Lab Code: 200167-0

FCC PART 15.249

IC RSS-210, ISSUE 7, JUNE 2007

TEST AND MEASUREMENT REPORT

For

NVIDIA Corporation

2701 San Tomas Expressway,

Santa Clara, CA 95050, USA

FCC ID: VOB-P703A
IC: 7361A-P703A
Model: P703

Report Type:	**Product Type:**
Original Report	RF wireless 3D shutter glasses

Test Engineer:	Kevin Li
Report Number:	R1009234-249
Report Date:	2010-11-17
Reviewed By:	Victor Zhang RF Lead
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1009234-249	Original Report	2010-11-17

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of NVIDIA Corporation *FCC ID: VOB-P703A, IC: 7361A-P703A,* model: P703, which will be henceforth in this report referred to as the EUT (Equipment under Test). The EUT is a 3D Vision glasses is part of a system that enables the users to experience 3D images on 3D capable displays.

1.2 Mechanical Description of EUT

The EUT measures approximately 160 mm **(L)** x 150 mm **(W)** x 30mm **(H)** and weighs approximately 4.5 g.

**The data gathered are from a typical production sample provided by the manufacturer with serial number R1009234-1 assigned by BACL.*

1.3 Objective

This type approval report is prepared on behalf of *NVIDIA Corporation* 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 7, June 2007.

The objective is to determine compliance with FCC rules for section 15.203, 15.205, 15.207, 15.209, 15.249 and IC RSS-210, RSS-Gen.

1.4 Related Submittal(s)/Grant(s)

Wireless Hub for 3D Vision System with FCC ID: VOB-P753A.

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 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 $\pm$2.0 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.

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: C-2463 and R-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 was configured for testing according to ANSI C63.4-2003.

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

2.2 EUT Exercise Software

N/A

2.3 Special Accessories

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

2.4 Equipment Modifications

No modifications were made to the EUT.

2.5 Local Support Equipment

Manufacturer	Description	Model No.	Serial No.
Samsung	Monitor	2233RZ	CM22H1LQB00241V
Dell	Desktop	DCD0	00045-841-663-763
Dell	Keyboard	L100	-
Dell	Mouse	-	-

2.6 Internal Parts List and Details

N/A

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
USB cable	< 10m	EUT	Desktop

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 §7.1.4	Antenna Requirement	Compliant
FCC §15.249 IC RSS-210 §A2.9	Field Strength of Fundamental	Compliant
FCC §15.207(a) IC RSS-Gen §7.2.2	AC Power Line Conduction Emissions	Compliant
FCC §15.205, §15.209 & §15.249 IC RSS-210 §A2.9	Radiated Emissions	Compliant
FCC §15.215 IC RSS-Gen §4.6.1	Occupied Bandwidth (99% &20 dB)	Compliant
IC RSS-Gen §4.10, §6	Receiver Spurious Emission	Compliant
FCC §15.249(d) IC RSS-210 §A2.9	Out of Band Emissions	Compliant

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.

According to IC RSS-Gen §7.1.4, 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.

4.2 Antenna Connector Construction

The EUT antenna is integrated into the PCB construction, which in accordance to FCC §15.203 and IC RSS-Gen §7.1.4, is considered sufficient to comply with the provisions of this section.

Result: Compliant.

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

5.1 Applicable Standard

As per FCC §15.207 & 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 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 in a shield room, the setup and measurement procedure was per ANSI C63.4:2003. The Specification limits were in accordance with FCC Part 15.207.

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

The EUT was connected to a PC via USB cable, and the PC was powered by 120V/60Hz AC power.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Solar Electronics	LISN	9252-R-24-BNC	511205	2010-06-25
TTE	Filter, High Pass	H9962-150K-50-21378	K7133	2010-06-10

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

5.4 Test Procedure

During the conducted emissions test, the EUT host system was connected to the host system via a USB cable. The host system was connected to the mains

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".

5.5 Test Environmental Conditions

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

**The testing was performed by Kevin Li on 2010-09-29 in 5 meter chamber 3.*

5.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Cable Loss, and Attenuator Factor adding to the Indicated Reading. The basic equation is as follows:

Corrected Amplitude = Indicated Reading + Cable Loss + Attenuator Factor

For example, a Corrected Amplitude of 34.08 dBuV/m = Indicated Reading (23.85 dBuV) + Cable Factor (0.22 dB) + Attenuator Factor (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

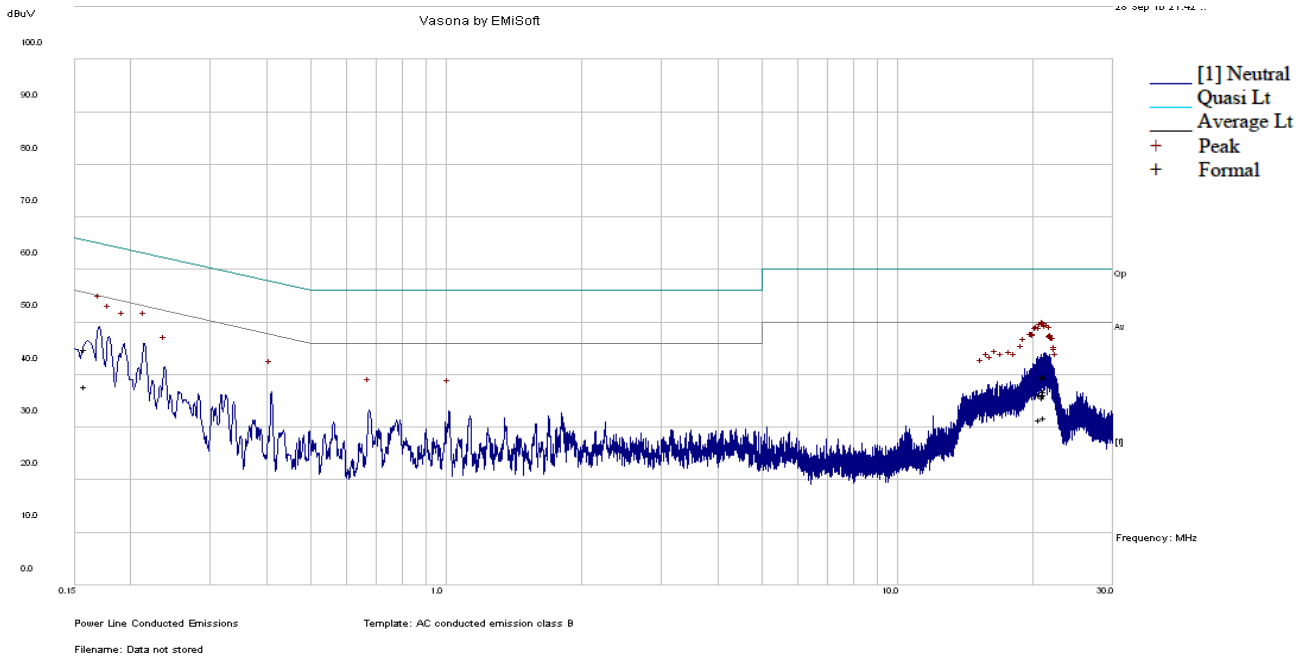
5.7 Summary of Test Results

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

Connection: Desktop Host connected to 120 V/60 Hz, AC			
Margin (dB)	**Frequency (MHz)**	**Conductor Mode (Line/Neutral)**	**Range (MHz)**
-13.75	21.29296	Line	0.15 to 30

