

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

**Summer Infant, Inc.**

582 Great Road, North Smithfield, Rhode Island 02896, USA

**FCC ID: PZK-2827T**

<b>Report Type:</b> Original Report	<b>Product Type:</b> Baby Monitor
<b>Test Engineer:</b> <u>Kvass Yang</u>	<i>Kvass. Yang</i>
<b>Report Number:</b> <u>RSZ11012704</u>	
<b>Report Date:</b> <u>2011-03-08</u>	
<b>Reviewed By:</b> <u>EMC Engineer</u>	<i>Merry Zhao</i>
<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. 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 contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

**TABLE OF CONTENTS**

**GENERAL INFORMATION.....4**

    PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....4

    OBJECTIVE .....4

    RELATED SUBMITTAL(S)/GRANT(S).....4

    TEST METHODOLOGY .....4

    TEST FACILITY .....4

**SYSTEM TEST CONFIGURATION.....6**

    DESCRIPTION OF TEST CONFIGURATION .....6

    EQUIPMENT MODIFICATIONS .....6

    EUT EXERCISE SOFTWARE .....6

    EXTERNAL I/O CABLE.....6

    BLOCK DIAGRAM OF TEST SETUP .....6

**SUMMARY OF TEST RESULTS .....7**

**FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE).....8**

    APPLICABLE STANDARD .....8

    TEST DATA .....8

**FCC §15.203 – ANTENNA REQUIREMENT .....9**

    APPLICABLE STANDARD .....9

    ANTENNA CONNECTOR CONSTRUCTION .....9

**FCC §15.207(a) – AC LINE CONDUCTED EMISSIONS .....10**

    APPLICABLE STANDARD .....10

    MEASUREMENT UNCERTAINTY .....10

    EUT SETUP .....10

    EMI TEST RECEIVER SETUP .....11

    TEST EQUIPMENT LIST AND DETAILS .....11

    TEST PROCEDURE .....11

    TEST RESULTS SUMMARY .....11

    TEST DATA .....11

**FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS.....14**

    APPLICABLE STANDARD .....14

    MEASUREMENT UNCERTAINTY .....14

    EUT SETUP .....14

    EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP .....15

    TEST EQUIPMENT LIST AND DETAILS .....15

    TEST PROCEDURE .....15

    CORRECTED AMPLITUDE & MARGIN CALCULATION .....15

    TEST RESULTS SUMMARY .....16

    TEST DATA .....16

**FCC §15.247(a) (1) - CHANNEL SEPARATION TEST .....19**

    APPLICABLE STANDARD .....19

    TEST EQUIPMENT LIST AND DETAILS .....19

    TEST PROCEDURE .....19

    TEST DATA .....19

**FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING.....23**  
APPLICABLE STANDARD .....23  
TEST EQUIPMENT LIST AND DETAILS.....23  
TEST PROCEDURE .....23  
TEST DATA .....23

**FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST .....26**  
APPLICABLE STANDARD .....26  
TEST EQUIPMENT LIST AND DETAILS.....26  
TEST PROCEDURE .....26  
TEST DATA .....26

**FCC §15.247(a) (1) (iii) -TIME OF OCCUPANCY (DWELL TIME).....28**  
APPLICABLE STANDARD .....28  
TEST EQUIPMENT LIST AND DETAILS.....28  
TEST PROCEDURE .....28  
TEST DATA .....28

**FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT.....31**  
APPLICABLE STANDARD .....31  
TEST EQUIPMENT LIST AND DETAILS.....31  
TEST PROCEDURE .....31  
TEST DATA .....31

**FCC §15.247(d) - BAND EDGES TESTING .....34**  
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 *Summer Infant, Inc.*'s product, model number: *PZK-2827T* (FCC ID: *PZK-2827T*) or the "EUT" as referred to in this report is a *Baby Monitor*, which measures approximately: 17.0 cm (L) x 9.0 cm (W) x 9.0 cm (H), rated input voltage: DC 7.5 V adapter.

Adapter information:

Model: AD050750500;

Input: AC 120V 250mA, 60Hz;

Output: DC 7.5V 500 mA

*All measurement and test data in this report was gathered from production sample serial number: 11010094 (Assigned by BACL, Shenzhen). The EUT was received on 2011-01-27.*

### Objective

This Type approval report is prepared on behalf of *Summer Infant, Inc.* 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.

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

2.4 GHz wireless monitor with FCC ID: PZK-2827R

### 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 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 3<sup>rd</sup> 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 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/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in engineering mode which was selected by manufacturer.

### Equipment Modifications

No modification was made to the unit tested.

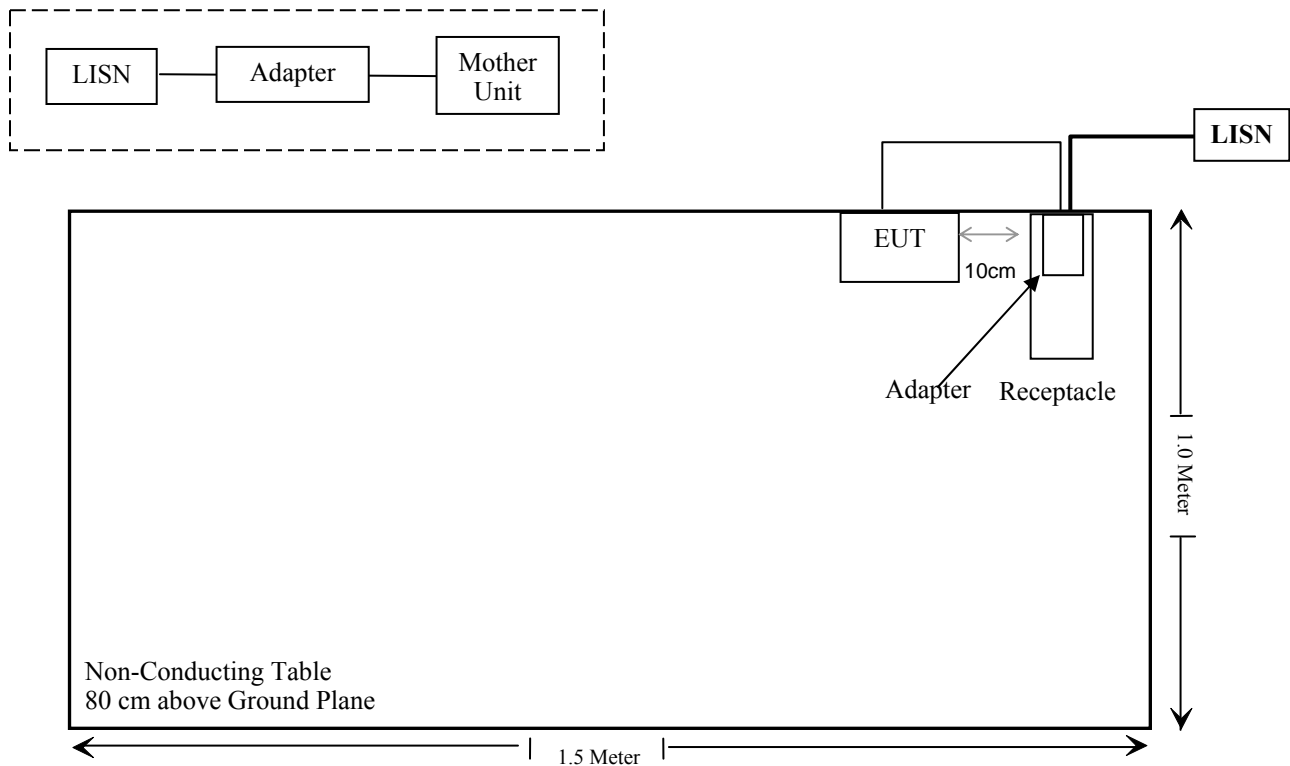
### EUT Exercise Software

N/A

### External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detachable DC Power Cable	3.68	Adapter	EUT

### Block Diagram of Test Setup



---

**SUMMARY OF TEST RESULTS**

---

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

## FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

### Applicable Standard

According to FCC 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

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

Where:

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: 8.79 (dBm)

Maximum peak output power at antenna input terminal: 7.568(mW)

Prediction distance: >20 (cm)

Predication frequency: 2408.825 (MHz)

Antenna Gain (typical): 0 (dBi)

Maximum Antenna Gain: 1 (numeric)

The worst case is power density at predication frequency at 20 cm: 0.0015 (mW/cm<sup>2</sup>)

MPE limit for general population exposure at prediction frequency: 1.0 (mW/cm<sup>2</sup>)

### Result:

The device meets the MPE at 20 cm distance.



---

## **FCC §15.203 – ANTENNA REQUIREMENT**

---

### **Applicable Standard**

According to FCC § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used 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 connected to RF board, which in accordance to section 15.203, the maximum gain is 0 dBi; please refer to the internal photos.

**Result:** Compliance.

## FCC §15.207(a) – AC LINE CONDUCTED EMISSIONS

### Applicable Standard

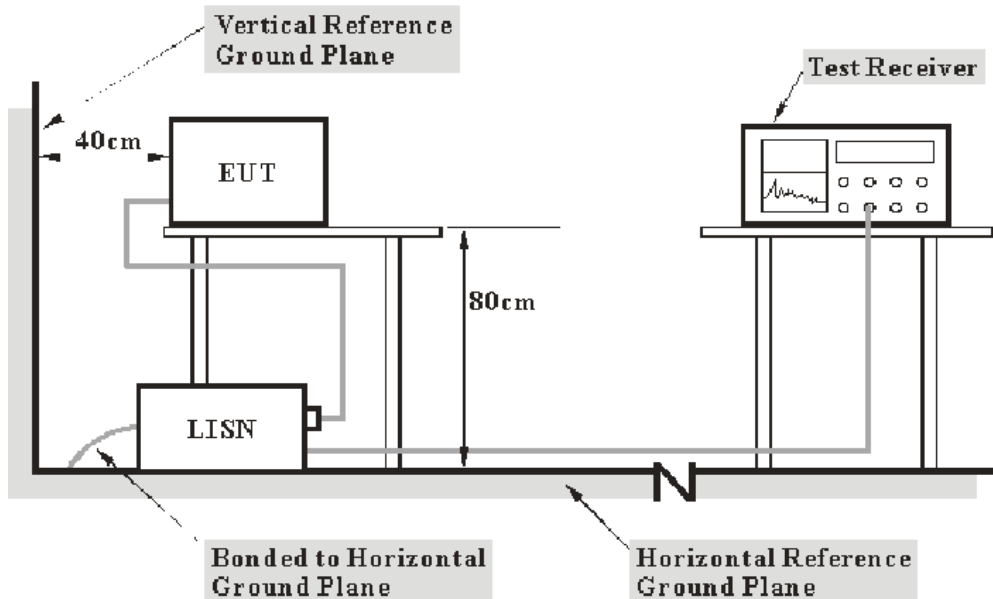
FCC§15.207

### 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 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  $\pm 2.4$  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 C63.4-2009 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:

<u>Frequency Range</u>	<u>IF B/W</u>
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	2010-03-03	2011-03-02
Rohde & Schwarz	L.I.S.N.	ESH2-Z5	892107/021	2010-03-09	2011-03-08

\* **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 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:

**5.68 dB at 0.520 MHz in the Neutral conductor mode**

## Test Data

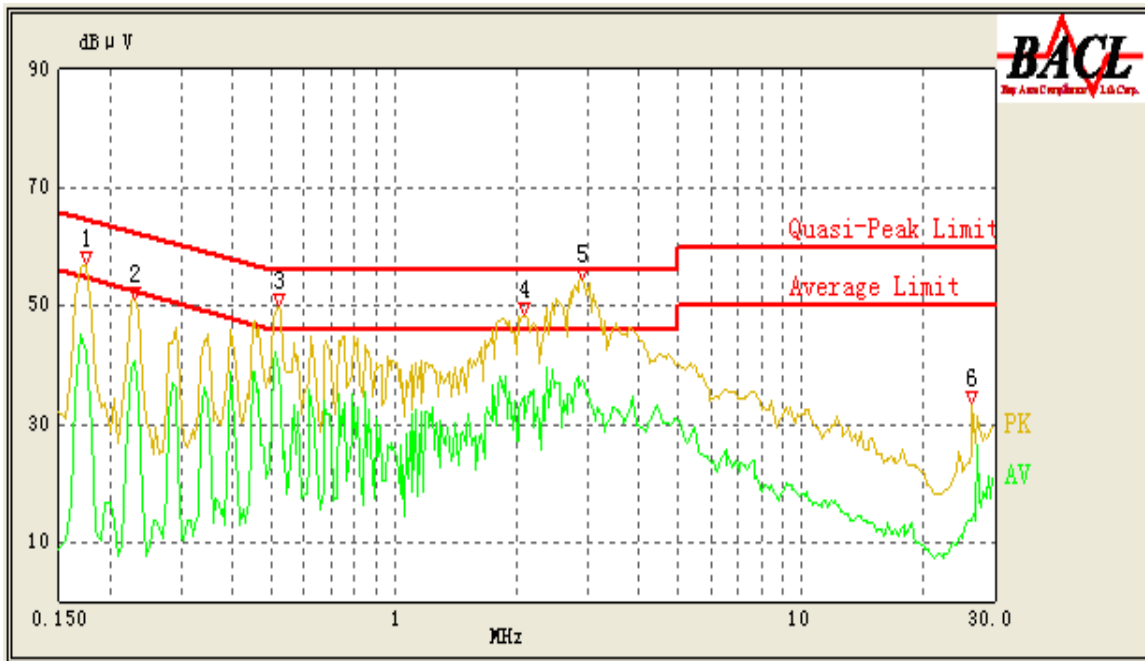
### Environmental Conditions

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	48 %
<b>ATM Pressure:</b>	101 kPa

