NVLAP LAB CODE 200707-0

FCC PART 15.249

EMI MEASUREMENT AND TEST REPORT

For

Shenzhen Gospell Smarthome Electronic Co., Ltd

West, 5F/Block2, Vision (Shenzhen) Park, South HI-Tech Park,
Nanshan, Shenzhen, China

FCC ID: TW5GB8602

This Report Concerns:	Equipment Type:
☒ Original Report	2.4GHz wireless A/V color camera

Test Engineer:	Merry Zhao, Andy Yan, Emily Zou
Report No.:	RSZ07041703
Test Date:	2007-04-23 to 2007-05-09
Report Date:	2007-05-09
Reviewed By:	EMC Manager: Boni Baniqued
Prepared By:	Bay Area Compliance Laboratory 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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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Shenzhen Gospell Smarthome Electronic Co., Ltd*'s product, model number: *GB8602* or the "EUT" as referred to in this report is a *2.4GHz wireless A/V color camera*, which measures approximately 10.5cmL x 10.0cmW x 11.0cmH, rated input voltage: DC 9V.

AC/DC Adapter (Switching mode power supply)：
Manufacturer: Gospell
Model: GP006BU
Input: 100-240V ~ 50/60 Hz 0.3A
Output: 9V=500mA 4.5VA Max LPS

** The test data gathered are from production sample, serial number: 0704020 provided by the manufacturer, we receive the EUT on 2007-04-17.*

Objective

This Type approval report is prepared on behalf of *Shenzhen Gospell Smarthome 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 Laboratory 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 Laboratory 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 Laboratory 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 04, 2004. 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 Laboratory Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0). The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm.

