

FCC PART 15.247

MEASUREMENT AND TEST REPORT

For

**Imobiile Technology, L.L.C**

8227 NW 68 ST., Miami, Florida 33166, USA

**FCC ID: ZOTIMO1700**

|  |  |
|--|--|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>GSM Mobile Phone   |
| <b>Test Engineer:</b>                  | <u>Back Huang</u> <i>Back Huang</i>  |
| <b>Report Number:</b>                  | <u>RSZ110601002-00-15.247</u>  |
| <b>Report Date:</b>                    | <u>2011-06-20</u>  |
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**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\*, 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 *Imobiile Technology, L.L.C*'s product, model number: *IMO-1700 (FCC ID: ZOTIMO1700)* or the "EUT" as referred to in this report is a *Mobile phone*, which measures approximately: 11.4 cm (L) x 6.2 cm (W) x 1.3 cm (H), rated input voltage: DC 3.7 V battery.

#### Adapter Information:

Manufacturer: AOHAI;

Model: ZT-666-E0500;

Input: 100-240V~50/60Hz 0.25A;

Output: 5.0V 0.5A

#### Frequency Range:

Cellular Band: 824-849 MHz (Tx), 869-894 MHz (Rx)

PCS Band: 1850-1910 MHz (Tx), 1930-1990 MHz (Rx)

Bluetooth: 2400-2483.5 MHz (Tx/Rx)

Modulation Mode: GMSK (GSM); GFSK (Bluetooth)

#### Transmitter Rated Output Power:

Cellular Band: 33 dBm; PCS Band: 30 dBm

Bluetooth: -6~4 dBm

*\* All measurement and test data in this report was gathered from production sample serial number: 1106003 (Assigned by BACL, Shenzhen). The EUT was received on 2011-06-01.*

## Objective

This Type approval report is prepared on behalf of *Imobiile Technology, L.L.C* 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)

FCC Part 22H&24E PCE and FCC Part 15B JBP submissions with FCC ID: ZOTIMO1700.

## 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 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 is provided by manufacture.

### EUT Exercise Software

N/A

### Equipment Modifications

No modification was made to the unit tested.

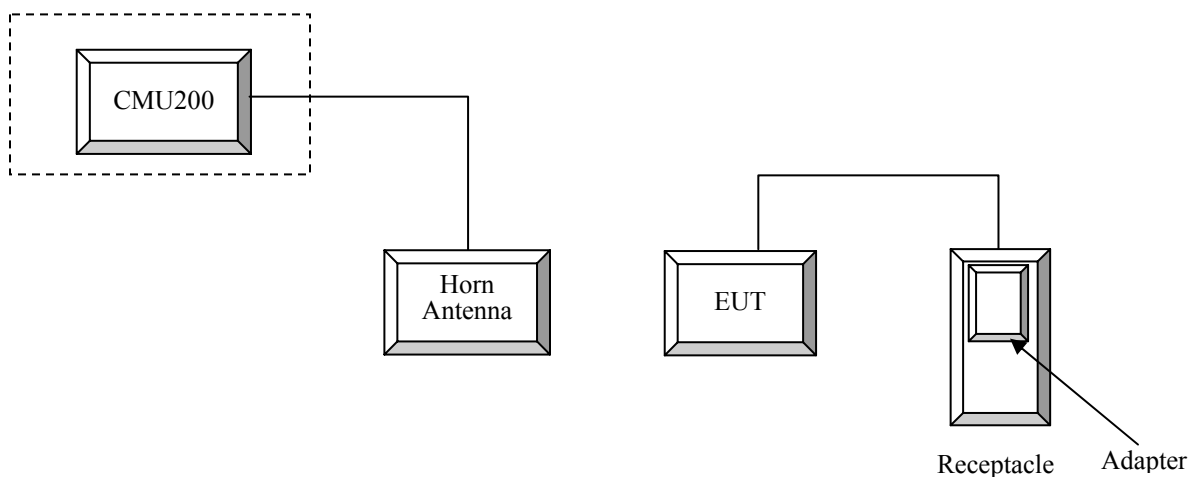
### Local Support Equipment List and Details

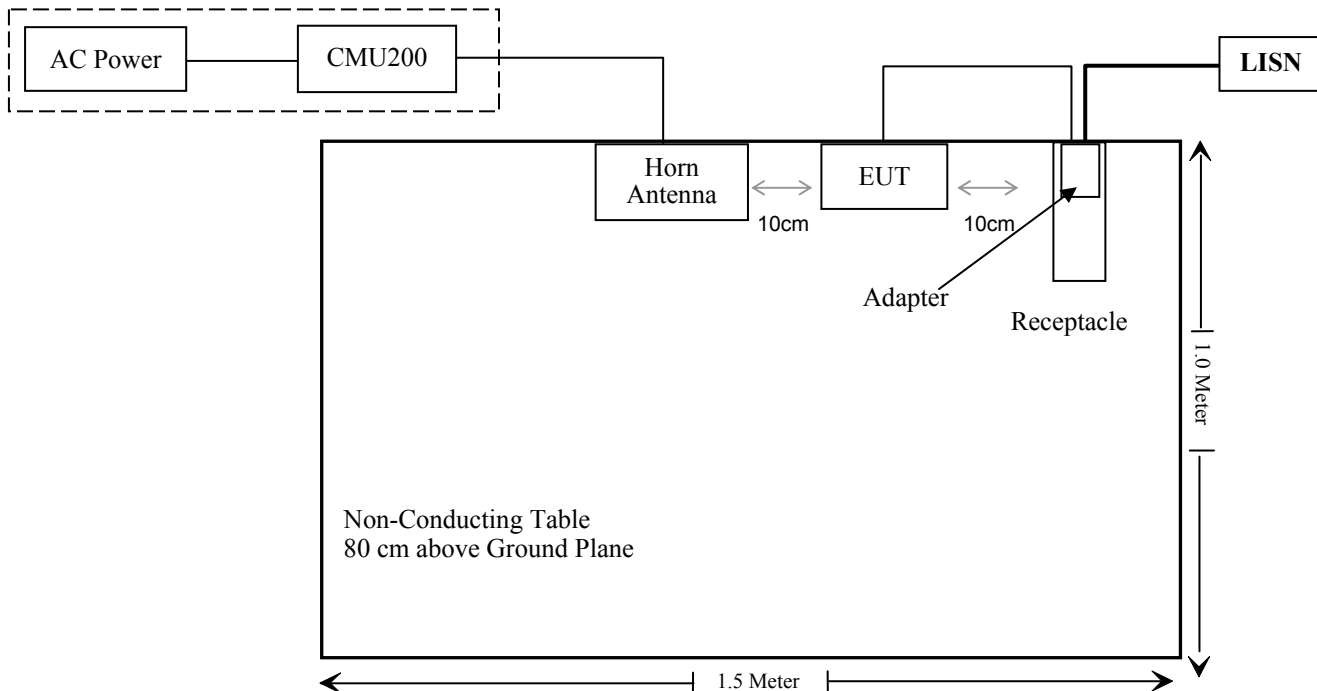
| Manufacturer | Description                       | Model  | Serial Number |
|--------------|-----------------------------------|--------|---------------|
| R & S        | Universal Radio CommutationTester | CMU200 | 11000008.02   |

### External I/O Cable

| Cable Description                    | Length (m) | From Port | To      |
|--------------------------------------|------------|-----------|---------|
| Unshielded Detachable DC Power Cable | 1.0        | EUT       | Adapter |

### Configuration of Test Setup



**Block Diagram of Test Setup**

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**SUMMARY OF TEST RESULTS**

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| FCC Rules                       | Description of Test              | Result     |
|---------------------------------|----------------------------------|------------|
| §15.247 (i), §2.1093            | RF Exposure Information          | Compliance |
| §15.203                         | Antenna Requirement              | Compliance |
| §15.207 (a)                     | AC Line Conducted Emissions      | Compliance |
| §15.205, §15.209,<br>§15.247(d) | Radiated Emissions               | Compliance |
| §15.247 (a)(1)                  | 20 dB Emission 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) & §2.1093 – RF EXPOSURE INFORMATION

### 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 ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

**Table 2 – Summary of SAR Evaluation Requirements for a Cell Phone with Multiple Transmitters**

|                                | Individual Transmitter  | Simultaneous Transmission   |
|--------------------------------|---|---|
| <b>Licensed Transmitters</b>   | <u>Routine evaluation required</u>  | <b>SAR not required:</b><br><u>Unlicensed only</u><br><ul style="list-style-type: none"> <li>when stand-alone 1-g SAR is not required and antenna is <math>\geq 5</math> cm from other antennas</li> </ul> <u>Licensed &amp; Unlicensed</u><br><ul style="list-style-type: none"> <li>when the sum of the 1-g SAR is <math>&lt; 1.6</math> W/kg for all simultaneous transmitting antennas</li> <li>when SAR to peak location separation ratio of simultaneous transmitting antenna pair is <math>&lt; 0.3</math></li> </ul> <b>SAR required:</b><br><u>Licensed &amp; Unlicensed</u><br>antenna pairs with SAR to peak location separation ratio $\geq 0.3$ ; test is only required for the configuration that results in the highest SAR in stand-alone configuration for each wireless mode and exposure condition<br><b>Note: simultaneous transmission exposure conditions for head and body can be different for different style phones; therefore, different test requirements may apply</b> |
| <b>Unlicensed Transmitters</b> | <p><u>When there is no simultaneous transmission –</u></p> <ul style="list-style-type: none"> <li>output <math>\leq 60</math> f: SAR not required</li> <li>output <math>&gt; 60</math> f: stand-alone SAR required</li> </ul> <p><u>When there is simultaneous transmission –</u></p> <p><u>Stand-alone SAR not required when</u></p> <ul style="list-style-type: none"> <li>output <math>\leq 2 \cdot P_{Ref}</math> and antenna is <math>\geq 5.0</math> cm from other antennas</li> <li>output <math>\leq P_{Ref}</math> and antenna is <math>\geq 2.5</math> cm from other antennas</li> <li>output <math>\leq P_{Ref}</math> and antenna is <math>&lt; 2.5</math> cm from other antennas, each with either output power <math>\leq P_{Ref}</math> or 1-g SAR <math>&lt; 1.2</math> W/kg</li> </ul> <p><u>Otherwise stand-alone SAR is required</u></p> <p><u>When stand-alone SAR is required</u></p> <ul style="list-style-type: none"> <li>test SAR on highest output channel for each wireless mode and exposure condition</li> <li>if SAR for highest output channel is <math>&gt; 50\%</math> of SAR limit, evaluate all channels according to normal procedures</li> </ul> |   |
| <b>Jaw, Mouth and Nose</b>     | <p><u>Flat phantom SAR required</u></p> <ul style="list-style-type: none"> <li>when measurement is required in tight regions of SAM and it is not feasible or the results can be questionable due to probe tilt, calibration, positioning and orientation issues</li> <li>position rectangular and clam-shell phones according to flat phantom procedures and conduct SAR measurements for these specific locations</li> </ul>  | When simultaneous transmission SAR testing is required, contact the FCC Laboratory for interim guidance.  |

Routine SAR evaluation refers to that specifically required by §2.1093, using measurements or computer simulation. When routine SAR evaluation is not required, portable transmitters with output power greater than the applicable low threshold require SAR evaluation to qualify for TCB approval.

