

FCC Part 15C

Measurement and Test Report

For

Trend-tech Technology Co., Limited

Room 205, Building No. 5, YaoXing HuaYuan, XinHuiDaDao No. 45,
XinHui District, JiangMen City, GuangDong Province,
China | Postage Code:529100

FCC ID: 2ABM8-WNA015

FCC Rule(s):	<u>FCC Part 15C</u>
Product Description:	<u>AC1200 Dual Band WiFi PCI-e Adapter</u>
Tested Model:	<u>WNA015</u>
Report No.:	<u>STR16058159I-1</u>
Tested Date:	<u>2015-05-20 to 2016-06-18</u>
Issued Date:	<u>2016-06-21</u>
Tested By:	<u>Irving Liu / Engineer</u>
Reviewed By:	<u>Suan Su / Engineer</u>
Approved & Authorized By:	<u>Jandy So / PSQ Manager</u>
Prepared By:	<p>Shenzhen SEM.Test Technology Co., Ltd. 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101) Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn</p>

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

TABLE OF CONTENTS

1. GENERAL INFORMATION	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
1.2 TEST STANDARDS.....	4
1.3 TEST METHODOLOGY.....	4
1.4 TEST FACILITY	4
1.5 EUT SETUP AND TEST MODE	5
1.6 TEST EQUIPMENT LIST AND DETAILS	5
2. SUMMARY OF TEST RESULTS	6
3. RF EXPOSURE	7
3.1 STANDARD APPLICABLE.....	7
3.2 TEST RESULT.....	7
4. ANTENNA REQUIREMENT	8
4.1 STANDARD APPLICABLE.....	8
4.2 EVALUATION INFORMATION	8
5. POWER SPECTRAL DENSITY	9
5.1 STANDARD APPLICABLE.....	9
5.2 TEST PROCEDURE.....	9
5.3 ENVIRONMENTAL CONDITIONS	9
5.4 SUMMARY OF TEST RESULTS/PLOTS	10
6. 6DB BANDWIDTH	23
6.1 STANDARD APPLICABLE.....	23
6.2 TEST PROCEDURE.....	23
6.3 ENVIRONMENTAL CONDITIONS	23
6.4 SUMMARY OF TEST RESULTS/PLOTS	23
7. RF OUTPUT POWER	37
7.1 STANDARD APPLICABLE.....	37
7.2 TEST PROCEDURE.....	37
7.3 ENVIRONMENTAL CONDITIONS	37
7.4 SUMMARY OF TEST RESULTS/PLOTS	38
8. FIELD STRENGTH OF SPURIOUS EMISSIONS	51
8.1 MEASUREMENT UNCERTAINTY	51
8.2 STANDARD APPLICABLE.....	51
8.3 TEST PROCEDURE.....	51
8.4 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	53
8.5 ENVIRONMENTAL CONDITIONS	53
8.6 SUMMARY OF TEST RESULTS/PLOTS	53
9. OUT OF BAND EMISSIONS.....	82
9.1 STANDARD APPLICABLE.....	82
9.2 TEST PROCEDURE.....	82
9.3 ENVIRONMENTAL CONDITIONS	83
9.4 SUMMARY OF TEST RESULTS/PLOTS	83
10. CONDUCTED EMISSIONS	115
10.1 MEASUREMENT UNCERTAINTY	115
10.2 TEST PROCEDURE.....	115
10.3 BASIC TEST SETUP BLOCK DIAGRAM.....	115
10.4 ENVIRONMENTAL CONDITIONS	115
10.5 TEST RECEIVER SETUP	116
10.6 SUMMARY OF TEST RESULTS/PLOTS	116
10.7 CONDUCTED EMISSIONS TEST DATA.....	116

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: Trend-tech Technology Co., Limited
Address of applicant: Room 205, Building No. 5, YaoXing HuaYuan, XinHuiDaDao
No. 45, XinHui District, JiangMen City, GuangDong
Province, China | Postage Code:529100

Manufacturer: Trend-tech Technology Co., Limited
Address of manufacturer: Room 205, Building No. 5, YaoXing HuaYuan, XinHuiDaDao
No. 45, XinHui District, JiangMen City, GuangDong
Province, China | Postage Code:529100

General Description of EUT	
Product Name:	AC1200 Dual Band WiFi PCI-e Adapter
Trade Name:	Trend-tech
Model No.:	WNA015
Adding Model(s):	/
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11b, 802.11g, 802.11n
Frequency Range:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
RF Output Power:	22.11dBm (Conducted)
Type of Modulation:	CCK, OFDM, QPSK, BPSK, 16QAM, 64QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 300Mbps
Quantity of Channels:	11 for 802.11b/g/n(HT20); 7 for 802.11n(HT40)
Channel Separation:	5MHz
Type of Antenna:	SMA-reverse Antenna
Antenna Gain:	3.5dBi
Lowest Internal frequency of EUT:	40MHz

1.2 Test Standards

The following report is prepared on behalf of the Trend-tech Technology Co., Limited 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 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices, and ANSI C63.4-2014, 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 measurement guide KDB 558074 D01 V03r05 for digital transmission systems shall be performed also and KDB 662911 D01 Multiple Transmitter Output v02r01 shall be performed also.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology 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 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11b	2412MHz, 2437MHz, 2462MHz
TM2	802.11g	2412MHz, 2437MHz, 2462MHz
TM3	802.11n-HT20	2412MHz, 2437MHz, 2462MHz
TM4	802.11n-HT40	2422MHz, 2437MHz, 2452MHz

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
PC	Dell	VOSTRO 260S	J1XTC3X

1.6 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2016-06-04	2017-06-03
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
Horn Antenna	ETS	3116B	00088203	2016-06-04	2017-06-03
Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2016-06-04	2017-06-03
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2016-06-04	2017-06-03
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2016-06-04	2017-06-03

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 2.1093	RF Exposure	Compliant
§ 15.203; § 15.247(b)(4)(i)	Antenna Requirement	Compliant
§ 15.207(a)	Conducted Emission	Compliant
§ 15.247(e)	Power Spectral Density	Compliant
§ 15.247(a)(2)	6 dB Bandwidth	Compliant
§ 15.247(b)(3)	RF Output Power	Compliant
§ 15.209(a)	Radiated Emission	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF exposure.

4. Antenna Requirement

4.1 Standard Applicable

According to FCC Part 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.

4.2 Evaluation Information

This product has two SMA-reverse antennas, fulfill the requirement of this section.

5. Power Spectral Density

5.1 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.

5.2 Test Procedure

According to the KDB 558074 D01 V03r05, such specifications require that the same method as used to determine the conducted output power shall also be used to determine the power spectral density. The test method of power spectral density as below:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set span to at least 1.5 times the OBW.
- c) Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set VBW $\geq 3 \times \text{RBW}$.
- e) Detector = power averaging (RMS) or sample detector (when RMS not available).
- f) Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.
- g) Sweep time = auto couple.
- h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
- i) Use the peak marker function to determine the maximum amplitude level.
- j) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

5.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results/Plots

Test Mode	Test Channel MHz	Power Spectral Density dBm/100kHz			Limit dBm/3kHz
		Chain 1	Chain 2	Total	
802.11b	2412	4.072	3.780	6.94	8
	2437	2.131	2.065	5.11	8
	2462	1.837	1.784	4.81	8
802.11g	2412	0.613	-1.031	2.88	8
	2437	1.505	1.111	4.33	8
	2462	-1.522	-1.612	1.43	8
802.11n HT20	2412	0.150	-1.710	2.33	8
	2437	1.535	0.638	4.12	8
	2462	-1.847	-1.592	1.30	8
802.11n HT40	2422	-6.599	-6.209	-3.37	8
	2437	-5.981	-6.056	-3.01	8
	2452	-8.018	-8.612	-5.23	8

Please refer to the following test plots:

Antenna 1

802.11b-Low Channel



802.11b-Middle Channel



802.11b-High Channel



802.11g-Low Channel



802.11g-Middle Channel



802.11g-High Channel



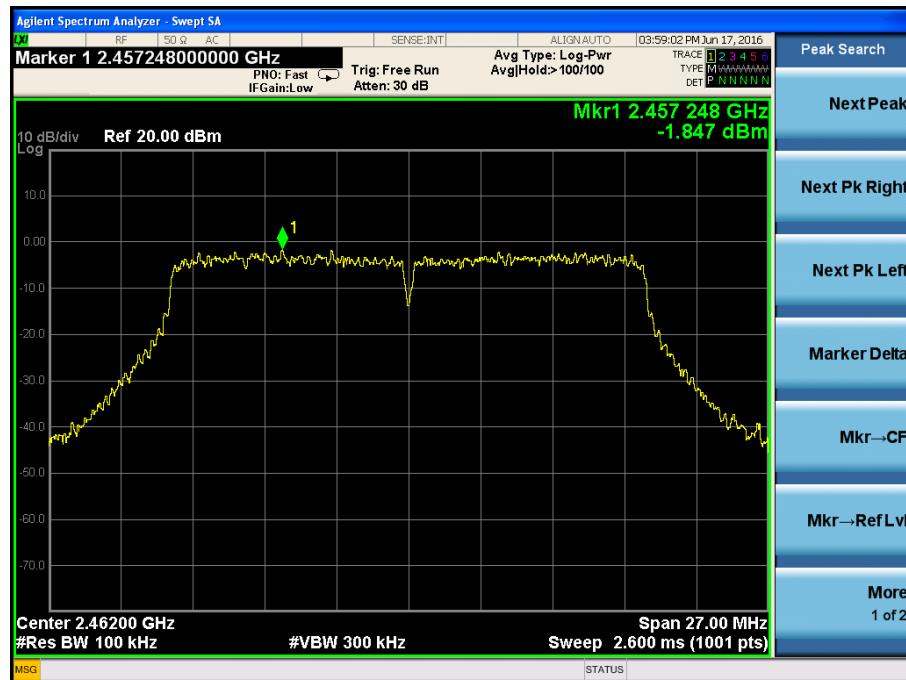
802.11n-HT20-Low Channel



802.11n-HT20-Middle Channel



802.11n-HT20-High Channel



802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



Antenna 2

802.11b-Low Channel



802.11b-Middle Channel



802.11b-High Channel



802.11g-Low Channel



802.11g-Middle Channel



802.11g-High Channel



802.11n-HT20-Low Channel



802.11n-HT20-Middle Channel



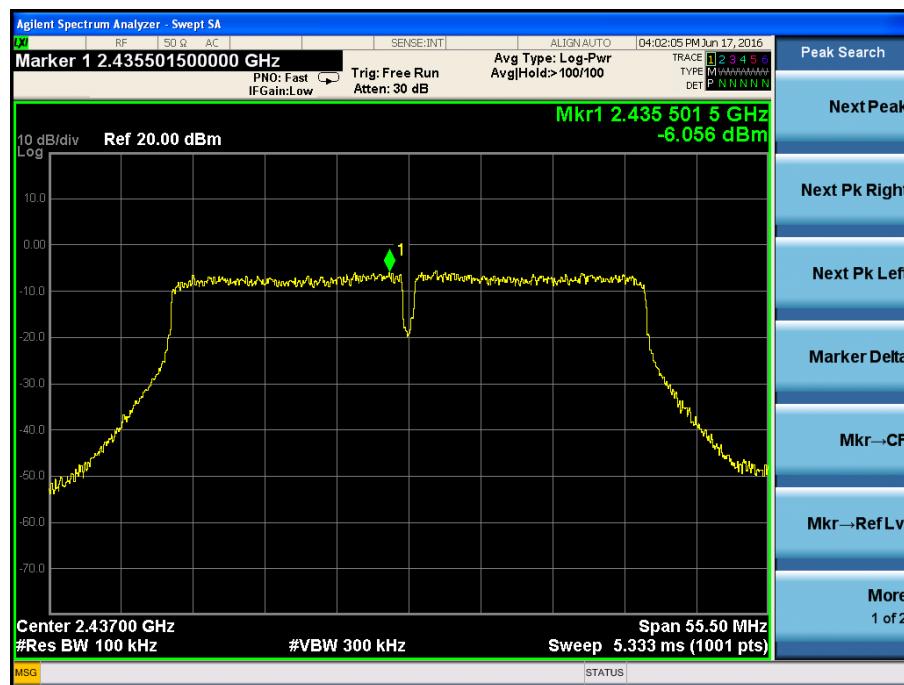
802.11n-HT20-High Channel



802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



6. 6dB Bandwidth

6.1 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.

6.2 Test Procedure

- a) Set RBW = 100 kHz.
- b) Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

6.3 Environmental Conditions

Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.4 Summary of Test Results/Plots

Antenna 1

Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit kHz
802.11b	2412	10.150	15.112	≥500
	2437	10.150	15.034	≥500
	2462	10.150	15.011	≥500
802.11g	2412	16.560	16.434	≥500
	2437	16.550	16.436	≥500
	2462	16.560	16.428	≥500
802.11n-HT20	2412	17.780	17.623	≥500
	2437	17.750	17.613	≥500
	2462	17.770	17.612	≥500
802.11n-HT40	2422	36.510	36.140	≥500
	2437	36.500	36.122	≥500
	2452	36.500	36.142	≥500

Antenna 2

Test Mode	Test Channel MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	Limit kHz
802.11b	2412	10.110	15.435	≥500
	2437	10.150	15.205	≥500
	2462	10.110	15.168	≥500
802.11g	2412	15.560	16.464	≥500
	2437	16.560	16.473	≥500
	2462	16.560	16.454	≥500
802.11n-HT20	2412	17.800	17.668	≥500
	2437	17.800	17.671	≥500
	2462	17.790	17.654	≥500
802.11n-HT40	2422	36.520	36.167	≥500
	2437	36.510	36.134	≥500
	2452	36.520	36.155	≥500

Please refer to the following test plots:

Antenna 1

802.11b-Low Channel



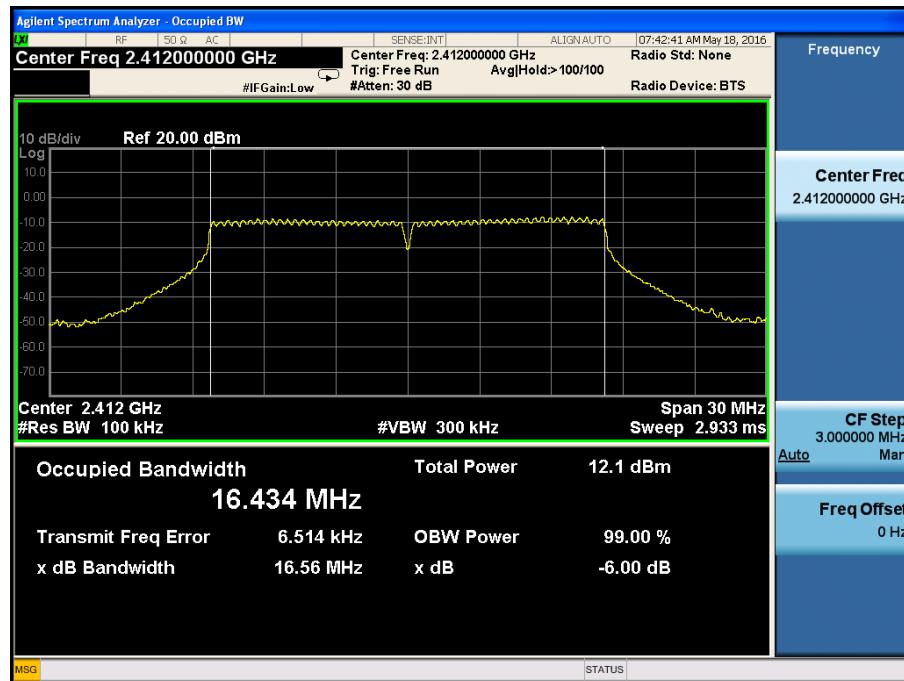
802.11b-Middle Channel



802.11b-High Channel



802.11g-Low Channel



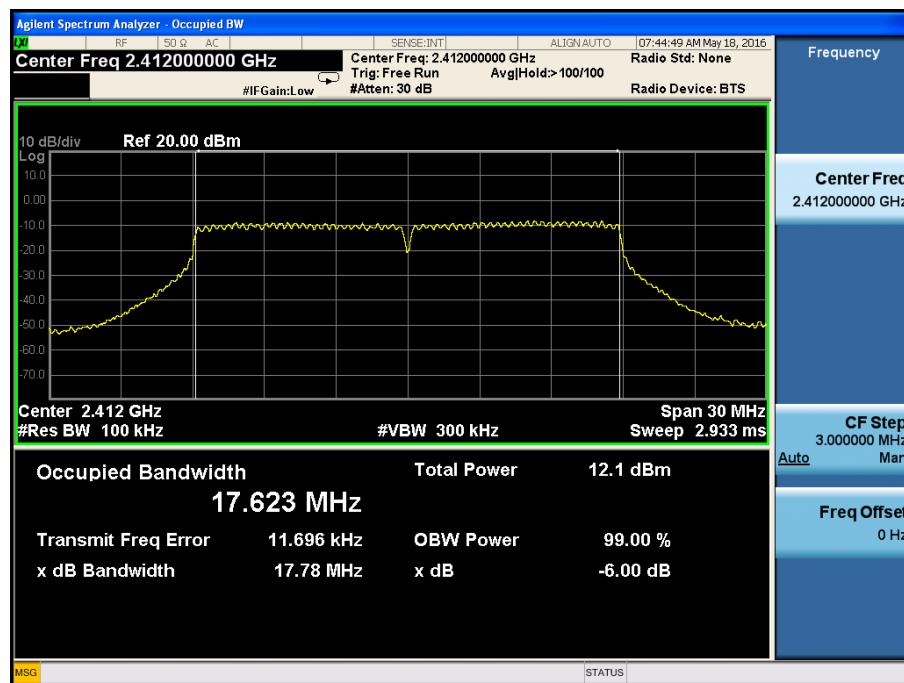
802.11g-Middle Channel



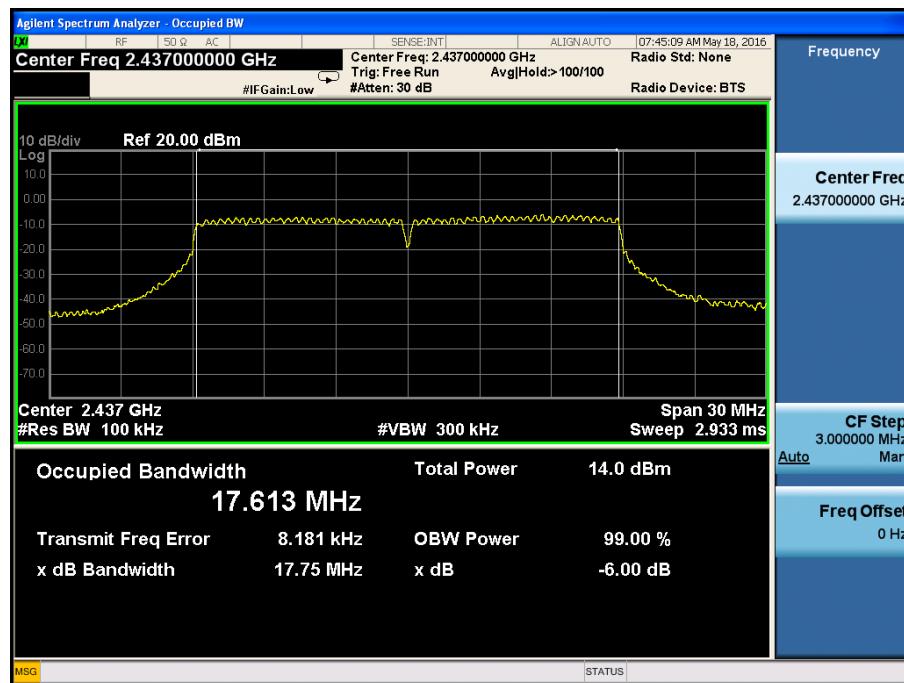
802.11g-High Channel



802.11n-HT20-Low Channel



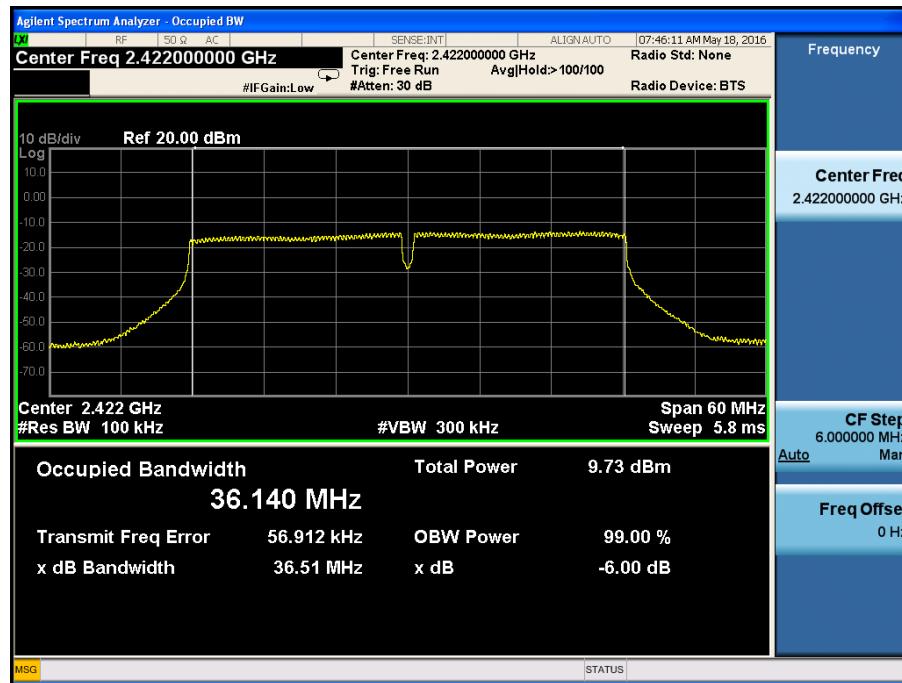
802.11n-HT20-Middle Channel



802.11n-HT20-High Channel



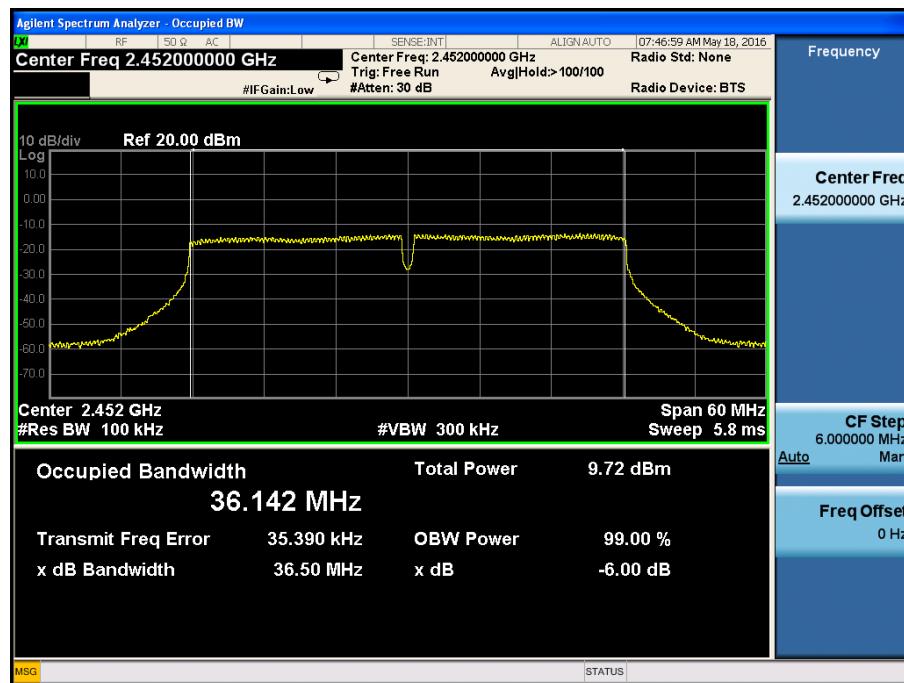
802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



Antenna 2

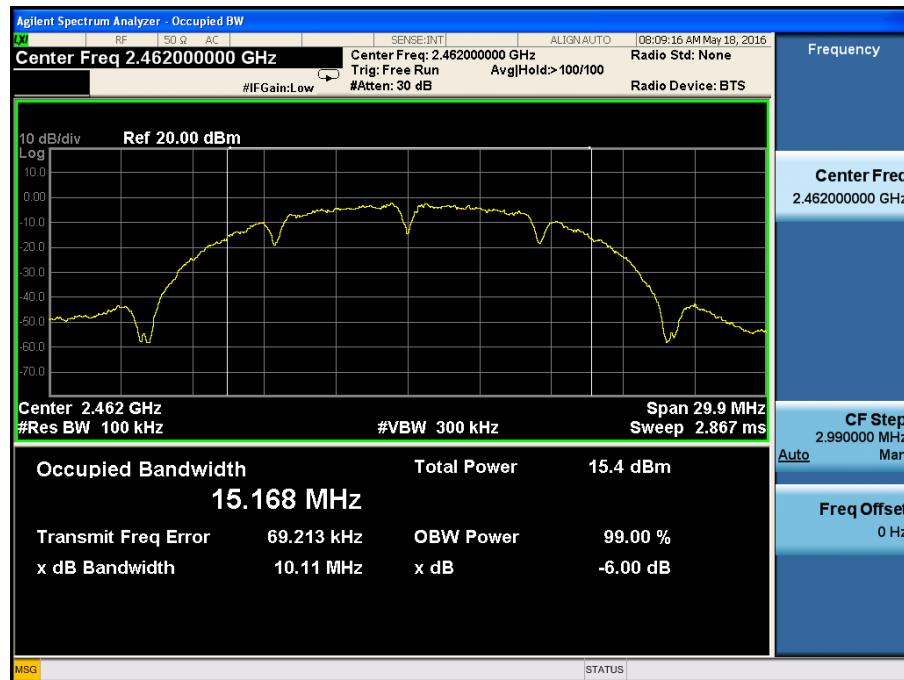
802.11b-Low Channel



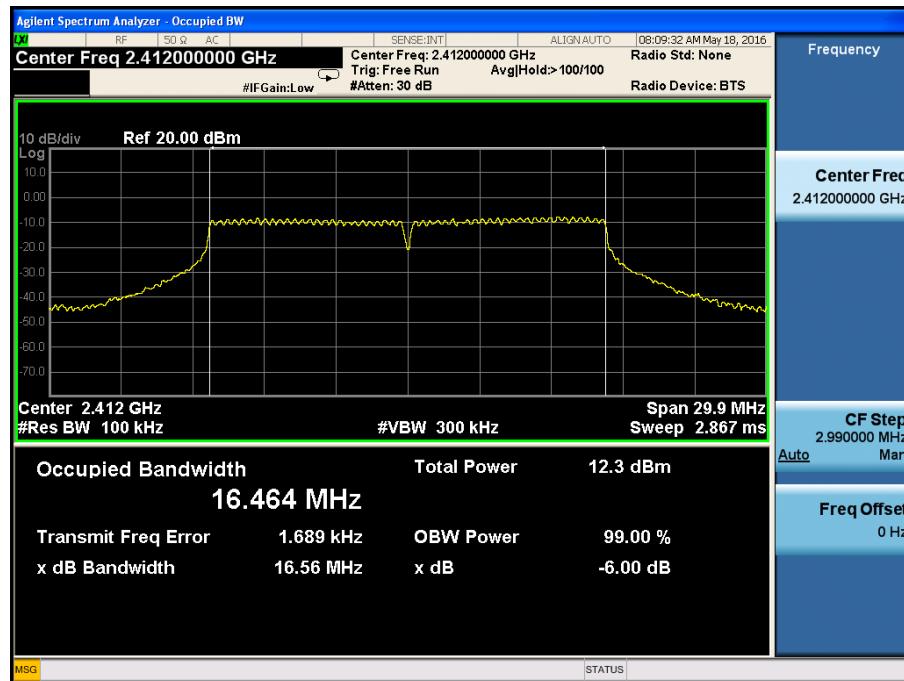
802.11b-Middle Channel



802.11b-High Channel



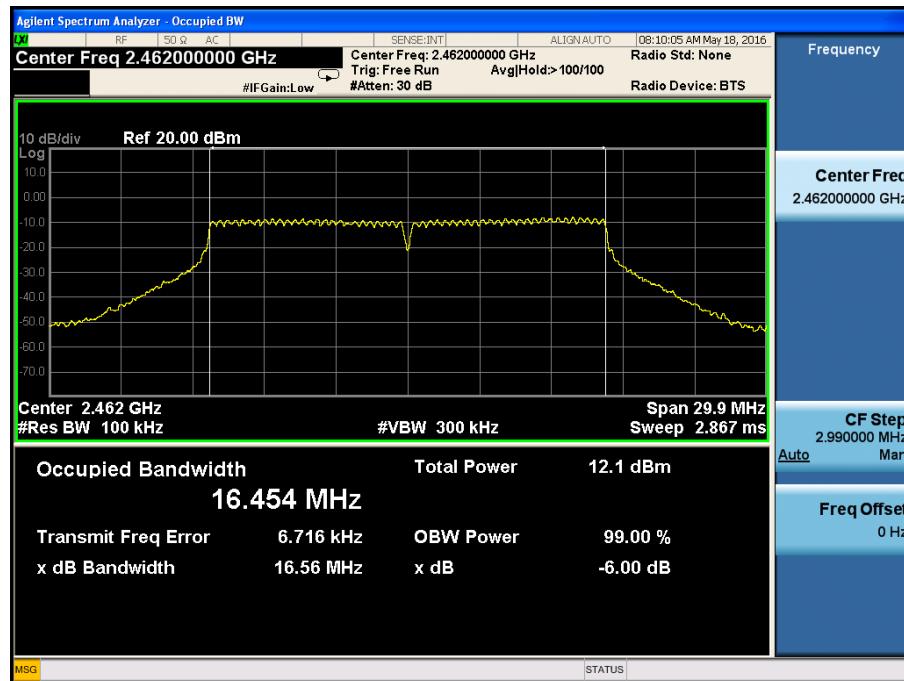
802.11g-Low Channel



802.11g-Middle Channel



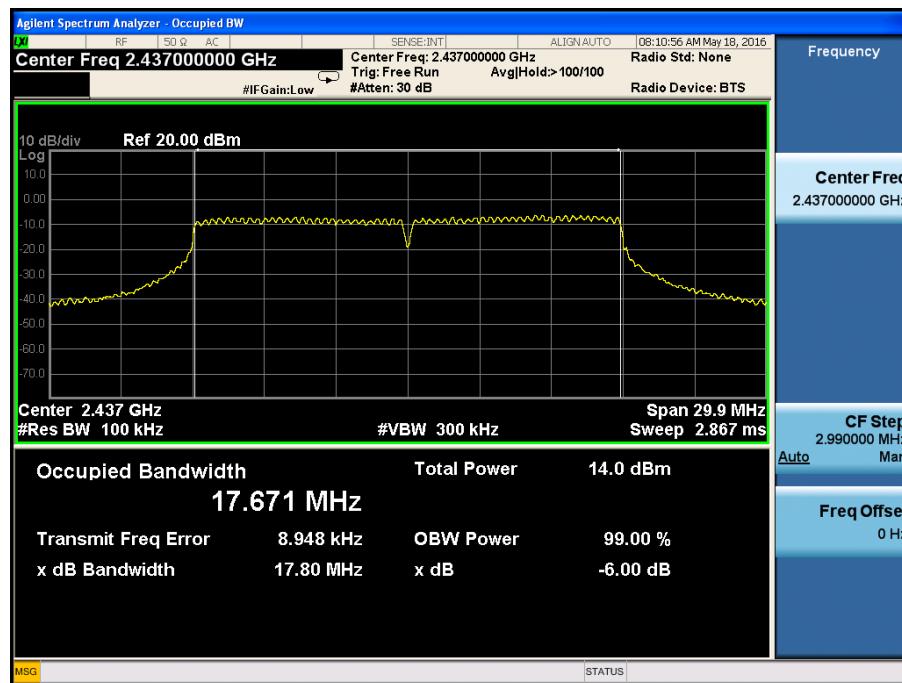
802.11g-High Channel



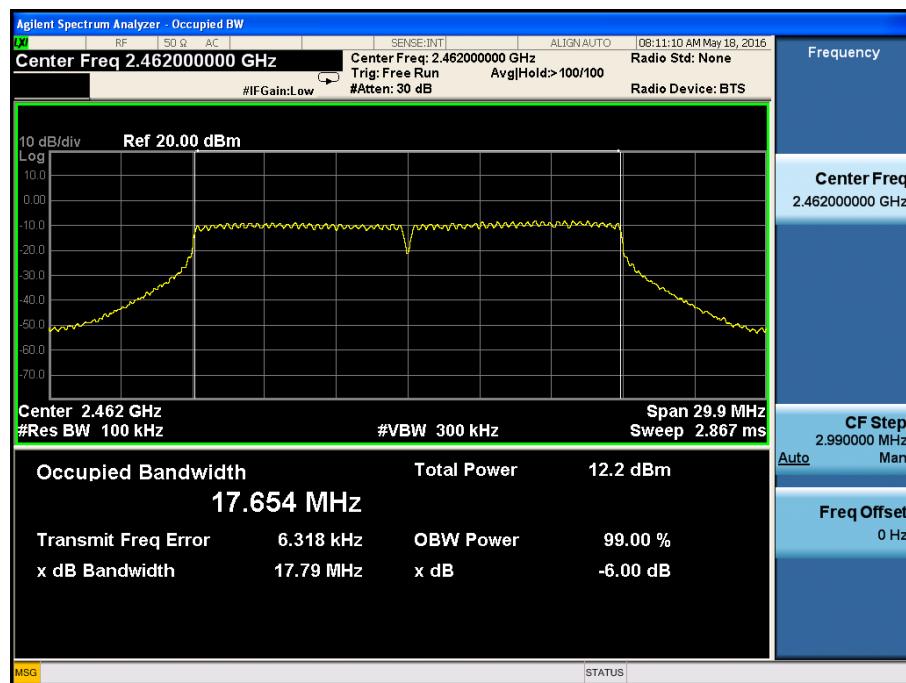
802.11n-HT20-Low Channel



802.11n-HT20-Middle Channel



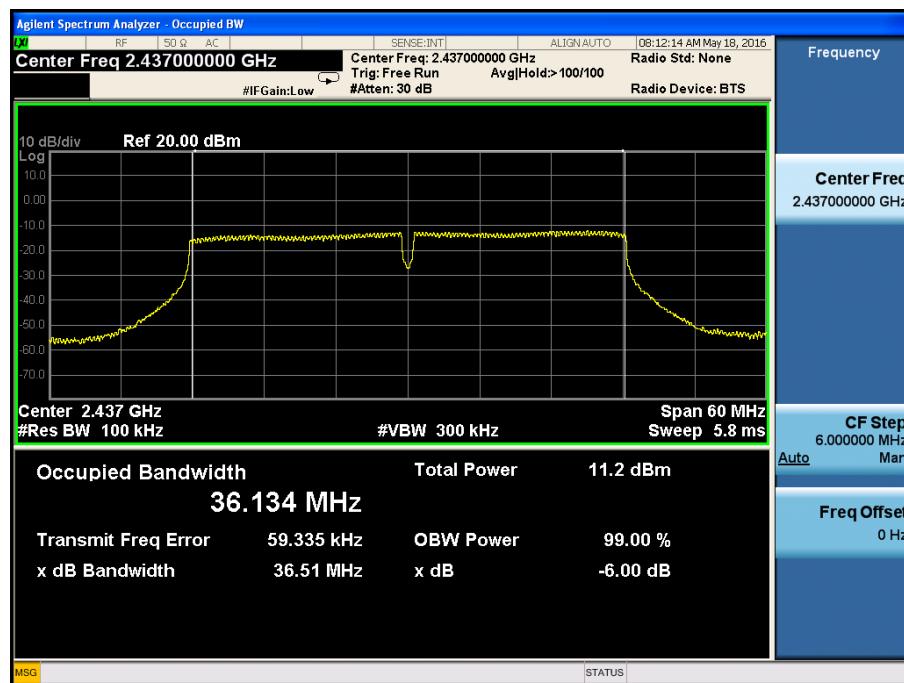
802.11n-HT20-High Channel



802.11n-HT40-Low Channel



802.11n-HT40-Middle Channel



802.11n-HT40-High Channel



7. RF Output Power

7.1 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.

