



**FCC 47 CFR PART 15 SUBPART C &  
INDUSTRY CANADA RSS-210  
(Class II Permissive Change)**

**TEST REPORT**

**For**

**802.11n 1x1 PCIe Minicard transceiver**

**Trade Name: Atheros**

**Model: AR5B95**

*Issued to*

**Wistron Corporation  
21F, 88, Sec. 1, Hsin Tai Wu Rd., Hsichih,  
Taipei Hsien 221, Taiwan, R.O.C.**

*Issued by*

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## 1. TEST RESULT CERTIFICATION

**Applicant:**

Wistron Corporation  
21F, 88, Sec. 1, Hsin Tai Wu Rd., Hsichih,  
Taipei Hsien 221, Taiwan, R.O.C.

**Manufacturer:**

Wistron Corporation  
21F, 88, Sec. 1, Hsin Tai Wu Rd., Hsichih,  
Taipei Hsien 221, Taiwan, R.O.C.

**Equipment Under Test:**

802.11n 1x1 PCIe Minicard transceiver

**Trade Name:**

Atheros

**Model Number:**

AR5B95

**Date of Test:**

March 11 ~ 15, 2010

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C & INDUSTRY CANADA RSS-210	No non-compliance noted

**We hereby certify that:**

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2003 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247 and Industry Canada RSS-210.

The test results of this report relate only to the tested sample EUT identified in this report.

*Approved by:*

Rex Lai  
Section Manager  
Compliance Certification Services Inc.

*Reviewed by:*

Gina Lo  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	802.11n 1x1 PCIe Minicard transceiver					
<b>Trade Name</b>	Atheros					
<b>Model Number</b>	AR5B95					
<b>Model Discrepancy</b>	N/A					
<b>Module Trade Name</b>	802.11 bgn: Atheros					
<b>Module Model Number</b>	802.11 bgn: AR5B95					
<b>Power Supply</b>	Powered by host device					
<b>Frequency Range</b>	IEEE 802.11b/g mode: 2.412~2.462 GHz draft 802.11n Standard-20 MHz Channel mode: 2.412~2.462 GHz draft 802.11n Wide-40 MHz Channel mode: 2.422~2.452 GHz					
<b>Transmit Power (Peak Power)</b>	<b>Mode</b>	<b>Frequency Range</b>	<b>Output Power (dBm)</b>	<b>Output Power (mw)</b>		
	802.11b	2412 - 2462	21.13	129.7179		
	802.11g	2412 - 2462	25.21	331.8945		
	802.11n Standard-20 MHz	2412 - 2462	25.28	337.2873		
	802.11n Standard-40 MHz	2422 - 2452	21.95	156.6751		
<b>Transmit Power (Average power)</b>	<b>Mode</b>	<b>Frequency Range</b>	<b>Output Power (dBm)</b>	<b>Output Power (mw)</b>		
	802.11b	2412 - 2462	18.02	63.3870		
	802.11g	2412 - 2462	17.08	51.0505		
	802.11n Standard-20 MHz	2412 - 2462	17.09	51.1682		
	802.11n Standard-40 MHz	2422 - 2452	13.50	22.3872		
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mpbs) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mpbs) draft 802.11n Standard-20 MHz Channel mode: OFDM (6.5, 7.2, 13, 14.4, 14.44, 19.5, 21.7, 26, 28.89, 28.9, 39, 43.3, 43.33 52, 57.78, 57.8, 58.5, 65.0, 72.2, 78, 86.67, 104, 115.56, 117, 130, 144.44, 150 Mbps) draft 802.11n Wide-40 MHz Channel mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150 Mbps)					
<b>Number of Channels</b>	IEEE 802.11b/g mode: 11 Channels draft 802.11n Standard-20 MHz Channel mode: 11 Channels draft 802.11n Wide-40 MHz Channel mode: 7 Channels					
<b>Antenna Specification / Designation</b>	<b>Antenna Brand</b>	<b>Mean</b>	<b>Part Number</b>	<b>Antenna Type</b>	<b>Antenna Gain</b>	
	WNC	AMD CPU for AUX	25.91301.011	PIFA Antenna	-2.02 dBi	
	WNC	AMD CPU for Main	25.91302.011	PIFA Antenna	-0.4 dBi	
	WNC	Intel CPU for AUX	25.92031.011	PIFA Antenna	-1.27 dBi	
	WNC	Intel CPU for Main	25.92030.011	PIFA Antenna	-1.57 dBi	
	Yageo	AMD CPU for AUX	25.91301.001	PIFA Antenna	-1.28 dBi	
	Yageo	AMD CPU for Main	25.91301.002	PIFA Antenna	1.42 dBi	
	Yageo	Intel CPU for AUX	25.92031.001	PIFA Antenna	-0.62 dBi	
	Yageo	Intel CPU for Main	25.92030.001	PIFA Antenna	0.06 dBi	
<b>Class II Permissive Change</b>	Add portable category for the Lenovo Bixby platform Product name: Notebook Computer / Brand name: lenovo Model: Intel CPU / LC: 20063XXXX (X=0~9,A~Z or blank), LI: 0894XXXX (X=0~9,A~Z or blank) AMD CPU / LC:20064XXXX (X=0~9,A~Z or blank), LI: 0915XXXX (X=0~9,A~Z or blank)					

**Remark:**

1. The sample selected for test was production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC ID: **PU5-AR5B95** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.



### 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4 and FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 2, and RSS-210 Issue 7.

#### 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### 3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

The tests documented in this report were performed in accordance with IC RSS-210, IC RSS-Gen, IC RSS-102, and ANSI C63.4.

#### 3.3 GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



### 3.5 DESCRIPTION OF TEST MODES

The EUT (model: AR5B95) comes with four different antennas for sale. After the preliminary test, the antenna with part number 25.91301.002 was found to emit the worst emissions and therefore had been tested under operating condition.

Test program used to control the EUT for staying in continuous transmitting mode was programmed.

Software used to control the EUT for staying in continuous transmitting mode was programmed.

After verification, all tests were carried out with the worst case test modes as shown below except radiated spurious emission below 1GHz and power line conducted emissions below 30MHz, which worst case was in normal link mode only.

**IEEE 802.11b mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 1Mbps data rate were chosen for full testing.

**IEEE 802.11g mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6Mbps data rate were chosen for full testing.

**draft 802.11n Standard-20 MHz Channel mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2462MHz) with 6.5Mbps data rate were chosen for full testing.

**draft 802.11n Wide-40 MHz Channel mode:**

Channel Low (2422MHz), Channel Mid (2437MHz) and Channel High (2452MHz) with 13.5Mbps data rate were chosen for full testing.



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

*Remark: Each piece of equipment is scheduled for calibration once a year.*

3M Semi Anechoic Chamber				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	09/09/2010
Test Receiver	Rohde&Schwarz	ESCI	100064	11/28/2010
Switch Controller	TRC	Switch Controller	SC94050010	05/02/2010
4 Port Switch	TRC	4 Port Switch	SC94050020	05/02/2010
Loop Antenna	EMCO	6502	8905/2356	05/28/2010
Horn-Antenna	TRC	HA-0502	06	06/03/2010
Horn-Antenna	TRC	HA-0801	04	06/17/2010
Horn-Antenna	TRC	HA-1201A	01	08/10/2010
Horn-Antenna	TRC	HA-1301A	01	08/10/2010
Bilog- Antenna	Sunol Sciences	JB3	A030205	03/26/2011
Turn Table	Max-Full	MFT-120S	T120S940302	N.C.R.
Antenna Tower	Max-Full	MFA-430	A440940302	N.C.R.
Controller	Max-Full	MF-CM886	CC-C-1F-13	N.C.R.
Site NSA	CCS	N/A	FCC MRA: TW1039 IC: 2324G-1/-2	10/17/2010 11/04/2010
Test S/W			LABVIEW (V 6.1)	

Powerline Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver 9kHz-30MHz	Rohde & Schwarz	ESHS30	828144/003	11/17/2010
Two-Line V-Network 9kHz-30MHz	Schaffner	NNB41	03/10013	06/10/2010
LISN 10kHz-100MHz	EMCO	3825/2	9106-1809	04/08/2010
Test S/W			LABVIEW (V 6.1)	



### 4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/-1.1559
3M Semi Anechoic Chamber / 30M~200M	+/-3.9944
3M Semi Anechoic Chamber / 200M~1000M	+/-3.9285
3M Semi Anechoic Chamber / 1G~8G	+/-2.4734
3M Semi Anechoic Chamber / 8G~18G	+/-2.4878
3M Semi Anechoic Chamber / 18G~26G	+/-2.6215
3M Semi Anechoic Chamber / 26G~40G	+/-2.8603

*Remark: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.*



## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

No.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.

Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

No.11, Wugong 6th Rd., Wugu Industrial Park, Taipei Hsien 248, Taiwan

Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045

No.81-1, Lane 210, Bade 2nd Rd., Luchu Hsiang, Taoyuan Hsien 338, Taiwan

Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."



### 5.3 TABLE OF ACCREDITATIONS AND LISTINGS

*\* No part of this report may be used to claim or imply product endorsement by A2LA or any agency of the US Government.*

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3M Semi Anechoic Chamber (FCC MRA: TW1039) to perform FCC Part 15 measurements	 FCC MRA: TW1039
Taiwan	TAF	LP0002, RTTE01, FCC Method-47 CFR Part 15 Subpart C, D, E, RSS-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12.2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	 Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2



## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
1.	LCD Monitor	DELL	2408WFPb	CN-OG293H-74261-95 M-1KGS	FCC DoC	Shielded, 1.8m with 2 cores	Unshielded, 1.8m
2	USB Mouse	HP	MO19UCA	20440964	FCC DoC	Shielded, 1.8m	N/A
3	Multimedia Earphone	Labtec	Axis-301	N/A	FCC DoC	Unshielded, 1.8m*2	N/A
4	eSATA3.5" HDD Enclosure	eSATA	STM10	500127-E33-0017	FCC DoC	Shielded, 1.8m	N/A
5	Modem	Hayes	231AA	A26931083831	BFJ9D93108US	Shielded, 1.8m	Unshielded, 1.8m
6	SD Card	SANDISK	N/A	N/A	N/A	N/A	N/A
7	Notebook PC (Remote)	DELL	PP05L	7T390 A03	E2K5HCKT	LAN Cable: Unshielded, 10m	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core
8	Wireless Pre-N Router (Remote)	BELKIN	F5D8230-4	N/A	SA3-AGN0901A P0100	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

#### **Remark:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.



## 7. APPLICABLE RULES FOR INDUSTRY CANADA RSS-210

### **RSS-210 §2 General Certification Requirements and Specifications**

#### **RSS-210 §2.1 Frequency Stability**

When the carrier frequency stability is not specified, it need not be tested, provided that the carrier frequency is chosen such that the fundamental modulation products (meaning the nominal bandwidth) lie totally within the bands listed in Tables 2, 3, 4 and 5 and do not fall into any restricted band listed in Table 1. Due account shall be taken of carrier frequency drift as a result of aging, temperature, humidity, and supply voltage variations when using frequencies near the band edges.

#### **RSS-210 §2.2 Restricted Bands and Unwanted Emission Frequencies**

Restricted bands, identified in Table 1, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy, and some government uses. Except where otherwise indicated, the following restrictions apply:

(a) Fundamental components of modulation of LPDs shall not fall within the restricted bands of Table 1.

(b) Unwanted emissions falling into restricted bands of Table 1 shall meet Tables 2 and 3 limits. It should also be noted that unwanted emissions falling in non-restricted bands do not need to be suppressed to a level lower than the Table 2 and 3 limits.

(c) Unwanted emissions not falling within restricted frequency bands may also use the limits specified in the applicable annex.

#### **RSS-210 §2.3 Licence-exempt Receivers**

Category I licence-exempt receivers are required to have their spurious emissions comply with Section 7.2.3 of RSS-Gen.

#### **RSS-210 §2.6 General Field Strength Limits**

Table 2 and 3 list the permissible levels of unwanted emissions of transmitters and receivers. However, transmitters with field strengths that do not exceed the limits in these tables may also operate in these frequency bands, other than the restricted bands of Table 1 and the TV bands (i.e. unwanted emissions of transmitters and receivers are permitted to fall into Table 1 and TV frequencies but intentional emissions are prohibited). See the note of Table 2 for further details.

## RSS-210 §2.7 Tables

**RSS-210 Table 1: Restricted Frequency Bands** <sup>(Note)</sup>

MHz	MHz	MHz	MHz	GHz
0.090-0.110	8.37625-8.38675	--	1718.8-1722.2	9.0-9.2
--	8.41425-8.41475	156.52475-156.52525	2200-2300	9.3-9.5
2.1735-2.1905	12.29-12.293	156.7-156.9	2310-2390	10.6-12.7
3.020-3.026	12.51975-12.52025	--	--	13.25-13.4
4.125-4.128	12.57675-12.57725	--	2655-2900	14.47-14.5
4.17725-4.17775	13.36-13.41	240-285	3260-3267	15.35-16.2
4.20725-4.20775	16.42-16.423	322-335.4	3332-3339	17.7-21.4
5.677-5.683	16.69475-16.69525	399.9-410	3345.8-3358	22.01-23.12
6.215-6.218	16.80425-16.80475	608-614	3500-4400	23.6-24.0
6.26775-6.26825	25.5-25.67	960-1427	4500-5150	31.2-31.8
6.31175-6.31225	37.5-38.25	1435-1626.5	5350-5460	36.43-36.5
8.291-8.294	73-74.6; 74.8-75.2	1645.5-1646.5	7250-7750	Above 38.6
8.362-8.366	108-138	1660-1710	8025-8500	

**Note:** Certain frequency bands listed in Table 2 and above 38.6 GHz are designated for low-power licence-exempt applications. These frequency bands and the requirements that apply to the devices are set out in this Standard as well as RSS-310.

**RSS-210 Table 2: General Field Strength Limits for Transmitters and Receivers at Frequencies Above 30 MHz** <sup>(Note)</sup>

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

**Note:** Transmitting devices are not permitted in Table 1 bands or in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, and 614-806 MHz). Prohibition of operation in TV bands does not apply to momentary devices, or to medical telemetry devices in the band 174-216 MHz, and to perimeter protection systems in the bands 54-72 and 76-88 MHz. The perimeter protection devices are to meet Table 3 field strengths limits.

**RSS-210 Table 3: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)**

Frequency (fundamental or spurious)	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in Hz)	300
490-1.705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

*Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.*

**RSS-210 §Annex 8: Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands**

This section applies to systems that employ frequency hopping (FH) and digital modulation technology in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands. Systems in these bands may employ frequency hopping, digital modulation and or a combination (hybrid) of both techniques.

A frequency hopping system that synchronizes with another or several other systems (to avoid frequency collision among them) via off-air sensing or via connecting cables is not hopping randomly and therefore is not in compliance with RSS-210.

**RSS-210 §A8.2 Digital Modulation Systems**

These include systems employing digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to all three bands.

**RSS-210 §A8.4 Transmitter Output Power and e.i.r.p. Requirements**

(4) For systems employing digital modulation techniques operating in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands, the maximum peak conducted power shall not exceed 1 W. Except as provided in Section A8.4(5), the e.i.r.p. shall not exceed 4 W.

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power (see RSS-Gen)

(5) Point-to-point systems in the bands 2400-2483.5 MHz and 5725-5850 MHz are permitted to have an e.i.r.p. higher than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be allowed to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to- point systems.

**Note:** “Fixed, point-to-point operation”, excludes point-to-multipoint systems, omnidirectional applications and multiple co-located transmitters transmitting the same information.



