Lab Code: 200167-0

FCC PART 15.249

IC RSS-210, ISSUE 8, DEC 2010

TEST AND MEASUREMENT REPORT

For

Arrayent, Inc.

2317 Broadway Street, Suite 140,

Redwood City, CA 94063, USA

FCC ID: Y4B-FAL-EGW
IC: 10122A-FALEGW

Report Type:	**Product Type:**
Original	900 MHz Low Power Transceiver

Test Engineer:	Ning Ma
Report Number:	R1112153-249
Report Date:	2012-01-31
Reviewed By:	Victor Zhang EMC/RF Lead
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1112153-249	Original report	2012-01-31

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Arrayent, Inc.* product, *Model: OLGATEWAY, FCC ID: Y4B-FAL-EGW, IC: 10122A-FALEGW* which will henceforth be referred to as the EUT (Equipment Under Test). The EUT is a Ethernet Gateway (EGW) which provides Internet connectivity for an ecosystem of home security products using the primary Arrayent communications network. In addition the product will be able to operate on the First Alert Onelink. The EGW acts as a hub and access point for the wireless. As the wireless hub for the 900 MHz wireless products in the Power Control Ecosystem, it manages frequency allocation and packet switching. As the access point it converts radio packets to Internet packets allowing monitoring and control of wireless products from the Internet.

1.2 Mechanical Description of EUT

The *EUT* measures approximately 86 mm **(L)** x 36 mm **(W)** x 32 mm **(H)**, and weighs approximately 2.1 g.

The data gathered are from a production sample provided by the manufacturer. Serial number: 1112153 assigned by BACL.

1.3 Objective

This type approval report is prepared on behalf of *Arrayent Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules and RSS 210 rules.

This product has two functions; the primary function working from 908.4-919.65 MHz, the secondary function will be low power working at 909 MHz, 913.32 MHz and 922.92 MHz only. The test in this report is to determine the secondary function compliance with FCC/IC rules for section Antenna Requirements, Conducted Emissions and Radiated Spurious Emissions.

1.4 Related Submittal(s)/Grant(s)

FCC Part 15.247/IC RSS-210 filing with FCC ID: Y4B-FAL-EGW and IC: 10122A-FALEGW.

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.

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.

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.: R-3729, C-4176, G-469, and T-1206. 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 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 host system was configured for testing according to ANSI C63.4-2003.

2.2 EUT Exercise Software

EUT software was provided by the client: SmartRF_Studio_7-1.6.1

2.3 Special Accessories

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

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturers	Descriptions	Model Number	Serial Numbers
-	-	-	-

2.6 EUT Internal Configuration and Details

Manufacturers	Descriptions	Model Number	Serial Numbers
Arrayent Inc	PCB Board	-	e318580

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
USB cable	< 1m	Programming Jig	Laptop

2.8 Power Supply and Line Filters

Manufacturer	Description	Model No.	Serial No.
DVE	AC/DC Power Adapter	DSC-6PFA-05 FUS	-

3 Summary of Test Results

Results reported relate only to the product tested.

FCC/IC Rules	Description of Test	Result
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 §15.215 IC RSS-Gen §4.6	99% & 20 dB Emission Bandwidth	Compliant
FCC §15.249 IC RSS-210 §A2.9	Field Strength of Fundamental & Harmonics	Compliant
FCC § 15.249 IC RSS-210 §A2.9	Out of Band Emissions	Compliant
FCC §15.209, §15.249(d) IC RSS-210 §A2.9, RSS-Gen §7.2.2	Restricted Band & Spurious Emissions	Compliant
IC RSS-Gen §4.10, §6	Receiver Spurious Emissions	Compliant

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.

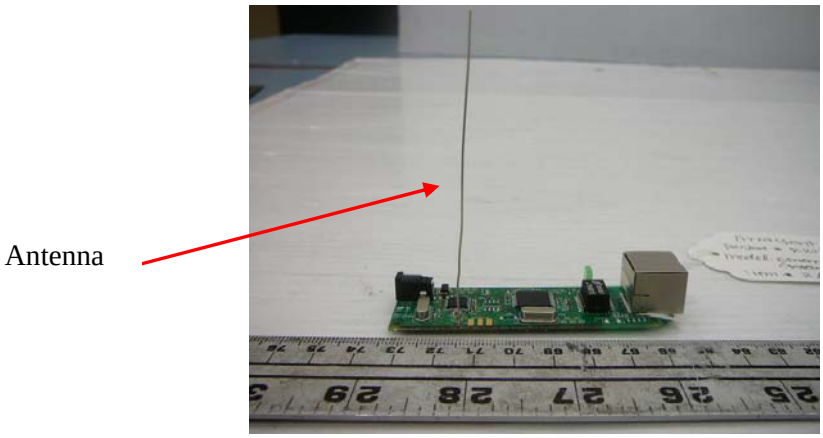
As per IC RSS-Gen §7.1.2: Transmitter Antenna

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 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 Results

The EUT has an integral antenna with a maximum gain of 7.3 dBi, which is accordance to sections FCC Part 15.203/IC RSS-Gen and considered sufficient to comply with the provisions of these sections.