- 1) The distance between BT and GSM antenna is  $4.1\text{cm} > 2.5\text{cm}$ . The maximum output power of Bluetooth antenna is  $1.23\text{ mW} < P_{\text{Ref}}(12\text{ mW})$ .
- 2) According to KDB648474, stand alone SAR for Bluetooth is not required.
- 3) According to KDB648474, simultaneous transmission SAR evaluation is not required for BT and GSM antenna.

**Result:**

The SAR measurement of Bluetooth antenna is exempt.

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## 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 user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### Antenna Connector Construction

The EUT has two antennas, one is Bluetooth antenna, the gain is -2.2 dBi, another is GSM/PCS antenna, the gain for GSM is -2.0 dBi, for PCS is -1.0 dBi, which are in accordance to section 15.203, please refer to the internal photos.

**Result:** Compliance.

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

### Applicable Standard

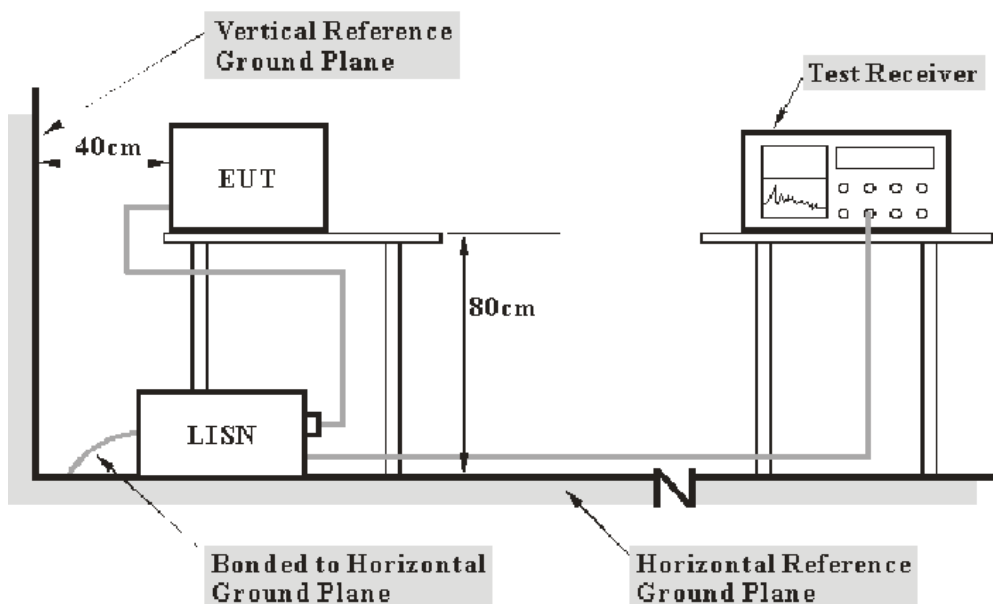
FCC §15.207

### 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(k=2, 95% level of confidence).

### EUT Setup



- Note: 1. Support units were connected to second LISN.  
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2009 measurement procedure. The specification used was with the FCC Part 15.207 limits.

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

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:

| <b><i>Frequency Range</i></b> | <b><i>IF B/W</i></b> |
|-------------------------------|----------------------|
| 150 kHz – 30 MHz              | 9 kHz                |

## 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 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  | 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 Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207, with the worst margin reading of:

**12.15 dB at 0.810 MHz in the Neutral conducted mode**

## Test Data

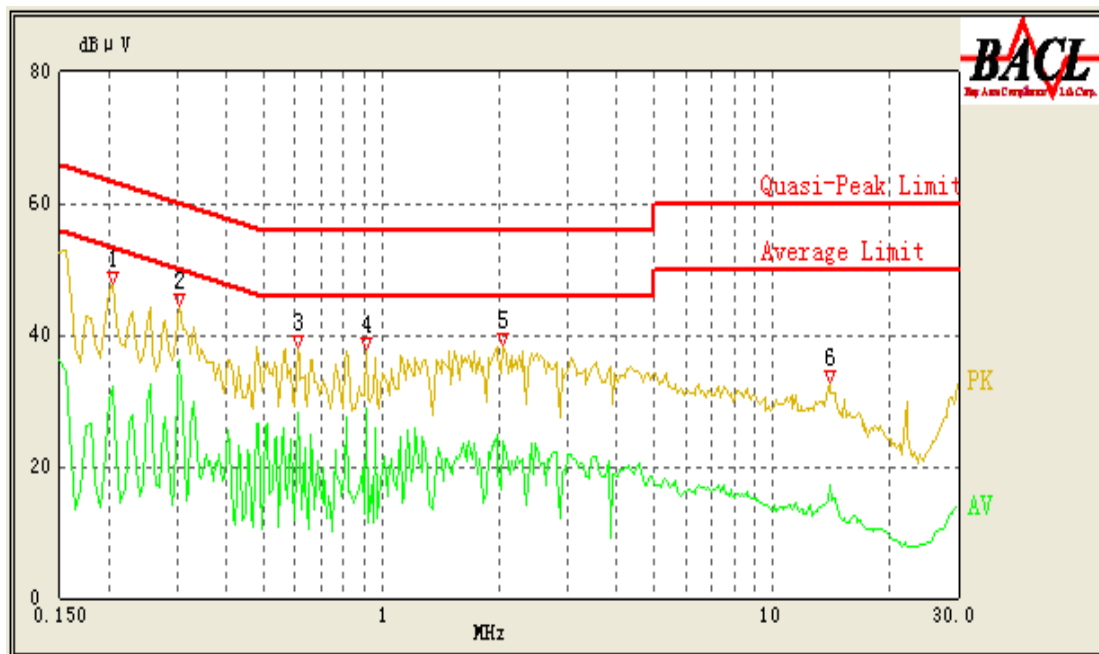
### Environmental Conditions

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

\* The testing was performed by Back Huang on 2011-06-16.

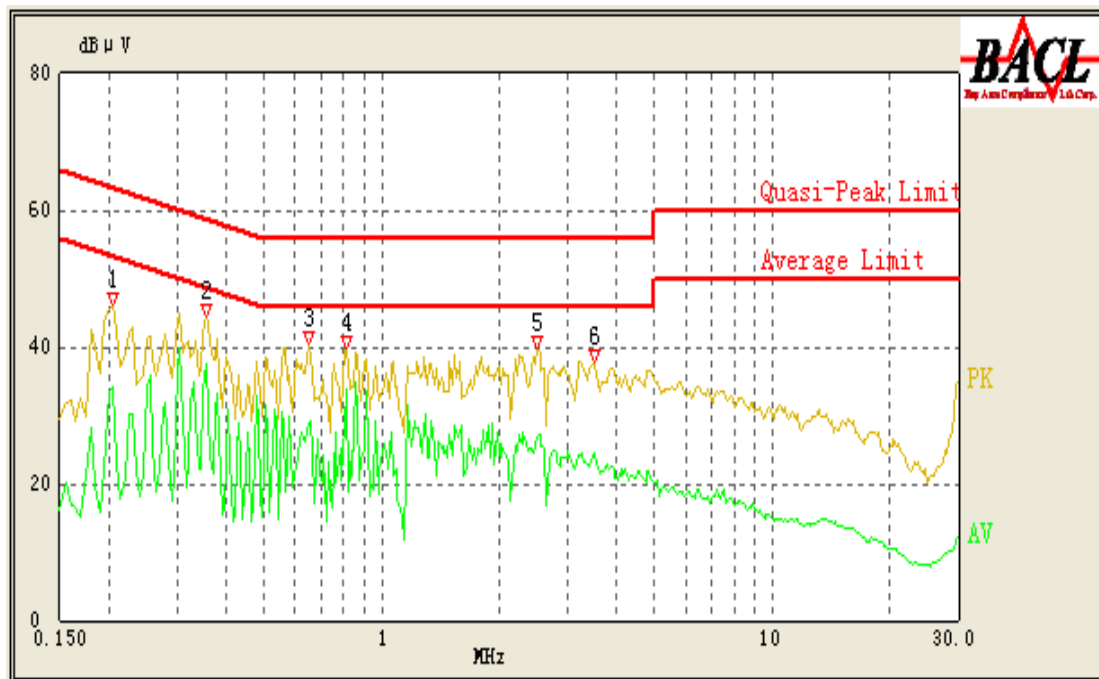
Test Mode: Adapter Charging & Transmitting (Bluetooth)

