



**FCC 47 CFR PART 15 SUBPART C AND ANSI C63.4 : 2003**

**TEST REPORT**

**For**

**Wireless Mini-PCI**

**Model : WMP-N07**

**Issued for**

**LaCie USA**

**22985 NW Evergreen Parkway Hillsboro, OR 97124**

**Issued by**

**Compliance Certification Services Inc.**

**Tainan Laboratory**

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## Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	12/09/2009	Initial Issue	All Page 142	Jeter Wu



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## 1. TEST REPORT CERTIFICATION

**Applicant** : LaCie USA  
**Address** : 22985 NW Evergreen Parkway Hillsboro, OR 97124  
**Equipment Under Test** : Wireless Mini-PCI  
**Model** : WMP-N07  
**Tested Date** : June 29 ~ July 11, 2007 ; October 27 ~ December 07, 2009

APPLICABLE STANDARD	
STANDARD	TEST RESULT
FCC Part 15 Subpart C AND ANSI C63.4:2003	PASS

Approved by:

Jeter Wu  
Section Manager

Reviewed by:

Eric Yang  
Senior Engineer

WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.



## 2. EUT DESCRIPTION

### 2.1 DESCRIPTION OF EUT & POWER

<b>Product Name</b>	Wireless Mini-PCI
<b>Model Number</b>	WMP-N07
<b>Frequency Range</b>	IEEE 802.11b/g, 802.11n HT20 : 2412MHz~2462MHz IEEE 802.11n HT40 : 2422MHz~2452MHz
<b>Transmit Power</b>	IEEE 802.11b : 22.71dBm IEEE 802.11g : 20.82dBm IEEE 802.11n HT20 : 20.61dBm IEEE 802.11n HT40 : 20.47dBm
<b>Channel Spacing</b>	IEEE 802.11b/g, 802.11n HT20/HT40 : 5MHz
<b>Channel Number</b>	IEEE 802.11b/g, 802.11n HT20 : 11 Channels IEEE 802.11n HT40 : 7 Channels
<b>Transmit Data Rate</b>	IEEE 802.11b: 11, 5.5, 2, 1Mbps IEEE 802.11g : 54, 48, 36, 24, 18, 12, 9, 6Mbps IEEE 802.11n HT20: 130, 117, 104, 78, 65, 58.5, 52, 39, 26, 19.5, 13, 6.5 Mbps IEEE 802.11n HT40: 270, 243, 216, 162, 135, 121.5, 108, 81, 54, 40.5, 27, 13.5Mbps
<b>Type of Modulation</b>	IEEE 802.11b : DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g : OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n HT20/40 : OFDM (64QAM, 16QAM, QPSK, BPSK)
<b>Frequency Selection</b>	by software / firmware
<b>Antenna Type</b>	Chain 0 : PIFA Antenna, Model: C037-511024-A(SSR-209370), Antenna Gain 0.69 dBi at 2.4GHz, with EMI core. Chain 1, 2 : PIFA Antenna, Model: C037-511026-A(SSR-209371), Antenna Gain -0.4 dBi at 2.4GHz, with EMI core.
<b>Power Source</b>	3.3 VDC (From Notebook PC, Powered From Host Device)
<b>Note</b>	Ralink RF Module Model : RT2820 + RT2860

**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: XXKWMPN07A1 filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.
3. For more details, please refer to the User's manual of the EUT.
4. This report is modified from 70629001.



### 3. DESCRIPTION OF TEST MODES

The EUT is an 802.11n MIMO transceiver in Mini-PCI Module form factor. It has two transmitter chains and three receive chains ( $2 \times 3$  configurations). The  $2 \times 3$  configuration is implemented with two outside chains (Chain 0 and 1) and the middle chain (chain 2) Rx only.

11b/g mode, only examines Chain 0, because only Chain 0 is functional according to the user diver of Ralink. The power is transmitted from TX0 only at 11b/g normal mode in Ralink solution.

The RF chipset is manufactured by Ralink Technology, Corp.

#### IEEE 802.11b, 802.11g, 802.11n HT20 mode

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode : 11Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11g mode : 6Mbps data rate (worst case) were chosen for full testing.

IEEE 802.11n HT20 mode : 6.5Mbps data rate (worst case) were chosen for full testing.

#### IEEE 802.11n HT40 mode

The EUT had been tested under operating condition.

There are three channels have been tested as following :

Channel	Frequency (MHz)
Low	2422
Middle	2437
High	2452

IEEE 802.11n HT40 mode : 13.5Mbps data rate (worst case) were chosen for full testing.



## **4. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4:2003 and FCC CRF 47 15.207, 15.209 and 15.247.

## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

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

No. 8, Jiu Cheng Ling, Jiaokeng Village, Sinhua Township, Tainan Hsien 712, Taiwan R.O.C.

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 : 2003 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 preselectors 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 LABORATORY ACCREDITATIONS LISTINGS**

The test facilities used to perform radiated and conducted emissions tests are accredited by Taiwan Accreditation Foundation for the specific scope of accreditation under Lab Code: 1109 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324H-1 for OATS -6.

**5.4 TABLE OF ACCREDITATIONS AND LISTINGS**

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 FCC MRA: TW-1037
Japan	VCCI	3/10 meter Open Area Test Sites to perform conducted/radiated measurements	 C-2882 R-2635
Taiwan	TAF	CISPR 11, FCC METHOD-47 CFR Part 18, EN 55011, EN 60601-1-2, CISPR 22, CNS 13438, EN 55022, EN 55024, AS/NZS CISPR 22 CISPR 14, EN 55014-1, EN 55014-2, CNS 13783-1, CISPR 22, CNS 13439, EN 55013, FCC Method-47 CFR Part 15 Subpart B, IC ICES-003, VCCI V-3 & V-4 FCC Method-47 CFR Part 15 Subpart C and ANSI C63.4, LP 0002 EN / IEC 61000-4-2 / -3 / -4 / -5 / -6 / -8 / -11 EN 61000-3-2, EN 61000-3-3 EN 61000-6-3, EN 61000-6-1, AS/NZS 4251.1, EN 61000-6-4, EN 61000-6-2, AS/NZS 4251.2, EN 61204-3, EN 50130-4, EN 62040-2, EN 50371, EN 50385, AS/NZS 4268, ETSI EN 300 386 ETSI EN 300 328, ETSI EN 301 489-1/-3/-9/-17 ETSI EN 301 893, ETSI EN 300 220-2/-1 ETSI EN 300 440-2/-1 ETSI EN 301 357-2/-1 RSS-310, RSS-210 Issue 7, RSS-Gen Issue 2	  Testing Laboratory 1109
Taiwan	BSMI	CNS 13438, CNS 13783-1, CNS13439	 SL2-IN-E-0039 SL2-R1/R2-0039 SL2-A1-E-0039
Canada	Industry Canada	RSS210, Issue 7	 IC 2324H-1

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





## 6. CALIBRATION AND UNCERTAINTY

### 6.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 6.2 MEASUREMENT UNCERTAINTY

The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4.

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 1000 MHz	+/- 3.2 dB
Radiated Emission, 1 to 26.5GHz	+/- 3.2 dB
Power Line Conducted Emission	+/- 2.1 dB

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



## 7. SETUP OF EQUIPMENT UNDER TEST

### SUPPORT EQUIPMENT

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Notebook PC	DELL	Latitude D610	CN-0C4708-48643-625-5565	E2K24BNHM
2	Notebook PC	HP	Compaq nx6130	CNU543274R	CNTWM3B2200BGA
3	Wireless Access Point	D-Link	DWL-7100AP	DQ6114B00002	KA22003040018-1
4	Modem	ZyXEL	Omni 56K	S1Z4107727	1880MN156K
5	Printer	HP	hp desk jet 948c	CN19S6S1XS	DoC

### SETUP DIAGRAM FOR TESTS

EUT & peripherals setup diagram is shown in appendix setup photos.

### EUT OPERATING CONDITION

#### **For RF :**

1. Set up all computers like the setup diagram.
2. The “Ralink QA Test Program for RT 2860 ver1.0.0.2” software was used for testing.  
The EUT driver software installed in the host support equipment during testing was RT2860 QATEST PCI WDM Driver.

#### **TX Mode**

- ⇒ **Tx Data Rate:** MCS=3; LP 11Mbps Bandwidth 20 (IEEE 802.11b mode)  
MCS=0; 6Mbps Bandwidth 20 (IEEE 802.11g mode)  
MCS=0; 6.5Mbps Bandwidth 20 (IEEE 802.11n HT20 mode)  
MCS=0; 13.5Mbps Bandwidth 40 (IEEE 802.11n HT40 mode)

⇒ **Power control : PIFA Antenna**

IEEE 802.11b Channel Low (2412MHz) TX Power0 08 (only chain0 TX)  
IEEE 802.11b Channel Mid (2437MHz) TX Power0 0F (only chain0 TX)  
IEEE 802.11b Channel High (2462MHz) TX Power0 11 (only chain0 TX)  
IEEE 802.11g Channel Low (2412MHz) TX Power0 0C (only chain0 TX)  
IEEE 802.11g Channel Mid (2437MHz) TX Power0 10 (only chain0 TX)  
IEEE 802.11g Channel High (2462MHz) TX Power0 11 (only chain0 TX)  
IEEE 802.11n HT20 Channel Low (2412MHz) TX Power0 08 / TX Power1 13  
IEEE 802.11n HT20 Channel Mid (2437MHz) TX Power0 0B / TX Power1 13  
IEEE 802.11n HT20 Channel High (2462MHz) TX Power0 0D / TX Power1 13  
IEEE 802.11n HT40 Channel Low (2422MHz) TX Power0 03 / TX Power1 0E  
IEEE 802.11n HT40 Channel Mid (2437MHz) TX Power0 0A / TX Power1 11  
IEEE 802.11n HT40 Channel High (2452MHz) TX Power0 07 / TX Power1 0E

3. All of the function are under run.
4. Start test.



**For Normal operating :**

1. Set up all computers like the setup diagram.
2. All of the function are under run.
3. Notebook PC (2) ping 192.168.0.10 –t to Notebook PC (1).
4. Notebook PC (1) ping 192.168.0.20 –t to Notebook PC (2).
5. Notebook PC (1) ping 192.168.0.50 –t to Wireless Access Point (3).
6. Start test.



## 8. APPLICABLE LIMITS AND TEST RESULTS

### 8.1 6dB BANDWIDTH

#### LIMIT

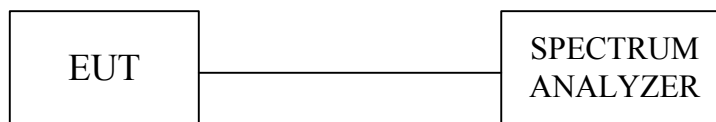
§ 15.207(a) (2) For direct sequence systems, the minimum 6dB bandwidth shall be at least 500kHz

#### TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSEK30	835253/002	10/17/2007
SPECTRUM ANALYZER	AGILENT	E4446A	MY433601.32	03/05/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

#### TEST SETUP



#### TEST PROCEDURE

The transmitter output was connected to a spectrum analyzer. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

**TEST RESULTS****IEEE 802.11b MODE**

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	12150	500	PASS
Middle	2437	12200	500	PASS
High	2462	12150	500	PASS

**IEEE 802.11g MODE**

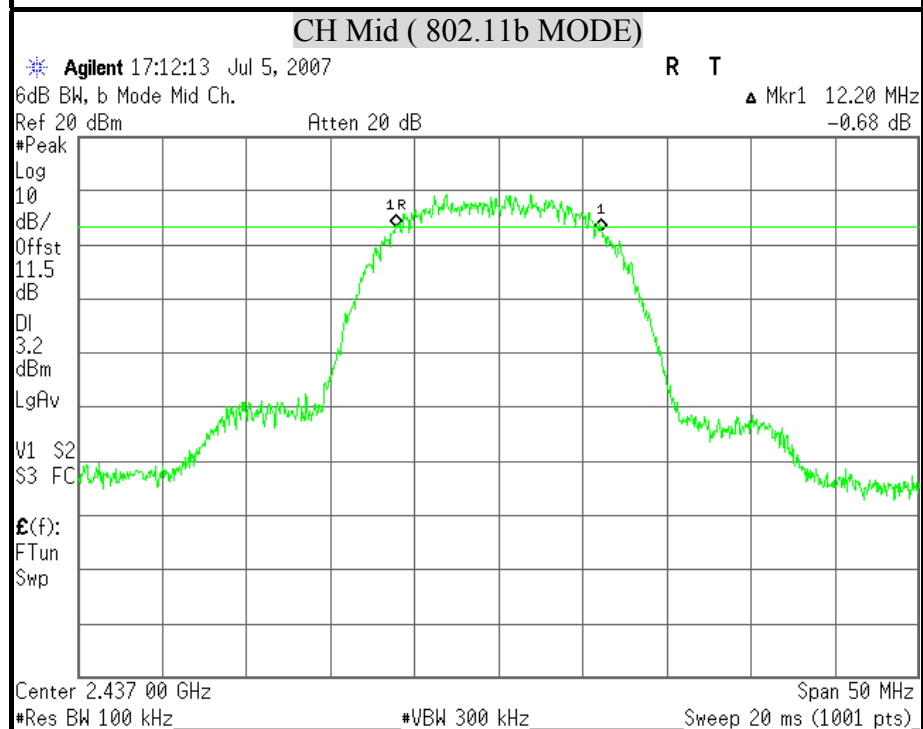
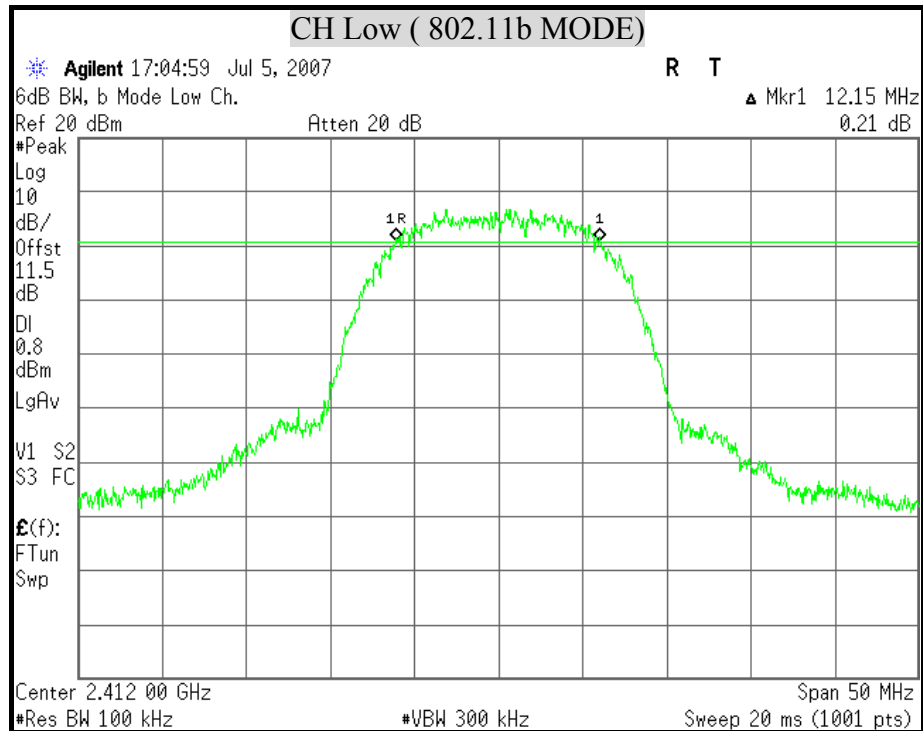
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass / Fail
Low	2412	16550	500	PASS
Middle	2437	16550	500	PASS
High	2462	16550	500	PASS

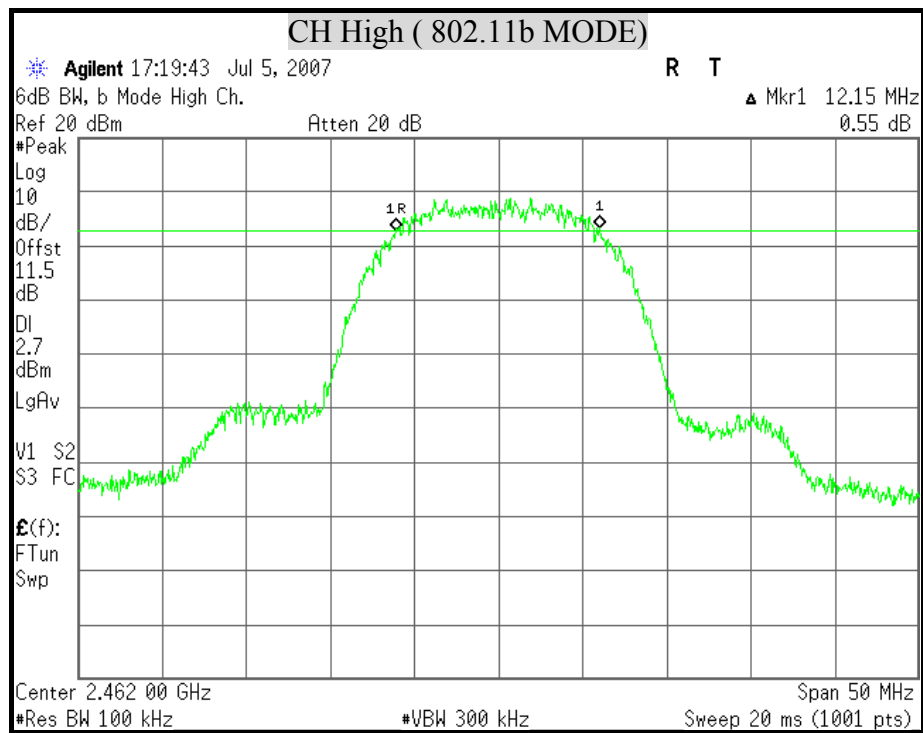
**IEEE 802.11n HT20 mode (Two TX)**

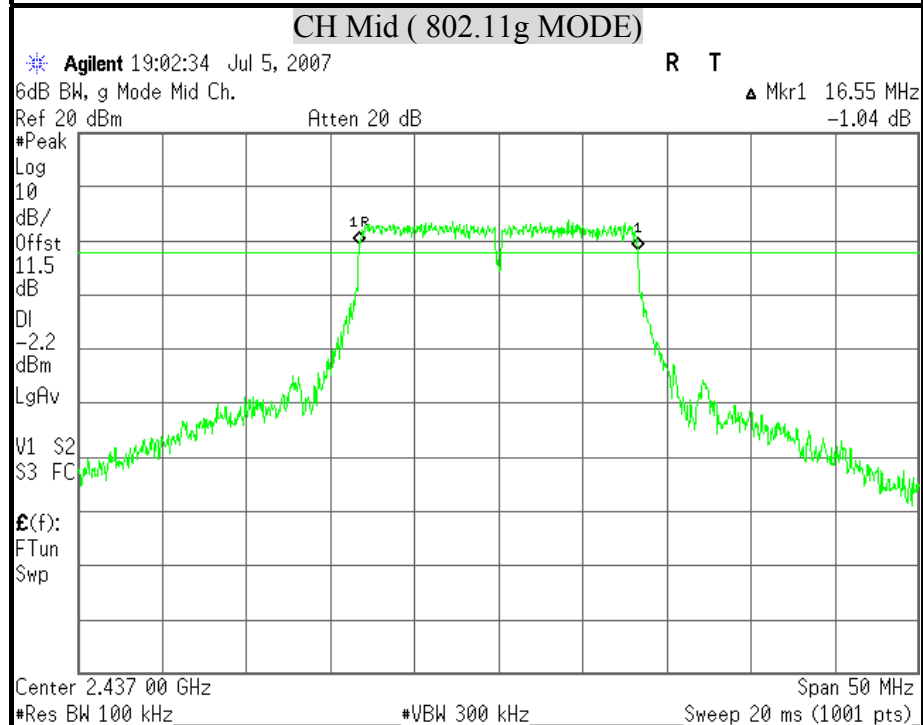
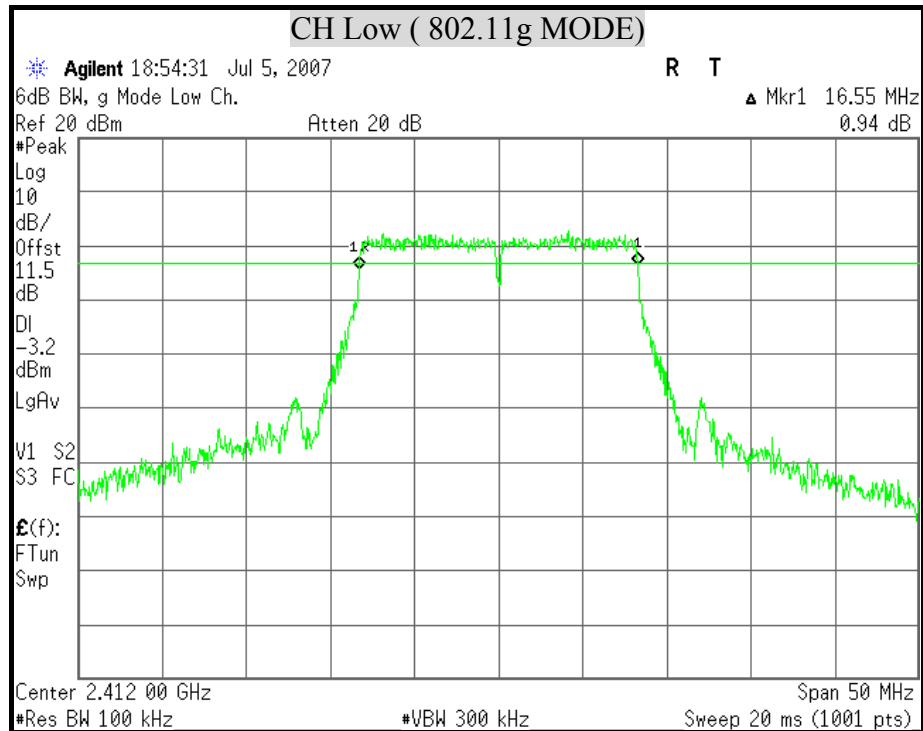
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)		Minimum Limit (kHz)	Pass / Fail
		Chain 0	Chain 1		
Low	2412	17700	17750	500	PASS
Middle	2437	17700	17700	500	PASS
High	2462	17700	17700	500	PASS

**IEEE 802.11n HT40 mode (Two TX)**

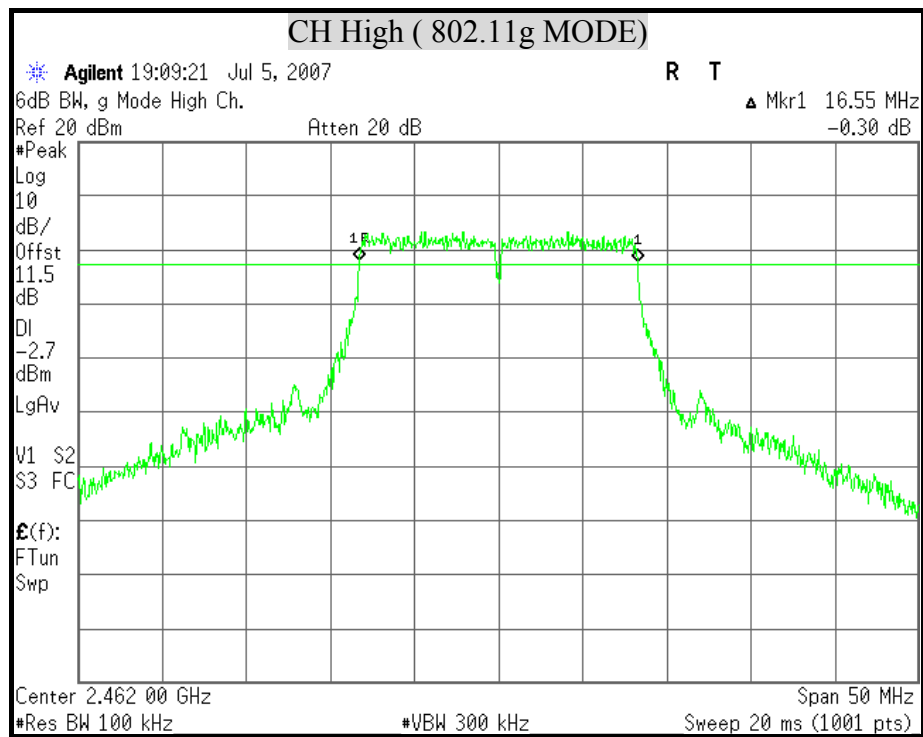
Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)		Minimum Limit (kHz)	Pass / Fail
		Chain 0	Chain 1		
Low	2422	36350	36400	500	PASS
Middle	2437	36400	36400	500	PASS
High	2452	36350	36400	500	PASS

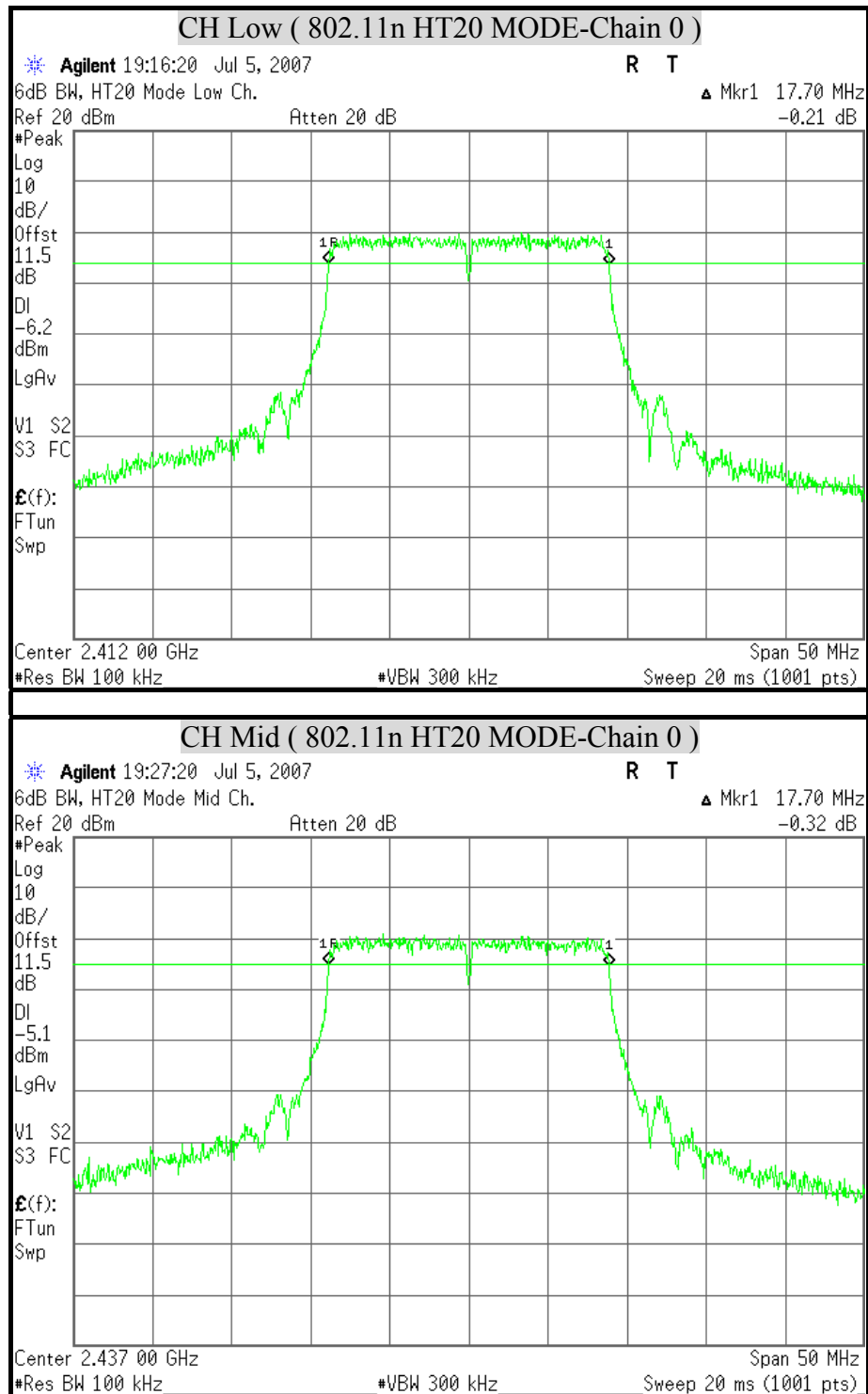
**6dB BANDWIDTH ( 802.11b MODE)**

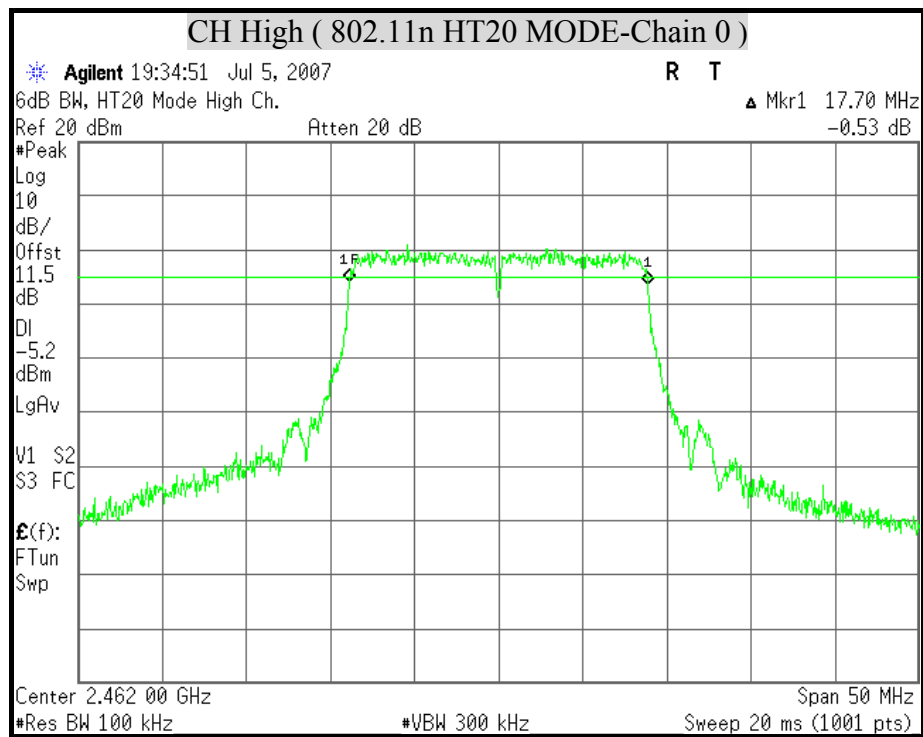


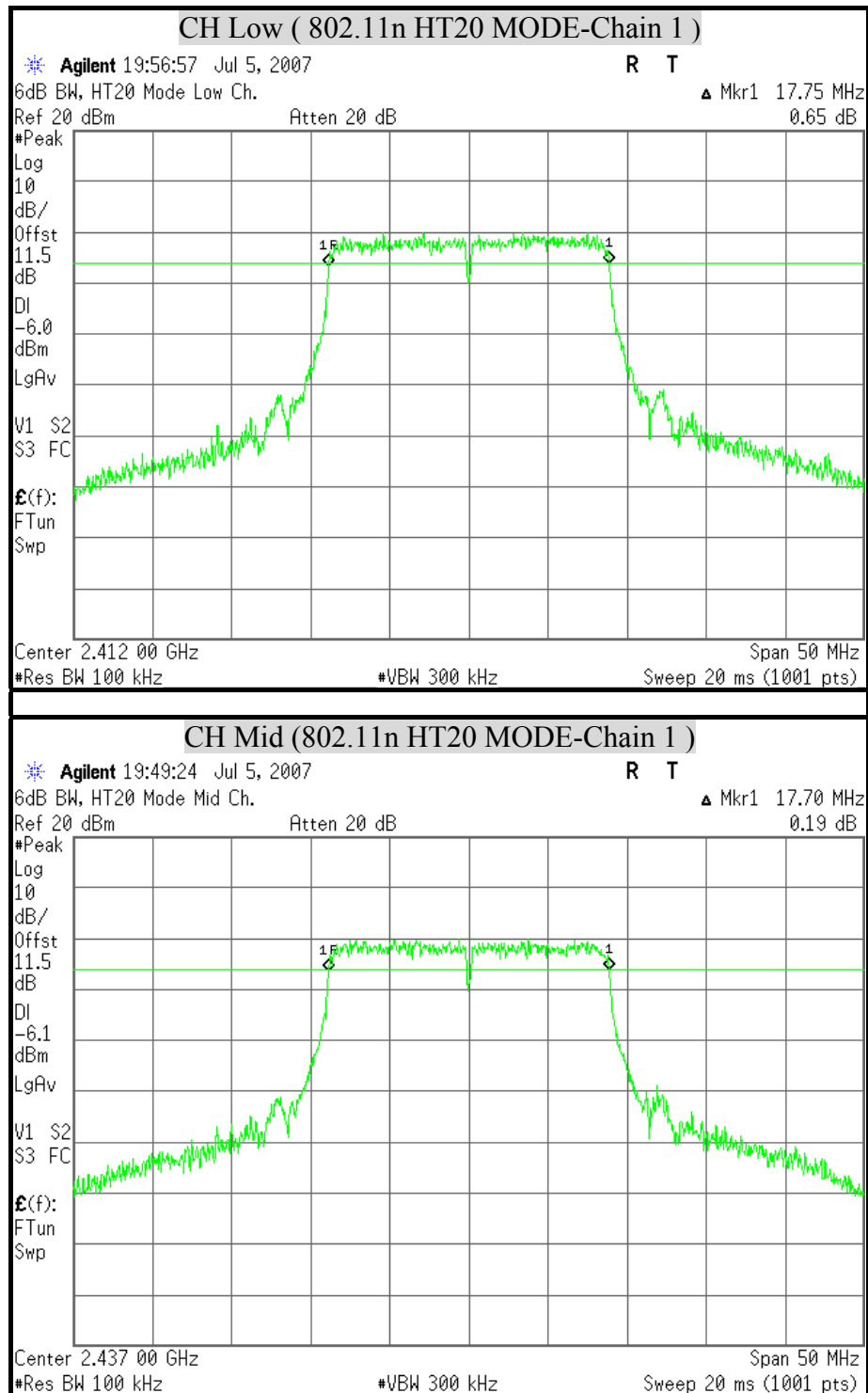
**6dB BANDWIDTH ( 802.11g MODE)**

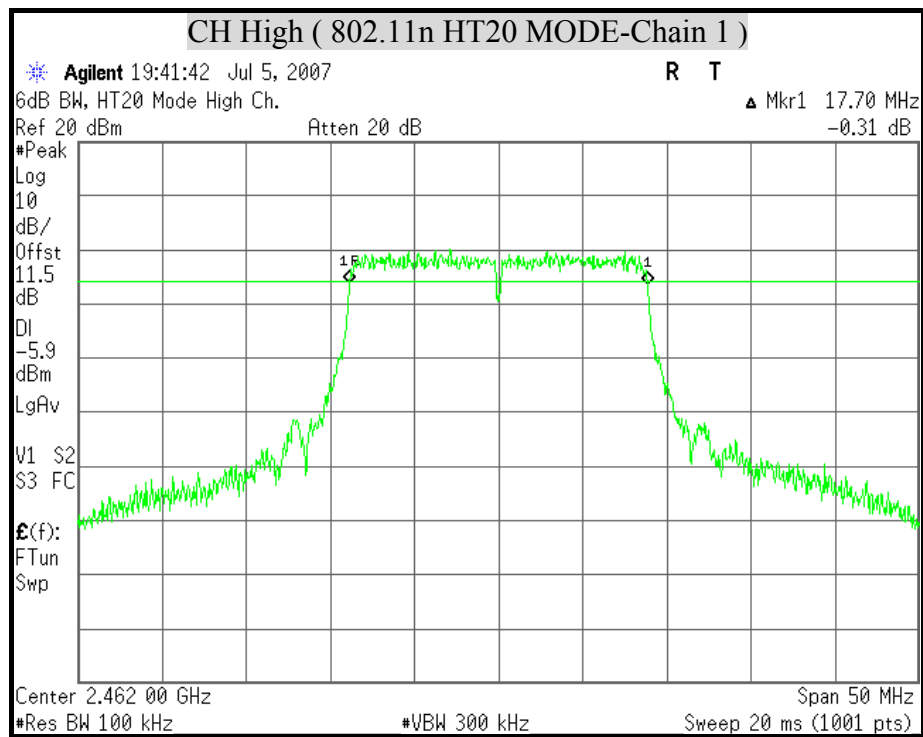


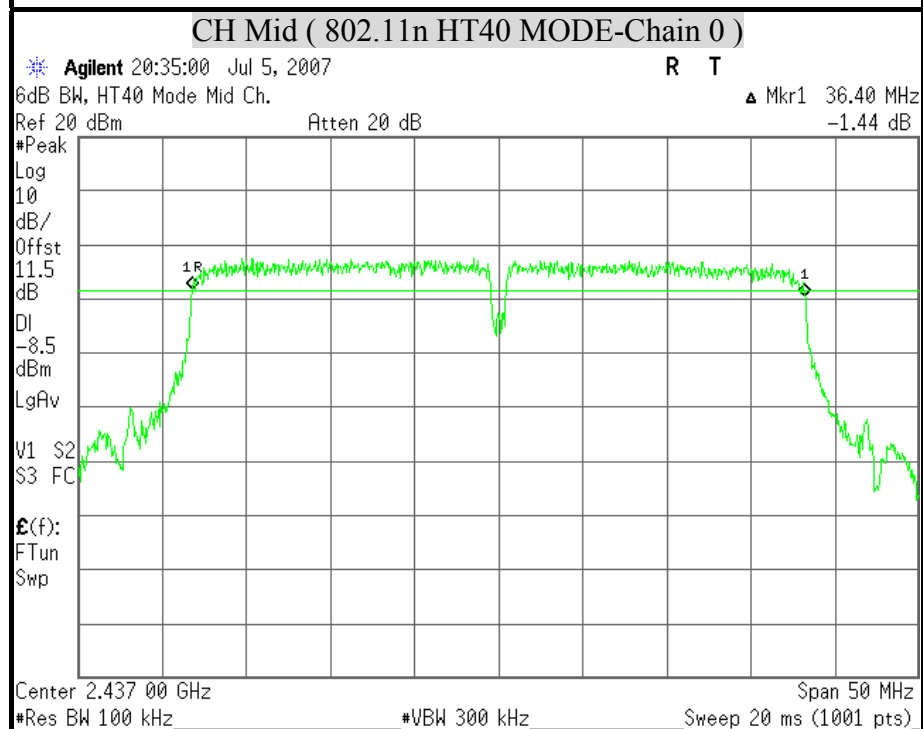
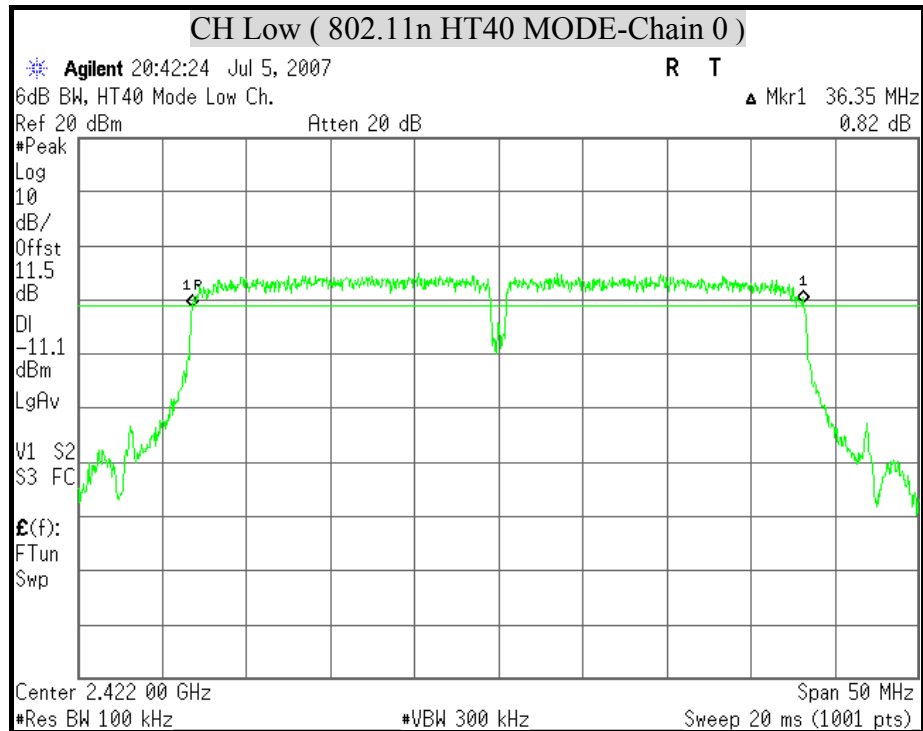