5.8 Conducted Emissions Test Plots and Data

120 V, 60 Hz – Line



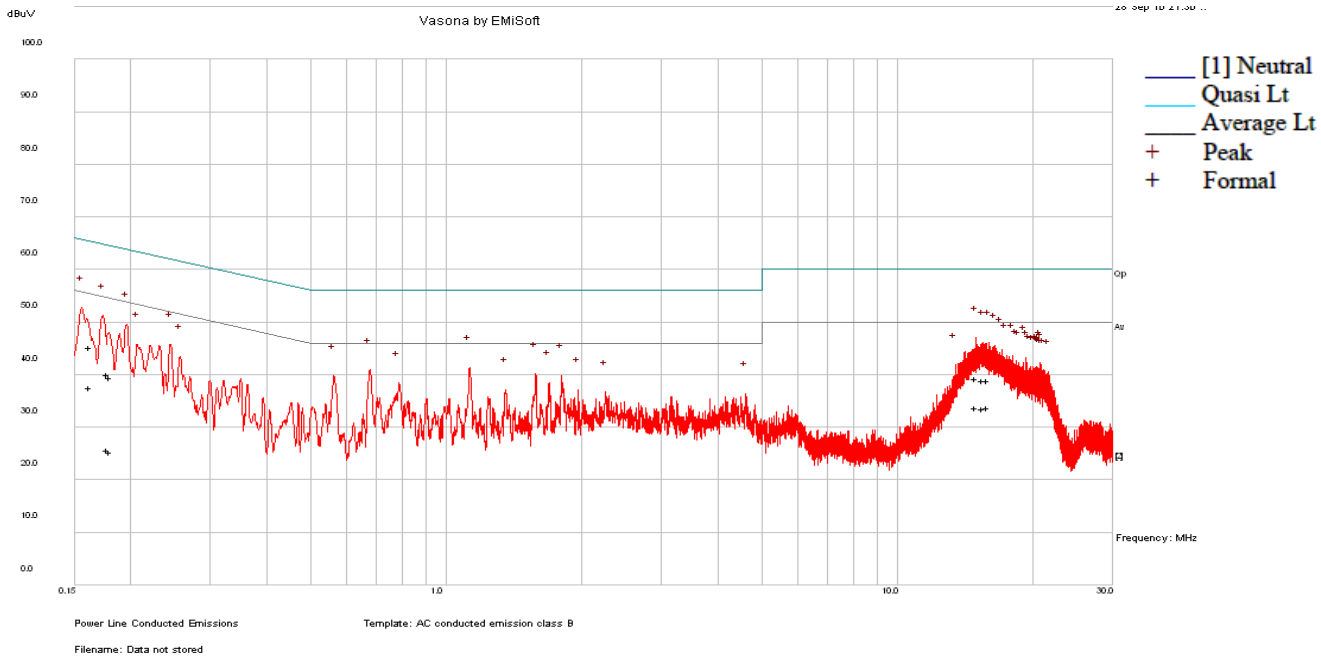
Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
0.158268	44.82	Line	65.55	-20.74
21.17413	36.89	Line	60.00	-23.11
21.29296	39.66	Line	60.00	-20.34
21.04481	39.46	Line	60.00	-20.54
20.78542	36.30	Line	60.00	-23.70
21.10348	39.47	Line	60.00	-20.53

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
0.158268	37.71	Line	55.55	-17.84
21.17413	31.92	Line	50.00	-18.08
21.29296	36.25	Line	50.00	-13.75
21.04481	35.70	Line	50.00	-14.30
20.78542	31.50	Line	50.00	-18.50
21.10348	36.10	Line	50.00	-13.90

120 V, 60 Hz – Neutral



Quasi-Peak Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
0.162834	45.28	Neutral	65.32	-20.04
14.93012	39.27	Neutral	60.00	-20.73
0.177897	40.09	Neutral	64.58	-24.49
15.50747	38.83	Neutral	60.00	-21.17
15.91887	38.99	Neutral	60.00	-21.01
0.180435	39.44	Neutral	64.47	-25.02

Average Measurements

Frequency (MHz)	Corrected Amplitude (dBµV)	Conductor (Line/ Neutral)	Limit (dBµV)	Margin (dB)
0.162834	37.59	Neutral	55.32	-17.72
14.93012	33.70	Neutral	50.00	-16.30
0.177897	25.80	Neutral	54.58	-28.79
15.50747	33.59	Neutral	50.00	-16.41
15.91887	33.80	Neutral	50.00	-16.20
0.180435	25.24	Neutral	54.47	-29.22

6 FCC §15.205, §15.209, §15.249 & IC RSS-210 §A2.9 - Radiated Emissions

6.1 Applicable Standard

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

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

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

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

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

MHz	MHz	MHz	GHz
0.090 – 0.110	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 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

6.2 Test Setup

The radiated emissions tests were performed in 5 meter chambers using the setup in accordance with ANSI C63.4-2003. The specification limits were in accordance with FCC 15 subpart C.

6.3 EUT Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003.

The spacing between the peripherals was 10 centimeters.

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

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=120 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 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 -7dB means the emission is 7dB below the maximum limit.
The equation for margin calculation is as follows:

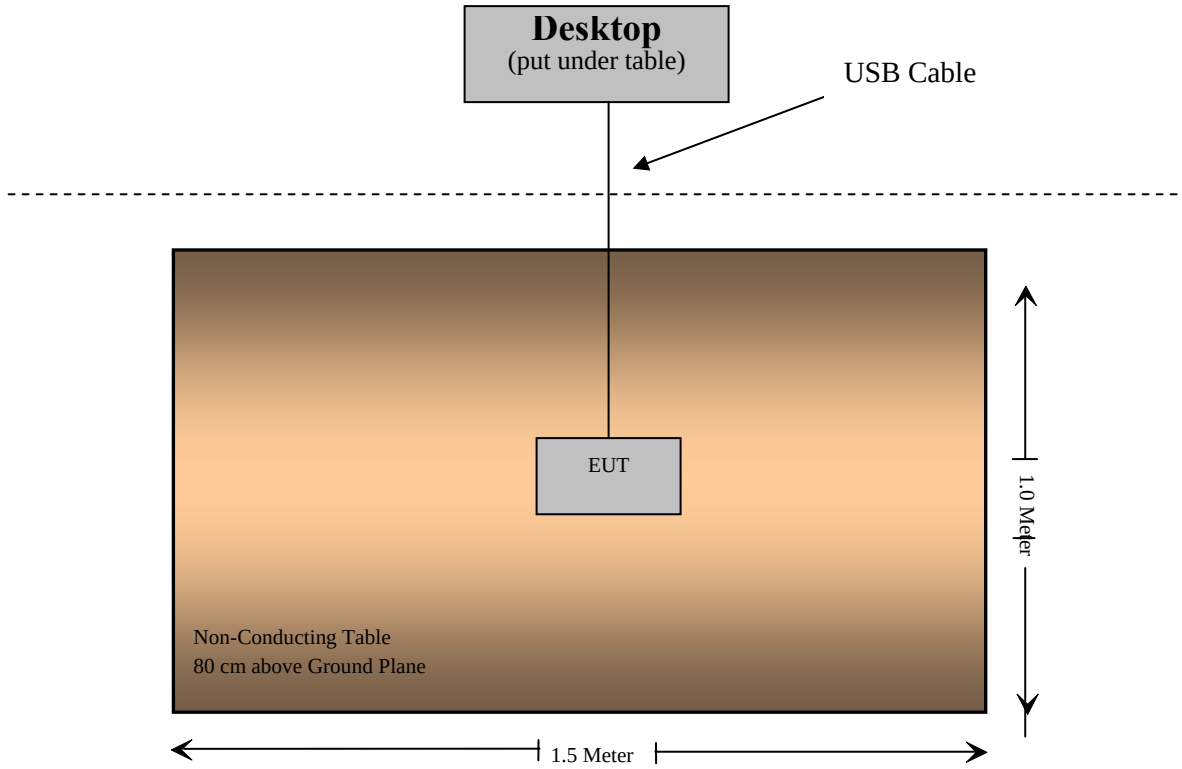
Margin = Corrected Amplitude - Limit

6.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
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	2010-05-28
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09
HP	Pre Amplifier	8449B	3147A00400	2010-02-01

