

# FCC PART 15.247

## MEASUREMENT AND TEST REPORT

For

Azure Communications Inc.

170 Knowles Drive, Suite 207  
Los Gatos, CA 95032, USA

**FCC ID: TXDAZ2400**  
**Model: AZ-2400**

|   |   |   |
|---|---|---|
| <b>This Report Concerns:</b><br><input checked="" type="checkbox"/> Original Report |   | <b>Product Type:</b><br>Wi-Fi Wireless Access Point |
| <b>Test Engineer:</b>   | James Ma  | <i>James Ma</i> 2006-10-31                          |
| <b>Report No.:</b>  | R0610111-20   |   |
| <b>Report Date:</b>   | 2006-10-30  |   |
| <b>Reviewed By:</b>   | Test Engineer: Daniel Deng  | <i>[Signature]</i> 2006-10-31                       |
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## GENERAL INFORMATION

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

The *Azure Communications Inc.*, FCC ID: *TXDAZ2400* or the “EUT” as referred to in this report is a Wi-Fi Wireless CATV Extension Access Point. The EUT is a point-to-multipoint system operating in the unlicensed 2.4 GHz band using the IEEE 802.11b/g standard. The system allows the end user to send/receive “Ethernet data” traffic wirelessly. The wireless access point is made up of an antenna assembly, baseband processor with an IEEE 802.11b/g radio, embedded DOCSIS cable modem, network interface board, and power supply system.

### Mechanical Description

*Azure Communications Inc.*, FCC ID: *TXDAZ2400* or the “EUT” as referred to in this report is a Wireless Access Point; it measures approximately **368.3mmL x 196.8mmW x 107.9mmH and weighs 9kg.**

*\*The test data gathered are from a typical production sample which is provided by the manufacturer, model number: AZ2400 with the serial number of XG623G65NE06018.*

### EUT Photo



*EUT Front View*



*Antenna Front View*

*Additional photos please refer to Exhibit C*

### Objective

This type approval report is prepared on behalf of *Azure Communications Inc.* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C.

The objective is to determine compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, and power spectral density, 100 kHz Bandwidth of Band Edges Measurement, Spurious Emissions, Conducted and Spurious Radiated Emissions.

**Related Submittal(s)/Grant(s)**

No Related Submittals.

**Test Methodology**

All measurements contained in this report were conducted in accordance with ANSI C63.4-2003.

**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 values range from  $\pm 2.0$  for Conducted Emissions tests and  $\pm 4.0$  dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL.

Detailed instrumentation measurement uncertainties can be found in BACL report QAP-018.

**Test Facility**

The Test site used by BACL Corp. to collect measurement data is located at it's facility in Sunnyvale, California, USA.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. 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, Industry Canada, and Voluntary Control Council for Interference have the reports on file and are listed under FCC file 31040/SIT 1300F2, IC registration number: 3062A, and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

## SYSTEM TEST CONFIGURATION

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### Justification

The host system was configured for testing according to ANSI C63.4-2003.

The EUT was tested in the normal (native) operating mode to represent *worst*-case results during the final qualification test.

### EUT Exercise Software

The EUT exercise program and the following Channel setting were used during the testing:

|         |          |          |          |
|---------|----------|----------|----------|
| 802.11b | 2412 MHZ | 2437 MHZ | 2462 MHZ |
| 802.11g | 2412 MHZ | 2437 MHZ | 2462 MHZ |

### Special Accessories

N/A

### Equipment Modifications

No modifications were made to the EUT.

### Interface Ports and Cabling

| Cable Description | Cable type (S/Us) | From         | To  | Length (M) |
|-------------------|-------------------|--------------|-----|------------|
| Ethernet Cable    | RJ-45             | Dell Lap Top | EUT | 1.5        |

## SUMMARY OF TEST RESULTS

Results reported relate only to the product tested.

| FCC RULES                            | DESCRIPTION OF TEST                     | RESULT    |
|--------------------------------------|---|-----------|
| §2.1091<br>§15.247 (e) (i)           | RF Exposure                             | Compliant |
| §15.203                              | Antenna Requirements                    | Compliant |
| § 15.207 (a)                         | AC Line Conducted Emissions             | Compliant |
| §15.247(d)                           | Spurious Emissions at Antenna Terminals | Compliant |
| §15.205, §15.209 (a) &<br>§15.247(d) | Radiated Spurious Emissions             | Compliant |
| §15.247 (a)(2)                       | 6 dB Bandwidth                          | Compliant |
| §15.247 (b)(3)                       | Maximum Peak Output Power               | Compliant |
| § 15.247 (d)                         | 100 kHz Bandwidth of Band Edge          | Compliant |
| §15.247 (e)                          | Power Spectral Density                  | Compliant |

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## **§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.

And according to § 15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The antenna for this device is an integral, non-disconnectable antenna with a gain of 14.0 dBi.

### **Antenna Description**

The antenna subassembly is a single flat panel patch antenna array printed on a circuit board with a female SMA connector. The antenna is vertically polarized and only one is required for both transmitting and receiving. The antenna offers azimuthal beam width of 30 degrees and approximately 60 degrees of elevation beam width. The maximum antenna gain is 14 dBi. In order to ensure that none but the antenna provided by the manufacturer is utilized, it is permanently embedded into the circuit board assembly. Subsequently, attempted removal or replacement would result in destruction of the connector, thus compromising further use of the device.



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

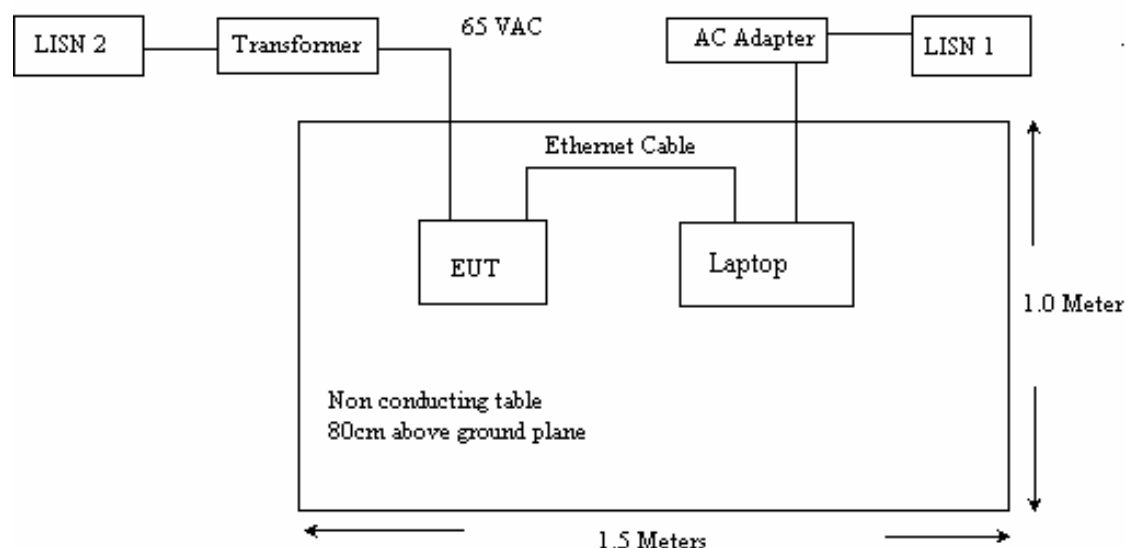
### Test Setup

The measurement was performed at shield room, using the same setup per ANSI C63.4 – 2003 measurement procedure. The specification used was FCC Class B limits.

External I/O cables were draped along the edge of the test table and bundle when necessary.

The EUT was connected with LISN-1.

### Test Setup Block Diagram



### Test Procedure

During the conducted emissions test, the power cord of the EUT was connected to the mains outlet of the LISN-1.

Maximizing procedure was performed on the six (6) highest provided emissions of the EUT.

All the data were recorded in the peak detection mode, quasi-peak and, or, average. Quasi-Peak readings are distinguished with a "QP". Average readings are distinguished with an "Ave".

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 20° C     |
| Relative Humidity: | 56%       |
| ATM Pressure:      | 1024 mbar |

*\*The testing was performed by James Ma on 2006-10-25.*

**Test Equipment List and Details**

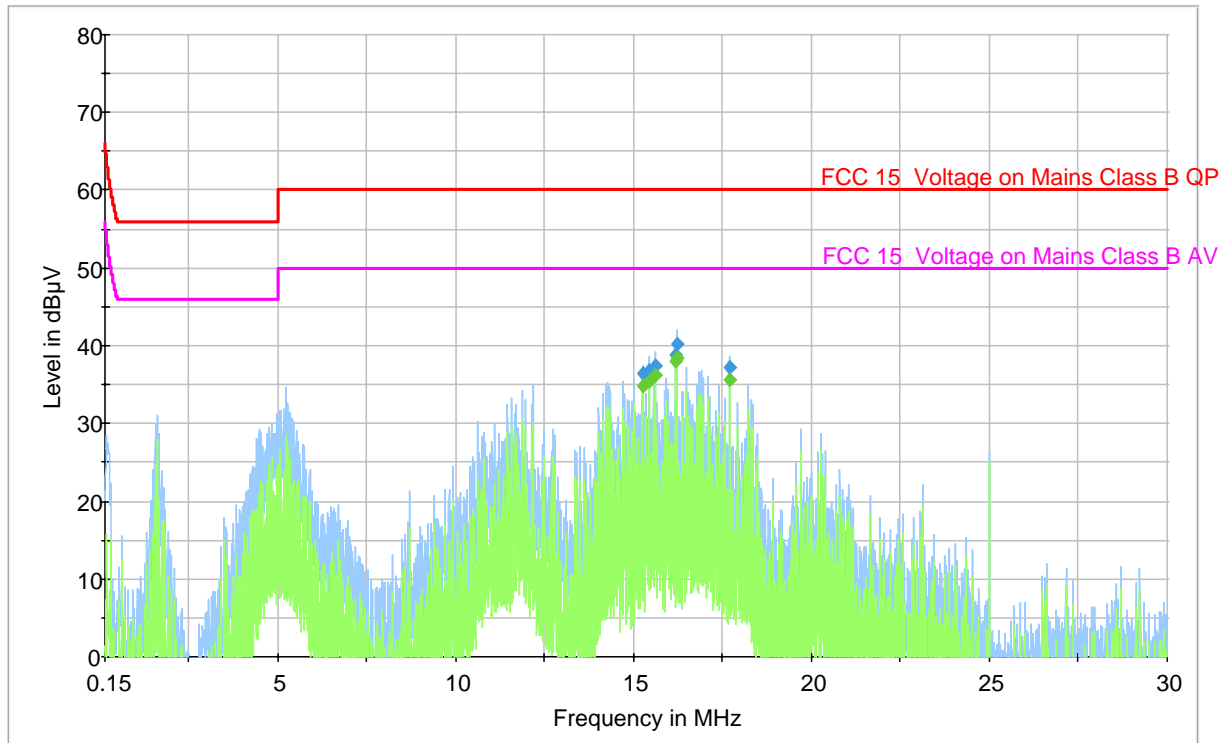
| Manufacturer | Description            | Model   | Serial Number | Cal. Date  |
|--------------|------------------------|---------|---------------|------------|
| R&S          | Receiver, EMI Test     | ESCS30  | 100176        | 2006-03-16 |
| R&S          | LISN, Artificial Mains | ESH2-Z5 | 871884/039    | 2005-11-14 |

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

**Summary of Test Results**

According to the recorded data in following table, the EUT complied with the FCC standard's limits for a Class B device with the *worst* margin reading of:

**-11.7 dB at 17.694000MHz in the Line conductor**

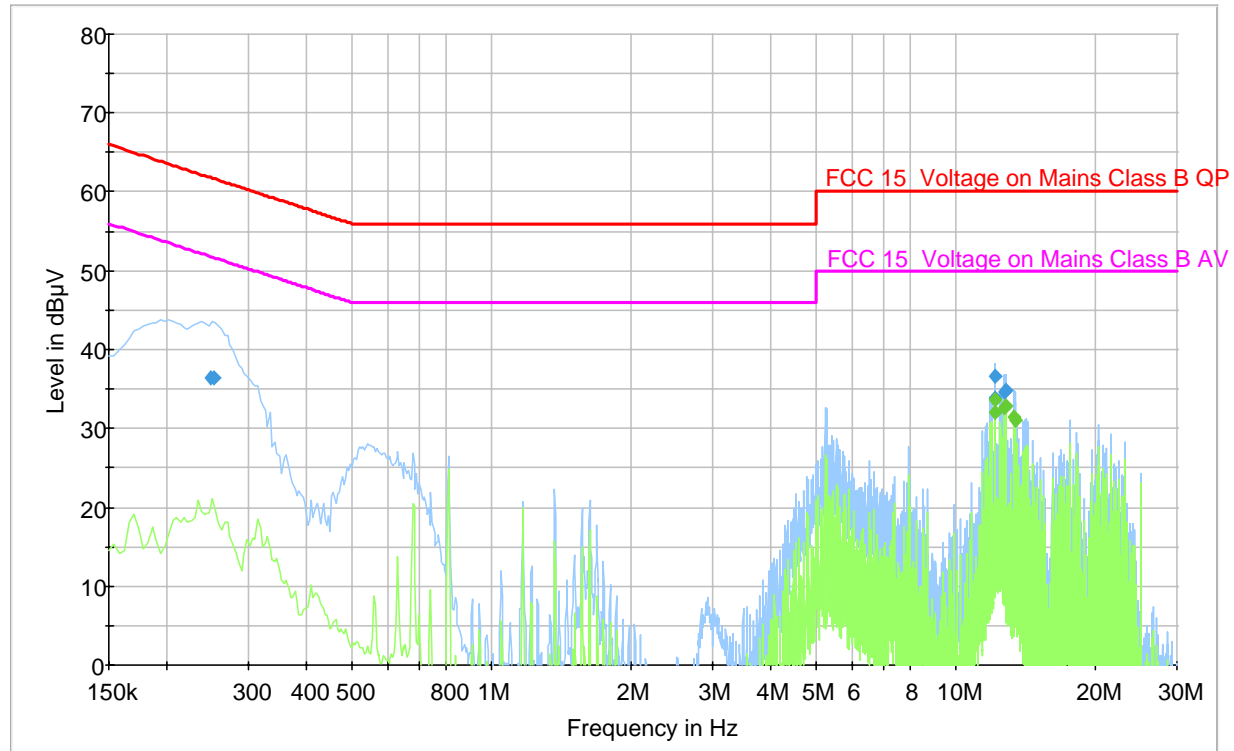
**Conducted Emissions Test plots and Data:****Line:**

QP Measurements (please replace all references to “Line” to “conductor”)

| Frequency (MHz) | Quasi-Peak (dBμV) | Line      | Corrected Reading (dB) | Limit (dBμV) | Margin (dB) |
|-----------------|-------------------|-----------|------------------------|--------------|-------------|
| 16.2300         | 40.2              | conductor | 0.3                    | 60.0         | -19.8       |
| 16.1660         | 38.9              | conductor | 0.3                    | 60.0         | -21.1       |
| 15.6180         | 37.4              | conductor | 0.3                    | 60.0         | -22.6       |
| 17.6940         | 37.2              | conductor | 0.5                    | 60.0         | -22.8       |
| 15.4340         | 36.9              | conductor | 0.4                    | 60.0         | -23.1       |
| 15.2500         | 36.5              | conductor | 0.4                    | 60.0         | -23.5       |

**Average Measurements**

| Frequency (MHz) | Average (dBμV) | Line      | Corrected Reading (dB) | Limit (dBμV) | Margin (dB) |
|-----------------|----------------|-----------|------------------------|--------------|-------------|
| 17.6940         | 35.6           | conductor | 0.5                    | 50.0         | -11.7       |
| 16.2300         | 38.4           | conductor | 0.3                    | 50.0         | -12.0       |
| 16.1660         | 38.0           | conductor | 0.3                    | 50.0         | -13.8       |
| 15.6180         | 36.2           | conductor | 0.3                    | 50.0         | -14.5       |
| 15.4340         | 35.5           | conductor | 0.4                    | 50.0         | -14.5       |
| 15.4340         | 35.5           | conductor | 0.4                    | 50.0         | -15.3       |

**Conducted Emissions Test plots and Data:****Neutral:****QP Measurements**

| Frequency (MHz) | Quasi-Peak (dBμV) | Line | Corrected Reading (dB) | Limit (dBμV) | Margin (dB) |
|-----------------|-------------------|------|------------------------|--------------|-------------|
| 12.1970         | 36.6              | N    | 0.4                    | 60.0         | -23.4       |
| 12.8090         | 34.9              | N    | 0.4                    | 60.0         | -25.1       |
| 0.2530          | 36.4              | N    | 0.2                    | 61.7         | -25.3       |
| 12.7490         | 34.7              | N    | 0.4                    | 60.0         | -25.3       |
| 0.2490          | 36.4              | N    | 0.2                    | 61.8         | -25.4       |
| 12.1370         | 33.8              | N    | 0.4                    | 60.0         | -26.2       |

**Average Measurements**

| Frequency (MHz) | Average (dBμV) | Line | Corrected Reading (dB) | Limit (dBμV) | Margin (dB) |
|-----------------|----------------|------|------------------------|--------------|-------------|
| 12.1970         | 33.5           | N    | 0.4                    | 50.0         | -16.5       |
| 12.8090         | 32.9           | N    | 0.4                    | 50.0         | -17.1       |
| 12.7490         | 32.6           | N    | 0.4                    | 50.0         | -17.4       |
| 12.1370         | 32.1           | N    | 0.4                    | 50.0         | -17.9       |
| 13.3570         | 31.4           | N    | 0.5                    | 50.0         | -18.6       |
| 13.4210         | 31.1           | N    | 0.5                    | 50.0         | -18.9       |

## **§2.1051 & §15.247(d) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

### **Applicable Standard**

Requirements: CFR 47, § 2.1051.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

### **Measurement Procedure**

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### **Equipment Lists**

| Manufacturer | Description        | Model  | Serial Number | Cal. Date  |
|--------------|--------------------|--------|---------------|------------|
| Agilent      | Analyzer, Spectrum | E4446A | US44300386    | 2006-03-06 |

\* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### **Environmental Conditions**

|                    |           |
|--------------------|-----------|
| Temperature:       | 20° C     |
| Relative Humidity: | 56%       |
| ATM Pressure:      | 1024 mbar |