7.2 Test Procedure

According to KDB-558074 D01 V03r05, 9.2.2.2 (channel integration method) When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth

- a) Set span to at least 1.5 times the OBW.
- b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.
- c) Set VBW $\geq 3 \times$ RBW.
- d) Number of points in sweep $\geq 2 \times$ span / RBW. (This gives bin-to-bin spacing \leq RBW/2, so that narrowband signals are not lost between frequency bins.)
- e) Sweep time = auto.
- f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- g) If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle \geq 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run” .
- h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.
- i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

7.3 Environmental Conditions

Temperature:	26° C
Relative Humidity:	57%
ATM Pressure:	1011 mbar

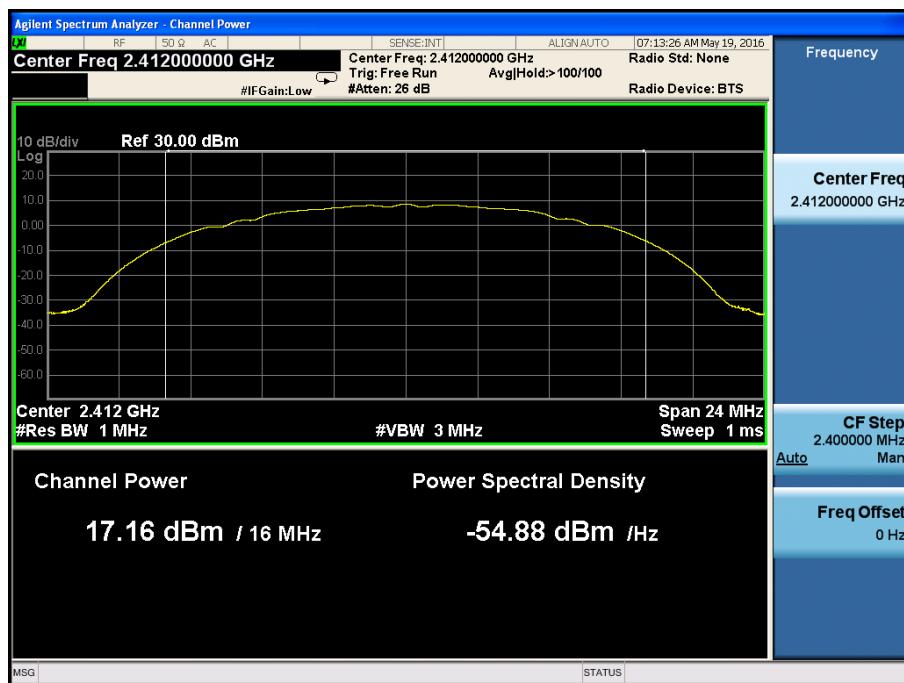
7.4 Summary of Test Results/Plots

Test Mode	Frequency MHz	Power 1 dBm	Power 2 dBm	Total Power dBm	Output Power mW	Limit mW
802.11b_11Mbps	2412	17.16	16.45	19.83	96.16	1000
	2437	14.43	13.70	17.09	51.18	1000
	2462	15.74	15.90	18.83	76.40	1000
802.11g_54Mbps	2412	17.55	16.74	20.17	104.09	1000
	2437	19.23	18.64	21.96	156.87	1000
	2462	17.81	17.17	20.51	112.51	1000
802.11n HT20_MCS7	2412	17.59	16.96	20.30	107.07	1000
	2437	19.39	18.79	22.11	162.55	1000
	2462	18.06	17.38	20.74	118.68	1000
802.11n HT40_MCS7	2422	14.59	14.09	17.36	54.42	1000
	2437	15.66	15.32	18.50	70.85	1000
	2452	14.41	13.80	17.13	51.59	1000

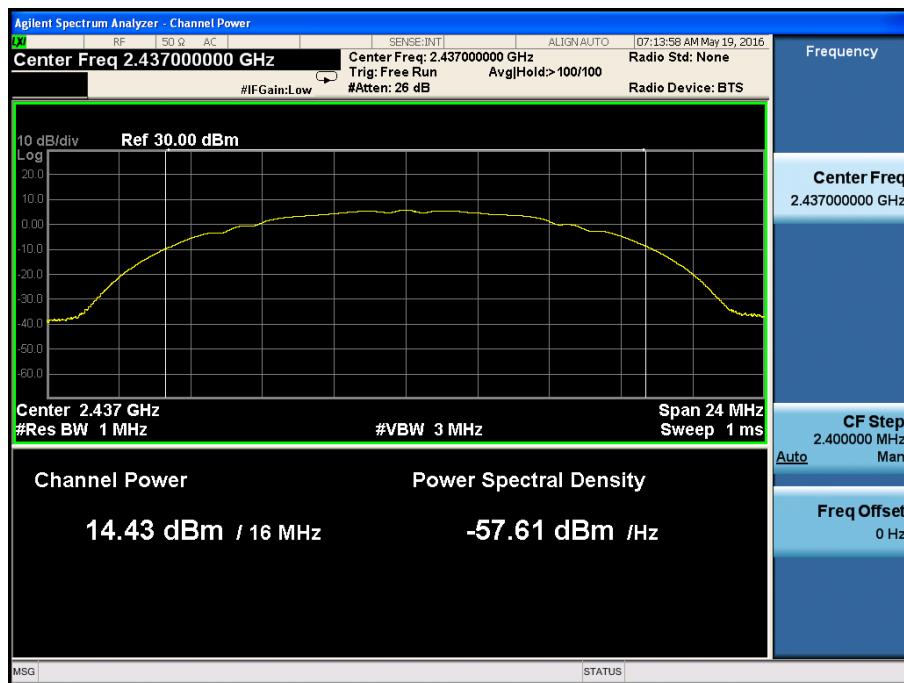
Please refer to the following test plots:

Antenna 1

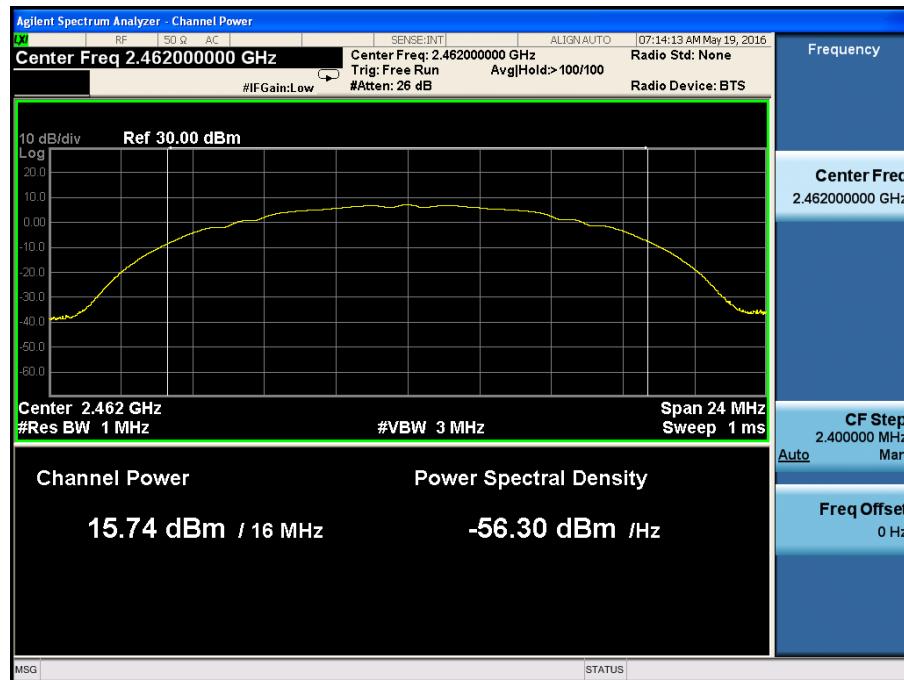
802.11b-11Mbps-Low Channel



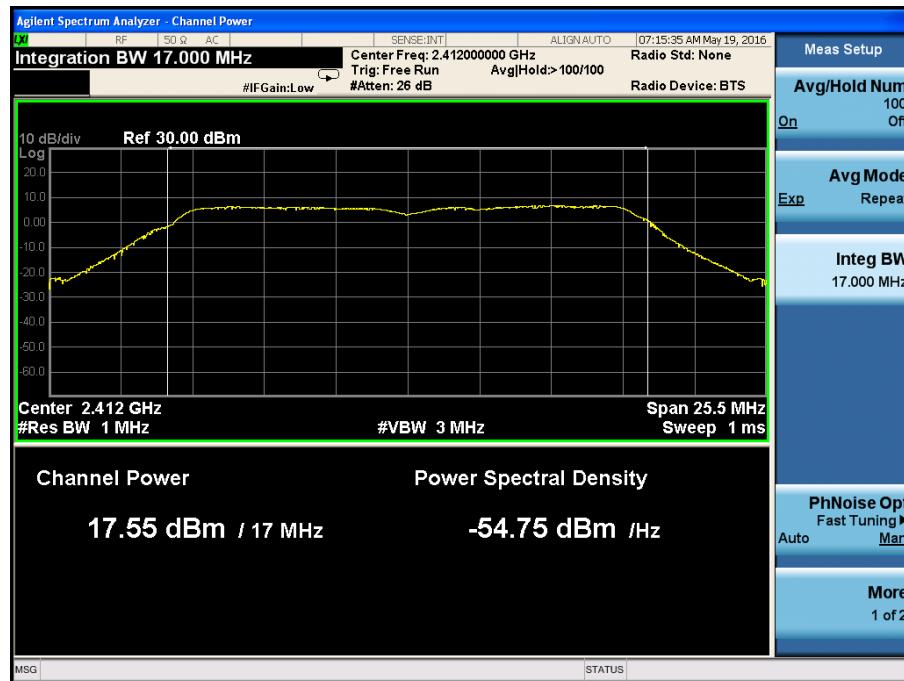
802.11b -11Mbps-Middle Channel



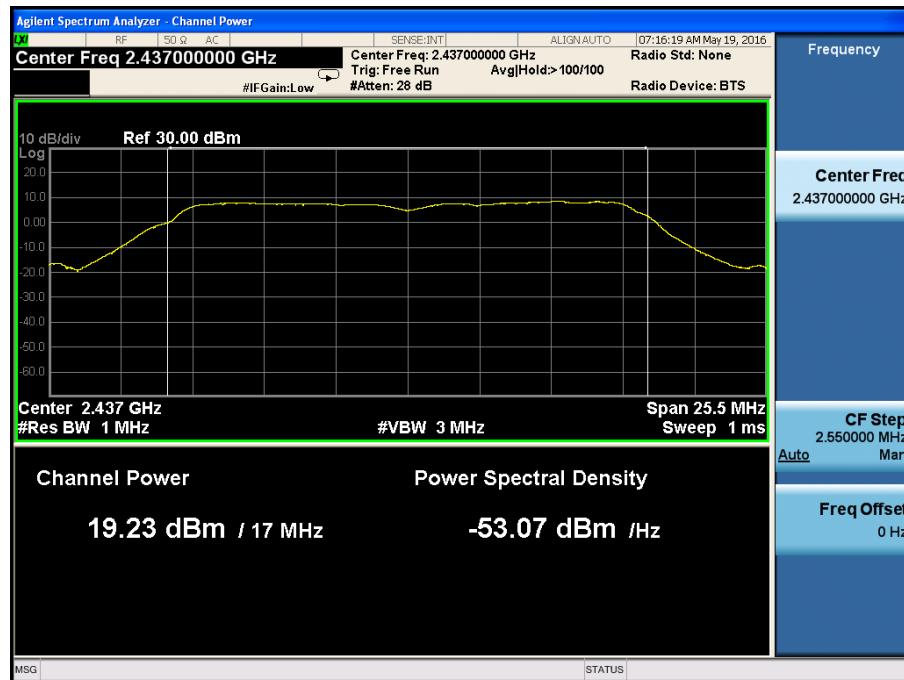
802.11b -11Mbps-High Channel



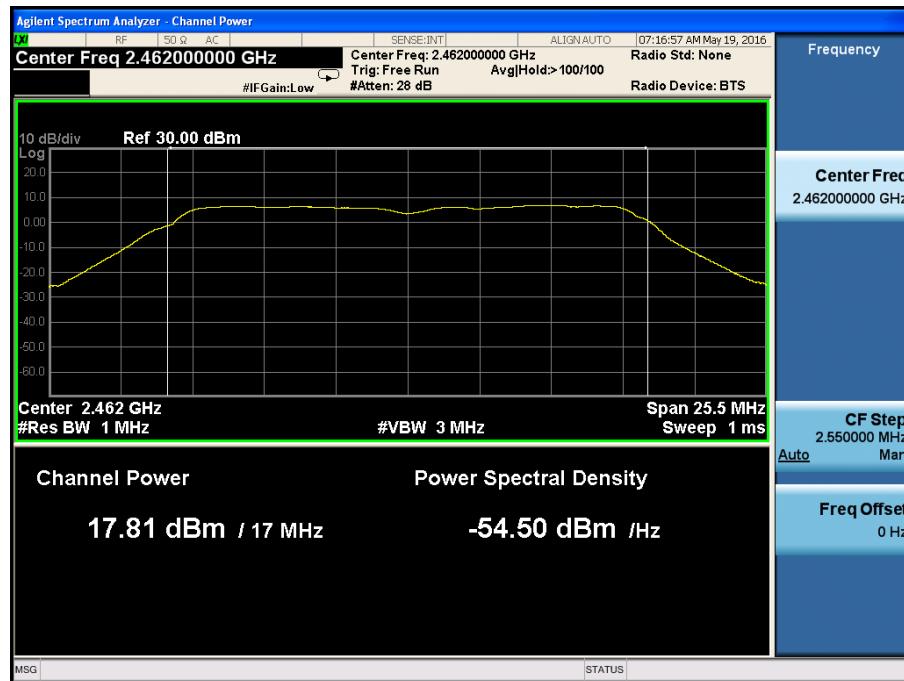
802.11g-54Mbps-Low Channel



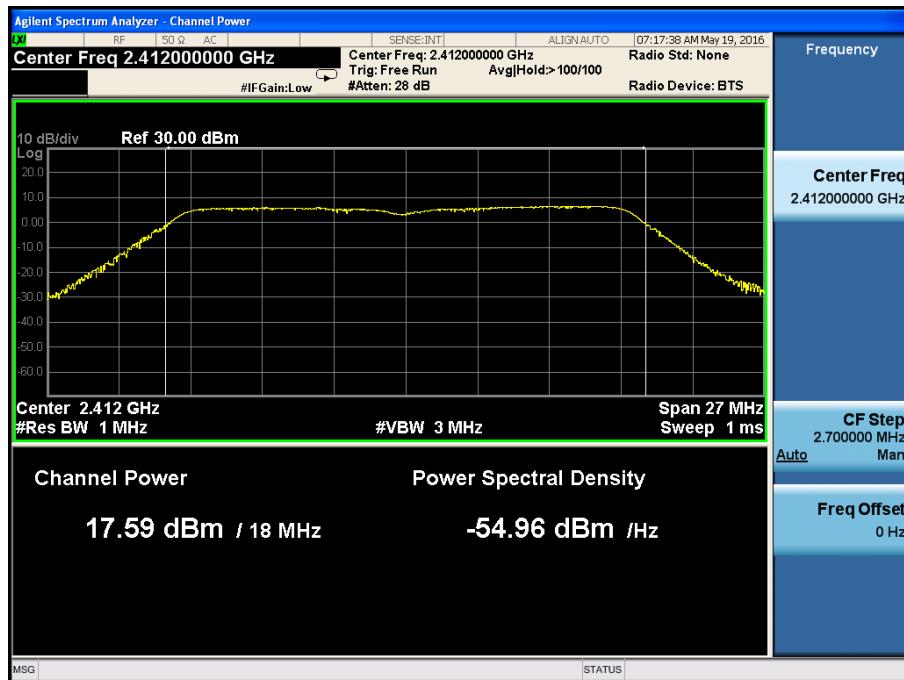
802.11g-54Mbps-Middle Channel



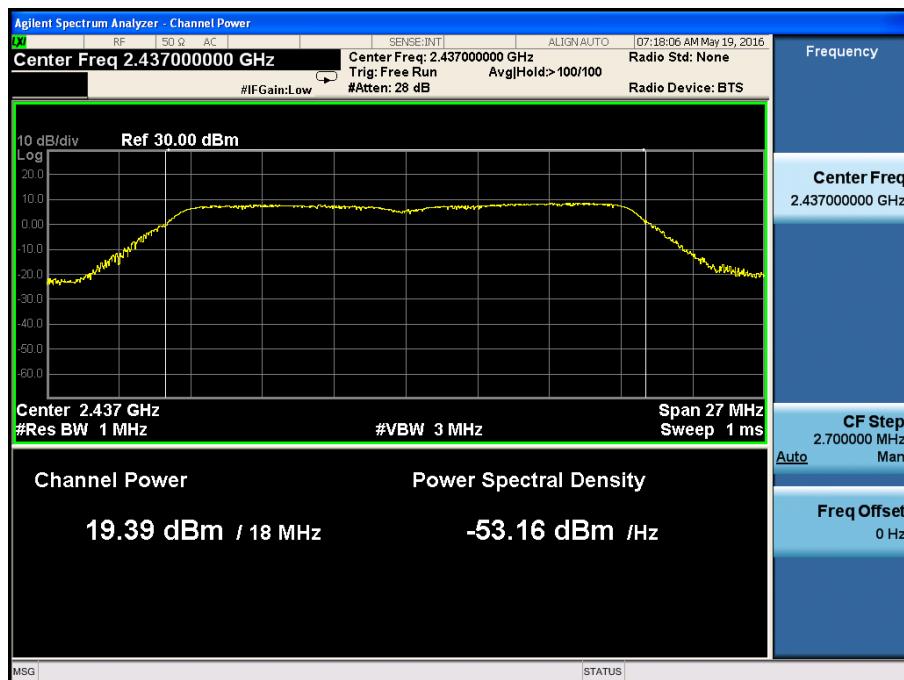
802.11g-54Mbps-High Channel



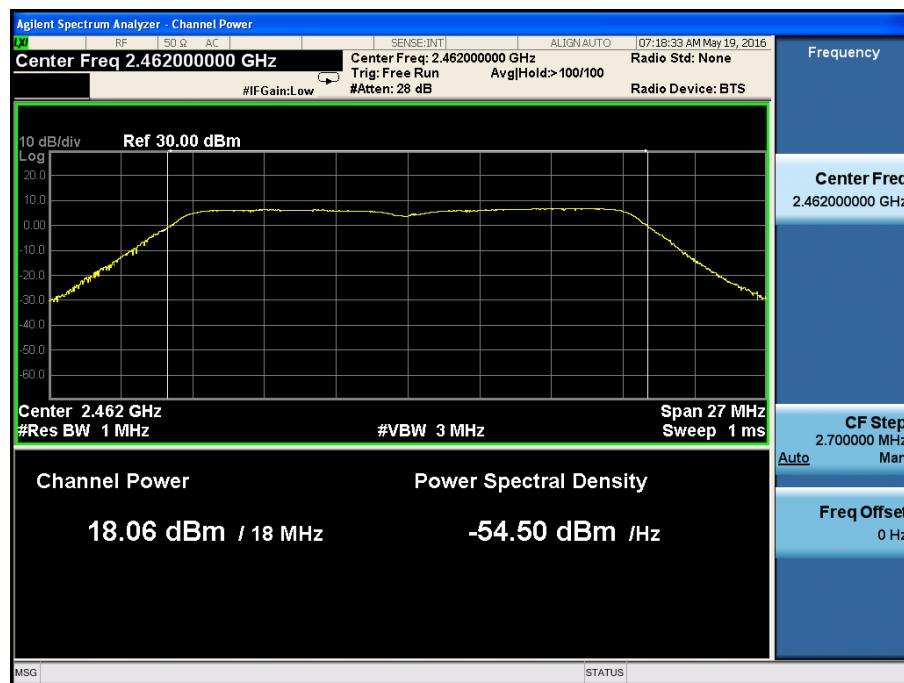
802.11n-HT20-MCS7-Low Channel



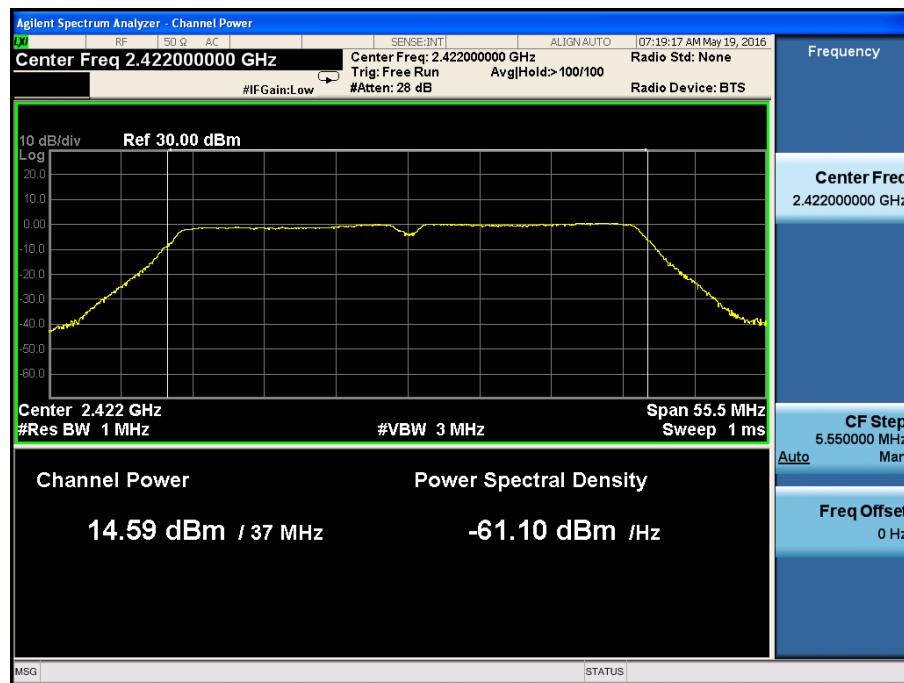
802.11n-HT20-MCS7-Middle Channel



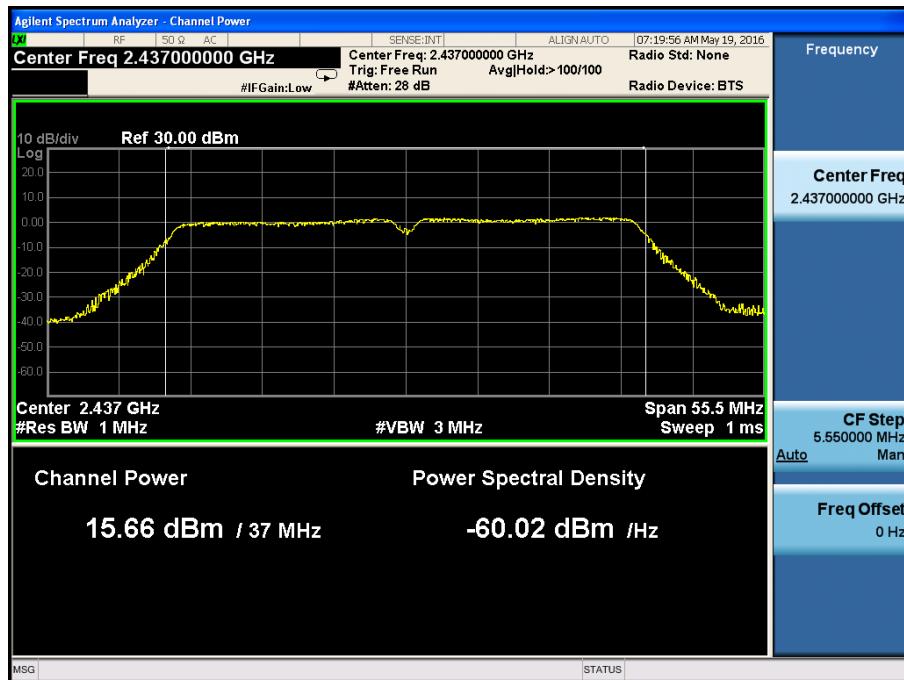
802.11n-HT20-MCS7-High Channel



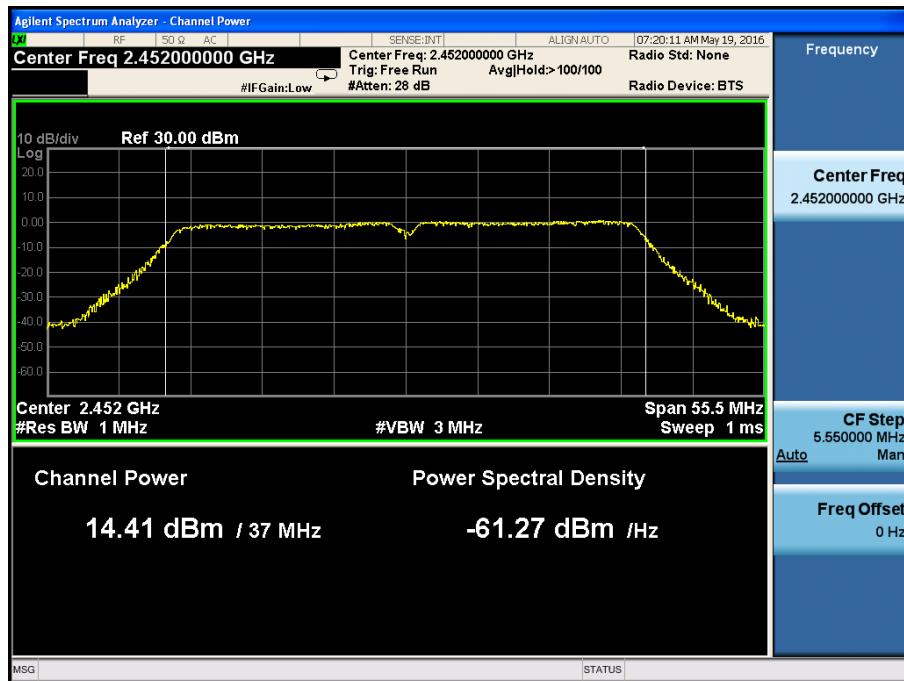
802.11n-HT40-MCS7-Low Channel



802.11n-HT40-MCS7-Middle Channel

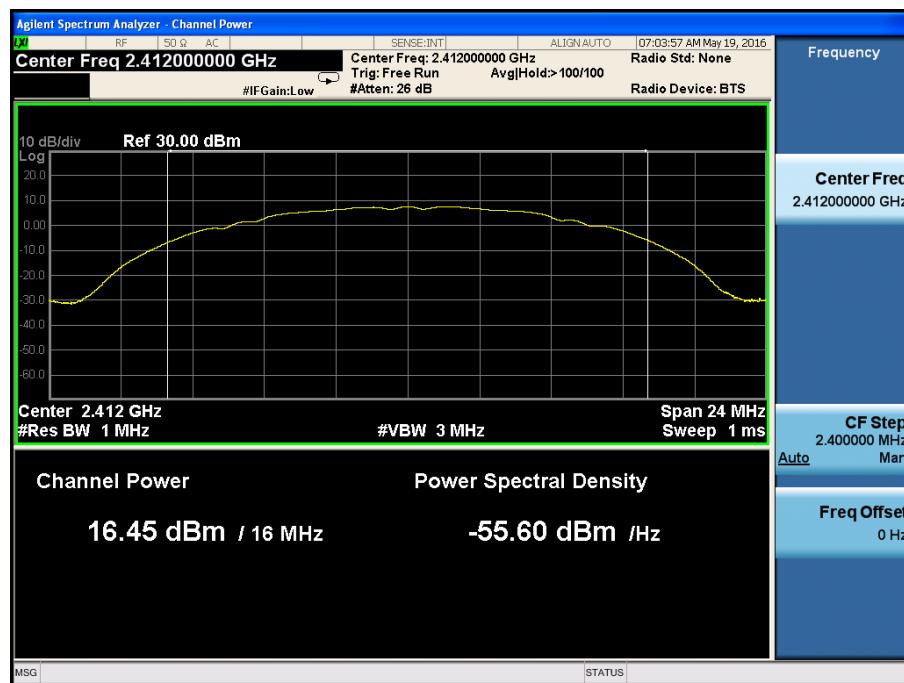


802.11n-HT40-MCS7-High Channel

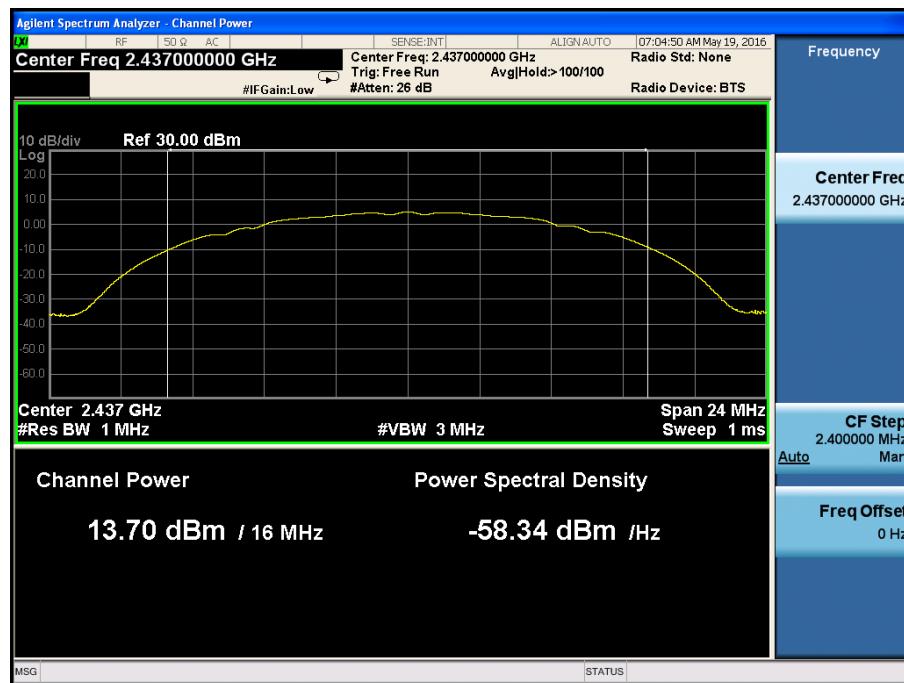


Antenna 2

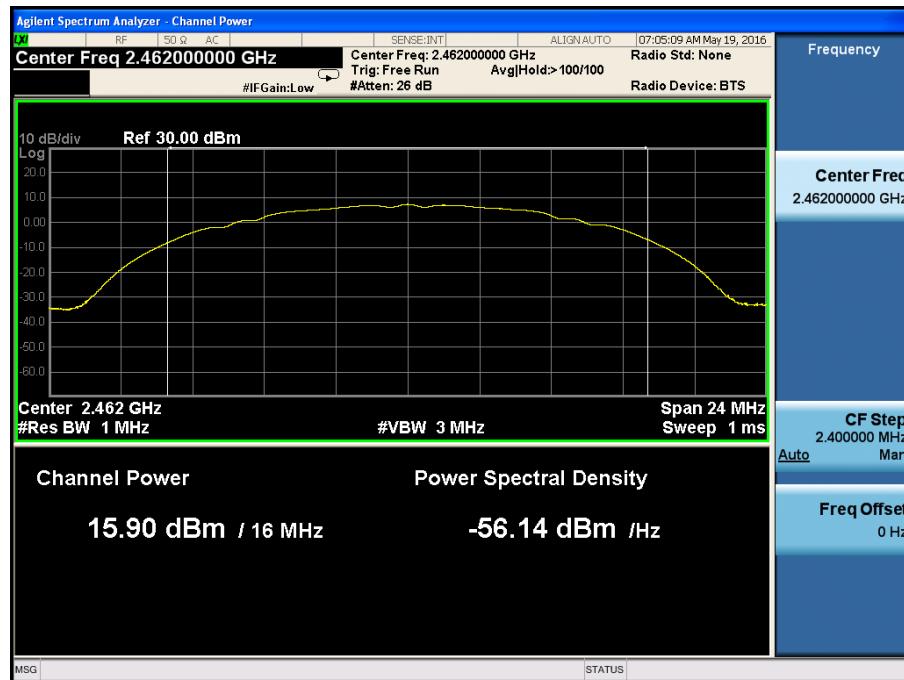
802.11b-11Mbps-Low Channel



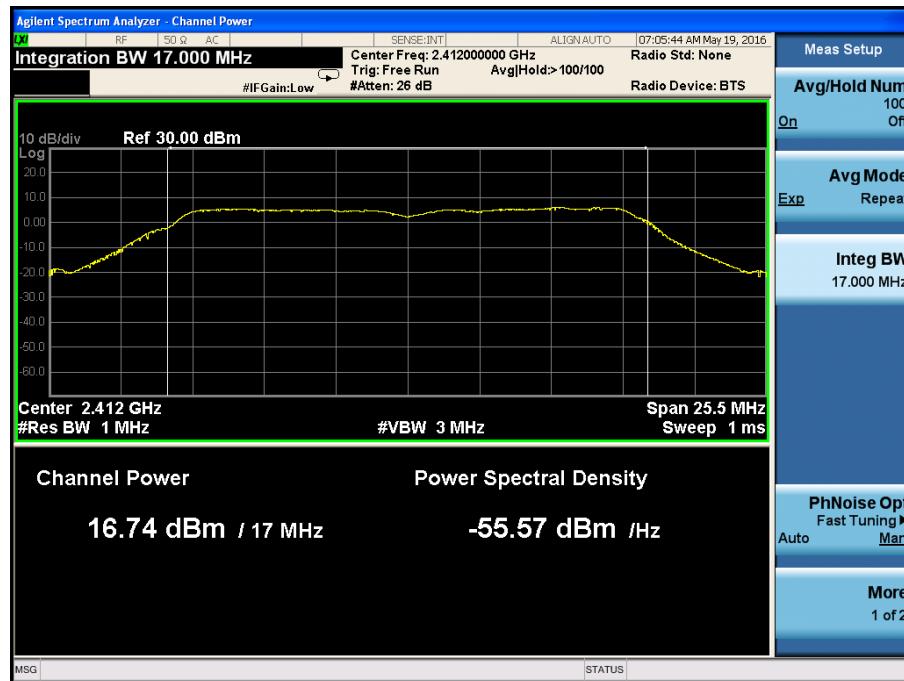
802.11b -11Mbps-Middle Channel



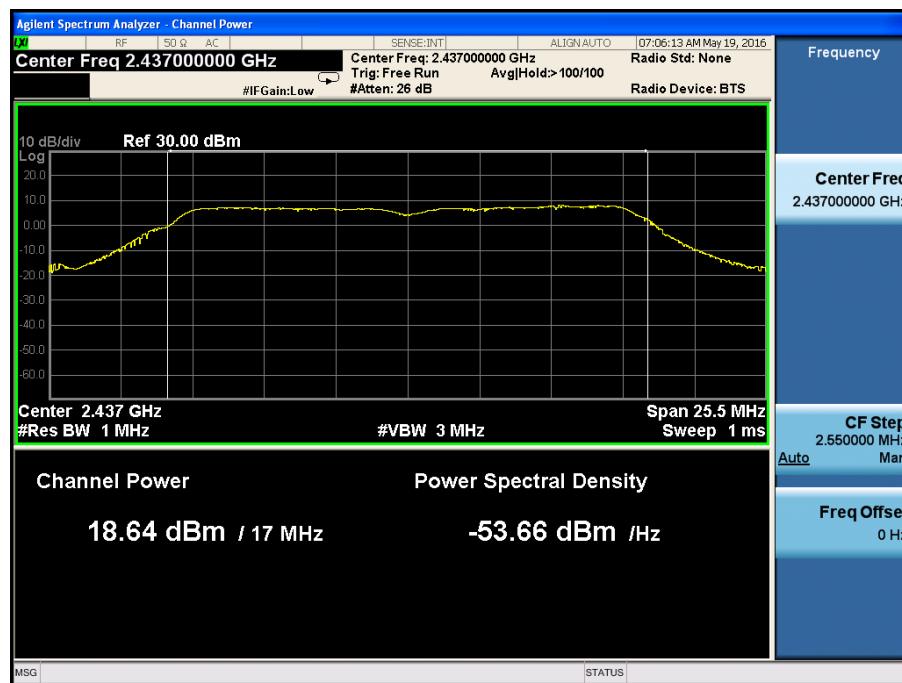
802.11b -11Mbps-High Channel



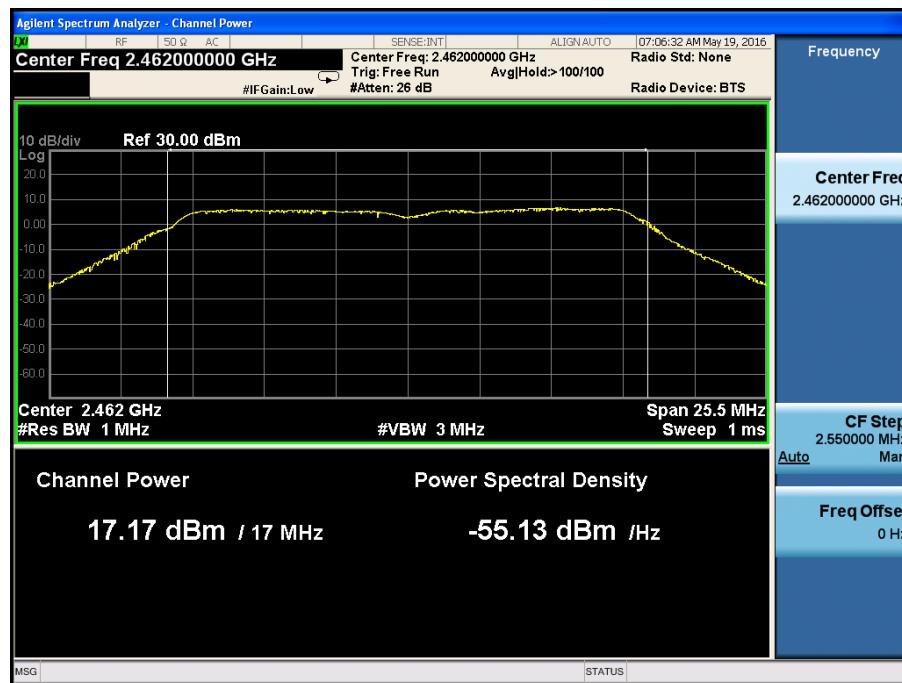
802.11g-54Mbps-Low Channel



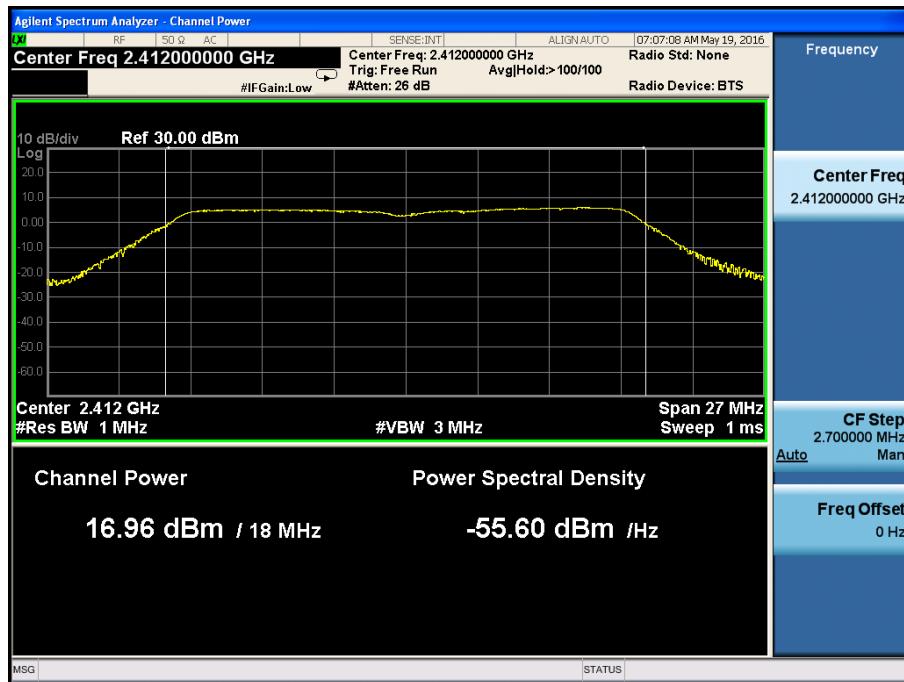
802.11g-54Mbps-Middle Channel



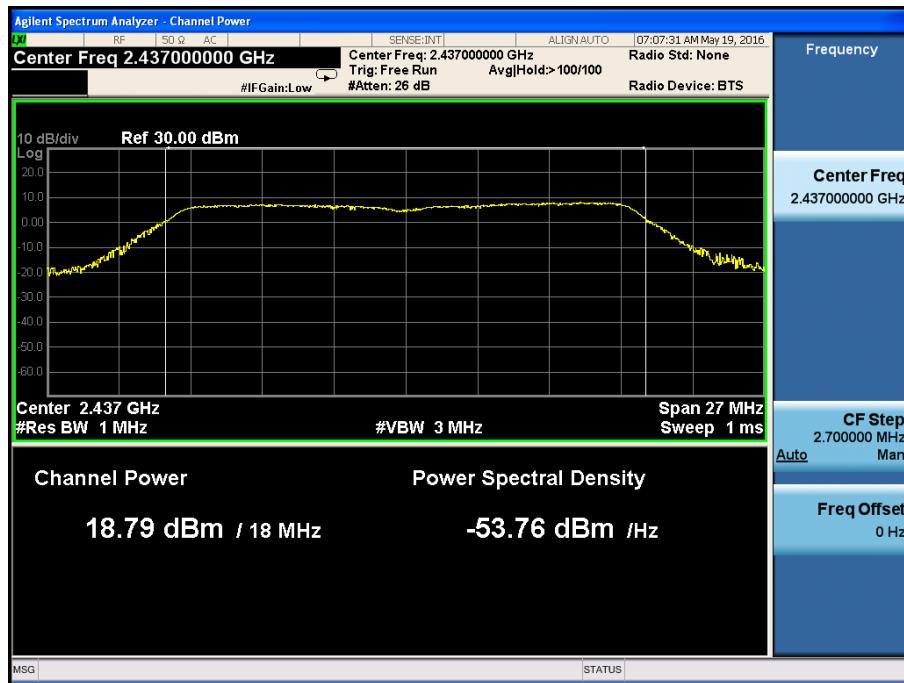
802.11g-54Mbps-High Channel



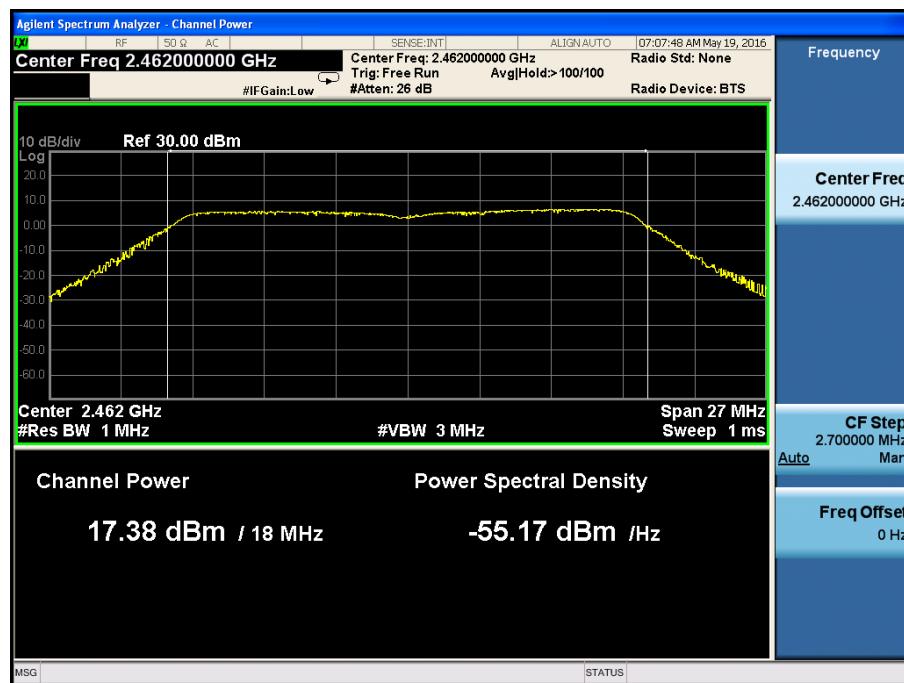
802.11n-HT20-MCS7-Low Channel



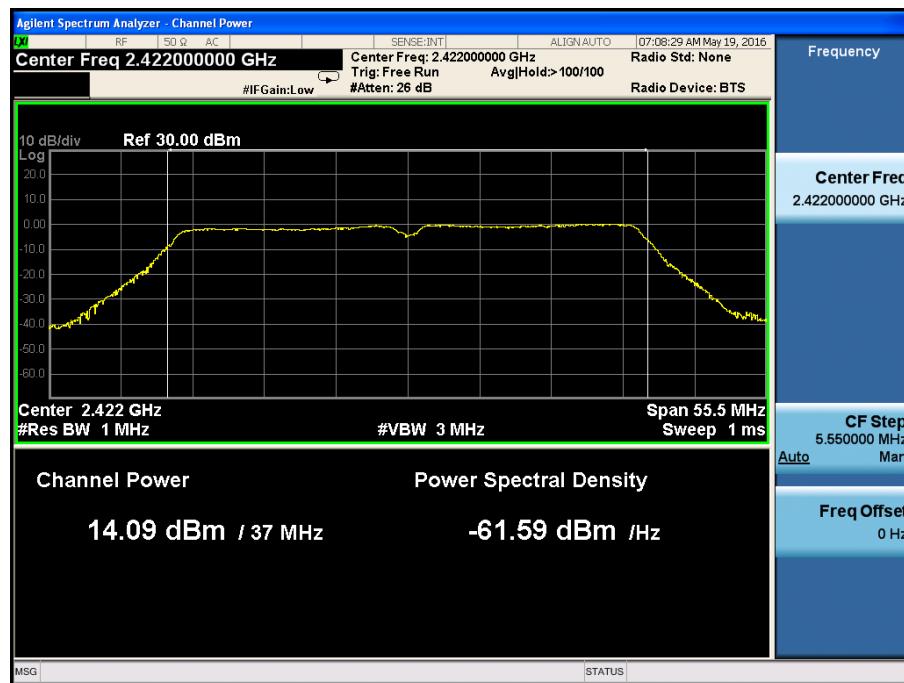
802.11n-HT20-MCS7-Middle Channel



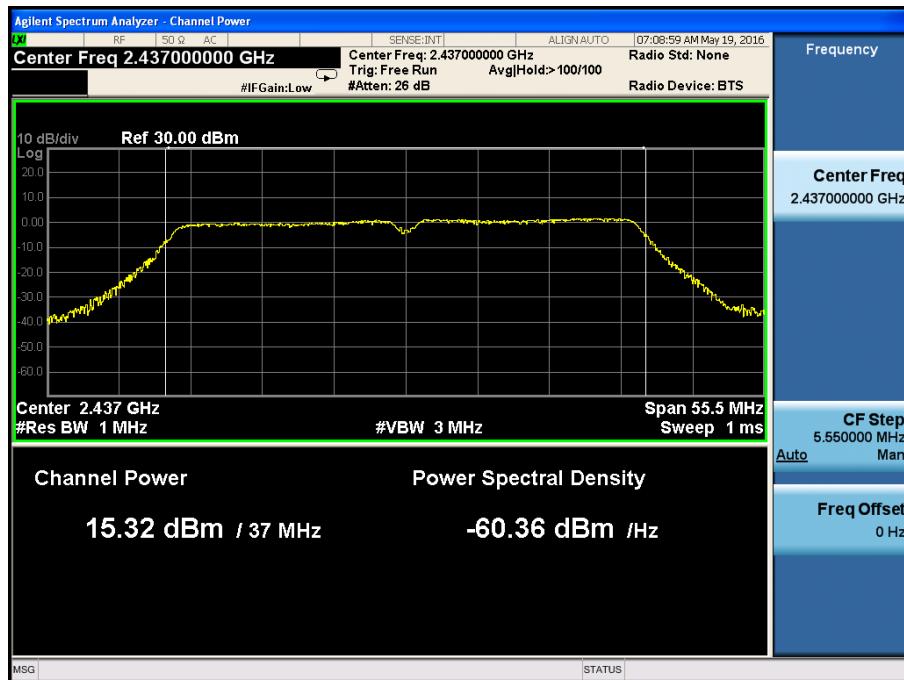
802.11n-HT20-MCS7-High Channel



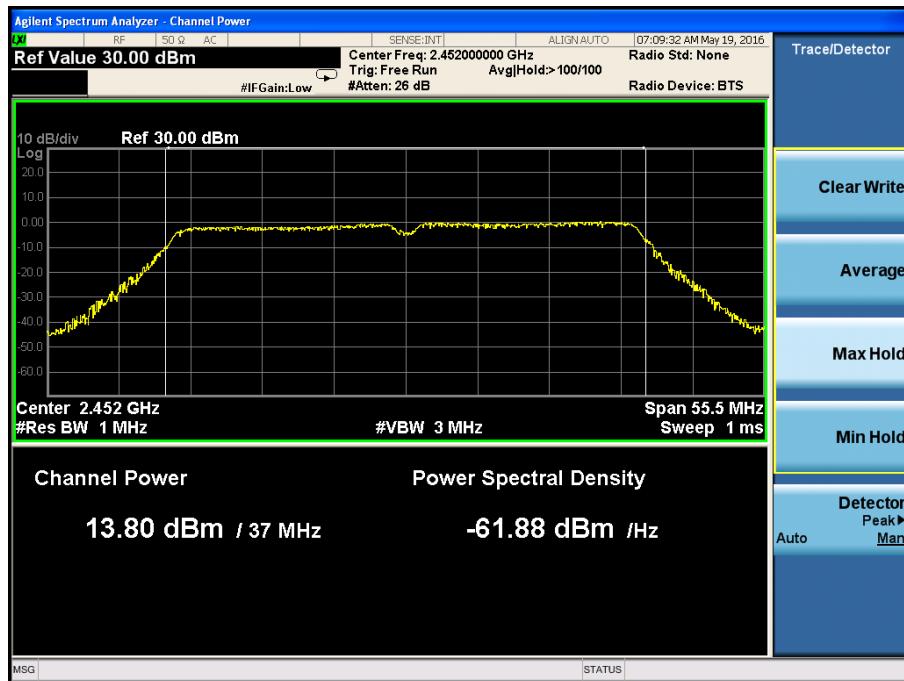
802.11n-HT40-MCS7-Low Channel



802.11n-HT40-MCS7-Middle Channel



802.11n-HT40-MCS7-High Channel



8. Field Strength of Spurious Emissions

8.1 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 ± 5.10 dB.

8.2 Standard Applicable

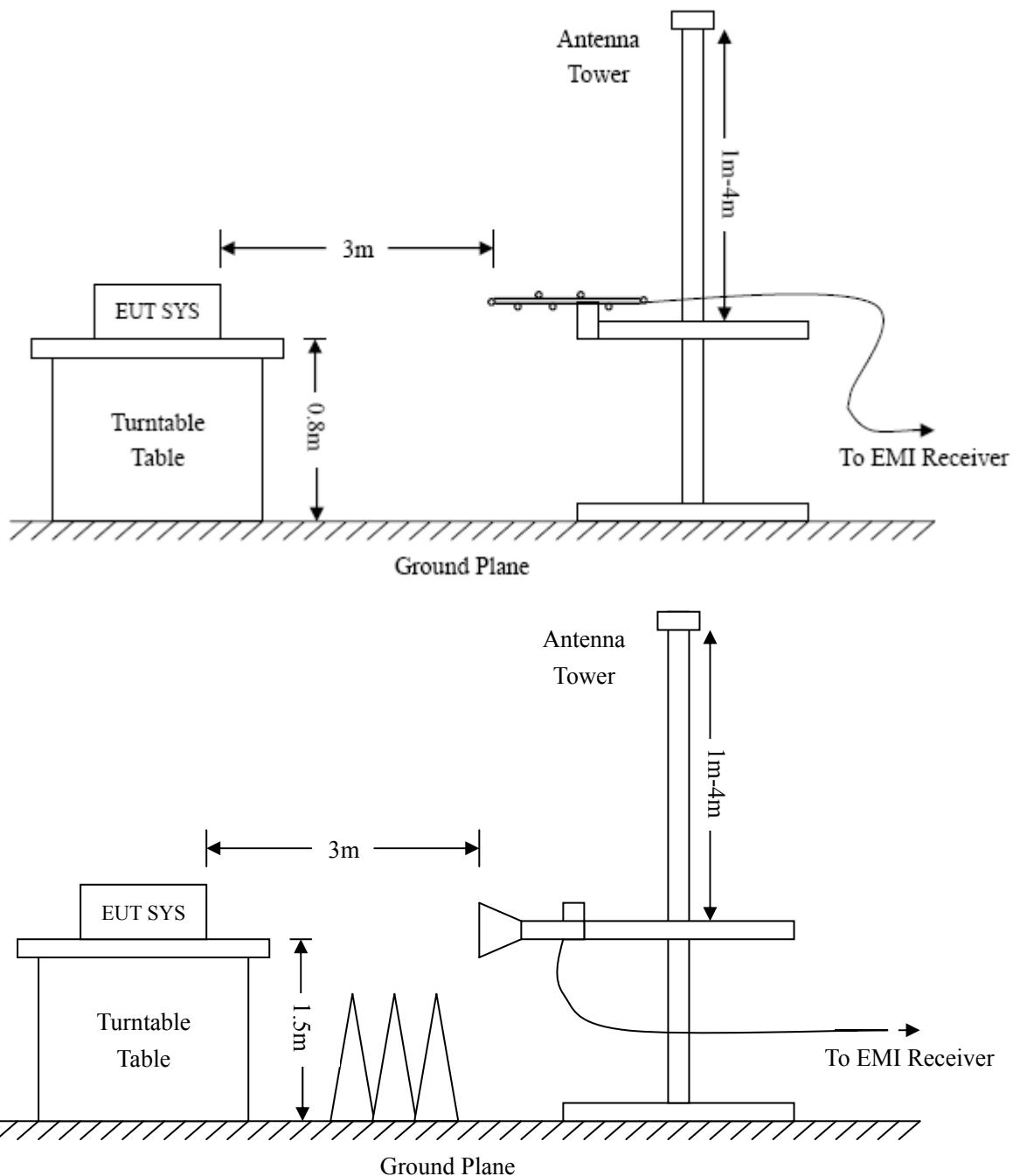
According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

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. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

8.3 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 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.



Frequency :9kHz-30MHz
 RBW=10KHz,
 VBW =30KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak

Frequency :30MHz-1GHz
 RBW=120KHz,
 VBW=300KHz
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, QP

Frequency :Above 1GHz
 RBW=1MHz,
 VBW=3MHz(Peak), 10Hz(AV)
 Sweep time= Auto
 Trace = max hold
 Detector function = peak, AV

8.4 Corrected Amplitude & Margin Calculation

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

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

8.5 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

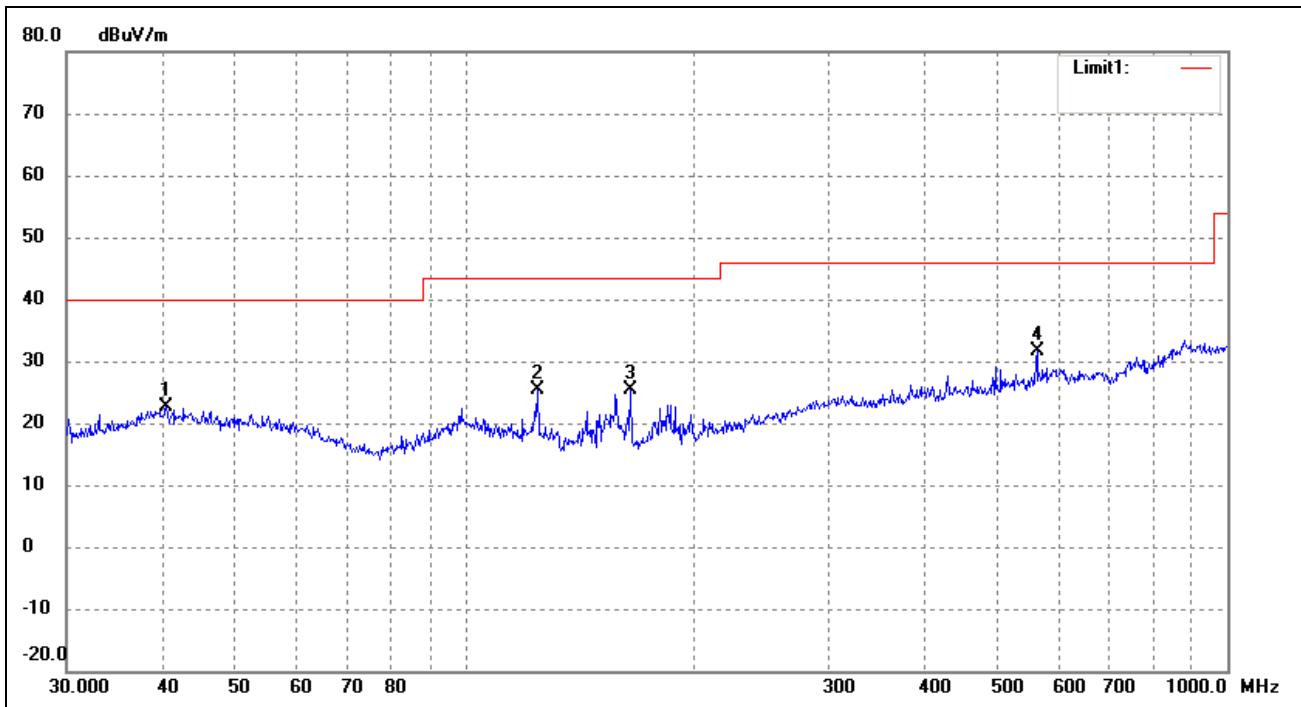
8.6 Summary of Test Results/Plots

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

Note: this EUT was tested in 3 orthogonal positions, the antenna vertically is worst case position and the data was reported.

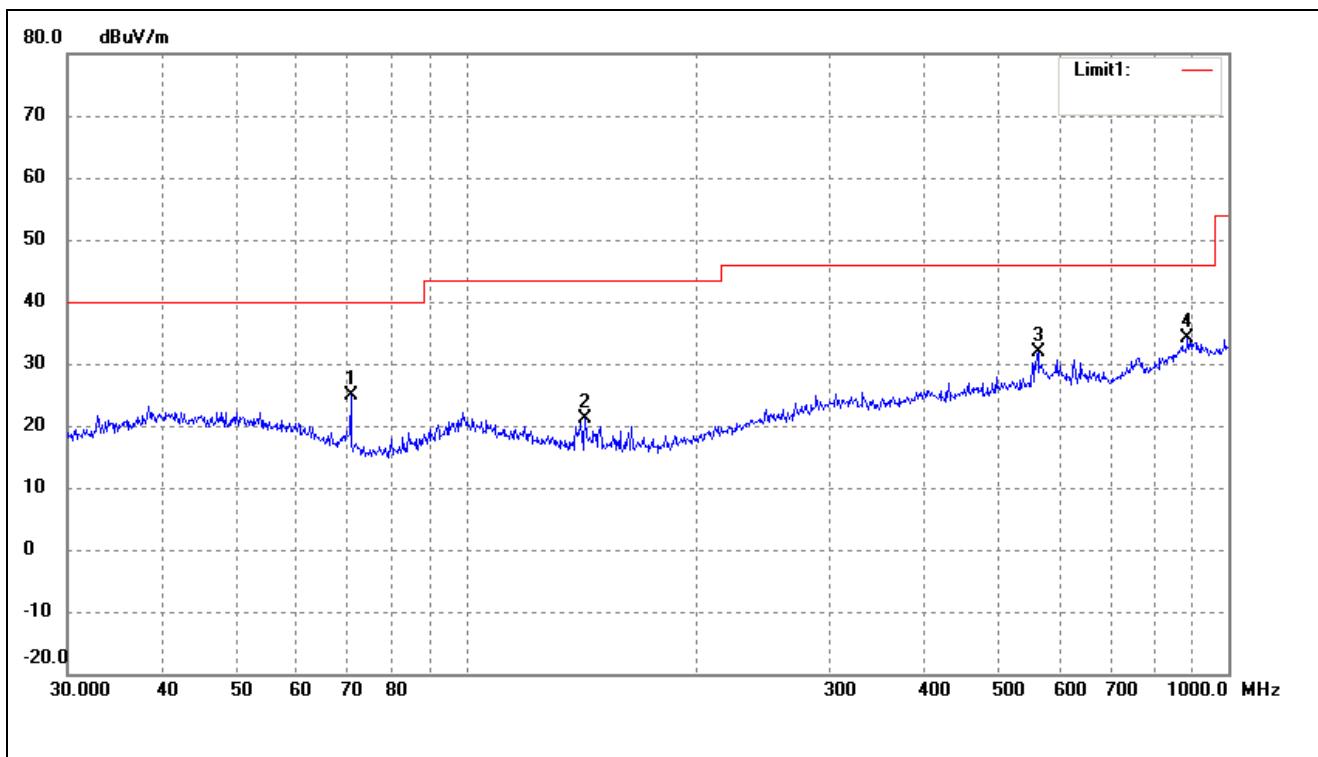
Plot of Radiated Emissions Test Data (30MHz to 1GHz)

EUT: AC1200 Dual Band WiFi PCI-e Adapter
Tested Model: WNA015
Operating Condition: 802.11b Transmitting Low Channel-2412MHz
Comment: DC3.3V
Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	40.5591	15.34	7.19	22.53	40.00	-17.47	46	100	peak
2	124.5690	21.62	3.65	25.27	43.50	-18.23	135	100	peak
3	164.9075	22.76	2.65	25.41	43.50	-18.09	183	100	peak
4	562.6624	20.02	11.67	31.69	46.00	-14.31	231	100	peak

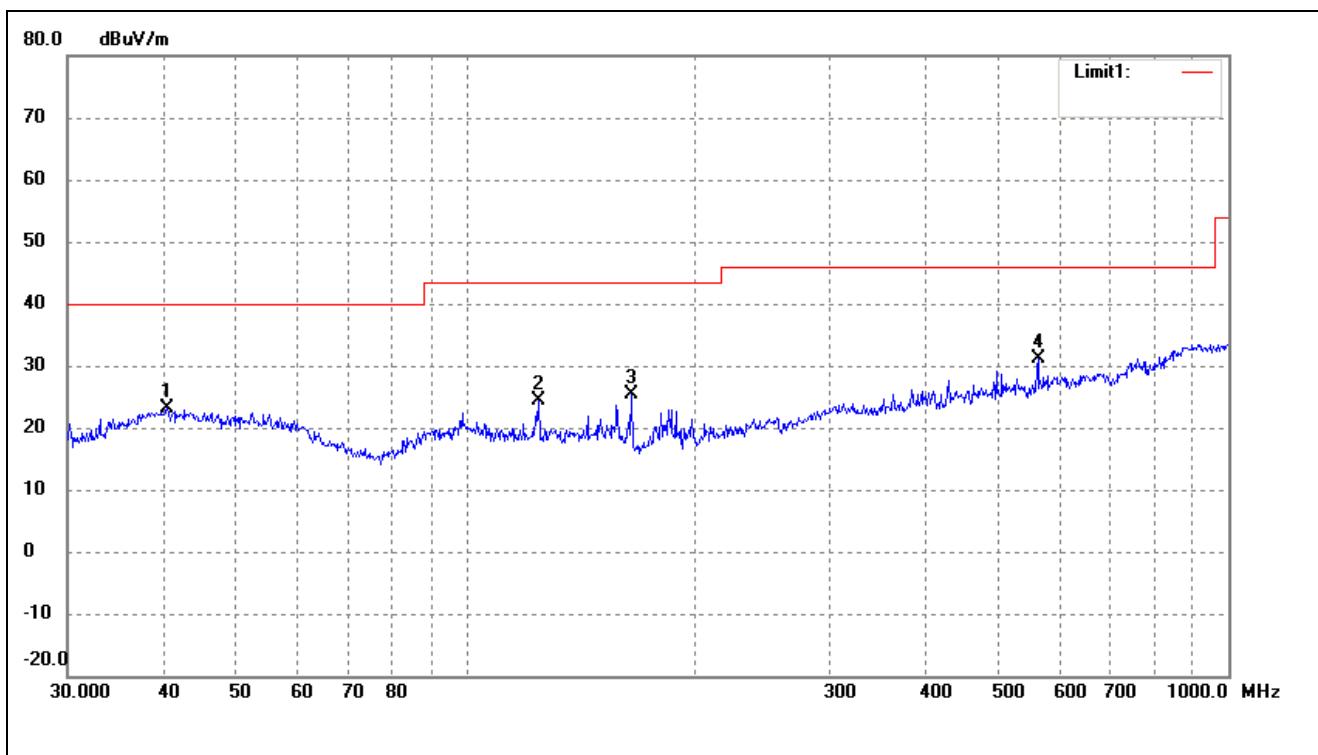
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	70.5836	22.87	2.12	24.99	40.00	-15.01	79	100	peak
2	143.3261	18.75	2.45	21.20	43.50	-22.30	146	100	peak
3	562.6624	20.21	11.67	31.88	46.00	-14.12	201	100	peak
4	884.5029	17.31	16.83	34.14	46.00	-11.86	278	100	peak

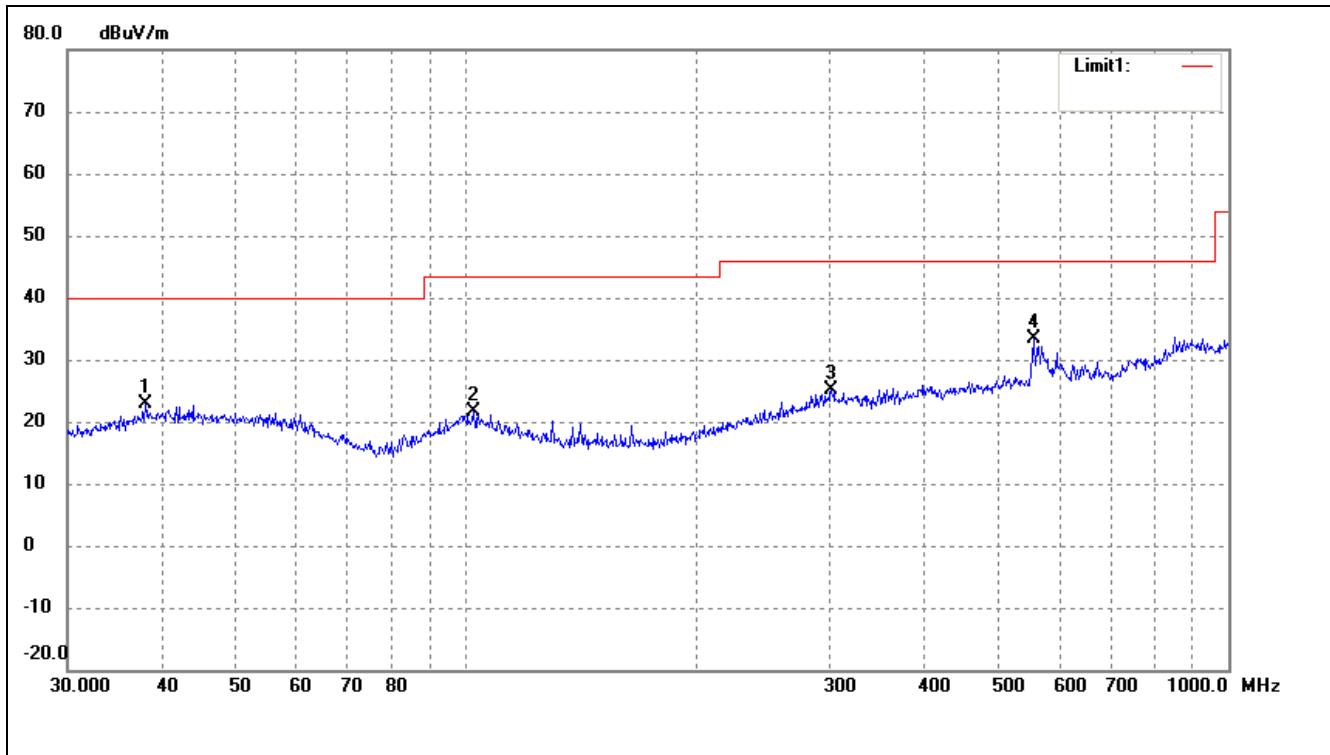
Operating Condition: 802.11b Transmitting Middle Channel-2437MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	40.5591	15.84	7.19	23.03	40.00	-16.97	36	100	peak
2	124.5690	20.62	3.65	24.27	43.50	-19.23	126	100	peak
3	164.9073	22.76	2.65	25.41	43.50	-18.09	184	100	peak
4	562.6624	19.52	11.67	31.19	46.00	-14.81	265	100	peak

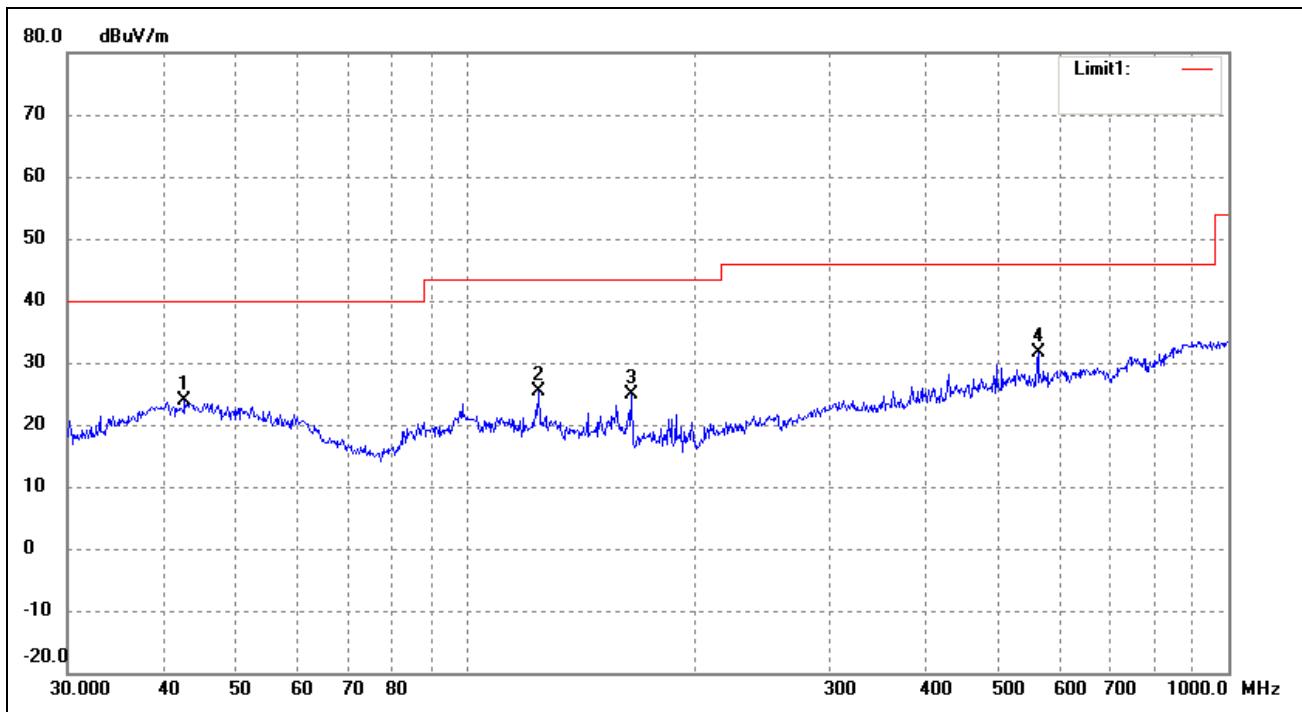
Test Specification: Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	37.9450	13.92	8.90	22.82	40.00	-17.18	41	100	peak
2	102.3597	15.65	5.88	21.53	43.50	-21.97	86	100	peak
3	301.4224	16.00	9.18	25.18	46.00	-20.82	153	100	peak
4	554.8254	21.94	11.46	33.40	46.00	-12.60	237	100	peak

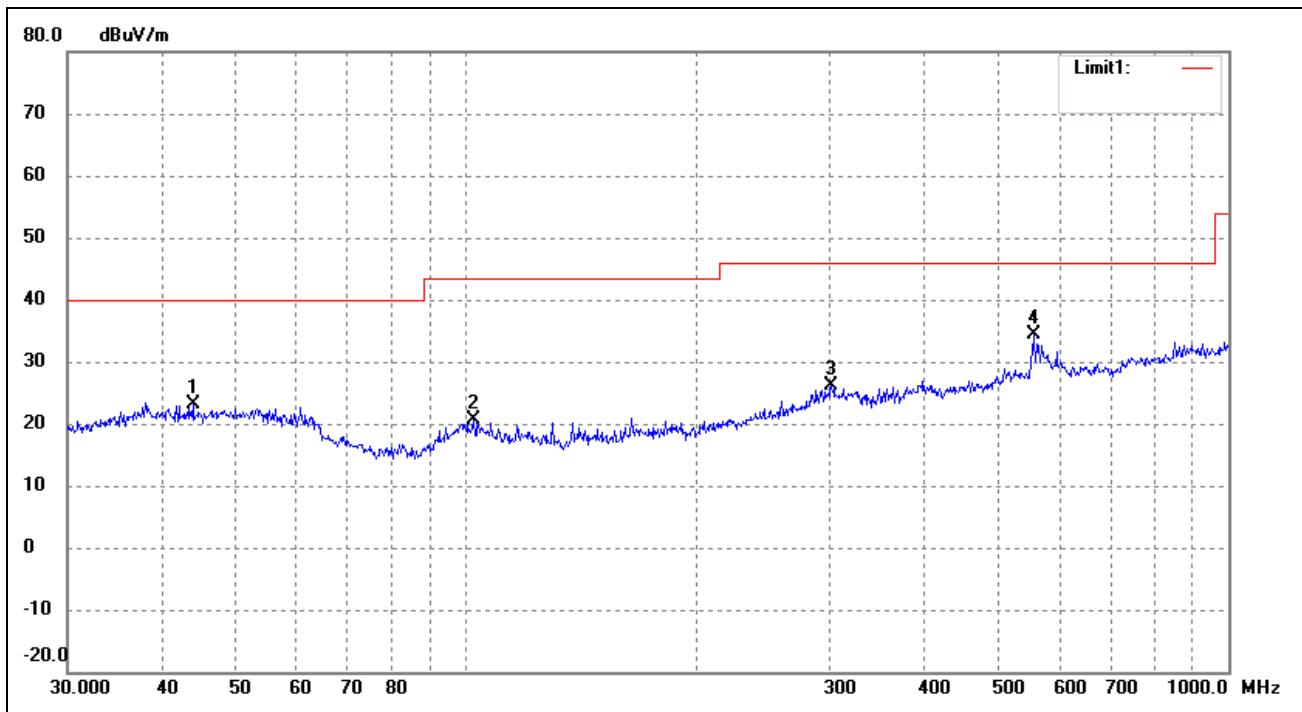
Operating Condition: 802.11b Transmitting High Channel-2462MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	42.7496	16.80	6.98	23.78	40.00	-16.22	40	100	peak
2	124.5690	21.62	3.65	25.27	43.50	-18.23	129	100	peak
3	164.9072	22.26	2.65	24.91	43.50	-18.59	178	100	peak
4	562.6624	20.02	11.67	31.69	46.00	-14.31	252	100	peak

