



ISO/IEC17025 Accredited Lab.

# **FCC ID TEST REPORT**

for

**WIFI Module**

**MODEL: RA-WN110606C**

**Trade Mark: N/A**

**Integrated circuit Factory: MediaTek**

**Integrated circuit Model: RT5370**

**FCC ID: AQF-RA-WN110606C**

**Test Report Number: 1301001000**

**Issued Date: January 21, 2013**

Issued for

**Forcelink Electronic Co., Ltd.**

**6 Floor, B Block, RunChang Industrial park, Bantian Town, Shenzhen  
City, China**

Issued By:

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## 1 TEST CERTIFICATION

|                                   |                                                                                                                         |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Product:</b>                   | WIFI Module                                                                                                             |
| <b>Model:</b>                     | RA-WN110606C                                                                                                            |
| <b>Trade Mark</b>                 | N/A                                                                                                                     |
| <b>Integrated Circuit Factory</b> | MediaTek                                                                                                                |
| <b>Integrated Circuit Model:</b>  | RT5370                                                                                                                  |
| <b>Applicant:</b>                 | <b>Forcelink Electronic Co., Ltd.</b><br>6 Floor, B Block, RunChang Industrial park, Bantian Town, Shenzhen City, China |
| <b>Factory:</b>                   | <b>Forcelink Electronic Co., Ltd.</b><br>6 Floor, B Block, RunChang Industrial park, Bantian Town, Shenzhen City, China |
| <b>Tested:</b>                    | January 04, 2013 ~ January 15, 2013                                                                                     |
| <b>Test Voltage:</b>              | DC 5V(PC Input AC 120V/60Hz)                                                                                            |
| <b>Applicable Standards:</b>      | FCC Part 15 Subpart C: 2011<br>ANSI C63.4:2009                                                                          |

The above equipment has been tested by SHENZHEN TIMEWAY TECHNOLOGY CONSULTING CO., LTD. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:**



(Brown Lu)

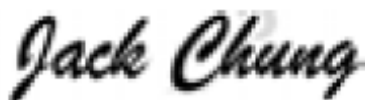
**Date:** 2013-01-21



**Check By:**

(Terry Tang)

**Date:** 2013-01-21



**Approved By:**

(Jack Chung)

**Date:** 2013-01-21

## 2 TEST RESULT SUMMARY

### FCC 15 Subpart C, Paragraph 15.247

| FCC RULES                     | DESCRIPTION OF TEST                     | RESULT |
|-------------------------------|-----------------------------------------|--------|
| §15.203                       | Antenna Requirement                     | Pass   |
| §15.207 (a)                   | Conducted Emissions                     | Pass   |
| §15.247(d)                    | Spurious Emissions at Antenna Port      | Pass   |
| §15.205                       | Restricted Bands                        | Pass   |
| §15.209, §15.205, 1§15.247(d) | Spurious Emissions                      | Pass   |
| §15.247 (a)(2)                | 6 dB Bandwidth                          | Pass   |
| §15.247(b)(3)                 | Maximum Peak Output Power               | Pass   |
| §15.247(d)                    | 100kHz Bandwidth of Frequency Band Edge | Pass   |
| §15.247(e)                    | Power Spectral Density                  | Pass   |

NOTE:

” N/A” denotes test is not applicable in this Test Report

The test result judgment is decided by the limit of test standard

### 3 EUT DESCRIPTION

|                                     |                                                                                                                                                   |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>                      | WIFI Module                                                                                                                                       |
| <b>Trade Mark</b>                   | N/A                                                                                                                                               |
| <b>Model</b>                        | RA-WN110606C                                                                                                                                      |
| <b>Applicant</b>                    | Forcelink Electronic Co., Ltd.                                                                                                                    |
| <b>EUT Type</b>                     | <input checked="" type="checkbox"/> Engineering Sample. <input type="checkbox"/> Product Sample,<br><input type="checkbox"/> Mass Product Sample. |
| <b>Serial Number</b>                | N/A                                                                                                                                               |
| <b>Integrated Circuit Factory</b>   | MediaTek                                                                                                                                          |
| <b>Integrated Circuit Model</b>     | RT5370                                                                                                                                            |
| <b>Antenna Type</b>                 | PCB Antenna                                                                                                                                       |
| <b>EUT Power Rating</b>             | DC 5V/3.3V, 0.125A                                                                                                                                |
| <b>Temperature Range(Operating)</b> | -10 ~50℃                                                                                                                                          |
| <b>Type of the Equipment</b>        | Combined Equipment                                                                                                                                |
| <b>Operating Frequency (WIFI)</b>   | 802.11b/g/n-HT20: 2412MHz - 2462MHz<br>802.11n-HT40: 2422MHz – 2452MHz                                                                            |
| <b>Type of Modulation</b>           | CCK, DQPSK, DBPSK for DSSS<br>BPSK, QPSK, 16QAM and 64QAM for OFDM                                                                                |
| <b>Number of Channels</b>           | 802.11b/g/n-HT20: 11 channels<br>802.11n-HT40: 7 channels                                                                                         |
| <b>Data rate</b>                    | 802.11b: 1-11Mbps<br>802.11g: 6-54Mbps<br>802.11n-20M: 7.2-72Mbps<br>802.11n-40M: 15-150Mbps                                                      |

*Note: N/A stand for no applicable.*

## 4 SETUP OF EQUIPMENT UNDER TEST AND TEST EQUIPMENTS USED

| EQUIPMENT/FACILITIES | MANUFACTURER      | MODEL #      | SERIAL NO.      | CAL. DUE DATE | CAL. INTERVAL |
|----------------------|-------------------|--------------|-----------------|---------------|---------------|
| EMI Test Receiver    | R&S               | ESCI         | 100005          | 12/16/2013    | 1 Year        |
| LISN                 | LS                | LS16         | 16010222<br>119 | 12/16/2013    | 1 Year        |
| LISN(EUT)            | Mestec            | AN3016       | 04/10040        | 12/22/2013    | 1 Year        |
| EMI Test Receiver    | R&S               | ESCI         | 100005          | 12/16/2013    | 1 Year        |
| Spectrum Analyzer    | R&S               | FSU          | 100114          | 12/14/2013    | 1 Year        |
| Pre Amplifier        | H.P.              | HP8447E      | 2945A02<br>715  | 12/16/2013    | 1 Year        |
| Pre-Amplifier        | Compliance        | PAM0118      | 1360976         | 12/16/2013    | 1 Year        |
| Bilog Antenna        | SUNOL<br>Sciences | JB3          | A021907         | 12/10/2013    | 1 Year        |
| Horn Antenna         | Schwarzbeck       | BBHA<br>9170 | RS2036          | 12/10/2013    | 1 Year        |
| Horn Antenna         | Schwarzbeck       | BBHA<br>9120 | RS4051          | 12/10/2013    | 1 Year        |
| Loop Antenna         | Schwarzbeck       | FESP5132     | RS101           | 12/23/2013    | 1 Year        |
| Cable                | TIME<br>MICROWAVE | LMR-400      | N-TYPE04        | 12/09/2013    | 1 Year        |
| Cable                | TIME<br>MICROWAVE | --           | --              | 12/09/2013    | 1 Year        |
| System-Controller    | CCS               | N/A          | N/A             | N.C.R         | 1 Year        |
| Turn Table           | CCS               | N/A          | N/A             | N.C.R         | 1 Year        |
| Antenna Tower        | CCS               | N/A          | N/A             | N.C.R         | 1 Year        |
| Spectrum analyzer    | Agilent           | E4407B       | 88156318        | 12/09/2013    | 1 Year        |

#### 4.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| No. | Equipment | Model No. | Serial No. | FCC ID | Trade Name | Data Cable | Power Cord |
|-----|-----------|-----------|------------|--------|------------|------------|------------|
| 1   | Note book | 4752ZG    | N/A        | N/A    | acer       | N/A        | N/A        |

**Note:**

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

#### 4.2. Description of Test Configuration

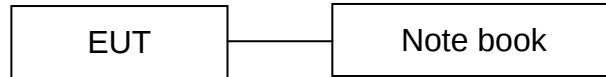
For 802.11b and 802.11g mode and 802.11n, 11 channels are provided to testing:

| 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 in 802.11b/g/n-HT20

EUT was tested with Channel 3, 6 and 9 in 802.11n-HT40

### **4.3. CONFIGURATION OF SYSTEM UNDER TEST**



(EUT: WIFI Module)

### **4.4. Justification**

1. Set up EUT with the relative support equipments.
2. Make sure the test software control the EUT working state.  
(according to the standard measurement).

## **5 FACILITIES AND ACCREDITATIONS**

### **5.1. FACILITIES**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAL-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:1999 General Requirements) for the Competence of testing Laboratories.

#### **FCC-Registration No.: 899988**

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 899988.

#### **IC- Registration No.: IC5205A-01**

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration IC No.: 5205A-01

## 5.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| No. | Item                         | Uncertainty               |
|-----|------------------------------|---------------------------|
| 1   | Conducted Emission Test      | $\pm 3.6\text{dB}$        |
| 2   | RF power,conducted           | $\pm 0.16\text{dB}$       |
| 3   | Spurious emissions,conducted | $\pm 0.21\text{dB}$       |
| 4   | All emissions,radiated(<1G)  | $\pm 4.7\text{dB}$        |
| 5   | All emissions,radiated(>1G)  | $\pm 4.7\text{dB}$        |
| 6   | Temperature                  | $\pm 0.5^{\circ}\text{C}$ |
| 7   | Humidity                     | $\pm 2\%$                 |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

## **§15.203 - ANTENNA REQUIREMENT**

### **Standard Applicable**

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 uses a inside jointing PCB Antenna, The Antenna is unique coupling antenna. The Antenna gain is 0dBi. please refer to the EUT internal photos.

## **§15.207 - CONDUCTED EMISSIONS**

### **Applicable Standard**

The specification used was with the FCC Part 15.207 limits.

### **Test Procedure**

During the conducted emission test, the EUT was connected to the outlet of the LISN. Maximizing procedure was performed on the six (6) highest emissions of the EUT. All data was recorded in the Quasi-peak and average detection mode.

### **Test Result**

PASS

Test Mode: Operating

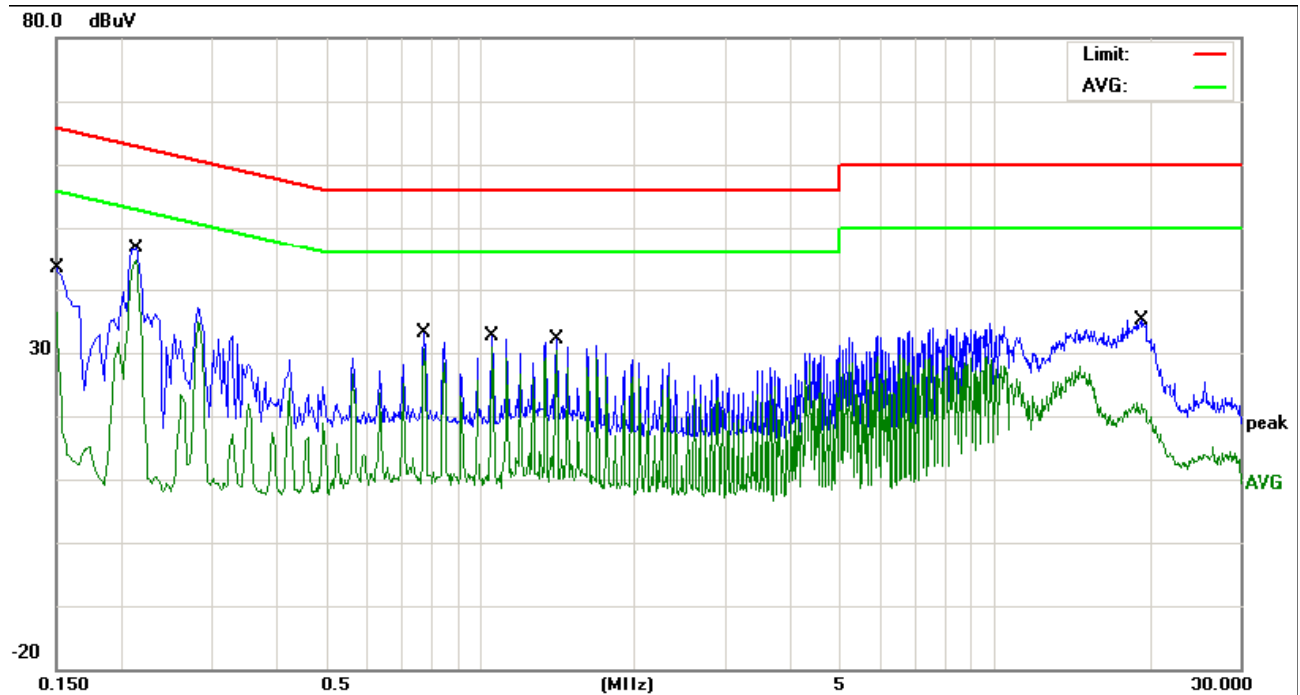
### **Environmental Conditions**

|                    |          |
|--------------------|----------|
| Temperature:       | 26 °C    |
| Relative Humidity: | 60%      |
| ATM Pressure:      | 100.0kPa |

### **Plot(s) of Test Data**

Plot(s) of Test Data is presented hereinafter as reference.

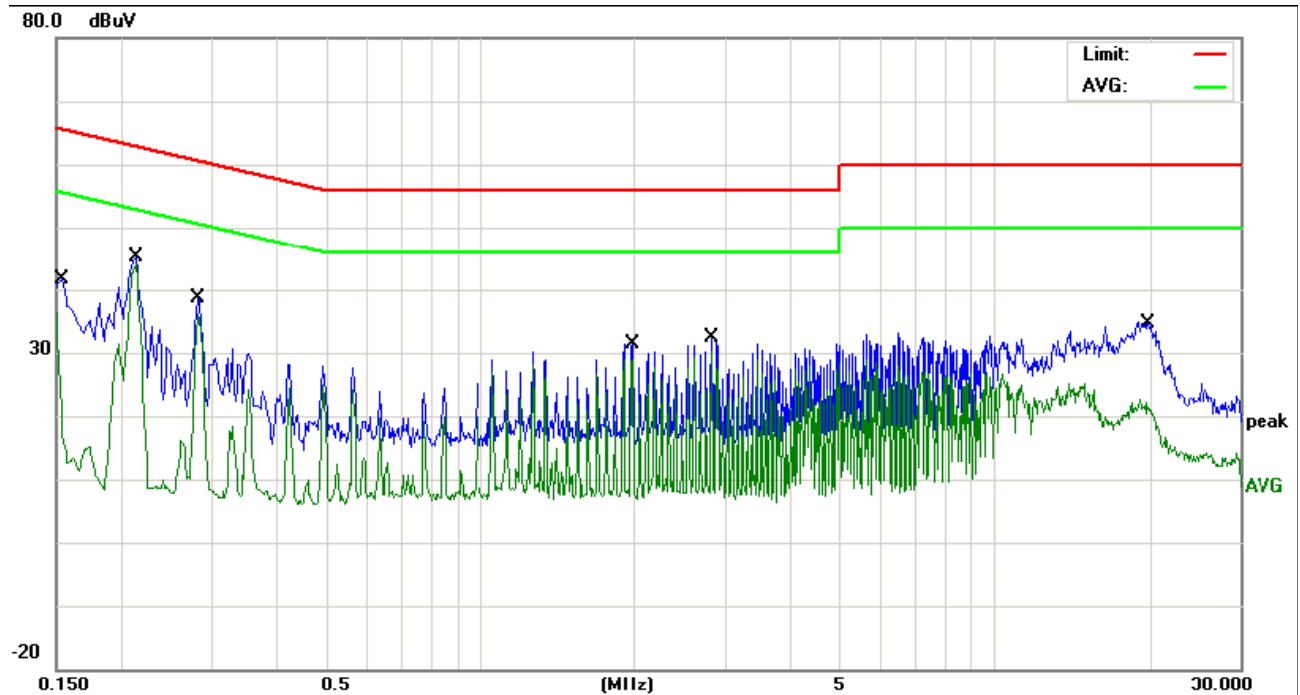
Phase: Live



| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measurement | Limit | Over   |          |
|-----|-----|---------|---------------|----------------|-------------|-------|--------|----------|
|     |     | MHz     | dBuV          | dB             | dBuV        | dBuV  | dB     | Detector |
| 1   |     | 0.1500  | 32.80         | 10.45          | 43.25       | 65.99 | -22.74 | QP       |
| 2   |     | 0.1500  | 25.97         | 10.45          | 36.42       | 55.99 | -19.57 | AVG      |
| 3   |     | 0.2128  | 36.12         | 10.34          | 46.46       | 63.09 | -16.63 | QP       |
| 4   | *   | 0.2128  | 33.84         | 10.34          | 44.18       | 53.09 | -8.91  | AVG      |
| 5   |     | 0.7780  | 22.43         | 10.59          | 33.02       | 56.00 | -22.98 | QP       |
| 6   |     | 0.7780  | 20.04         | 10.59          | 30.63       | 46.00 | -15.37 | AVG      |
| 7   |     | 1.0620  | 21.92         | 10.75          | 32.67       | 56.00 | -23.33 | QP       |
| 8   |     | 1.0620  | 20.02         | 10.75          | 30.77       | 46.00 | -15.23 | AVG      |
| 9   |     | 1.4140  | 21.48         | 10.73          | 32.21       | 56.00 | -23.79 | QP       |
| 10  |     | 1.4140  | 19.77         | 10.73          | 30.50       | 46.00 | -15.50 | AVG      |
| 11  |     | 19.3819 | 24.61         | 10.49          | 35.10       | 60.00 | -24.90 | QP       |
| 12  |     | 19.3819 | 11.34         | 10.49          | 21.83       | 50.00 | -28.17 | AVG      |

Remark: All of the Tx modes have been investigated, and only worst mode is presented in this report.

Phase:Neutral



| No. | Mk. | Freq.   | Reading Level | Correct Factor | Measure-ment | Limit | Over   |          |
|-----|-----|---------|---------------|----------------|--------------|-------|--------|----------|
|     |     | MHz     | dBuV          | dB             | dBuV         | dBuV  | dB     | Detector |
| 1   |     | 0.1500  | 29.97         | 10.45          | 40.42        | 65.99 | -25.57 | QP       |
| 2   |     | 0.1500  | 25.88         | 10.45          | 36.33        | 55.99 | -19.66 | AVG      |
| 3   |     | 0.2128  | 34.51         | 10.34          | 44.85        | 63.09 | -18.24 | QP       |
| 4   | *   | 0.2128  | 33.13         | 10.34          | 43.47        | 53.09 | -9.62  | AVG      |
| 5   |     | 0.2819  | 28.12         | 10.59          | 38.71        | 60.76 | -22.05 | QP       |
| 6   |     | 0.2819  | 25.47         | 10.59          | 36.06        | 50.76 | -14.70 | AVG      |
| 7   |     | 1.9820  | 20.74         | 10.71          | 31.45        | 56.00 | -24.55 | QP       |
| 8   |     | 1.9820  | 18.10         | 10.71          | 28.81        | 46.00 | -17.19 | AVG      |
| 9   |     | 2.8300  | 21.64         | 10.68          | 32.32        | 56.00 | -23.68 | QP       |
| 10  |     | 2.8300  | 19.41         | 10.68          | 30.09        | 46.00 | -15.91 | AVG      |
| 11  |     | 19.7460 | 24.23         | 10.50          | 34.73        | 60.00 | -25.27 | QP       |
| 12  |     | 19.7460 | 9.85          | 10.50          | 20.35        | 50.00 | -29.65 | AVG      |

Remark:All of the Tx modes have been investigated, and only worst mode is presented in this report.

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

### Test Equipment

Please refer to section 4 this report.

### Test Procedure

The out of band emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

### Environmental Conditions

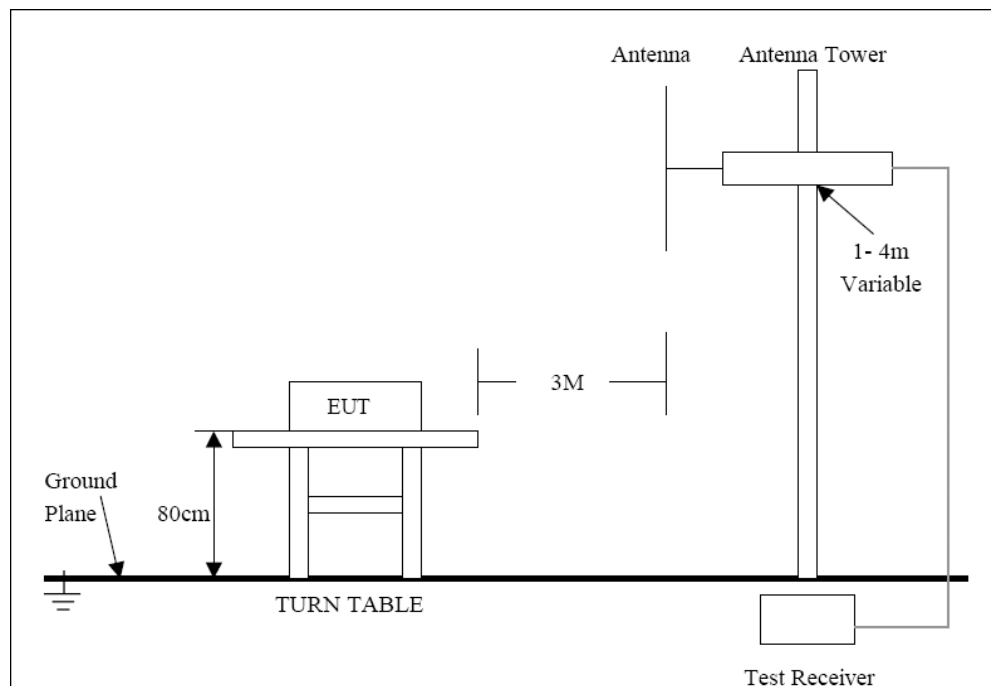
|                    |          |
|--------------------|----------|
| Temperature:       | 26 °C    |
| Relative Humidity: | 55%      |
| ATM Pressure:      | 100.0kPa |

### Radiated Test 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:

| Frequency Range   | RBW     | Video B/W | Detector |
|-------------------|---------|-----------|----------|
| 9KHz-30MHz        | 10 kHz  | 30 kHz    | QP       |
| 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      |



For the accrual test configuration, please refer to the related items-photos of Testing.

## Radiated Emission Limit

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

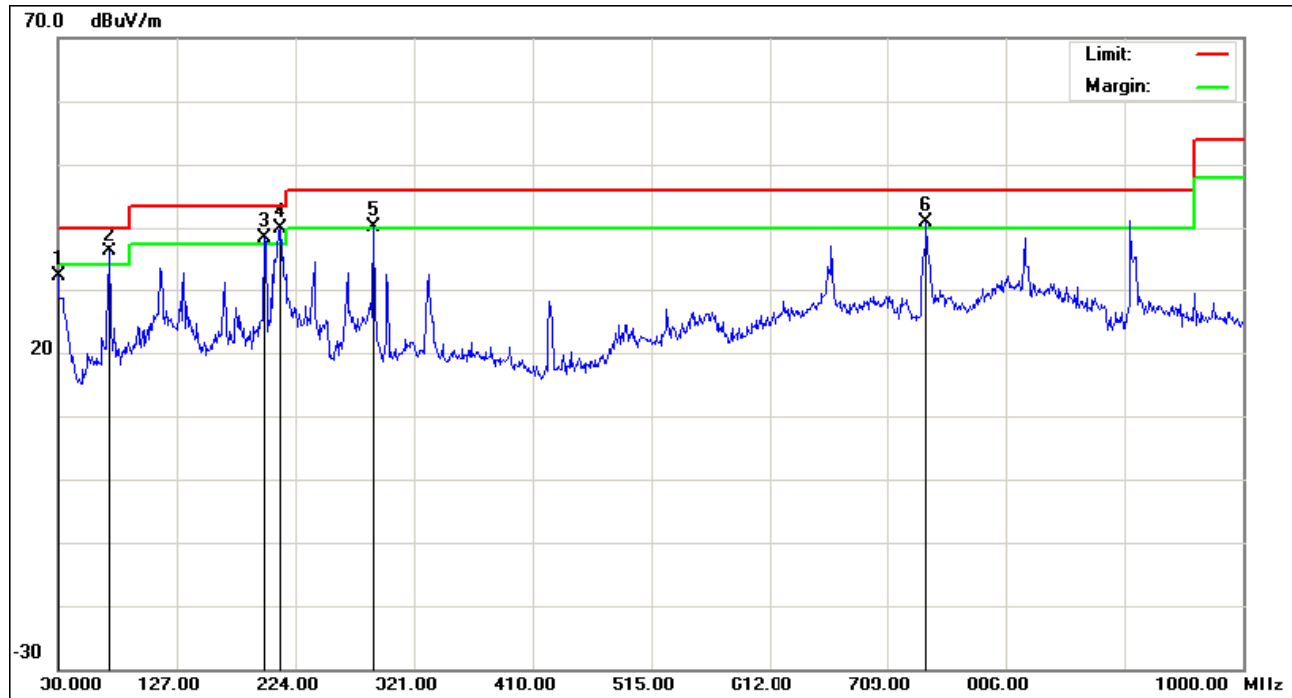
| Frequency<br>(MHz) | Field strength<br>(microvolts/meter) | Measurement distance<br>(meters) |
|--------------------|--------------------------------------|----------------------------------|
| 0.009–0.490        | 2400/F (kHz)                         | 300                              |
| 0.490–1.705        | 24000/F (kHz)                        | 30                               |
| 1.705–30.0         | 30                                   | 30                               |
| 30–88              | 100**                                | 3                                |
| 88–216             | 150**                                | 3                                |
| 216–960            | 200**                                | 3                                |
| Above 960          | 500                                  | 3                                |

## Radiated Emission Test Result

*Test Mode:* Transmitting

NOTE:9KHz-30MHz the measurements were greater than 20dB below the limit.