AC 120V/60 Hz, Line



| Conducted Emissions |                         |                        | FCC Part 15.207 |             |                      |
|---------------------|-------------------------|------------------------|-----------------|-------------|----------------------|
| Frequency (MHz)     | Corrected Result (dBμV) | Correction Factor (dB) | Limit (dBμV)    | Margin (dB) | Remark (PK/ QP/Ave.) |
| 0.305               | 36.09                   | 10.10                  | 51.57           | 15.48       | Ave                  |
| 0.915               | 28.88                   | 10.10                  | 46.00           | 17.12       | Ave                  |
| 0.610               | 28.17                   | 10.10                  | 46.00           | 17.83       | Ave                  |
| 2.035               | 35.57                   | 10.10                  | 56.00           | 20.43       | QP                   |
| 0.915               | 35.50                   | 10.10                  | 56.00           | 20.50       | QP                   |
| 0.305               | 40.73                   | 10.10                  | 61.57           | 20.84       | QP                   |
| 0.610               | 35.04                   | 10.10                  | 56.00           | 20.96       | QP                   |
| 2.035               | 23.83                   | 10.10                  | 46.00           | 22.17       | Ave                  |
| 0.205               | 32.10                   | 10.10                  | 54.43           | 22.33       | Ave                  |
| 0.205               | 41.85                   | 10.10                  | 64.43           | 22.58       | QP                   |
| 14.030              | 17.18                   | 10.10                  | 50.00           | 32.82       | Ave                  |
| 14.030              | 21.62                   | 10.10                  | 60.00           | 38.38       | QP                   |

## AC 120V/60 Hz, Neutral



| Conducted Emissions |                         |                        | FCC Part 15.207 |             |                      |
|---------------------|-------------------------|------------------------|-----------------|-------------|----------------------|
| Frequency (MHz)     | Corrected Result (dBμV) | Correction Factor (dB) | Limit (dBμV)    | Margin (dB) | Remark (PK/ QP/Ave.) |
| 0.810               | 33.85                   | 10.10                  | 46.00           | 12.15       | Ave                  |
| 0.355               | 37.58                   | 10.10                  | 50.14           | 12.56       | Ave                  |
| 0.650               | 28.86                   | 10.10                  | 46.00           | 17.14       | Ave                  |
| 0.810               | 37.89                   | 10.10                  | 56.00           | 18.11       | QP                   |
| 0.355               | 41.40                   | 10.10                  | 60.14           | 18.74       | QP                   |
| 2.500               | 26.72                   | 10.10                  | 46.00           | 19.28       | Ave                  |
| 2.500               | 36.29                   | 10.10                  | 56.00           | 19.71       | QP                   |
| 0.205               | 34.09                   | 10.10                  | 54.43           | 20.34       | Ave                  |
| 3.510               | 35.16                   | 10.10                  | 56.00           | 20.84       | QP                   |
| 3.510               | 24.26                   | 10.10                  | 46.00           | 21.74       | Ave                  |
| 0.205               | 41.71                   | 10.10                  | 64.43           | 22.72       | QP                   |
| 0.650               | 31.39                   | 10.10                  | 56.00           | 24.61       | QP                   |

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

### Applicable Standard

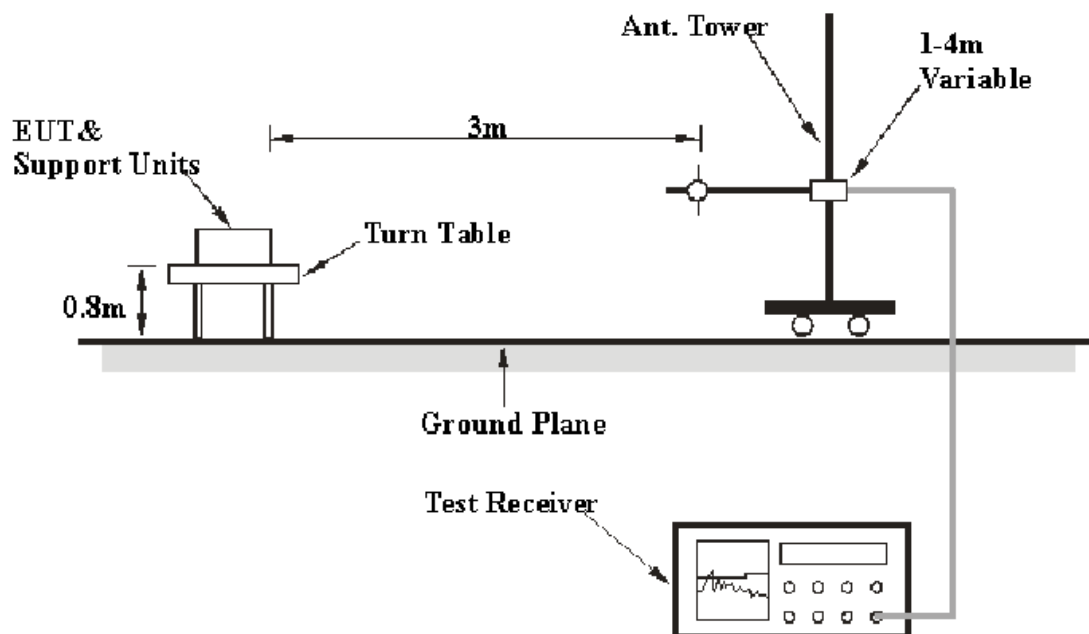
FCC §15.247 (d); §15.209; §15.205;

### 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 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(k=2, 95% level of confidence).

### EUT Setup



The radiated emission tests were performed in the 3 meters chamber B test site, using the setup accordance with the ANSI C63.4-2009. 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.



## 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><b>Frequency Range</b></i> | <i><b>RBW</b></i> | <i><b>Video B/W</b></i> | <i><b>Detector</b></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 Procedure

For the radiated emissions test, the adapter was connected to the outlet of the LISN

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, 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 limit. The equation for margin calculation is as follows:

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

## 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> |
|---------------------|--------------------|--------------|----------------------|-------------------------|-----------------------------|
| HP                  | Amplifier          | HP8447D      | 2944A09795           | 2010-08-02              | 2011-08-01                  |
| Rohde & Schwarz     | EMI Test Receiver  | ESCI         | 100035               | 2010-11-11              | 2011-11-10                  |
| Sunol Sciences      | Broadband Antenna  | JB1          | A040904-1            | 2010-07-05              | 2011-07-04                  |
| 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                  |
| Rohde & Schwarz     | Spectrum Analyzer  | FSEM30       | 849720/019           | 2010-07-08              | 2011-07-07                  |

\* **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 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:

### Below 1 GHz:

**9.2 dB** at **37.696250 MHz** in the **Vertical** polarization

### Above 1 GHz:

**17.69 dB** at **7206 MHz** in the **Horizontal** polarization (Low Channel Ave)

## Test Data

### Environmental Conditions

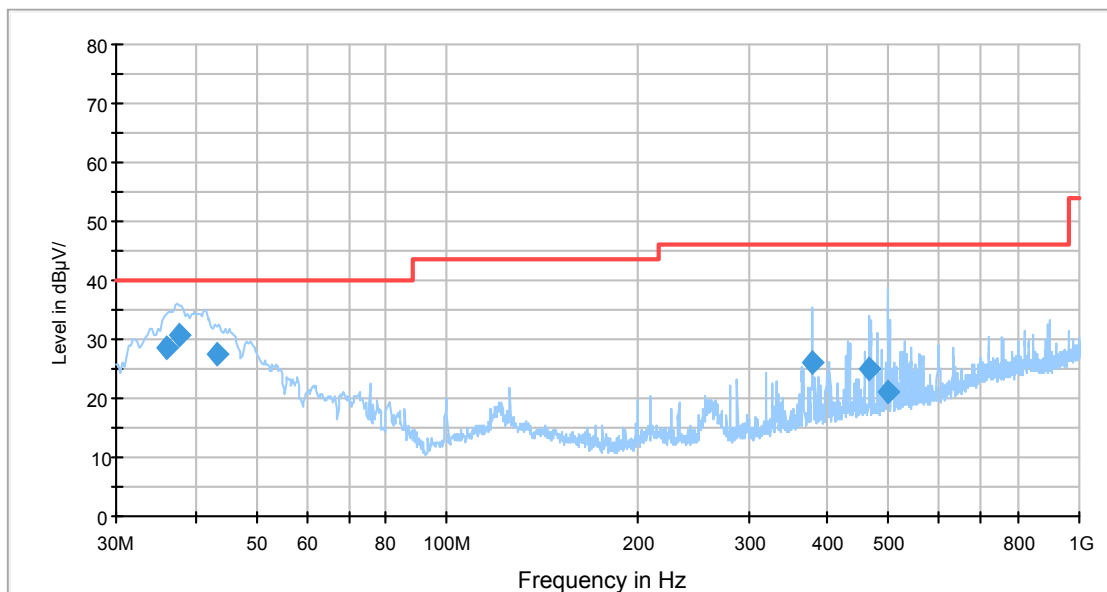
|                           |          |
|---------------------------|----------|
| <b>Temperature:</b>       | 25 °C    |
| <b>Relative Humidity:</b> | 56 %     |
| <b>ATM Pressure:</b>      | 100.0kPa |

*The testing was performed by Back Huang on 2011-06-13.*

*Test Mode: Transmitting (Bluetooth)*

## 1) Below 1 GHz:

Auto Test(FCC 15.209)



| Frequency<br>(MHz) | Corrected<br>Amplitude<br>(dBμV/m) | Test Antenna   |                   | Turntable<br>Position<br>(degree) | Correction<br>Factor<br>(dB) | Limit<br>(dBμV/m) | Margin<br>(dB) |
|--------------------|------------------------------------|----------------|-------------------|-----------------------------------|------------------------------|-------------------|----------------|
|                    |                                    | Height<br>(cm) | Polarity<br>(H/V) |                                   |                              |                   |                |
| 37.696250          | 30.8                               | 100.0          | V                 | 119.0                             | -9.6                         | 40.0              | 9.2            |
| 35.994500          | 28.7                               | 100.0          | V                 | 205.0                             | -9.5                         | 40.0              | 11.3           |
| 43.281750          | 27.6                               | 101.0          | V                 | 162.0                             | -10.1                        | 40.0              | 12.4           |
| 377.893750         | 26.1                               | 184.0          | V                 | 170.0                             | -10.4                        | 46.0              | 19.9           |
| 464.230500         | 24.9                               | 120.0          | H                 | 193.0                             | -8.9                         | 46.0              | 21.1           |
| 498.424000         | 20.9                               | 101.0          | V                 | 240.0                             | -8.4                         | 46.0              | 25.1           |

