

**FCC 47 CFR PART 15 SUBPART C &  
INDUSTRY CANADA RSS-247****TEST REPORT****For****Notebook Computer****FCC Model:**

Satellite CL1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
Satellite L1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
Satellite Radius 11 CL1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
Satellite Radius 11 L1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
dynabook N31, dynabook NB31, dynabook N41, dynabookNB41, dynabook N61,  
dynabook NB61

**IC Model:****Satellite L10W-C****Trade Name: TOSHIBA***Issued to***Pegatron Corporation****5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, TAIWAN (R.O.C.)***Issued by***Compliance Certification Services Inc.****No.11, Wugong 6th Rd., Wugu Dist.,  
New Taipei City 24891, Taiwan. (R.O.C.)****<http://www.ccsrf.com>****[service@ccsrf.com](mailto:service@ccsrf.com)****Issued Date: August 13, 2015**

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**Revision History**

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	August 13, 2015	Initial Issue	ALL	Becca Chen
01	August 26, 2015	1. Added Loop Antenna. 2. Added remarks and narrative.	P.10, P.76	Becca Chen

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# 1. TEST RESULT CERTIFICATION

**Applicant:** Pegatron Corporation  
5F, NO. 76, LIGONG ST., BEITOU DISTRICT, TAIPEI CITY 112, TAIWAN (R.O.C.)

**Manufacturer:** Toshiba Corporation  
1-1, Shibaura 1-Chome, Minato-Ku, Tokyo, 105-8001, Japan

**Equipment Under Test:** Notebook Computer

**Trade Name:** TOSHIBA

**FCC Model:** Satellite CL1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
Satellite L1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
Satellite Radius 11 CL1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
Satellite Radius 11 L1\*\*\*\*\*-C\*\*\*\*\*(\* means 0-9; a-z; A-Z; / ; - ; or blank),  
dynabook N31, dynabook NB31, dynabook N41, dynabookNB41, dynabook N61, dynabook NB61

**IC Model:** Satellite L10W-C

**Date of Test:** July 21 ~ August 9, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C & Industry Canada RSS-247 Issue 1	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 C63.10: 2013 for IC, ANSI C63.10: 2013 for FCC 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-247.

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

*Approved by:*

*Reviewed by:*




\_\_\_\_\_  
Miller Lee  
Manager  
Compliance Certification Services Inc.

\_\_\_\_\_  
Angel Cheng  
Section Manager  
Compliance Certification Services Inc.

## 2. EUT DESCRIPTION

<b>Product</b>	Notebook Computer		
<b>Trade Name</b>	TOSHIBA		
<b>FCC Model Number</b>	Satellite CL1*****-C*****(* means 0-9; a-z; A-Z; / ; - ; or blank), Satellite L1*****-C*****(* means 0-9; a-z; A-Z; / ; - ; or blank), Satellite Radius 11 CL1*****-C*****(* means 0-9; a-z; A-Z; / ; - ; or blank), Satellite Radius 11 L1*****-C*****(* means 0-9; a-z; A-Z; / ; - ; or blank), dynabook N31, dynabook NB31, dynabook N41, dynabookNB41, dynabook N61, dynabook NB61		
<b>IC Model Number</b>	Satellite L10W-C		
<b>Model Discrepancy</b>	All the above models are identical except for the designation of model numbers. The suffix of "" (* means 0-9; a-z; A-Z; / ; - ; or blank) on model number is just for marketing purpose only.		
<b>Received Date</b>	July 8, 2015		
<b>WLAN Manufacturer</b>	Broadcom	<b>Model</b>	BCM943142Y
<b>EUT Power Rating</b>	1. 19Vdc from Adaptor 2. Powered from Battery Toshiba (LG) / PA5209U-1BRS: 7.2V, 28Wh (3684mAh) Toshiba (PANASONIC) / PA5209U-1BRS: 3.6V, 29Wh (4090mAh)		
<b>Power Adaptor Power Rating / Manufacturer</b>	<b>Toshiba (Vendor: Liteon) / PA3822U-1ACA</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Liteon) / PA3822E-1AC3</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Delta) / PA3822U-1ACA</b> I/P: 100-240Vac, 50-60Hz, 1.2A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Delta) / PA3822E-1AC3</b> I/P: 100-240Vac, 50-60Hz, 1.2A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Chicony) / PA3822U-1ACA</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Chicony) / PA3822E-1AC3</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Liteon) / PA5177U-1ACA</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Liteon) / PA5177E-1AC3</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Delta) / PA5177U-1ACA</b> I/P: 100-240Vac, 50/60Hz, 1.2A O/P: 19Vdc, 2.37A		
	<b>Toshiba (Vendor: Delta) / PA5177E-1AC3</b>		

	I/P: 100-240Vac, 50/60Hz, 1.2A O/P: 19Vdc, 2.37A			
	<b>Toshiba (Vendor: Chicony) / PA5177U-1ACA</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A			
	<b>Toshiba (Vendor: Chicony) / PA5177E-1AC3</b> I/P: 100-240Vac, 50-60Hz, 1.3A O/P: 19Vdc, 2.37A			
<b>Frequency Range</b>	2412 ~ 2462 MHz			
<b>Transmit Power</b>	<b>Mode</b>	<b>Frequency Range</b>	<b>Output Power (dBm)</b>	<b>Output Power (W)</b>
	IEEE 802.11b	2412 - 2462	16.51	0.0448
	IEEE 802.11g	2412 - 2462	22.11	0.1626
	IEEE 802.11n HT 20 MHz	2412 - 2462	22.11	0.1626
	IEEE 802.11n HT 40 MHz	2422 - 2452	22.14	0.1637
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mbps) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mbps) IEEE 802.11n HT 20 MHz 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 Mbps) IEEE 802.11n HT 40 MHz mode: OFDM (13.5, 15, 27, 30, 40.5, 45, 54, 60, 81, 90, 108, 120, 121.5, 135, 150, 162, 180, 216, 240, 243, 270, 300 Mbps)			
<b>Number of Channels</b>	IEEE 802.11b/g mode: 11 Channels IEEE 802.11n HT 20 MHz mode: 11 Channels IEEE 802.11n HT 40 MHz mode: 7 Channels			
<b>Antenna Designation</b>	PIFA Antenna Yageo / ANTA0TP09161WLAN1(Main) / 1.53 dBi Yageo / ANTA0TP09161WLAN2 (Aux)/ 1.31 dBi ACON / APP6Y-700149 (Main) / -0.88 dBi ACON / APP6Y-700150 (Aux) / 1.21 dBi INPAQ / WA-P-LB-02-288 (Main) / 0.56 dBi INPAQ / WA-P-LB-01-137(Aux) / 0.09 dBi			

**Remark:**

1. The sample selected for test was engineering sample that approximated to production product and was provided by manufacturer.
2. This submittal(s) (test report) is intended for FCC&IC ID: **VUI-MORPHEUS43142** & **7582A-MORPHEUS43142** filing to comply with FCC Part 15C, Section 15.207, 15.209 and IC RSS-247 & RSS-GEN.

### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and FCC CFR 47 Part 15.207, 15.209, 15.247.

The tests documented in this report were performed in accordance with IC RSS-247, IC RSS-Gen and ANSI C63.10:2013.

This submittal(s) (test report) is intended for IC Certification with Industry Canada RSS-247.

#### **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-247, IC RSS-Gen, IC RSS-102, and ANSI C63.10: 2013 for IC, ANSI C63.10: 2013 for FCC.

#### **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 ANSI C63.10: 2013 for IC, ANSI C63.10: 2013 for FCC 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 1.5 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 ANSI C63.10: 2013 for IC, ANSI C63.10: 2013 for FCC.

### 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: Satellite L10W-C) had been tested under operating condition.

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

After verification, all tests carried out are 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 and receiving radiated spurious emission above 1GHz, which worst case was in CH Mid 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.

**IEEE 802.11n HT 20 MHz mode:**

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

**IEEE 802.11n HT 40 MHz mode:**

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

The field strength of spurious emission was measured in the following position: The EUT has Notebook mode, Flat mode, and Tent mode, Stand mode, Tablet X, Y and Z axis modes. The worst emission was found in Flat mode and the worst case was recorded.

## 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 and Loop Antenna is scheduled for calibration once three years.*

Conducted Emissions Test Site				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510252	11/23/2015
Thermostatic/Hrgrosatic Chamber	TAICHY	MHG-150LF	930619	10/07/2015
AC Power Source	EXTECH	6205	1140845	N.C.R
DC Power Supply	ABM	8301HD	D011531	N.C.R
Power Meter	Anritsu	ML2495A	1012009	06/07/2016
Power Sensor	Anritsu	MA2411A	0917072	06/08/2016
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101073	07/19/2016

Wugu 966 Chamber A				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	E4446A	US42510268	09/18/2015
EMI Test Receiver	R&S	ESCI	100064	06/04/2016
Bilog Antenna	Sunol Sciences	JB3	A030105	08/19/2015
Horn Antenna	EMCO	3117	00055165	01/26/2016
Horn Antenna	EMCO	3116	26370	12/25/2015
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Pre-Amplifier	MITEQ	1652-3000	1490939	08/09/2016
Pre-Amplifier	EMC	EMC 01265	4035	06/04/2016
Pre-Amplifier	MITEQ	AMF-6F-260400-40-8P	985646	12/25/2015
Coaxial Cable	Huber+Suhner	102	29212/2	12/25/2015
Coaxial Cable	Huber+Suhner	102	29406/2	12/25/2015
Loop Antenna	COM-POWER	AL-130	121051	01/26/2016
Test S/W	EZ-EMC (CCS-3A1RE)			

Conducted Emission Room #B				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	101073	09/18/2015
LISN	R&S	ENV216	101054	06/06/2016
LISN	SCHWARZBECK	NSLK 8127	8127-541	11/25/2015
Capacitive Voltage Probe	FCC	F-CVP-1	100185	03/12/2016
Test S/W	CCS-3A1-CE			

### 4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	+/-1.2575
3M Semi Anechoic Chamber / 30M~200M	+/- 4.0138
3M Semi Anechoic Chamber / 200M~1000M	+/- 3.9483
3M Semi Anechoic Chamber / 1G~8G	+/- 2.5975
3M Semi Anechoic Chamber / 8G~18G	+/- 2.6112
3M Semi Anechoic Chamber / 18G~26G	+/- 2.7389
3M Semi Anechoic Chamber / 26G~40G	+/- 2.9683

**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.139, Wugong Rd., Wugu Dist., New Taipei City 24891, Taiwan (R.O.C.)  
Tel: 886-2-2298-4086 / Fax: 886-2-2298-1470
- No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)  
Tel: 886-2-2299-9720 / Fax: 886-2-2298-4045
- No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN,  
R.O.C.  
Tel: 886-3-324-0332 / Fax: 886-3-324-5235

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10: 2013 for IC, ANSI C63.10: 2009 for FCC 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, bucolical, log periodic, bi-log, ridged waveguide, horn and/or Loop. 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 LABORATORY ACCREDITATIONS AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by American Association for Laboratory Accreditation Program for the specific scope accreditation under Lab Code: 0824-01 to perform Electromagnetic Interference tests according to FCC Part 15 and CISPR 22 requirements. In addition, the test facilities are listed with Industry Canada, Certification and Engineering Bureau, IC 2324G-1 for 3M Semi Anechoic Chamber A, 2324G-2 for 3M Semi Anechoic Chamber B.

### 5.4 TABLE OF ACCREDITATIONS AND LISTINGS

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-247, 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	
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	 IC 2324G-1 IC 2324G-2

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

## 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	Equipment	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

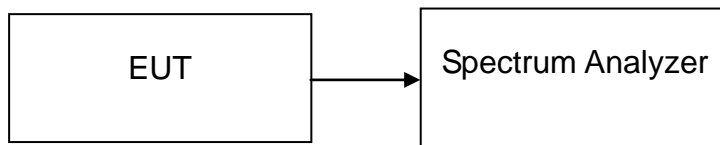
**Remark:**

- 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. FCC PART 15.247 REQUIREMENTS & RSS-247 REQUIREMENTS

### 7.1 99% BANDWIDTH

#### Test Configuration



#### TEST PROCEDURE

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold.