Test Specification: *Vertical*

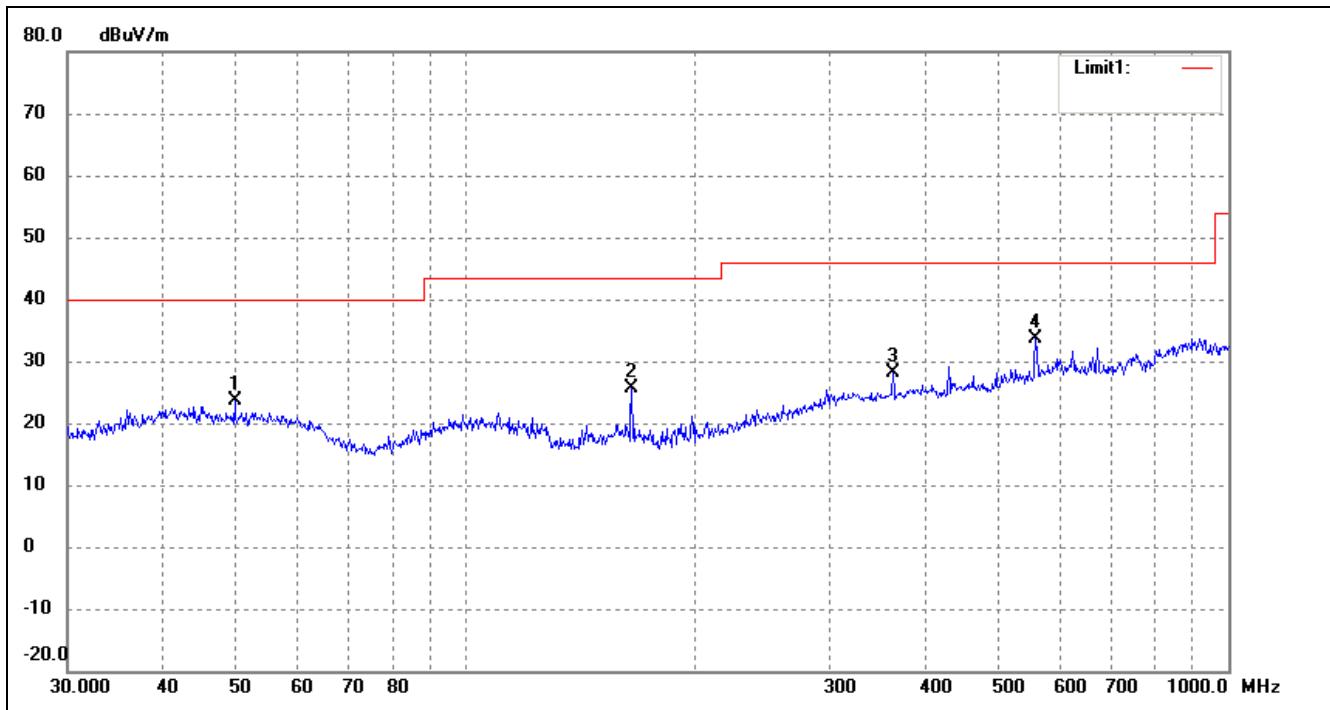


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	43.8119	14.92	8.12	23.04	40.00	-16.96	44	100	peak
2	102.3597	14.65	5.88	20.53	43.50	-22.97	102	100	peak
3	301.4223	17.00	9.18	26.18	46.00	-19.82	184	100	peak
4	554.8253	22.94	11.46	34.40	46.00	-11.60	256	100	peak

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

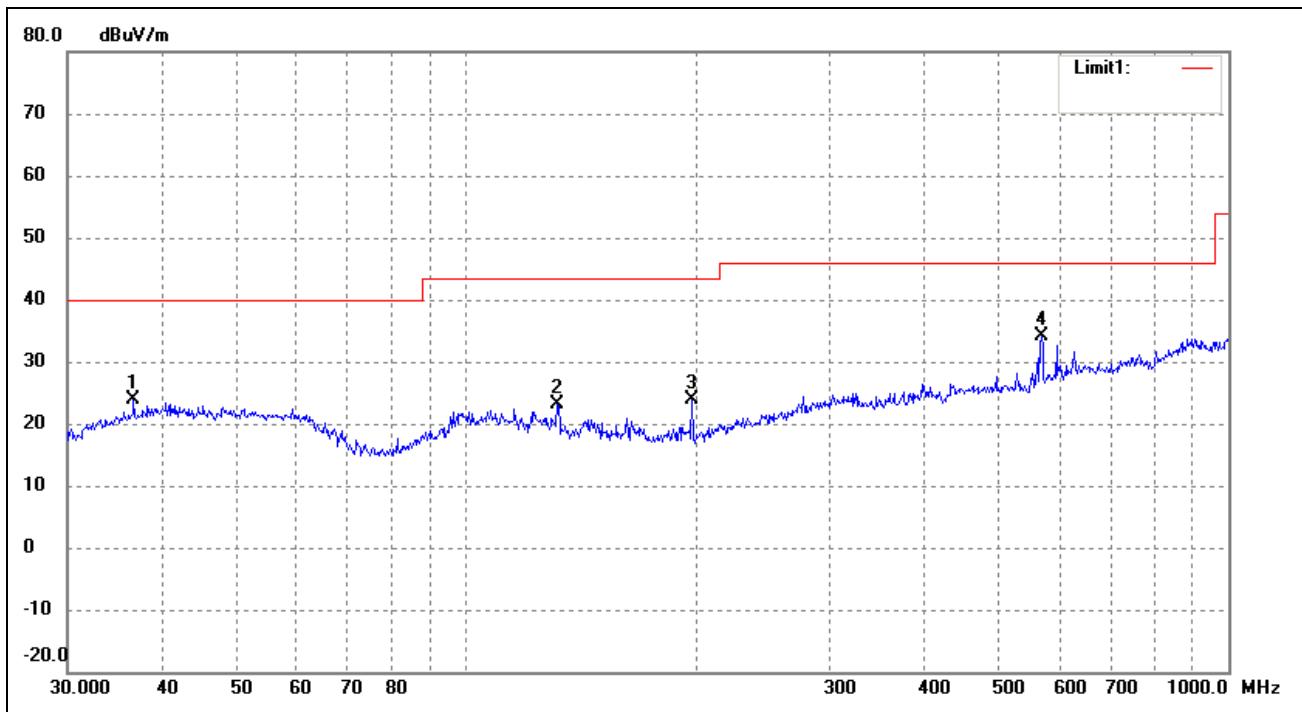
EUT: AC1200 Dual Band WiFi PCI-e Adapter
Tested Model: WNA015
Operating Condition: 802.11g Transmitting Low Channel-2412MHz
Comment: DC 3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	49.7068	17.33	6.29	23.62	40.00	-16.38	37	100	peak
2	164.9074	22.93	2.65	25.58	43.50	-17.92	93	100	peak
3	362.9845	18.89	9.24	28.13	46.00	-17.87	184	100	peak
4	558.7301	22.04	11.52	33.56	46.00	-12.44	268	100	peak

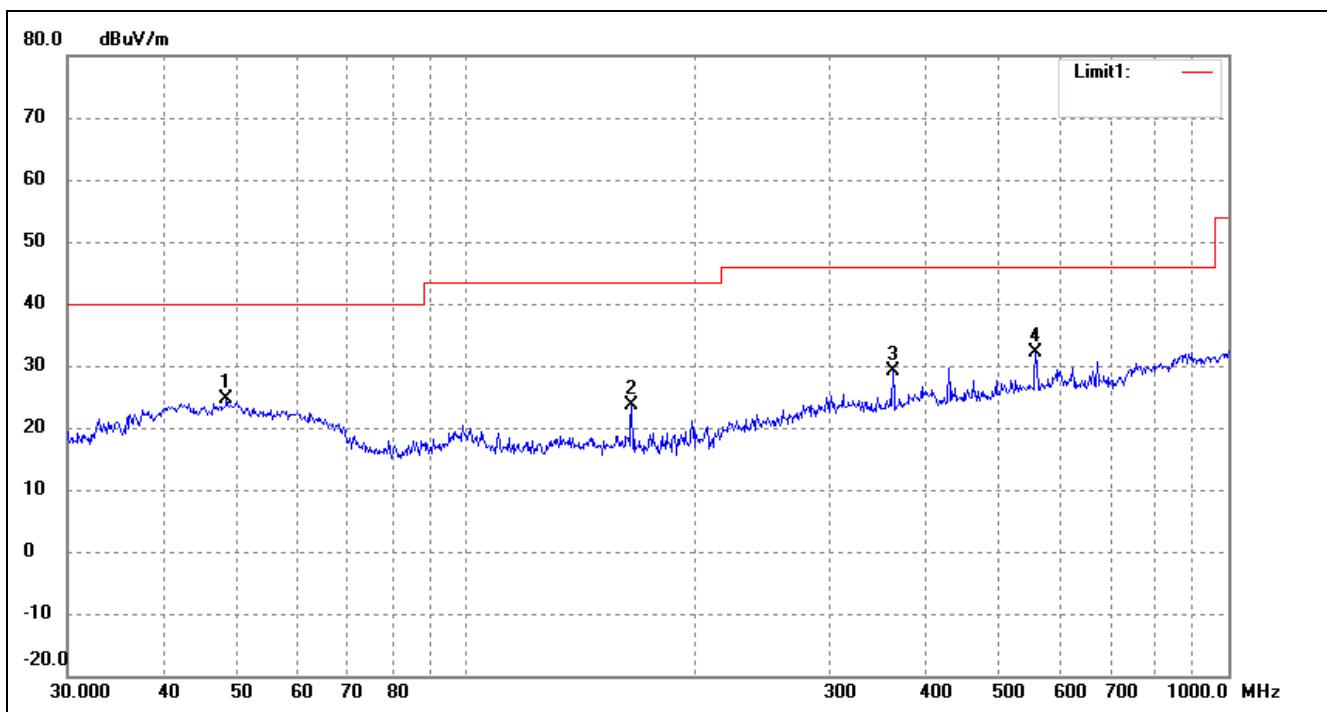
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	36.6375	15.14	8.68	23.82	40.00	-16.18	32	100	peak
2	131.7575	20.00	3.07	23.07	43.50	-20.43	113	100	peak
3	197.8926	20.40	3.58	23.98	43.50	-19.52	172	100	peak
4	568.6127	22.16	11.98	34.14	46.00	-11.86	239	100	peak

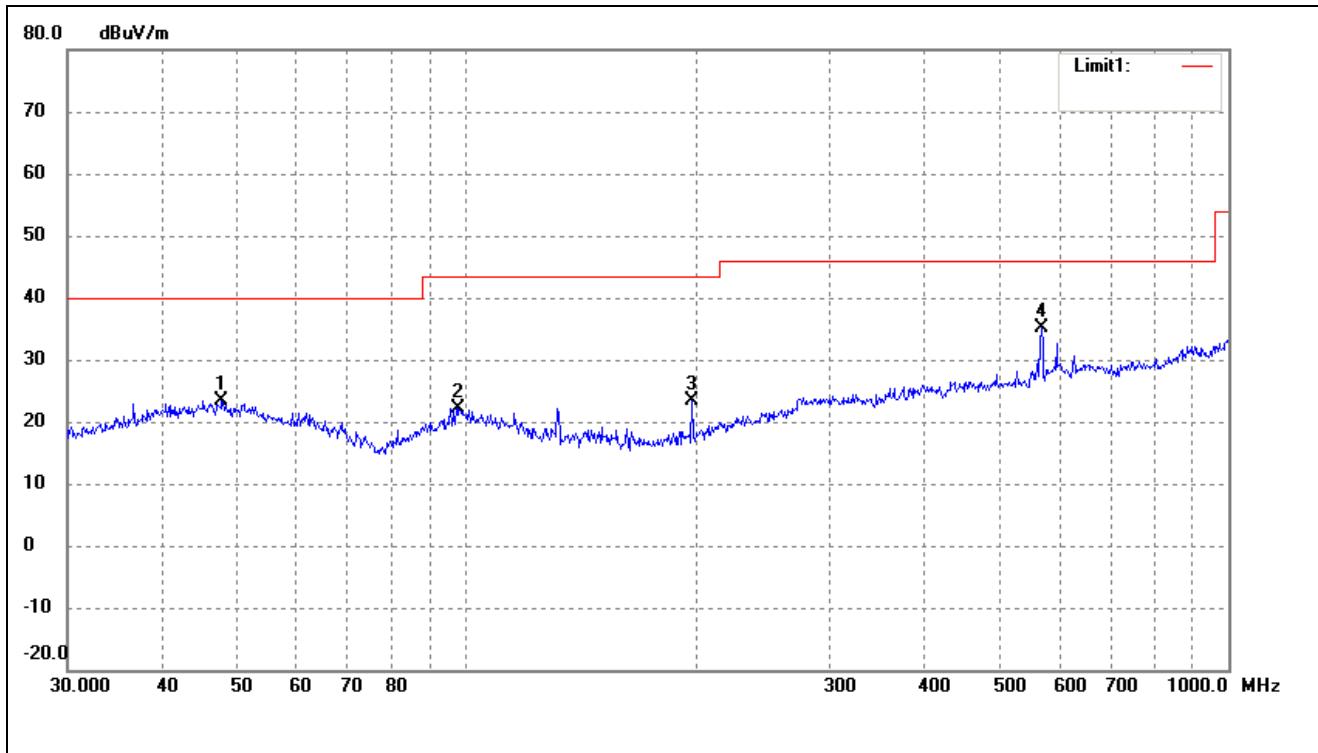
Operating Condition: 802.11g Transmitting Middle Channel-2437MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	48.5016	18.11	6.41	24.52	40.00	-15.48	54	100	peak
2	164.9074	20.93	2.65	23.58	43.50	-19.92	173	100	peak
3	362.9844	19.89	9.24	29.13	46.00	-16.87	239	200	peak
4	558.7301	20.54	11.52	32.06	46.00	-13.94	284	200	peak

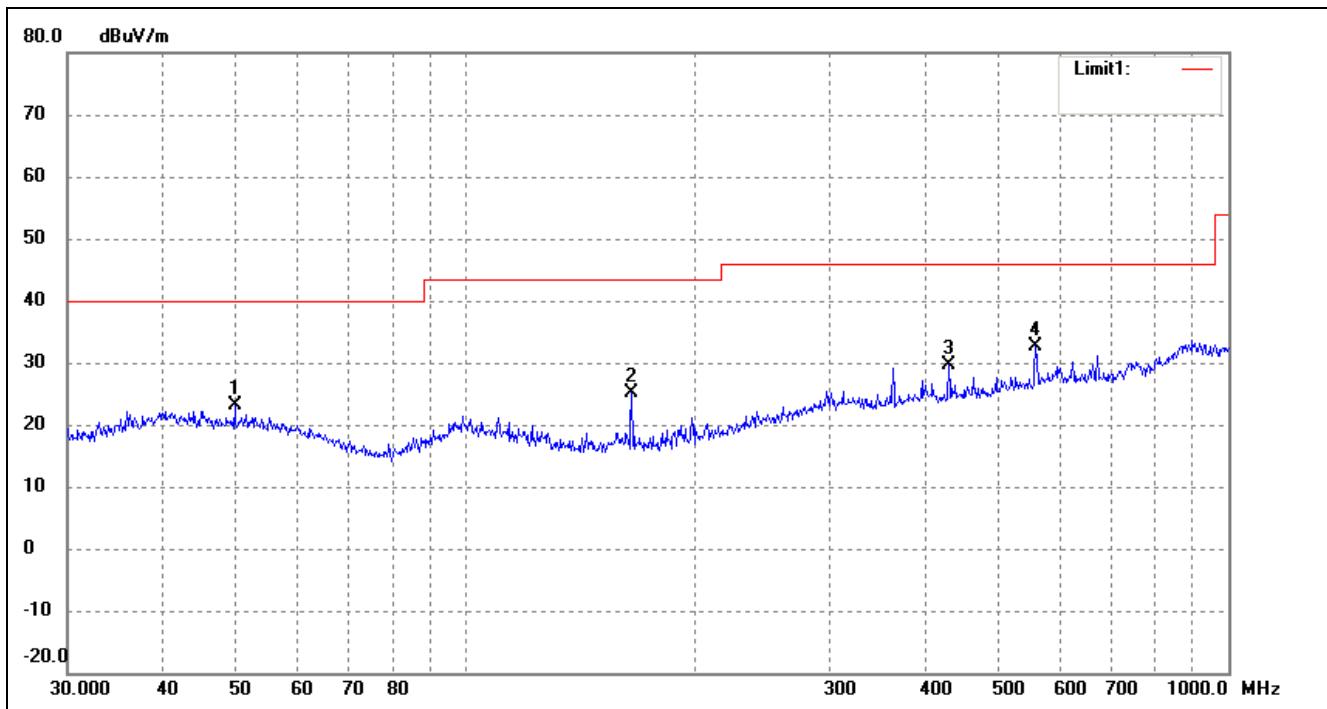
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	47.8260	16.41	6.91	23.32	40.00	-16.68	51	100	peak
2	97.7980	16.60	5.58	22.18	43.50	-21.32	97	100	peak
3	197.8926	19.90	3.58	23.48	43.50	-20.02	146	100	peak
4	568.6127	23.16	11.98	35.14	46.00	-10.86	275	100	peak

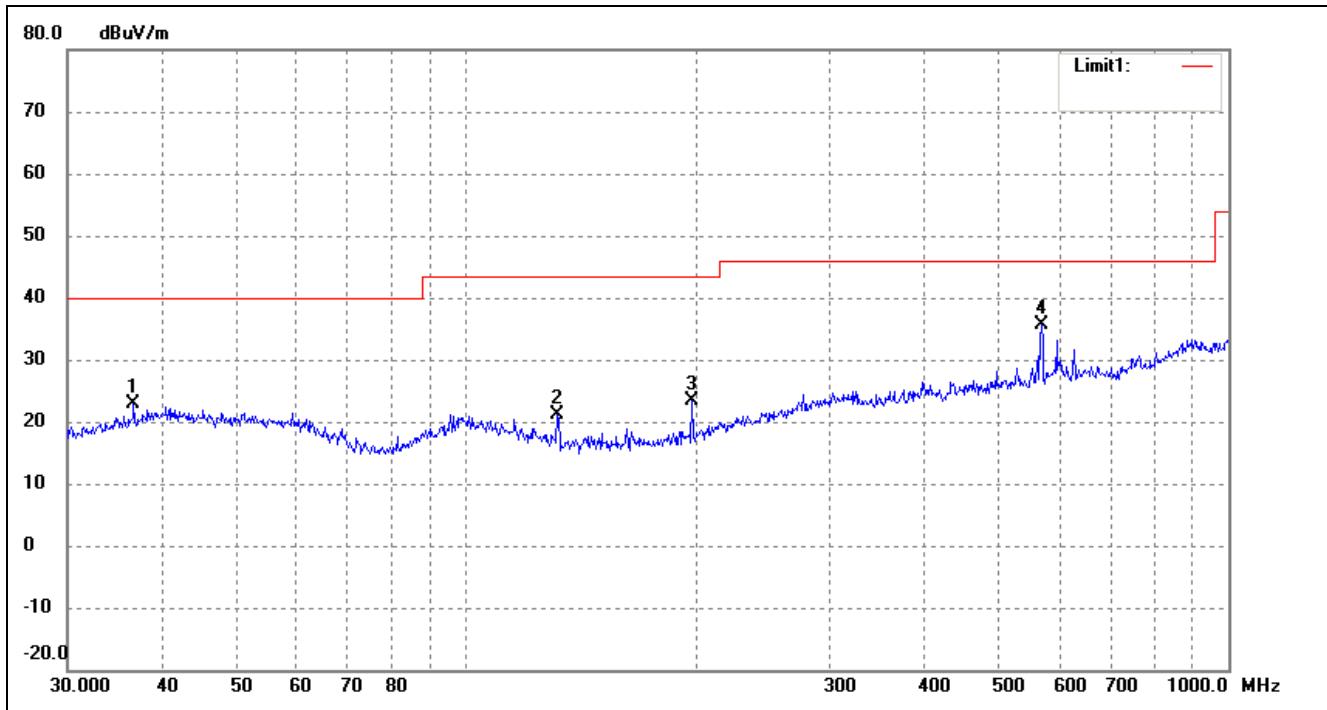
Operating Condition: 802.11g Transmitting High Channel-2462MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	49.7068	16.83	6.29	23.12	40.00	-16.88	42	100	peak
2	164.9075	22.43	2.65	25.08	43.50	-18.42	103	200	peak
3	429.5228	19.86	9.68	29.54	46.00	-16.46	187	200	peak
4	558.7302	21.04	11.52	32.56	46.00	-13.44	262	100	peak

Test Specification: *Vertical*

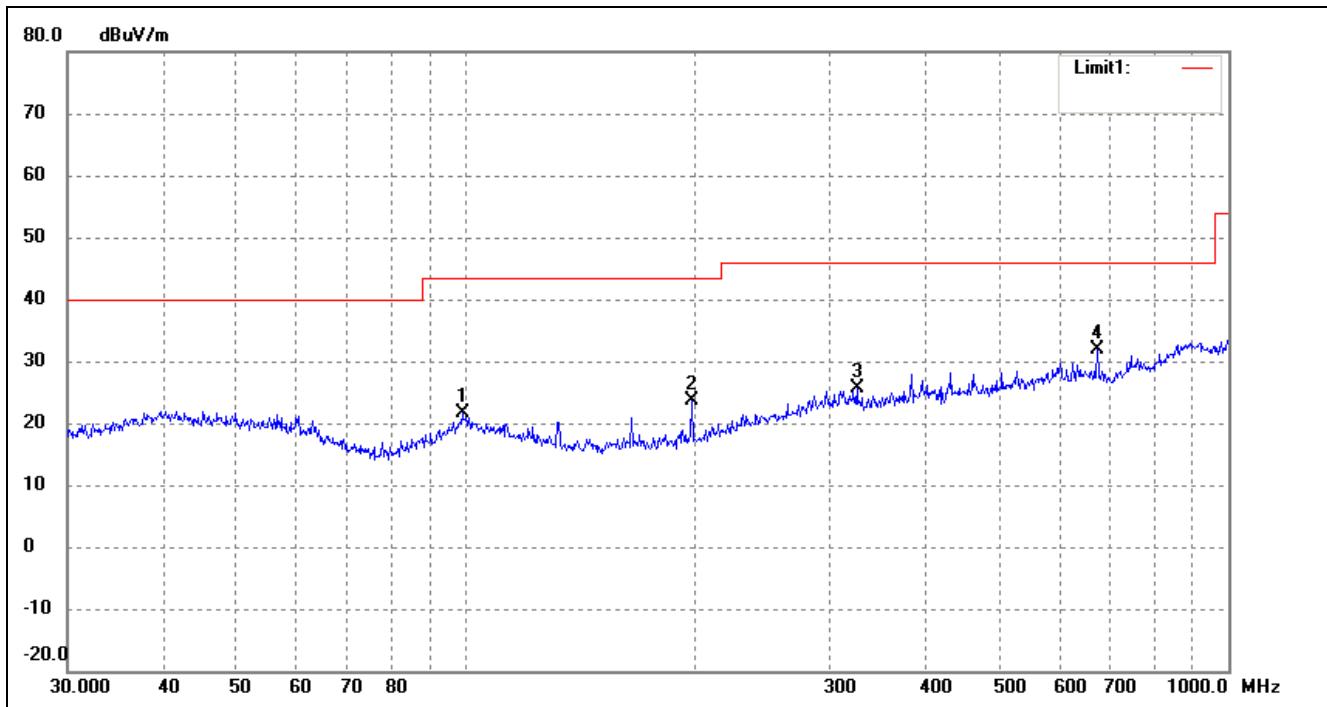


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	36.6375	14.14	8.68	22.82	40.00	-17.18	26	100	peak
2	131.7577	18.00	3.07	21.07	43.50	-22.43	92	100	peak
3	197.8928	19.90	3.58	23.48	43.50	-20.02	139	100	peak
4	568.6127	23.66	11.98	35.64	46.00	-10.36	243	100	peak

Plot of Radiated Emissions Test Data (30MHz to 1GHz)

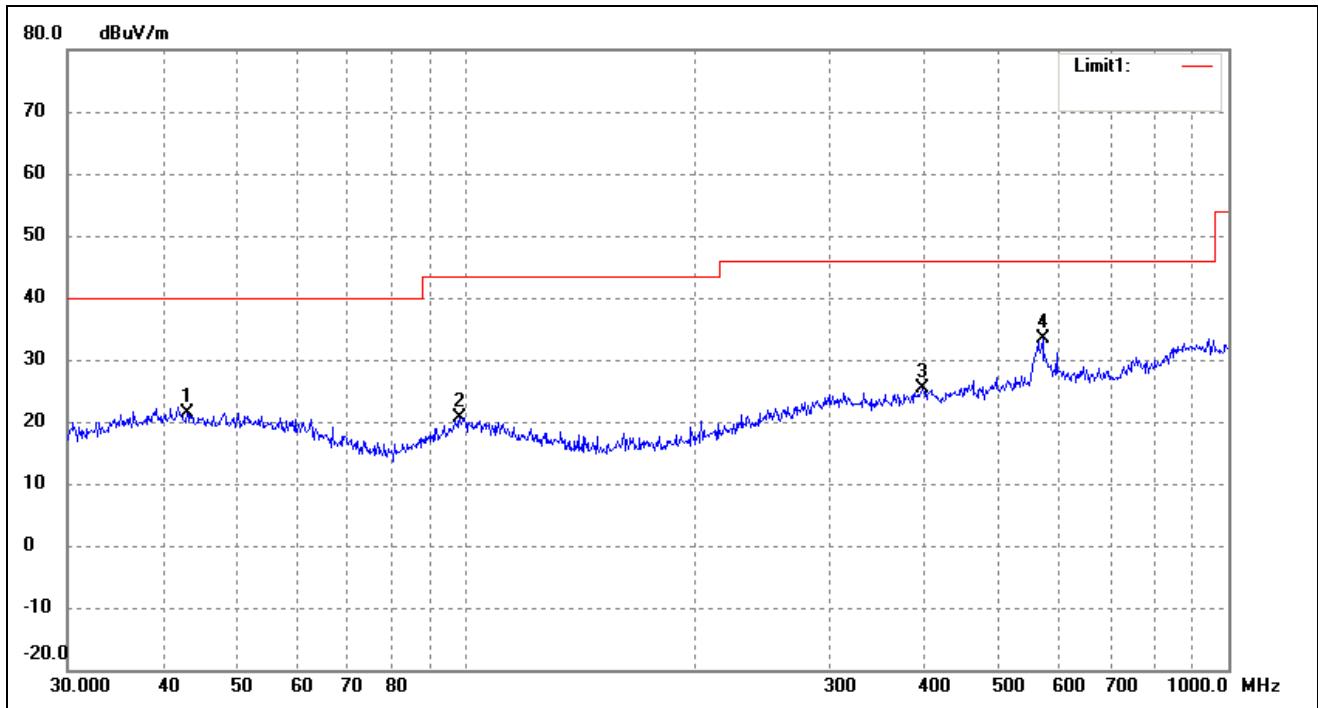
EUT: *AC1200 Dual Band WiFi PCI-e Adapter*
 Tested Model: *WNA015*
 Operating Condition: *802.11n-HT20 Transmitting Low Channel-2412MHz*
 Comment: *DC 3.3V*

Test Specification: *Horizontal*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	98.8324	15.90	5.84	21.74	43.50	-21.76	66	100	peak
2	197.8926	19.93	3.58	23.51	43.50	-19.99	120	200	peak
3	325.5957	16.40	9.14	25.54	46.00	-20.46	179	200	peak
4	672.8444	19.74	12.22	31.96	46.00	-14.04	266	100	peak

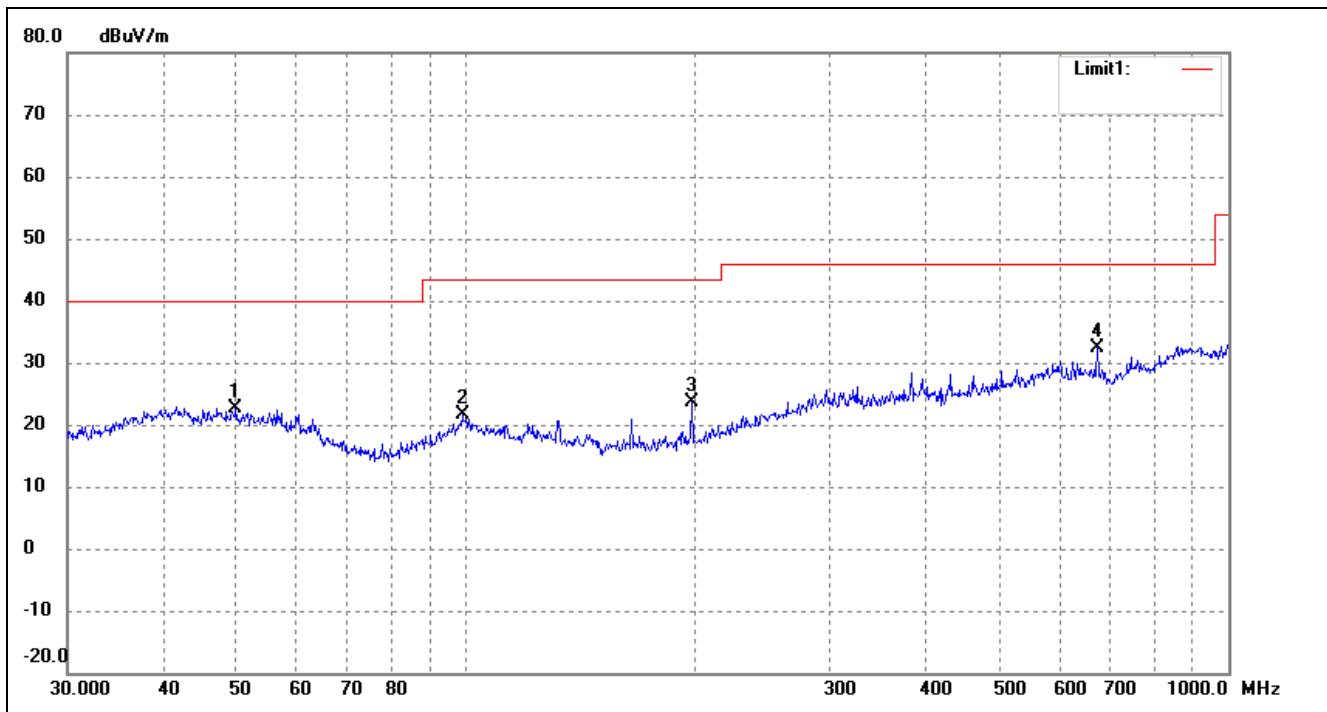
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	43.0504	13.09	8.33	21.42	40.00	-18.58	56	100	peak
2	98.1419	14.97	5.67	20.64	43.50	-22.86	116	100	peak
3	397.6333	15.34	10.03	25.37	46.00	-20.63	213	100	peak
4	570.6100	21.18	12.08	33.26	46.00	-12.74	274	100	peak

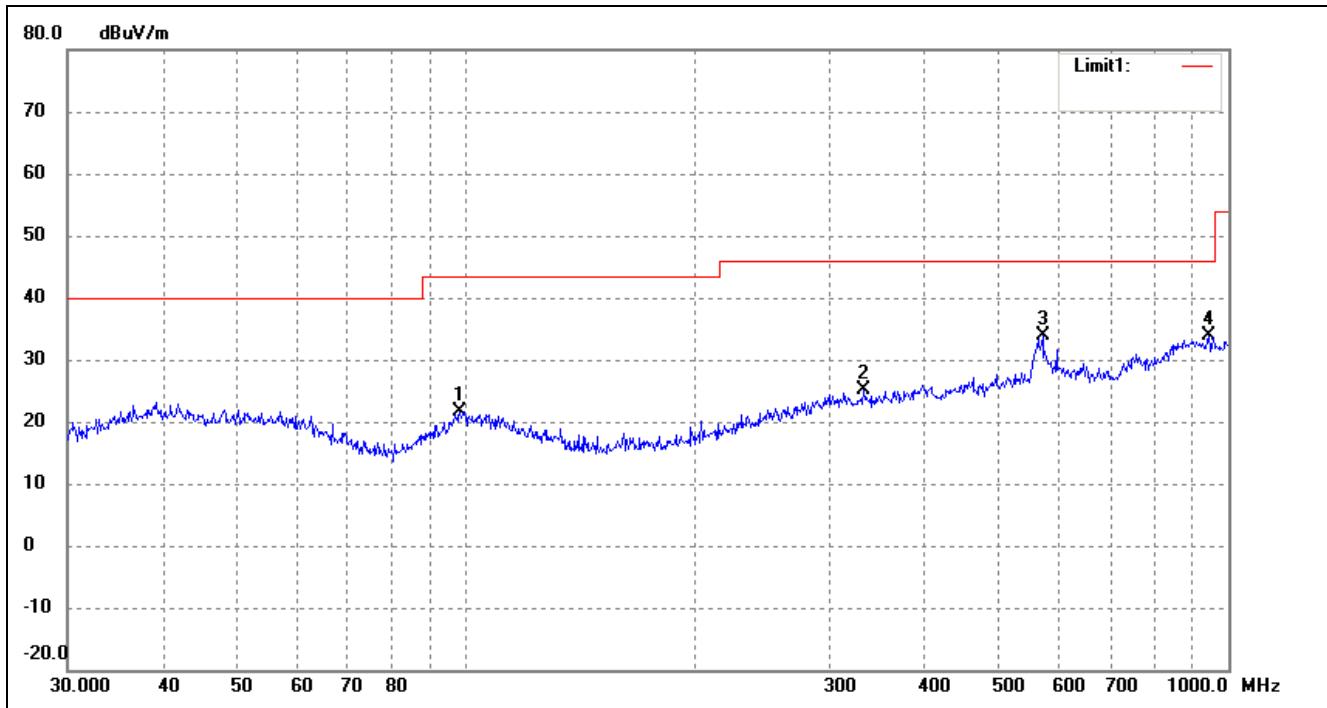
Operating Condition: 802.11n-HT20 Transmitting Middle Channel-2437MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	49.8813	16.29	6.27	22.56	40.00	-17.44	55	100	peak
2	98.8324	15.90	5.84	21.74	43.50	-21.76	106	100	peak
3	197.8926	19.93	3.58	23.51	43.50	-19.99	201	100	peak
4	672.8444	20.24	12.22	32.46	46.00	-13.54	275	100	peak

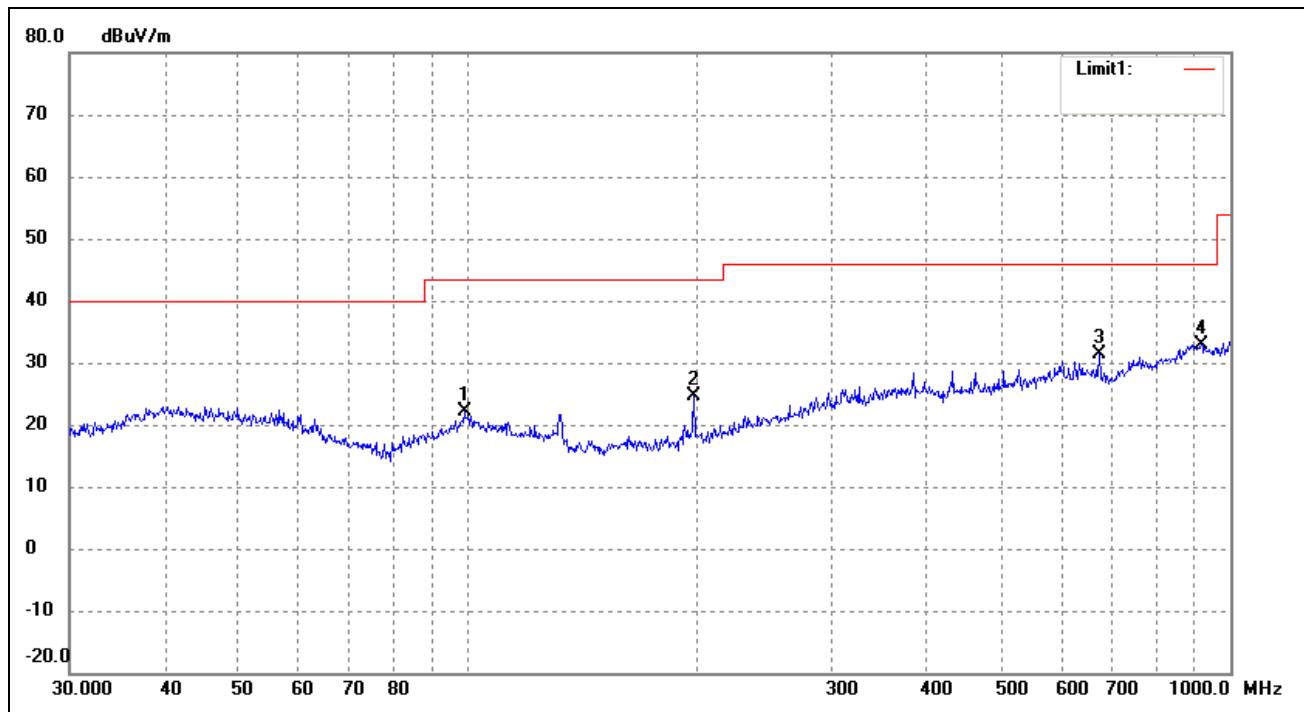
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	98.1419	15.97	5.67	21.64	43.50	-21.86	78	100	peak
2	332.5187	16.12	8.93	25.05	46.00	-20.95	164	100	peak
3	570.6100	21.68	12.08	33.76	46.00	-12.24	246	100	peak
4	942.1304	17.66	16.23	33.89	46.00	-12.11	279	100	peak