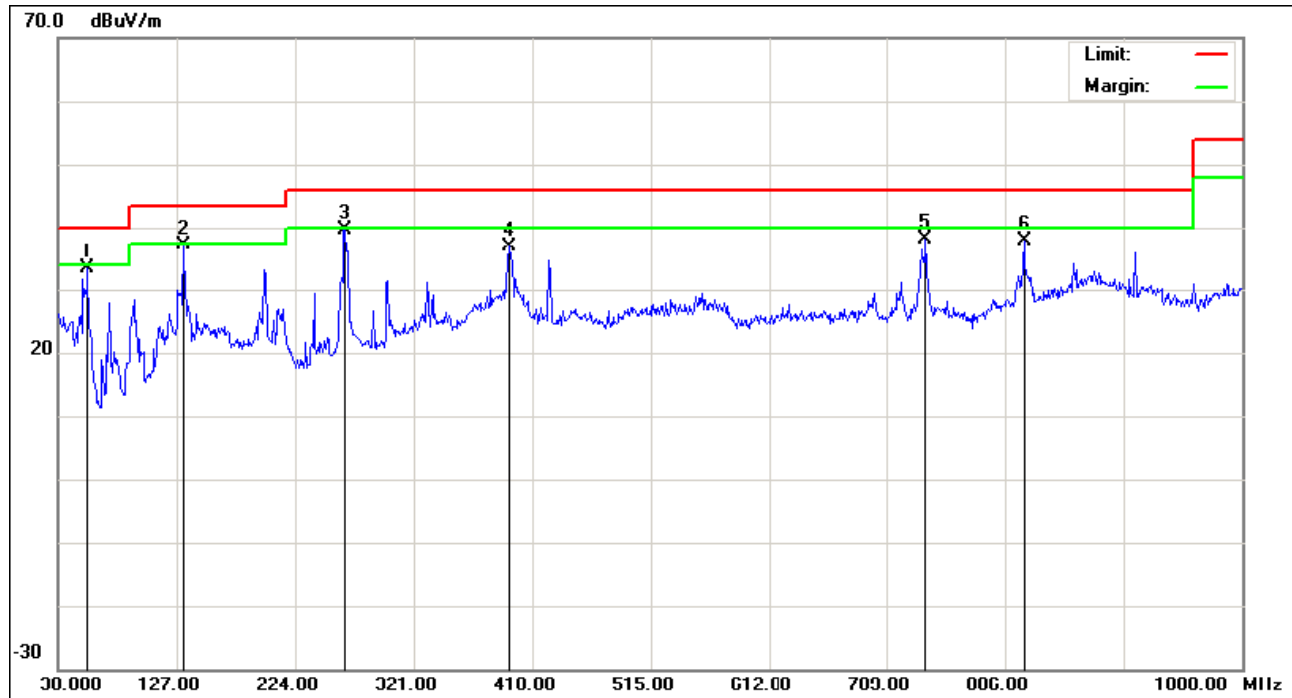
Horizontal:



| No. | Mk. | Freq.    | Reading<br>Level | Correct<br>Factor | Measure-<br>ment | Limit  | Over  |          |
|-----|-----|----------|------------------|-------------------|------------------|--------|-------|----------|
|     |     | MHz      | dBuV             | dB                | dBuV/m           | dBuV/m | dB    | Detector |
| 1   |     | 30.0000  | 31.10            | 0.96              | 32.06            | 40.00  | -7.94 | QP       |
| 2   | !   | 71.7099  | 50.01            | -13.88            | 36.13            | 40.00  | -3.87 | QP       |
| 3   | !   | 198.7800 | 46.87            | -8.50             | 38.37            | 43.50  | -5.13 | QP       |
| 4   | *   | 211.3899 | 48.52            | -8.66             | 39.86            | 43.50  | -3.64 | QP       |
| 5   | !   | 288.0199 | 44.99            | -4.84             | 40.15            | 46.00  | -5.85 | QP       |
| 6   | !   | 741.0099 | 38.63            | 2.16              | 40.79            | 46.00  | -5.21 | QP       |

Remark: All of the Tx modes have been investigated, and only worst mode is presented in this report.

Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBuV | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBuV/m | Limit<br>dBuV/m | Over<br>dB | Detector |
|-----|-----|--------------|--------------------------|-------------------------|----------------------------|-----------------|------------|----------|
| 1   |     | 54.2500      | 47.72                    | -14.44                  | 33.28                      | 40.00           | -6.72      | QP       |
| 2   |     | 132.8199     | 44.56                    | -7.55                   | 37.01                      | 43.50           | -6.49      | QP       |
| 3   | *   | 264.7400     | 44.49                    | -4.93                   | 39.56                      | 46.00           | -6.44      | QP       |
| 4   |     | 399.5699     | 37.30                    | -0.33                   | 36.97                      | 46.00           | -9.03      | QP       |
| 5   |     | 741.0099     | 36.39                    | 1.86                    | 38.25                      | 46.00           | -7.75      | QP       |
| 6   |     | 821.5199     | 32.48                    | 5.31                    | 37.79                      | 46.00           | -8.21      | QP       |

Remark: All of the Tx modes have been investigated, and only worst mode is presented in this report.

Above 1GHz:

802.11b

| Indicated                |                                 | Detector<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                   |                |
|--------------------------|---------------------------------|---------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|-------------------|----------------|
| Frequency<br>(MHz)       | Receiver<br>Reading<br>(dBμV/m) |                     |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| Low Channel (2412MHz)    |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7236                     | 37.5                            | AV                  | 360                      | 1.5           | V              | 35.4                     | 4.51                  | 33.7                     | 43.71                     | 54                | 10.29          |
| 4824                     | 39.3                            | AV                  | 250                      | 1.2           | V              | 31.3                     | 4.64                  | 33.4                     | 41.84                     | 54                | 12.16          |
| 7236                     | 35.2                            | AV                  | 45                       | 1.4           | H              | 35.4                     | 4.51                  | 33.7                     | 41.41                     | 54                | 12.59          |
| 4824                     | 38.6                            | AV                  | 60                       | 1.6           | H              | 31.3                     | 4.64                  | 33.4                     | 41.14                     | 54                | 12.86          |
| 4824                     | 53.6                            | PK                  | 180                      | 1.3           | V              | 31.3                     | 4.64                  | 33.4                     | 56.14                     | 74                | 17.86          |
| 7236                     | 48.6                            | PK                  | 300                      | 1.5           | V              | 35.4                     | 4.51                  | 33.7                     | 54.81                     | 74                | 19.19          |
| 7236                     | 47.7                            | PK                  | 100                      | 1.5           | H              | 35.4                     | 4.51                  | 33.7                     | 53.91                     | 74                | 20.09          |
| 4824                     | 49.9                            | PK                  | 210                      | 1.1           | H              | 31.3                     | 4.64                  | 33.4                     | 52.44                     | 74                | 21.56          |
| Middle Channel (2437MHz) |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7311                     | 40.6                            | AV                  | 180                      | 1.5           | V              | 35.4                     | 4.75                  | 33.7                     | 47.05                     | 54                | 6.95           |
| 7311                     | 39.1                            | AV                  | 185                      | 1.3           | H              | 35.4                     | 4.75                  | 33.7                     | 45.55                     | 54                | 8.45           |
| 4874                     | 41.7                            | AV                  | 200                      | 1.5           | V              | 31.3                     | 4.64                  | 33.4                     | 44.24                     | 54                | 9.76           |
| 4874                     | 40.5                            | AV                  | 360                      | 1.5           | H              | 31.3                     | 4.64                  | 33.4                     | 43.04                     | 54                | 10.96          |
| 7311                     | 53.8                            | PK                  | 120                      | 1.2           | V              | 35.4                     | 4.75                  | 33.7                     | 60.25                     | 74                | 13.75          |
| 4874                     | 55.6                            | PK                  | 75                       | 1.5           | V              | 31.3                     | 4.64                  | 33.4                     | 58.14                     | 74                | 15.86          |
| 7311                     | 50.4                            | PK                  | 220                      | 1.4           | H              | 35.4                     | 4.75                  | 33.7                     | 56.85                     | 74                | 17.15          |
| 4874                     | 52.6                            | PK                  | 0                        | 1.1           | H              | 31.3                     | 4.64                  | 33.4                     | 55.14                     | 74                | 18.86          |
| High Channel (2462MHz)   |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7386                     | 42.0                            | AV                  | 160                      | 1.3           | V              | 35.3                     | 4.75                  | 33.7                     | 48.35                     | 54                | 5.65           |
| 7386                     | 41.9                            | AV                  | 245                      | 1.4           | H              | 35.3                     | 4.75                  | 33.7                     | 48.25                     | 54                | 5.75           |
| 4924                     | 43.8                            | AV                  | 360                      | 1.5           | V              | 32.0                     | 4.64                  | 33.4                     | 47.04                     | 54                | 6.96           |
| 4924                     | 42.4                            | AV                  | 45                       | 1.5           | H              | 32.0                     | 4.64                  | 33.4                     | 45.64                     | 54                | 8.36           |
| 7386                     | 52.2                            | PK                  | 90                       | 1.2           | V              | 35.3                     | 4.75                  | 33.7                     | 58.55                     | 74                | 15.45          |
| 4924                     | 55.1                            | PK                  | 0                        | 1.4           | V              | 32.0                     | 4.64                  | 33.4                     | 58.34                     | 74                | 15.66          |
| 4924                     | 54.6                            | PK                  | 200                      | 1.4           | H              | 32.0                     | 4.64                  | 33.4                     | 57.84                     | 74                | 16.16          |
| 7386                     | 51.3                            | PK                  | 180                      | 1.2           | H              | 35.3                     | 4.75                  | 33.7                     | 57.65                     | 74                | 16.35          |

802.11g

| Indicated                |                                 | Detector<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                   |                |
|--------------------------|---------------------------------|---------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|-------------------|----------------|
| Frequency<br>(MHz)       | Receiver<br>Reading<br>(dBμV/m) |                     |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| Low Channel (2412MHz)    |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7236                     | 38.6                            | AV                  | 1.24                     | 1.3           | V              | 35.4                     | 4.51                  | 33.7                     | 44.81                     | 54                | 9.19           |
| 7236                     | 37.8                            | AV                  | 200                      | 1.4           | H              | 35.4                     | 4.51                  | 33.7                     | 44.01                     | 54                | 9.99           |
| 4824                     | 40.7                            | AV                  | 90                       | 1.5           | V              | 31.3                     | 4.64                  | 33.4                     | 43.24                     | 54                | 10.76          |
| 4824                     | 39.1                            | AV                  | 45                       | 1.5           | H              | 31.3                     | 4.64                  | 33.4                     | 41.64                     | 54                | 12.36          |
| 7236                     | 46.5                            | PK                  | 165                      | 1.4           | V              | 35.4                     | 4.51                  | 33.7                     | 52.71                     | 74                | 21.29          |
| 4824                     | 49.8                            | PK                  | 320                      | 1.2           | V              | 31.3                     | 4.64                  | 33.4                     | 52.34                     | 74                | 21.66          |
| 4824                     | 47.5                            | PK                  | 0                        | 1.5           | H              | 31.3                     | 4.64                  | 33.4                     | 50.04                     | 74                | 23.96          |
| 7236                     | 42.7                            | PK                  | 120                      | 1.2           | H              | 35.4                     | 4.51                  | 33.7                     | 48.91                     | 74                | 25.09          |
| Middle Channel (2437MHz) |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7311                     | 38.6                            | AV                  | 200                      | 1.5           | H              | 35.4                     | 4.75                  | 33.7                     | 45.05                     | 54                | 8.95           |
| 4874                     | 40.5                            | AV                  | 120                      | 1.4           | H              | 31.3                     | 4.64                  | 33.4                     | 43.04                     | 54                | 10.96          |
| 7311                     | 35.9                            | AV                  | 320                      | 1.3           | V              | 35.4                     | 4.75                  | 33.7                     | 42.35                     | 54                | 11.65          |
| 4874                     | 36.7                            | AV                  | 190                      | 1.3           | V              | 31.3                     | 4.64                  | 33.4                     | 39.24                     | 54                | 14.76          |
| 7311                     | 44.2                            | PK                  | 45                       | 1.5           | H              | 35.4                     | 4.75                  | 33.7                     | 50.65                     | 74                | 23.35          |
| 7311                     | 43.2                            | PK                  | 360                      | 1.4           | V              | 35.4                     | 4.75                  | 33.7                     | 49.65                     | 74                | 24.35          |
| 4874                     | 46.8                            | PK                  | 0                        | 1.4           | V              | 31.3                     | 4.64                  | 33.4                     | 49.34                     | 74                | 24.66          |
| 4874                     | 45.3                            | PK                  | 60                       | 1.2           | H              | 31.3                     | 4.64                  | 33.4                     | 47.84                     | 74                | 26.16          |
| High Channel (2462MHz)   |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7386                     | 38.2                            | AV                  | 160                      | 1.3           | V              | 35.3                     | 4.75                  | 33.7                     | 44.55                     | 54                | 9.45           |
| 4924                     | 41.3                            | AV                  | 360                      | 1.5           | V              | 32.0                     | 4.55                  | 33.4                     | 44.45                     | 54                | 9.55           |
| 4924                     | 40.5                            | AV                  | 45                       | 1.5           | H              | 32.0                     | 4.55                  | 33.4                     | 43.65                     | 54                | 10.35          |
| 7386                     | 37.1                            | AV                  | 245                      | 1.4           | H              | 35.3                     | 4.75                  | 33.7                     | 43.45                     | 54                | 10.55          |
| 4924                     | 54.7                            | PK                  | 0                        | 1.4           | V              | 32.0                     | 4.55                  | 33.4                     | 57.85                     | 74                | 16.15          |
| 7386                     | 50.6                            | PK                  | 90                       | 1.2           | V              | 35.3                     | 4.75                  | 33.7                     | 56.95                     | 74                | 17.05          |
| 7386                     | 47.6                            | PK                  | 180                      | 1.2           | H              | 35.3                     | 4.75                  | 33.7                     | 53.95                     | 74                | 20.05          |
| 4924                     | 49.4                            | PK                  | 200                      | 1.4           | H              | 32.0                     | 4.55                  | 33.4                     | 52.55                     | 74                | 21.45          |

802.11n HT20

| Indicated                 |                                 | Detector<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                   |                |
|---------------------------|---------------------------------|---------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|-------------------|----------------|
| Frequency<br>(MHz)        | Receiver<br>Reading<br>(dBμV/m) |                     |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| Low Channel (2412MHz )    |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7236                      | 35.8                            | AV                  | 355                      | 1.3           | V              | 41.3                     | 8.90                  | 34.1                     | 51.9                      | 54                | 2.10           |
| 4824                      | 34.2                            | AV                  | 120                      | 1.3           | H              | 41.3                     | 8.90                  | 34.1                     | 50.3                      | 54                | 3.70           |
| 7236                      | 40.6                            | AV                  | 100                      | 1.4           | H              | 36.1                     | 6.38                  | 34.2                     | 48.88                     | 54                | 5.12           |
| 4824                      | 40.1                            | AV                  | 90                       | 1.5           | V              | 36.1                     | 6.38                  | 34.2                     | 48.38                     | 54                | 5.62           |
| 4824                      | 46.2                            | PK                  | 165                      | 1.2           | V              | 41.3                     | 8.90                  | 34.1                     | 62.3                      | 74                | 11.70          |
| 7236                      | 44.3                            | PK                  | 45                       | 1.4           | H              | 41.3                     | 8.90                  | 34.1                     | 60.4                      | 74                | 13.60          |
| 7236                      | 48.3                            | PK                  | 210                      | 1.5           | V              | 36.1                     | 6.38                  | 34.2                     | 56.58                     | 74                | 17.42          |
| 4824                      | 47.2                            | PK                  | 200                      | 1.2           | H              | 36.1                     | 6.38                  | 34.2                     | 55.48                     | 74                | 18.52          |
| Middle Channel (2437MHz ) |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7311                      | 34.7                            | AV                  | 360                      | 1.3           | V              | 41.8                     | 8.92                  | 34.1                     | 51.32                     | 54                | 2.68           |
| 4874                      | 34.1                            | AV                  | 180                      | 1.4           | V              | 41.8                     | 8.92                  | 34.1                     | 50.72                     | 54                | 3.28           |
| 7311                      | 52.9                            | PK                  | 300                      | 1.4           | V              | 41.8                     | 8.92                  | 34.1                     | 69.52                     | 74                | 4.48           |
| 4874                      | 38.4                            | AV                  | 205                      | 1.3           | H              | 36.5                     | 6.39                  | 34.2                     | 47.09                     | 54                | 6.91           |
| 7311                      | 48.5                            | PK                  | 150                      | 1.3           | H              | 41.8                     | 8.92                  | 34.1                     | 65.12                     | 74                | 8.88           |
| 7311                      | 36.1                            | AV                  | 90                       | 1.5           | H              | 36.5                     | 6.39                  | 34.2                     | 44.79                     | 54                | 9.21           |
| 4874                      | 53.4                            | PK                  | 45                       | 1.5           | V              | 36.5                     | 6.39                  | 34.2                     | 62.09                     | 74                | 11.91          |
| 4874                      | 50.6                            | PK                  | 0                        | 1.1           | H              | 36.5                     | 6.39                  | 34.2                     | 59.29                     | 74                | 14.71          |
| High Channel (2462MHz )   |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7386                      | 35.4                            | AV                  | 210                      | 1.5           | H              | 42.0                     | 8.90                  | 34.3                     | 52                        | 54                | 2.00           |
| 4924                      | 35.2                            | AV                  | 0                        | 1.3           | V              | 42.0                     | 8.90                  | 34.3                     | 51.8                      | 54                | 2.20           |
| 4924                      | 40.7                            | AV                  | 115                      | 1.4           | H              | 36.4                     | 6.39                  | 34.2                     | 49.29                     | 54                | 4.71           |
| 7386                      | 39.6                            | AV                  | 45                       | 1.4           | V              | 36.4                     | 6.39                  | 34.2                     | 48.19                     | 54                | 5.81           |
| 4924                      | 47.1                            | PK                  | 180                      | 1.4           | V              | 42.0                     | 8.90                  | 34.3                     | 63.7                      | 74                | 10.30          |
| 7386                      | 46.2                            | PK                  | 95                       | 1.4           | H              | 42.0                     | 8.90                  | 34.3                     | 62.8                      | 74                | 11.20          |
| 7386                      | 50.2                            | PK                  | 360                      | 1.5           | V              | 36.4                     | 6.39                  | 34.2                     | 58.79                     | 74                | 15.21          |
| 4924                      | 49.6                            | PK                  | 265                      | 1.1           | H              | 36.4                     | 6.39                  | 34.2                     | 58.19                     | 74                | 15.81          |

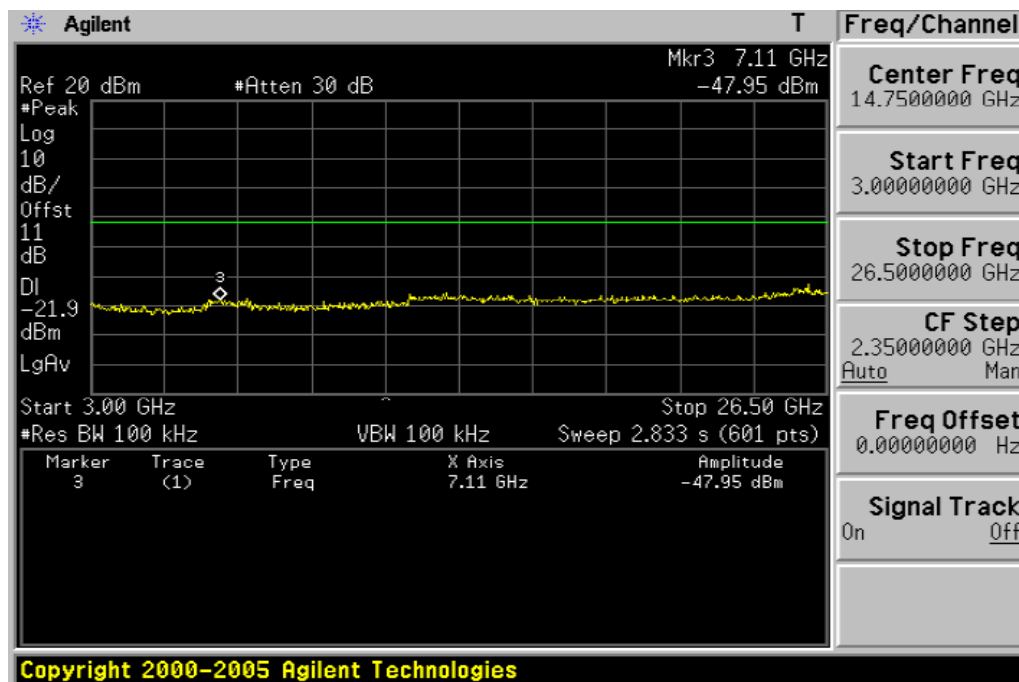
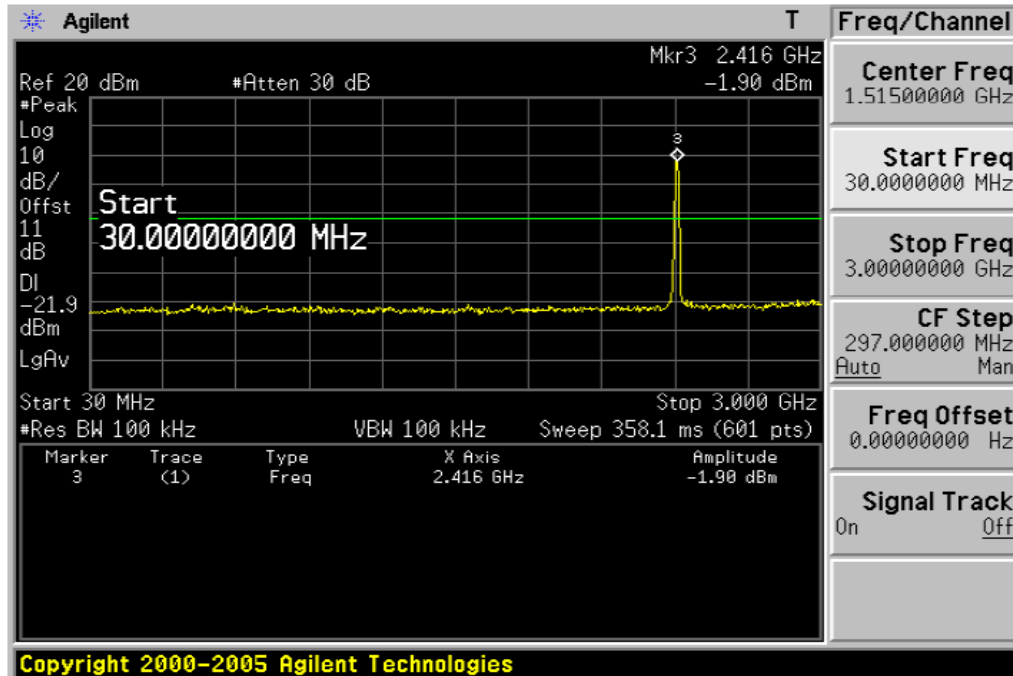
802.11n HT40

| Indicated                 |                                 | Detector<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                   |                |
|---------------------------|---------------------------------|---------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|-------------------|----------------|
| Frequency<br>(MHz)        | Receiver<br>Reading<br>(dBμV/m) |                     |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| Low Channel (2422MHz )    |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7266                      | 34.9                            | AV                  | 355                      | 1.3           | V              | 41.3                     | 8.90                  | 34.1                     | 51.0                      | 54                | 3.00           |
| 4844                      | 34.7                            | AV                  | 120                      | 1.3           | H              | 41.3                     | 8.90                  | 34.1                     | 50.8                      | 54                | 3.20           |
| 7266                      | 40.4                            | AV                  | 100                      | 1.4           | H              | 36.1                     | 6.38                  | 34.2                     | 48.68                     | 54                | 5.32           |
| 4844                      | 40.7                            | AV                  | 90                       | 1.5           | V              | 36.1                     | 6.38                  | 34.2                     | 48.98                     | 54                | 5.02           |
| 4844                      | 45.7                            | PK                  | 165                      | 1.2           | V              | 41.3                     | 8.90                  | 34.1                     | 61.8                      | 74                | 12.20          |
| 7266                      | 43.4                            | PK                  | 45                       | 1.4           | H              | 41.3                     | 8.90                  | 34.1                     | 59.5                      | 74                | 14.50          |
| 7266                      | 48.0                            | PK                  | 210                      | 1.5           | V              | 36.1                     | 6.38                  | 34.2                     | 56.28                     | 74                | 17.72          |
| 4844                      | 48.2                            | PK                  | 200                      | 1.2           | H              | 36.1                     | 6.38                  | 34.2                     | 56.48                     | 74                | 17.52          |
| Middle Channel (2437MHz ) |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7311                      | 34.7                            | AV                  | 360                      | 1.3           | V              | 41.8                     | 8.92                  | 34.1                     | 51.32                     | 54                | 2.68           |
| 4874                      | 34.5                            | AV                  | 180                      | 1.4           | V              | 41.8                     | 8.92                  | 34.1                     | 51.12                     | 54                | 2.88           |
| 7311                      | 52.5                            | PK                  | 300                      | 1.4           | V              | 41.8                     | 8.92                  | 34.1                     | 69.12                     | 74                | 4.98           |
| 4874                      | 37.5                            | AV                  | 205                      | 1.3           | H              | 36.5                     | 6.39                  | 34.2                     | 46.19                     | 54                | 7.81           |
| 7311                      | 49.5                            | PK                  | 150                      | 1.3           | H              | 41.8                     | 8.92                  | 34.1                     | 66.12                     | 74                | 9.88           |
| 7311                      | 36.1                            | AV                  | 90                       | 1.5           | H              | 36.5                     | 6.39                  | 34.2                     | 44.79                     | 54                | 9.21           |
| 4874                      | 54.3                            | PK                  | 45                       | 1.5           | V              | 36.5                     | 6.39                  | 34.2                     | 62.99                     | 74                | 11.01          |
| 4874                      | 50.1                            | PK                  | 0                        | 1.1           | H              | 36.5                     | 6.39                  | 34.2                     | 58.79                     | 74                | 14.21          |
| High Channel (2452MHz )   |                                 |                     |                          |               |                |                          |                       |                          |                           |                   |                |
| 7356                      | 34.2                            | AV                  | 210                      | 1.5           | H              | 42.0                     | 8.90                  | 34.3                     | 50.8                      | 54                | 3.20           |
| 4904                      | 35.2                            | AV                  | 0                        | 1.3           | V              | 42.0                     | 8.90                  | 34.3                     | 50.8                      | 54                | 3.20           |
| 4904                      | 40.1                            | AV                  | 115                      | 1.4           | H              | 36.4                     | 6.39                  | 34.2                     | 48.69                     | 54                | 5.31           |
| 7356                      | 39.6                            | AV                  | 45                       | 1.4           | V              | 36.4                     | 6.39                  | 34.2                     | 48.19                     | 54                | 5.81           |
| 4904                      | 47.7                            | PK                  | 180                      | 1.4           | V              | 42.0                     | 8.90                  | 34.3                     | 64.3                      | 74                | 9.70           |
| 7356                      | 45.5                            | PK                  | 95                       | 1.4           | H              | 42.0                     | 8.90                  | 34.3                     | 62.1                      | 74                | 11.90          |
| 7356                      | 49.9                            | PK                  | 360                      | 1.5           | V              | 36.4                     | 6.39                  | 34.2                     | 58.49                     | 74                | 15.51          |
| 4904                      | 48.3                            | PK                  | 265                      | 1.1           | H              | 36.4                     | 6.39                  | 34.2                     | 56.89                     | 74                | 17.11          |