**Test Data****Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	11.9884
Mid	2437	12.0742
High	2462	12.1073

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.7177
Mid	2437	16.7044
High	2462	16.7076

**Test mode: IEEE 802.11n HT 20 MHz mode**

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.6042
Mid	2437	17.6141
High	2462	17.5919

**Test mode: 802.11n Standard-40 MHz mode**

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	35.8431
Mid	2437	35.9171
High	2452	35.8676

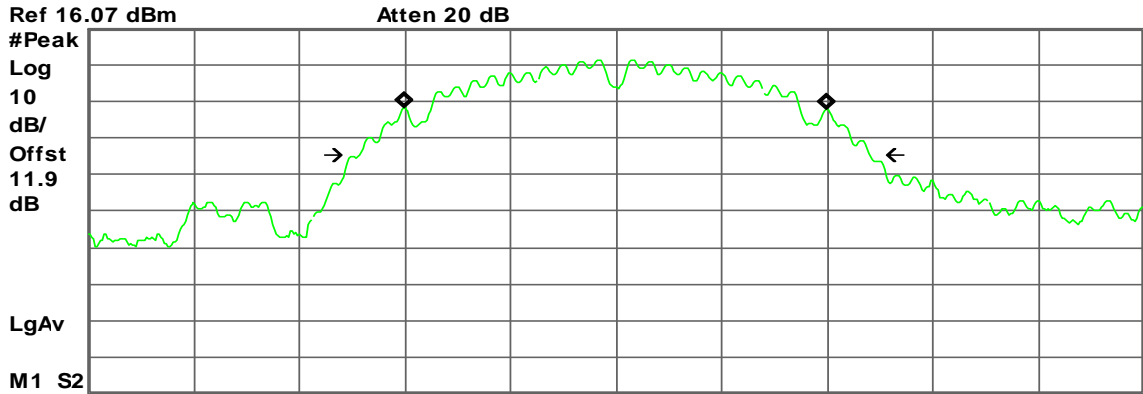


**Test Plot**

**IEEE 802.11b mode  
99% Bandwidth (CH Low)**

Agilent

R L



Center 2.412 00 GHz Span 30 MHz  
 #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
11.9884 MHz

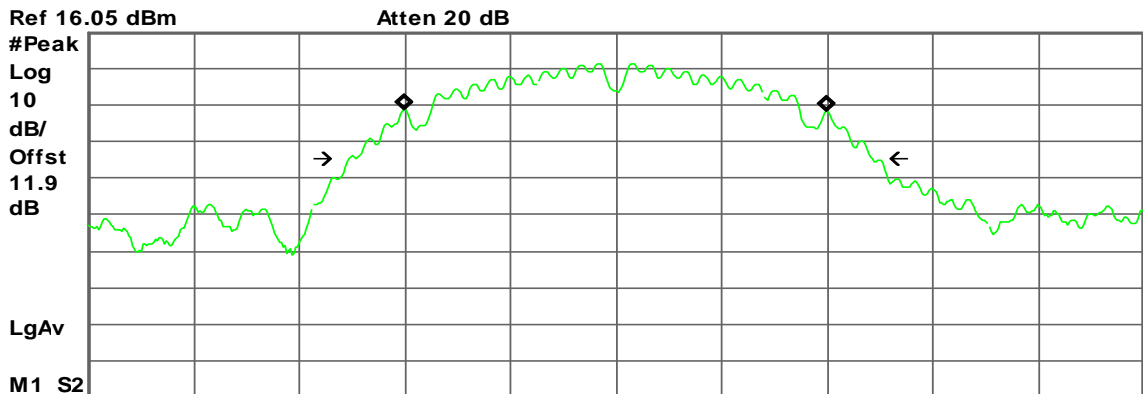
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -23.291 kHz  
x dB Bandwidth 14.544 MHz

**99% Bandwidth (CH Mid)**

Agilent

R L



Center 2.437 00 GHz Span 30 MHz  
 #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
12.0742 MHz

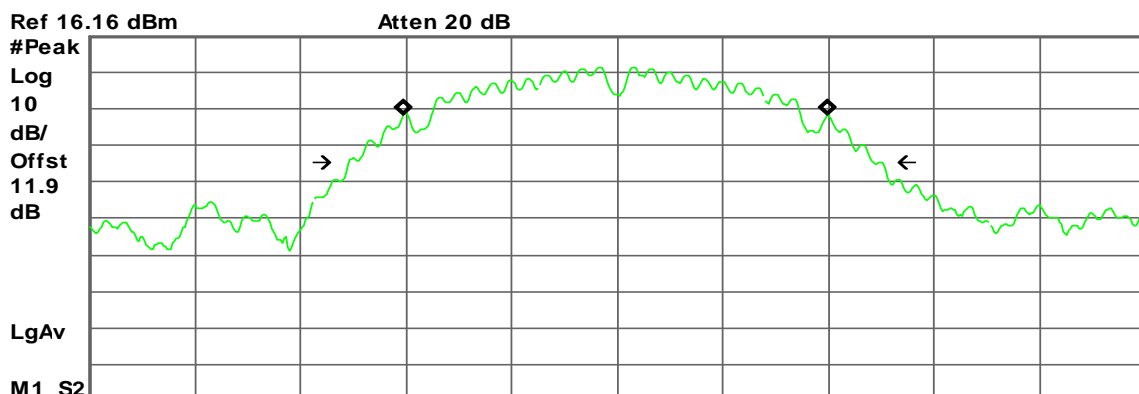
Occ BW % Pwr 99.00 %  
x dB -26.00 dB

Transmit Freq Error -35.719 kHz  
x dB Bandwidth 14.901 MHz

### 99% Bandwidth (CH High)

Agilent

R L



Center 2.462 00 GHz Span 30 MHz  
 #Res BW 300 kHz #VBW 1 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
 12.1073 MHz

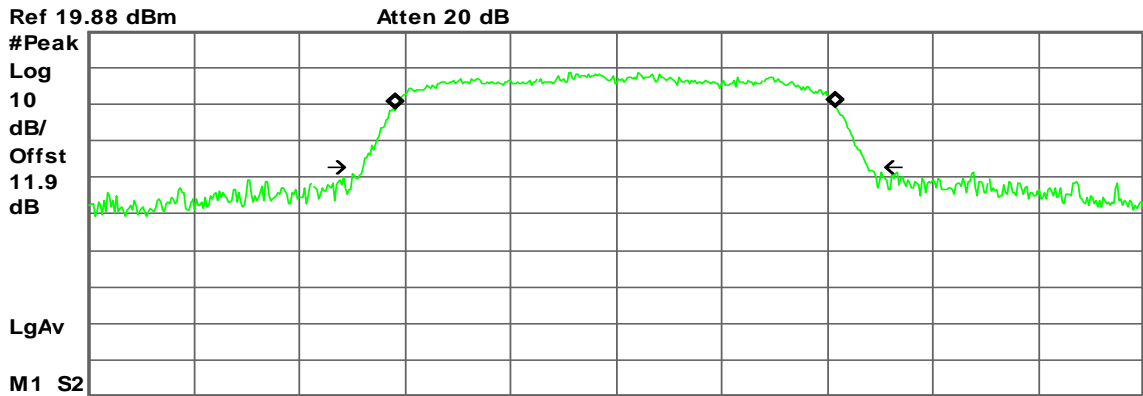
Occ BW % Pwr 99.00 %  
 x dB -26.00 dB

Transmit Freq Error -42.044 kHz  
 x dB Bandwidth 15.131 MHz

**IEEE 802.11g mode**  
**99% Bandwidth (CH Low)**

Agilent

R L



Occupied Bandwidth  
 16.7177 MHz

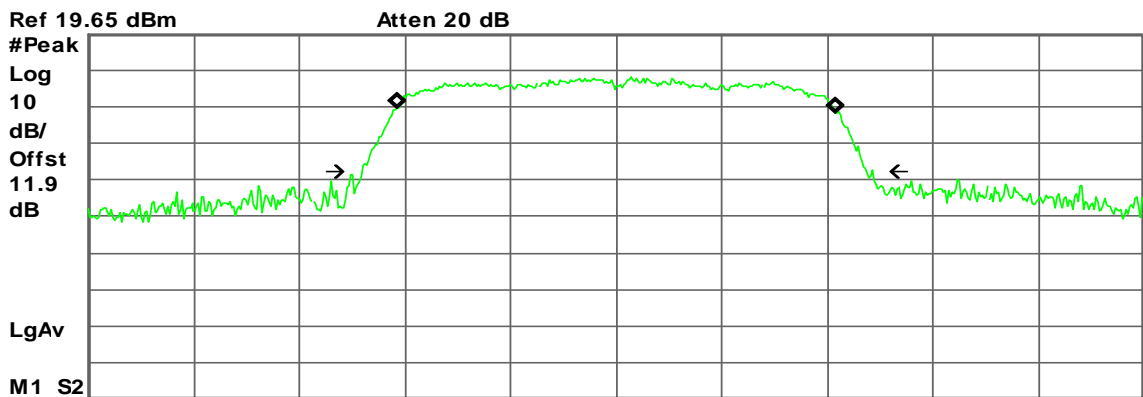
Occ BW % Pwr 99.00 %  
 x dB -26.00 dB

Transmit Freq Error -19.331 kHz  
 x dB Bandwidth 19.152 MHz

**99% Bandwidth (CH Mid)**

Agilent

R L



Occupied Bandwidth  
 16.7044 MHz

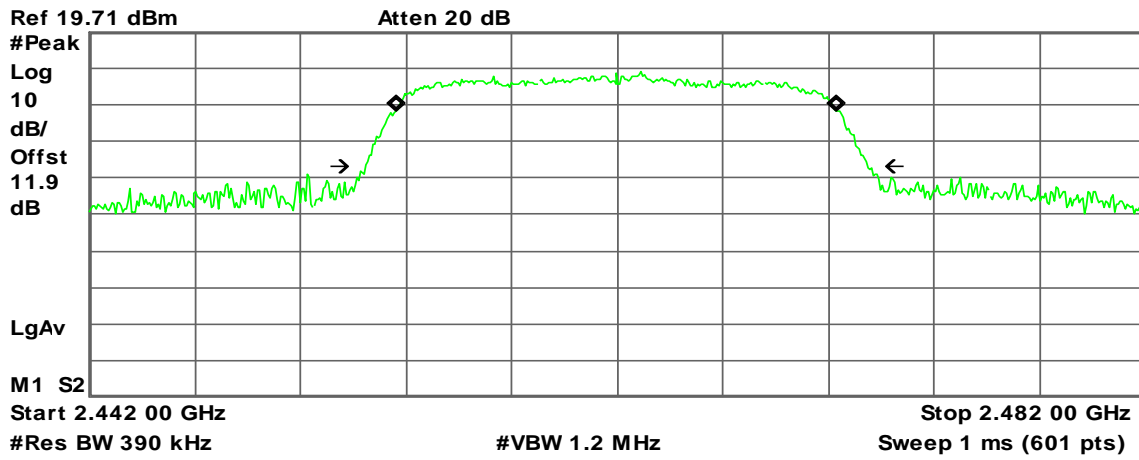
Occ BW % Pwr 99.00 %  
 x dB -26.00 dB

Transmit Freq Error -9.481 kHz  
 x dB Bandwidth 19.388 MHz

### 99% Bandwidth (CH High)

Agilent

R L



Occupied Bandwidth  
16.7076 MHz

Occ BW % Pwr      99.00 %  
x dB      -26.00 dB

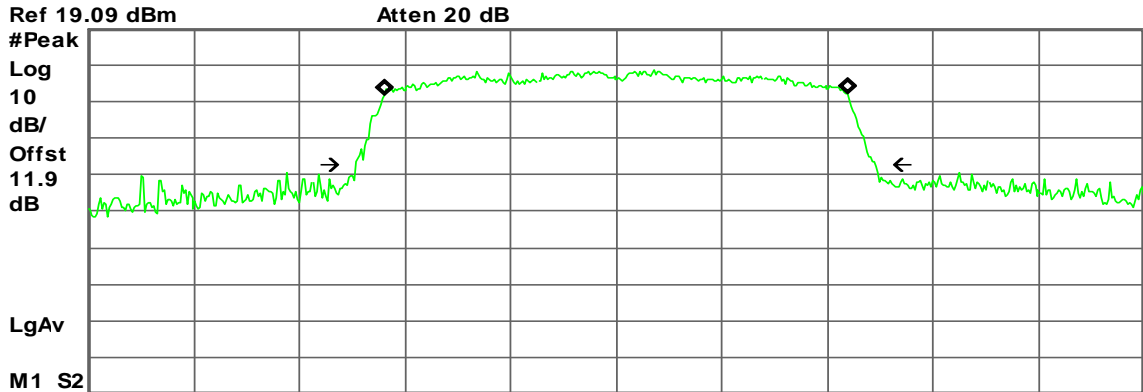
Transmit Freq Error      -37.231 kHz  
x dB Bandwidth      19.073 MHz

