FCC Part 15C (WIFI)

Measurement and Test Report

For

Matsunichi Digital Development (Shenzhen) Co., Ltd

No. 4401, International Chamber of Commerce Tower, No. 168 FuHua Rd3,

FuTian District, Shenzhen, China

FCC ID: ZDRTC970

Report Concerns: Original Report	**Equipment Type:** Mode De Vie
Model:	TC970
Report No.:	STR11038136I-1
Test Date:	2011-03-16 to 2011-03-23
Issue Date:	2011-03-28
Tested By:	Jason Chen / Engineer
Reviewed By:	Lahm Peng / EMC Manager
Approved & Authorized By:	Jandy so/PSQ Manager

Prepared By:

SEM.Test Compliance Service Co., Ltd
3/F, Jinbao Commerce Building, Xin'an Fanshen Road,
Bao'an District, Shenzhen, P.R.C.（518101）
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	Matsunichi Digital Development (Shenzhen) Co., Ltd
Address of applicant:	No. 4401, International Chamber of Commerce Tower, No.168 FuHua Rd3, FuTian District, Shenzhen, China
Manufacturer:	Guangzhou Singulargold Electronics Co., Ltd
Address of manufacturer:	No.6, Lianhua yan Road, Science City, Guangzhou Hi-Tech Industrial Development Zone, Guangzhou, China

General Description of E.U.T

Items	Description
EUT Description:	Mode De Vie
Trade Name:	Le Pan
Model No.:	TC970, TC976
Rated Voltage:	DC 3.7V with power adaptor
RF Output Power	Max. 16.13dBm
Antenna Gain:	0dBi
Frequency range:	2412-2462MHz for 11b/g/n(HT20)
Number of channels:	11
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna
Size:	23.7x18.9x1.1 cm

Note: The test data is gathered from a production sample, provided by the manufacture. The other model listed in the report has different appearance only of TC970 without circuit and electronic construction changed, declared by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of the Matsunichi Digital Development (Shenzhen) Co., Ltd in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

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

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

1.3 Test Methodology

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

the range of 9 kHz to 40 GHz.

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

1.4 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 Exercise Software

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

1.6 Accessories Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/
/	/	/	/

1.7 EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.2	Shielded	Without Core
/	/	/	/

2. SUMMARY OF TEST RESULTS

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

3. CONDUCTED EMISSIONS

3.1 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.

3.2 Test Equipment List and Details

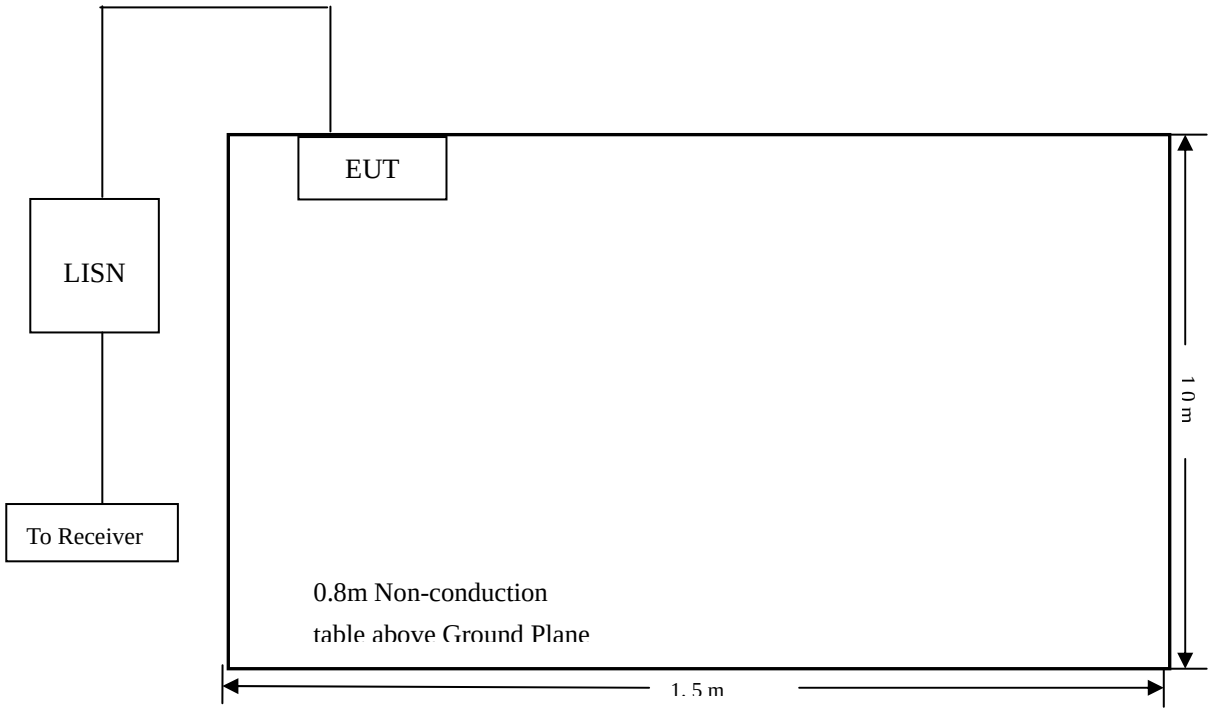
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2010-12-20	2011-12-19
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2010-12-20	2011-12-19
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2010-12-20	2011-12-19

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

3.3 Test Procedure

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

3.4 Basic Test Setup Block Diagram



3.5 Environmental Conditions

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

3.6 Summary of Test Results/Plots

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

-1.93 dBμV at **3.07 MHz** in the **Line Pk** Detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC 15.207	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBμV	QP/Ave/Pk	Line/Neutral	dBμV	dB
3.07	54.06	Pk	Line	56.00	-1.93
4.278	43.08	Ave	Line	46.00	-2.91
2.002	50.99	Pk	Line	56.00	-5.00
4.002	40.51	Ave	Neutral	46.00	-5.48
3.014	49.91	Pk	Neutral	56.00	-6.08
5.334	51.88	Pk	Line	60.00	-8.11
1.962	47.88	Pk	Neutral	56.00	-8.11
1.962	37.81	Ave	Neutral	46.00	-8.18
0.154	56.46	Pk	Line	65.77	-9.31
8.062	40.66	Ave	Line	50.00	-9.33
0.762	34.33	Ave	Neutral	46.00	-11.66

Plot of Conducted Emissions Test Data

Conducted Disturbance

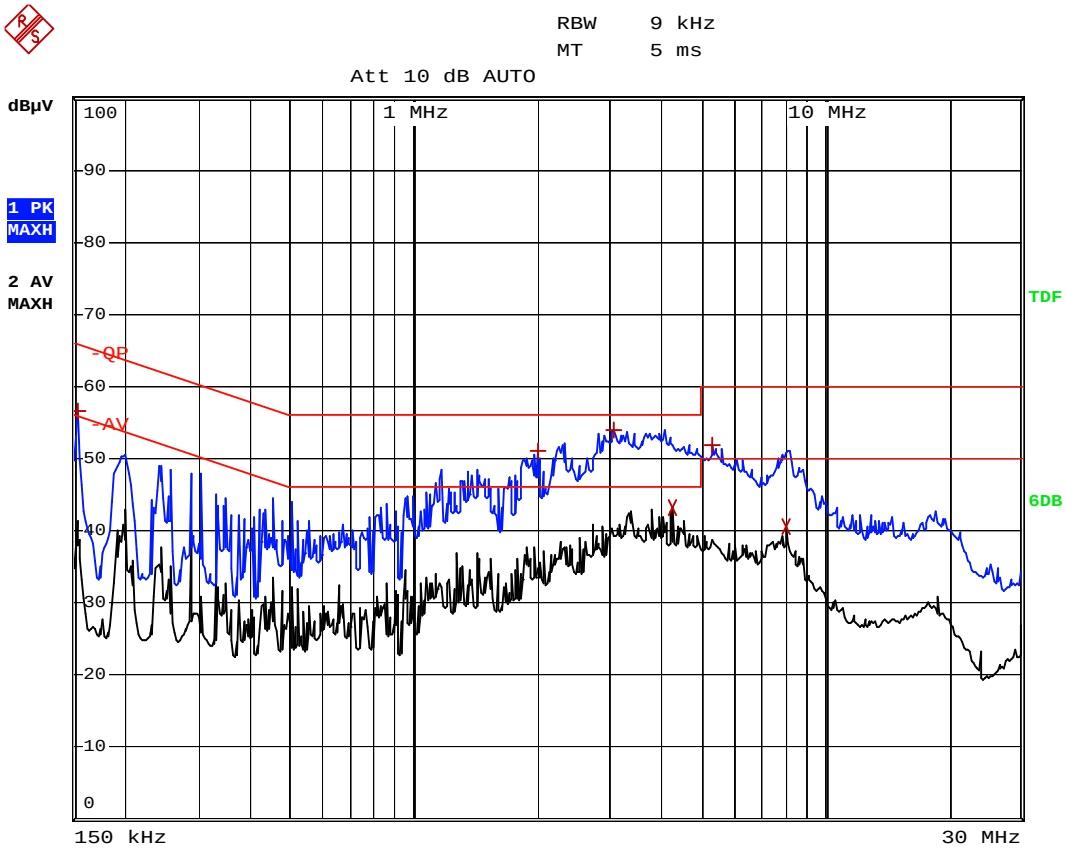
EUT: Mode De Vie

M/N: TC970

Operating Condition: Transmitting

Test Specification: L

Comment: AC 120V/60Hz/Adapter 3.7V



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Plot of Conducted Emissions Test Data

Conducted Disturbance

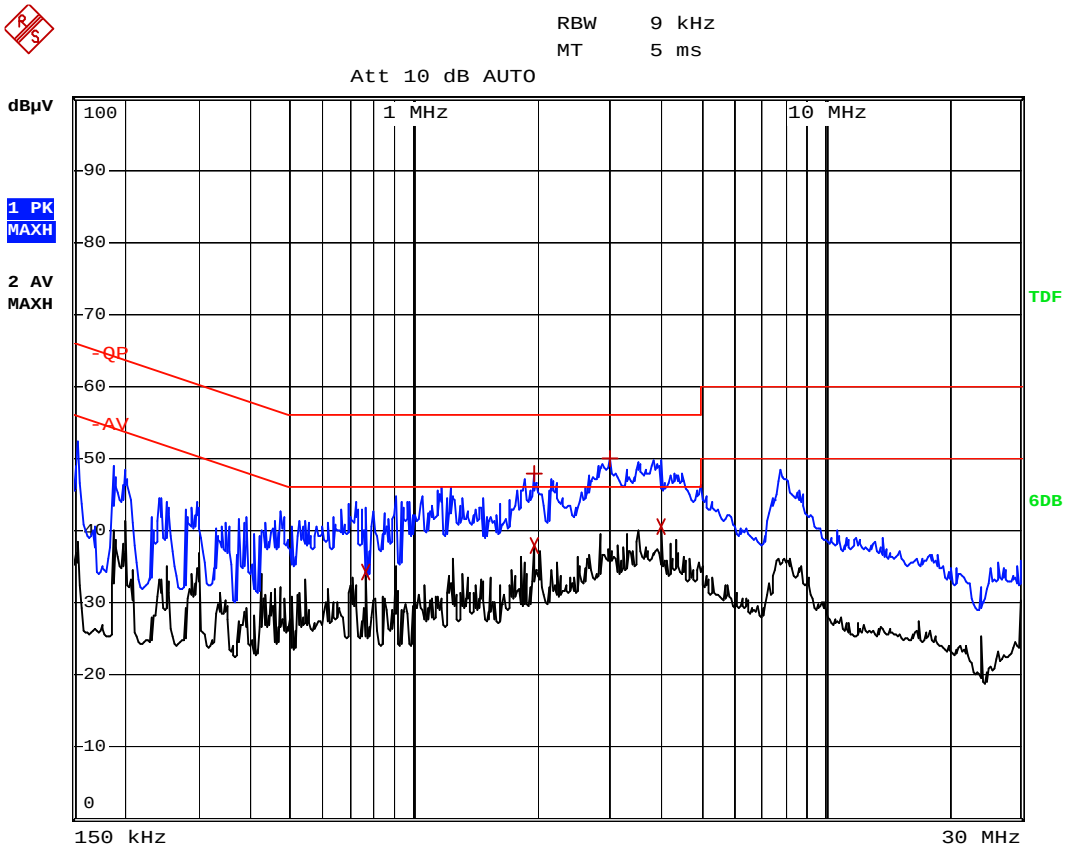
EUT: Mode De Vie

M/N: TC970

Operating Condition: Transmitting

Test Specification: N

Comment: AC 120V/60Hz/Adapter 3.7V



Date: 16.MAR.2011 16:10:34

4. §15.203 - ANTENNA REQUIREMENT

4.1 Standard Applicable

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

4.2 Test Result

This product has a integral antenna, 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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2010-12-20	2011-12-19
Attenuator	ATTEN	ATS100-4-20	/	2010-12-20	2011-12-19

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

5.3 Test Procedure

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

5.4 Environmental Conditions

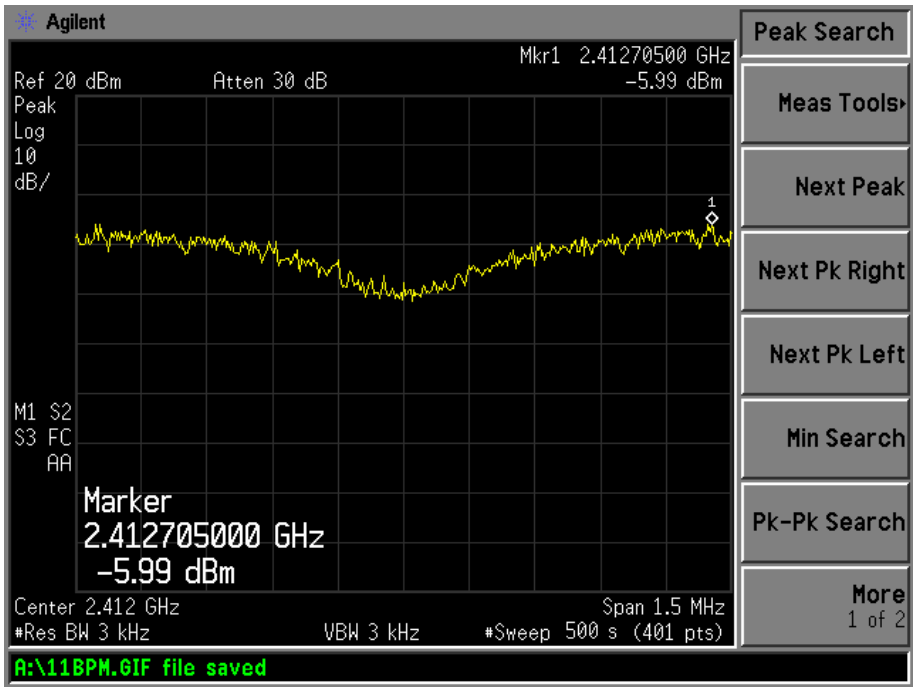
Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

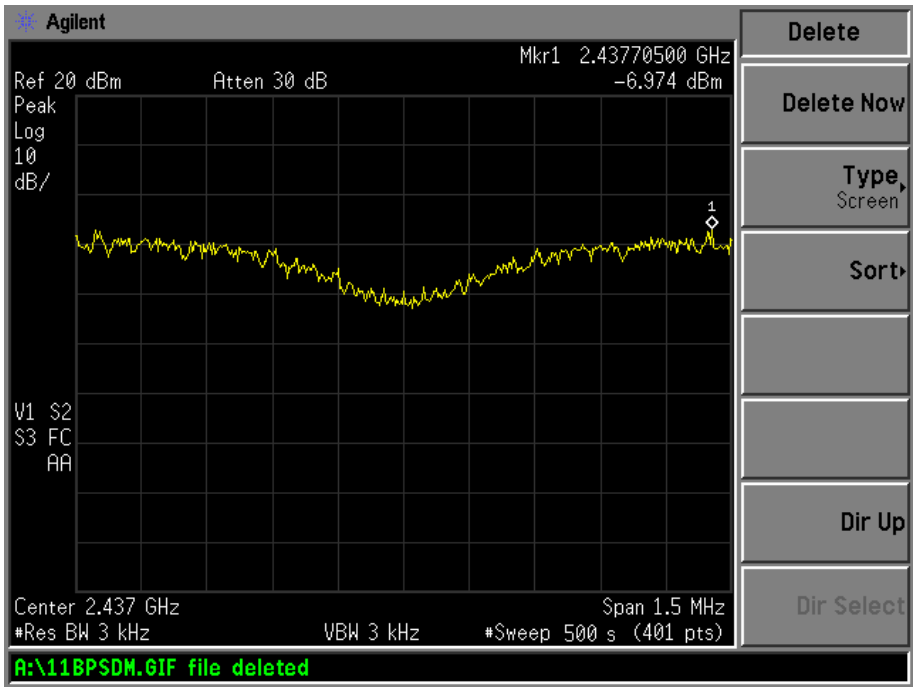
Test mode	Test channel	Reading dBm/3kHz	Limit dBm/3kHz
802.11b	Low channel (2412MHz)	-5.99	8
	Middle channel (2437MHz)	-6.974	8
	High channel (2462MHz)	-7.367	8
802.11g	Low channel (2412MHz)	-13.17	8
	Middle channel (2437MHz)	-14.34	8
	High channel (2462MHz)	-15.06	8
802.11n HT20	Low channel (2412MHz)	-15.23	8
	Middle channel (2437MHz)	-15.92	8
	High channel (2462MHz)	-16.42	8

For 802.11b

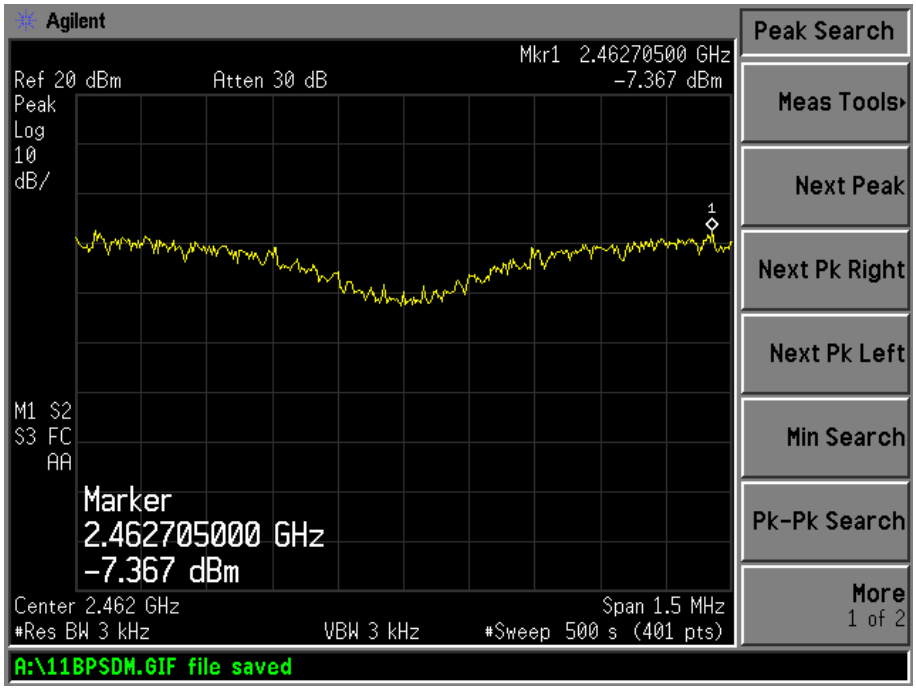
Low Channel:



Middle Channel:

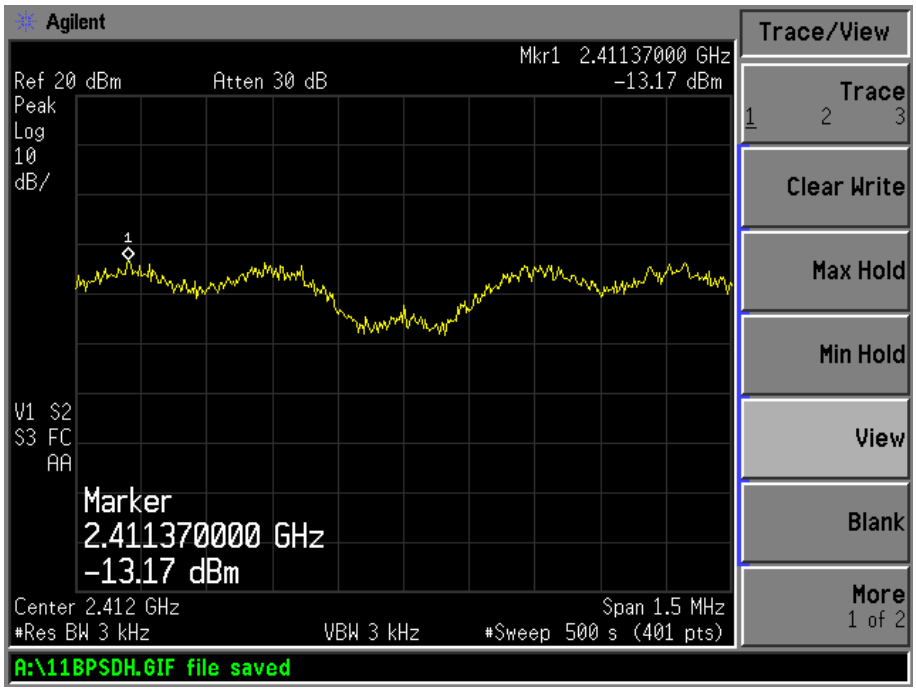


High Channel:

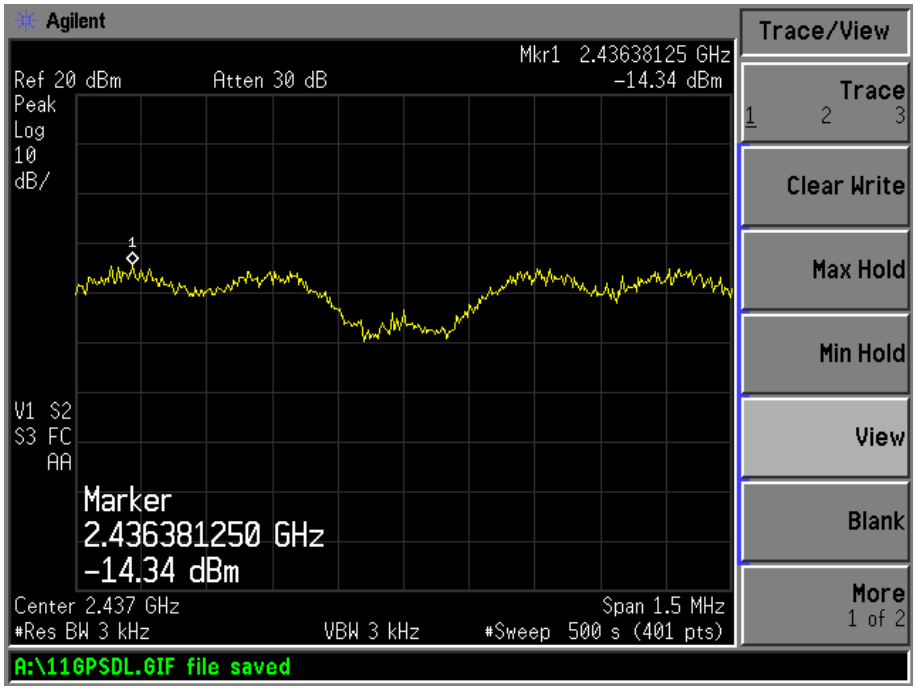


For 802.11g

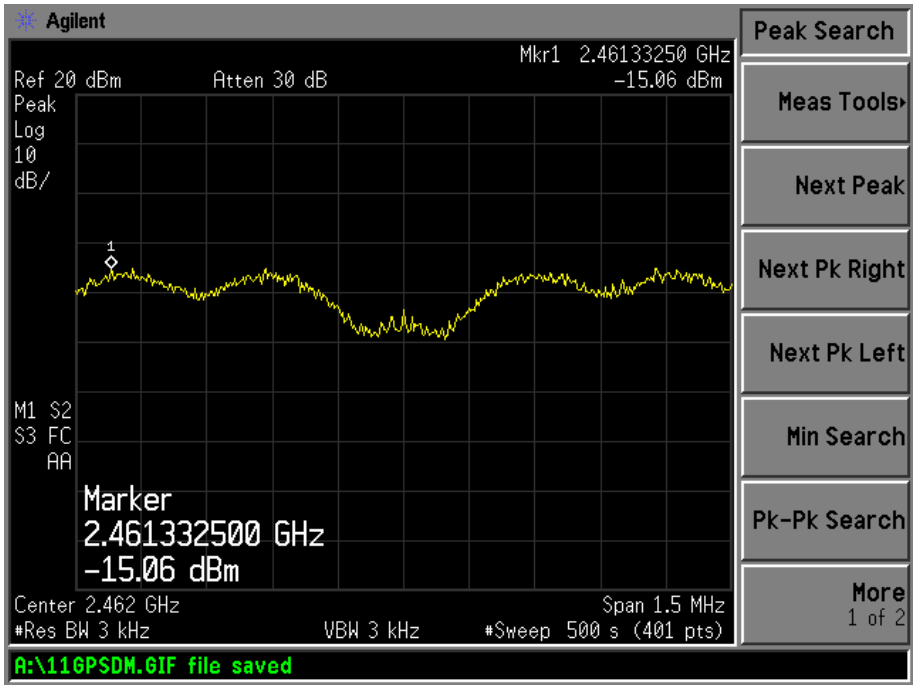
Low Channel:



Middle Channel:

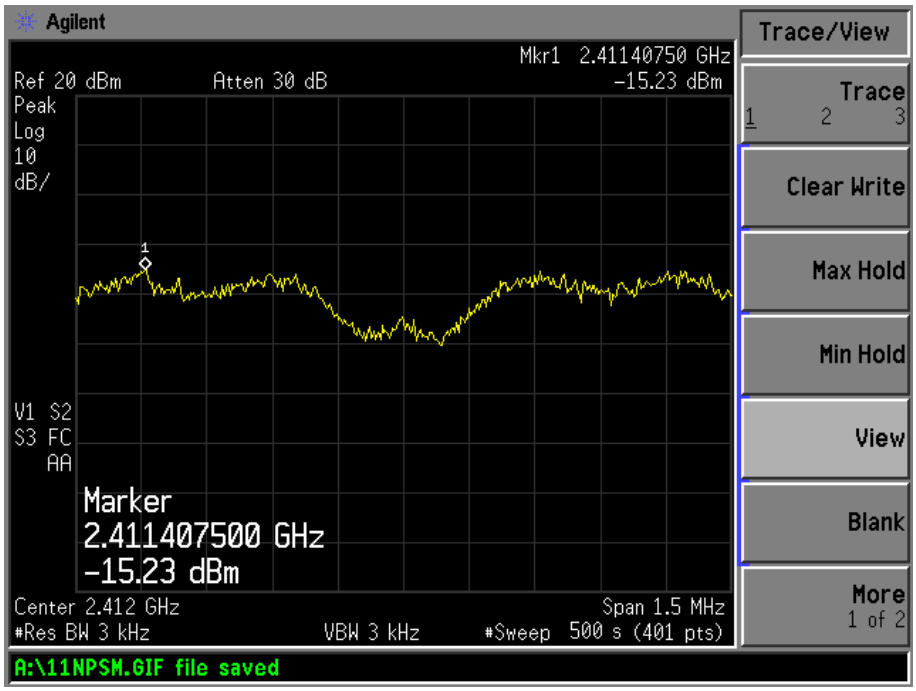


High Channel:

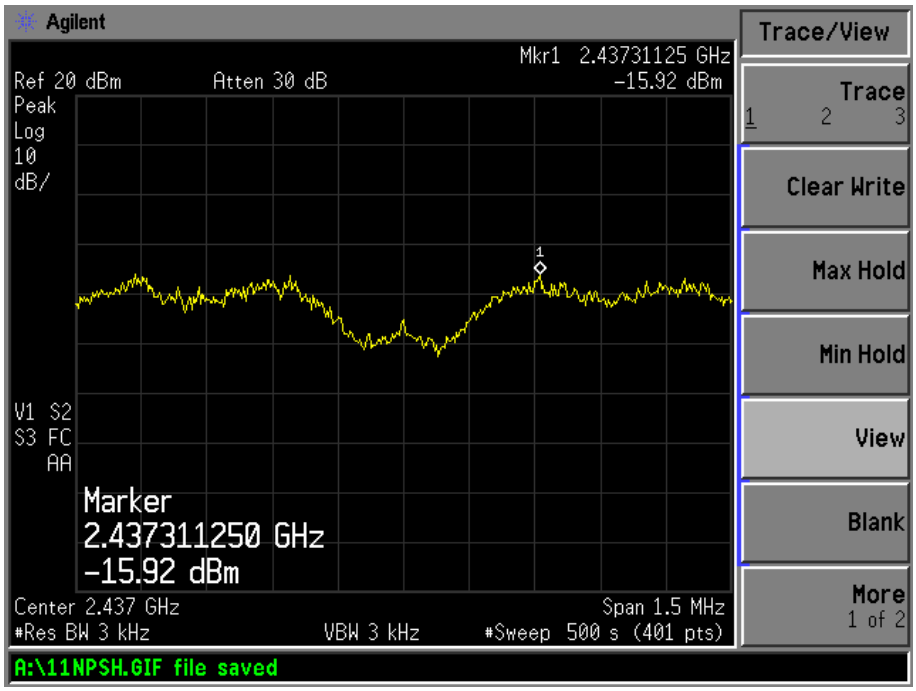


For 802.11n HT20

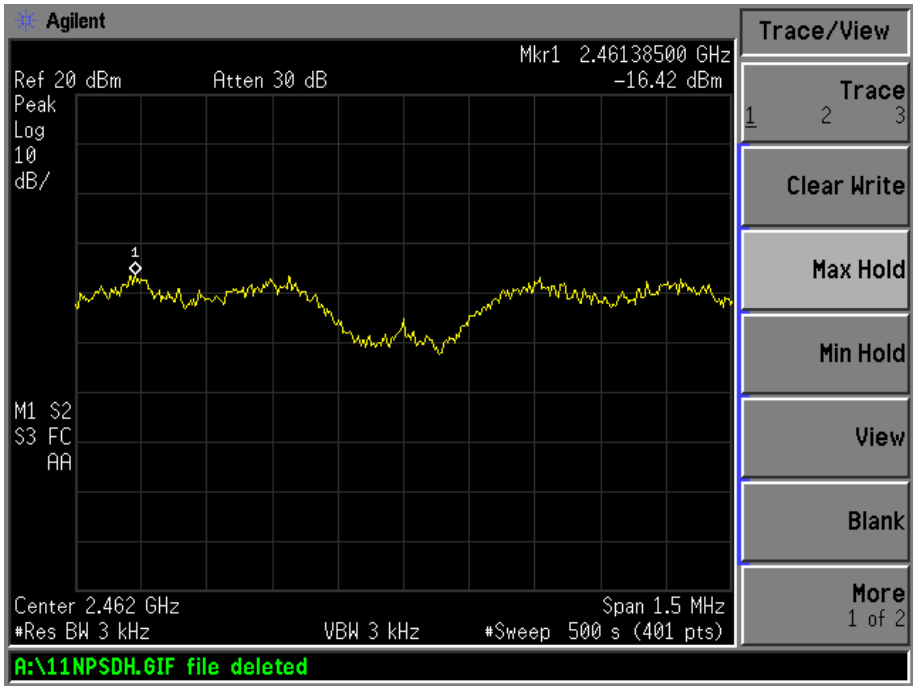
Low Channel:



Middle Channel:



High Channel:



6. 6-dB 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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2010-12-20	2011-12-19
Attenuator	ATTEN	ATS100-4-20	/	2010-12-20	2011-12-19

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

6.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. The spectrum analyzer as RBW=100KHz (1 % of Bandwidth.), Sweep=auto
4. Mark the peak frequency and –6dB (upper and lower) frequency.

6.4 Environmental Conditions

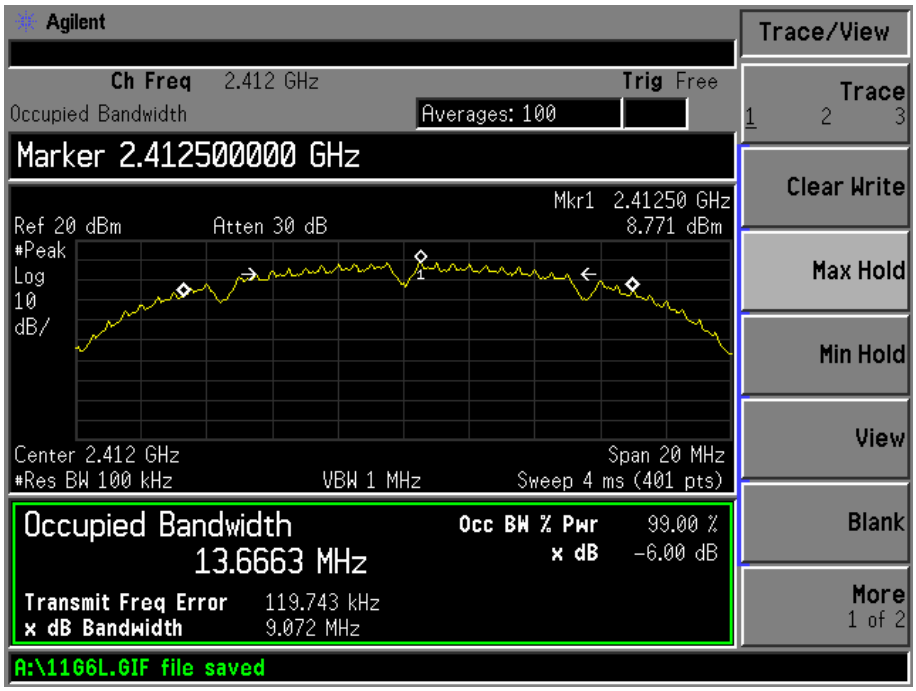
Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.5 Summary of Test Results/Plots

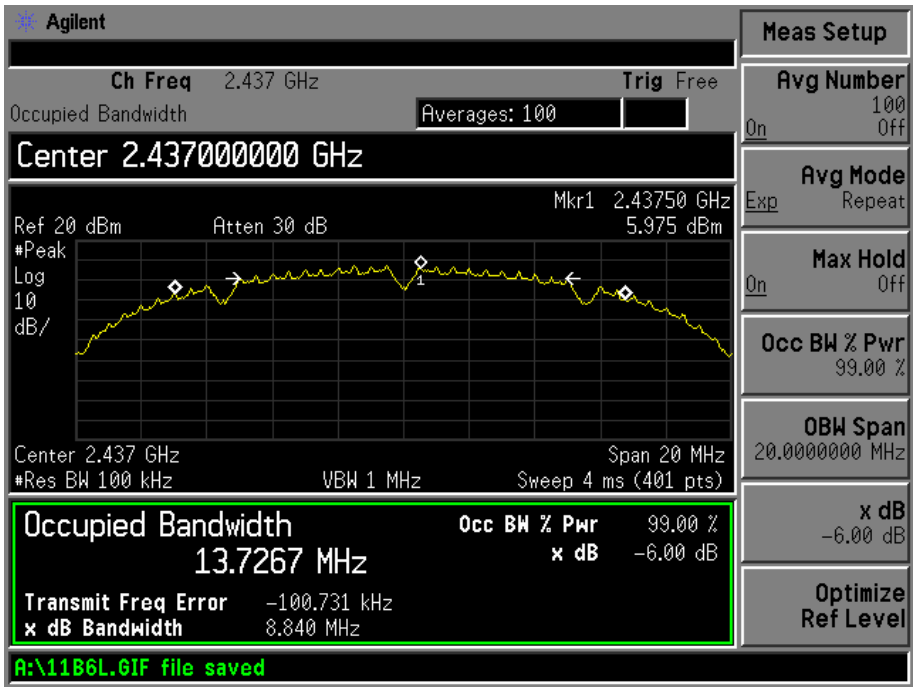
Test mode	Frequency MHz	6 dB Bandwidth kHz	Limit kHz
802.11b	2412	9072	500
	2437	8840	500
	2462	9050	500
802.11g	2412	15894	500
	2437	15440	500
	2462	15699	500
802.11n HT 20	2412	17552	500
	2437	16839	500
	2462	16337	500

For 802.11b

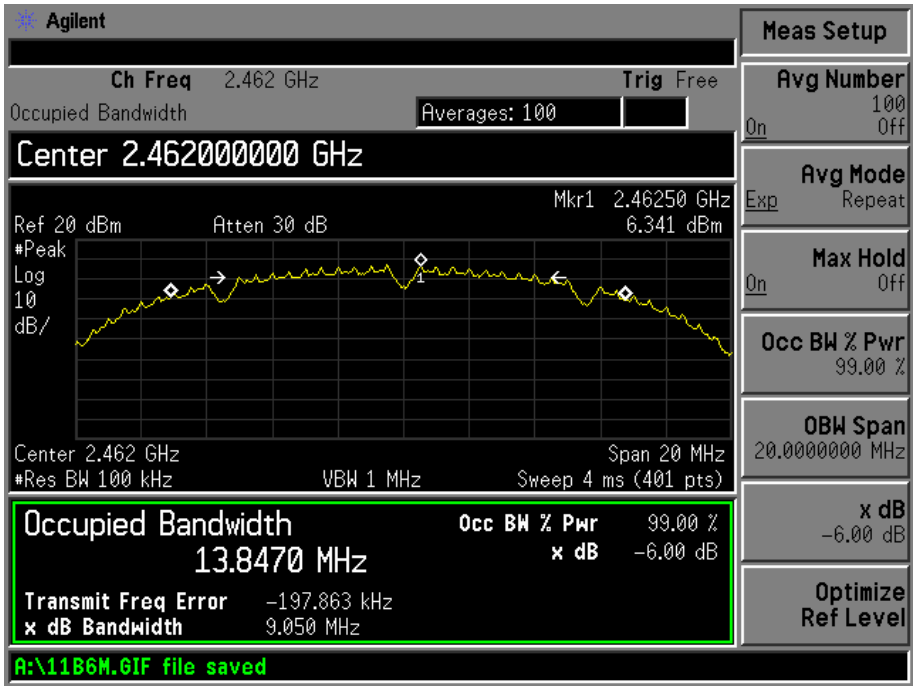
Low Channel:



Mid Channel:

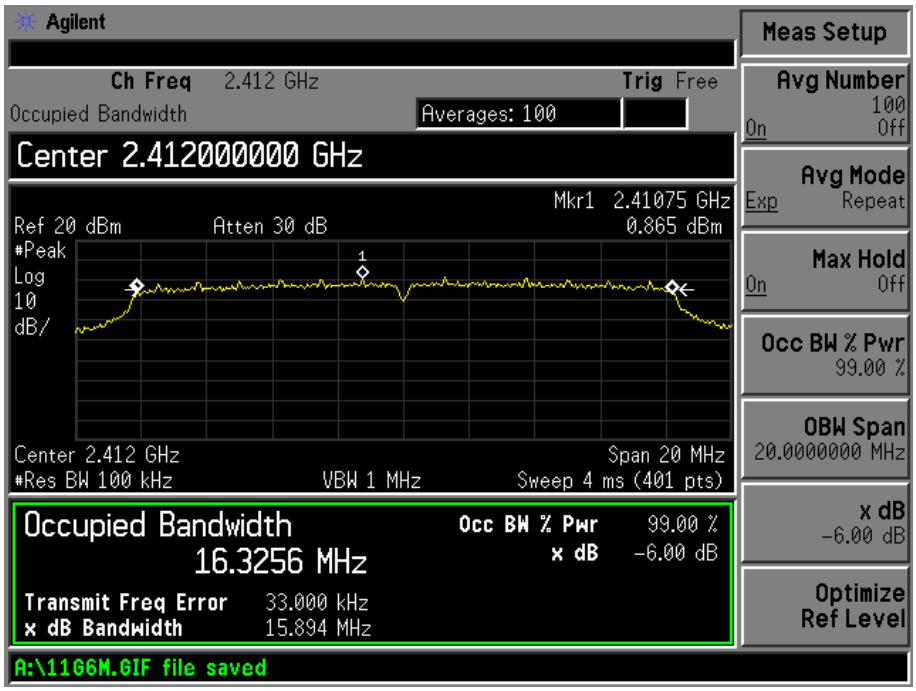


High Channel:

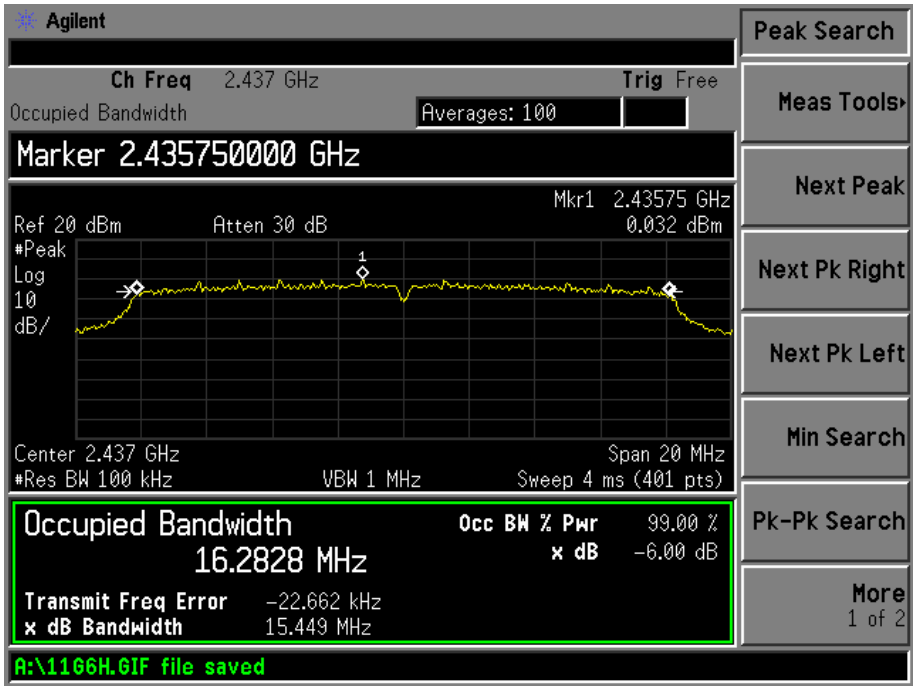


For 802.11g

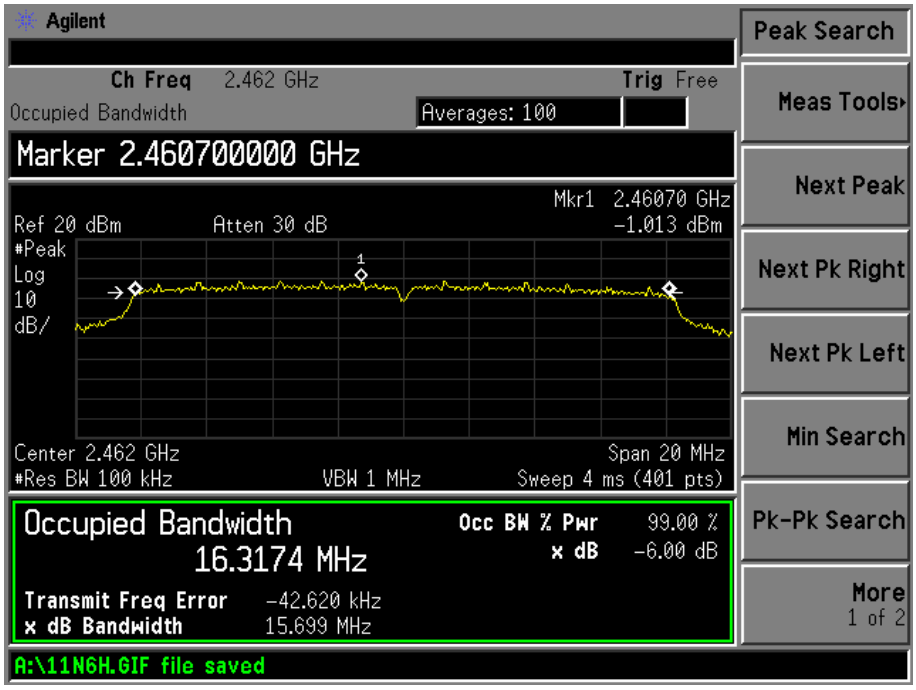
Low Channel:



Mid Channel:

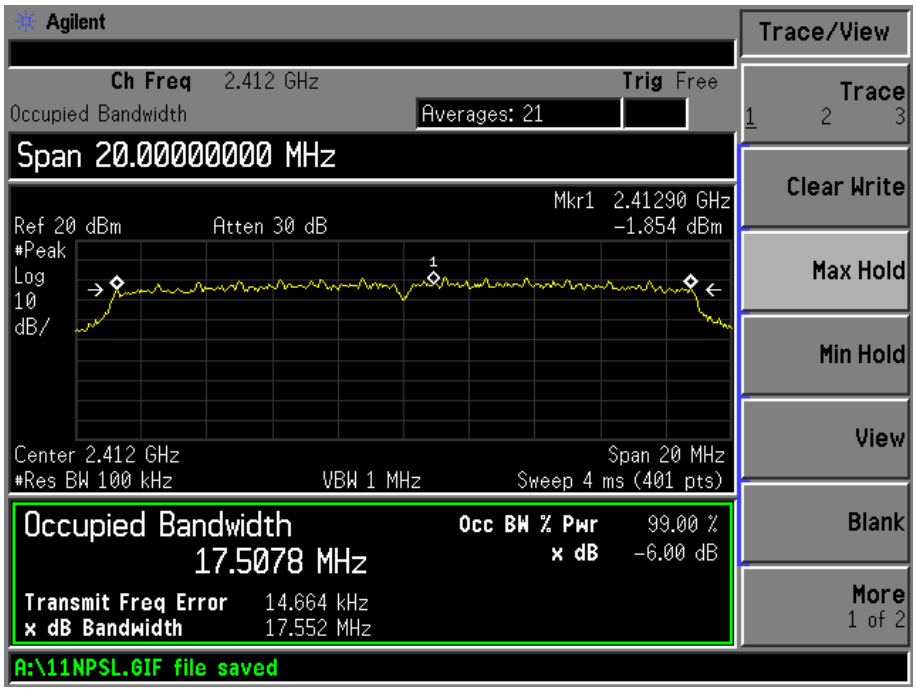


High Channel:



For 802.11n HT20

Low Channel:



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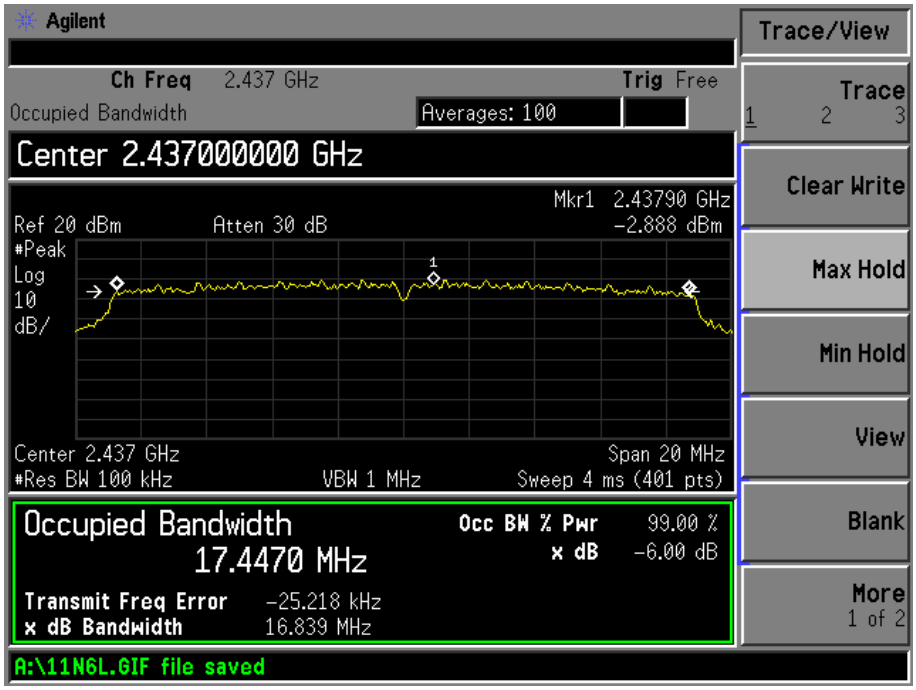
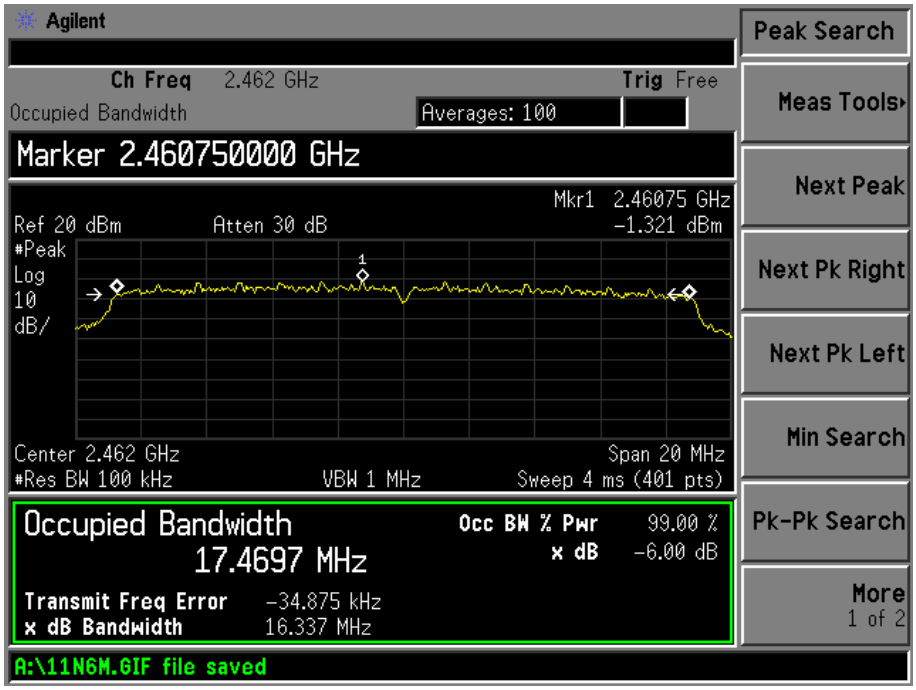


High Channel:



7. POWER OUTPUT

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 Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	Agilent	E4402B	US41192821	2010-12-20	2011-12-19
Attenuator	ATTEN	ATS100-4-20	/	2010-12-20	2011-12-19

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

7.3 Test Procedure

According to section 15.247(b)-power output of the KDB-558074 (2005), the method #1 of the power output option2 was used, the following is the measurement procedure.

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.

2. Set RBW = 1 MHz, Set VBW $\geqslant$ 3 MHz.

4. Use sample detector mode if bin width (i.e., span/number of points in spectrum display) < 0.5 RBW. Otherwise use peak detector mode.

5. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”.

6. Trace average 100 traces in power averaging mode.

7. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges.

7.4 Environmental Conditions

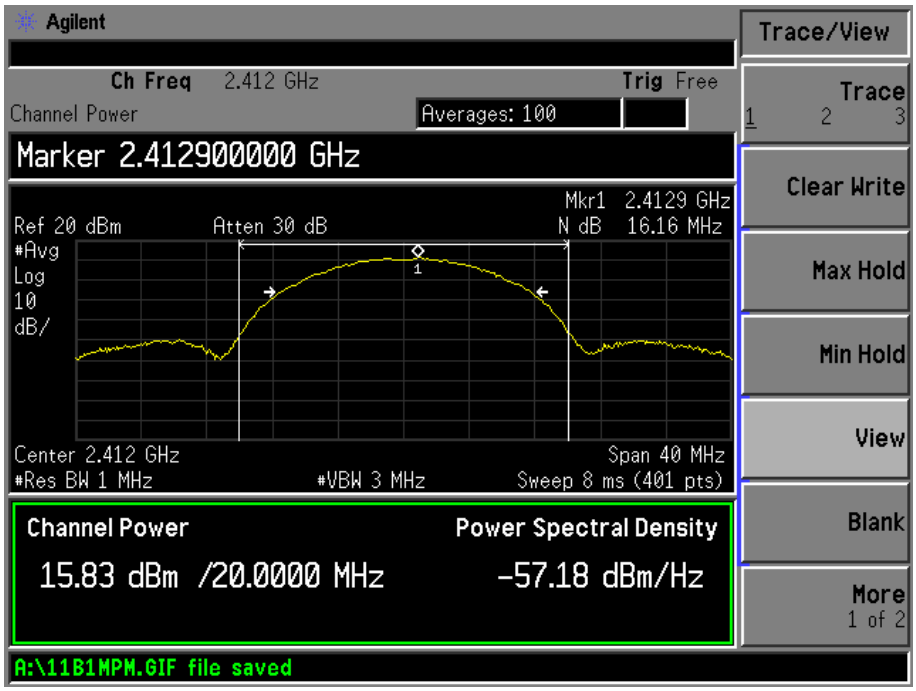
Temperature:	21° C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

7.5 Summary of Test Results/Plots

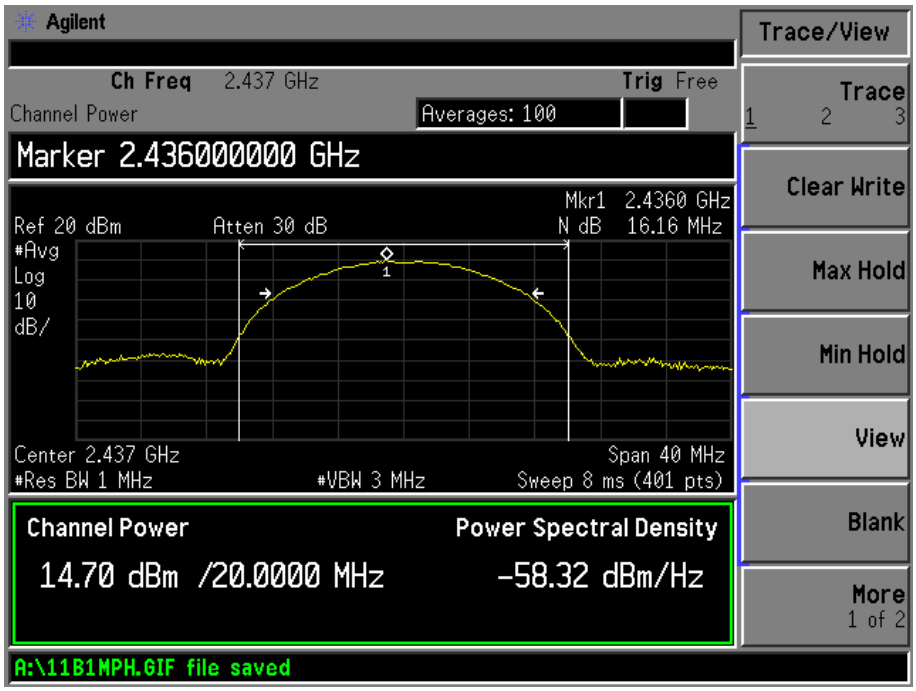
Test mode	Frequency MHz	Reading dBm	Output power W	Limit W
802.11b (1M)	2412	15.83	0.03828	1
	2437	14.70	0.02951	1
	2462	14.41	0.02760	1
802.11b (11M)	2412	16.13	0.04102	1
	2437	15.16	0.03820	1
	2462	14.12	0.02582	1
802.11g (6M)	2412	11.32	0.01355	1
	2437	10.08	0.01018	1
	2462	9.24	0.00839	1
802.11g (54M)	2412	11.09	0.01285	1
	2437	9.32	0.00855	1
	2462	8.16	0.00654	1
802.11n HT20	2412	10.11	0.01025	1
	2437	9.22	0.00835	1
	2462	8.24	0.00666	1

For 802.11b_1M rate

Low Channel:



Middle Channel:



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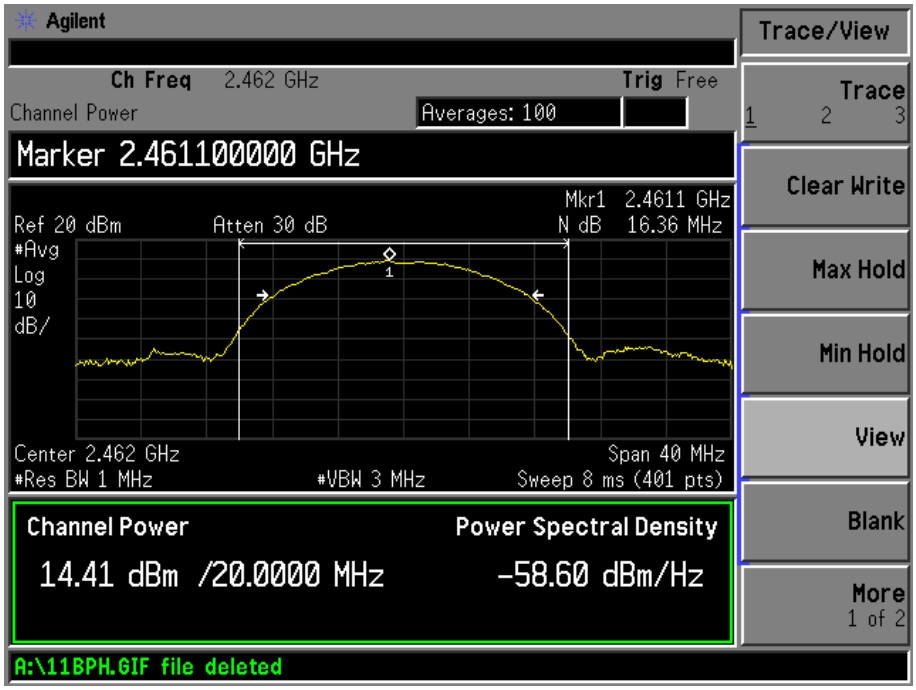

For 802.11b_11M rate

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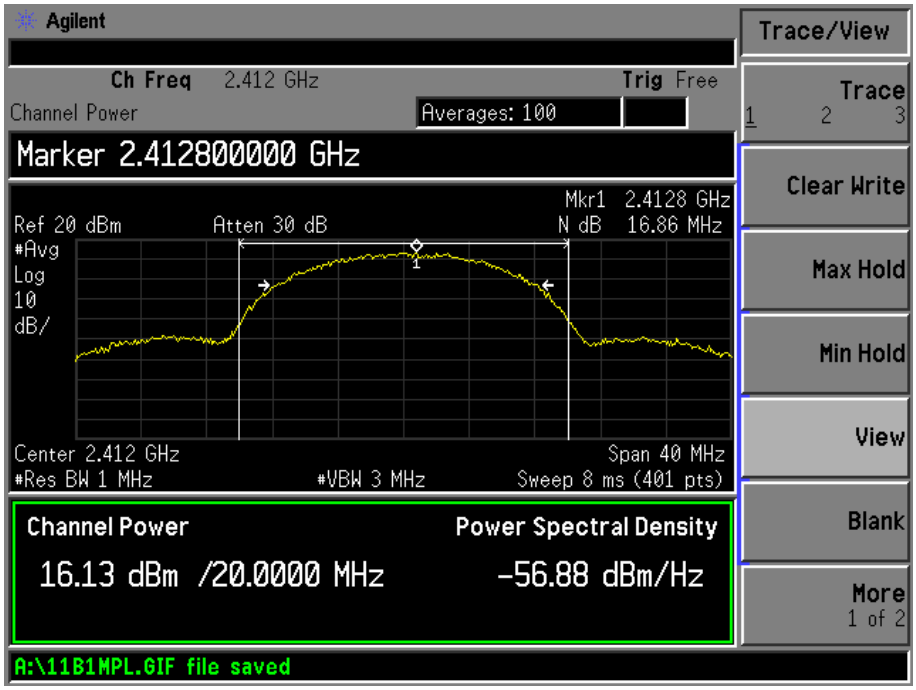

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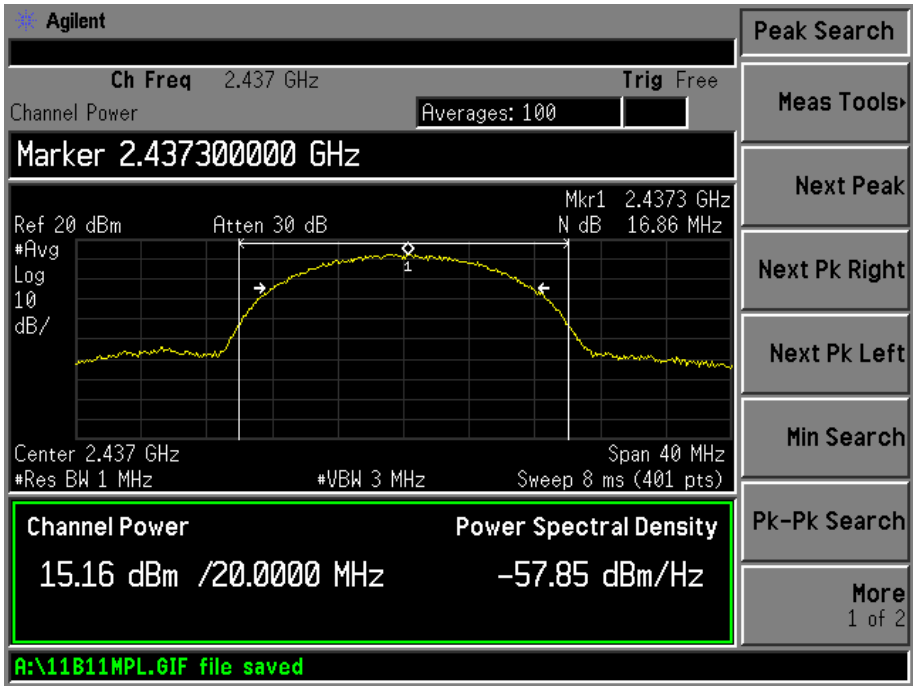
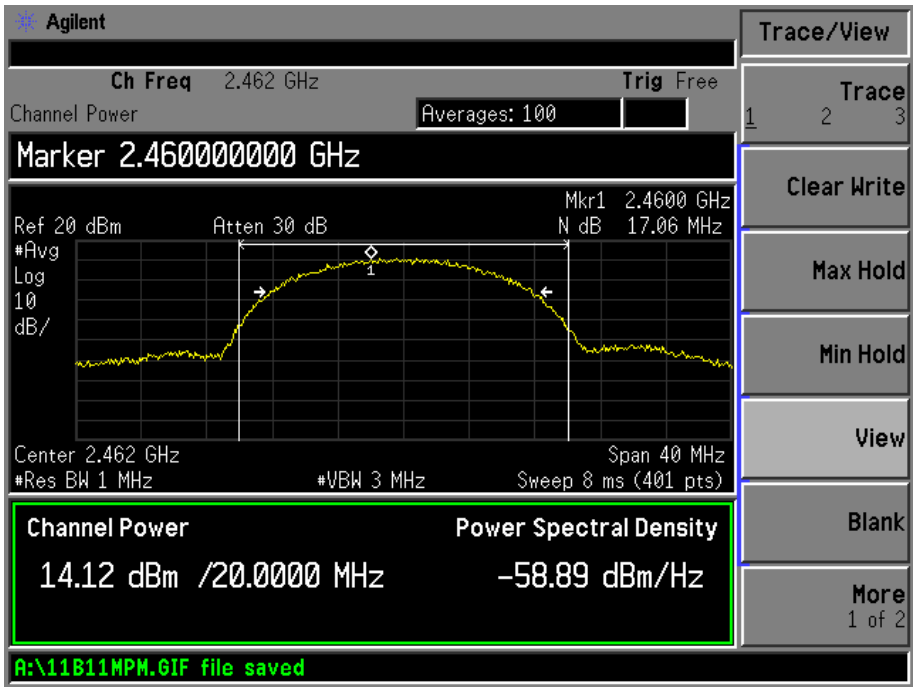
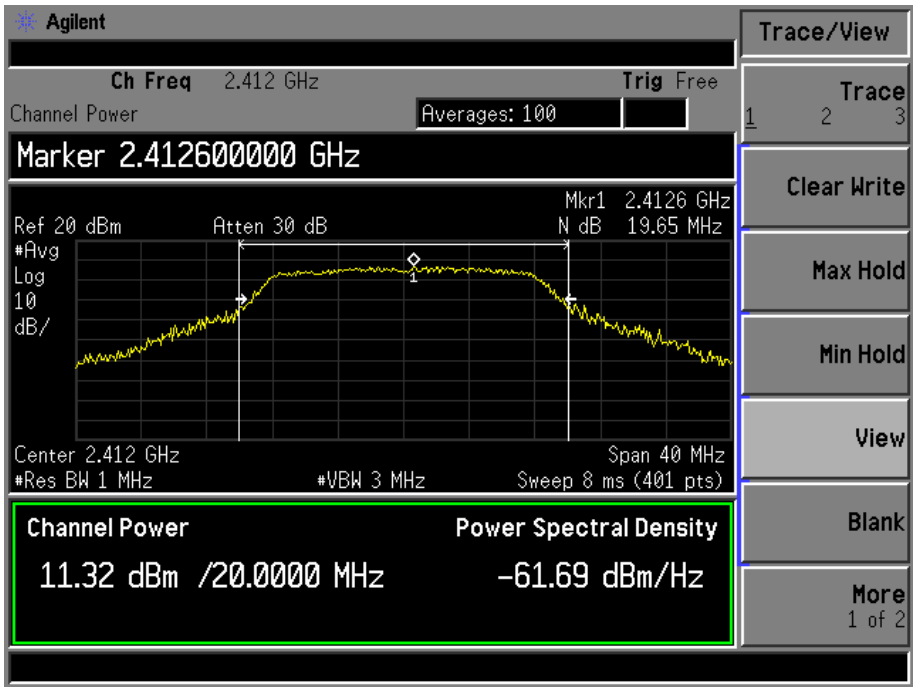


High Channel:

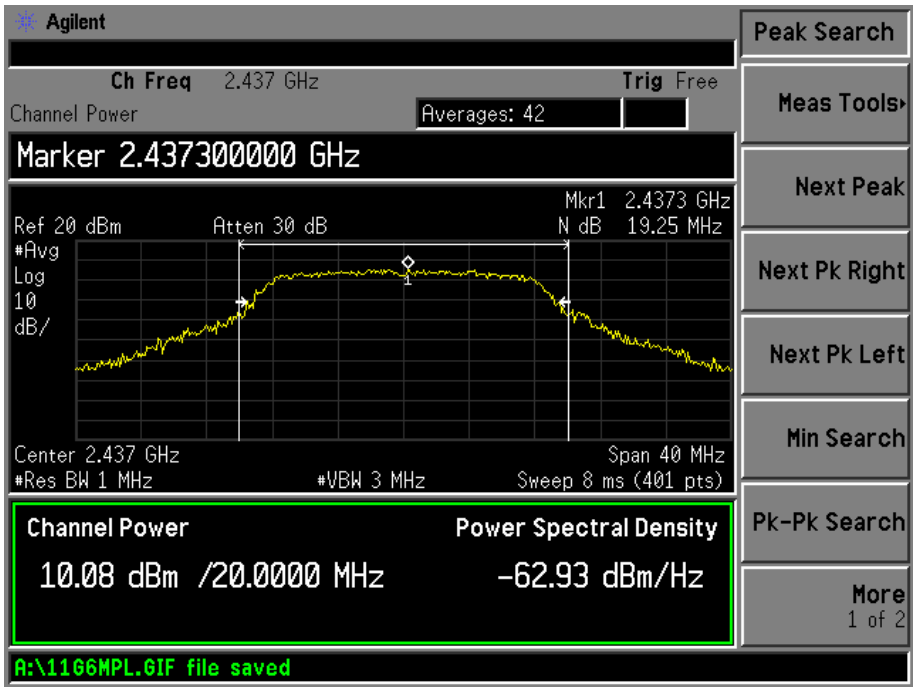


For 802.11g_6M rate

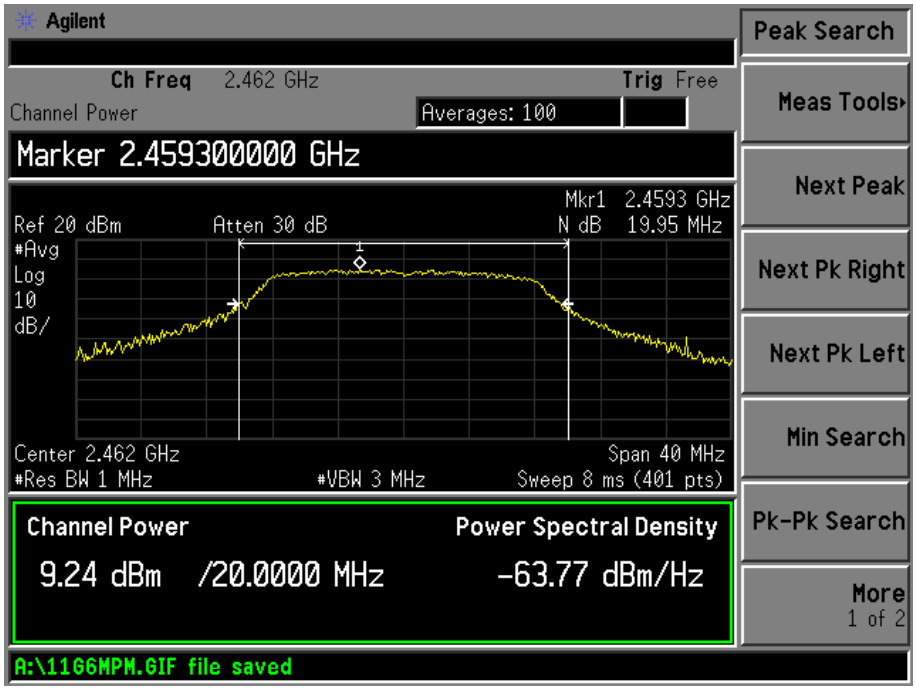
Low Channel:



Middle Channel:

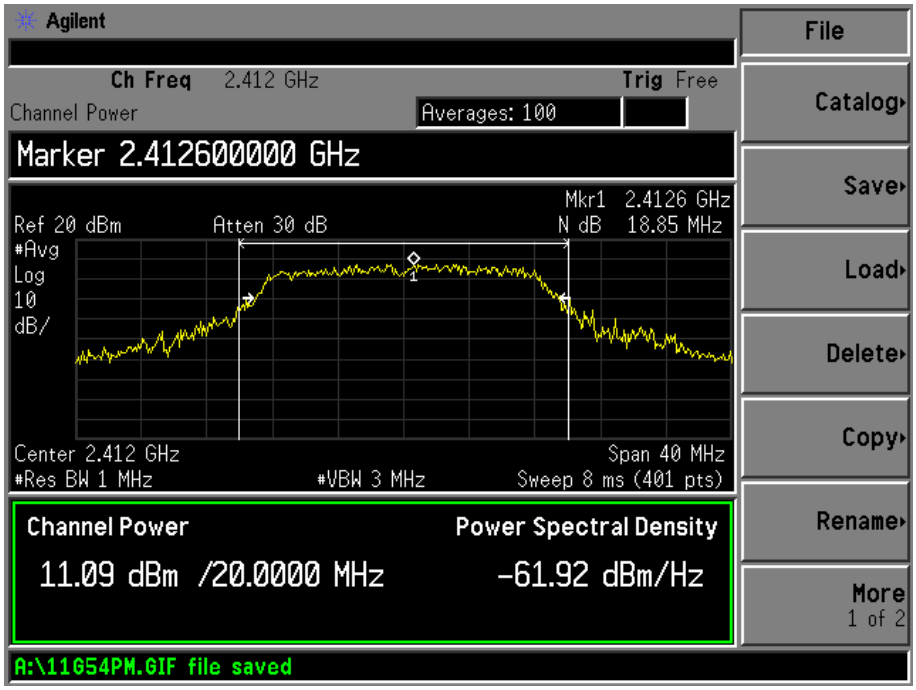


High Channel:

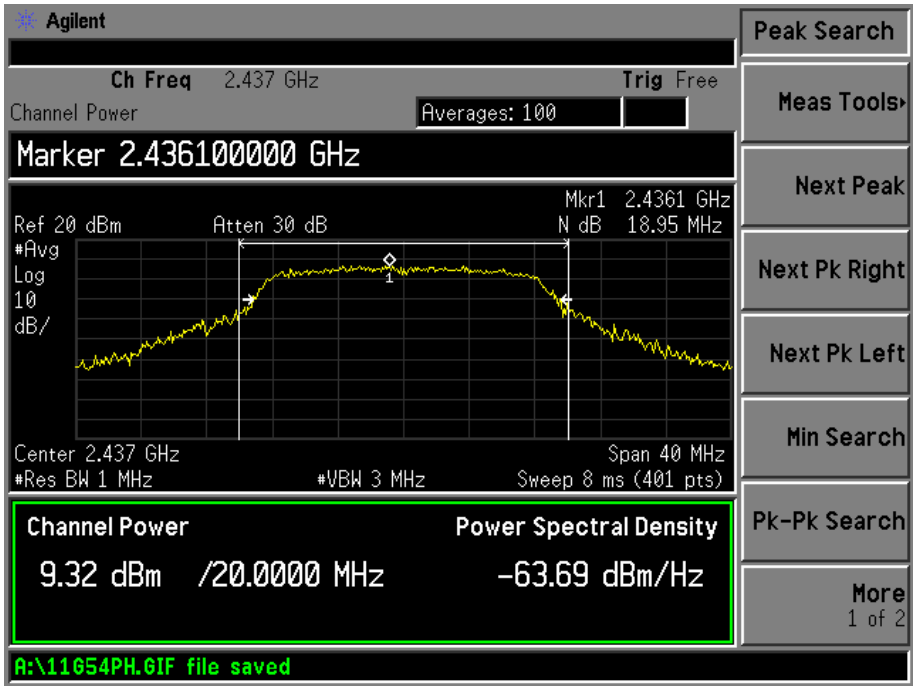


For 802.11g_54M rate

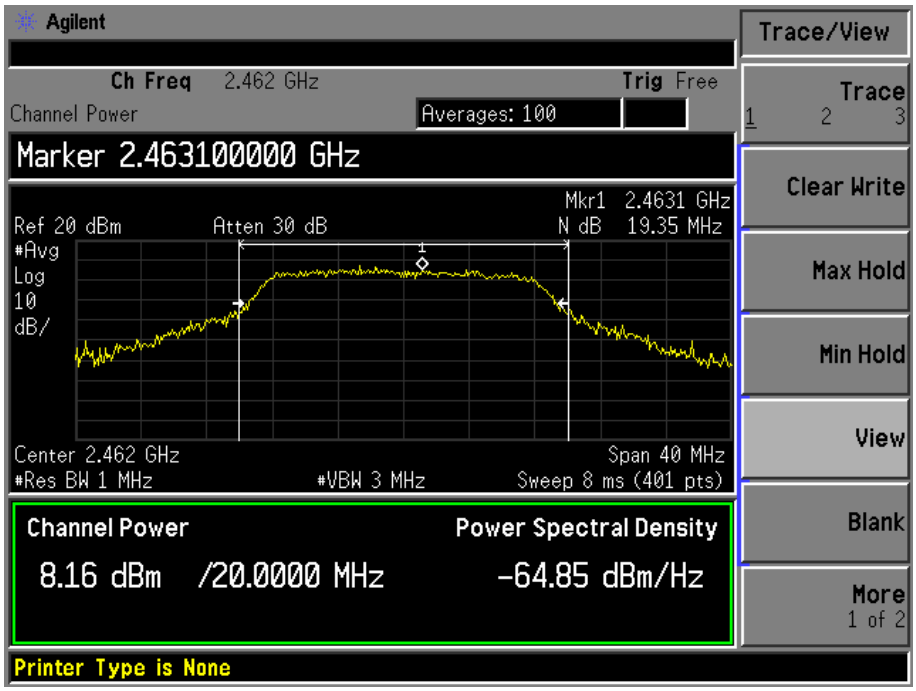
Low Channel:



Middle Channel:

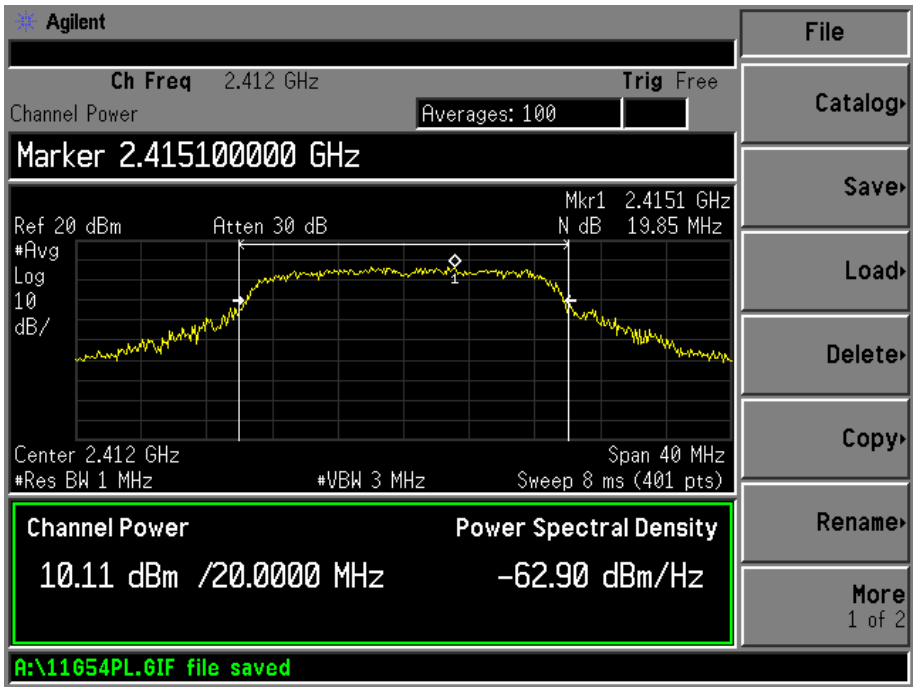


High Channel:

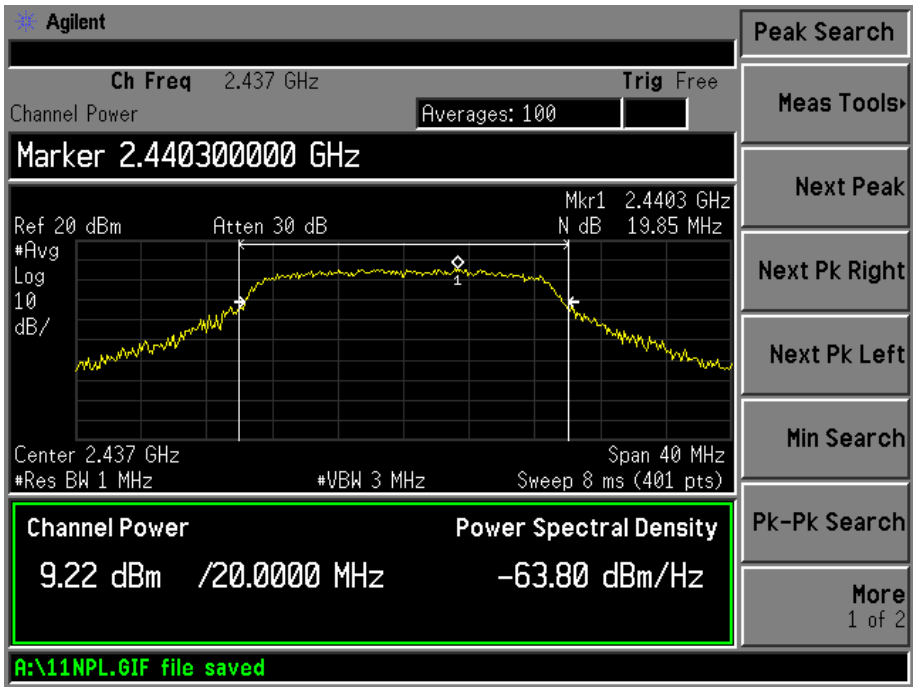


For 802.11n HT20_ rate

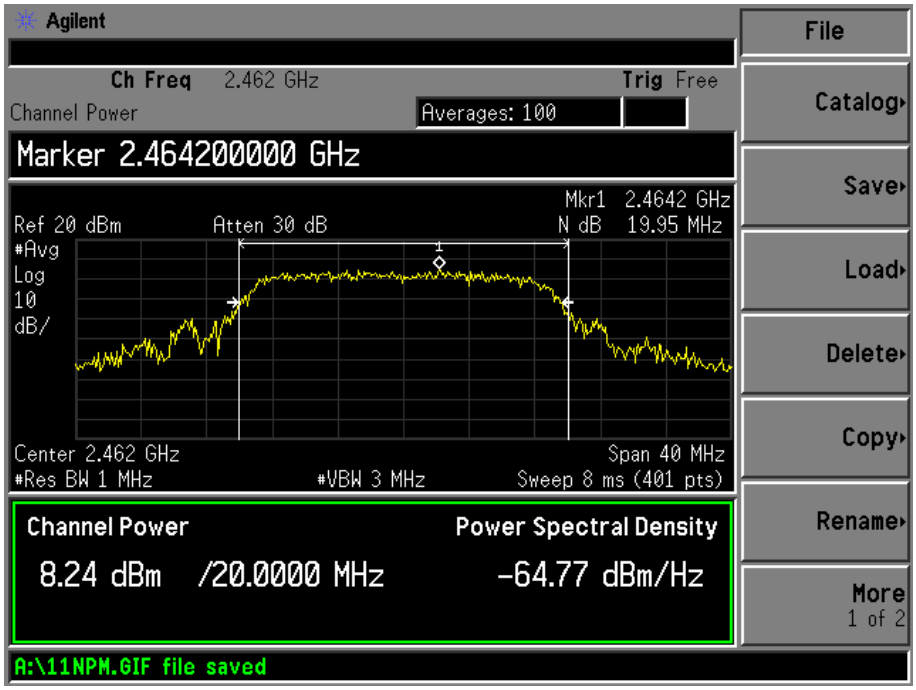
Low Channel:



Middle Channel:



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

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

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

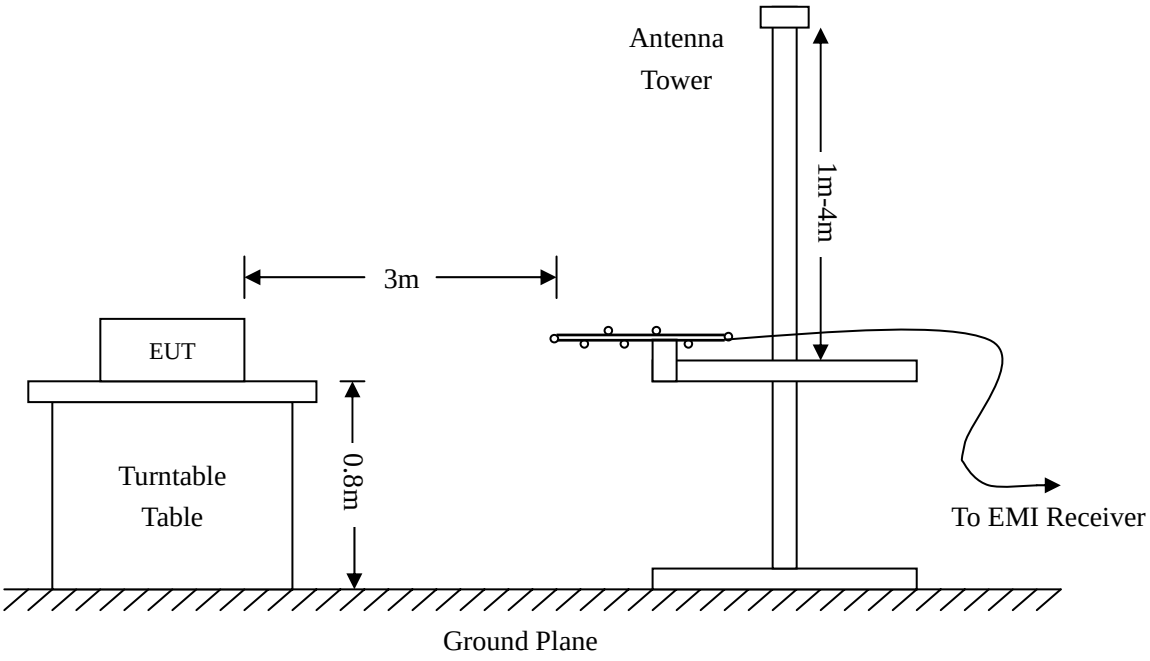
Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

8.3 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

8.4 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.



8.5 Corrected Amplitude & Margin Calculation

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

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

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

Margin = Corr. Ampl. – FCC Part 15 Limit

8.6 Environmental Conditions

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

8.7 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:

-1.25dBμV at **647.3856MHz** in the **Horizontal** polarization, **Transmitting 802.11Nht20 Middle Channel** test mode with, **30 MHz to 25 GHz, 3Meters**

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

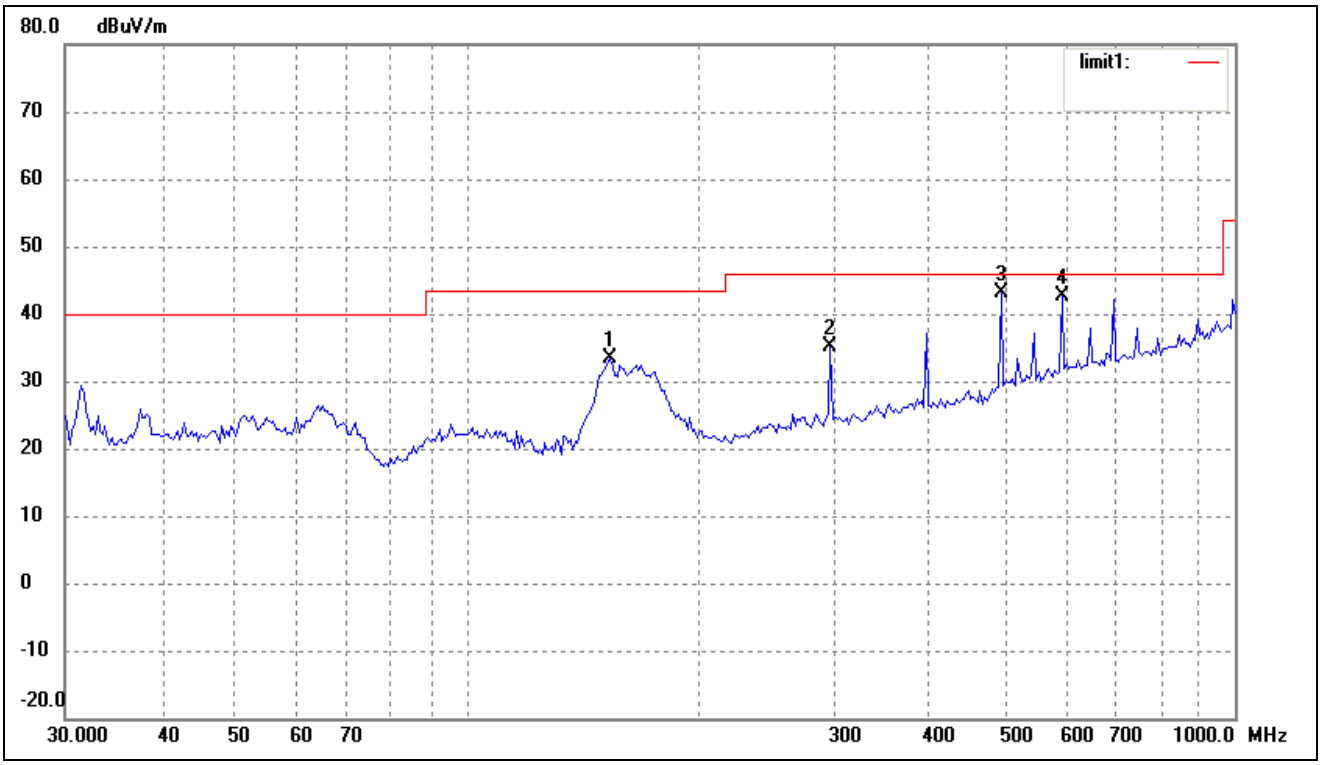
Test Result/Plots:

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11b) Low Channel

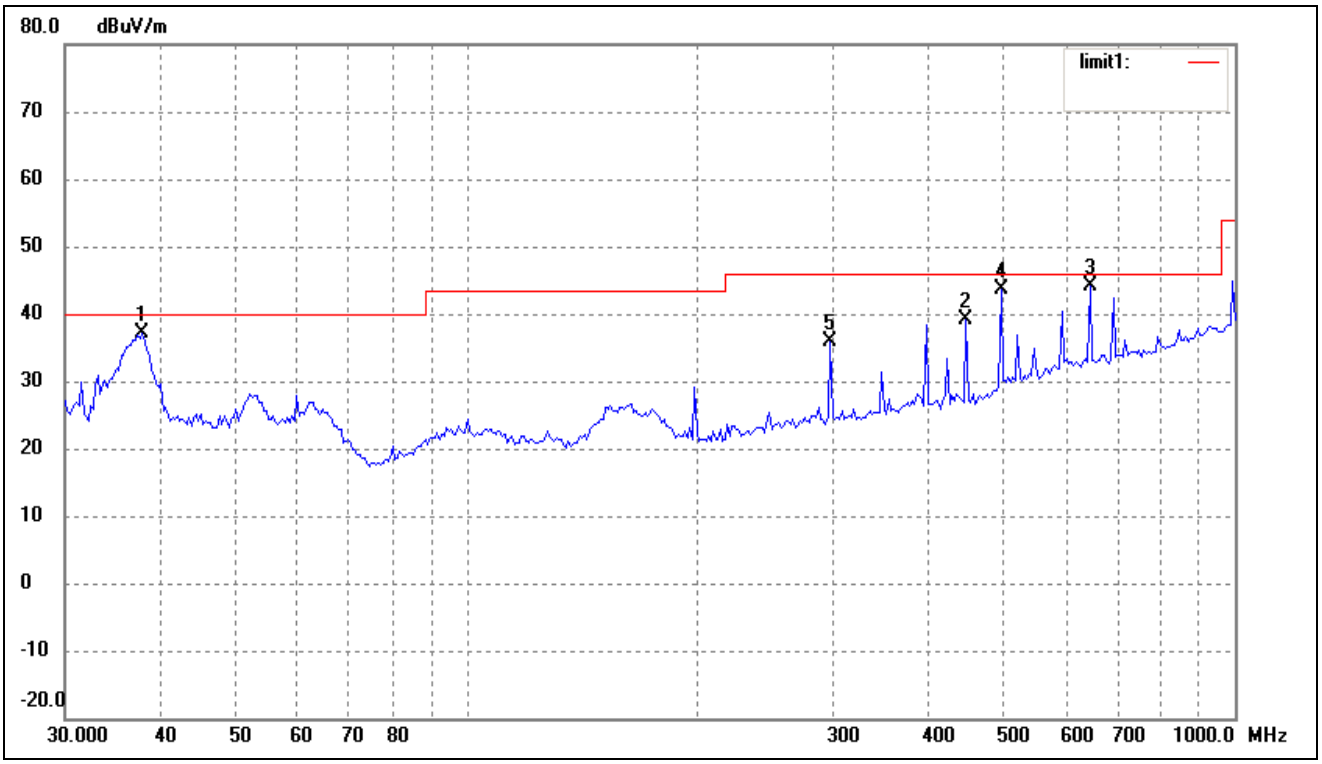
Comment:

Horizontal



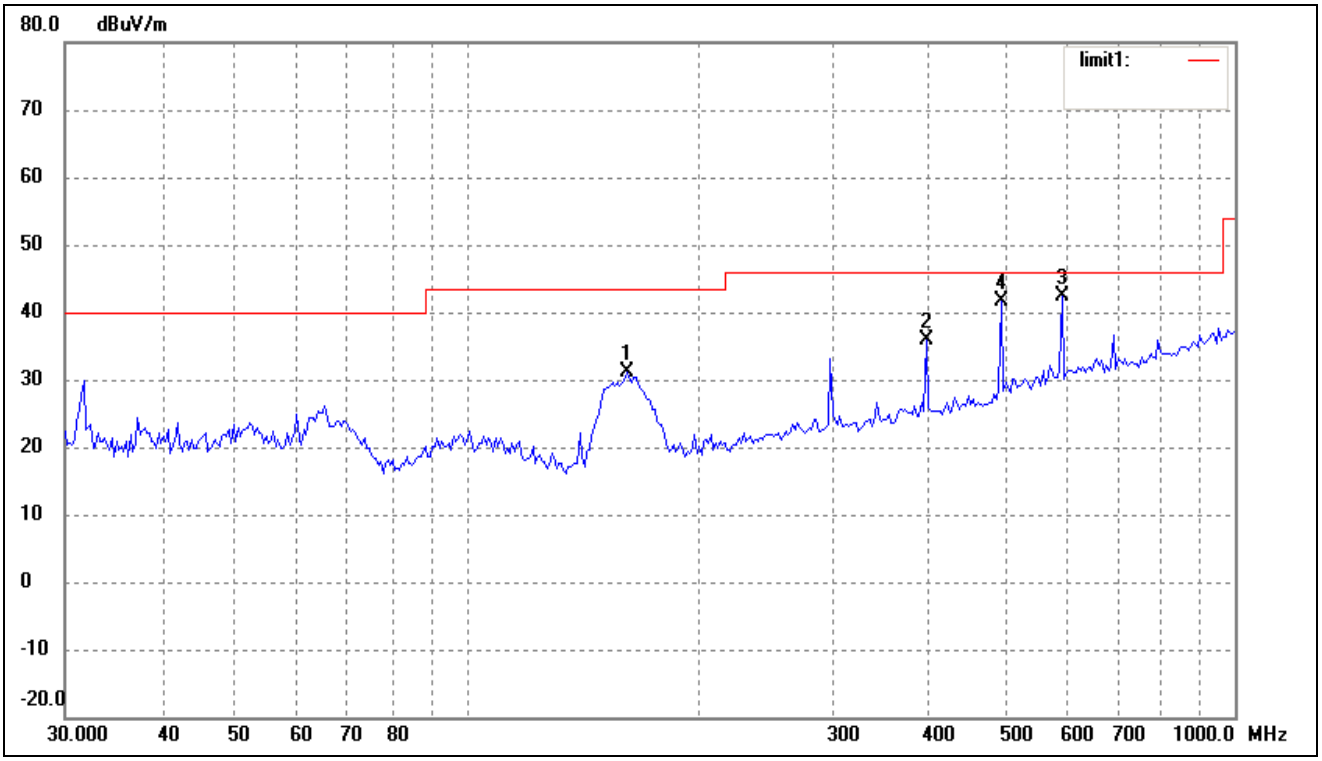
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	153.7385	29.16	4.25	33.41	43.50	-10.09	360	200	peak
2	297.2241	25.41	9.73	35.14	46.00	-10.86	0	100	peak
3	495.9344	29.24	14.01	43.25	46.00	-2.75	206	114	QP
4	595.1329	26.10	16.55	42.65	46.00	-3.35	227	254	QP

Vertical



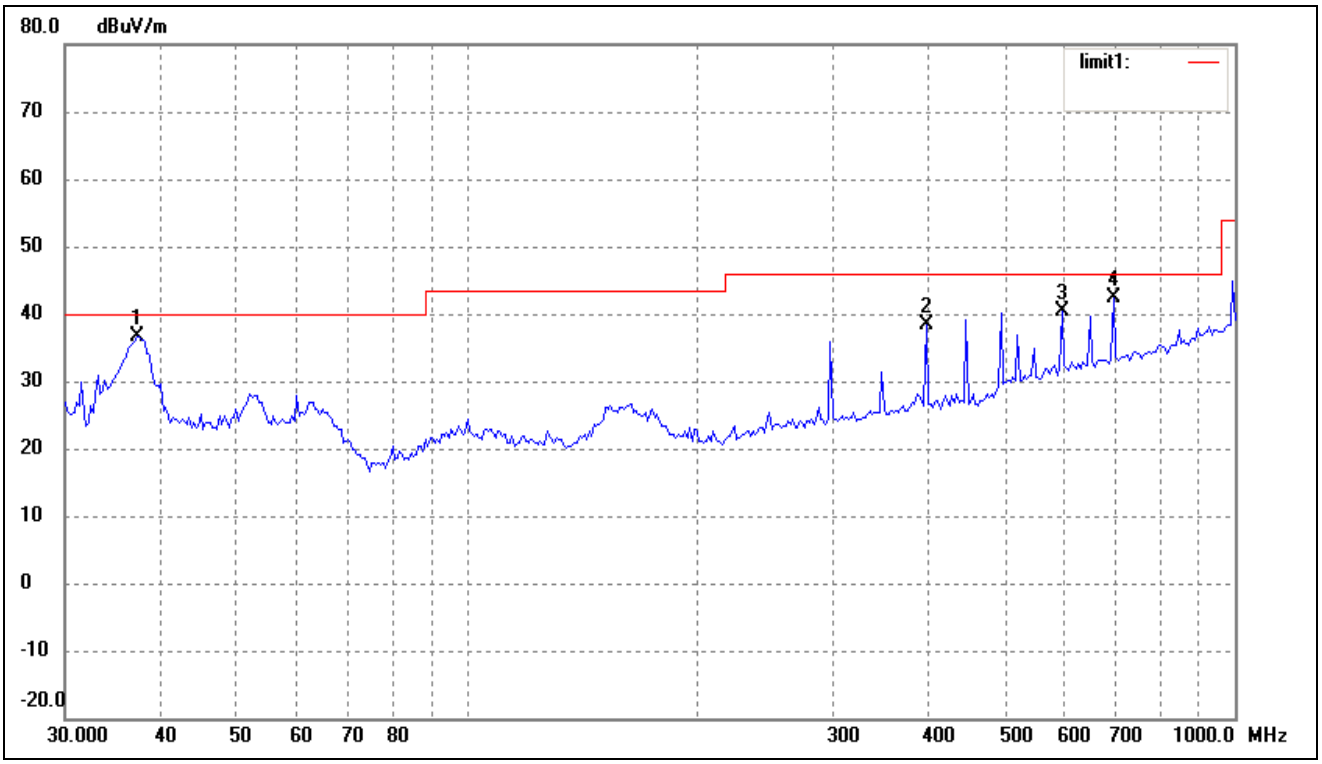
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.8121	29.52	7.54	37.06	40.00	-2.94	231	100	QP
2	446.4141	27.03	12.05	39.08	46.00	-6.92	225	118	QP
3	647.3856	27.07	17.07	44.14	46.00	-1.86	106	206	QP
4	495.9344	29.52	14.01	43.53	46.00	-2.47	220	107	QP
5	297.2241	26.20	9.73	35.93	46.00	-10.07	0	360	peak

Spurious Emission From 30 MHz to 1 GHz
Test mode: Transmitting (802.11b) Middle Channel
Comment:
Horizontal



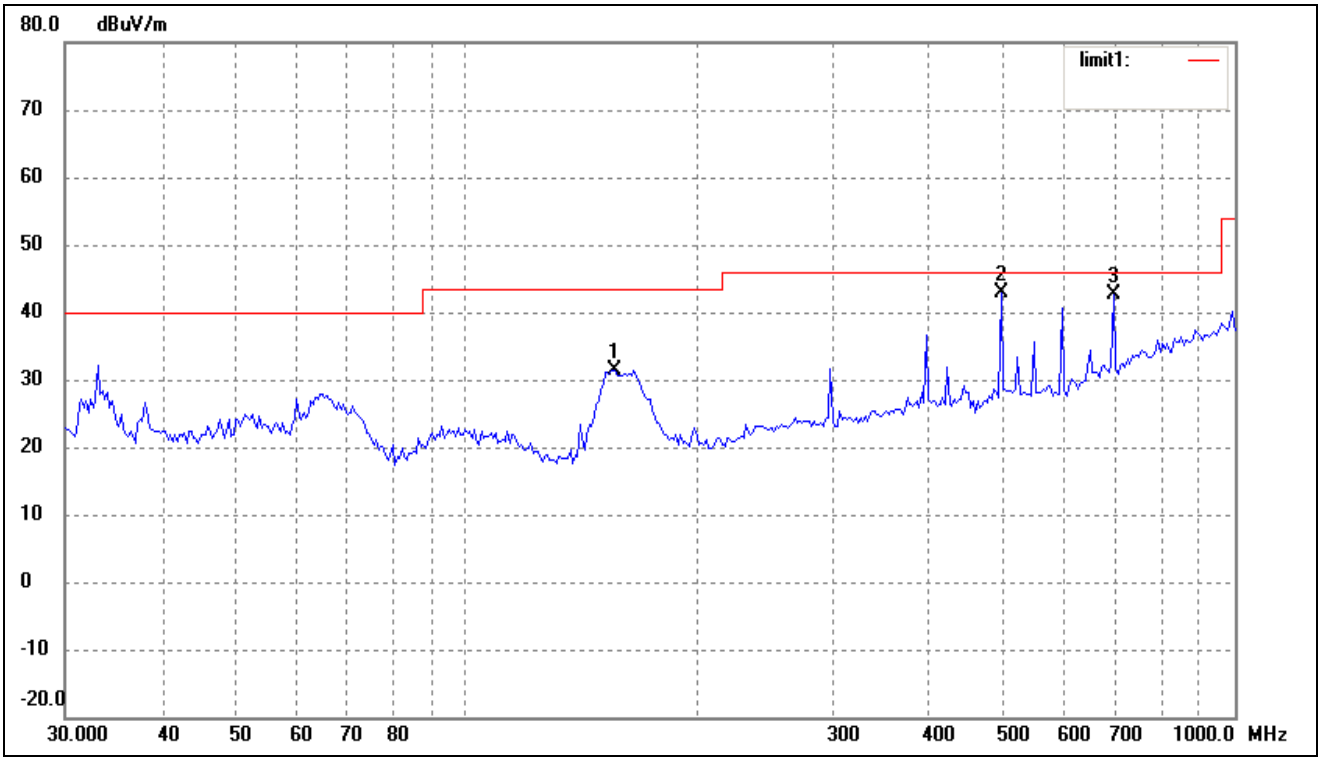
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	161.4742	26.44	4.59	31.03	43.50	-12.47	360	200	peak
2	396.2415	24.51	11.37	35.88	46.00	-10.12	0	200	peak
3	595.1329	25.85	16.55	42.40	46.00	-3.60	208	150	QP
4	495.9344	27.53	14.01	41.54	46.00	-4.46	117	124	QP

Vertical



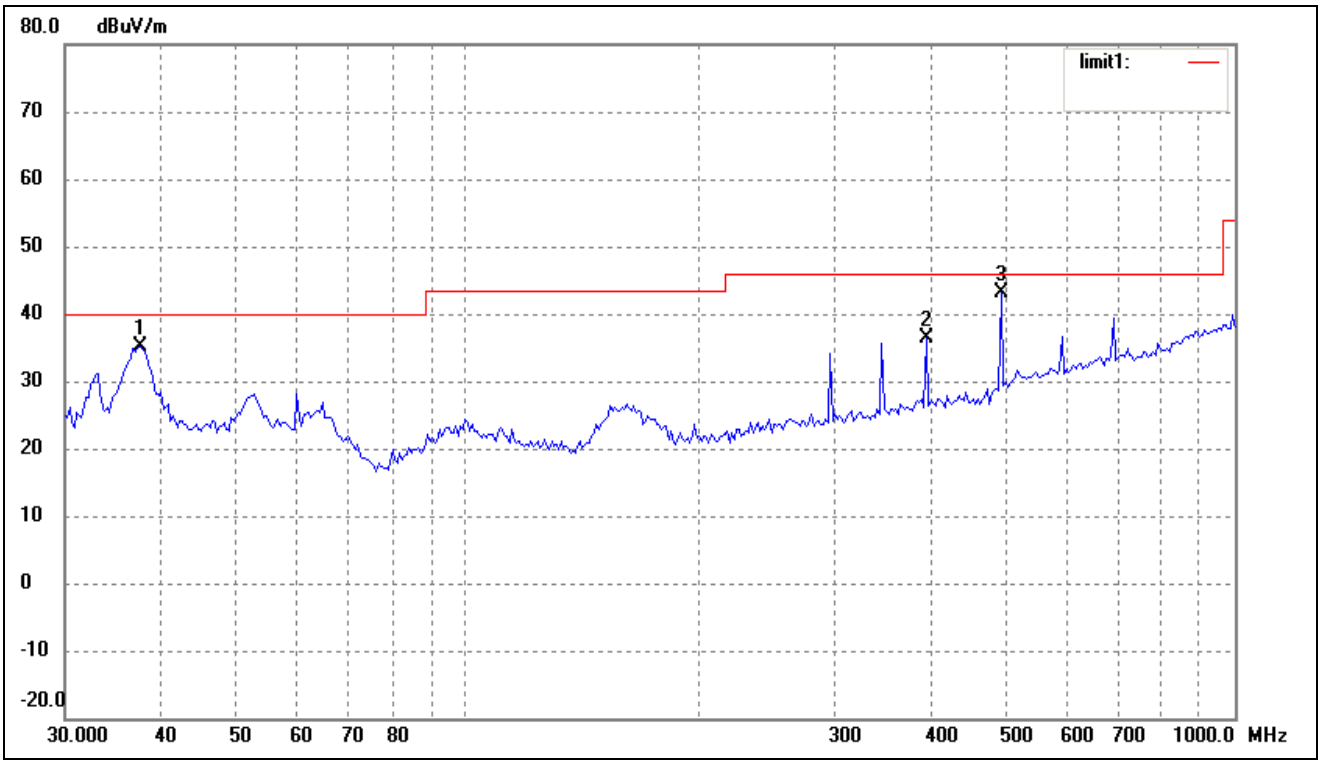
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.2855	29.11	7.40	36.51	40.00	-3.49	203	150	QP
2	396.2415	26.97	11.37	38.34	46.00	-7.66	226	125	QP
3	595.1329	23.86	16.55	40.41	46.00	-5.59	360	200	QP
4	694.4174	24.90	17.45	42.35	46.00	-3.65	0	200	QP

Spurious Emission From 30 MHz to 1 GHz
Test mode: Transmitting (802.11b) High Channel
Comment:
Horizontal



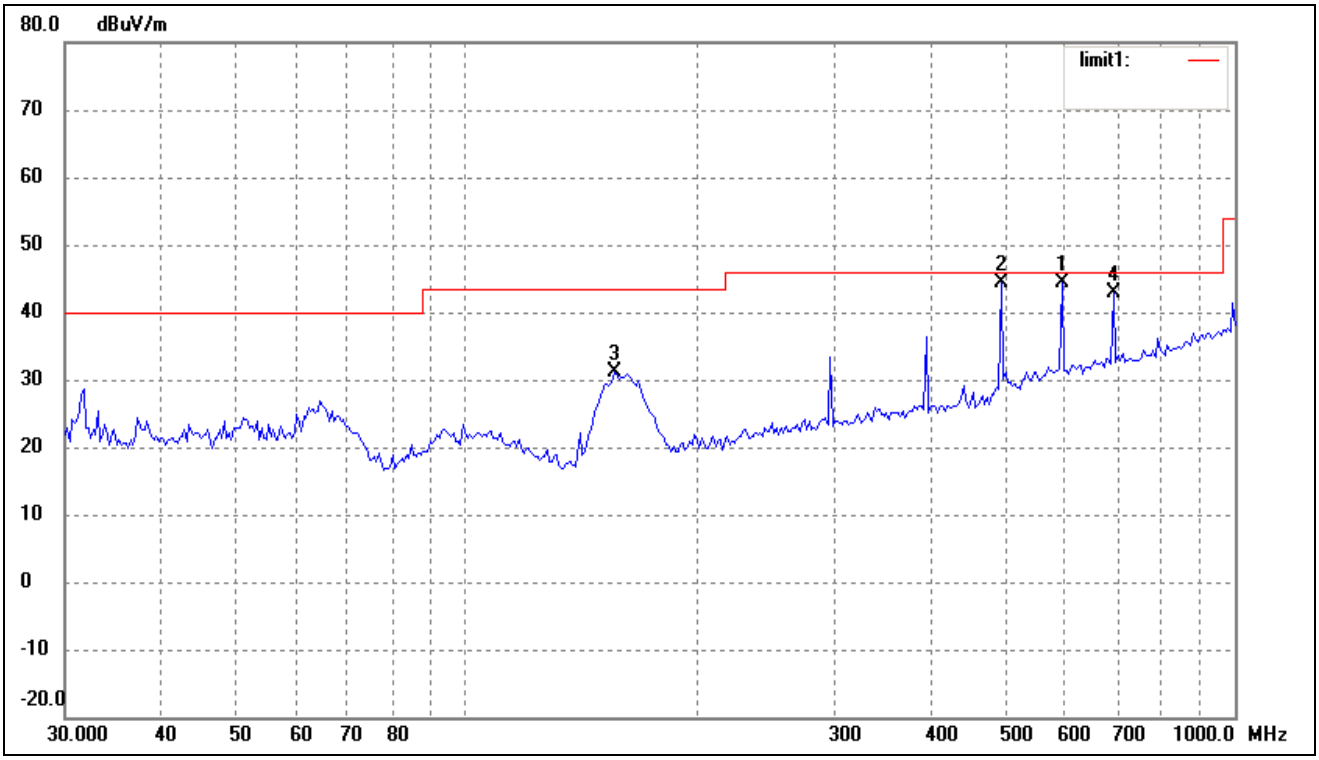
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	155.9101	27.11	4.35	31.46	43.50	-12.04	360	200	peak
2	495.9344	28.91	14.01	42.92	46.00	-3.08	208	150	QP
3	694.4174	25.18	17.45	42.63	46.00	-3.37	135	170	QP

Vertical



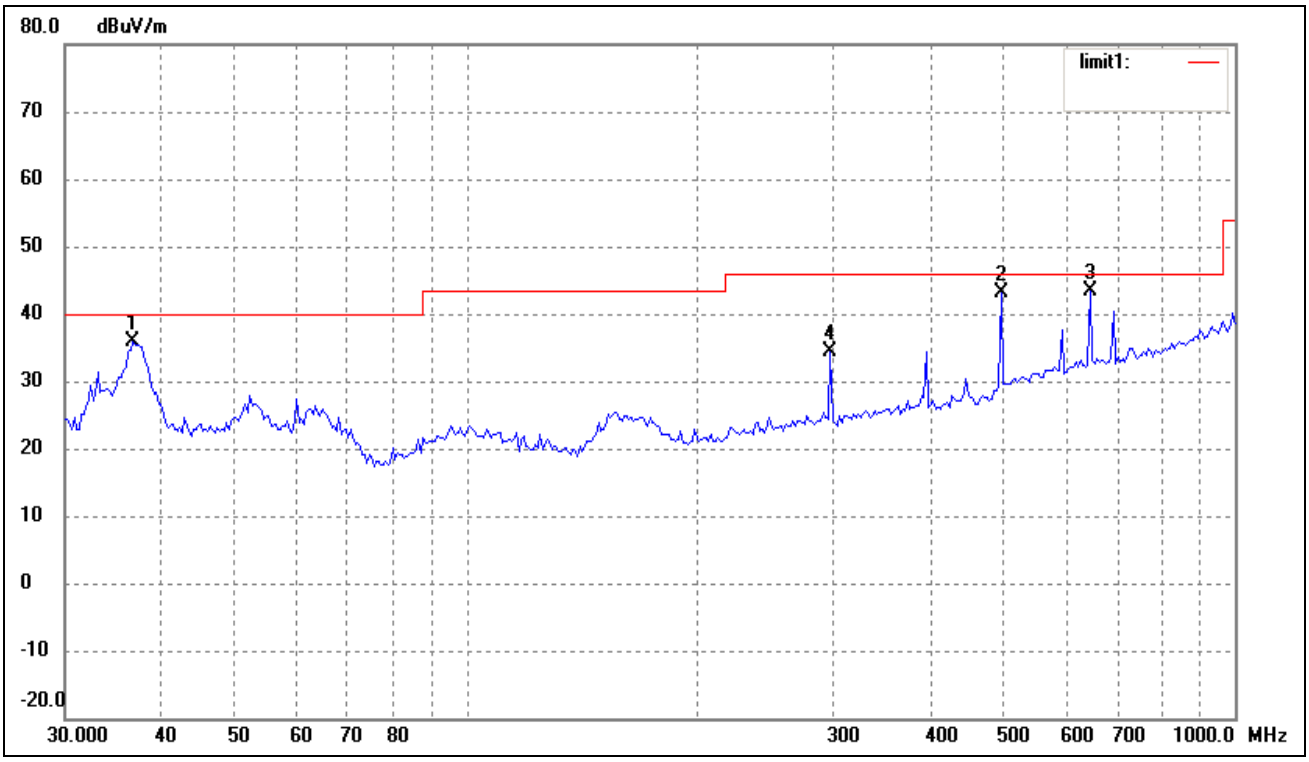
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.5479	27.74	7.47	35.21	40.00	-4.79	203	108	QP
2	396.2415	24.89	11.37	36.26	46.00	-9.74	360	115	peak
3	495.9344	29.24	14.01	43.25	46.00	-2.75	106	200	QP