**2) Above 1 GHz:**

| Indicated                 |                           | Detector<br>(PK/Ave.) | Table<br>Angle<br>Degree | Test Antenna  |                | Correction Factor        |                       |                      | FCC Part 15.247/15.209/15.205 |                   |                |          |
|---------------------------|---------------------------|-----------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|----------------------|-------------------------------|-------------------|----------------|----------|
| Frequency<br>(MHz)        | S.A.<br>Reading<br>(dBμV) |                       |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-<br>Amp.<br>(dB) | Cord.<br>Amp.<br>(dBμV/m)     | Limit<br>(dBμV/m) | Margin<br>(dB) | Note     |
| Low Channel (2402 MHz)    |                           |                       |                          |               |                |                          |                       |                      |                               |                   |                |          |
| 7206                      | 18.73                     | Ave                   | 210                      | 1.6           | H              | 39.0                     | 5.22                  | 26.64                | 36.31                         | 54                | 17.69          | harmonic |
| 7206                      | 19.06                     | Ave                   | 150                      | 1.8           | V              | 37.9                     | 5.22                  | 26.64                | 35.54                         | 54                | 18.46          | harmonic |
| 4804                      | 19.31                     | Ave                   | 330                      | 1.3           | H              | 36.3                     | 4.30                  | 26.75                | 33.16                         | 54                | 20.84          | harmonic |
| 4804                      | 22.57                     | Ave                   | 180                      | 2.1           | V              | 32.8                     | 4.30                  | 26.75                | 32.92                         | 54                | 21.08          | harmonic |
| 7206                      | 33.86                     | PK                    | 210                      | 1.6           | H              | 39.0                     | 5.22                  | 26.64                | 51.44                         | 74                | 22.56          | harmonic |
| 7206                      | 34.50                     | PK                    | 150                      | 1.8           | V              | 37.9                     | 5.22                  | 26.64                | 50.98                         | 74                | 23.02          | harmonic |
| 4804                      | 37.93                     | PK                    | 180                      | 2.1           | V              | 35.0                     | 4.30                  | 26.75                | 50.48                         | 74                | 23.52          | harmonic |
| 4804                      | 34.77                     | PK                    | 330                      | 1.3           | H              | 36.3                     | 4.30                  | 26.75                | 48.62                         | 74                | 25.38          | harmonic |
| Middle Channel (2441 MHz) |                           |                       |                          |               |                |                          |                       |                      |                               |                   |                |          |
| 7323                      | 18.51                     | Ave                   | 140                      | 1.5           | H              | 39.0                     | 5.21                  | 26.64                | 36.08                         | 54                | 17.92          | harmonic |
| 7323                      | 19.07                     | Ave                   | 350                      | 1.8           | V              | 37.9                     | 5.21                  | 26.64                | 35.54                         | 54                | 18.46          | harmonic |
| 4882                      | 22.14                     | Ave                   | 180                      | 2.1           | V              | 35.4                     | 4.37                  | 26.75                | 35.16                         | 54                | 18.84          | harmonic |
| 4882                      | 19.06                     | Ave                   | 250                      | 1.3           | H              | 36.6                     | 4.37                  | 26.75                | 33.28                         | 54                | 20.72          | harmonic |
| 7323                      | 33.74                     | PK                    | 140                      | 1.5           | H              | 39.0                     | 5.21                  | 26.64                | 51.31                         | 74                | 22.69          | harmonic |
| 7323                      | 34.67                     | PK                    | 350                      | 1.8           | V              | 37.9                     | 5.21                  | 26.64                | 51.14                         | 74                | 22.86          | harmonic |
| 4882                      | 37.63                     | PK                    | 180                      | 2.1           | V              | 35.4                     | 4.37                  | 26.75                | 50.65                         | 74                | 23.35          | harmonic |
| 4882                      | 34.52                     | PK                    | 250                      | 1.3           | H              | 36.6                     | 4.37                  | 26.75                | 48.74                         | 74                | 25.26          | harmonic |
| High Channel (2480 MHz)   |                           |                       |                          |               |                |                          |                       |                      |                               |                   |                |          |
| 4960                      | 23.23                     | Ave                   | 280                      | 1.9           | V              | 35.4                     | 4.37                  | 26.75                | 36.25                         | 54                | 17.75          | harmonic |
| 7440                      | 18.54                     | Ave                   | 150                      | 2.1           | H              | 39.0                     | 5.20                  | 26.64                | 36.10                         | 54                | 17.90          | harmonic |
| 7440                      | 19.58                     | Ave                   | 169                      | 1.7           | V              | 37.7                     | 5.20                  | 26.64                | 35.84                         | 54                | 18.16          | harmonic |
| 4960                      | 20.06                     | Ave                   | 340                      | 1.5           | H              | 36.6                     | 4.37                  | 26.75                | 34.28                         | 54                | 19.72          | harmonic |
| 4960                      | 38.58                     | PK                    | 280                      | 1.9           | V              | 35.4                     | 4.37                  | 26.75                | 51.60                         | 74                | 22.40          | harmonic |
| 7440                      | 34.69                     | PK                    | 169                      | 1.7           | V              | 37.7                     | 5.20                  | 26.64                | 50.95                         | 74                | 23.05          | harmonic |
| 7440                      | 32.97                     | PK                    | 150                      | 2.1           | H              | 39.0                     | 5.20                  | 26.64                | 50.53                         | 74                | 23.47          | harmonic |
| 4960                      | 35.03                     | PK                    | 340                      | 1.5           | H              | 36.6                     | 4.37                  | 26.75                | 49.25                         | 74                | 24.75          | harmonic |

**3) Spurious emission in restricted band:**

| Indicated          |                           | Detector<br>(PK/Ave.) | Table<br>Angle<br>Degree | Test Antenna  |                | Correction Factor        |                       |                      | FCC Part 15.247/15.209/15.205 |                   |                |          |
|--------------------|---------------------------|-----------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|----------------------|-------------------------------|-------------------|----------------|----------|
| Frequency<br>(MHz) | S.A.<br>Reading<br>(dBμV) |                       |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-<br>Amp.<br>(dB) | Cord.<br>Amp.<br>(dBμV/m)     | Limit<br>(dBμV/m) | Margin<br>(dB) | Note     |
| 2483.56            | 23.32                     | Ave                   | 170                      | 1.8           | V              | 30.6                     | 3.10                  | 26.85                | 30.17                         | 54                | 23.83          | spurious |
| 2483.56            | 23.19                     | Ave                   | 256                      | 2.1           | H              | 30.6                     | 3.10                  | 26.85                | 30.04                         | 54                | 23.96          | spurious |
| 2389.88            | 22.27                     | Ave                   | 360                      | 1.3           | V              | 30.1                     | 2.98                  | 26.85                | 28.50                         | 54                | 25.50          | spurious |
| 2389.88            | 21.82                     | Ave                   | 320                      | 1.3           | H              | 30.1                     | 2.98                  | 26.85                | 28.05                         | 54                | 25.95          | spurious |
| 2483.56            | 38.54                     | PK                    | 170                      | 1.8           | V              | 30.6                     | 3.10                  | 26.85                | 45.39                         | 74                | 28.61          | spurious |
| 2483.56            | 37.86                     | PK                    | 256                      | 2.1           | H              | 30.6                     | 3.10                  | 26.85                | 44.71                         | 74                | 29.29          | spurious |
| 2389.88            | 37.62                     | PK                    | 360                      | 1.3           | V              | 30.1                     | 2.98                  | 26.85                | 43.85                         | 74                | 30.15          | spurious |
| 2389.88            | 36.02                     | PK                    | 320                      | 1.3           | H              | 30.1                     | 2.98                  | 26.85                | 42.25                         | 74                | 31.75          | 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 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 Equipment List and Details

| Manufacturer    | Description       | Model  | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|--------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30 | 849720/019    | 2010-07-08       | 2011-07-07           |

\* **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 Data

#### Environmental Conditions

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

\* The testing was performed by Back Huang on 2011-06-15.

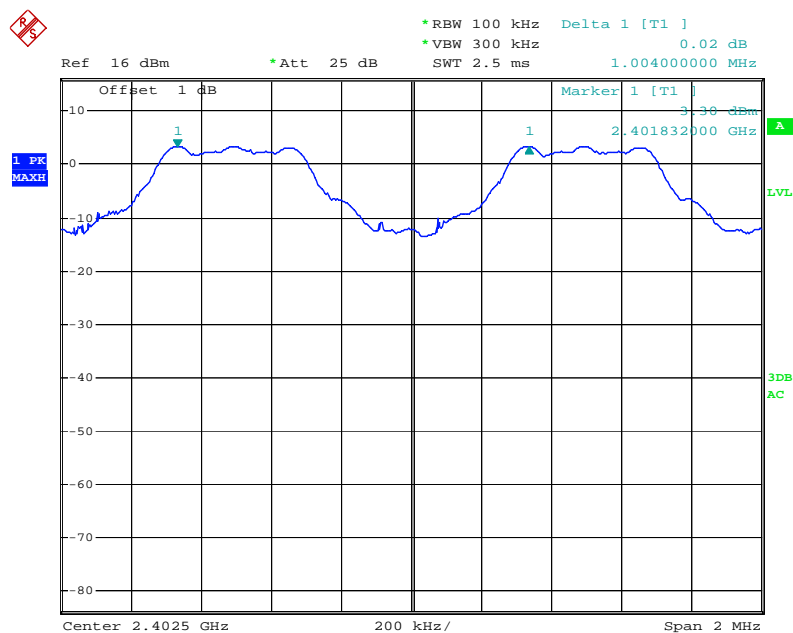
**Test Result:** Compliance.