**IEEE 802.11n HT 20 MHz mode**

**99% Bandwidth (CH Low)**

Agilent

R L



Ref 19.09 dBm      Atten 20 dB  
 Center 2.412 00 GHz      Span 40 MHz  
 #Res BW 390 kHz      #VBW 1.2 MHz      Sweep 1 ms (601 pts)

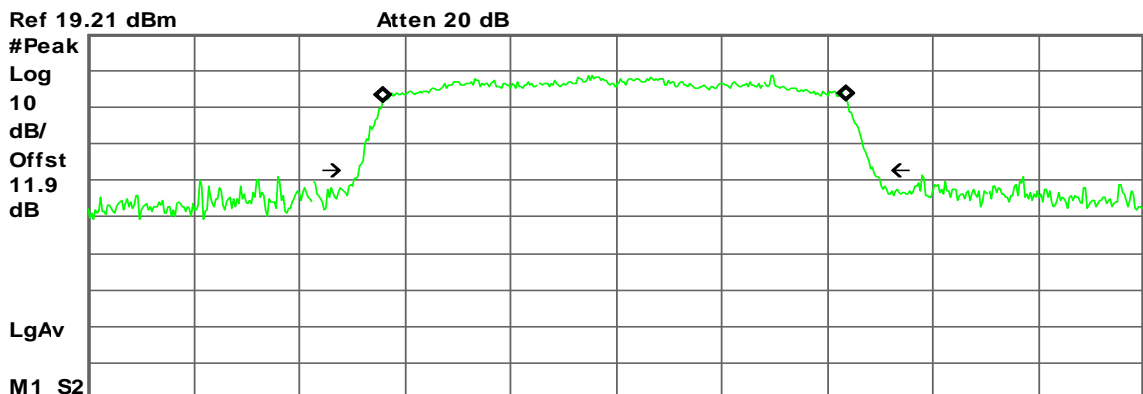
Occupied Bandwidth      Occ BW % Pwr      99.00 %  
 17.6042 MHz      x dB      -26.00 dB

Transmit Freq Error      -13.431 kHz  
 x dB Bandwidth      19.729 MHz

**99% Bandwidth (CH Mid)**

Agilent

R L



Ref 19.21 dBm      Atten 20 dB  
 Center 2.437 00 GHz      Span 40 MHz  
 #Res BW 390 kHz      #VBW 1.2 MHz      Sweep 1 ms (601 pts)

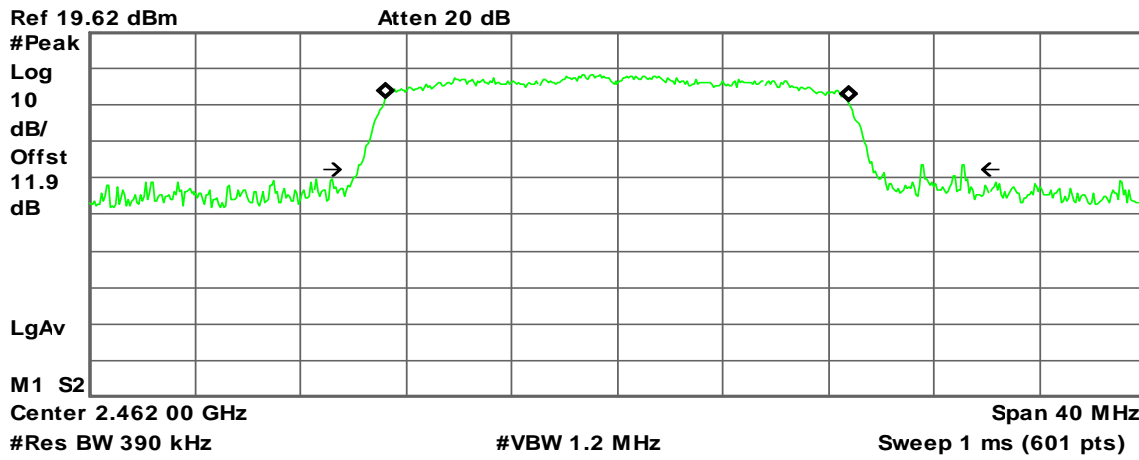
Occupied Bandwidth      Occ BW % Pwr      99.00 %  
 17.6141 MHz      x dB      -26.00 dB

Transmit Freq Error      -42.241 kHz  
 x dB Bandwidth      19.546 MHz

### 99% Bandwidth (CH High)

Agilent

R L



Occupied Bandwidth  
17.5919 MHz

Occ BW % Pwr      99.00 %  
x dB      -26.00 dB

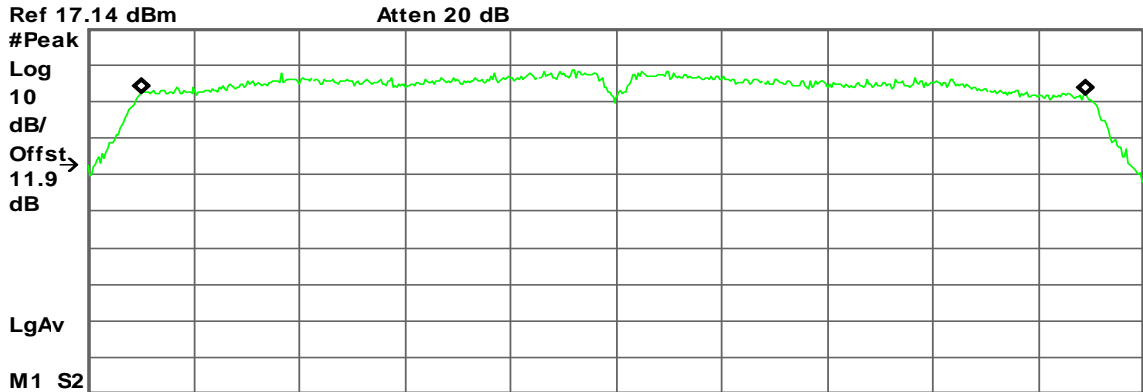
Transmit Freq Error      -22.407 kHz  
x dB Bandwidth      22.990 MHz

**802.11n Standard-40 MHz**

**99% Bandwidth (CH Low)**

Agilent

R L



Center 2.422 00 GHz Span 40 MHz  
 #Res BW 390 kHz #VBW 1.2 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**35.8431 MHz**

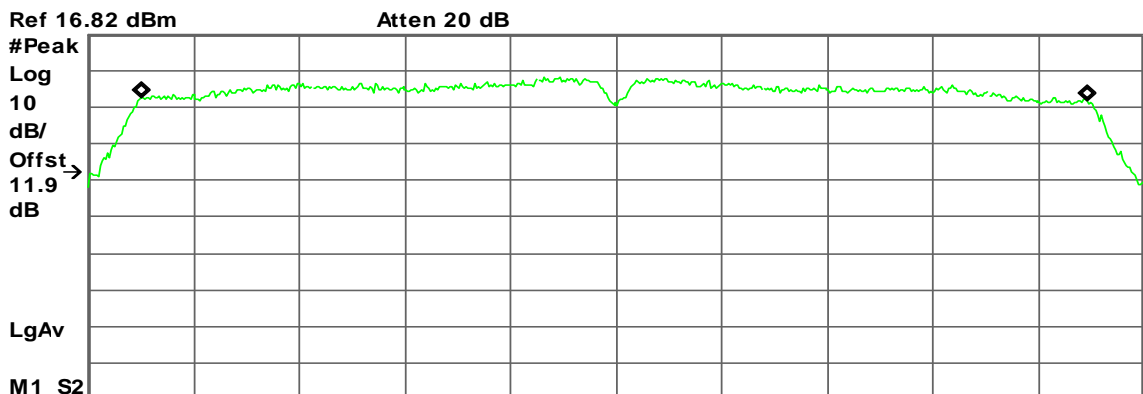
Occ BW % Pwr 99.00 %  
 x dB -26.00 dB

Transmit Freq Error -90.421 kHz  
 x dB Bandwidth 39.198 MHz

**99% Bandwidth (CH Mid)**

Agilent

R L



Center 2.437 00 GHz Span 40 MHz  
 #Res BW 390 kHz #VBW 1.2 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**35.9171 MHz**

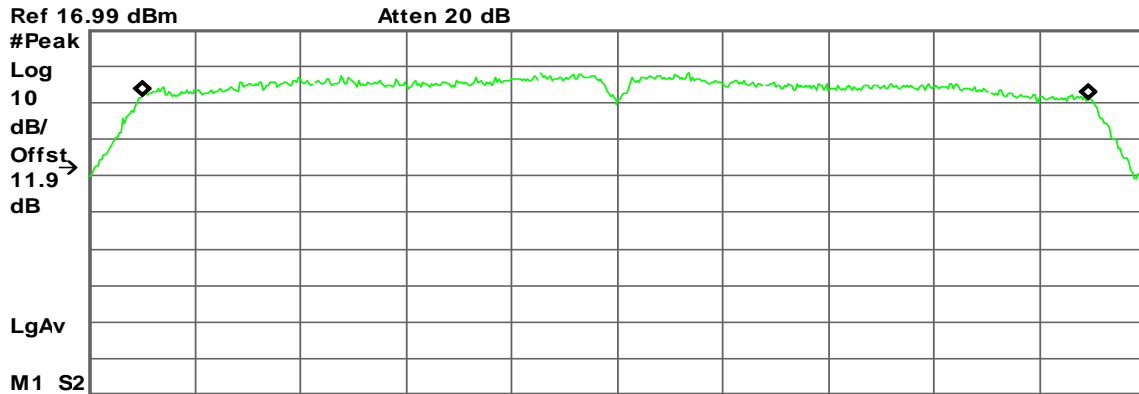
Occ BW % Pwr 99.00 %  
 x dB -26.00 dB

Transmit Freq Error -72.185 kHz  
 x dB Bandwidth 39.108 MHz

### 99% Bandwidth (CH High)

Agilent

R L



Center 2.452 00 GHz Span 40 MHz  
 #Res BW 390 kHz #VBW 1.2 MHz Sweep 1 ms (601 pts)

**Occupied Bandwidth**  
**35.8676 MHz**

Occ BW % Pwr 99.00 %  
 x dB -26.00 dB

Transmit Freq Error -86.723 kHz  
 x dB Bandwidth 39.252 MHz

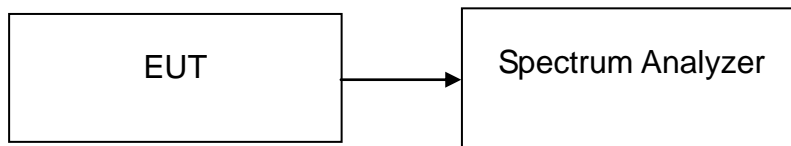


## 7.2 6DB BANDWIDTH

### LIMIT

According to §15.247(a)(2) & RSS-247, systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6dB bandwidth shall be at least 500 kHz.

