

FCC PART 15.247

TEST REPORT

For

**TOMY International Inc.**

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**FCC ID: BMWTFY7500P**

|                                                                                                                                                                                                                                                                                                                      |                                               |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| <b>Report Type:</b><br>Original Report                                                                                                                                                                                                                                                                               | <b>Product Type:</b><br>Baby Monitor (Parent) |
| <b>Test Engineer:</b> <u>Ares Liu</u> <i>Ares Liu</i>                                                                                                                                                                                                                                                                |                                               |
| <b>Report Number:</b> <u>R1DG111207005-00</u>                                                                                                                                                                                                                                                                        |                                               |
| <b>Report Date:</b> <u>2012-01-06</u>                                                                                                                                                                                                                                                                                |                                               |
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**Note:** This test report is prepared for the customer shown above and for the equipment 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\* 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)

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## GENERAL INFORMATION

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

The *TOMY International, Inc.*'s product, model number: *Y7500P (FCC ID: BMWTFY7500P)* (the "EUT") in this report was a *Baby Monitor (Parent)*, which was measured approximately: 10.7 cm (L) x 6.2 cm (W) x 2.9 cm (H), rated input voltage: DC 5V charging from adapter.

Adapter Information: Switching Adapter  
Model No.: SSA-6P-05 US 050 100;  
Input: 100-240V~50/60Hz 200 mA;  
Output: 5V DC 1000 mA

*\* All measurement and test data in this report was gathered from production sample serial number: 1112073 (Assigned by BACL, Shenzhen). The EUT was received on 2011-12-07.*

### Objective

This report is prepared on behalf of *TOMY International, 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, section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

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

Submitted with the baby part of a system with FCC ID: BMWTFY7500C.

### 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 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

### Description of Test Configuration

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

### EUT Exercise Software

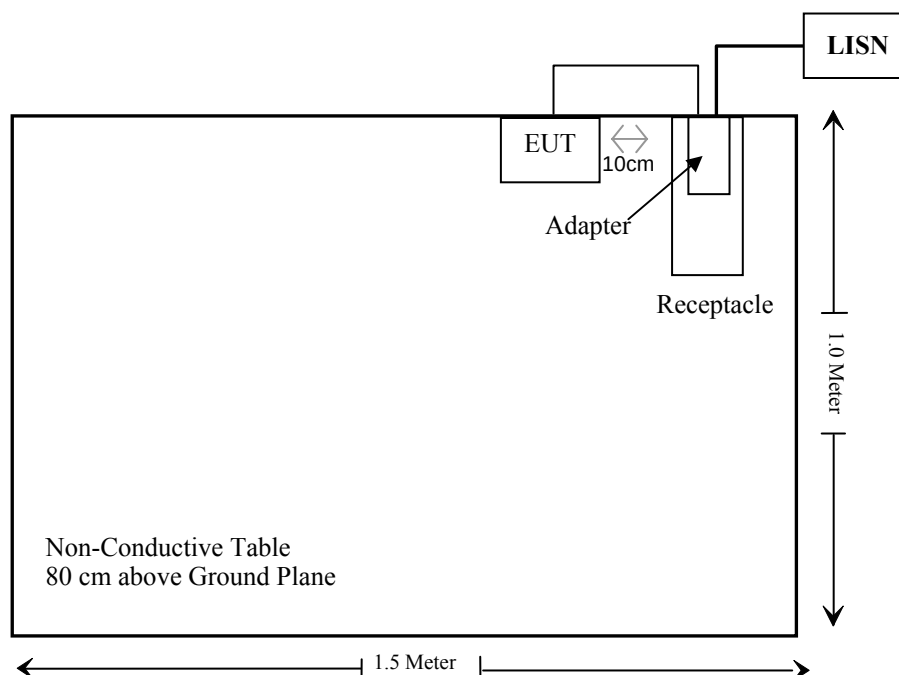
No Exercise Software.

### Equipment Modifications

Add flimsy copper metal skin on the VBM1142-PU PCBA local shielding RF radiation.  
As follows photo:



### Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

| FCC Rules                            | Description of Test              | Result     |
|--------------------------------------|----------------------------------|------------|
| §15.247 (i), §1.1307 (b)(1), §2.1093 | RF Exposure                      | Compliance |
| §15.203                              | Antenna Requirement              | Compliance |
| §15.207 (a)                          | 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 |

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**FCC §15.247 (i) & §2.1093 - RF EXPOSURE**

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**Applicable Standard**

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 Mobile Portable RF Exposure v03r03, no SAR required if power is lower than the flowing threshold:

When routine evaluation is required for SAR and the output power is  $\leq 60/f(\text{GHz})$  mW, the test reduction and test exclusion procedures given herein, or in KDB 616217 or KDB 648474, are applicable.

A device may be used in portable exposure conditions with no restrictions on host platforms when either the source-based time-averaged output power is  $\leq 60/f(\text{GHz})$  mW or all measured 1-g SAR are  $< 0.4$  W/kg.10 When SAR evaluation is required, the most conservative exposure conditions for all expected operating configurations must be tested.

**Result**

Averaged conducted output power = peak + 20log (duty cycle) = 16.76 + 10log (19.81/329.21) = 4.55 dBm

Antenna gain = -1.5 dBi

SAR exclusion threshold =  $60/f = 60/2.441 = 24.58$  mw

SAR evaluation is not necessary.



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

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### **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 used two integral antenna permanently soldered to main board, the gain is -1.5 dBi, which fully in accordance to section 15.203, please refer to the EUT photos.

