



NVLAP LAB CODE 200707-0



FCC PART 15.249

MEASUREMENT AND TEST REPORT

For

Voyetra Turtle Beach, Inc.

150 Clearbrook Road, Ste 162,
Elmsford, NY 10523, USA

FCC ID: XGB-TB2165A
Model: X31

Report Type: Original Report	Product Type: X31 Wireless RF Headphone
Test Engineer: Weir Zhong	<i>Weir Zhong</i>
Report Number: RSZ10022602	
Report Date: 2010-04-01	
Reviewed By: EMC Engineer	<i>Merry Zhao</i>
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008

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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "*" (Rev.2)

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Voyetra Turtle Beach, Inc.* 's product, model *X31* (FCC ID: *XGB-TB2165A*), or the "EUT" as referred to in this report is a *X31 Wireless RF Headphone* which measures *which* measures approximately 15 cm L x 20 cm W x 9 cm H, rated input voltage: DC 2*1.5V AAA battery.

** All measurement and test data in this report was gathered from production sample serial number: 1002039 (Assigned by BAACL, Shenzhen). The EUT was received on 2010-02-26.*

Objective

This Type approval report is prepared on behalf of *Voyetra Turtle Beach, Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.109, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted 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.

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

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 21, 2007. 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 has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Equipment Modifications

No modifications were made to the unit tested.

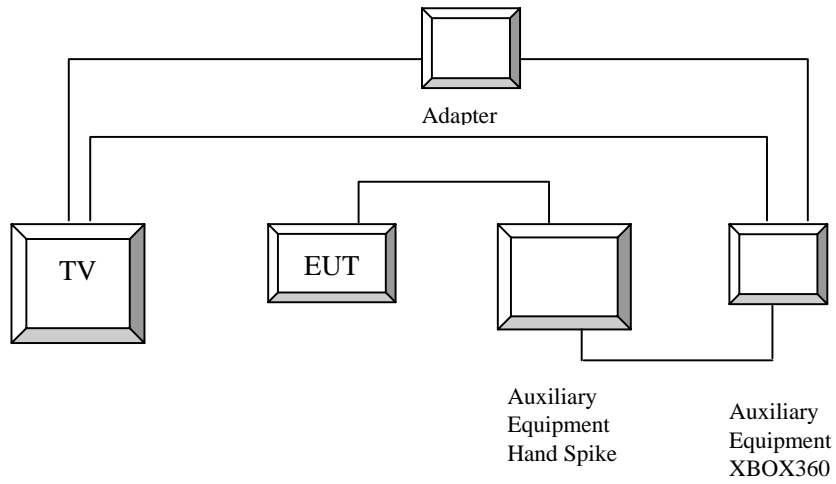
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
KONKA	TV	T14FA073	AQX337YY5029056	DOC
Microsoft	X BOX	XBOX360	504706661306	N/A
Microsoft	AC Adapter	DSP-186CB-1A	9902B013806613	N/A

