

FCC PART 15.247  
MEASUREMENT AND TEST REPORT

For  
**Electronics Co., Ltd.**

NO.161, Xin Min Road, Tong Luo Wei Industrial Zone, Jin Xia, Chang An Town,  
Dong Guan City, Guang Dong Province, China

**FCC ID: WED-1636372**

|  |                                |
|--|--------------------------------|
| <b>Report Type:</b><br>Original Report   | <b>Product Type:</b><br>E-BOOK |
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| <b>Report Number:</b> <u>RSZ10101101-15.247</u>  |                                |
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\* This report may contain 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 *Electronics Co., Ltd*'s product, model number: 1636372 (FCC ID: WED-1636372) or the "EUT" as referred to in this report is a E-BOOK with the 2.4 GHz 802.11b/g Wi-Fi function, which measures approximately: 23.3 cm (L) x 13.3 cm (W) x 1.5 cm (H), rated input voltage: DC 3.7 V battery.

Adapter information:

Manufacturer: HUONIU

M/N: HNC050150U

Input: AC 100-240 V 50-60 Hz 0.35 A Max.

Output: 5.0 V 1.5A

*\* All measurement and test data in this report was gathered from production sample serial number: 1010017 (Assigned by BACL, Shenzhen). The EUT was received on 2010-10-11.*

### Objective

This Type approval report is prepared on behalf of *Electronics Co., Ltd* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

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

No related submittal(s).

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

### Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 21, 2007. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

For 802.11b and 802.11g mode, 11 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 1       | 2412            | 7       | 2442            |
| 2       | 2417            | 8       | 2447            |
| 3       | 2422            | 9       | 2452            |
| 4       | 2427            | 10      | 2457            |
| 5       | 2432            | 11      | 2462            |
| 6       | 2437            | /       | /               |

EUT was tested with Channel 1, 6 and 11.

### EUT Exercise Software

N/A

### Equipment Modifications

No modification was made to the unit tested.

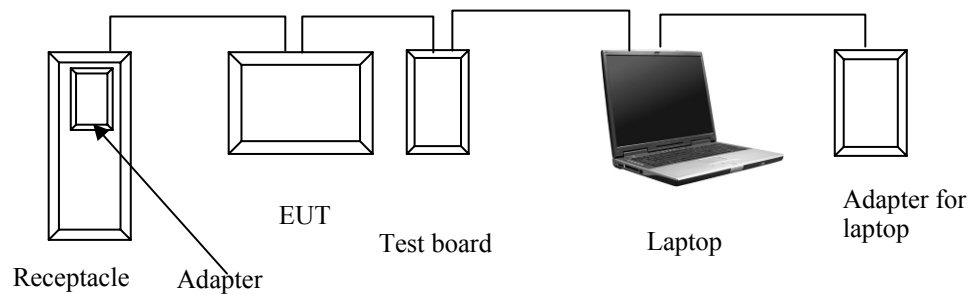
### Local Support Equipment List and Details

| Manufacturer | Description | Model  | Serial Number | FCC ID |
|--------------|-------------|--------|---------------|--------|
| Compaq       | Laptop      | PP2040 | N/A           | N/A    |

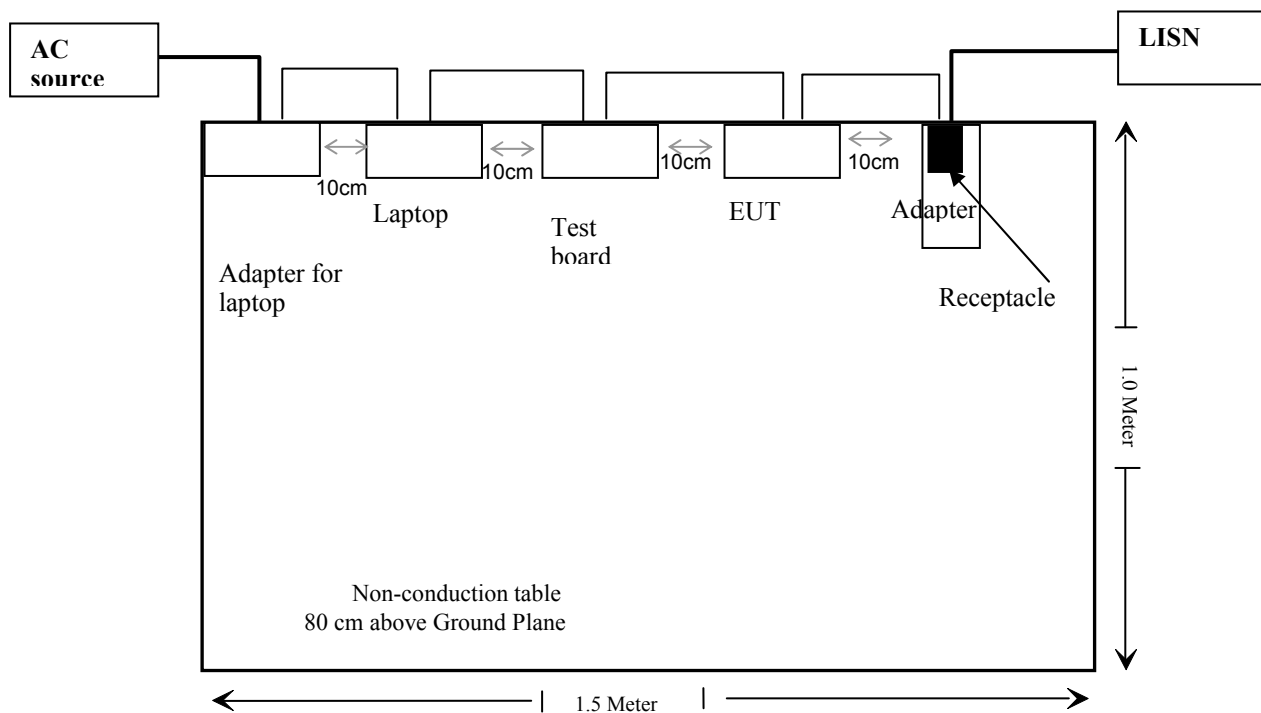
### External I/O Cable

| Cable Description                       | Length (m) | From/Port  | To         |
|---|------------|------------|------------|
| Unshielded Detachable USB Cable         | 0.5        | EUT        | Test board |
| Unshielded Detachable Serial Port Cable | 1.0        | Test board | Laptop     |
| Unshielded Detachable USB Cable         | 0.5        | Test board | Laptop     |

## Configuration of Test Setup



## Block Diagram of Test Setup



## SUMMARY OF TEST RESULTS

| FCC Rules                       | Description of Test                     | Result     |
|---------------------------------|---|------------|
| §15.247(i), §2.1093             | RF Exposure                             | Compliance |
| §15.203                         | Antenna Requirement                     | Compliance |
| §15.207 (a),                    | Conducted Emissions                     | Compliance |
| §15.247(d)                      | Spurious Emissions at Antenna Port      | Compliance |
| §15.205, §15.209,<br>§15.247(d) | Spurious Emissions & Restricted Bands   | Compliance |
| §15.247 (a)(2)                  | 6 dB Bandwidth                          | Compliance |
| §15.247(b)(3)                   | Maximum Peak Output Power               | Compliance |
| §15.247(d)                      | 100kHz Bandwidth of Frequency Band Edge | Compliance |
| §15.247(e)                      | Power Spectral Density                  | 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.

**Measurement Result:**

Max conducted peak output power (P): 10.23 dBm

Antenna Gain: 0 dBi

EIRP = 10.23 dBm

$P_{\text{Max}} = 10.23 \text{ dBm} = 10.54 \text{ mW}$

SAR exempted threshold:  $60/f_{\text{GHz}} = 60/2.412 = 24.88 \text{ mW}$

$P_{\text{Max}} < 60/f_{\text{GHz}}$

SAR evaluation can be exempted due to the maximum output power is less than the threshold.

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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 a Wi-Fi (integral) antenna soldered on the PCB, which complies with the Part 15.203. The maximum antenna gain is 0 dBi. Please see EUT photo for details.

**Result:** Compliance.

## FCC §15.207 (a) - CONDUCTED EMISSIONS

### Applicable Standard

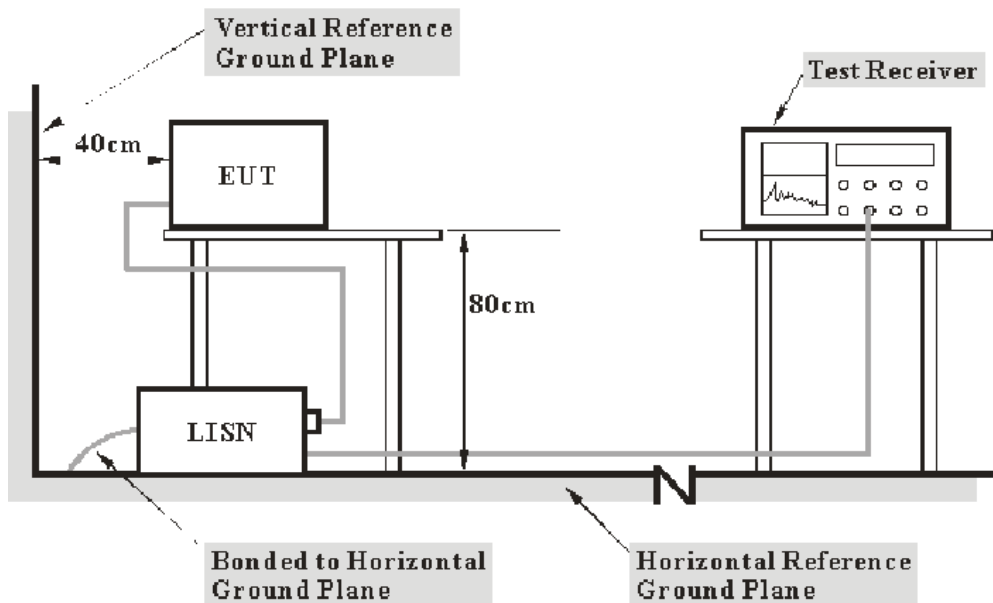
FCC §15.207

### 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 NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is  $\pm 2.4$  dB.

### EUT Setup



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

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

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

## EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

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

## Test Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCS30  | 830245/006    | 2010-03-03       | 2011-03-02           |
| Rohde & Schwarz | L.I.S.N.          | ESH2-Z5 | 892107/021    | 2010-03-09       | 2011-03-08           |

\* **Statement of Traceability:** Bay Area Compliance Laboratory Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

During the conducted emission test, the adapter was connected to the 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:

**1.50 dB at 0.195 MHz in the Neutral conductor mode**

## Test Data

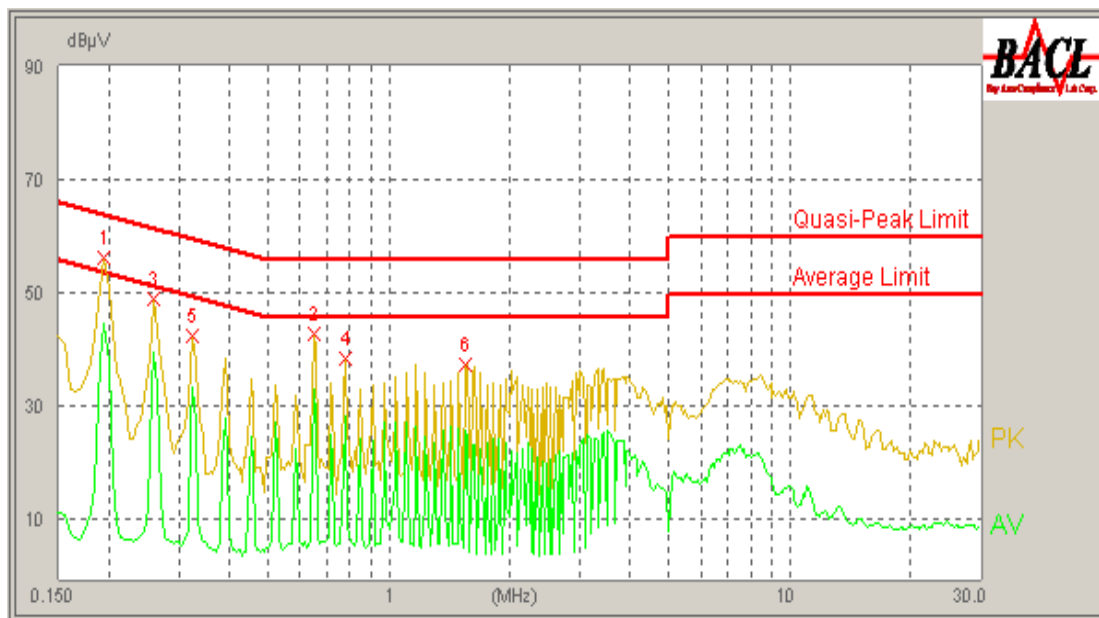
### Environmental Conditions

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

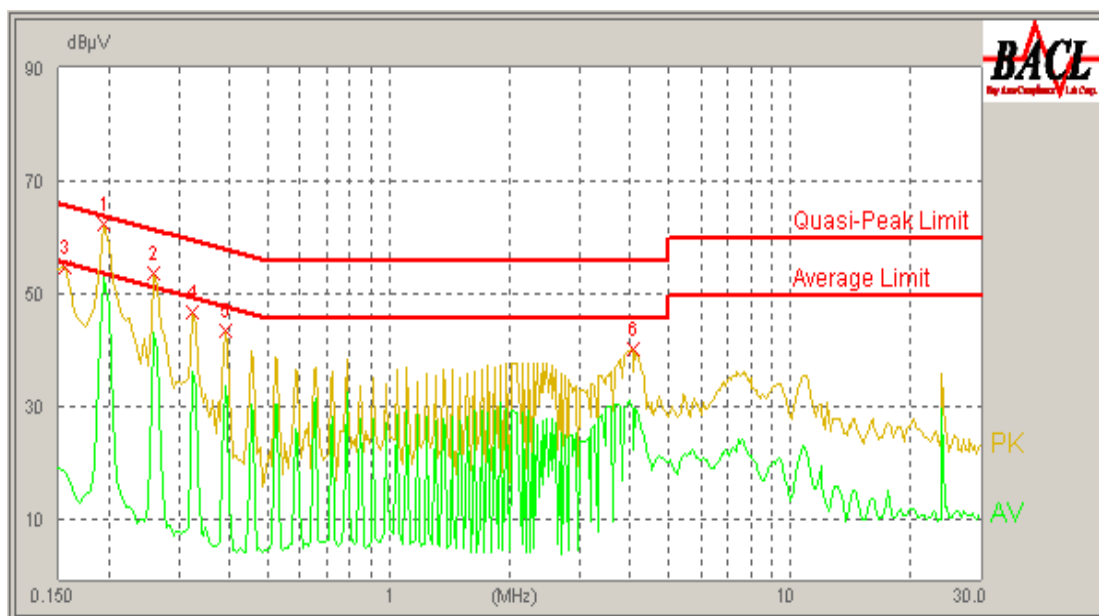
*The testing was performed by Kvass Yang on 2010-10-15.*

Test Mode: Transmitting (WIFI) & Charging

120 V, 60 Hz, Line:



| Conducted Emissions |                        |                     | FCC Part 15.207 |             |                     |
|---------------------|------------------------|---------------------|-----------------|-------------|---------------------|
| Frequency (MHz)     | Correction Factor (dB) | Cord. Result (dBμV) | Limit (dBμV)    | Margin (dB) | Remark (PK/QP/Ave.) |
| 0.195               | 10.10                  | 55.41               | 64.71           | 9.30        | QP                  |
| 0.195               | 10.10                  | 44.65               | 54.71           | 10.06       | Ave                 |
| 0.650               | 10.20                  | 33.30               | 46.00           | 12.7        | Ave                 |
| 0.260               | 10.10                  | 39.75               | 52.86           | 13.11       | Ave                 |
| 0.260               | 10.10                  | 48.87               | 62.86           | 13.99       | QP                  |
| 0.650               | 10.20                  | 39.45               | 56.00           | 16.55       | QP                  |
| 0.325               | 10.00                  | 33.57               | 51.00           | 17.43       | Ave                 |
| 0.780               | 10.20                  | 28.47               | 46.00           | 17.53       | Ave                 |
| 0.325               | 10.00                  | 43.01               | 61.00           | 17.99       | QP                  |
| 1.560               | 10.10                  | 25.75               | 46.00           | 20.25       | Ave                 |
| 0.780               | 10.20                  | 35.60               | 56.00           | 20.4        | QP                  |
| 1.560               | 10.10                  | 34.10               | 56.00           | 21.9        | QP                  |

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

| Conducted Emissions |                        |                     | FCC Part 15.207 |             |                     |
|---------------------|------------------------|---------------------|-----------------|-------------|---------------------|
| Frequency (MHz)     | Correction Factor (dB) | Cord. Result (dBμV) | Limit (dBμV)    | Margin (dB) | Remark (PK/QP/Ave.) |
| 0.195               | 10.10                  | 53.21               | 54.71           | 1.50*       | Ave                 |
| 0.195               | 10.10                  | 57.12               | 64.71           | 7.59        | QP                  |
| 0.260               | 10.10                  | 43.49               | 52.86           | 9.37        | Ave                 |
| 0.260               | 10.10                  | 49.73               | 62.86           | 13.13       | QP                  |
| 0.325               | 10.00                  | 36.21               | 51.00           | 14.79       | Ave                 |
| 0.390               | 10.00                  | 34.02               | 49.14           | 15.12       | Ave                 |
| 4.055               | 10.10                  | 30.08               | 46.00           | 15.92       | Ave                 |
| 0.325               | 10.00                  | 41.02               | 61.00           | 19.98       | QP                  |
| 0.390               | 10.00                  | 36.20               | 59.14           | 22.94       | QP                  |
| 0.155               | 10.10                  | 36.12               | 65.86           | 29.74       | QP                  |
| 4.055               | 10.10                  | 24.10               | 56.00           | 31.9        | QP                  |
| 0.155               | 10.10                  | 19.15               | 55.86           | 36.71       | Ave                 |

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

### Applicable Standard

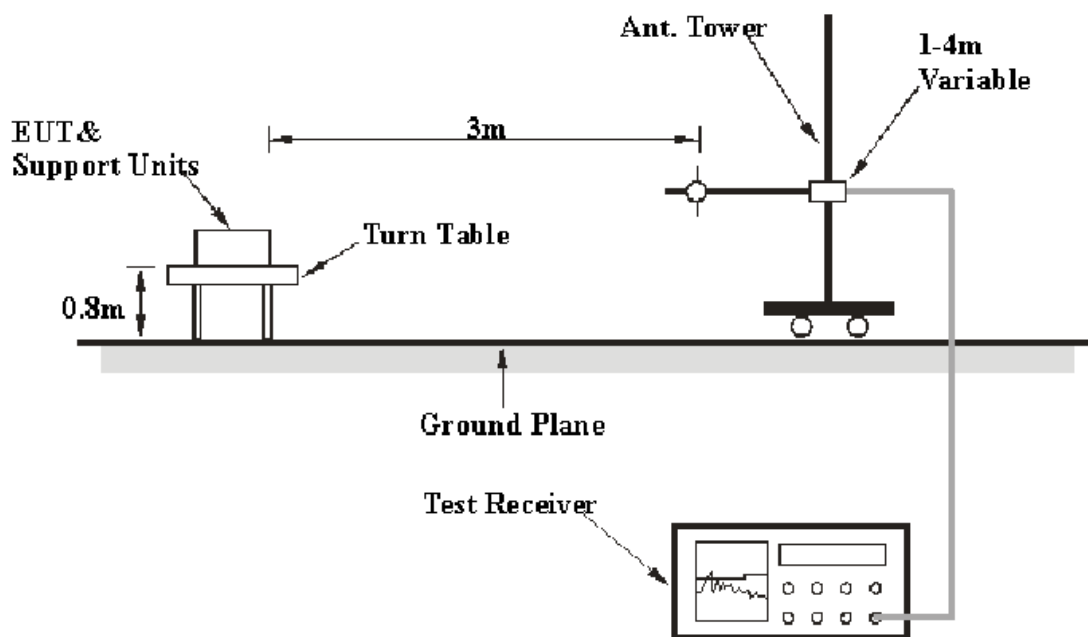
FCC §15.247 (d); §15.209; §15.205;

### 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.

### EUT Setup



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

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

The spacing between the peripherals was 10 cm.

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

## EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

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

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

## Test Equipment List and Details

| Manufacturer    | Description       | Model   | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|---------|---------------|------------------|----------------------|
| HP              | Amplifier         | HP8447D | 2944A09795    | 2010-08-02       | 2011-08-02           |
| Rohde & Schwarz | EMI Test Receiver | ESCI    | 100035        | 2009-11-24       | 2010-11-23           |
| Sunol Sciences  | Broadband Antenna | JB1     | A040904-1     | 2010-03-11       | 2011-03-11           |
| HP              | Amplifier         | 8449B   | 3008A00277    | 2009-09-12       | 2010-09-11           |
| Sunol Sciences  | Horn Antenna      | DRH-118 | A052604       | 2010-05-05       | 2011-05-04           |
| Rohde & Schwarz | Spectrum Analyzer | FSEM30  | 849720/019    | 2010-07-08       | 2011-07-08           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

## Test Procedure

For the radiated emissions test, the adapter was connected to the 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-1GHz , 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:

### Below 1 GHz:

802.11b: **2.1 dB** at **35.625480 MHz** in the **Vertical** polarization  
802.11g: **1.1 dB** at **349.995250 MHz** in the **Horizontal** polarization

### Above 1 GHz:

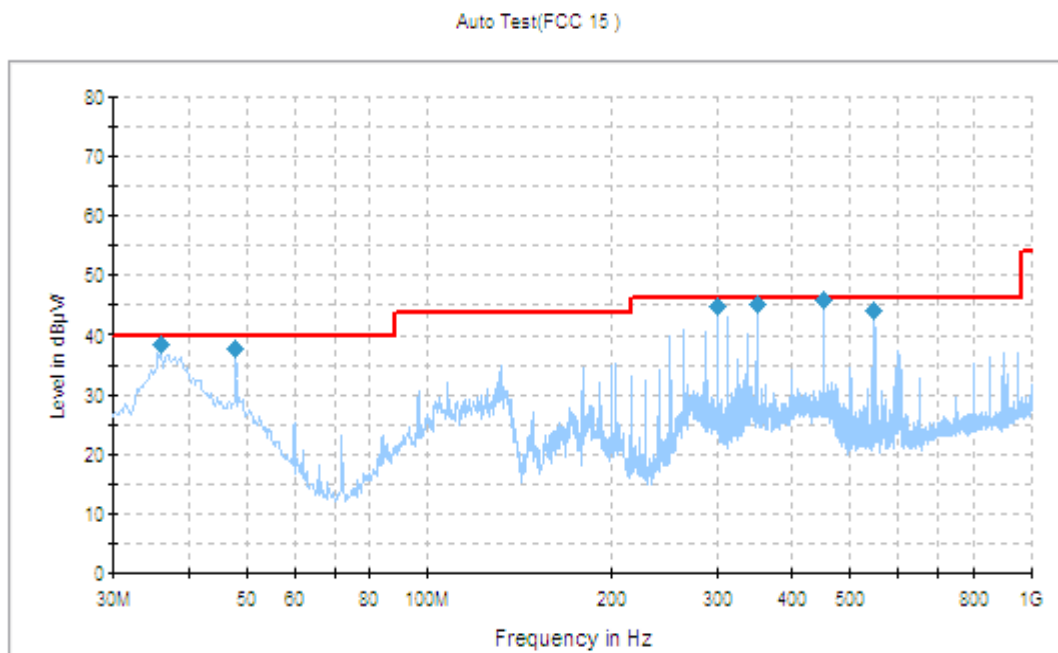
802.11b (Low Channel): **13.08 dB** at **4824 MHz** in the **Horizontal** polarization  
802.11g (Low Channel): **10.66 dB** at **4824 MHz** in the **Horizontal** polarization

