



NVLAP LAB CODE 200707-0



FCC PART 15.247

## MEASUREMENT AND TEST REPORT

For

**Hull Base International Ltd.**

Room 1004, New Lee Wah Centre, 88 Tokwawan Road,

Tokwawan, Hong Kong

**FCC ID: XGGH100C09**  
**Model: H100 (Camera Unit: H100C)**

<b>Report Type:</b> Original Report	<b>Product Type:</b> 2.4 GHz Wireless Monitoring Device
<b>Test Engineer:</b>	Weir Zhong
<b>Report Number:</b>	RSZ09060304
<b>Report Date:</b>	2009-08-05
	Merry Zhao
<b>Reviewed By:</b>	EMC Engineer
<b>Prepared By:</b>	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

**Note:** This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Shenzhen). This report **must not** be used by the customer to claim product certification, approval, or endorsement by NVLAP\*, NIST, or any agency of the Federal Government.

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

## **TABLE OF CONTENTS**

<b>GENERAL INFORMATION.....</b>	<b>4</b>
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....	4
OBJECTIVE .....	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY .....	4
TEST FACILITY .....	4
<b>SYSTEM TEST CONFIGURATION.....</b>	<b>6</b>
DESCRIPTION OF TEST CONFIGURATION .....	6
EQUIPMENT MODIFICATIONS .....	6
LOCAL SUPPORT EQUIPMENT LIST AND DETAILS .....	6
EXTERNAL I/O CABLE.....	6
CONFIGURATION OF TEST SETUP .....	7
BLOCK DIAGRAM OF TEST SETUP .....	7
<b>SUMMARY OF TEST RESULTS .....</b>	<b>8</b>
<b>CFR47 §15.247 (i), §1.1307 (b) (1) &amp; §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE) .....</b>	<b>9</b>
STANDARD APPLICABLE .....	9
TEST DATA .....	9
<b>CFR47 §15.203 – ANTENNA REQUIREMENT .....</b>	<b>10</b>
STANDARD APPLICABLE .....	10
ANTENNA CONNECTOR CONSTRUCTION .....	10
<b>CFR47 §15.207 (a) - CONDUCTED EMISSIONS .....</b>	<b>11</b>
APPLICABLE STANDARD .....	11
MEASUREMENT UNCERTAINTY.....	11
EUT SETUP .....	11
EMI TEST RECEIVER SETUP.....	12
TEST EQUIPMENT LIST AND DETAILS.....	12
TEST PROCEDURE .....	12
TEST RESULTS SUMMARY .....	12
TEST DATA .....	13
PLOT(S) OF TEST DATA.....	13
<b>CFR47 §15.205, §15.209 &amp; §15.247 – RADIATED EMISSIONS.....</b>	<b>15</b>
APPLICABLE STANDARD .....	15
MEASUREMENT UNCERTAINTY.....	15
EUT SETUP .....	15
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP .....	16
TEST EQUIPMENT LIST AND DETAILS.....	16
TEST PROCEDURE .....	16
CORRECTED AMPLITUDE & MARGIN CALCULATION .....	16
TEST RESULTS SUMMARY .....	17
TEST DATA .....	17
<b>CFR47 §15.247(a) (1)-CHANNEL SEPARATION TEST .....</b>	<b>20</b>
APPLICABLE STANDARD .....	20
TEST EQUIPMENT LIST AND DETAILS.....	20
TEST PROCEDURE .....	20

TEST DATA .....	20
<b>CFR47 §15.247(a) (1) – 20 dB BANDWIDTH TESTING .....</b>	<b>23</b>
APPLICABLE STANDARD .....	23
TEST EQUIPMENT LIST AND DETAILS.....	23
TEST PROCEDURE .....	23
TEST DATA .....	23
<b>CFR47 §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST .....</b>	<b>26</b>
APPLICABLE STANDARD .....	26
TEST EQUIPMENT LIST AND DETAILS.....	26
TEST PROCEDURE .....	26
TEST DATA .....	26
<b>CFR47 §15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWELL TIME) .....</b>	<b>28</b>
APPLICABLE STANDARD .....	28
TEST EQUIPMENT LIST AND DETAILS.....	28
TEST PROCEDURE .....	28
TEST DATA .....	28
<b>CFR47 §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT .....</b>	<b>31</b>
APPLICABLE STANDARD .....	31
TEST EQUIPMENT LIST AND DETAILS.....	31
TEST PROCEDURE .....	31
TEST DATA .....	31
<b>CFR47 §15.247(d) - BAND EDGES TESTING .....</b>	<b>34</b>
APPLICABLE STANDARD .....	34
TEST EQUIPMENT LIST AND DETAILS.....	34
TEST PROCEDURE .....	34
TEST DATA .....	35

## GENERAL INFORMATION

---

### Product Description for Equipment under Test (EUT)

The *Hull Base International Ltd.*'s product, model number: *H100 (Camera Unit: H100C) (FCC ID: XGGH100C09)* or the "EUT" as referred to in this report is a *Wireless Monitoring Device*, which measures approximately: 10.0 cm L x 9.0 cm W x 4.5 cm H for monitor, rated input voltage: DC 6V adapter.

Adapter Information: OEM POWER ADAPTOR

Model: ADS10-W060100

Input: 100-240V 50-60Hz, 0.5A

Output: 6V, 1.0A

*All measurement and test data in this report was gathered from production sample serial number: 0906015(Assigned by BACL, Shenzhen). The EUT was received on 2009-06-03.*

### Objective

This Type approval report is prepared on behalf of *Hull Base International Ltd.* in accordance with Part 2, Subpart J, 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 15.247 rules.

This measurement and test report only pertains to the camera unit portion of the EUT; for measurement and test results to the monitor unit please refer to report RSZ09060303 issued by Shenzhen BACL.

### Related Submittal(s)/Grant(s)

FCC Part 15.247 submission with FCC ID: XGGH100M09.

### 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 emissions measurement was performed and 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

### Description of Test Configuration

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 unit tested.

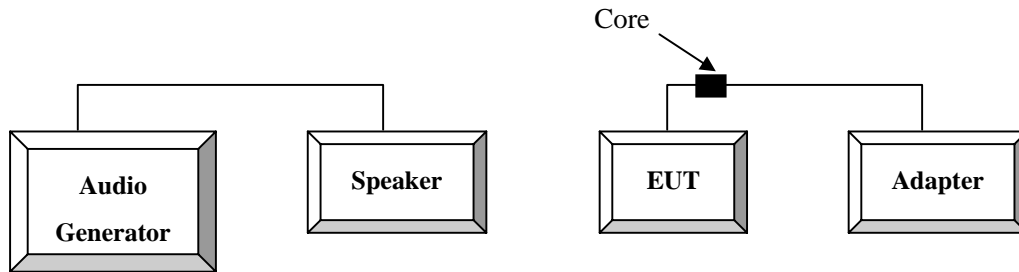
### Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
OEM	POWER ADAPTOR	ADS10-W060100	N/A	N/A
NANYAN	Audio Generator	NY2201	019596	N/A
RCA	Speaker	RTD170	N/A	N/A