External I/O Cable

Cable Description	Length (M)	From/Port	To
Adapter Cable	1.70	EUT	Adapter

SYSTEM TEST CONFIGURATION

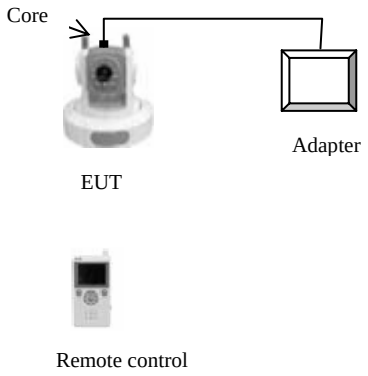
Justification

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

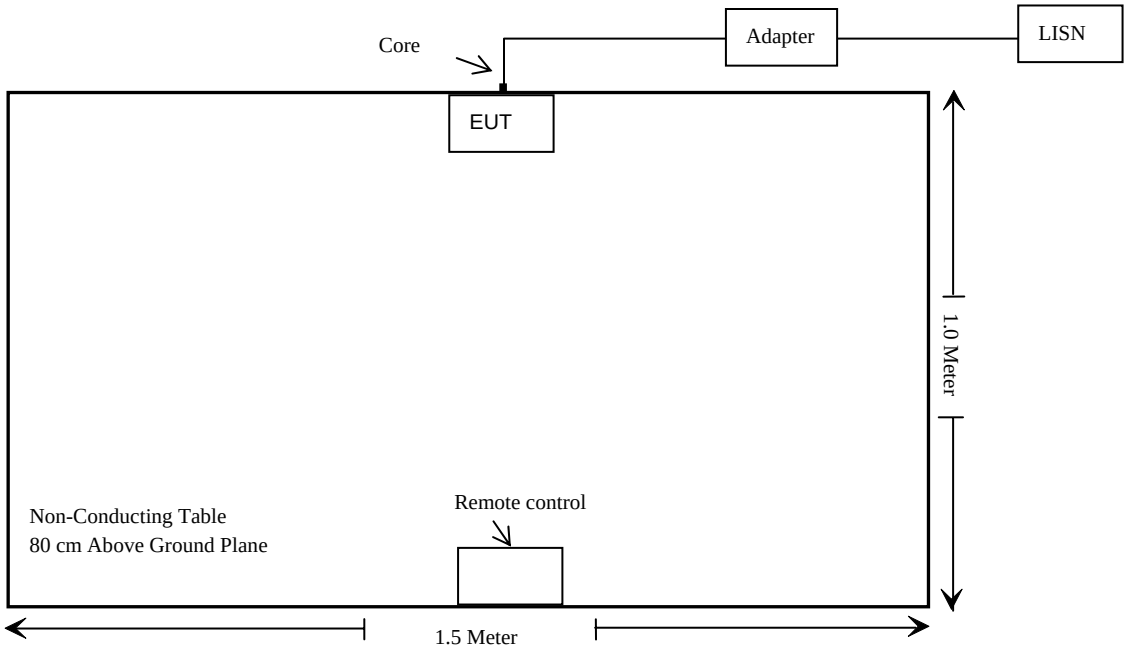
Equipment Modifications

Bay Area Compliance Laboratory Corp. (Shenzhen) has not done any modification on the 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)	Radiated Emissions	Compliant*
§15.249(d)	Out of band emissions	Compliant

** Within the measurement uncertainty*

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

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 antenna is a permanently attached antenna, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

Result: Compliance.

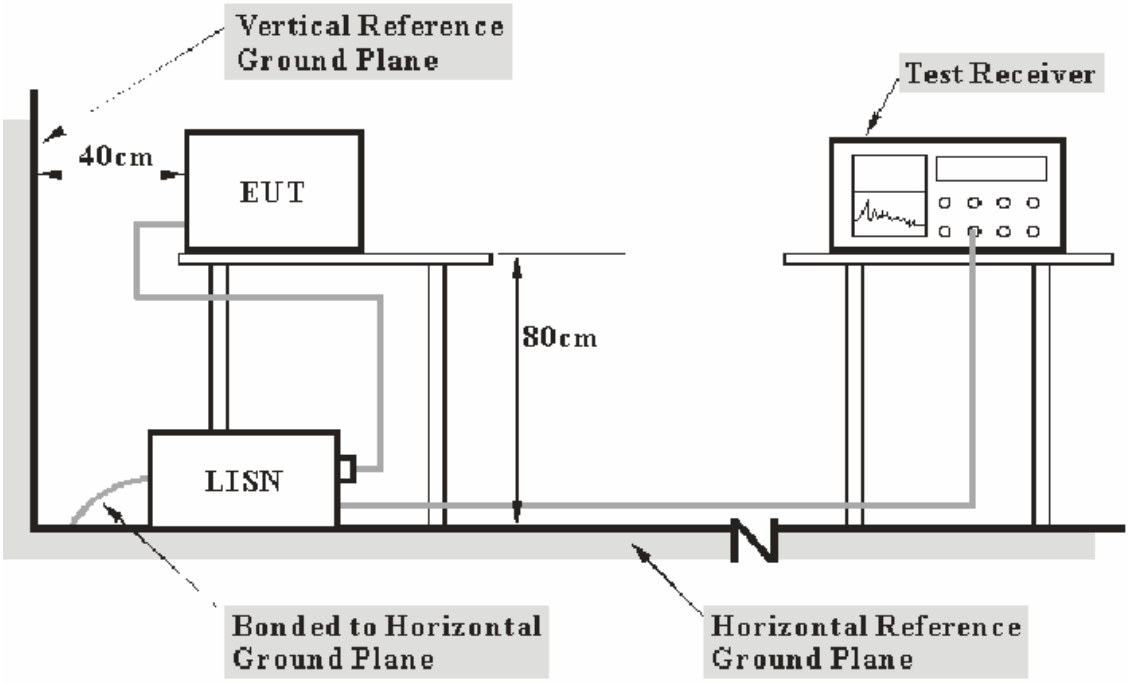
§15.207 (a) - CONDUCTED EMISSIONS

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 Class B 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:

Frequency Range	***IF B/W***
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	ESCI	100035	2006-09-29	2007-09-29
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2007-03-26	2008-03-26

***** Com-Power's LISN were used as the supporting equipment.
*** 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

During the conducted emission test, the adapter connected to the outlet of the LISN.

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:

12.5 dB at **24.005 MHz** in the **Neutral** conductor mode

Test Data

Environmental Conditions

Temperature:	22 ° C
Relative Humidity:	55%
ATM Pressure:	100.0 kPa

The testing was performed by Emily Zou on 2007-05-09.

