

FCC PART 15.247  
TEST REPORT

For

**b mobile HK Limited**

G/F., 144 UN CHAU STREET, SHAM SHUI PO, KOWLOON, HONG KONG

**FCC ID: ZSW-QS810**

|                                               |                                                                                                                                                                                                                                                                                             |
|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report        | <b>Product Type:</b><br>GSM Mobile Phone                                                                                                                                                                                                                                                    |
| <b>Test Engineer:</b> Jimmy Xiao              | <i>Jimmy Xiao</i>                                                                                                                                                                                                                                                                           |
| <b>Report Number:</b> RSZ120621001-00D        |                                                                                                                                                                                                                                                                                             |
| <b>Report Date:</b> 2012-07-16                |                                                                                                                                                                                                                                                                                             |
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\* This report contains data that are not covered by the NVLAP accreditation and are marked with an asterisk "★" (Rev.2)

## **TABLE OF CONTENTS**

|                                                                        |           |
|------------------------------------------------------------------------|-----------|
| <b>GENERAL INFORMATION.....</b>                                        | <b>4</b>  |
| PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....               | 4         |
| OBJECTIVE .....                                                        | 4         |
| RELATED SUBMITTAL(S)/GRANT(S).....                                     | 4         |
| TEST METHODOLOGY .....                                                 | 4         |
| TEST FACILITY .....                                                    | 5         |
| <b>SYSTEM TEST CONFIGURATION.....</b>                                  | <b>6</b>  |
| DESCRIPTION OF TEST CONFIGURATION .....                                | 6         |
| EUT EXERCISE SOFTWARE .....                                            | 6         |
| EQUIPMENT MODIFICATIONS .....                                          | 6         |
| EXTERNAL I/O CABLE.....                                                | 6         |
| BLOCK DIAGRAM OF TEST SETUP .....                                      | 7         |
| <b>SUMMARY OF TEST RESULTS .....</b>                                   | <b>8</b>  |
| <b>§15.247 (i) and §1.1307 (b) (1), §2.1093 – RF EXPOSURE .....</b>    | <b>9</b>  |
| STANDARD APPLICABLE .....                                              | 9         |
| <b>FCC §15.203 - ANTENNA REQUIREMENT.....</b>                          | <b>10</b> |
| APPLICABLE STANDARD .....                                              | 10        |
| ANTENNA CONNECTOR CONSTRUCTION .....                                   | 10        |
| <b>FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS .....</b>             | <b>11</b> |
| APPLICABLE STANDARD .....                                              | 11        |
| MEASUREMENT UNCERTAINTY.....                                           | 11        |
| EUT SETUP .....                                                        | 11        |
| EMI TEST RECEIVER SETUP.....                                           | 12        |
| TEST PROCEDURE .....                                                   | 12        |
| TEST EQUIPMENT LIST AND DETAILS.....                                   | 12        |
| TEST RESULTS SUMMARY .....                                             | 12        |
| TEST DATA .....                                                        | 12        |
| <b>FCC §15.209, §15.205 &amp; §15.247(d) - SPURIOUS EMISSIONS.....</b> | <b>15</b> |
| APPLICABLE STANDARD .....                                              | 15        |
| MEASUREMENT UNCERTAINTY.....                                           | 15        |
| EUT SETUP .....                                                        | 15        |
| EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP .....                      | 16        |
| TEST PROCEDURE .....                                                   | 16        |
| CORRECTED AMPLITUDE & MARGIN CALCULATION .....                         | 16        |
| TEST EQUIPMENT LIST AND DETAILS.....                                   | 17        |
| TEST RESULTS SUMMARY .....                                             | 17        |
| TEST DATA .....                                                        | 17        |
| <b>FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH.....</b>               | <b>25</b> |
| APPLICABLE STANDARD .....                                              | 25        |
| TEST PROCEDURE .....                                                   | 25        |
| TEST EQUIPMENT LIST AND DETAILS.....                                   | 25        |
| TEST DATA .....                                                        | 25        |
| <b>FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER .....</b>            | <b>30</b> |
| APPLICABLE STANDARD .....                                              | 30        |

|                                                                       |           |
|-----------------------------------------------------------------------|-----------|
| TEST PROCEDURE .....                                                  | 30        |
| TEST EQUIPMENT LIST AND DETAILS.....                                  | 30        |
| TEST DATA .....                                                       | 30        |
| <b>FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE.....</b> | <b>35</b> |
| APPLICABLE STANDARD .....                                             | 35        |
| TEST PROCEDURE .....                                                  | 35        |
| TEST EQUIPMENT LIST AND DETAILS.....                                  | 35        |
| TEST DATA .....                                                       | 35        |
| <b>FCC §15.247(e) - POWER SPECTRAL DENSITY .....</b>                  | <b>39</b> |
| APPLICABLE STANDARD .....                                             | 39        |
| TEST PROCEDURE .....                                                  | 39        |
| TEST EQUIPMENT LIST AND DETAILS.....                                  | 39        |
| TEST DATA .....                                                       | 39        |

## GENERAL INFORMATION

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

The *b mobile HK Limited*'s product, model number: *QS810 (FCC ID: ZSW-QS810)* or the "EUT" in this report was a *GSM Mobile Phone*, which was measured approximately: 11.1 cm (L) x 5.7 cm (W) x 1.5 cm (H), rated input voltage: DC 3.7 V Li-ion battery or DC 5.0 V charging from adapter.

Adapter information:

Input: AC 110-240V, 50-60Hz, 150mA

Output: DC 5.0V, 500mA

Frequency Range: 2412-2462MHz (Tx/Rx)

Modulation Mode: DSSS/OFDM

Transmitter Output Power: 19.89 dBm (Conducted power)

*\* All measurement and test data in this report was gathered from production sample serial number: 00493 (Assigned by applicant). The EUT was received on 2012-06-21.*

### Objective

This report is prepared on behalf of *b mobile HK Limited* 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 15B JBP, Part 15.247 DSS and Part 22H/24E PCE submissions with FCC ID: ZSW-QS810.

### 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.

The uncertainty of any RF tests which use conducted method measurement is  $\pm 0.96$  dB, the uncertainty of any radiation on emissions measurement is  $\pm 4.0$  dB

**Test Facility**

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

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

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

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is an ISO/IEC 17025 accredited laboratory, and is accredited by National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



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

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

For 802.11b and 802.11g modes, 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.

The worst case data rate is determined with the data rate with highest output power. For 802.11b mode: 1 Mbps data rate was chosen for full testing. For 802.11g mode: 6 Mbps data rate was chosen for full testing.

### EUT Exercise Software

N/A

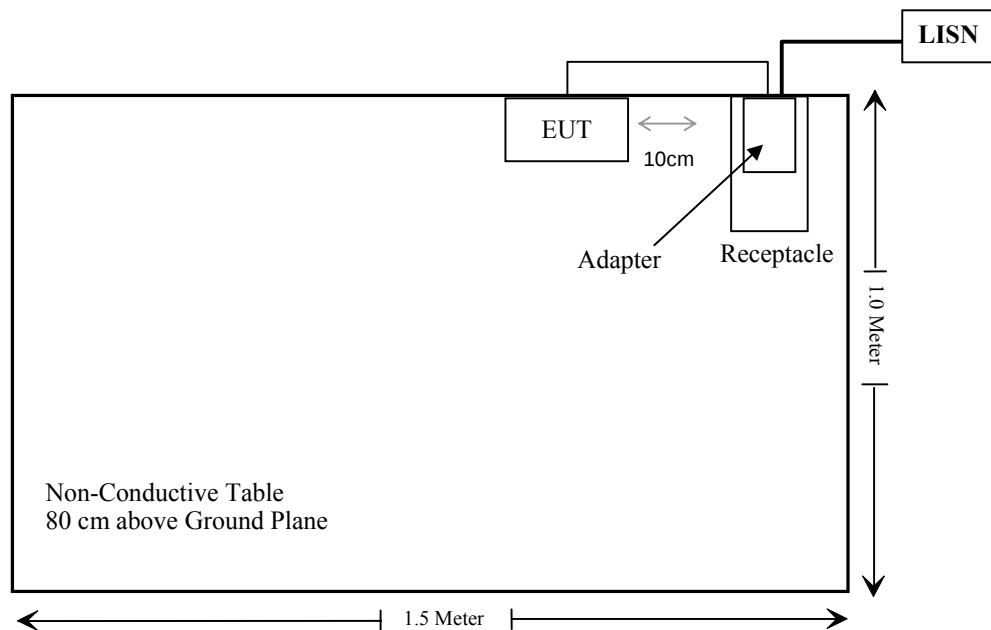
### Equipment Modifications

No modification was made to the EUT tested.

### External I/O Cable

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

## 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)                     | AC Line Conducted Emissions              | Compliance |
| §15.247(d)                      | Spurious Emissions at Antenna Port       | Compliance |
| §15.205, §15.209,<br>§15.247(d) | Spurious Emissions                       | Compliance |
| §15.247 (a)(2)                  | 6 dB Emission Bandwidth                  | Compliance |
| §15.247(b)(3)                   | Maximum Peak Output Power                | Compliance |
| §15.247(d)                      | 100 kHz Bandwidth of Frequency Band Edge | Compliance |
| §15.247(e)                      | Power Spectral Density                   | Compliance |

**§15.247 (i) and §1.1307 (b) (1), §2.1093 – RF EXPOSURE**

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**Standard Applicable**

According to §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.

Limits for General Population/Uncontrolled Exposure

GSM antenna can transmit simultaneously with WiFi or BT antenna

The distance between WiFi and GSM antenna is  $7.3\text{ cm} > 5\text{ cm}$ . The max output power of WiFi antenna is (19.89dBm)  $97.50\text{mW} > 2\text{PRef}$  (24mW) and for all simultaneous transmitting antennas, the sum of the 1-g SAR is  $1.395\text{ W/kg} < 1.6\text{ W/kg}$ .

The distance between BT and GSM antenna is  $1.4\text{cm} < 2.5\text{cm}$ . The max output power of BT antenna is (7.27dBm)  $5.33\text{mW} < \text{PRef}$  (12mW) and the maximum SAR of GSM is  $1.180\text{ W/kg} < 1.2\text{ W/kg}$ .

- 1) According to KDB648474, Stand-alone SAR evaluation for WiFi is required, for Bluetooth is not required.
- 2) When the sum of the 1-g SAR is  $< 1.6\text{W/Kg}$  for GSM and WiFi, the simultaneous SAR is not required.
- 3) PRef is defined as the maximum conducted power available at the antenna according to source-based time-averaging requirements of Section 2.1093(d)(5).

**Result: Compliant**

Please refer to the SAR report, report No. RSZ120621001-20.

## **FCC §15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

According to § 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 an integrated antenna for WiFi, which was permanently attached and the gain was 1.33 dBi, fulfill the requirement of this section. Please refer to the internal photos.

