldered onto the PCB. This is in accordance to sections FCC Part 15.203 and IC RSS-Gen §7.1.2, is considered sufficient to comply with the provisions of these sections. Please refer to the EUT photos.

6 FCC §15.207 & IC RSS-Gen §7.2.4 – AC Line Conducted Emissions

6.1 Applicable Standards

As per FCC §15.207 and IC RSS-Gen §7.2.4 Conducted limits:

For an intentional radiator that 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 the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

6.2 Test Setup

The measurement was performed in a shielded room. The test setup and measurement procedure was per ANSI C63.4-2009. The specification limits were in accordance with FCC §15.207 and IC RSS-Gen §7.2.4.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The AC/DC power adapter of the EUT was connected with LISN-1 which provided 120 V / 60 Hz AC power.

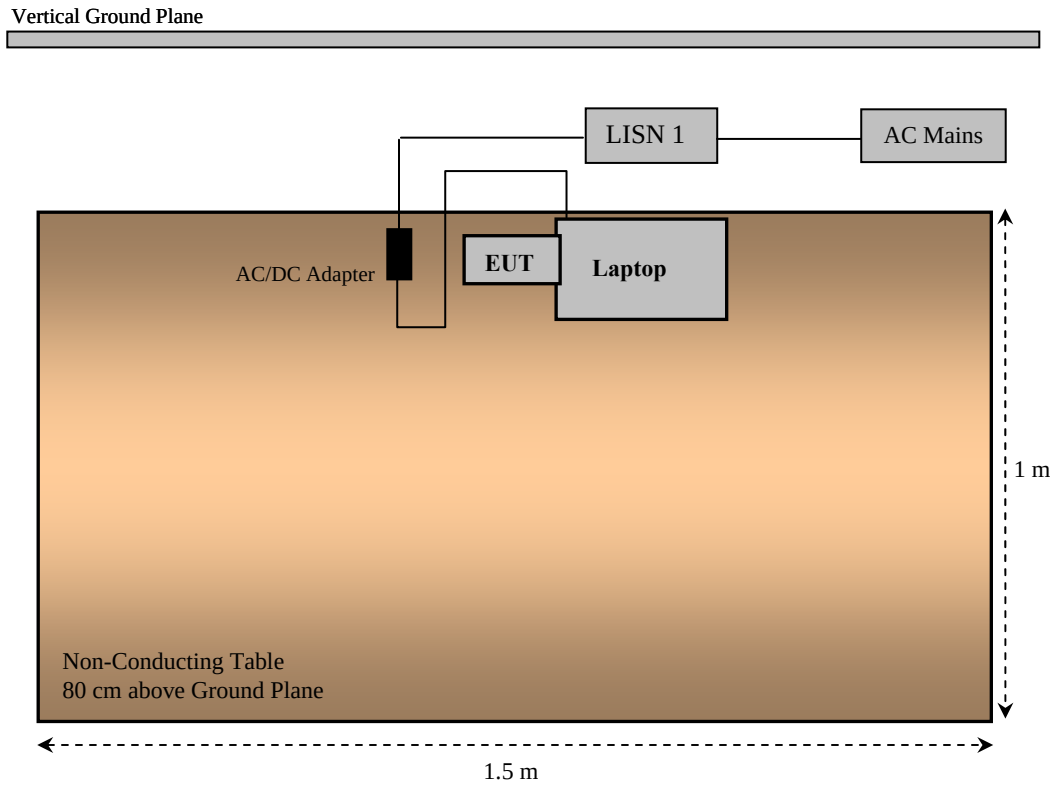
6.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a “QP.” Average readings are distinguished with an “Ave”.

6.4 Test Setup Block Diagram



6.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Cable Loss (CL) plus the High Pass Filter/Attenuator value (HA) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + CL + HA – Ga

For example, a corrected amplitude (CA) of 36 dBuV = Indicated Amplitude reading (Ai) of 50.0 dBuV + Cable Loss (CL) 1.0 dB + High Pass Filter/Attenuator (IA) 5 dB - Amplifier Gain (Ga) 20 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV) - Limit (dBuV)

6.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2012-04-18	1yr
Solar Electronics	LISN	9252-R-24-BNC	511205	2012-06-25	1yr
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2012-05-30	1yr

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

6.7 Test Environmental Conditions

Temperature:	16 ºC
Relative Humidity:	47 %
ATM Pressure:	101.83 kPa

The testing was performed by Glenn Escano on 2013-03-06 in 5m chamber2.

6.8 Summary of Test Results

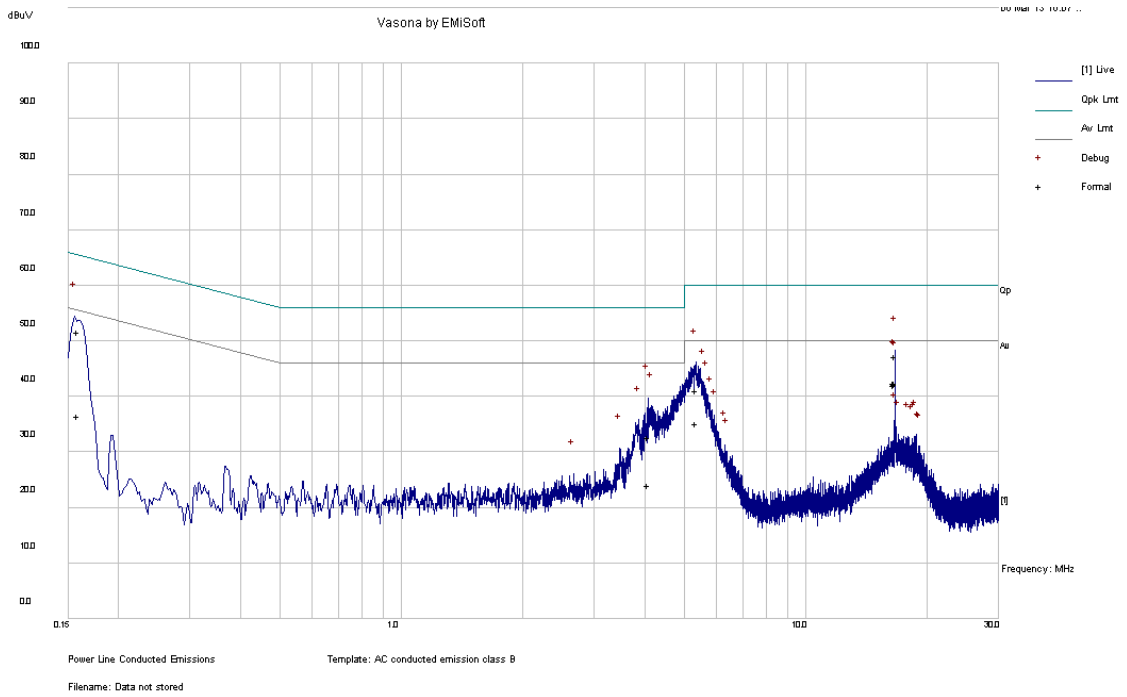
According to the recorded data in following table, the EUT complied with the FCC standard's conducted emissions limits, with a worst case margin of:

Transmitter Mode

Connection: AC/DC adapter of Laptop connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor (Line/Neutral)**	**Range (MHz)**
-1.76	16.62528	Neutral	0.15-30

6.9 Conducted Emissions Test Plots and Data

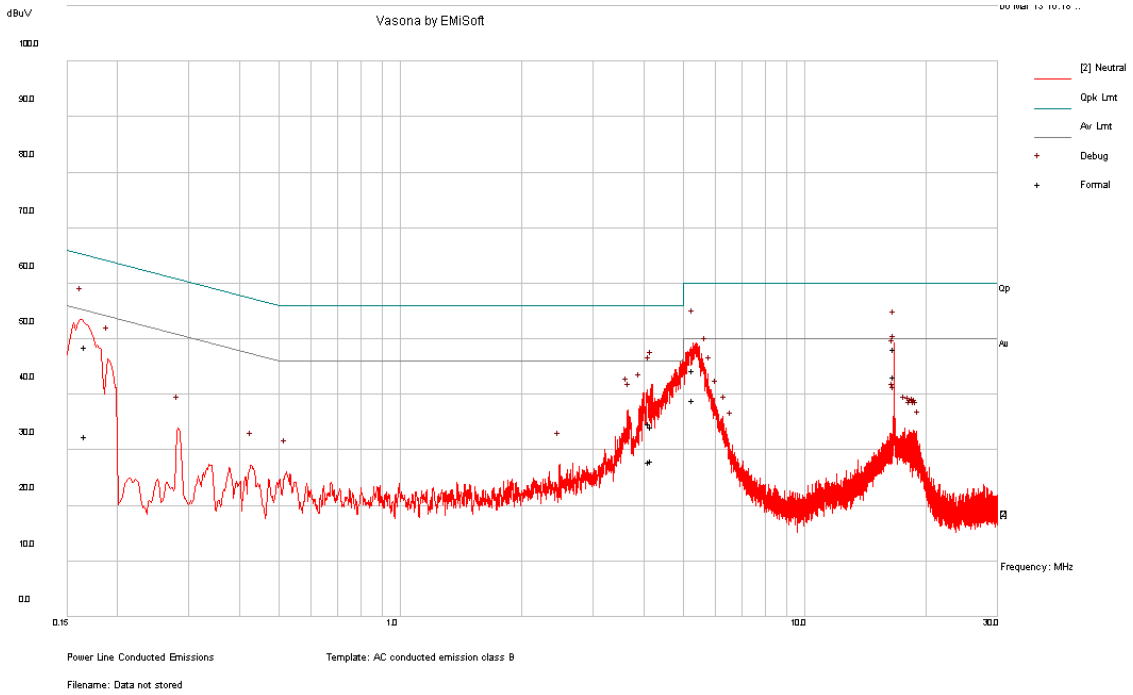
Worst mode 802.11 b Middle Channel – 120 V, 60, Line



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
16.62392	47.21	L	60	-12.79	QP
0.159161	51.69	L	65.51	-13.81	QP
16.65811	42.52	L	60	-17.48	QP
16.59134	42.36	L	60	-17.64	QP
5.359736	41.02	L	60	-18.98	QP
4.082402	32.74	L	56	-23.26	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
16.62392	47.31	L	50	-2.69	Ave.
16.65811	42.31	L	50	-7.69	Ave.
16.59134	42.13	L	50	-7.87	Ave.
5.359736	35.25	L	50	-14.75	Ave.
0.159161	36.53	L	55.51	-18.97	Ave.
4.082402	23.98	L	46	-22.02	Ave.

Worst mode 802.11 b Middle Channel – 120 V, 60, Neutral



Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
16.62528	48.15	N	60	-11.85	QP
5.308796	44.31	N	60	-15.69	QP
0.166713	48.62	N	65.12	-16.51	QP
16.65811	43.3	N	60	-16.70	QP
4.127582	34.77	N	56	-21.23	QP
4.175534	34.28	N	56	-21.72	QP

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)	Detector (QP/Ave.)
16.62528	48.24	N	50	-1.76	Ave.
16.65811	43.14	N	50	-6.86	Ave.
5.308796	38.98	N	50	-11.02	Ave.
4.175534	28.04	N	46	-17.96	Ave.
4.127582	27.8	N	46	-18.20	Ave.
0.166713	32.53	N	55.12	-22.59	Ave.

7 FCC §15.247(d) & IC RSS-210 §A8.5 - Spurious Emissions at Antenna Terminals

7.1 Applicable Standard

For FCC §15.247(d) and IC RSS-210 §A8.5 in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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.

7.2 Measurement Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	29 %
ATM Pressure:	102.4 kPa

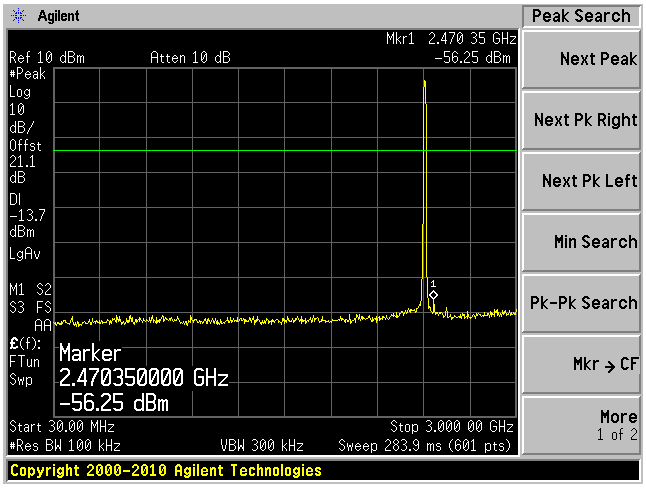
The testing was performed by Victor Zhang on 2013-02-26 at RF test site.

7.5 Test Results

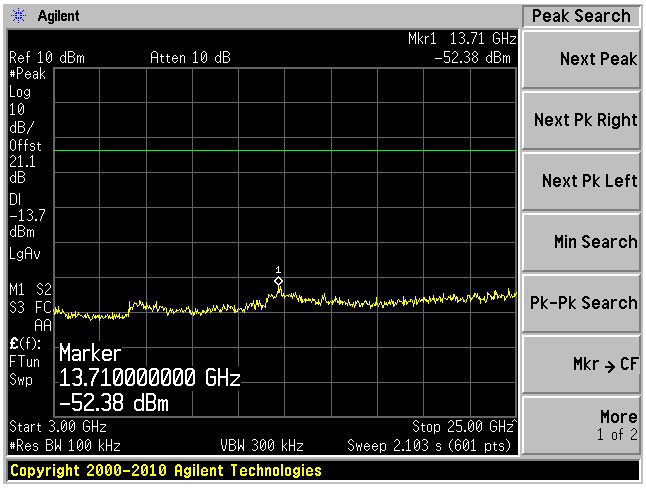
Please refer to following plots.

