



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

For

Realtek Semiconductor Corp.

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Hsinchu 300, Taiwan

FCC ID: TX2-RTL8191SU IC: 6317A-RTL8191SU

Report Type: Class II Permiss	ive Change	Product Type: 802.11b/g/n Min	i Cord
	ive Change	802.110/g/li Willi	I Calu
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Report Number:	R1101194-247		
Report Date:	2011-02-28		
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP*, NIST, or any agency of the Federal Government. * This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "*" Realtek Semiconductor Corp.

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Revision Number	Report Number	Description of Revision	Date of Revision
0	R1101194-247	Original Report	2011-02-15
1	R1101194-247 draft A	Updated report content	2011-02-22
2	R1101194-247 draft B	Updated Labeling information	2011-02-23
3	R1101194-247	Final Report	2011-02-28

DOCUMENT REVISION HISTORY

1 General Information

1.1 Product Description for Equipment under Test (EUT)

The product, FCC ID: TX2-RTL8191SU, IC: 6317A-RTL8191SU is an 802.11b/g/n mini card which is integrated with *Motion Computing incorporated's* product, *model: FWS-001*. The operating frequency is: 2412~2462MHz. The FWS-001 is a Tablet PC.

1.2 Mechanical Description of EUT

WLAN (EUT) Module measures approximately 2.7cm (L) \times 3cm (W) \times 0.3cm (H), weight 3g. *The test data gathered are from typical production sample, IMEI number: 355096040017609 provided by manufacturer.*

The tablet PC (Host) measures approximately 27cm (L) \times 17.5cm (W) \times 1.5cm (H), weight 968g (with standard battery).

The test data gathered are from typical production sample, serial number: R1101193-4 assigned by BACL

1.3 Objective

The objective is to determine continued compliance of the Satellite transmitter module (FCC ID: TX2-RTL8191SU/ IC: 6317A-RTL8191SU) integrated with model FWS-001 in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules and IC RSS-210, Issue 8.Standard's requirements for Power output, AC line Conducted emission, Transmitter Spurious Emission, and Receiver Spurious Emission.

1.4 Related Submittal(s)/Grant(s)

Realtek Semiconductor Corp's report, FCC ID: TX2-RTL8191SU/ IC: 6317A-RTL8191SU.

1.5 Test Methodology

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz and ANSI C63.10-2009, American National Standard for Testing Unlicensed Wireless Devices.

1.6 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in 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 NIS 81, The Treatment of Uncertainty in EMC Measurements, the values range from ± 2.0 for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

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 sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has 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 facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: R-2463 and C-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2001670.htm

2 System Test Configuration

2.1 Justification

The EUT and its host were configured for testing according to ANSI C63.4-2003 & ANSI C63.10-2009. The EUT was tested in the testing mode to represent *worst*-case results during the final qualification test.

2.2 EUT Exercise Software

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

Radio	Band Width	Frequency/Data Rate		
Mode	(MHz)	Low Channel (MHz/Mbps)	Middle Channel (MHz/Mbps)	High Channel (MHz)
802.11b	20	2412/1	2437/1	2462/1
802.11g	20	2412/6	2437/6	2462/6
802.11n(20)	20	2412/6.5	2437/6.5	2462/6.5
802.11n(40)	20	2422/13	2437/13	2452/13

2.3 Special Accessories

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

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 EUT Internal Configuration

Manufacturers	Descriptions	Models	Serial Numbers
Motion Computing	Tablet PC	FWS-001	-
Compal Electronics Inc.	Motherboard	PVX00 LA- 6892P	-
Intel	Processor	1.5G	-
Toshiba	Solid State Drive	128G	X07S102KTF9Z
Atheros Communications	Bluetooth Module	AR5BBU12	-
Realtek	WiFi Module	RTL8191SU	74F06D1739CF 0B
Sierra Wireless	GSM/CDMA/WCDMA Module	MC8355	-

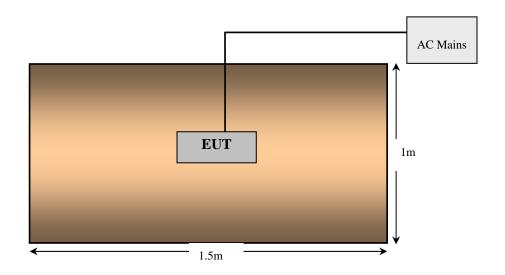
2.6 Local /Remote Support Equipment

Manufacturer	Product Description	Model No.	Serial No.
-	-	-	-

2.7 Power Supply and Line Filters

Manufacturer	Item Description	Model No.	Serial No.
Delta Electronics Inc	AC/DC Adapter	SADP-65NB	67LW038003A

2.8 Radiated emission Test Setup Block Diagrams



3 Summary of Test Results

Results reported relate only to the product tested.

FCC/IC Rules	Description of Test	Results
FCC §15.203; IC RSS-Gen §7.1.4	Antenna Requirement	Compliance
FCC §15.207(a); IC RSS-Gen §7.2.2	AC Line Conducted Emissions	Compliance
FCC §15.205, §15.209; IC RSS-210 §2.2	Restricted Bands	Compliance *
FCC §15.209(a), §15.247(d); IC RSS-210 §A8.5, §2.6	Radiated Spurious Emissions	Compliance
FCC §15.247(a)(2); IC RSS-210 §A8.2	6 dB Emission Bandwidth	Compliance *
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	Compliance *
FCC §15.247(e); IC RSS-210 §A8.2(b)	Power Spectral Density	Compliance *
IC RSS-210 §2.6 RSS-Gen § 4.10	Receiver Spurious Emission	Compliance
FCC §15.247(i), §2.1093; IC RSS-102	RF Exposure Information (SAR)	Compliance **

Note: Compliance *, please refer to FCC ID: TX2-RTL8191SU and IC: 6317A-RTL8191SU. Compliance **, please refer to SAR report released by BACL, report number: R1101194-SAR.

4 FCC §15.203 & IC RSS-Gen §7.1.4 – Antenna Requirement

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.

As per IC RSS-Gen §7.1.4: Transmitter Antenna

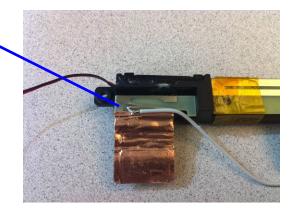
A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of 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 milliwatts or less. For devices of output powers greater than 10 milliwatts, 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 Result

The EUT has two antennas (Main and AUX, model Number: PVX00) with the maximum gain of -1.6 dBi for each of them, which in accordance to sections FCC Part 15.203 and IC RSS-Gen §7.1.4, is considered sufficient to comply with the provisions of these sections.





5 FCC §15.207 & IC RSS-Gen §7.2.2 – AC Line Conducted Emissions

5.1 Applicable Standards

As per FCC §15.207 and IC RSS-Gen §7.2.2 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 μ H/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	Conducted Limit (dBuV)		
(MHz)	Quasi-peak	Average	
0.15-0.5	66 to 56 *	56 to 46 *	
0.5-5	56	46	
5-30	60	50	

* Decreases with the logarithm of the frequency.

5.2 Test Setup

The measurement was performed at shield room, using the setup per ANSI C63.4-2003 measurement procedure. The specification used was FCC Part15.207 and IC RSS-Gen limits.

External I/O cables were draped along the edge of the test table and bundle when necessary. The AC/DC adapter of the EUT was connected to LISN-1 which is connected to 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.

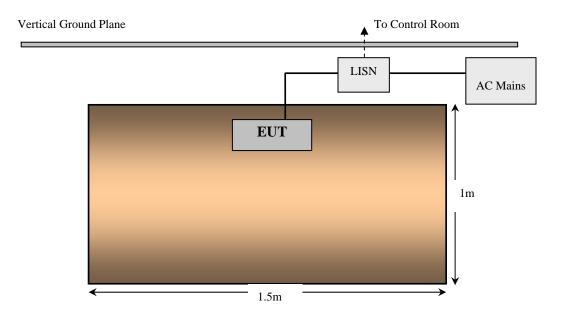
All data was recorded in the peak detection mode, quasi-peak and average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

5.4 Test Equipment List and Details

Manufacturers	Description	Models	Serial Numbers	Calibration Dates
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.595 0K03	100337	2010-03-24
Solar Electronics Co	LISN	9252-50-R-24-N	0511213	2010-06-28
TTE	Filter, High Pass	H962-150k-50-21378	K7132	2010-06-10

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

5.5 Test Setup Block Diagrams



5.6 Test Environmental Conditions

Temperature:	15~25° C
Relative Humidity:	30~63%
ATM Pressure:	101.2~103.5kPa

Testing was performed by Jack Liu, on 2011-01-18 ~ 2011-02-11.