**Result:** Compliance.

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

### Applicable Standard

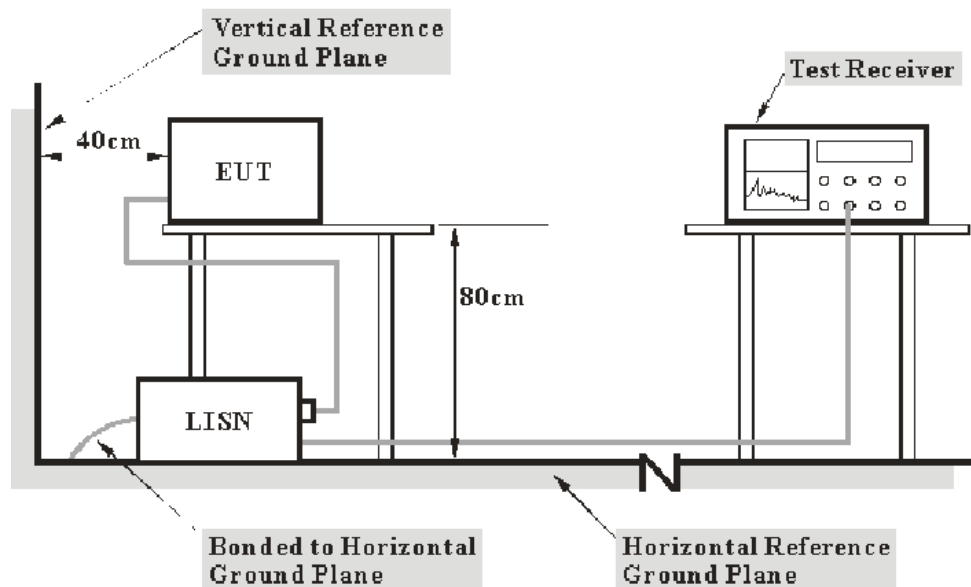
FCC§15.207

### 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 CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at Bay Area Compliance Laboratory Corp. (Shenzhen) is 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 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 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       | 100176               | 2011-11-24              | 2012-11-23                  |
| Rohde & Schwarz     | L.I.S.N.           | ESH2-Z5      | 892107/021           | 2011-11-17              | 2012-11-16                  |
| Rohde & Schwarz     | Pulse limiter      | ESH3Z2       | DE25985              | 2011-07-08              | 2012-07-07                  |
| BACL                | CE Test software   | BACL-CE      | V1.0                 | -                       | -                           |

\* **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:

**16.01 dB at 0.210 MHz in the Line conducted mode**

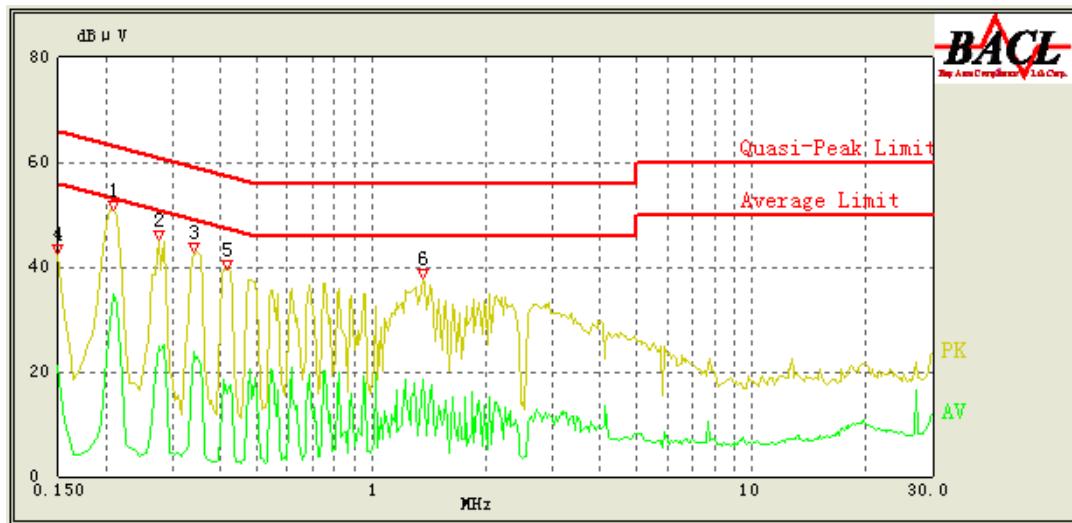
## Test Data

### Environmental Conditions

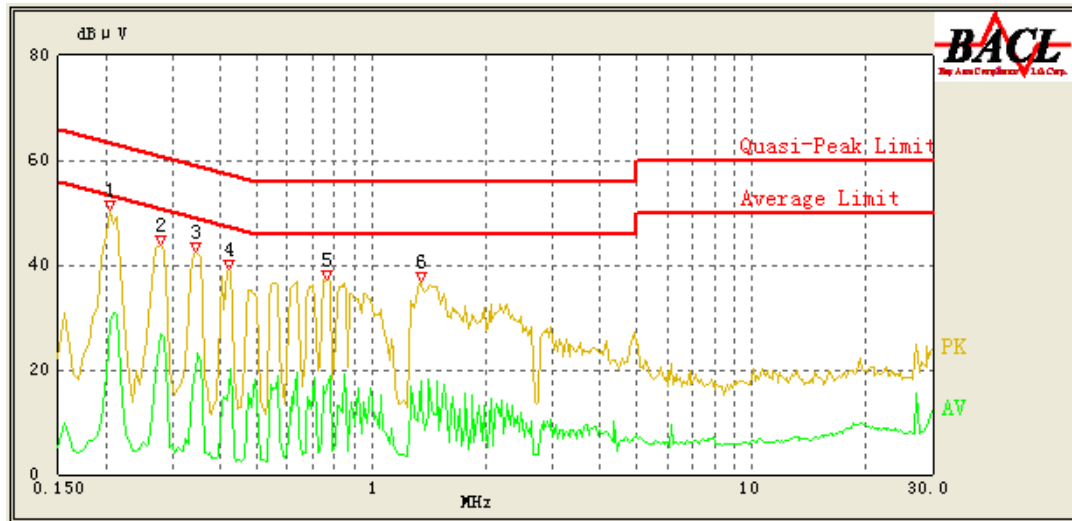
|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 56 %      |
| <b>ATM Pressure:</b>      | 100.0 kPa |

*The testing was performed by Jimmy Xiao on 2012-07-03.*

*Test Mode: Transmitting*

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

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.210           | 48.28                      | 9.67                   | 64.29        | 16.01       | QP                    |
| 0.210           | 34.70                      | 9.67                   | 54.29        | 19.59       | Ave.                  |
| 1.370           | 35.68                      | 9.88                   | 56.00        | 20.32       | QP                    |
| 0.275           | 42.07                      | 9.66                   | 62.43        | 20.36       | QP                    |
| 0.340           | 39.47                      | 9.66                   | 60.57        | 21.10       | QP                    |
| 0.415           | 35.66                      | 9.67                   | 58.43        | 22.77       | QP                    |
| 0.340           | 24.00                      | 9.66                   | 50.57        | 26.57       | Ave.                  |
| 0.275           | 24.98                      | 9.66                   | 52.43        | 27.45       | Ave.                  |
| 1.365           | 18.48                      | 9.88                   | 46.00        | 27.52       | Ave.                  |
| 0.150           | 38.00                      | 9.67                   | 66.00        | 28.00       | QP                    |
| 0.415           | 15.78                      | 9.67                   | 48.43        | 32.65       | Ave.                  |
| 0.150           | 21.25                      | 9.67                   | 56.00        | 34.75       | Ave.                  |

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

| Frequency (MHz) | Corrected Amplitude (dBμV) | Correction Factor (dB) | Limit (dBμV) | Margin (dB) | Detector (PK/Ave./QP) |
|-----------------|----------------------------|------------------------|--------------|-------------|-----------------------|
| 0.205           | 47.48                      | 9.64                   | 64.43        | 16.95       | QP                    |
| 0.765           | 35.10                      | 9.78                   | 56.00        | 20.90       | QP                    |
| 0.280           | 41.35                      | 9.65                   | 62.29        | 20.94       | QP                    |
| 1.345           | 35.00                      | 9.88                   | 56.00        | 21.00       | QP                    |
| 0.345           | 38.65                      | 9.66                   | 60.43        | 21.78       | QP                    |
| 0.420           | 36.13                      | 9.67                   | 58.29        | 22.16       | QP                    |
| 0.205           | 29.05                      | 9.64                   | 54.43        | 25.38       | Ave.                  |
| 0.280           | 26.79                      | 9.65                   | 52.29        | 25.50       | Ave.                  |
| 0.775           | 17.97                      | 9.79                   | 46.00        | 28.03       | Ave.                  |
| 1.345           | 17.95                      | 9.88                   | 46.00        | 28.05       | Ave.                  |
| 0.345           | 19.60                      | 9.66                   | 50.43        | 30.83       | Ave.                  |
| 0.420           | 16.11                      | 9.67                   | 48.29        | 32.18       | Ave.                  |

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

### Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

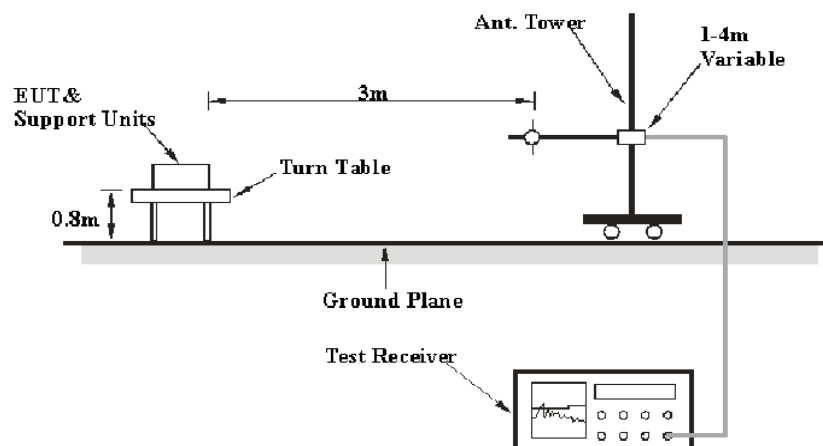
### Measurement Uncertainty

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.

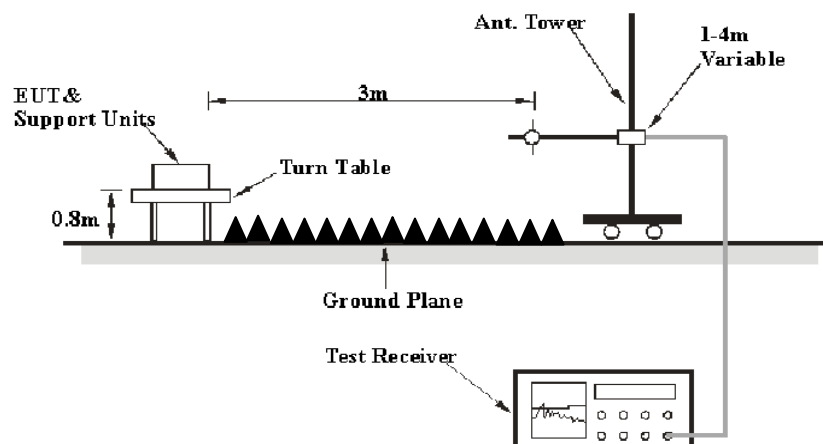
Based on CISPR 16-4-4, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is 4.0 dB(k=2, 95% level of confidence) .