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

5.1 Applicable Standard

As per FCC §15.207 & 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	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 §15.207 and IC RSS-Gen §6.6 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.

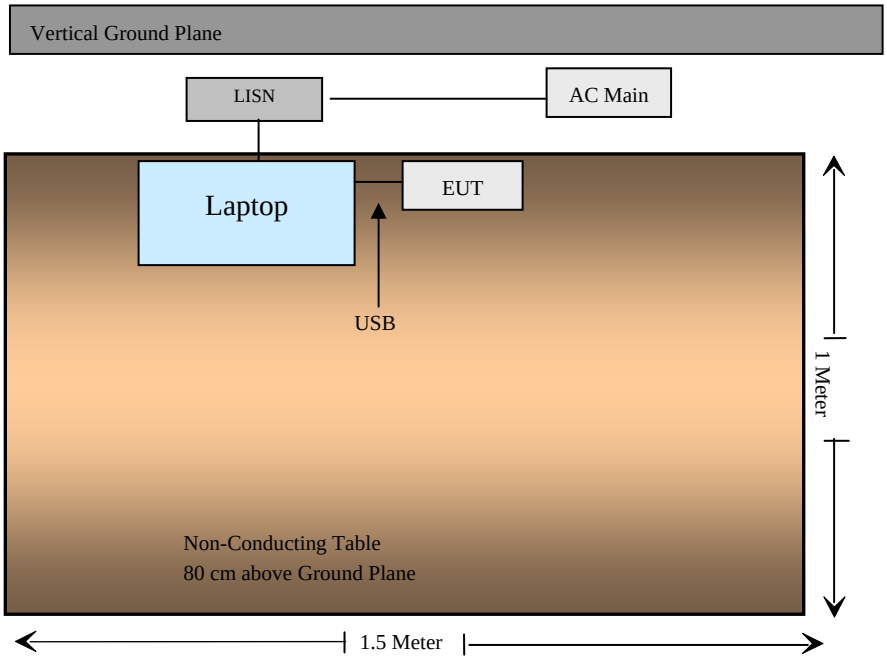
5.3 Test Procedure

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
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100044	2011-04-14
Solar Electronics	LISN	9252-R-24-BNC	511205	2011-06-25
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2011-06-10

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

5.7 Test Environmental Conditions

Temperature:	21~24 °C
Relative Humidity:	38~45 %
ATM Pressure:	101.2-102 kPa

The testing was performed by Ning Ma on 11-20-2011 and 11-21-2011 in 5 meter chamber 3.

5.8 Summary of Test Results

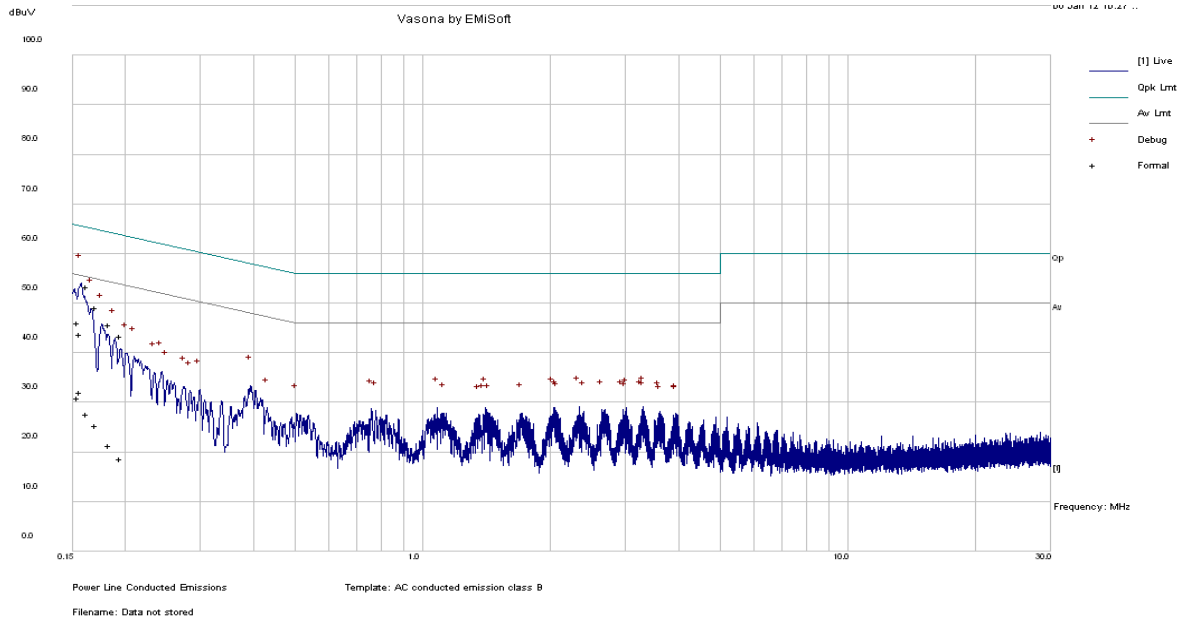
According to the recorded data in following table, the EUT complied with the FCC/IC standard's conducted emissions limits, with the margin reading of:

Worst Channel: 922.92 MHz

Connection: 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor (Line/Neutral)**	**Range (MHz)**
-11.96	0.163076	Line	0.15 to 30

5.9 Conducted Emissions Test Plots and Data

120 V, 60 Hz – Line



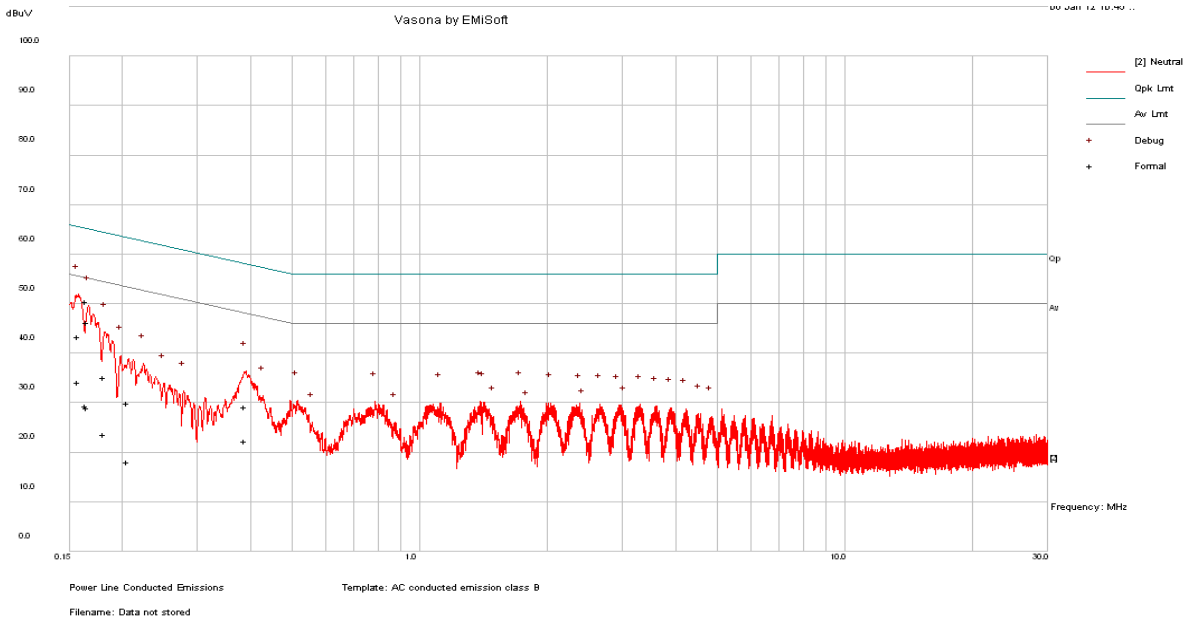
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.163076	53.34	Line	65.31	-11.96
0.170397	49.22	Line	64.94	-15.72
0.183729	45.6	Line	64.32	-18.71
0.155042	46.01	Line	65.73	-19.71
0.194934	43.34	Line	63.82	-20.48
0.156602	43.8	Line	65.64	-21.85

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.156602	32.08	Line	55.64	-23.57
0.155042	31	Line	55.73	-24.72
0.163076	27.76	Line	55.31	-27.55
0.170397	25.45	Line	54.94	-29.49
0.183729	21.41	Line	54.32	-32.91
0.194934	18.61	Line	53.82	-35.21

120 V, 60 Hz – Natural



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.164639	50.44	Neutral	65.23	-14.79
0.166112	46.35	Neutral	65.15	-18.80
0.157628	43.31	Neutral	65.59	-22.27
0.389385	29.21	Neutral	58.08	-28.86
0.181436	35.11	Neutral	64.42	-29.31
0.206247	29.99	Neutral	63.36	-33.37

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/Neutral)	Limit (dBµV)	Margin (dB)
0.157628	34.26	Neutral	55.59	-21.33
0.389385	22.37	Neutral	48.08	-25.71
0.164639	29.44	Neutral	55.23	-25.78
0.166112	29.11	Neutral	55.15	-26.05
0.181436	23.58	Neutral	54.42	-30.84
0.206247	18.2	Neutral	53.36	-35.15