Test Mode: Transmitting

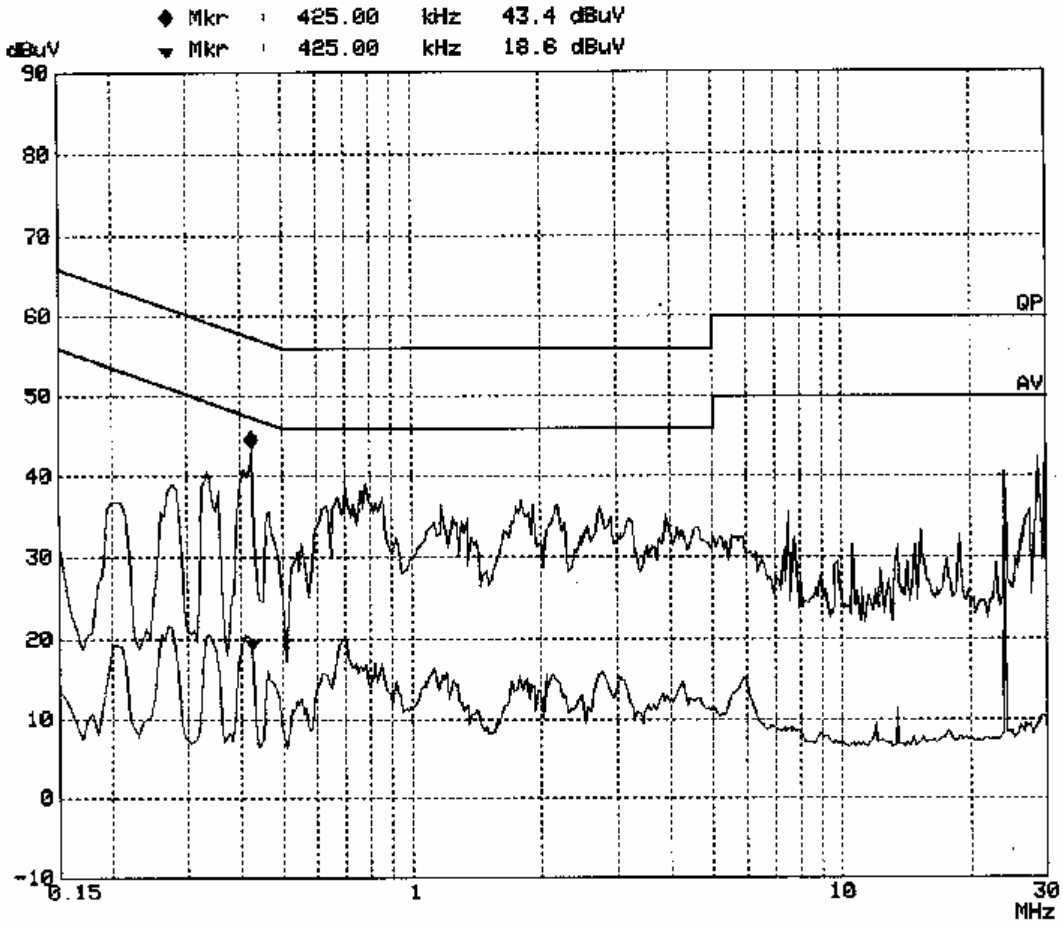
LINE CONDUCTED EMISSIONS				FCC PART 15.207	
Frequency (MHz)	**Amplitude (dBμV)**	**Detector (QP/AV)**	**Phase (Live/Neutral)**	**Limit (dBμV)**	**Margin (dB)**
24.005	37.50	AV	Neutral	50.00	12.50
0.425	43.40	QP	Live	57.35	13.95
0.415	41.20	QP	Neutral	57.55	16.35
24.000	33.50	AV	Live	50.00	16.50
0.700	39.30	QP	Live	56.00	16.70
2.105	38.70	QP	Neutral	56.00	17.30
28.845	42.40	QP	Live	60.00	17.60
0.335	40.70	QP	Live	59.33	18.63
24.005	41.30	QP	Neutral	60.00	18.70
0.850	37.30	QP	Neutral	56.00	18.70
0.415	28.70	AV	Neutral	47.55	18.85
1.800	37.10	QP	Live	56.00	18.90
24.000	40.60	QP	Live	60.00	19.40
1.280	36.20	QP	Neutral	56.00	19.80
1.135	35.00	QP	Neutral	56.00	21.00
2.105	24.40	AV	Neutral	46.00	21.60
0.850	24.40	AV	Neutral	46.00	21.60
1.280	23.30	AV	Neutral	46.00	22.70
1.135	22.90	AV	Neutral	46.00	23.10
0.700	19.70	AV	Live	46.00	26.30
0.335	20.60	AV	Live	49.33	28.73
0.425	18.60	AV	Live	47.35	28.75
1.805	13.60	AV	Live	46.00	32.40
29.155	10.40	AV	Live	50.00	39.60