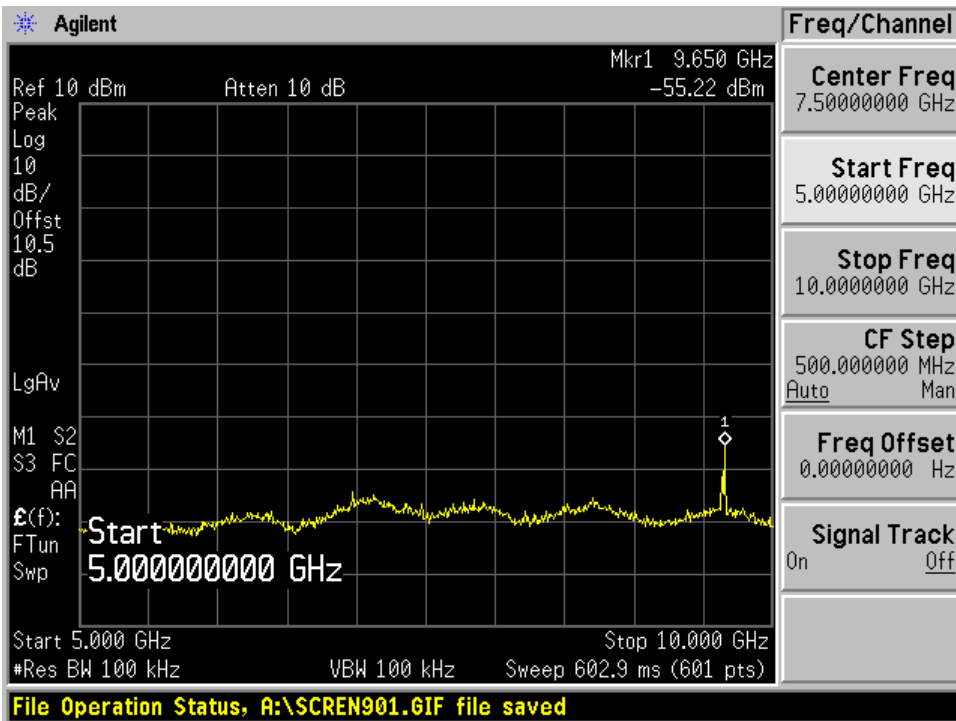
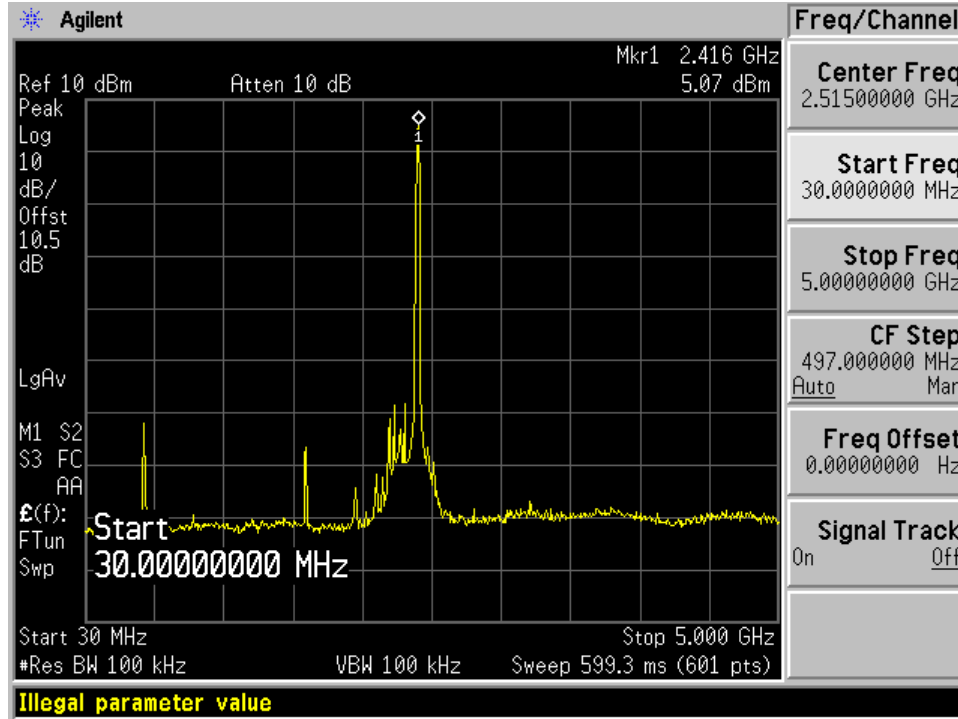
*\*The testing was performed by James Ma on 2006-10-25.*

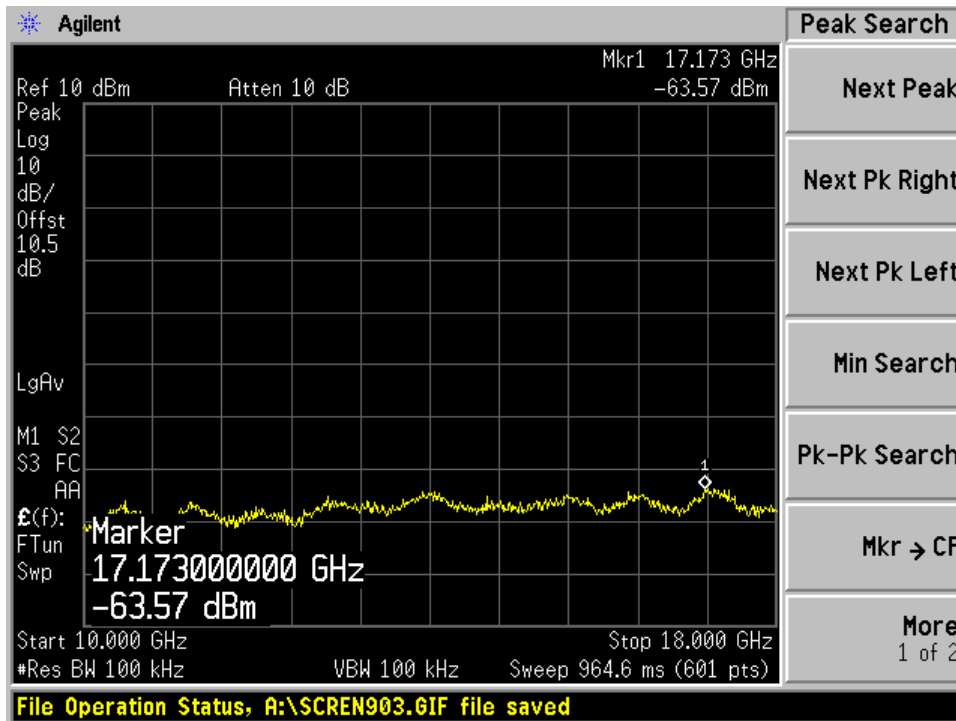
### **Measurement Results**

Please refer to following pages for plots of spurious emissions.

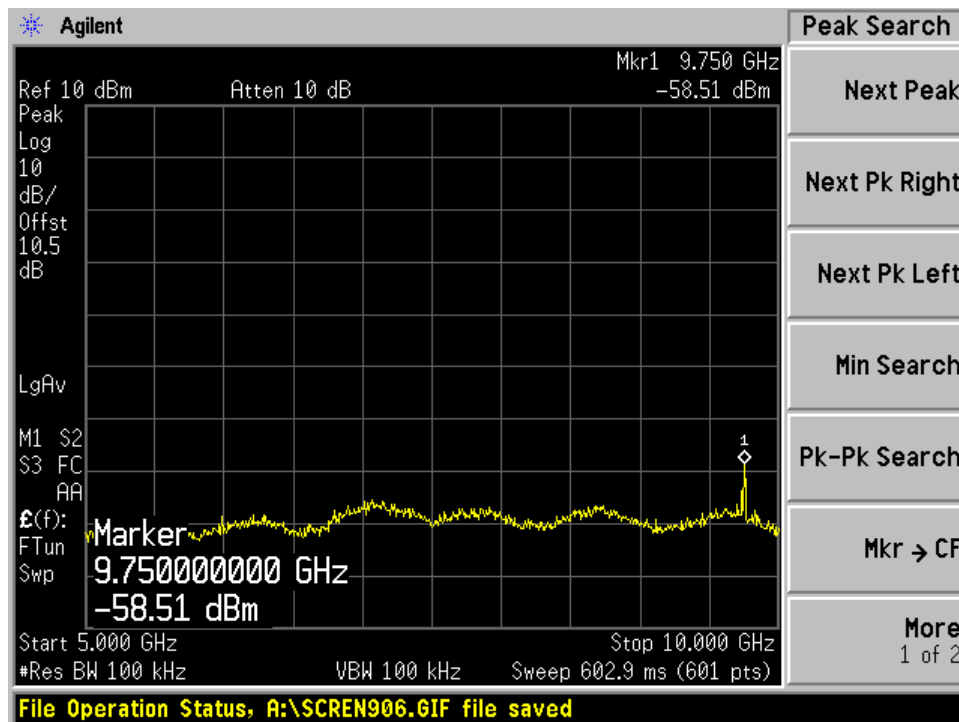
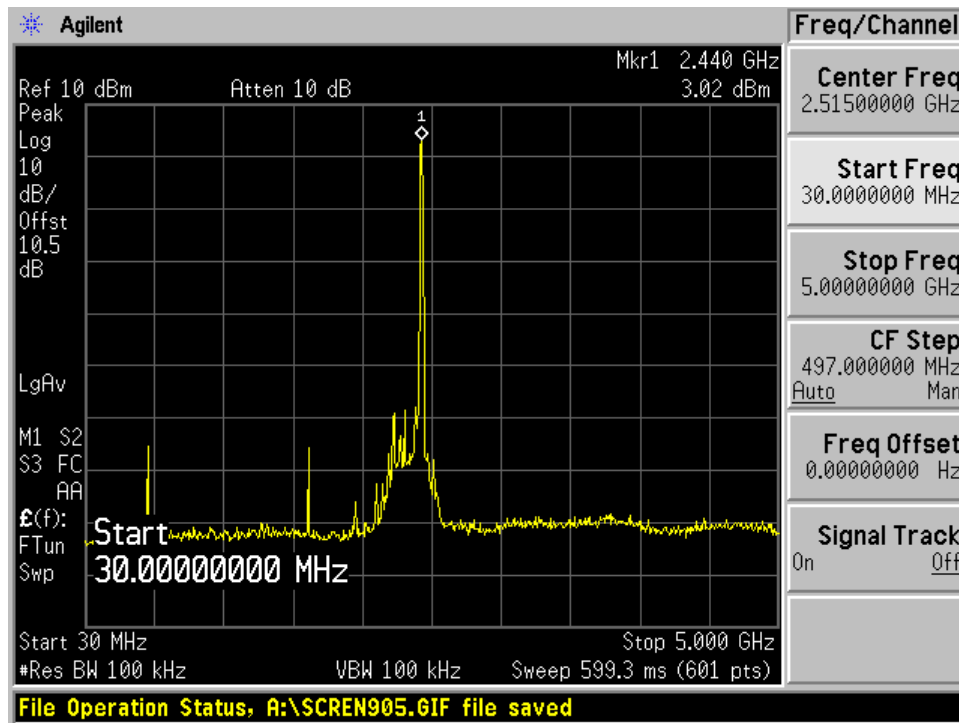
**802.11b**

## Low Channel-1

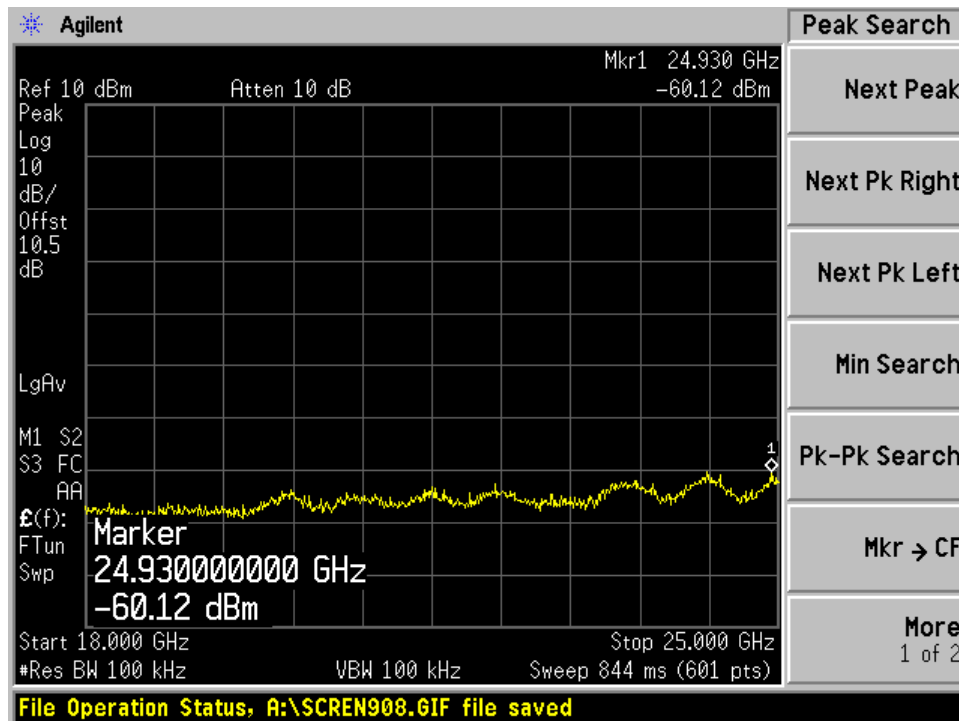




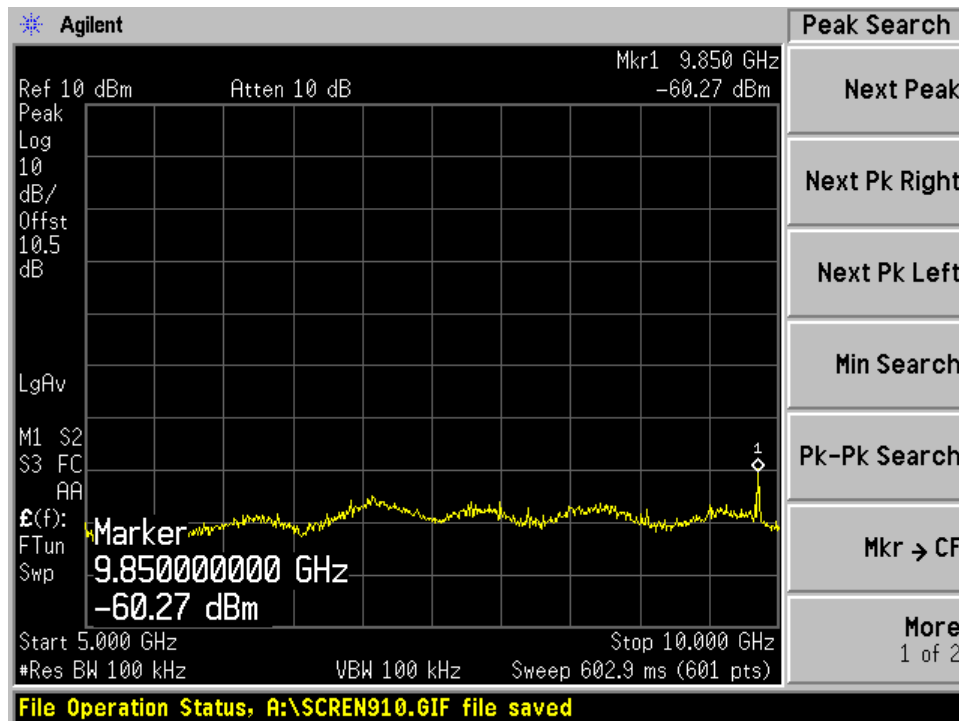
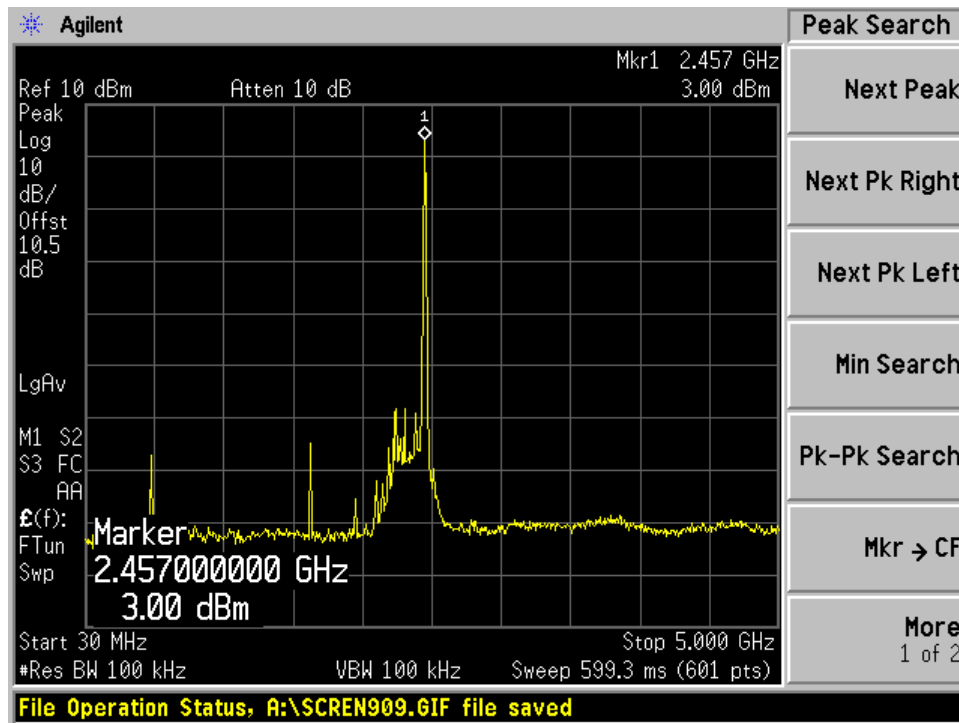
## Middle Channel-6

