



## FCC TEST REPORT

for

**HSDPA/WCDMA/EDGE/GPRS/GSM 850/900/1800/1900/2100MHz**

**Mobile Phone**

**MODEL: i-mobile i651**

**Test Report Number:**

**KS100831B02-RP**

Issued for

**YuHua TelTech (Shanghai) Co.,Ltd.**

**4F/2, District B, No. 1000 Jinhai Road, Pudong 201206, Shanghai, P.R. China**

Issued by:

**Compliance Certification Services Inc.**

**Kun shan Laboratory**

**No.10 Weiye Rd, Innovation park, Eco&Tec,  
Development Zone, Kunshan City, Jiangsu, P.R.C**

**TEL: 86-512-57355888**

**FAX: 86-512-57370818**

**Issued Date:September 9, 2010**



**Note:** This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document. The client should not use it to claim product endorsement by TAF, A2LA, NVLAP, NIST or any government agencies. The test results in the report only apply to the tested sample.



## Revision History

| Rev. | Issue Date        | Revisions     | Effect Page | Revised By  |
|------|-------------------|---------------|-------------|-------------|
| 00   | September 9, 2010 | Initial Issue | ALL         | Spring Zhou |
|      |                   |               |             |             |



## TABLE OF CONTENTS

|   |           |
|---|-----------|
| <b>1 TEST CERTIFICATION .....</b>                     | <b>4</b>  |
| <b>2 TEST RESULT SUMMARY .....</b>                    | <b>4</b>  |
| <b>3 EUT DESCRIPTION.....</b>                         | <b>6</b>  |
| <b>4 TEST METHODOLOGY.....</b>                        | <b>7</b>  |
| 4.1. DESCRIPTION OF TEST MODES .....                  | 7         |
| <b>5 SETUP OF EQUIPMENT UNDER TEST .....</b>          | <b>8</b>  |
| 5.1. DESCRIPTION OF SUPPORT UNITS.....                | 8         |
| 5.2. CONFIGURATION OF SYSTEM UNDER TEST .....         | 8         |
| <b>6 FACILITIES AND ACCREDITATIONS .....</b>          | <b>9</b>  |
| 6.1. FACILITIES .....                                 | 9         |
| 6.2. ACCREDITATIONS .....                             | 9         |
| 6.3. MEASUREMENT UNCERTAINTY .....                    | 9         |
| <b>7 LIMITS AND RESULTS .....</b>                     | <b>10</b> |
| 7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT ..... | 10        |
| 7.2. SPURIOUS EMISSIONS MEASUREMENT.....              | 15        |
| 7.3. 6dB BANDWIDTH MEASUREMENT .....                  | 33        |
| 7.4. PEAK OUTPUT POWER .....                          | 38        |
| 7.5. BAND EDGES MEASUREMENT:.....                     | 43        |
| 7.6. PEAK POWER SPECTRAL DENSITY MEASUREMENT.....     | 45        |
| <b>APPENDIX I RADIO FREQUENCY EXPOSURE.....</b>       | <b>60</b> |



## 1 TEST CERTIFICATION

**Product:** HSDPA/WCDMA/EDGE/GPRS/GSM 850/900/1800/1900/2100MHz Mobile Phone

**Model:** i-mobile i651

**Brand:** i-mobile

**Tested:** April 16, 2010 and September 9, 2010

**Applicant:** YuHua TelTech (Shanghai) Co.,Ltd.  
4F/2, District B, No. 1000 Jinhai Road, Pudong 201206, Shanghai, P.R. China

**Manufacturer:** YuHua TelTech (Shanghai) Co.,Ltd.  
4F/2, District B, No. 1000 Jinhai Road, Pudong 201206, Shanghai, P.R. China

### APPLICABLE STANDARDS

| Standard     | Test Type                      | Standard                     | Test Type   |
|--------------|--------------------------------|------------------------------|---|
| 15.207(a)    | Power Line Conducted Emissions | 15.247(d)<br>15.209(a)       | ● Spurious Emissions<br>● Conducted Measurement<br>● Radiated Emissions |
| 15.247(a)(2) | 6dB Bandwidth Measurement      | 15.247(b)(3)<br>15.247(b)(4) | Peak Power Measurement  |
| 15.247(d)    | Band Edges Measurement         | 15.247(e)                    | Peak Power Spectral Density   |

### DEVIATION FROM APPLICABLE STANDARD

None

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in **ANSI C63.4: 2003** and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247.

*Approved by:*

*Spring Zhou*

Spring Zhou  
RF Manager  
Compliance Certification Service Inc.

*Reviewed by:*

*Jeff Fang*

Jeff Fang  
RF Section Manager  
Compliance Certification Service Inc.



## 2 TEST RESULT SUMMARY

### APPLICABLE STANDARDS

| Standard                     | Test Type   | Result | Remark                         |
|------------------------------|---|--------|--------------------------------|
| 15.247(a)(2)                 | 6dB Bandwidth Measurement   | Pass   | Meet the requirement of limit. |
| 15.247(b)(3)<br>15.247(b)(4) | Peak Power Measurement  | Pass   | Meet the requirement of limit. |
| 15.247(d)                    | Band Edges Measurement  | Pass   | Meet the requirement of limit. |
| 15.247(e)                    | Peak Power Spectral Density   | Pass   | Meet the requirement of limit. |
| 15.247(d)<br>15.209(a)       | Spurious Emissions<br>● Conducted Measurement<br>● Radiated Emissions | Pass   | Meet the requirement of limit. |
| 15.207(a)                    | Power line Conducted Emissions  | Pass   | Meet the requirement of limit. |

Note: 1. The test result judgment is decided by the limit of test standard  
2. The information of measurement uncertainty is available upon the customer's request.



## 3 EUT DESCRIPTION

|   |  |
|---|--|
| <b>Product</b>                          | HSDPA/WCDMA/EDGE/GPRS/GSM850/900/1800/1900/2100MHz Mobile Phone  |
| <b>Trade Name</b>                       | i-mobile   |
| <b>Model Number</b>                     | i-mobile i651  |
| <b>Model Discrepancy</b>                | N/A  |
| <b>Wireless LAN module Model Number</b> | AW-GH381   |
| <b>Wireless LAN module Brand name</b>   | AzureWave  |
| <b>DC Power Cable Type</b>              | Unshielded, 1.8m (Non-Detachable) at Power Adapter with a core   |
| <b>Frequency Range</b>                  | 2412 ~ 2462 MHz  |
| <b>Transmit Power</b>                   | IEEE 802.11b:16.29dBm<br>IEEE 802.11g:12.95dBm   |
| <b>Modulation Technique</b>             | IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>IEEE 802.11g: DSSS (CCK, DQPSK, DBPSK) + OFDM (QPSK, BPSK, 16-QAM, 64-QAM) |
| <b>Transmit Data Rate</b>               | IEEE 802.11b: 11, 5.5, 2, 1 Mbps<br>IEEE 802.11g: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps                   |
| <b>Number of Channels</b>               | IEEE 802.11b , IEEE 802.11g :11 Channels   |
| <b>Antenna Specification</b>            | 1 dBi gain (Max)   |

**Note:** 1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.

2. This submittal(s) (test report) is intended for FCC ID: S2VDP100 filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



## 4 TEST METHODOLOGY

### 4.1. DESCRIPTION OF TEST MODES

The EUT had been tested under operating condition.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

The field strength of spurious emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis) with Power adapter . The worst emission was found in stand-up position (Z axis)

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz, which worst case was in normal link mode only.

IEEE802.11b: Channel low(2412MHz), Channel middle(2437MHz) and Channel high (2462MHz) with preliminary test 11, 5.5, 2, and 1, After the preliminary scan , the following test mode 11Mbps highest data rate (the worst case) are chosen for the final testing.

IEEE802.11g: Channel low(2412MHz), Channel middle(2437MHz) and Channel high(2462MHz) with preliminary test 54/48/36/24/18/12/9/6, After the preliminary scan , the following test mode 6Mbps data rate (the worst case) are chosen for the final testing.



## 5 SETUP OF EQUIPMENT UNDER TEST

### 5.1. 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   | N/A       | N/A       | N/A        | N/A    | N/A        | 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.

### 5.2. CONFIGURATION OF SYSTEM UNDER TEST

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.



## 6 FACILITIES AND ACCREDITATIONS

### 6.1. FACILITIES

All measurement facilities used to collect the measurement data are located at

**No.10Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.**

The sites are constructed in conformance with the requirements of ANSI C63.4:2003 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 6.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

|               |                  |
|---------------|------------------|
| <b>USA</b>    | FCC,A2LA         |
| <b>Japan</b>  | VCCI             |
| <b>Canada</b> | INDUSTRY CANADA, |
| <b>Taiwan</b> | TAF              |
| <b>China</b>  | CNAS             |

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsrf.com>.

### 6.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETR 028:

| Measurement         | Frequency  |                 | Uncertainty |
|---------------------|------------|-----------------|-------------|
| Conducted emissions | 9kHz~30MHz |                 | +/- 3.43dB  |
| Radiated emissions  | H          | 30MHz ~ 200MHz  | +/- 4.72dB  |
|                     |            | 200MHz ~1000MHz | +/- 4.72dB  |
|                     | V          | 30MHz ~ 200MHz  | +/- 4.83dB  |
|                     |            | 200MHz ~1000MHz | +/- 4.70dB  |

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



## 7 LIMITS AND RESULTS

### 7.1. POWER LINE CONDUCTED EMISSIONS MEASUREMENT

#### 7.1.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.207(a), except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

| Frequency Range (MHz) | Limits (dB $\mu$ V) |           |
|-----------------------|---------------------|-----------|
|                       | Quasi-peak          | Average   |
| 0.15 to 0.50          | 66 to 56*           | 56 to 46* |
| 0.50 to 5             | 56                  | 46        |
| 5 to 30               | 60                  | 50        |

**NOTE:**

- (1) The lower limit shall apply at the transition frequencies.
- (2) The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
- (3) All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

**TEST INSTRUMENTS**

| Conducted Emission |              |                         |               |                 |
|--------------------|--------------|-------------------------|---------------|-----------------|
| Name of Equipment  | Manufacturer | Model                   | Serial Number | Calibration Due |
| EMC Analyzer       | R&S          | ESCI3                   | 100781        | 04/24/2011      |
| V (V-LISN)         | Schwarzbeck  | NNLK 8129               | 8129-143      | 04/24/2011      |
| LISN (EUT)         | FCC          | FCC-LISN-50/250-50-2-02 | SN:05012      | 04/24/2011      |
| TRANSIENT LIMITER  | SCHAFFNER    | CFL9206                 | 1710          | 04/24/2011      |

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. N.C.R = No Calibration Request.

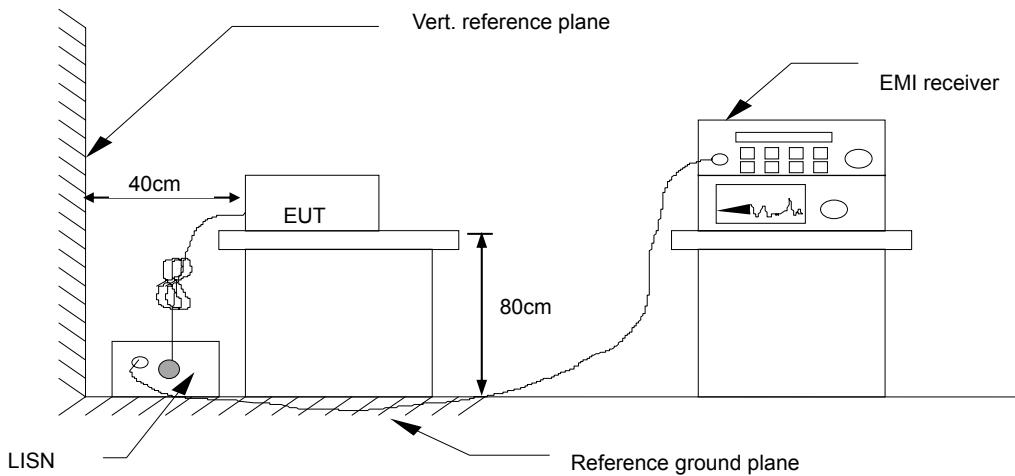


## 7.1.2. TEST PROCEDURES (please refer to measurement standard)

- The EUT and Support equipment, if needed, was placed on a non-conducted table, which is 0.8m above the ground plane and 0.4m away from the conducted wall.
- The test equipment EUT installed received AC main power, through a Line Impedance Stabilization Network (LISN), which supplied power source and was grounded to the ground plane. All support equipment power received from a second LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- The EUT test program was started. Emissions were measured on each current carrying line of the EUT using an EMI Test Receiver connected to the LISN powering the EUT.
- The frequency range from 150 kHz to 30 MHz was searched. The test data of the worst-case condition(s) was recorded. Emission levels under limit 20dB were not recorded.



## 7.1.3. TEST SETUP



- For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 7.1.4. Data Sample:

| Frequency (MHz) | QP Reading (dBuV) | AV Reading (dBuV) | Correction factor (dB) | QP Result (dBuV) | AV Result (dBuV) | QP Limit (dBuV) | AV Limit (dBuV) | QP Margin (dB) | AV Margin (dB) | Note |
|-----------------|-------------------|-------------------|------------------------|------------------|------------------|-----------------|-----------------|----------------|----------------|------|
| XXX             | 37.58             | 35.11             | 10.10                  | 47.68            | 45.21            | 63.49           | 53.49           | -15.81         | -8.28          | L1   |

Frequency (MHz) = Emission frequency in MHz  
Reading (dBuV) = Uncorrected Analyzer/Receiver reading  
Correction factor (dB) = Insertion loss of LISN  
Limit (dBuV) = Limit stated in standard  
Margin (dB) = Reading (dBuV) – Limit (dBuV)  
Note = Current carrying line of reading



## 7.1.5. TEST RESULTS

|                          |                         |  |  |               |             |
|--------------------------|-------------------------|--|--|---------------|-------------|
| Model No.                | i-mobile i651           |  |  | Test Mode     | Normal Link |
| Environmental Conditions | 23deg.C,50% RH, 991 hPa |  |  | 6dB BANDWIDTH | 9 kHz       |
| Tested by:               | Jeff                    |  |  |               |             |

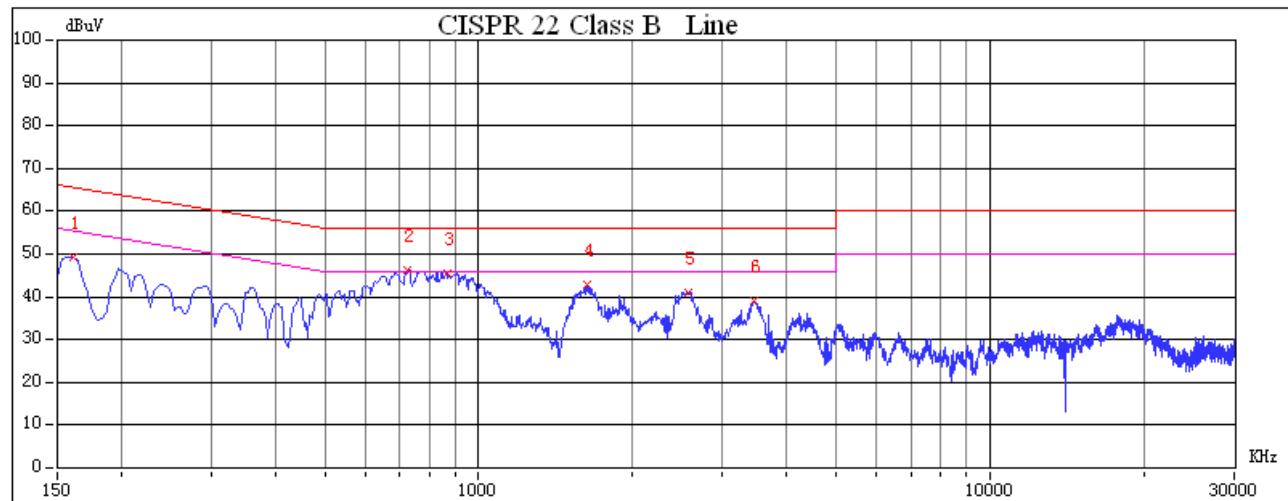
REMARKS: L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

| Freq.<br>(MHz) | PEAK.<br>Raw<br>(dBuV) | Q.P.<br>Raw<br>(dBuV) | AVG<br>Raw<br>(dBuV) | Q.P.<br>Limit<br>(dBuV) | AVG<br>Limit<br>(dBuV) | Margin<br>(dB) | Factor<br>(dB) | Remark |
|----------------|------------------------|-----------------------|----------------------|-------------------------|------------------------|----------------|----------------|--------|
| 0.161          | 49.27                  | 46.84                 | 34.81                | 65.68                   | 55.68                  | -20.87         | 10.06          | L1     |
| 0.723          | 46.37                  | 40.71                 | 31.53                | 56.00                   | 46.00                  | -14.47         | 10.95          | L1     |
| 0.871          | 45.67                  | 39.56                 | 29.52                | 56.00                   | 46.00                  | -16.48         | 11.00          | L1     |
| 1.626          | 42.81                  | 35.47                 | 25.93                | 56.00                   | 46.00                  | -20.07         | 11.06          | L1     |
| 2.576          | 40.97                  | 33.22                 | 24.29                | 56.00                   | 46.00                  | -21.71         | 11.12          | L1     |
| 3.456          | 39.04                  | 31.55                 | 22.26                | 56.00                   | 46.00                  | -23.74         | 11.16          | L1     |
|                |                        |                       |                      |                         |                        |                |                |        |
| 0.161          | 56.75                  | 41.53                 | 31.71                | 65.68                   | 55.68                  | -23.97         | 10.16          | L2     |
| 0.205          | 49.51                  | 37.38                 | 20.97                | 64.41                   | 54.41                  | -33.44         | 10.18          | L2     |
| 0.712          | 44.65                  | 36.53                 | 25.89                | 56.00                   | 46.00                  | -20.11         | 10.15          | L2     |
| 0.804          | 44.87                  | 33.94                 | 23.52                | 56.00                   | 46.00                  | -9.56          | 10.15          | L2     |
| 1.622          | 42.05                  | 33.37                 | 22.81                | 56.00                   | 46.00                  | -23.19         | 10.43          | L2     |
| 2.560          | 41.20                  | 31.87                 | 21.10                | 56.00                   | 46.00                  | -24.90         | 10.68          | L2     |

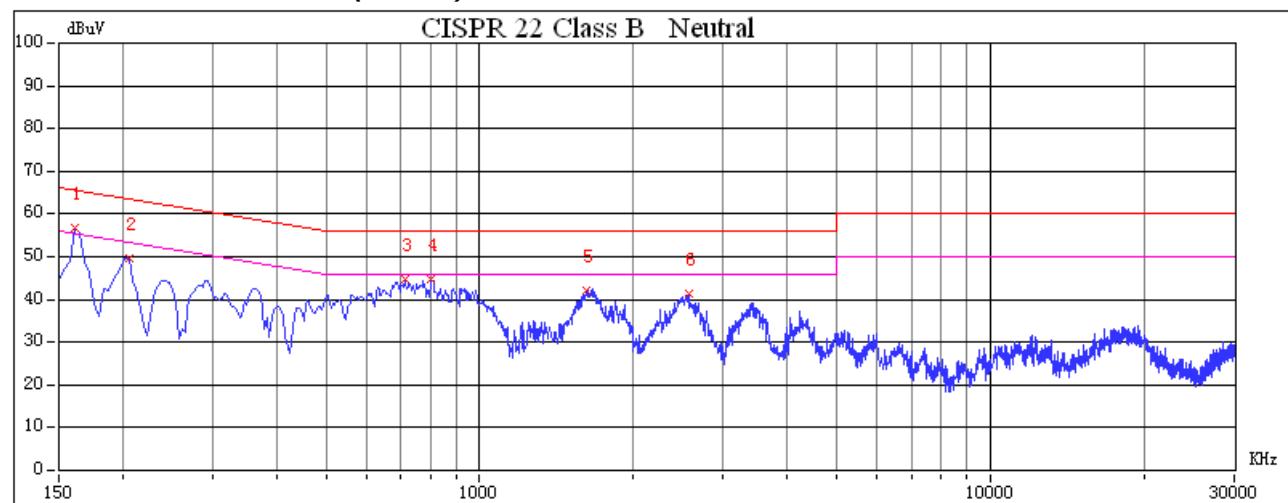


## Test Plots

### **Conducted emissions (Line 1)**



### **Conducted emissions (Line 2)**





## 7.2. SPURIOUS EMISSIONS MEASUREMENT

### 7.2.1. LIMITS OF CONDUCTED EMISSIONS MEASUREMENT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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 Section 15.205(c)).