## Test Data

### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 24 °C    |
| Relative Humidity: | 56 %     |
| ATM Pressure:      | 100.0kPa |

*The testing was performed by Kvass Yang on 2010-10-15.*

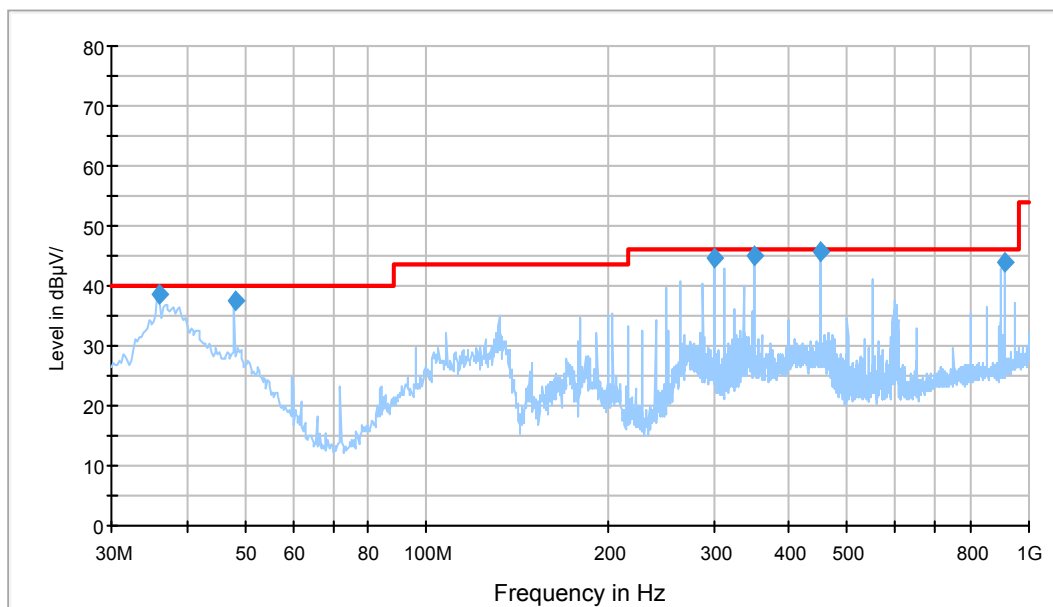
**Below 1 GHz:***Test Mode: Transmitting (802.11b)*

| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Ant. Height (cm) | Ant. Polarity (H/V) | Turntable Position (deg) | Correction Factor (dB) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|------------------|---------------------|--------------------------|------------------------|----------------|-------------|
| 35.625480       | 37.9                         | 101.0            | V                   | 57.0                     | -9.5                   | 40.0           | 2.1*        |
| 300.021500      | 43.9                         | 101.0            | H                   | 94.0                     | -12.4                  | 46.0           | 2.1*        |
| 358.956320      | 43.4                         | 135.0            | H                   | 129.0                    | -11.1                  | 46.0           | 2.6         |
| 448.798540      | 43.2                         | 172.0            | H                   | 273.0                    | -9.1                   | 46.0           | 2.8         |
| 48.254170       | 37.1                         | 97.0             | V                   | 145.0                    | -16.5                  | 40.0           | 2.9         |
| 564.125800      | 42.7                         | 192.0            | V                   | 77.0                     | -0.4                   | 46.0           | 3.3         |

\* Within measurement uncertainty.

Test Mode: Transmitting (802.11g)

Auto Test(FCC 15 )



| Frequency (MHz) | Corrected Amplitude (dBμV/m) | Ant. Height (cm) | Ant. Polarity (H/V) | Turntable Position (deg) | Correction Factor (dB) | Limit (dBμV/m) | Margin (dB) |
|-----------------|------------------------------|------------------|---------------------|--------------------------|------------------------|----------------|-------------|
| 349.995250      | 44.9                         | 135.0            | H                   | 129.0                    | -11.1                  | 46.0           | 1.1*        |
| 299.987750      | 44.8                         | 101.0            | H                   | 94.0                     | -12.4                  | 46.0           | 1.2*        |
| 449.984000      | 44.7                         | 172.0            | H                   | 273.0                    | -9.1                   | 46.0           | 1.3*        |
| 36.046500       | 38.5                         | 101.0            | V                   | 57.0                     | -9.5                   | 40.0           | 1.5*        |
| 911.689000      | 43.8                         | 192.0            | V                   | 77.0                     | -0.4                   | 46.0           | 2.2         |
| 48.173250       | 37.5                         | 97.0             | V                   | 145.0                    | -16.5                  | 40.0           | 2.5         |

\* Within measurement uncertainty.

**Above 1 GHz:**

802.11b Mode:

| Indicated                 |                           | Detector<br>(PK/AV) | Table<br>Angle<br>Degree | Test Antenna  |                | Correction Factor        |                       |                      | FCC Part 15.247/15.209    |                   |                |          |
|---------------------------|---------------------------|---------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|----------------------|---------------------------|-------------------|----------------|----------|
| 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) | Comment  |
| Low Channel (2412 MHz)    |                           |                     |                          |               |                |                          |                       |                      |                           |                   |                |          |
| 4824                      | 32.12                     | AV                  | 0                        | 1.1           | H              | 31.2                     | 4.3                   | 26.7                 | 40.92                     | 54                | 13.08          | harmonic |
| 4824                      | 31.75                     | AV                  | 15                       | 1.5           | V              | 31.2                     | 4.3                   | 26.7                 | 40.55                     | 54                | 13.45          | harmonic |
| 4824                      | 42.81                     | PK                  | 0                        | 1.1           | H              | 31.2                     | 4.3                   | 26.7                 | 51.61                     | 74                | 22.39          | harmonic |
| 4824                      | 41.98                     | PK                  | 15                       | 1.5           | V              | 31.2                     | 4.3                   | 26.7                 | 50.78                     | 74                | 23.22          | harmonic |
| Middle Channel (2437 MHz) |                           |                     |                          |               |                |                          |                       |                      |                           |                   |                |          |
| 4874                      | 31.72                     | AV                  | 310                      | 1.6           | V              | 31.2                     | 4.3                   | 26.7                 | 40.52                     | 54                | 13.48          | harmonic |
| 4874                      | 31.15                     | AV                  | 10                       | 1.2           | H              | 31.2                     | 4.3                   | 26.7                 | 39.95                     | 54                | 14.05          | harmonic |
| 4874                      | 42.13                     | PK                  | 310                      | 1.6           | V              | 31.2                     | 4.3                   | 26.7                 | 50.93                     | 74                | 23.07          | harmonic |
| 4874                      | 41.53                     | PK                  | 10                       | 1.2           | H              | 31.2                     | 4.3                   | 26.7                 | 50.33                     | 74                | 23.67          | harmonic |
| High Channel (2462 MHz)   |                           |                     |                          |               |                |                          |                       |                      |                           |                   |                |          |
| 4924                      | 30.41                     | AV                  | 25                       | 1.4           | V              | 31.9                     | 4.4                   | 26.6                 | 40.11                     | 54                | 13.89          | harmonic |
| 4924                      | 30.24                     | AV                  | 125                      | 1.5           | H              | 31.9                     | 4.4                   | 26.6                 | 39.94                     | 54                | 14.06          | harmonic |
| 4924                      | 40.42                     | PK                  | 25                       | 1.4           | V              | 31.9                     | 4.4                   | 26.6                 | 50.12                     | 74                | 23.88          | harmonic |
| 4924                      | 40.22                     | PK                  | 125                      | 1.5           | H              | 31.9                     | 4.4                   | 26.6                 | 49.92                     | 74                | 24.08          | harmonic |

**Suprious emission in restricted band:**

| Indicated          |                           | Detector<br>(PK/AV) | 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) | Comment  |
| 2366.64            | 36.11                     | AV                  | 0                        | 1.3           | H              | 27.5                     | 3.0                   | 26.8                 | 39.81                         | 54                | 14.19          | spurious |
| 2366.64            | 34.77                     | AV                  | 125                      | 2.4           | V              | 27.5                     | 3.0                   | 26.8                 | 38.47                         | 54                | 15.53          | spurious |
| 2483.95            | 33.80                     | AV                  | 305                      | 1.7           | H              | 27.5                     | 3.2                   | 26.8                 | 37.7                          | 54                | 16.3           | spurious |
| 2483.95            | 33.76                     | AV                  | 117                      | 1.7           | V              | 27.5                     | 3.2                   | 26.8                 | 37.66                         | 54                | 16.34          | spurious |
| 2366.64            | 44.45                     | PK                  | 0                        | 1.3           | H              | 27.5                     | 3.0                   | 26.8                 | 48.15                         | 74                | 25.85          | spurious |
| 2366.64            | 43.45                     | PK                  | 125                      | 2.4           | V              | 27.5                     | 3.0                   | 26.8                 | 47.15                         | 74                | 26.85          | spurious |
| 2483.95            | 42.44                     | PK                  | 305                      | 1.7           | H              | 27.5                     | 3.2                   | 26.8                 | 46.34                         | 74                | 27.66          | spurious |
| 2483.95            | 42.15                     | PK                  | 117                      | 1.7           | V              | 27.5                     | 3.2                   | 26.8                 | 46.05                         | 74                | 27.95          | spurious |

802.11g Mode:

| Indicated                 |                           | Detector<br>(PK/AV) | Table<br>Angle<br>Degree | Test Antenna  |                | Correction Factor        |                       |                      | FCC Part 15.247/15.209    |                   |                |          |
|---------------------------|---------------------------|---------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|----------------------|---------------------------|-------------------|----------------|----------|
| 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) | Comment  |
| Low Channel (2412 MHz)    |                           |                     |                          |               |                |                          |                       |                      |                           |                   |                |          |
| 4824                      | 34.54                     | AV                  | 14                       | 1.3           | H              | 31.2                     | 4.3                   | 26.7                 | 43.34                     | 54                | 10.66          | harmonic |
| 4824                      | 33.11                     | AV                  | 142                      | 1.5           | V              | 31.2                     | 4.3                   | 26.7                 | 41.91                     | 54                | 12.09          | harmonic |
| 4824                      | 43.76                     | PK                  | 14                       | 1.3           | H              | 31.2                     | 4.3                   | 26.7                 | 52.56                     | 74                | 21.44          | harmonic |
| 4824                      | 42.67                     | PK                  | 142                      | 1.5           | V              | 31.2                     | 4.3                   | 26.7                 | 51.47                     | 74                | 22.53          | harmonic |
| Middle Channel (2437 MHz) |                           |                     |                          |               |                |                          |                       |                      |                           |                   |                |          |
| 4874                      | 34.02                     | AV                  | 105                      | 1.5           | H              | 31.2                     | 4.3                   | 26.7                 | 42.82                     | 54                | 11.18          | harmonic |
| 4874                      | 33.01                     | AV                  | 321                      | 1.4           | V              | 31.2                     | 4.3                   | 26.7                 | 41.81                     | 54                | 12.19          | harmonic |
| 4874                      | 43.15                     | PK                  | 105                      | 1.5           | H              | 31.2                     | 4.3                   | 26.7                 | 51.95                     | 74                | 22.05          | harmonic |
| 4874                      | 42.64                     | PK                  | 321                      | 1.4           | V              | 31.2                     | 4.3                   | 26.7                 | 51.44                     | 74                | 22.56          | harmonic |
| High Channel (2462 MHz)   |                           |                     |                          |               |                |                          |                       |                      |                           |                   |                |          |
| 4924                      | 32.67                     | AV                  | 0                        | 1.5           | H              | 31.9                     | 4.4                   | 26.6                 | 42.37                     | 54                | 11.63          | harmonic |
| 4924                      | 32.13                     | AV                  | 0                        | 1.5           | V              | 31.9                     | 4.4                   | 26.6                 | 41.83                     | 54                | 12.17          | harmonic |
| 4924                      | 44.86                     | PK                  | 0                        | 1.5           | H              | 31.9                     | 4.4                   | 26.6                 | 54.56                     | 74                | 19.44          | harmonic |
| 4924                      | 42.10                     | PK                  | 0                        | 1.5           | V              | 31.9                     | 4.4                   | 26.6                 | 51.8                      | 74                | 22.2           | harmonic |