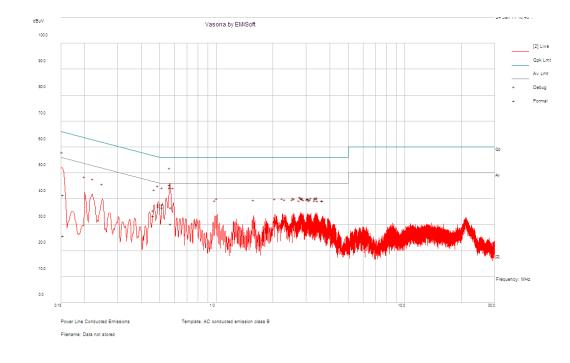
5.7 Test Results

According to the recorded data in following table, the EUT <u>complied with the FCC & IC standard's</u> conducted emissions limits for consumer devices, with the *worst* margin reading of:

Connection: 120V/60Hz (Transmitting worst mode: 802.11 b Mode High channel)					
Margin (dB)Frequency (MHz)Conductor (Line/Neutral)Range (MHz)					
-0.47	0.566313	.566313 Neutral 0.15 to 30 MHz			
Connection: 120V/60H	Connection: 120V/60Hz (Transmitting worst mode: 802.11 n 40MHz Mode Low channel)				
-1.13 0.566612 Neutral 0.15 to 30 MHz					

Please refer to the following plots and data:

Transmitting Mode:



(Worst Case 802.11 b, High channel) 120V/60 Hz Line:

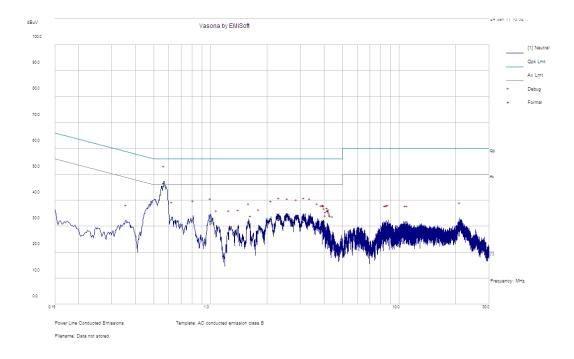
Quasi-Peak Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.567645	45.34	L	56	-10.66
0.516226	37.76	L	56	-18.24
0.493151	37.8	L	56.11	-18.32
0.574178	36.71	L	56	-19.29
0.465059	35.5	L	56.6	-21.1
0.153954	41.5	L	65.78	-24.28

Average Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.567645	44.36	L	46	-1.64
0.493151	37	L	46.11	-9.12
0.516226	36.68	L	46	-9.32
0.465059	33.53	L	46.6	-13.07
0.574178	30.37	L	46	-15.63
0.153954	25.83	L	55.78	-29.95

(Worst Case 802.11 b, High channel) 120V/60 Hz Neutral:



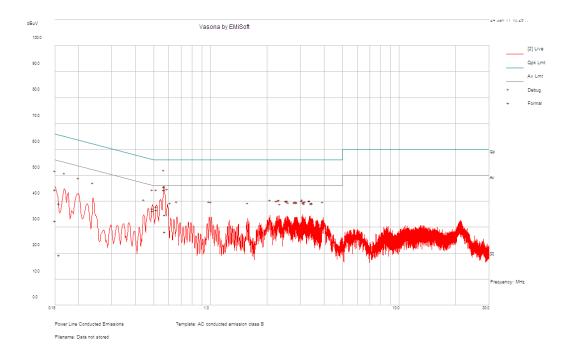
Quasi-Peak Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.566313	46.63	Ν	56	-9.37
2.560148	33.79	Ν	56	-22.21
3.373512	33.78	Ν	56	-22.22
3.103622	33.42	Ν	56	-22.58
2.315728	33.04	Ν	56	-22.96
1.010015	32.02	N	56	-23.98

Average Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.566313	45.53	Ν	46	-0.47
2.560148	32.73	Ν	46	-13.27
2.315728	32.4	Ν	46	-13.6
3.373512	31.85	Ν	46	-14.15
3.103622	31.64	Ν	46	-14.36
1.010015	31.14	Ν	46	-14.86



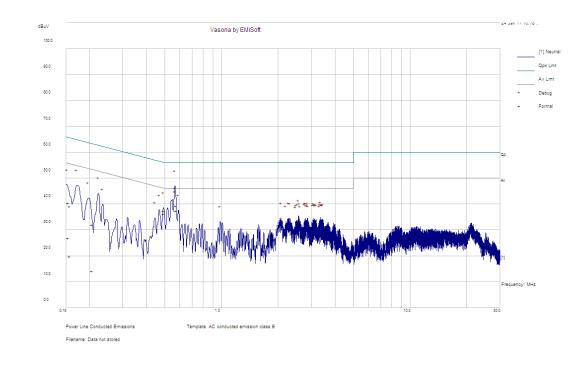


Quasi-Peak Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.567116	45.71	L	56	-10.29
0.517108	38.06	L	56	-17.94
0.494062	37.33	L	56.1	-18.77
0.575276	34.71	L	56	-21.29
0.15009	44.53	L	65.99	-21.47
0.157459	39.16	L	65.6	-26.44

Average Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.567116	44.35	L	46	-1.65
0.517108	36.73	L	46	-9.27
0.494062	36.24	L	46.1	-9.86
0.575276	28.29	L	46	-17.71
0.15009	32.46	L	55.99	-23.53
0.157459	19.21	L	55.6	-36.38



(Worst Case 802.11 n 40MHz, Low channel) 120V/60 Hz Neutral:

Quasi-Peak Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.566612	46.32	Ν	56	-9.68
0.572258	39.41	Ν	56	-16.59
0.492118	37.52	Ν	56.13	-18.61
0.154008	40.62	Ν	65.78	-25.17
0.156841	39.14	Ν	65.63	-26.49
0.205529	32.16	Ν	63.38	-31.23

Average Measurement:

Frequency (MHz)	Corrected Amplitude (dBuV)	Conductor (L/N)	Limit (dBuV)	Margin (dB)
0.566612	44.87	Ν	46	-1.13
0.572258	37.5	Ν	46	-8.5
0.492118	36.36	Ν	46.13	-9.78
0.154008	26.95	Ν	55.78	-28.83
0.156841	19.87	Ν	55.63	-35.76
0.205529	14.2	N	53.38	-39.19

6 FCC §15.205, §15.209, §15.247(d) & IC RSS-210 §A8.5, §2.6 - Spurious Radiated Emissions

6.1 Applicable Standards

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) and IC RSS-210 §2.2, only spurious emissions are permitted in any of the frequency bands listed below:

f (MHz)	f (MHz)	f (MHz)	f (GHz)
$\begin{array}{c} 0.090 - 0.110 \\ 0.495 - 0.505 \\ 2.1735 - 2.1905 \\ 4.125 - 4.128 \\ 4.17725 - 4.17775 \\ 4.20725 - 4.20775 \\ 6.215 - 6.218 \\ 6.26775 - 6.26825 \end{array}$	16.42 - 16.423 $16.69475 - 16.69525$ $25.5 - 25.67$ $37.5 - 38.25$ $73 - 74.6$ $74.8 - 75.2$ $108 - 121.94$ $123 - 138$	$\begin{array}{r} 960-1240\\ 1300-1427\\ 1435-1626.5\\ 1645.5-1646.5\\ 1660-1710\\ 1718.8-1722.2\\ 2200-2300\\ 2310-2390\\ \end{array}$	$\begin{array}{r} 4.5-5.15\\ 5.35-5.46\\ 7.25-7.75\\ 8.025-8.5\\ 9.0-9.2\\ 9.3-9.5\\ 10.6-12.7\\ 13.25-13.4\end{array}$
$\begin{array}{c} 6.31175 - 6.31225\\ 8.291 - 8.294\\ 8.362 - 8.366\\ 8.37625 - 8.38675\\ 8.41425 - 8.41475\\ 12.29 - 12.293\\ 12.51975 - 12.52025\\ 12.57675 - 12.57725\\ 13.36 - 13.41\end{array}$	149.9 - 150.05 $149.9 - 150.05$ $156.52475 - 156.52525$ $156.7 - 156.9$ $162.0125 - 167.17$ $167.72 - 173.2$ $240 - 285$ $322 - 335.4$ $399.9 - 410$ $608 - 614$	2483.5 - 2500 $2690 - 2900$ $3260 - 3267$ $3.332 - 3.339$ $3 3458 - 3 358$ $3.600 - 4.400$	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)).