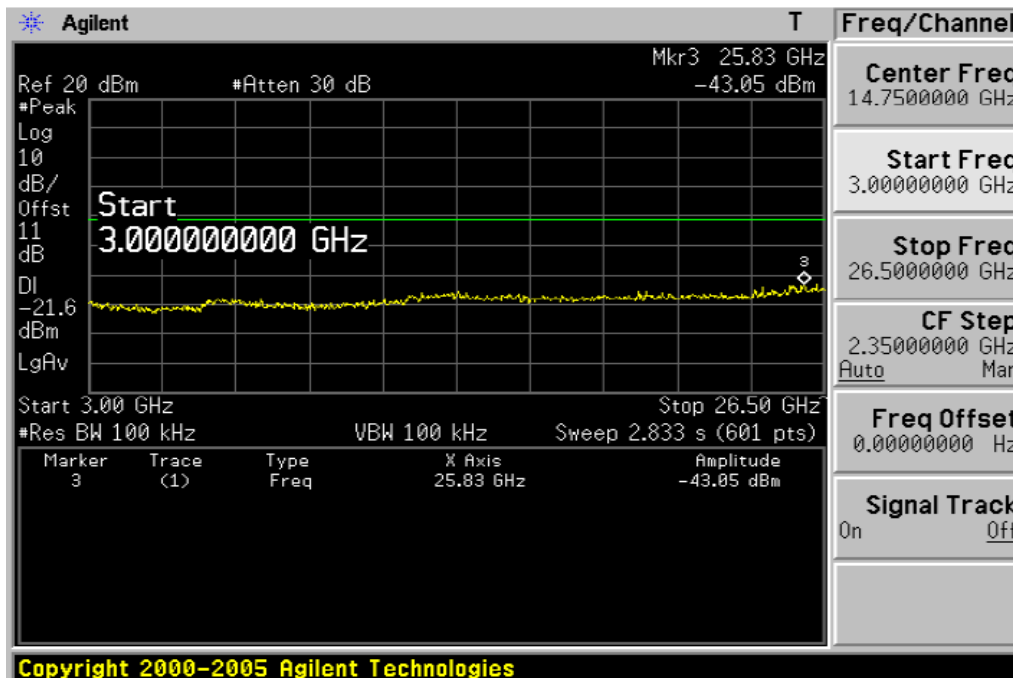
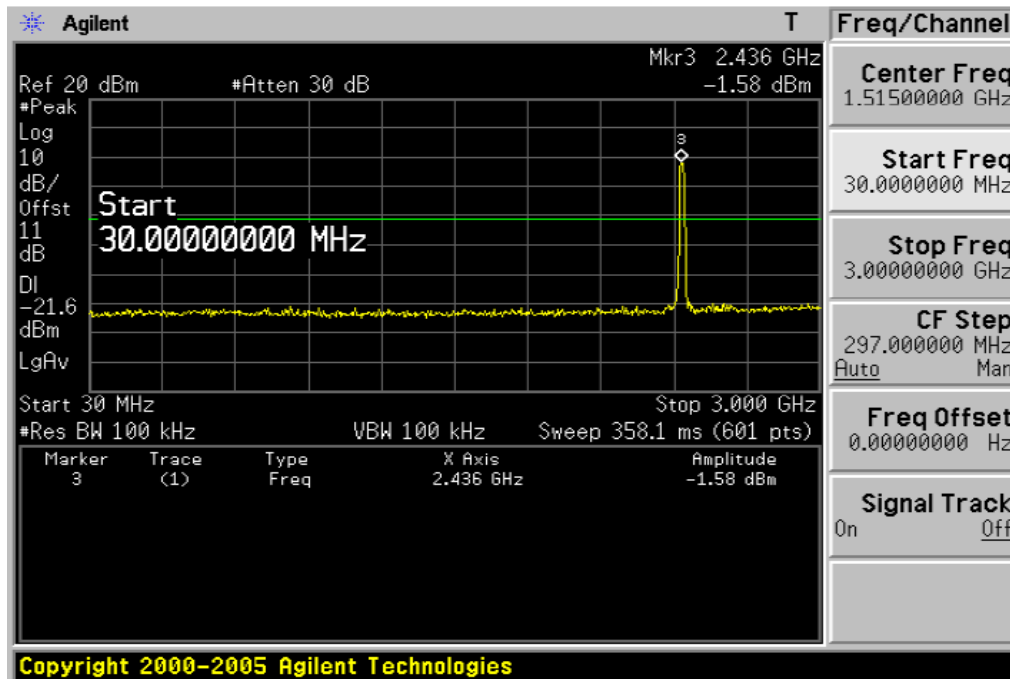
Antenna port conducted spurious emissions

802.11b mode:

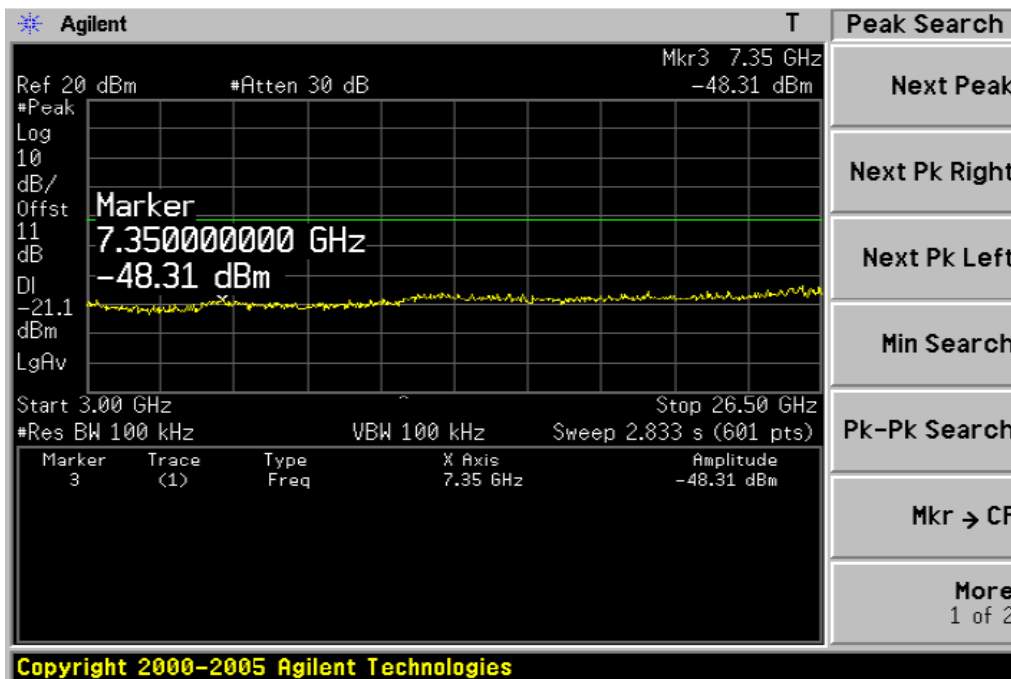
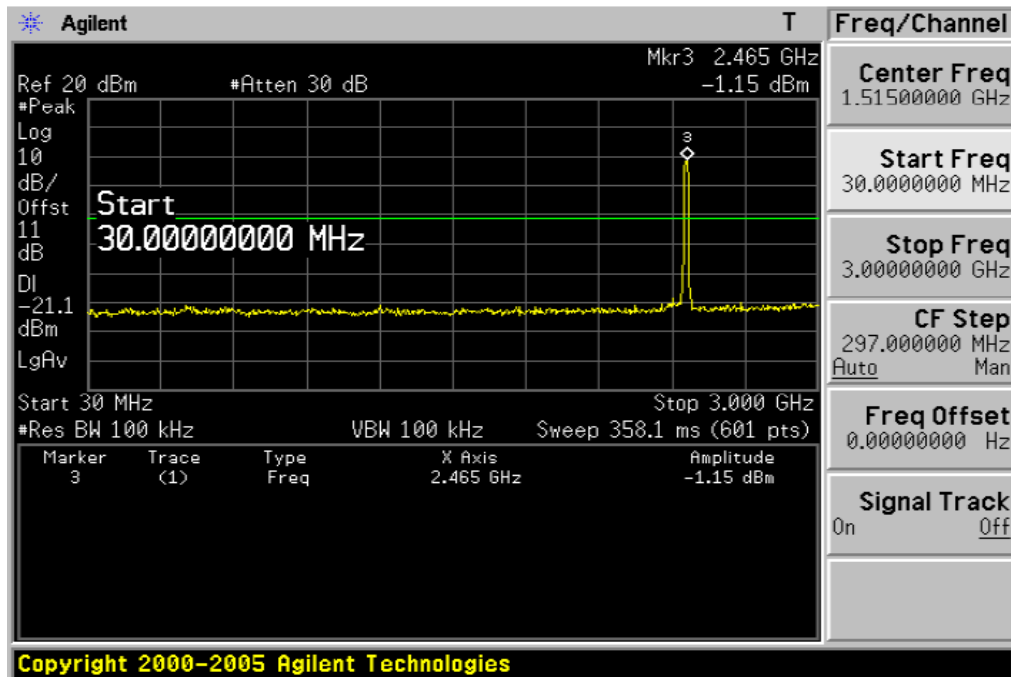
### Low channel



## Middle channel

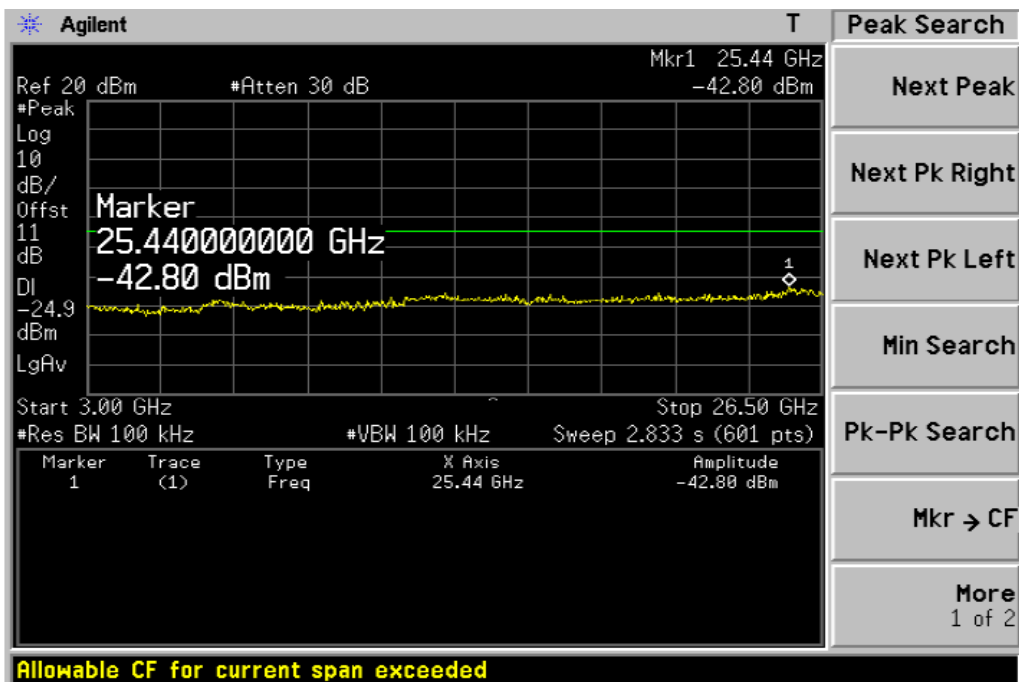
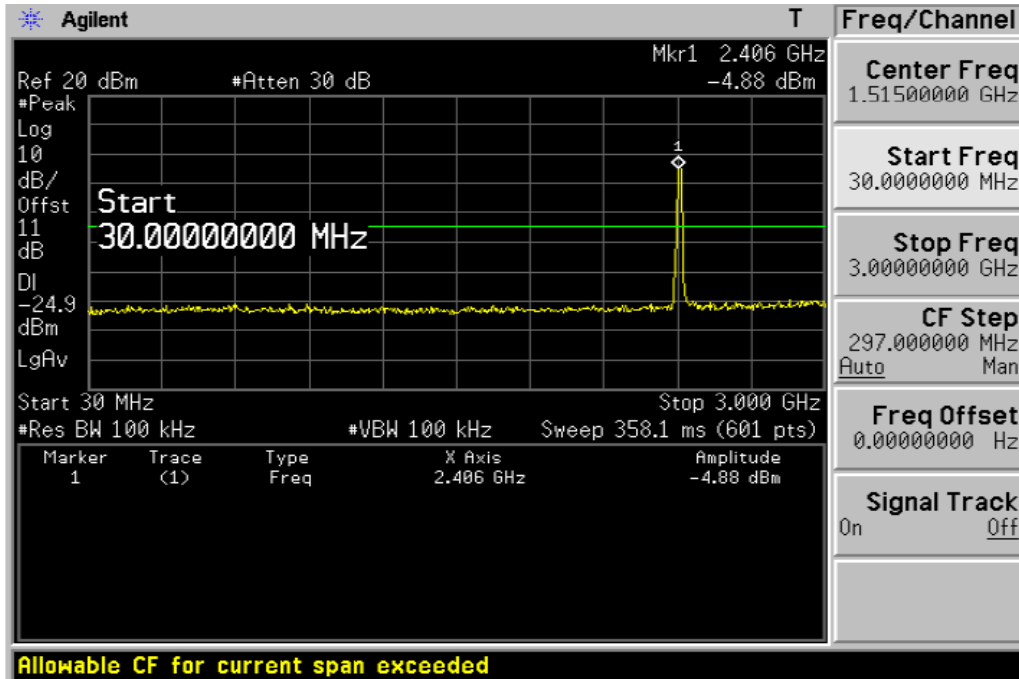


## High channel

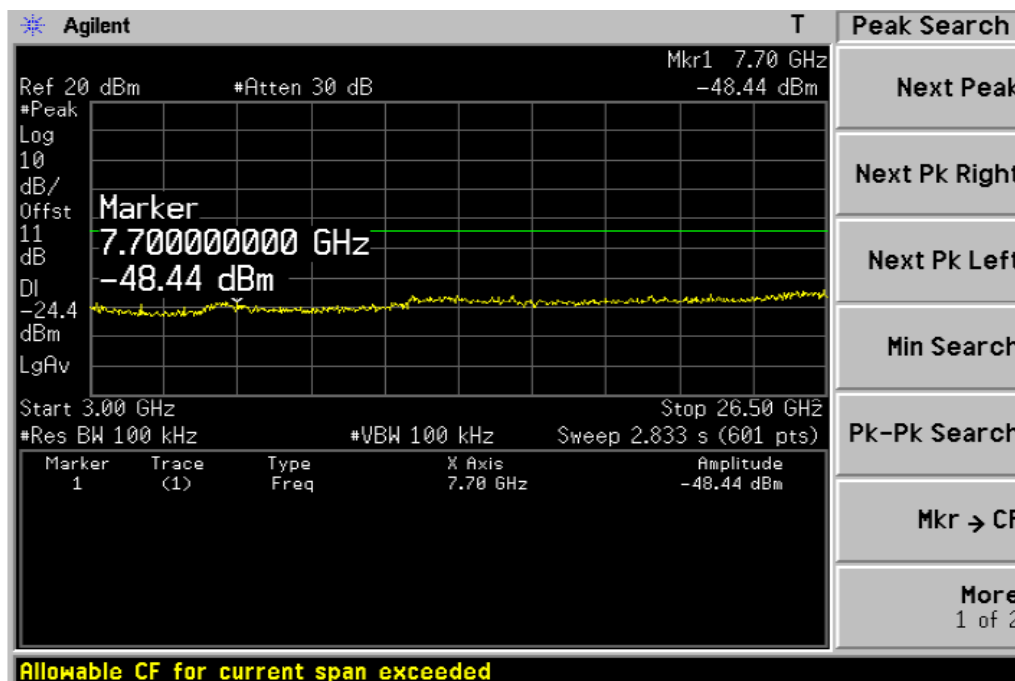
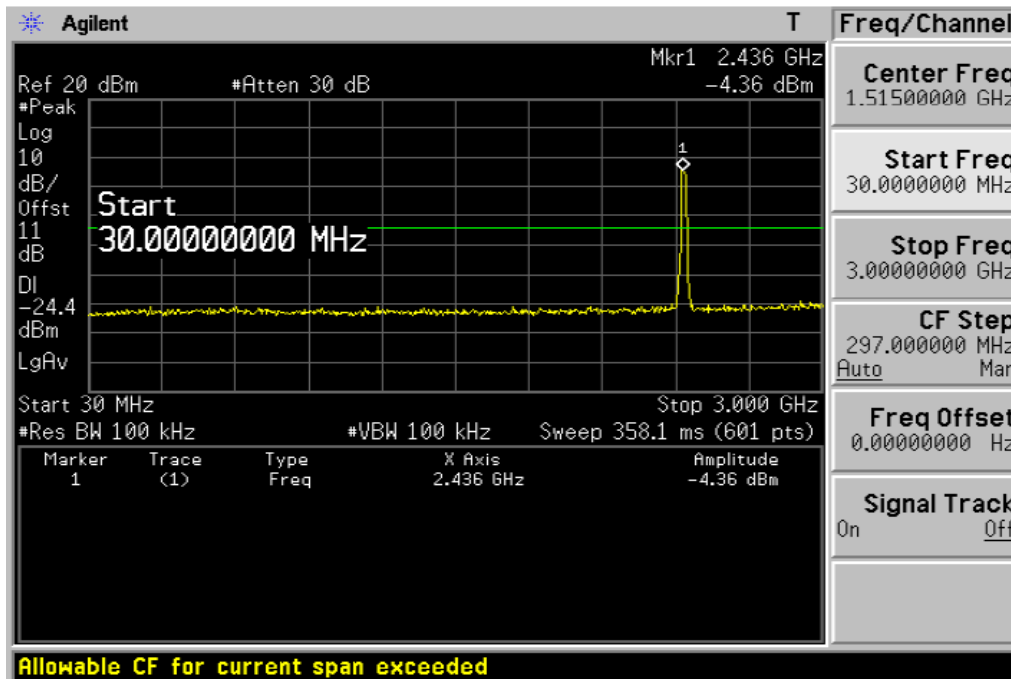


802.11g mode:

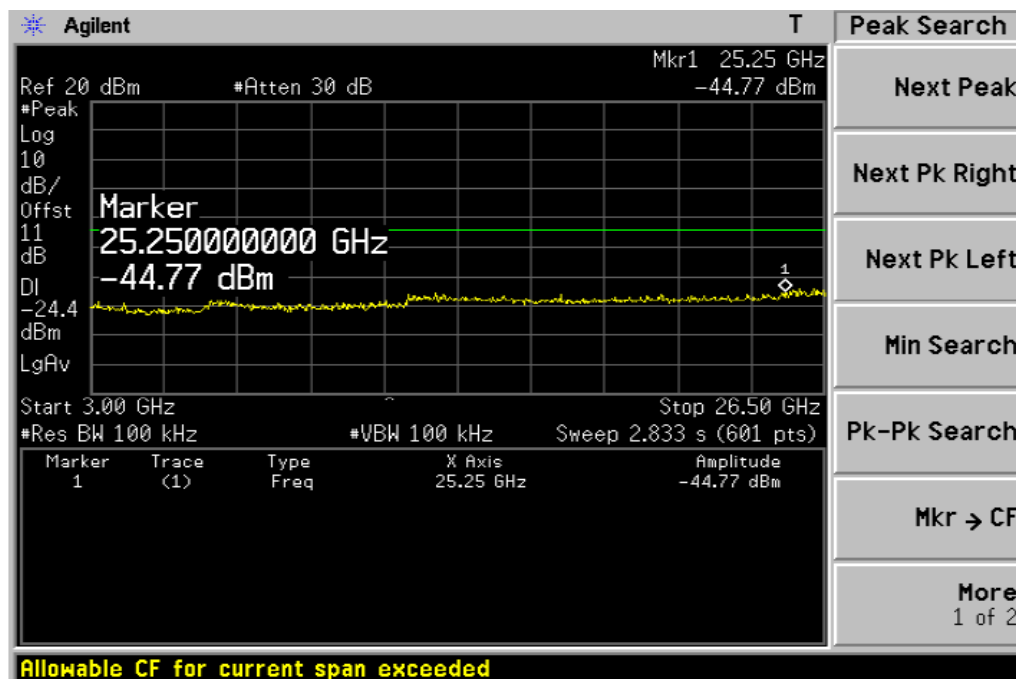
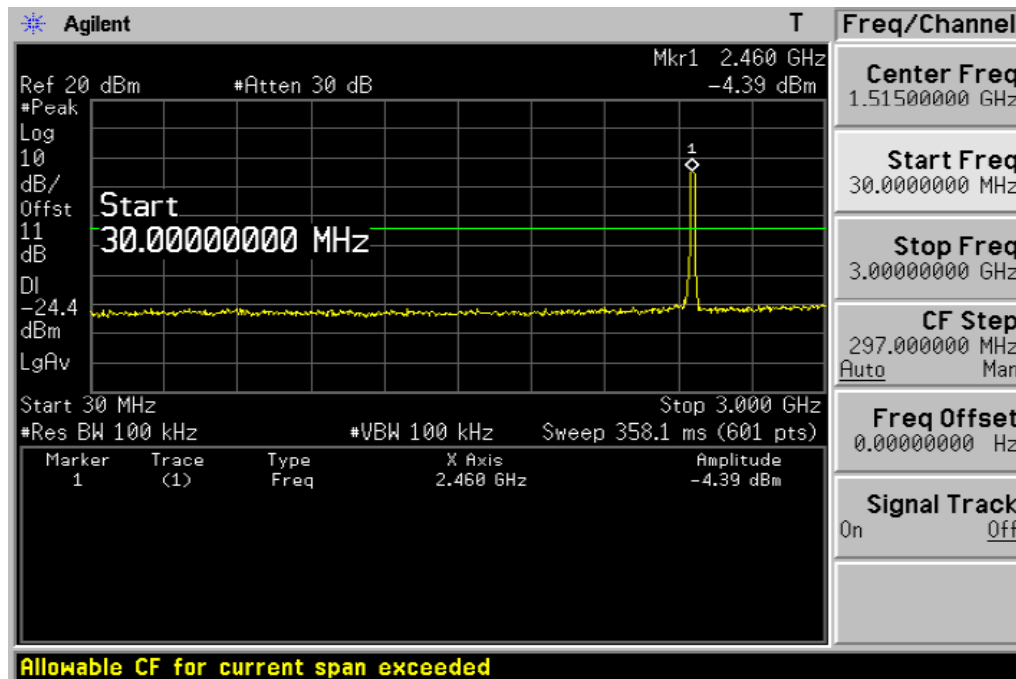
## Low channel



### Middle channel

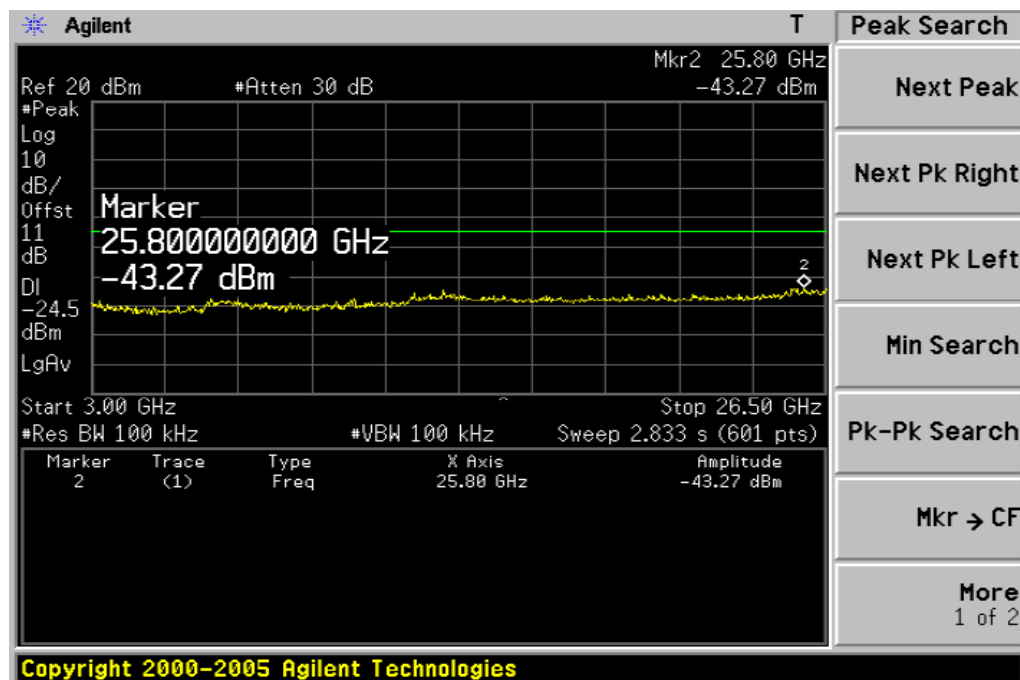
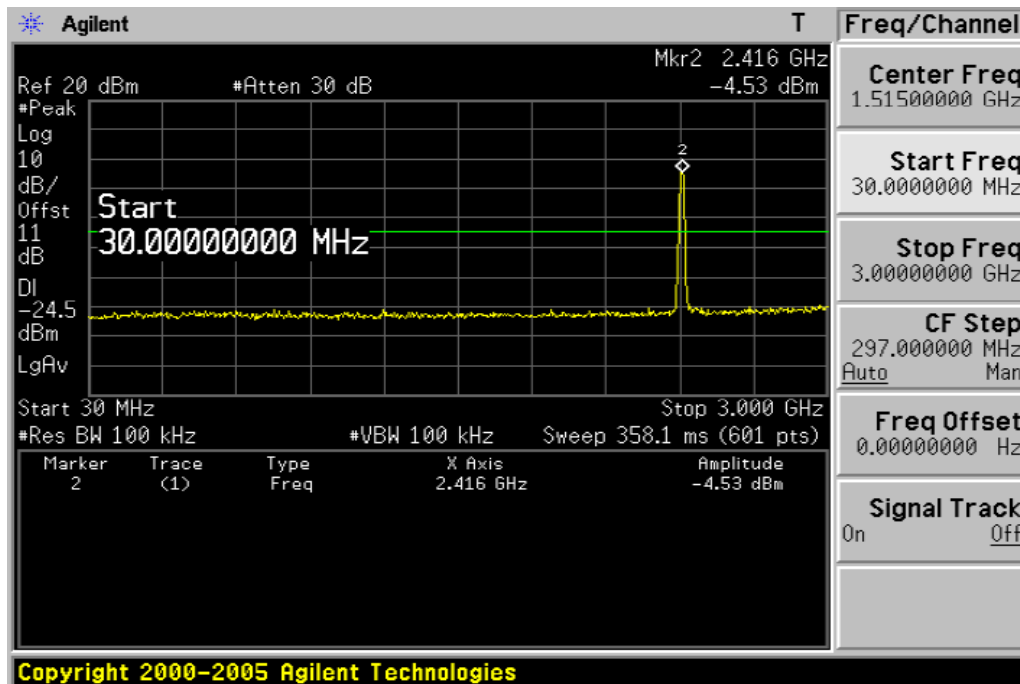