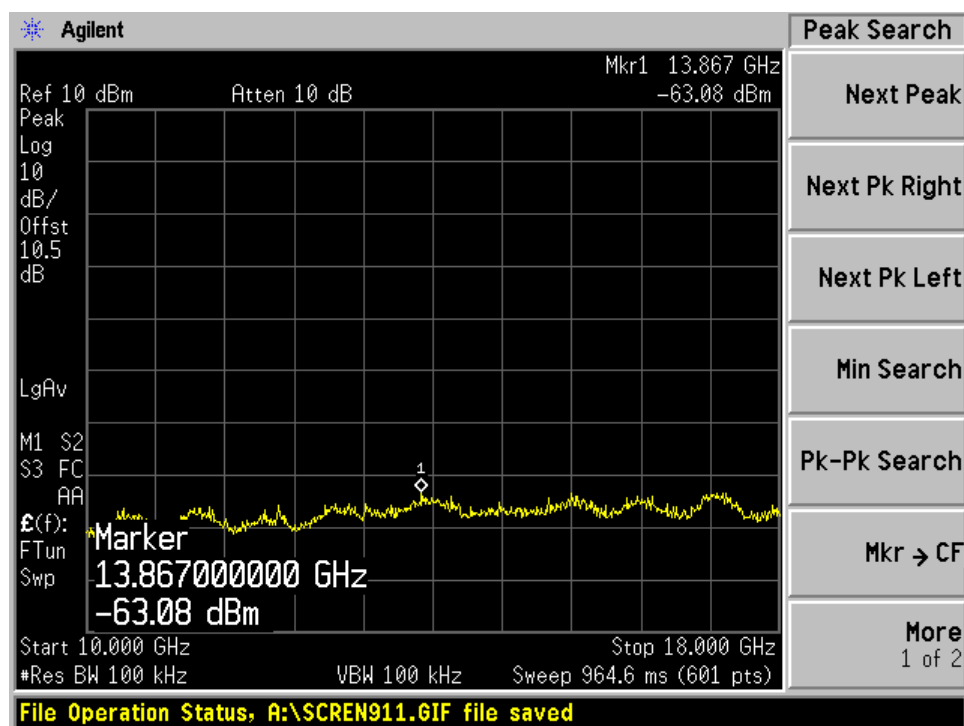






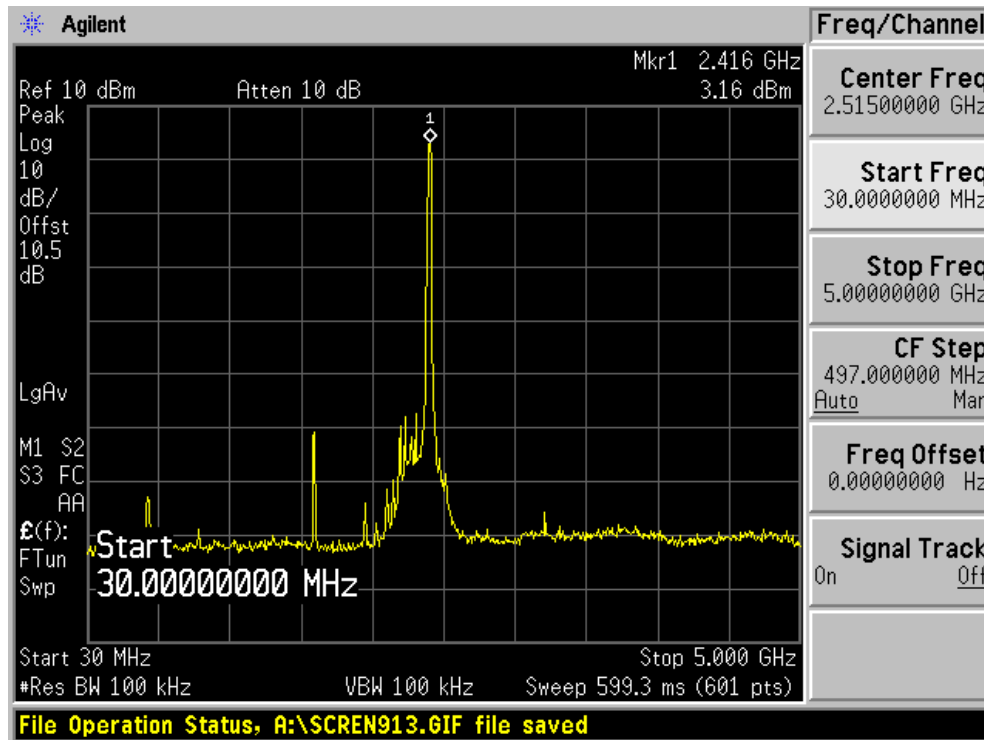
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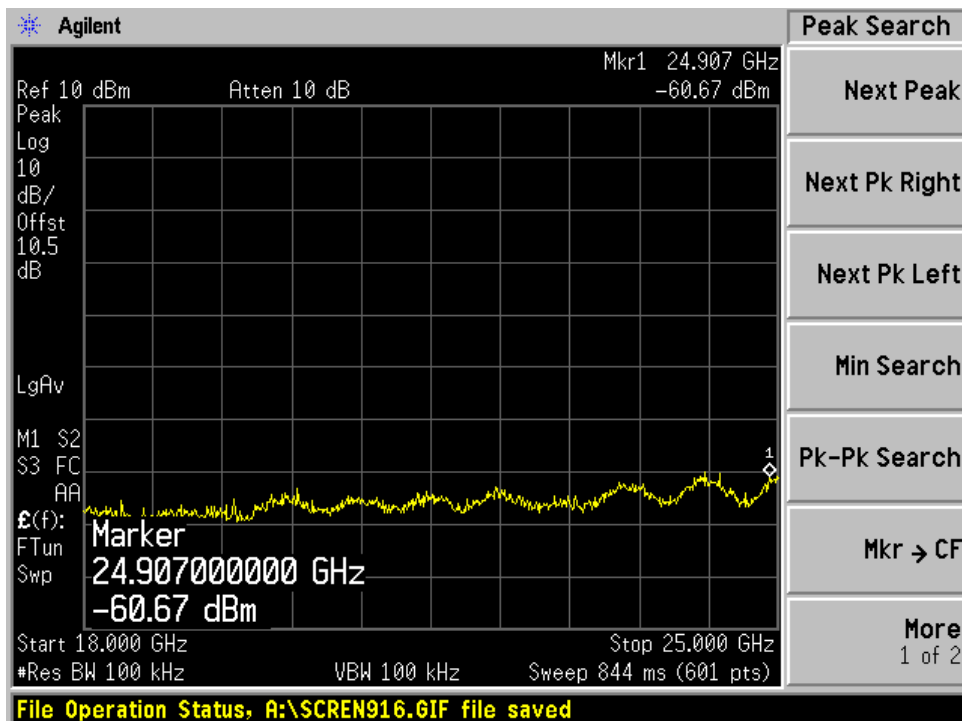
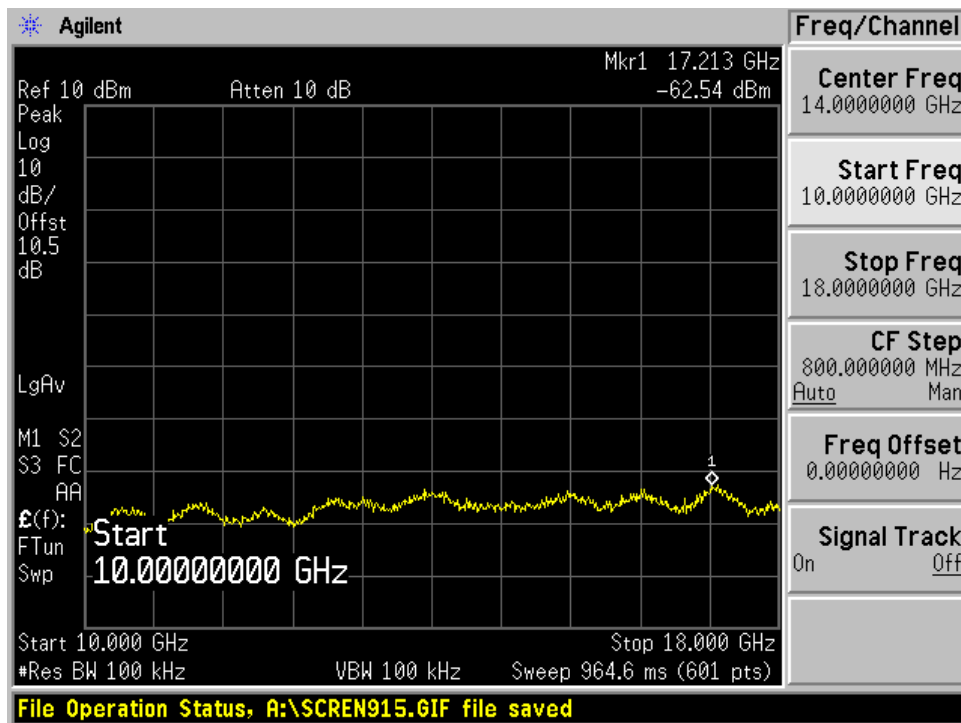




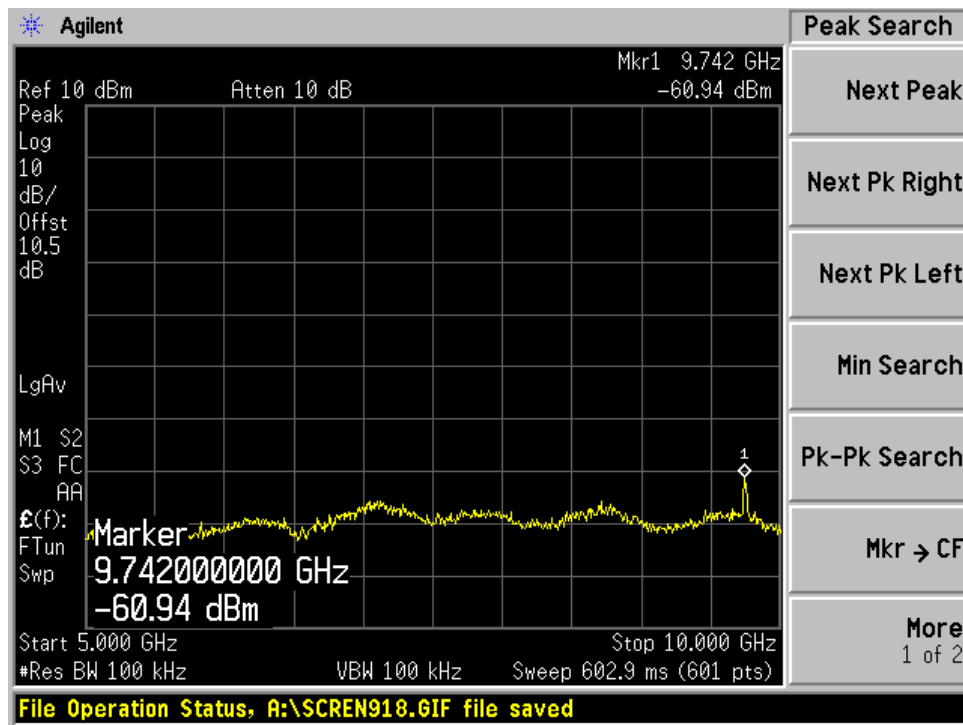
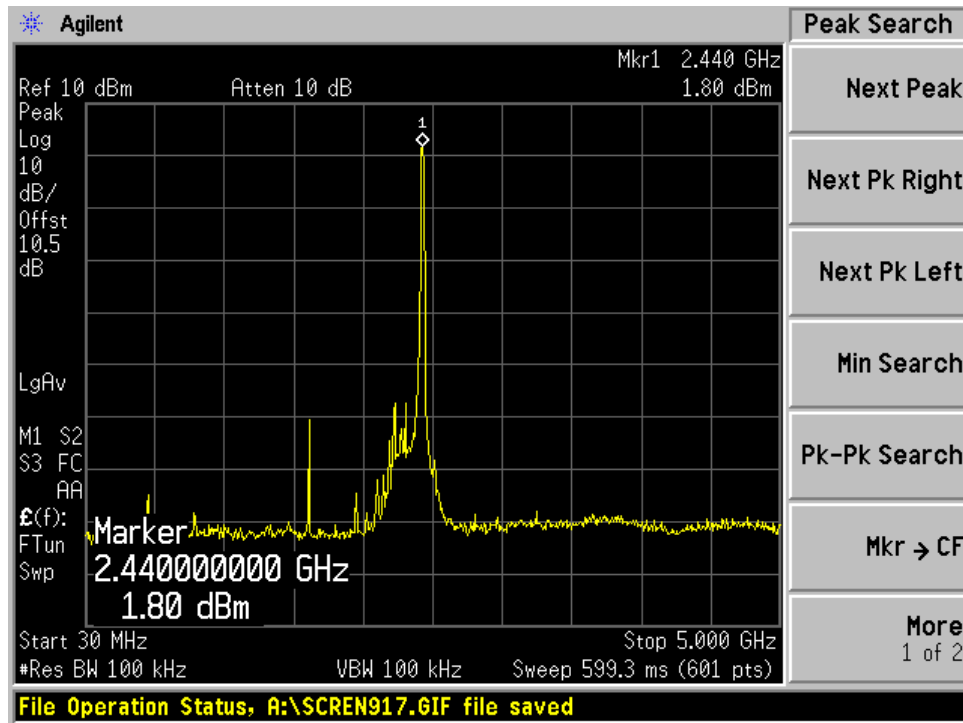
**802.11g**

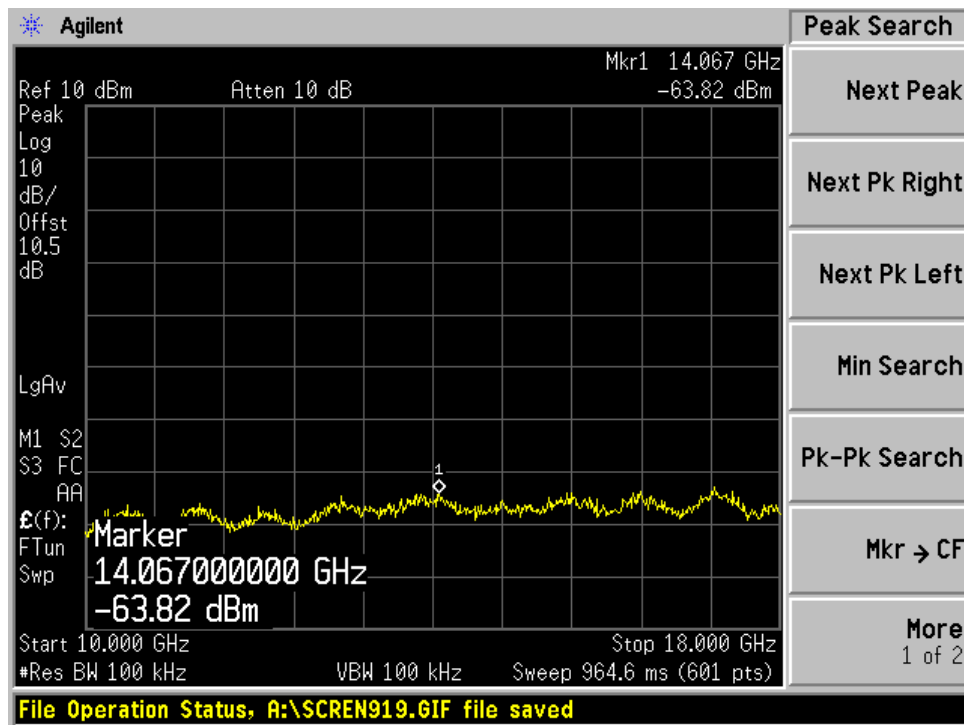
Low Channel-1



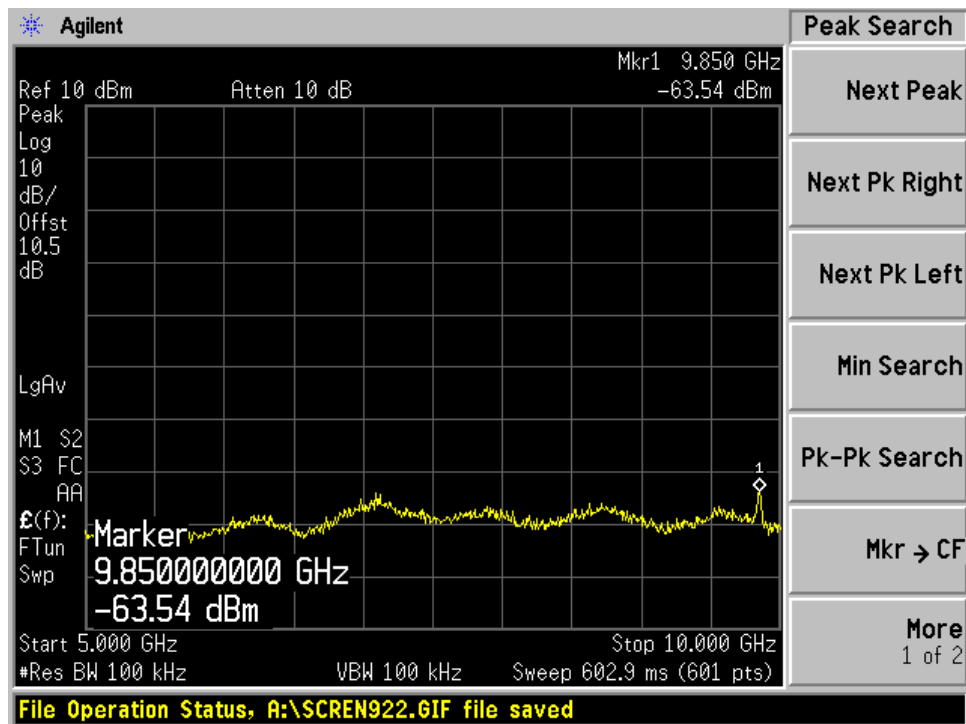
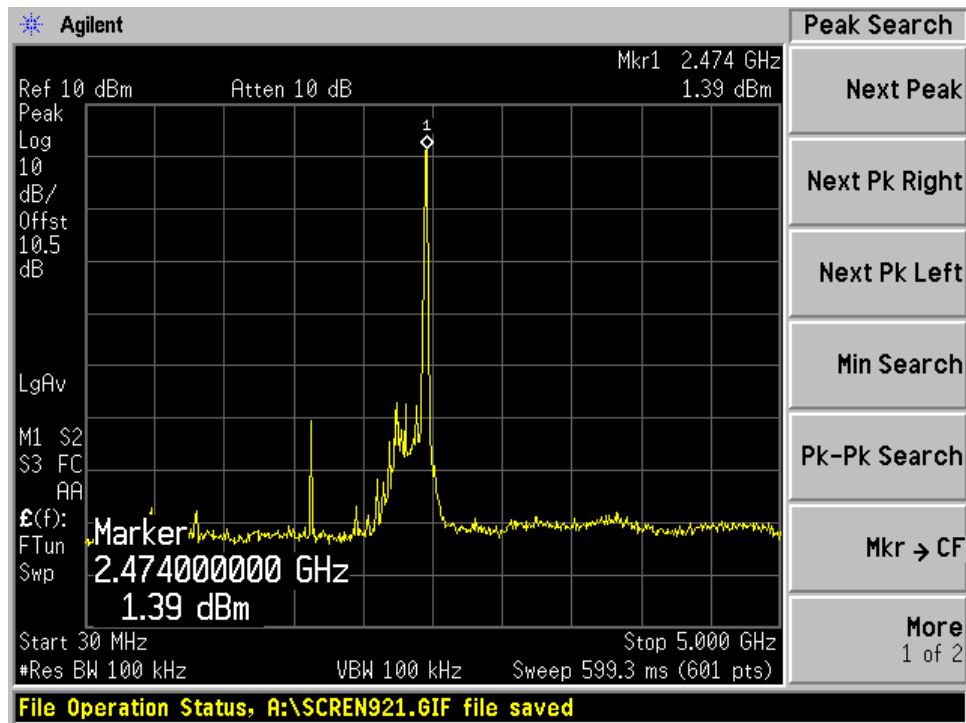