*The testing was performed by Kvass Yang on 2011-02-22.*

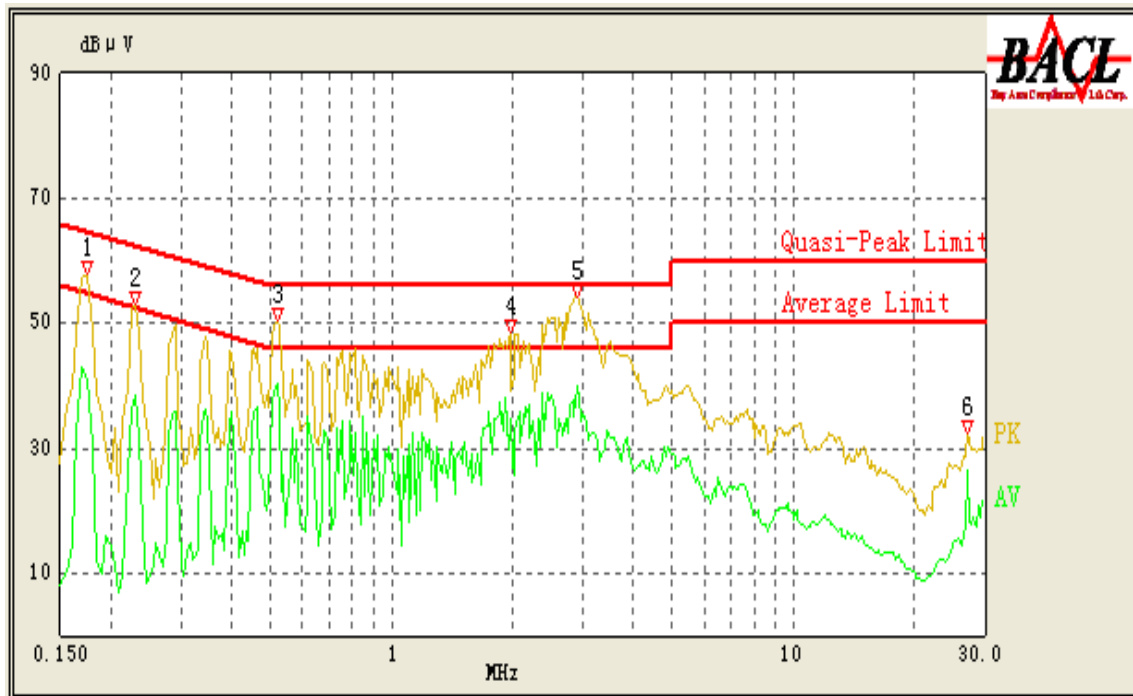
*Test Mode: Transmitting*

AC 120 V/60 Hz, Line



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Cord. Result (dBµV)	Correction Factor (dB)	Limit (dBµV)	Margin (dB)	Detector (PK/QP/Ave)
0.520	49.05	10.20	56.00	6.95	QP
0.520	39.02	10.20	46.00	6.98	Ave
2.905	48.52	10.15	56.00	7.48	QP
2.890	37.44	10.16	46.00	8.56	Ave
2.090	34.79	10.20	46.00	11.21	Ave
0.175	53.78	10.08	65.29	11.51	QP
2.080	43.41	10.20	56.00	12.59	QP
0.230	40.63	10.05	53.71	13.08	Ave
0.175	42.03	10.08	55.29	13.26	Ave
0.230	48.99	10.05	63.71	14.72	QP
26.615	14.67	10.13	50.00	35.33	Ave
26.315	17.53	10.14	60.00	42.47	QP

**AC 120 V/ 60 Hz, Neutral:**



Conducted Emissions			FCC Part 15.207		
Frequency (MHz)	Cord. Result (dBμV)	Correction Factor (dB)	Limit (dBμV)	Margin (dB)	Detector (PK/QP/Ave)
0.520	40.32	10.20	46.00	5.68	Ave
2.900	50.21	10.15	56.00	5.79	QP
2.885	39.80	10.16	46.00	6.20	Ave
0.520	48.81	10.20	56.00	7.19	QP
0.175	54.40	10.08	65.29	10.89	QP
1.980	34.87	10.20	46.00	11.13	Ave
1.970	43.07	10.20	56.00	12.93	QP
0.175	41.19	10.08	55.29	14.10	Ave
0.230	49.58	10.05	63.71	14.13	QP
0.230	38.50	10.05	53.71	15.21	Ave
27.120	26.60	10.13	50.00	23.40	Ave
27.120	30.04	10.13	60.00	29.96	QP

## FCC §15.205, §15.209 & §15.247(d) – RADIATED EMISSIONS

### Applicable Standard

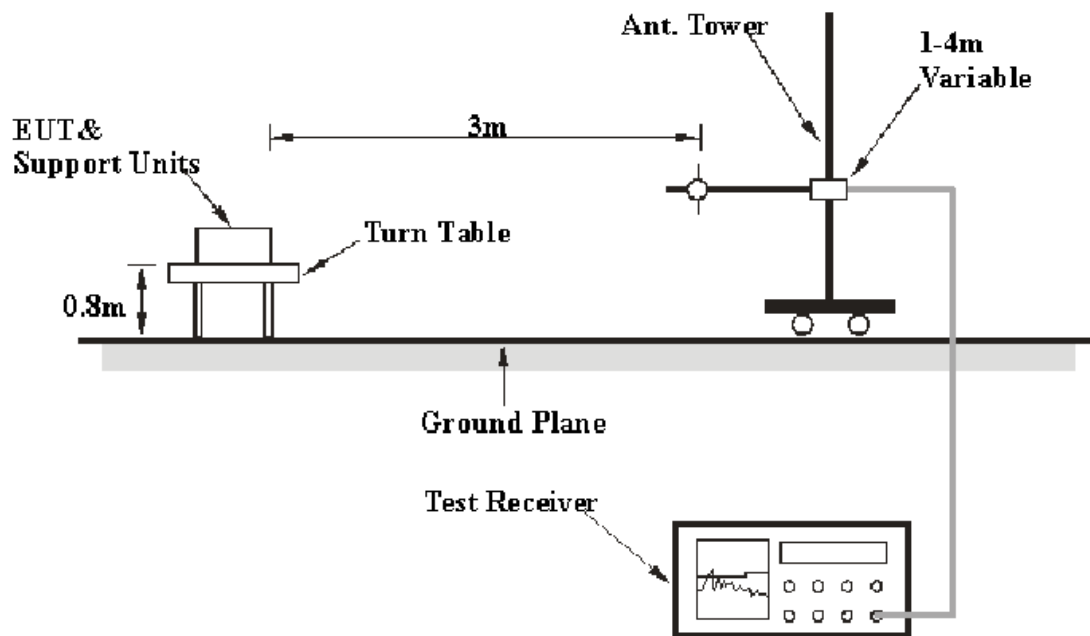
FCC §15.205; §15.209; §15.247(d)

### 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, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.247 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 spacing between the peripherals was 10 cm.

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

## 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>	<i>Detector</i>
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	Ave

## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	HP8447D	2944A09795	2010-08-02	2011-08-02
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-24	2011-11-24
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2010-03-11	2011-03-11
HP	Amplifier	2VA-213+	T-E27H	2010-03-08	2011-03-08
Sunol Sciences	Horn Antenna	DRH-118	A052604	2010-05-05	2011-05-04
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2010-07-08	2011-07-08

\* **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 -1 GHz and peak and Average detection modes for frequencies above 1 GHz.

