

FCC Part 15C

Measurement and Test Report

For

SHENZHEN HI-LINK ELECTRONIC CO., LTD

13C2 TianXiang Building Tian'an HiTech Venture Park, Futian, Shenzhen,

China

FCC ID: ZXVHLK-2MXX

Report Concerns: Original Report	Equipment Type: WIFI MODULE
Model:	<u>HLK-2M01</u>
Report No.:	<u>STR11088086I</u>
Test Date:	<u>2011-08-09 to 2011-08-24</u>
Issue Date:	<u>2011-08-30</u>
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Prepared By:	
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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: SHENZHEN HI-LINK ELECTRONIC CO., LTD
 Address of applicant: 13C2 TianXiang Building Tian'an HiTech Venture Park,
 Futian, Shenzhen, China

Manufacturer: B-LINK ELECTRONIC LIMITED
 Address of manufacturer: No 37, FuQian Rd, JuTang Community, GuanLan Town,
 BaoAn district, Shenzhen, China

General Description of E.U.T

Items	Description
EUT Description:	WIFI MODULE
Trade Name:	HI-LINK
Model No.:	HLK-2M01
Rated Voltage:	DC 5V
RF Output Power	Max. 13.13dBm
Antenna Gain:	0 dBi
Frequency range:	2412MHz~2462MHz
Number of channels:	11
Channel Separation:	5MHz
Type of Antenna:	Integral Antenna

Note: The test data is gathered from a production sample, provided by the manufacture.

1.2 Test Standards

The following report is prepared on behalf of the SHENZHEN HI-LINK ELECTRONIC 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
Notebook	ASUS	X50R	N/A

1.7 EUT Cable List and Details

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

2. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.203; § 15.247(c)(1)(i)	Antenna Requirement	Compliant
§ 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

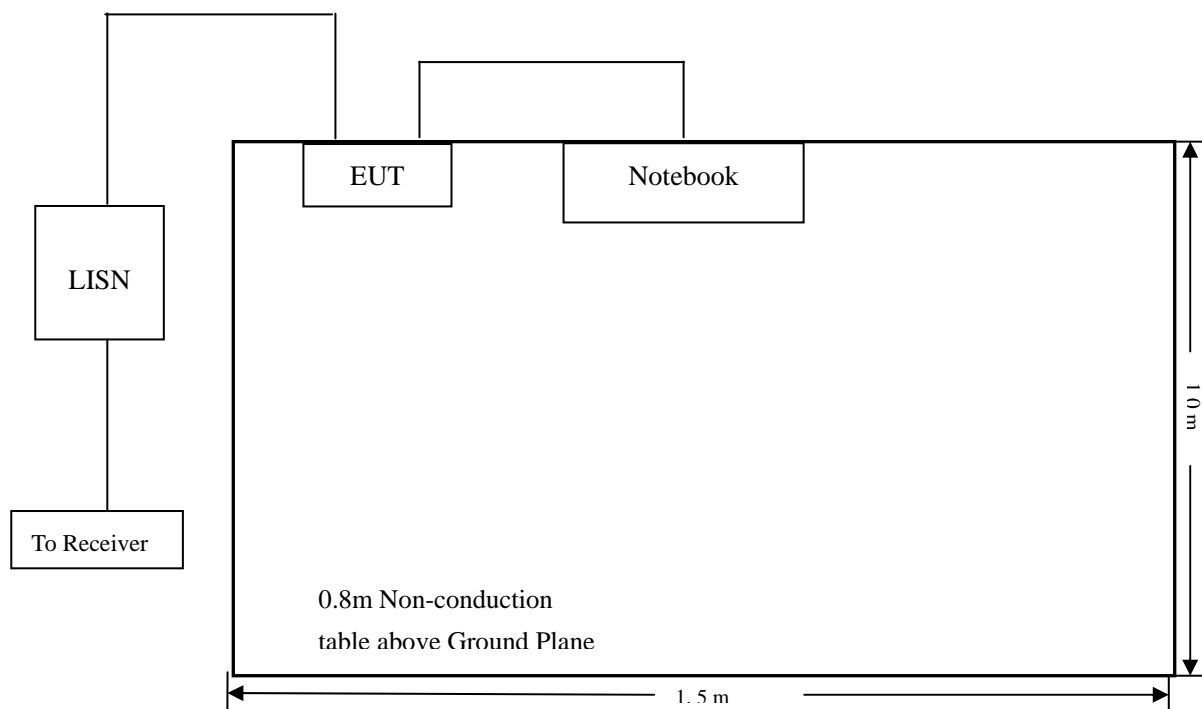
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2010-12-20	2011-12-19
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2010-12-20	2011-12-19
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2010-12-20	2011-12-19

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:	23 °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 Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-5.32 dB μ V at 2.458 MHz in the Neutral PK Detector, 0.15-30MHz

3.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

Conducted Disturbance

EUT: WIFI MODULE

M/N: HLK-2M01

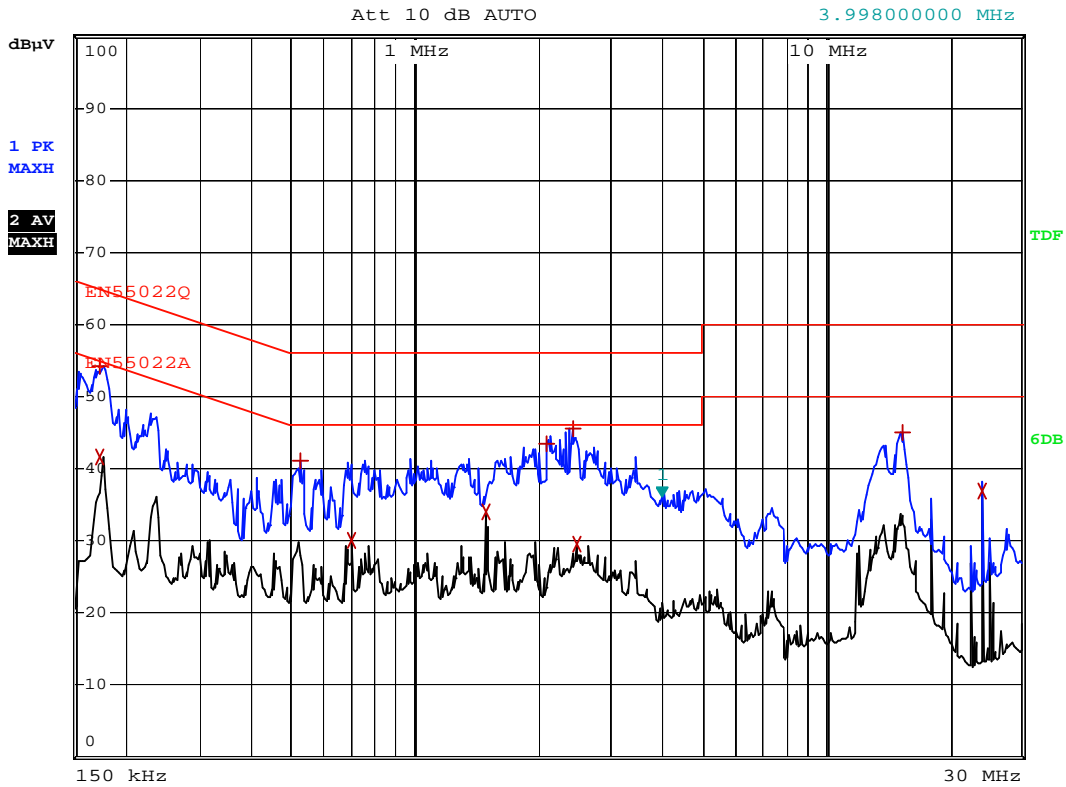
Operating Condition: Transmitting

Test Specification: L

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



RBW 9 kHz Marker 1 [T1]
 MT 10 ms 36.06 dBµV
 3.998000000 MHz



EDIT PEAK LIST (Prescan Results)			
Trace1:	EN55022Q		
Trace2:	EN55022A		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Max Peak	174 kHz	54.21	-10.55
2 Average	174 kHz	41.49	-13.27
1 Max Peak	526 kHz	41.18	-14.81
2 Average	702 kHz	29.94	-16.05
2 Average	1.498 MHz	33.98	-12.01
1 Max Peak	2.106 MHz	43.37	-12.62
1 Max Peak	2.442 MHz	45.57	-10.42
2 Average	2.47 MHz	29.64	-16.35
1 Max Peak	15.35 MHz	44.99	-15.00
2 Average	23.986 MHz	36.99	-13.00

Plot of Conducted Emissions Test Data

Conducted Disturbance

EUT: WIFI MODULE

M/N: HLK-2M01

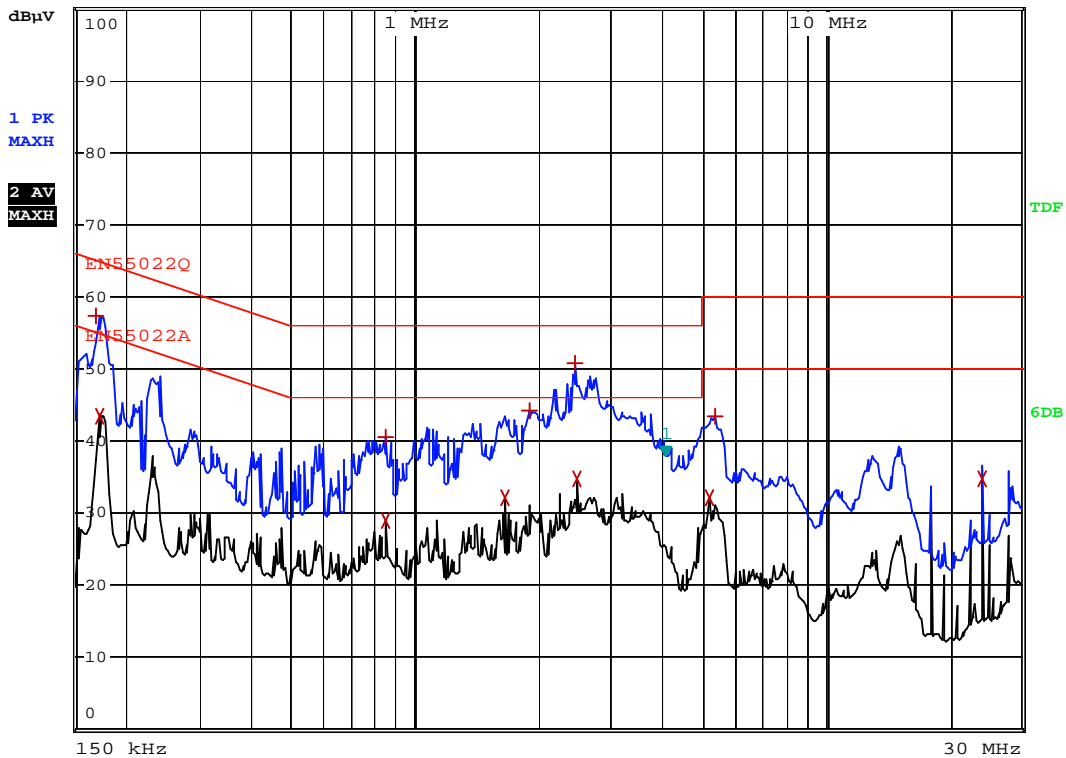
Operating Condition: Transmitting

Test Specification: N

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



RBW 9 kHz Marker 1 [T1]
 MT 10 ms 37.84 dBµV
 Att 10 dB AUTO 4.094000000 MHz



EDIT PEAK LIST (Prescan Results)			
Trace1:	EN55022Q		
Trace2:	EN55022A		
Trace3:	---		
TRACE	FREQUENCY	LEVEL dBµV	DELTA LIMIT dB
1 Max Peak	170 kHz	57.28	-7.67
2 Average	174 kHz	43.43	-11.33
1 Max Peak	850 kHz	40.49	-15.50
2 Average	850 kHz	28.95	-17.04
2 Average	1.654 MHz	32.05	-13.95
1 Max Peak	1.914 MHz	44.30	-11.69
1 Max Peak	2.458 MHz	50.67	-5.32
2 Average	2.482 MHz	34.79	-11.20
2 Average	5.238 MHz	32.07	-17.92
1 Max Peak	5.398 MHz	43.50	-16.49
2 Average	23.986 MHz	34.66	-15.33

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 PCB 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

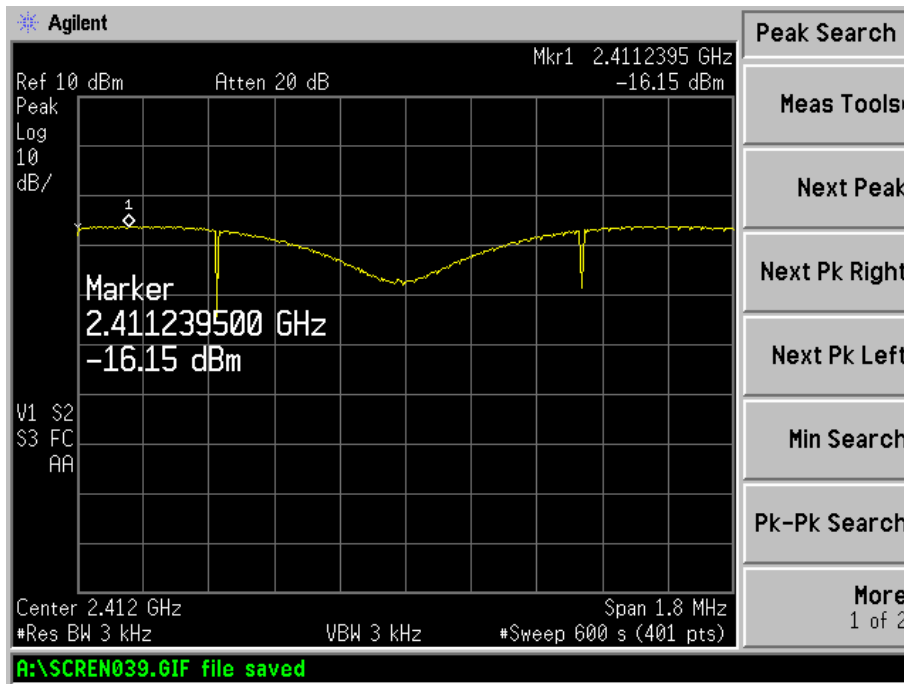
Temperature:	20° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

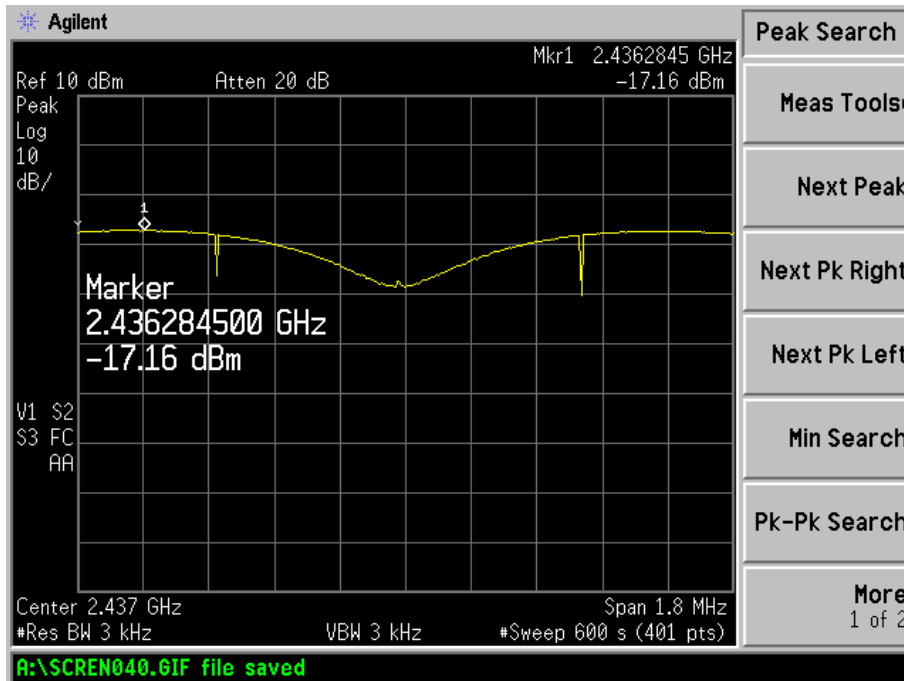
Test mode	Test channel	Reading dBm/3kHz	Limit dBm/3kHz
802.11b	Low channel (2412MHz)	-16.15	8
	Middle channel (2437MHz)	-17.16	8
	High channel (2462MHz)	-19.44	8
802.11g	Low channel (2412MHz)	-17.42	8
	Middle channel (2437MHz)	-18.71	8
	High channel (2462MHz)	-21.85	8