Suprious emission in restricted band:

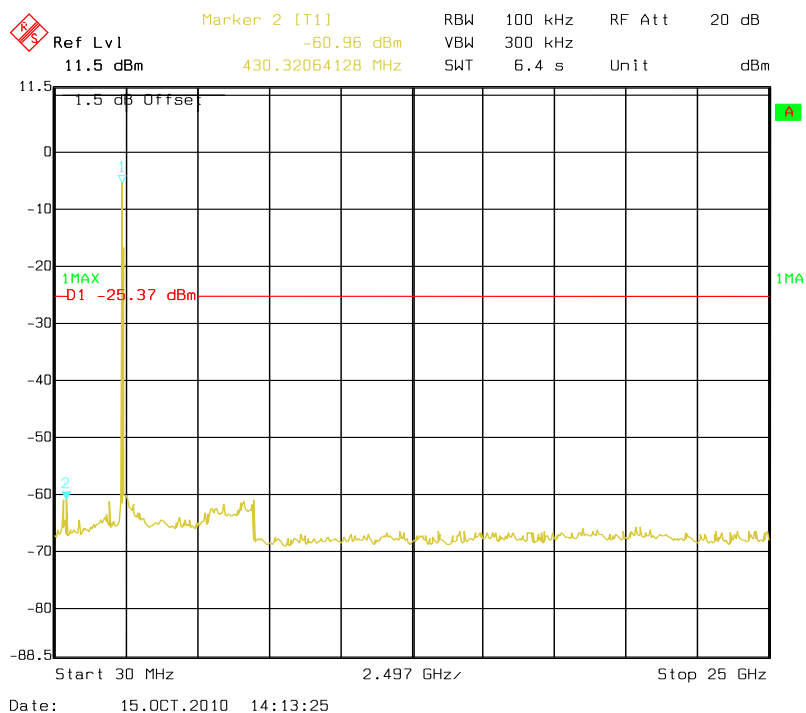
| Indicated          |                           | Detector<br>(PK/AV) | Table<br>Angle<br>Degree | Test Antenna  |                | Correction Factor        |                       |                      | FCC Part 15.247/15.209/15.205 |                   |                |          |
|--------------------|---------------------------|---------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|----------------------|-------------------------------|-------------------|----------------|----------|
| 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) | Comment  |
| 2485.20            | 32.48                     | AV                  | 32                       | 1.5           | H              | 27.5                     | 3.2                   | 26.8                 | 36.38                         | 54                | 17.62          | spurious |
| 2485.20            | 31.24                     | AV                  | 0                        | 1.7           | V              | 27.5                     | 3.2                   | 26.8                 | 35.14                         | 54                | 18.86          | spurious |
| 2389.20            | 31.17                     | AV                  | 125                      | 2             | V              | 27.5                     | 3                     | 26.8                 | 34.87                         | 54                | 19.13          | spurious |
| 2389.20            | 30.11                     | AV                  | 25                       | 1.8           | H              | 27.5                     | 3                     | 26.8                 | 33.81                         | 54                | 20.19          | spurious |
| 2389.20            | 44.12                     | PK                  | 125                      | 2             | V              | 27.5                     | 3                     | 26.8                 | 47.82                         | 74                | 26.18          | spurious |
| 2389.20            | 43.74                     | PK                  | 25                       | 1.8           | H              | 27.5                     | 3                     | 26.8                 | 47.44                         | 74                | 26.56          | spurious |
| 2485.20            | 42.56                     | PK                  | 32                       | 1.5           | H              | 27.5                     | 3.2                   | 26.8                 | 46.46                         | 74                | 27.54          | spurious |
| 2485.20            | 42.44                     | PK                  | 0                        | 1.7           | V              | 27.5                     | 3.2                   | 26.8                 | 46.34                         | 74                | 27.66          | spurious |

**Antenna Port Conducted Spurious Emissions**

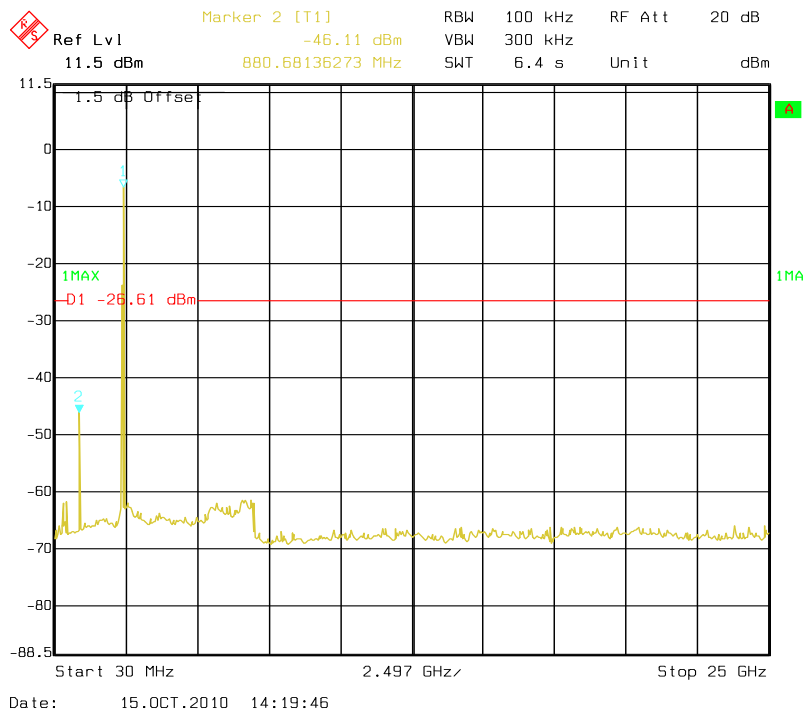
| Channel Frequency<br>(MHz) | Limit<br>(dBc) | Ref.<br>Plot | Result |
|----------------------------|----------------|--------------|--------|
| 802.11b mode               |                |              |        |
| 2412                       | 20             | PLOT 1       | PASS   |
| 2437                       | 20             | PLOT 2       | PASS   |
| 2462                       | 20             | PLOT 3       | PASS   |
| 802.11g mode               |                |              |        |
| 2412                       | 20             | PLOT 4       | PASS   |
| 2437                       | 20             | PLOT 5       | PASS   |
| 2462                       | 20             | PLOT 6       | PASS   |

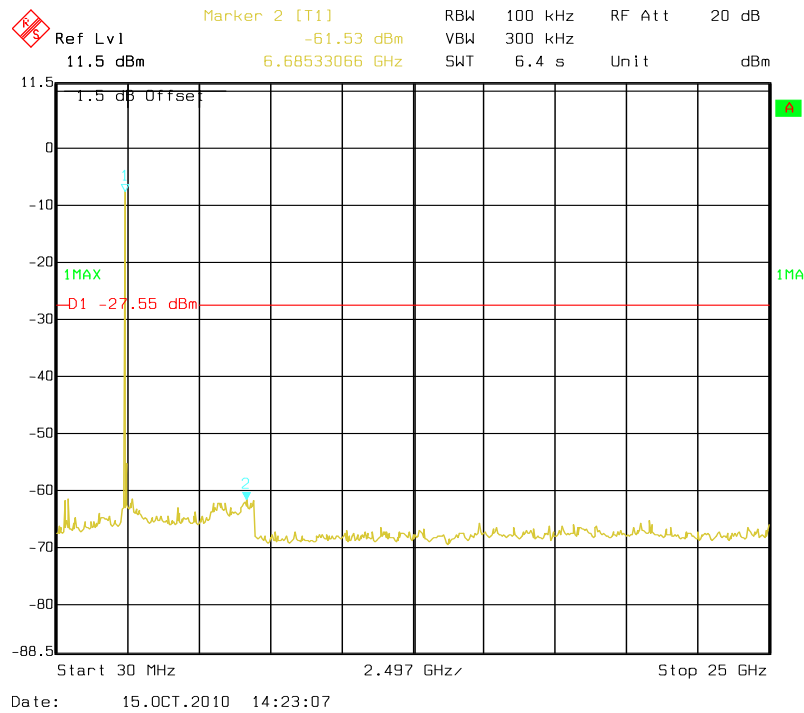
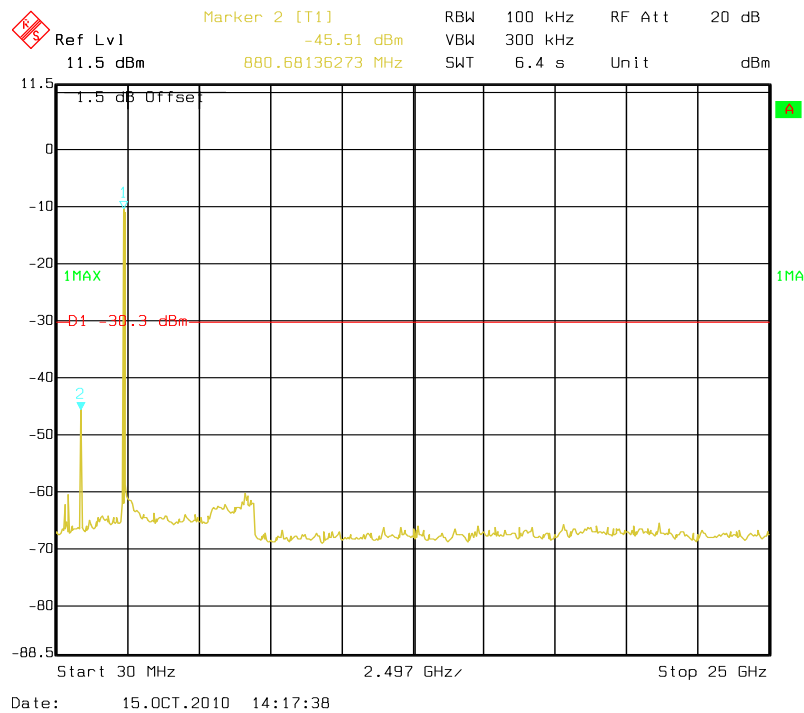
Please refer to the following plots. The limit was 20 dBc to the fundamental in 100 kHz RBW.

## PLOT 1- 802.11b Low Channel

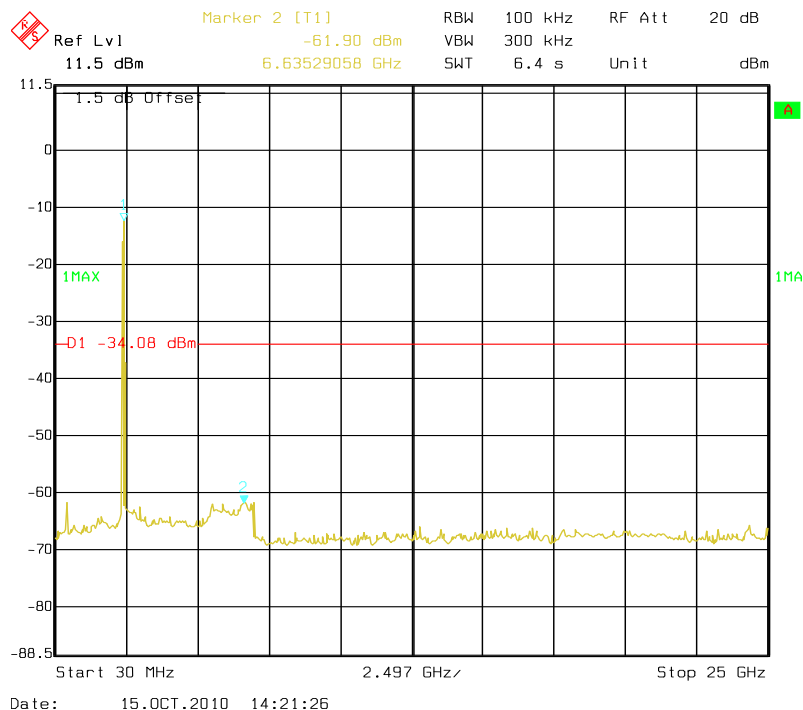
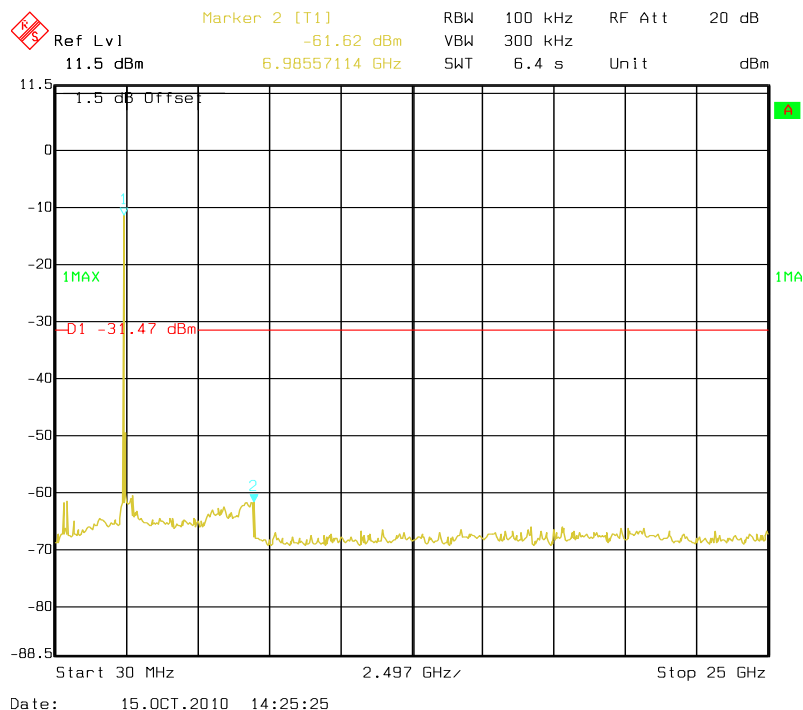


