

FCC Part 15C (Wi-Fi) Measurement and Test Report

For

Netatmo

17, route de la Reine – 92100 Boulogne Billancourt - FRANCE

FCC ID: N3A-NWS02IN

FCC Rules: FCC Part 15C

Product Description: Netatmo Weather Station

Tested Model: NWS02

Report No.: STR13018700I-2

Tested Date: 2013-02-01 to 2013-03-25

Issued Date: 2013-03-26

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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: Netatmo
Address of applicant: 17, route de la Reine – 92100 Boulogne Billancourt - FRANCE

Manufacturer: Netatmo
Address of manufacturer: 17, route de la Reine – 92100 Boulogne Billancourt - FRANCE

General Description of EUT	
Product Name:	Netatmo Weather Station
Brand Name:	NWS
Model No.:	NWS02
Rated Voltage:	DC 5V
Rated Current:	700mA
Rated Power:	3.5W
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11 b/g/n
Frequency Range:	2412-2462 MHz for 11b/g/n(HT20)
RF Output Power:	17.25 dBm (Conducted)
Data Rate:	1-11Mbps, 6-54Mbps, 65Mbps
Modulation:	CCK, BPSK, QPSK, 16QAM
Quantity of Channels:	11 for 802.11b/g/n-HT20
Channel Separation:	5MHz
Antenna Type:	Integral Antenna
Antenna Gain:	0 dBi
Lowest Internal Frequency of EUT:	32.768 kHz
Device Category:	Fixed Device

1.2 Test Standards

The following report is prepared on behalf of the Netatmo 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 C63.4-2003, 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 public notice KDB 558074 for digital transmission systems shall be performed also.

1.4 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.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Electronics Service 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 3/F, Jinbao Commerce Building, Xin'an Fanshen 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

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
USB Cable	1.5	Shielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Adapter	3YE	GQ07-050065	N/A

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 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)(d)	Radiated Emission	Compliant
§ 15.247(d)	Band Edge (Out of Band Emissions)	Compliant

N/A: not applicable

3. Antenna Requirement

3.1 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.

3.2 Evaluation Information

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

4. Power Spectral Density

4.1 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.

4.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2012-03-28	2013-03-27
Attenuator	ATTEN	ATS100-4-20	/	2012-03-28	2013-03-27

4.3 Test Procedure

According to the KDB 558074, the test method of power spectral density as below:

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW ≥ 3 kHz.
4. Set the VBW $\geq 3 \times$ RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.4 Environmental Conditions

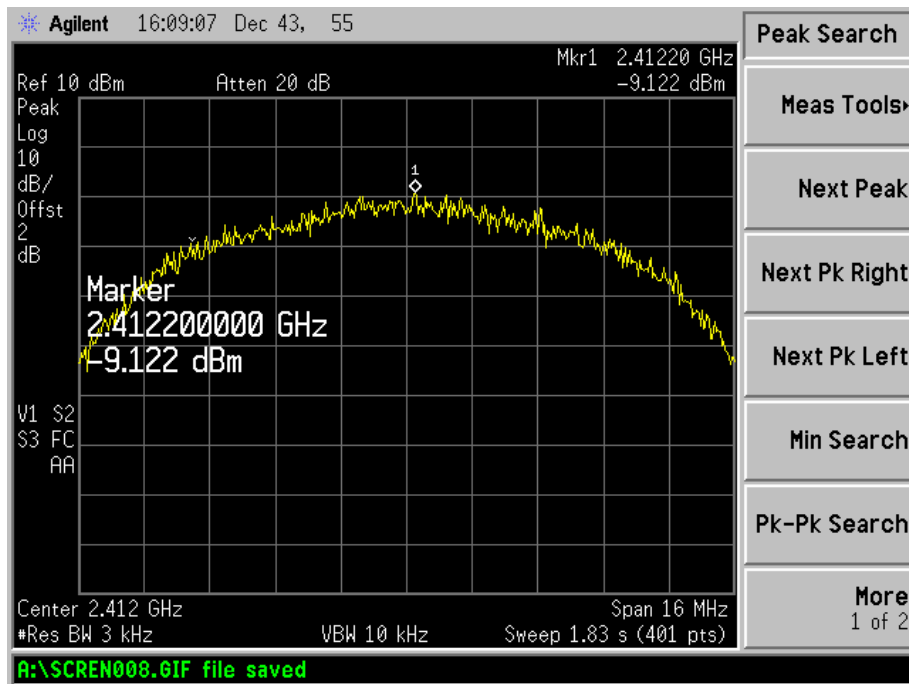
Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

4.5 Summary of Test Results/Plots

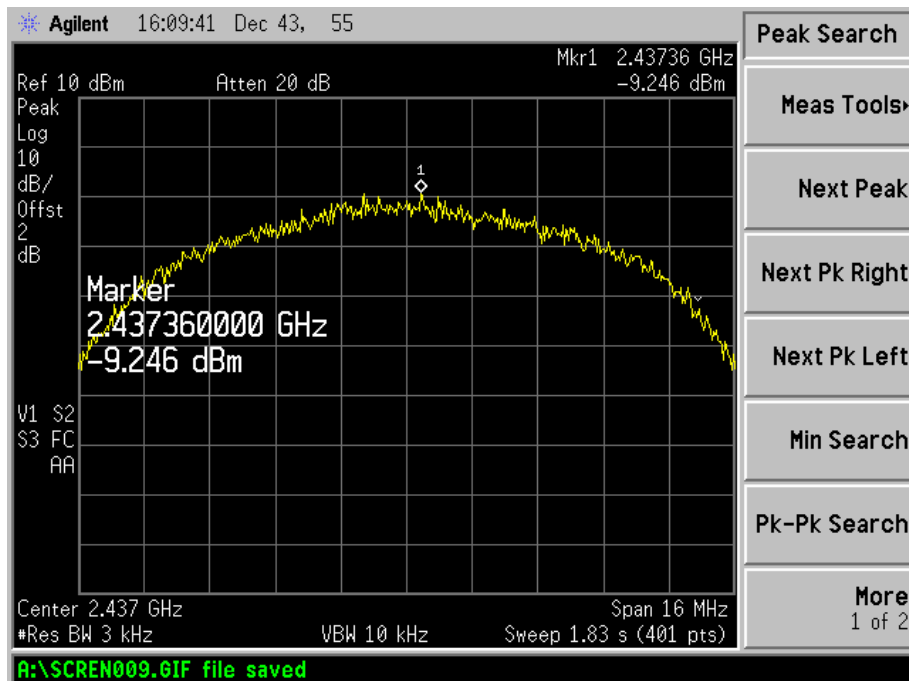
Test Mode	Test Channel MHz	Power Spectral Density dBm/3kHz	Limit dBm/3kHz
802.11b	2412	-9.122	8
	2437	-9.246	8
	2462	-8.968	8
802.11g	2412	-13.250	8
	2437	-12.000	8
	2462	-13.130	8
802.11n HT20	2412	-12.930	8
	2437	-12.870	8
	2462	-13.230	8

Please refer to the following test plots:

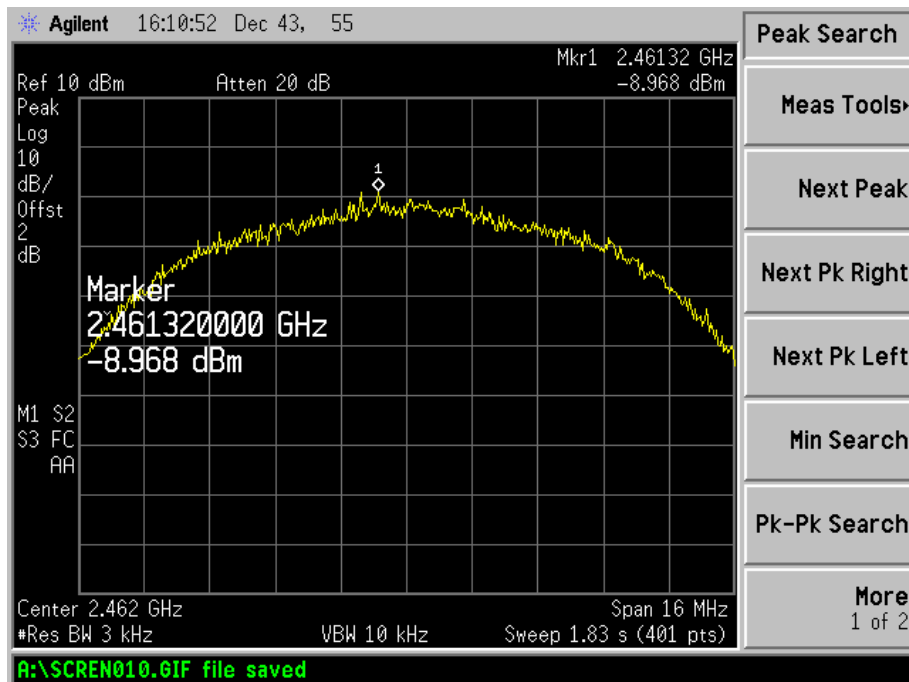
802.11b-Low Channel



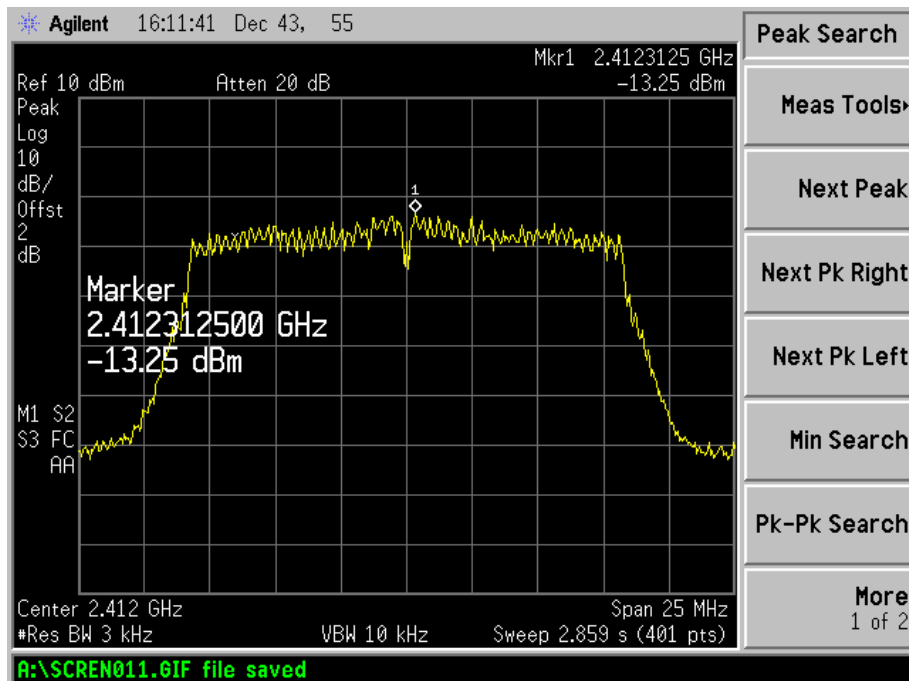
802.11b-Middle Channel



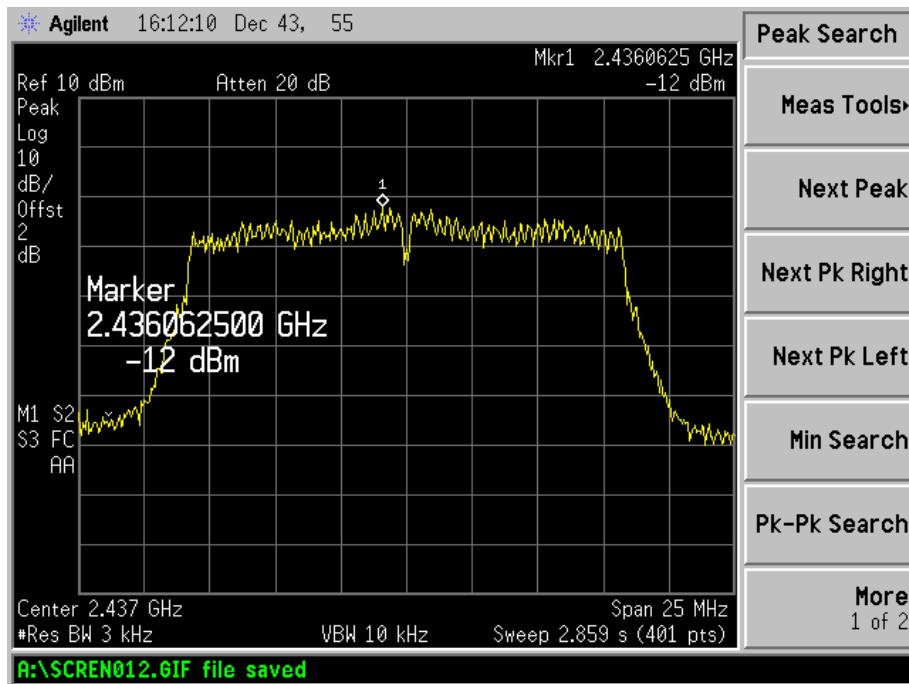
802.11b-High Channel



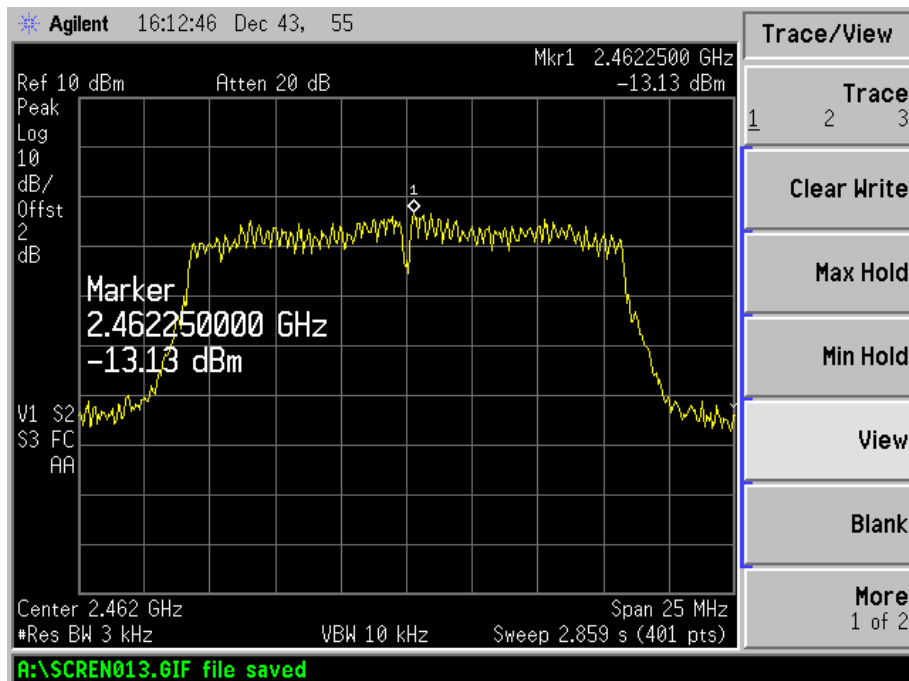
802.11g-Low Channel



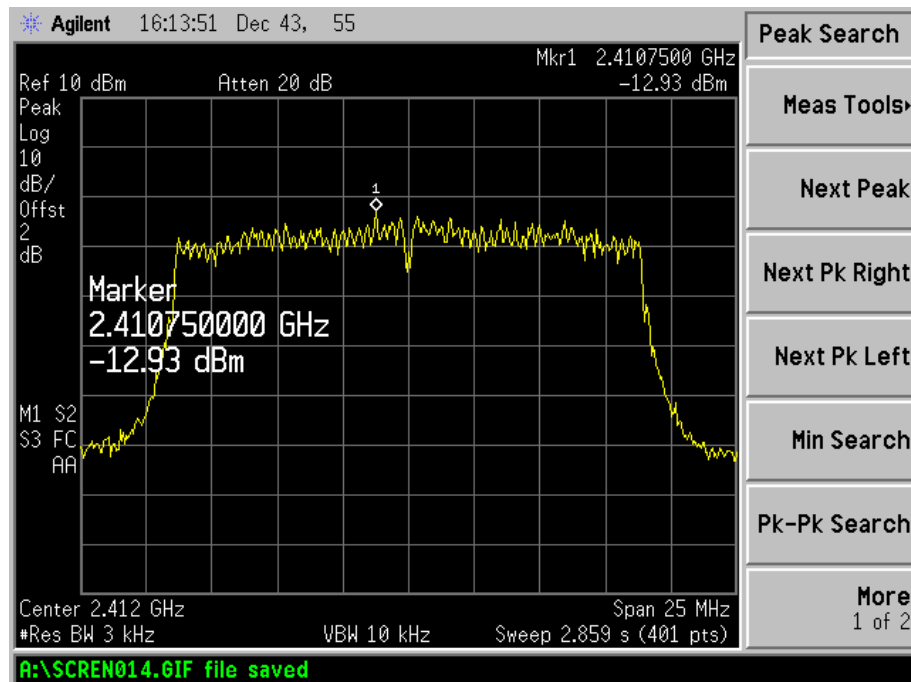
802.11g-Middle Channel



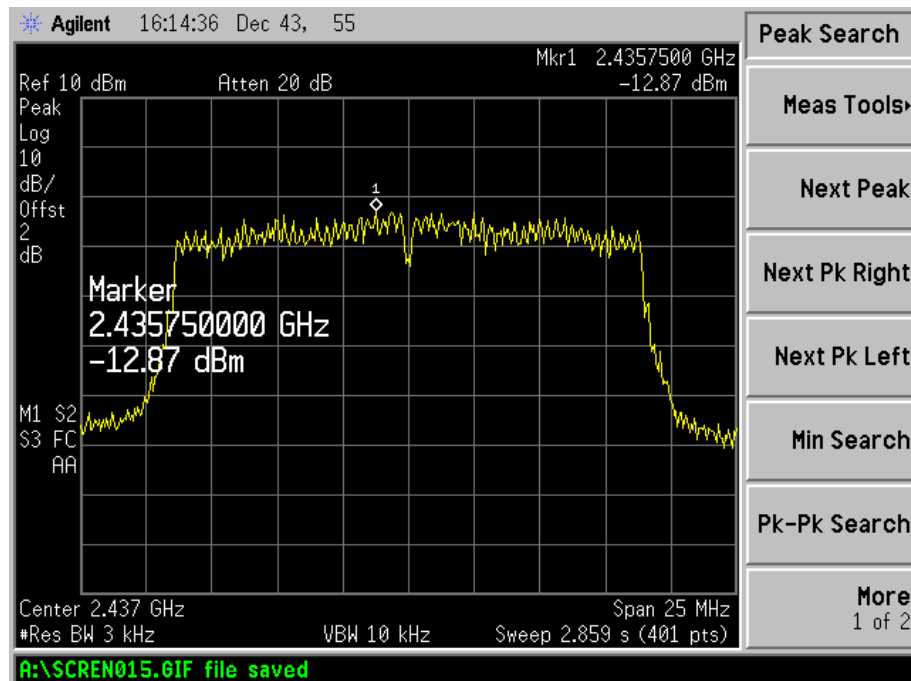
802.11g-High Channel



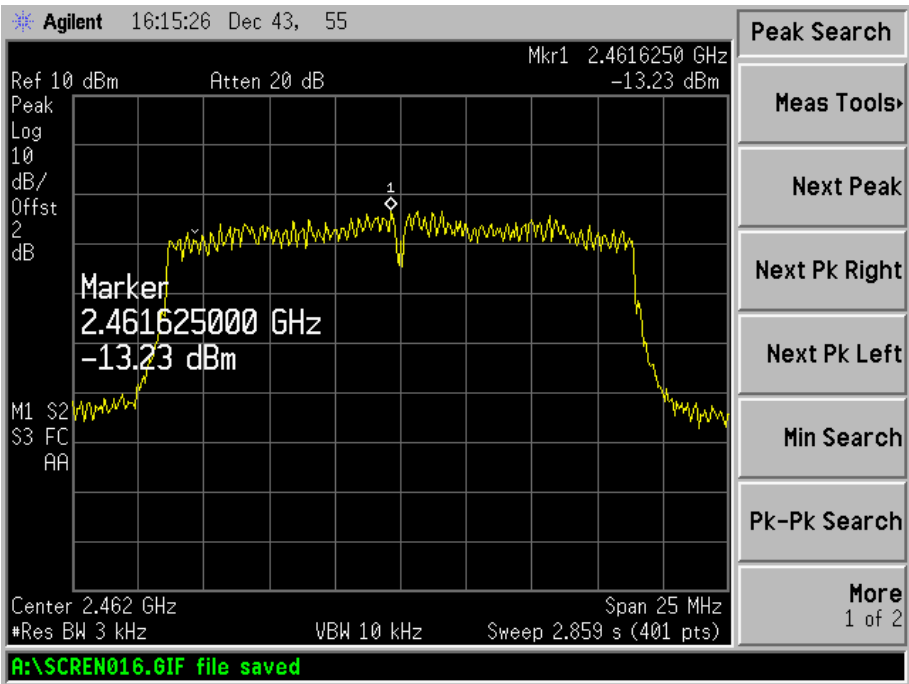
802.11n-HT20-Low Channel



802.11n-HT20-Middle Channel



802.11n-HT20-High Channel



5. 6dB Bandwidth

5.1 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.

5.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2012-03-28	2013-03-27
Attenuator	ATTEN	ATS100-4-20	/	2012-03-28	2013-03-27

5.3 Test Procedure

1. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.4 Environmental Conditions

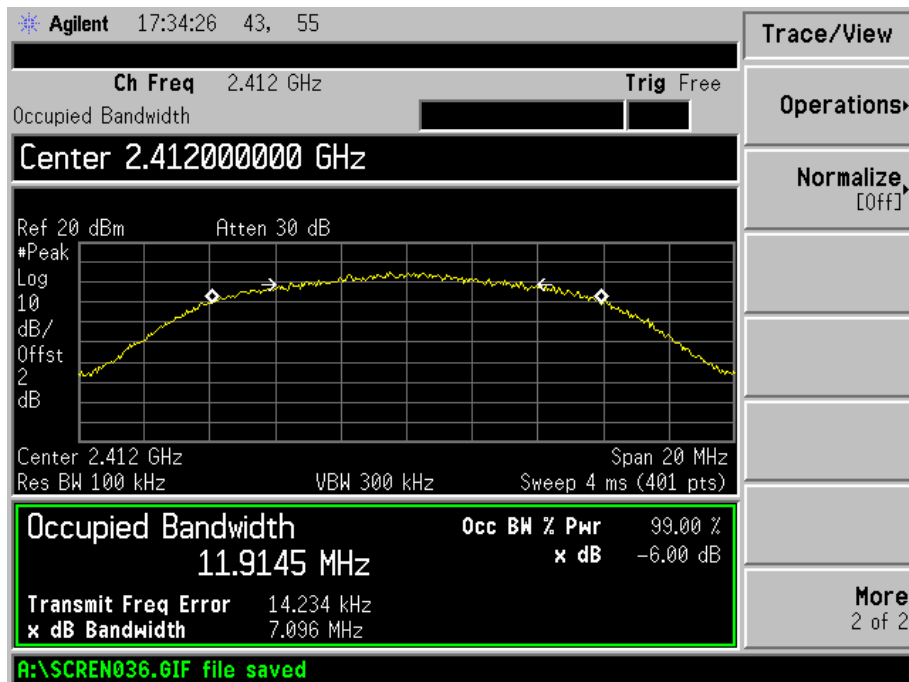
Temperature:	21° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

5.5 Summary of Test Results/Plots

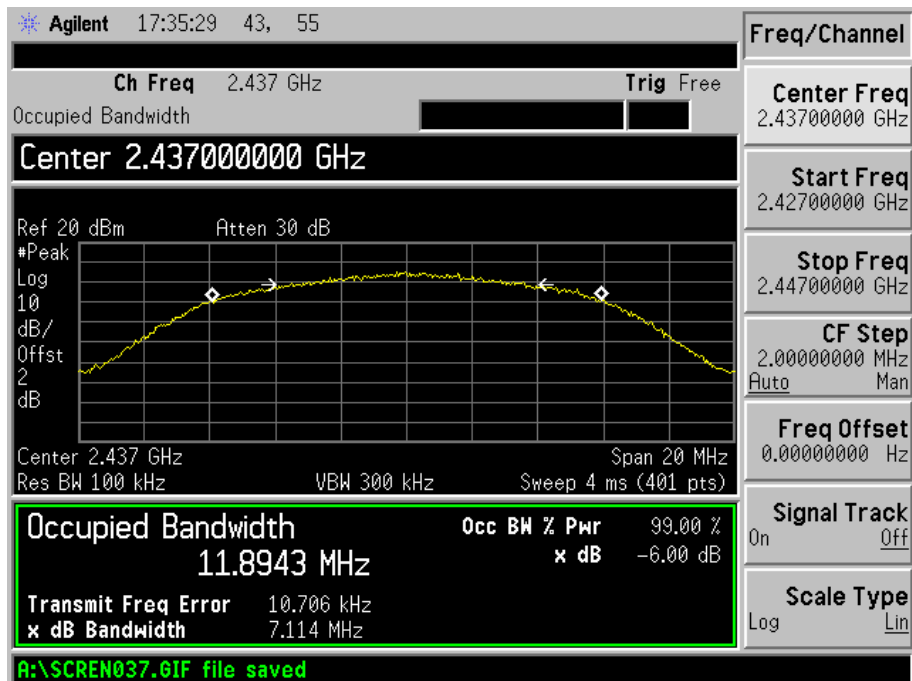
Test Mode	Test Channel MHz	6 dB Bandwidth kHz	Limit kHz
802.11b	2412	7096	500
	2437	7114	500
	2462	7577	500
802.11g	2412	15686	500
	2437	15713	500
	2462	15341	500
802.11n-HT20	2412	17559	500
	2437	17135	500
	2462	17348	500