Please refer to following tables and plots

*Test Mode: Transmitting*

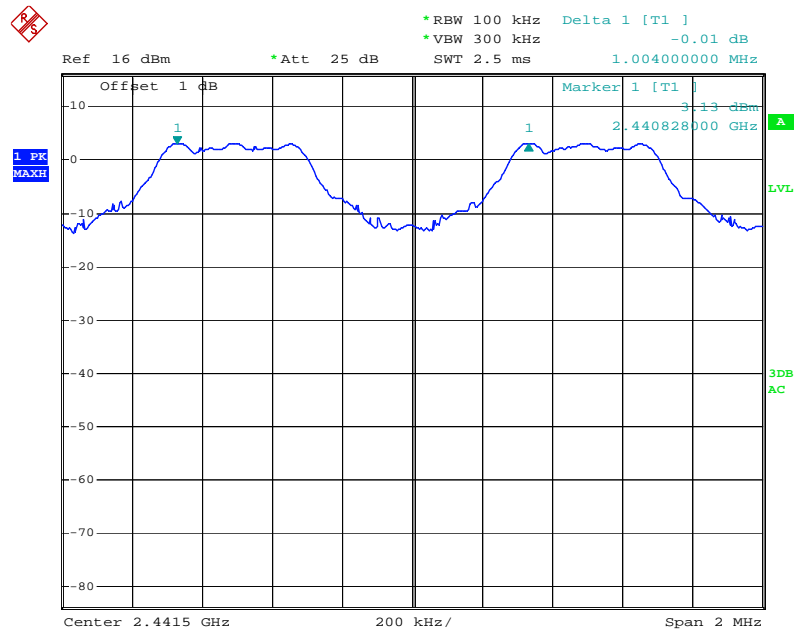
| Channel  | Frequency (MHz) | Channel Separation (MHz) | Limit (MHz) | Result |
|----------|-----------------|--------------------------|-------------|--------|
| Low      | 2402            | 1.004                    | 0.5333      | Pass   |
| Adjacent | 2403            |                          |             |        |
| Middle   | 2441            | 1.004                    | 0.5307      | Pass   |
| Adjacent | 2442            |                          |             |        |
| High     | 2480            | 1.004                    | 0.5307      | Pass   |
| Adjacent | 2479            |                          |             |        |

Please refer to the following plots.

**Low Channel**

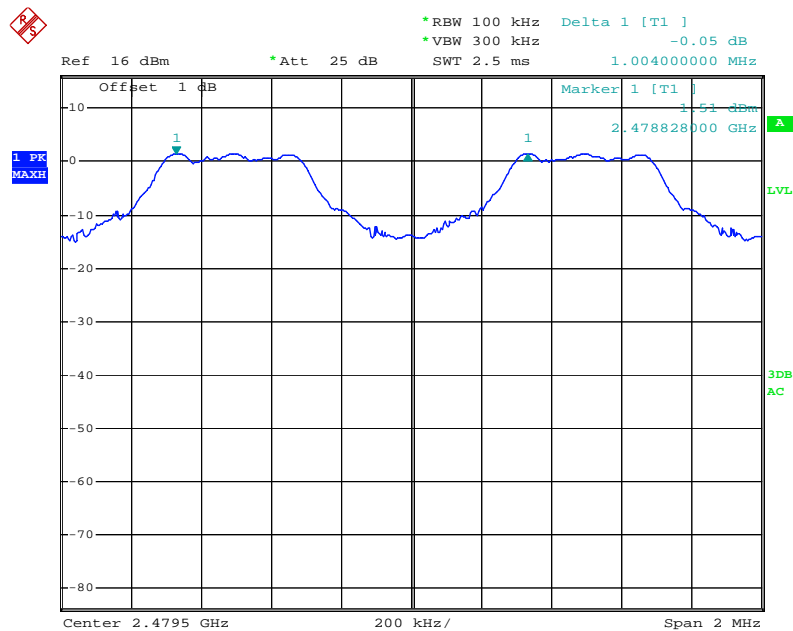
Date: 15.JUN.2011 11:12:55

## Middle Channel



Date: 15.JUN.2011 11:15:25

## High Channel



Date: 15.JUN.2011 11:18:53

## FCC §15.247(a) (1) – 20 dB EMISSION 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 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 Equipment List and Details

| Manufacturer    | Description       | Model  | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|--------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30 | 849720/019    | 2010-07-08       | 2011-07-07           |

\* **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 Data

#### Environmental Conditions

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

\* The testing was performed by Back Huang on 2011-06-15.

**Test Result:** Compliance.

Please refer to following tables and plots

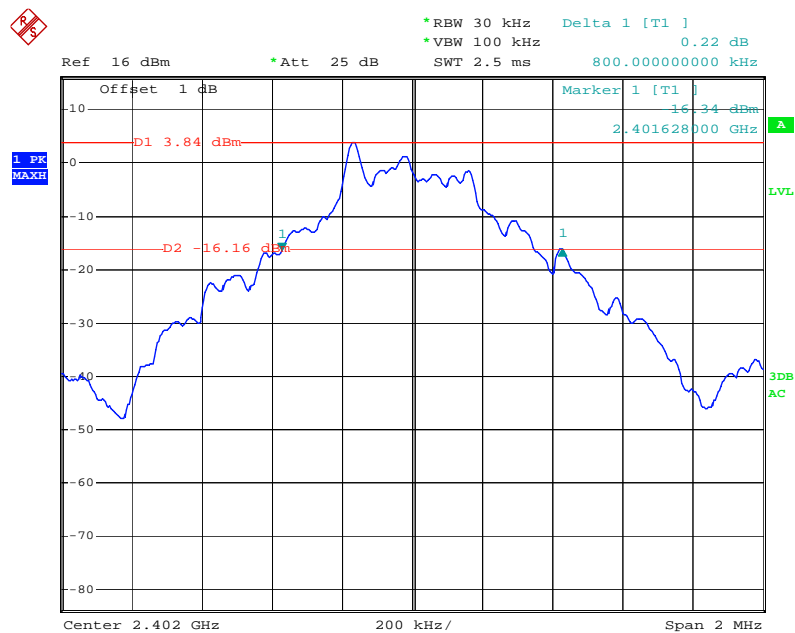


*Test Mode: Transmitting*

| Channel | Frequency (MHz) | 20 dB Emission Bandwidth (MHz) |
|---------|-----------------|--------------------------------|
| Low     | 2402            | 0.800                          |
| Middle  | 2441            | 0.796                          |
| High    | 2480            | 0.796                          |

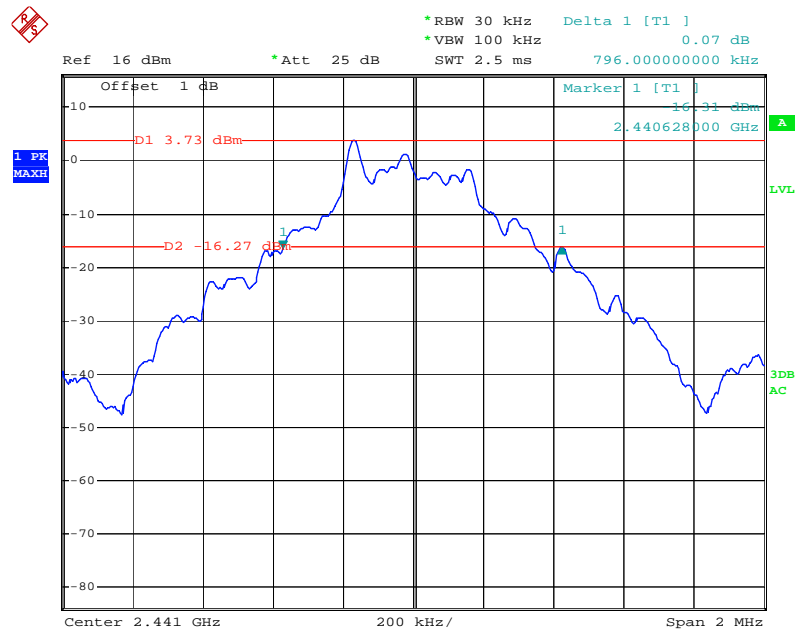
Please refer to the following plots.