## Corrected Amplitude & Margin Calculation

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

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

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB 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, and section 15.205, 15.209 and 15.247, with the worst margin reading of:

**0.1 dB at 150.672250 MHz in the Horizontal polarization**

### Test Data

#### Environmental Conditions

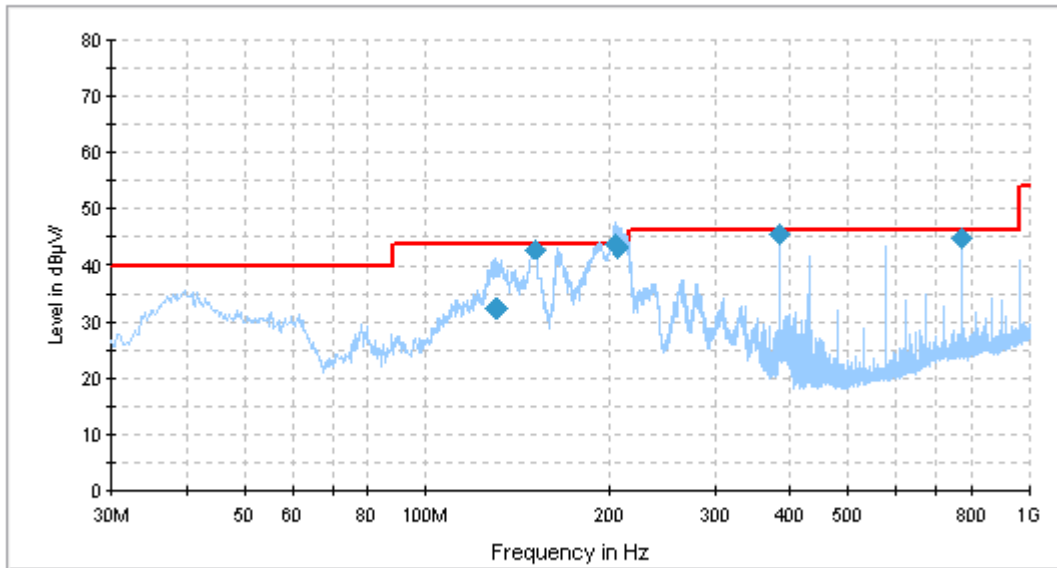
<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	48 %
<b>ATM Pressure:</b>	101 kPa

\* The testing was performed by Kvass Yang on 2011-02-21.

Test mode: Transmitting



**Below 1 GHz: (worse case)**



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Test Antenna		Turntable Position (degree)	Correction Factor (dB)	Limit (dBµV/m)	Margin (dB)
		Height (cm)	Polarity (H/V)				
150.672250	43.4	243.0	H	165.0	-14.0	43.5	0.1*
204.492000	43.4	194.0	H	0.0	-14.3	43.5	0.1*
206.770250	43.2	196.0	H	8.0	-14.2	43.5	0.3*
384.022250	45.3	104.0	H	94.0	-10.3	46.0	0.7*
768.065500	44.7	105.0	V	16.0	-2.2	46.0	1.3*
130.865000	32.6	314.0	H	9.0	-12.6	43.5	10.9

\*Within measurement uncertainty.

**Above 1 GHz:**

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209			
Frequency (MHz)	S.A. Reading (dB $\mu$ V)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Comment
Low Channel (2408.825 MHz)												
7226.475	31.12	Ave	168	1.6	H	39.1	5.16	26.62	48.76	54	5.24	harmonic
4817.650	32.65	Ave	268	1.6	H	35.8	4.32	26.80	45.97	54	8.03	harmonic
4817.650	51.25	PK	200	1.6	H	35.8	4.32	26.80	64.57	74	9.43	harmonic
7226.475	28.16	Ave	180	1.6	V	37.8	5.16	26.62	44.50	54	9.50	harmonic
4817.650	30.25	Ave	263	1.8	V	34.1	4.32	26.80	41.87	54	12.13	harmonic
4817.650	50.17	PK	263	1.8	V	34.1	4.32	26.80	61.79	74	12.21	harmonic
7226.475	40.45	PK	168	1.6	H	39.1	5.16	26.62	58.09	74	15.91	harmonic
7226.475	40.52	PK	180	1.6	V	37.8	5.16	26.62	56.86	74	17.14	harmonic
1869.450	31.23	Ave	152	1.5	H	29.4	2.53	26.78	36.38	54	17.62	spurious
1869.450	25.42	Ave	250	1.0	V	29.0	2.53	26.78	30.17	54	23.83	spurious
1869.450	40.97	PK	152	1.5	H	29.4	2.53	26.78	46.12	74	27.88	spurious
1869.450	30.20	PK	250	1.0	V	29.0	2.53	26.78	34.95	74	39.05	spurious
Middle Channel (2439.20 MHz)												
4878.4	35.78	Ave	270	1.6	H	36.4	4.36	26.80	49.74	54	4.26	harmonic
7317.6	30.04	Ave	180	1.0	H	39.1	5.09	26.60	47.63	54	6.37	harmonic
4878.4	52.89	PK	270	1.6	H	36.4	4.36	26.80	66.85	74	7.15	harmonic
4878.4	31.42	Ave	180	1.3	V	35.2	4.36	26.80	44.18	54	9.82	harmonic
7317.6	27.46	Ave	273	1.8	V	37.8	5.09	26.60	43.75	54	10.25	harmonic
4878.4	50.67	PK	180	1.3	V	35.2	4.36	26.80	63.43	74	10.57	harmonic
7317.6	44.35	PK	180	1.0	H	39.1	5.09	26.60	61.94	74	12.06	harmonic
7317.6	42.15	PK	273	1.8	V	37.8	5.09	26.60	58.44	74	15.56	harmonic
High Channel (2467.40 MHz)												
7404.2	33.42	Ave	180	1.6	H	39.0	5.30	26.58	51.14	54	2.86	harmonic
4934.8	36.47	Ave	168	1.3	H	36.6	4.40	26.75	50.72	54	3.28	harmonic
4934.8	53.64	PK	168	1.3	H	36.6	4.40	26.75	67.89	74	6.11	harmonic
7404.2	30.21	Ave	268	1.5	V	37.8	5.30	26.58	46.73	54	7.27	harmonic
4934.8	32.47	Ave	270	1.6	V	35.4	4.40	26.75	45.52	54	8.48	harmonic
4934.8	52.34	PK	270	1.6	V	35.4	4.40	26.75	65.39	74	8.61	harmonic
7404.2	45.21	PK	180	1.6	H	39.0	5.30	26.58	62.93	74	11.07	harmonic
7404.2	41.56	PK	268	1.5	V	37.8	5.30	26.58	58.08	74	15.92	harmonic

**Spurious Emissions in the Restrict Bands:**

Indicated		Detector (PK/Ave)	Table Angle Degree	Test Antenna		Correction Factor			FCC Part 15.247/15.209/15.205			
Frequency (MHz)	S.A. Reading (dB $\mu$ V)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre- Amp. (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Comment
2483.87	33.45	Ave	158	1.5	V	27.5	3.2	26.8	37.35	54	16.65	spurious
2483.87	32.15	Ave	210	1.4	H	27.5	3.2	26.8	36.05	54	17.95	spurious
2483.87	44.45	PK	158	1.5	V	27.5	3.2	26.8	48.35	74	25.65	spurious
2483.87	42.44	PK	210	1.4	H	27.5	3.2	26.8	46.34	74	27.66	spurious

## FCC §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 20 dB 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 20 dB 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	2010-11-24	2011-11-24

\* **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

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101 kPa

\* The testing was performed by Kvass Yang on 2011-02-18.

