FCC Part 15C

Measurement and Test Report

For

CHUNG NAM ELECTRONICS CO., LTD.

12F, Chung Nam Building, No.1 Lockhart Road, Hongkong

FCC ID: Q72WLC322NA

Report Concerns: Original Report	**Equipment Type:** 802.11n 2x2 USB PCBA

Model: WLC322NA

Report No.: STR08068101I

Test/Witness Engineer: Seven Song

Test Date: 2008-06-20 to 2008-07-12

Issued Date: 2008-09-12

Prepared By:

SEM.Test Compliance Service Co., Ltd
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Bao'an District, Shenzhen, P.R.C.（518101）

Approved & Authorized By: Jandy So

PSQ Manager / Jandy So

Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	CHUNG NAM ELECTRONICS CO., LTD.
Address of applicant:	12F, Chung Nam Building, No.1 Lockhart Road, Hongkong
Manufacturer:	NAM TAI ELECTRONICS (SHENZHEN) CO., LTD.
Address of manufacturer:	No.38 Luogang Road, Luogang Industrial Zone, Bu Ji, Shenzhen, China

General Description of E.U.T

Items	Description
EUT Description:	802.11n 2x2 USB PCBA
Trade Name:	CNE
Model No.:	WLC322NA
Rated Voltage:	DC 5V
Max. Output Power	< 19dBm
Frequency range:	2412-2462MHz
Number of channels:	11
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Size:	7.5x2.0x0.5cm

Note: The test data gathered are from a production provided by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of the CHUNG NAM ELECTRONICS CO., LTD. in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted with Low Channel, Middle Channel and High Channel, accordingly in reference to the Operating Instructions.

1.5 Test Facility

- **FCC – Registration No.: 994117**
  SEM.Test Compliance Services Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is 994117.

- **Industry Canada (IC) Registration No.: 7673A**
  The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

1.6 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components.

1.7 Accessories Equipment List and Details

Manufacturer	Description	Model	Serial Number
IBM	Notebook	T22	LV14893
TP-LINK	Modem	TM-EC5658V	KT99CTQC-508
Lenovo	Printer	3110	OD65133711480

1.8 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203; § 15.247(c)(1)(i)	Antenna Requirement	Compliant
§ 1.1307(b)(1)	Maximum Permissible Exposure	Compliant
§ 15.207	Conducted Emission	Compliant
§ 15.247(e)	Power Spectral Density	Compliant
§ 15.247(a)(2)	6 dB Bandwidth	Compliant
§ 15.247(b)(3)	Power Output	Compliant
§ 15.209(a)(d)	Radiated Emission	Compliant
§ 15.247(d)	Band edge	Compliant

3. §15.203 - ANTENNA REQUIREMENT

3.1 Standard Applicable

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an Integral antenna, fulfill the requirement of this section.

4. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

4.1 Standard Applicable

According to § 1.1307(b)(1), system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100000			5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100000			1	30

Note: f = frequency in MHz: * = Plane-wave equivalents power density

4.2 MPE Calculation Method

$S = (30*P*G) / (377*R^2)$

S = power density (in appropriate units, e.g., mw/cm^2)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

4.3 MPE Calculation Result

Maximum peak output power at antenna input terminal: 18.40 (dBm)
Maximum peak output power at antenna input terminal: 69.1831 (mW)
Prediction distance: >20 (cm)
Prediction frequency: 2437 (MHz)
Antenna gain (typical): 0 (dBi)
Antenna gain (typical): 1 (numeric)
The worst case is power density at prediction frequency at 20cm: 0.013763 (mw/cm^2)
MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

0.013763 (mw/cm^2) < 1 (mw/cm^2)

Result: Pass

5. CONDUCTED EMISSIONS

5.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 0.5 dB.

5.2 Test Equipment List and Details

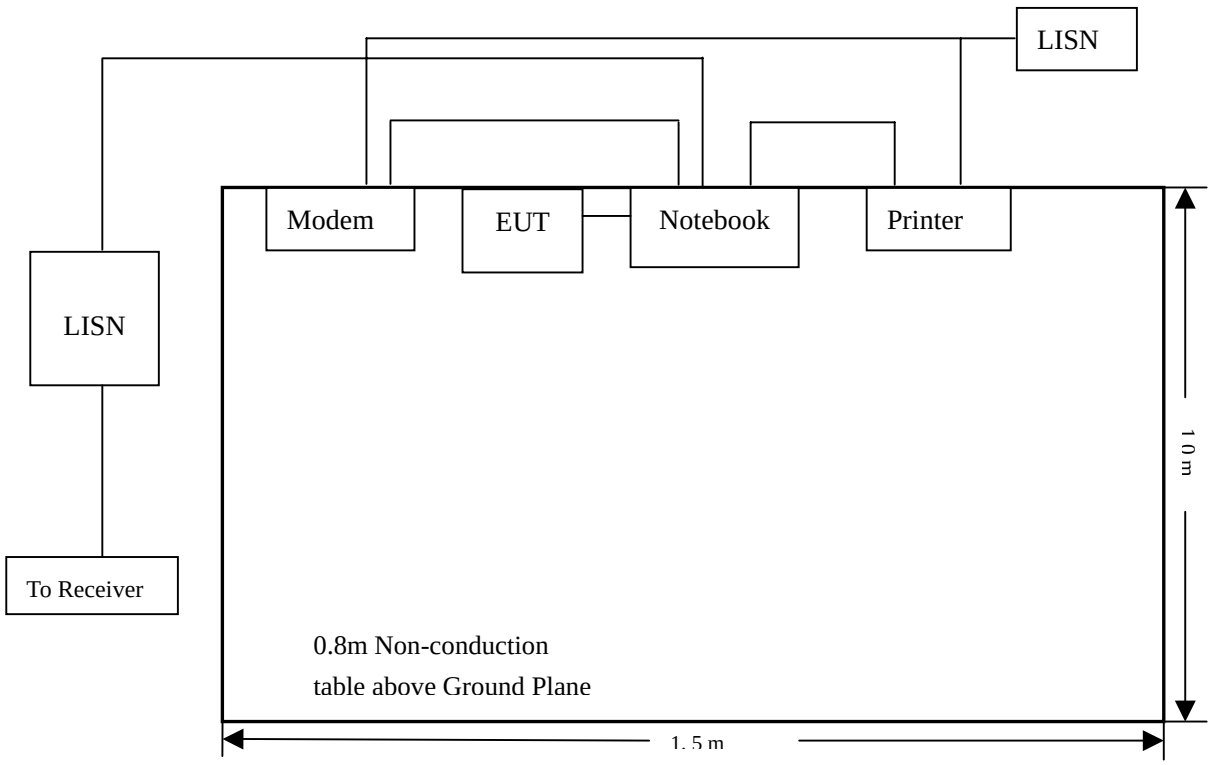
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESCS30	830245/009	2008-01-25	2009-01-24
AMN	Rohde & Schwarz	ESH2-Z5	100002	2008-01-25	2009-01-24
Limiter	Rohde & Schwarz	ESH3-Z2	357.8810.52	2008-01-25	2009-01-24
AMN	Rohde & Schwarz	ESH3-Z5	828304/014	2008-01-25	2009-01-24

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

5.4 Basic Test Setup Block Diagram



5.5 Environmental Conditions

Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

5.6 Summary of Test Results/Plots

According to the data in section 3.7, the EUT complied with the FCC 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-7.0 dBμV at **0.986 MHz** in the **Line**, 0.15-30MHz

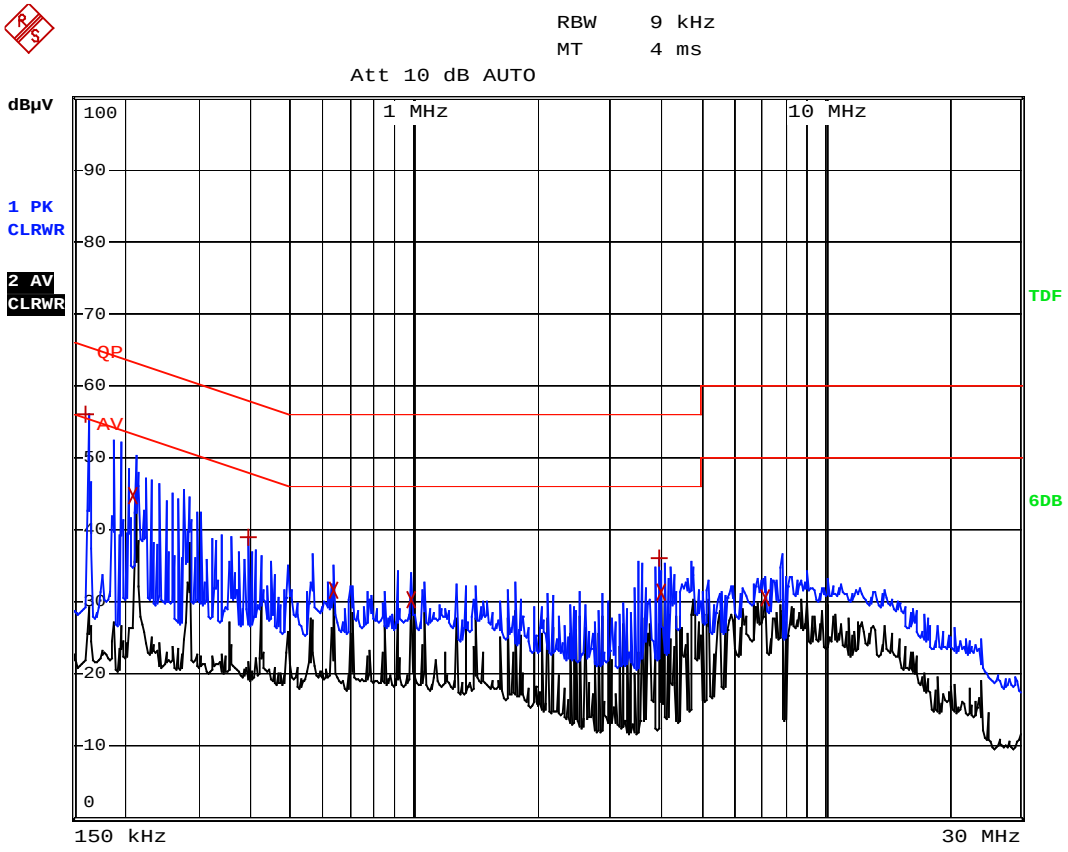
5.7 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15.207	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	QP/Ave/Pk	Line/Neutral	dBμV	dB
0.986	39.03	Ave	Line	46	-7.0
0.21	44.85	Ave	Neutral	53.21	-8.4
0.162	54.83	Pk	Neutral	65.36	-10.5
0.154	54.83	Pk	Line	65.78	-11.0
0.21	39.85	Ave	Line	53.21	-13.4
0.634	31.70	Ave	Neutral	46	-14.3
4.086	31.68	Ave	Line	46	-14.3
4.018	31.35	Ave	Neutral	46	-14.7
0.634	31.05	Ave	Line	46	-15.0
0.986	30.42	Ave	Neutral	46	-15.6
3.946	37.87	Pk	Line	56	-18.1
6.762	31.48	Ave	Line	50	-18.5
0.394	39.01	Pk	Neutral	57.98	-19.0
0.382	39.02	Pk	Line	58.24	-19.2
7.19	30.55	Ave	Neutral	50	-19.5
3.95	36.20	Pk	Neutral	56	-19.8

Note: Emission attenuation more than 20dB are not report.

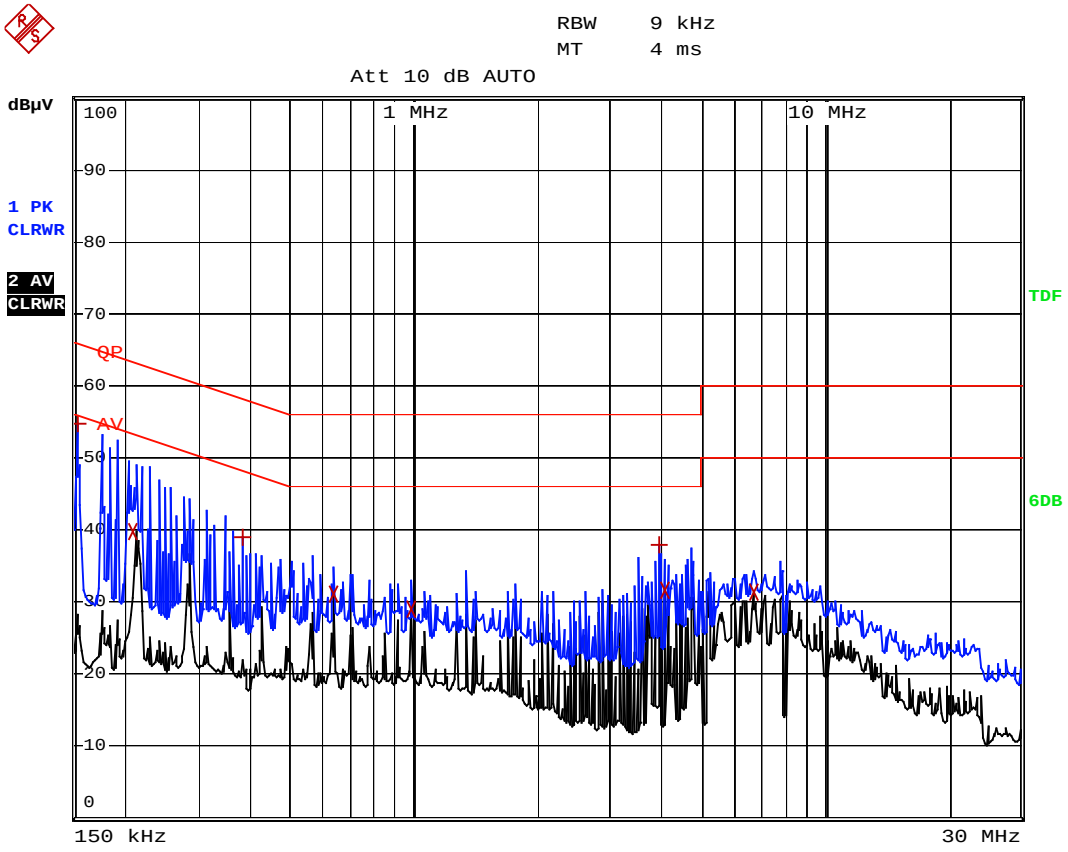
Plot of Conducted Emissions Test Data

Conducted Disturbance
EUT: 802.11n 2x2 USB PCBA
M/N: WLC322NA
Operating Condition: Running
Test Specification: N
Comment: AC120V/60Hz



Plot of Conducted Emissions Test Data

Conducted Disturbance
EUT: 802.11n 2x2 USB PCBA
M/N: WLC322NA
Operating Condition: Running
Test Specification: L
Comment: AC 120V/60Hz



6. POWER SPECTRAL DENSITY

6.1 Standard Applicable

According to 15.247(a)(1)(iii), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

6.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2008-01-25	2009-01-24
ETS	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2008-01-25	2009-01-24

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW, VBW=3KHz, Span = 20MHz.
4. Repeat above procedures until all frequency measured was complete.

6.4 Environmental Conditions

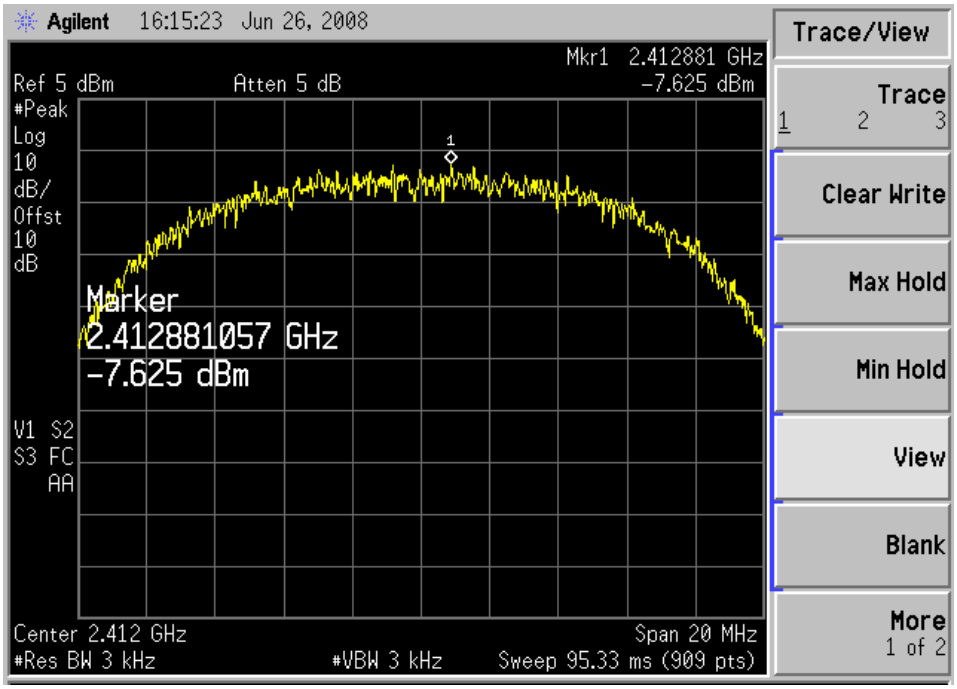
Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

6.5 Summary of Test Results/Plots

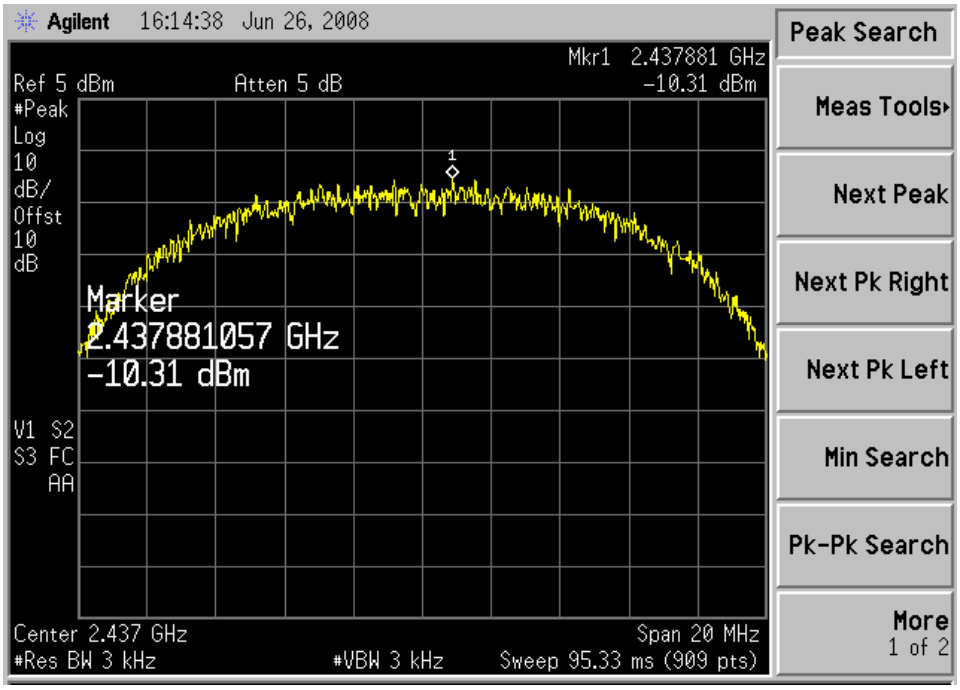
Test mode	Test channel	Reading dBm/3kHz (Chain 1)	Reading dBm/3kHz (Chain 2)	Limit dBm/3kHz
802.11b	Low channel (2412MHz)	-7.625	-6.139	8
	Middle channel (2437MHz)	-10.31	-6.406	8
	High channel (2462MHz)	-10.59	-6.776	8
802.11g	Low channel (2412MHz)	-14.79	-10.94	8
	Middle channel (2437MHz)	-14.8	-7.187	8
	High channel (2462MHz)	-14.79	-10.48	8
802.11n HT-20	Low channel (2412MHz)	-13.28	-3.588	8
	Middle channel (2437MHz)	-14.11	-9.198	8
	High channel (2462MHz)	-14.79	-8.743	8
802.11n HT-40	Low channel (2412MHz)	-2.056	-6.709	8
	Middle channel (2437MHz)	-2.599	-7.129	8
	High channel (2462MHz)	-5.758	-5.832	8

For 802.11b (Chain 1)

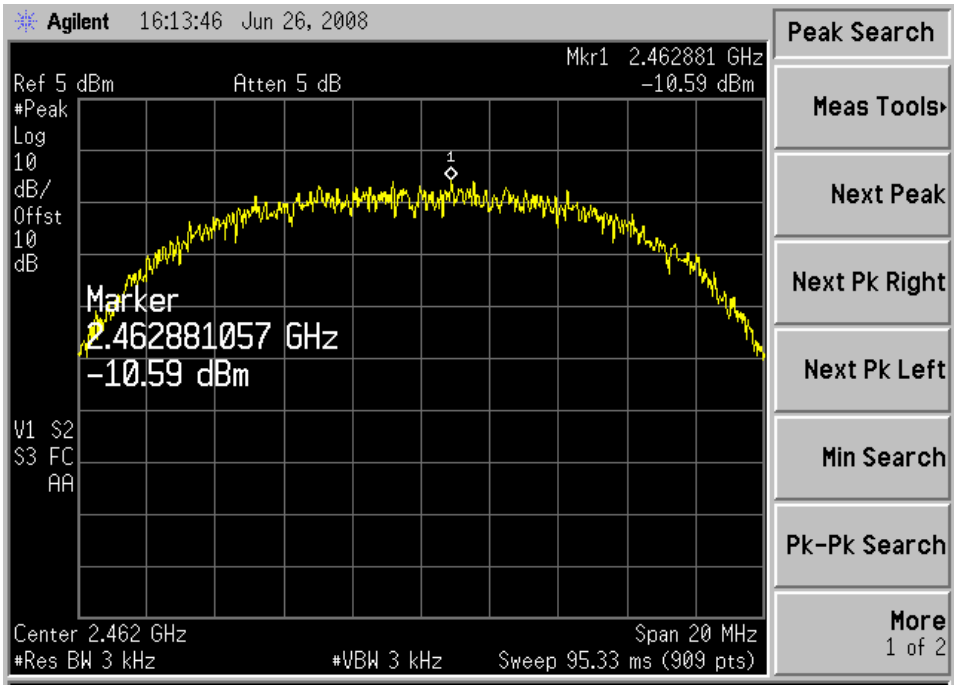
Low Channel:



Middle Channel:

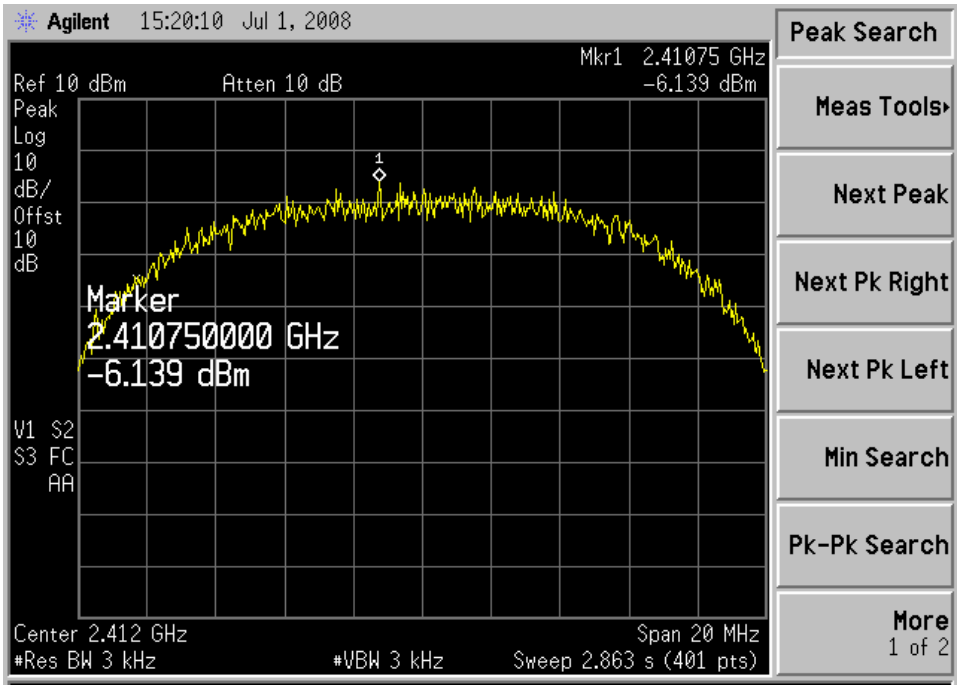


High Channel:

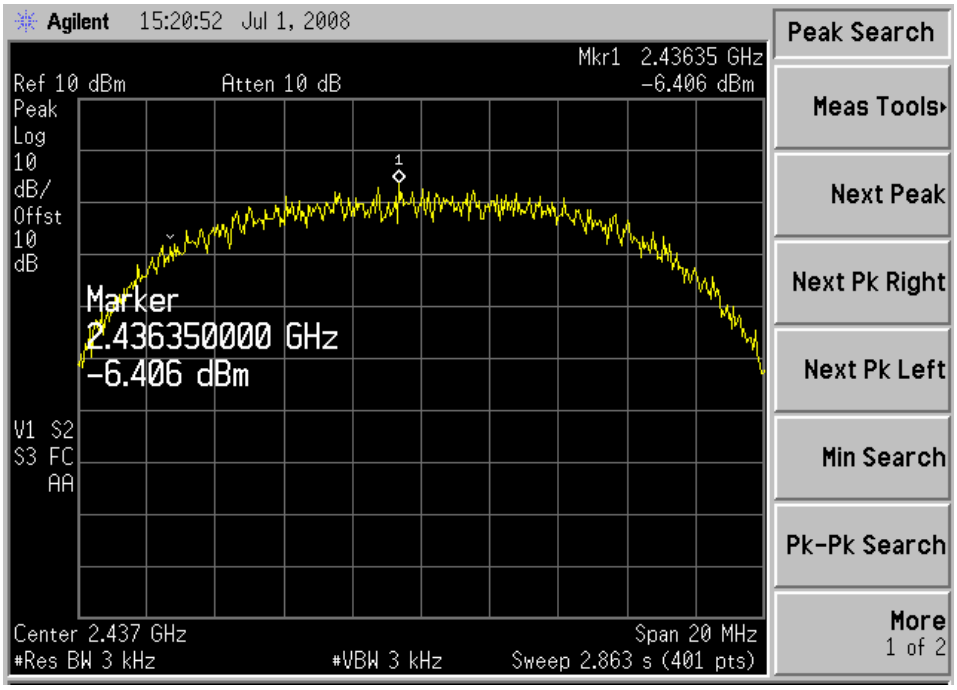


For 802.11b (Chain 2)

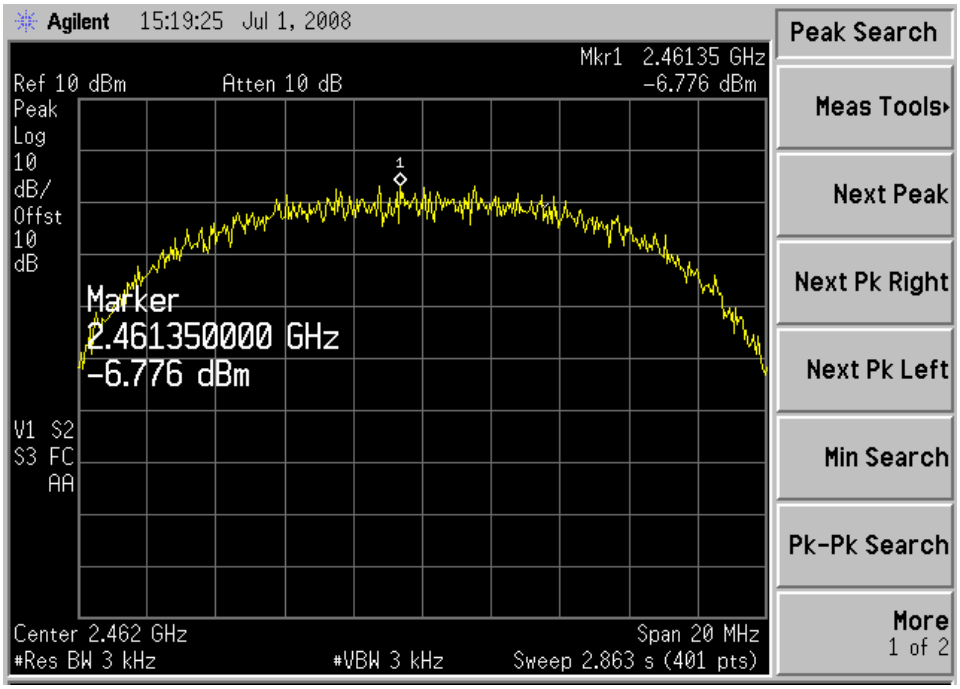
Low Channel:



Middle Channel:

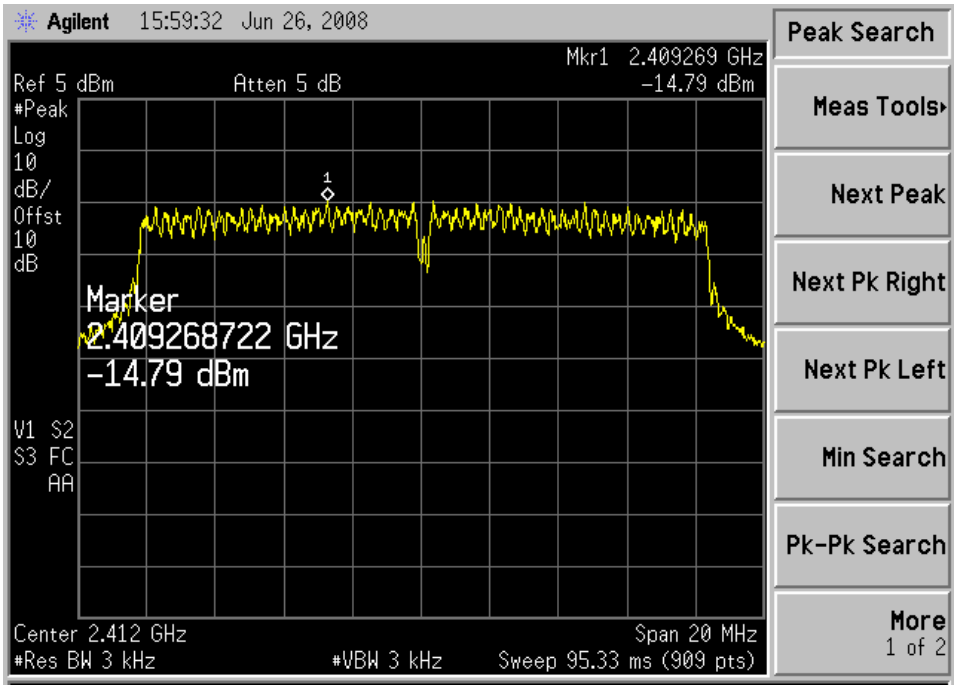


High Channel:

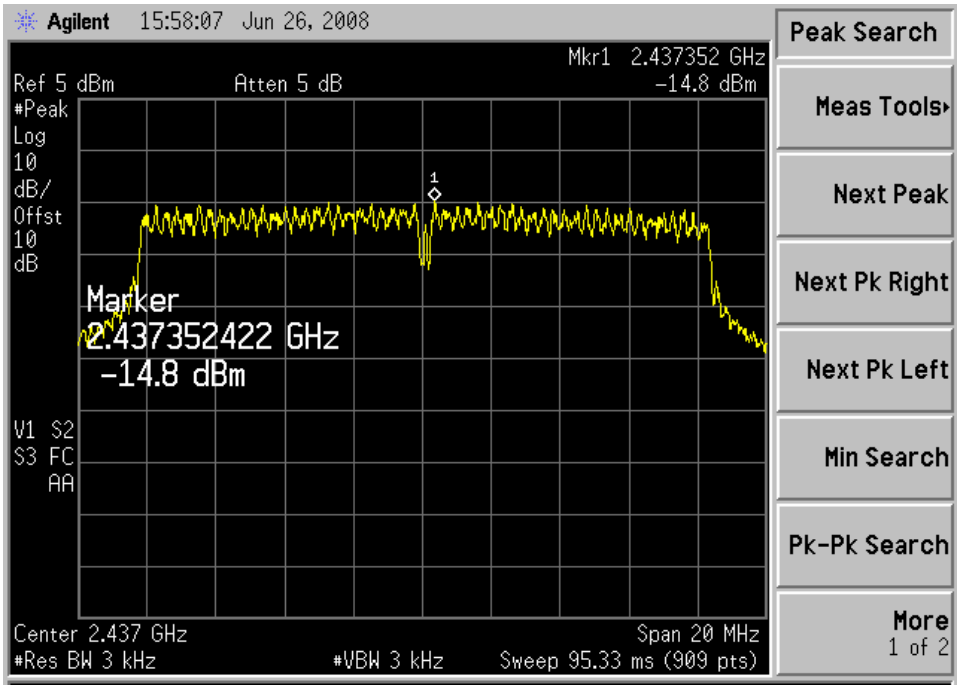


For 802.11g (Chain 1)

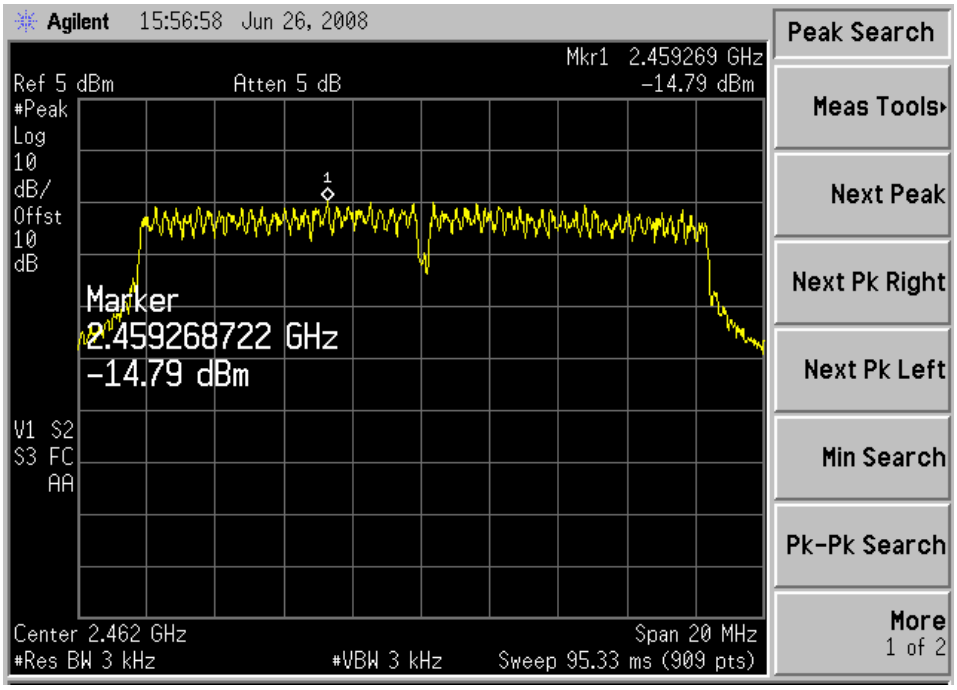
Low Channel:



Middle Channel:

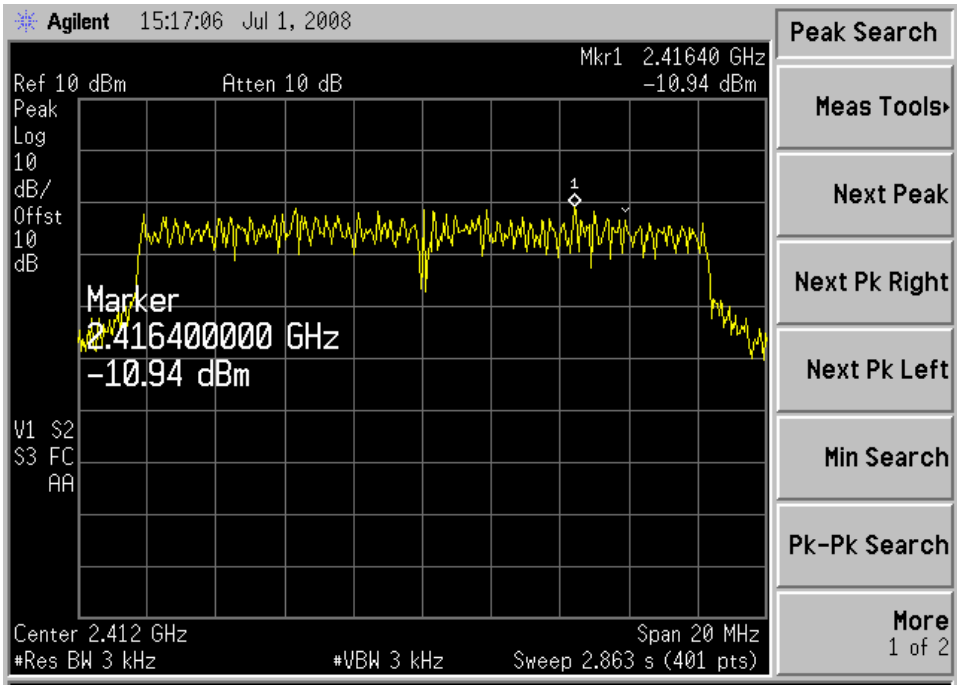


High Channel:

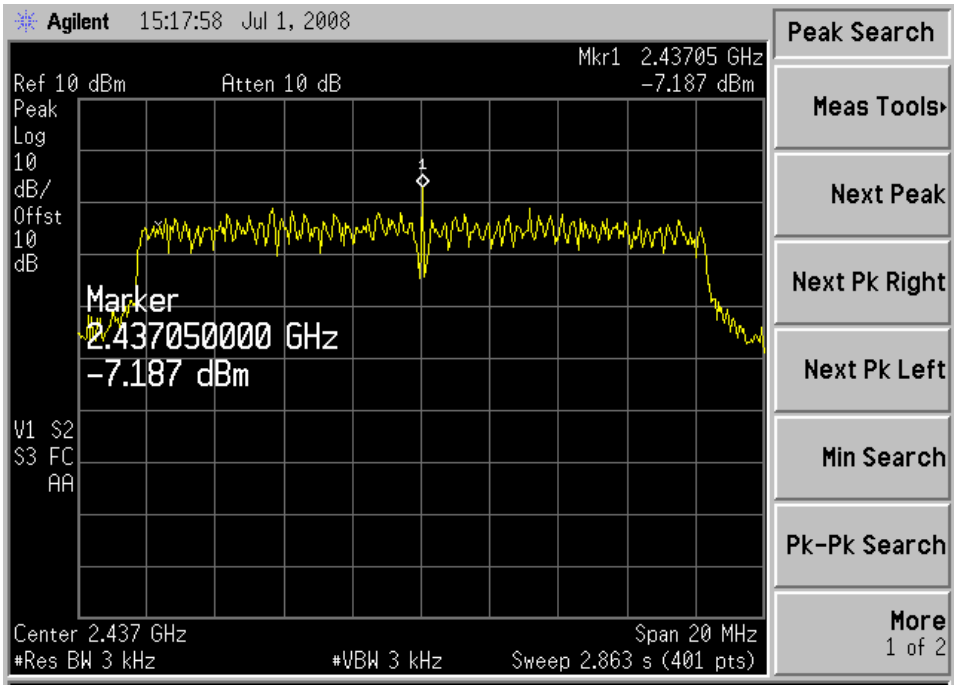


For 802.11g (Chain 2)

Low Channel:



Middle Channel:



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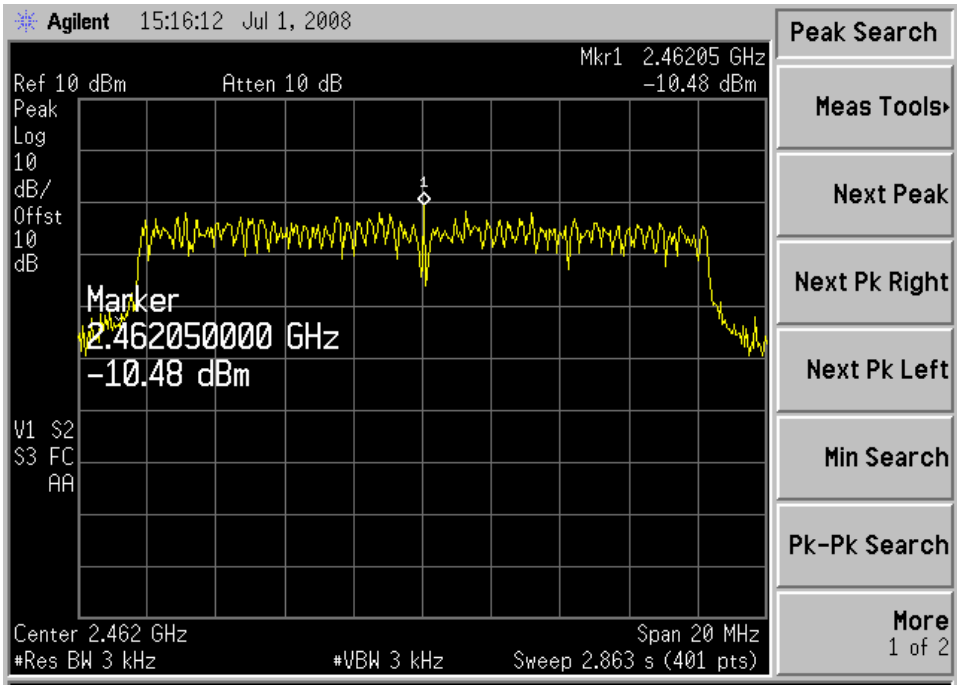
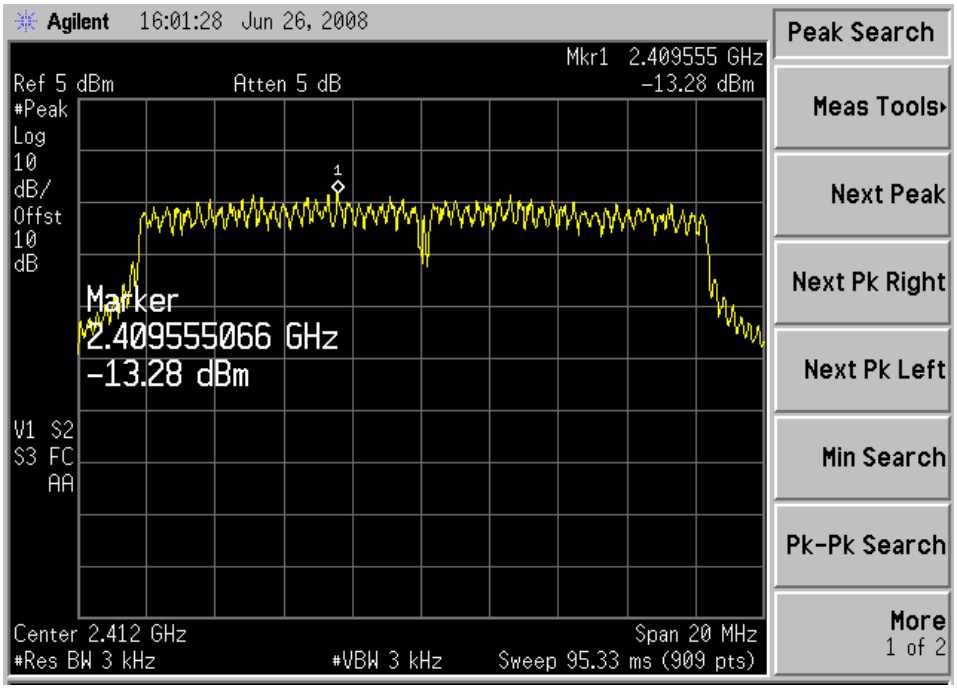
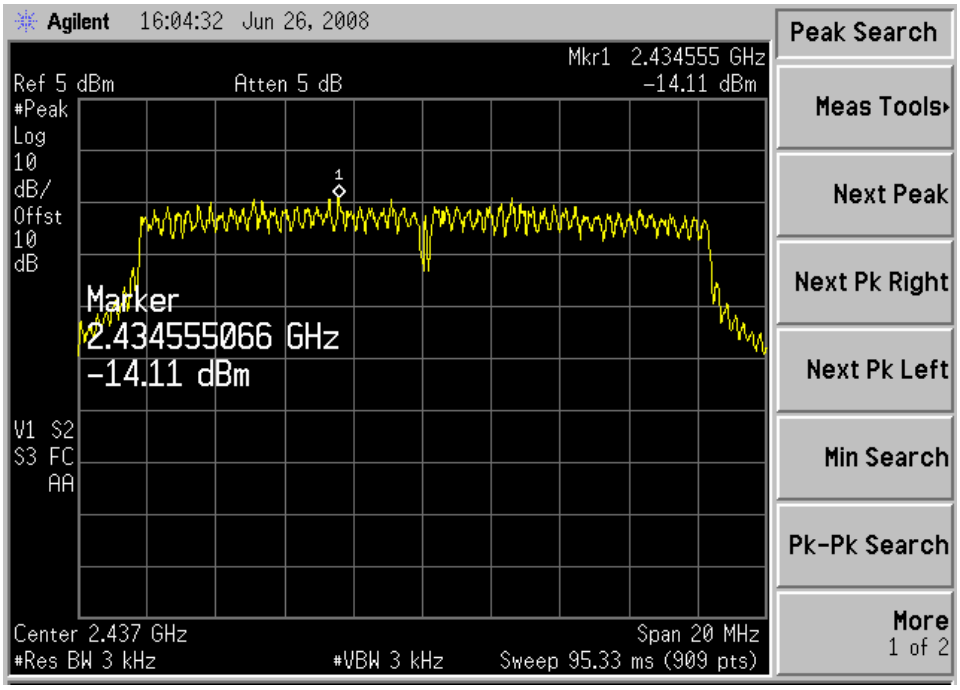


For 802.11n HT-20 (Chain 1)

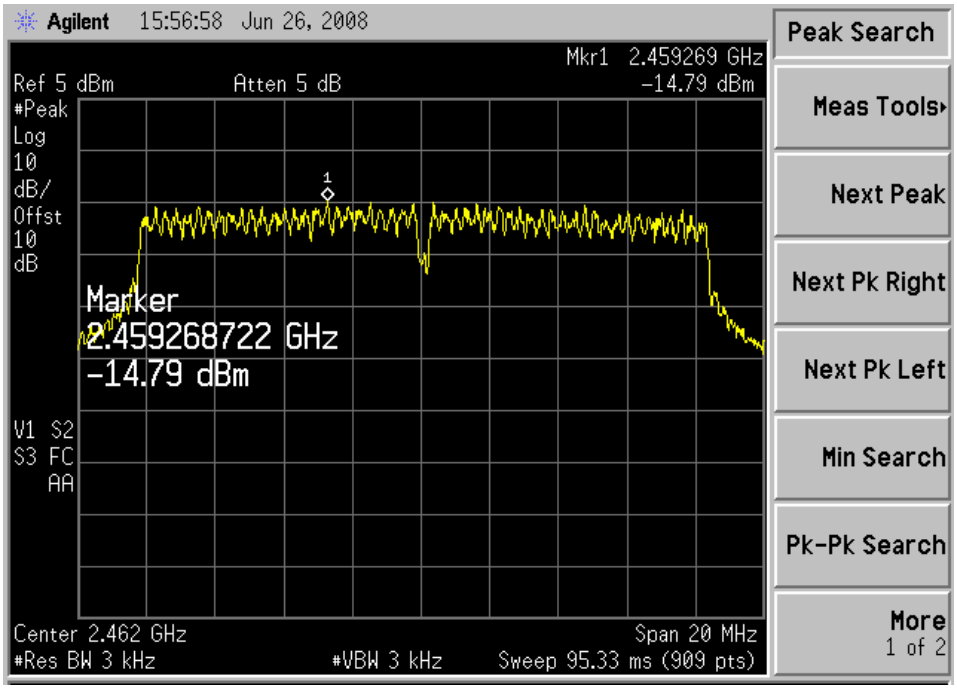
Low Channel:



Middle Channel:

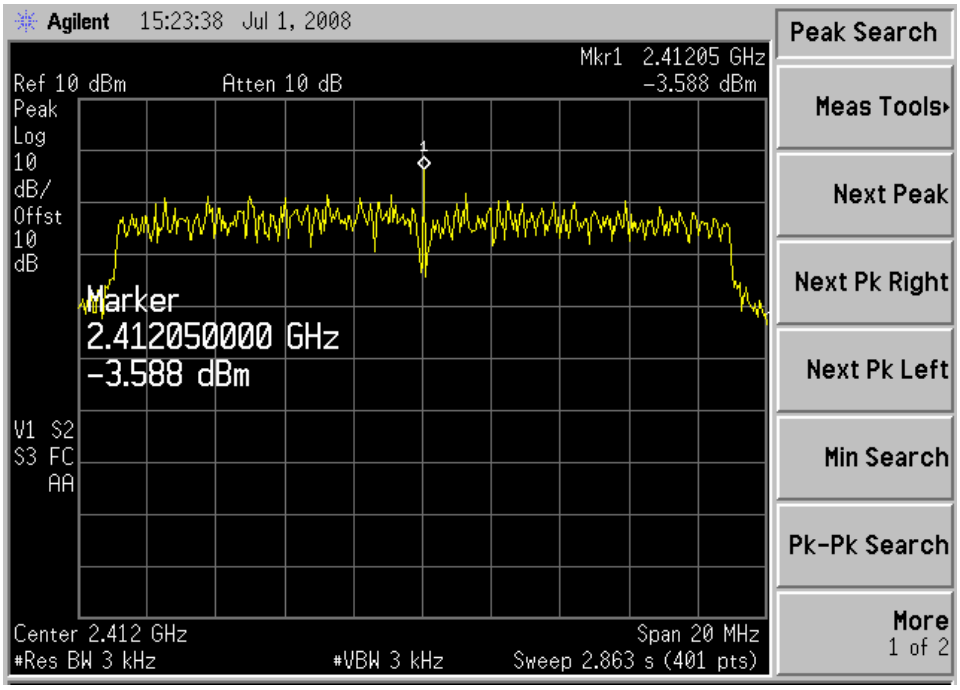


High Channel:

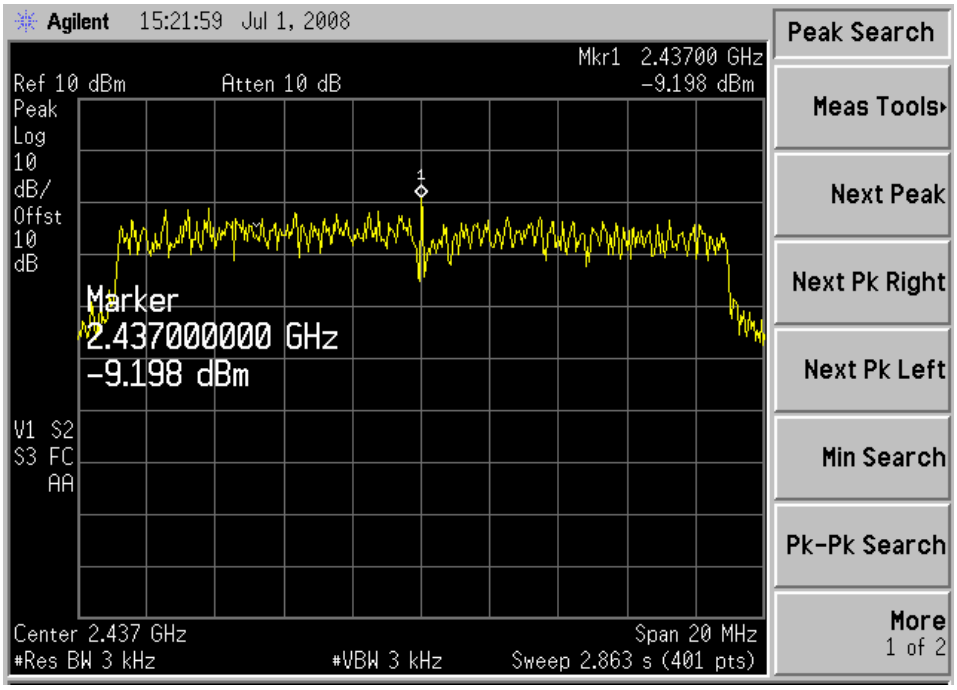


For 802.11n HT-20 (Chain 2)

Low Channel:



Middle Channel:



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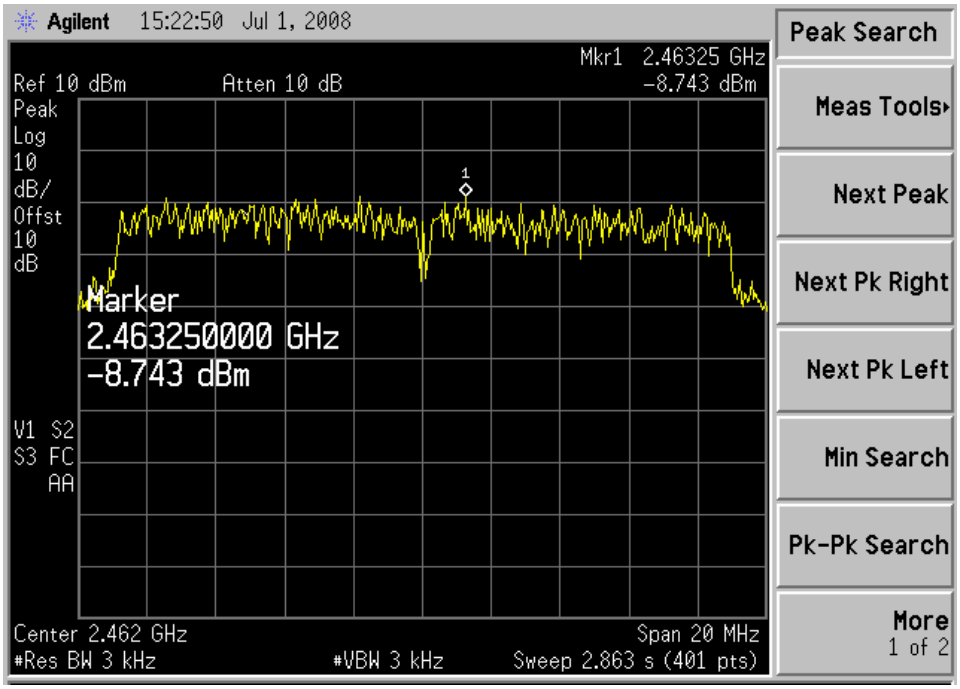
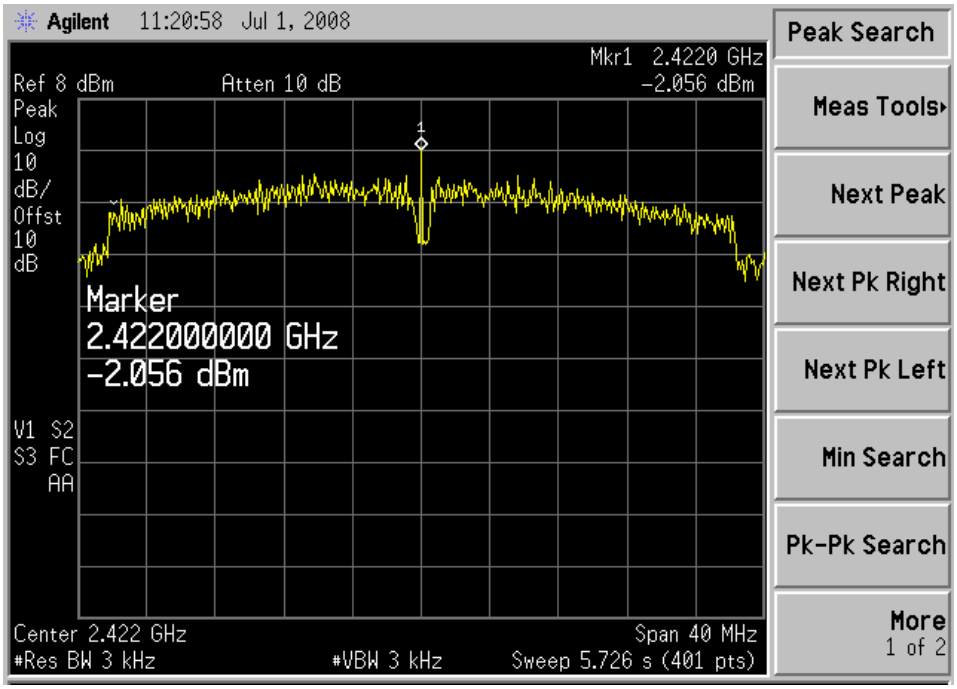
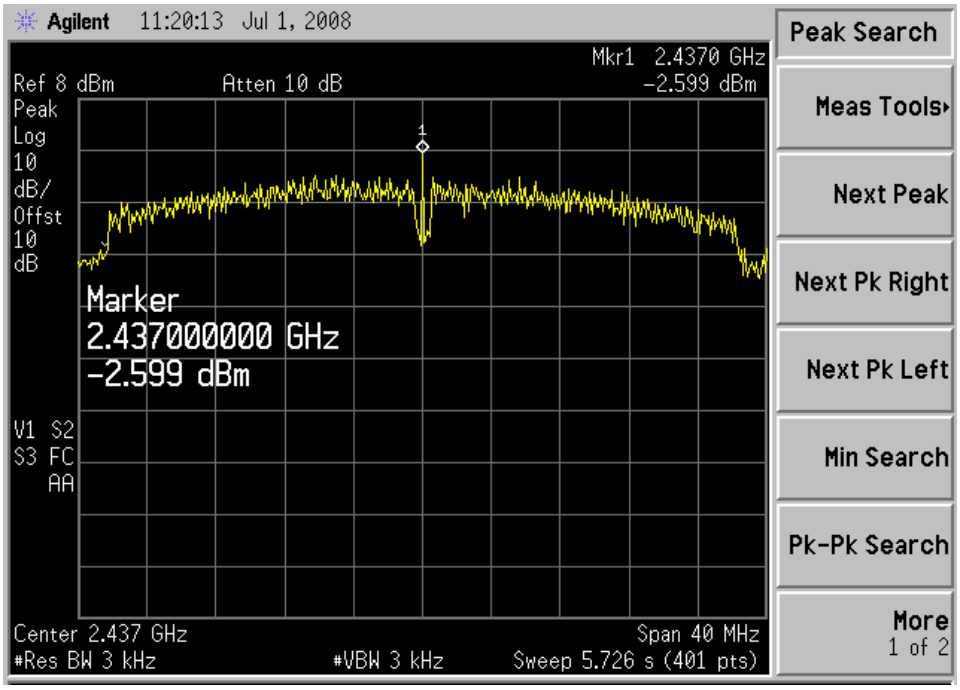