## High channel

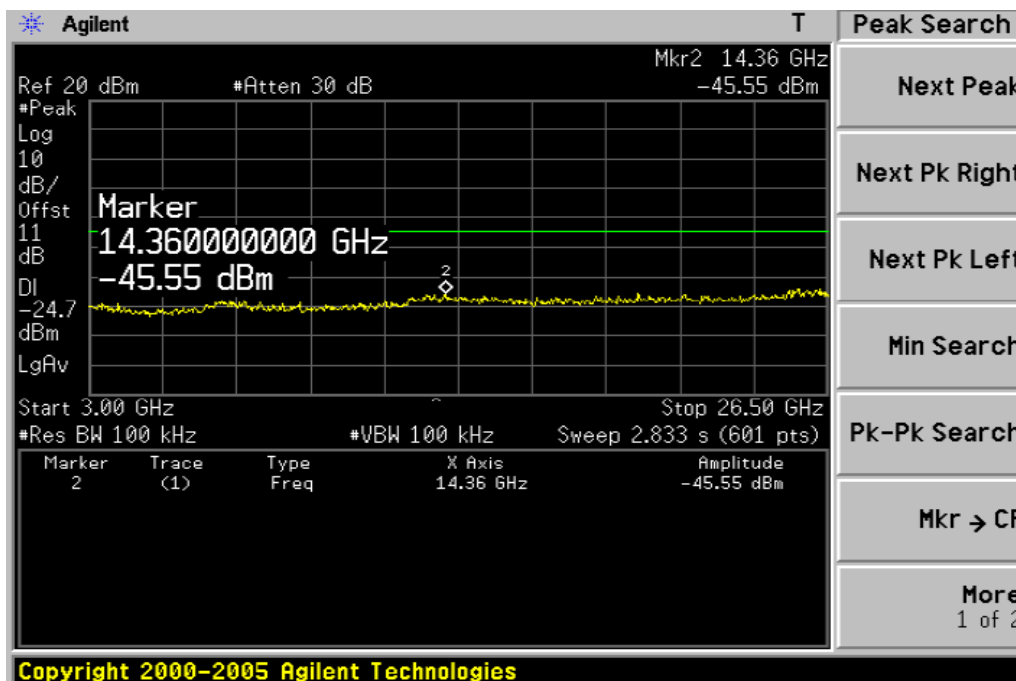
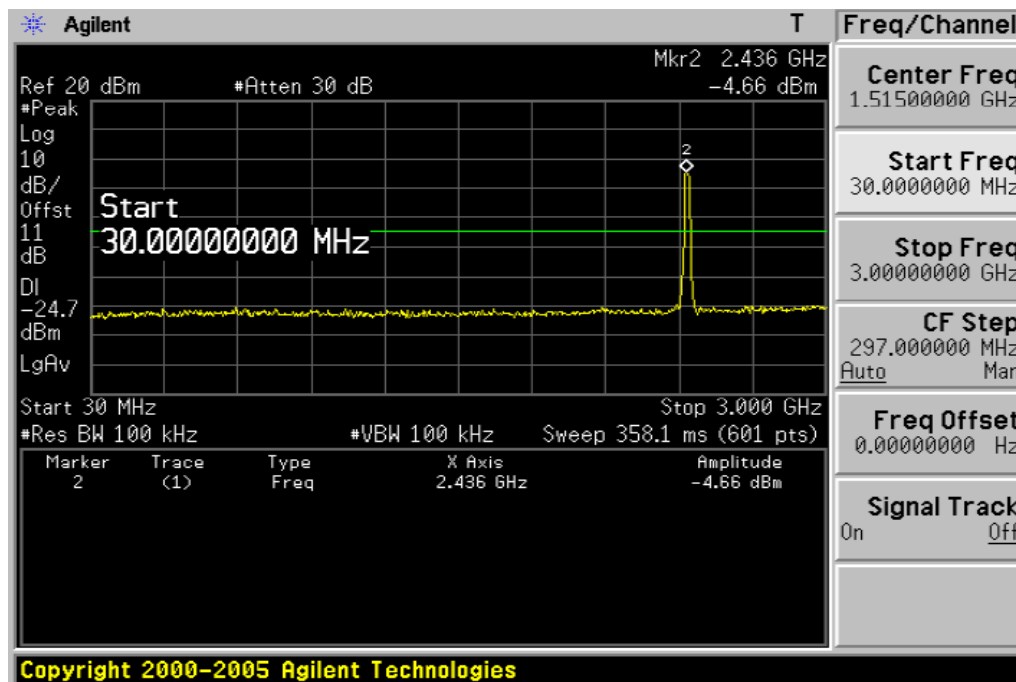


802.11n HT20 mode:

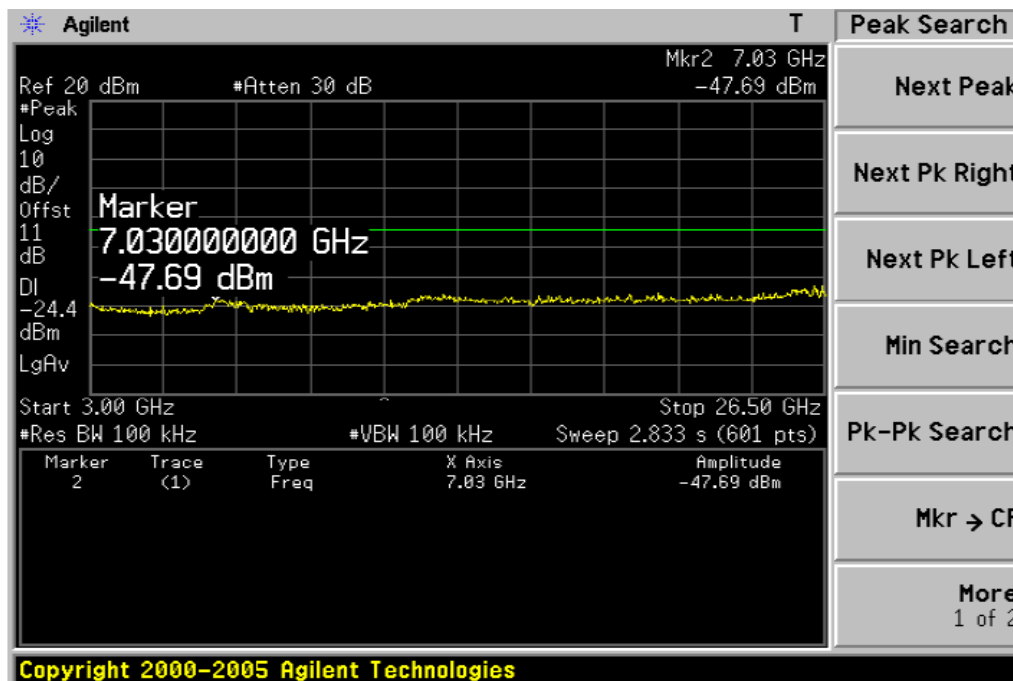
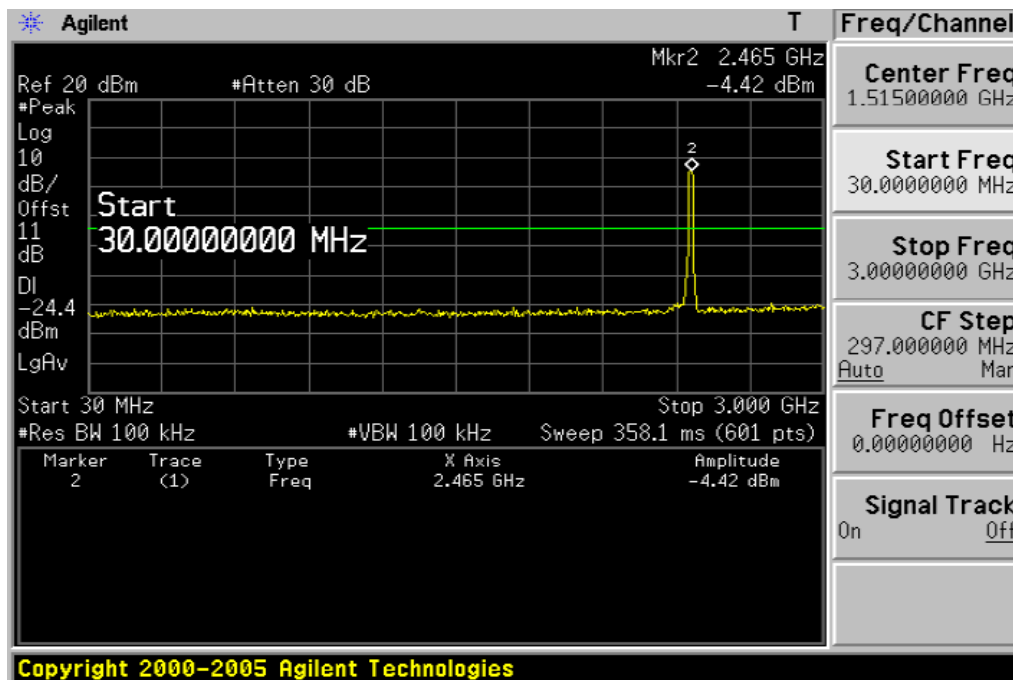
### Low channel



### Middle channel

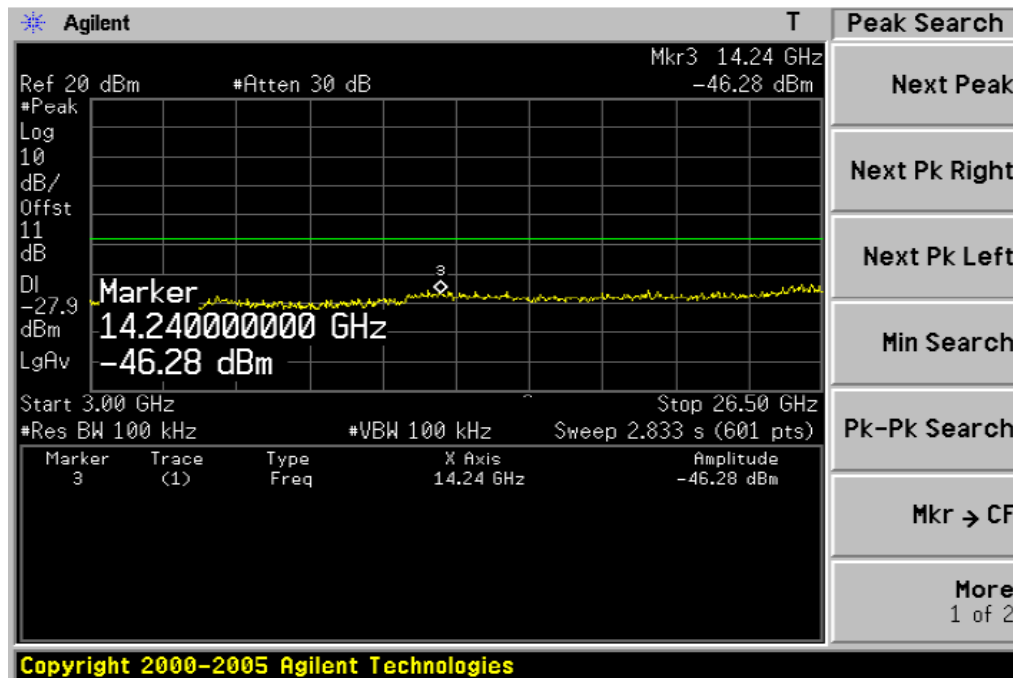
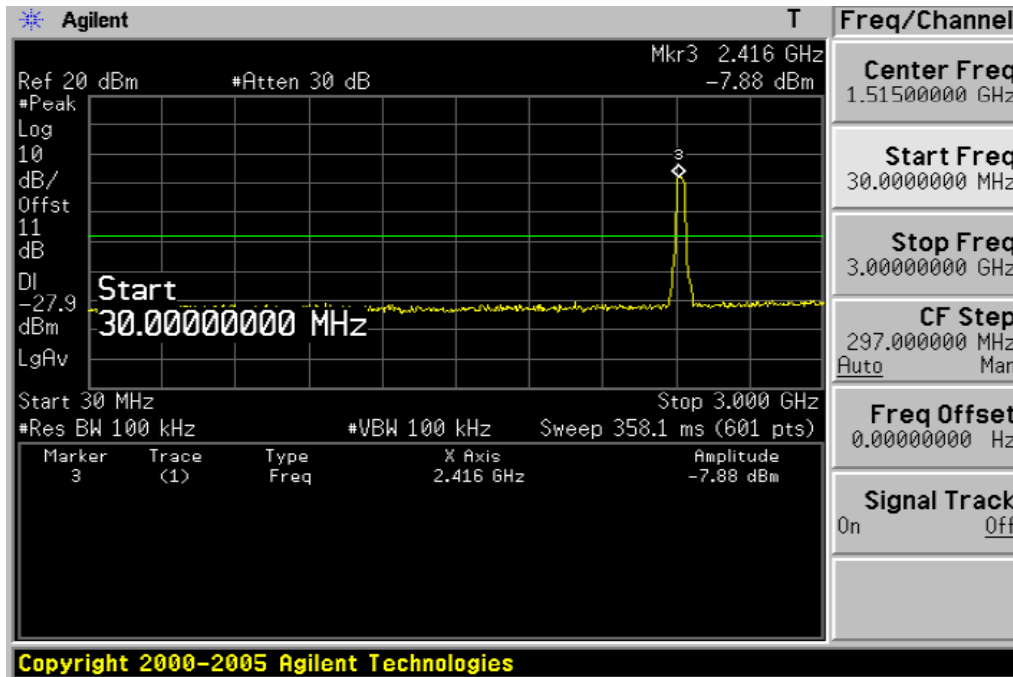


## High channel

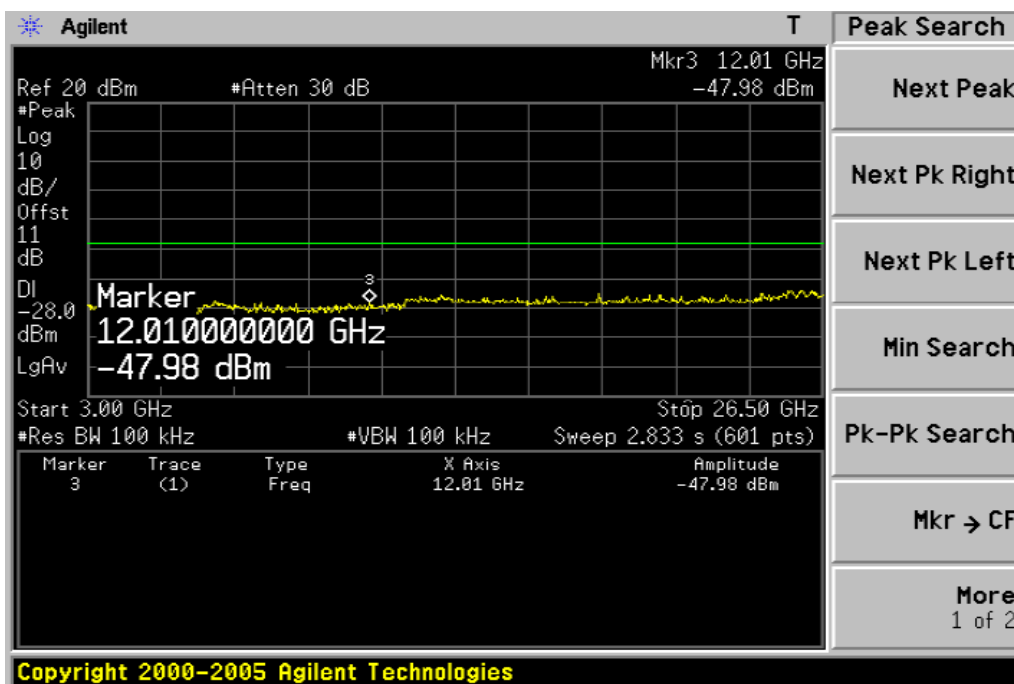
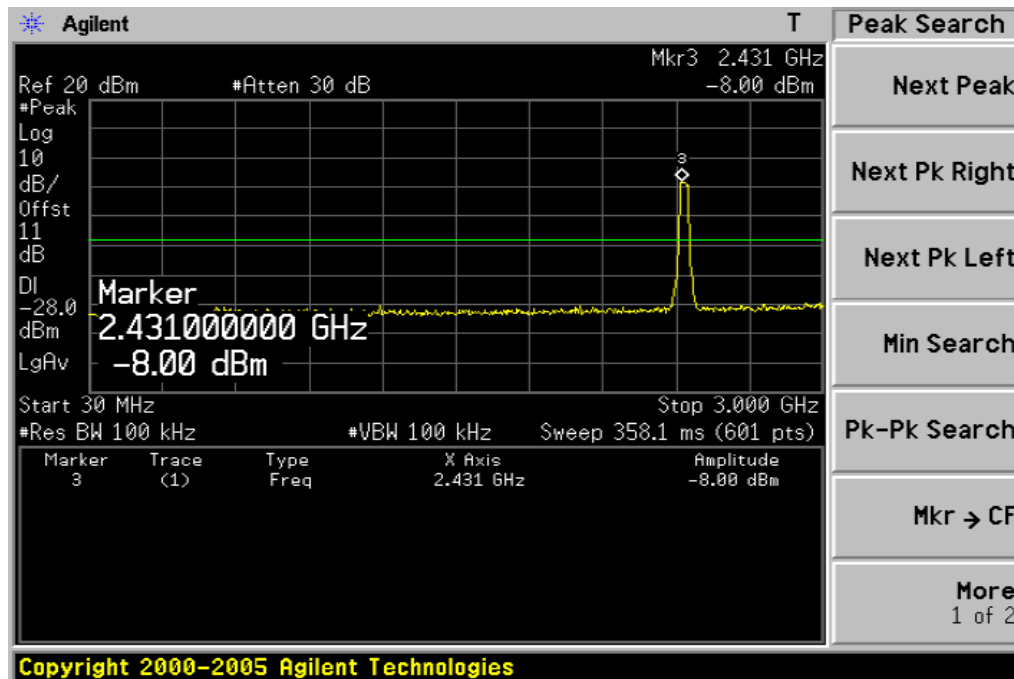


802.11n HT40 mode:

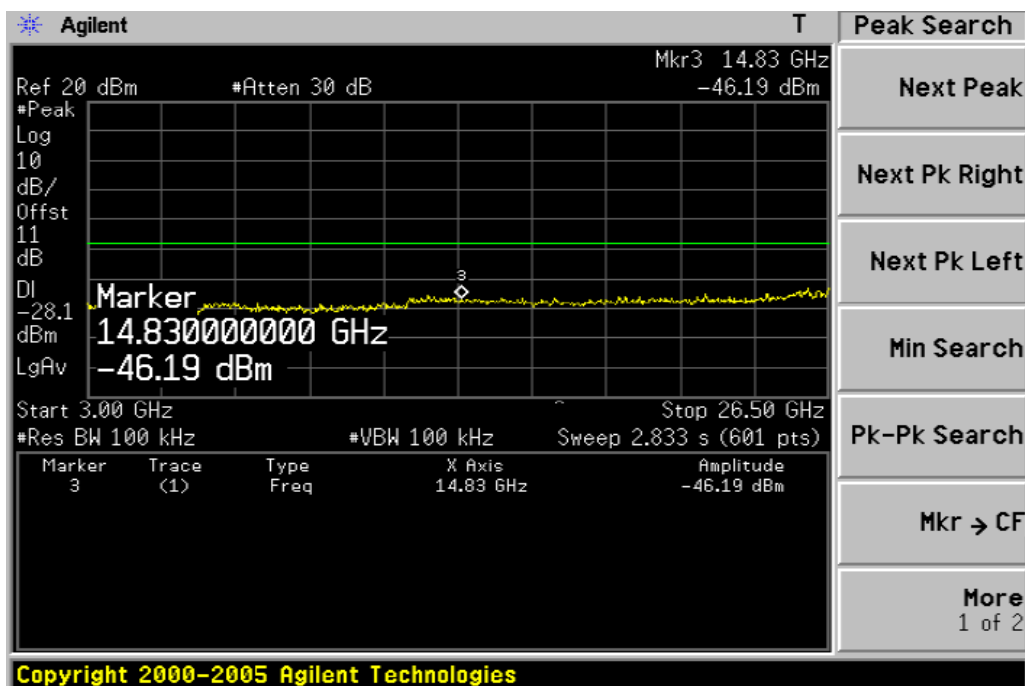
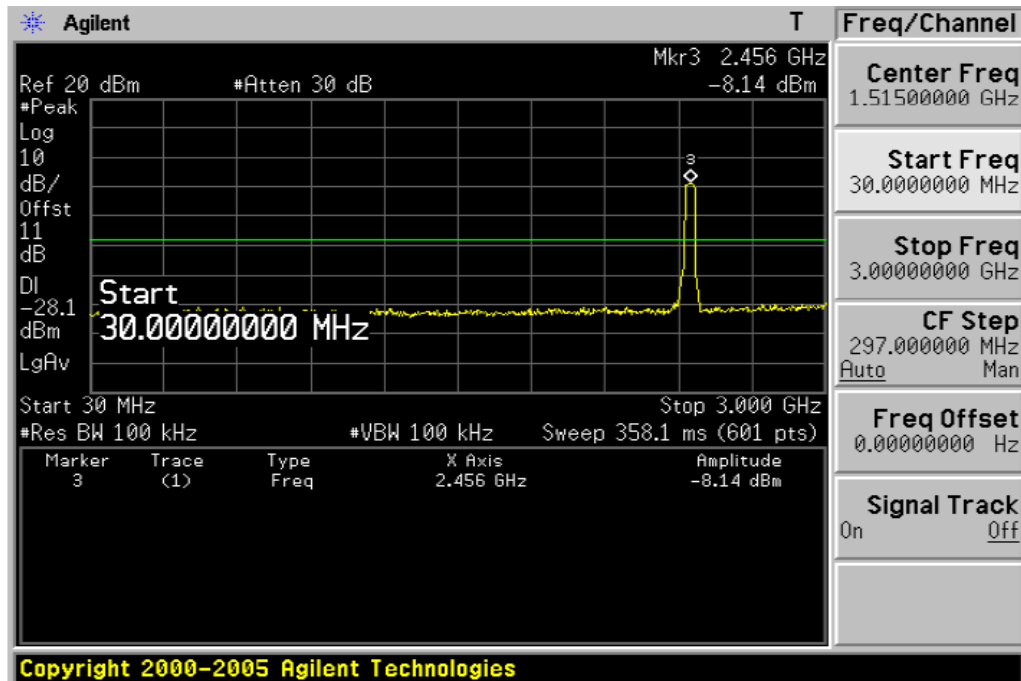
### Low channel



### Middle channel



### High channel



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

### Test Equipment

Please refer to Section 4 this report.

### Test Procedure

1. Set EUT in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100KHz, VBW $\geq$ RBW, Span=40MHz, Sweep=auto.
4. Mark the peak frequency and -6dB(upper and lower)frequency.
5. Repeat until all the rest channels are investigated.

### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 26 °C    |
| Relative Humidity: | 55%      |
| ATM Pressure:      | 100.0kPa |

### 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.

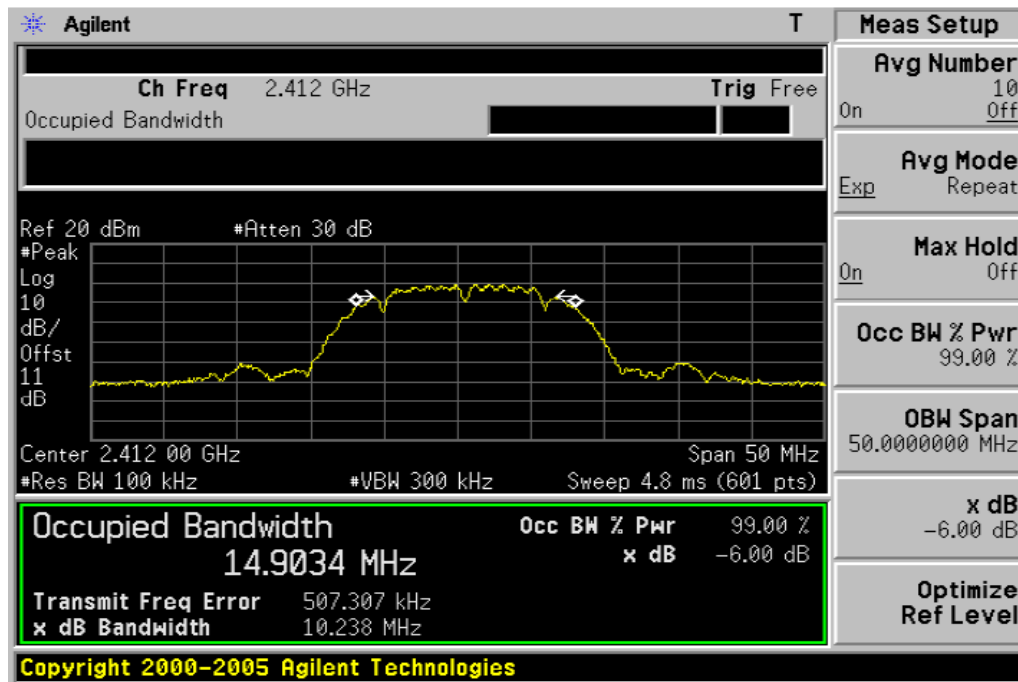
## Test Result: Pass.

