



NVLAP LAB CODE 200707-0



FCC PART 15.249

MEASUREMENT AND TEST REPORT


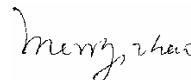
For

Shenzhen Gospel Smarthome Electronic Co., Ltd.

5Floor/Block 2, Vision (SZ) Park, Hi-Tech Industrial Park,

Shenzhen, Guangdong, P.R. of China

FCC ID: TW5GA-4100

Report Type: Original Report	Product Type: Wireless Transmitter
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Report Number: RSZ09060502	
Report Date: 2009-07-01	
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk “*”

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Gospell Smarhome Electronic Co., Ltd.* 's product, model *GA-4100* (FCC ID: *TW5GA-4100*), or the "EUT" as referred to in this report is a *Wireless Transmitter* which measures approximately 3.5 cm L x 3.3 cm W x 3.9 cm H, rated input voltage: DC 12V adapter.

** All measurement and test data in this report was gathered from production sample serial number: 0906019 (Assigned by BACL, Shenzhen). The EUT was received on 2009-06-05.*

Objective

This Type approval report is prepared on behalf of *Shenzhen Gospell Smarhome Electronic Co., Ltd.* 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, 15.209 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.

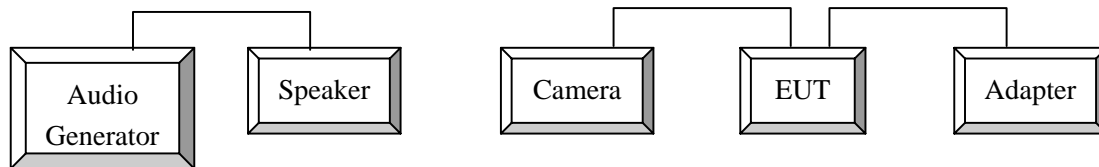
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Gospel	Wireless Monitor (Receiver)	N/A	N/A	DoC
Gospel	Wireless Camera	N/A	N/A	DoC
GPE	Adapter	GPE051-120050-5	N/A	DoC
NANYAN	Audio Generator	NY2201	019596	DoC
RCA	AUDIO SPEAKER	RTD170	N/A	DoC