For 802.11n HT-40 (Chain 1)

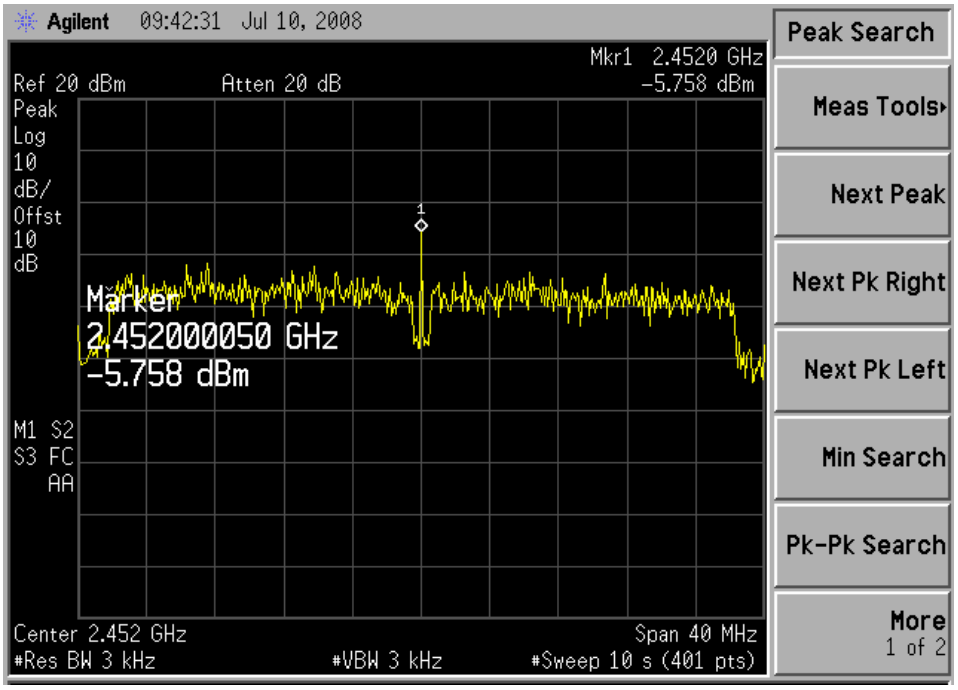
Low Channel:



Middle Channel:

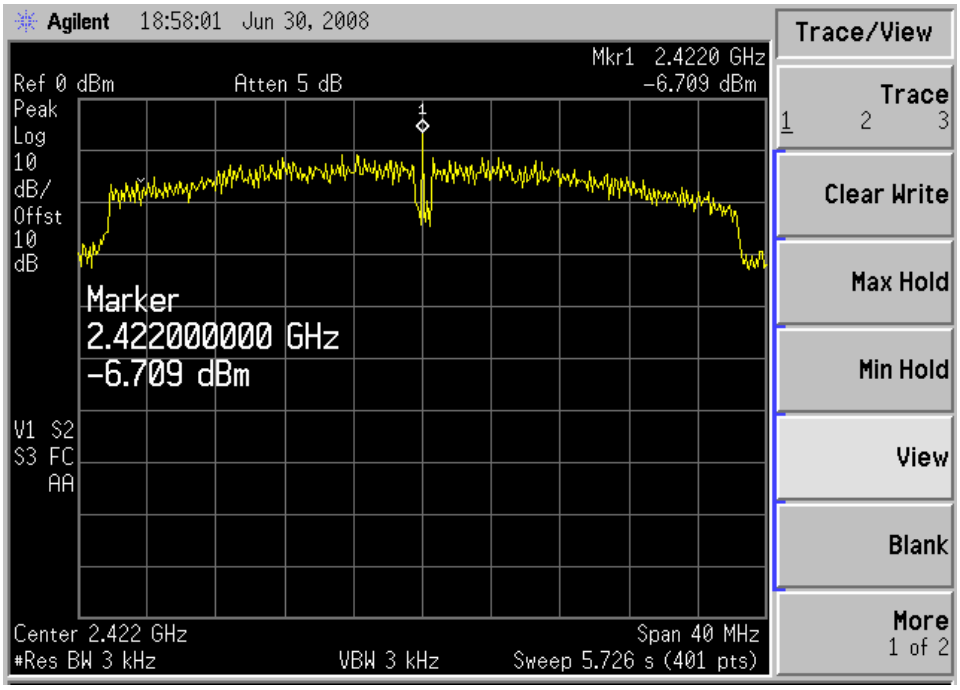


High Channel:

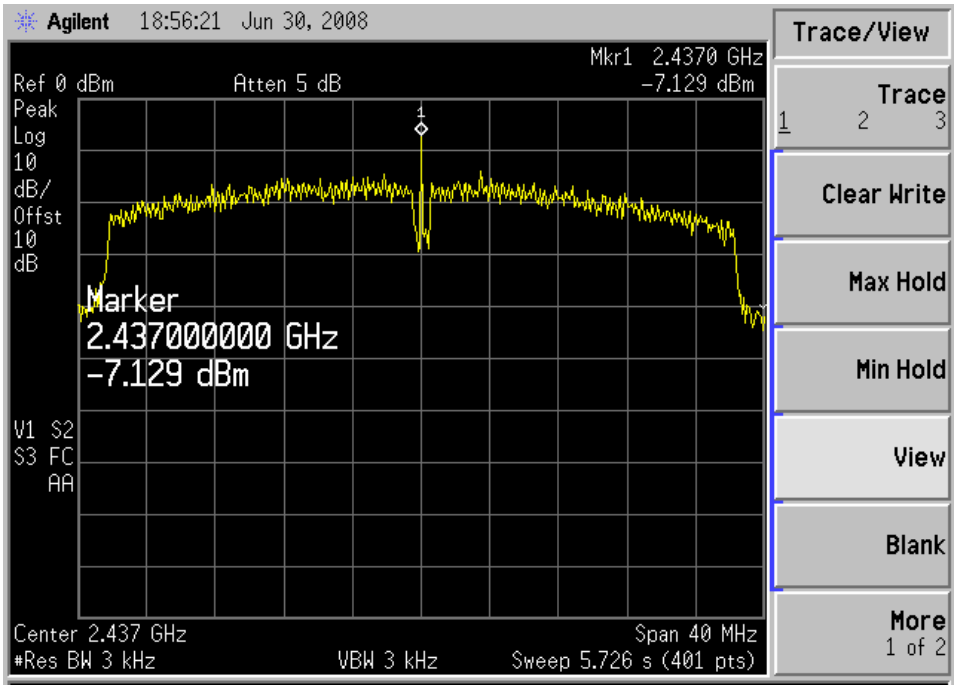


For 802.11n HT-40 (Chain 2)

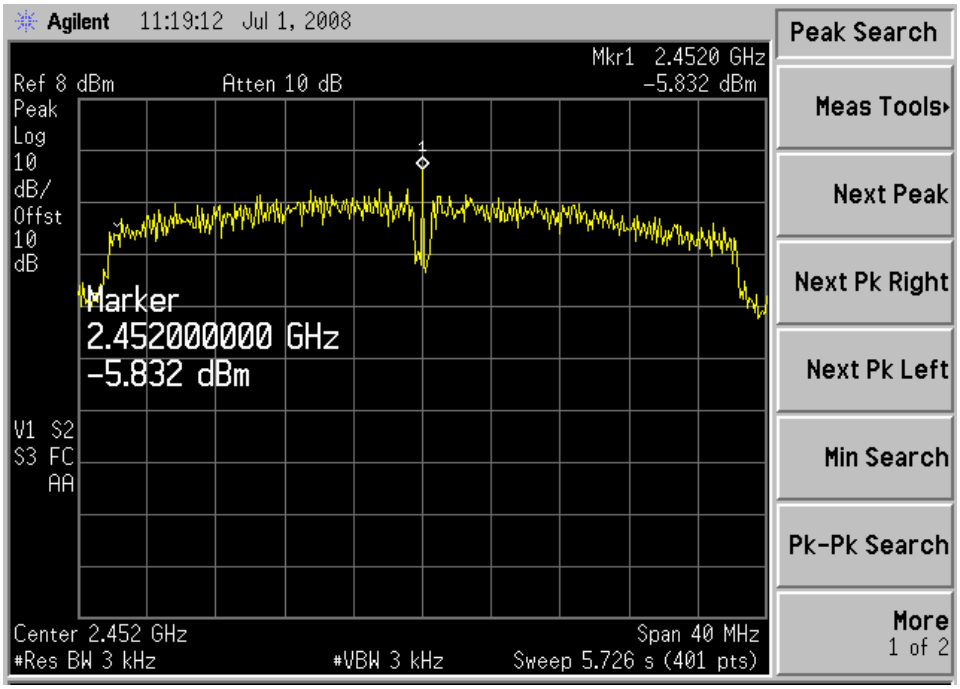
Low Channel:



Middle Channel:



High Channel:



7. 6-dB BANDWIDTH

7.1 Standard Applicable

According to 15.247(a)(2). Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

7.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2008-01-25	2009-01-24
ETS	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2008-01-25	2009-01-24

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

7.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. The spectrum analyzer as RBW=300KHz (1 % of Bandwidth.), Sweep=auto
4. Mark the peak frequency and –6dB (upper and lower) frequency.

7.4 Environmental Conditions

Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

7.5 Summary of Test Results/Plots

Test mode	Frequency MHz	6 dB Bandwidth kHz	Limit kHz
802.11b (Chain 1)	2412	11520	500
	2437	11227	500
	2462	11192	500
802.11 b (Chain 2)	2412	11369	500
	2437	11306	500
	2462	11746	500

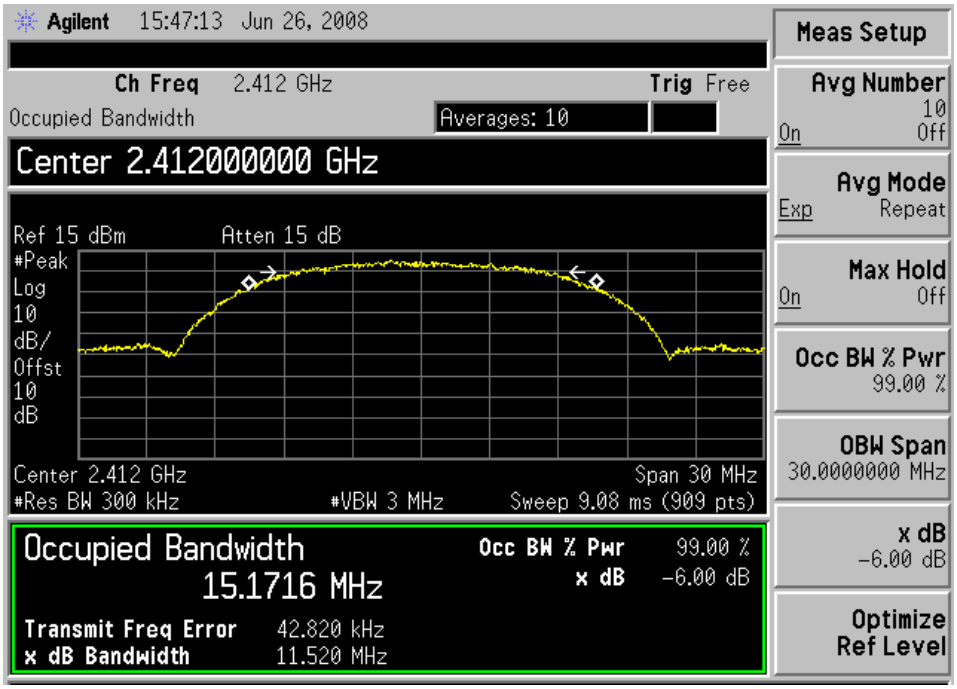
Test mode	Frequency MHz	6 dB Bandwidth kHz	Limit kHz
802.11g (Chain 1)	2412	16440	500
	2437	16309	500
	2462	16452	500
802.11 g (Chain 2)	2412	15503	500
	2437	16309	500
	2462	16429	500

Test mode	Frequency MHz	6 dB Bandwidth kHz	Limit kHz
802.11n HT-20 (Chain 1)	2412	16310	500
	2437	16362	500
	2462	16334	500
802.11 n HT-20 (Chain 2)	2412	17454	500
	2437	17344	500
	2462	17620	500

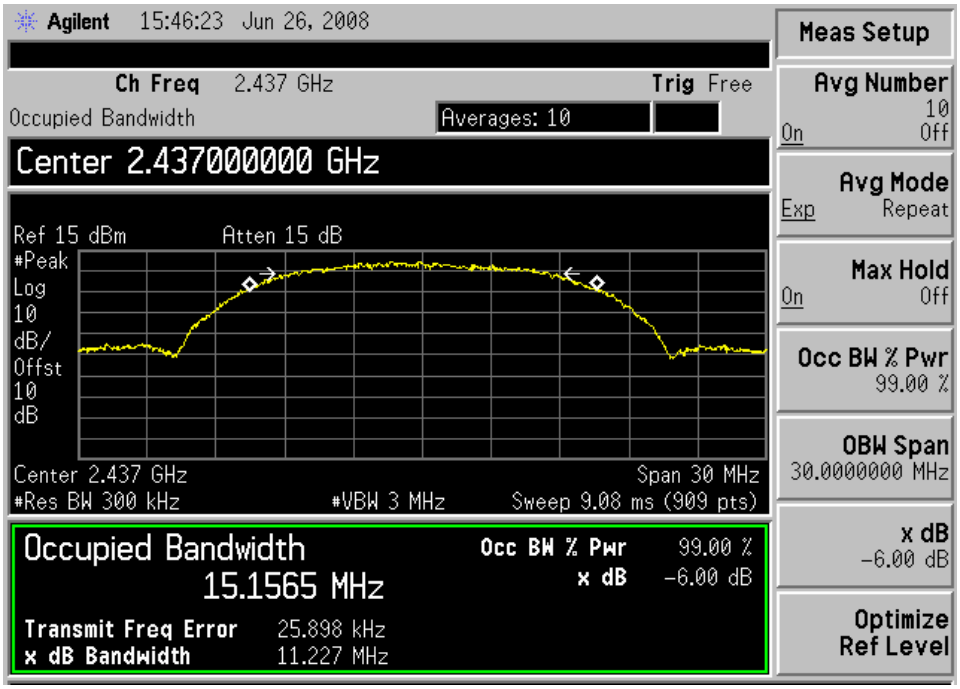
Test mode	Frequency MHz	6 dB Bandwidth kHz	Limit kHz
802.11n HT-40 (Chain 1)	2422	30390	500
	2437	27851	500
	2452	31053	500
802.11 n HT-40 (Chain 2)	2422	36037	500
	2437	36159	500
	2452	35757	500

For 802.11b (Chain 1)

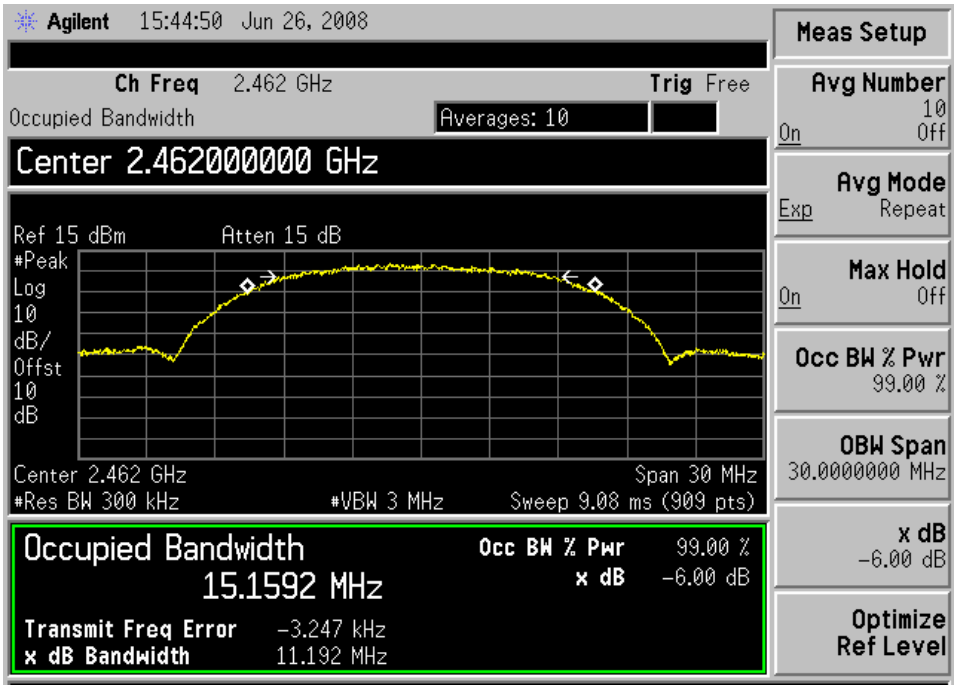
Low Channel:



Mid Channel:

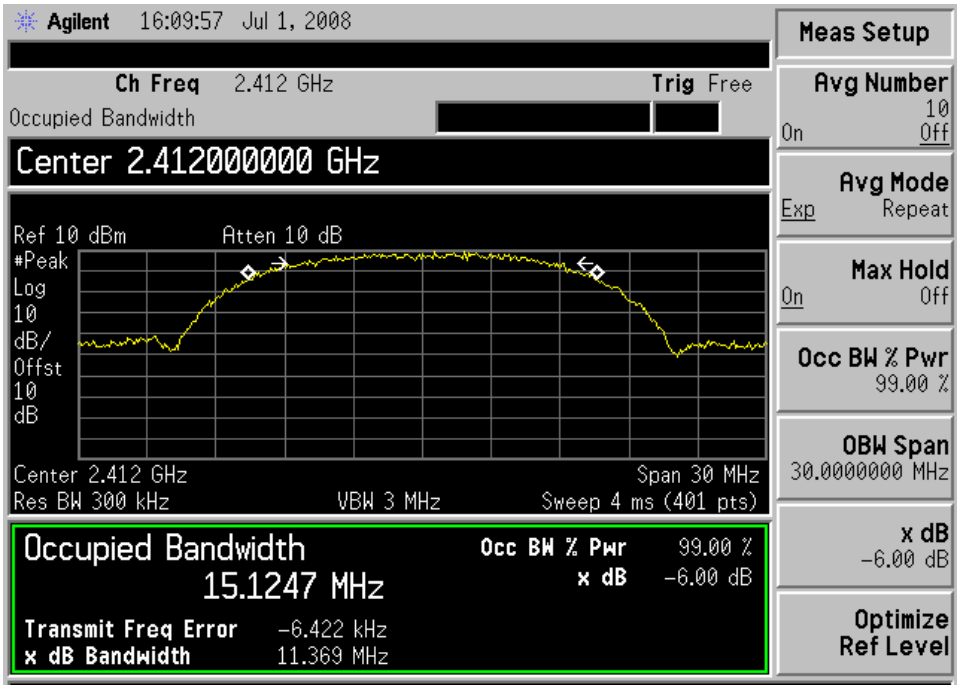


High Channel:

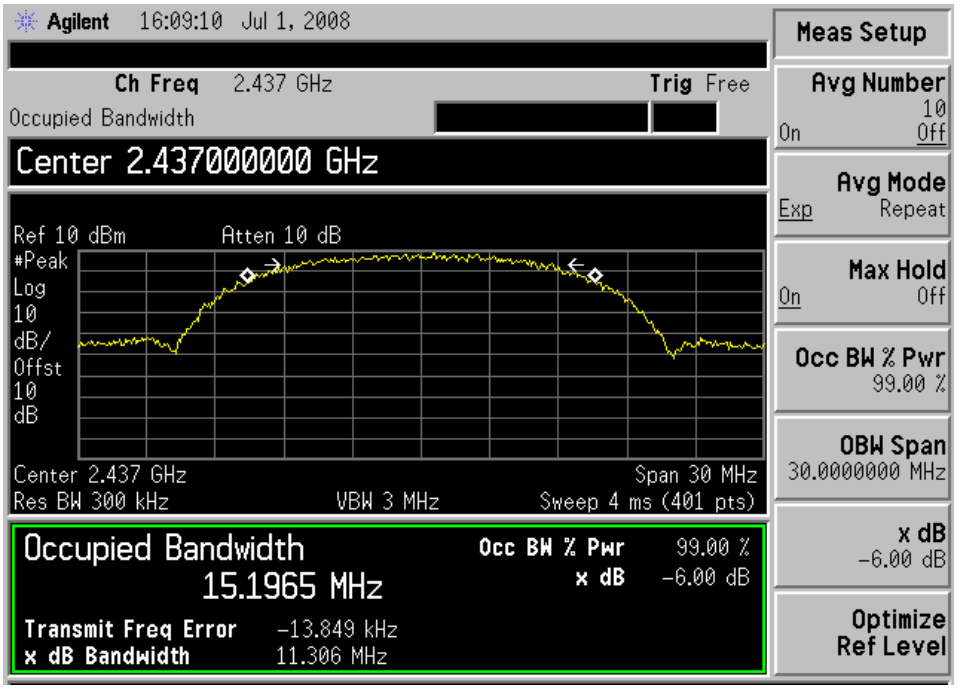


For 802.11b (Chain 2)

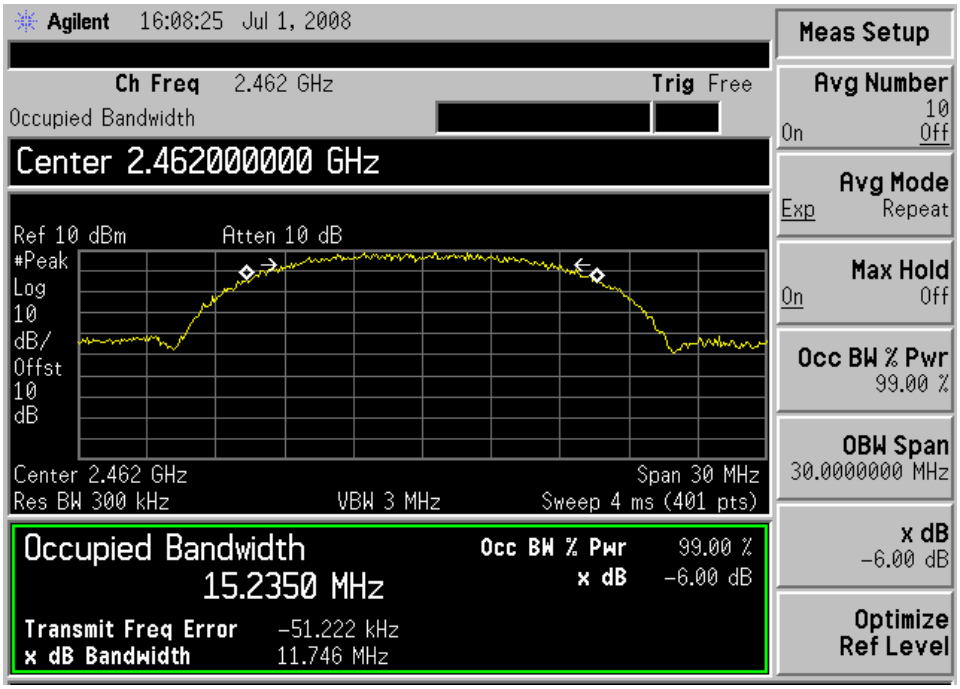
Low Channel:



Middle Channel:

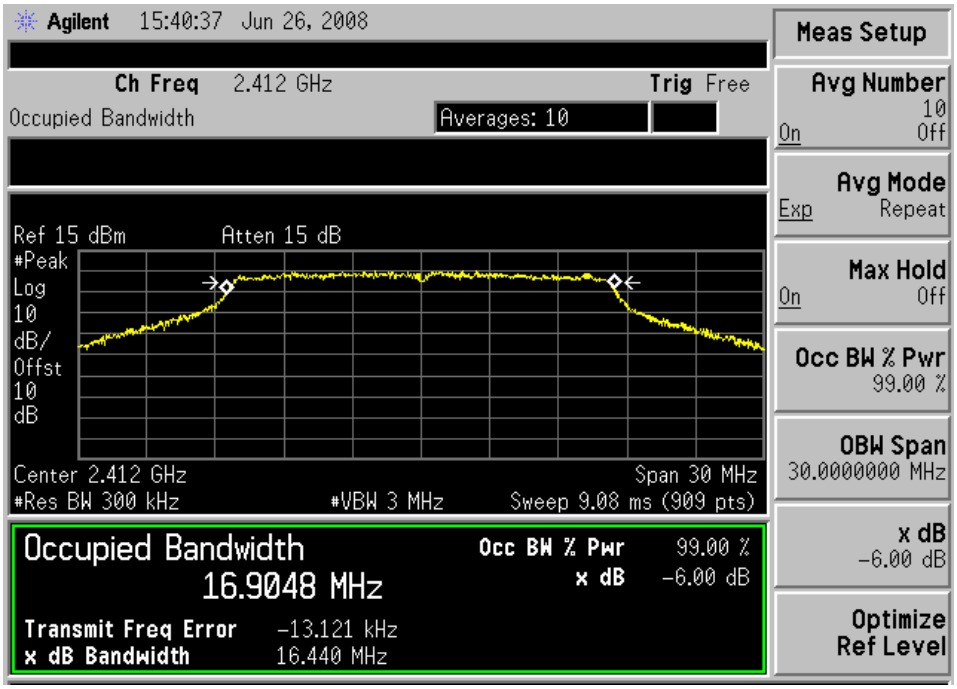


High Channel:

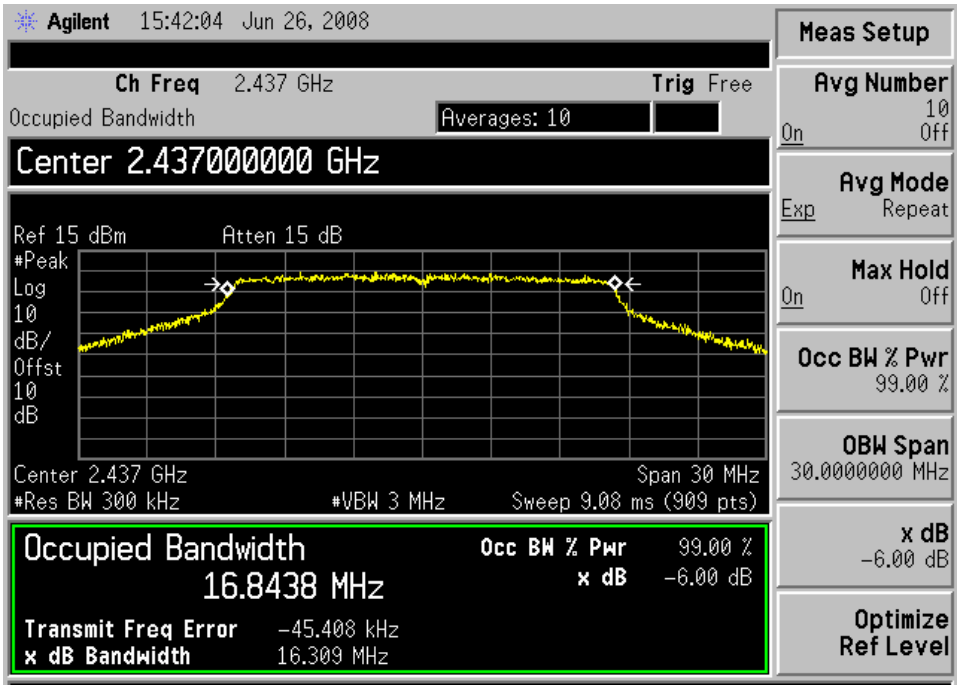


For 802.11g (Chain 1)

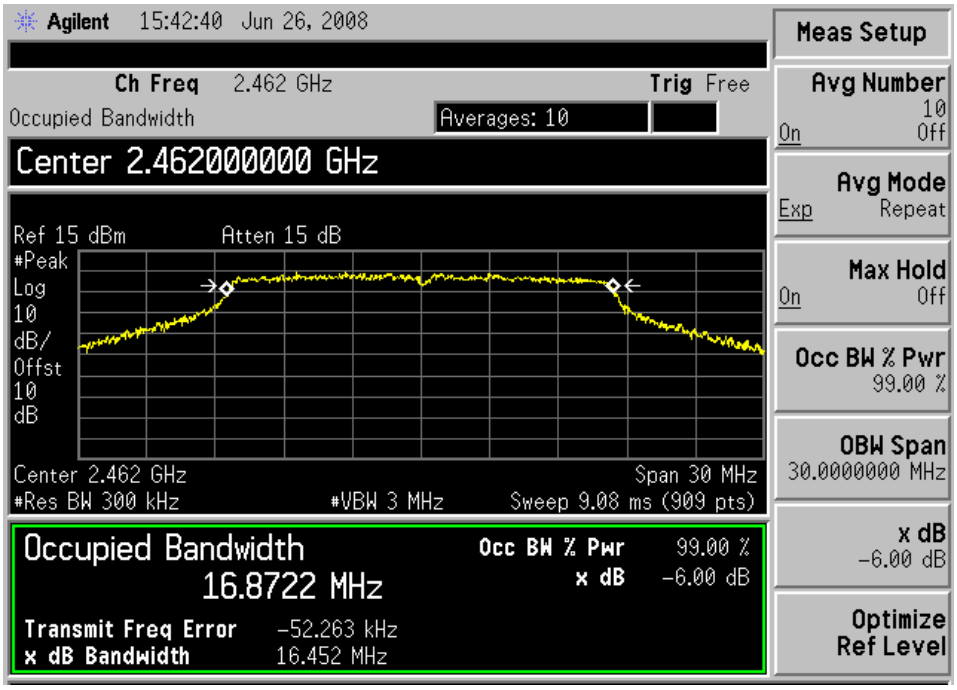
Low Channel:



Middle Channel:

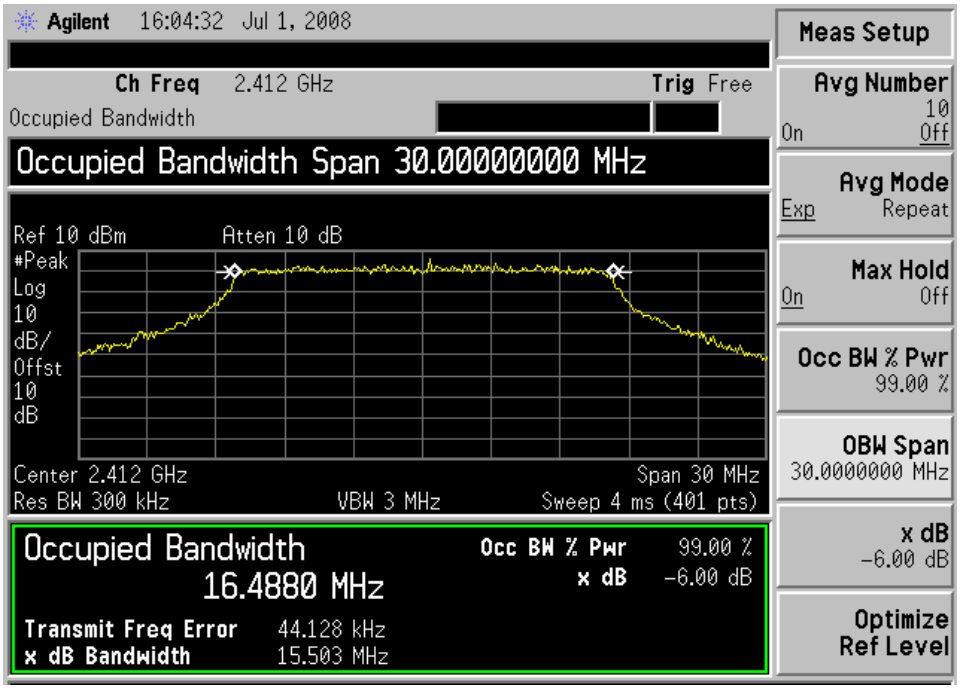


High Channel:

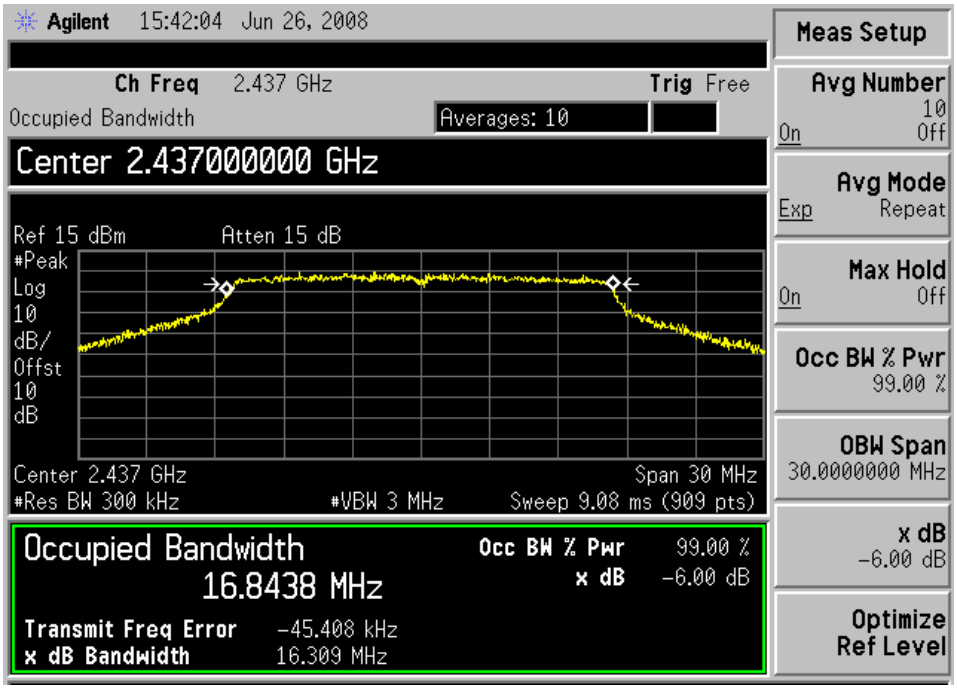


For 802.11g (Chain 2)

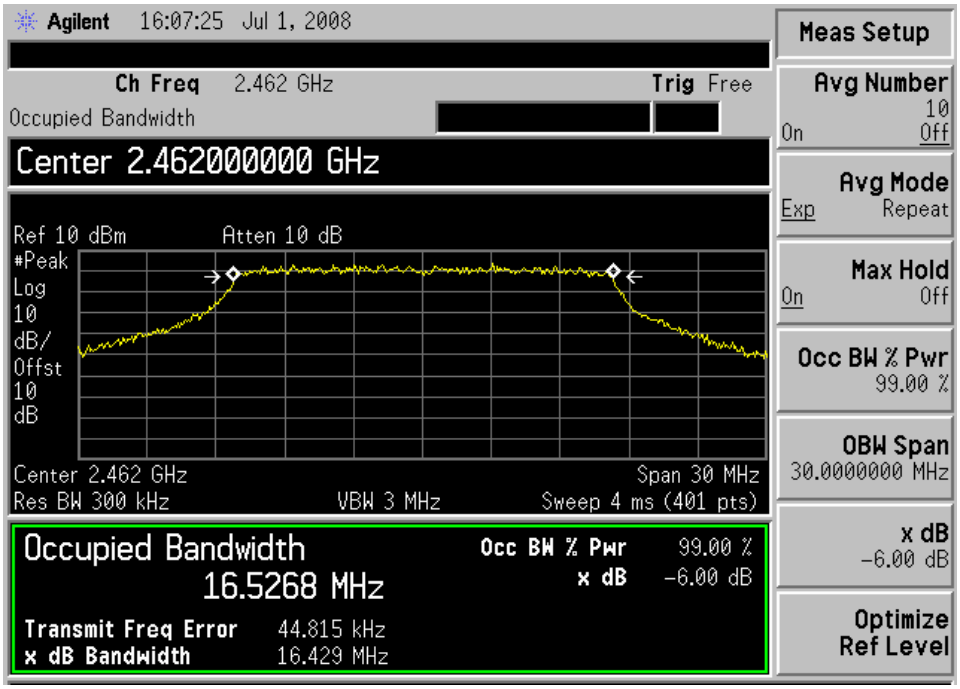
Low Channel:



Middle Channel:

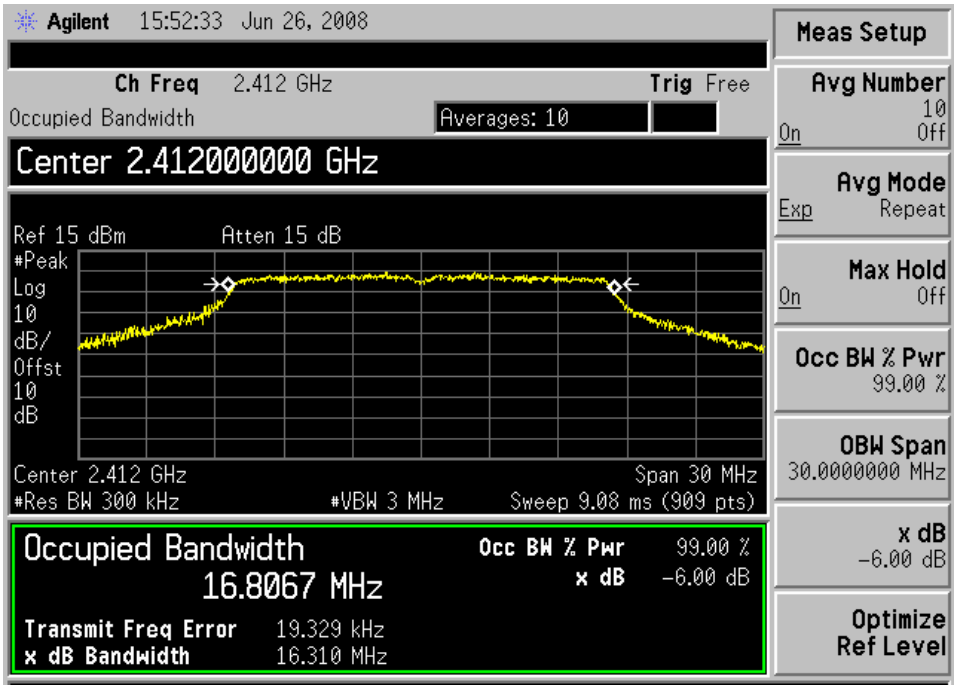


High Channel:

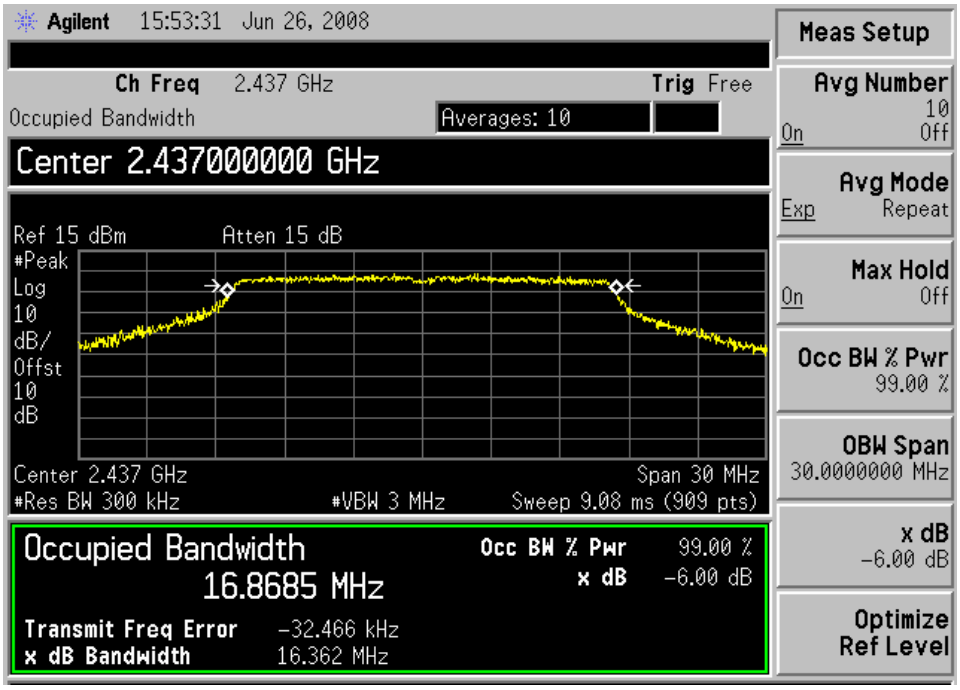


For 802.11n HT-20 (Chain 1)

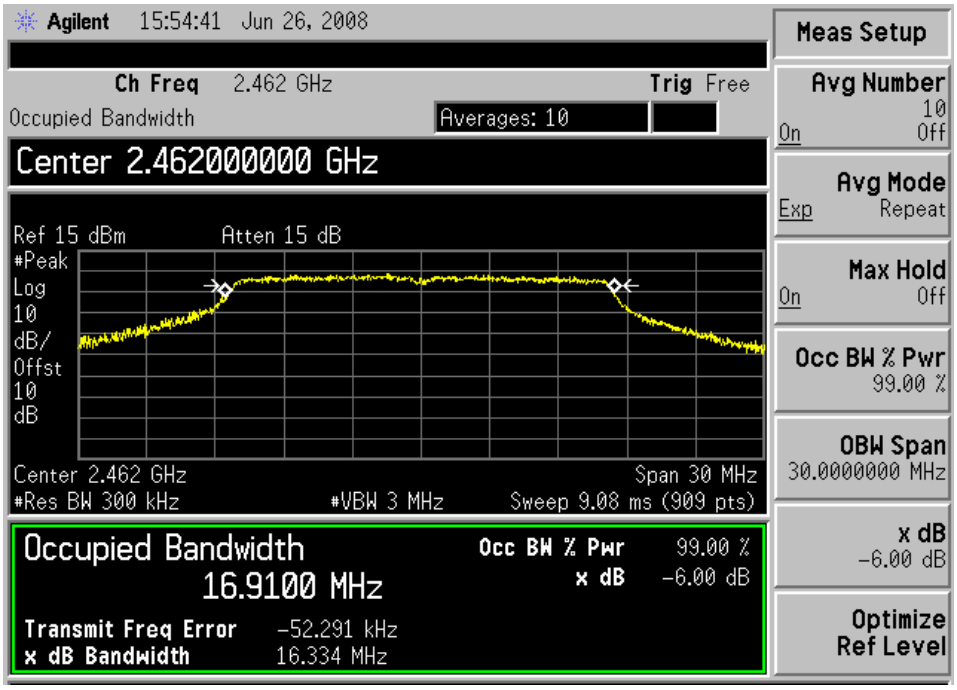
Low Channel:



Middle Channel:

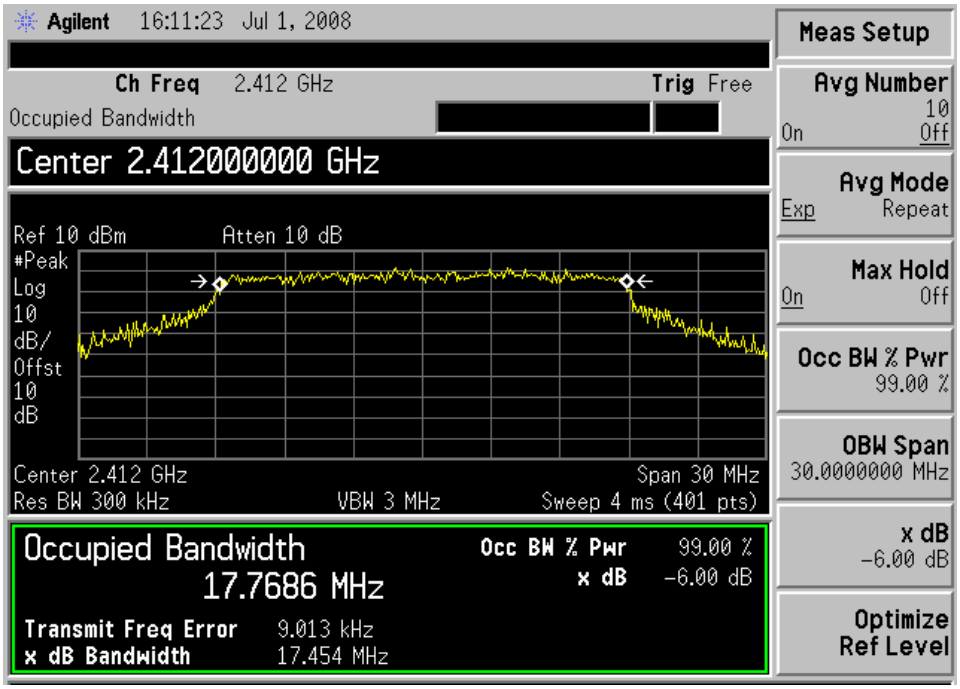


High Channel:

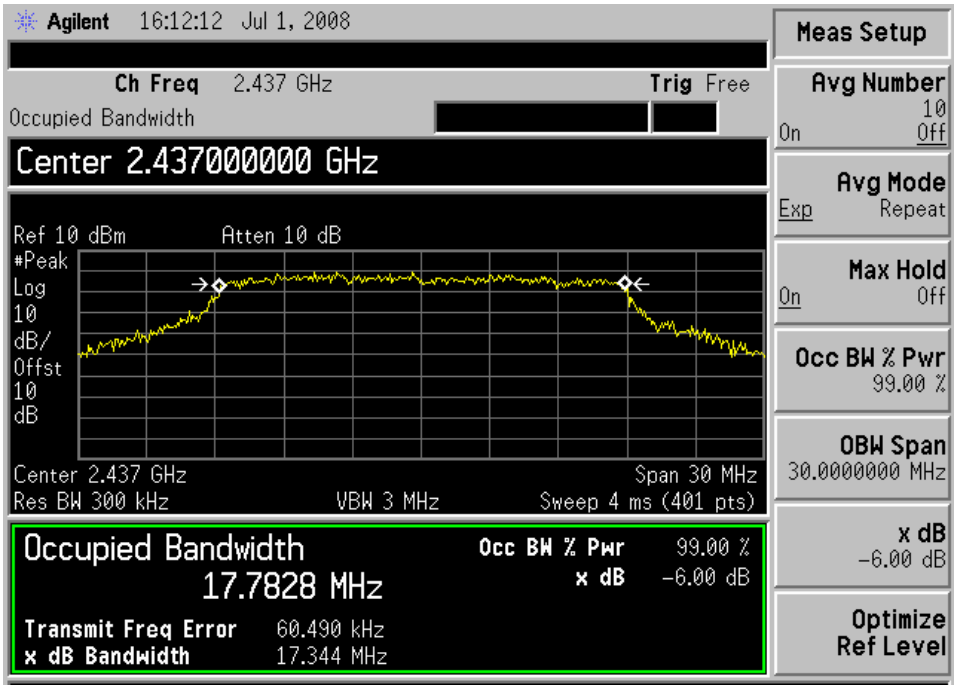


For 802.11n HT-20 (Chain 2)

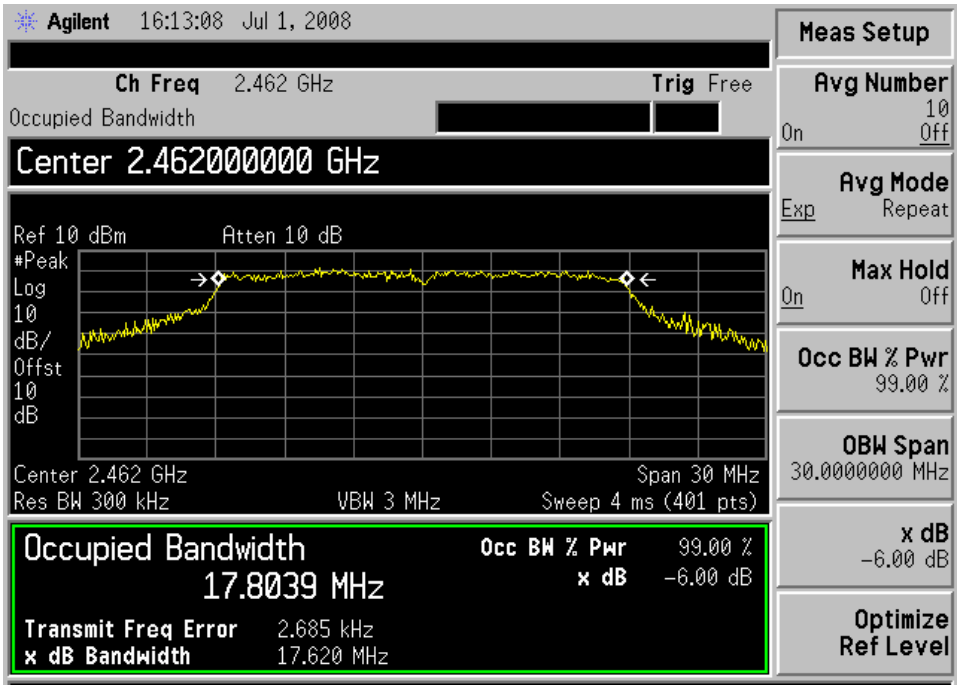
Low Channel:



Middle Channel:

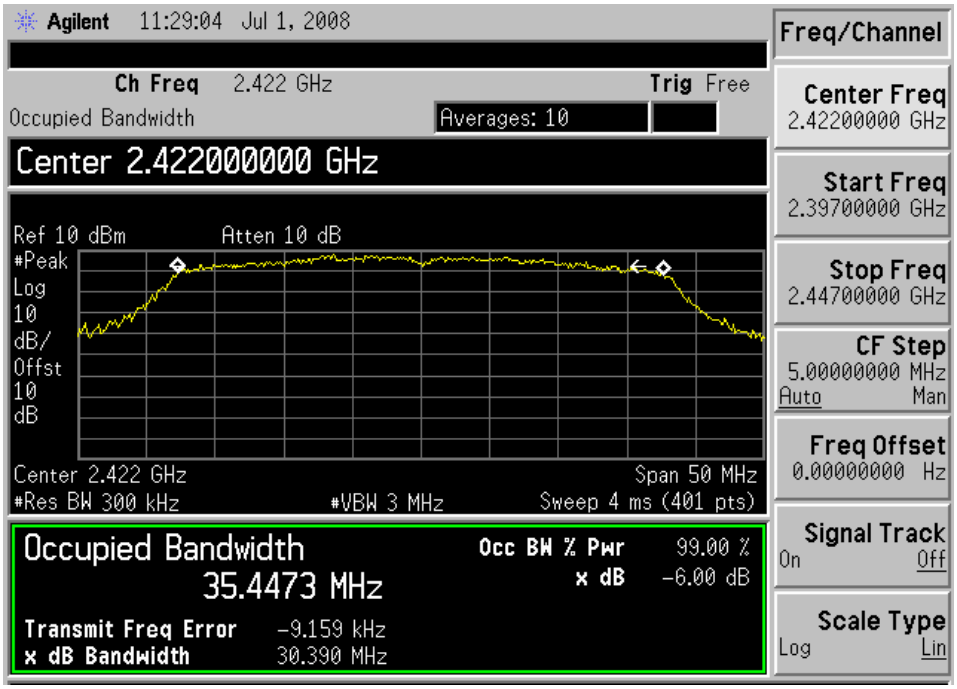


High Channel:

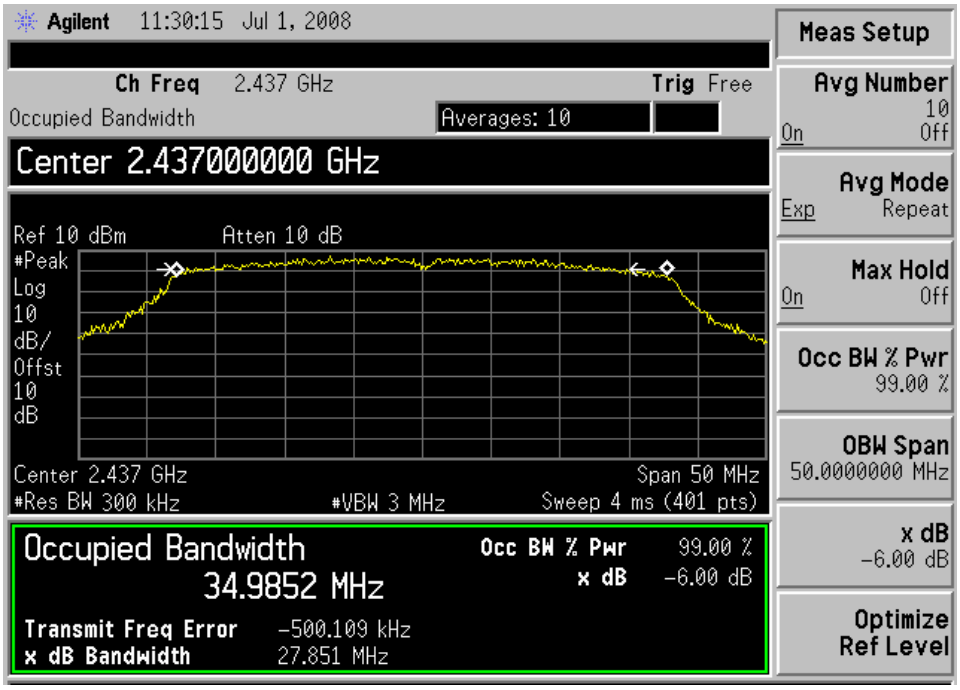


For 802.11n HT-40 (Chain 1)