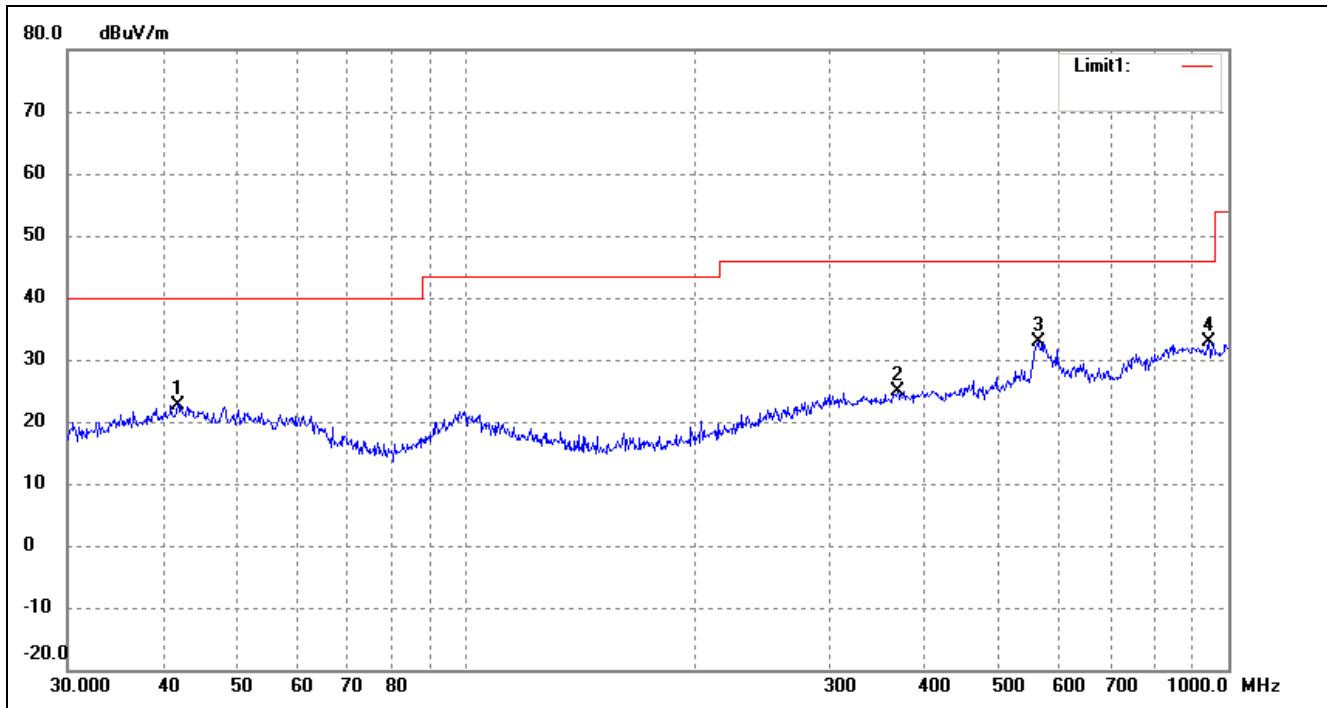
Operating Condition: 802.11n-HT20 Transmitting High Channel-2462MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	98.8324	16.40	5.84	22.24	43.50	-21.26	100	100	peak
2	197.8926	20.93	3.58	24.51	43.50	-18.99	178	100	peak
3	672.8444	19.24	12.22	31.46	46.00	-14.54	226	200	peak
4	916.0687	16.41	16.56	32.97	46.00	-13.03	301	200	peak

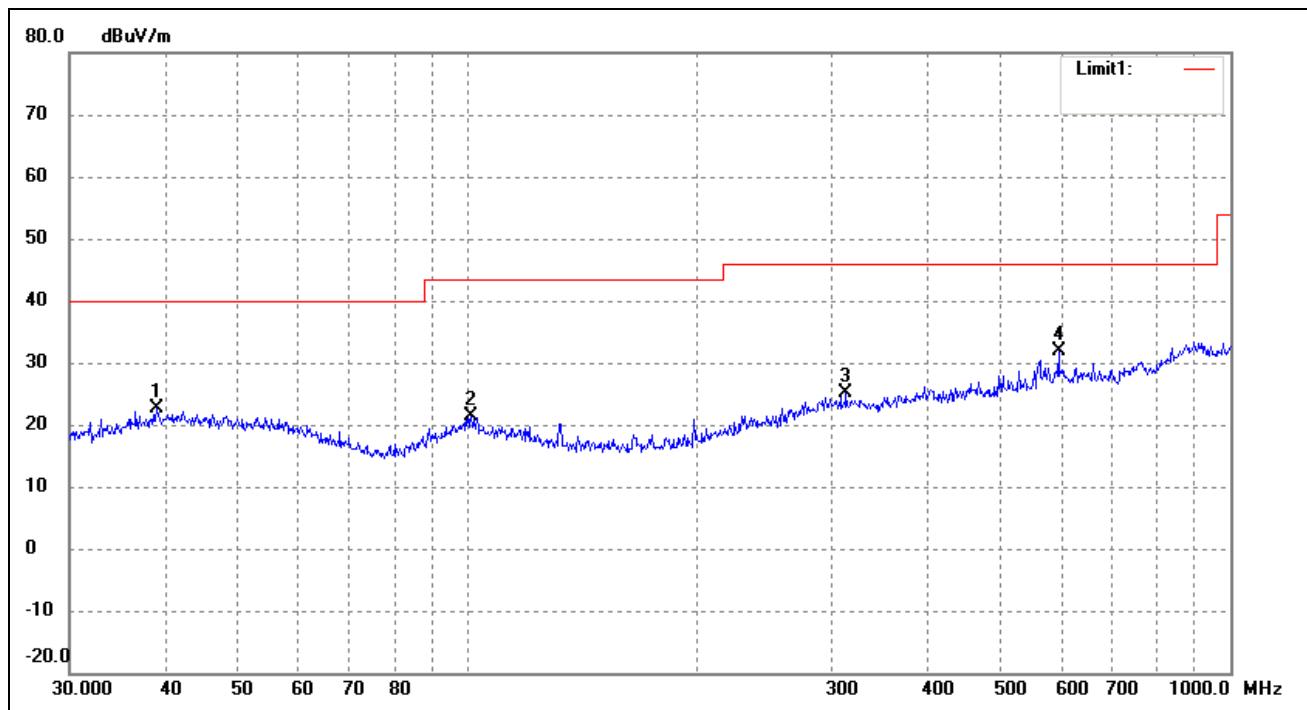
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	41.8596	14.06	8.69	22.75	40.00	-17.25	49	100	peak
2	368.1116	15.74	9.23	24.97	46.00	-21.03	157	100	peak
3	562.6624	21.27	11.67	32.94	46.00	-13.06	235	100	peak
4	942.1304	16.66	16.23	32.89	46.00	-13.11	284	100	peak

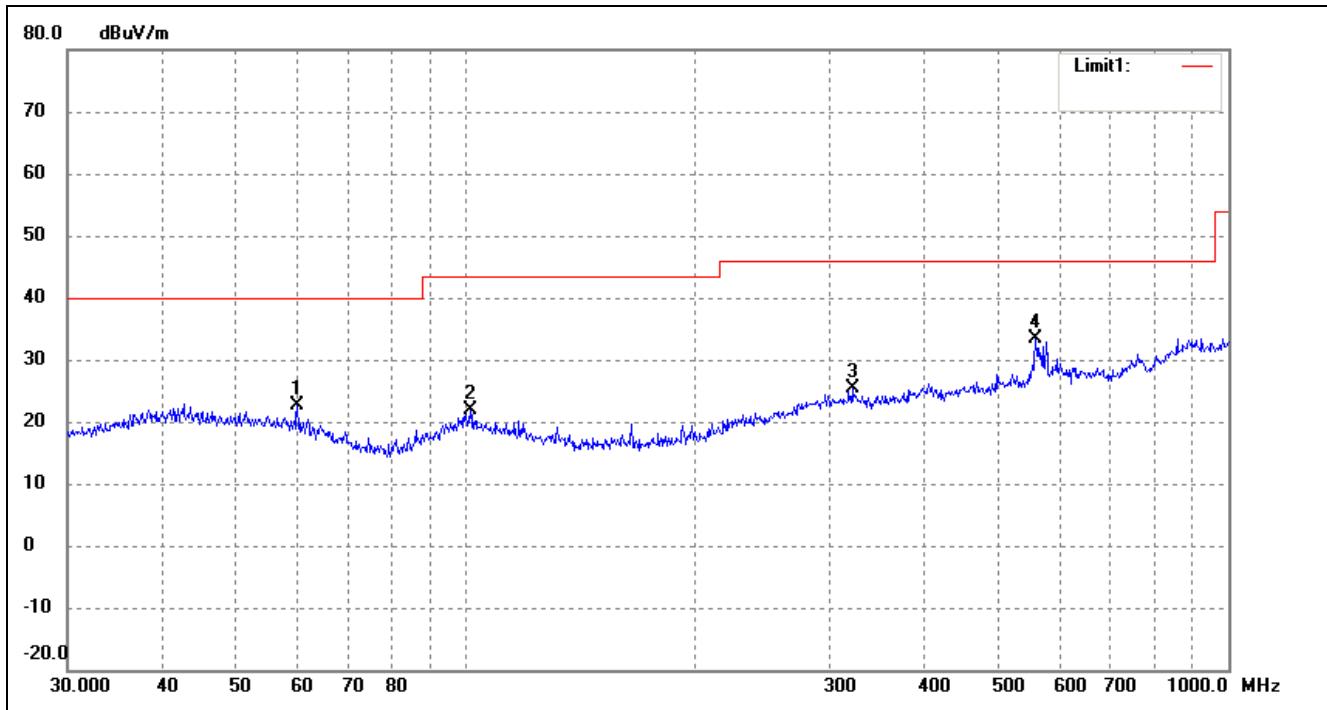
EUT: AC1200 Dual Band WiFi PCI-e Adapter
Tested Model: WNA015
Operating Condition: 802.11n-HT40 Transmitting Low Channel-2422MHz
Comment: DC 3.7V

Test Specification: Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	39.0245	13.53	9.08	22.61	40.00	-17.39	38	100	peak
2	100.9339	15.44	6.03	21.47	43.50	-22.03	79	200	peak
3	313.2760	15.94	9.25	25.19	46.00	-20.81	164	200	peak
4	595.1327	18.85	13.14	31.99	46.00	-14.01	257	100	peak

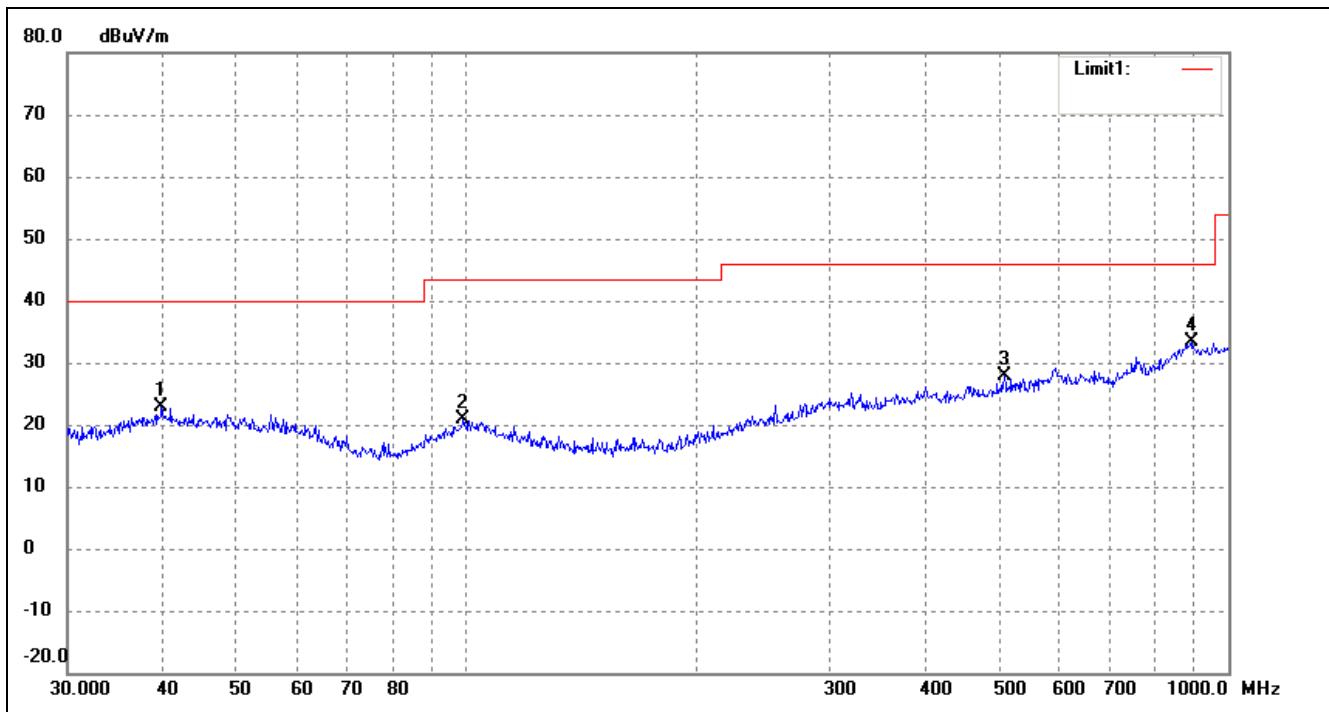
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	60.0691	17.15	5.36	22.51	40.00	-17.49	74	100	peak
2	101.2885	15.84	5.99	21.83	43.50	-21.67	108	100	peak
3	321.0608	16.17	9.26	25.43	46.00	-20.57	213	100	peak
4	558.7302	21.75	11.52	33.27	46.00	-12.73	269	100	peak

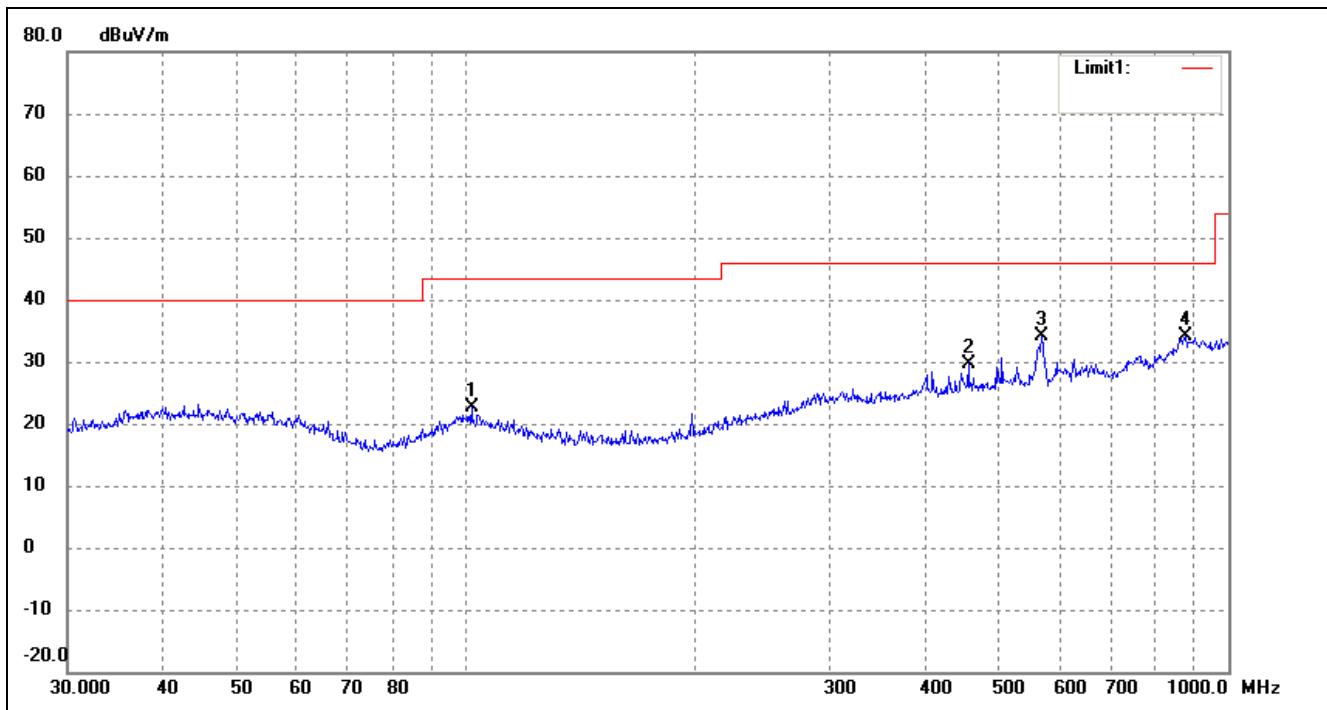
Operating Condition: 802.11n-HT40 Transmitting Middle Channel-2437MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	39.8542	15.66	7.21	22.87	40.00	-17.13	51	100	peak
2	99.1797	14.87	5.92	20.79	43.50	-22.71	117	100	peak
3	508.2582	16.81	11.07	27.88	46.00	-18.12	206	100	peak
4	893.8567	16.46	16.85	33.31	46.00	-12.69	259	100	peak

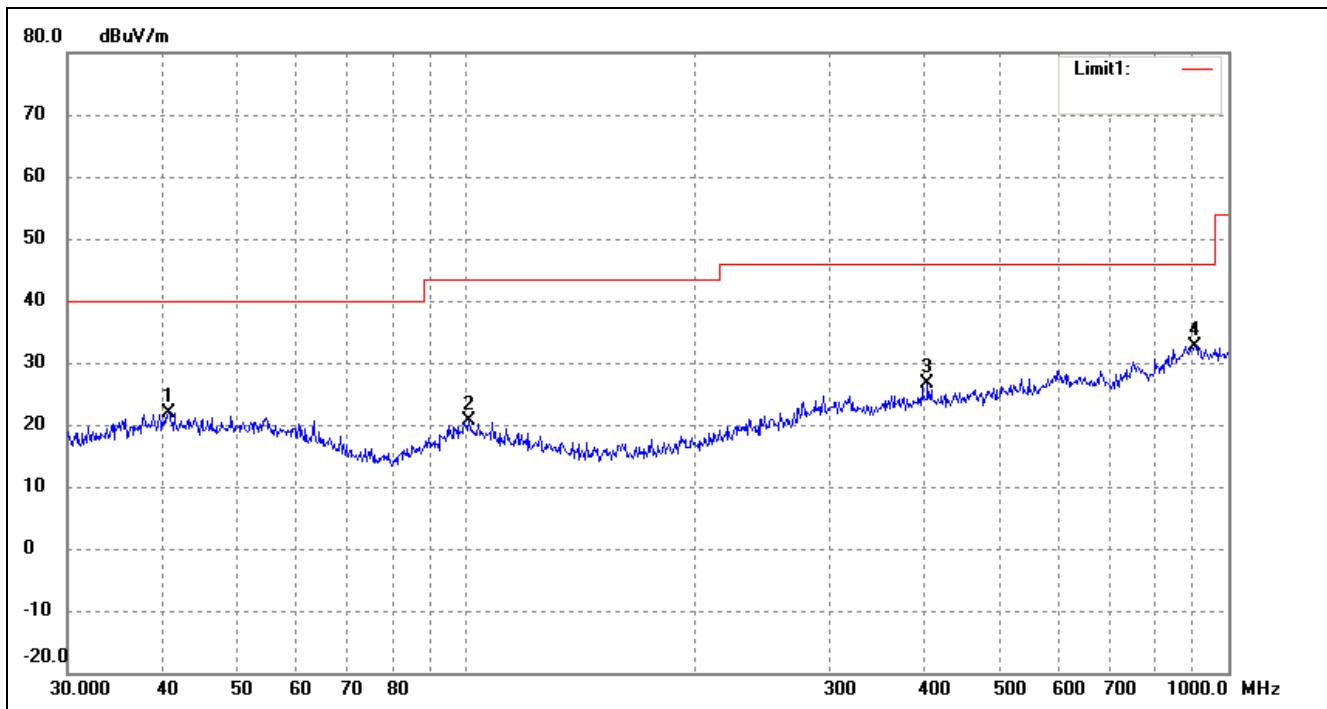
Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	101.6443	16.58	5.95	22.53	43.50	-20.97	103	100	peak
2	455.9058	19.25	10.45	29.70	46.00	-16.30	198	100	peak
3	568.6127	22.04	11.98	34.02	46.00	-11.98	225	100	peak
4	878.3214	17.43	16.78	34.21	46.00	-11.79	306	100	peak

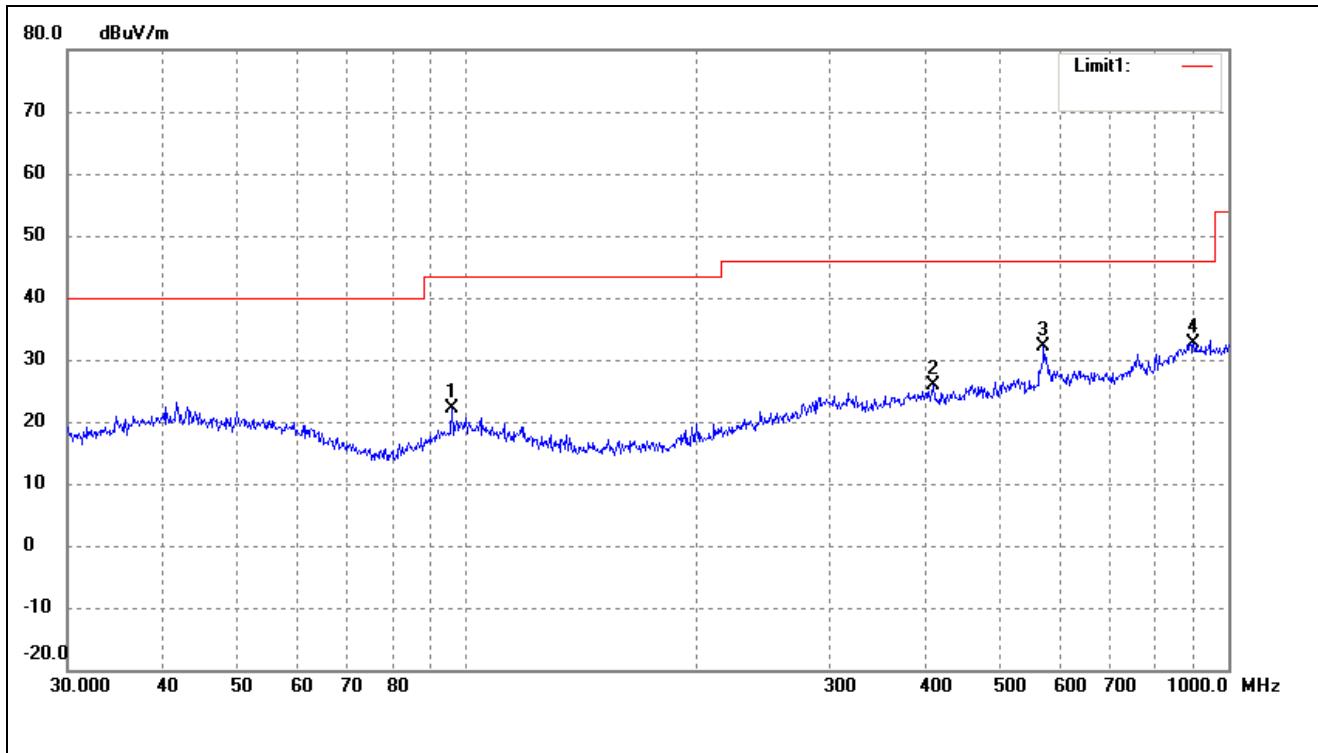
Operating Condition: 802.11n-HT40 Transmitting High Channel-2452MHz
Comment: DC3.3V

Test Specification: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(•)	(cm)	
1	40.7016	14.82	7.18	22.00	40.00	-18.00	56	100	peak
2	100.9340	14.53	6.03	20.56	43.50	-22.94	135	100	peak
3	403.2500	16.62	10.01	26.63	46.00	-19.37	236	100	peak
4	903.3094	15.92	16.79	32.71	46.00	-13.29	298	100	peak

Test Specification: *Vertical*



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (•)	Height (cm)	Remark
1	95.7622	17.15	5.06	22.21	43.50	-21.29	105	100	peak
2	410.3824	16.10	9.74	25.84	46.00	-20.16	203	100	peak
3	572.6144	20.06	12.19	32.25	46.00	-13.75	264	100	peak
4	900.1473	15.78	16.85	32.63	46.00	-13.37	316	100	peak

Spurious Emissions Above 1GHz

Test Mode: 802.11b

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2412MHz							
4824.000	59.24	0.57	59.81	74.00	-14.19	H	PK
4824.000	44.84	0.57	45.41	54.00	-8.59	H	AV
7236.000	35.01	3.69	38.70	74.00	-35.30	H	PK
7236.000	23.58	3.69	27.27	54.00	-26.73	H	AV
4824.000	50.85	0.57	51.42	74.00	-22.58	V	PK
4824.000	37.17	0.57	37.74	54.00	-16.26	V	AV
7236.000	34.80	3.69	38.49	74.00	-35.51	V	PK
7236.000	23.41	3.69	27.10	54.00	-26.90	V	AV
Middle Channel-2437MHz							
4874.000	57.35	0.66	58.01	74.00	-15.99	H	PK
4874.000	42.77	0.66	43.43	54.00	-10.57	H	AV
7311.000	37.61	3.76	41.37	74.00	-32.63	H	PK
7311.000	25.87	3.76	29.63	54.00	-24.37	H	AV
4874.000	51.19	0.66	51.85	74.00	-22.15	V	PK
4874.000	37.61	0.66	38.27	54.00	-15.73	V	AV
7311.000	38.83	3.76	42.59	74.00	-31.41	V	PK
7311.000	25.84	3.76	29.60	54.00	-24.40	V	AV
High Channel-2462MHz							
4924.000	56.32	0.74	57.06	74.00	-16.94	H	PK
4924.000	42.94	0.74	43.68	54.00	-10.32	H	AV
7386.000	37.91	3.83	41.74	74.00	-32.26	H	PK
7386.000	27.26	3.83	31.09	54.00	-22.91	H	AV
4924.000	53.07	0.74	53.81	74.00	-20.19	V	PK
4924.000	39.42	0.74	40.16	54.00	-13.84	V	AV
7386.000	38.69	3.83	42.52	74.00	-31.48	V	PK
7386.000	27.20	3.83	31.03	54.00	-22.97	V	AV

Test Mode: 802.11g

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar	Detector
Low Channel-2412MHz							
4824.000	54.00	0.57	54.57	74.00	-19.43	H	PK
4824.000	47.78	0.57	48.35	54.00	-5.65	H	AV
7236.000	35.17	3.69	38.86	74.00	-35.14	H	PK
7236.000	23.82	3.69	27.51	54.00	-26.49	H	AV
4824.000	42.22	0.57	42.79	74.00	-31.21	V	PK
4824.000	33.11	0.57	33.68	54.00	-20.32	V	AV
7236.000	35.08	3.69	38.77	74.00	-35.23	V	PK
7236.000	23.89	3.69	27.58	54.00	-26.42	V	AV
Middle Channel-2437MHz							
4874.000	53.19	0.66	53.85	74.00	-20.15	H	PK
4874.000	46.35	0.66	47.01	54.00	-6.99	H	AV
7311.000	37.62	3.76	41.38	74.00	-32.62	H	PK
7311.000	26.04	3.76	29.80	54.00	-24.20	H	AV
4874.000	43.36	0.66	44.02	74.00	-29.98	V	PK
4874.000	32.19	0.66	32.85	54.00	-21.15	V	AV
7311.000	37.03	3.76	40.79	74.00	-33.21	V	PK
7311.000	26.65	3.76	30.41	54.00	-23.59	V	AV
High Channel-2462MHz							
4924.000	55.79	0.74	56.53	74.00	-17.47	H	PK
4924.000	33.00	0.74	33.74	54.00	-20.26	H	AV
7386.000	37.86	3.83	41.69	74.00	-32.31	H	PK
7386.000	27.21	3.83	31.04	54.00	-22.96	H	AV
4924.000	45.15	0.74	45.89	74.00	-28.11	V	PK
4924.000	33.60	0.74	34.34	54.00	-19.66	V	AV
7386.000	38.93	3.83	42.76	74.00	-31.24	V	PK
7386.000	27.12	3.83	30.95	54.00	-23.05	V	AV

Test Mode: 802.11n-HT20

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel-2412MHz							
4824.000	55.85	0.57	56.42	74.00	-17.58	H	PK
4824.000	32.67	0.57	33.24	54.00	-20.76	H	AV
7236.000	34.49	3.69	38.18	74.00	-35.82	H	PK
7236.000	23.28	3.69	26.97	54.00	-27.03	H	AV
4824.000	43.03	0.57	43.60	74.00	-30.40	V	PK
4824.000	31.74	0.57	32.31	54.00	-21.69	V	AV
7236.000	34.59	3.69	38.28	74.00	-35.72	V	PK
7236.000	23.31	3.69	27.00	54.00	-27.00	V	AV
Middle Channel-2437MHz							
4874.000	53.08	0.66	53.74	74.00	-20.26	H	PK
4874.000	31.66	0.66	32.32	54.00	-21.68	H	AV
7311.000	36.80	3.76	40.56	74.00	-33.44	H	PK
7311.000	26.16	3.76	29.92	54.00	-24.08	H	AV
4874.000	44.14	0.66	44.80	74.00	-29.20	V	PK
4874.000	32.41	0.66	33.07	54.00	-20.93	V	AV
7311.000	37.59	3.76	41.35	74.00	-32.65	V	PK
7311.000	25.48	3.76	29.24	54.00	-24.76	V	AV
High Channel-2462MHz							
4924.000	53.25	0.74	53.99	74.00	-20.01	H	PK
4924.000	31.69	0.74	32.43	54.00	-21.57	H	AV
7386.000	38.35	3.83	42.18	74.00	-31.82	H	PK
7386.000	27.19	3.83	31.02	54.00	-22.98	H	AV
4924.000	43.52	0.74	44.26	74.00	-29.74	V	PK
4924.000	31.12	0.74	31.86	54.00	-22.14	V	AV
7386.000	38.66	3.83	42.49	74.00	-31.51	V	PK
7386.000	26.99	3.83	30.82	54.00	-23.18	V	AV

Test Mode: 802.11n-HT40

Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar	Detector
Low Channel-2422MHz							
4844.000	53.25	0.60	53.85	74.00	-20.15	H	PK
4824.000	38.25	0.60	38.85	54.00	-15.15	H	AV
7266.000	46.48	3.72	50.20	74.00	-23.80	H	PK
7266.000	32.56	3.72	36.28	54.00	-17.72	H	AV
4844.000	54.22	0.60	54.82	74.00	-19.18	V	PK
4824.000	39.42	0.60	40.02	54.00	-13.98	V	AV
7266.000	48.81	3.72	52.53	74.00	-21.47	V	PK
7266.000	34.78	3.72	38.50	54.00	-15.50	V	AV
Middle Channel-2437MHz							
4874.000	52.53	0.66	53.19	74.00	-20.81	H	PK
4874.000	37.88	0.66	38.54	54.00	-15.46	H	AV
7311.000	44.88	3.76	48.64	74.00	-25.36	H	PK
7311.000	32.03	3.76	35.79	54.00	-18.21	H	AV
4874.000	53.74	0.66	54.40	74.00	-19.60	V	PK
4874.000	39.95	0.66	40.61	54.00	-13.39	V	AV
7311.000	45.78	3.76	49.54	74.00	-24.46	V	PK
7311.000	34.00	3.76	37.76	54.00	-16.24	V	AV
High Channel-2452MHz							
4904.000	52.65	0.72	53.37	74.00	-20.63	H	PK
4904.000	39.37	0.72	40.09	54.00	-13.91	H	AV
7356.000	45.63	3.81	49.44	74.00	-24.56	H	PK
7356.000	30.73	3.81	34.54	54.00	-19.46	H	AV
4904.000	54.84	0.72	55.56	74.00	-18.44	V	PK
4904.000	40.83	0.72	41.55	54.00	-12.45	V	AV
7356.000	48.18	3.81	51.99	74.00	-22.01	V	PK
7356.000	35.12	3.81	38.93	54.00	-15.07	V	AV

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

9. Out of Band Emissions

9.1 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

9.2 Test Procedure

According to the KDB 558074D01 v03r05, the band-edge radiated test method as follows:

Set span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation (2310MHz to 2420MHz for low bandedge, 2460MHz to 2500MHz for the high bandedge)

RBW = 1MHz, VBW = 1MHz for peak value measured

RBW = 1MHz, VBW = 10Hz for average value measured

Sweep = auto; Detector function = peak/average; Trace = max hold

All the trace to stabilize, set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. Those emission must comply with the 15.209 limit for fall in the restricted bands listed in section 15.205. Note that the method of measurement KDB publication number: 913591 may be used for the radiated bandedge measurements.

According to the KDB 558074 D01 V03r05, the conducted spurious emissions test method as follows:

1. Set start frequency to DTS channel edge frequency.
2. Set stop frequency so as to encompass the spectrum to be examined.
3. Set RBW = 100 kHz.
4. Set VBW \geq 300 kHz.
5. Detector = peak.
6. Trace Mode = max hold.
7. Sweep = auto couple.
8. Allow the trace to stabilize (this may take some time, depending on the extent of the span).
9. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements specified in section 8.1. Report the three highest emissions relative to the limit.

9.3 Environmental Conditions

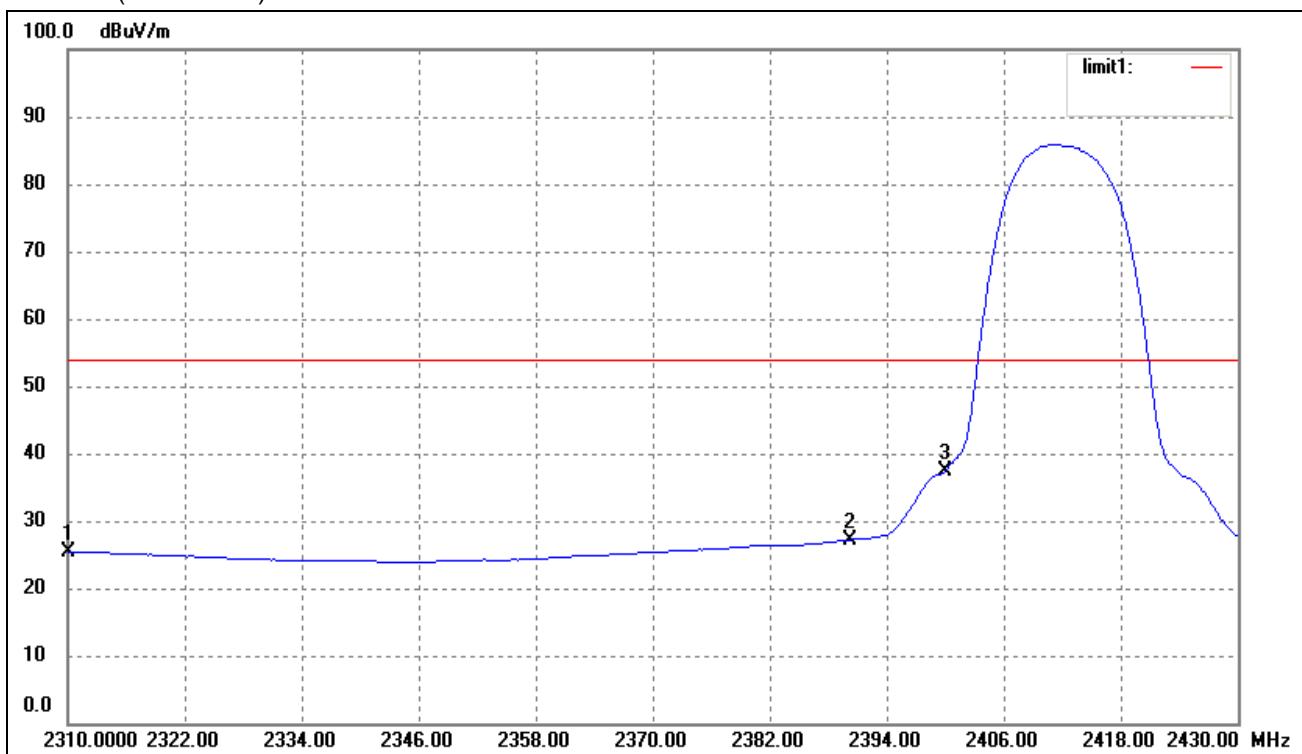
Temperature:	23°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.4 Summary of Test Results/Plots

Please refer to the test plots as below.

