FCC PART 15.247
IC RSS-210, ISSUE 8, DEC 2010
TEST AND MEASUREMENT REPORT

For

Looxcie, Inc.

1196 Borregas Ave., Suite 200,

Sunnyvale, CA 94089, USA

FCC ID: YJ8-LX4
IC: 9087A-LX4

Report Type: Original Report	**Product Type:** Wearable HD Camera with Wi-Fi Connectivity

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Report Number:	R1209271-247
Report Date:	2012-10-12
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1209271-247	Original Report	2012-10-12

1 General Description

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Looxcie Inc.*, and their product FCC ID: YJ8-LX4, IC: 9087A-LX4 model: *LXHD* or the "EUT" as referred on this report is Wearable HD Camera with Wi-Fi Connectivity.

1.2 Mechanical Description of EUT

The EUT measures 12cm (L) x 2.8cm (W) x 2.1cm (H) and weighs 0.02 kg.

The data gathered are from a production sample provided by the manufacturer, serial number: R1209271-01 (Serial number assigned by BACL).

1.3 Objective

This report is prepared on behalf of *Looxcie, 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)

No Related Submittals.

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 CISPR16-4-2:2003, 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.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

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.

The worst-case data rates are determined to be as follows for each mode based upon investigation by measuring the average power, peak power and PSD across all data rates bandwidths, and modulations.

The EUT had been tested with the following data rate settings (worst case):

Radio Mode	Bandwidth (MHz)	Frequency/Data Rate		
		Low CH (MHz/Mbps)	Mid CH (MHz/Mbps)	High CH (MHz/Mbps)
802.11b	20	2412/1	2437/1	2462/1
802.11g	20	2412/6	2437/6	2462/6

2.2 EUT Exercise Software

The test utility used was LX-HD Debut Console was provided by Looxcie and was verified by Jeffrey Wu to comply with the standard requirements being tested against.

2.3 Special Equipment

There were no special accessories were required, included, or intended for use with EUT during these tests.

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model	Serial Number
Lenovo	Laptop	G550	-

2.6 EUT Internal Configuration Details

Manufacturer	Description	Model	Serial Number
Looxcie	Main-Board	LX-HD	-
RainSun	2.4 GHz Wireless Antenna	AN2051	-
Nano Radio	2.5 GHz Wifi Chip	NRG731	-

2.7 External I/O Cabling List and AC Cord

Cable Description	Length (m)	From	To
RF Cable	<1.0m	EUT	PSA

2.8 Power Supply List and Details

Manufacturer	Description	Model	Serial Number
Salix Technology Co.Ltd	AC/DC adaptor	PA-2	-

3 Summary of Test Results

Results reported relate only to the product tested.

FCC/IC Rules	Description of Test	Results
FCC §15.247(i), §2.1091 IC RSS-102	RF Exposure	Note *
FCC §15.203 IC RSS-Gen §7.1.2	Antenna Requirement	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.4	AC Line Conducted Emissions	Compliant
FCC §15.209 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(b)(3) IC RSS-210 §A8.4	Maximum Peak Output Power	Compliant
FCC §15.247(a) (2) IC RSS-210 §A8.2(a)	6 dB Bandwidth & 99% Bandwidth	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 §4.10	Receiver Spurious Emission	Compliant

Note: * Refer to SAR report No.: R1209271-FCC-SAR

4 FCC §15.203 & IC RSS-Gen §7.1.2 – Antenna Requirements

4.1 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: Transmitter Antenna

A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified 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 certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

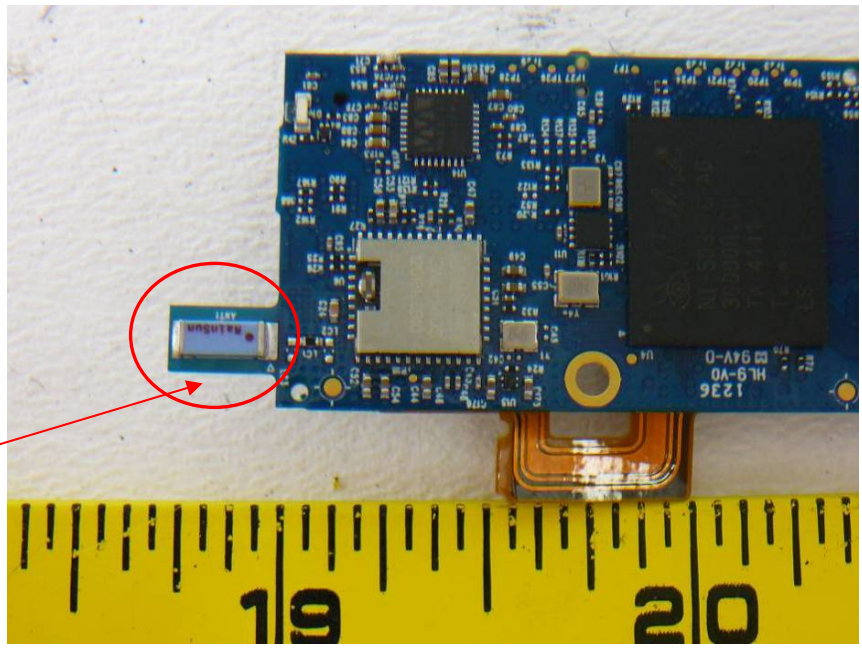
When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 mW or less. For devices of output powers greater than 10 mW, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

4.2 Antenna List

Antenna Model	Antenna Gain (dBi) 2.4 GHz
AN2051	0.5

4.3 Result

The EUT has maximum gain of 0.5 dBi antenna, which in accordance to sections FCC §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.



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

5.1 Applicable Standards

As per FCC §15.207 & 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 [1]	56 to 46 [1]
0.5-5	56	46
5-30	60	50

Note [1]: Decreases with the logarithm of the frequency.

5.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2009 measurement procedure. The specification used was FCC §15.207 limits and IC RSS-Gen §7.2.4 limits.

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.

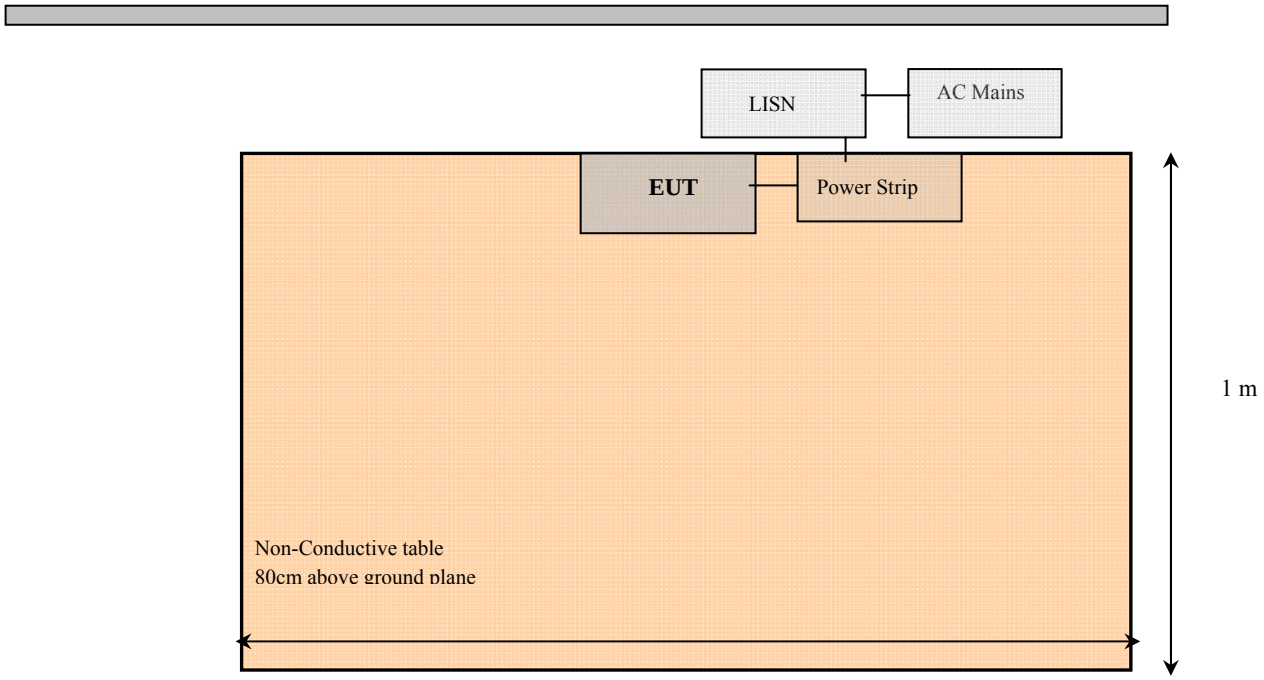
5.3 Test Procedure

During the conducted emissions test, the power cord of the EUT host system was connected to the mains outlet of the LISN-2.

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".