## **RSS-210 §A8.5 Out-of-band Emissions**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced 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 section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required.

## **RSS-Gen §2 General Information**

Unless otherwise indicated, radiocommunications equipment is subject to licensing pursuant to subsection 4(1) of the *Radiocommunication Act*.

### **RSS-Gen §2.1.2 Category II Equipment**

Category II equipment comprises radio devices where a standard has been prescribed but for which a TAC is not required, that is, equipment certification by Industry Canada or a Certification Body (CB) is not required (certification exempt), pursuant to subsection 4(3) of the *Radiocommunication Act*. The manufacturer or importer shall nevertheless ensure that the standards are complied with. A test report shall be available on request and the device shall be properly labelled.

### **RSS-Gen §2.2 Receivers**

Radiocommunication receivers are defined as Category I equipment or Category II equipment by the characteristics outlined below.

#### **RSS-Gen §2.2.1 Category I Equipment Receivers**

A receiver is classified as Category I equipment if it meets one of the following conditions:

- (a) is a stand-alone receiver that is tunable to any frequency in the band 30-960 MHz;
- (b) is a receiver that is associated with Category I transmitters; or
- (c) is a scanner receiver.

Except for scanner receivers, which have their own RSSs, Category I receivers shall comply with the limits for receiver spurious emissions set out in Section 6 of this RSS-Gen, and shall be certified under the RSS applicable to the transmitter type with which the receiver is associated or designed to operate (NOT under RSS-Gen).

#### **RSS-Gen §2.2.2 Category II Equipment Receivers**

A receiver is classified as Category II equipment if it is not meeting the conditions of Section 2.2.1.

#### **RSS-Gen §2.2.3 Licence-exempt Receivers**

Paging receivers, “receive-only” earth stations operating with satellites approved by Industry Canada, and stand-alone receivers which are exempted from licensing, can be classified as either Category I or Category II. These receivers shall comply with the requirements of RSS-210 or RSS-310, respectively.

### **RSS-Gen §2.3 Licence-exempt Low-power Radiocommunication Devices (LPDs)**

Licence-exempt low-power radiocommunication devices are devices which have intentional and unwanted emissions of very low signal levels such that they can co-exist with licensed radio services. LPDs are required to operate on a “**no-interference no-protection**” basis (i.e. they may not cause radio interference and cannot claim protection from interference). The requirements for LPDs are generally described in Section 7.

### **RSS-Gen §5.5 Exposure of Humans to RF Fields**

Before equipment certification is granted, the applicable requirements of RSS-102 shall be met.

### **RSS-Gen §6 Receiver Spurious Emission Standard**

The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1.

#### **RSS-Gen Table 1 - Spurious Emission Limits for Receivers**

Frequency (MHz)	Field Strength microvolts/m at 3 metres
30-88	100
88-216	150
216-960	200
Above 960	500

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

### **RSS-Gen §7.1.4 Transmitter Antenna**

A transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

**RSS-Gen §7.2.2 Transmitter and Receiver AC Power Lines Conducted Emission Limits**

Except when the requirements applicable to a given device state otherwise, for any licence-exempt radiocommunication device equipped to operate from the public utility AC power supply, either directly or indirectly, the radio frequency voltage that is conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in Table 2. The tighter limit applies at the frequency range boundaries.

**RSS-Gen Table 2 – AC Power Lines Conducted Emission Limits**

Frequency Range (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*\*Decreases with the logarithm of the frequency*

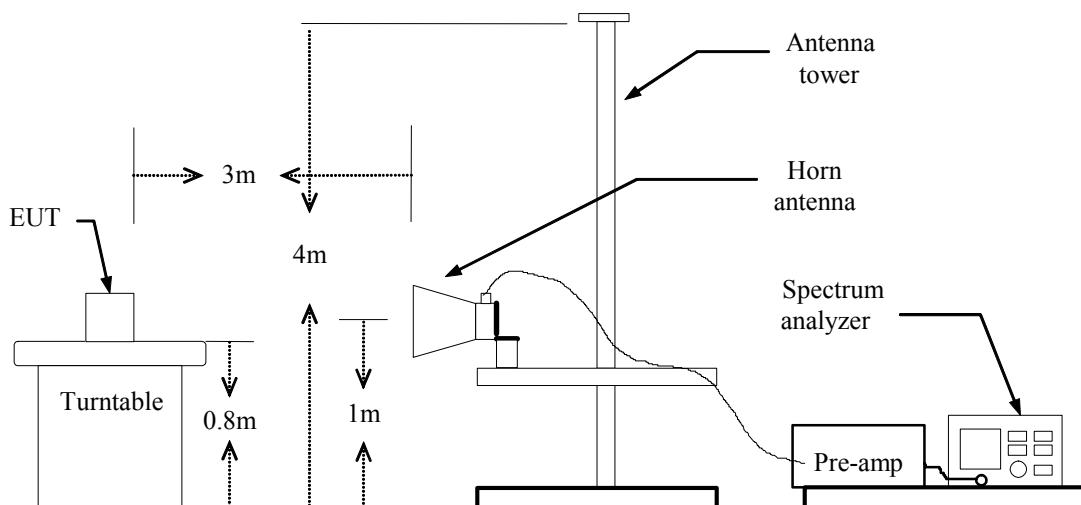
## 8. FCC PART 15.247 REQUIREMENTS& RSS-210 REQUIREMENTS

### 8.1 BAND EDGES MEASUREMENT

#### LIMIT

According to §15.247(d) & RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum 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. 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) (see Section 15.205(c)).

#### Test Configuration

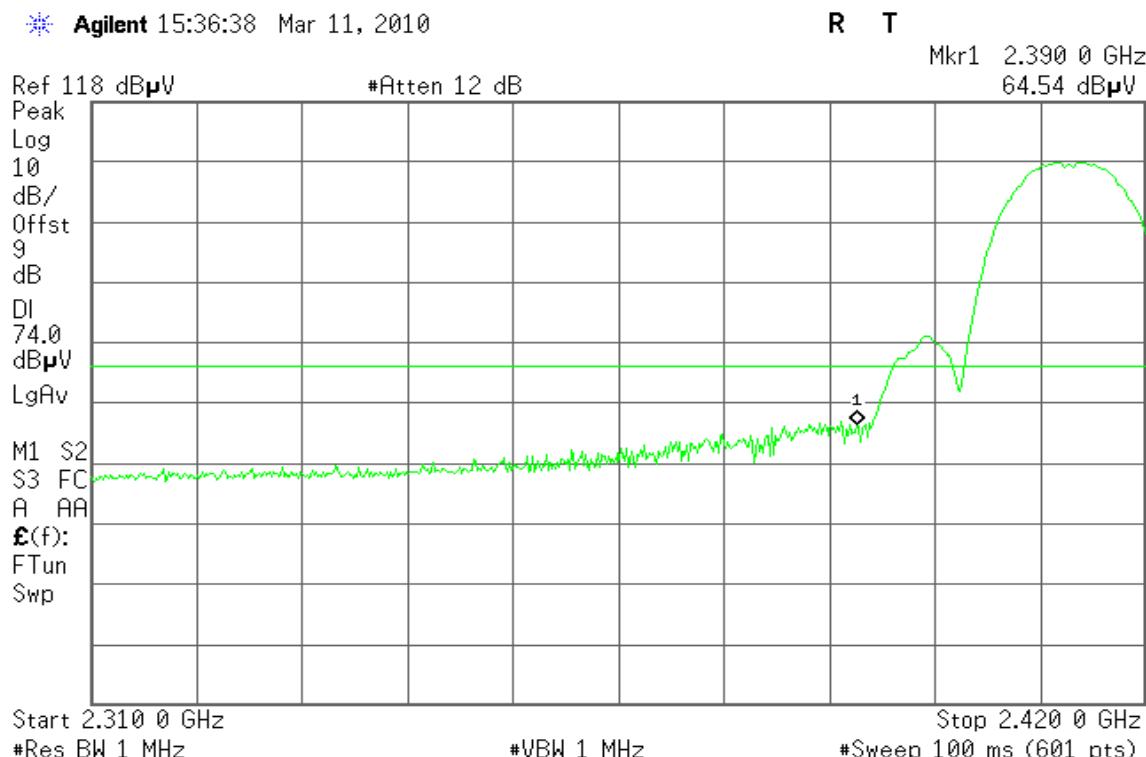


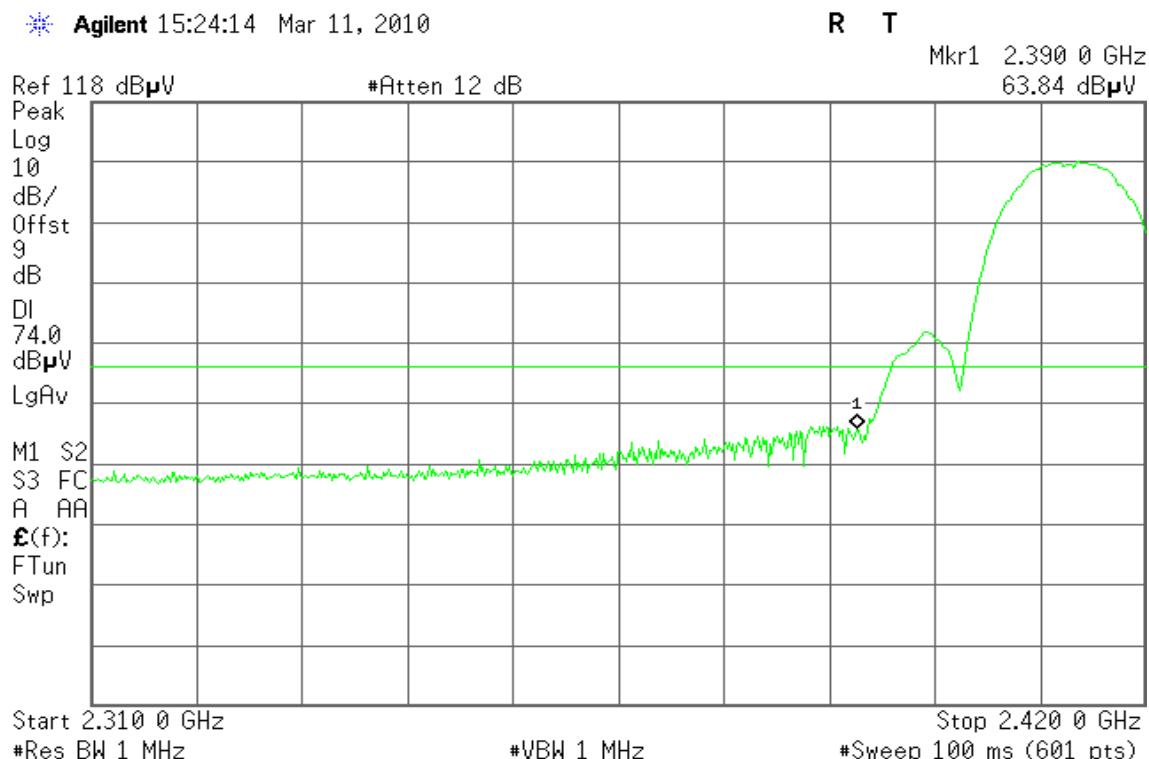
#### TEST PROCEDURE

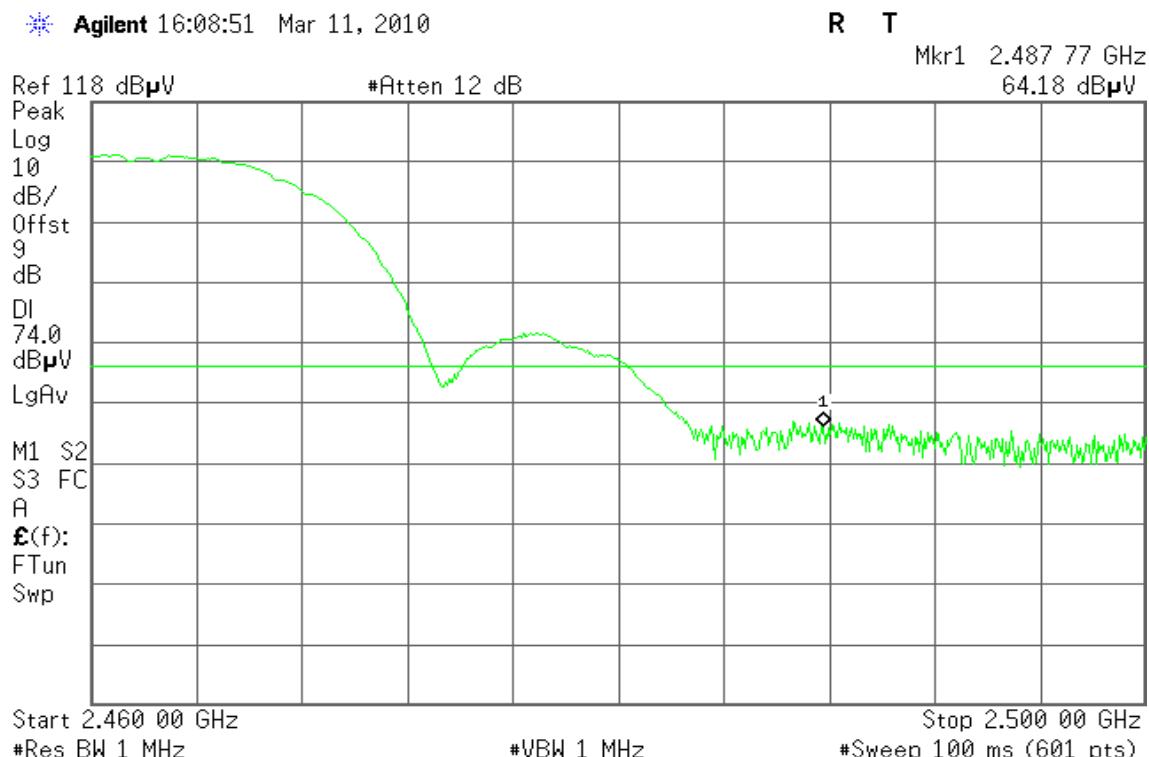
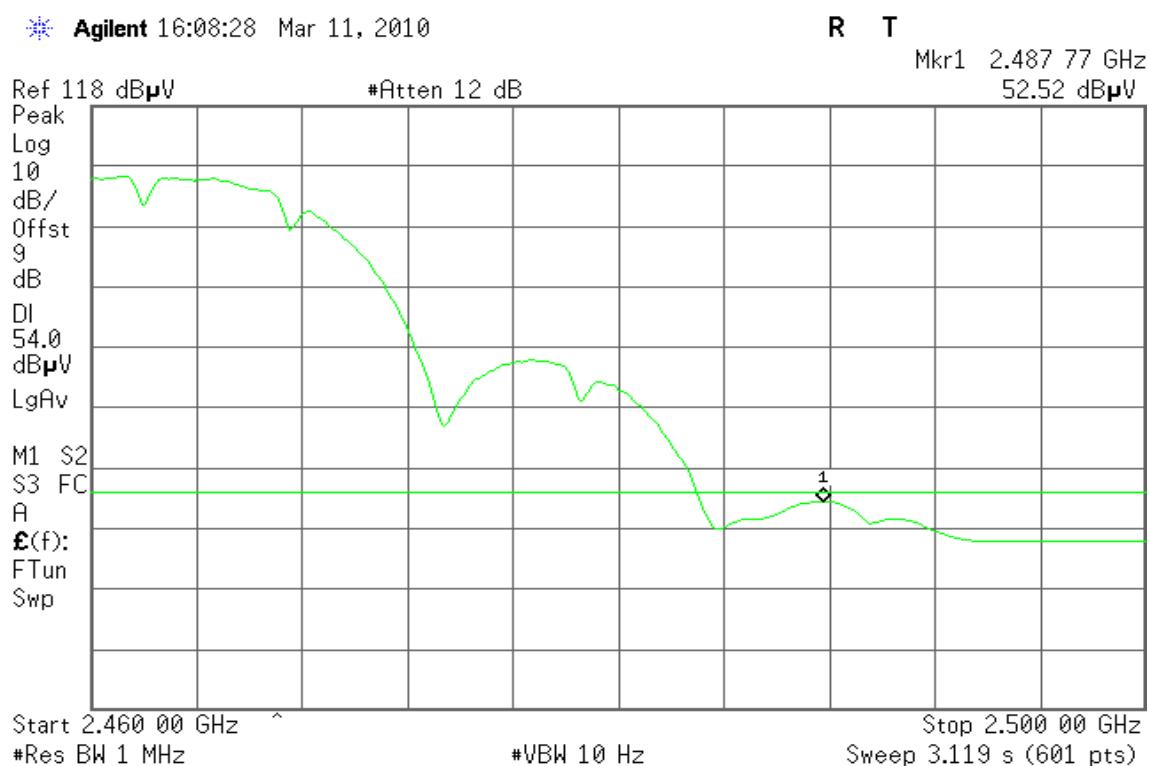
1. The EUT is placed on a turntable, which is 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
  - (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