## Low Channel



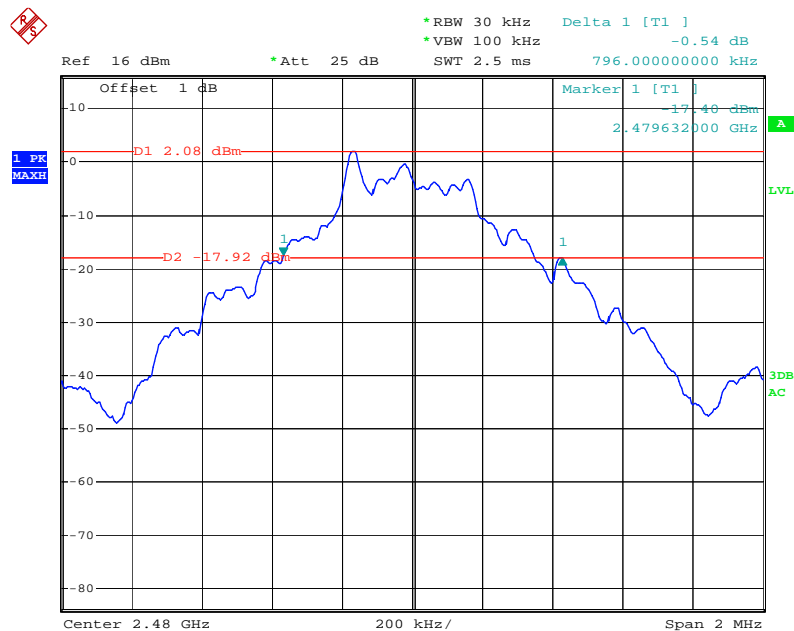
Date: 15.JUN.2011 14:57:01

## Middle Channel



Date: 15.JUN.2011 14:52:50

## High Channel



Date: 15.JUN.2011 14:54:45

**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 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 Equipment List and Details**

| Manufacturer    | Description       | Model  | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|--------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30 | 849720/019    | 2010-07-08       | 2011-07-07           |

\* **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 Data****Environmental Conditions**

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

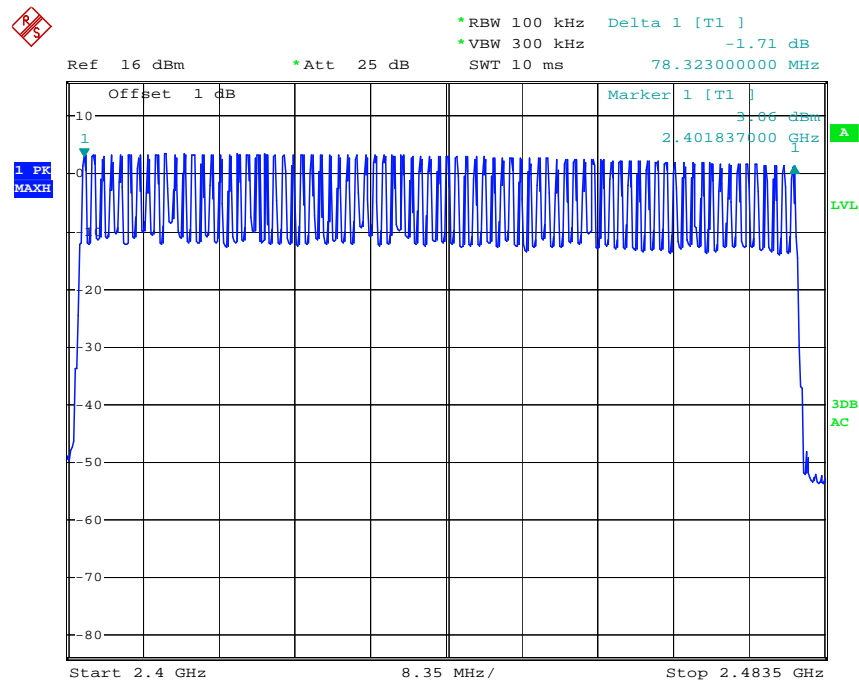
*The testing was performed by Back Huang on 2011-06-15.*

**Test Result:** Compliance.

Please refer to following tables and plots

*Test Mode: Transmitting*

| Frequency Range (MHz) | Number of Hopping Channel | Limit     |
|-----------------------|---------------------------|-----------|
| 2400-2483.5           | 79                        | $\geq 15$ |

**Number of Hopping Channels**

Date: 15.JUN.2011 11:37:49

## 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 Procedure

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. Sweep was set as 0.4 \* 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 \* 31.6s

Hop rate=1600/s

### Test Equipment List and Details

| Manufacturer    | Description       | Model  | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|--------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30 | 849720/019    | 2010-07-08       | 2011-07-07           |

\* **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 Data

#### Environmental Conditions

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

\* The testing was performed by Back Huang on 2011-06-15.

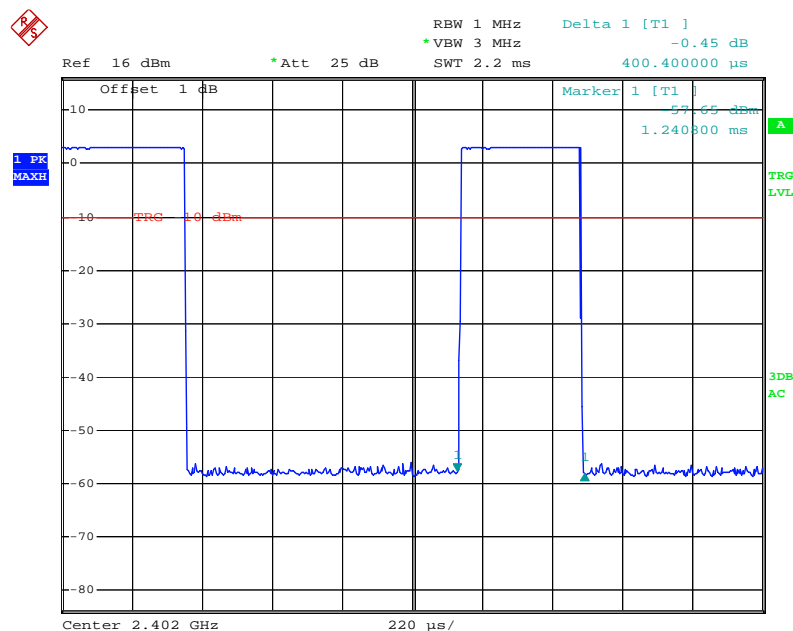
**Test Result:** Compliance.

Please refer to following tables and plots

*Test Mode: Transmitting*

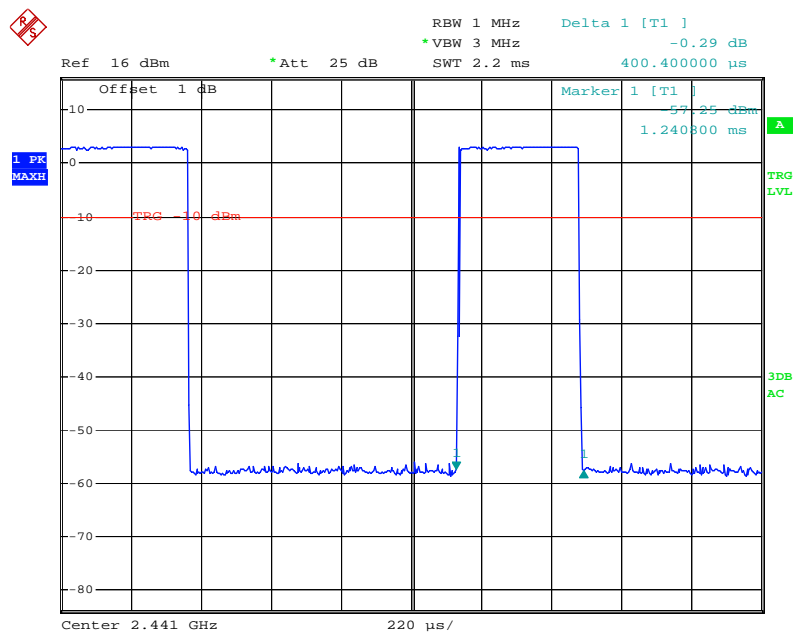
| Mode | Channel  | Pulse Width (ms) | Dwell Time (s) | Limit (s) | Result |
|------|--|------------------|----------------|-----------|--------|
| DH 1 | Low  | 0.4004           | 0.128128       | 0.4       | Pass   |
|      | Middle   | 0.4004           | 0.128128       | 0.4       | Pass   |
|      | High   | 0.3960           | 0.126720       | 0.4       | Pass   |
|      | Note: DH1: Dwell time = Pulse time*(1600/2/79)*31.6s |                  |                |           |        |
| DH 3 | Low  | 1.7020           | 0.272320       | 0.4       | Pass   |
|      | Middle   | 1.7020           | 0.272320       | 0.4       | Pass   |
|      | High   | 1.6872           | 0.269952       | 0.4       | Pass   |
|      | Note: DH3: Dwell time = Pulse time*(1600/4/79)*31.6s |                  |                |           |        |
| DH 5 | Low  | 2.967            | 0.31648        | 0.4       | Pass   |
|      | Middle   | 2.967            | 0.31648        | 0.4       | Pass   |
|      | High   | 2.967            | 0.31648        | 0.4       | Pass   |
|      | Note: DH5: Dwell time = Pulse time*(1600/6/79)*31.6s |                  |                |           |        |

Please refer to the following plots.