Please refer to the following test plots:

802.11b-Low Channel



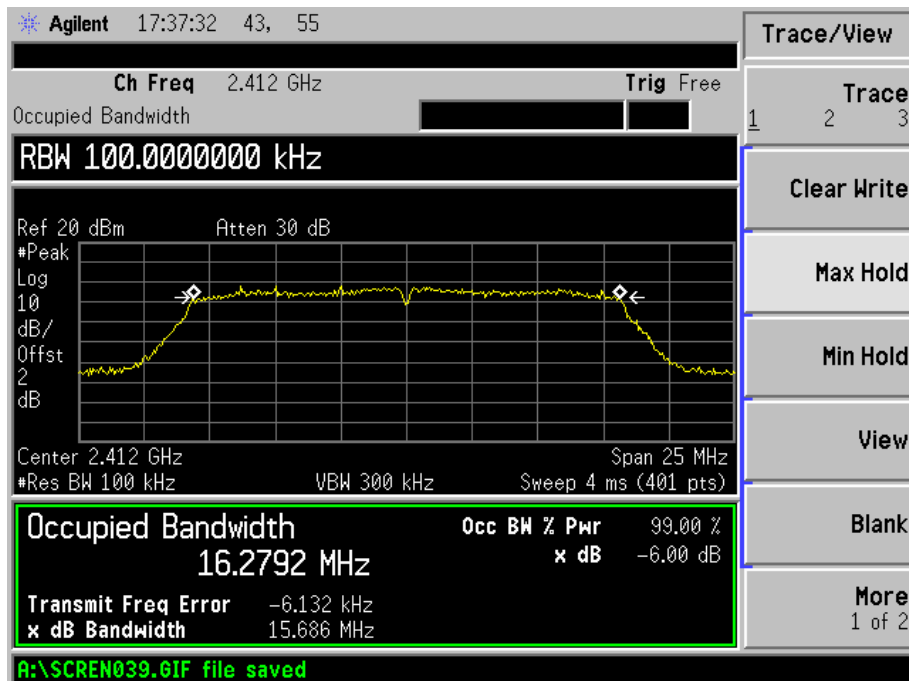
802.11b-Middle Channel



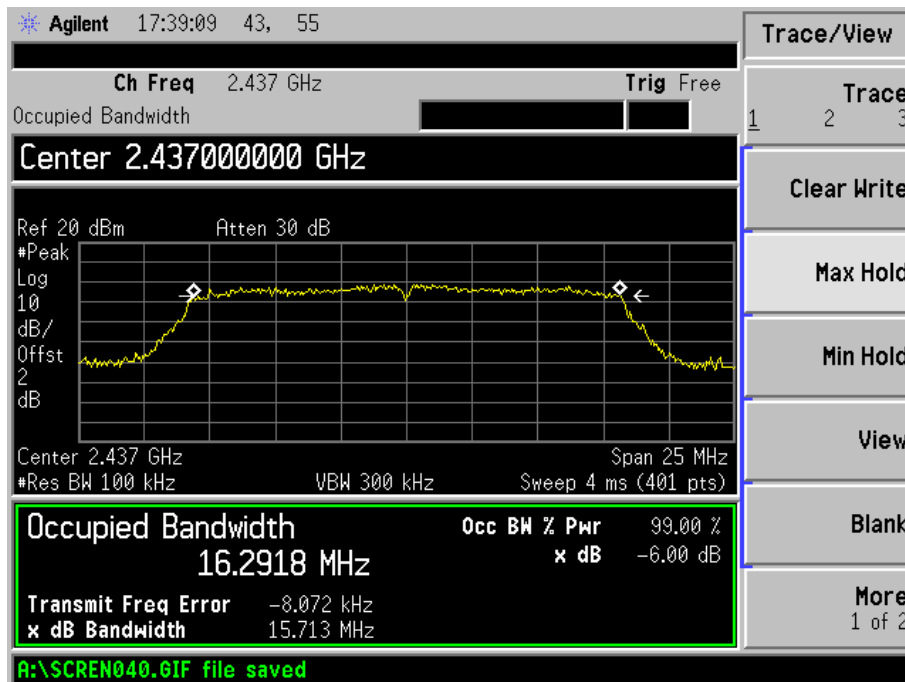
802.11b-High Channel



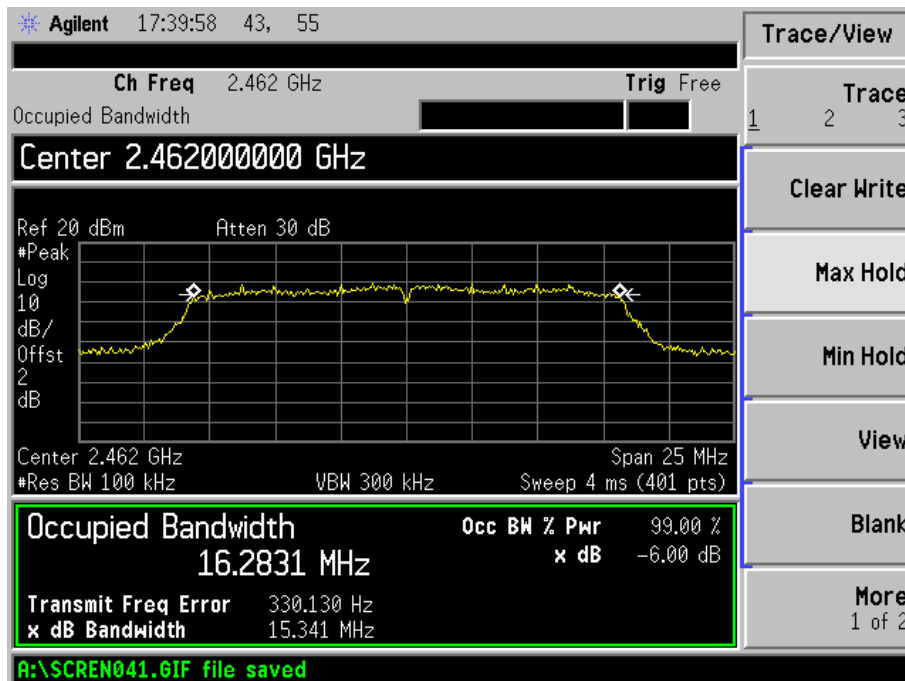
802.11g-Low Channel



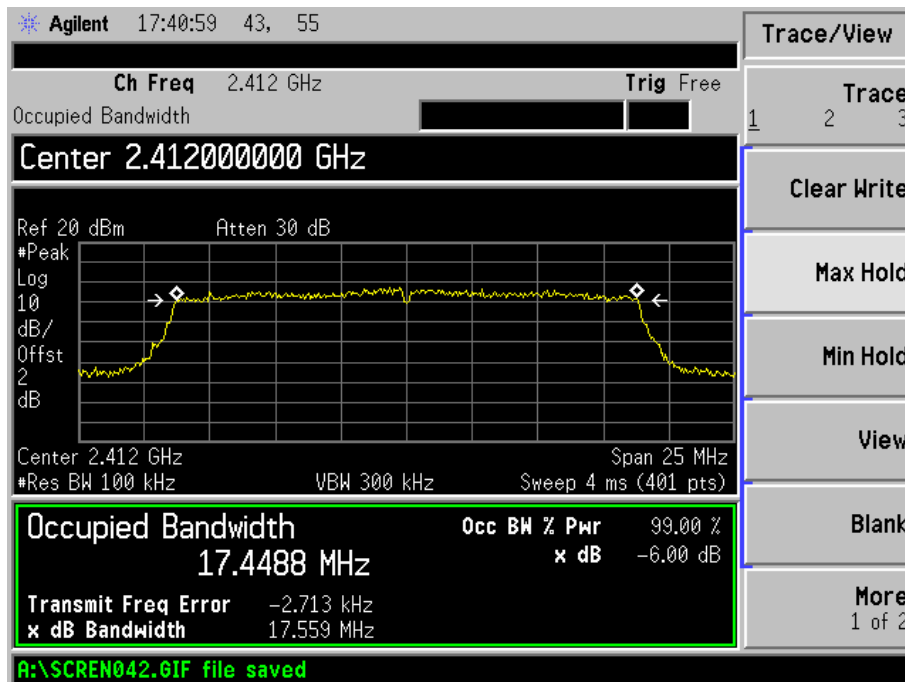
802.11g-Middle Channel



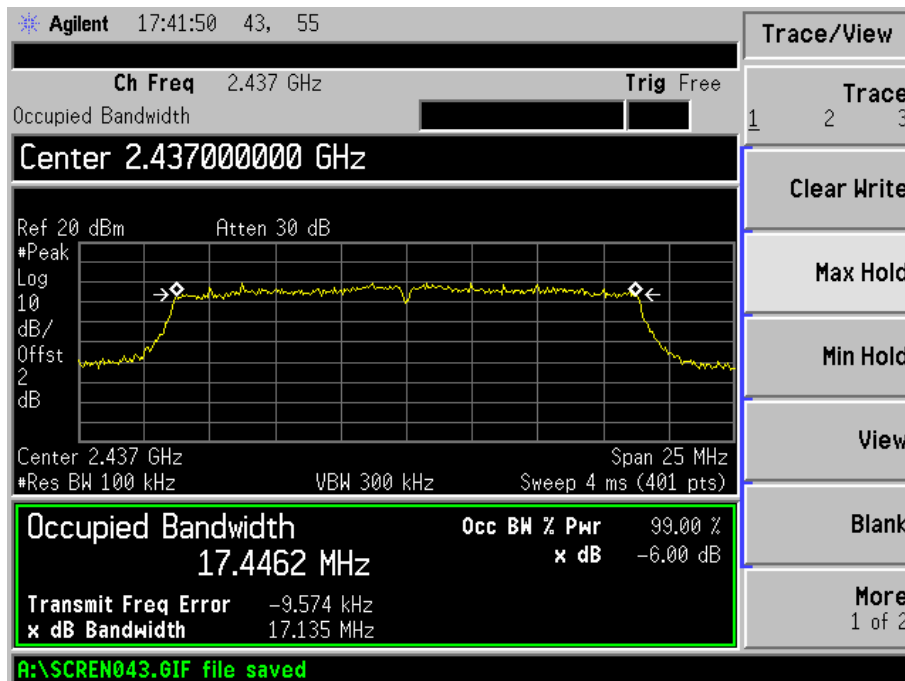
802.11g-High Channel



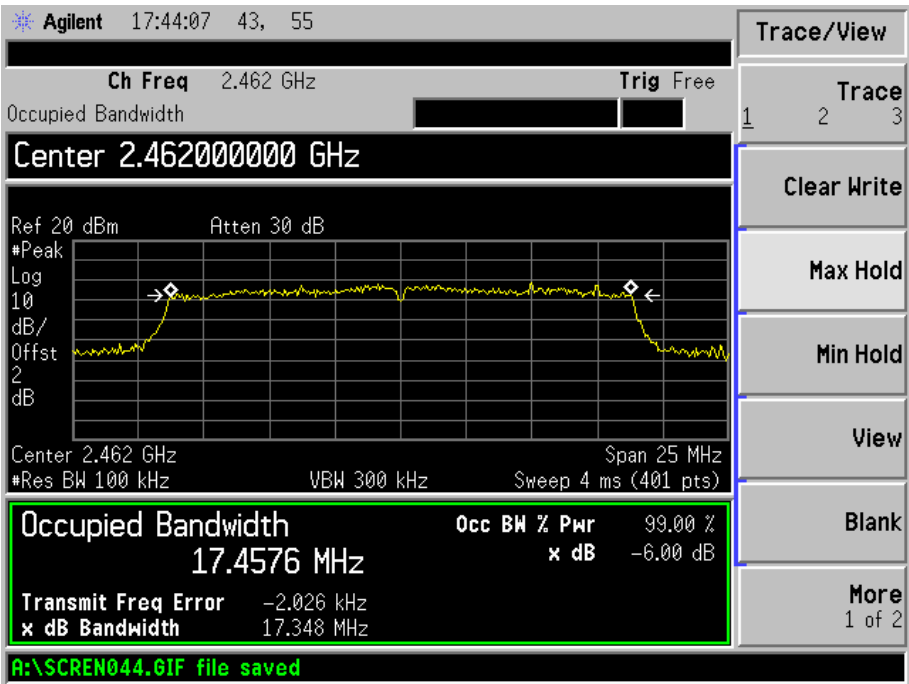
802.11n-HT20-Low Channel



802.11n-HT20-Middle Channel



802.11n-HT20-High Channel



6. RF Output Power

6.1 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.

6.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2012-03-28	2013-03-27
Attenuator	ATTEN	ATS100-4-20	/	2012-03-28	2013-03-27

6.3 Test Procedure

According to section 15.247(b)-power output of the KDB-558074 (2012),

1. Set the RBW = maximum available (at least 1 MHz).
2. Set the VBW = 3 x RBW or maximum available setting (must be $\geq$ RBW).
3. Set the span to fully encompass the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the spectrum analyzer's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some analyzers, this may require a manual override to ensure use of peak detector). If the spectrum analyzer does not have a band power function, sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

6.4 Environmental Conditions

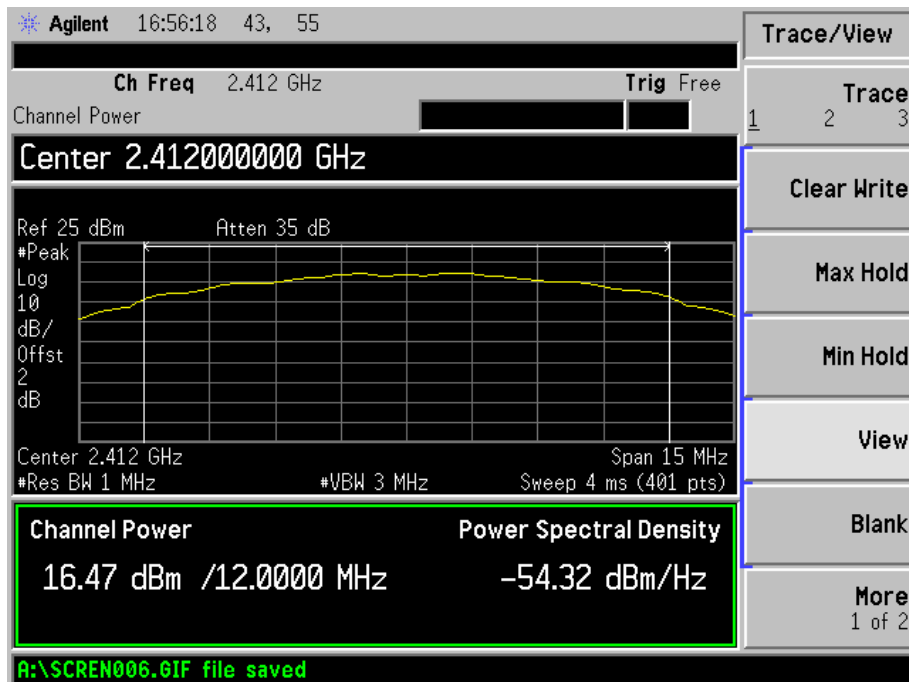
Temperature:	21° C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

6.5 Summary of Test Results/Plots

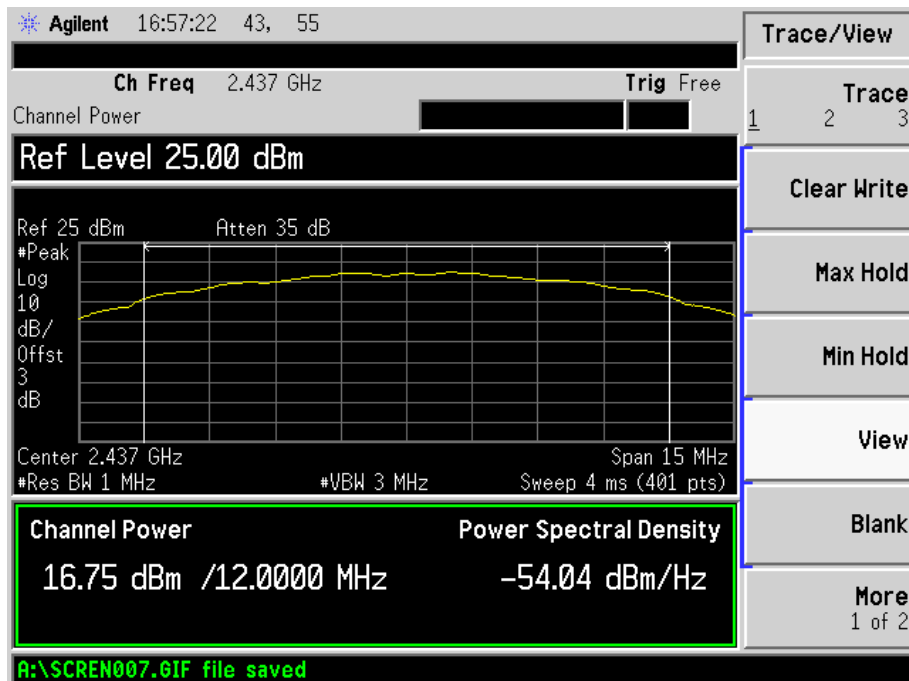
Test Mode	Frequency MHz	Reading dBm	Output Power mW	Limit mW
802.11b_1Mbps	2412	16.47	44.36	1000
	2437	16.75	47.32	1000
	2462	16.54	45.08	1000
802.11b_11Mbps	2412	17.25	53.09	1000
	2437	16.49	44.57	1000
	2462	16.37	43.35	1000
802.11g_6Mbps	2412	15.32	34.04	1000
	2437	15.64	36.64	1000
	2462	15.89	38.82	1000
802.11g_54Mbps	2412	15.25	33.50	1000
	2437	15.52	35.65	1000
	2462	15.80	38.02	1000
802.11n HT20_MCS0	2412	15.22	33.27	1000
	2437	15.57	36.06	1000
	2462	15.74	37.50	1000
802.11n HT20_MCS7	2412	15.28	33.73	1000
	2437	15.52	35.65	1000
	2462	15.75	37.58	1000

Please refer to the following test plots:

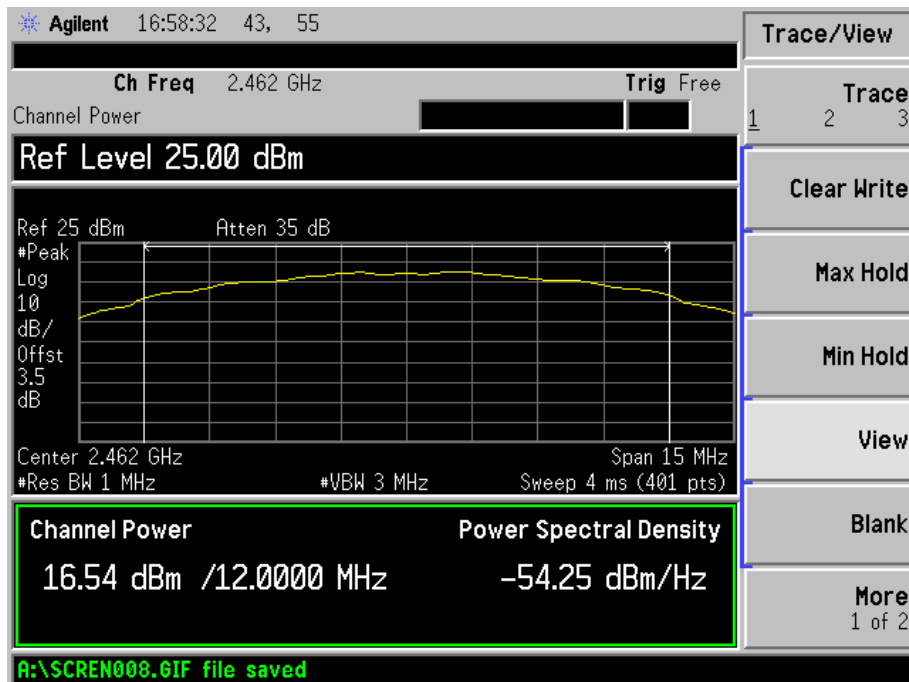
802.11b-1Mbps-Low Channel



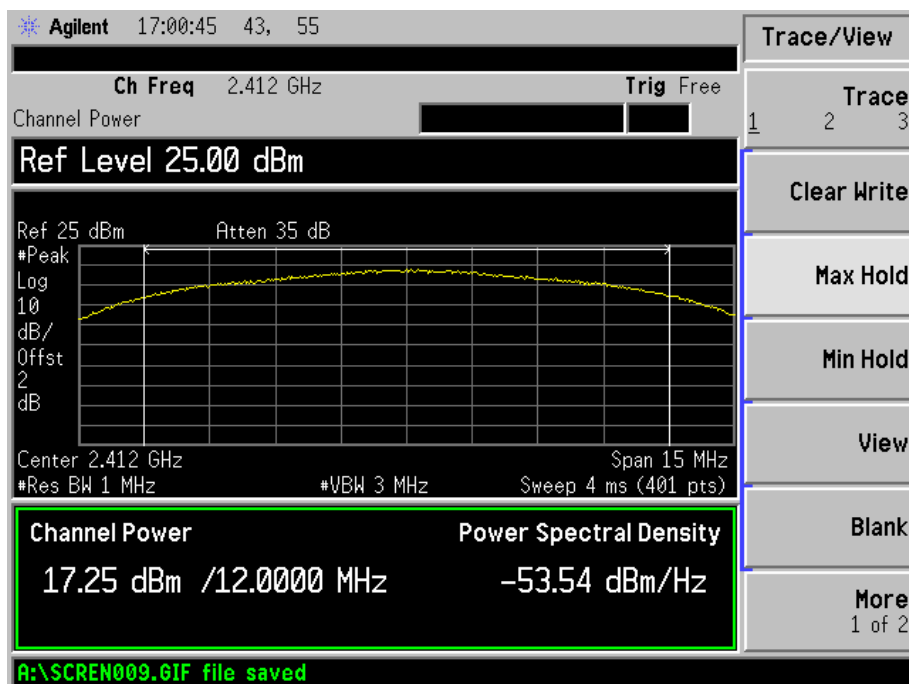
802.11b-1Mbps-Middle Channel



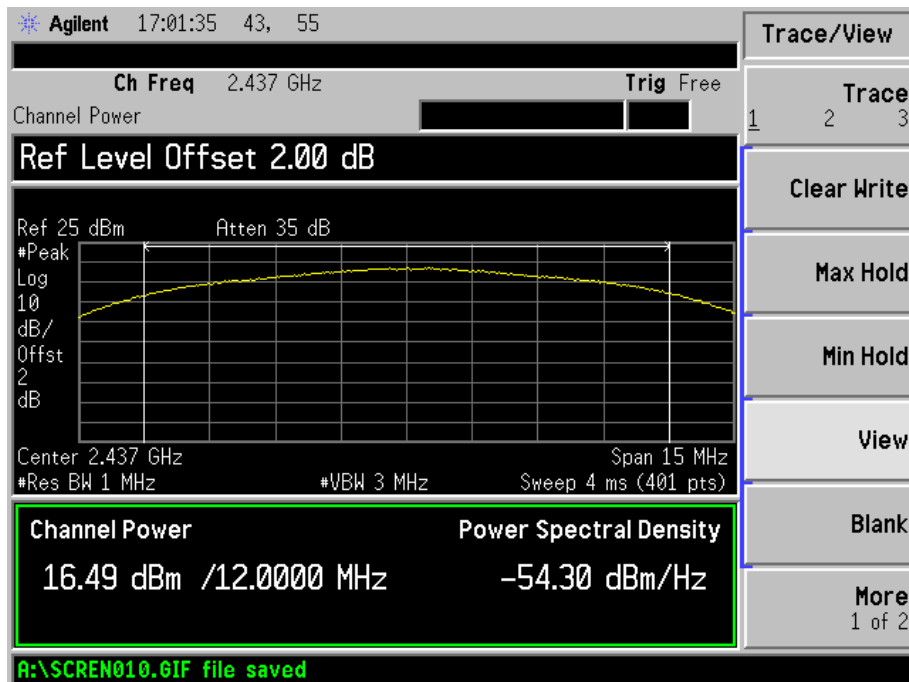
802.11b-1Mbps-High Channel



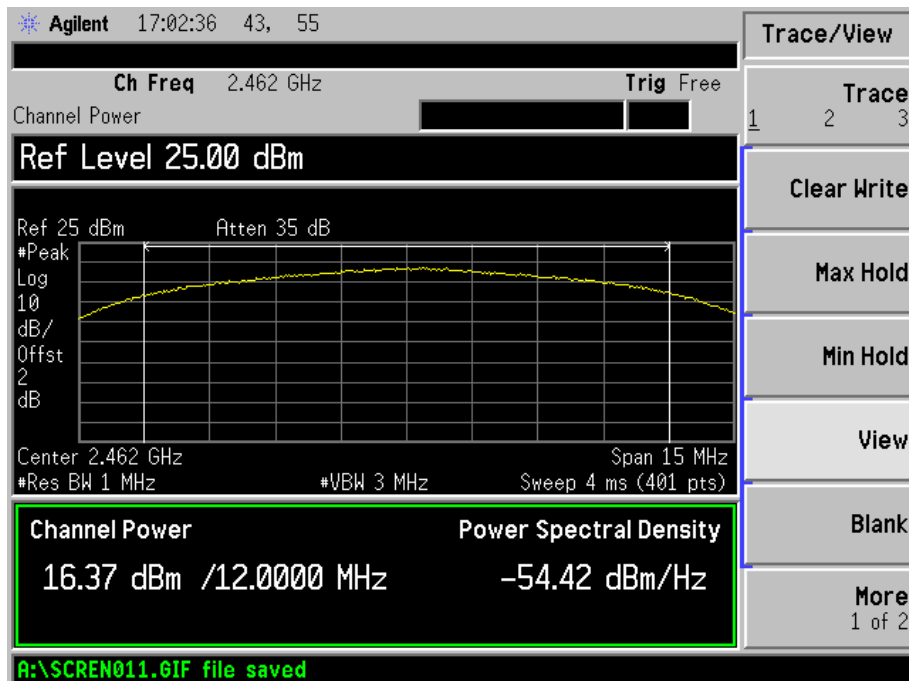
802.11b11Mbps-Low Channel



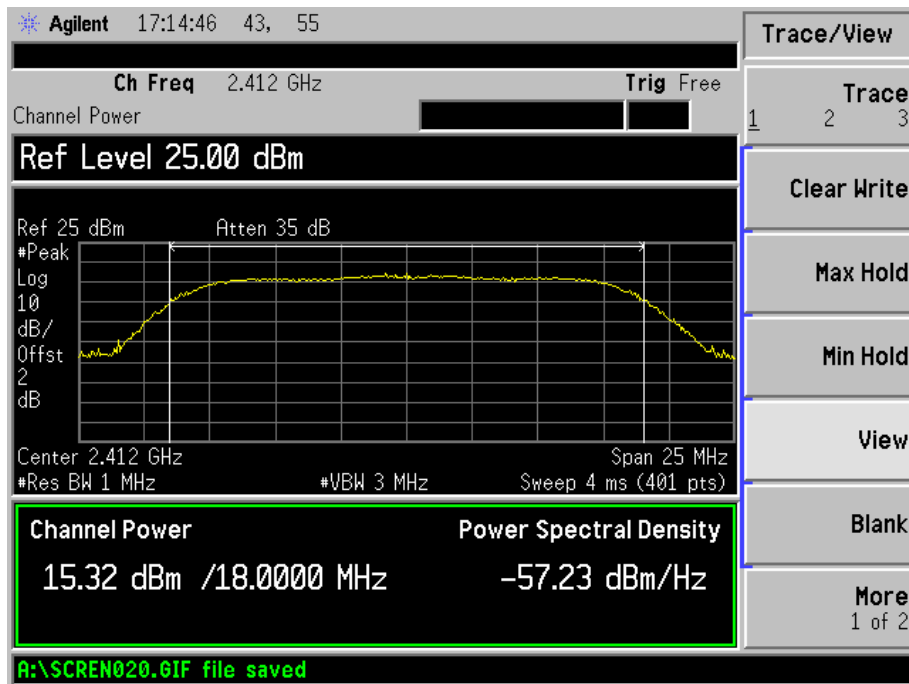
802.11b-11Mbps-Middle Channel



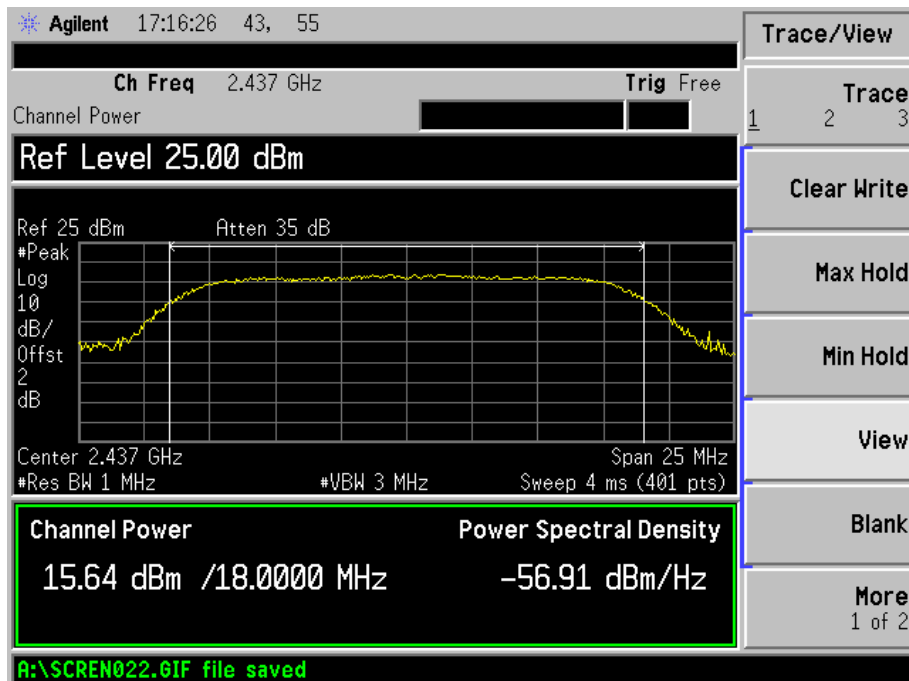
802.11b-11Mbps-High Channel



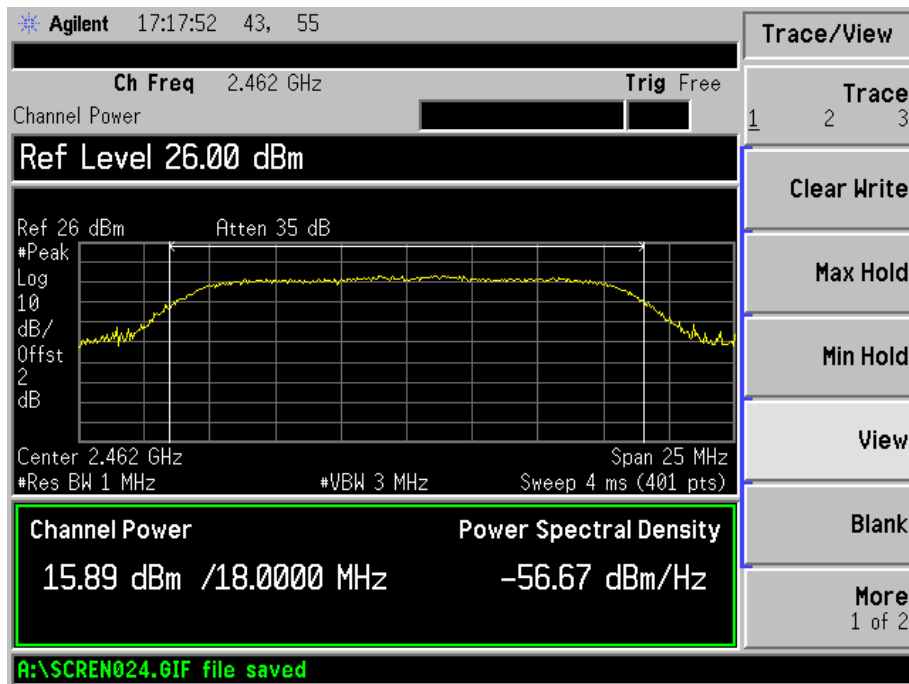
802.11g-6Mbps-Low Channel



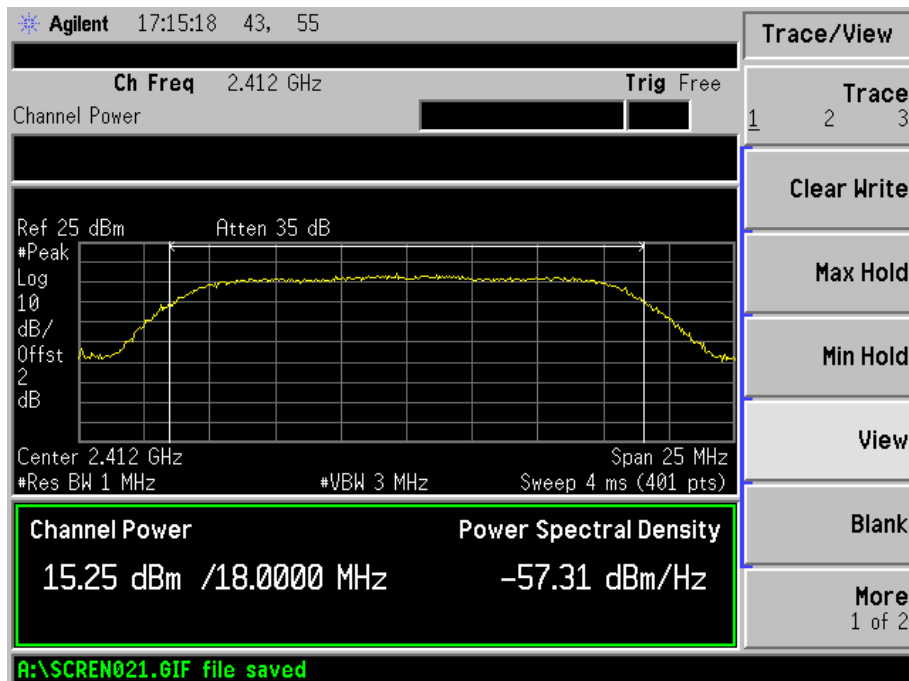
802.11g-6Mbps-Middle Channel



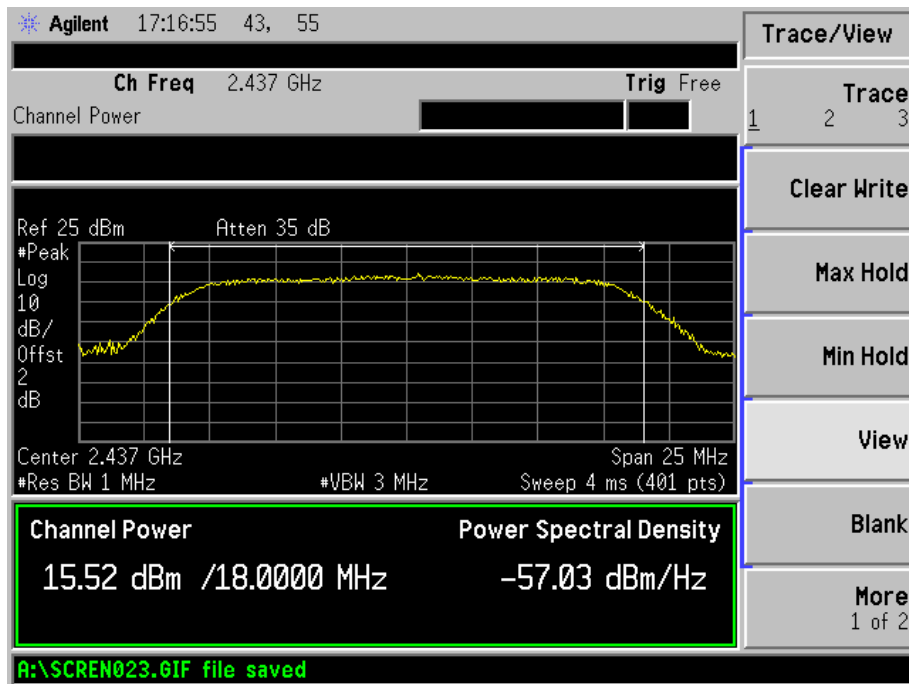
802.11 g-6Mbps-High Channel



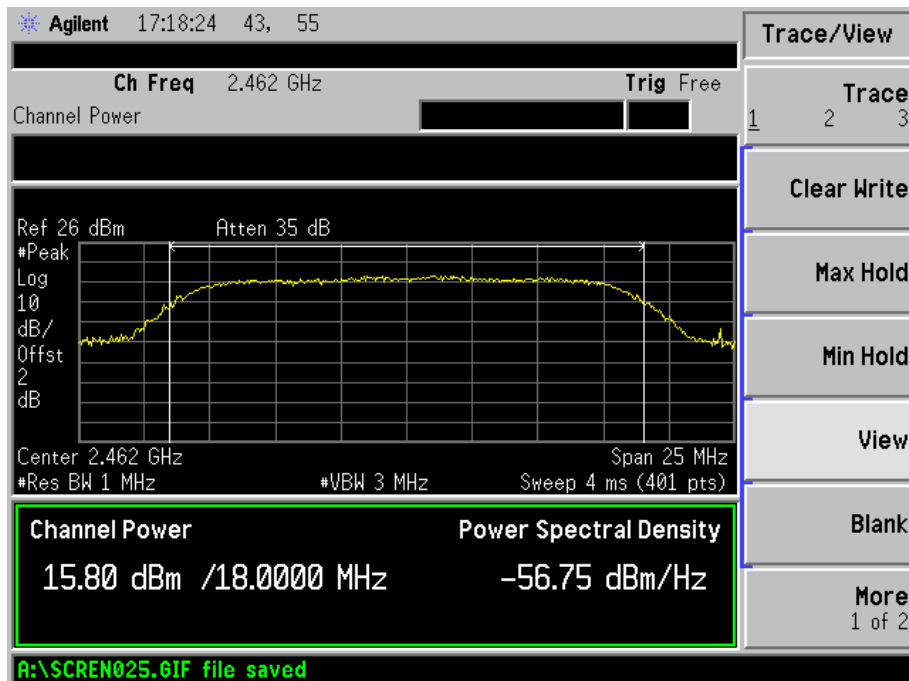
802.11g-54Mbps-Lows Channel



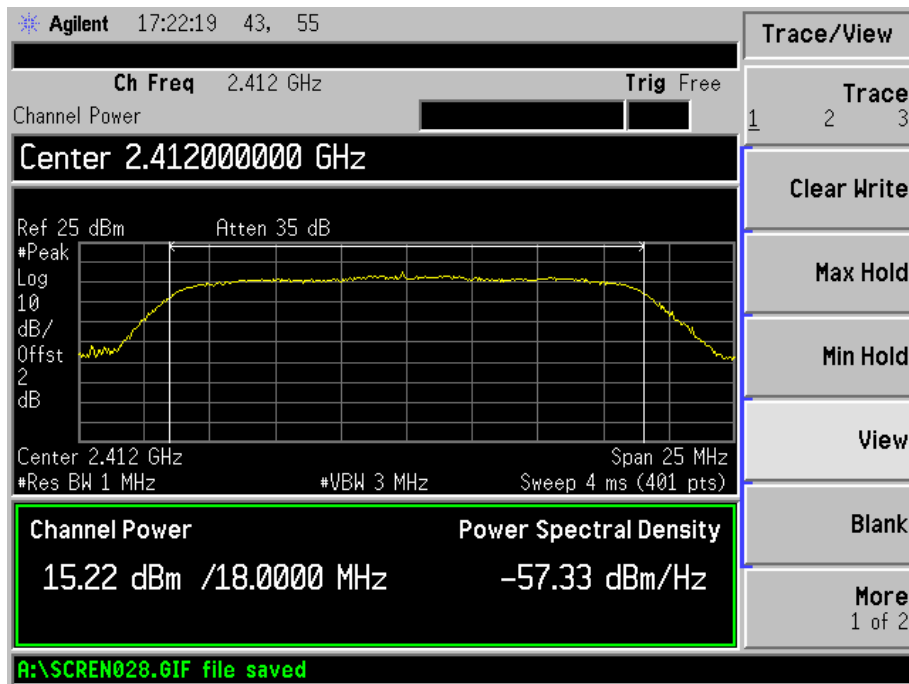
802.11g-54Mbps-Middle Channel



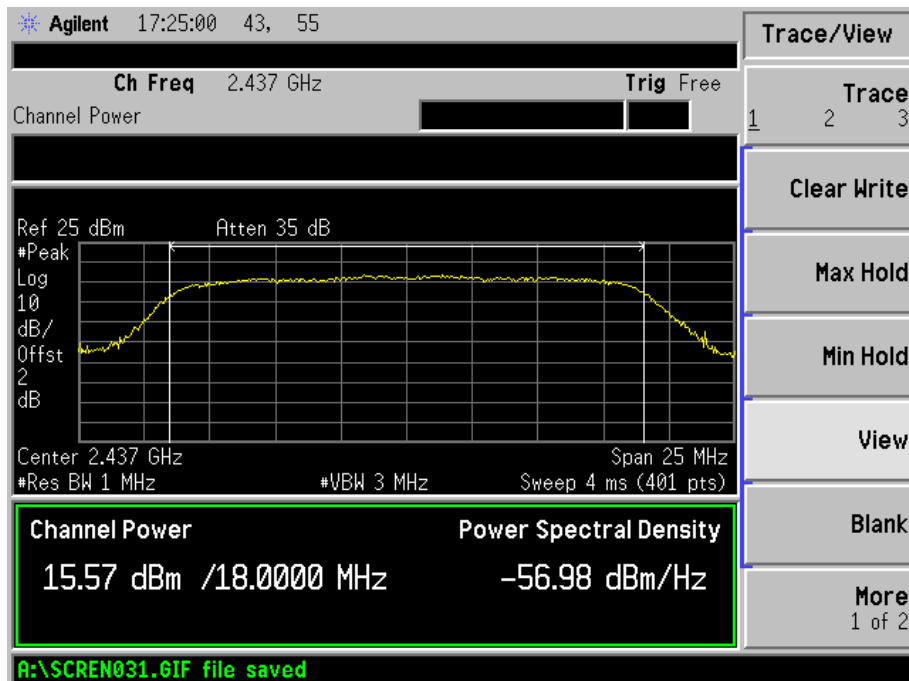
802.11g-54Mbps-High Channel



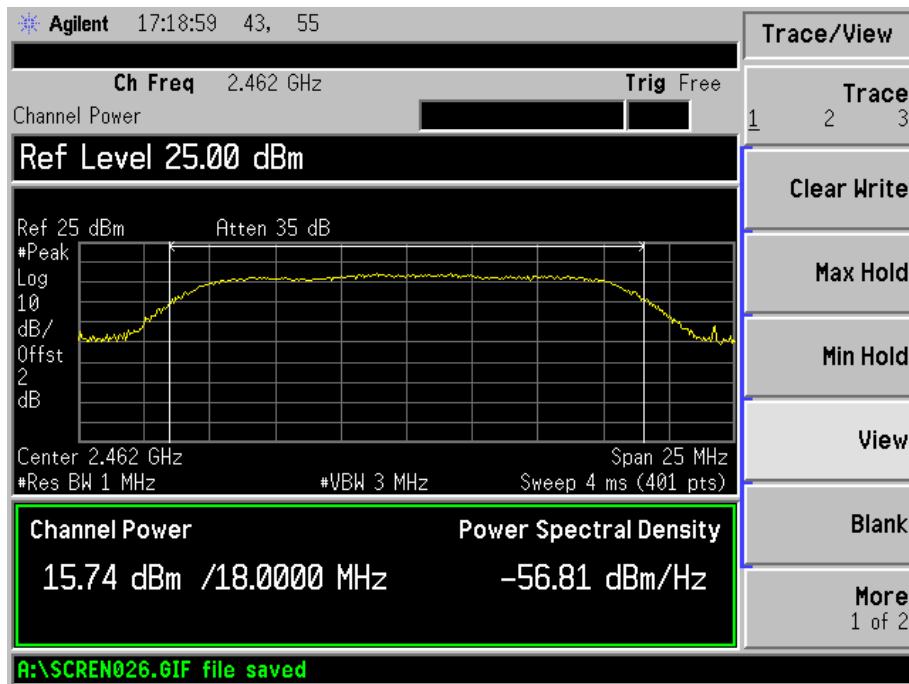
802.11n-HT20-MCS0-Low Channel



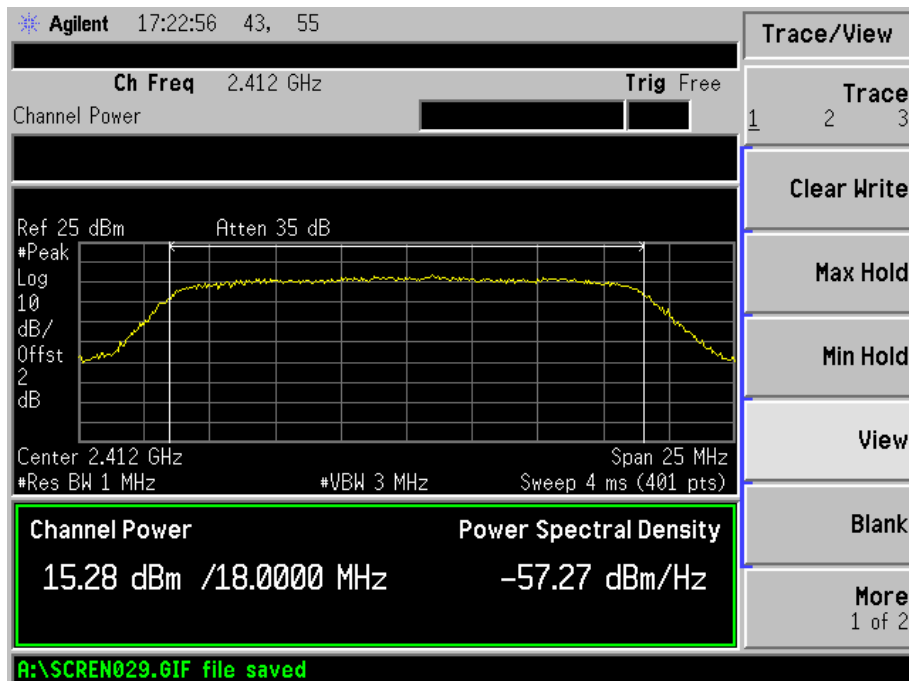
802.11n-HT20-MCS0-Middle Channel



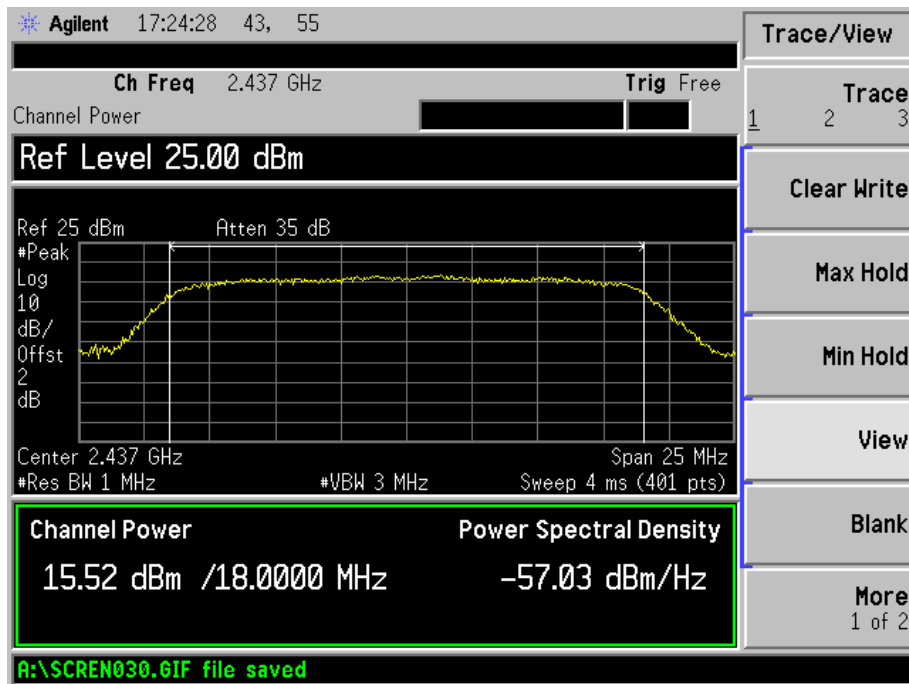
802.11n-HT20-MCS0-High Channel



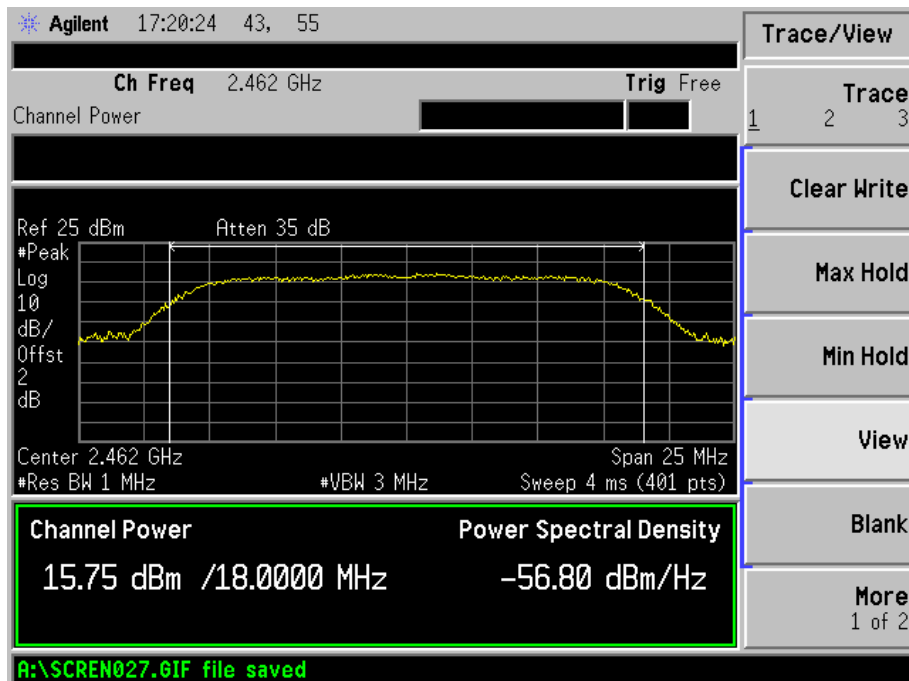
802.11n-HT20-MCS7-Low Channel



802.11n-HT20-MCS7-Middle Channel



802.11n-HT20-MCS7-High Channel



7. Field Strength of Spurious Emissions

7.1 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.