**Test Result:** Compliance.

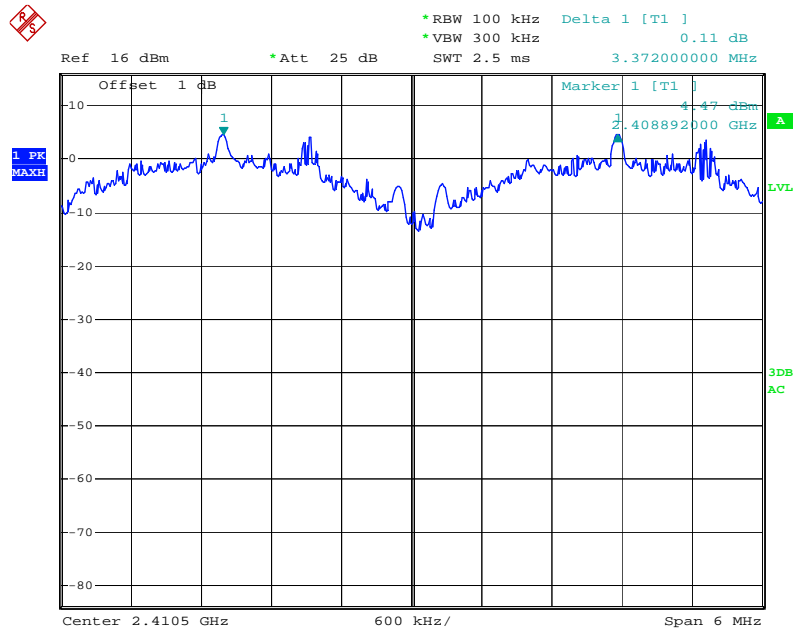
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Channel Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)	Result
Channel 1	2408.825	3.372	2.293	Pass
Channel 2	2412.200			
Channel 10	2439.200	3.372	2.307	Pass
Channel 11	2442.575			
Channel 16	2460.650	4.796	2.307	Pass
Channel 15	2456.075			
Channel 18	2467.400	3.372	2.307	Pass
Channel 17	2464.025			

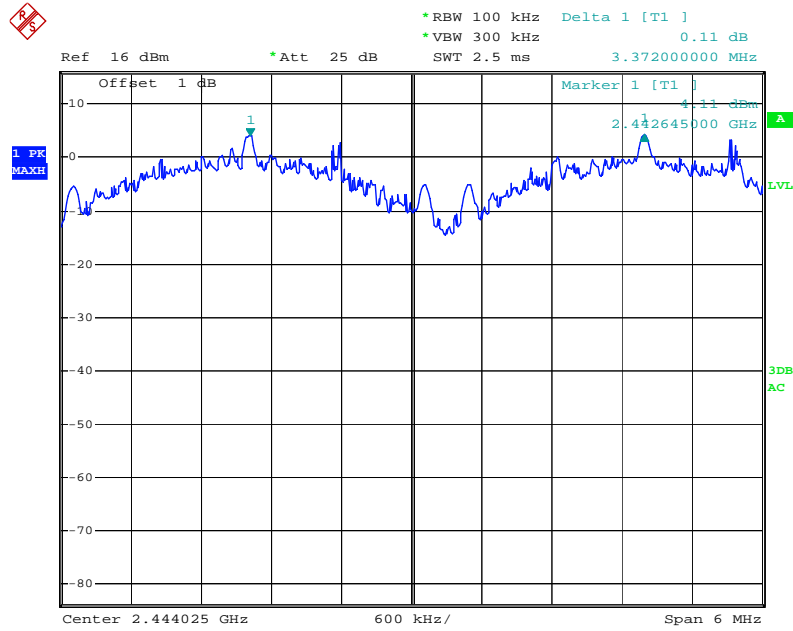
Please refer to the following plots.

Channel 1 & Channel 2



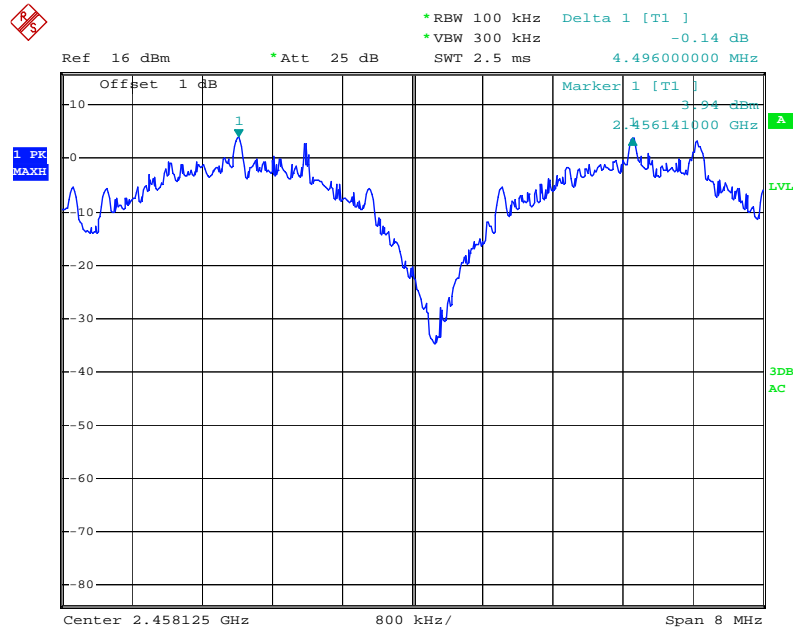
Date: 18.FEB.2011 12:09:31

### Channel 10 & Channel 11



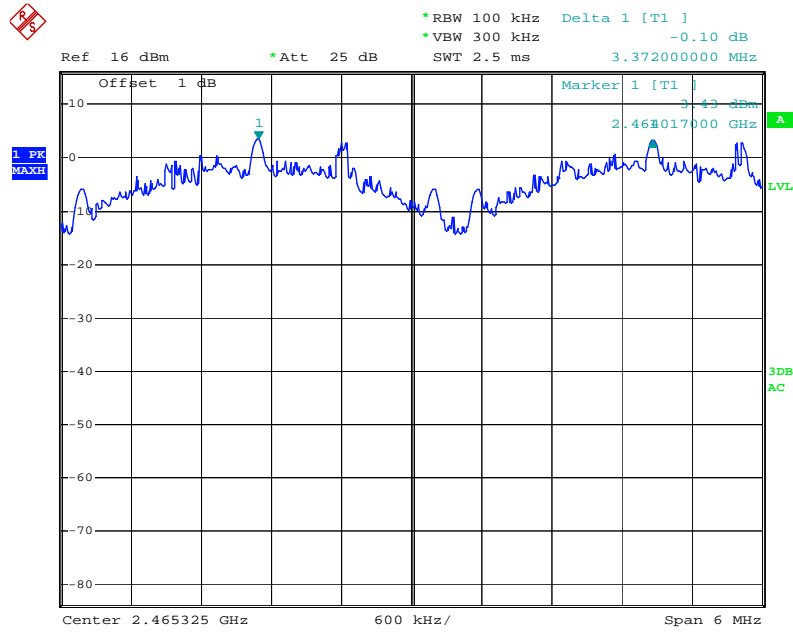
Date: 18.FEB.2011 12:11:13

### Channel 15 & Channel 16



Date: 18.FEB.2011 12:19:30

### Channel 17 & Channel 18



Date: 18.FEB.2011 12:22:36

## FCC §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 125 mW.

### Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-24	2011-11-24

\* **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:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101 kPa

\* *The testing was performed by Kvass Yang on 2011-02-18.*

**Test Result:** Compliance.

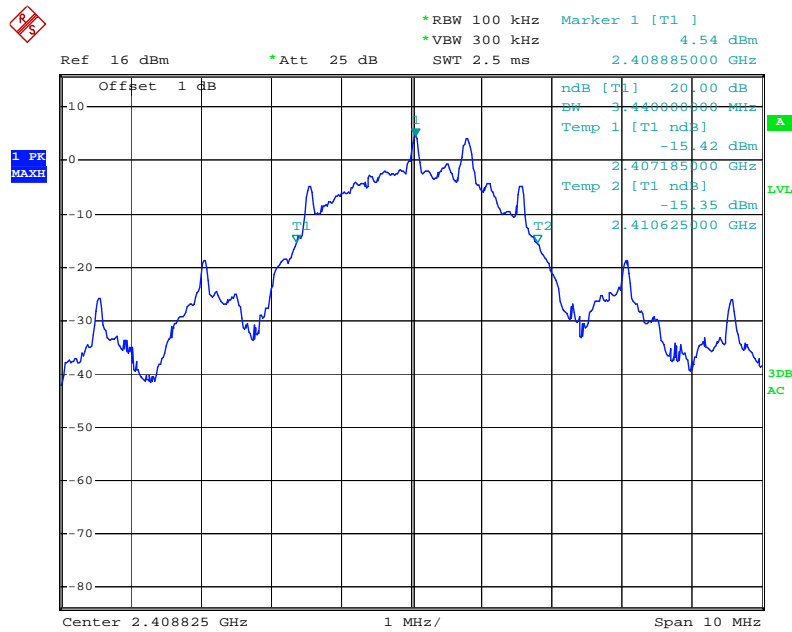
Please refer to following tables and plots

Test Mode: Transmitting

Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
Low	2408.825	3.440
Middle	2439.200	3.460
High	2467.400	3.460

Please refer to the following plots.