6 FCC §15.249 (a) & IC RSS-210 §A2.9 – Field Strength of Fundamental & Harmonics

6.1 Applicable Standard

As Per FCC §15.249(a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation

As Per RSS-210 §A2.9, The field strength measured at 3 meters shall not exceed the limits shown in the following table:

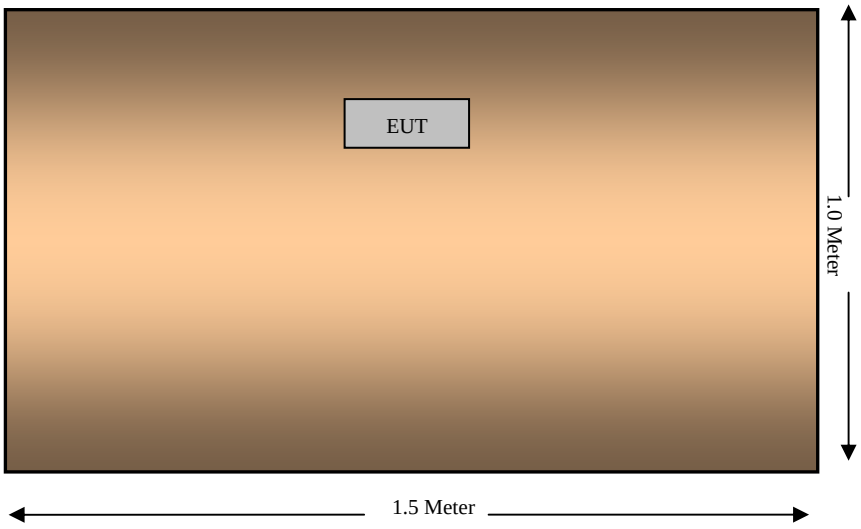
Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millvolts/meter)
902–928 MHz	50	0.5
2400–2483.5 MHz	50	0.5
5725–5875 MHz	50	0.5

6.2 Test 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 IC RSS-210/RSS-Gen.

The spacing between the peripherals was 10 centimeters.

6.3 Test Setup Block Diagram



6.4 Test Procedure

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

6.5 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

6.6 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2011-03-21
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2011-05-17
Hewlett Packard	Pre amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2011-05-09

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

6.7 Test Environmental Conditions

Temperature:	22°C
Relative Humidity:	31 %
ATM Pressure:	101.1kPa

The testing was performed by Ning Ma on 2012-01-05 in 5m chamber #3.

6.8 Test Results

According to the data hereinafter, the EUT complied with the limits presented in FCC 15C and IC RSS-210/RSS-Gen, and had the worst margin of:

Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Comments
-1.24	1844	Vertical	Harmonics (High Channel)

Please refer to the following tables for more detailed results

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/AV	Turntable Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)	Comment
Low Channel 909 MHz												
909	86.21	Peak	182	113	V	23	3.46	25.23	87.44	114	-26.56	Fund.
909	86.72	Peak	293	100	H	23	3.46	25.23	87.95	114	-26.05	Fund.
909	79.08	Ave	182	113	V	23	3.46	25.23	80.31	94	-13.69	Fund.
909	79.46	Ave	293	100	H	23	3.46	25.23	80.69	94	-13.31	Fund.
1818	44.58	Peak	266	100	V	25.5	2.49	27.54	45.03	74	-28.97	Harmonic
1818	44.28	Peak	265	149	H	25.5	2.49	27.54	44.73	74	-29.27	Harmonic
1818	38.85	Ave	266	100	V	25.5	2.49	27.54	39.3	54	-14.7	Harmonic
1818	39.53	Ave	265	149	H	25.5	2.49	27.54	39.98	54	-14.02	Harmonic
Middle Channel: 913.32 MHz												
913.32	83.91	Peak	51	100	V	23	3.46	25.23	85.14	114	-28.86	Fund.
913.32	88.92	Peak	285	100	H	23	3.46	25.23	90.15	114	-23.85	Fund.
913.32	76.67	Ave	51	100	V	23	3.46	25.23	77.9	94	-16.1	Fund.
913.32	81.75	Ave	285	100	H	23	3.46	25.23	82.98	94	-11.02	Fund.
1826.64	43.87	Peak	324	100	V	25.5	2.49	27.6	44.26	74	-29.74	Harmonic
1826.64	43.96	Peak	265	148	H	25.5	2.49	27.6	44.35	74	-29.65	Harmonic
1826.64	37.88	Ave	324	100	V	25.5	2.49	27.6	38.27	54	-15.73	Harmonic
1826.64	38.94	Ave	265	148	H	25.5	2.49	27.6	39.33	54	-14.67	Harmonic
High Channel: 922.92 MHz												
922.92	87.53	Peak	66	100	V	23	3.46	25.23	88.76	114	-25.24	Fund.
922.92	94.22	Peak	293	100	H	23	3.46	25.23	95.45	114	-18.55	Fund.
922.92	80.44	Ave	66	100	V	23	3.46	25.23	81.67	94	-12.33	Fund.
922.92	86.97	Ave	293	100	H	23	3.46	25.23	88.2	94	-5.8	Fund.
1845.84	56.24	Peak	259	100	V	25.6	2.49	27.6	56.73	74	-17.27	Harmonic
1845.84	52.05	Peak	196	249	H	25.6	2.49	27.6	52.54	74	-21.46	Harmonic
1845.84	52.27	Ave	259	100	V	25.6	2.49	27.6	52.76	54	-1.24	Harmonic
1845.84	44.78	Ave	196	249	H	25.6	2.49	27.6	45.27	54	-8.73	Harmonic