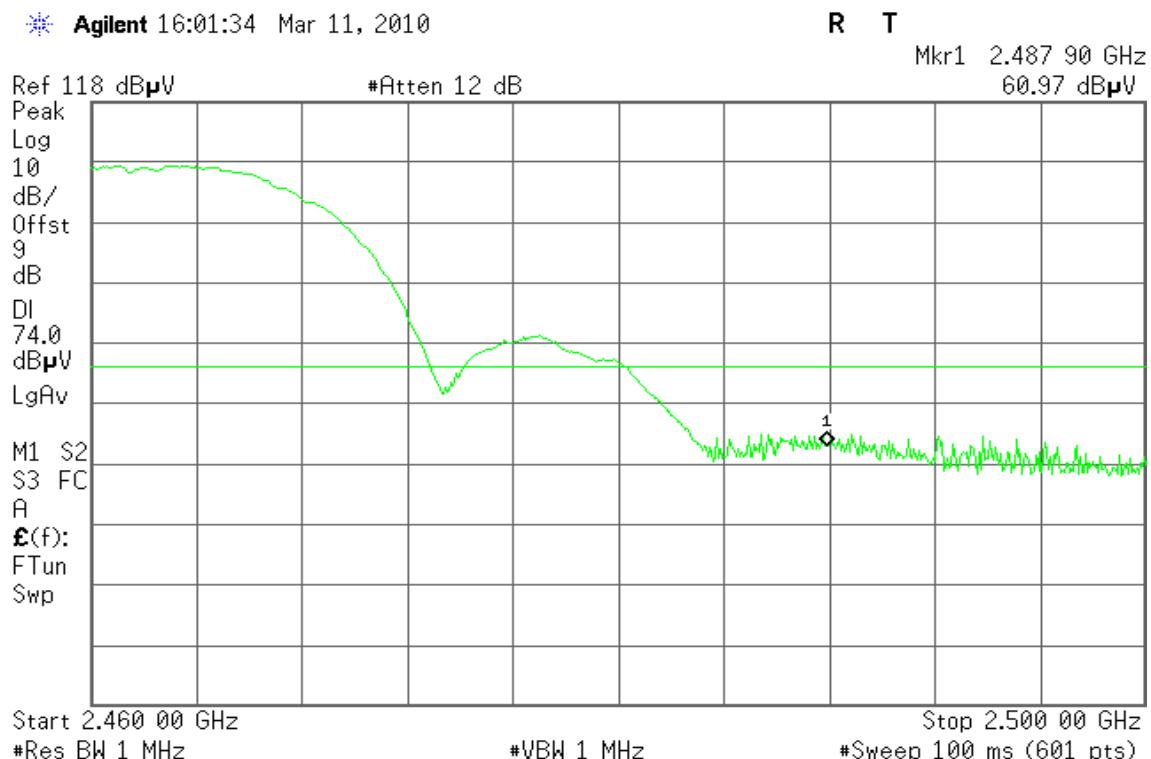
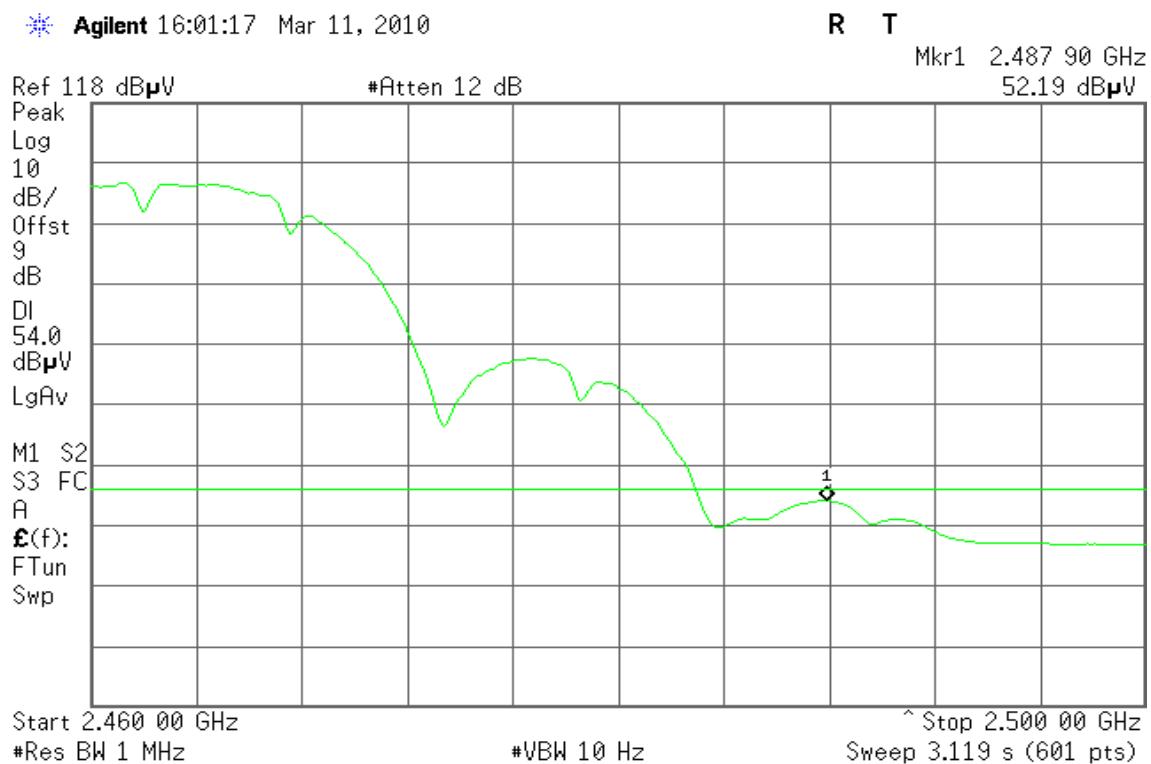
#### TEST RESULTS

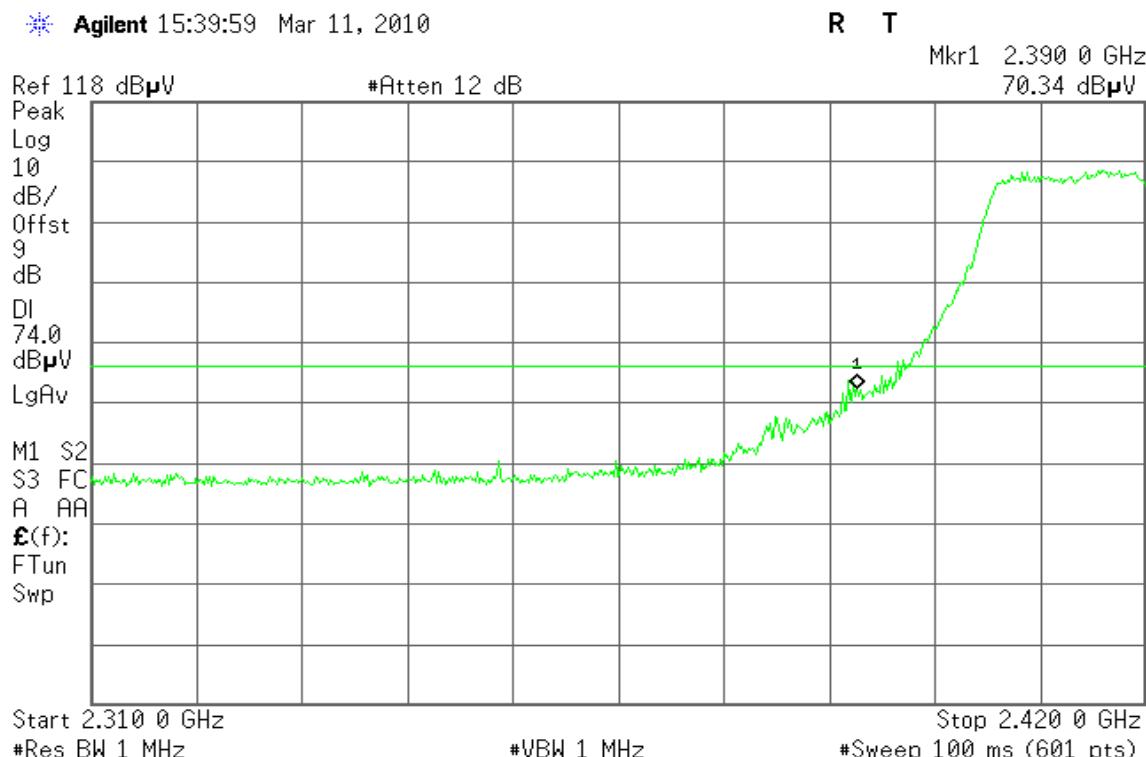
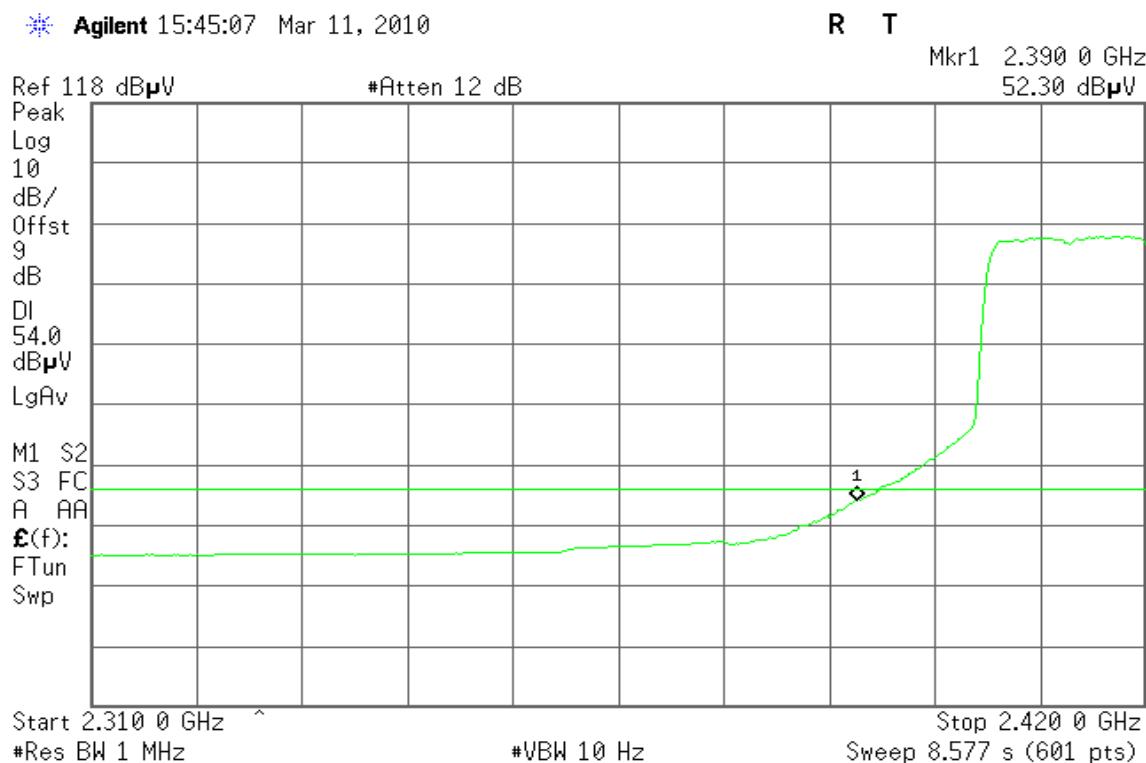
Refer to attach spectrum analyzer data chart.

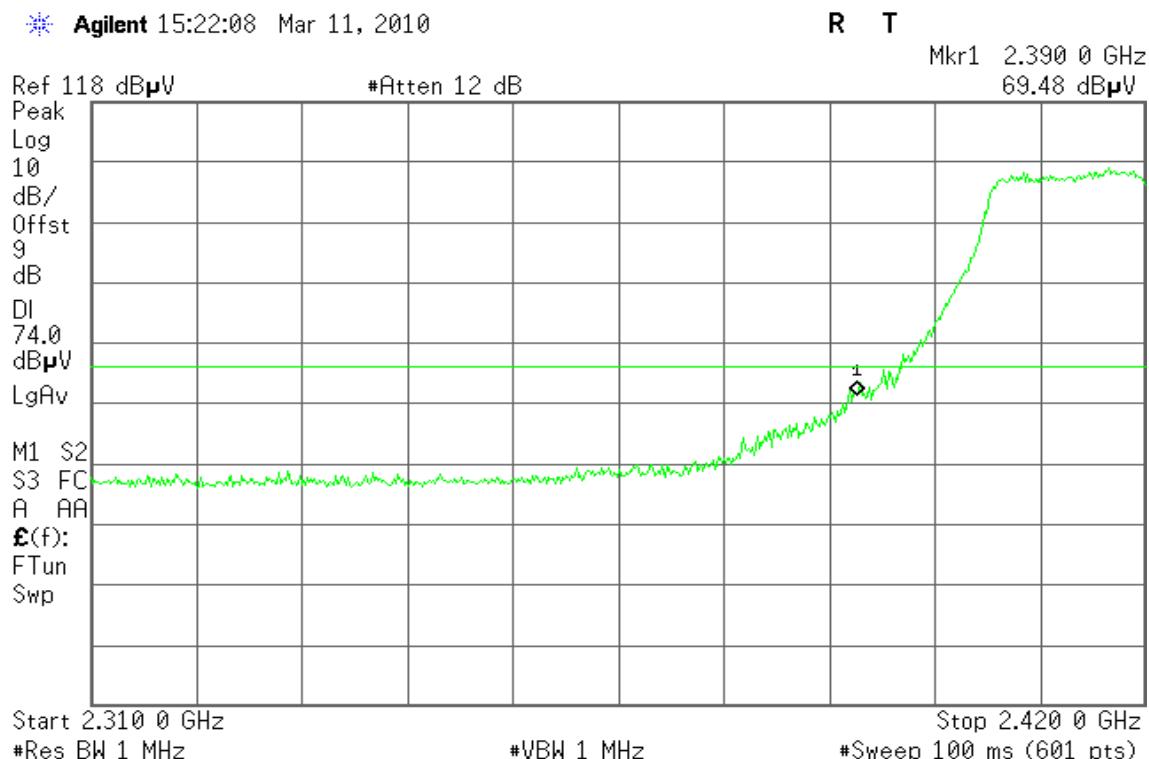
**Band Edges (IEEE 802.11b mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