**Low Channel for DH1**

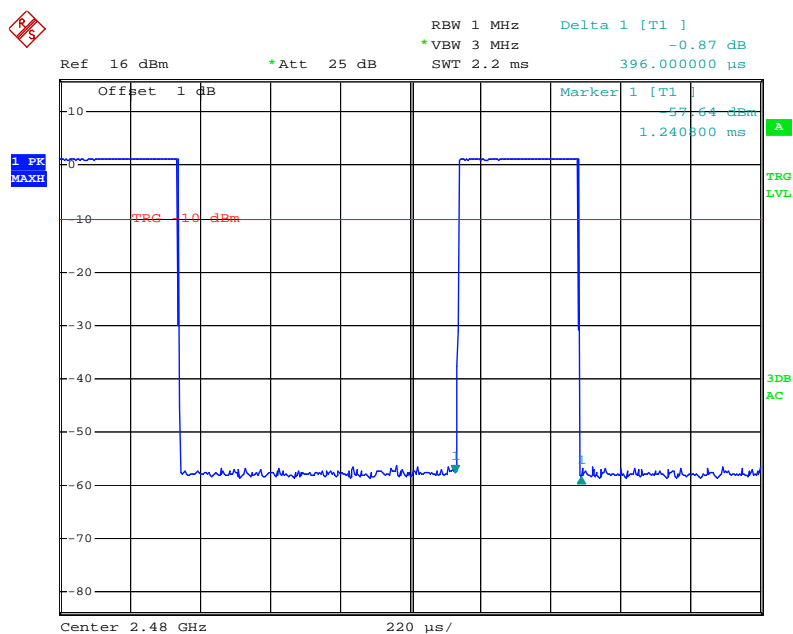
Date: 15.JUN.2011 11:22:29

## Middle Channel for DH1



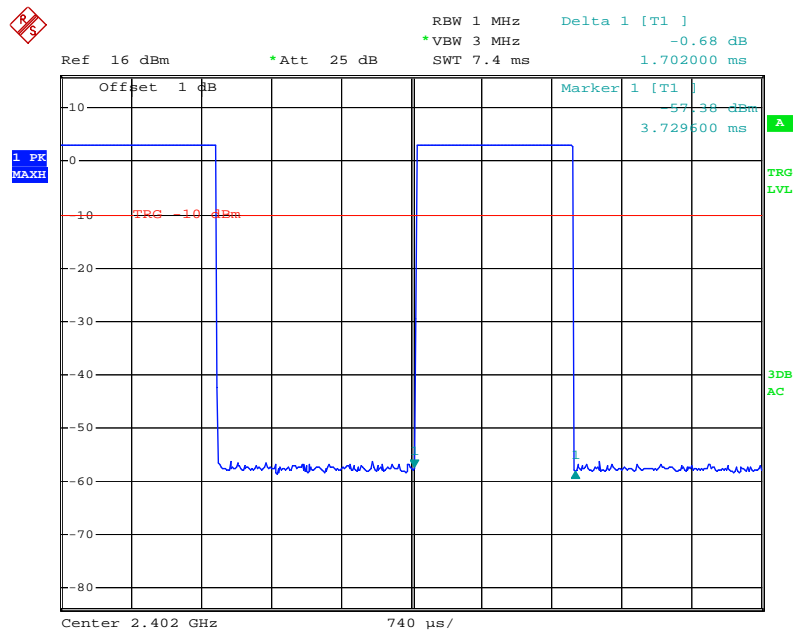
Date: 15.JUN.2011 11:23:16

## High Channel for DH1



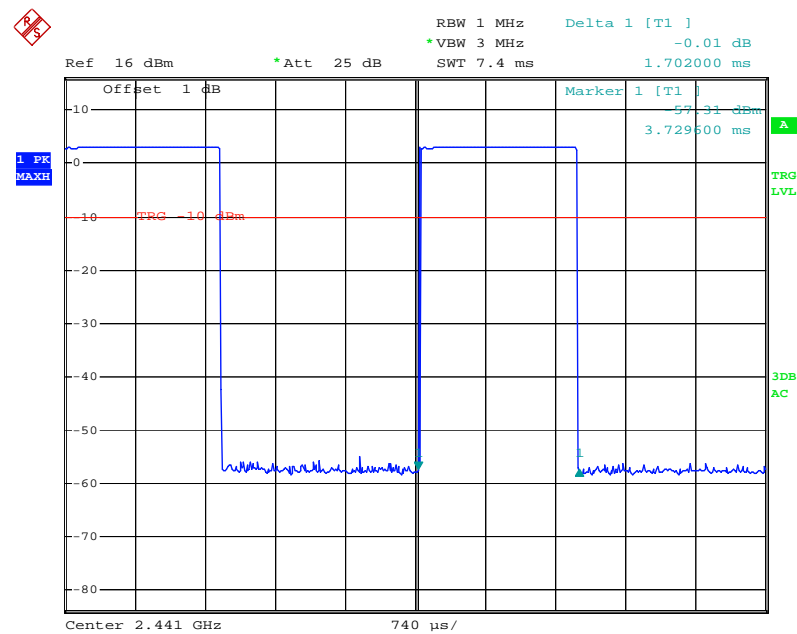
Date: 15.JUN.2011 11:23:55

## Low Channel for DH3



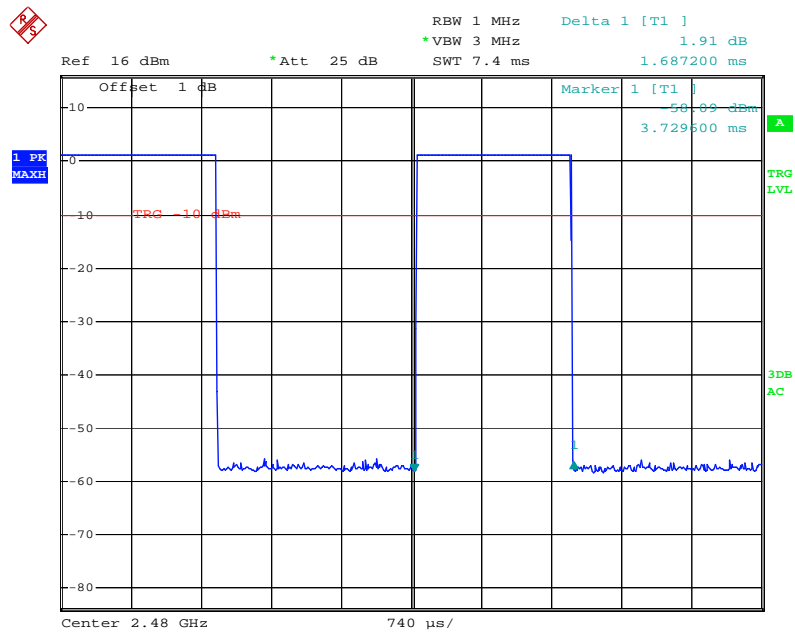
Date: 15.JUN.2011 11:24:39

## Middle Channel for DH3

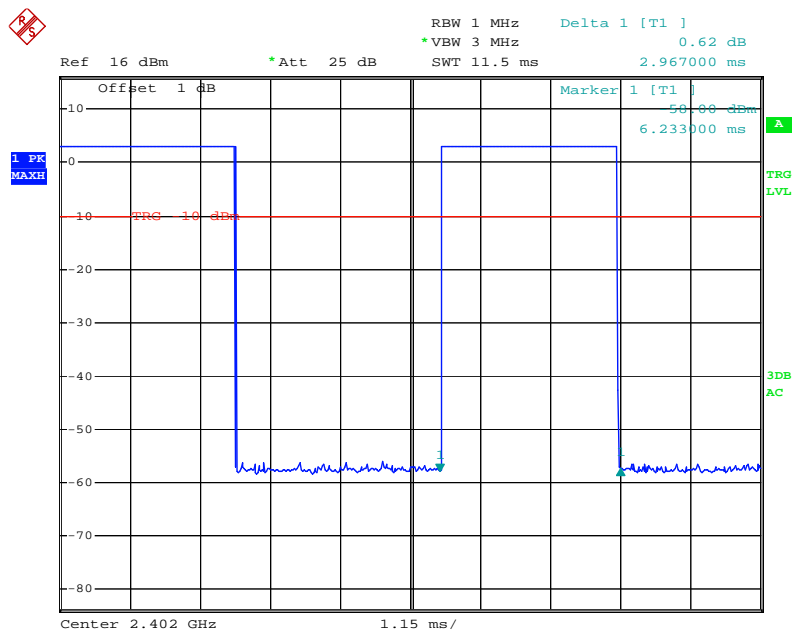


Date: 15.JUN.2011 11:25:06



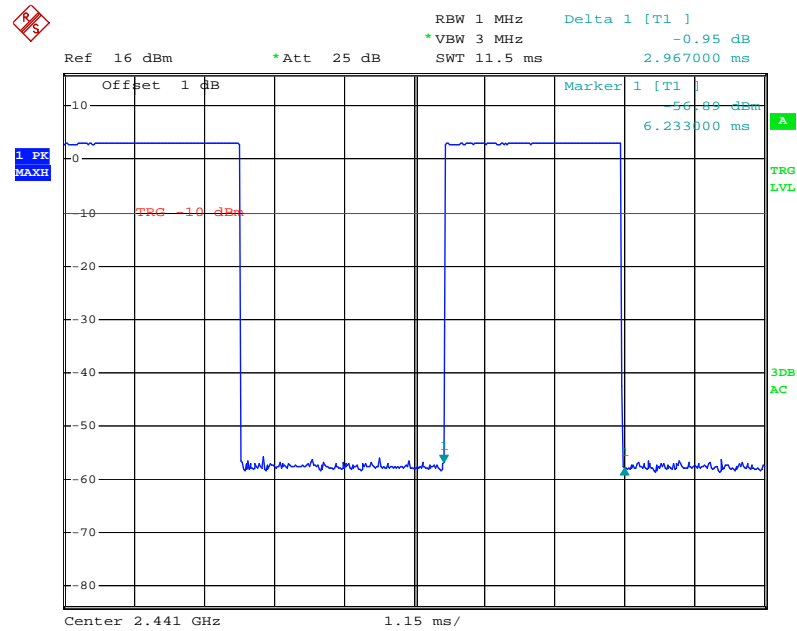
**High Channel for DH3**

Date: 15.JUN.2011 11:26:04

**Low Channel for DH5**

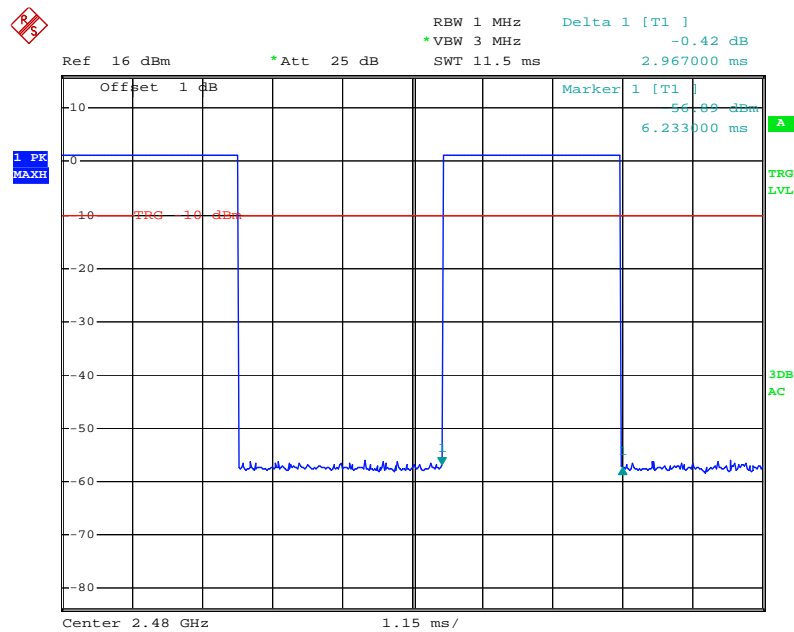
Date: 15.JUN.2011 11:27:22

## Middle Channel for DH5



Date: 15.JUN.2011 11:28:17

## High Channel for DH5



Date: 15.JUN.2011 11:29:07

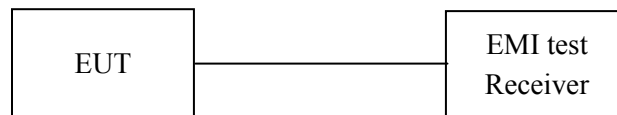
## FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