7 FCC §15.209, §15.249 & IC §RSS-210 §A 2.9, RSS-Gen §7.2.2 – Out of Band Emissions

7.1 Applicable Standard

As per FCC §15.209(a) and IC RSS-Gen §7.2.2: Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 Note 2	3
88 - 216	150 Note 2	3
216 - 960	200 Note 2	3
Above 960	500	3

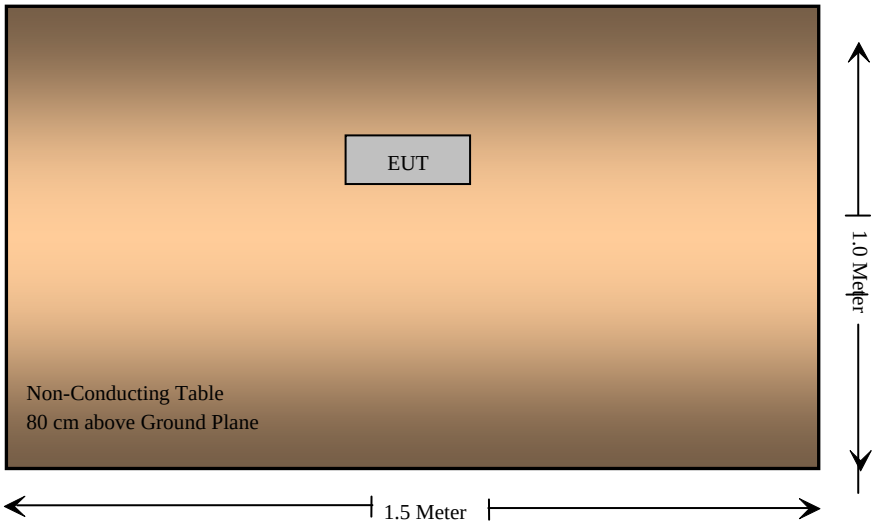
Note 2: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of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

As Per FCC §15.205(a) and IC RSS-Gen §7.2.2 except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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

As per FCC §15.249(d) and IC RSS-210 §A2.9(b), Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in FCC §15.209/IC RSS-Gen, whichever is the lesser attenuation.

7.2 Test Setup Block Diagram



7.3 Test Procedure

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:

(2) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
(3) 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
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2011-03-21
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2011-05-17
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2011-05-09

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

7.6 Test Environmental Conditions

Temperature:	22°C
Relative Humidity:	31 %
ATM Pressure:	101.1kPa

The testing was performed by Ning Ma on 2012-01-05 in 5m chamber #3.