IC RSS-Gen §4.9 the measurement method shall be described in the test report. The same parameter, peak power or average power, used for the transmitter output power measurement shall be used for unwanted emission measurements. The search for unwanted emissions shall be from the lowest frequency internally generated or used in the device (local oscillator, intermediate or carrier frequency), or from 30 MHz, whichever is the lower, to the 5th harmonic of the highest frequency generated without exceeding 40 GHz.

6.2 EUT Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15C and RSS-210/RSS-Gen 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.

6.3 Test Procedure

For the radiated emissions test, the EUT was connected to the DC power source, 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 meters away from the testing antenna, which is varied from 1-4 meters, 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

6.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with 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

Manufacturers	Descriptions	Models	Serial Number	Calibration Dates
A.H Systems	Antenna, Horn	SAS-200/571	261	2010-09-23
Hewlett Packard	Pre amplifier	8447D	2944A06639	2010-06-18
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-11-29
Agilent	PSA Series Spectrum Analyzer	E4440A	US45303156	2010-08-09
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2010-05-10
HP	Pre Amplifier	8449B	3147A00400	2010-02-01

6.5 Test Equipment List and Details

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

6.6 Test Environmental Conditions

Temperature:	15~25° C
Relative Humidity:	30~63%
ATM Pressure:	101.2~103.5kPa

Testing was performed by Jack Liu, on 2011-01-18 ~ 2011-02-11.

6.7 Test Result Summary

According to the data hereinafter, the EUT <u>complied with the limits presented in FCC Title 47, Part 15,</u> <u>Subpart C and IC RSS-210, RSS-Gen</u>, and had the worst margin of:

802.11 b mode:

Mode: Transmitting. 30-1000 MHz(Worst Channel)									
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range						
-16.98	38.75675	Vertical	High, 30 to 1000 MHz						
Mode: Transmitting, A	bove 1000 MHz								
-14	4824	Vertical	Low, 1 to 25 GHz						
-15.4	4874	Vertical	Middle, 1 to 25 GHz						
-15.2	7386	Horizontal	High, 1 to 25 GHz						

802.11 g mode:

Mode: Transmitting. 30-1000 MHz(Worst Channel)										
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range							
-16.76	42.17125	Vertical	Middle, 30 to 1000 MHz							
Mode: Transmitting, A	bove 1000 MHz									
-20.9	4824	Vertical	Low, 1 to 25 GHz							
-21.2	4874	Vertical	Middle, 1 to 25 GHz							
-20.4	4924	Vertical	High, 1 to 25 GHz							

802.11 n 20MHz BW mode:

Mode: Transmitting. 3	Mode: Transmitting. 30-1000 MHz(Worst Channel)										
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range								
-16.63	37.42925	Vertical	Middle, 30 to 1000 MHz								
Mode: Transmitting, A	bove 1000 MHz										
-20.9	4824	Horizontal	Low, 1 to 25 GHz								
-23.4	4874	Horizontal	Middle, 1 to 25 GHz								
-21.4	4924	Horizontal	High, 1 to 25 GHz								

802.11 n 40MHz BW mode:

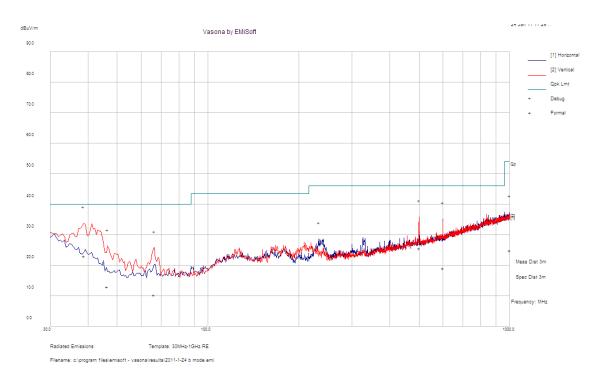
Mode: Transmitting. 30-1000 MHz(Worst Channel)									
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Channel, Range						
-22.04	43.9305	Vertical	Low, 30 to 1000 MHz						
Mode: Transmitting,	Above 1000 MHz								
-18.6	4844	Vertical	Low, 1 to 25 GHz						
-18.7	4874	Vertical	Middle, 1 to 25 GHz						
-22.5	4904	Vertical	High, 1 to 25 GHz						

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6.8 Radiated Emissions Test Plot & Data

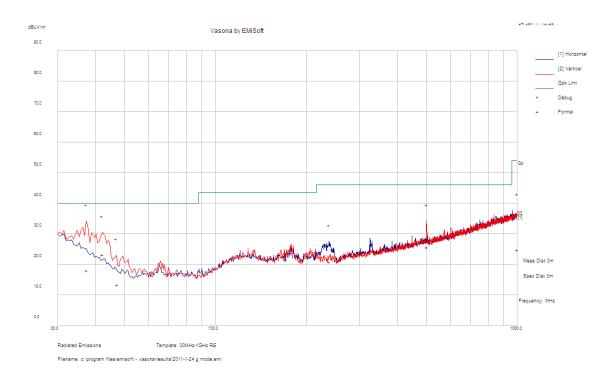
1) 30 MHz – 1 GHz, measured at 3 meters distance

20 MHz: 802.11b mode, (worst case)



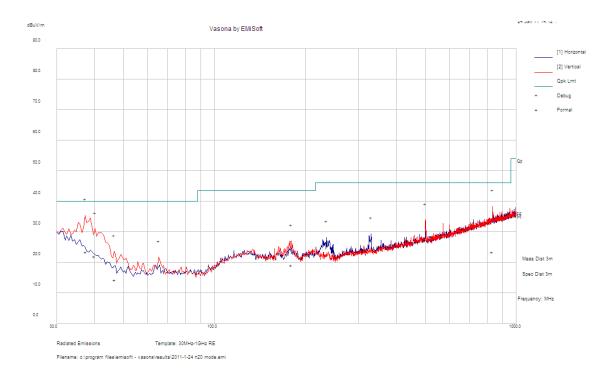
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Height Polarity		Limit (dBµV/m)	Margin (dB)
38.75675	23.02	125	V	9	40	-16.98
501.083	25.59	244	V	4	46	-20.41
600.2633	19.05	237	Н	80	46	-26.95
46.367	13.05	189	V	352	40	-26.95
998.342	25	275	V	173	54	-29
66.18175	10.27	265	V	246	40	-29.73

20 MHz: 802.11g mode, (worst case)



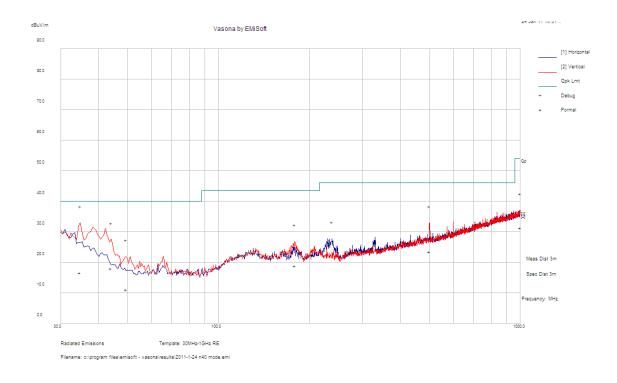
Frequency (MHz)			Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
42.17125	23.24	116	V	35	40	-16.76
500.9753	25.56	207	V	360	46	-20.44
37.52475	18.01	223	V	56	40	-21.99
237.609	20.76	113	Н	321	46	-25.24
47.18625	13.36	147	V	44	40	-26.64
998.212	24.73	128	V	14	54	-29.27