**Result:** Compliance.

## FCC §15.207 (a) - CONDUCTED EMISSIONS

### Applicable Standard

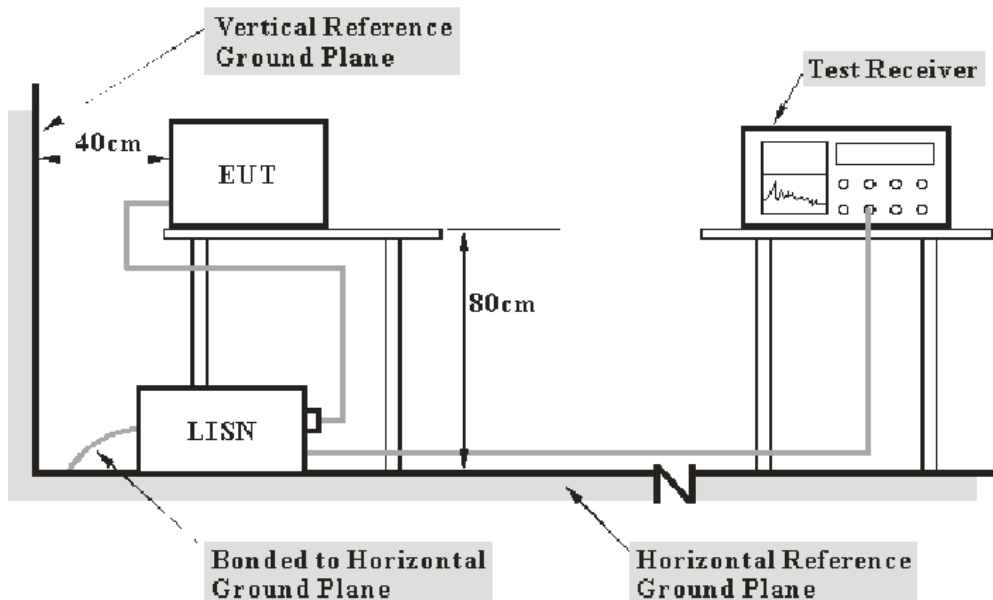
FCC §15.207

### 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  $\pm 2.4$  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 spacing between the peripherals was 10 cm.

The adapter was connected to a 120VAC/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    | 2011-03-03       | 2012-03-02           |
| Rohde & Schwarz | L.I.S.N.          | ESH2-Z5 | 892107/021    | 2011-03-09       | 2012-03-08           |

\* **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:

**10.2 dB at 0.45 MHz** in the **Line** conducted mode

## Test Data

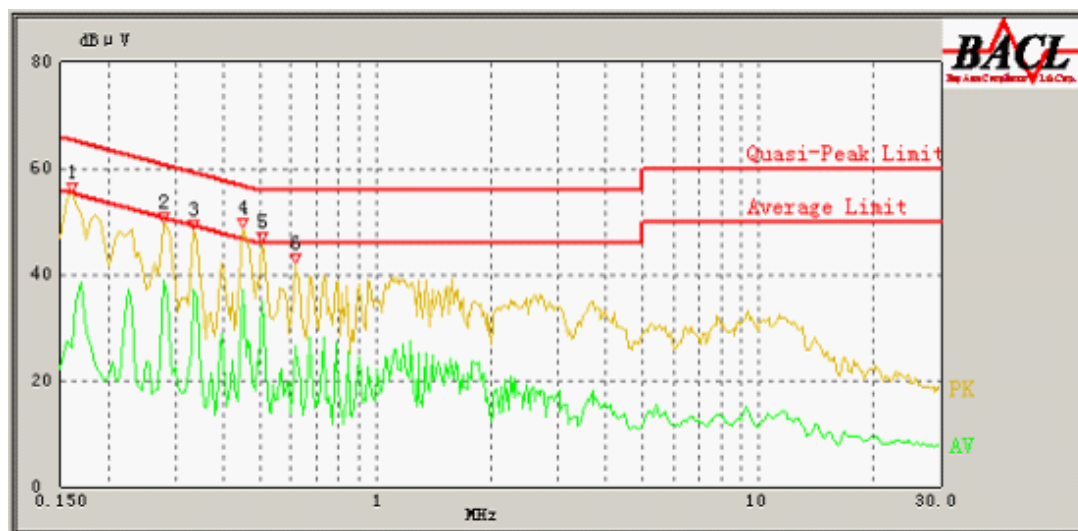
### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25 ° C    |
| Relative Humidity: | 48 %      |
| ATM Pressure:      | 100.0 kPa |

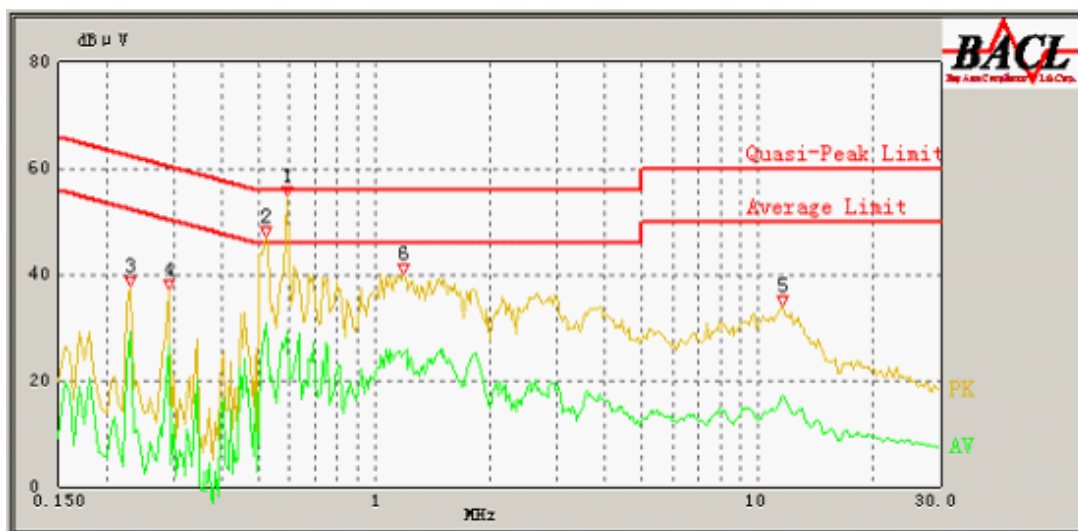
*The testing was performed by Ares Liu on 2011-12-26.*

Test Mode: Operating

AC 120 V, 60 Hz, Line:



| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/QP/Ave.) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.450           | 37.23                      | 16.60                  | 47.43        | 10.20       | Ave.                  |
| 0.505           | 34.91                      | 15.03                  | 46.00        | 11.09       | Ave.                  |
| 0.280           | 38.96                      | 21.10                  | 52.29        | 13.33       | Ave.                  |
| 0.335           | 37.32                      | 20.05                  | 50.71        | 13.39       | Ave.                  |
| 0.615           | 26.51                      | 13.57                  | 46.00        | 19.49       | Ave.                  |
| 0.160           | 26.11                      | 21.10                  | 55.71        | 29.60       | Ave.                  |
| 0.615           | 23.57                      | 13.57                  | 56.00        | 32.43       | QP                    |
| 0.450           | 23.24                      | 16.60                  | 57.43        | 34.19       | QP                    |
| 0.505           | 18.96                      | 15.03                  | 56.00        | 37.04       | QP                    |
| 0.280           | 23.92                      | 21.10                  | 62.29        | 38.37       | QP                    |
| 0.335           | 19.25                      | 20.05                  | 60.71        | 41.46       | QP                    |
| 0.160           | 23.55                      | 21.10                  | 65.71        | 42.16       | QP                    |