7.7 Summary of Test Results

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

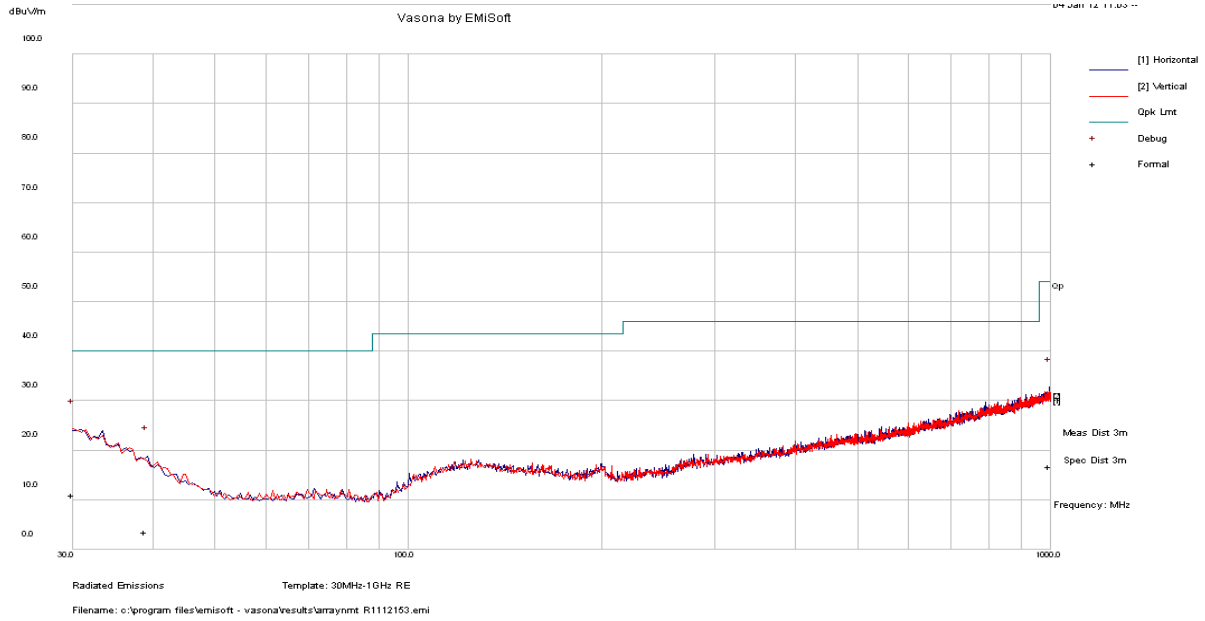
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range
-28.96	30	Vertical	30 to 25000 MHz

Please refer to the following tables for more detailed results

7.8 Out of Band Emissions Test Plot & Data

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

The EUT was tested in the highest power channel to represent *worst*-case results during the final qualification test.



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
30	11.04	290	V	72	40	-28.96
39.062	3.54	220	H	214	40	-36.46
995.3463	16.82	99	H	335	54	-37.18

2) Above 1 GHz, Measured at 3 meters

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/AV	Turntable Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)				Limit (dBuV/m)	Margin (dB)	Comment
Low Channel: 909 MHz												
-	-	-	-	-	-	-	-	-	-	-	-	Spurious
Middle Channel: 913.32 MHz												
-	-	-	-	-	-	-	-	-	-	-	-	Spurious
High Channel: 922.92 MHz												
-	-	-	-	-	-	-	-	-	-	-	-	Spurious

Note: All emissions except harmonics are 20 dB lower then the limit and/or under the noise floor level.

8 FCC §15.215 & IC RSS-Gen §4.6 - 99% & 20 dB Emission Bandwidth

8.1 Applicable Standard

FCC §15.215 and RSS-Gen §4.6.

8.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument via radiated horn antenna. 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 20 dB from the reference level. Record the frequency difference as the emissions bandwidth. (20 dB bandwidth for DTS)
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Manufacturers	Description	Model No.	Serial No.	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10

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:	24°C
Relative Humidity:	33 %
ATM Pressure:	101.1kPa

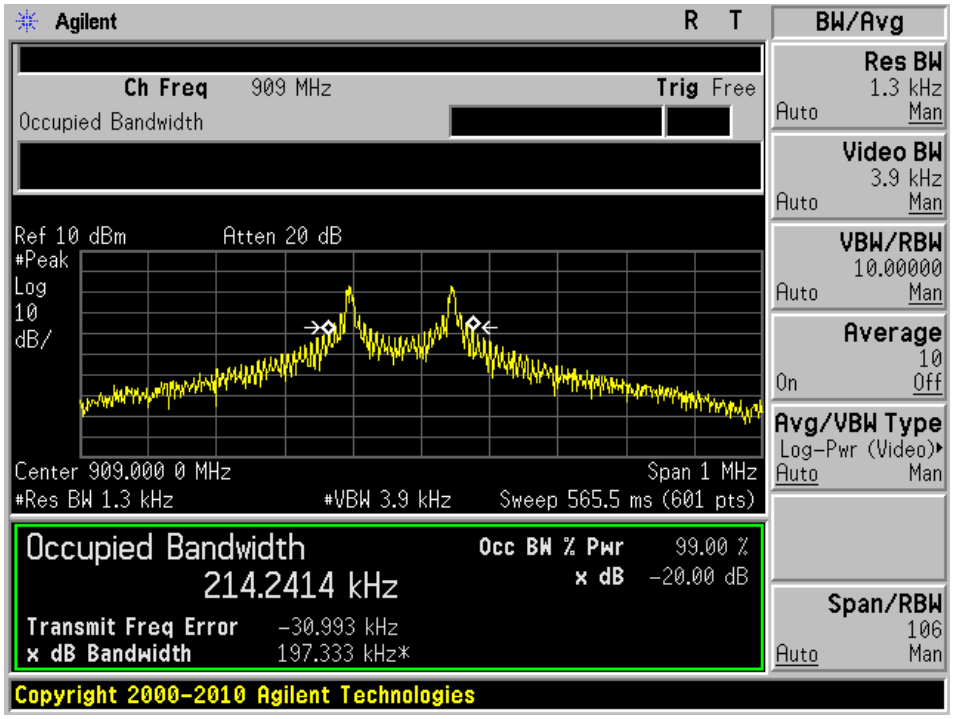
The testing was performed by Ning Ma on 2012-01-06 in 5m chamber #3