20 MHz: 802.11n mode, (worst case)



Frequency (MHz)	Corrected Antenna Amplitude Height (dBµV/m) (cm)		Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
37.42925	23.37	101	V	24	40	-16.63
39.97	21.91	134	V	62	40	-18.09
499.7708	27.31	98	V	0	46	-18.69
832.9665	23.29	176	V	240	46	-22.71
179.5178	19.05	126	V	31	43.5	-24.45
46.61225	14.18	129	V	311	40	-25.82

40 MHz: 802.11n mode, (worst case)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Height Polarity		Limit (dBµV/m)	Margin (dB)
43.9305	17.96	159	V	302	40	-22.04
499.383	23.5	120	V	341	46	-22.5
1000	31.3	170	Н	135	54	-22.7
34.73825	16.65	209	V	335	40	-23.35
178.9925	18.88	134	V	87	43.5	-24.62
49.34225	11.2	317	V	232	40	-28.8

2) 1 – 25 GHz, measured at 3 meters distance

802.11b mode:

	S.A.	Turntable	Т	est Anten	na	Cable	Pre-	Cord.	FCC	C/IC	
Frequency (MHz)	Reading (dBµV)	Azimuth (degrees)	Height (cm)	Polarity (H/V)	Factor (dB/m)	Loss (dB)		Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
			Low	Channel	2412 MH	z, measu	ured at 3	meters			
4824	38.17	208	100	Н	33.42	4.52	34.77	41.3	74	-32.7	Peak
4824	40.67	249	103	V	33.42	4.52	34.77	43.8	74	-30.2	Peak
4824	32.06	208	100	Н	33.42	4.52	34.77	35.2	54	-18.8	Ave
4824	36.87	249	103	V	33.42	4.52	34.77	40.0	54	-14.0	Ave
7236	36.31	100	116	Н	37.38	5.48	35.16	44.0	74	-30.0	Peak
7236	35.17	184	105	V	37.38	5.48	35.16	42.9	74	-31.1	Peak
7236	28.78	100	116	Н	37.38	5.48	35.16	36.5	54	-17.5	Ave
7236	25.87	184	105	V	37.38	5.48	35.16	33.6	54	-20.4	Ave
			Midd	le channe	1 2437 M	Hz meas	sured at 3	3 meters			
4874	38.04	247	107	Н	33.42	4.53	34.77	41.2	74	-32.8	Peak
4874	38.27	239	103	V	33.42	4.53	34.77	41.5	74	-32.5	Peak
4874	33.79	247	107	Н	33.42	4.53	34.77	37.0	54	-17.0	Ave
4874	35.37	239	103	v	33.42	4.53	34.77	38.6	54	-15.4	Ave
7311	37.25	100	107	Н	37.06	5.58	35.14	44.8	74	-29.2	Peak
7311	37.48	235	147	V	37.06	5.58	35.14	45.0	74	-29.0	Peak
7311	31.08	100	107	Н	37.06	5.58	35.14	38.6	54	-15.4	Ave
7311	30.19	235	147	V	37.06	5.58	35.14	37.7	54	-16.3	Ave
			Higł	n channel	2462 MH	lz measu	red at 3	meters			
4924	38.48	247	100	Н	33.62	4.46	34.74	41.8	74	-32.2	Peak
4924	38.07	161	100	v	33.62	4.46	34.74	41.4	74	-32.6	Peak
4924	34.53	247	100	Н	33.62	4.46	34.74	37.9	54	-16.1	Ave
4924	31.52	161	100	V	33.62	4.46	34.74	34.9	54	-19.1	Ave
7386	38.91	97	111	Н	37.06	5.56	35.14	46.4	74	-27.6	Peak
7386	39	156	114	V	37.06	5.56	35.14	46.5	74	-27.5	Peak
7386	31.32	97	111	Н	37.06	5.56	35.14	38.8	54	-15.2	Ave
7386	31.2	156	114	V	37.06	5.56	35.14	38.7	54	-15.3	Ave

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802.11g mode:

	S.A.	Turntable	Т	est Anten	na	Cable	Pre-	Cord.	FCC	C/IC	
Frequency (MHz)	Reading (dBµV)	Azimuth (degrees)	Height (cm)	Polarity (H/V)	Factor (dB/m)	(1D)	Amp. (dB)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
Low Channel 2412 MHz, measured at 3 meters											
4824	36.98	246	104	Н	33.42	4.52	34.77	40.2	74	-33.8	Peak
4824	37.17	50	100	V	33.42	4.52	34.77	40.3	74	-33.7	Peak
4824	29.04	246	104	Н	33.42	4.52	34.77	32.2	54	-21.8	Ave
4824	29.94	50	100	V	33.42	4.52	34.77	33.1	54	-20.9	Ave
			Midd	le channe	1 2437 M	Hz meas	ured at 3	3 meters			
4874	37.45	241	100	Н	33.42	4.53	34.77	40.6	74	-33.4	Peak
4874	37.37	48	100	V	33.42	4.53	34.77	40.6	74	-33.4	Peak
4874	29.54	241	100	Н	33.42	4.53	34.77	32.7	54	-21.3	Ave
4874	29.6	48	100	V	33.42	4.53	34.77	32.8	54	-21.2	Ave
			High	n channel	2462 MH	Iz measu	red at 3	meters			
4924	24.98	104	101	Н	33.62	4.46	34.74	28.3	74	-45.7	Peak
4924	37.02	254	102	V	33.62	4.46	34.74	40.4	74	-33.6	Peak
4924	23.61	104	101	Н	33.62	4.46	34.74	26.9	54	-27.1	Ave
4924	30.3	254	102	V	33.62	4.46	34.74	33.6	54	-20.4	Ave

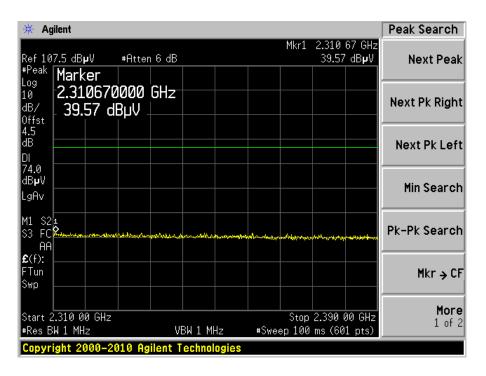
802.11n, 20 MHz Mode:

	S.A.	Turntable	Т	est Anten	na	Cable	Pre-	Cord.	FCC	C/IC	
Frequency (MHz)	Reading (dBµV)	- Incigite I blainty I actor	Amp. (dB)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments				
	Low Channel 2412 MHz, measured at 3 meters										
4824	38.44	241	105	Н	33.42	4.52	34.77	41.6	74	-32.4	Peak
4824	38.45	43	100	V	33.42	4.52	34.77	41.6	74	-32.4	Peak
4824	29.94	241	105	Н	33.42	4.52	34.77	33.1	54	-20.9	Ave
4824	28.57	43	100	V	33.42	4.52	34.77	31.7	54	-22.3	Ave
			Midd	le channe	1 2437 M	Hz meas	sured at 3	3 meters			
4874	38.44	128	100	Н	33.42	4.53	34.77	41.6	74	-32.4	Peak
4874	38.63	255	100	V	33.42	4.53	34.77	41.8	74	-32.2	Peak
4874	27.43	128	100	Н	33.42	4.53	34.77	30.6	54	-23.4	Ave
4874	27.21	255	100	V	33.42	4.53	34.77	30.4	54	-23.6	Ave
			Higl	n channel	2462 MH	Iz measu	red at 3	meters			
4924	38.79	242	100	Н	33.62	4.46	34.74	42.1	74	-31.9	Peak
4924	39.32	252	100	V	33.62	4.46	34.74	42.7	74	-31.3	Peak
4924	29.31	242	100	Н	33.62	4.46	34.74	32.6	54	-21.4	Ave
4924	29.1	252	100	V	33.62	4.46	34.74	32.4	54	-21.6	Ave

802.11n, 40 MHz Mode:

	S.A.	Turntable	Т	est Anten	na	Cable	Pre-	Cord.	FCC	C/IC	
Frequency (MHz)	Reading (dBµV)	Azimuth (degrees)	Height (m)	Polarity (H/V)	Factor (dB/m)	Loss (dB)	Amp. (dB)	Reading (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Comments
Low Channel 2422 MHz, measured at 3 meters											
4844	38.35	233	100	Н	33.42	4.56	34.75	41.6	74	-32.4	Peak
4844	39.88	152	100	V	33.42	4.56	34.75	43.1	74	-30.9	Peak
4844	29.51	233	100	Н	33.42	4.56	34.75	32.7	54	-21.3	Ave
4844	32.14	152	100	V	33.42	4.56	34.75	35.4	54	-18.6	Ave
			Midd	le channe	1 2437 M	Hz meas	sured at 3	3 meters			
4874	37.18	244	102	Н	33.42	4.53	34.77	40.4	74	-33.6	Peak
4874	39.1	152	100	V	33.42	4.53	34.77	42.3	74	-31.7	Peak
4874	26.52	244	102	Н	33.42	4.53	34.77	29.7	54	-24.3	Ave
4874	32.15	152	100	V	33.42	4.53	34.77	35.3	54	-18.7	Ave
			High	n channel	2452 MH	Iz measu	red at 3	meters			
4904	36.69	97	100	Н	33.62	4.52	34.74	40.1	74	-33.9	Peak
4904	38.08	254	110	V	33.62	4.52	34.74	41.5	74	-32.5	Peak
4904	25.54	97	100	Н	33.62	4.52	34.74	28.9	54	-25.1	Ave
4904	28.11	254	110	V	33.62	4.52	34.74	31.5	54	-22.5	Ave

3) Spurious Emissions in Restricted Bands:



802.11 b, Lowest Channel at Horizontal, Peak

802.11b, Lowest Channel at Horizontal, Average

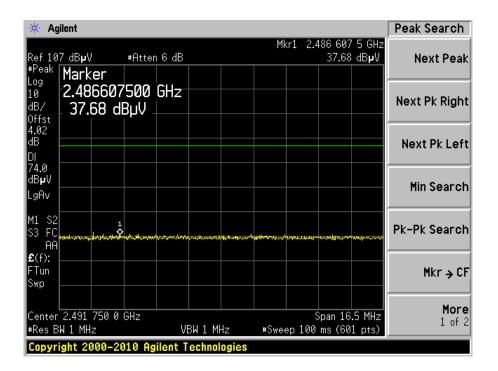
🔆 Agileı	nt									Peak Search
D (4 A D D	- 15 11	<u>`</u>	A 15				Mkr1		67 GHz	
Ref 107.5 #Peak M		#Httei	n 6 dB				1	39.57	'dB µ V	Next Peak
	larker									
	.310670		GHz-							Next Pk Right
dB/	39.57 dł	3μV .								Nexter Right
Offst 45										
4.5 dB										Next Pk Left
DI 📃										
74.0										
dB µ V										Min Search
LgAv										
M1 S21										
S3 FC	hadrod and the state of the sta	<i>whether</i>	wanna	andha	An	man	and the state of the	And the second states	-	Pk-Pk Search
AA										
£ (f): FTun										Mkr. CE
Swp 📃										Mkr → CF
Start 23	10 00 GHz						Ston	2390	00 GHz	More
#Res BW :			V	3W 1 M	Hz	#Swe		ms (60		1 of 2
	nt 2000-20	10 00								

🔆 Agilent				Peak Search
Ref 107.5 dB µ V #Att	en 6 dB	Mkr1	2.310 80 GHz 40.08 dBµV	Next Peak
*Peak Marker Log 10 2.310800000 dB/ 40.08 dBµV offst	GHz			Next Pk Right
4.5 dB DI				Next Pk Left
74.0 dB µ V LgAv				Min Search
M1 S2 S3 FC	na fallen fan 1960 mange stilte tree Ardenne gerege	Marchae Marcon a state a destar	-	Pk-Pk Search
€(f): FTun Swp				Mkr → CF
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 1 MHz		2.390 00 GHz ms (601 pts)	More 1 of 2
Copyright 2000-2010 F	gilent Technologies			

802.11b, Lowest Channel at Vertical, Peak

802.11b, Lowest Channel at Vertical, Average

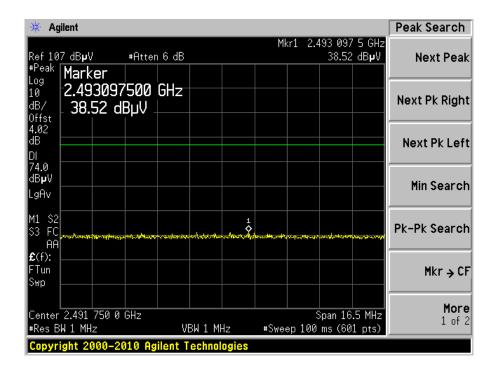
🔆 Agilent									Peak Search
Ref 107.5 dB µ V	#Attei	n 6 dB				Mkr1		27 GHz dB µ V	Next Peak
*Peak Log 10 2.310270 dB/ 0ffst 26.32 d E		GHz							Next Pk Right
4.5 dB DI 54.0									Next Pk Left
dBµV LgAv									Min Search
M1 S2 S3 FS AA									Pk-Pk Search
€(f): ò FTun Swp	~								Mkr → CF
Start 2.310 00 GHz #Res BW 1 MHz		#\	/BW 10	Hz	Swee		 2.390 5 s (60	00 GHzî 1 pts)	More 1 of 2
Copyright 2000-20	10 Ag	ilent T	echno	logies	_	_		_	



802.11b, Highest Channel at Horizontal, Peak

802.11b, Highest Channel at Horizontal, Average

🗧 Agilent							Peak Search
ef 107 dB µ V #I	Atten 6 dB			Mkr1 2.4		0 GHz dB µ V	Next Peak
^{Peak} Marker 9 2.4997250 ^{B/} 24.17 dBµ							Next Pk Right
02 B I 4.0							Next Pk Left
BµV							Min Search
1 S2 3 FS AA							Pk-Pk Search
(f): Tun wp							Mkr → CF
enter 2.491 750 0 GH Res BW 1 MHz		/BW 10 H;	z Sv	eep 4.54	Span 16 9 s (60		More 1 of 2
opyright 2000-201							



802.11b, Highest Channel at Vertical, Peak

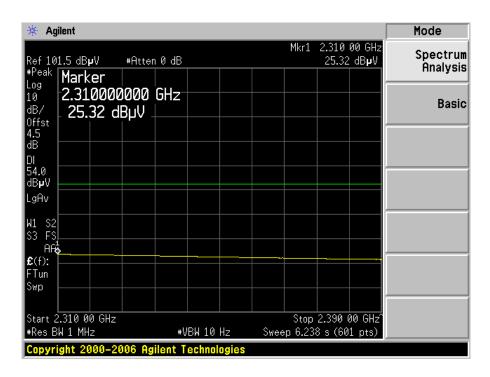
802.11b, Highest Channel at Vertical, Average

🔆 Agilent							Peak Search
Ref107 dB µ V #Atter	n 6 dB		Mk	(r1 2.4) 0 GHz 6 dB µ V	Next Peak
^{*Peak} Marker ^{.og} 2.499670000 ^{dB/} 24.16 dBµV	GHz						Next Pk Right
4.02 dB DI 54.0							Next Pk Left
.gAv							Min Search
M1 S2 S3 FS AA							Pk-Pk Search
Є (f): -Tun Swp							Mkr → CF
Center 2.491 750 0 GHz #Res BW 1 MHz	#VBh	10 Hz	Swee		5pan 16 9 s (60	.5 MHz^ 1 pts)	More 1 of 2

🔆 Agilent			Peak Search
Ref 101.5 dBµV #Atte	n 0 dB	Mkr1 2.316 27 GHz 37.75 dB µ V	Next Peak
^{#Peak} Marker Log 10 2.316270000 dB/ 37.75 dBµV	GHz		Next Pk Right
4.5 dB DI			Next Pk Left
74.0 dB µ V LgAv			Min Search
M1 S2 S3 FC AA	an a	who was a second and a second s	Pk-Pk Search
£(f): FTun Swp			Mkr → CF
Start 2.310 00 GHz #Res BW 1 MHz	#VBW1MHz #Sw	Stop 2.390 00 GHz eep 100 ms (601 pts)	More 1 of 2
Copyright 2000-2006 As	ilent Technologies		