## PLOT 2- 802.11b Middle Channel



**PLOT 3- 802.11b High Channel****PLOT 4- 802.11g Low Channel**



**PLOT 5- 802.11g Middle Channel****PLOT 6- 802.11g High Channel**

## FCC §15.247(a) (2) – 6 dB BANDWIDTH TESTING

### Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

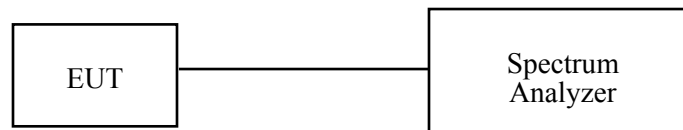
### Test Equipment List and Details

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 100035        | 2009-11-24       | 2010-11-23           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 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:      | 100.0kPa |

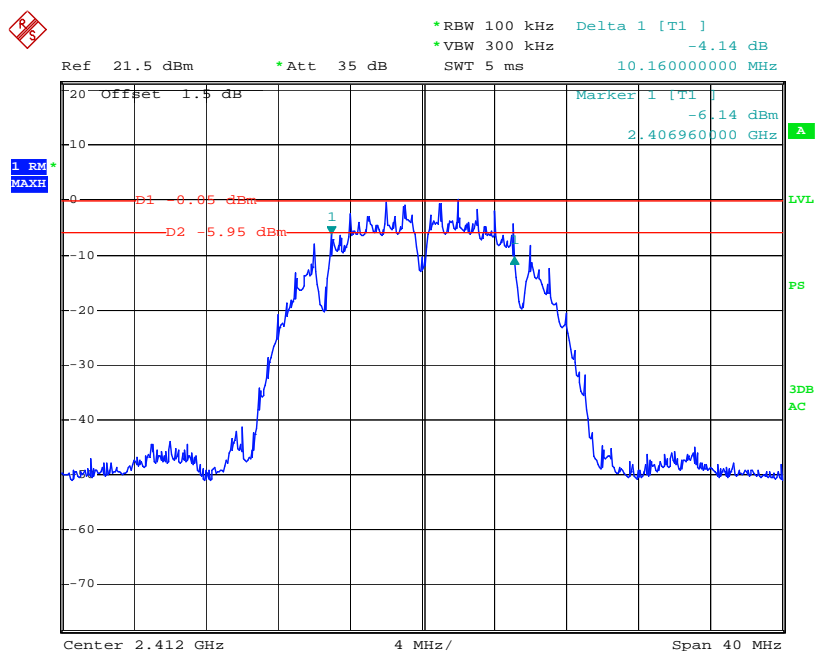
*The testing was performed by Kvass Yang on 2010-10-15.*

**Test Result:** Pass.

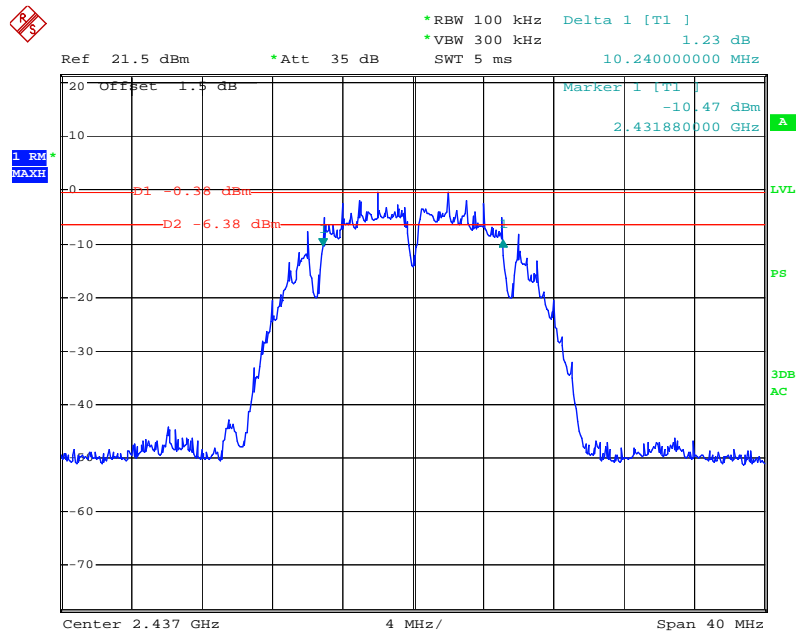
Please refer to the following tables and plots.

| Channel             | Channel Frequency (MHz) | Measured 6 dB Bandwidth (MHz) | FCC Part 15.247 Limit (kHz) |
|---------------------|-------------------------|-------------------------------|-----------------------------|
| <b>802.11b mode</b> |                         |                               |                             |
| Low                 | 2412                    | 10.16                         | >500                        |
| Middle              | 2437                    | 10.24                         | >500                        |
| High                | 2462                    | 10.24                         | >500                        |
| <b>802.11g mode</b> |                         |                               |                             |
| Low                 | 2412                    | 16.48                         | >500                        |
| Middle              | 2437                    | 16.48                         | >500                        |
| High                | 2462                    | 16.64                         | >500                        |