Plot(s) of Test Data

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

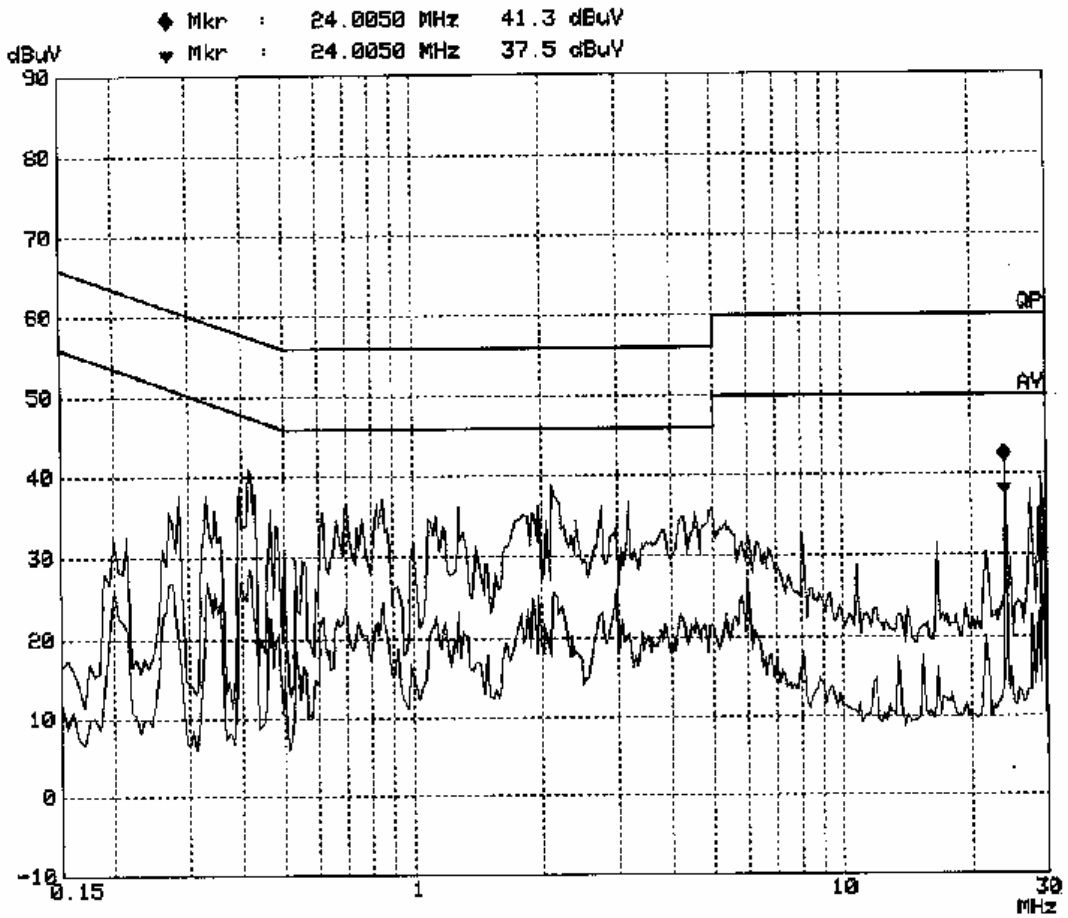
CONDUCTED EMISSION TEST
FCC PART15 CLASS B

EUT:	2.4GHz wireless camera system;M/N:GB8602
Manuf:	GOSPELL
Op Cond:	Transmitting
Operator:	EMILY
Test Spec:	AC 120V/60Hz L
Comment:	Temp:25'C Humi:56%
Date:	09. May 07 14:25



