# FCC 47 CFR PART 15 SUBPART C

# TEST REPORT

**For**

## 300Mbps Wireless N 4-port Media Bridge

## Model: TEW-640MB

## Trade Name: TRENDnet

*Issued to*

**TRENDnet, Inc.**
**20675 Manhattan Place,Torrance,CA 90501**

*Issued by*

**Compliance Certification Services Inc.**
**No. 11, Wu-Gong 6th Rd., Wugu Industrial Park,**
**Taipei Hsien 248, Taiwan (R.O.C.)**
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**service@ccsrf.com**

Testing Laboratory
1309

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# 1. TEST RESULT CERTIFICATION

**Applicant:** TRENDnet, Inc.
20675 Manhattan Place,Torrance,CA 90501

**Equipment Under Test:** 300Mbps Wireless N 4-port Media Bridge

**Trade Name:** TRENDnet

**Model:** TEW-640MB

**Date of Test:** December 11 ~ 17, 2010

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULT** |
| FCC 47 CFR Part 15 Subpart C | No non-compliance noted |

## We hereby certify that:

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.

The test results of this report relate only to the tested sample EUT identified in this report.

*Approved by:*

Rex Lai
Section Manager
Compliance Certification Services Inc.

*Reviewed by:*

Gina Lo
Section Manager
Compliance Certification Services Inc.

# 2. EUT DESCRIPTION

| | |
|---|---|
| **Product** | 300Mbps Wireless N 4-port Media Bridge |
| **Trade Name** | TRENDnet |
| **Model Number** | TEW-640MB |
| **Model Discrepancy** | N/A |
| **Power Rating** | Powered by Power Adapter<br>Bestec / EA0121WAA<br>I/P: 100-240VAC, 50-60Hz, 0.5A<br>O/P: 12V, 1A |
| **Frequency Range** | 2412 ~ 2462 MHz |
| **Transmit Power** | IEEE 802.11b mode: 18.15 dBm<br>IEEE 802.11g mode: 15.63 dBm<br>IEEE 802.11n HT 20 MHz mode: 15.63 dBm<br>IEEE 802.11n HT 40 MHz mode: 15.37 dBm |
| **Modulation Technique** | IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mbps)<br>IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mbps)<br>IEEE 802.11n HT 20 MHz mode: OFDM (6.5, 7.22, 13, 14.44, 19.5, 21.67, 26, 28.89, 39, 43.33, 52, 57.78, 57.78, 58.5, 65.0, 72.22, 78, 86.67, 104, 115.56, 117, 130, 144.44 Mbps)<br>IEEE 802.11n HT 40 MHz mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps) |
| **Number of Channels** | IEEE 802.11b/g mode: 11 Channels<br>IEEE 802.11n HT 20 MHz mode: 11 Channels<br>IEEE 802.11n HT 40 MHz mode: 7 Channels |
| **Antenna Specification** | Left: PCB Antenna / Gain: 3dBi<br>Right: PCB Antenna / Gain: 3dBi |
| | Antenna Calculation for MIMO Mode:<br>3 dBi + 10 log (2) = 6.01 dBi (Numeric gain: 3.99) |

***Remark:***

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: **XU8TEW640MB** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

# 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

## 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

## 3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

## 3.3 GENERAL TEST PROCEDURES

**Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

**Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

## 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| [1]0.495 - 0.505 | 16.69475 - 16.69525 | 608 - 614 | 5.35 - 5.46 |
| 2.1735 - 2.1905 | 16.80425 - 16.80475 | 960 - 1240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1300 - 1427 | 8.025 - 8.5 |
| 4.17725 - 4.17775 | 37.5 - 38.25 | 1435 - 1626.5 | 9.0 - 9.2 |
| 4.20725 - 4.20775 | 73 - 74.6 | 1645.5 - 1646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1660 - 1710 | 10.6 - 12.7 |
| 6.26775 - 6.26825 | 108 - 121.94 | 1718.8 - 1722.2 | 13.25 - 13.4 |
| 6.31175 - 6.31225 | 123 - 138 | 2200 - 2300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2310 - 2390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.52475 - | 2483.5 - 2500 | 17.7 - 21.4 |
| 8.37625 - 8.38675 | 156.52525 | 2655 - 2900 | 22.01 - 23.12 |
| 8.41425 - 8.41475 | 156.7 - 156.9 | 3260 - 3267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 162.0125 - 167.17 | 3332 - 3339 | 31.2 - 31.8 |
| 12.51975 - 12.52025 | 167.72 - 173.2 | 3345.8 - 3358 | 36.43 - 36.5 |
| 12.57675 - 12.57725 | 240 - 285 | 3600 - 4400 | ([2]) |
| 13.36 - 13.41 | 322 - 335.4 | | |

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

## 3.5 DESCRIPTION OF TEST MODES

The EUT (model: TEW-640MB) had been tested under operating condition.

The EUT is a 2x2 configuration spatial MIMO (2Tx & 2Rx) without beam forming function that operate in double TX chains and double RX chains. The 2x2 configuration is implemented with two outside TX & RX chains (Chain 0 and 1).

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

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

**IEEE 802.11b mode:**
Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate and cyclic delay diversity were chosen for full testing.

**IEEE 802.11g mode:**
Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate and cyclic delay diversity were chosen for full testing.

**IEEE 802.11n HT 20 MHz mode:**
Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

**IEEE 802.11n HT 40 MHz mode:**
Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.

# 4. INSTRUMENT CALIBRATION

## 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

## 4.2 MEASUREMENT EQUIPMENT USED

**Equipment Used for Emissions Measurement**

***Remark:*** *Each piece of equipment is scheduled for calibration once a year and Loop Antenna is scheduled for calibration once three years.*

| Conducted Emissions Test Site | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| Spectrum Analyzer | Agilent | E4446A | MY43360131 | 03/03/2011 |
| Power Meter | Agilent | E4416A | GB41291611 | 06/27/2011 |
| Power Sensor | Agilent | E9327A | US40441097 | 06/27/2011 |

| 3M Semi Anechoic Chamber | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| Spectrum Analyzer | Agilent | E4446A | US42510252 | 10/25/2011 |
| EMI Test Receiver | R&S | ESCI | 100064 | 02/04/2011 |
| Pre-Amplifier | Mini-Circults | ZFL-1000LN | SF350700823 | 01/13/2011 |
| Pre-Amplifier | MITEQ | AFS44-00102650-42-10P-44 | 1415367 | 11/19/2011 |
| Bilog Antenna | Sunol Sciences | JB3 | A030105 | 09/10/2011 |
| Horn Antenna | EMCO | 3117 | 00055165 | 12/07/2010 |
| Loop Antenna | EMCO | 6502 | 8905/2356 | 06/10/2013 |
| Turn Table | CCS | CC-T-1F | N/A | N.C.R |
| Antenna Tower | CCS | CC-A-1F | N/A | N.C.R |
| Controller | CCS | CC-C-1F | N/A | N.C.R |
| Site NSA | CCS | N/A | N/A | 12/31/2010 |
| Test S/W | EZ-EMC (CCS-3A1RE) | | | |

| Powerline Conducted Emissions Test Site | | | | |
|---|---|---|---|---|
| **Name of Equipment** | **Manufacturer** | **Model** | **Serial Number** | **Calibration Due** |
| EMI Test Receiver | R&S | ESHS30 | 828144/003 | 03/25/2011 |
| LISN | EMCO | 3825/2 | 9106-1809 | 05/02/2011 |
| LISN | SCHAFFNER | NNB 41 | 03/10013 | 03/14/2011 |

## 4.3 MEASUREMENT UNCERTAINTY

| PARAMETER | UNCERTAINTY |
|---|---|
| Powerline Conducted Emission | +/- 1.6202 |
| 3M Semi Anechoic Chamber / 30M~200M | +/- 4.0606 |
| 3M Semi Anechoic Chamber / 200M~1000M | +/- 3.9979 |
| 3M Semi Anechoic Chamber / 1G~8G | +/- 2.5790 |
| 3M Semi Anechoic Chamber / 8G~18G | +/- 2.5928 |
| 3M Semi Anechoic Chamber / 18G~26G | +/- 2.7212 |
| 3M Semi Anechoic Chamber / 26G~40G | +/- 2.9520 |

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

# 5. FACILITIES AND ACCREDITATIONS

## 5.1 FACILITIES

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

☐ No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

☐ No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

## 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

## 5.3 TABLE OF ACCREDITATIONS AND LISTINGS

| Country | Agency | Scope of Accreditation | Logo |
|---|---|---|---|
| USA | FCC | 3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements | FCC MRA: TW1039 |
| Taiwan | TAF | LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310<br>IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2,<br>ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328,<br>ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893,<br>ETSI EN 301 489-1/3/7/17<br>FCC OET Bulletin 65 + Supplement C,<br>EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385,<br>EN 50392, IEC 62209, CNS 14958-1, CNS 14959<br>FCC Method –47 CFR Part 15 Subpart B<br>IEC / EN 61000-3-2, IEC / EN 61000-3-3,<br>IEC / EN 61000-4-2/3/4/5/6/8/11 | TAF Testing Laboratory 1309 |
| Canada | Industry Canada | 3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform | Canada<br>IC 2324G-1<br>IC 2324G-2 |

** No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

# 6. SETUP OF EQUIPMENT UNDER TEST

## 6.1 SETUP CONFIGURATION OF EUT

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

## 6.2 SUPPORT EQUIPMENT

| No | Equipment | Brand | Model | Series No. | FCC ID | Data Cable | Power Cord |
|---|---|---|---|---|---|---|---|
| 1. | Notebook PC (Remote) | IBM | 2672 (X31) | 99KPZYN | WLAN: ANO20030400LEG Bluetooth: ANO20020100MTN | LAN Cable: Unshielded, 10m | AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core |
| 2. | Notebook PC (Remote) | DELL | PP19L | GK102 A00 | QDS-BRCM1021 | LAN Cable: Unshielded, 10m | AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core |
| 3. | Notebook PC (Remote) | DELL | PP10L | 61G6Q1S | FCC DoC | LAN Cable: Unshielded, 10m | AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core |
| 4. | Notebook PC (Remote) | ASUS | M5200AE | 5BN0AG019631 | PD9WM3B2100 | LAN Cable: Unshielded, 10m | AC I/P: Unshielded, 1.8m with a core DC O/P: Unshielded, 1.8m |
| 5. | Wireless Router (Remote) | PLANEX | BLW-04SAG | 40DDA0421 | FCC DoC | N/A | Unshielded, 1.8m |

***Remark:***

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.*

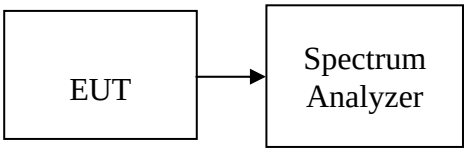
# 7. FCC PART 15.247 REQUIREMENTS

## 7.1 6DB BANDWIDTH

## LIMIT

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 6dB bandwidth shall be at least 500 kHz.

**Test Configuration**




## TEST PROCEDURE

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 = 100 kHz, VBW = RBW, Span = 50 MHz, Sweep = auto.
4. Mark the peak frequency and –6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

## TEST RESULTS

*No non-compliance noted.*

## Test Data

### Test mode: IEEE 802.11b mode

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low | 2412 | 10.08 | >500 | PASS |
| Mid | 2437 | 10.17 | | PASS |
| High | 2462 | 10.17 | | PASS |

### Test mode: IEEE 802.11g mode

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low | 2412 | 16.50 | >500 | PASS |
| Mid | 2437 | 16.50 | | PASS |
| High | 2462 | 16.33 | | PASS |

### Test mode: IEEE 802.11n HT 20 MHz mode / Chain 0

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low | 2412 | 17.25 | >500 | PASS |
| Mid | 2437 | 17.08 | | PASS |
| High | 2462 | 17.33 | | PASS |

### Test mode: IEEE 802.11n HT 20 MHz mode / Chain 1

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low | 2412 | 16.67 | >500 | PASS |
| Mid | 2437 | 16.67 | | PASS |
| High | 2462 | 16.42 | | PASS |

### Test mode: IEEE 802.11n HT 40 MHz mode / Chain 0

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low | 2422 | 35.33 | >500 | PASS |
| Mid | 2437 | 34.25 | | PASS |
| High | 2452 | 33.75 | | PASS |

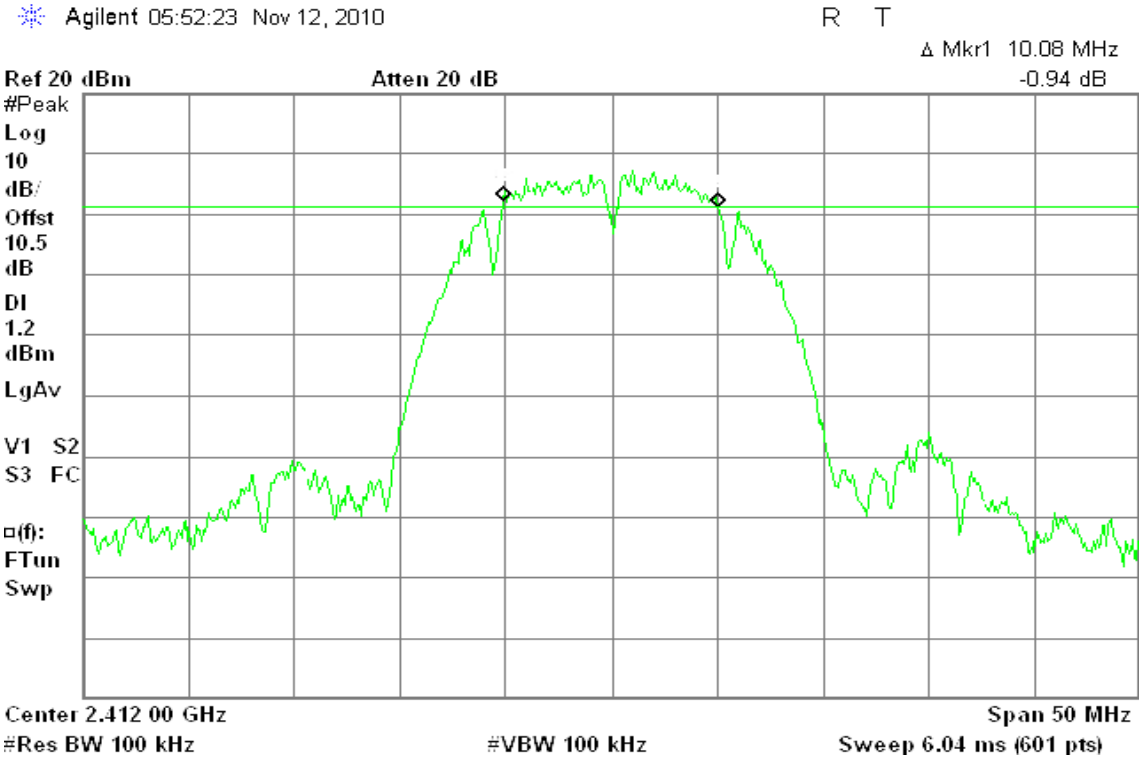
### Test mode: IEEE 802.11n HT 40 MHz mode / Chain 1

| Channel | Frequency (MHz) | 6dB Bandwidth (MHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low | 2422 | 35.17 | >500 | PASS |
| Mid | 2437 | 34.50 | | PASS |
| High | 2452 | 34.83 | | PASS |

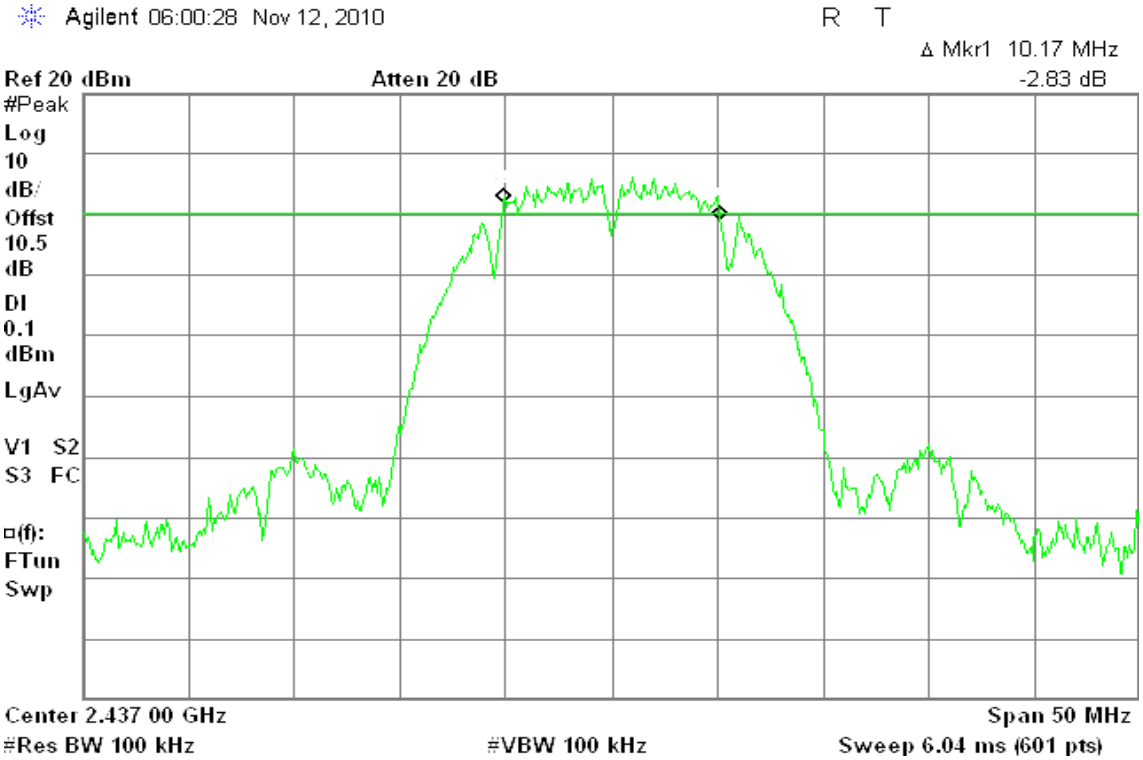
## Test Plot

### IEEE 802.11b mode

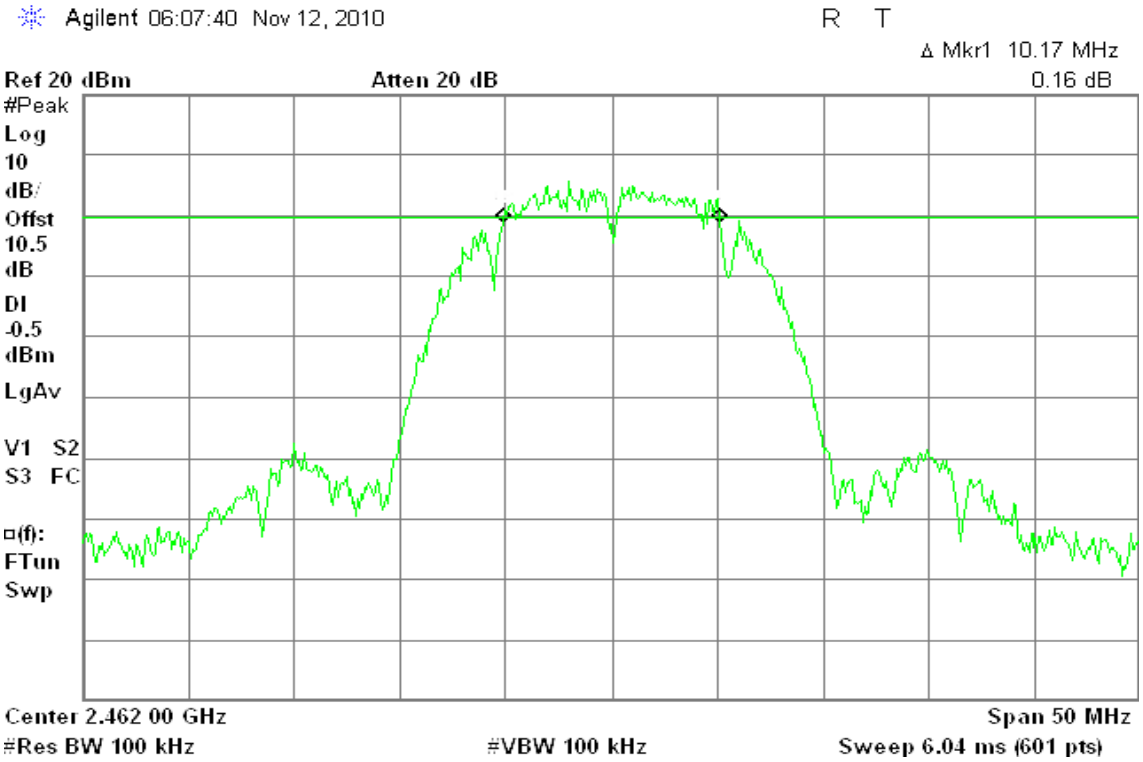
### 6dB Bandwidth (CH Low)




### 6dB Bandwidth (CH Mid)

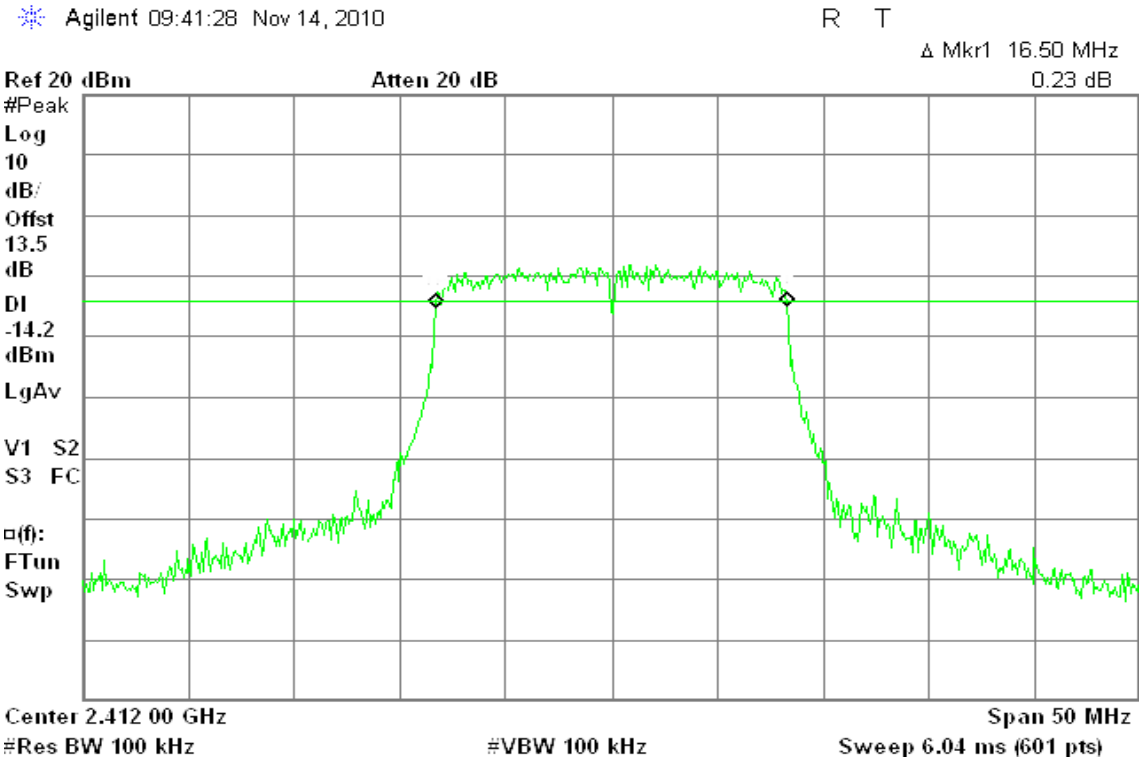


## 6dB Bandwidth (CH High)

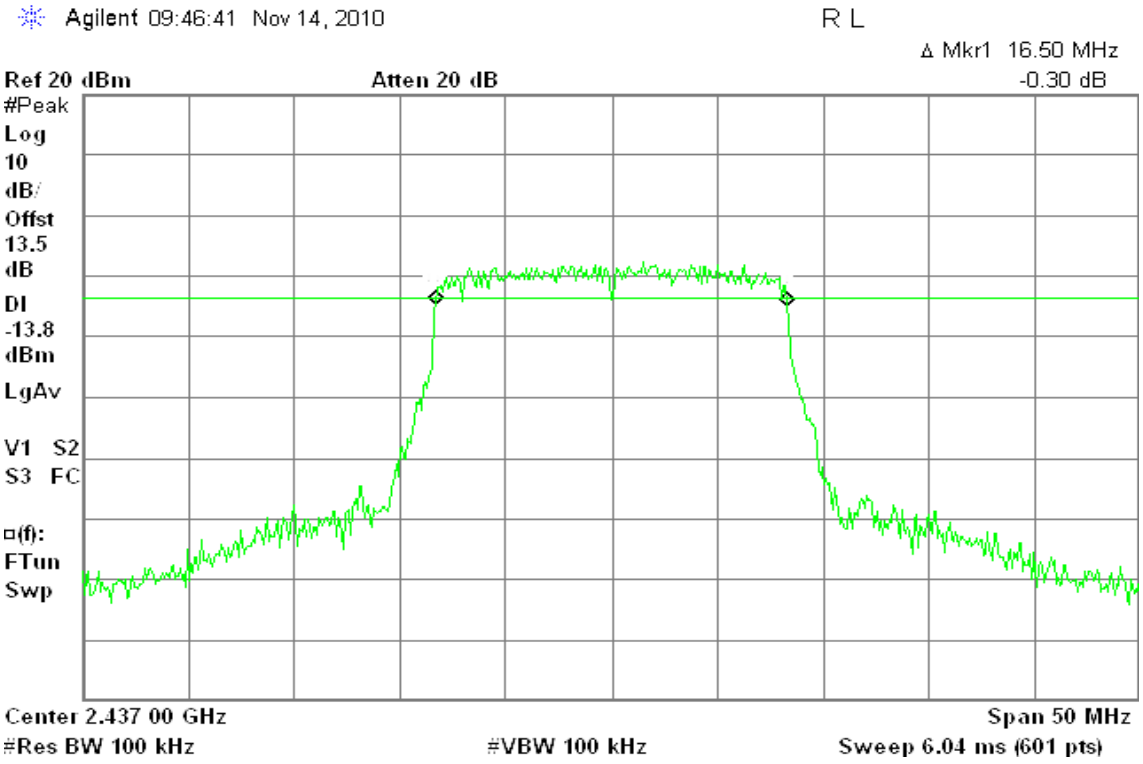



## IEEE 802.11g mode

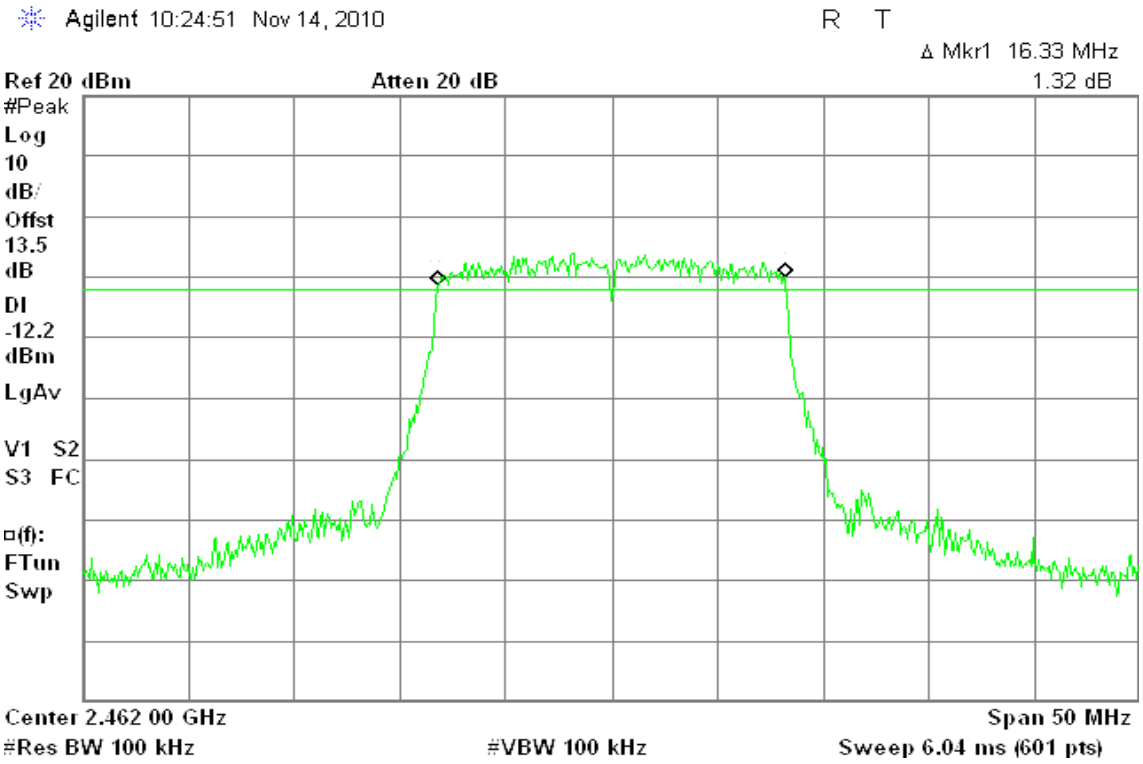
## 6dB Bandwidth (CH Low)



## 6dB Bandwidth (CH Mid)

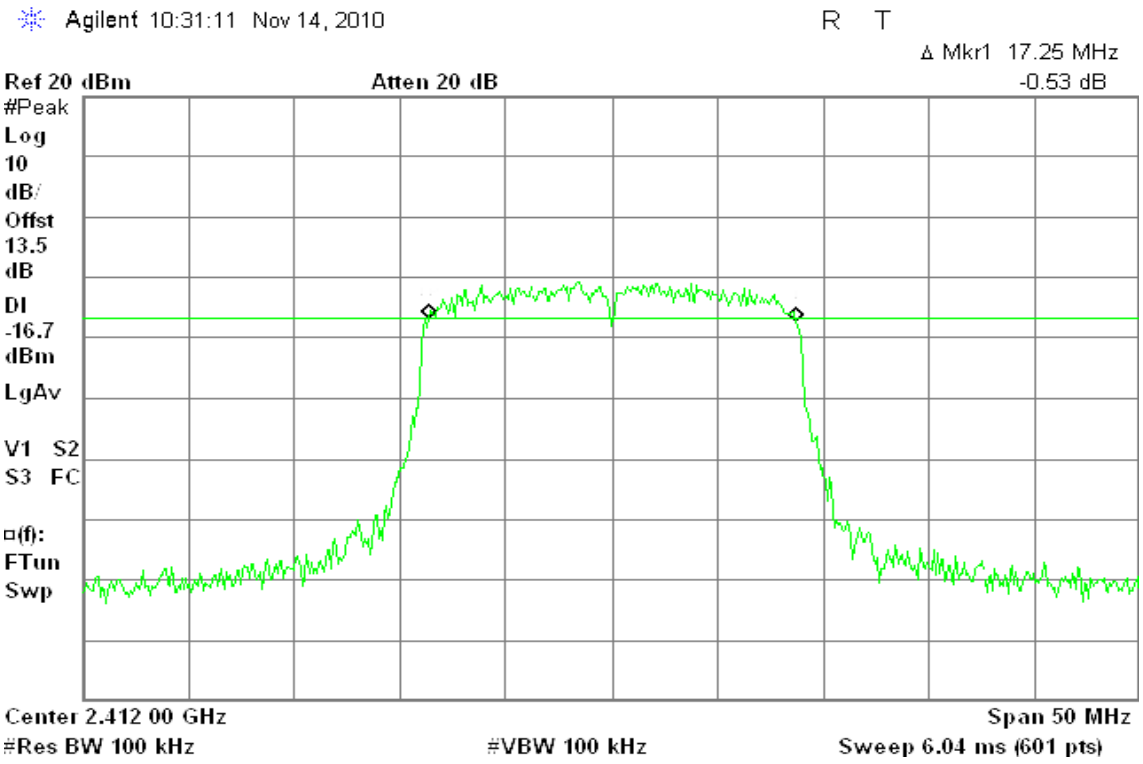



## 6dB Bandwidth (CH High)

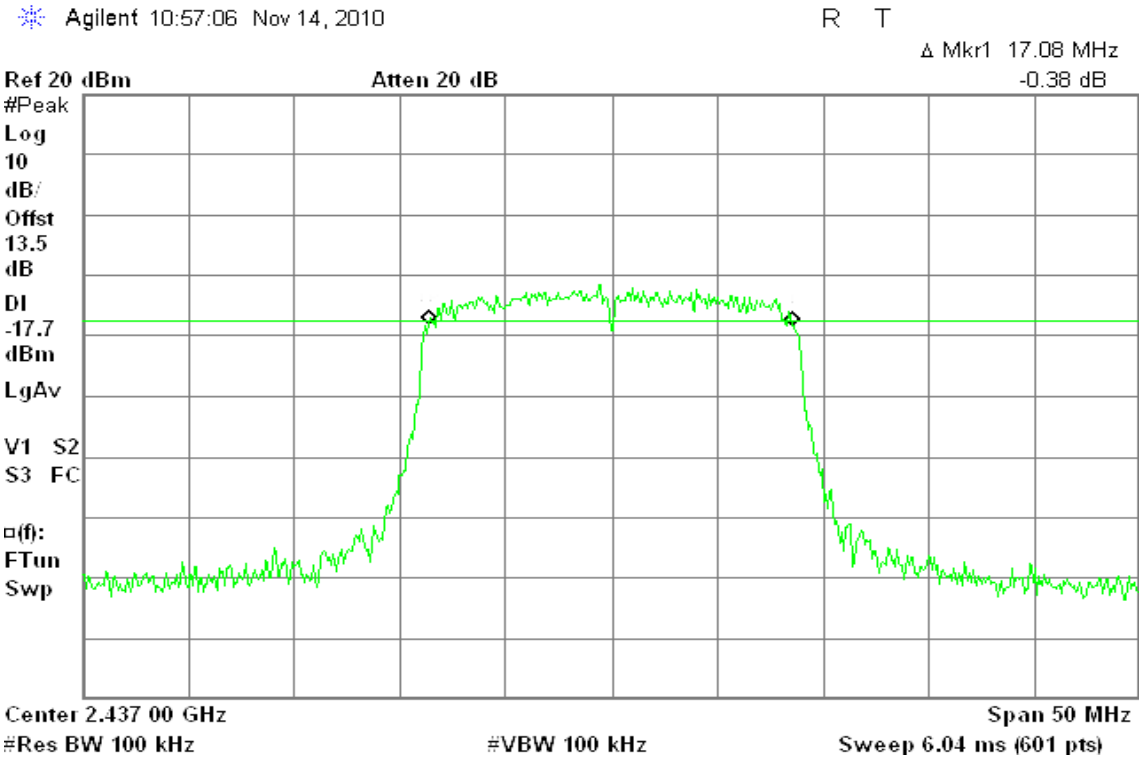


## IEEE 802.11n HT 20 MHz mode / Chain 0

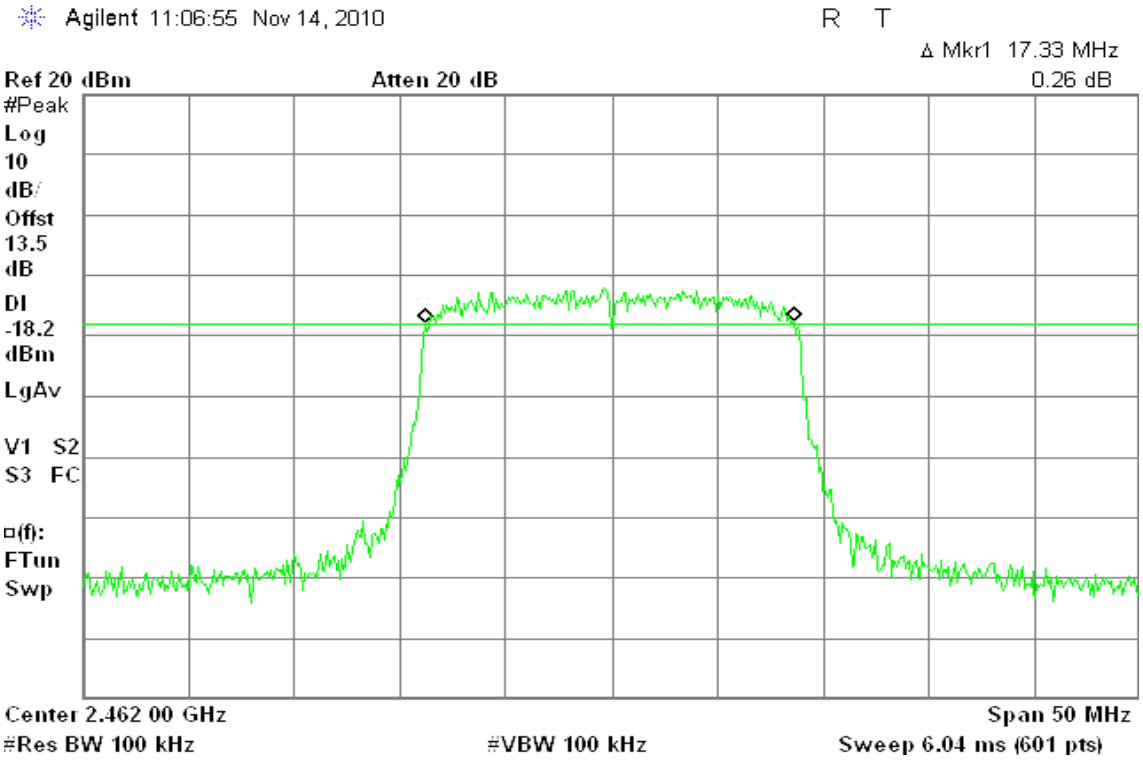
### 6dB Bandwidth (CH Low)