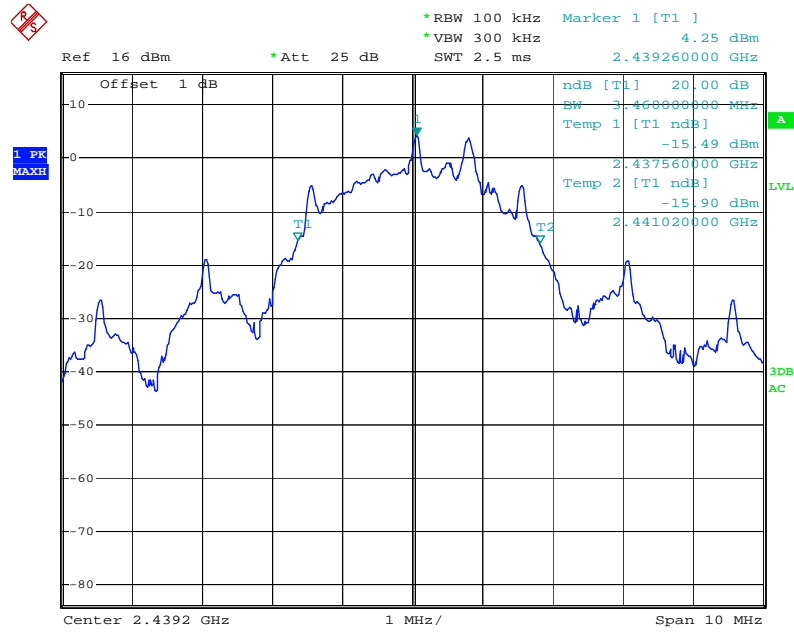
Low Channel



Date: 18.FEB.2011 12:31:19

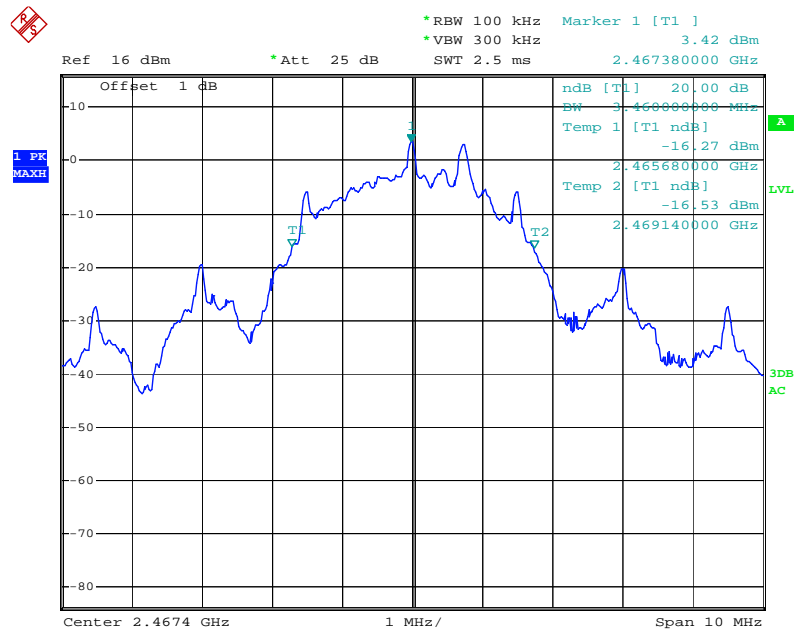


### Middle Channel



Date: 18.FEB.2011 13:27:26

### High Channel



Date: 18.FEB.2011 12:32:34

## FCC §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	2010-11-24	2011-11-24

\* **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

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101 kPa

*The testing was performed by Sula Huang on 2011-02-18.*

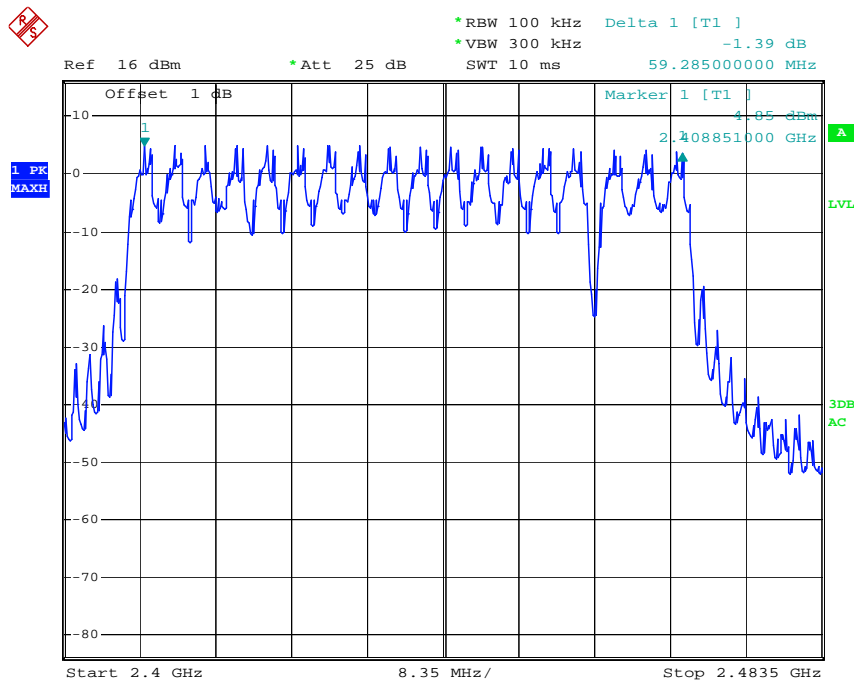
*Test Mode: Transmitting*

**Test Result:** Compliance.

Please refer to following tables and plots

Frequency Range (MHz)	Number of Hopping Channel (CH)	Limit (CH)
2400-2483.5	18	≥ 15

**Number of Hopping Channels**



Date: 18.FEB.2011 08:21:53

## **FCC §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**

<b>Manufacturer</b>	<b>Description</b>	<b>Model</b>	<b>Serial Number</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2010-11-24	2011-11-24

\* **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 = Pulse time\*(210/2/18)\*18\*0.4 S