Please refer to the following tables

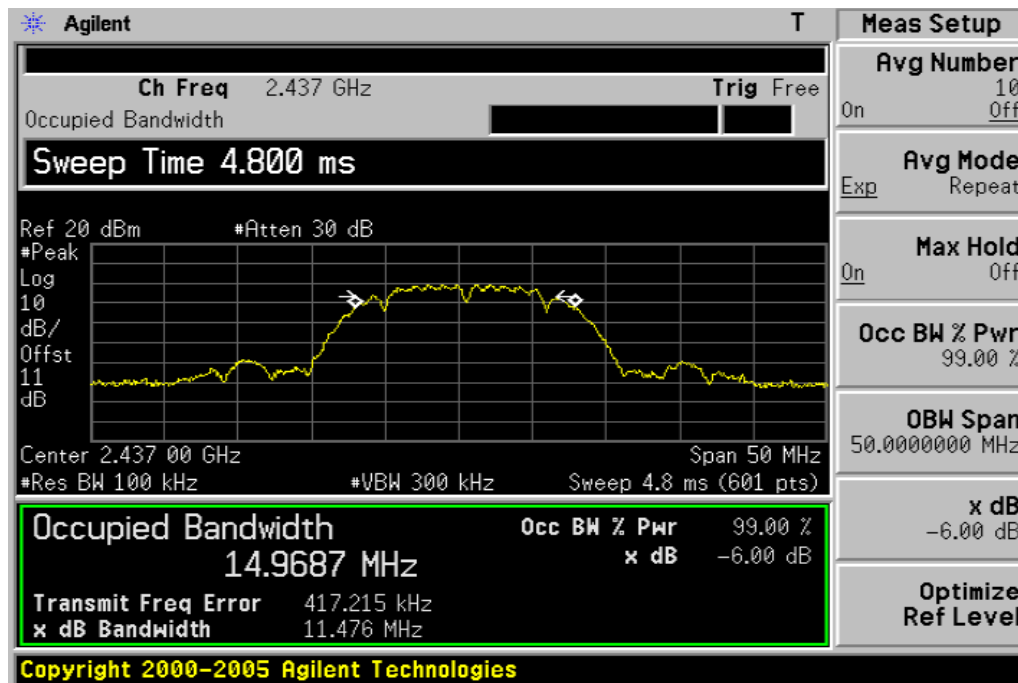
| Channel Frequency (MHz)  | Data Rate (Mbps) | 6dB Bandwidth (kHz) | Limit (kHz) | Ref. Plot |
|--------------------------|------------------|---------------------|-------------|-----------|
| <b>802.11b Mode</b>      |                  |                     |             |           |
| 2412                     | 1                | 10238               | > 500       | PLOT 1    |
| 2437                     | 1                | 11476               | > 500       | PLOT 2    |
| 2462                     | 1                | 10185               | > 500       | PLOT 3    |
| <b>802.11g Mode</b>      |                  |                     |             |           |
| 2412                     | 6                | 16513               | > 500       | PLOT 4    |
| 2437                     | 6                | 16518               | > 500       | PLOT 5    |
| 2462                     | 6                | 16448               | > 500       | PLOT 6    |
| <b>802.11n HT20 Mode</b> |                  |                     |             |           |
| 2412                     | 7.2              | 17408               | > 500       | PLOT 7    |
| 2437                     | 7.2              | 17359               | > 500       | PLOT 8    |
| 2462                     | 7.2              | 17008               | > 500       | PLOT 9    |
| <b>802.11n HT40 Mode</b> |                  |                     |             |           |
| 2422                     | 15               | 35589               | > 500       | PLOT 10   |
| 2437                     | 15               | 36179               | > 500       | PLOT 11   |
| 2452                     | 15               | 35950               | > 500       | PLOT 12   |

## 802.11b Mode:

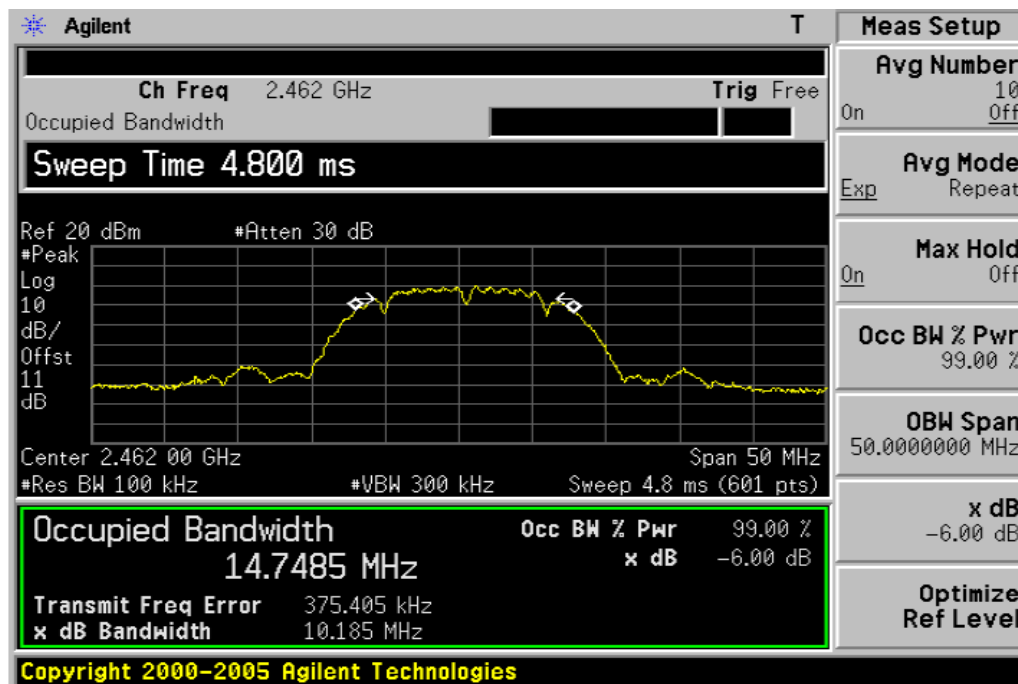
### Low Channel



### Middle channel

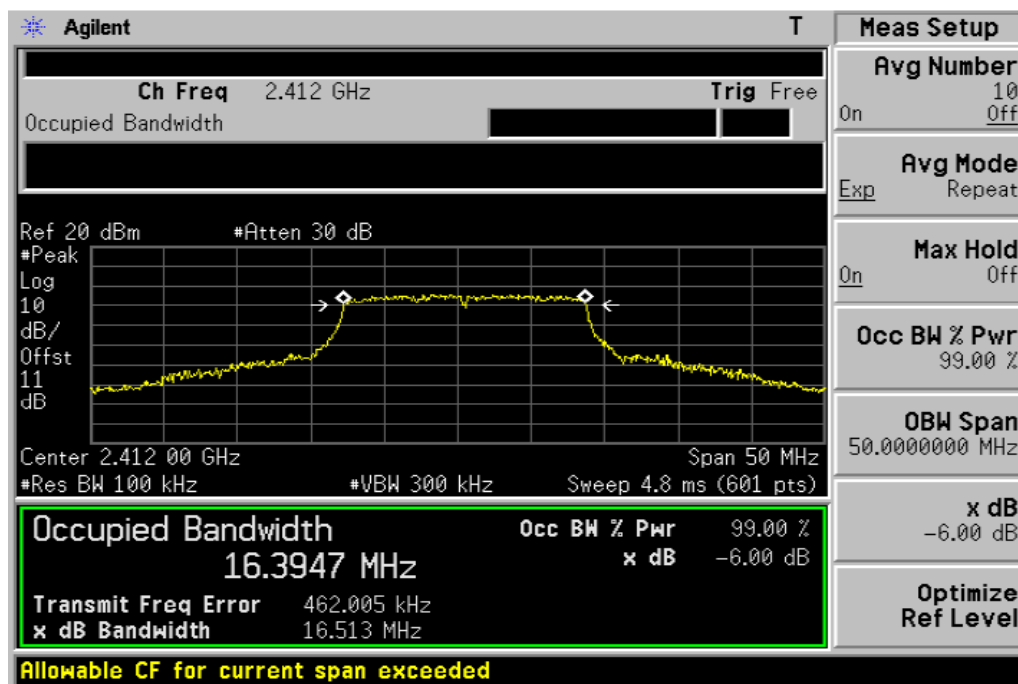


### High Channel

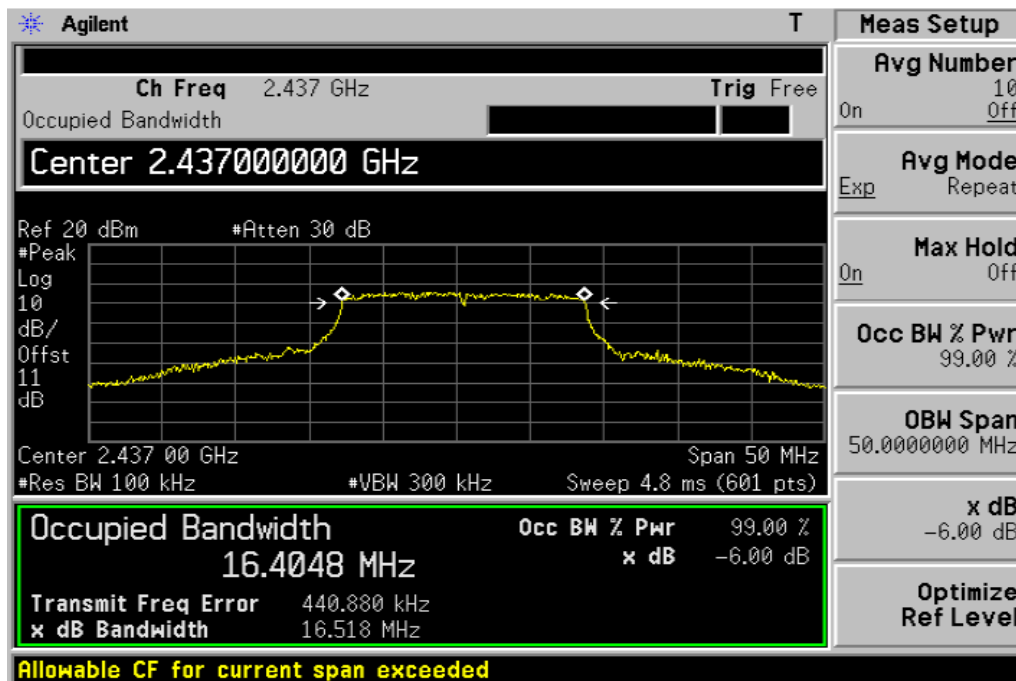


802.11g Mode:

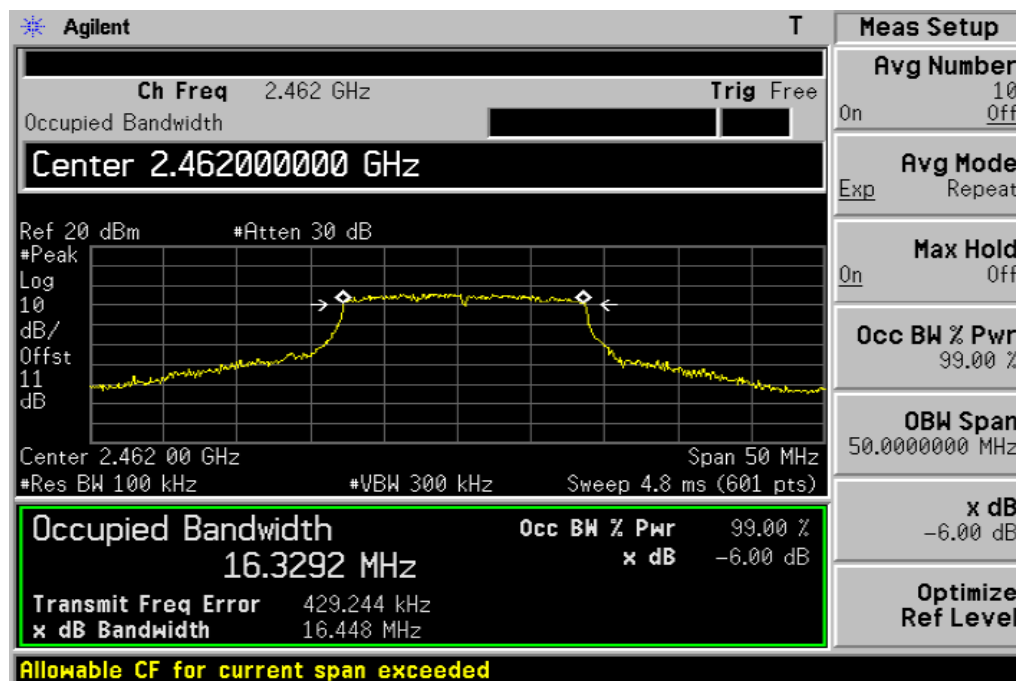
### Low Channel



### Middle Channel

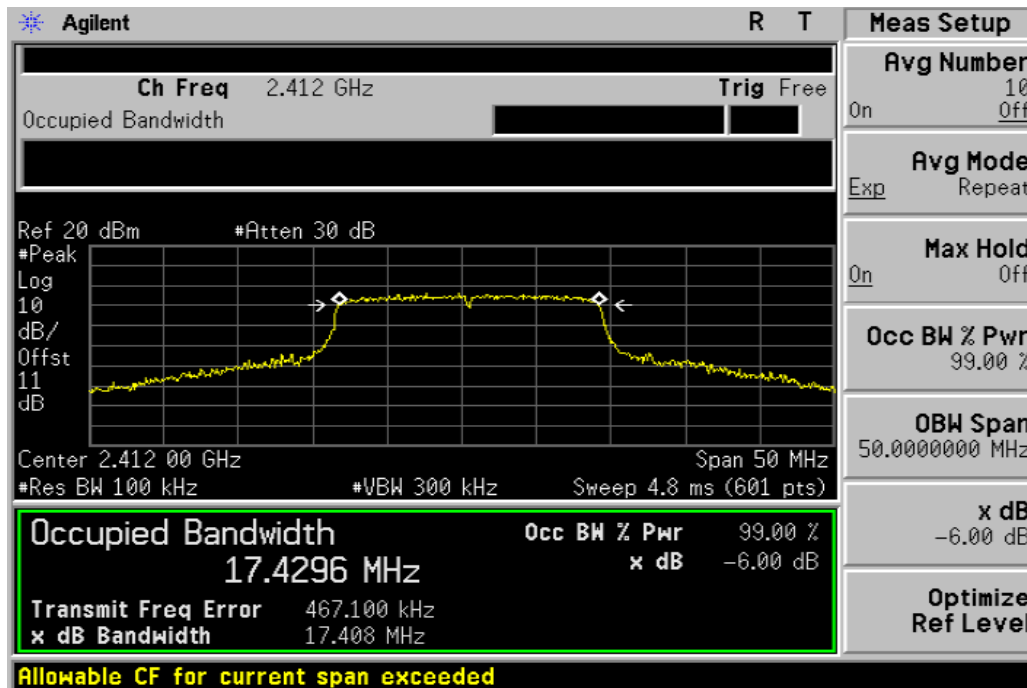


### High Channel

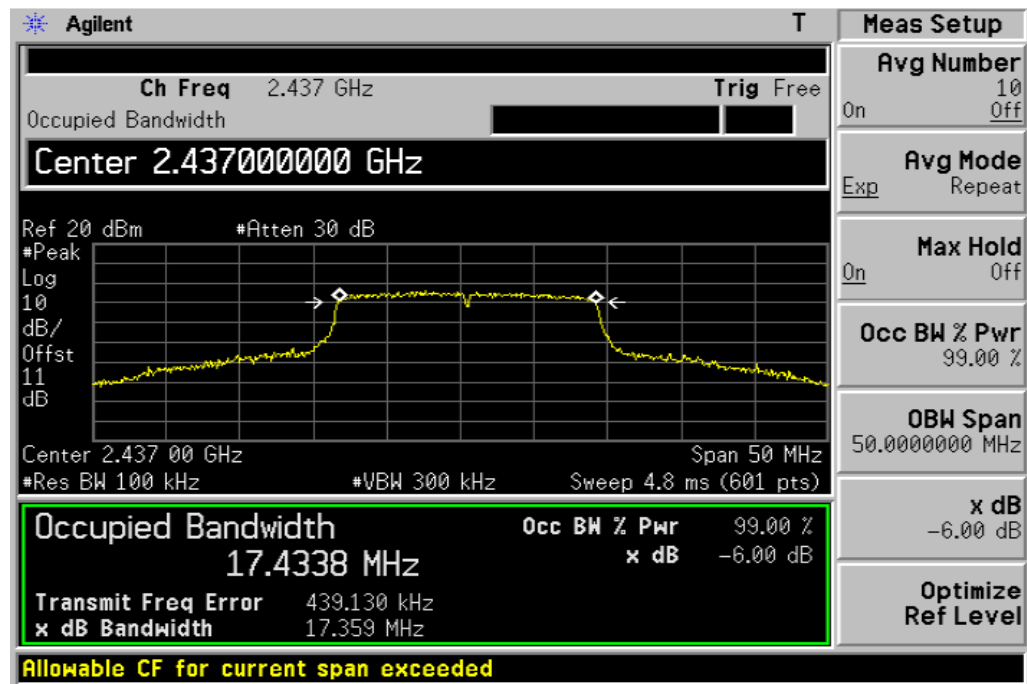


## 802.11n HT20 Mode:

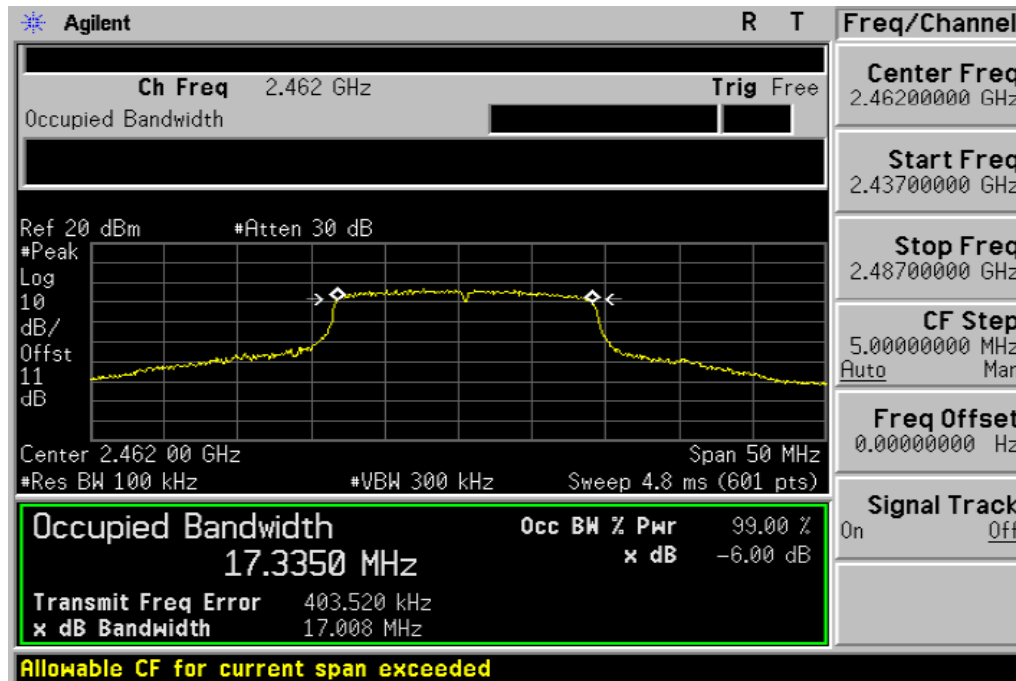
### Low Channel



### Middle Channel

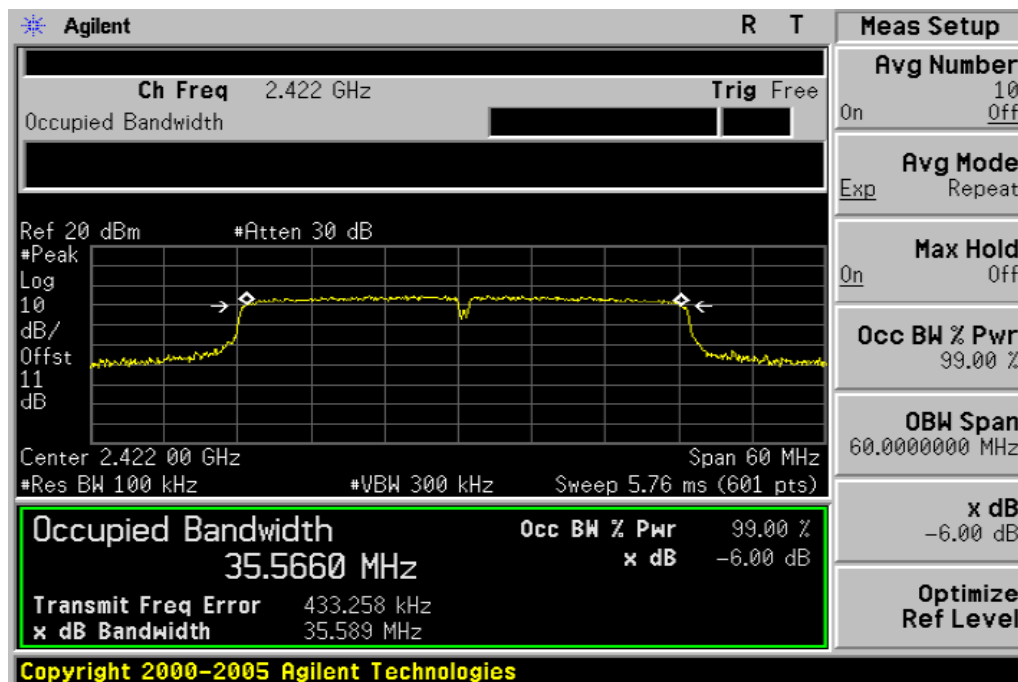


### High Channel

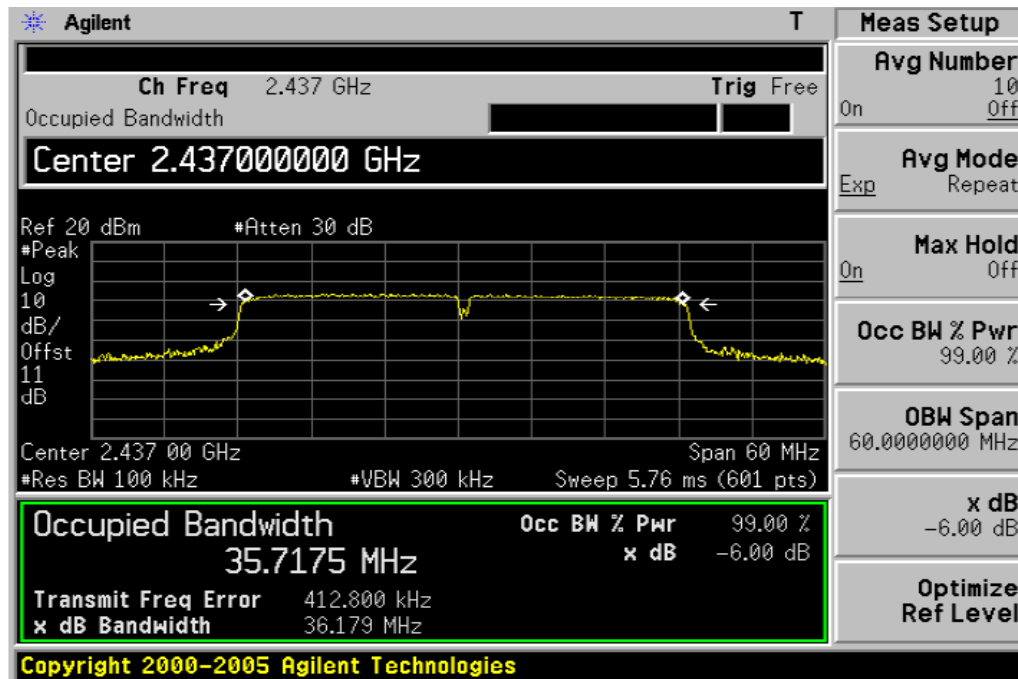


### 802.11n HT40 Mode:

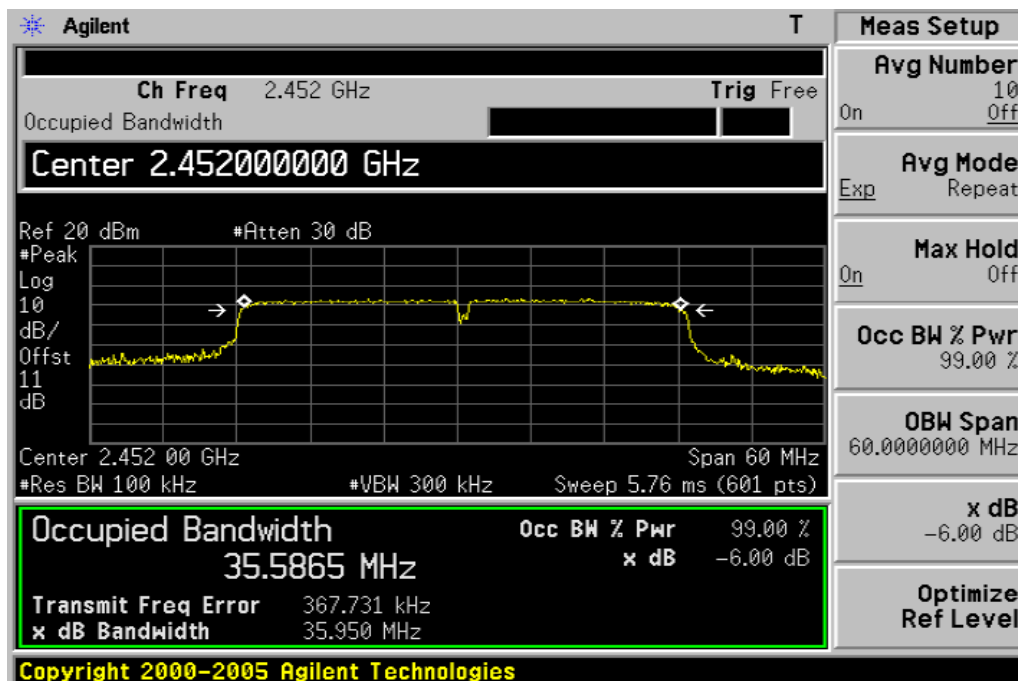
### Low channel



### Middle channel



### High channel



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

### Test Equipment

Please refer to Section 4 this report.

### Test Procedure

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set VBW  $\geq$  3 MHz.
4. Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.
5. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”.
6. Trace average 100 traces in power averaging mode.
7. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 26 °C    |
| Relative Humidity: | 55%      |
| ATM Pressure:      | 100.0kPa |

### Applicable Standard

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

## Test Result

### 802.11b Mode:

| Channel | Frequency (MHz) | Data Rate (Mbps) | Conducted Power (dBm) | Limit (dBm) |
|---------|-----------------|------------------|-----------------------|-------------|
| Low     | 2412            | 1                | 12.91                 | 30          |
| Mid     | 2437            | 1                | 12.95                 | 30          |
| High    | 2462            | 1                | 12.91                 | 30          |

### 802.11g Mode:

| Channel | Frequency (MHz) | Data Rate (Mbps) | Conducted Power (dBm) | Limit (dBm) |
|---------|-----------------|------------------|-----------------------|-------------|
| Low     | 2412            | 6                | 12.98                 | 30          |
| Mid     | 2437            | 6                | 12.91                 | 30          |
| High    | 2462            | 6                | 12.92                 | 30          |

### 802.11n HT20 Mode:

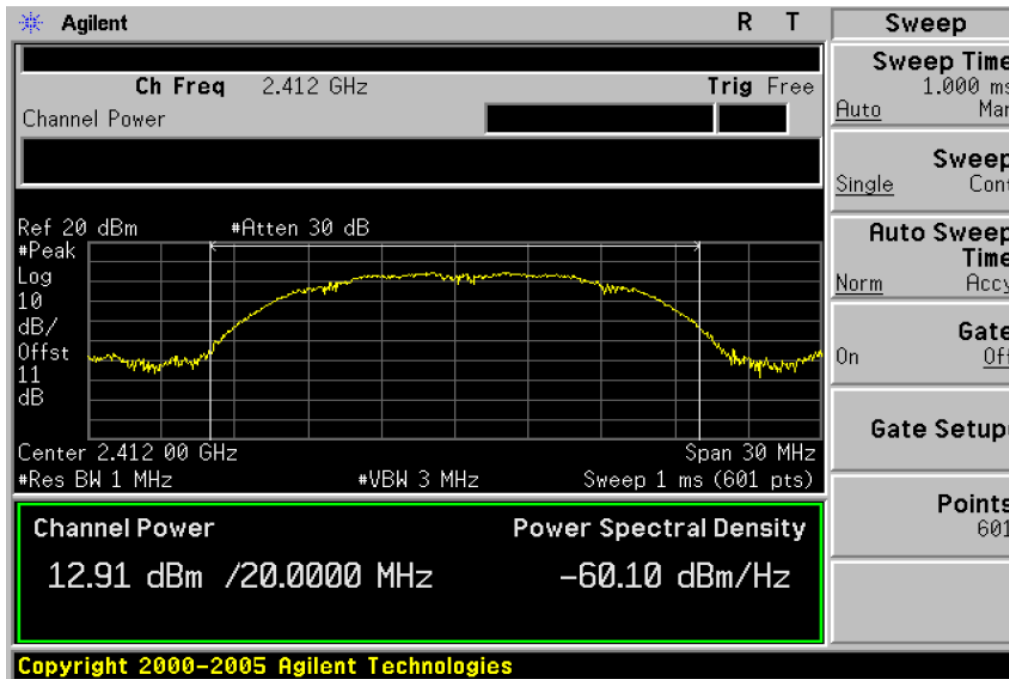
| Channel | Channel Frequency (MHz) | Data Rate (Mbps) | Power Output (dBm) | Limit (dBm) |
|---------|-------------------------|------------------|--------------------|-------------|
| Low     | 2412                    | 7.2              | 12.95              | 30          |
| Mid     | 2437                    | 7.2              | 12.92              | 30          |
| High    | 2462                    | 7.2              | 12.95              | 30          |