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

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/QP/Ave.) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.520           | 30.94                      | 14.83                  | 46.00        | 15.06       | Ave.                  |
| 0.590           | 29.15                      | 13.90                  | 46.00        | 16.85       | Ave.                  |
| 0.290           | 44.65                      | 21.10                  | 62.00        | 17.35       | QP                    |
| 0.230           | 45.38                      | 21.10                  | 63.71        | 18.33       | QP                    |
| 0.520           | 36.46                      | 14.83                  | 56.00        | 19.54       | QP                    |
| 1.190           | 25.08                      | 11.10                  | 46.00        | 20.92       | Ave.                  |
| 0.230           | 29.12                      | 21.10                  | 53.71        | 24.59       | Ave.                  |
| 0.290           | 26.43                      | 21.10                  | 52.00        | 25.57       | Ave.                  |
| 1.195           | 29.99                      | 11.10                  | 56.00        | 26.01       | QP                    |
| 0.590           | 27.53                      | 13.90                  | 56.00        | 28.47       | QP                    |
| 11.665          | 17.14                      | 11.10                  | 50.00        | 32.86       | Ave.                  |
| 11.665          | 25.43                      | 11.10                  | 60.00        | 34.57       | QP                    |

## FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

### Applicable Standard

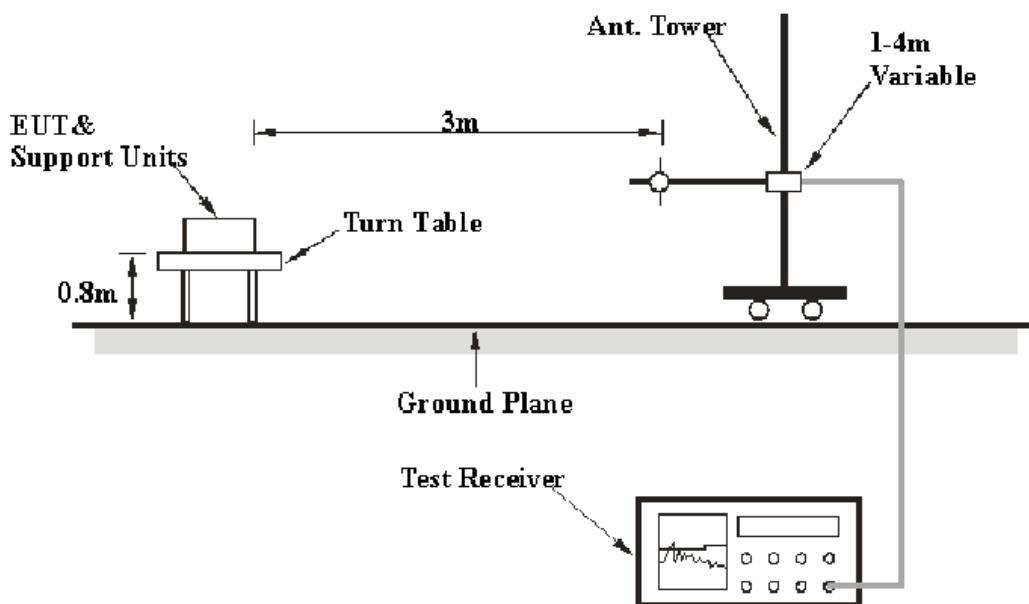
FCC §15.247 (d); §15.209; §15.205;

### 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  $\pm 4.0$  dB ( $k=2$ , 95% level of confidence).

### EUT Setup



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. 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    | 2011-08-02       | 2012-08-01           |
| Rohde & Schwarz   | EMI Test Receiver | ESCI     | 100035        | 2011-11-11       | 2012-11-10           |
| Sunol Sciences    | Broadband Antenna | JB1      | A040904-1     | 2011-07-05       | 2012-07-04           |
| Mini-circuits     | Amplifier         | ZVA-213+ | T-E27H        | 2011-03-08       | 2012-03-07           |
| Sunol Sciences    | Horn Antenna      | DRH-118  | A052604       | 2011-05-05       | 2012-05-04           |
| Electro-Mechanics | Horn Antenna      | 3116     | 9510-2270     | 2011-10-11       | 2012-10-10           |
| Rohde & Schwarz   | Signal Analyzer   | FSIQ 26  | 609358        | 2011-07-08       | 2012-07-07           |

\* **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 7 dB means the emission is 7 dB below the 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:

**1.65 dB at 4806 MHz in the Vertical polarization at Low channel**

## Test Data

### Environmental Conditions

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

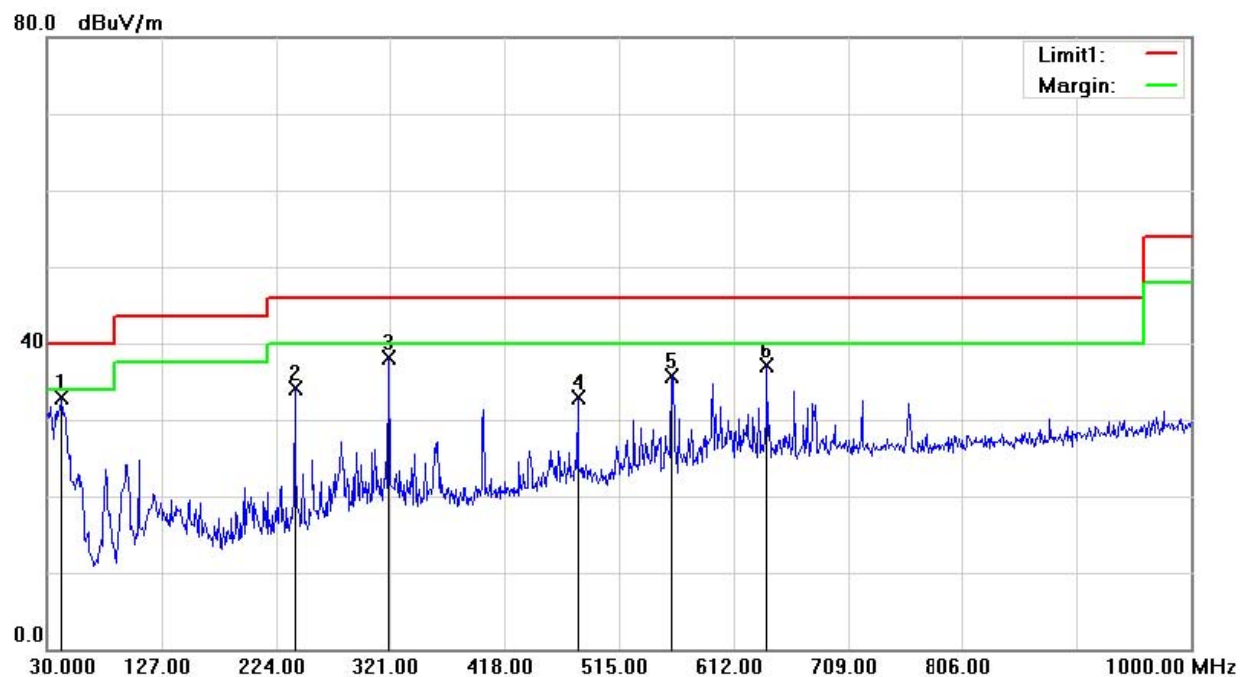
*The testing was performed by Ares Liu on 2011-12-22.*