### 6dB Bandwidth (CH Mid)

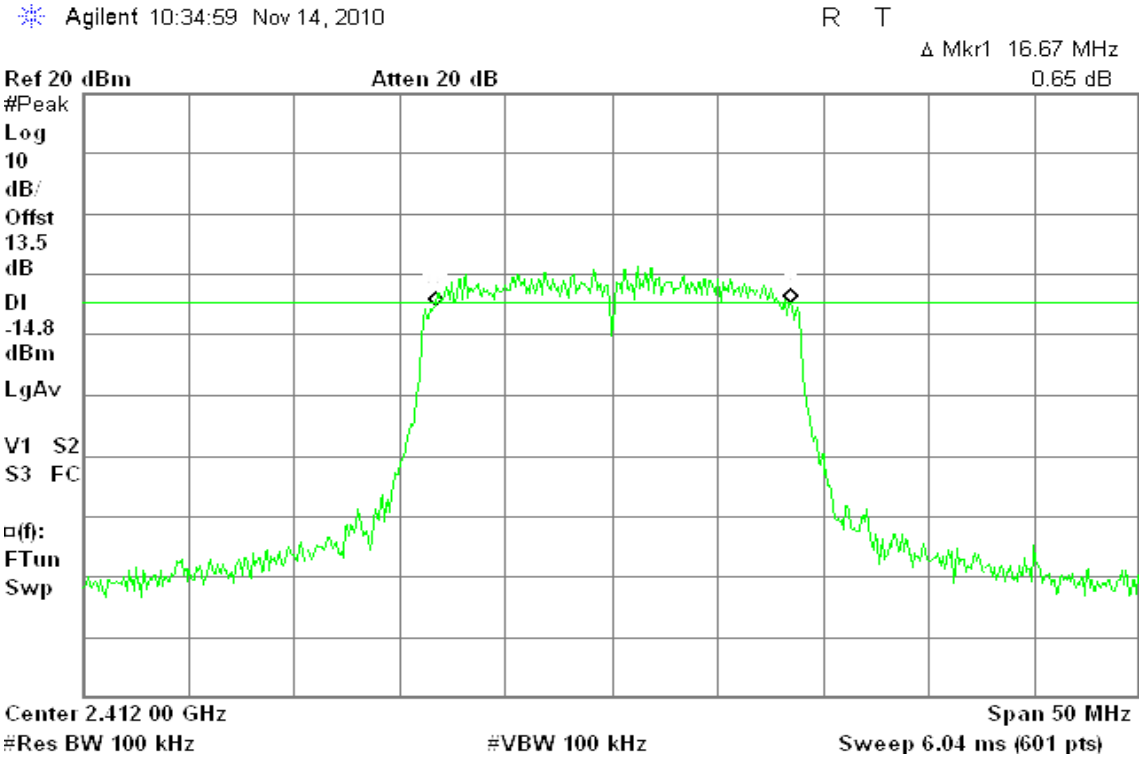


### 6dB Bandwidth (CH High)

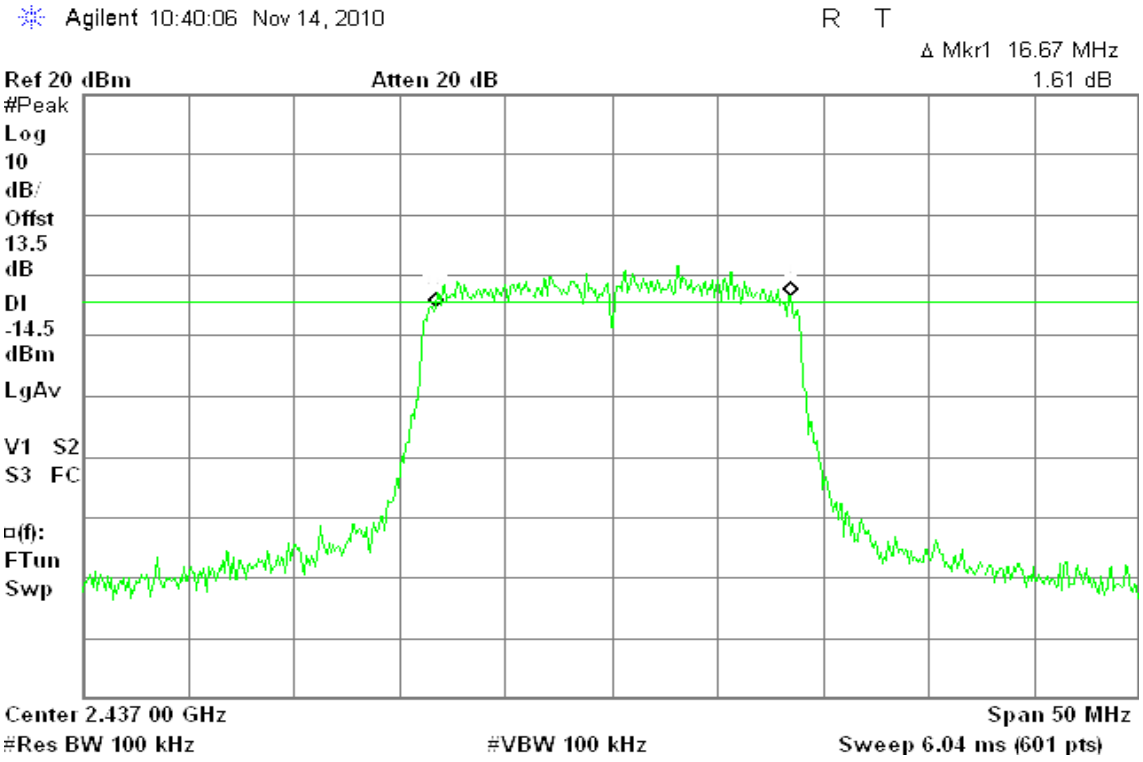



## IEEE 802.11n HT 20 MHz mode / Chain 1

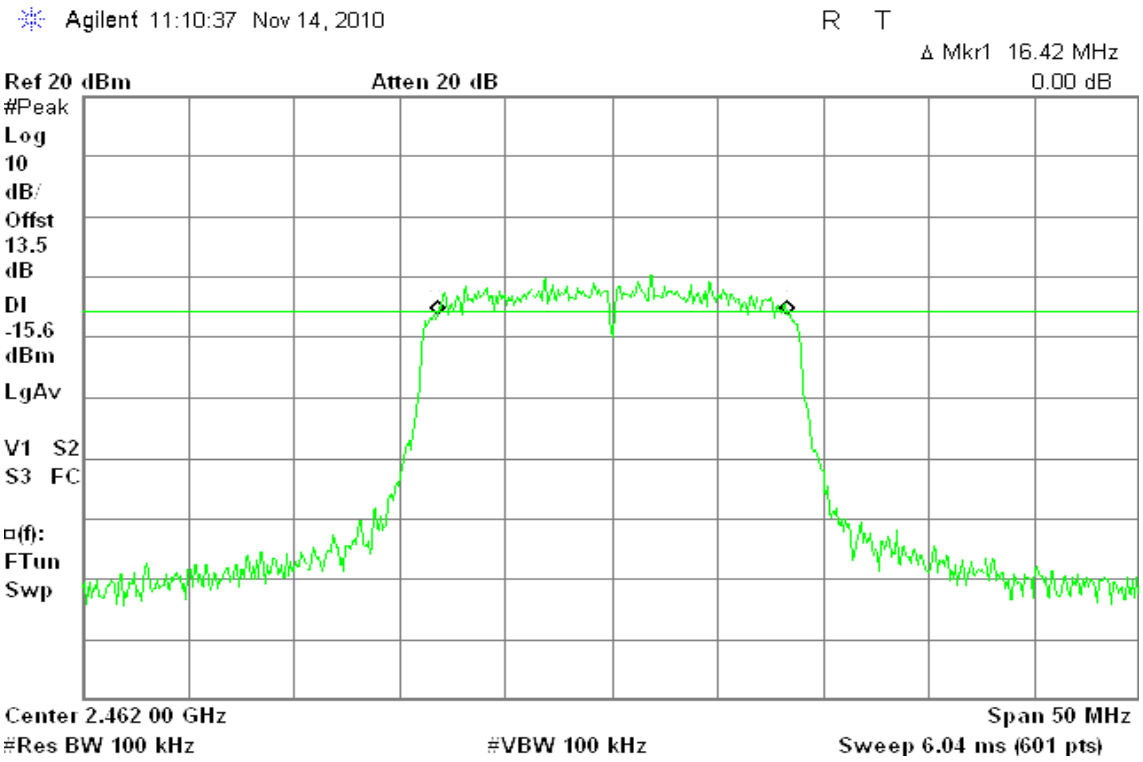
### 6dB Bandwidth (CH Low)



## 6dB Bandwidth (CH Mid)

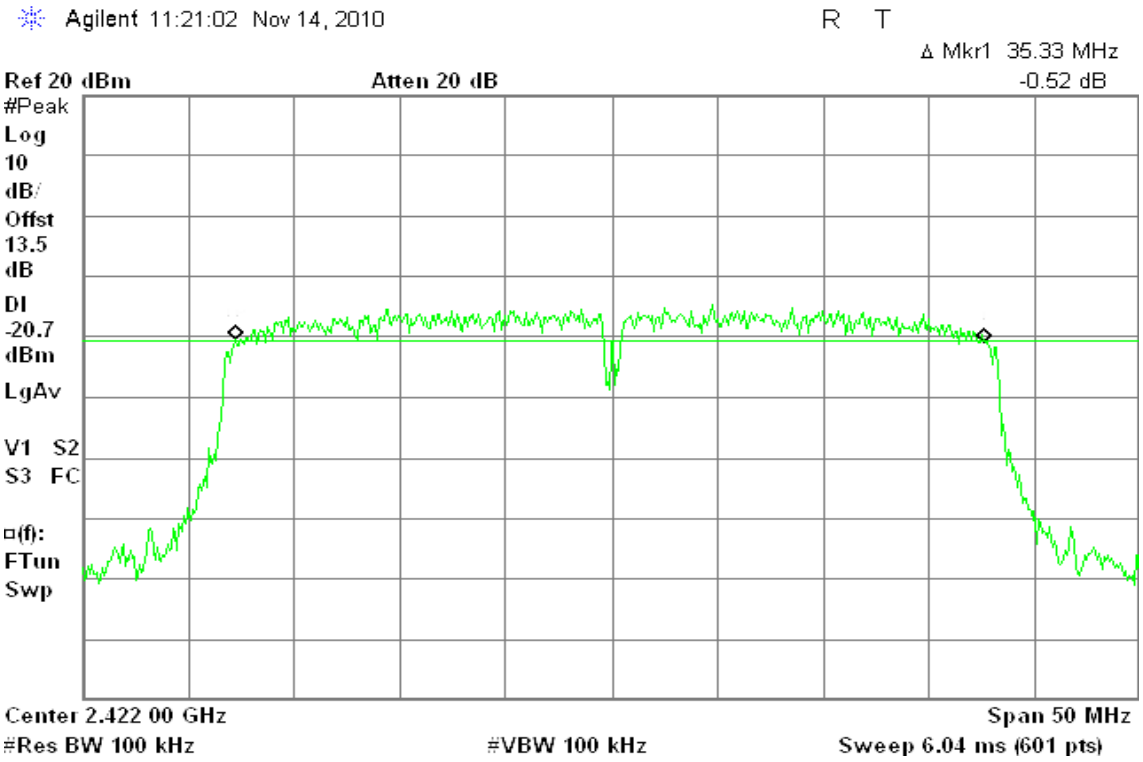



## 6dB Bandwidth (CH High)

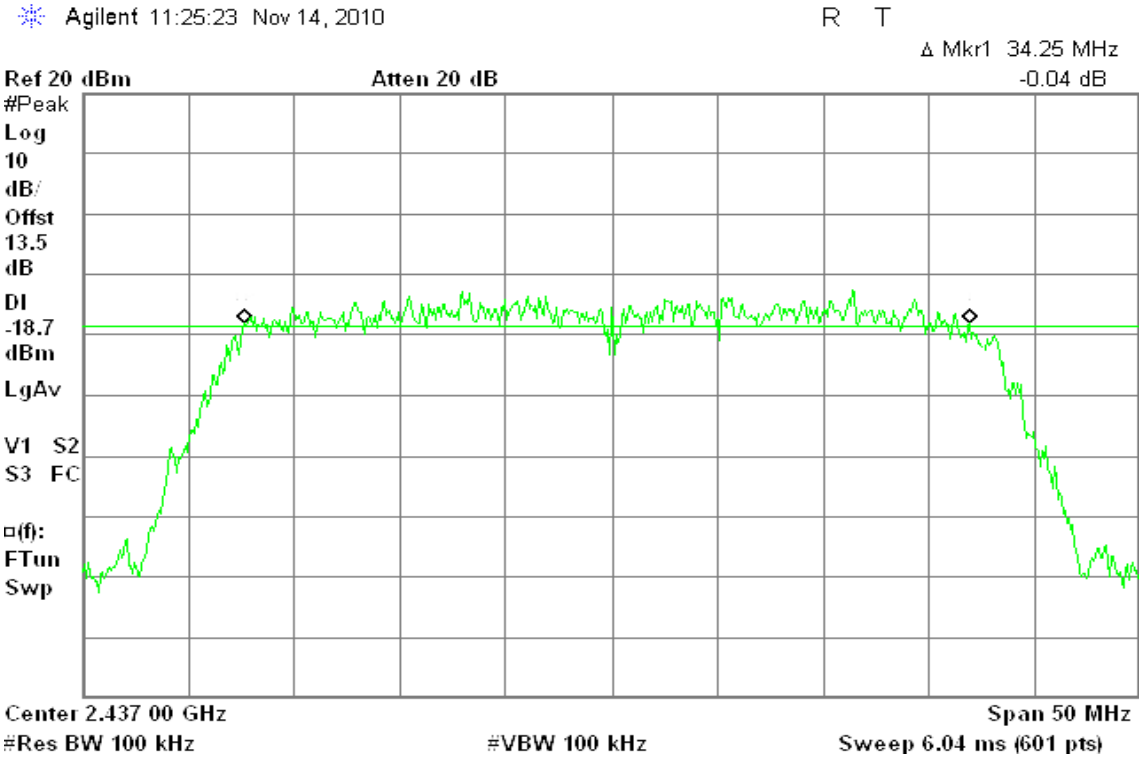


## IEEE 802.11n HT 40 MHz mode / Chain 0

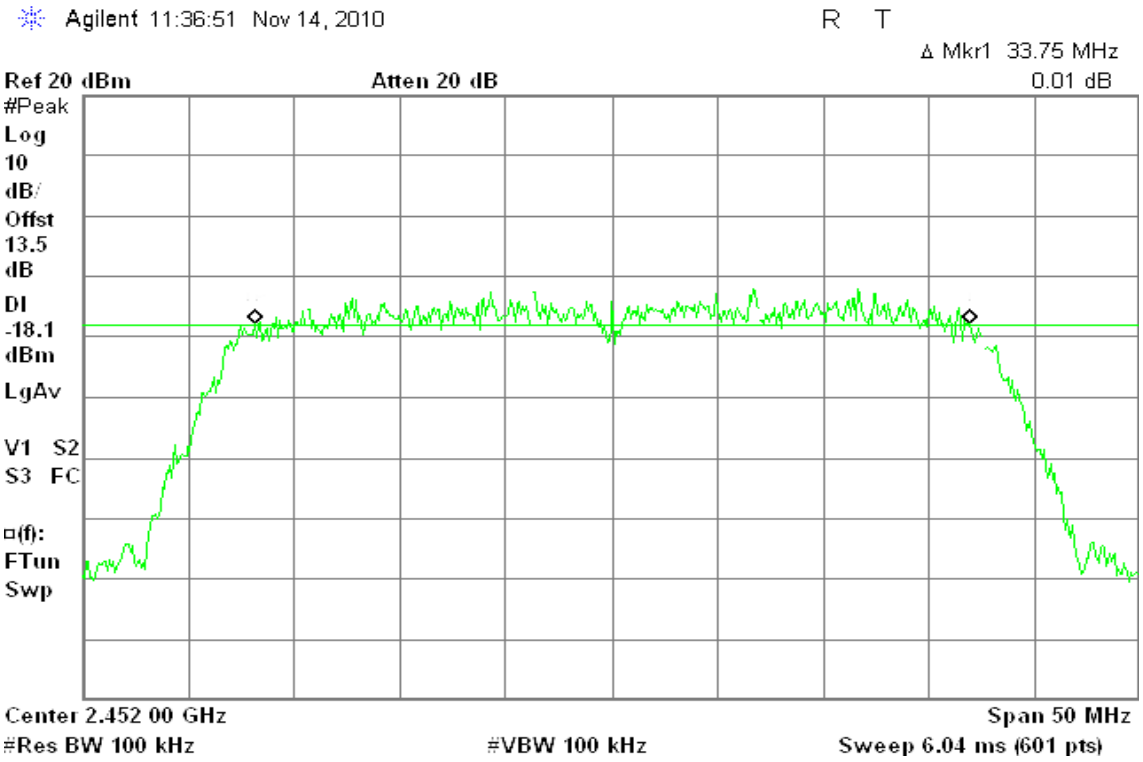
### 6dB Bandwidth (CH Low)




### 6dB Bandwidth (CH Mid)

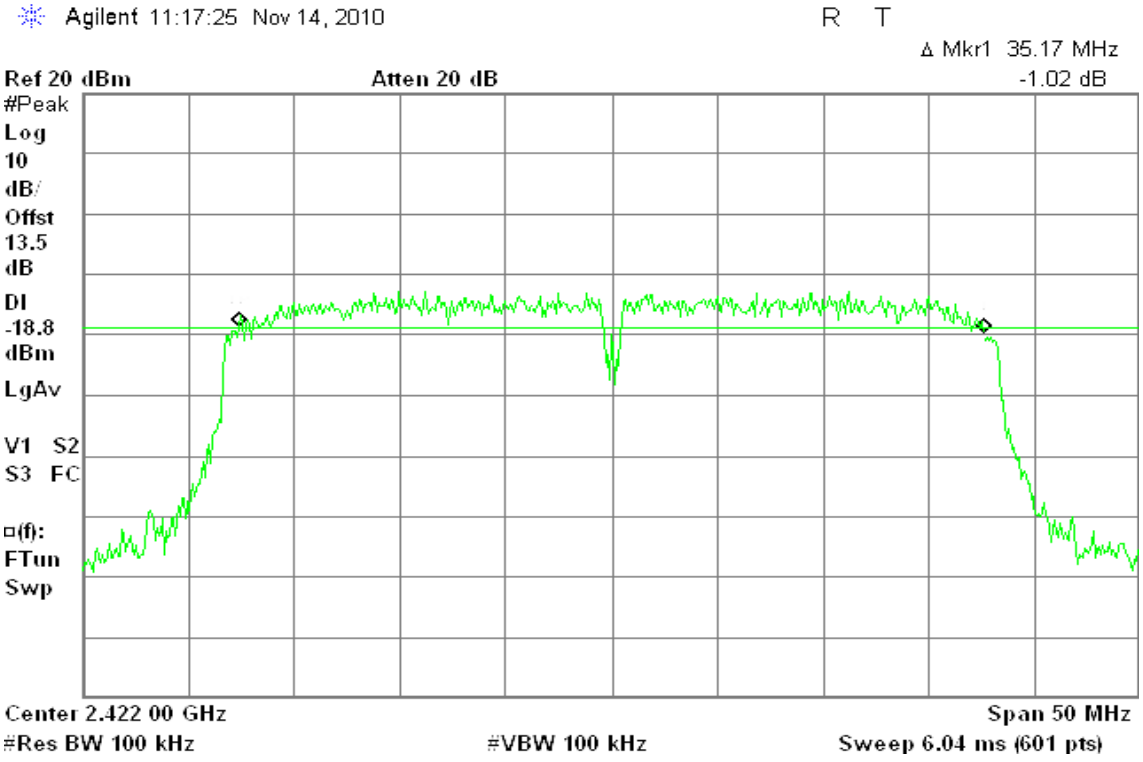


### 6dB Bandwidth (CH High)

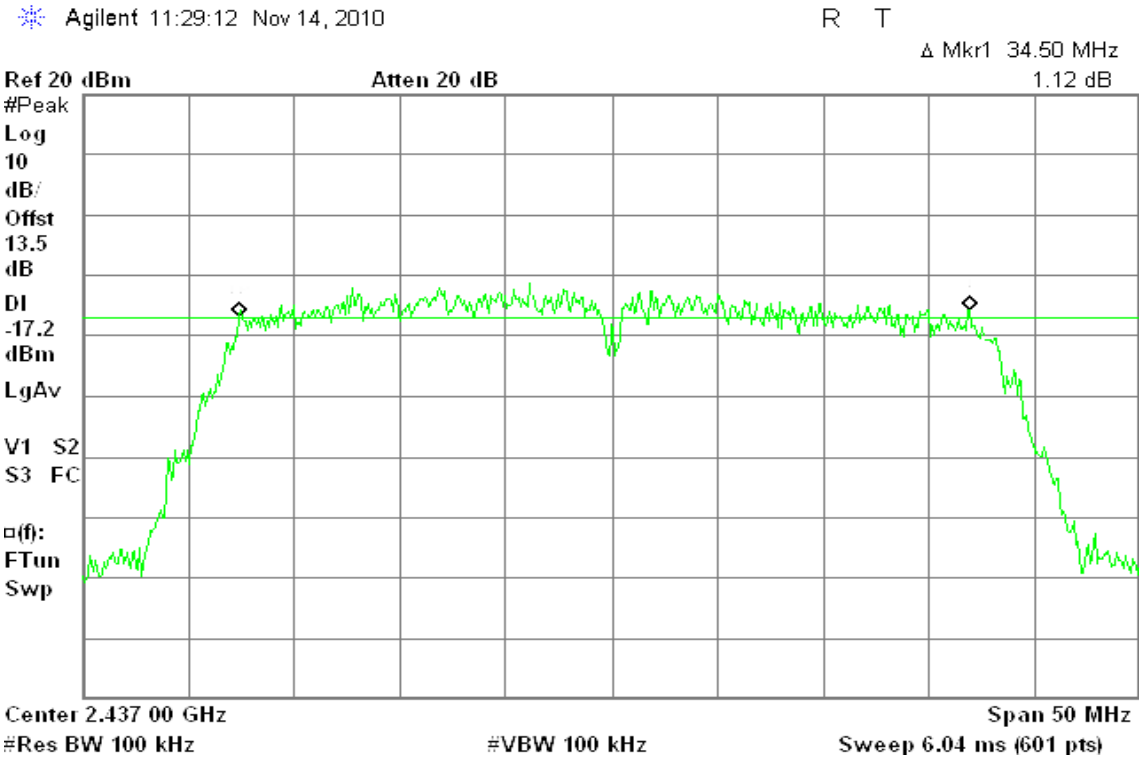



## IEEE 802.11n HT 40 MHz mode / Chain 1

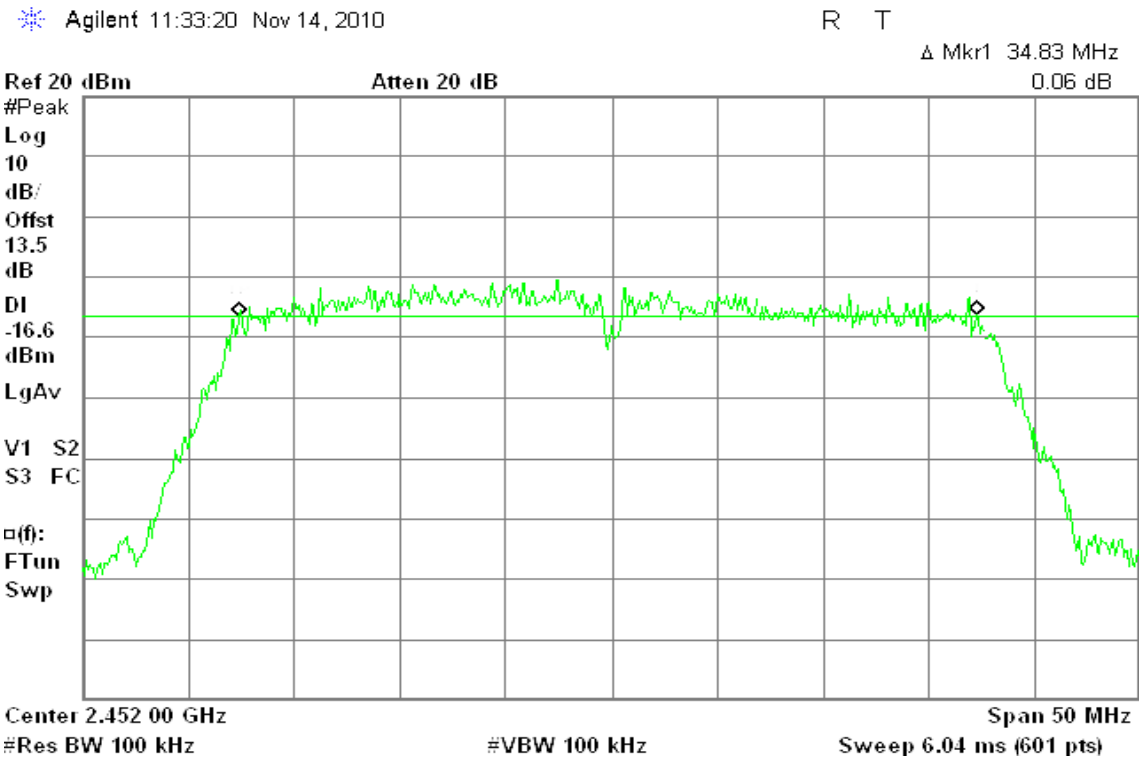
### 6dB Bandwidth (CH Low)



## 6dB Bandwidth (CH Mid)




## 6dB Bandwidth (CH High)



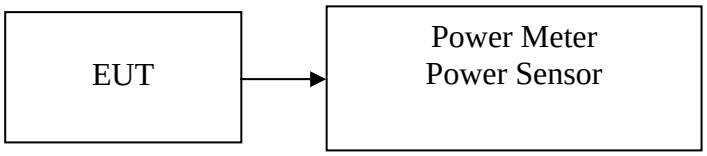
## 7.2 PEAK POWER

## LIMIT

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.

## TEST CONFIGURATION




## TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

## Test Data

### Test mode: IEEE 802.11b mode

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---|---|---|---|---|---|
| Low | 2412 | 18.02 | 0.0634 | 1.00 | PASS |
| Mid | 2437 | 17.97 | 0.0627 | | PASS |
| High | 2462 | 18.15 | 0.0653 | | PASS |

### Test mode: IEEE 802.11g mode

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---|---|---|---|---|---|
| Low | 2412 | 15.41 | 0.0348 | 1.00 | PASS |
| Mid | 2437 | 15.44 | 0.0350 | | PASS |
| High | 2462 | 15.63 | 0.0366 | | PASS |

### Test mode: IEEE 802.11n HT 20 MHz mode

| Channel | Frequency (MHz) | Chain 0 Output Power (dBm) | Chain 1 Output Power (dBm) | Total Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---|---|---|---|---|---|---|---|
| Low | 2412 | 12.86 | 12.36 | 15.63 | 0.0365 | 0.7943 | PASS |
| Mid | 2437 | 12.16 | 12.13 | 15.16 | 0.0328 | | PASS |
| High | 2462 | 12.14 | 11.56 | 14.87 | 0.0307 | | PASS |

### Test mode: IEEE 802.11n HT 40 MHz mode

| Channel | Frequency (MHz) | Chain 0 Output Power (dBm) | Chain 1 Output Power (dBm) | Total Output Power (dBm) | Output Power (W) | Limit (W) | Result |
|---|---|---|---|---|---|---|---|
| Low | 2422 | 11.97 | 12.46 | 15.23 | 0.0334 | 0.7943 | PASS |
| Mid | 2437 | 11.94 | 12.08 | 15.02 | 0.0318 | | PASS |
| High | 2452 | 12.24 | 12.48 | 15.37 | 0.0345 | | PASS |

*Remark:*

*1. Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000)+ Chain 1 (10^(Output Power /10)/1000)*

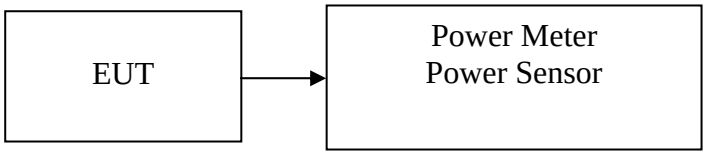
*2. The maximum antenna gain is 6.01dBi; therefore the reduction due to antenna gain is 1dBi, so the limit is 29dBm.*

## 7.3 AVERAGE POWER

### LIMIT

None; for reporting purposes only.

### TEST CONFIGURATION




### TEST PROCEDURE

*The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.*

## Test Data

### Test mode: IEEE 802.11b mode

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) |
|---|---|---|---|
| Low | 2412 | 15.25 | 0.03350 |
| Mid | 2437 | 15.23 | 0.03334 |
| High | 2462 | 15.42 | 0.03483 |

### Test mode: IEEE 802.11g mode

| Channel | Frequency (MHz) | Output Power (dBm) | Output Power (W) |
|---|---|---|---|
| Low | 2412 | 5.38 | 0.00345 |
| Mid | 2437 | 5.50 | 0.00355 |
| High | 2462 | 6.05 | 0.00403 |

### Test mode: IEEE 802.11n HT 20 MHz mode

| Channel | Frequency (MHz) | Chain 0 Output Power (dBm) | Chain 1 Output Power (dBm) | Total Output Power (dBm) | Output Power (W) |
|---|---|---|---|---|---|
| Low | 2412 | 3.59 | 3.41 | 6.51 | 0.0045 |
| Mid | 2437 | 2.91 | 3.28 | 6.11 | 0.0041 |
| High | 2462 | 2.86 | 3.16 | 6.02 | 0.0040 |

### Test mode: IEEE 802.11n HT 40 MHz mode

| Channel | Frequency (MHz) | Chain 0 Output Power (dBm) | Chain 1 Output Power (dBm) | Total Output Power (dBm) | Output Power (W) |
|---|---|---|---|---|---|
| Low | 2422 | 3.19 | 3.62 | 6.42 | 0.0044 |
| Mid | 2437 | 3.15 | 3.38 | 6.28 | 0.0042 |
| High | 2452 | 3.45 | 3.67 | 6.57 | 0.0045 |

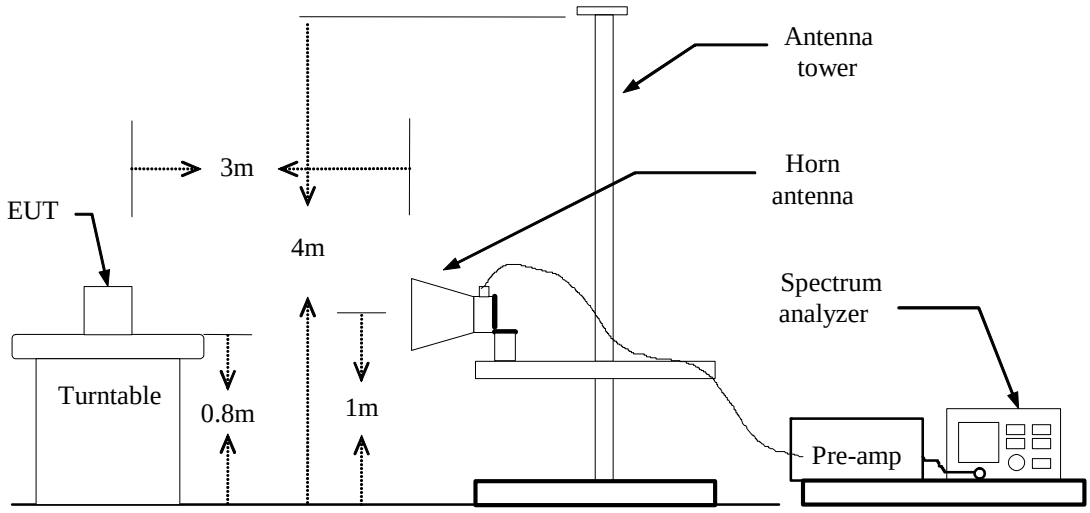
***Remark:*** *Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000)+ Chain 1 (10^(Output Power /10)/1000)*

## 7.4 BAND EDGES MEASUREMENT

## LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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)).

**Test Configuration**




## TEST PROCEDURE

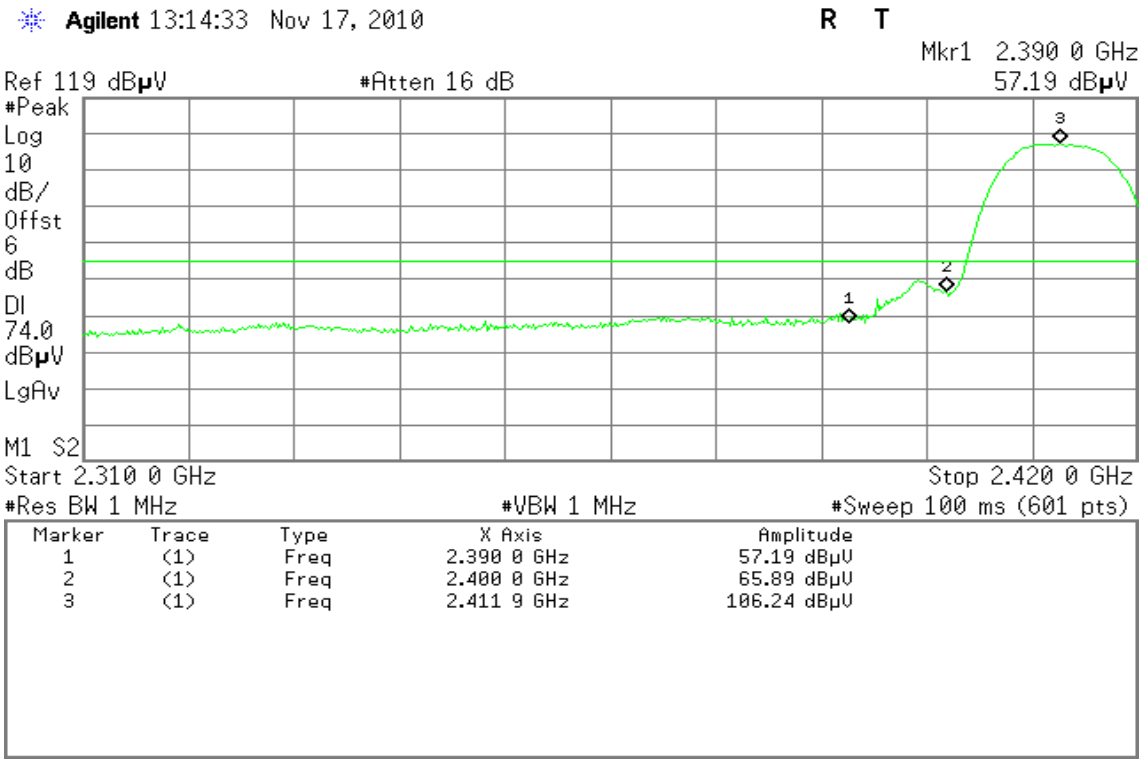
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the 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 measured.

## TEST RESULTS

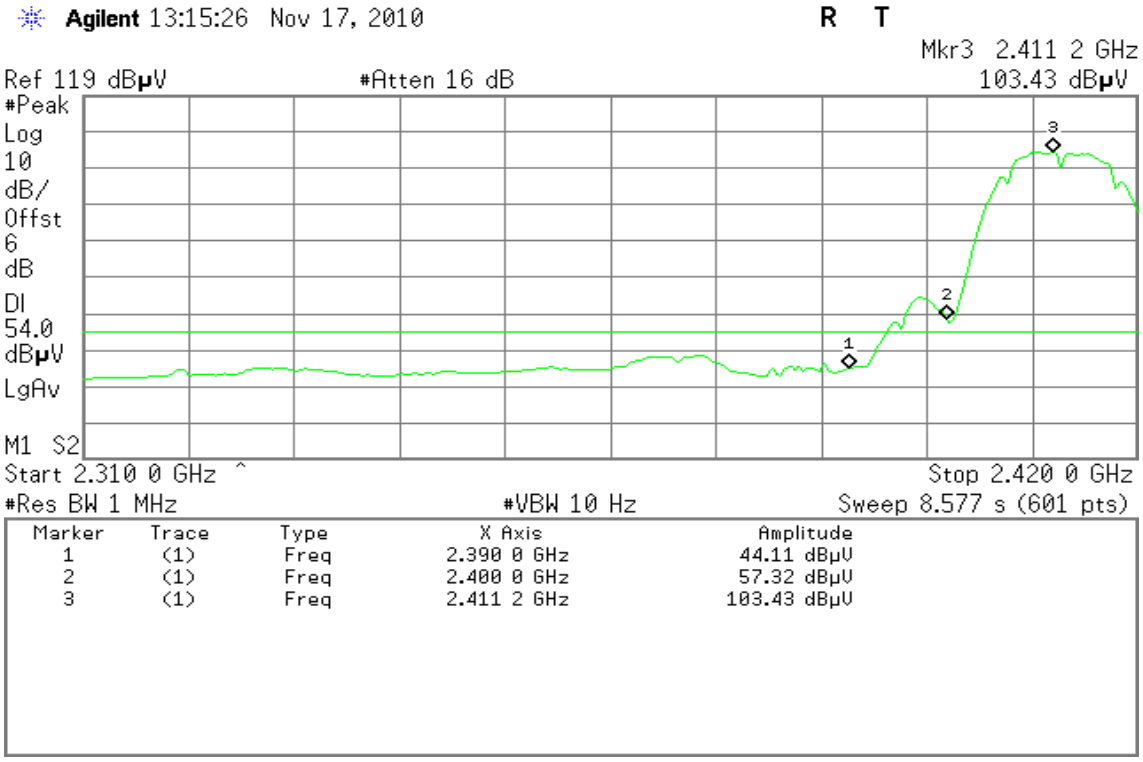
Refer to attach spectrum analyzer data chart.

## Band Edges (IEEE 802.11b mode / CH Low)

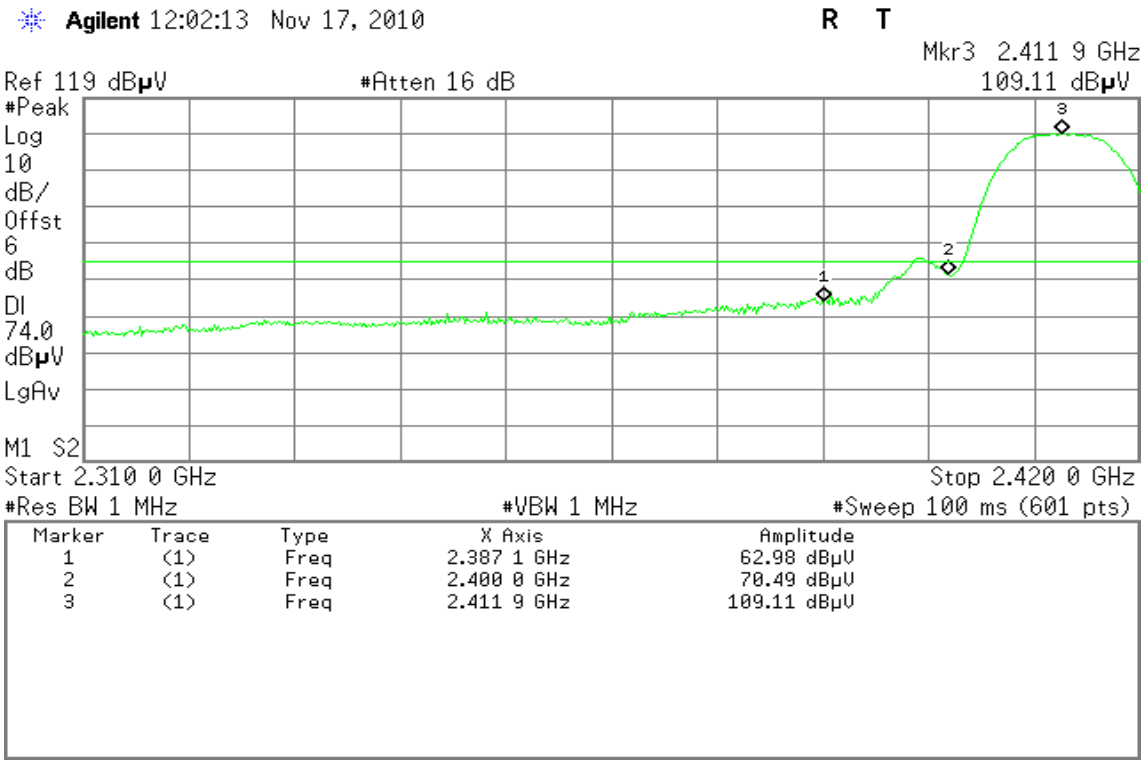
**Detector mode: Peak** **Polarity: Vertical**