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW = 100 kHz, VBW = RBW, Span = 50 MHz, Sweep = auto.
4. Mark the peak frequency and -6dB (upper and lower) frequency.
5. Repeat until all the rest channels are investigated.

### TEST RESULTS

*No non-compliance noted*

**Test Data**

**Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	8.3334	>500	PASS
Mid	2437	8.3334		PASS
High	2462	8.25		PASS

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.1666	>500	PASS
Mid	2437	16.1667		PASS
High	2462	16.1667		PASS

**Test mode: IEEE 802.11n HT 20 MHz mode**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.5	>500	PASS
Mid	2437	17.3334		PASS
High	2462	17.3333		PASS

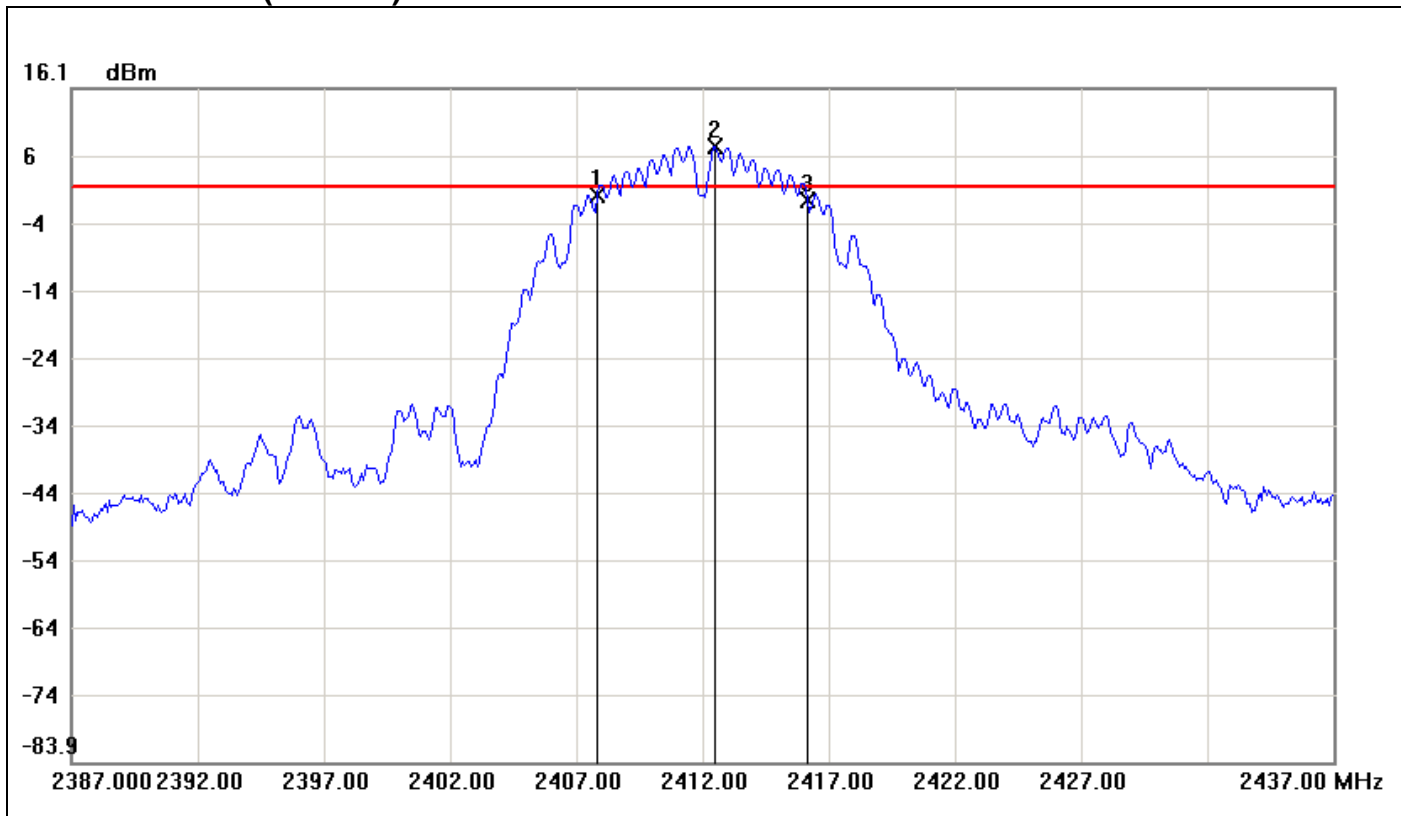
**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	35	>500	PASS
Mid	2437	34.75		PASS
High	2452	35.3333		PASS

**Test Plot**

**IEEE 802.11b mode**

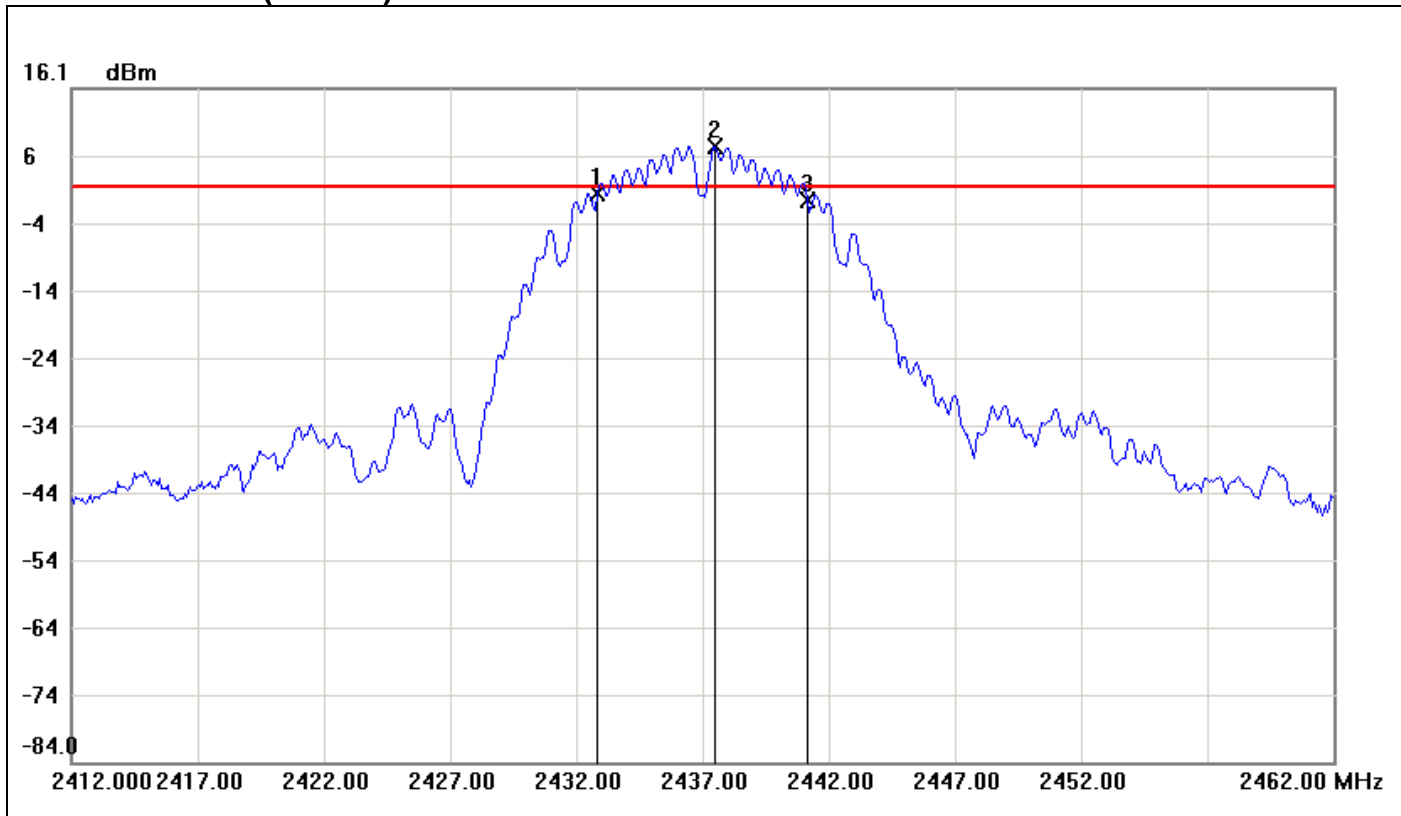
**6dB Bandwidth (CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2407.8333	0.23	1.49	-1.26
2	2412.5000	7.49	1.49	6.00
3	2416.1667	-0.61	1.49	-2.10

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	8.3334	-0.84

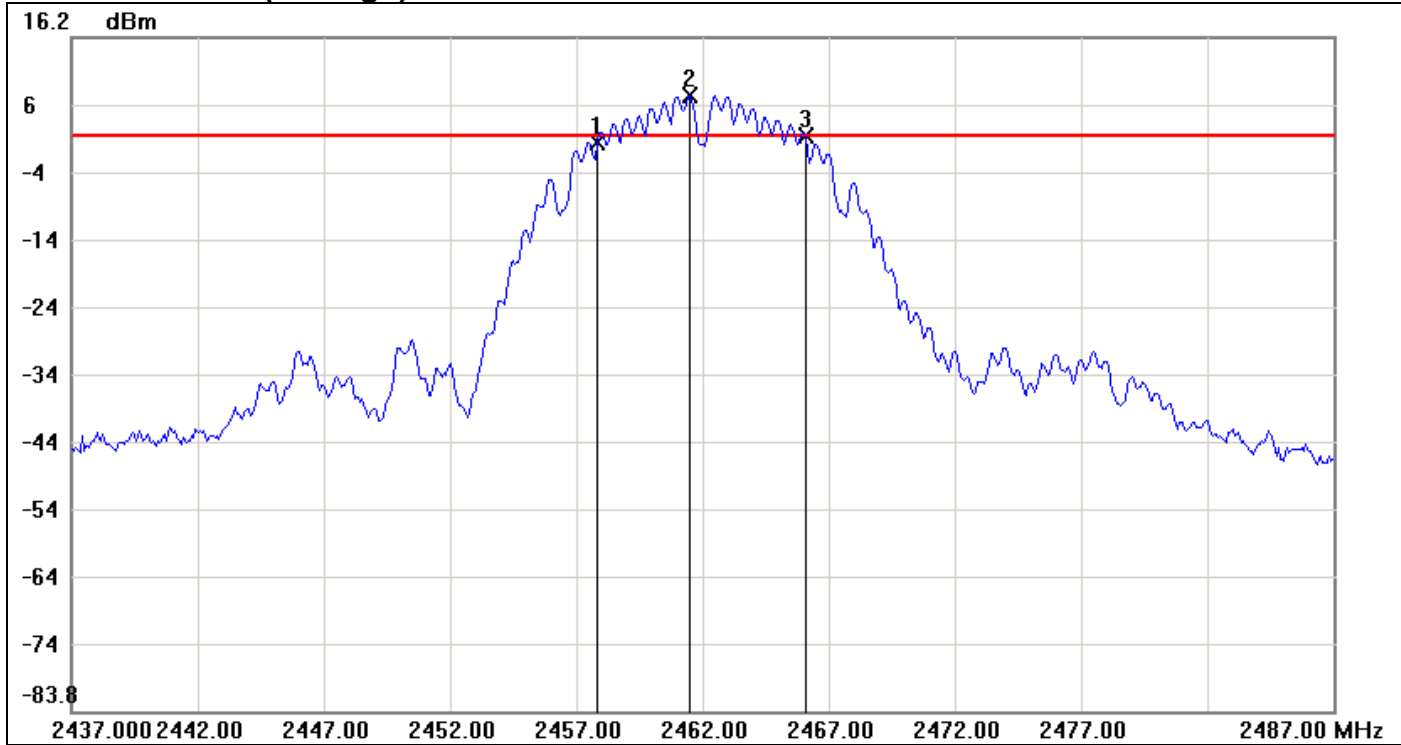
**6dB Bandwidth (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2432.8333	0.36	1.44	-1.08
2	2437.5000	7.44	1.44	6.00
3	2441.1667	-0.61	1.44	-2.05