8.5 Test Results

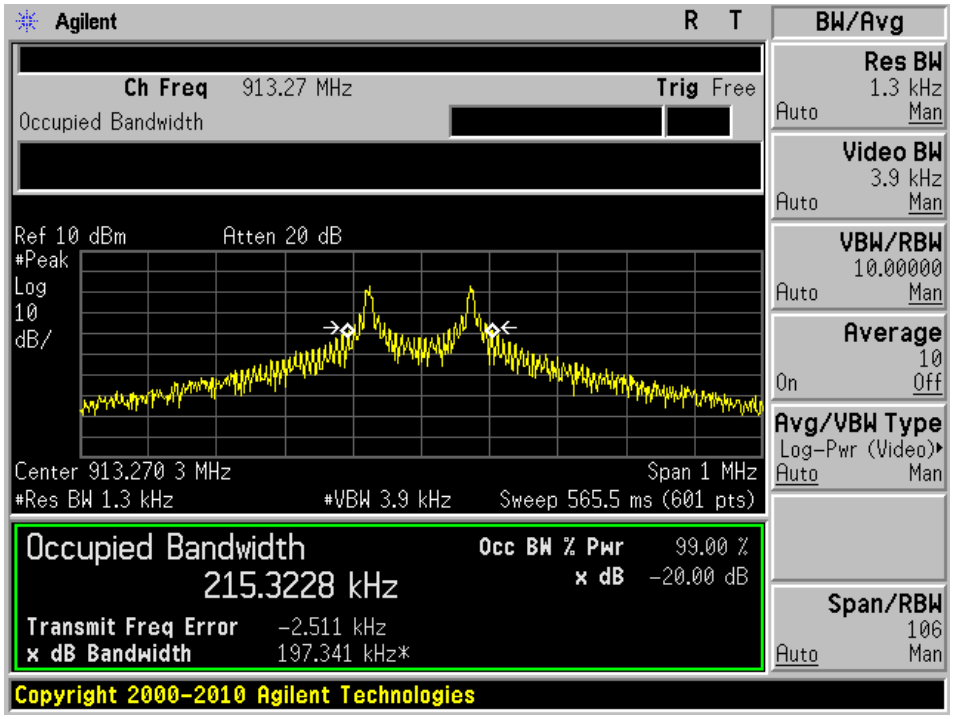
Channel	Frequency (MHz)	20 dB Emission Bandwidth (kHz)	99% Emission Bandwidth (kHz)
Low	909	197.333	214.2414
Middle	913.32	197.341	215.3228
High	922.92	196.925	216.8174

