

FCC PART 15.245
MEASUREMENT AND TEST REPORT

For

Hydrim Electronics Co., Ltd.

Block A6 Haosi Linpo Keng Ind.Park Shajing Town Bao'an District Shenzhen P.R.C

FCC ID: OZ3HC401S

Report Type: Original Report	Product Type: Lighting Control Switch (Motion sensor)
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Report Number: RSZ120723002-00	
Report Date: 2012-08-02	
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* This report contains 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 *Hydrim Electronics Co., Ltd.* 's product, model *HC401S* (FCC ID: *OZ3HC401S*), or the "EUT" as referred to in this report is an *Lighting Control Switch (Motion sensor)*, which was measured approximately: 10.3 cm (L) x 5.2 cm (W) x 2.9 cm (H), rated input voltage: AC 120/277 V~60Hz.

** All measurement and test data in this report was gathered from production sample serial number: 1207109 (Assigned by BACL, Shenzhen). The EUT was received on 2012-07-23.*

Objective

This report is prepared on behalf of *Hydrim Electronics 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 the compliance of EUT with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209 and 15.245 rules.

Related Submittal(s)/Grant(s)

No related submittal (s).

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, 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 on 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 December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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 an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (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).

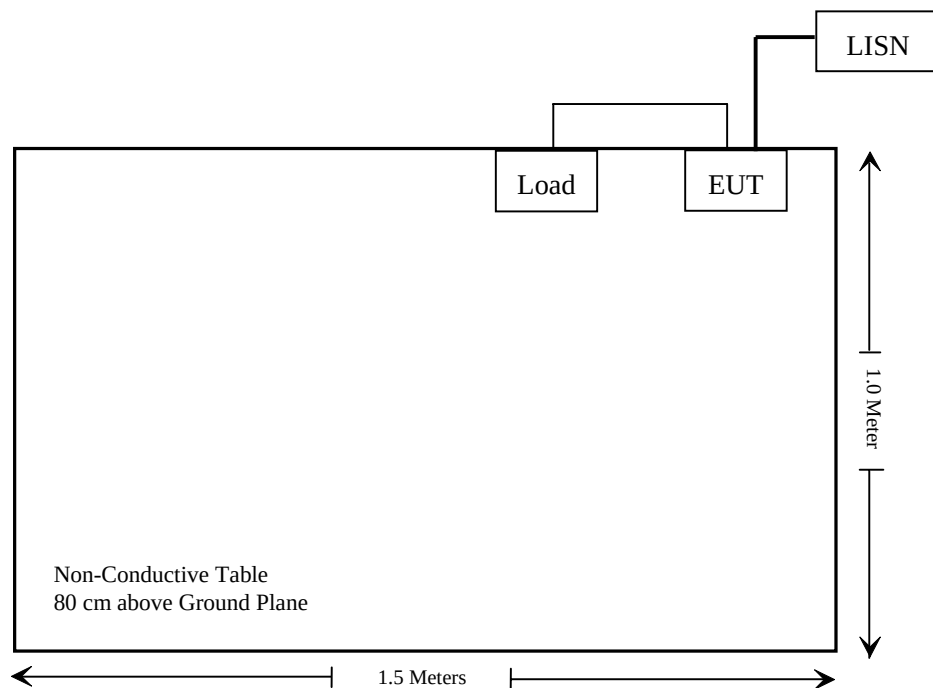
Equipment Modifications

No modification was made to the EUT tested.

Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
BACL	Capacitive Load	--	--

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207(a)	Conducted Emissions	Compliance
15.205, §15.209, §15.245(b)	Radiated Emissions	Compliance

FCC§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 patch antenna, 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 §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