7.2 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.

7.3 Test Equipment List and Details

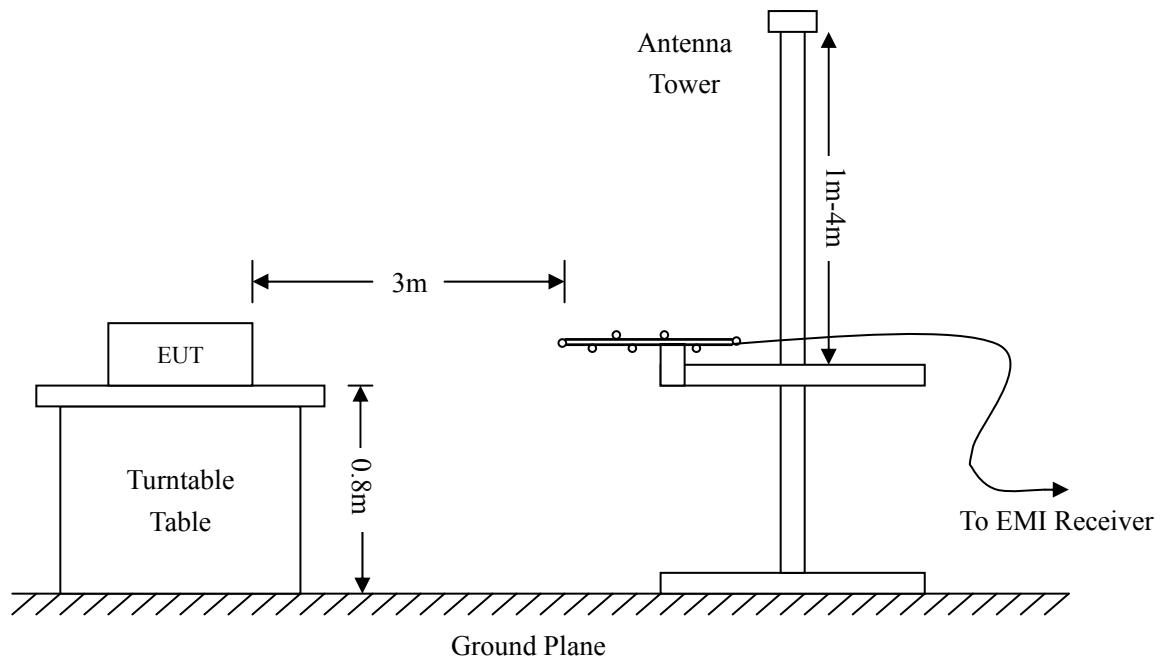
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2012-03-28	2013-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24
Horn Antenna	ETS	3116B	00088203	2012-02-25	2013-02-24
Loop Antenna	SCHWARZECK	HFRA 5165	9365	2012-02-25	2013-02-24

7.4 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.



7.5 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:

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

7.6 Environmental Conditions

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

7.7 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:

**-2.56 dB at 45.0583 MHz in the Vertical polarization for 802.11n-HT20 Transmitting Low Channel,
9kHz to 25 GHz, 3 Meters**

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

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

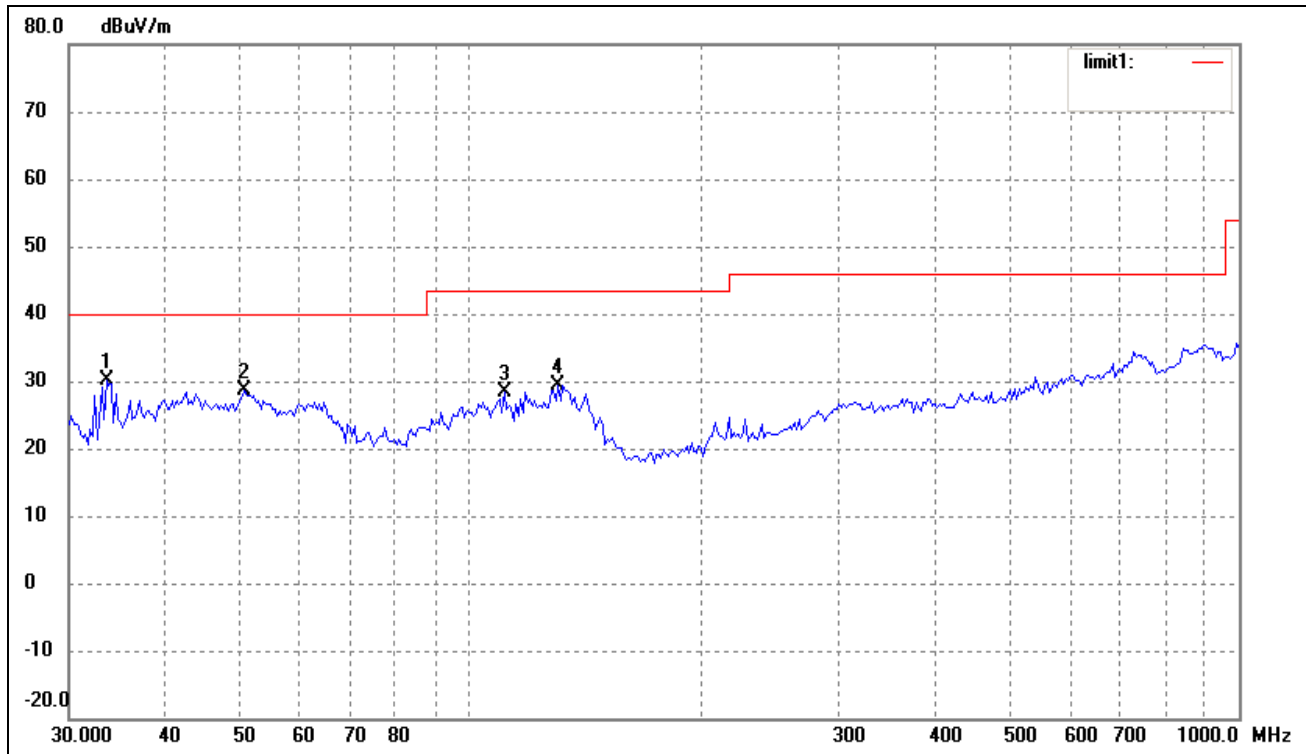
EUT: Netatmo Weather Station

Tested Model: NWS02

Operating Condition: 802.11b Transmitting Low Channel-2412MHz

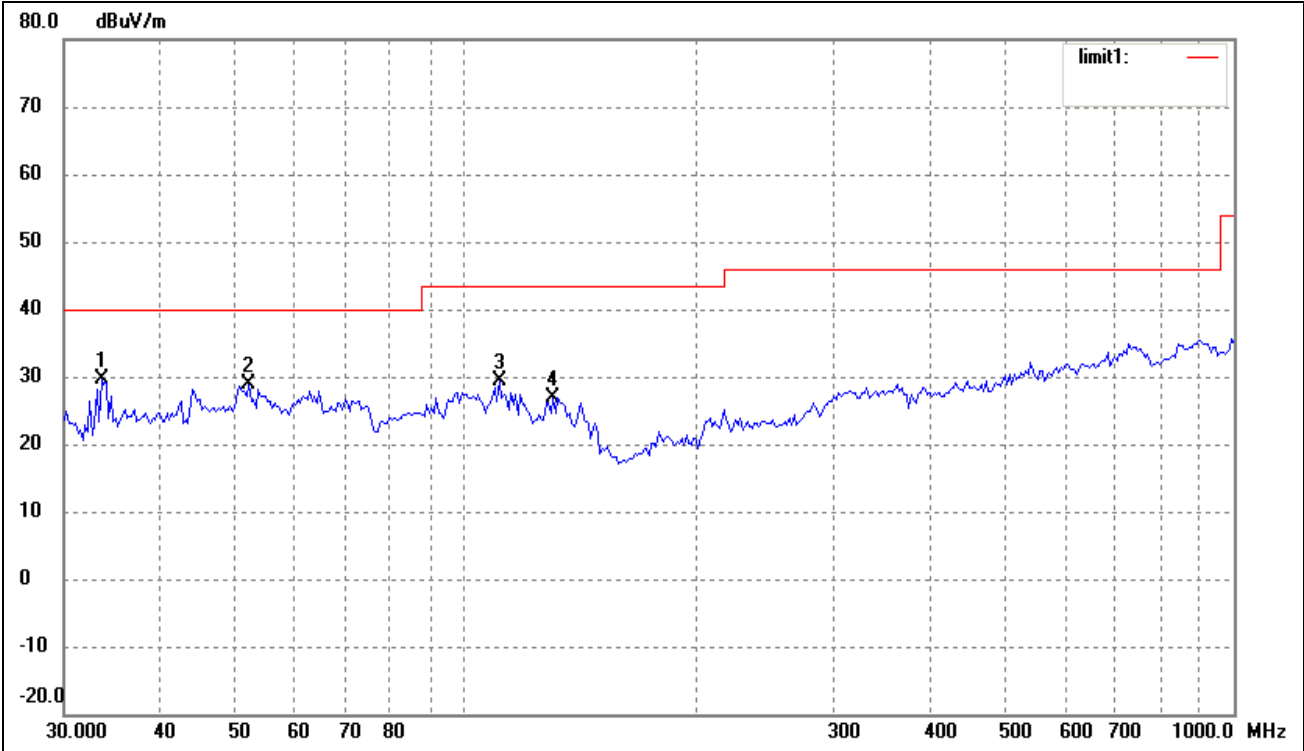
Comment: AC 120V/60Hz adapter, USB 5V

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	33.5624	21.61	8.63	30.24	40.00	-9.76	360	100	peak
2	50.7637	22.11	6.54	28.65	40.00	-11.35	360	100	peak
3	110.5687	22.48	5.80	28.28	43.50	-15.22	360	100	peak
4	129.9226	25.20	4.13	29.33	43.50	-14.17	360	100	peak

Test Specification: Vertical

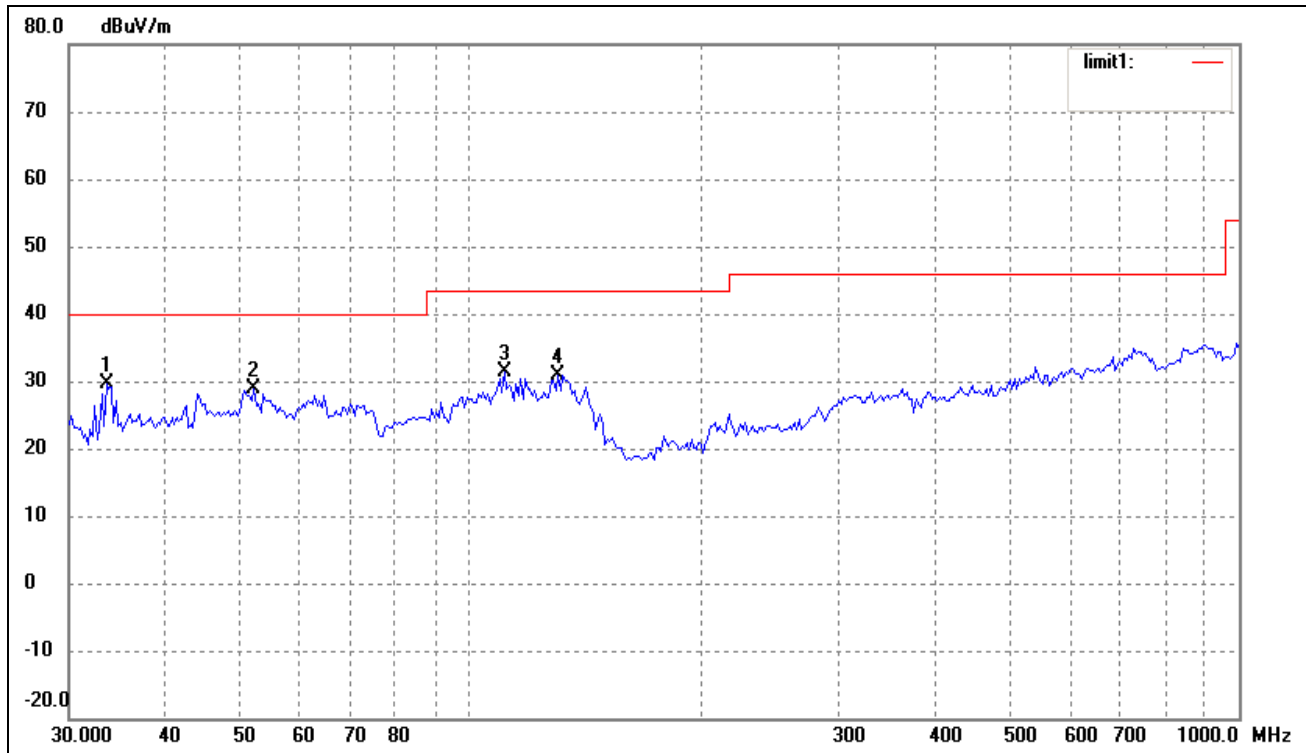


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.5624	21.11	8.63	29.74	40.00	-10.26	270	100	peak
2	52.2079	22.40	6.42	28.82	40.00	-11.18	116	100	peak
3	110.5687	23.48	5.80	29.28	43.50	-14.22	360	100	peak
4	129.9226	22.70	4.13	26.83	43.50	-16.67	360	100	peak

Operating Condition: 802.11b Transmitting Middle Channel-2437MHz

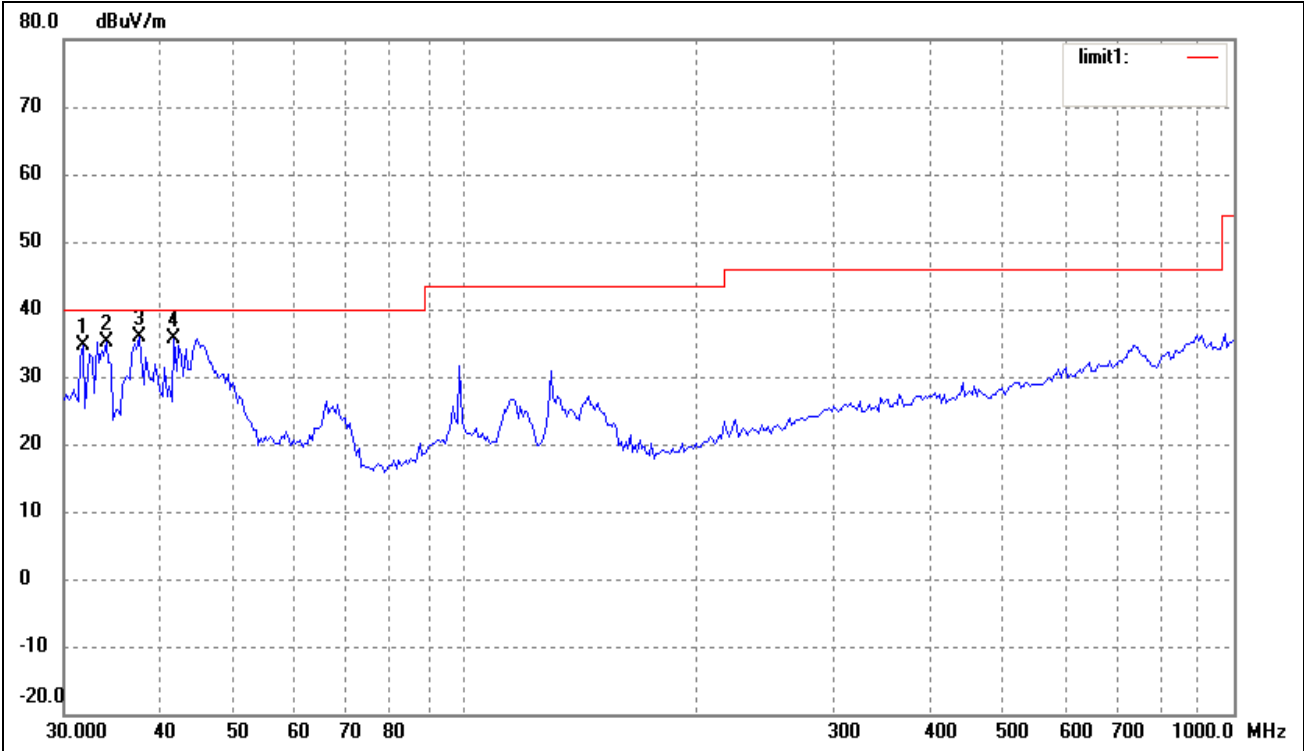
Comment: AC 120V/60Hz adapter, USB 5V

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	33.5624	21.11	8.63	29.74	40.00	-10.26	360	100	peak
2	52.2079	22.40	6.42	28.82	40.00	-11.18	224	100	peak
3	110.5687	25.48	5.80	31.28	43.50	-12.22	360	200	peak
4	129.9226	26.70	4.13	30.83	43.50	-12.67	360	200	peak

Test Specification: Vertical

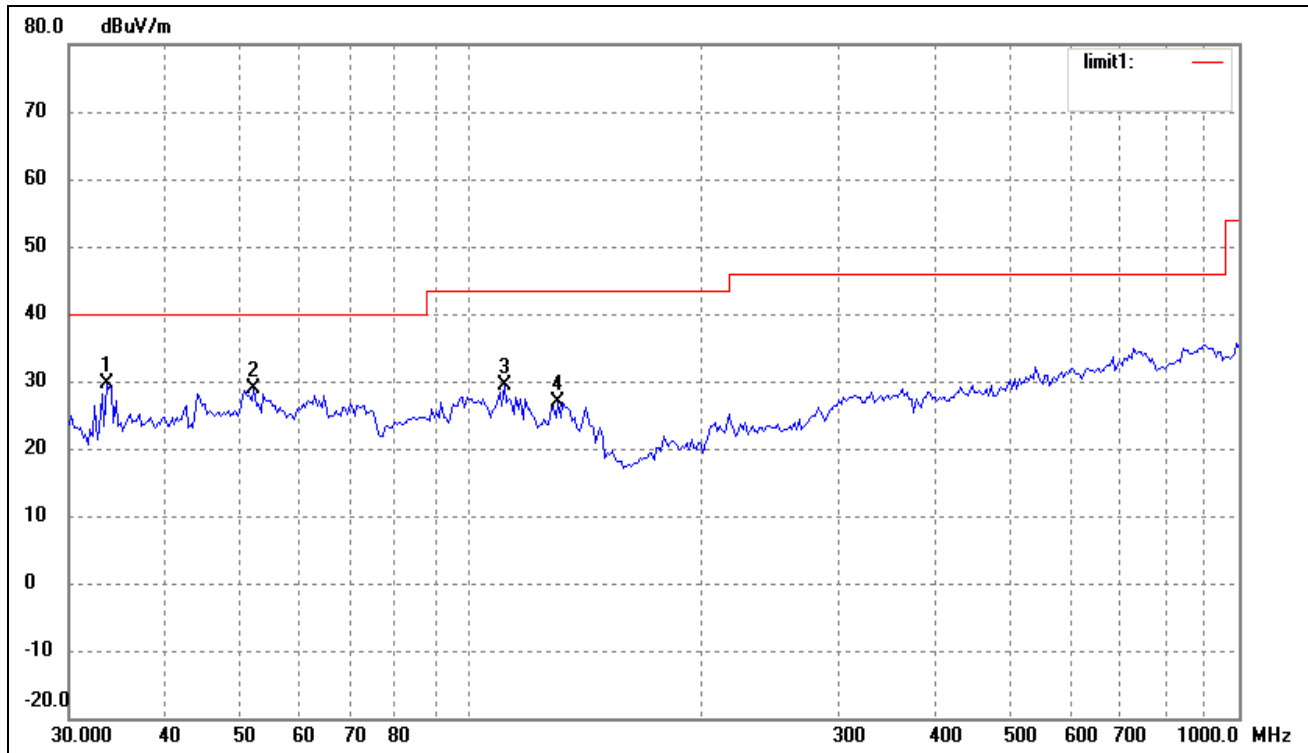


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	31.7313	26.21	8.33	34.54	40.00	-5.46	270	100	peak
2	34.0365	26.35	8.72	35.07	40.00	-4.93	360	100	peak
3	37.5479	26.48	9.29	35.77	40.00	-4.23	360	100	peak
4	41.7130	26.45	9.16	35.61	40.00	-4.39	225	100	peak

Operating Condition: 802.11b Transmitting High Channel-2462MHz

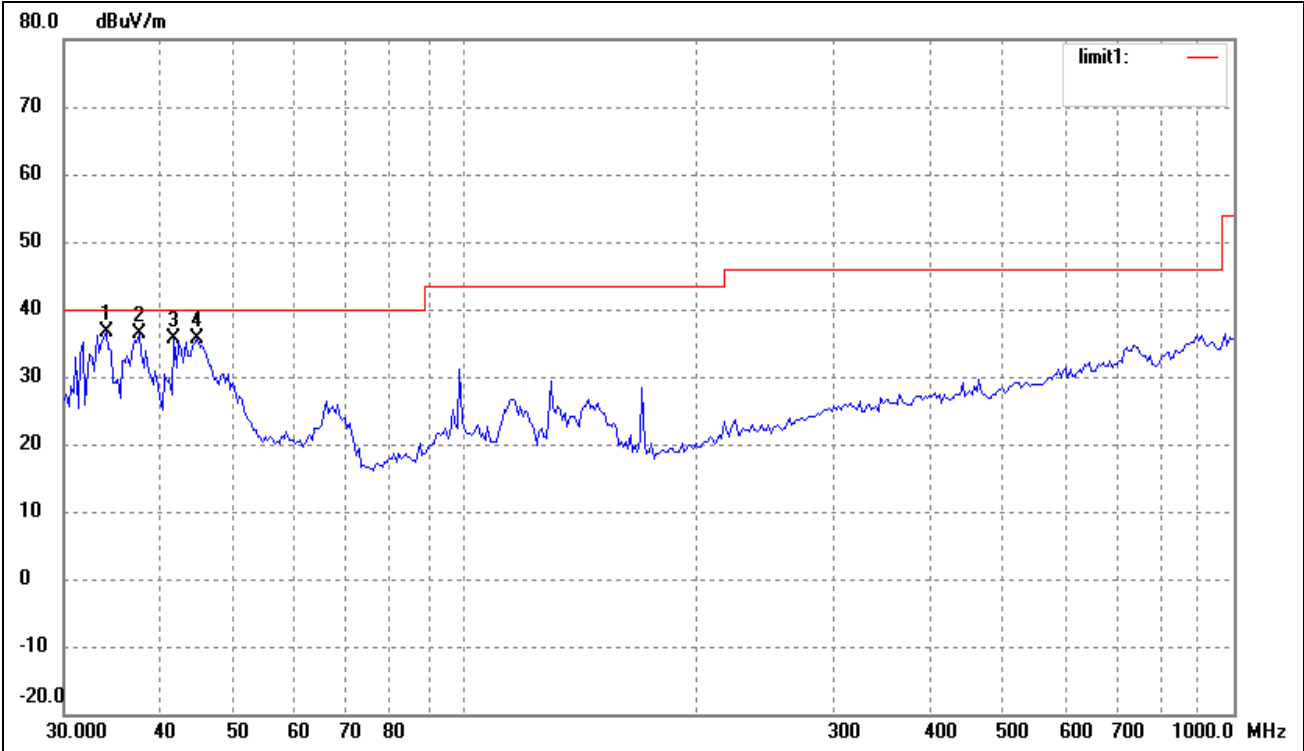
Comment: AC 120V/60Hz adapter, USB 5V

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	33.5624	21.11	8.63	29.74	40.00	-10.26	272	100	peak
2	52.2079	22.40	6.42	28.82	40.00	-11.18	87	100	peak
3	110.5687	23.48	5.80	29.28	43.50	-14.22	113	100	peak
4	129.9226	22.70	4.13	26.83	43.50	-16.67	360	100	peak