802.11b Low Channel 2412 MHz

30 MHz – 3 GHz

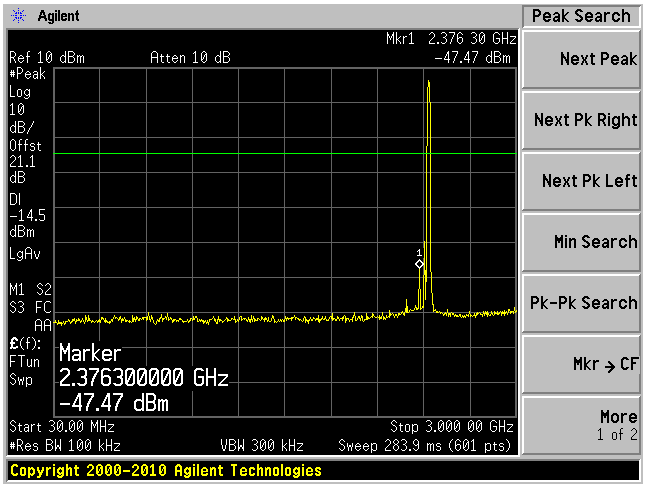


3 GHz – 25 GHz

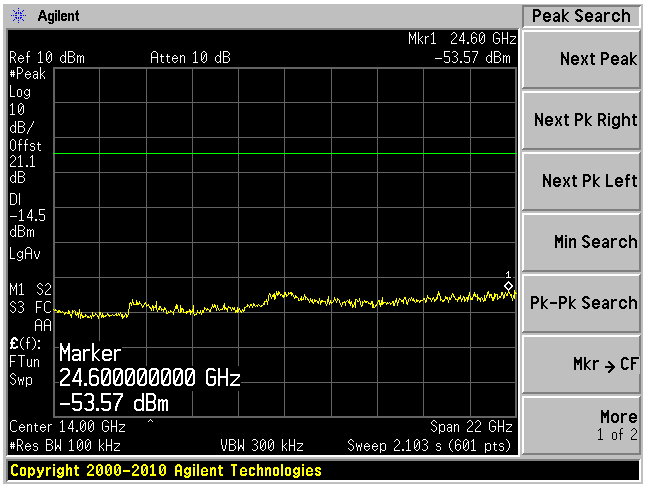


802.11b Middle Channel 2437 MHz

30 MHz – 3 GHz

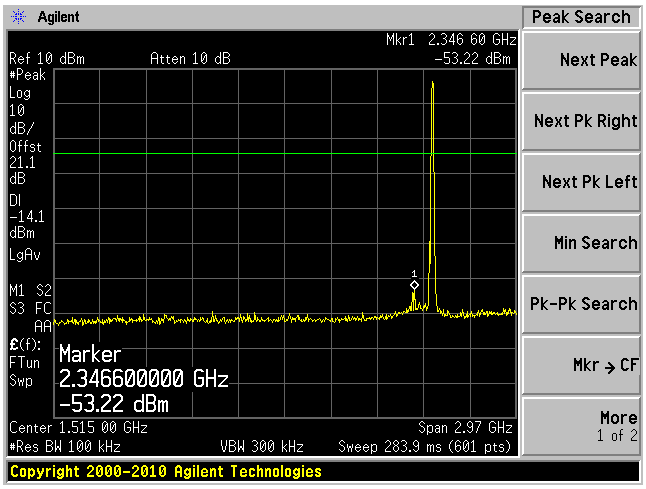


3 GHz – 25 GHz

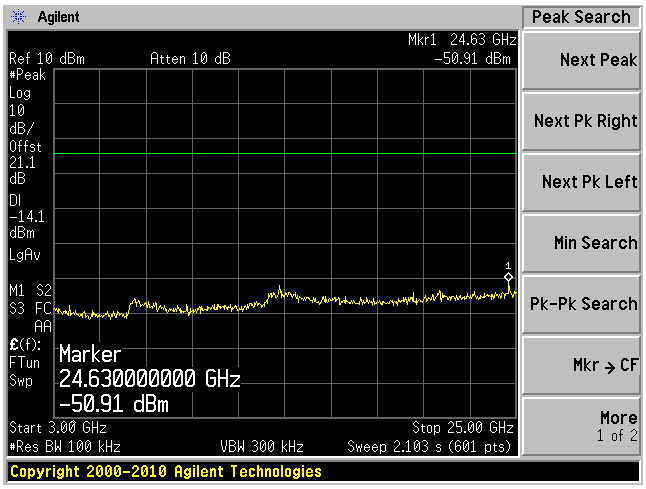


802.11b High Channel 2462 MHz

30 MHz – 3 GHz

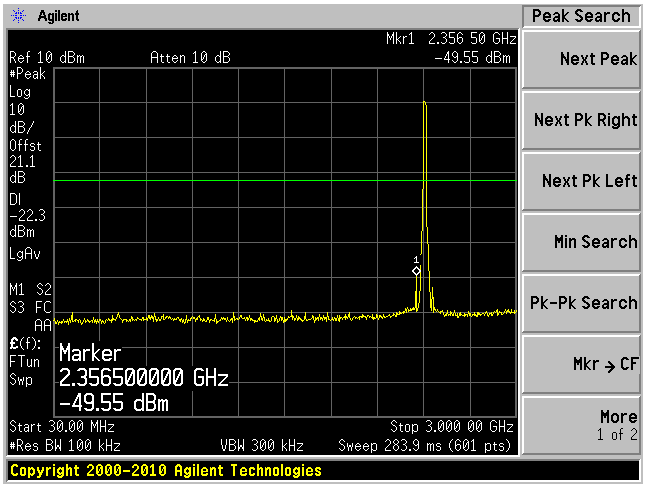


3 GHz – 25 GHz

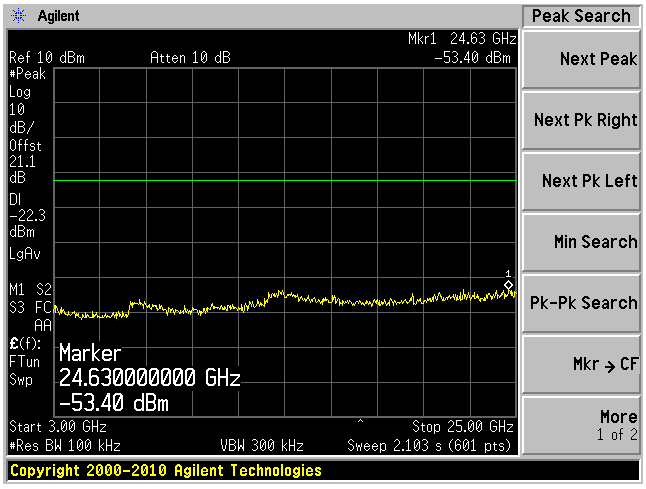


802.11g Low Channel 2412 MHz

30 MHz – 3 GHz

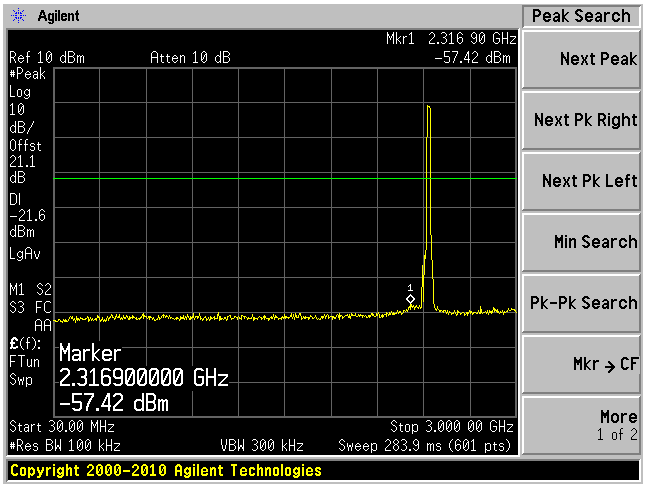


3 GHz – 25 GHz

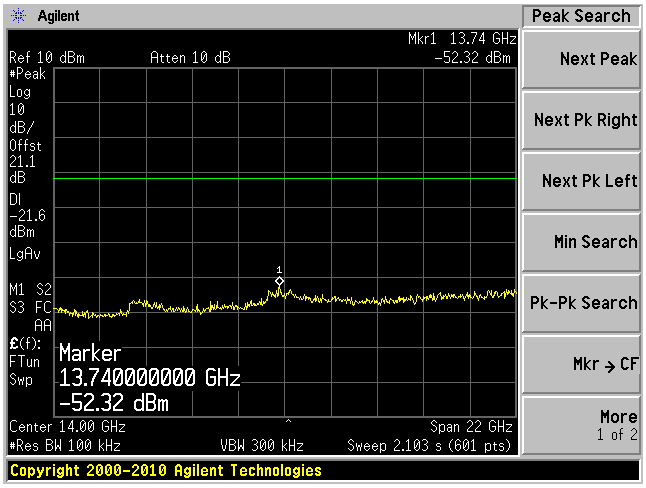


802.11g Middle Channel 2437 MHz

30 MHz – 3 GHz

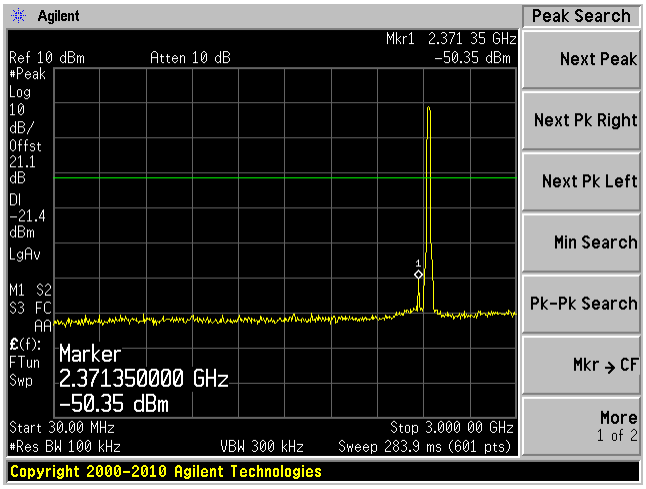


3 GHz – 25 GHz

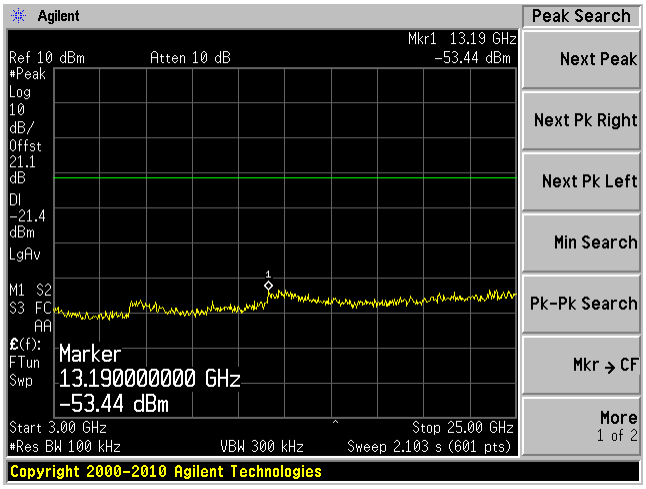


802.11g High Channel 2462 MHz

30 MHz – 3 GHz

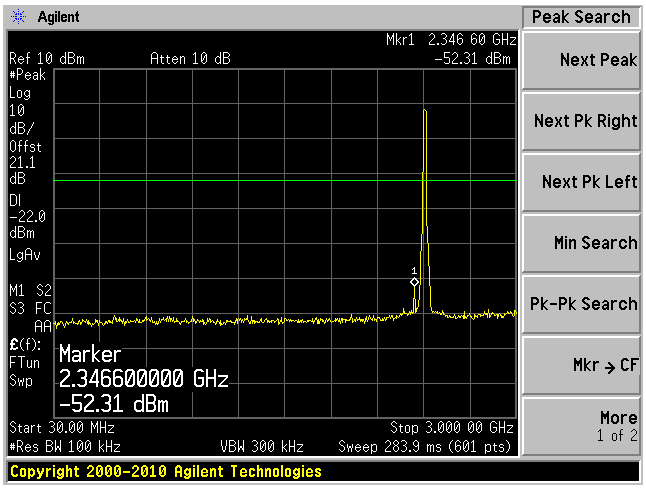


3 GHz – 25 GHz

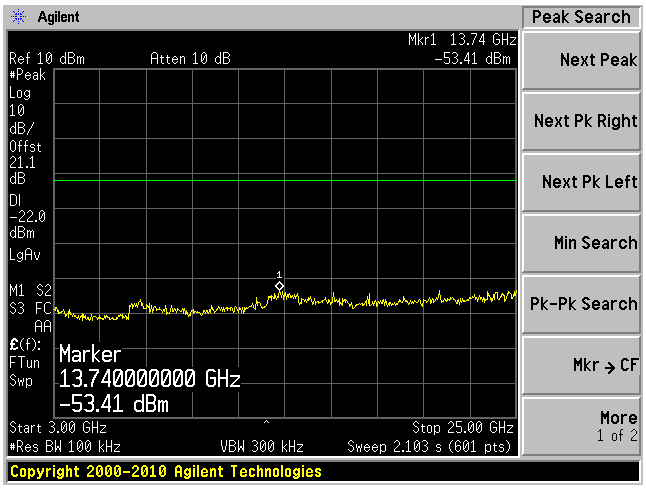


802.11n HT20 Low Channel 2412 MHz

30 MHz – 3 GHz

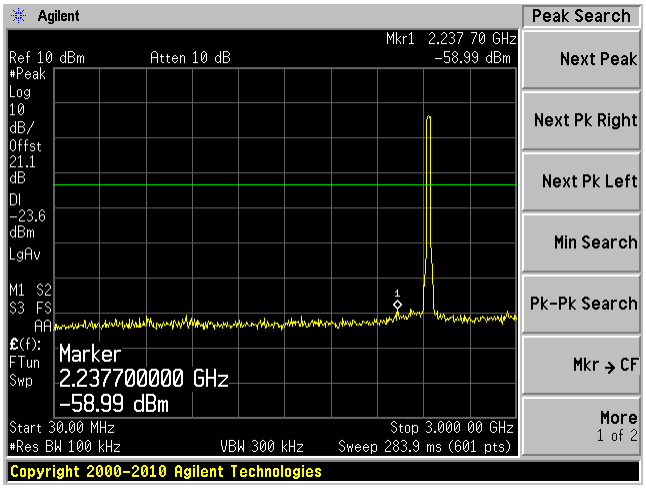


3 GHz – 25 GHz

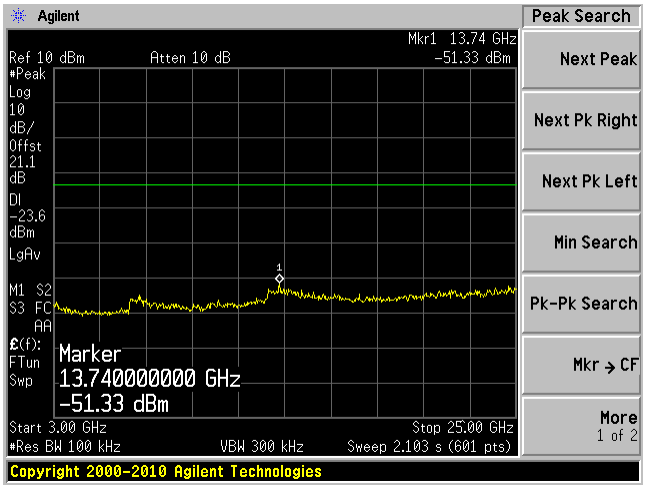


802.11n HT20 Middle Channel 2437 MHz

30 MHz – 3 GHz

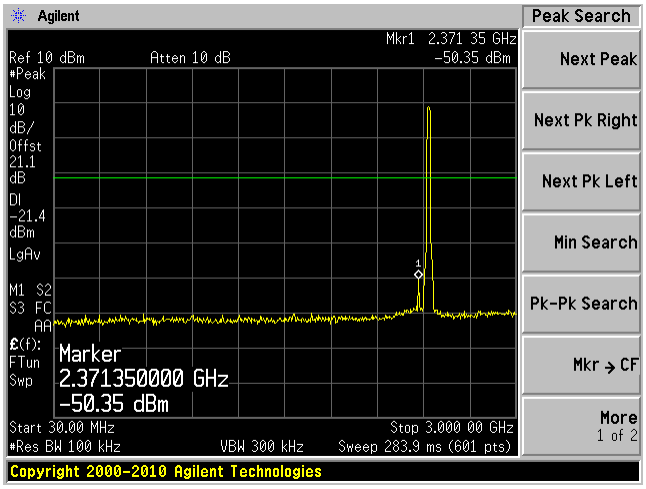


3 GHz – 25 GHz

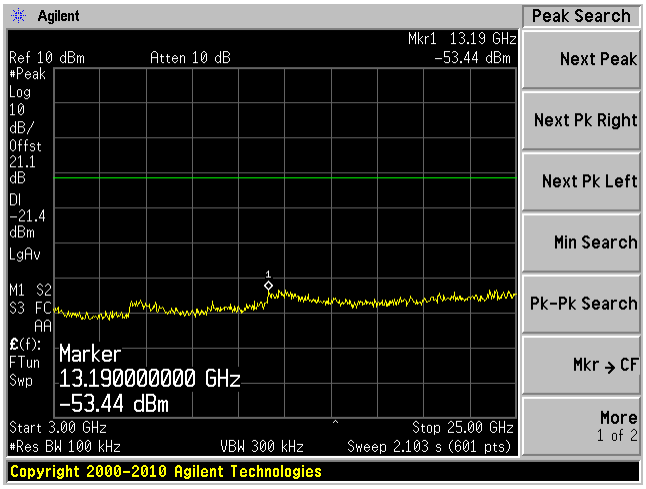


802.11n HT20 High Channel 2462 MHz

30 MHz – 3 GHz

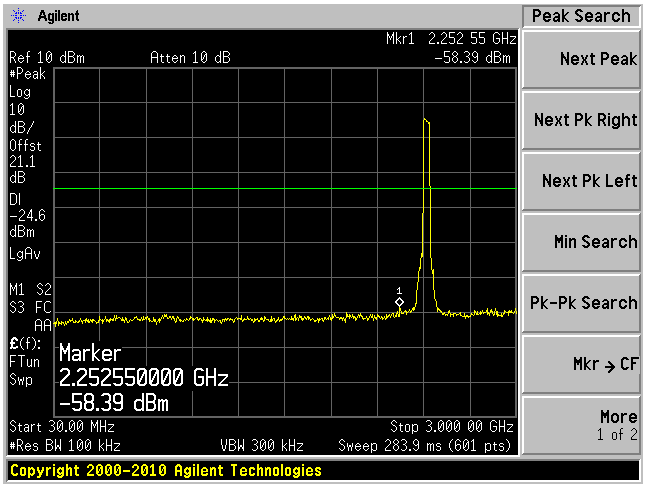


3 GHz – 25 GHz

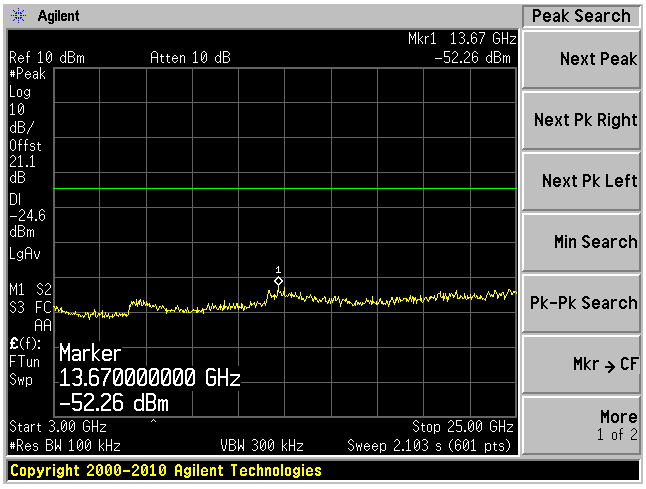


802.11n HT40 Low Channel 2422 MHz

30 MHz – 3 GHz

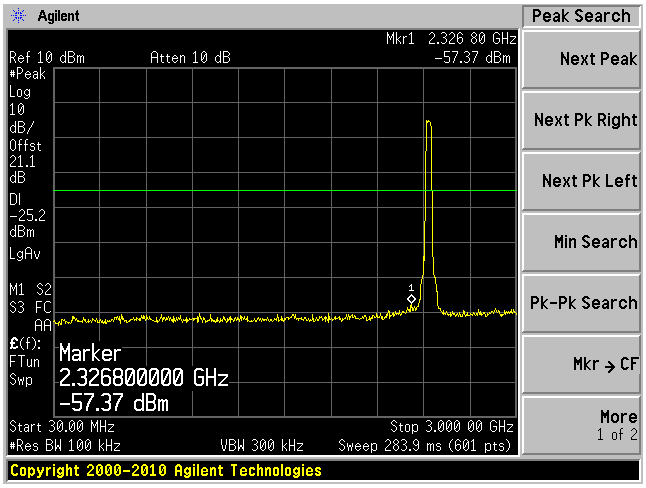


3 GHz – 25 GHz

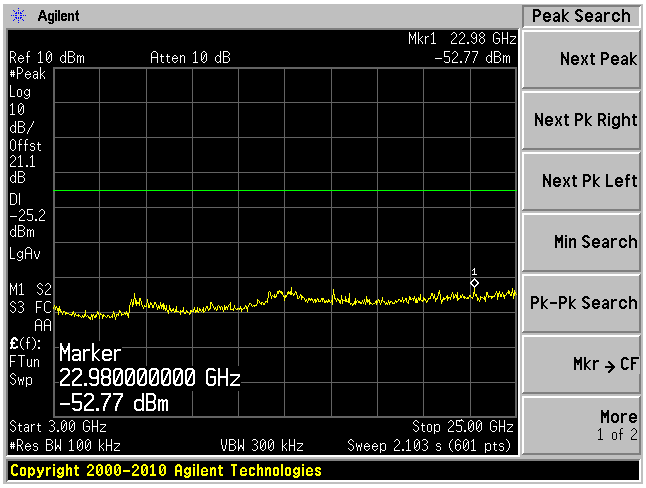


802.11n HT40 Middle Channel 2437 MHz

30 MHz – 3 GHz

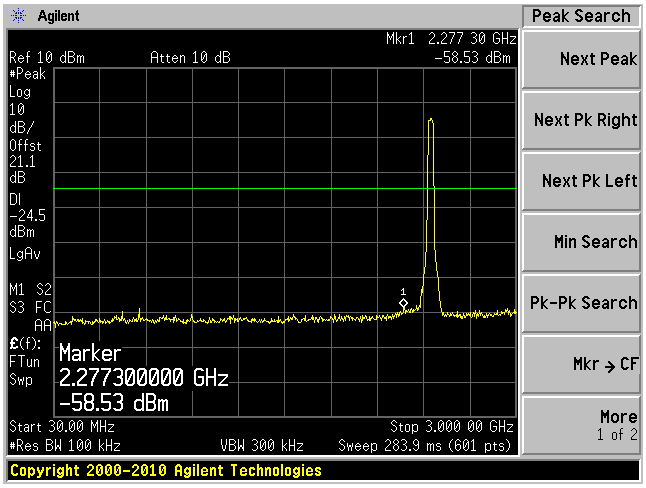


3 GHz – 25 GHz

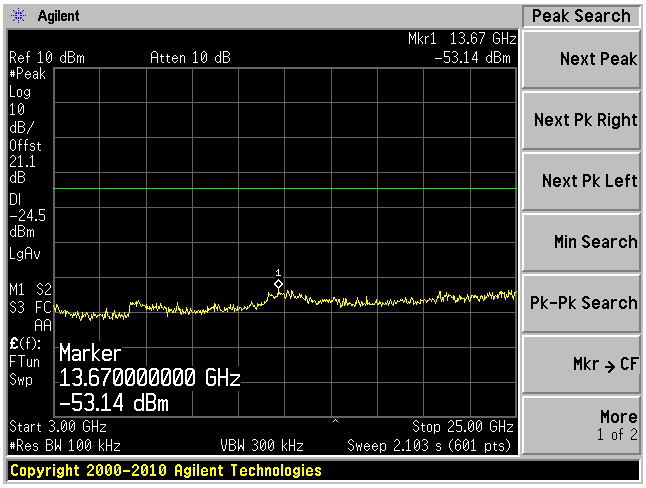


802.11n HT40 High Channel 2452 MHz

30 MHz – 3 GHz



3 GHz – 25 GHz



8 FCC §15.205, §15.209 & §15.247(d) & IC RSS-210 §A8.5 - Spurious Radiated Emissions

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1 MHz.

As per FCC §15.209(a) and RSS-210: Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table

Frequency (MHz)	Field Strength (micro volts/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 Note 2	3
88 - 216	150 Note 2	3
216 - 960	200 Note 2	3
Above 960	500	3

Note 2: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	960 – 1240	4. 5 – 5. 15
0.495 – 0.505	16.69475 – 16.69525	1300 – 1427	5. 35 – 5. 46
2.1735 – 2.1905	25.5 – 25.67	1435 – 1626.5	7.25 – 7.75