For 802.11b

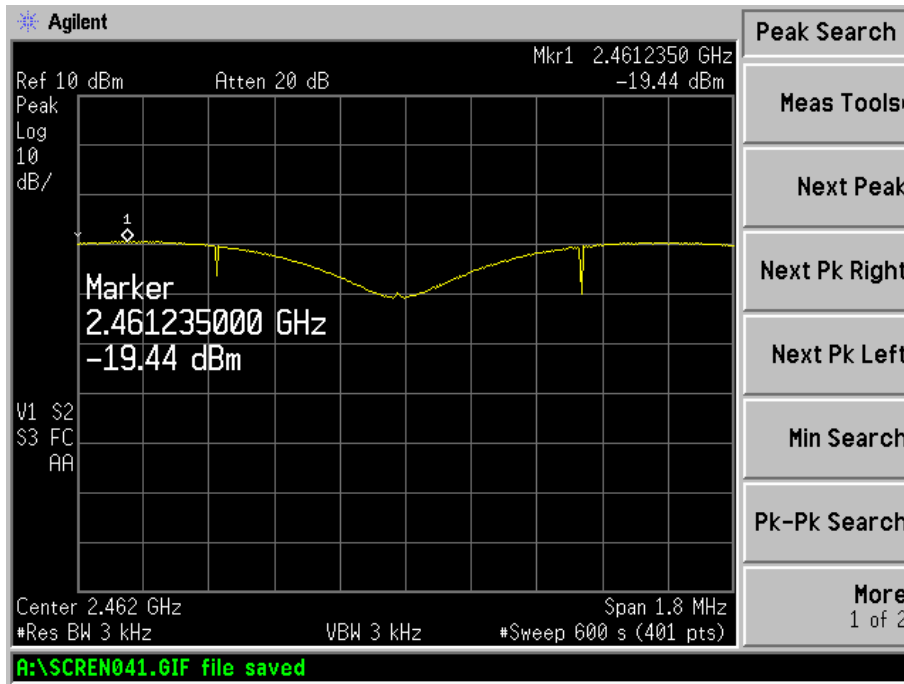
Low Channel:



Middle Channel:

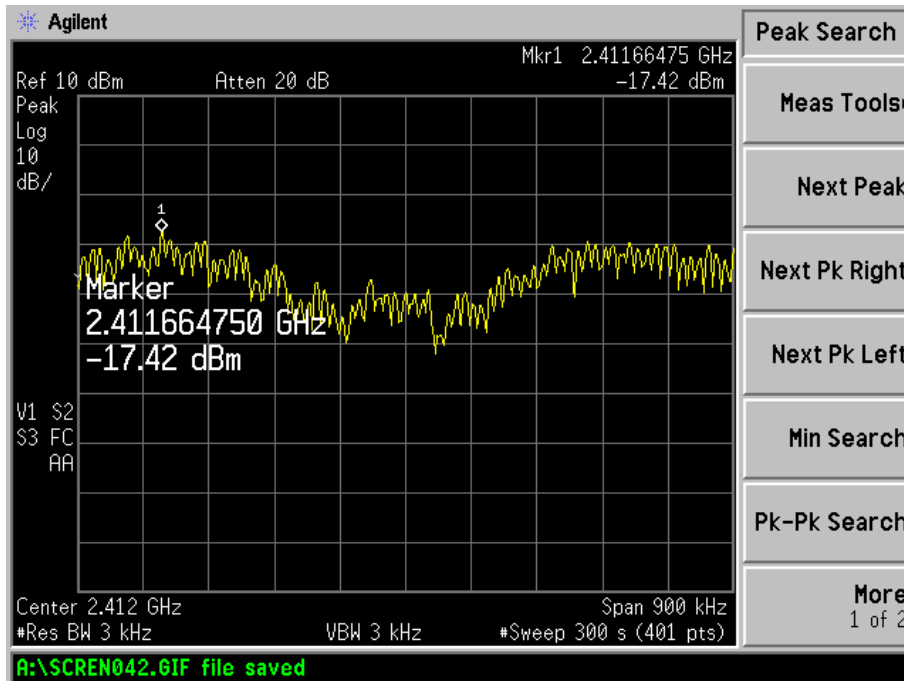


High Channel:

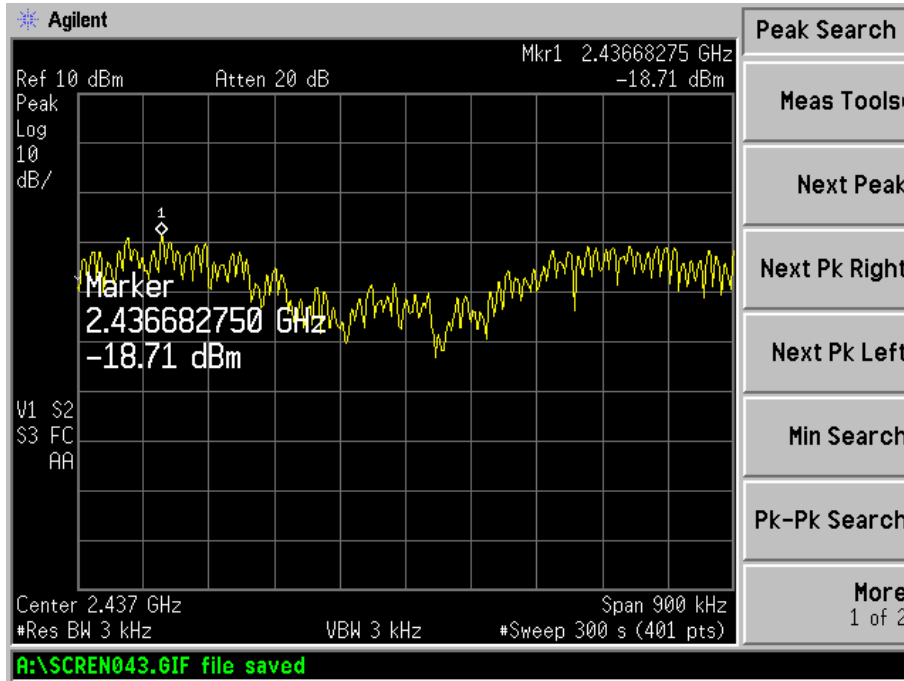


For 802.11g

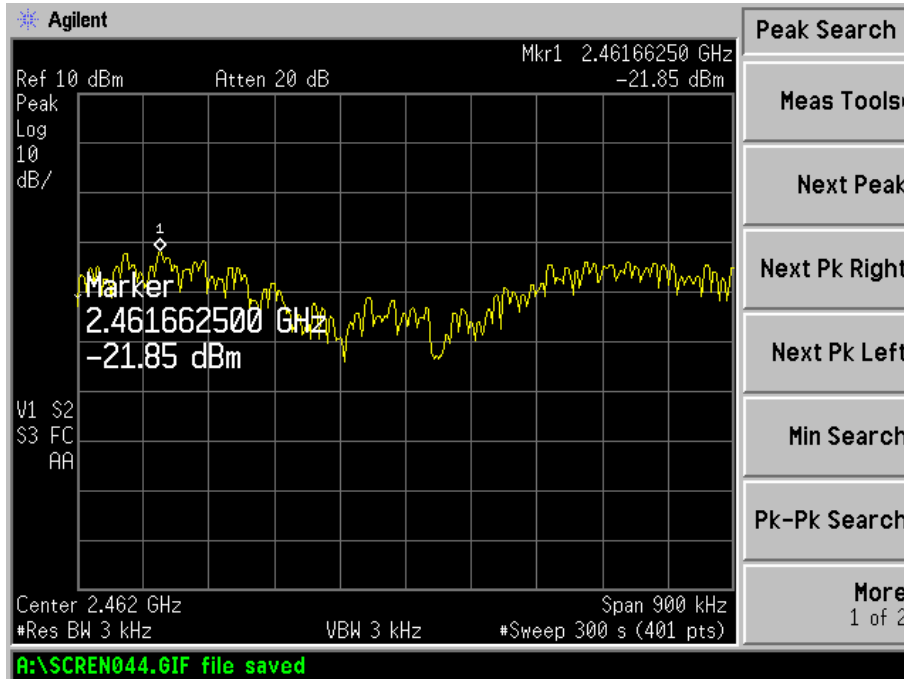
Low Channel:



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

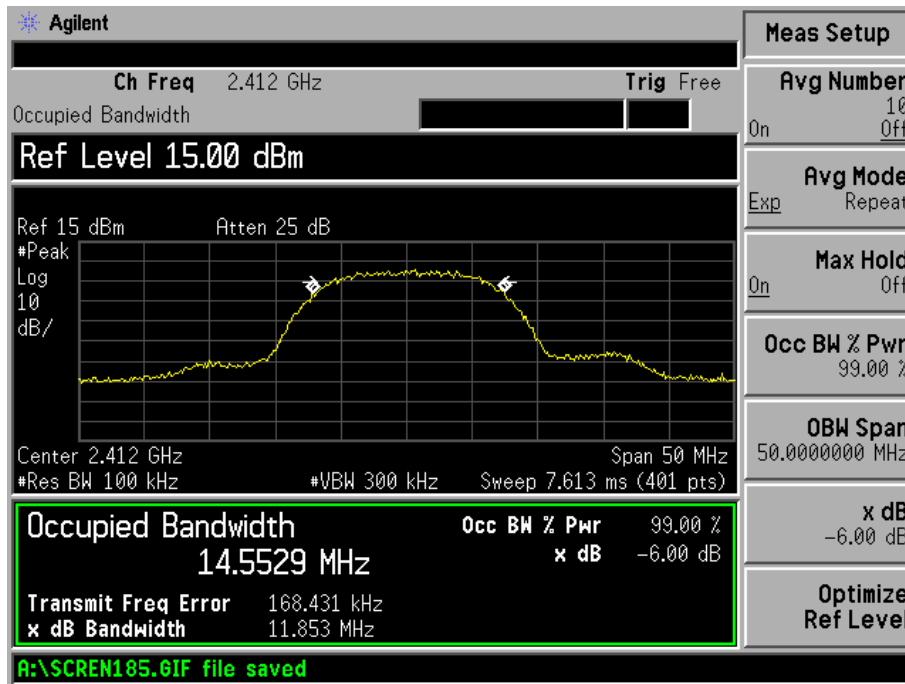
Temperature:	24° C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.5 Summary of Test Results/Plots

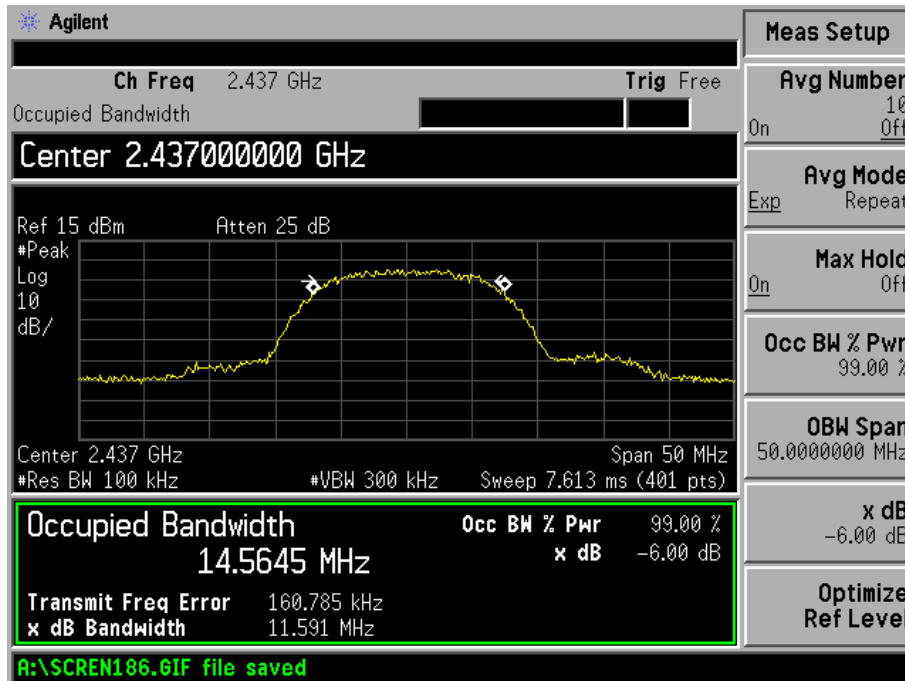
Test mode	Frequency MHz	6 dB Bandwidth kHz	Limit kHz
802.11b	2412	11853	500
	2437	11591	500
	2462	11181	500
802.11g	2412	16250	500
	2437	16141	500
	2462	16213	500

For 802.11b

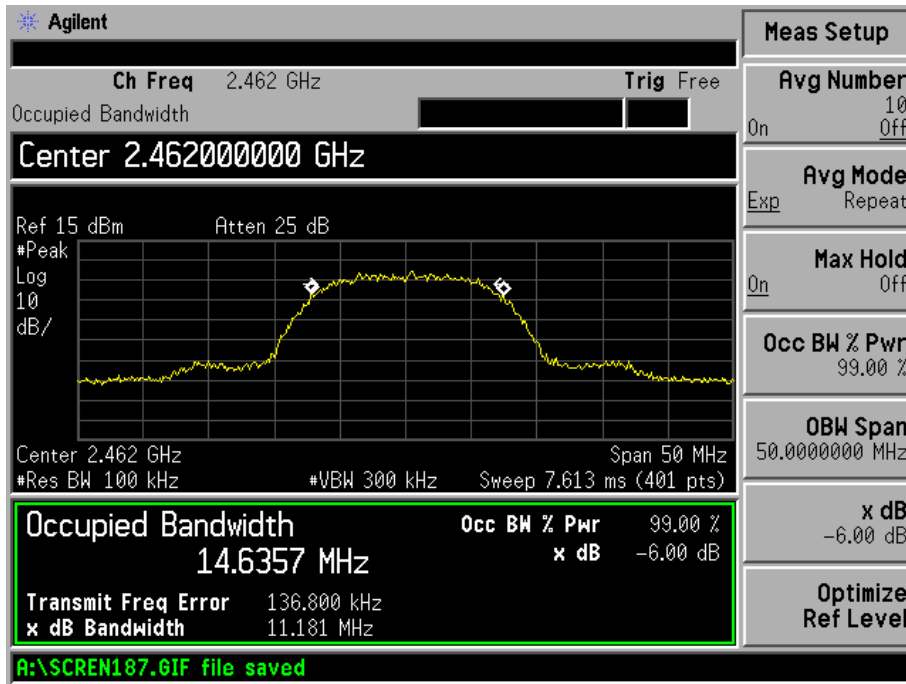
Low Channel:



Mid Channel:

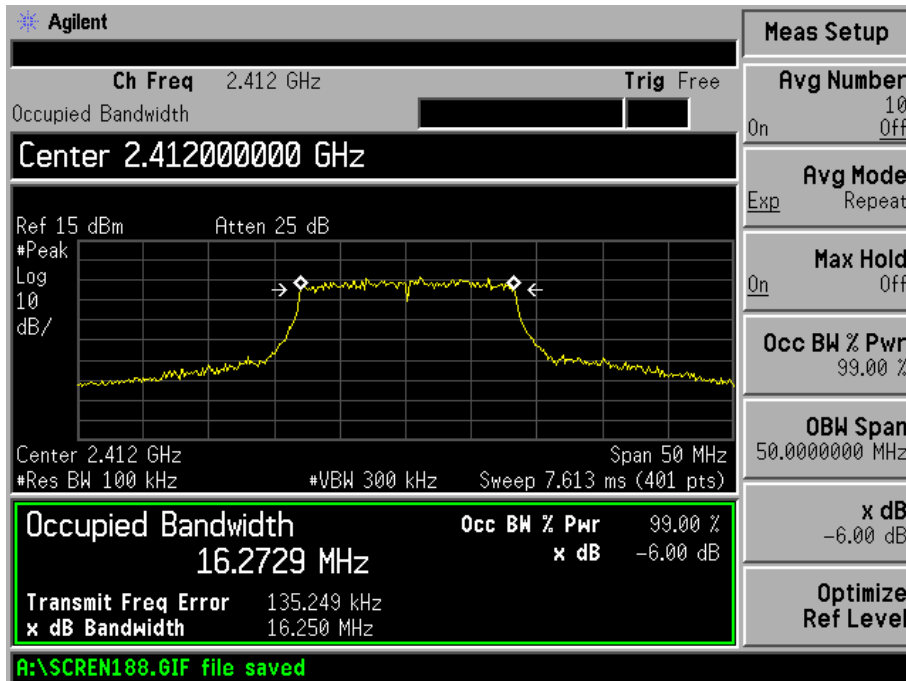


High Channel:

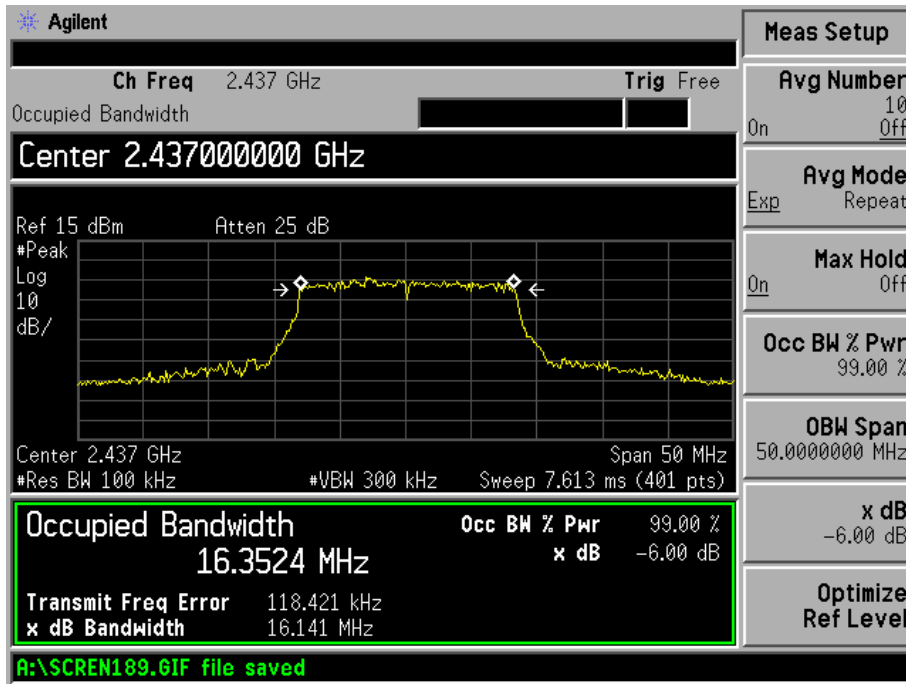


For 802.11g

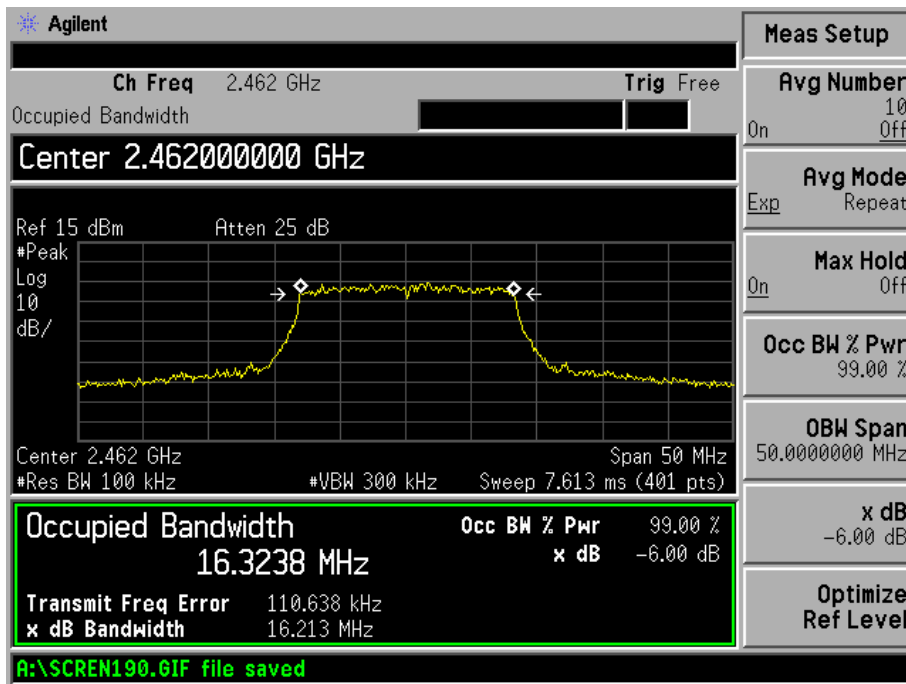
Low Channel:



Mid Channel:



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 \geq 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

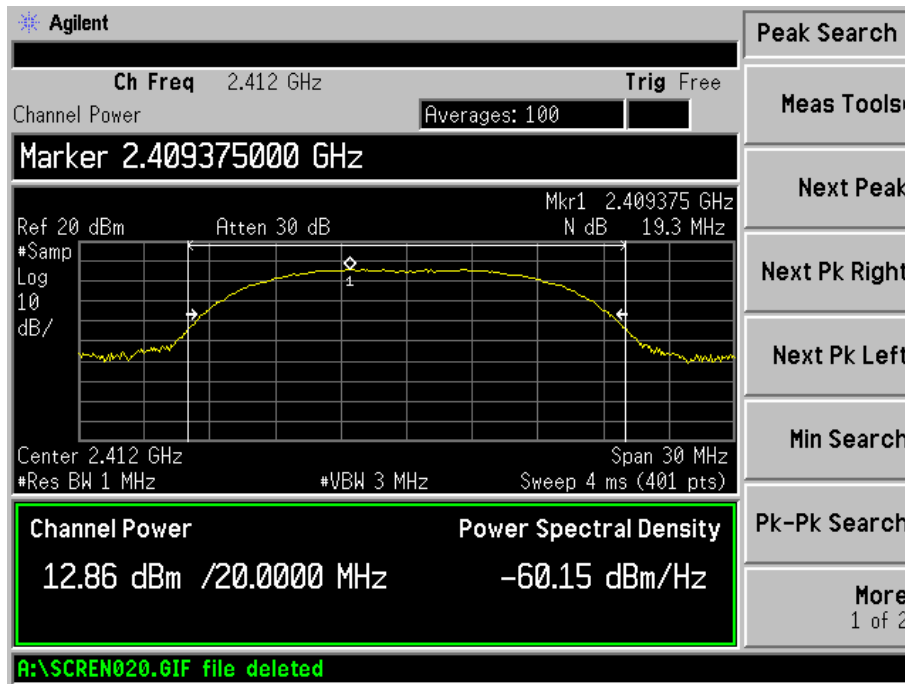
Temperature:	21° C
Relative Humidity:	55%
ATM Pressure:	1011 mbar

7.5 Summary of Test Results/Plots

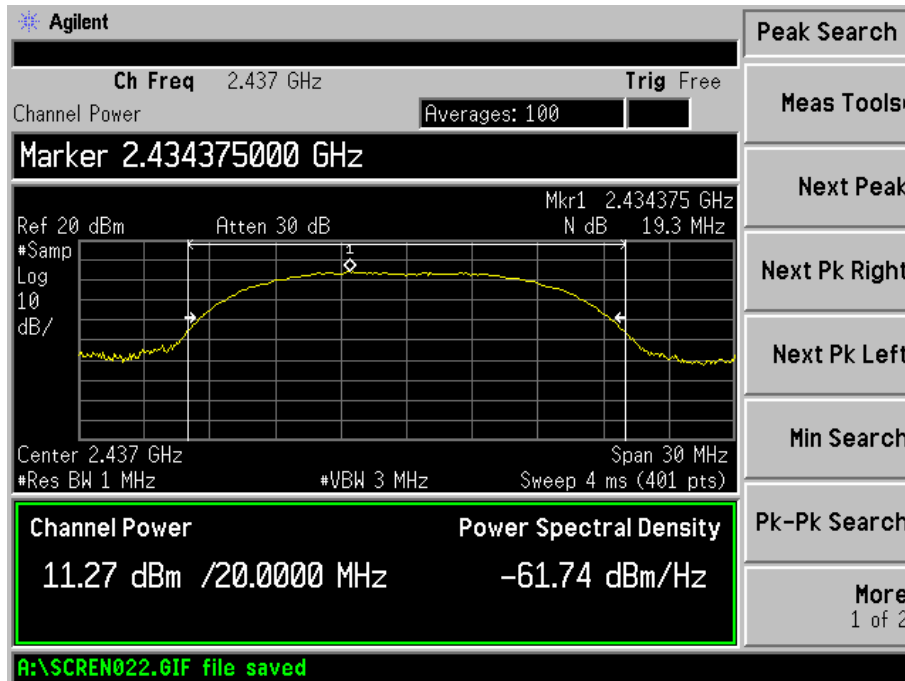
Test mode	Frequency MHz	Reading dBm	Output power W	Limit W
802.11b (1M)	2412	12.86	0.01932	1
	2437	11.27	0.01340	1
	2462	10.41	0.01099	1
802.11b (11M)	2412	13.13	0.02056	1
	2437	11.05	0.01274	1
	2462	10.54	0.01132	1
802.11g (6M)	2412	10.85	0.01216	1
	2437	9.60	0.00912	1
	2462	7.24	0.00530	1
802.11g (54M)	2412	10.90	0.01230	1
	2437	9.18	0.00828	1
	2462	7.87	0.00612	1

For 802.11b_1M rate

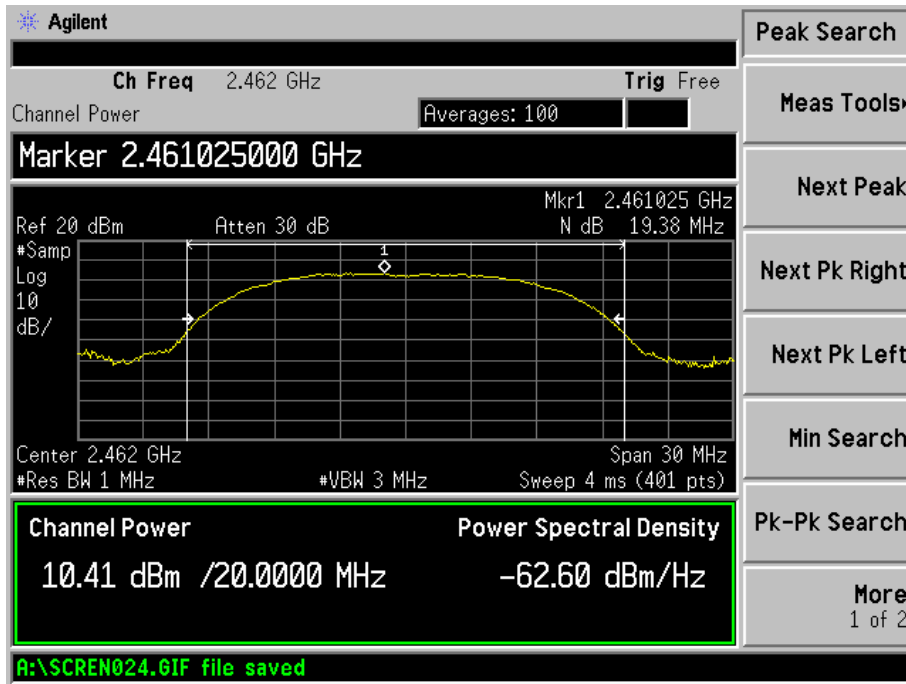
Low Channel:



Middle Channel:

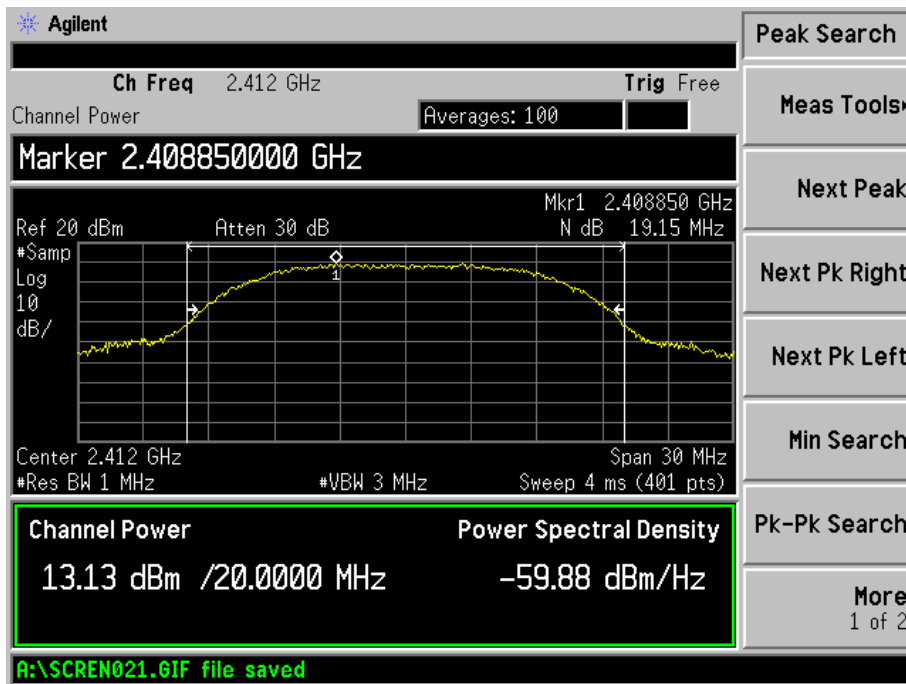


High Channel:

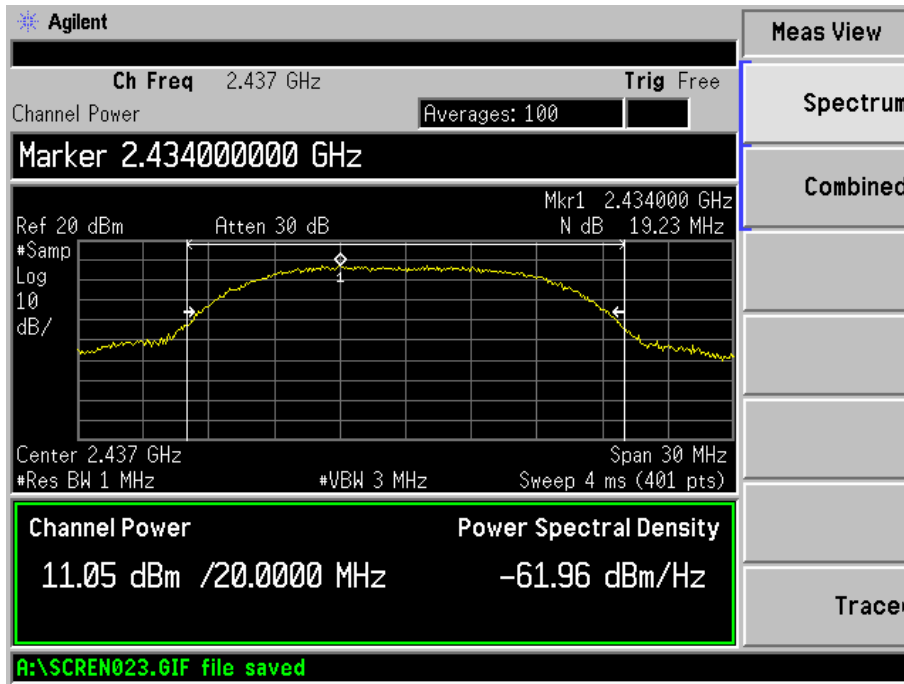


For 802.11b_11M rate

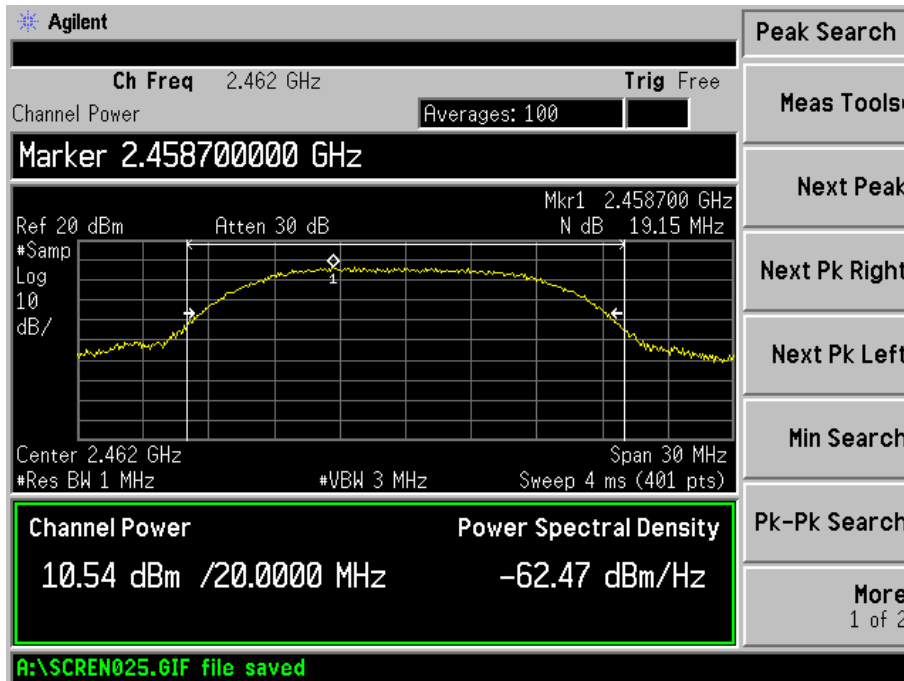
Low Channel:



Middle Channel:

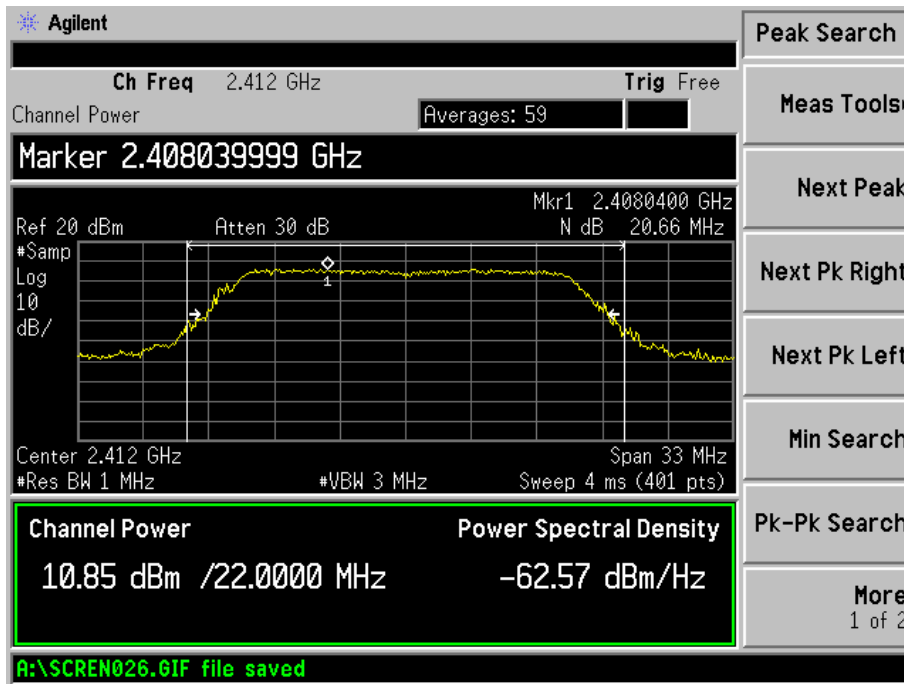


High Channel:

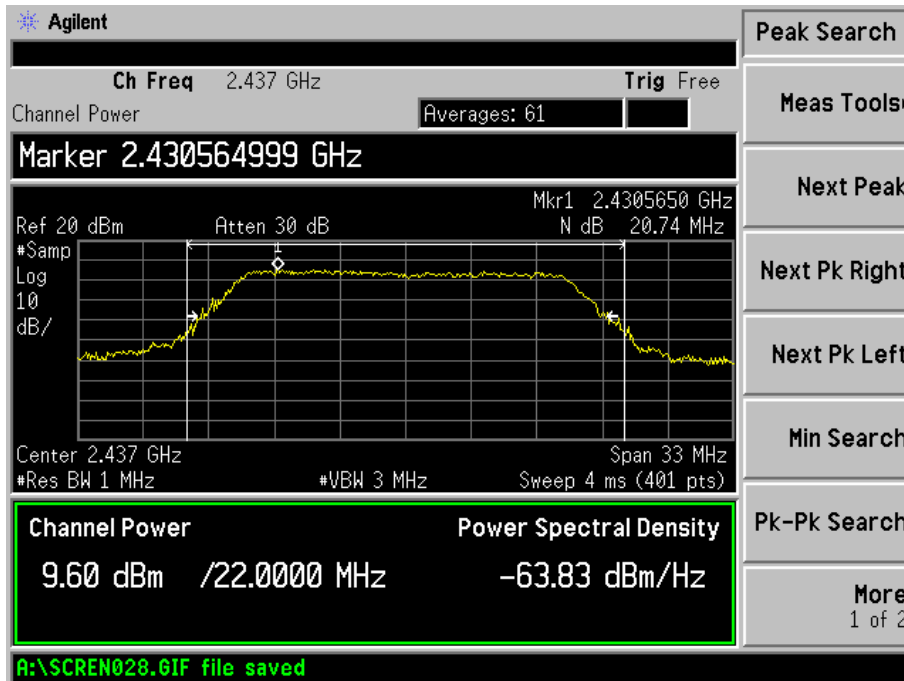


For 802.11g_6M rate

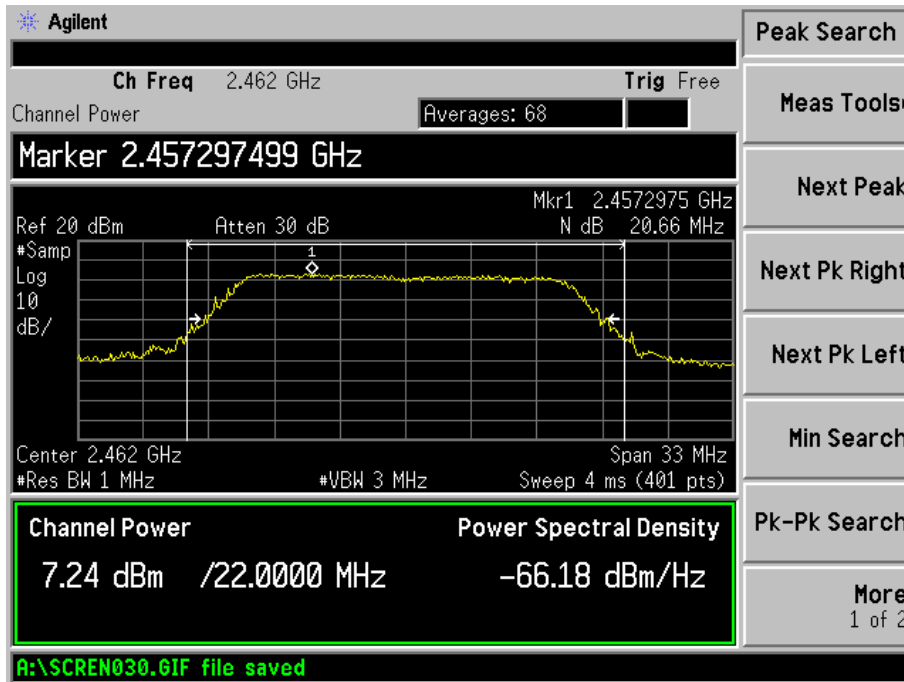
Low Channel:



Middle Channel:

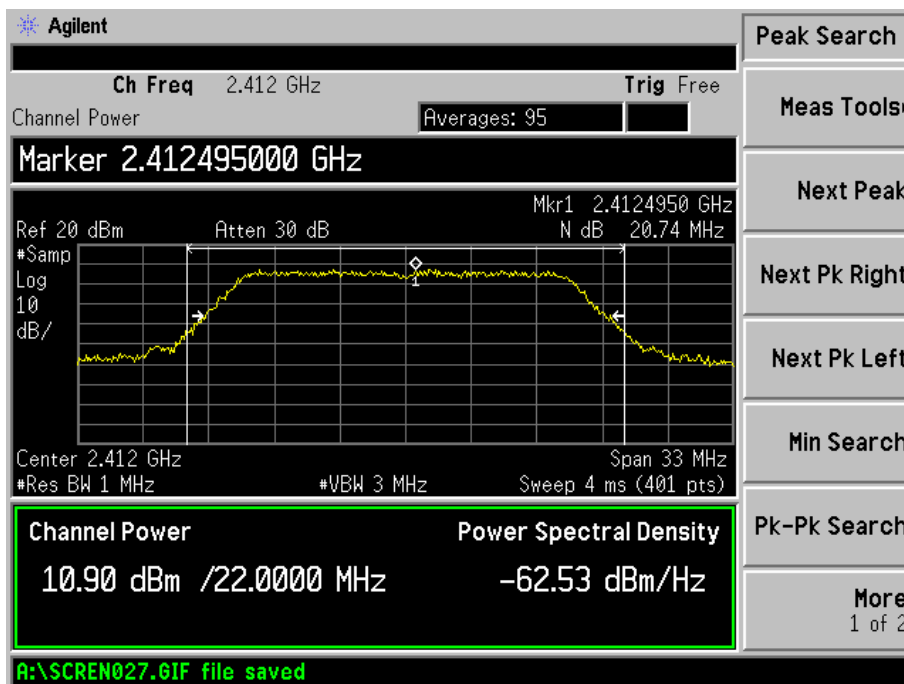


High Channel:

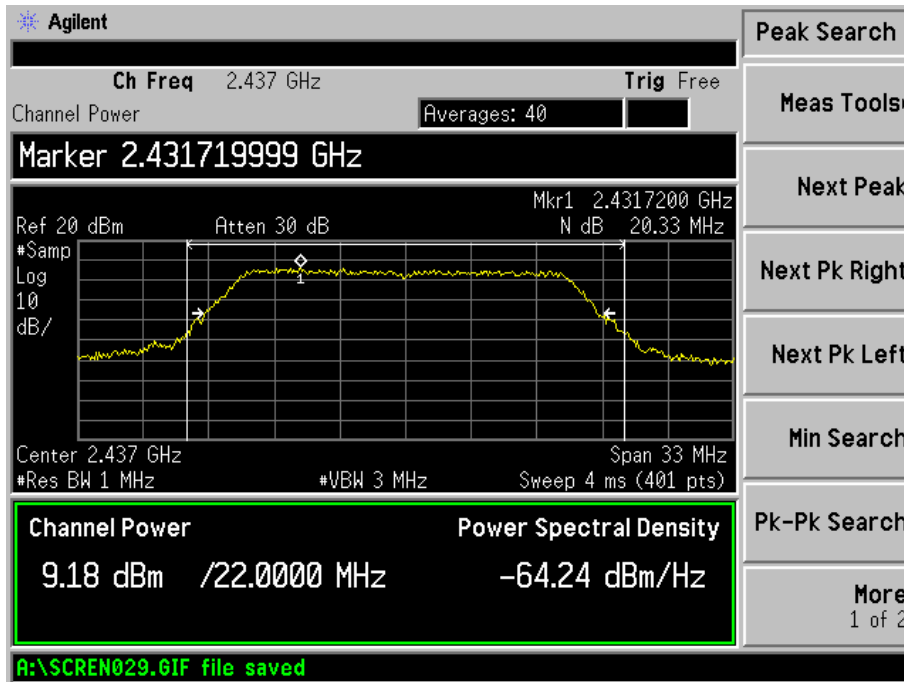


For 802.11g_54M rate

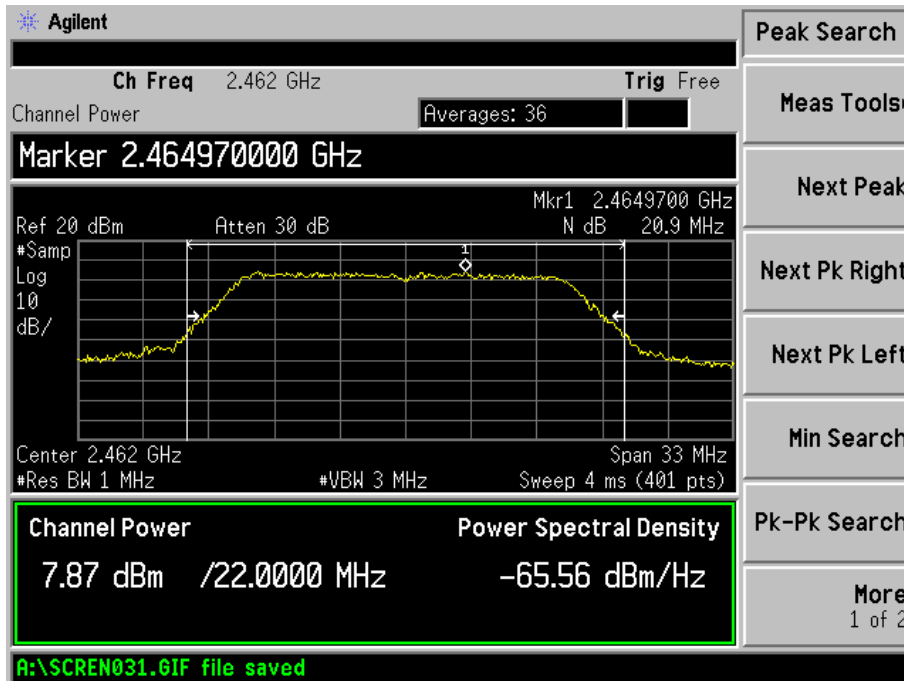
Low Channel:



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

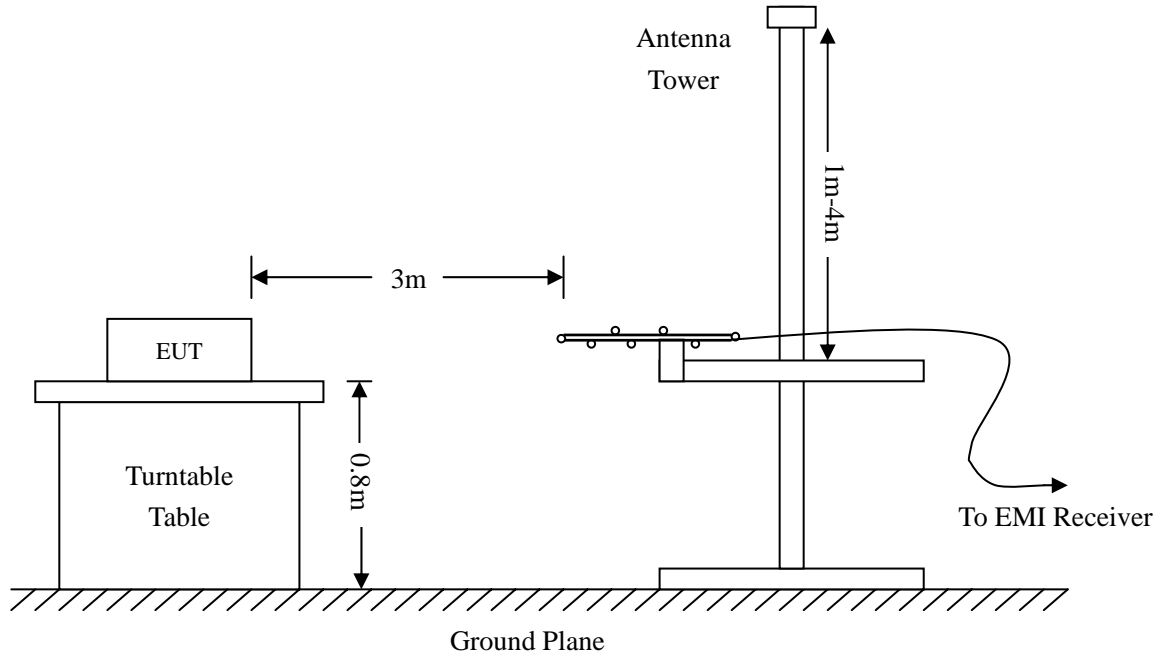
Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Spectrum Analyzer	R&S	FSP	836079/035	2010-12-20	2011-12-19
EMI Test Receiver	R&S	ESVB	825471/005	2010-12-20	2011-12-19
Positioning Controller	C&C	CC-C-1F	N/A	2010-12-20	2011-12-19
RF Switch	EM	EMSW18	SW060023	2010-12-20	2011-12-19
Pre-amplifier	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 C63.4-2009 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:

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

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

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

8.6 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:

-1.6 dBμV at 7236MHz in the Horizontal polarization, Transmitting 802.11b Low 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.