**30MHz - 1GHz:**

Test Mode: Transmitting

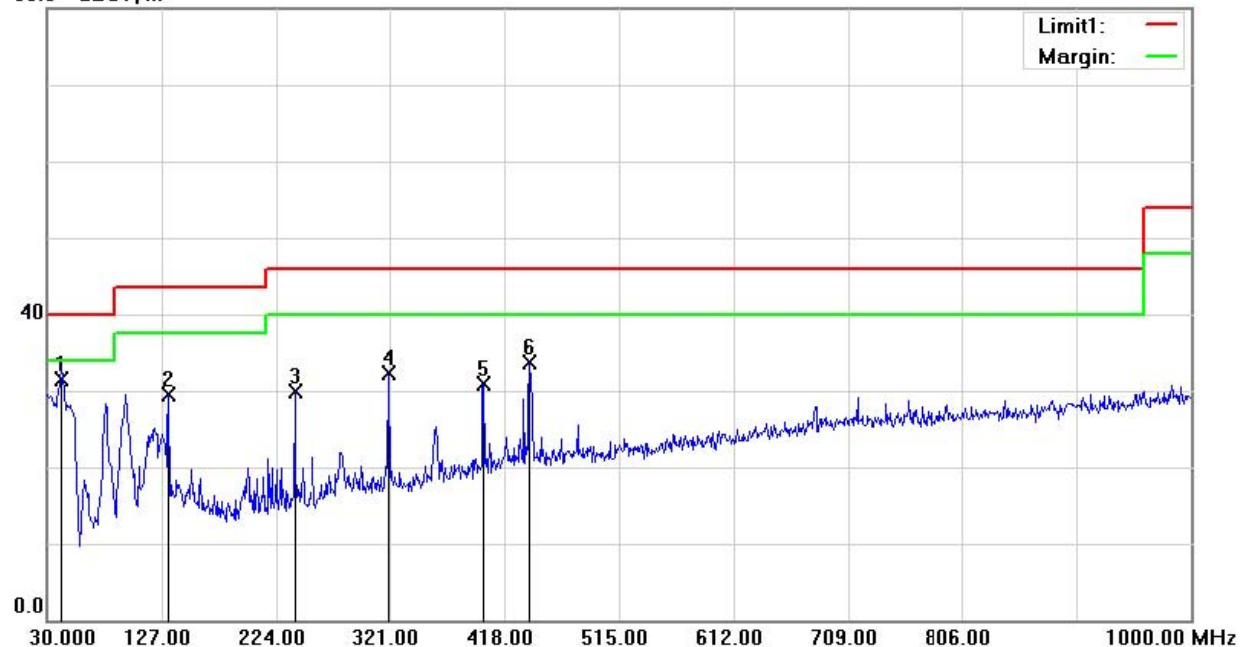
Vertical



| Frequency (MHz) | Corrected Amplitude (dBuV/m) | Ant. Polarity (H/V) | Correction Factor (dB) | Limit (dBuV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------------|----------------|-------------|
| 42.6100         | 32.93                        | V                   | -7.38                  | 40.00          | 7.07        |
| 320.0300        | 38.04                        | V                   | -4.37                  | 46.00          | 7.96        |
| 640.1300        | 37.20                        | V                   | 1.78                   | 46.00          | 8.80        |
| 559.6200        | 35.72                        | V                   | 0.18                   | 46.00          | 10.28       |
| 239.5200        | 34.11                        | V                   | -6.83                  | 46.00          | 11.89       |
| 480.0800        | 32.98                        | V                   | -0.53                  | 46.00          | 13.02       |

*Horizontal*

80.0 dBuV/m



| Frequency (MHz) | Corrected Amplitude (dBuV/m) | Ant. Polarity (H/V) | Correction Factor (dB) | Limit (dBuV/m) | Margin (dB) |
|-----------------|------------------------------|---------------------|------------------------|----------------|-------------|
| 41.6400         | 31.52                        | H                   | -6.71                  | 40.00          | 8.48        |
| 439.3400        | 33.76                        | H                   | -1.68                  | 46.00          | 12.24       |
| 320.0300        | 32.27                        | H                   | -4.37                  | 46.00          | 13.73       |
| 132.8200        | 29.60                        | H                   | -5.47                  | 43.50          | 13.90       |
| 400.5400        | 30.95                        | H                   | -2.51                  | 46.0           | 15.05       |
| 239.5200        | 29.83                        | H                   | -6.83                  | 46.00          | 16.17       |