### 7.2.2. TEST INSTRUMENTS

| Conducted Emissions Test Site |              |        |               |                 |
|-------------------------------|--------------|--------|---------------|-----------------|
| Name of Equipment             | Manufacturer | Model  | Serial Number | Calibration Due |
| Spectrum Analyzer             | Agilent      | E4446A | MY44020154    | 04/24/2011      |

### 7.2.3. TEST PROCEDURE (please refer to measurement standard)

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site. The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

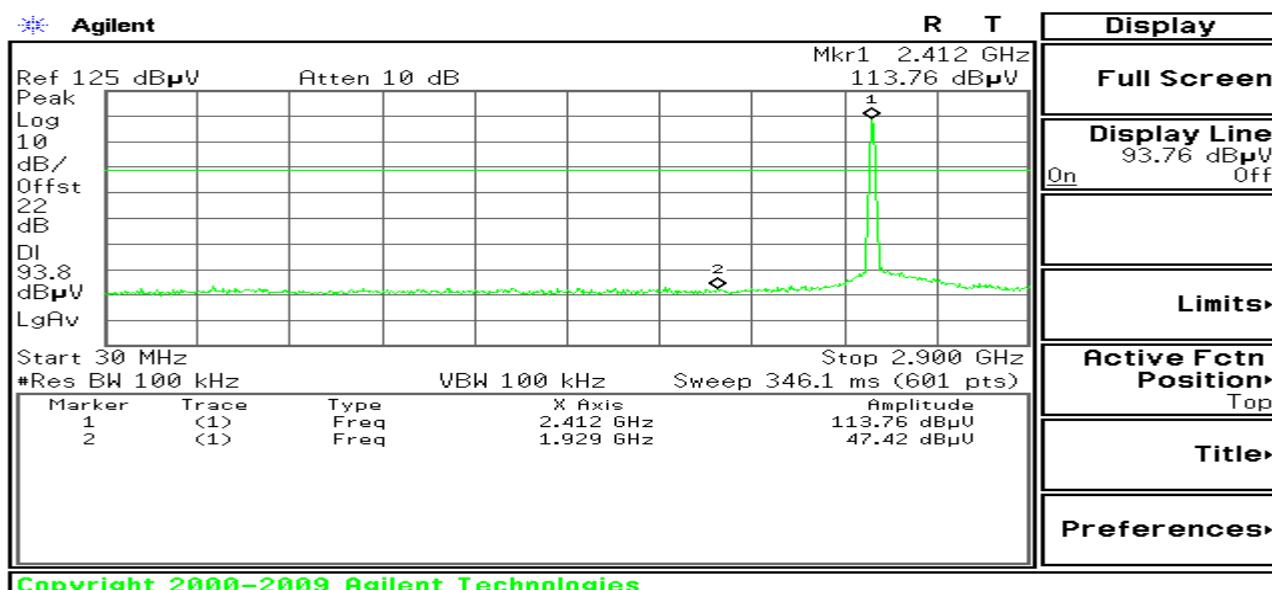


## 7.2.4. TEST RESULTS

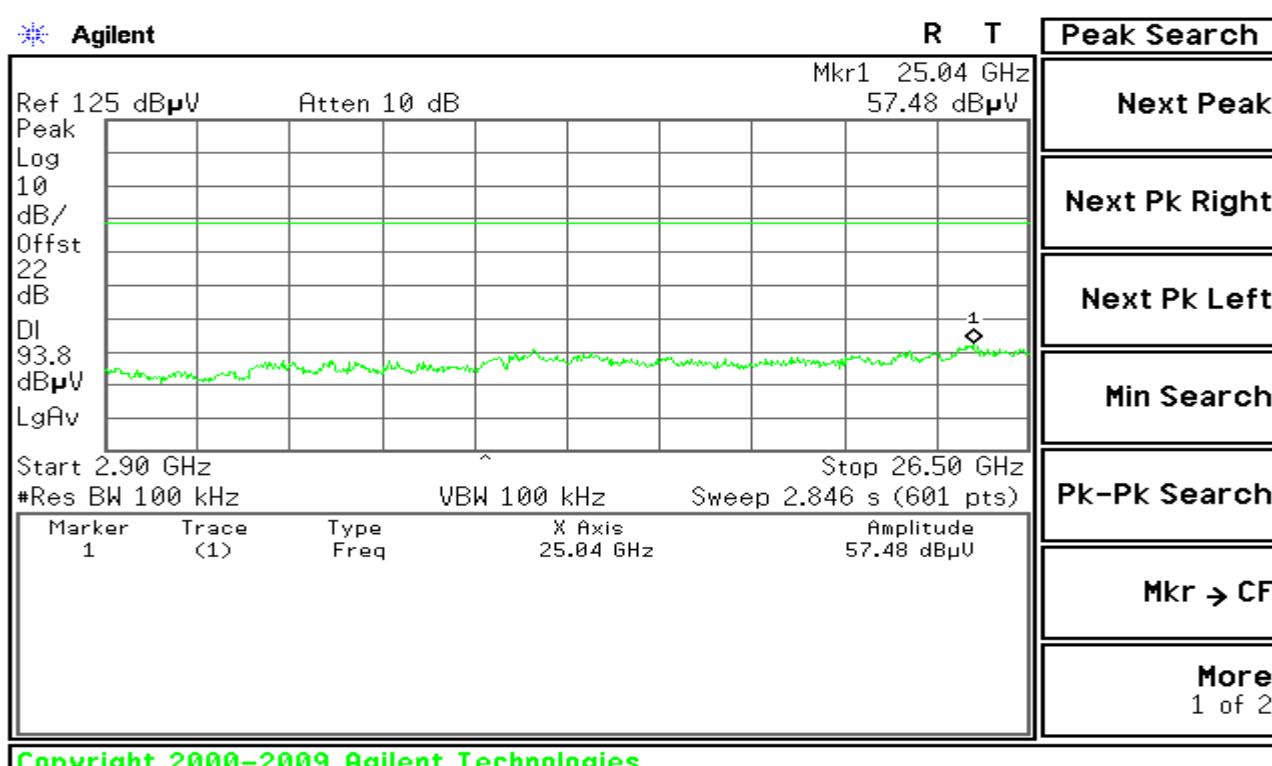
### Test Plot (IEEE 802.11b mode)

#### CH Low

30MHz ~ 2.9GHz



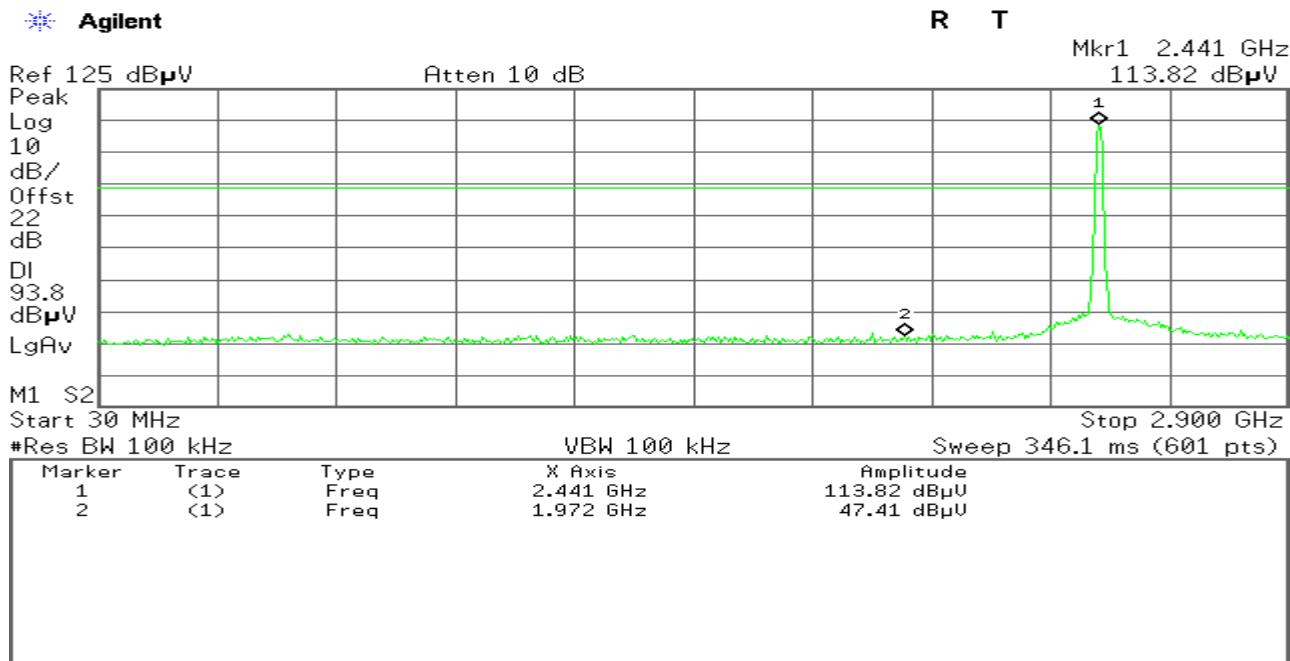
2.9GHz ~ 26.5GHz



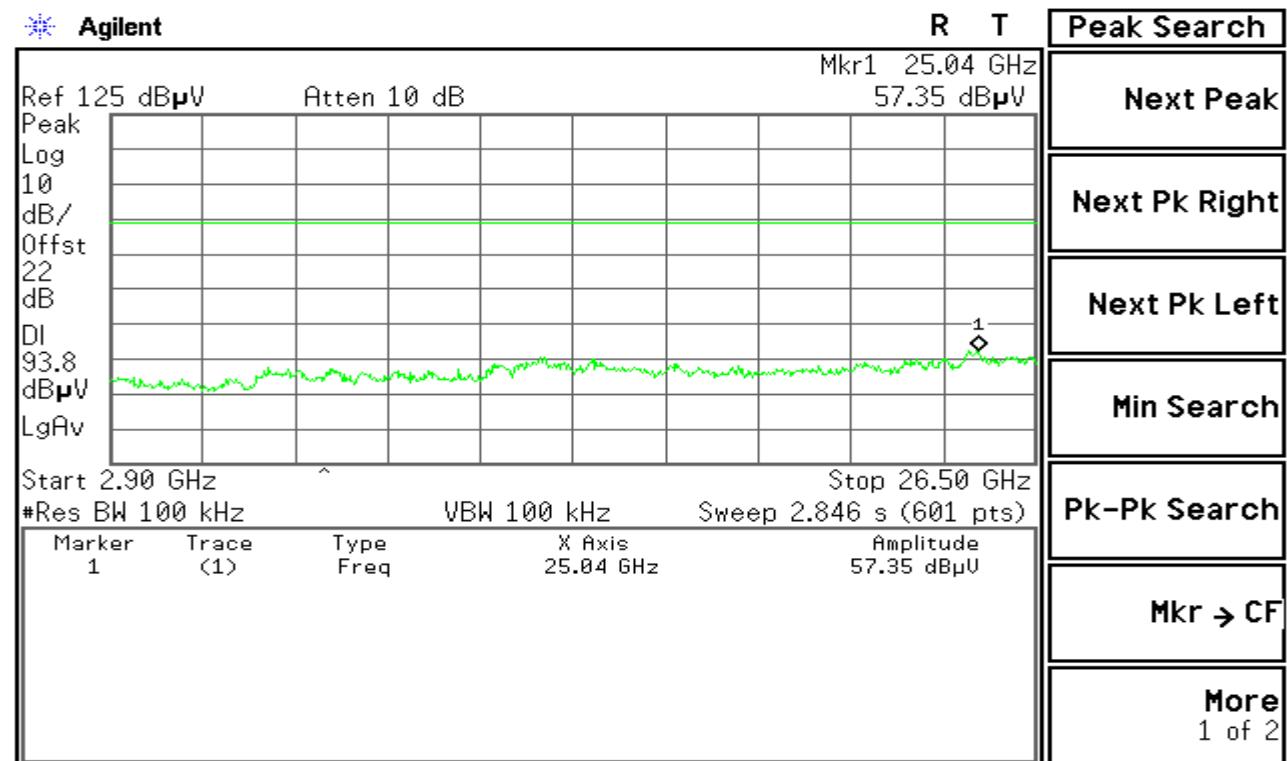


## CH Mid

### 30MHz ~ 2.9GHz



### 2.9GHz ~ 26.5GHz

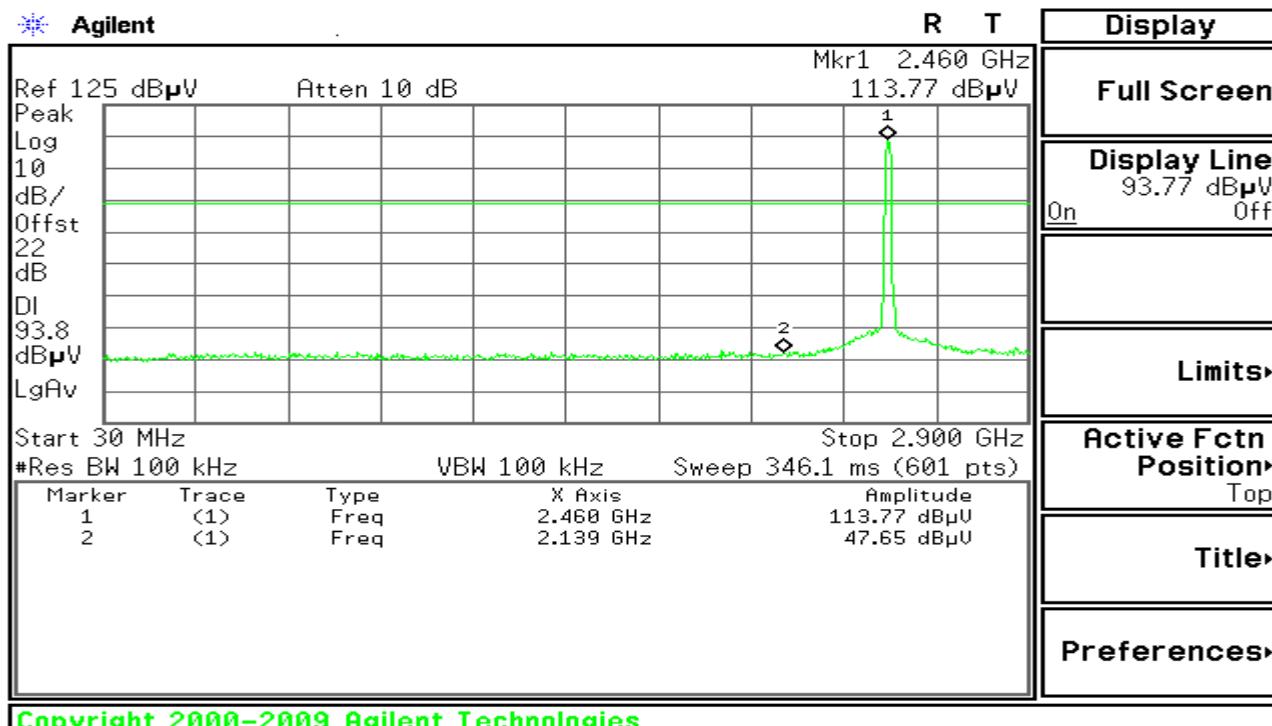


Copyright 2000-2009 Agilent Technologies

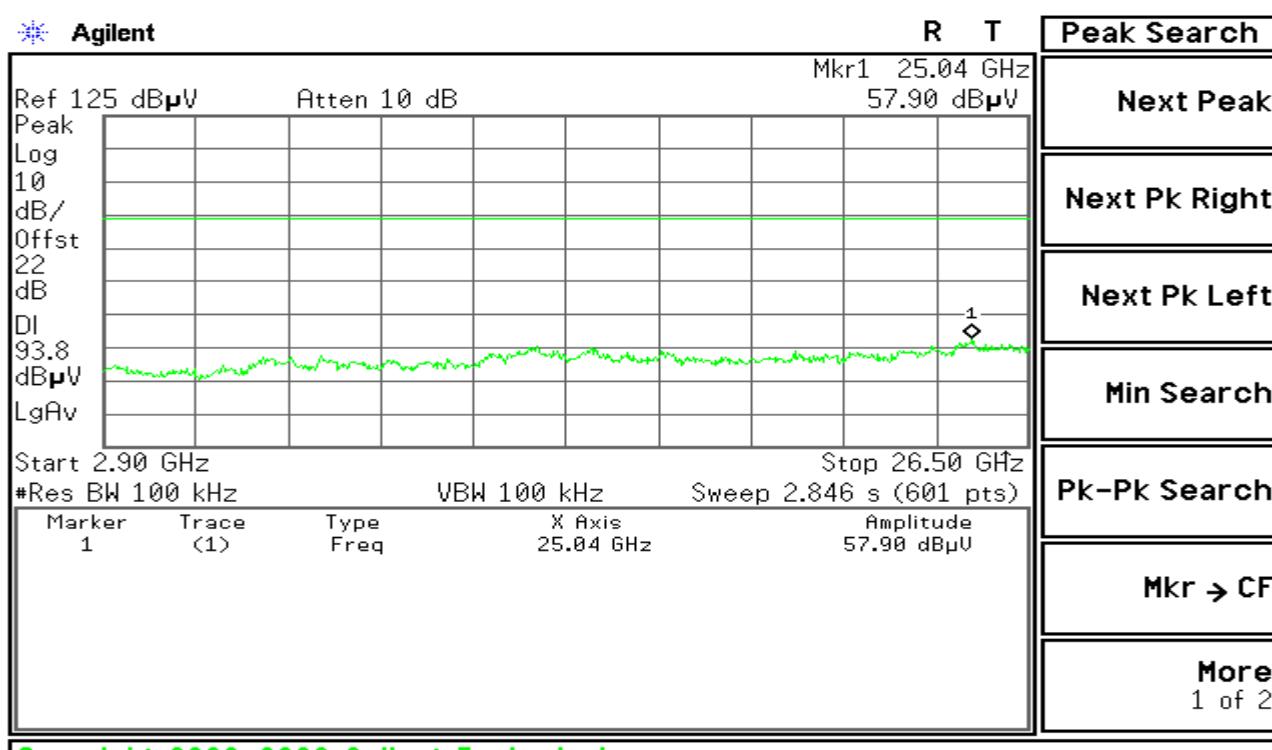


## CH High

### 30MHz ~ 2.9GHz



### 2.9GHz ~ 26.5GHz

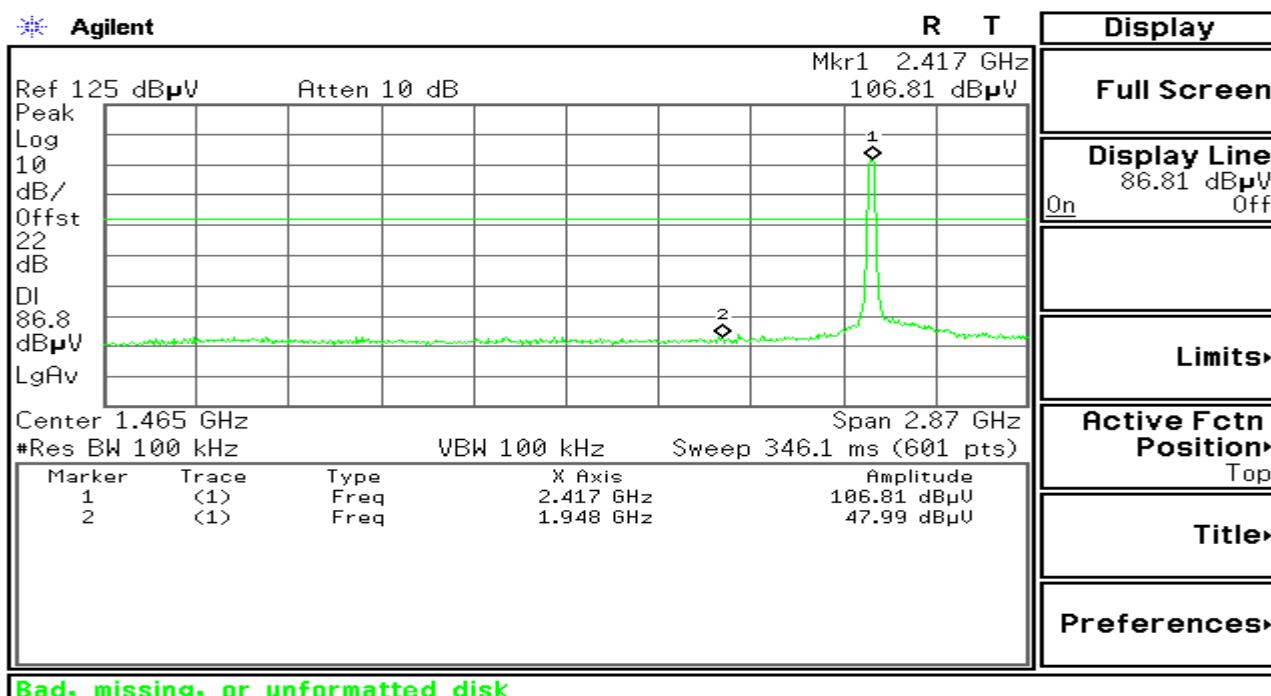




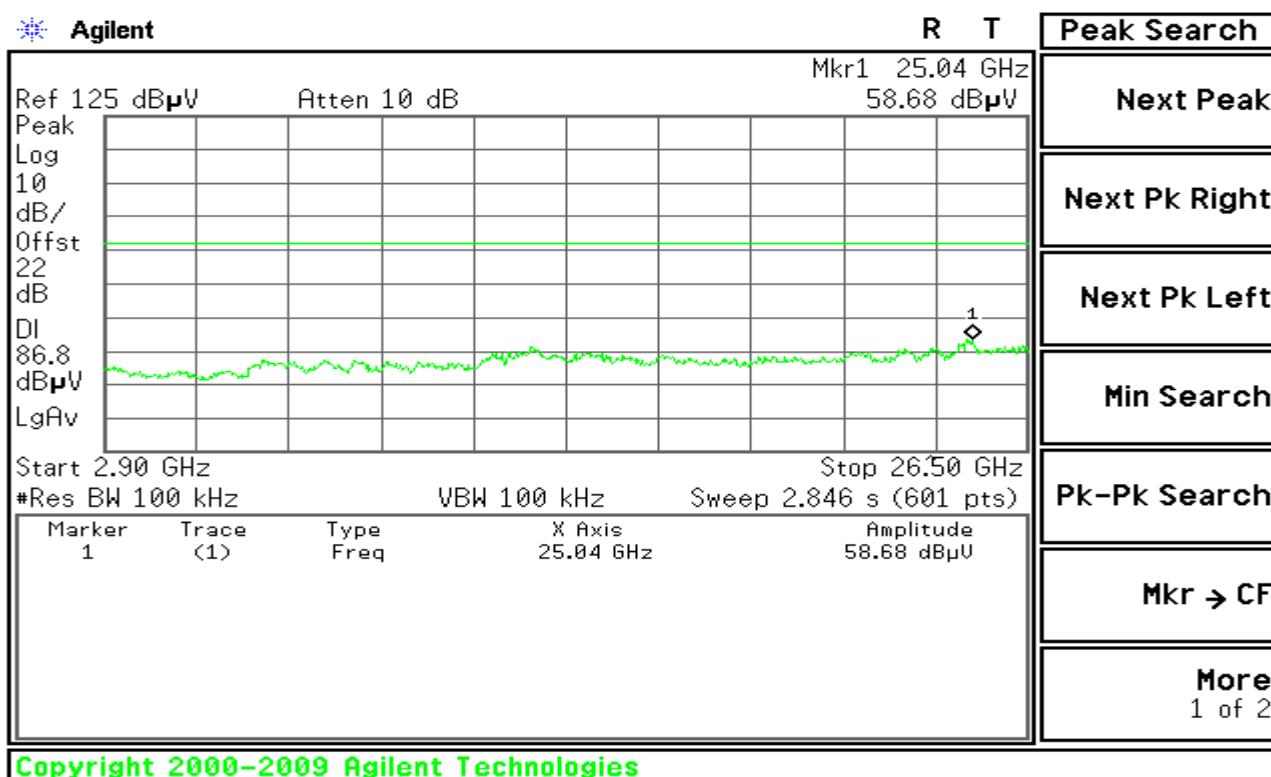
## Test Plot (IEEE 802.11g mode)