4.125 – 4.128	37.5 – 38.25	1645.5 – 1646.5	8.025 – 8.5
4.17725 – 4.17775	73 – 74.6	1660 – 1710	9.0 – 9.2
4.20725 – 4.20775	74.8 – 75.2	1718.8 – 1722.2	9.3 – 9.5
6.215 – 6.218	108 – 121.94	2200 – 2300	10.6 – 12.7
6.26775 – 6.26825	123 – 138	2310 – 2390	13.25 – 13.4
6.31175 – 6.31225	149.9 – 150.05	2483.5 – 2500	14.47 – 14.5
8.291 – 8.294	156.52475 – 156.52525	2690 – 2900	15.35 – 16.2
8.362 – 8.366	156.7 – 156.9	3260 – 3267	17.7 – 21.4
8.37625 – 8.38675	162.0125 –167.17	3.332 – 3.339	22.01 – 23.12
8.41425 – 8.41475	167.72 – 173.2	3 3458 – 3 358	23.6 – 24.0
12.29 – 12.293	240 – 285	3.600 – 4.400	31.2 – 31.8
12.51975 – 12.52025	322 – 335.4		36.43 – 36.5
12.57675 – 12.57725	399.9 – 410		Above 38.6
13.36 – 13.41	608 – 614		

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. 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 §15.205(c).

As per IC RSS-210 §A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under Section A8.4 (4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

8.2 Test Setup

The radiated emissions tests were performed in the 5-meter Chamber, using the setup in accordance with ANSI C63.4-2009. The specification used was the FCC 15C and IC RSS-210 limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle when necessary.

8.3 Test Procedure

For the radiated emissions test, the EUT host, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000 MHz:

(1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to the indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, the Corrected Amplitude (CA) of 40.3 dBuV/m = indicated Amplitude reading (Ai) 32.5 dBuV + Antenna Factor (AF) 23.5dB + Cable Loss (CL) 3.7 dB + Attenuator (Atten) 10 dB - Amplifier Gain (Ga) 29.4 dB

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin (dB) = Corrected Amplitude (dBuV/m) - Limit (dBuV/m)

8.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2012-09-19	1 year
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2012-06-18	1 year
EMCO	Horn Antenna	3115	9511-4627	2012-10-17	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A10187	2013-03-08	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2012-05-09	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

8.6 Test Environmental Conditions

Temperature:	20°C
Relative Humidity:	45%
ATM Pressure:	101.90kPa

The testing was performed by Glenn Escano on 2013-03-25 to 2013-03-27 in 5 meter chamber 3.