**1 - 25GHz:**

| Indicated                   |                               | Detector<br>(PK/Ave.) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247/15.209/15.205 |                   |                |          |
|-----------------------------|-------------------------------|-----------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|-------------------------------|-------------------|----------------|----------|
| Frequency<br>(MHz)          | Receiver<br>Reading<br>(dBμV) |                       |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m)     | Limit<br>(dBμV/m) | Margin<br>(dB) | Comment  |
| Low Channel (2403 MHz)      |                               |                       |                          |               |                |                          |                       |                          |                               |                   |                |          |
| 4806                        | 21.45                         | Ave.                  | 104                      | 1.2           | V              | 32.6                     | 5.7                   | 7.4                      | 52.35                         | 54                | 1.65*          | harmonic |
| 2258.5                      | 48.21                         | PK                    | 198                      | 1.8           | H              | 28.3                     | 3.7                   | 8.6                      | 71.61                         | 74                | 2.39*          | spurious |
| 4806                        | 20.3                          | Ave.                  | 201                      | 1.4           | H              | 32.6                     | 5.7                   | 7.4                      | 51.20                         | 54                | 2.80*          | harmonic |
| 2258.5                      | 27.69                         | Ave.                  | 168                      | 1.1           | V              | 28.3                     | 3.7                   | 8.6                      | 51.09                         | 54                | 2.91*          | spurious |
| 2275.5                      | 47.56                         | PK                    | 126                      | 1.7           | H              | 28.3                     | 3.7                   | 8.6                      | 70.96                         | 74                | 3.04*          | spurious |
| 2258.5                      | 25.64                         | Ave.                  | 198                      | 1.8           | H              | 28.3                     | 3.7                   | 8.6                      | 49.04                         | 54                | 4.96           | spurious |
| 2258.5                      | 44.85                         | PK                    | 168                      | 1.1           | V              | 28.3                     | 3.7                   | 8.6                      | 68.25                         | 74                | 5.75           | spurious |
| 2275.5                      | 24.23                         | Ave.                  | 100                      | 1.0           | V              | 28.3                     | 3.7                   | 8.6                      | 47.63                         | 54                | 6.37           | spurious |
| 2275.5                      | 43.24                         | PK                    | 100                      | 1.0           | V              | 28.3                     | 3.7                   | 8.6                      | 66.64                         | 74                | 7.36           | spurious |
| 2275.5                      | 21.36                         | Ave.                  | 126                      | 1.7           | H              | 28.3                     | 3.7                   | 8.6                      | 44.76                         | 54                | 9.24           | spurious |
| 4806                        | 31.99                         | PK                    | 201                      | 1.4           | H              | 32.6                     | 5.7                   | 7.4                      | 62.89                         | 74                | 11.11          | harmonic |
| 4806                        | 30.57                         | PK                    | 104                      | 1.2           | V              | 32.6                     | 5.7                   | 7.4                      | 61.47                         | 74                | 12.53          | harmonic |
| 2386                        | 13.5                          | Ave.                  | 69                       | 1.5           | H              | 29.7                     | 3.7                   | 8.5                      | 38.40                         | 54                | 15.60          | spurious |
| 2350                        | 13.48                         | Ave.                  | 324                      | 1.1           | V              | 29.7                     | 3.7                   | 8.5                      | 38.38                         | 54                | 15.62          | spurious |
| 2386                        | 29.31                         | PK                    | 69                       | 1.5           | H              | 29.7                     | 3.7                   | 8.5                      | 54.21                         | 74                | 19.79          | spurious |
| 2350                        | 29.06                         | PK                    | 3324                     | 1.1           | V              | 29.7                     | 3.7                   | 8.5                      | 53.96                         | 74                | 20.04          | spurious |
| Middle Channel (2440.5 MHz) |                               |                       |                          |               |                |                          |                       |                          |                               |                   |                |          |
| 2264                        | 28.67                         | Ave.                  | 311                      | 1.0           | V              | 28.3                     | 3.7                   | 8.6                      | 52.07                         | 54                | 1.93*          | spurious |
| 2255                        | 27.01                         | Ave.                  | 267                      | 1.1           | V              | 28.3                     | 3.7                   | 8.6                      | 50.41                         | 54                | 3.59*          | spurious |
| 2251                        | 43.86                         | PK                    | 221                      | 1.5           | H              | 28.3                     | 3.7                   | 8.6                      | 67.26                         | 74                | 6.74           | spurious |
| 2264                        | 23.71                         | Ave.                  | 195                      | 1.7           | H              | 28.3                     | 3.7                   | 8.6                      | 47.11                         | 54                | 6.89           | spurious |
| 4880                        | 15.57                         | Ave.                  | 301                      | 1.4           | H              | 32.6                     | 5.7                   | 7.4                      | 46.47                         | 54                | 7.53           | harmonic |
| 4880                        | 14.96                         | Ave.                  | 264                      | 1.1           | V              | 32.6                     | 5.7                   | 7.4                      | 45.86                         | 54                | 8.14           | harmonic |
| 2264                        | 42.22                         | PK                    | 195                      | 1.7           | H              | 28.3                     | 3.7                   | 8.6                      | 65.62                         | 74                | 8.38           | spurious |
| 2251                        | 21.43                         | Ave.                  | 221                      | 1.5           | H              | 28.3                     | 3.7                   | 8.6                      | 44.83                         | 54                | 9.17           | spurious |
| 2255                        | 41.23                         | PK                    | 67                       | 1.1           | V              | 28.3                     | 3.7                   | 8.6                      | 64.63                         | 74                | 9.37           | spurious |
| 4880                        | 30.91                         | PK                    | 301                      | 1.4           | H              | 32.6                     | 5.7                   | 7.4                      | 61.81                         | 74                | 12.19          | harmonic |
| 2264                        | 38.39                         | PK                    | 311                      | 1.0           | V              | 28.3                     | 3.7                   | 8.6                      | 61.79                         | 74                | 12.21          | spurious |
| 4880                        | 29.98                         | PK                    | 264                      | 1.1           | V              | 32.6                     | 5.7                   | 7.4                      | 60.88                         | 74                | 13.12          | harmonic |
| High Channel (2478 MHz)     |                               |                       |                          |               |                |                          |                       |                          |                               |                   |                |          |
| 2253                        | 27.88                         | Ave.                  | 175                      | 1.2           | V              | 28.3                     | 3.7                   | 8.6                      | 51.28                         | 54                | 2.72*          | spurious |
| 2253                        | 45.08                         | PK                    | 47                       | 1.7           | H              | 28.3                     | 3.7                   | 8.6                      | 68.48                         | 74                | 5.52           | spurious |
| 2253                        | 23.71                         | Ave.                  | 47                       | 1.7           | H              | 28.3                     | 3.7                   | 8.6                      | 47.11                         | 54                | 6.89           | spurious |
| 4956                        | 14.96                         | Ave.                  | 267                      | 1.9           | H              | 32.6                     | 5.7                   | 7.4                      | 45.86                         | 54                | 8.14           | harmonic |
| 2253                        | 41.64                         | PK                    | 175                      | 1.2           | V              | 28.3                     | 3.7                   | 8.6                      | 65.04                         | 74                | 8.96           | spurious |
| 4956                        | 14.89                         | Ave.                  | 301                      | 1.1           | V              | 32.6                     | 3.8                   | 7.4                      | 43.89                         | 54                | 10.11          | harmonic |
| 4956                        | 28.83                         | PK                    | 301                      | 1.1           | V              | 32.6                     | 5.7                   | 7.4                      | 59.73                         | 74                | 14.27          | harmonic |
| 4956                        | 28.37                         | PK                    | 267                      | 1.9           | H              | 32.6                     | 5.7                   | 7.4                      | 59.27                         | 74                | 14.73          | harmonic |
| 2488                        | 13.43                         | Ave.                  | 167                      | 1.6           | H              | 29.7                     | 3.7                   | 8.5                      | 38.33                         | 54                | 15.67          | spurious |
| 2486                        | 13.41                         | Ave.                  | 247                      | 1.0           | V              | 29.7                     | 3.7                   | 8.5                      | 38.31                         | 54                | 15.69          | spurious |
| 2488                        | 28.97                         | PK                    | 167                      | 1.6           | H              | 29.7                     | 3.7                   | 8.5                      | 53.87                         | 74                | 20.13          | spurious |
| 2486                        | 28.89                         | PK                    | 247                      | 1.0           | V              | 29.7                     | 3.7                   | 8.5                      | 53.79                         | 74                | 20.21          | 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 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        | 2011-11-11       | 2012-11-10           |

\* **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 Operating mode, spectrum Bandwidth was set at 100 kHz, maxhold the channel.
2. Set the adjacent channel of the EUT maxhold another trace
3. Measure the channel separation.

### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 56 %      |
| ATM Pressure:      | 100.9 kPa |

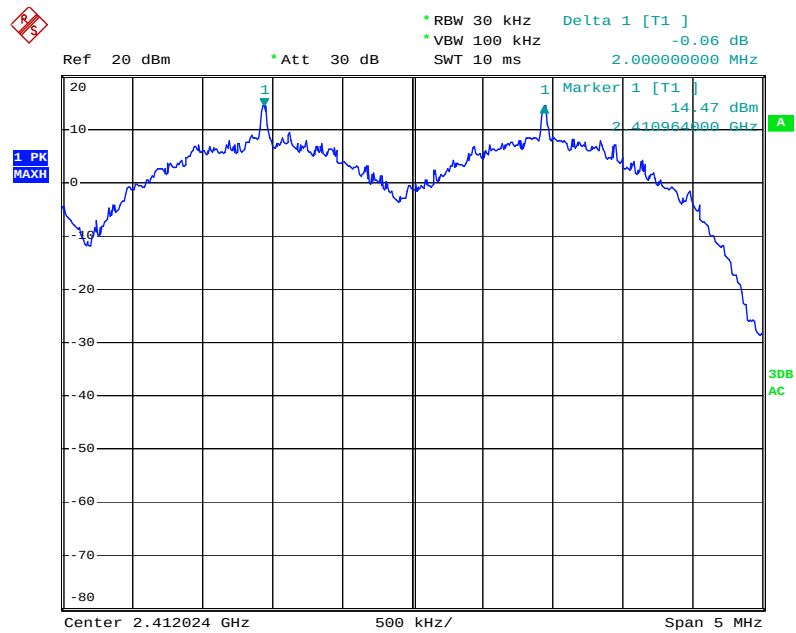
\* The testing was performed by Ares Liu on 2012-01-06.

**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

| Frequency (MHz) | Channel Separation (MHz) | Limit (MHz) | Result |
|-----------------|--------------------------|-------------|--------|
| 2411            | 2.00                     | $\geq 1.46$ | Pass   |



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**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 125mW.

**Test Equipment List and Details**

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 100035        | 2011-11-11       | 2012-11-10           |

\* **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 on the test table without connection to measurement instrument. Turn on the EUT. 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**

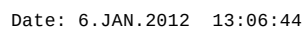
|                    |          |
|--------------------|----------|
| Temperature:       | 25 °C    |
| Relative Humidity: | 56 %     |
| ATM Pressure:      | 100.9kPa |

\* The testing was performed by Ares Liu on 2012-01-06.

**Test Result:** Compliance.

Please refer to following tables and plots

| Frequency (MHz) | 20 dB Bandwidth (MHz) |
|-----------------|-----------------------|
| 2437            | 2.19                  |



**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        | 2011-11-11       | 2012-11-10           |

\* **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>      | 100.9kPa |

*The testing was performed by Ares Liu on 2011-12-29.*

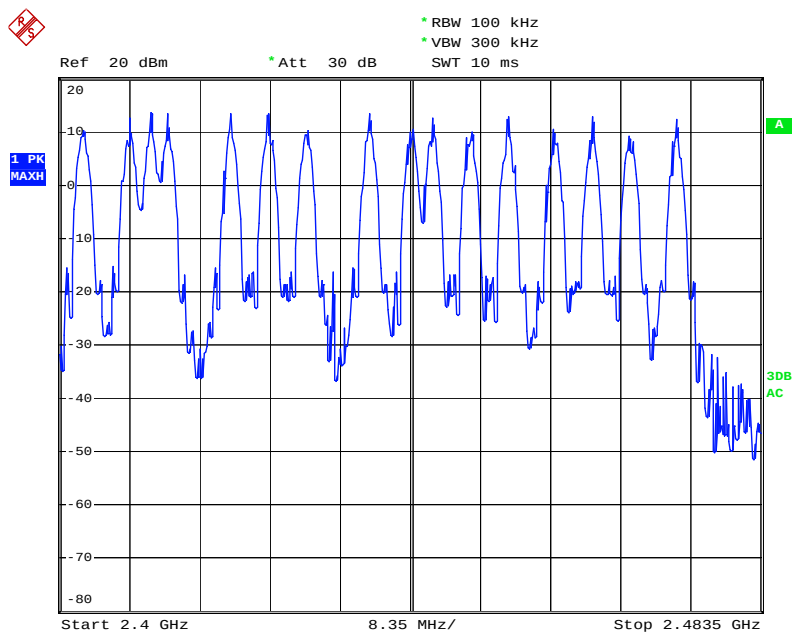
**Test Result:** Compliance.

Please refer to following tables and plots



*Test Mode: Transmitting*

| Frequency Range<br>(MHz) | Number of<br>Hopping Channel | Limit     |
|--------------------------|------------------------------|-----------|
| 2400-2483.50             | 16                           | $\geq 15$ |

**Number of Hopping Channels**

Date: 29.DEC.2011 16:08:22

**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**

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 100035        | 2011-11-11       | 2012-11-10           |

\* **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\*16\*0.4\*(15/5)

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

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

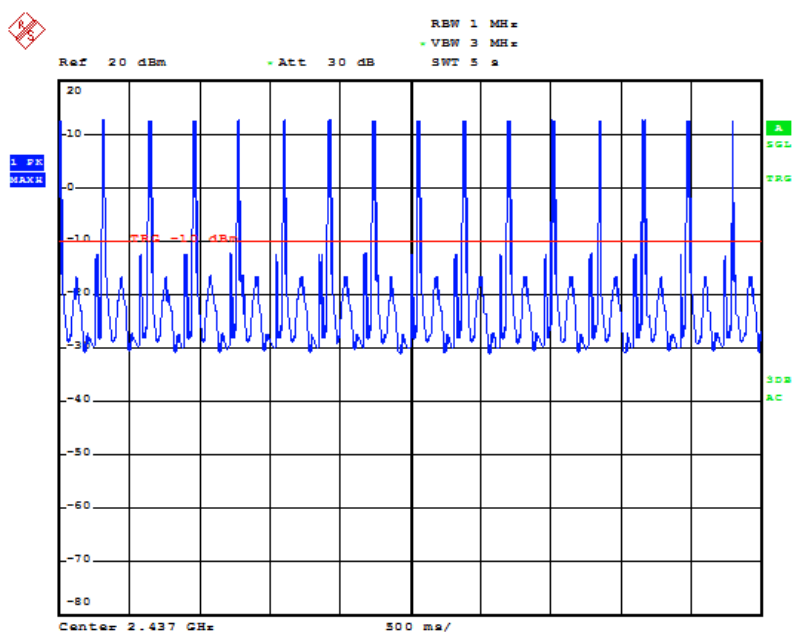
*The testing was performed by Ares Liu on 2011-12-29.*