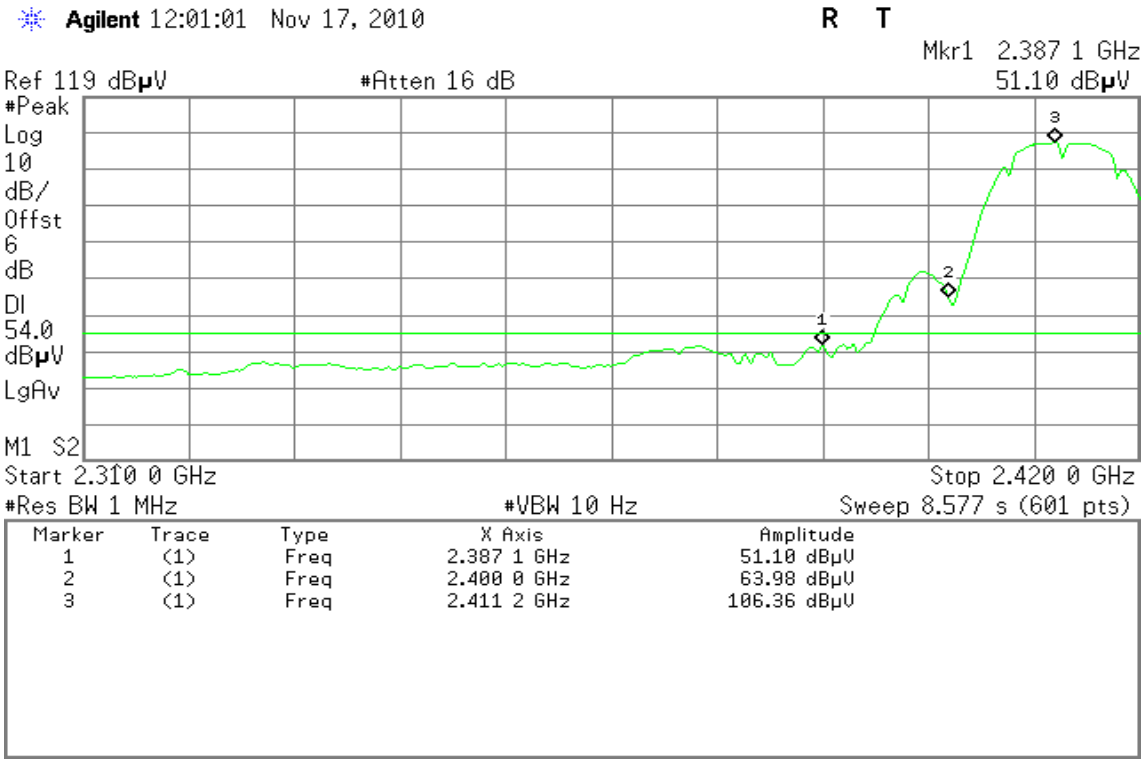

**Detector mode: Average** **Polarity: Vertical**



**Detector mode: Peak** **Polarity: Horizontal**

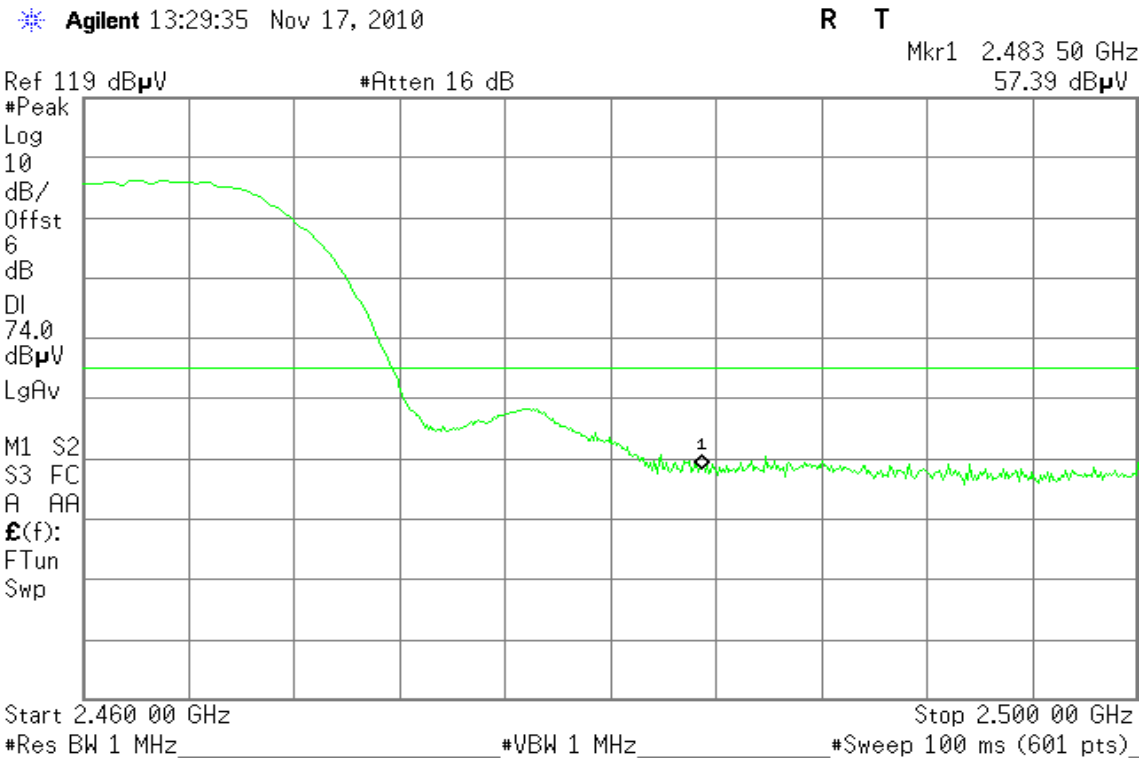



**Detector mode: Average** **Polarity: Horizontal**

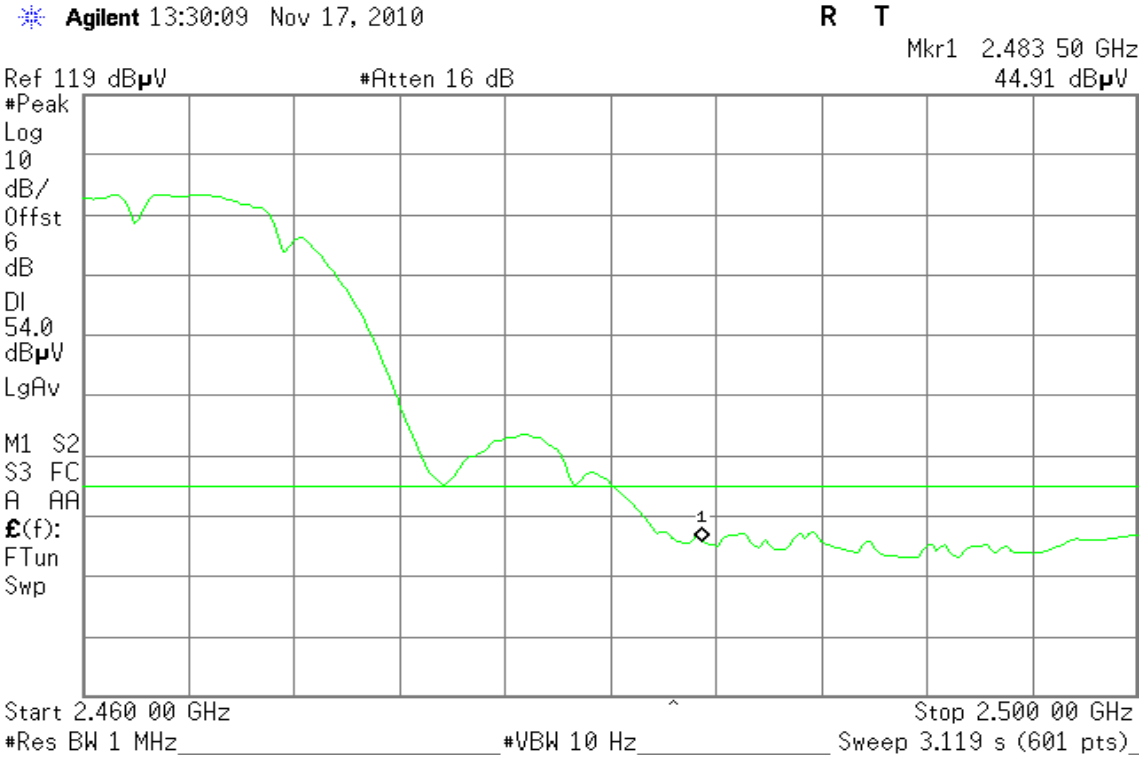


## Band Edges (IEEE 802.11b mode / CH High)

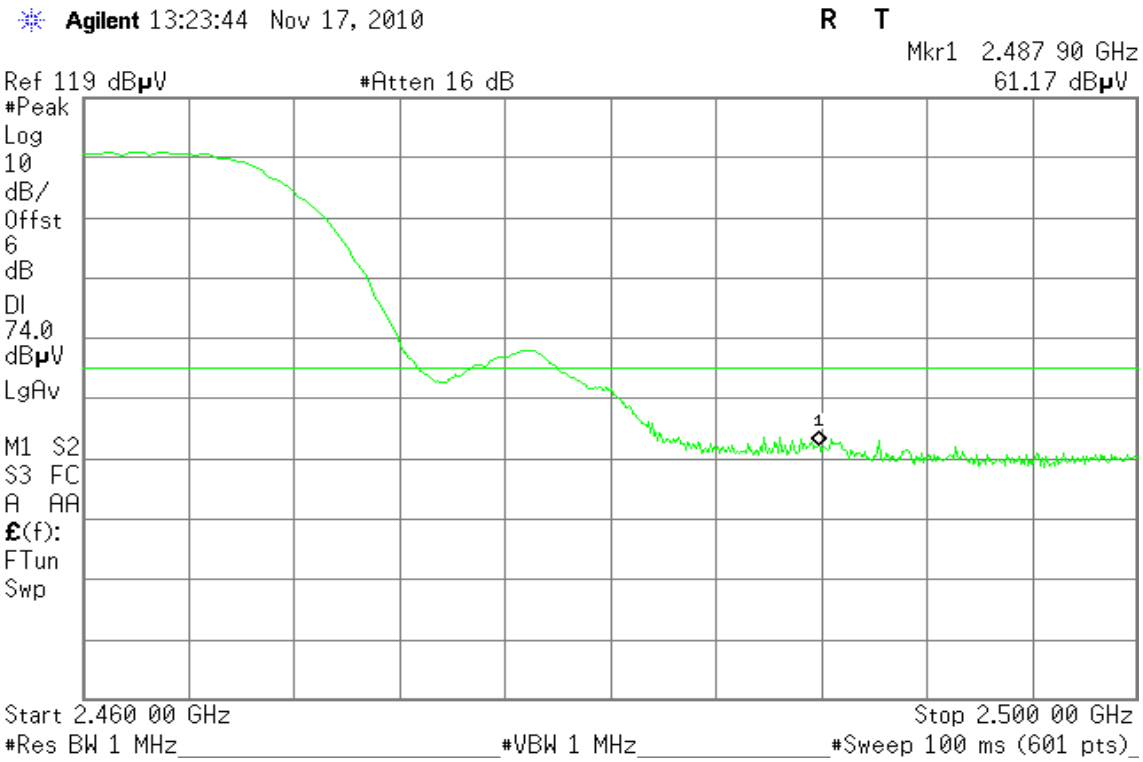
### Detector mode: Peak Polarity: Vertical



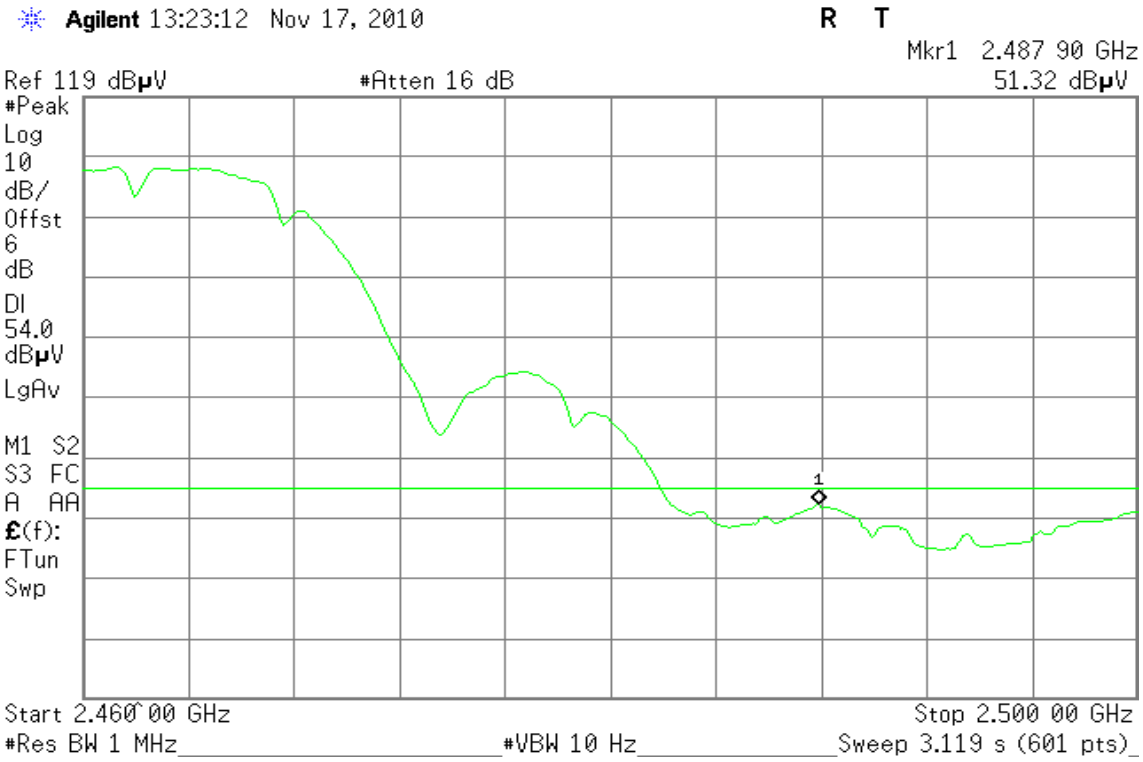

### Detector mode: Average Polarity: Vertical



**Detector mode: Peak** **Polarity: Horizontal**

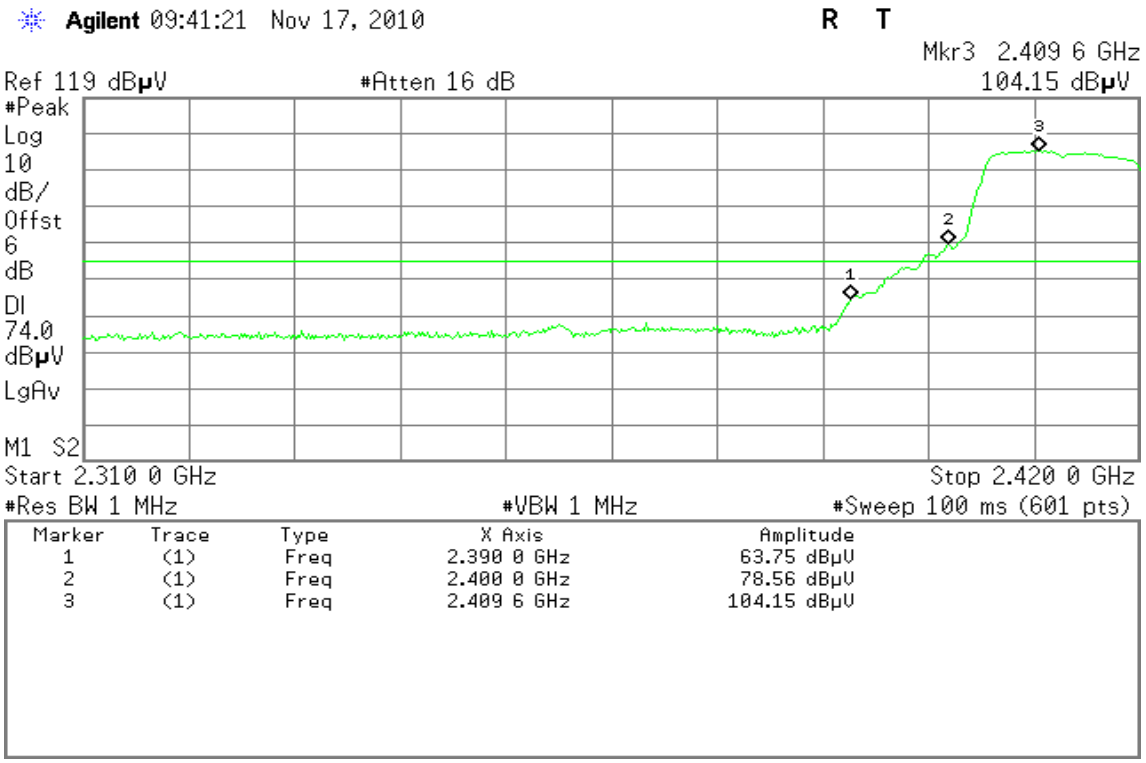



**Detector mode: Average** **Polarity: Horizontal**

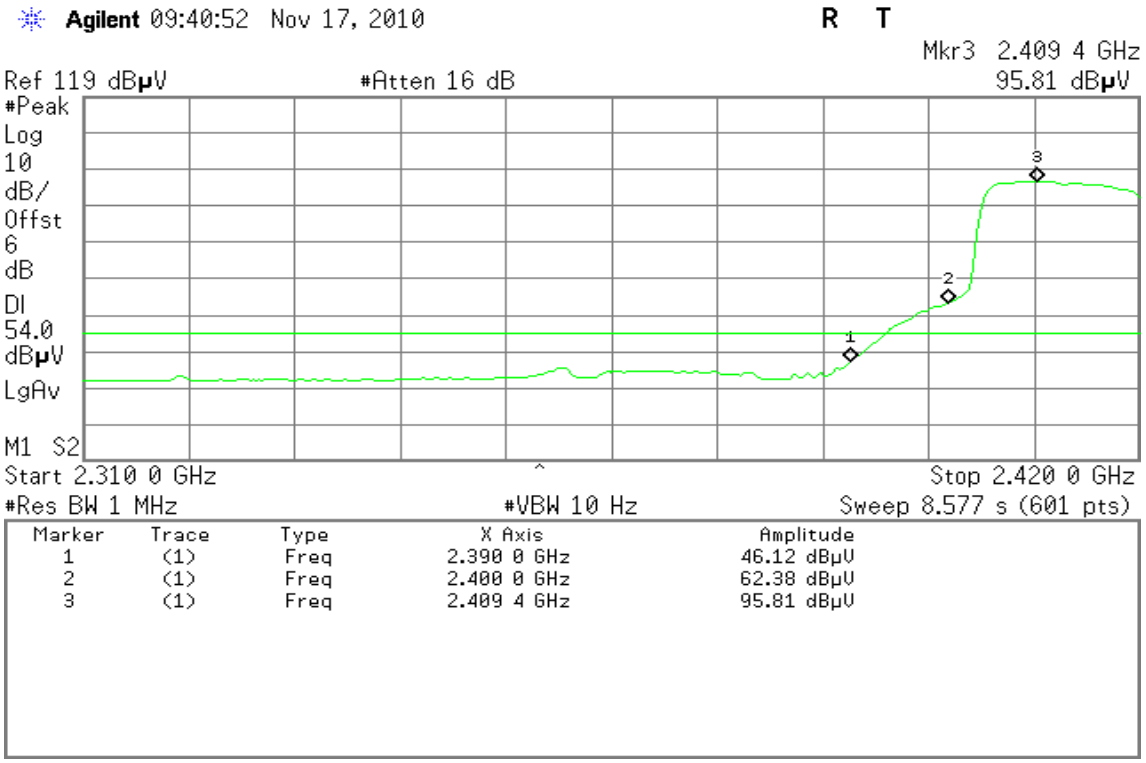


## Band Edges (IEEE 802.11g mode / CH Low)

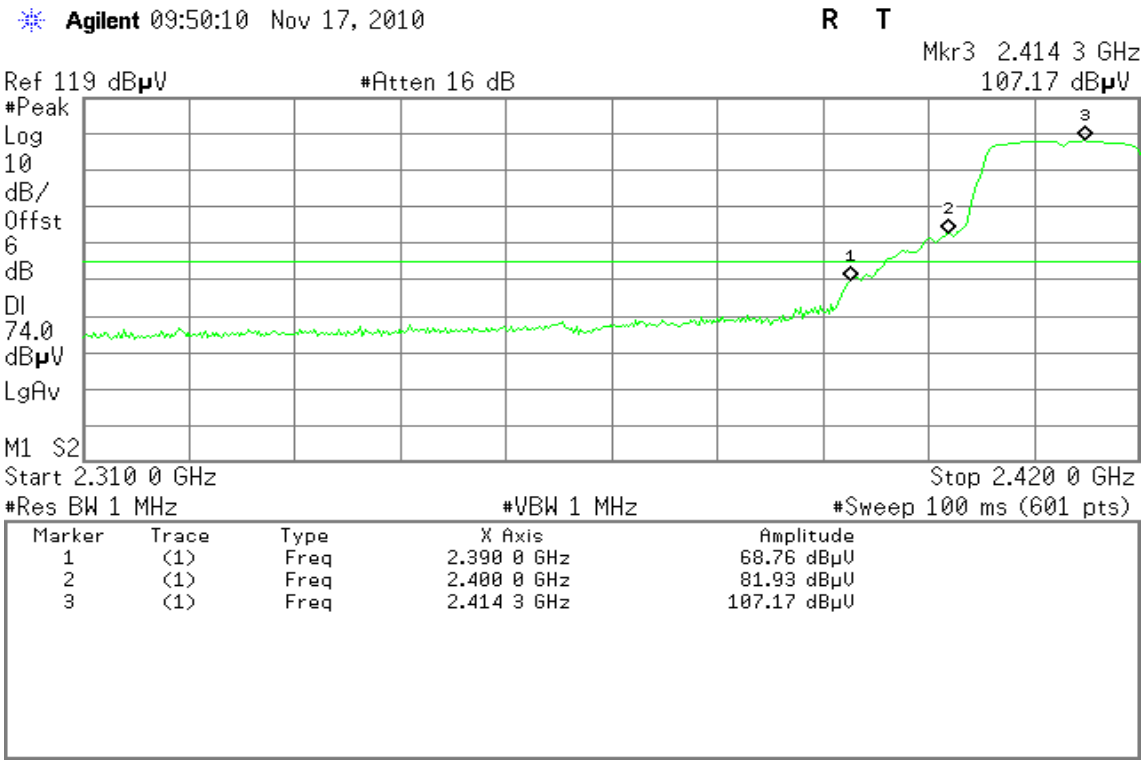
### Detector mode: Peak Polarity: Vertical



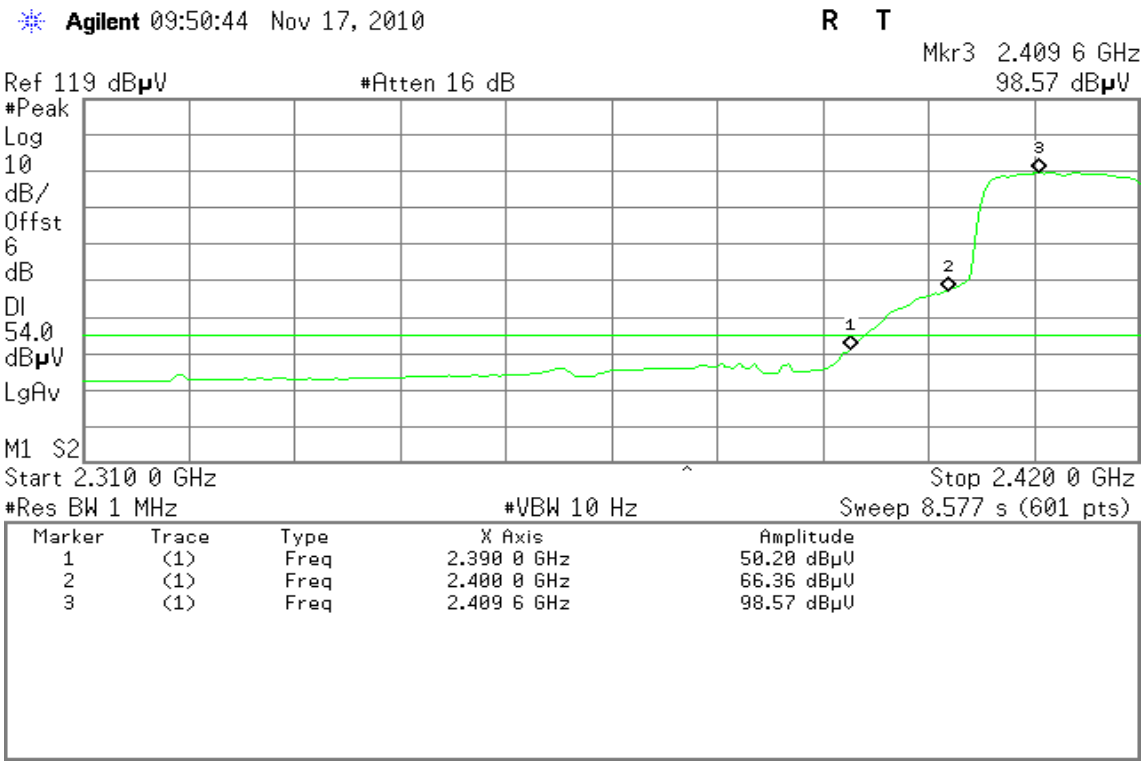

### Detector mode: Average Polarity: Vertical



**Detector mode: Peak** **Polarity: Horizontal**

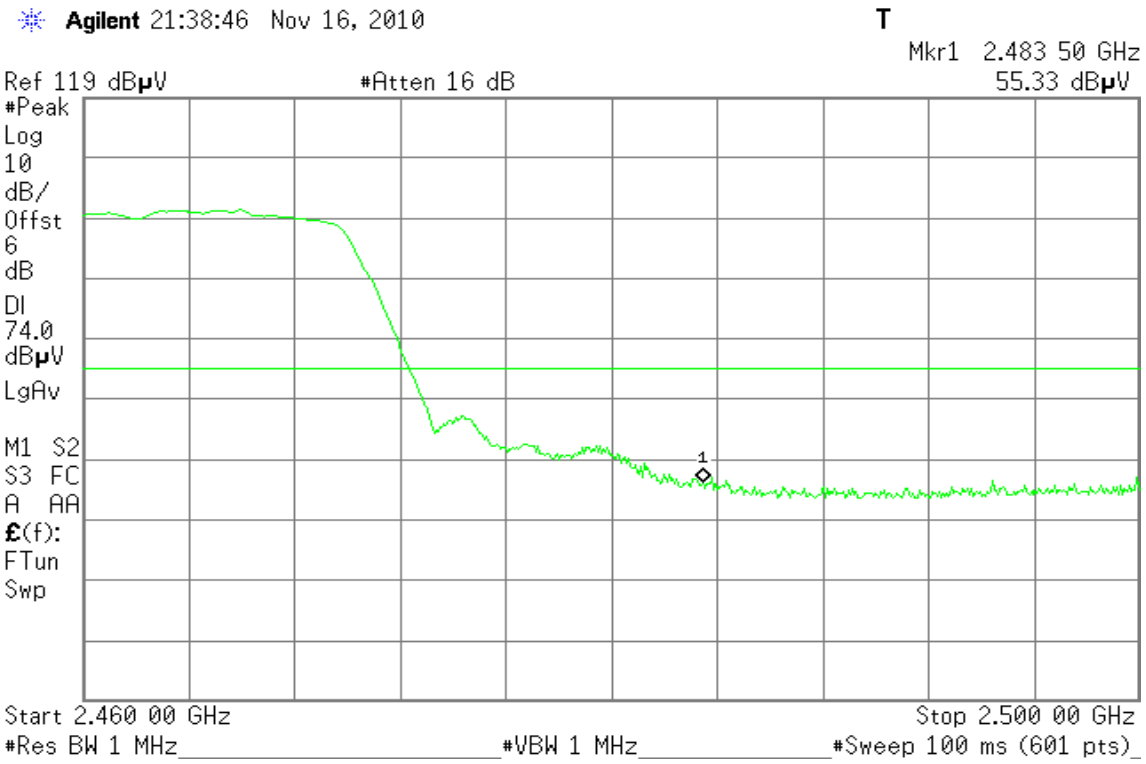



**Detector mode: Average** **Polarity: Horizontal**

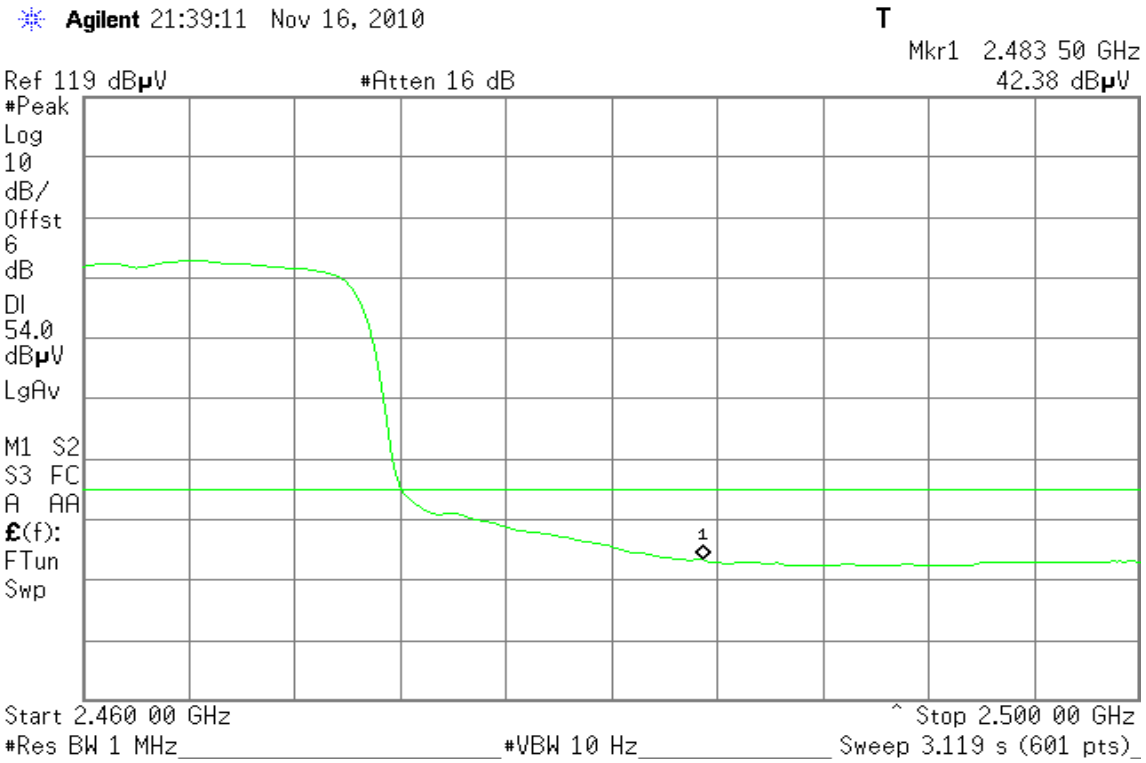


## Band Edges (IEEE 802.11g mode / CH High)

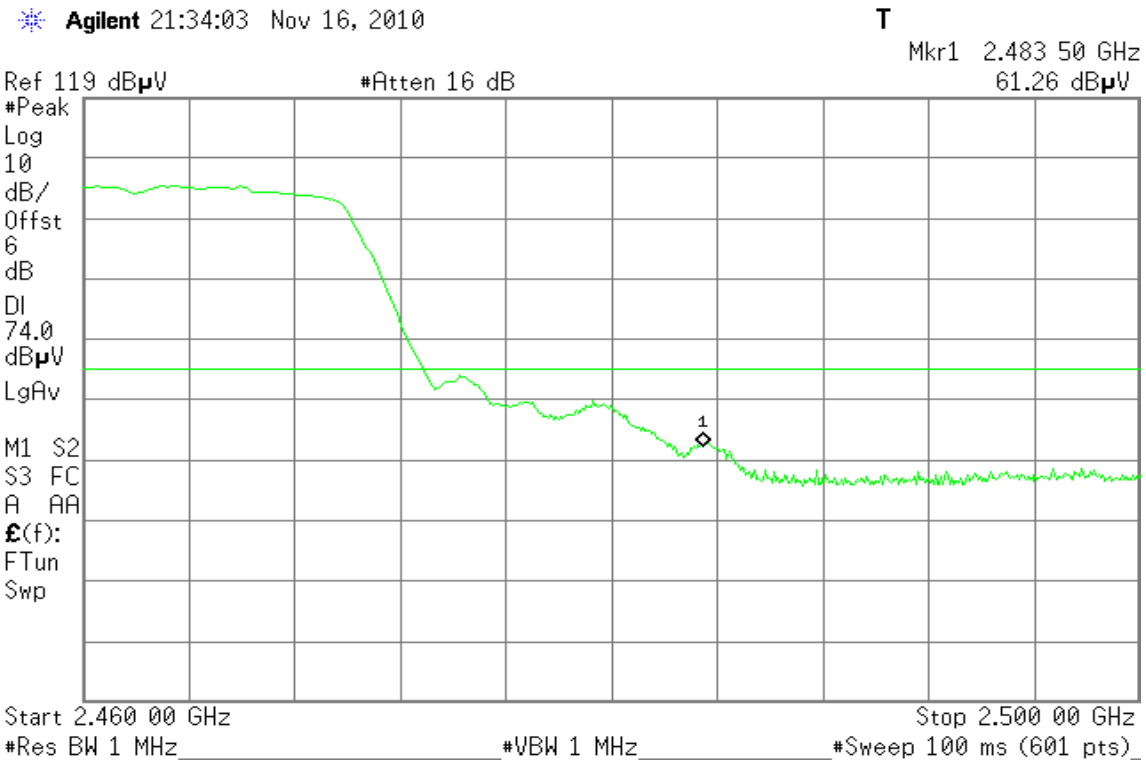
### Detector mode: Peak Polarity: Vertical



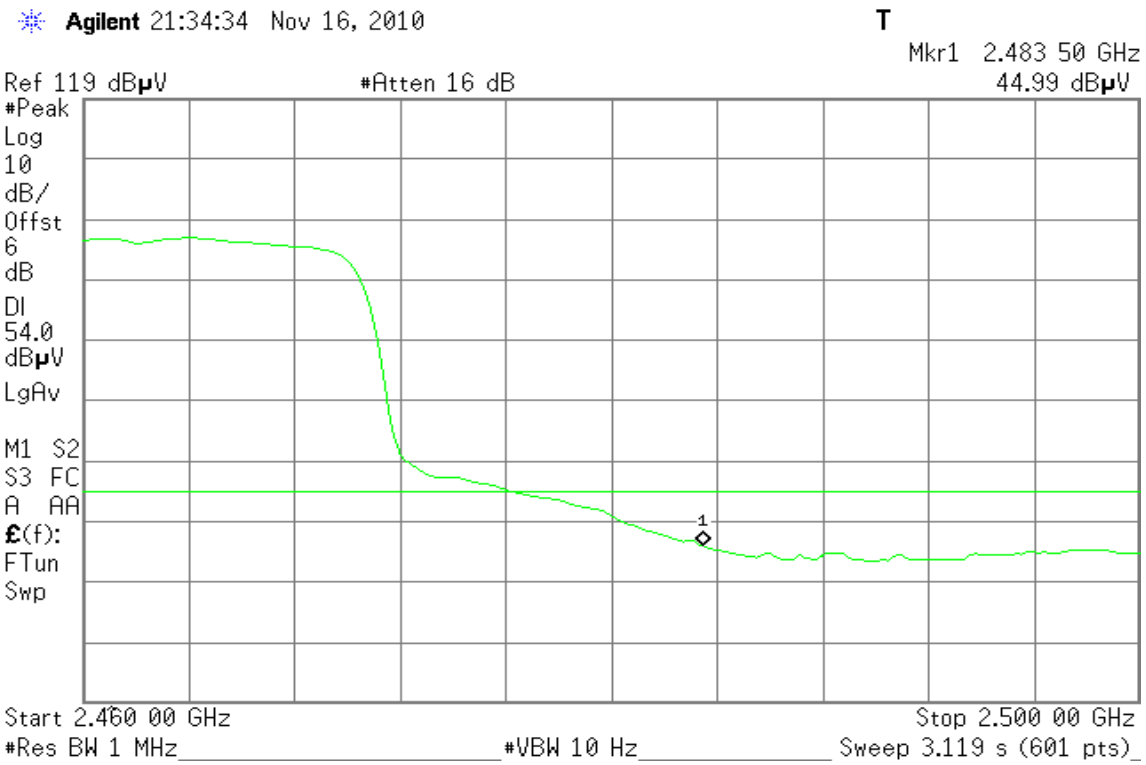

### Detector mode: Average Polarity: Vertical



**Detector mode: Peak** **Polarity: Horizontal**

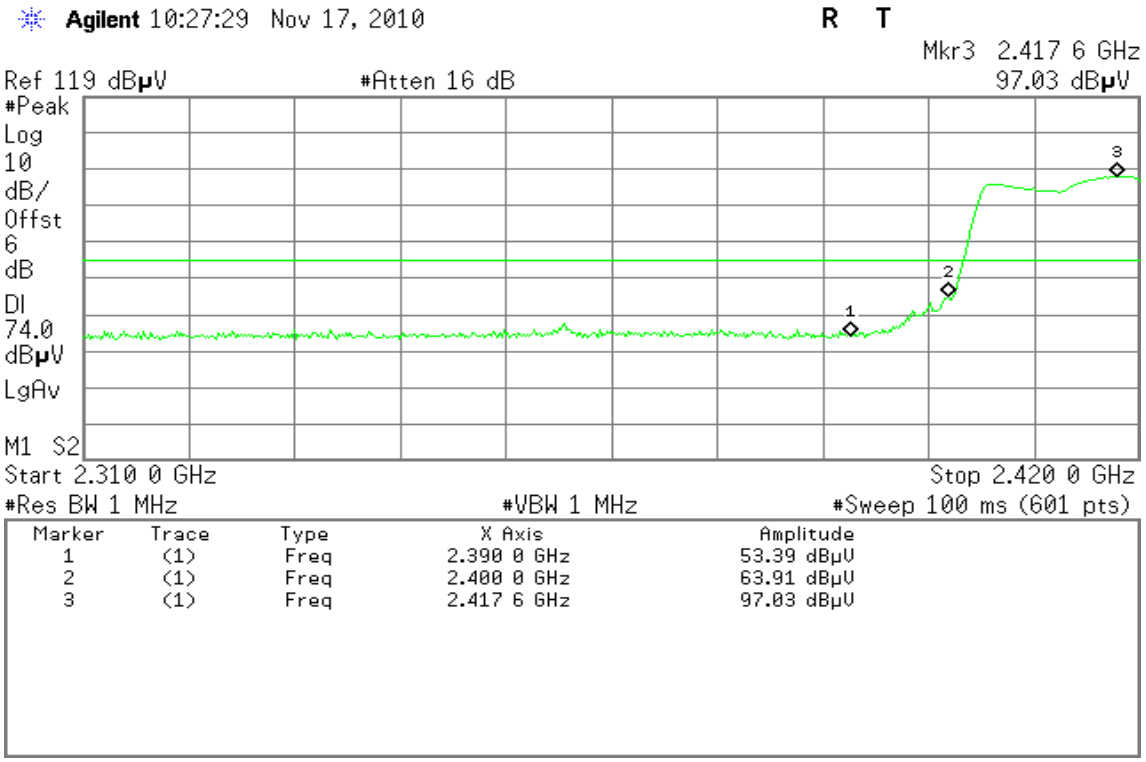



**Detector mode: Average** **Polarity: Horizontal**

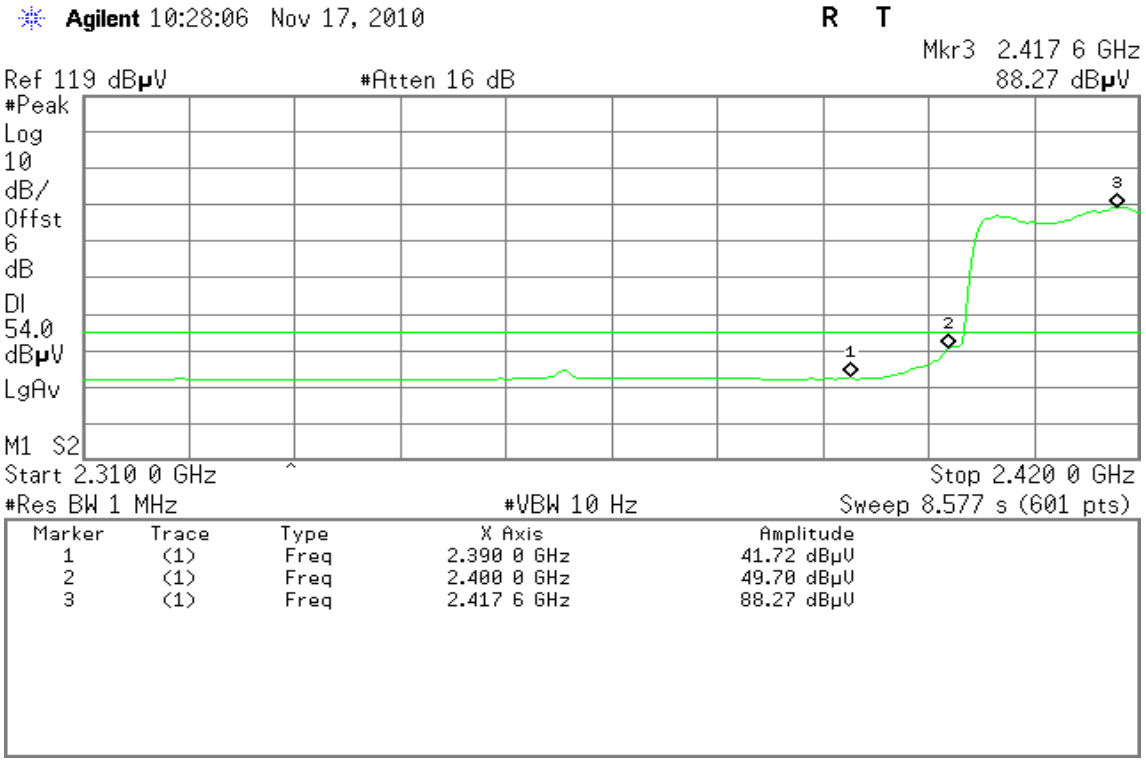


**Band Edges (IEEE 802.11n HT 20 MHz mode / CH Low)**

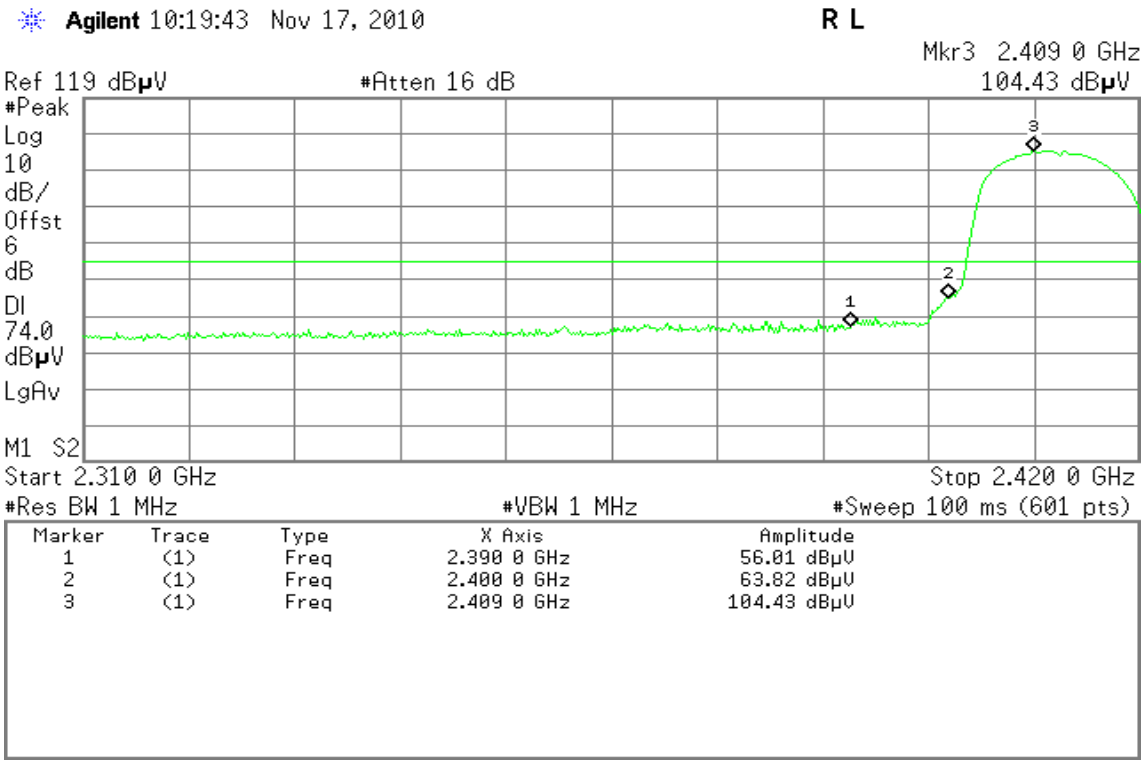
**Detector mode: Peak** **Polarity: Vertical**