### **Test Data**

#### **Environmental Conditions**

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101 kPa

\* *The testing was performed by Kvass Yang on 2011-02-18.*

**Test Result:** Compliance.

Please refer to following tables and plots

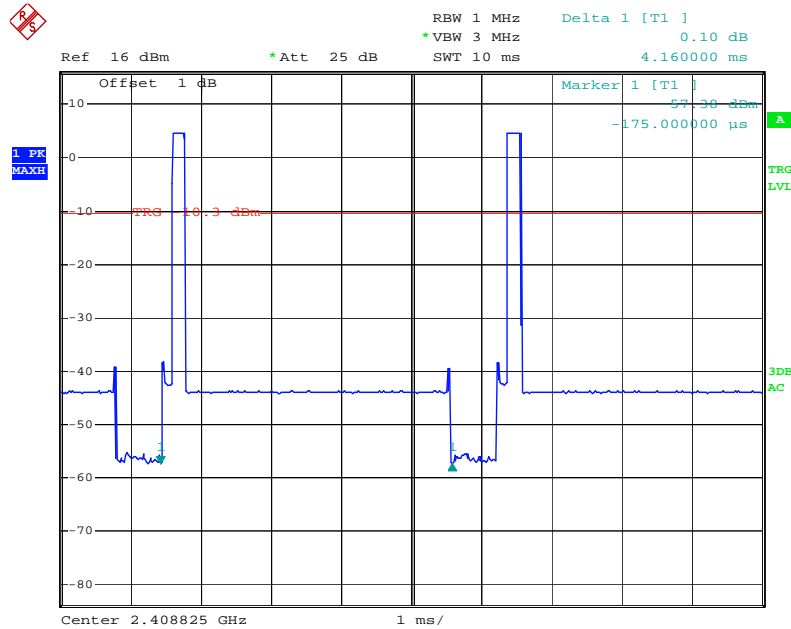
Test Mode: Transmitting

Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
Low	4.160	0.17472	0.4	Pass
Middle	4.180	0.17556	0.4	Pass
High	4.180	0.17556	0.4	Pass

*Note: Dwell time = Pulse time\*(210/2/18)\*18\*0.4 S*

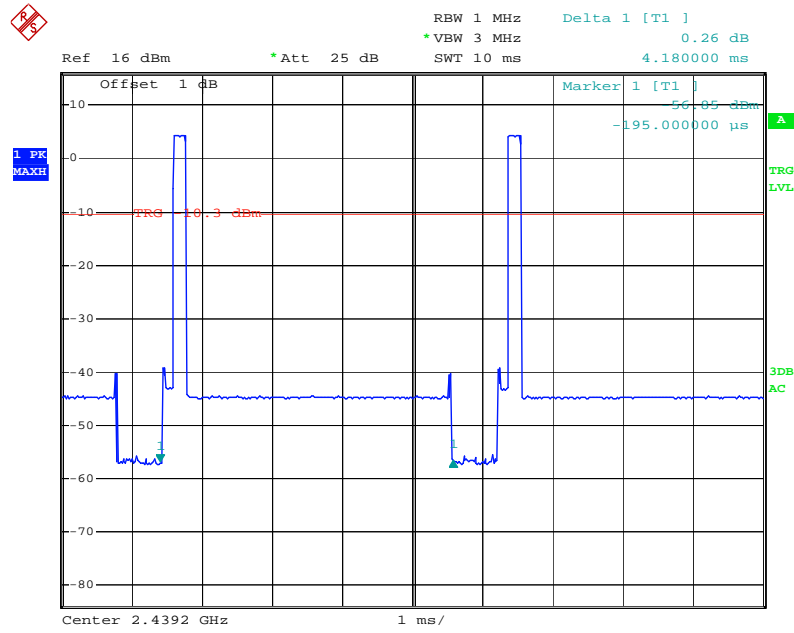
Please refer to the following plots.

Low Channel



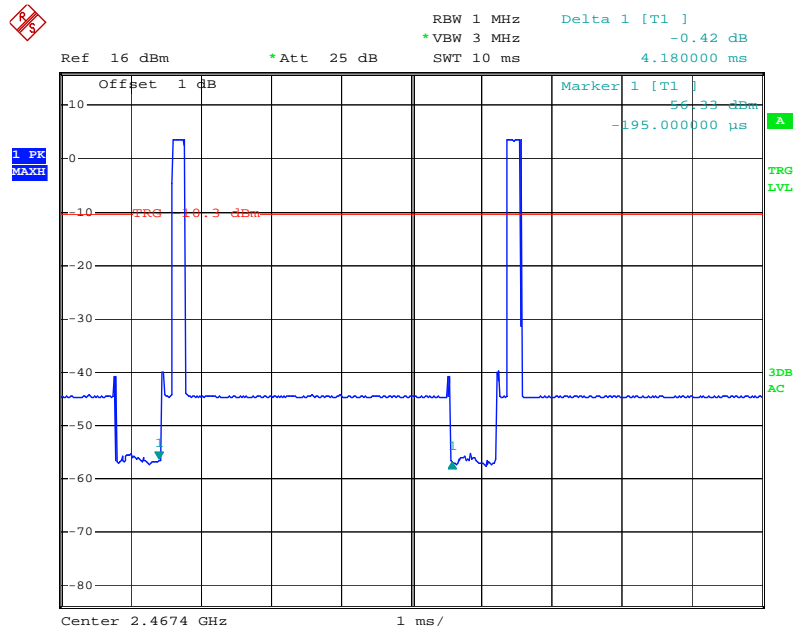
Date: 18.FEB.2011 13:14:21

### Middle Channel



Date: 18.FEB.2011 13:18:21

### High Channel



Date: 18.FEB.2011 13:20:56

## FCC §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. And 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	2010-11-24	2011-11-24

\* **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

<b>Temperature:</b>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101 kPa

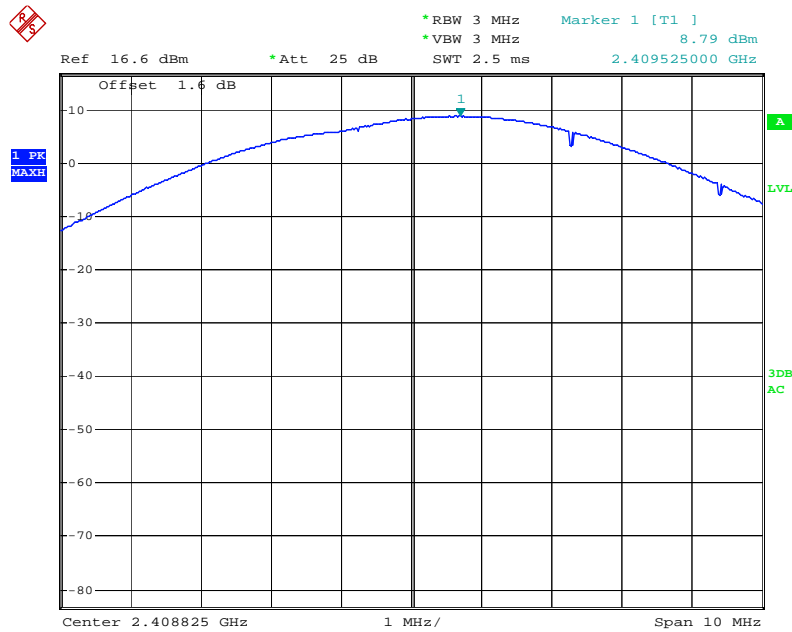
\* *The testing was performed by Kvass Yang on 2011-02-18.*

**Test Result:** Compliance.

Test Mode: Transmitting

Freq. (MHz)	Conducted Output Power (dBm)	Conducted Output Power (mW)	Part15.247 Limit (mW)
2408.825	8.79	7.568	125
2439.200	8.43	6.966	125
2467.400	8.02	6.339	125