Spurious Emission From 30 MHz to 1 GHz
Test mode: Transmitting (802.11g) Low Channel
Comment:
Horizontal



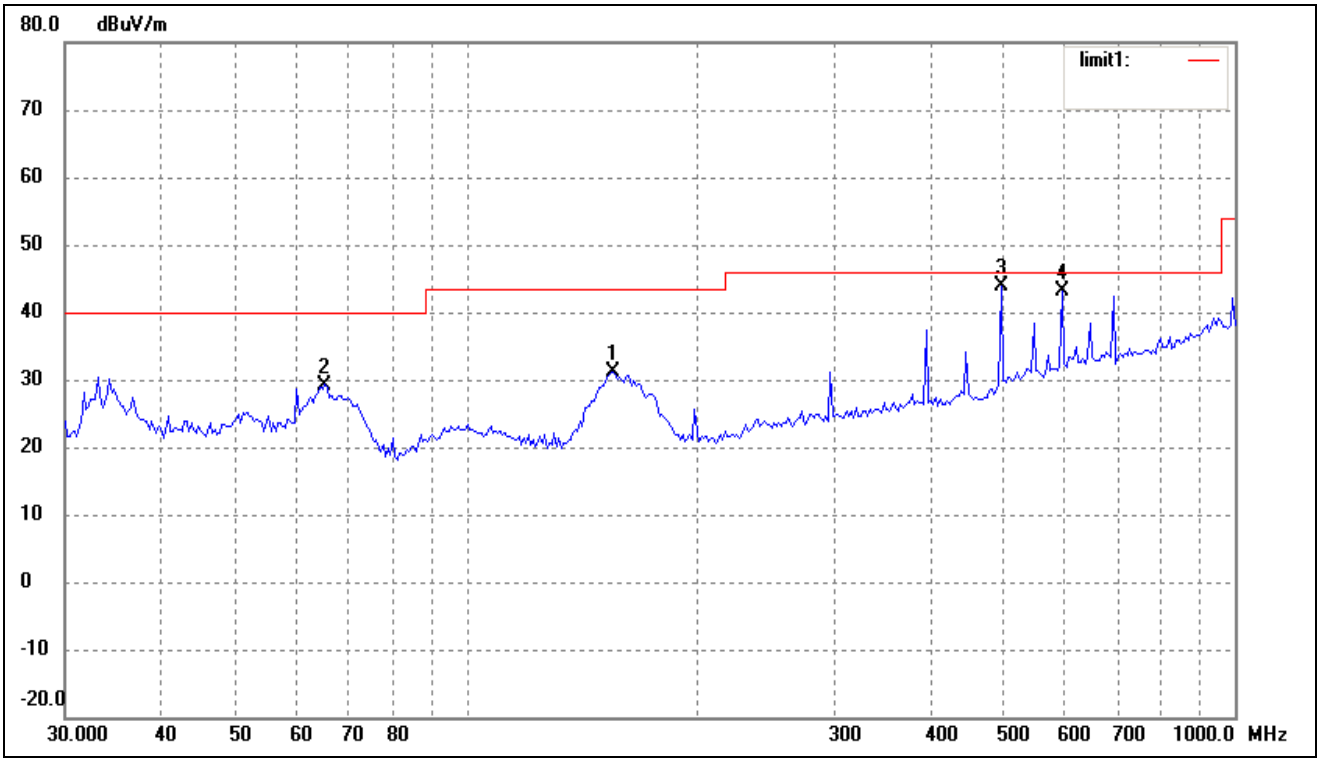
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	595.1329	27.91	16.55	44.46	46.00	-1.54	206	119	QP
2	495.9344	30.31	14.01	44.32	46.00	-1.68	221	128	QP
3	155.9101	26.83	4.35	31.18	43.50	-12.32	360	100	peak
4	694.4174	25.48	17.45	42.93	46.00	-3.07	116	207	QP

Vertical



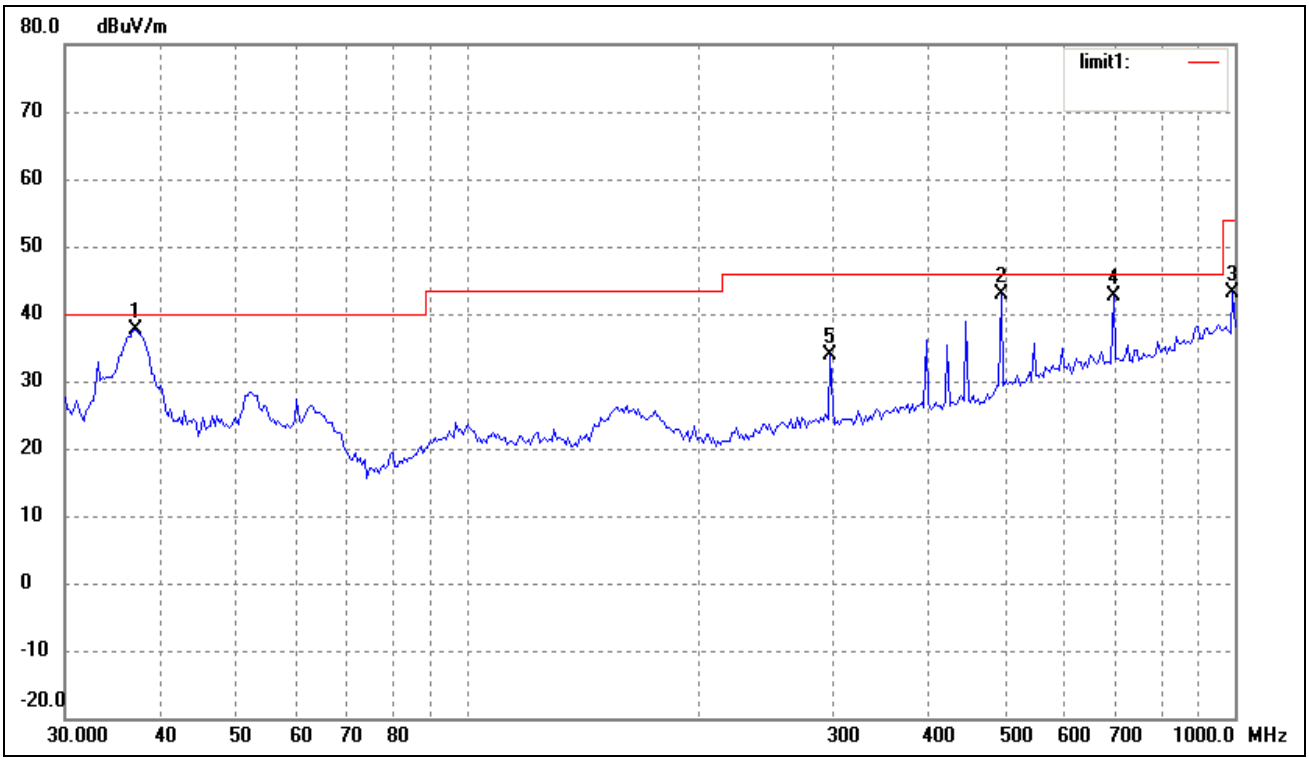
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	36.7662	28.69	7.25	35.94	40.00	-4.06	206	107	QP
2	495.9344	29.10	14.01	43.11	46.00	-2.89	231	119	QP
3	647.3856	26.39	17.07	43.46	46.00	-2.54	118	145	QP
4	297.2241	24.55	9.73	34.28	46.00	-11.72	360	200	peak

Spurious Emission From 30 MHz to 1 GHz
Test mode: Transmitting (802.11g) Middle Channel
Comment:
Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	154.8205	26.75	4.30	31.05	43.50	-12.45	360	100	peak
2	65.3432	23.81	5.44	29.25	40.00	-10.75	0	100	peak
3	495.9344	29.86	14.01	43.87	46.00	-2.13	227	116	QP
4	595.1329	26.46	16.55	43.01	46.00	-2.99	124	208	QP

Vertical



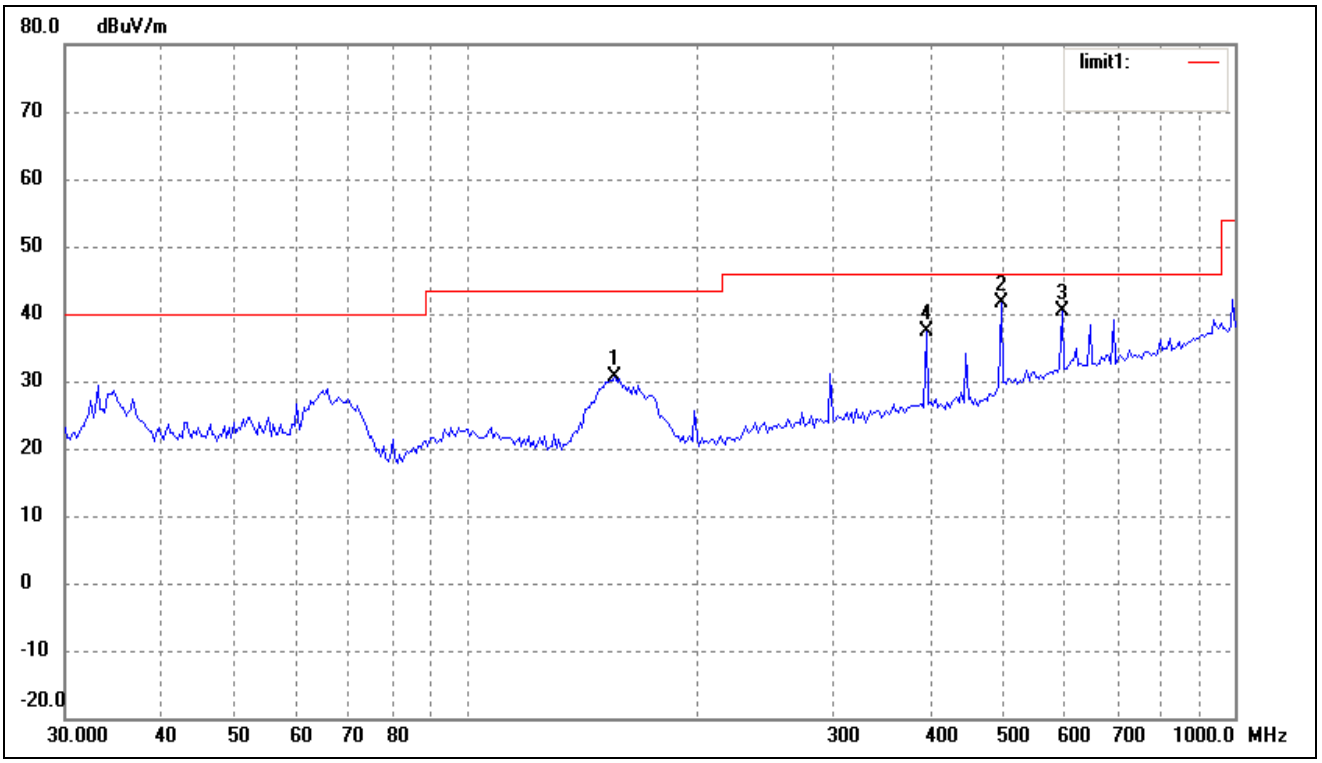
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.0249	30.28	7.33	37.61	40.00	-2.39	203	126	QP
2	495.9344	28.80	14.01	42.81	46.00	-3.19	118	157	QP
3	993.0114	20.59	22.61	43.20	54.00	-10.80	0	100	peak
4	694.4174	25.24	17.45	42.69	46.00	-3.31	109	124	QP
5	297.2241	24.09	9.73	33.82	46.00	-12.18	128	100	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11g) High Channel

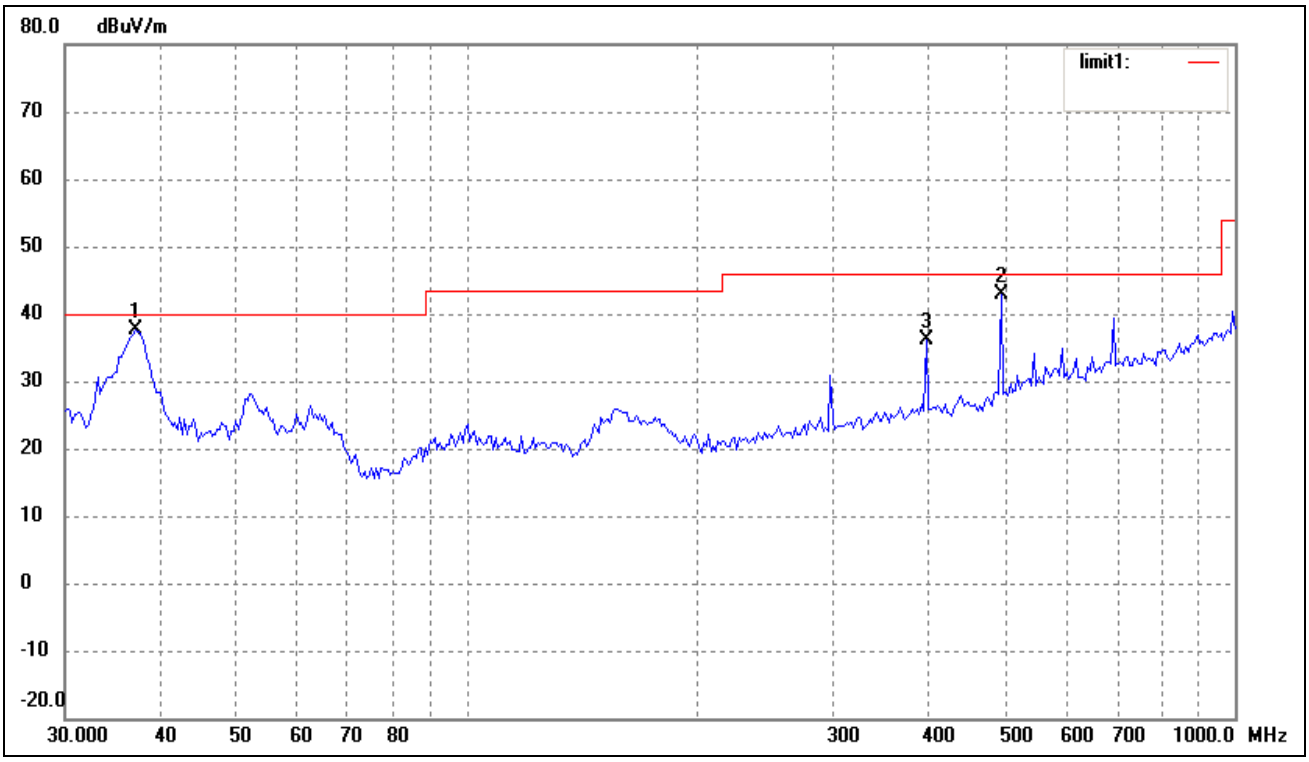
Comment:

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	155.9101	26.31	4.35	30.66	43.50	-12.84	360	100	peak
2	495.9344	27.50	14.01	41.51	46.00	-4.49	209	106	QP
3	595.1329	23.88	16.55	40.43	46.00	-5.57	216	141	QP
4	396.2415	25.96	11.37	37.33	46.00	-8.67	0	200	peak

Vertical



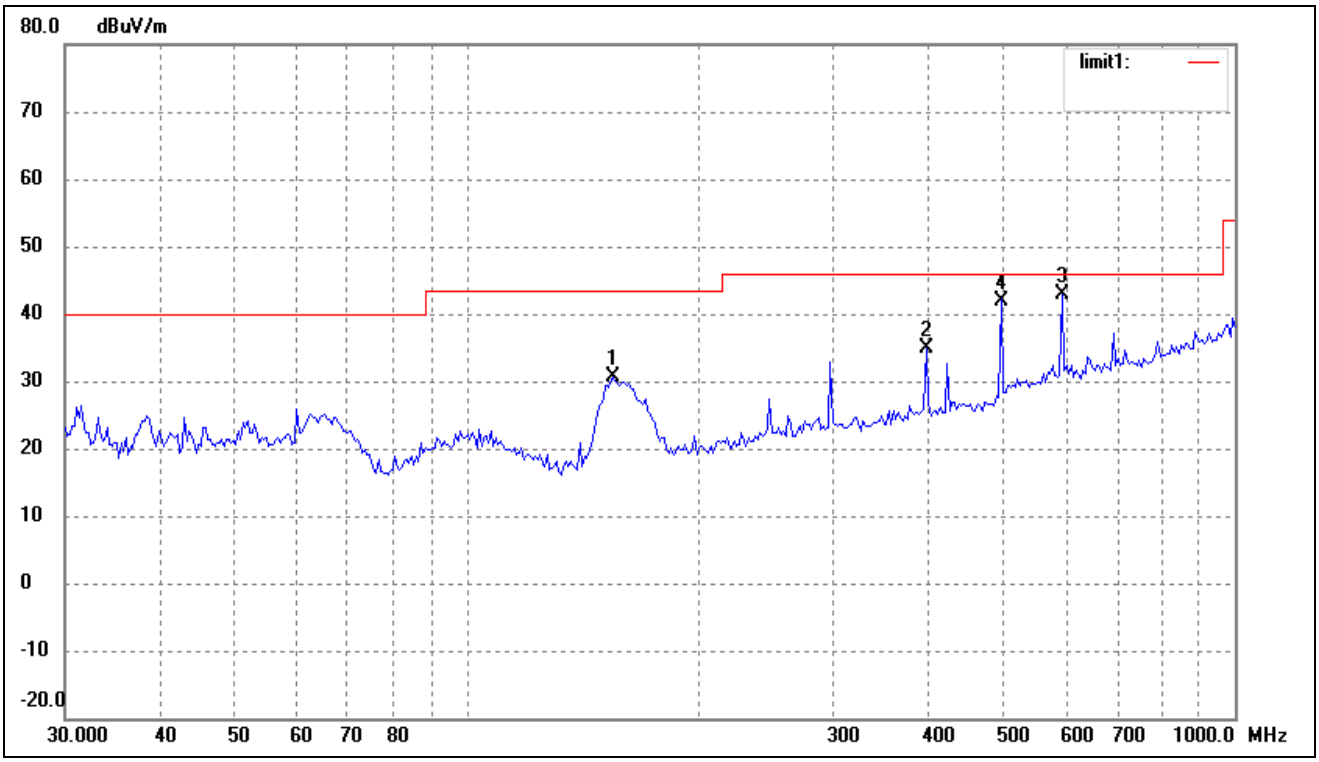
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.0249	30.28	7.33	37.61	40.00	-2.39	206	148	QP
2	495.9344	28.92	14.01	42.93	46.00	-3.07	237	112	QP
3	396.2415	24.65	11.37	36.02	46.00	-9.98	360	200	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11n HT20) Low Channel

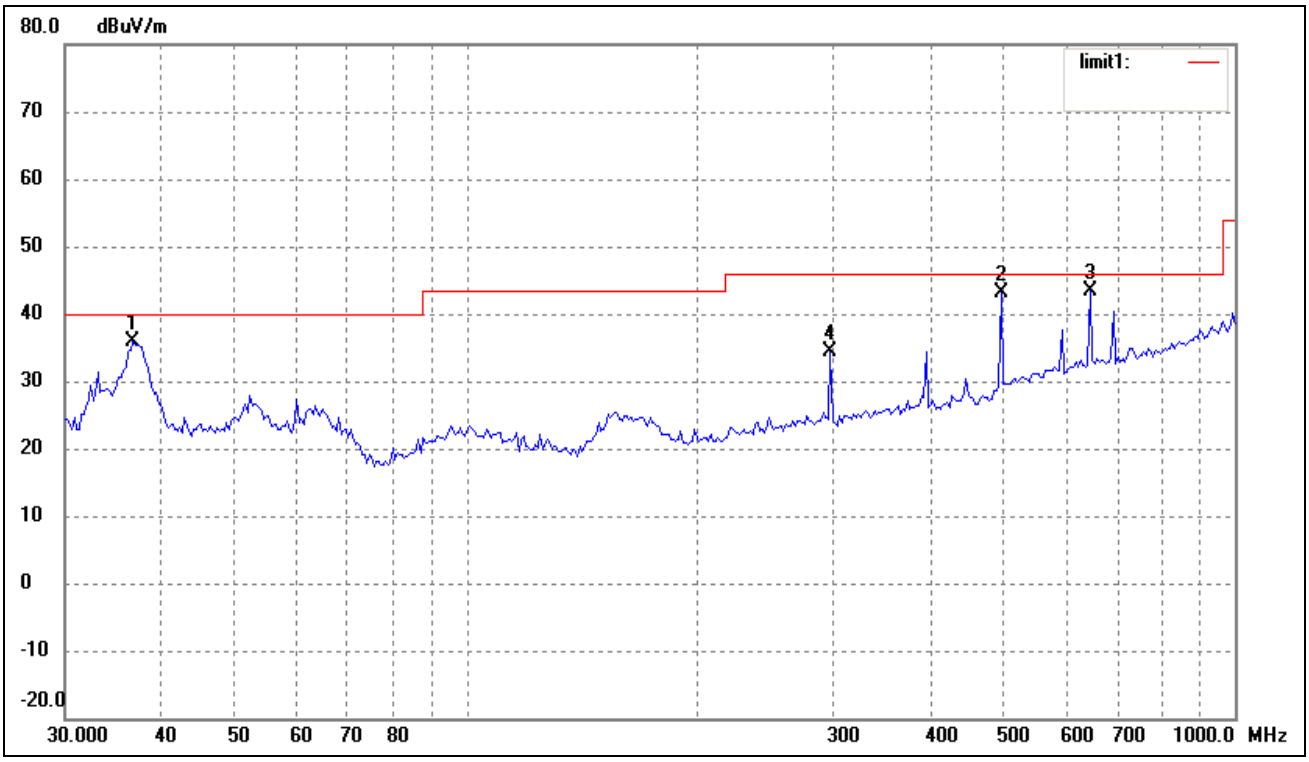
Comment:

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	154.8205	26.21	4.30	30.51	43.50	-12.99	360	100	peak
2	396.2415	23.46	11.37	34.83	46.00	-11.17	0	200	peak
3	595.1329	26.23	16.55	42.78	46.00	-3.22	206	103	QP
4	495.9344	27.99	14.01	42.00	46.00	-4.00	228	150	QP