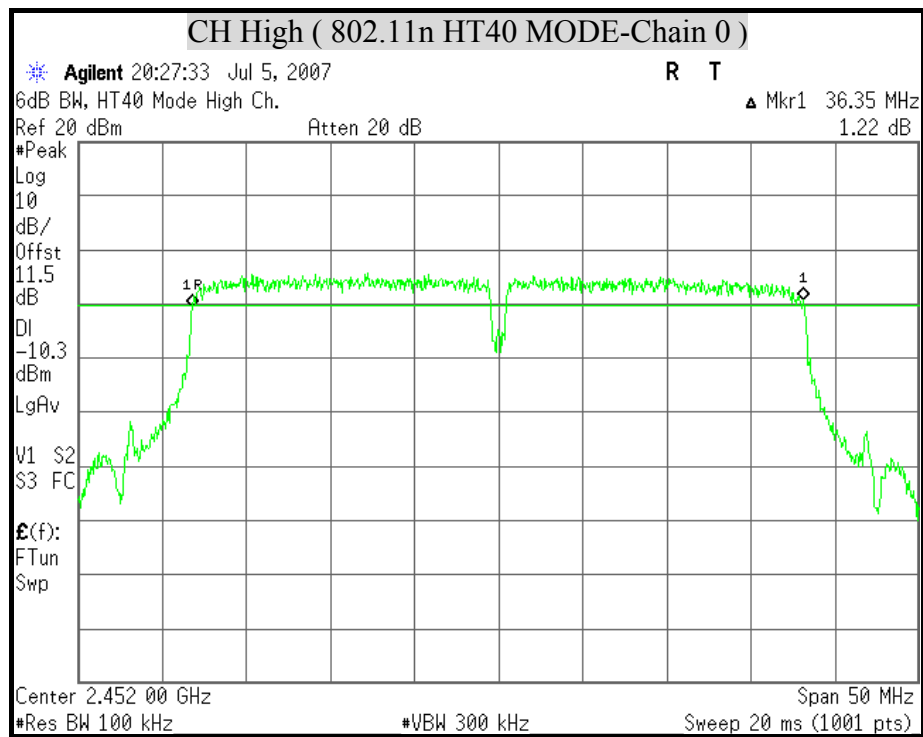
**6dB BANDWIDTH ( 802.11n HT20 MODE)**

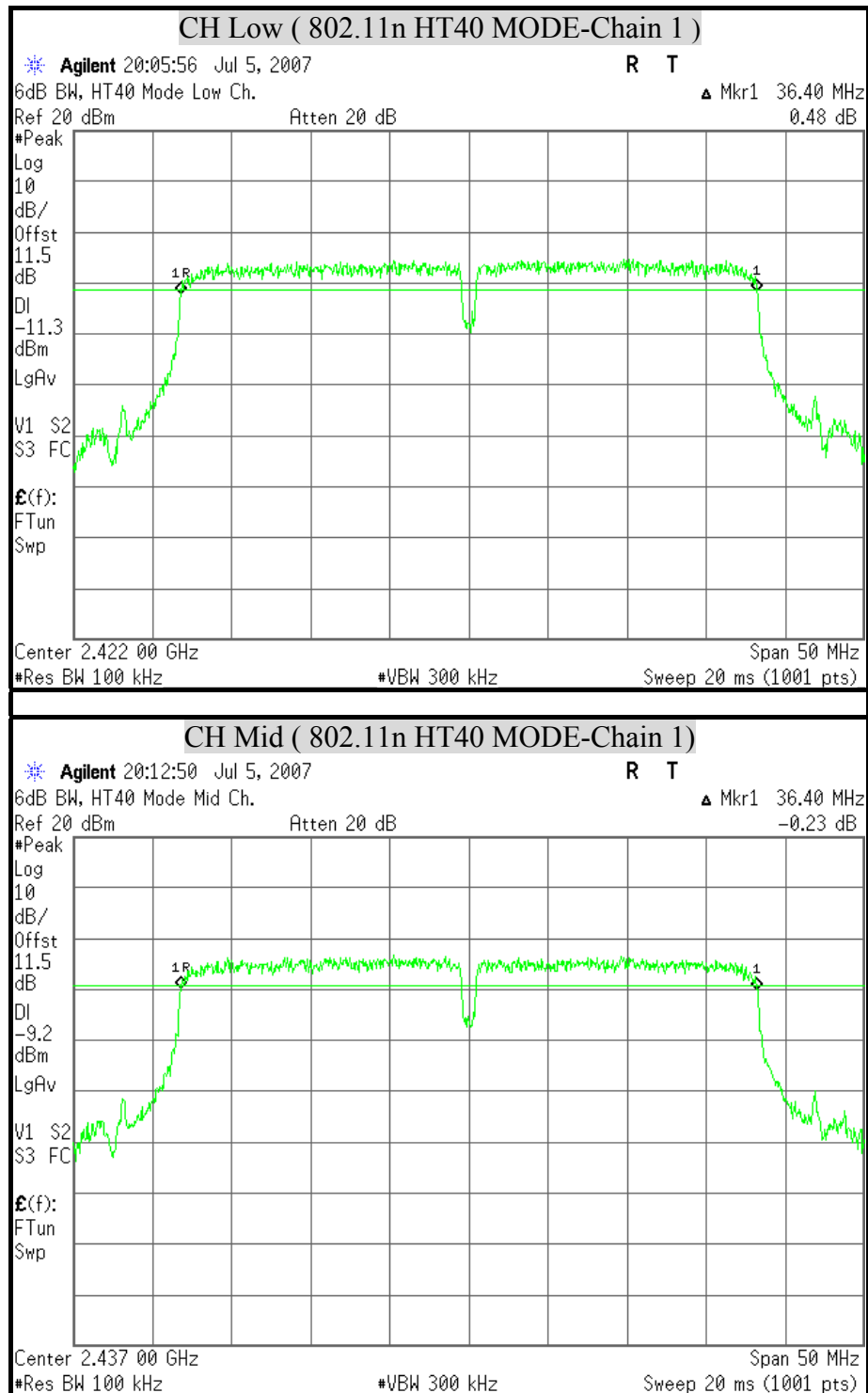




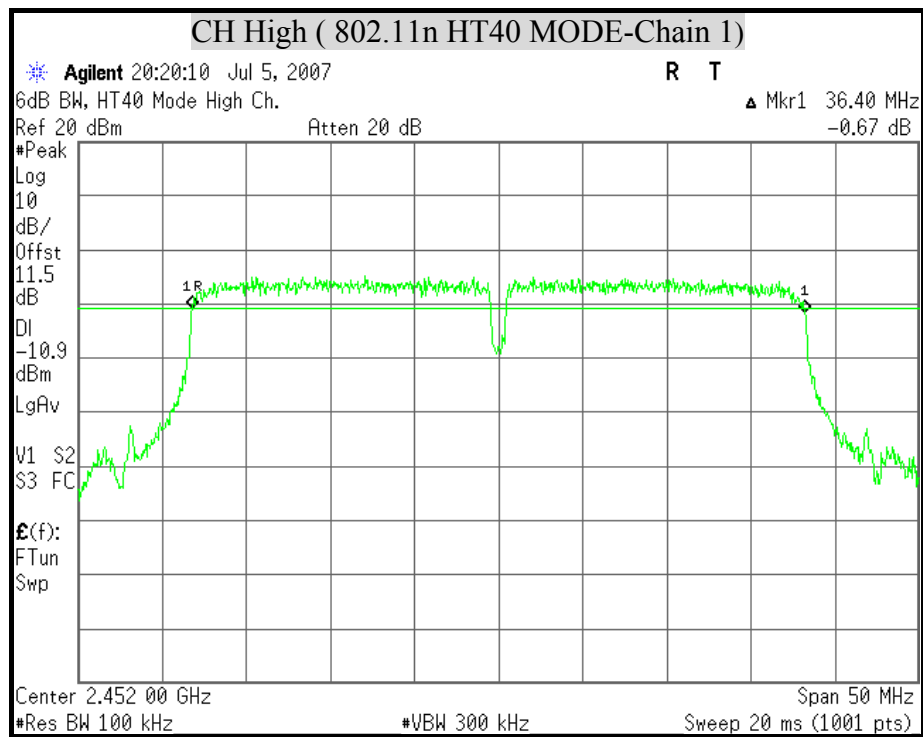


**6dB BANDWIDTH ( 802.11n HT40 MODE)**











## 8.2 99% BANDWIDTH

### LIMIT

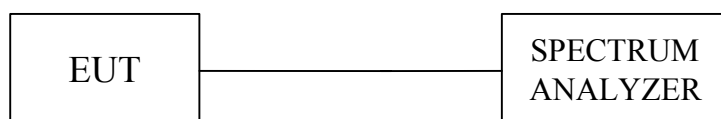
None; for reporting purposes only.

### TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/05/2009
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/21/2009

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### TEST SETUP



### TEST PROCEDURE

1. The spectrum shall be set as follows :

Span : The minimum span to fully display the emission and approximately 20dB below peak level.

RBW : The set to 1% to 3% of the approximate emission width.

2. Compute the combined power of all signal responses contained in the trace by covering all the data points.
3. For 99% occupied BW, place the markers at the frequency at which 0.5% of the power lies to the right of the right marker and 0.5% of the power lies to the left of the left marker.
4. The 99% BW is the bandwidth between the right and left markers.

**TEST RESULTS****IEEE 802.11b MODE**

Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)
Low	2412	15.30
Middle	2437	15.23
High	2462	15.24

**IEEE 802.11g MODE**

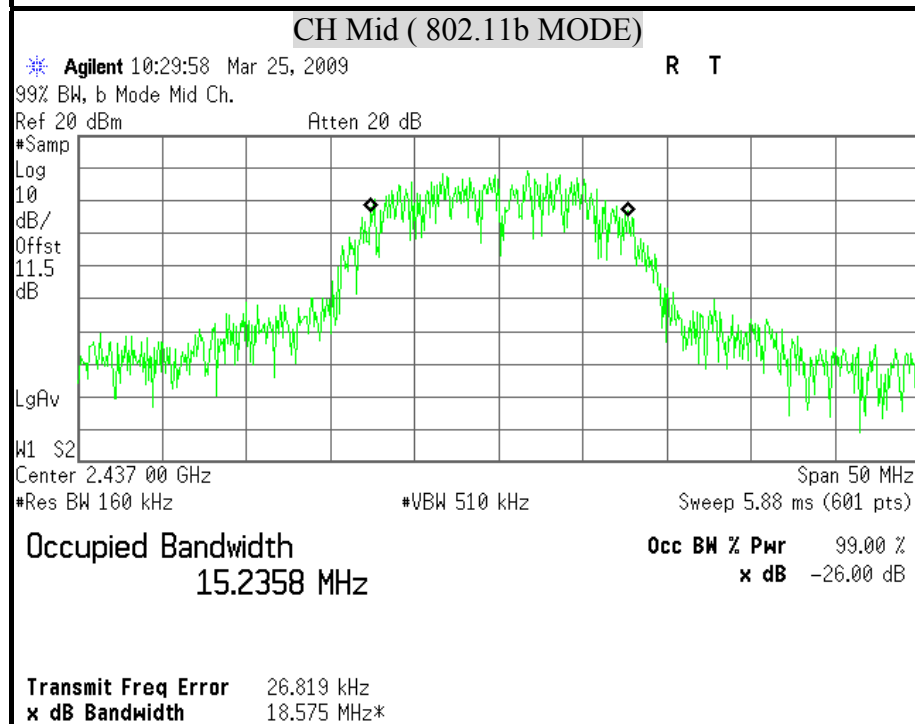
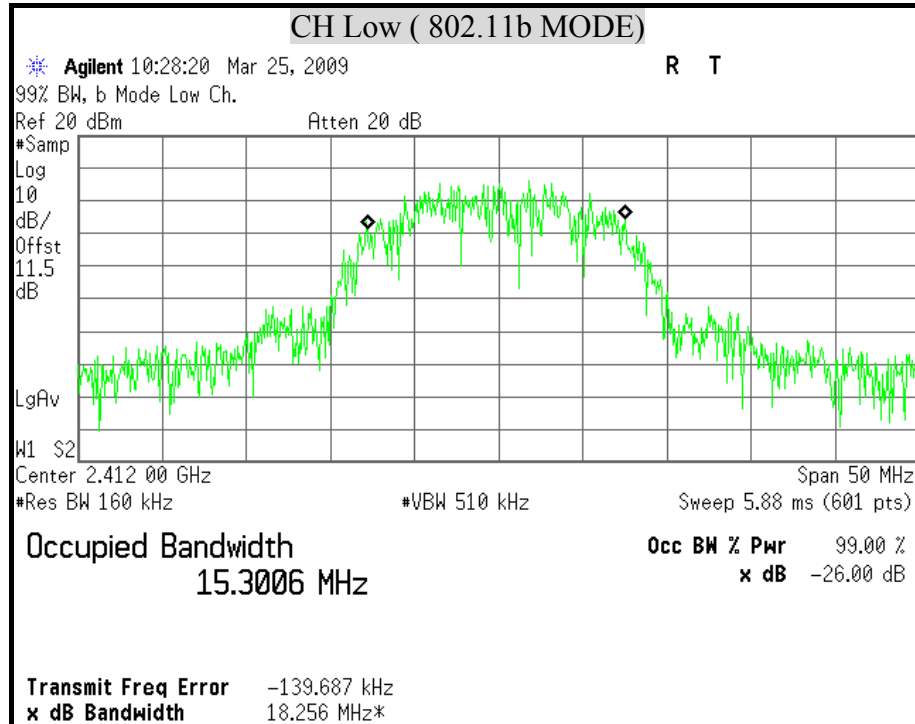
Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)
Low	2412.00	16.37
Middle	2437.00	16.43
High	2462.00	16.38

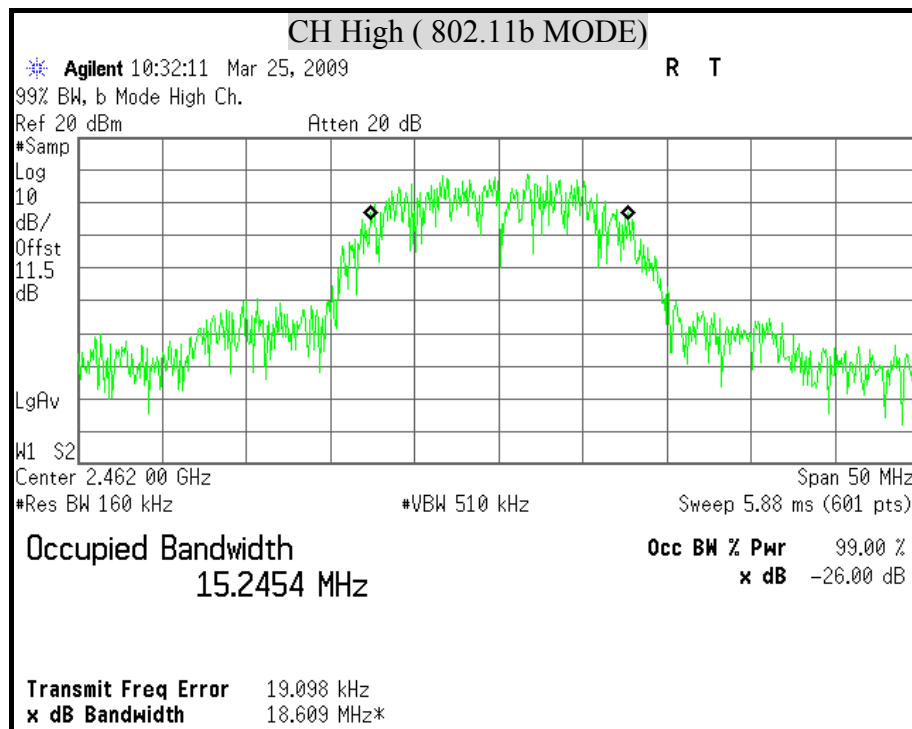
**IEEE 802.11n HT20 mode (Two TX)**

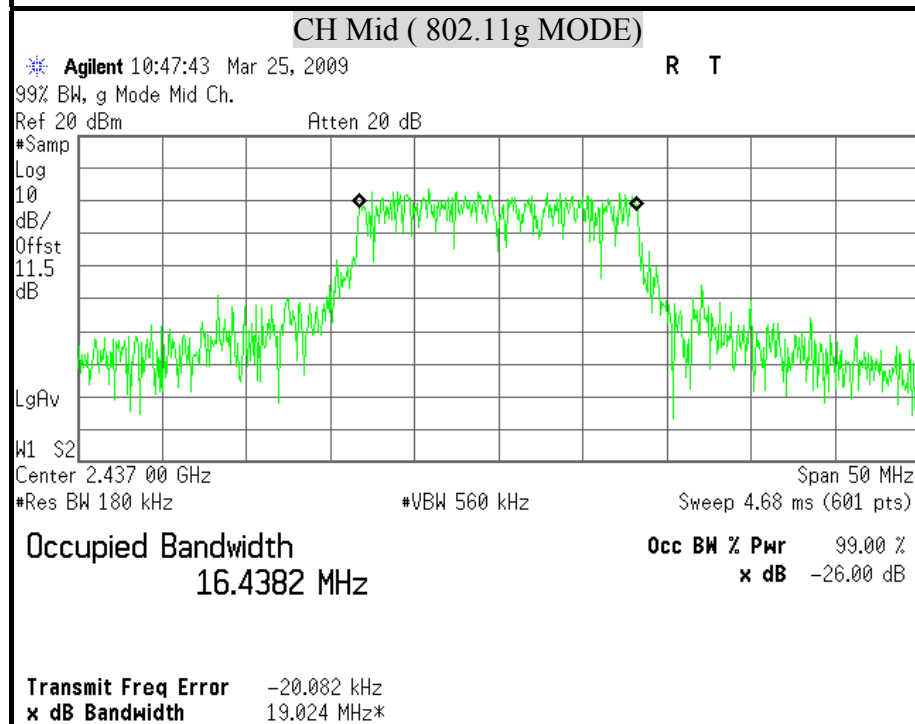
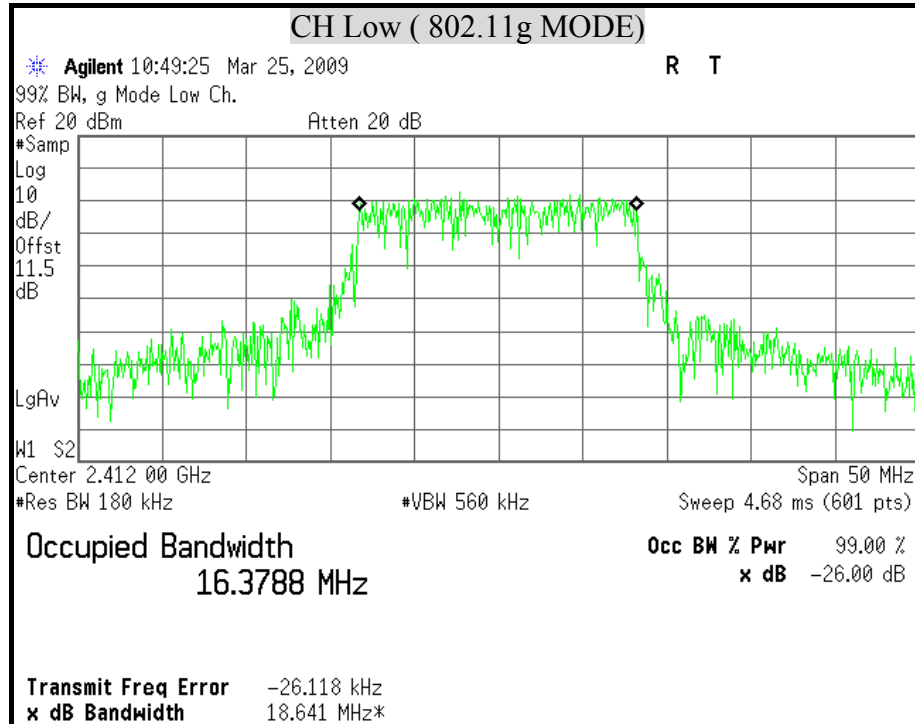
Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)	
		Chain 0	Chain 1
Low	2412.00	17.57	17.56
Middle	2437.00	17.47	17.52
High	2462.00	17.46	17.52

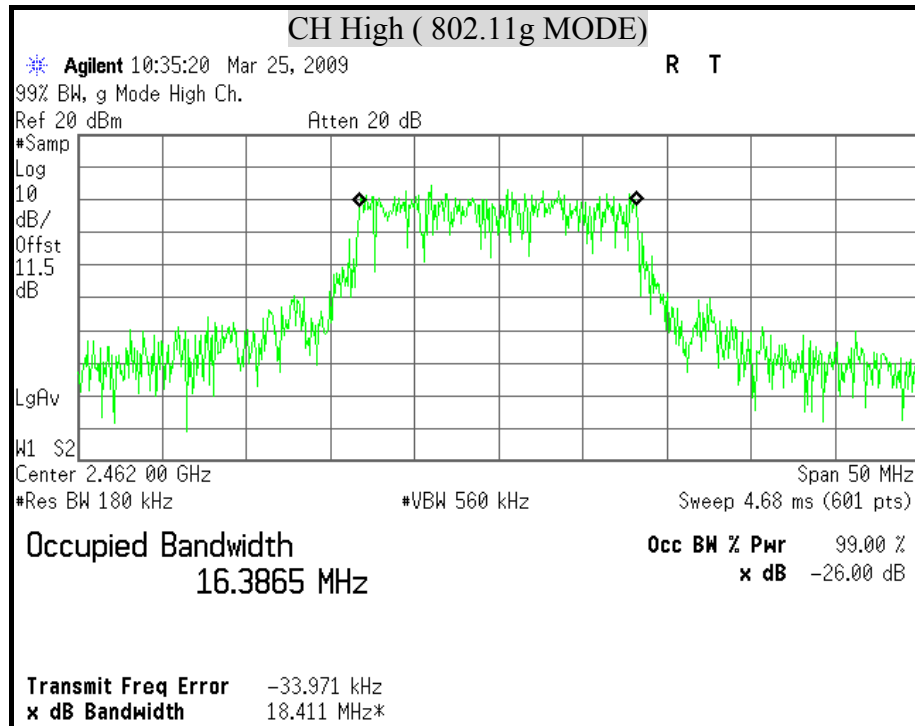
**IEEE 802.11n HT40 mode (Two TX)**

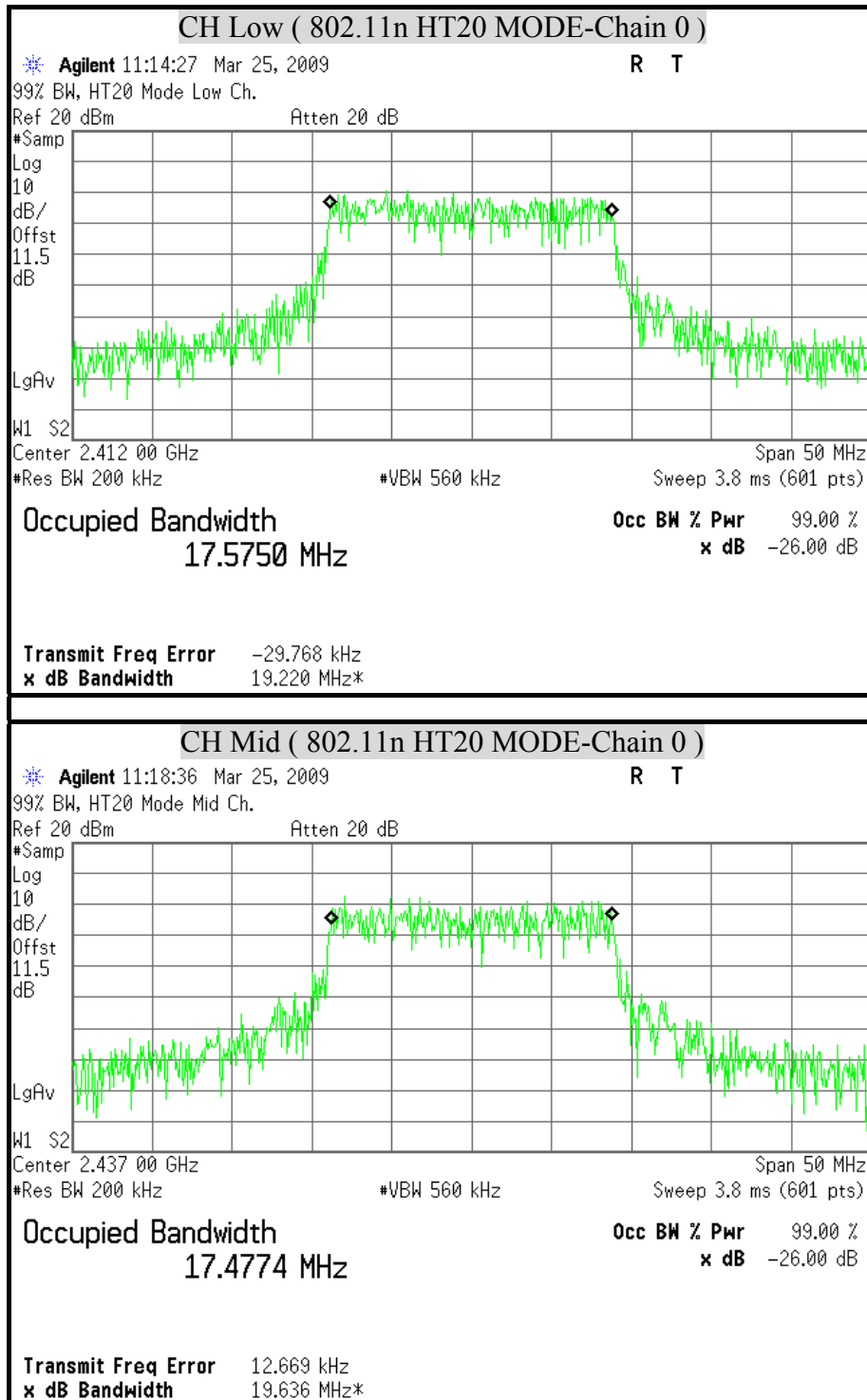
Channel	Channel Frequency (MHz)	99% Occupied power bandwidth (MHz)	
		Chain 0	Chain 1
Low	2422.00	35.72	36.01
Middle	2437.00	35.94	35.93
High	2452.00	35.83	35.83

**99% BANDWIDTH ( 802.11b MODE)**

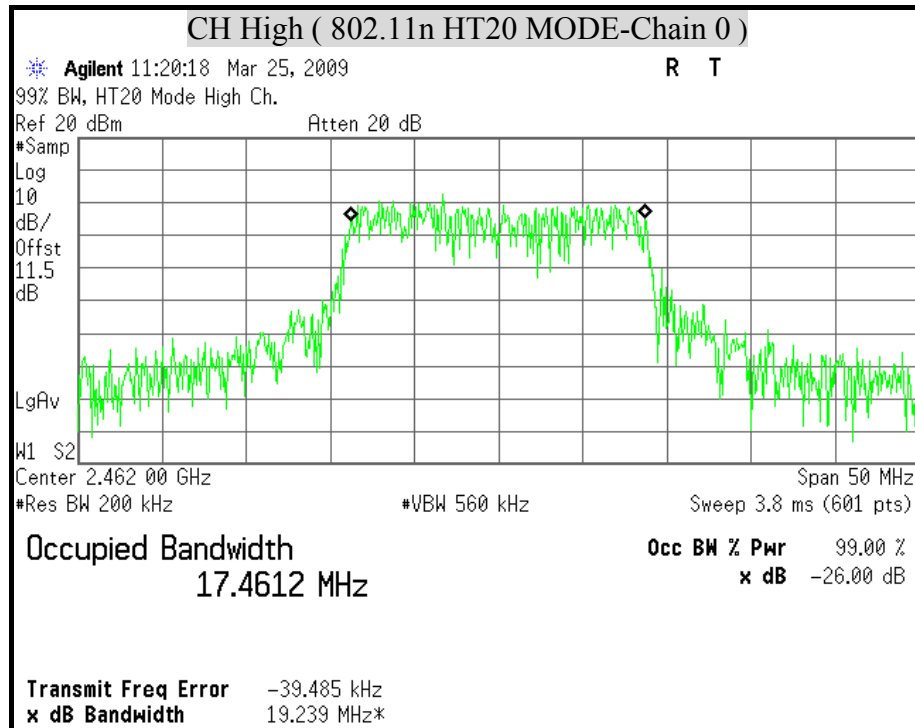


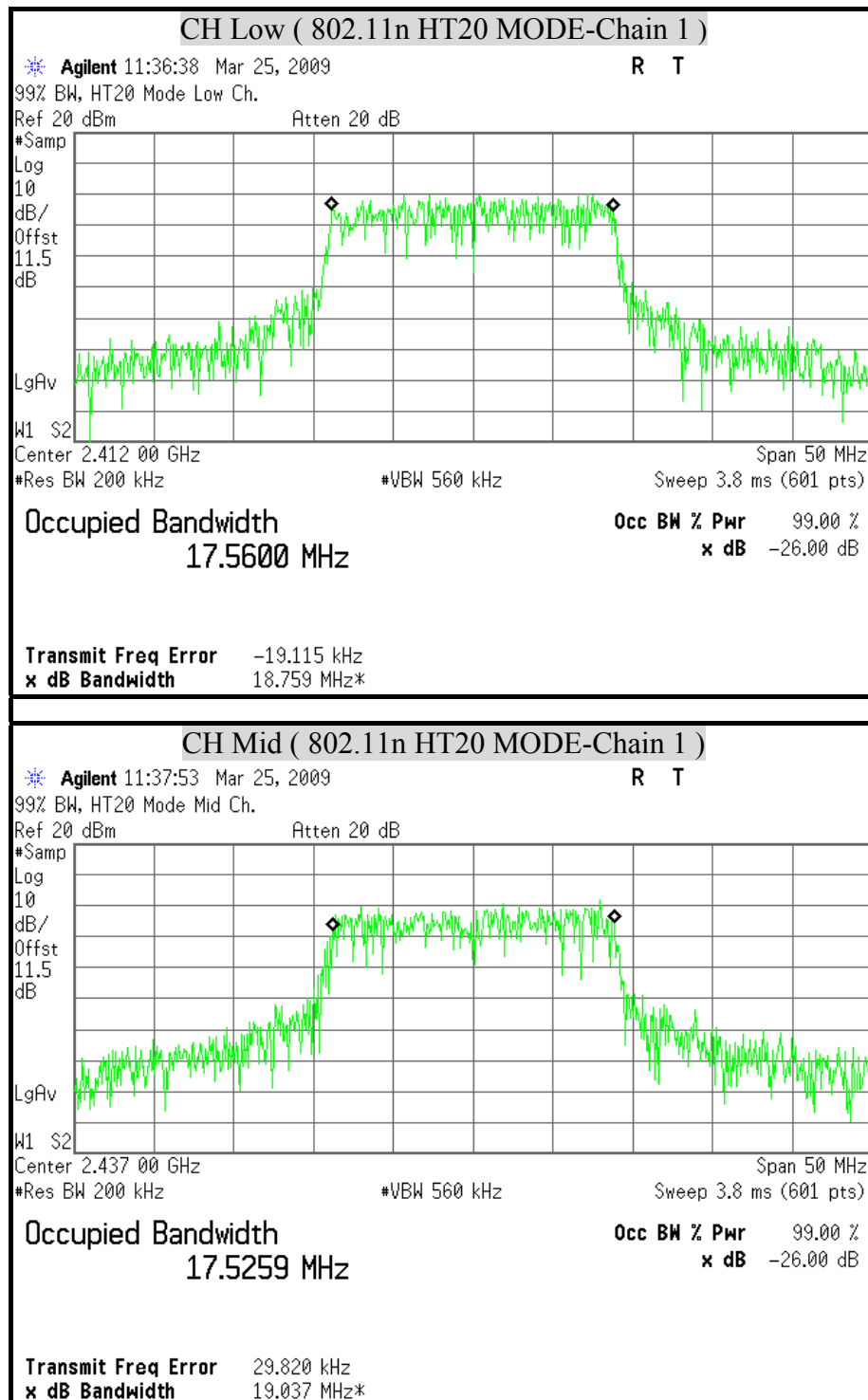
**99% BANDWIDTH ( 802.11g MODE)**

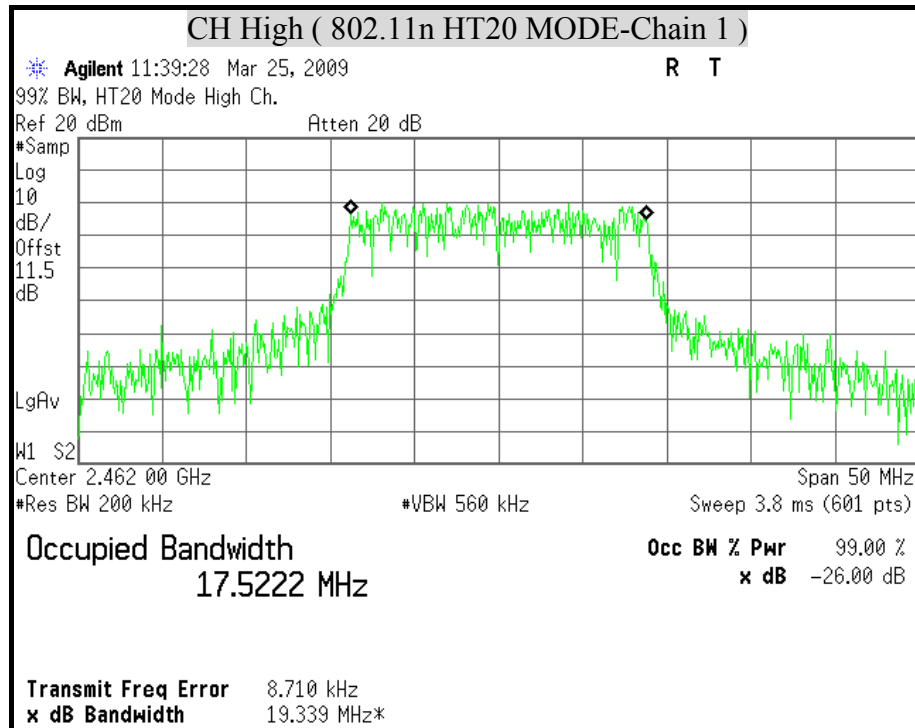


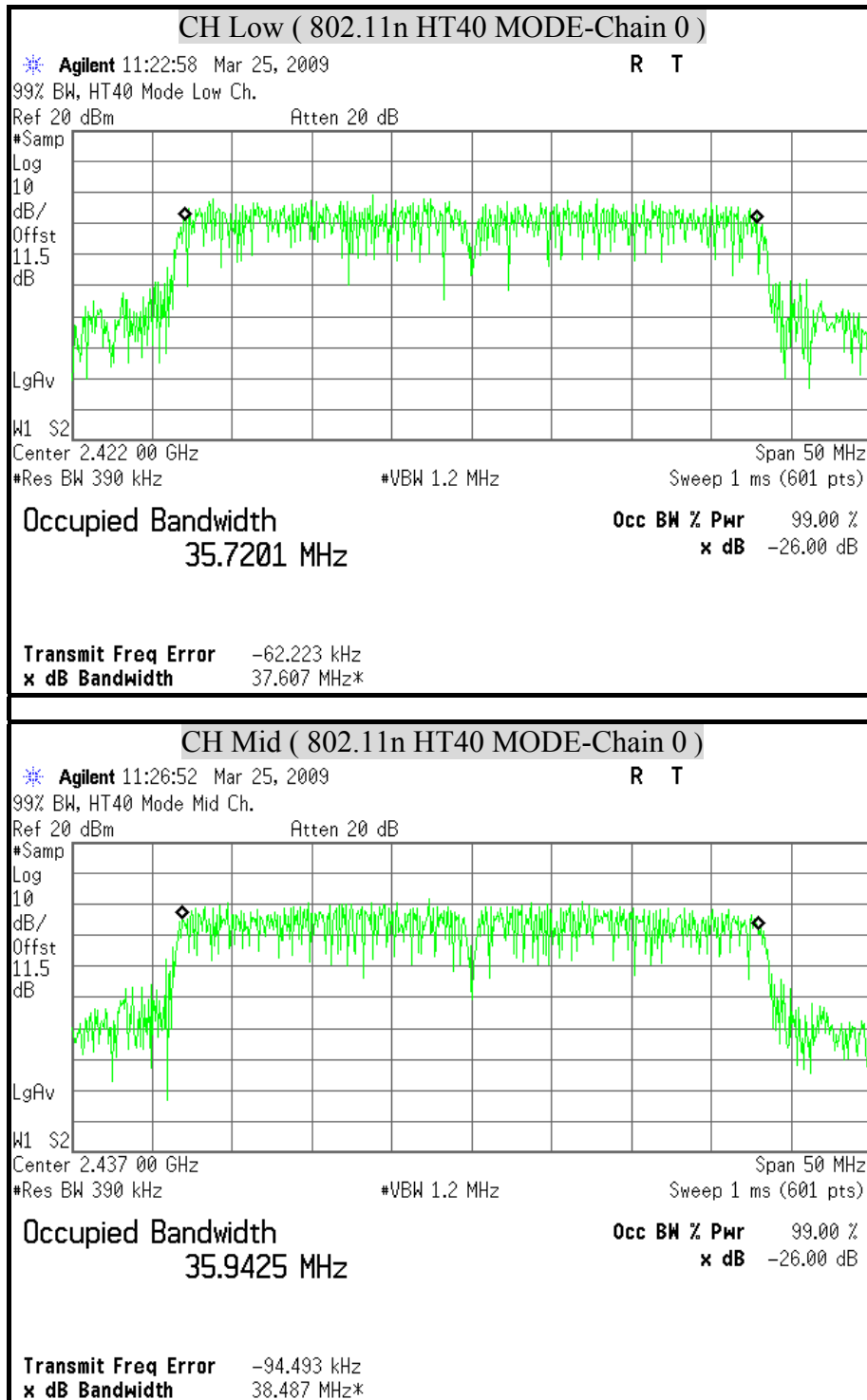
**99% BANDWIDTH ( 802.11n HT20 MODE )**

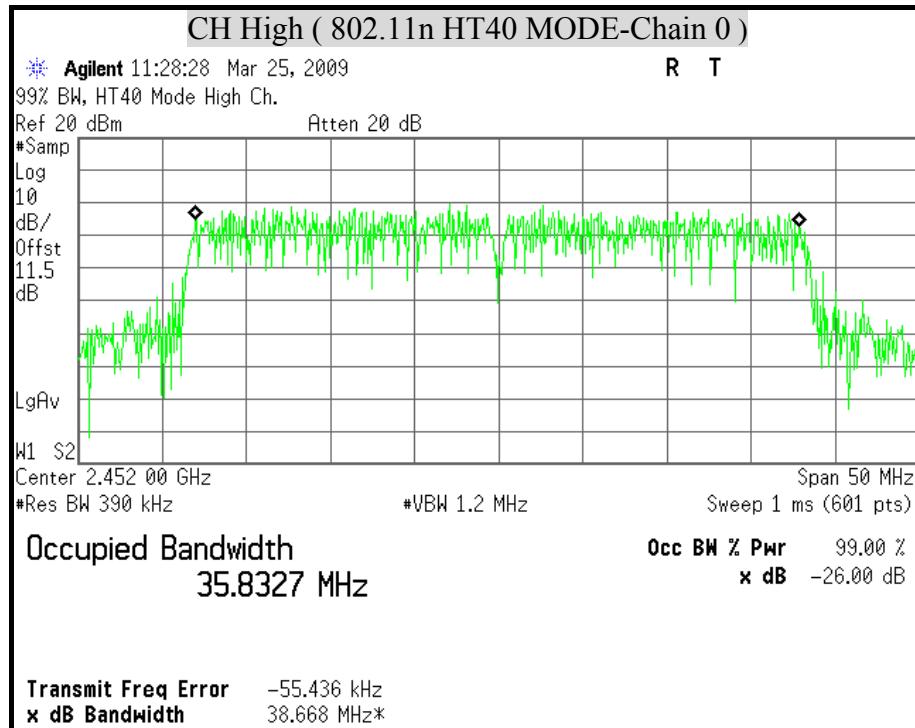


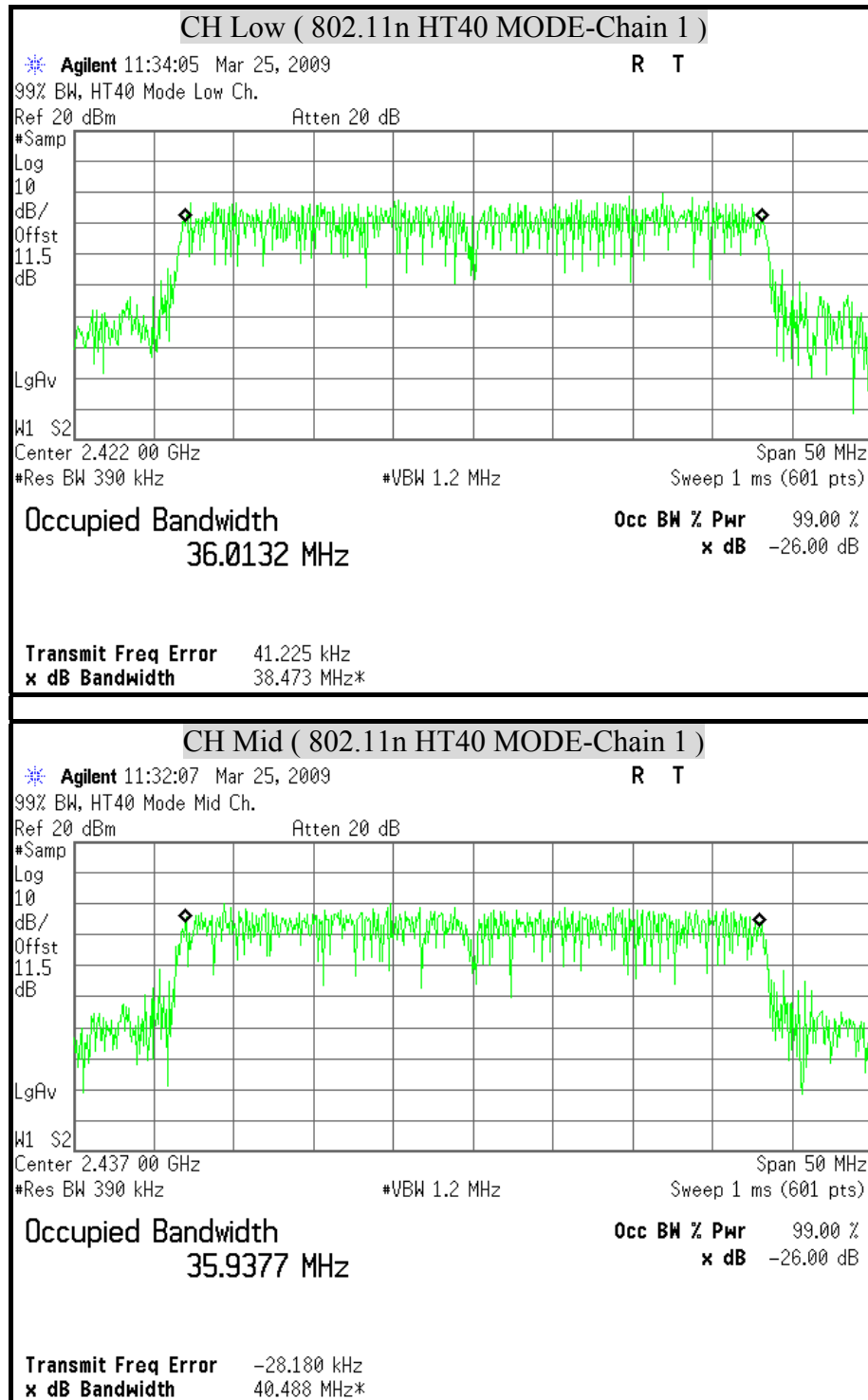


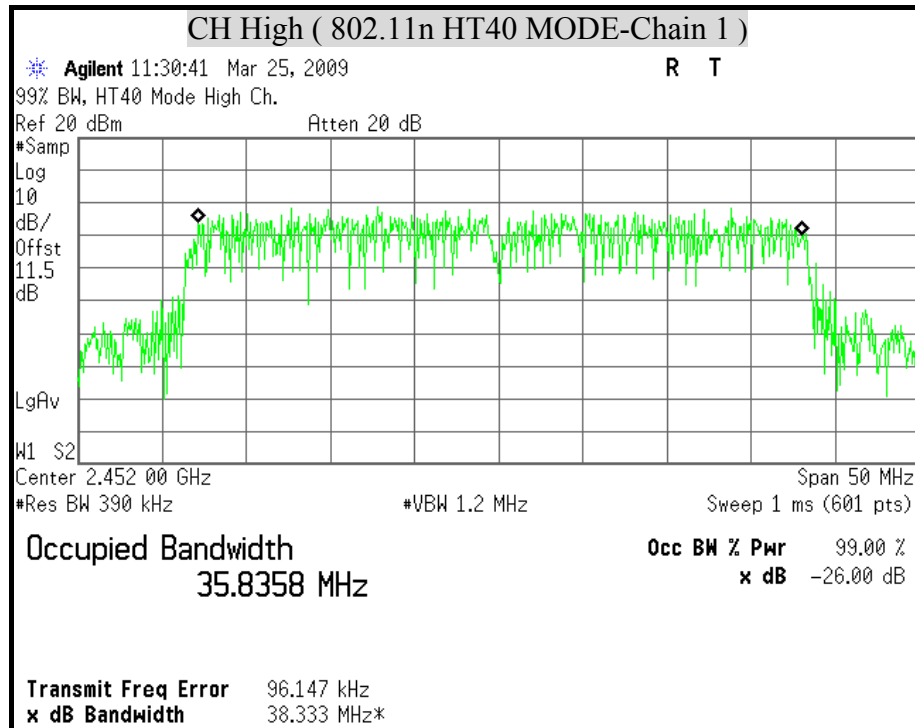




**99% BANDWIDTH (802.11n HT40 MODE)**









## 8.3 MAXIMUM PEAK OUTPUT POWER

### LIMIT

§ 15.247(b) The maximum peak output power of the intentional radiator shall not exceed the following :

§ 15.247(b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands : 1 watt.