CONDUCTED EMISSION TEST
FCC PART15 CLASS B

EUT:	2.4GHz wireless camera system;M/N:GB8602
Manuf:	GOSPELL
Op Cond:	Transmitting
Operator:	EMILY
Test Spec:	AC 120V/60Hz N
Comment:	Temp:25'C Humi:56%
Date:	09. May 07 14:04



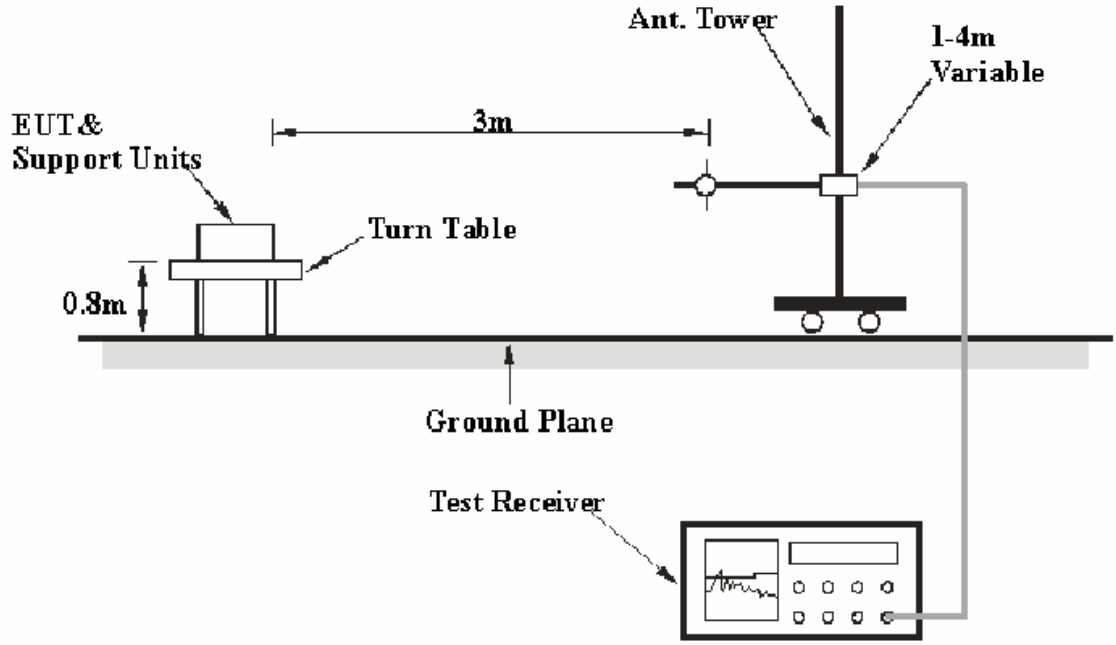
§15.205 §15.209(a) §15.249(a) §15.249(c) - RADIATED EMISSIONS

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 Laboratory Corp. (Shenzhen) is ±4.0 dB.

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.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

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

EMI Test Receiver Setup

The system was investigated from 30 MHz to 25000 MHz.

During the radiated emission and out of band emission test, the test receiver was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
30 – 1000 MHz	100 kHz	300 kHz
1000 MHz – 25000 MHz	1MHz	3 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2006-09-29	2007-09-29
HP	Amplifier	8447E	1937A01046	2006-11-15	2007-11-15
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2006-08-14	2007-08-14
HP	Amplifier	8449B	3008A00277	2006-09-29	2007-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2006-09-25	2007-09-25
Agilent	Spectrum Analyzer	8564E	3943A01781	2006-11-22	2007-11-22

*** 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

For the radiated emissions test, the adapter 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.

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

Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Meter Reading + Antenna Loss + Cable Loss- 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 = Limit - Corr. Ampl.