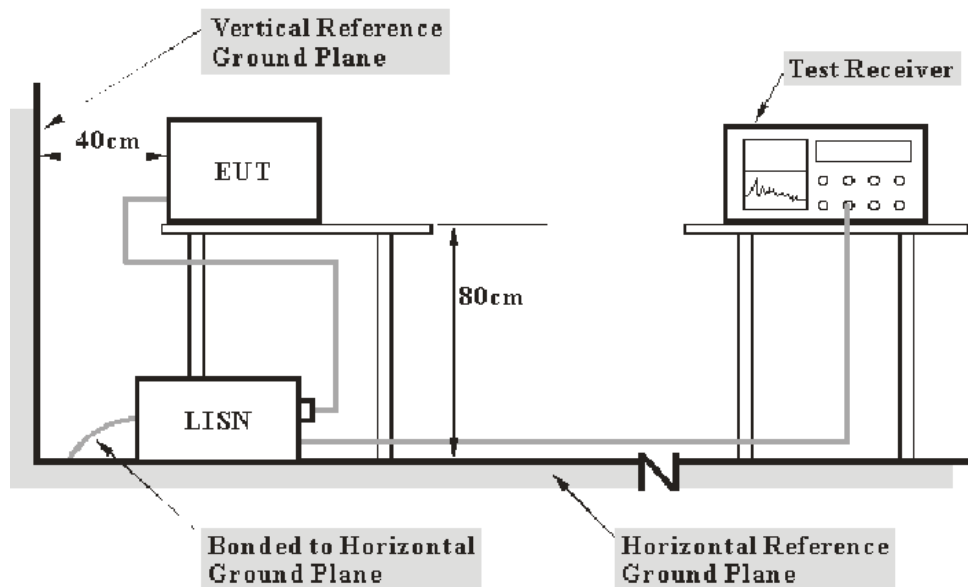
FCC §15.207

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 CISPR 16-4-4, 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($k=2$, 95% level of confidence).

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 C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

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

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:

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

Test Procedure

During the conducted emission test, the EUT was 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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2011-11-24	2012-11-23
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2011-11-17	2012-11-16
Rohde & Schwarz	Pulse limiter	ESH3Z2	DE25985	2012-07-08	2013-07-07
BACL	CE Test software	BACL-CE	V1.0	N/A	N/A

* **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 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:

4.44 dB at 2.460 MHz in the **Neutral** conducted mode for Capacitive Load-1000W

Test Data

Environmental Conditions

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

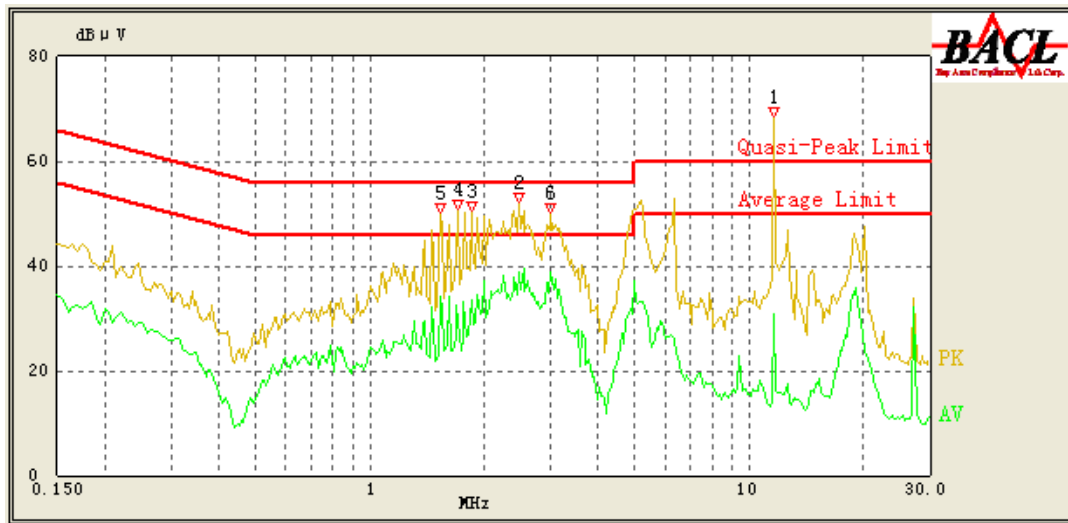
* The testing was performed by Tiger Ye on 2012-07-24.