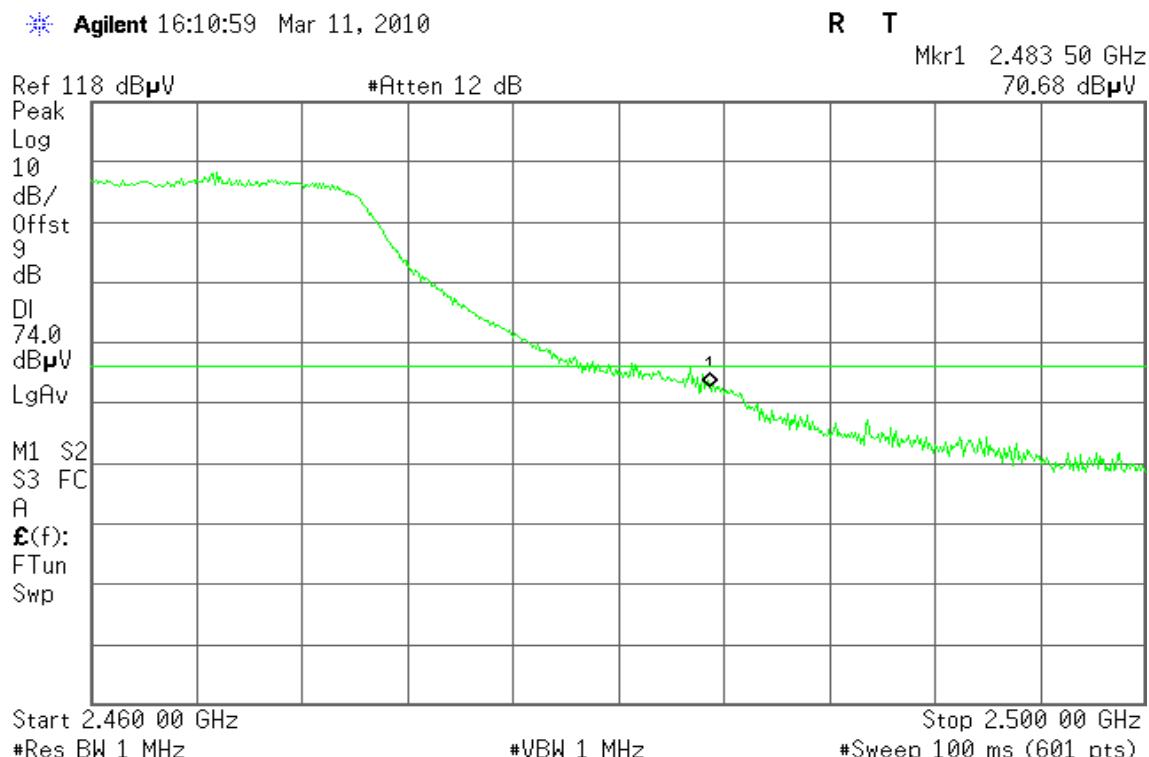
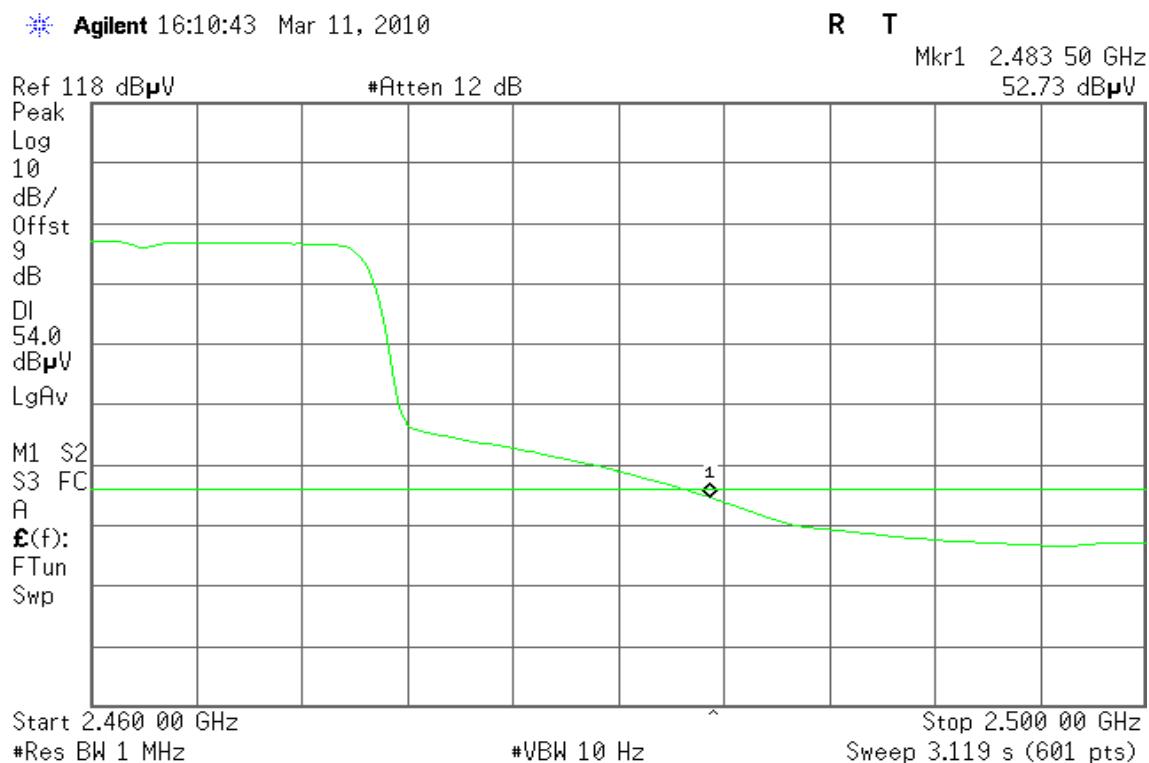
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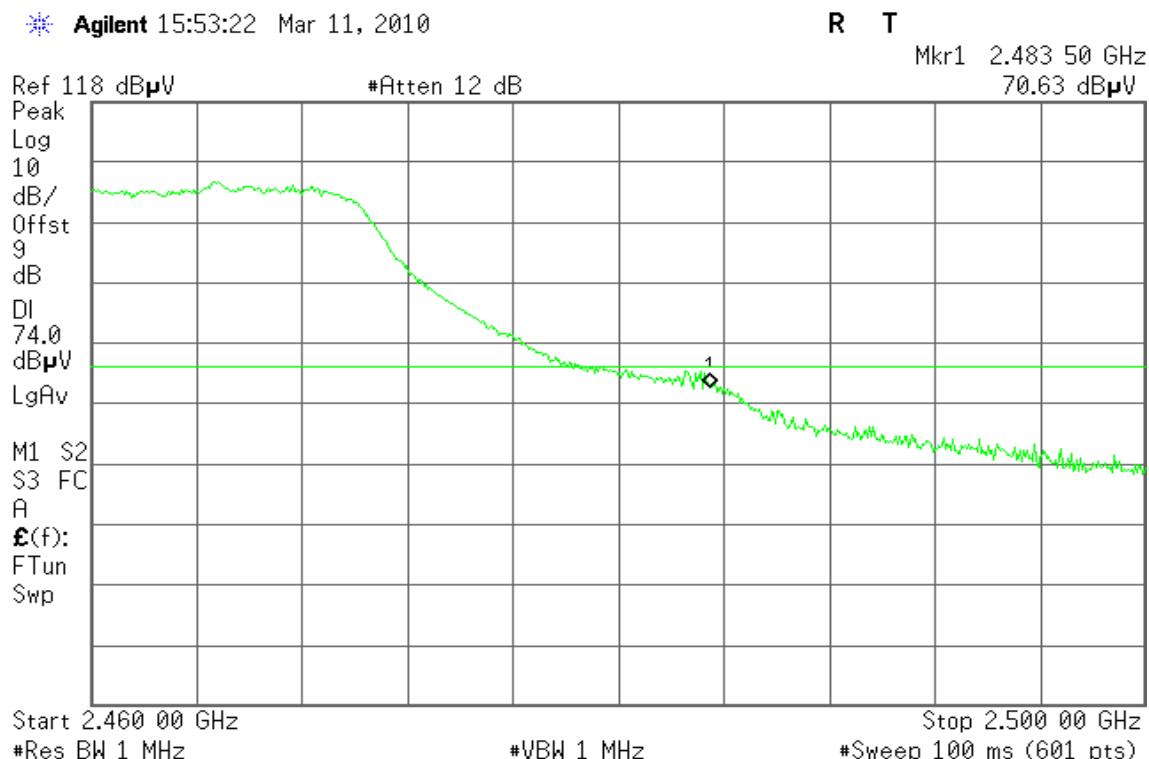
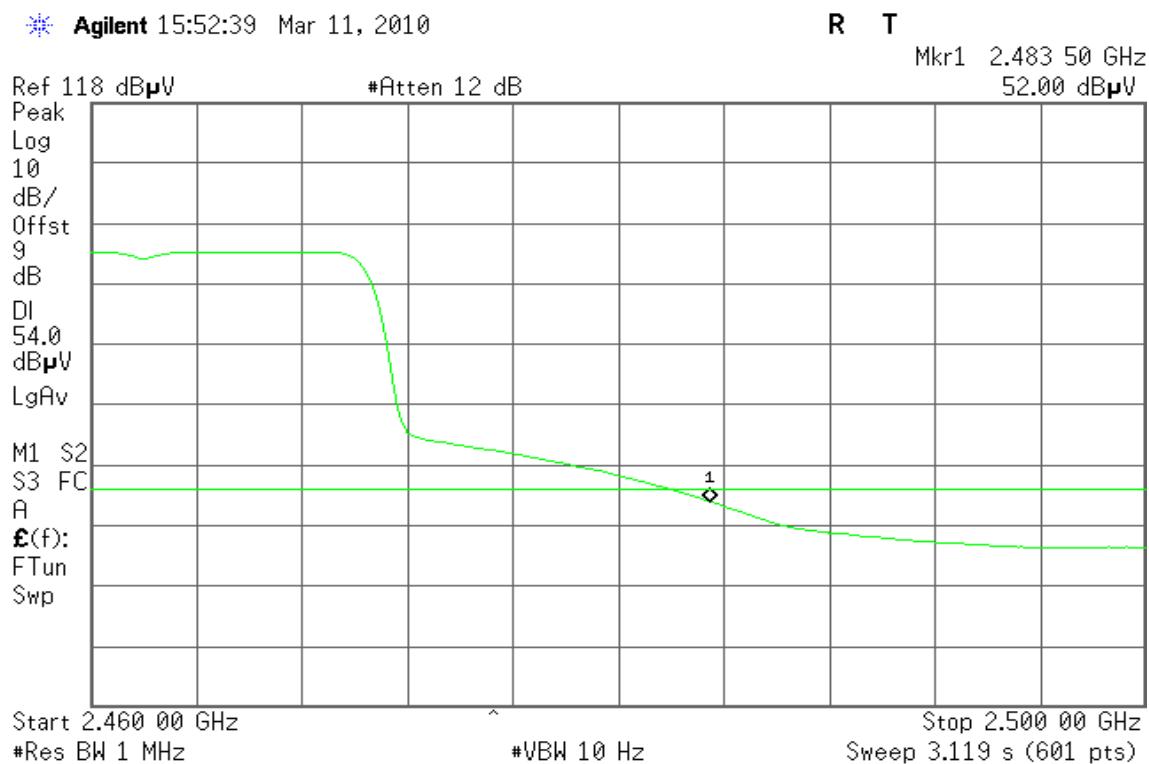
**Band Edges (IEEE 802.11b mode / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

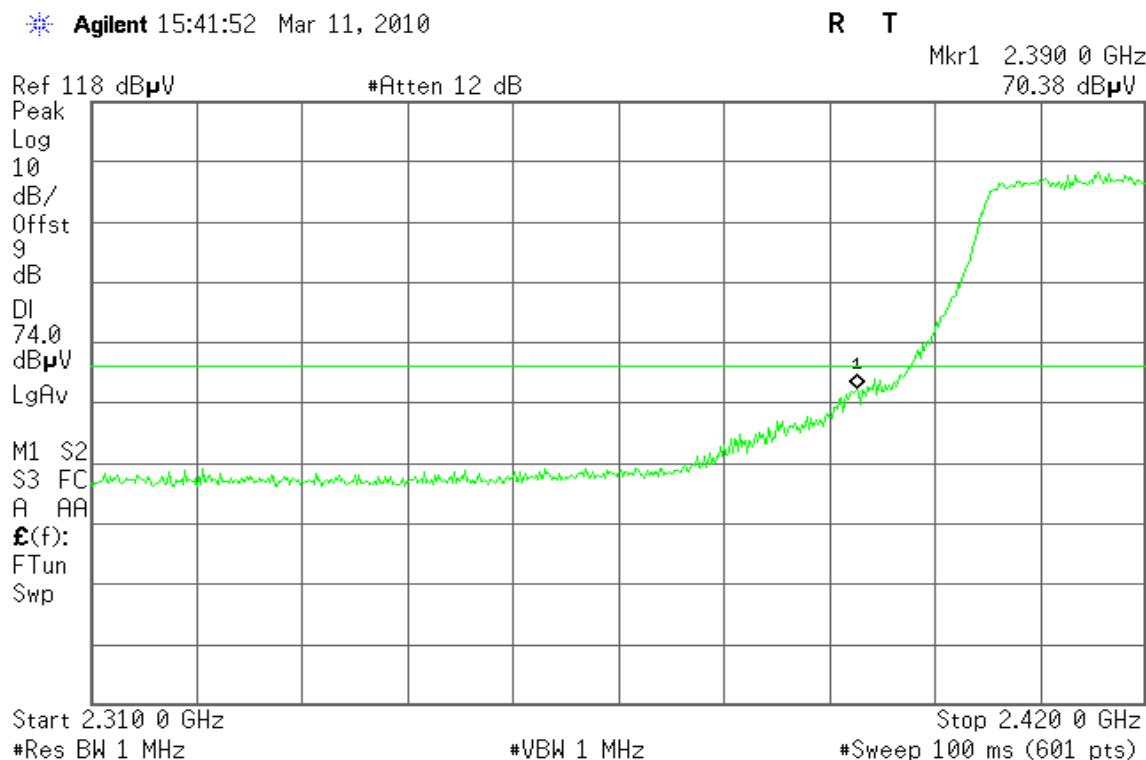
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