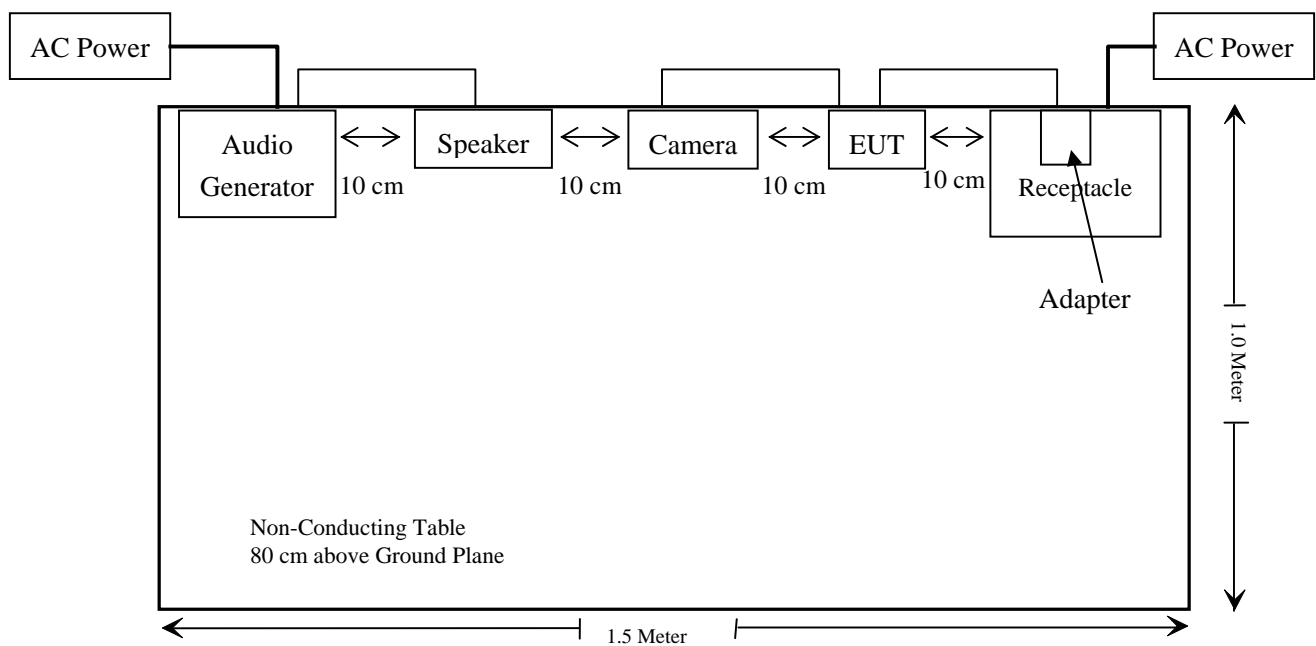
External I/O Cable

Cable Description	Length (M)	From/Port	To
Unshielded Detachable Data Cable	0.37	BNC Connector	Camera
Unshielded Detachable DC Power Cable	1.95	Adapter	EUT

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	Compliant
§ 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

§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §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 an integral 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.

§15.207 (a) - CONDUCTED EMISSIONS

Applicable Standard

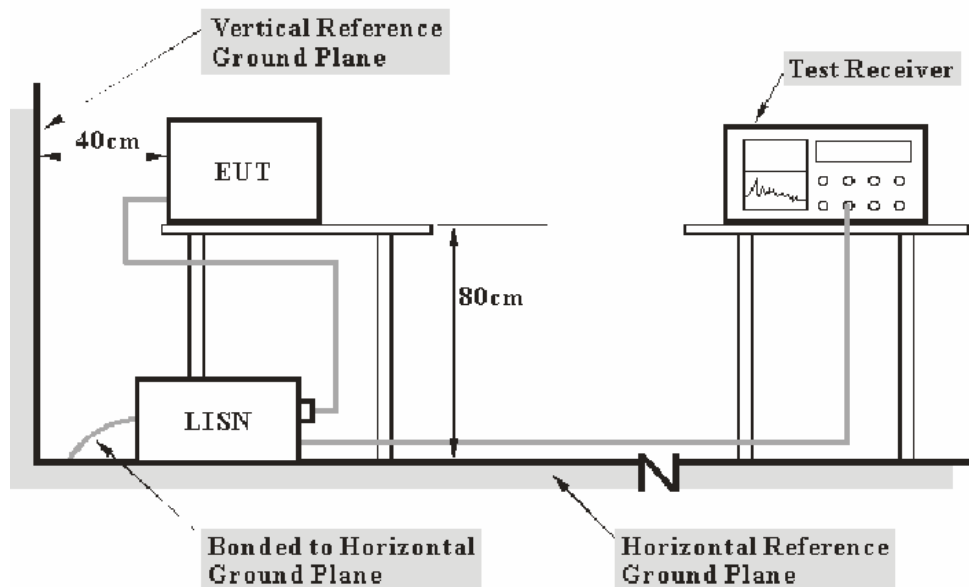
CFR47 §15.207

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is ± 2.4 dB.

EUT Setup



- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

<i>Frequency Range</i>	<i>IF B/W</i>
150 kHz – 30 MHz	9 kHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	830245/006	2009-04-28	2010-04-27
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2009-04-28	2010-04-27

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

Test Procedure

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

9.06 dB at 0.3500 MHz in the Line conductor mode

Test Data**Environmental Conditions**

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

* The testing was performed by Sula Huang on 2009-06-26.