802.11 g, Lowest Channel at Horizontal, Peak

802.11g, Lowest Channel at Horizontal, Average



* Agilent						Display
Ref 101.5 dBµV #Atte	n 0 dB		Mkr1 :	2.322 40 38.36 d		Full Screen
^{#Peak} Marker Log 10 2.322400000 dB/ 38.36 dBµV	GHz					Display Line 74.00 dBμV <u>On</u> 0ff
4.5 dB DI 74.0 dBµV						
LgAv M1 S2 S3 FC	the affective and the second	sterhlunnstruthsynd	%.a?i=1 1194q=1-4.a	ralisashakurad	han the second sec	Limits Active Fctn Position Top
AA £(f): FTun Swp						Title
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 1 M	Hz #Swee		2.390 00 ns (601		Preferences.
Copyright 2000-2006 Ag	ilent Technol	ogies				

802.11g, Lowest Channel at Vertical, Peak

802.11g, Lowest Channel at Vertical, Average

🔆 Agilent										Mode Setup
Ref 101.5 d		#Atte	n 0 dB				Mkr1		67 GHz 3 dB µ V	Radio Std, None
	ker 10670 5.33 dl		GHz							Radio Std Setup
4.5 dB DI 54.0										Retain Params
dB µ V										Enable All Measurements Yes <u>No</u>
M1 S2 S3 FS AA £(f):										
FTun Swp										
Start 2.310 #Res BW 1 M			+\/ +\/	'BW 10	Hz	Sw <u>ee</u>		2.390 8 s (60	00 GHz 01 pts)	
Copyright :	2000-20	006 Ag	ilent T	echno	logies					

🔆 Agilent				Peak Search
Ref 101 dB µ V #Atte	n 0 dB	Mkr1	2.491 42 GHz 35.51 dBµV	Next Peak
* ^{Peak} Marker Log 10 2.491420000 dB/ 35.51 dBµV Offst	GHz			Next Pk Right
4.02 dB DI				Next Pk Left
74.0 dB µ V LgAv				Min Search
M1 S2 S3 FC AA	niprinaukrakolinik minipilikanish	wanterstand	\{Magaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaangaalaa	Pk-Pk Search
£(f): FTun Swp				Mkr → CF
Start 2.483 50 GHz #Res BW 1 MHz	#VBW 1 MHz		2.500 00 GHz ms (601 pts)	More 1 of 2
Copyright 2000-2006 Ag	gilent Technologie	S		

802.11g, Highest Channel at Horizontal, Peak

80.211g, Highest Channel at Horizontal, Average

🔆 Ag	ilent								Peak Search
	1 dB µ V	#Atte	n 0 dB				Mkr1	81 GHz 0 dB µ V	Next Peak
	Marker 2.499810 21.79 d		GHz						Next Pk Right
4.02 dB DI 54.0									Next Pk Left
54.0 dB µ V LgAv									Min Search
M1 S2 S3 FS AA								1	Pk-Pk Search
€(f): Tun Swp								¢	Mkr→CF
	2.483 50 GHz W 1 MHz		#\	'BW 10	Hz	Swee		00 GHz^ 01 pts)	More 1 of 2
Copyri	ight 2000-20	006 Ac	ilent T	echno	logies				

🔆 Agilen	nt									Peak Search
Ref 101 c	dBµV	#Attei	n 0 dB				Mkr1		39 GHz) dB µ V	Next Peak
	arker .491390 35.70 dE		GHz							Next Pk Right
4.02										Next Pk Left
74.0 dB µ V LgAv										Min Search
M1 S2 S3 FC AA	Mar Maryana	agenfor-sea	Unopposition	1 .mk	alenske solen	y. Marine			bypositioner	Pk-Pk Search
£(f): FTun Swp										Mkr→CF
Start 2.48 #Res BW 1	83 50 GHz 1 MHz		#\	BW 1 M	lHz	#Swe		2.500 ms (60	00 GHz 1 pts)	More 1 of 2
Copyrigh	t 2000-20	06 Ag	ilent T	echnol	ogies					

802.11g, Highest Channel at Vertical, Peak

802.11g, Highest Channel at Vertical, Average

🔆 Ag	ilent								Peak Search
	1 dB µ V	#Atte	n 0 dB				Mkr1	48 GHz) dB µ V	Next Peak
	Marker 2.49948 21.80 c		GHz						Next Pk Right
4.02 dB DI 54.0									Next Pk Left
dB µ V LgAv									Min Search
M1 S2 S3 FS AA									Pk-Pk Search
€(f): FTun Swp								\$	Mkr → CF
	2.483 50 GHz W 1 MHz		#\	/BW 10	Hz	Swee		00 GHz^ 11 pts)	More 1 of 2
	ght 2000-2	006 Ag							

🔆 Agilent									System
Ref 107.5 dB µ V	#Atten	6 dB				Mkr1		40 GHz dB µ V	Show Errors
*Peak Marker Log 10 2.320400 dB/ 40.36 d		GHz							Power On/ Preset
4.5 dB DI									Time/Date
74.0 dB µ V LgAv									Alignments
M1 S2 S3 FC	n marine	nak-sipetaria a ^m a	hhange Ald	donalo de mario	ىي _ە رىلىنىغىيو ا لىلان	an a	gayan ahlan		Config I/O
€(f): FTun Swp									Reference
Start 2.310 00 GHz #Res BW 1 MHz		#V	BW 1 M	Hz	#Swee		2.390 (ms (60	00 GHz 1 pts)	More 1 of 3
	010 Agi				#Swee				1

802.11 n20, Lowest Channel at Horizontal, Peak

802.11n20, Lowest Channel at Horizontal, Average

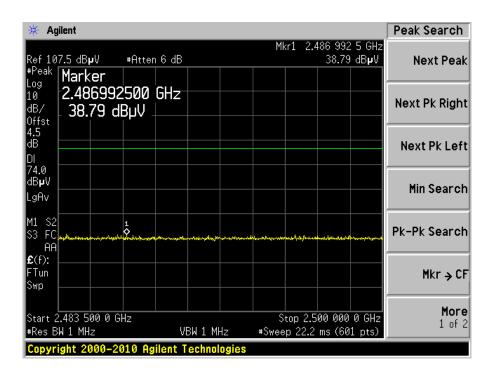
Mkr1 Ref 107.5 dBµV #Atten 6 dB *Peak Marker Image: Colspan="2">Colspan="2">Mkr1 10 2.310000000 GHz Image: Colspan="2">Offer 10 2.310000000 GHz Image: Colspan="2">Offer 10 26.29 dBµV Image: Colspan="2">Offer 0ffst Image: Colspan="2">Offer 4.5 Image: Colspan="2">Image: Colspan="2">Offer 0ffst Image: Colspan="2">Offer 4.5 Image: Colspan="2">Image: Colspan="2">Offer 0I Image: Colspan="2">Offer 54.0 Image: Colspan="2">Offer 11 S2 Image: Colspan="2">Offer S3 FS Image: Colspan="2">Offer AA Image: Colspan="2">Offer	2.310 00 GHz 26.29 dBµV Next Peak
Log 10 2.310000000 GHz dB/ 0ffst 4.5 dB DI 54.0 dBµV LgAv M1 \$2 \$3 FS	Next Pk Right
4.5 dB DI 54.0 dBµV LgAv M1 S2 S3 FS	
dBµV LgAv M1 S2 S3 FS	Next Pk Left
\$3 F\$	Min Search
	Pk-Pk Search
£ (f): סָּ	Mkr → CF
	0 2.390 00 GHz More 1 of 2 95 s (601 pts)

🔆 Agilent					Peak Search
Ref 107.5 dB µ V #A	ltten 6 dB			33 GHz 7 dB µ V	Next Peak
*Peak Marker Log 10 2.32133000 dB/ 39.77 dBµ Offst					Next Pk Right
4.5 dB DI 74.0					Next Pk Left
dBµV					Min Search
M1 S2 S3 FC	amater Magnesrapherson de	an a	er-handerander open Talda ang		Pk-Pk Search
£(f): FTun Swp					Mkr → CF
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 1	MHz #Swe	Stop 2.390 9p 100 ms (6		More 1 of 2
Copyright 2000-2010			eb 100 III3 (C	01 p(3)	