## Middle Channel-6

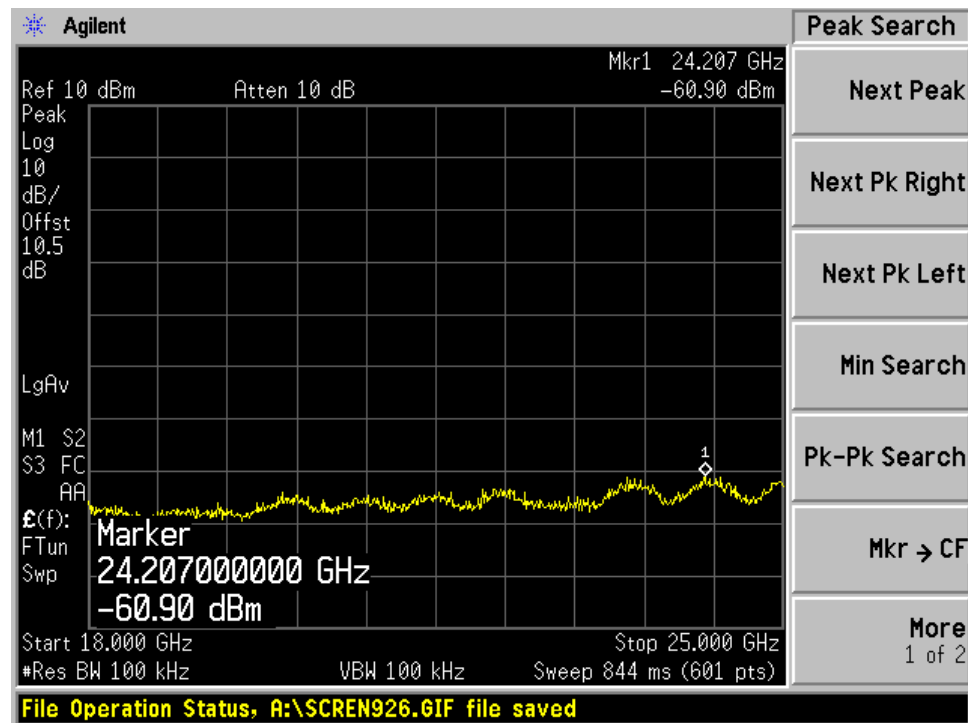
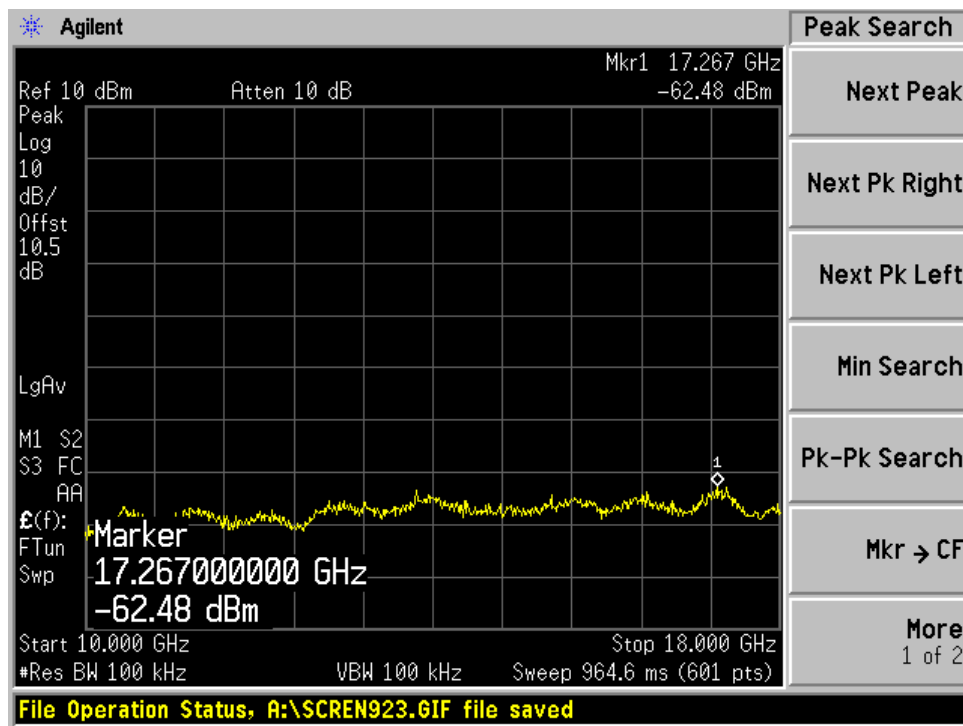


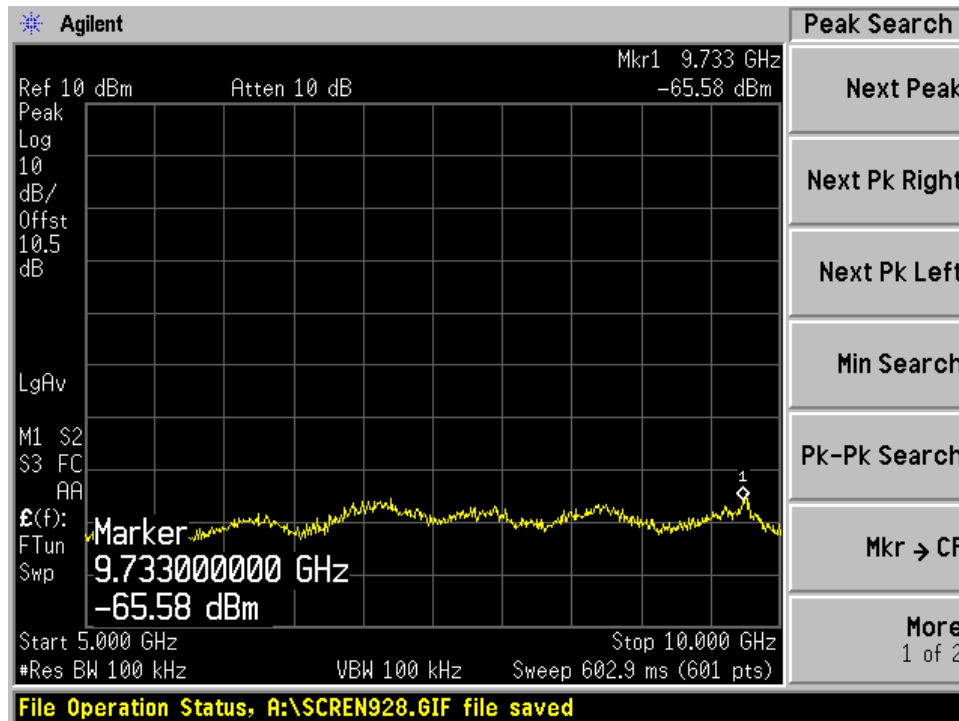
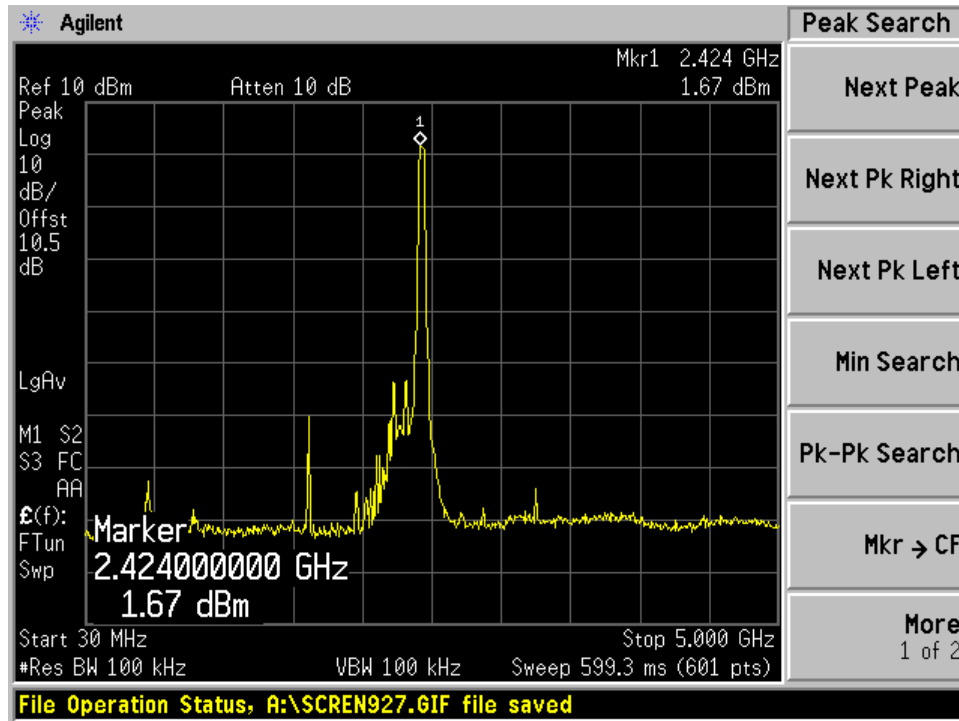


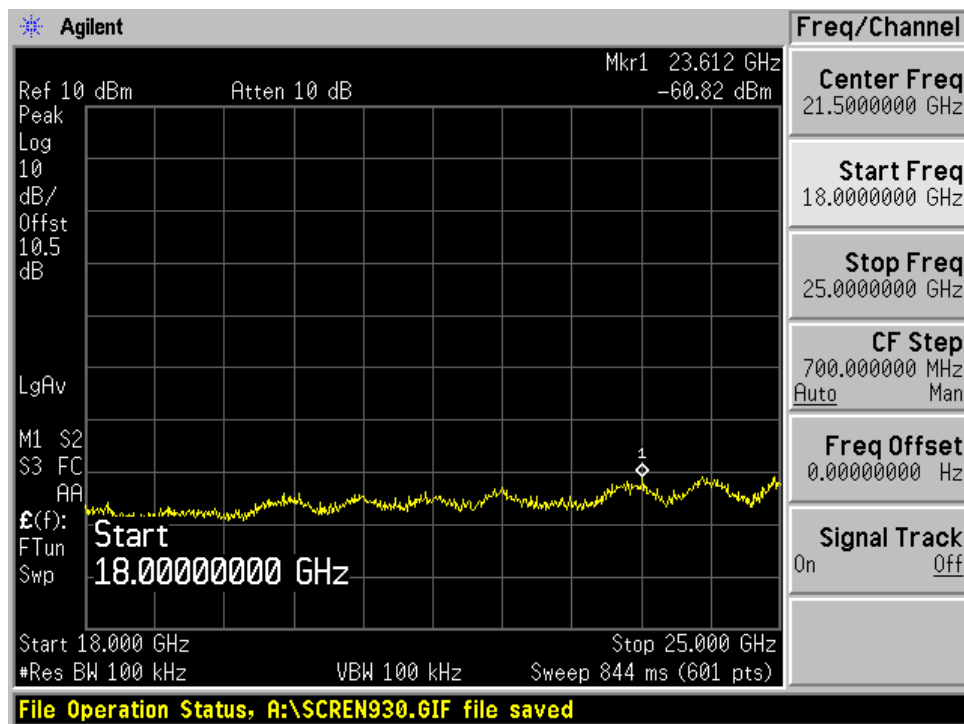
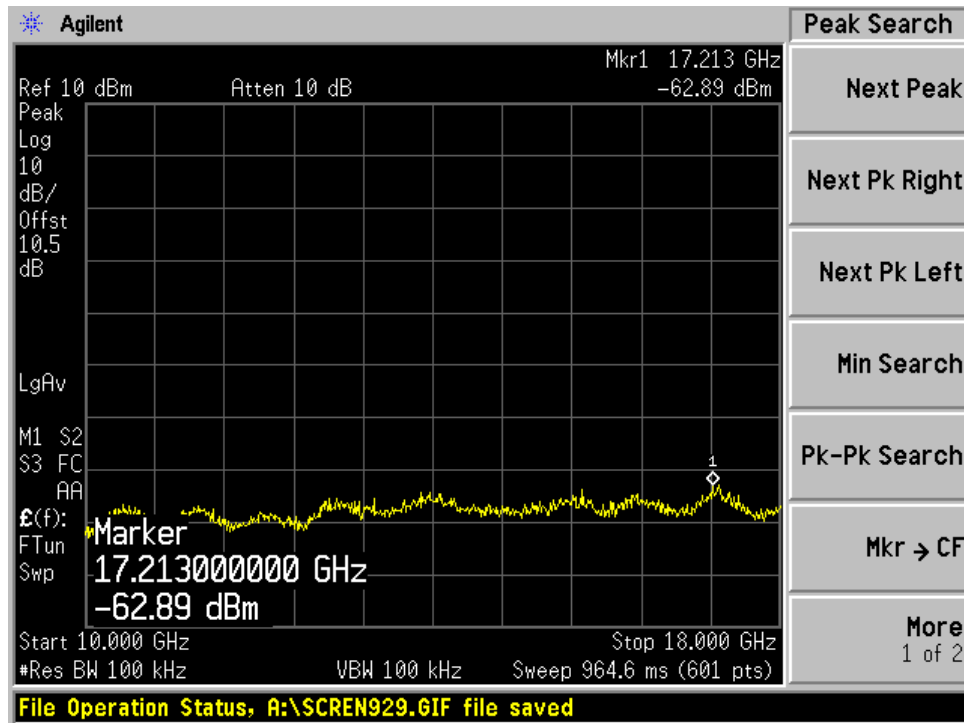
## High Channel-11







**Super-G**  
Middle Channel-6



## **§15.205, §15.209 (a) & §15.247(d) – RADIATED SPURIOUS EMISSIONS**

### **Test Setup**

The radiated emissions tests were performed in the 3-meter chamber, using the setup in accordance with ANSI C63.4-2003. The specifications used are the FCC 15 Subpart C limits.

### **Test Equipment List and Details**

| <b>Manufacturer</b> | <b>Description</b>            | <b>Model</b> | <b>Serial Number</b> | <b>Cal. Date</b> |
|---------------------|-------------------------------|--------------|----------------------|------------------|
| Sonoma              | Amplifier, Pre                | 317          | 260408               | 2006-02-03       |
| Agilent             | Analyzer, Spectrum            | E4446A       | US44300386           | 2006-03-06       |
| HP                  | Amplifier, Pre (1 ~ 26.5 GHz) | 8449B        | 3147A00400           | 2006-08-10       |
| Sunol Sciences      | Antenna                       | JB3          | A020106-3/S006628    | 2006-03-14       |
| A. R.A              | Antenna, Horn                 | DRG-118/A    | 1132                 | 2005-08-17       |

**\* Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### **Environmental Conditions**

|                    |           |
|--------------------|-----------|
| Temperature:       | 20° C     |
| Relative Humidity: | 56%       |
| ATM Pressure:      | 1024 mbar |

*\*The testing was performed by James Ma on 2006-10-25.*

## Test Procedure

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations.

All data were recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limits), and are distinguished with a "QP" in the data table.

## Corrected Amplitude & Margin Calculation

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

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

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 emissions is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Part 15.247 Limit}$$

## Summary of Test Results

According to the data hereinafter, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.209 and 15.247, and had the worst margin of:

802.11b:

- 17.1 dB at 7236.0 MHz in the **Vertical** polarization, **Low** Channel
- 17.5 dB at 7311.0 MHz in the **Vertical** polarization, **Middle** Channel
- 17.8 dB at 7386.0 MHz in the **Vertical** polarization, **High** Channel

802.11g:

- 17.1 dB at 7236.0 MHz in the **Vertical** polarization, **Low** Channel
- 17.8 dB at 7311.0 MHz in the **Vertical** polarization, **Middle** Channel
- 18.4 dB at 7386.0 MHz in the **Vertical** polarization, **High** Channel

Super-g

- 17.8 dB at 7311.0 MHz in the **Vertical** polarization, **Middle** Channel

**Run#1 Radiated Harmonics and Spur Emissions***802.11b Low Channel:*

| Frequency | Reading | Azimuth | Height | Polarization | Antenna Factor | Cable Loss | Amplifier Gain | Corrected Reading | Limit  | Margin | Comments  |
|-----------|---------|---------|--------|--------------|----------------|------------|----------------|-------------------|--------|--------|-----------|
| MHz       | dBuV    | Degrees | Meters | H / V        | dB/m           | dB         | dB             | dBuV/m            | dBuV/m | (dB)   |           |
| 2412.0    | 119.8   | 0       | 1.0    | v            | 28.7           | 1.5        | 35.8           | 114.1             |        |        | Fund/Peak |
| 2412.0    | 104.2   | 90      | 1.2    | h            | 28.7           | 1.5        | 35.8           | 98.5              |        |        | Fund/Peak |
| 2412.0    | 115.0   | 0       | 1.2    | v            | 28.7           | 1.5        | 35.8           | 109.3             |        |        | Ave       |
| 2412.0    | 100.4   | 90      | 1.2    | h            | 28.7           | 1.5        | 35.8           | 94.7              |        |        | Ave       |
| 7236.0    | 30.7    | 180     | 2.0    | v            | 36.7           | 4.2        | 34.7           | 36.9              | 54     | -17.1  | Ave       |
| 7236.0    | 29.5    | 90      | 2.0    | h            | 36.7           | 4.2        | 34.7           | 35.7              | 54     | -18.3  | Ave       |
| 4824.0    | 31.1    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 30.7              | 54     | -23.3  | Ave       |
| 4824.0    | 30.0    | 180     | 2.3    | h            | 32.5           | 1.9        | 34.8           | 29.6              | 54     | -24.4  | Ave       |
| 7236.0    | 32.0    | 90      | 2.0    | v            | 36.7           | 4.2        | 34.7           | 38.2              | 74     | -35.8  | Peak      |
| 7236.0    | 30.0    | 180     | 2.0    | h            | 36.7           | 4.2        | 34.7           | 36.2              | 74     | -37.8  | Peak      |
| 4824.0    | 32.2    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 31.8              | 74     | -42.2  | Peak      |
| 4824.0    | 30.4    | 180     | 2.3    | h            | 32.5           | 1.9        | 34.8           | 30.0              | 74     | -44.0  | Peak      |