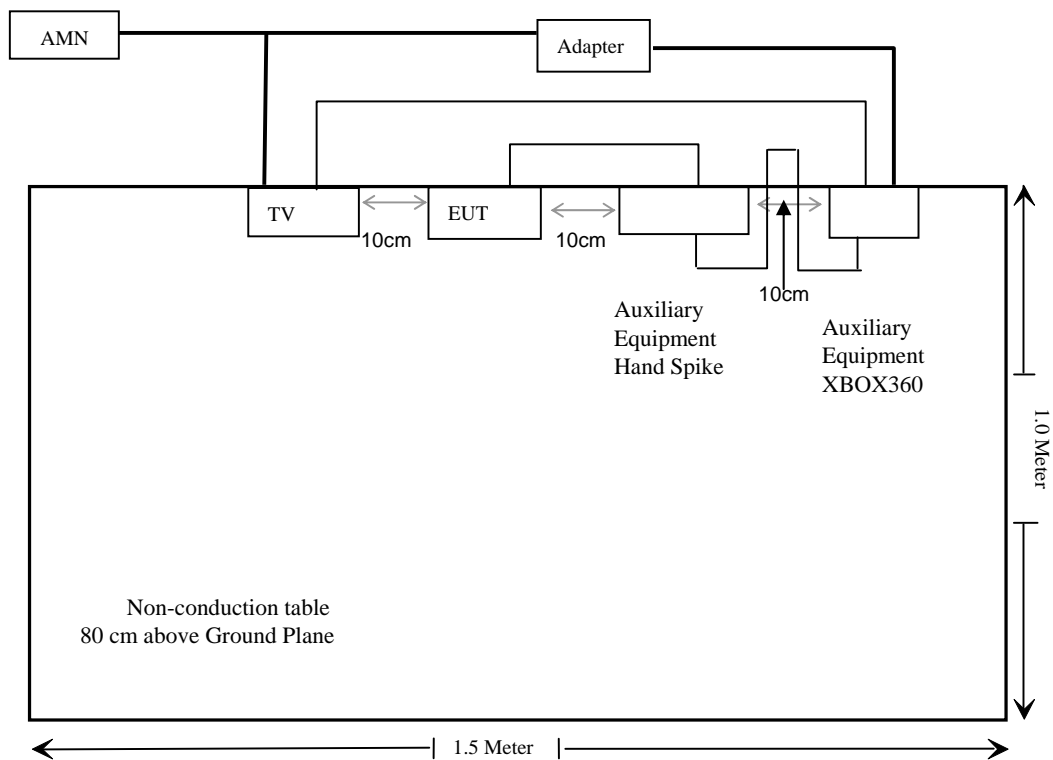
External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielded Detachable HD AV Cable	2.5	EUT	Audio Port/XBOX360
Unshielded Undetachable Hand Spike Cable	2.8	Signal Port/ XBOX360	Hand Spike
Unshielded Detachable Audio Control Cable	1.2	Hand Spike	EUT
Shielded Detachable AC Cable	1.8	AC Port/Adapter	AC Mains

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	N/A *
§15.109, §15.205(a), §15.209(a), 15.249(a), §15.249(c), §15.35	Radiated Emissions	Compliant
§15.249(d)	Out of Band Emissions	Compliant

Note: * Battery operation.

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, 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.

Antenna Connector Construction

The EUT has a printed antenna on PCB, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

Result: Compliant.

Please refer to the EUT photos.

FCC §15.109, §15.205, §15.209 & §15.249 - RADIATED EMISSIONS

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

As per FCC §15.249 (c), Field strength limits are specified at a distance of 3 meters.

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 best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 4.0 dB.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

Below 1000 MHz:

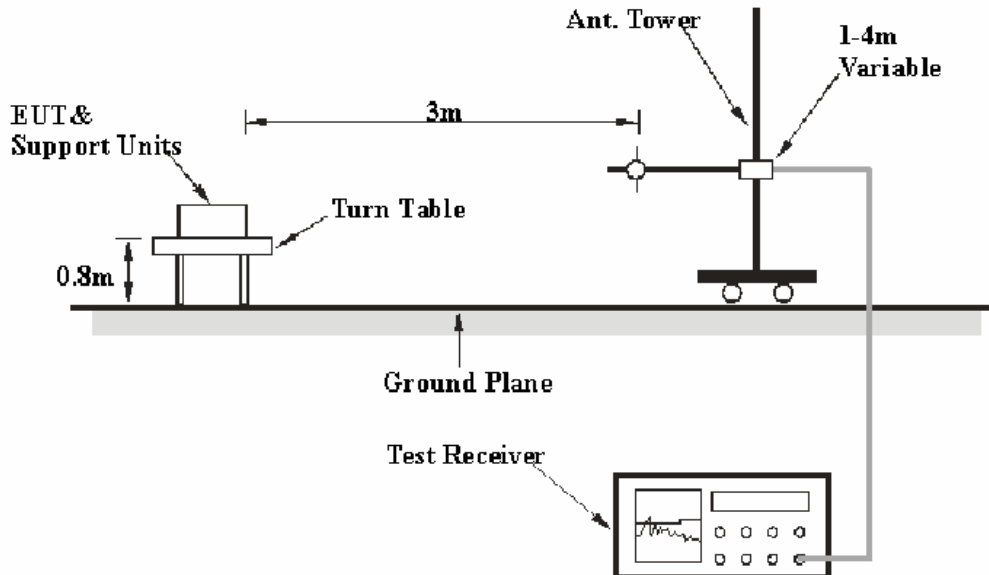
$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000 MHz:

$$\text{Peak: RBW} = 1\text{MHz} / \text{VBW} = 1\text{MHz} / \text{Sweep} = \text{Auto}$$

$$\text{Average: RBW} = 1\text{MHz} / \text{VBW} = 10\text{Hz} / \text{Sweep} = \text{Auto}$$