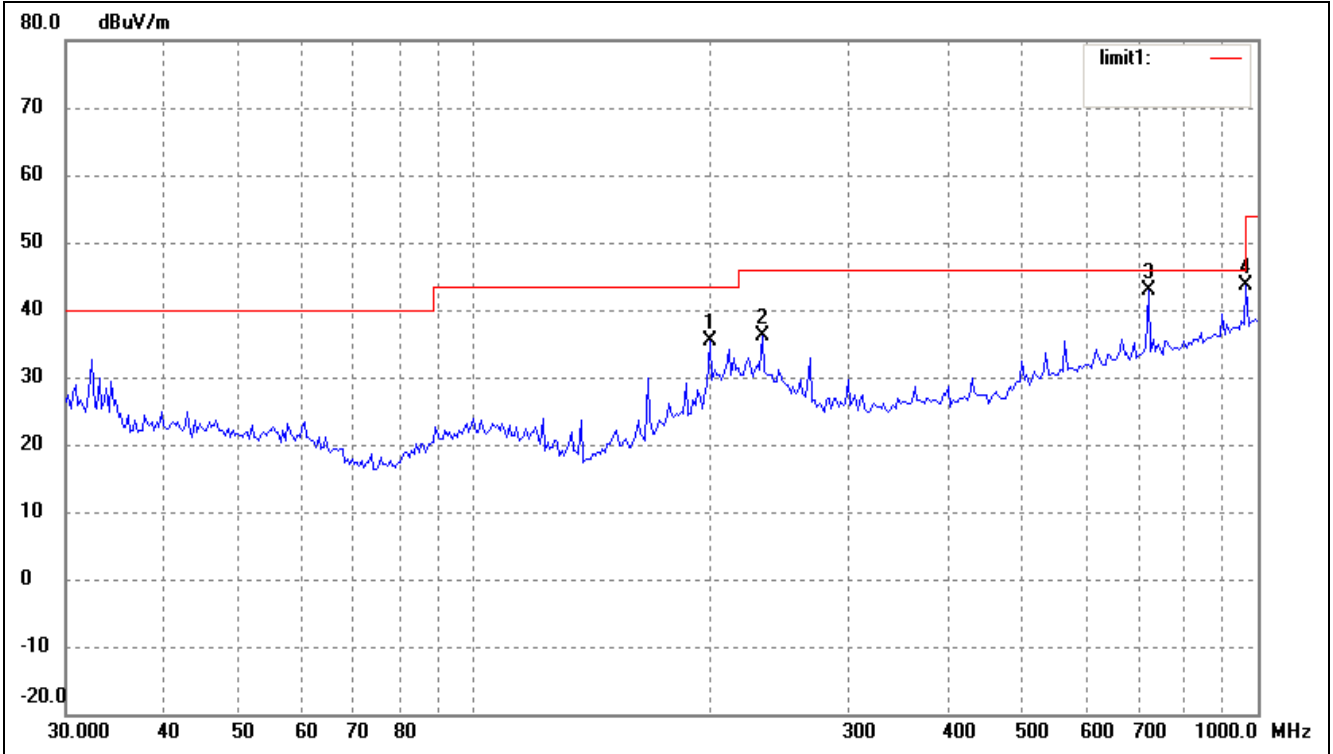
Test Result/Plots:

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11b) Low Channel

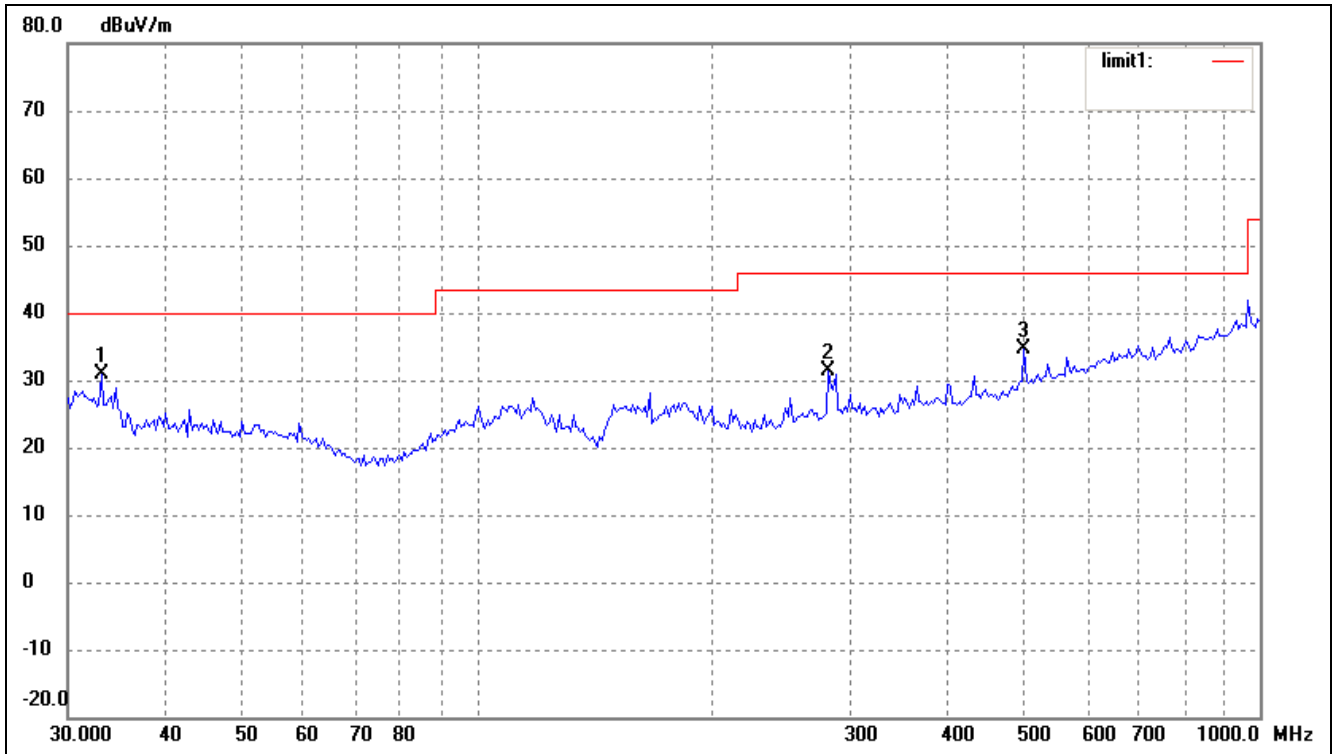
Comment:

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	199.2855	28.69	6.58	35.27	43.50	-8.23	215	100	peak
2	232.5318	28.09	8.01	36.10	46.00	-9.90	47	100	peak
3	724.2611	25.12	17.86	42.98	46.00	-3.02	68	100	peak
4	965.5421	21.53	22.10	43.63	54.00	-10.37	51	100	peak

Vertical



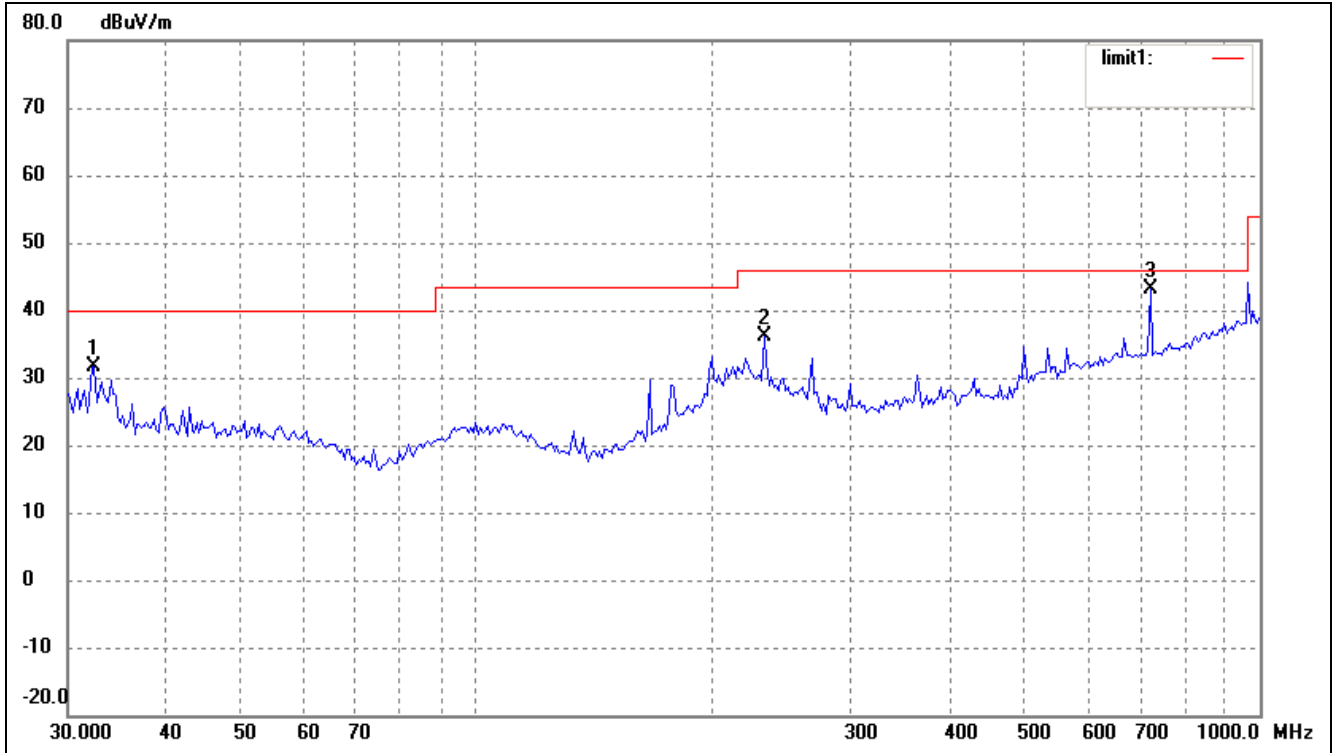
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.0950	24.22	6.77	30.99	40.00	-9.01	360	100	peak
2	281.0075	21.75	9.53	31.28	46.00	-14.72	25	100	peak
3	499.4247	20.16	14.36	34.52	46.00	-11.48	61	100	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11b) Middle Channel

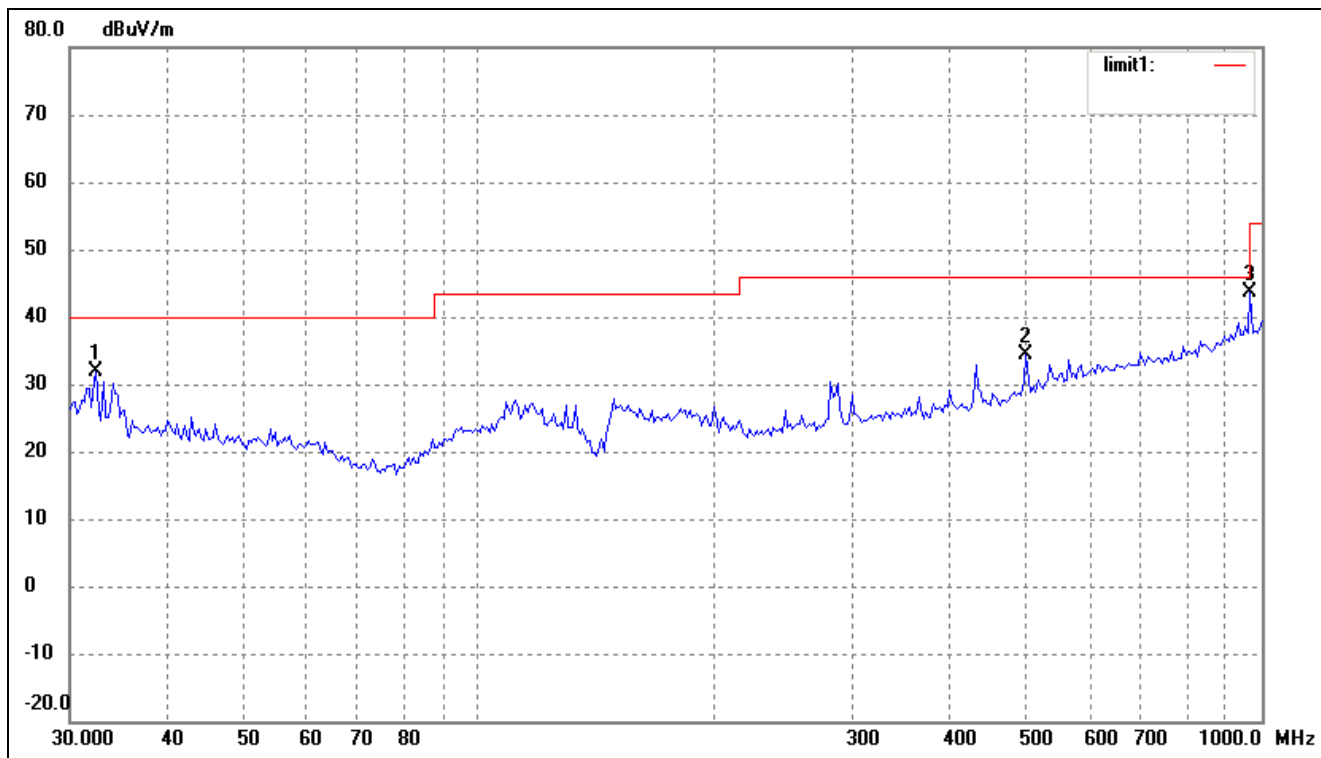
Comment:

Horizontal



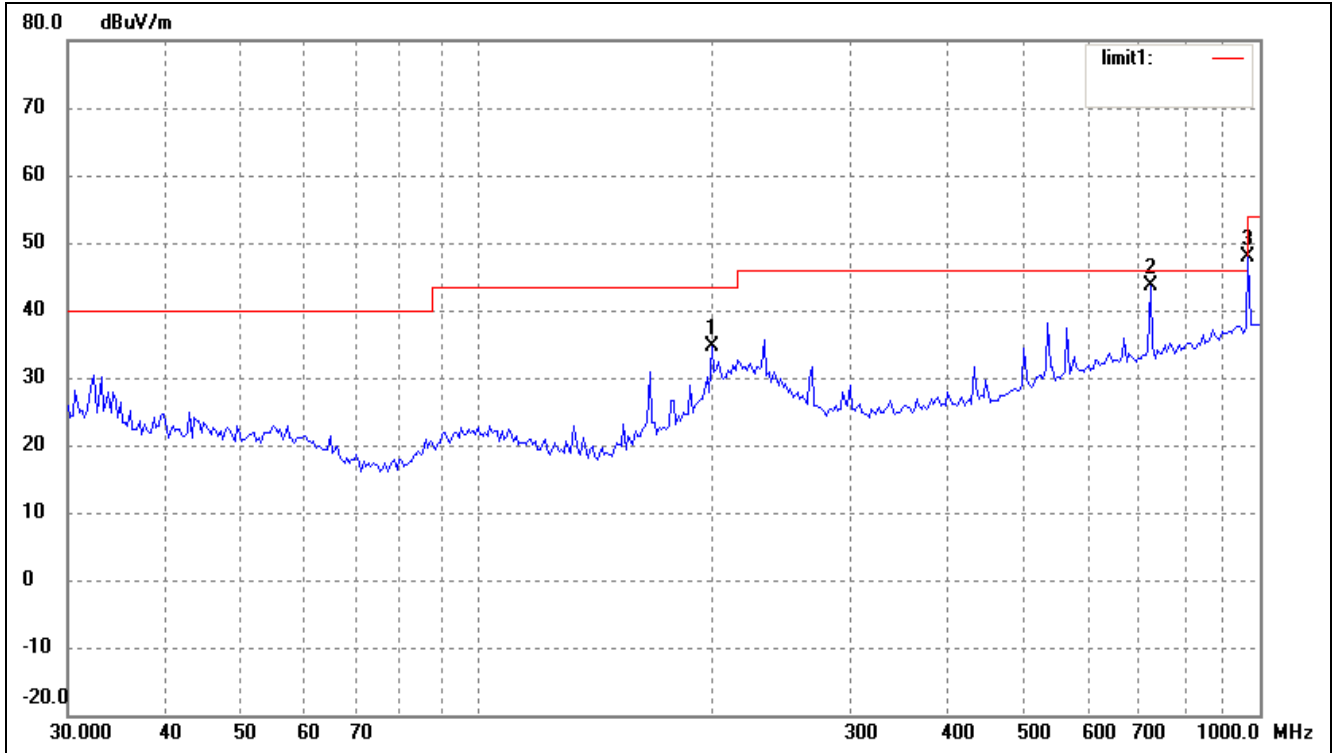
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.4059	24.88	6.77	31.65	40.00	-8.35	63	100	peak
2	232.5318	28.23	8.01	36.24	46.00	-9.76	125	100	peak
3	724.2611	25.39	17.86	43.25	46.00	-2.75	79	100	peak

Vertical



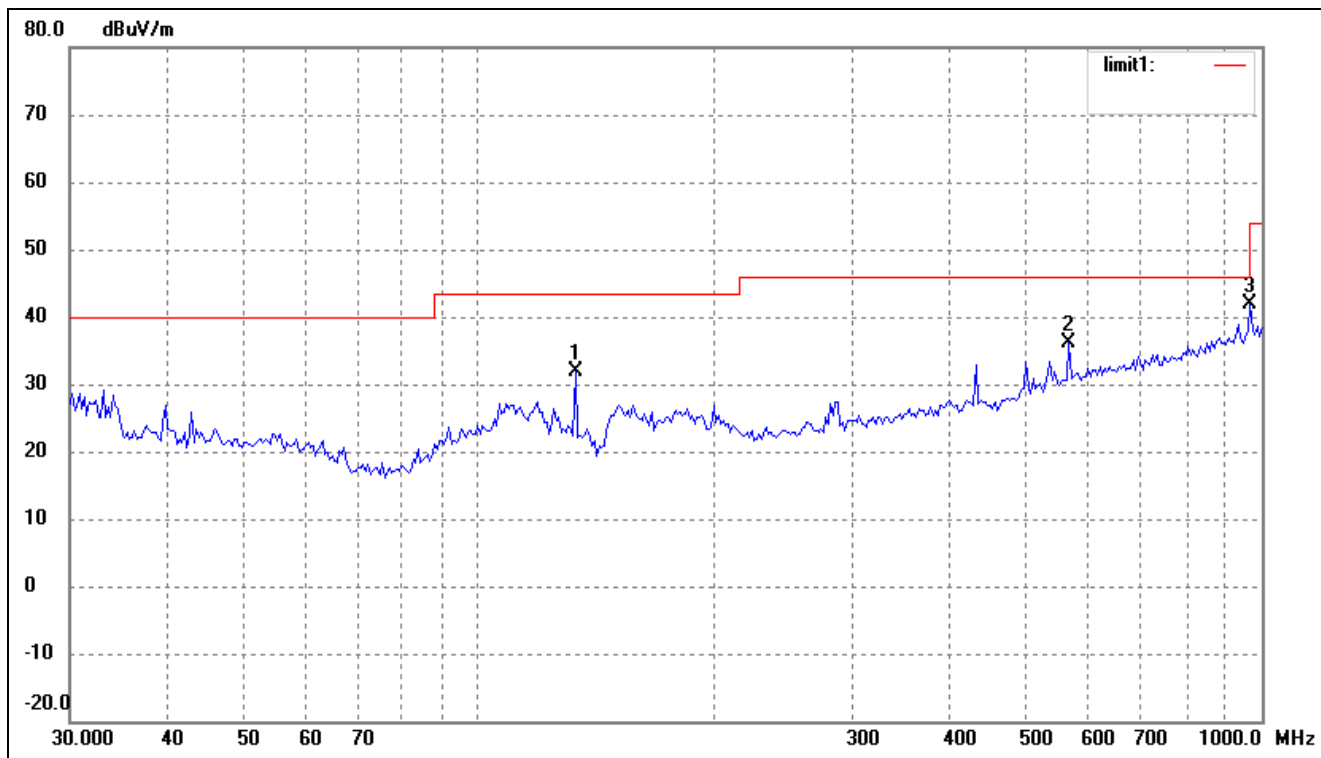
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	32.4059	25.05	6.77	31.82	40.00	-8.18	305	100	peak
2	499.4247	20.06	14.36	34.42	46.00	-11.58	47	100	peak
3	965.5421	21.47	22.10	43.57	54.00	-10.43	158	100	peak

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



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	199.2855	28.00	6.58	34.58	43.50	-8.92	205	100	peak
2	724.2611	25.66	17.86	43.52	46.00	-2.48	26	100	peak
3	965.5421	25.89	22.10	47.99	54.00	-6.01	215	200	peak

Vertical



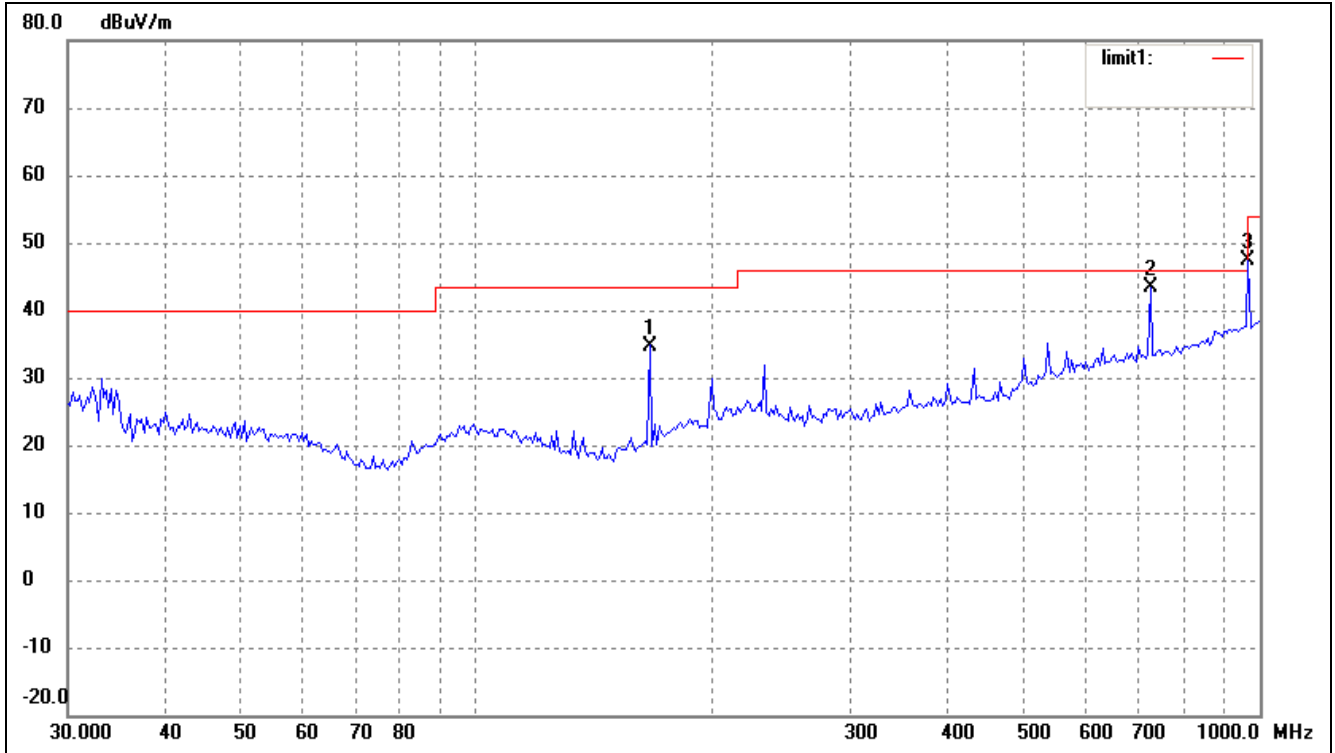
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	132.6850	27.42	4.40	31.82	43.50	-11.68	145	100	peak
2	566.6223	20.25	15.91	36.16	46.00	-9.84	26	100	peak
3	965.5421	19.75	22.10	41.85	54.00	-12.15	60	100	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11g) Low Channel

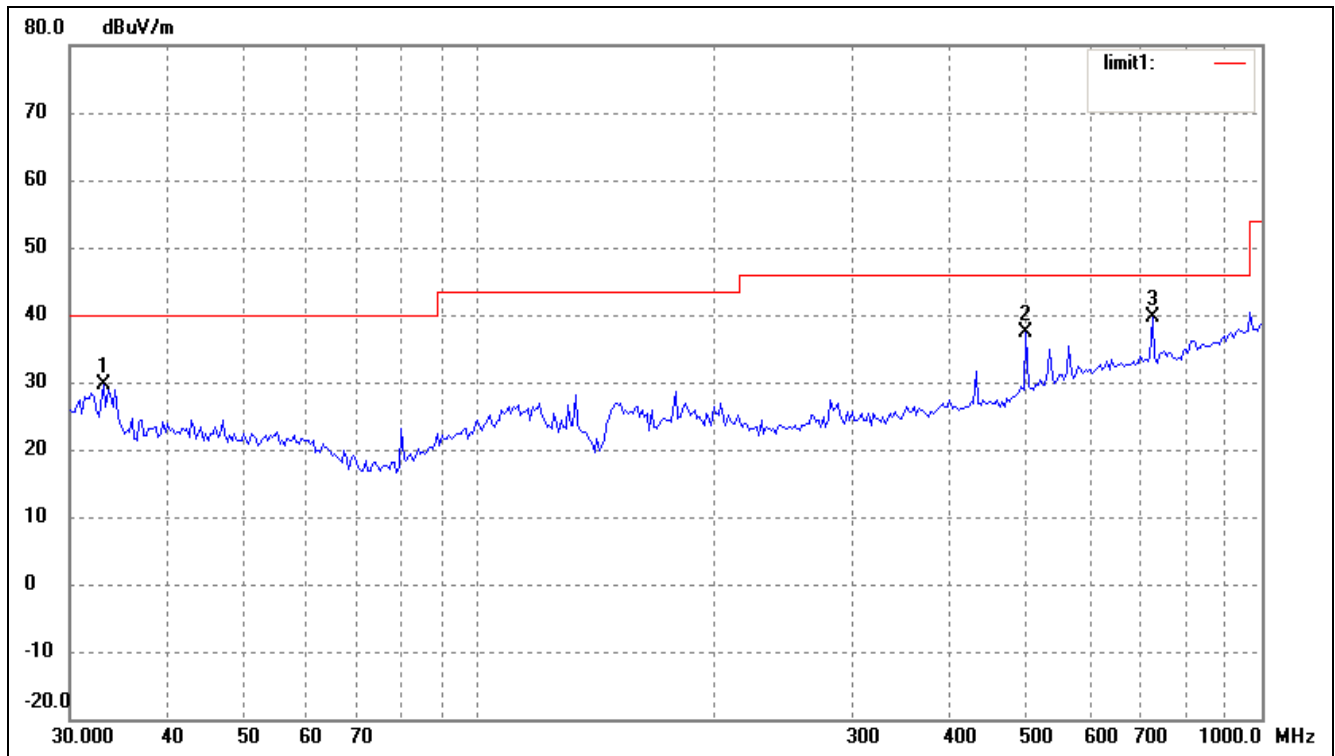
Comment:

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	166.0680	30.00	4.75	34.75	43.50	-8.75	154	100	peak
2	724.2611	25.48	17.86	43.34	46.00	-2.66	28	100	peak
3	965.5421	25.27	22.10	47.37	54.00	-6.63	54	100	peak

Vertical



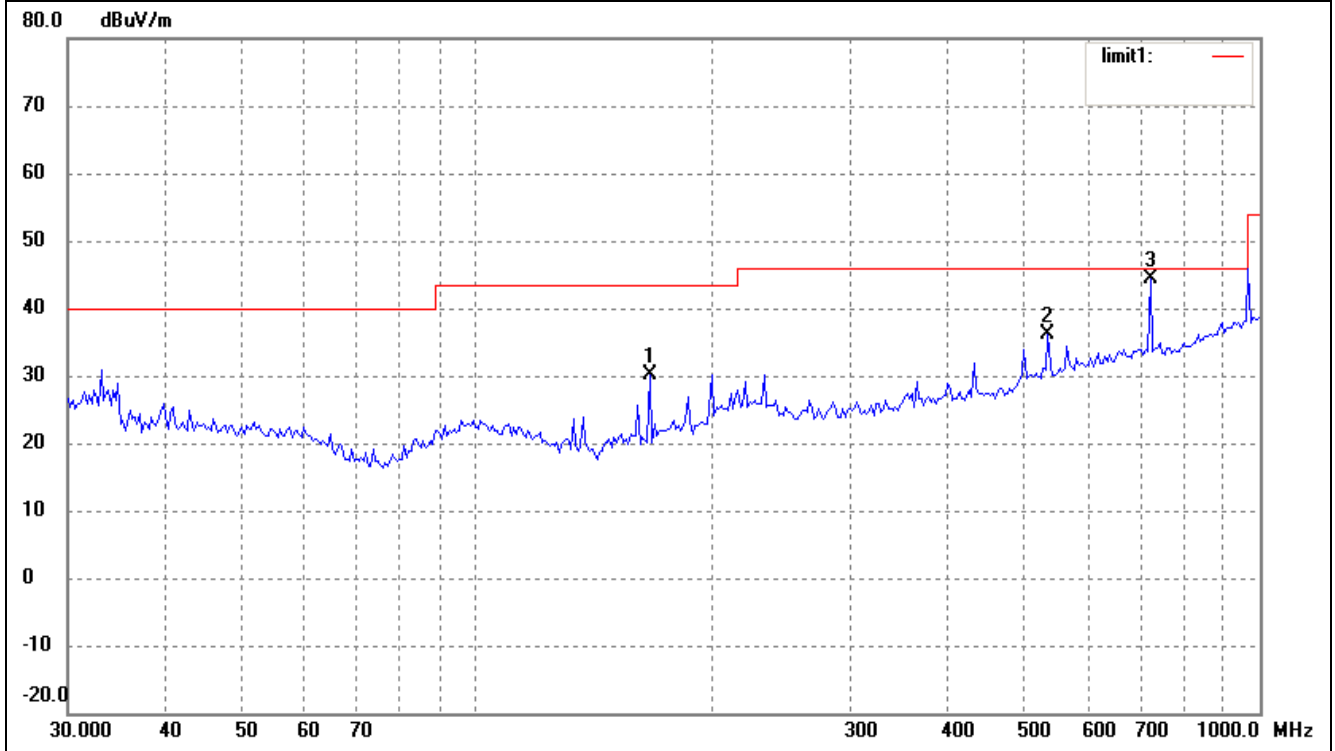
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	33.0950	22.85	6.77	29.62	40.00	-10.38	201	100	peak
2	499.4247	23.11	14.36	37.47	46.00	-8.53	300	100	peak
3	724.2611	21.68	17.86	39.54	46.00	-6.46	21	100	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11g) Middle Channel