802.11b-Lowest Bandedge

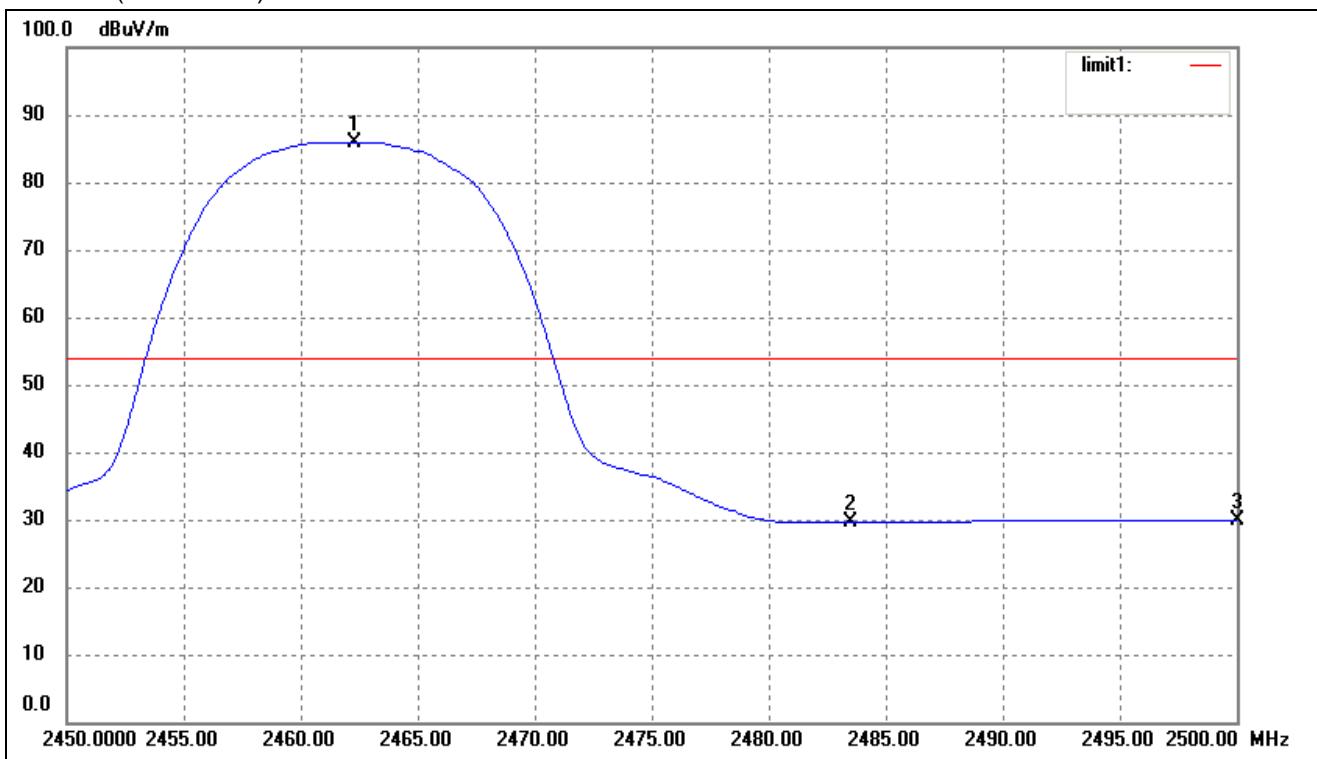
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	29.17	-3.71	25.46	54.00	-28.54	Average Detector
	2310.000	42.23	-3.71	38.52	74.00	-35.48	Peak Detector
2	2390.000	30.75	-3.54	27.21	54.00	-26.79	Average Detector
	2390.000	42.90	-3.54	39.36	74.00	-34.64	Peak Detector
3	2400.000	41.00	-3.51	37.49	54.00	-16.51	Average Detector
	2400.000	51.93	-3.51	48.42	74.00	-25.58	Peak Detector

802.11b-Highest Bandedge

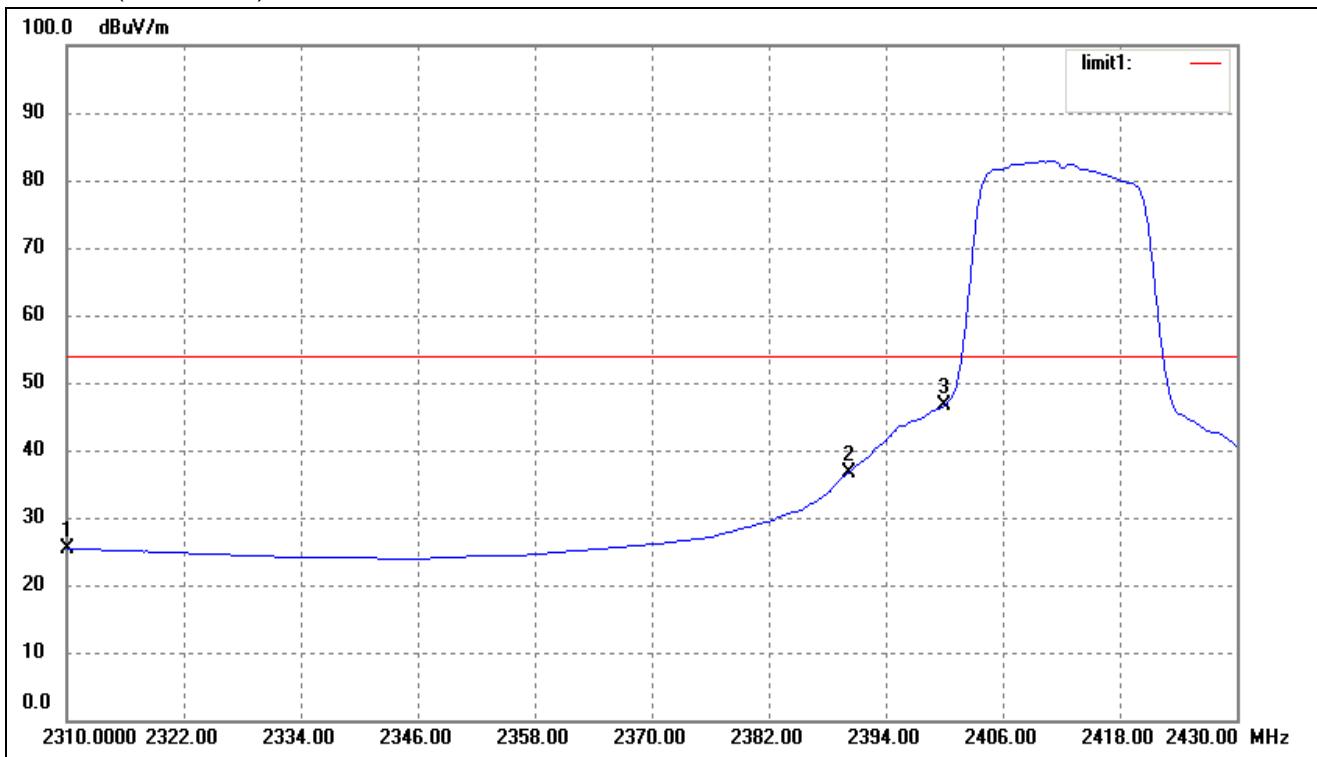
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2462.300	89.35	-3.37	85.98	/	/	Average Detector
	2462.300	97.99	-3.37	94.62	/	/	Peak Detector
2	2483.500	Delta = 56.6dBc		29.38	54.00	-24.62	Average Detector
	2483.500			38.02	74.00	-35.98	Peak Detector
3	2500.000	33.13	-3.28	29.85	54.00	-24.15	Average Detector
	2500.000	46.79	-3.28	43.51	74.00	-30.49	Peak Detector

802.11g-Lowest Bandedge

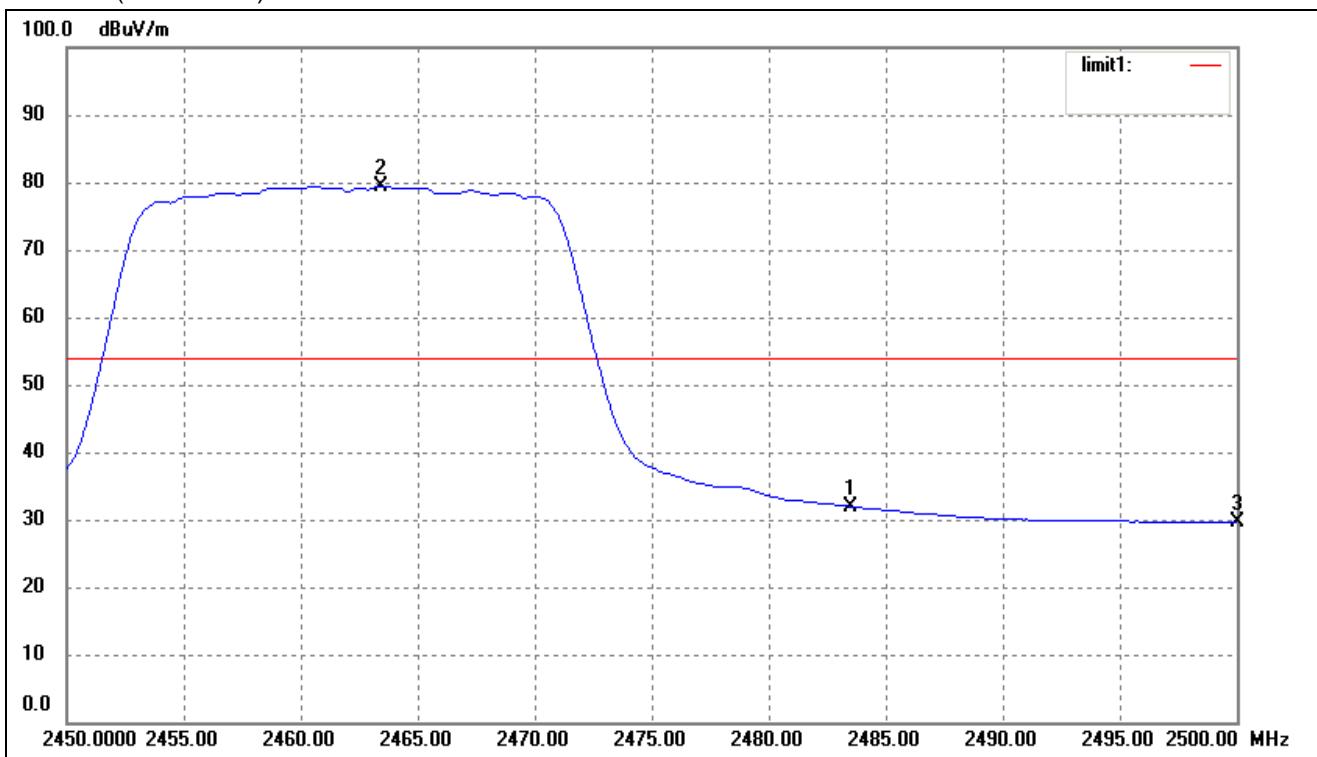
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	29.15	-3.71	25.44	54.00	-28.56	Average Detector
	2310.000	41.87	-3.71	38.16	74.00	-35.84	Peak Detector
2	2390.000	40.17	-3.54	36.63	54.00	-17.37	Average Detector
	2390.000	60.80	-3.54	57.26	74.00	-16.74	Peak Detector
3	2400.000	50.13	-3.51	46.62	54.00	-7.38	Average Detector
	2400.000	70.72	-3.51	67.21	74.00	-6.79	Peak Detector

802.11g-Highest Bandedge

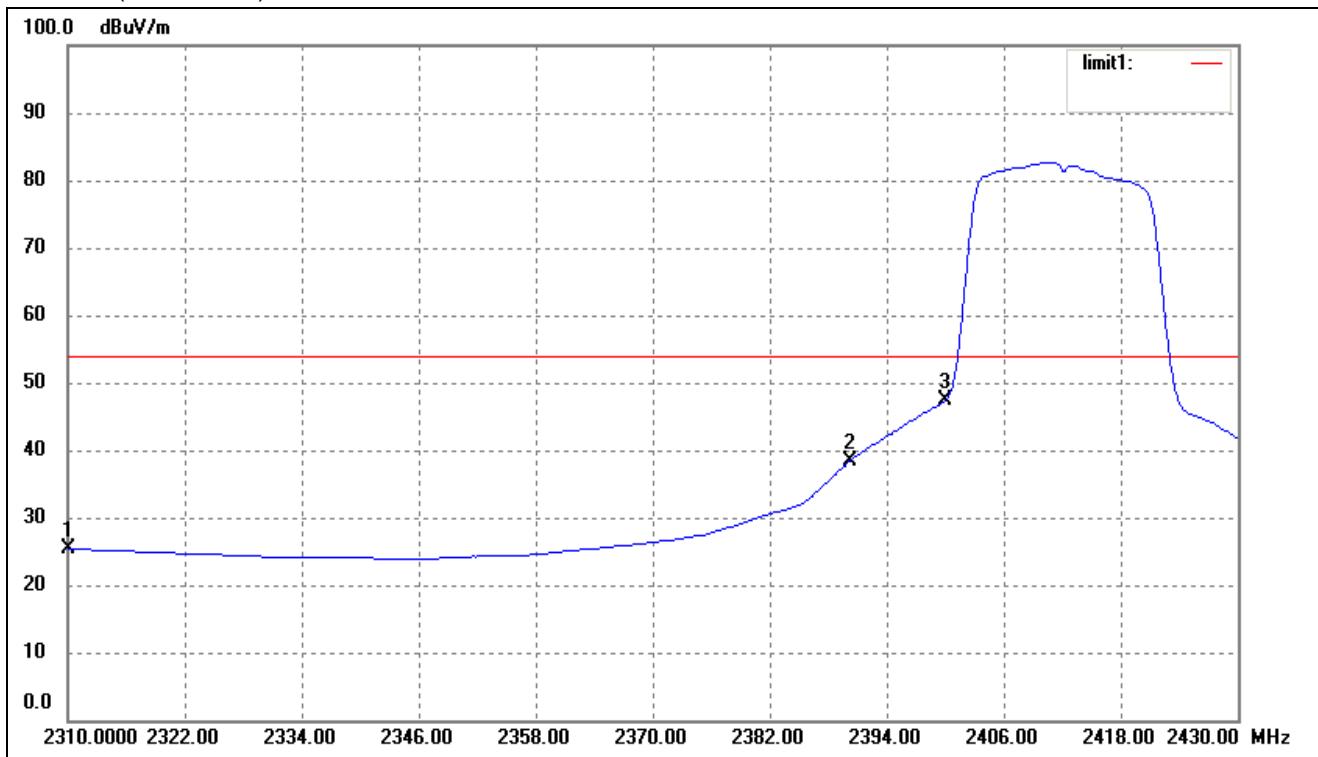
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
2	2463.400	82.80	-3.36	79.44	/	/	Average Detector
	2463.400	93.60	-3.36	90.24	/	/	Peak Detector
1	2483.500	Delta = 50.07dBc	-3.36	29.37	54.00	-24.63	Average Detector
	2483.500			45.14	74.00	-33.83	Peak Detector
3	2500.000	32.93	-3.28	29.65	54.00	-24.35	Average Detector
	2500.000	43.83	-3.28	40.55	74.00	-33.45	Peak Detector

802.11n-HT20-Lowest Bandedge

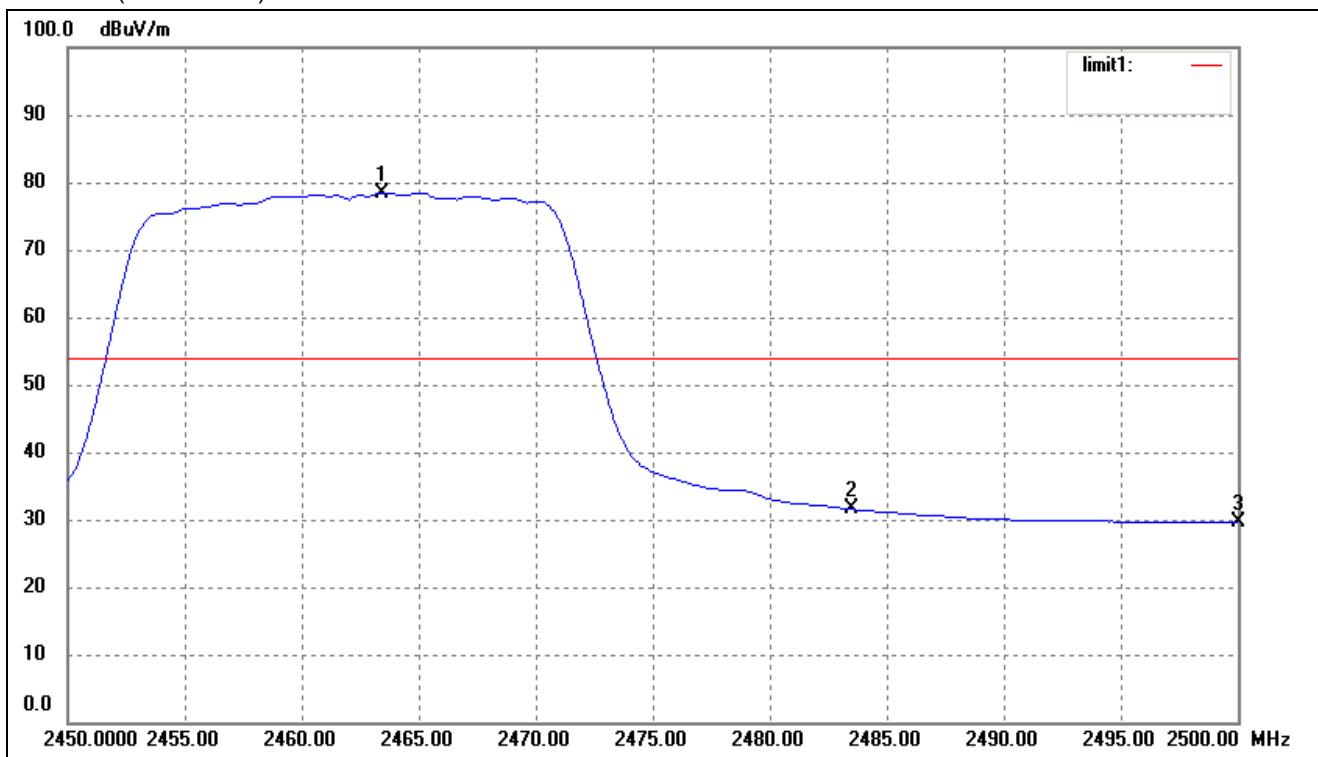
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	29.11	-3.71	25.40	54.00	-28.60	Average Detector
	2310.000	38.48	-3.71	34.77	74.00	-39.23	Peak Detector
2	2390.000	41.94	-3.54	38.40	54.00	-15.60	Average Detector
	2390.000	54.59	-3.54	51.05	74.00	-22.95	Peak Detector
3	2400.000	50.87	-3.51	47.36	54.00	-6.64	Average Detector
	2400.000	61.86	-3.51	58.35	74.00	-15.65	Peak Detector

802.11n-HT20-Highest Bandedge

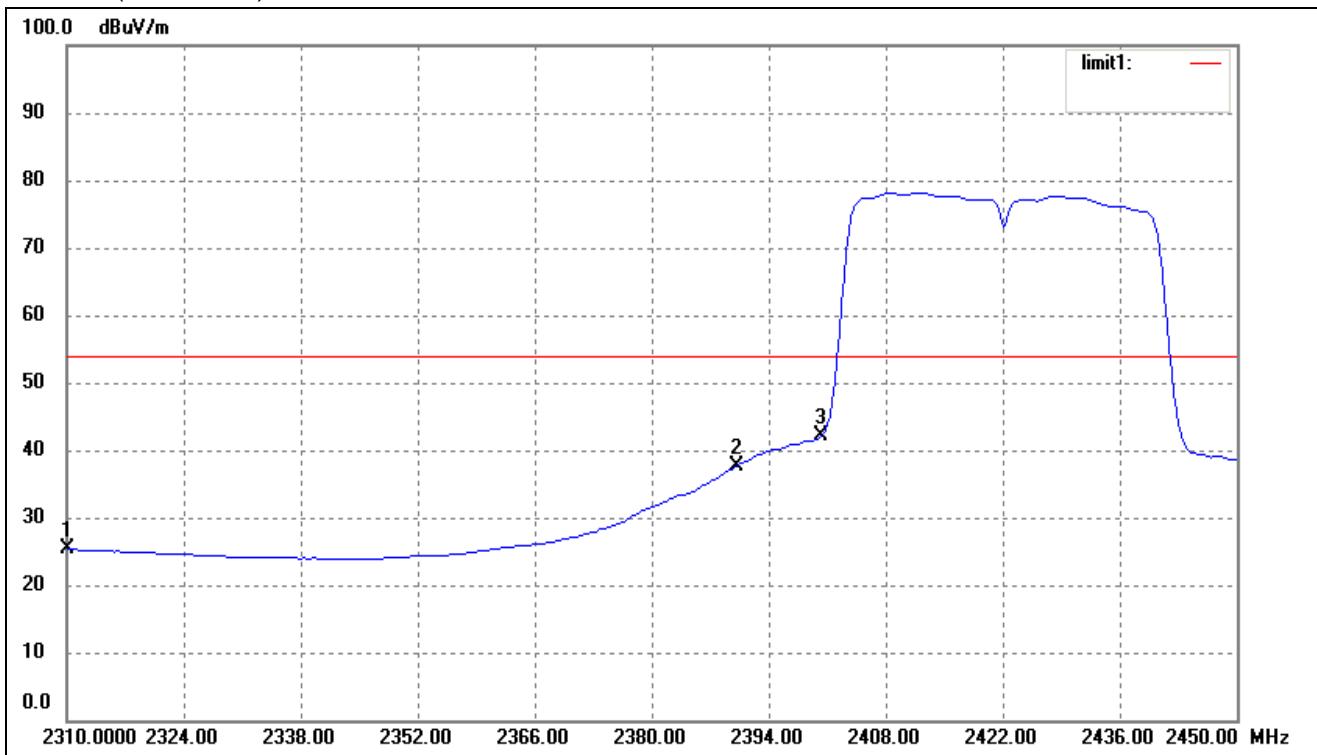
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dB _{uV/m})	Correct dB/m	Result (dB _{uV/m})	Limit (dB _{uV/m})	Margin (dB)	Remark
1	2463.400	81.80	-3.36	78.44	/	/	Average Detector
	2463.400	92.56	-3.36	89.20	/	/	Peak Detector
2	2483.500	Delta = 47.46dBc		30.98	54.00	-23.02	Average Detector
	2483.500			41.74	74.00	-32.26	Peak Detector
3	2500.000	32.87	-3.28	29.59	54.00	-24.41	Average Detector
	2500.000	45.21	-3.28	41.93	74.00	-32.07	Peak Detector

802.11n-HT40-Lowest Bandedge

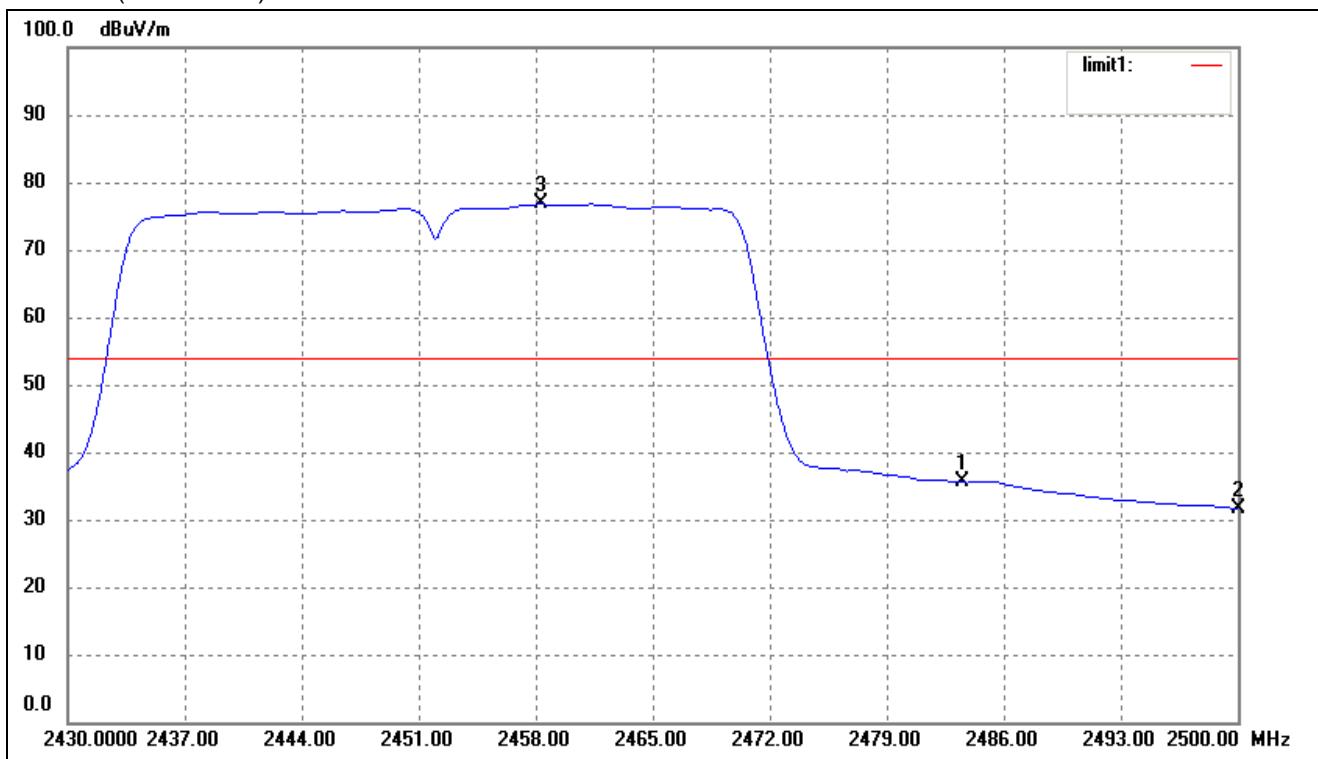
Vertical (Worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	29.03	-3.71	25.32	54.00	-28.68	Average Detector
	2310.000	42.42	-3.71	38.71	74.00	-35.29	Peak Detector
2	2390.000	41.17	-3.54	37.63	54.00	-16.37	Average Detector
	2390.000	58.01	-3.54	54.47	74.00	-19.53	Peak Detector
3	2400.000	45.53	-3.51	42.02	54.00	-11.98	Average Detector
	2400.000	61.59	-3.51	58.08	74.00	-15.92	Peak Detector

802.11n-HT40-Highest Bandedge

Vertical (Worst case)



No.	Frequency (MHz)	Reading (dB _{uV/m})	Correct dB/m	Result (dB _{uV/m})	Limit (dB _{uV/m})	Margin (dB)	Remark
3	2458.280	80.15	-3.38	76.77	/	/	Average Detector
	2458.280	91.25	-3.38	87.87	/	/	Peak Detector
1	2483.500	Delta = 40.73dBc	36.04	54.00	-17.96	Average Detector	
	2483.500			47.14	74.00	-26.86	Peak Detector
2	2500.000	34.98	-3.28	31.70	54.00	-22.30	Average Detector
	2500.000	48.54	-3.28	45.26	74.00	-28.74	Peak Detector

Ant. 1

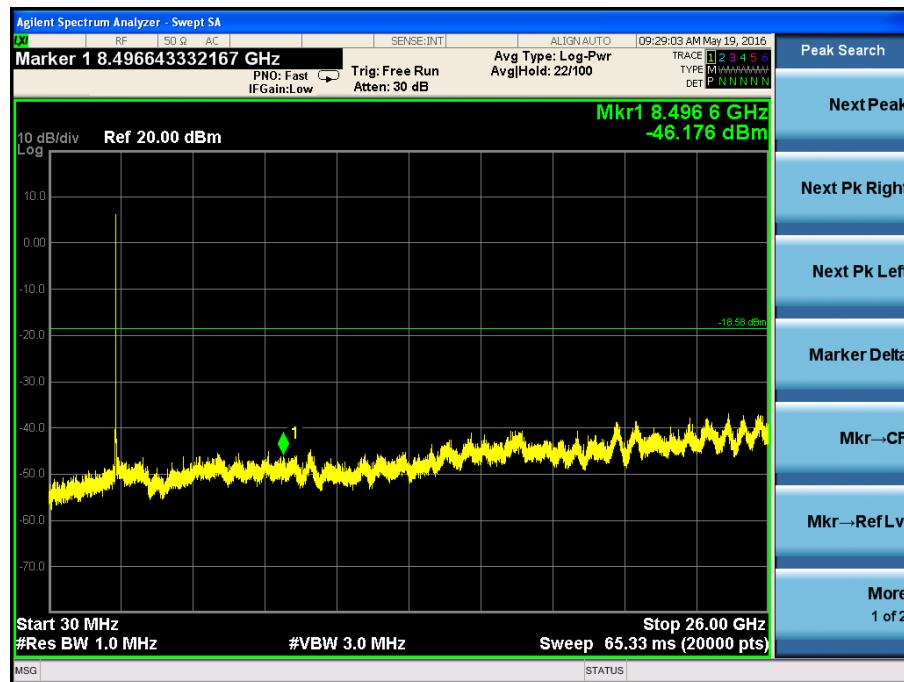
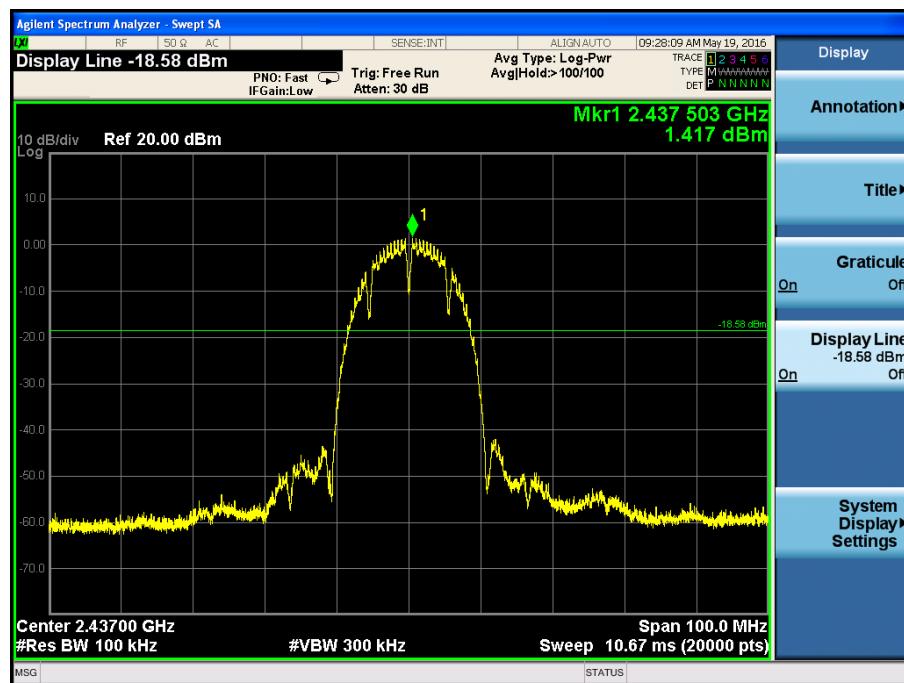
Out-of-Band and Spurious Emission (Conducted)

802.11b

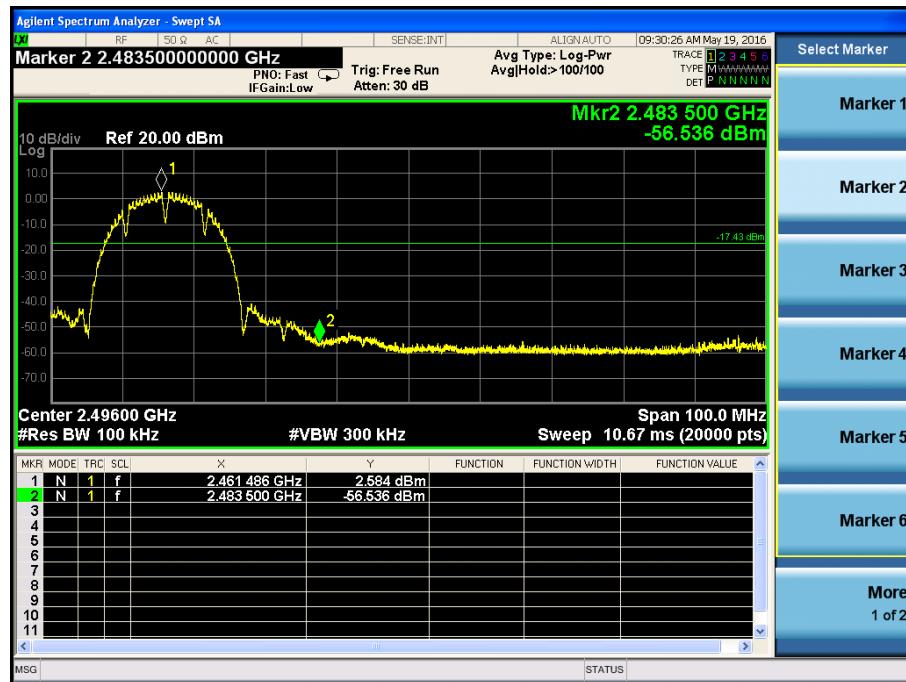
Low Channel



Middle Channel

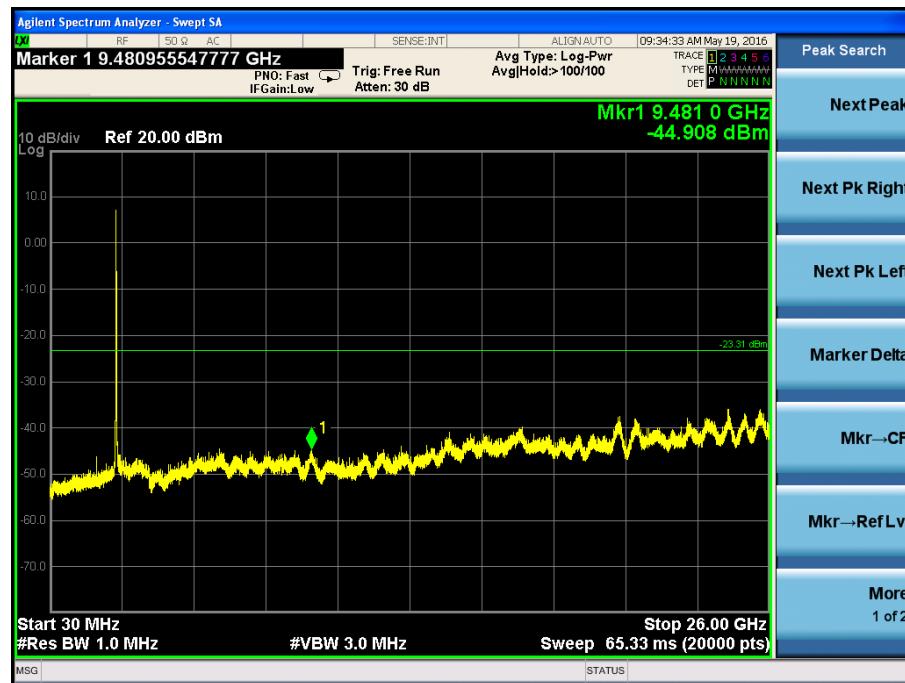
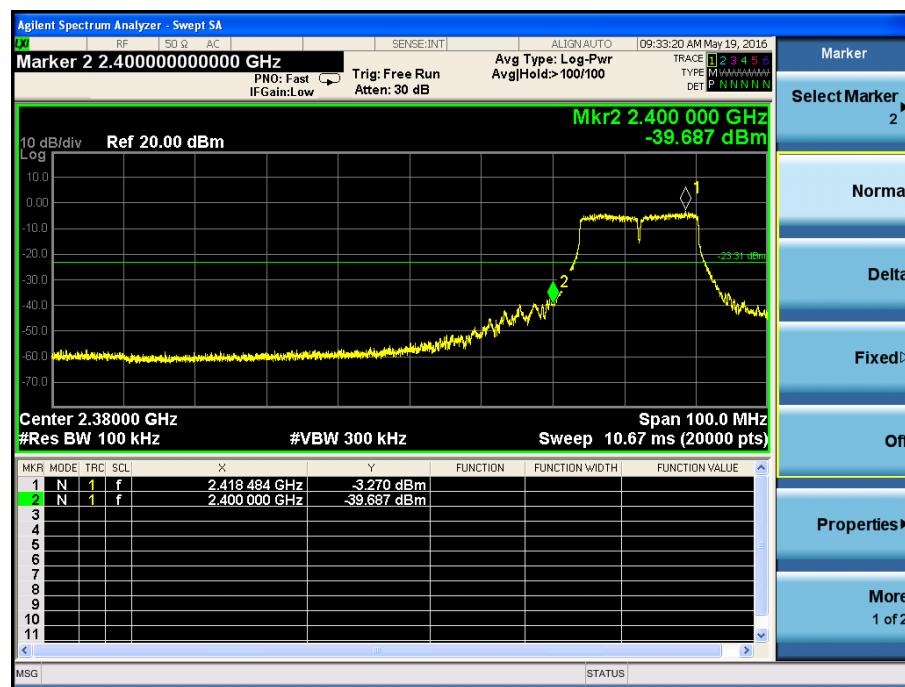