**CH Low**

30MHz ~ 2.9GHz



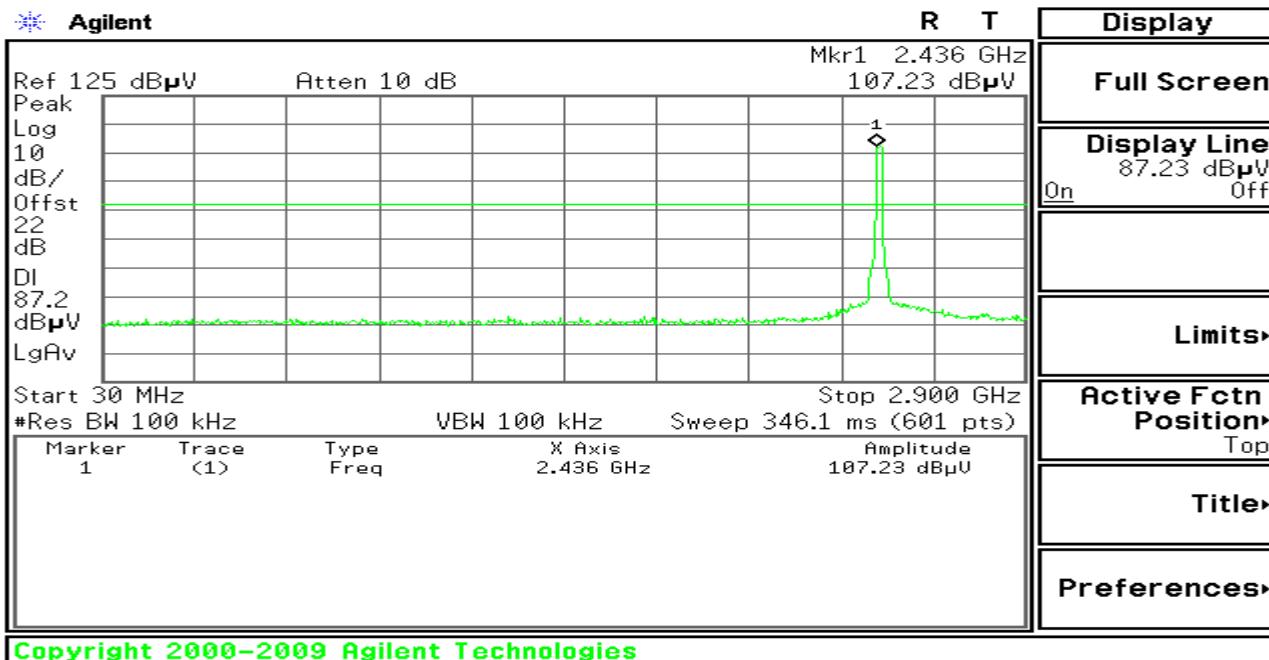
2.9GHz ~ 26.5GHz



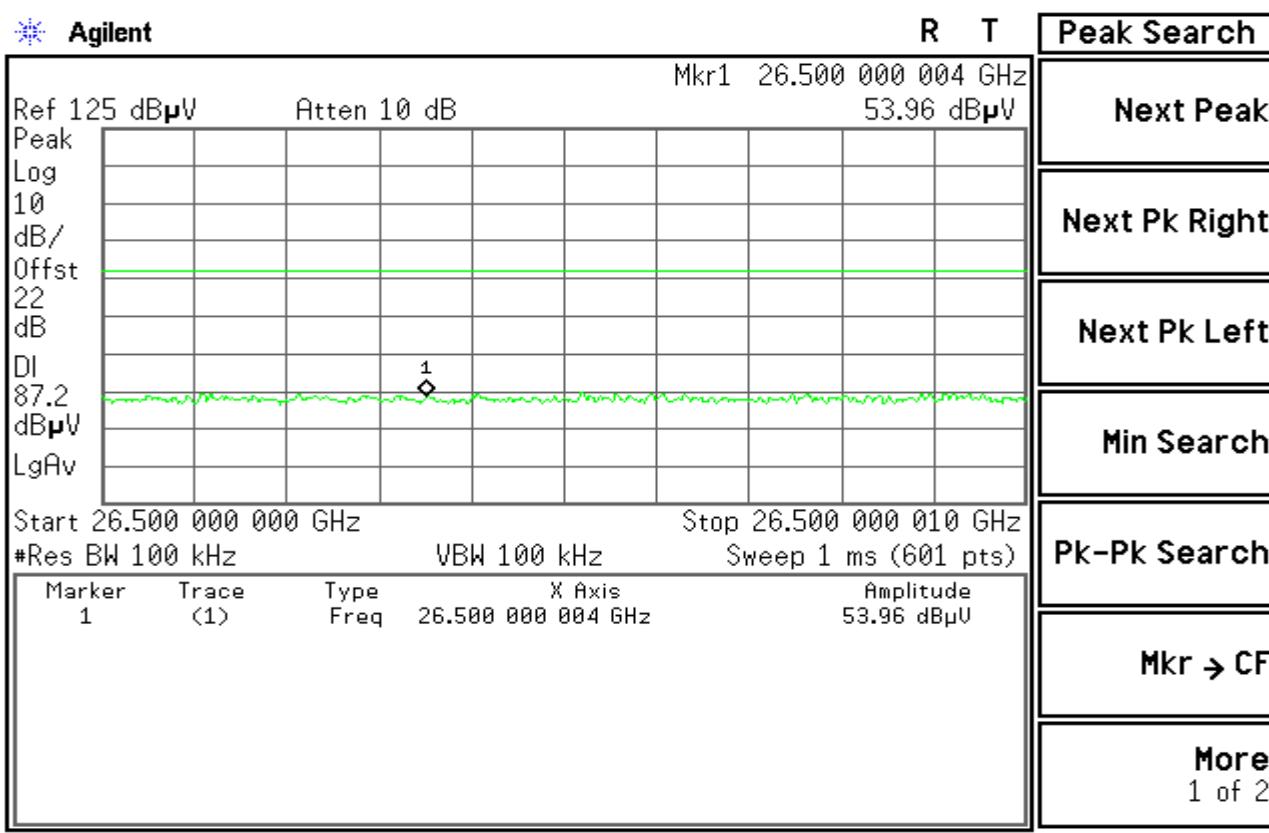


## CH Mid

30MHz ~ 2.9GHz



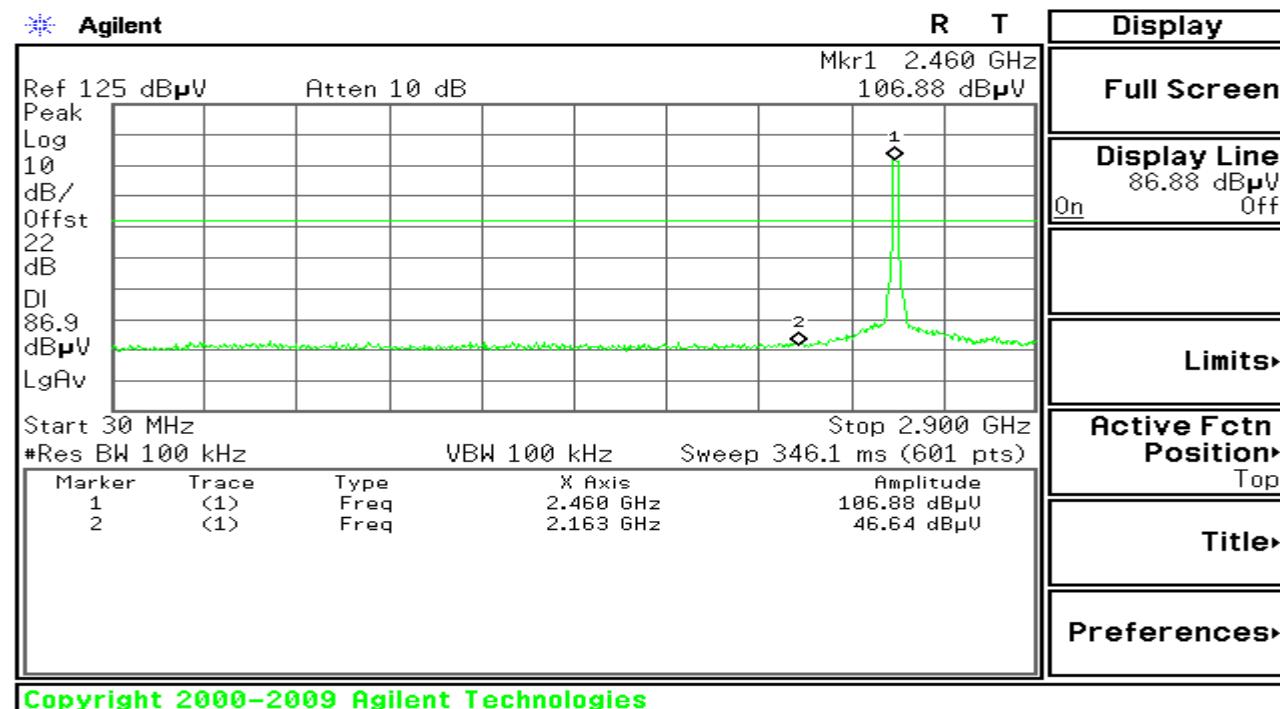
2.9GHz ~ 26.5GHz



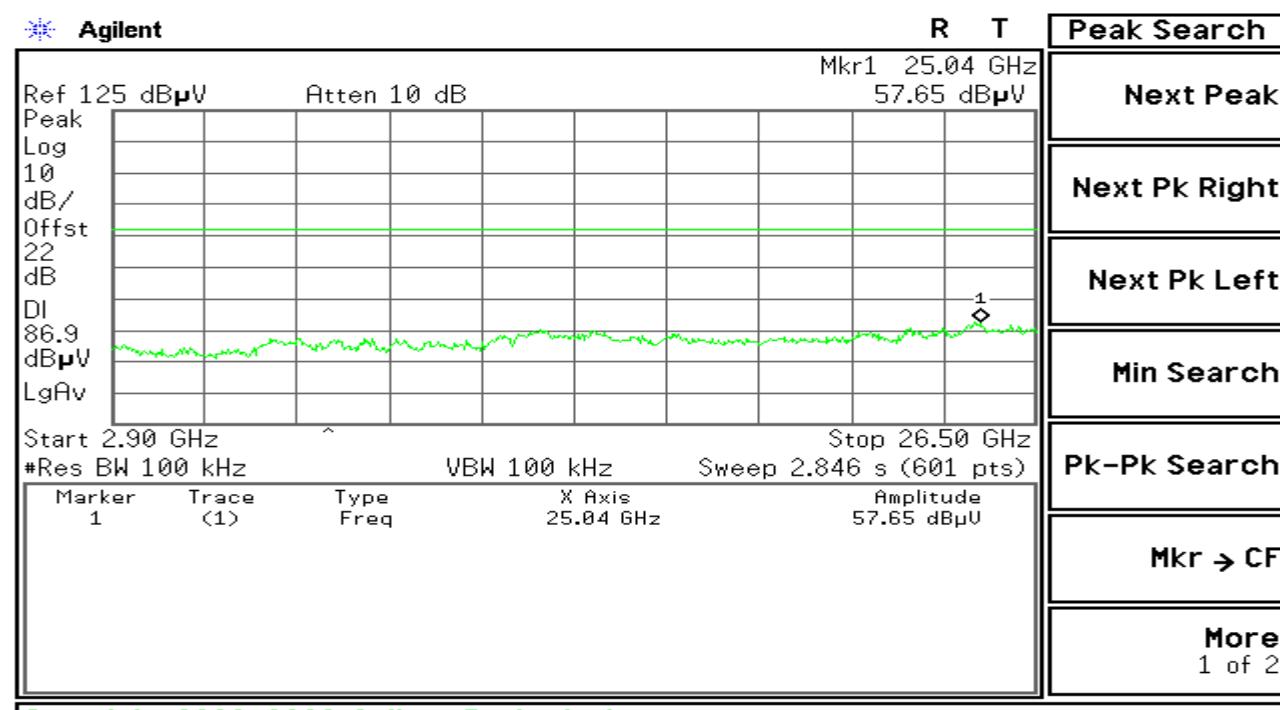


## CH High

30MHz ~ 2.9GHz



2.9GHz ~ 26.5GHz





## 7.2.5. Radiated Emissions

### 7.2.5.1. LIMITS OF RADIATED EMISSIONS MEASUREMENT

- According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (MHz) | Field Strength ( $\mu$ V/m) | Measurement Distance (m) |
|-----------------|-----------------------------|--------------------------|
| 0.009 - 0.490   | $2400/F(\text{kHz})$        | 300                      |
| 0.490 - 1.705   | $24000/F(\text{kHz})$       | 30                       |
| 1.705 - 30.0    | 30                          | 30                       |
| 30-88           | 100*                        | 3                        |
| 88-216          | 150*                        | 3                        |
| 216-960         | 200*                        | 3                        |
| Above 960       | 500                         | 3                        |

**Remark:** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

- In the emission table above, the tighter limit applies at the band edges.

| Frequency (MHz) | Field Strength ( $\mu$ V/m at 3-meter) | Field Strength (dB $\mu$ V/m at 3-meter) |
|-----------------|--|--|
| 30-88           | 100                                    | 40                                       |
| 88-216          | 150                                    | 43.5                                     |
| 216-960         | 200                                    | 46                                       |
| Above 960       | 500                                    | 54                                       |

**NOTE:** (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dB $\mu$ V/m) =  $20 \log$  Emission level ( $\mu$ V/m).



## 7.2.5.2. TEST INSTRUMENTS

| 3M Semi Anechoic Chamber (977) |              |             |               |                 |
|--------------------------------|--------------|-------------|---------------|-----------------|
| Name of Equipment              | Manufacturer | Model       | Serial Number | Calibration Due |
| Spectrum Analyzer              | Agilent      | E4446A      | MY44020154    | 04/24/2011      |
| Spectrum Analyzer              | Agilent      | E4446A      | US44300398    | 04/24/2011      |
| EMI Test Receiver              | R&S          | ESPI3       | 101026        | 04/24/2011      |
| Pre-Amplifier                  | MINI         | ZFL-1000VH2 | d041703       | 02/28/2011      |
| Pre-Amplifier                  | Miteq        | NSP4000-NF  | 870731        | 02/28/2011      |
| Bilog Antenna                  | Sunol        | JB1         | A110204-2     | 11/22/2010      |
| Horn-antenna                   | SCHWARZBECK  | BBHA9120D   | D:266         | 12/04/2010      |
| PSG Analog Signal Generator    | Agilent      | E8257C      | MY43321570    | 04/24/2011      |
| Turn Table                     | CT           | CT123       | 4165          | N.C.R           |
| Antenna Tower                  | CT           | CTERG23     | 3256          | N.C.R           |
| Controller                     | CT           | CT100       | 95637         | N.C.R           |
| Site NSA                       | CCS          | N/A         | N/A           | 04/06/2011      |
| Loop Antenna                   | ARA          | PLA-1030/B  | 1029          | 02/24/2011      |

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 93105,90471.
4. N.C.R = No Calibration Required.

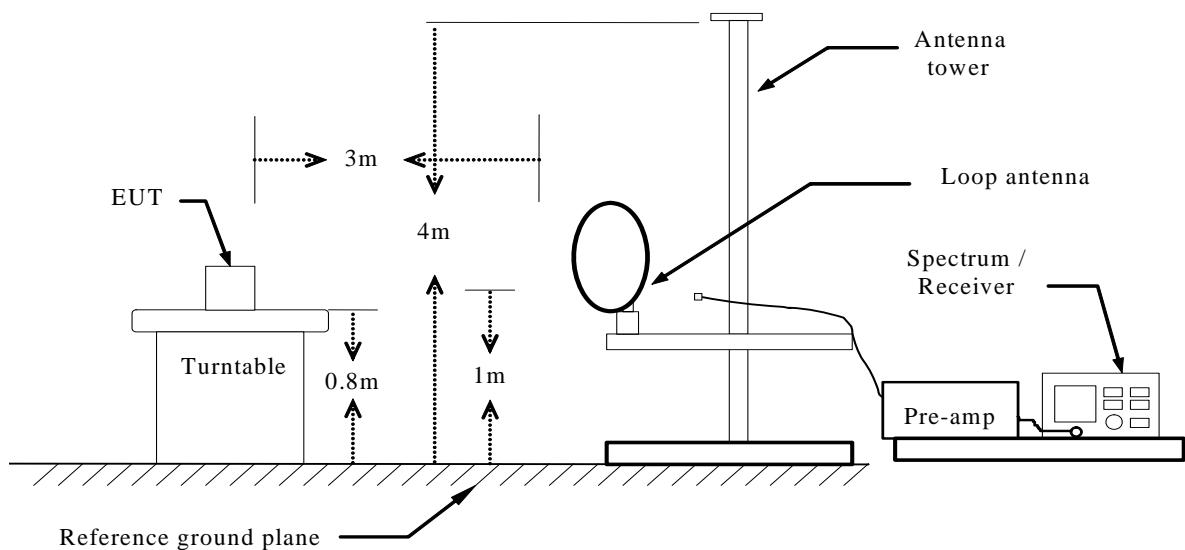
## 7.2.5.3. TEST PROCEDURE (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:  
Below 1GHz:  
RBW=100kHz / VBW=300kHz / Sweep=AUTO  
Above 1GHz:  
(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO  
(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

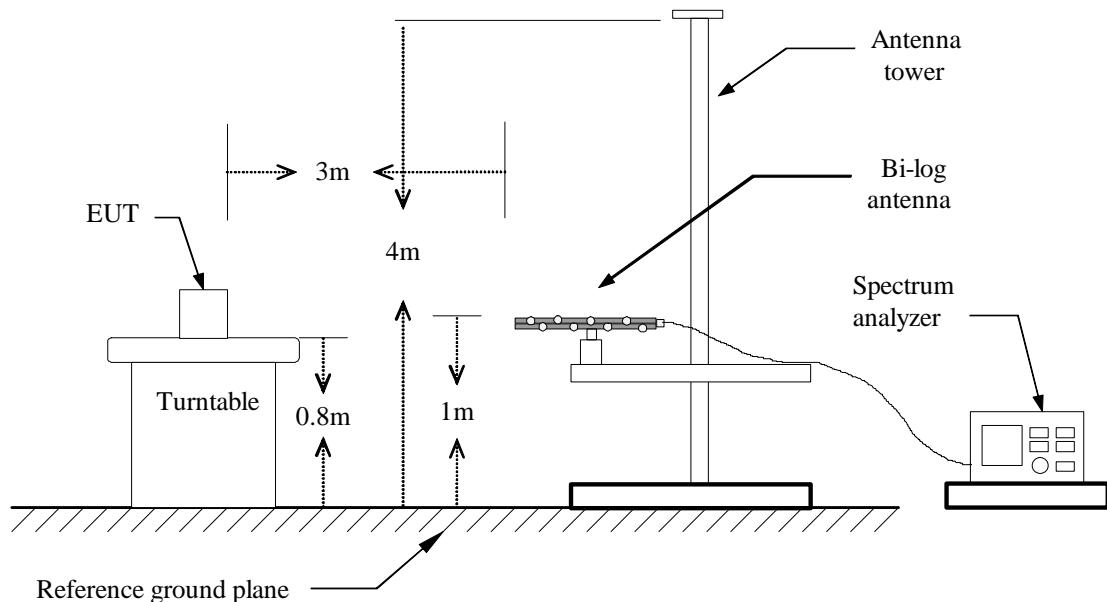


## 7.2.5.4. TEST SETUP

### Below 30MHz

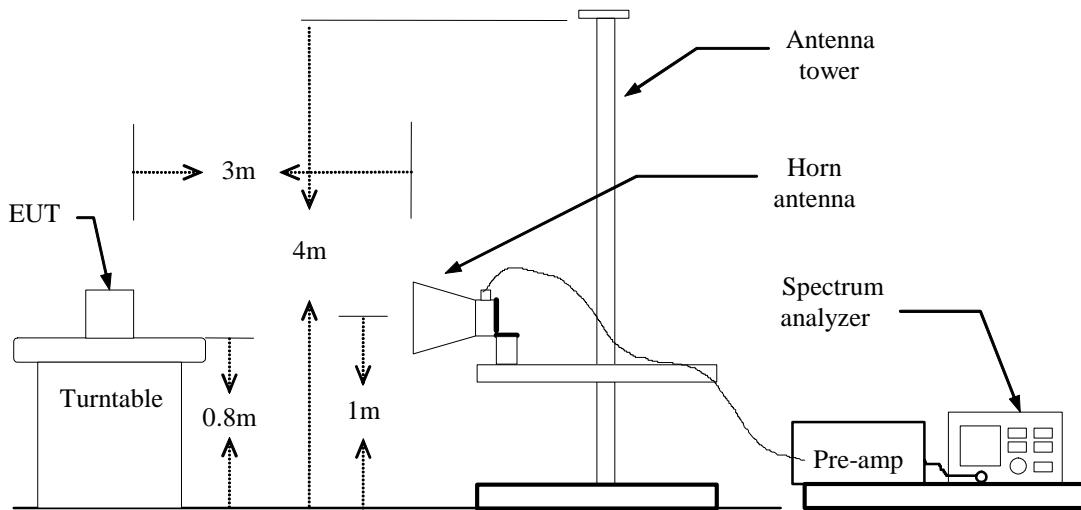


### Below 1 GHz





## Above 1 GHz



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

### 7.2.5.5. Data Sample:

#### Below 1 GHz

| Frequency (MHz) | Ant.Pol. (H/V) | Reading (Remark) (dBuV) | Correction Factor (dB/m) | Result (Remark) (dBuV/m) | Limit (Peak) (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-------------------------|--------------------------|--------------------------|-----------------------|-------------|--------|
| xxx             | V              | 12.12                   | 10.21                    | 22.33                    | 37.00                 | -14.67      | Peak   |

#### Above 1 GHz

| Frequency (MHz) | Ant.Pol. (H/V) | Reading (Peak) (dBuV) | Reading (Average) (dBuV) | Correction Factor (dB/m) | Result (Peak) (dBuV/m) | Result (Average) (dBuV/m) | Limit (Peak) (dBuV/m) | Limit (Average) (dBuV/m) | Margin (dB) | Remark |
|-----------------|----------------|-----------------------|--------------------------|--------------------------|------------------------|---------------------------|-----------------------|--------------------------|-------------|--------|
| xxx             | V              | 65.45                 | 63.00                    | -11.12                   | 54.33                  | 51.88                     | 74.00                 | 54.00                    | -2.12       | AVG    |

Frequency (MHz)

= Emission frequency in MHz

Ant.Pol. (H/V)

= Antenna polarization

Reading (dBuV)

= Uncorrected Analyzer / Receiver reading

Correction Factor (dB/m)

= Antenna factor + Cable loss – Amplifier gain

Result (dBuV/m)

= Reading (dBuV) + Correction Factor (dB/m)

Limit (dBuV/m)

= Limit stated in standard

Margin (dB)

= Remark Result (dBuV/m) – Limit (dBuV/m)

Peak

= Peak Reading

QP

= Quasi-peak Reading

AVG

= Average Reading



## 7.2.5.6. TEST RESULTS

### Below 1 GHz

**Operation Mode:** Normal Link

**Test Date:** September 9, 2010

**Temperature:** 24°C

**Tested by:** Jeff

**Humidity:** 50 % RH

**Polarity:** Ver. / Hor.

| <b>Freq.<br/>(MHz)</b> | <b>Ant.Pol.<br/>H/V</b> | <b>Detector<br/>Mode<br/>(PK/QP)</b> | <b>Reading<br/>(dBuV)</b> | <b>Factor<br/>(dB)</b> | <b>Actual FS<br/>(dBuV/m)</b> | <b>Limit 3m<br/>(dBuV/m)</b> | <b>Safe<br/>Margin<br/>(dB)</b> |
|------------------------|-------------------------|--------------------------------------|---------------------------|------------------------|-------------------------------|------------------------------|---------------------------------|
| 39.19                  | V                       | Peak                                 | 43.26                     | -8.2                   | 35.06                         | 40.0                         | -4.94                           |
| 71.12                  | V                       | Peak                                 | 47.95                     | -13.7                  | 34.25                         | 40.0                         | -5.75                           |
| 133.34                 | V                       | Peak                                 | 46.28                     | -7.03                  | 39.25                         | 43.5                         | -4.25                           |
| 266.99                 | V                       | Peak                                 | 48.77                     | -7.19                  | 41.58                         | 46.0                         | -4.42                           |
| 667.53                 | V                       | Peak                                 | 36.95                     | 2.18                   | 39.13                         | 46.0                         | -6.87                           |
| 723.64                 | V                       | Peak                                 | 37.59                     | 2.95                   | 40.54                         | 46.0                         | -5.46                           |
| <hr/>                  |                         |                                      |                           |                        |                               |                              |                                 |
| 72.2                   | H                       | Peak                                 | 50.26                     | -13.67                 | 36.59                         | 43.5                         | -6.91                           |
| 137.13                 | H                       | Peak                                 | 46.52                     | -7.13                  | 39.39                         | 43.5                         | -4.11                           |
| 222.08                 | H                       | Peak                                 | 48.99                     | -8.73                  | 40.26                         | 46.0                         | -5.74                           |
| 828.85                 | H                       | Peak                                 | 37.62                     | 4.12                   | 41.74                         | 46.0                         | -4.26                           |
| 935.47                 | H                       | Peak                                 | 34.57                     | 6.42                   | 40.99                         | 46.0                         | -5.01                           |
| 980.36                 | H                       | Peak                                 | 41.08                     | 6.98                   | 48.06                         | 54.0                         | -5.94                           |

### **REMARKS:**

1. Measuring frequencies from 9 KHz to the 1GHz, No emission found between lowest internal used/generated frequency to 30 MHz.
2. Radiated emissions measured in frequency range from 9 KHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.
3. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).