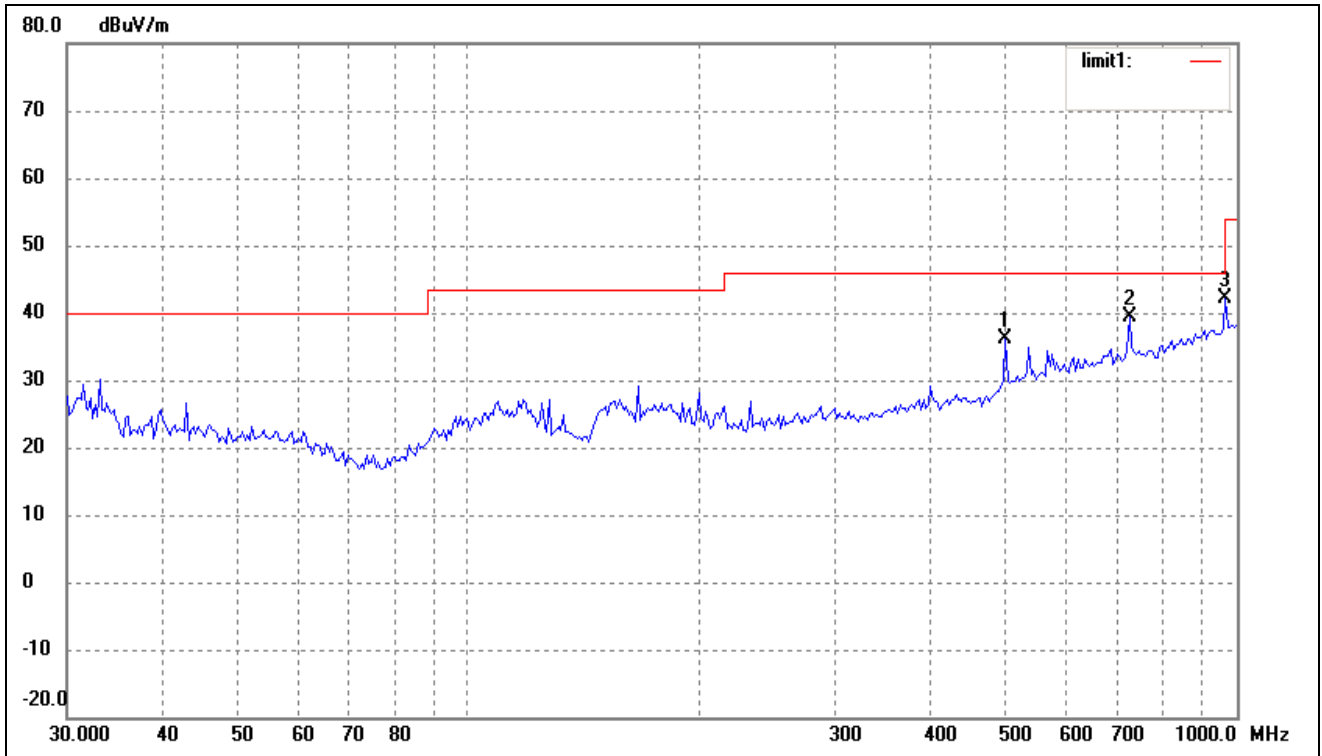
Comment:

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	166.0680	25.29	4.75	30.04	43.50	-13.46	79	100	peak
2	535.7073	20.93	15.21	36.14	46.00	-9.86	54	100	peak
3	724.2611	26.50	17.86	44.36	46.00	-1.64	120	100	peak

Vertical



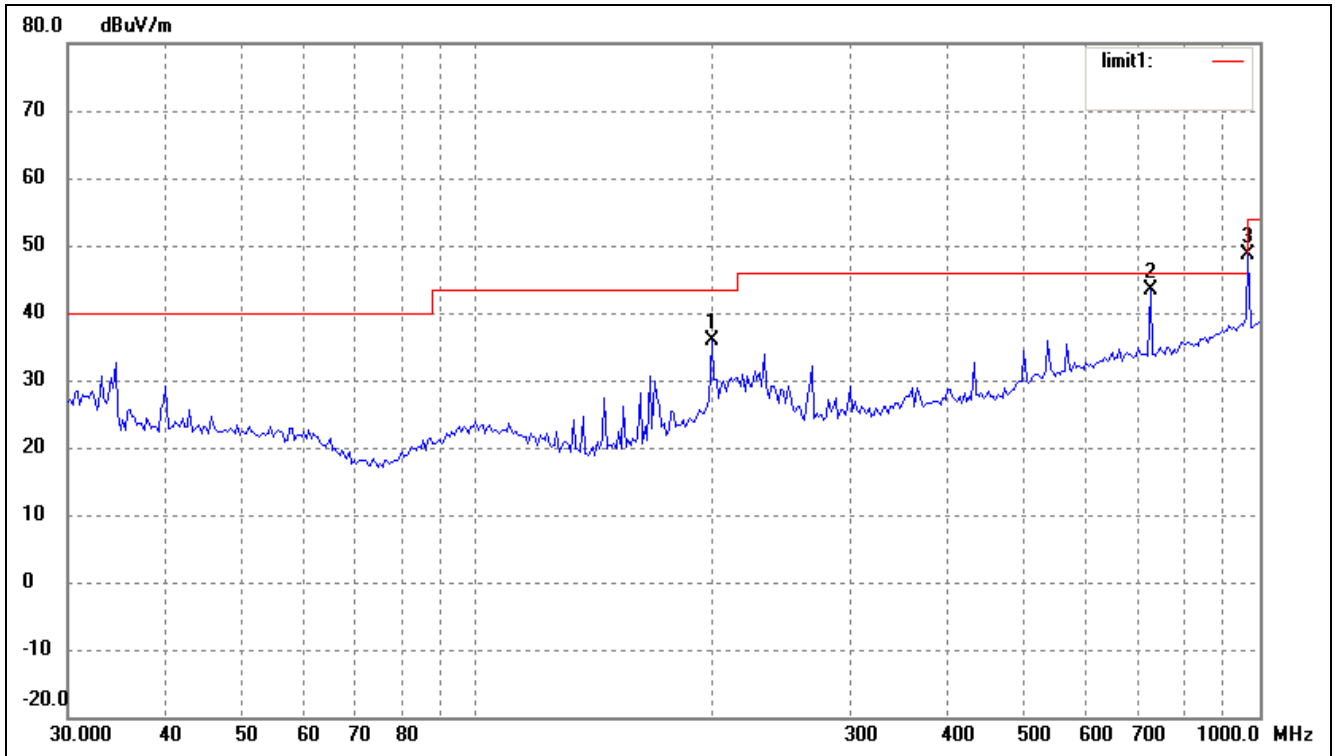
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	499.4247	21.82	14.36	36.18	46.00	-9.82	205	100	peak
2	724.2611	21.51	17.86	39.37	46.00	-6.63	64	100	peak
3	965.5421	19.99	22.10	42.09	54.00	-11.91	11	100	peak

Spurious Emission From 30 MHz to 1 GHz

Test mode: Transmitting (802.11g) High Channel

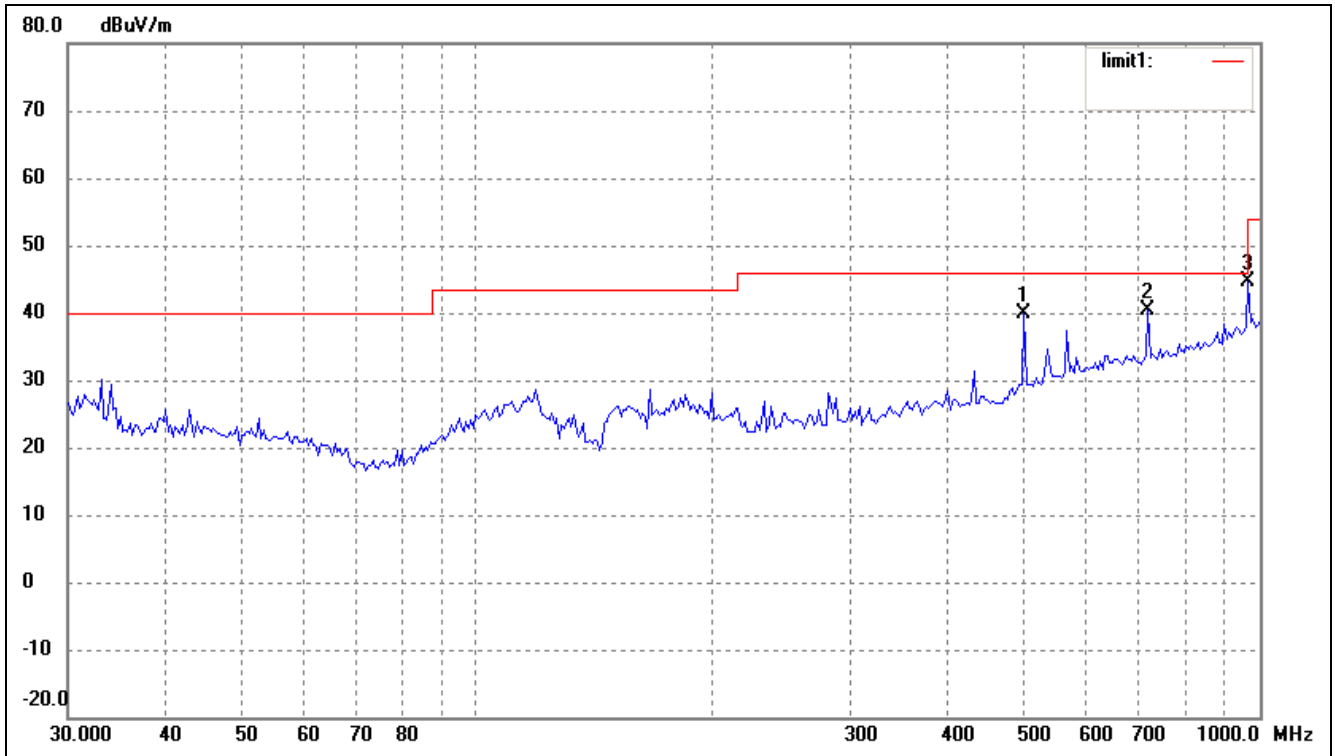
Comment:

Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	199.2855	29.18	6.58	35.76	43.50	-7.74	22	100	peak
2	724.2611	25.57	17.86	43.43	46.00	-2.57	256	100	peak
3	965.5421	26.44	22.10	48.54	54.00	-5.46	64	100	peak

Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Remark
1	499.4247	25.56	14.36	39.92	46.00	-6.08	71	100	peak
2	719.1995	22.62	17.79	40.41	46.00	-5.59	81	100	peak
3	965.5421	22.53	22.10	44.63	54.00	-9.37	109	100	peak

*Spurious Emission above 1GHz**Test Mode: Transmitting (802.11b)*

Frequency MHz	Detector	Meter Reading dBuV	Direction Degree	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Correction Amplitude dBuV/m	Limit dBuV/m	Margin dB
Low Channel (1G to 25GHz)										
4824.0	PK	53.4	90	V	34.1	5.2	33.0	59.7	74	-14.3
4824.0	PK	48.8	270	H	34.1	5.2	33.0	58.8	74	-15.2
7236.0	PK	49.9	180	V	37.4	6.1	33.5	59.9	74	-14.1
7236.0	PK	54.5	45	H	37.4	6.1	33.5	60.8	74	-13.2
4824.0	AV	45.3	270	V	34.1	5.2	33.0	51.6	54	-2.4
4824.0	AV	40.8	90	H	34.1	5.2	33.0	50.8	54	-3.2
7236.0	AV	41.9	45	V	37.4	6.1	33.5	51.9	54	-2.1
7236.0	AV	46.1	60	H	37.4	6.1	33.5	52.4	54	-1.6
Middle Channel (1G to 25GHz)										
4874.0	PK	53.9	45	V	34.1	5.2	33.0	60.2	74	-13.8
4874.0	PK	51.2	270	H	34.1	5.2	33.0	61.2	74	-12.8
7311.0	PK	52.5	45	V	37.4	6.1	33.5	62.5	74	-11.5
7311.0	PK	55.4	180	H	37.4	6.1	33.5	61.7	74	-12.3
4874.0	AV	46.3	270	V	34.1	5.2	33.0	52.6	54	-1.4
4874.0	AV	41.4	90	H	34.1	5.2	33.0	51.4	54	-2.6
7311.0	AV	42.2	60	V	37.4	6.1	33.5	52.2	54	-1.8
7311.0	AV	45.8	45	H	37.4	6.1	33.5	52.1	54	-1.9
High Channel (1G to 25GHz)										
4924.0	PK	52.3	270	V	34.1	5.2	33.0	58.6	74	-15.4
4924.0	PK	49.4	45	H	34.1	5.2	33.0	59.4	74	-14.6
7386.0	PK	50.5	180	V	37.4	6.1	33.5	60.5	74	-13.5
7386.0	PK	53.2	45	H	37.4	6.1	33.5	59.5	74	-14.5
4924.0	AV	44.1	90	V	34.1	5.2	33.0	50.4	54	-3.6
4924.0	AV	41.2	270	H	34.1	5.2	33.0	51.2	54	-2.8
7386.0	AV	41.9	60	V	37.4	6.1	33.5	51.9	54	-2.1
7386.0	AV	45.7	60	H	37.4	6.1	33.5	52.0	54	-2.0

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	52.3	90	V	34.1	5.2	33.0	58.6	74	-15.4
4824.0	PK	47.8	270	H	34.1	5.2	33.0	57.8	74	-16.2
7236.0	PK	49.5	180	V	37.4	6.1	33.5	59.5	74	-14.5
7236.0	PK	52.4	45	H	37.4	6.1	33.5	58.7	74	-15.3
4824.0	AV	44.1	270	V	34.1	5.2	33.0	50.4	54	-3.6
4824.0	AV	39.8	90	H	34.1	5.2	33.0	49.8	54	-4.2
7236.0	AV	41.7	45	V	37.4	6.1	33.5	51.7	54	-2.3
7236.0	AV	43.5	60	H	37.4	6.1	33.5	49.8	54	-4.2
Middle Channel (1G to 25GHz)										
4874.0	PK	51.3	45	V	34.1	5.2	33.0	57.6	74	-16.4
4874.0	PK	47.9	270	H	34.1	5.2	33.0	57.9	74	-16.1
7311.0	PK	48.8	45	V	37.4	6.1	33.5	58.8	74	-15.2
7311.0	PK	52.6	180	H	37.4	6.1	33.5	58.9	74	-15.1
4874.0	AV	43.1	270	V	34.1	5.2	33.0	49.4	54	-4.6
4874.0	AV	39.6	90	H	34.1	5.2	33.0	49.6	54	-4.4
7311.0	AV	41.3	60	V	37.4	6.1	33.5	51.3	54	-2.7
7311.0	AV	44.8	45	H	37.4	6.1	33.5	51.1	54	-2.9
High Channel (1G to 25GHz)										
4924.0	PK	52.2	270	V	34.1	5.2	33.0	58.5	74	-15.5
4924.0	PK	46.7	45	H	34.1	5.2	33.0	56.7	74	-17.3
7386.0	PK	49.8	180	V	37.4	6.1	33.5	59.8	74	-14.2
7386.0	PK	51.6	45	H	37.4	6.1	33.5	57.9	74	-16.1
4924.0	AV	44.0	90	V	34.1	5.2	33.0	50.3	54	-3.7
4924.0	AV	38.4	270	H	34.1	5.2	33.0	48.4	54	-5.6
7386.0	AV	41.2	60	V	37.4	6.1	33.5	51.2	54	-2.8
7386.0	AV	43.0	60	H	37.4	6.1	33.5	49.3	54	-4.7

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.