Test Specification: Vertical

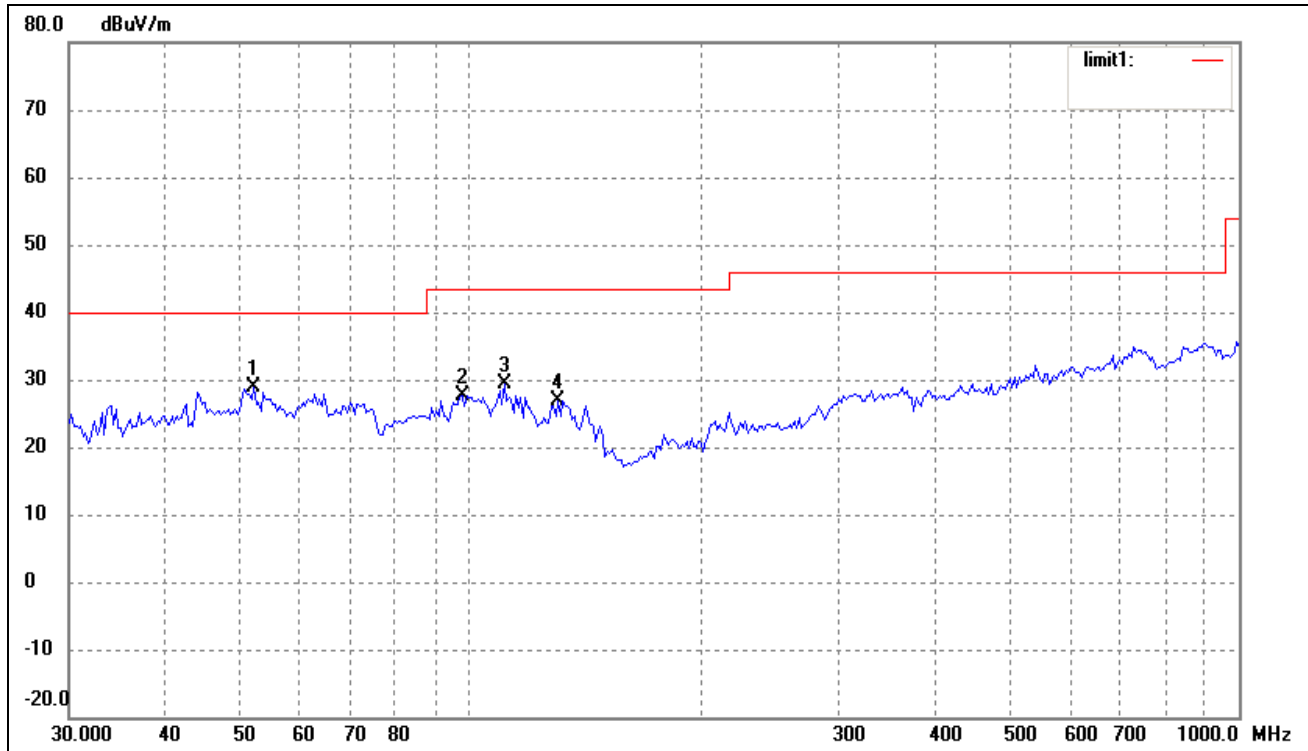


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	34.0365	27.85	8.72	36.57	40.00	-3.43	267	100	peak
2	37.5479	26.98	9.29	36.27	40.00	-3.73	360	100	peak
3	41.7130	26.45	9.16	35.61	40.00	-4.39	100	100	peak
4	44.7434	27.37	8.24	35.61	40.00	-4.39	264	200	peak

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

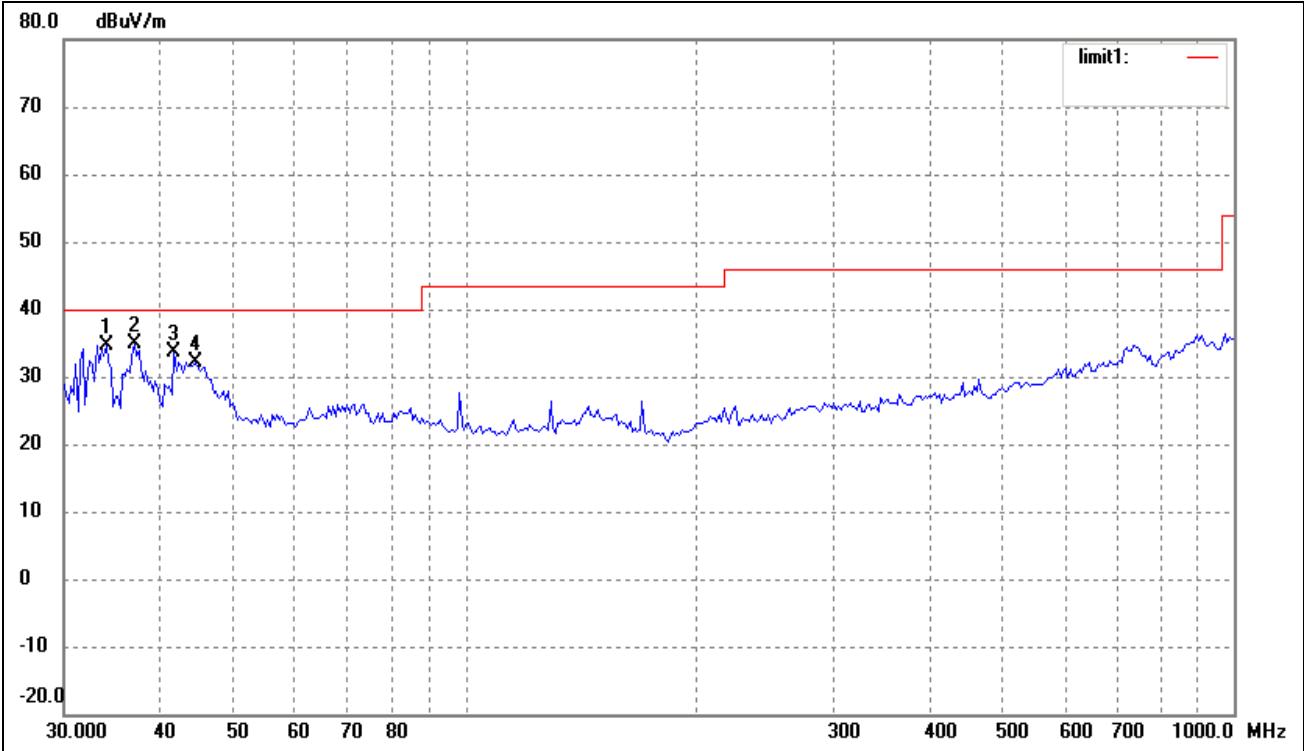
EUT: Netatmo Weather Station
 Tested Model: NWS02
 Operating Condition: 802.11g Transmitting Low Channel-2412MHz
 Comment: AC 120V/60Hz adapter, USB 5V

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	52.2079	22.40	6.42	28.82	40.00	-11.18	275	100	peak
2	97.4560	21.36	6.21	27.57	43.50	-15.93	360	100	peak
3	110.5687	23.48	5.80	29.28	43.50	-14.22	360	100	peak
4	129.9226	22.70	4.13	26.83	43.50	-16.67	360	100	peak

Test Specification: Vertical

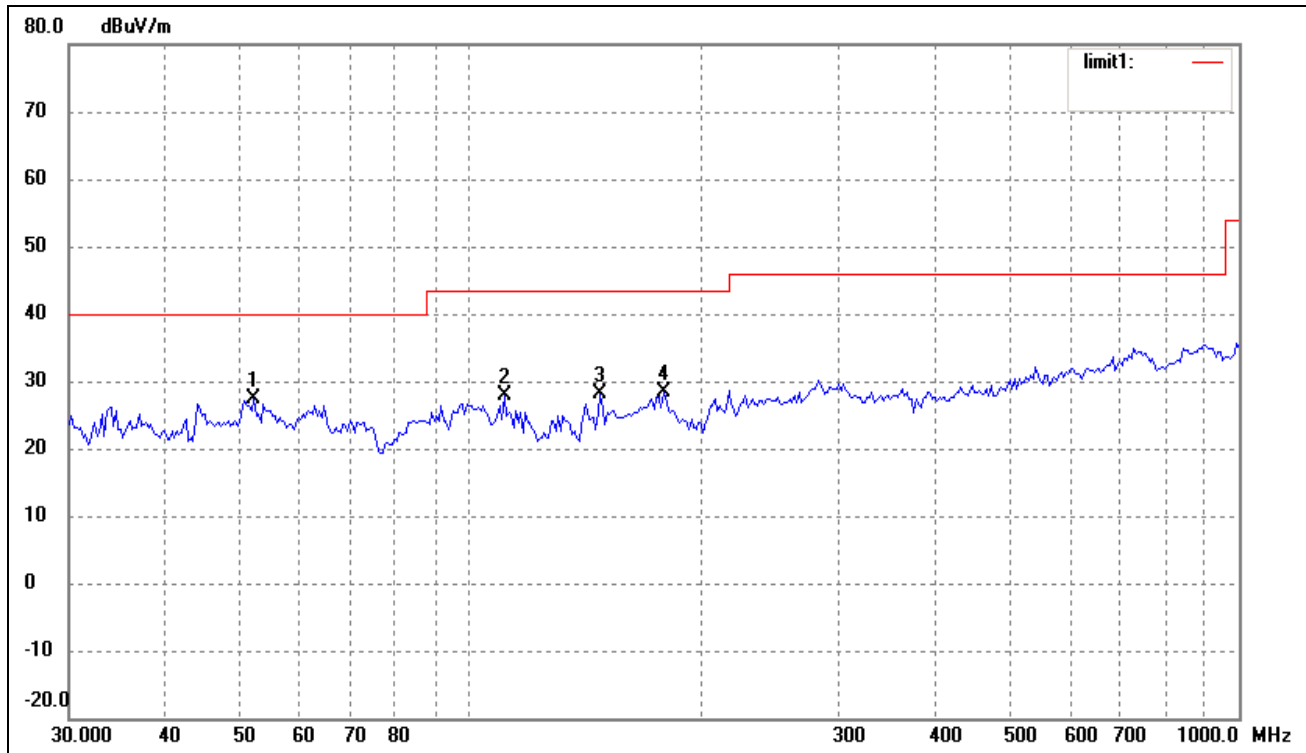


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	34.0365	25.85	8.72	34.57	40.00	-5.43	147	100	peak
2	37.0249	25.69	9.21	34.90	40.00	-5.10	182	100	peak
3	41.7130	24.45	9.16	33.61	40.00	-6.39	270	100	peak
4	44.4308	23.83	8.33	32.16	40.00	-7.84	135	100	peak

Operating Condition: 802.11g Transmitting Middle Channel-2437MHz

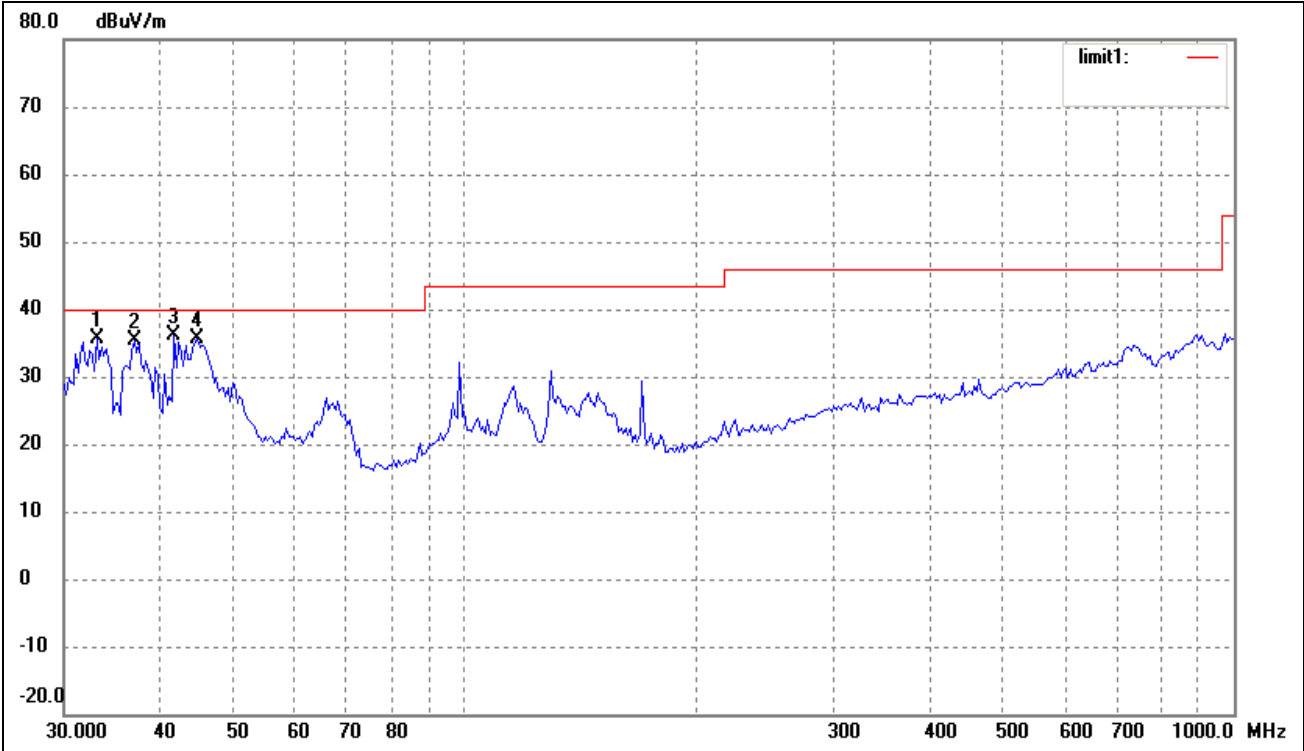
Comment: AC 120V/60Hz adapter, USB 5V

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	52.2079	20.90	6.42	27.32	40.00	-12.68	87	100	peak
2	110.5687	21.98	5.80	27.78	43.50	-15.72	178	100	peak
3	147.4036	24.62	3.52	28.14	43.50	-15.36	272	100	peak
4	178.1327	24.59	3.74	28.33	43.50	-15.17	116	100	peak

Test Specification: Vertical

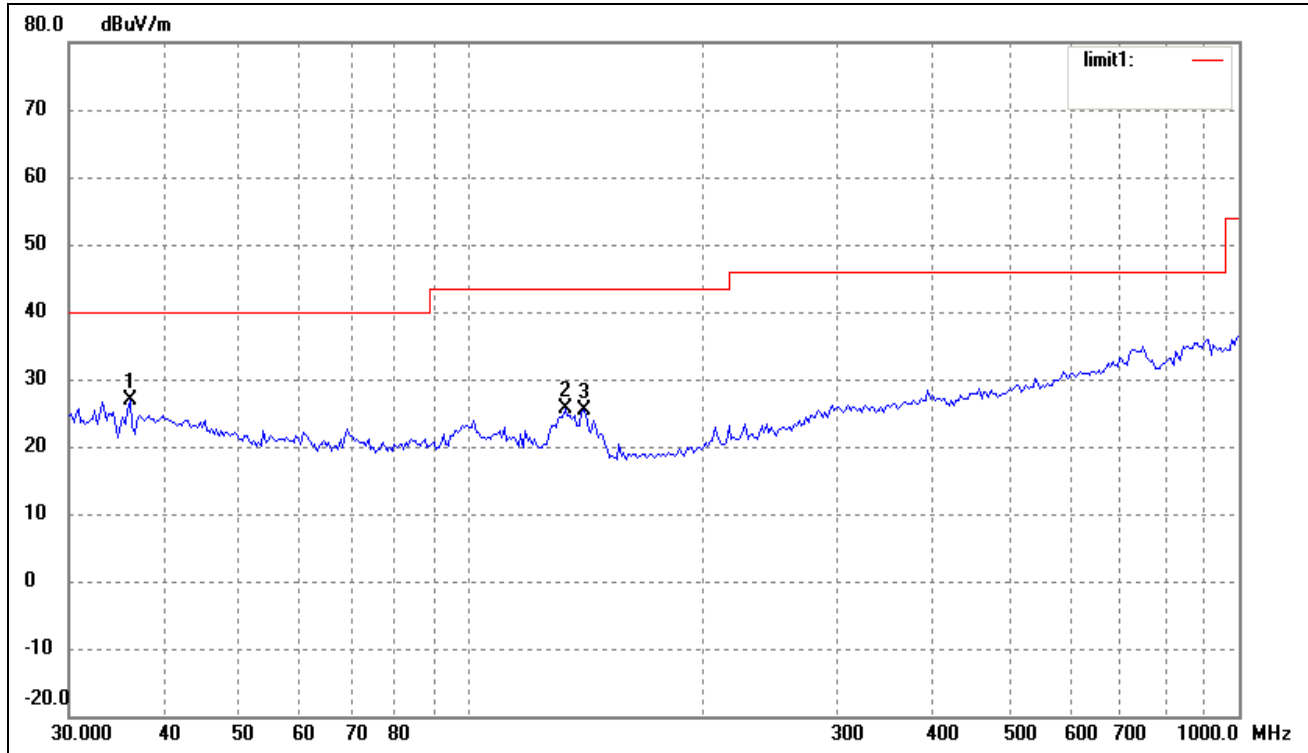


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.0950	26.95	8.56	35.51	40.00	-4.49	247	100	peak
2	37.0249	26.19	9.21	35.40	40.00	-4.60	138	100	peak
3	41.7130	26.95	9.16	36.11	40.00	-3.89	226	100	peak
4	44.7434	27.37	8.24	35.61	40.00	-4.39	158	100	peak

Operating Condition: 802.11g Transmitting High Channel-2462MHz

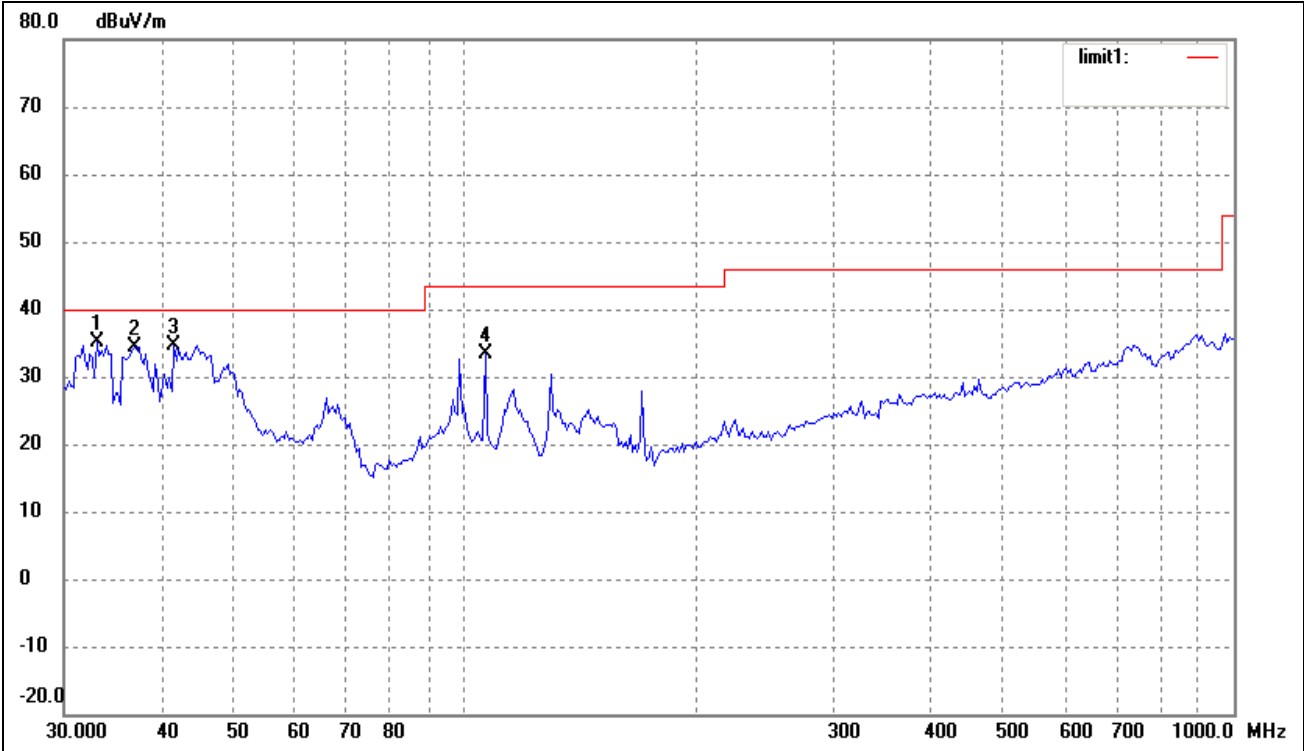
Comment: AC 120V/60Hz adapter, USB 5V

Test Specification: Horizontal

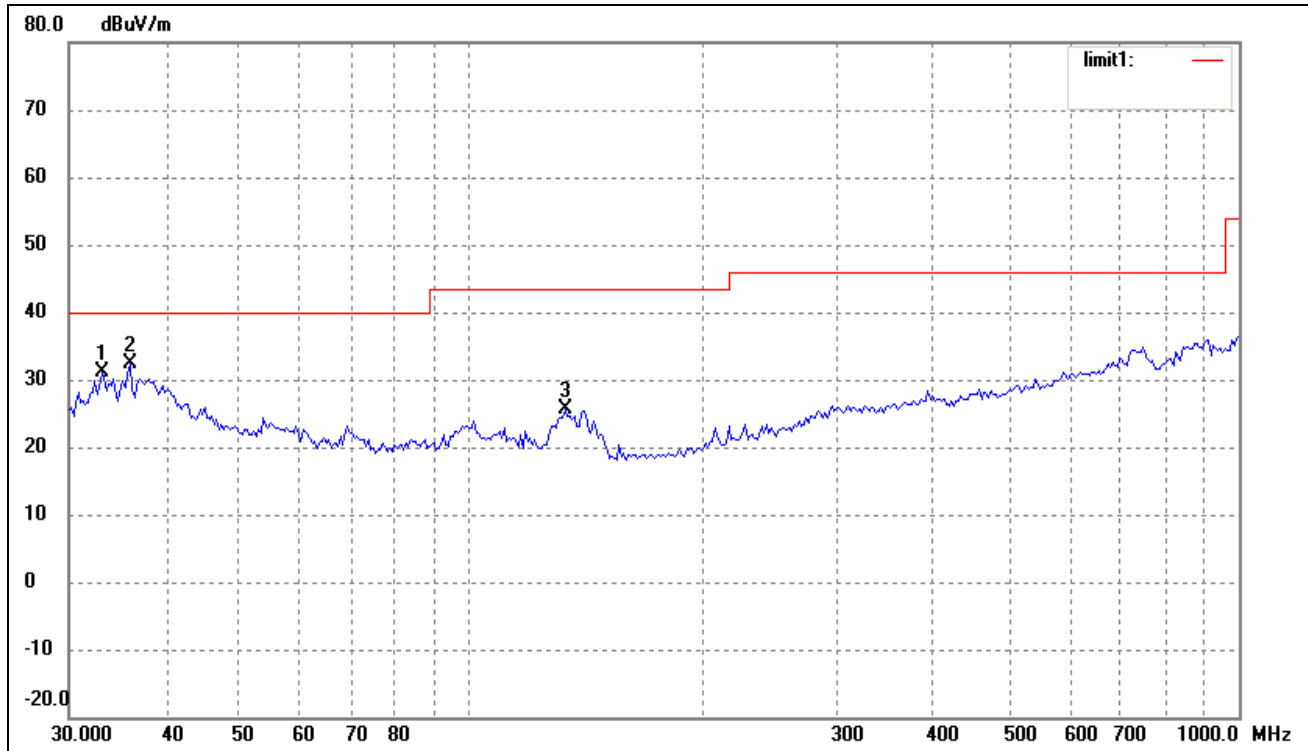


No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	36.0007	17.78	9.04	26.82	40.00	-13.18	234	100	peak
2	132.6850	21.60	3.93	25.53	43.50	-17.97	270	100	peak
3	140.3421	22.06	3.40	25.46	43.50	-18.04	360	100	peak