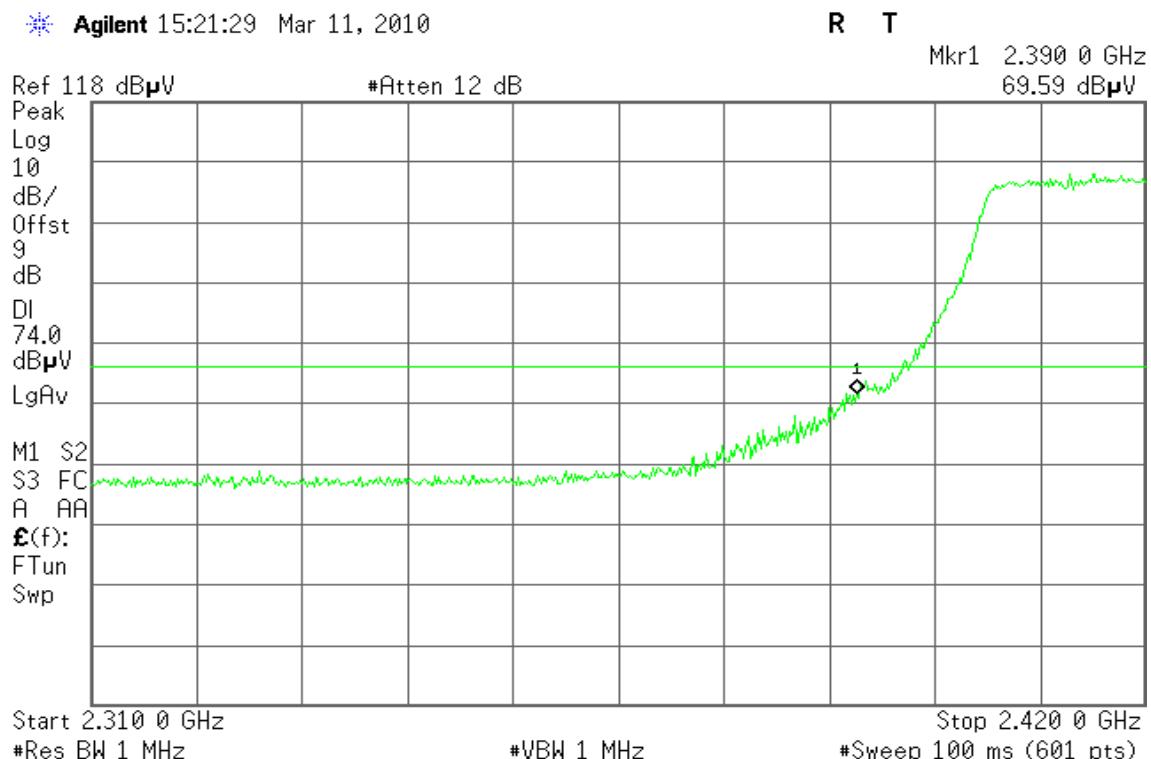
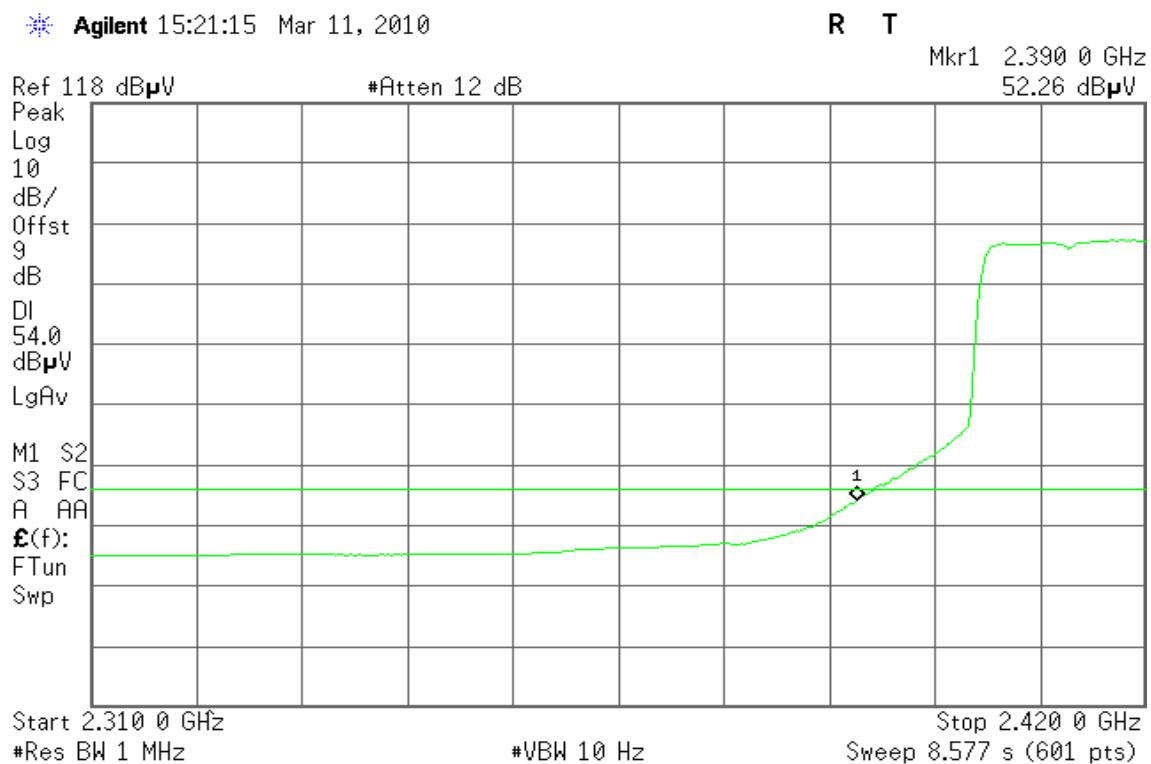
**Band Edges (IEEE 802.11g mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

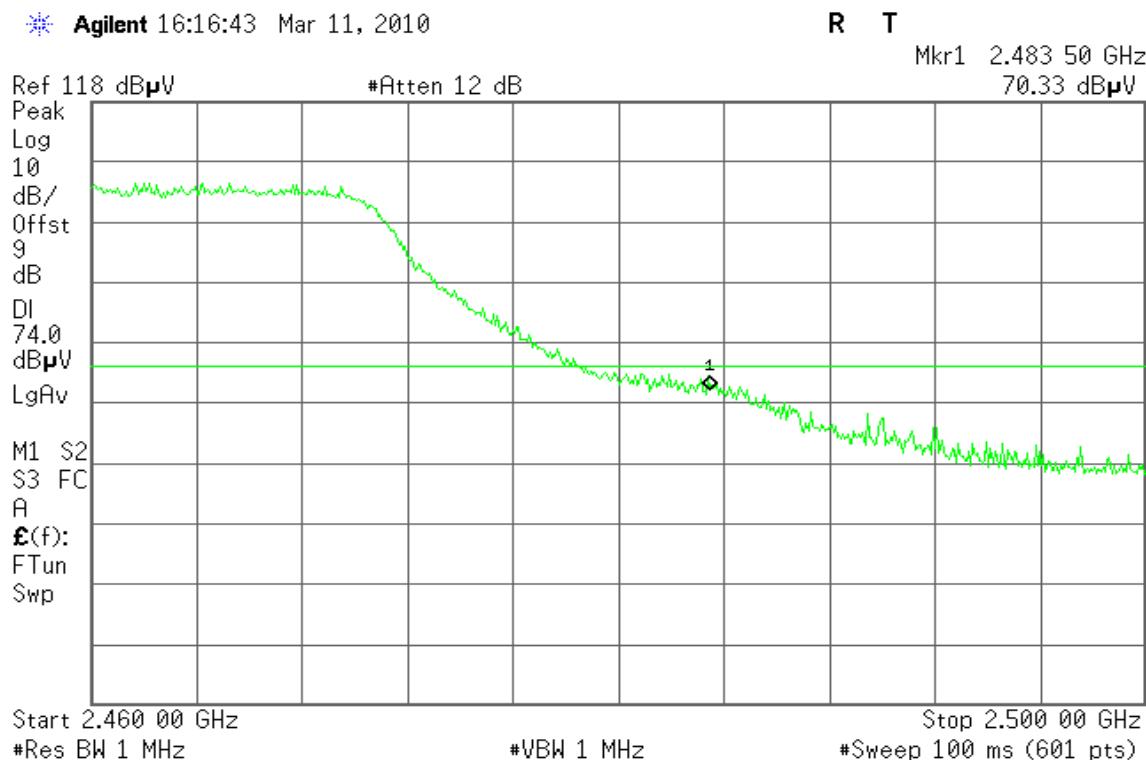
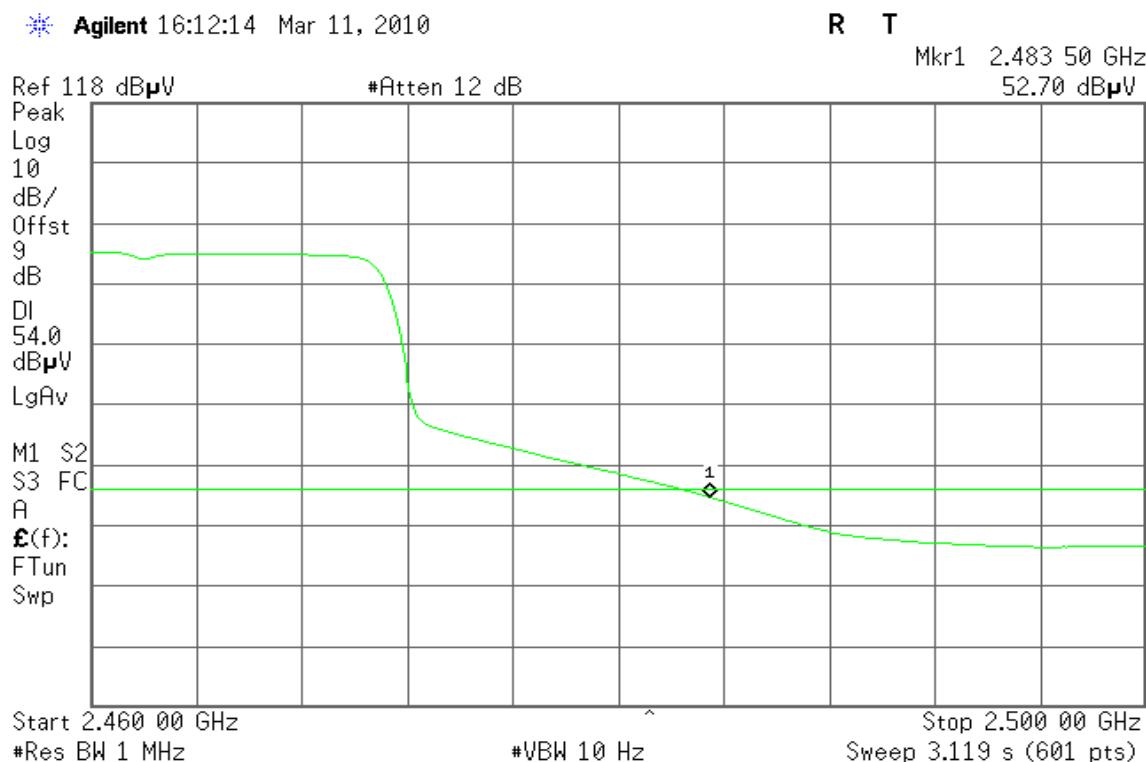
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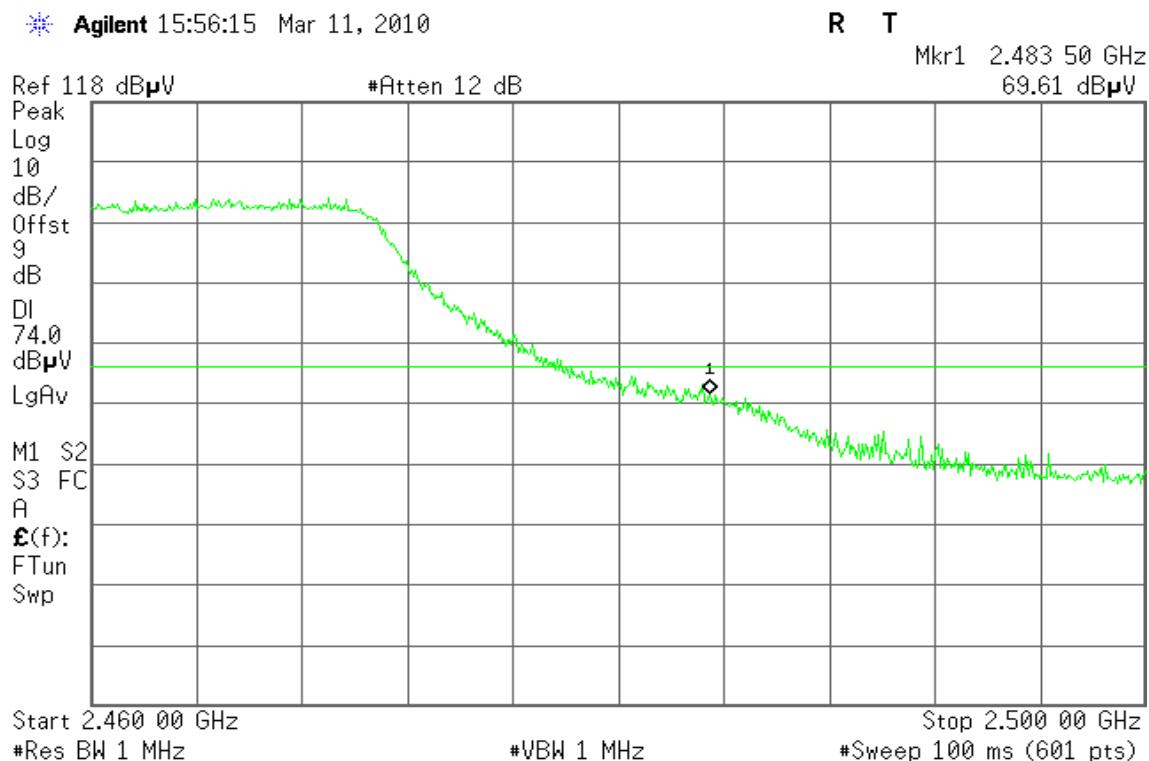
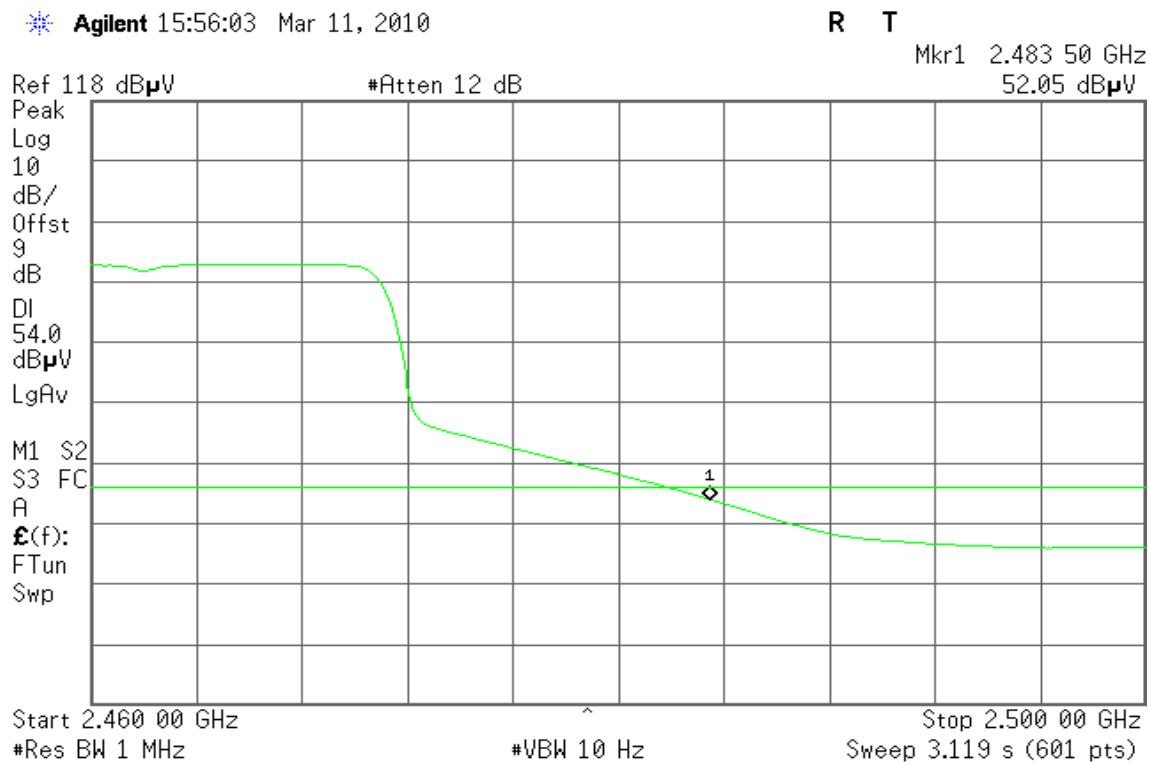
**Band Edges (IEEE 802.11g mode / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