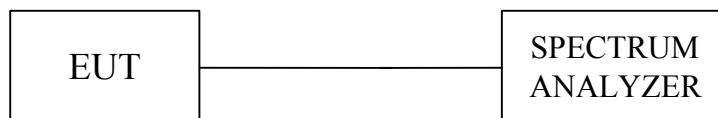
§ 15.247(b) (4) Except as shown in paragraphs (c) of this section , if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2), and (b)(3) of this section , as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSEK30	835253/002	10/17/2007
SPECTRUM ANALYZER	AGILENT	E4446A	MY433601.32	03/05/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### TEST SETUP



### TEST PROCEDURE

1. The spectrum shall be set as follows :
  - Span : 1.5 times channel integration bandwidth.
  - RBW : 1MHz
  - VBW : 3MHz
  - Detector : Peak
  - Sweep : Single trace
2. Compute the combined power of all signal responses contained in the trace by covering all the data points.
3. For 99% occupied BW, place the markers at the frequency at which 0.5% of the power lies to the right of the right marker and 0.5% of the power lies to the left of the left marker.
4. The peak output power is the channel power integrated over 99% bandwidth.



**TEST RESULTS**

No non-compliance noted

Total peak power calculation formula:

$10 \log (10^{\text{(Chain 0 Power / 10)}} + 10^{\text{(Chain1 Power / 10)}})$ .

The maximum antenna gain is 0.69dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm. In the legacy mode, the effective antenna gain is  $0.69 + 10 \times \log(2) = 3.70$  dBi.

**IEEE 802.11b MODE**

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	20.56	30	PASS
Middle	2437	22.71	30	PASS
High	2462	22.44	30	PASS

**Remark:**

1. At final test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11g MODE**

Channel	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power Limit (dBm)	Pass / Fail
Low	2412	19.54	30	PASS
Middle	2437	20.82	30	PASS
High	2462	20.32	30	PASS

**Remark:**

1. At final test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT20 mode (Two TX)**

Channel	Channel Frequency (MHz)	Peak Power (dBm)		Peak Power Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
Low	2412	17.16	17.15	20.17	30	PASS
Middle	2437	17.91	17.26	20.61	30	PASS
High	2462	17.59	17.07	20.35	30	PASS

**Remark:**

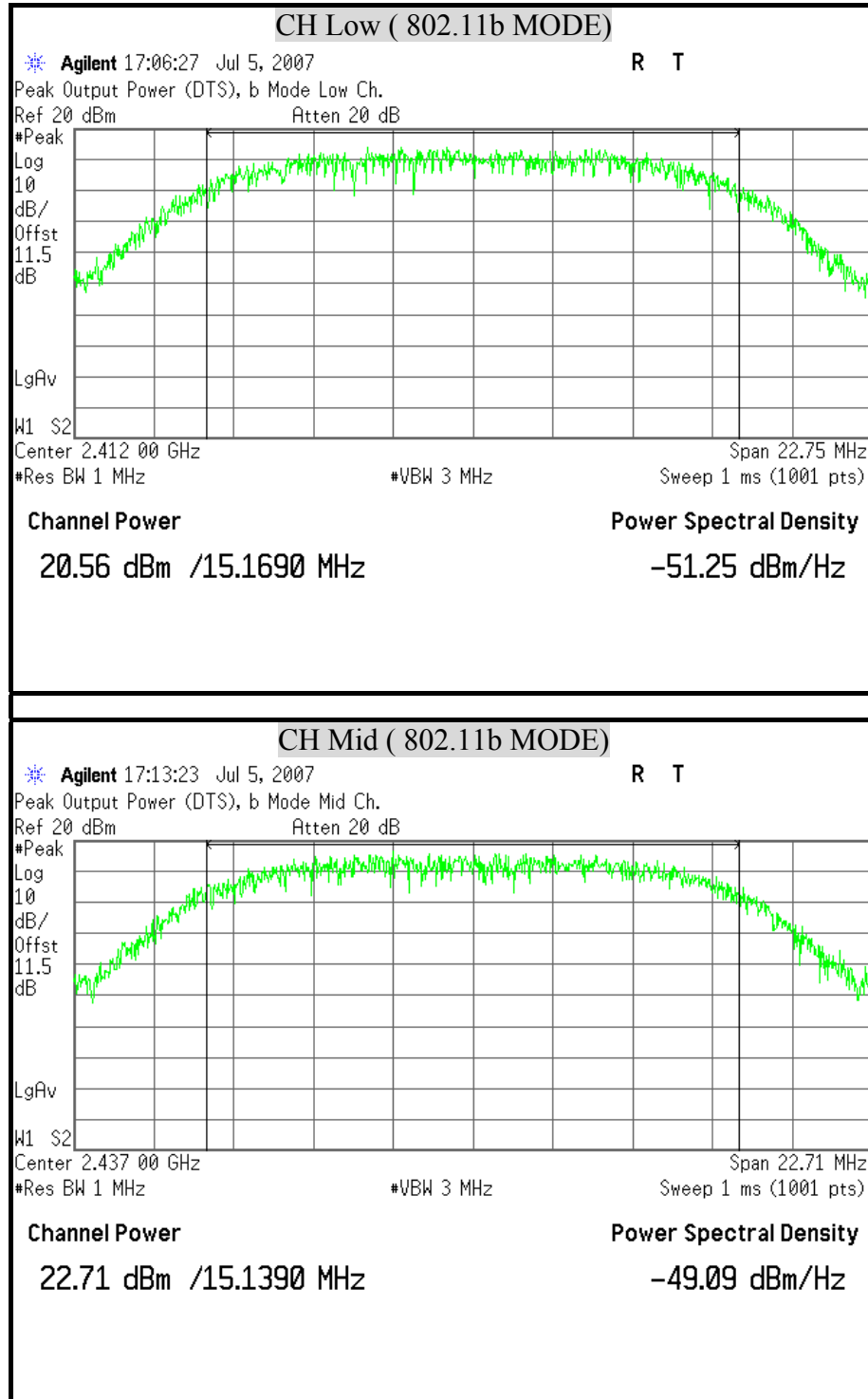
1. At final test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

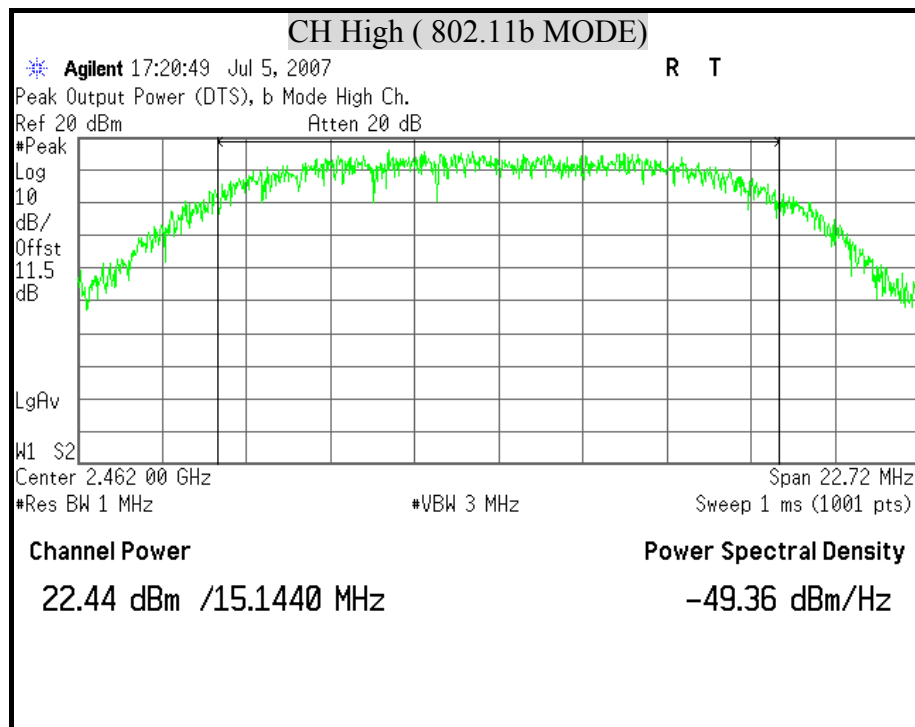
**IEEE 802.11n HT40 mode (TwoTX)**

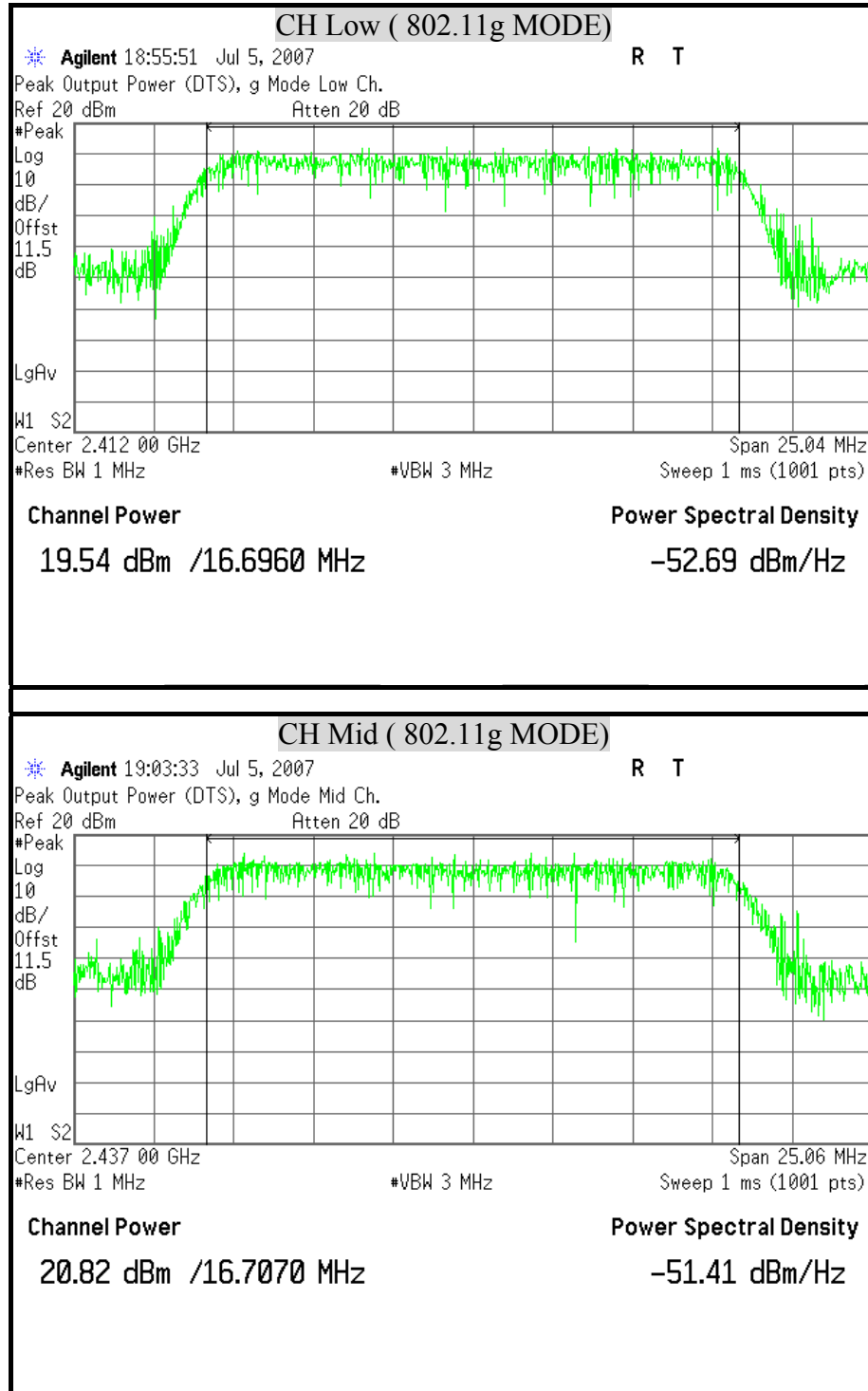
Channel	Channel Frequency (MHz)	Peak Power (dBm)		Peak Power Total (dBm)	Peak Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
Low	2422	15.21	15.01	18.12	30	PASS
Middle	2437	17.88	16.99	20.47	30	PASS
High	2452	15.99	15.40	18.72	30	PASS

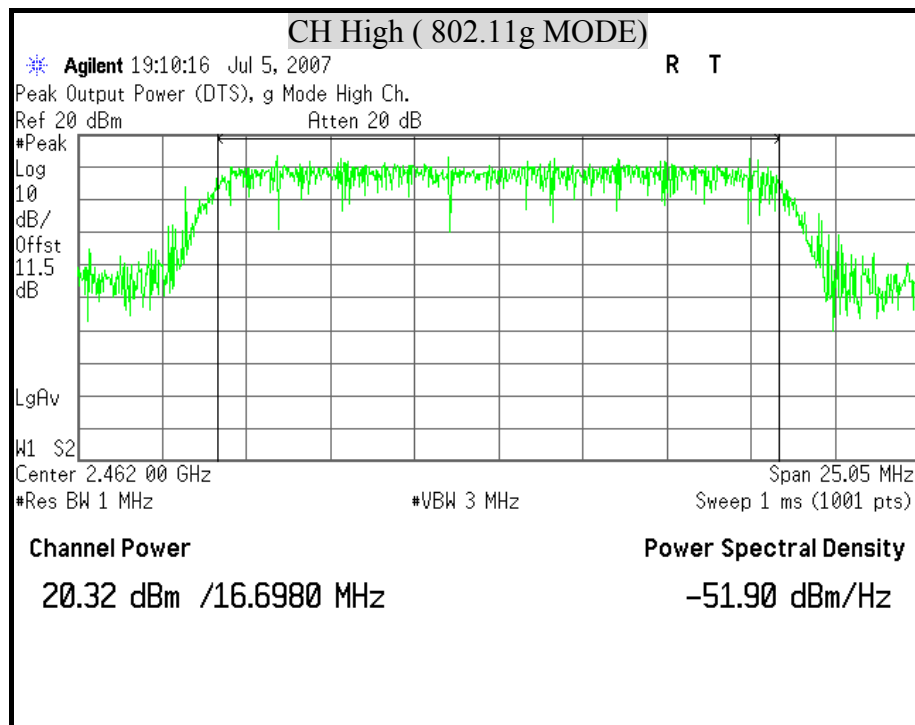
**Remark:**

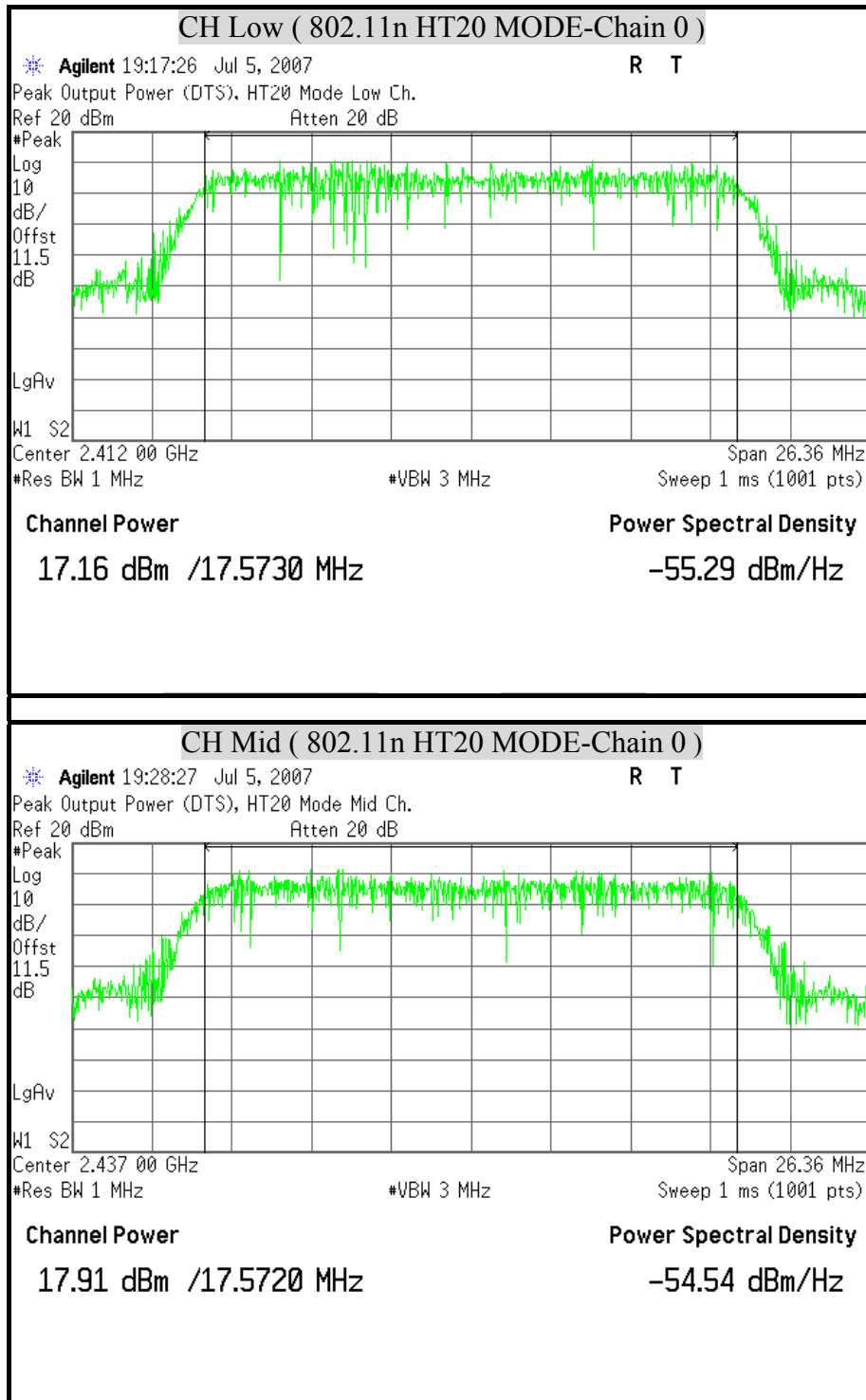
1. At final test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

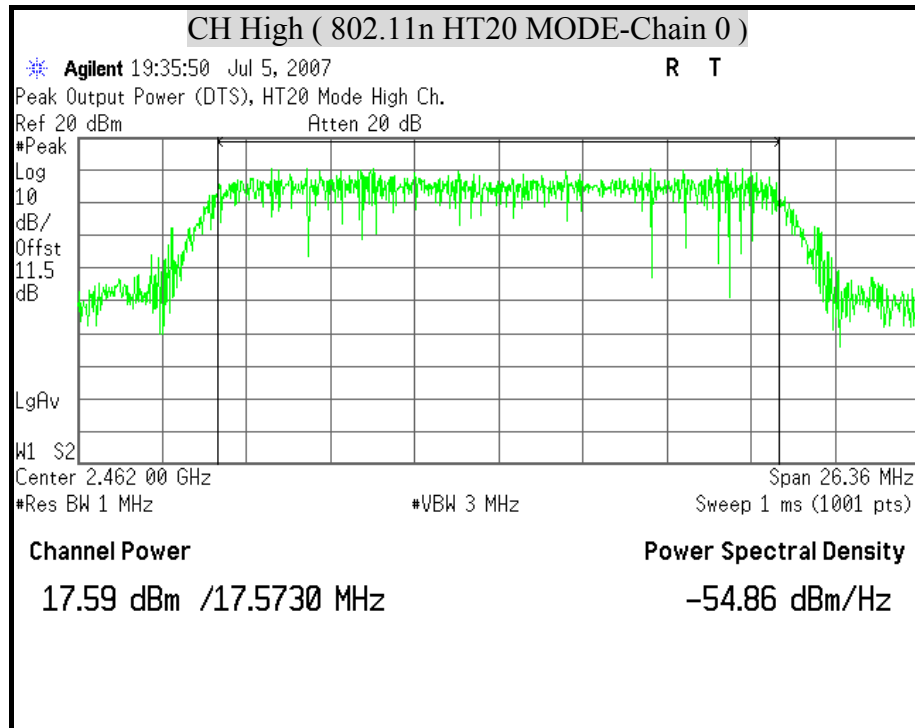
**MAXIMUM PEAK OUTPUT POWER ( 802.11b MODE)**



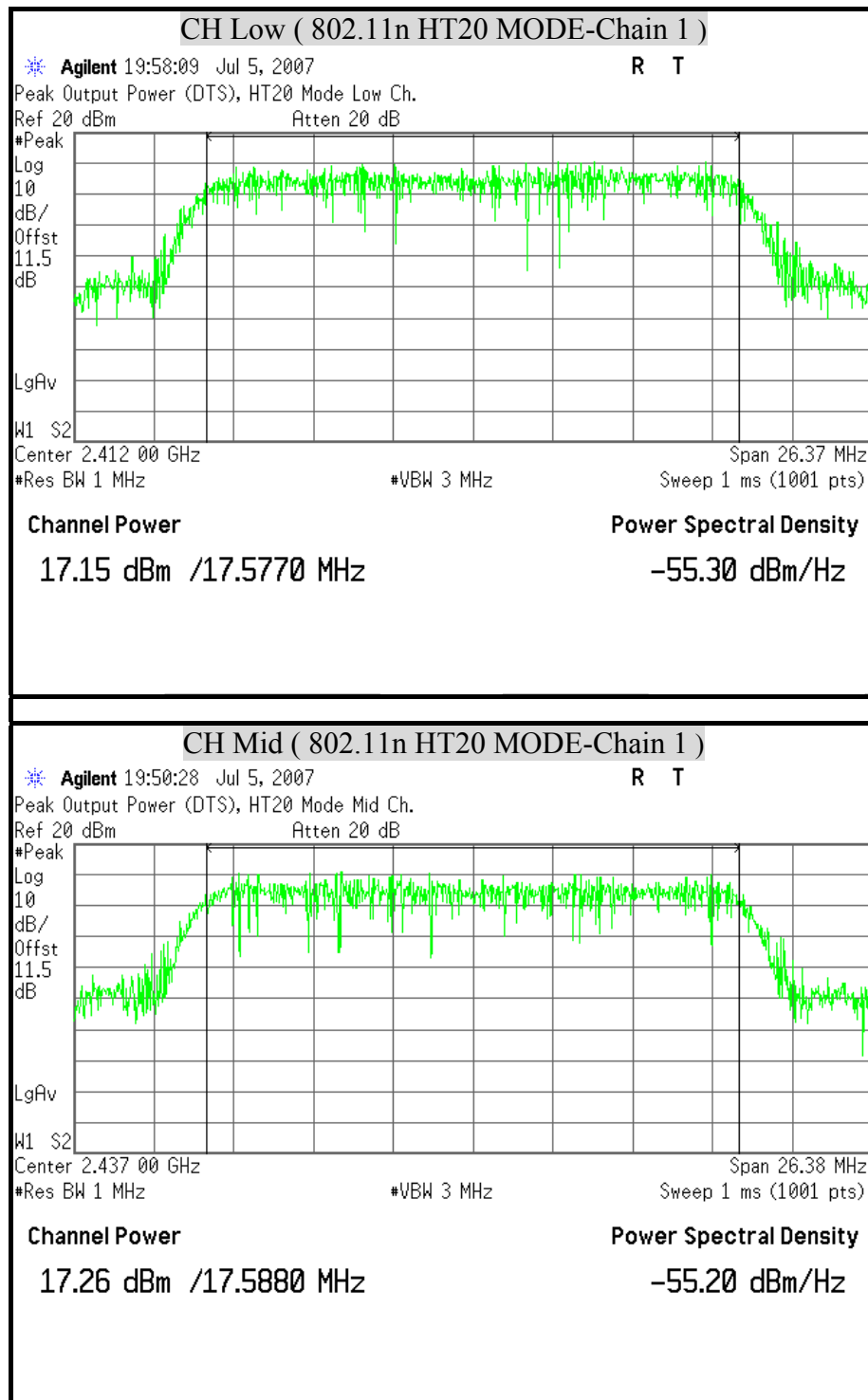
**MAXIMUM PEAK OUTPUT POWER ( 802.11g MODE)**

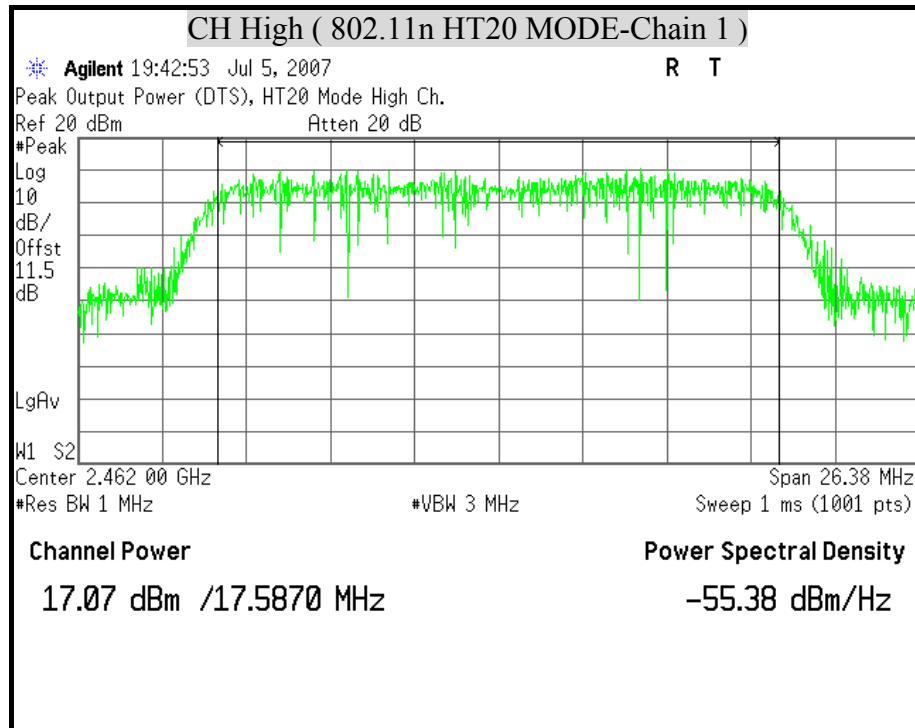


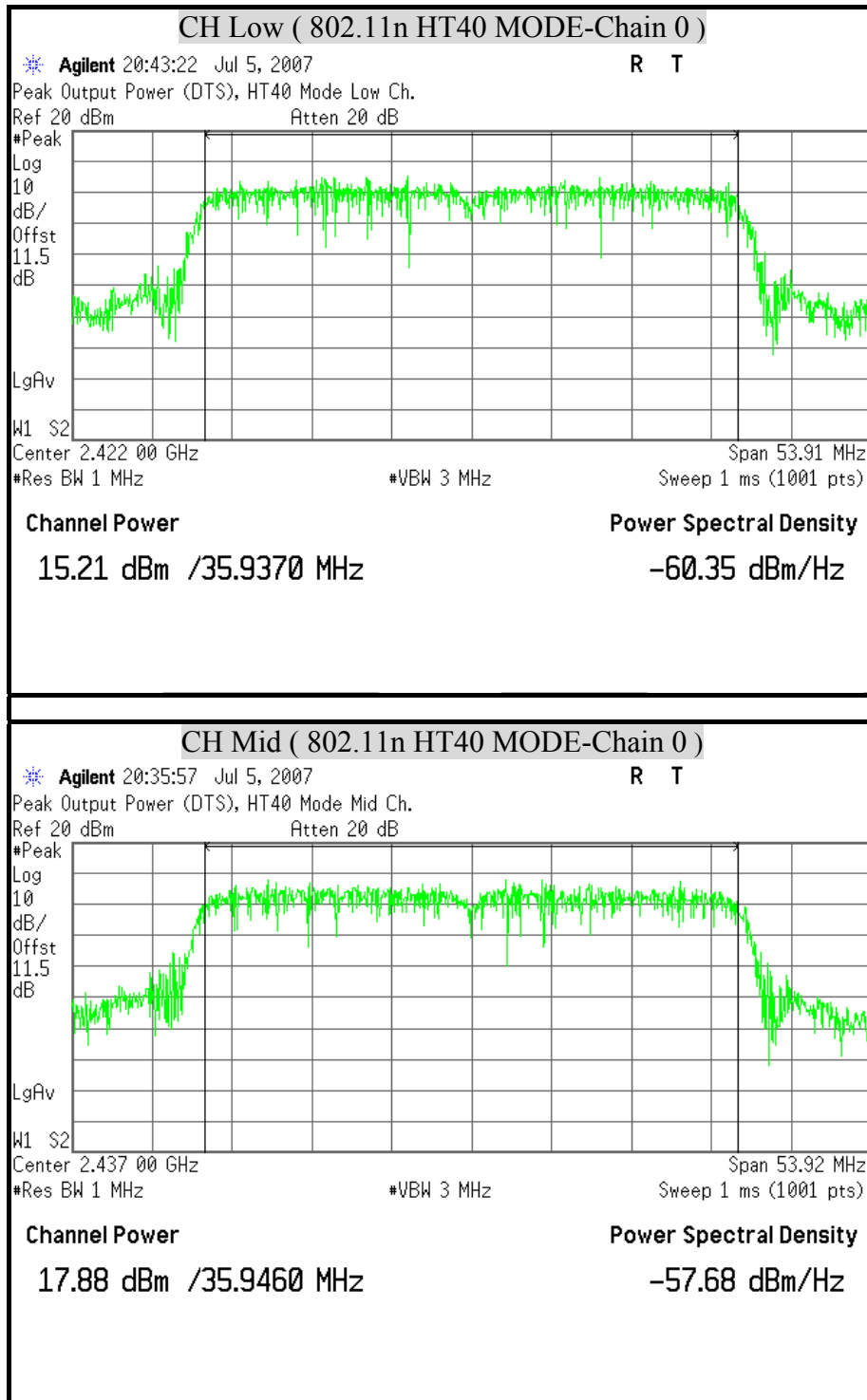
**MAXIMUM PEAK OUTPUT POWER ( 802.11n HT20 MODE )**

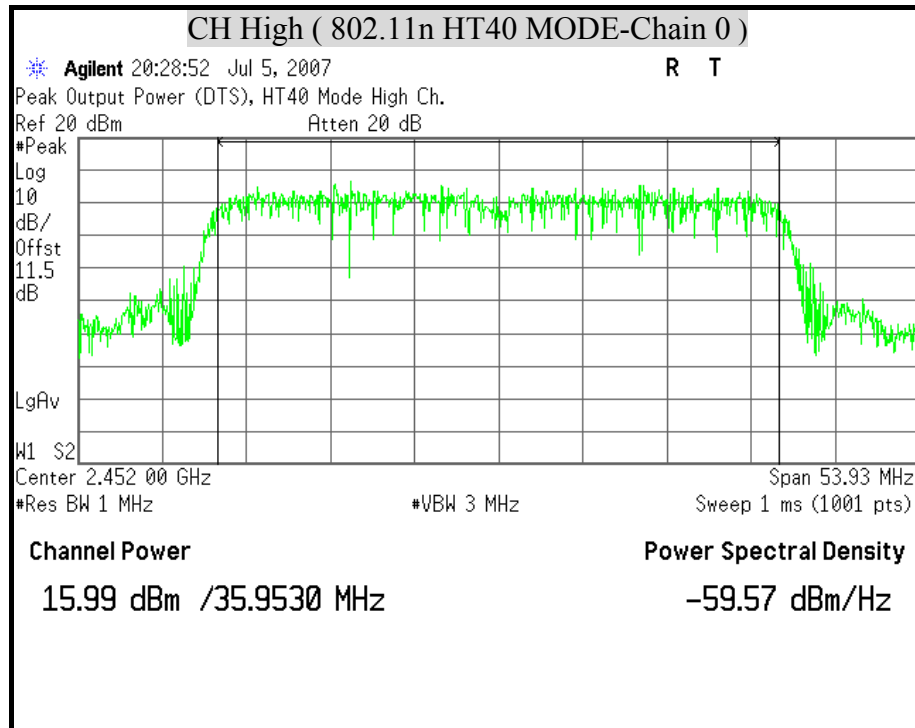


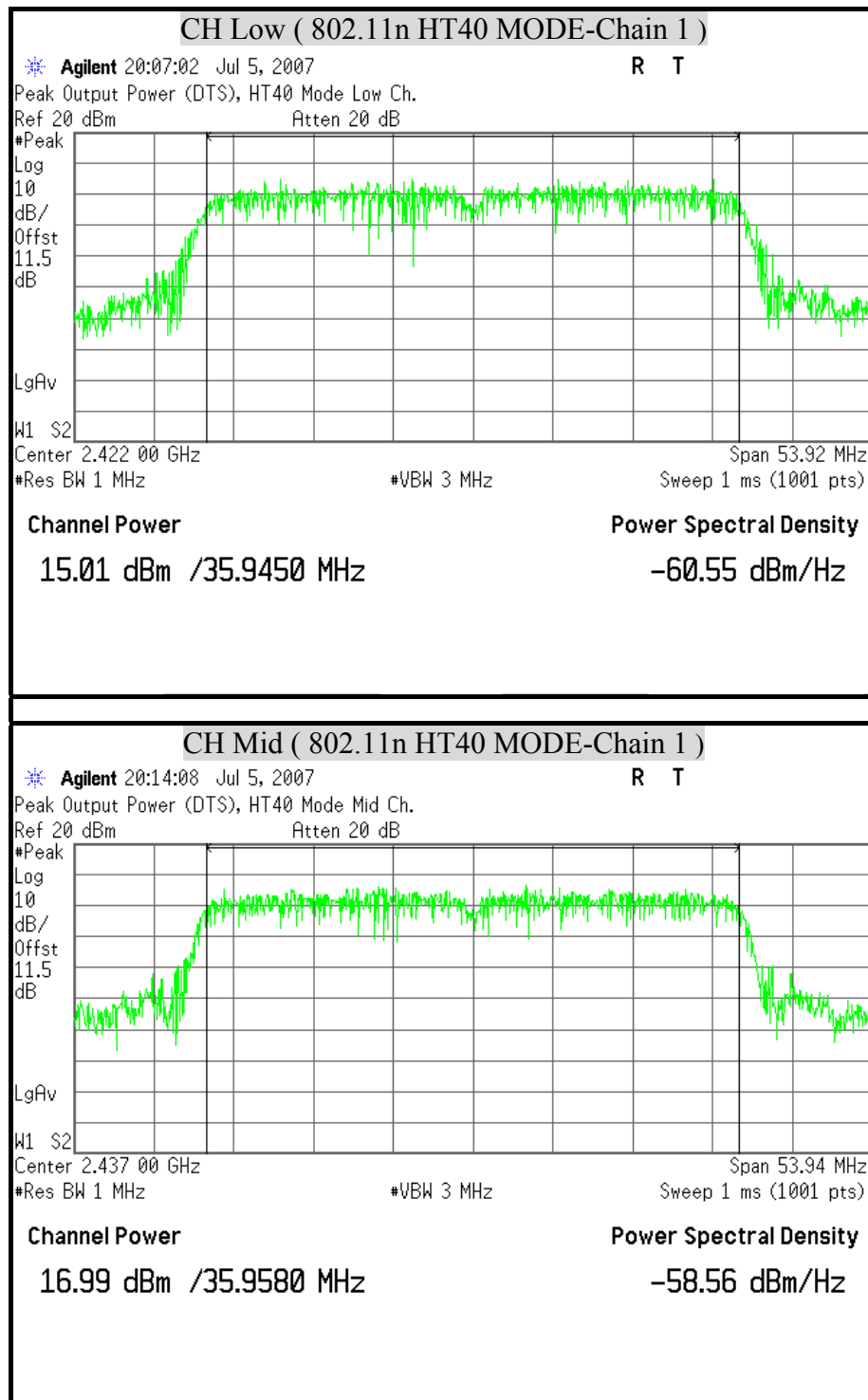


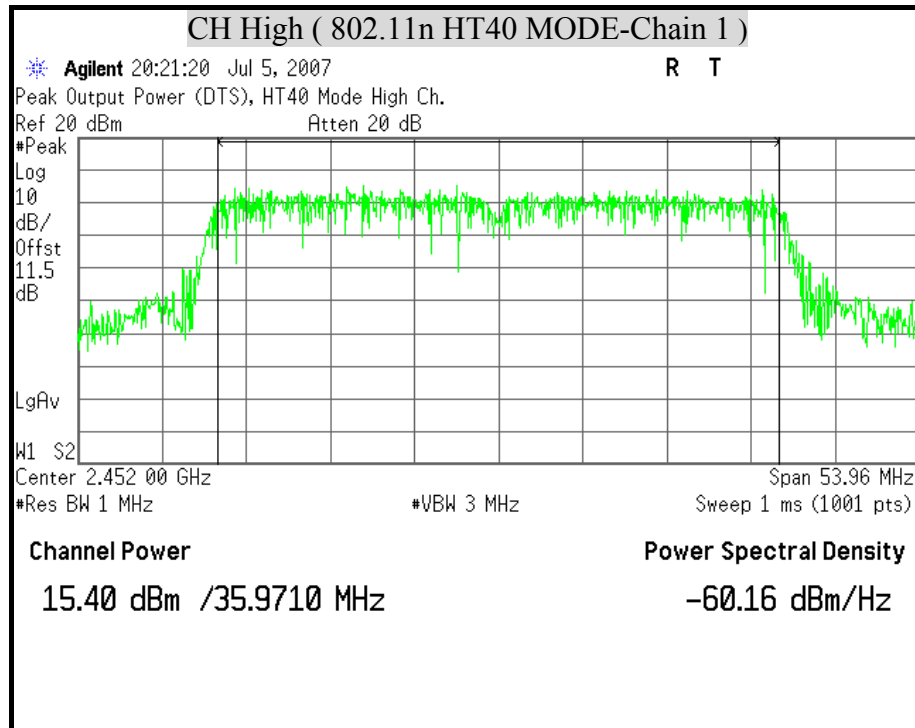




**MAXIMUM PEAK OUTPUT POWER ( 802.11n HT40 MODE )**









## 8.4 MAXIMUM PERMISSIBLE EXPOSURE

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b) LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time
(A) Limits for Occupational / Control Exposures				
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300-1,500	--	--	F/1500	6
1,500-100,000	--	--	1	30

## CALCULATIONS

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:

$$P (mW) = P (W) / 1000 \text{ and}$$

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

Yields

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

Where  $d$  = Distance in cm

$P$  = Power in mW

$G$  = Numeric antenna gain

$S$  = Power density in mW / cm<sup>2</sup>

**LIMIT**Power Density Limit,  $S=1.0\text{mW/cm}^2$ **TEST RESULTS**

Mode	Antenna Gain (dBi)	Minimum separation distance (cm)	Output Power (dBm)	Numeric antenna gain (dB)	Power Density Limit ( $\text{mW/cm}^2$ )	Power Density at 20cm ( $\text{mW/cm}^2$ )
IEEE 802.11b	0.69	20.0	22.71	1.17	1.00	0.043523
IEEE 802.11g	0.69	20.0	20.82	1.17	1.00	0.028166
IEEE 802.11n HT20	0.69	20.0	20.61	1.17	1.00	0.026836
IEEE 802.11n HT40	0.69	20.0	20.47	1.17	1.00	0.025985

**Remark:** For mobile or fixed location transmitters, the maximum power density is  $1.0\text{ mW/cm}^2$  even if the calculation indicates that the power density would be larger.