Test Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209, FCC 15.109 and FCC §15.249 limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2009-08-02	2010-08-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2009-04-12	2010-04-12
HP	Amplifier	8449B	3008A00277	2009-09-12	2010-09-11
Sunol Sciences	Horn Antenna	DRH-118	A052604	2009-05-05	2010-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2009-07-08	2010-07-07

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

For the radiated emissions test, the TV and other support equipment were connected to the AC floor outlet.

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, 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.

Corrected Amplitude & Margin Calculation

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

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 B means the emission is 7 B below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.109 and 15.249, with the worst margin reading of:

Below 1 GHz:

Transmitting Mode: **7.9 dB** at **30.656556 MHz** in the **Vertical** polarization.
Receiving Mode: **11.2 dB** at **30.412125 MHz** in the **Vertical** polarization

Above 1 GHz:

Transmitting Mode: **7.39 dB** at **4808 MHz** in the **Horizontal** polarization, Low Channel
Transmitting Mode: **7.23 dB** at **4880 MHz** in the **Horizontal** polarization, Middle channel
Transmitting Mode: **9.91 dB** at **4952MHz** in the **Horizontal** polarization, High channel

Test Data

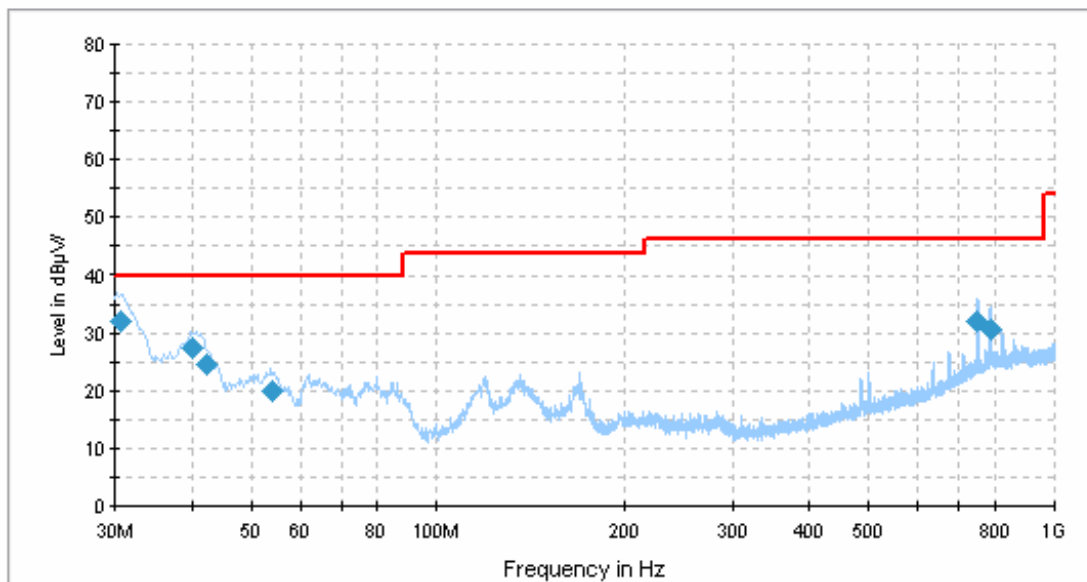
Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	56%
ATM Pressure:	100.0 kPa

The testing was performed by Weir Zhong on 2010-03-11.

Test Mode: Transmitting (Worse case)

Below 1 GHz:



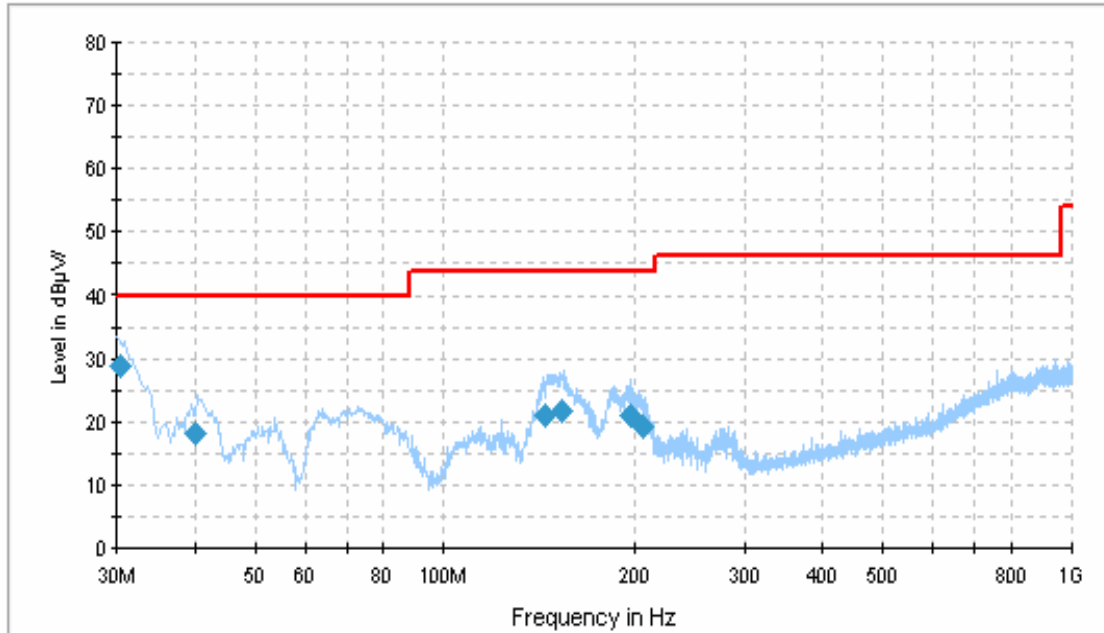
Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Limit (dBµV/m)	Margin (dB)
30.656556	32.1	99.0	V	122.0	40.0	7.9
40.059250	27.4	99.0	V	208.0	40.0	12.6
750.370250	32.3	201.0	V	269.0	46.0	13.7
42.186500	24.8	132.0	V	222.0	40.0	15.2
788.778500	30.8	116.0	V	227.0	46.0	15.2
54.247250	20.0	99.0	V	263.0	40.0	20.0

Above 1 GHz:

Frequency (MHz)	S.A. Reading (dBµV/m)	Detector PK/AV	Direction Degree	Test Antenna			Cable Loss (dB)	Pre Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC 15.209/15.249		
				Height (m)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)	comment
Low Channel												
2404	83.79	AV	84	1.7	V	30.3	7.90	33.9	88.09	94	5.91	Fund.
4808	56.25	AV	257	2.1	H	36.3	7.76	33.7	66.61	74	7.39	harmonic
2404	80.02	AV	212	2.2	H	30.9	7.90	33.9	84.92	94	9.08	Fund.
4808	52.41	AV	269	1.8	V	35.0	7.76	33.7	61.47	74	12.53	harmonic
2386.31	35.06	AV	0	1.5	H	30.5	7.90	33.9	39.56	54	14.44	spurious
2386.31	34.12	AV	146	1.1	V	30.1	7.90	33.9	38.22	54	15.78	spurious
4808	62.35	PK	257	2.1	H	36.3	7.76	33.7	72.71	94	21.29	harmonic
2404	88.11	PK	84	1.7	V	30.3	7.90	33.9	92.41	114	21.59	Fund.
2386.31	47.66	PK	0	1.5	H	30.5	7.90	33.9	52.16	74	21.84	spurious
7212	37.32	AV	155	1.6	H	39.2	9.12	33.6	52.04	74	21.96	harmonic
2386.31	46.51	PK	146	1.1	V	30.1	7.90	33.9	50.61	74	23.39	spurious
7212	37.01	AV	323	1.0	V	38.0	9.12	33.6	50.53	74	23.47	harmonic
2404	84.19	PK	212	2.2	H	30.9	7.90	33.9	89.09	114	24.91	Fund.
4808	58.33	PK	269	1.8	V	35.0	7.76	33.7	67.39	94	26.61	harmonic
7212	49.67	PK	155	1.6	H	39.2	9.12	33.6	64.39	94	29.61	harmonic
7212	48.89	PK	323	1.0	V	38.0	9.12	33.6	62.41	94	31.59	harmonic
Middle Channel												
2440	83.70	AV	56	1.1	V	30.4	7.95	33.9	88.15	94	5.85	Fund.
4880	55.95	AV	255	1.5	H	36.6	7.92	33.7	66.77	74	7.23	harmonic
2440	80.17	AV	210	2.0	H	31.0	7.95	33.9	85.22	94	8.78	Fund.
4880	53.12	AV	179	1.6	V	35.4	7.92	33.7	62.74	74	11.26	harmonic
2399.87	35.10	AV	360	2.0	H	32.5	8.05	33.8	41.85	54	12.15	spurious
2399.87	34.13	AV	188	1.0	V	31.0	8.05	33.8	39.38	54	14.62	spurious
2399.87	47.50	PK	360	2.0	H	32.5	8.05	33.8	54.25	74	19.75	spurious
2440	88.15	PK	56	1.1	V	30.4	7.95	33.9	92.6	114	21.4	Fund.
7320	37.75	AV	142	1.7	H	39.3	9.15	33.6	52.6	74	21.4	harmonic
4880	61.47	PK	255	1.5	H	36.6	7.92	33.7	72.29	94	21.71	harmonic
2399.87	46.38	PK	188	1.0	V	31.0	8.05	33.8	51.63	74	22.37	spurious
7320	37.39	AV	46	1.1	V	38.1	9.15	33.6	51.04	74	22.96	harmonic
2440	85.34	PK	210	2.0	H	31.0	7.95	33.9	90.39	114	23.61	Fund.
4880	59.67	PK	179	1.6	V	35.4	7.92	33.7	69.29	94	24.71	harmonic
7320	50.16	PK	142	1.7	H	39.3	9.15	33.6	65.01	94	28.99	harmonic
7320	49.83	PK	46	1.1	V	38.1	9.15	33.6	63.48	94	30.52	harmonic