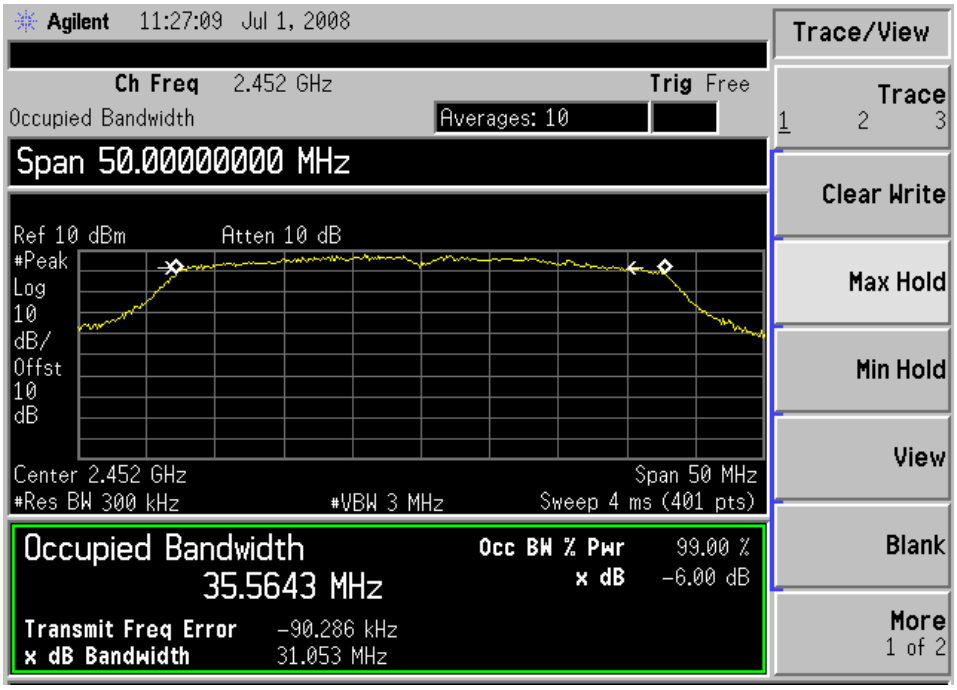
Low Channel:



Middle Channel:

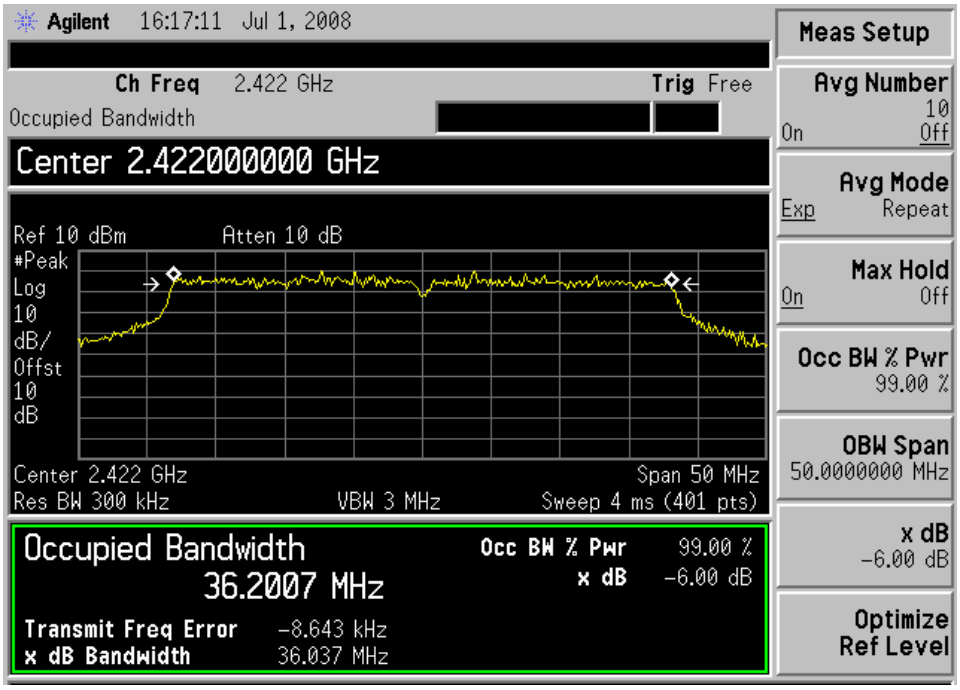


High Channel:

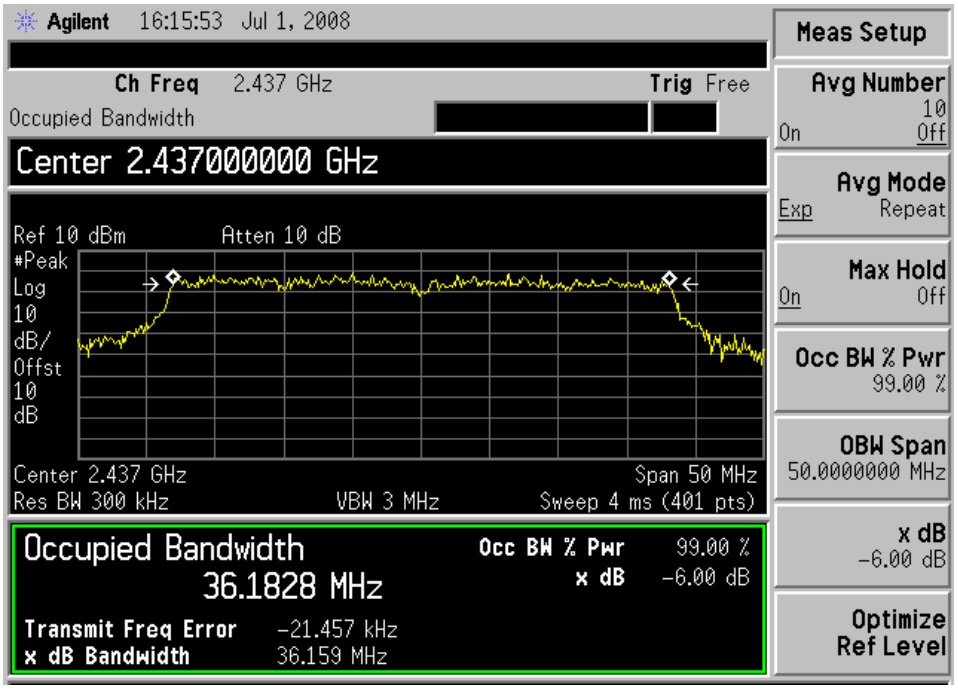


For 802.11n HT-40 (Chain 2)

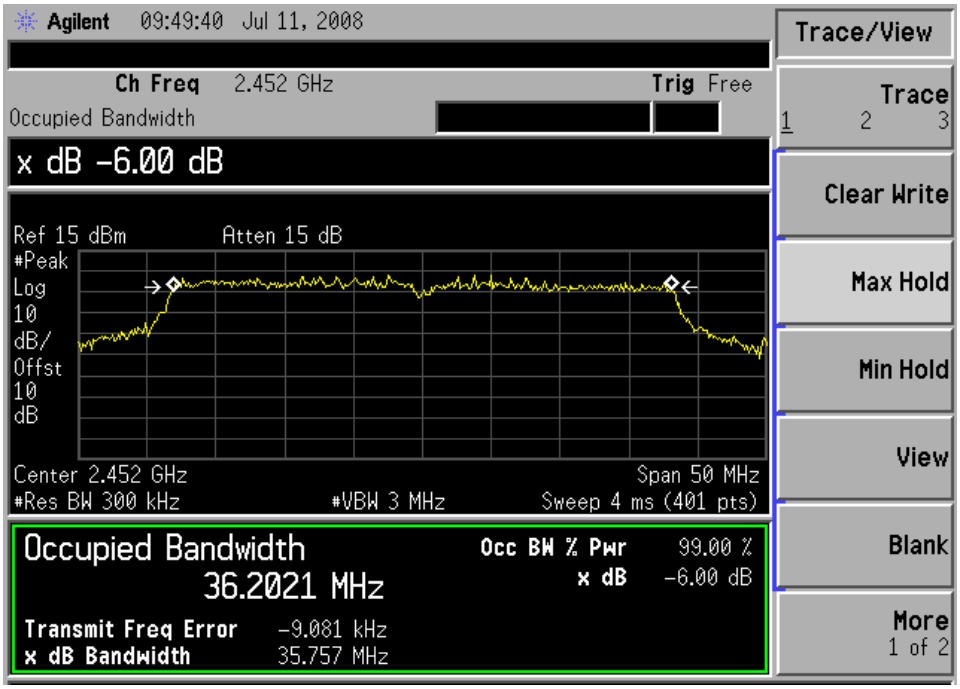
Low Channel:



Middle Channel:



High Channel:



8. POWER OUTPUT

8.1 Standard Applicable

According to 15.247(b)(3). For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt.

8.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2008-01-25	2009-01-24
ETS	50 ohm Coaxial Cable	SUCOFLEX 104	25498514	2008-01-25	2009-01-24

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

8.3 Test Procedure

The device under test has an integral antenna and the power was measured on a radiated basis.

8.4 Environmental Conditions

Temperature:	21° C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

8.5 Summary of Test Results/Plots

Test mode	Frequency MHz	Reading dBm	Output power W	Limit W
802.11b (Chain 1)	2412	17.64	0.05808	1
	2437	17.74	0.05943	1
	2462	17.88	0.06138	1
802.11b (Chain 2)	2412	17.27	0.05333	1
	2437	18.40	0.06918	1
	2462	18.35	0.06839	1

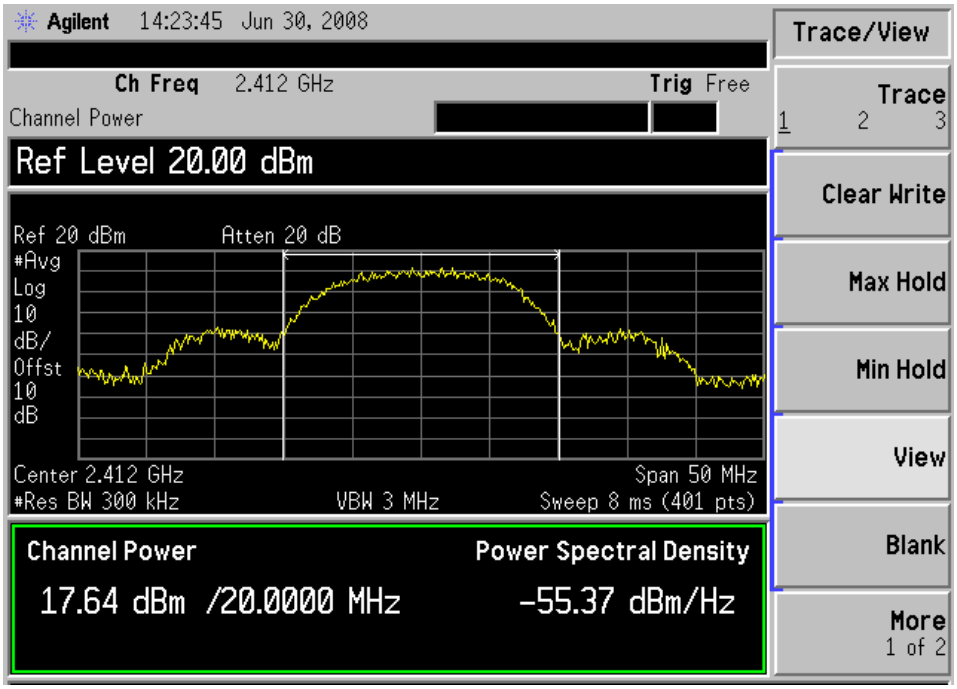
Test mode	Frequency MHz	Reading dBm	Output power W	Limit W
802.11g (Chain 1)	2412	16.22	0.04188	1
	2437	15.47	0.03524	1
	2462	14.31	0.02698	1
802.11g (Chain 2)	2412	15.37	0.03443	1
	2437	15.06	0.03206	1
	2462	16.07	0.04046	1

Test mode	Frequency MHz	Reading dBm	Output power W	Limit W
802.11n HT-20 (Chain 1)	2412	13.34	0.02158	1
	2437	12.64	0.01837	1
	2462	12.32	0.01706	1
802.11n HT-20 (Chain 2)	2412	12.95	0.01972	1
	2437	12.71	0.01866	1
	2462	12.76	0.01888	1

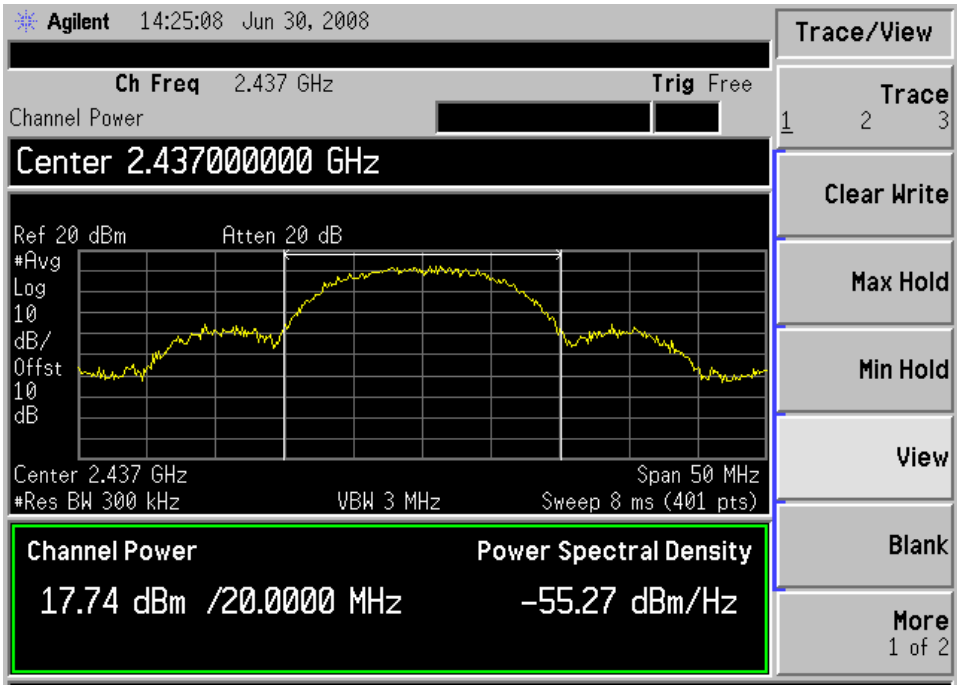
Test mode	Frequency MHz	Reading dBm	Output power W	Limit W
802.11n HT-40 (Chain 1)	2422	12.45	0.01758	1
	2437	12.64	0.01837	1
	2452	12.20	0.01660	1
802.11n HT-40 (Chain 2)	2422	12.56	0.01803	1
	2437	14.05	0.02541	1
	2452	12.95	0.01972	1

For 802.11b (Chain 1)

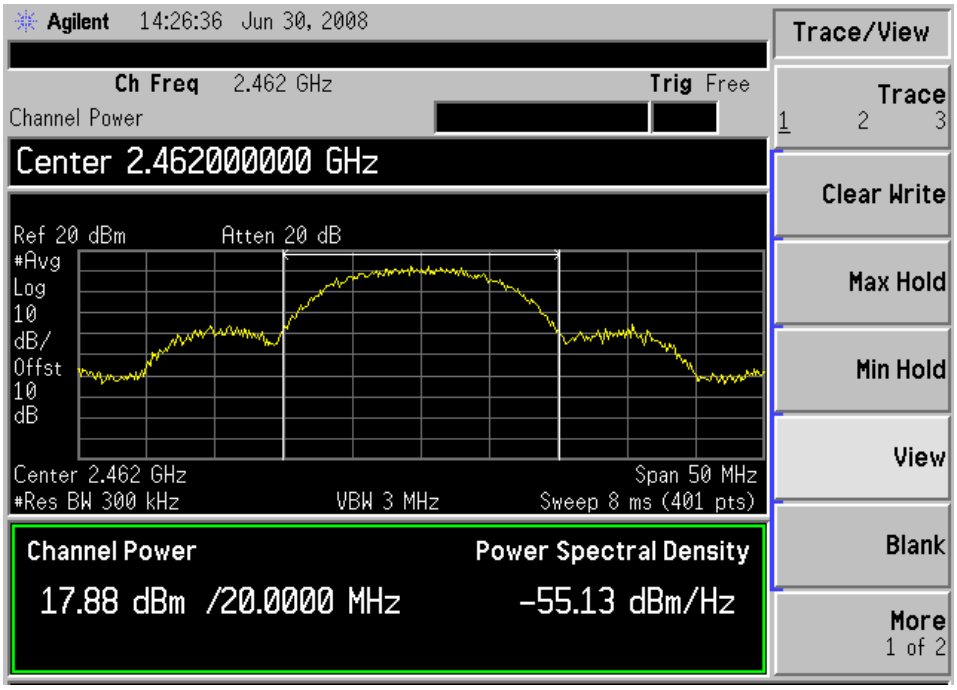
Low Channel:



Middle Channel:

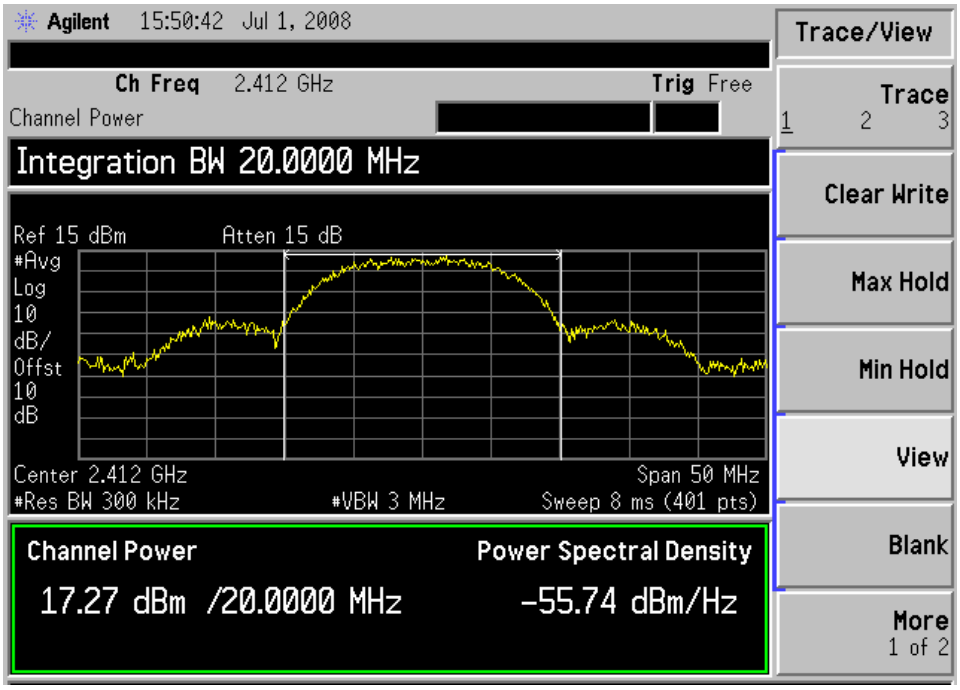


High Channel:

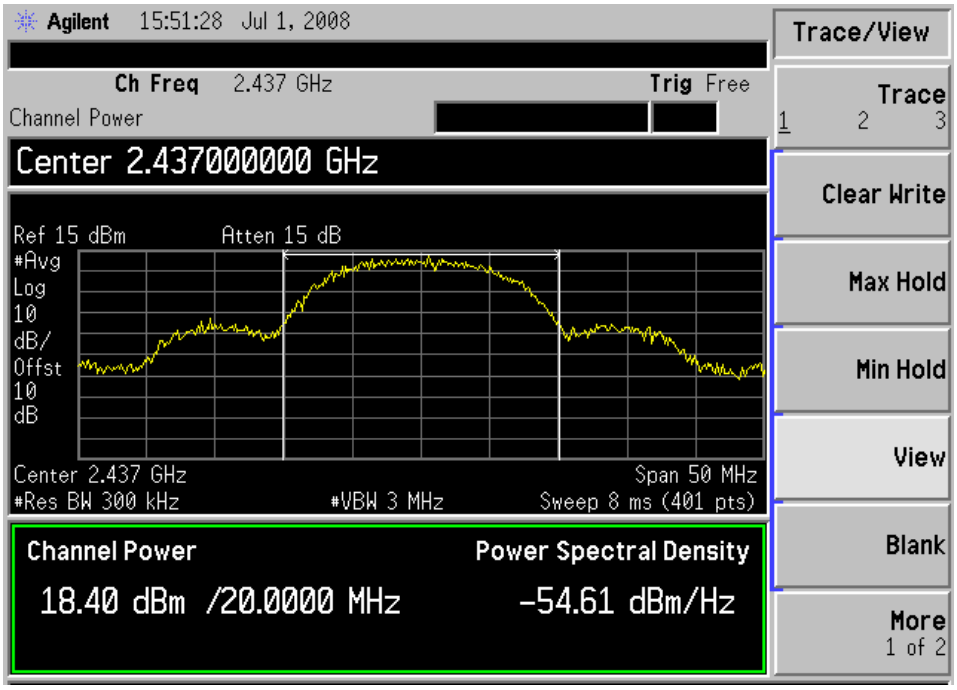


For 802.11b (Chain 2)

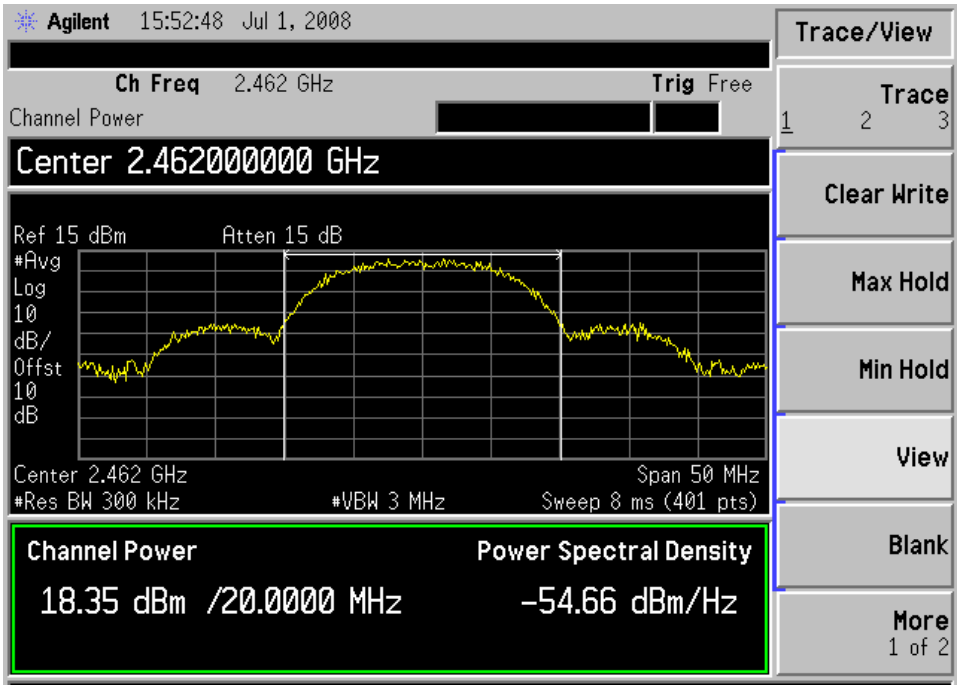
Low Channel:



Middle Channel:

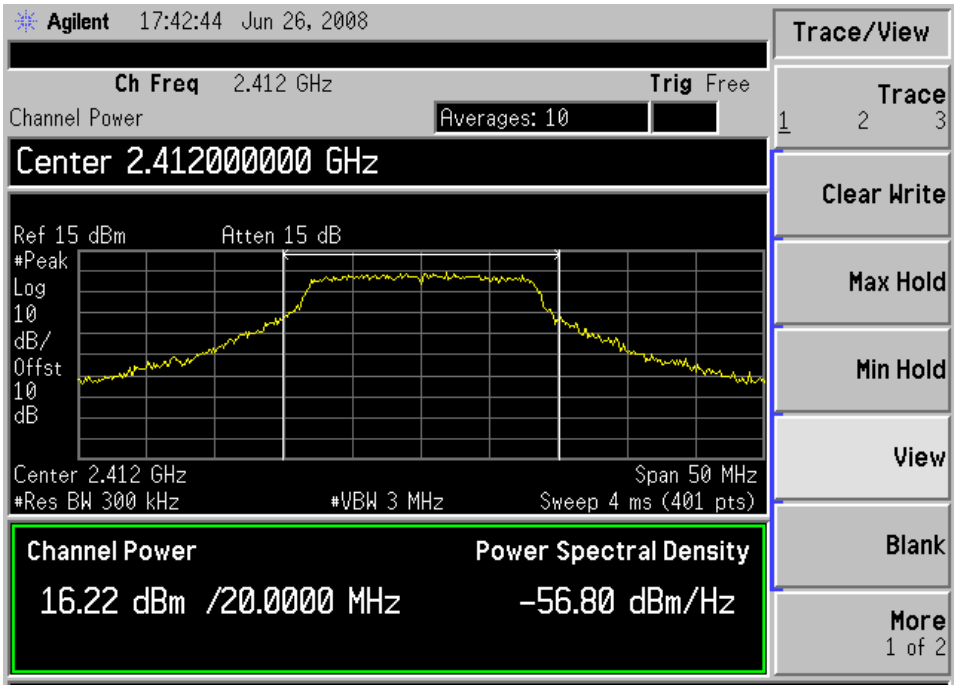


High Channel:

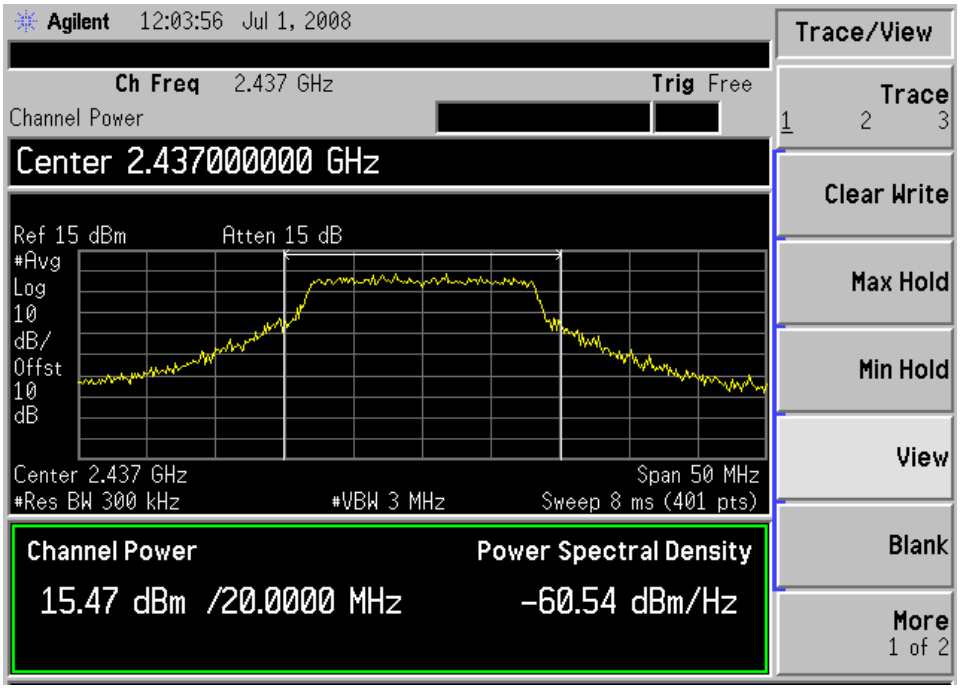


For 802.11g (Chain 1)

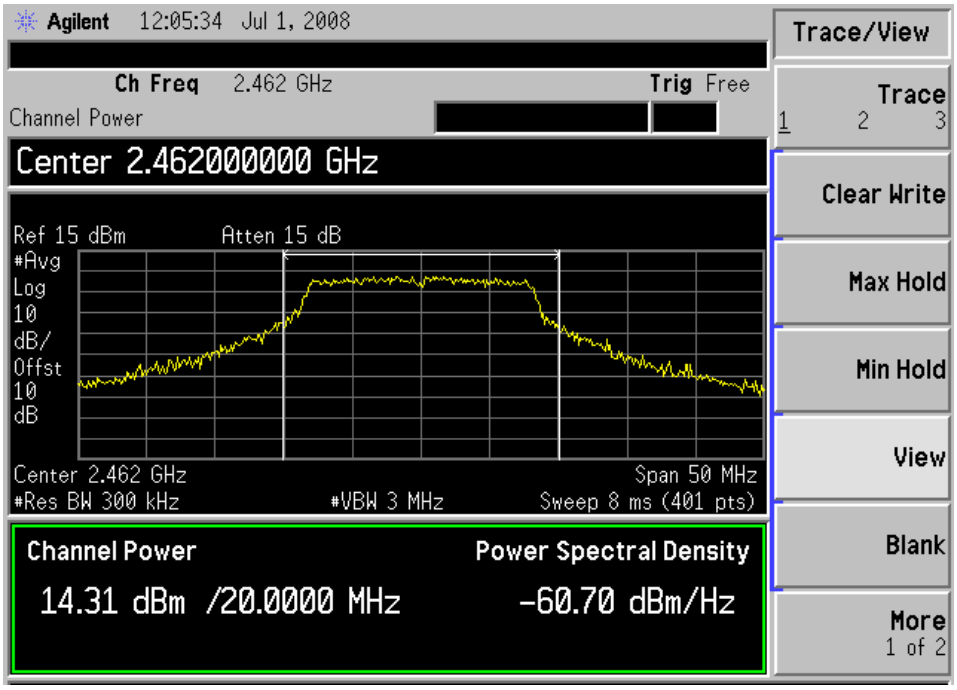
Low Channel:



Middle Channel:

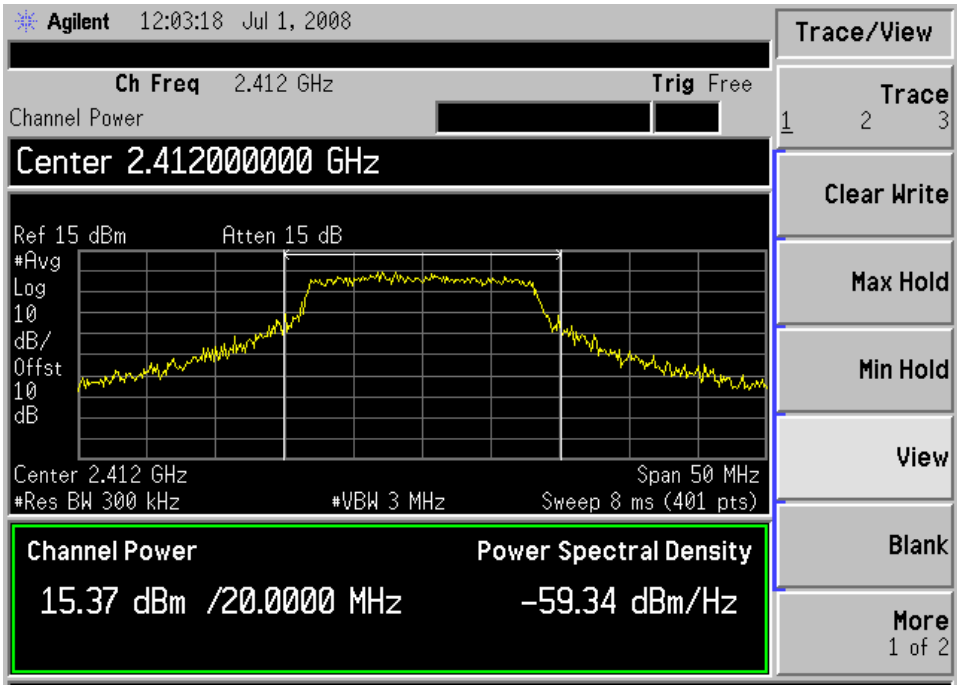


High Channel:

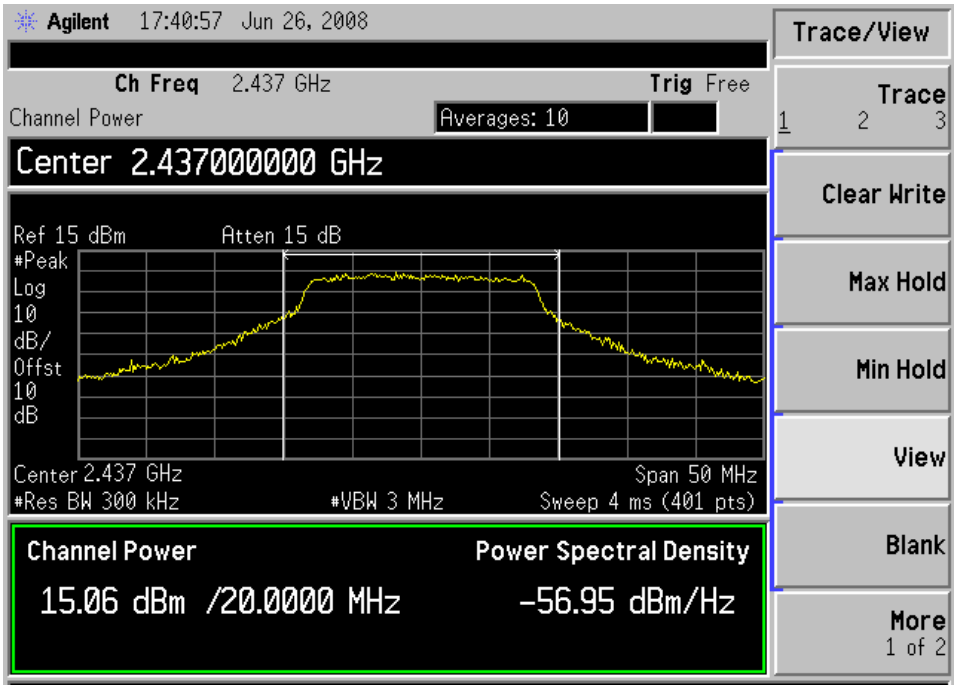


For 802.11g (Chain 2)

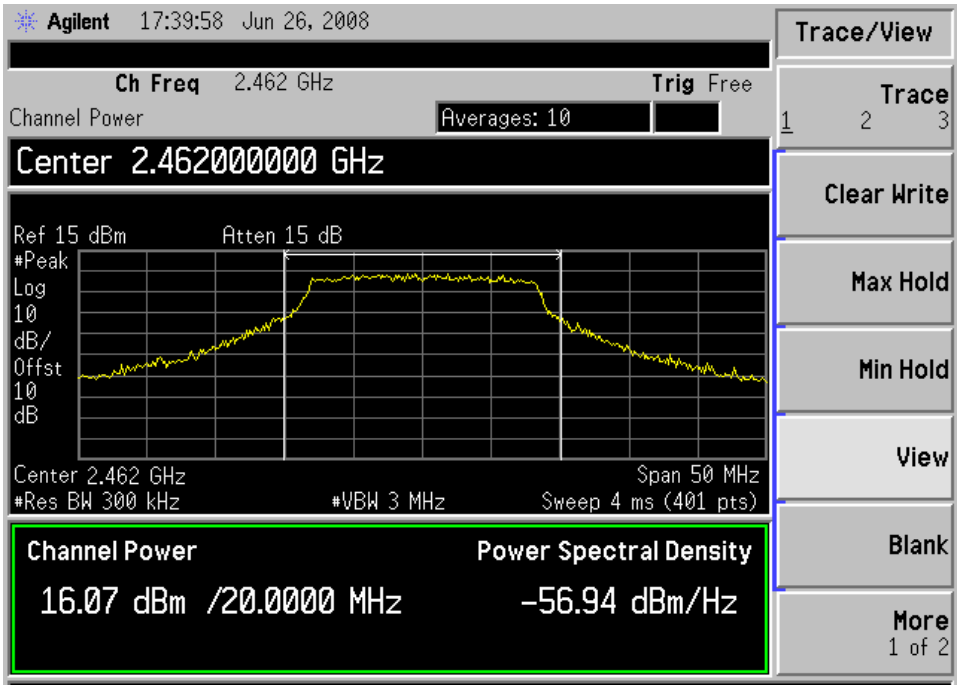
Low Channel:



Middle Channel:

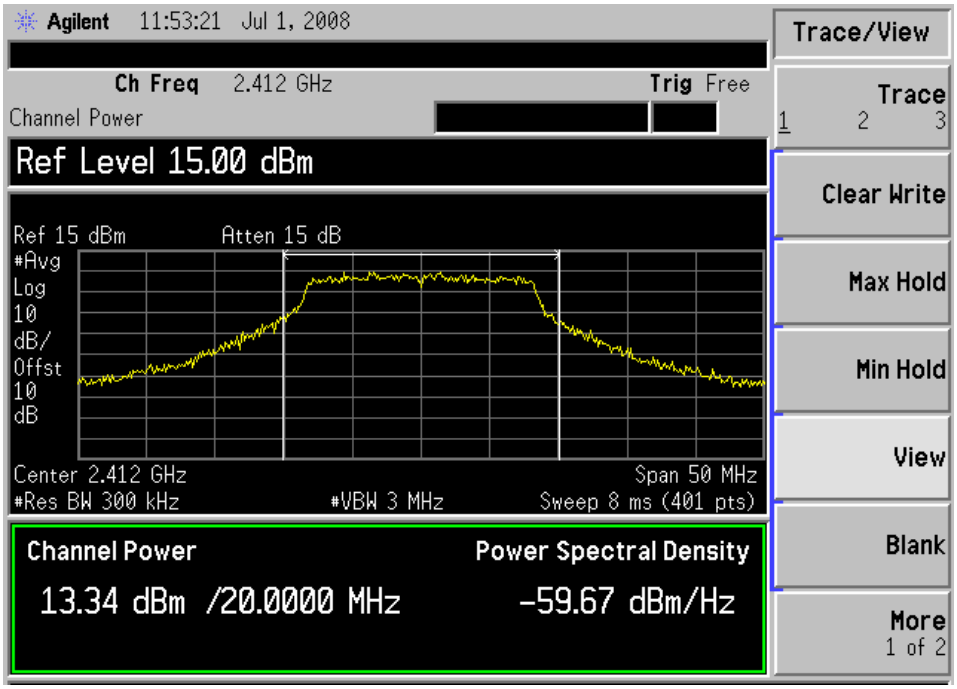


High Channel:

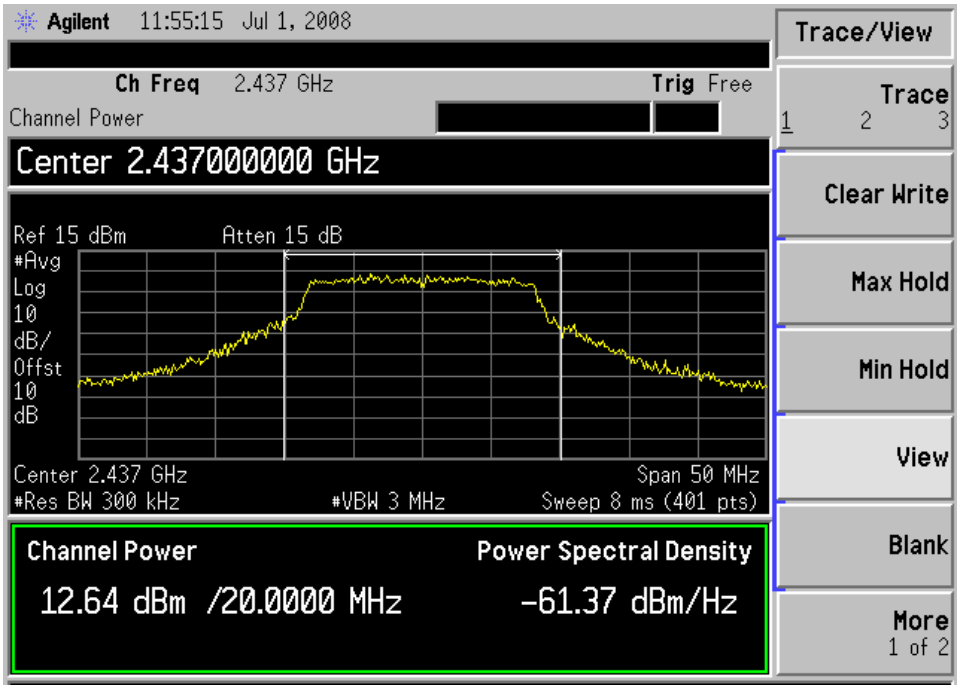


For 802.11n HT-20 (Chain 1)

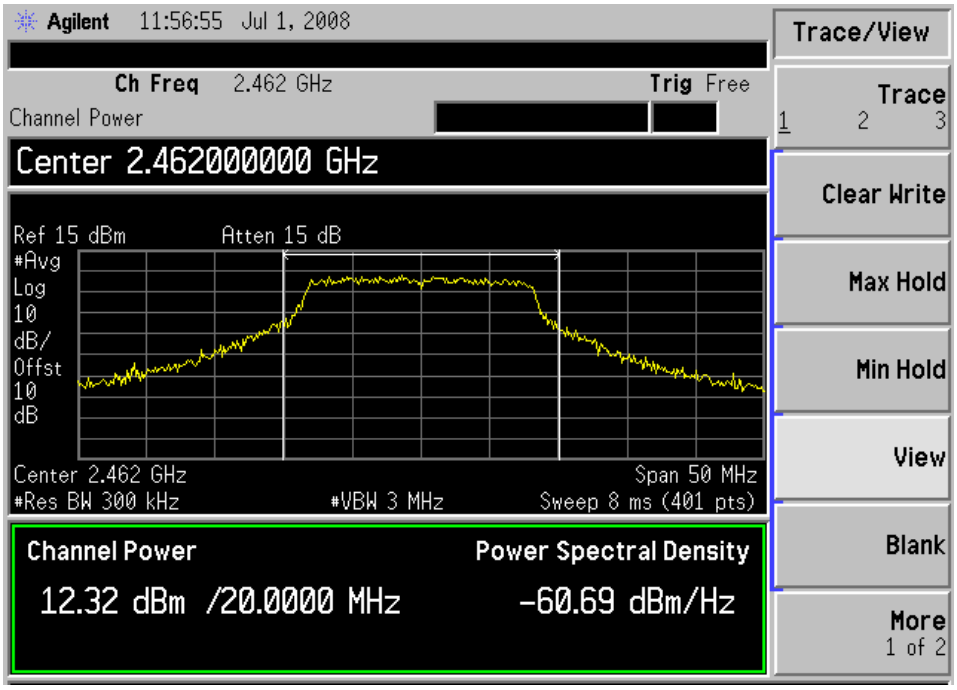
Low Channel:



Middle Channel:

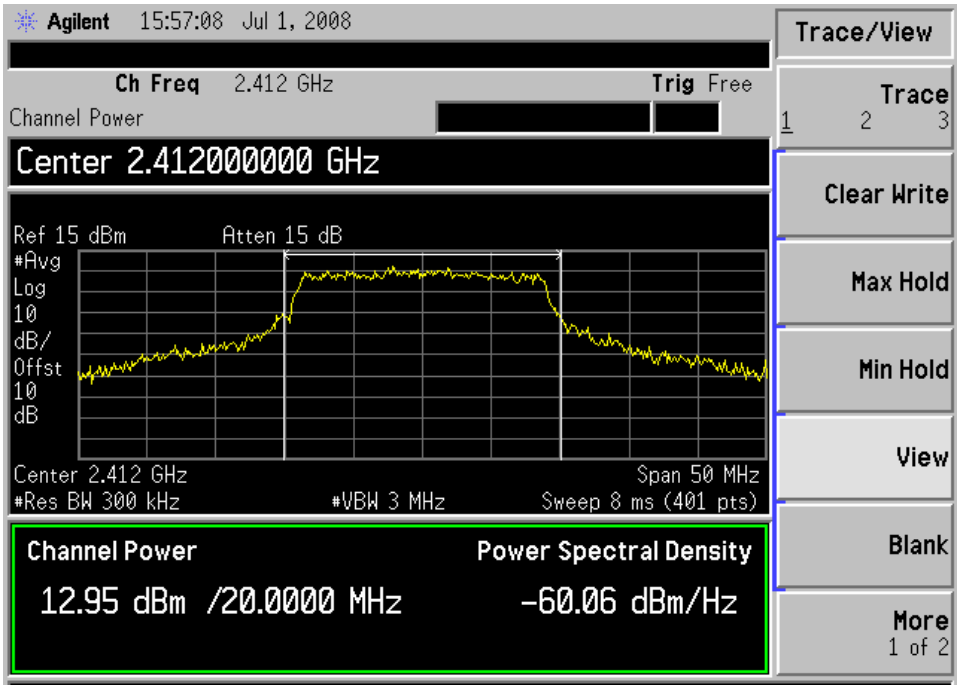


High Channel:

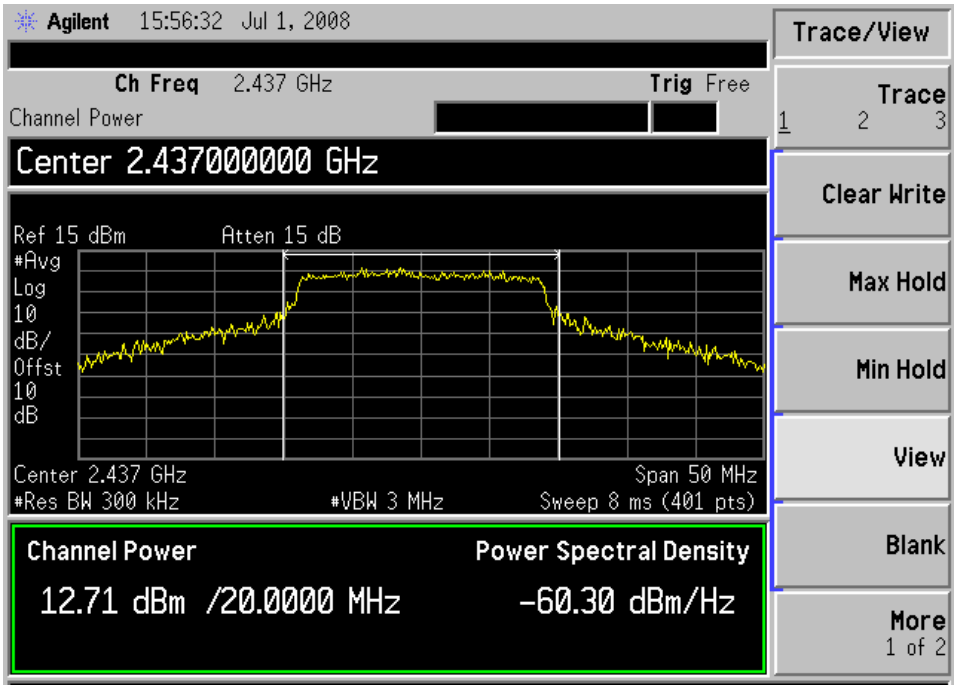


For 802.11n HT-20 (Chain 2)

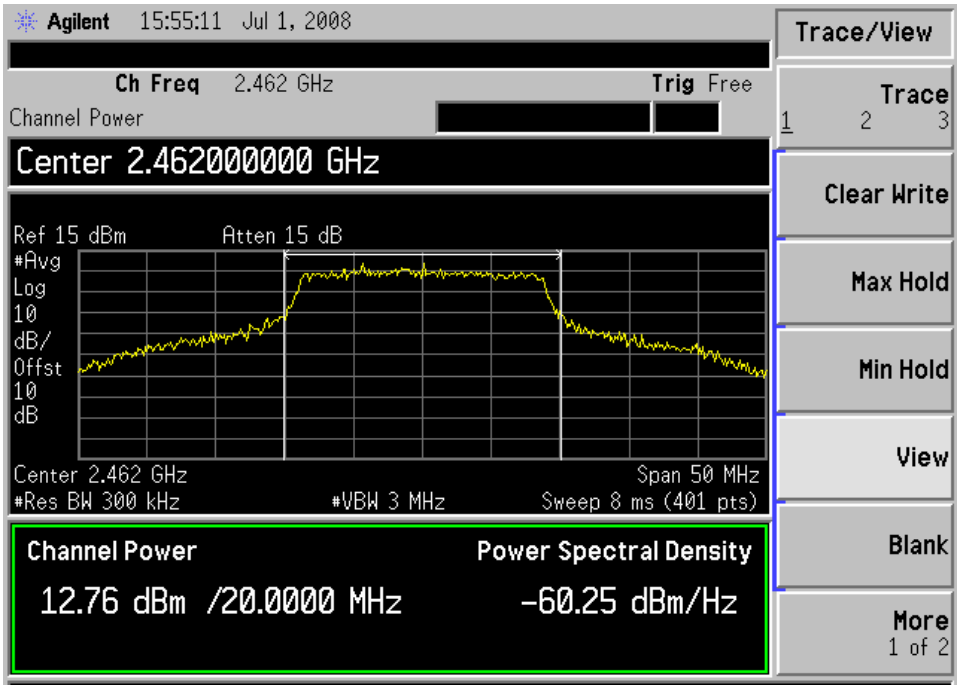
Low Channel:



Middle Channel:

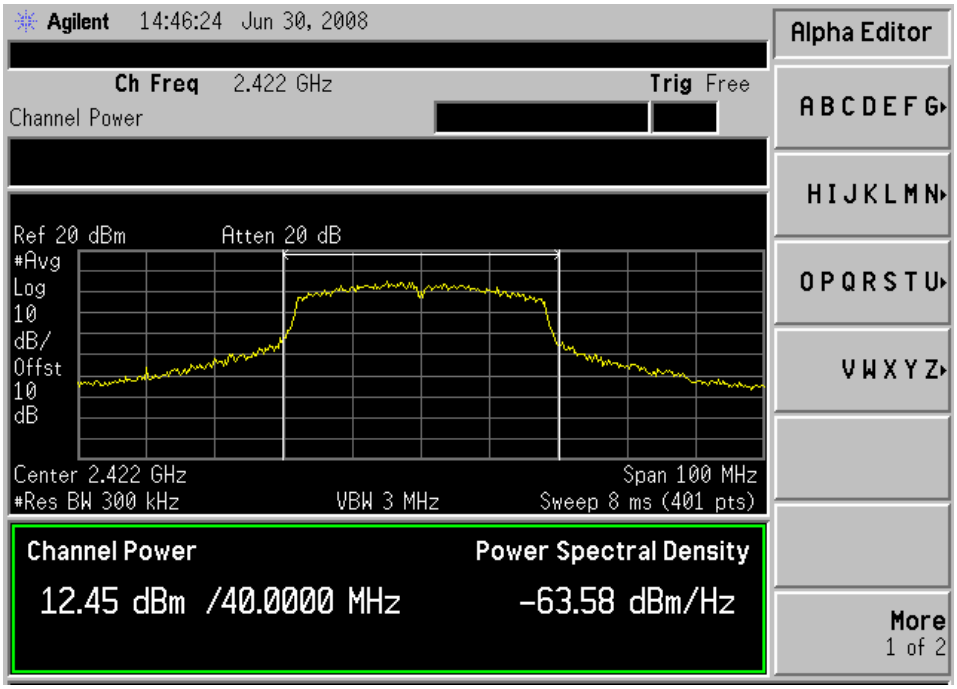


High Channel:

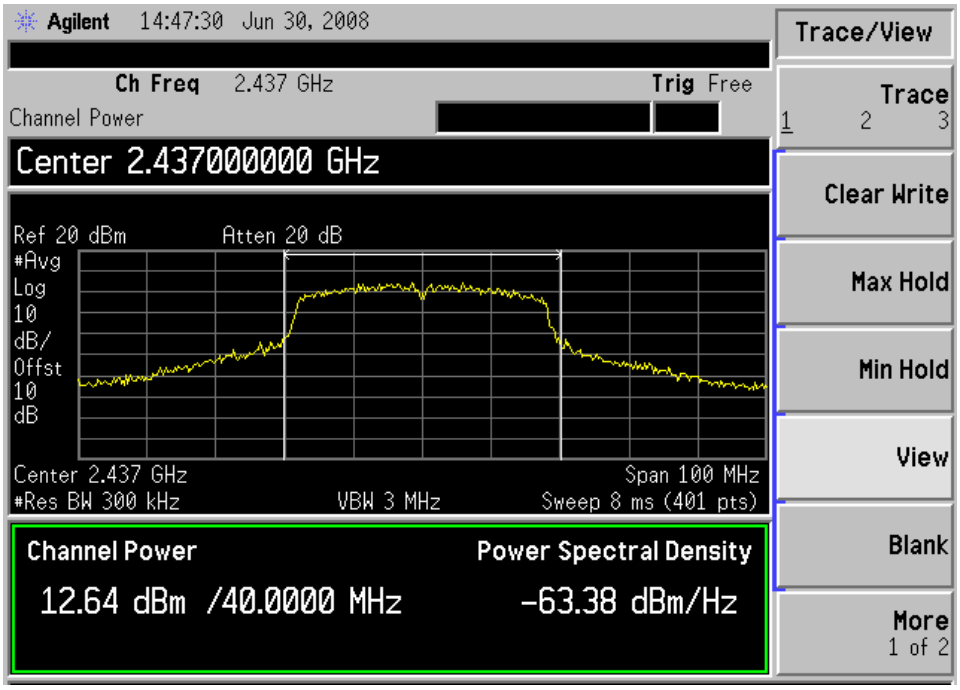


For 802.11n HT-40 (Chain 1)

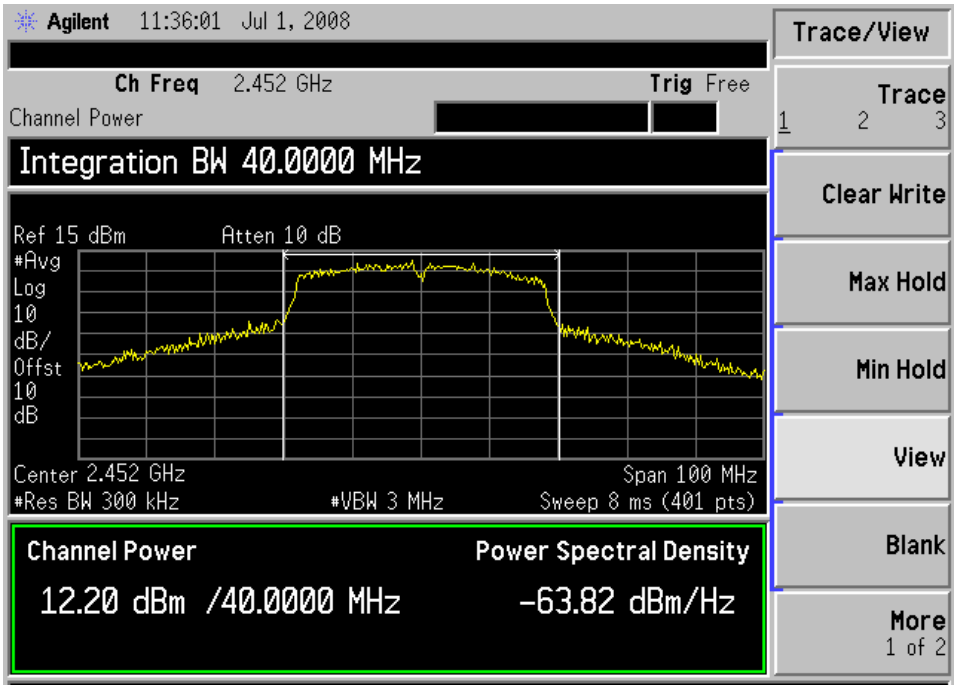
Low Channel:



Middle Channel:

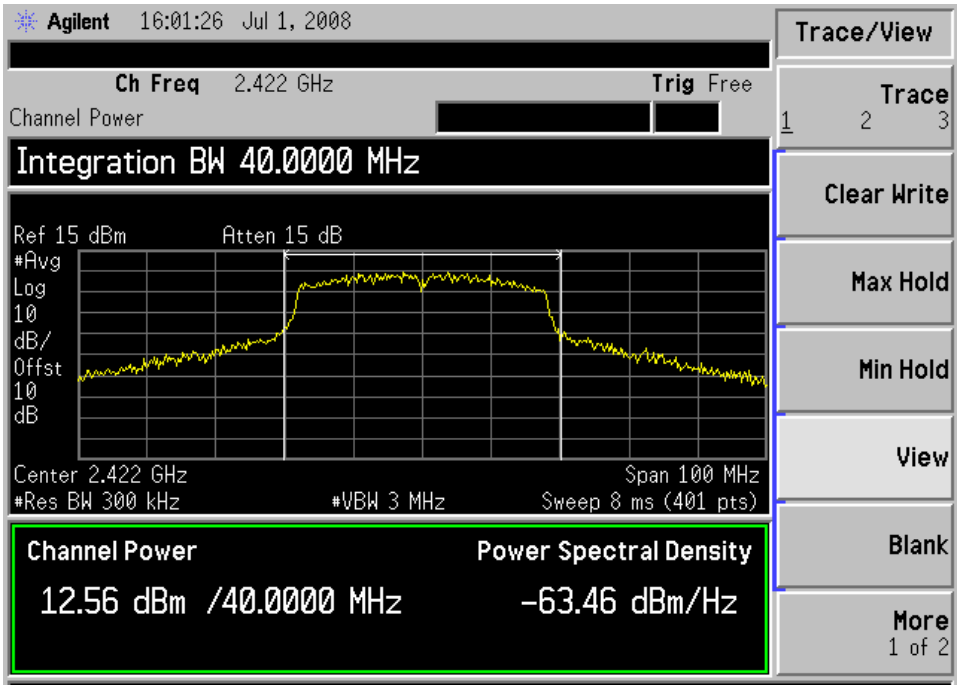


High Channel:

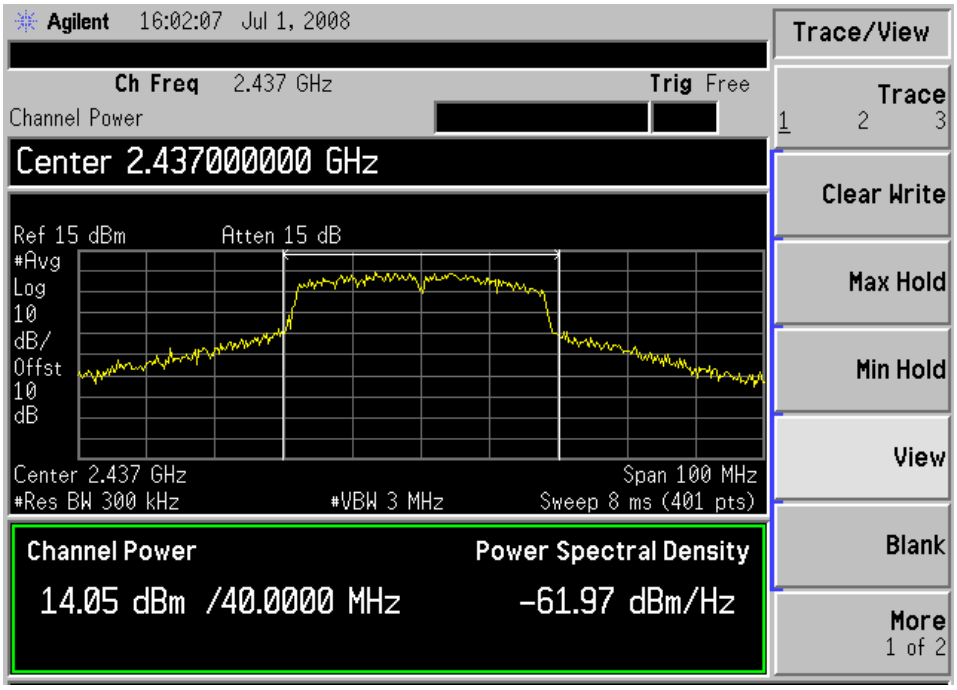


For 802.11n HT-40 (Chain 2)

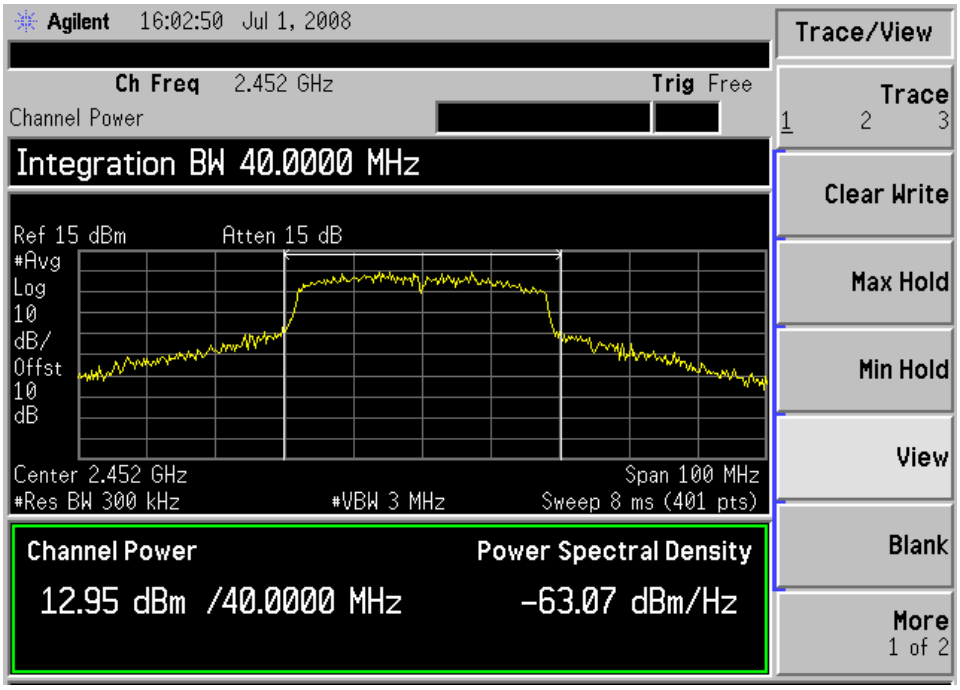
Low Channel:



Middle Channel:



High Channel:



9. FIELD STRENGTH OF SPURIOUS EMISSIONS

9.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±3.0 dB.

9.2 Standard Applicable

According to §15.247(c), 15.205 15.209(b) &15.35 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Section 15.209:
30 - 88 MHz 40 dBuV/m @3M
88 -216 MHz 43.5 dBuV/m @3M
216 -960 MHz 46 dBuV/m @3M
Above 960 MHz 54dBuV/m @3M

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

9.3 Test Equipment List and Details

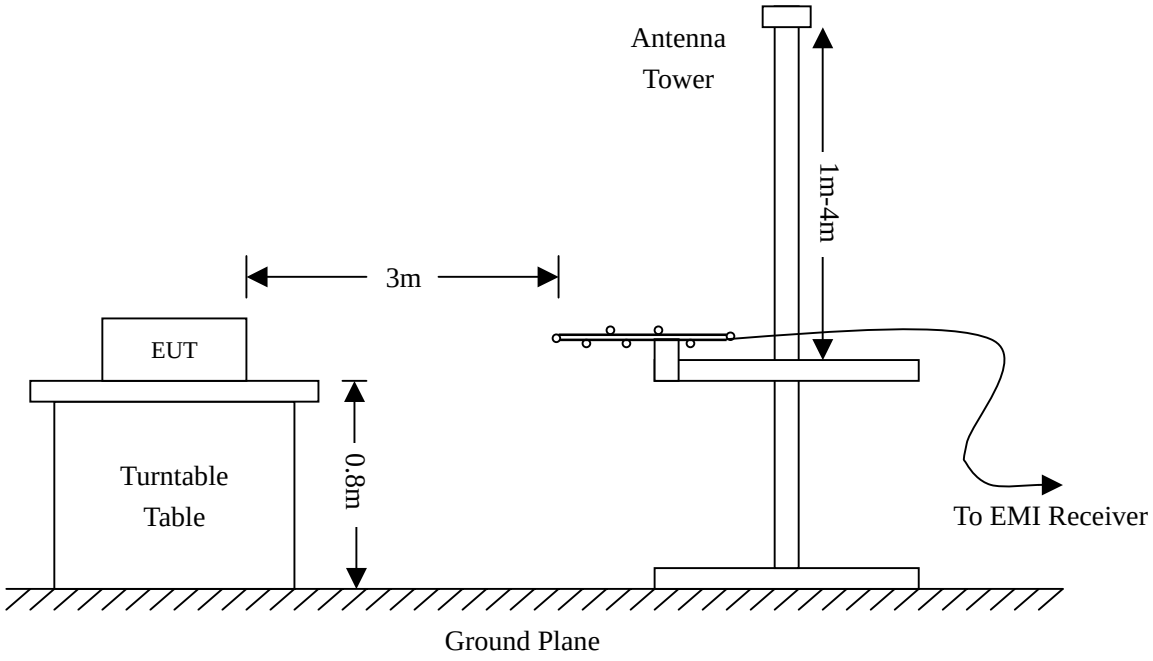
Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-01-25	2009-01-24
Positioning Controller	C&C	CC-C-1F	N/A	2008-01-25	2009-01-24
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-01-25	2009-01-24
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-01-25	2009-01-24
RF Switch	EM	EMSW18	SW060023	2008-01-25	2009-01-24
Amplifier	Agilent	8447F	3113A06717	2008-01-25	2009-01-24
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-01-25	2009-01-24
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-01-25	2009-01-24

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

9.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.



9.5 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – FCC Part 15 Limit

9.6 Environmental Conditions

Temperature:	22° C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

9.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst margin of:

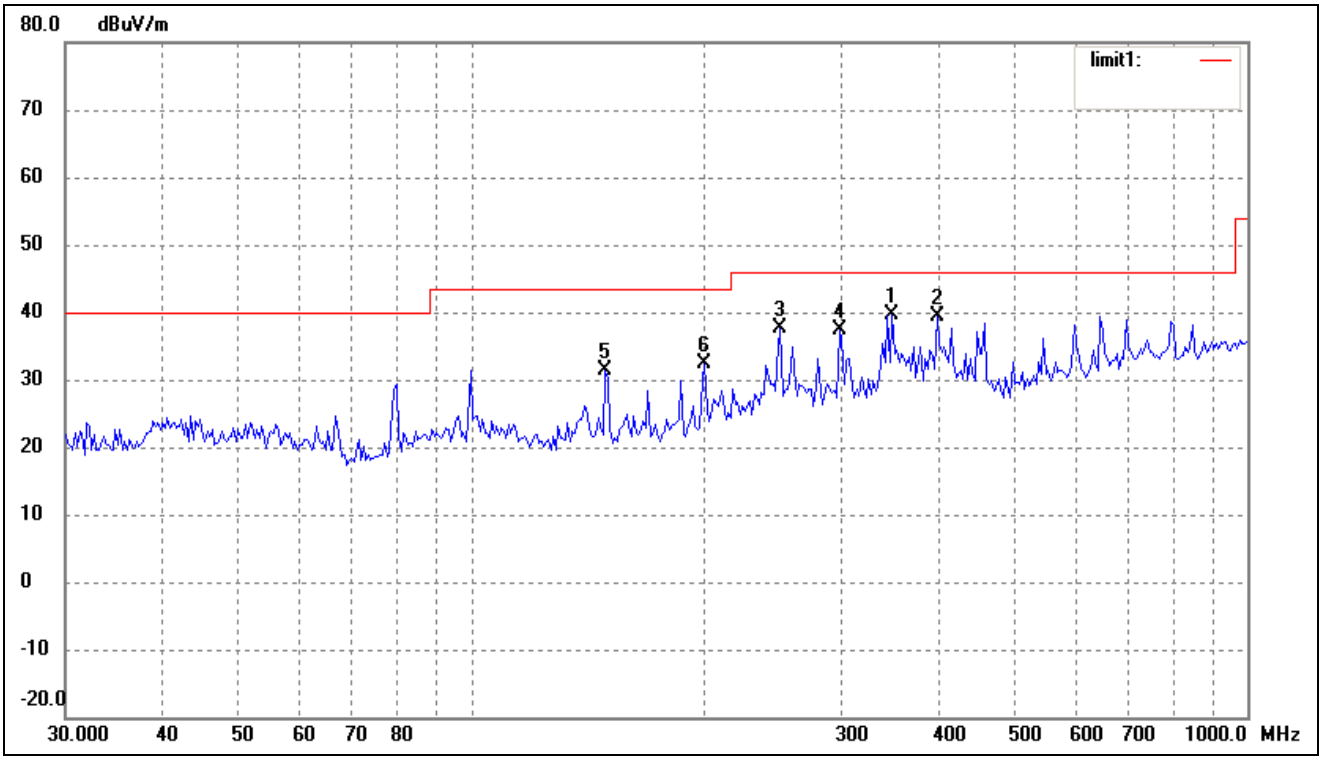
-2.2 dBμV at **4874 MHz** in the **Vertical** polarization, **30 MHz to 25 GHz, 3Meters**

Test Result/Plots:

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11b)

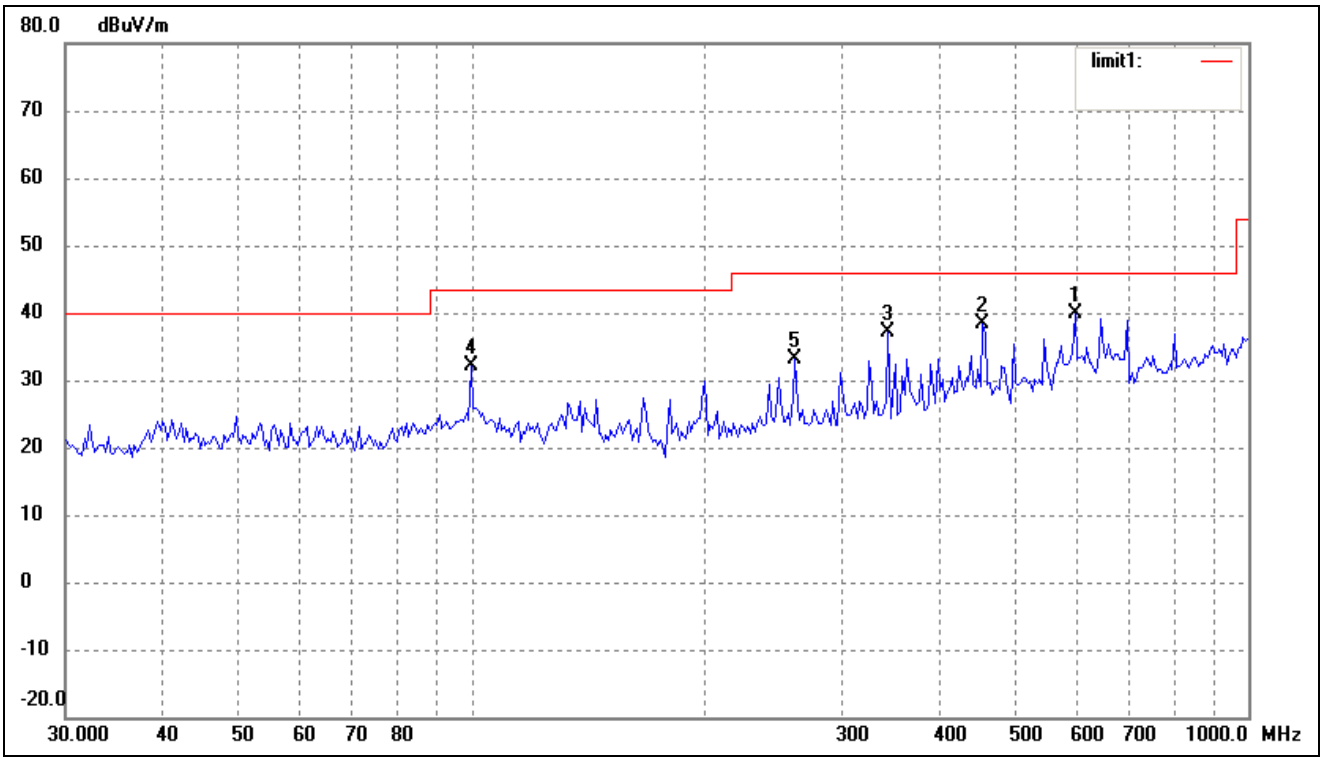
Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	348.5145	28.92	10.63	39.55	46.00	-6.45	85	100	peak
2	398.2962	27.93	11.40	39.33	46.00	-6.67	120	100	peak
3	250.4859	28.99	8.70	37.69	46.00	-8.31	0	190	peak
4	298.5932	27.55	9.75	37.30	46.00	-8.70	360	150	peak
5	148.9175	27.24	4.07	31.31	43.50	-12.19	0	100	peak
6	200.0432	25.80	6.58	32.38	43.50	-11.12	115	120	peak

Test mode: Transmitting (802.11b)

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	Factor(dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	598.7067	25.77	14.15	39.92	46.00	-6.08	10	100	peak
2	455.1888	27.07	11.39	38.46	46.00	-7.54	180	180	peak
3	343.6506	26.61	10.52	37.13	46.00	-8.87	360	190	peak
4	99.7676	23.77	8.41	32.18	43.50	-11.32	55	150	peak
5	261.2730	24.08	8.98	33.06	46.00	-12.94	0	100	peak

Spurious Emission Above 1GHz

Test mode: Transmitting (802.11b)

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	AV	44	270	V	34.1	5.2	33.0	50.3	54	-3.7
4824.0	AV	42	90	H	37.4	5.2	33.0	51.6	54	-2.4
7236.0	AV	39.8	60	H	34.1	6.1	33.5	46.5	54	-7.5
7236.0	AV	35.9	45	V	37.4	6.1	33.5	45.9	54	-8.1
4824.0	PK	54.9	90	V	34.1	5.2	33.0	61.2	74	-12.8
4824.0	PK	53.4	45	H	34.1	5.2	33.0	59.7	74	-14.3
7236.0	PK	45.8	270	V	37.4	6.1	33.5	55.8	74	-18.2
7236.0	PK	46.5	180	H	37.4	6.1	33.5	56.5	74	-17.5
2412.0	AV	104.6	60	H	29.1	3.7	34.0	103.4		(Fund.)
2412.0	AV	106.7	270	V	29.1	3.7	34.0	105.5		(Fund.)
2412.0	PK	111.7	45	H	29.1	3.7	34.0	110.5		(Fund.)
2412.0	PK	111.9	90	V	29.1	3.7	34.0	110.7		(Fund.)
Middle Channel (1G to 25GHz)										
4874.0	AV	45.5	90	v	34.1	5.2	33.0	51.8	54	-2.2
7311.0	AV	40.9	270	v	37.4	6.1	33.5	50.9	54	-3.1
4874.0	AV	42.4	45	h	34.1	5.2	33.0	48.7	54	-5.3
7311.0	AV	37.2	60	h	37.4	6.1	33.5	47.2	54	-6.8
4874.0	PK	56.6	270	v	34.1	5.2	33.0	62.9	74	-11.1
7311.0	PK	51.6	45	v	37.4	6.1	33.5	61.6	74	-12.4
4874.0	PK	52.4	180	h	34.1	5.2	33.0	58.7	74	-15.3
7311.0	PK	49.4	45	h	37.4	6.1	33.5	59.4	74	-14.6
2437.0	AV	108.4	45	h	29.1	3.7	34.0	107.2		(Fund.)
2437.0	AV	107.5	90	v	29.1	3.7	34.0	106.3		(Fund.)
2437.0	PK	112.7	90	h	29.1	3.7	34.0	111.5		(Fund.)
2437.0	PK	111.6	60	v	29.1	3.7	34.0	110.4		(Fund.)

High Channel (1G to 25GHz)										
4924.0	AV	44.8	90	v	34.1	5.2	33.0	51.1	54	-2.9
7386.0	AV	41.8	270	v	37.4	6.1	33.5	51.8	54	-2.2
4924.0	AV	43.3	60	h	34.1	5.2	33.0	49.6	54	-4.4
7386.0	AV	40	60	h	37.4	6.1	33.5	50.0	54	-4.0
4924.0	PK	58	270	v	34.1	5.2	33.0	64.3	74	-9.7
4924.0	PK	57.5	180	h	34.1	5.2	33.0	63.8	74	-10.2
7386.0	PK	50.2	45	v	37.4	6.1	33.5	60.2	74	-13.8
7386.0	PK	51.5	45	h	37.4	6.1	33.5	61.5	74	-12.5
2462.0	AV	109.4	45	h	29.1	3.7	34.0	108.2		(Fund.)
2462.0	AV	110	90	v	29.1	3.7	34.0	108.8		(Fund.)
2462.0	PK	113.4	90	h	29.1	3.7	34.0	112.2		(Fund.)
2462.0	PK	114.8	90	v	29.1	3.7	34.0	113.6		(Fund.)

Note 1: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5^{th} Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.
Note 2: Emissions attenuated more than 20 dB below the permissible value are not reported. Since the emission's level of 802.11g and 802.11n is lower than the 802.11b, the emissions data of 802.11b is showed only.

10. OUT OF BAND EMISSIONS

10.1 Standard Applicable

According to §15.247 (d) 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.

10.2 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date	Due. Date
Agilent	Spectrum Analyzer	E4402B	US41192821	2008-01-25	2009-01-24
Spectrum Analyzer	ROHDE&SCHWARZ	FSEA20	DE25181	2008-01-25	2009-01-24
Positioning Controller	C&C	CC-C-1F	N/A	2008-01-25	2009-01-24
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2008-01-25	2009-01-24
Horn Antenna	SCHWARZBECK	BBHX 9120	9120-426	2008-01-25	2009-01-24
RF Switch	EM	EMSW18	SW060023	2008-01-25	2009-01-24
Amplifier	Agilent	8447F	3113A06717	2008-01-25	2009-01-24
Coaxial Cable	SCHWARZBECK	AK9513	9513-10	2008-01-25	2009-01-24
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	25498514	2008-01-25	2009-01-24

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

10.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW, VBW=100KHz, Span=50MHz, Sweep = auto
3. Set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, then mark the higher-level emission for comparing with the FCC rules.

10.4 Environmental Conditions

Temperature:	21° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

10.5 Summary of Test Results/Plots

Test mode	Frequency MHz	Limit dBuV /dB	Result
802. 11b (Chain 1)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass
802. 11b (Chain 2)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass

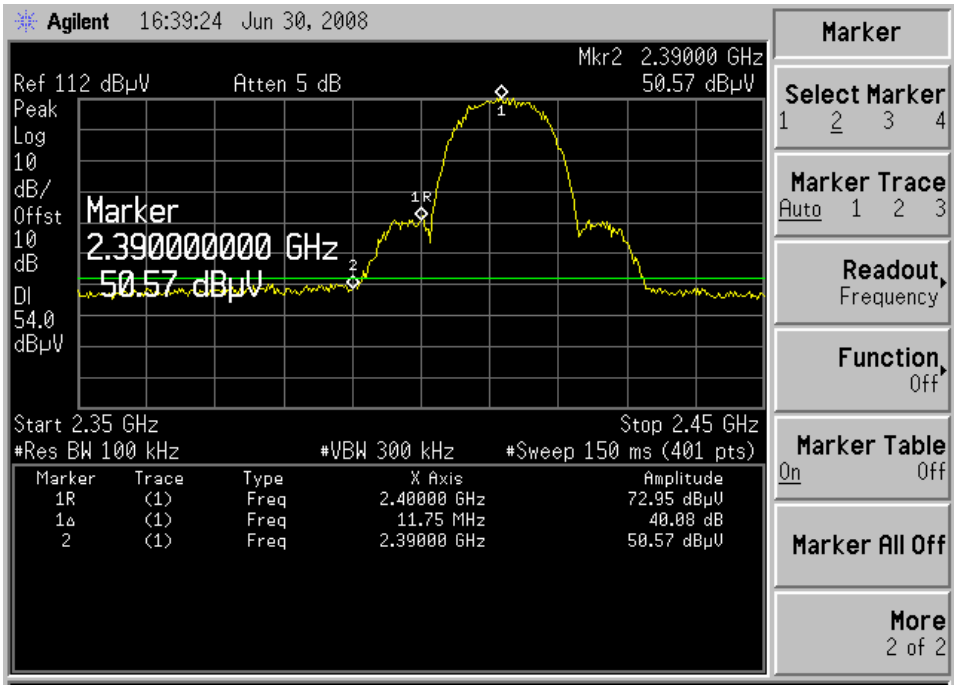
Test mode	Frequency MHz	Limit dBuV /dB	Result
802. 11g (Chain 1)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass
802. 11g (Chain 2)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass

Test mode	Frequency MHz	Limit dBuV /dB	Result
802. 11n HT-20 (Chain 1)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass
802. 11n HT-20 (Chain 2)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass

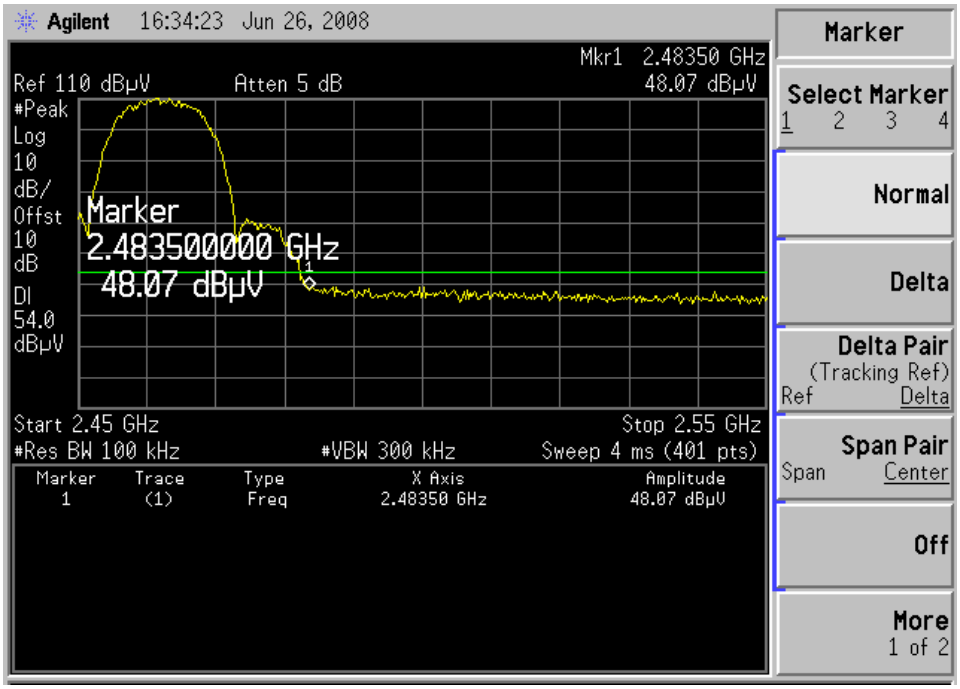
Test mode	Frequency MHz	Limit dBuV /dB	Result
802. 11n HT-40 (Chain 1)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass
802. 11n HT-40 (Chain 2)	2390.00	<54dBuv	Pass
	2400.00	>20dB	Pass
	2483.50	<54dBuv	Pass

For 802.11b (Chain 1)

Lowest Bandedge

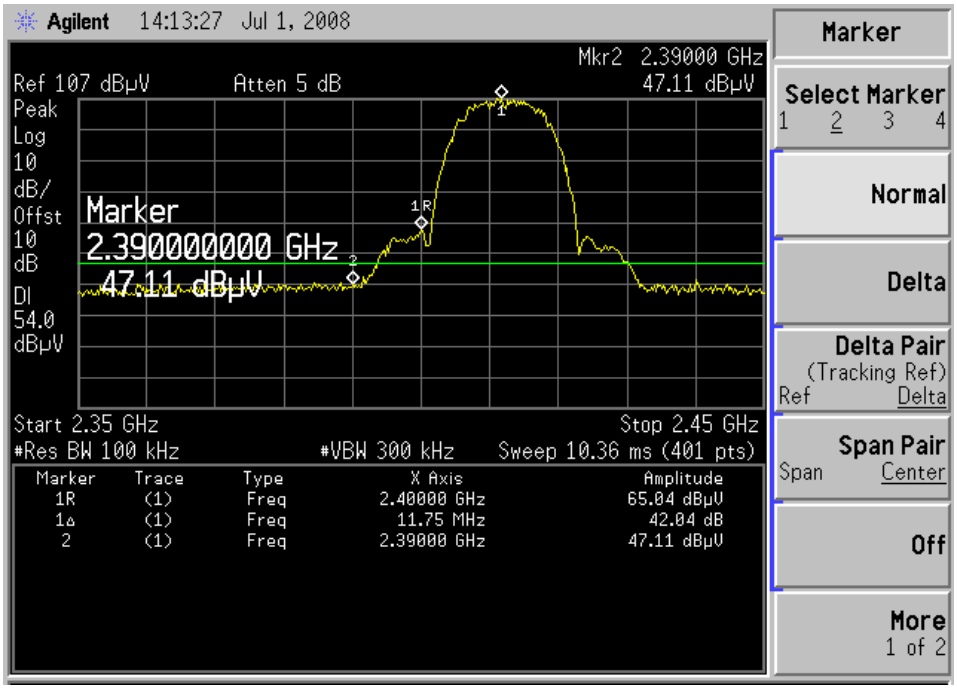


Highest Bandedge

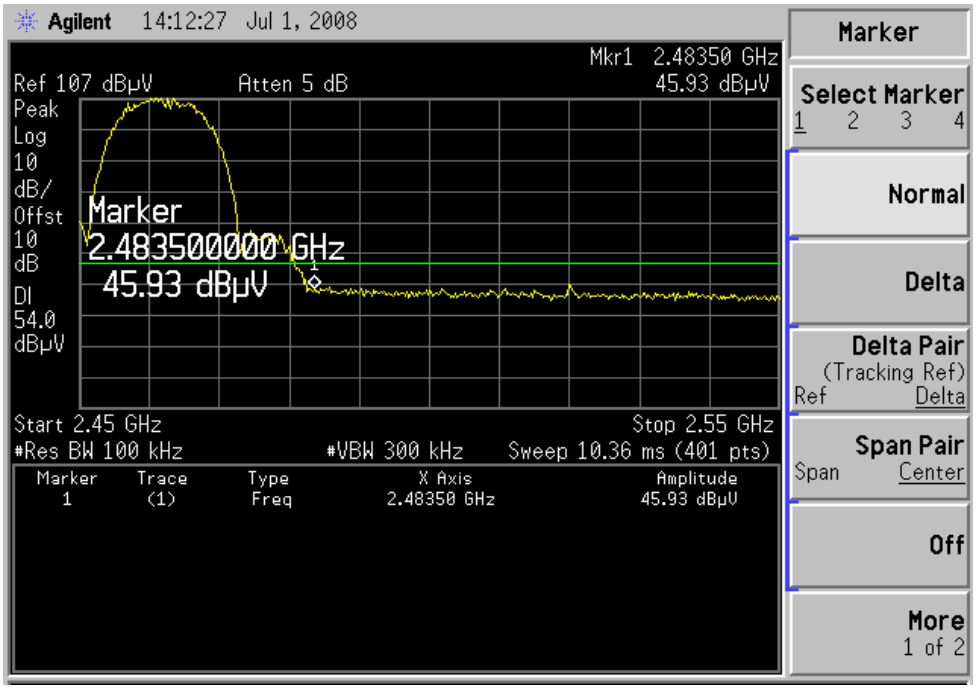


For 802.11b (Chain 2)