Test Specification: Vertical

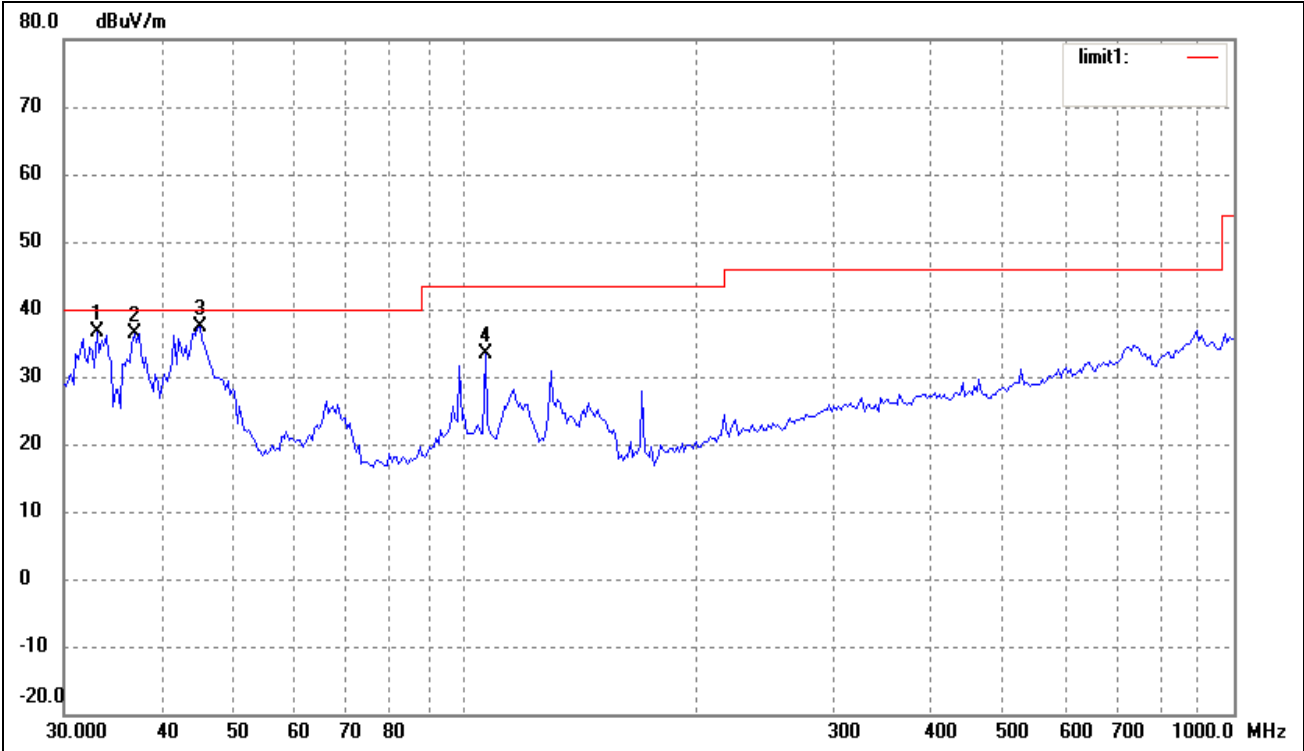


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.0950	26.45	8.56	35.01	40.00	-4.99	272	100	peak
2	37.0249	25.19	9.21	34.40	40.00	-5.60	270	100	peak
3	41.7130	25.45	9.16	34.61	40.00	-5.39	134	100	peak
4	106.0126	27.02	6.24	33.26	43.50	-10.24	360	100	peak

Plot of Radiated Emissions Test Data (30MHz to 1GHz)*EUT:* Netatmo Weather Station*Tested Model:* NWS02*Operating Condition:* 802.11n-HT20 Transmitting Low Channel-2412MHz*Comment:* AC 120V/60Hz adapter, USB 5V*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	33.0950	22.56	8.56	31.12	40.00	-8.88	360	100	peak
2	36.0007	23.28	9.04	32.32	40.00	-7.68	360	200	peak
3	132.6850	21.60	3.93	25.53	43.50	-17.97	360	100	peak

Test Specification: Vertical

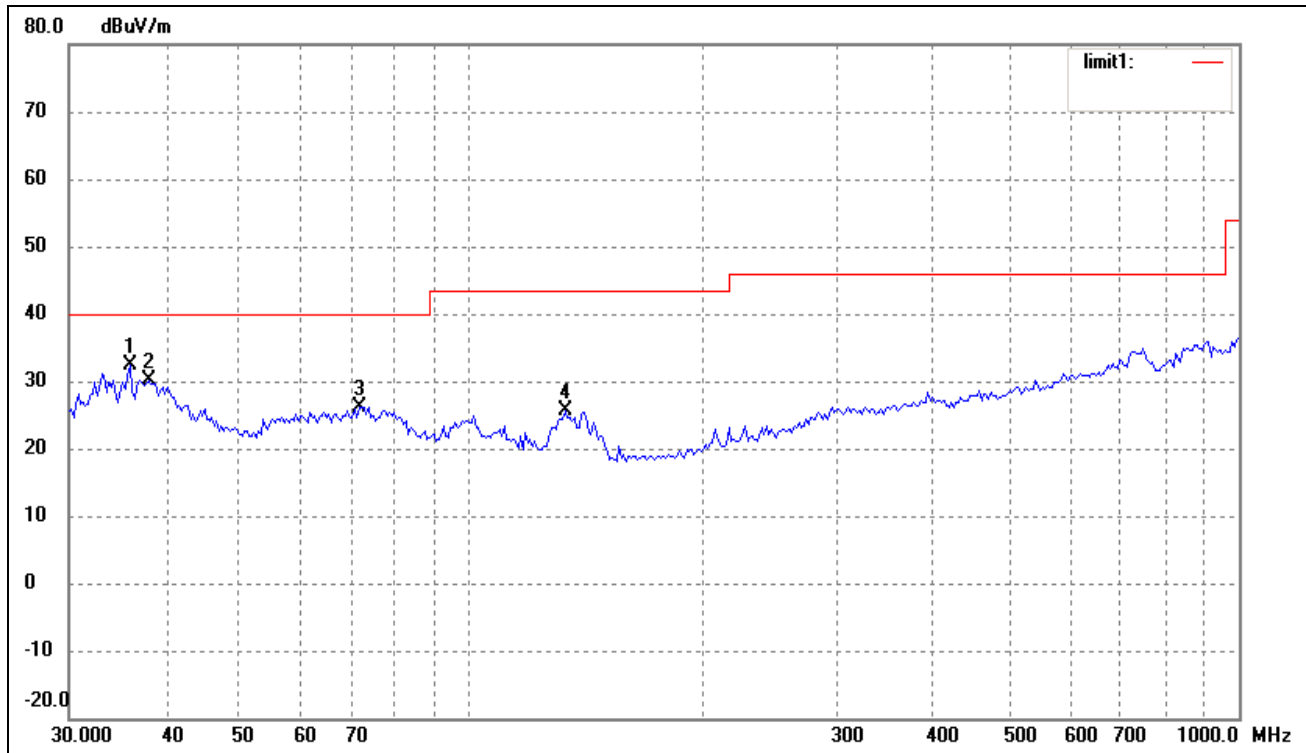


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.0950	27.95	8.56	36.51	40.00	-3.49	270	100	peak
2	37.0249	27.19	9.21	36.40	40.00	-3.60	134	100	peak
3	45.0583	29.30	8.14	37.44	40.00	-2.56	226	100	peak
4	106.0126	27.02	6.24	33.26	43.50	-10.24	270	100	peak

Operating Condition: 802.11n-HT20 Transmitting Middle Channel-2437MHz

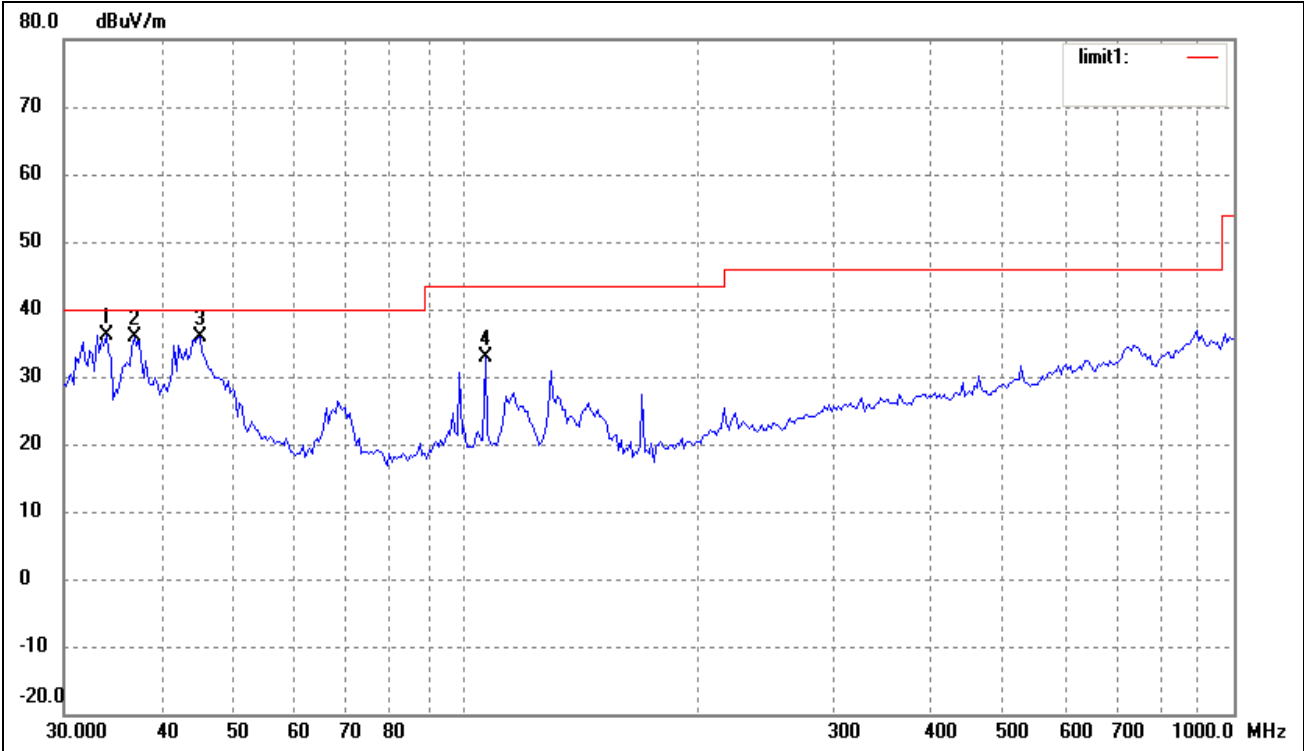
Comment: AC 120V/60Hz adapter, USB 5V

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	36.0007	23.28	9.04	32.32	40.00	-7.68	137	100	peak
2	38.0783	20.64	9.37	30.01	40.00	-9.99	270	100	peak
3	71.5806	23.73	2.34	26.07	40.00	-13.93	114	100	peak
4	132.6850	21.60	3.93	25.53	43.50	-17.97	250	100	peak

Test Specification: Vertical

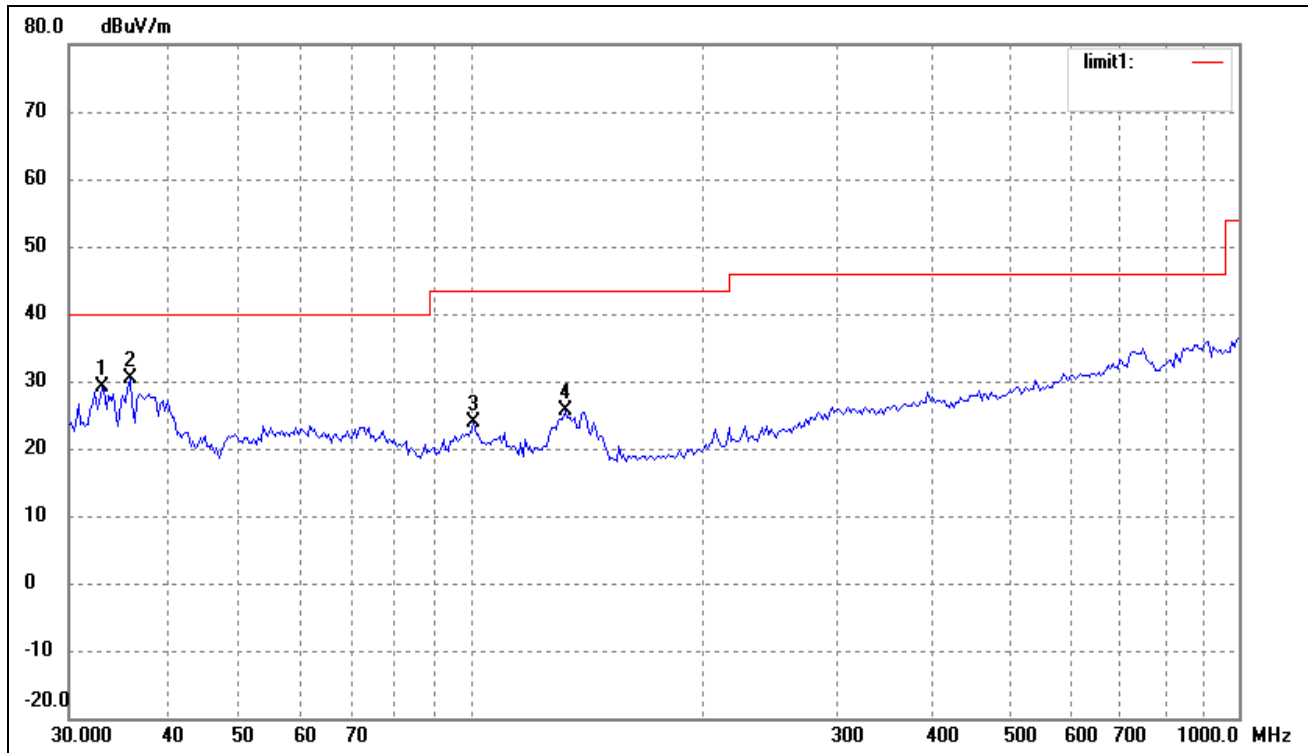


No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	34.0365	27.35	8.72	36.07	40.00	-3.93	270	100	peak
2	37.0249	26.69	9.21	35.90	40.00	-4.10	360	100	peak
3	45.0583	27.80	8.14	35.94	40.00	-4.06	178	100	peak
4	106.0126	26.52	6.24	32.76	43.50	-10.74	113	100	peak

Operating Condition: 802.11n-HT20 Transmitting High Channel-2462MHz

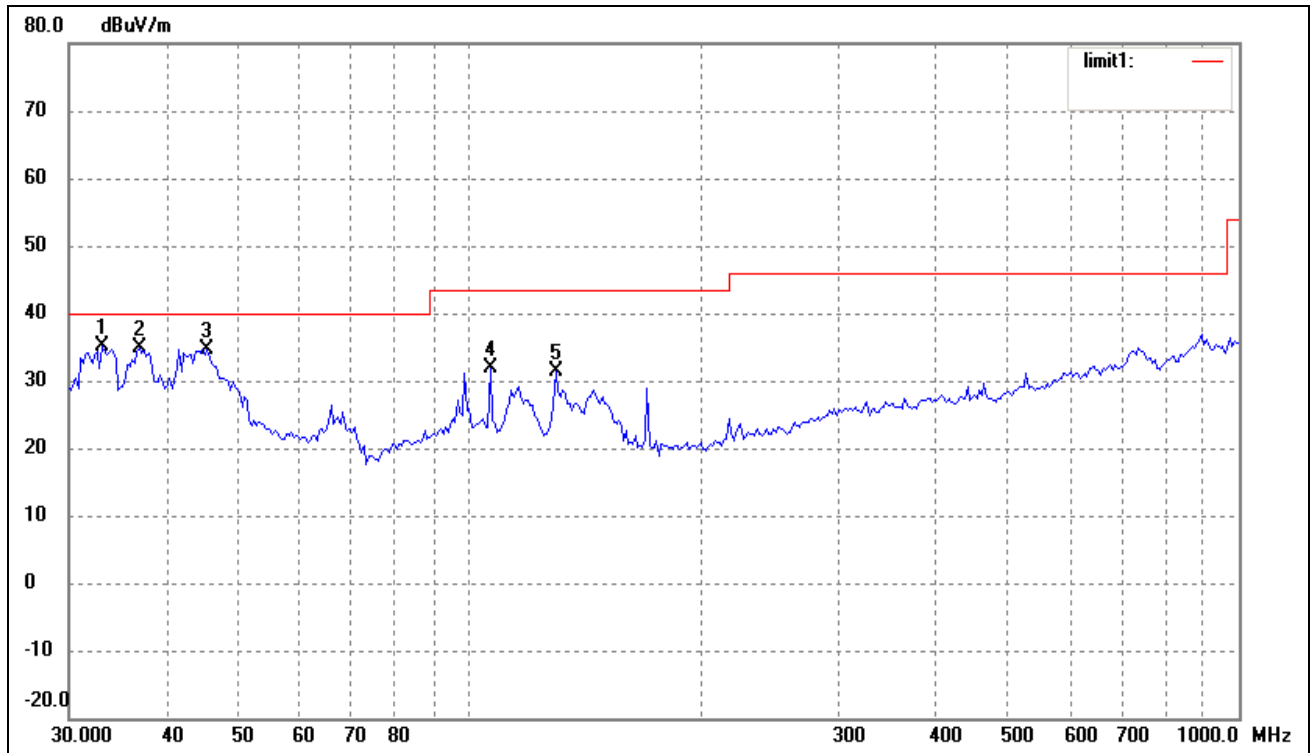
Comment: AC 120V/60Hz adapter, USB 5V

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	33.0950	20.56	8.56	29.12	40.00	-10.88	274	100	peak
2	36.0007	21.28	9.04	30.32	40.00	-9.68	360	100	peak
3	100.9340	17.12	6.75	23.87	43.50	-19.63	213	100	peak
4	132.6850	21.60	3.93	25.53	43.50	-17.97	226	100	peak

Test Specification: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	33.0950	26.45	8.56	35.01	40.00	-4.99	270	100	peak
2	37.0249	25.69	9.21	34.90	40.00	-5.10	332	100	peak
3	45.3755	26.67	8.05	34.72	40.00	-5.28	89	100	peak
4	106.0126	25.52	6.24	31.76	43.50	-11.74	360	100	peak
5	129.0146	27.26	4.20	31.46	43.50	-12.04	360	100	peak

*Spurious Emissions Above 1GHz**Test Mode: 802.11b*

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824.000	58.23	-3.87	54.36	74.00	-19.64	H	PK
4824.000	47.21	-3.87	43.34	54.00	-10.66	H	AV
7236.000	51.18	1.14	52.32	74.00	-21.68	H	PK
7236.000	39.18	1.19	40.37	54.00	-13.63	H	AV
4824.000	57.51	-3.86	53.65	74.00	-20.35	V	PK
4824.000	45.21	-3.86	41.35	54.00	-12.65	V	AV
7236.000	50.20	1.10	51.30	74.00	-22.70	V	PK
7236.000	39.60	1.10	40.70	54.00	-13.30	V	AV
Middle Channel-2437MHz							
4874.000	56.59	-3.74	52.85	74.00	-21.15	H	PK
4874.000	46.90	-3.74	43.16	54.00	-10.84	H	AV
7311.000	48.90	1.47	50.37	74.00	-23.63	H	PK
7311.000	38.63	1.47	40.10	54.00	-13.90	H	AV
4874.000	58.09	-3.74	54.35	74.00	-19.65	V	PK
4874.000	45.54	-3.74	41.80	54.00	-12.20	V	AV
7311.000	52.59	1.47	54.06	74.00	-19.94	V	PK
7311.000	41.45	1.47	42.92	54.00	-11.08	V	AV
High Channel-2462MHz							
4924.000	56.72	-3.59	53.13	74.00	-20.87	H	PK
4924.000	47.14	-3.59	43.55	54.00	-10.45	H	AV
7386.000	50.34	1.79	52.13	74.00	-21.87	H	PK
7386.000	39.51	1.79	41.30	54.00	-12.70	H	AV
4924.000	59.34	-3.59	55.75	74.00	-18.25	V	PK
4924.000	45.81	-3.59	42.22	54.00	-11.78	V	AV
7386.000	49.58	1.79	51.37	74.00	-22.63	V	PK
7386.000	37.89	1.79	39.68	54.00	-14.32	V	AV

Test Mode: 802.11g

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824.000	56.32	-3.86	52.46	74.00	-21.54	H	PK
4824.000	45.66	-3.86	41.80	54.00	-12.20	H	AV
7236.000	53.30	1.10	54.40	74.00	-19.60	H	PK
7236.000	42.18	1.10	43.28	54.00	-10.72	H	AV
4824.000	54.21	-3.86	50.35	74.00	-23.65	V	PK
4824.000	44.12	-3.86	40.26	54.00	-13.74	V	AV
7236.000	53.25	1.10	54.35	74.00	-19.65	V	PK
7236.000	42.20	1.10	43.30	54.00	-10.70	V	AV
Middle Channel-2437MHz							
4874.000	56.94	-3.74	53.20	74.00	-20.80	H	PK
4874.000	48.38	-3.74	44.64	54.00	-9.36	H	AV
7311.000	53.10	1.47	54.57	74.00	-19.43	H	PK
7311.000	42.50	1.47	43.97	54.00	-10.03	H	AV
4874.000	57.39	-3.74	53.65	74.00	-20.35	V	PK
4874.000	45.94	-3.74	42.20	54.00	-11.80	V	AV
7311.000	49.85	1.47	51.32	74.00	-22.68	V	PK
7311.000	38.53	1.47	40.00	54.00	-14.00	V	AV
High Channel-2462MHz							
4924.000	58.17	-3.59	54.58	74.00	-19.42	H	PK
4924.000	47.12	-3.59	43.53	54.00	-10.47	H	AV
7386.000	52.71	1.79	54.50	74.00	-19.50	H	PK
7386.000	38.54	1.79	40.33	54.00	-13.67	H	AV
4924.000	55.95	-3.59	52.36	74.00	-21.64	V	PK
4924.000	42.13	-3.59	38.54	54.00	-15.46	V	AV
7386.000	48.56	1.79	50.35	74.00	-23.65	V	PK
7386.000	37.24	1.79	39.03	54.00	-14.97	V	AV

Test Mode: 802.11n-HT20

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel-2412MHz							
4824.000	58.21	-3.86	54.35	74.00	-19.65	H	PK
4824.000	46.70	-3.86	42.84	54.00	-11.16	H	AV
7236.000	52.61	1.10	53.71	74.00	-20.29	H	PK
7236.000	39.13	1.10	40.23	54.00	-13.77	H	AV
4824.000	54.95	-3.86	51.09	74.00	-22.91	V	PK
4824.000	44.08	-3.86	40.22	54.00	-13.78	V	AV
7236.000	51.01	1.10	52.11	74.00	-21.89	V	PK
7236.000	39.26	1.10	40.36	54.00	-13.64	V	AV
Middle Channel-2437MHz							
4874.000	57.29	-3.74	53.55	74.00	-20.45	H	PK
4874.000	45.11	-3.74	41.37	54.00	-12.63	H	AV
7311.000	51.01	1.47	52.48	74.00	-21.52	H	PK
7311.000	37.54	1.47	39.01	54.00	-14.99	H	AV
4874.000	57.14	-3.74	53.40	74.00	-20.60	V	PK
4874.000	45.10	-3.74	41.36	54.00	-12.64	V	AV
7311.000	53.25	1.47	54.72	74.00	-19.28	V	PK
7311.000	41.34	1.47	42.81	54.00	-11.19	V	AV
High Channel-2462MHz							
4924.000	57.72	-3.59	54.13	74.00	-19.87	H	PK
4924.000	46.34	-3.59	42.75	54.00	-11.25	H	AV
7386.000	50.73	1.79	52.52	74.00	-21.48	H	PK
7386.000	40.75	1.79	42.54	54.00	-11.46	H	AV
4924.000	57.61	-3.59	54.02	74.00	-19.98	V	PK
4924.000	43.13	-3.59	39.54	54.00	-14.46	V	AV
7386.000	51.46	1.79	53.25	74.00	-20.75	V	PK
7386.000	39.53	1.79	41.32	54.00	-12.68	V	AV

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 4th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz.

8. Out of Band Emissions

8.1 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).

8.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2012-03-28	2013-03-27
EMI Test Receiver	R&S	ESVB	825471/005	2012-03-28	2013-03-27
Pre-amplifier	Agilent	8447F	3113A06717	2012-03-28	2013-03-27
Pre-amplifier	Compliance Direction	PAP-0118	24002	2012-03-28	2013-03-27
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2012-02-25	2013-02-24
Horn Antenna	ETS	3117	00086197	2012-02-25	2013-02-24

8.3 Test Procedure

According to the KDB 558074, 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.