High Channel

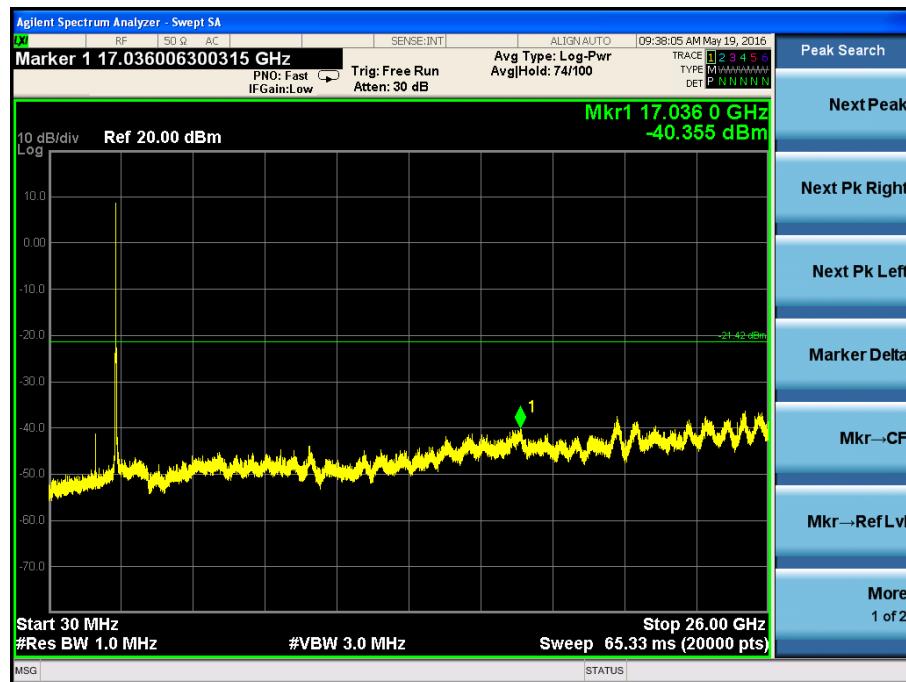
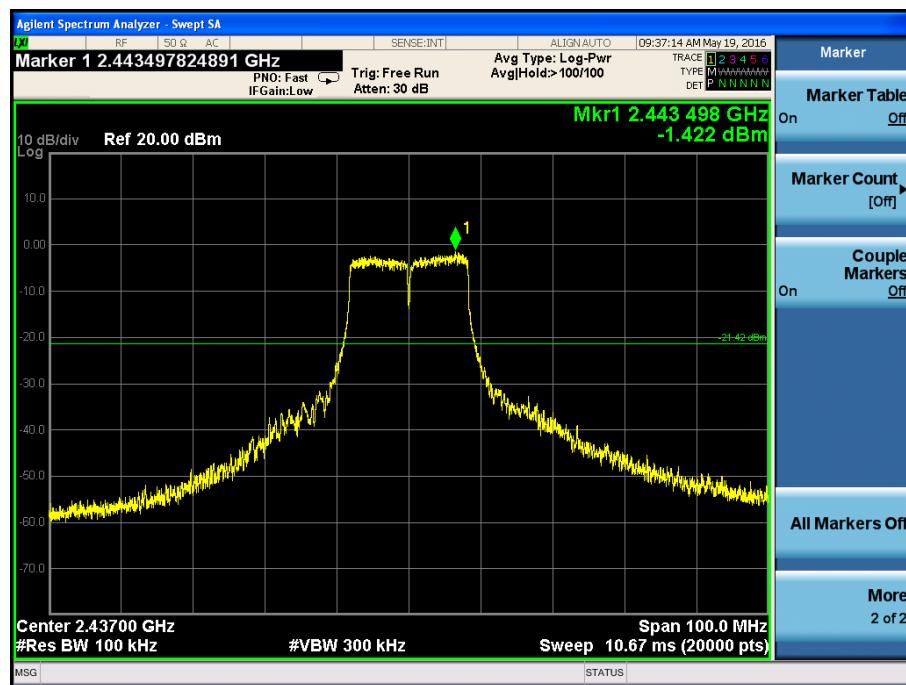


802.11g

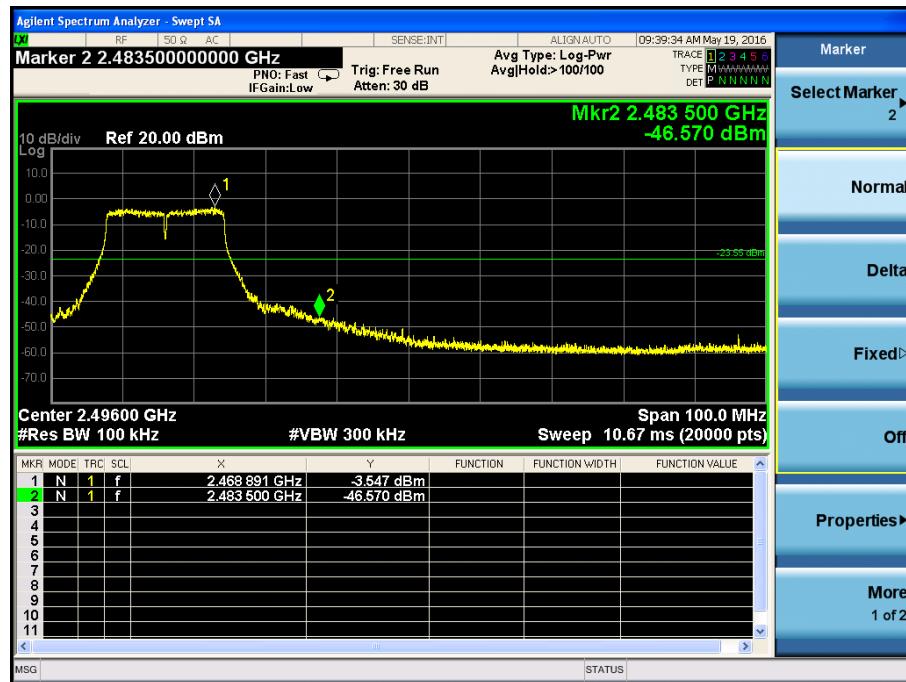
Low Channel



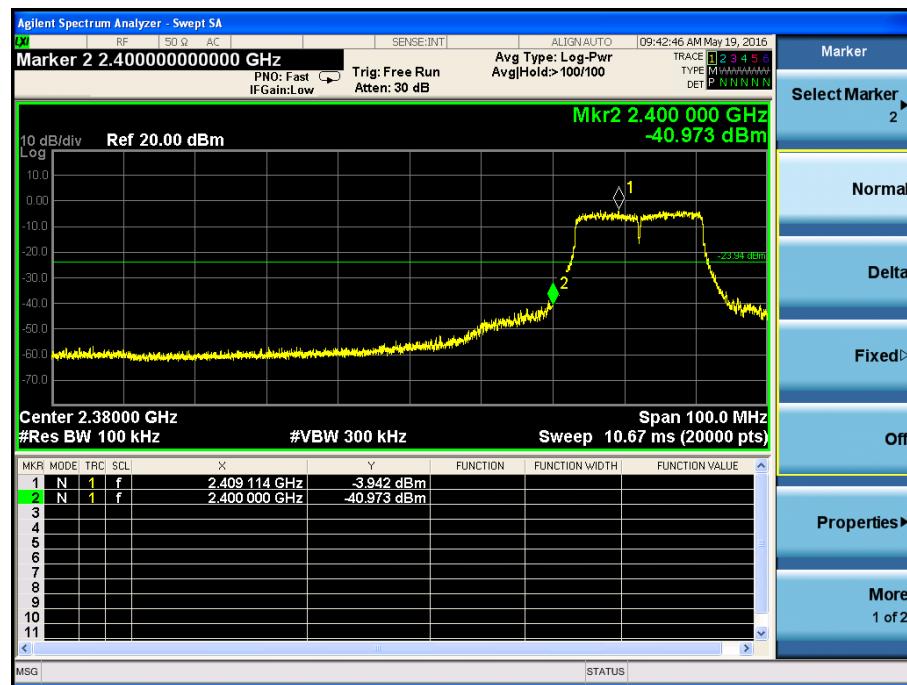
Middle Channel



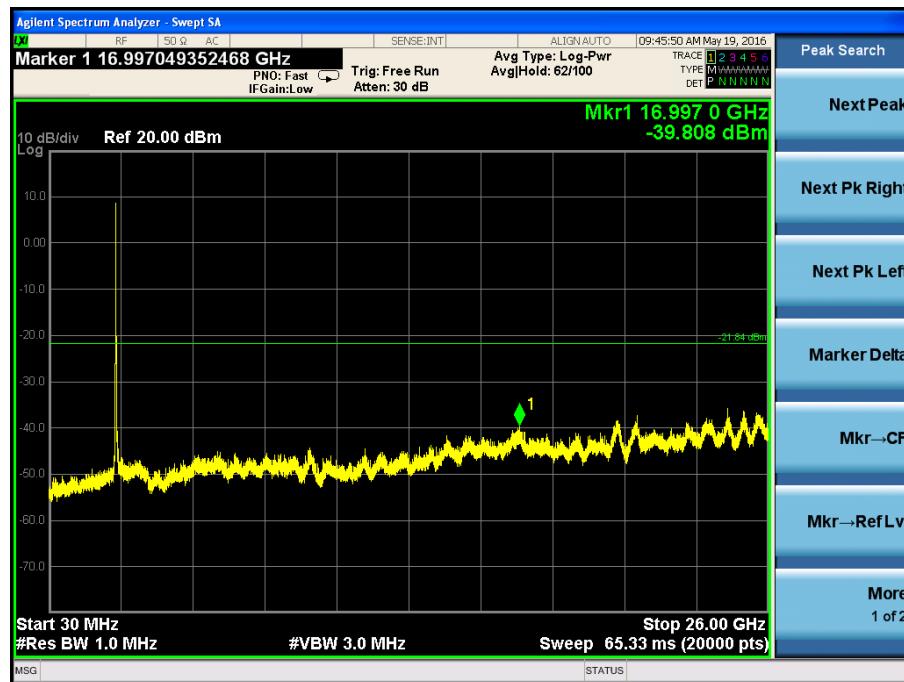
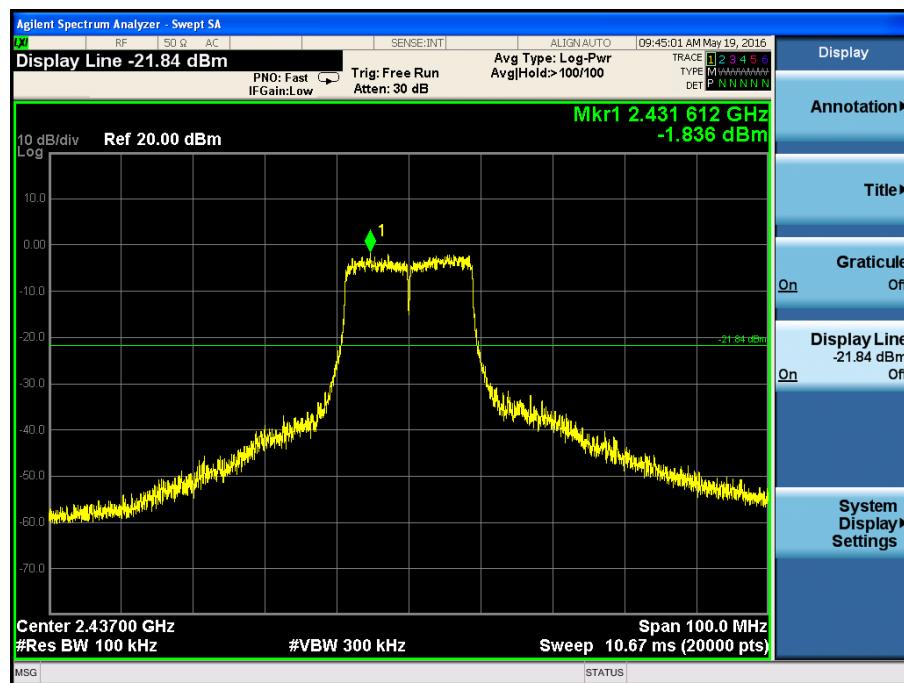
High Channel



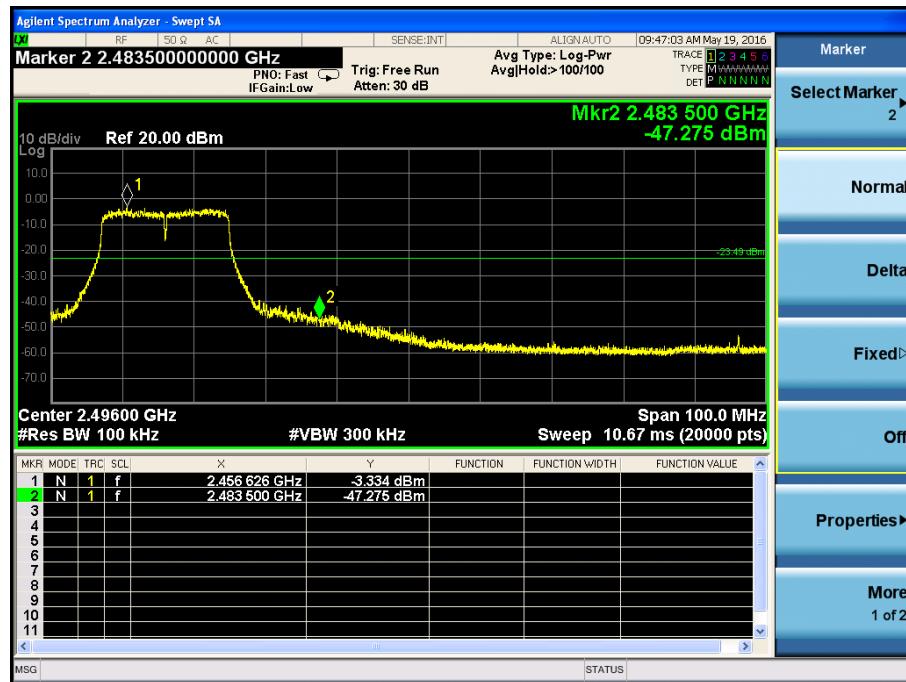
11n-HT20
Low Channel



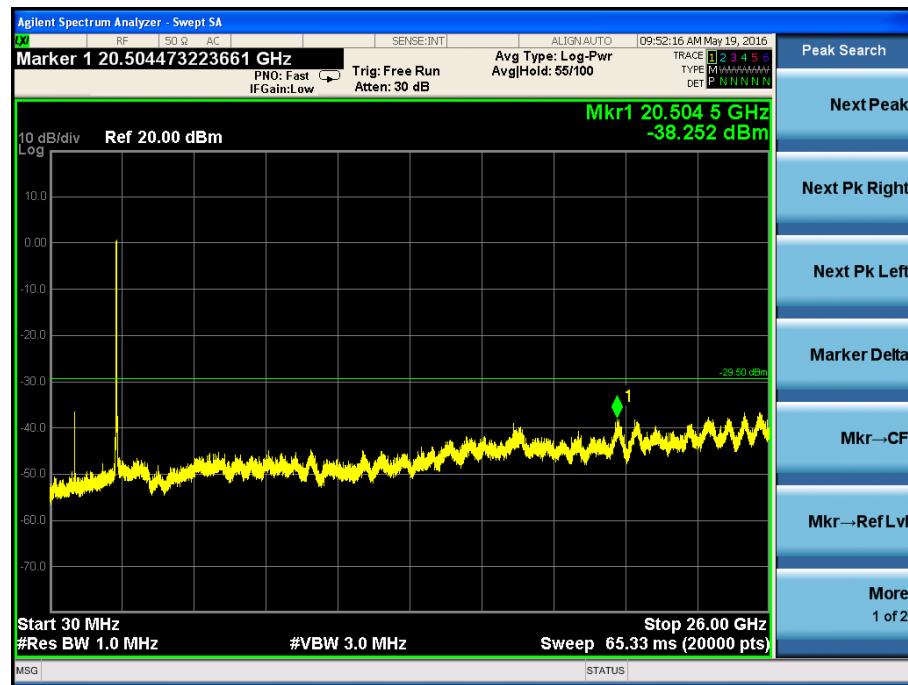
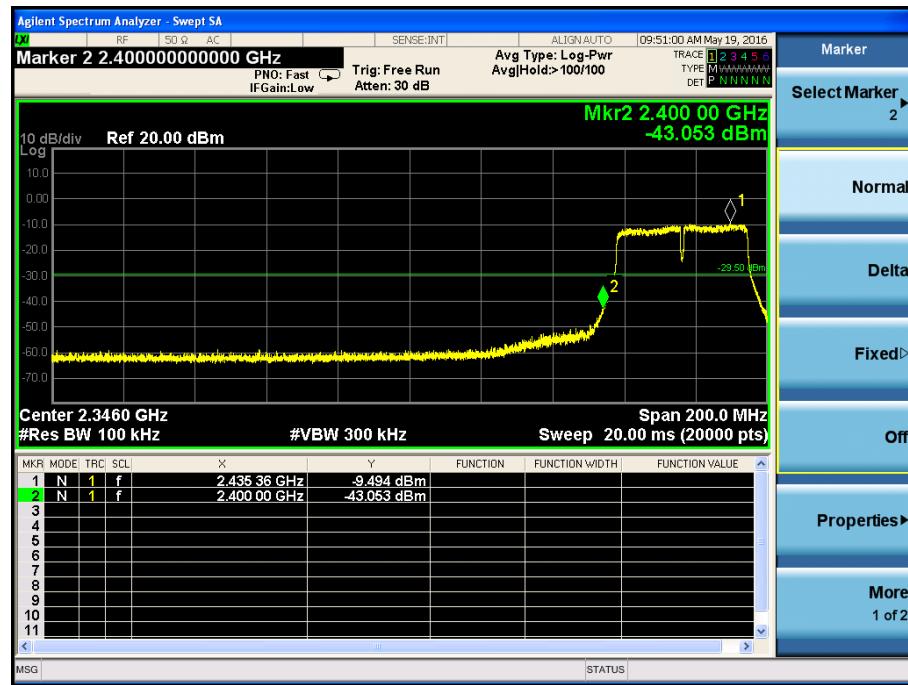
Middle Channel



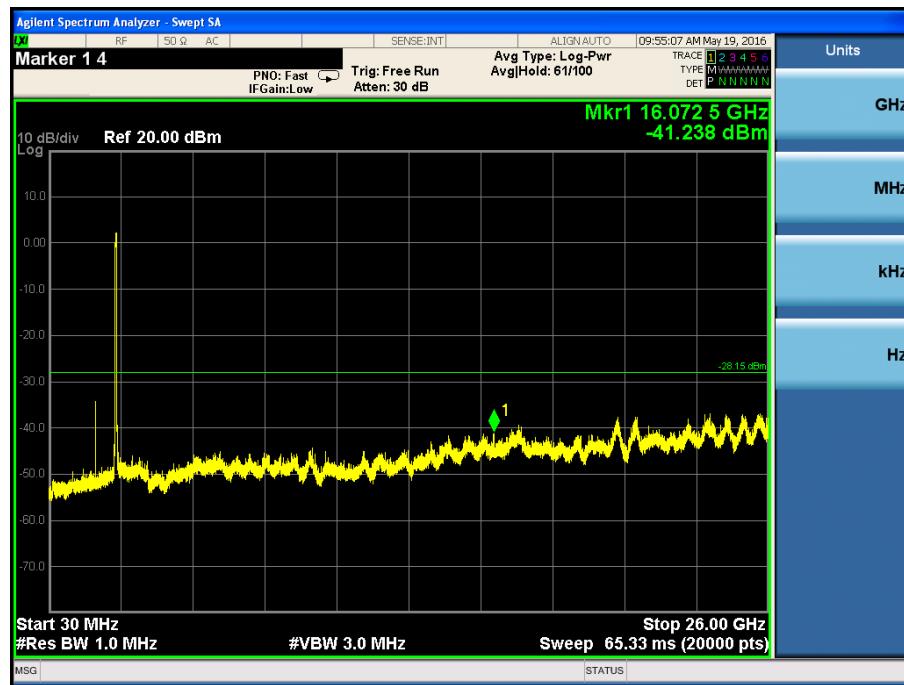
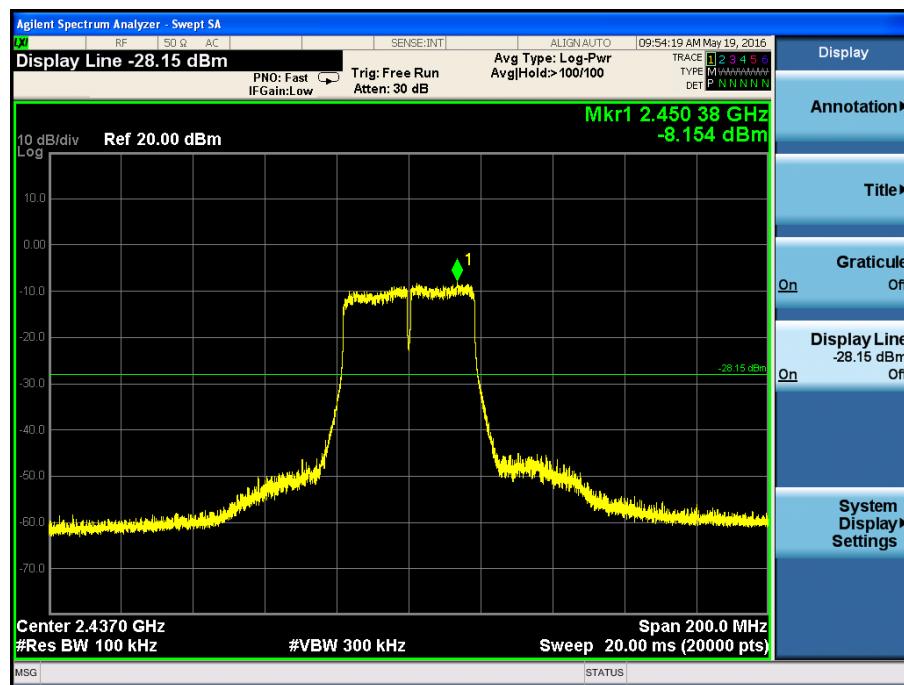
High Channel



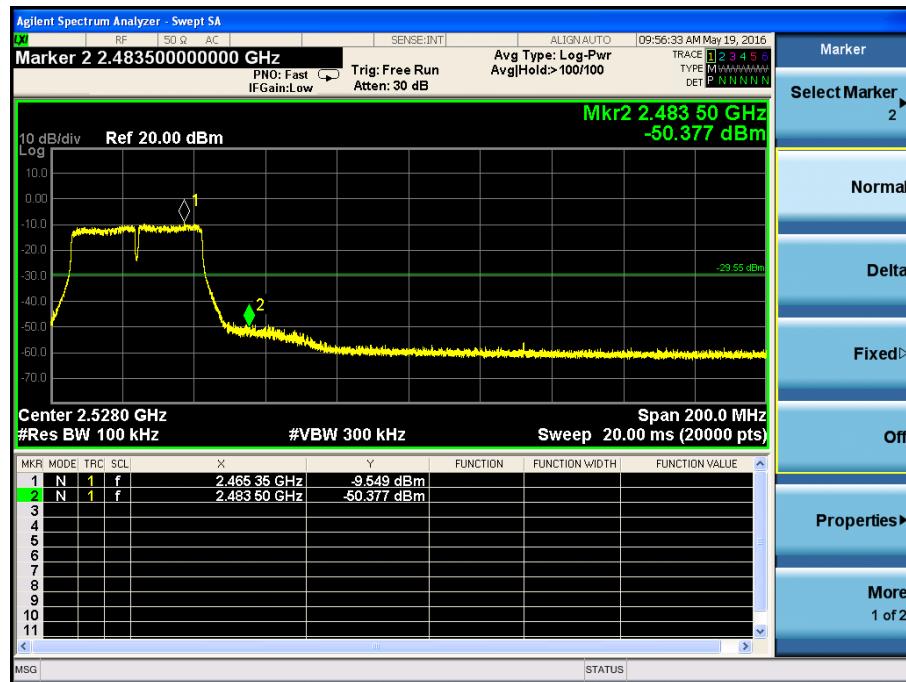
11n-HT40 Low Channel



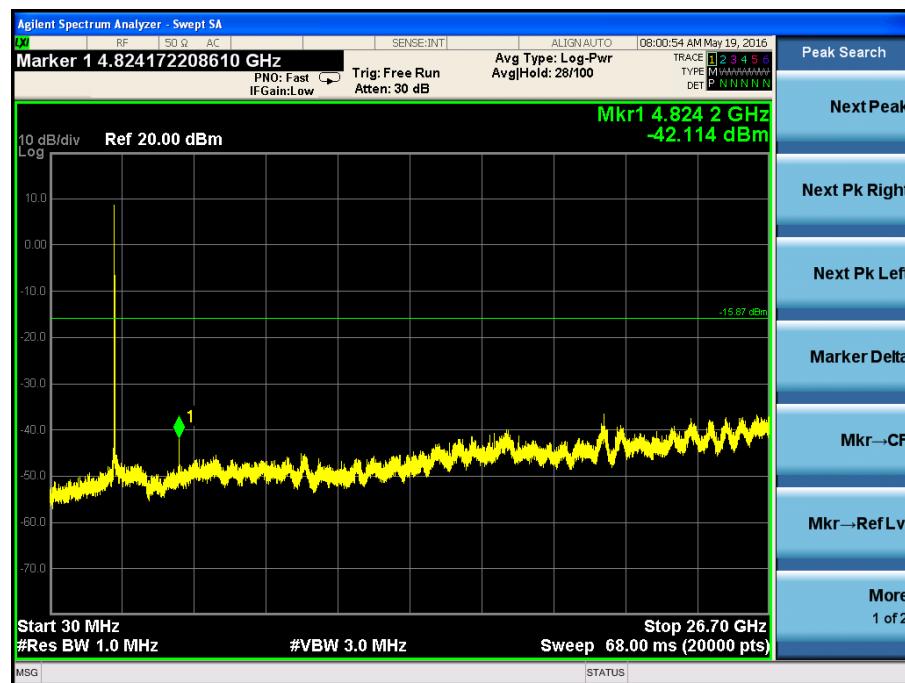
Middle Channel



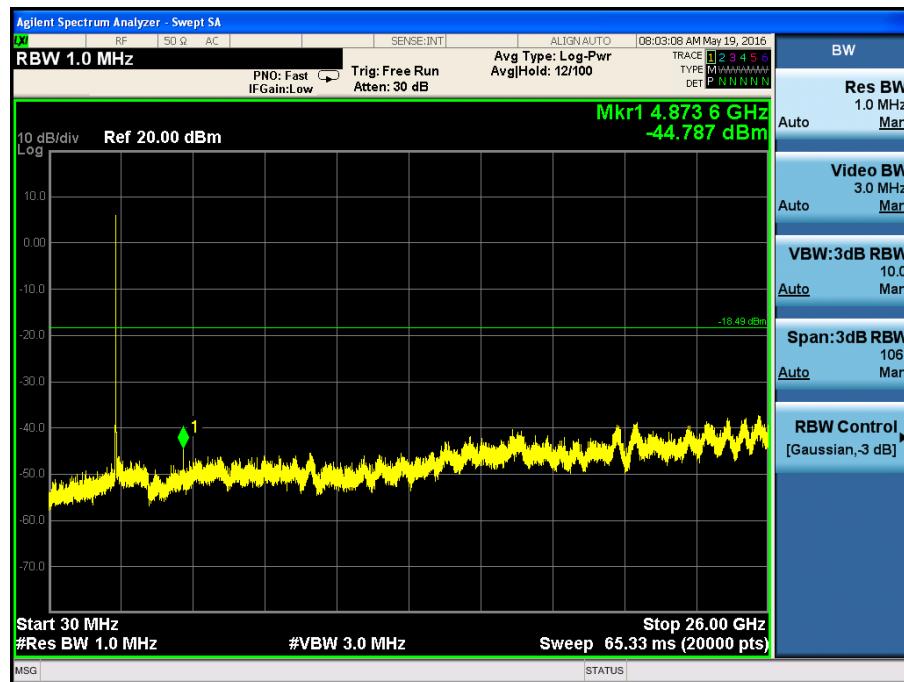
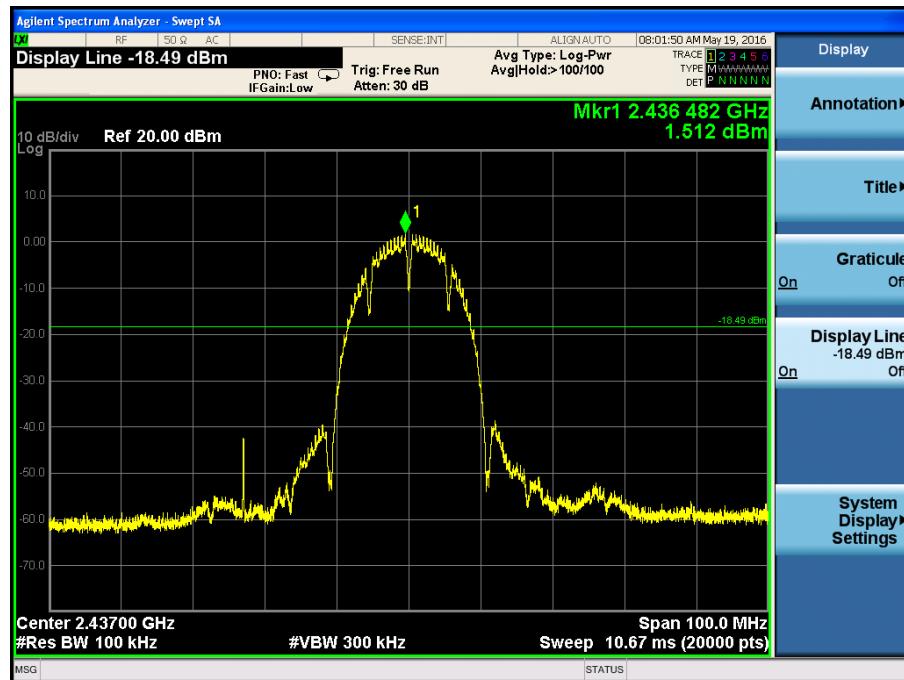
High Channel



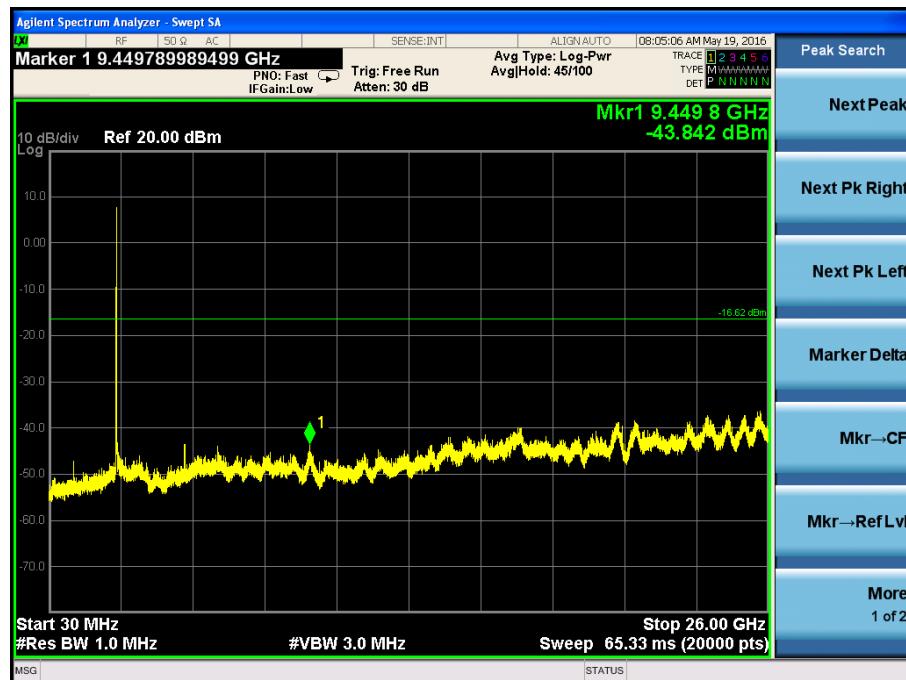
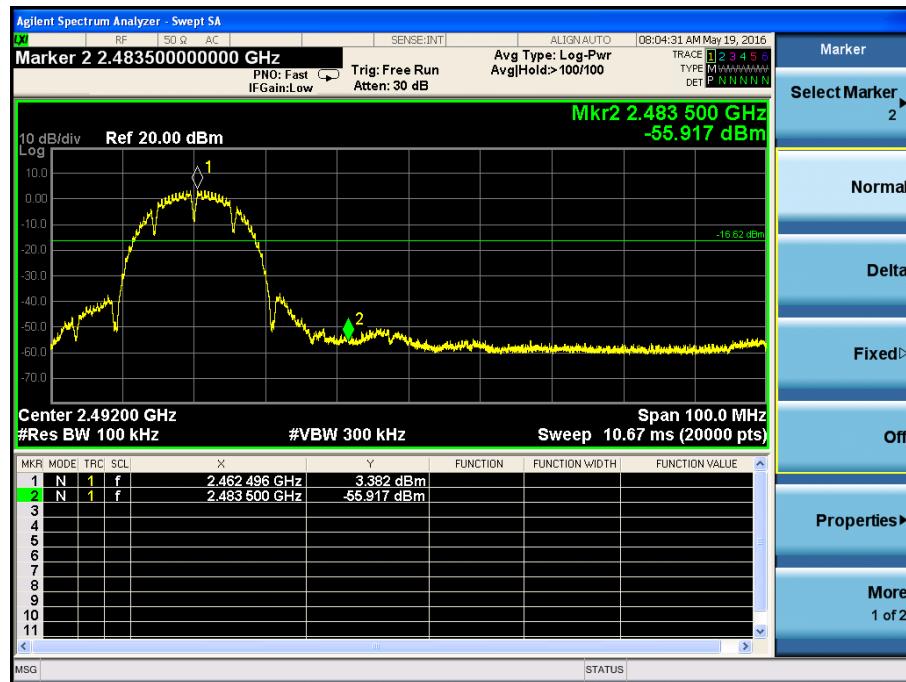
Ant. 2
802.11b
Low Channel