Vertical



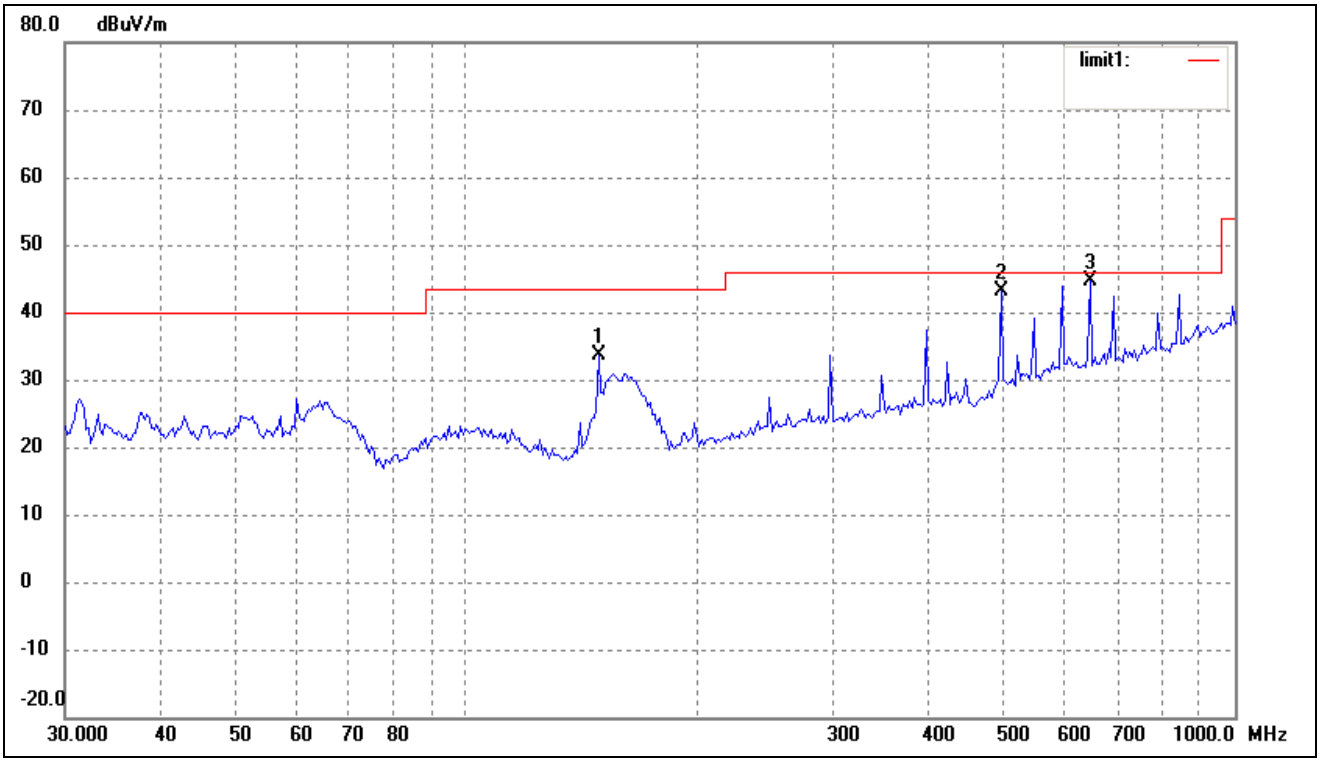
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	36.7662	28.69	7.25	35.94	40.00	-4.06	206	107	QP
2	495.9344	29.10	14.01	43.11	46.00	-2.89	231	119	QP
3	647.3856	26.39	17.07	43.46	46.00	-2.54	118	145	QP
4	297.2241	24.55	9.73	34.28	46.00	-11.72	360	200	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11n HT20) Middle Channel

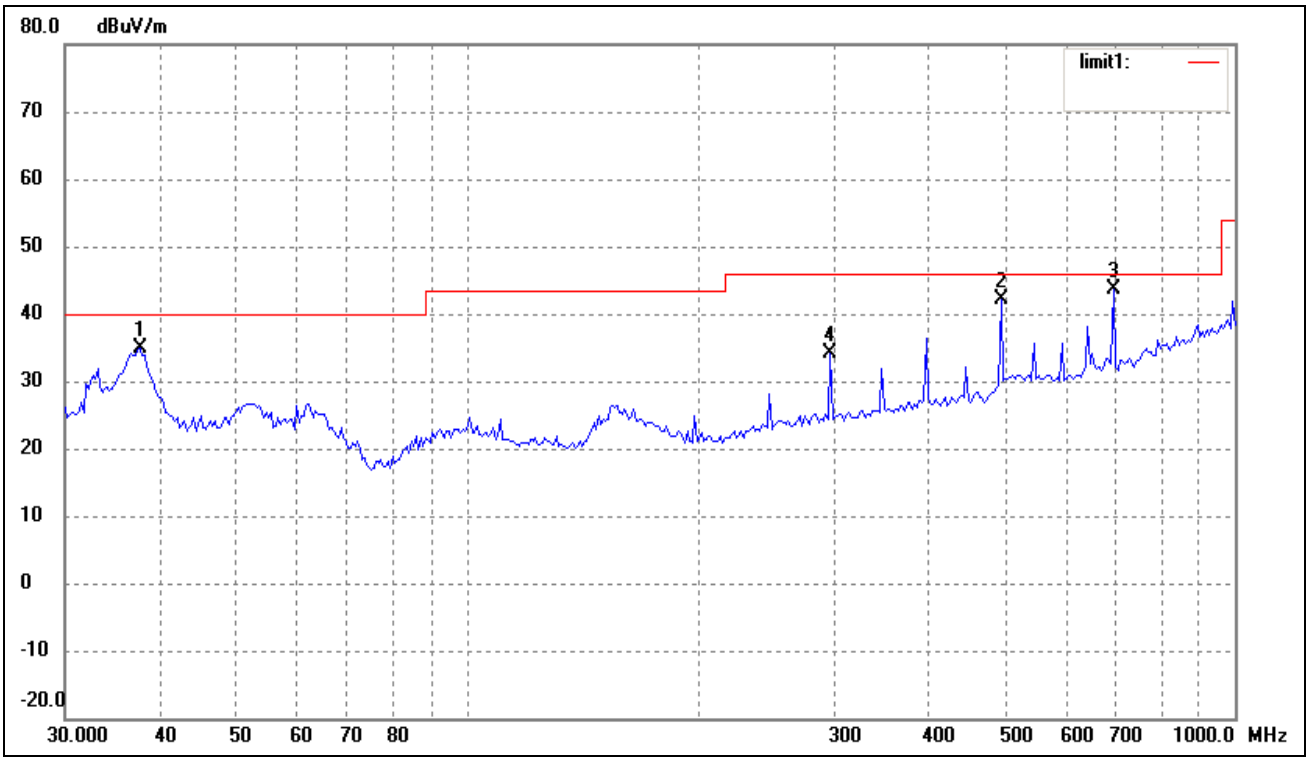
Comment:

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	148.4410	29.50	4.07	33.57	43.50	-9.93	360	200	peak
2	495.9344	29.10	14.01	43.11	46.00	-2.89	209	114	QP
3	647.3856	27.68	17.07	44.75	46.00	-1.25	227	125	QP

Vertical



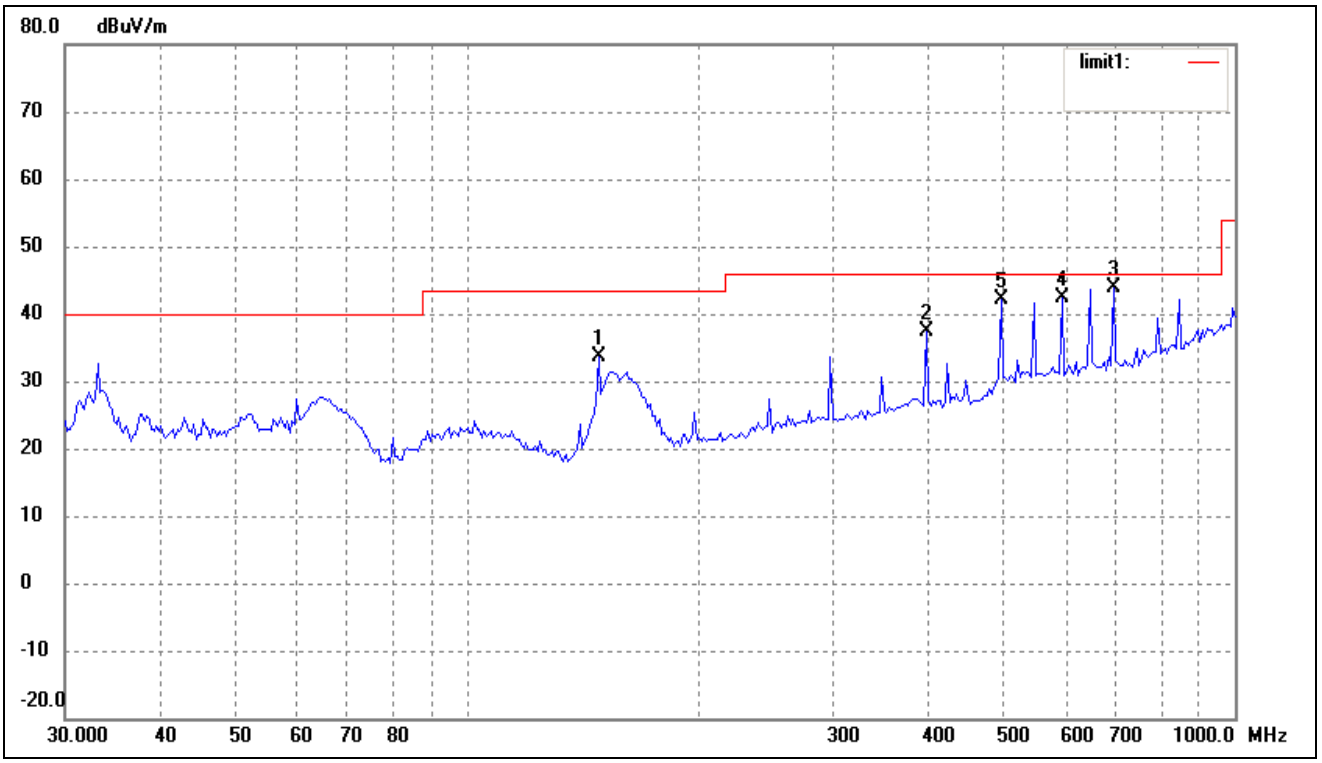
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.5479	27.34	7.47	34.81	40.00	-5.19	206	153	QP
2	495.9344	28.05	14.01	42.06	46.00	-3.94	223	149	QP
3	694.4174	26.06	17.45	43.51	46.00	-2.49	128	115	QP
4	297.2241	24.43	9.73	34.16	46.00	-11.84	360	200	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11n HT20) High Channel

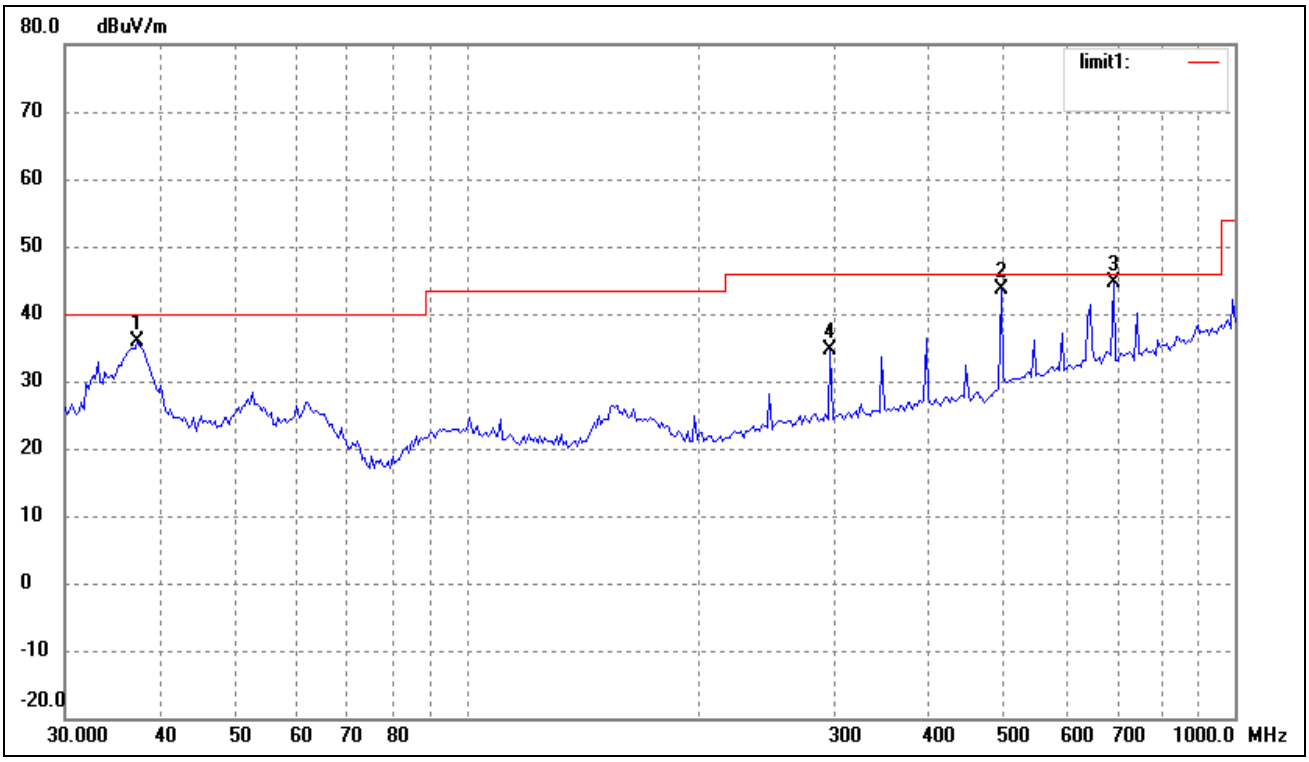
Comment:

Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	148.4410	29.50	4.07	33.57	43.50	-9.93	360	200	peak
2	396.2415	26.11	11.37	37.48	46.00	-8.52	0	100	peak
3	694.4174	26.42	17.45	43.87	46.00	-2.13	203	106	QP
4	595.1329	25.87	16.55	42.42	46.00	-3.58	228	115	QP
5	495.9344	28.10	14.01	42.11	46.00	-3.89	164	256	QP

Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	37.2855	28.58	7.40	35.98	40.00	-4.02	203	157	QP
2	495.9344	29.61	14.01	43.62	46.00	-2.38	234	136	QP
3	694.4174	27.06	17.45	44.51	46.00	-1.49	116	122	QP
4	297.2241	24.92	9.73	34.65	46.00	-11.35	360	200	peak

Spurious Emission above 1GHz

Test Mode: Transmitting (802.11b)

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	PK	50.6	90	V	34.1	5.2	33.0	56.9	74	-17.1
4824.0	PK	45.2	270	H	34.1	5.2	33.0	51.5	74	-22.5
7236.0	PK	46.2	180	V	37.4	6.1	33.5	56.2	74	-17.8
7236.0	PK	44.1	45	H	37.4	6.1	33.5	54.1	74	-19.9
4824.0	AV	35.2	270	V	34.1	5.2	33.0	41.5	54	-12.5
4824.0	AV	33.9	90	H	34.1	5.2	33.0	40.2	54	-13.8
7236.0	AV	34.8	45	V	37.4	6.1	33.5	44.8	54	-9.2
7236.0	AV	33.8	60	H	37.4	6.1	33.5	43.8	54	-10.2
Middle Channel (1G to 25GHz)										
4874.0	PK	49.2	45	V	34.1	5.2	33.0	55.5	74	-18.5
4874.0	PK	47.1	270	H	34.1	5.2	33.0	53.4	74	-20.6
7311.0	PK	45.8	45	V	37.4	6.1	33.5	55.8	74	-18.2
7311.0	PK	44.2	180	H	37.4	6.1	33.5	54.2	74	-19.8
4874.0	AV	38.5	270	V	34.1	5.2	33.0	44.8	54	-9.2
4874.0	AV	37.2	90	H	34.1	5.2	33.0	43.5	54	-10.5
7311.0	AV	33.6	60	V	37.4	6.1	33.5	43.6	54	-10.4
7311.0	AV	34.1	45	H	37.4	6.1	33.5	44.1	54	-9.9
High Channel (1G to 25GHz)										
4924.0	PK	50.2	270	V	34.1	5.2	33.0	56.5	74	-17.5
4924.0	PK	48.6	45	H	34.1	5.2	33.0	54.9	74	-19.1
7386.0	PK	44.1	180	V	37.4	6.1	33.5	54.1	74	-19.9
7386.0	PK	43.9	45	H	37.4	6.1	33.5	53.9	74	-20.1
4924.0	AV	39.5	90	V	34.1	5.2	33.0	45.8	54	-8.2
4924.0	AV	33.8	270	H	34.1	5.2	33.0	40.1	54	-13.9
7386.0	AV	34.6	60	V	37.4	6.1	33.5	44.6	54	-9.4
7386.0	AV	32.4	60	H	37.4	6.1	33.5	42.4	54	-11.6

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

Spurious Emission Above 1GHz

Test Mode: Transmitting (802.11g)

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	PK	53.2	90	V	34.1	5.2	33.0	59.5	74	-14.5
4824.0	PK	49.6	270	H	34.1	5.2	33.0	55.9	74	-18.1
7236.0	PK	48.2	180	V	37.4	6.1	33.5	58.2	74	-15.8
7236.0	PK	46.8	45	H	37.4	6.1	33.5	56.8	74	-17.2
4824.0	AV	38.5	270	V	34.1	5.2	33.0	44.8	54	-9.2
4824.0	AV	36.8	90	H	34.1	5.2	33.0	43.1	54	-10.9
7236.0	AV	35.6	45	V	37.4	6.1	33.5	45.6	54	-8.4
7236.0	AV	34.7	60	H	37.4	6.1	33.5	44.7	54	-9.3
Middle Channel (1G to 25GHz)										
4874.0	PK	49.3	45	V	34.1	5.2	33.0	55.6	74	-18.4
4874.0	PK	48.2	270	H	34.1	5.2	33.0	54.5	74	-19.5
7311.0	PK	45.1	45	V	37.4	6.1	33.5	55.1	74	-18.9
7311.0	PK	44.2	180	H	37.4	6.1	33.5	54.2	74	-19.8
4874.0	AV	39.5	270	V	34.1	5.2	33.0	45.8	54	-8.2
4874.0	AV	37.8	90	H	34.1	5.2	33.0	44.1	54	-9.9
7311.0	AV	35.3	60	V	37.4	6.1	33.5	45.3	54	-8.7
7311.0	AV	36.7	45	H	37.4	6.1	33.5	46.7	54	-7.3
High Channel (1G to 25GHz)										
4924.0	PK	55.2	270	V	34.1	5.2	33.0	61.5	74	-12.5
4924.0	PK	51.8	45	H	34.1	5.2	33.0	58.1	74	-15.9
7386.0	PK	49.6	180	V	37.4	6.1	33.5	59.6	74	-14.4
7386.0	PK	47.8	45	H	37.4	6.1	33.5	57.8	74	-16.2
4924.0	AV	38.2	90	V	34.1	5.2	33.0	44.5	54	-9.5
4924.0	AV	36.5	270	H	34.1	5.2	33.0	42.8	54	-11.2
7386.0	AV	34.8	60	V	37.4	6.1	33.5	44.8	54	-9.2
7386.0	AV	33.6	60	H	37.4	6.1	33.5	43.6	54	-10.4

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

Spurious Emission Above 1GHz

Test Mode: Transmitting (802.11n HT20)

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	PK	56.8	90	V	34.1	5.2	33.0	63.1	74	-10.9
4824.0	PK	55.7	270	H	34.1	5.2	33.0	62.0	74	-12.0
7236.0	PK	48.2	180	V	37.4	6.1	33.5	58.2	74	-15.8
7236.0	PK	46.7	45	H	37.4	6.1	33.5	56.7	74	-17.3
4824.0	AV	35.2	270	V	34.1	5.2	33.0	41.5	54	-12.5
4824.0	AV	34.1	90	H	34.1	5.2	33.0	40.4	54	-13.6
7236.0	AV	33.8	45	V	37.4	6.1	33.5	43.8	54	-10.2
7236.0	AV	32.6	60	H	37.4	6.1	33.5	42.6	54	-11.4
Middle Channel (1G to 25GHz)										
4874.0	PK	54.8	45	V	34.1	5.2	33.0	61.1	74	-12.9
4874.0	PK	52.7	270	H	34.1	5.2	33.0	59.0	74	-15.0
7311.0	PK	46.7	45	V	37.4	6.1	33.5	56.7	74	-17.3
7311.0	PK	45.1	180	H	37.4	6.1	33.5	55.1	74	-18.9
4874.0	AV	38.4	270	V	34.1	5.2	33.0	44.7	54	-9.3
4874.0	AV	33.7	90	H	34.1	5.2	33.0	40.0	54	-14.0
7311.0	AV	35.6	60	V	37.4	6.1	33.5	45.6	54	-8.4
7311.0	AV	36.1	45	H	37.4	6.1	33.5	46.1	54	-7.9
High Channel (1G to 25GHz)										
4924.0	PK	51.4	270	V	34.1	5.2	33.0	57.7	74	-16.3
4924.0	PK	49.7	45	H	34.1	5.2	33.0	56.0	74	-18.0
7386.0	PK	51.2	180	V	37.4	6.1	33.5	61.2	74	-12.8
7386.0	PK	50.7	45	H	37.4	6.1	33.5	60.7	74	-13.3
4924.0	AV	35.2	90	V	34.1	5.2	33.0	41.5	54	-12.5
4924.0	AV	34.7	270	H	34.1	5.2	33.0	41.0	54	-13.0
7386.0	AV	33.8	60	V	37.4	6.1	33.5	43.8	54	-10.8
7386.0	AV	32.4	60	H	37.4	6.1	33.5	42.4	54	-11.6

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

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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.