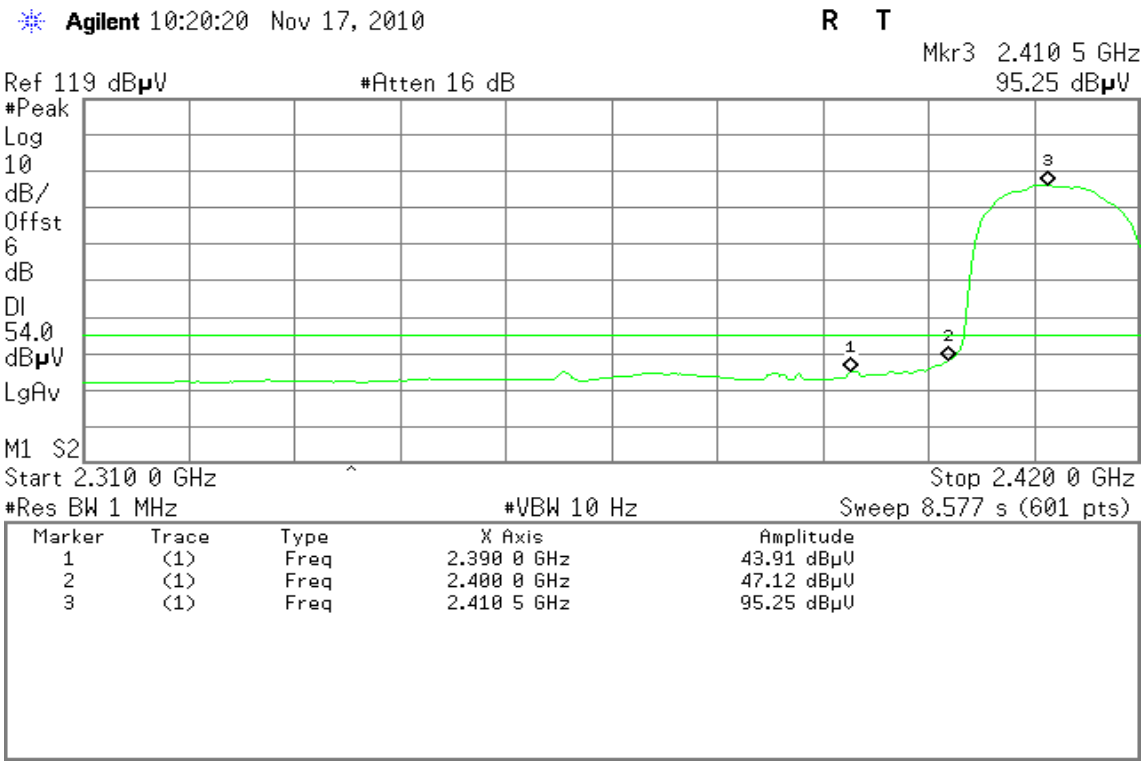

**Detector mode: Average** **Polarity: Vertical**



**Detector mode: Peak** **Polarity: Horizontal**

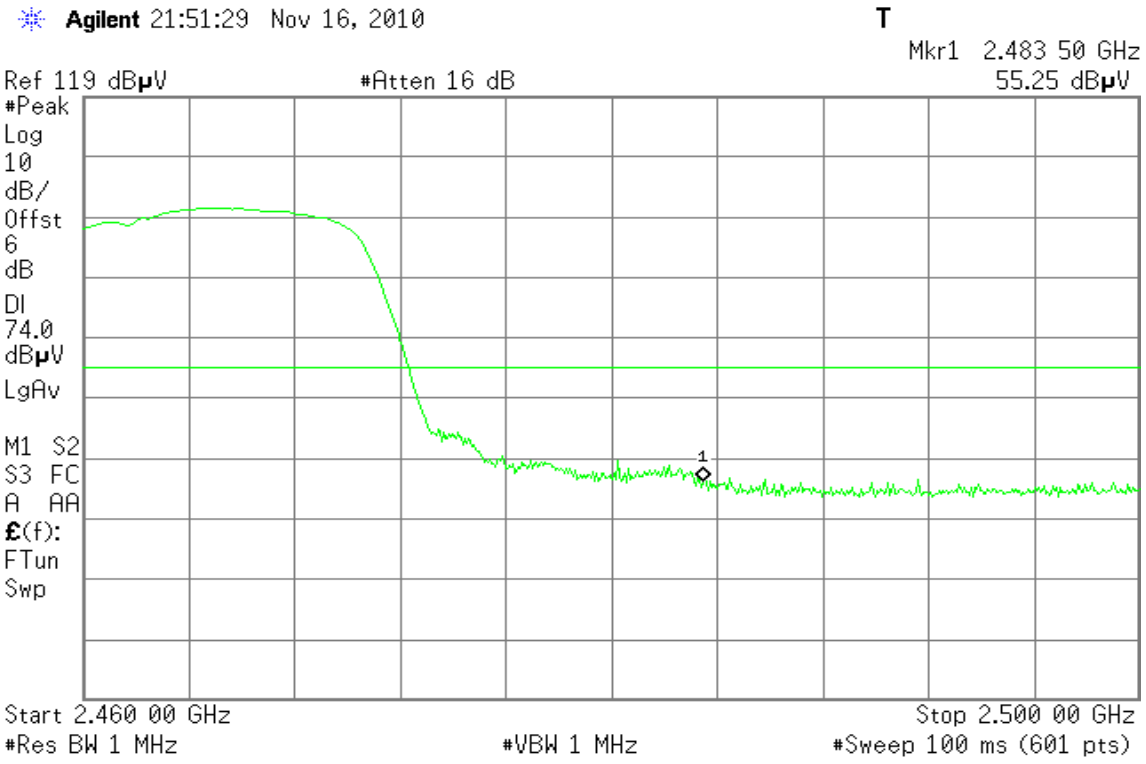



**Detector mode: Average** **Polarity: Horizontal**

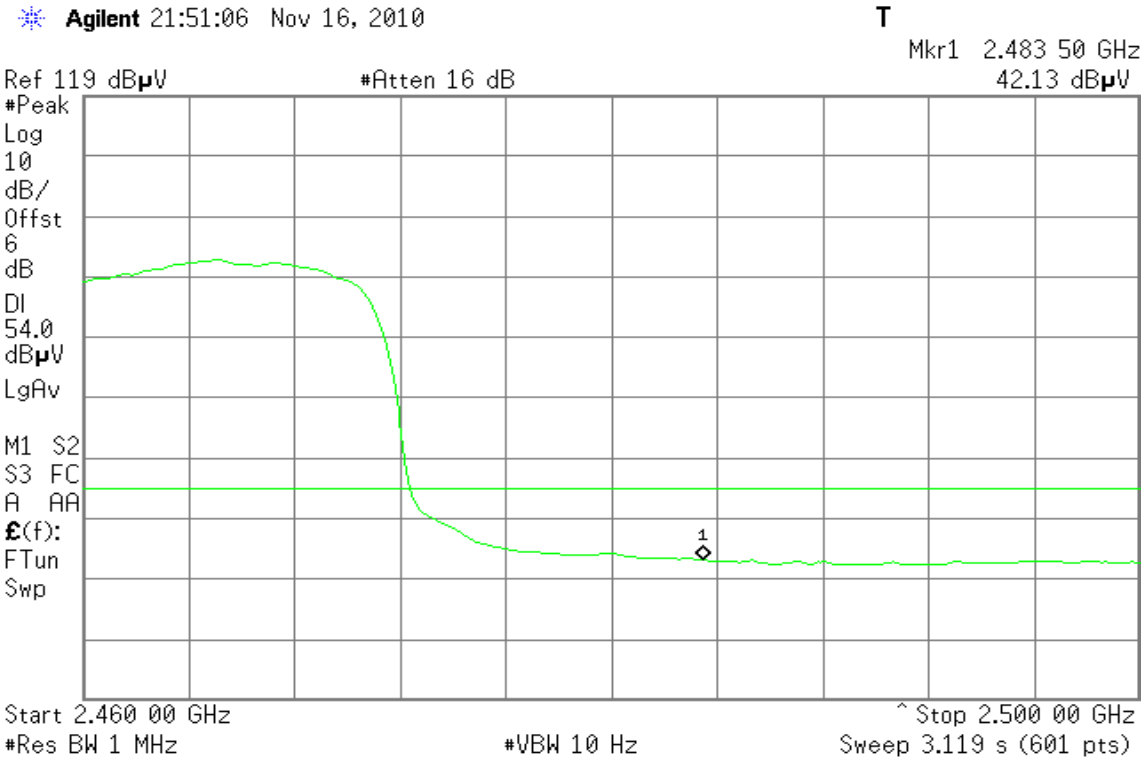


**Band Edges (IEEE 802.11n HT 20 MHz mode / CH High)**

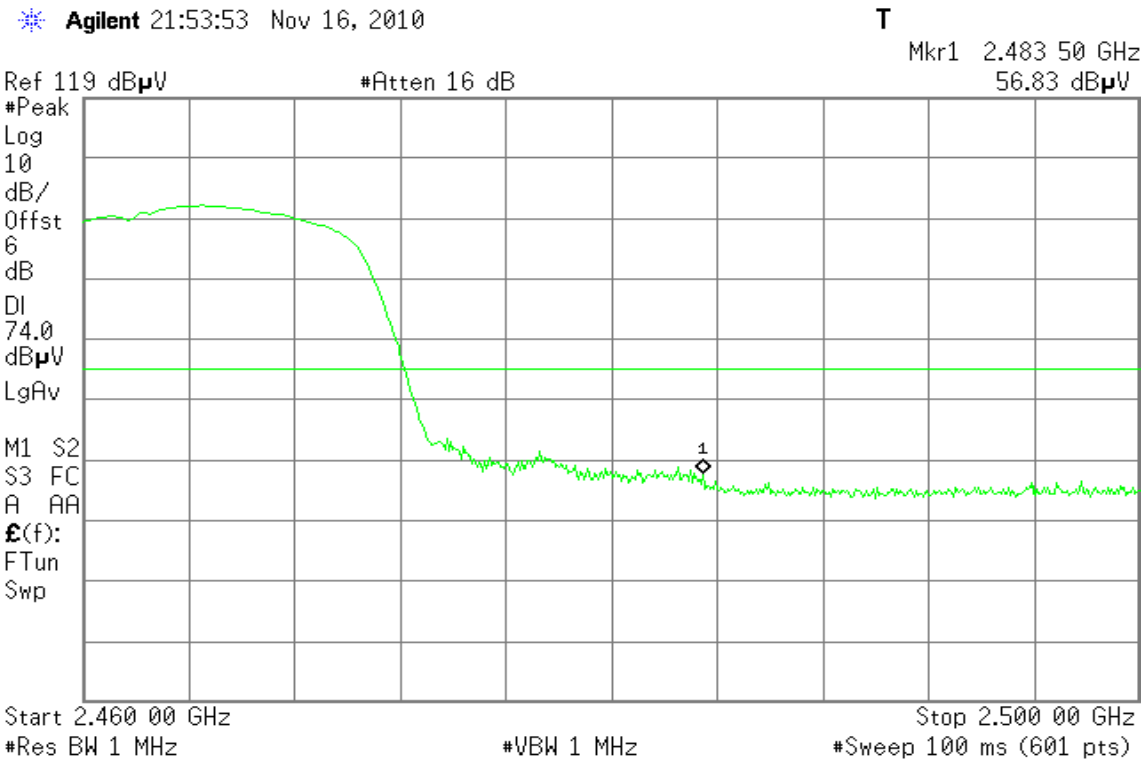
**Detector mode: Peak** **Polarity: Vertical**



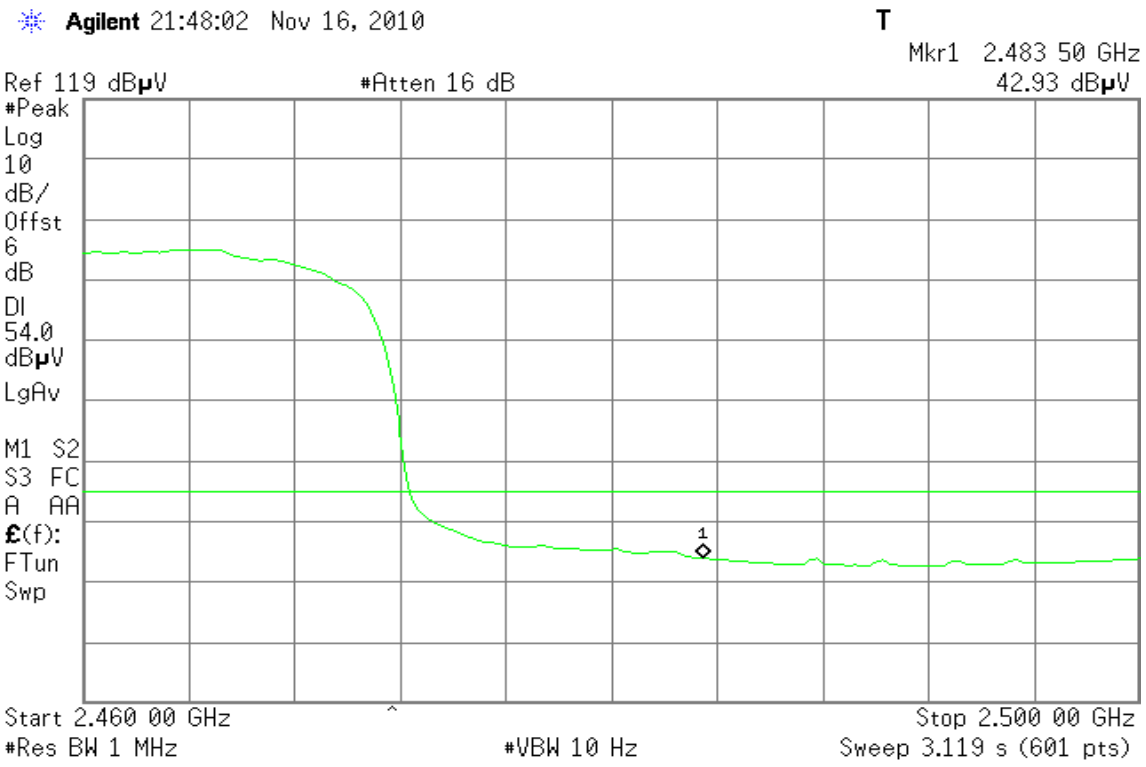

**Detector mode: Average** **Polarity: Vertical**



**Detector mode: Peak** **Polarity: Horizontal**

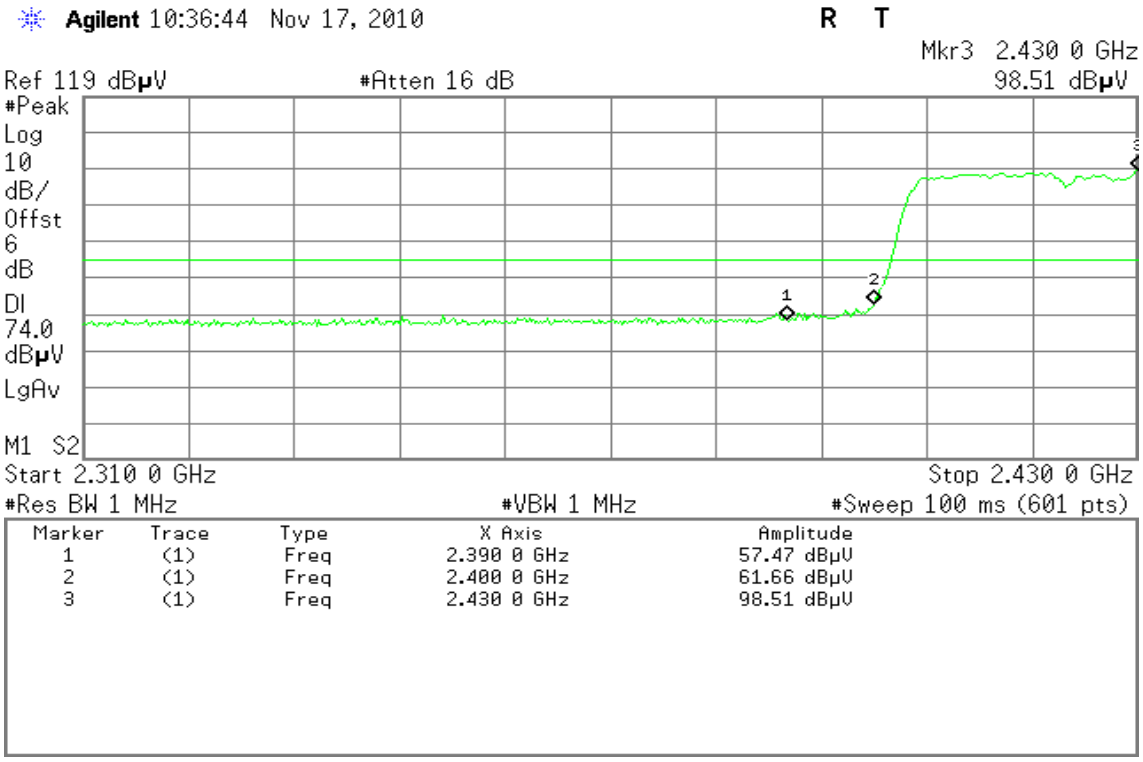



**Detector mode: Average** **Polarity: Horizontal**

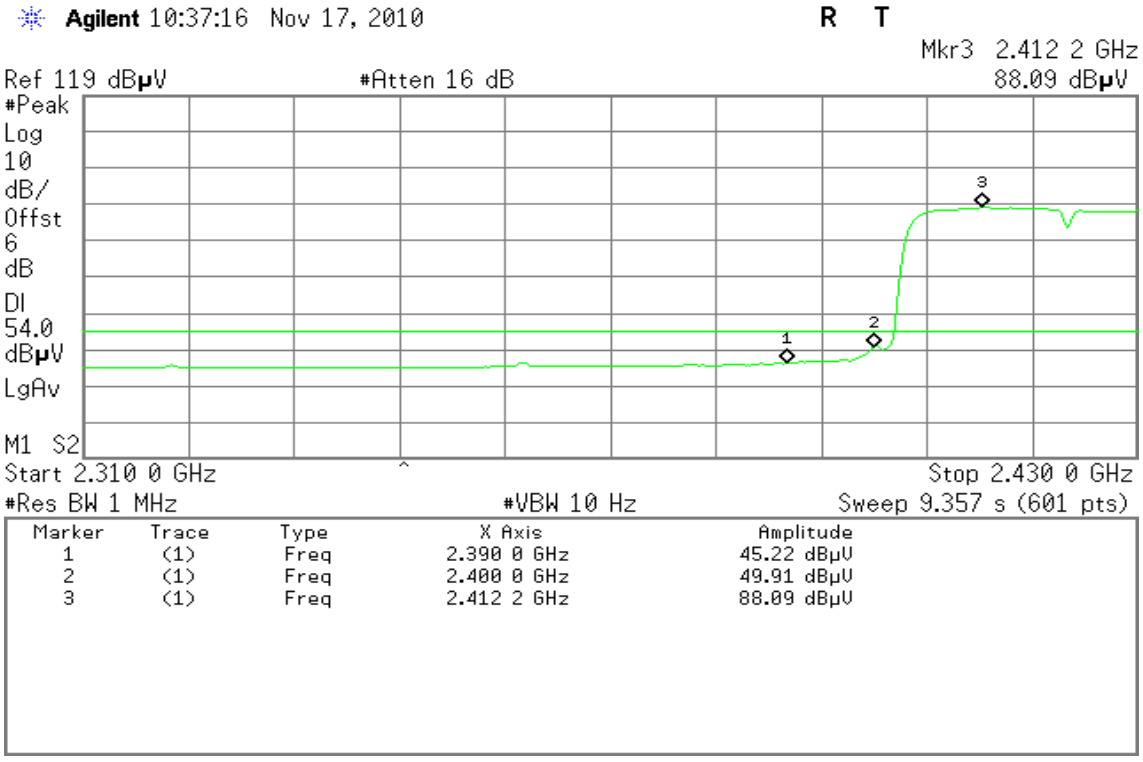


**Band Edges (IEEE 802.11n HT 40 MHz mode / CH Low)**

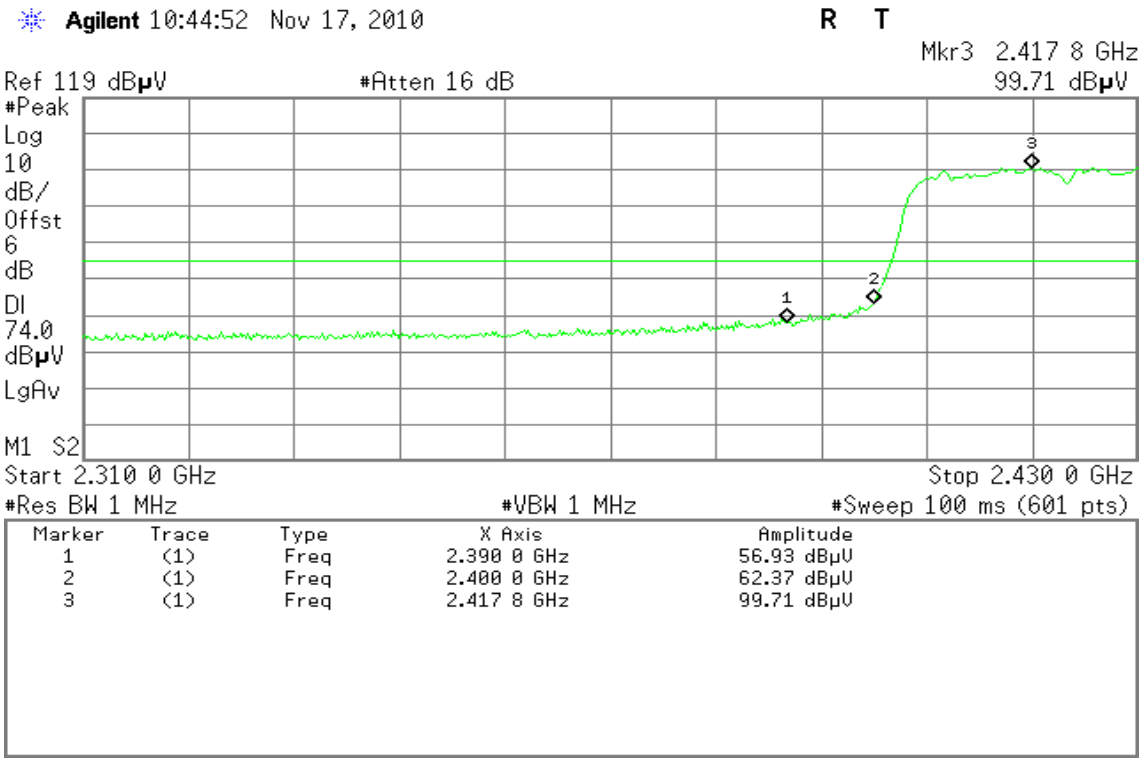
**Detector mode: Peak** **Polarity: Vertical**



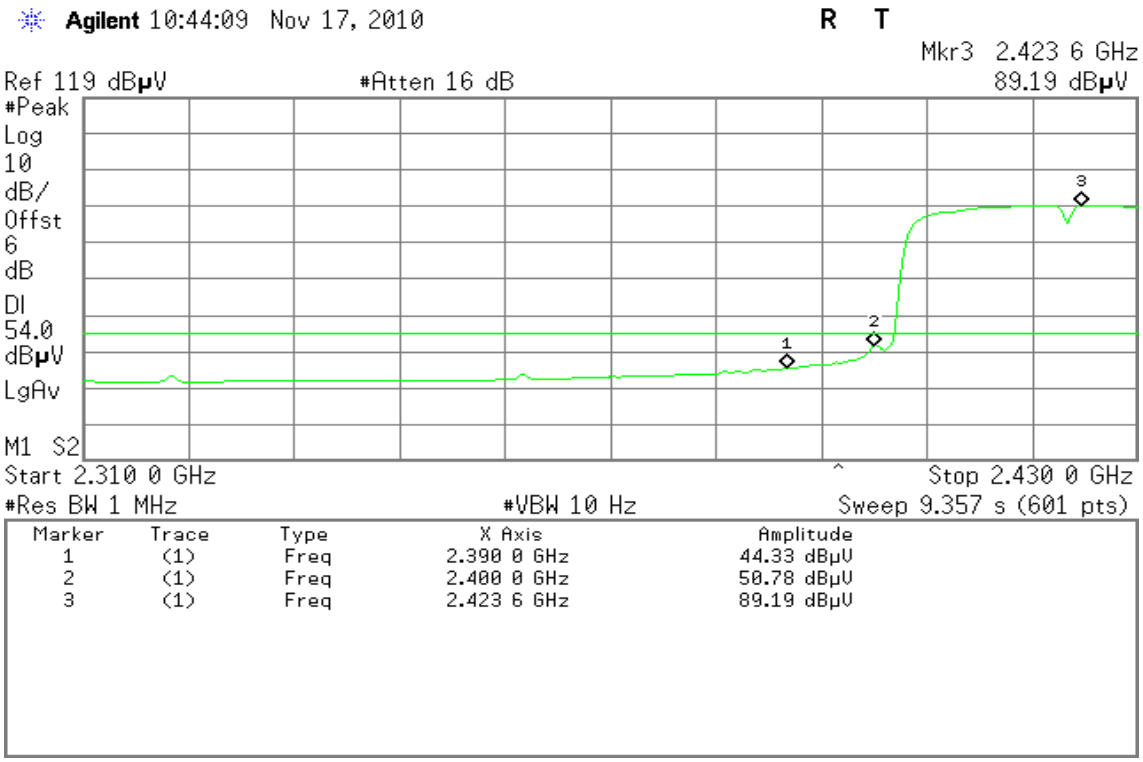

**Detector mode: Average** **Polarity: Vertical**



**Detector mode: Peak** **Polarity: Horizontal**

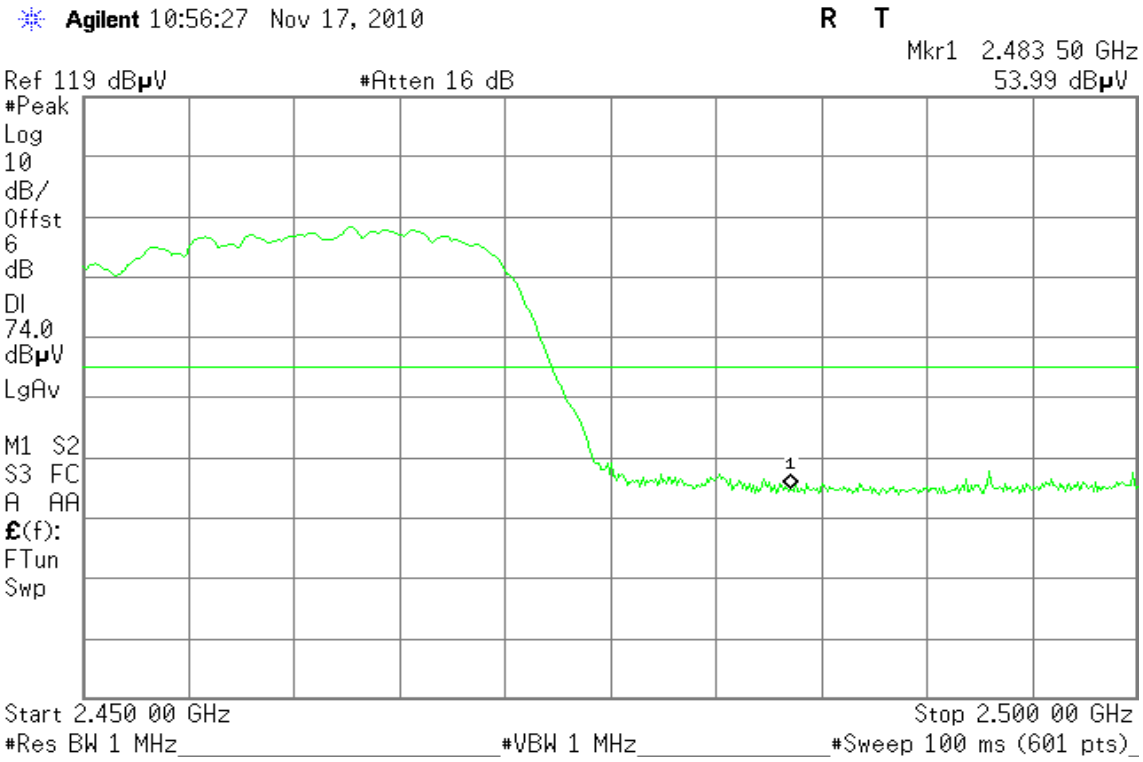



**Detector mode: Average** **Polarity: Horizontal**

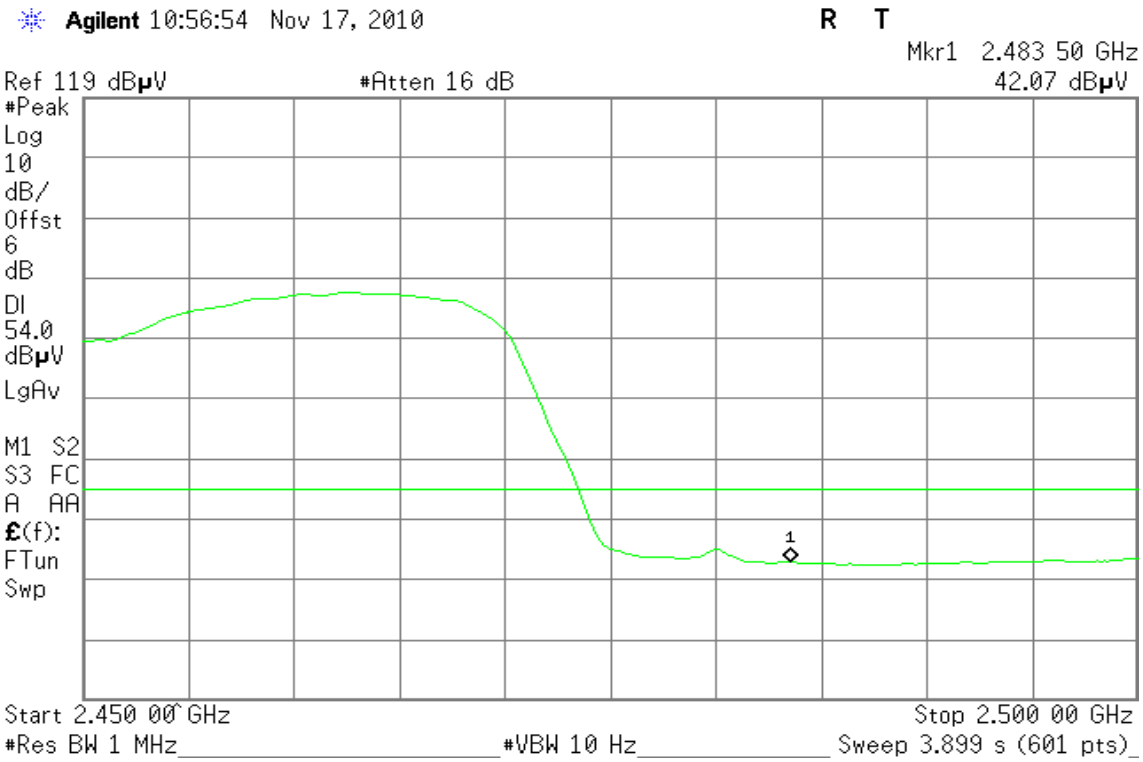


**Band Edges (IEEE 802.11n HT 40 MHz mode / CH High)**

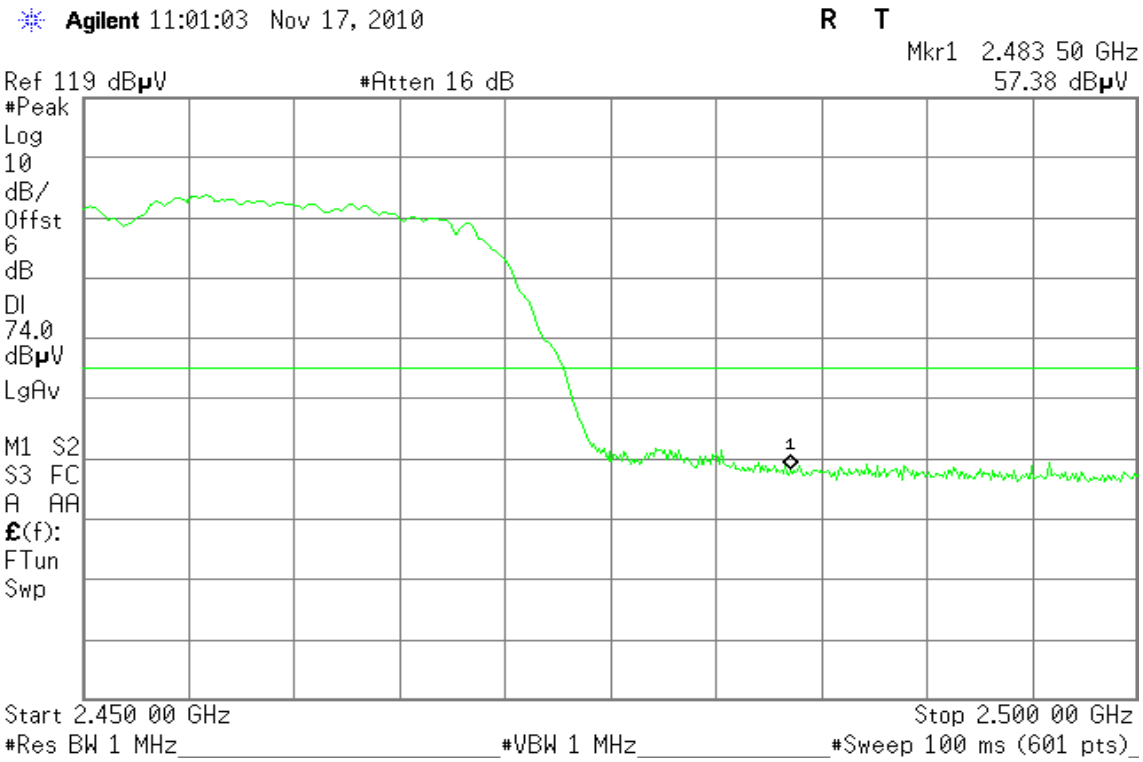
**Detector mode: Peak** **Polarity: Vertical**



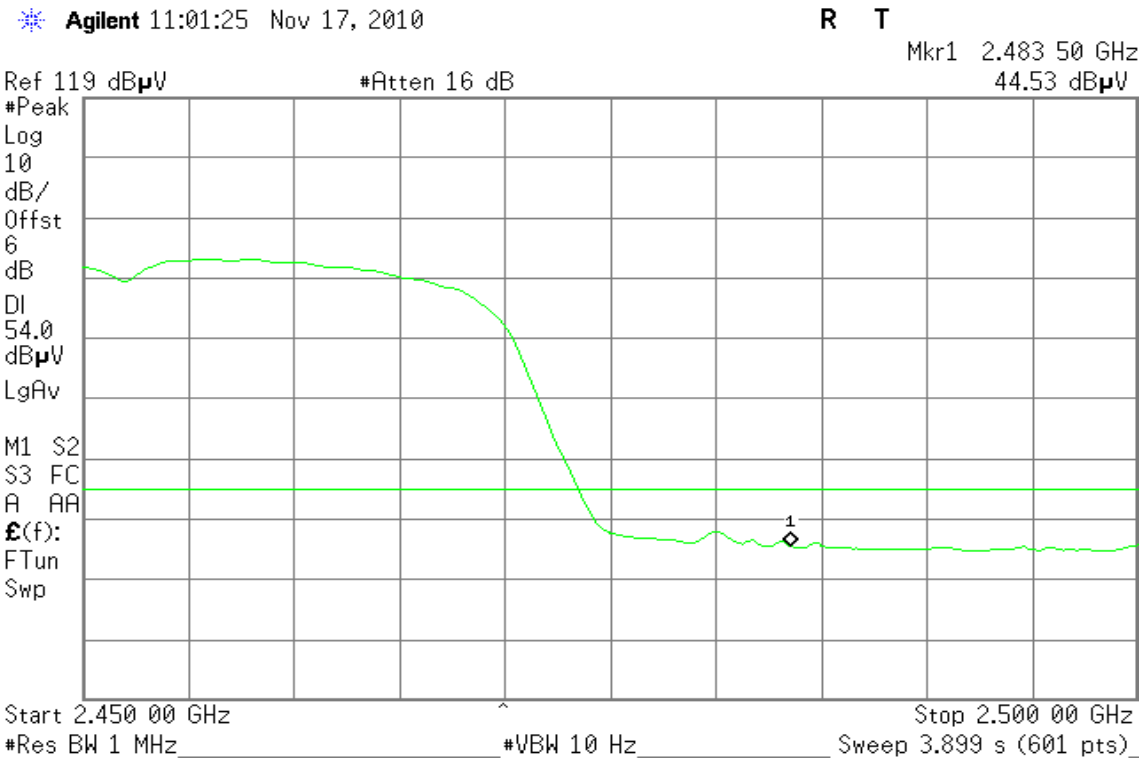

**Detector mode: Average** **Polarity: Vertical**



**Detector mode: Peak** **Polarity: Horizontal**




**Detector mode: Average** **Polarity: Horizontal**

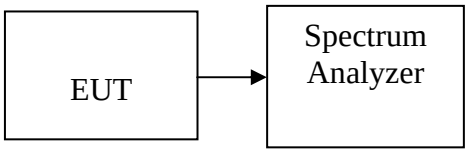


## 7.5 PEAK POWER SPECTRAL DENSITY

## LIMIT

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.