Lowest Bandedge

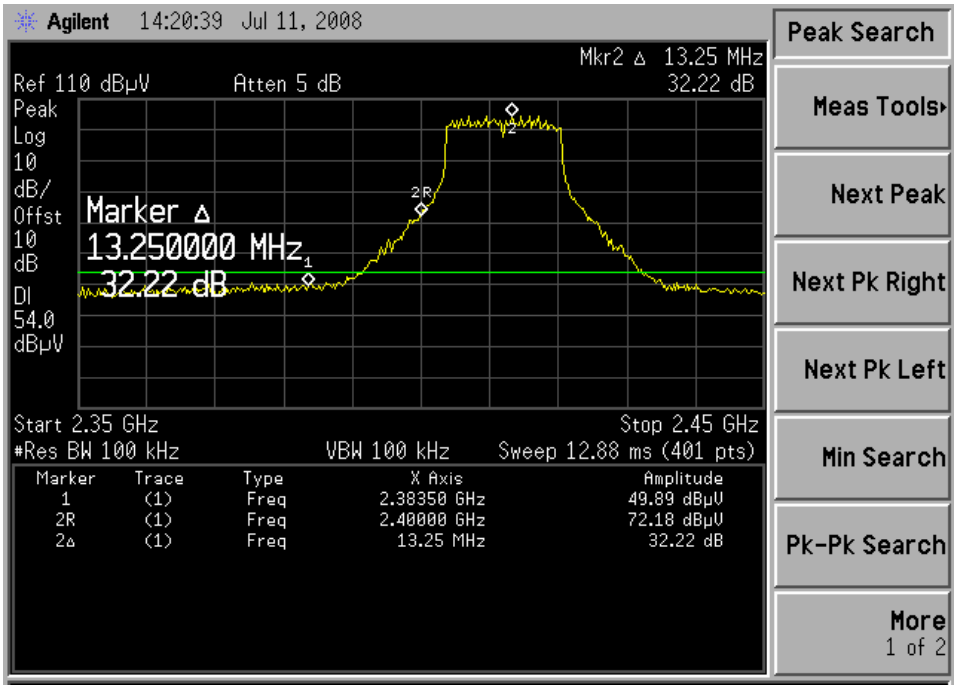


Highest Bandedge

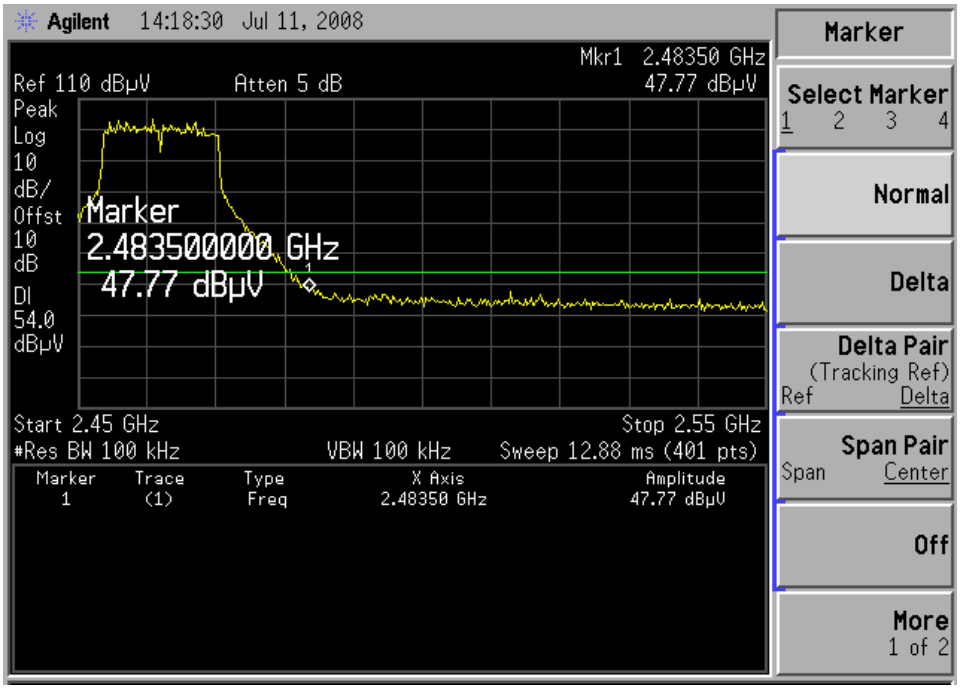


For 802.11g (Chain 1)

Lowest Bandedge

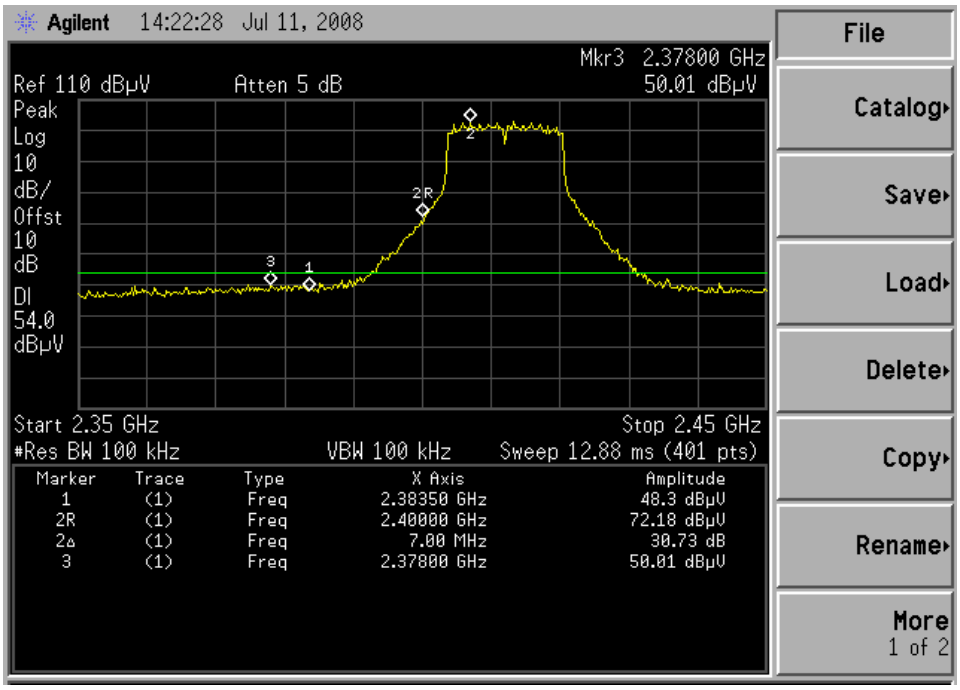


Highest Bandedge

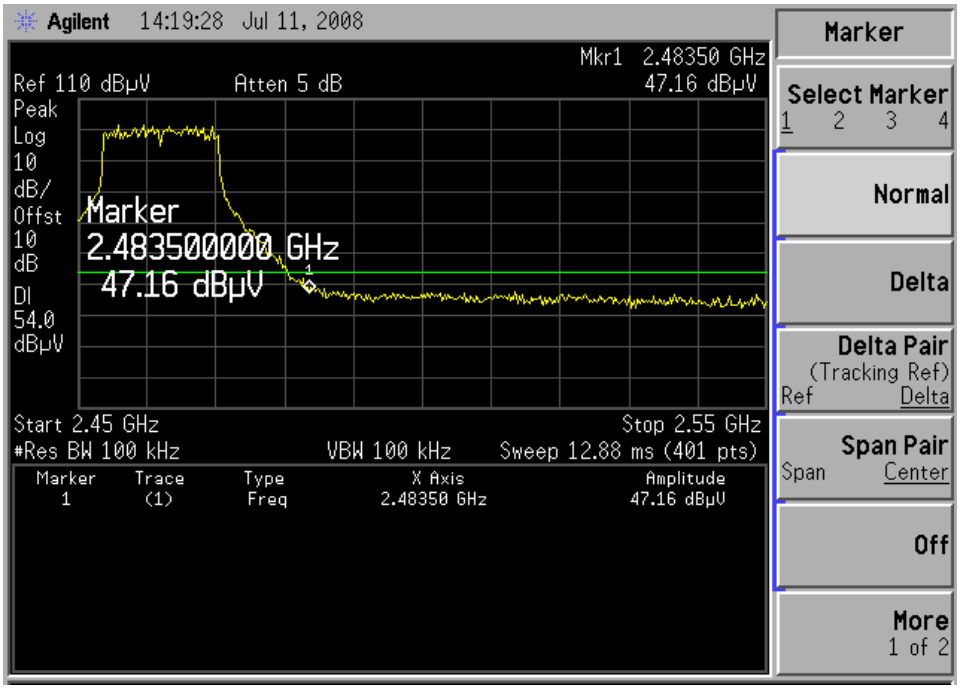


For 802.11g (Chain 2)

Lowest Bandedge

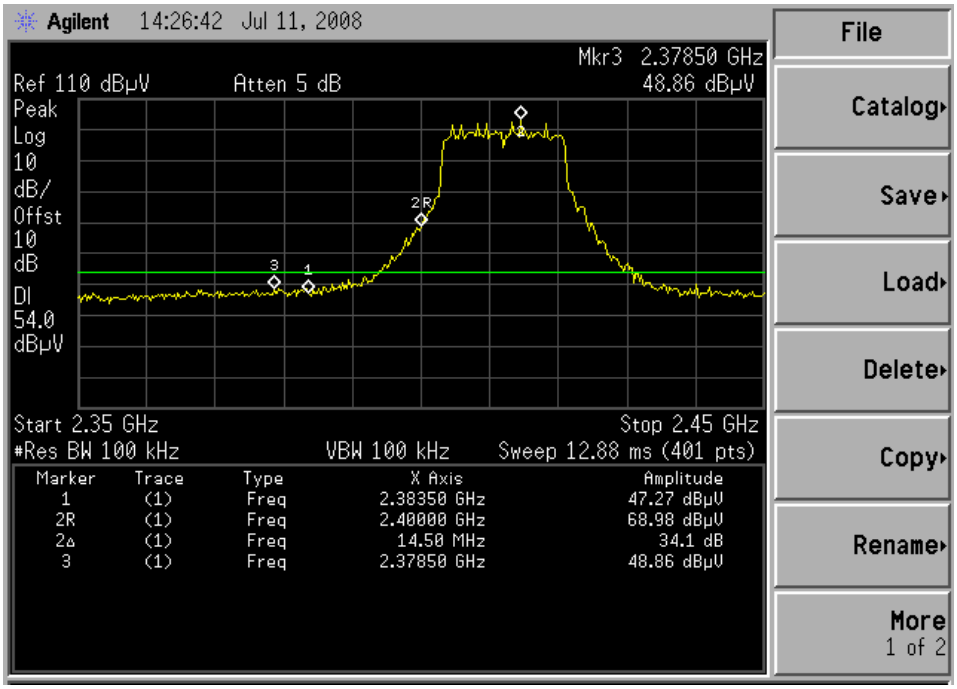


Highest Bandedge

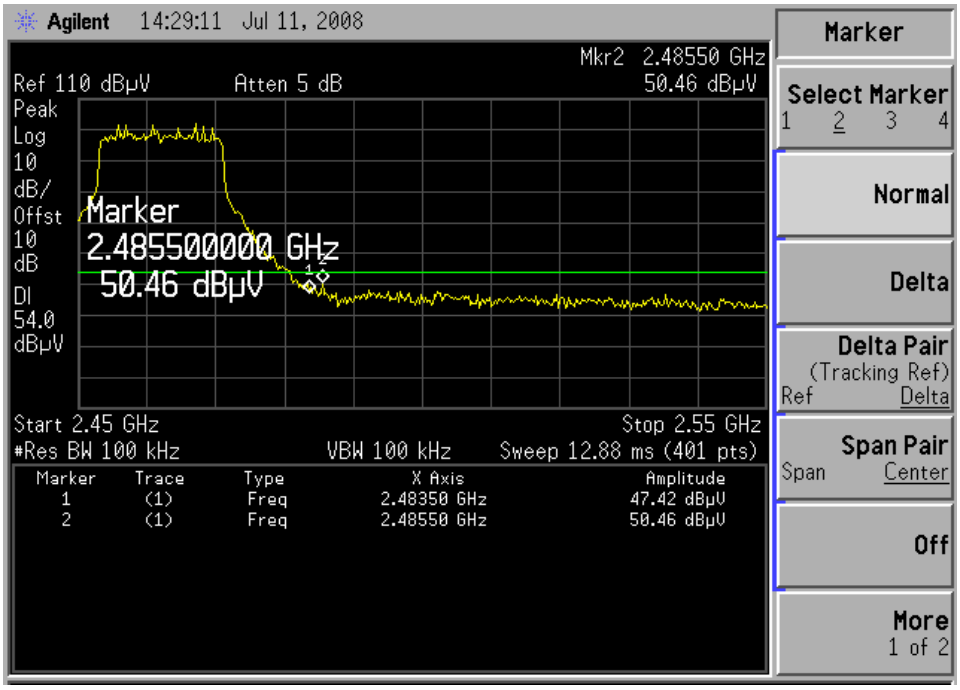


For 802.11n HT-20 (Chain 1)

Lowest Bandedge

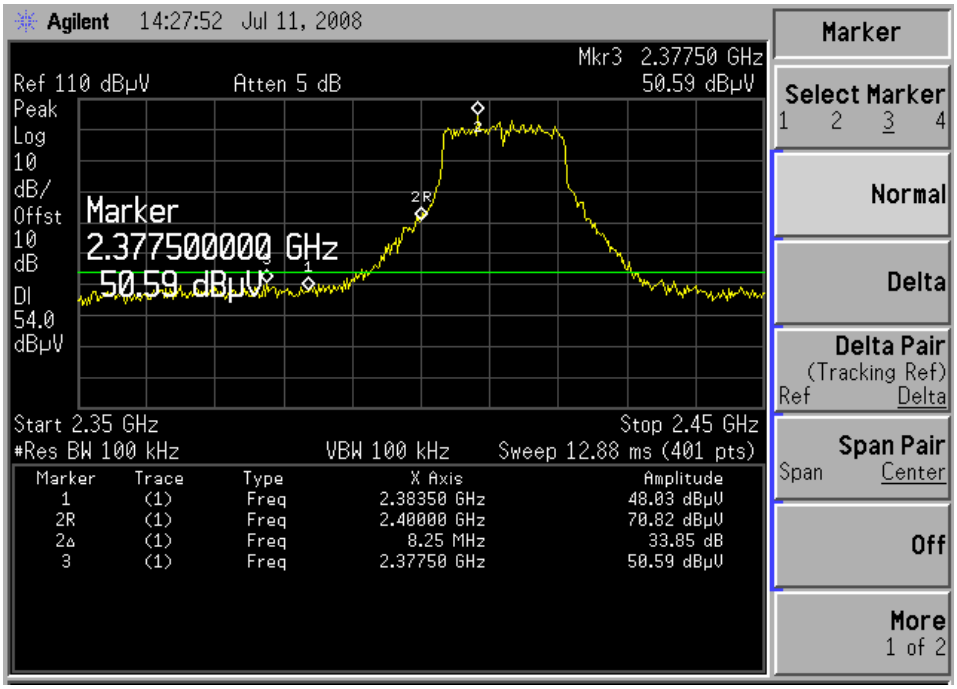


Highest Bandedge

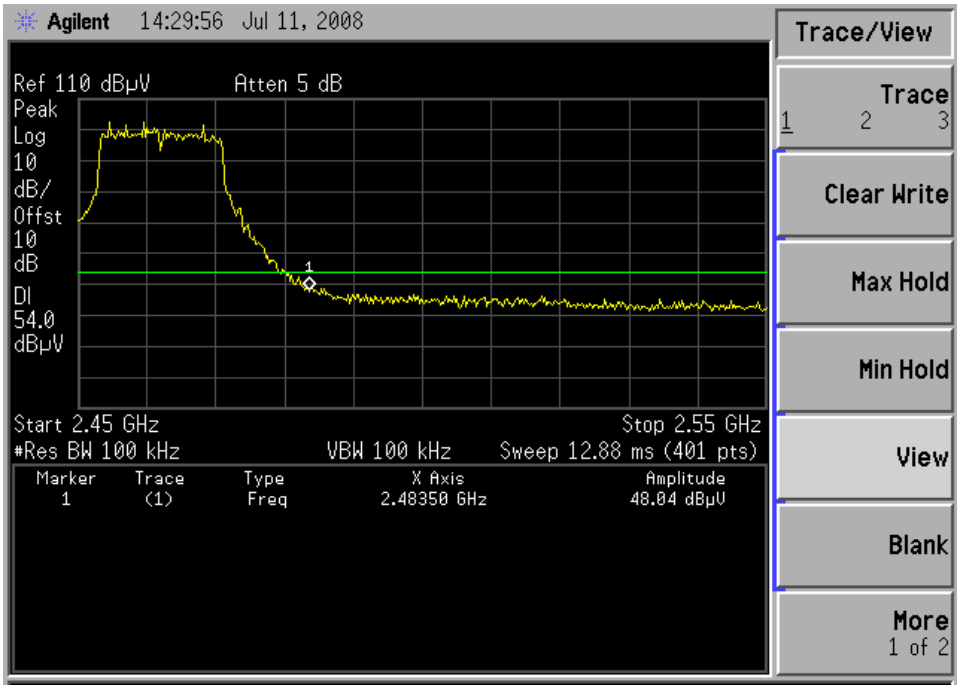


For 802.11n HT-20 (Chain 2)

Lowest Bandedge

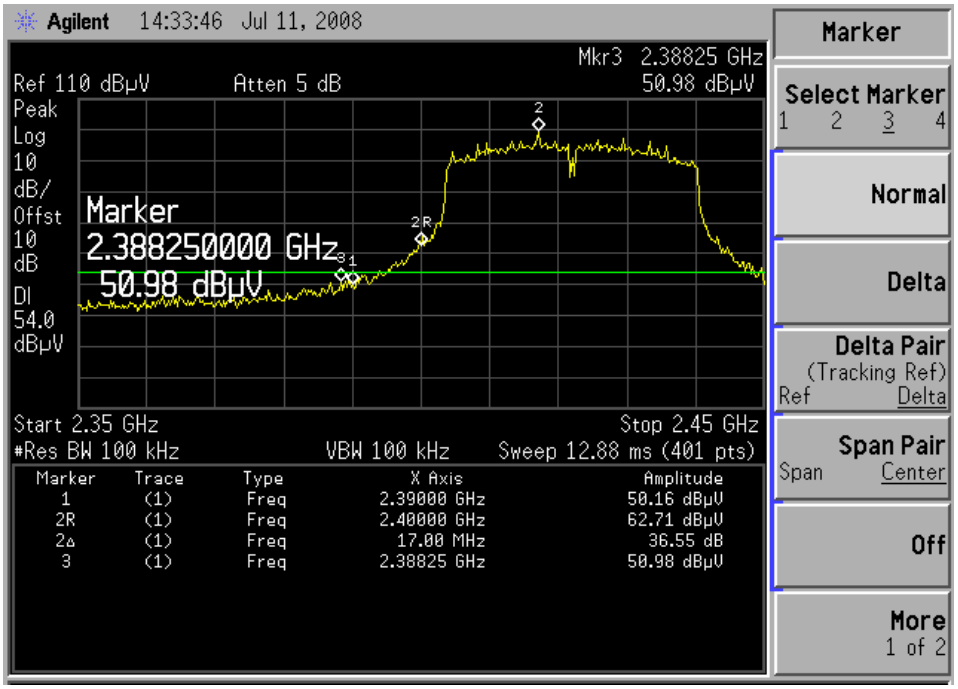


Highest Bandedge

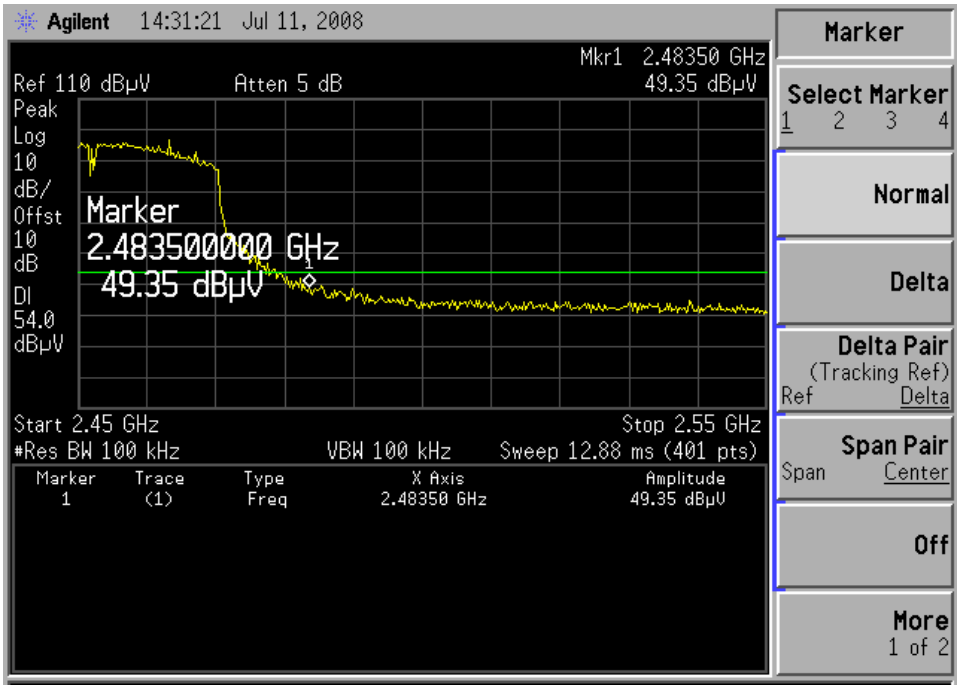


For 802.11n HT-40 (Chain 1)

Lowest Bandedge

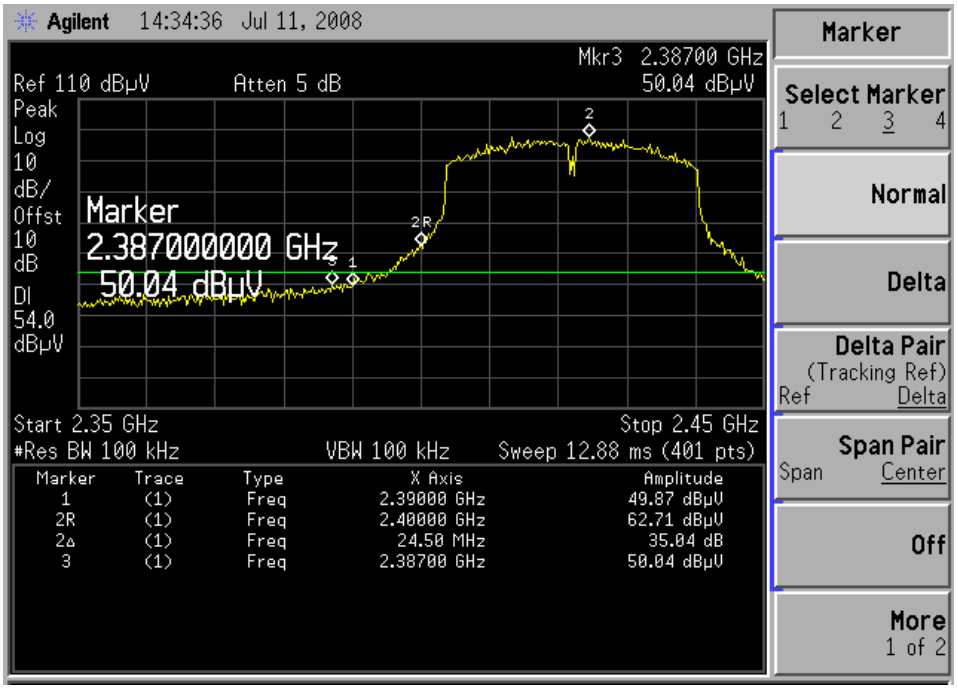


Highest Bandedge

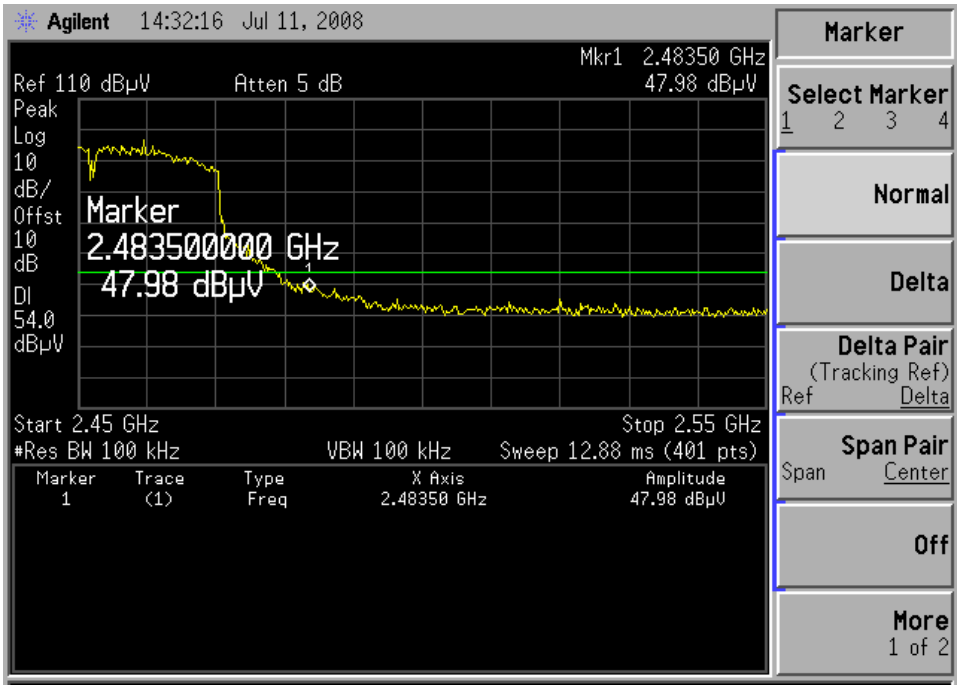


For 802.11n HT-40 (Chain 2)

Lowest Bandedge



Highest Bandedge



******* END OF REPORT *******