8.7 Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15C and IC RSS-210 standard's radiated emissions limits, and had a worst case margin of:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Worst Channel, Range**
-4.744	2483.5	Vertical	802.11b High 30 MHz–25 GHz

Please refer to the following table and plots for specific test result details

8.8 Radiated Emissions Test Data and Plots

30–25 GHz, Measured at 3 meters

802.11b mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	71.47	170	126	V	28.838	3.12	0	103.428	NA	NA	Fund/Peak
2412	63.23	170	126	V	28.838	3.12	0	95.188	NA	NA	Fund/Ave
2412	64.73	211	100	H	28.838	3.12	0	96.688	NA	NA	Fund/Peak
2412	55.97	211	100	H	28.838	3.12	0	87.928	NA	NA	Fund/Ave
2390	37.51	170	126	V	28.192	3.12	0	68.822	74	-5.178	Spur/Peak
2390	12.92	170	126	V	28.192	3.12	0	44.232	54	-9.768	Spur/Ave
2390	30.47	211	100	H	28.192	3.12	0	61.782	74	-12.218	Spur/Peak
2390	11.64	211	100	H	28.192	3.12	0	42.952	54	-11.048	Spur/Ave
4824	38.88	0	100	V	33.1	4.06	27.70	48.324	74	-25.676	Harm/Peak*
4824	38.84	0	100	H	33.1	4.06	27.70	48.284	74	-25.716	Harm/ Peak*
4824	23.97	0	100	V	33.1	4.06	27.70	33.414	54	-20.586	Harm/Ave*
4824	24.61	0	100	H	33.1	4.06	27.70	34.054	54	-19.946	Harm/Ave*
7236	42	164	174	V	36.1	4.93	27.6	55.486	83.428	-27.942	Harm/ Peak*
7236	42.02	317	100	H	36.1	4.93	27.6	55.506	76.688	-21.182	Harm/ Peak*
7236	26.86	164	174	V	36.1	4.93	27.6	40.346	75.188	-34.842	Harm/Ave1
7236	27.2	317	100	H	36.1	4.93	27.6	40.686	67.928	-27.242	Harm/Ave*
9648	38.77	0	100	V	38.0	5.82	27.02	55.539	83.428	-27.889	Harm/ Peak*
9648	38.85	0	100	H	38.0	5.82	27.02	55.619	76.688	-21.069	Harm/ Peak*
9648	23.76	0	100	V	38.0	5.82	27.02	40.529	75.188	-34.659	Harm/Ave*
9648	23.81	0	100	H	38.0	5.82	27.02	40.579	67.928	-27.349	Harm/Ave*
12060	39.8	0	100	V	39.2	6.14	26.99	58.176	74	-15.824	Harm/ Peak*
12060	39.57	0	100	H	39.2	6.14	26.99	57.946	74	-16.054	Harm/ Peak*
12060	24.67	0	100	V	39.2	6.14	26.99	43.046	54	-10.954	Harm/Ave*
12060	24.5	0	100	H	39.2	6.14	26.99	42.876	54	-11.124	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11b mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2437	70.02	173	124	V	28.921	3.21	0	102.151	NA	NA	Fund/Peak
2437	61.73	173	124	V	28.921	3.21	0	93.861	NA	NA	Fund/Ave
2437	63.89	210	100	H	28.921	3.21	0	96.021	NA	NA	Fund/Peak
2437	55.01	210	100	H	28.921	3.21	0	87.141	NA	NA	Fund/Ave
4874	38.97	0	100	V	33.2	4.10	27.8	48.475	74	-25.525	Harm/Peak*
4874	39.21	0	100	H	33.2	4.10	27.8	48.715	74	-25.285	Harm/ Peak*
4874	23.74	0	100	V	33.2	4.10	27.8	33.245	54	-20.755	Harm/Ave*
4874	24.09	0	100	H	33.2	4.10	27.8	33.595	54	-20.405	Harm/Ave*
7311	40.93	0	100	V	36.4	4.88	27.5	54.657	74	-19.343	Harm/ Peak*
7311	40.54	0	100	H	36.4	4.88	27.5	54.267	74	-19.733	Harm/ Peak*
7311	25.79	0	100	V	36.4	4.88	27.5	39.517	54	-14.483	Harm/Ave*
7311	25.77	0	100	H	36.4	4.88	27.5	39.497	54	-14.503	Harm/Ave*
9748	38.9	0	100	V	38.2	5.49	27.0	55.569	82.151	-26.582	Harm/ Peak*
9748	38.97	0	100	H	38.2	5.49	27.0	55.639	96.021	-40.382	Harm/ Peak*
9748	23.8	0	100	V	38.2	5.49	27.0	40.469	73.861	-33.392	Harm/Ave*
9748	23.83	0	100	H	38.2	5.49	27.0	40.499	67.141	-26.642	Harm/Ave*
12185	39.68	0	100	V	39.1	6.14	27.0	57.938	74	-16.062	Harm/ Peak*
12185	39.71	0	100	H	39.1	6.14	27.0	57.968	74	-16.032	Harm/ Peak*
12185	24.95	0	100	V	39.1	6.14	27.0	43.208	54	-10.792	Harm/Ave*
12185	24.97	0	100	H	39.1	6.14	27.0	43.228	54	-10.772	Harm/Ave*

Note: *1 Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11b mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	70.74	174	122	V	29.066	3.25	0	103.056	NA	NA	Fund/Peak
2462	62.52	174	122	V	29.066	3.25	0	94.836	NA	NA	Fund/Ave
2462	64.01	210	100	H	29.066	3.25	0	96.326	NA	NA	Fund/Peak
2462	55.13	210	100	H	29.066	3.25	0	87.446	NA	NA	Fund/Ave
2483.5	36.92	174	122	V	29.066	3.27	0	69.256	74	-4.744	Spur/Peak
2483.5	11.82	174	122	V	29.066	3.27	0	44.156	54	-9.844	Spur/Ave
2483.5	30.29	210	100	H	29.066	3.27	0	62.626	74	-11.374	Spur/Peak
2483.5	11.08	210	100	H	29.066	3.27	0	43.416	54	-10.584	Spur/Ave
4924	39.2	0	100	V	33.3	4.09	27.8	48.867	74	-25.133	Harm/Peak*
4924	38.72	0	100	H	33.3	4.09	27.8	48.387	74	-25.613	Harm/ Peak*
4924	23.97	0	100	V	33.3	4.09	27.8	33.637	54	-20.363	Harm/Ave*
4924	23.98	0	100	H	33.3	4.09	27.8	33.647	54	-20.353	Harm/Ave*
7386	39.87	0	100	V	36.5	4.89	27.5	53.755	74	-20.245	Harm/ Peak*
7386	40.81	0	100	H	36.5	4.89	27.5	54.695	74	-19.305	Harm/ Peak*
7386	25.66	0	100	V	36.5	4.89	27.5	39.545	54	-14.455	Harm/Ave*
7386	25.63	0	100	H	36.5	4.89	27.5	39.515	54	-14.485	Harm/Ave*
9848	38.45	0	100	V	38.4	5.77	27.0	55.640	83.056	-27.416	Harm/ Peak*
9848	39.57	0	100	H	38.4	5.77	27.0	56.760	76.326	-19.566	Harm/ Peak*
9848	23.9	0	100	V	38.4	5.77	27.0	41.090	74.836	-33.746	Harm/Ave*
9848	23.95	0	100	H	38.4	5.77	27.0	41.140	67.446	-26.306	Harm/Ave*
12310	39.88	0	100	V	38.9	6.14	27.0	57.909	74	-16.091	Harm/Peak*
12310	39.43	0	100	H	38.9	6.14	27.0	57.459	74	-16.541	Harm/ Peak*
12310	24.93	0	100	V	38.9	6.14	27.0	42.959	54	-11.041	Harm/Ave*
12310	24.65	0	100	H	38.9	6.14	27.0	42.679	54	-11.321	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11g mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	68.15	173	124	V	28.838	3.12	0	100.108	NA	NA	Fund/Peak
2412	57.15	173	124	V	28.838	3.12	0	89.108	NA	NA	Fund/Ave
2412	61.33	210	100	H	28.838	3.12	0	93.288	NA	NA	Fund/Peak
2412	50.28	210	100	H	28.838	3.12	0	82.238	NA	NA	Fund/Ave
2390	32.87	173	124	V	28.192	3.12	0	64.182	74	-9.818	Spur/Peak
2390	12.53	173	124	V	28.192	3.12	0	43.842	54	-10.158	Spur/Ave
2390	25.82	210	100	H	28.192	3.12	0	57.132	74	-16.868	Spur/Peak
2390	11.92	210	100	H	28.192	3.12	0	43.232	54	-10.768	Spur/Ave
4824	38.38	0	100	V	33.1	4.06	27.70	47.824	74	-26.176	Harm/Peak*
4824	40.3	0	100	H	33.1	4.06	27.70	49.744	74	-24.256	Harm/Peak*
4824	24.03	0	100	V	33.1	4.06	27.70	33.474	54	-20.526	Harm/Ave*
4824	24.85	0	100	H	33.1	4.06	27.70	34.294	54	-19.706	Harm/Ave*
7236	39.24	0	100	V	36.1	4.93	27.6	52.726	80.108	-27.382	Harm/Peak*
7236	39.86	0	100	H	36.1	4.93	27.6	53.346	73.288	-19.942	Harm/Peak*
7236	25.4	0	100	V	36.1	4.93	27.6	38.886	69.108	-30.222	Harm/Ave*
7236	25.38	0	100	H	36.1	4.93	27.6	38.866	62.238	-23.372	Harm/Ave*
9648	38.66	0	100	V	38.0	5.82	27.02	55.429	80.108	-24.679	Harm/Peak*
9648	38.73	0	100	H	38.0	5.82	27.02	55.499	73.288	-17.789	Harm/Peak*
9648	24.02	0	100	V	38.0	5.82	27.02	40.789	69.108	-28.319	Harm/Ave*
9648	23.95	0	100	H	38.0	5.82	27.02	40.719	62.238	-21.519	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11g mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2437	66.46	174	124	V	28.921	3.21	0	98.591	NA	NA	Fund/Peak
2437	55.14	174	124	V	28.921	3.21	0	87.271	NA	NA	Fund/Ave
2437	59.79	210	100	H	28.921	3.21	0	91.921	NA	NA	Fund/Peak
2437	49.01	210	100	H	28.921	3.21	0	81.141	NA	NA	Fund/Ave
4874	38.71	0	100	V	33.2	4.10	27.8	48.215	74	-25.785	Harm/Peak*
4874	38.32	0	100	H	33.2	4.10	27.8	47.825	74	-26.175	Harm/Peak*
4874	23.75	0	100	V	33.2	4.10	27.8	33.255	54	-20.745	Harm/Ave*
4874	24.67	0	100	H	33.2	4.10	27.8	34.175	54	-19.825	Harm/Ave*
7311	39.17	0	100	V	36.4	4.88	27.5	52.897	74	-21.103	Harm/Peak*
7311	40.3	0	100	H	36.4	4.88	27.5	54.027	74	-19.973	Harm/Peak*
7311	25.23	0	100	V	36.4	4.88	27.5	38.957	54	-15.043	Harm/Ave*
7311	25.2	0	100	H	36.4	4.88	27.5	38.927	54	-15.073	Harm/Ave*
9748	39.52	0	100	V	38.2	5.49	27.0	56.189	78.591	-22.402	Harm/Peak*
9748	39	0	100	H	38.2	5.49	27.0	55.669	71.921	-16.252	Harm/Peak*
9748	25.19	0	100	V	38.2	5.49	27.0	41.859	67.271	-25.412	Harm/Ave*
9748	25.16	0	100	H	38.2	5.49	27.0	41.829	61.141	-19.312	Harm/Ave*

Note:*1 Noise Floor Level.

All 30 MHz–1G Hz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11g mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	66.97	172	120	V	29.066	3.25	0	99.286	NA	NA	Fund/Peak
2462	56.14	172	120	V	29.066	3.25	0	88.456	NA	NA	Fund/Ave
2462	59.24	210	100	H	29.066	3.25	0	91.556	NA	NA	Fund/Peak
2462	48.08	210	100	H	29.066	3.25	0	80.396	NA	NA	Fund/Ave
2483.5	35.86	172	120	V	29.066	3.27	0	68.196	74	-5.804	Spur/Peak
2483.5	13.56	172	120	V	29.066	3.27	0	45.896	54	-8.104	Spur/Ave
2483.5	28.02	210	100	H	29.066	3.27	0	60.356	74	-13.644	Spur/Peak
2483.5	11.17	210	100	H	29.066	3.27	0	43.506	54	-10.494	Spur/Ave
4924	37.99	0	100	V	33.3	4.09	27.8	47.657	74	-26.343	Harm/Peak*
4924	38.78	0	100	H	33.3	4.09	27.8	48.447	74	-25.553	Harm/Peak*
4924	23.61	0	100	V	33.3	4.09	27.8	33.277	54	-20.723	Harm/Ave*
4924	23.86	0	100	H	33.3	4.09	27.8	33.527	54	-20.473	Harm/Ave*
7386	39.24	0	100	V	36.5	4.89	27.5	53.125	74	-20.875	Harm/Peak*
7386	39.11	0	100	H	36.5	4.89	27.5	52.995	74	-21.005	Harm/Peak*
7386	24.72	0	100	V	36.5	4.89	27.5	38.605	54	-15.395	Harm/Ave*
7386	24.86	0	100	H	36.5	4.89	27.5	38.745	54	-15.255	Harm/Ave*
9848	38.46	0	100	V	38.4	5.77	27.0	55.650	79.286	-23.636	Harm/Peak*
9848	38.58	0	100	H	38.4	5.77	27.0	55.770	71.556	-15.786	Harm/Peak*
9848	23.56	0	100	V	38.4	5.77	27.0	40.750	68.456	-27.706	Harm/Ave*
9848	23.84	0	100	H	38.4	5.77	27.0	41.030	60.396	-19.366	Harm/Ave*