5.4 Test Setup Block Diagram



5.5 Corrected Amplitude & Margin Calculation

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

CA = Ai + CL + Atten

For example, a corrected amplitude of 46.2 dBuV = Indicated Reading (32.5 dBuV) + Cable Loss (3.7 dB) + Attenuator (10 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

5.6 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Solar Electronics	LISN, EMC	9252-R-24-BNC	511213	2012-06-25	1 year
Rohde & Schwarz	Receiver, EMI Test	ECSI 1166.5950K03	100044	2012-04-18	1 year

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

5.7 Test Environmental Conditions

Temperature:	23°C
Relative Humidity:	40 %
ATM Pressure:	101.3 kPa

The testing was performed by Jeffrey Wu on 2012-10-04 at 5meter 3

5.8 Summary of Test Results

According to the recorded data in following table, the EUT complied with the FCC Part 15.207 and IC RSS-Gen standard's conducted emissions limits, with the margin reading of:

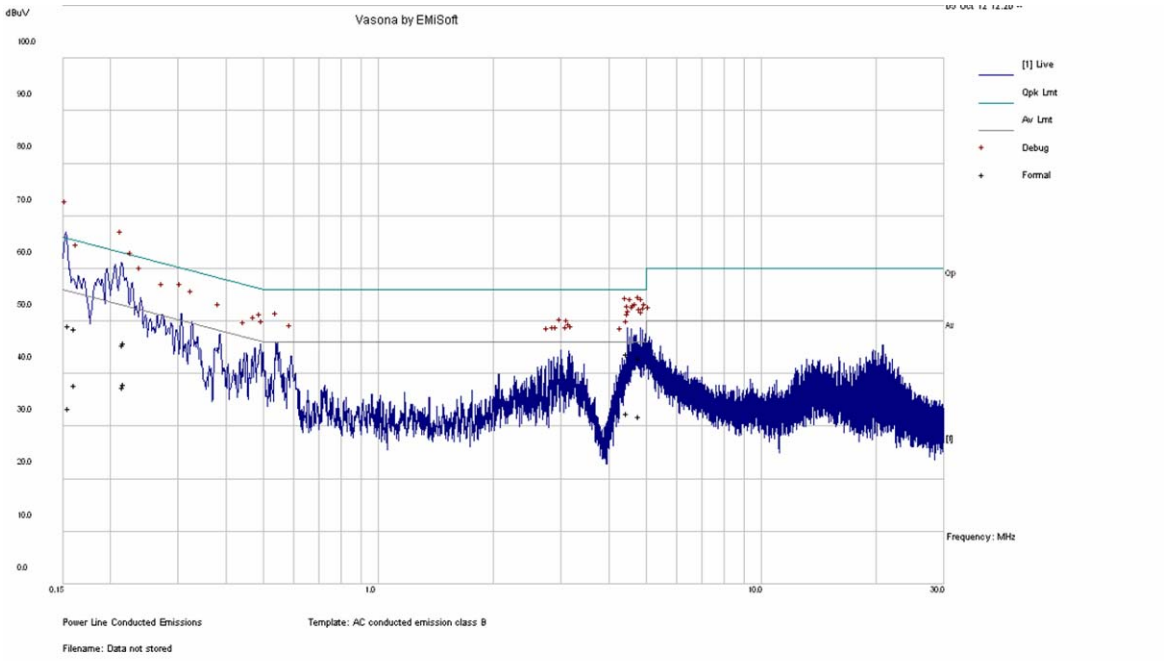
Transmitting Mode the Worst Case: 802.11 b Low channel

Connection: AC/DC adapter connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-7.02	0.499203	Neutral	0.15-30

5.9 Conducted Emissions Test Plots and Data

Transmitting Mode the Worst Case: 802.11 b Low channel

120 V, 60 Hz – Line



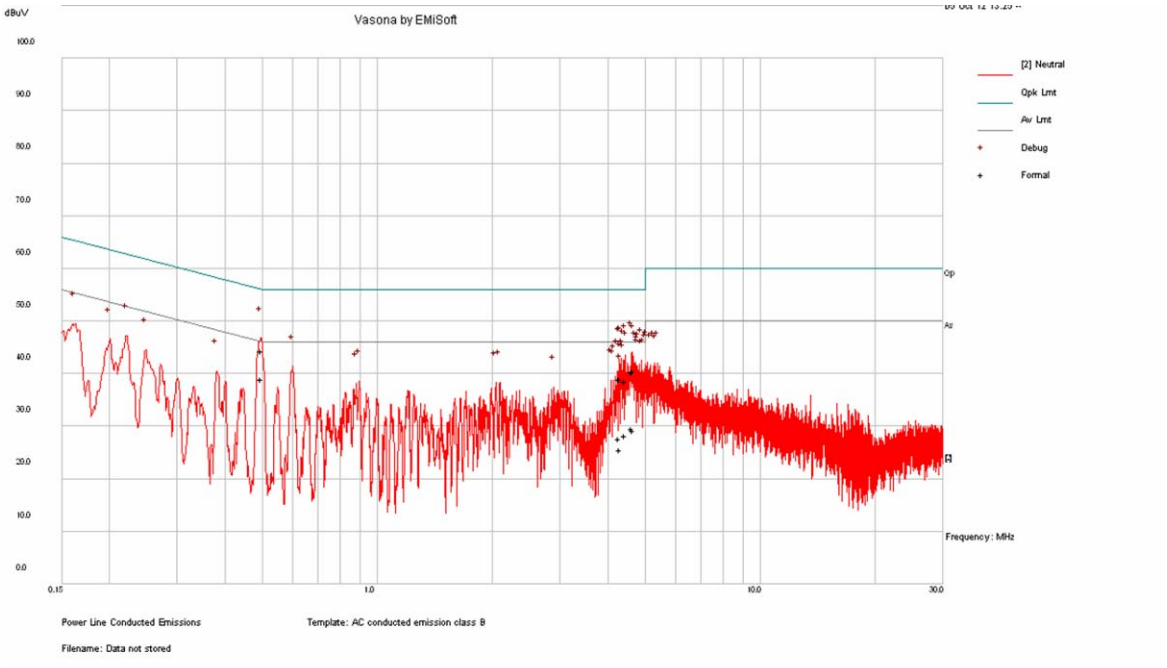
Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
4.464731	43.87	Line	56	-12.13
4.824329	42.95	Line	56	-13.05
0.155445	49.22	Line	65.7	-16.48
0.161853	48.55	Line	65.37	-16.82
0.217953	45.87	Line	62.9	-17.03
0.216378	45.6	Line	62.96	-17.36

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
4.464731	32.54	Line	46	-13.46
4.824329	31.94	Line	46	-14.06
0.217953	38.02	Line	52.9	-14.88
0.216378	37.39	Line	52.96	-15.57
0.161853	37.84	Line	55.37	-17.53
0.155445	33.44	Line	55.7	-22.26

120 V, 60 Hz – Neutral



Quasi-Peak Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.499203	44.45	Neutral	56	-11.57
4.68077	40.53	Neutral	56	-15.47
4.629002	40.26	Neutral	56	-15.74
4.292198	38.94	Neutral	56	-17.06
4.319039	38.93	Neutral	56	-17.07
4.449068	38.56	Neutral	56	-17.44

Average Measurements:

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.499203	39	Neutral	46	-7.02
4.629002	29.65	Neutral	46	-16.35
4.68077	29.26	Neutral	46	-16.74
4.449068	28.2	Neutral	46	-17.8
4.292198	27.63	Neutral	46	-18.37
4.319039	25.5	Neutral	46	-20.5

6 FCC §2.1051, §15.247(d) & IC RSS-210 §A8.5 – Spurious Emissions at Antenna Terminals

6.1 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.

6.2 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.

6.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year

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

6.4 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	40 %
ATM Pressure:	101.1 kPa

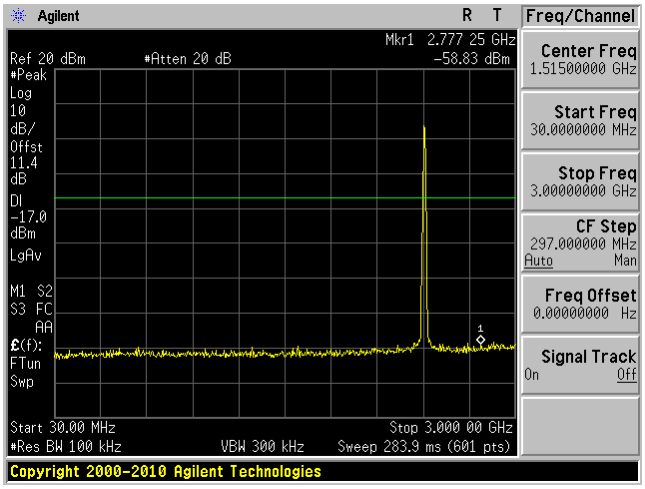
The testing was performed by Jeffrey Wu on 2012-10-03 at RF site.

6.5 Test Results

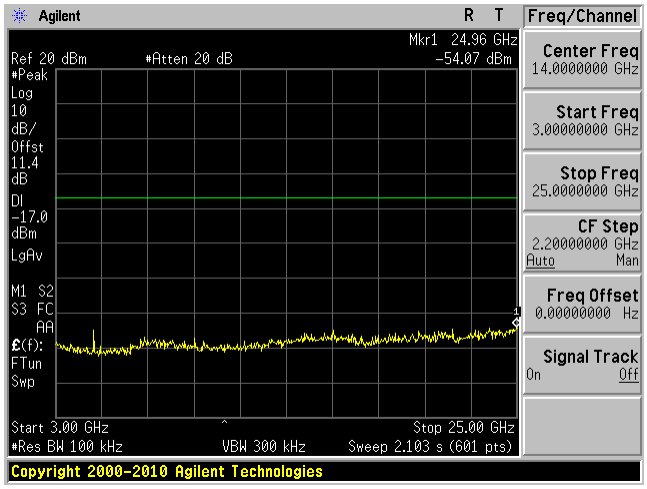
Please refer to following plots of spurious emissions.