### EUT Setup

**Below 1 GHz:**



**Above 1 GHz:**



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209, and FCC 15.247 limits.

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

The 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:

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

During the radiated emission test, the adapter was connected to the outlet of the floor.

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 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

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

**Test Equipment List and Details**

| Manufacturer              | Description        | Model    | Serial Number | Calibration Date | Calibration Due Date |
|---------------------------|--------------------|----------|---------------|------------------|----------------------|
| HP                        | Amplifier          | HP8447D  | 2944A09795    | 2011-11-24       | 2012-11-23           |
| Rohde & Schwarz           | EMI Test Receiver  | ESCI     | 101122        | 2011-11-17       | 2012-11-16           |
| Sunol Sciences            | Broadband Antenna  | JB1      | A040904-2     | 2011-11-28       | 2012-11-27           |
| SUPER ULTRA               | Amplifier          | ZVA-213+ | N/A           | 2011-11-24       | 2012-11-23           |
| Sunol Sciences            | Horn Antenna       | DRH-118  | A052304       | 2011-12-01       | 2012-11-30           |
| Rohde & Schwarz           | Signal Analyzer    | FSIQ26   | 8386001028    | 2011-11-24       | 2012-11-23           |
| the electro-Mechanics Co. | Horn Antenna       | 3116     | 9510-2270     | 2011-10-14       | 2012-10-13           |
| R&S                       | Auto test Software | EMC32    | V6.30         | -                | -                    |

\* **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, section 15.205, 15.209 and 15.247, with the worst margin reading of:

**0.41 dB at 4924 MHz in the Horizontal polarization**

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

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

*The testing was performed by Jimmy Xiao on 2012-07-05.*

**30 MHz-25 GHz:****802.11b Mode:**

| Frequency<br>(MHz)        | Receiver          |                          | Turn<br>Table<br>Degree | Rx Antenna    |                   |                | Cable<br>Loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part<br>15.247/205/209 |                |
|---------------------------|-------------------|--------------------------|-------------------------|---------------|-------------------|----------------|-----------------------|---------------------------|------------------------------------|----------------------------|----------------|
|                           | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                         | Height<br>(m) | Polarity<br>(H/V) | Factor<br>(dB) |                       |                           |                                    | Limit<br>(dBμV/m)          | Margin<br>(dB) |
| Low Channel (2412 MHz)    |                   |                          |                         |               |                   |                |                       |                           |                                    |                            |                |
| 2412                      | 77.95             | PK                       | 69                      | 1.5           | V                 | 29.6           | 3.03                  | /                         | 110.58                             | /                          | /              |
| 2412                      | 73.28             | Ave.                     | 36                      | 1.5           | V                 | 29.6           | 3.03                  | /                         | 105.91                             | /                          | /              |
| 2412                      | 73.43             | PK                       | 180                     | 1.5           | H                 | 29.6           | 3.03                  | /                         | 106.06                             | /                          | /              |
| 2412                      | 70.12             | Ave.                     | 180                     | 1.5           | H                 | 29.6           | 3.03                  | /                         | 102.75                             | /                          | /              |
| 4824                      | 41.12             | Ave.                     | 14                      | 1.1           | V                 | 34.6           | 4.30                  | 26.50                     | 53.52                              | 54                         | 0.48*          |
| 4824                      | 46.99             | PK                       | 312                     | 1.1           | V                 | 34.6           | 4.30                  | 26.50                     | 59.39                              | 74                         | 14.61          |
| 2483.9                    | 32.82             | PK                       | 224                     | 1.0           | H                 | 30.6           | 3.11                  | 26.50                     | 40.03                              | 74                         | 33.97          |
| 2354.2                    | 31.33             | PK                       | 12                      | 1.2           | V                 | 29.0           | 2.98                  | 26.50                     | 36.81                              | 74                         | 37.19          |
| 2382.8                    | 30.53             | PK                       | 125                     | 1.1           | V                 | 29.6           | 3.03                  | 26.50                     | 36.66                              | 74                         | 37.34          |
| 9648                      | 33.26             | PK                       | 54                      | 1.3           | H                 | 39.8           | 5.99                  | 26.50                     | 52.55                              | 90.58                      | 38.03          |
| 7236                      | 32.95             | PK                       | 35                      | 1.2           | V                 | 37.9           | 5.22                  | 26.50                     | 49.57                              | 90.58                      | 41.01          |
| Middle Channel (2437 MHz) |                   |                          |                         |               |                   |                |                       |                           |                                    |                            |                |
| 2437                      | 75.54             | PK                       | 23                      | 1.3           | V                 | 30.2           | 3.11                  | /                         | 108.85                             | /                          | /              |
| 2437                      | 70.32             | Ave.                     | 114                     | 1.3           | V                 | 30.2           | 3.11                  | /                         | 103.63                             | /                          | /              |
| 2437                      | 72.54             | PK                       | 358                     | 1.2           | H                 | 30.2           | 3.11                  | /                         | 105.85                             | /                          | /              |
| 2437                      | 66.12             | Ave.                     | 358                     | 1.2           | H                 | 30.2           | 3.11                  | /                         | 99.43                              | /                          | /              |
| 4874                      | 40.52             | Ave.                     | 154                     | 1.1           | V                 | 34.6           | 4.36                  | 26.50                     | 52.98                              | 54                         | 1.02*          |
| 4874                      | 43.03             | PK                       | 189                     | 1.1           | V                 | 34.6           | 4.36                  | 26.50                     | 55.49                              | 74                         | 18.51          |
| 7311                      | 35.43             | PK                       | 168                     | 1.3           | H                 | 37.9           | 5.09                  | 26.50                     | 51.92                              | 74                         | 22.08          |
| 2489.2                    | 33.69             | PK                       | 224                     | 1.2           | H                 | 30.6           | 3.11                  | 26.50                     | 40.90                              | 74                         | 33.10          |
| 2356.4                    | 33.47             | PK                       | 35                      | 1.2           | V                 | 29.0           | 2.98                  | 26.50                     | 38.95                              | 74                         | 35.05          |
| 2342.6                    | 32.88             | PK                       | 24                      | 1.1           | H                 | 29.0           | 2.98                  | 26.50                     | 38.36                              | 74                         | 35.64          |
| 9748                      | 32.13             | PK                       | 239                     | 1.2           | H                 | 39.8           | 6.1                   | 26.50                     | 51.53                              | 88.85                      | 37.32          |
| High Channel (2462 MHz)   |                   |                          |                         |               |                   |                |                       |                           |                                    |                            |                |
| 2462                      | 76.96             | PK                       | 78                      | 1.2           | V                 | 30.2           | 3.11                  | /                         | 110.27                             | /                          | /              |
| 2462                      | 72.95             | Ave.                     | 78                      | 1.2           | V                 | 30.2           | 3.11                  | /                         | 106.26                             | /                          | /              |
| 2462                      | 72.15             | PK                       | 176                     | 1.2           | H                 | 30.2           | 3.11                  | /                         | 105.46                             | /                          | /              |
| 2462                      | 68.47             | Ave.                     | 176                     | 1.2           | H                 | 30.2           | 3.11                  | /                         | 101.78                             | /                          | /              |
| 4924                      | 41.09             | Ave.                     | 78                      | 1.2           | H                 | 34.6           | 4.40                  | 26.50                     | 53.59                              | 54                         | 0.41*          |
| 4924                      | 46.12             | PK                       | 78                      | 1.2           | H                 | 34.6           | 4.40                  | 26.50                     | 58.62                              | 74                         | 15.38          |
| 7386                      | 34.58             | PK                       | 122                     | 1.0           | H                 | 37.2           | 5.21                  | 26.50                     | 50.49                              | 74                         | 23.51          |
| 2485.6                    | 32.05             | PK                       | 225                     | 1.2           | H                 | 30.6           | 3.11                  | 26.50                     | 39.26                              | 74                         | 34.74          |
| 2493.2                    | 31.96             | PK                       | 136                     | 1.1           | V                 | 30.2           | 3.11                  | 26.50                     | 38.77                              | 74                         | 35.23          |
| 2336.5                    | 31.03             | PK                       | 83                      | 1.3           | H                 | 29.0           | 2.98                  | 26.50                     | 36.51                              | 74                         | 37.49          |

|      |       |    |     |     |   |      |      |       |       |       |       |
|------|-------|----|-----|-----|---|------|------|-------|-------|-------|-------|
| 9848 | 32.13 | PK | 196 | 1.2 | H | 39.8 | 6.09 | 26.50 | 51.52 | 90.27 | 38.75 |
|------|-------|----|-----|-----|---|------|------|-------|-------|-------|-------|

\*Within measurement uncertainty!