## Above 1 GHz

**Operation Mode:** TX / IEEE 802.11b / CH Low

**Test Date:** September 9, 2010

**Temperature:** 23°C

**Tested by:** Jeff

**Humidity:** 51% RH

**Polarity:** Ver. / Hor.

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------|---------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                |         |
| 4825.00        | V               | 43.11                     | 30.25                   | 10.93                   | 54.04            | 41.18          | 74                        | 54                      | -12.82         | average |
| 7234.33        | V               | 42.85                     | 28.79                   | 18.51                   | 61.36            | 47.30          | 74                        | 54                      | -6.70          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
| 4825.00        | H               | 42.26                     | 29.88                   | 10.93                   | 53.19            | 40.81          | 74                        | 54                      | -13.19         | average |
| 7235.13        | H               | 41.57                     | 27.5                    | 18.51                   | 60.08            | 46.01          | 74                        | 54                      | -7.99          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |

### REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



# Compliance Certification Services Inc.

Reference No.: KS100831B02- RP

Report No : KS100831B02- RP

**Operation Mode:** TX / IEEE 802.11b / CH Mid

**Test Date:** September 9, 2010

**Temperature:** 23°C

**Tested by:** Jeff

**Humidity:** 51% RH

**Polarity:** Ver. / Hor.

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------|---------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                |         |
| 4874.66        | V               | 41.52                     | 30.02                   | 11.02                   | 52.54            | 41.04          | 74                        | 54                      | -12.96         | average |
| 7311.23        | V               | 40.85                     | 26.77                   | 18.58                   | 59.43            | 45.35          | 74                        | 54                      | -8.65          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
| 4875.23        | H               | 40.69                     | 29.89                   | 11.02                   | 51.71            | 40.91          | 74                        | 54                      | -13.09         | average |
| 7312.23        | H               | 40.11                     | 26.5                    | 18.58                   | 58.69            | 45.08          | 74                        | 54                      | -8.92          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |

## REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



# Compliance Certification Services Inc.

Reference No.: KS100831B02- RP

Report No.: KS100831B02- RP

**Operation Mode:** TX / IEEE 802.11b / CH High

**Test Date:** September 9, 2010

**Temperature:** 23°C

**Tested by:** Jeff

**Humidity:** 51 % RH

**Polarity:** Ver. / Hor.

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------|---------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                |         |
| 4925.32        | V               | 42.63                     | 30.15                   | 11.14                   | 53.77            | 41.29          | 74                        | 54                      | -12.71         | average |
| 7385.66        | V               | 41.28                     | 27.05                   | 18.64                   | 59.92            | 45.69          | 74                        | 54                      | -8.31          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
| 4925.00        | H               | 41.98                     | 30.06                   | 11.14                   | 53.12            | 41.2           | 74                        | 54                      | -12.8          | average |
| 7384.96        | H               | 40.89                     | 26.75                   | 18.64                   | 59.53            | 45.39          | 74                        | 54                      | -8.61          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |

**REMARKS:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



# Compliance Certification Services Inc.

Reference No.: KS100831B02- RP

Report No : KS100831B02- RP

**Operation Mode:** TX / IEEE 802.11g / CH Low

**Test Date:** September 9, 2010

**Temperature:** 23°C

**Tested by:** Jeff

**Humidity:** 51 % RH

**Polarity:** Ver. / Hor.

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------|---------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                |         |
| 4824.56        | V               | 42.35                     | 30.08                   | 10.93                   | 53.28            | 41.01          | 74                        | 54                      | -12.99         | average |
| 7233.64        | V               | 40.08                     | 27.11                   | 18.51                   | 58.59            | 45.62          | 74                        | 54                      | -8.38          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
| 4825.00        | H               | 41.89                     | 29.89                   | 10.93                   | 52.82            | 40.82          | 74                        | 54                      | -13.18         | average |
| 7232.69        | H               | 39.82                     | 26.18                   | 18.51                   | 58.33            | 44.69          | 74                        | 54                      | -9.31          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |

## REMARKS:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



# Compliance Certification Services Inc.

Reference No.: KS100831B02- RP

Report No.: KS100831B02- RP

**Operation Mode:** TX / IEEE 802.11g / CH Mid

**Test Date:** September 9, 2010

**Temperature:** 23°C

**Tested by:** Jeff

**Humidity:** 51 % RH

**Polarity:** Ver. / Hor.

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------|---------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                |         |
| 4875.00        | V               | 41.35                     | 30.06                   | 11.02                   | 52.37            | 41.08          | 74                        | 54                      | -12.92         | average |
| 7311.25        | V               | 39.77                     | 26.14                   | 18.58                   | 58.35            | 44.72          | 74                        | 54                      | -9.28          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
| 4874.69        | H               | 40.89                     | 29.98                   | 11.02                   | 51.91            | 41             | 74                        | 54                      | -13            | average |
| 7311.24        | H               | 39.52                     | 25.8                    | 18.58                   | 58.10            | 44.38          | 74                        | 54                      | -9.62          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |

**REMARKS:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



# Compliance Certification Services Inc.

Reference No.: KS100831B02- RP

Report No.: KS100831B02- RP

**Operation Mode:** TX / IEEE 802.11g / CH High

**Test Date:** September 9, 2010

**Temperature:** 23°C

**Tested by:** Jeff

**Humidity:** 51 % RH

**Polarity:** Ver. / Hor.

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Margin<br>(dB) | Remark  |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|----------------|---------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                |         |
| 4925.00        | V               | 42.03                     | 29.88                   | 11.14                   | 53.17            | 41.02          | 74                        | 54                      | -12.98         | average |
| 7385.65        | V               | 40.85                     | 25.75                   | 18.64                   | 59.49            | 44.39          | 74                        | 54                      | -9.61          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
| 4924.66        | H               | 41.86                     | 28.97                   | 11.14                   | 53.00            | 40.11          | 74                        | 54                      | -13.89         | average |
| 7384.68        | H               | 40.36                     | 25.41                   | 18.64                   | 59.00            | 44.05          | 74                        | 54                      | -9.95          | average |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |
|                |                 |                           |                         |                         |                  |                |                           |                         |                |         |

**REMARKS:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “ N/A ” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



## 7.3. 6dB BANDWIDTH MEASUREMENT

### 7.3.1. LIMITS

According to §15.247(a)(2), 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.

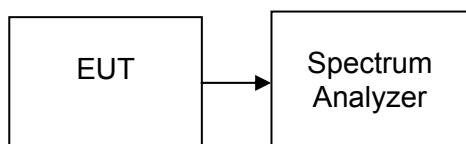
### 7.3.2. TEST INSTRUMENTS

| Conducted Emissions Test Site |              |        |               |                 |
|-------------------------------|--------------|--------|---------------|-----------------|
| Name of Equipment             | Manufacturer | Model  | Serial Number | Calibration Due |
| Spectrum Analyzer             | Agilent      | E4446A | MY44020154    | 11/16/2010      |

### 7.3.3. TEST PROCEDURES (please refer to measurement standard)

1. Place the EUT on the table and set it 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 = RBW, Span = 20MHz, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

### 7.3.4. TEST SETUP





## 7.3.5. TEST RESULTS

*No non-compliance noted*

### Test Data

#### Test mode: IEEE 802.11b

| Channel | Frequency (MHz) | Bandwidth (kHz) | Limit (kHz) | Test Result |
|---------|-----------------|-----------------|-------------|-------------|
| Low     | 2412            | 9955            | >500        | PASS        |
| Mid     | 2437            | 9977            |             | PASS        |
| High    | 2462            | 9520            |             | PASS        |

### Test Data

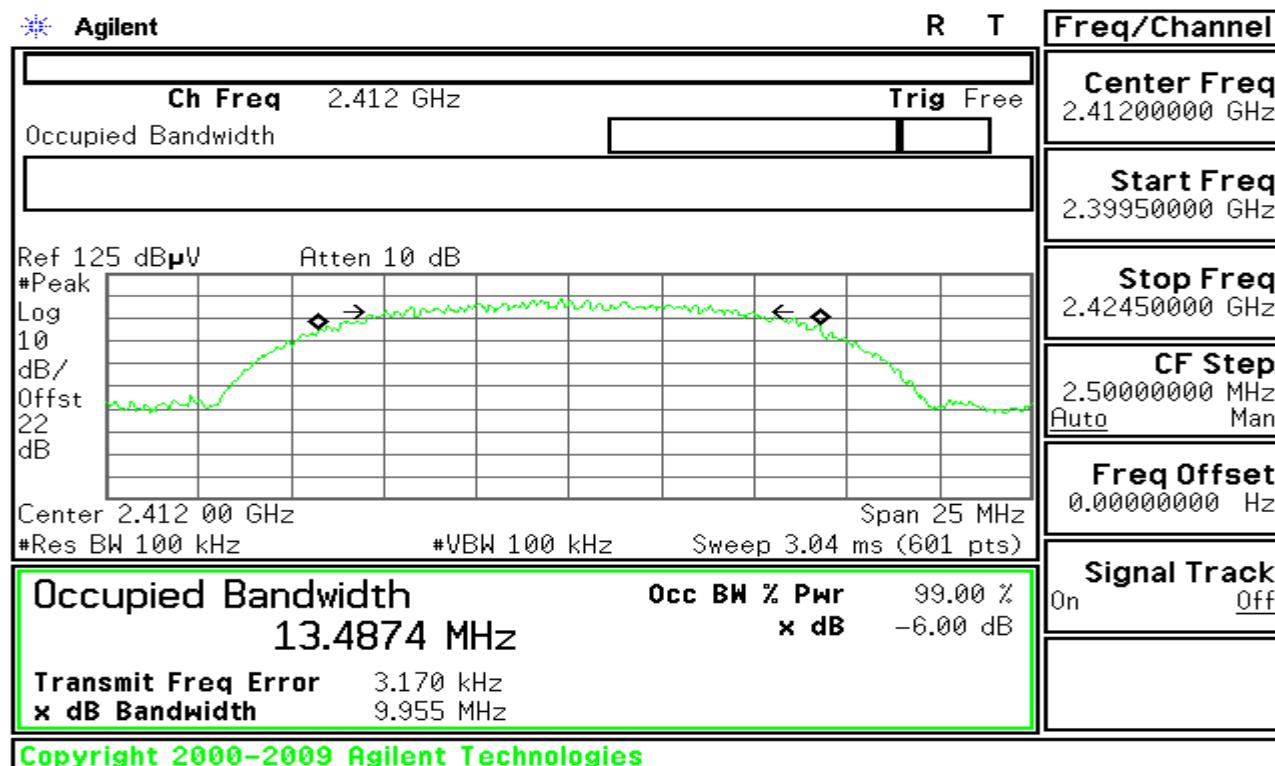
#### Test mode: IEEE 802.11g

| Channel | Frequency (MHz) | Bandwidth (kHz) | Limit (kHz) | Test Result |
|---------|-----------------|-----------------|-------------|-------------|
| Low     | 2412            | 16541           | >500        | PASS        |
| Mid     | 2437            | 16538           |             | PASS        |
| High    | 2462            | 16532           |             | PASS        |

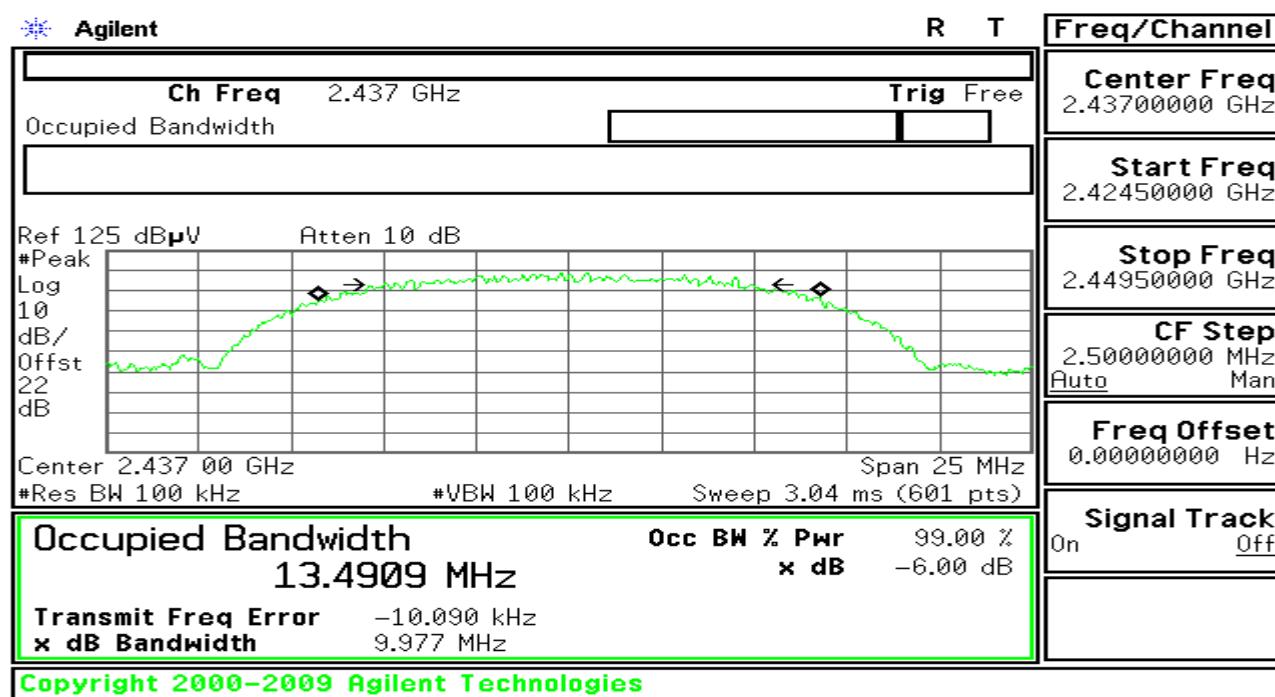


## Test Plot (IEEE 802.11b mode)

### 6dB Bandwidth (CH Low)

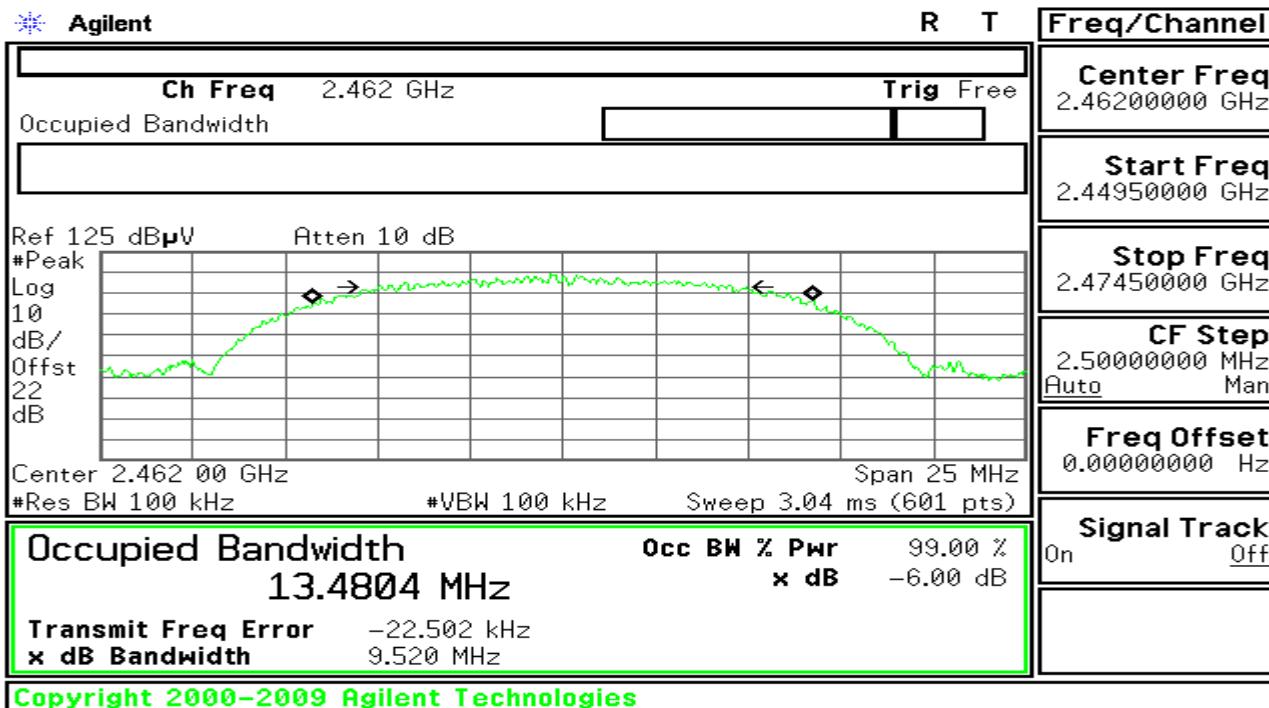


### 6dB Bandwidth (CH Mid)



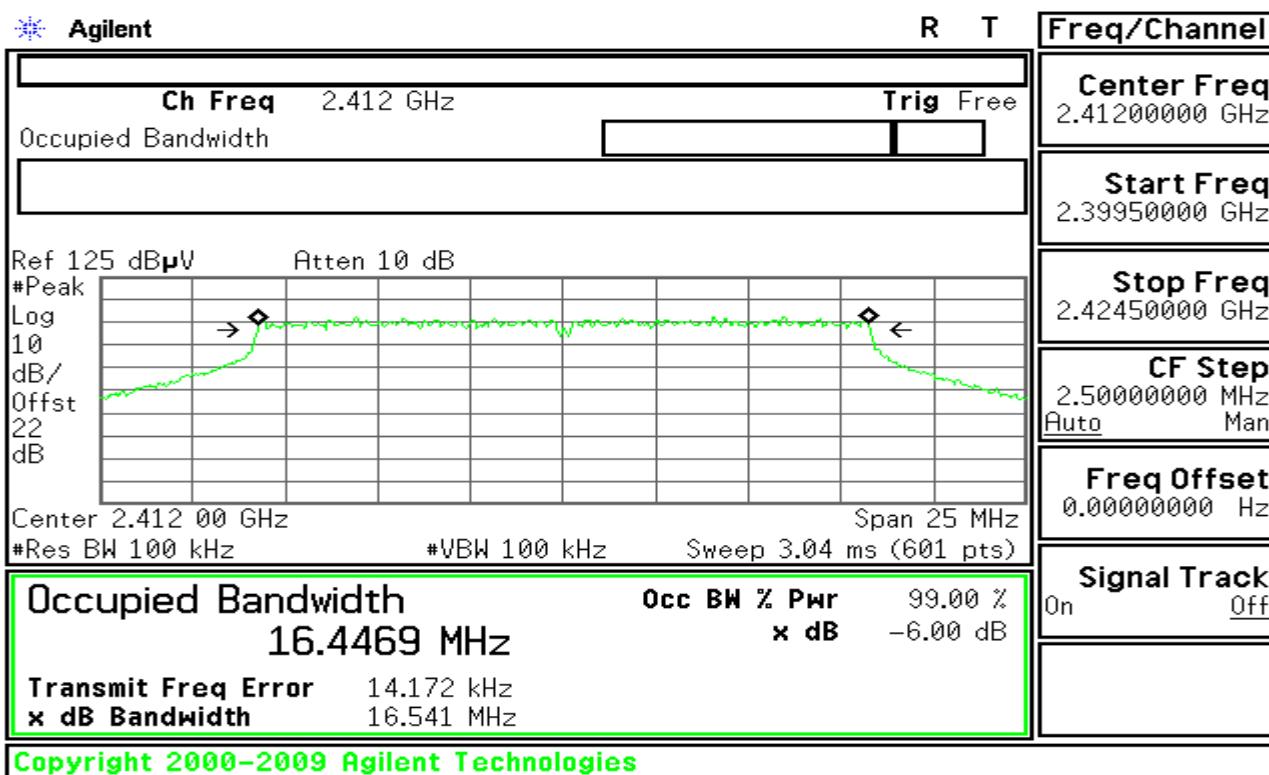


## 6dB Bandwidth (CH High)



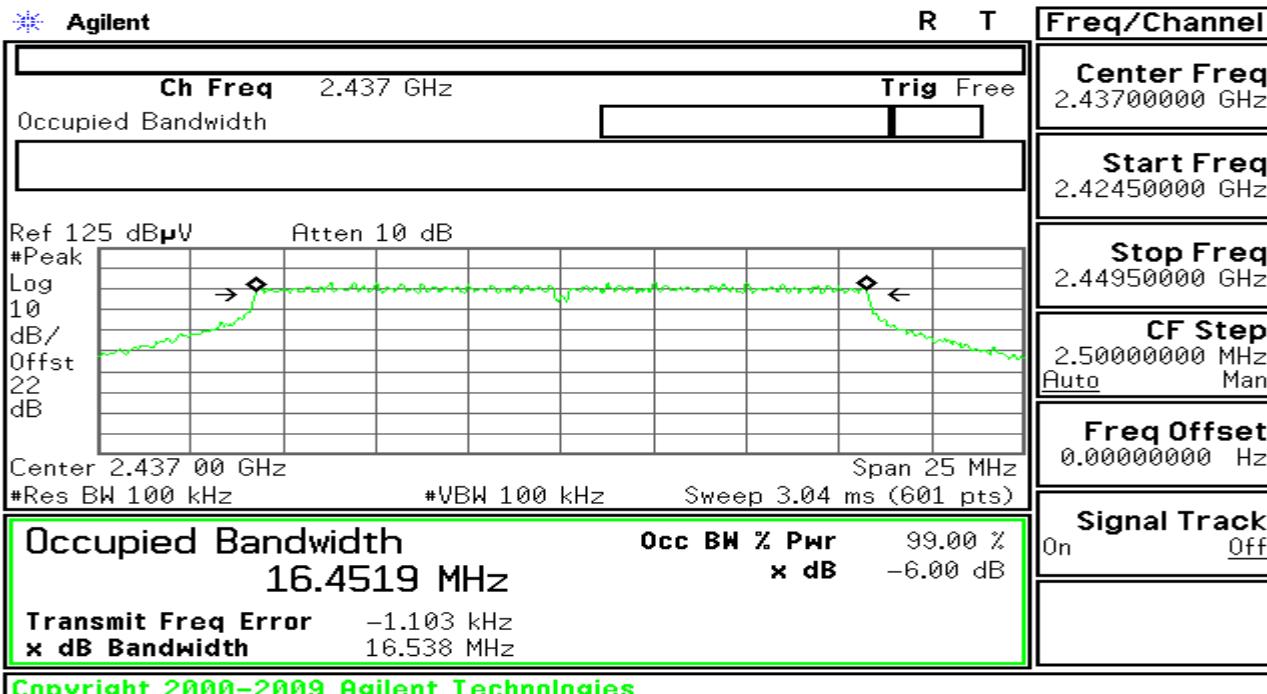
## Test Plot (IEEE 802.11g mode)

## 6dB Bandwidth (CH Low)

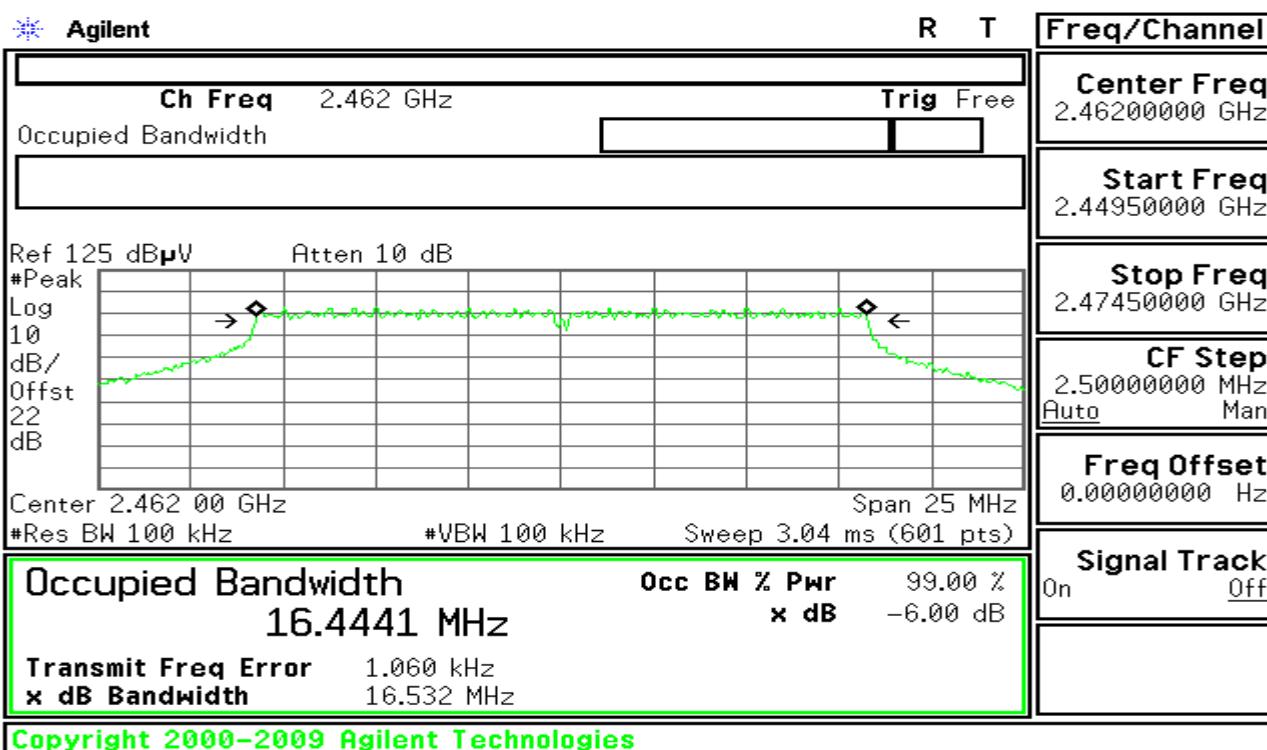




## 6dB Bandwidth (CH Mid)



## 6dB Bandwidth (CH High)





## 7.4. PEAK OUTPUT POWER

### 7.4.1. LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 7.4.2. TEST INSTRUMENTS

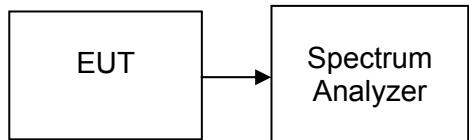
| Conducted Emissions Test Site |              |        |               |                 |
|-------------------------------|--------------|--------|---------------|-----------------|
| Name of Equipment             | Manufacturer | Model  | Serial Number | Calibration Due |
| Spectrum Analyzer             | Agilent      | E4446A | MY44020154    | 04/24/2011      |

### 7.4.3. TEST PROCEDURES (please refer to measurement standard)

- 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  $\text{high}\text{free run}\text{high}$ .
- 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.