802.11b, Low Channel, 2412 MHz

Plot: 30 MHz – 3 GHz

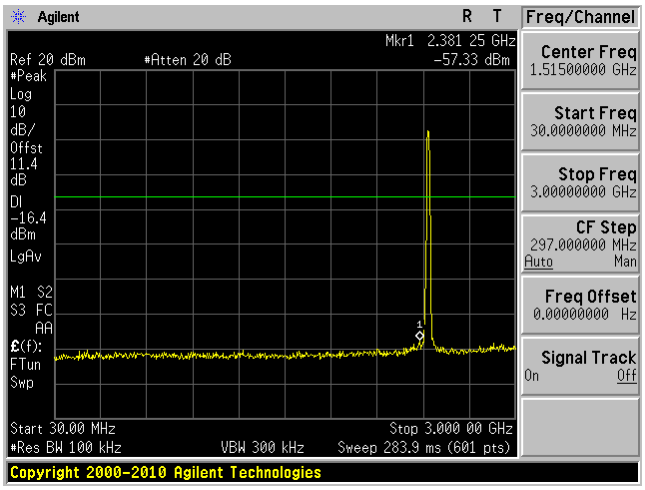


Plot: 3 GHz – 25 GHz

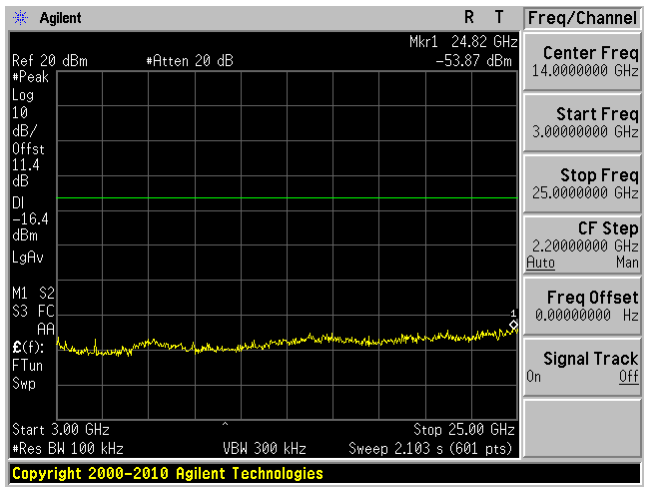


802.11b, Middle Channel, 2437 MHz

Plot: 30 MHz – 3 GHz

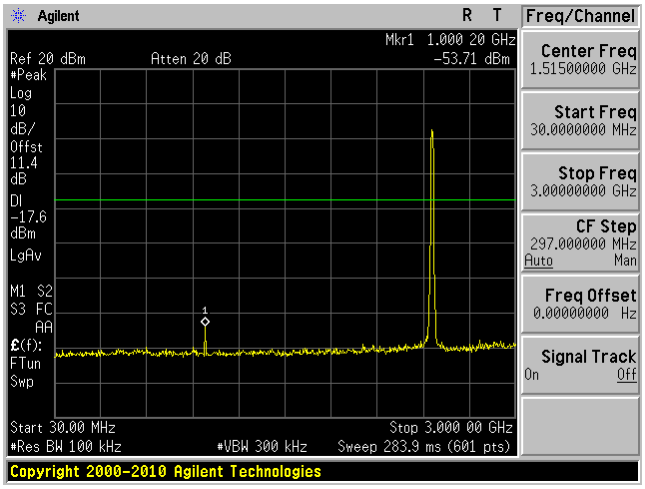


Plot: 3 GHz – 25 GHz

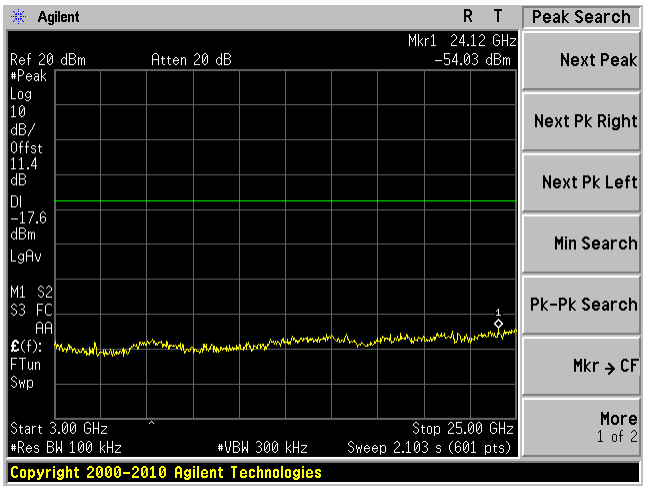


802.11b, High Channel, 2462 MHz

Plot: 30 MHz – 3 GHz

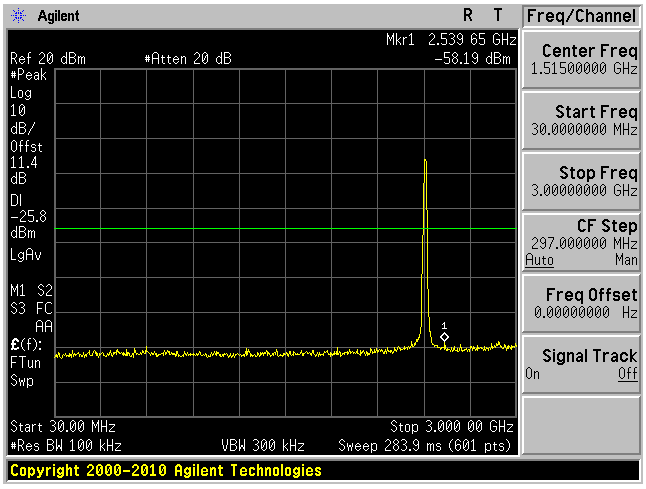


Plot: 3 GHz – 25 GHz

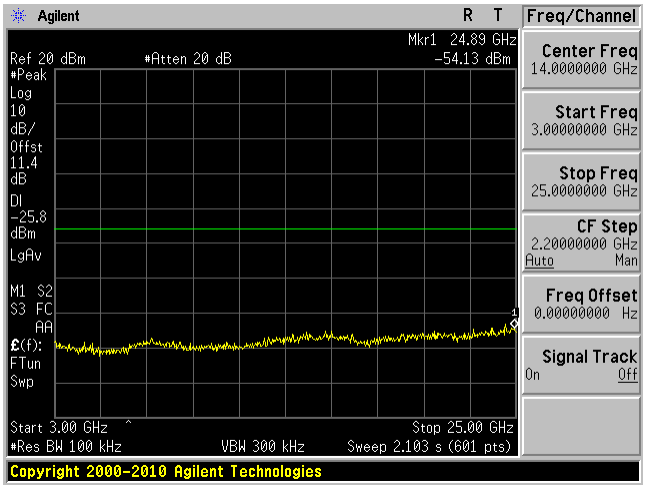


802.11g, Low Channel 2412 MHz

Plot: 30 MHz – 3 GHz

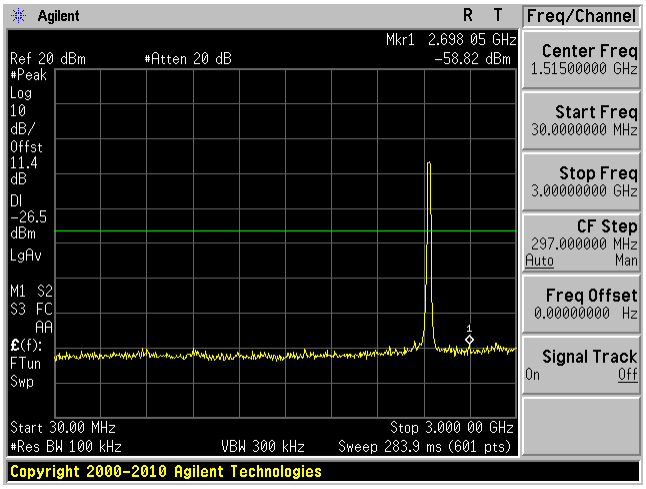


Plot: 3 GHz – 25 GHz

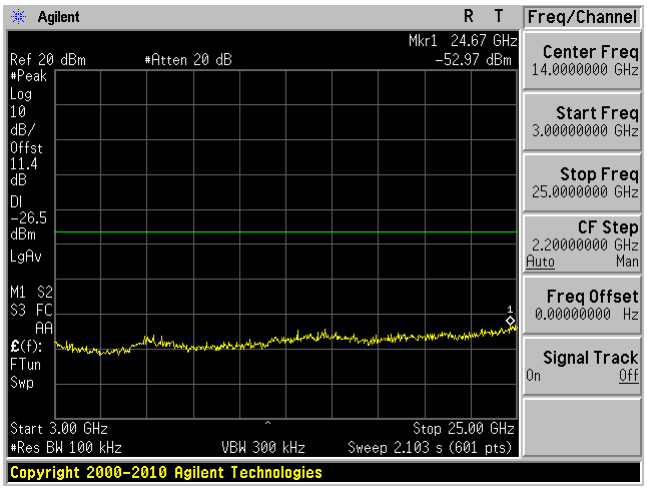


802.11g, Middle Channel 2437 MHz

Plot: 30 MHz – 3 GHz

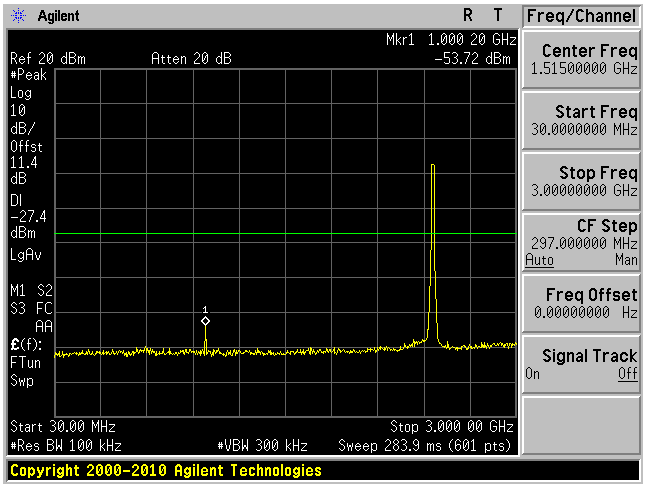


Plot: 3 GHz – 25 GHz

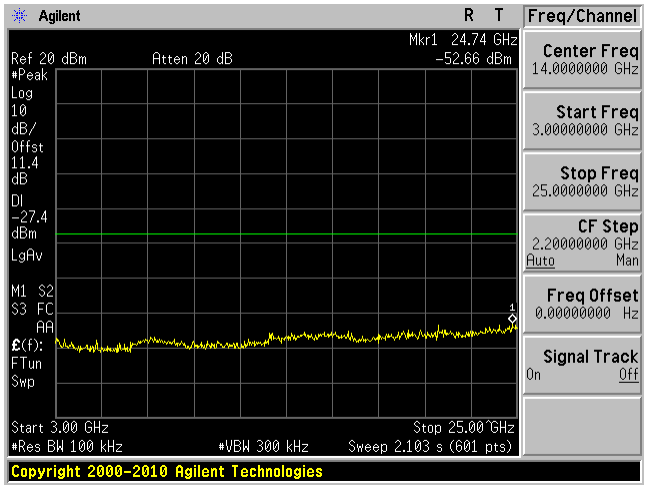


802.11g, High Channel 2462 MHz

Plot: 30 MHz – 3 GHz



Plot: 3 GHz – 25 GHz



7 FCC §15.205, §15.209 & §15.247(c) & IC RSS-210 §A8.5 – Spurious Radiated Emissions

7.1 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**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

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

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 Out-of-band Emissions, 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.

7.2 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 15 Subpart C and IC RSS-210 limits.

The spacing between the peripherals was 3 centimeters.

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

7.3 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

7.4 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

7.5 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2012-08-15	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2012-06-09	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2012-05-09	1 year
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year
A.R.A	Horn Antenna	DRH-118	1132	2012-01-04	1 year

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

7.6 Test Environmental Conditions

Temperature:	23-24 °C
Relative Humidity:	40-46 %
ATM Pressure:	101-102kPa

The testing was performed by Jeffrey Wu from 2012-10-02-2012-10-03 at 5 meter.

7.7 Summary of Test Results

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

30 - 1000 MHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-30.15	2412	Vertical	802.11 b mode, CH 1

1 – 25 GHz:

Mode: Transmitting			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Mode, Channel**
-5.261	1332	Horizontal	802.11 b mode, CH 6

Please refer to the following tables for specific test result details

7.8 Radiated Emissions Test Data

1) 30 MHz – 1 GHz, Measured at 3 meters

Quasi-Peak Measurements:

802.11b Mode Low channel (2412 MHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
30.87	9.84	184	V	317	40	-30.16
30.87	9.9	224	H	317	40	-30.1
134.72	2.97	237	V	125	43.5	-40.53
137.72	2.76	75	H	86	43.5	-40.74
980.37	16.08	302	V	51	54	-37.92
980.37	16.04	228	H	75	54	-37.96

802.11b Mode Middle channel (2437 MHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
30.87	9.75	184	V	317	40	-30.25
30.87	9.84	224	H	317	40	-30.16
134.72	2.91	237	V	125	43.5	-40.59
137.72	2.66	75	H	86	43.5	-40.84
980.37	16.01	302	V	51	54	-37.99
980.37	15.87	228	H	75	54	-38.13

802.11b Mode High channel (2462MHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
30.87	9.72	184	V	317	40	-30.28
30.87	9.8	224	H	317	40	-30.2
134.72	2.84	237	V	125	43.5	-40.66
137.72	2.65	75	H	86	43.5	-40.85
980.37	16	302	V	51	54	-38
980.37	15.76	228	H	75	54	-38.24