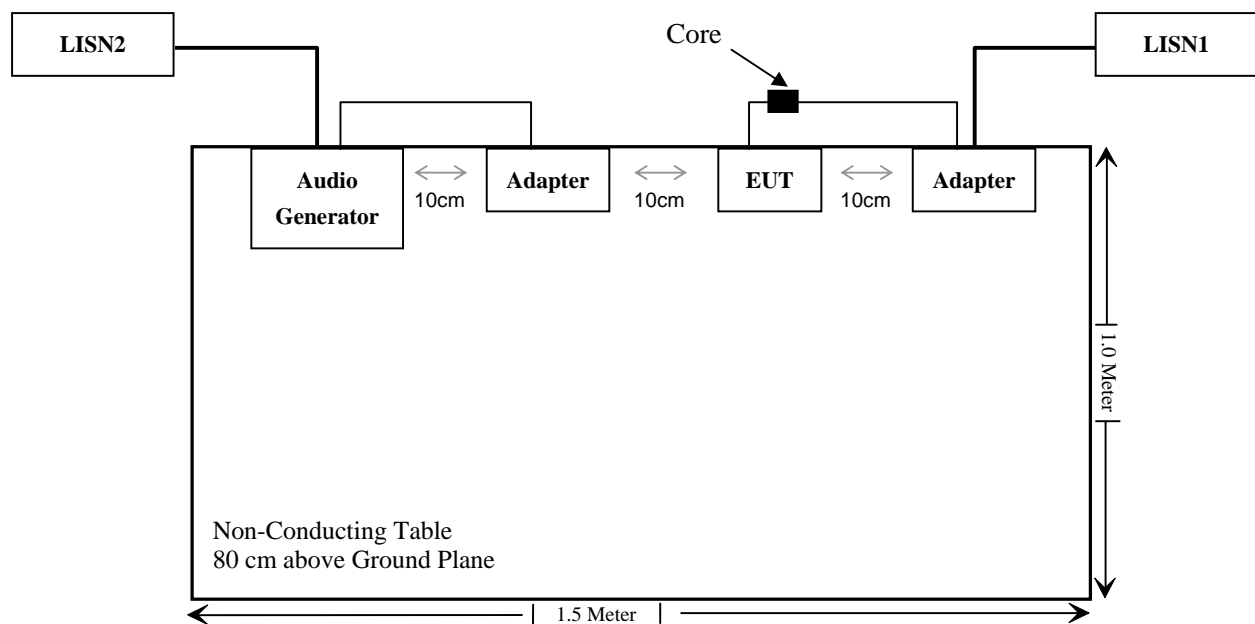
### External I/O Cable

Cable Description	Length (m)	From Port	To
Unshielded Undetachable DC Power Cable	1.6	Adapter	EUT
Unshielded Detachable Audio Cable	0.5	Audio Generator	Speaker

## Configuration of Test Setup



## Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
§15.247 (i), §1.1307 (b)(1), §2.1091	Maximum Permissible Exposure (MPE)	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Radiated Emissions	Compliant
§15.247 (a)(1)	20 dB Bandwidth	Compliant
§15.247(a)(1)	Channel Separation Test	Compliant
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliant
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliant
§15.247(b)(1)	Peak Output Power Measurement	Compliant
§15.247(d)	Band Edges	Compliant



## CFR47 §15.247 (i), §1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Standard Applicable

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

#### Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mw/cm <sup>2</sup> )	Averaging Time (Minutes)
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

### Test Data

Predication of MPE limit at a given distance

$$S = PG/4\pi R^2$$

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally **numeric** gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Maximum peak output power at antenna input terminal: 15.20 (dBm)

Maximum peak output power at antenna input terminal: 33.113 (mW)

Prediction distance: 20 (cm)

Predication frequency: 2437.875 (MHz)

Antenna Gain (typical): 1.2 (dBi)

Antenna Gain (typical): 1.318 (numeric)

The power density at predication frequency at 20 cm: 0.0087 (mW/cm<sup>2</sup>)

MPE limit for General Population/Uncontrolled exposure at prediction frequency: 1.0 (mW/cm<sup>2</sup>)

### Result:

The predicted power density level at 20 cm is 0.0087 mw/cm<sup>2</sup> which is below the uncontrolled exposure limit of 1.0 mw/cm<sup>2</sup>, The EUT is used at least 20 cm away from user's body. It is determined as mobile equipment and complies with the MPE limit.

---

**CFR47 §15.203 – ANTENNA REQUIREMENT**

---

**Standard Applicable**

According to CFR47 § 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.

**Antenna Connector Construction**

The EUT has an integral antenna soldered to the PCB, which in accordance to section 15.203, the maximum gain is 1.2 dBi; please refer to the internal photos.

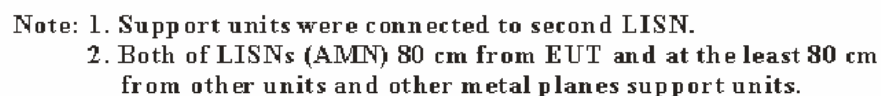
**Result:** Compliant.

### Applicable Standard

## Measurement Uncertainty

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



The adapter was connected to a 120V 60Hz 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><b>Frequency Range</b></i>	<i><b>IF B/W</b></i>
150 kHz – 30 MHz	9 kHz

## Test Equipment List and Details

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Com-Power	L.I.S.N.	LI-200	12005	N/A	N/A
Com-Power	L.I.S.N.	LI-200	12208	N/A	N/A
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

\* 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 was connected to the outlet of the first LISN, the other local support equipments were connected to the outlet of the second 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:

**Transmitting mode: 16.60 dB at 0.1500 MHz in the Line conductor mode**

**Test Data****Environmental Conditions**

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.0 kPa

\* The testing was performed by Weir Zhong on 2009-06-17.