9.2 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	Agilent	8447F	3113A06717	2010-12-20	2011-12-19
Pre-amplifier	Compliance Direction	PAP-0118	24002	2010-12-20	2011-12-19
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	2011-01-09	2012-01-08
Horn Antenna	ETS	3117	00086197	2011-01-09	2012-01-08

9.3 Test Procedure

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

9.4 Environmental Conditions

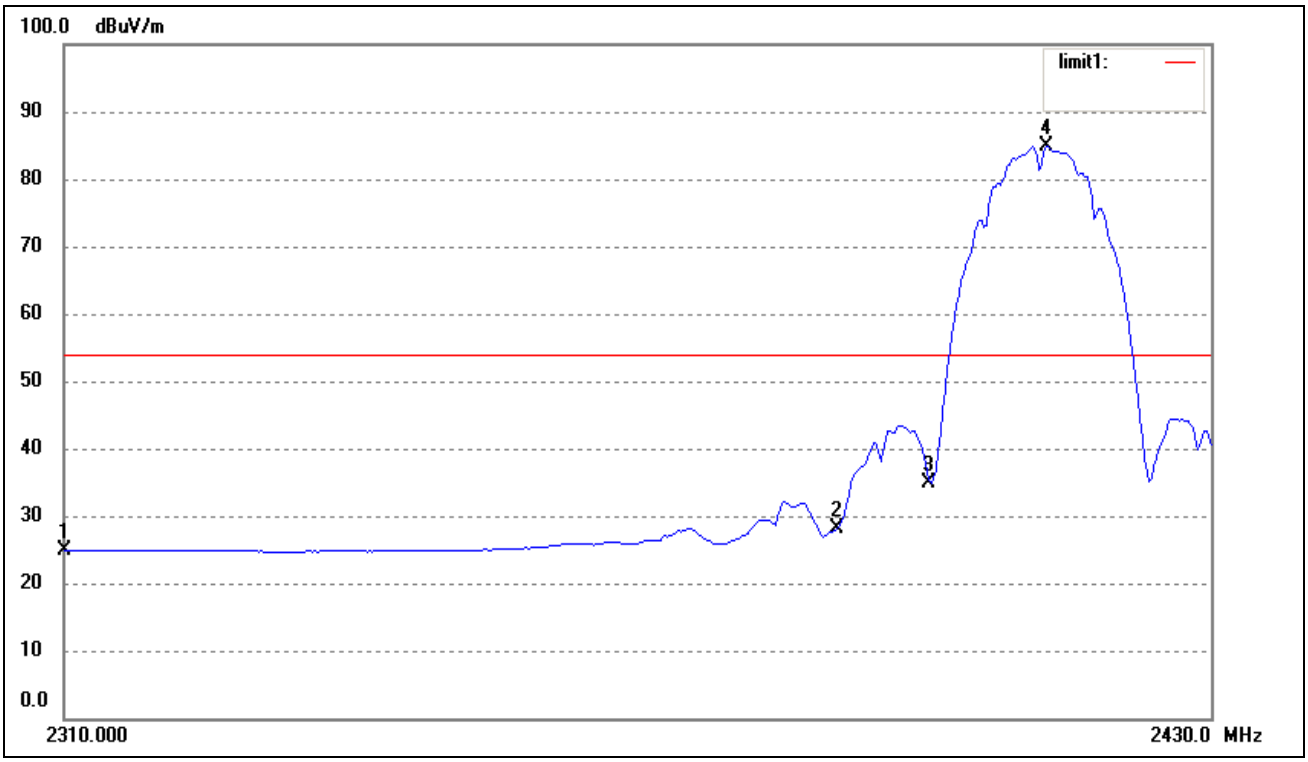
Temperature:	21° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

9.5 Summary of Test Results/Plots

Test mode	Frequency MHz	Limit dBuV /dB	Result
802.11b	2390.00	<54dBuv	Pass
	2400.00	>20dB ATT	Pass
	2483.50	<54dBuv	Pass
802.11g	2390.00	<54dBuv	Pass
	2400.00	>20dB ATT	Pass
	2483.50	<54dBuv	Pass
802.11nHT20	2390.00	<54dBuv	Pass
	2400.00	>20dB ATT	Pass
	2483.50	<54dBuv	Pass

For 802.11b

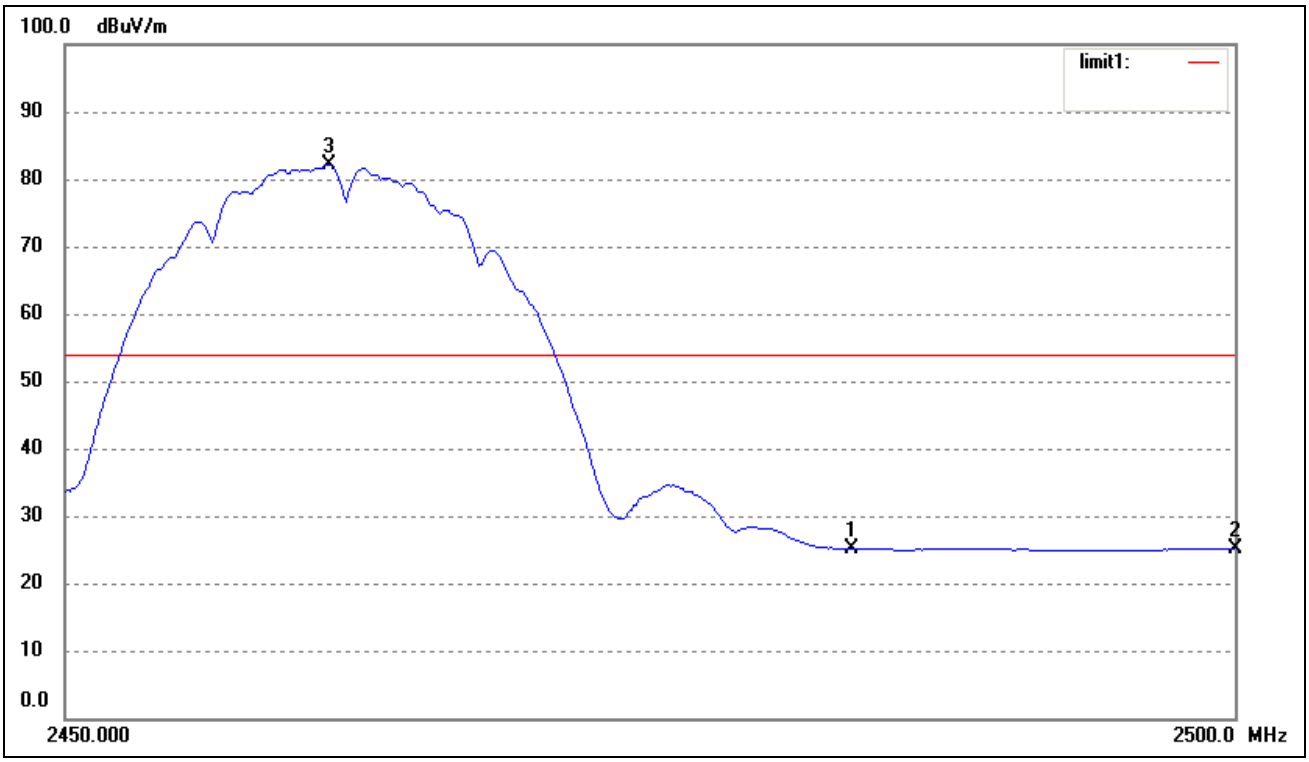
Lowest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	29.59	-4.65	24.94	54.00	-29.06	Average Detector
	2310.000	59.38	-4.65	54.73	74.00	-19.27	Peak Detector
2	2390.000	32.63	-4.46	28.17	54.00	-25.83	Average Detector
	2390.000	61.24	-4.46	56.78	74.00	-17.22	Peak Detector
3	2400.000	39.36	-4.43	34.93	/	/	Average Detector
4	2412.343	89.34	-4.40	84.94	/	/	Average Detector

For 802.11b

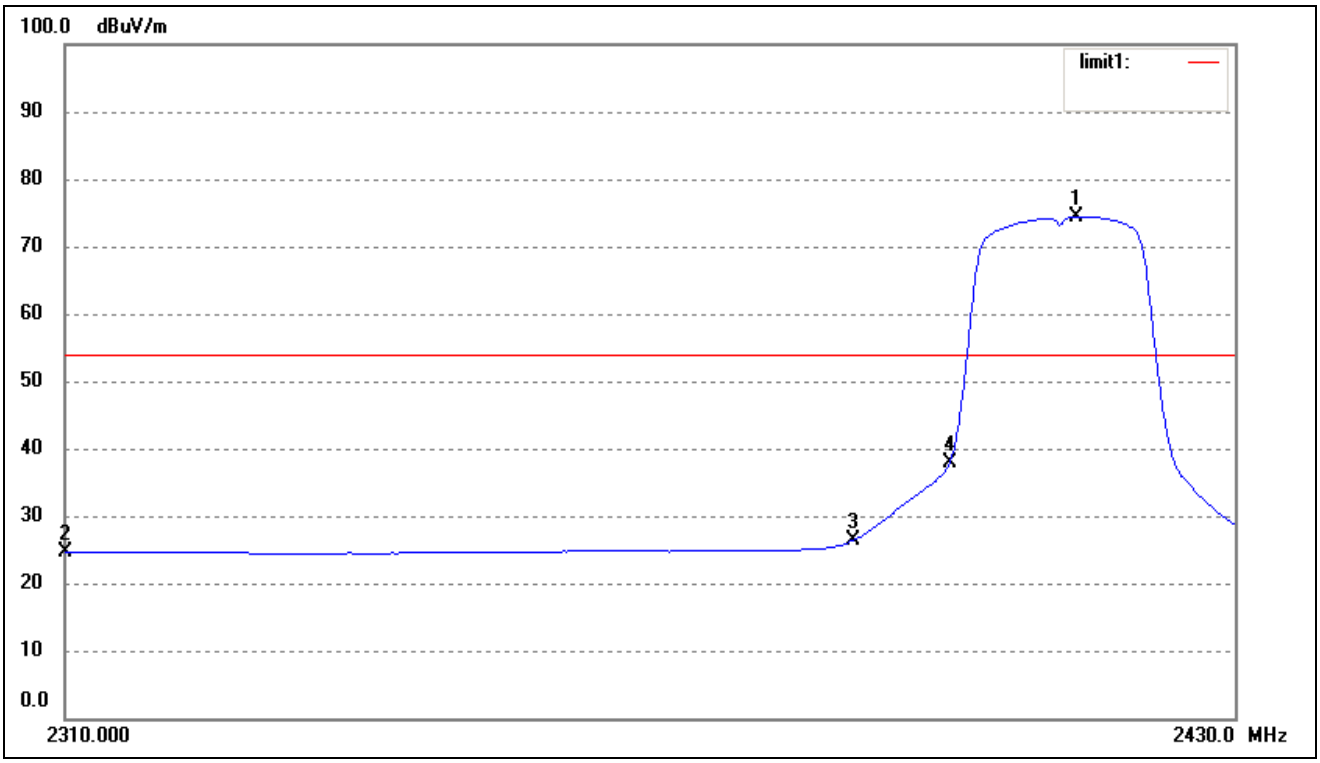
Highest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	29.34	-4.23	25.11	54.00	-28.89	Average Detector
	2483.500	58.26	-4.23	54.03	74.00	-19.97	Peak Detector
2	2500.000	29.38	-4.18	25.20	54.00	-28.80	Average Detector
	2500.000	60.34	-4.18	56.16	74.00	-17.48	Peak Detector
3	2461.212	86.42	-4.28	82.14	/	/	Average Detector

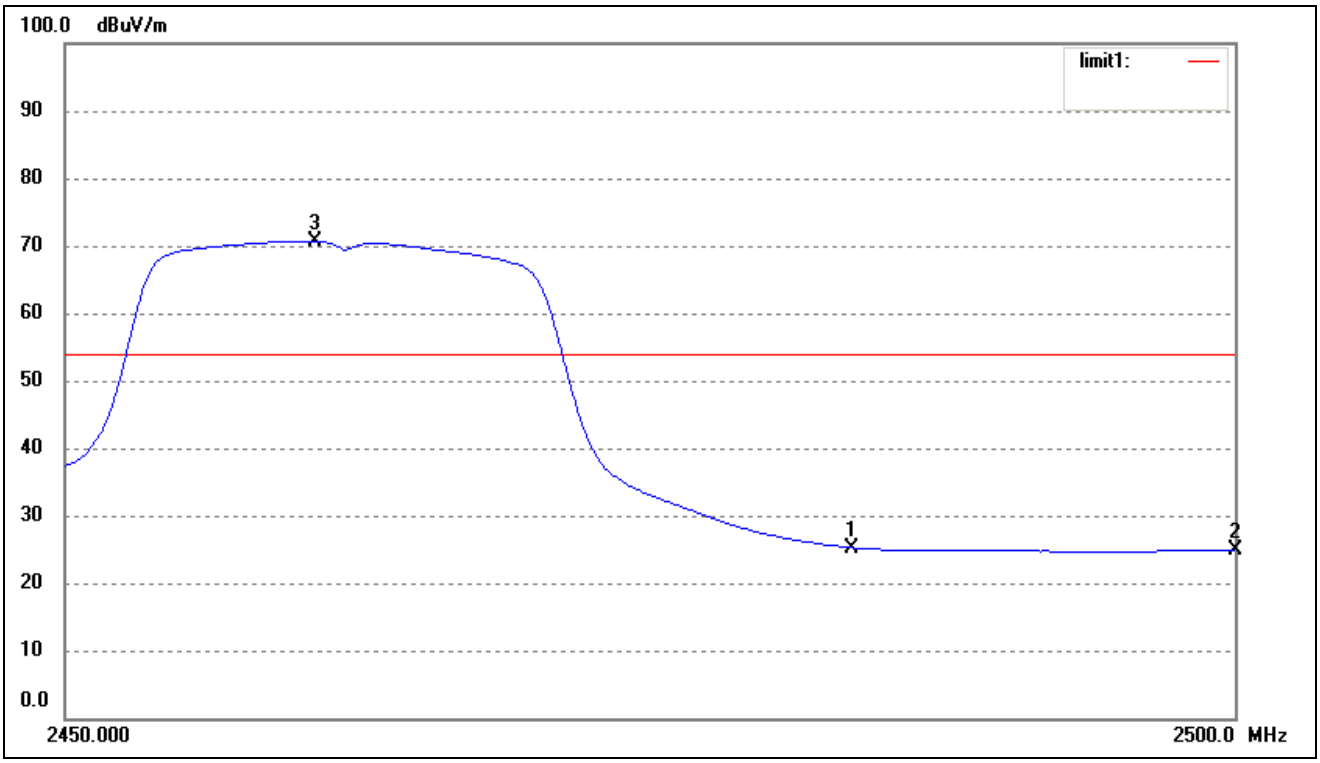
For 802.11g

Lowest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2413.321	78.80	-4.40	74.40	/	/	Average Detector
2	2310.000	29.29	-4.65	24.64	54.00	-29.36	Average Detector
	2310.000	59.18	-4.65	54.53	74.00	-19.47	Peak Detector
3	2390.000	30.87	-4.46	26.41	54.00	-27.59	Average Detector
	2390.000	61.28	-4.46	56.82	74.00	-17.18	Peak Detector
4	2400.000	42.25	-4.43	37.82	/	/	Average Detector

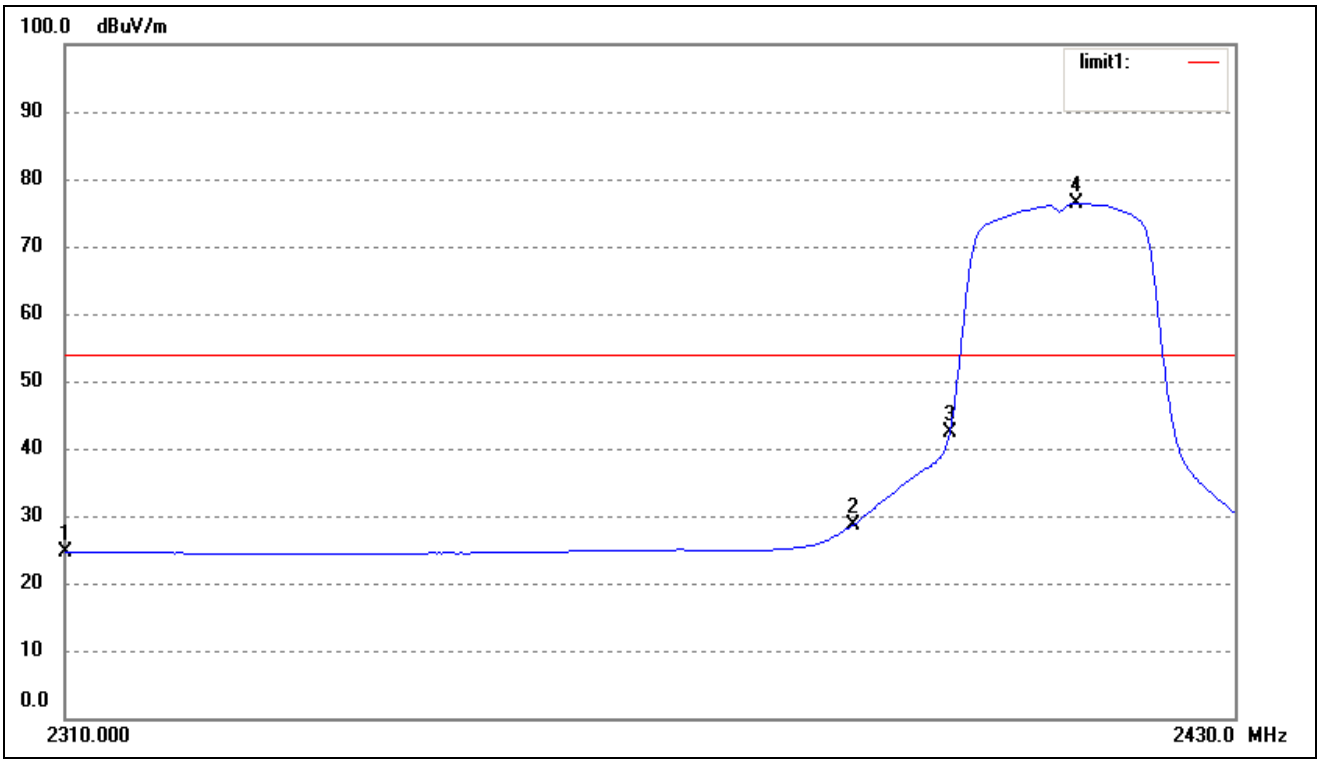
Highest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	29.47	-4.23	25.24	54.00	-28.76	Average Detector
	2483.500	59.42	-4.23	55.19	74.00	-18.81	Peak Detector
2	2500.000	29.03	-4.18	24.85	54.00	-29.15	Average Detector
	2500.000	60.16	-4.18	55.98	74.00	-18.02	Peak Detector
3	2460.615	75.00	-4.28	70.72	/	/	Peak Detector

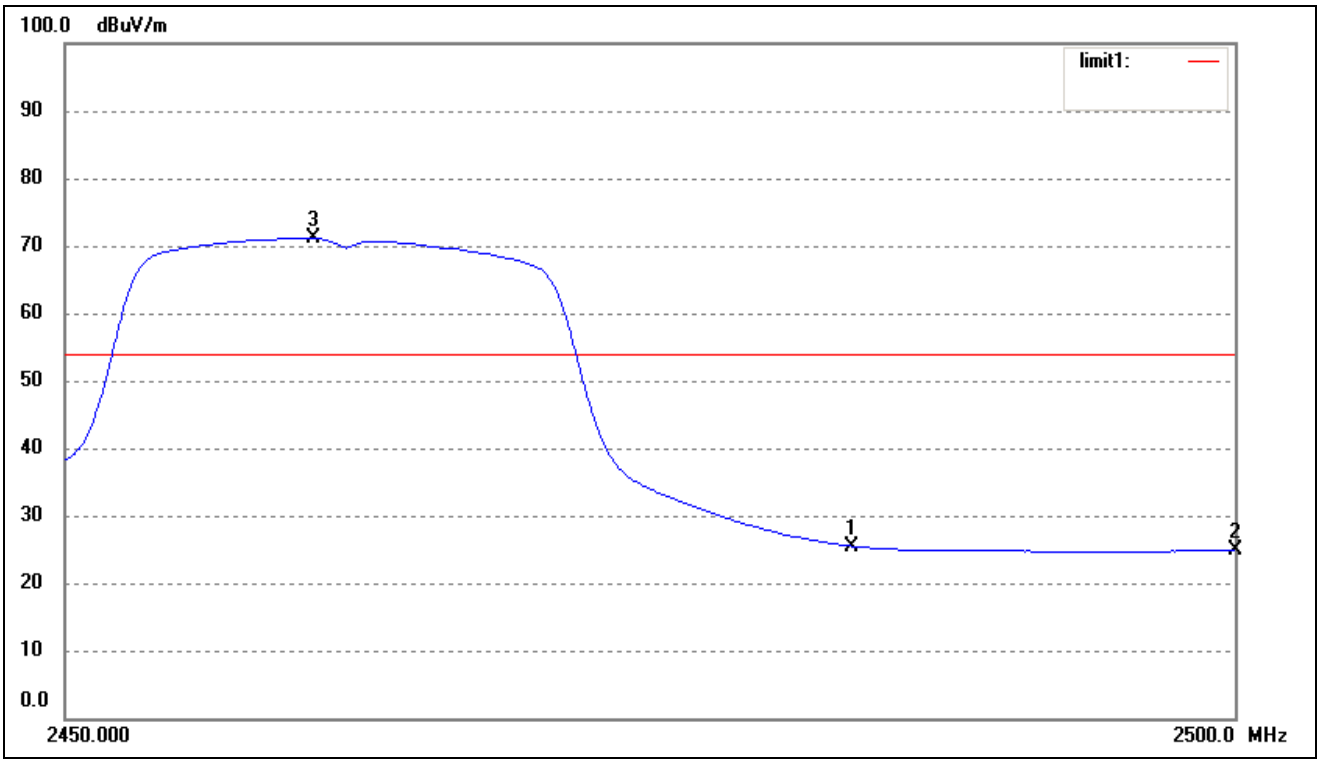
For 802.11n HT20

Lowest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2310.000	29.24	-4.65	24.59	54.00	-29.41	Average Detector
	2310.000	59.63	-4.65	54.98	74.00	-19.02	Peak Detector
2	2390.000	33.13	-4.46	28.67	54.00	-25.33	Average Detector
	2390.000	62.18	-4.46	57.72	74.00	-16.28	Peak Detector
3	2400.000	46.72	-4.43	42.29	/	/	Average Detector
4	2413.321	80.79	-4.40	76.39	/	/	Average Detector

Highest Bandedge



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	
1	2483.500	29.68	-4.23	25.45	54.00	-28.55	Average Detector
	2483.500	59.06	-4.23	54.83	74.00	-19.17	Peak Detector
2	2500.000	29.00	-4.18	24.82	54.00	-29.18	Average Detector
	2500.000	60.27	-4.18	56.09	74.00	-17.91	Peak Detector
3	2460.516	75.40	-4.28	71.12	/	/	Average Detector

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