**Test Configuration**




## TEST PROCEDURE

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 = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep time = 100 s
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

## TEST RESULTS

*No non-compliance noted.*

## Test Data

### Test mode: IEEE 802.11b mode

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| Low | 2412 | -9.90 | 8.00 | PASS |
| Mid | 2437 | -10.59 | | PASS |
| High | 2462 | -10.82 | | PASS |

### Test mode: IEEE 802.11g mode

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| Low | 2412 | -17.74 | 8.00 | PASS |
| Mid | 2437 | -17.98 | | PASS |
| High | 2462 | -16.06 | | PASS |

### Test mode: IEEE 802.11n HT 20 MHz mode

| Channel | Frequency (MHz) | Chain 0 PPSD (dBm) | Chain 1 PPSD (dBm) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| Low | 2412 | -20.96 | -23.38 | -8.43 | 8.00 | PASS |
| Mid | 2437 | -21.76 | -21.98 | -6.21 | | PASS |
| High | 2462 | -21.77 | -24.27 | -6.31 | | PASS |

### Test mode: IEEE 802.11n HT 40 MHz mode

| Channel | Frequency (MHz) | Chain 0 PPSD (dBm) | Chain 1 PPSD (dBm) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|---|---|
| Low | 2422 | -21.90 | -24.30 | -14.42 | 8.00 | PASS |
| Mid | 2437 | -21.75 | -24.50 | -8.36 | | PASS |
| High | 2452 | -21.63 | -24.65 | -8.65 | | PASS |

***Remark:*** *Total PPSD (dBm) = 10*LOG(10^(Chain 0 PPSD / 10)+10^(Chain 1 PPSD /10))*

## Test mode: IEEE 802.11n HT 20 MHz mode with combiner

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| Low | 2412 | -15.68 | 7.00 | PASS |
| Mid | 2437 | -17.95 | | PASS |
| High | 2462 | -20.23 | | PASS |

## Test mode: IEEE 802.11n HT 40 MHz mode with combiner

| Channel | Frequency (MHz) | PPSD (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| Low | 2422 | -19.20 | 7.00 | PASS |
| Mid | 2437 | -19.20 | | PASS |
| High | 2452 | -18.24 | | PASS |

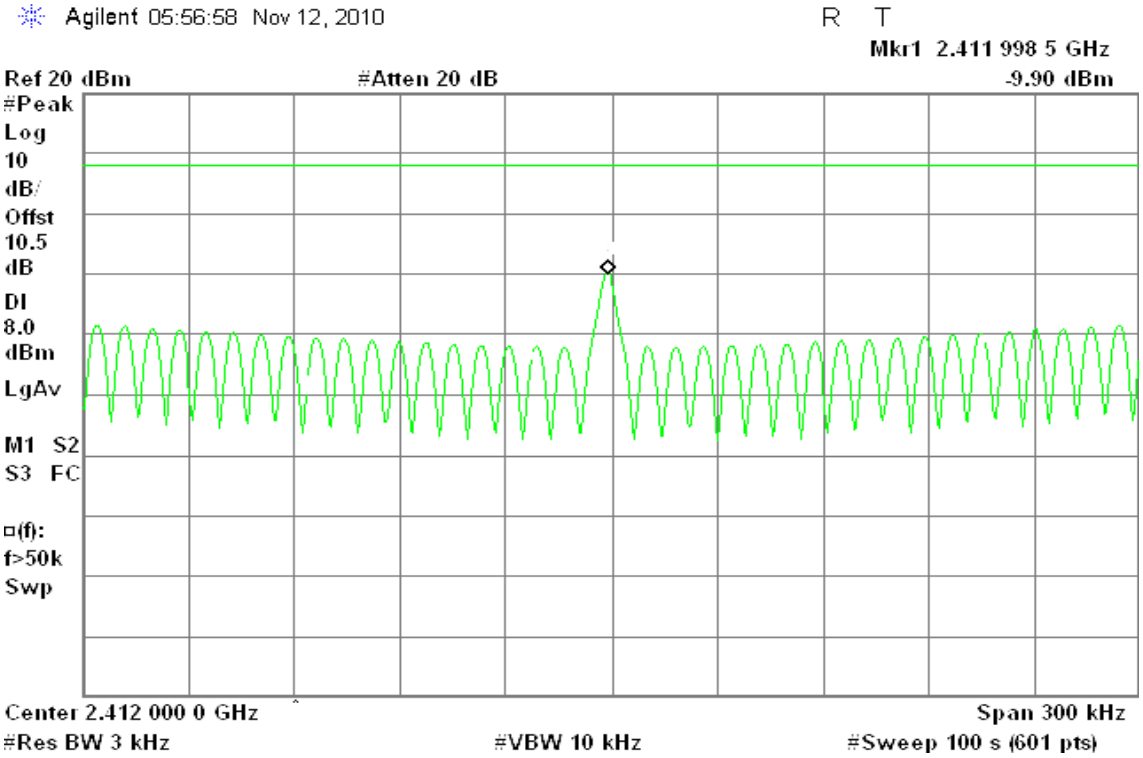
***Remark:***

*The maximum antenna gain is 6.01dBi; therefore the reduction due to antenna gain is 1dBi, so the limit is 7dBm.*

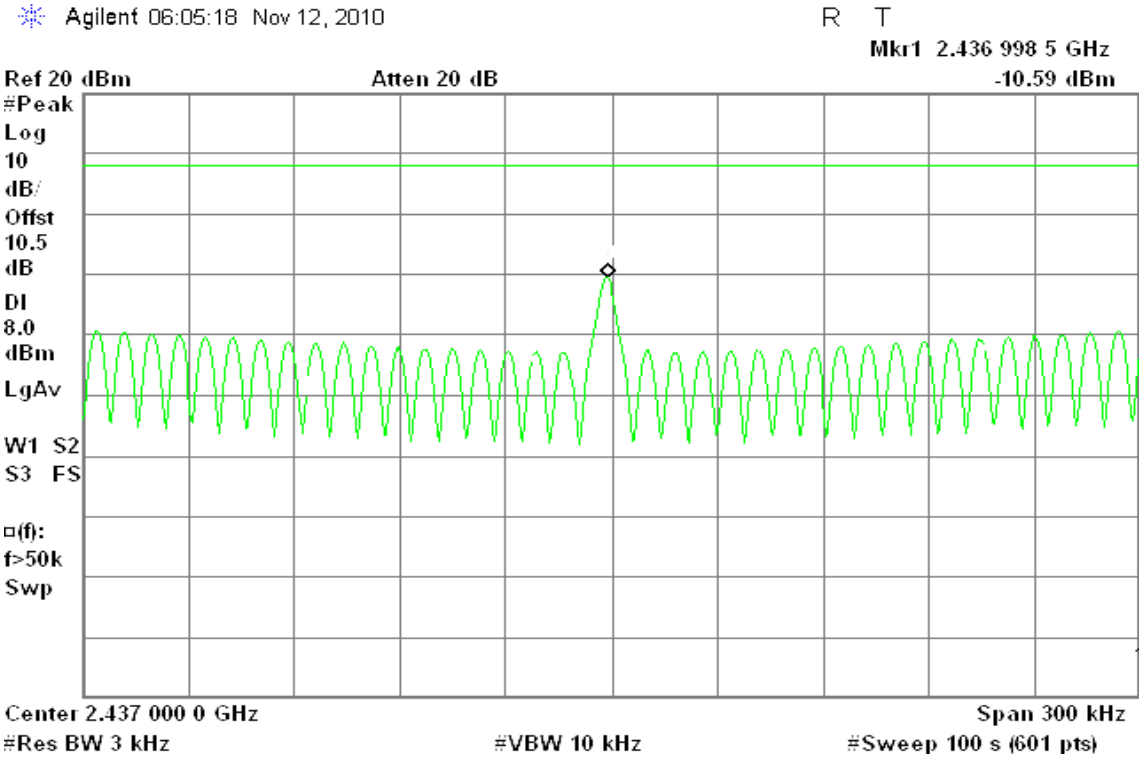
## Test Plot

## IEEE 802.11b mode

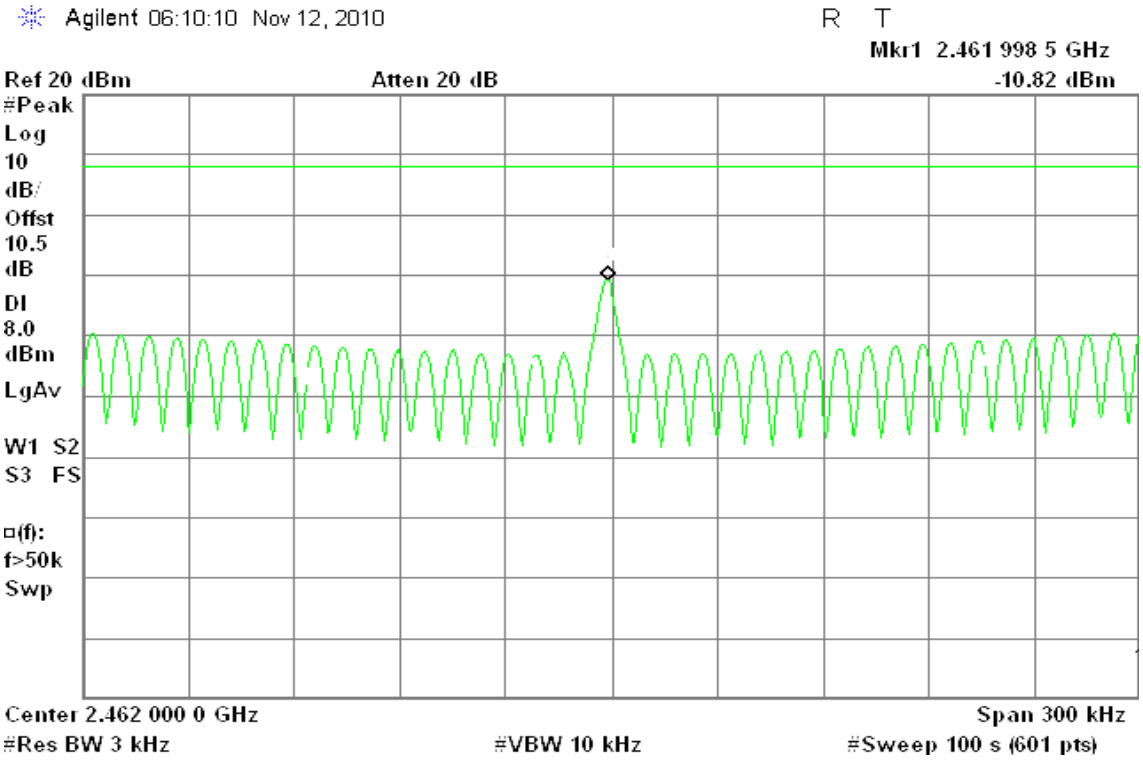
### PPSD (CH Low)




### PPSD (CH Mid)

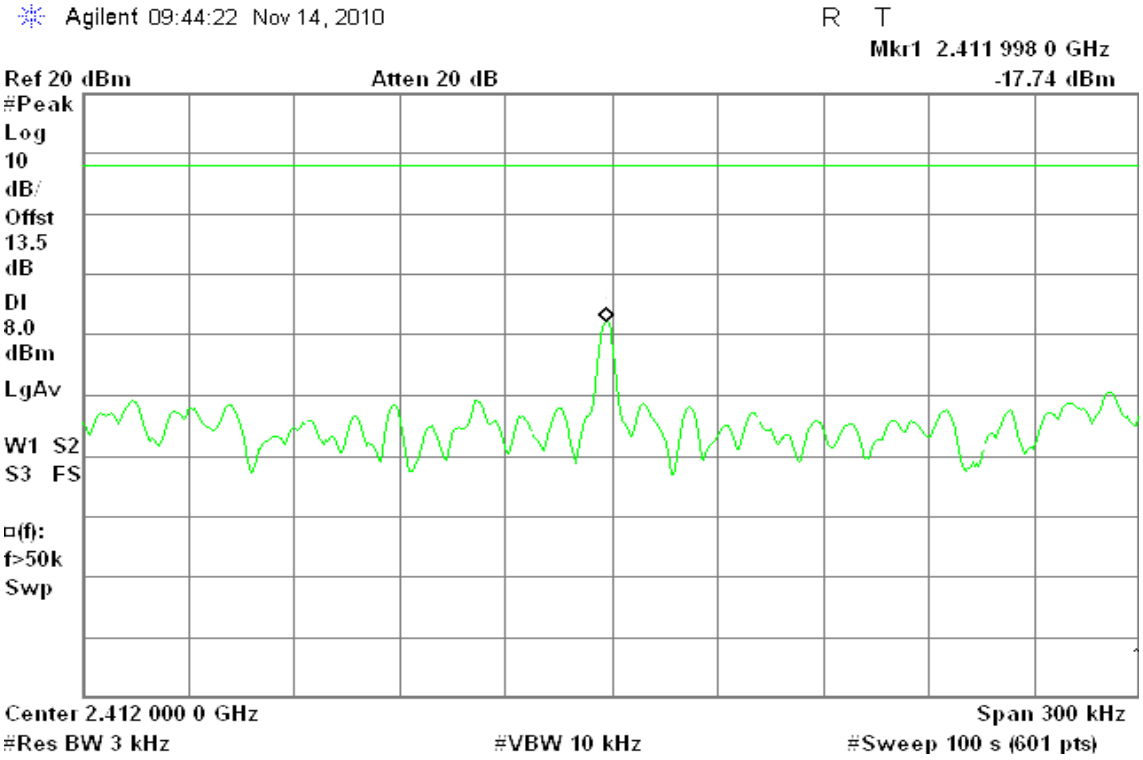


## PPSD (CH High)

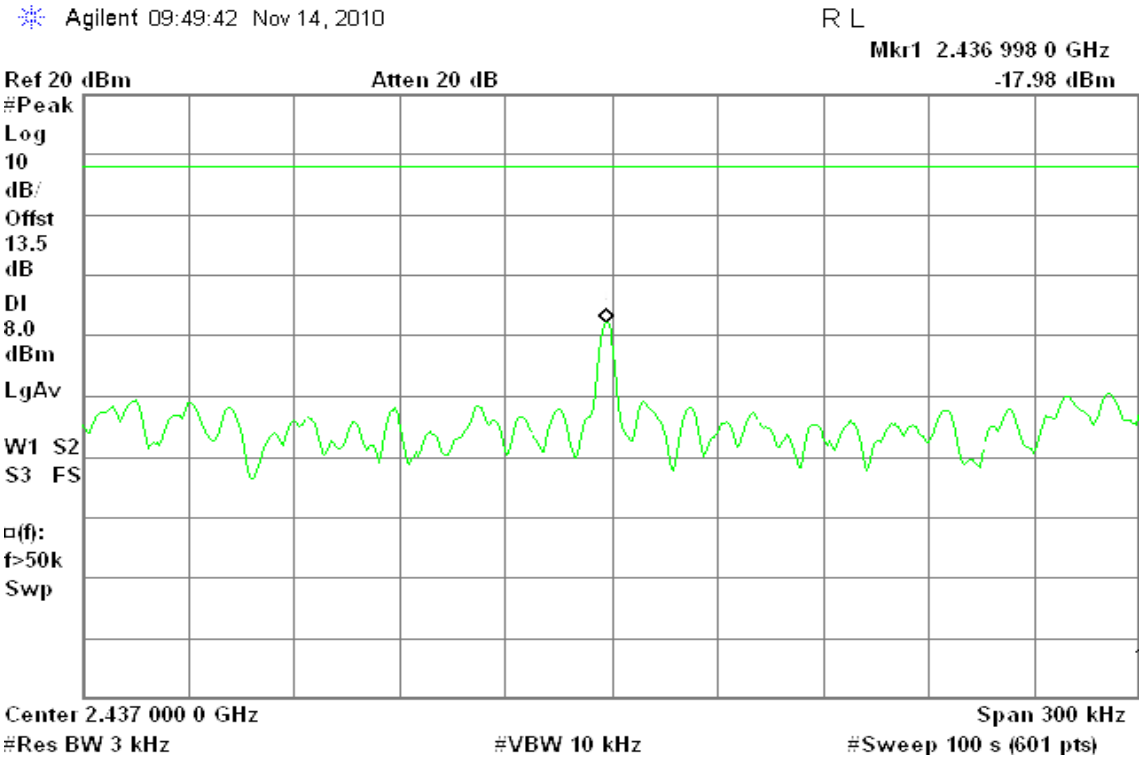

Agilent 06:10:10 Nov 12, 2010
R T
Mkr1 2.461 998 5 GHz
-10.82 dBm
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10.5
dB
Dl
8.0
dBm
LgAv
W1 S2
S3 FS
¤(f):
f>50k
Swp
Center 2.462 000 0 GHz
Span 300 kHz
#Res BW 3 kHz
#VBW 10 kHz
#Sweep 100 s (601 pts)

## IEEE 802.11g mode

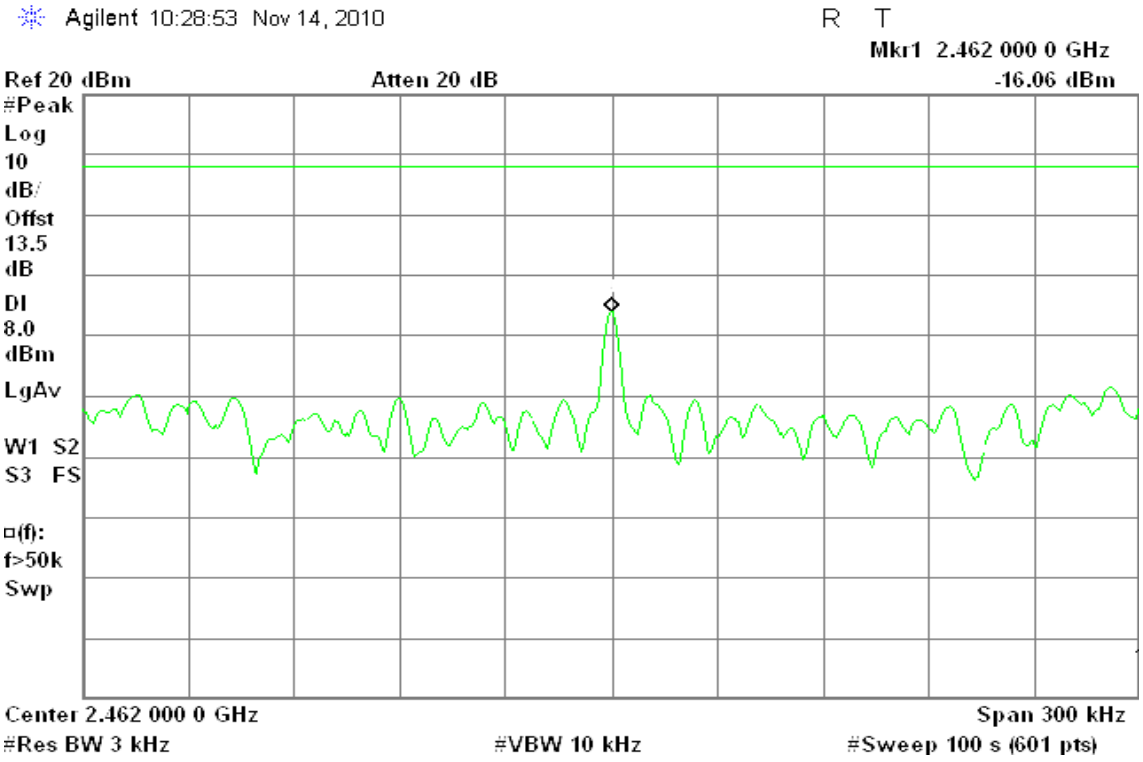
### PPSD (CH Low)




### PPSD (CH Mid)

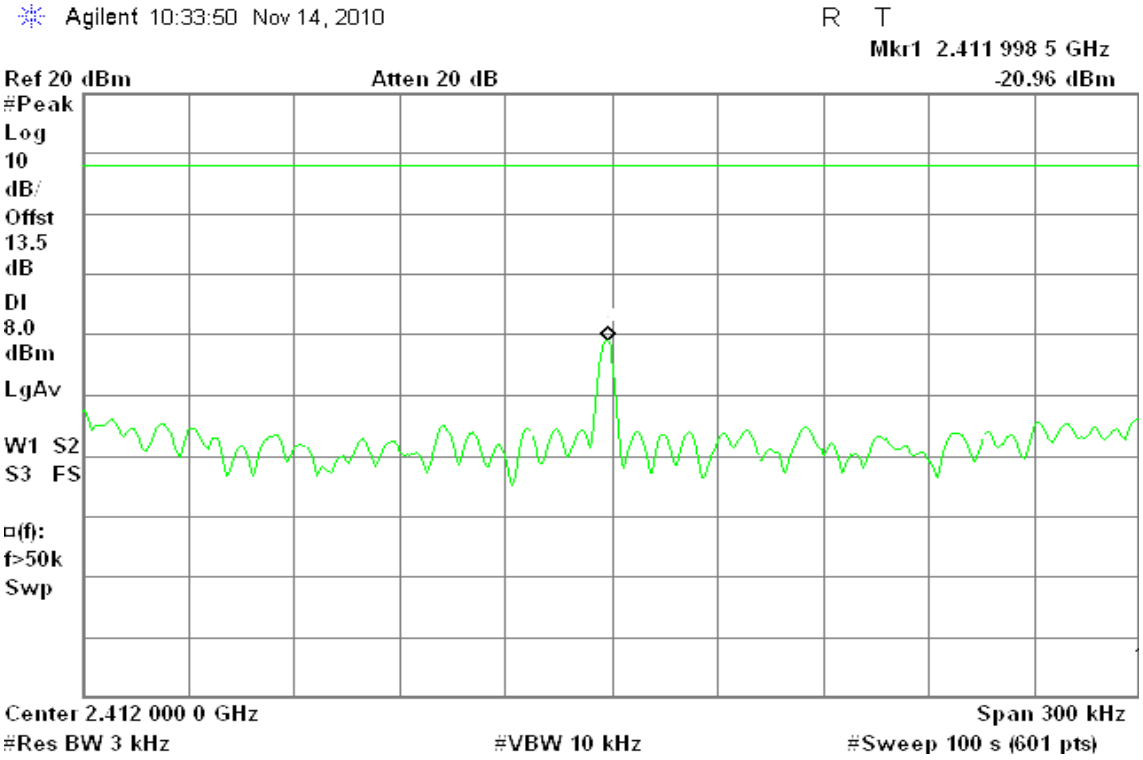


## PPSD (CH High)

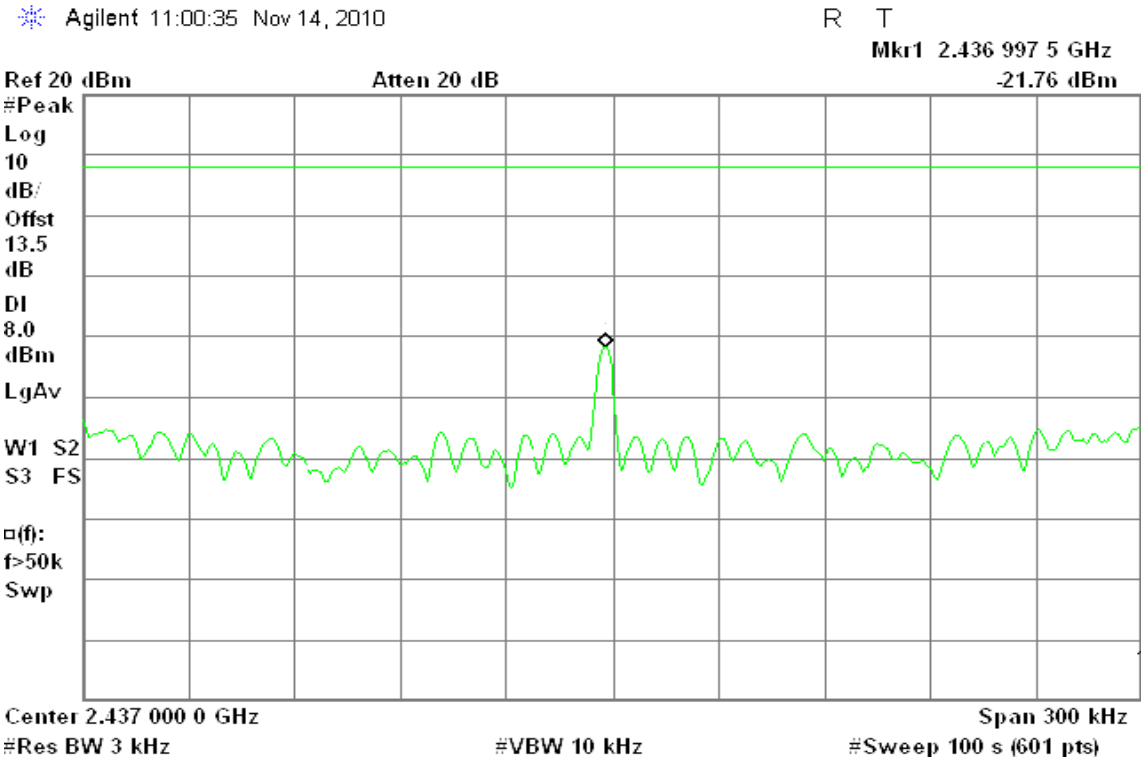

Agilent 10:28:53 Nov 14, 2010
R T
Mkr1 2.462 000 0 GHz
-16.06 dBm
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
13.5
dB
Dl
8.0
dBm
LgAv
W1 S2
S3 FS
¤(f):
f>50k
Swp
Center 2.462 000 0 GHz
Span 300 kHz
#Res BW 3 kHz
#VBW 10 kHz
#Sweep 100 s (601 pts)

## IEEE 802.11n HT 20 MHz mode / Chain 0

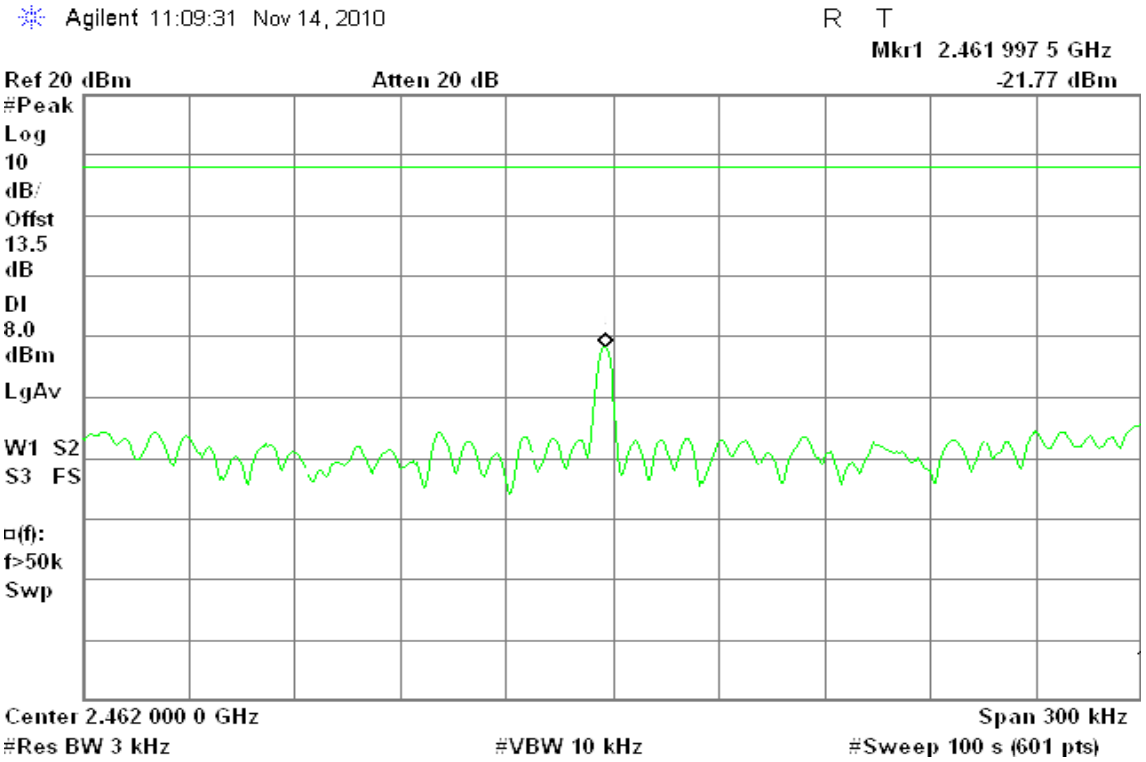
### PPSD (CH Low)




### PPSD (CH Mid)

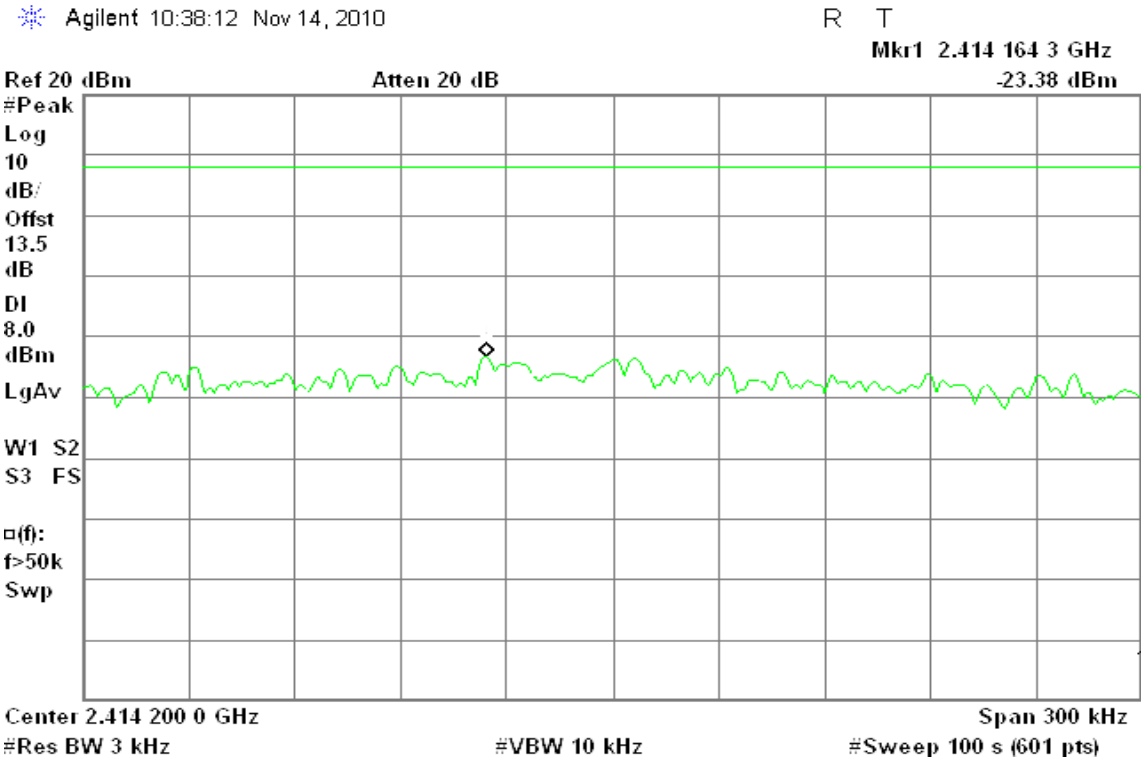


## PPSD (CH High)

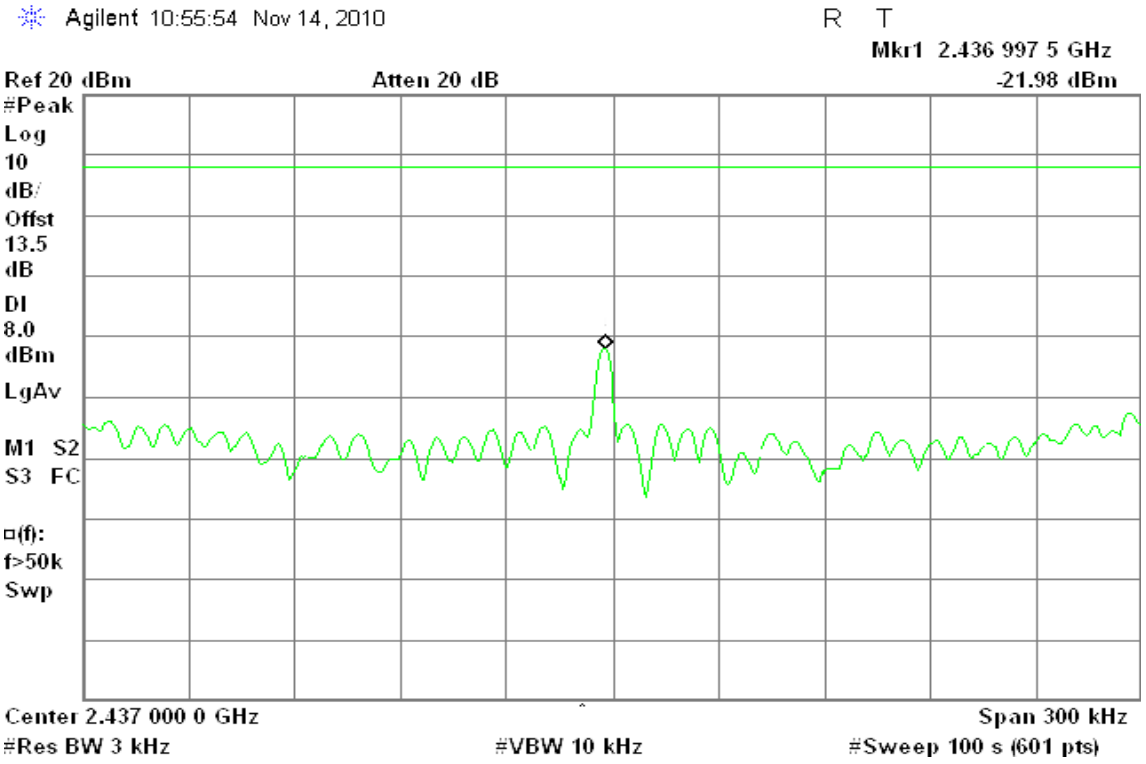



## IEEE 802.11n HT 20 MHz mode / Chain 1

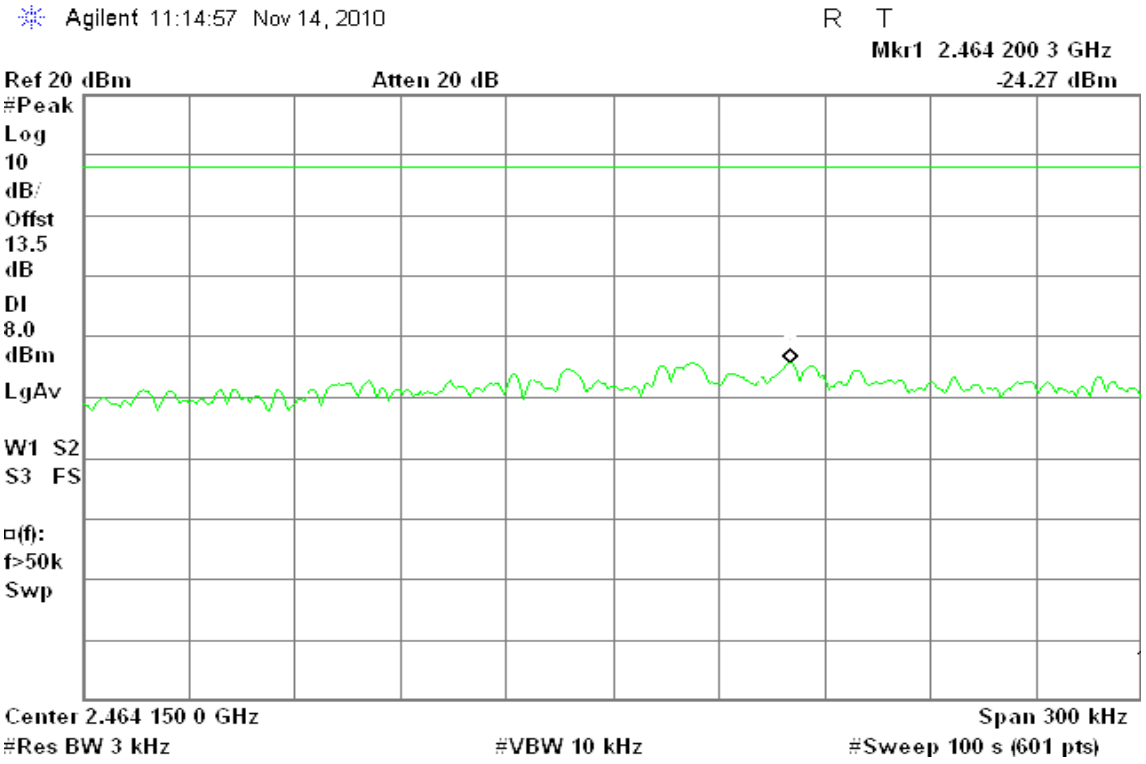
## PPSD (CH Low)



## PPSD (CH Mid)

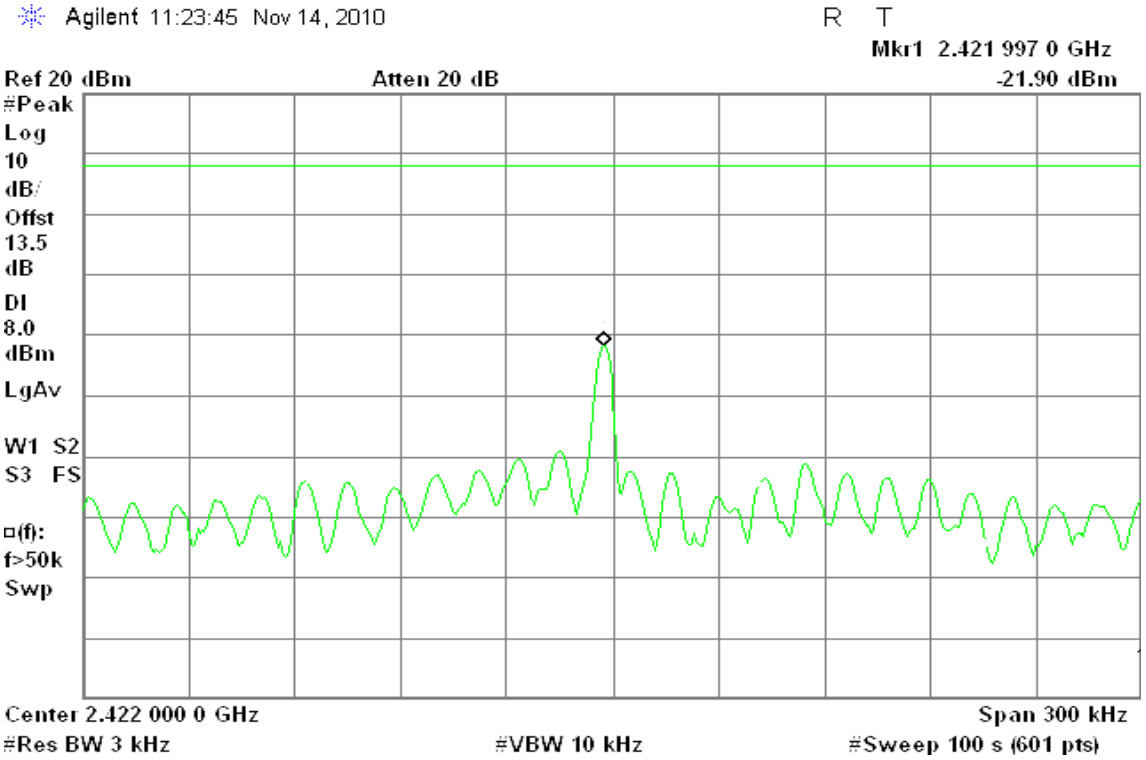



## PPSD (CH High)

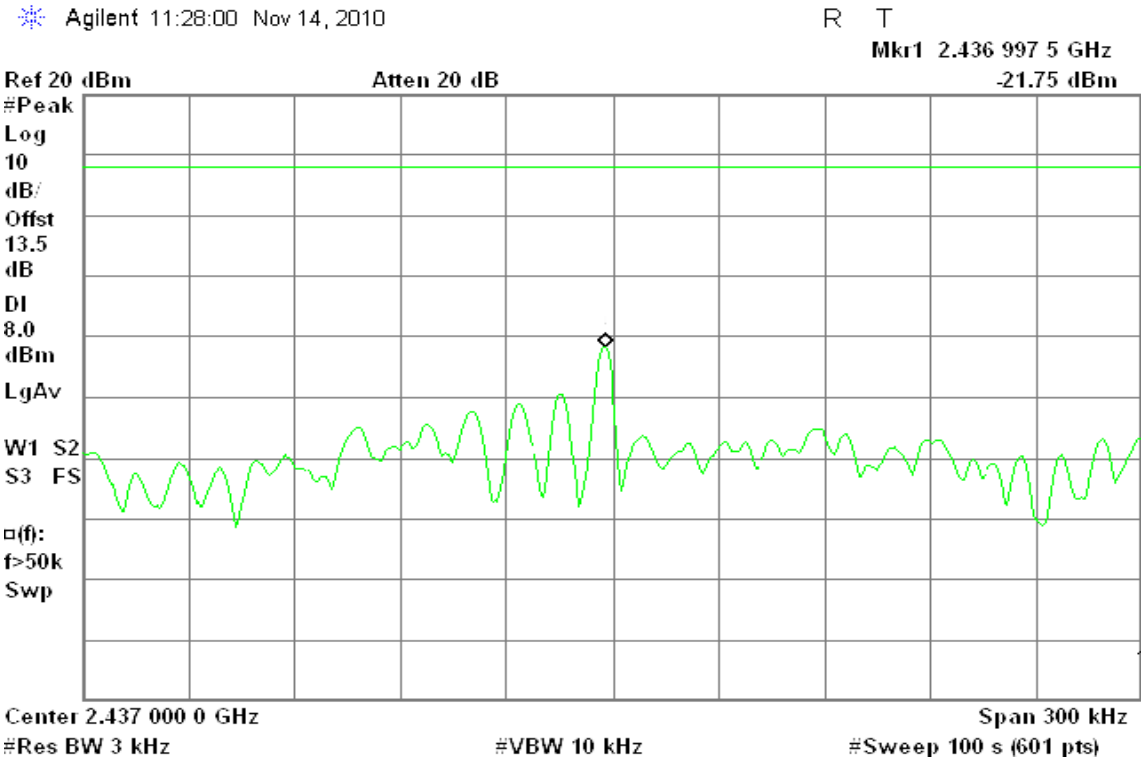


## IEEE 802.11n HT 40 MHz mode / Chain 0

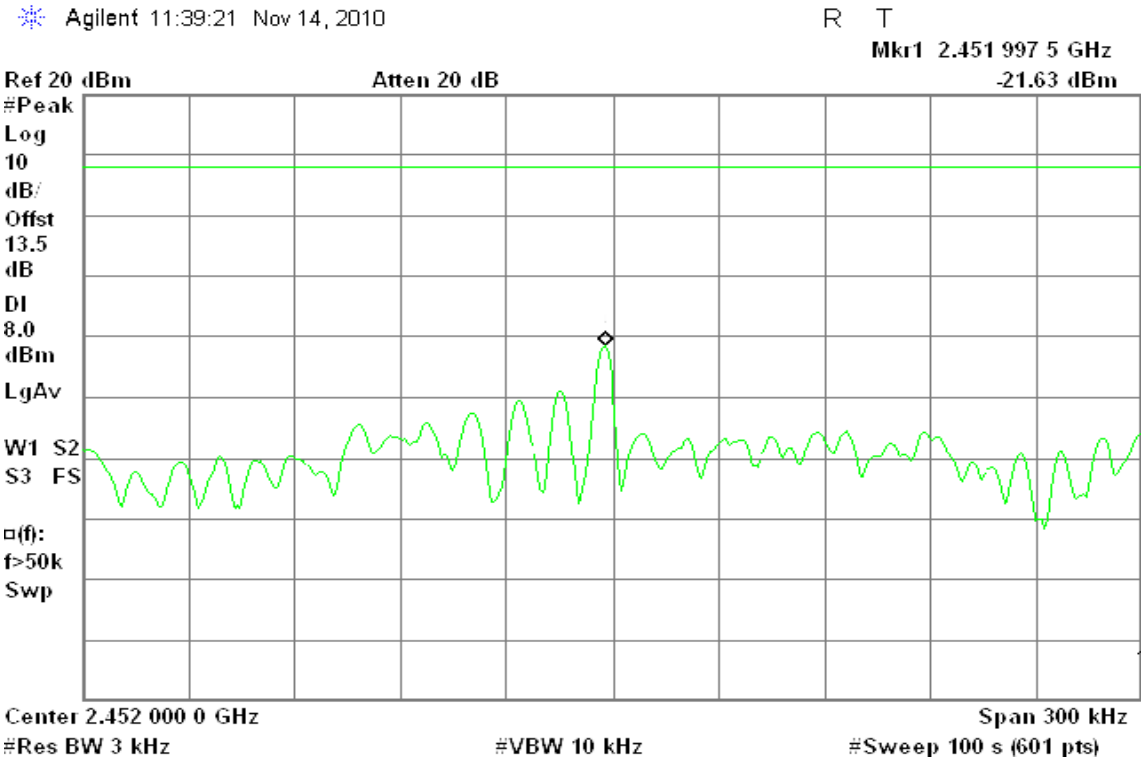
### PPSD (CH Low)