## 8.5 AVERAGE POWER

### LIMIT

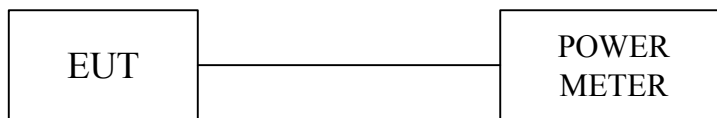
None; for reporting purposes only.

### TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
POWER METER	ANRITSU	ML2487A MAL2491A	6K00001783 030982	03/06/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### TEST SETUP



### TEST PROCEDURE

The transmitter output is connected to a power meter.

**TEST RESULTS**

Total average power calculation formula:

$10 \log (10^{\text{(Chain 0 Power / 10)}} + 10^{\text{(Chain1 Power / 10)}})$ .

**IEEE 802.11b MODE**

Channel	Channel Frequency (MHz)	Average Power Output (dBm)
Low	2412	18.36
Middle	2437	20.62
High	2462	20.06

**Remark:**

1. At final test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11g MODE**

Channel	Channel Frequency (MHz)	Average Power Output (dBm)
Low	2412	16.79
Middle	2437	18.20
High	2462	17.61

**Remark:**

1. At final test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT20 MODE (Two TX)**

Channel	Channel Frequency (MHz)	Average Power (dBm)		Average Power (dBm)
		Chain 0	Chain 0	
Low	2412	14.71	14.64	17.69
Middle	2437	15.33	14.94	18.15
High	2462	15.12	14.72	17.93

**Remark:**

1. At final test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT40 MODE (Two TX)**

Channel	Channel Frequency (MHz)	Average Power (dBm)		Average Power (dBm)
		Chain 0	Chain 0	
Low	2422	12.43	12.26	15.36
Middle	2437	15.23	14.43	17.86
High	2452	13.05	12.75	15.91

**Remark:**

1. At final test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.



## 8.6 POWER SPECTRAL DENSITY

### LIMIT

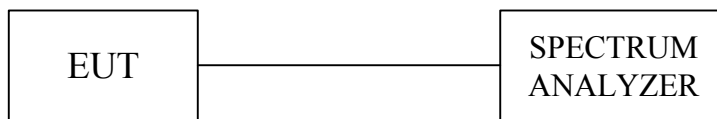
§ 15.247(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSEK30	835253/002	10/17/2007
SPECTRUM ANALYZER	AGILENT	E4446A	MY433601.32	03/05/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### TEST SETUP



Combined mode



### TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using  $RBW = 3\text{KHz}$  and  $VBW \geq RBW$ , set sweep time = span / 3KHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

**TEST RESULTS**

Total power spectral density calculation formula:

$10 \log (10^{\text{(Chain 0 PPSD / 10)}} + 10^{\text{(Chain1 PPSD / 10)}})$ .

**IEEE 802.11b MODE**

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-6.39	8	PASS
Middle	2437	-4.18	8	PASS
High	2462	-4.59	8	PASS

**Remark:**

1. At final test to get the worst-case emission at 11Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11g MODE**

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-12.48	8	PASS
Middle	2437	-11.02	8	PASS
High	2462	-11.52	8	PASS

**Remark:**

1. At final test to get the worst-case emission at 6Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT20 MODE (Two TX)**

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)		PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
Low	2412	-13.21	-13.55	-10.37	8	PASS
Middle	2437	-12.42	-13.03	-9.70	8	PASS
High	2462	-13.08	-13.27	-10.16	8	PASS

**Remark:**

1. At final test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT20 Combined MODE (Two TX)**

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2412	-8.19	8	PASS
Middle	2437	-7.76	8	PASS
High	2462	-8.29	8	PASS

**Remark:**

1. At final test to get the worst-case emission at 6.5Mbps.
2. The cable assembly insertion loss of 15.5 dB (including 10 dB pad and 5.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT40 MODE (Two TX)**

Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)		PPSD Total (dBm)	Maximum Limit (dBm)	Pass / Fail
		Chain 0	Chain 1			
Low	2422	-18.18	-19.11	-15.61	8	PASS
Middle	2437	-15.95	-15.84	-12.88	8	PASS
High	2452	-17.11	-17.39	-14.24	8	PASS

**Remark:**

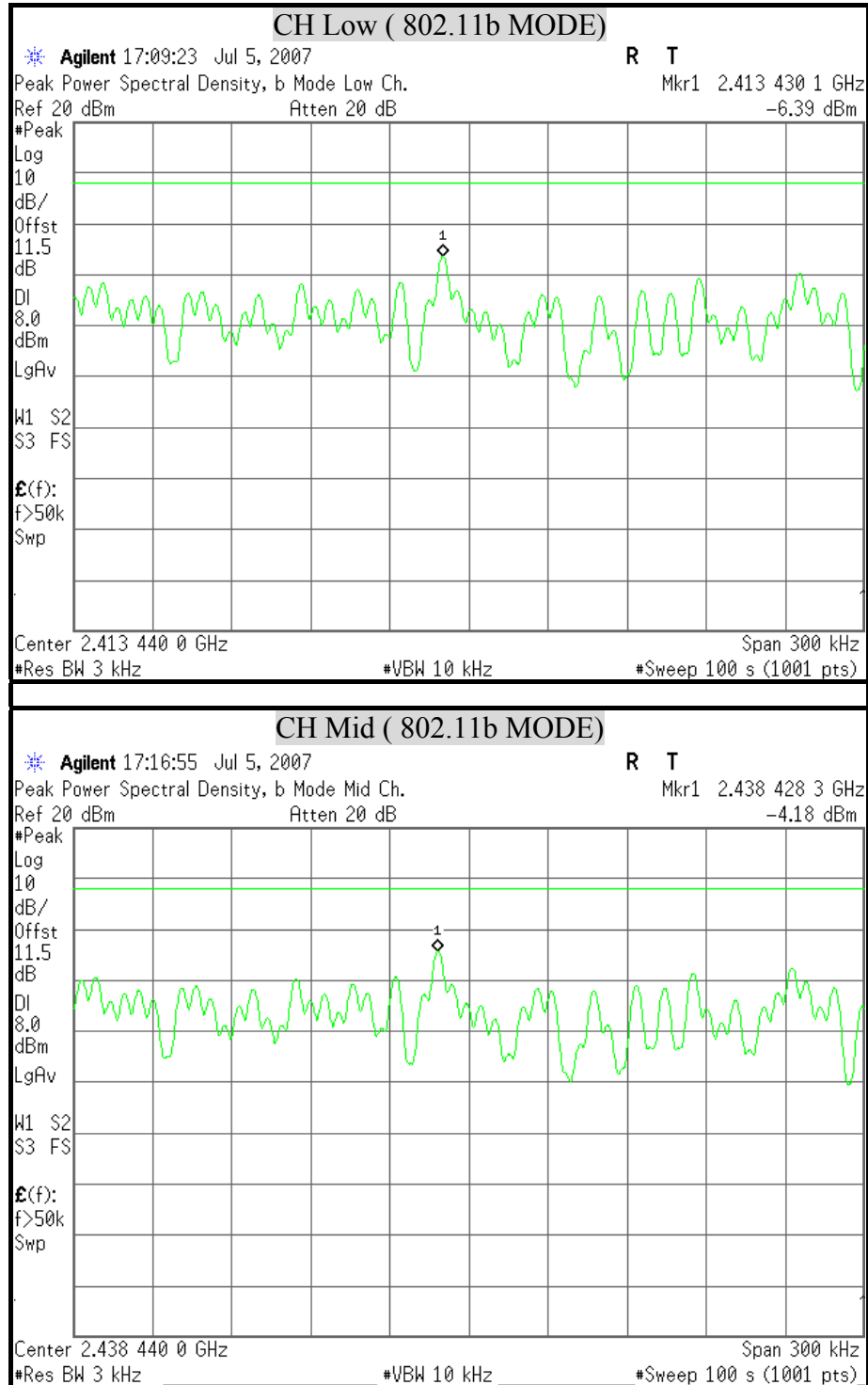
1. At final test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 11.5 dB (including 10 dB pad and 1.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

**IEEE 802.11n HT40 Combined MODE (Two TX)**

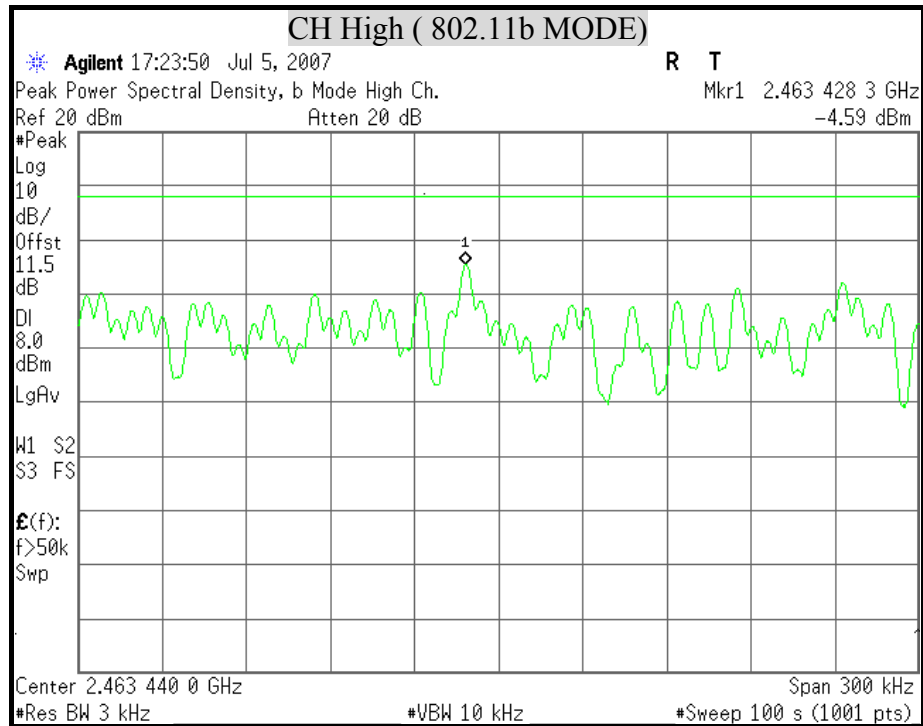
Channel	Channel Frequency (MHz)	Final RF Power Level in 3KHz BW (dBm)	Maximum Limit (dBm)	Pass / Fail
Low	2422	-12.19	8	PASS
Middle	2437	-8.62	8	PASS
High	2452	-10.65	8	PASS

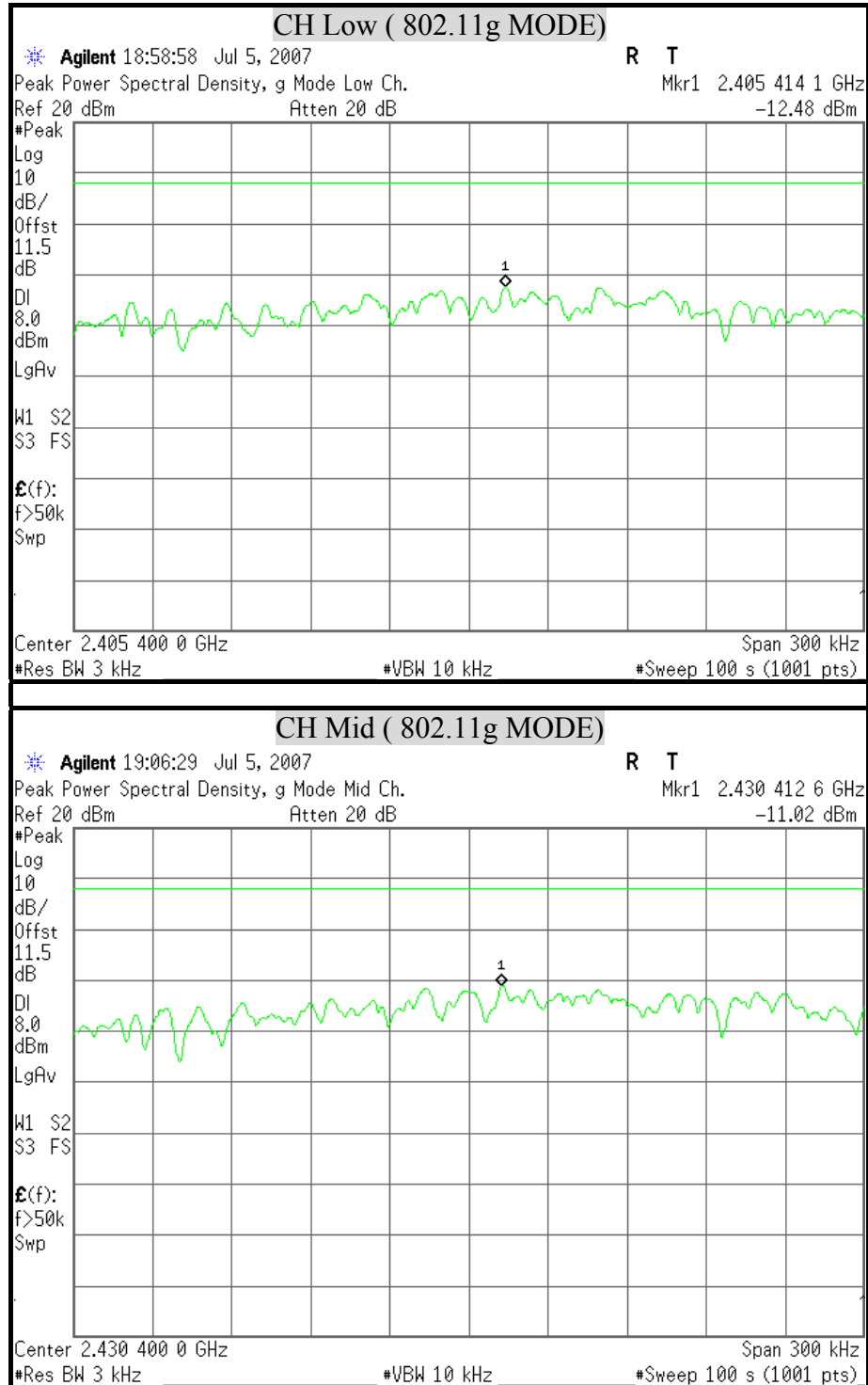
**Remark:**

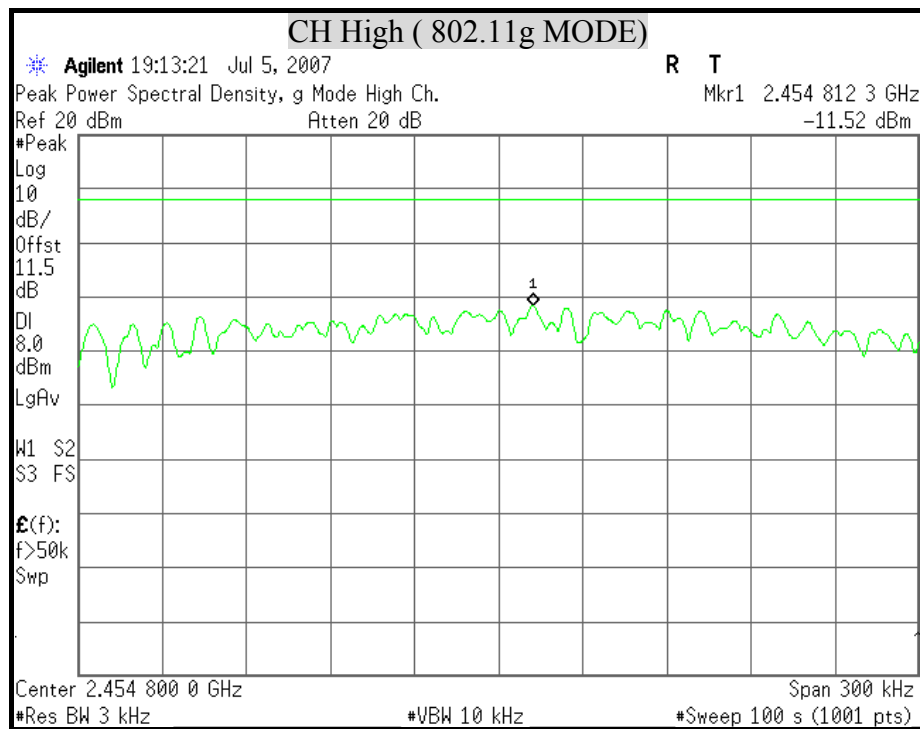
1. At final test to get the worst-case emission at 13.5Mbps.
2. The cable assembly insertion loss of 15.5 dB (including 10 dB pad and 5.5 dB cable) was Entered as an offset in the spectrum analyzer to allow for direct reading of power.

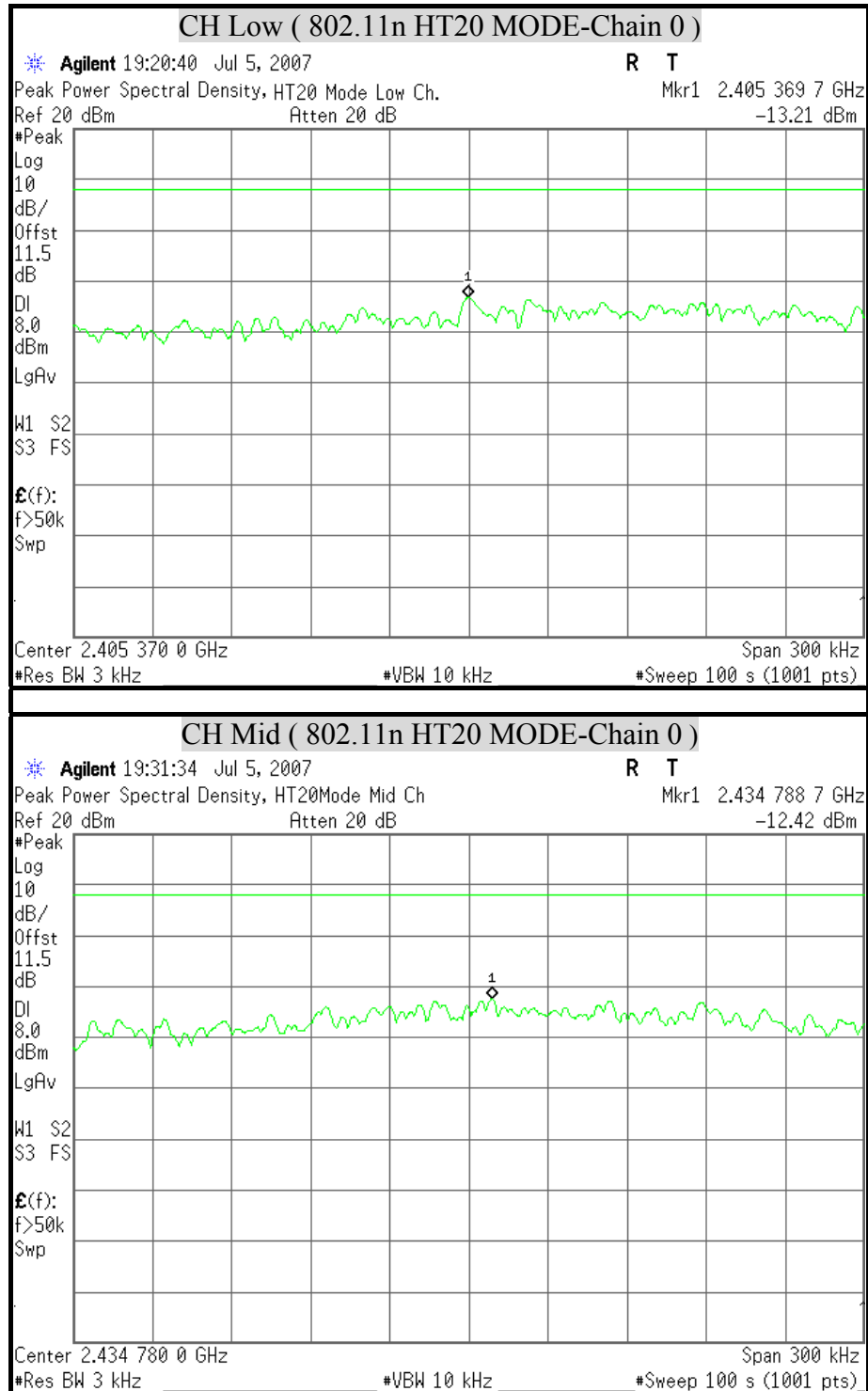
**POWER SPECTRAL DENSITY ( IEEE 802.11b MODE)**

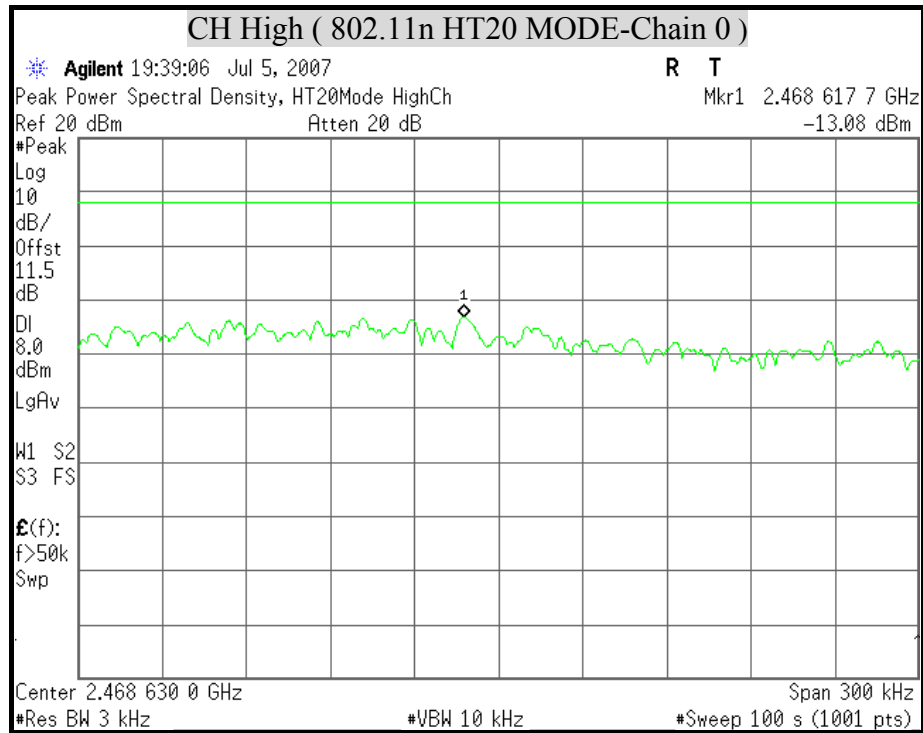


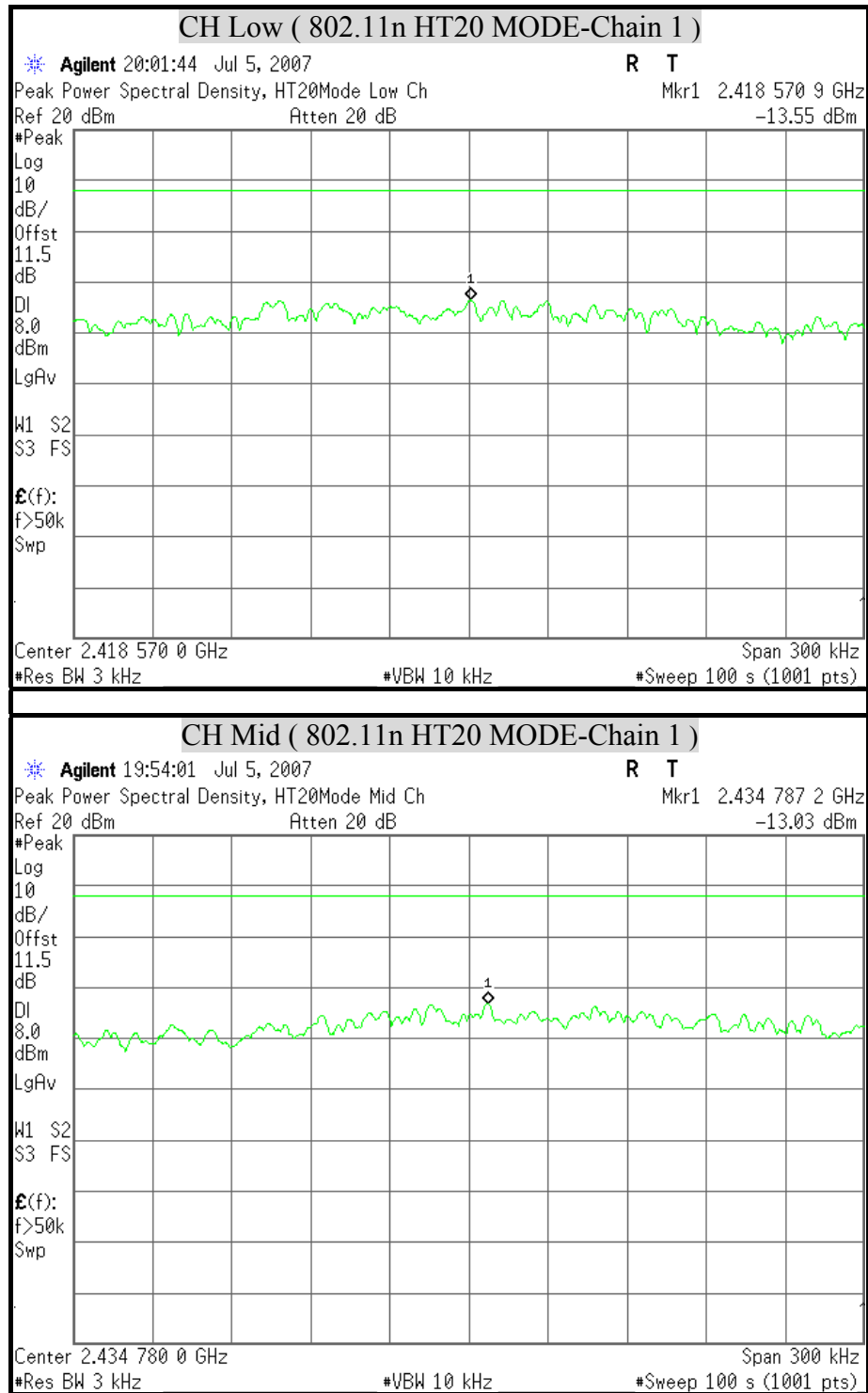


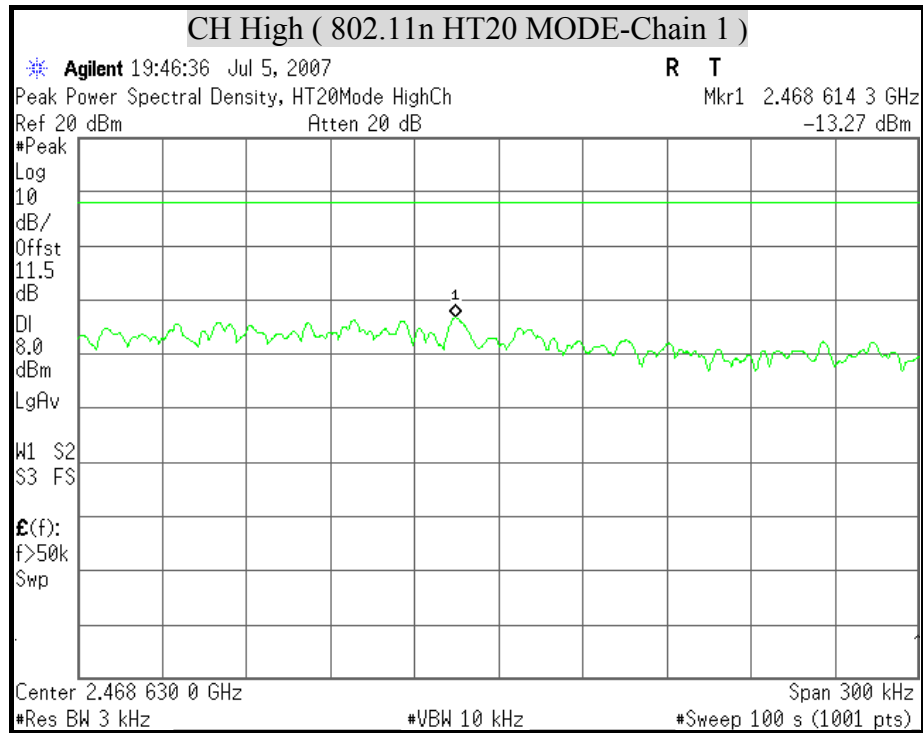
**POWER SPECTRAL DENSITY ( IEEE 802.11g MODE)**

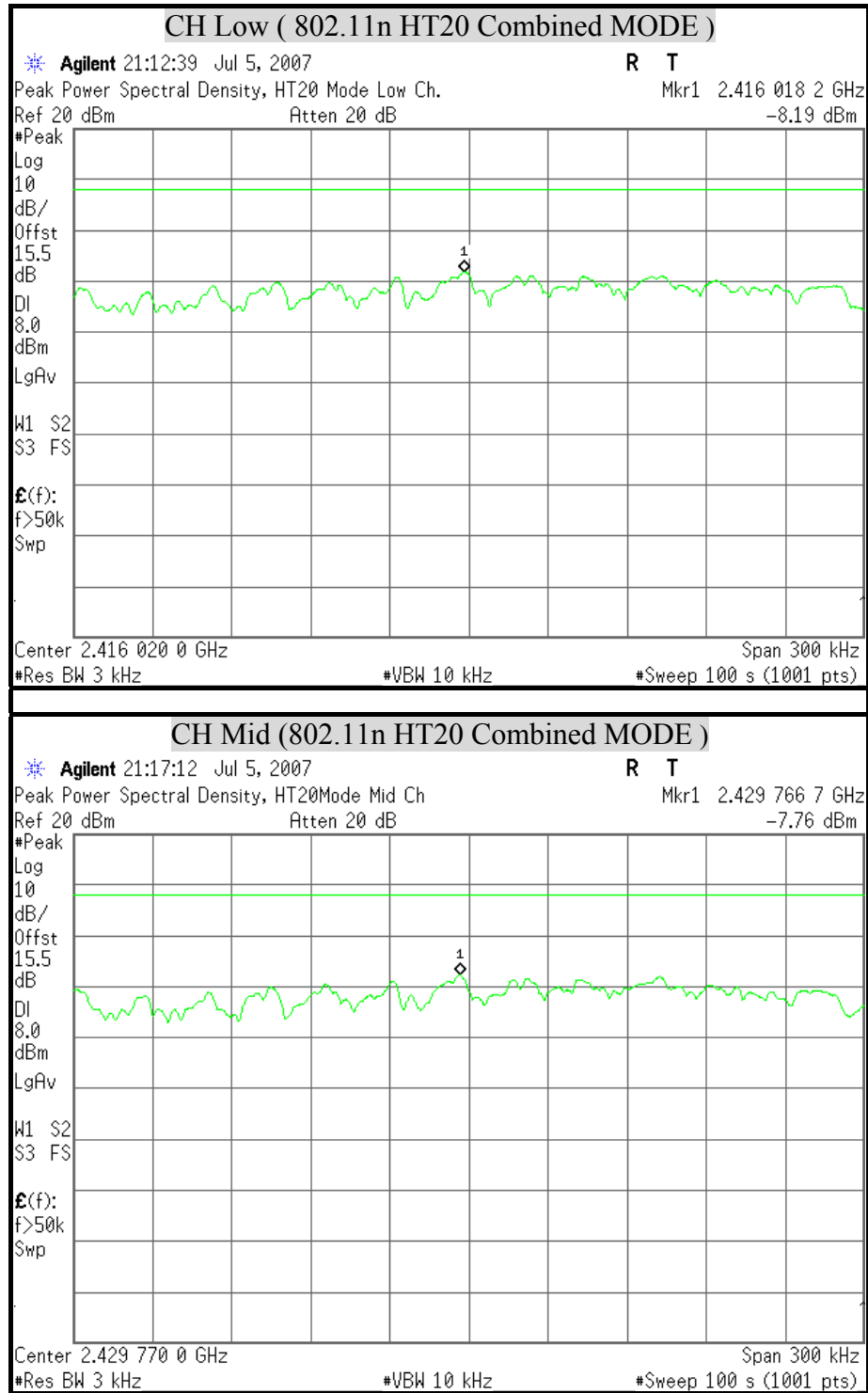


**POWER SPECTRAL DENSITY ( 802.11n HT20 MODE )**

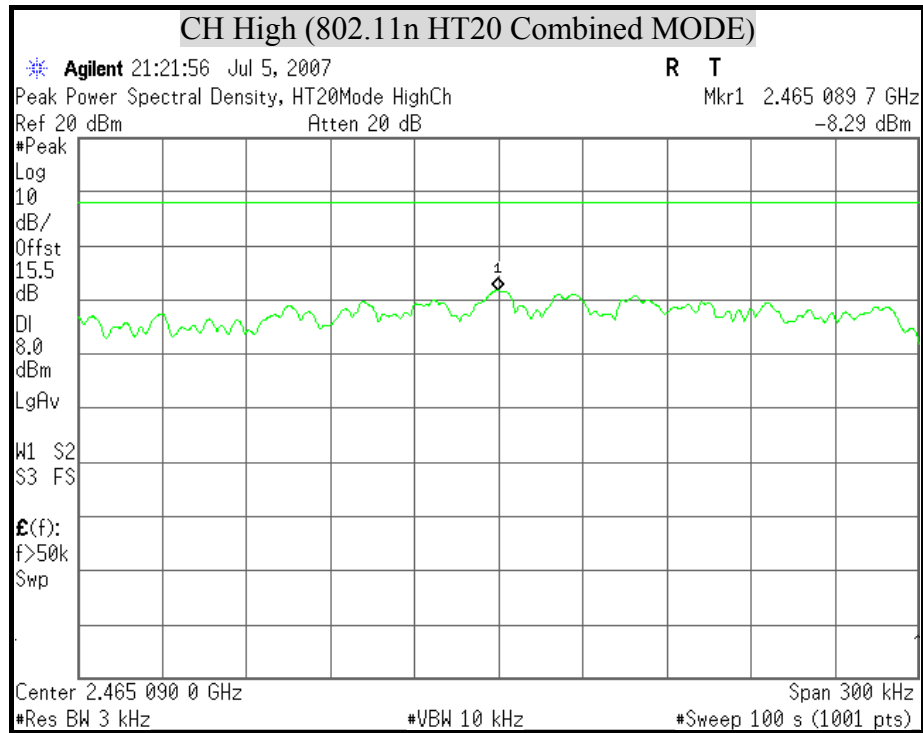


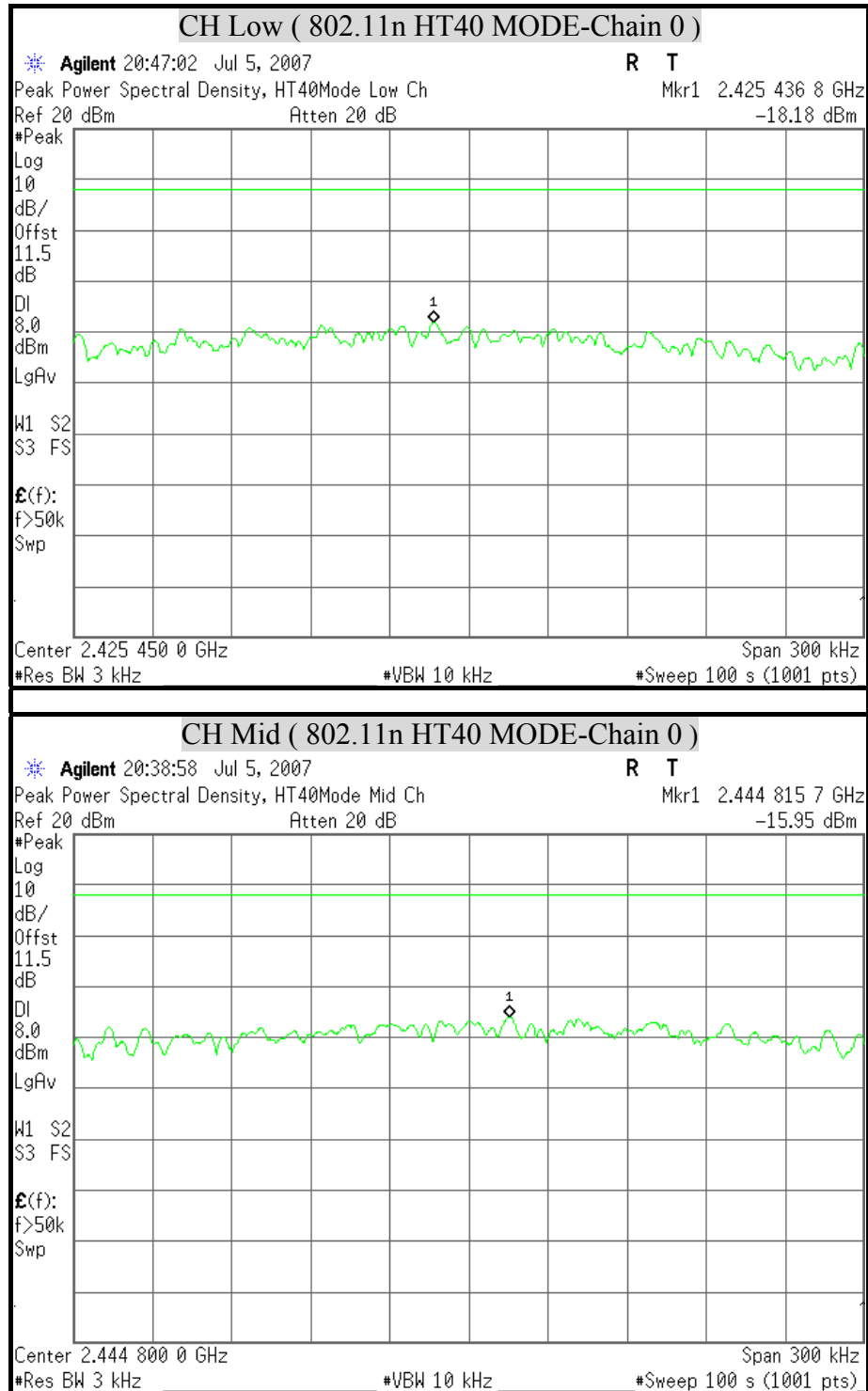


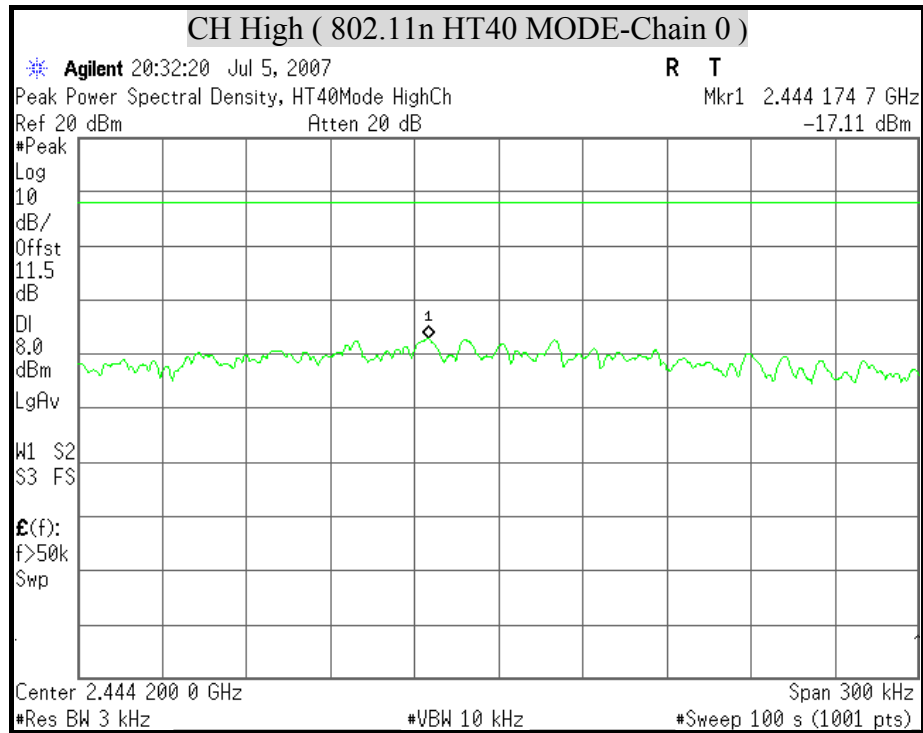


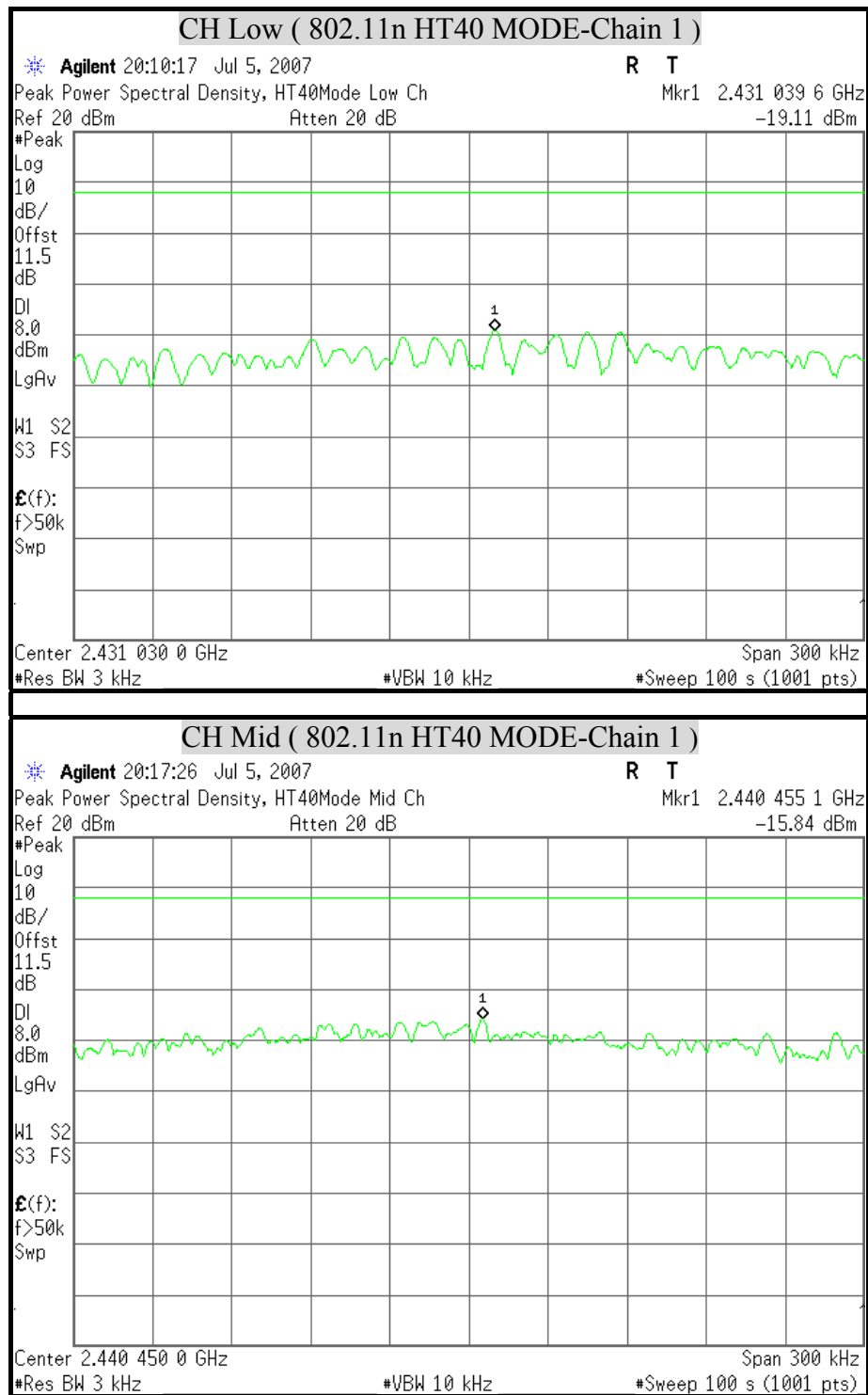
**POWER SPECTRAL DENSITY ( 802.11n HT20 Combined MODE )**