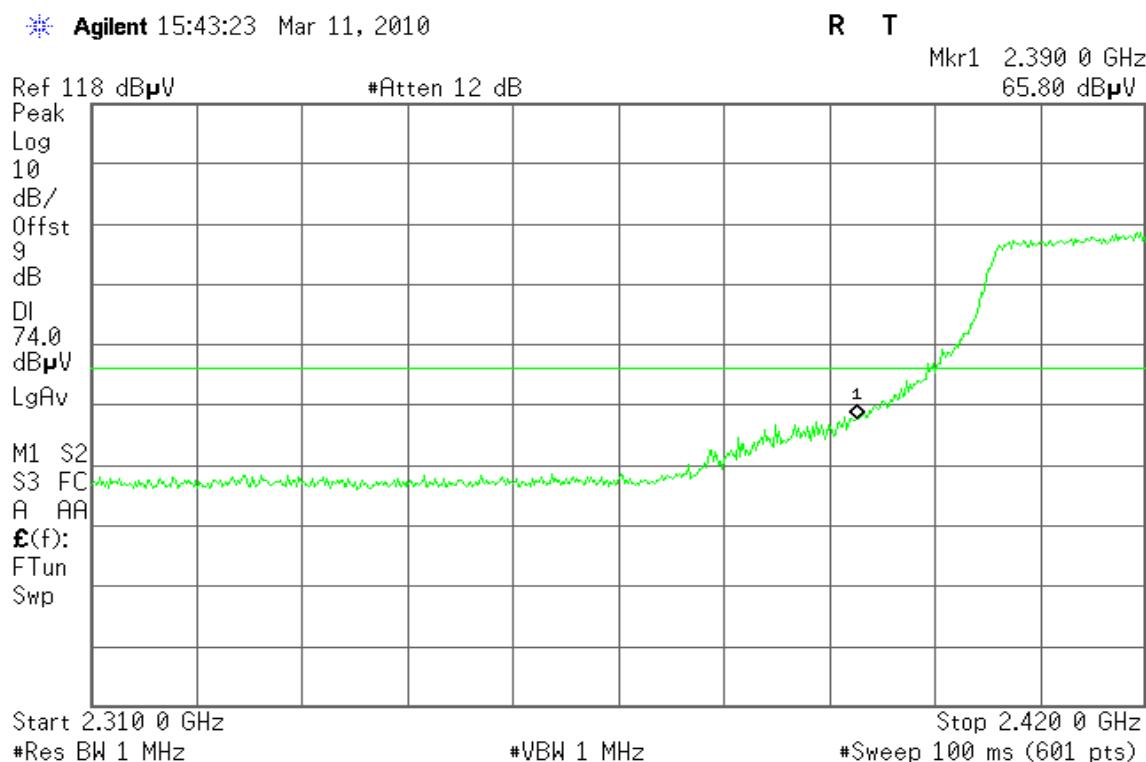
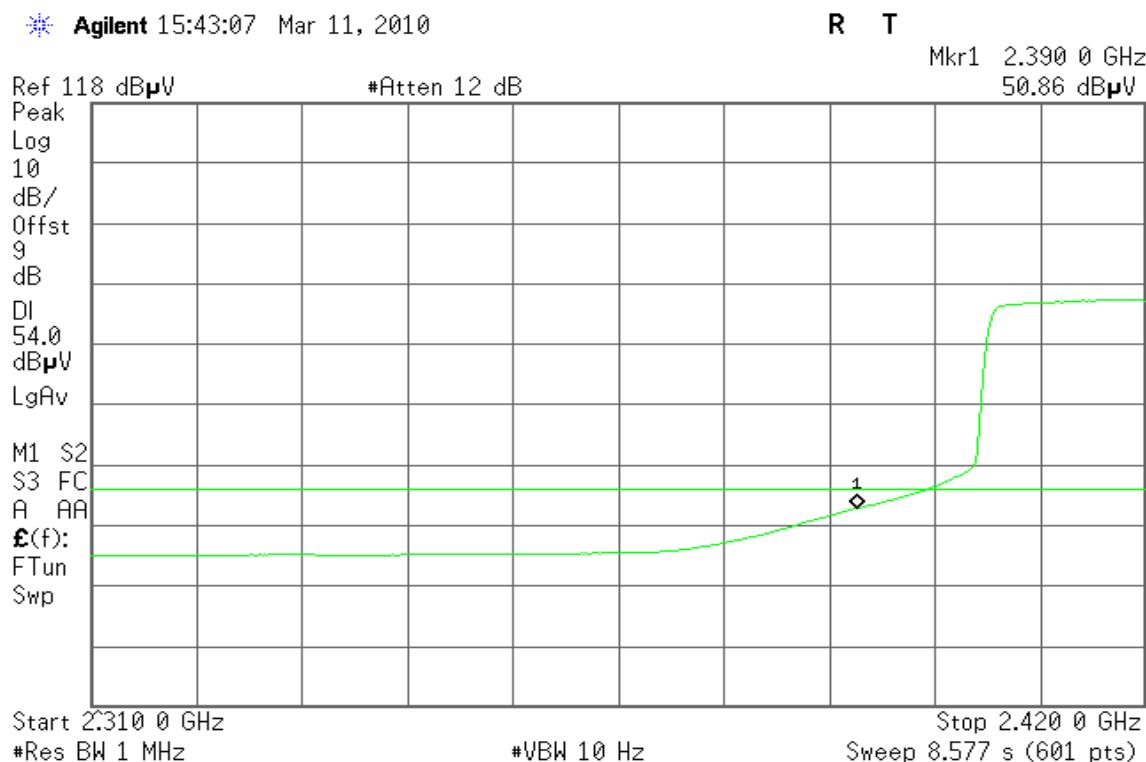
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

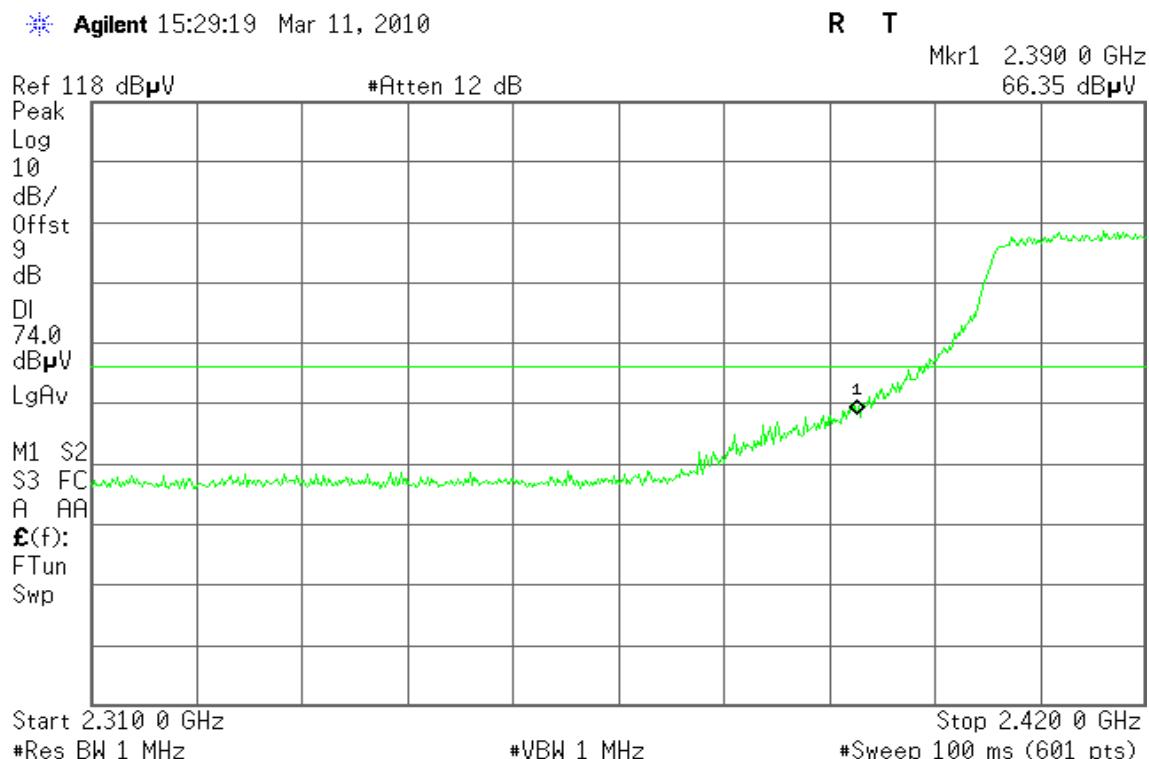
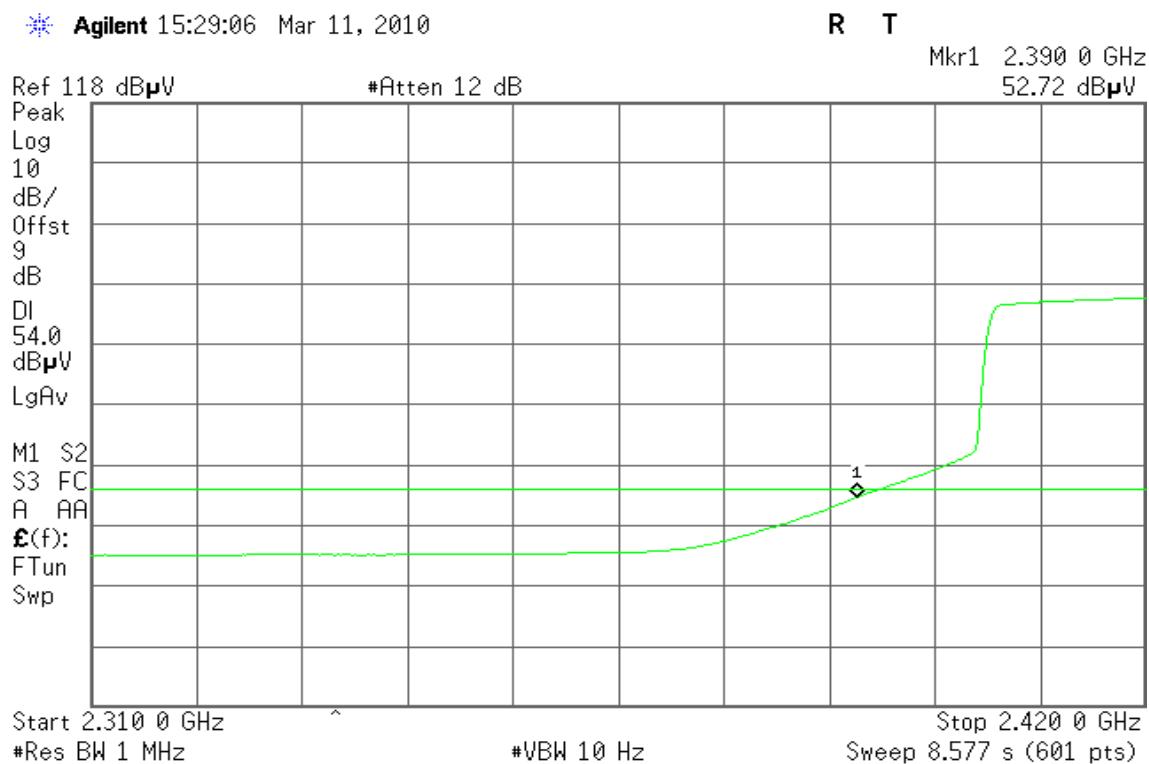
**Band Edges (draft 802.11n Standard-20 MHz Channel mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

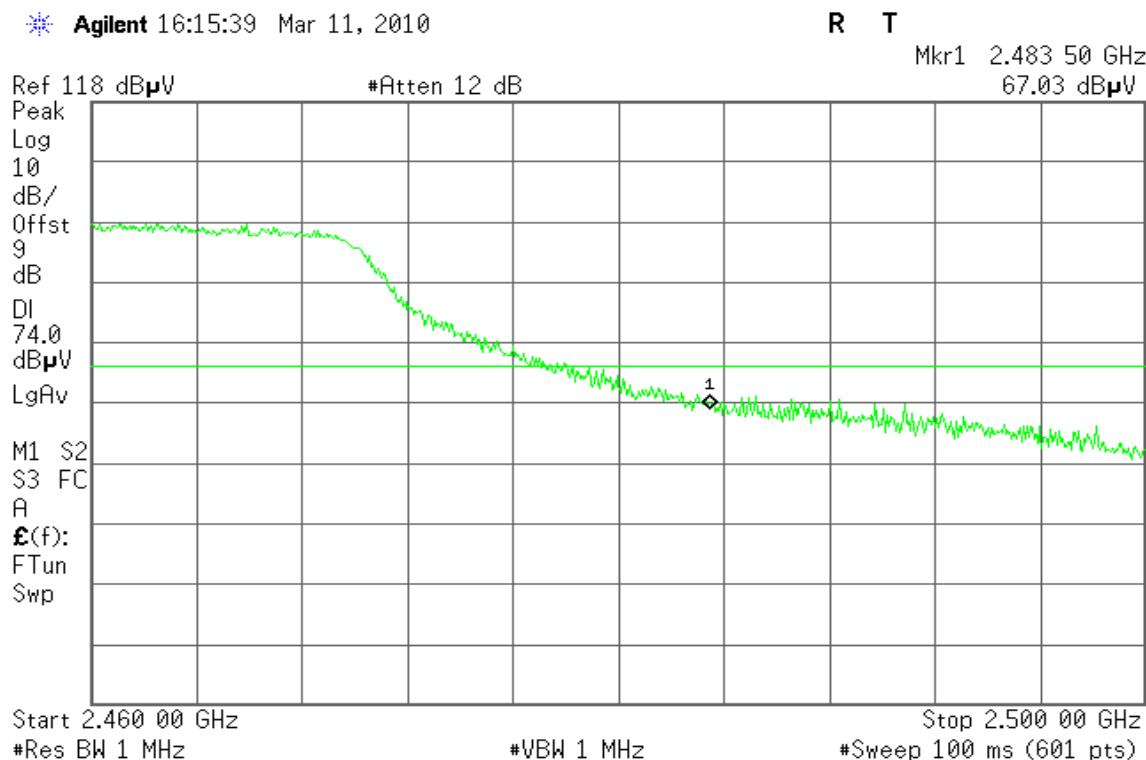
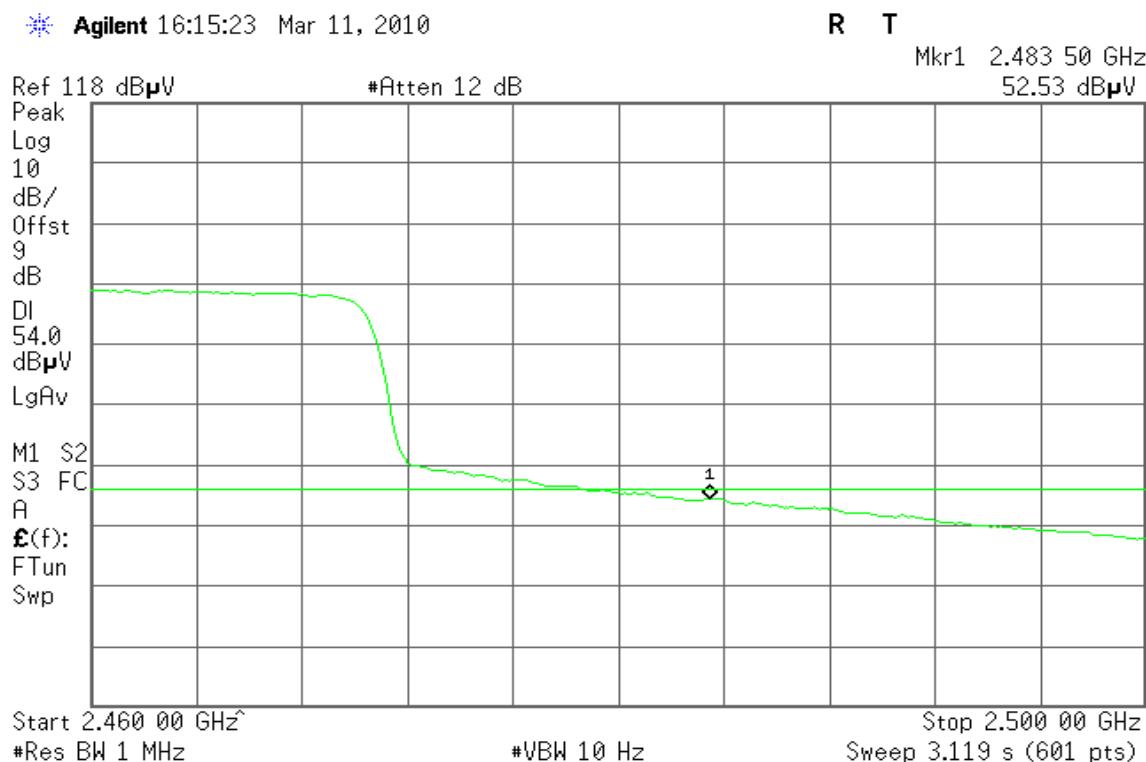
**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