### PPSD (CH Mid)

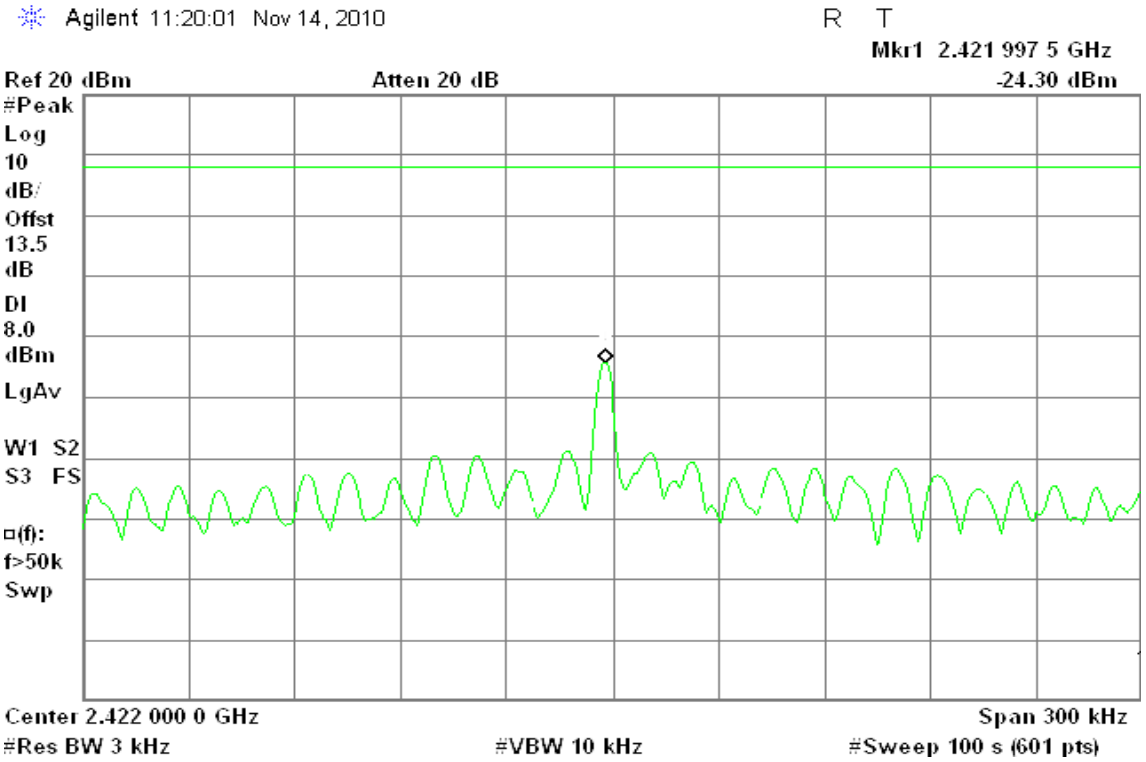


## PPSD (CH High)

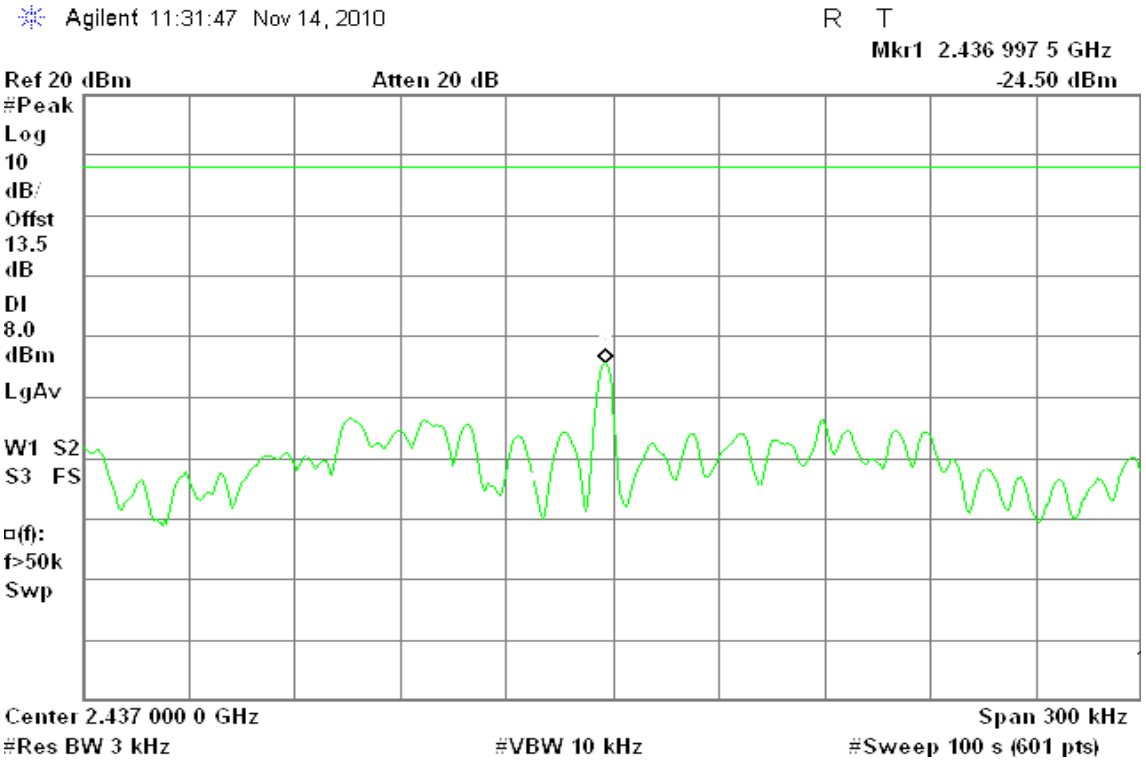



## IEEE 802.11n HT 40 MHz mode / Chain 1

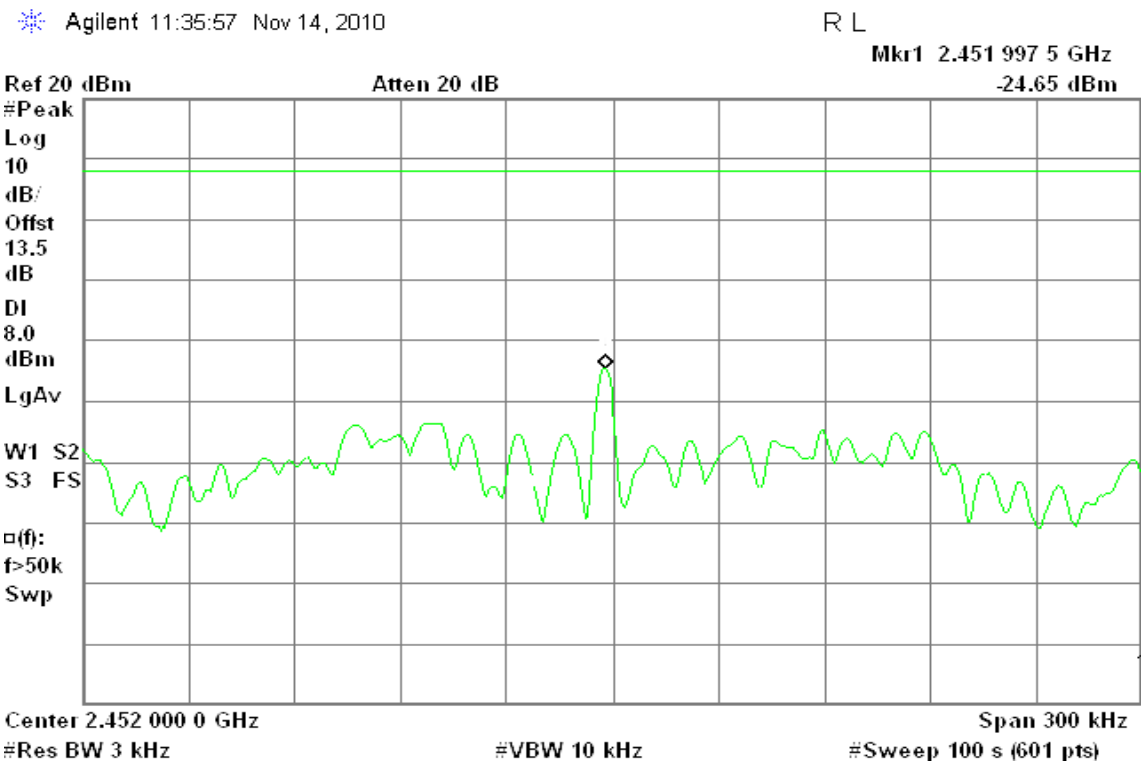
## PPSD (CH Low)



## PPSD (CH Mid)

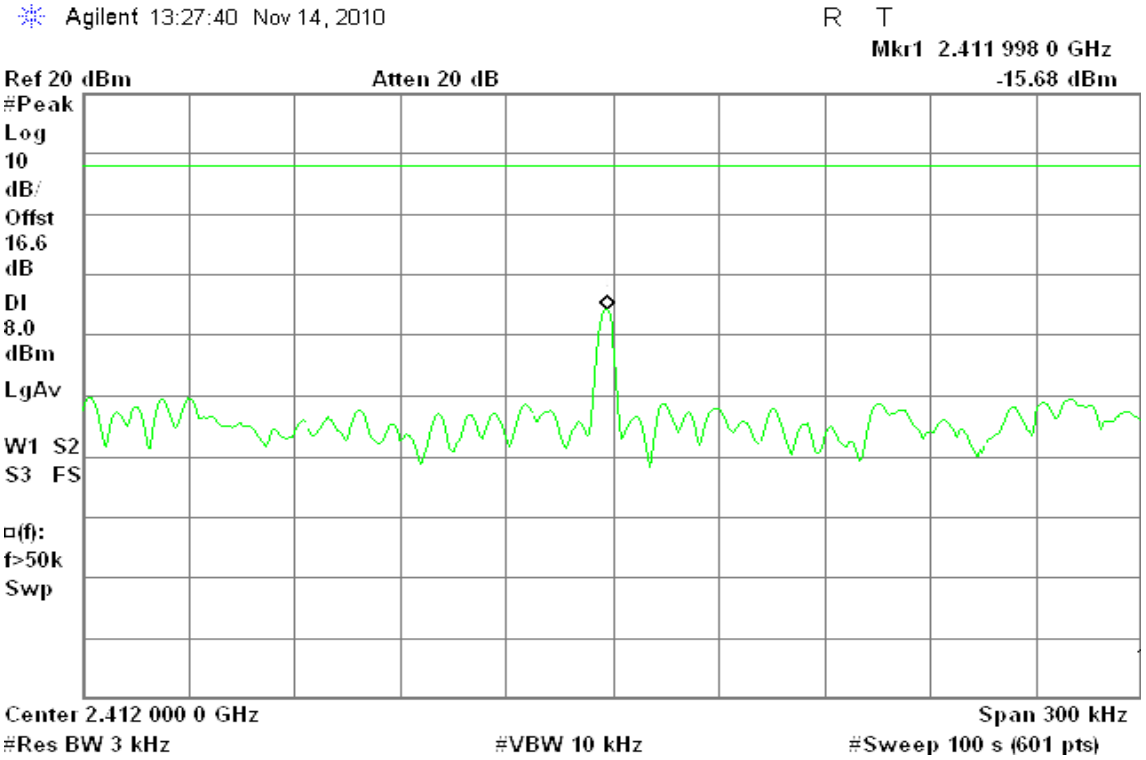



## PPSD (CH High)

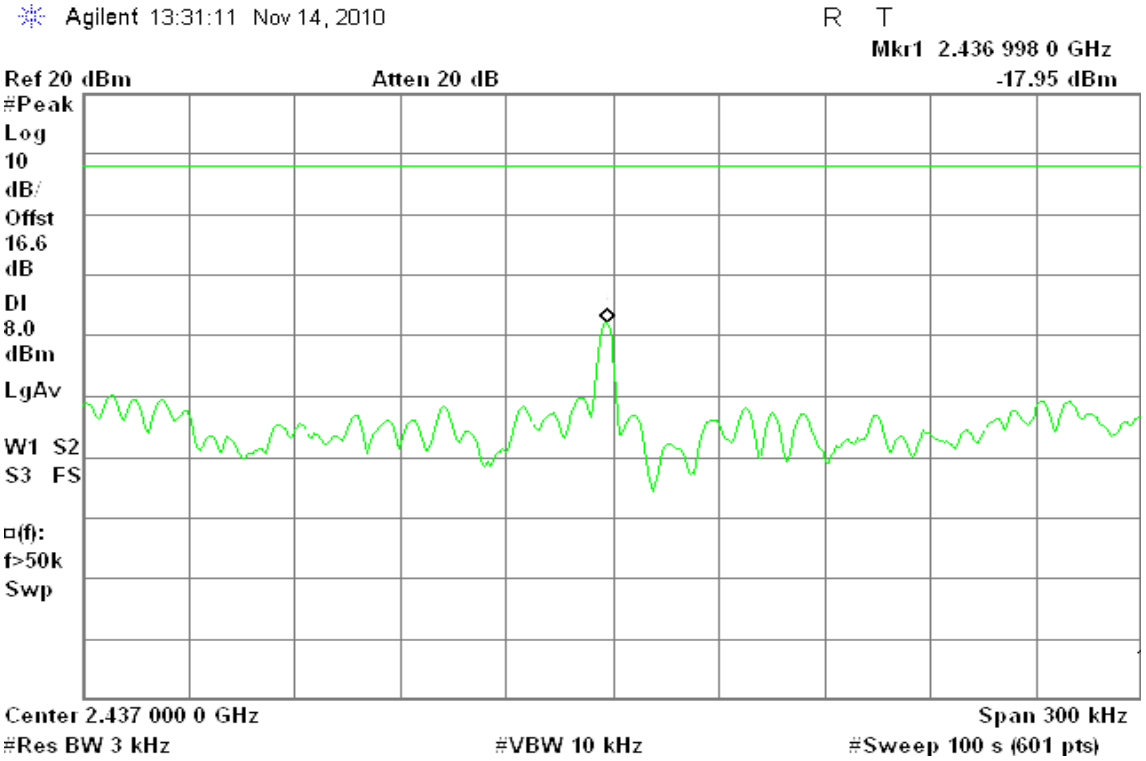


## IEEE 802.11n HT 20 MHz mode with combiner

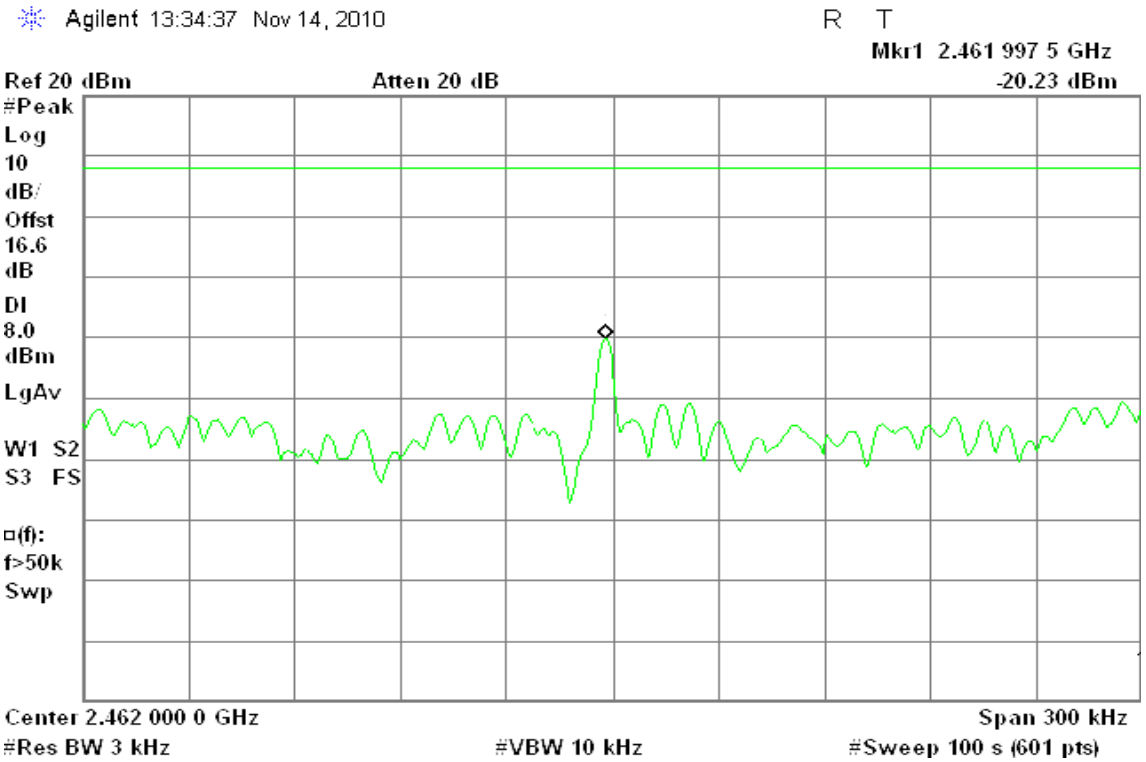
### PPSD (CH Low)




### PPSD (CH Mid)

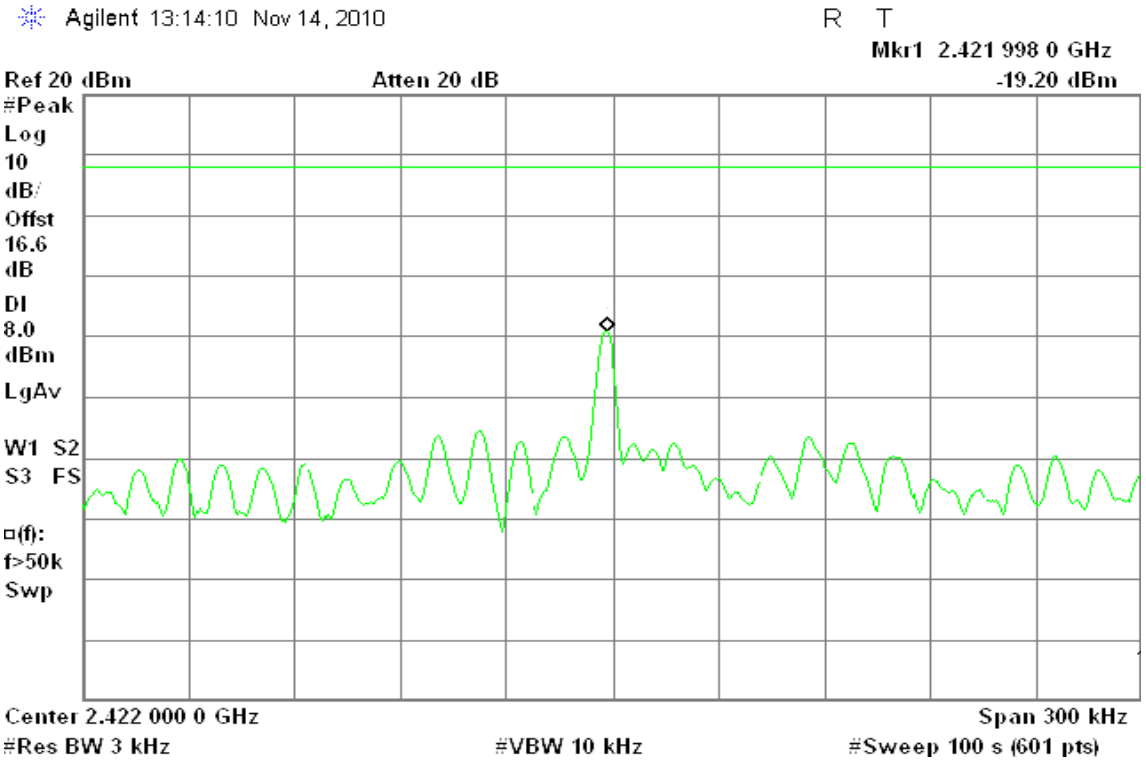


## PPSD (CH High)

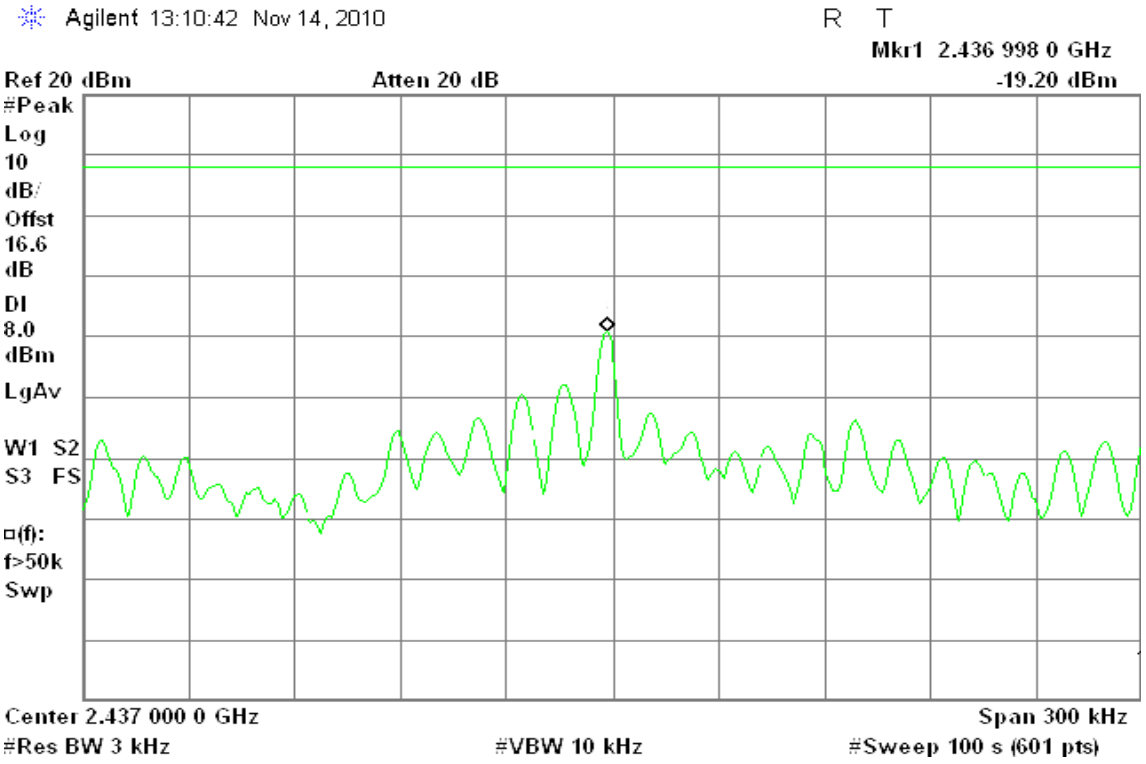



## IEEE 802.11n HT 40 MHz mode with combiner

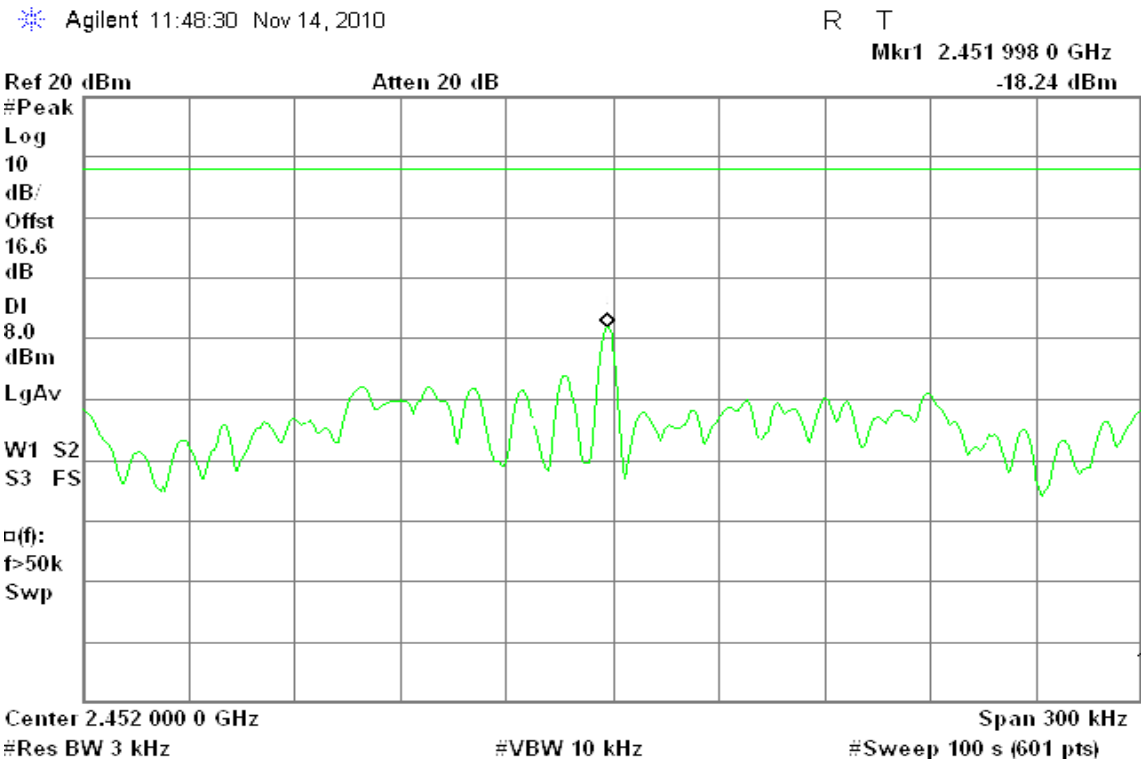
## PPSD (CH Low)



## PPSD (CH Mid)




## PPSD (CH High)



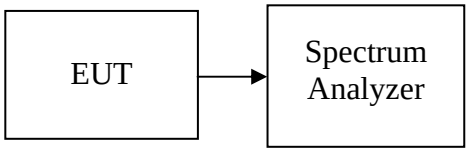
# 7.6 SPURIOUS EMISSIONS

## 7.6.1 Conducted Measurement

## LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in 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)).

**Test Configuration**




## TEST PROCEDURE

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 13GHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

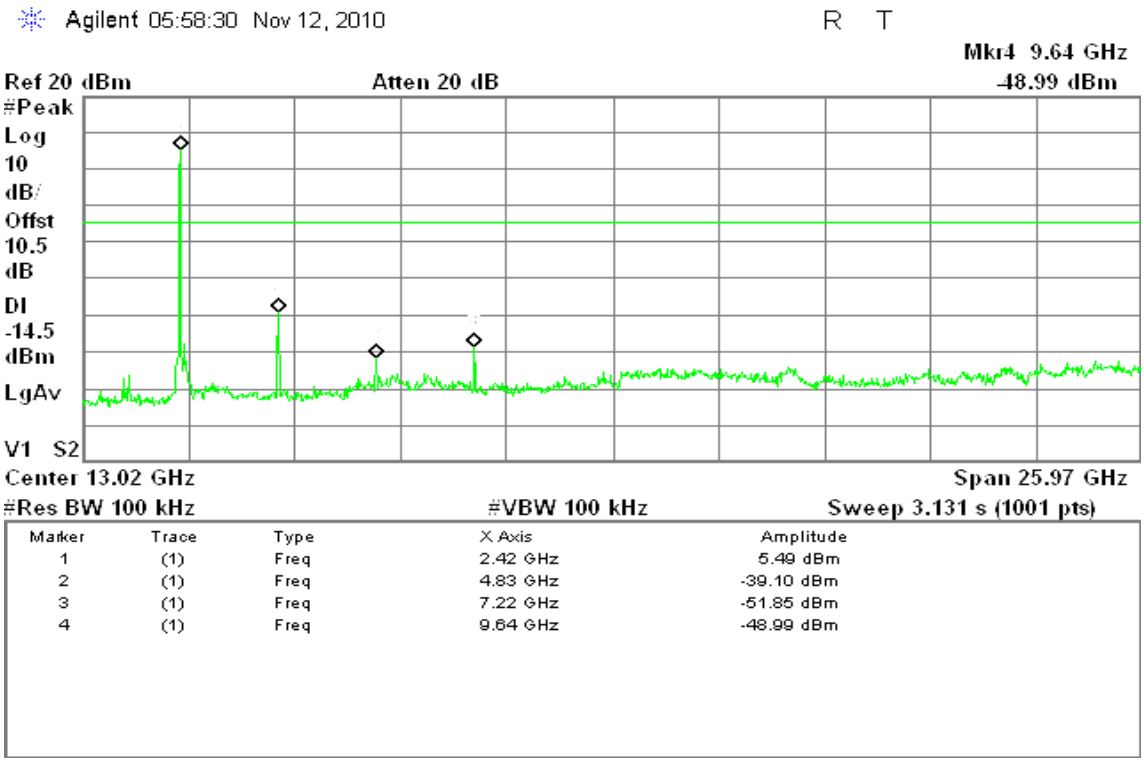
## TEST RESULTS

*No non-compliance noted.*

## Test Plot

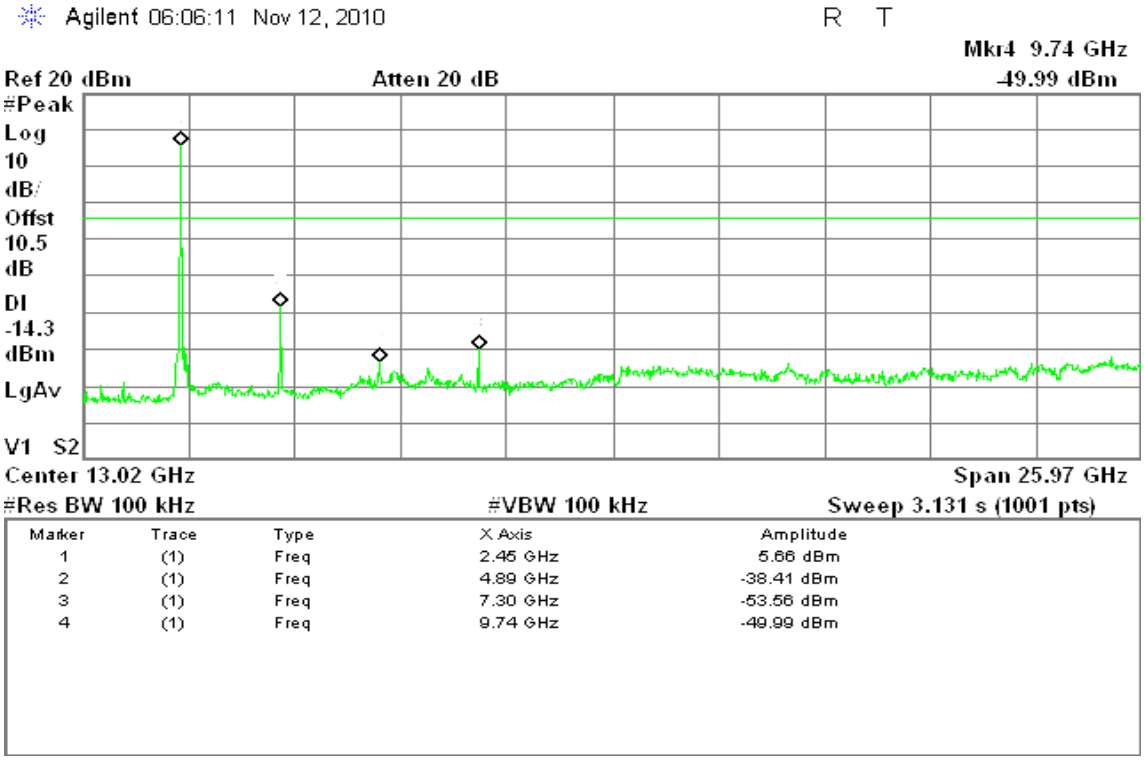
## IEEE 802.11b mode

### CH Low



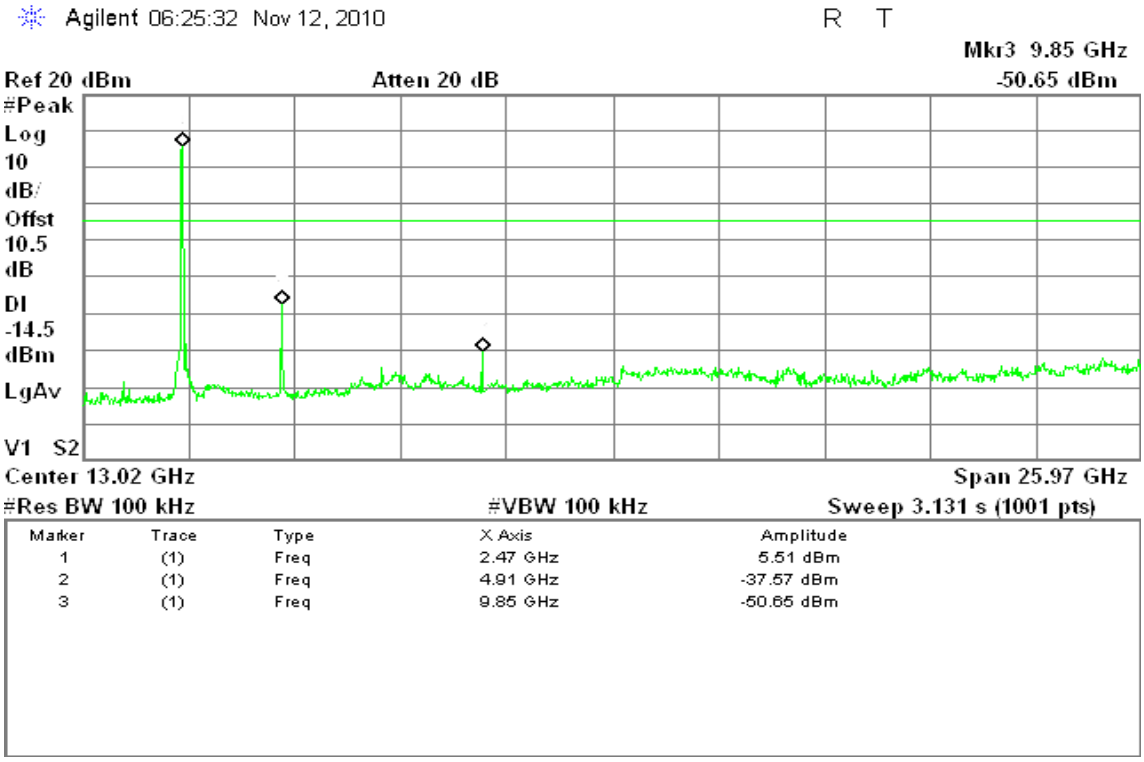

| Marker | Trace | Type | X Axis | Amplitude |
|---|---|---|---|---|
| 1 | (1) | Freq | 2.42 GHz | 5.49 dBm |
| 2 | (1) | Freq | 4.83 GHz | -39.10 dBm |
| 3 | (1) | Freq | 7.22 GHz | -51.85 dBm |
| 4 | (1) | Freq | 9.64 GHz | -48.99 dBm |

### CH Mid



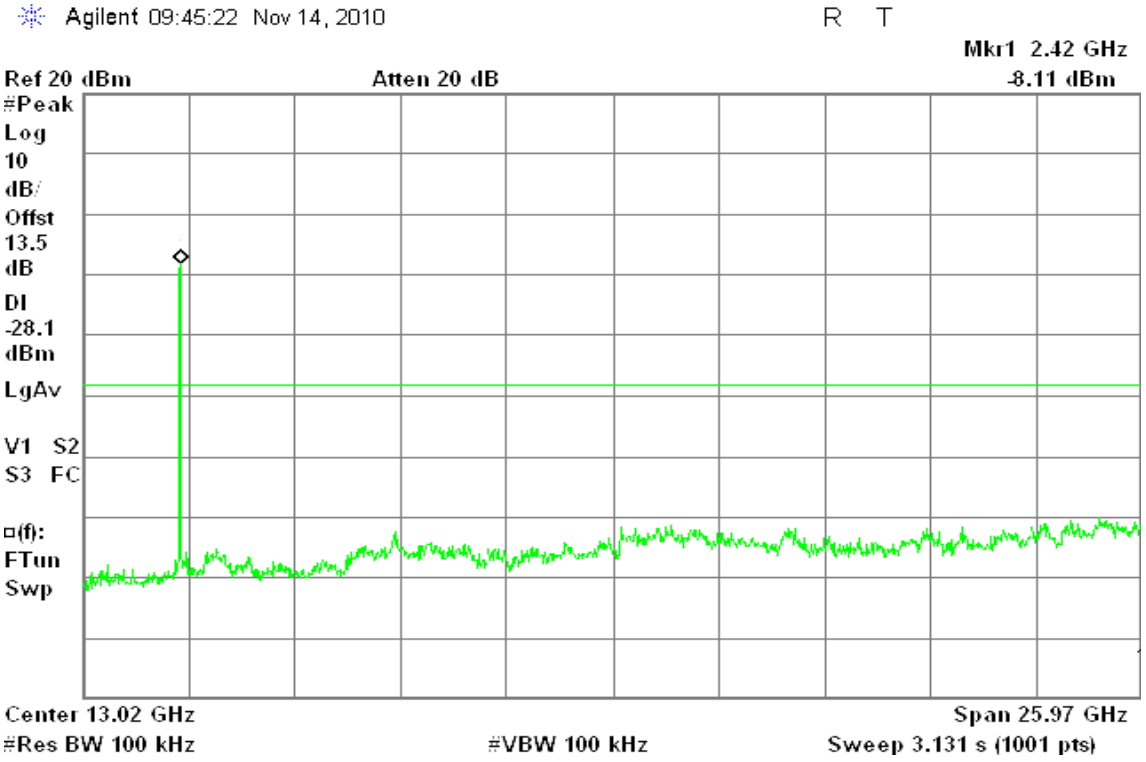

| Marker | Trace | Type | X Axis | Amplitude |
|---|---|---|---|---|
| 1 | (1) | Freq | 2.45 GHz | 5.66 dBm |
| 2 | (1) | Freq | 4.89 GHz | -38.41 dBm |
| 3 | (1) | Freq | 7.30 GHz | -53.56 dBm |
| 4 | (1) | Freq | 9.74 GHz | -49.99 dBm |

## CH High

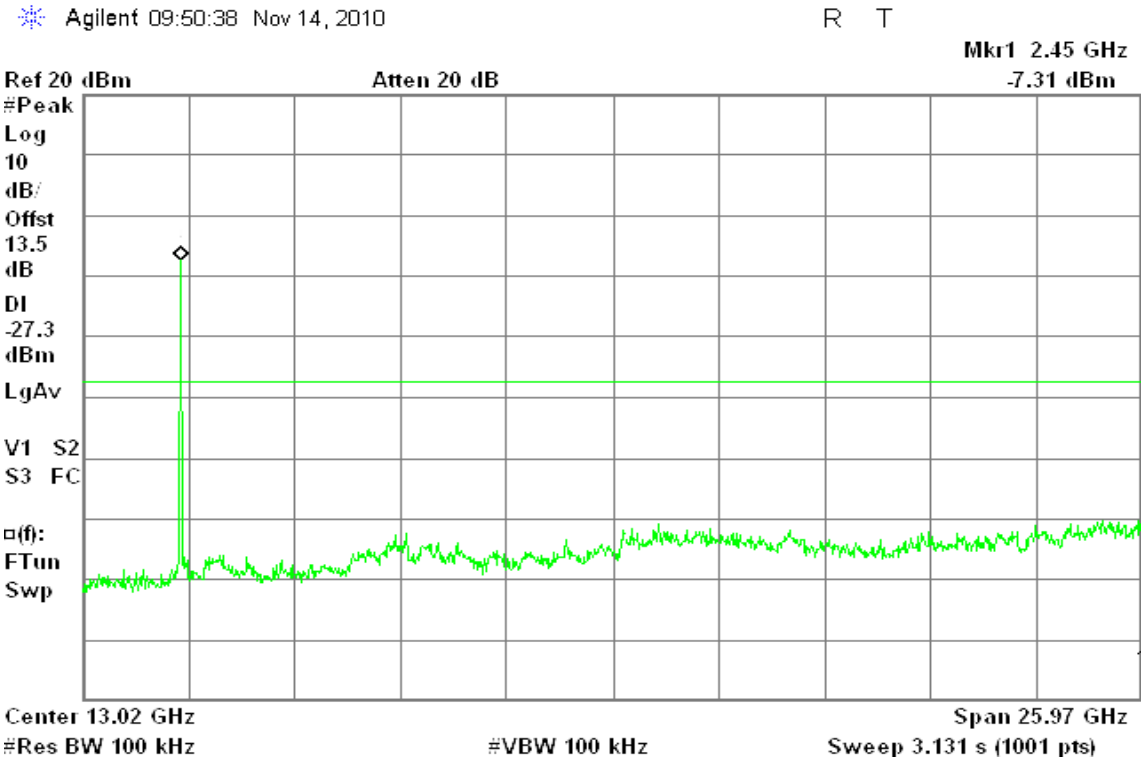

Agilent 06:25:32 Nov 12, 2010
R T
Mkr3 9.85 GHz
-50.65 dBm
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
10.5
dB
Dl
-14.5
dBm
LgAv
V1 S2
Center 13.02 GHz
Span 25.97 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 3.131 s (1001 pts)
Marker Trace Type X Axis Amplitude
1 (1) Freq 2.47 GHz 5.51 dBm
2 (1) Freq 4.91 GHz -37.57 dBm
3 (1) Freq 9.85 GHz -50.65 dBm