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.

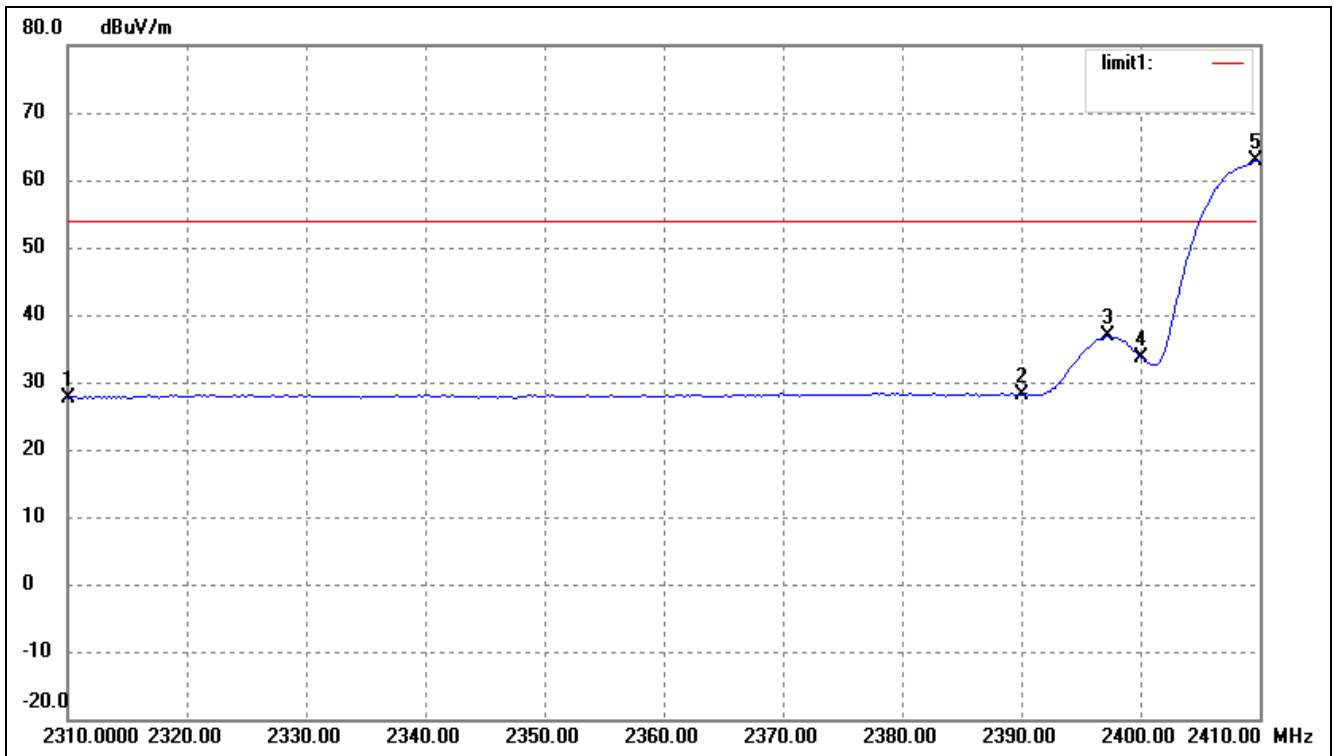
9.4 Environmental Conditions

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

9.5 Summary of Test Results/Plots

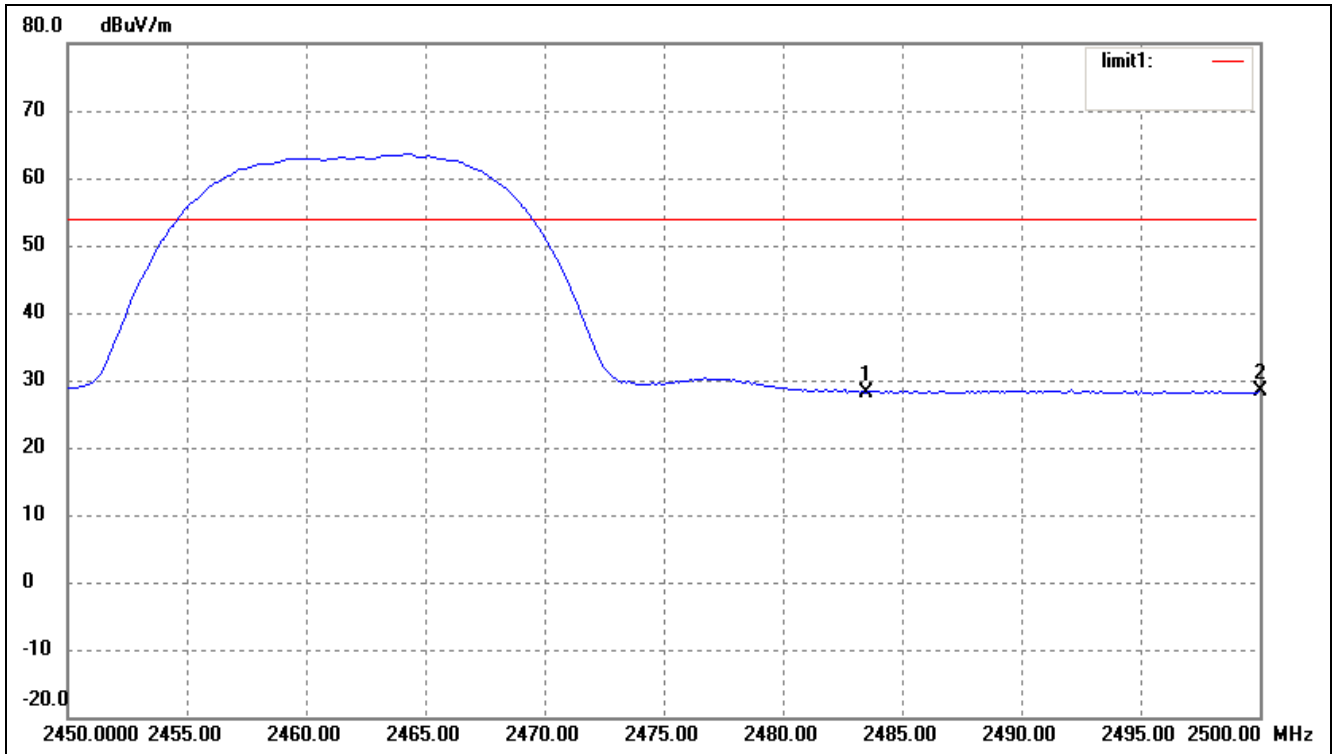
Test mode	Frequency MHz	Limit dBuV /dB	Result
802.11b	2310.00	<54dBuV	Pass
	2390.00	<54dBuV	Pass
	2400.00	>20dB ATT	Pass
	2483.50	<54dBuV	Pass
802.11g	2310.00	<54dBuV	Pass
	2390.00	<54dBuV	Pass
	2400.00	>20dB ATT	Pass
	2483.50	<54dBuV	Pass

For 802.11b
Lowest Bandedge



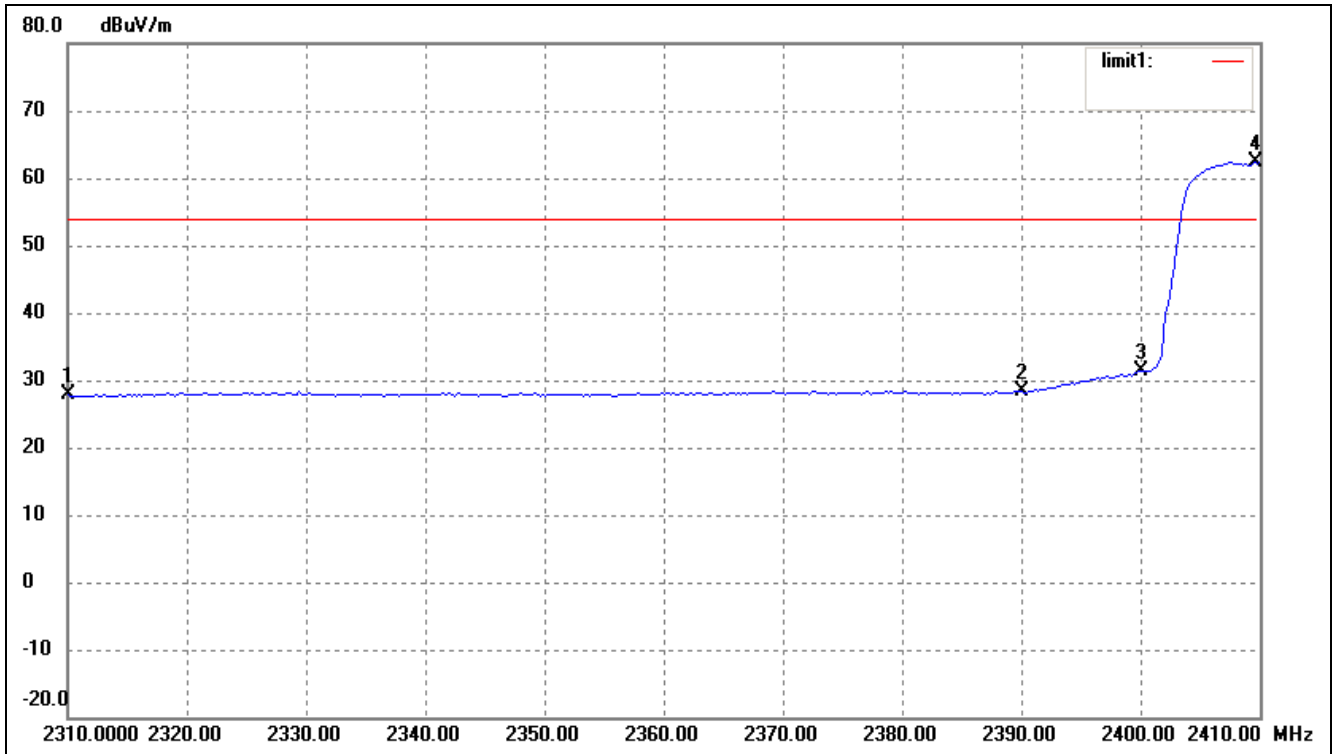
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	35.22	-7.51	27.71	54.00	-26.29	Average Detector
	2310.000	48.03	-7.51	40.52	74.00	-33.48	Peak Detector
2	2390.000	35.46	-7.34	28.12	54.00	-25.88	Average Detector
	2390.000	47.96	-7.34	40.62	74.00	-33.38	Peak Detector
3	2397.200	44.07	-7.31	36.76	/	/	Average Detector
4	2400.000	40.95	-7.31	33.64	/	/	Average Detector
5	2409.600	70.08	-7.28	62.80	/	/	Average Detector

For 802.11b
Highest Bandedge



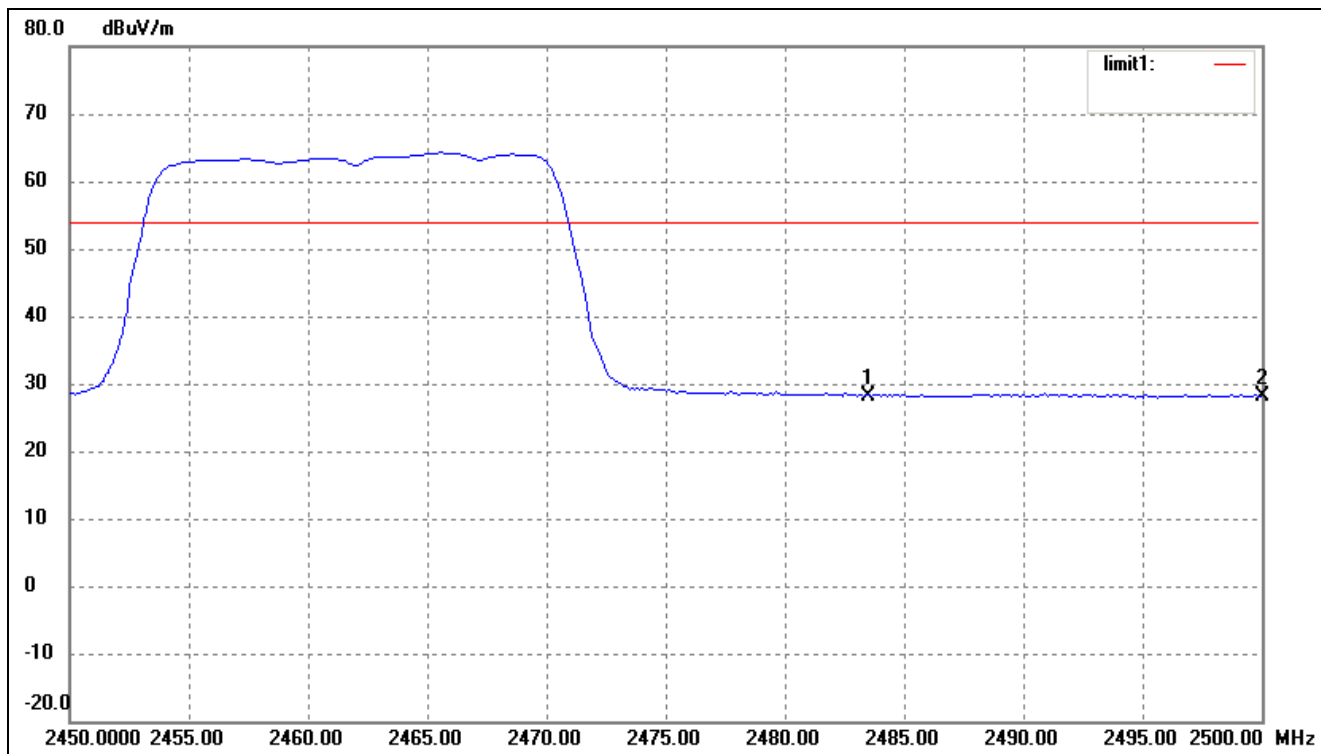
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	35.38	-7.13	28.25	54.00	-25.75	Average Detector
	2483.500	47.64	-7.13	40.51	74.00	-33.49	Peak Detector
2	2500.000	35.42	-7.08	28.34	54.00	-25.66	Average Detector
	2500.000	47.12	-7.08	40.04	74.00	-33.96	Peak Detector

For 802.11g
Lowest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.000	35.41	-7.51	27.90	54.00	-26.10	Average Detector
	2310.000	48.01	-7.51	40.50	74.00	-33.50	Peak Detector
2	2390.000	35.60	-7.34	28.26	54.00	-25.74	Average Detector
	2390.000	47.56	-7.34	40.22	74.00	-33.78	Peak Detector
3	2400.000	38.62	-7.31	31.31	/	/	Average Detector
4	2409.600	69.75	-7.28	62.47	/	/	Average Detector

Highest Bandedge



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	35.38	-7.13	28.25	54.00	-25.75	Average Detector
	2483.500	47.56	-7.13	40.43	74.00	-33.57	Peak Detector
2	2500.000	35.18	-7.08	28.10	54.00	-25.90	Average Detector
	2500.000	47.20	-7.08	40.12	74.00	-33.88	Peak Detector

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