## 7.4.4. TEST SETUP



## 7.4.5. TEST RESULTS

*No non-compliance noted*

### Test Data

**Test mode: IEEE 802.11b**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---------|-----------------|--------------------|------------------|-----------|--------|
| Low     | 2412            | 16.03              | 0.04009          | 1         | PASS   |
| Mid     | 2437            | 16.29              | 0.04256          |           | PASS   |
| High    | 2462            | 15.91              | 0.03899          |           | PASS   |

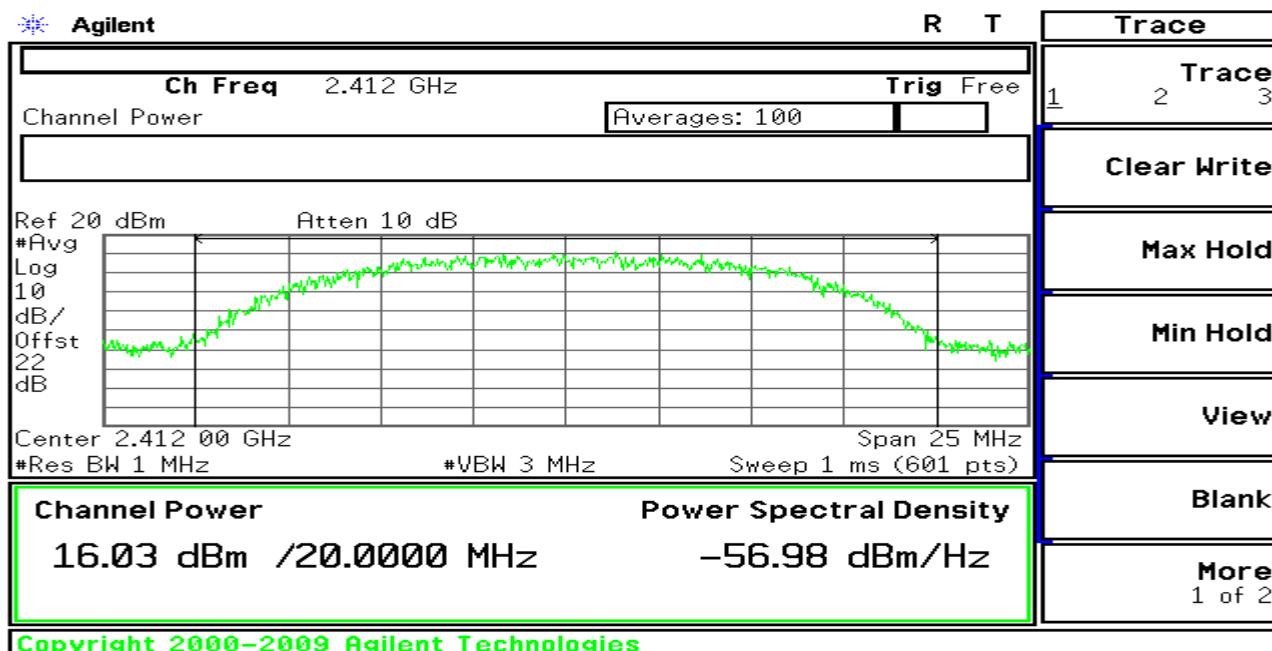
**Test mode: IEEE 802.11g**

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---------|-----------------|--------------------|------------------|-----------|--------|
| Low     | 2412            | 12.67              | 0.01849          | 1         | PASS   |
| Mid     | 2437            | 12.95              | 0.01972          |           | PASS   |
| High    | 2462            | 12.74              | 0.01879          |           | PASS   |

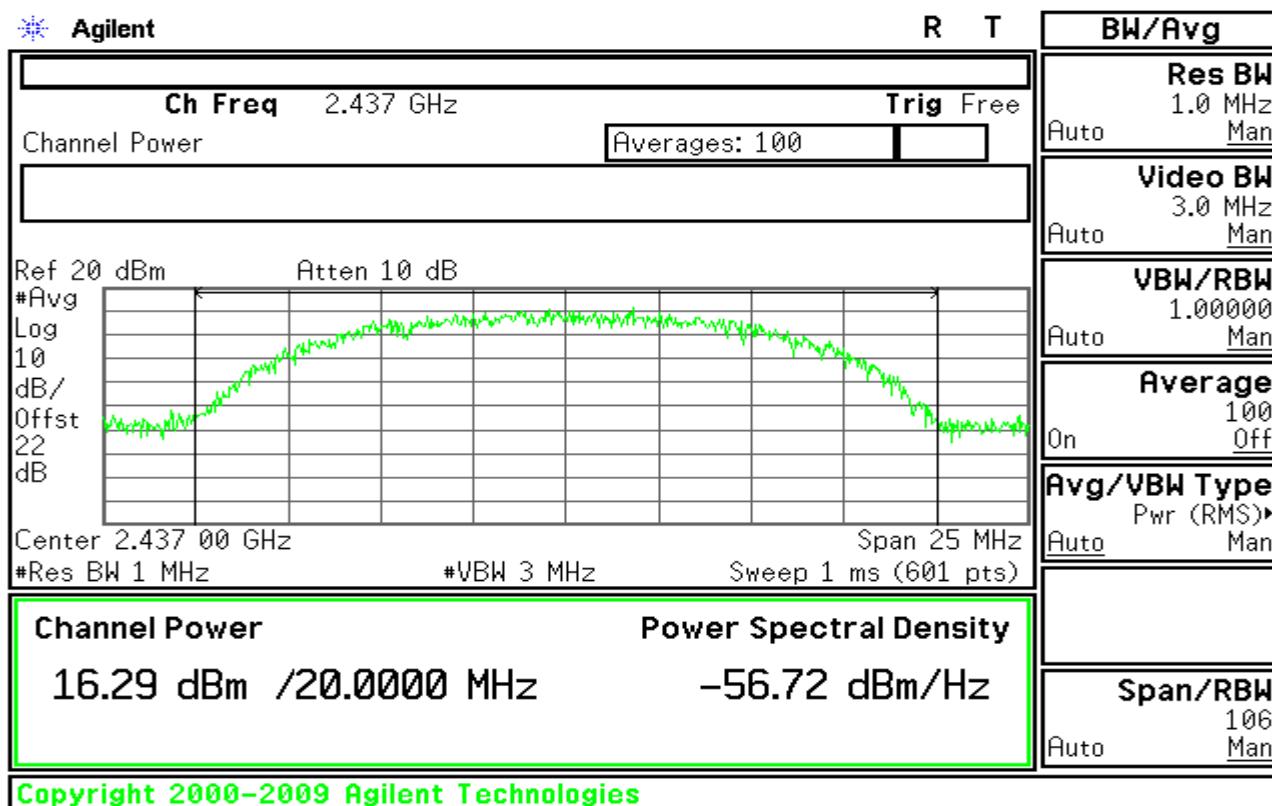


## Test Plot (IEEE 802.11b mode)

### Peak Power (CH Low)

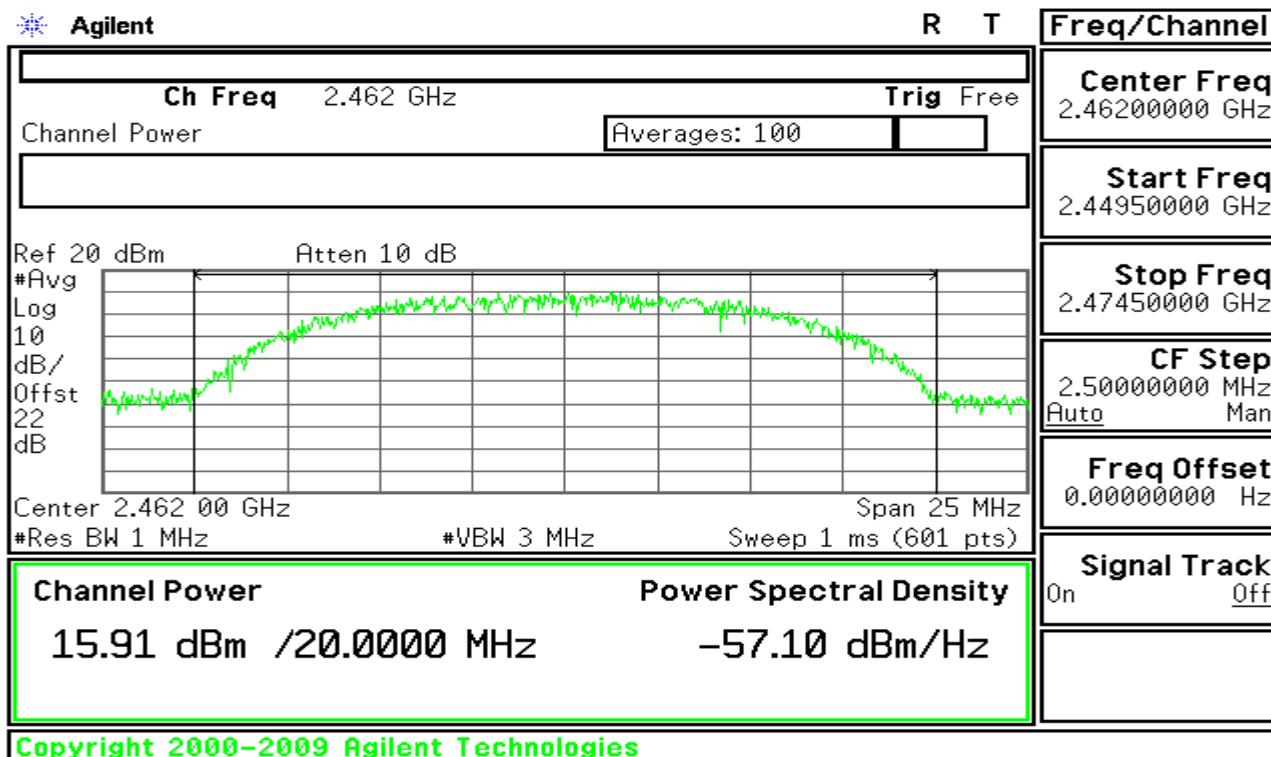


### Peak Power (CH Mid)



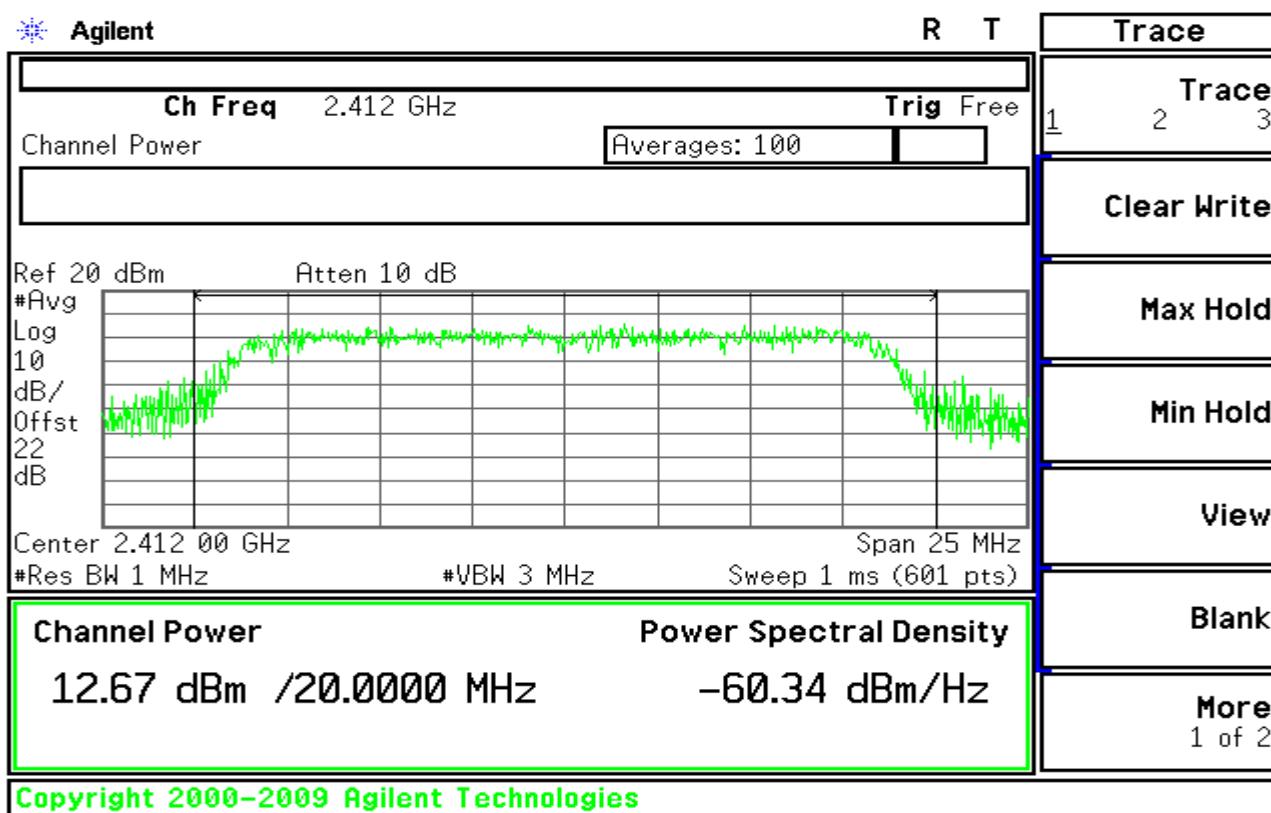


## Peak Power (CH High)



## Test Plot (IEEE 802.11g mode)

## Peak Power (CH Low)

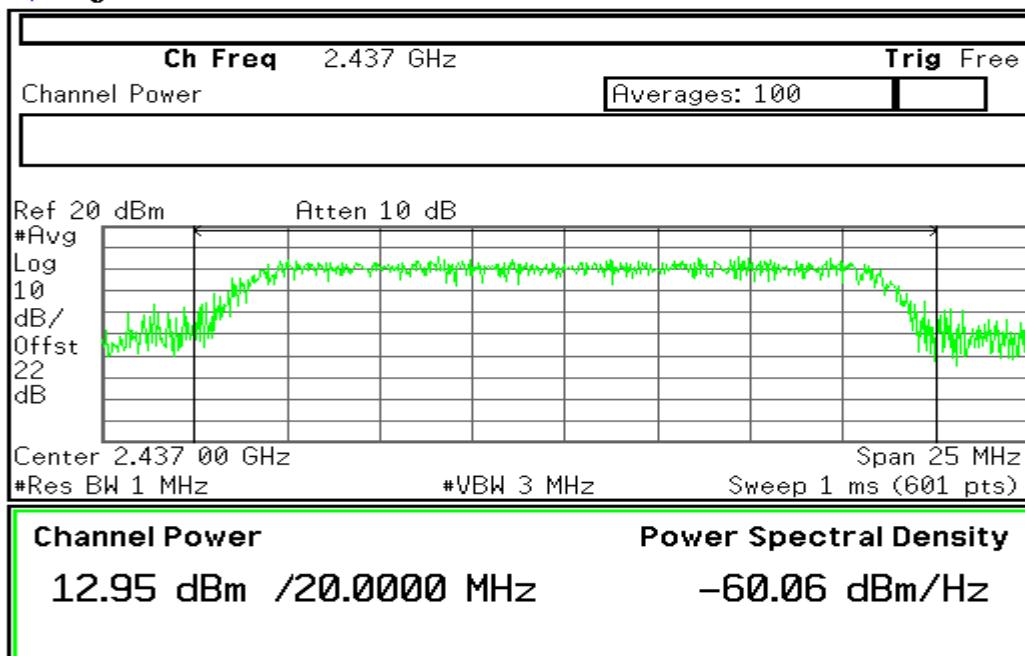




## Peak Power (CH Mid)

Agilent

R T



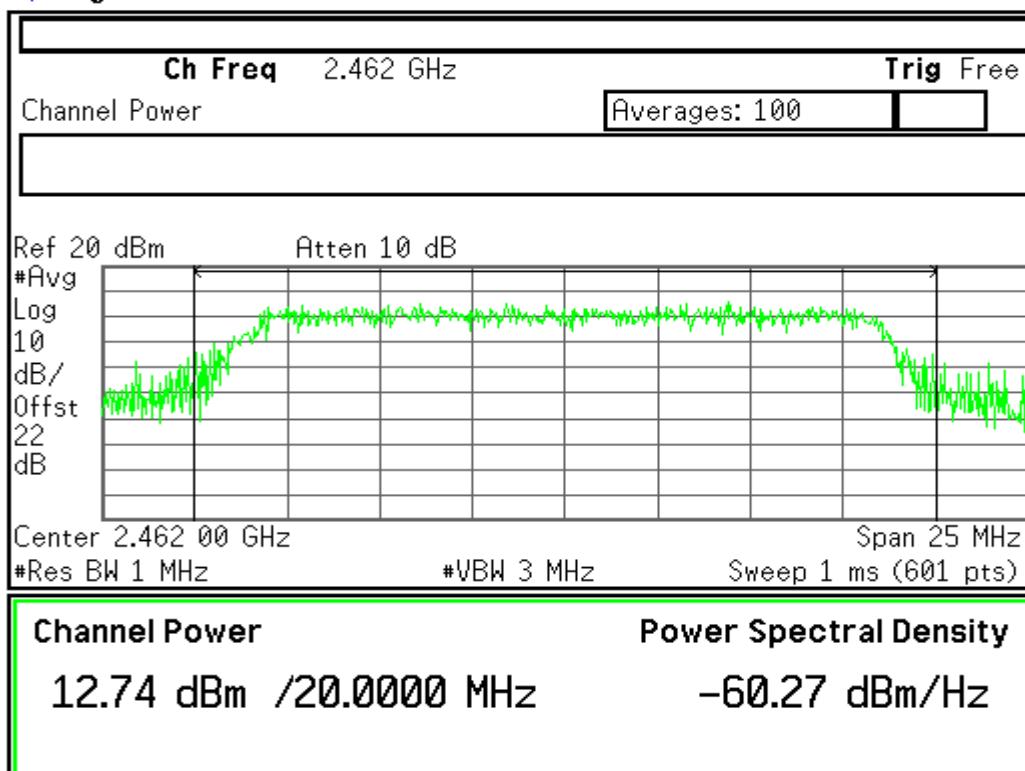
| BW/Avg       |           |
|--------------|-----------|
| Res BW       | 1.0 MHz   |
| Auto         | Man       |
| Video BW     | 3.0 MHz   |
| Auto         | Man       |
| VBW/RBW      | 1.00000   |
| Auto         | Man       |
| Average      | 100       |
| On           | Off       |
| Avg/VBW Type | Pwr (RMS) |
| Auto         | Man       |
| Span/RBW     | 106       |
| Auto         | Man       |

Copyright 2000-2009 Agilent Technologies

## Peak Power (CH High)

Agilent

R T



| Meas Setup    |               |
|---------------|---------------|
| Avg Number    | 100           |
| On            | Off           |
| Avg Mode      | Exp Repeat    |
| Integ BW      | 20.0000 MHz   |
| Chan Pwr Span | 25.000000 MHz |
| PSD Unit      | dBm/Hz        |
| Optimize      | Ref Level     |
| More          | 1 of 2        |

Copyright 2000-2009 Agilent Technologies



## 7.5. BAND EDGES MEASUREMENT:

### 7.5.1. LIMITS

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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 Section 15.205(c)).