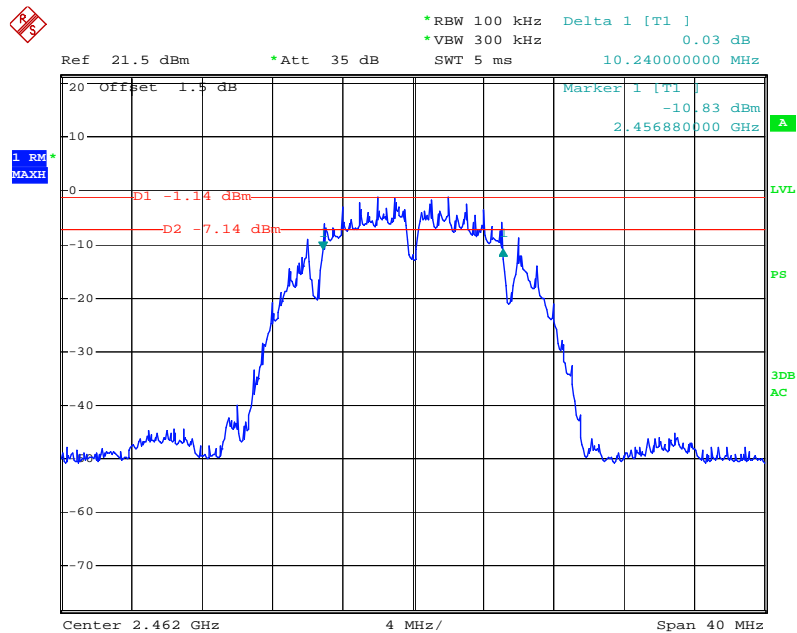
### 802.11b Low Channel



Date: 15.OCT.2010 12:00:43

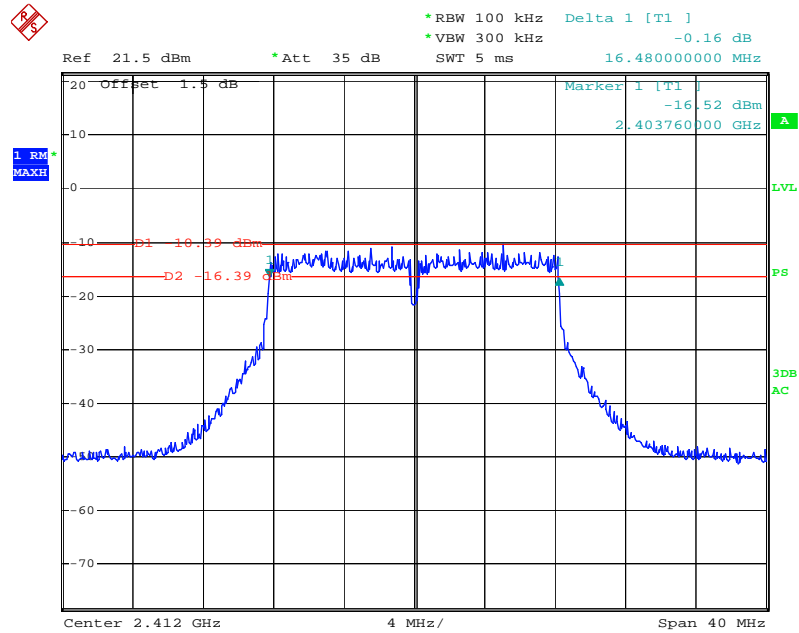
**802.11b Middle Channel**

Date: 15.OCT.2010 11:57:36

**802.11b High Channel**

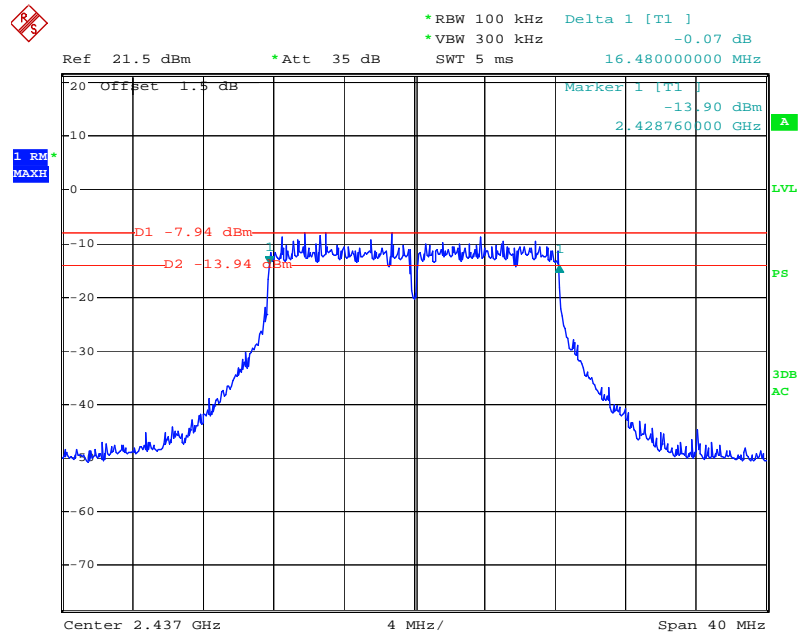
Date: 15.OCT.2010 11:56:05

## 802.11g Low Channel



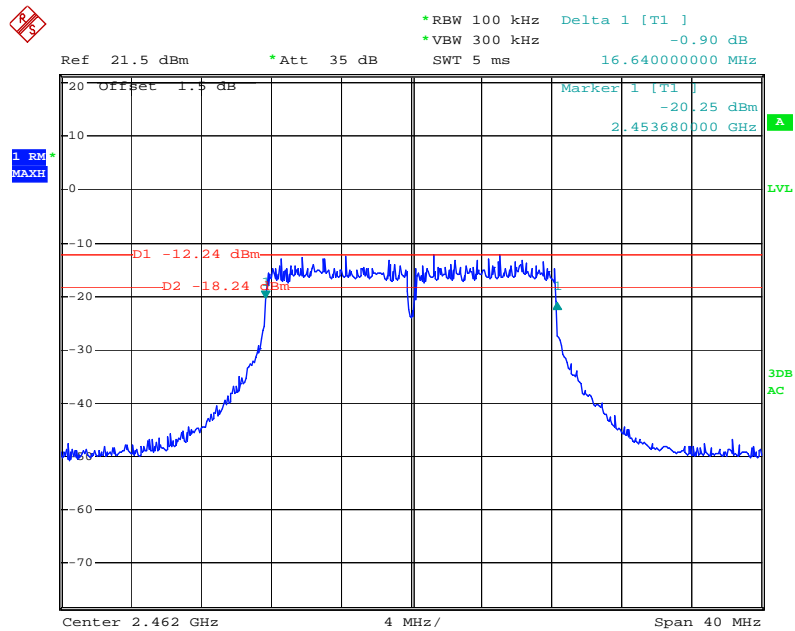
Date: 15.OCT.2010 12:37:26

## 802.11g Middle Channel



Date: 15.OCT.2010 11:59:21

## 802.11g High Channel



Date: 15.OCT.2010 15:22:43

## FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

### Applicable Standard

According to §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

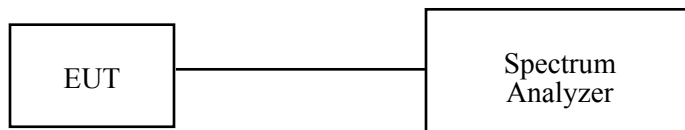
### Test Equipment List and Details

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 100035        | 2009-11-24       | 2010-11-23           |

\* **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

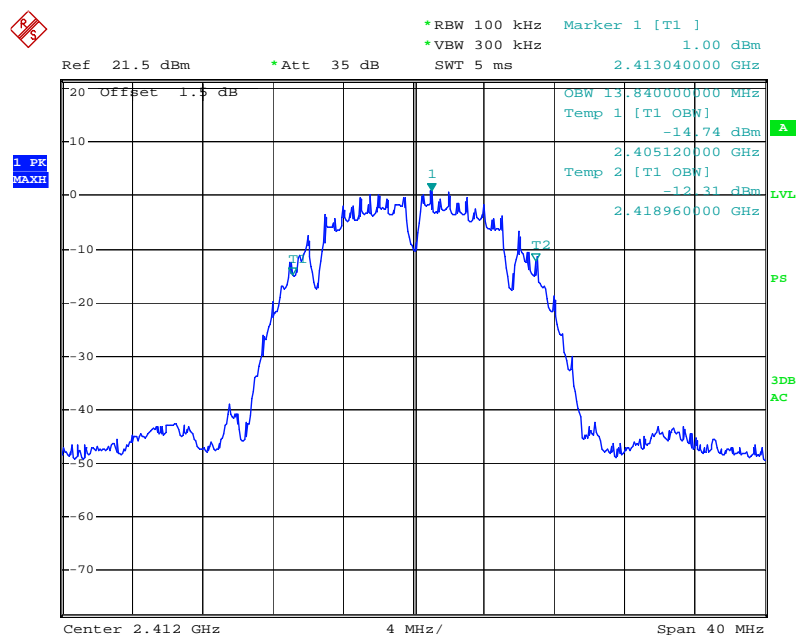
#### Environmental Conditions

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

*The testing was performed by Kvass Yang on 2010-10-15.*

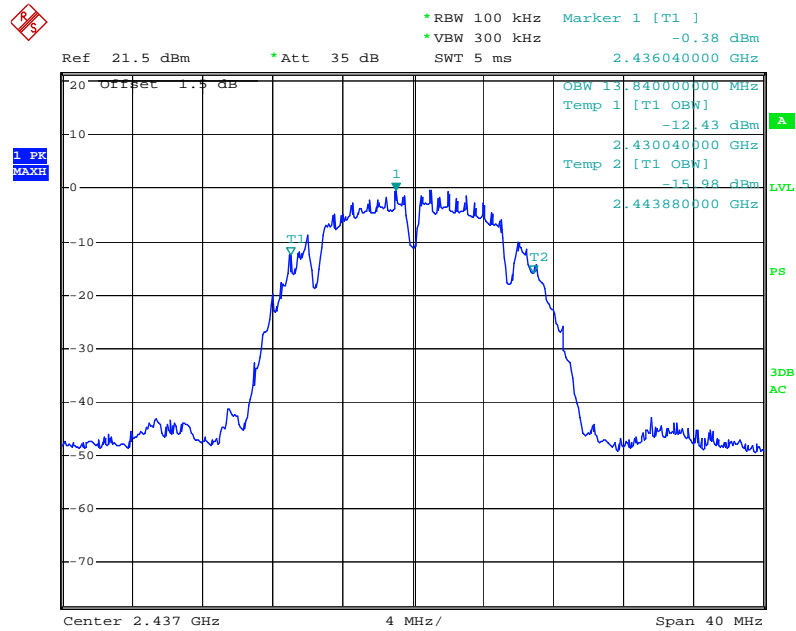
*Test Mode: Transmitting*

| Channel             | Channel Frequency (MHz) | Data Rate (Mbps) | Output Power (dBm) | Limit (dBm) |
|---------------------|-------------------------|------------------|--------------------|-------------|
| <b>802.11b mode</b> |                         |                  |                    |             |
| Low                 | 2412                    | 1                | 10.23              | 30          |
| Middle              | 2437                    | 1                | 9.96               | 30          |
| High                | 2462                    | 1                | 9.82               | 30          |
| <b>802.11g mode</b> |                         |                  |                    |             |
| Low                 | 2412                    | 6                | 6.71               | 30          |
| Middle              | 2437                    | 6                | 7.16               | 30          |
| High                | 2462                    | 6                | 6.45               | 30          |

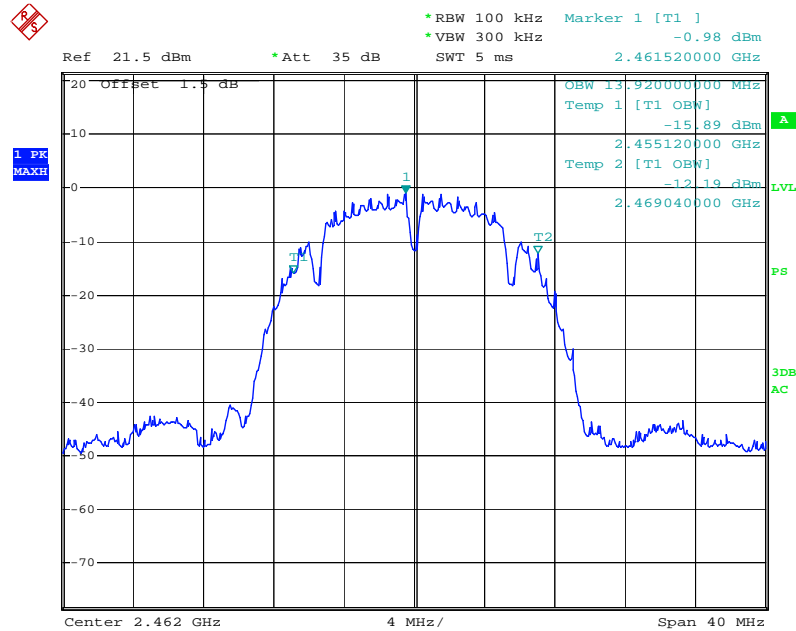
**802.11b Mode:****99% Occupied Bandwidth, Low Channel**

Date: 15.OCT.2010 11:34:18

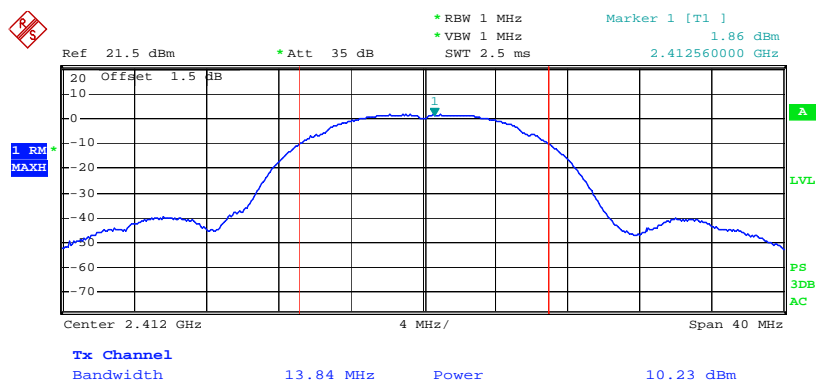


**99% Occupied Bandwidth, Middle Channel**

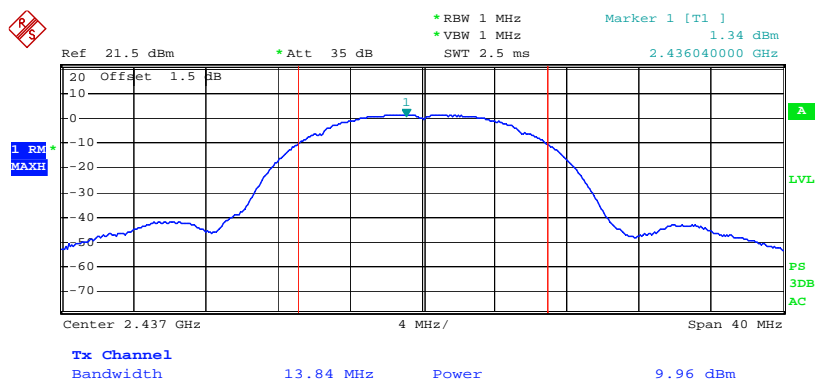
Date: 15.OCT.2010 11:37:21

**99% Occupied Bandwidth, High Channel**

Date: 15.OCT.2010 11:44:20

**802.11b RF Output Power, Low Channel**

Date: 15.OCT.2010 11:35:23

**802.11b RF Output Power, Middle Channel**

Date: 15.OCT.2010 11:38:22

Ref 21.5 dBm \*Att 35 dB \*RBW 1 MHz \*VBW 1 MHz SWT 2.5 ms Marker 1 [T1] 1.20 dBm 2.461040000 GHz