Test Mode: Transmitting

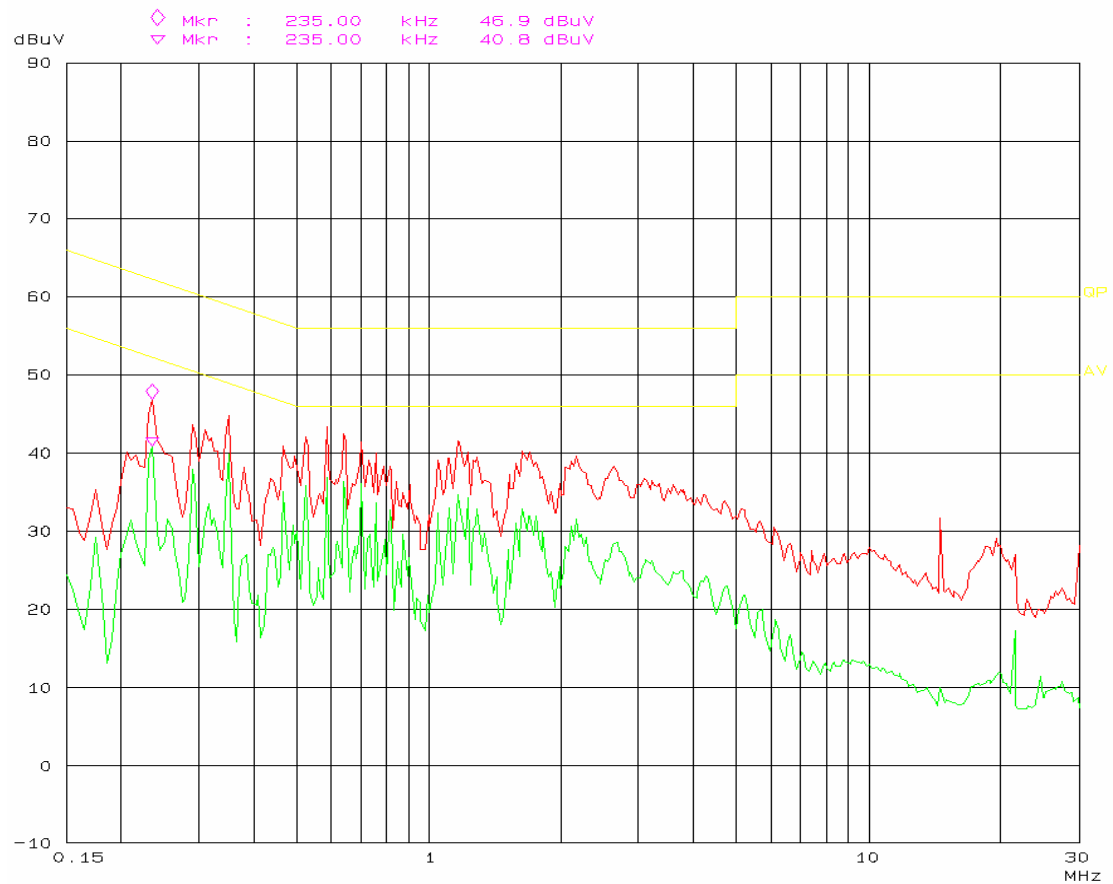
Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dBμV)	Detector (QP/AV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)
0.3500	39.90	AV	Line	48.96	9.06
0.5850	36.80	AV	Line	46.00	9.20
0.6400	36.30	AV	Line	46.00	9.70
0.5250	35.80	AV	Line	46.00	10.20
0.2350	40.80	AV	Line	52.27	11.47
0.5850	43.40	QP	Line	56.00	12.60
0.2900	37.90	AV	Line	50.52	12.62
0.5850	42.80	QP	Neutral	56.00	13.20
0.6400	42.40	QP	Line	56.00	13.60
0.3500	35.10	AV	Neutral	48.96	13.86
0.5250	42.10	QP	Line	56.00	13.90
0.5850	32.10	AV	Neutral	46.00	13.90
0.5250	42.00	QP	Neutral	56.00	14.00
0.3500	44.80	QP	Line	58.96	14.16
0.5250	31.40	AV	Neutral	46.00	14.60
0.3500	44.30	QP	Neutral	58.96	14.66
0.6400	41.10	QP	Neutral	56.00	14.90
0.2350	46.90	QP	Line	62.27	15.37
0.6400	30.50	AV	Neutral	46.00	15.50
0.2350	46.30	QP	Neutral	62.27	15.97
0.2900	43.60	QP	Line	60.52	16.92
0.2900	43.40	QP	Neutral	60.52	17.12
0.2900	33.30	AV	Neutral	50.52	17.22
0.2350	34.90	AV	Neutral	52.27	17.37

Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

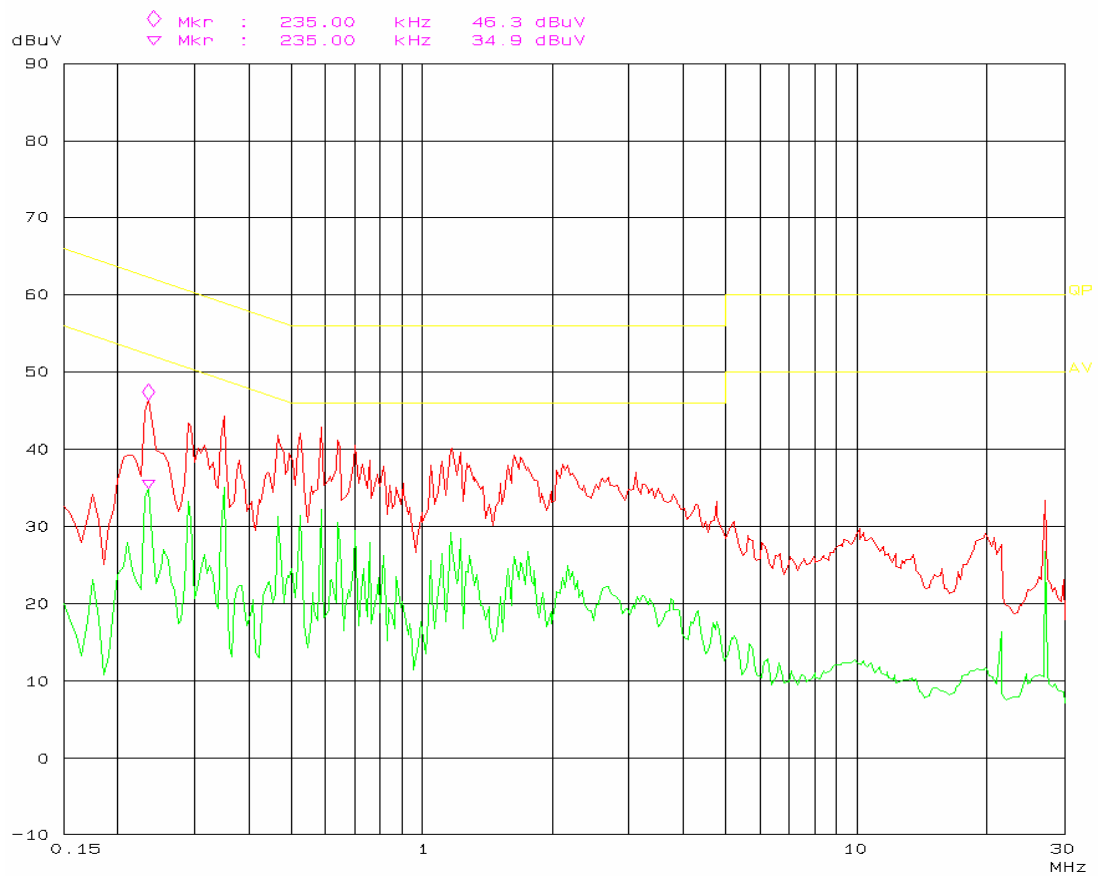
Conducted Emission FCC PART15

EUT: Wireless Transmitter M/N: GA-4100
Manuf: Gospel
Op Cond: Transmitting
Operator: Suia
Test Spec: AC 120V/60Hz L
Comment: Temp: 25 Hum: 56%
BACL



Conducted Emission FCC PART15

EUT: Wireless Transmitter M/N: GA-4100
Manuf: Gospel
Op Cond: Transmitting
Operator: Sula
Test Spec: AC 120V/60Hz N
Comment: Temp: 25 Hum: 56%
BACL



§15.205(a) §15.209(a) §15.249(a) §15.249(d) §15.35 - RADIATED EMISSIONS**Applicable Standard**

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

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

(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.

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:

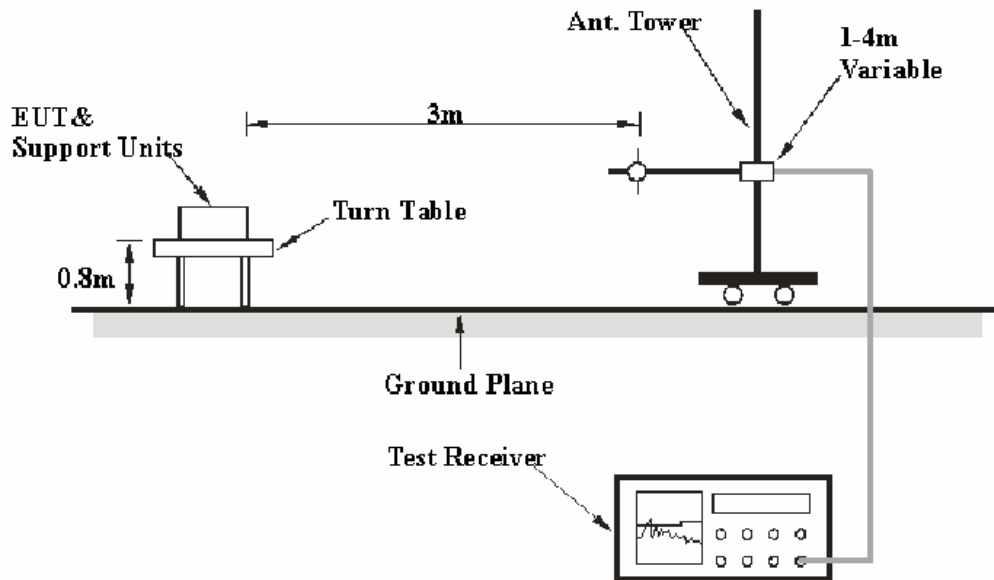
Below 1000MHz:

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

Above 1000MHz:

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

EUT 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
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-10-16	2009-10-16
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2009-04-12	2010-04-12
HP	Amplifier	8449B	3008A00277	2008-09-29	2009-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-08-28	2009-08-27

* **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 EUT, and all support equipment power cords was connected to the AC floor outlet.

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

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 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 7dB means the emission is 7dB 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 15.209 & 15.249, with the worst margin reading of:

Below 1GHz:

Transmitting Mode: **18.5 dB** at **36.13 MHz** in the **Vertical** polarization.

Above 1GHz:

Transmitting Mode: **6.21 dB** at **908 MHz** in the **Vertical** polarization, CH1.

Transmitting Mode: **3.16 dB** at **922 MHz** in the **Horizontal** polarization, CH2.

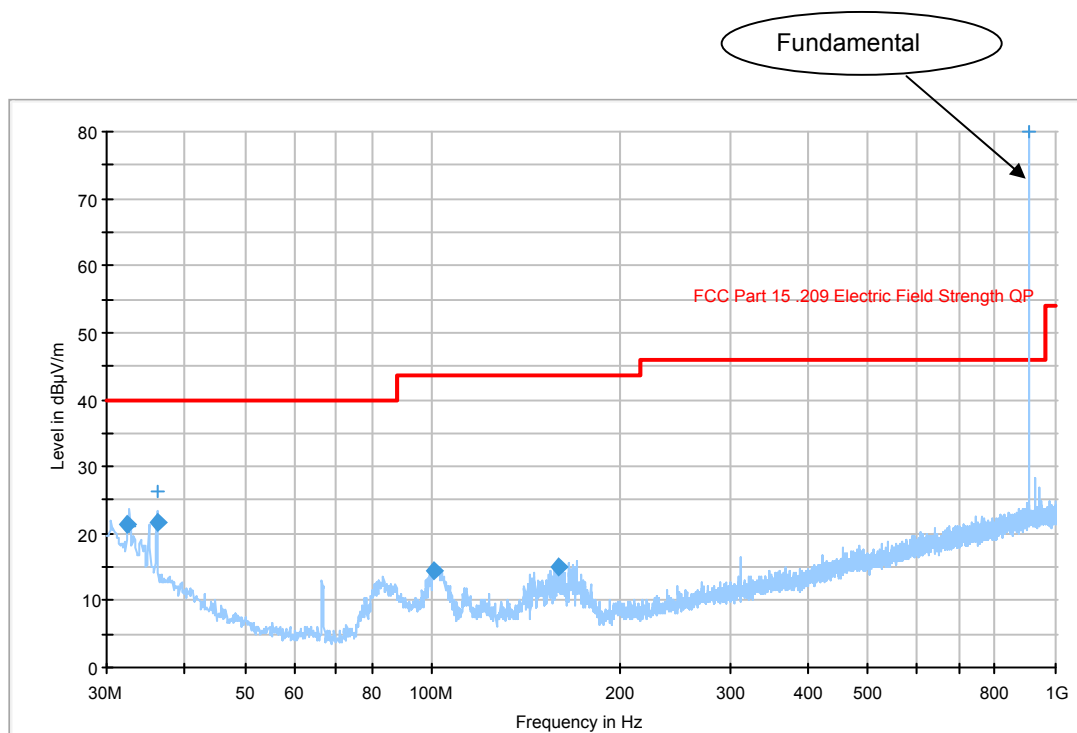
Test Data**Environmental Conditions**

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

The testing was performed by Sula Huang on 2009-06-24.