Frequency (MHz)	S.A. Reading (dB μ V/m)	Detector PK/AV	Direction Degree	Test Antenna			Cable Loss (dB)	Pre Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	FCC 15.209/15.249		
				Height (m)	Polar (H/V)	Factor (dB)				Limit (dB μ V/m)	Margin (dB)	Comment
High Channel												
2476	84.05	AV	181	2.0	V	30.5	7.97	33.9	88.62	94	5.38	Fund.
2476	80.12	AV	255	2.0	H	31.1	7.97	33.9	85.29	94	8.71	Fund.
4952	53.24	AV	259	2.0	H	36.6	7.95	33.7	64.09	74	9.91	harmonic
4952	53.18	AV	360	1.5	V	35.4	7.95	33.7	62.83	74	11.17	harmonic
2485.96	35.27	AV	52	1.5	H	32.5	7.97	33.9	41.84	54	12.16	spurious
2485.96	34.51	AV	146	1.0	V	31.0	7.97	33.9	39.58	54	14.42	spurious
2485.96	47.79	PK	52	1.5	H	32.5	7.97	33.9	54.36	74	19.64	spurious
2476	89.17	PK	181	2.0	V	30.5	7.97	33.9	93.74	114	20.26	Fund.
7428	37.65	AV	34	1.8	H	39.4	9.18	33.6	52.63	74	21.37	harmonic
2485.96	46.75	PK	146	1.0	V	31.0	7.97	33.9	51.82	74	22.18	spurious
7428	36.91	AV	182	1.1	V	38.1	9.18	33.6	50.59	74	23.41	harmonic
2476	85.26	PK	255	2.0	H	31.1	7.97	33.9	90.43	114	23.57	Fund.
4952	58.83	PK	259	2.0	H	36.6	7.95	33.7	69.68	94	24.32	harmonic
4952	59.60	PK	360	1.5	V	35.4	7.95	33.7	69.25	94	24.75	harmonic
7428	50.30	PK	34	1.8	H	39.4	9.18	33.6	65.28	94	28.72	harmonic
7428	49.37	PK	182	1.1	V	38.1	9.18	33.6	63.05	94	30.95	harmonic

Test mode: Receiving (Worse case)



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Limit (dBµV/m)	Margin (dB)
30.412125	28.8	101.0	V	39.0	40.0	11.2
40.149000	18.3	120.0	V	40.0	40.0	21.7
153.481250	21.7	111.0	V	0.0	43.5	21.8
143.927000	21.1	162.0	V	0.0	43.5	22.4
196.759000	20.9	111.0	V	58.0	43.5	22.6
207.065000	19.3	111.0	V	97.0	43.5	24.2

Note: Radiated emission above 1 GHz of receiving mode has not detected, so there is no record about it.