802.11g Mode, Low channel (2412 MHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
30.87	9.73	184	V	317	40	-30.15
30.87	9.85	224	H	317	40	-37.04
134.72	2.96	237	V	125	43.5	-40.54
137.72	2.67	75	H	86	43.5	-40.83
980.37	16.12	302	V	51	54	-37.88
980.37	15.78	228	H	75	54	-38.22

802.11g Mode, Middle channel (2437 MHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
45.04	9.67	184	V	317	40	-30.33
45.04	9.84	224	H	317	40	-30.16
134.72	2.92	237	V	125	43.5	-40.58
137.72	2.65	75	H	86	43.5	-40.85
980.37	16.08	302	V	51	54	-37.92
980.37	15.75	228	H	75	54	-38.25

802.11g Mode, High channel (2462 MHz)

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
45.04	9.65	184	V	317	40	-30.35
45.04	9.72	224	H	317	40	-30.28
134.72	2.85	237	V	125	43.5	-40.65
137.72	2.62	75	H	86	43.5	-40.88
980.37	15.78	302	V	51	54	-38.22
980.37	15.42	228	H	75	54	-38.58

2) 1–25 GHz, Measured at 3 meters

802.11b mode, Low Channel

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	60.21	183	125	V	29.0	2.94	-	92.130	-	-	Peak
2412	59.86	110	100	H	29.0	2.94	-	91.780	-	-	Peak
2412	54.52	183	125	V	29.0	2.94	-	86.440	-	-	Ave
2412	54.02	110	100	H	29.0	2.94	-	85.940	-	-	Ave
2390	26.03	183	125	V	29.0	2.94	-	57.950	74	-16.050	Peak
2390	25.91	110	100	H	29.0	2.94	-	57.830	74	-16.170	Peak
2390	12.41	183	125	V	29.0	2.94	-	44.330	54	-9.670	Ave
2390	12.55	110	100	H	29.0	2.94	-	44.470	54	-9.530	Ave
1332	53.07	101	100	V	25.1	2.08	27.44	52.859	74	-21.141	Peak
1332	50.65	0	111	H	25.1	2.08	27.44	50.439	74	-23.561	Peak
1332	44.30	101	100	V	25.1	2.08	27.44	44.089	54	-9.911	Ave
1332	42.10	0	111	H	25.1	2.08	27.44	41.889	54	-12.111	Ave
4824	44.06	127	100	V	32.7	4.06	27.70	53.130	74	-20.870	Peak
4824	39.72	64	125	H	32.7	4.06	27.70	48.790	74	-25.210	Peak
4824	38.44	127	100	V	32.7	4.06	27.70	47.510	54	-6.490	Ave
4824	33.15	64	125	H	32.7	4.06	27.70	42.220	54	-11.780	Ave
7236	31.53	0	100	V	36.2	4.93	27.58	45.126	72.130	-27.004	Peak
7236	32.35	0	100	H	36.2	4.93	27.58	45.946	71.780	-25.834	Peak
7236	18.22	0	100	V	36.2	4.93	27.58	31.816	66.440	-34.624	Ave
7236	18.21	0	100	H	36.2	4.93	27.58	31.806	65.940	-34.134	Ave
9648	29.93	0	100	V	37.4	5.82	27.06	46.045	72.130	-26.085	Peak
9648	30.30	0	100	H	37.4	5.82	27.06	46.415	71.780	-25.365	Peak
9648	16.66	0	100	V	37.4	5.82	27.06	32.775	66.440	-33.665	Ave
9648	16.62	0	100	H	37.4	5.82	27.06	32.735	65.940	-33.205	Ave

802.11b mode, Middle Channel

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	59.87	199	126	V	29.0	2.94	-	91.790	-	-	Peak
2437	59.43	109	149	H	29.0	2.94	-	91.350	-	-	Peak
2437	54.29	199	126	V	29.0	2.94	-	86.210	-	-	Ave
2437	54.87	109	149	H	29.0	2.94	-	86.790	-	-	Ave
1332	52.72	101	100	V	25.1	2.08	27.44	52.509	74	-21.491	Peak
1332	58.16	42	118	H	25.1	2.08	27.44	57.949	74	-16.051	Peak
1332	43.85	101	100	V	25.1	2.08	27.44	43.639	54	-10.361	Ave
1332	48.95	42	118	H	25.1	2.08	27.44	48.739	54	-5.261	Ave
4874	41.72	261	156	V	33.1	4.10	27.67	51.247	74	-22.753	Peak
4874	37.63	61	139	H	33.1	4.10	27.67	47.157	74	-26.843	Peak
4874	36.66	261	156	V	33.1	4.10	27.67	46.187	54	-7.813	Ave
4874	30.37	61	139	H	33.1	4.10	27.67	39.897	54	-14.103	Ave
7311	31.53	0	100	V	36.4	4.88	27.51	45.312	74	-28.688	Peak
7311	31.64	0	100	H	36.4	4.88	27.51	45.422	74	-28.578	Peak
7311	18.64	0	100	V	36.4	4.88	27.51	32.422	54	-21.578	Ave
7311	18.42	0	100	H	36.4	4.88	27.51	32.202	54	-21.798	Ave
9748	30.07	0	100	V	37.3	5.74	26.98	46.094	74	-27.906	Peak
9748	30.03	0	100	H	37.3	5.74	26.98	46.054	74	-27.946	Peak
9748	17.08	0	100	V	37.3	5.74	26.98	33.104	54	-20.896	Ave
9748	18.43	0	100	H	37.3	5.74	26.98	34.454	54	-19.546	Ave