802.11n20, Lowest Channel at Vertical, Peak

802.11n20, Lowest Channel at Vertical, Average

🔆 Agiler	nt									Peak Search
Ref 107.5		#Attei	n 6 dB				Mkr1		47 GHz dB µ V	Next Peak
10 2	larker 2.311470 26.27 dE		GHz							Next Pk Right
4.5 dB										Next Pk Left
dB µ V LgAv										Min Search
W1 S2 S3 FS AA 1										Pk-Pk Search
£(f): ☆ FTun Swp										Mkr → CF
L Start 2.3: #Res BW :	10 00 GHz 1 MHz		#\	BW 10	Hz	Swee		2.390(5 s (60	00 GHzî 1 pts)	More 1 of 2
Copyriał	ht 2000-20	10 Ac	ilent T	echno	logies					



802.11n20, Highest Channel at Horizontal, Peak

802.11n20, Highest Channel at Horizontal, Average

🔆 Agilent								Peak Search
	n 6 dB			Mł	r1 2.4		75GHz 3dB µ V	Next Peak
^{*Peak} Marker Log 10 2.494637500 dB/ 0ffst 24.63 dBµV	GHz							Next Pk Right
4.5 dB DI 54.0								Next Pk Left
dBµV LgAv								Min Search
M1 S2 S3 FS AA								Pk-Pk Search
€(f): FTun Swp								Mkr → CF
Start 2.483 500 0 GHz #Res BW 1 MHz	=	BW 10	Hz			00 000 9 s (60	0 GHzî 01 pts)	More 1 of 2

GD/ 38.27 GBµV Offst 4.5 dB 1 74.0 1 dBµV 1 IgAv 1 M1 S2 1 S3 FC 1 AA 1 E(f): 1	Peak Search		ilent	🔆 Ag
10 2.486937500 GHz dB/ 38.27 dBμV 0ffst 38.27 dBμV 45 38.27 dBμV 10 1 74.0 1 18μV 1 294 1 195 1 196 1 197 1 198 1 199 <	Next Peak	6 dB	7.5 dB µ V #Atte	Ref 10
dB DI 74.0 dBµV LgAv M1 \$2 \$3 FC AR €(f):	Next Pk Right	GHz	2.486937500	10 dB/
dBµV LgAv M1 S2 S3 FC AA £(f):	Next Pk Left			dB DI
S_{A}^{S} FC A_{A}^{A} $\mathfrak{E}(f):$	Min Search			dB µ V
	Pk-Pk Search	 a-,	natura manageria de la compete	S3 FC AA
Flun Swp	Mkr → CF			FTun
Start 2,483 500 0 GHz Stop 2.500 000 0 GHz #Res BW 1 MHz #VBW 1 MHz Sweep 20 ms (601 pts)	More 1 of 2	#VBW 1 MHz		

802.11n20, Highest Channel at Vertical, Peak

802.11n20, Highest Channel at Vertical, Average

🗧 Agilent								Peak Search
ef 107.5 dB µ V #Atte	en 6 dB			Mł	kr1 2.4		′5 GHz dB µ V	Next Peak
^{Peak} Marker ^{og} 2.498707500 ^{B/} 24.64 dBµV ^{ffst}	GHz							Next Pk Right
.5 B II 4.0								Next Pk Left
gAv								Min Search
11 S2 3 FS AA								Pk-Pk Search
:(f): Tun wp							1 ◊	Mkr → Cl
tart 2.483 500 0 GHz Res BW 1 MHz	#\	/BW 10	Hz			00 000 9 s (60	0 GHzî 1 pts)	More 1 of 2

				Peak Search
en 6 dB		Mkr1	2.342 80 39.86 dE	
				Next Pk Right
				Next Pk Left
				Min Search
Alle marker and the set	ansistenson particip	haybaarayaayaa yaayaha	halada da ang kang kang da pang da pang da pa	Pk-Pk Search
				Mkr → CF
#VBW 1	MHz #S			
		0 GHz	en 6 dB	en 6 dB 39.86 df

802.11 n40, Lowest Channel at Horizontal, Peak

802.11 n40, Lowest Channel at Horizontal, Average

🔄 Agilent					Peak Search
	itten 6 dB			2.310 80 26.30 dE	
Peak Marker 99 2.31080000 B/ 26.30 dBµ					Next Pk Right
5 B Jl 4.0					Next Pk Left
BµV gAv					Min Search
11 S2 3 FS AA					Pk-Pk Search
:(f): ф Тип імр					Mkr → CF
itart 2.310 00 GHz Res BW 1 MHz	#\	/BW 10 Hz	Swee	.390 00 s (601 p	

🔆 Agilent			Peak Search
Ref 107.5 dB µ V #Atte	n 6 dB	Mkr1 2.339 60 GH 39.92 dBµ	
* ^{Peak} Marker Log 10 2.339600000 dB/ 39.92 dBµV 0ffst	GHz		Next Pk Right
4.5 dB DI			Next Pk Left
74.0 dBµV LgAv			Min Search
M1 S2 S3 FC	nter and the second second	**************************************	Pk-Pk Search
£(f): FTun Swp			Mkr → CF
Start 2.310 00 GHz #Res BW 1 MHz	#VBW 1 MHz	Stop 2.390 00 GH Sweep 20 ms (601 pts	
Copyright 2000-2010 As	ilent Technologies		

802.11 n40, Lowest Channel at Vertical, Peak

802.11 n40, Lowest Channel at Vertical, Average

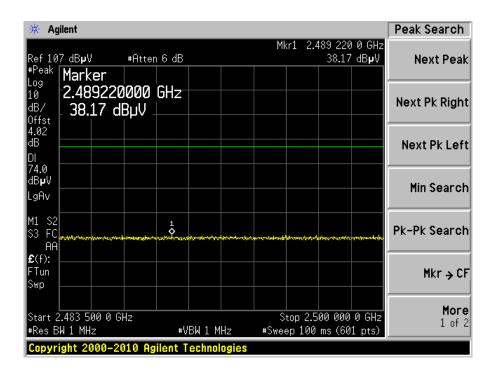
🔆 Ag	jilent									Peak Search
	7.5 dBµV	#Atte	n 6 dB				Mkr1		40 GHz dB µ V	Next Peak
10 dB/ Offst	Marker 2.310400 26.29 dl		GHz							Next Pk Right
4.5 dB DI 54.0										Next Pk Left
dB µ V LgAv										Min Search
M1 S2 S3 FS AA										Pk-Pk Search
£(f): ₹ FTun Swp	ò									Mkr→CF
	2.310 00 GHz W 1 MHz		#\	/BW 10	Hz	Swee		2.390 5 s (60	00 GHzî 11 pts)	More 1 of 2
Copyri	ight 2000-20	010 Ag	ilent T	echno	logies					

🔆 Agilent			Peak Search
Ref107 dB µ V #Atte	n 6 dB	Mkr1 2.486 222 5 GHz 37.98 dB µ V	Next Peak
^{#Peak} Marker Log 10 2.486222500 dB/ 37.98 dBµV	GHz		Next Pk Right
4.02 dB DI 74.0			Next Pk Left
dBµV			Min Search
M1 S2 S3 FC	alaurininintertendentelauritetta	an and a start of the start of the same of the same of the start of the same of the same of the same of the same	Pk-Pk Search
€(f): FTun Swp			Mkr → CF
Start 2.483 500 0 GHz #Res BW 1 MHz	#VBW 1 MHz	Stop 2.500 000 0 GHz #Sweep 100 ms (601 pts)	More 1 of 2
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802.11 n40, Highest Channel at Horizontal, Peak

802.11 n40, Highest Channel at Horizontal, Average

🔆 Ag	ilent									Peak Search
	7 dBµV	#Atte	n 6 dB			M	kr1 2.4		5 0 GHz ′dB µ V	Next Peak
	Marker 2.499725 24.17 dl		GHz							Next Pk Right
4.02 dB DI 54.0										Next Pk Left
dB µ V LgAv										Min Search
M1 S2 S3 FS AA										Pk-Pk Search
£(f): F⊤un Swp										Mkr → CF
	2.483 500 0 GH W 1 MHz	łz	#\	'BW 10	Hz			00 000 9 s (60	0 GHzî 1 pts)	More 1 of 2
Copyri	ight 2000-20	10 As	ilent T	echno	logies					



802.11 n40, Highest Channel at Vertical, Peak

802.11 n40, Highest Channel at Vertical, Average

🔆 Agilent						Peak Search
	n 6 dB		Mkr1 2	499 642. 24.15	25GHz 6dB µ V	Next Peak
^{HPeak} Marker ^{.09} 2.499642500 ^{JB} / 24.15 dBµV ^{Offst}	GHz					Next Pk Right
A.02 HB DI 54.0						Next Pk Left
.gAv						Min Search
41 S2 53 FS AA						Pk-Pk Search
E(f):						Mkr → CF
Start 2.483 500 0 GHz +Res BW 1 MHz	#VBW 10) Hz	Stop 2. Sweep 4.5	500 000 49 s (60		More 1 of 2

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

7.1 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.