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:

30 -1000MHz:

1.20 dB at **47.999675 MHz** in the **Vertical** polarization

Above 1GHz:

2.15 dB at **9656 MHz** in the **Horizontal** polarization, Low Channel
7.41 dB at **9728 MHz** in the **Horizontal** polarization, Middle Channel
7.43 dB at **9872 MHz** in the **Vertical** polarization, High Channel

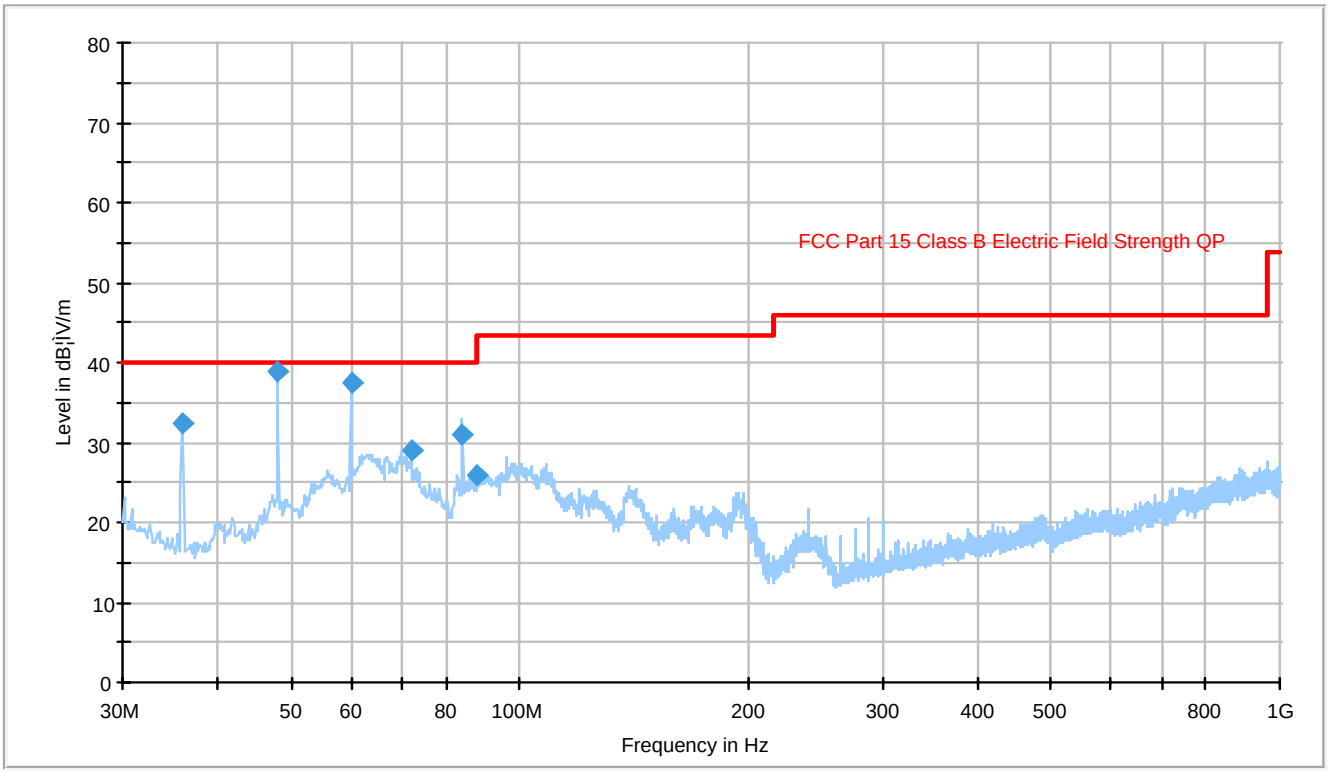
Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	53%
ATM Pressure:	100.9 kPa

The testing was performed by Andy Yan on 2007-04-23.