*802.11b Middle Channel:*

| Frequency | Reading | Azimuth | Height | Polarization | Antenna Factor | Cable Loss | Amplifier Gain | Corrected Reading | Limit  | Margin | Comments  |
|-----------|---------|---------|--------|--------------|----------------|------------|----------------|-------------------|--------|--------|-----------|
| MHz       | dBuV    | Degrees | Meters | H / V        | dB/m           | dB         | dB             | dBuV/m            | dBuV/m | (dB)   |           |
| 2437.0    | 118.2   | 0       | 1.3    | v            | 28.7           | 1.5        | 35.8           | 112.5             |        |        | Fund/Peak |
| 2437.0    | 103.1   | 90      | 1.2    | h            | 28.7           | 1.5        | 35.8           | 97.4              |        |        | Fund/Peak |
| 2437.0    | 114.5   | 0       | 1.3    | v            | 28.7           | 1.5        | 35.8           | 108.8             |        |        | Ave       |
| 2437.0    | 100.2   | 90      | 1.2    | h            | 28.7           | 1.5        | 35.8           | 94.5              |        |        | Ave       |
| 7311.0    | 30.3    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 36.5              | 54     | -17.5  | Ave       |
| 7311.0    | 30.0    | 180     | 2.1    | h            | 36.7           | 4.2        | 34.7           | 36.2              | 54     | -17.8  | Ave       |
| 4874.0    | 32.0    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 31.6              | 54     | -22.4  | Ave       |
| 4874.0    | 30.0    | 180     | 2.2    | h            | 32.5           | 1.9        | 34.8           | 29.6              | 54     | -24.4  | Ave       |
| 7311.0    | 32.0    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 38.2              | 74     | -35.8  | Peak      |
| 7311.0    | 31.1    | 180     | 2.3    | h            | 36.7           | 4.2        | 34.7           | 37.3              | 74     | -36.7  | Peak      |
| 4874.0    | 33.0    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 32.6              | 74     | -41.4  | Peak      |
| 4874.0    | 31.0    | 180     | 2.2    | h            | 32.5           | 1.9        | 34.8           | 30.6              | 74     | -43.4  | Peak      |

*802.11b High Channel:*

| Frequency | Reading | Azimuth | Height | Polarization | Antenna Factor | Cable Loss | Amplifier Gain | Corrected Reading | Limit  | Margin | Comments  |
|-----------|---------|---------|--------|--------------|----------------|------------|----------------|-------------------|--------|--------|-----------|
| MHz       | dBuV    | Degrees | Meters | H / V        | dB/m           | dB         | dB             | dBuV/m            | dBuV/m | (dB)   |           |
| 2462.0    | 118.1   | 0       | 1.3    | v            | 28.7           | 1.5        | 35.8           | 112.4             |        |        | Fund/Peak |
| 2462.0    | 102.2   | 90      | 1.2    | h            | 28.7           | 1.5        | 35.8           | 96.5              |        |        | Fund/Peak |
| 2462.0    | 113.6   | 0       | 1.3    | v            | 28.7           | 1.5        | 35.8           | 107.9             |        |        | Fund/Peak |
| 2462.0    | 99.7    | 90      | 1.2    | h            | 28.7           | 1.5        | 35.8           | 94.0              |        |        | Ave       |
| 7386.0    | 30.0    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 36.2              | 54     | -17.8  | Peak      |
| 7386.0    | 30.0    | 90      | 2.1    | h            | 36.7           | 4.2        | 34.7           | 36.2              | 54     | -17.8  | Peak      |
| 4924.0    | 30.4    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 30.0              | 54     | -24.0  | Ave       |
| 4924.0    | 29.2    | 90      | 2.1    | h            | 32.5           | 1.9        | 34.8           | 28.8              | 54     | -25.2  | Ave       |
| 7386.0    | 31.6    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 37.8              | 74     | -36.2  | Ave       |
| 7386.0    | 30.8    | 90      | 2.1    | h            | 36.7           | 4.2        | 34.7           | 37.0              | 74     | -37.0  | Peak      |
| 4924.0    | 32.2    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 31.8              | 74     | -42.2  | Ave       |
| 4924.0    | 30.0    | 90      | 2.1    | h            | 32.5           | 1.9        | 34.8           | 29.6              | 74     | -44.4  | Ave       |

*802.11g Low Channel:*

| Frequency | Reading | Azimuth | Height | Polarization | Antenna Factor | Cable Loss | Amplifier Gain | Corrected Reading | Limit  | Margin | Comments  |
|-----------|---------|---------|--------|--------------|----------------|------------|----------------|-------------------|--------|--------|-----------|
| MHz       | dBuV    | Degrees | Meters | H / V        | dB/m           | dB         | dB             | dBuV/m            | dBuV/m | (dB)   |           |
| 2412.0    | 116.2   | 90      | 1.0    | v            | 28.7           | 1.5        | 35.8           | 110.5             |        |        | Fund/Peak |
| 2412.0    | 102.5   | 0       | 1.2    | h            | 28.7           | 1.5        | 35.8           | 96.8              |        |        | Fund/Peak |
| 2412.0    | 110.7   | 180     | 1.2    | v            | 28.7           | 1.5        | 35.8           | 105.0             |        |        | Ave       |
| 2412.0    | 96.4    | 0       | 1.2    | h            | 28.7           | 1.5        | 35.8           | 90.7              |        |        | Ave       |
| 7236.0    | 30.7    | 180     | 2.0    | v            | 36.7           | 4.2        | 34.7           | 36.9              | 54     | -17.1  | Ave       |
| 7236.0    | 29.5    | 90      | 2.0    | h            | 36.7           | 4.2        | 34.7           | 35.7              | 54     | -18.3  | Ave       |
| 4824.0    | 31.1    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 30.7              | 54     | -23.3  | Ave       |
| 4824.0    | 30.0    | 180     | 2.3    | h            | 32.5           | 1.9        | 34.8           | 29.6              | 54     | -24.4  | Ave       |
| 7236.0    | 32.0    | 90      | 2.0    | v            | 36.7           | 4.2        | 34.7           | 38.2              | 74     | -35.8  | Peak      |
| 7236.0    | 30.0    | 180     | 2.0    | h            | 36.7           | 4.2        | 34.7           | 36.2              | 74     | -37.8  | Peak      |
| 4824.0    | 32.2    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 31.8              | 74     | -42.2  | Peak      |
| 4824.0    | 30.4    | 180     | 2.3    | h            | 32.5           | 1.9        | 34.8           | 30.0              | 74     | -44.0  | Peak      |

*802.11g Middle Channel:*

| Frequency | Reading | Azimuth | Height | Polarization | Antenna Factor | Cable Loss | Amplifier Gain | Corrected Reading | Limit  | Margin | Comments  |
|-----------|---------|---------|--------|--------------|----------------|------------|----------------|-------------------|--------|--------|-----------|
| MHz       | dBuV    | Degrees | Meters | H / V        | dB/m           | dB         | dB             | dBuV/m            | dBuV/m | (dB)   |           |
| 2437.0    | 116.4   | 180     | 1.3    | v            | 28.7           | 1.5        | 35.8           | 110.7             |        |        | Fund/Peak |
| 2437.0    | 104.1   | 180     | 1.2    | h            | 28.7           | 1.5        | 35.8           | 98.4              |        |        | Fund/Peak |
| 2437.0    | 111.2   | 180     | 1.3    | v            | 28.7           | 1.5        | 35.8           | 105.5             |        |        | Ave       |
| 2437.0    | 98.3    | 180     | 1.2    | h            | 28.7           | 1.5        | 35.8           | 92.6              |        |        | Ave       |
| 7311.0    | 30.0    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 36.2              | 54     | -17.8  | Ave       |
| 7311.0    | 29.1    | 180     | 2.1    | h            | 36.7           | 4.2        | 34.7           | 35.3              | 54     | -18.7  | Ave       |
| 4874.0    | 30.0    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 29.6              | 54     | -24.4  | Ave       |
| 4874.0    | 29.8    | 180     | 2.2    | h            | 32.5           | 1.9        | 34.8           | 29.4              | 54     | -24.6  | Ave       |
| 7311.0    | 31.0    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 37.2              | 74     | -36.8  | Peak      |
| 7311.0    | 30.0    | 180     | 2.3    | h            | 36.7           | 4.2        | 34.7           | 36.2              | 74     | -37.8  | Peak      |
| 4874.0    | 32.0    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 31.6              | 74     | -42.4  | Peak      |
| 4874.0    | 31.1    | 180     | 2.2    | h            | 32.5           | 1.9        | 34.8           | 30.7              | 74     | -43.3  | Peak      |

*802.11g High Channel:*

| Frequency | Reading | Azimuth | Height | Polarization | Antenna Factor | Cable Loss | Amplifier Gain | Corrected Reading | Limit  | Margin | Comments  |
|-----------|---------|---------|--------|--------------|----------------|------------|----------------|-------------------|--------|--------|-----------|
| MHz       | dBuV    | Degrees | Meters | H / V        | dB/m           | dB         | dB             | dBuV/m            | dBuV/m | (dB)   |           |
| 2462.0    | 115.7   | 180     | 1.3    | v            | 28.7           | 1.5        | 35.8           | 110.0             |        |        | Fund/Peak |
| 2462.0    | 103.8   | 180     | 1.2    | h            | 28.7           | 1.5        | 35.8           | 98.1              |        |        | Fund/Peak |
| 2462.0    | 110.2   | 180     | 1.3    | v            | 28.7           | 1.5        | 35.8           | 104.5             |        |        | Ave       |
| 2462.0    | 98.0    | 180     | 1.2    | h            | 28.7           | 1.5        | 35.8           | 92.3              |        |        | Ave       |
| 7386.0    | 29.4    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 35.6              | 54     | -18.4  | Ave       |
| 7386.0    | 29.2    | 90      | 2.1    | h            | 36.7           | 4.2        | 34.7           | 35.4              | 54     | -18.6  | Ave       |
| 4924.0    | 30.0    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 29.6              | 54     | -24.4  | Ave       |
| 4924.0    | 29.5    | 90      | 2.1    | h            | 32.5           | 1.9        | 34.8           | 29.1              | 54     | -24.9  | Ave       |
| 7386.0    | 31.1    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 37.3              | 74     | -36.7  | Peak      |
| 7386.0    | 30.0    | 90      | 2.1    | h            | 36.7           | 4.2        | 34.7           | 36.2              | 74     | -37.8  | Peak      |
| 4924.0    | 31.5    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 31.1              | 74     | -42.9  | Peak      |
| 4924.0    | 31.1    | 90      | 2.1    | h            | 32.5           | 1.9        | 34.8           | 30.7              | 74     | -43.3  | Peak      |



*Super-g - Mid Channel:*

| Frequency | Reading | Azimuth | Height | Polarization | Antenna Factor | Cable Loss | Amplifier Gain | Corrected Reading | Limit  | Margin | Comments  |
|-----------|---------|---------|--------|--------------|----------------|------------|----------------|-------------------|--------|--------|-----------|
| MHz       | dBuV    | Degrees | Meters | H / V        | dB/m           | dB         | dB             | dBuV/m            | dBuV/m | (dB)   |           |
| 2437.0    | 115.3   | 180     | 1.3    | v            | 28.7           | 1.5        | 35.8           | 109.6             |        |        | Fund/Peak |
| 2437.0    | 103.5   | 180     | 1.2    | h            | 28.7           | 1.5        | 35.8           | 97.8              |        |        | Fund/Peak |
| 2437.0    | 110.1   | 180     | 1.3    | v            | 28.7           | 1.5        | 35.8           | 104.4             |        |        | Ave       |
| 2437.0    | 97.5    | 180     | 1.2    | h            | 28.7           | 1.5        | 35.8           | 91.8              |        |        | Ave       |
| 7311.0    | 30.0    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 36.2              | 54     | -17.8  | Ave       |
| 7311.0    | 29.5    | 180     | 2.1    | h            | 36.7           | 4.2        | 34.7           | 35.7              | 54     | -18.3  | Ave       |
| 4874.0    | 30.0    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 29.6              | 54     | -24.4  | Ave       |
| 4874.0    | 29.8    | 180     | 2.2    | h            | 32.5           | 1.9        | 34.8           | 29.4              | 54     | -24.6  | Ave       |
| 7311.0    | 31.0    | 270     | 2.4    | v            | 36.7           | 4.2        | 34.7           | 37.2              | 74     | -36.8  | Peak      |
| 7311.0    | 30.0    | 180     | 2.3    | h            | 36.7           | 4.2        | 34.7           | 36.2              | 74     | -37.8  | Peak      |
| 4874.0    | 31.6    | 270     | 2.4    | v            | 32.5           | 1.9        | 34.8           | 31.2              | 74     | -42.8  | Peak      |
| 4874.0    | 30.7    | 180     | 2.2    | h            | 32.5           | 1.9        | 34.8           | 30.3              | 74     | -43.7  | Peak      |

## §15.247(a) (2) – 6 dB BANDWIDTH

### Applicable Standard

According to §15.247(a)(2), for digital modulation techniques, the minimum 6dB bandwidth shall be at least 500 kHz.

### Measurement 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 emissions bandwidth. (6 dB bandwidth for DTS)
4. Repeat above procedures until all frequencies measured were complete.

### Equipment Lists

| Manufacturer | Description        | Model  | Serial Number | Cal. Date  |
|--------------|--------------------|--------|---------------|------------|
| Agilent      | Analyzer, Spectrum | E4446A | US44300386    | 2006-03-06 |

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 20° C     |
| Relative Humidity: | 56%       |
| ATM Pressure:      | 1024 mbar |

*\*The testing was performed by James Ma on 2006-10-25.*

**Measurement Result**

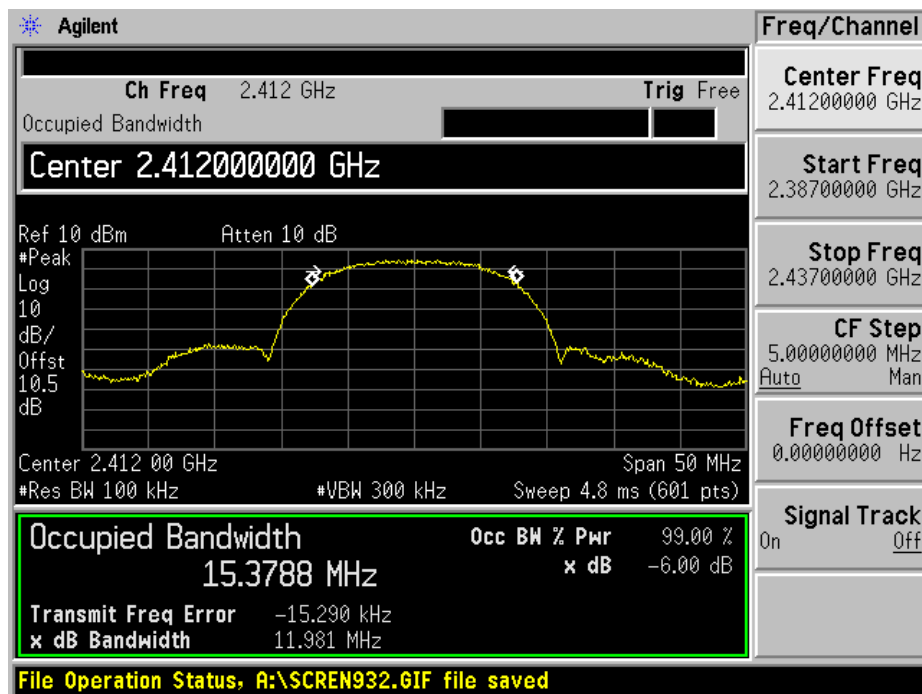
| Channel<br>802.11b | Frequency<br>MHz | Channel<br>Bandwidth (KHz) | Limit<br>KHz |
|--------------------|------------------|----------------------------|--------------|
| Low                | 2412             | 11981                      | >500         |
| Mid                | 2437             | 11053                      | >500         |
| High               | 2462             | 11856                      | >500         |

| Channel<br>802.11g | Frequency<br>MHz | Channel<br>Bandwidth (KHz) | Limit<br>KHz |
|--------------------|------------------|----------------------------|--------------|
| Low                | 2412             | 16529                      | >500         |
| Mid                | 2437             | 16486                      | >500         |
| High               | 2462             | 16485                      | >500         |

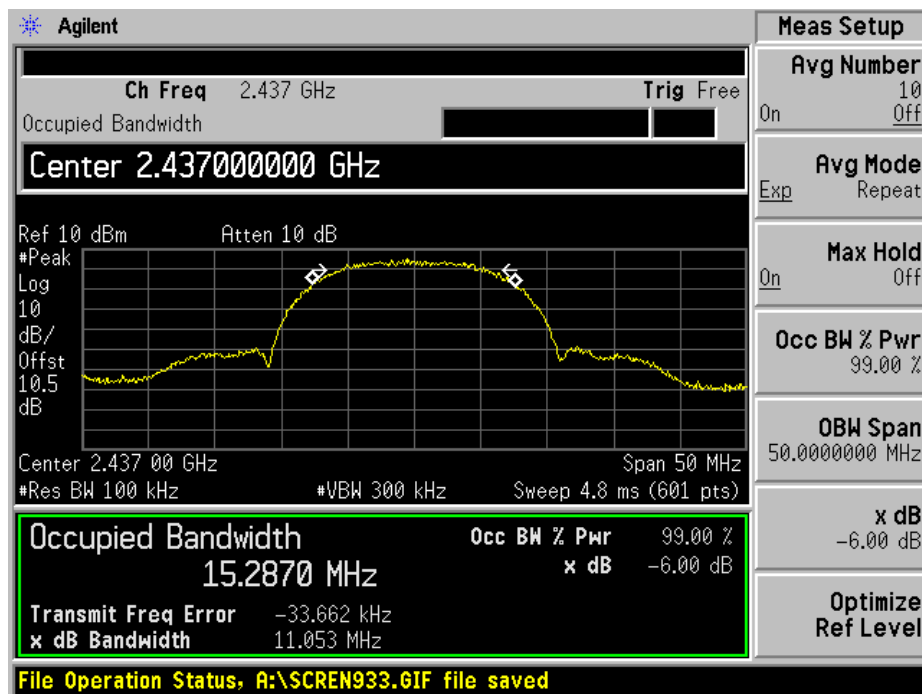
| Channel<br>Super-G | Frequency<br>MHz | Channel<br>Bandwidth (KHz) | Limit<br>KHz |
|--------------------|------------------|----------------------------|--------------|
| Mid                | 2437             | 31602                      | >500         |