### 802.11n HT40 Mode:

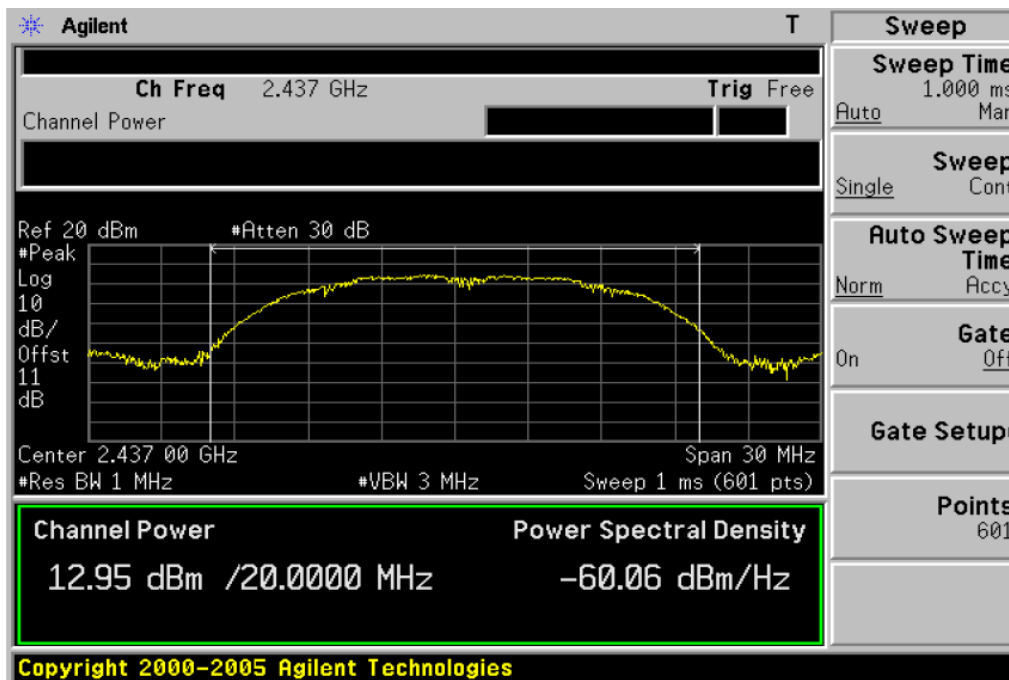
| Channel | Channel Frequency (MHz) | Data Rate (Mbps) | Power Output (dBm) | Limit (dBm) |
|---------|-------------------------|------------------|--------------------|-------------|
| Low     | 2422                    | 15               | 12.95              | 30          |
| Mid     | 2437                    | 15               | 12.95              | 30          |
| High    | 2452                    | 15               | 12.91              | 30          |

## 802.11b Mode:

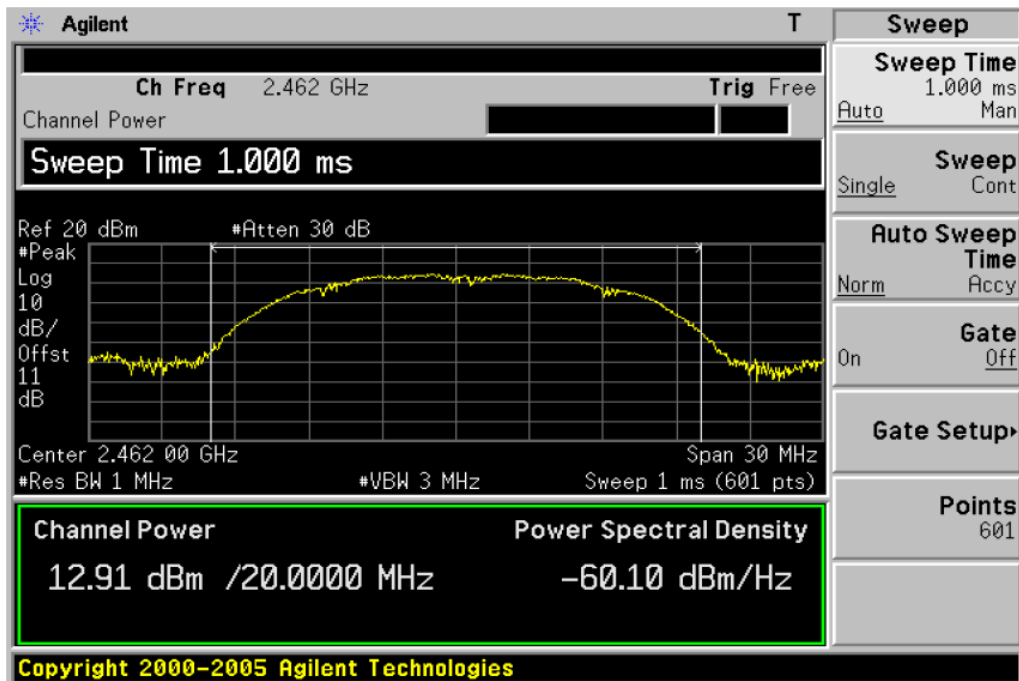
### Low channel



### Middle channel

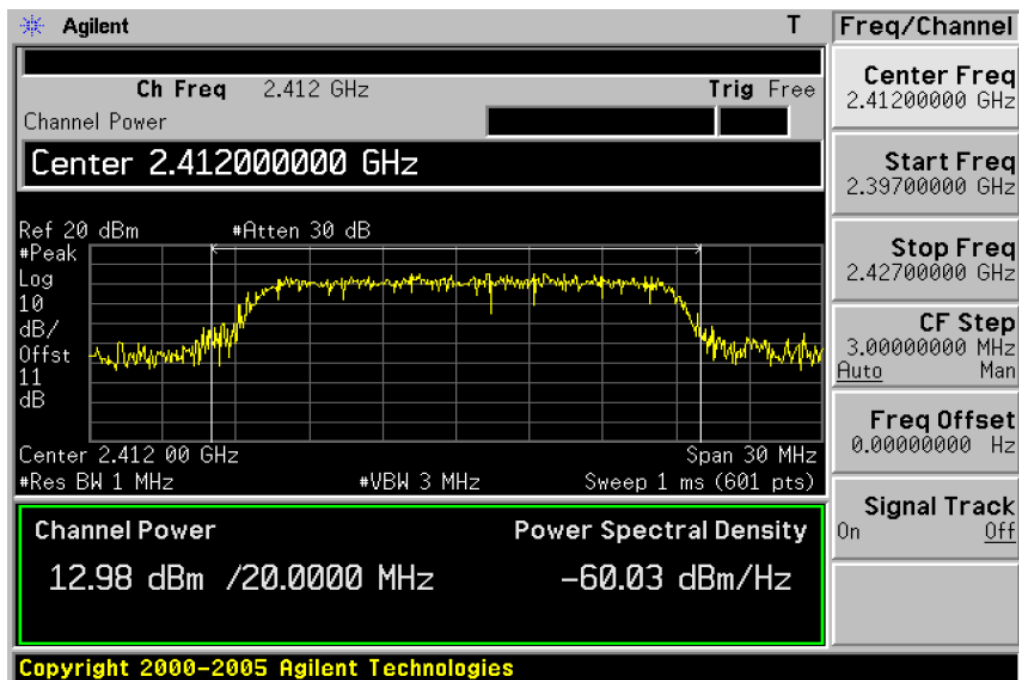


### High channel

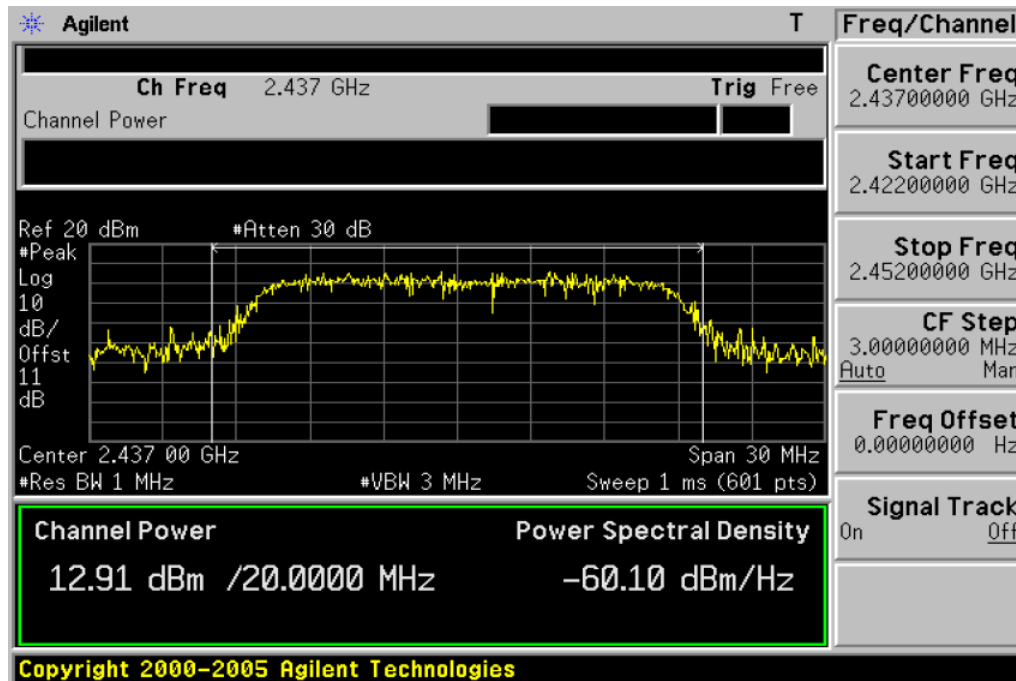


802.11g mode:

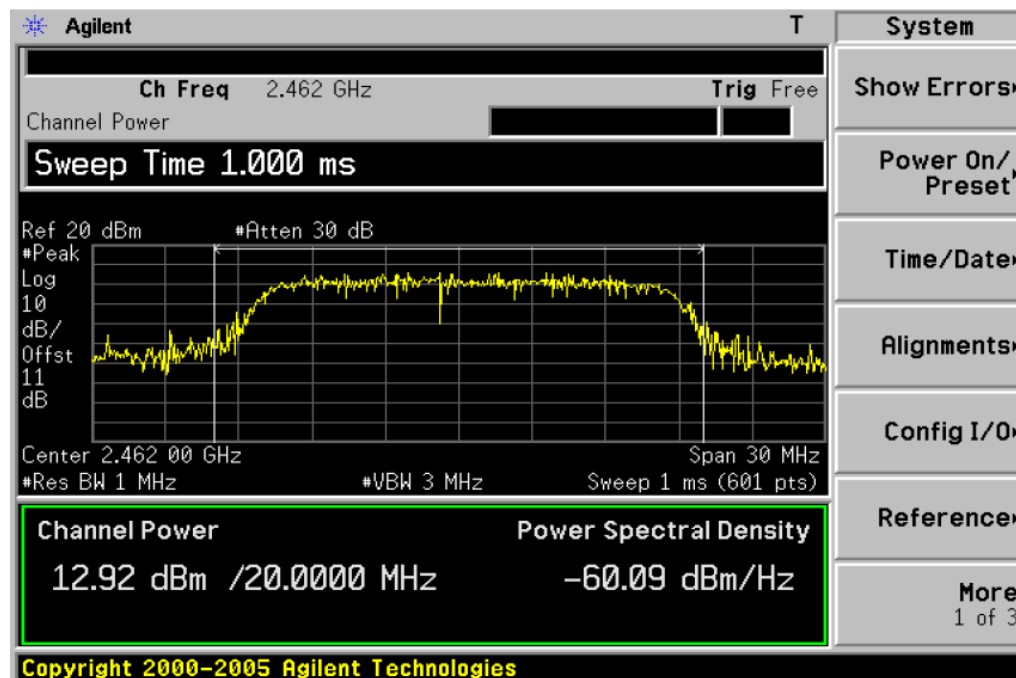
### Low channel



### Middle channel

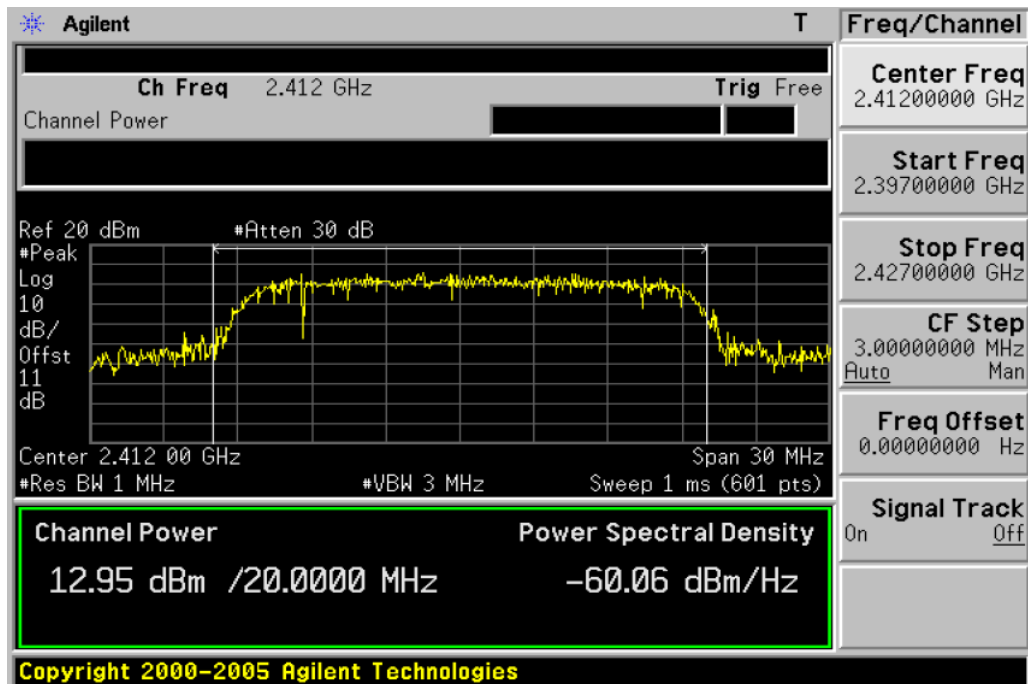


### High channel

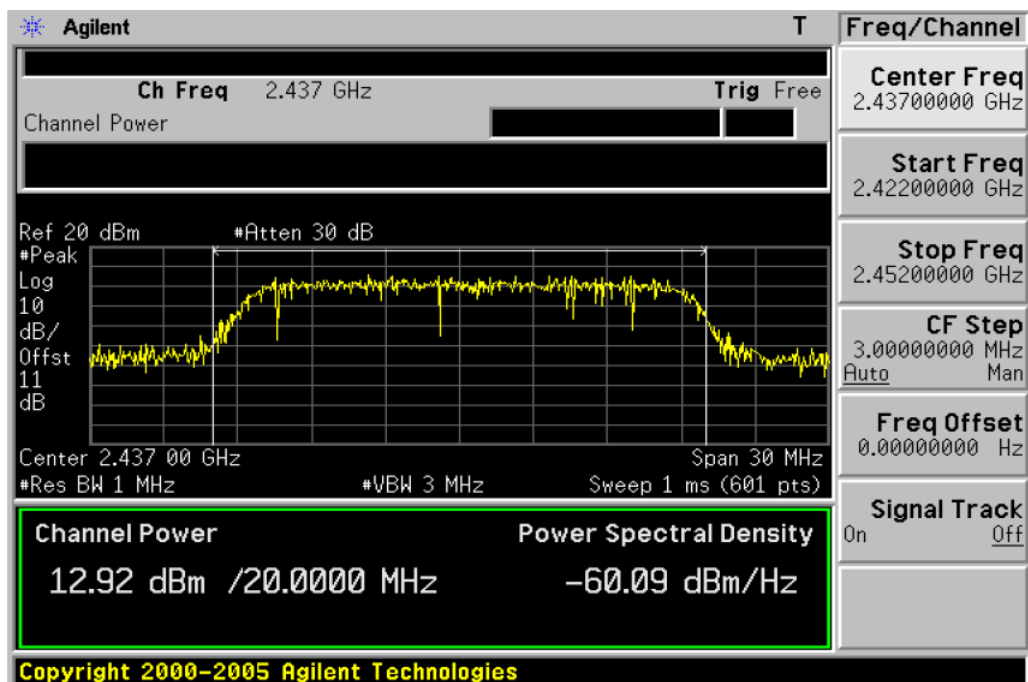


## 802.11n HT20 Mode:

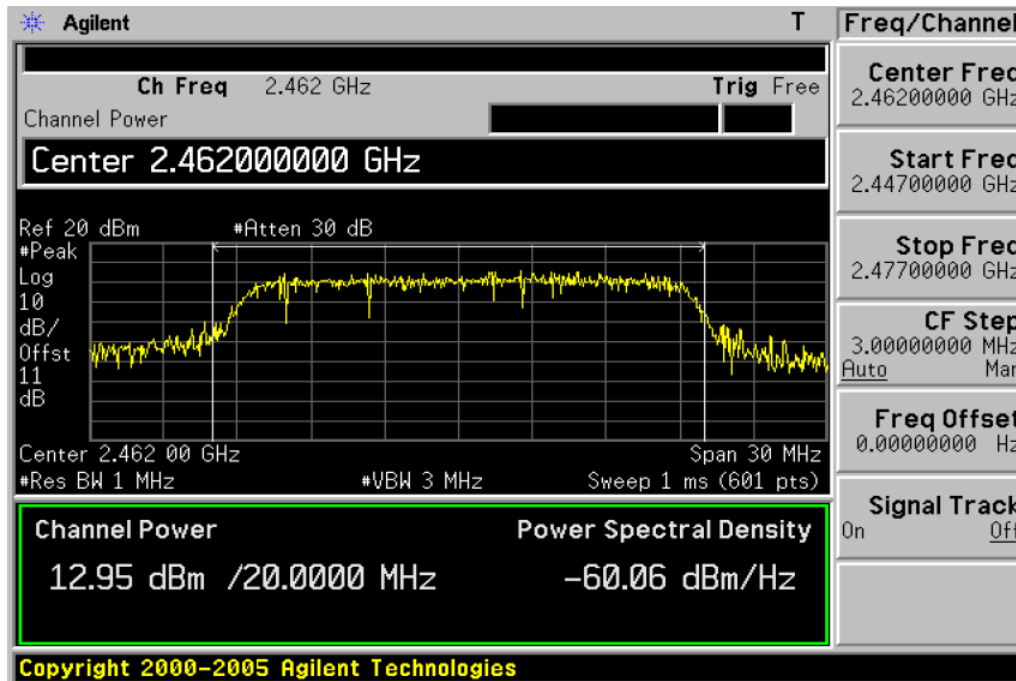
### Low channel



### Middle channel

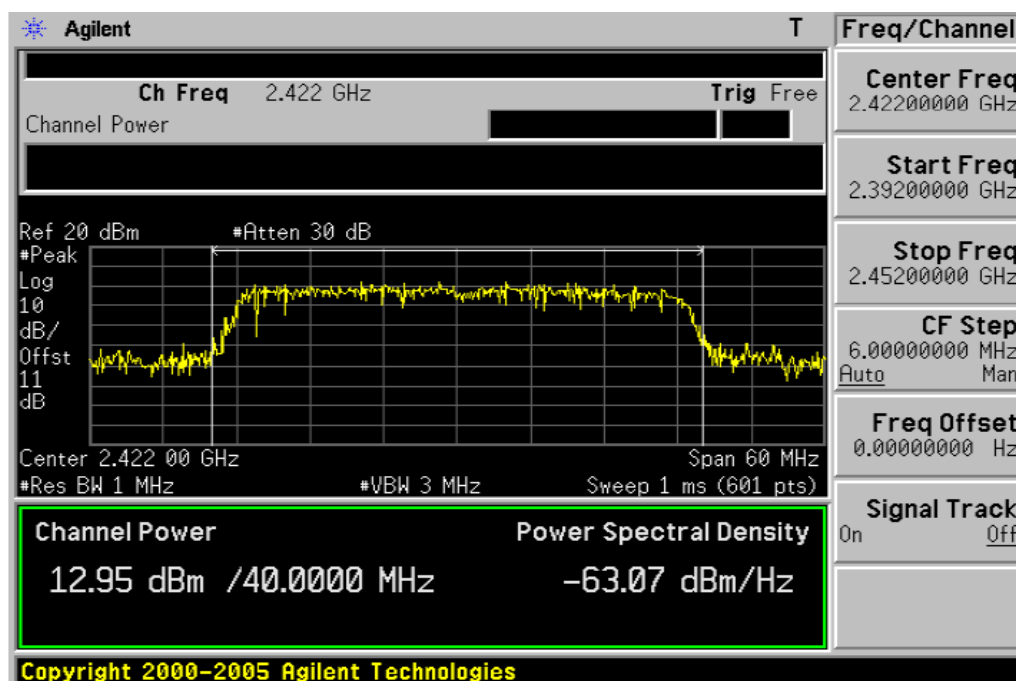


### High channel

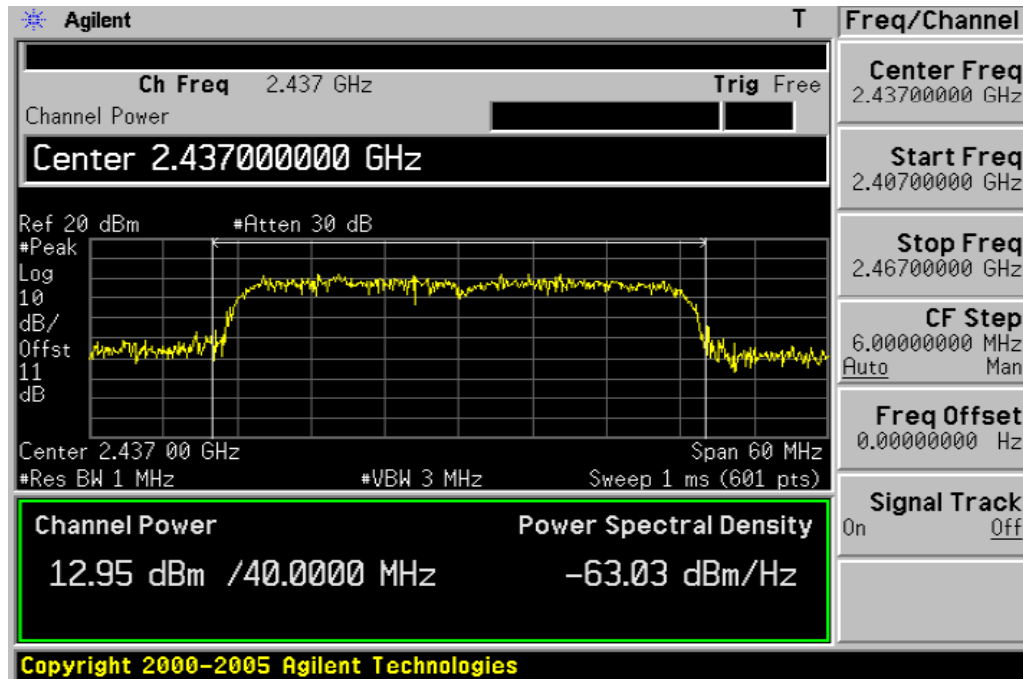


### 802.11n HT40 Mode:

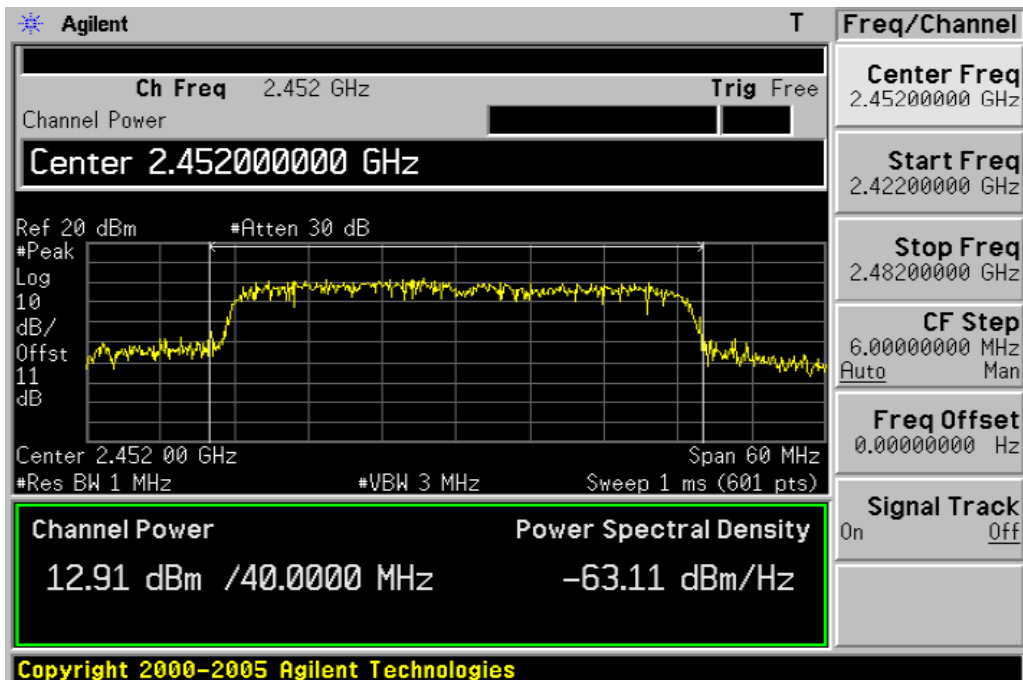
### Low channel



### Middle channel



### High channel



## **§15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE**

### **Test Equipment**

Please refer to Section 4 this report.