9.4 Environmental Conditions

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

9.5 Summary of Test Results/Plots

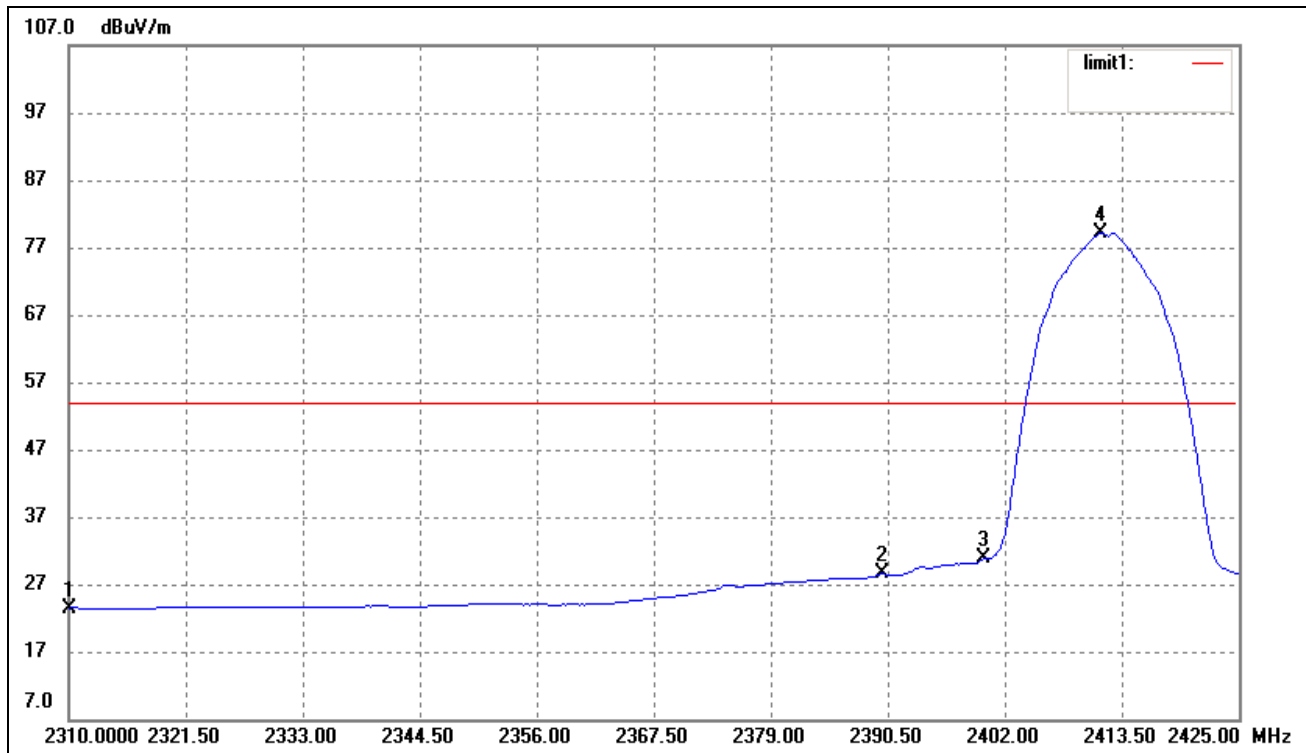
Test Mode	Test Frequency MHz	Limit dBuV / dBc	Result
802.11b	2310.00	<54 dBuV	Pass
	2386.08	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2498.32	<54 dBuV	Pass
	2483.50	<54 dBuV	Pass
802.11g	2310.00	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2400.00	<54 dBuV	Pass
	2483.50	<54 dBuV	Pass
802.11n-HT20	2310.00	<54 dBuV	Pass
	2390.00	<54 dBuV	Pass
	2400.00	<54 dBuV	Pass
	2483.50	<54 dBuV	Pass

The edge emissions are below the FCC 15.209 Limits or complies with the 15.247(d) requirements.

Please refer to the test plots as below.

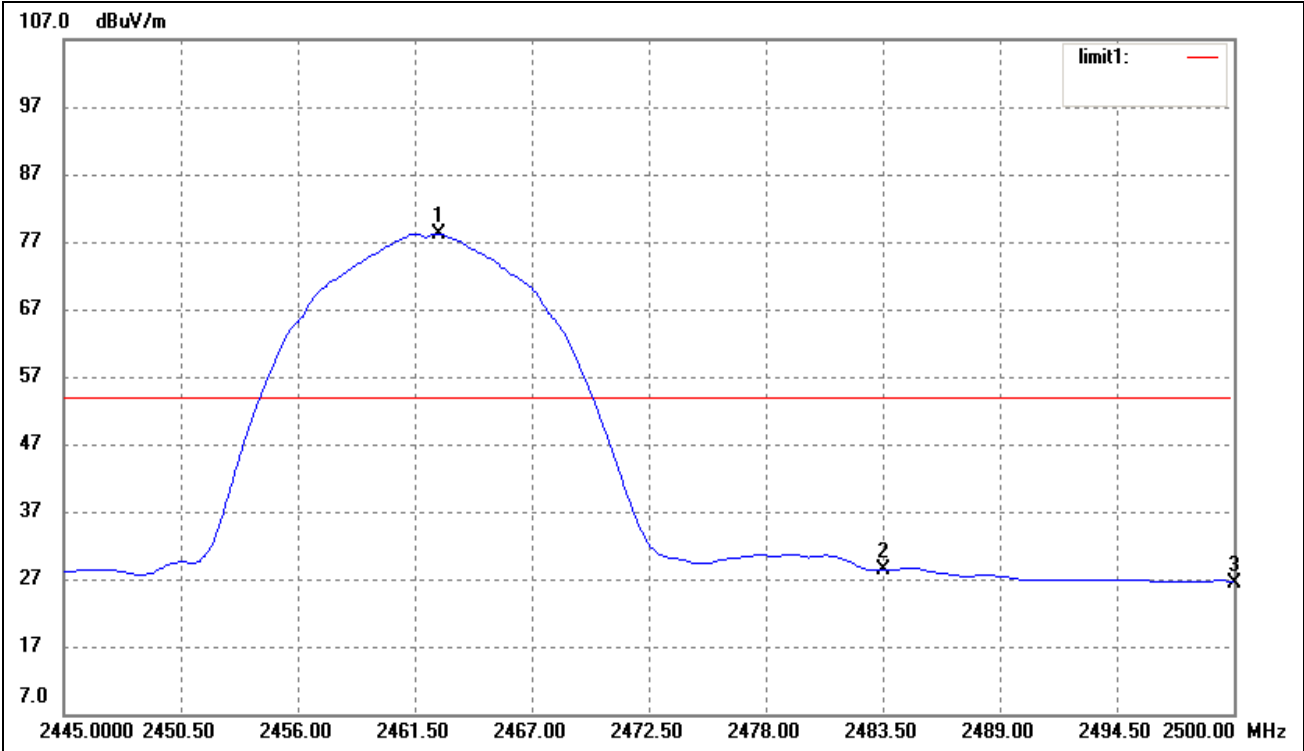
Bandedge (Radiated)

802.11b-Lowest Bandedge



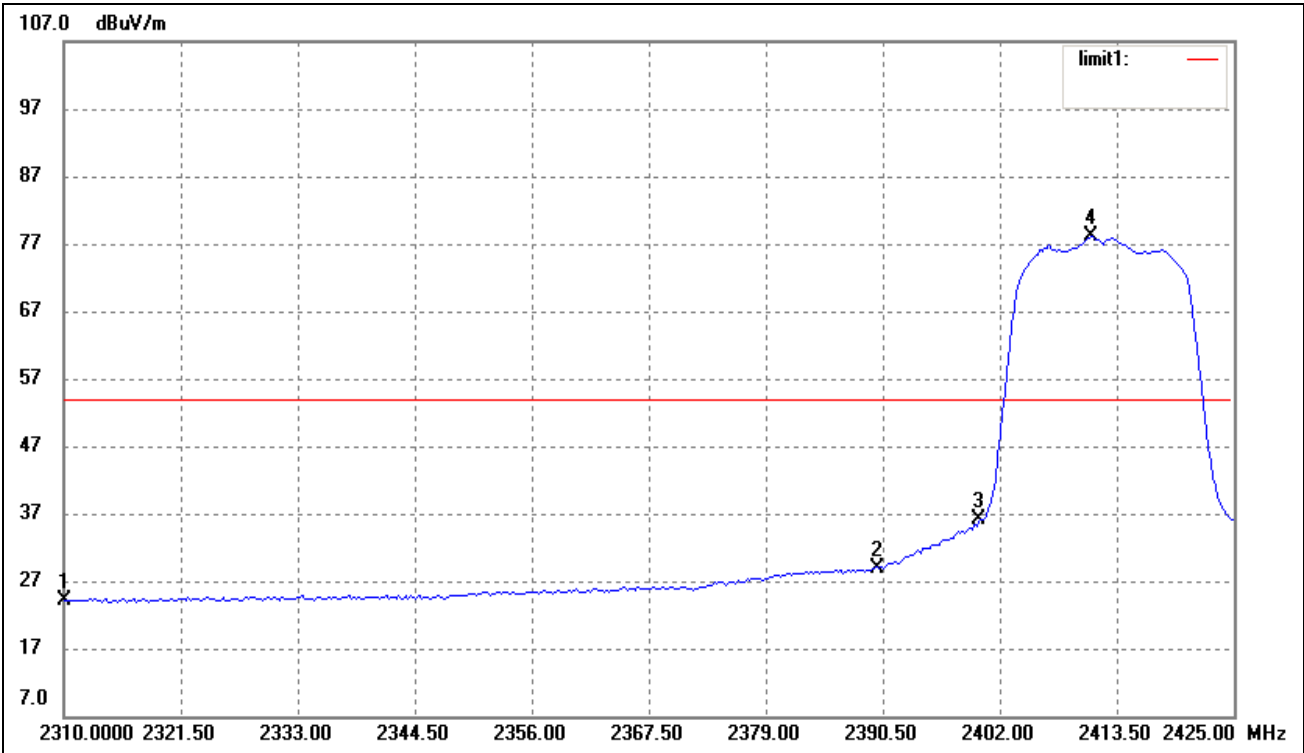
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	35.22	-11.72	23.50	54.00	-30.50	Average Detector
	2310.000	50.11	-11.72	38.39	74.00	-35.61	Peak Detector
2	2390.000	40.30	-11.75	28.55	54.00	-25.45	Average Detector
	2390.000	53.48	-11.75	41.73	74.00	-32.27	Peak Detector
3	2400.000	42.66	-11.75	30.91	54.00	-23.09	Average Detector
	2400.000	55.94	-11.75	44.19	74.00	-29.81	Peak Detector
4	2411.430	90.91	-11.75	79.16	/	/	Average Detector
	2411.430	106.96	-11.75	95.21	/	/	Peak Detector

802.11b-Highest Bandedge

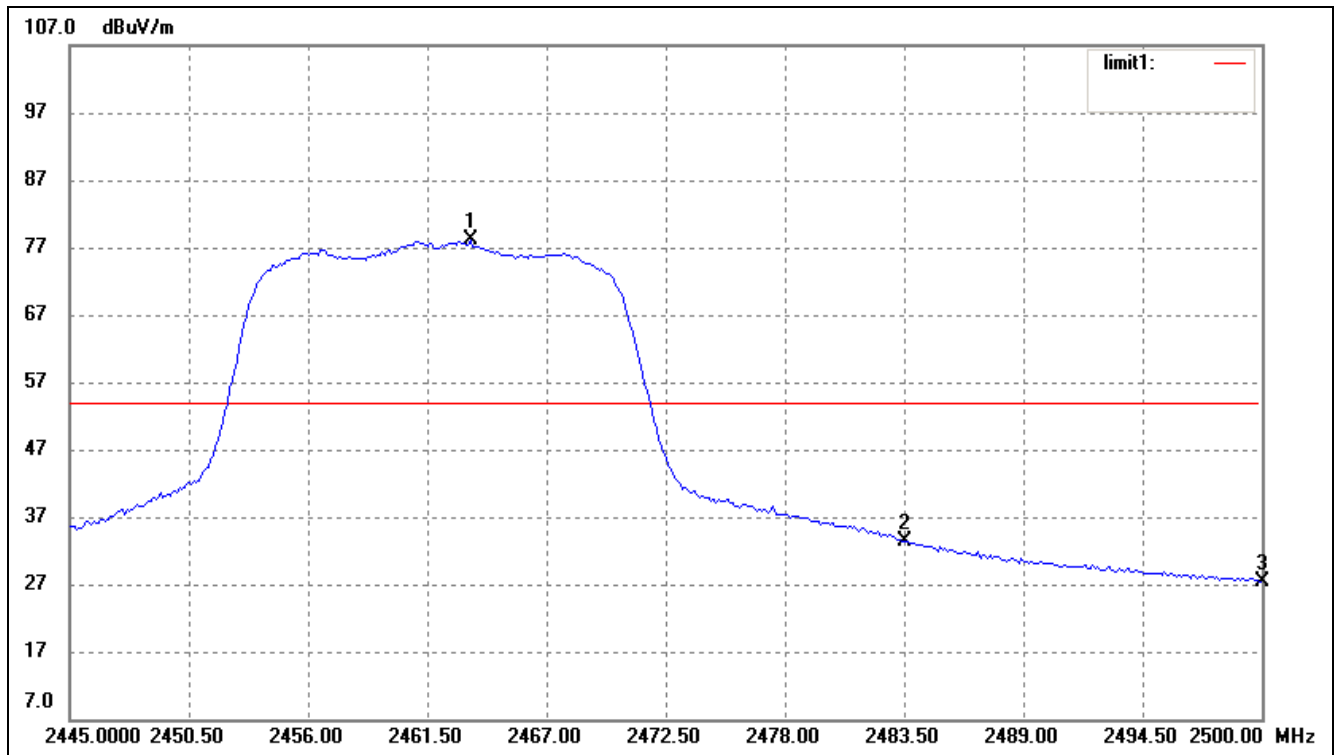


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2462.600	90.02	-11.78	78.24	/	/	Average Detector
	2462.600	104.21	-11.77	92.44	/	/	Peak Detector
2	2483.500	Delta = 54.5 dBc		23.74	54.00	-30.26	Average Detector
	2483.500			37.94	74.00	-36.06	Peak Detector
3	2500.000	38.28	-11.78	26.50	54.00	-27.50	Average Detector
	2500.000	54.10	-11.78	42.32	74.00	-31.68	Peak Detector

802.11g-Lowest Bandedge

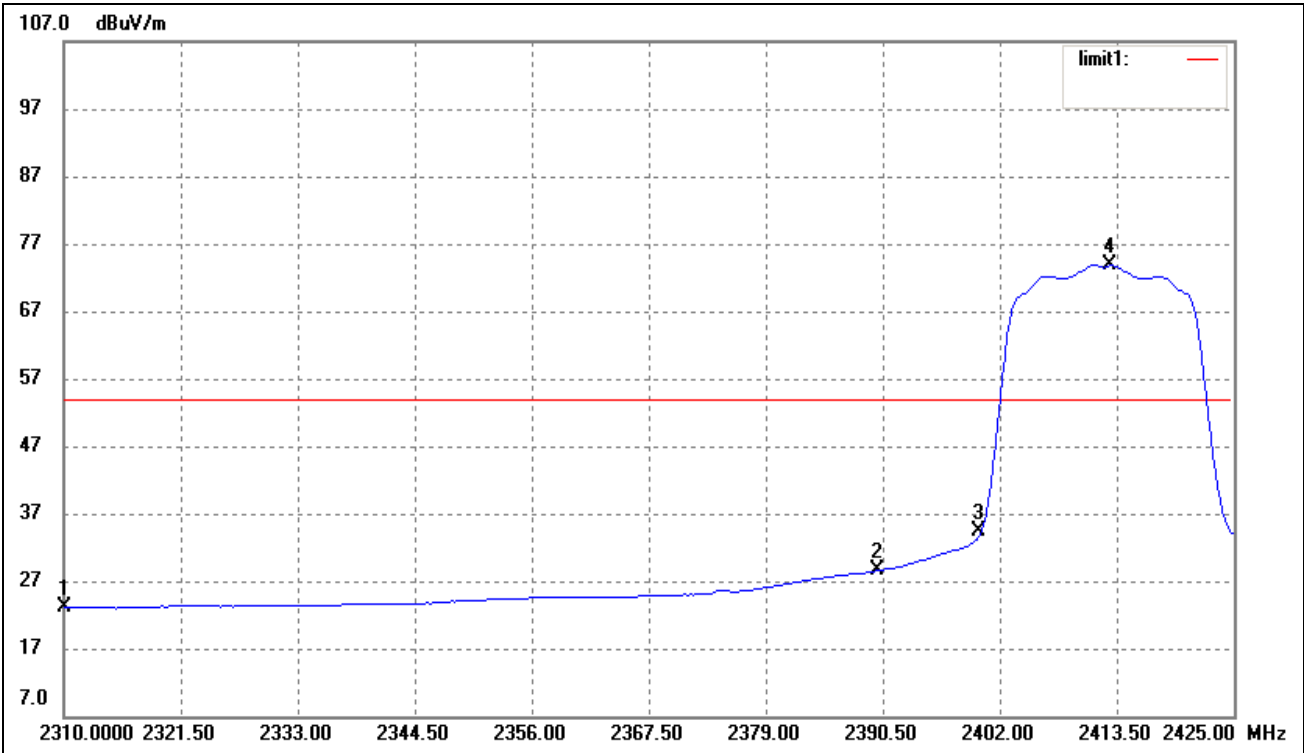


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	35.80	-11.72	24.08	54.00	-29.92	Average Detector
	2310.000	50.39	-11.72	38.67	74.00	-35.33	Peak Detector
2	2390.000	40.66	-11.75	28.91	54.00	-25.09	Average Detector
	2390.000	56.80	-11.75	45.05	74.00	-28.95	Peak Detector
3	2400.000	47.76	-11.75	36.01	54.00	-17.99	Average Detector
	2400.000	68.57	-11.75	56.82	74.00	-17.18	Peak Detector
4	2410.970	89.80	-11.75	78.05	/	/	Average Detector
	2410.970	107.12	-11.75	95.37	/	/	Peak Detector



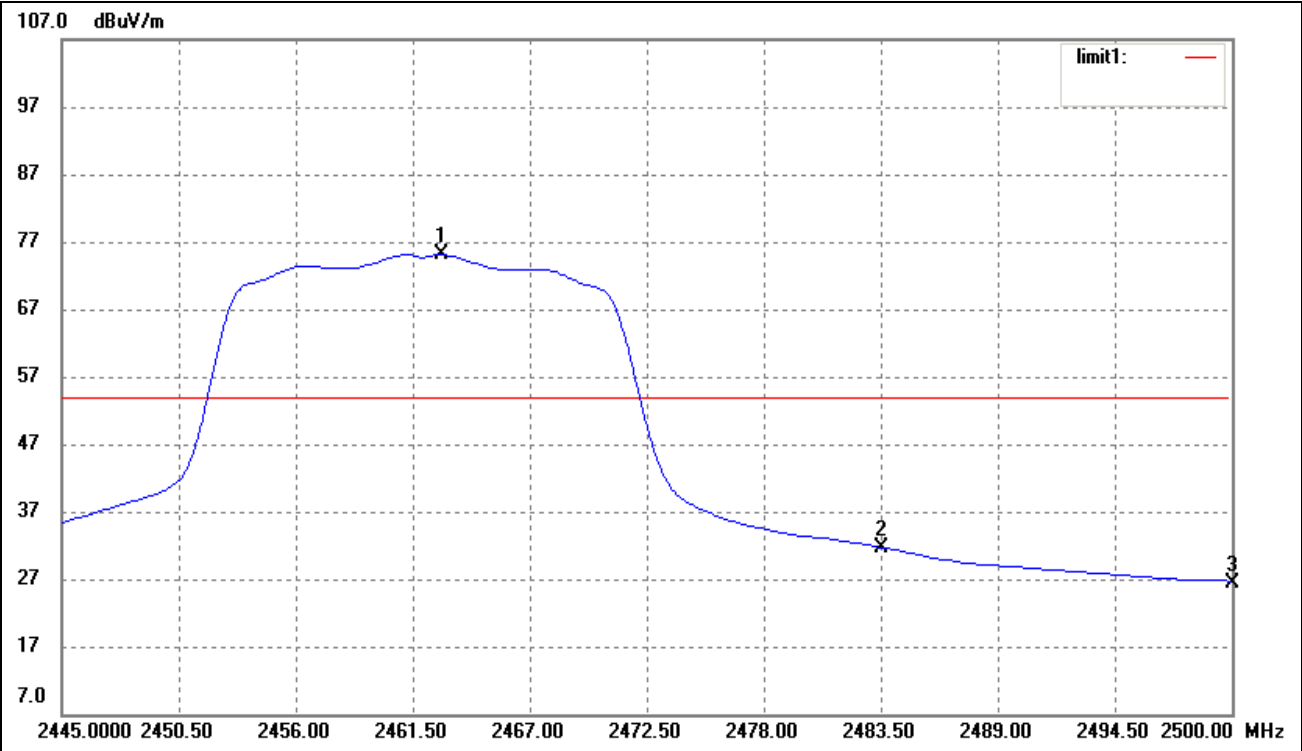
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2463.480	89.83	-11.77	78.06	/	/	Average Detector
	2463.480	103.17	-11.77	91.40	/	/	Peak Detector
2	2483.500	Delta = 48.31 dBc		29.75	54.00	-24.25	Average Detector
	2483.500			33.09	74.00	-40.91	Peak Detector
3	2500.000	39.20	-11.78	27.42	54.00	-26.58	Average Detector
	2500.000	54.63	-11.78	42.85	74.00	-31.15	Peak Detector

802.11n-HT20-Lowest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	34.94	-11.72	23.22	54.00	-30.78	Average Detector
	2310.000	49.64	-11.72	37.92	74.00	-36.08	Peak Detector
2	2390.000	40.29	-11.75	28.54	54.00	-25.46	Average Detector
	2390.000	61.76	-11.75	50.01	74.00	-23.99	Peak Detector
3	2400.000	46.02	-11.75	34.27	54.00	-19.73	Average Detector
	2400.000	69.42	-11.75	57.67	74.00	-16.33	Peak Detector
4	2411.280	84.29	-11.75	72.54	/	/	Average Detector
	2411.280	102.01	-11.75	90.26	/	/	Peak Detector

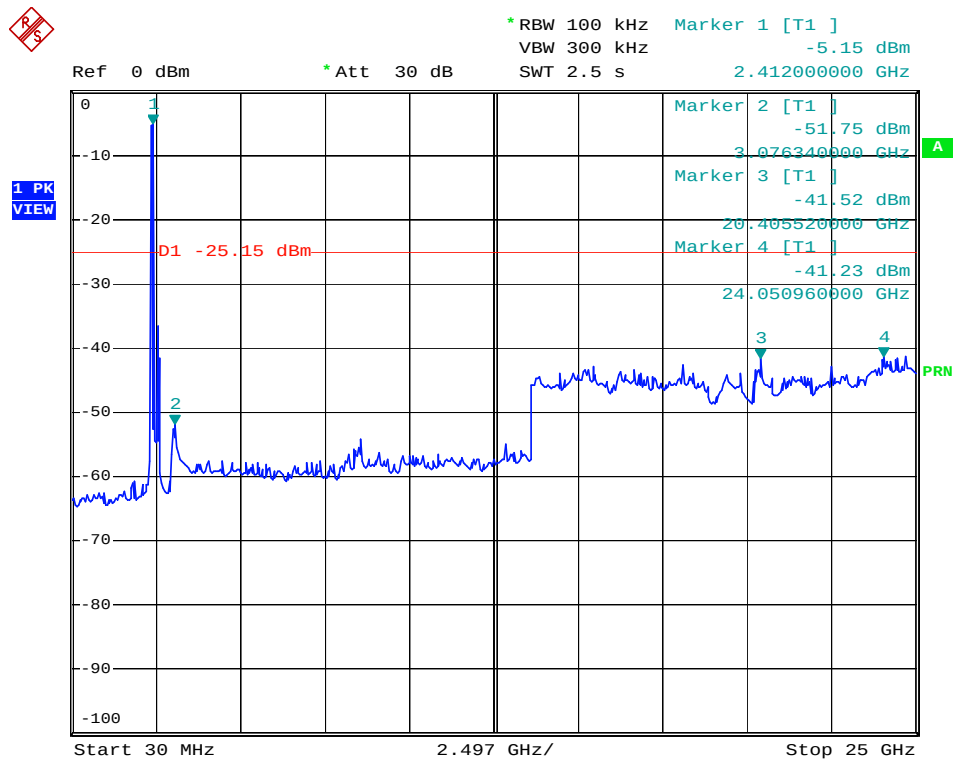
802.11n-HT20-Highest Bandedge



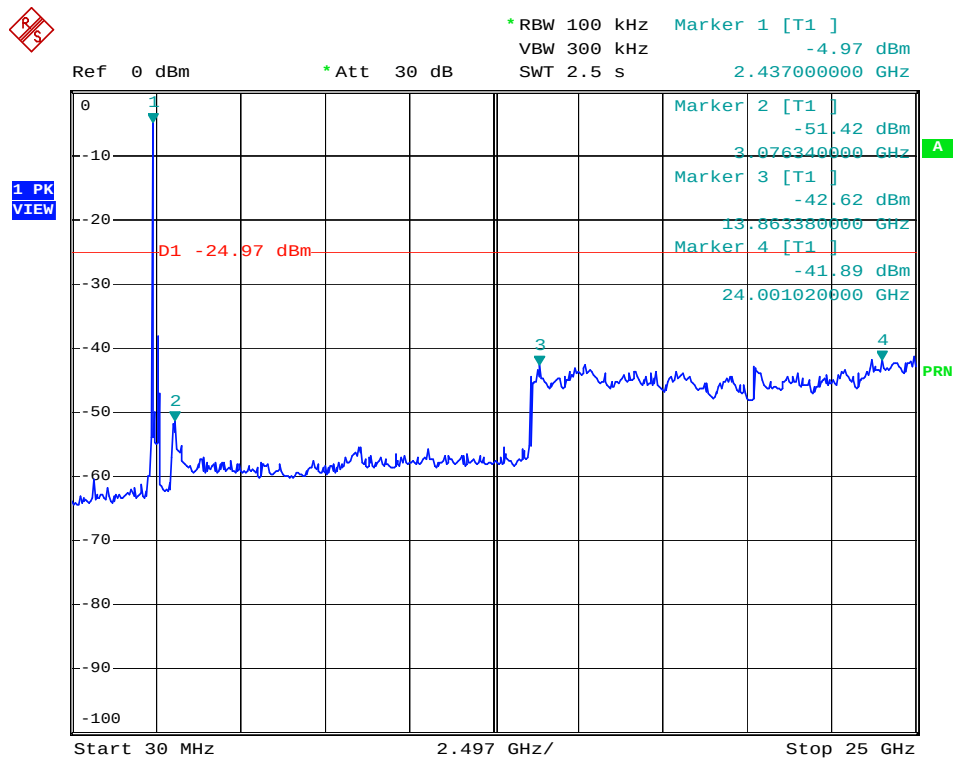
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2462.820	86.89	-11.78	75.11	/	/	Average Detector
	2462.820	103.58	-11.78	91.80	/	/	Peak Detector
2	2483.500	Delta = 47.97 dBc		27.41	54.00	-26.59	Average Detector
	2483.500			43.83	74.00	-30.17	Peak Detector
3	2500.000	38.27	-11.78	26.49	54.00	-27.51	Average Detector
	2500.000	56.33	-11.78	44.55	74.00	-29.45	Peak Detector