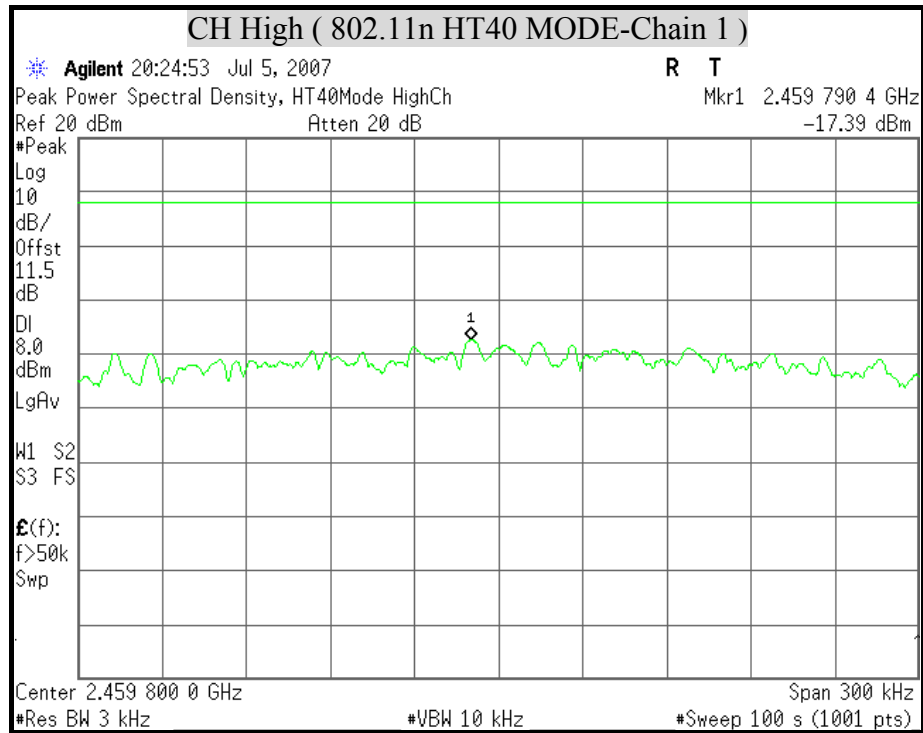


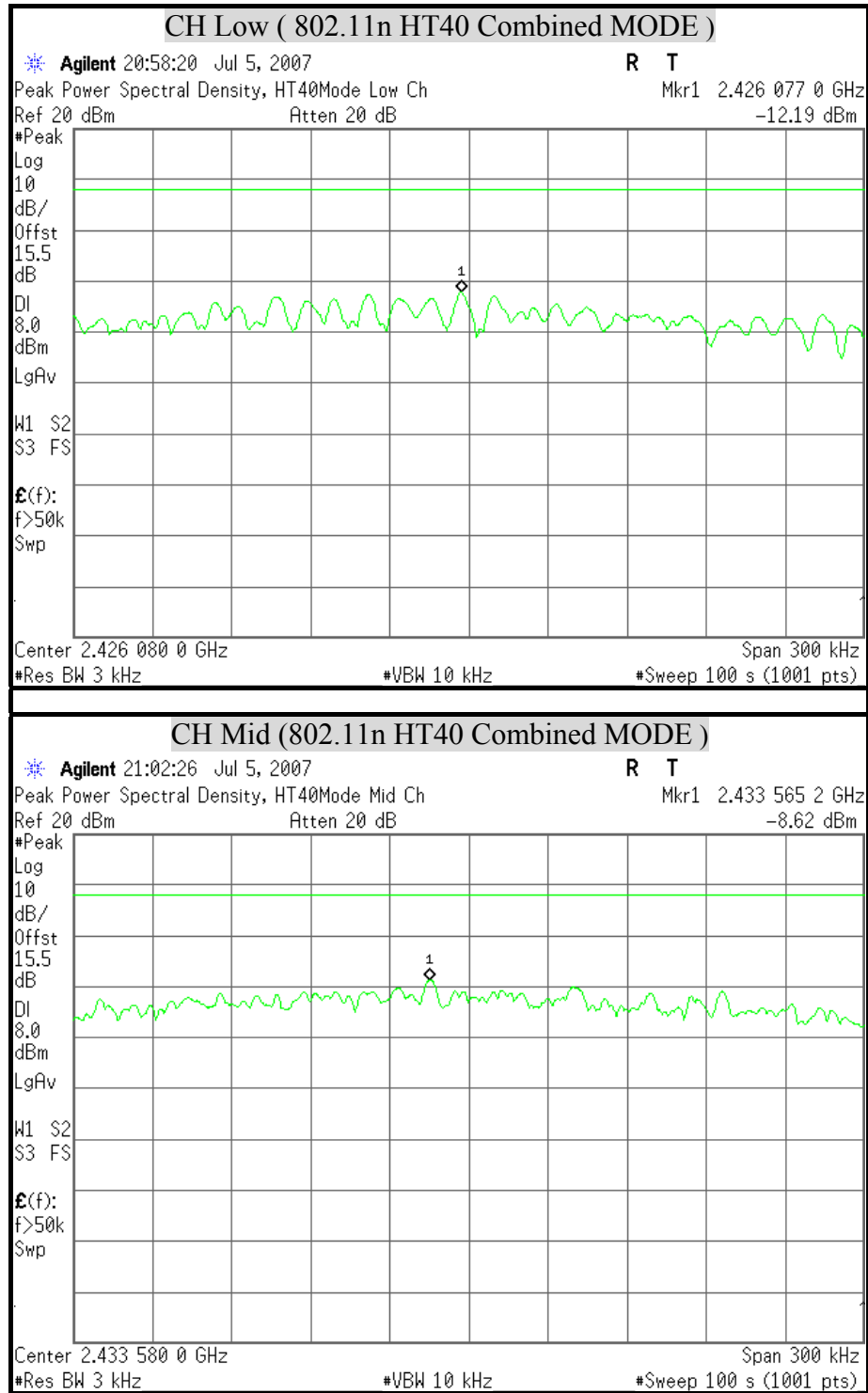


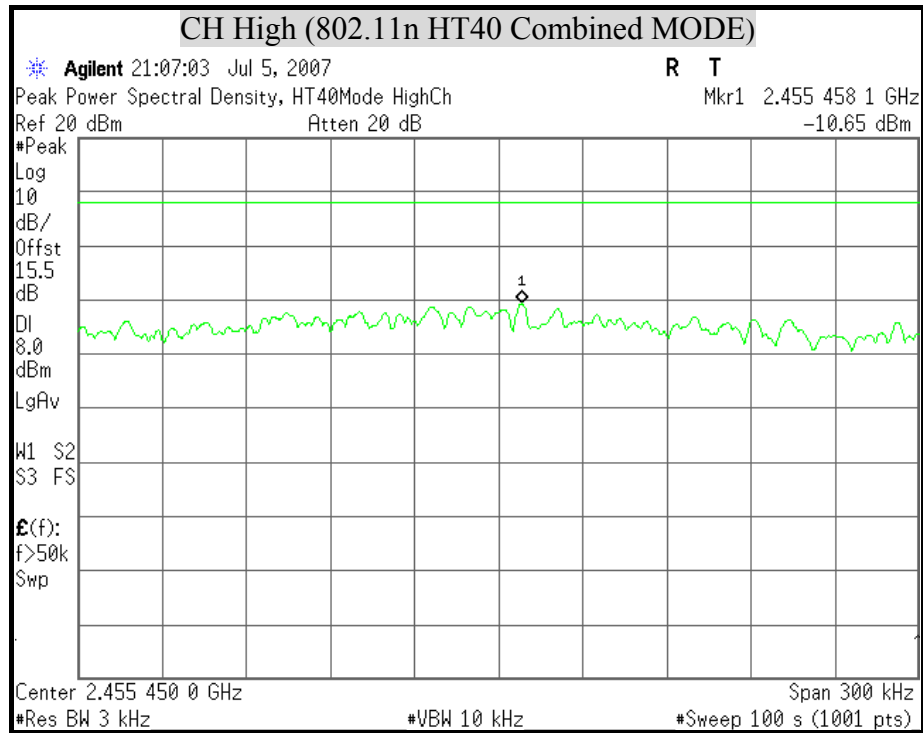
**POWER SPECTRAL DENSITY ( 802.11n HT40 MODE )**







**POWER SPECTRAL DENSITY ( 802.11n HT40 Combined MODE )**





## 8.7 CONDUCTED SPURIOUS EMISSION

### LIMITS

§ 15.247(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a) (see § 15.205(c)).

### TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

### TEST EQUIPMENT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSEK30	835253/002	10/17/2007
SPECTRUM ANALYZER	AGILENT	E4446A	MY433601.32	03/05/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

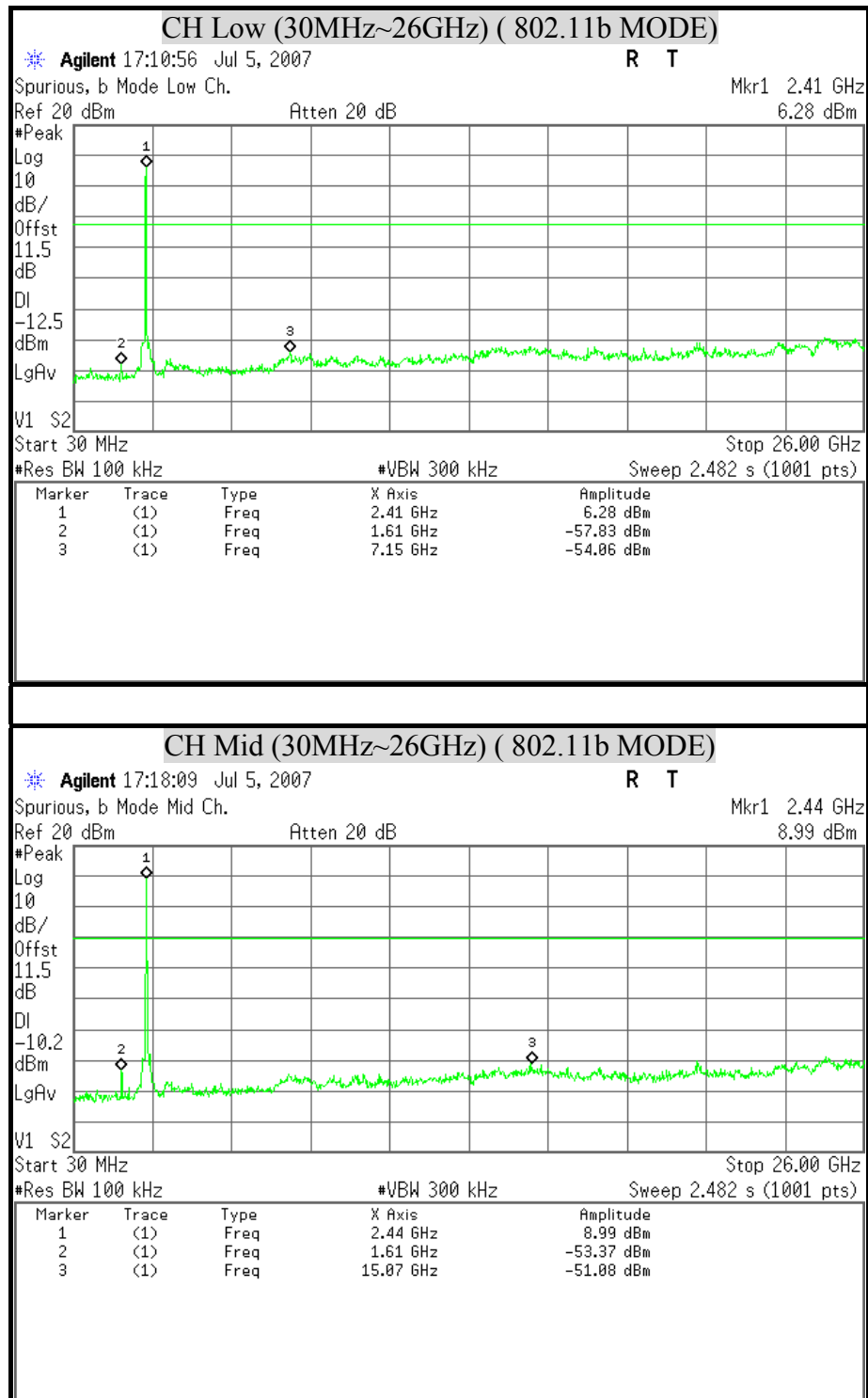
### TEST SETUP

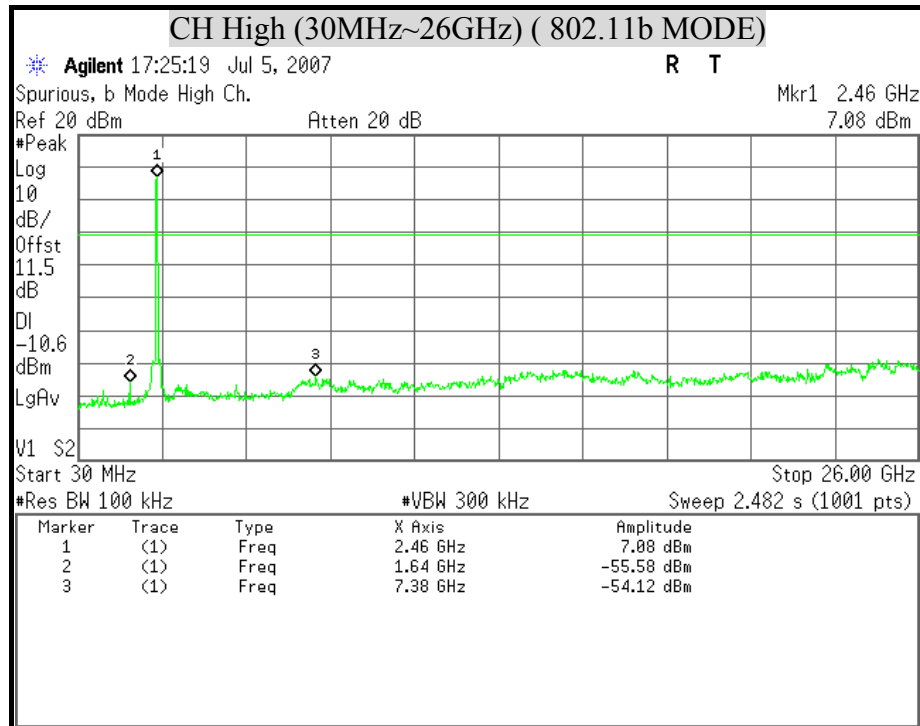


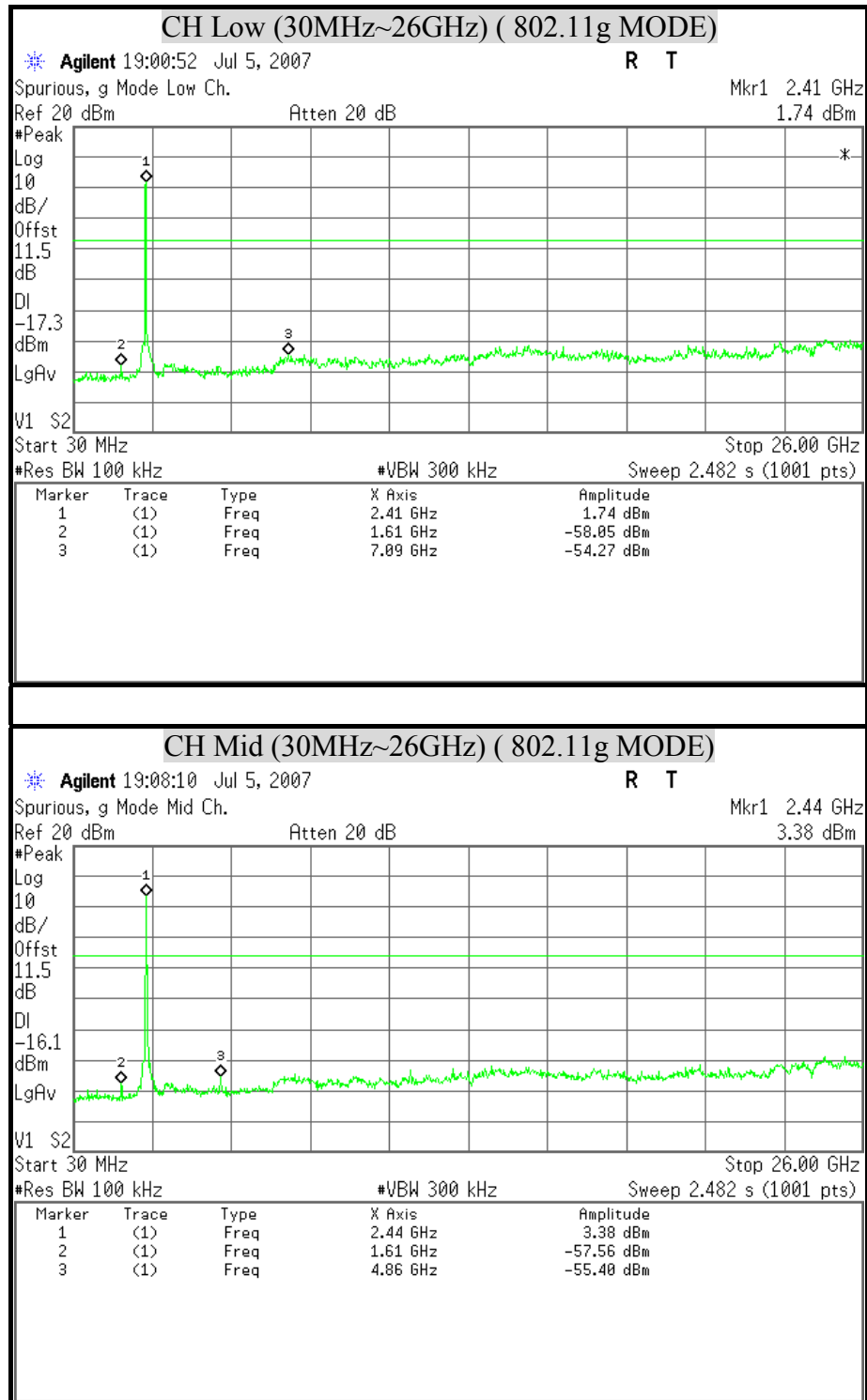
Combined mode

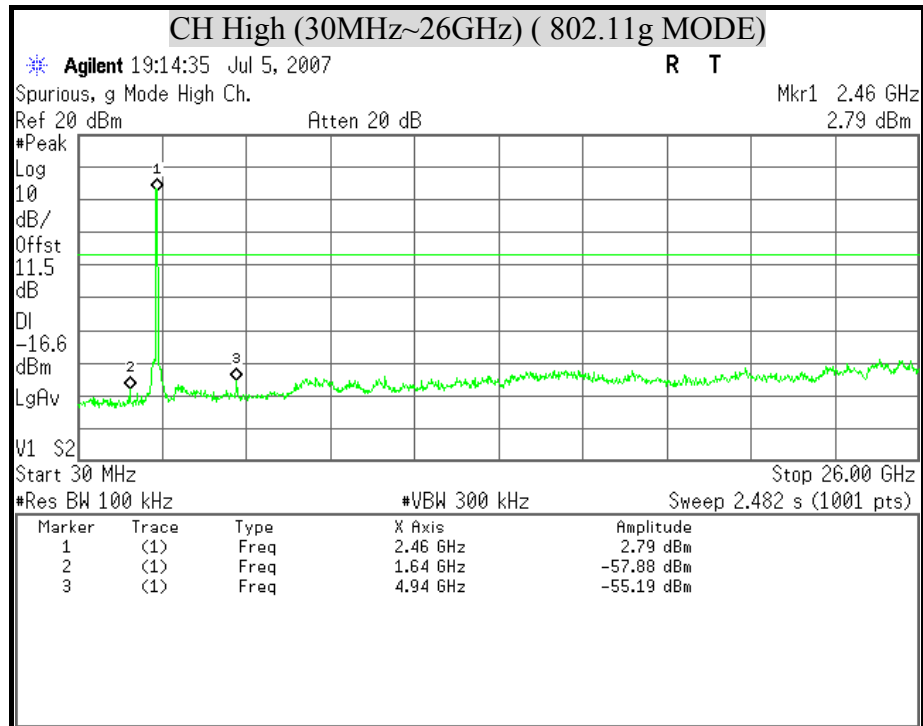


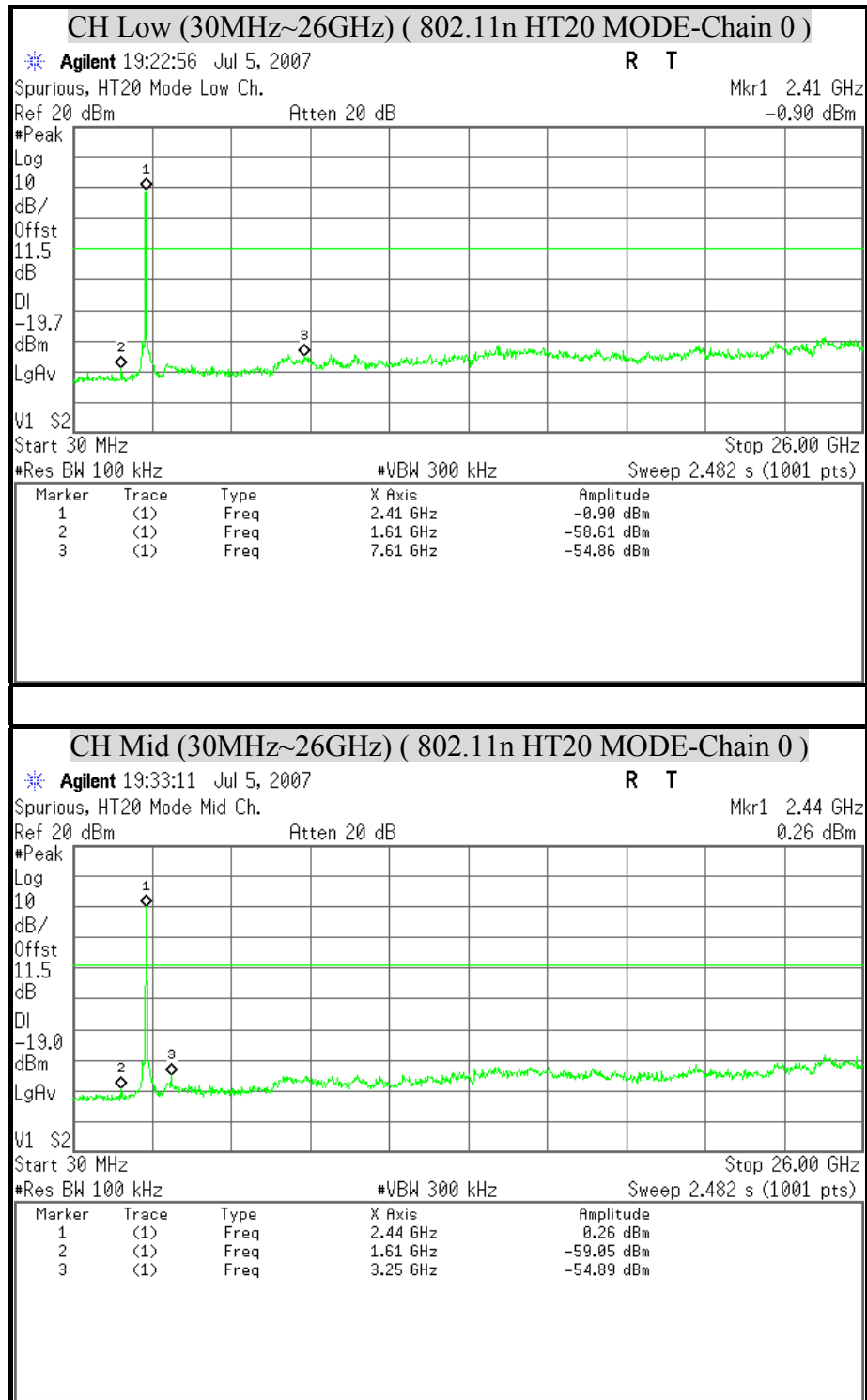


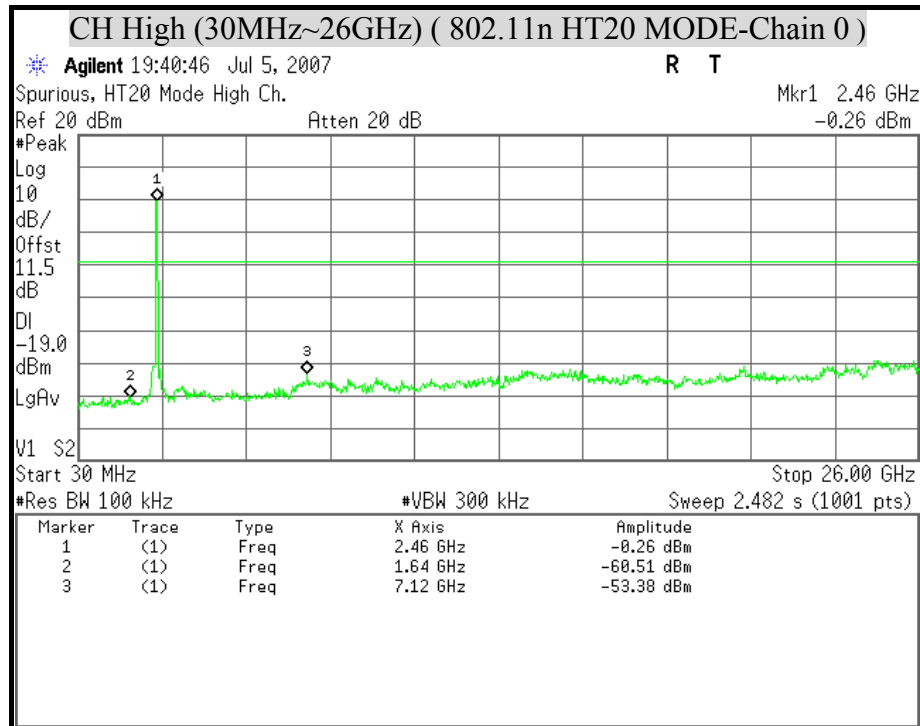
**TEST RESULTS****OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT  
( IEEE 802.11b MODE)**

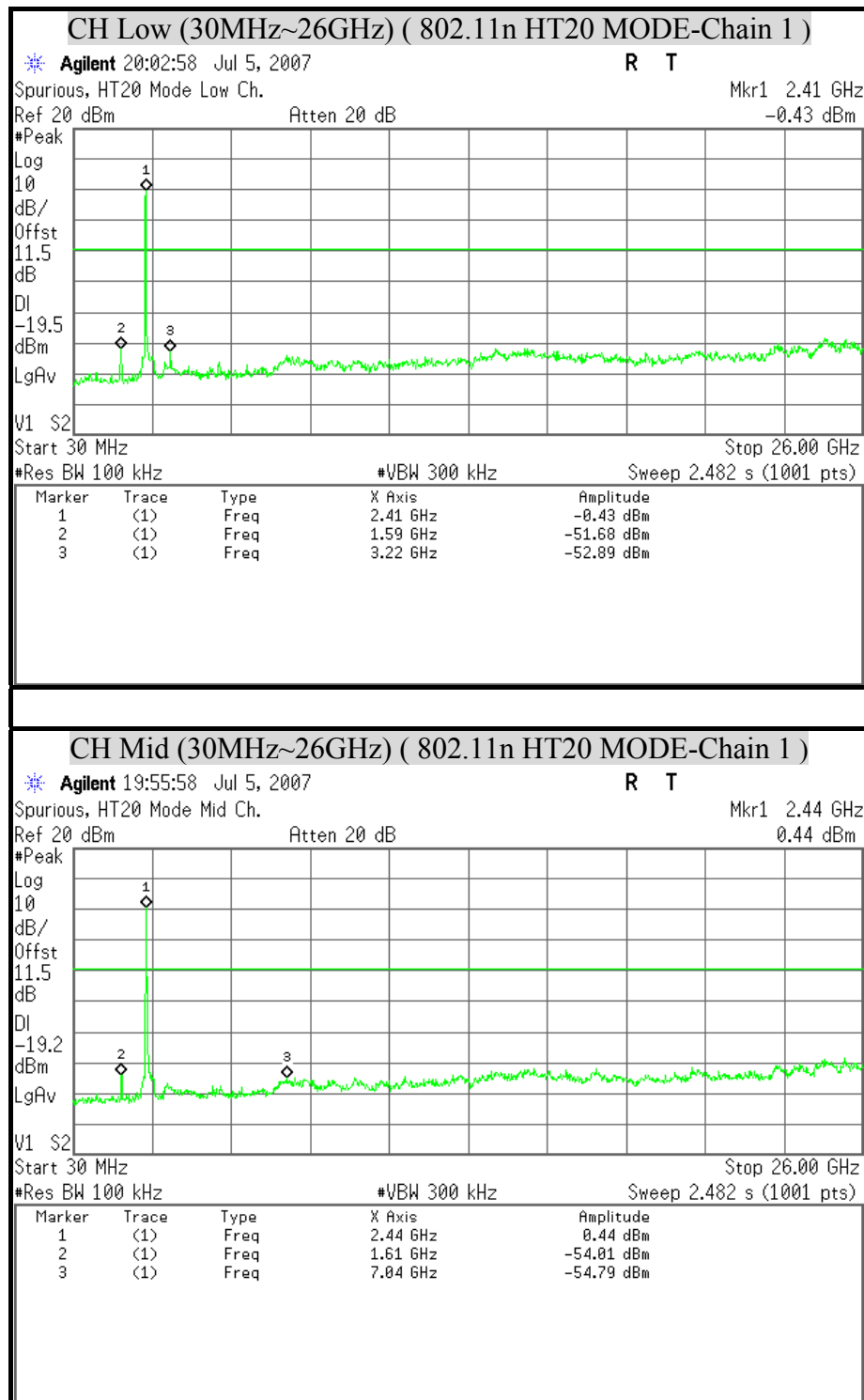


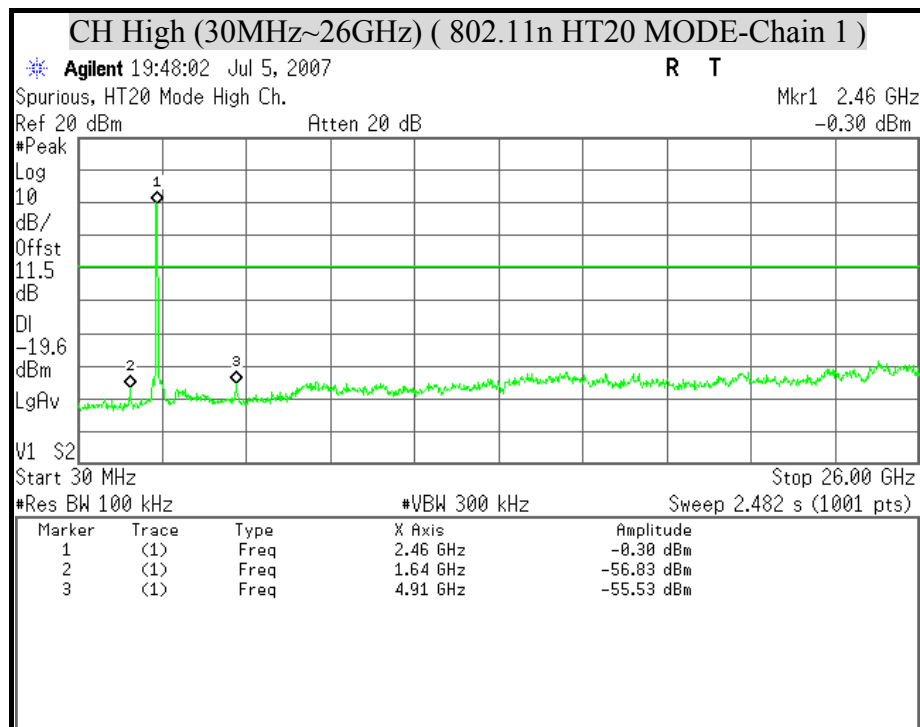
**OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT****( 802.11g MODE)**



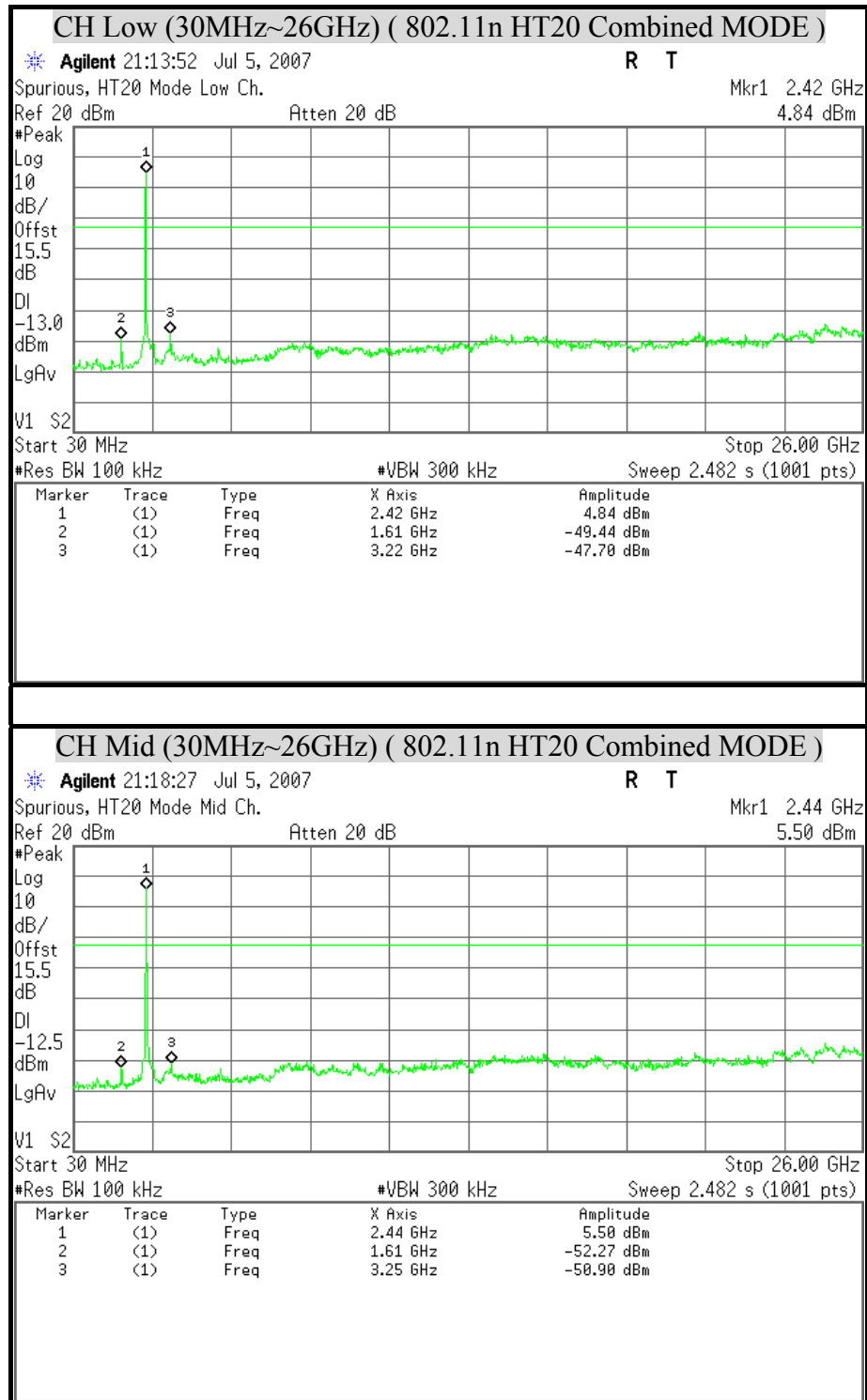
**OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT****( 802.11n HT20 MODE )**