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

6.7 Test Setup Block Diagram



6.8 Test Environmental Conditions

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

**The testing was performed by Kevin Li on2010-09-28 in 5 meter chamber 3.*

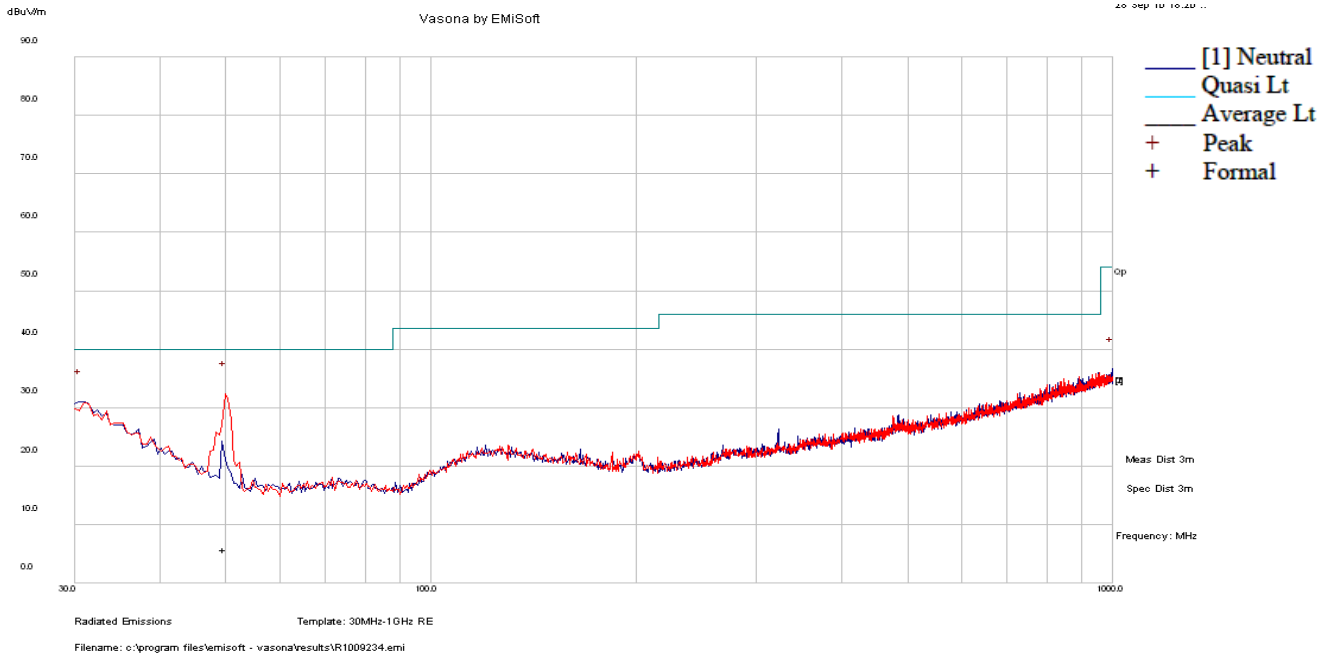
6.9 Summary of Test Results

According to the data hereinafter, the EUT complied with the limits presented in FCC Part 15, Subpart C, section 15.205, 15.209 and 15.249 and IC RSS-210, RSS-Gen, please refer to the following table and plots.

6.10 Radiated Emissions Test Plot & Data

30 MHz – 1 GHz @ 3 meter Distance

Worst Channel: Low Channel



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
49.86775	5.74	366	V	278	40	-34.26

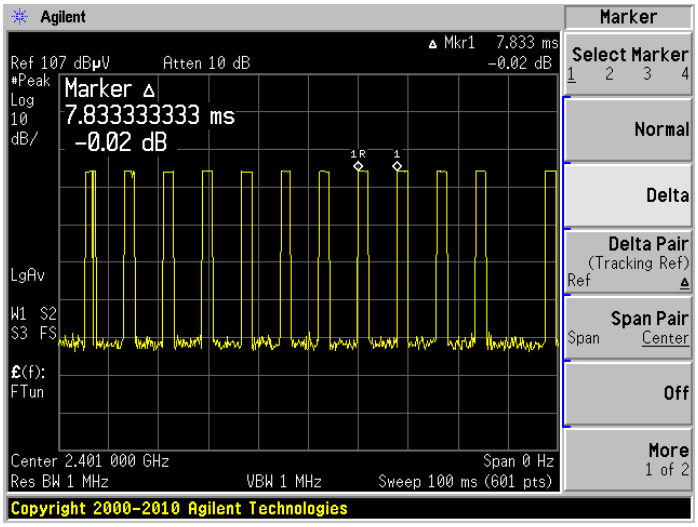
Above 1 GHz @ 3 meter Distance

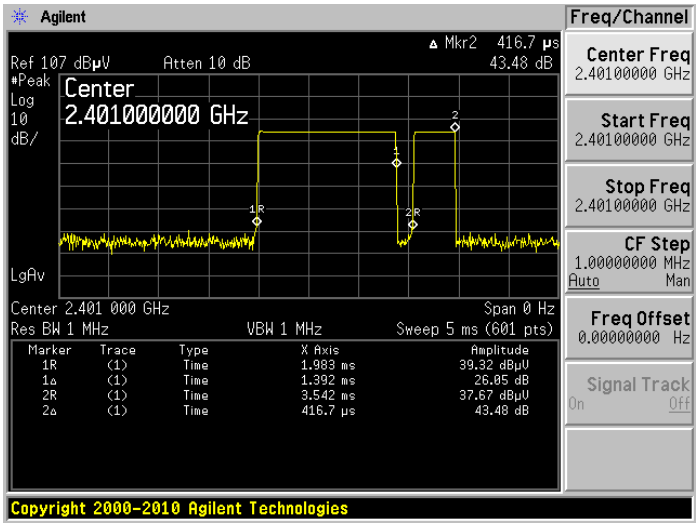
Low Channel: 2401 MHz

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/QP/AV	Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Comment
2401	90.19	Peak	168	103	V	28.63	3.1	27.8	0	94.12	114	-19.88	Fund.
2401	87.86	Peak	98	100	H	28.63	3.1	27.8	0	91.79	114	-22.21	Fund.
2401	90.19	Ave	168	103	V	28.63	3.1	27.8	-12.73	81.39	94	-12.61	Fund.
2401	87.86	Ave	98	100	H	28.63	3.1	27.8	-12.73	79.06	94	-14.94	Fund.
-	-	-	-	-	V	-	-	-	-	-	74	-	Harmonics[1]
-	-	-	-	-	H	-	-	-	-	-	54	-	Harmonics[1]
-	-	-	-	-	V	-	-	-	-	-	74	-	Spurious[2]
-	-	-	-	-	H	-	-	-	-	-	54	-	Spurious[2]

[1]*All Harmonics are at noise floor level and/or 20dB below the limit*
[2]*All Spurious are at noise floor level and/or 20dB below the limit*
Note: • Average Value (*) is calculated based on Peak Reading + Duty Cycle Factor
• Duty Cycle Factor (DCF) = 20 log$_{10}$(Ton/Tp) = -12.73 dB