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	8.3334	-0.97

**6dB Bandwidth (CH High)**

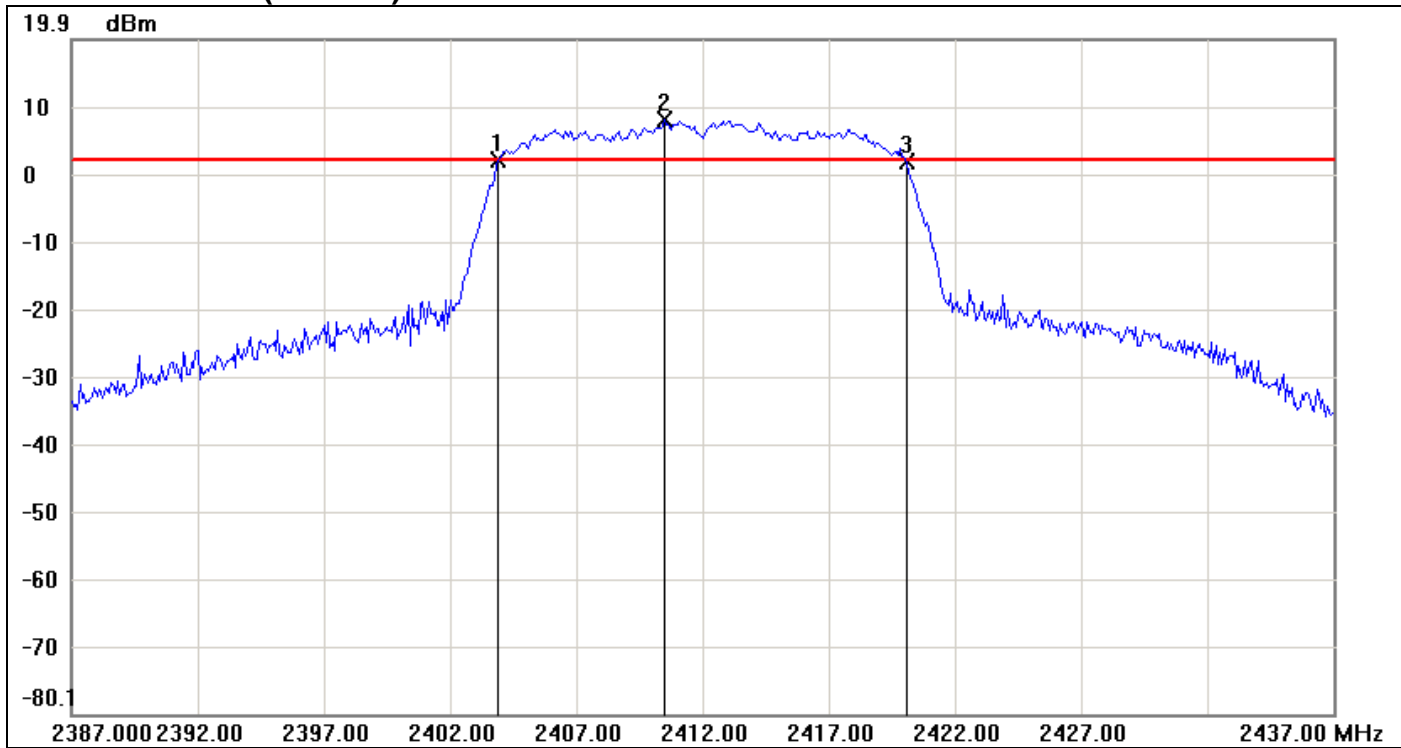


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2457.8333	0.51	1.56	-1.05
2	2461.5000	7.56	1.56	6.00
3	2466.0833	1.47	1.56	-0.09

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	8.25	0.96

**IEEE 802.11g mode**

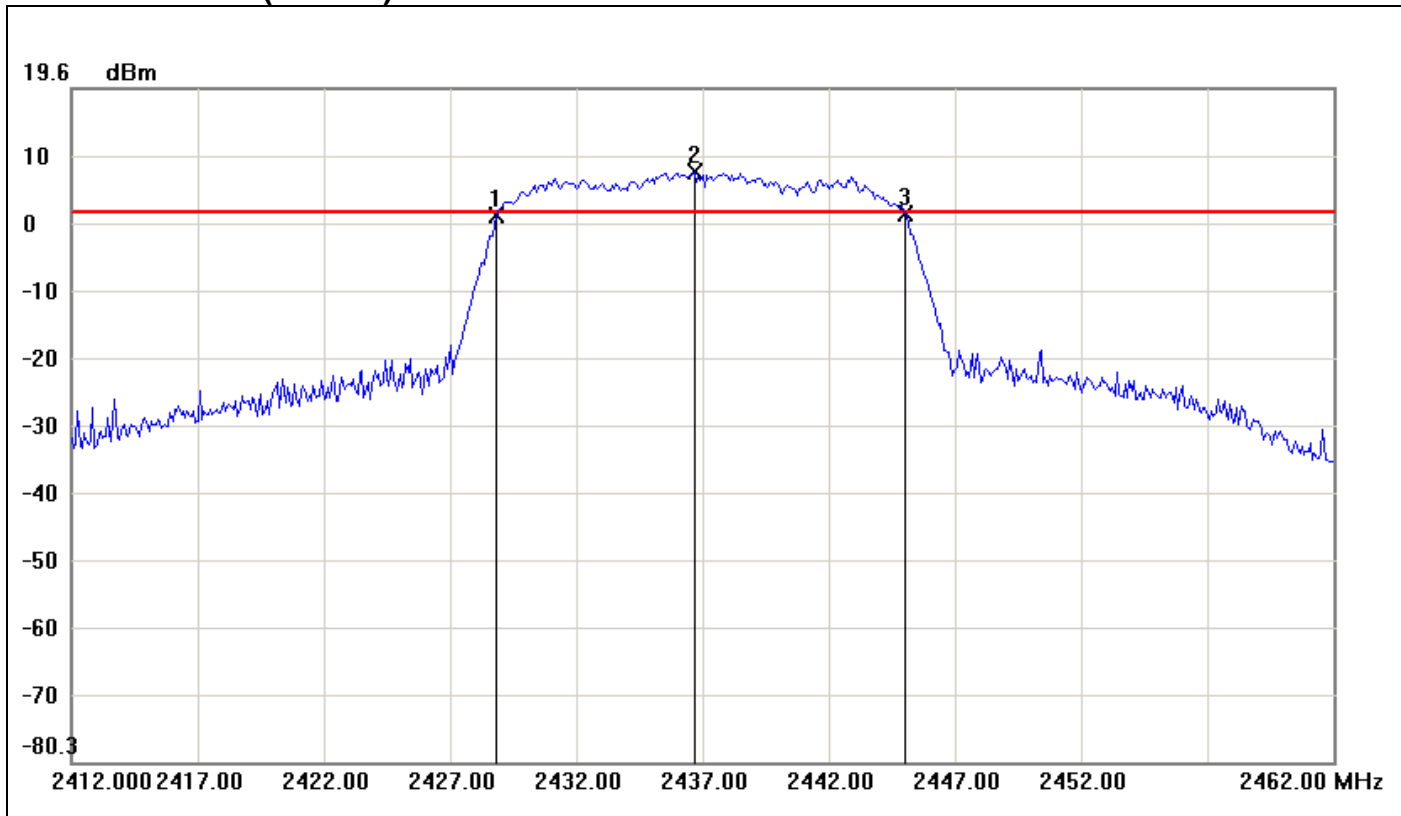
**6dB Bandwidth (CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.9167	1.90	1.94	-0.04
2	2410.5000	7.94	1.94	6.00
3	2420.0833	1.65	1.94	-0.29

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	16.1666	-0.25

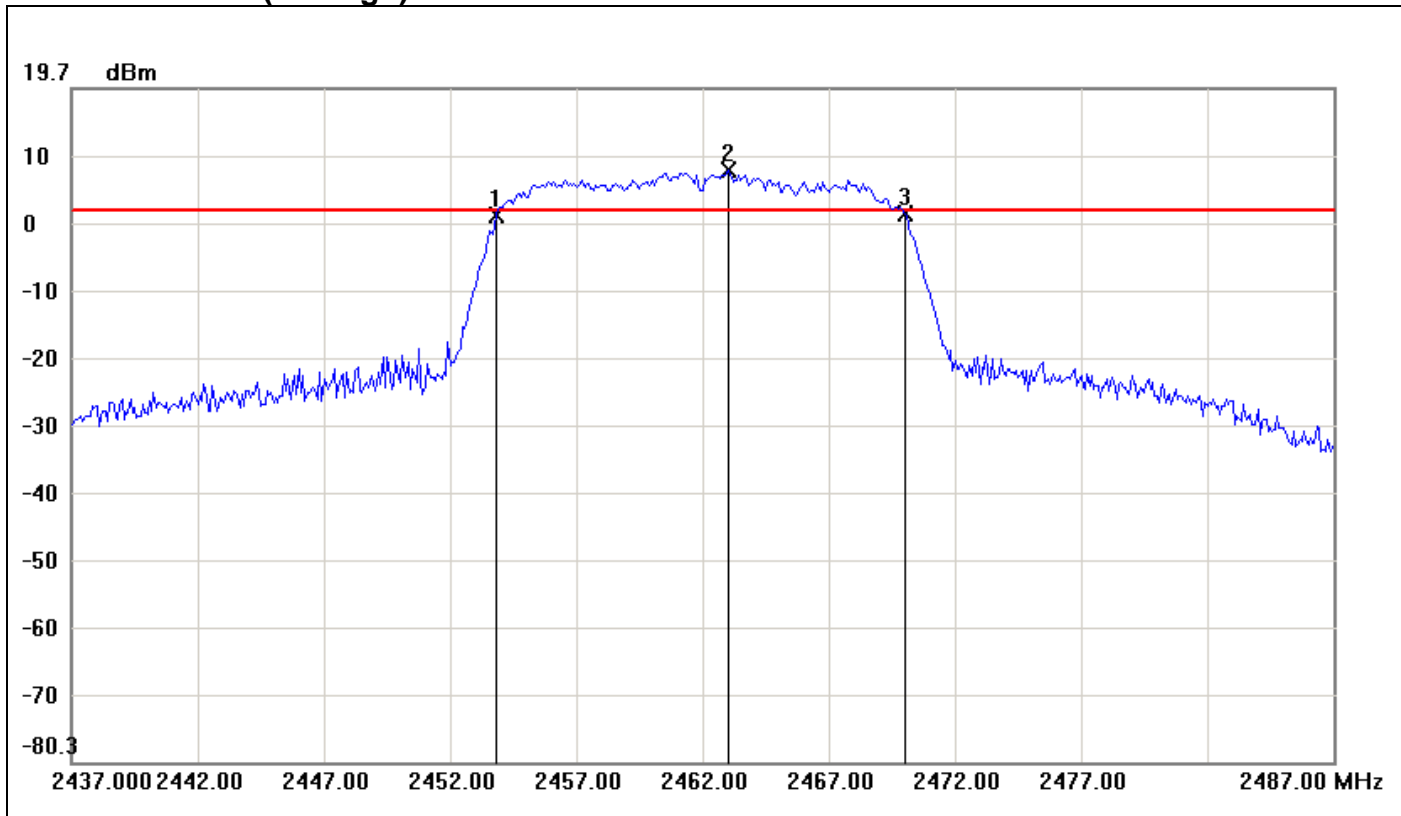
**6dB Bandwidth (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2428.8333	0.70	1.16	-0.46
2	2436.6667	7.16	1.16	6.00
3	2445.0000	1.06	1.16	-0.10