## IEEE 802.11g mode

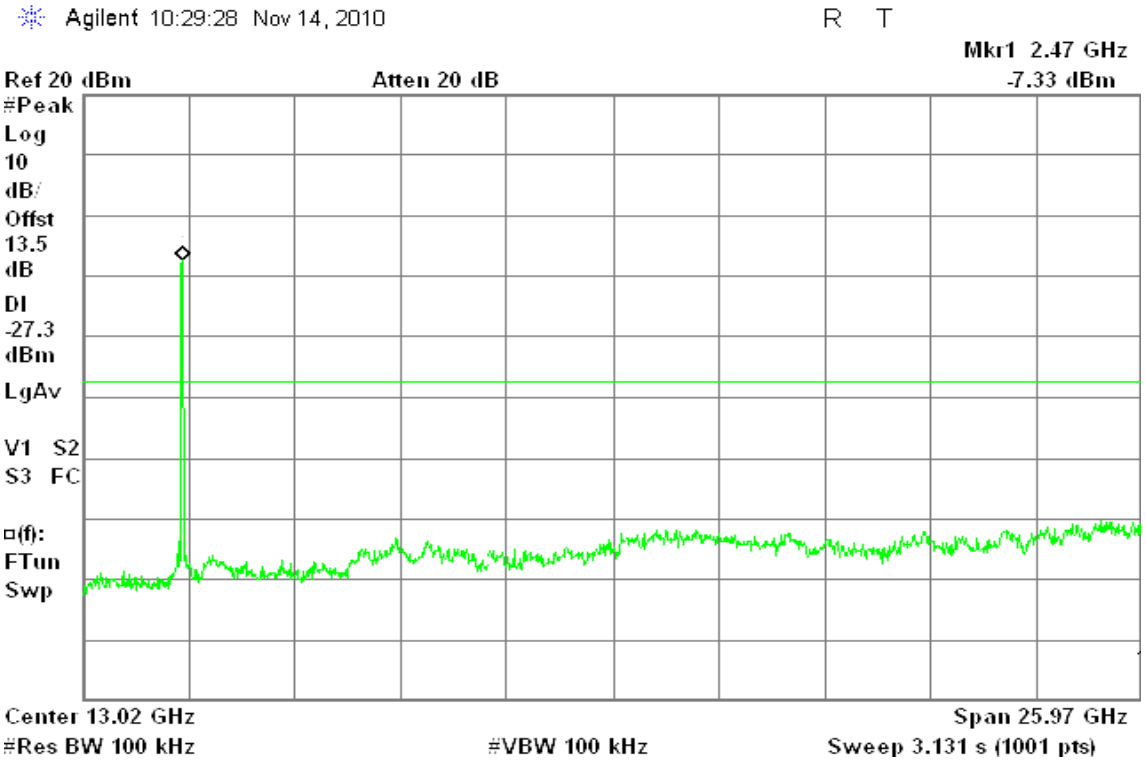
### CH Low




### CH Mid

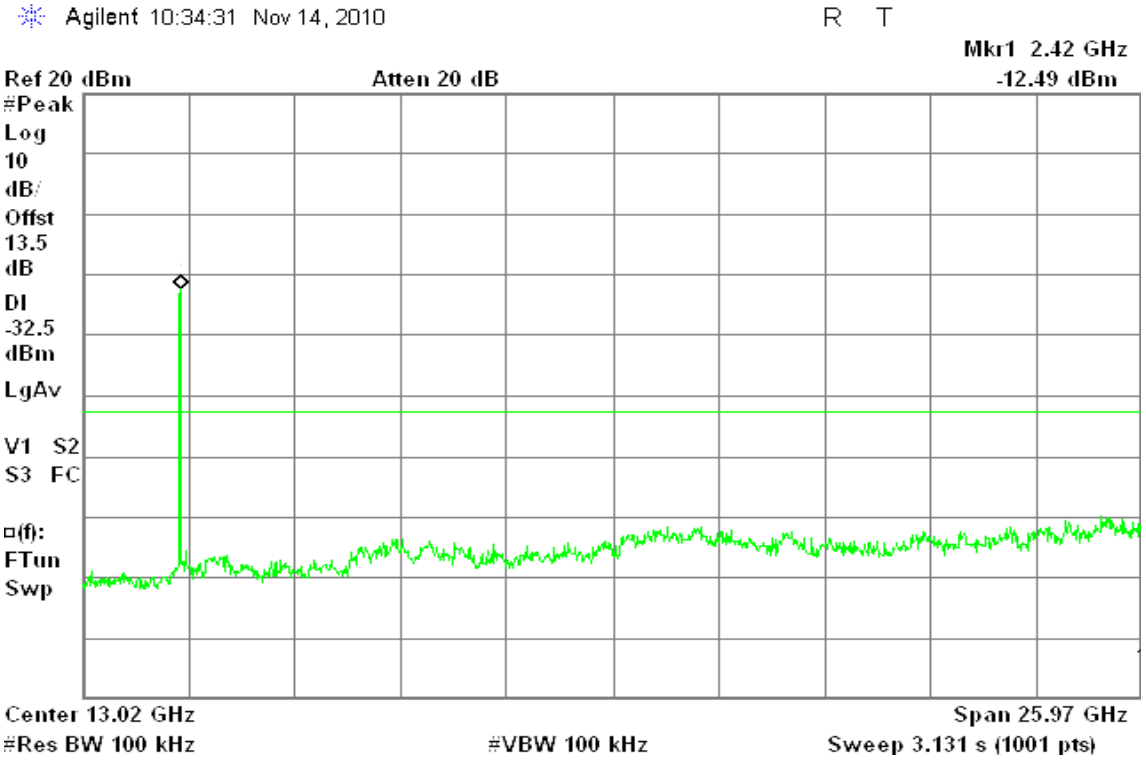


## CH High

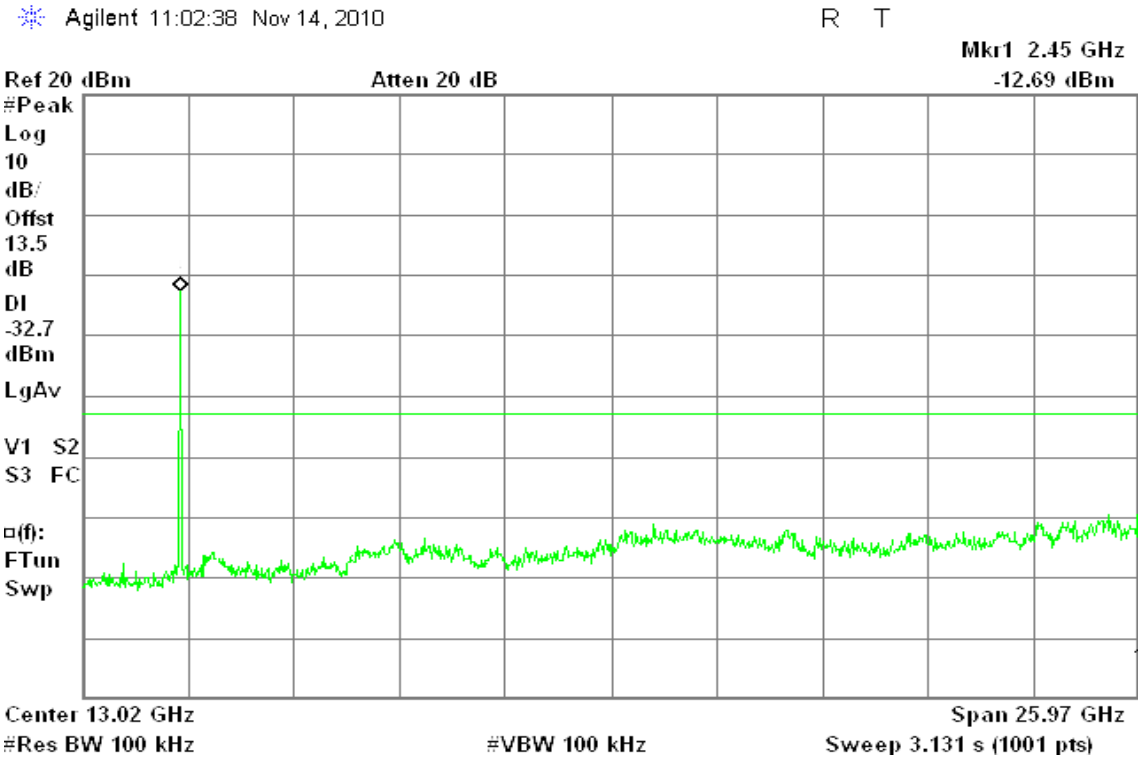

Agilent 10:29:28 Nov 14, 2010
R T
Mkr1 2.47 GHz
-7.33 dBm
Ref 20 dBm
Atten 20 dB
#Peak
Log
10
dB/
Offst
13.5
dB
Dl
-27.3
dBm
LgAv
V1 S2
S3 FC
¤(f):
FTun
Swp
Center 13.02 GHz
Span 25.97 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 3.131 s (1001 pts)