Please refer to the following plot for the Duty cycle calculation:





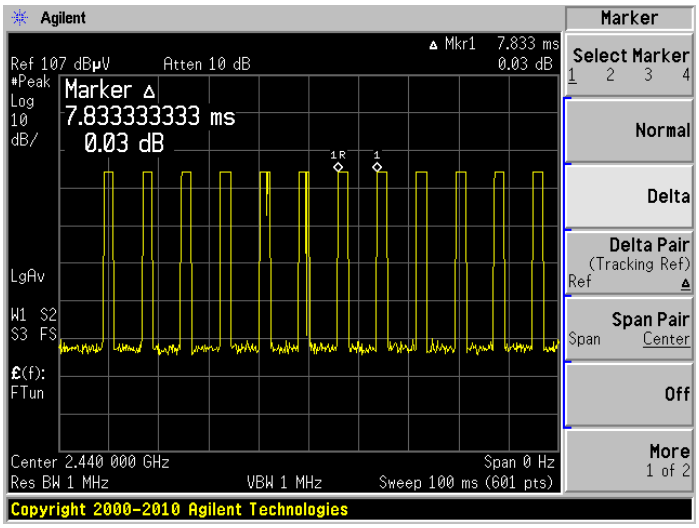
Duty Cycle Plots

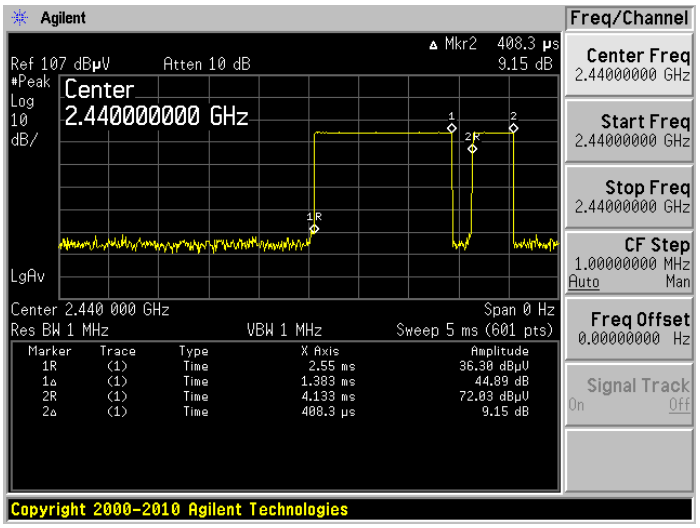
Middle Channel: 2440 MHz

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/QP/AV	Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Comment
2440	89.03	Peak	149	100	V	28.63	3.1	27.8	0	92.96	114	-21.04	Fund.
2440	88.49	Peak	280	159	H	28.63	3.1	27.8	0	92.42	114	-21.58	Fund.
2440	89.03	Ave	168	100	V	28.63	3.1	27.8	-12.73	80.23	94	-13.77	Fund.
2440	88.49	Ave	98	159	H	28.63	3.1	27.8	-12.73	79.69	94	-14.31	Fund.
-	-	-	-	-	V	-	-	-	-	-	74	-	Harmonics[1]
-	-	-	-	-	H	-	-	-	-	-	54	-	Harmonics[1]
-	-	-	-	-	V	-	-	-	-	-	74	-	Spurious[2]
-	-	-	-	-	H	-	-	-	-	-	54	-	Spurious[2]

[1]*All Harmonics are at noise floor level and/or 20dB below the limit*
[2]*All Spurious are at noise floor level and/or 20dB below the limit*
Note: • Average Value (*) is calculated based on Peak Reading + Duty Cycle Factor
• Duty Cycle Factor (DCF) = 20 log$_{10}$(Ton/Tp) = -12.73 dB

Please refer to the following plot for the Duty cycle calculation:





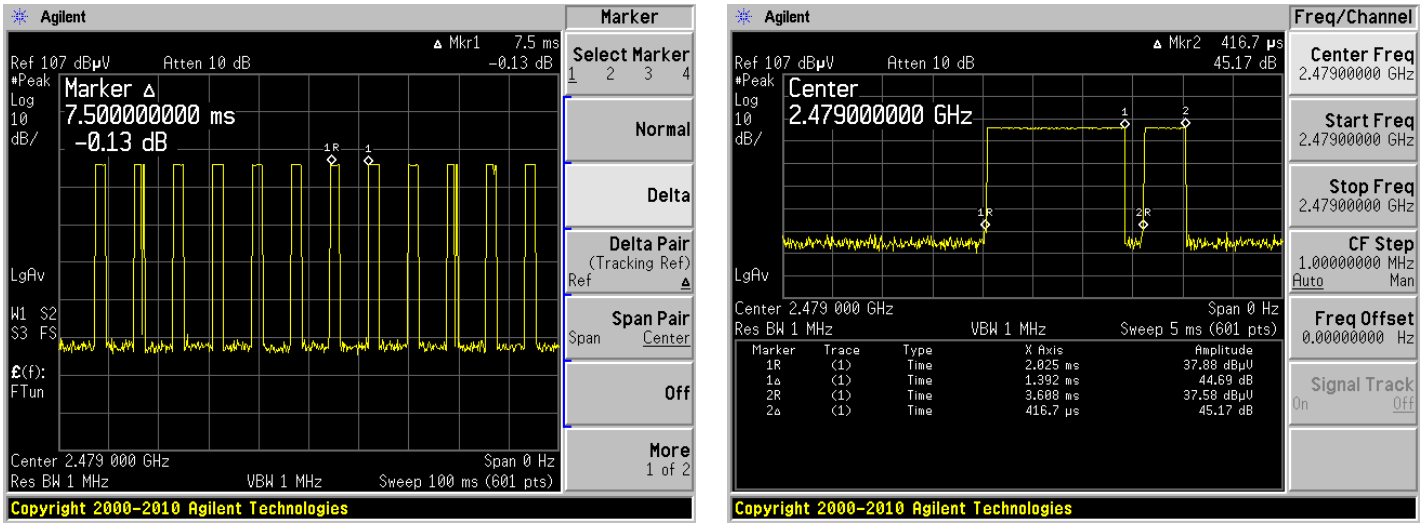
Duty Cycle Plots

High Channel: 2479 MHz

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/QP/AV	Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Comment
2479	89.18	Peak	329	100	V	28.63	3.1	27.8	0	93.11	114	-20.89	Fund.
2479	87.67	Peak	281	153	H	28.63	3.1	27.8	0	91.6	114	-22.4	Fund.
2479	89.18	Ave	329	100	V	28.63	3.1	27.8	-12.73	80.38	94	-13.62	Fund.
2479	87.67	Ave	281	153	H	28.63	3.1	27.8	-12.73	78.87	94	-15.13	Fund.
-	-	-	-	-	V	-	-	-	-	-	74	-	Harmonics[1]
-	-	-	-	-	H	-	-	-	-	-	54	-	Harmonics[1]
-	-	-	-	-	V	-	-	-	-	-	74	-	Spurious[2]
-	-	-	-	-	H	-	-	-	-	-	54	-	Spurious[2]

[1]*All Harmonics are at noise floor level and/or 20dB below the limit*
[2]*All Spurious are at noise floor level and/or 20dB below the limit*
Note: • Average Value (*) is calculated based on Peak Reading + Duty Cycle Factor
• Duty Cycle Factor (DCF) = 20 log$_{10}$(Ton/Tp) = -12.73 dB