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	16.1667	0.36

**6dB Bandwidth (CH High)**



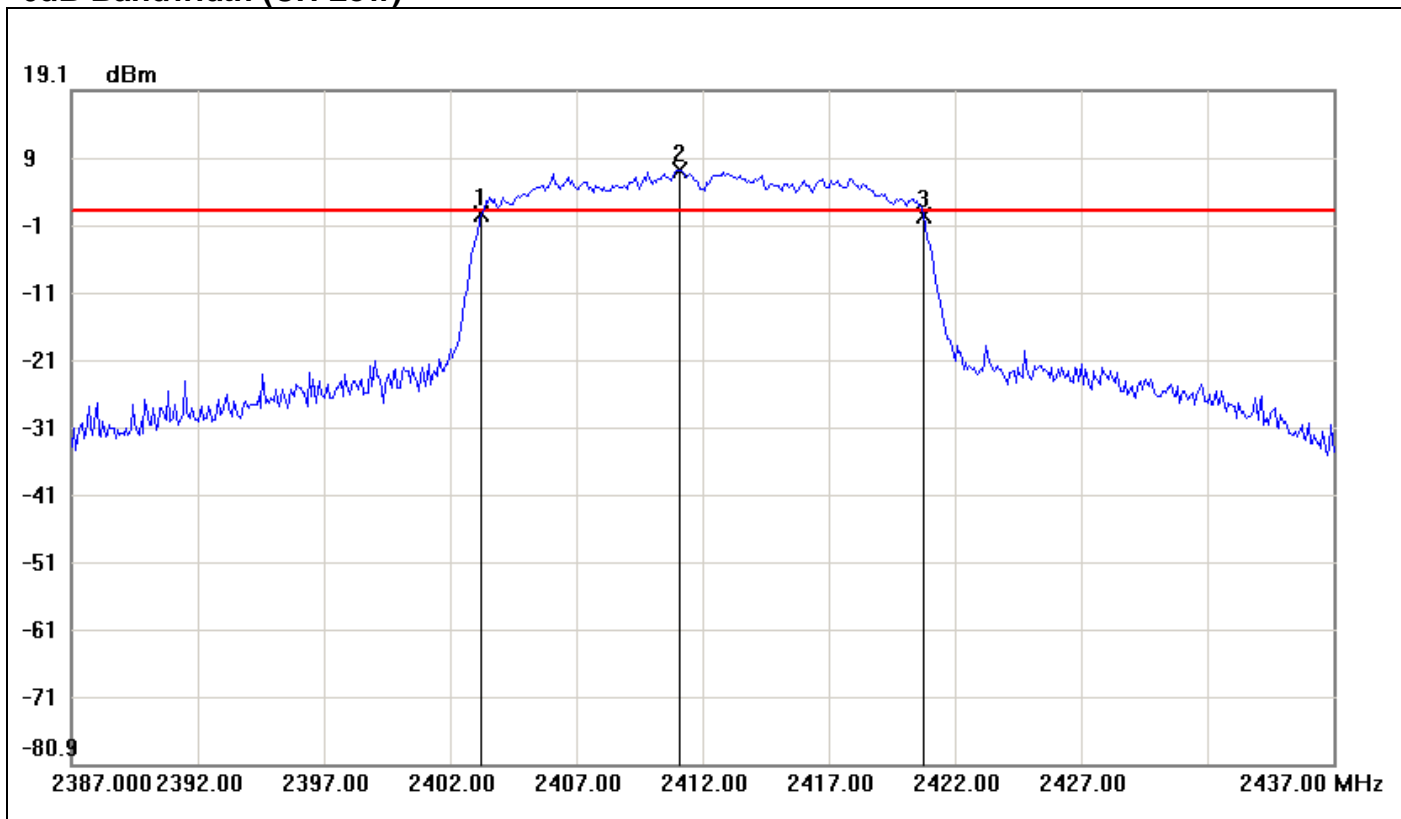
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2453.8333	0.89	1.67	-0.78
2	2463.0000	7.67	1.67	6.00
3	2470.0000	1.07	1.67	-0.60

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	16.1667	0.18



**IEEE 802.11n HT 20 MHz mode**

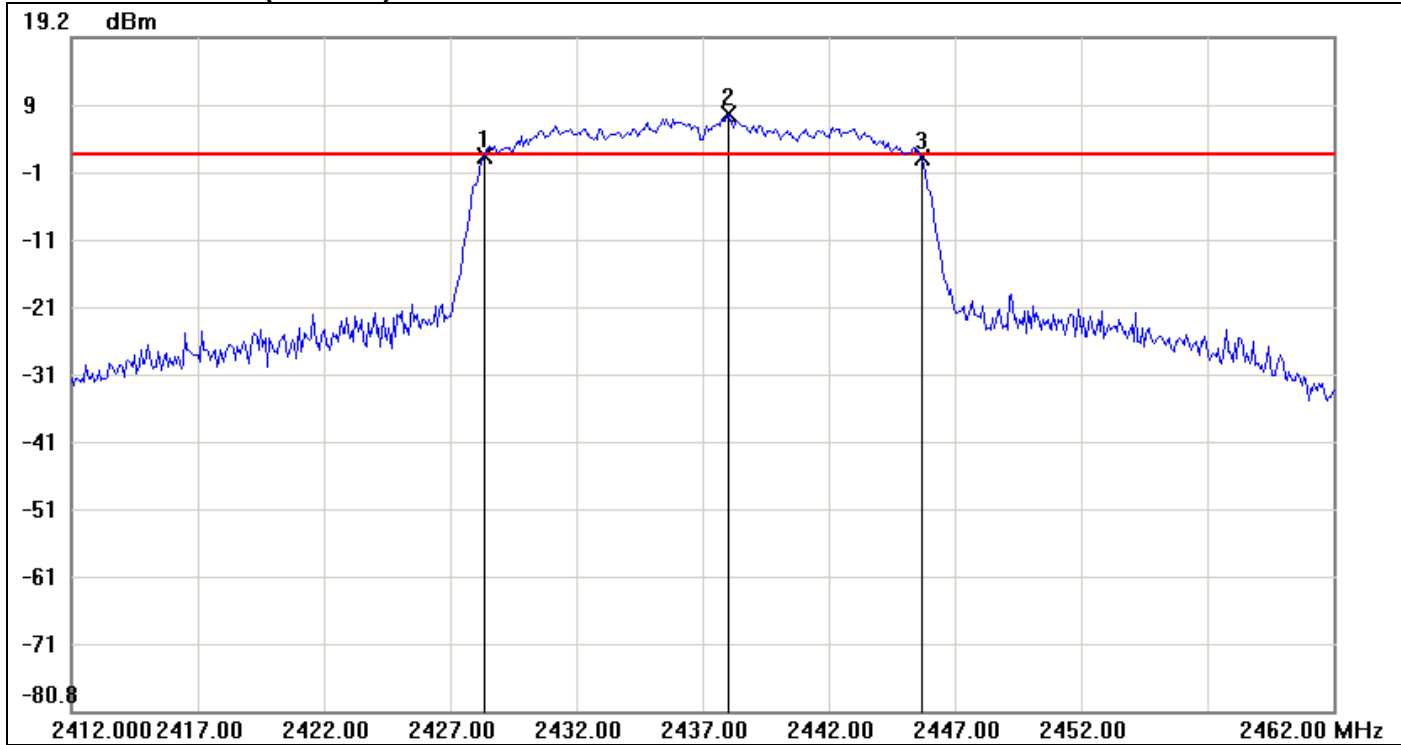
**6dB Bandwidth (CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.2500	0.83	1.29	-0.46
2	2411.0833	7.29	1.29	6.00
3	2420.7500	0.47	1.29	-0.82

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	17.5	-0.36

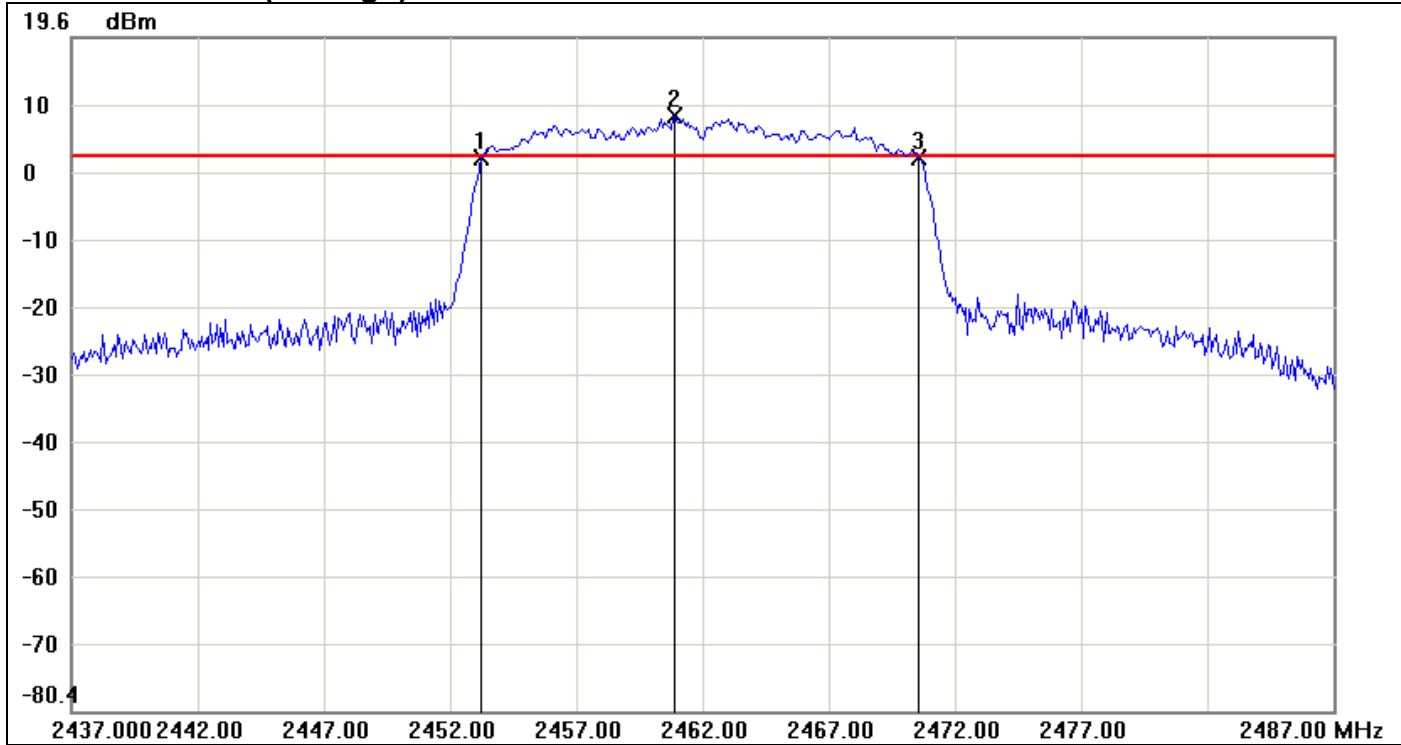
**6dB Bandwidth (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2428.3333	1.70	1.87	-0.17
2	2438.0000	7.87	1.87	6.00
3	2445.6667	1.43	1.87	-0.44