Test Mode: Transmitting



Frequency (MHz)	Quasi-Peak (dBµV/m)	Antenna Height (cm)	Polarity	Turn table Position (deg)	Corr. (dB)	Limit (dBµV/m)	Margin (dB)
47.999675	38.8	100.0	V	116.0	-16.9	40.0	1.2*
60.004025	37.5	99.0	V	152.0	-18.2	40.0	2.5*
36.012425	32.3	99.0	V	354.0	-8.9	40.0	7.7
83.991775	31.1	123.0	V	311.0	-17.9	40.0	8.9
71.988200	29.0	99.0	V	0.0	-17.5	40.0	11.0
87.862550	25.9	120.0	V	302.0	-18.2	40.0	14.1

Above 1 GHz:

Low -Channel (2414MHz)

Frequency (MHz)	Reading (dBμV)	Detector PK/QP/AV	Direction Degree	Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBμV/m)	FCC 15.249		
										Limit Reading (dBμV/m)	Margin (dB)	comment
9656	59.5	PK	230	1.8	H	41.1	5.35	34.1	71.85	74	2.15*	Harmonic
9656	38.67	AV	149	1.8	H	41.1	5.35	34.1	51.02	54	2.98*	Harmonic
9656	59.83	PK	358	1.3	V	39.9	5.35	34.1	70.98	74	3.02*	Harmonic
7242	60.33	PK	168	1.6	H	39.2	4.51	33.7	70.34	74	3.66*	Harmonic
7242	60.67	PK	268	1.6	V	37.7	4.51	33.7	69.18	74	4.82	Harmonic
4828	40.67	AV	270	1.6	H	36.6	4.64	33.4	48.51	54	5.49	Harmonic
9656	36.83	AV	360	1.6	V	39.9	5.35	34.1	47.98	54	6.02	Harmonic
4828	41.17	AV	180	1.6	V	35.4	4.64	33.4	47.81	54	6.19	Harmonic
7242	38.33	AV	263	1.8	V	37.7	4.51	33.7	46.84	54	7.16	Harmonic
7242	36.41	AV	268	1.6	H	39.2	4.51	33.7	46.42	54	7.58	Harmonic
4828	57	PK	49	1.2	H	36.6	4.64	33.4	64.84	74	9.16	Harmonic
2414	84.57	AV	45	1	V	30.6	3.61	35	83.78	94	10.22	Fundamental
4828	56.5	PK	250	1	V	35.4	4.64	33.4	63.14	74	10.86	Harmonic
2414	99.67	PK	18	1.6	V	30.6	3.61	35	98.88	114	15.12	Fundamental
2414	74.07	AV	263	1.4	H	30.6	3.61	35	73.28	94	20.72	Fundamental
2414	84.07	PK	20	1.2	H	30.6	3.61	35	83.28	114	30.72	Fundamental

** Within the measurement uncertainty*

Middle Channel (2432MHz)

Frequency (MHz)	Reading (dBμV)	Detector PK/QP/AV	Direction Degree	Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBμV/m)	FCC 15.249		
										Limit Reading (dBμV/m)	Margin (dB)	comment
9728	33.42	AV	270	1.6	H	41.5	5.77	34.1	46.59	54	7.41	Harmonic
9728	33.46	AV	180	1.6	V	40.4	5.77	34.1	45.53	54	8.47	Harmonic
7296	35.07	AV	261	1.0	H	39.0	4.51	33.7	44.88	54	9.12	Harmonic
9728	50.17	PK	49	1.2	H	41.5	5.77	34.1	63.34	74	10.66	Harmonic
7296	34.57	AV	90	1.2	V	37.7	4.51	33.7	43.08	54	10.92	Harmonic
4864	35.90	AV	180	1.6	V	35.4	4.64	33.4	42.54	54	11.46	Harmonic
7296	52.50	PK	180	1.3	H	39.0	4.51	33.7	62.31	74	11.69	Harmonic
4864	33.23	AV	270	1.6	H	36.6	4.64	33.4	41.07	54	12.93	Harmonic
7296	52.5	PK	180	1.0	V	37.7	4.51	33.7	61.01	74	12.99	Harmonic
9728	48.83	PK	250	1.0	V	40.4	5.77	34.1	60.9	74	13.1	Harmonic
2432	80.50	AV	45	1.0	V	30.6	3.61	35.0	79.71	94	14.29	Fundamental
4864	48.3	PK	49	1.2	H	36.6	4.64	33.4	56.14	74	17.86	Harmonic
4864	49.33	PK	250	1.0	V	35.4	4.64	33.4	55.97	74	18.03	Harmonic
2432	92.67	PK	18	1.6	V	30.6	3.61	35.0	91.88	114	22.12	Fundamental
2432	69.83	AV	263	1.4	H	30.6	3.61	35.0	69.04	94	24.96	Fundamental
2432	83.00	PK	20	1.2	H	30.6	3.61	35.0	82.21	114	31.79	Fundamental