#### 7.5.1.1. TEST INSTRUMENTS

| 3M Semi Anechoic Chamber (977) |              |             |               |                 |
|--------------------------------|--------------|-------------|---------------|-----------------|
| Name of Equipment              | Manufacturer | Model       | Serial Number | Calibration Due |
| Spectrum Analyzer              | Agilent      | E4446A      | MY44020154    | 04/24/2011      |
| Spectrum Analyzer              | Agilent      | E4446A      | US44300398    | 04/24/2011      |
| EMI Test Receiver              | R&S          | ESPI3       | 101026        | 04/24/2011      |
| Pre-Amplifier                  | MINI         | ZFL-1000VH2 | d041703       | 02/28/2011      |
| Pre-Amplifier                  | Miteq        | NSP4000-NF  | 870731        | 02/28/2011      |
| Bilog Antenna                  | Sunol        | JB1         | A110204-2     | 11/22/2010      |
| Horn-antenna                   | SCHWARZBECK  | BBHA9120D   | D:266         | 12/04/2010      |
| PSG Analog Signal Generator    | Agilent      | E8257C      | MY43321570    | 04/24/2011      |
| Turn Table                     | CT           | CT123       | 4165          | N.C.R           |
| Antenna Tower                  | CT           | CTERG23     | 3256          | N.C.R           |
| Controller                     | CT           | CT1OO       | 95637         | N.C.R           |
| Site NSA                       | CCS          | N/A         | N/A           | 04/06/2011      |

**NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The FCC Site Registration number is 93105,90471.

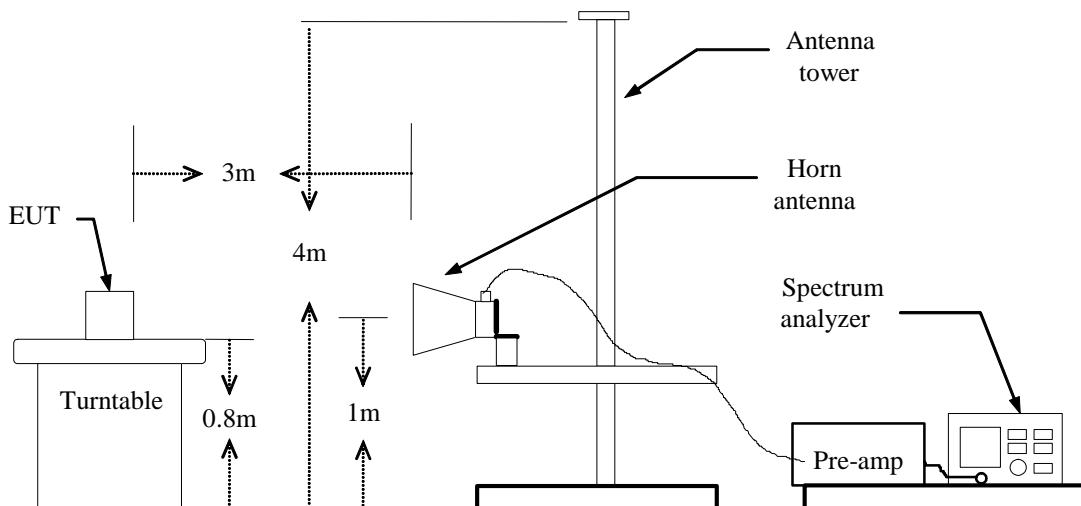
4. N.C.R = No Calibration Required.



## 7.5.2. TEST PROCEDURES (please refer to measurement standard)

1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are

## 7.5.3. TEST SETUP





## Test Data

### Test Plot (IEEE 802.11b mode)

| Freq.<br>(MHz) | Ant. Pol<br>H/V | Peak<br>Reading<br>(dBuV) | AV<br>Reading<br>(dBuV) | Ant. / CL<br>CF<br>(dB) | Actual Fs        |                | Peak<br>Limit<br>(dBuV/m) | AV<br>Limit<br>(dBuV/m) | Peak<br>Margin<br>(dB) | AV<br>Margin<br>(dB) |
|----------------|-----------------|---------------------------|-------------------------|-------------------------|------------------|----------------|---------------------------|-------------------------|------------------------|----------------------|
|                |                 |                           |                         |                         | Peak<br>(dBuV/m) | AV<br>(dBuV/m) |                           |                         |                        |                      |
| 2400.00        | V               | 51.83                     | 38.89                   | 4.80                    | 56.63            | 43.69          | 74                        | 54                      | -17.37                 | -10.31               |
| 2483.50        | V               | 48.79                     | 37.29                   | 4.80                    | 53.59            | 42.09          | 74                        | 54                      | -20.41                 | -11.91               |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
| 2400.00        | H               | 49.50                     | 38.77                   | 4.80                    | 54.30            | 43.57          | 74                        | 54                      | -19.70                 | -10.43               |
| 2483.50        | H               | 47.63                     | 35.89                   | 4.80                    | 52.43            | 40.69          | 74                        | 54                      | -21.57                 | -13.31               |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |
|                |                 |                           |                         |                         |                  |                |                           |                         |                        |                      |



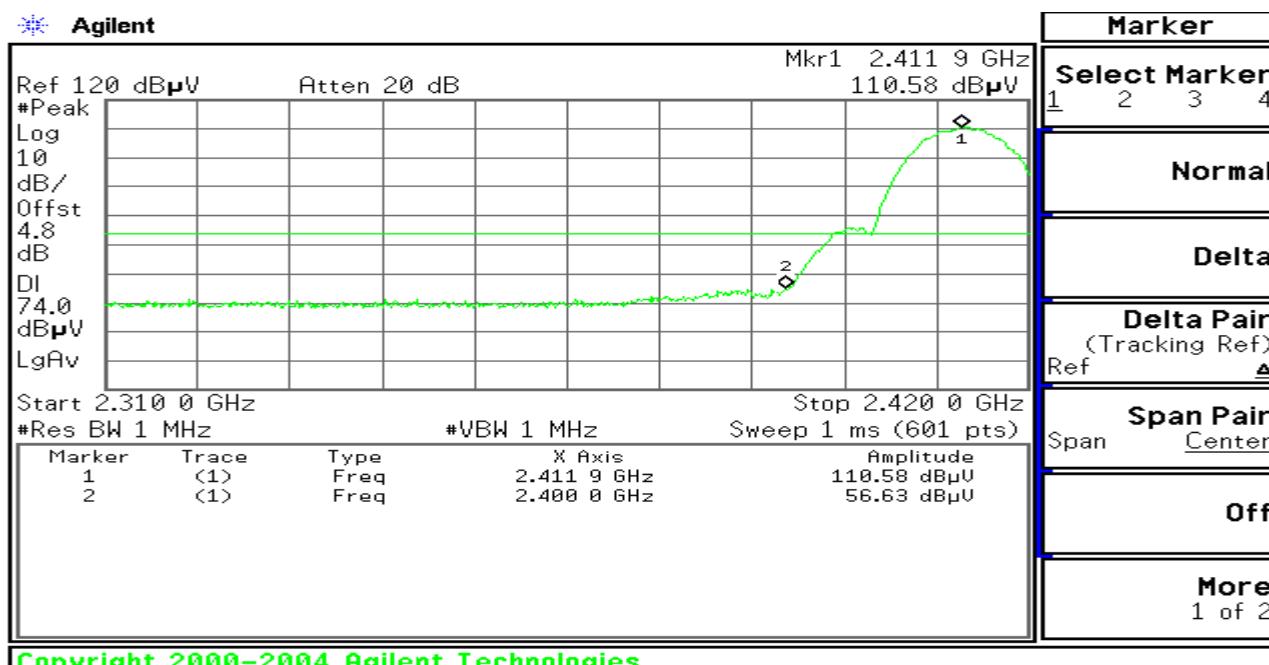
## 7.5.4. TEST RESULTS

### Test Plot (IEEE 802.11b mode)

#### Band Edges (CH Low)

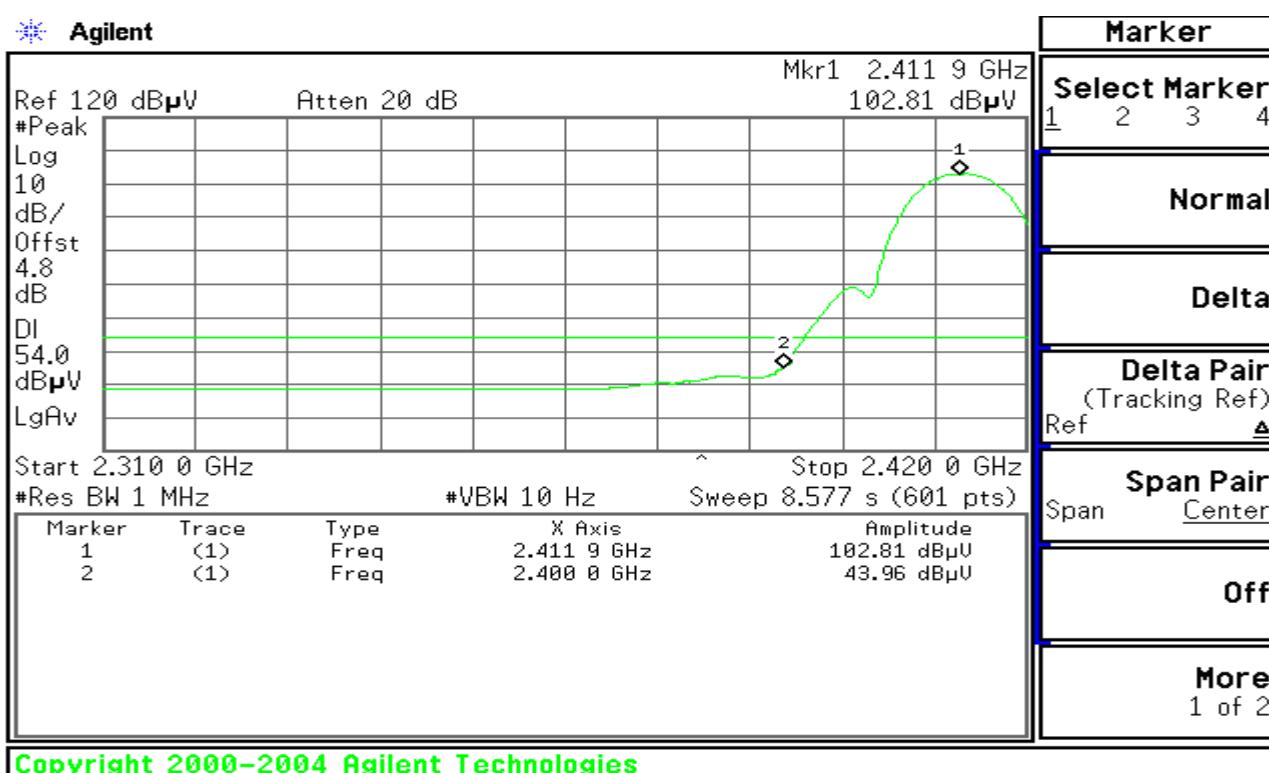
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

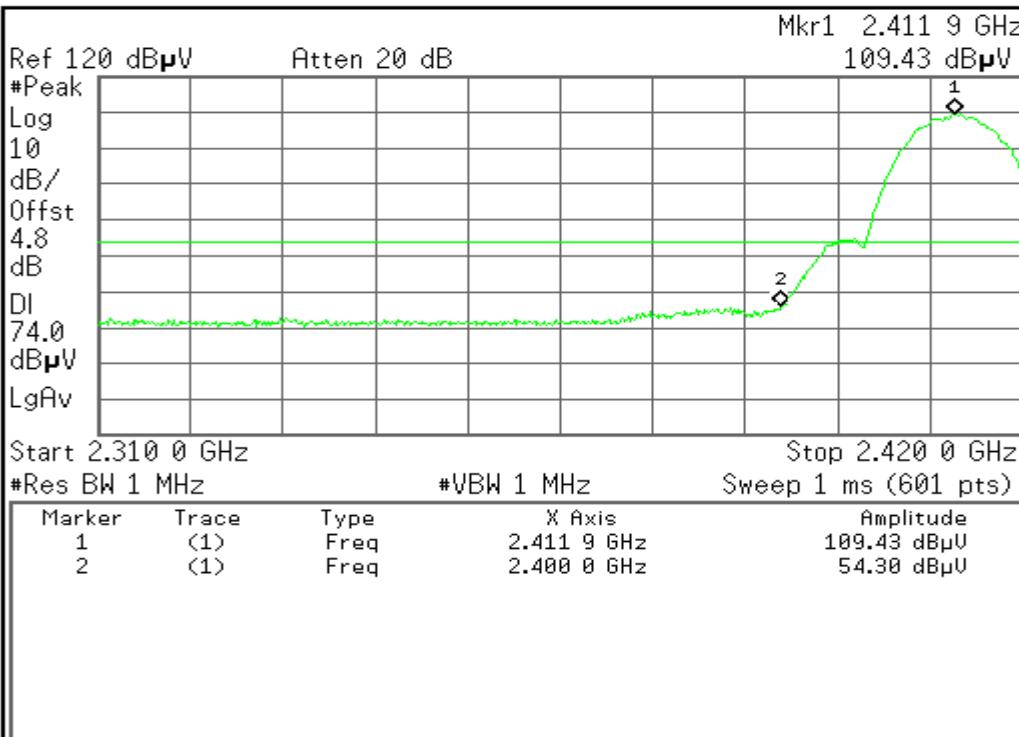




Detector mode: Peak

Polarity: Horizontal

Agilent



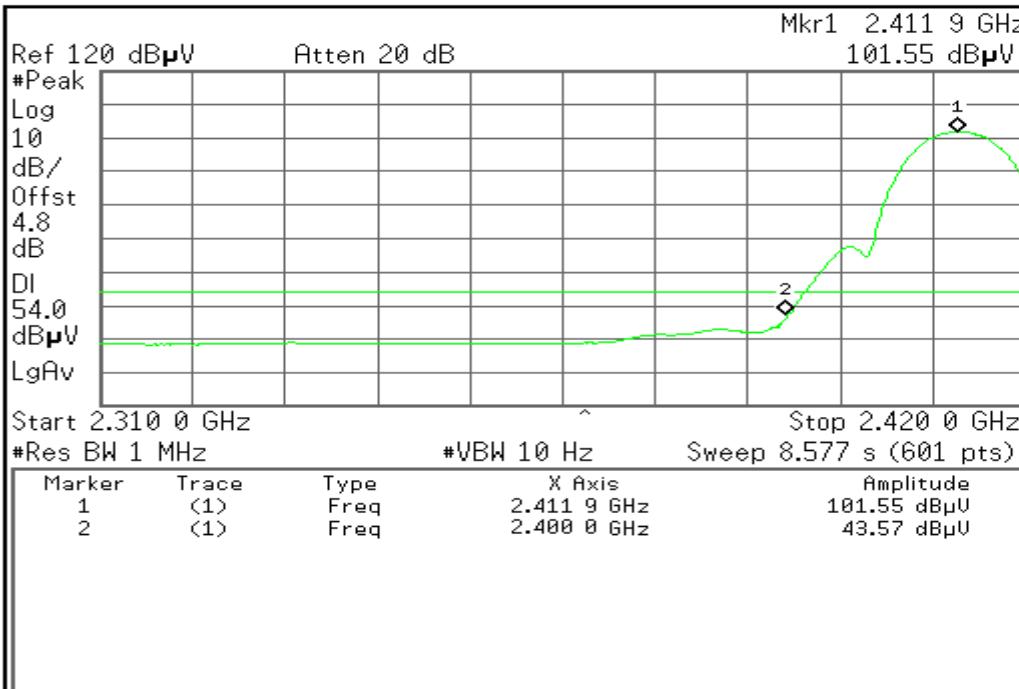
| Marker                        |   |   |   |
|-------------------------------|---|---|---|
| Select Marker                 |   |   |   |
| 1                             | 2 | 3 | 4 |
| Normal                        |   |   |   |
| Delta                         |   |   |   |
| Delta Pair (Tracking Ref) Ref |   |   |   |
| Span Pair Span                |   |   |   |
| Center                        |   |   |   |
| Off                           |   |   |   |
| More 1 of 2                   |   |   |   |

Copyright 2000-2004 Agilent Technologies

Detector mode: Average

Polarity: Horizontal

Agilent



| Marker                        |   |   |   |
|-------------------------------|---|---|---|
| Select Marker                 |   |   |   |
| 1                             | 2 | 3 | 4 |
| Normal                        |   |   |   |
| Delta                         |   |   |   |
| Delta Pair (Tracking Ref) Ref |   |   |   |
| Span Pair Span                |   |   |   |
| Center                        |   |   |   |
| Off                           |   |   |   |
| More 1 of 2                   |   |   |   |

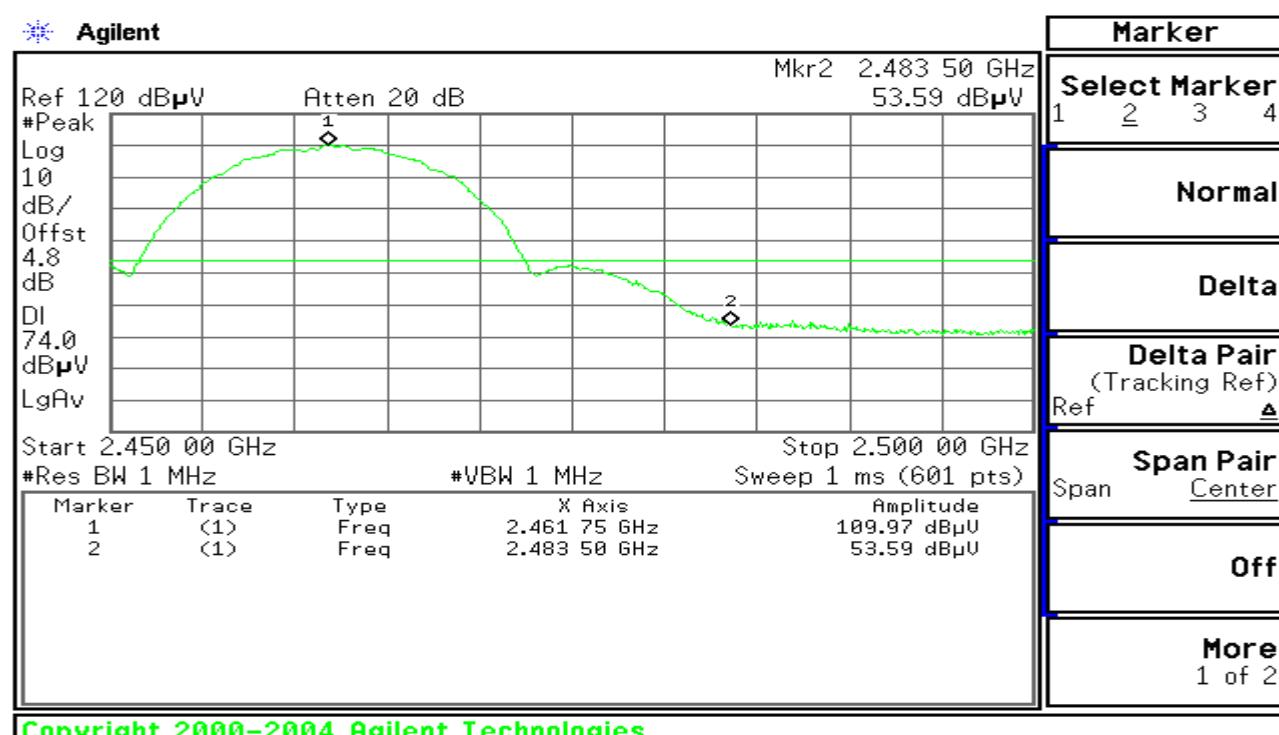
Copyright 2000-2004 Agilent Technologies



## Band Edges (CH High)

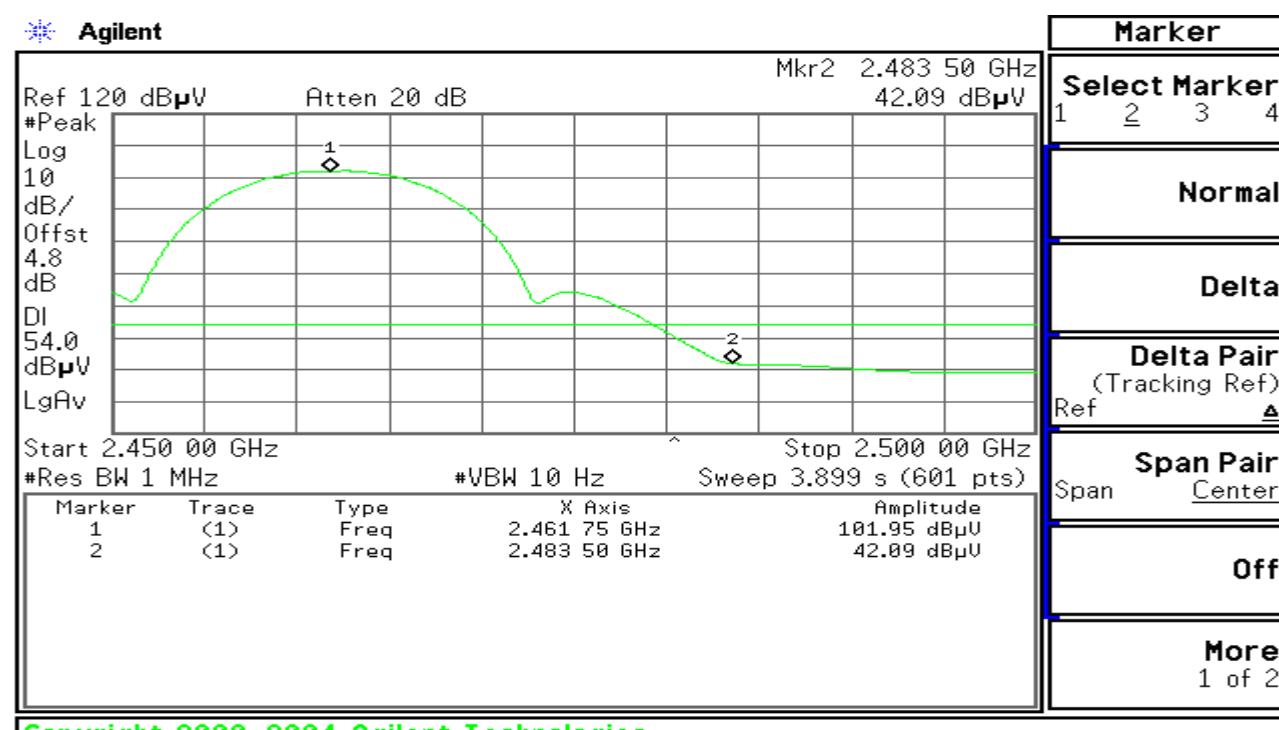
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