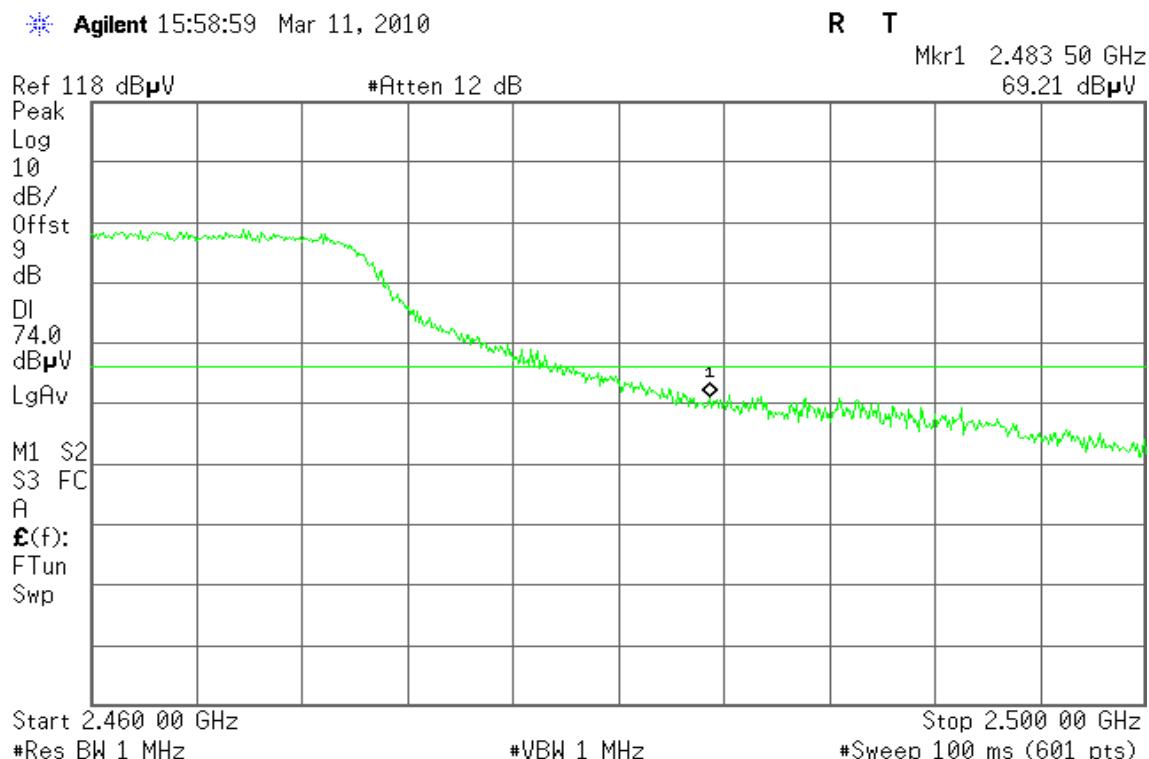
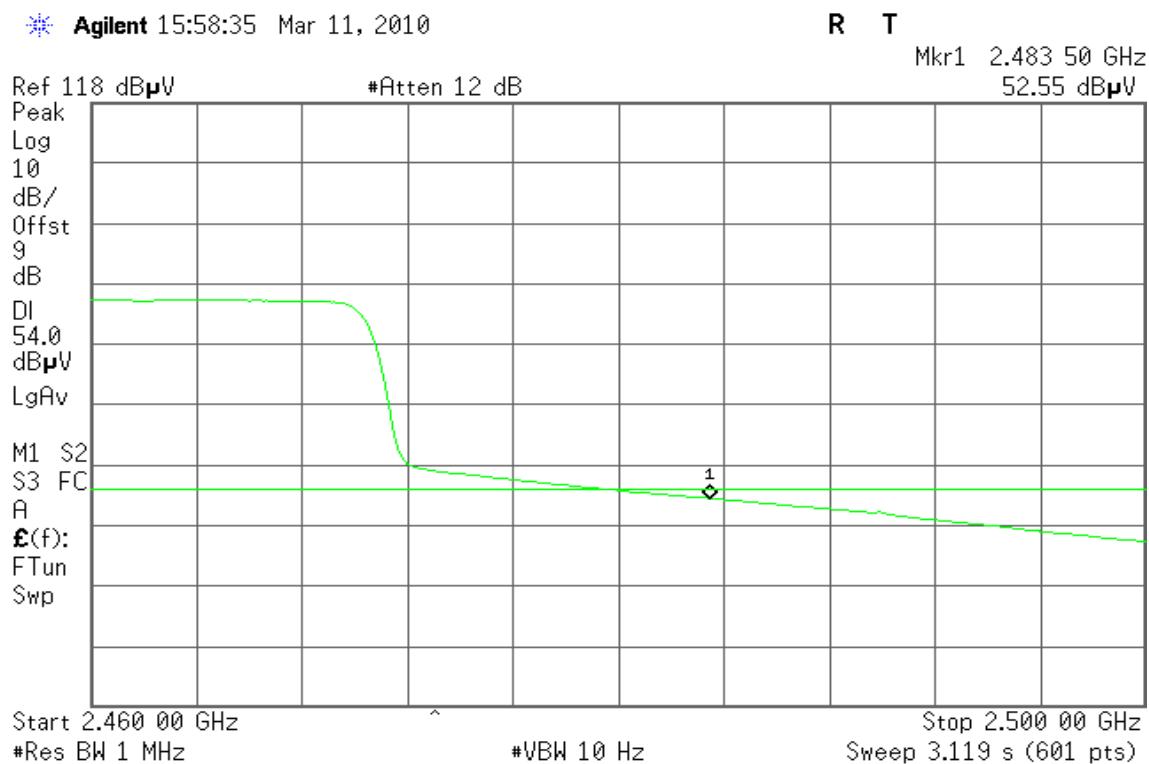
**Band Edges (draft 802.11n Standard-20 MHz Channel mode / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH Low)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**

**Band Edges (draft 802.11n Wide-40 MHz Channel mode / CH High)****Detector mode: Peak****Polarity: Vertical****Detector mode: Average****Polarity: Vertical**

**Detector mode: Peak****Polarity: Horizontal****Detector mode: Average****Polarity: Horizontal**



## 8.2 RADIATED EMISSIONS

### LIMIT

- According to §15.205, 209(a) & RSS-210 Clause 2.6 (Transmitter) and IC RSS-GEN Clause 6 (Receiver), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength ( $\mu$ V/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

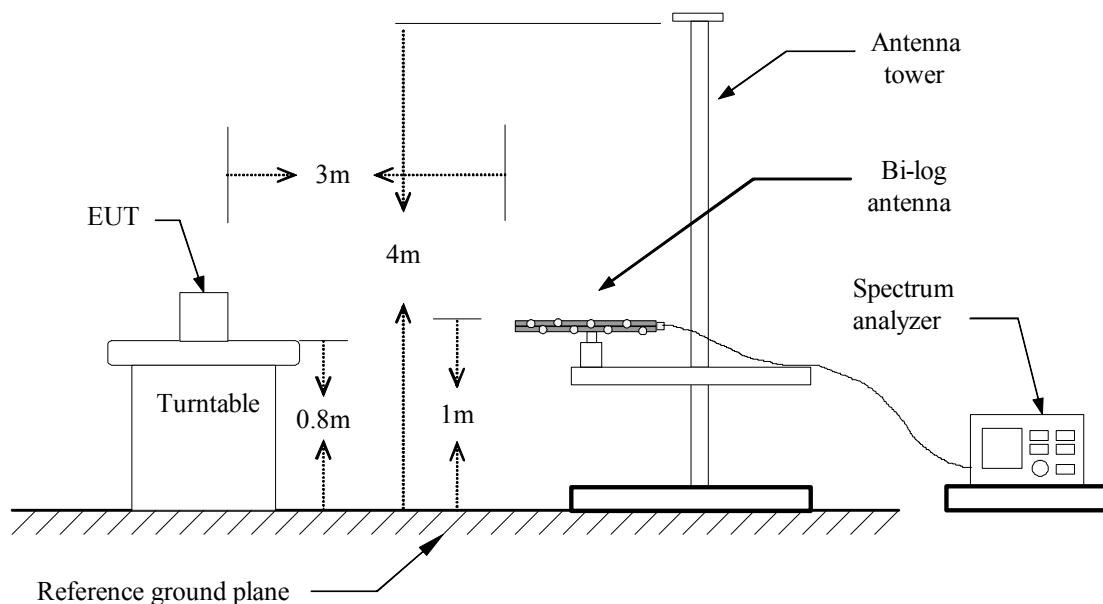
*Remark: Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.*

- In the emission table above, the tighter limit applies at the band edges.

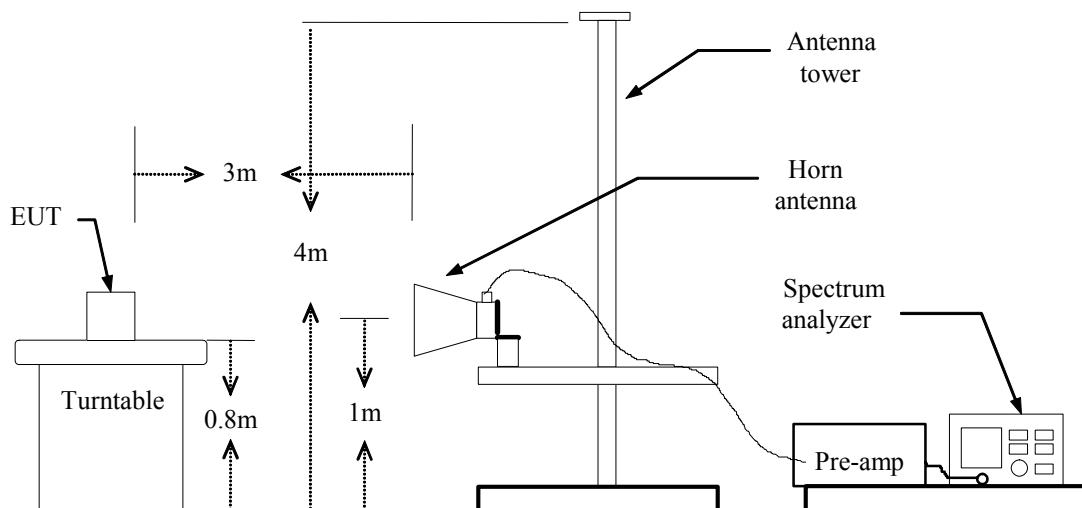
Frequency (MHz)	Field Strength ( $\mu$ V/m at 3-meter)	Field Strength (dB $\mu$ V/m at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

## Test Configuration

### Below 1 GHz



### Above 1 GHz





## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

**Below 1GHz****Operation Mode:** Normal Link**Test Date:** March 11, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
220.77	V	40.89	-11.46	29.44	46.00	-16.56	Peak
264.42	V	47.86	-9.93	37.93	46.00	-8.07	Peak
335.55	V	43.18	-8.39	34.79	46.00	-11.21	Peak
384.05	V	44.44	-7.40	37.04	46.00	-8.96	Peak
599.07	V	40.16	-4.07	36.10	46.00	-9.90	Peak
783.37	V	34.83	-1.50	33.33	46.00	-12.67	Peak
215.92	H	43.43	-11.15	32.27	43.50	-11.23	Peak
264.42	H	49.04	-9.93	39.11	46.00	-6.89	Peak
299.98	H	44.50	-9.24	35.26	46.00	-10.74	Peak
335.55	H	44.85	-8.39	36.45	46.00	-9.55	Peak
384.05	H	47.61	-7.40	40.21	46.00	-5.79	Peak
400.22	H	43.18	-7.08	36.10	46.00	-9.90	Peak

**Remark:**

1. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).*
2. *Radiated emissions measured were made with an instrument using peak/quasi-peak detector mode.*
3. *Quasi-peak test would be performed if the peak result were greater than the quasi-peak limit or as required by the applicant.*
4. *Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.*
5. *Margin (dB) = Remark result (dBuV/m) – Quasi-peak limit (dBuV/m).*