Note:*1 Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11n HT20 mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2412 MHz, measured at 3 meters											
2412	67.92	174	122	V	28.838	3.12	0	99.878	NA	NA	Fund/Peak
2412	57.01	174	122	V	28.838	3.12	0	88.968	NA	NA	Fund/Ave
2412	61.03	210	100	H	28.838	3.12	0	92.988	NA	NA	Fund/Peak
2412	50.13	210	100	H	28.838	3.12	0	82.088	NA	NA	Fund/Ave
2390	33.41	174	122	V	28.192	3.12	0	64.722	74	-9.278	Spur/Peak
2390	11.59	174	122	V	28.192	3.12	0	42.902	54	-11.098	Spur/Ave
2390	25.97	210	100	H	28.192	3.12	0	57.282	74	-16.718	Spur/Peak
2390	11.92	210	100	H	28.192	3.12	0	43.232	54	-10.768	Spur/Ave
4824	40.22	161	100	V	33.1	4.06	27.70	49.664	74	-24.336	Harm/Peak*
4824	39.46	0	100	H	33.1	4.06	27.70	48.904	74	-25.096	Harm/Peak*
4824	24.2	161	100	V	33.1	4.06	27.70	33.644	54	-20.356	Harm/Ave*
4824	24.33	0	100	H	33.1	4.06	27.70	33.774	54	-20.226	Harm/Ave*
7236	39.67	0	100	V	36.1	4.93	27.6	53.156	79.878	-26.722	Harm/Peak*
7236	40.87	295	100	H	36.1	4.93	27.6	54.356	72.988	-18.632	Harm/Peak*
7236	25.57	0	100	V	36.1	4.93	27.6	39.056	68.968	-29.912	Harm/Ave*
7236	25.94	295	100	H	36.1	4.93	27.6	39.426	62.088	-22.662	Harm/Ave*
9648	38.23	0	100	V	38.0	5.82	27.02	54.999	79.878	-24.879	Harm/Peak*
9648	38.74	0	100	H	38.0	5.82	27.02	55.509	72.988	-17.479	Harm/Peak*
9648	23.78	0	100	V	38.0	5.82	27.02	40.549	68.968	-28.419	Harm/Ave*
9648	23.73	0	100	H	38.0	5.82	27.02	40.499	62.088	-21.589	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11n HT20 mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2437	66.27	174	124	V	28.921	3.21	0	98.401	NA	NA	Fund/Peak
2437	54.87	174	124	V	28.921	3.21	0	87.001	NA	NA	Fund/Ave
2437	59.61	211	100	H	28.921	3.21	0	91.741	NA	NA	Fund/Peak
2437	48.89	211	100	H	28.921	3.21	0	81.021	NA	NA	Fund/Ave
4874	38.41	0	100	V	33.2	4.10	27.8	47.915	74	-26.085	Harm/Peak*
4874	38.48	0	100	H	33.2	4.10	27.8	47.985	74	-26.015	Harm/Peak*
4874	23.54	0	100	V	33.2	4.10	27.8	33.045	54	-20.955	Harm/Ave*
4874	24.19	0	100	H	33.2	4.10	27.8	33.695	54	-20.305	Harm/Ave*
7311	39.61	0	100	V	36.4	4.88	27.5	53.337	74	-20.663	Harm/Peak*
7311	39.84	0	100	H	36.4	4.88	27.5	53.567	74	-20.433	Harm/Peak*
7311	24.71	0	100	V	36.4	4.88	27.5	38.437	54	-15.563	Harm/Ave*
7311	24.74	0	100	H	36.4	4.88	27.5	38.467	54	-15.533	Harm/Ave*
9748	38.25	0	100	V	38.2	5.49	27.0	54.919	78.401	-23.482	Harm/Peak*
9748	38.39	0	100	H	38.2	5.49	27.0	55.059	71.741	-16.682	Harm/Peak*
9748	23.57	0	100	V	38.2	5.49	27.0	40.239	67.001	-26.762	Harm/Ave*
9748	23.49	0	100	H	38.2	5.49	27.0	40.159	61.021	-20.862	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11n HT20 mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2462 MHz, measured at 3 meters											
2462	66.47	122	172	V	29.066	3.25	0	98.786	NA	NA	Fund/Peak
2462	55.87	122	172	V	29.066	3.25	0	88.186	NA	NA	Fund/Ave
2462	59.13	209	100	H	29.066	3.25	0	91.446	NA	NA	Fund/Peak
2462	48.07	209	100	H	29.066	3.25	0	80.386	NA	NA	Fund/Ave
2483.5	35.19	122	172	V	29.066	3.27	0	67.526	74	-6.474	Spur/Peak
2483.5	12.12	122	172	V	29.066	3.27	0	44.456	54	-9.544	Spur/Ave
2483.5	28.03	209	100	H	29.066	3.27	0	60.366	74	-13.634	Spur/Peak
2483.5	11.27	209	100	H	29.066	3.27	0	43.606	54	-10.394	Spur/Ave
4924	38.22	0	100	V	33.3	4.09	27.8	47.887	74	-26.113	Harm/Peak*
4924	37.59	0	100	H	33.3	4.09	27.8	47.257	74	-26.743	Harm/ Peak
4924	23.08	0	100	V	33.3	4.09	27.8	32.747	54	-21.253	Harm/Ave*
4924	23.47	0	100	H	33.3	4.09	27.8	33.137	54	-20.863	Harm/Ave*
7386	39.59	0	100	V	36.5	4.89	27.5	53.475	74	-20.525	Harm/Peak*
7386	39.85	0	100	H	36.5	4.89	27.5	53.735	74	-20.265	Harm/Peak*
7386	24.74	0	100	V	36.5	4.89	27.5	38.625	54	-15.375	Harm/Ave*
7386	24.82	0	100	H	36.5	4.89	27.5	38.705	54	-15.295	Harm/Ave*
9848	39.03	0	100	V	38.4	5.77	27.0	56.220	78.786	-22.566	Harm/Peak*
9848	39.6	0	100	H	38.4	5.77	27.0	56.790	71.446	-14.656	Harm/Peak*
9848	23.84	0	100	V	38.4	5.77	27.0	41.030	68.186	-27.156	Harm/Ave*
9848	23.75	0	100	H	38.4	5.77	27.0	40.940	60.386	-19.446	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11n HT40 mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Low Channel 2422 MHz, measured at 3 meters											
2422	63.34	124	170	V	28.838	3.12	0	95.298	NA	NA	Fund/Peak
2422	52.96	124	170	V	28.838	3.12	0	84.918	NA	NA	Fund/Ave
2422	56.79	210	100	H	28.838	3.12	0	88.748	NA	NA	Fund/Peak
2422	45.97	210	100	H	28.838	3.12	0	77.928	NA	NA	Fund/Ave
2390	32.55	124	170	V	28.192	3.12	0	63.862	74	-10.138	Spur/Peak
2390	11.47	124	170	V	28.192	3.12	0	42.782	54	-11.218	Spur/Ave
2390	24.98	210	100	H	28.192	3.12	0	56.292	74	-17.708	Spur/Peak
2390	11.39	210	100	H	28.192	3.12	0	42.702	54	-11.298	Spur/Ave
4844	38.08	0	100	V	33.2	4.06	27.70	47.605	74	-26.395	Harm/Peak*
4844	38.49	0	100	H	33.2	4.06	27.70	48.015	74	-25.985	Harm/Peak*
4844	23.43	0	100	V	33.2	4.06	27.70	32.955	54	-21.045	Harm/Ave*
4844	24.17	0	100	H	33.2	4.06	27.70	33.695	54	-20.305	Harm/Ave*
7266	40.26	0	100	V	36.1	4.88	27.6	53.716	74	-20.284	Harm/Peak*
7266	39.51	0	100	H	36.1	4.88	27.6	52.966	74	-21.034	Harm/Peak*
7266	24.89	0	100	V	36.1	4.88	27.6	38.346	54	-15.654	Harm/Ave*
7266	24.86	0	100	H	36.1	4.88	27.6	38.316	54	-15.684	Harm/Ave*
9688	39.93	0	100	V	38.1	5.74	26.98	56.747	75.298	-18.551	Harm/Peak*
9688	38.37	0	100	H	38.1	5.74	26.98	55.187	68.748	-13.561	Harm/Peak*
9688	23.34	0	100	V	38.1	5.74	26.98	40.157	64.918	-24.761	Harm/Ave*
9688	23.31	0	100	H	38.1	5.74	26.98	40.127	57.928	-17.801	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11n HT40 mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Middle Channel 2437 MHz, measured at 3 meters											
2437	61.97	124	170	V	28.921	3.21	0	94.101	NA	NA	Fund/Peak
2437	51.86	124	170	V	28.921	3.21	0	83.991	NA	NA	Fund/Ave
2437	55.37	211	100	H	28.921	3.21	0	87.501	NA	NA	Fund/Peak
2437	44.12	211	100	H	28.921	3.21	0	76.251	NA	NA	Fund/Ave
4874	38.36	0	100	V	33.2	4.10	27.8	47.865	74	-26.135	Harm/Peak*
4874	39.14	0	100	H	33.2	4.10	27.8	48.645	74	-25.355	Harm/Peak*
4874	23.24	0	100	V	33.2	4.10	27.8	32.745	54	-21.255	Harm/Ave*
4874	24.35	0	100	H	33.2	4.10	27.8	33.855	54	-20.145	Harm/Ave*
7311	39.64	0	100	V	36.4	4.88	27.5	53.367	74	-20.633	Harm/Peak*
7311	39.07	0	100	H	36.4	4.88	27.5	52.797	74	-21.203	Harm/Peak*
7311	24.7	0	100	V	36.4	4.88	27.5	38.427	54	-15.573	Harm/Ave*
7311	24.73	0	100	H	36.4	4.88	27.5	38.457	54	-15.543	Harm/Ave*
9748	38.68	0	100	V	38.2	5.74	27.0	55.599	74.101	-18.502	Harm/Peak*
9748	38.42	0	100	H	38.2	5.74	27.0	55.339	67.501	-12.162	Harm/Peak*
9748	23.55	0	100	V	38.2	5.74	27.0	40.469	63.991	-23.522	Harm/Ave*
9748	23.49	0	100	H	38.2	5.74	27.0	40.409	56.251	-15.842	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

802.11n HT40 mode:

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC/IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
High Channel 2452 MHz, measured at 3 meters											
2452	62.77	122	174	V	29.066	3.25	0	95.086	NA	NA	Fund/Peak
2452	52.48	122	174	V	29.066	3.25	0	84.796	NA	NA	Fund/Ave
2452	55.86	211	100	H	29.066	3.25	0	88.176	NA	NA	Fund/Peak
2452	44.87	211	100	H	29.066	3.25	0	77.186	NA	NA	Fund/Ave
2483.5	32.67	122	174	V	29.066	3.27	0	65.006	74	-8.994	Spur/Peak
2483.5	12.03	122	174	V	29.066	3.27	0	44.366	54	-9.634	Spur/Ave
2483.5	25.22	211	100	H	29.066	3.27	0	57.556	74	-16.44	Spur/Peak
2483.5	11.03	211	100	H	29.066	3.27	0	43.366	54	-10.63	Spur/Ave
4904	38.34	0	100	V	33.3	4.10	27.7	48.097	74	-25.903	Harm/Peak*
4904	38.43	0	100	H	33.3	4.10	27.7	48.187	74	-25.813	Harm/Peak*
4904	22.91	0	100	V	33.3	4.10	27.7	32.667	54	-21.333	Harm/Ave*
4904	23.02	0	100	H	33.3	4.10	27.7	32.777	54	-21.223	Harm/Ave*
7356	39.9	0	100	V	36.5	4.89	27.6	53.693	74	-20.307	Harm/Peak*
7356	39.25	0	100	H	36.5	4.89	27.6	53.043	74	-20.957	Harm/Peak*
7356	24.71	0	100	V	36.5	4.89	27.6	38.503	54	-15.497	Harm/Ave*
7356	24.58	0	100	H	36.5	4.89	27.6	38.373	54	-15.627	Harm/Ave*
9808	38.46	0	100	V	38.3	5.77	27.0	55.497	75.086	-19.589	Harm/Peak*
9808	38.7	0	100	H	38.3	5.77	27.0	55.737	68.176	-12.439	Harm/Peak*
9808	23.75	0	100	V	38.3	5.77	27.0	40.787	64.796	-24.009	Harm/Ave*
9808	23.8	0	100	H	38.3	5.77	27.0	40.837	57.186	-16.349	Harm/Ave*

Note: * Noise Floor Level.

All 30 MHz–1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below: (The data listed below are based on the worst point on the worst result with 802.11 b Middle channel 2437 MHz)

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
325.987	24.55	QP	V	326	32	46	-21.45

9 FCC §15.247(a)(2) & IC RSS-210 §A8.2 – 6 dB & 99% Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2) and IC RSS-210 A8.2 (a), systems using digital modulation techniques may operate in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emissions bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

9.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	29 %
ATM Pressure:	102.4 kPa

The testing was performed by Victor Zhang on 2013-02-26 at RF test site.