Test Mode: Transmitting

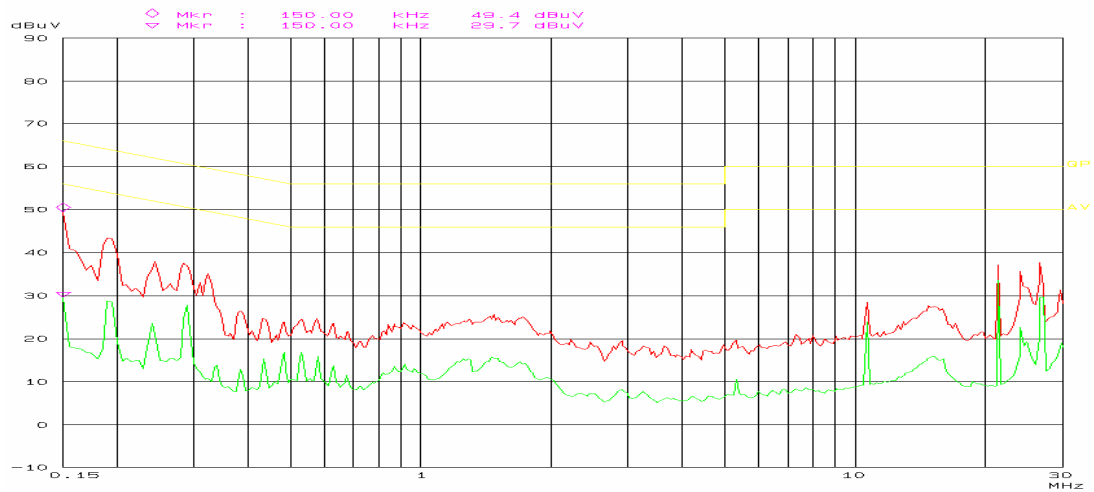
Line Conducted Emissions				FCC Part 15.207	
Frequency (MHz)	Amplitude (dBμV)	Detector (QP/AV)	Conductor (Line/Neutral)	Limit (dBμV)	Margin (dB)
0.1500	49.40	QP	Line	66.00	16.60
21.3350	32.00	AV	Neutral	50.00	18.00
0.1750	45.50	QP	Neutral	64.72	19.22
26.6750	29.50	AV	Line	50.00	20.50
0.1950	43.10	QP	Line	63.82	20.72
0.2750	39.30	QP	Neutral	60.97	21.67
26.6750	27.80	AV	Neutral	50.00	22.20
26.6700	37.70	QP	Line	60.00	22.30
0.2750	28.30	AV	Neutral	50.97	22.67
0.2900	27.80	AV	Line	50.52	22.72
0.2900	37.00	QP	Line	60.52	23.52
26.6650	36.40	QP	Neutral	60.00	23.60
21.3350	35.40	QP	Neutral	60.00	24.60
0.1950	28.50	AV	Line	53.82	25.32
0.1500	29.70	AV	Line	56.00	26.30
1.2850	17.00	AV	Neutral	46.00	29.00
1.2950	26.80	QP	Neutral	56.00	29.20
0.5300	16.80	AV	Line	46.00	29.20
1.5050	15.40	AV	Line	46.00	30.60
1.5100	24.90	QP	Line	56.00	31.10
15.6800	28.50	QP	Neutral	60.00	31.50
0.5300	24.50	QP	Line	56.00	31.50
0.1750	22.60	AV	Neutral	54.72	32.12
15.7200	17.20	AV	Neutral	50.00	32.80

**Plot(s) of Test Data**

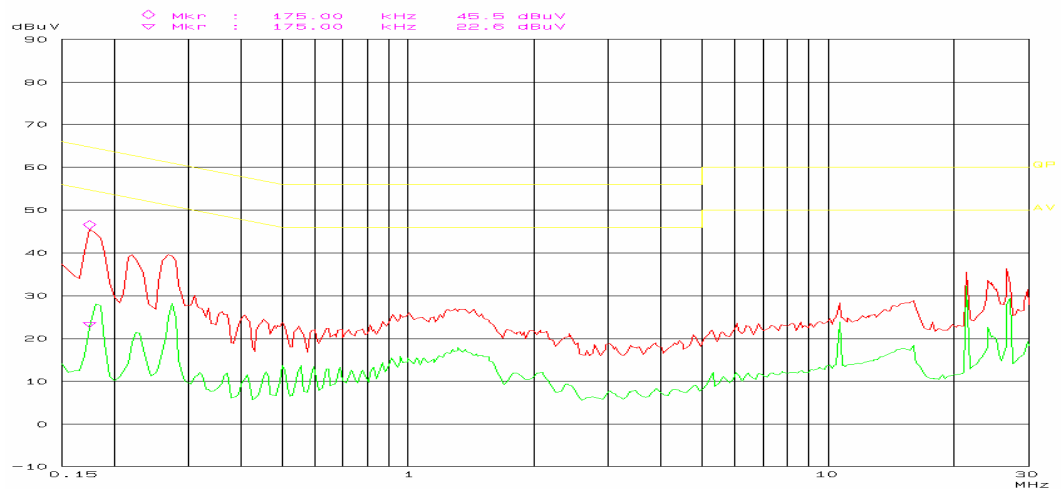
Plot(s) of Test Data is presented hereinafter as reference.

Conducted emission  
FCC PART 15

EUT: Wireless Monitoring Device M/N: H100C  
Manuf: Hull Base International Ltd.  
Op Cond: Transmitting  
Operator: Weir  
Test Spec: Adapter input AC 120V/60Hz Line  
Comment: Temp: 25 Hum: 56%  
BACL

Conducted emission  
FCC PART 15

EUT: Wireless Monitoring Device M/N: H100C  
Manuf: Hull Base International Ltd.  
Op Cond: Transmitting  
Operator: Weir  
Test Spec: Adapter input AC 120V/60Hz Neutral  
Comment: Temp: 25 Hum: 56%  
BACL



## CFR47 §15.205, §15.209 & §15.247 – RADIATED EMISSIONS

### Applicable Standard

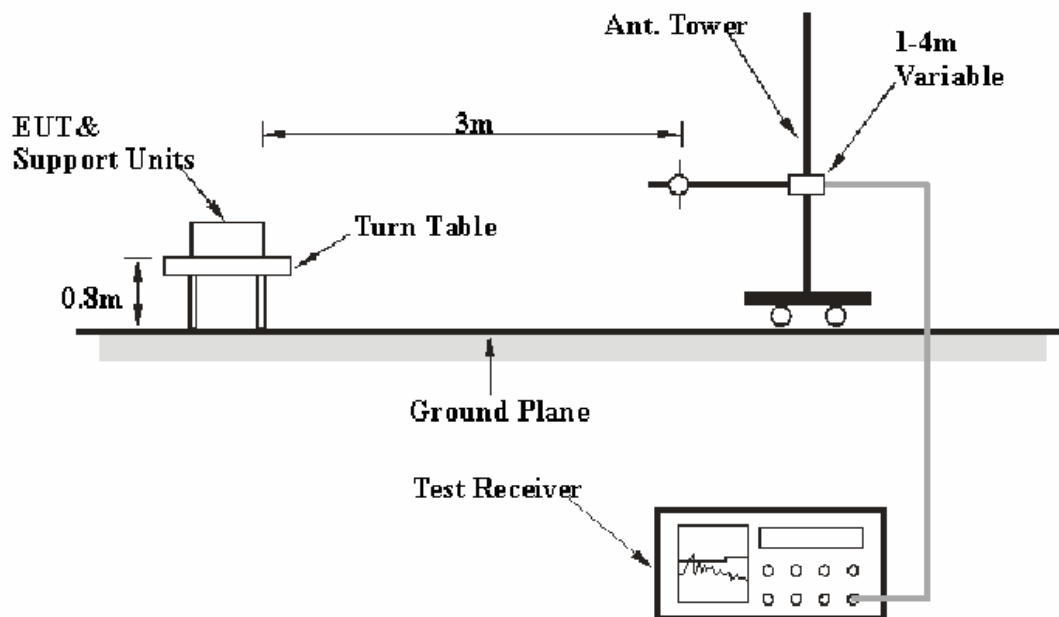
CFR47 §15.205; §15.209; §15.247 (d)

### 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  $\pm 4.0$  dB.

### EUT Setup



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.247 limits.