802.11b mode, High Channel

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 2437 MHz, measured at 3 meters											
2462	57.49	168	127	V	29.1	2.94	-	89.550	-	-	Peak
2462	58.03	110	100	H	29.1	2.94	-	90.090	-	-	Peak
2462	51.75	168	127	V	29.1	2.94	-	83.810	-	-	Ave
2462	52.49	110	100	H	29.1	2.94	-	84.550	-	-	Ave
2491	26.55	0	100	V	29.1	3.01	-	58.680	74	-15.320	Peak
2491	26.74	0	100	H	29.1	3.01	-	58.870	74	-15.130	Peak
2491	12.59	0	100	V	29.1	3.01	-	44.720	54	-9.280	Ave
2491	12.59	0	100	H	29.1	3.01	-	44.720	54	-9.280	Ave
1332	51.56	98	100	V	25.1	2.08	27.44	51.349	74	-22.651	Peak
1332	57.86	42	118	H	25.1	2.08	27.44	57.649	74	-16.351	Peak
1332	43.01	98	100	V	25.1	2.08	27.44	42.799	54	-11.201	Ave
1332	48.76	42	118	H	25.1	2.08	27.44	48.549	54	-5.451	Ave
4924	36.63	99	117	V	32.9	4.10	26.75	46.838	74	-27.162	Peak
4924	33.59	135	132	H	32.9	4.10	26.75	43.798	74	-30.202	Peak
4924	27.58	99	117	V	32.9	4.10	26.75	37.788	54	-16.212	Ave
4924	22.35	135	132	H	32.9	4.10	26.75	32.558	54	-21.442	Ave
7386	72.72	0	100	V	36.4	4.89	27.51	86.533	74	12.533	Peak
7386	32.59	0	100	H	36.4	4.89	27.51	46.403	74	-27.597	Peak
7386	19.87	0	100	V	36.4	4.89	27.51	33.683	54	-20.317	Ave
7386	18.66	0	100	H	36.4	4.89	27.51	32.473	54	-21.527	Ave
9848	30.69	0	100	V	37.4	5.77	26.98	46.920	69.550	-22.630	Peak
9848	30.93	0	100	H	37.4	5.77	26.98	47.160	70.090	-22.930	Peak
9848	17.79	0	100	V	37.4	5.77	26.98	34.020	63.810	-29.790	Ave
9848	17.64	0	100	H	37.4	5.77	26.98	33.870	64.550	-30.680	Ave

802.11g mode, Low Channel

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	57.9	200	100	57.9	29.0	2.94	-	89.820	-	-	Peak
2412	57.2	113	100	57.2	29.0	2.94	-	89.120	-	-	Peak
2412	47.45	200	100	47.45	29.0	2.94	-	79.370	-	-	Ave
2412	46.97	113	100	46.97	29.0	2.94	-	78.890	-	-	Ave
2390	27.590	200	100	27.590	29.0	2.94	-	59.510	74	-16.050	Peak
2390	27.470	113	100	27.470	29.0	2.94	-	59.390	74	-16.170	Peak
2390	12.76	200	100	12.76	29.0	2.94	-	44.680	54	-9.670	Ave
2390	12.74	113	100	12.74	29.0	2.94	-	44.660	54	-9.530	Ave
1332	52.45	100	100	V	25.1	2.08	27.44	52.239	74	-21.761	Peak
1332	52.41	101	100	H	25.1	2.08	27.44	52.199	74	-21.801	Peak
1332	43.16	100	100	V	25.1	2.08	27.44	42.949	54	-11.051	Ave
1332	43.56	101	100	H	25.1	2.08	27.44	43.349	54	-10.651	Ave
4824	46.19	310	100	V	32.7	4.06	27.70	55.260	74	-18.740	Peak
4824	37.16	288	100	H	32.7	4.06	27.70	46.230	74	-27.770	Peak
4824	29.51	310	100	V	32.7	4.06	27.70	38.580	54	-15.420	Ave
4824	21.48	288	100	H	32.7	4.06	27.70	30.550	54	-23.450	Ave
7236	32.94	0	100	V	36.2	4.93	27.58	46.536	69.820	-23.284	Peak
7236	31.68	0	100	H	36.2	4.93	27.58	45.276	69.120	-23.844	Peak
7236	18.42	0	100	V	36.2	4.93	27.58	32.016	59.370	-27.354	Ave
7236	18.27	0	100	H	36.2	4.93	27.58	31.866	58.890	-27.024	Ave
9648	30.67	0	100	V	37.4	5.82	27.06	46.785	69.820	-23.035	Peak
9648	31.27	0	100	H	37.4	5.82	27.06	47.385	69.120	-21.735	Peak
9648	16.70	0	100	V	37.4	5.82	27.06	32.815	59.370	-26.555	Ave
9648	17.91	0	100	H	37.4	5.82	27.06	34.025	58.890	-24.865	Ave

802.11g mode, Middle Channel

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	56.36	172	100	V	29.0	2.94	-	88.280	-	-	Peak
2437	55.54	172	100	H	29.0	2.94	-	87.460	-	-	Peak
2437	45.58	172	100	V	29.0	2.94	-	77.500	-	-	Ave
2437	45.43	172	100	H	29.0	2.94	-	77.350	-	-	Ave
1332	52.63	100	100	V	25.1	2.08	27.44	52.419	74	-21.581	Peak
1332	47.49	42	115	H	25.1	2.08	27.44	47.279	74	-26.721	Peak
1332	43.21	100	100	V	25.1	2.08	27.44	42.999	54	-11.001	Ave
1332	45.01	42	115	H	25.1	2.08	27.44	44.799	54	-9.201	Ave
4874	42.35	310	100	V	33.1	4.10	27.67	51.877	74	-22.123	Peak
4874	35.09	137	100	H	33.1	4.10	27.67	44.617	74	-29.383	Peak
4874	24.12	310	100	V	33.1	4.10	27.67	33.647	54	-20.353	Ave
4874	18.47	137	100	H	33.1	4.10	27.67	27.997	54	-26.003	Ave
7311	32.10	0	100	V	36.4	4.88	27.51	45.882	74	-28.118	Peak
7311	32.58	0	100	H	36.4	4.88	27.51	46.362	74	-27.638	Peak
7311	18.53	0	100	V	36.4	4.88	27.51	32.312	54	-21.688	Ave
7311	18.49	0	100	H	36.4	4.88	27.51	32.272	54	-21.728	Ave
9748	30.33	0	100	V	37.3	5.74	26.98	46.354	68.280	-21.926	Peak
9748	30.40	0	100	H	37.3	5.74	26.98	46.424	67.460	-21.036	Peak
9748	16.84	0	100	V	37.3	5.74	26.98	32.864	57.500	-24.636	Ave
9748	16.85	0	100	H	37.3	5.74	26.98	32.874	57.350	-24.476	Ave

802.11g mode, High Channel

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 2437 MHz, measured at 3 meters											
2462	54.22	202	100	V	29.1	2.94	-	86.280	-	-	Peak
2462	54.94	115	100	H	29.1	2.94	-	87.000	-	-	Peak
2462	44.74	202	100	V	29.1	2.94	-	76.800	-	-	Ave
2462	44.89	115	100	H	29.1	2.94	-	76.950	-	-	Ave
2484	25.74	0	100	V	29.1	3.01	-	57.870	74	-16.130	Peak
2484	26.54	0	100	H	29.1	3.01	-	58.670	74	-15.330	Peak
2484	12.57	0	100	V	29.1	3.01	-	44.700	54	-9.300	Ave
2484	12.72	0	100	H	29.1	3.01	-	44.830	54	-9.170	Ave
1332	52.31	100	100	V	25.1	2.08	27.44	52.099	74	-21.901	52.31
1332	58.81	42	115	H	25.1	2.08	27.44	58.599	74	-15.401	58.81
1332	43.32	100	100	V	25.1	2.08	27.44	43.109	54	-10.891	43.32
1332	49.02	42	115	H	25.1	2.08	27.44	48.809	54	-5.191	49.02
4924	42.16	294	113	V	32.9	4.10	26.75	52.368	74	-21.632	Peak
4924	33.83	281	100	H	32.9	4.10	26.75	44.038	74	-29.962	Peak
4924	22.72	294	113	V	32.9	4.10	26.75	32.928	54	-21.072	Ave
4924	18.51	281	100	H	32.9	4.10	26.75	28.718	54	-25.282	Ave
7386	32.04	0	100	V	36.4	4.89	27.51	45.853	74	-28.147	Peak
7386	31.56	0	100	H	36.4	4.89	27.51	45.373	74	-28.627	Peak
7386	18.61	0	100	V	36.4	4.89	27.51	32.423	54	-21.577	Ave
7386	18.60	0	100	H	36.4	4.89	27.51	32.413	54	-21.587	Ave
9848	29.74	0	100	V	37.4	5.77	26.98	45.970	66.280	-20.310	Peak
9848	30.80	0	100	H	37.4	5.77	26.98	47.030	67.000	-19.970	Peak
9848	17.10	0	100	V	37.4	5.77	26.98	33.330	56.800	-23.470	Ave
9848	17.37	0	100	H	37.4	5.77	26.98	33.600	56.950	-23.350	Ave

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

8.1 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

8.2 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 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.