Test Mode: Transmitting (Capacitive Load-400W)

AC 120V, Line



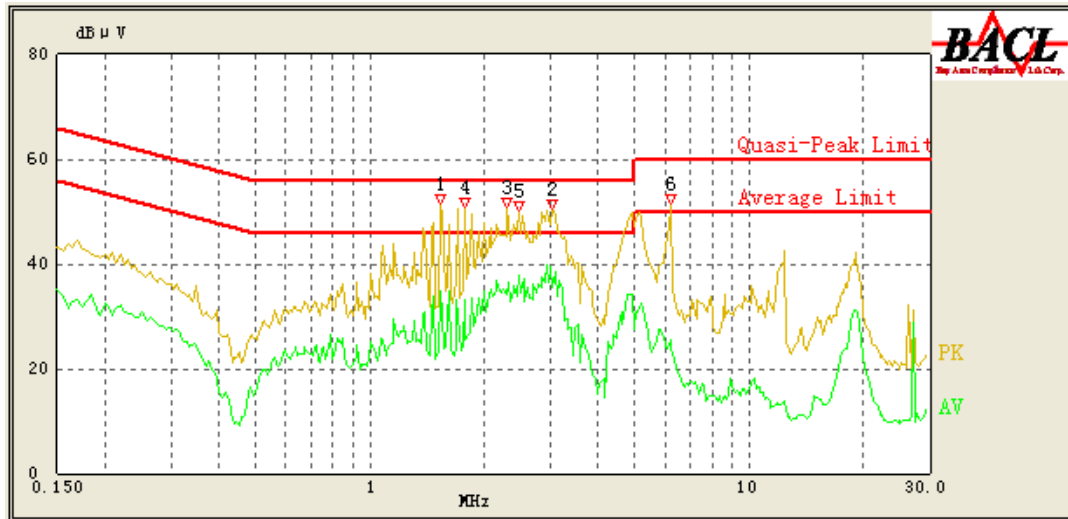
Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/ QP/Ave.)
2.465	47.90	10.22	56.00	8.10	QP
2.465	47.80	10.22	56.00	8.20	QP
1.540	47.31	10.19	56.00	8.69	QP
2.465	37.13	10.22	46.00	8.87	Ave.
2.465	37.13	10.22	46.00	8.87	Ave.
1.690	36.32	10.19	46.00	9.68	Ave.
2.385	33.98	10.22	46.00	12.02	Ave.
1.845	43.88	10.20	56.00	12.12	QP
1.540	33.85	10.19	46.00	12.15	Ave.
1.850	32.74	10.20	46.00	13.26	Ave.
1.690	37.88	10.19	56.00	18.12	QP
2.380	37.75	10.21	56.00	18.25	QP

AC 120V, Neutral

Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/ QP/Ave.)
3.005	38.95	10.23	46.00	7.05	Ave.
2.470	38.92	10.21	46.00	7.08	Ave.
2.465	48.42	10.21	56.00	7.58	QP
1.850	47.68	10.20	56.00	8.32	QP
1.540	47.05	10.19	56.00	8.95	QP
1.700	44.94	10.19	56.00	11.06	QP
1.540	34.21	10.19	46.00	11.79	Ave.
1.850	33.45	10.20	46.00	12.55	Ave.
3.005	43.26	10.23	56.00	12.74	QP
1.695	32.35	10.19	46.00	13.65	Ave.
11.640	30.83	10.74	50.00	19.17	Ave.
11.640	34.73	10.74	60.00	25.27	QP