Middle Channel

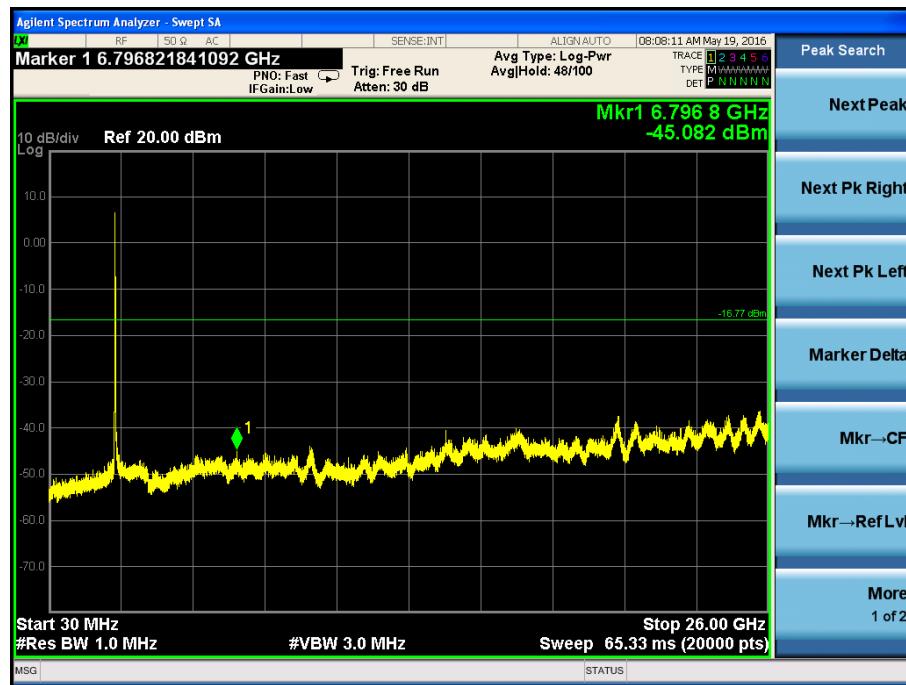
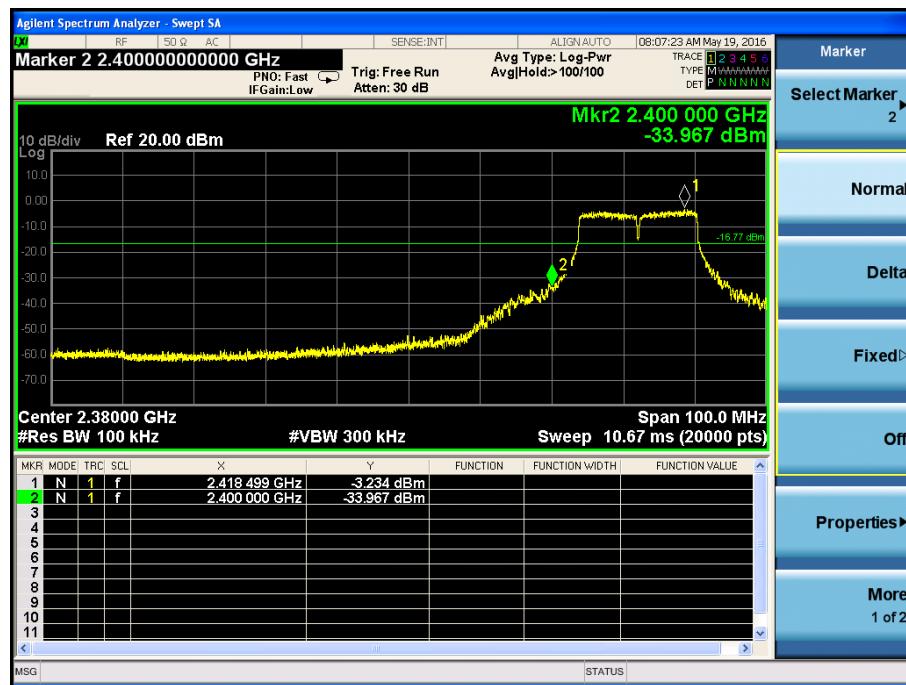


High Channel

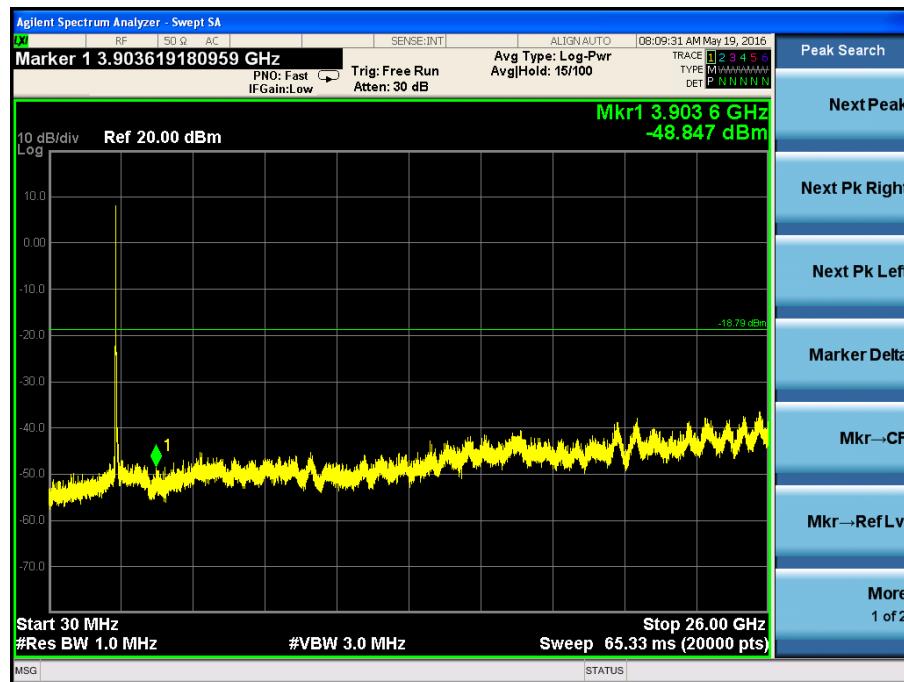
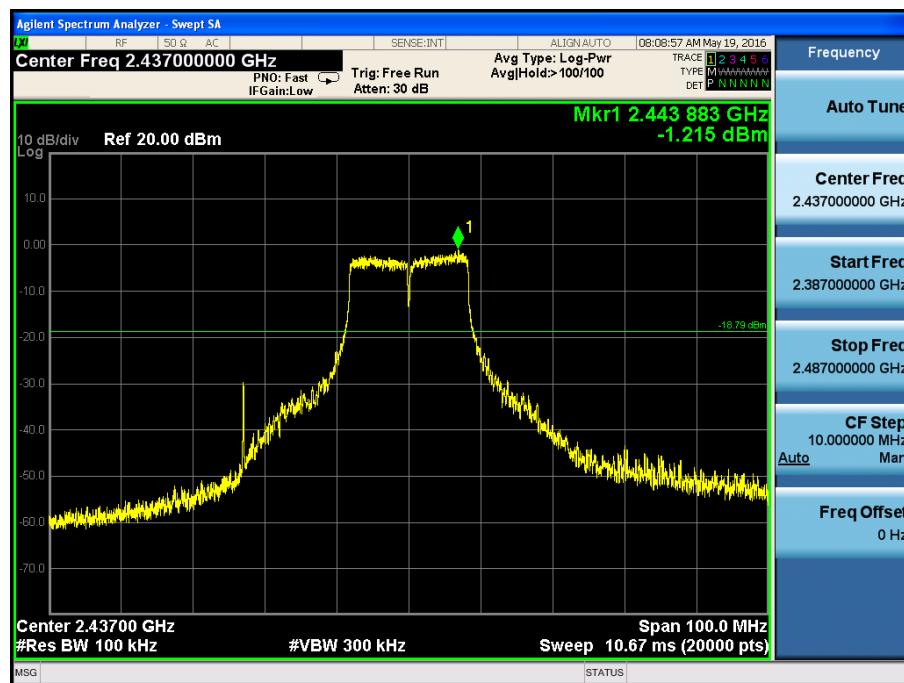


802.11g

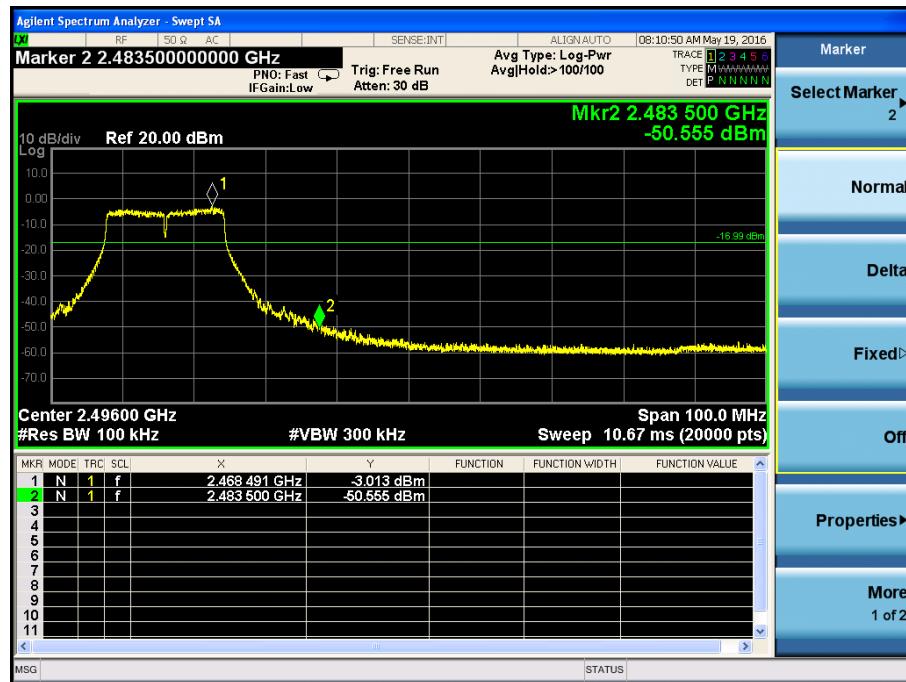
Low Channel



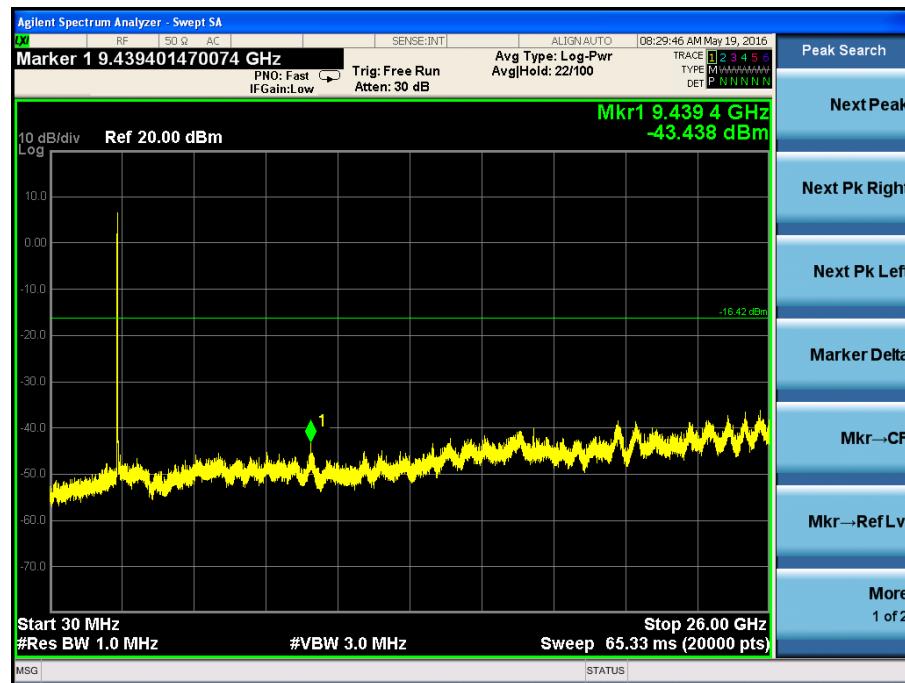
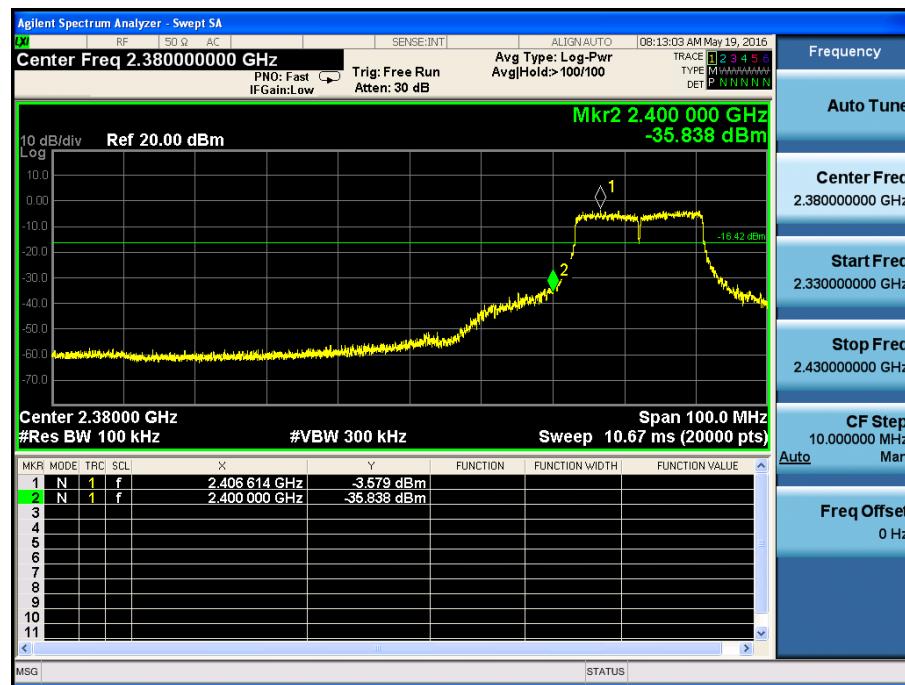
Middle Channel



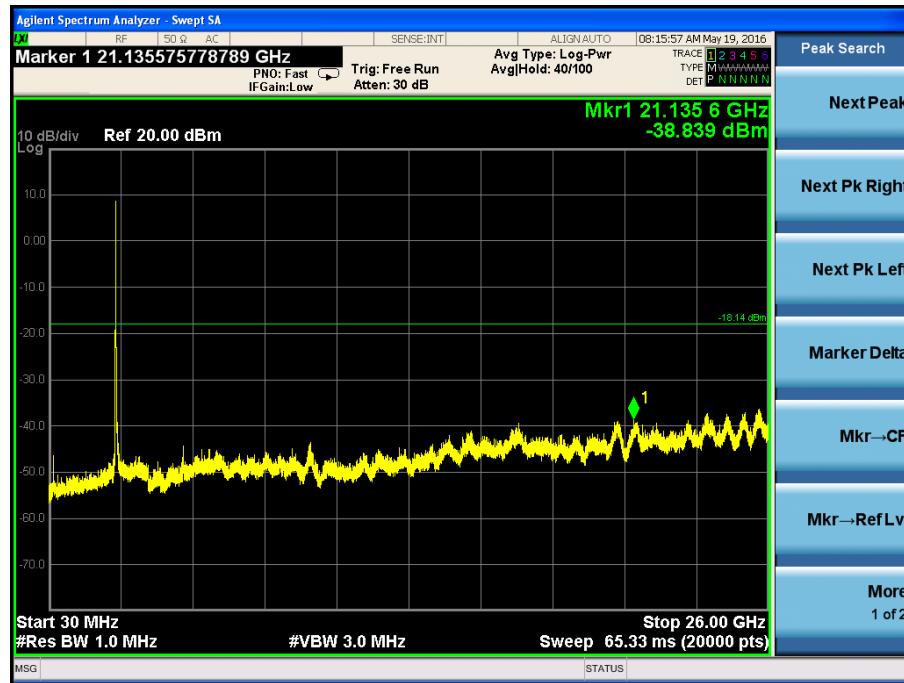
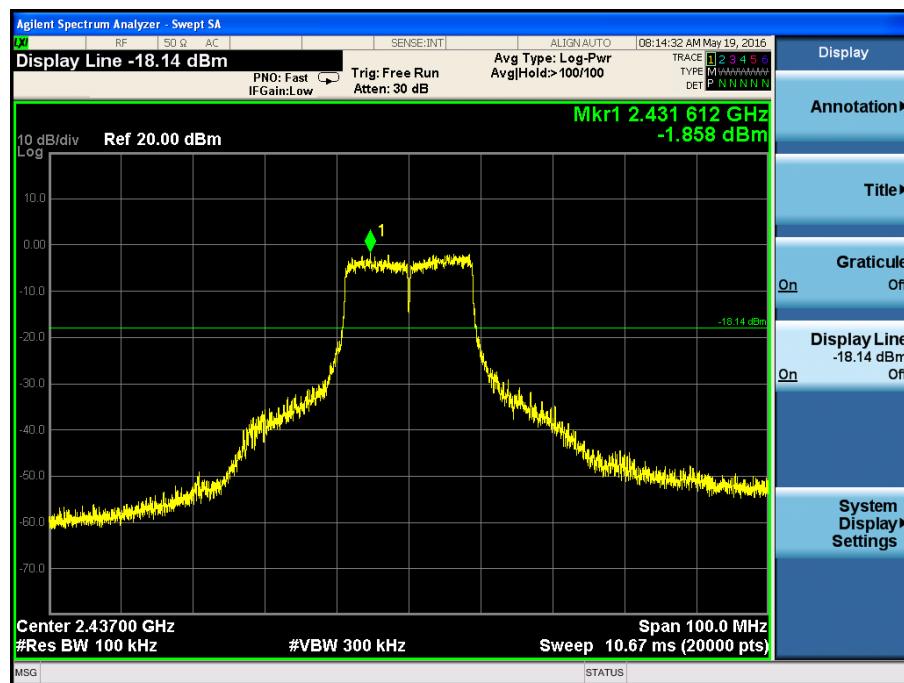
High Channel



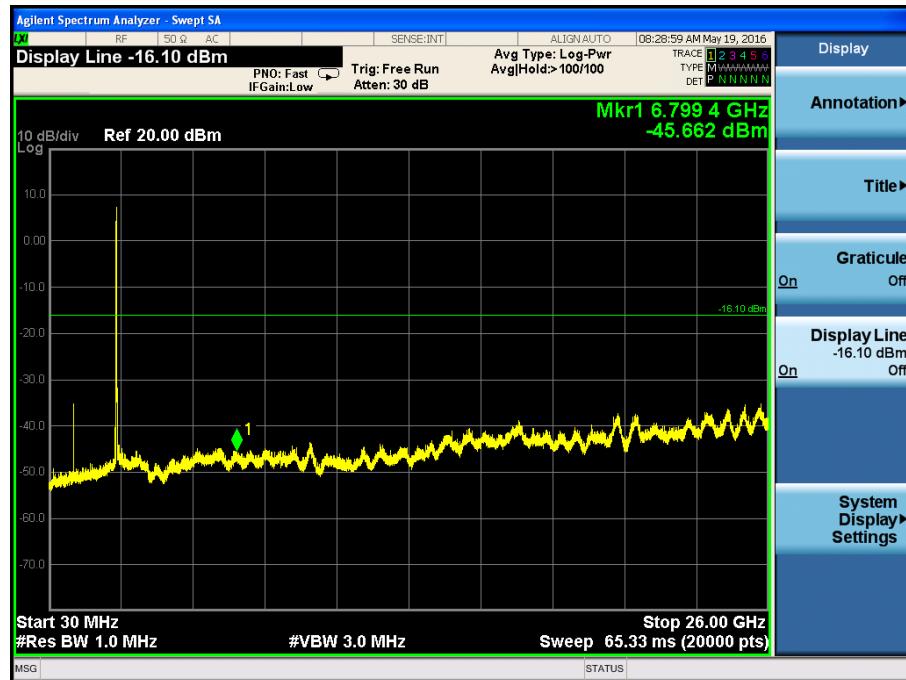
802.11n-HT20
Low Channel



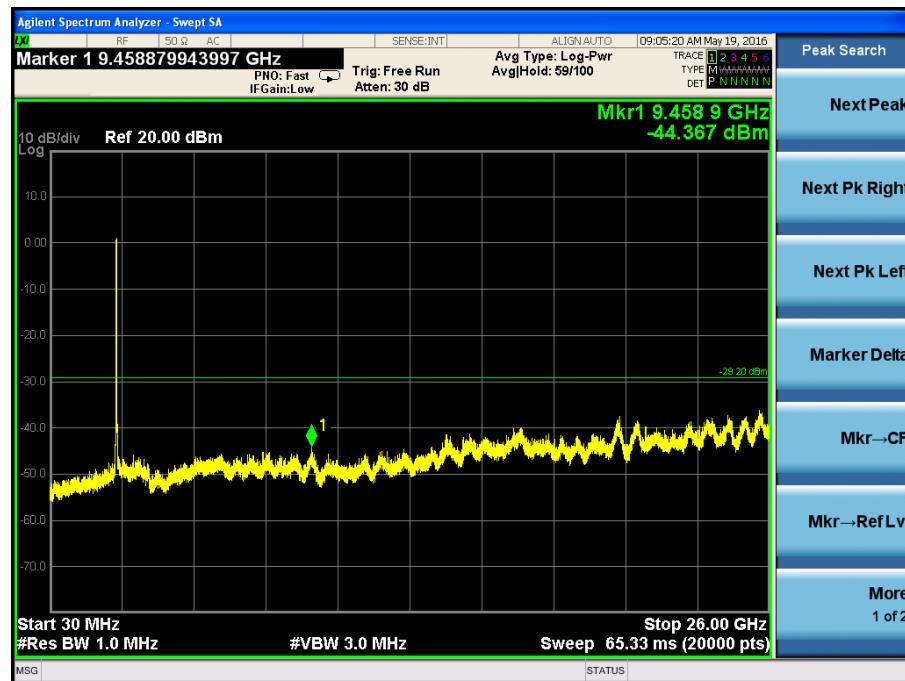
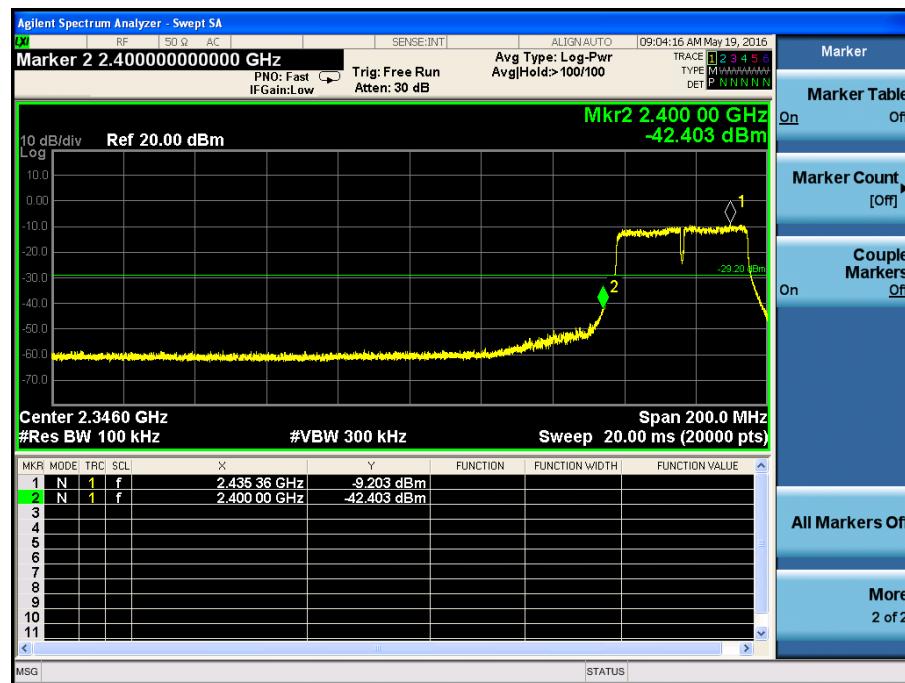
Middle Channel



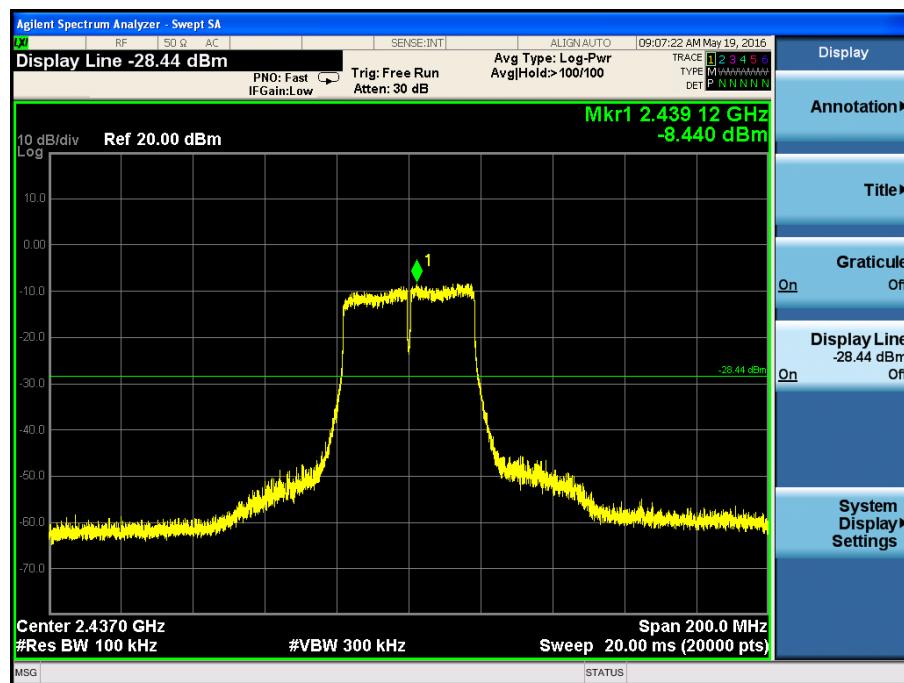
High Channel



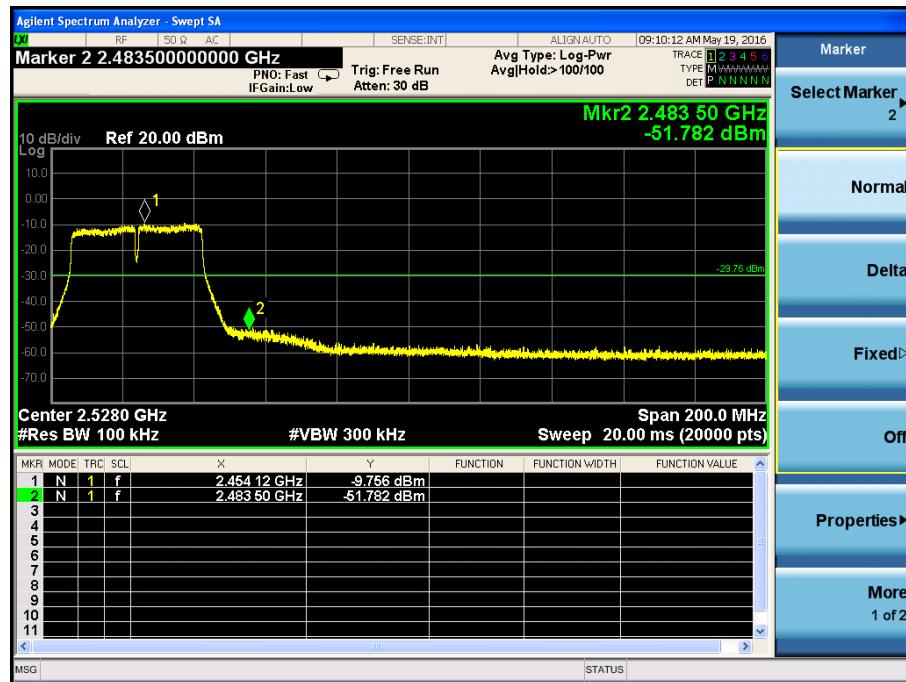
802.11n-HT40
Low Channel



Middle Channel



High Channel



10. Conducted Emissions

10.1 Measurement Uncertainty

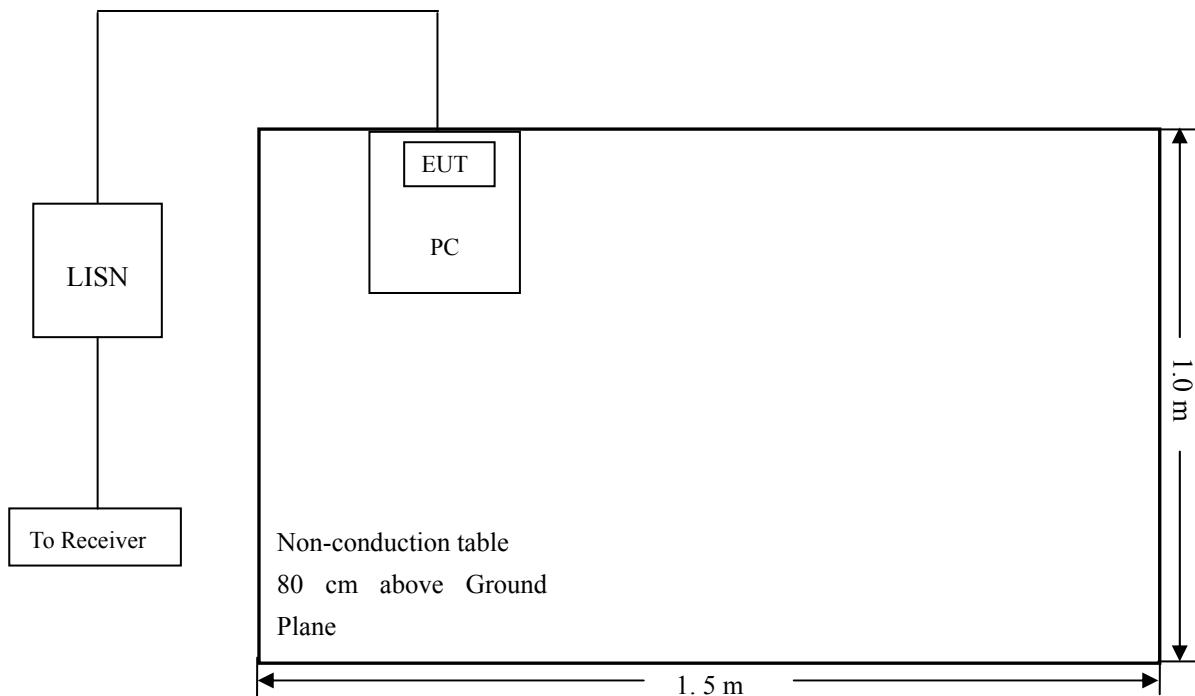
Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

10.2 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 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.

10.3 Basic Test Setup Block Diagram



10.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

10.5 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency	150 kHz
Stop Frequency.....	30 MHz
Sweep Speed	Auto
IF Bandwidth.....	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

10.6 Summary of Test Results/Plots

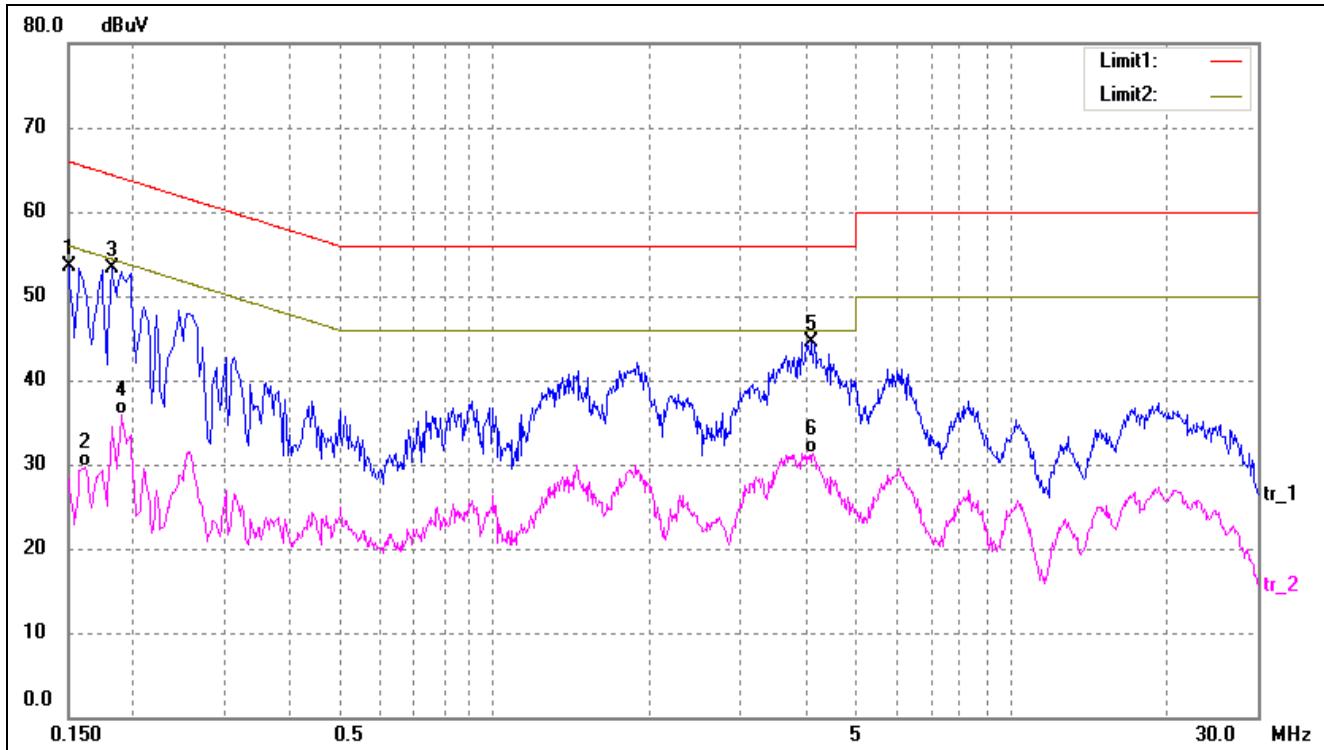
According to the data in section 10.7, the EUT complied with the FCC Part 15.207 Conducted margin for this device, with the *worst* margin reading of:

-9.13 dB at 0.1900 MHz in the **Line mode, peak detector, 0.15-30MHz**

10.7 Conducted Emissions Test Data

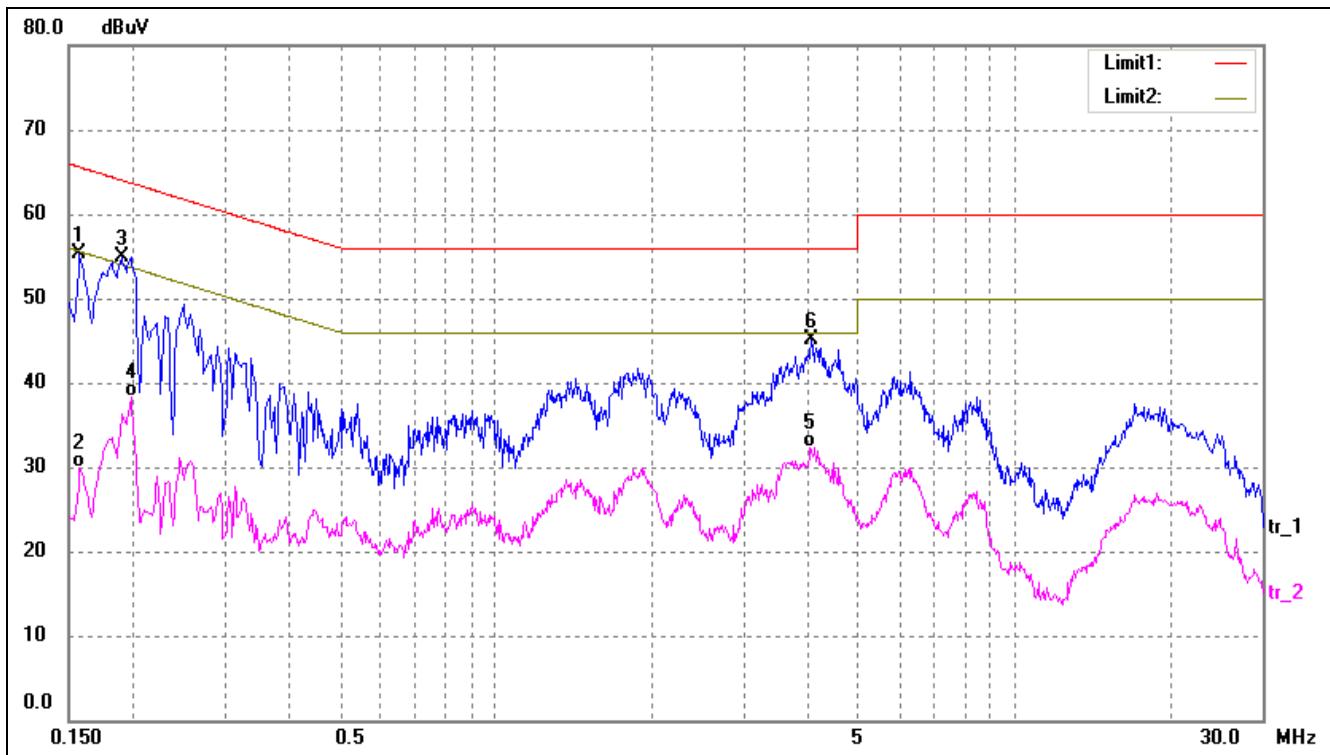
Plot of Conducted Emissions Test Data

EUT: AC1200 Dual Band WiFi PCI-e Adapter
Tested Model: WNA015
Operating Condition: Transmitting
Comment: AC 120V/60Hz; DC 3.3 from PCI of PC
Test Specification: Neutral



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1500	43.96	9.50	53.46	66.00	-12.54	peak
2	0.1620	20.24	9.50	29.74	55.36	-25.62	Avg
3*	0.1820	43.73	9.50	53.23	64.39	-11.16	peak
4	0.1900	26.32	9.50	35.82	54.04	-18.22	Avg
5	4.1340	34.57	10.00	44.57	56.00	-11.43	peak
6	4.1420	21.36	10.00	31.36	46.00	-14.64	Avg

Test Specification: Line



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1580	45.71	9.50	55.21	65.57	-10.36	peak
2	0.1580	20.32	9.50	29.82	55.57	-25.75	Avg
3*	0.1900	45.41	9.50	54.91	64.04	-9.13	peak
4	0.1980	28.84	9.50	38.34	53.69	-15.35	Avg
5	4.0460	22.31	10.00	32.31	46.00	-13.69	Avg
6	4.0540	35.10	10.00	45.10	56.00	-10.90	peak

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