Offset 1.5 dB

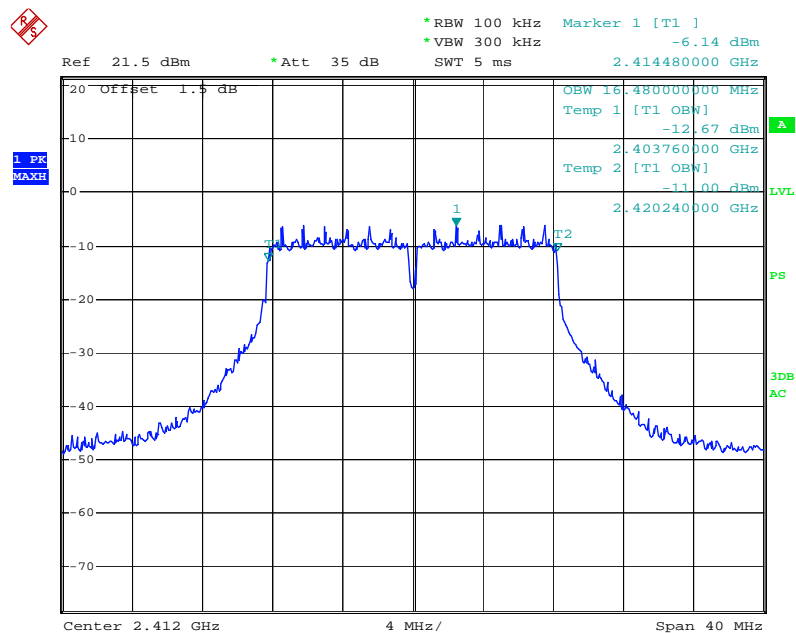
1. RM MAXH

Center 2.462 GHz 4 MHz/ Span 40 MHz

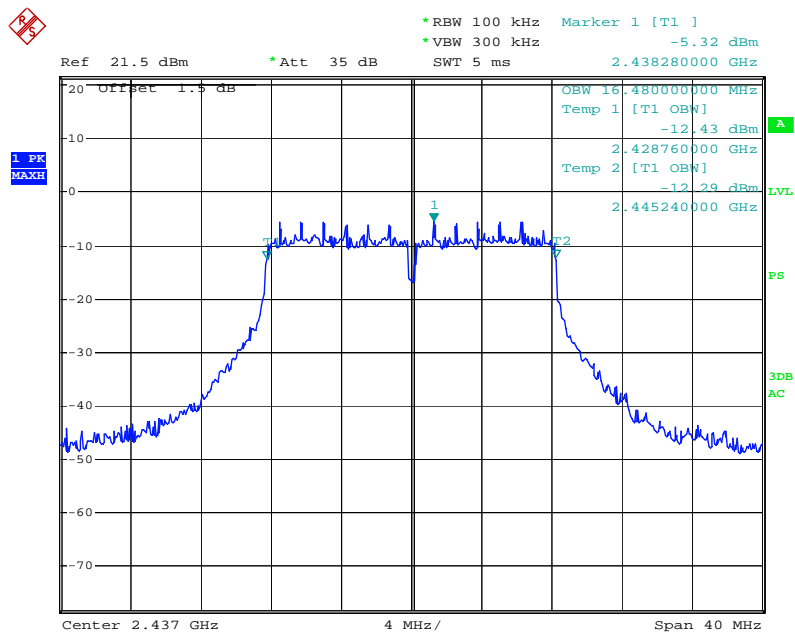
Tx Channel Bandwidth 13.92 MHz Power 9.82 dBm

Date: 15.OCT.2010 11:45:03

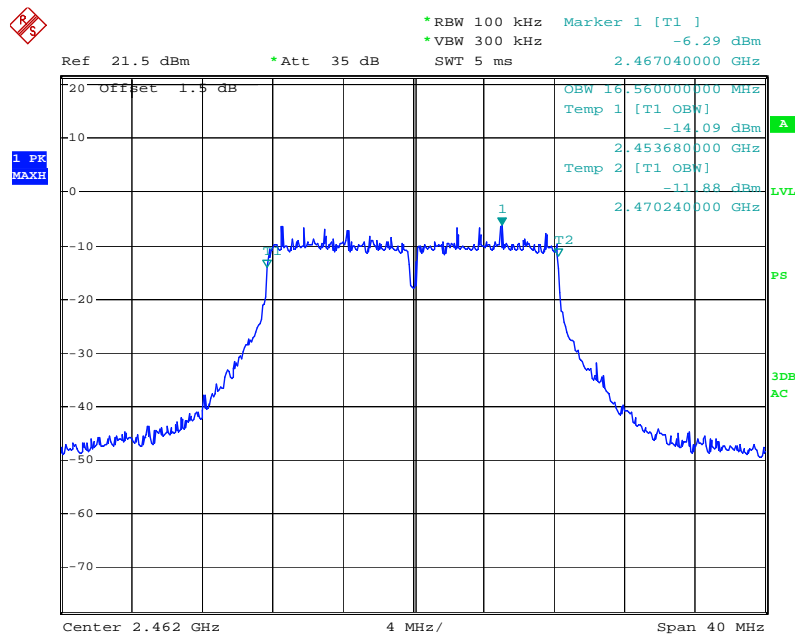
## 99% Occupied Bandwidth, Low Channel



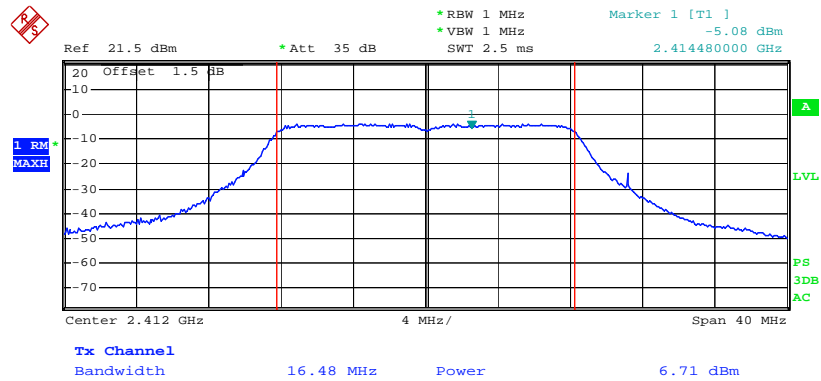
Date: 15.OCT.2010 11:46:29

**99% Occupied Bandwidth, Middle Channel**

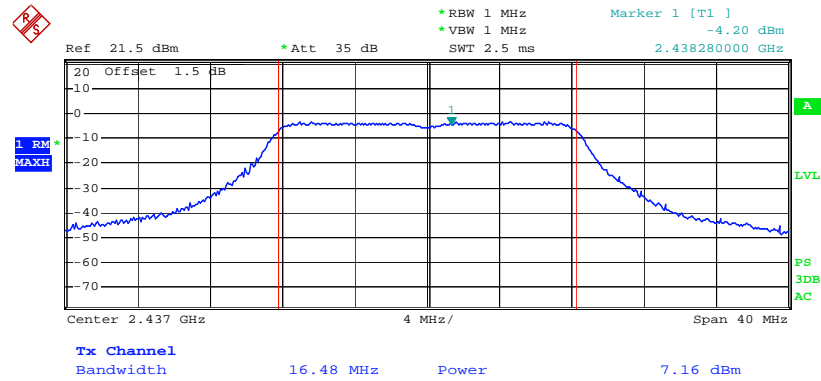
Date: 15.OCT.2010 11:48:17

**99% Occupied Bandwidth, High Channel**

Date: 15.OCT.2010 11:49:59

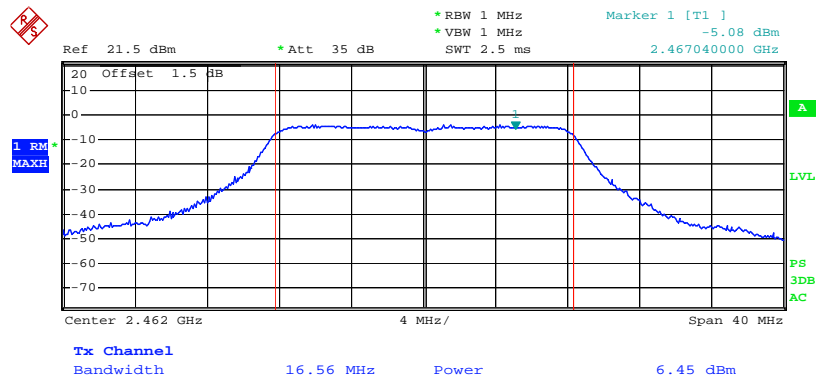
**802.11g RF Output Power, Low Channel**

Date: 15.OCT.2010 11:47:11

**802.11g RF Output Power, Middle Channel**

Date: 15.OCT.2010 11:48:52

## 802.11g RF Output Power, High Channel



Date: 15.OCT.2010 11:50:37

**FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE****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        | 2009-11-24       | 2010-11-23           |

\* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

**Test Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 1 MHz and VBW of spectrum analyzer to 1 MHz 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 Data****Environmental Conditions**

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

*The testing was performed by Kvass Yang on 2010-08-29.*

**Test Result:** *Compliance.*

| Frequency<br>(MHz) | Delta Peak to band<br>emission<br>(dBc) | Limit<br>(dBc) |
|--------------------|---|----------------|
| 802.11b mode       |   |                |
| 2366.64            | 43.19                                   | 20             |
| 2483.90            | 44.52                                   | 20             |
| 802.11g mode       |   |                |
| 2389.20            | 36.55                                   | 20             |
| 2485.20            | 38.17                                   | 20             |

Please refer to following plots.



\*RBW 100 kHz  
 \*VBW 300 kHz  
 \*Att 35 dB  
 SWT 15 ms

Ref 21.5 dBm  
 Marker 2 [T1]  
 -45.74 dBm  
 2.366640000 GHz

Offset 1.5 dB  
 Marker 1 [T1]  
 -2.55 dBm  
 2.411040000 GHz

1 PK MAXH

F1

Start 2.31 GHz  
 12 MHz/  
 Stop 2.43 GHz

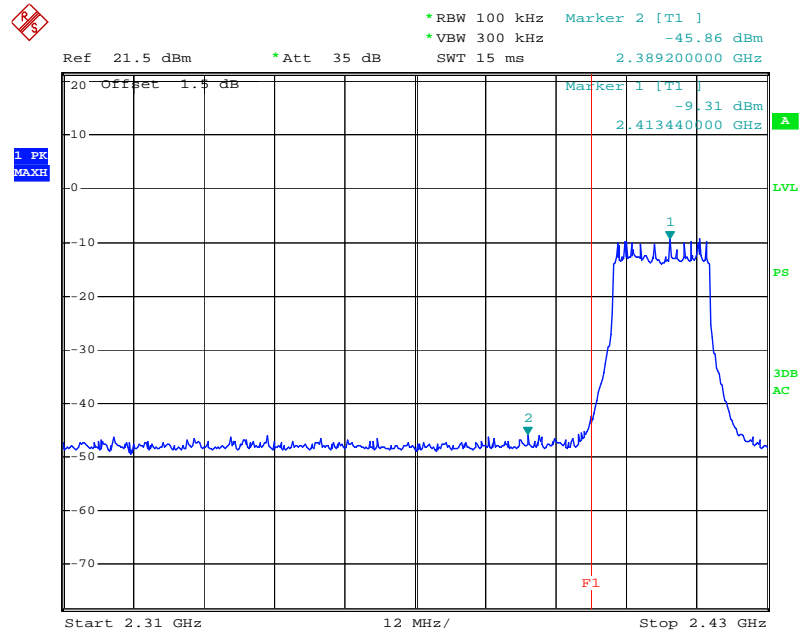
Date: 15.OCT.2010 12:40:22

Ref 21.5 dBm \*Att 35 dB \*RBW 100 kHz \*VBW 300 kHz SWT 5 ms

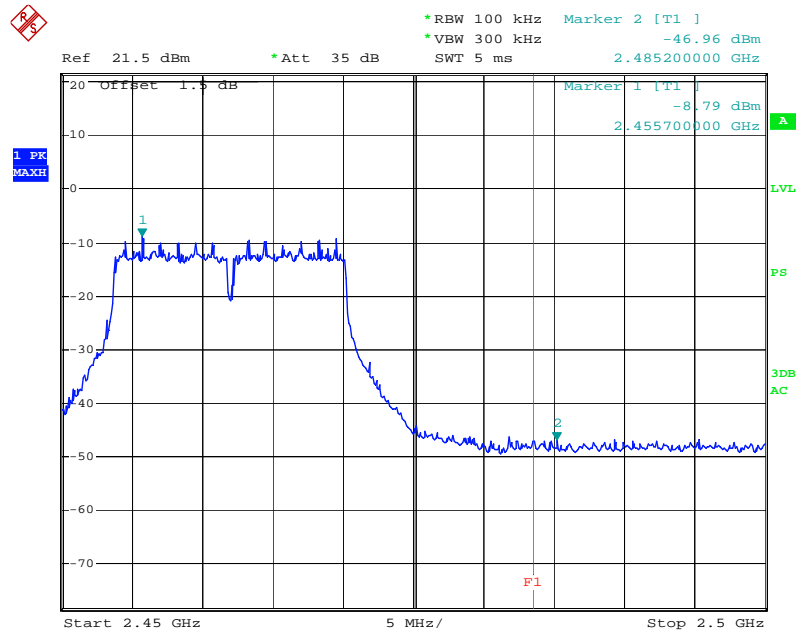
Marker 2 [T1 ] -2.34 dBm 2.461000000 GHz

Start 2.45 GHz 5 MHz/ Stop 2.5 GHz

Date: 15.OCT.2010 12:42:14

**802.11g: Band Edge, Left Side**

Date: 15.OCT.2010 12:39:26

**802.11g: Band Edge, Right Side**

Date: 15.OCT.2010 12:43:30

## FCC §15.247(e) - POWER SPECTRAL DENSITY

### Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

### Test Equipment List and Details

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 100035        | 2009-11-24       | 2010-11-23           |

\* **Statement of Traceability:** Bay Area Compliance Lab 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 was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 1.5MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value. (DTS)
4. Repeat above procedures until all frequencies measured were complete.