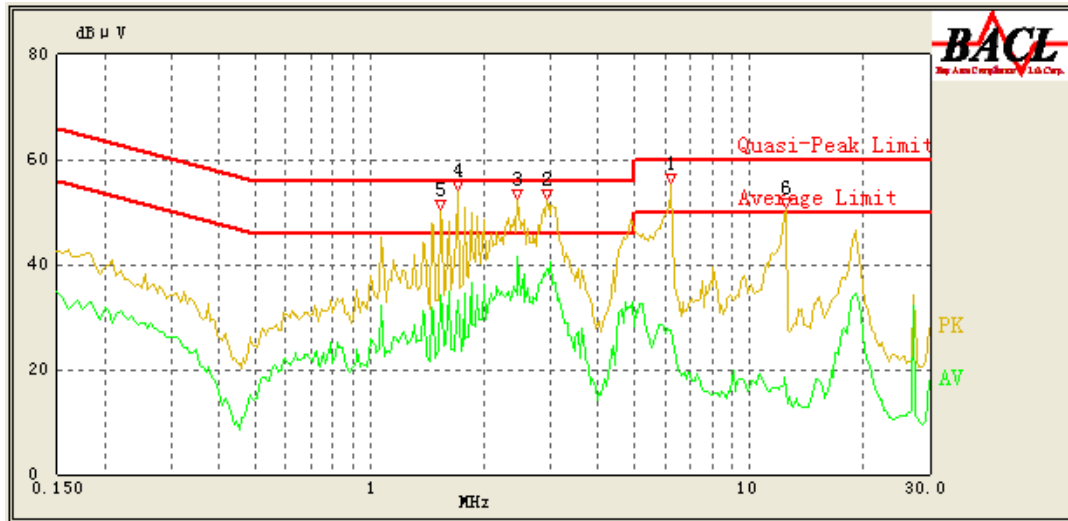
Test Mode: Transmitting (Capacitive Load-1000W)

AC 277V, Line



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/ QP/Ave.)
2.465	37.86	10.22	46.00	8.14	Ave.
1.540	47.55	10.19	56.00	8.45	QP
2.465	47.18	10.22	56.00	8.82	QP
2.315	36.61	10.21	46.00	9.39	Ave.
1.775	46.56	10.20	56.00	9.44	QP
3.035	35.60	10.24	46.00	10.40	Ave.
1.540	34.69	10.19	46.00	11.31	Ave.
1.775	33.20	10.20	46.00	12.80	Ave.
3.035	42.17	10.24	56.00	13.83	QP
2.305	38.56	10.21	56.00	17.44	QP
6.245	23.86	10.35	50.00	26.14	Ave.
6.210	28.42	10.35	60.00	31.58	QP

AC 277V, Neutral



Frequency (MHz)	Corrected Amplitude (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/ QP/Ave.)
2.460	41.56	10.22	46.00	4.44	Ave.
2.930	39.29	10.23	46.00	6.71	Ave.
1.540	47.43	10.19	56.00	8.57	QP
1.700	44.79	10.19	56.00	11.21	QP
1.540	34.08	10.19	46.00	11.92	Ave.
2.920	43.90	10.23	56.00	12.10	QP
1.700	33.20	10.19	46.00	12.80	Ave.
2.460	42.93	10.22	56.00	13.07	QP
6.220	27.51	10.35	50.00	22.49	Ave.
6.220	30.58	10.35	60.00	29.42	QP
12.425	18.56	10.89	50.00	31.44	Ave.
12.450	19.62	10.90	60.00	40.38	QP

FCC§15.205, §15.209&§15.245(b) - RADIATED EMISSIONS**Applicable Standard**

As per FCC§15.245 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (millivolts/meter)
902–928	500	1.6
2435–2465	500	1.6
5785–5815	500	1.6
10500–10550	2500	25.0
24075–24175	2500	25.0

(1) Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For the second and third harmonics of field disturbance sensors operating in the 24075–24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

(iii) Field disturbance sensors designed to be used in motor vehicles or aircraft must include features to prevent continuous operation unless their emissions in the restricted bands, other than the second and third harmonics from devices operating in the 24075–24175 MHz band, fully comply with the limits given in §15.209. Continuous operation of field disturbance sensors designed to be used in farm equipment, vehicles such as fork lifts that are intended primarily for use indoors or for very specialized operations, or railroad locomotives, railroad cars and other equipment which travels on fixed tracks is permitted. A field disturbance sensor will be considered not to be operating in a continuous mode if its operation is limited to specific activities of limited duration (e.g., putting a vehicle into reverse gear, activating a turn signal, etc.).

(2) Field strength limits are specified at a distance of 3 meters.

(3) 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.