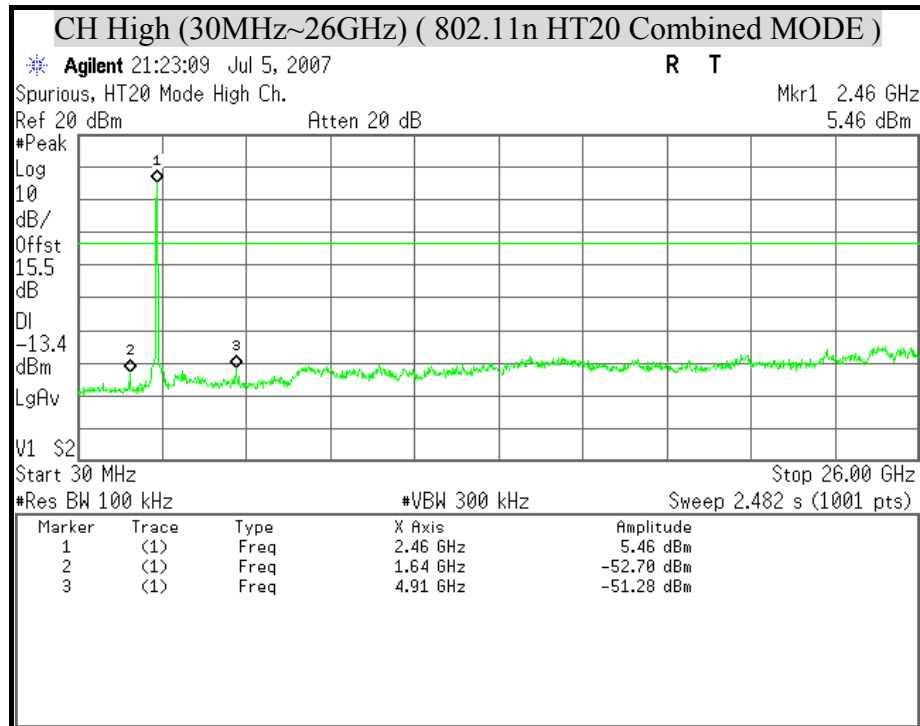


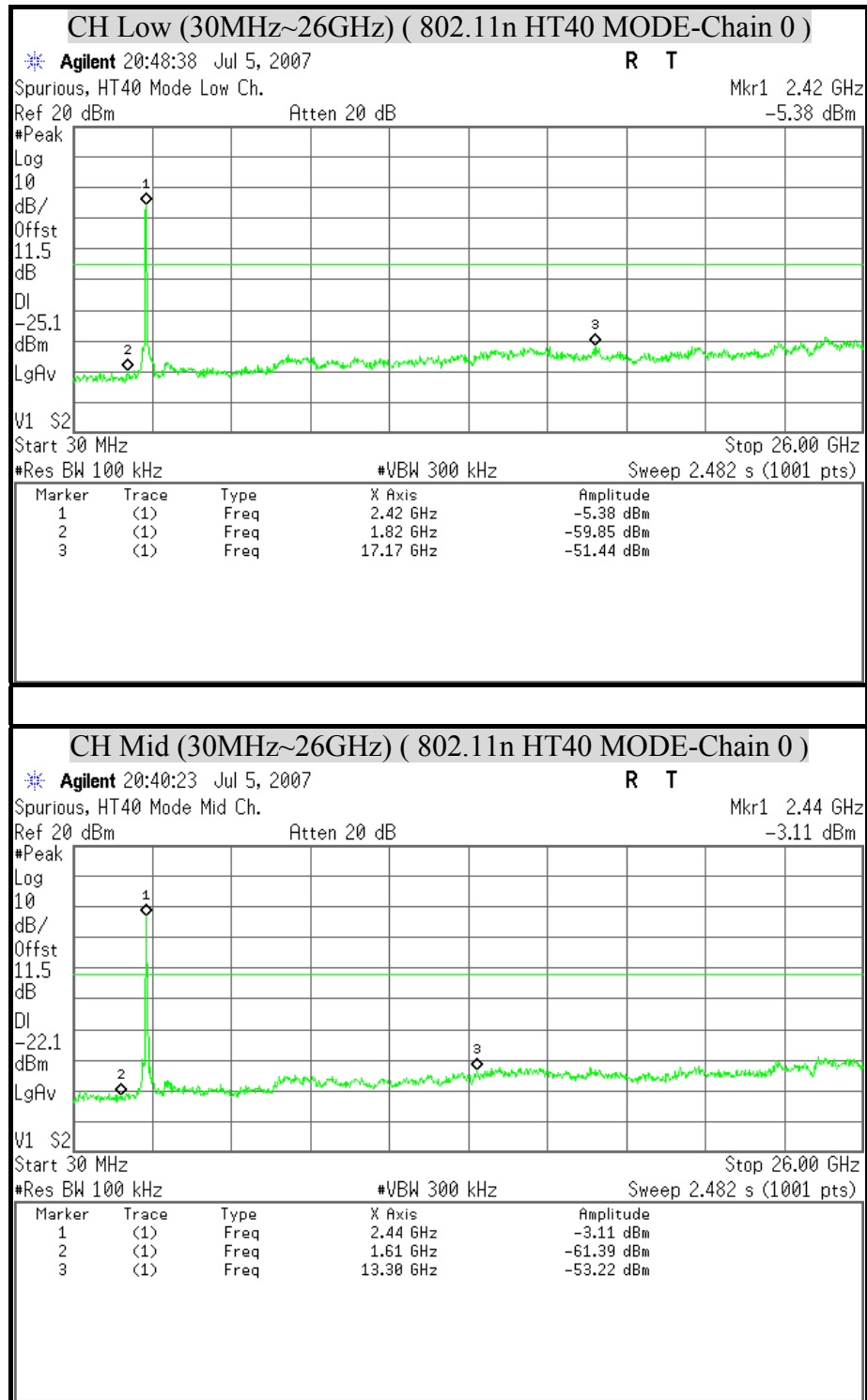


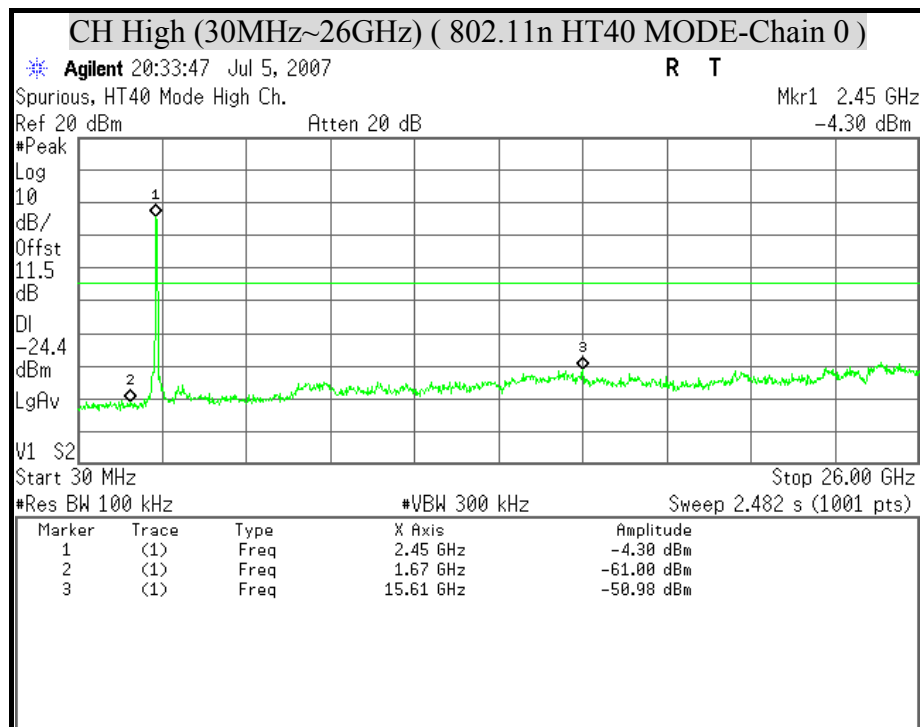


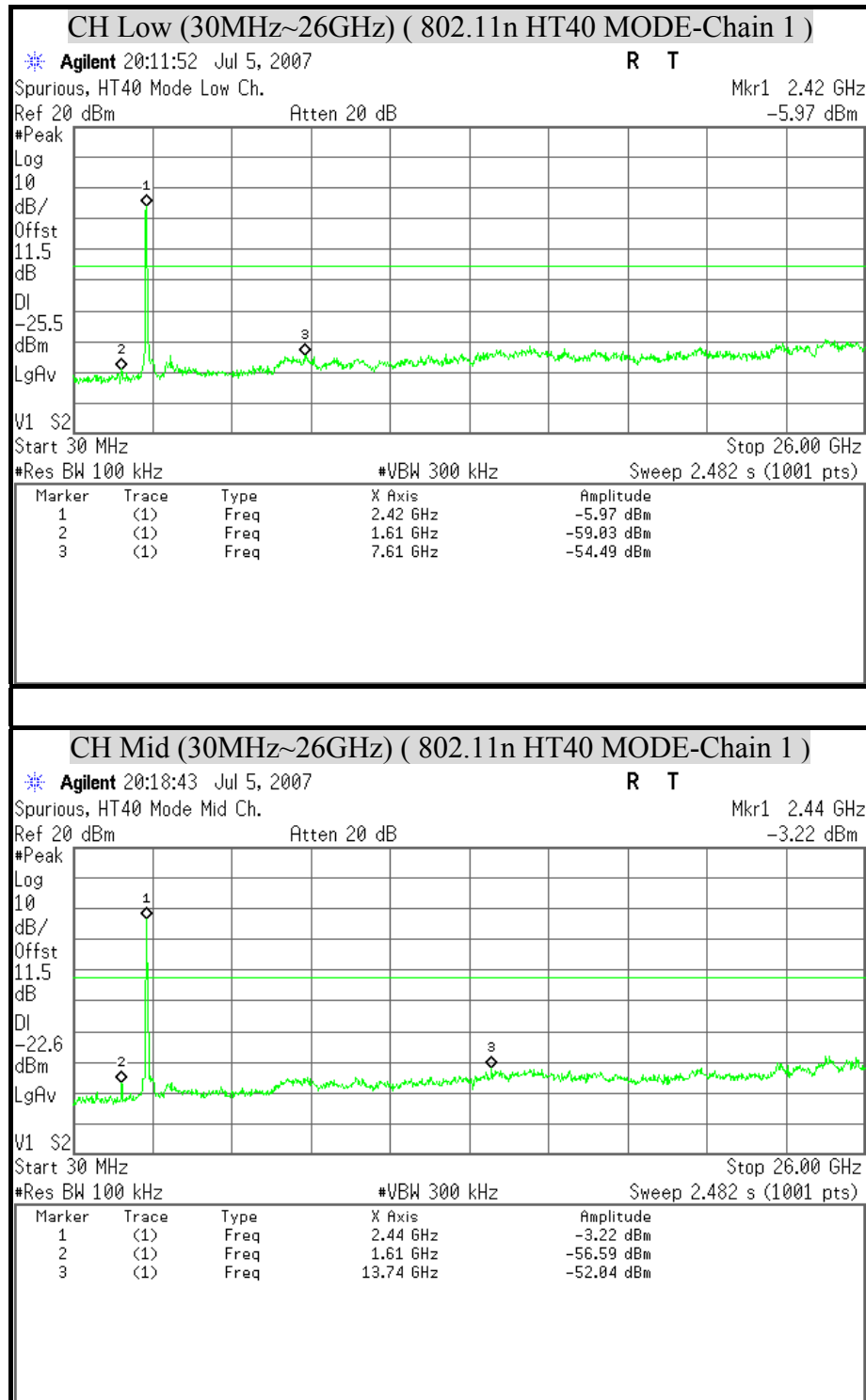


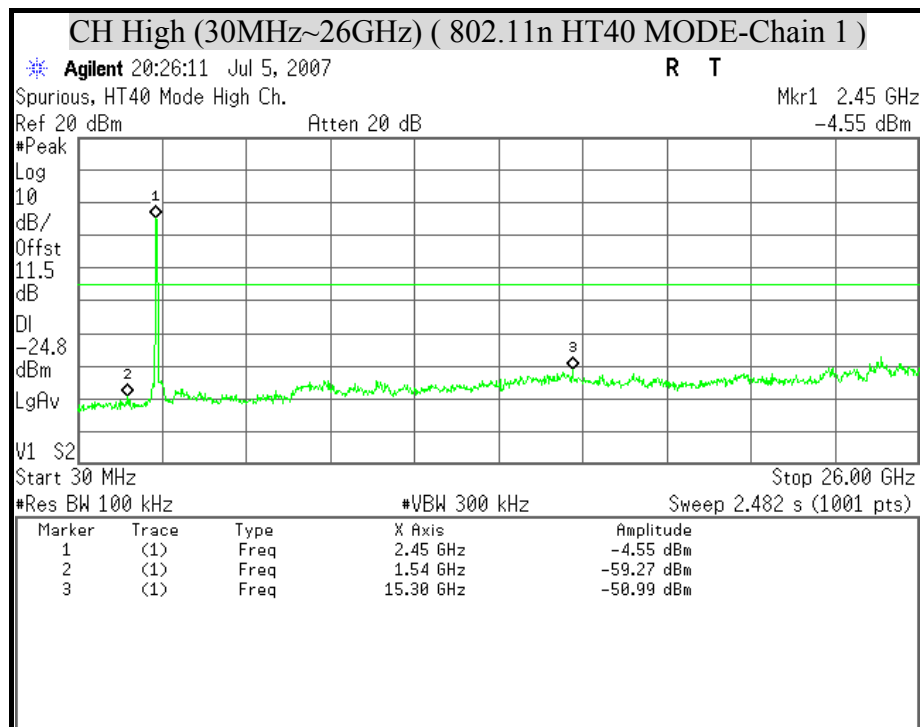
**OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT****( 802.11n HT20 Combined MODE )**

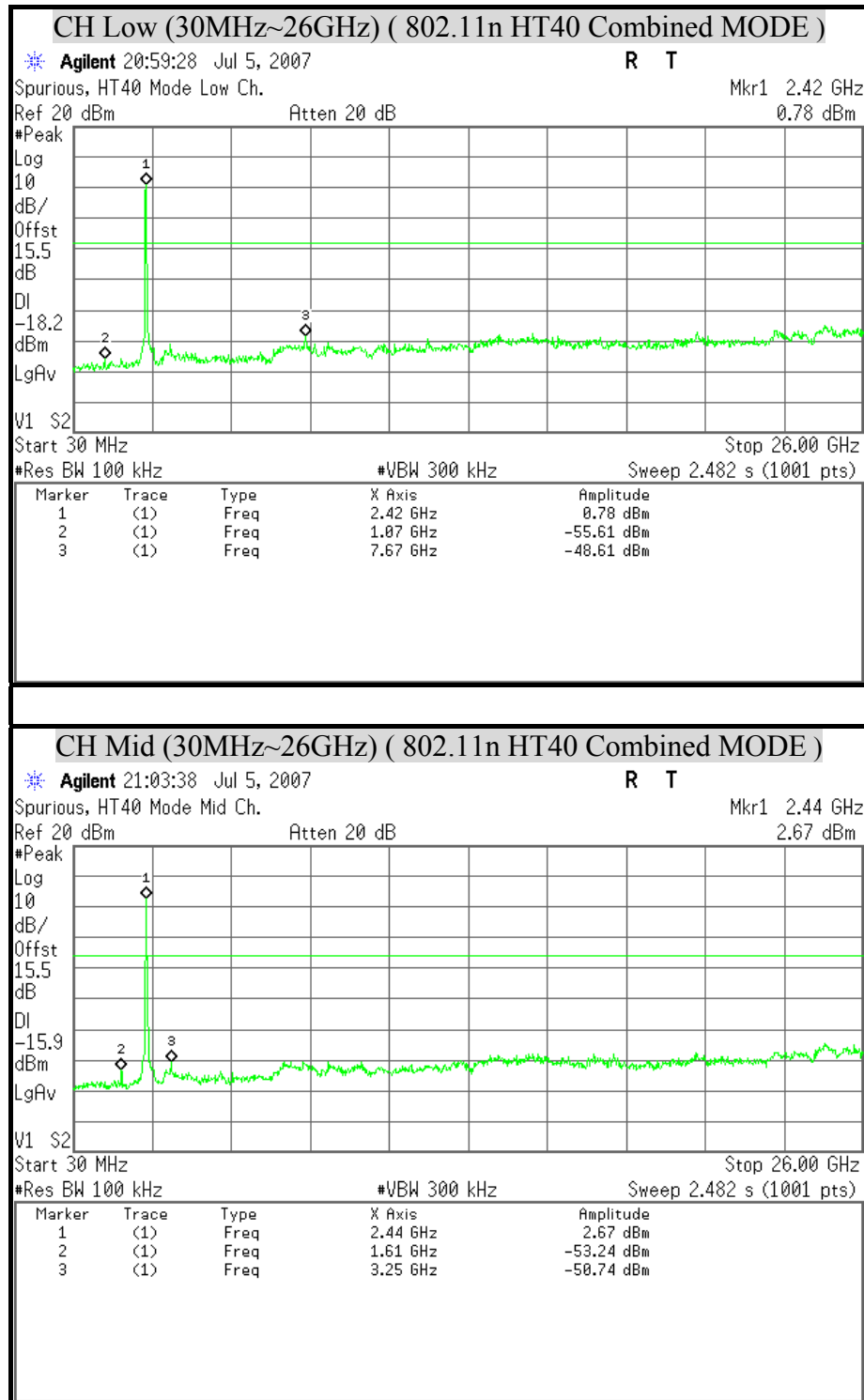


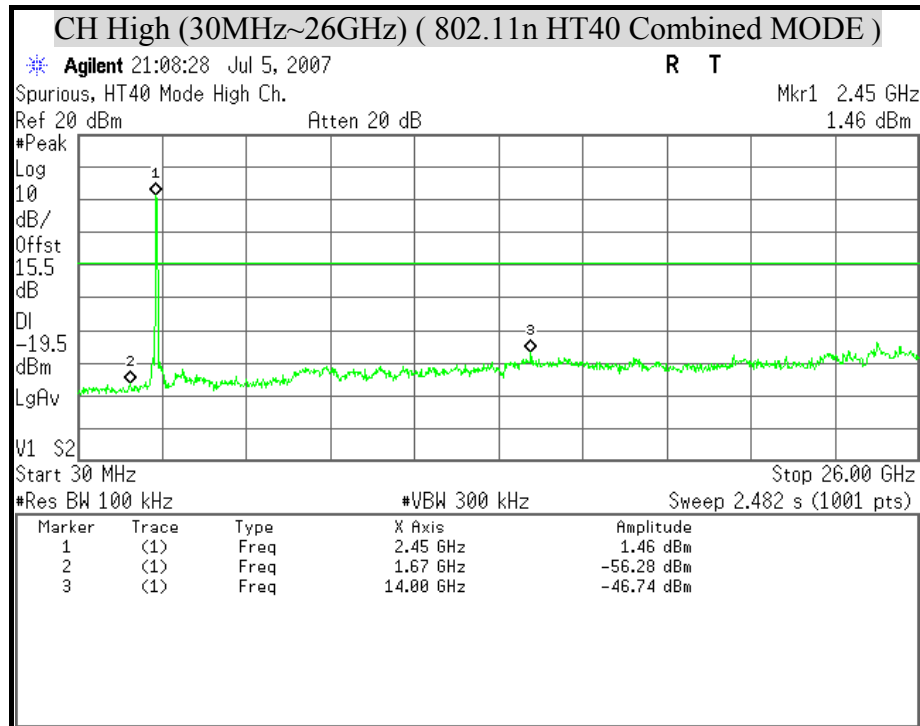
**OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT****( 802.11n HT40 MODE )**







**OUT-OF-BAND SPURIOUS EMISSIONS-CONDUCTED MEASUREMENT****( 802.11n HT40 Combined MODE )**







## 8.8 RADIATED EMISSIONS

### 8.8.1 TRANSMITTER RADIATED SUPURIOUS EMSSIONS

#### LIMITS

§ 15.205 (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
<sup>1</sup> 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 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3338	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

§ 15.205 (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.



§ 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 (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* 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.

§ 15.209 (b) In the emission table above, the tighter limit applies at the band edges.

### **TEST EQUIPMENT**

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
SPECTRUM ANALYZER	AGILENT	E4446A	MY43360132	06/09/2010
SPECTRUM ANALYZER	AGILENT	E4446A	MY46180323	05/26/2010
EMI TEST RECEIVER	R & S	ESCI	100221	05/17/2010
BILOG ANTENNA	SCHWARZBECK	VULB	9168_249	09/17/2010
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00078732	06/30/2010
PRE-AMPLIFIER	Agilent	8449B	3008A01471	08/02/2010
PRE-AMPLIFIER	HP	8447F	2944A03748	09/24/2010
Notch Filters Band Reject	Micro-Tronics	BRM50702-01	009	N.C.R.
Band Reject Filter	Micro-Tronics	BRC50703-01	004	N.C.R.
Band Reject Filter	Micro-Tronics	BRC50704-01	004	N.C.R.
Band Reject Filter	Micro-Tronics	BRC50705-01	007	N.C.R.
RF COAXIAL CABLE	HUBERSUHNER	SUCOFLEX 104PEA	SN31350	07/21/2010

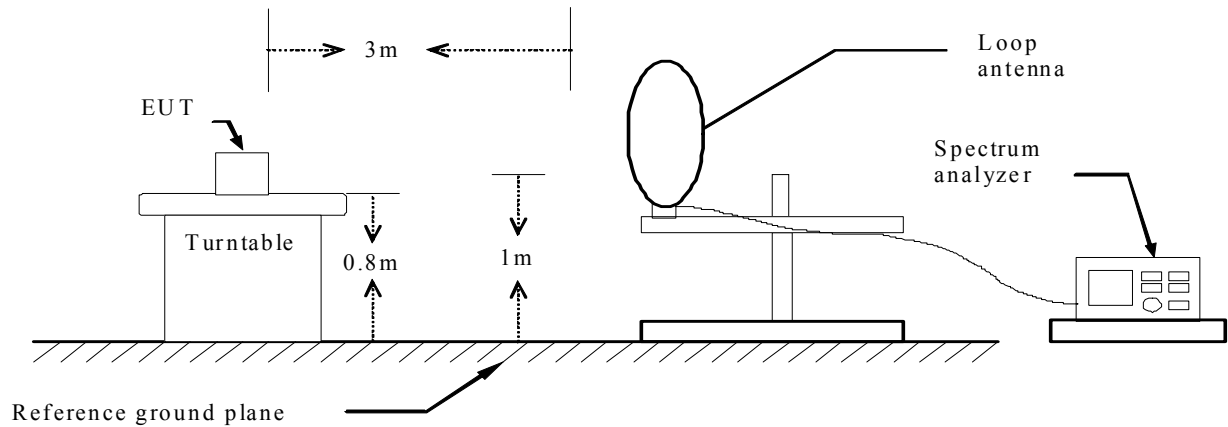
**Remark:** 1. Each piece of equipment is scheduled for calibration once a year.

2. N.C.R = No Calibration Request.

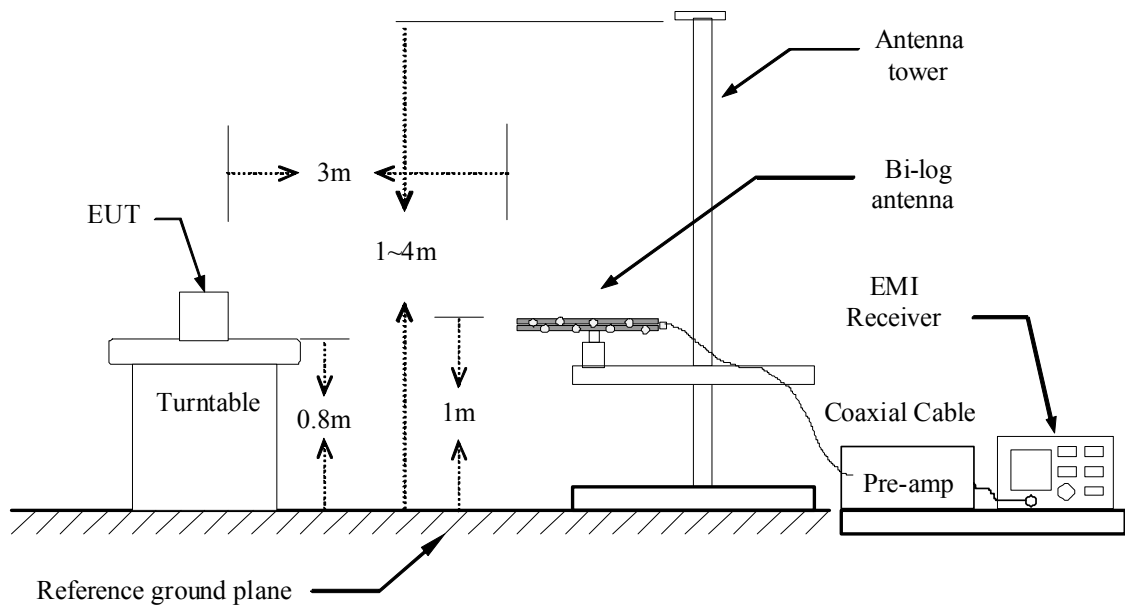
## TEST SETUP

The diagram below shows the test setup that is utilized to make the measurements for emission from below 1GHz.

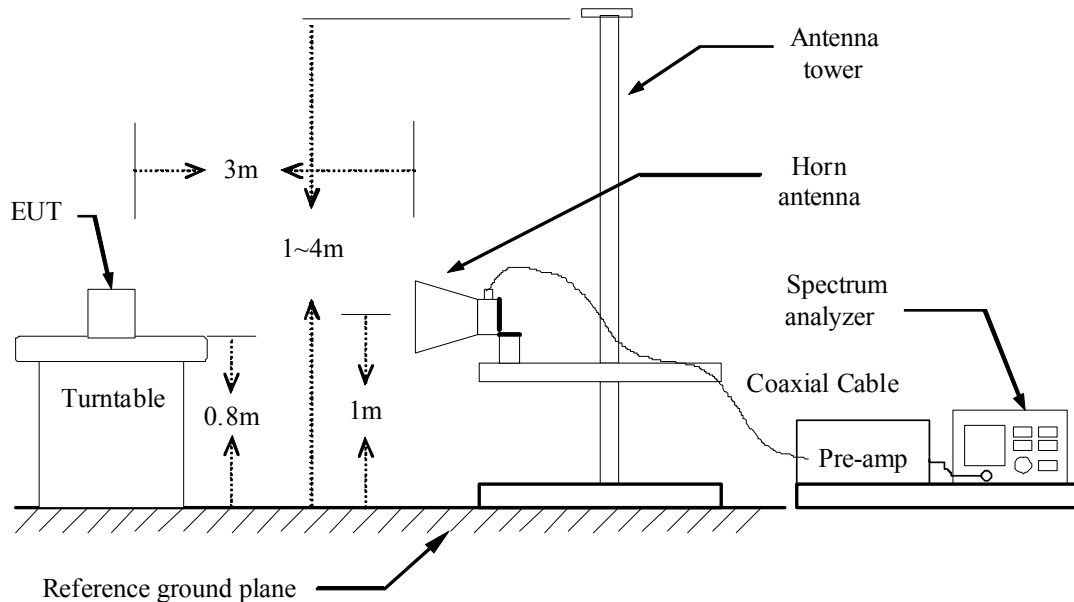
### 9kHz ~ 30MHz



### 30MHz ~ 1GHz



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



## TEST PROCEDURE

- The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- While measuring the radiated emission below 1GHz, the EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. While measuring the radiated emission above 1GHz, the EUT was set 3 meters away from the interference-receiving antenna.
- The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

### Note :

- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
- The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1GHz.
- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.



## 8.8.2 WORST-CASE RADIATED EMISSION BELOW 1 GHz

### BELOW 1 GHz (9kHz ~ 30MHz)

No emission found between lowest internal used/generated frequency to 30MHz.

### BELOW 1 GHz (30MHz ~ 1GHz)

<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/11/30
<b>Model</b>	WMP-N07	<b>Test By</b>	Rick Lin
<b>Test Mode</b>	Normal operating	<b>TEMP &amp; Humidity</b>	25.9°C, 63%

Horizontal						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
140.58	49.90	-10.65	39.25	43.50	-4.25	QP
159.98	49.80	-9.73	40.07	43.50	-3.43	QP
193.93	49.20	-12.22	36.98	43.50	-6.52	QP
266.68	50.80	-10.00	40.80	46.00	-5.20	QP
289.96	48.60	-9.16	39.44	46.00	-6.56	QP
366.59	48.30	-6.92	41.38	46.00	-4.62	QP
415.09	45.10	-5.48	39.63	46.00	-6.37	Peak
905.91	36.06	3.94	40.00	46.00	-6.00	Peak
Vertical						
Frequency (MHz)	Reading (dBμV)	Correction Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
38.73	46.30	-10.66	35.64	40.00	-4.36	Peak
140.58	47.71	-10.65	37.06	43.50	-6.44	Peak
191.99	48.62	-12.12	36.51	43.50	-6.99	Peak
199.75	50.68	-12.53	38.15	43.50	-5.35	Peak
366.59	47.17	-6.92	40.26	46.00	-5.74	Peak
499.48	41.46	-3.73	37.72	46.00	-8.28	Peak
599.39	40.23	-1.59	38.64	46.00	-7.36	Peak
921.43	35.18	4.17	39.35	46.00	-6.65	Peak

**Remark:**

1. Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit.
2. 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.
3. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Loss (dB) – PreAmp.Gain (dB)
4. Result (dBμV/m) = Reading (dBμV) + Correction Factor (dB/m)
5. Margin (dB) = Remark result (dBμV/m) - Quasi-peak limit (dBμV/m).



### 8.8.3 TRANSMITTER RADIATED EMISSION ABOVE 1 GHz

<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11b TX (CH Low)	<b>TEMP &amp; Humidity</b>	26.2°C, 59%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1256.00	54.74	---	-3.90	50.84	---	74.00	54.00	-3.16	Peak
1756.00	56.83	41.56	-0.63	56.20	40.93	74.00	54.00	-13.07	AVG
2414.00	103.30	---	2.31	105.61	---	---	---	---	Carrier
4822.50	54.71	41.67	7.08	61.79	48.75	74.00	54.00	-5.25	AVG
7230.00	46.88	36.25	9.85	56.73	46.10	74.00	54.00	-7.90	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1182.00	54.16	---	-4.15	50.00	---	74.00	54.00	-4.00	Peak
1598.00	57.13	42.66	-2.14	54.99	40.52	74.00	54.00	-13.48	AVG
2408.00	104.54	---	2.30	106.84	---	---	---	---	Carrier
4815.00	51.43	38.74	7.08	58.51	45.82	74.00	54.00	-8.18	AVG
7230.00	50.79	40.87	9.85	60.64	50.72	74.00	54.00	-3.28	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)



<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11b TX (CH Middle)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1232.00	53.90	---	-3.98	49.92	---	74.00	54.00	-4.08	Peak
1652.00	56.69	42.93	-1.62	55.07	41.31	74.00	54.00	-12.69	AVG
2434.00	105.09	---	2.34	107.43	---	---	---	---	Carrier
4387.50	42.06	---	6.51	48.57	---	74.00	54.00	-5.43	Peak
4875.00	43.47	---	7.11	50.59	---	74.00	54.00	-3.41	Peak
5782.50	41.50	---	8.87	50.37	---	74.00	54.00	-3.63	Peak
6675.00	41.51	27.72	9.92	51.43	37.64	74.00	54.00	-16.36	AVG
7320.00	48.24	37.34	9.66	57.90	47.00	74.00	54.00	-7.00	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1192.00	54.70	---	-4.12	50.58	---	74.00	54.00	-3.42	Peak
1596.00	57.26	42.82	-2.16	55.10	40.66	74.00	54.00	-13.34	AVG
2436.00	106.87	---	2.34	109.21	---	---	---	---	Carrier
4867.50	49.54	36.17	7.11	56.65	43.28	74.00	54.00	-10.72	AVG
6097.50	41.11	---	9.34	50.45	---	74.00	54.00	-3.55	Peak
7305.00	45.90	33.98	9.69	55.59	43.67	74.00	54.00	-10.33	AVG
8265.00	42.72	27.18	11.30	54.02	38.48	74.00	54.00	-15.52	AVG
9367.50	41.56	27.86	12.68	54.24	40.54	74.00	54.00	-13.46	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result – Limit  
Remark Peak = Result(PK) – Limit(AV)  
Remark AVG = Result(AV) – Limit(AV)





<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11b TX (CH High)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1310.00	54.09	---	-3.72	50.37	---	74.00	54.00	-3.63	Peak
1598.00	52.87	---	-2.14	50.73	---	74.00	54.00	-3.27	Peak
2464.00	104.31	---	2.38	106.69	---	---	---	---	Carrier
3255.00	42.96	---	3.83	46.80	---	74.00	54.00	-7.20	Peak
4807.50	41.06	---	7.08	48.14	---	74.00	54.00	-5.86	Peak
6142.50	41.35	---	9.38	50.73	---	74.00	54.00	-3.27	Peak
7387.50	41.71	---	9.52	51.23	---	74.00	54.00	-2.77	Peak
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1228.00	53.92	---	-4.00	49.92	---	74.00	54.00	-4.08	Peak
1600.00	57.69	43.97	-2.12	55.57	41.85	74.00	54.00	-12.15	AVG
2464.00	105.11	---	2.38	107.49	---	---	---	---	Carrier
3075.00	43.65	---	3.50	47.16	---	74.00	54.00	-6.84	Peak
4395.00	41.52	---	6.54	48.05	---	74.00	54.00	-5.95	Peak
6232.50	40.16	---	9.46	49.62	---	74.00	54.00	-4.38	Peak
6982.50	41.23	---	10.31	51.54	---	74.00	54.00	-2.46	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6.  $Result = Reading + Correction\ Factor$   
 $Margin = Result - Limit$   
 $Remark\ Peak = Result(PK) - Limit(AV)$   
 $Remark\ AVG = Result(AV) - Limit(AV)$





<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11g TX (CH Low)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1210.00	53.96	---	-4.06	49.91	---	74.00	54.00	-4.09	Peak
1600.00	56.31	41.93	-2.12	54.19	39.81	74.00	54.00	-14.19	AVG
2418.00	100.25	---	2.31	102.57	---	---	---	---	Carrier
3277.50	42.39	---	3.88	46.26	---	74.00	54.00	-7.74	Peak
3817.50	41.96	---	4.81	46.78	---	74.00	54.00	-7.22	Peak
4822.50	49.74	36.79	7.08	56.82	43.87	74.00	54.00	-10.13	AVG
6232.50	40.25	---	9.46	49.71	---	74.00	54.00	-4.29	Peak
7222.50	46.86	32.36	9.87	56.73	42.23	74.00	54.00	-11.77	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1242.00	54.51	---	-3.95	50.56	---	74.00	54.00	-3.44	Peak
1598.00	53.42	---	-2.14	51.28	---	74.00	54.00	-2.72	Peak
2404.00	103.72	---	2.29	106.02	---	---	---	---	Carrier
3487.50	42.14	---	4.26	46.40	---	74.00	54.00	-7.60	Peak
4815.00	48.43	35.03	7.08	55.51	42.11	74.00	54.00	-11.89	AVG
5947.50	40.59	---	9.16	49.75	---	74.00	54.00	-4.25	Peak
6435.00	41.24	---	9.64	50.88	---	74.00	54.00	-3.12	Peak
7222.50	49.65	36.03	9.87	59.52	45.90	74.00	54.00	-8.10	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result – Limit  
Remark Peak = Result(PK) – Limit(AV)  
Remark AVG = Result(AV) – Limit(AV)



<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11g TX (CH Middle)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1206.00	53.99	---	-4.07	49.92	---	74.00	54.00	-4.08	Peak
1568.00	53.12	---	-2.42	50.69	---	74.00	54.00	-3.31	Peak
2442.00	100.76	---	2.35	103.11	---	---	---	---	Carrier
3240.00	42.67	---	3.81	46.48	---	74.00	54.00	-7.52	Peak
3570.00	42.49	---	4.40	46.89	---	74.00	54.00	-7.11	Peak
4875.00	42.52	---	7.11	49.63	---	74.00	54.00	-4.37	Peak
5992.50	40.26	---	9.24	49.50	---	74.00	54.00	-4.50	Peak
7297.50	49.05	34.01	9.71	58.76	43.72	74.00	54.00	-10.28	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1244.00	54.31	---	-3.94	50.37	---	74.00	54.00	-3.63	Peak
1594.00	57.76	43.39	-2.18	55.58	41.21	74.00	54.00	-12.79	AVG
2444.00	102.92	---	2.35	105.28	---	---	---	---	Carrier
3322.50	42.80	---	3.96	46.75	---	74.00	54.00	-7.25	Peak
4867.50	47.67	35.03	7.11	54.78	42.14	74.00	54.00	-11.86	AVG
6082.50	40.37	---	9.33	49.69	---	74.00	54.00	-4.31	Peak
7305.00	48.56	34.72	9.69	58.25	44.41	74.00	54.00	-9.59	AVG
14152.50	41.92	28.23	20.90	62.82	49.13	74.00	54.00	-4.87	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)



<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11g TX (CH High)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1296.00	54.83	---	-3.77	51.07	---	74.00	54.00	-2.93	Peak
1598.00	53.40	---	-2.14	51.27	---	74.00	54.00	-2.73	Peak
2458.00	101.01	---	2.37	103.38	---	---	---	---	Carrier
4462.50	40.83	---	6.78	47.61	---	74.00	54.00	-6.39	Peak
4822.50	41.56	---	7.08	48.65	---	74.00	54.00	-5.35	Peak
6112.50	41.29	---	9.35	50.64	---	74.00	54.00	-3.36	Peak
6667.50	41.00	---	9.91	50.91	---	74.00	54.00	-3.09	Peak
7387.50	49.88	30.98	9.52	59.40	40.50	74.00	54.00	-13.50	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1320.00	54.00	---	-3.69	50.31	---	74.00	54.00	-3.69	Peak
1596.00	57.55	43.18	-2.16	55.39	41.02	74.00	54.00	-12.98	AVG
2458.00	102.30	---	2.37	104.67	---	---	---	---	Carrier
3285.00	42.67	---	3.89	46.56	---	74.00	54.00	-7.44	Peak
4665.00	41.02	---	7.00	48.03	---	74.00	54.00	-5.97	Peak
5475.00	40.70	---	8.31	49.02	---	74.00	54.00	-4.98	Peak
7380.00	48.72	31.34	9.53	58.25	40.87	74.00	54.00	-13.13	AVG
9352.50	42.19	28.00	12.66	54.85	40.66	74.00	54.00	-13.34	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)



<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11n HT20 TX (CH Low)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1146.00	54.74	---	-4.28	50.46	---	74.00	54.00	-3.54	Peak
1472.00	54.16	---	-3.17	50.99	---	74.00	54.00	-3.01	Peak
2420.00	102.39	---	2.32	104.70	---	---	---	---	Carrier
3690.00	41.92	---	4.60	46.52	---	74.00	54.00	-7.48	Peak
4507.50	40.96	---	6.92	47.88	---	74.00	54.00	-6.12	Peak
4815.00	49.90	35.60	7.08	56.98	42.68	74.00	54.00	-11.32	AVG
6022.50	40.72	---	9.27	49.99	---	74.00	54.00	-4.01	Peak
7230.00	51.90	33.33	9.85	61.75	43.18	74.00	54.00	-10.82	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1320.00	54.33	---	-3.69	50.64	---	74.00	54.00	-3.36	Peak
1596.00	57.56	43.38	-2.16	55.40	41.22	74.00	54.00	-12.78	AVG
2408.00	106.76	---	2.30	109.06	---	---	---	---	Carrier
4140.00	41.45	---	5.62	47.07	---	74.00	54.00	-6.93	Peak
4830.00	47.32	33.33	7.09	54.41	40.42	74.00	54.00	-13.58	AVG
5632.50	40.92	---	8.61	49.52	---	74.00	54.00	-4.48	Peak
6435.00	40.68	---	9.64	50.32	---	74.00	54.00	-3.68	Peak
7230.00	49.12	35.07	9.85	58.97	44.92	74.00	54.00	-9.08	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)



<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11n HT20 TX (CH Middle)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1180.00	54.54	---	-4.16	50.38	---	74.00	54.00	-3.62	Peak
1570.00	53.59	---	-2.41	51.18	---	74.00	54.00	-2.82	Peak
2432.00	103.03	---	2.33	105.36	---	---	---	---	Carrier
3547.50	42.78	---	4.36	47.14	---	74.00	54.00	-6.86	Peak
4867.50	47.47	33.42	7.11	54.58	40.53	74.00	54.00	-13.47	AVG
6135.00	40.48	---	9.37	49.85	---	74.00	54.00	-4.15	Peak
6495.00	40.58	---	9.69	50.27	---	74.00	54.00	-3.73	Peak
7305.00	47.07	31.85	9.69	56.76	41.54	74.00	54.00	-12.46	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1238.00	54.37	---	-3.96	50.40	---	74.00	54.00	-3.60	Peak
1594.00	57.85	43.11	-2.18	55.67	40.93	74.00	54.00	-13.07	AVG
2442.00	108.08	---	2.35	110.43	---	---	---	---	Carrier
3922.50	41.60	---	4.99	46.59	---	74.00	54.00	-7.41	Peak
4875.00	43.93	---	7.11	51.04	---	74.00	54.00	-2.96	Peak
5595.00	41.71	---	8.54	50.25	---	74.00	54.00	-3.75	Peak
6615.00	40.49	---	9.84	50.34	---	74.00	54.00	-3.66	Peak
7312.50	50.55	35.65	9.68	60.23	45.33	74.00	54.00	-8.67	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)



<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11n HT20 TX (CH High)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1202.00	54.64	---	-4.09	50.56	---	74.00	54.00	-3.44	Peak
1478.00	53.85	---	-3.15	50.70	---	74.00	54.00	-3.30	Peak
2458.00	102.52	---	2.37	104.89	---	---	---	---	Carrier
3292.50	43.05	---	3.90	46.96	---	74.00	54.00	-7.04	Peak
4642.50	41.11	---	6.99	48.10	---	74.00	54.00	-5.90	Peak
6037.50	40.46	---	9.29	49.75	---	74.00	54.00	-4.25	Peak
6727.50	40.77	---	9.99	50.76	---	74.00	54.00	-3.24	Peak
7380.00	49.22	32.92	9.53	58.75	42.45	74.00	54.00	-11.55	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1272.00	54.25	---	-3.85	50.40	---	74.00	54.00	-3.60	Peak
1592.00	57.35	43.36	-2.20	55.15	41.16	74.00	54.00	-12.84	AVG
2466.00	106.44	---	2.38	108.82	---	---	---	---	Carrier
3390.00	42.94	---	4.08	47.02	---	74.00	54.00	-6.98	Peak
4927.50	41.22	---	7.14	48.36	---	74.00	54.00	-5.64	Peak
5805.00	40.54	---	8.91	49.45	---	74.00	54.00	-4.55	Peak
6562.50	40.19	---	9.78	49.96	---	74.00	54.00	-4.04	Peak
7387.50	48.29	33.09	9.52	57.81	42.61	74.00	54.00	-11.39	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)