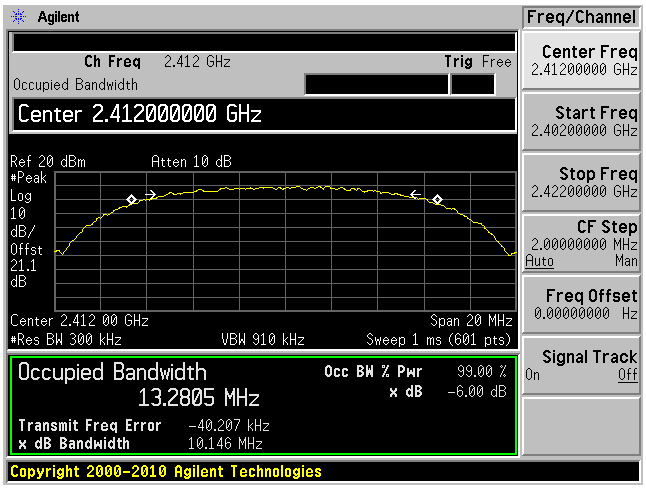
9.5 Test Results

Channel	Frequency (MHz)	99% Emission Bandwidth (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Results
802.11b mode					
Low	2412	13.2805	10.146	> 500	Compliant
Middle	2437	13.2708	10.127	> 500	Compliant
High	2462	13.2586	10.153	> 500	Compliant
802.11g mode					
Low	2412	16.678	16.635	> 500	Compliant
Middle	2437	16.6781	16.691	> 500	Compliant
High	2462	16.6656	16.652	> 500	Compliant
802.11n HT20 mode					
Low	2412	17.8123	17.729	> 500	Compliant
Middle	2437	17.8013	17.752	> 500	Compliant
High	2462	17.793	17.727	> 500	Compliant
802.11n HT40 mode					
Low	2422	36.4592	36.637	> 500	Compliant
Middle	2437	36.3407	36.494	> 500	Compliant
High	2452	36.3777	36.703	> 500	Compliant

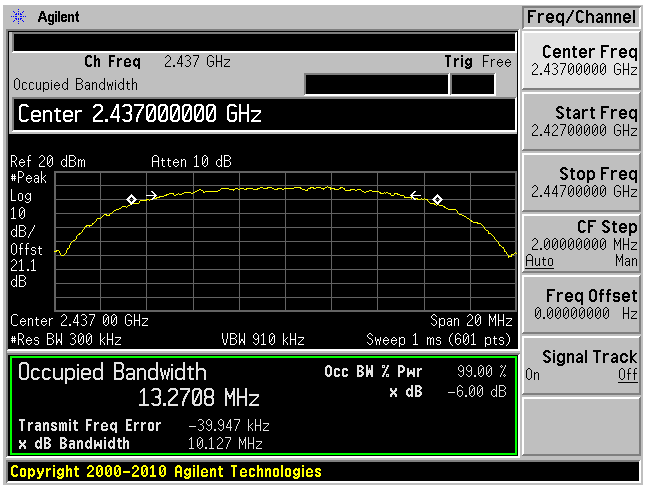
Please refer to the following plots for detailed test results

802.11 b

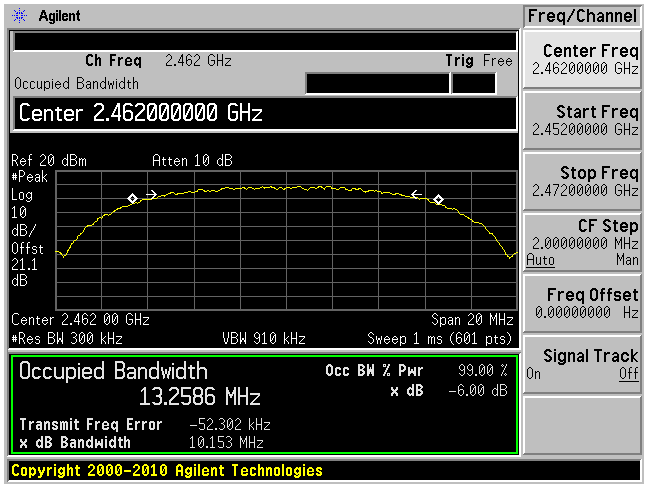
Low channel: 2412 MHz



Middle Channel: 2437 MHz

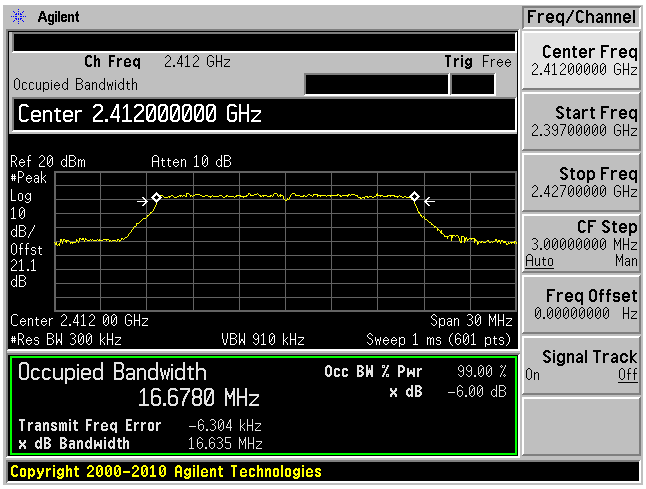


High Channel: 2462 MHz

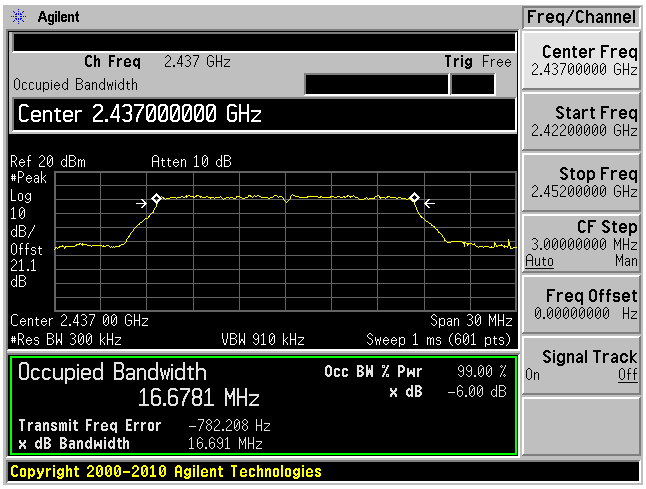


802.11 g

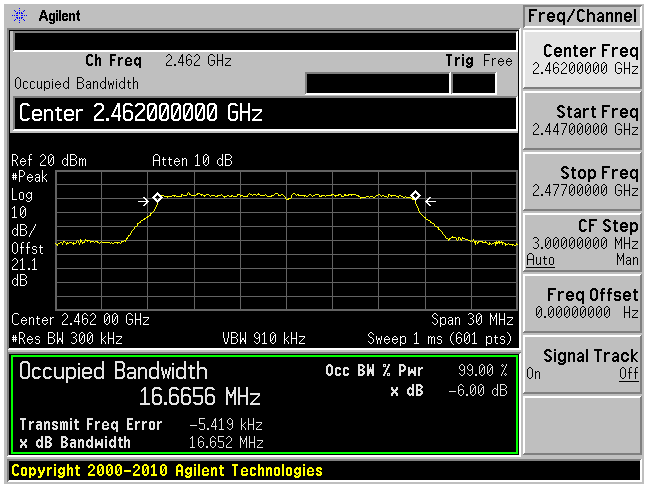
Low channel: 2412 MHz



Middle Channel: 2437 MHz

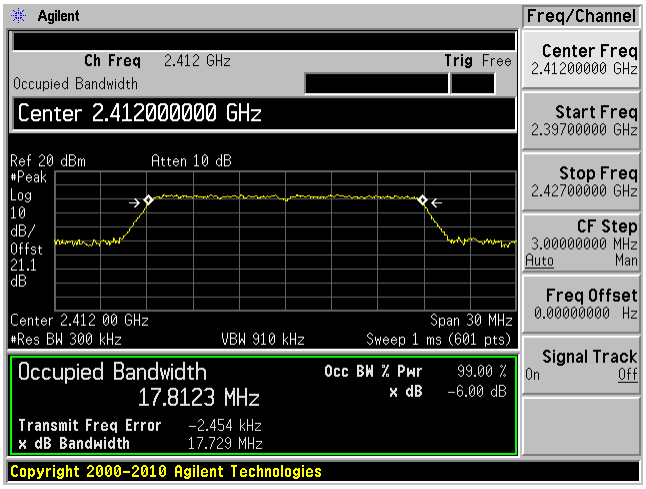


High Channel: 2462 MHz

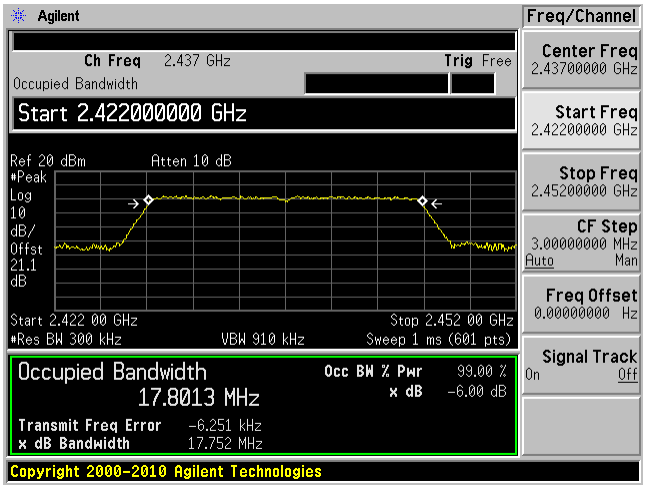


802.11n HT20

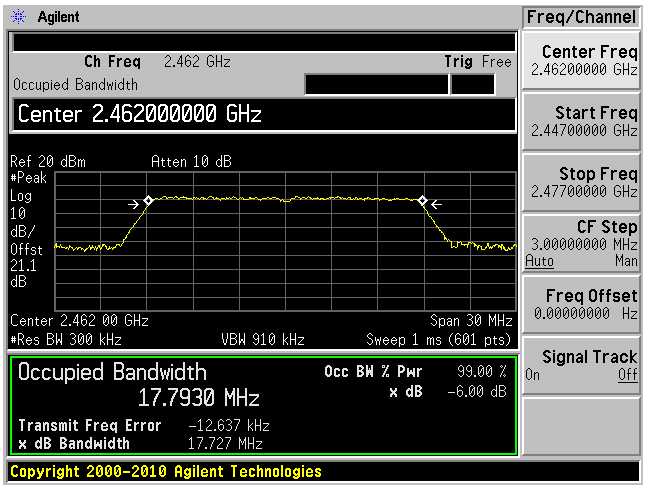
Low channel: 2412 MHz



Middle Channel: 2437 MHz

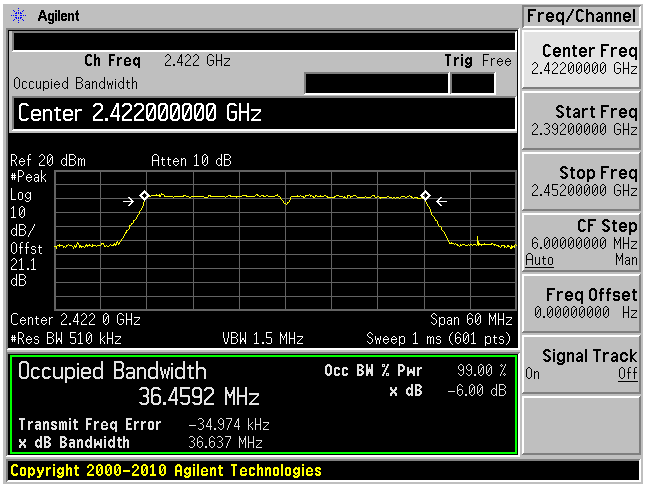


High Channel: 2462 MHz

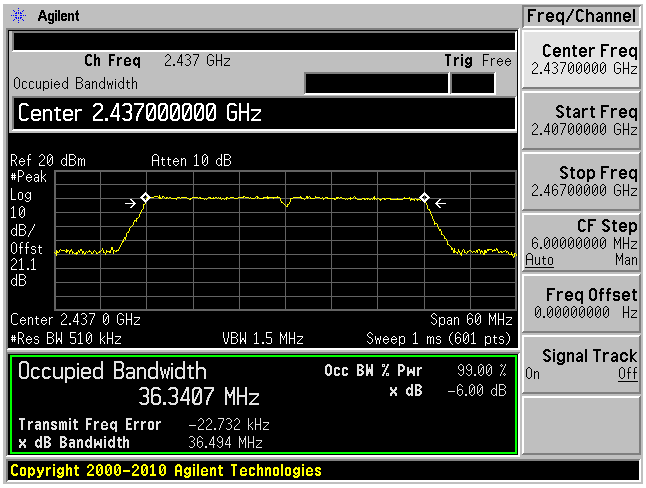


802.11n HT40

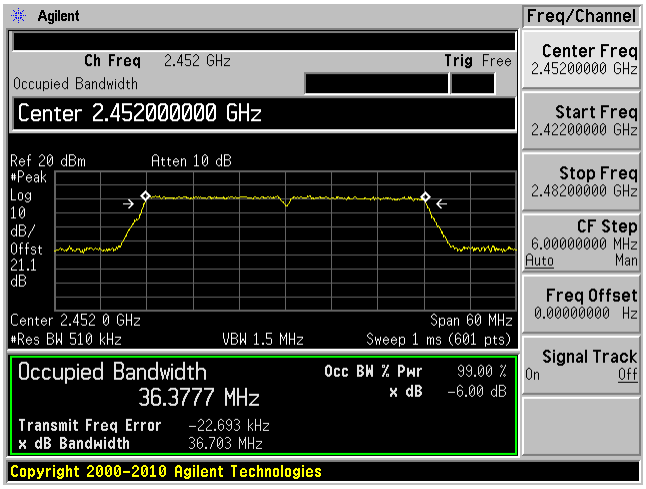
Low channel: 2422 MHz



Middle Channel: 2437 MHz



High Channel: 2452 MHz



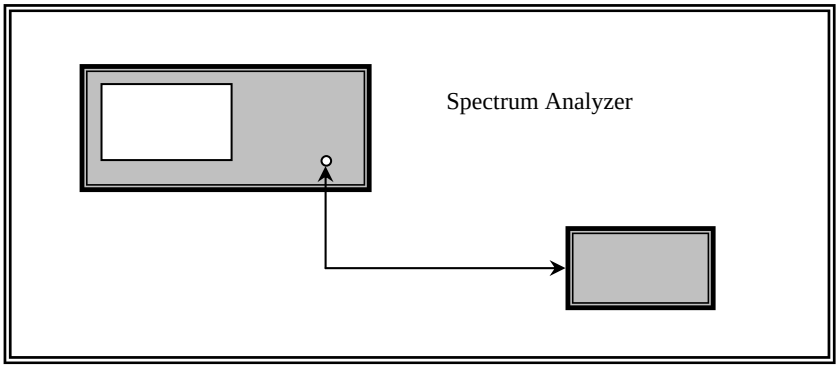
10 FCC §15.247(b) & IC RSS-210 §A8.4 - Peak Output Power Measurement

10.1 Applicable Standard

According to FCC §15.247(b) and IC RSS-210 §A8.4 (4) for systems using digital modulation in the 902~928 MHz, 2400~2483.5 MHz, and 5725~5850 MHz bands: 1 Watt.

10.2 Measurement Procedure

1. Place the EUT on a bench and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to a spectrum analyzer.
3. Add a correction factor to the display.