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
30MHz – 1000 MHz	100 kHz	300 kHz
1000 MHz – 25 GHz	1 MHz	3 MHz

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2008-08-02	2009-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2009-03-11	2010-03-11
HP	Amplifier	8449B	3008A00277	2008-09-12	2009-09-11
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 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.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1GHz and peak and Average detection modes for frequencies above 1GHz.

## 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 maximum limit. The equation for margin calculation is as follows:

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



## Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, with the worst margin reading of:

### Below 1GHz:

**Transmitting mode: 1.9 dB at 149.333175 MHz in the Vertical polarization**

### Above 1 GHz:

**Transmitting mode: 10.03 dB at 4828.50 MHz in the Horizontal polarization (Low Channel)**

**Transmitting mode: 7.58 dB at 4875.75 MHz in the Horizontal polarization (Middle Channel)**

**Transmitting mode: 10.05 dB at 4923.00 MHz in the Horizontal polarization (High Channel)**

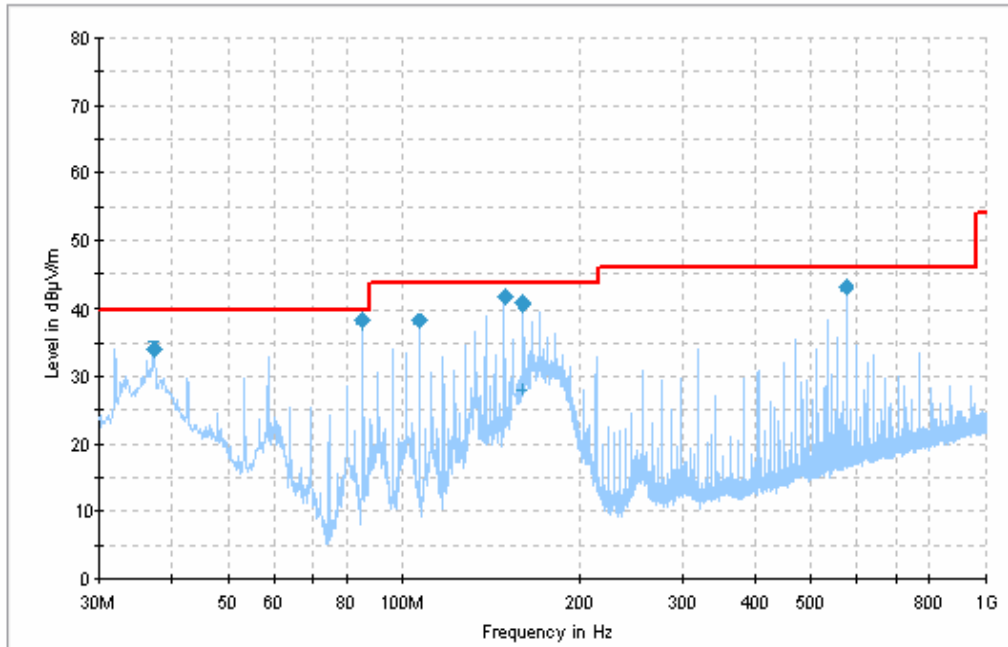
## Test Data

### Environmental Conditions

<b>Temperature:</b>	26 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

*\* The testing was performed by Weir Zhong on 2009-07-22.*

*Test Mode: Transmitting (below 1 GHz)*



Frequency (MHz)	Corrected Amplitude (dBμV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	Limit (dBμV/m)	Margin (dB)
149.333175	41.6	102.0	V	298.0	-18.5	43.5	1.9*
106.665850	37.5	107.0	V	71.0	-19.6	43.5	2.5*
85.325850	37.4	123.0	V	37.0	-22.2	40.0	2.6*
159.990350	40.7	220.0	H	75.0	-18.1	43.5	2.8*
576.019125	43.1	199.0	V	270.0	-9.1	46.0	2.9*
37.361400	34.2	102.0	V	262.0	-13.6	40.0	5.8

\* Within measurement uncertainty.

Test Mode: Transmitting (Above 1 GHz)

Frequency (MHz)	S.A. Reading (dBμV/m)	Detector PK/QP/AV	Direction Degree	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dBμV/m)	FCC Part 15.247/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	Remarks
Low Channel (2414.25 MHz)												
4828.50	33.24	AV	320	1.7	H	36.50	7.93	33.70	43.97	54	10.03	harmonic
4828.50	33.38	AV	236	1.0	V	35.20	7.93	33.70	42.81	54	11.19	harmonic
2290.50	33.27	AV	180	2.0	H	30.60	7.15	33.90	37.12	54	16.88	spurious
2290.50	33.67	AV	25	1.1	V	30.15	7.15	33.90	37.07	54	16.93	spurious
2290.50	52.56	PK	25	1.1	V	30.15	7.15	33.90	55.96	74	18.04	spurious
4828.50	44.85	PK	320	1.7	H	36.50	7.93	33.70	55.58	74	18.42	harmonic
4828.50	45.53	PK	236	1.0	V	35.20	7.93	33.70	54.96	74	19.04	harmonic
2290.50	46.52	PK	180	2.0	H	30.60	7.15	33.90	50.37	74	23.63	spurious
Middle Channel (2437.875 MHz)												
4875.75	36.88	AV	208	1.6	V	35.30	7.94	33.70	46.42	54	7.58	harmonic
4875.75	35.10	AV	231	2.0	H	36.52	7.94	33.70	45.86	54	8.14	harmonic
4875.75	53.89	PK	208	1.6	V	35.30	7.94	33.70	63.43	74	10.57	harmonic
4875.75	51.34	PK	231	2.0	H	36.52	7.94	33.70	62.1	74	11.9	harmonic
2286.50	54.30	PK	177	1.0	V	30.13	7.15	33.90	57.68	74	16.32	spurious
2286.50	33.70	AV	177	1.0	V	30.13	7.15	33.90	37.08	54	16.92	spurious
2286.50	33.12	AV	59	1.7	H	30.56	7.15	33.90	36.93	54	17.07	spurious
2286.50	51.24	PK	59	1.7	H	30.56	7.15	33.90	55.05	74	18.95	spurious
High Channel (2461.5 MHz)												
4923.00	33.10	AV	236	2.0	H	36.60	7.95	33.70	43.95	54	10.05	harmonic
4923.00	33.52	AV	182	1.1	V	35.40	7.95	33.70	43.17	54	10.83	harmonic
2258.55	33.41	AV	225	1.5	H	30.40	6.60	33.90	36.51	54	17.49	spurious
2258.55	33.57	AV	6	1.0	V	30.10	6.60	33.90	36.37	54	17.63	spurious
4923.00	44.32	PK	236	2.0	H	36.60	7.95	33.70	55.17	74	18.83	harmonic
4923.00	44.53	PK	182	1.1	V	35.40	7.95	33.70	54.18	74	19.82	harmonic
2258.55	49.78	PK	6	1.0	V	30.10	6.60	33.90	52.58	74	21.42	spurious
2258.55	46.01	PK	225	1.5	H	30.40	6.60	33.90	49.11	74	24.89	spurious