### 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 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 Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30  | 849720/019    | 2010-07-08       | 2011-07-07           |
| SUNOL SCIENCES  | Horn antenna      | DRH-118 | A052604       | 2011-05-05       | 2012-05-05           |

\* **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 Data

#### Environmental Conditions

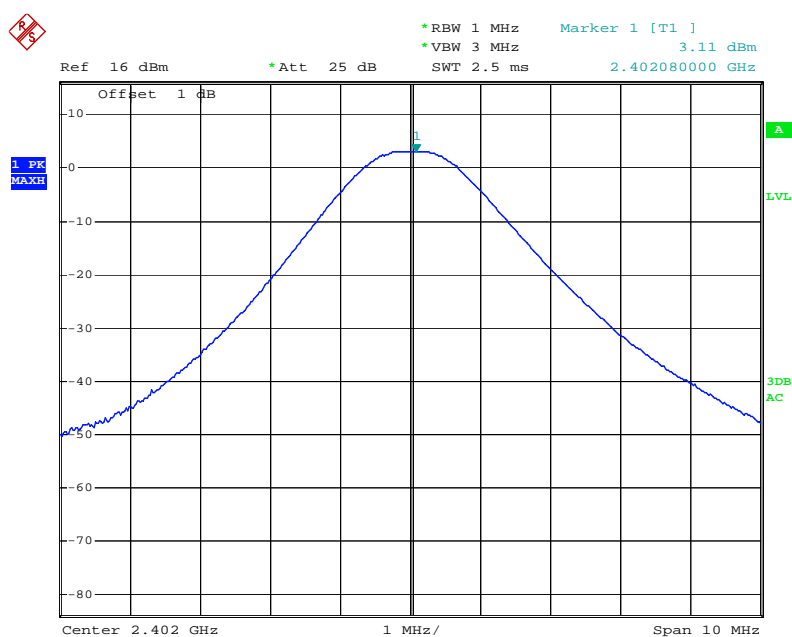
|                    |          |
|--------------------|----------|
| Temperature:       | 25 °C    |
| Relative Humidity: | 56 %     |
| ATM Pressure:      | 100.9kPa |

\* The testing was performed by Back Huang on 2011-06-15.

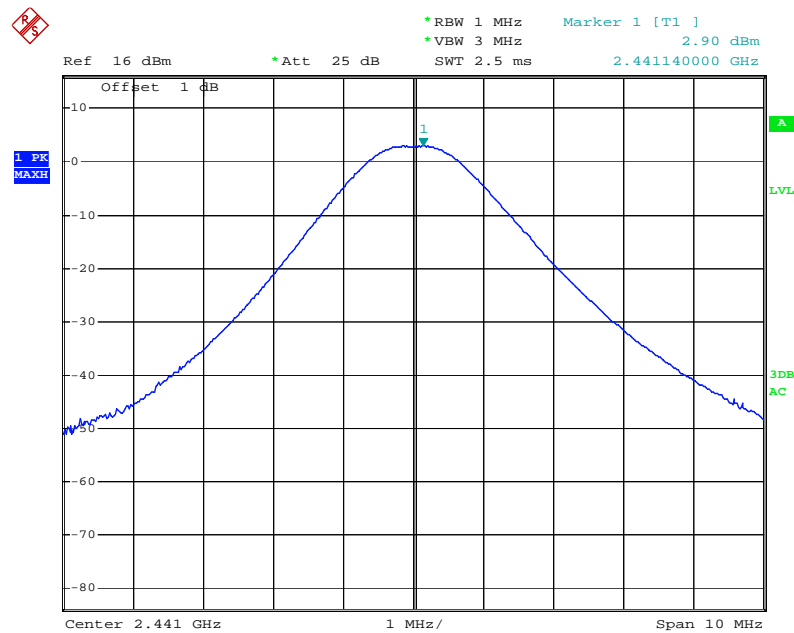
**Test Result:** Compliance.

*Test Mode: Transmitting*

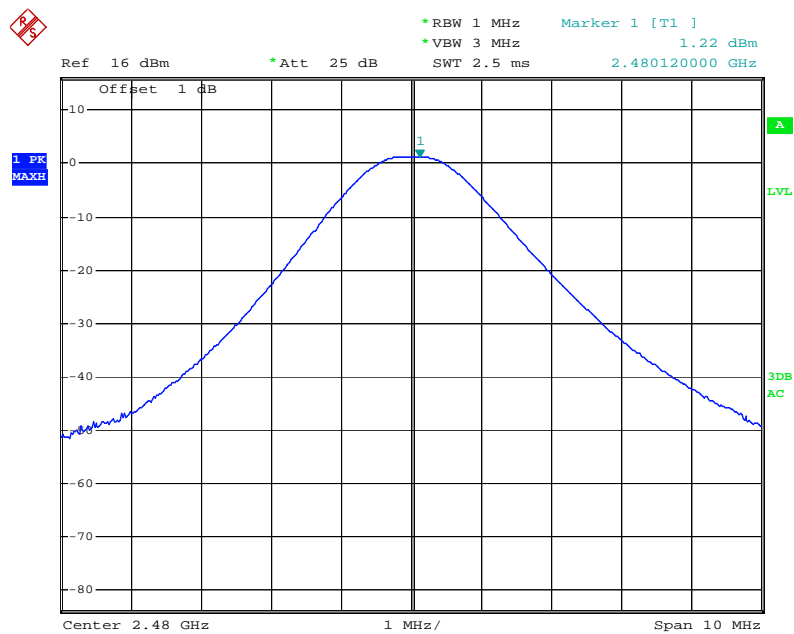
| Channel | Frequency (MHz) | Conducted Output Power (dBm) | Conducted Output Power (mW) | Limit (mW) |
|---------|-----------------|------------------------------|-----------------------------|------------|
| Low     | 2402            | 3.11                         | 2.046                       | 125        |
| Middle  | 2441            | 2.90                         | 1.950                       | 125        |
| High    | 2480            | 1.22                         | 1.324                       | 125        |

**Low Channel**

Date: 15.JUN.2011 11:32:18

**Middle Channel**

Date: 15.JUN.2011 11:33:50

**High Chanel**

Date: 15.JUN.2011 11:35:09

## 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 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.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

### Test Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | Spectrum Analyzer | FSEM30  | 849720/019    | 2010-07-08       | 2011-07-07           |
| SUNOL SCIENCES  | Horn antenna      | DRH-118 | A052604       | 2011-05-05       | 2012-05-05           |

\* **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 Data****Environmental Conditions**

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

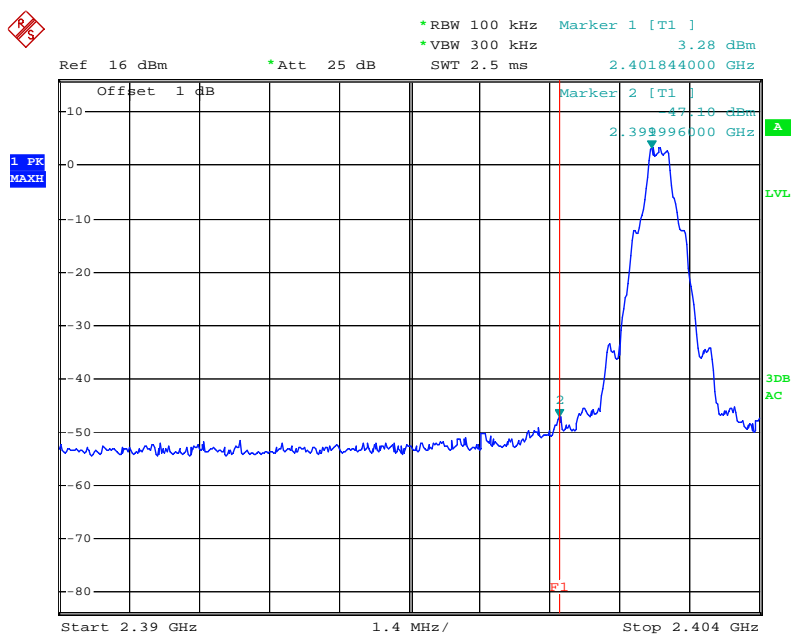
*\*The testing was performed by Back Huang on 2011-06-15.*

**Test Result:** Compliant

Please refer to the following table and plots.

*Test Mode: Transmitting*

| Frequency (MHz) | Delta Peak to Band Emission (dBc) | Limit (dBc) |
|-----------------|-----------------------------------|-------------|
| 2399.996        | 50.38                             | 20          |
| 2483.588        | 52.73                             | 20          |

**Band Edge: Left Side**

Date: 15.JUN.2011 11:06:02

Ref 16 dBm \*Att 25 dB

\*RBW 100 kHz Marker 1 [T1]  
 \*VBW 300 kHz 1.46 dBm  
 SWT 2.5 ms 2.479804000 GHz

Offset 1 dB

1 PK MAXH

Marker 2 [T1]  
 51.27 dBm  
 2.484468000 GHz

Start 2.478 GHz 2.2 MHz/ Stop 2.5 GHz

Date: 15.JUN.2011 11:08:33

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