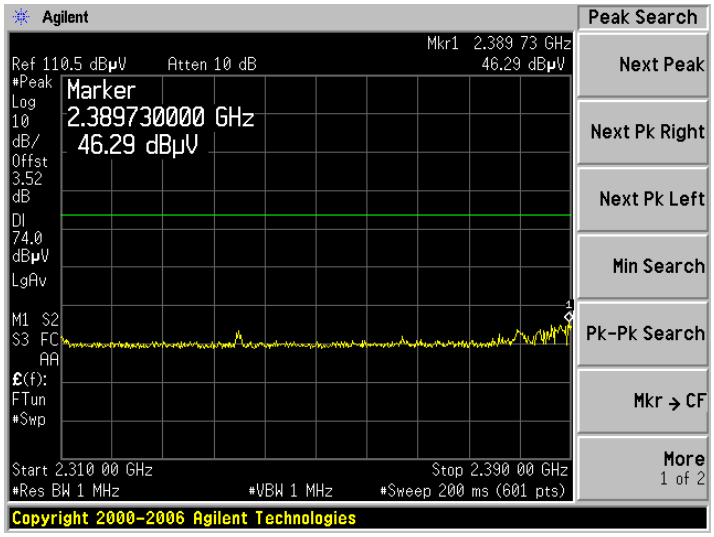
Please refer to the following plot for the Duty cycle calculation:



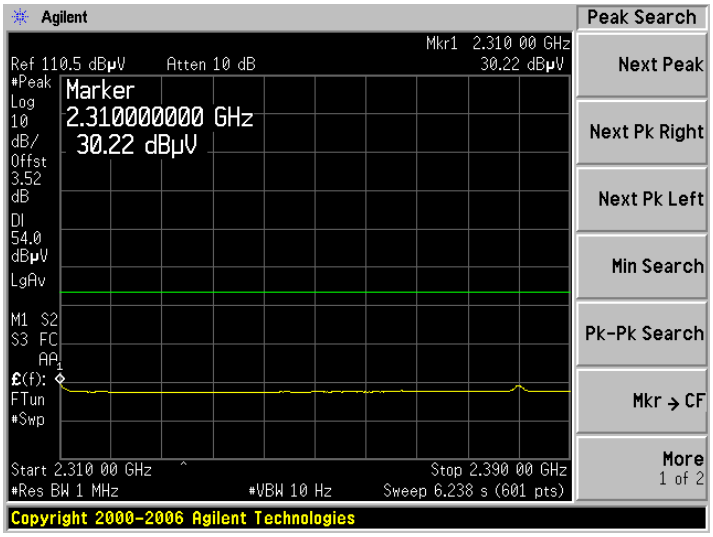
Duty Cycle Plots

Restricted Band Emissions

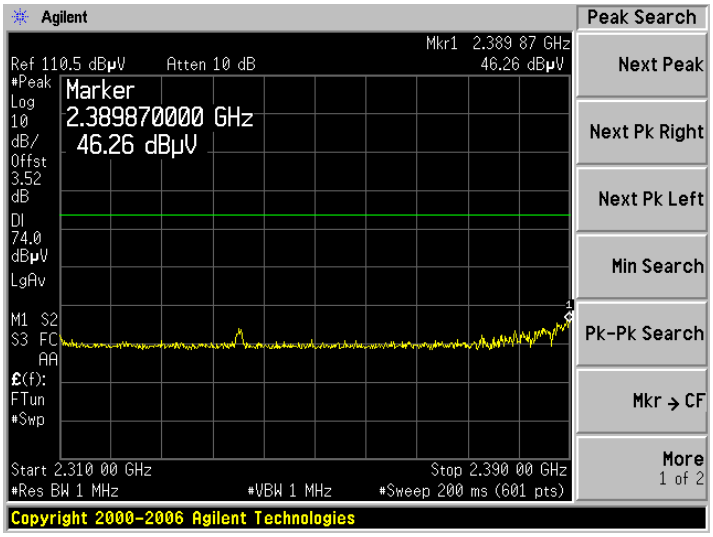
Lowest Channel at Horizontal, Peak



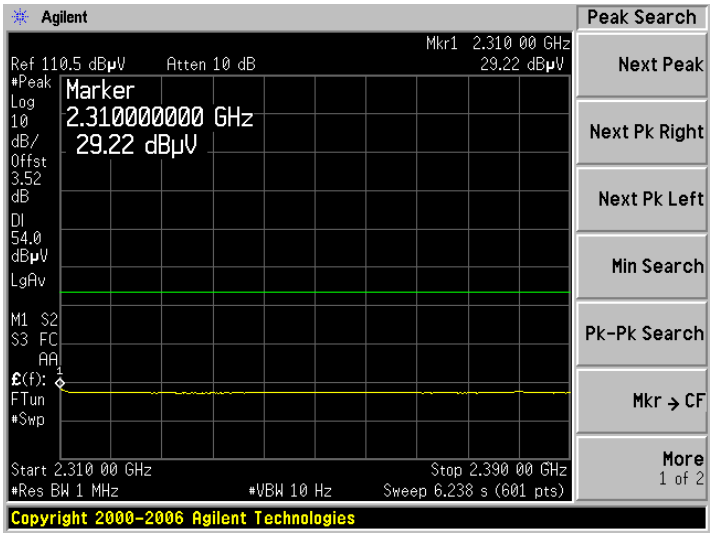
Lowest Channel at Horizontal, Average



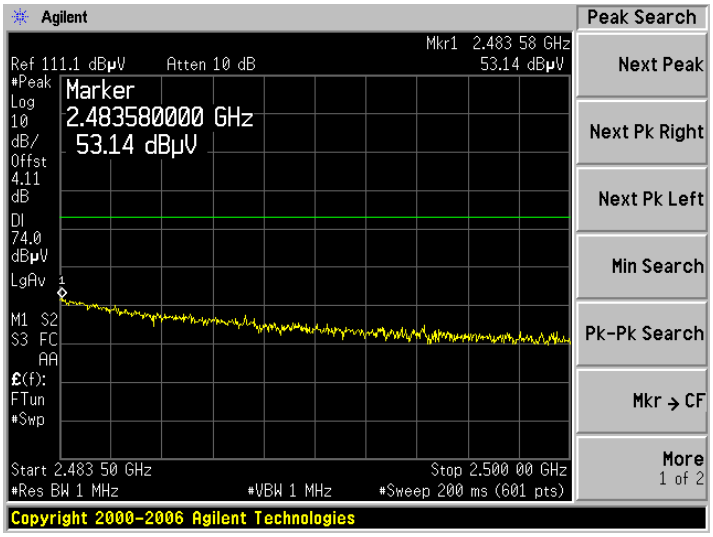
Lowest Channel at Vertical, Peak



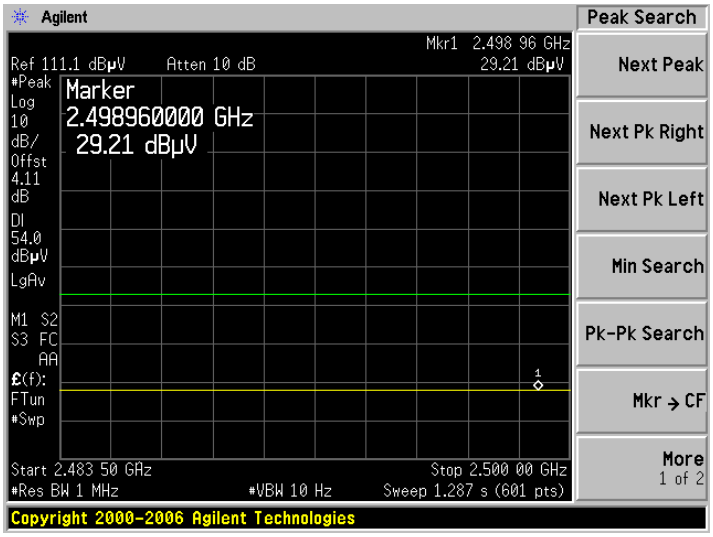
Lowest Channel at Vertical, Average



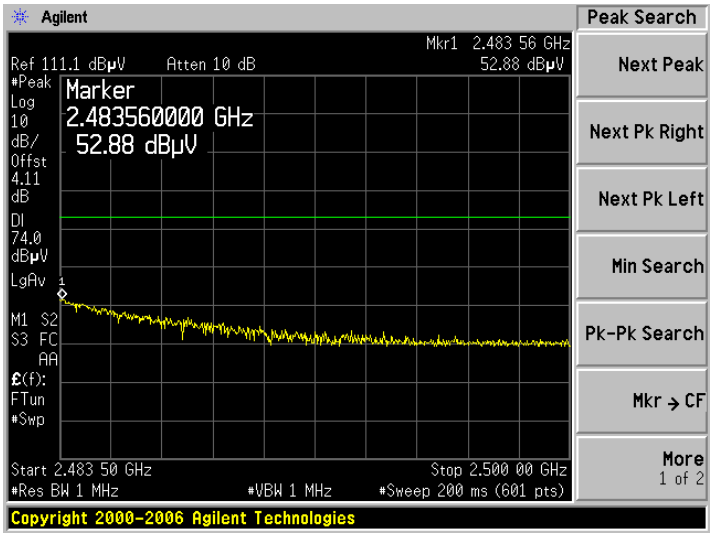
Highest Channel at Horizontal, Peak



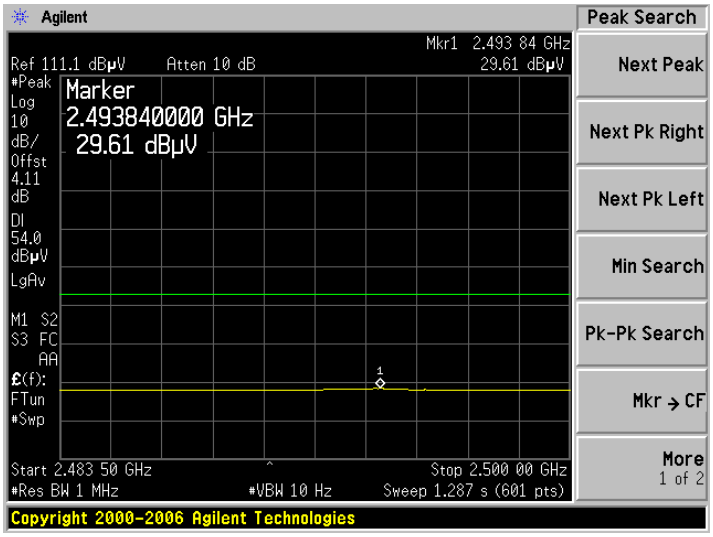
Highest Channel at Horizontal, Average



Highest Channel at Vertical, Peak



Highest Channel at Vertical, Average



7 FCC §15.249(d) & IC RSS-210 §A 2.9– Out of Band Emissions

7.1 Applicable Standard

According to §15.249(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 FCC §15.209(a): 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.

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT 3 meters away measurement instrument. Turn on the EUT. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-05-28
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09
HP	Pre Amplifier	8449B	3147A00400	2010-02-01

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

7.4 Test Environmental Conditions

Temperature:	22°C
Relative Humidity:	31%
ATM Pressure:	102kPa

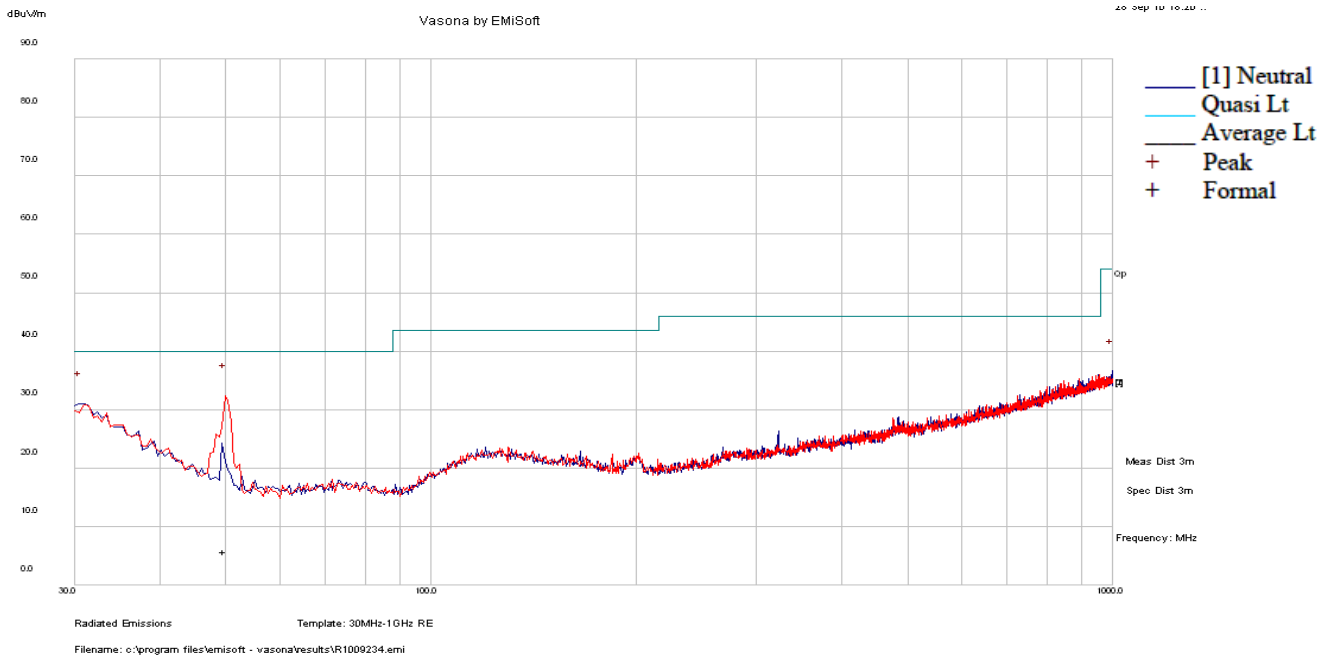
The testing was performed by Kevin Li on 2010-09-28 in 5 meter chamber #3.

7.5 Test Results

According to the data hereinafter, the out of band emissions of the EUT complied with the limits presented in FCC Part 15, Subpart C, section 15.209 and 15.249 and IC RSS-210, RSS-Gen , please refer to the following table and plots.

30 MHz – 1 GHz @ 3 meter Distance

Worst Channel: Low Channel



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
49.86775	5.74	366	V	278	40	-34.26

Above 1 GHz @ 3 meter Distance

Low Channel: 2401 MHz

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/QP/AV	Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Comment
-	-	-	-	-	V	-	-	-	-	-	74	-	Spurious[1]
-	-	-	-	-	H	-	-	-	-	-	54	-	Spurious[1]

Middle Channel: 2440 MHz

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/QP/AV	Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Comment
-	-	-	-	-	V	-	-	-	-	-	74	-	Spurious[1]
-	-	-	-	-	H	-	-	-	-	-	54	-	Spurious[1]

High Channel: 2479 MHz

Freq. (MHz)	S.A. Reading (dBuV)	Detector PK/QP/AV	Azimuth Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Duty Cycle Factor (dB)	Cord. Amp. (dBµV/m)	FCC & IC		
				Height (cm)	Polar. (H/V)	Factor (dB/m)					Limit (dBuV/m)	Margin (dB)	Comment
-	-	-	-	-	V	-	-	-	-	-	74	-	Spurious[1]
-	-	-	-	-	H	-	-	-	-	-	54	-	Spurious[1]

[1]*All Spurious are at noise floor level and/or 20dB below the limit*

8 FCC §15.215 & IC RSS-Gen §4.6.1 – 20 dB & 99% Occupied Bandwidth

8.1 Applicable Standard

FCC §15.215.
IC RSS-Gen §4.6.1

8.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT 3 meters away from measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emissions bandwidth. (6 dB bandwidth for DXT)
4. Repeat above procedures until all frequencies measured were complete.