**802.11 b mode:**

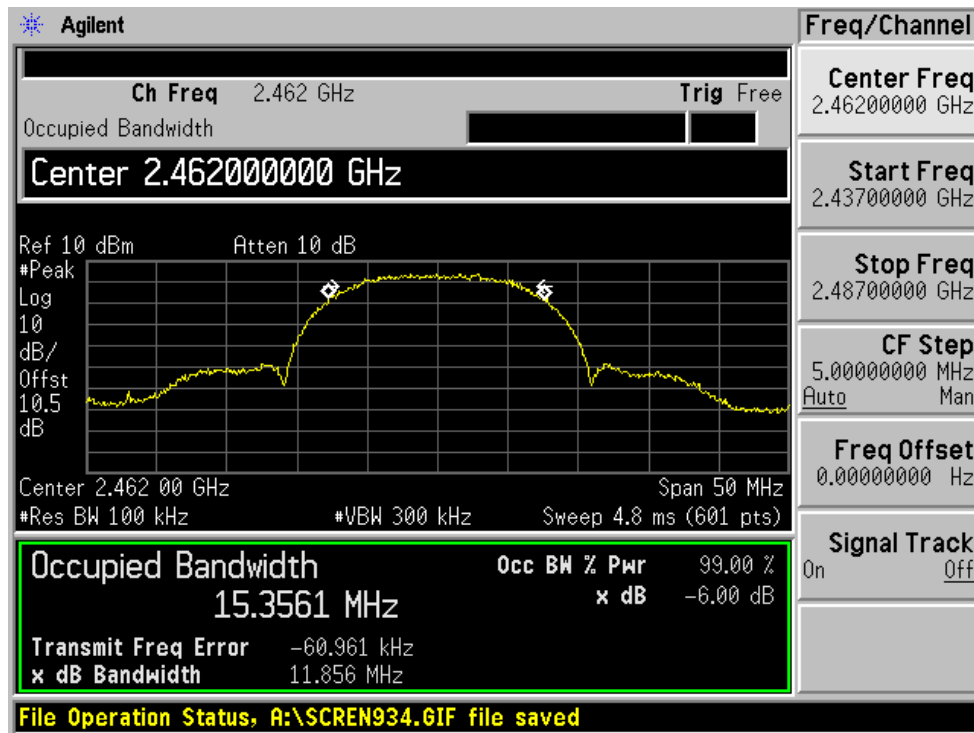
## Low Channel



## Middle Channel

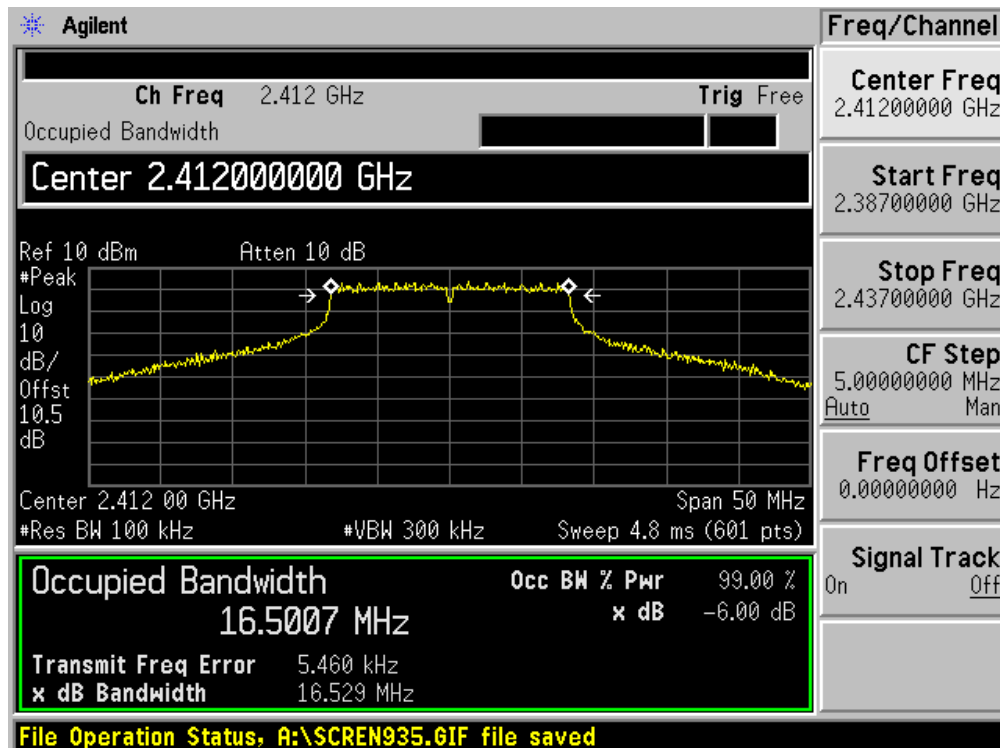


## High Channel

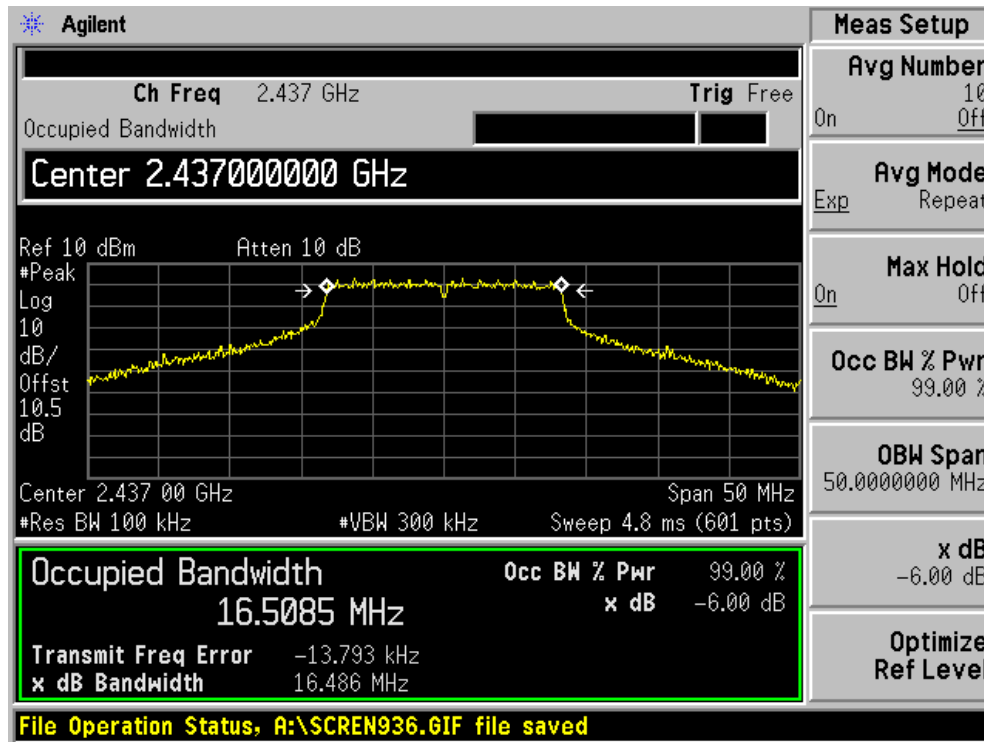


## 802.11g mode:

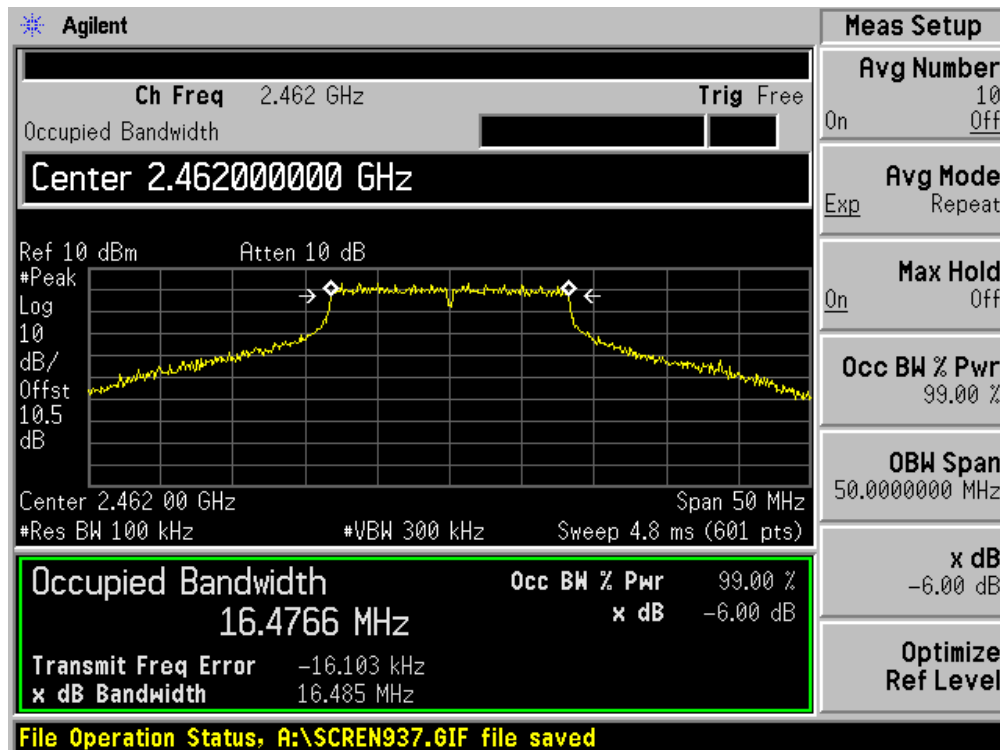
## Low Channel

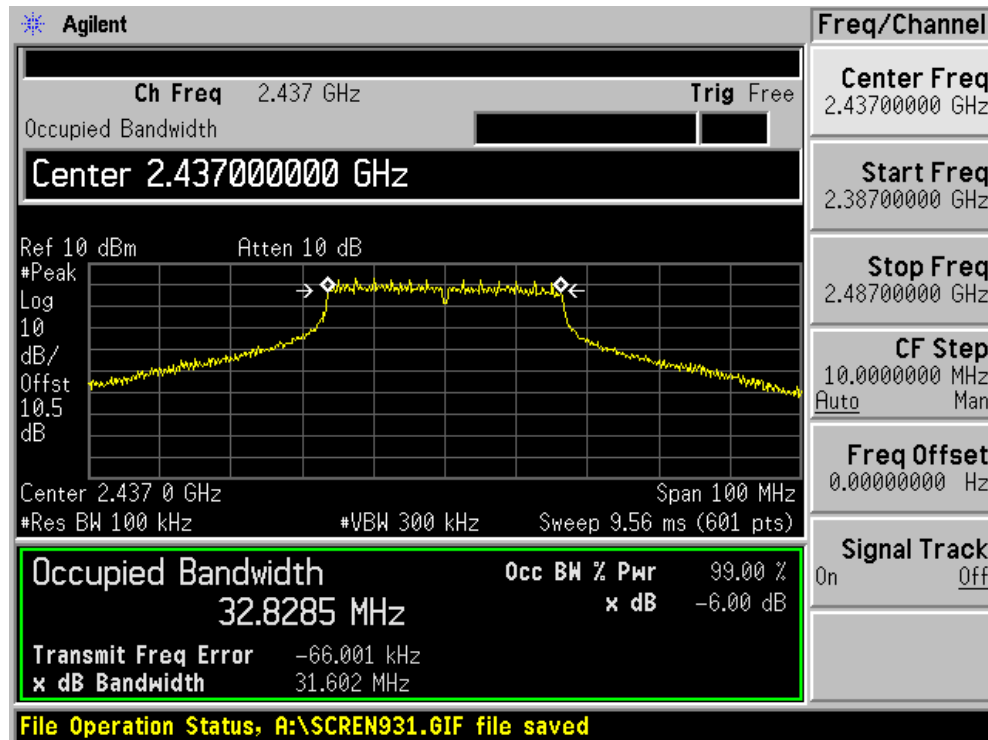


## Middle Channel



## High Channel



**Super- G mode:**

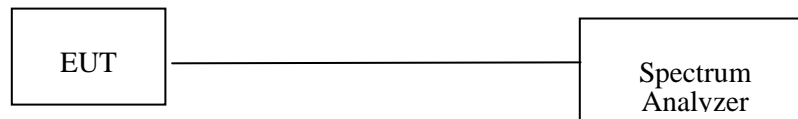
## §15.247(b) (3) – MAXIMUM PEAK OUTPUT POWER

### Applicable Standard

According to §15.247(b) (3), for systems using digital modulation in 2400-2483.5 MHz: 1 Watt

### Measurement 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 a spectrum analyzer.
3. Add a correction factor to the display.



### Equipment Lists

| Manufacturer | Description        | Model  | Serial Number | Cal. Date  |
|--------------|--------------------|--------|---------------|------------|
| Agilent      | Analyzer, Spectrum | E4446A | US44300386    | 2006-03-06 |

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 20° C     |
| Relative Humidity: | 56%       |
| ATM Pressure:      | 1024 mbar |

\*The testing was performed by James Ma on 2006-10-25.

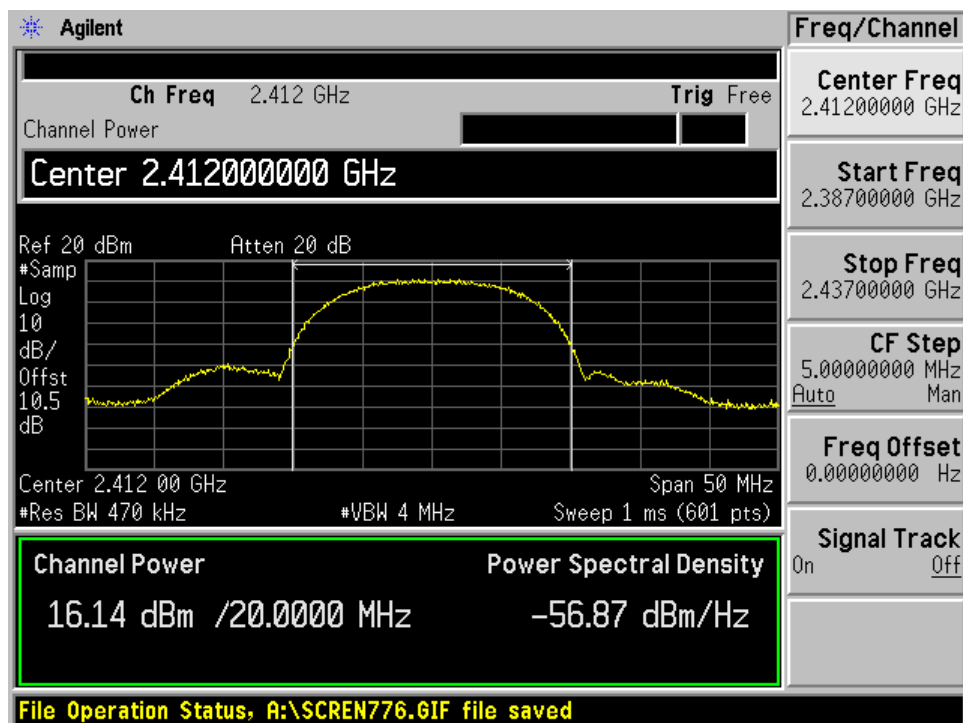
### Measurement Result

| Frequency (MHz) | RF Power (dBm) |         |         | Limit (dBm)<br>Due to 14 dbi Antenna Gain |
|-----------------|----------------|---------|---------|---|
|                 | 802.11b        | 802.11g | Super-G |   |
| 2412            | 16.14          | 16.17   | -       | 22  |
| 2437            | 16.12          | 16.21   | 15.34   | 22  |
| 2462            | 15.51          | 15.28   | -       | 22  |