### **Test Procedure**

The out of band emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

### **Environmental Conditions**

|                    |          |
|--------------------|----------|
| Temperature:       | 26 °C    |
| Relative Humidity: | 55%      |
| ATM Pressure:      | 100.0kPa |

### **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 Result**

PASS

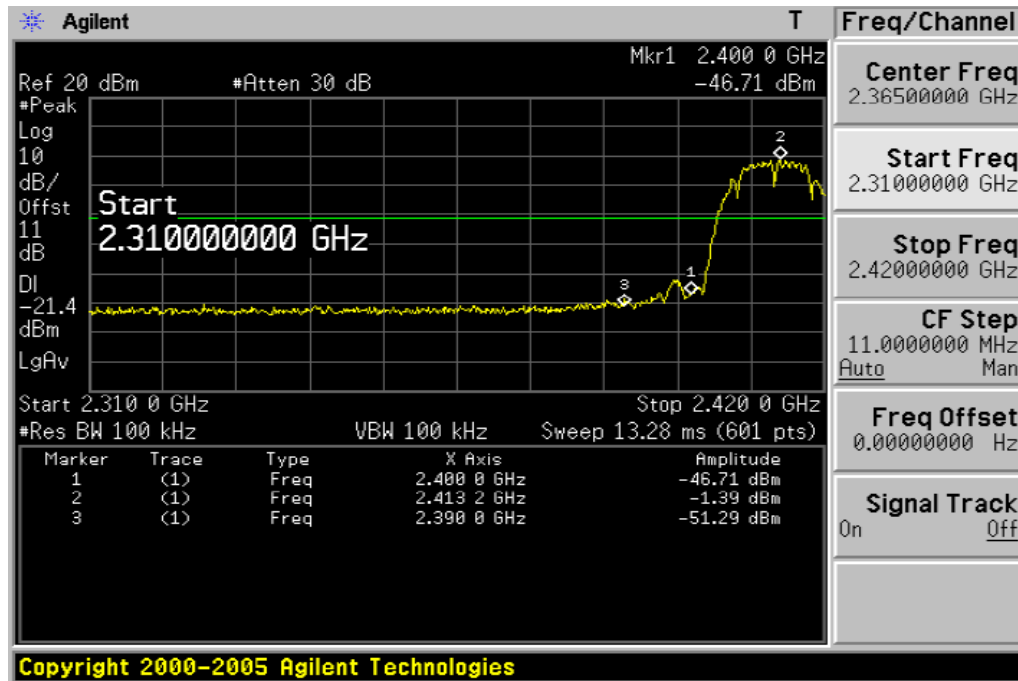
Above 1GHz:

802.11b

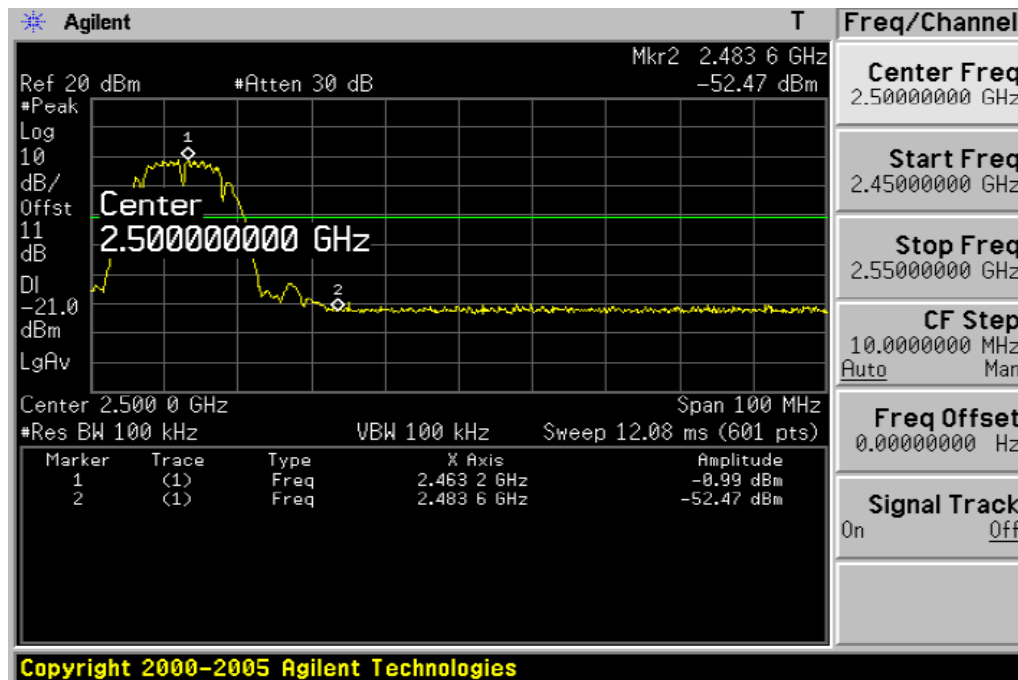
| Indicated             |                                 | result<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                  |                |
|-----------------------|---------------------------------|-------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|------------------|----------------|
| Frequency<br>(MHz)    | Receiver<br>Reading<br>(dBμV/m) |                   |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>dBμV/m) | Margin<br>(dB) |
| Low Channel (2412MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                  |                |
| 2390                  | 45.33                           | AV                | 250                      | 1.2           | V              | 30.3                     | 4.1                   | 33.1                     | 46.63                     | 54               | 7.37           |
| 2390                  | 45.44                           | AV                | 60                       | 1.6           | H              | 30.3                     | 4.1                   | 33.1                     | 46.74                     | 54               | 7.26           |
| 2390                  | 55.63                           | PK                | 180                      | 1.3           | V              | 30.3                     | 4.1                   | 33.1                     | 56.93                     | 74               | 17.07          |
| 2390                  | 55.86                           | PK                | 210                      | 1.1           | H              | 30.3                     | 4.1                   | 33.1                     | 57.16                     | 74               | 16.84          |
| HighChannel (2462MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                  |                |
| 2483.5                | 36.91                           | AV                | 360                      | 1.5           | V              | 31                       | 4.4                   | 32.7                     | 39.61                     | 54               | 14.39          |
| 2483.5                | 37.85                           | AV                | 45                       | 1.5           | H              | 31                       | 4.4                   | 32.7                     | 40.55                     | 54               | 13.45          |
| 2483.5                | 46.58                           | PK                | 0                        | 1.4           | V              | 31                       | 4.4                   | 32.7                     | 49.28                     | 74               | 24.72          |
| 2483.5                | 47.88                           | PK                | 200                      | 1.4           | H              | 31                       | 4.4                   | 32.7                     | 50.58                     | 74               | 23.42          |

**Note:** the BAND EDGE RESTRICTED BANDS emission is too low at least 20dB to the Fundamental.

### Lowchannel



### High channel

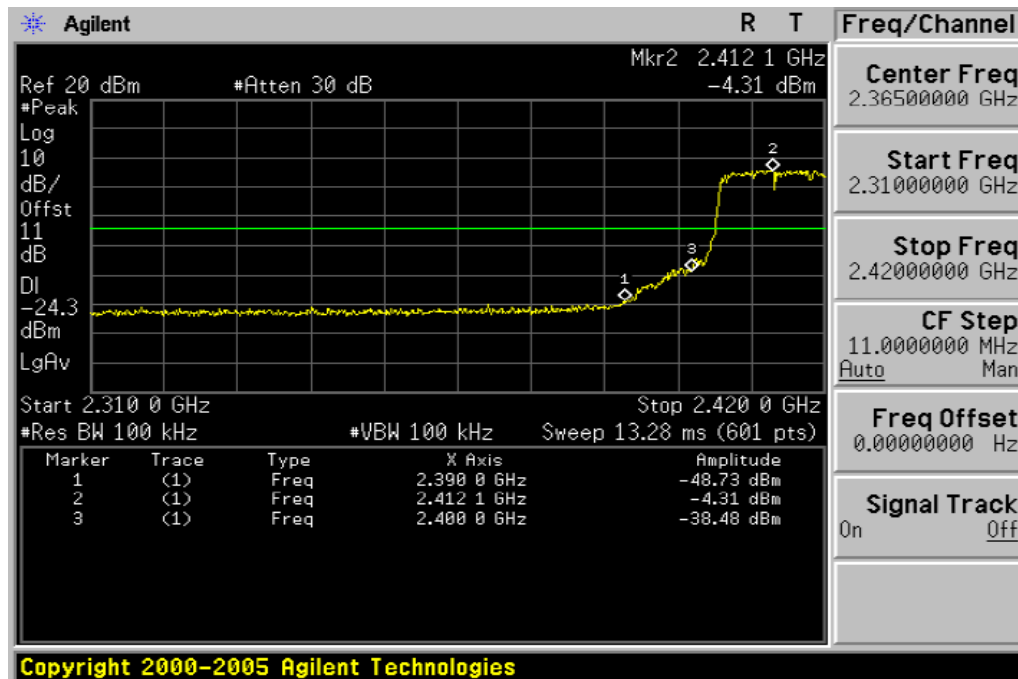


802.11g

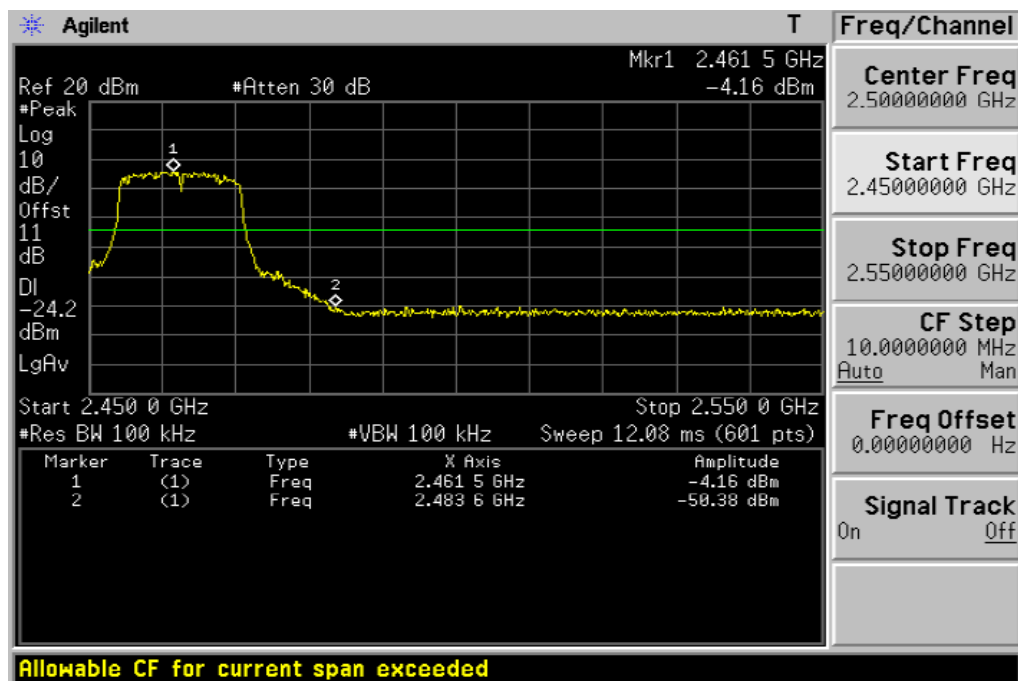
| Indicated             |                                 | result<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                   |                |
|-----------------------|---------------------------------|-------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|-------------------|----------------|
| Frequency<br>(MHz)    | Receiver<br>Reading<br>(dBμV/m) |                   |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| Low Channel (2412MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                   |                |
| 2390                  | 39.47                           | AV                | 250                      | 1.2           | V              | 30.3                     | 4.1                   | 33.1                     | 40.77                     | 54                | 13.23          |
| 2390                  | 46.92                           | AV                | 60                       | 1.6           | H              | 30.3                     | 4.1                   | 33.1                     | 48.22                     | 54                | 5.78           |
| 2390                  | 54.35                           | PK                | 180                      | 1.3           | V              | 30.3                     | 4.1                   | 33.1                     | 55.85                     | 74                | 18.15          |
| 2390                  | 64.63                           | PK                | 210                      | 1.1           | H              | 30.3                     | 4.1                   | 33.1                     | 65.93                     | 74                | 8.07           |
| HighChannel (2462MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                   |                |
| 2483.5                | 39.22                           | AV                | 360                      | 1.5           | V              | 31                       | 4.4                   | 32.7                     | 41.92                     | 54                | 12.08          |
| 2483.5                | 43.71                           | AV                | 45                       | 1.5           | H              | 31                       | 4.4                   | 32.7                     | 46.41                     | 54                | 7.59           |
| 2483.5                | 55.50                           | PK                | 0                        | 1.4           | V              | 31                       | 4.4                   | 32.7                     | 58.20                     | 74                | 15.80          |
| 2483.5                | 59.91                           | PK                | 200                      | 1.4           | H              | 31                       | 4.4                   | 32.7                     | 62.61                     | 74                | 11.39          |

**Note:** the BAND EDGE RESTRICTED BANDS emission is too low at least 20dB to the Fundamental.

### Low channel



### High channel

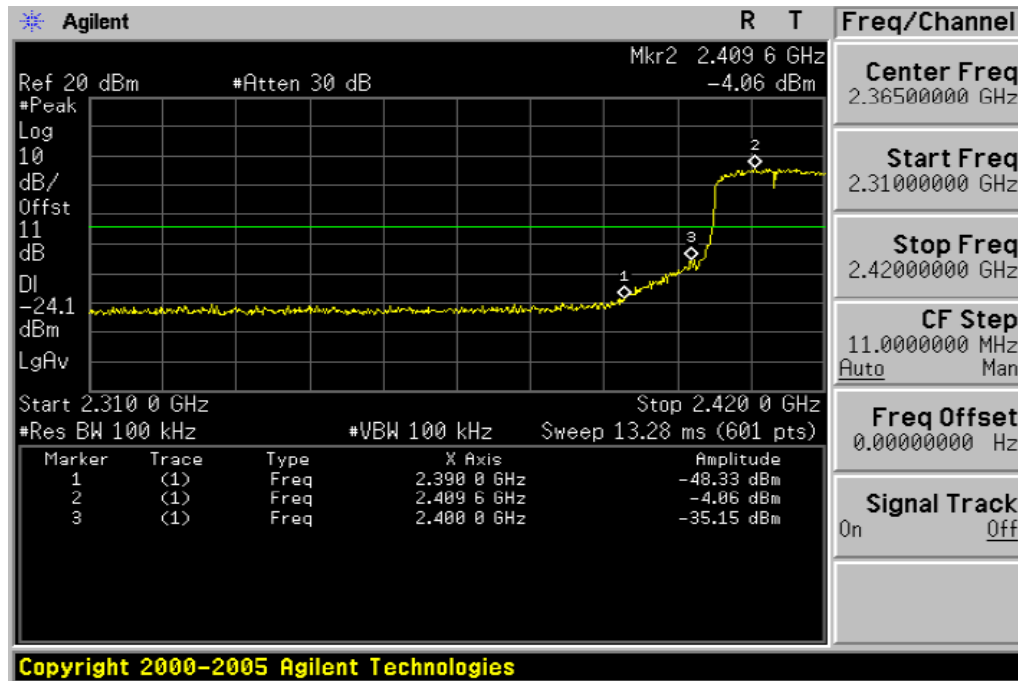


802.11n HT20

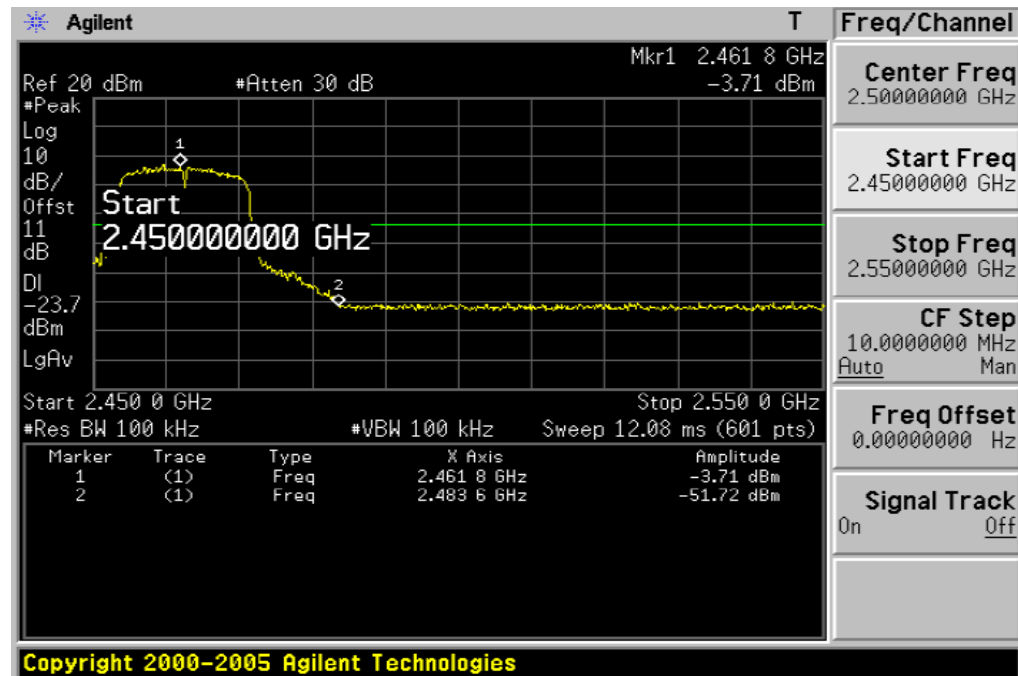
| Indicated             |                                 | result<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                   |                |
|-----------------------|---------------------------------|-------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|-------------------|----------------|
| Frequency<br>(MHz)    | Receiver<br>Reading<br>(dBμV/m) |                   |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| Low Channel (2412MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                   |                |
| 2390                  | 44.41                           | AV                | 250                      | 1.2           | V              | 30.3                     | 4.1                   | 33.1                     | 45.71                     | 54                | 8.29           |
| 2390                  | 47.70                           | AV                | 60                       | 1.6           | H              | 30.3                     | 4.1                   | 33.1                     | 49.00                     | 54                | 5.00           |
| 2390                  | 61.37                           | PK                | 180                      | 1.3           | V              | 30.3                     | 4.1                   | 33.1                     | 62.67                     | 74                | 11.33          |
| 2390                  | 62.81                           | PK                | 210                      | 1.1           | H              | 30.3                     | 4.1                   | 33.1                     | 64.11                     | 74                | 9.89           |
| HighChannel (2462MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                   |                |
| 2483.5                | 38.05                           | AV                | 360                      | 1.5           | V              | 31                       | 4.4                   | 32.7                     | 40.75                     | 54                | 13.25          |
| 2483.5                | 40.31                           | AV                | 45                       | 1.5           | H              | 31                       | 4.4                   | 32.7                     | 43.01                     | 54                | 10.99          |
| 2483.5                | 57.34                           | PK                | 0                        | 1.4           | V              | 31                       | 4.4                   | 32.7                     | 60.04                     | 74                | 13.96          |
| 2483.5                | 58.79                           | PK                | 200                      | 1.4           | H              | 31                       | 4.4                   | 32.7                     | 61.49                     | 74                | 12.51          |

**Note:** the BAND EDGE RESTRICTED BANDS emission is too low at least 20dB to the Fundamental.

### Low channel



### High channel

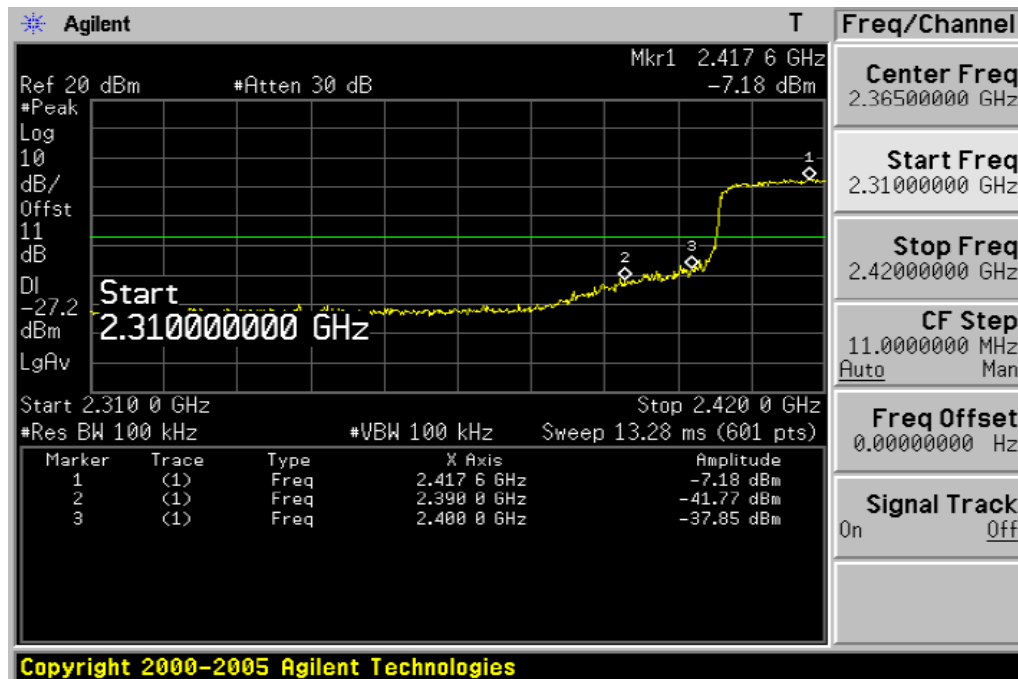


802.11n HT40

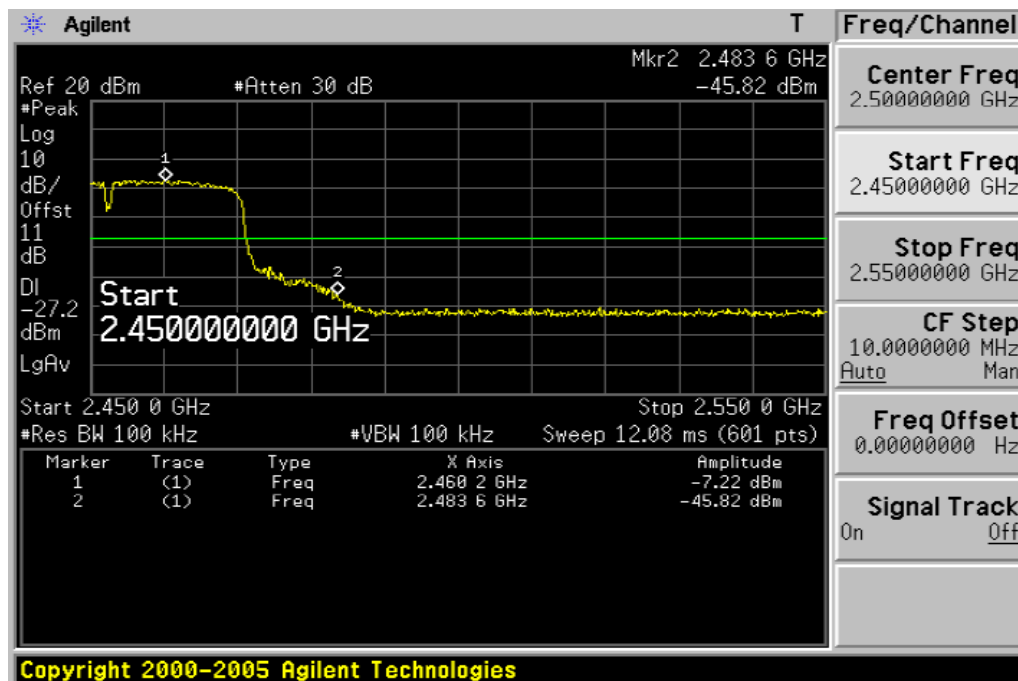
| Indicated             |                                 | result<br>(PK/AV) | Table<br>Angle<br>Degree | Antenna       |                | Correction Factor        |                       |                          | FCC Part 15.247           |                   |                |
|-----------------------|---------------------------------|-------------------|--------------------------|---------------|----------------|--------------------------|-----------------------|--------------------------|---------------------------|-------------------|----------------|
| Frequency<br>(MHz)    | Receiver<br>Reading<br>(dBμV/m) |                   |                          | Height<br>(m) | Polar<br>(H/V) | Ant.<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Pre-Amp.<br>Gain<br>(dB) | Cord.<br>Amp.<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) |
| Low Channel (2422MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                   |                |
| 2390                  | 48.95                           | AV                | 242                      | 1.2           | V              | 30.3                     | 4.1                   | 33.1                     | 50.25                     | 54                | 3.75           |
| 2390                  | 49.05                           | AV                | 58                       | 1.6           | H              | 30.3                     | 4.1                   | 33.1                     | 50.35                     | 54                | 3.65           |
| 2390                  | 62.90                           | PK                | 175                      | 1.3           | V              | 30.3                     | 4.1                   | 33.1                     | 64.20                     | 74                | 9.80           |
| 2390                  | 65.65                           | PK                | 200                      | 1.1           | H              | 30.3                     | 4.1                   | 33.1                     | 66.95                     | 74                | 7.05           |
| HighChannel (2452MHz) |                                 |                   |                          |               |                |                          |                       |                          |                           |                   |                |
| 2483.5                | 43.22                           | AV                | 358                      | 1.5           | V              | 31                       | 4.4                   | 32.7                     | 45.92                     | 54                | 8.08           |
| 2483.5                | 44.93                           | AV                | 41                       | 1.5           | H              | 31                       | 4.4                   | 32.7                     | 47.63                     | 54                | 6.37           |
| 2483.5                | 59.48                           | PK                | 12                       | 1.4           | V              | 31                       | 4.4                   | 32.7                     | 62.18                     | 74                | 11.82          |
| 2483.5                | 59.61                           | PK                | 189                      | 1.4           | H              | 31                       | 4.4                   | 32.7                     | 62.31                     | 74                | 11.69          |

**Note:** the BAND EDGE RESTRICTED BANDS emission is too low at least 20dB to the Fundamental.

### Low channel



### High channel



## §15.247(e) - POWER SPECTRAL DENSITY

### Test Equipment

Please refer to Section 4 this report.

### Test Procedure

1. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
2. Set the analyzer span to at least 1.5 times the DTS channel bandwidth.
3. Set the RBW  $\geq 3 \text{ kHz}$
4. Set the VBW  $\geq 3 \times \text{RBW}$
5. Detector = power average (RMS) or sample detector (when RMS not available).
6. Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span/RBW}$
7. Sweep time = auto couple.
8. Employ trace averaging (RMS) mode over a minimum of 100 traces.
9. Use the peak marker function to determine the maximum amplitude level.