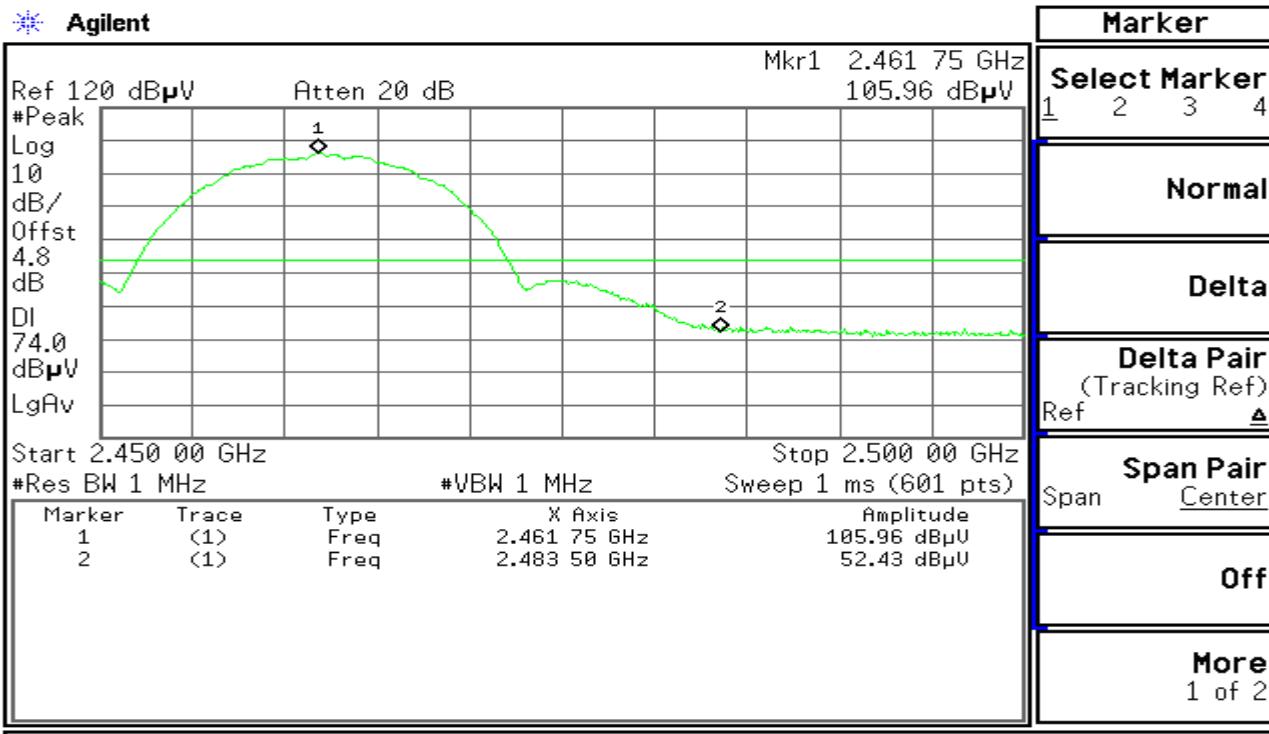
Polarity: Vertical





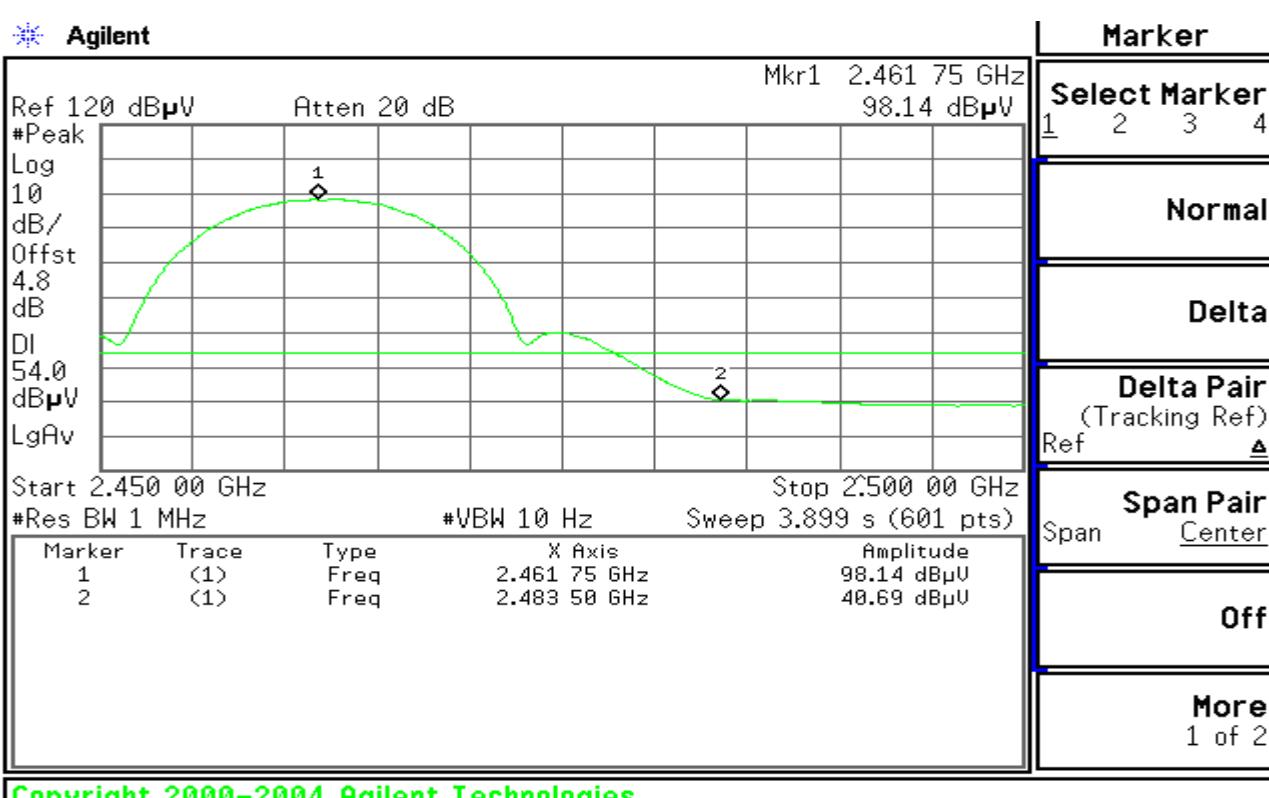
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal





## Test Data

## Test Plot (IEEE 802.11g mode)

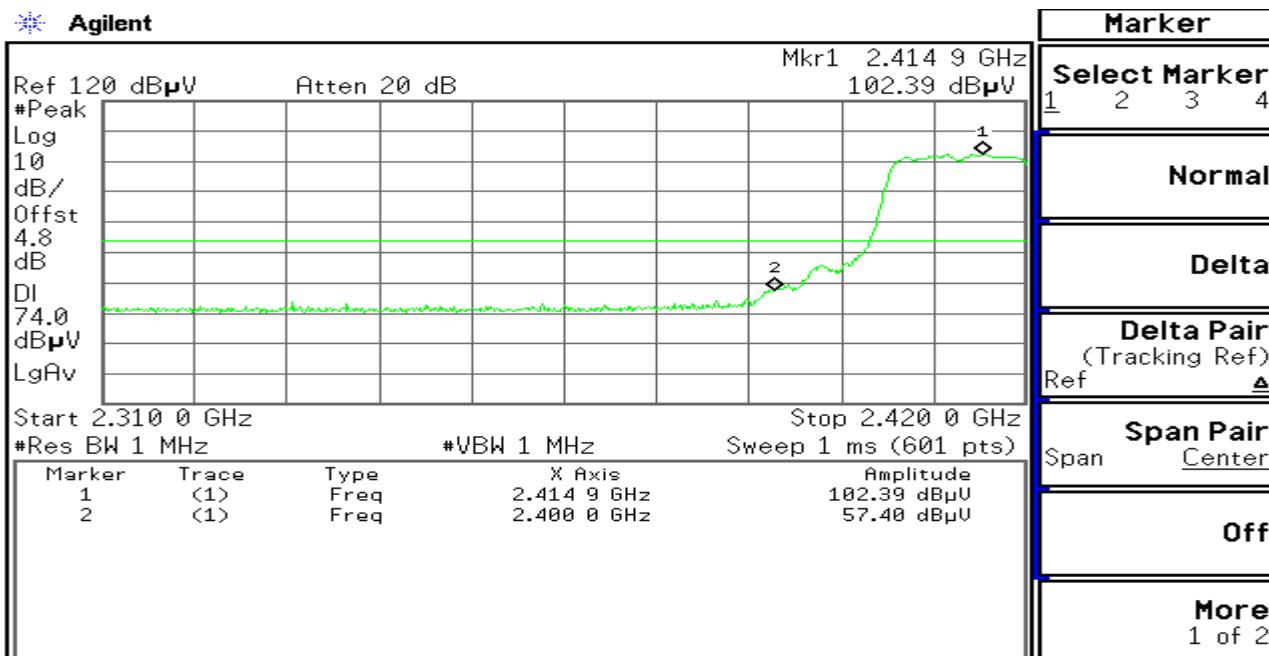


## Test Plot (IEEE 802.11g mode)

### Band Edges (CH Low)

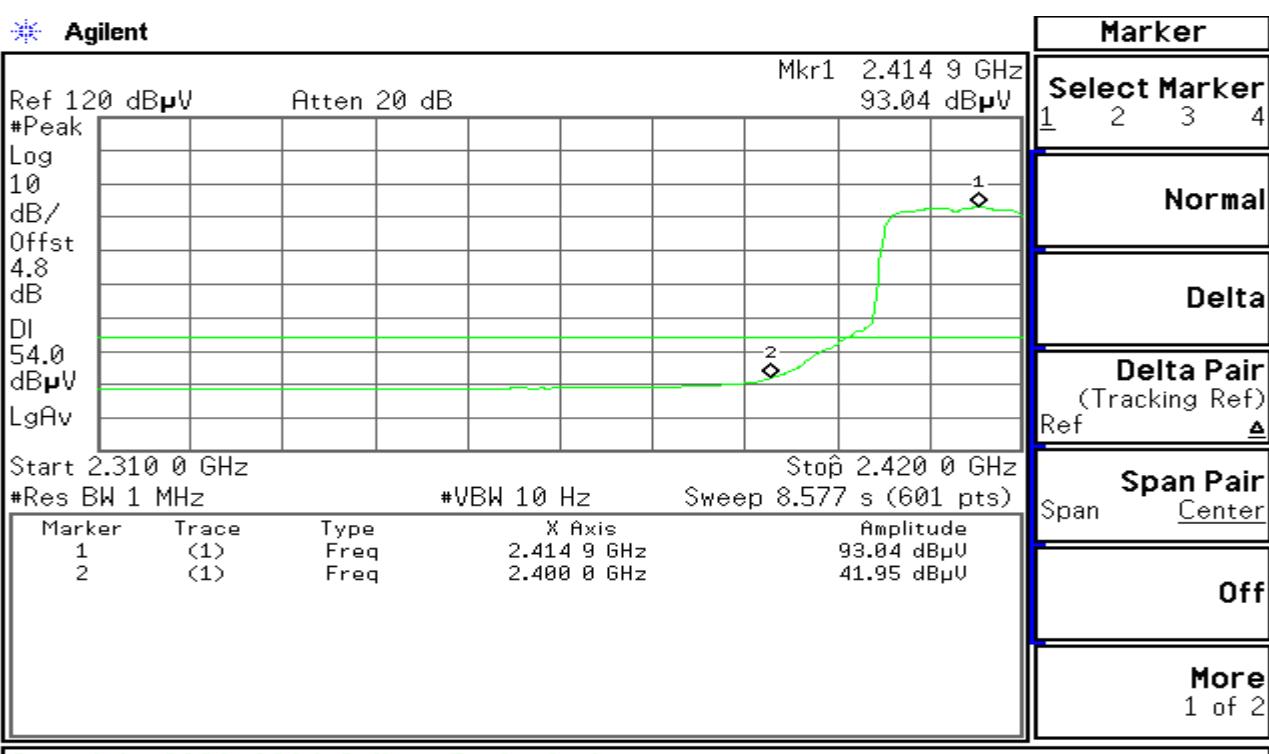
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