Spurious emission in restricted band

Frequency (MHz)	S.A. Reading (dBμV/m)	Detector PK/QP/AV	Direction Degree	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dBμV/m)	FCC Part 15.247/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	Remarks
Out of left side band (2310 – 2390 MHz)												
2387.43	63.91	PK	182	1.0	V	30.30	7.88	33.90	68.19	74	5.81	spurious
2386.47	53.80	PK	16	2.0	H	30.90	7.88	33.90	58.68	74	15.32	spurious
2386.47	33.50	AV	16	2.0	H	30.90	7.88	33.90	38.38	54	15.62	spurious
2387.43	33.96	AV	182	1.0	V	30.30	7.88	33.90	38.24	54	15.76	spurious
Out of left side band (2483.5 – 2500 MHz)												
2483.55	61.57	PK	135	1.1	V	30.32	7.90	33.90	65.89	74	8.11	spurious
2487.90	33.12	AV	215	1.8	H	30.92	7.90	33.90	38.04	54	15.96	spurious
2483.55	33.71	AV	135	1.1	V	30.32	7.90	33.90	38.03	54	15.97	spurious
2487.90	52.89	PK	215	1.8	H	30.92	7.90	33.90	57.81	74	16.19	spurious

## CFR47 §15.247(a) (1)-CHANNEL SEPARATION TEST

### Applicable Standard

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06

\* **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

1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another truce
3. Measure the channel separation.

### Test Data

#### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

\* The testing was performed by Weir Zhong on 2009-07-23.

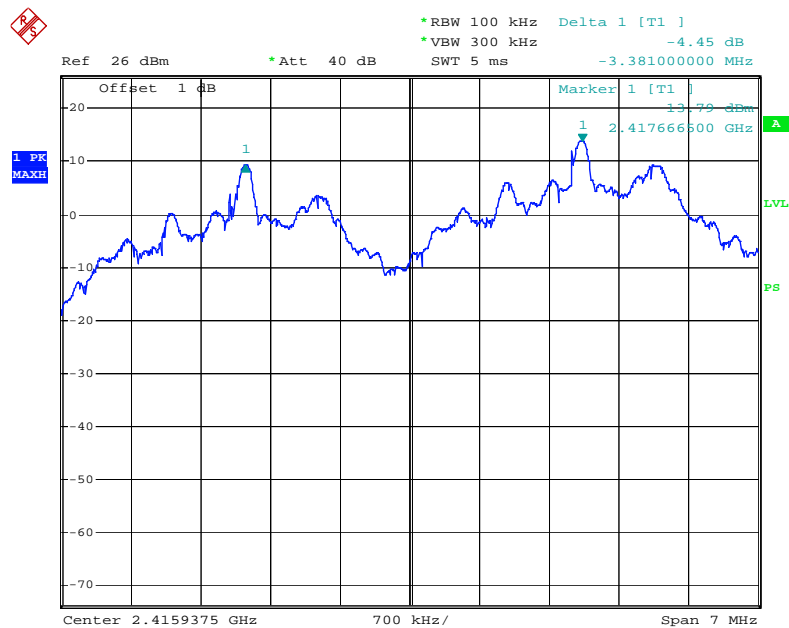
**Test Result:** Compliant.

Please refer to following tables and plots

*Test Mode: Transmitting*

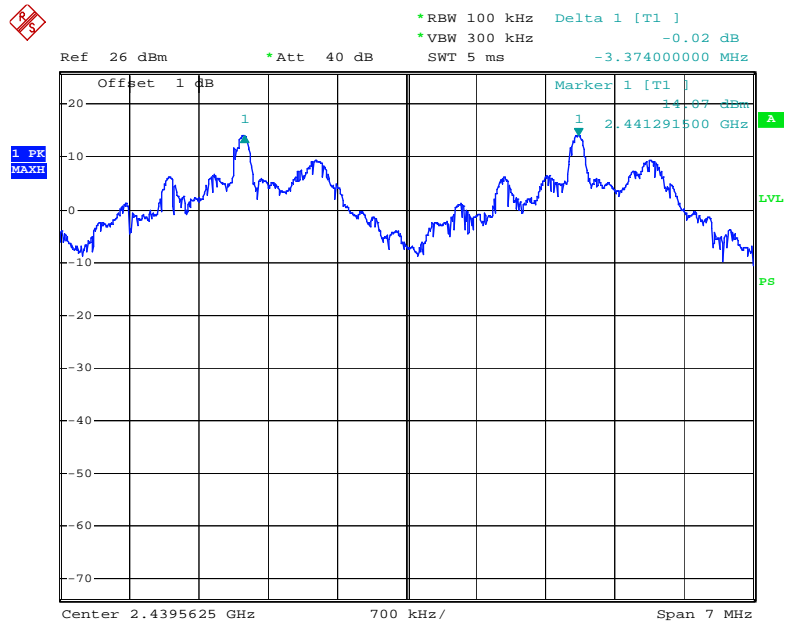
Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Low Channel	2414.250	3.381	2.08	Pass
Adjacent Channel	2417.625			
Mid Channel	2437.875	3.374	2.13	Pass
Adjacent Channel	2441.250			
High Channel	2461.500	3.388	2.09	Pass
Adjacent Channel	2458.125			

Please refer to the following plots.

**Low Channel**

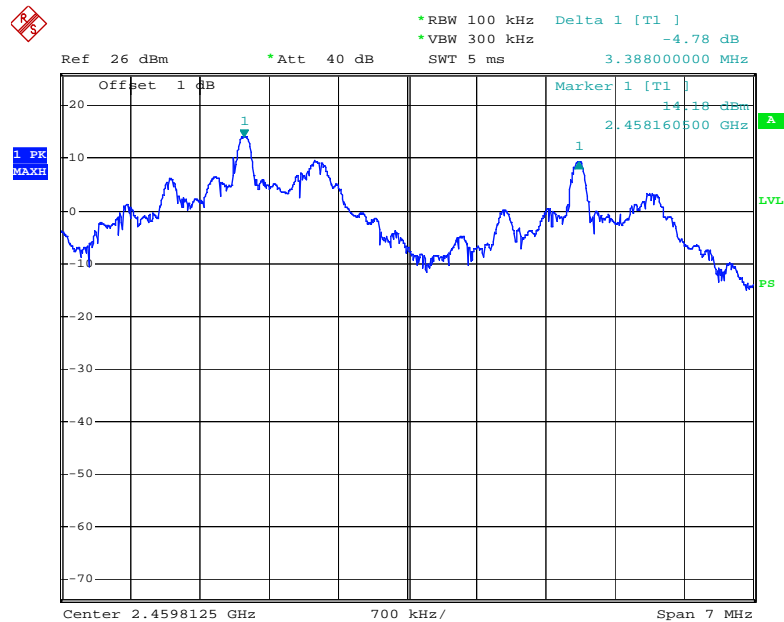
Date: 23.JUL.2009 22:52:06

## Middle Channel



Date: 23.JUL.2009 22:55:00

## High Channel



Date: 23.JUL.2009 23:00:04

## CFR47 §15.247(a) (1) – 20 dB BANDWIDTH TESTING

### Applicable Standard

Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06

\* **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

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 it to measurement instrument. 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 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

### Test Data

#### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

\* The testing was performed by Weir Zhong on 2009-07-23.