Conducted Spurious Emissions

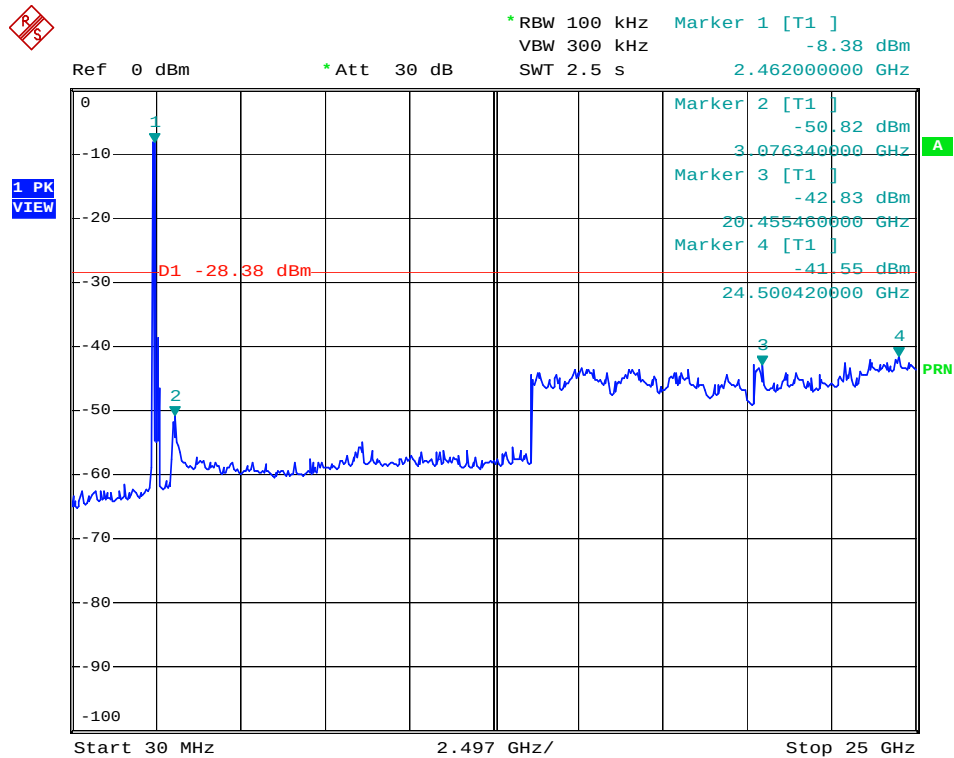
802.11b Low Bandedge



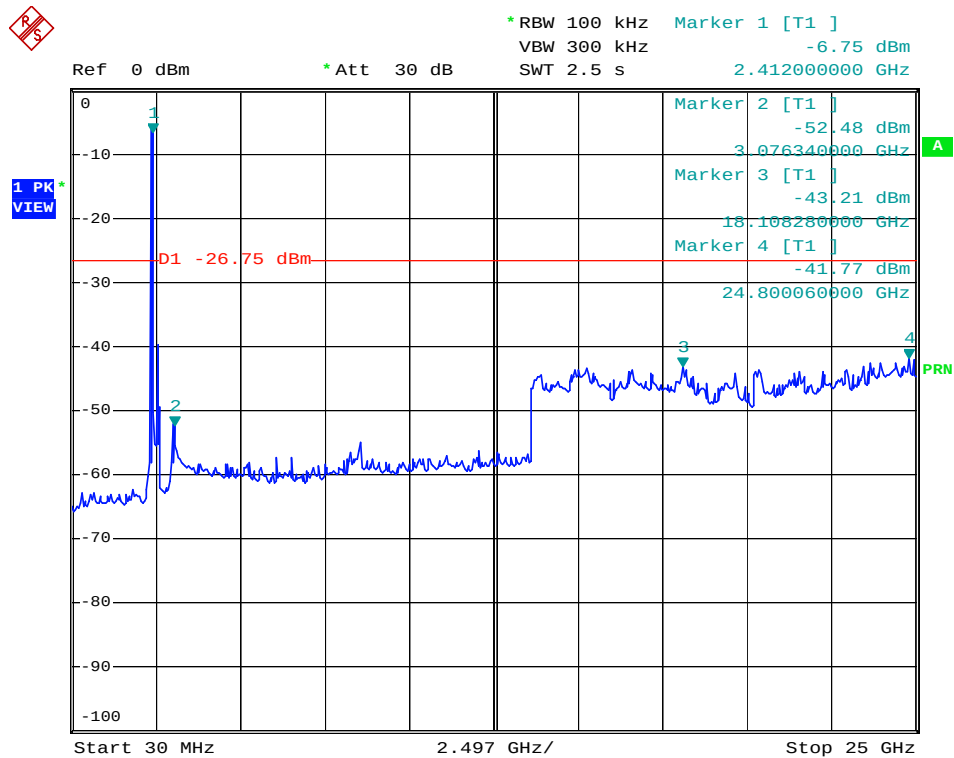
802.11b Middle Bandedge



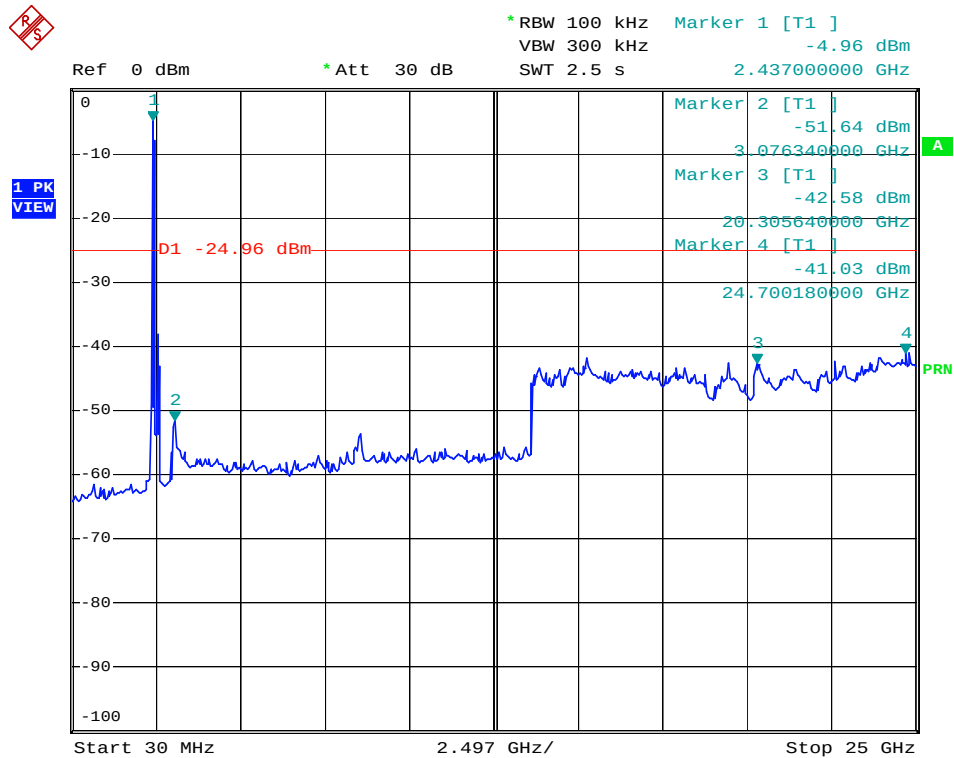
802.11b High Bandedge



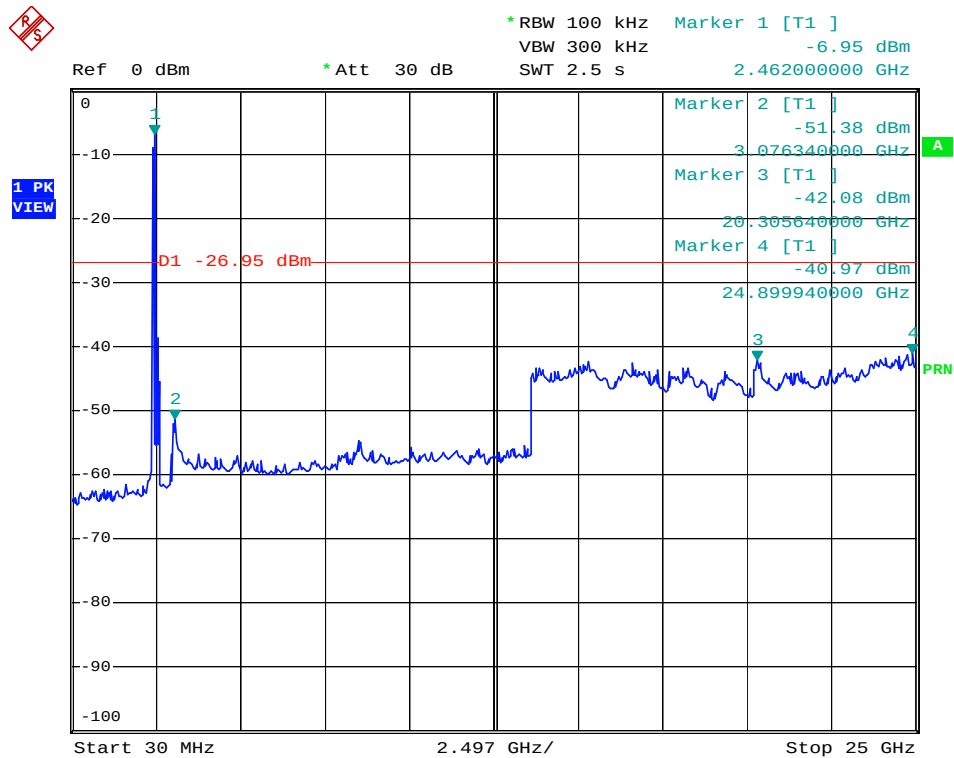
802.11g Low Bandedge



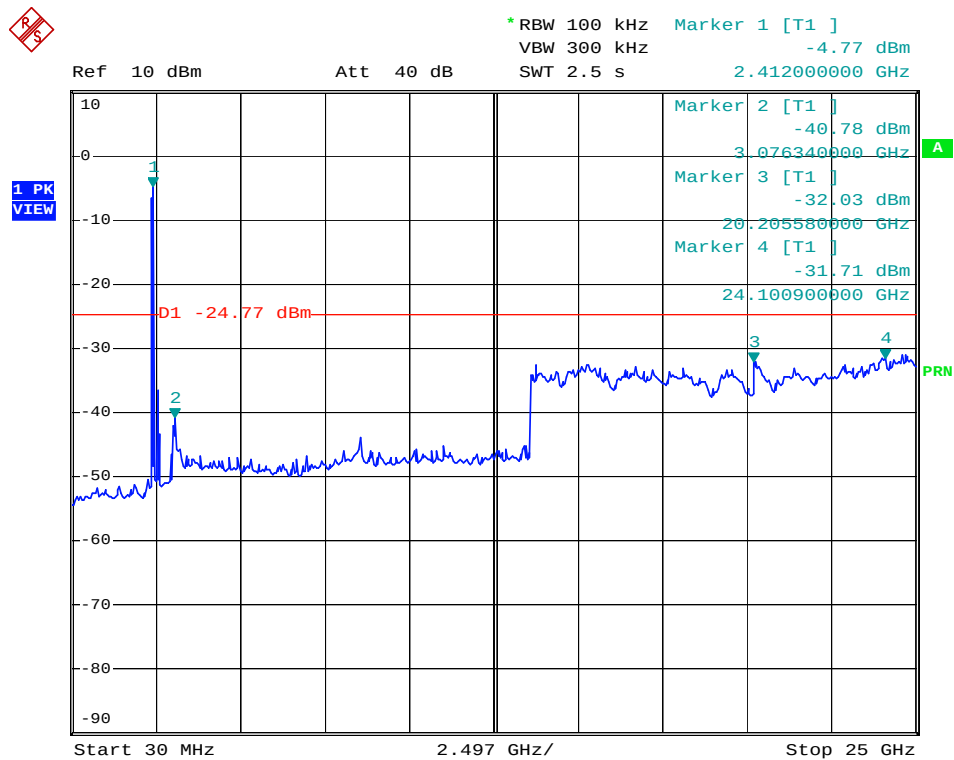
802.11g Middle Bandedge



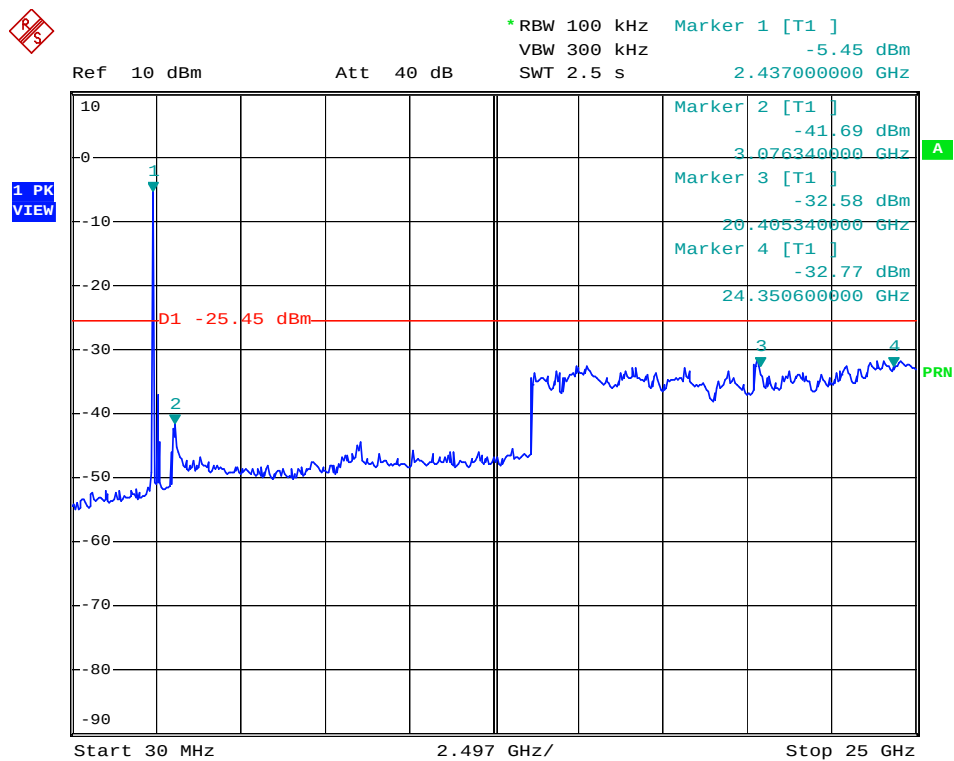
802.11g High Bandedge



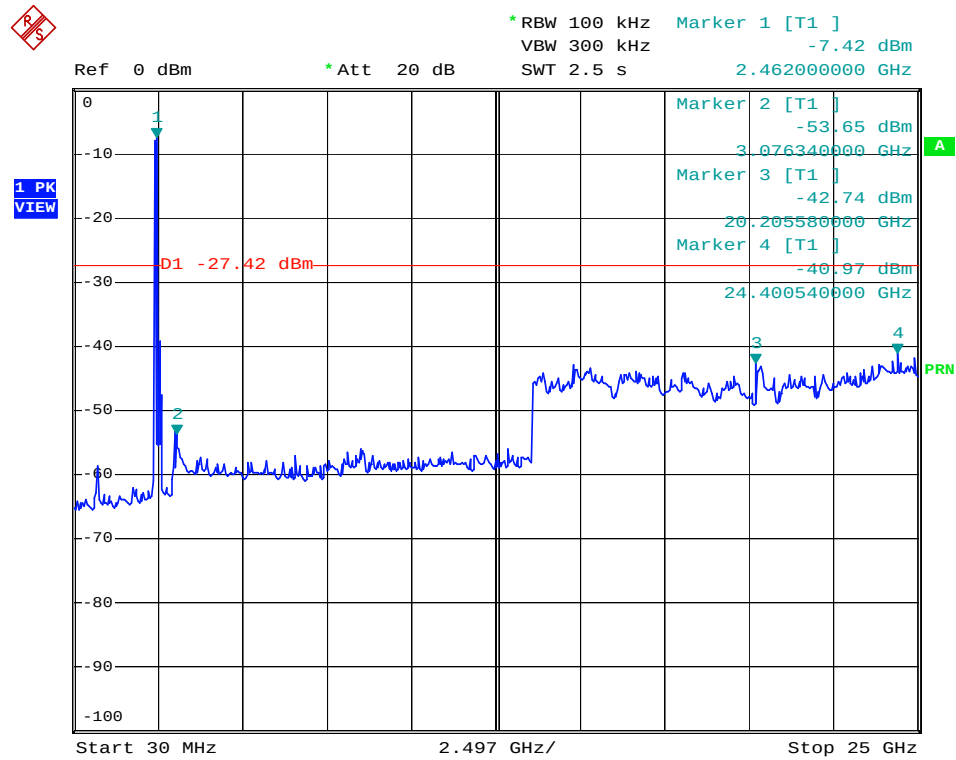
802.11n-HT20 Low Bandedge



802.11n-HT20 Middle Bandedge



802.11n-HT20 High Bandedge



9. Conducted Emissions

9.1 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.

9.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2012-03-28	2013-03-27
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2012-03-28	2013-03-27
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2012-03-28	2013-03-27

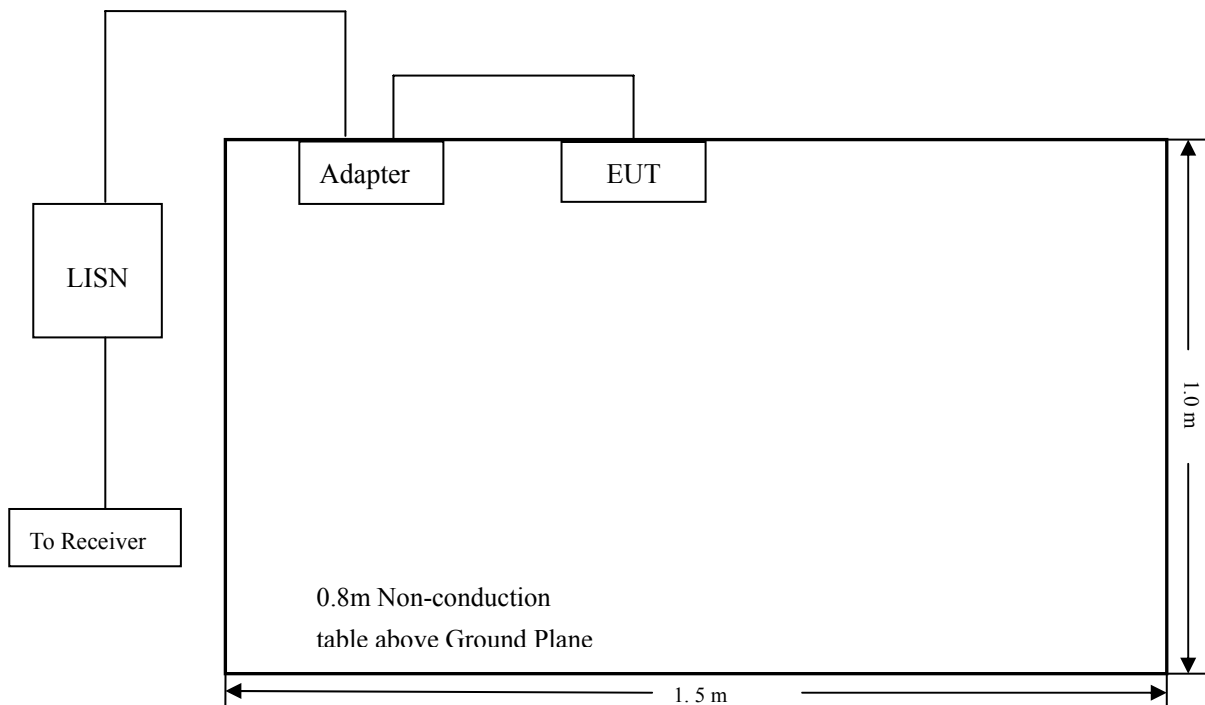
9.3 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.207 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.

9.4 Basic Test Setup Block Diagram



9.5 Environmental Conditions

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

9.6 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

9.7 Summary of Test Results/Plots

According to the data in section 11.8, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

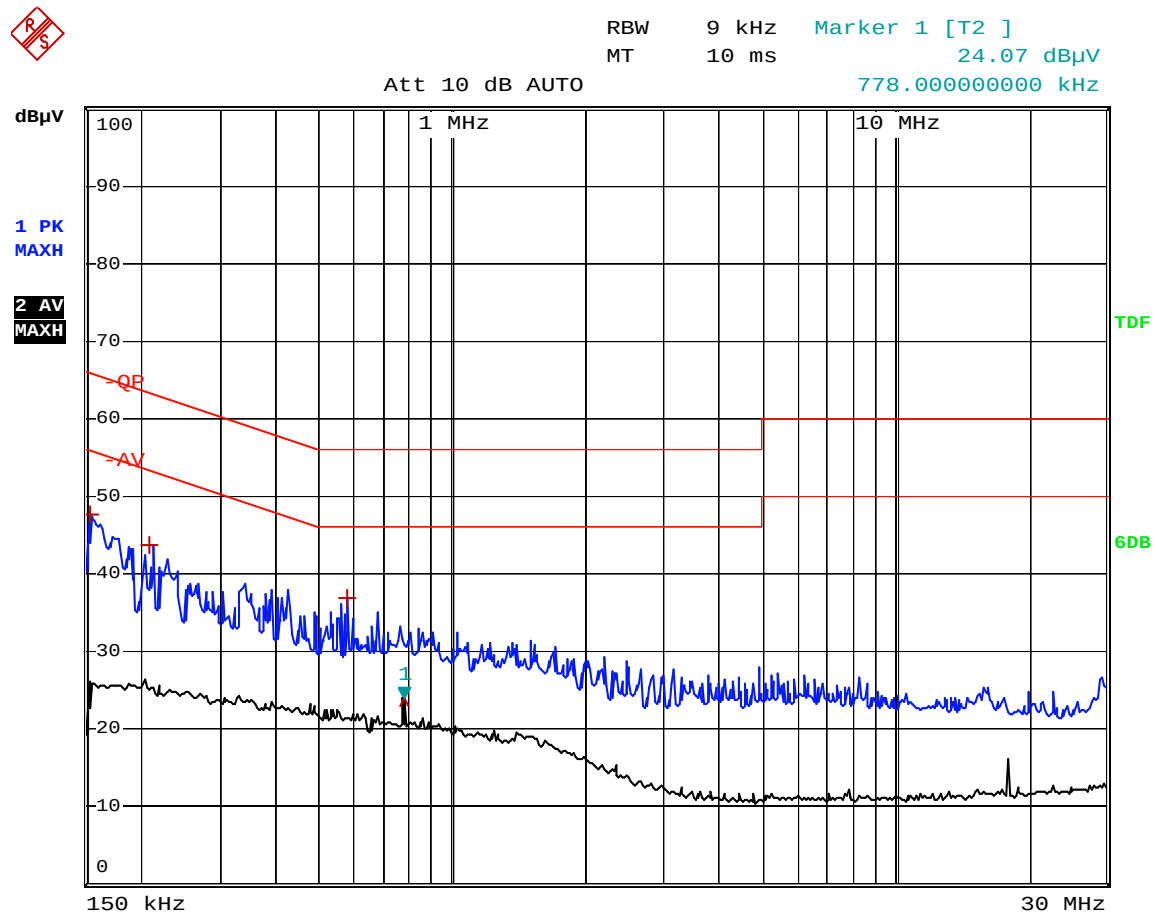
-18.17 dB at 0.154 MHz in the Line mode, Peak detector, 0.15-30MHz

9.8 Conducted Emissions Test Data

Test Specification: *Neutral*

EDIT PEAK LIST (Prescan Results)			
Trace1:		-QP	
Trace2:		-AV	
Trace3:		---	
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Max Peak	154 kHz	46.55	-19.23
1 Max Peak	182 kHz	43.35	-21.04
1 Max Peak	534 kHz	36.73	-19.26
2 Average	774 kHz	24.08	-21.91

Test Specification: Line



EDIT PEAK LIST (Prescan Results)			
Trace1:	-QP		
Trace2:	-AV		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB
1 Max Peak	154 kHz	47.60	-18.17
1 Max Peak	210 kHz	43.65	-19.54
1 Max Peak	578 kHz	36.87	-19.12
2 Average	778 kHz	24.06	-21.93

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