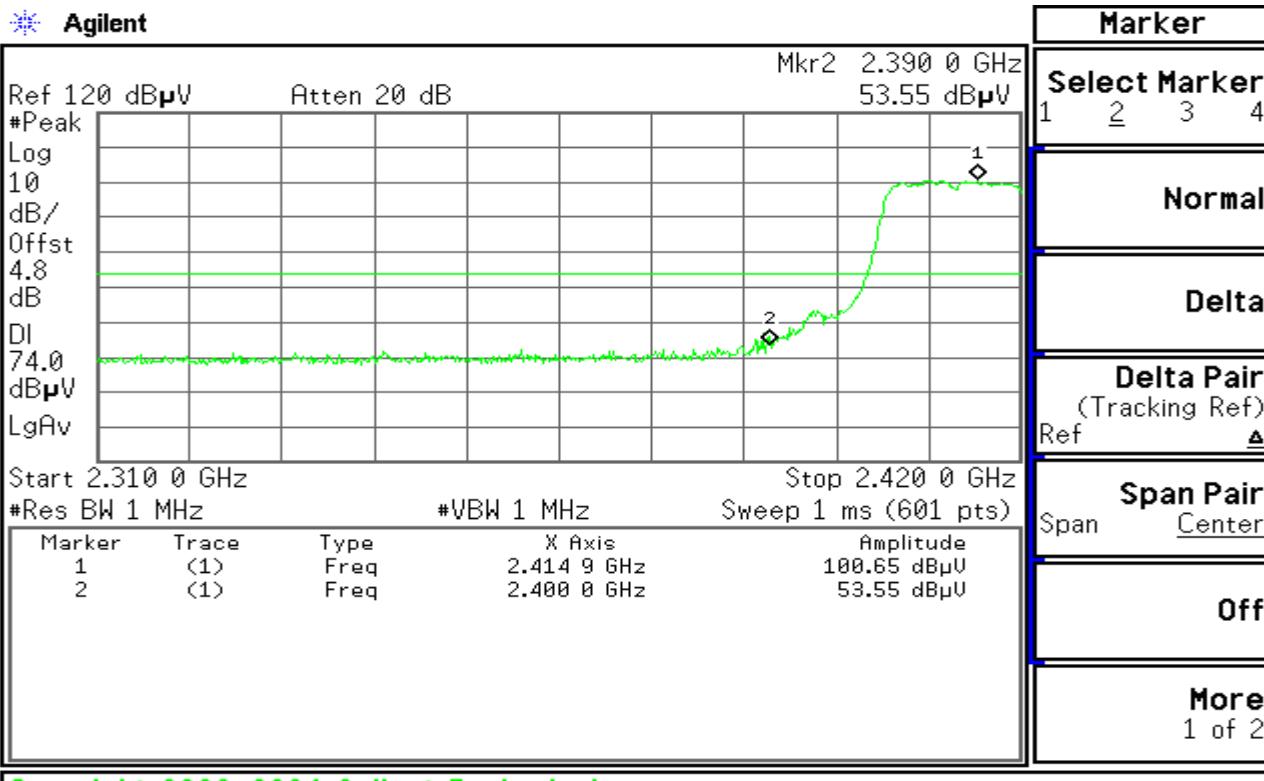
Polarity: Vertical





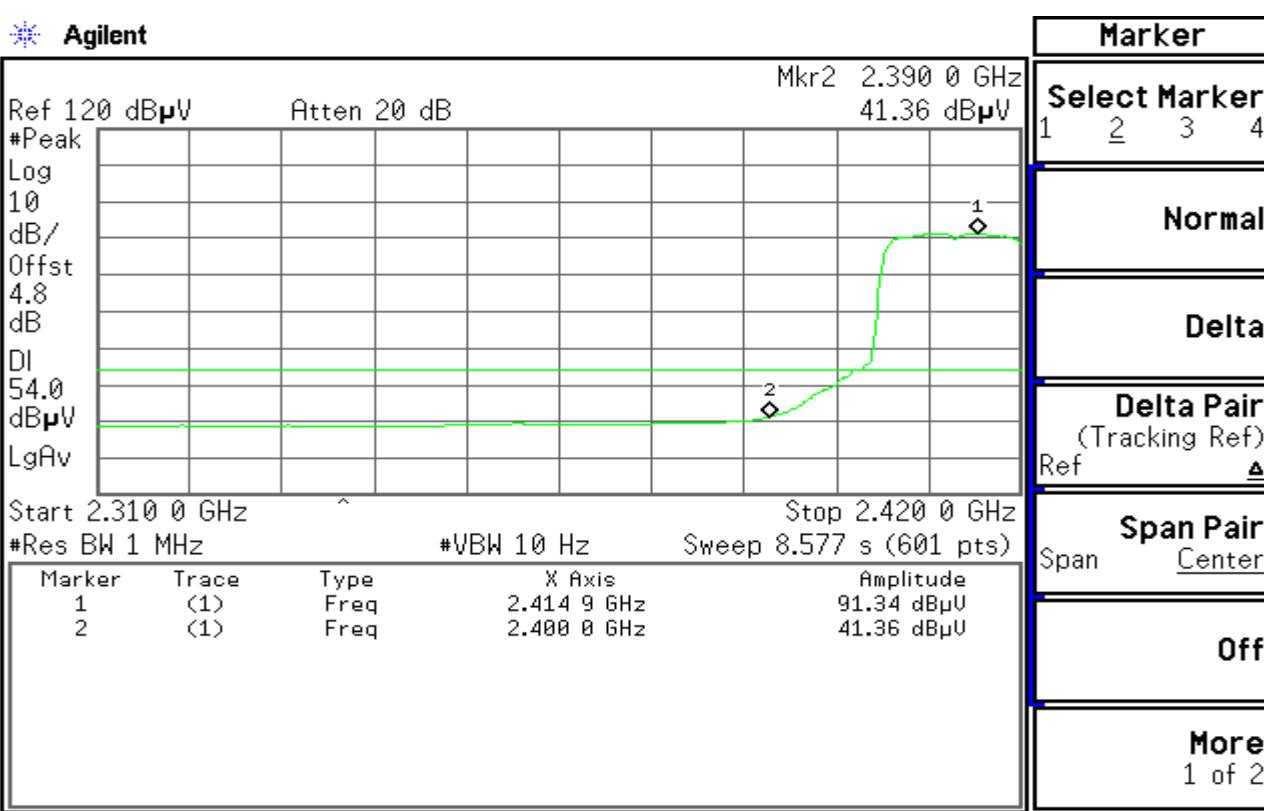
Detector mode: Peak

Polarity: Horizontal



Detector mode: Average

Polarity: Horizontal

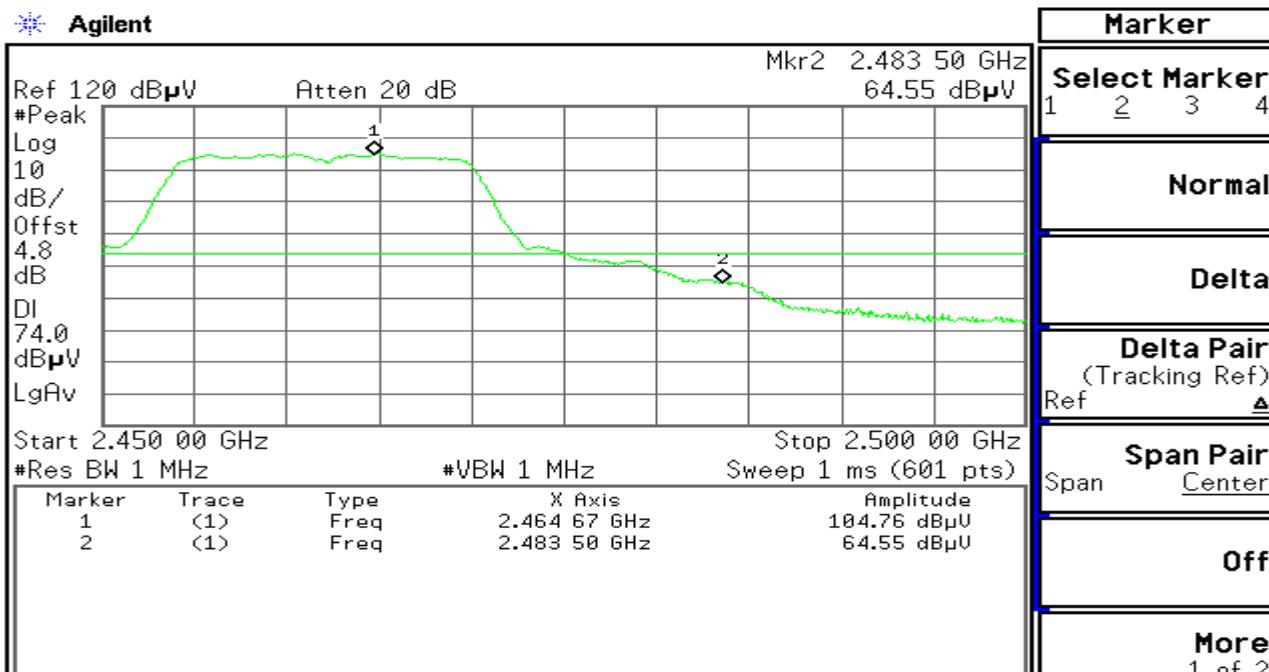




## Band Edges (CH High)

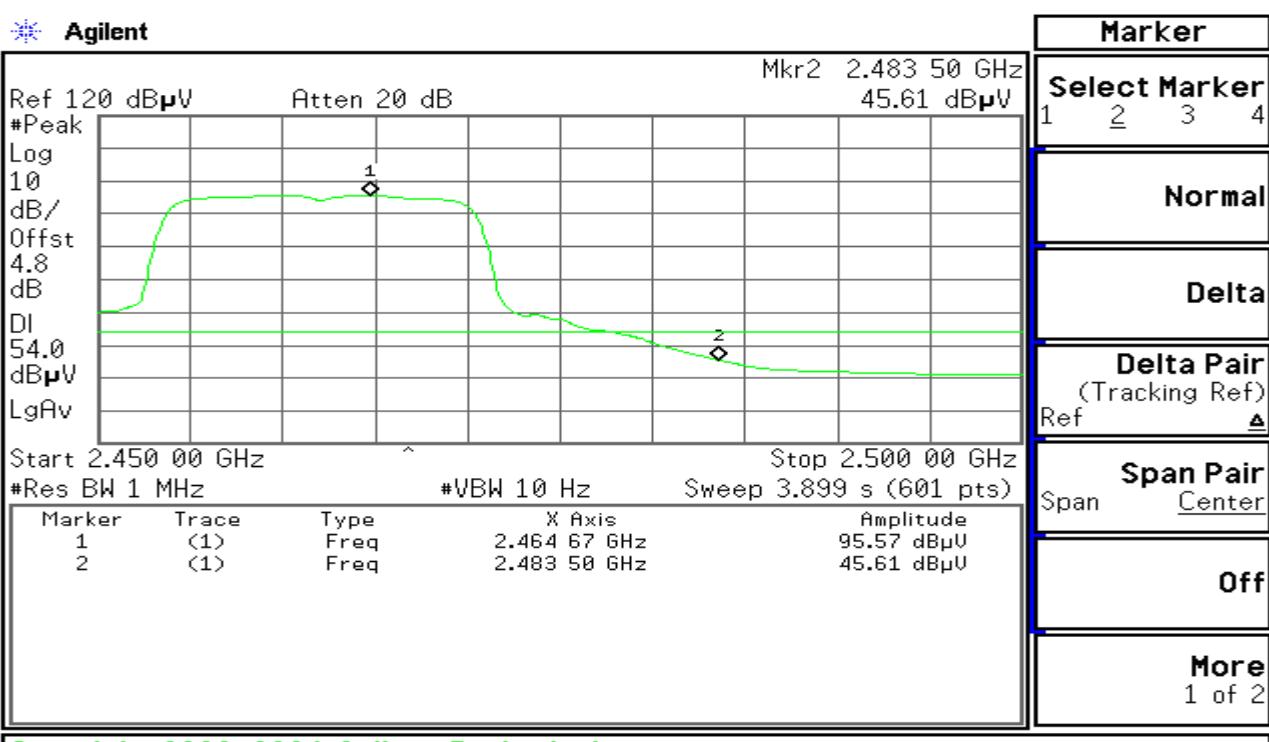
Detector mode: Peak

Polarity: Vertical



Detector mode: Average

Polarity: Vertical

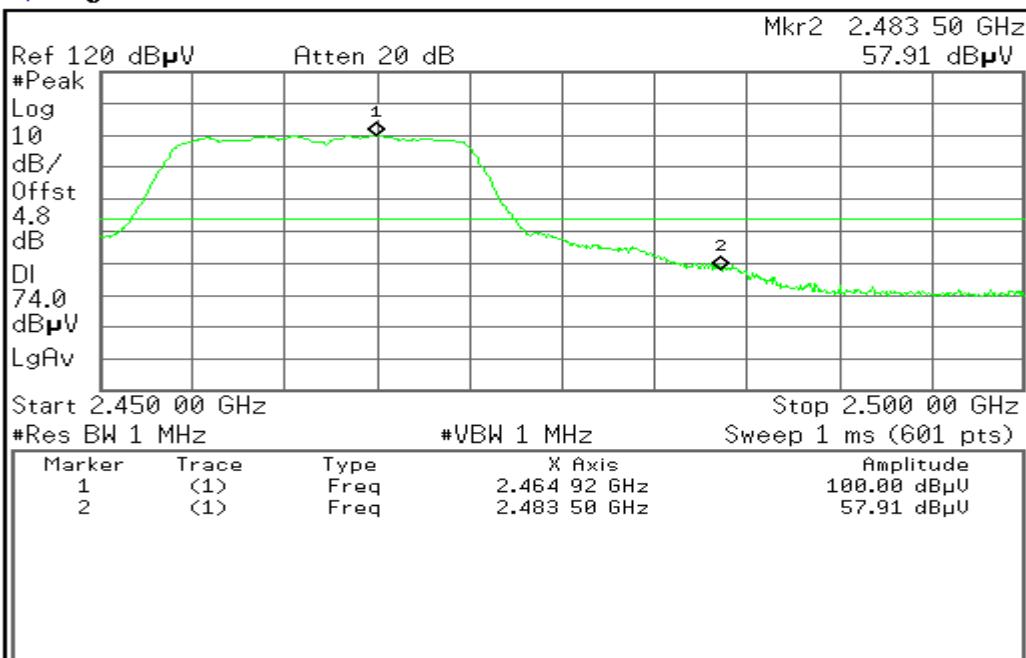




Detector mode: Peak

Polarity: Horizontal

Agilent



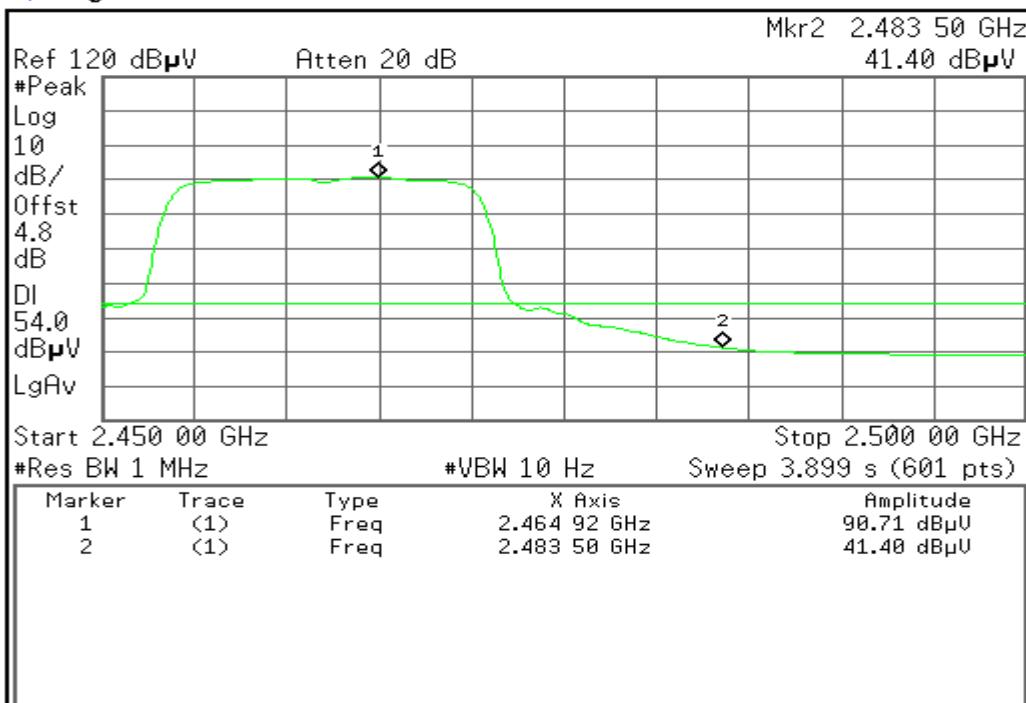
Marker  
Select Marker  
1 2 3 4  
Normal  
Delta  
Delta Pair (Tracking Ref)  
Ref ▲  
Span Pair  
Span Center  
Off  
More  
1 of 2

Copyright 2000-2004 Agilent Technologies

Detector mode: Average

Polarity: Horizontal

Agilent



Marker  
Select Marker  
1 2 3 4  
Normal  
Delta  
Delta Pair (Tracking Ref)  
Ref ▲  
Span Pair  
Span Center  
Off  
More  
1 of 2

Copyright 2000-2004 Agilent Technologies



## 7.6. PEAK POWER SPECTRAL DENSITY MEASUREMENT

### 7.6.1. LIMITS

1. According to §15.247(e), 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.
2. According to §15.247(f), the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

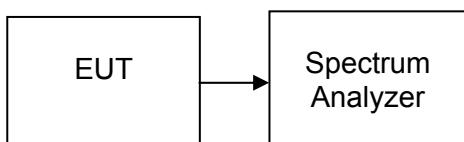
### 7.6.2. TEST INSTRUMENTS

| Conducted Emissions Test Site |              |        |               |                 |
|-------------------------------|--------------|--------|---------------|-----------------|
| Name of Equipment             | Manufacturer | Model  | Serial Number | Calibration Due |
| Spectrum Analyzer             | Agilent      | E4446A | MY44020154    | 04/24/2011      |

### 7.6.3. TEST PROCEDURES (please refer to measurement standard)

1. Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW = 3kHz, VBW = 10kHz, Span = 300kHz, Sweep=100s
3. Record the max. reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

### 7.6.4. TEST SETUP





## 7.6.5. TEST RESULTS

*No non-compliance noted*

### Test Data

#### Test mode: IEEE 802.11b

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Test Result |
|---------|-----------------|------------|-------------|-------------|
| Low     | 2412            | -7.92      | 8.00        | PASS        |
| Mid     | 2437            | -7.93      |             | PASS        |
| High    | 2462            | -7.64      |             | PASS        |

### Test Data

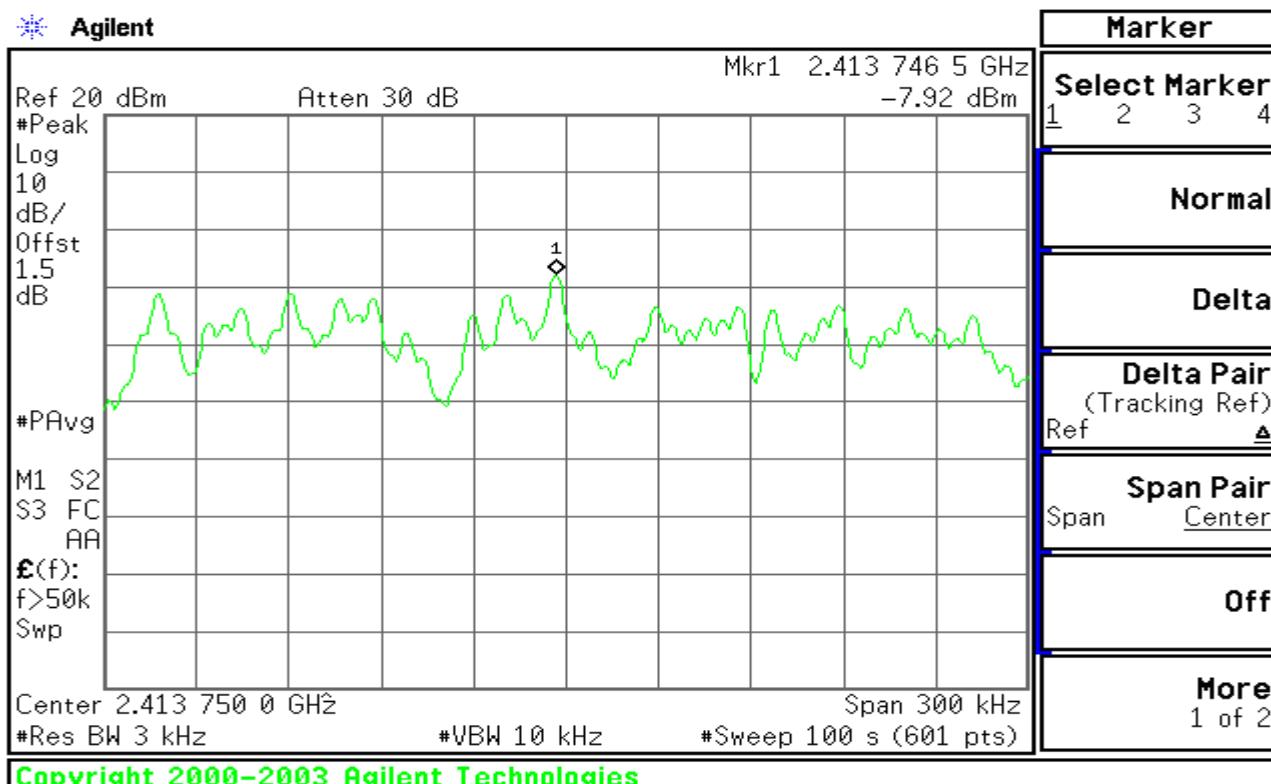
#### Test mode: IEEE 802.11g

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Test Result |
|---------|-----------------|------------|-------------|-------------|
| Low     | 2412            | -14.34     | 8.00        | PASS        |
| Mid     | 2437            | -14.57     |             | PASS        |
| High    | 2462            | -14.27     |             | PASS        |



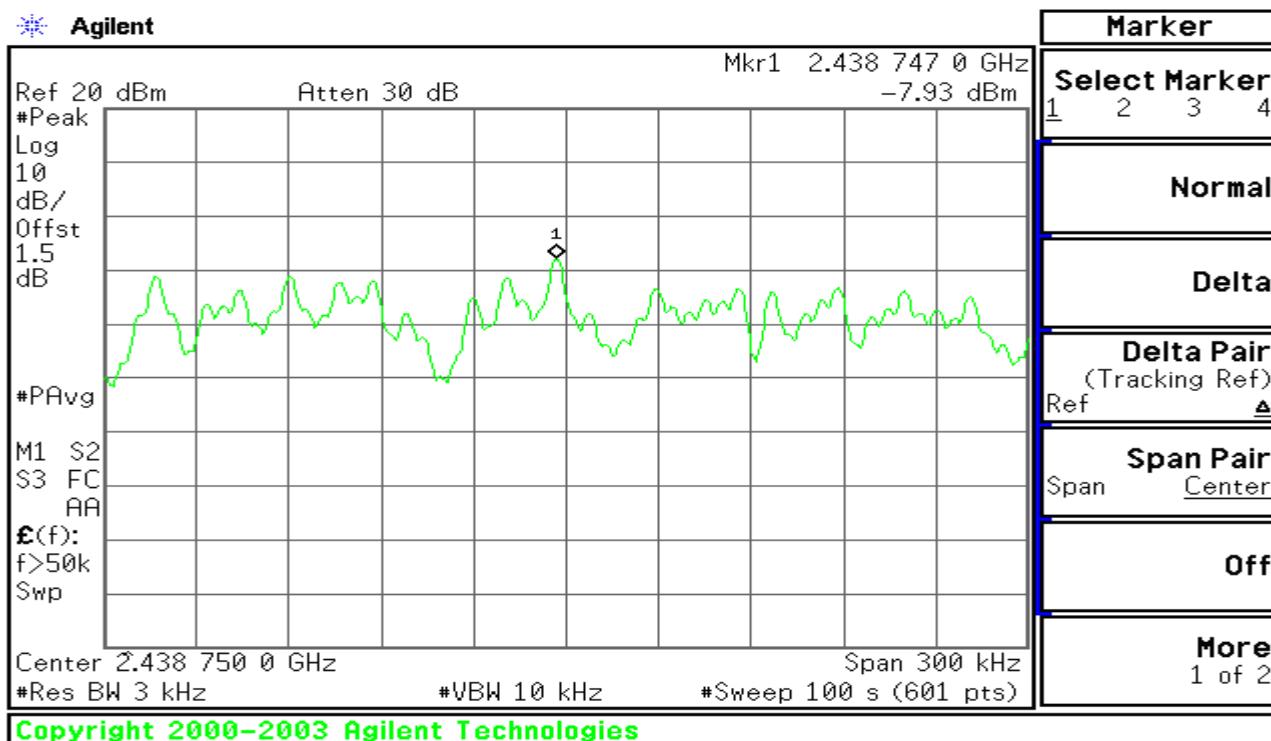
## Test Plot (IEEE 802.11b mode)

### PPSD (CH Low)



Copyright 2000-2003 Agilent Technologies

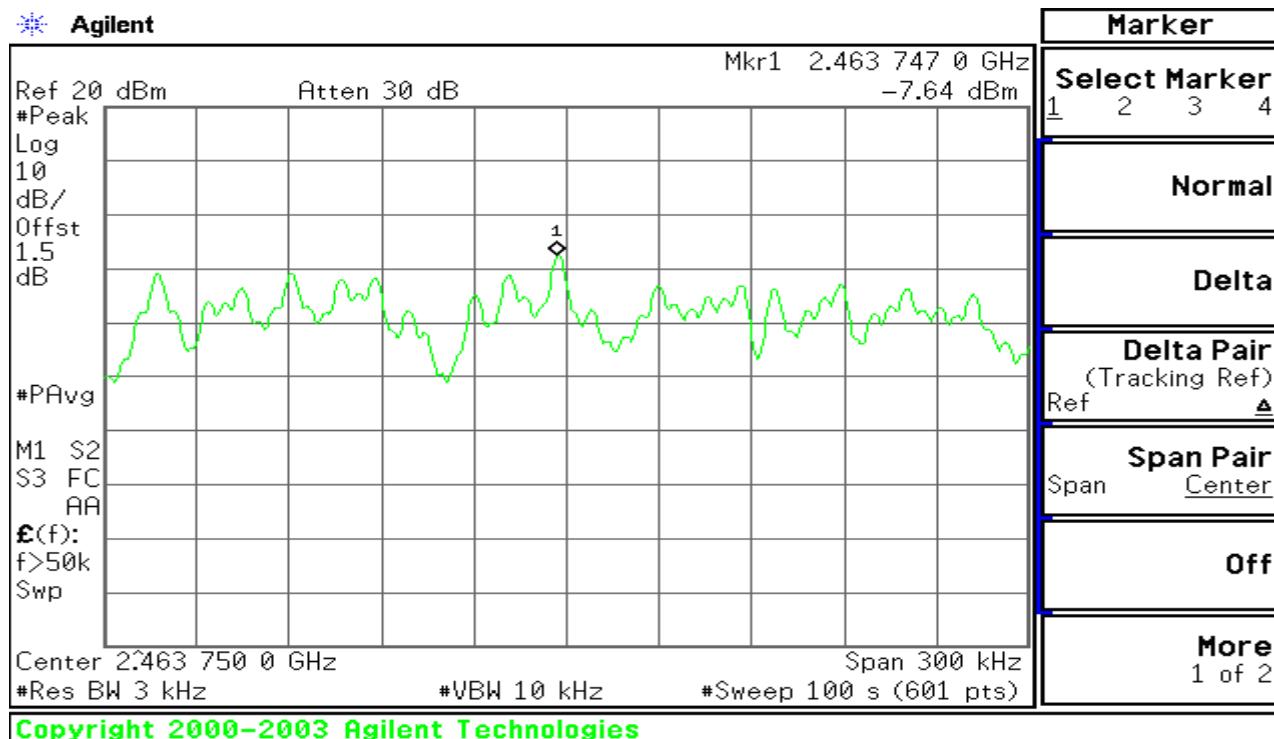
### PPSD (CH Mid)



Copyright 2000-2003 Agilent Technologies

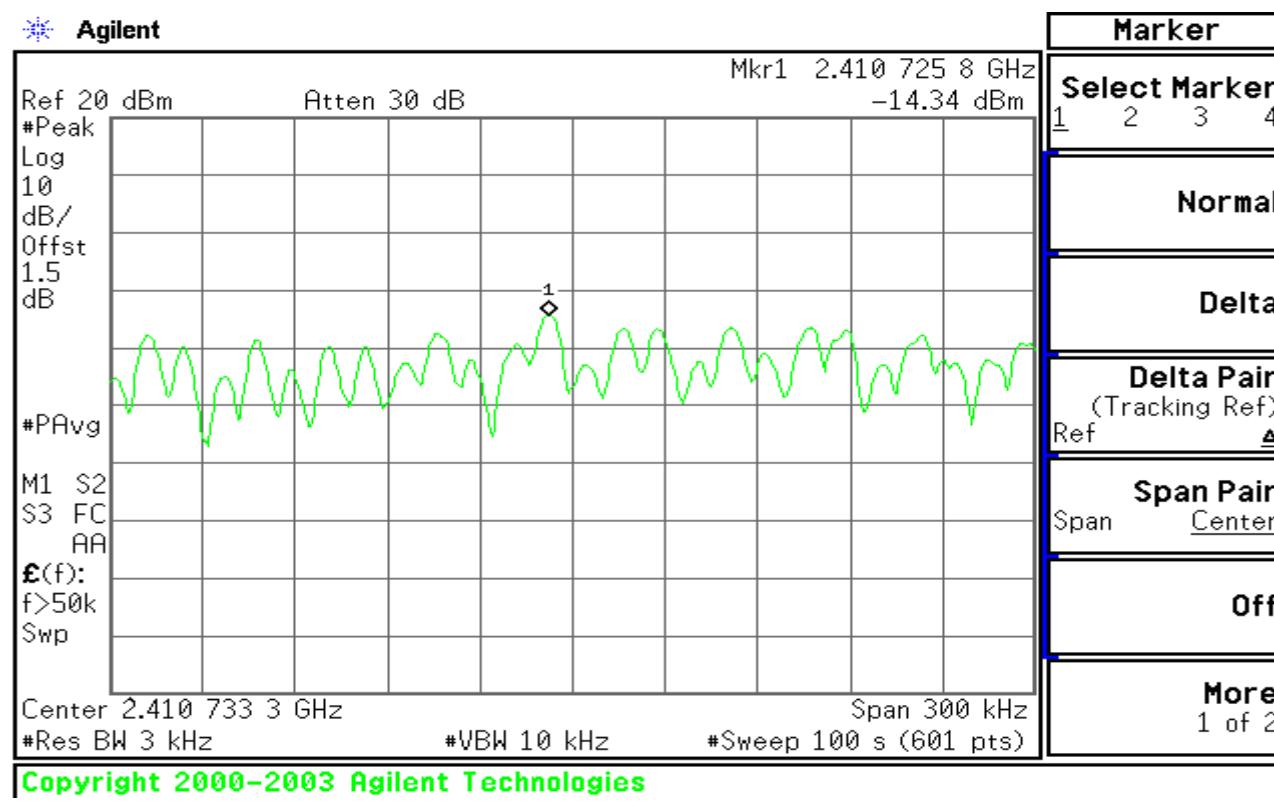


## PPSD (CH High)



## Test Plot (IEEE 802.11g mode)

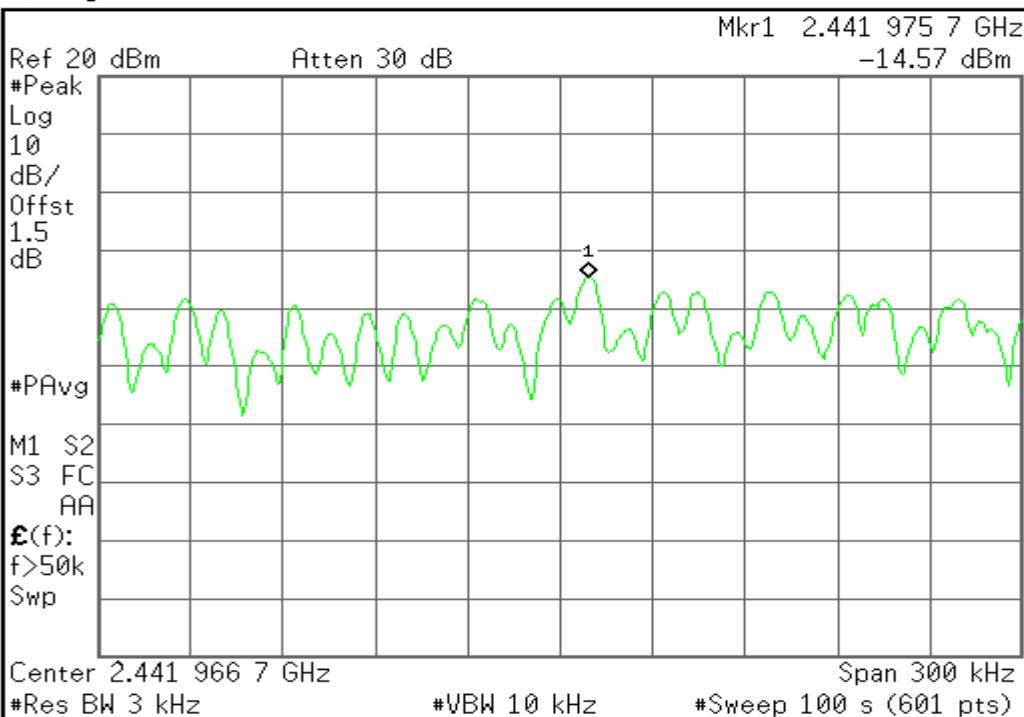
### PPSD (CH Low)





## PPSD (CH Mid)

Agilent



**Marker**

**Select Marker**

1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref

Span Pair Span Center

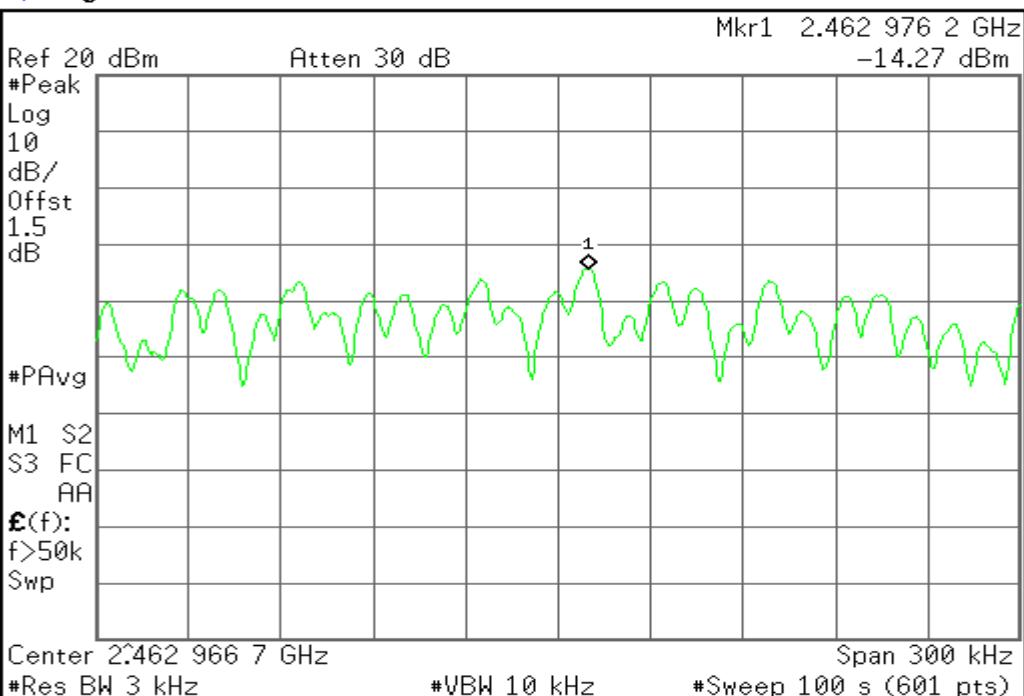
Off

More 1 of 2

Copyright 2000-2003 Agilent Technologies

## PPSD (CH High)

Agilent



**Marker**

**Select Marker**

1 2 3 4

Normal

Delta

Delta Pair (Tracking Ref) Ref

Span Pair Span Center

Off

More 1 of 2

Copyright 2000-2003 Agilent Technologies



## APPENDIX I RADIO FREQUENCY EXPOSURE

Please refer to report FCC SAR NEW.