**802.11g Mode:**

| Frequency<br>(MHz)        | Receiver          |                          | Turn<br>Table<br>Degree | Rx Antenna    |                   |                | Cable<br>Loss<br>(dB) | Amplifier<br>Gain<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part<br>15.247/205/209 |                |
|---------------------------|-------------------|--------------------------|-------------------------|---------------|-------------------|----------------|-----------------------|---------------------------|------------------------------------|----------------------------|----------------|
|                           | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                         | Height<br>(m) | Polarity<br>(H/V) | Factor<br>(dB) |                       |                           |                                    | Limit<br>(dBμV/m)          | Margin<br>(dB) |
| Low Channel (2412 MHz)    |                   |                          |                         |               |                   |                |                       |                           |                                    |                            |                |
| 2412                      | 76.09             | PK                       | 36                      | 1.1           | H                 | 29.6           | 3.03                  | /                         | 108.72                             | /                          | /              |
| 2412                      | 63.88             | Ave.                     | 36                      | 1.1           | H                 | 29.6           | 3.03                  | /                         | 96.51                              | /                          | /              |
| 2412                      | 72.56             | PK                       | 34                      | 1.2           | V                 | 29.6           | 3.03                  | /                         | 105.19                             | /                          | /              |
| 2412                      | 59.72             | Ave.                     | 35                      | 1.2           | V                 | 29.6           | 3.03                  | /                         | 92.35                              | /                          | /              |
| 4824                      | 39.28             | PK                       | 174                     | 1.5           | V                 | 34.6           | 4.30                  | 26.50                     | 51.68                              | 74                         | 22.32          |
| 2389.2                    | 37.28             | PK                       | 224                     | 1.3           | V                 | 29.6           | 3.03                  | 26.50                     | 43.41                              | 74                         | 30.59          |
| 2486.4                    | 33.42             | PK                       | 132                     | 1.2           | V                 | 30.2           | 3.11                  | 26.50                     | 40.23                              | 74                         | 33.77          |
| 2315.5                    | 32.56             | PK                       | 85                      | 1.2           | H                 | 29.0           | 2.98                  | 26.50                     | 38.04                              | 74                         | 35.96          |
| 9648                      | 32.52             | PK                       | 141                     | 1.2           | H                 | 39.8           | 5.98                  | 26.50                     | 51.80                              | 88.72                      | 36.92          |
| 7236                      | 32.15             | PK                       | 168                     | 1.1           | V                 | 37.9           | 5.22                  | 26.50                     | 48.77                              | 88.72                      | 39.95          |
| Middle Channel (2437 MHz) |                   |                          |                         |               |                   |                |                       |                           |                                    |                            |                |
| 2437                      | 73.28             | PK                       | 87                      | 1.4           | H                 | 30.6           | 3.11                  | /                         | 106.99                             | /                          | /              |
| 2437                      | 61.71             | Ave.                     | 87                      | 1.4           | H                 | 30.6           | 3.11                  | /                         | 95.42                              | /                          | /              |
| 2437                      | 69.14             | PK                       | 183                     | 1.3           | V                 | 30.6           | 3.11                  | /                         | 102.85                             | /                          | /              |
| 2437                      | 57.69             | Ave.                     | 183                     | 1.3           | V                 | 30.6           | 3.11                  | /                         | 91.40                              | /                          | /              |
| 7311                      | 32.56             | PK                       | 331                     | 1.2           | V                 | 37.9           | 5.09                  | 26.50                     | 49.05                              | 74                         | 24.95          |
| 4824                      | 35.63             | PK                       | 185                     | 1.2           | V                 | 34.6           | 4.36                  | 26.50                     | 48.09                              | 74                         | 25.91          |
| 2382.5                    | 33.68             | PK                       | 135                     | 1.2           | V                 | 29.0           | 2.98                  | 26.50                     | 39.16                              | 74                         | 34.84          |
| 2313.4                    | 32.87             | PK                       | 25                      | 1.3           | H                 | 29.0           | 2.98                  | 26.50                     | 38.35                              | 74                         | 35.65          |
| 2485.6                    | 31.54             | PK                       | 55                      | 1.6           | V                 | 30.2           | 3.11                  | 26.50                     | 38.35                              | 74                         | 35.65          |
| 9748                      | 31.59             | PK                       | 254                     | 1.1           | H                 | 39.8           | 6.10                  | 26.50                     | 50.99                              | 86.99                      | 36.00          |
| High Channel (2462 MHz)   |                   |                          |                         |               |                   |                |                       |                           |                                    |                            |                |
| 2462                      | 73.66             | PK                       | 68                      | 1.3           | H                 | 30.6           | 3.11                  | /                         | 107.37                             | /                          | /              |
| 2462                      | 61.64             | Ave.                     | 68                      | 1.3           | H                 | 30.6           | 3.11                  | /                         | 95.35                              | /                          | /              |
| 2462                      | 69.47             | PK                       | 145                     | 1.2           | V                 | 30.6           | 3.11                  | /                         | 103.18                             | /                          | /              |
| 2462                      | 57.53             | Ave.                     | 145                     | 1.2           | V                 | 30.6           | 3.11                  | /                         | 91.24                              | /                          | /              |
| 7386                      | 35.18             | PK                       | 125                     | 1.0           | H                 | 37.2           | 5.21                  | 26.50                     | 51.09                              | 74                         | 22.91          |
| 4924                      | 36.83             | PK                       | 78                      | 1.2           | H                 | 34.6           | 4.40                  | 26.50                     | 49.33                              | 74                         | 24.67          |
| 9848                      | 35.63             | PK                       | 27                      | 1.5           | H                 | 39.8           | 6.09                  | 26.50                     | 55.02                              | 87.37                      | 32.35          |
| 2486.5                    | 34.17             | PK                       | 112                     | 1.3           | H                 | 30.6           | 3.11                  | 26.50                     | 41.38                              | 74                         | 32.62          |
| 2491.3                    | 33.68             | PK                       | 125                     | 1.1           | V                 | 30.2           | 3.11                  | 26.50                     | 40.49                              | 74                         | 33.51          |
| 2322.6                    | 33.87             | PK                       | 243                     | 1.2           | H                 | 29.0           | 2.98                  | 26.50                     | 39.35                              | 74                         | 34.65          |

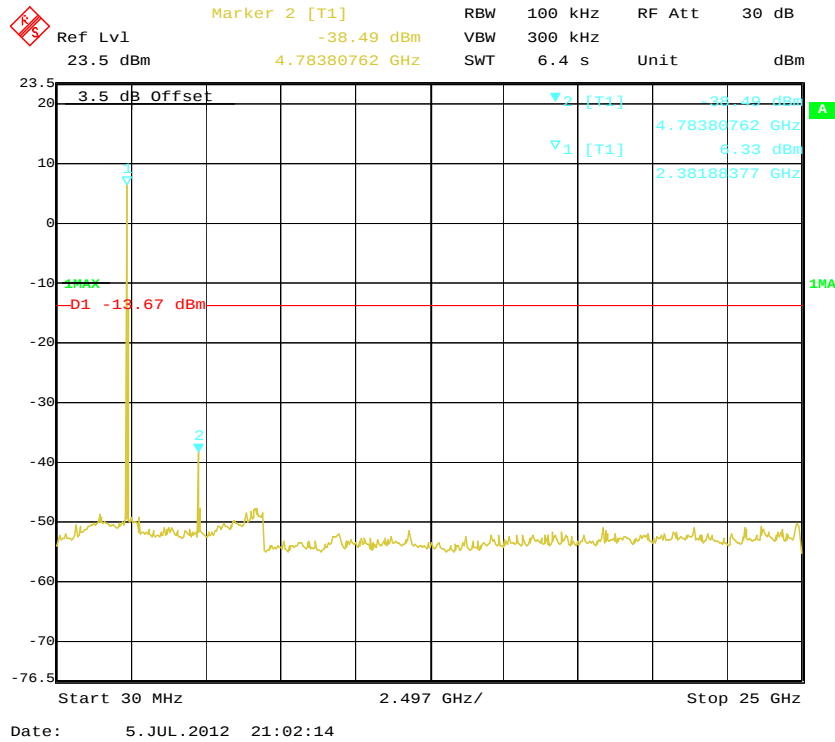
Note 1: For 30 MHz to 1000 MHz, the spurious emissions are 20 dB below the limit or are on the system noise level.

Note 2: For above 1 GHz, if the peak (or quasi-peak) measured value complied with the average limit, it is unnecessary to perform an average measurement.