No.		ΔFrequency(MHz)	ΔLevel(dB)
1	mk3-mk1	17.3334	-0.27

**6dB Bandwidth (CH High)**

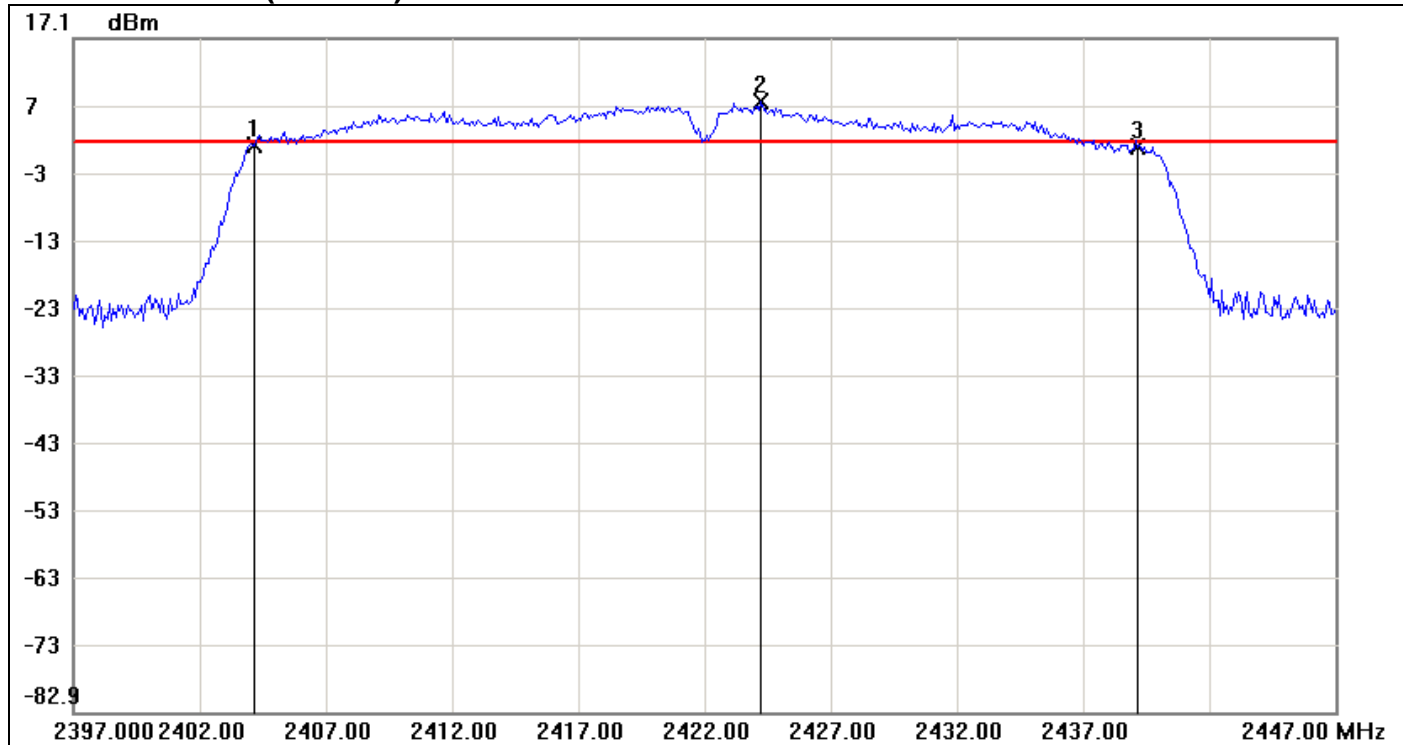


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2453.2500	1.63	1.91	-0.28
2	2460.9167	7.91	1.91	6.00
3	2470.5833	1.84	1.91	-0.07

No.		ΔFrequency(MHz)	ΔLevel(dB)
1	mk3-mk1	17.3333	0.21

**IEEE 802.11n HT 40 MHz mode**

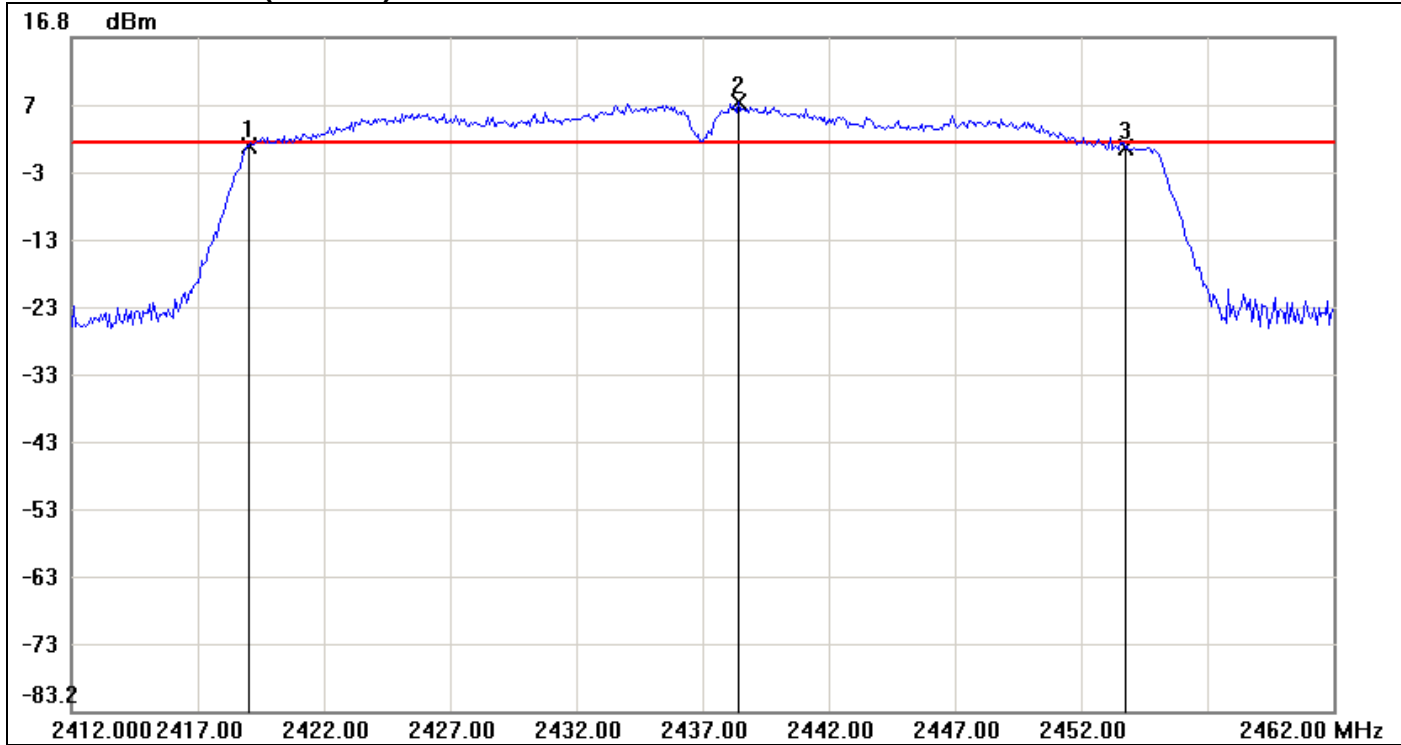
**6dB Bandwidth (CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2404.1667	1.25	1.73	-0.48
2	2424.2500	7.73	1.73	6.00
3	2439.1667	0.91	1.73	-0.82

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	35	-0.34

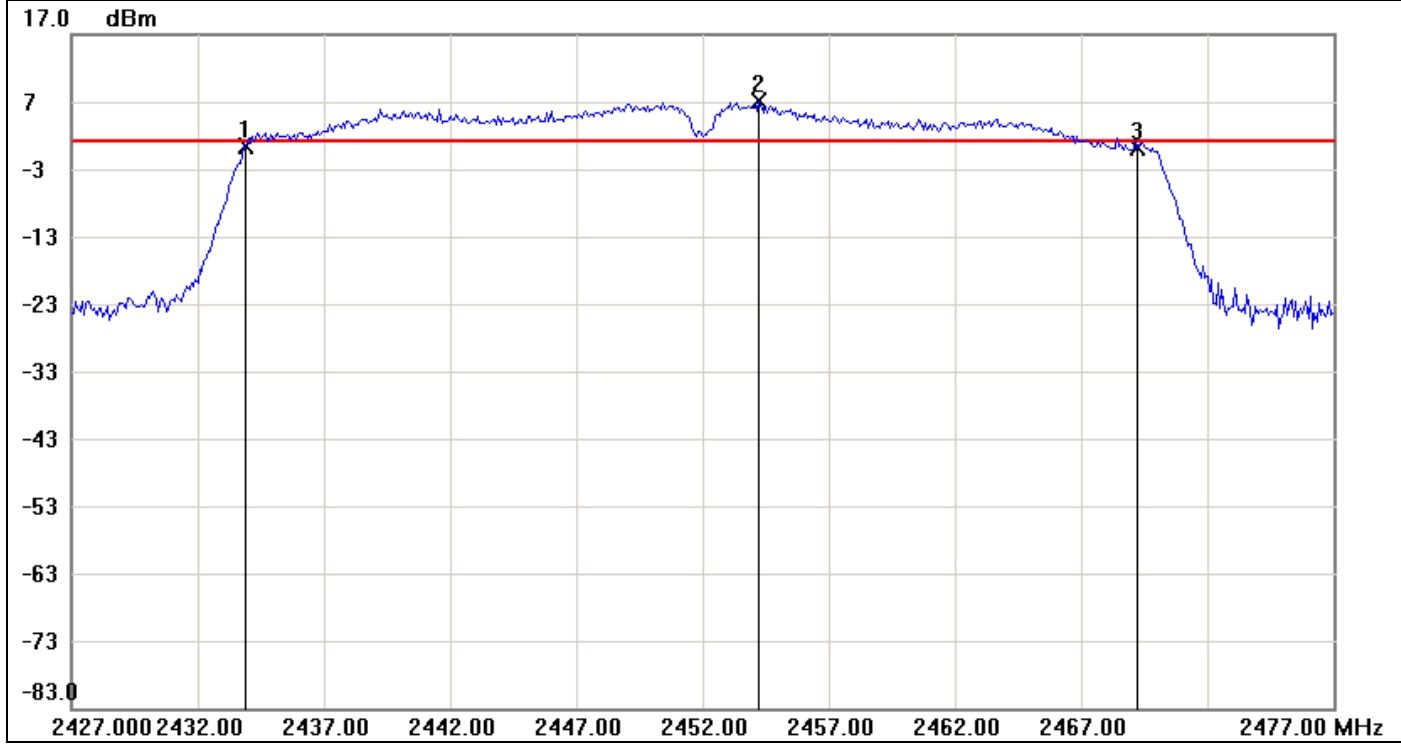
**6dB Bandwidth (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2419.0000	0.70	1.10	-0.40
2	2438.4167	7.10	1.10	6.00
3	2453.7500	0.41	1.10	-0.69

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	34.75	-0.29

**6dB Bandwidth (CH High)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2433.9167	0.29	1.19	-0.90
2	2454.2500	7.19	1.19	6.00
3	2469.2500	0.11	1.19	-1.08

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	35.3333	-0.18

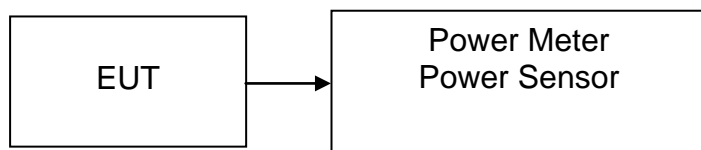
## 7.3 PEAK POWER

### LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. According to §15.247(b)(3), for systems using digital modulation in the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz: 1 Watt.
2. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
3. According to RSS-247, for systems employing digital modulation techniques operating in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz, the maximum peak conducted output power shall not exceed 1 W.

### Test Configuration



### TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

### TEST RESULTS

*No non-compliance noted*

**Test Data**

**Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	16.28	0.0425	1.00	PASS
Mid	2437	<b>*16.51</b>	0.0448		PASS
High	2462	16.33	0.0430		PASS

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	21.85	0.1531	1.00	PASS
Mid	2437	22.07	0.1611		PASS
High	2462	<b>*22.11</b>	0.1626		PASS

**Test mode: IEEE 802.11n HT 20 MHz mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	21.71	0.1483	1.00	PASS
Mid	2437	22.02	0.1592		PASS
High	2462	<b>*22.11</b>	0.1626		PASS

**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	22.03	0.1596	1.00	PASS
Mid	2437	22.01	0.1589		PASS
High	2452	<b>*22.14</b>	0.1637		PASS

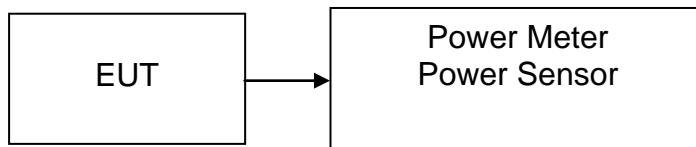


## 7.4 AVERAGE POWER

### LIMIT

None; for reporting purposes only.