**Test Result:** Compliance.

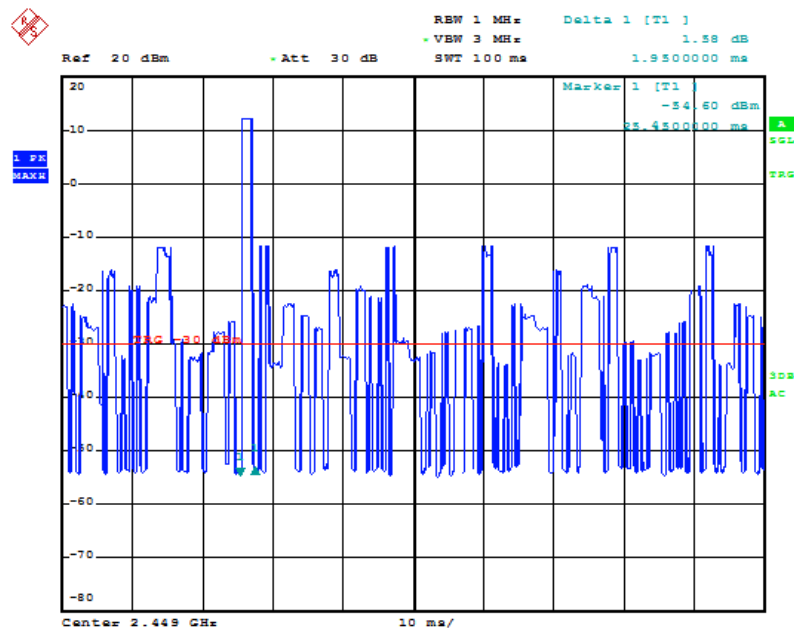
Please refer to following tables and plots

*Test Mode: Transmitting*

| Channel                                    | Pulse Width (ms) | Dwell Time (S) | Limit (S) | Result |
|--------------------------------------------|------------------|----------------|-----------|--------|
| Low                                        | 1.95             | 0.0374         | 0.4       | Pass   |
| Note: Dwell time= Pulse time*16*0.4*(15/5) |                  |                |           |        |



Date: 29.DEC.2011 16:15:42



Date: 29.DEC.2011 17:14:24

## 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. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

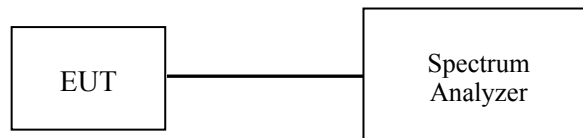
### Test Equipment List and Details

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 100035        | 2011-11-11       | 2012-11-10           |

\* **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 it 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:       | 25 °C    |
| Relative Humidity: | 56 %     |
| ATM Pressure:      | 100.9kPa |

\* The testing was performed by Ares Liu on 2011-12-29.

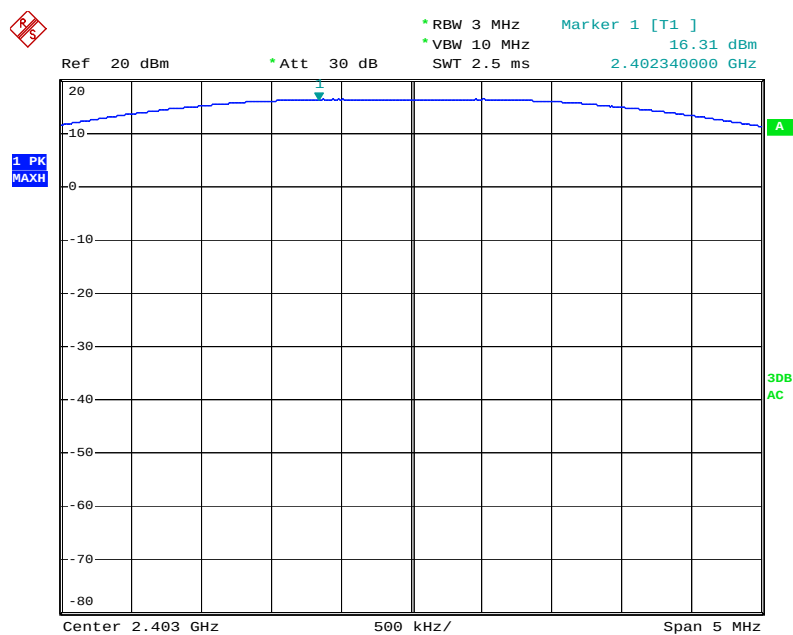
**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

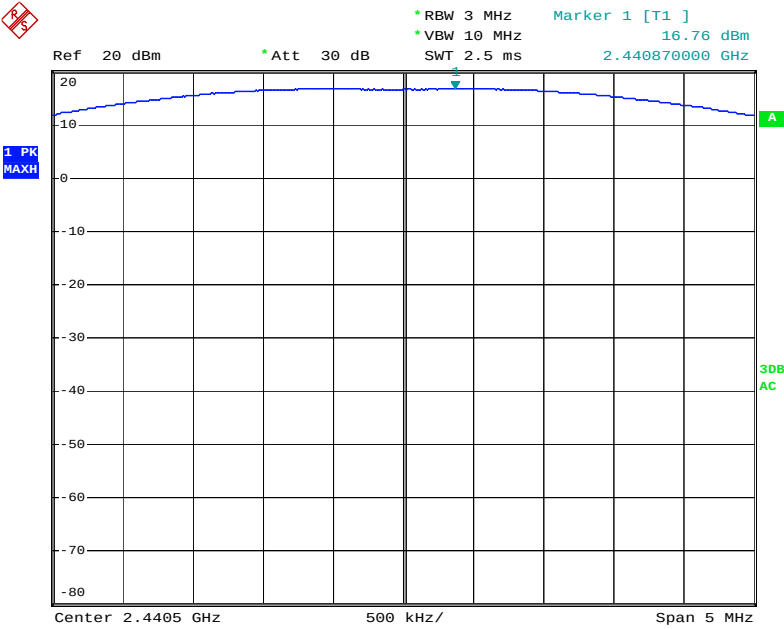
| Frequency<br>(MHz) | Conducted Output Power |       | Part 15.247 Limit<br>(mW) |
|--------------------|------------------------|-------|---------------------------|
|                    | (dBm)                  | (mW)  |                           |
| 2403               | 16.31                  | 42.75 | 125                       |
| 2440.5             | 16.76                  | 47.42 | 125                       |
| 2478               | 16.76                  | 47.42 | 125                       |