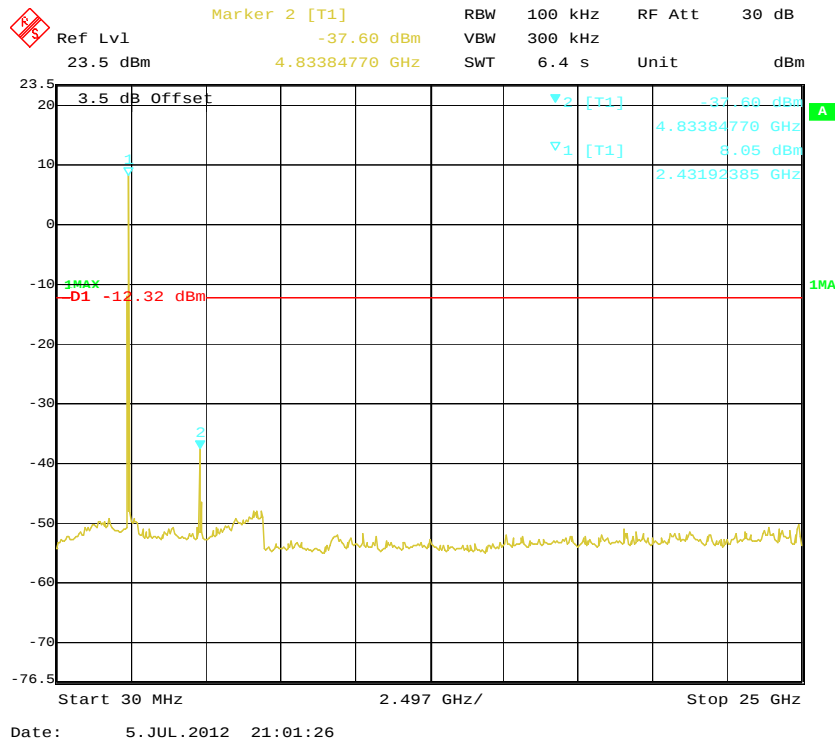


# Antenna Port Conducted Spurious Emissions:

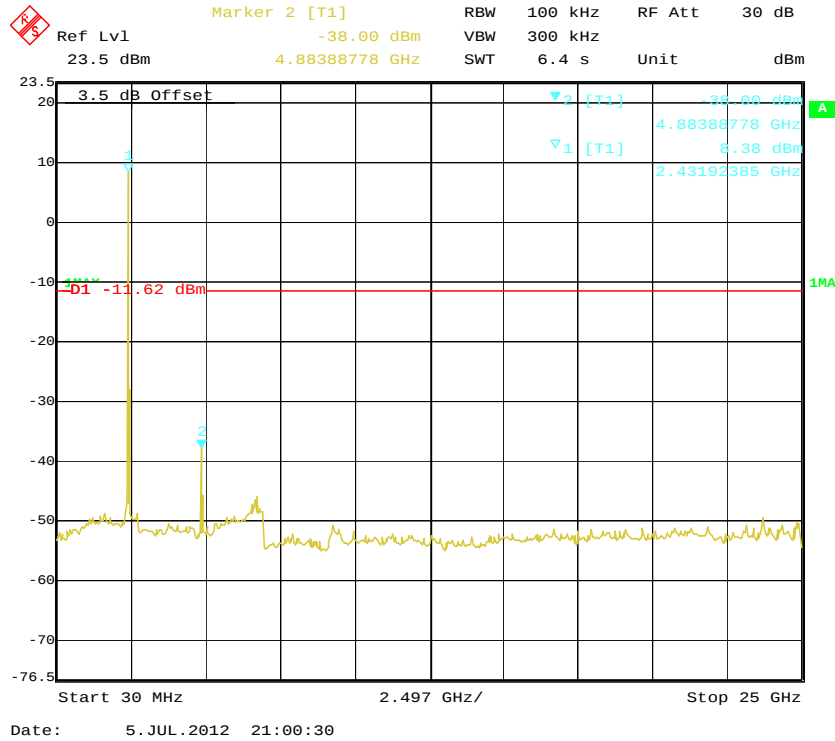
## 802.11b Low Channel



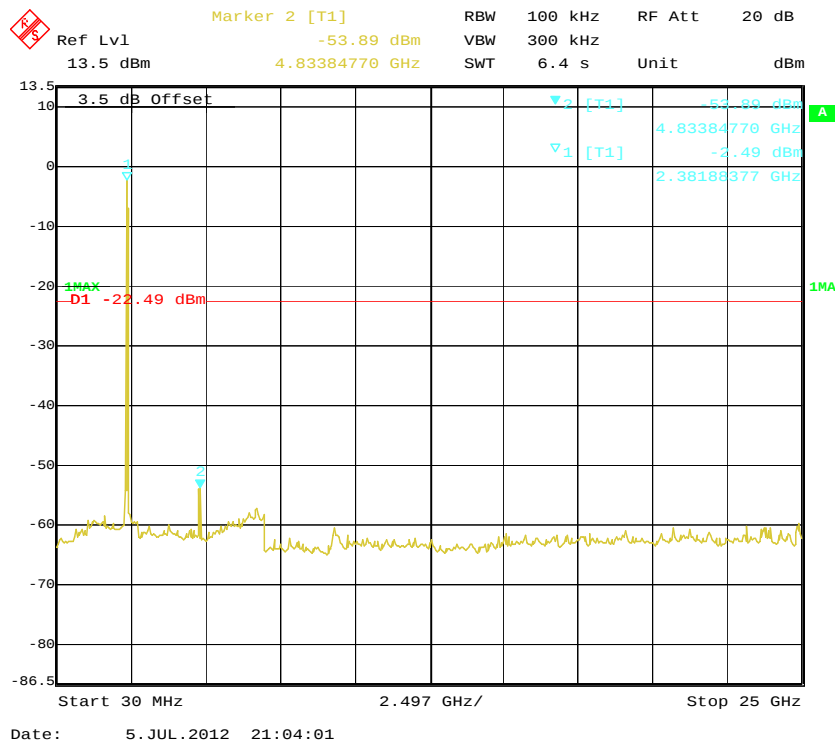
## 802.11b Middle Channel



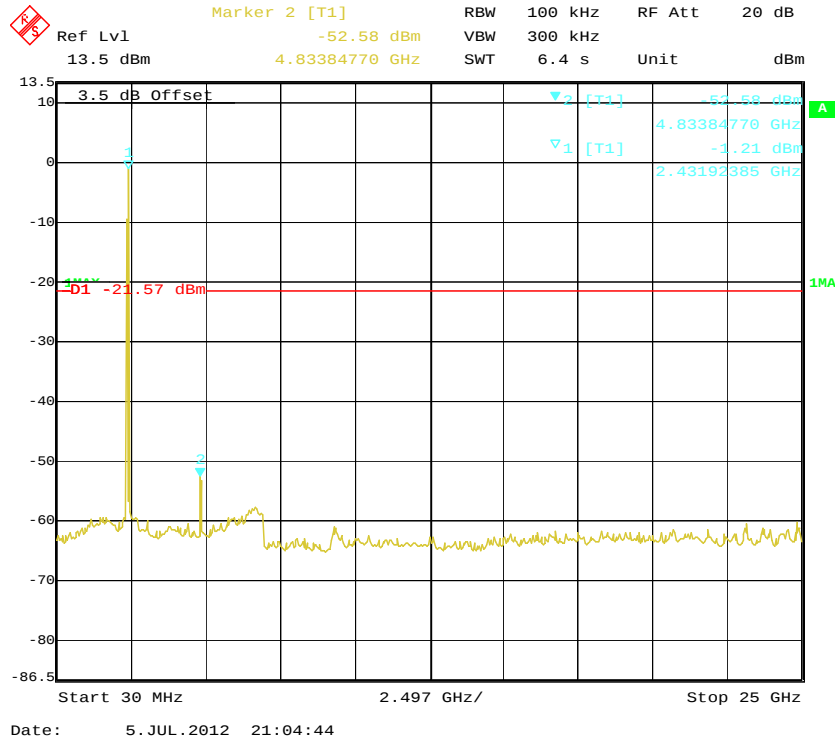
### 802.11b High Channel



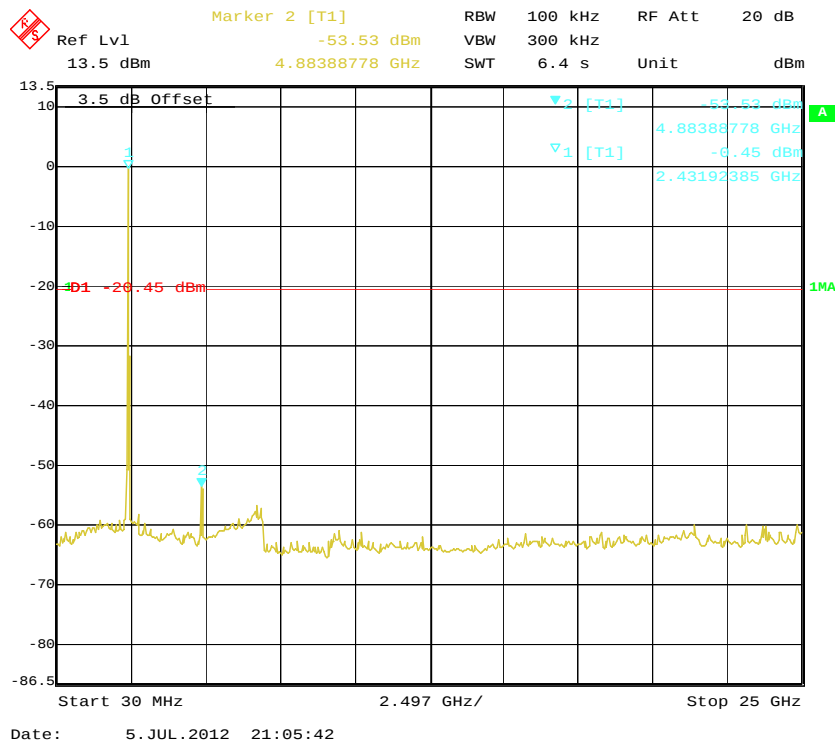
### 802.11g Low Channel



### 802.11g Middle Channel



### 802.11g High Channel



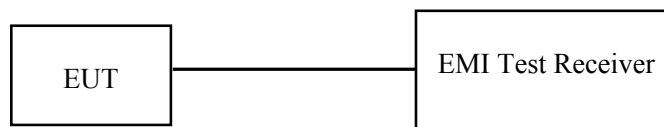
## FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH

### 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 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 Equipment List and Details

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 101122        | 2011-11-17       | 2012-11-16           |

\* **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 |

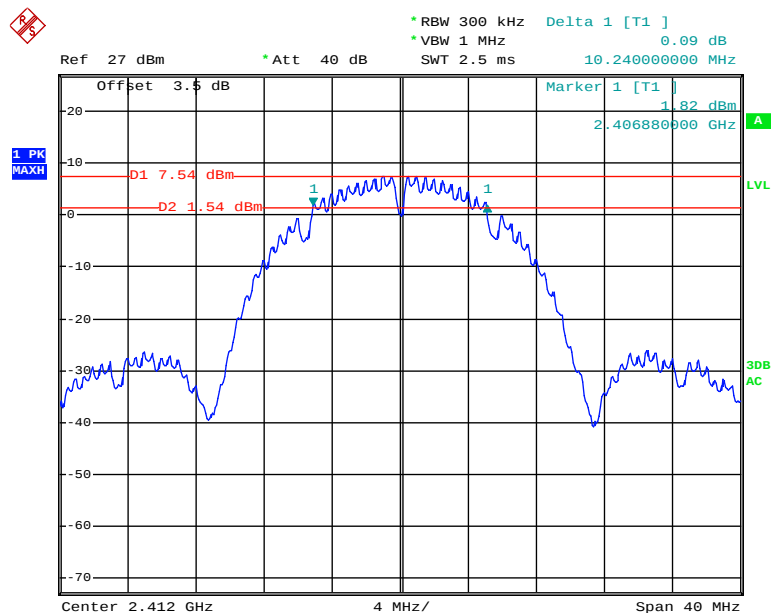
The testing was performed by Jimmy Xiao on 2012-07-04 and 2012-07-05.

**Test Result:** Pass.

Please refer to the following tables and plots.

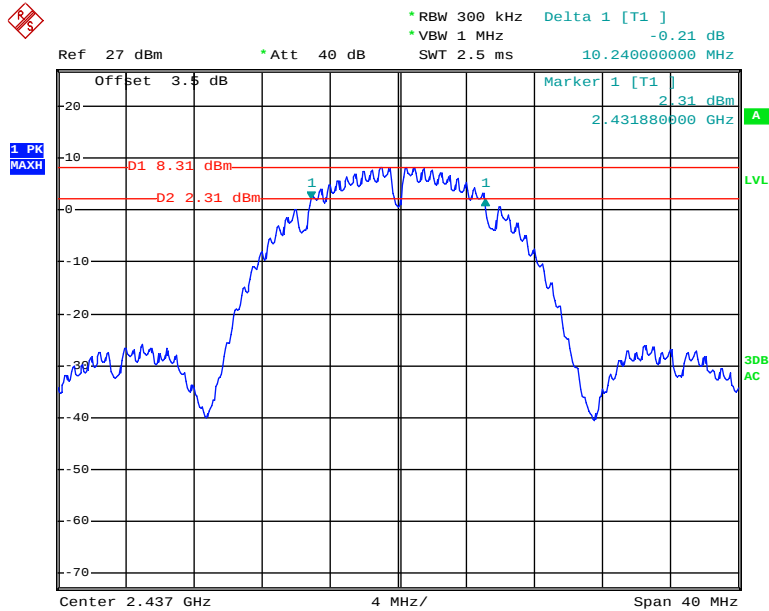
| Channel      | Channel Frequency (MHz) | Data Rate (Mbps) | 6dB Bandwidth (MHz) | FCC Part 15.247 Limit (kHz) |
|--------------|-------------------------|------------------|---------------------|-----------------------------|
| 802.11b mode |                         |                  |                     |                             |
| Low          | 2412                    | 1                | 10.24               | $\geq 500$                  |
| Middle       | 2437                    | 1                | 10.24               | $\geq 500$                  |
| High         | 2462                    | 1                | 10.24               | $\geq 500$                  |
| 802.11g mode |                         |                  |                     |                             |
| Low          | 2412                    | 6                | 16.32               | $\geq 500$                  |
| Middle       | 2437                    | 6                | 16.32               | $\geq 500$                  |
| High         | 2462                    | 6                | 16.32               | $\geq 500$                  |