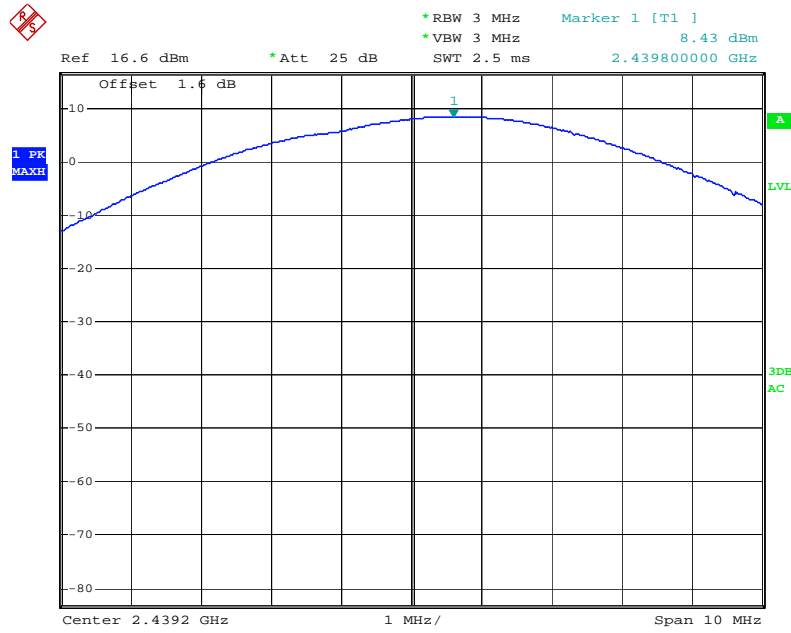
Low Channel



Date: 18.FEB.2011 12:58:47

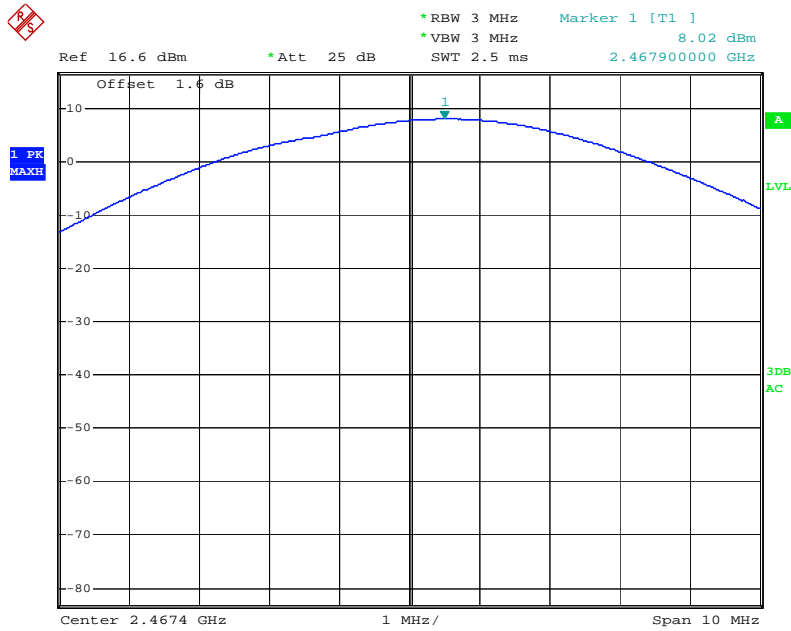


### Middle Channel



Date: 18.FEB.2011 13:26:12

### High Chanel



Date: 18.FEB.2011 12:45:28

## FCC §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	2010-11-24	2011-11-24

\* **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 100 kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1 MHz, VBW=3 MHz.
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>	25 ° C
<b>Relative Humidity:</b>	56 %
<b>ATM Pressure:</b>	101 kPa

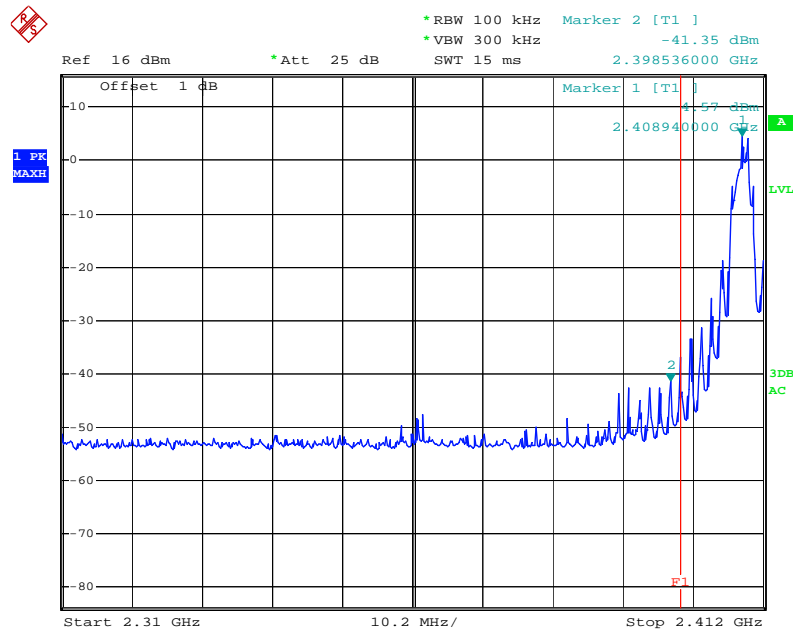
*\*The testing was performed by Kvass Yang on 2011-02-18*

Test Result: Compliance, please refer to the following table and plots.

*Test Mode: Transmitting*

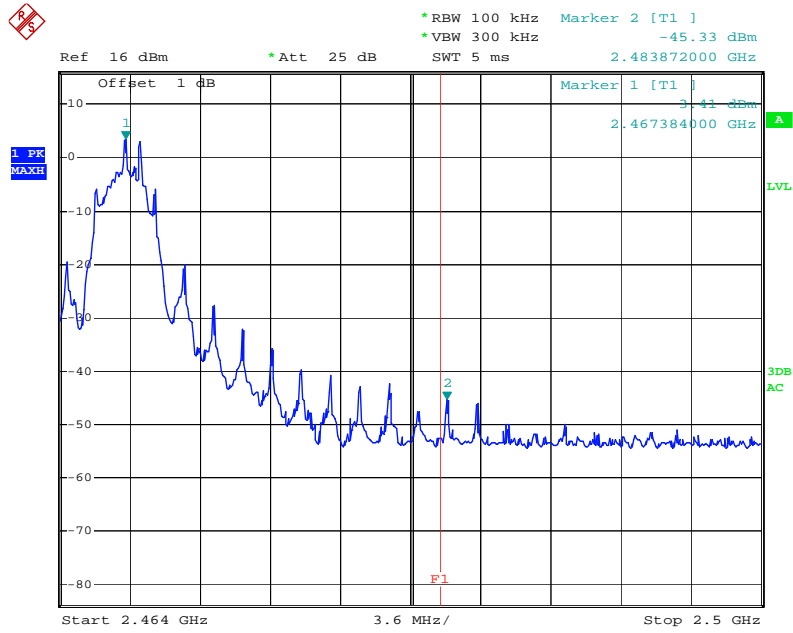
Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)
2398.536	45.92	20
24833872	48.74	20

#### Band Edge: Left Side



Date: 18.FEB.2011 13:11:43

### Band Edge: Right Side



Date: 18.FEB.2011 13:09:04

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