(4) The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

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 CISPR 16-4-4, 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:

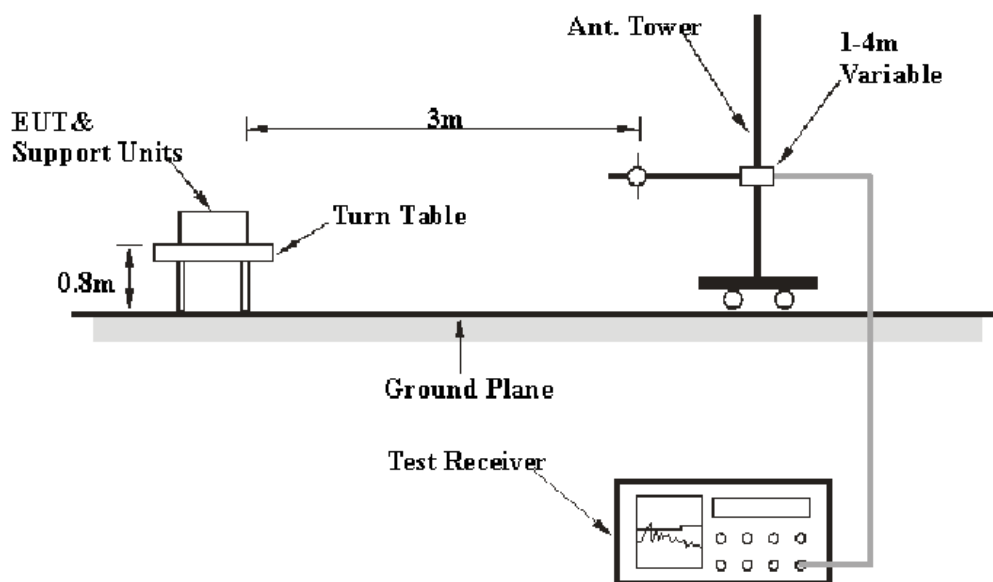
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

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

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

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209 /205and FCC 15.245 limits.

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 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:

$$\begin{aligned}\text{Corrected Amplitude} &= \text{Meter Reading} + \text{Correction Factor} \\ \text{Correction Factor} &= \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}\end{aligned}$$

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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2011-11-24	2012-11-23
Rohde & Schwarz	EMI Test Receiver	ESCI	101122	2011-11-17	2012-11-16
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2011-11-28	2012-11-27
Mini-Circuits	Amplifier	ZVA-213+	N/A	2011-11-24	2012-11-23
Sunol Sciences	Horn Antenna	DRH-118	A052304	2011-12-01	2012-11-30
Rohde & Schwarz	Signal Analyzer	FSIQ26	8386001028	2011-11-24	2012-11-23
Agilent	Spectrum Analyzer	8564E	3943A01781	2012-05-17	2013-05-16
the electro-Mechanics Co.	Horn Antenna	3116	9510-2270	2011-10-14	2012-10-13

* **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 Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209, 15.205 & 15.245, with the worst margin reading of:

2.81 dB at 11616.2 MHz in the Horizontal polarization

Test Data**Environmental Conditions**

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

The testing was performed by Tiger Ye on 2012-07-24.

Test Mode: Transmitting

1-1): 30MHz~1GHz (Capacitive Load-400W)

AC 120V

Frequency (MHz)	Corrected Amplitude (dBμV/m)	Detector (QP)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
35.367700	17.5	QP	266.0	V	231.0	-9.1	40.0	22.5
66.347950	15.8	QP	105.0	V	177.0	-18.5	40.0	24.2
38.714050	15.7	QP	256.0	V	283.0	-11.4	40.0	24.3
63.710450	15.7	QP	274.0	V	149.0	-18.6	40.0	24.3
43.843350	12.2	QP	127.0	V	76.0	-14.5	40.0	27.8
100.688750	15.8	QP	179.0	H	298.0	-14.7	46.0	30.2

1-2): 30MHz~1GHz (Capacitive Load-1000W)