7.2 Test Results

FCC §15.247(a)(2) & IC RSS-210 §A8.2(a) – 6 dB Occupied Bandwidth

7.3 Applicable Standard

According to FCC §15.247(a)(2) and 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

7.4 Test Results

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

8.1 Applicable Standard

According to FCC §15.247(b)(3) and IC RSS-210 §A8.4 for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

8.2 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.



8.3 Test Equipment List and Details

Manufacturer	Description	Model No.	Serial No.	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09

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

8.4 Test Environmental Conditions

Temperature:	15~25° C	
Relative Humidity:	30~63%	
ATM Pressure:	101.2~103.5kPa	

Testing was performed by Jerry Huang, on 2011-01-18 ~ 2011-02-11.

8.5 Test Results

802.11 b mode:

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	19.62	30	-10.38
Mid	2437	19.65	30	-10.35
High	2462	19.93	30	-10.07

802.11 g mode:

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	17.55	30	-12.45
Mid	2437	17.62	30	-12.38
High	2462	17.49	30	-12.51

802.11 n 20 MHz mode:

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	16.63	30	-13.37
Mid	2437	16.75	30	-13.25
High	2462	16.60	30	-13.4

802.11 n 40 MHz mode:

Channel	Frequency (MHz)	Output Power (dBm)	Limit (dBm)	Margin (dB)
Low	2422	16.70	30	-13.3
Mid	2437	16.63	30	-13.37
High	2452	16.53	30	-13.47

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

9.1 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.

9.2 Test Results

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

10.1 Applicable Standard

According to FCC §15.247 (e) and IC 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.

10.2 Test Results

11 IC RSS-Gen §4.10 & RSS-210 §2.6 - Receiver Spurious Emissions

11.1 Applicable Standard

According to IC RSS-Gen §4.10, The receiver shall be operated in the normal receive mode near the midpoint 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 §2.6, Tables 2 and 3 show the general field strength limits of unwanted emissions, where applicable, for transmitters and receivers operating in accordance with the provisions specified in this RSS. Transmitters whose wanted emissions are also within the limits shown in Tables 2 and 3 may operate in any of the frequency bands of Tables 2 and 3, other than the restricted bands of Table 1 and the TV bands, and shall be certified under RSS-210.

Frequency		trength neters (watts, e.i.r.p.)
(MHz)	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

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

Note: Transmitting devices are not permitted in Table 1 bands or in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, and 614-806 MHz). Prohibition of operation in TV bands does not apply to momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to perimeter protection systems in the bands 54-72 and 76-88 MHz. The perimeter protection devices are to meet Table 3 field strengths limits.

Table 3: General Field Strength Limits for Transmitters at Frequencies below 30 MHz (Transmit)

Frequency (fundamental or spurious)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.

11.2 Test Setup

The radiated emissions tests were performed in the 3 meter chamber, using the setup in accordance with ANSI C63.4-2003.

11.3 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.

11.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with 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

Manufacturers	Descriptions	Models	Serial Number	Calibration Dates
A.H Systems	Antenna, Horn	SAS-200/571	261	2010-09-23
Hewlett Packard	Pre amplifier	8447D	2944A06639	2010-06-18
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-11-29
Agilent	PSA Series Spectrum Analyzer	E4440A	US45303156	2010-08-09
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2010-05-10
HP	Pre-amplifier	8449B	3147A00400	2010-02-01

11.5 Test Equipment List and Details

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

11.6 Test Environmental Conditions

Temperature:	15~25° C	
Relative Humidity:	30~63%	
ATM Pressure:	101.2~103.5kPa	

Testing was performed by Jack Liu, on 2011-01-18 ~ 2011-02-11.

11.7 Test Results

According to the recorded data, the EUT complied with RSS-210/Gen Standard, and had the worst margin reading of:

Receiving 802.11b mode:

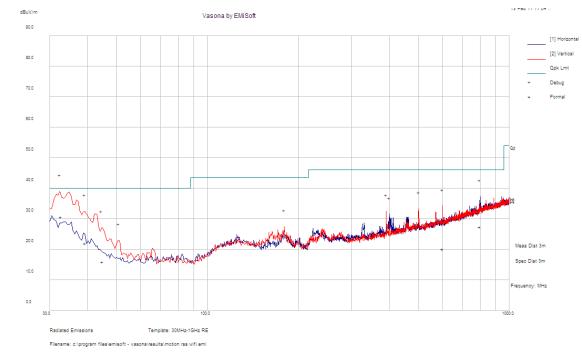
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range
-9.35	32.6505	Vertical	30 MHz to 1 GHz
-13.78	7957.666	Vertical	Above 1 GHz

Receiving 802.11n 40 MHz mode:

Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range	
-11.15	32.61925	Vertical	30 MHz to 1 GHz	
-13.9	7974.995	Vertical	Above 1 GHz	

Please refer to the following plot and data:

11.8 Radiated Emissions Test Plots and Data



802.11b Mode:

1) 30 MHz – 1 GHz

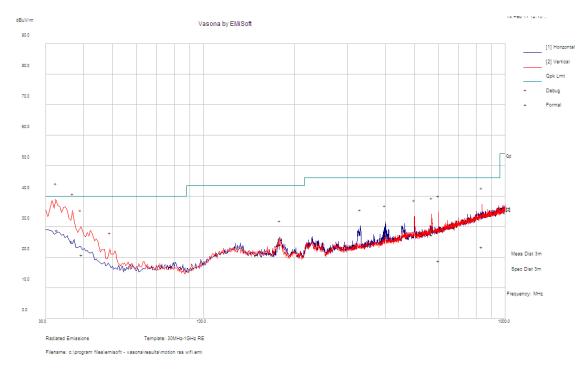
Frequency (MHz)	Corrected QP Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
32.6505	30.65	98	V	277	40	-9.35
39.293	22.03	148	V	116	40	-17.97
500.9878	27.32	116	V	0	46	-18.68
800.29	27.25	220	Н	228	46	-18.75
44.78925	16.03	131	V	231	40	-23.97
600.174	20.01	204	V	190	46	-25.99

2) Above 1 GHz (Middle Channel measured at 3 meters)

Frequency (MHz)	Corrected Ave Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
7957.666	40.22	150	V	132	54	-13.78
1201.136	33.22	102	V	0	54	-20.78
2454.661	31.15	182	V	15	54	-22.85
3001.108	30.31	142	V	302	54	-23.69
1205.158	27.49	118	V	146	54	-26.51
2442.184	27.33	137	V	236	54	-26.67

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802.11n 40 MHz mode



1) 30 MHz – 1 GHz

Frequency (MHz)	Corrected QP Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
32.61925	28.85	139	V	134	40	-11.15
36.599	25.2	98	V	164	40	-14.8
570.2188	27.37	98	V	26	46	-18.63
39.451	20.71	116	V	291	40	-19.29
835.9263	23.4	196	V	268	46	-22.6
600.5048	18.95	297	V	0	46	-27.05

2) Above 1 GHz (Middle Channel measured at 3 meters)

Frequency (MHz)	Corrected Ave Amp. (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
7974.995	40.1	132	V	3	54	-13.9
1202.238	35.82	109	V	160	54	-18.18
2454.829	30.9	113	V	284	54	-23.1
1996.276	28.63	113	V	211	54	-25.37
2416.823	28	135	Н	169	54	-26
1206.984	26.94	98	V	10	54	-27.06

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12 FCC §15.247(i), § 2.1093 & IC RSS-102 - RF Exposure Information

12.1 Applicable Standards

According to \$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.

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

12.2 Test Results

Compliant: The EUT is the portable device and thus requires SAR evaluation; please see BACL SAR Report R1101194-SAR for measurement and testing in details.