<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11n HT40 TX (CH Low)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1098.00	54.40	---	-4.44	49.96	---	74.00	54.00	-4.04	Peak
1780.00	54.46	40.77	-0.40	54.06	40.37	74.00	54.00	-13.63	AVG
2428.00	97.15	---	2.33	99.48	---	---	---	---	Carrier
3735.00	41.20	---	4.68	45.87	---	74.00	54.00	-8.13	Peak
4665.00	41.74	---	7.00	48.74	---	74.00	54.00	-5.26	Peak
6142.50	40.38	---	9.38	49.76	---	74.00	54.00	-4.24	Peak
6997.50	40.70	---	10.33	51.03	---	74.00	54.00	-2.97	Peak
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1248.00	54.51	---	-3.93	50.58	---	74.00	54.00	-3.42	Peak
1596.00	58.85	44.11	-2.16	56.69	41.95	74.00	54.00	-12.05	AVG
2426.00	105.27	---	2.33	107.59	---	---	---	---	Carrier
3285.00	42.42	---	3.89	46.31	---	74.00	54.00	-7.69	Peak
4987.50	41.00	---	7.17	48.17	---	74.00	54.00	-5.83	Peak
6457.50	41.74	---	9.66	51.40	---	74.00	54.00	-2.60	Peak
8167.50	40.68	---	11.24	51.92	---	74.00	54.00	-2.08	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)



<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11n HT40 TX (CH Middle)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1594.00	53.83	---	-2.18	51.65	---	74.00	54.00	-2.35	Peak
2426.00	102.08	---	2.33	104.40	---	---	---	---	Carrier
3217.50	42.52	---	3.76	46.28	---	74.00	54.00	-7.72	Peak
4365.00	40.85	---	6.43	47.28	---	74.00	54.00	-6.72	Peak
4882.50	42.48	---	7.12	49.59	---	74.00	54.00	-4.41	Peak
6127.50	40.89	---	9.37	50.26	---	74.00	54.00	-3.74	Peak
7312.50	50.49	35.35	9.68	60.17	45.03	74.00	54.00	-8.97	AVG
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1596.00	57.91	42.70	-2.16	55.75	40.54	74.00	54.00	-13.46	AVG
2438.00	106.01	---	2.34	108.36	---	---	---	---	Carrier
4860.00	42.18	---	7.10	49.28	---	74.00	54.00	-4.72	Peak
6502.50	40.79	---	9.70	50.49	---	74.00	54.00	-3.51	Peak
6802.50	44.26	27.97	10.08	54.34	38.05	74.00	54.00	-15.95	AVG
7305.00	49.13	35.75	9.69	58.82	45.44	74.00	54.00	-8.56	AVG

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. 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.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)





<b>Product Name</b>	Wireless Mini-PCI	<b>Test Date</b>	2009/12/02
<b>Model</b>	WMP-N07	<b>Test By</b>	Rueyyan Lin
<b>Test Mode</b>	IEEE 802.11n HT40 TX (CH High)	<b>TEMP &amp; Humidity</b>	25.6°C, 53%

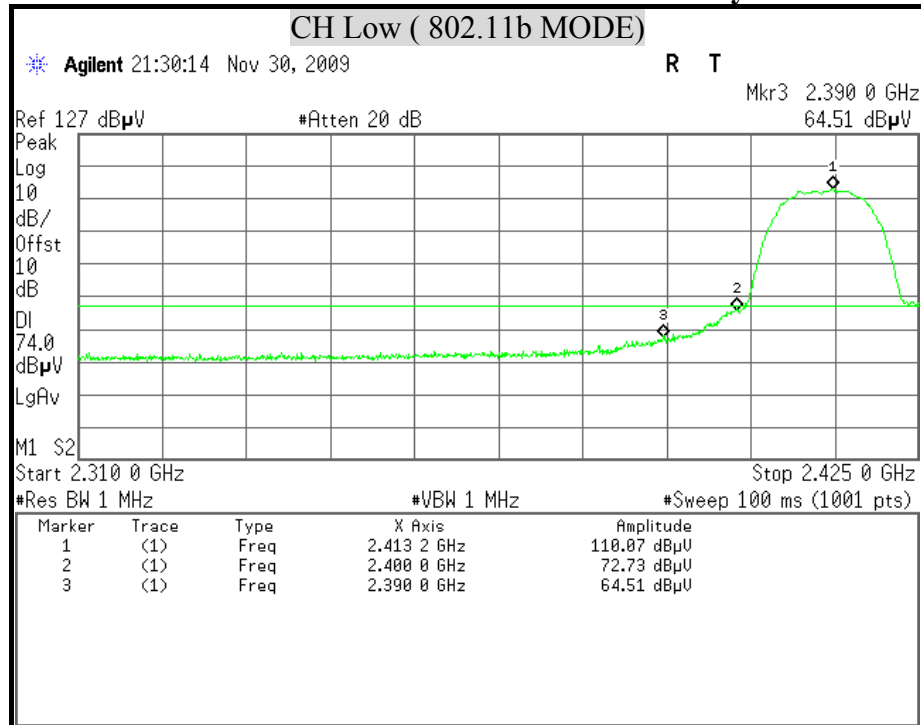
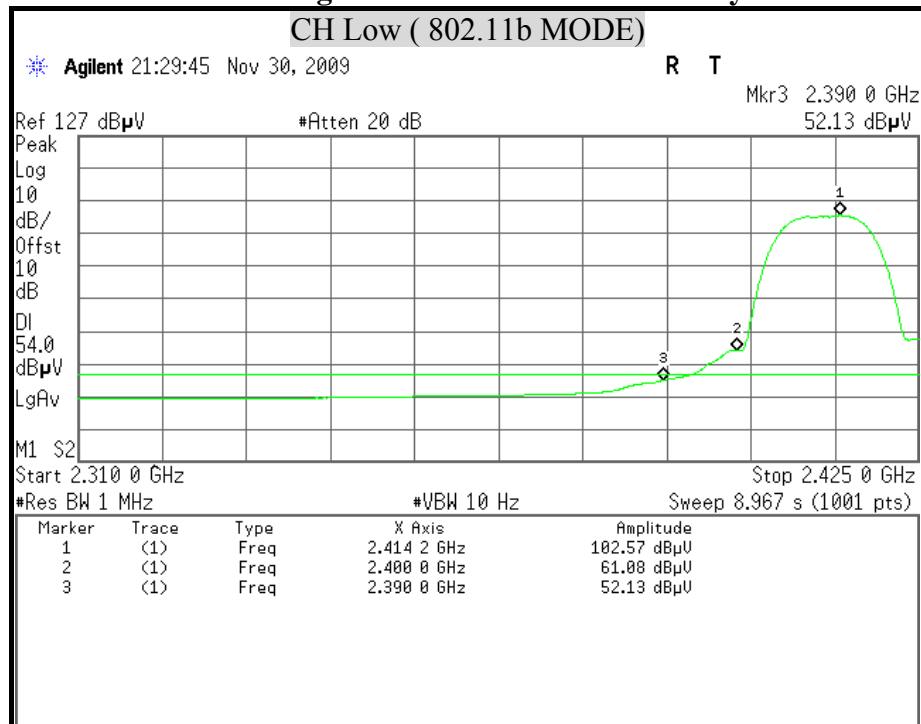
Horizontal									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1198.00	54.62	---	-4.10	50.52	---	74.00	54.00	-3.48	Peak
1580.00	54.26	---	-2.31	51.95	---	74.00	54.00	-2.05	Peak
2448.00	96.00	---	2.36	98.36	---	---	---	---	Carrier
4642.50	41.23	---	6.99	48.22	---	74.00	54.00	-5.78	Peak
5640.00	40.62	---	8.62	49.24	---	74.00	54.00	-4.76	Peak
6150.00	40.67	---	9.39	50.05	---	74.00	54.00	-3.95	Peak
6825.00	41.01	---	10.11	51.12	---	74.00	54.00	-2.88	Peak
Vertical									
Frequency (MHz)	Reading-PK (dBμV)	Reading-AV (dBμV)	Correction Factor (dB/m)	Result-PK (dBμV/m)	Result-AV (dBμV/m)	Limit-PK (dBμV/m)	Limit-AV (dBμV/m)	Margin (dB)	Remark
1412.00	54.22	---	-3.37	50.84	---	74.00	54.00	-3.16	Peak
1842.00	54.71	39.96	0.19	54.90	40.15	74.00	54.00	-13.85	AVG
2444.00	101.63	---	2.35	103.98	---	---	---	---	Carrier
3240.00	42.51	---	3.81	46.32	---	74.00	54.00	-7.68	Peak
4897.50	41.30	---	7.12	48.42	---	74.00	54.00	-5.58	Peak
5370.00	40.41	---	8.06	48.47	---	74.00	54.00	-5.53	Peak
5805.00	40.39	---	8.91	49.30	---	74.00	54.00	-4.70	Peak
6195.00	40.52	---	9.43	49.95	---	74.00	54.00	-4.05	Peak

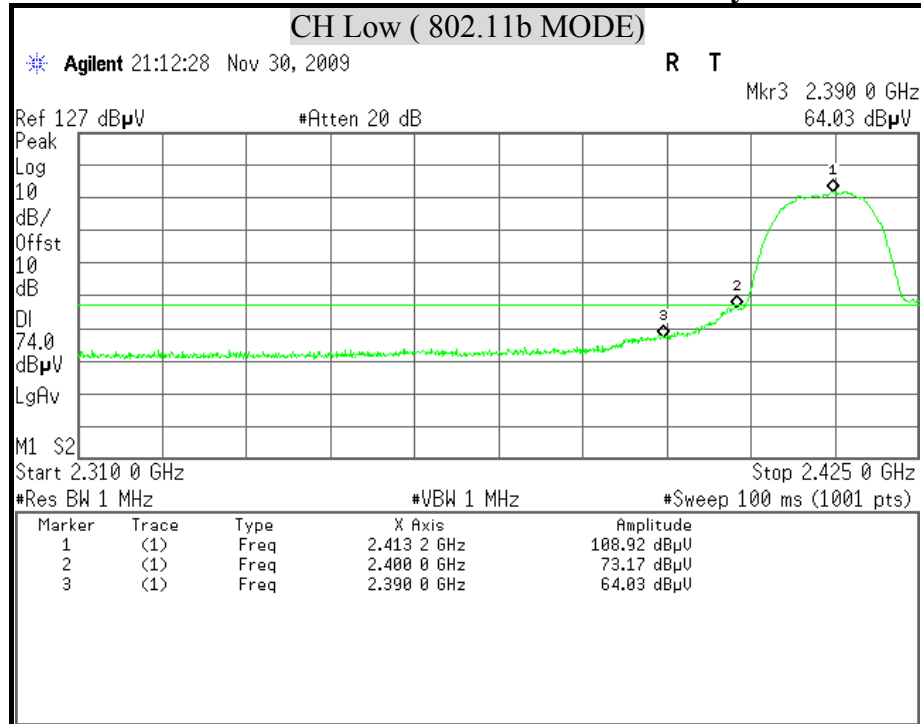
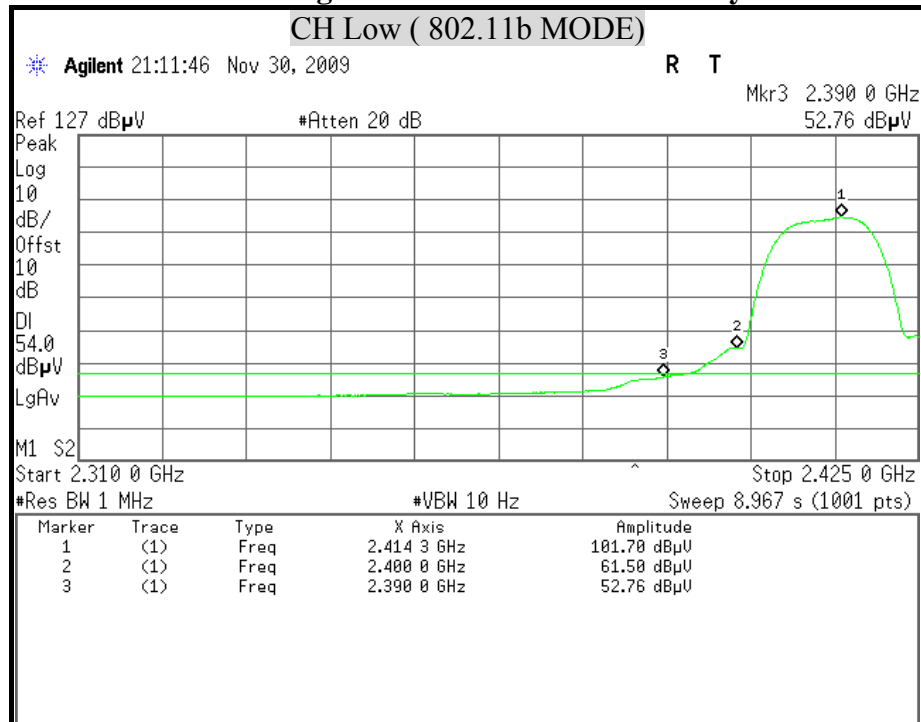
**Remark:**

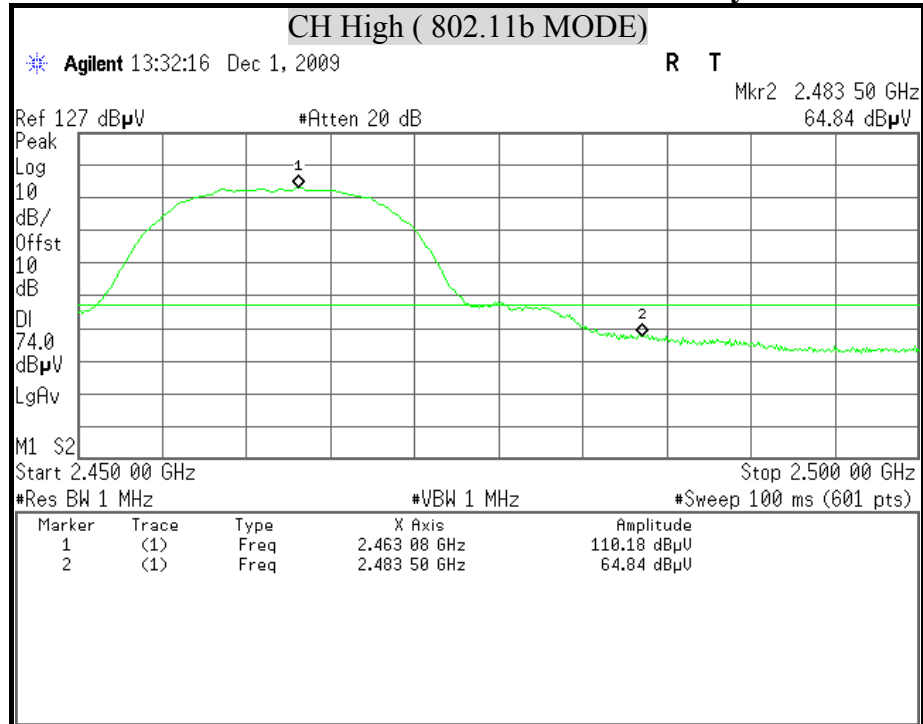
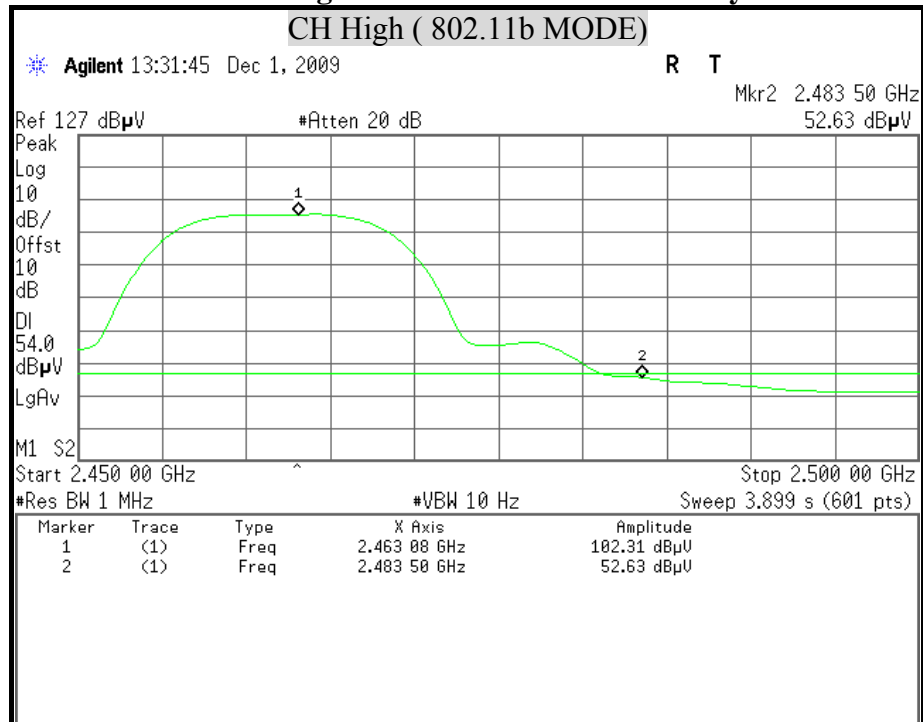
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Average test would be performed if the peak result were greater than the average limit.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with " N/A " remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
5. In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.
6. Result = Reading + Correction Factor  
Margin = Result - Limit  
Remark Peak = Result(PK) - Limit(AV)  
Remark AVG = Result(AV) - Limit(AV)

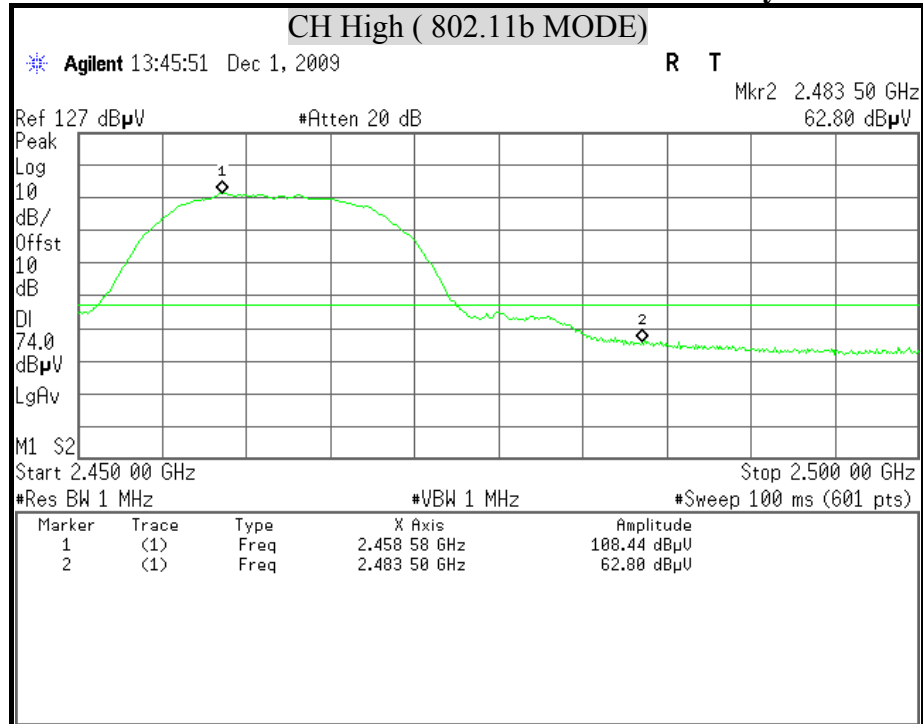
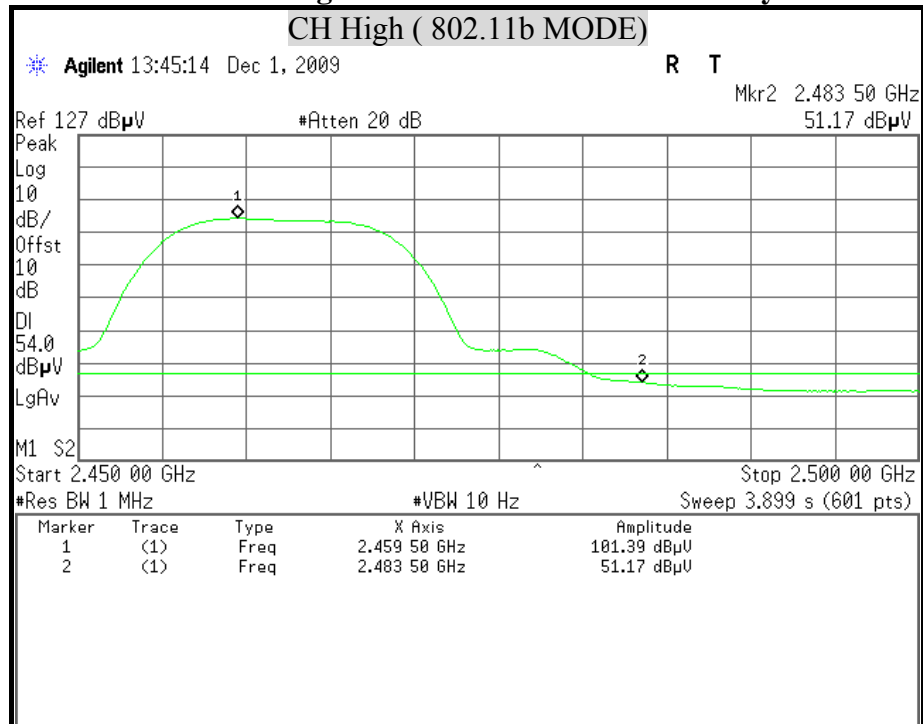


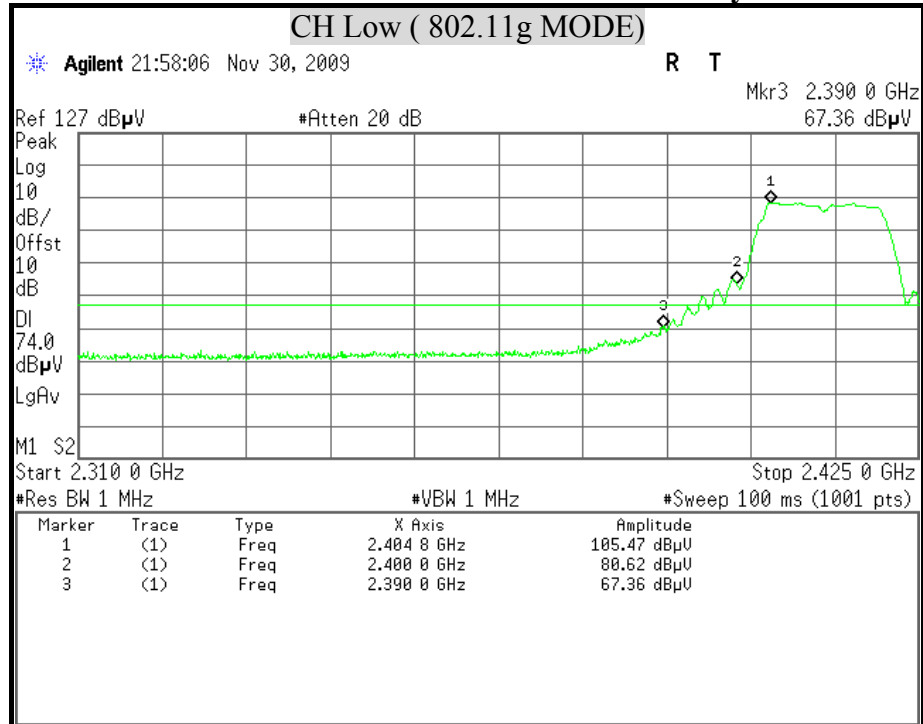
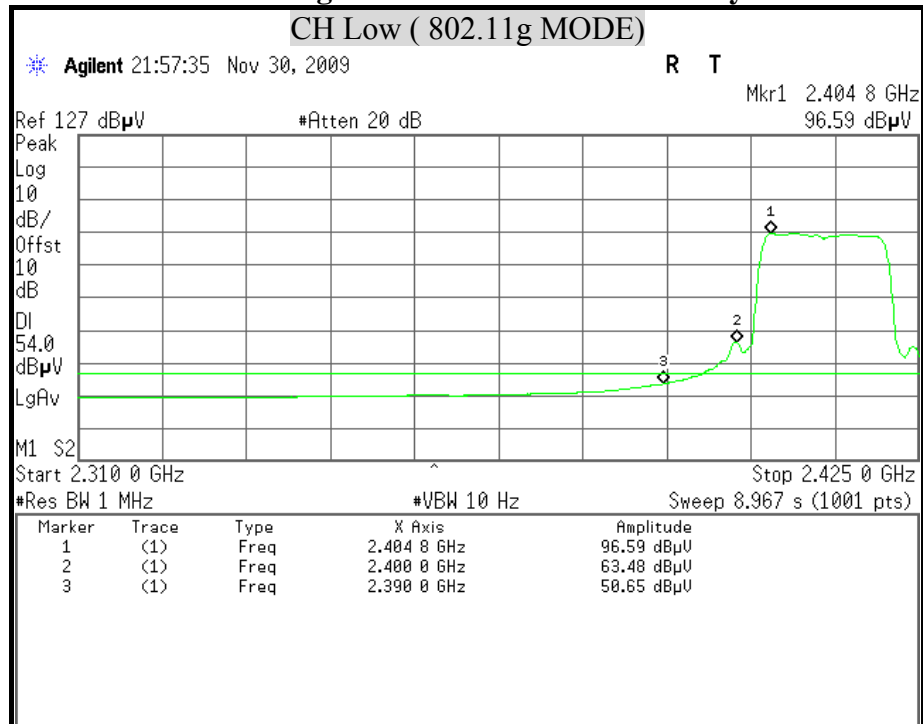
## 8.8.4 RESTRICTED BAND EDGES

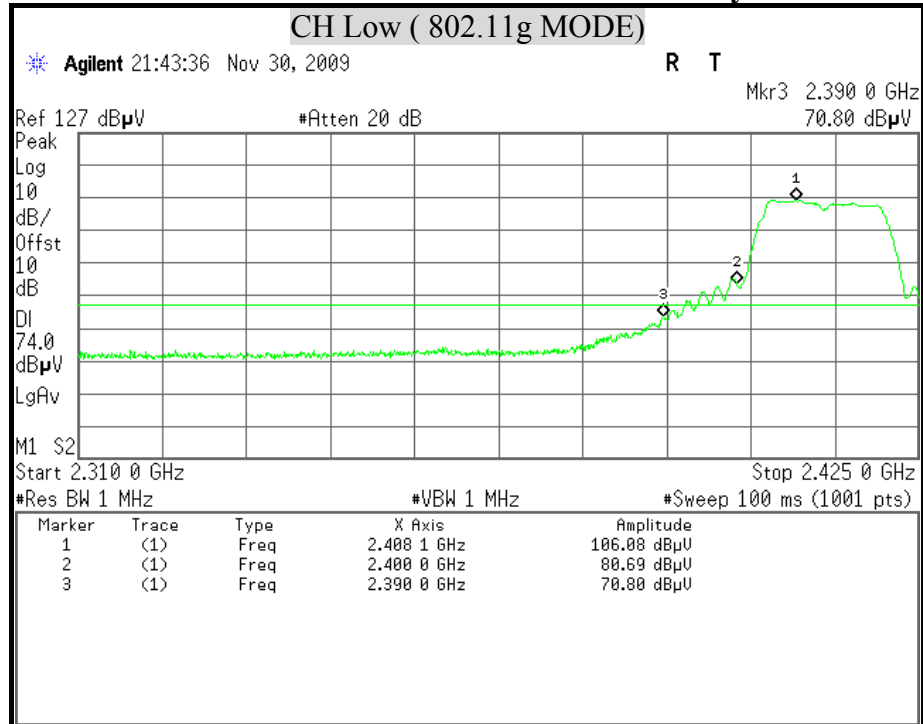
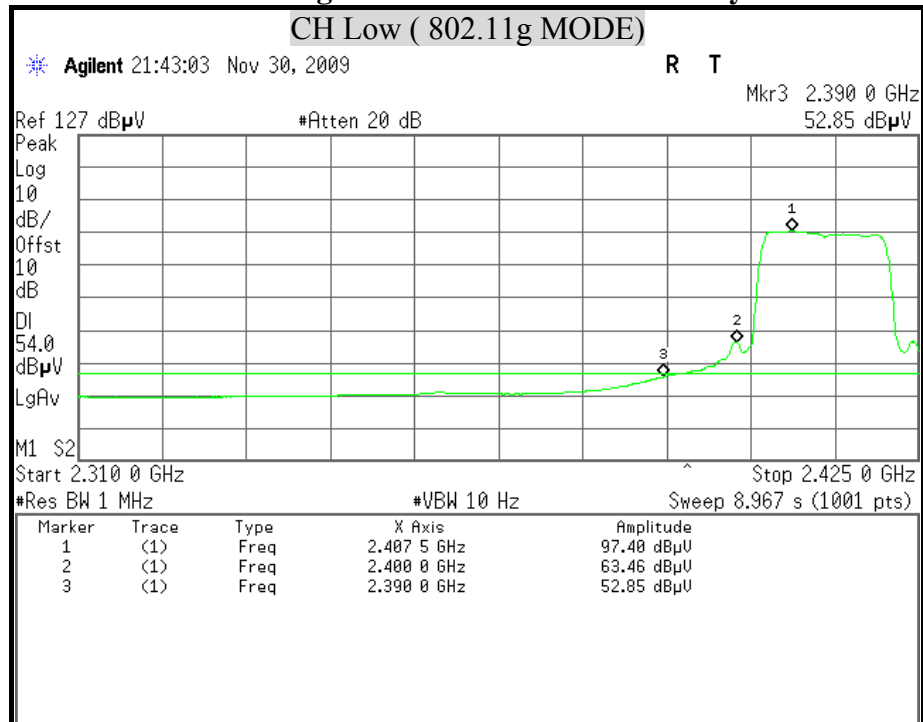
**Detector mode : Peak****Polarity : Horizontal****Detector mode : Average****Polarity : Horizontal**

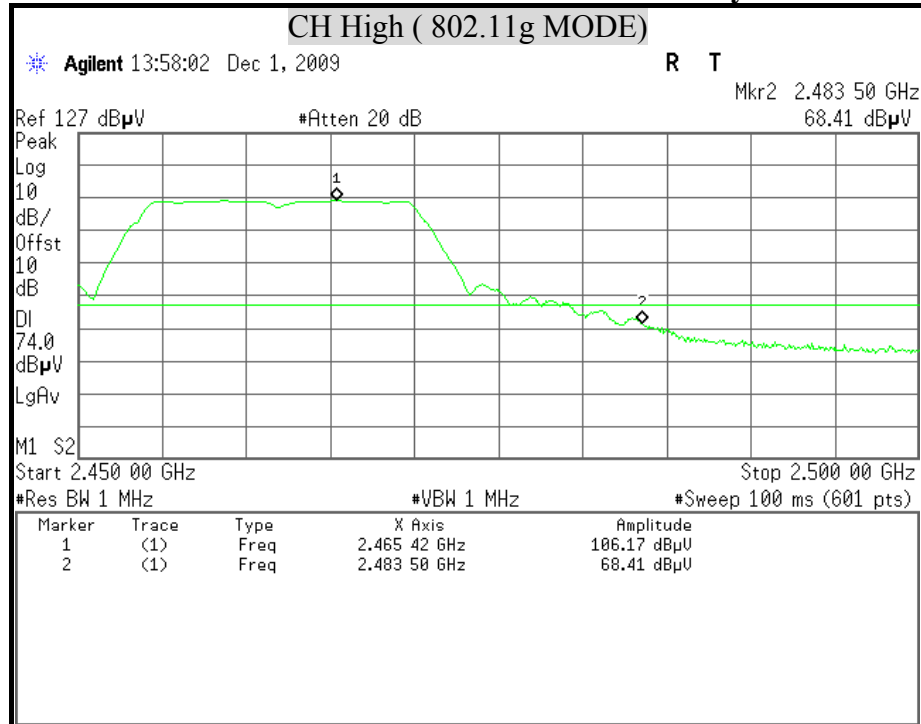
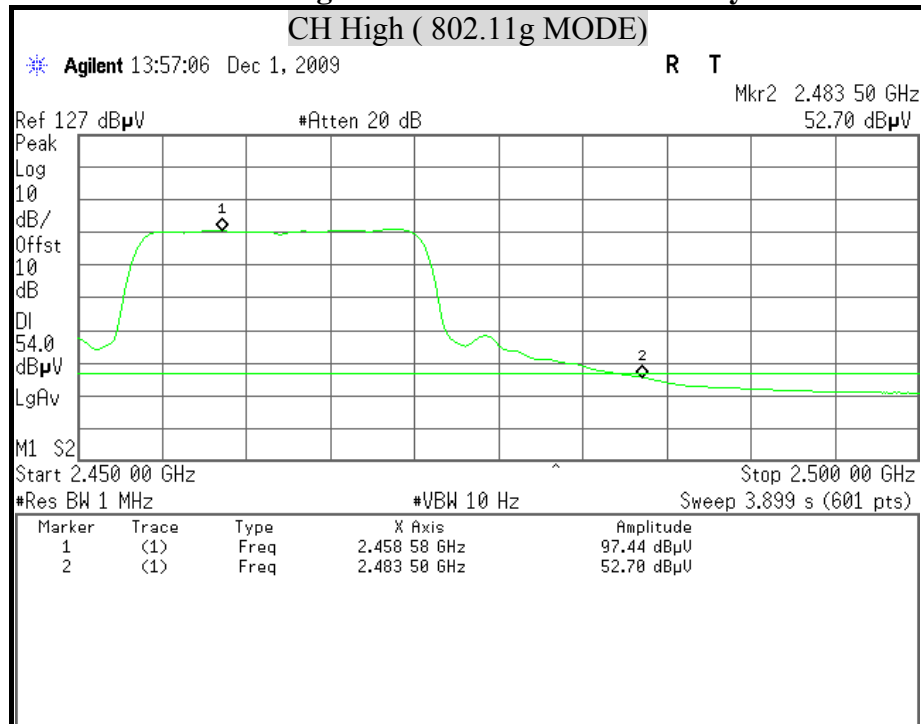
**Detector mode : Peak****Polarity : Vertical****Detector mode : Average****Polarity : Vertical**

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

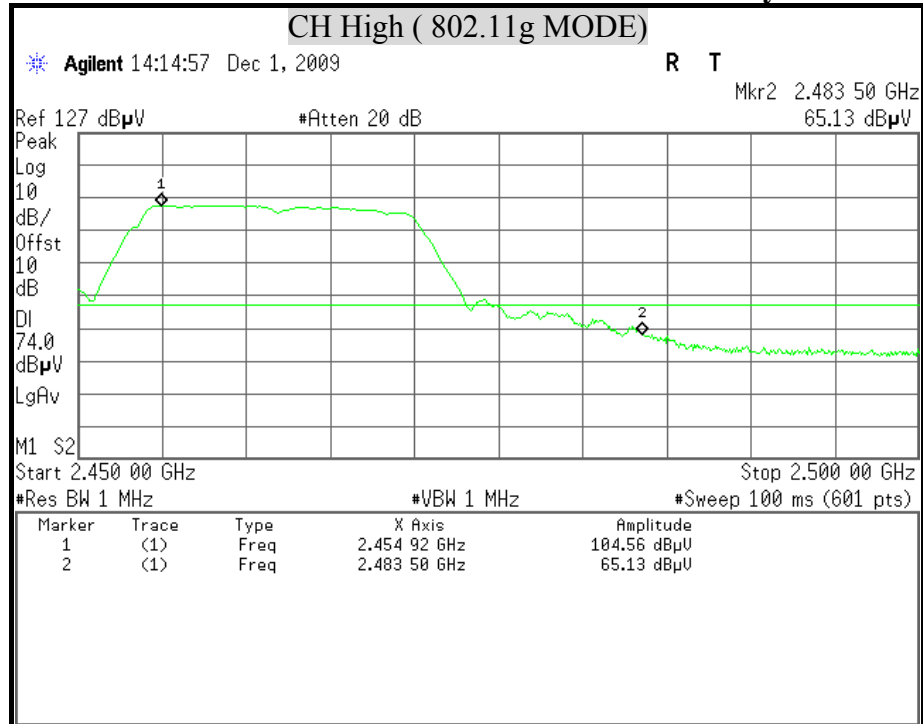
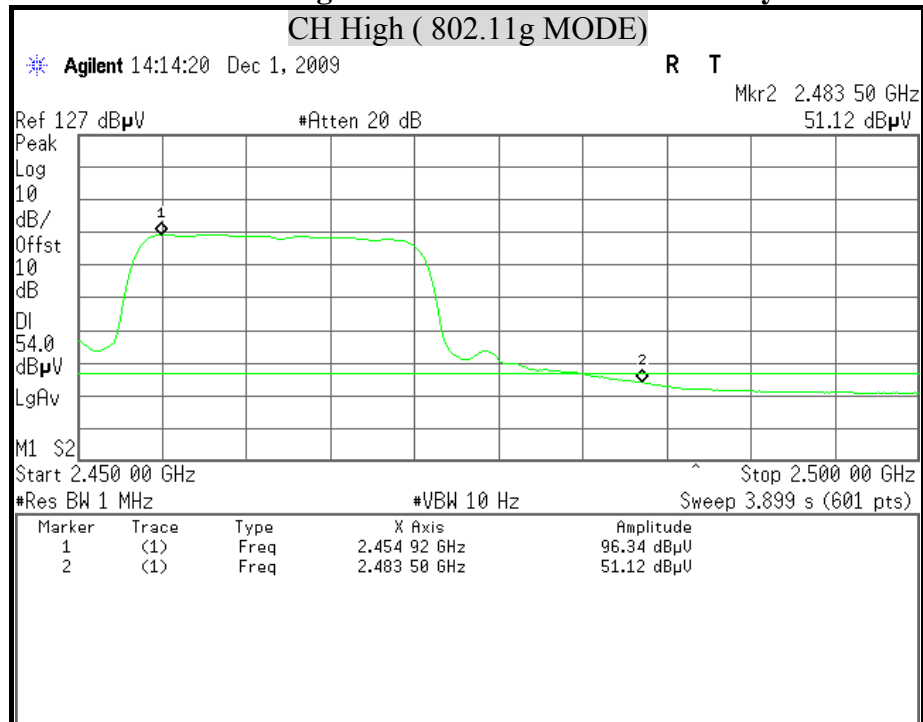
**Detector mode : Peak****Polarity : Vertical****Detector mode : Average****Polarity : Vertical**

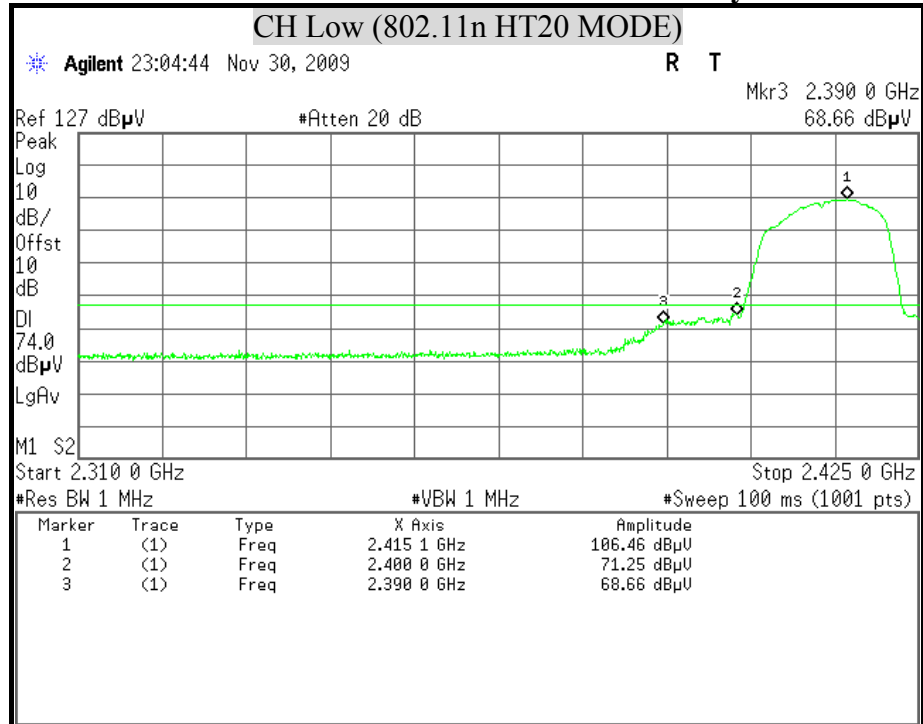
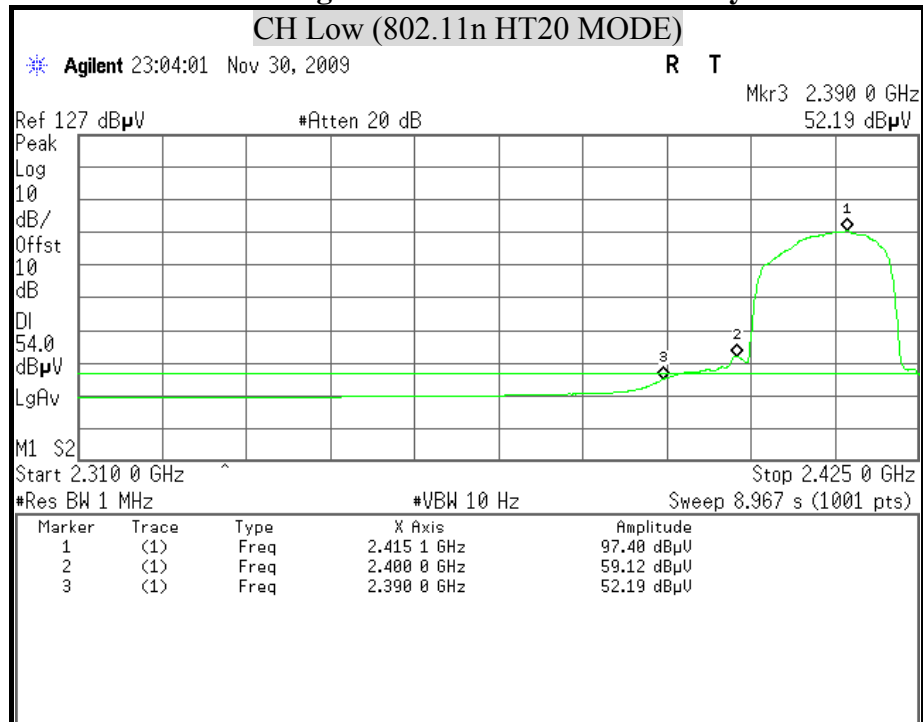
**Detector mode : Peak****Polarity : Horizontal****Detector mode : Average****Polarity : Horizontal**