### 802.11b Low Channel



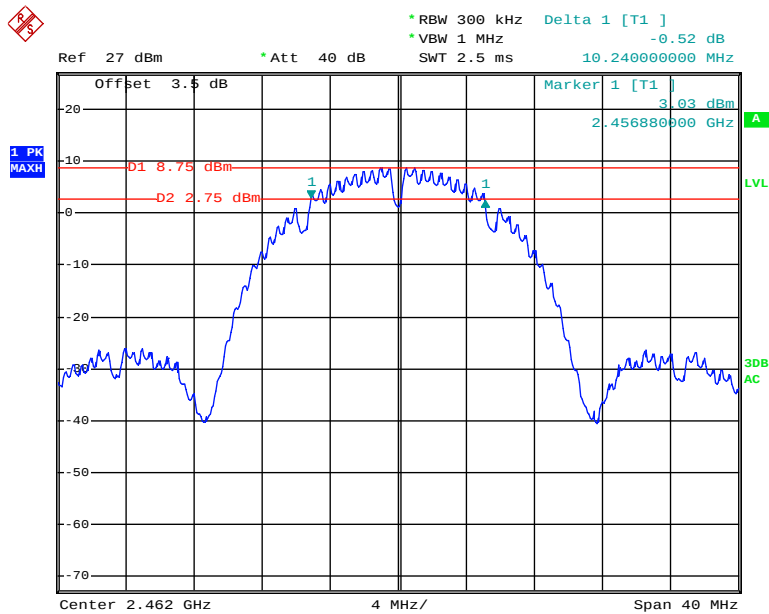
Date: 5.JUL.2012 15:33:16

### 802.11b Middle Channel



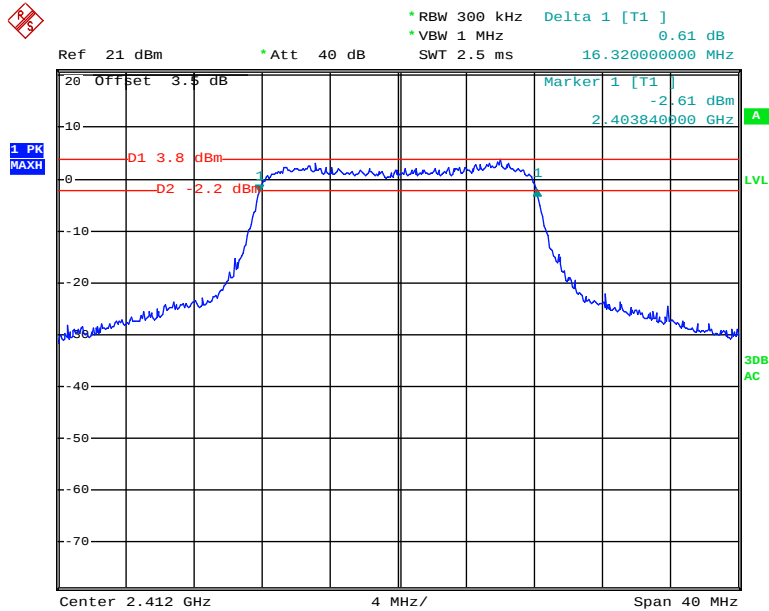
Date: 5.JUL.2012 15:36:30

### 802.11b High Channel



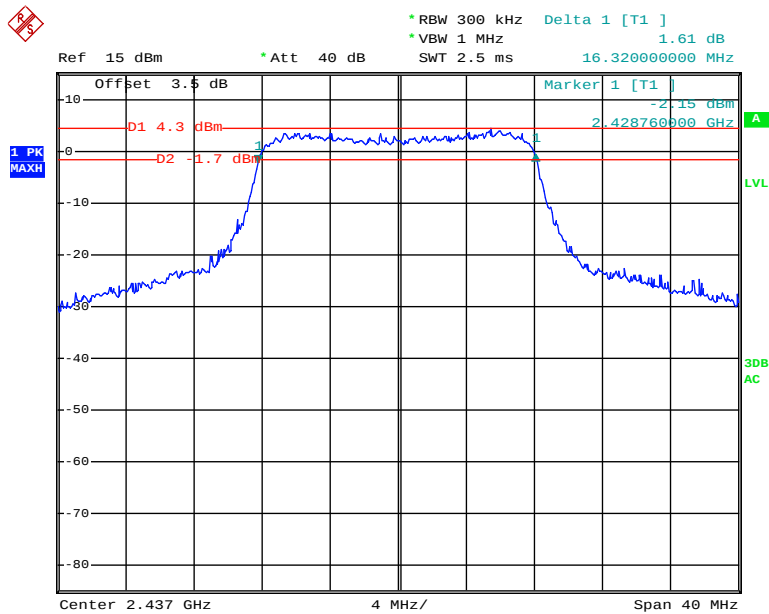
Date: 5.JUL.2012 15:37:56

### 802.11g Low Channel



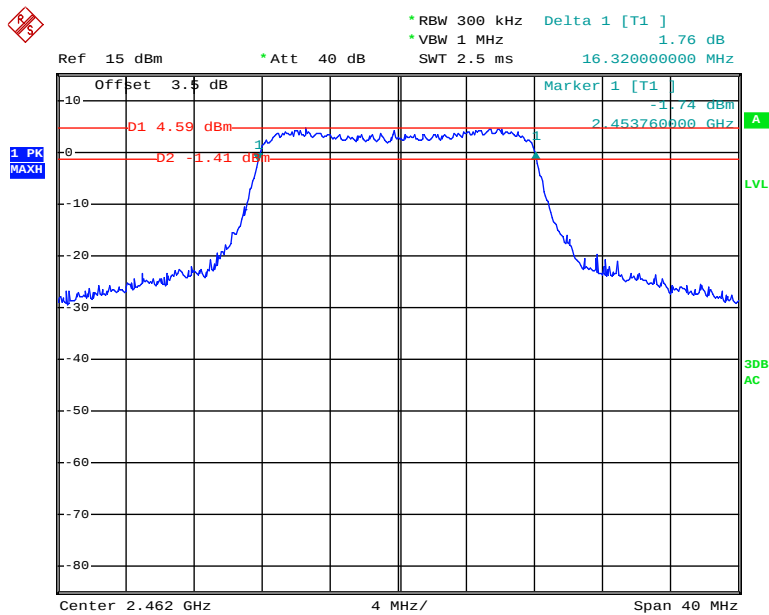
Date: 4.JUL.2012 15:47:11

### 802.11g Middle Channel



Date: 4.JUL.2012 15:54:29

# 802.11g High Channel



Date: 4.JUL.2012 15:58:33

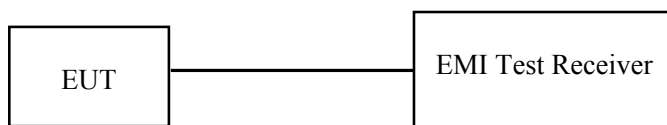
## FCC §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

### Applicable Standard

According to FCC §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 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 Equipment List and Details

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 101122        | 2011-11-17       | 2012-11-16           |

\* **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

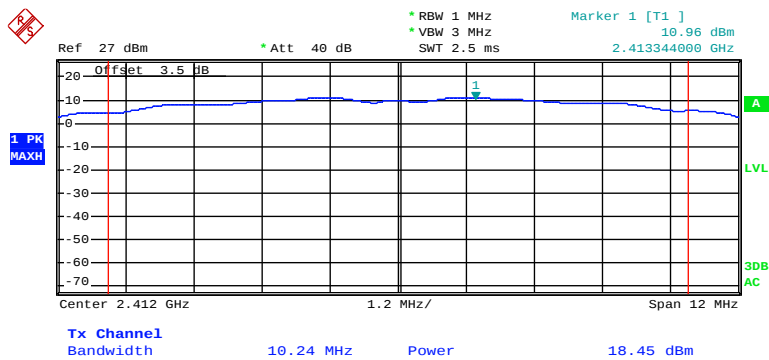
|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 56 %      |
| ATM Pressure:      | 100.0 kPa |

*The testing was performed by Jimmy Xiao on 2012-07-04 and 2012-07-05.*

*Test Mode: Transmitting*

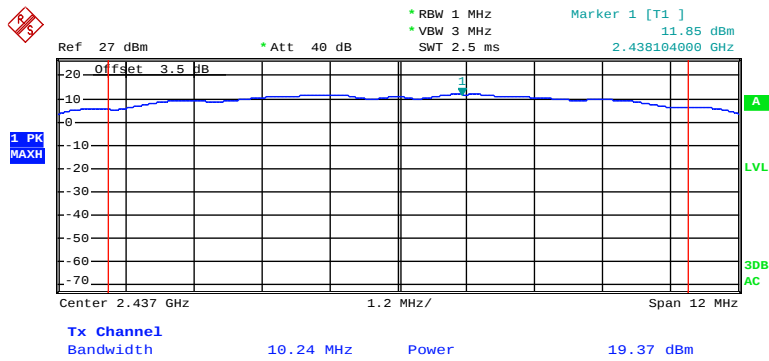
| Channel      | Frequency (MHz) | Data Rate (Mbps) | Reading Power (dBm) | Limit (dBm) | Result |
|--------------|-----------------|------------------|---------------------|-------------|--------|
| 802.11b mode |                 |                  |                     |             |        |
| Low          | 2412            | 1                | 18.45               | 30          | Pass   |
| Middle       | 2437            | 1                | 19.37               | 30          | Pass   |
| High         | 2462            | 1                | 19.89               | 30          | Pass   |
| 802.11g mode |                 |                  |                     |             |        |
| Low          | 2412            | 6                | 18.90               | 30          | Pass   |
| Middle       | 2437            | 6                | 19.85               | 30          | Pass   |
| High         | 2462            | 6                | 19.88               | 30          | Pass   |