**Test Result:** Compliant.

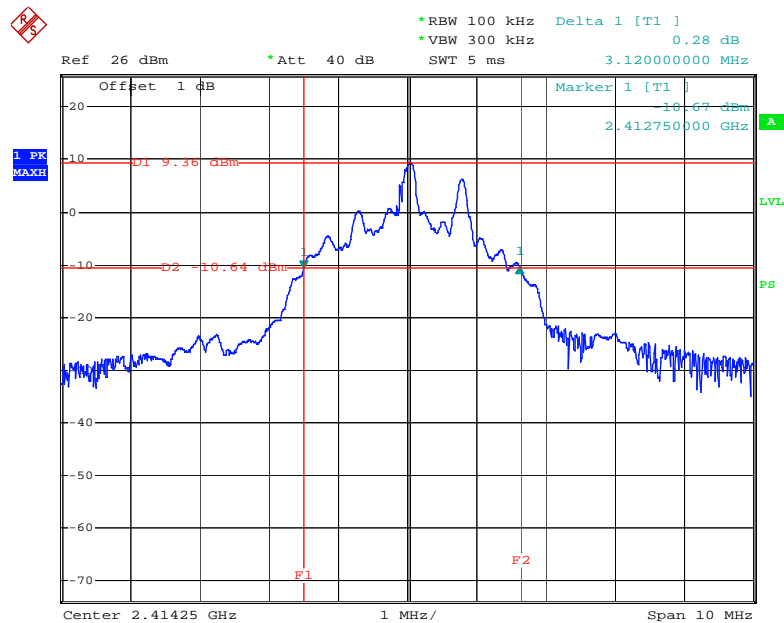
Please refer to following tables and plots

*Test Mode: Transmitting*

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
Low	2414.250	3.12
Middle	2437.875	3.20
High	2461.500	3.14

Please refer to the following plots.

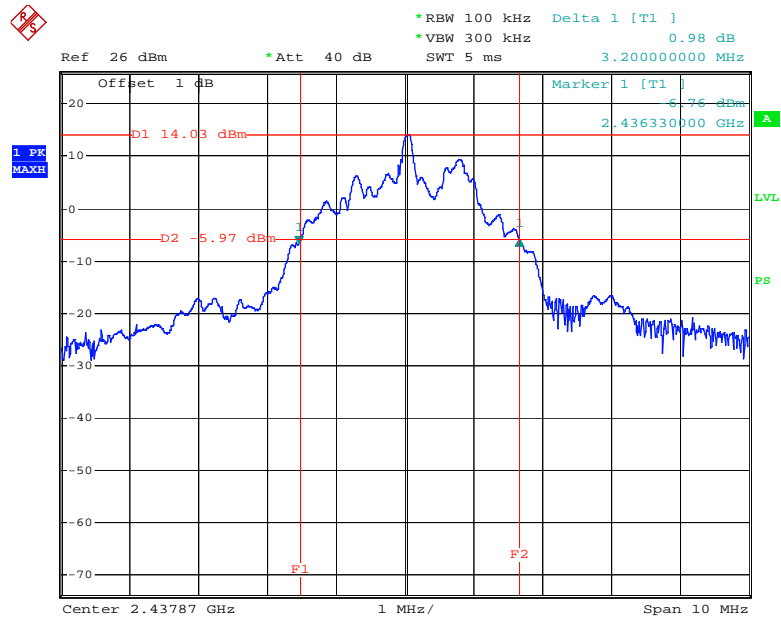
### Low Channel



Date: 23.JUL.2009 21:27:39

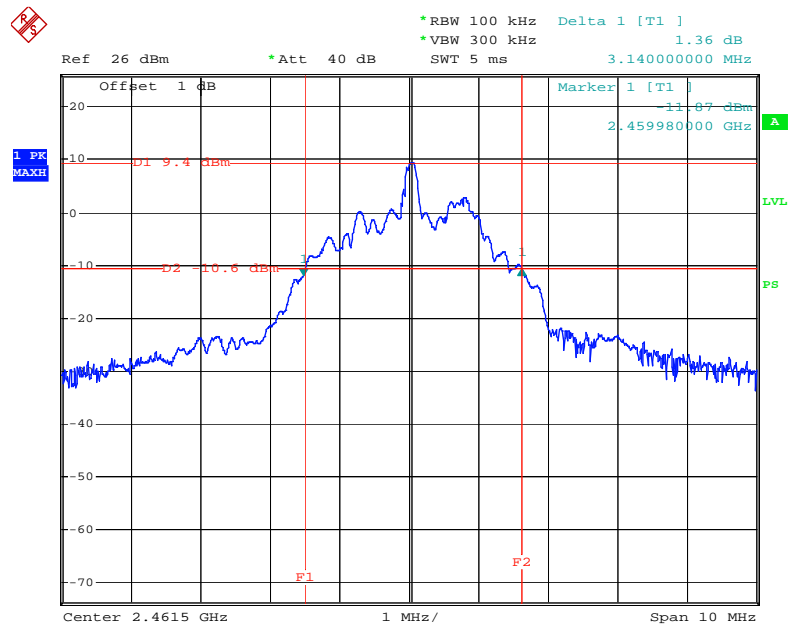


## Middle Channel



Date: 23.JUL.2009 21:30:53

## High Channel



Date: 23.JUL.2009 21:34:33

**CFR47 §15.247(a) (1) (iii)-QUANTITY OF HOPPING CHANNEL TEST****Applicable Standard**

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06

\* **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**

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Set the EUT in hopping mode from first channel to last.
3. By using the Max-Hold function record the Quantity of the channel.