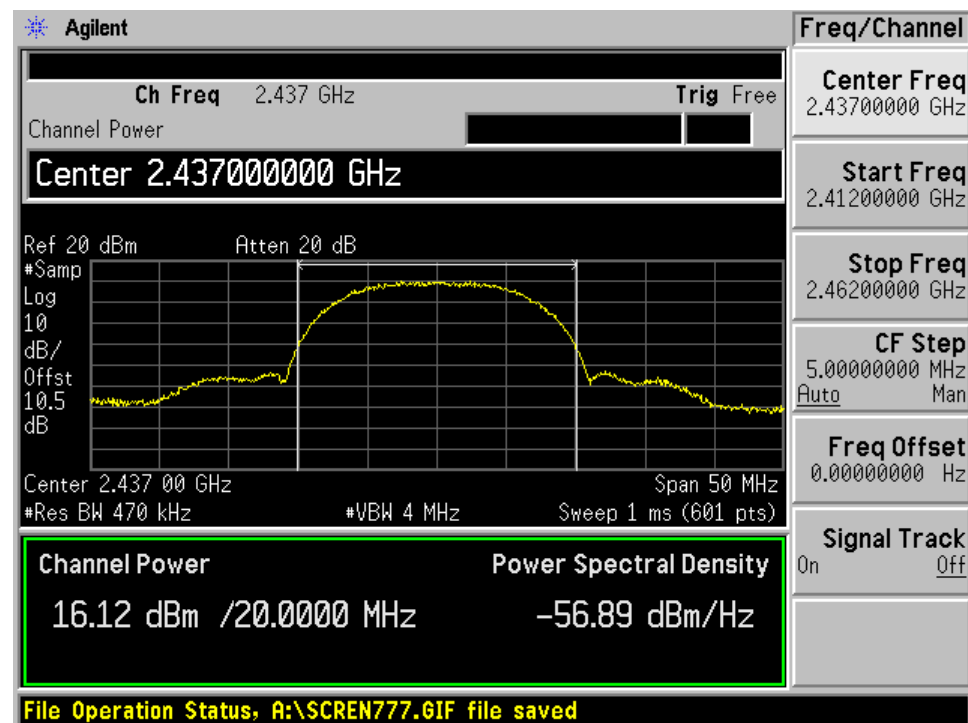


**802.11b mode:**

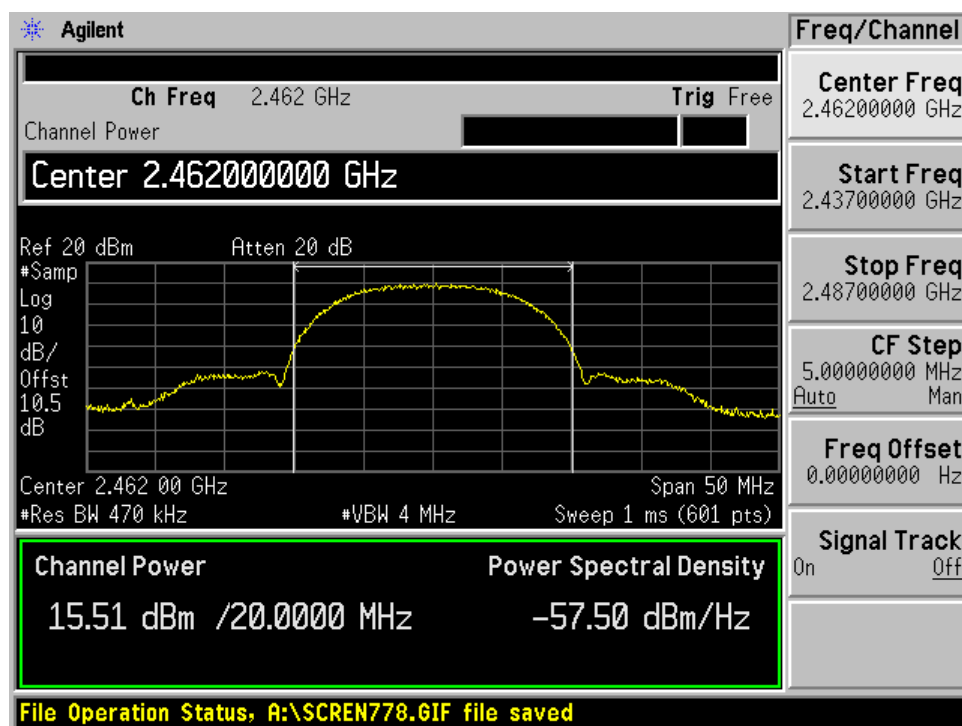
## Low Channel



## Middle Channel

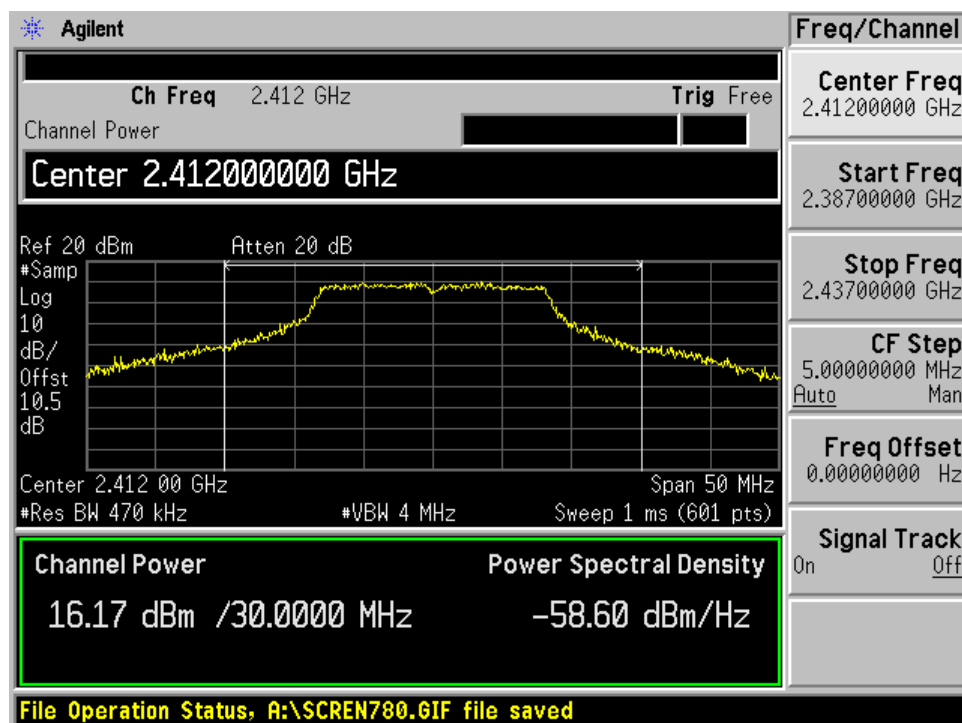


## High Channel

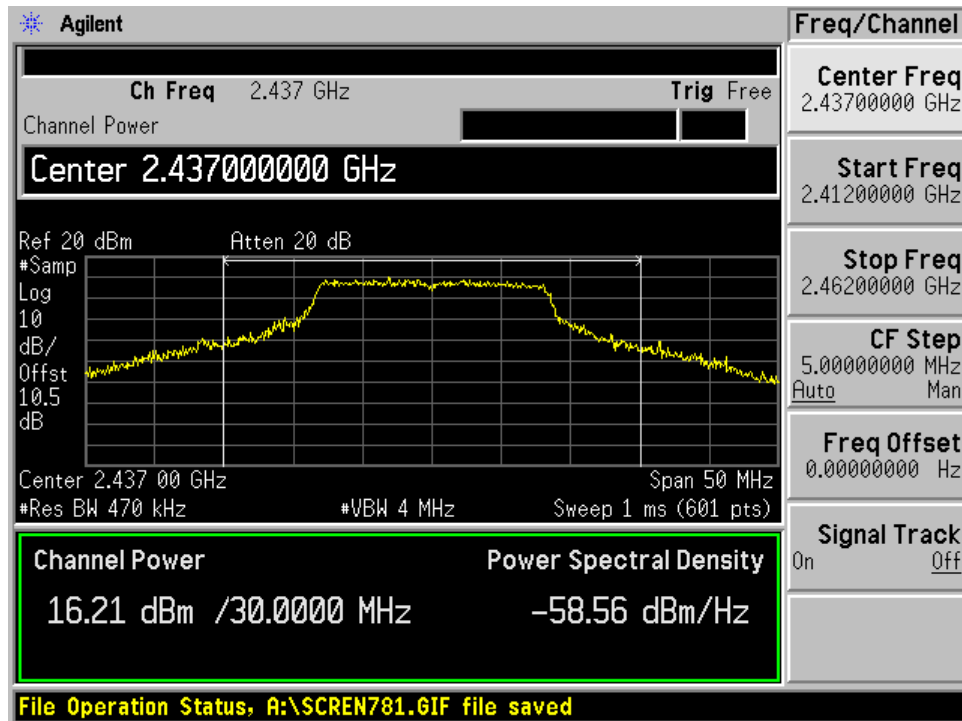


## 802.11g mode:

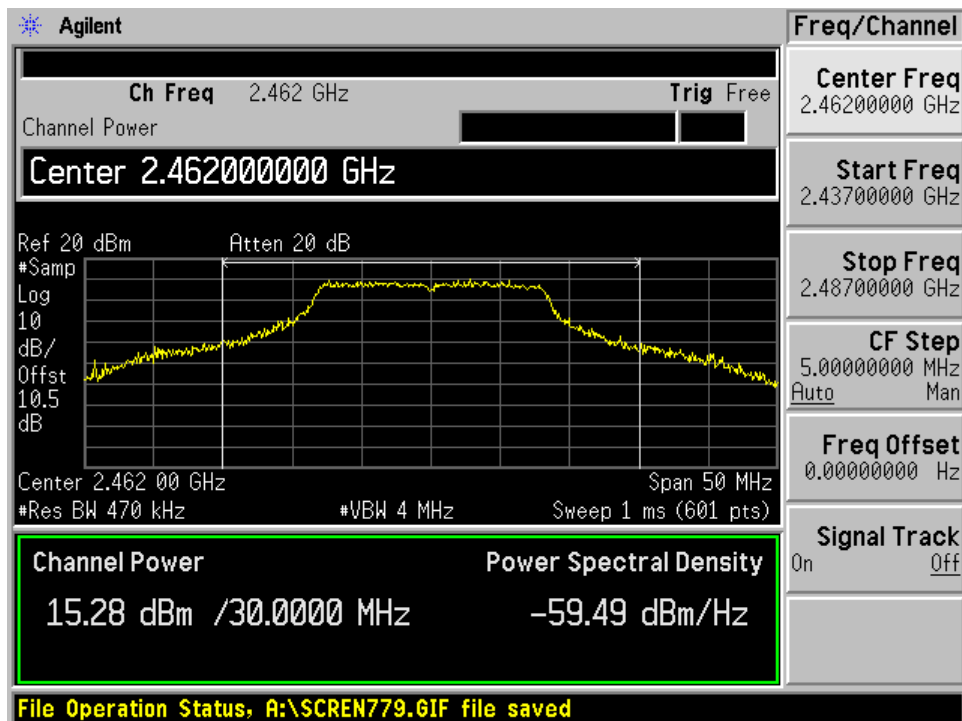
## Low Channel

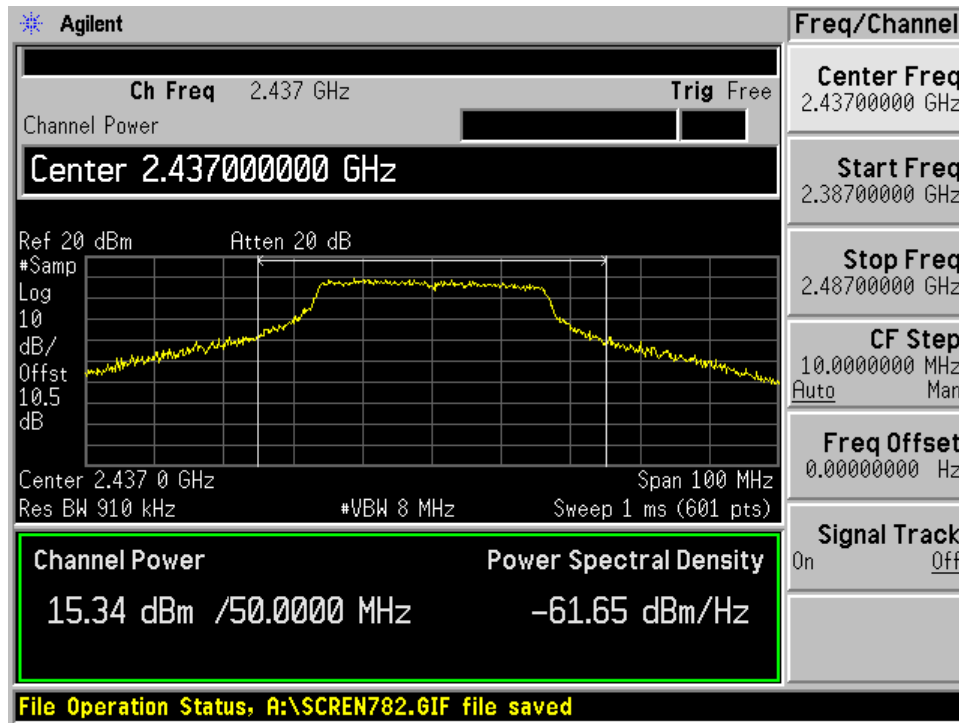


## Middle Channel



## High Channel



**Super-G mode:**

## **§15.247(d) - 100 KHZ BANDWIDTH FROM BAND EDGES**

### **Applicable Standard**

According to §15.247(d), in *any* 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emissions limits specified in §15.209(a) see §15.205(c)).

### **Measurement 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 both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

### **Equipment Lists**

| <b>Manufacturer</b> | <b>Description</b> | <b>Model</b> | <b>Serial Number</b> | <b>Cal. Date</b> |
|---------------------|--------------------|--------------|----------------------|------------------|
| Agilent             | Analyzer, Spectrum | E4446A       | US44300386           | 2006-03-06       |

\* **Statement of Traceability:** **BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### **Environmental Conditions**

|                    |           |
|--------------------|-----------|
| Temperature:       | 20° C     |
| Relative Humidity: | 56%       |
| ATM Pressure:      | 1024 mbar |

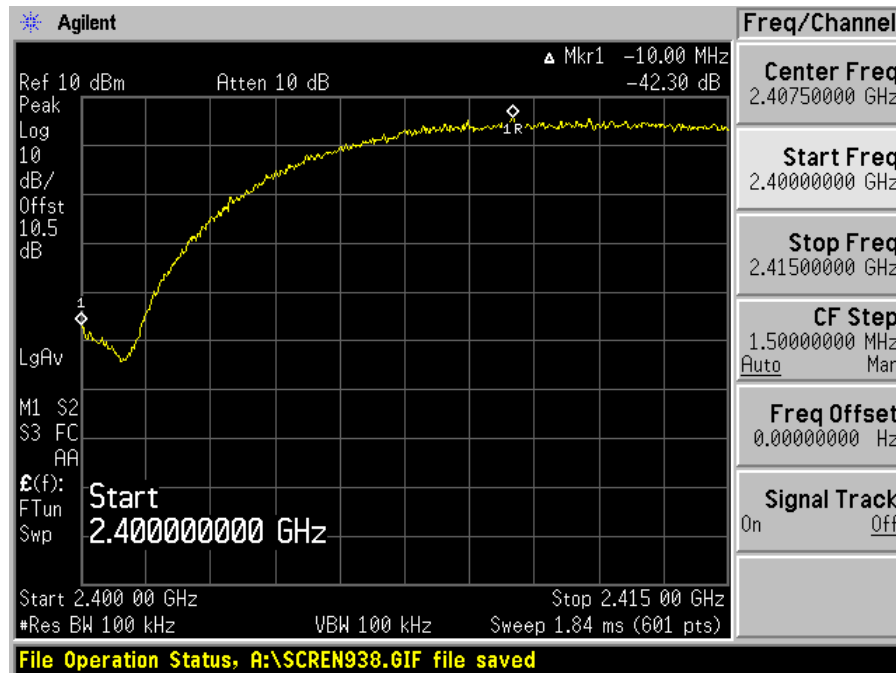
*\*The testing was performed by James Ma on 2006-10-25.*

**Measurement Result:**

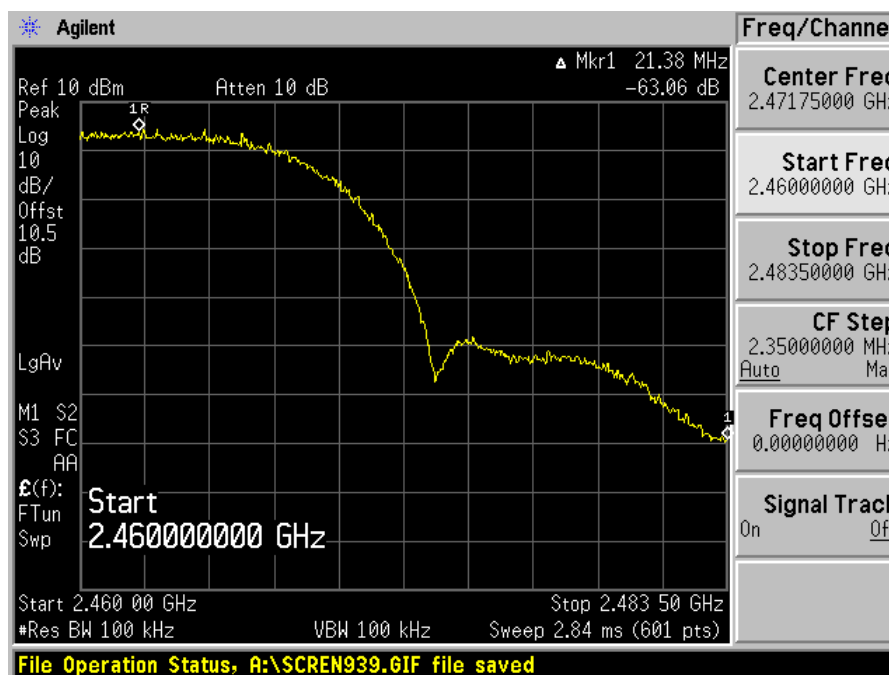
Please refer to following pages for plots of band edge.

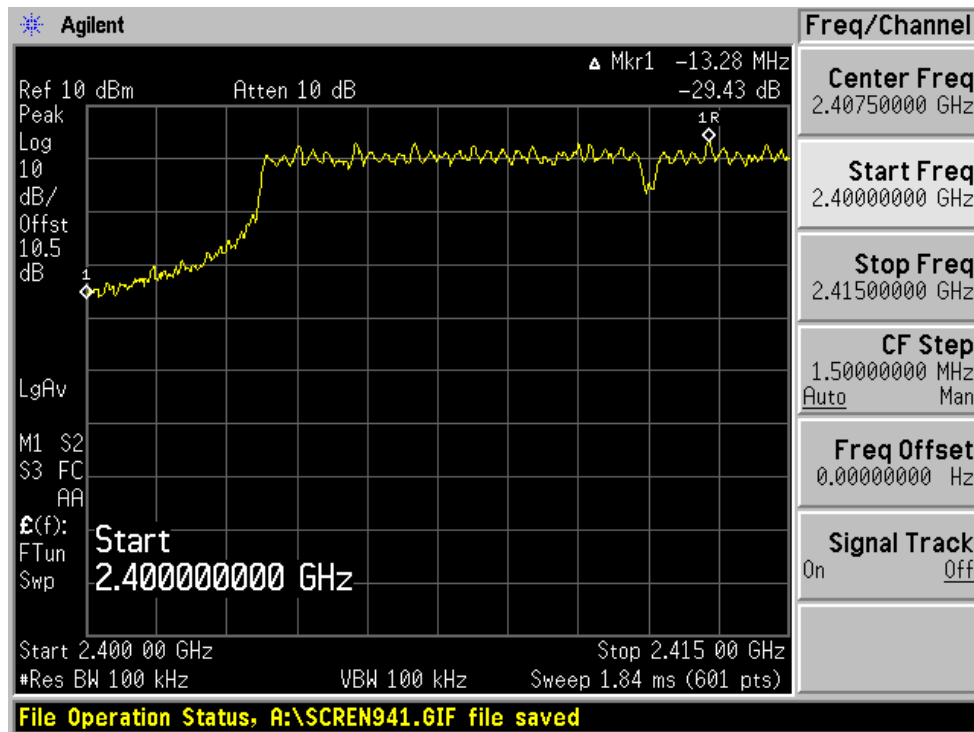
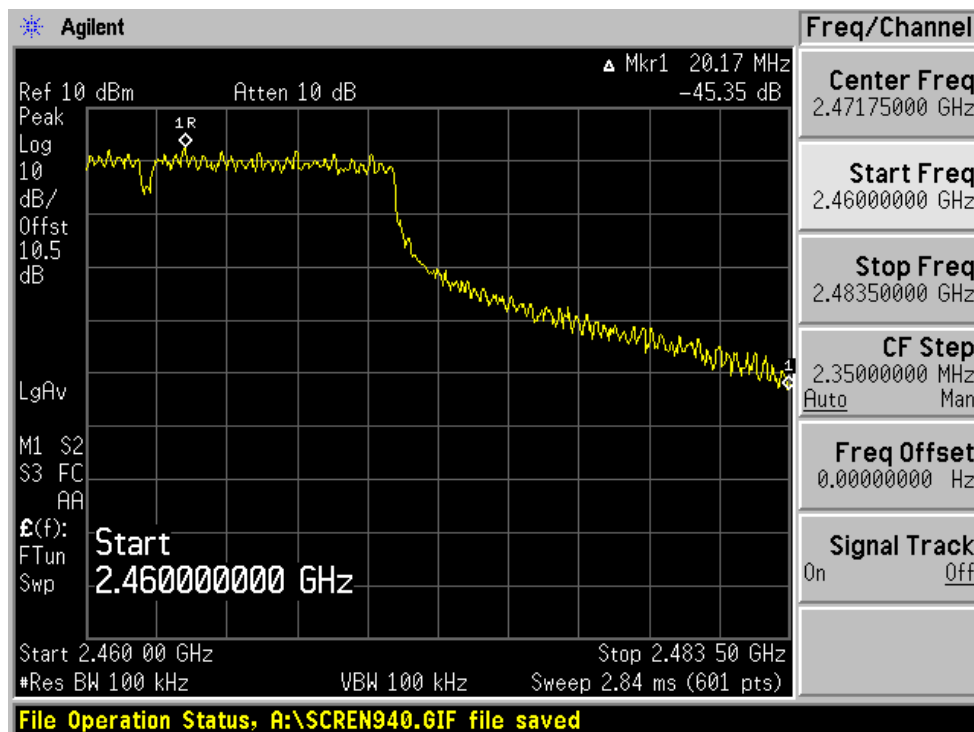
**802.11b mode:**

Low Channel



High Channel



**802.11g mode:****Low Channel****High Channel**

## §15.247(e) - POWER SPECTRAL DENSITY

### Applicable Standard

According to §15.247 (d), for direct sequence systems, the peak 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.