AC 277V

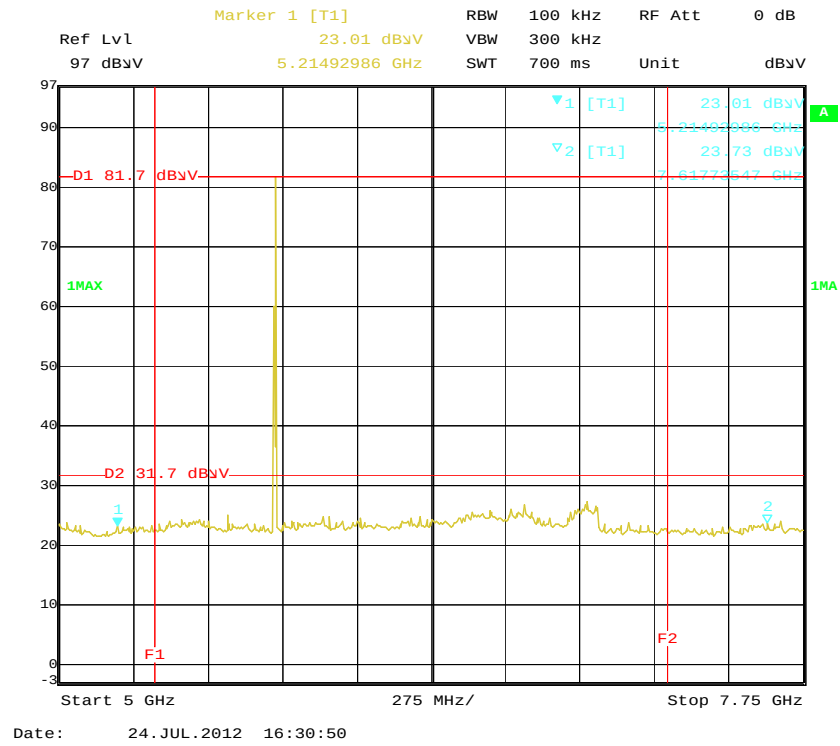
Frequency (MHz)	Corrected Amplitude (dBμV/m)	Detector (QP)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
53.615050	22.3	QP	137.0	V	145.0	-17.9	40.0	17.7
30.918695	20.4	QP	169.0	V	269.0	-6.1	40.0	19.6
57.401100	20.4	QP	105.0	V	317.0	-18.4	40.0	19.6
35.222400	17.0	QP	148.0	V	48.0	-9.0	40.0	23.0
40.600200	13.4	QP	205.0	V	205.0	-12.6	40.0	26.6
42.750650	11.1	QP	238.0	V	217.0	-13.9	40.0	28.9

2): 1GHz ~ 40 GHz

Frequency (MHz)	Corrected Amplitude (dB μ V/m)	Detector (PK/Ave.)	Height (m)	Polar (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dB μ V/m)	Margin (dB)
11616.2	51.19	Ave.	1.2	H	2	20.94	54.00	2.81*
11616.2	69.27	PK	1.2	H	2	20.94	74.00	4.73
6689.3	37.60	Ave.	1.1	H	82	17.44	54.00	16.40
9142.3	35.14	Ave.	1.2	H	71	18.09	54.00	18.86
8290.5	35.09	Ave.	1.1	V	88	17.50	54.00	18.91
7370.7	33.83	Ave.	1.2	V	16	15.91	54.00	20.17
17424.3	42.69	Ave.	1.3	V	77	25.03	64.00	21.31
6689.3	52.09	PK	1.1	H	82	17.44	74.00	21.91
8290.5	49.01	PK	1.1	V	88	17.50	74.00	24.99
9142.3	48.78	PK	1.2	H	71	18.09	74.00	25.22
7370.7	46.98	PK	1.2	V	16	15.91	74.00	27.02
17424.3	56.59	PK	1.3	V	77	25.03	84.00	27.41
5808.1	78.76	Ave.	1.1	V	63	13.84	114.00	35.24
5808.1	96.79	PK	1.1	V	63	13.84	134.00	37.21
5808.1	76.42	Ave.	1.2	H	24	13.84	114.00	37.58
5808.1	94.73	PK	1.2	H	24	13.84	134.00	39.27

*Within measurement uncertainty!

3) Band Edge:



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