8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year

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

8.4 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	40 %
ATM Pressure:	101.1kPa

The testing was performed by Jeffrey Wu on 2012-10-03at RF site.

8.5 Test Results

802.11 b mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (MHz)	Results
Low	2412	9.902	14.0266	> 0.5	Compliant
Middle	2437	9.331	14.0728	> 0.5	Compliant
High	2462	10.233	14.1271	> 0.5	Compliant

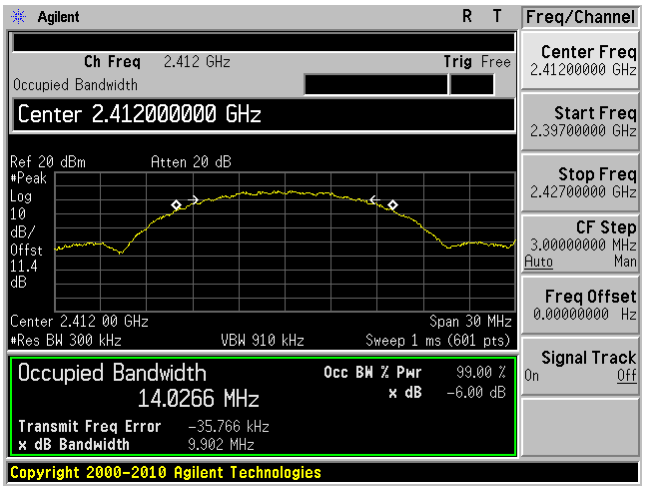
802.11 g mode:

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (MHz)	Results
Low	2412	16.462	16.9809	> 0.5	Compliant
Middle	2437	16.461	16.9446	> 0.5	Compliant
High	2462	16.483	16.8994	> 0.5	Compliant

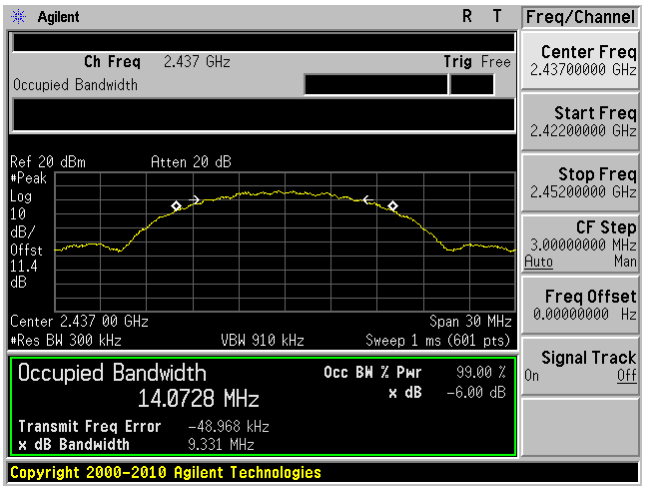
Please refer to the following plots for detailed test results

802.11 b mode

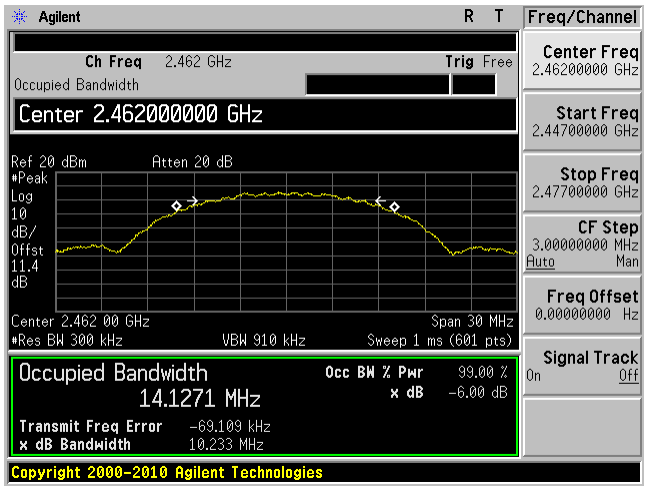
Low channel: 2412 MHz



Middle channel: 2437 MHz

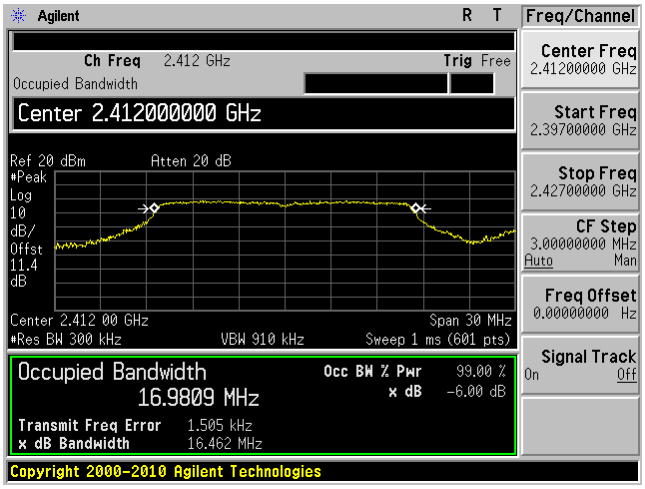


High channel: 2462 MHz

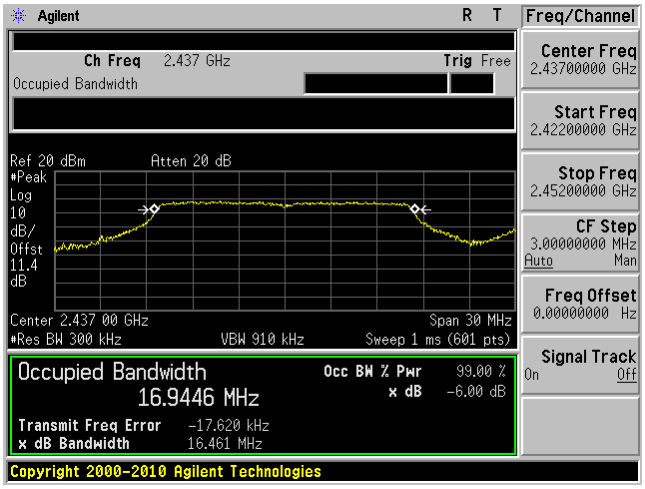


802.11 g mode

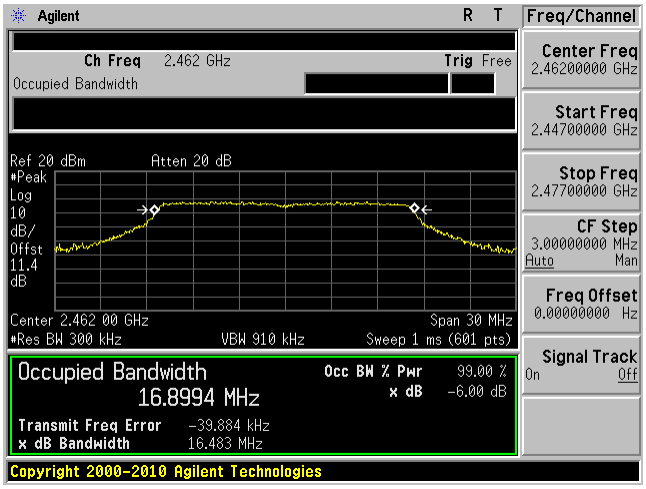
Low channel: 2412 MHz



Middle channel: 2437 MHz



High channel: 2462 MHz



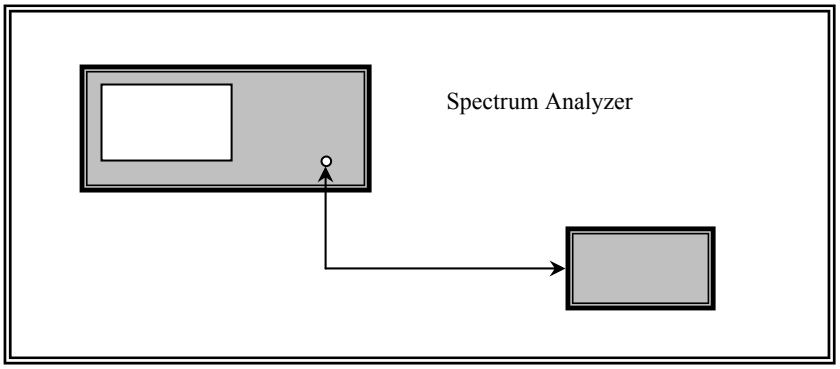
9 FCC §15.247(b) & IC RSS-210§A8.4 – Peak Output Power Measurement

9.1 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.

9.2 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.