### Measurement 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.

### Equipment Lists

| Manufacturer | Description        | Model  | Serial Number | Cal. Date  |
|--------------|--------------------|--------|---------------|------------|
| Agilent      | Analyzer, Spectrum | E4446A | US44300386    | 2006-03-06 |

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 20° C     |
| Relative Humidity: | 56%       |
| ATM Pressure:      | 1024 mbar |

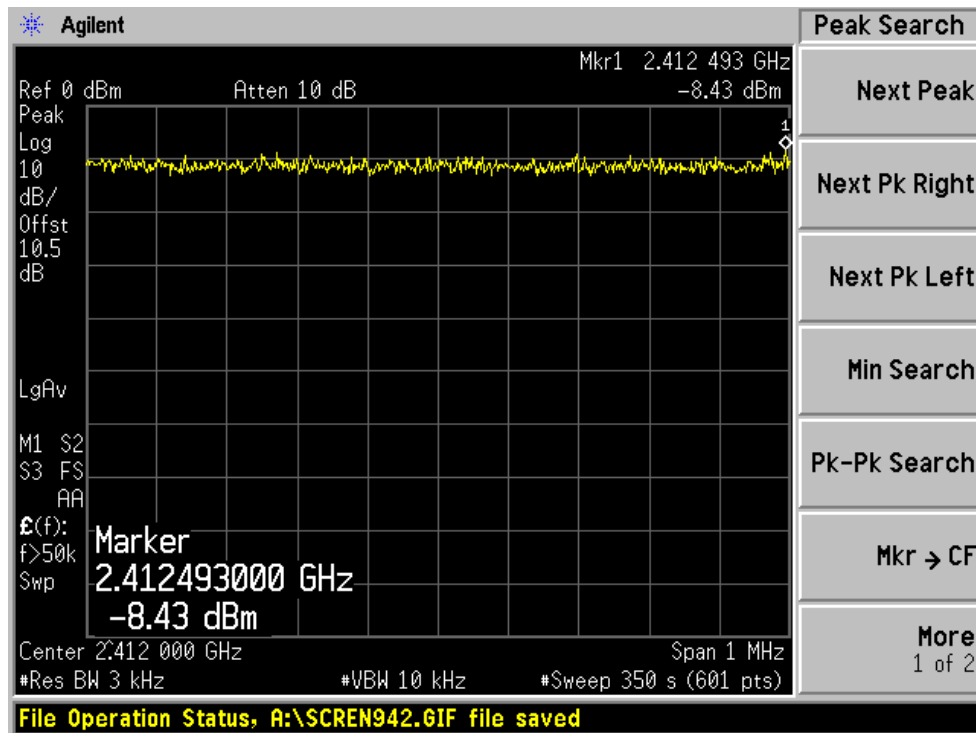
\*The testing was performed by James Ma on 2006-10-25.

### Measurement Result

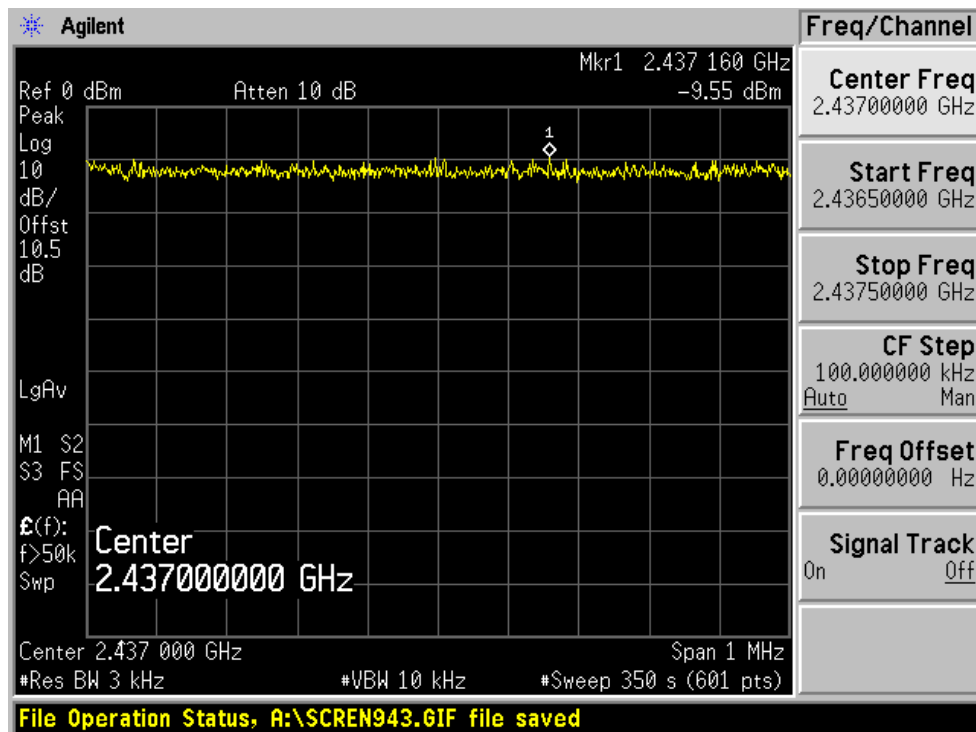
| Channel | Power Spectral Density (dBm/3KHz) |         |         | Limit (dBm/3KHz) |
|---------|-----------------------------------|---------|---------|------------------|
|         | 802.11b                           | 802.11g | Super-G |                  |
| Low     | -8.43                             | -10.31  | -       | 8                |
| Mid     | -9.55                             | -11.20  | -15.69  | 8                |
| High    | -10.11                            | -11.61  | -       | 8                |



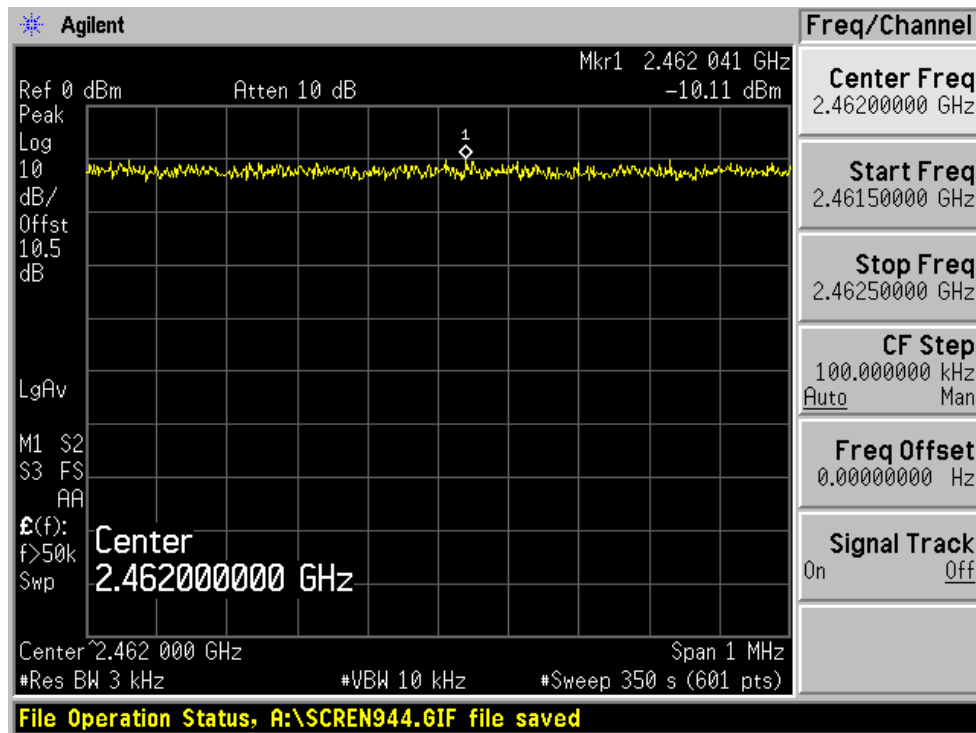
## 802.11b, Low Channel



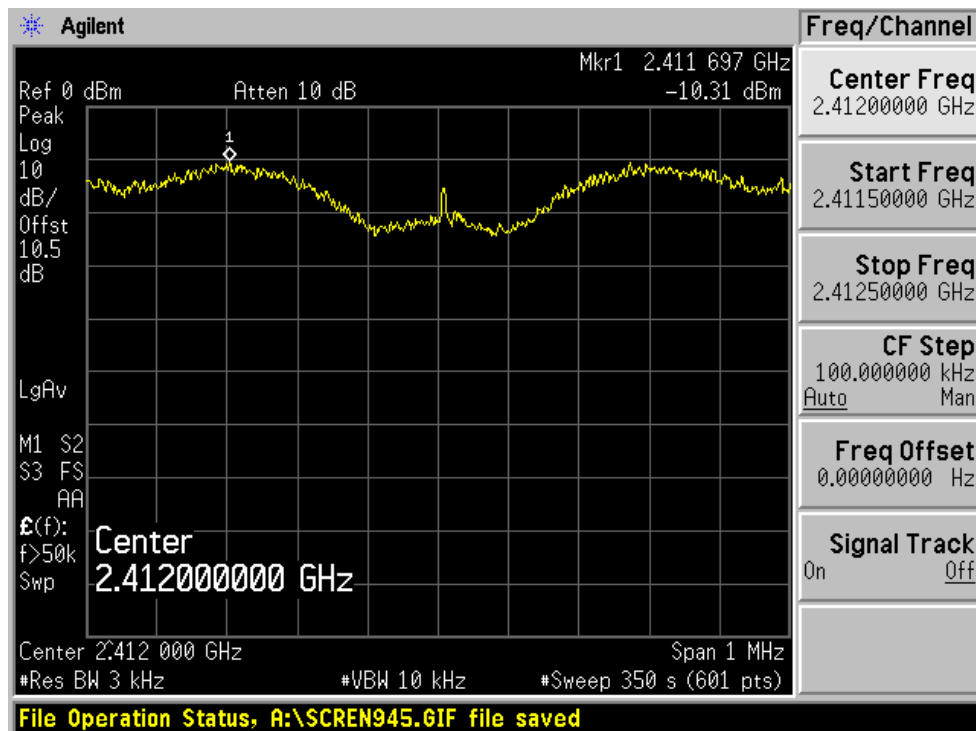
## 802.11b, Mid. Channel



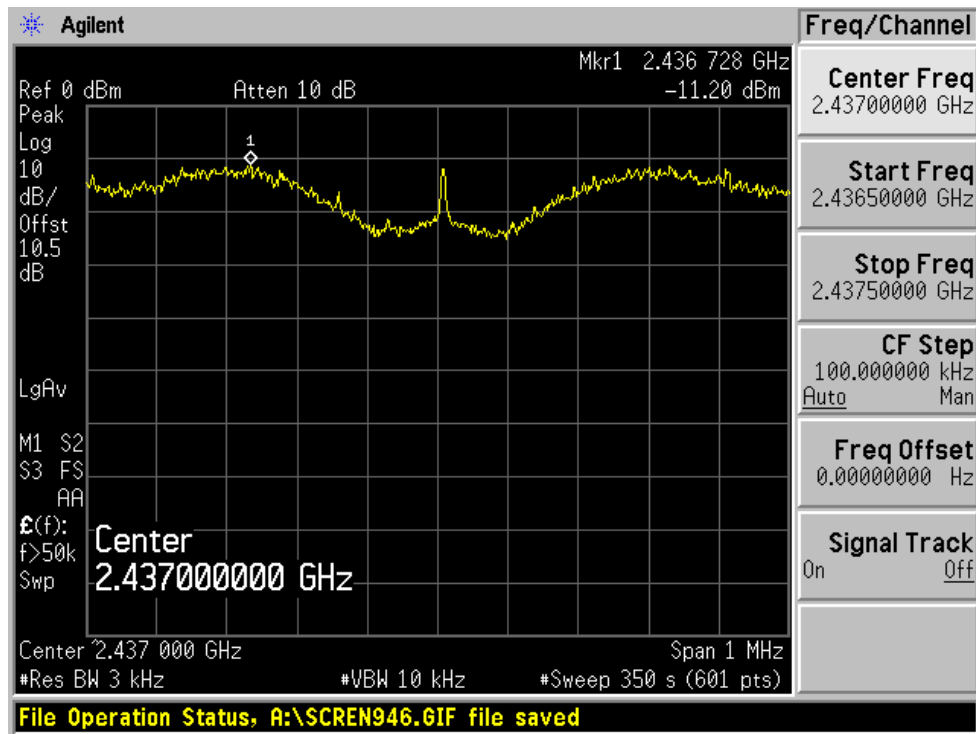
## 802.11b, High Channel



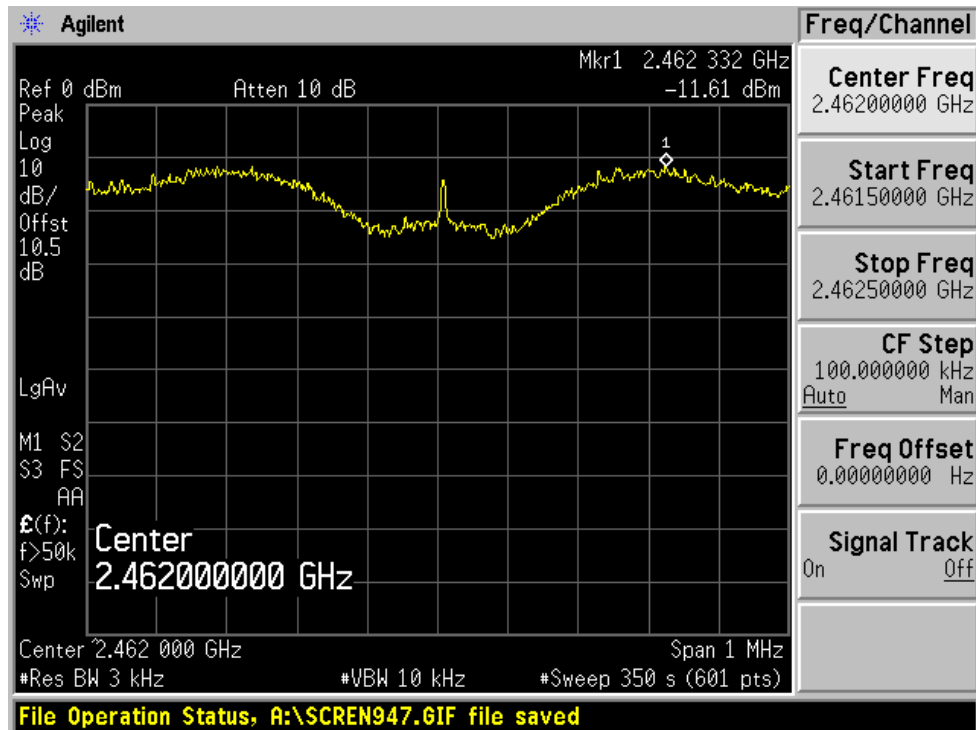
## 802.11g, Low Channel



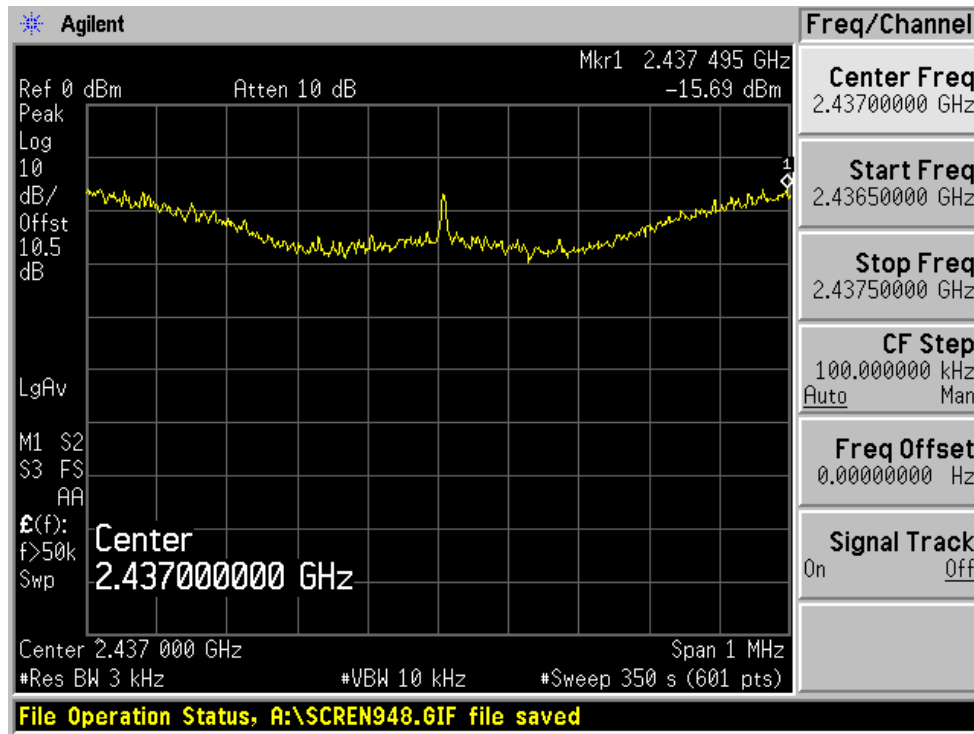
## 802.11g, Mid Channel



## 802.11g, High Channel



## Super-G



END OF REPORT