30-1000 MHz:

Test Mode: Transmitting



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Ant. Height (cm)	Ant. Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	FCC Limit (dBμV/m)	Margin (dB)
36.130000	21.5	125	V	181.0	-8.68	40.0	18.5
32.450000	21.3	117.0	V	355.0	-12.7	40.0	18.7
159.980000	14.9	123.0	H	272.0	-14.5	43.5	28.6
100.810000	14.3	110.0	H	288.0	-3.5	43.5	29.2

Above 1GHz:

Freq. (MHz)	S.A. Reading (dBμV/m)	Detector (PK/AV)	Table Direction Degree	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dBμV/m)	FCC 15.249 & 15.209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	Comment
CH1 (908 MHz)												
908	89.02	QP	23	1.02	V	20.4	3.92	25.55	87.79	94	6.21	Fund.
908	88.81	QP	270	1.04	H	20.4	3.92	25.55	87.58	94	6.42	Fund.
2724	41.30	AV	0	1.20	H	32.0	6.4	33.70	46.00	54	8.00	Harmonic
2724	41.42	AV	360	1.20	V	30.8	6.4	33.70	44.92	54	9.08	Harmonic
1816	41.25	AV	360	1.20	H	28.3	5.0	34.20	40.35	54	13.65	Harmonic
1816	39.27	AV	0	1.21	V	28.8	5.0	34.20	38.87	54	15.13	Harmonic
2724	49.65	PK	0	1.20	H	32.0	6.4	33.70	54.35	74	19.65	Harmonic
2724	47.63	PK	360	1.20	V	30.8	6.4	33.70	51.13	74	22.87	Harmonic
1816	49.72	PK	360	1.20	H	28.3	5.0	34.20	48.82	74	25.18	Harmonic
1816	48.32	PK	0	1.21	V	28.8	5.0	34.20	47.92	74	26.08	Harmonic
CH2 (922 MHz)												
922	91.96	QP	278	1.05	H	20.5	3.96	25.58	90.84	94	3.16	Fund.
922	90.07	QP	165	1.05	V	20.5	3.96	25.58	88.95	94	5.05	Fund.
2766	41.21	AV	39	2.0	H	32.0	6.5	33.80	45.91	54	8.09	Harmonic
2766	40.68	AV	93	1.74	V	31.0	6.5	33.80	44.38	54	9.62	Harmonic
1844	41.34	AV	336	1.12	V	29.1	5.0	34.10	41.34	54	12.66	Harmonic
1844	41.28	AV	354	1.91	H	29.0	5.0	34.10	41.18	54	12.82	Harmonic
2766	48.82	PK	39	2.0	H	32.0	6.5	33.80	53.52	74	20.48	Harmonic
2766	48.46	PK	93	1.74	V	31.0	6.5	33.80	52.16	74	21.84	Harmonic
1844	50.07	PK	336	1.12	V	29.1	5.0	34.10	50.07	74	23.93	Harmonic
1844	47.57	PK	354	1.91	H	29.0	5.0	34.10	47.47	74	26.53	Harmonic

§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.

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-11-07	2009-11-06
HP	Amplifier	8447E	1937A01046	2008-08-02	2009-08-02
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2009-03-11	2010-03-11

* **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 Sula Huang on 2009-06-23 to 2009-06-24.*

Test Result: Compliant

Please refer to the following table.

Test Mode: Transmitting

Frequency (MHz)	S.A. Reading (dB μ V/m)	Detector (PK)	Table Direction Degree	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	FCC 15.209	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)
890.20	24.03	PK	23	1.02	V	20.20	3.86	25.48	22.61	46	23.39
892.20	23.84	PK	186	1.10	H	20.20	3.86	25.48	22.42	46	23.58
934.28	21.02	PK	251	1.15	V	20.60	3.94	25.41	20.15	46	25.85
934.28	19.81	PK	278	1.05	H	20.60	3.94	25.41	18.94	46	27.06

Note: The peak radiated emission level is below the Quasi-peak limit 46 dB μ V/m.

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