### 802.11b RF Output Power, Low Channel



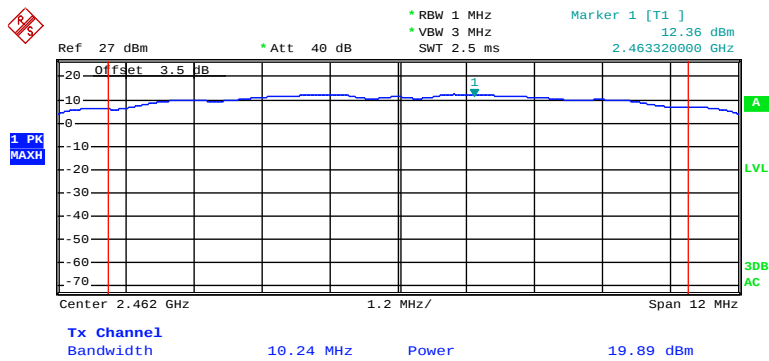
Date: 5 JUL 2012 15:34:56

### 802.11b RF Output Power, Middle Channel



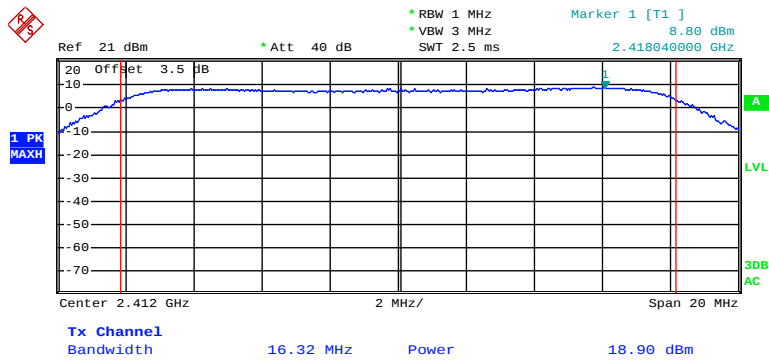
Date: 5.JUL.2012 15:37:00

### 802.11b RF Output Power, High Channel



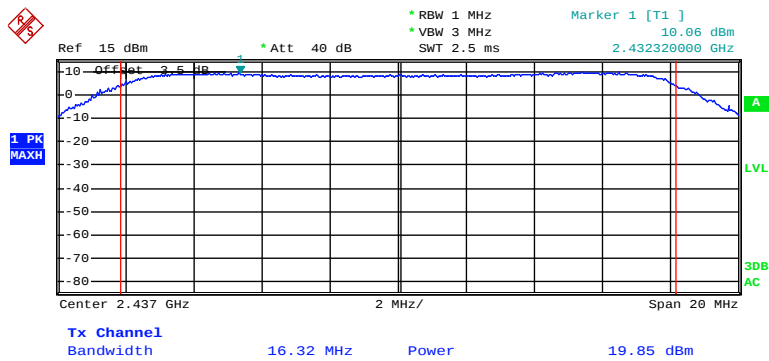
Date: 5.JUL.2012 15:38:26

### 802.11g RF Output Power, Low Channel



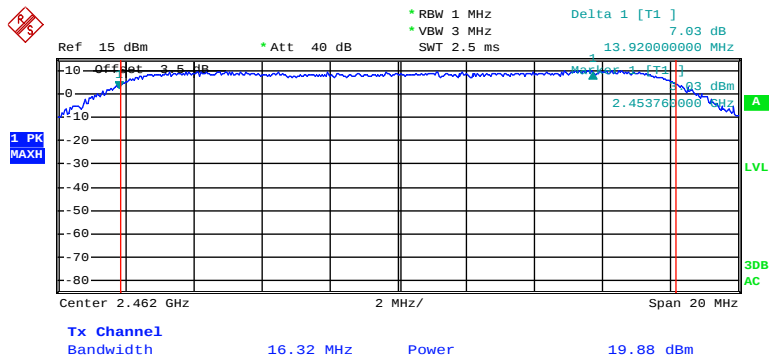
Date: 4.JUL.2012 15:49:25

### 802.11g RF Output Power, Middle Channel



Date: 4.JUL.2012 15:55:34

# 802.11g RF Output Power, High Channel



Date: 4.JUL.2012 15:59:25

## 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 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 100 kHz and VBW of spectrum analyzer to 300 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 | EMI Test Receiver | ESCI  | 101122        | 2011-11-17       | 2012-11-16           |

\* **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

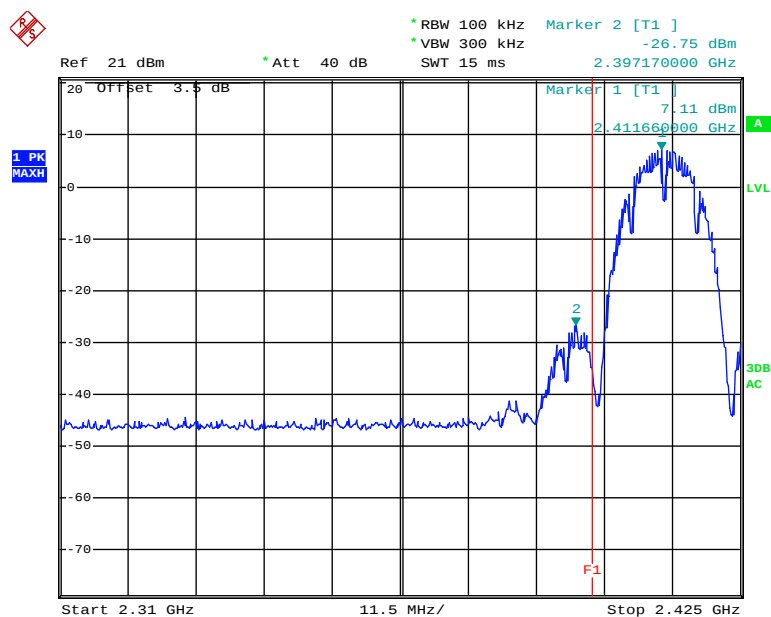
|                    |           |
|--------------------|-----------|
| Temperature:       | 25°C      |
| Relative Humidity: | 56 %      |
| ATM Pressure:      | 100.0 kPa |

*The testing was performed by Jimmy Xiao on 2012-07-04.*

**Test Result:** *Compliance*

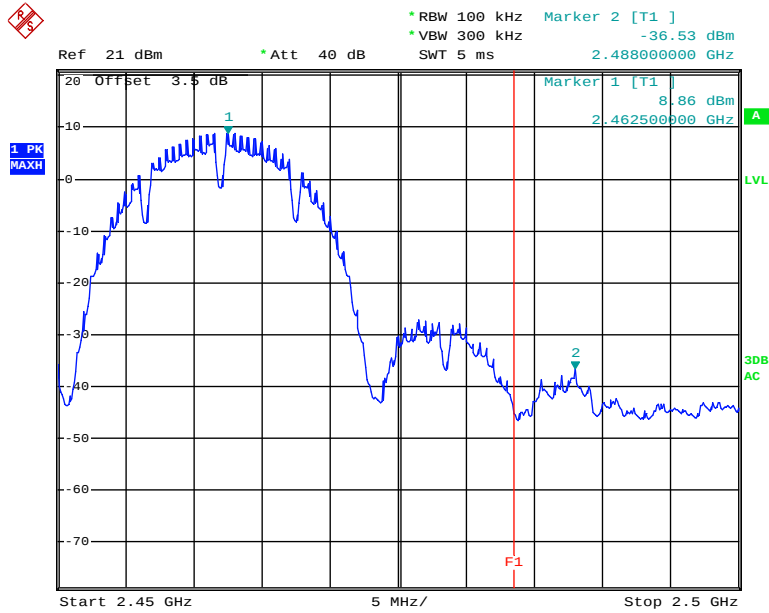
| Channel      | Delta Peak to Band Emission (dBc) | Delta Limit (dBc) | Result |
|--------------|-----------------------------------|-------------------|--------|
| 802.11b mode |                                   |                   |        |
| Left-band    | 33.86                             | 20                | Pass   |
| Right-band   | 45.39                             | 20                | Pass   |
| 802.11g mode |                                   |                   |        |
| Left-band    | 25.20                             | 20                | Pass   |
| Right-band   | 34.44                             | 20                | Pass   |

Please refer to following plots.

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

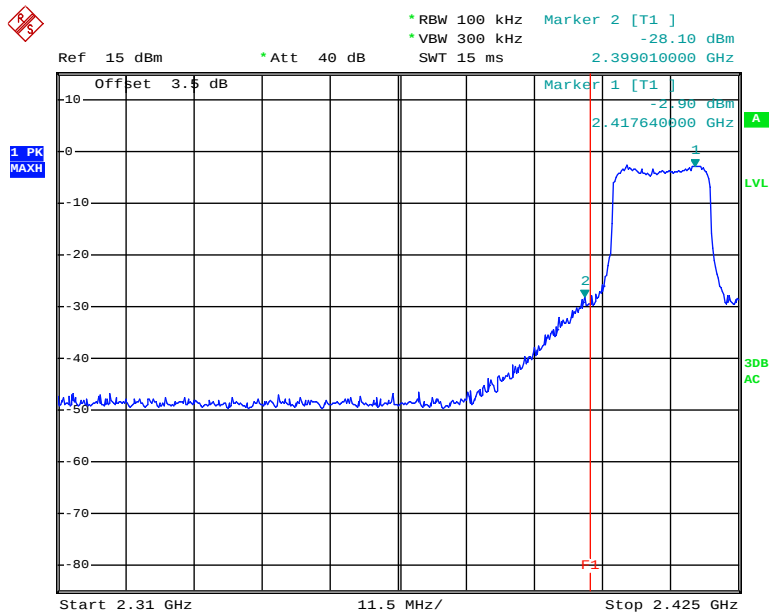
Date: 4.JUL.2012 15:30:18

### 802.11b: Band Edge, Right Side



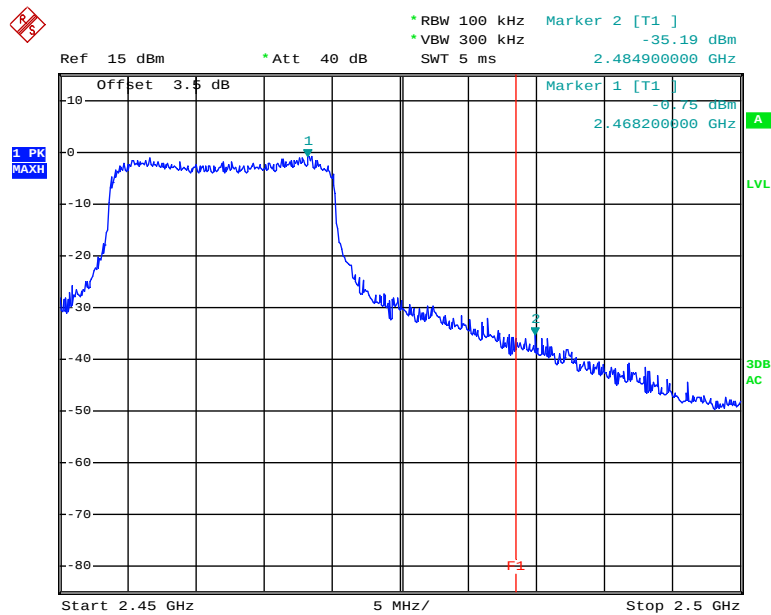
Date: 4.JUL.2012 15:43:53

### 802.11g: Band Edge, Left Side



Date: 4.JUL.2012 15:52:17

# 802.11g: Band Edge, Right Side



Date: 4.JUL.2012 16:00:28

## 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 Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 100 kHz.
3. Set the VBW  $\geq$  300 kHz.
4. Set the span to 5-30 % greater than the EBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
10. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3\text{ kHz}/100\text{ kHz} = -15.2\text{ dB})$ .
11. The resulting peak PSD level must be  $\leq 8\text{ dBm}$ .