High-Channel (2468MHz)

Frequency (MHz)	Reading (dBµV)	Detector PK/QP/AV	Direction Degree	Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable Loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBµV/m)	FCC 15.249		
										Limit Reading (dBµV/m)	Margin (dB)	comment
9872	33.40	AV	360	1.6	V	41.5	5.77	34.1	46.57	54	7.43	Harmonic
9872	33.57	AV	149	1.8	H	40.4	5.77	34.1	45.64	54	8.36	Harmonic
7404	35.57	AV	263	1.8	V	39.0	4.75	33.7	45.62	54	8.38	Harmonic
7404	35.57	AV	268	1.6	H	37.7	4.75	33.7	44.32	54	9.68	Harmonic
4936	34.90	AV	180	1.6	V	36.6	4.55	33.4	42.65	54	11.35	Harmonic
4936	35.57	AV	270	1.6	H	35.4	4.55	33.4	42.12	54	11.88	Harmonic
2468	80.23	AV	45	1.0	V	30.6	3.61	35.0	79.44	94	14.56	Fundamental
4936	47.90	PK	250	1.0	V	36.6	4.55	33.4	55.65	74	18.35	Harmonic
9872	41.20	PK	358	1.3	V	41.5	5.77	34.1	54.37	74	19.63	Harmonic
4936	47.57	PK	49	1.2	H	35.4	4.55	33.4	54.12	74	19.88	Harmonic
9872	41.53	PK	230	1.8	H	40.4	5.77	34.1	53.6	74	20.4	Harmonic
7404	43.2	PK	268	1.6	V	39.0	4.75	33.7	53.25	74	20.75	Harmonic
7404	43.03	PK	168	1.6	H	37.7	4.75	33.7	51.78	74	22.22	Harmonic
2468	92.57	PK	18	1.6	V	30.6	3.61	35.0	91.78	114	22.22	Fundamental
2468	69.07	AV	263	1.4	H	30.6	3.61	35.0	68.28	94	25.72	Fundamental
2468	79.73	PK	20	1.2	H	30.6	3.61	35.0	78.94	114	35.06	Fundamental

§15.249(d) – OUT OF BAND EMISSIONS

Standard Applicable

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

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 its antenna terminal to measurement instrument via a low loss cable. 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 the RBW to 1 MHz and VBW of spectrum analyzer to 3 MHz for PK Detector, Set the RBW to 1 MHz and VBW of spectrum analyzer to 10 Hz for AV Detector with a convenient frequency span including the specified frequencies of band edges.
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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2006-09-29	2007-09-29
HP	Amplifier	8449B	3008A00277	2006-09-29	2007-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2006-09-25	2007-09-25

*** Statement of Traceability:** Bay Area Compliance Laboratory 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:	53%
ATM Pressure:	100.9 kPa

The testing was performed by Merry Zhao on 2007-04-24.

Test Mode: Transmitting

Frequency (MHz)	Reading (dBμV)	Detector PK//AV	Direction Degree	Height (m)	Polar H / V	Antenna Factor (dB/m)	Cable loss (dB)	Pre-Amplifier (dB)	Corrected Reading (dBμV/m)	FCC 15.249	
										Limit dBμV/m)	Margin (dB)
2345.3	34.15	AV	20	1.2	H	28.9	3.61	35	31.66	54	22.34
2345.4	39.3	PK	263	1.4	H	28.9	3.61	35	36.81	74	37.19
2327.7	34.19	AV	49	1.2	V	30.6	3.61	35	33.40	54	20.60
2343.3	39.79	PK	270	1.6	V	30.6	3.61	35	39.00	74	35.00
2489.2	32.34	AV	168	1.6	H	28.9	4.00	35	30.24	54	23.76
2489.2	36.69	PK	268	1.6	H	28.9	4.00	35	34.59	74	39.41
2488.8	32.74	AV	230	1.8	V	30.6	4.00	35	32.34	54	21.66
2488.2	38.15	PK	230	1.8	V	30.6	4.00	35	37.75	74	36.25

Test Result: Compliance.