Please refer to the following plots for detailed test results

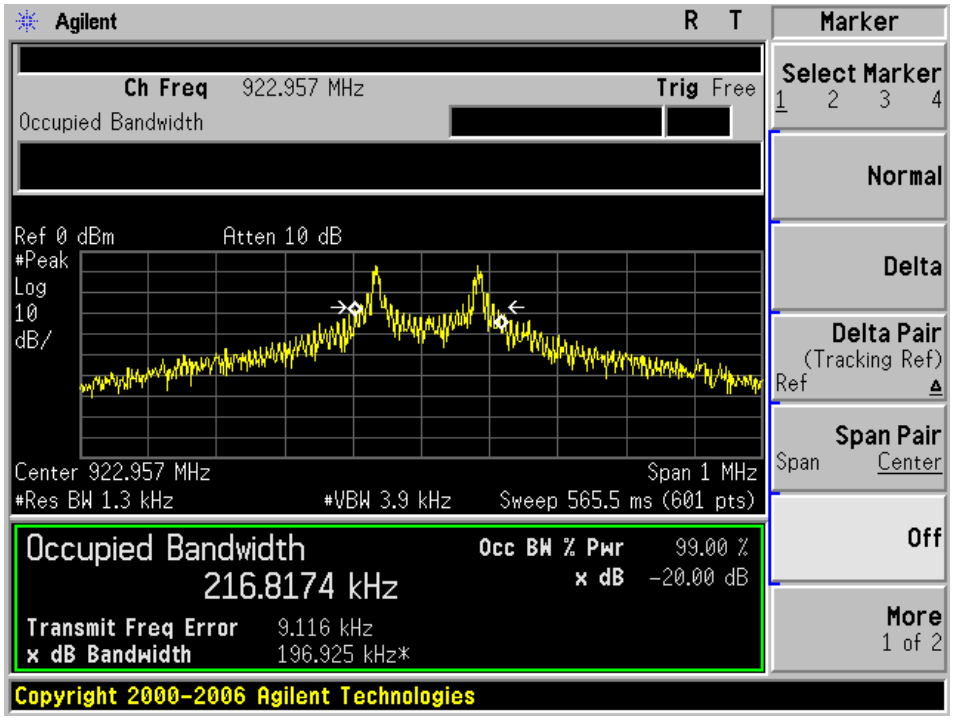
Low Channel – 909 MHz



Middle Channel – 913.32 MHz



High Channel – 922.92 MHz



9 IC RSS-Gen §4.10 & §6 - Receiver Spurious Radiated Emissions

9.1 Applicable Standard

IC RSS-Gen §4.10 and §6

9.2 EUT Setup

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

9.3 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.

9.4 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

9.5 Test Equipment Lists and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2011-06-29
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2011-03-21
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-11-29
Agilent	Spectrum Analyzer	E4440A	MY44303352	2011-05-10
HP	Pre-amplifier	8449B	3147A00400	2011-02-03

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

9.6 Test Environmental Conditions

Temperature:	18~21 °C
Relative Humidity:	30~35 %
ATM Pressure:	101.2-102.2kPa

The testing was performed by Ning Ma from 2012-01-05 in 5 meter chamber 2.

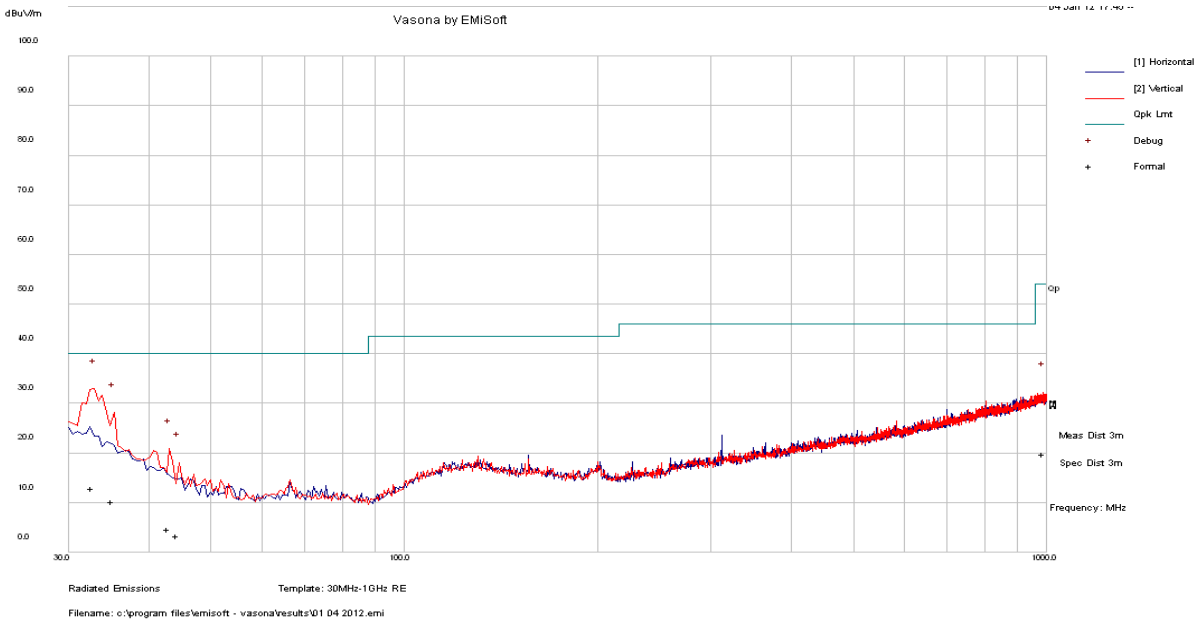
9.7 Summary of Test Results

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 (MHz)**
-27.07	32.6935	Vertical	30 to 1000

9.8 Radiated Emissions Test Plot & Data

1) Radiated Emission at 3 meters, 30 MHz – 1 GHz



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
32.6935	12.93	241	V	350	40	-27.07
35.0965	10.33	288	V	24	40	-29.67
42.969	4.79	203	V	344	40	-35.21
987.7118	19.83	119	V	46	54	-34.17
44.36875	3.32	231	V	119	40	-36.68

2) Radiated Emission at 3 meters, above 1 GHz

Frequency (MHz)	S.A. Reading (dBµV)	Turntable Azimuth (degrees)	Test Antenna			Cable Loss (dB)	Pre-Amp. (dB)	Cord. Reading (dBµV/m)	IC RSS-Gen		Comments
			Height (m)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
-	-	-	-	-	-	--	-	-	-	-	-
-	-	-	--	-	-	-	-	-	-	-	-

Note: All emissions are under noise floor level and/or 20 dB below the limit.