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-05-28
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09
HP	Pre Amplifier	8449B	3147A00400	2010-02-01

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:	22°C
Relative Humidity:	33 %
ATM Pressure:	101.1kPa

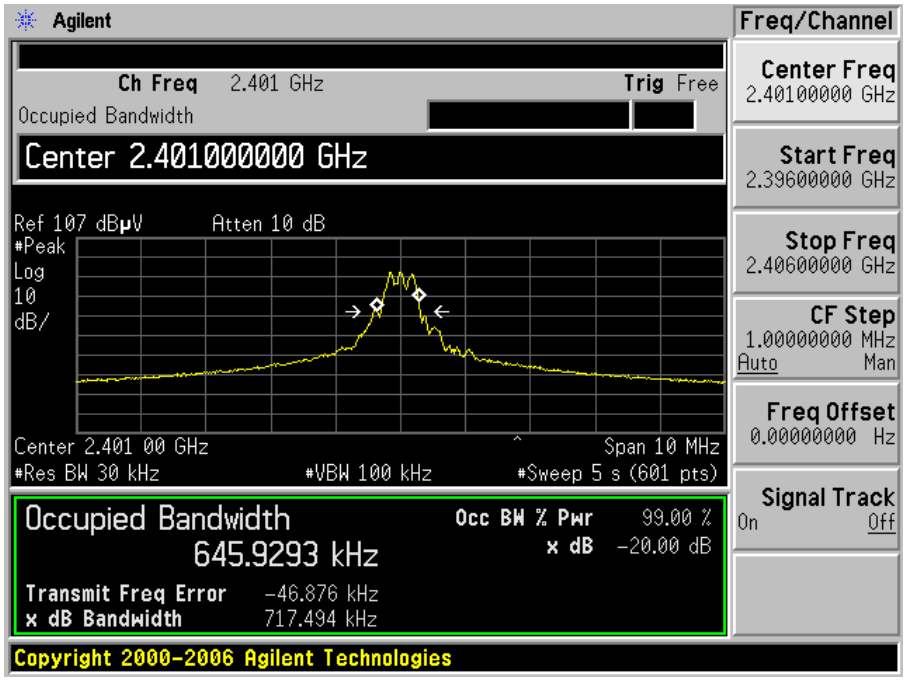
The testing was performed by Kevin Li on2009-09-28 in 5 meter chamber 3.

8.5 Test Results

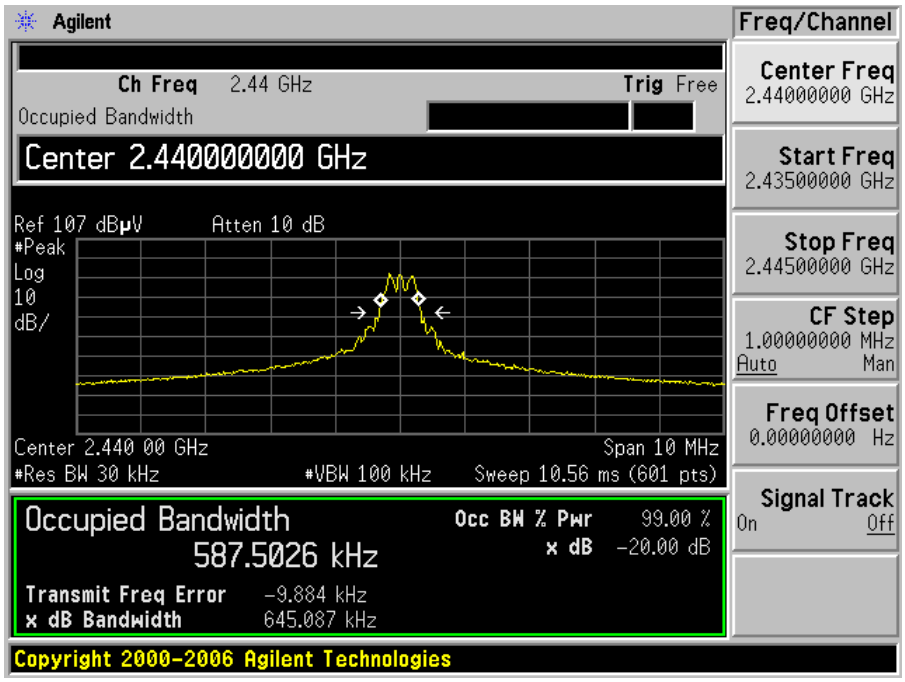
Channel	Frequency (MHz)	20 dB Occupied Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
Low	2401	717.494	645.929
Middle	2440	645.087	587.503
High	2479	711.340	688.108

Please refer to the following plots for detailed test results

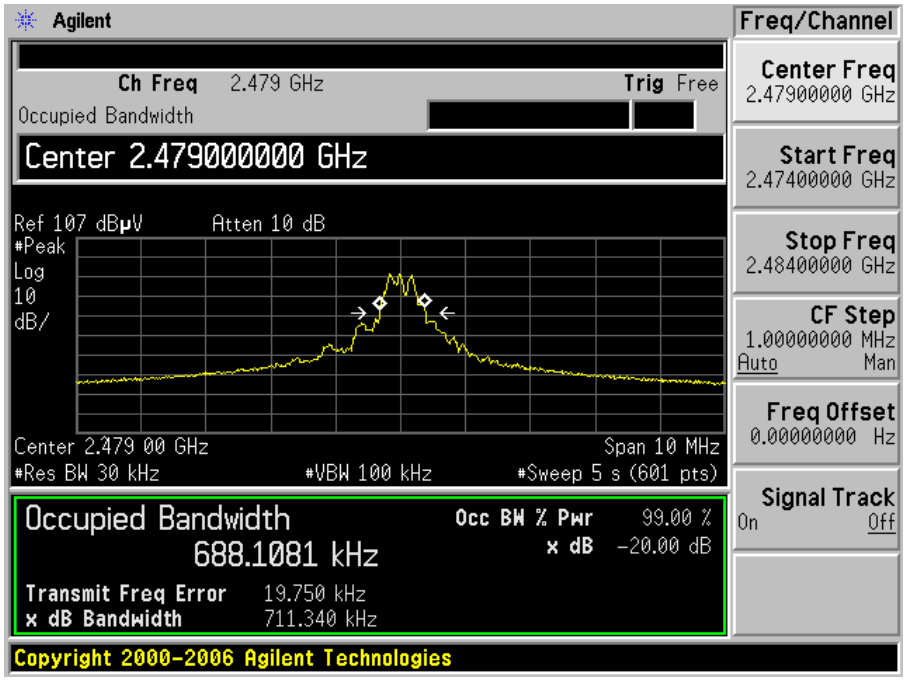
Low Channel



Middle Channel



High Channel



9 IC RSS-Gen §4.10 & §6 - Receiver Spurious Emission

9.1 Applicable Standard

The following receiver spurious emission limits shall be complied with:
(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

Table 1 - Spurious Emission Limits for Receivers

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

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

9.2 Test Setup

The radiated emissions tests were performed using the setup accordance with the ANSI C63.4-2003.