## Low Channel



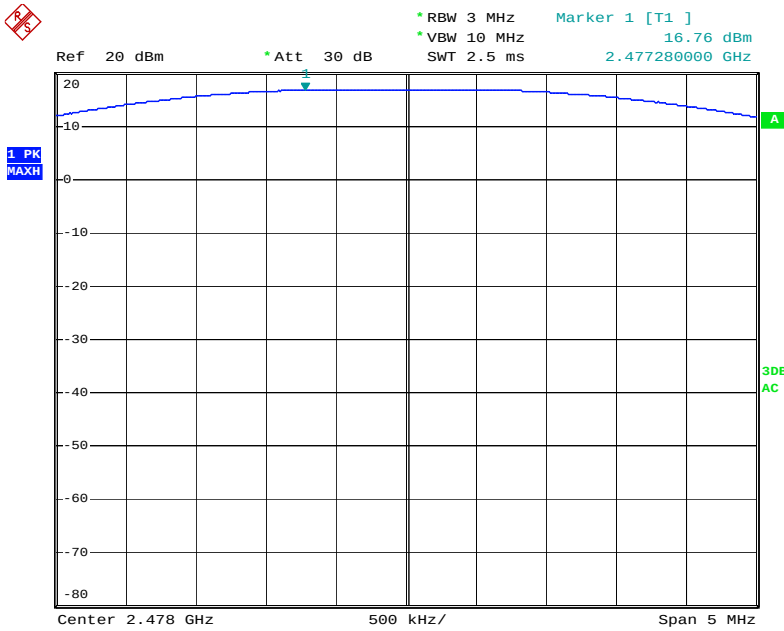
Date: 6.JAN.2012 12:08:54

Middle Channel



Date: 6.JAN.2012 12:07:49

High Channel



Date: 6.JAN.2012 12:09:15

## 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        | 2011-11-11       | 2012-11-10           |

\* **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. Put it on the Rotated table and turn on the EUT and make it operate in Operating 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

|                    |          |
|--------------------|----------|
| Temperature:       | 25 °C    |
| Relative Humidity: | 56 %     |
| ATM Pressure:      | 100.9kPa |

\*The testing was performed by Ares Liu on 2012-01-06.

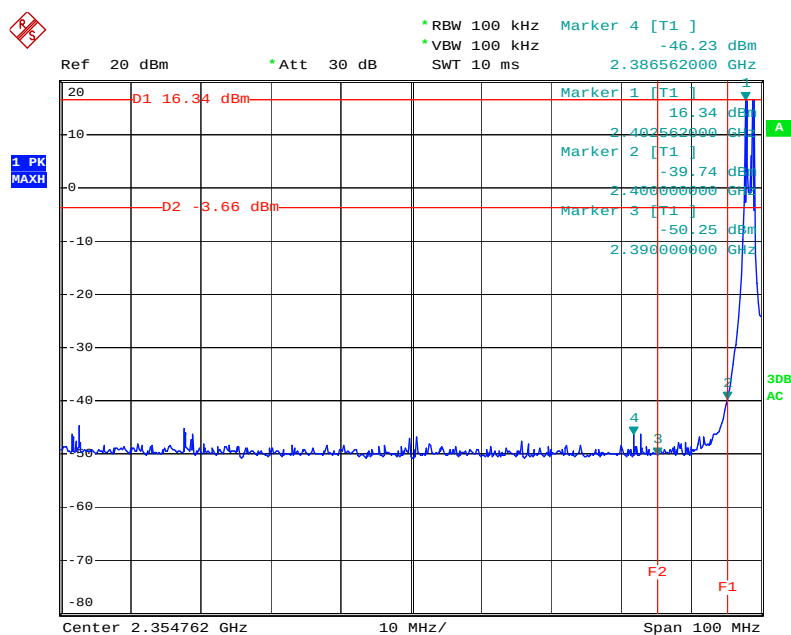
**Test Result:** Compliance.

Please refer to following tables and plots

Test Mode: Transmitting

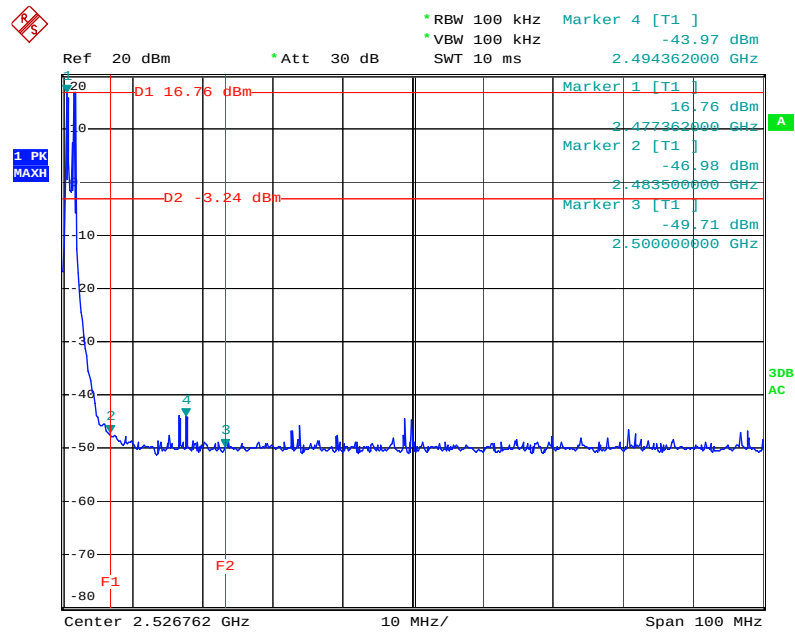
| Frequency (MHz) | Delta Peak to Band Emission (dBc) | Delta Limit (dBc) |
|-----------------|-----------------------------------|-------------------|
| 2386.362        | -46.23                            | 20                |
| 2494.362        | -43.97                            | 20                |

### Band Edge: Left Side



Date: 6.JAN.2012 13:08:39

# Band Edge: Right Side



Date: 6.JAN.2012 13:09:45

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