**Above 1 GHz****Operation Mode:** TX / IEEE 802.11b / CH Low**Test Date:** March 11, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1456.67	V	60.75	---	-8.83	51.91	---	74.00	54.00	-2.09	Peak
1530.00	V	62.67	45.48	-8.48	54.19	37.00	74.00	54.00	-17.00	AVG
1596.67	V	61.95	45.93	-7.87	54.08	38.06	74.00	54.00	-15.94	AVG
4400.00	V	53.20	36.44	1.12	54.32	37.56	74.00	54.00	-16.44	AVG
4991.67	V	53.05	36.59	1.12	54.17	37.71	74.00	54.00	-16.29	AVG
N/A										
1403.33	H	57.74	---	-8.92	48.82	---	74.00	54.00	-5.18	Peak
4991.67	H	53.04	36.04	1.12	54.16	37.16	74.00	54.00	-16.84	AVG
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11b / CH Mid**Test Date:** March 11, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1593.33	V	64.84	45.01	-7.90	56.94	37.11	74.00	54.00	-16.89	AVG
2383.33	V	64.94	46.84	-3.01	61.94	43.83	74.00	54.00	-10.17	AVG
4400.00	V	50.14	---	1.12	51.26	---	74.00	54.00	-2.74	Peak
4991.67	V	50.86	---	1.12	51.99	---	74.00	54.00	-2.01	Peak
N/A										
1393.33	H	59.58	---	-8.94	50.64	---	74.00	54.00	-3.36	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11b / CH High**Test Date:** March 11, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1596.67	V	61.88	45.67	-7.87	54.01	37.80	74.00	54.00	-16.20	AVG
4383.33	V	50.31	---	1.10	51.40	---	74.00	54.00	-2.60	Peak
4925.00	V	50.33	---	1.14	51.47	---	74.00	54.00	-2.53	Peak
4991.67	V	53.58	36.34	1.12	54.70	37.46	74.00	54.00	-16.54	AVG
N/A										
1426.67	H	57.73	---	-8.88	48.85	---	74.00	54.00	-5.15	Peak
4983.33	H	49.98	---	1.13	51.10	---	74.00	54.00	-2.90	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Low**Test Date:** March 11, 2010**Temperature:** 25°C**Tested by:** Mimic Yang**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1593.33	V	61.91	45.41	-7.90	54.01	37.51	74.00	54.00	-16.49	AVG
3216.67	V	51.69	---	-1.17	50.53	---	74.00	54.00	-3.47	Peak
4391.67	V	53.70	36.06	1.11	54.81	37.17	74.00	54.00	-16.83	AVG
4991.67	V	52.96	36.21	1.12	54.08	37.33	74.00	54.00	-16.67	AVG
4991.67	V									
N/A										
1403.33	H	57.99	---	-8.92	49.07	---	74.00	54.00	-4.93	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH Mid**Test Date:** March 11, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1463.33	V	59.67	---	-8.82	50.85	---	74.00	54.00	-3.15	Peak
1540.00	V	59.35	---	-8.39	50.95	---	74.00	54.00	-3.05	Peak
1596.67	V	62.22	45.30	-7.87	54.35	37.43	74.00	54.00	-16.57	AVG
4383.33	V	49.52	---	1.10	50.62	---	74.00	54.00	-3.38	Peak
4983.33	V	53.85	36.11	1.13	54.98	37.24	74.00	54.00	-16.76	AVG
N/A										
1413.33	H	57.91	---	-8.90	49.01	---	74.00	54.00	-4.99	Peak
3250.00	H	51.48	---	-1.16	50.32	---	74.00	54.00	-3.68	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** TX / IEEE 802.11g / CH High**Test Date:** March 11, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1500.00	V	60.35	---	-8.76	51.59	---	74.00	54.00	-2.41	Peak
1596.67	V	62.80	45.16	-7.87	54.93	37.29	74.00	54.00	-16.71	AVG
1640.00	V	61.60	46.11	-7.47	54.13	38.64	74.00	54.00	-15.36	AVG
4400.00	V	50.49	---	1.12	51.62	---	74.00	54.00	-2.38	Peak
5000.00	V	53.13	36.18	1.12	54.25	37.30	74.00	54.00	-16.70	AVG
N/A										
1526.67	H	59.38	---	-8.51	50.87	---	74.00	54.00	-3.13	Peak

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / draft 802.11n Standard-20 MHz Channel mode / CH Low

**Test Date:** March 11, 2010

**Temperature:** 23°C

**Tested by:** Mimic Yang

**Humidity:** 53 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1543.33	V	63.17	45.16	-8.36	54.81	36.80	74.00	54.00	-17.20	AVG
1600.00	V	61.96	45.07	-7.84	54.12	37.23	74.00	54.00	-16.77	AVG
4391.67	V	49.50	---	1.11	50.61	---	74.00	54.00	-3.39	Peak
4983.33	V	53.46	36.06	1.13	54.59	37.19	74.00	54.00	-16.81	AVG
N/A										
1406.67	H	57.39	---	-8.91	48.48	---	74.00	54.00	-5.52	Peak
3216.67	H	51.83	---	-1.17	50.67	---	74.00	54.00	-3.33	Peak
4983.33	H	53.63	36.20	1.13	54.76	37.33	74.00	54.00	-16.67	AVG
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / draft 802.11n Standard-20 MHz Channel mode / CH Mid

**Test Date:** March 11, 2010

**Temperature:** 23°C

**Tested by:** Mimic Yang

**Humidity:** 53 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1530.00	V	63.46	45.44	-8.48	54.98	36.96	74.00	54.00	-17.04	AVG
1593.33	V	62.81	45.37	-7.90	54.91	37.47	74.00	54.00	-16.53	AVG
3250.00	V	51.31	---	-1.16	50.15	---	74.00	54.00	-3.85	Peak
4383.33	V	53.33	36.03	1.10	54.43	37.13	74.00	54.00	-16.87	AVG
5000.00	V	53.03	36.19	1.12	54.15	37.31	74.00	54.00	-16.69	AVG
N/A										
1436.67	H	57.69	---	-8.87	48.83	---	74.00	54.00	-5.17	Peak
3250.00	H	50.49	---	-1.16	49.33	---	74.00	54.00	-4.67	Peak
4983.33	H	53.39	36.24	1.13	54.52	37.37	74.00	54.00	-16.63	AVG
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / draft 802.11n Standard-20 MHz Channel mode / CH High

**Test Date:** March 11, 2010

**Temperature:** 23°C

**Tested by:** Mimic Yang

**Humidity:** 53 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1043.33	V	59.86	---	-9.52	50.34	---	74.00	54.00	-3.66	Peak
1500.00	V	60.31	---	-8.76	51.55	---	74.00	54.00	-2.45	Peak
1556.67	V	62.45	45.37	-8.24	54.21	37.13	74.00	54.00	-16.87	AVG
1600.00	V	62.32	45.60	-7.84	54.48	37.76	74.00	54.00	-16.24	AVG
4391.67	V	50.54	---	1.11	51.65	---	74.00	54.00	-2.35	Peak
5000.00	V	53.80	36.04	1.12	54.92	37.16	74.00	54.00	-16.84	AVG
1496.67	H	58.14	---	-8.77	49.37	---	74.00	54.00	-4.63	Peak
4975.00	H	50.82	---	1.13	51.95	---	74.00	54.00	-2.05	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / draft 802.11n Wide-40 MHz Channel mode / CH Low

**Test Date:** March 11, 2010

**Temperature:** 23°C

**Tested by:** Mimic Yang

**Humidity:** 53 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1593.33	V	62.57	45.46	-7.90	54.67	37.56	74.00	54.00	-16.44	AVG
4391.67	V	49.92	---	1.11	51.03	---	74.00	54.00	-2.97	Peak
4991.67	V	53.78	36.08	1.12	54.90	37.20	74.00	54.00	-16.80	AVG
N/A										
1403.33	H	57.30	---	-8.92	48.38	---	74.00	54.00	-5.62	Peak
4983.33	H	53.28	36.11	1.13	54.41	37.24	74.00	54.00	-16.76	AVG
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / draft 802.11n Wide-40 MHz Channel mode / CH Mid

**Test Date:** March 11, 2010

**Temperature:** 23°C

**Tested by:** Mimic Yang

**Humidity:** 53 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1393.33	V	63.60	42.13	-8.94	54.66	33.19	74.00	54.00	-20.81	AVG
1500.00	V	59.90	---	-8.76	51.14	---	74.00	54.00	-2.86	Peak
1596.67	V	59.75	---	-7.87	51.88	---	74.00	54.00	-2.12	Peak
4391.67	V	49.40	---	1.11	50.51	---	74.00	54.00	-3.49	Peak
4991.67	V	53.30	36.23	1.12	54.42	37.35	74.00	54.00	-16.65	AVG
N/A										
1446.67	H	57.92	---	-8.85	49.07	---	74.00	54.00	-4.93	Peak
4983.33	H	50.72	---	1.13	51.85	---	74.00	54.00	-2.15	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



**Operation Mode:** TX / draft 802.11n Wide-40 MHz Channel mode / CH High

**Test Date:** March 11, 2010

**Temperature:** 23°C

**Tested by:** Mimic Yang

**Humidity:** 53 % RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1530.00	V	62.86	45.26	-8.48	54.38	36.78	74.00	54.00	-17.22	AVG
1596.67	V	61.94	45.39	-7.87	54.07	37.52	74.00	54.00	-16.48	AVG
1666.67	V	62.42	44.57	-7.22	55.20	37.35	74.00	54.00	-16.65	AVG
4391.67	V	53.38	36.17	1.11	54.49	37.28	74.00	54.00	-16.72	AVG
4991.67	V	53.47	36.00	1.12	54.59	37.12	74.00	54.00	-16.88	AVG
N/A										
1400.00	H	58.08	---	-8.93	49.15	---	74.00	54.00	-4.85	Peak
4983.33	H	50.45	---	1.13	51.57	---	74.00	54.00	-2.43	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).

**Operation Mode:** RX / IEEE 802.11g / CH Mid**Test Date:** March 11, 2010**Temperature:** 23°C**Tested by:** Mimic Yang**Humidity:** 53 % RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Ant. Pol. (H/V)	Reading (Peak) (dBuV)	Reading (Average) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Result (Average) (dBuV/m)	Limit (Peak) (dBuV/m)	Limit (Average) (dBuV/m)	Margin (dB)	Remark
1596.67	V	62.99	39.70	-7.87	55.12	31.83	74.00	54.00	-22.17	AVG
2200.00	V	57.90	38.44	-3.55	54.35	34.89	74.00	54.00	-19.11	AVG
2493.33	V	57.14	39.49	-2.68	54.46	36.81	74.00	54.00	-17.19	AVG
4391.67	V	53.28	35.89	1.11	54.39	37.00	74.00	54.00	-17.00	AVG
4991.67	V	53.41	36.01	1.12	54.53	37.13	74.00	54.00	-16.87	AVG
N/A										
2500.00	H	52.71	---	-2.66	50.05	---	74.00	54.00	-3.95	Peak
4983.33	H	50.40	---	1.13	51.53	---	74.00	54.00	-2.47	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit or as required by the applicant.
4. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
5. Measurements above show only up to 6 maximum emissions noted, or would be lesser, with “N/A” remark, if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
6. Margin (dB) = Remark result (dBuV/m) – Average limit (dBuV/m).



## 8.3 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a) & RSS-Gen §7.2.2, except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

\* Decreases with the logarithm of the frequency.

### Test Configuration

See test photographs attached in Appendix II for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT was placed on a table, which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.



## TEST RESULTS

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

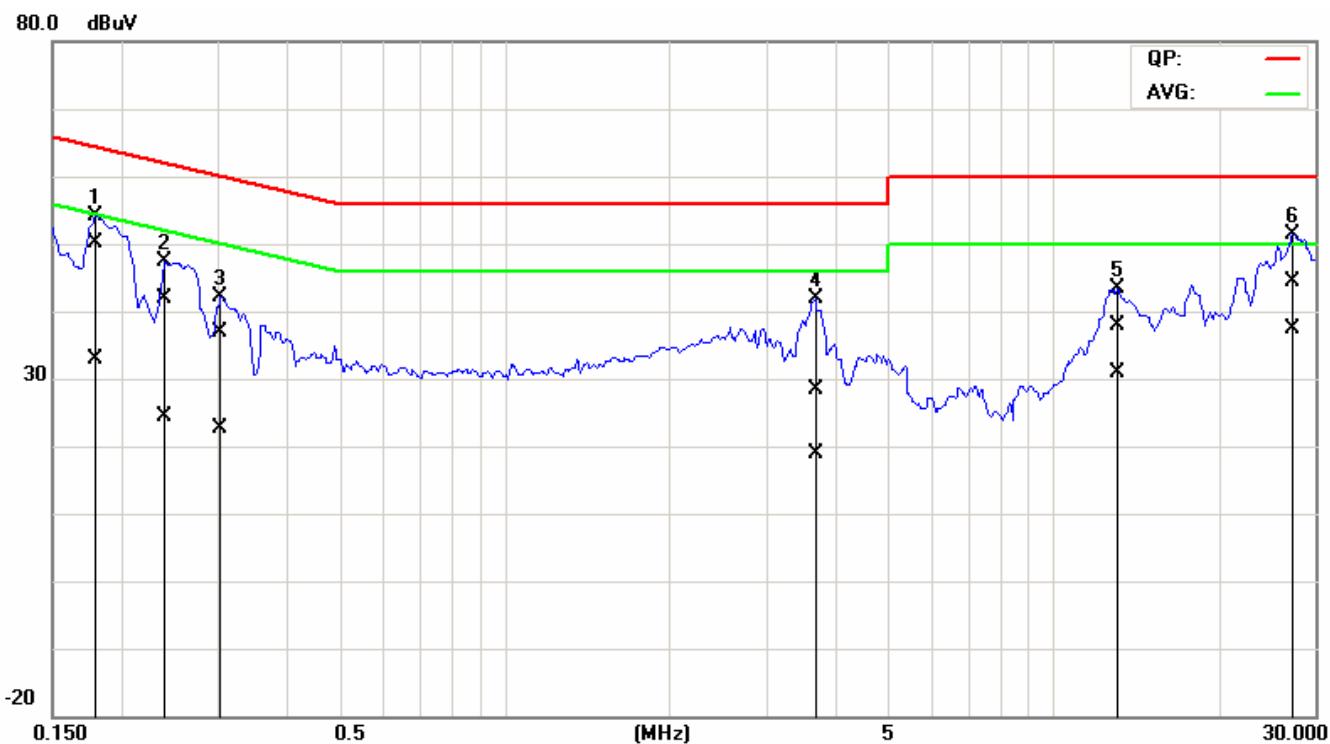
### Test Data

<b>Operation Mode:</b>	Normal Link	<b>Test Date:</b>	March 15, 2010
<b>Temperature:</b>	22°C	<b>Tested by:</b>	Wolf Huang
<b>Humidity:</b>	45% RH		

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1800	49.90	32.70	0.20	50.10	32.90	64.49	54.49	-14.39	-21.59	L1
0.2400	41.64	24.34	0.16	41.80	24.50	62.10	52.10	-20.30	-27.60	L1
0.3050	36.76	22.46	0.14	36.90	22.60	60.11	50.11	-23.21	-27.51	L1
3.6850	28.29	18.79	0.11	28.40	18.90	56.00	46.00	-27.60	-27.10	L1
13.0600	37.29	30.19	0.71	38.00	30.90	60.00	50.00	-22.00	-19.10	L1
27.4000	43.37	36.47	0.93	44.30	37.40	60.00	50.00	-15.70	-12.60	L1
0.1800	46.90	30.60	0.20	47.10	30.80	64.49	54.49	-17.39	-23.69	L2
0.2600	38.14	23.94	0.16	38.30	24.10	61.43	51.43	-23.13	-27.33	L2
0.3050	34.16	20.86	0.14	34.30	21.00	60.11	50.11	-25.81	-29.11	L2
3.7050	30.69	21.59	0.11	30.80	21.70	56.00	46.00	-25.20	-24.30	L2
12.8250	38.10	31.20	0.70	38.80	31.90	60.00	50.00	-21.20	-18.10	L2
27.0850	43.57	36.97	0.93	44.50	37.90	60.00	50.00	-15.50	-12.10	L2

### **Remark:**

1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between 0.15MHz and 30MHz was 9 kHz;
4. L1 = Line One (Live Line) / L2 = Line Two (Neutral Line)

**Test Plots****Conducted emissions (Line 1)****Conducted emissions (Line 2)**