9.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year

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

9.4 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	40 %
ATM Pressure:	101.1kPa

The testing was performed by Jeffrey Wu on 2012-10-03at RF site.

9.5 Test Results

802.11 b mode

Channel	Frequency (MHz)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	Margin (dB)
Low	2412	12.29	30	-17.71
Middle	2437	11.98	30	-18.02
High	2462	11.20	30	-18.80

802.11 g mode

Channel	Frequency (MHz)	Conducted Output Power (dBm)	FCC/IC Limit (dBm)	Margin (dB)
Low	2412	7.92	30	-22.08
Middle	2437	7.24	30	-22.76
High	2462	6.75	30	-23.25

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

10.1 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.

10.2 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.

10.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year

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

10.4 Test Environmental Conditions

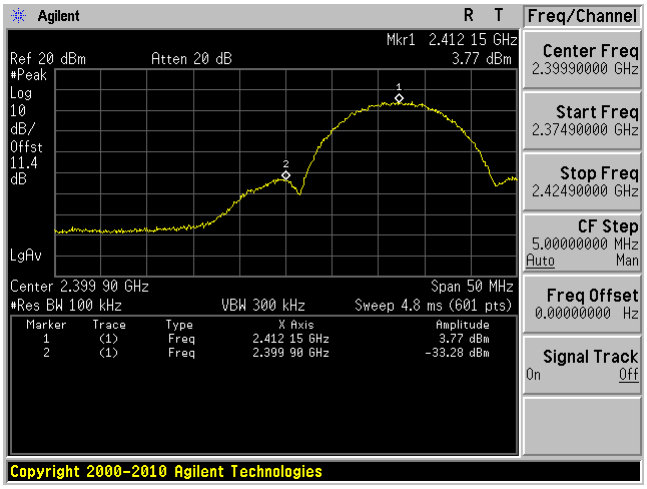
Temperature:	24 °C
Relative Humidity:	40 %
ATM Pressure:	101.1kPa

The testing was performed by Jeffrey Wu on 2012-10-03at RF site.

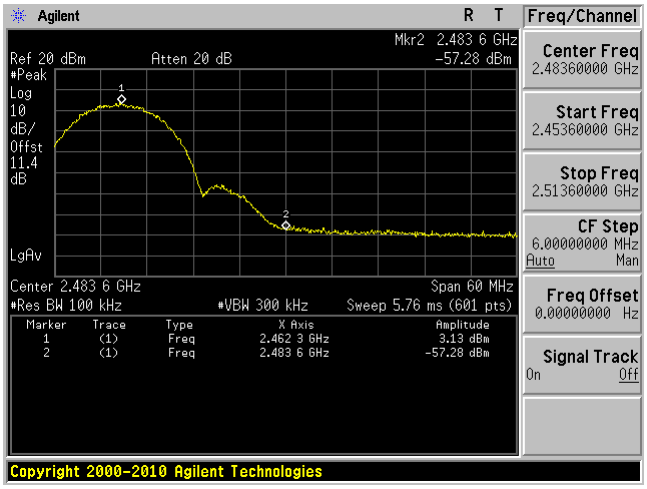
10.5 Test Results

Please refer to following pages for plots of band edge.

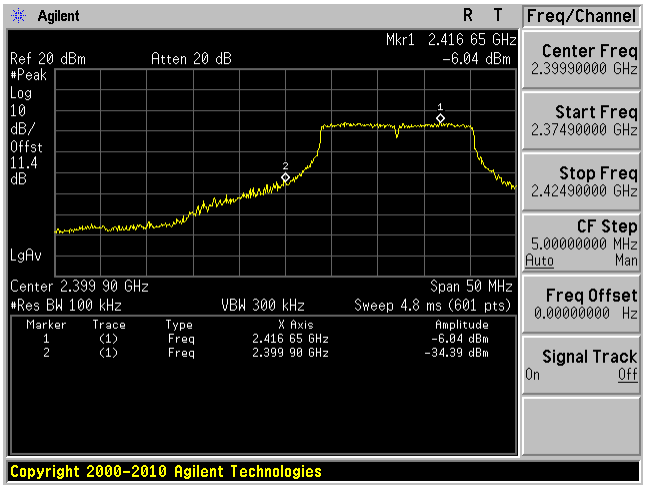
802.11b, Low Band Edge



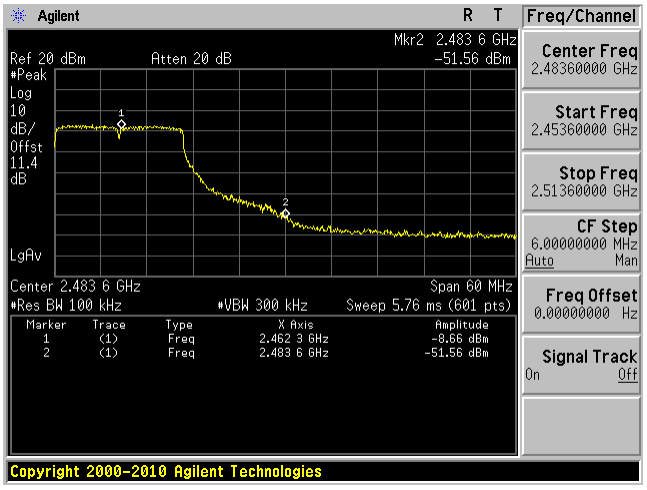
802.11b, High Band Edge



802.11g, Low Band Edge



802.11g, High Band Edge



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

11.1 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.

11.2 Measurement Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ 300 kHz.
4. Set the span to 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log (3 kHz/100 kHz = -15.2 dB).
11. The resulting peak PSD level must be ≤ 8 dBm.

11.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year

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

11.4 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	40 %
ATM Pressure:	101.1kPa

The testing was performed by Jeffrey Wu on 2012-10-03at RF site.

11.5 Test Results

802.11 b mode:

Channel	Frequency (MHz)	Power Spectral Density (dBm/100 kHz)	Corrected PSD (dBm)	FCC/IC Limit (dBm/3 kHz)	Results
Low	2412	2.99	-12.21	8	Pass
Mid	2437	3.57	-11.63	8	Pass
High	2462	2.38	-12.82	8	Pass

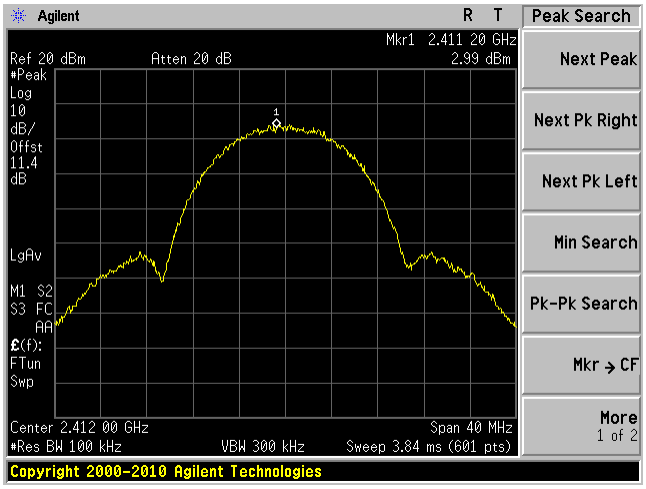
802.11 g mode:

Channel	Frequency (MHz)	Power Spectral Density (dBm/100 kHz)	Corrected PSD (dBm)	FCC/IC Limit (dBm/3 kHz)	Results
Low	2412	-5.77	-20.97	8	Pass
Mid	2437	-6.55	-21.75	8	Pass
High	2462	-7.36	-22.56	8	Pass

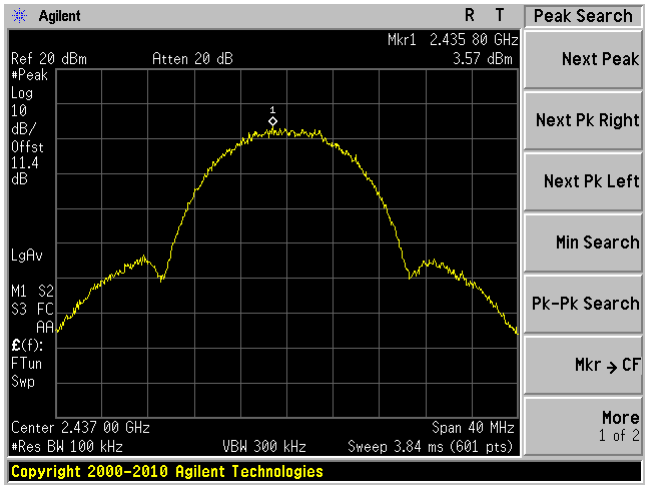
Please refer to the following plots for detailed test results:

802.11 b mode

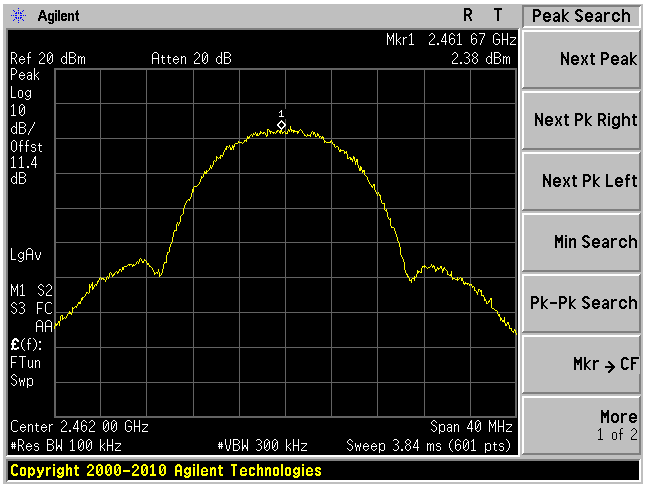
Low channel: 2412 MHz



Middle channel: 2437 MHz

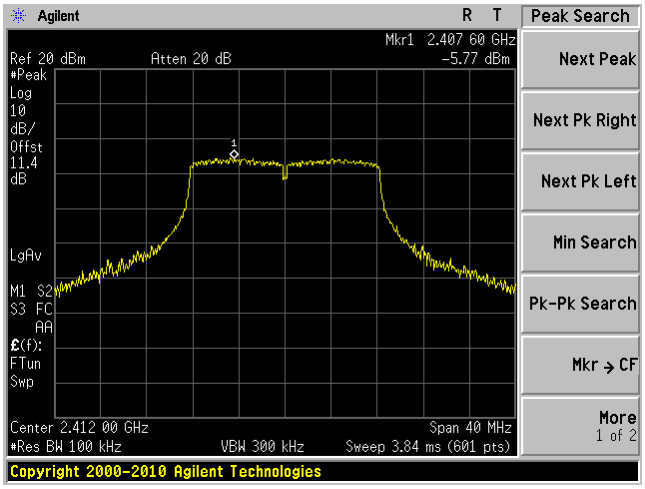


High channel: 2462 MHz

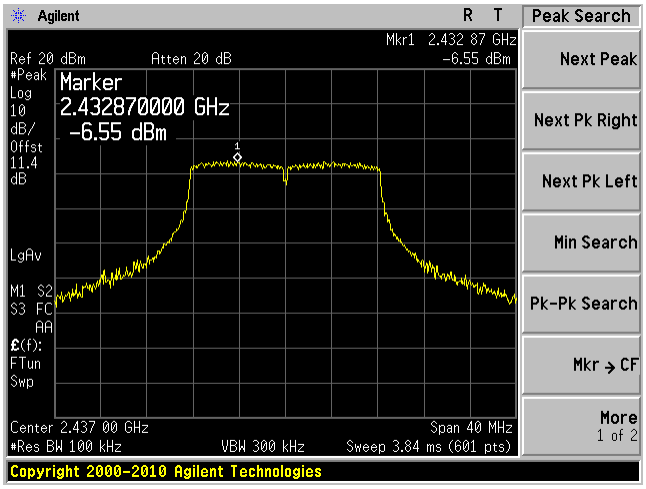


802.11 g mode

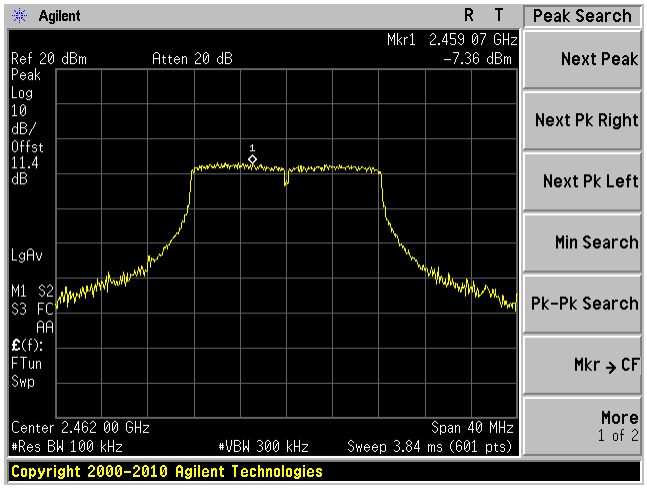
Low channel: 2412 MHz



Middle channel: 2437 MHz



High channel: 2462 MHz



12 IC RSS-210 §2.3 & RSS-Gen §4.10 – Receiver Spurious Radiated Emissions

12.1 Applicable Standard

According to IC RSS-Gen §4.10, the receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate.

Unless otherwise specified in the applicable RSS, the radiated emission measurement is the standard measurement method (with the device's antenna in place) to measure receiver spurious emissions.

Radiated emission measurements are to be performed using a calibrated open-area test site.

For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz.

For emissions below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector with the same measurement bandwidth as that for CISPR quasi-peak measurements. Above 1 GHz, measurements shall be performed using an average detector and a resolution bandwidth of 300 kHz to 1 MHz.

According to RSS-210 §6.1, Tables 2 shows the radiated spurious emission limits of receiver

Radiated Limits of Receiver Spurious Emissions

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

12.2 EUT Setup

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

12.3 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.

12.4 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

12.5 Test Equipment Lists and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2012-08-15	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2012-06-09	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2012-05-09	1 year
Agilent	Spectrum Analyzer	E4440A	US42221851	2012-02-28	1 year
A.R.A	Horn Antenna	DRH-118	1132	2012-01-04	1 year
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100444	2012-04-18	1 year

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

12.6 Test Environmental Conditions

Temperature:	23-24 °C
Relative Humidity:	40-46 %
ATM Pressure:	101-102kPa

The testing was performed by Jeffrey Wu from 2012-10-02-2012-10-03 at 5 meter.

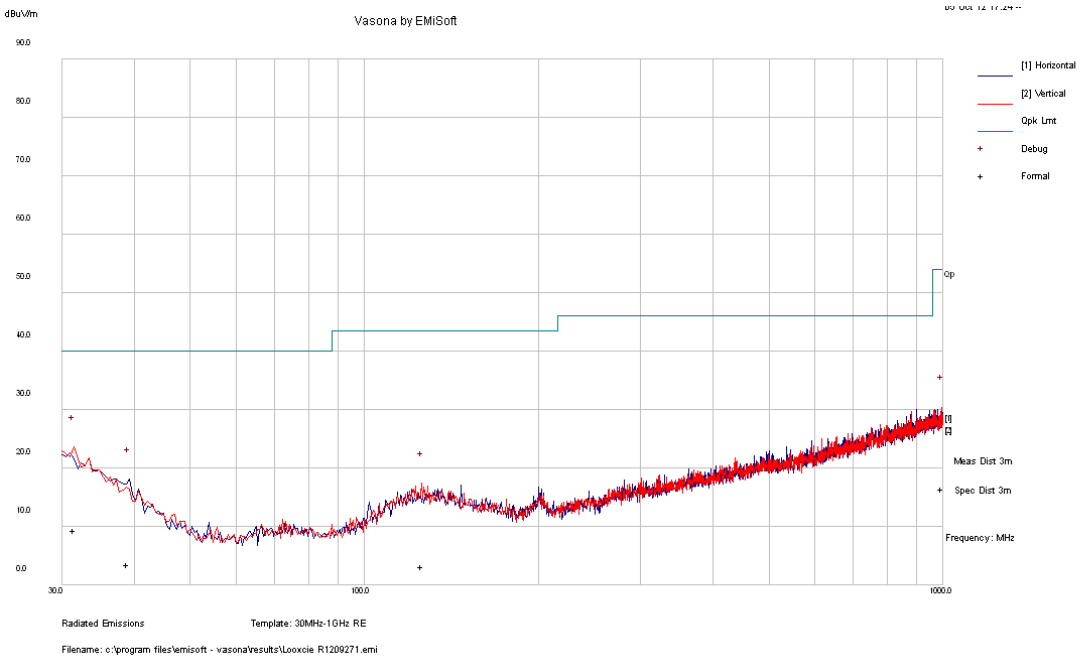
12.7 Summary of Test Results

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

Mode: Receiving			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Range (GHz)**
-8.748	6810	Horizontal	1 to 25

12.8 Test Results

1) 30 MHz - 1 GHz @ 3 meters distance



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)	Comment
31.58175	9.43	158	V	110	40	-30.57	QP
39.06025	3.56	241	H	246	40	-36.44	QP
125.587	3.2	289	V	13	43.5	-40.3	QP
996.1228	16.54	172	V	227	54	-37.46	QP

2) 1– 12.5 GHz @ 3 meters distance

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	IC		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
Receiving Mode, measured at 3 meters											
2218	37.09	0	100	V	28.1	2.80	27.73	40.280	54	-13.720	Peak
2218	37.23	0	100	H	28.1	2.80	27.73	40.420	54	-13.580	Peak
2218	22.95	0	100	V	28.1	2.80	27.73	26.140	54	-27.860	Ave
2218	22.95	0	100	H	28.1	2.80	27.73	26.140	54	-27.860	Ave
2812	36.96	0	100	V	29.1	3.20	27.84	41.466	54	-12.534	Peak
2812	35.97	0	100	H	29.1	3.20	27.84	40.476	54	-13.524	Peak
2812	22.40	0	100	V	29.1	3.20	27.84	26.906	54	-27.094	Ave
2812	22.36	0	100	H	29.1	3.20	27.84	26.866	54	-27.134	Ave
6810	31.88	0	100	V	35.7	5.18	27.58	45.212	54	-8.788	Peak
6810	31.92	0	100	H	35.7	5.18	27.58	45.252	54	-8.748	Peak
6810	18.47	0	100	V	35.7	5.18	27.58	31.802	54	-22.198	Ave
6810	18.56	0	100	H	35.7	5.18	27.58	31.892	54	-22.108	Ave