The spacing between the peripherals was 10 centimeters.

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

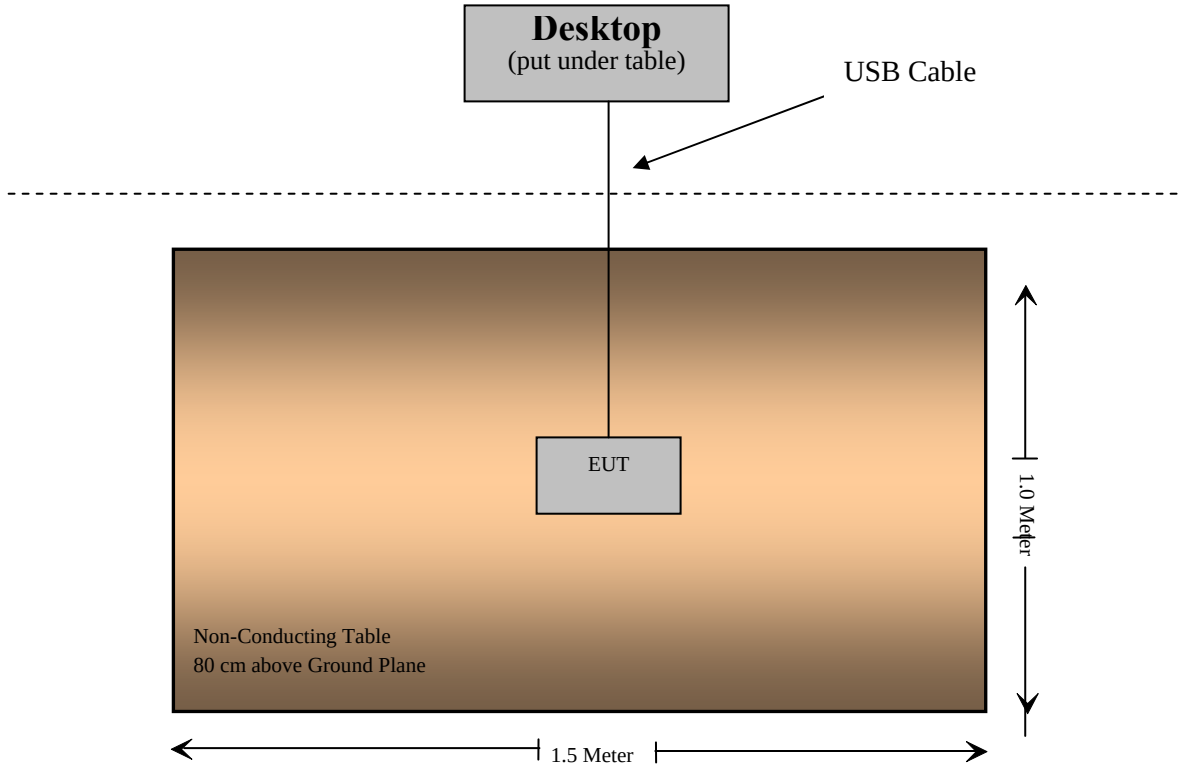
9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
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	2010-05-28
Agilent	PSA Series Spectrum Analyzer	E4440A	MY44303352	2010-05-09
HP	Pre Amplifier	8449B	3147A00400	2010-02-01

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

9.4 Test Setup Block Diagram

Radiated Emissions



9.5 Test Environmental Conditions

Temperature:	22°C
Relative Humidity:	31 %
ATM Pressure:	101.2kPa

The testing was performed by Kevin Li on 2010-09-28 in 5 meter chamber 3.

9.6 Test Results

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

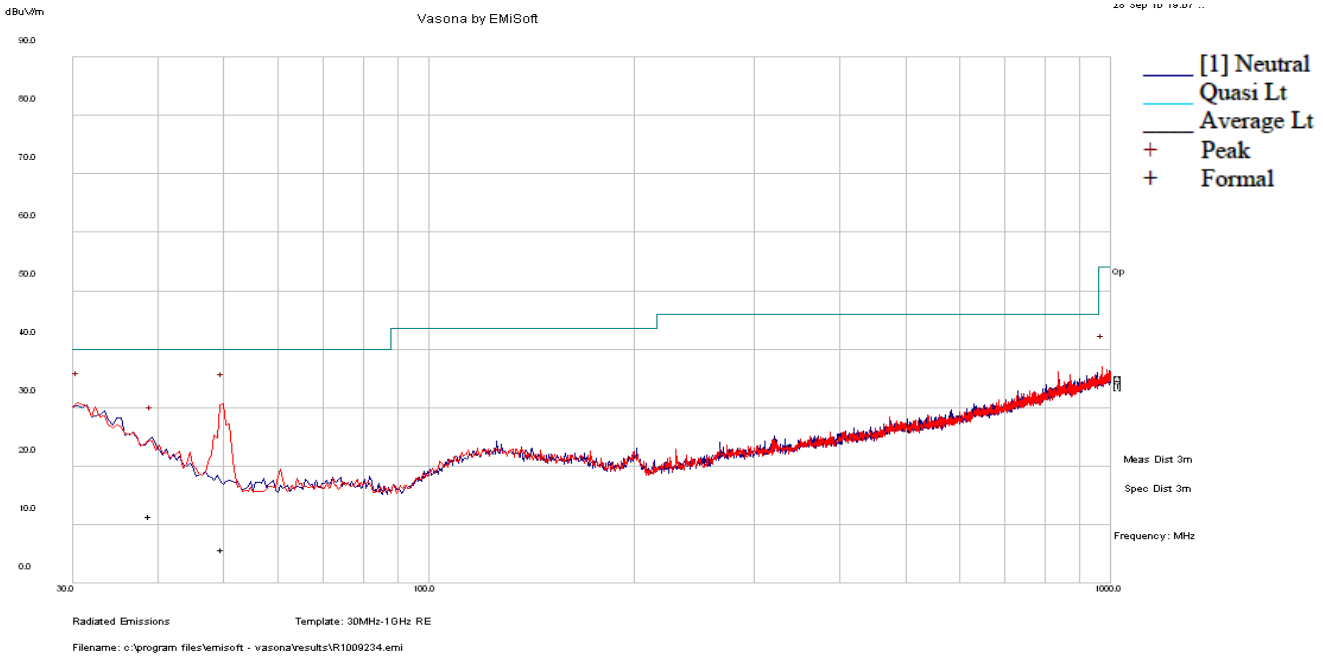
Receiving Mode:

Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Range
-28.58	39.05475	Horizontal	30 MHz to 1 GHz
-	-	-	Above 1 GHz[1]

[1]*Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.*

9.7 Radiated Emissions Test Plot & Data

1) 30 MHz – 1 GHz @ 3 meter Distance



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Azimuth (degrees)	Limit (dBµV/m)	Margin (dB)
49.7245	5.74	299	V	81	40	-34.26
39.05475	11.42	102	H	171	40	-28.58

2) Above 1 GHz @ 3 meter Distance

Frequency (MHz)	S.A. Reading (dBµV)	Table Azimuth (degree)	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	RSS-Gen		Comments
			Height (cm)	Polarity (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)	
-	-	-	-	-	-	-	-	-	-	-	*1*
-	-	-	-	-	-	-	-	-	-	-	*1*

[1]Note: All emission levels are at the noise floor and/or more then 20 dB below the limit.