### Test Data

#### Environmental Conditions

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

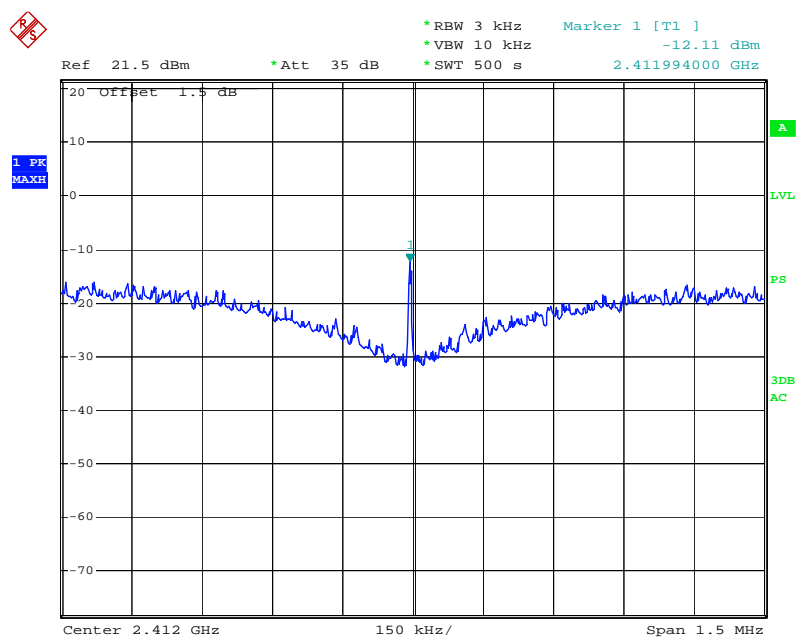
*The testing was performed by Kvass Yang on 2010-10-15.*

*Test Mode: Transmitting*

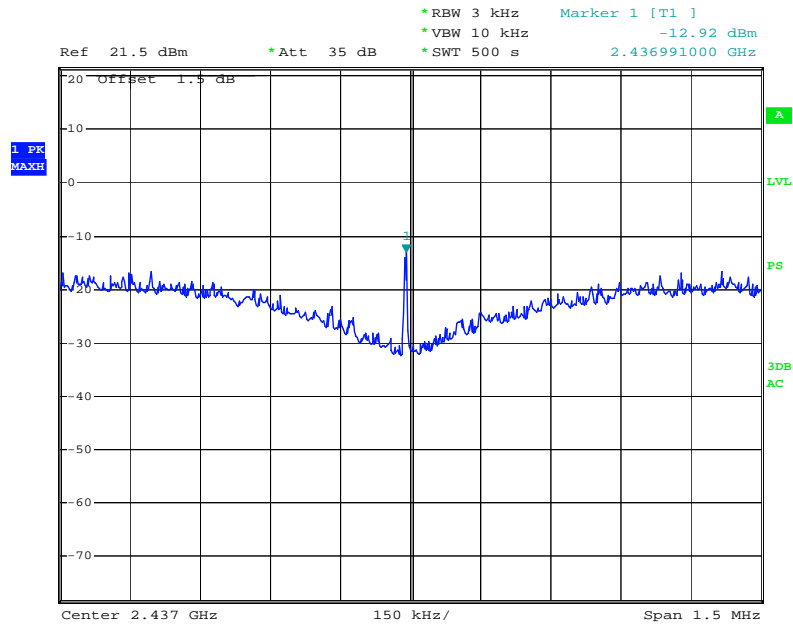
**Test Result:** Pass

| Channel      | Frequency (MHz) | Data Rate (Mbps) | PSD (dBm) | Limit (dBm) | Result |
|--------------|-----------------|------------------|-----------|-------------|--------|
| 802.11b mode |                 |                  |           |             |        |
| Low          | 2412            | 1                | -12.11    | 8           | Pass   |
| Middle       | 2437            | 1                | -12.92    | 8           | Pass   |
| High         | 2462            | 1                | -13.77    | 8           | Pass   |
| 802.11g mode |                 |                  |           |             |        |
| Low          | 2412            | 6                | -23.08    | 8           | Pass   |
| Middle       | 2437            | 6                | -22.44    | 8           | Pass   |
| High         | 2462            | 6                | -23.80    | 8           | Pass   |

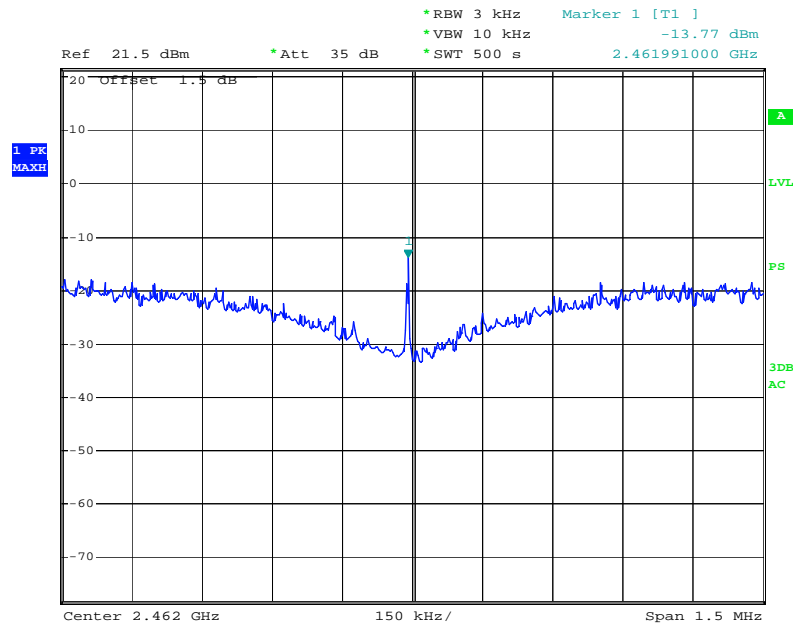
### Power Spectral Density, 802.11b Low Channel



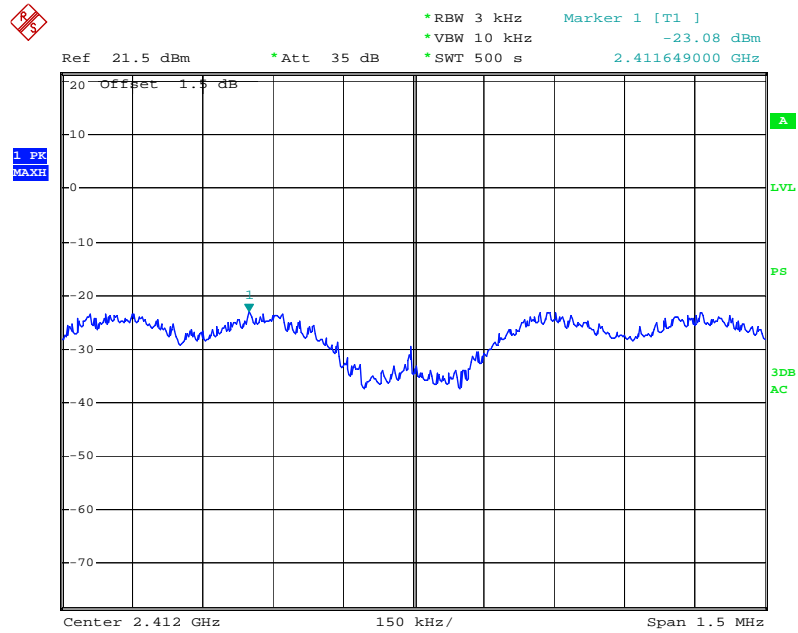
Date: 15.OCT.2010 13:36:08

**Power Spectral Density, 802.11b Middle Channel**

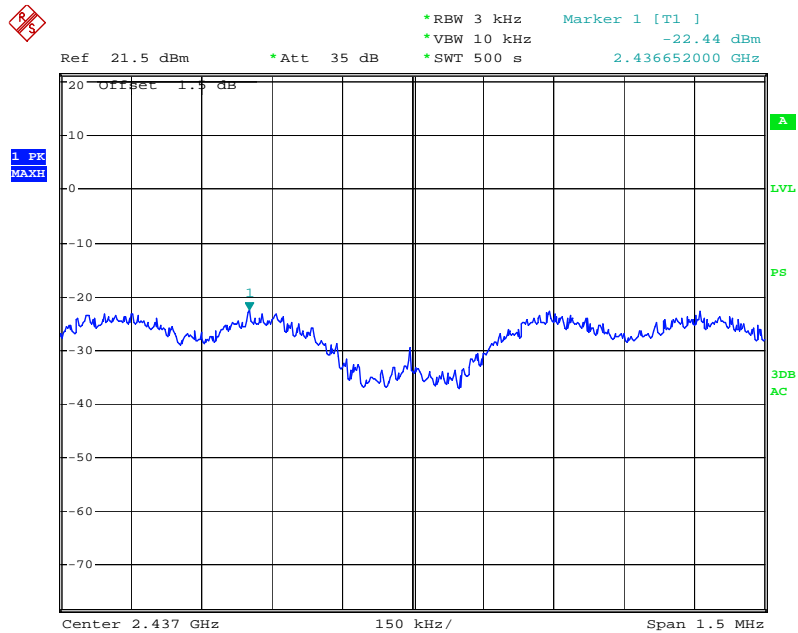
Date: 15.OCT.2010 17:03:30

**Power Spectral Density, 802.11b High Channel**

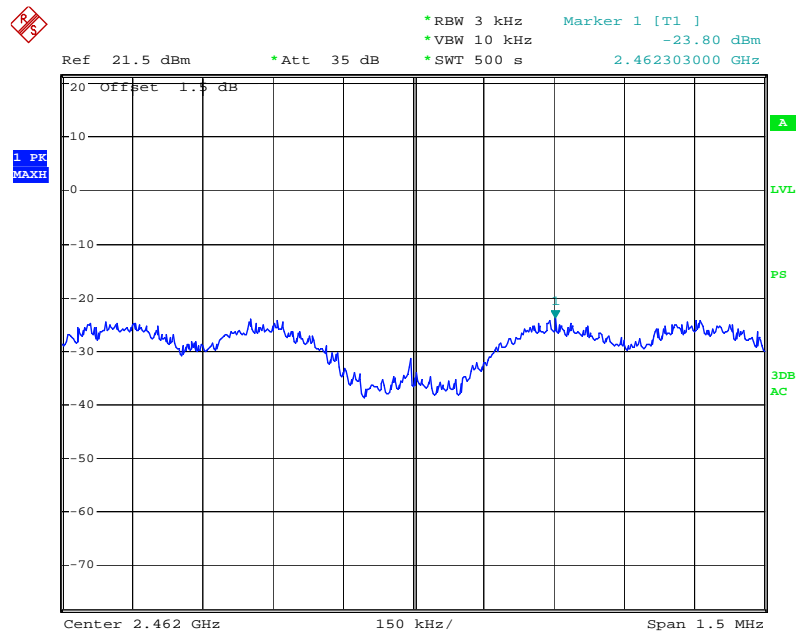
Date: 15.OCT.2010 17:13:07

**Power Spectral Density, 802.11g Low Channel**

Date: 15.OCT.2010 13:45:42

**Power Spectral Density, 802.11g Middle Channel**

Date: 15.OCT.2010 13:24:52

**Power Spectral Density, 802.11g High Channel**

Date: 15.OCT.2010 12:57:23

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