10.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

10.4 Test Environmental Conditions

Temperature:	25 °C
Relative Humidity:	35 %
ATM Pressure:	101.9 kPa

The testing was performed by Victor Zhang on 2013-02-22 at RF test site.

10.5 Test Results

Channel	Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
802.11b mode				
Low	2412	14.77	30	-15.23
Middle	2437	14.98	30	-15.02
High	2462	14.36	30	-15.64
802.11g mode				
Low	2412	12.02	30	-17.98
Middle	2437	11.25	30	-18.75
High	2462	11.28	30	-18.72
802.11n HT20 mode				
Low	2412	12.57	30	-17.43
Middle	2437	11.41	30	-18.59
High	2462	11.34	30	-18.66
802.11n HT40 mode				
Low	2422	11.54	30	-18.46
Middle	2437	10.74	30	-19.26
High	2452	10.84	30	-19.16

11 FCC §15.247(d) & IC RSS-210§A8.5 - 100 kHz Bandwidth of Band Edges

11.1 Applicable Standard

According to FCC §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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c).

According to IC RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

11.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

11.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

11.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	29 %
ATM Pressure:	102.4 kPa

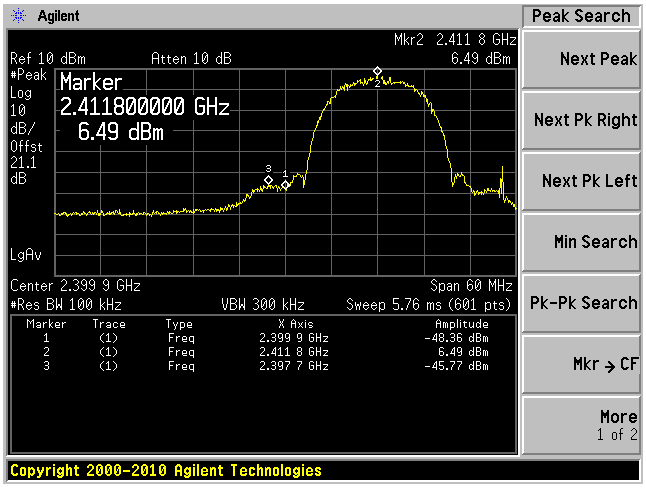
The testing was performed by Victor Zhang on 2013-02-26 at RF test site.

11.5 Test Results

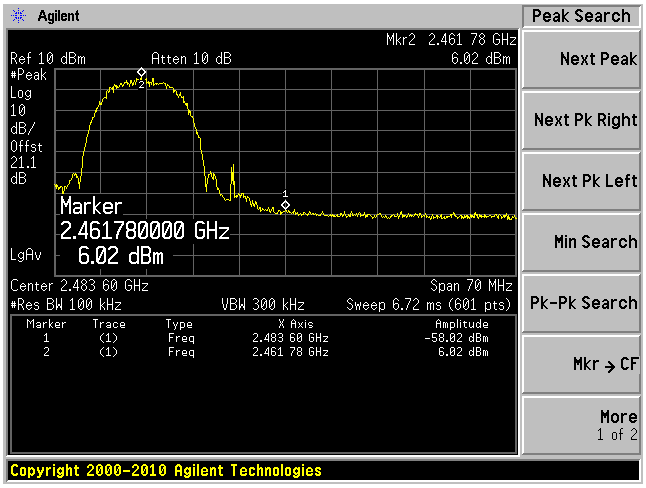
Please refer to following pages for plots of band edge.

802.11b

Low Band Edge

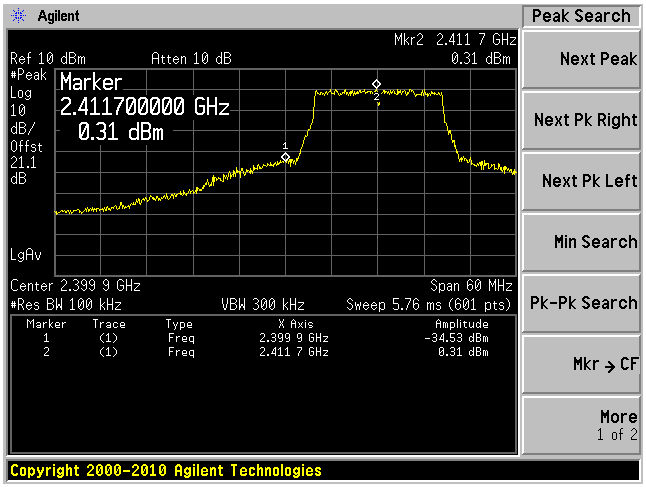


High Band Edge

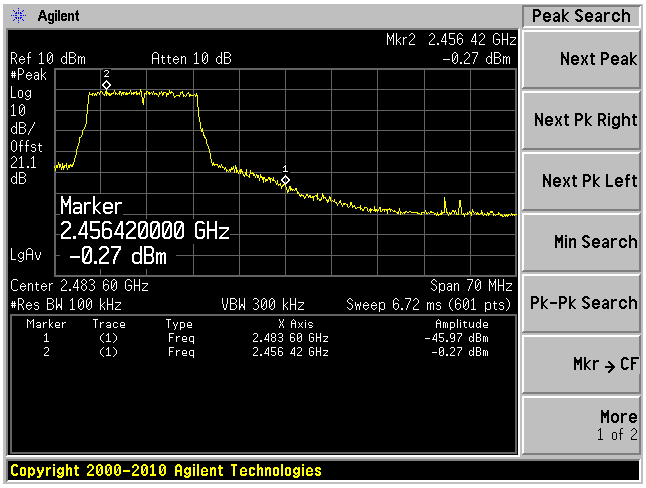


802.11g

Low Band Edge

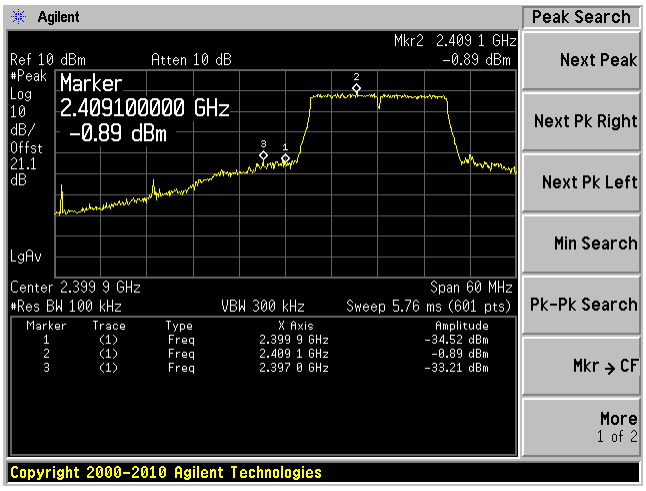


High Band Edge

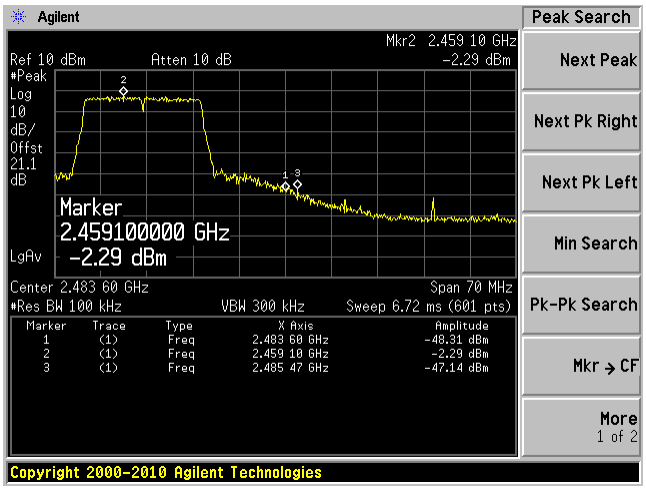


802.11n HT20

Low Band Edge

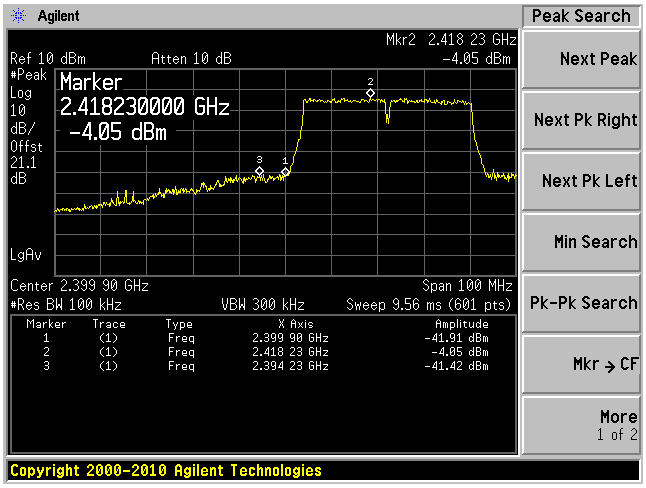


High Band Edge

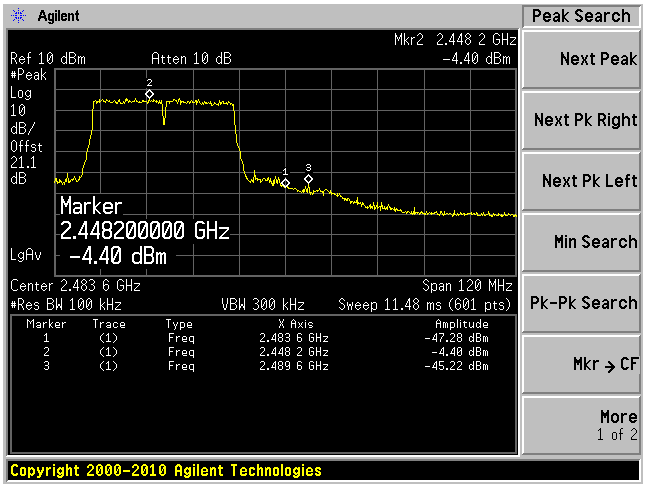


802.11n HT40

Low Band Edge



High Band Edge



12 FCC §15.247(e) & IC RSS-210 §A8.2 (b) - Power Spectral Density

12.1 Applicable Standard

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

12.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position and set the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. Additionally set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

12.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-10-16	1 year

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed according to A2LA requirements, traceable to the NIST.

12.4 Test Environmental Conditions

Temperature:	21 °C
Relative Humidity:	29 %
ATM Pressure:	102.4 kPa

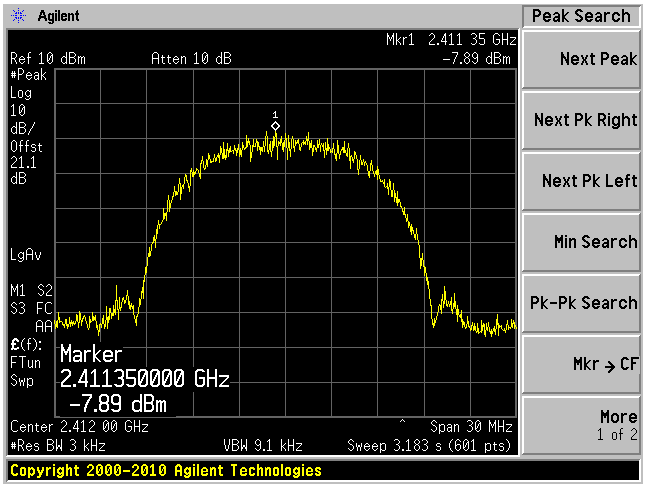
The testing was performed by Victor Zhang on 2013-02-26 at RF test site.

12.5 Test Results

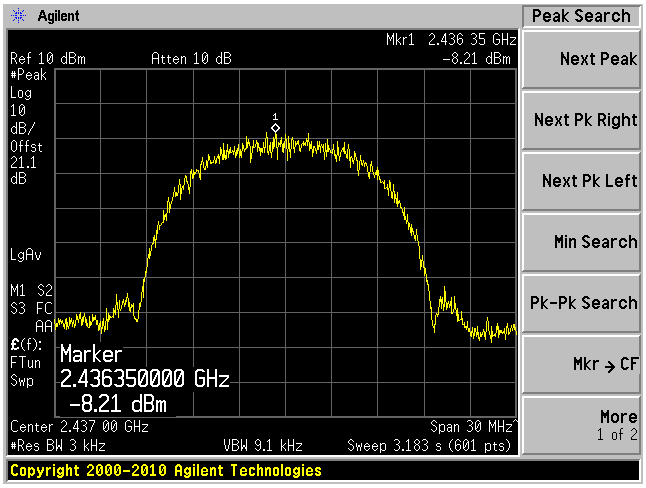
Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Margin (dB)
802.11 b				
Low	2412	-7.89	8	-15.89
Middle	2437	-8.21	8	-16.21
High	2462	-8.58	8	-16.58
802.11 g				
Low	2412	-13.09	8	-21.09
Middle	2437	-14.71	8	-22.71
High	2462	-13.78	8	-21.78
802.11n HT20				
Low	2412	-15.17	8	-23.17
Middle	2437	-16.47	8	-24.47
High	2462	-15.8	8	-23.8
802.11n HT40				
Low	2422	-16.62	8	-24.62
Middle	2437	-17.37	8	-25.37
High	2452	-17.07	8	-25.07