**Test Data****Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

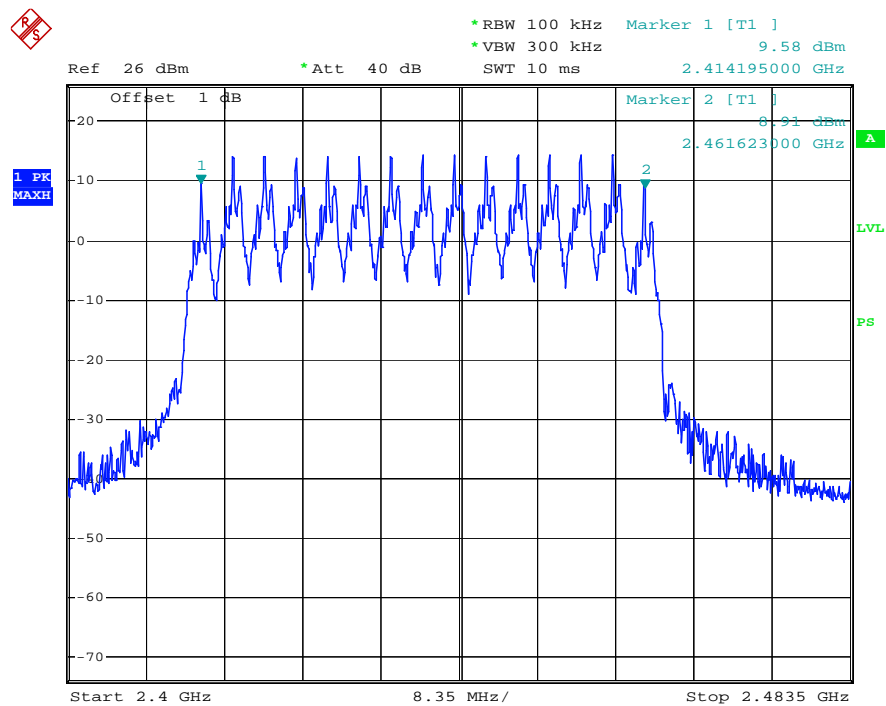
*The testing was performed by Weir Zhong on 2009-07-23.*

**Test Result:** Compliant.

Please refer to following tables and plots

*Test Mode: Transmitting*

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	15	$\geq 15$

**Number of Hopping Channels**

Date: 23.JUL.2009 22:09:17

**CFR47 §15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWELL TIME)****Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06

\* **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**

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 X channel no. (s), the quantity of pulse was get from single sweep. In addition, the time of single pulses was tested.

Dwell Time= time slot length \* hope rate/ number of hopping channels \*15\*0.4s

Hop rate=770/s

**Test Data****Environmental Conditions**

<b>Temperature:</b>	26 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

\* The testing was performed by Weir Zhong on 2009-07-23.

**Test Result:** Compliant.

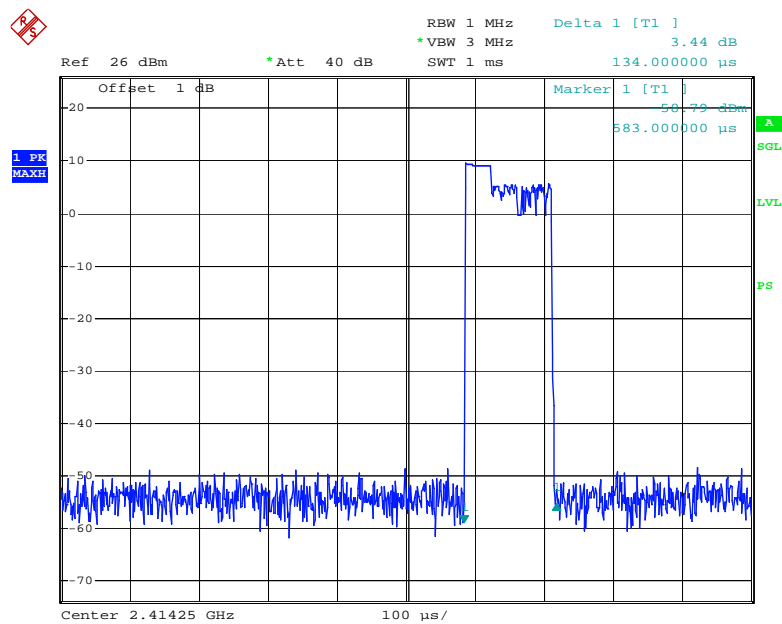
Please refer to following tables and plots

*Test Mode: Transmitting*

Channel	Pulse Width (ms)	Dwell Time (Sec)	Limit (Sec)	Result
Low	0.134	0.020636	0.4	Pass
Middle	0.138	0.021252	0.4	Pass
High	0.132	0.020328	0.4	Pass

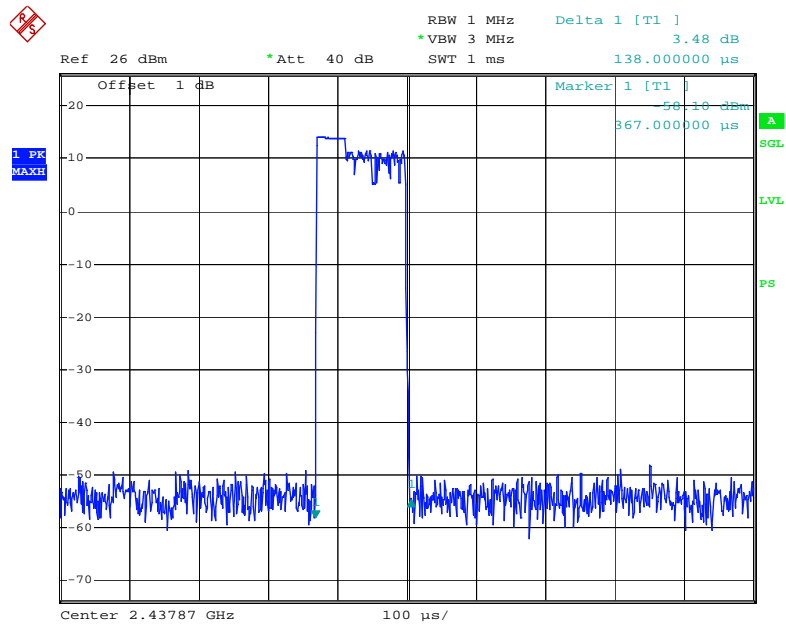
**Note:** Dwell time= Pulse time\* (770/2/15)\*15\*0.4S

Please refer to the following plots.

**Low Channel**

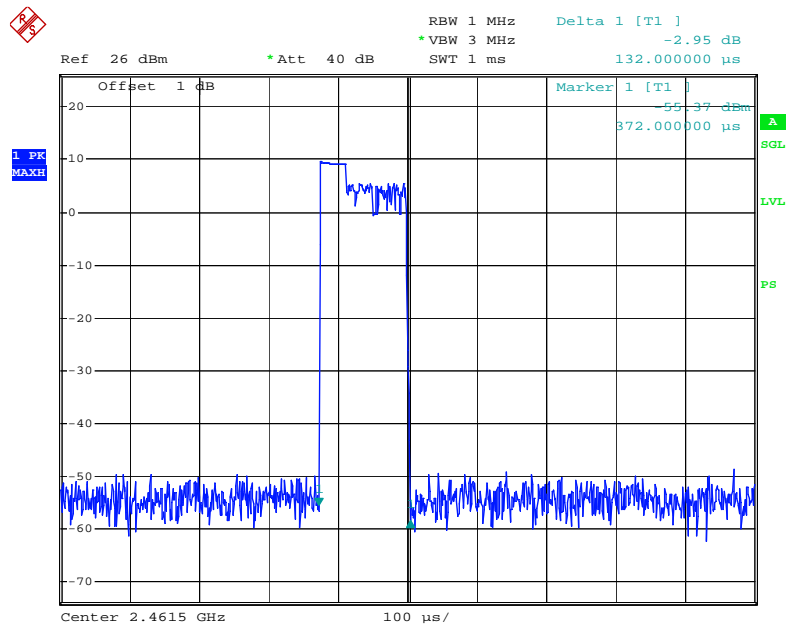
Date: 23.JUL.2009 22:24:01

## Middle Channel



Date: 23.JUL.2009 22:28:40

## High Channel



Date: 23.JUL.2009 22:37:25

## CFR47 §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

### Applicable Standard

According to §15.247(b) (1), for frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

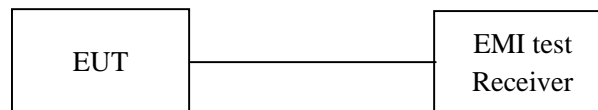
### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06

\* **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

1. Place the EUT on a bench and set in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to an EMI test receiver.
3. Add a correction factor to the display.