## IEEE 802.11n HT 20 MHz mode / Chain 0

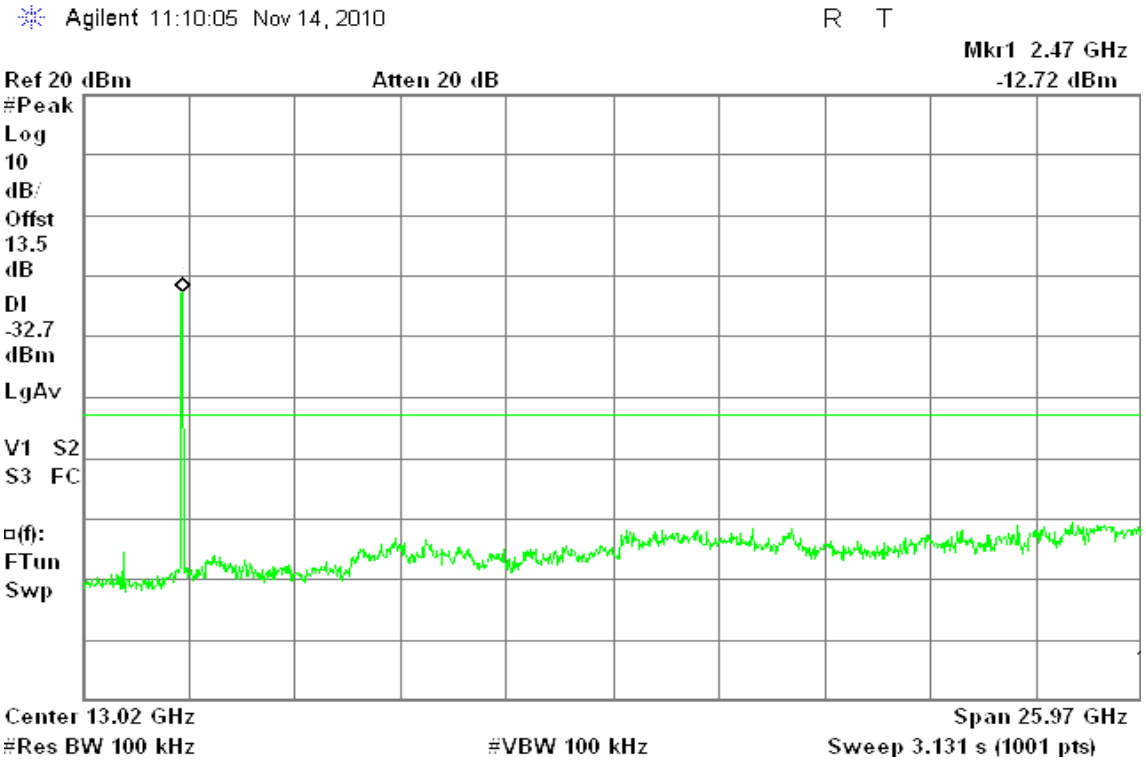
### CH Low




### CH Mid

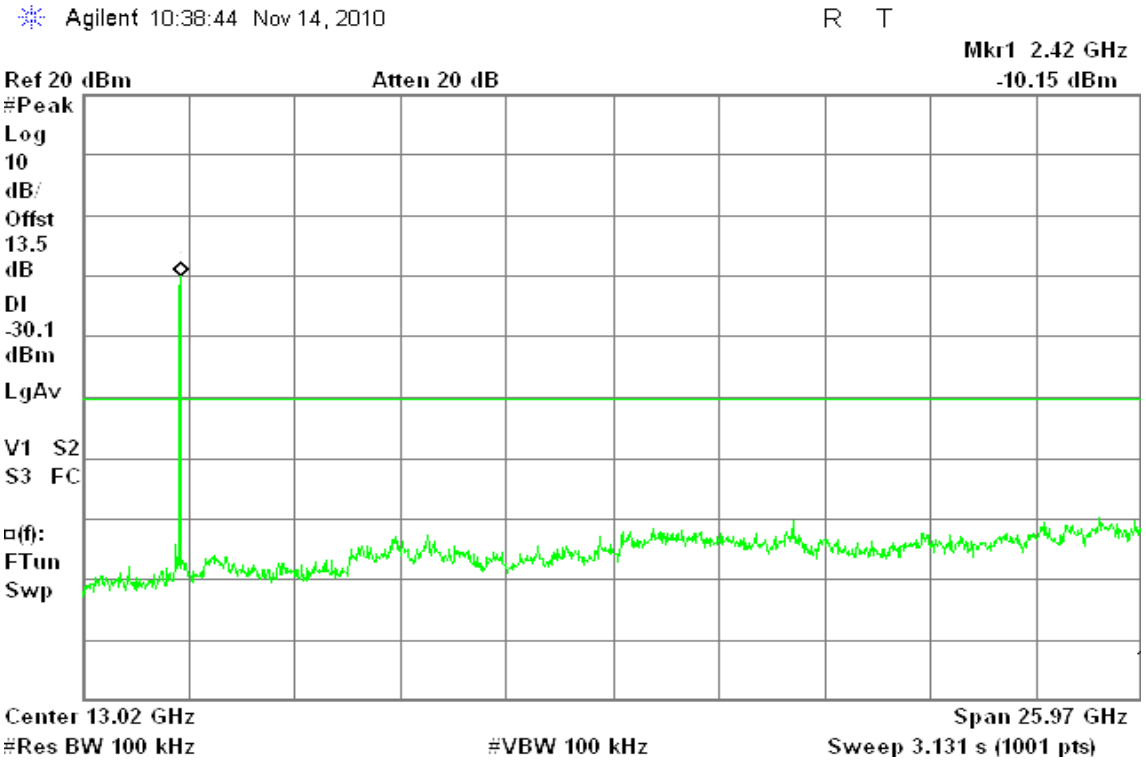


## CH High

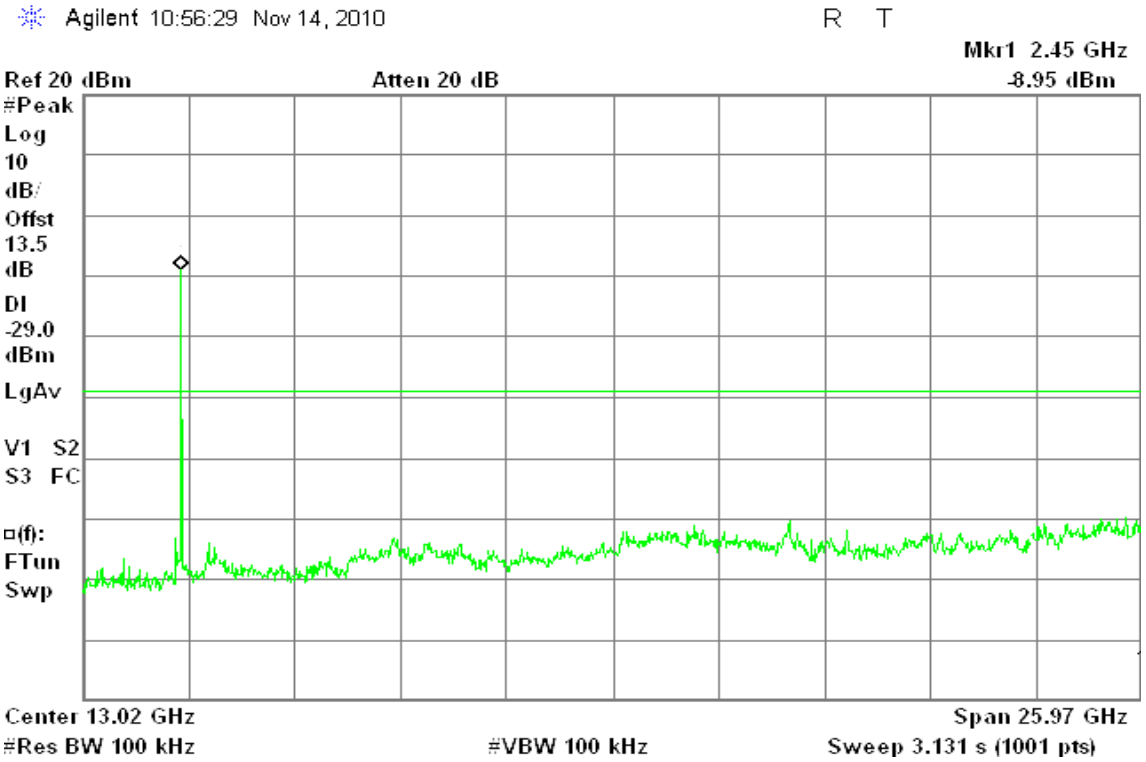



## IEEE 802.11n HT 20 MHz mode / Chain 1

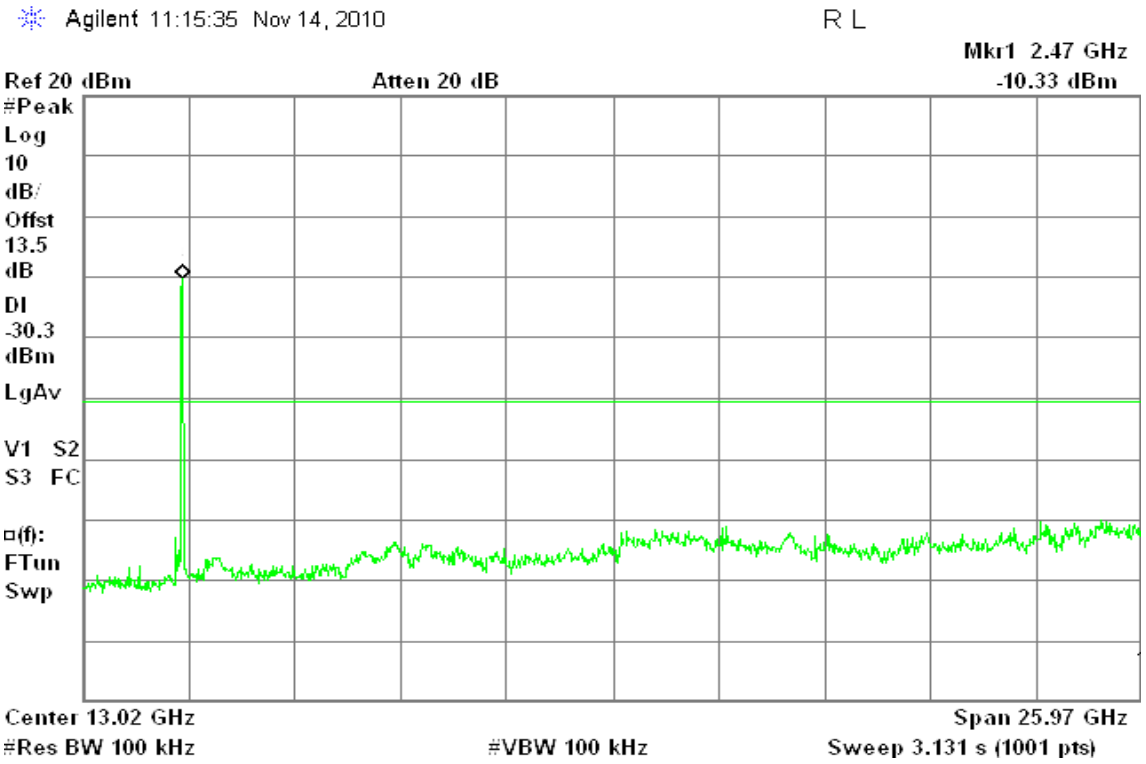
## CH Low



## CH Mid

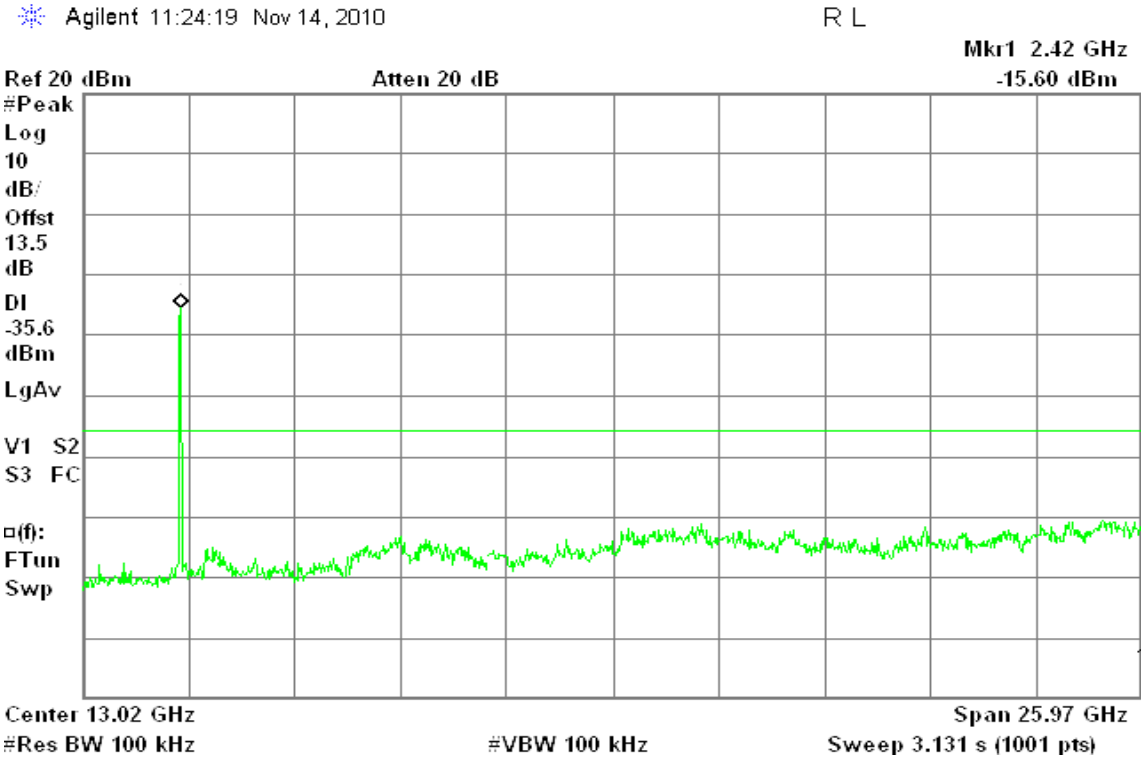



## CH High

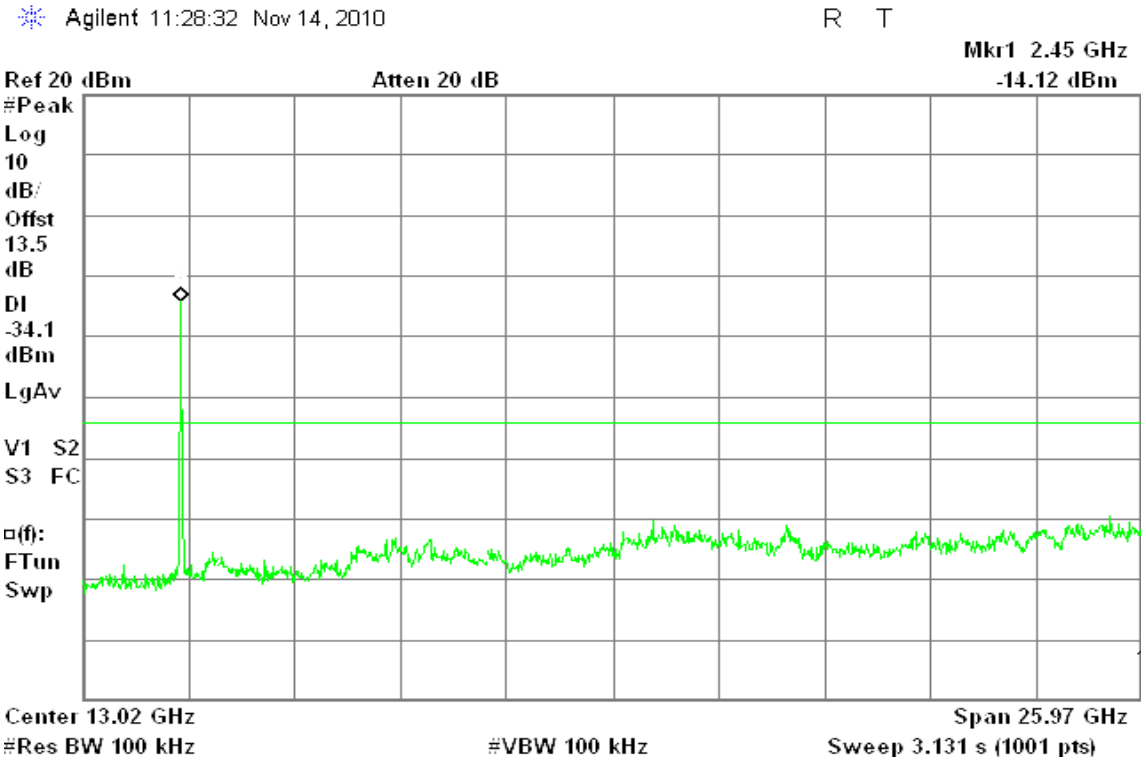


## IEEE 802.11n HT 40 MHz mode / Chain 0

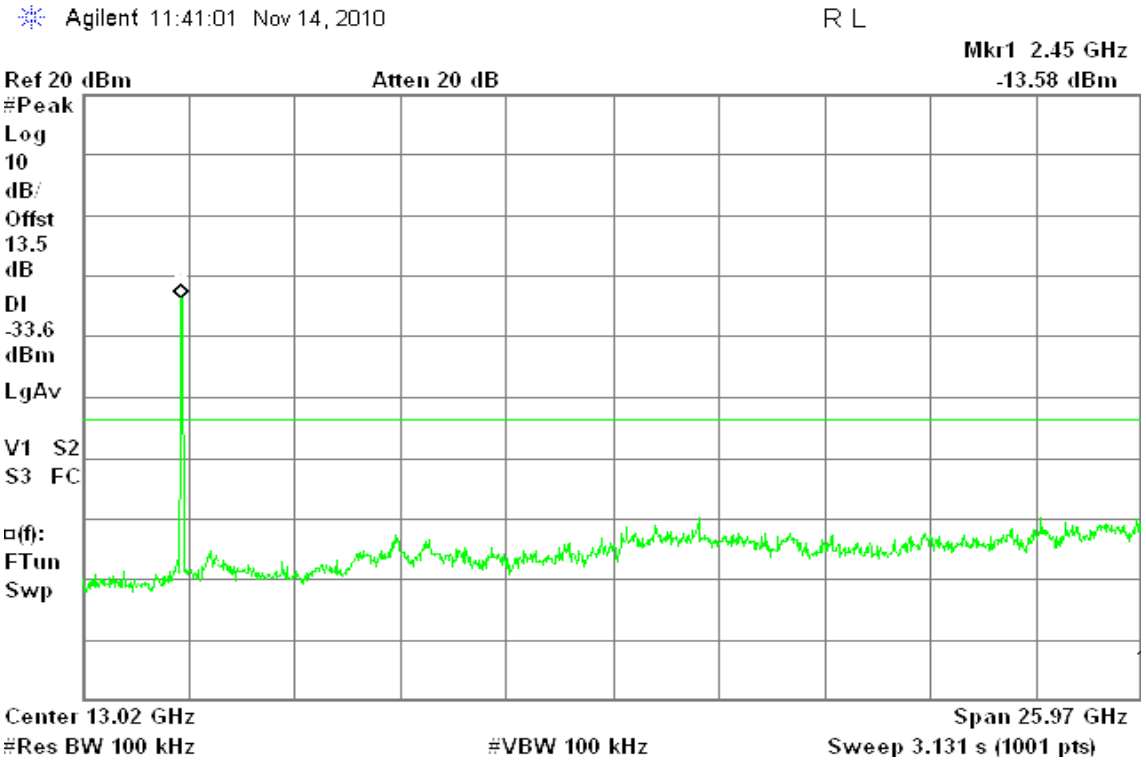
### CH Low




### CH Mid

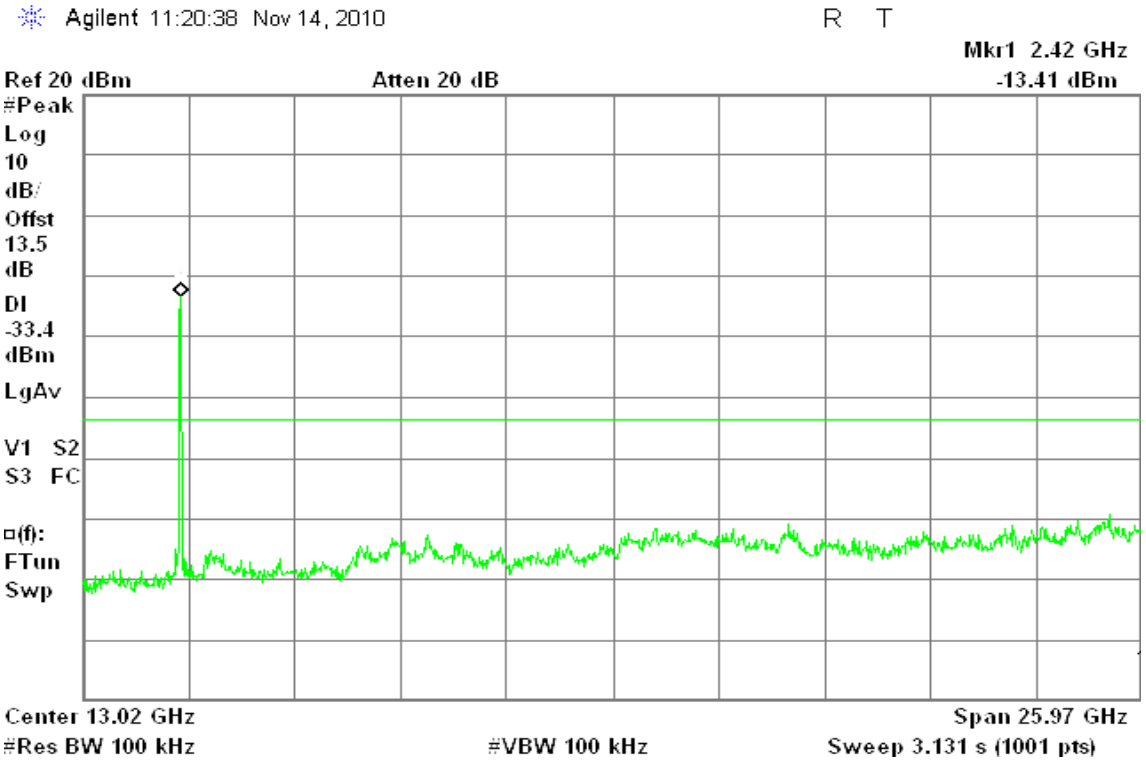


## CH High

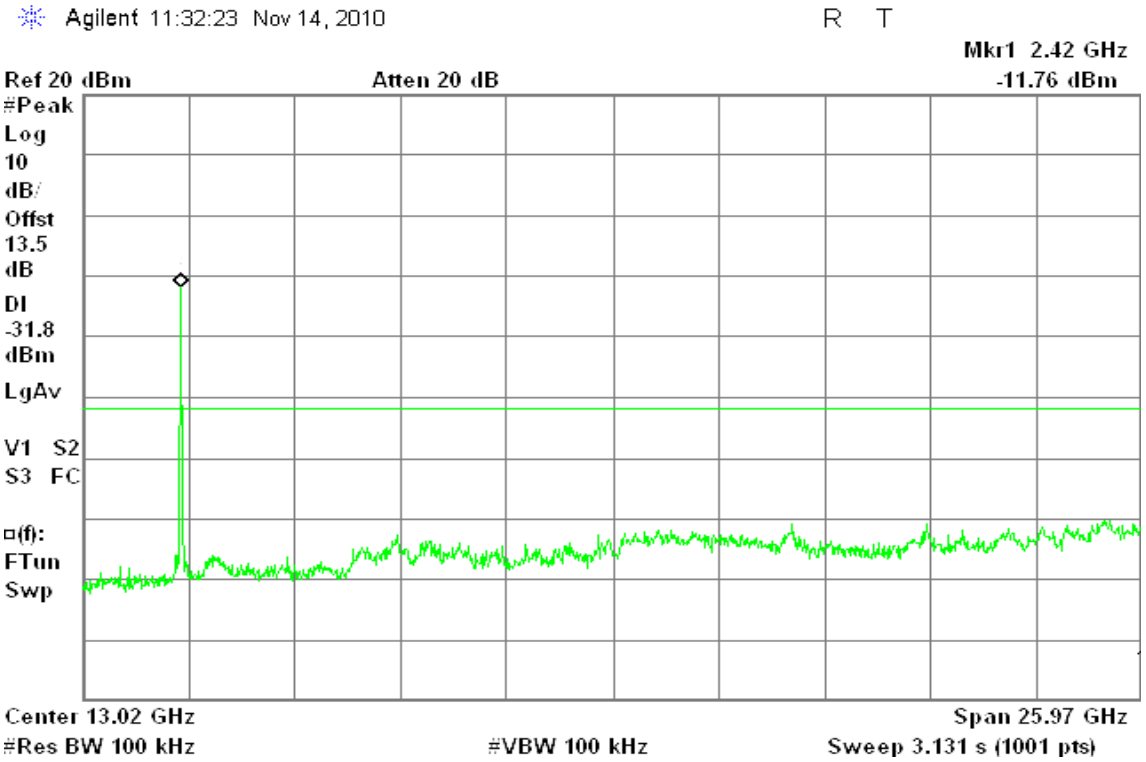



## IEEE 802.11n HT 40 MHz mode / Chain 1

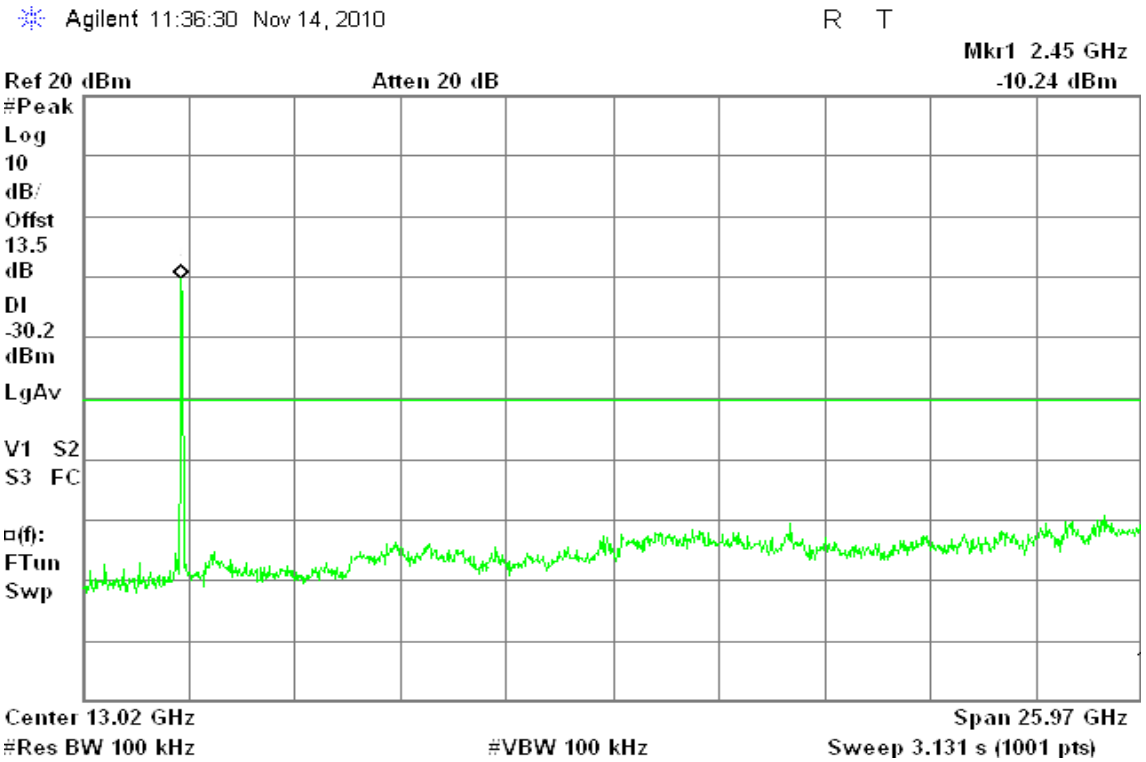
## CH Low



## CH Mid

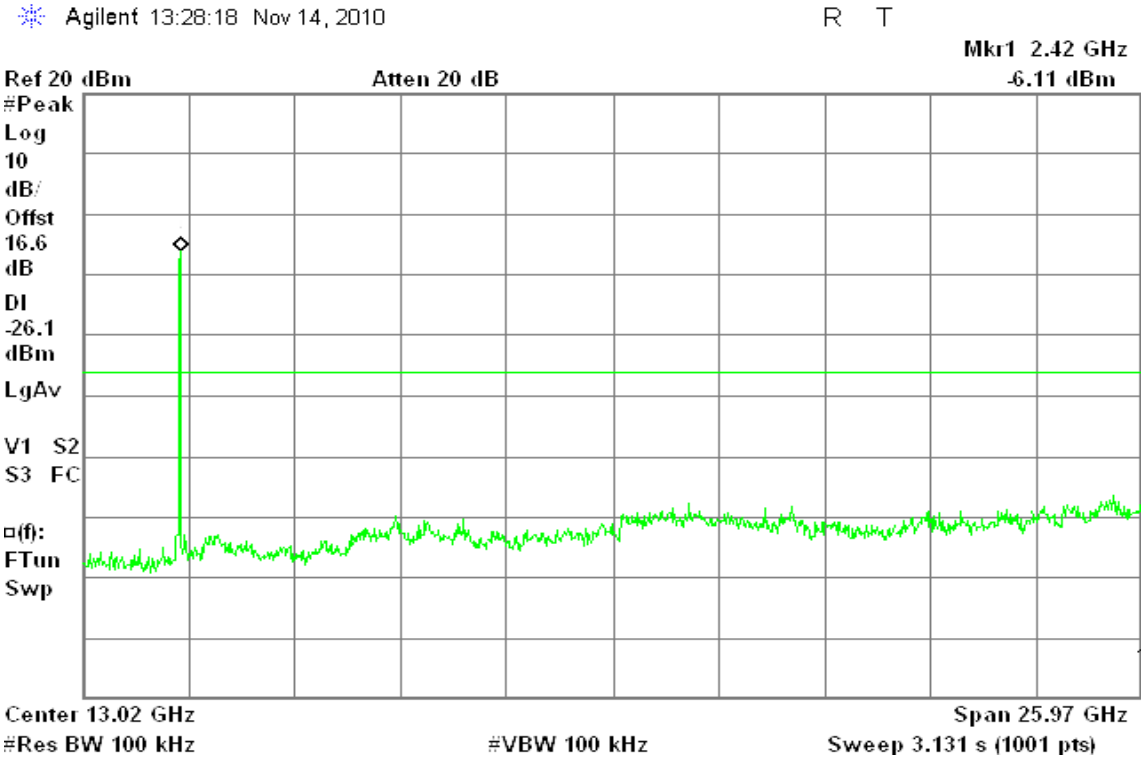



## CH High

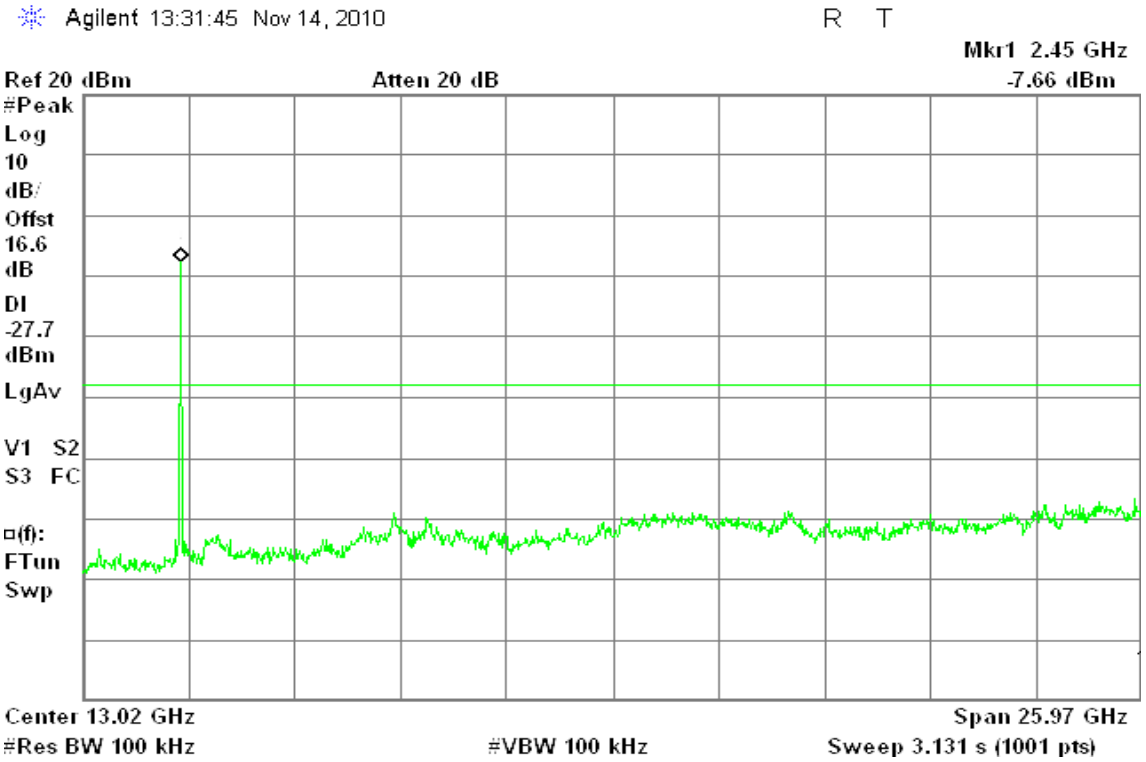


## IEEE 802.11n HT 20 MHz mode with combiner

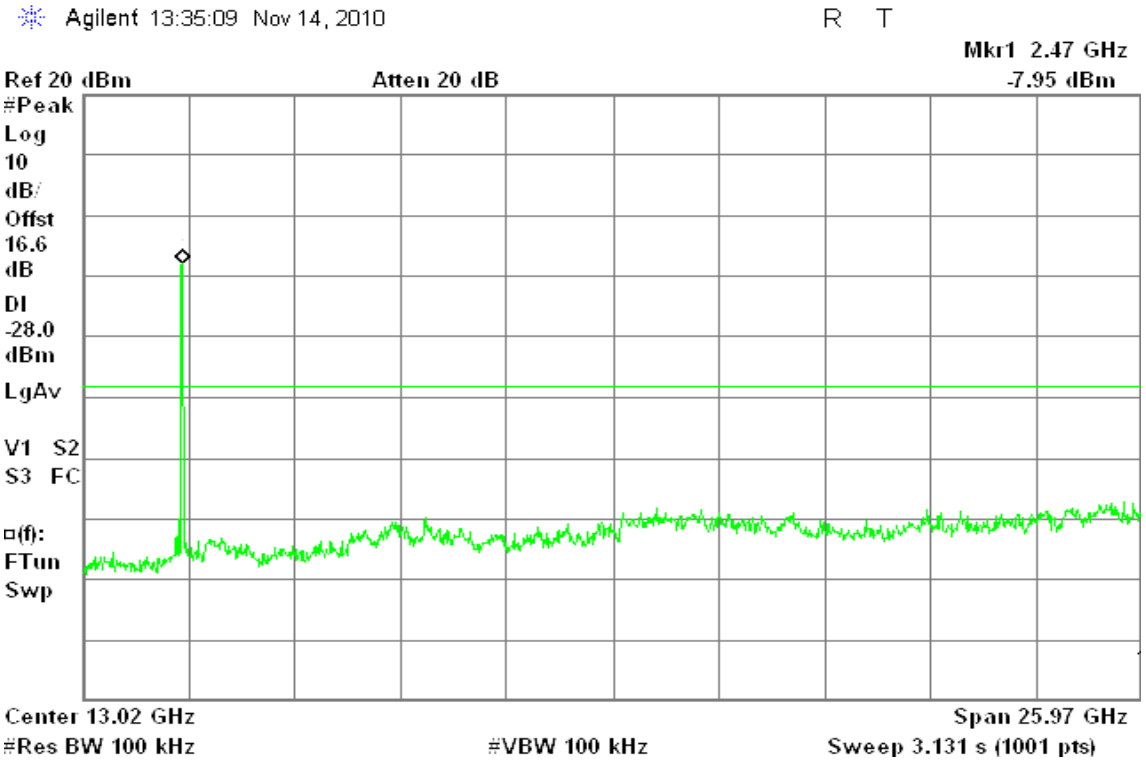
### CH Low




### CH Mid

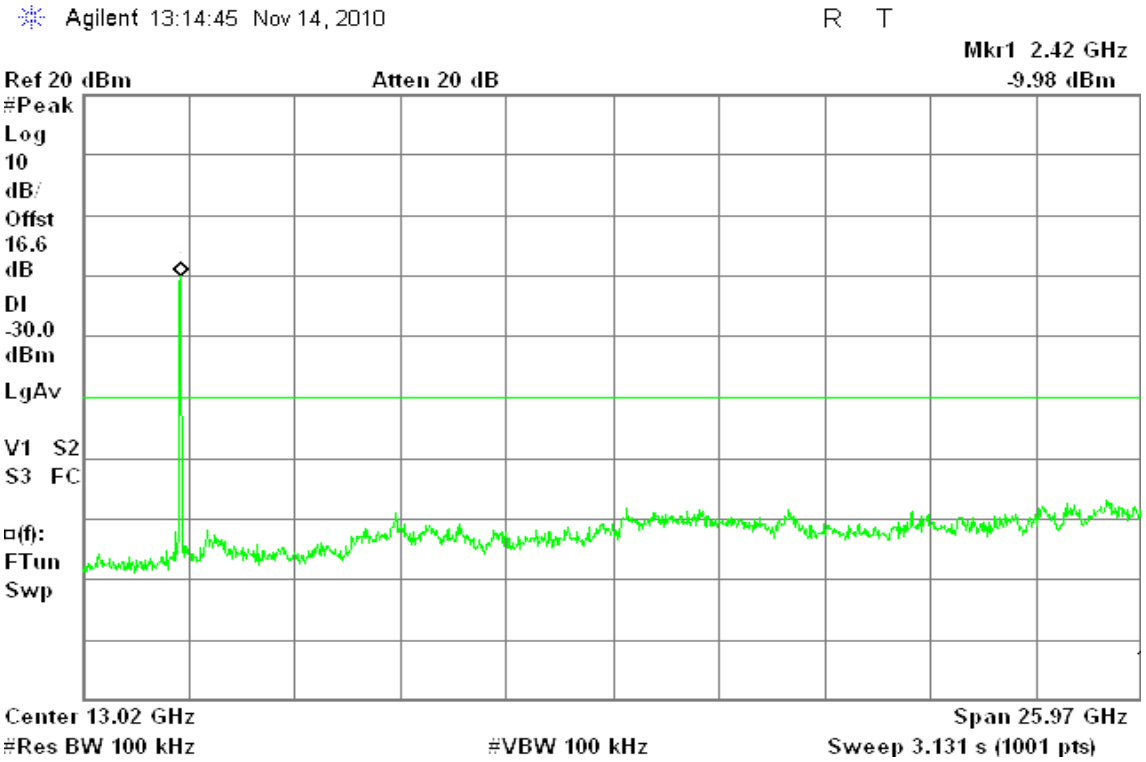


## CH High

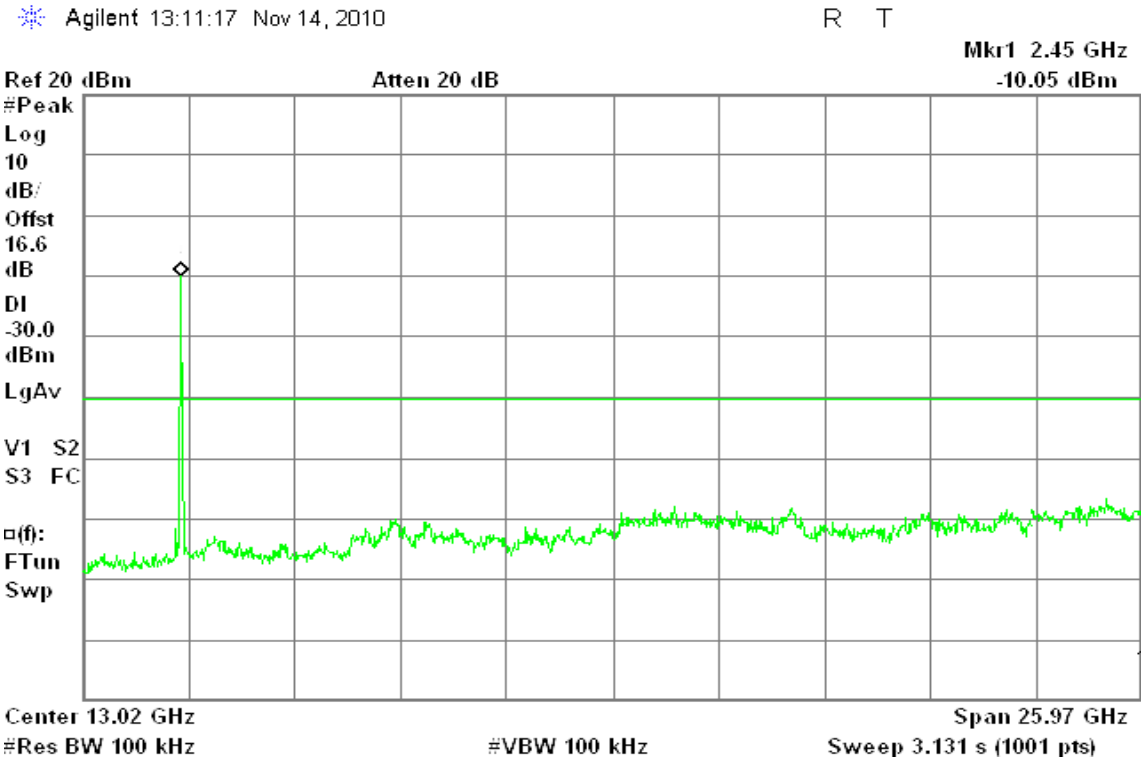



## IEEE 802.11n HT 40 MHz mode with combiner

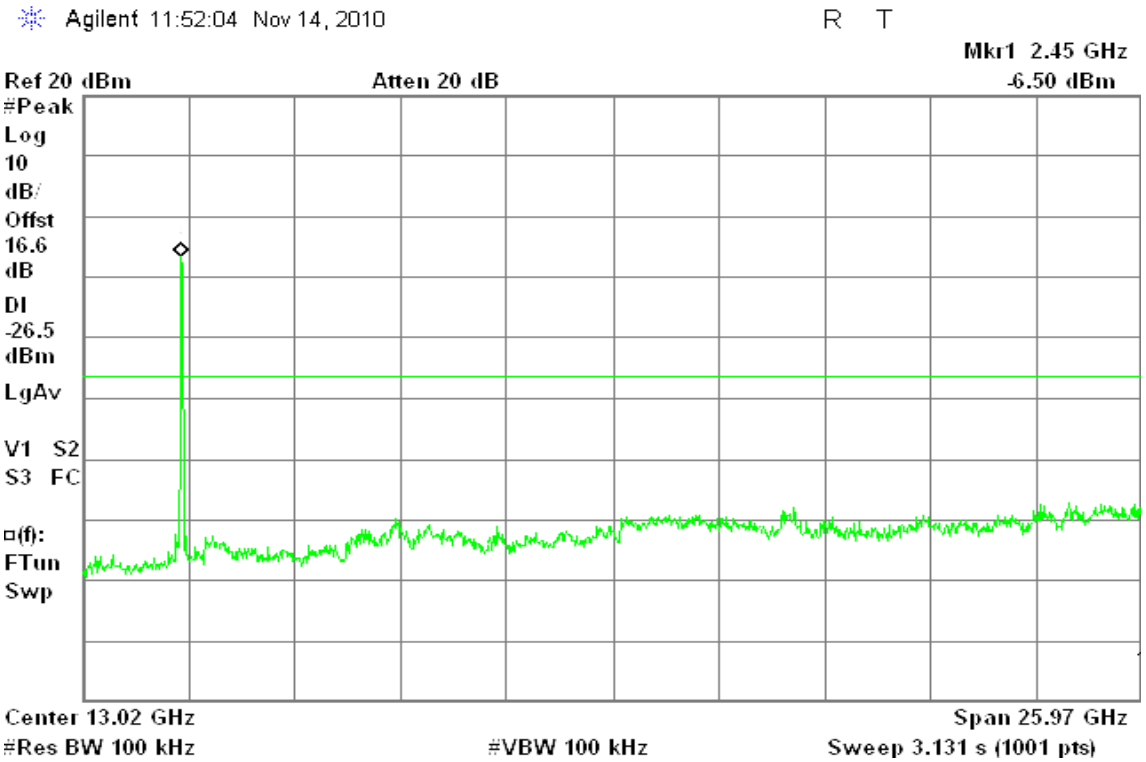
## CH Low



## CH Mid




## CH High



## 7.7 RADIATED EMISSIONS

## LIMIT

1. 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 (μV/m) | Measurement Distance (m) |
|---|---|---|
| 30-88 | 100* | 3 |
| 88-216 | 150* | 3 |
| 216-960 | 200* | 3 |
| Above 960 | 500 | 3 |

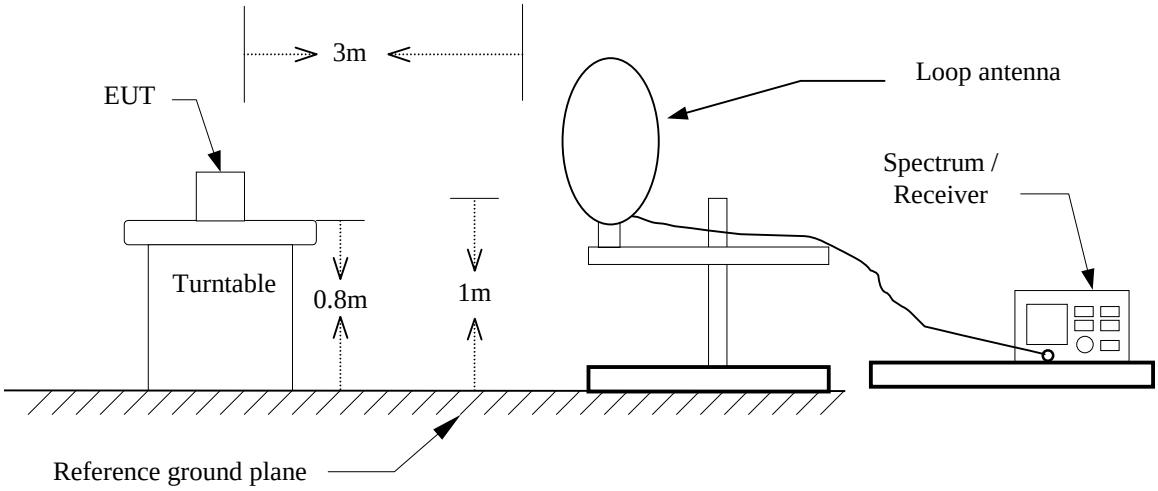
***Remark:*** *Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections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

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

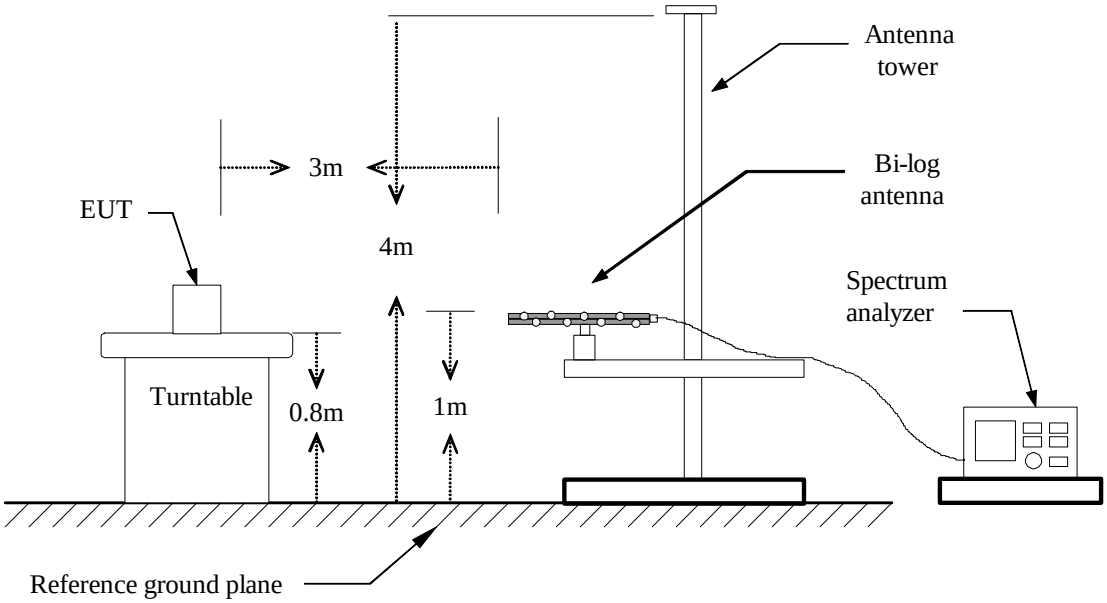
| Frequency (MHz) | Field Strength (μV/m at 3-meter) | Field Strength (dBμV/m at 3-meter) |
|---|---|---|
| 30-88 | 100 | 40 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46 |
| Above 960 | 500 | 54 |

## Test Configuration

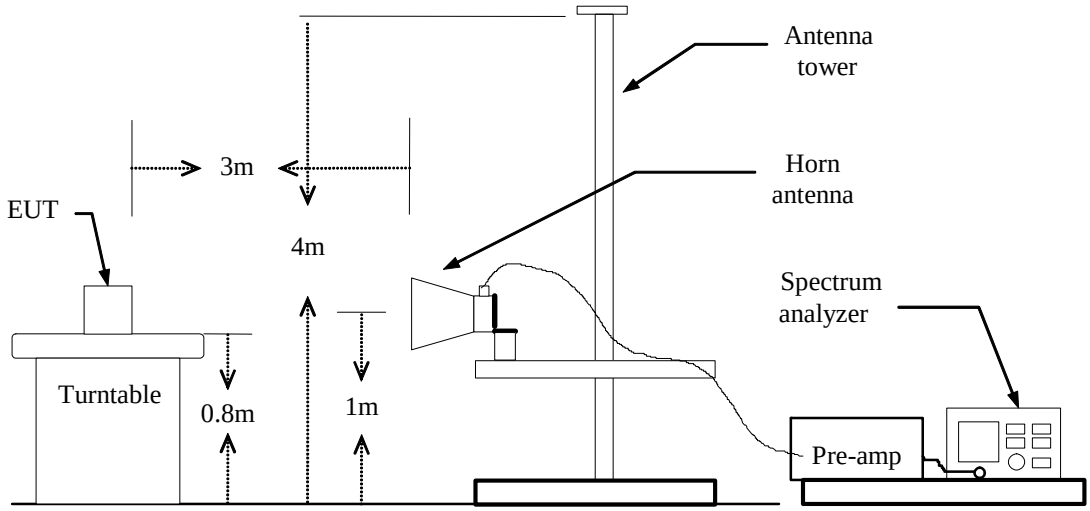
**9kHz ~ 30MHz**




**30MHz ~ 1GHz**



**Above 1 GHz**


Antenna
tower
3m
Horn
antenna
EUT
4m
Spectrum
analyzer
Turntable
0.8m
1m
Pre-amp

## TEST PROCEDURE

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.

## TEST RESULTS

*No non-compliance noted.*

**Below 1GHz**

**Operation Mode:** Normal Link **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54% RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | Reading (dBuV) | Correction Factor (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|
| 67.18 | 50.50 | -14.98 | 35.52 | 40.00 | -4.48 | Peak | V |
| 125.38 | 44.18 | -9.65 | 34.53 | 43.50 | -8.97 | Peak | V |
| 249.87 | 44.21 | -10.90 | 33.31 | 46.00 | -12.69 | Peak | V |
| 511.77 | 38.91 | -4.99 | 33.92 | 46.00 | -12.08 | Peak | V |
| 639.48 | 35.84 | -3.14 | 32.70 | 46.00 | -13.30 | Peak | V |
| 896.53 | 36.17 | -0.65 | 35.51 | 46.00 | -10.49 | Peak | V |
| | | | | | | | |
| 125.38 | 41.42 | -9.65 | 31.76 | 43.50 | -11.74 | Peak | H |
| 249.87 | 44.67 | -10.90 | 33.77 | 46.00 | -12.23 | Peak | H |
| 256.33 | 48.43 | -10.48 | 37.95 | 46.00 | -8.05 | Peak | H |
| 639.48 | 33.37 | -3.14 | 30.23 | 46.00 | -15.77 | Peak | H |
| 767.20 | 39.37 | -1.65 | 37.71 | 46.00 | -8.29 | Peak | H |
| 896.53 | 34.57 | -0.65 | 33.92 | 46.00 | -12.08 | Peak | H |

***Remark:***

1. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)*
2. *Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using peak/quasi-peak detector mode.*
3. *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.*
4. *Margin (dB) = Result (dBuV/m) – Limit (dBuV/m).*

## Above 1 GHz

**Operation Mode:** TX / IEEE 802.11b / CH Low **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2413.33 | 111.78 | 108.91 | -2.92 | 108.86 | 105.99 | Fundamental | | | | |
| 1833.33 | 56.78 | --- | -5.69 | 51.10 | --- | 74.00 | 54.00 | -2.90 | Peak | V |
| 4825.00 | 54.92 | 49.72 | 1.18 | 56.10 | 50.90 | 74.00 | 54.00 | -3.10 | AVG | V |
| 9650.00 | 56.16 | 53.99 | 12.15 | 68.31 | 66.14 | 88.86 | 85.99 | -19.85 | 20dBc AVG Fundamental | V |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| 2410.00 | 114.67 | 111.04 | -2.93 | 111.74 | 108.11 | Fundamental | | | | |
| 2336.67 | 62.82 | 50.90 | -3.15 | 59.67 | 47.75 | 74.00 | 54.00 | -6.25 | AVG | H |
| 3175.00 | 49.62 | --- | -1.17 | 48.44 | --- | 74.00 | 54.00 | -5.56 | Peak | H |
| 4825.00 | 54.60 | 48.61 | 1.18 | 55.78 | 49.79 | 74.00 | 54.00 | -4.21 | AVG | H |
| 7233.33 | 52.36 | 45.04 | 5.24 | 57.60 | 50.28 | 74.00 | 54.00 | -3.72 | AVG | H |
| 9650.00 | 46.41 | 40.44 | 12.15 | 58.56 | 52.59 | 91.74 | 88.11 | -35.52 | 20dBc AVG Fundamental | H |

***Remark:***

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. *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.*

**Operation Mode:** TX / IEEE 802.11b / CH Mid **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2433.33 | 110.40 | 107.73 | -2.86 | 107.54 | 104.87 | Fundamental | | | | |
| 1916.67 | 56.37 | --- | -4.92 | 51.45 | --- | 74.00 | 54.00 | -2.55 | Peak | V |
| 4875.00 | 57.60 | 50.20 | 1.16 | 58.76 | 51.36 | 74.00 | 54.00 | -2.64 | AVG | V |
| 9750.00 | 52.72 | 50.07 | 12.38 | 65.10 | 62.45 | 87.54 | 84.87 | -22.42 | 20dBc AVG Fundamental | V |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| 2436.67 | 114.19 | 111.56 | -2.85 | 111.34 | 108.71 | Fundamental | | | | |
| 1873.33 | 57.27 | --- | -5.32 | 51.95 | --- | 74.00 | 54.00 | -2.05 | Peak | H |
| 4875.00 | 53.97 | 47.53 | 1.16 | 55.13 | 48.69 | 74.00 | 54.00 | -5.31 | AVG | H |
| 9750.00 | 44.56 | 41.50 | 12.38 | 56.94 | 53.88 | 91.34 | 88.71 | -34.83 | 20dBc AVG Fundamental | H |
| N/A | | | | | | | | | | |
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***Remark:***

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. *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.*

**Operation Mode:** TX / IEEE 802.11b / CH High **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 2460.00 | 109.89 | 107.07 | -2.78 | 107.11 | 104.29 | Fundamental | | | | |
| 2330.00 | 60.49 | 49.12 | -3.17 | 57.32 | 45.95 | 74.00 | 54.00 | -8.05 | AVG | V |
| 4925.00 | 53.50 | 47.21 | 1.14 | 54.64 | 48.35 | 74.00 | 54.00 | -5.65 | AVG | V |
| 9850.00 | 53.87 | 51.58 | 12.61 | 66.48 | 64.19 | 87.11 | 84.29 | -20.10 | 20dBc AVG Fundamental | V |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
| 2463.33 | 110.69 | 107.95 | -2.77 | 107.92 | 105.18 | Fundamental | | | | |
| 2366.67 | 64.61 | 50.30 | -3.06 | 61.55 | 47.24 | 74.00 | 54.00 | -6.76 | AVG | H |
| 4925.00 | 52.89 | 46.10 | 1.14 | 54.03 | 47.24 | 74.00 | 54.00 | -6.76 | AVG | H |
| 9850.00 | 46.97 | 42.12 | 12.61 | 59.58 | 54.73 | 87.92 | 85.18 | -30.45 | 20dBc AVG Fundamental | H |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |

***Remark:***

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. *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.*

**Operation Mode:** TX / IEEE 802.11g / CH Low **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1776.67 | 58.08 | --- | -6.21 | 51.87 | --- | 74.00 | 54.00 | -2.13 | Peak | V |
| N/A | | | | | | | | | | |
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| | | | | | | | | | | |
| 1886.67 | 57.16 | --- | -5.19 | 51.97 | --- | 74.00 | 54.00 | -2.03 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11g / CH Mid **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1716.67 | 57.48 | --- | -6.76 | 50.72 | --- | 74.00 | 54.00 | -3.28 | Peak | V |
| N/A | | | | | | | | | | |
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| | | | | | | | | | | |
| 1893.33 | 57.09 | --- | -5.13 | 51.96 | --- | 74.00 | 54.00 | -2.04 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11g / CH High **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1646.67 | 58.24 | --- | -7.41 | 50.84 | --- | 74.00 | 54.00 | -3.16 | Peak | V |
| N/A | | | | | | | | | | |
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| | | | | | | | | | | |
| 1833.33 | 57.63 | --- | -5.69 | 51.94 | --- | 74.00 | 54.00 | -2.06 | Peak | H |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH Low **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1826.67 | 57.99 | --- | -5.75 | 52.25 | --- | 74.00 | 54.00 | -1.75 | Peak | V |
| N/A | | | | | | | | | | |
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| | | | | | | | | | | |
| 1826.67 | 56.86 | --- | -5.75 | 51.11 | --- | 74.00 | 54.00 | -2.89 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH Mid **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1760.00 | 58.26 | --- | -6.36 | 51.90 | --- | 74.00 | 54.00 | -2.10 | Peak | V |
| N/A | | | | | | | | | | |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| 1790.00 | 57.34 | --- | -6.09 | 51.25 | --- | 74.00 | 54.00 | -2.75 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH High **Test Date:** November 17, 2010

**Temperature:** 24°C **Tested by:** Wolf Huang

**Humidity:** 54 % RH **Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1793.33 | 57.76 | --- | -6.06 | 51.70 | --- | 74.00 | 54.00 | -2.30 | Peak | V |
| N/A | | | | | | | | | | |
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| 1786.67 | 57.25 | --- | -6.12 | 51.13 | --- | 74.00 | 54.00 | -2.87 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode / CH Low
**Test Date:** November 17, 2010
**Temperature:** 24°C
**Tested by:** Wolf Huang
**Humidity:** 54 % RH
**Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1826.67 | 56.87 | --- | -5.75 | 51.13 | --- | 74.00 | 54.00 | -2.87 | Peak | V |
| N/A | | | | | | | | | | |
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| 1746.67 | 57.54 | --- | -6.49 | 51.06 | --- | 74.00 | 54.00 | -2.94 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode / CH Mid
**Test Date:** November 17, 2010
**Temperature:** 24°C
**Tested by:** Wolf Huang
**Humidity:** 54 % RH
**Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1823.33 | 57.40 | --- | -5.78 | 51.62 | --- | 74.00 | 54.00 | -2.38 | Peak | V |
| N/A | | | | | | | | | | |
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| 1730.00 | 57.27 | --- | -6.64 | 50.63 | --- | 74.00 | 54.00 | -3.37 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode / CH High
**Test Date:** November 17, 2010
**Temperature:** 24°C
**Tested by:** Wolf Huang
**Humidity:** 54 % RH
**Polarity:** Ver. / Hor.

| Frequency (MHz) | 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 | Ant. Pol. (H/V) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1866.67 | 57.28 | --- | -5.38 | 51.90 | --- | 74.00 | 54.00 | -2.10 | Peak | V |
| N/A | | | | | | | | | | |
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| 1826.67 | 57.45 | --- | -5.75 | 51.70 | --- | 74.00 | 54.00 | -2.30 | Peak | H |
| 4925.00 | 50.17 | --- | 1.14 | 51.32 | --- | 74.00 | 54.00 | -2.68 | Peak | H |
| N/A | | | | | | | | | | |
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***Remark:***

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).*

# 7.8 POWERLINE CONDUCTED EMISSIONS

## LIMIT

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 μH/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 (dBμV) | |
|---|---|---|
| | 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 |

** Decreases with the logarithm of the frequency.*

### Test Configuration

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

## TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

# TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

**Test Data**

| | | | |
|---|---|---|---|
| **Operation Mode:** | Normal Link | **Test Date:** | November 11, 2010 |
| **Temperature:** | 26°C | **Tested by:** | Ali Shu |
| **Humidity:** | 60% RH | | |

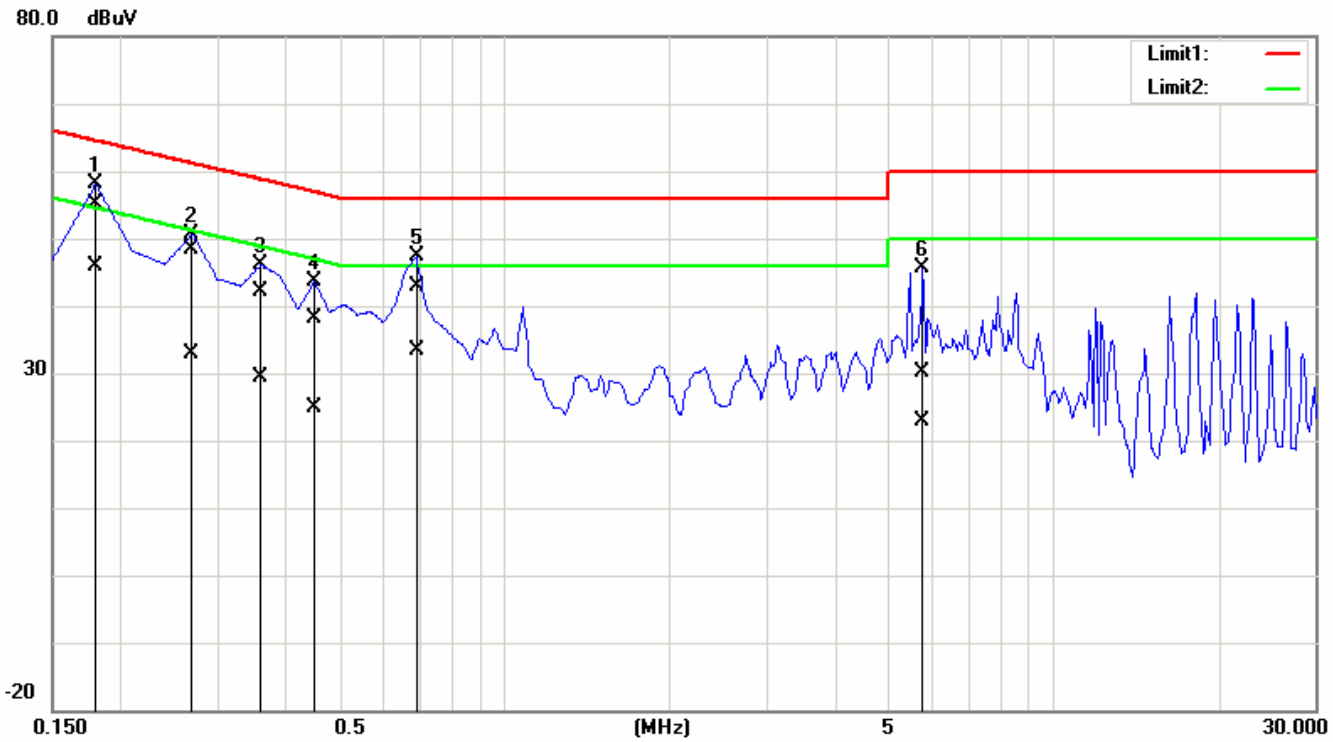
| Freq. (MHz) | QP Reading (dBuV) | AV Reading (dBuV) | Corr. factor (dB/m) | QP Result (dBuV/m) | AV Result (dBuV/m) | QP Limit (dBuV) | AV Limit (dBuV) | QP Margin (dB) | AV Margin (dB) | Note |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.1800 | 55.07 | 45.87 | 0.13 | 55.20 | 46.00 | 64.49 | 54.49 | -9.29 | -8.49 | L1 |
| 0.2700 | 48.27 | 32.67 | 0.13 | 48.40 | 32.80 | 61.12 | 51.12 | -12.72 | -18.32 | L1 |
| 0.3600 | 42.06 | 29.16 | 0.14 | 42.20 | 29.30 | 58.73 | 48.73 | -16.53 | -19.43 | L1 |
| 0.4500 | 38.06 | 24.76 | 0.14 | 38.20 | 24.90 | 56.88 | 46.88 | -18.68 | -21.98 | L1 |
| 0.6900 | 42.86 | 33.36 | 0.14 | 43.00 | 33.50 | 56.00 | 46.00 | -13.00 | -12.50 | L1 |
| 5.7900 | 29.95 | 22.65 | 0.15 | 30.10 | 22.80 | 60.00 | 50.00 | -29.90 | -27.20 | L1 |
| | | | | | | | | | | |
| 0.1800 | 54.88 | 39.38 | 0.12 | 55.00 | 39.50 | 64.49 | 54.49 | -9.49 | -14.99 | L2 |
| 0.2700 | 45.88 | 30.08 | 0.12 | 46.00 | 30.20 | 61.12 | 51.12 | -15.12 | -20.92 | L2 |
| 0.3600 | 39.57 | 24.37 | 0.13 | 39.70 | 24.50 | 58.73 | 48.73 | -19.03 | -24.23 | L2 |
| 0.6900 | 37.27 | 27.87 | 0.13 | 37.40 | 28.00 | 56.00 | 46.00 | -18.60 | -18.00 | L2 |
| 3.6600 | 33.93 | 23.23 | 0.07 | 34.00 | 23.30 | 56.00 | 46.00 | -22.00 | -22.70 | L2 |
| 18.2400 | 39.54 | 35.14 | 0.36 | 39.90 | 35.50 | 60.00 | 50.00 | -20.10 | -14.50 | L2 |

***Remark:***

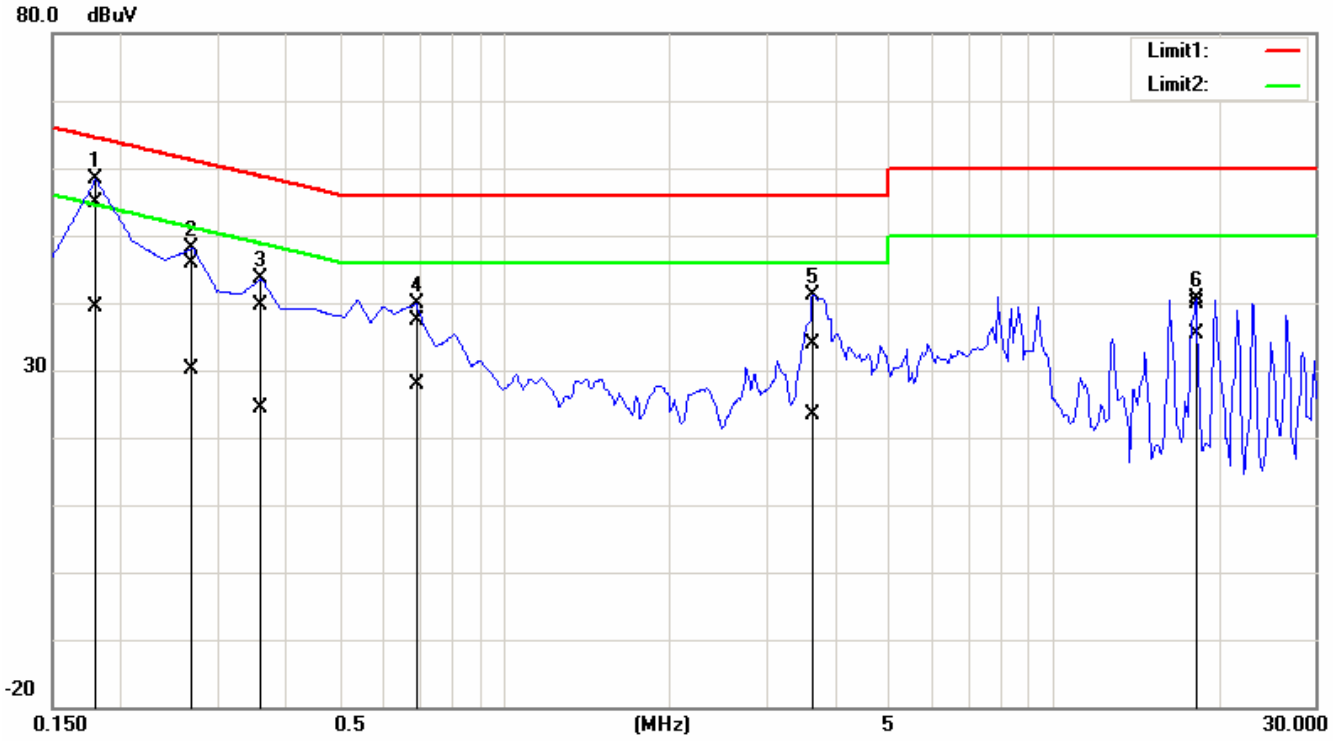
1. *Measuring frequencies from 0.15 MHz to 30MHz.*
2. *The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.*
3. *The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9 kHz;*
4. *L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)*

## Test Plots

### *Conducted emissions (Line 1)*




### *Conducted emissions (Line 2)*



# APPENDIX I
# RADIO FREQUENCY EXPOSURE

## LIMIT

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.

**EUT Specification**

| | |
|---|---|
| **EUT** | 300Mbps Wireless N 4-port Media Bridge |
| **Frequency band (Operating)** | ☒ WLAN: 2.412GHz ~ 2.462GHz<br>☐ WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br>☐ WLAN: 5.745GHz ~ 5.825GHz<br>☐ Others |
| **Device category** | ☐ Portable (<20cm separation)<br>☒ Mobile (>20cm separation)<br>☐ Others |
| **Exposure classification** | ☐ Occupational/Controlled exposure (S = 5mW/cm$^2$)<br>☒ General Population/Uncontrolled exposure (S=1mW/cm$^2$) |
| **Antenna diversity** | ☐ Single antenna<br>☒ Multiple antennas<br>☐ Tx diversity<br>☐ Rx diversity<br>☒ Tx/Rx diversity |
| **Max. output power** | IEEE 802.11b mode: 18.15 dBm (65.3 mW)<br>IEEE 802.11g mode: 15.63 dBm (36.6 mW)<br>IEEE 802.11n HT 20 MHz mode: 15.63 dBm (36.5 mW)<br>IEEE 802.11n HT 40 MHz mode: 15.37 dBm (34.5 mW) |
| **Antenna gain (Max)** | 3.0 dBi (Numeric gain: 2.0)<br>MIMO Mode:<br>3 dBi + 10 log (2) = 6.01 dBi (Numeric gain: 3.99) |
| **Evaluation applied** | ☒ MPE Evaluation*<br>☐ SAR Evaluation<br>☐ N/A |

***Remark:***

1. *The maximum output power is 15.63dBm (36.5mW) at 2412MHz (with 3.99 numeric antenna gain.)*
2. *DTS device is not subject to routine RF evaluation; MPE estimate is used to justify the compliance.*
3. *For mobile or fixed location transmitters, no SAR consideration applied. The maximum power density is 1.0 mW/cm2 even if the calculation indicates that the power density would be larger.*

## TEST RESULTS

*No non-compliance noted.*

## MPE EVALUATION

*No non-compliance noted.*

**Calculation**

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{3770}$

*Where* *E = Field strength in Volts / meter*
*P = Power in Watts*
*G = Numeric antenna gain*
*d = Distance in meters*
*S = Power density in milliwatts / square centimeter*

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

*P (mW) = P (W) / 1000 and*

*d (cm) = d(m) / 100*

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ ***Equation 1***

*Where* *d = Distance in cm*
*P = Power in mW*
*G = Numeric antenna gain*
*S = Power density in mW / cm$^2$*

**Maximum Permissible Exposure**

Substituting the MPE safe distance using d = 20 cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

*Where* *P = Power in mW*
*G = Numeric antenna gain*
*S = Power density in mW / cm$^2$*

**IEEE 802.11b mode:**

EUT output power = 65.3 mW

Numeric Antenna gain = 2.00

→ *Power density = 0.0259894 mW / cm$^2$*

**IEEE 802.11g mode:**

EUT output power = 36.6 mW

Numeric Antenna gain = 2.00

→ *Power density = 0.0145668 mW / cm$^2$*

**IEEE 802.11n HT 20 MHz mode:**

EUT output power = 36.5 mW

Numeric Antenna gain = 3.99

→ *Power density = 0.028981 mW / cm$^2$*

**IEEE 802.11n HT 40 MHz mode:**

EUT output power = 34.5 mW

Numeric Antenna gain = 3.99

→ *Power density = 0.027393 mW / cm$^2$*

*(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm$^2$ even if the calculation indicates that the power density would be larger.)*