### Environmental Conditions

|                    |          |
|--------------------|----------|
| Temperature:       | 25 °C    |
| Relative Humidity: | 55%      |
| ATM Pressure:      | 100.0kPa |

### 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.

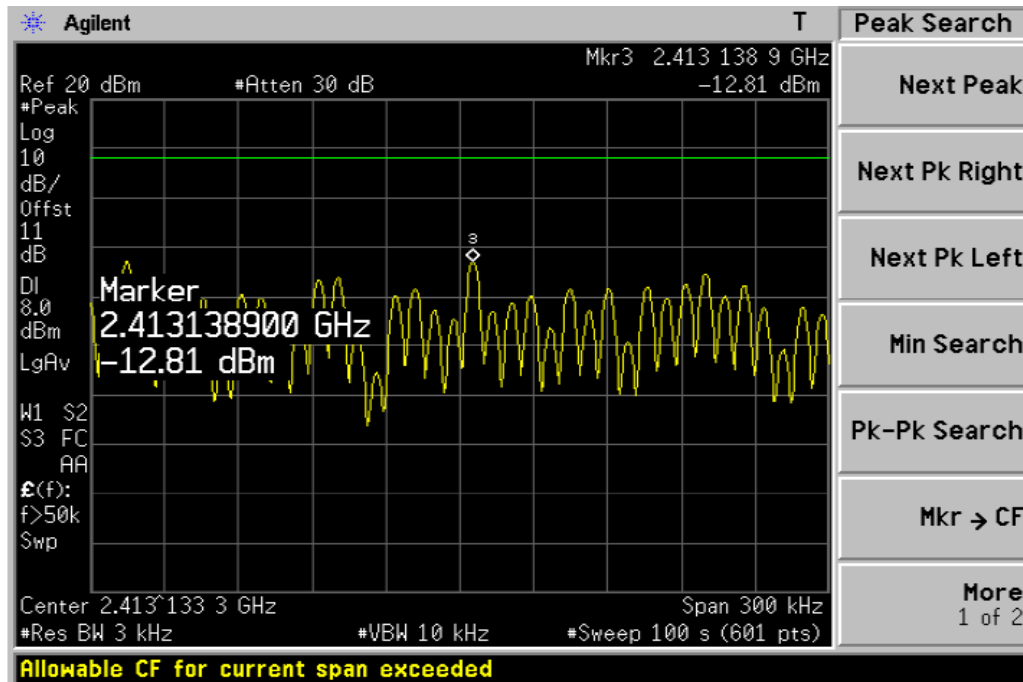
## Test Result

PASS

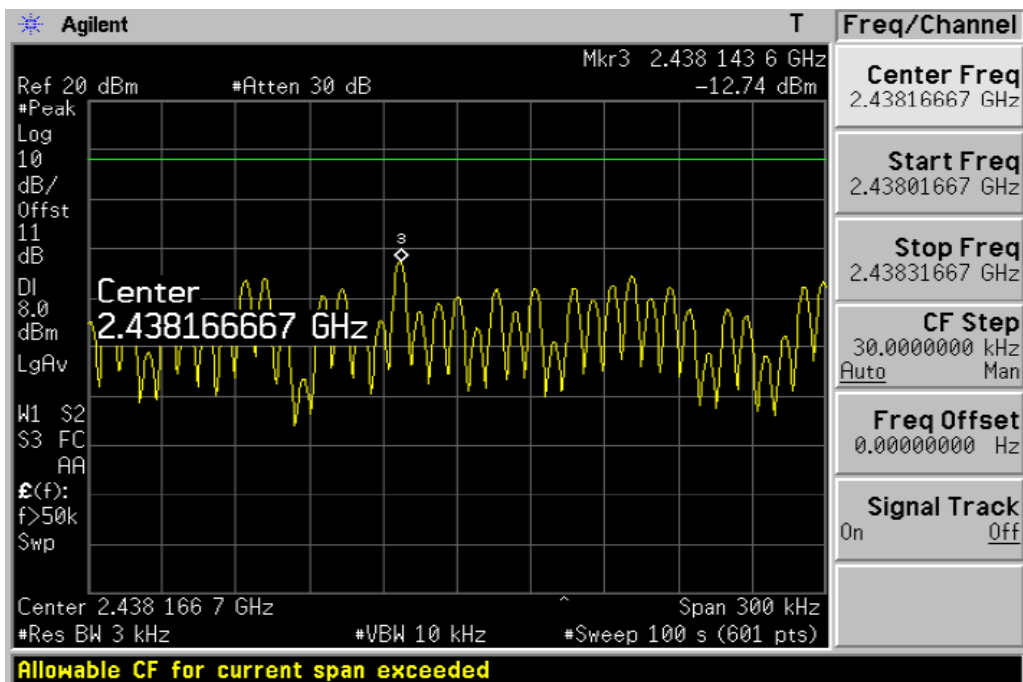
| Channel<br>Frequency (MHz) | Data Rate<br>(Mbps) | PSD<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) | RESULT    |
|----------------------------|---------------------|-------------------|---------------------|-----------|
| <b>802.11b Mode</b>        |                     |                   |                     |           |
| 2412                       | 1                   | -12.81            | 8                   | Compliant |
| 2437                       | 1                   | -12.74            | 8                   | Compliant |
| 2462                       | 1                   | -12.85            | 8                   | Compliant |
| <b>802.11g Mode</b>        |                     |                   |                     |           |
| 2412                       | 6                   | -19.47            | 8                   | Compliant |
| 2437                       | 6                   | -19.08            | 8                   | Compliant |
| 2462                       | 6                   | -19.02            | 8                   | Compliant |
| <b>802.11n HT20 Mode</b>   |                     |                   |                     |           |
| 2412                       | 7.2                 | -17.66            | 8                   | Compliant |
| 2437                       | 7.2                 | -17.43            | 8                   | Compliant |
| 2462                       | 7.2                 | -17.45            | 8                   | Compliant |
| <b>802.11n HT40 Mode</b>   |                     |                   |                     |           |
| 2422                       | 15                  | -18.84            | 8                   | Compliant |
| 2437                       | 15                  | -20.53            | 8                   | Compliant |
| 2452                       | 15                  | -22.43            | 8                   | Compliant |

802.11b Mode:

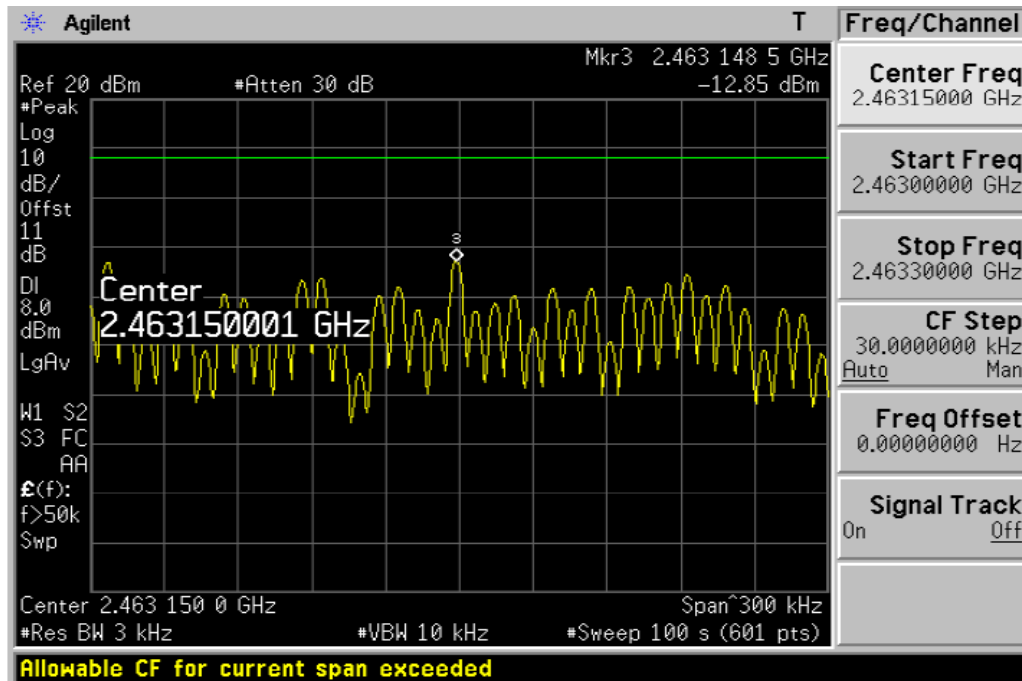
### Low Channel



### Middle Channel

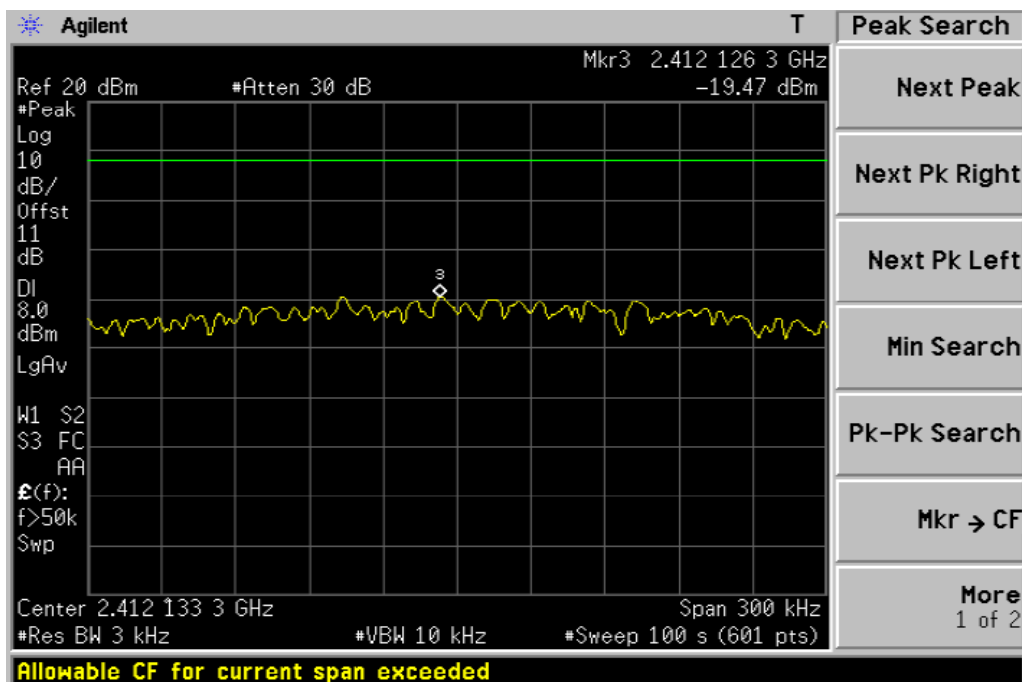


### High Channel

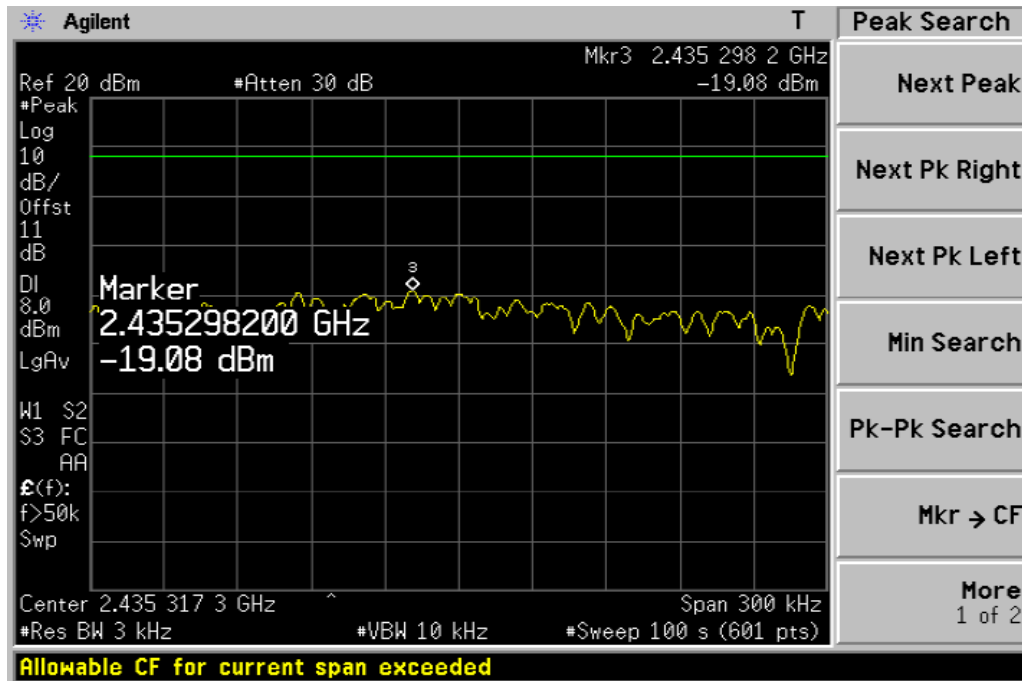


802.11g Mode:

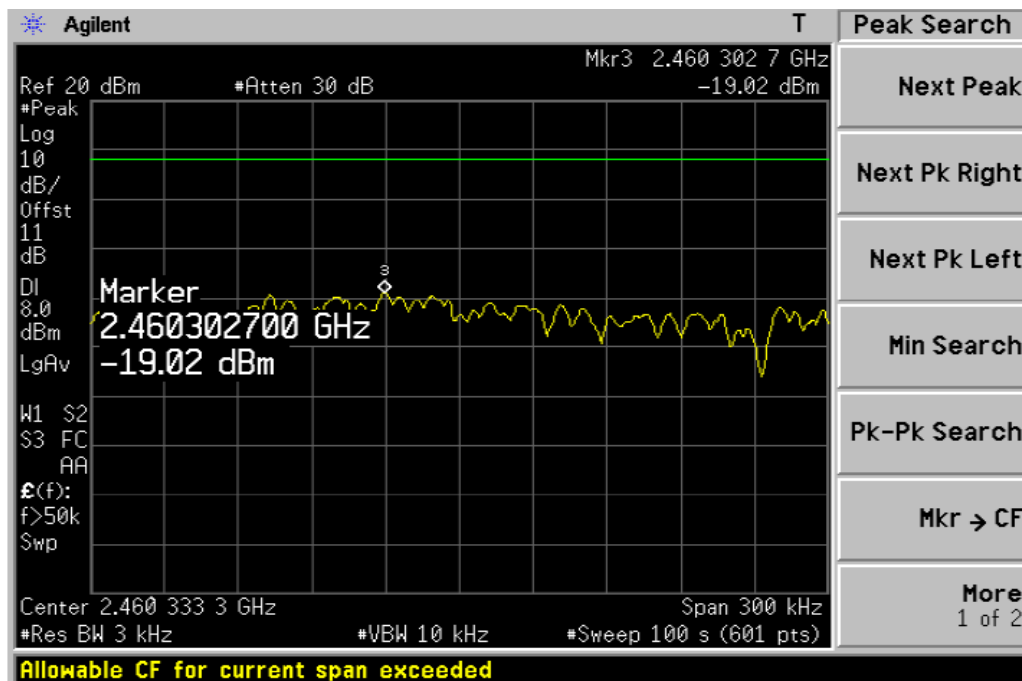
### Low Channel



### Middle Channel

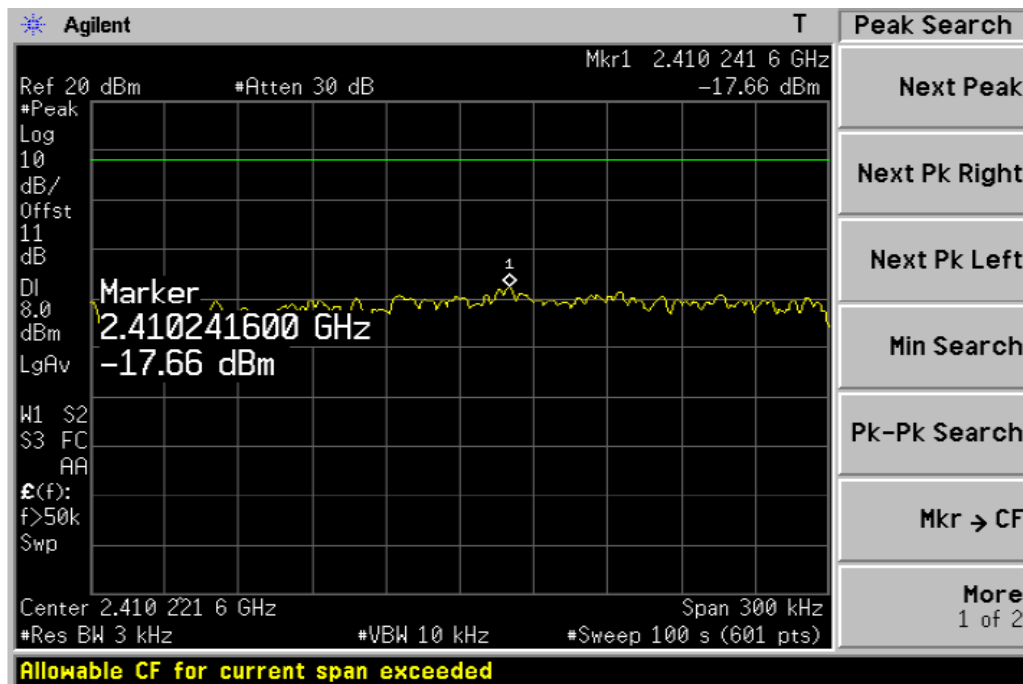


### High Channel

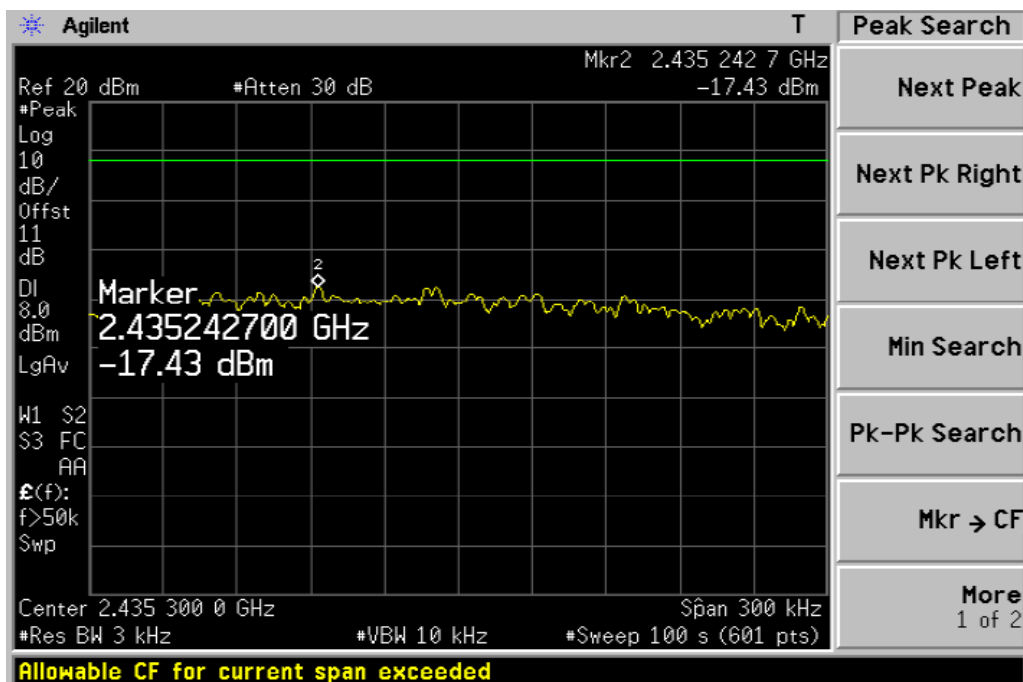


802.11n HT20 Mode:

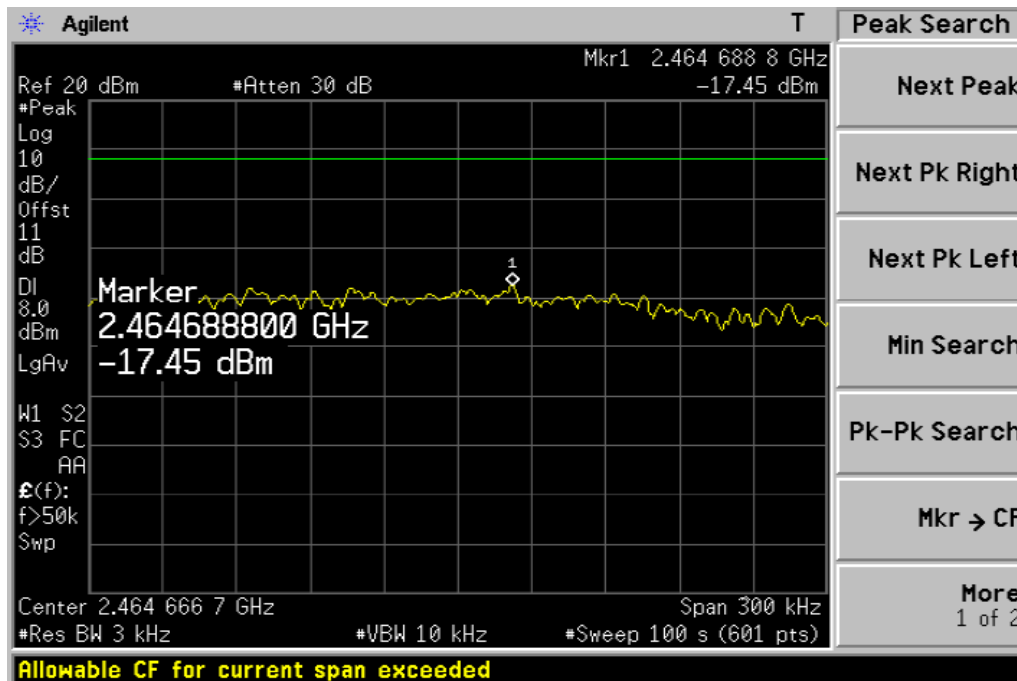
### Low Channel



### Middle Channel

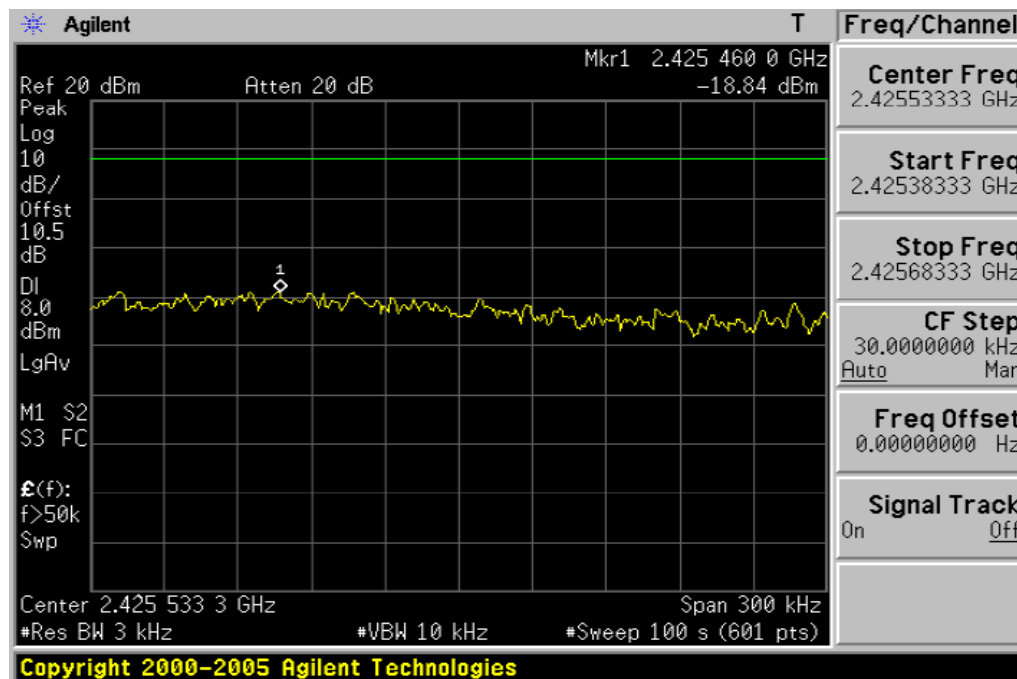


### High Channel

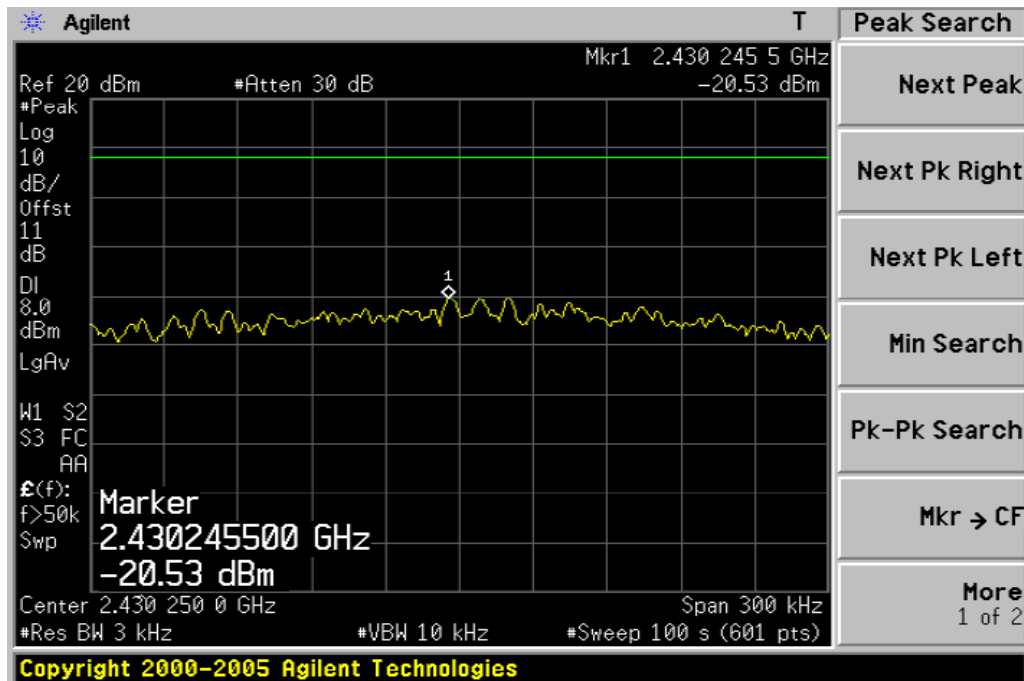


802.11n HT40 Mode:

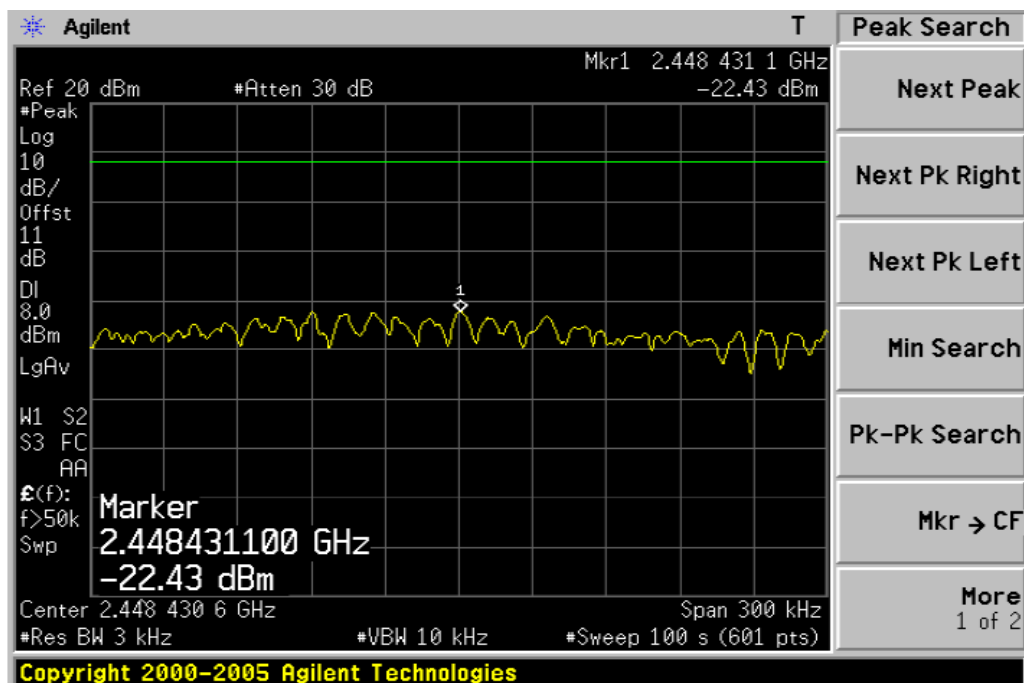
### Low channel



### Middle channel



### High channel



## PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST



### CONDUCTED EMISSION TEST



### **RADIATED EMISSION TEST**

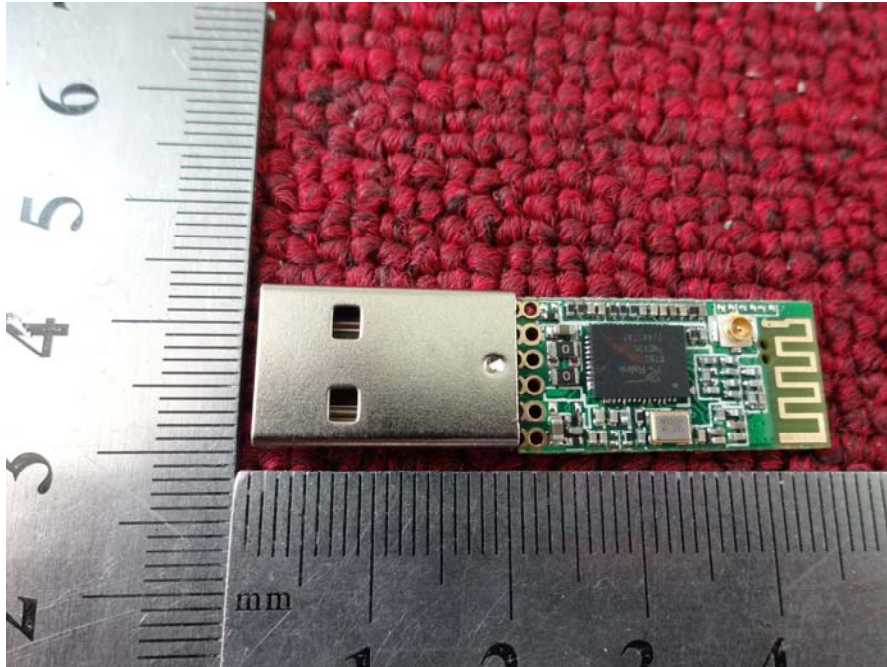


### **RADIATED EMISSION TEST**



## PHOTOGRAPHS OF EUT

photograph of EUT



photograph of EUT