FCC §15.249(d) – OUT OF BAND EMISSIONS

Applicable Standard

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.

Test Procedure

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, 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 at the band edge. The receiving antenna should be changed the polarization both of horizontal and vertical.

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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 best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 4.0 dB.

Test Equipment Setup

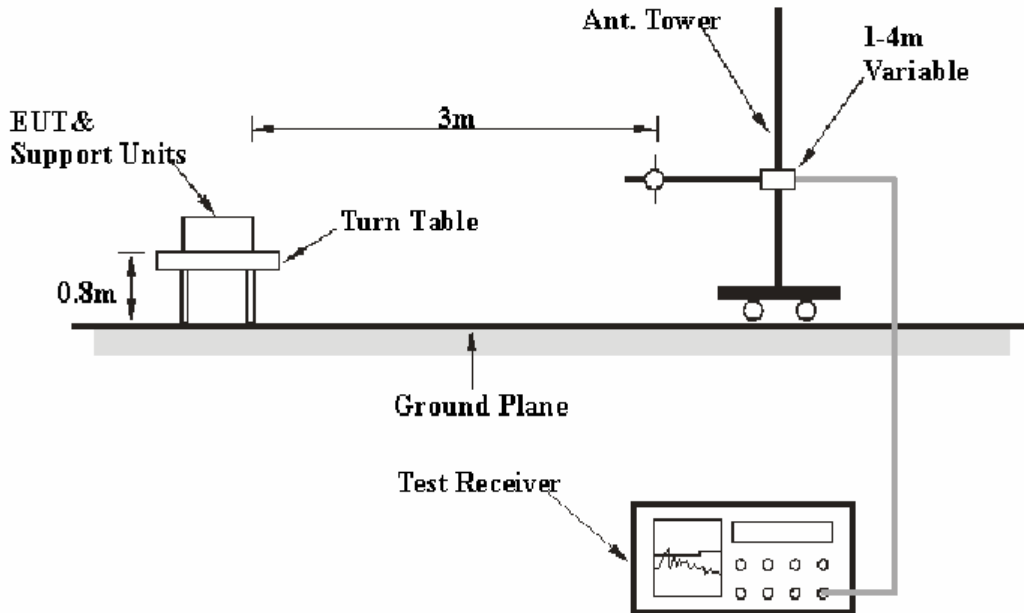
The spectrum analyzer or receiver is set as:

Above 1000 MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

Test Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.249 limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2009-11-24	2010-11-23
HP	Amplifier	8447E	1937A01046	2009-08-02	2010-08-02
Sunol Sciences	Horn Antenna	DRH-118	A052604	2009-05-05	2010-05-04

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.2 kPa

**The testing was performed by Weir Zhong on 2010-03-22.*

Test Result: Compliant

Please refer to the following table and plots.

Test Mode: Transmitting

Frequency (MHz)	S.A. Reading (dBµV/m)	Detector PK/AV	Direction Degree	Test Antenna			Cable Loss (dB)	Pre. Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC 15.209/15.249	
				Height (m)	Polar (H/V)	Factor (dB)				Limit (dBµV/m)	Margin (dB)
Frequency In Low Channel											
2399.85	35.92	AV	182	2.0	H	30.9	7.9	33.9	40.82	54	13.18
2399.85	35.16	AV	236	1.0	V	30.3	7.9	33.9	39.46	54	14.54
2399.85	46.01	PK	182	2.0	H	30.9	7.9	33.9	50.91	74	23.09
2399.85	45.52	PK	236	1.0	V	30.3	7.9	33.9	49.82	74	24.18
Frequency In High Channel											
2483.79	36.10	AV	360	1.8	H	31.1	8.0	33.9	41.3	54	12.7
2483.79	35.70	AV	34	1.1	V	30.4	8.0	33.9	40.2	54	13.8
2483.79	47.32	PK	360	1.8	H	31.1	8.0	33.9	52.52	74	21.48
2483.79	46.32	PK	34	1.1	V	30.4	8.0	33.9	50.82	74	23.18

******* END OF REPORT *******