### Test Data

#### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	100.9 kPa

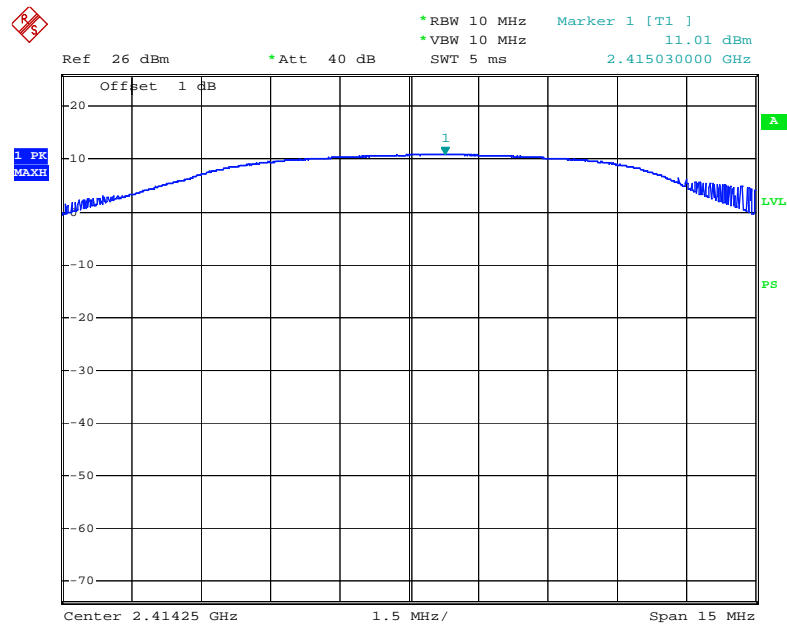
\* The testing was performed by Weir Zhong on 2009-07-23.

**Test Result:** Compliant.

*Test Mode: Transmitting*

Channel	Channel Frequency (MHz)	Conducted Output Power		Limit (mw)
		(dBm)	(mw)	
Low	2414.250	11.01	12.618	125
Middle	2437.875	15.20	33.113	125
High	2461.500	11.08	12.823	125

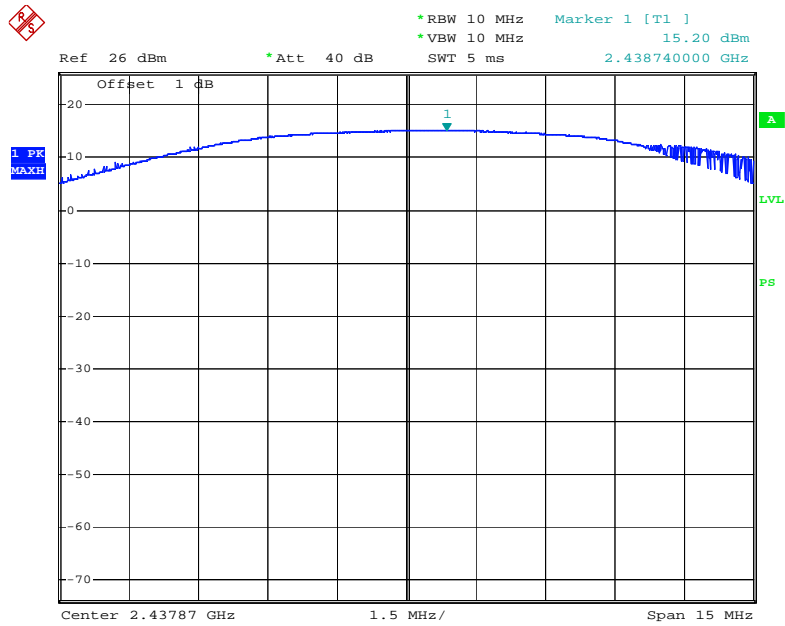
### Low Channel



Date: 23.JUL.2009 21:23:13

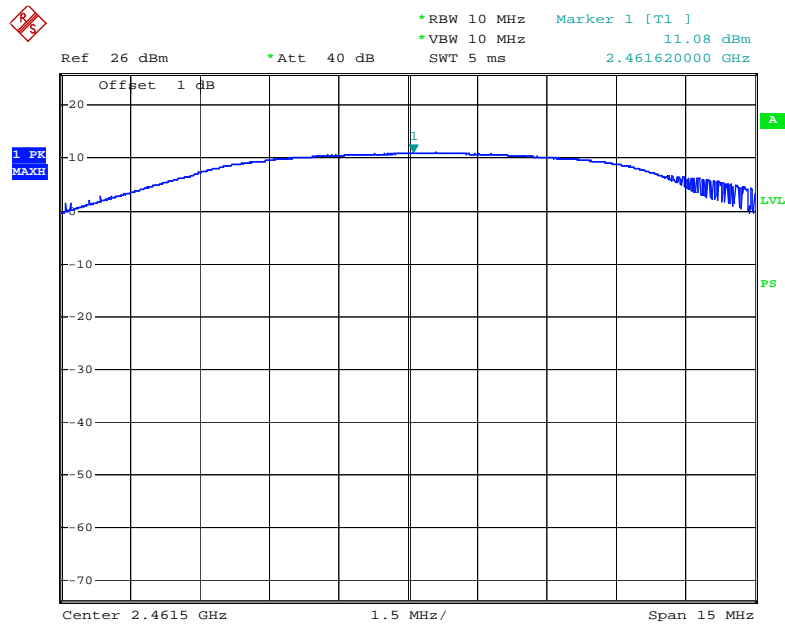


## Middle Channel



Date: 23.JUL.2009 21:18:30

## High Channel



Date: 23.JUL.2009 21:21:31

**CFR47 §15.247(d) - BAND EDGES TESTING****Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

**Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2008-11-07	2009-11-06

\* **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**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel 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 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz.
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 Data****Environmental Conditions**

<b>Temperature:</b>	26 °C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	100.9 kPa

*\*The testing was performed by Weir Zhong on 2009-07-23.*

**Test Result:** Compliant

*Test Mode: Transmitting*

<b>Frequency (MHz)</b>	<b>Delta Peak to Band Emission (dBc)</b>	<b>Limit (dBc)</b>
2399.86	29.95	20
2483.63	33.81	20

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