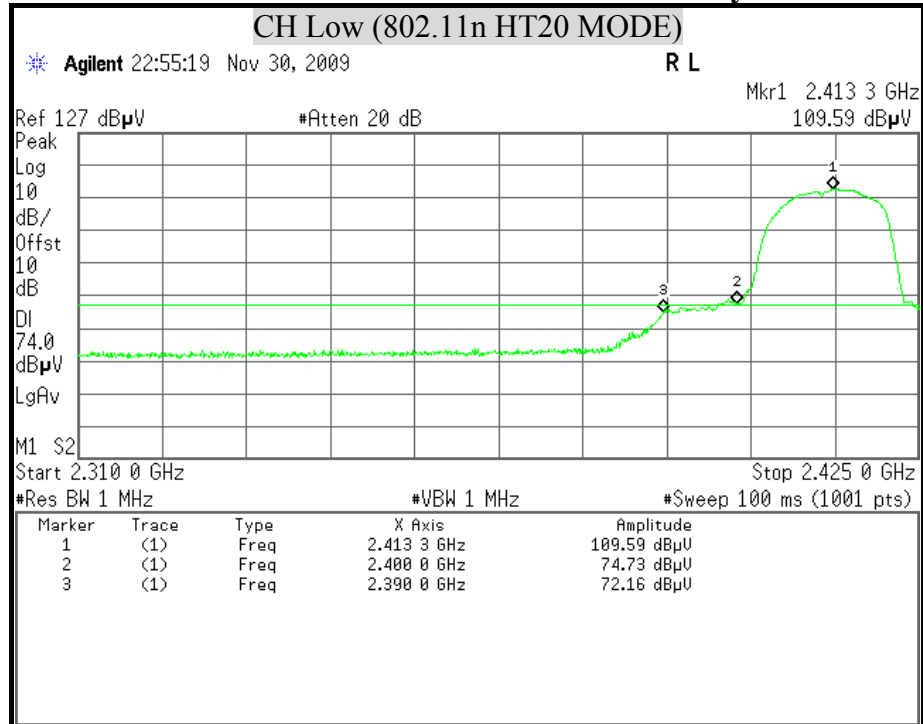
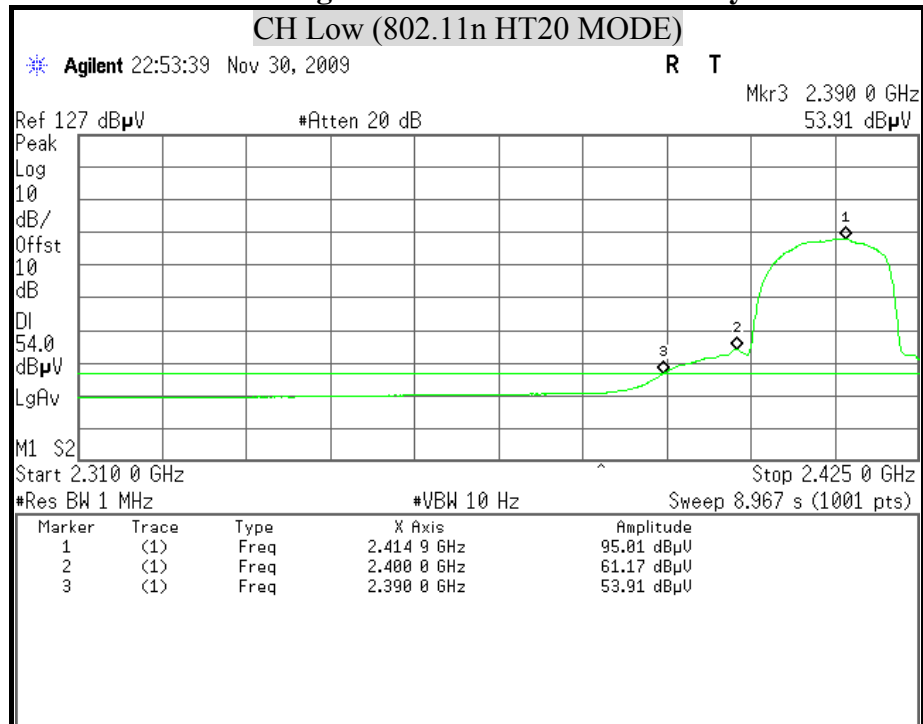
**Detector mode : Peak****Polarity : Vertical****Detector mode : Average****Polarity : Vertical**

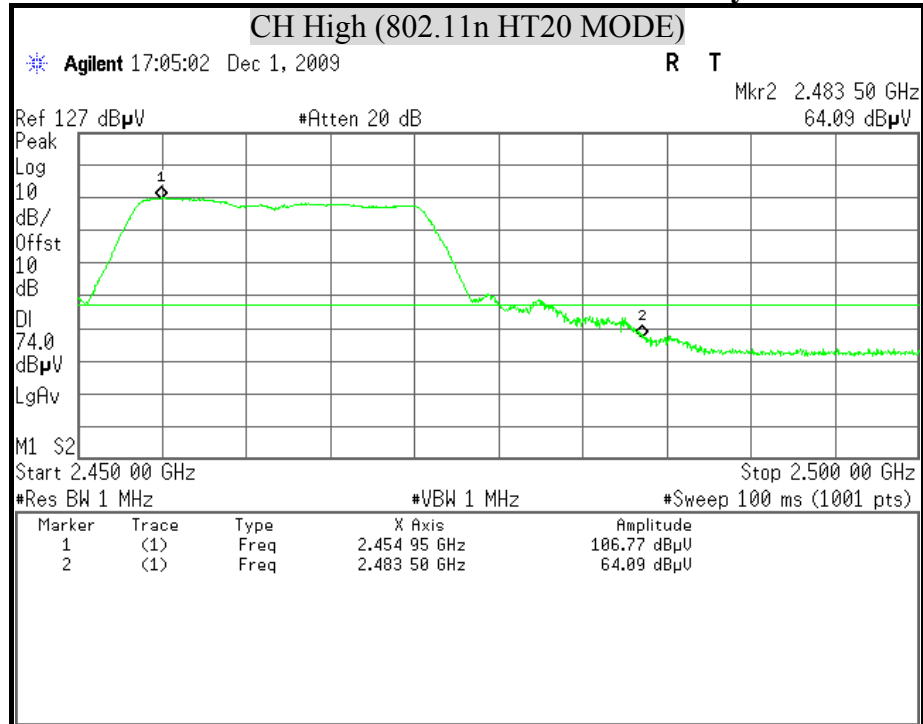
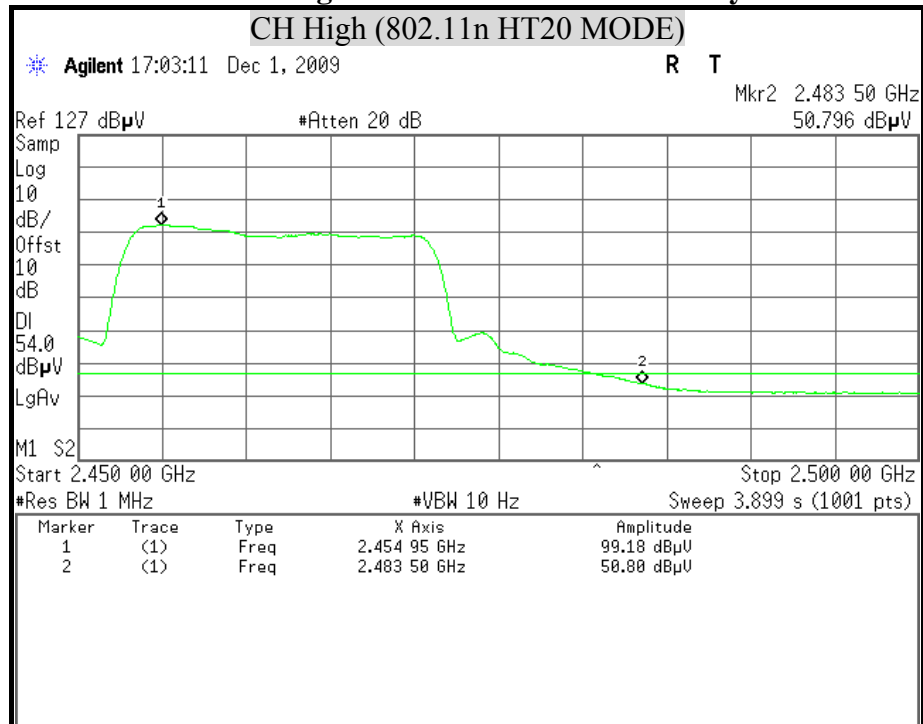
**Detector mode : Peak****Polarity : Horizontal****Detector mode : Average****Polarity : Horizontal**

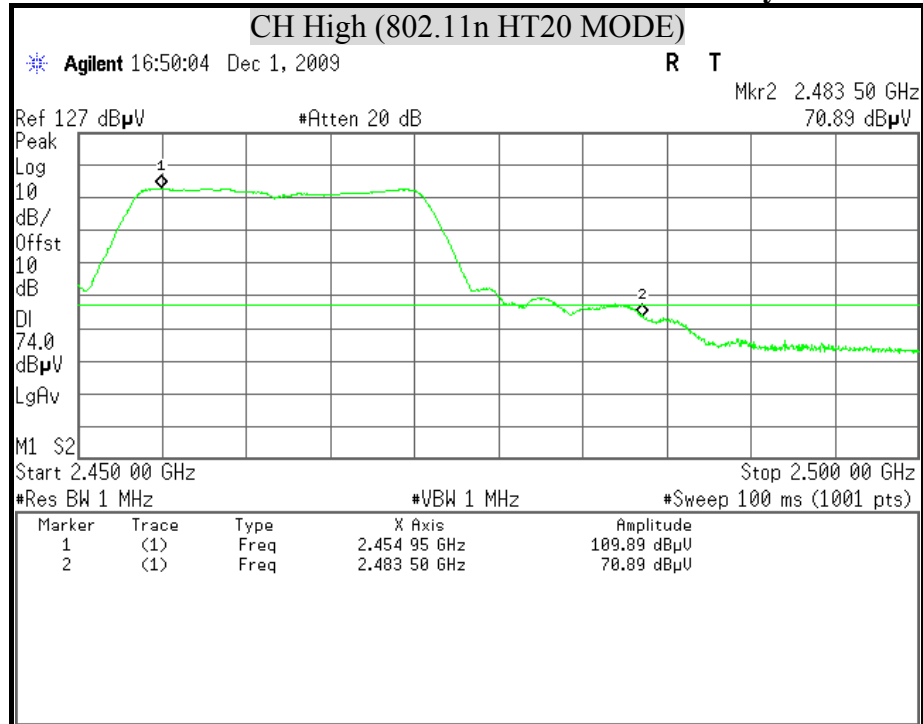
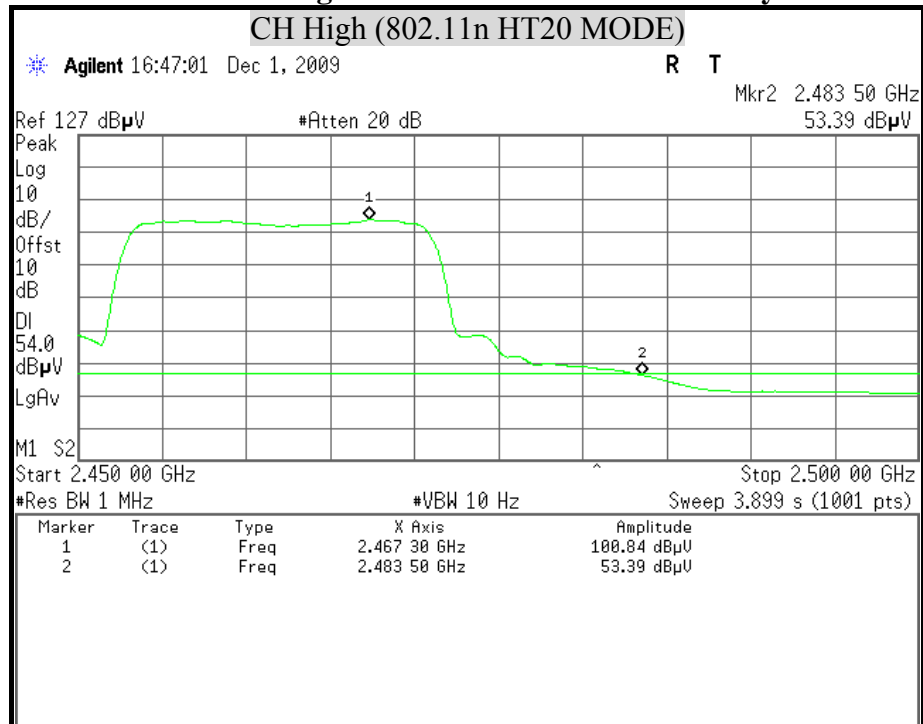


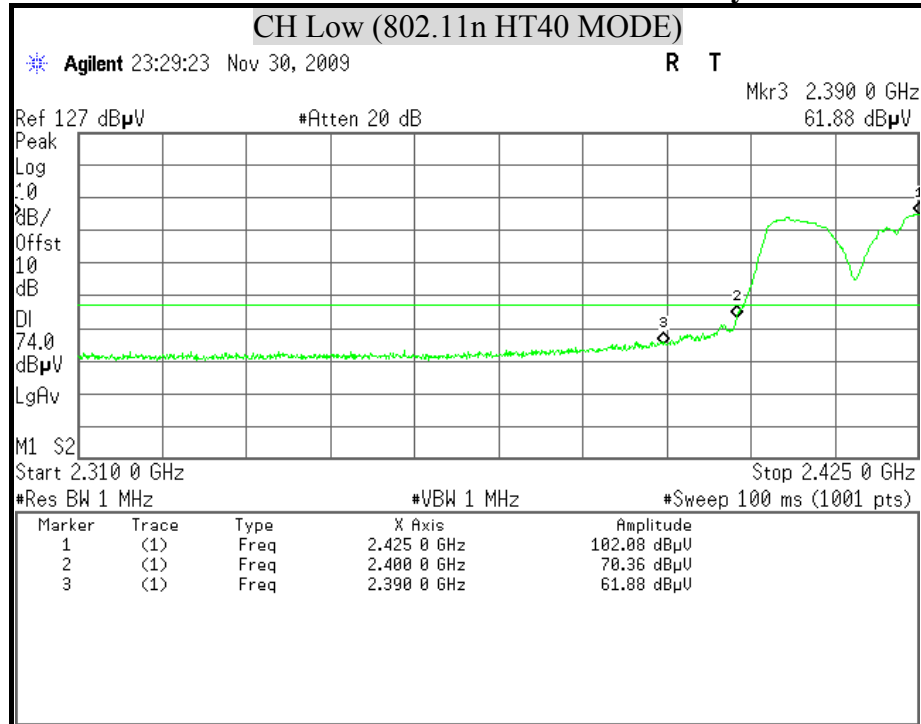
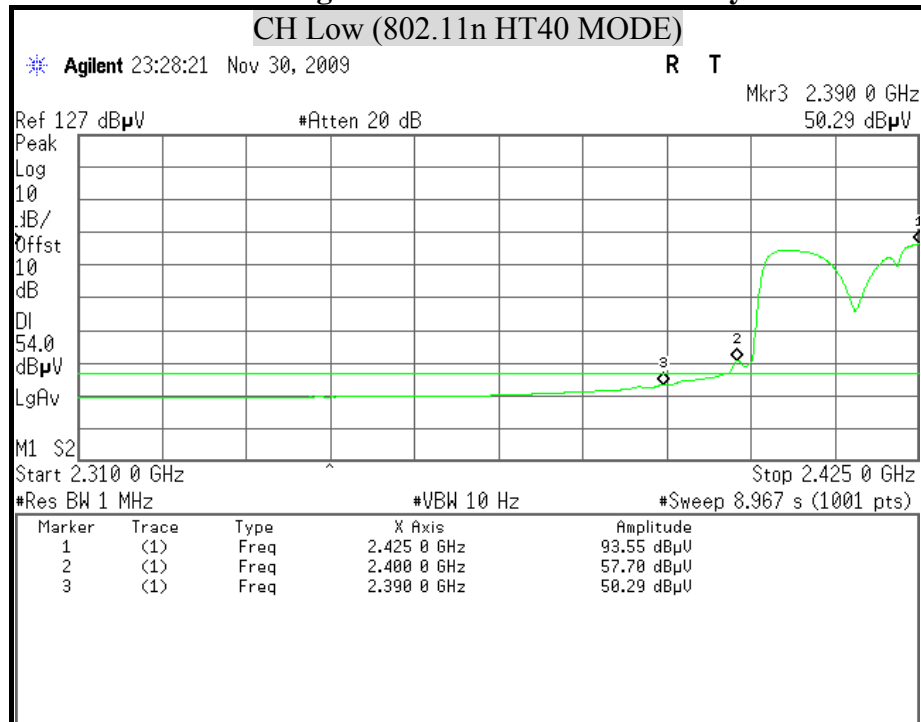
**Detector mode : Peak****Polarity : Vertical****Detector mode : Average****Polarity : Vertical**

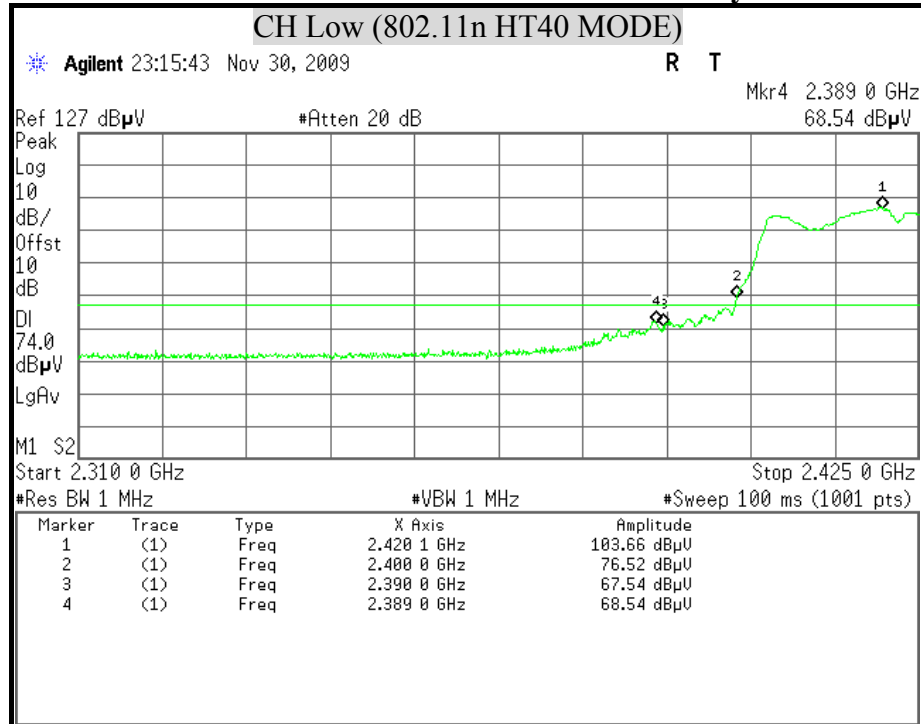
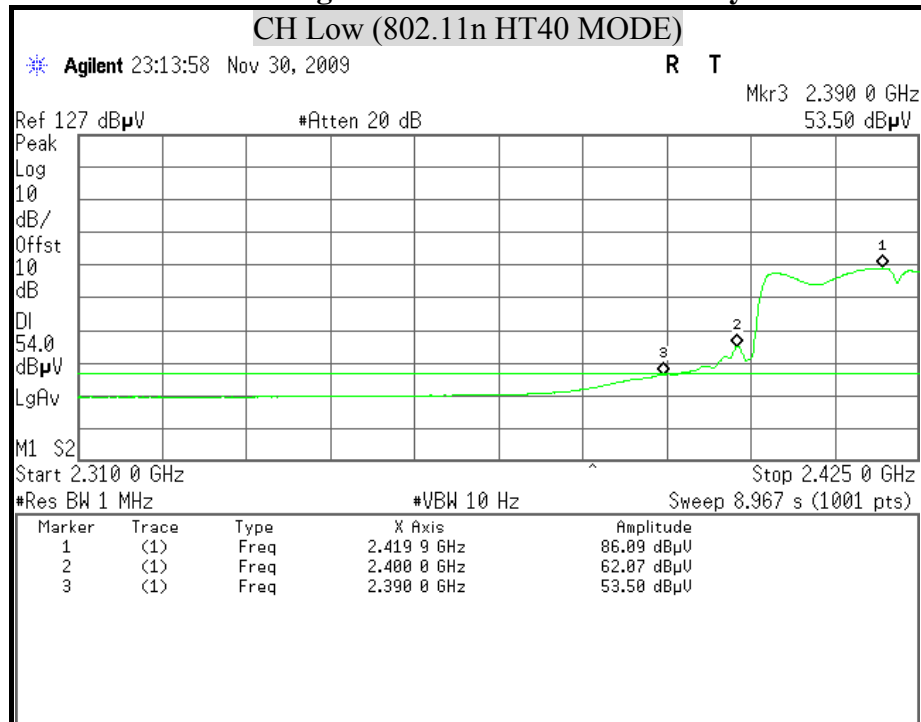
**Detector mode : Peak****Polarity : Horizontal****Detector mode : Average****Polarity : Horizontal**

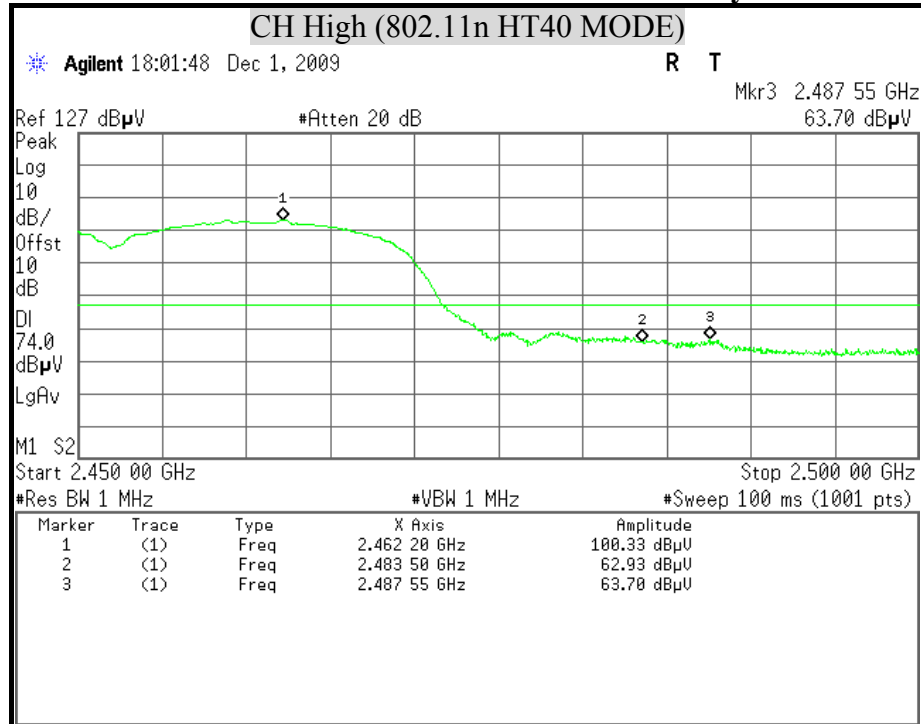
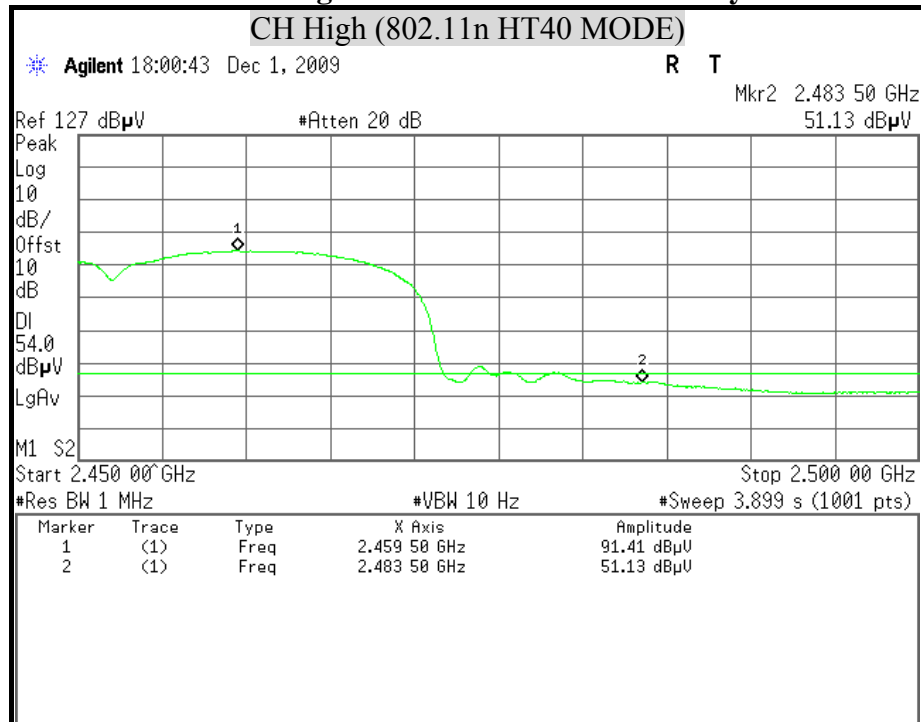
**Detector mode : Peak****Polarity : Vertical****Detector mode : Average****Polarity : Vertical**

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

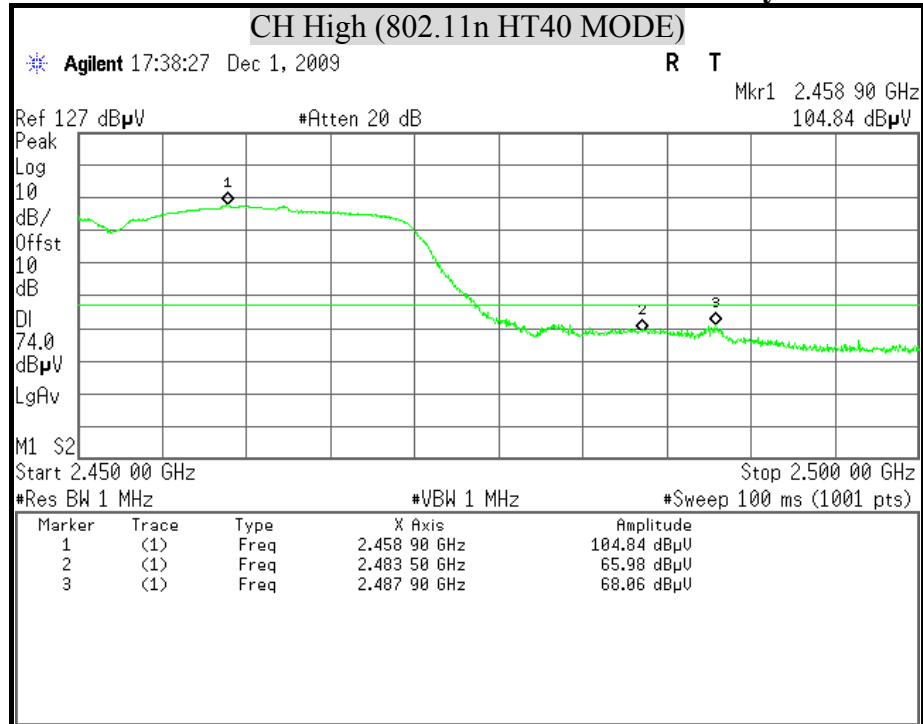
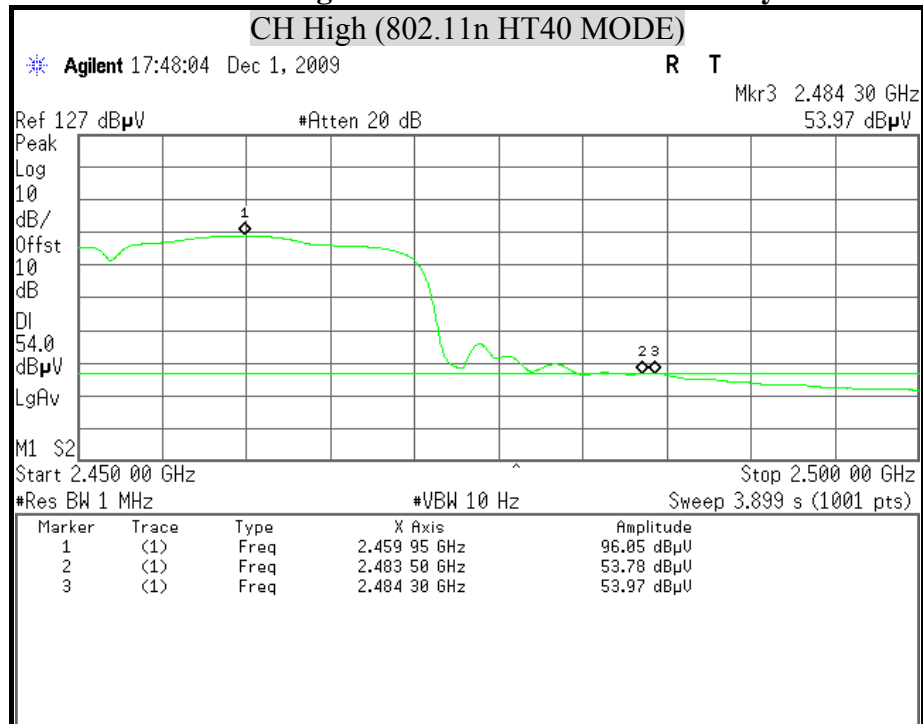
**Detector mode : Peak****Polarity : Vertical****Detector mode : Average****Polarity : Vertical**

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

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

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



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



## 8.9 POWERLINE CONDUCTED EMISSIONS

### LIMITS

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

The lower limit applies at the boundary between the frequency ranges.

Frequency of Emission (MHz)	Conducted limit (dB $\mu$ v)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 - 30	60	50

### TEST EQUIPMENT

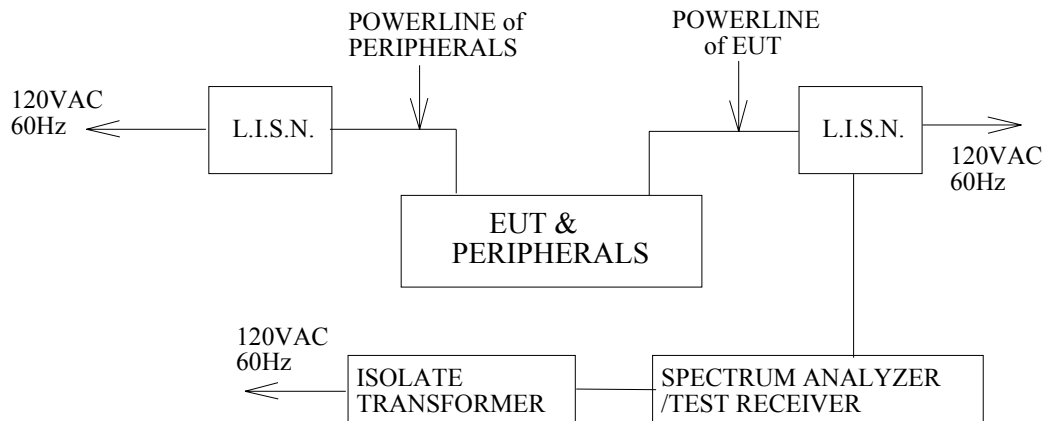
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
L.I.S.N	SCHWARZBECK	3810/2	9801-1850	02/26/2008
L.I.S.N	CHASE	NNLK 8129	8129118	01/26/2008
TEST RECEIVER	R & S	ESHS30	838550/003	01/31/2008
KEENE SHIELDED ROOM	-----	5983	No.1	N.C.R
PULSE LIMIT	R & S	ESH3-Z2	357.8810.52	07/10/2008
N TYPE COAXIAL CABLE	-----	-----	-----	08/21/2007
50 $\Omega$ TERMINATOR	-----	-----	-----	07/10/2008

**Remark:** 1. Each piece of equipment is scheduled for calibration once a year.

2. N.C.R = No Calibration Request.



## **TEST SETUP**



## **TEST PROCEDURE**

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80cm above the horizontal ground plane. The EUT IS CONFIGURED IN ACCORDANCE WITH ANSI C63.4:2003.

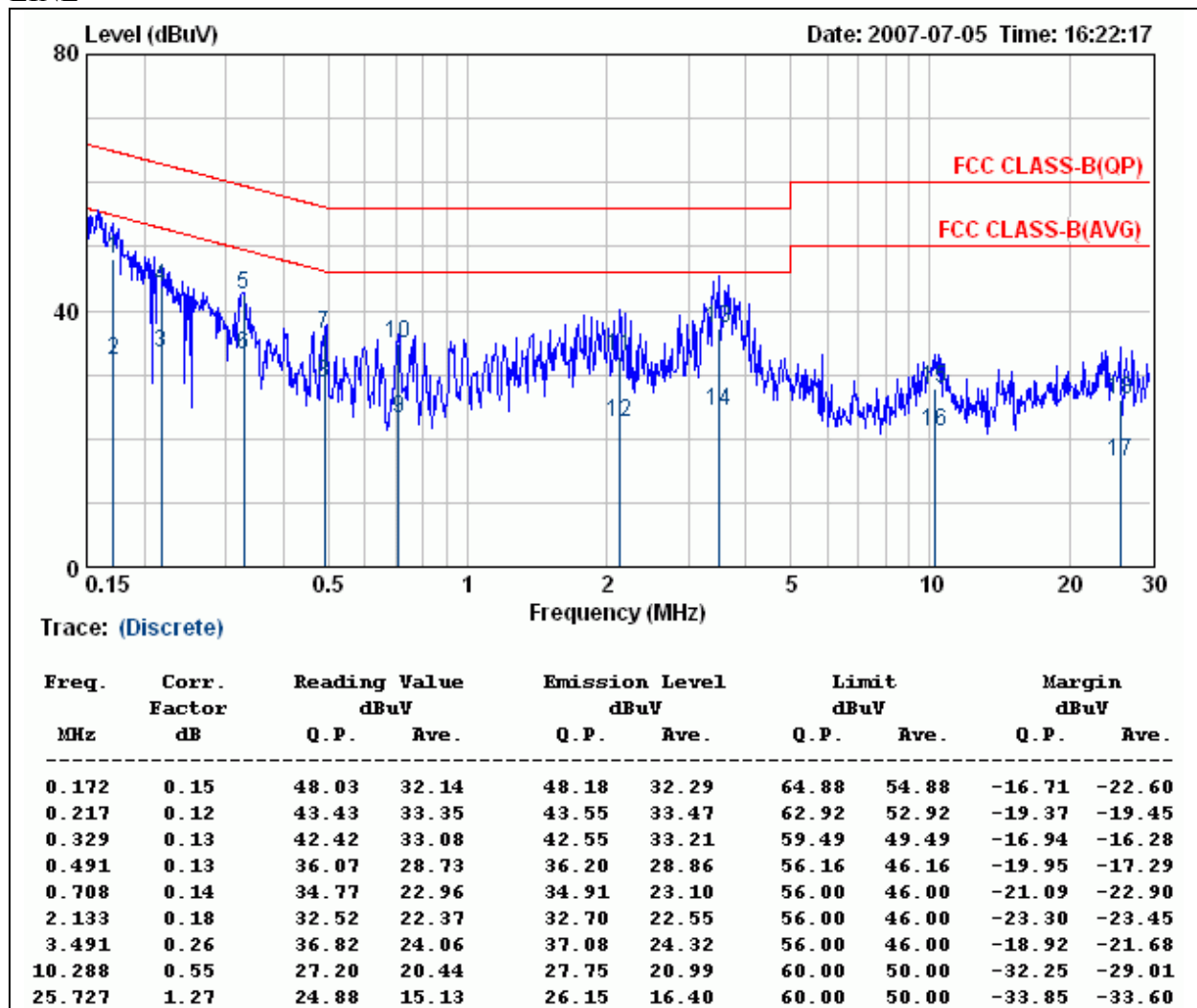
The resolution bandwidth is set to 9 kHz for both quasi-peak detection and average detection measurements.

Line conducted data is recorded for both NEUTRAL and LINE.

**TEST RESULTS**

Product Name	Wireless Mini-PCI	Test Date	2007/07/05
Model	WMP-N07	Test By	Alan Fan
Test Mode	Normal operating (Worst-case)	TEMP & Humidity	25°C, 54%

LINE

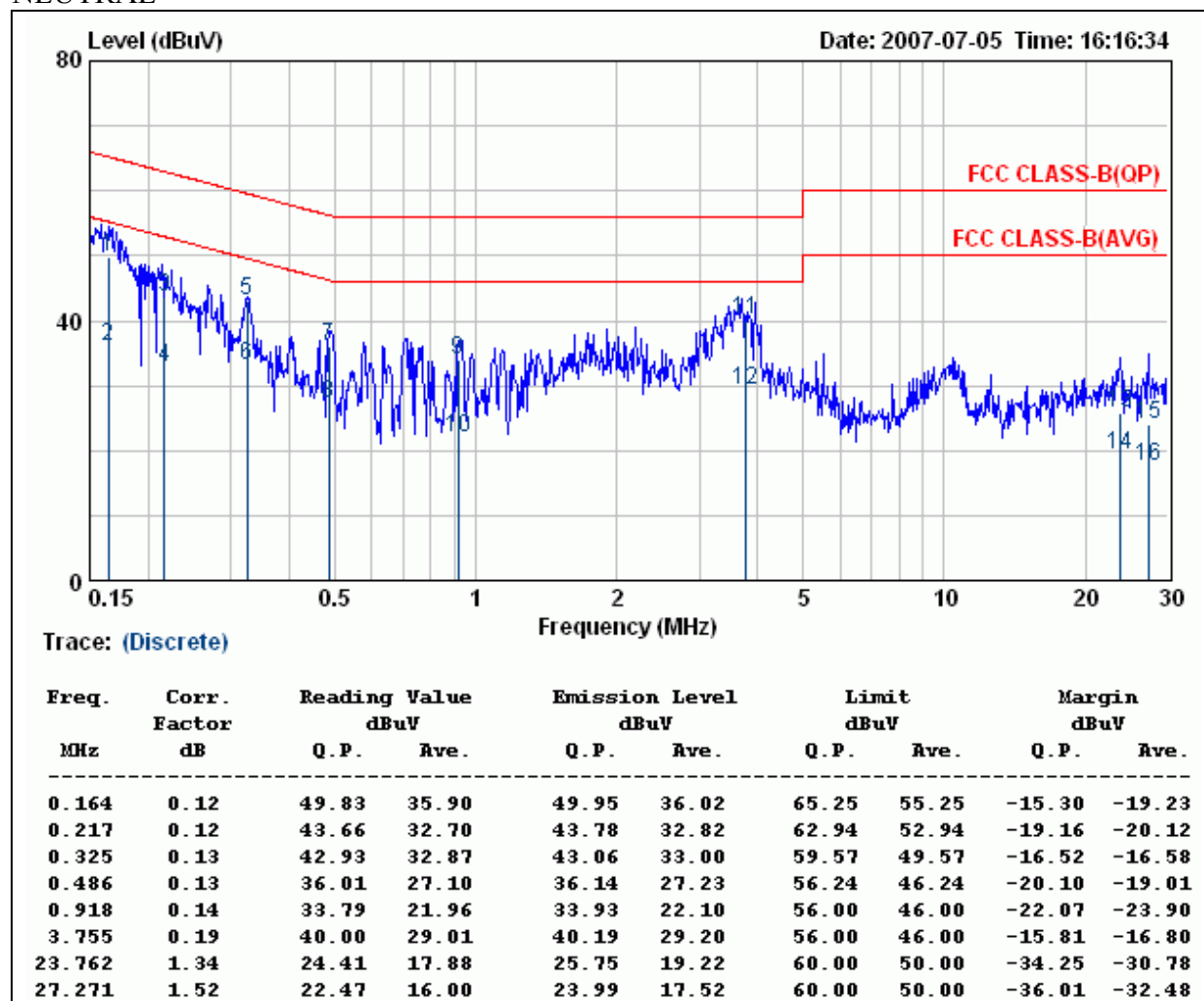
**Remark:**

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level - Limit value



Product Name	Wireless Mini-PCI	Test Date	2007/07/05
Model	WMP-N07	Test By	Alan Fan
Test Mode	Normal operating (Worst-case)	TEMP & Humidity	25°C, 54%

NEUTRAL

**Remark:**

1. Correction Factor = Insertion loss + cable loss
2. Margin value = Emission level – Limit value