802.11 b

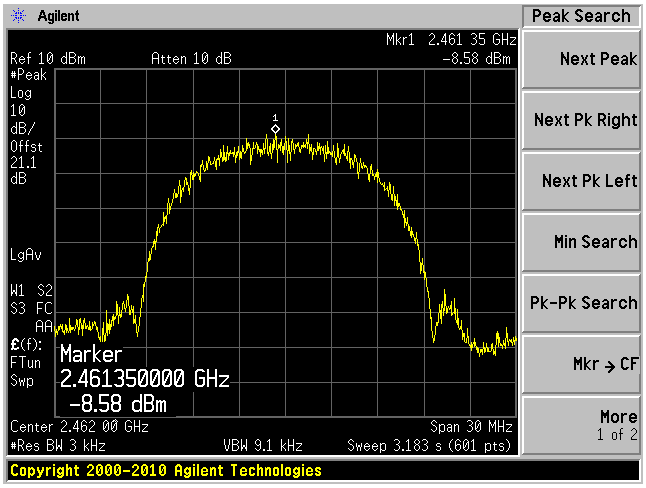
Low channel: 2412 MHz



Middle Channel: 2437 MHz

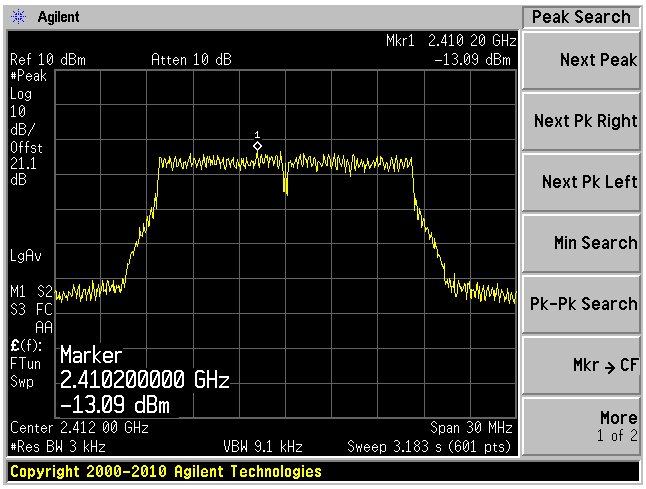


High Channel: 2462 MHz

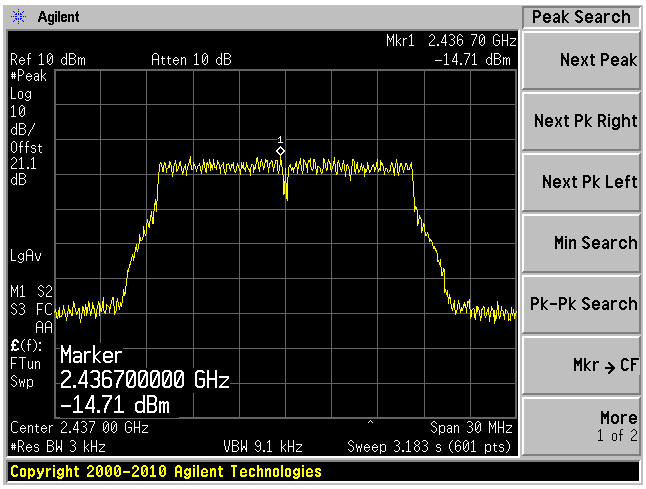


802.11 g

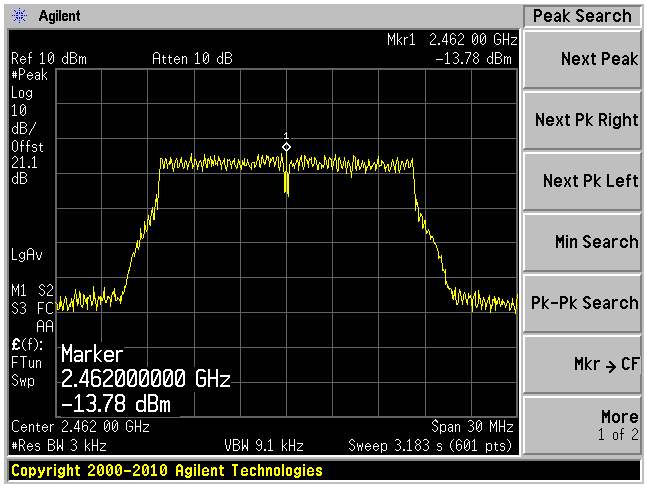
Low channel: 2412 MHz



Middle Channel: 2437 MHz

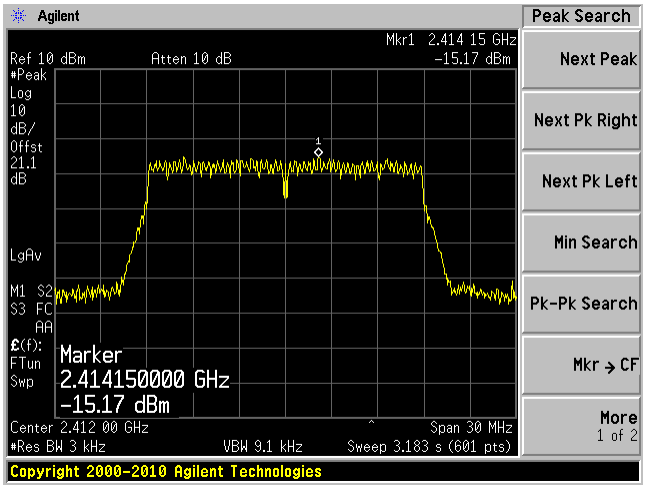


High Channel: 2462 MHz

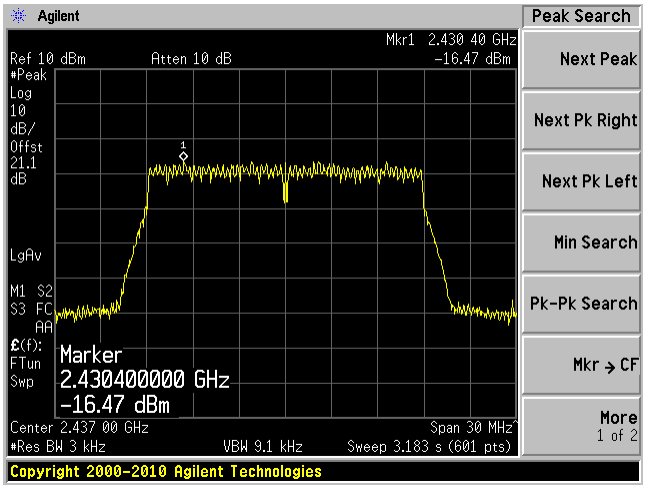


802.11n HT20

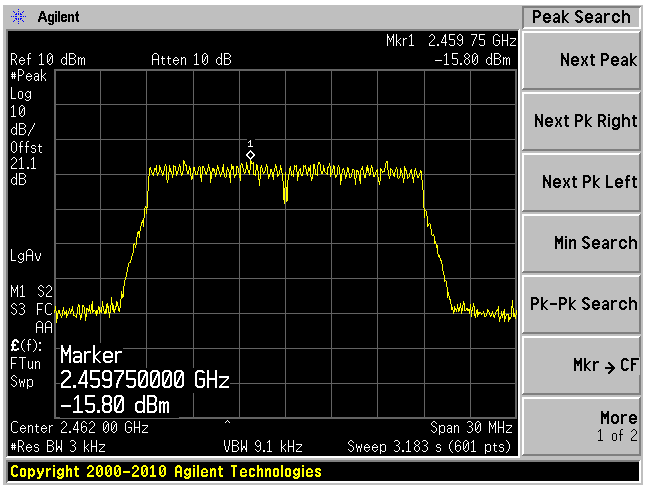
Low channel: 2412 MHz



Middle Channel: 2437 MHz

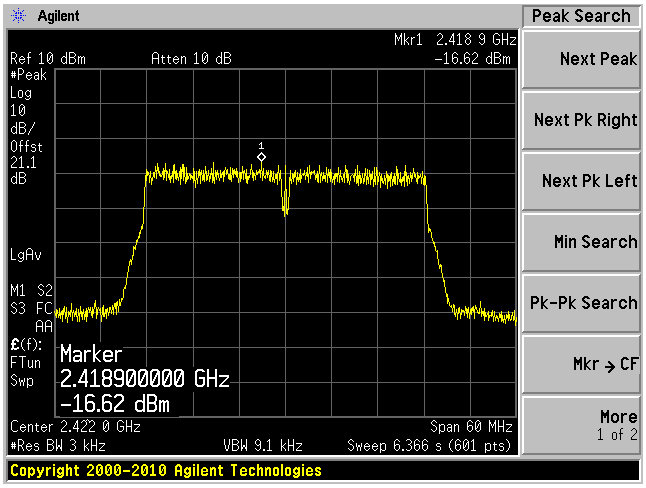


High Channel: 2462 MHz

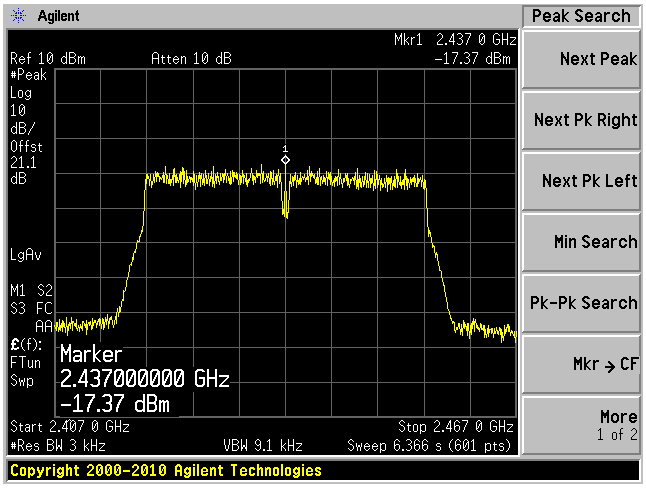


802.11n HT40

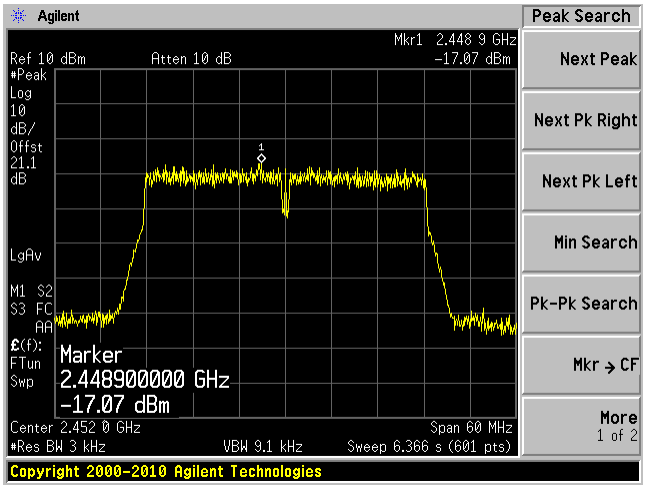
Low channel: 2422 MHz



Middle Channel: 2437 MHz



High Channel: 2452 MHz



13 IC RSS-210 §2.3 & RSS-Gen §6.1 - Receiver Spurious Radiated Emissions

13.1 Applicable Standard

According to IC RSS-Gen §6.1, spurious emissions from receivers shall not exceed the radiated limits shown in the table below.

Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies above 30 MHz (Note)

Frequency (MHz)	Field Strength Microvolts/m at 3 meters
30-88	100
88-216	150
216-960	200
Above 960	500

13.2 EUT Setup

The radiated emissions tests were performed in the 3 meter chamber, using the setup in accordance with ANSI C63.4-2009.

13.3 Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emissions was found to be marginal (within -4 dB of specification limits), and are distinguished with a "**QP**" in the data table.

13.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude (CA) is calculated by adding the Antenna Factor (AF), the Cable Loss (CL), the Attenuator Factor (Atten) and subtracting the Amplifier Gain (Ga) to indicated Amplitude (Ai) reading. The basic equation is as follows:

CA = Ai + AF + CL + Atten – Ga

For example, a corrected amplitude of 40.3 dBuV/m = Indicated Reading (32.5 dBuV) + Antenna Factor (+23.5dB) + Cable Loss (3.7 dB) + Attenuator (10 dB) - Amplifier Gain (29.4 dB)

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

13.5 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100338	2012-09-19	1 year
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Sunol Science Corp	System Controller	SC99V	011003-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2012-06-18	1 year
EMCO	Horn Antenna	3115	9511-4627	2012-10-17	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A10187	2013-03-08	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2012-05-09	1 year

Statement of Traceability: BACL attests that all calibrations have been performed per the A2LA requirements, traceable to NIST.

13.6 Test Environmental Conditions

Temperature:	23°C
Relative Humidity:	49%
ATM Pressure:	102.01

The testing was performed by Glenn Escano on 2013-03-27 at 5 meter chamber 3.

13.7 Summary of Test Results

According to the test data, the EUT complied with IC RSS-210/RSS-Gen, with the closest margins from the limit listed below:

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (MHz)**
-8.283	16000	Vertical/Horizontal (Noise Floor)	30–25000

13.8 Test Results

30 MHz -25 GHz, Measured at 3 meters

Receiving Mode

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	FCC & IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
1090	38.27	0	100	V	25.0	1.88	27.07	38.081	74	-35.919	Peak *
1090	38.27	0	100	H	25.0	1.88	27.07	38.081	74	-35.919	Peak *
1090	24.25	0	100	V	25.0	1.88	27.07	24.061	54	-29.939	Ave *
1090	24.25	0	100	H	25.0	1.88	27.07	24.061	54	-29.939	Ave *
8500	38.71	0	100	V	37.4	5.68	27.4	54.470	74	-19.530	Peak *
8500	38.71	0	100	H	37.4	5.68	27.4	54.470	74	-19.530	Peak *
8500	24.34	0	100	V	37.4	5.68	27.4	40.100	54	-13.900	Ave *
8500	24.34	0	100	H	37.4	5.68	27.4	40.100	54	-13.900	Ave *
16000	39.93	0	100	V	37.9	7.71	26.12	59.387	74	-14.613	Peak *
16000	39.93	0	100	H	37.9	7.71	26.12	59.387	74	-14.613	Peak *
16000	26.26	0	100	V	37.9	7.71	26.12	45.717	54	-8.283	Ave *
16000	26.26	0	100	H	37.9	7.71	26.12	45.717	54	-8.283	Ave *

Note: * Noise Floor Level.

All 30 MHz– 1 GHz spurious are digital related with 16.6 MHz SDIO clock, other emissions are on the noise floor level. Report only the worst case data as shown below:

Frequency MHz	Cord. Reading (dBµV/m)	Measurement Type (QP/Ave.)	Antenna Polarity (H/V)	Antenna Height (cm)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
35.83275	14.3	QP	H	132	249	40	-25.73
126.68925	21.8	QP	H	181	53	43.5	-21.69
359.0025	16.2	QP	H	99	286	46	-29.82