### Test Equipment List and Details

| Manufacturer    | Description       | Model | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|-------|---------------|------------------|----------------------|
| Rohde & Schwarz | EMI Test Receiver | ESCI  | 101122        | 2011-11-17       | 2012-11-16           |

\* **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 Data

#### Environmental Conditions

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

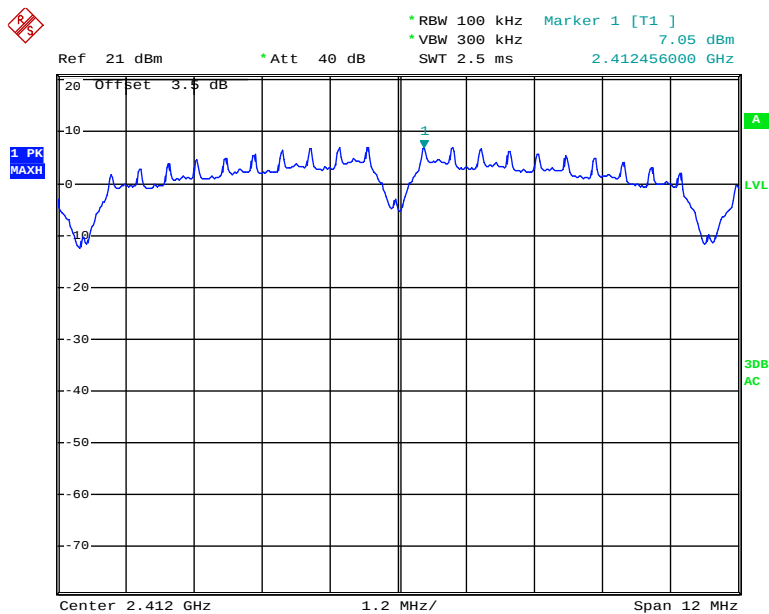
*The testing was performed by Jimmy Xiao on 2012-07-04.*

*Test Mode: Transmitting*

**Test Result:** Pass

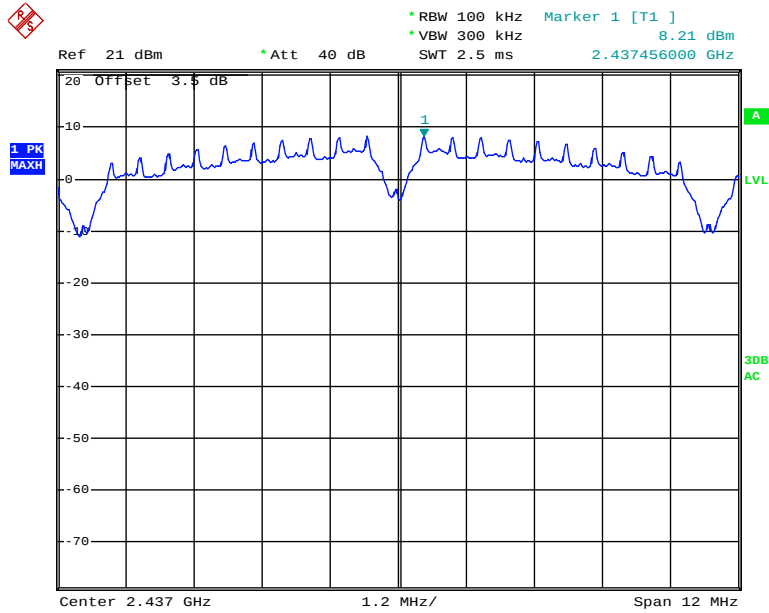
| Channel        | Frequency (MHz) | Data Rate (Mbps) | Power spectral density (dBm/100kHz) | BWCF (dB) | Power spectral density (dBm/3kHz) | Limit (dBm/3kHz) |
|----------------|-----------------|------------------|-------------------------------------|-----------|-----------------------------------|------------------|
| <b>802.11b</b> |                 |                  |                                     |           |                                   |                  |
| Low            | 2412            | 1                | 7.05                                | -15.2     | -8.15                             | 8                |
| Middle         | 2437            | 1                | 8.21                                | -15.2     | -6.99                             | 8                |
| High           | 2462            | 1                | 8.71                                | -15.2     | -6.49                             | 8                |
| <b>802.11g</b> |                 |                  |                                     |           |                                   |                  |
| Low            | 2412            | 6                | -2.31                               | -15.2     | -17.51                            | 8                |
| Middle         | 2437            | 6                | -1.38                               | -15.2     | -16.58                            | 8                |
| High           | 2462            | 6                | -1.12                               | -15.2     | -16.32                            | 8                |

### Power Spectral Density, 802.11b Low Channel



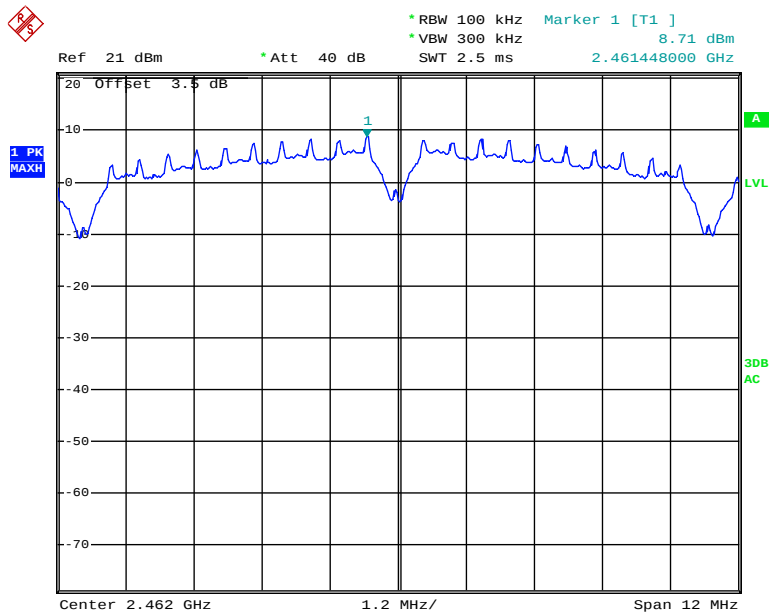
Date: 4.JUL.2012 15:31:29

### Power Spectral Density, 802.11b Middle Channel



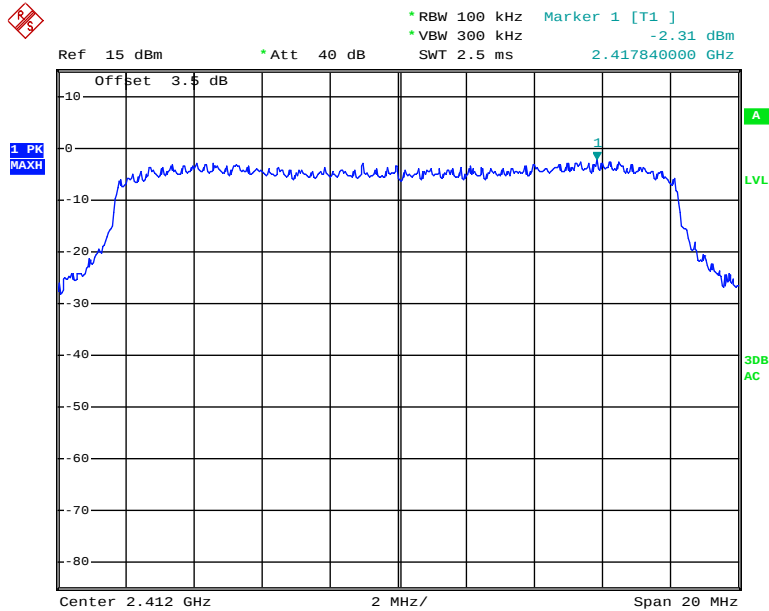
Date: 4.JUL.2012 15:35:24

### Power Spectral Density, 802.11b High Channel



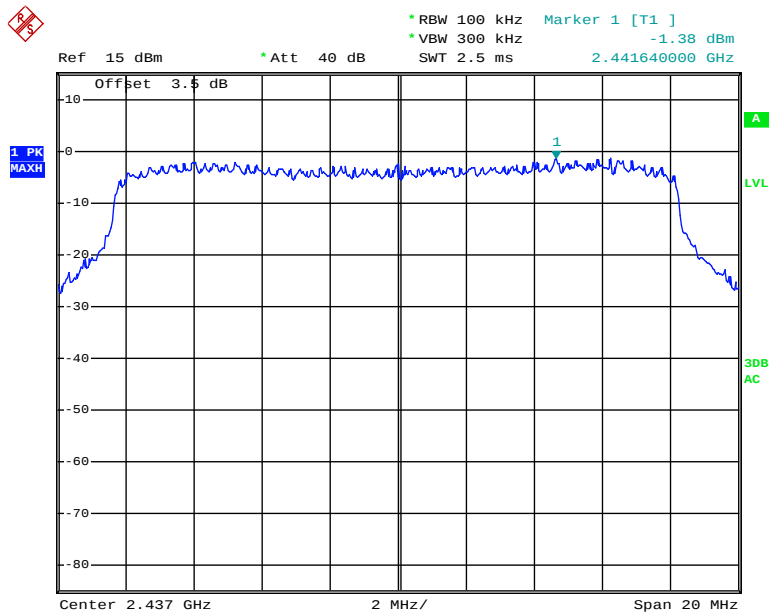
Date: 4.JUL.2012 15:41:40

### Power Spectral Density, 802.11g Low Channel



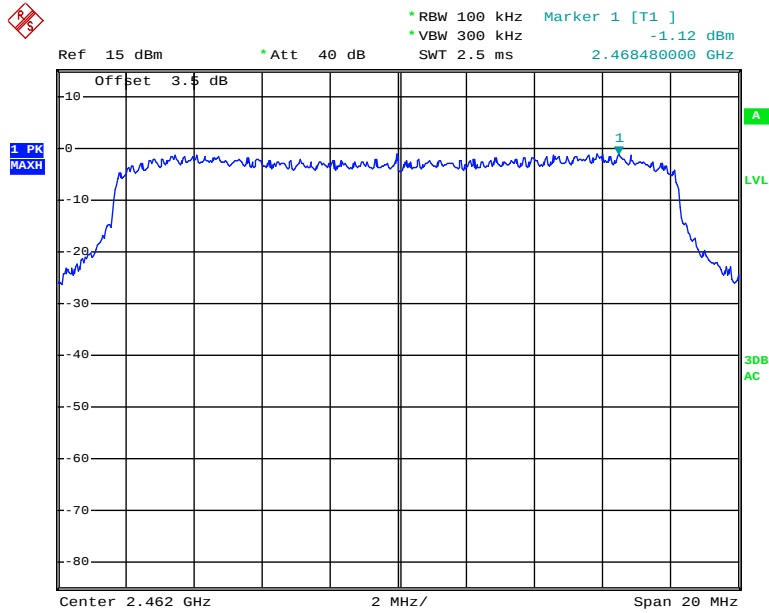
Date: 4.JUL.2012 15:50:51

### Power Spectral Density, 802.11g Middle Channel



Date: 4.JUL.2012 15:56:21

### Power Spectral Density, 802.11g High Channel



Date: 4.JUL.2012 15:57:25

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