### Test Configuration



### TEST PROCEDURE

The transmitter output is connected to the Power Meter. The Power Meter is set to the peak power detection.

### TEST RESULTS

*No non-compliance noted*

## Test Data

### Test mode: IEEE 802.11b mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.42	0.0220
Mid	2437	13.34	0.0216
High	2462	<b>*13.47</b>	0.0222

### Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.37	0.0217
Mid	2437	13.33	0.0215
High	2462	<b>*13.43</b>	0.0220

### Test mode: IEEE 802.11n HT 20 MHz mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	13.08	0.0203
Mid	2437	<b>*13.27</b>	0.0212
High	2462	13.17	0.0207

### Test mode: IEEE 802.11n HT 40 MHz mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2422	12.52	0.0179
Mid	2437	12.45	0.0176
High	2452	<b>*12.57</b>	0.0181

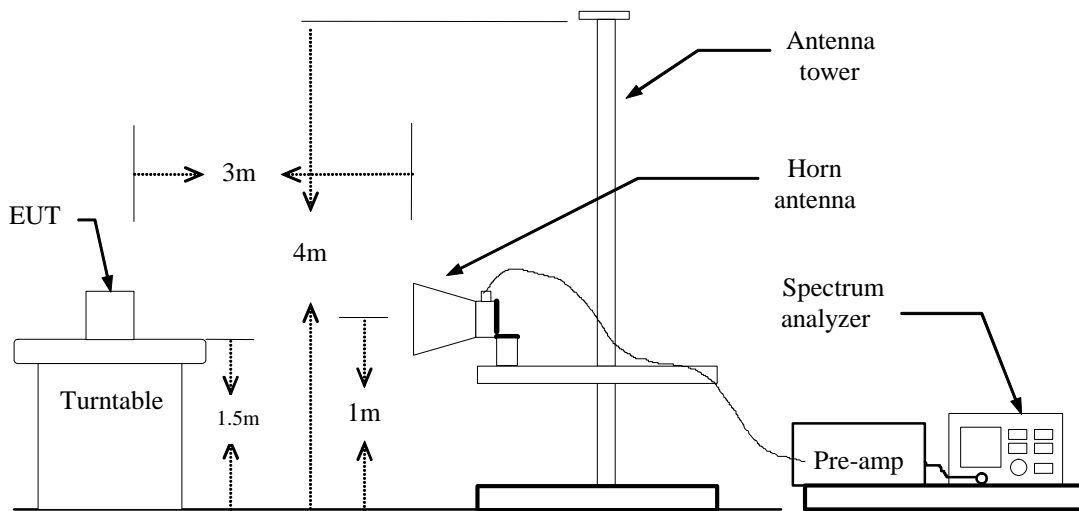
## 7.5 BAND EDGES MEASUREMENT

### LIMIT

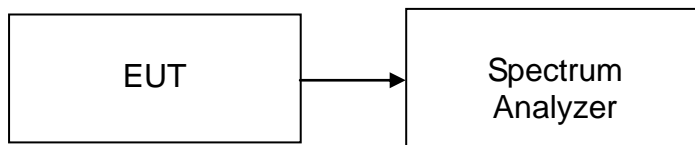
According to §15.247(d) & RSS-247, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that 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

#### For Radiated



#### For Conducted



## **TEST PROCEDURE**

### **For Radiated**

1. The EUT is placed on a turntable, which is 1.5m 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=1MHz / VBW=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz,  
if duty cycle  $\geq$  98%, VBW=10Hz.  
if duty cycle < 98% VBW=1/T.  
**IEEE 802.11b mode:** = 95%, VBW=82Hz  
**IEEE 802.11g mode:** = 95%, VBW=510Hz  
**IEEE 802.11n HT 20 MHz mode:** = 95%, VBW=560Hz  
**IEEE 802.11n HT 40 MHz mode:** = 91%, VBW=1.1KHz
5. Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

### **For Conducted**

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

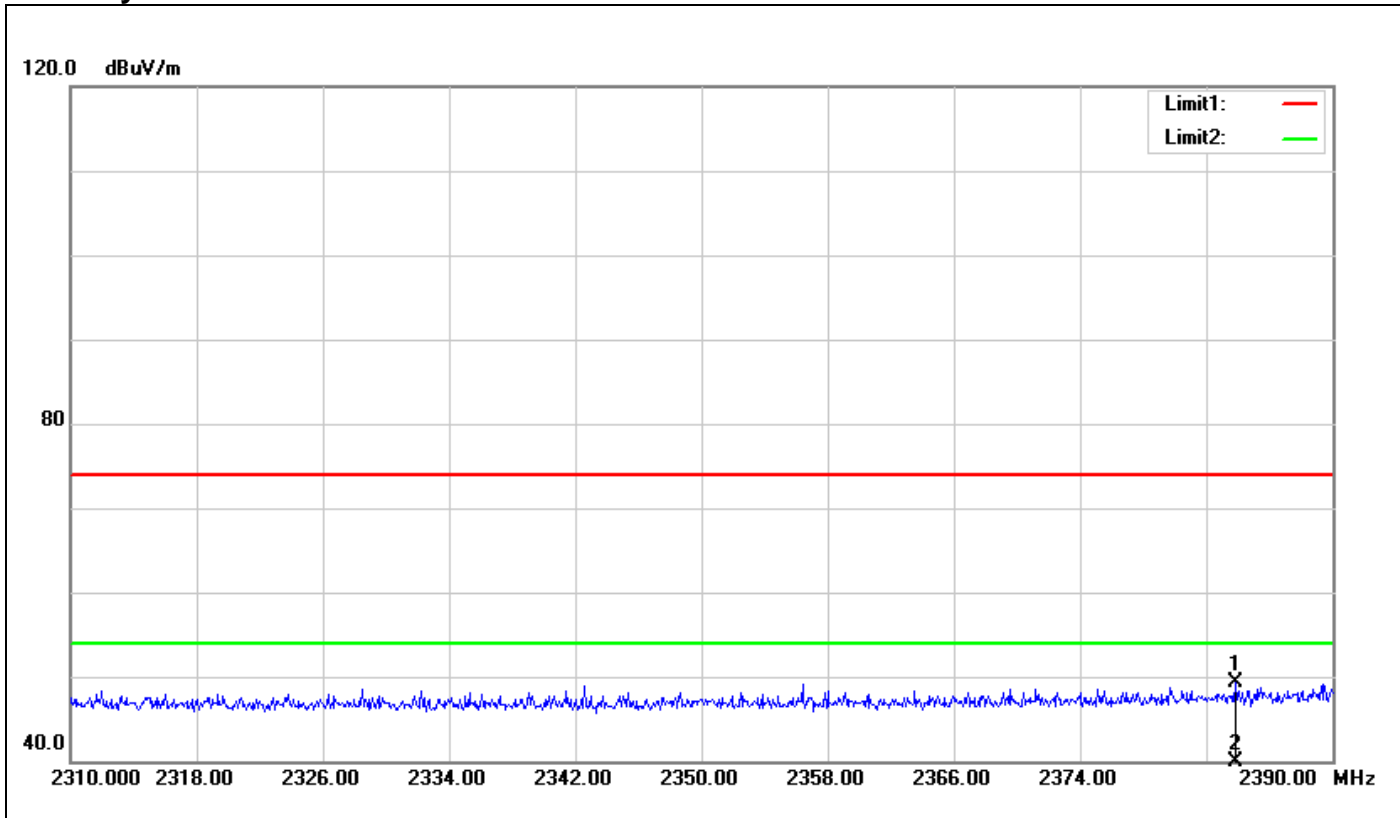
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

## **TEST RESULTS**

Refer to attach spectrum analyzer data chart.

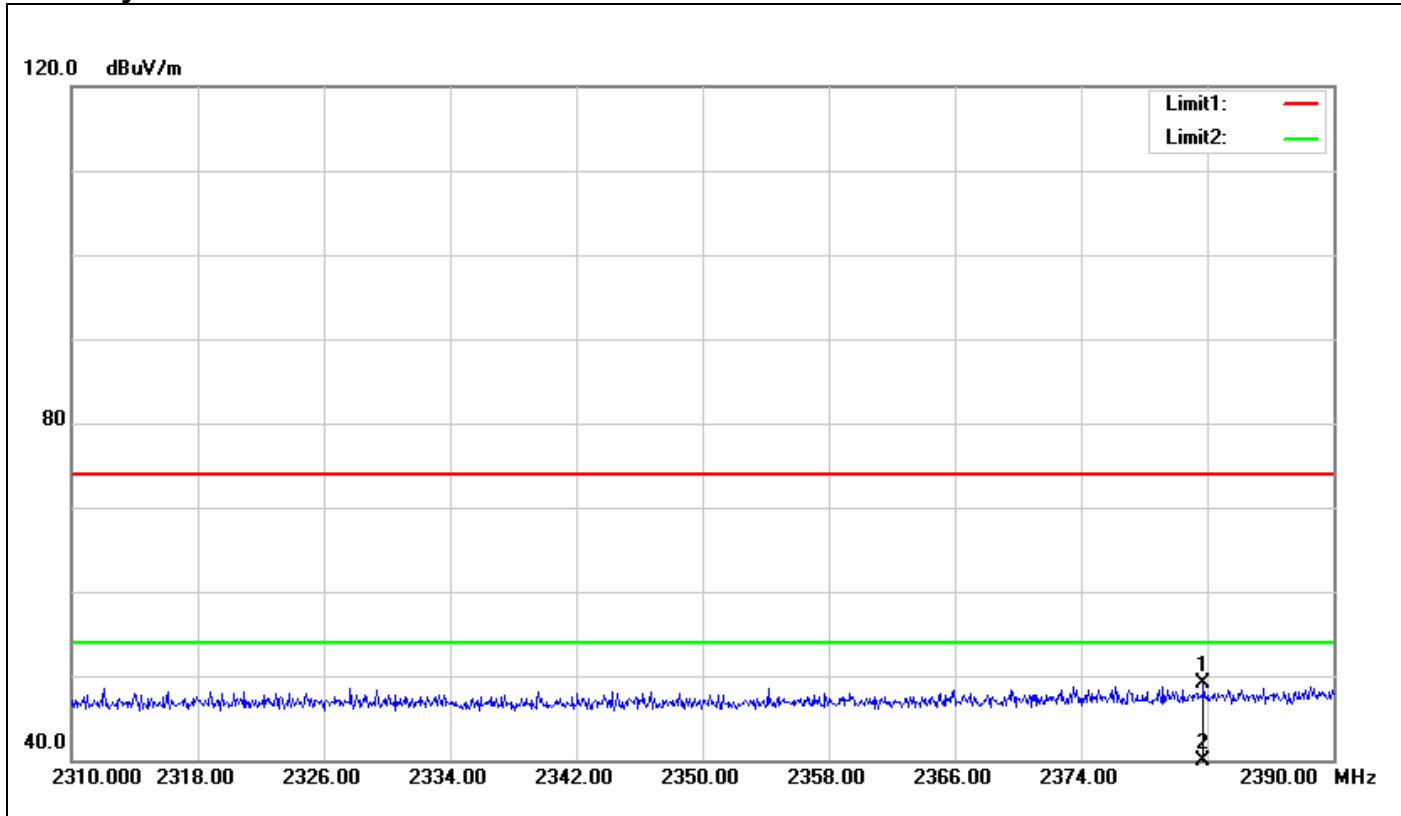
**Band Edges (IEEE 802.11b mode / CH Low)**

**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2383.840	51.82	-2.55	49.27	74.00	-24.73	100	147	peak
2	2383.840	38.43	-2.55	35.88	54.00	-18.12	100	147	AVG

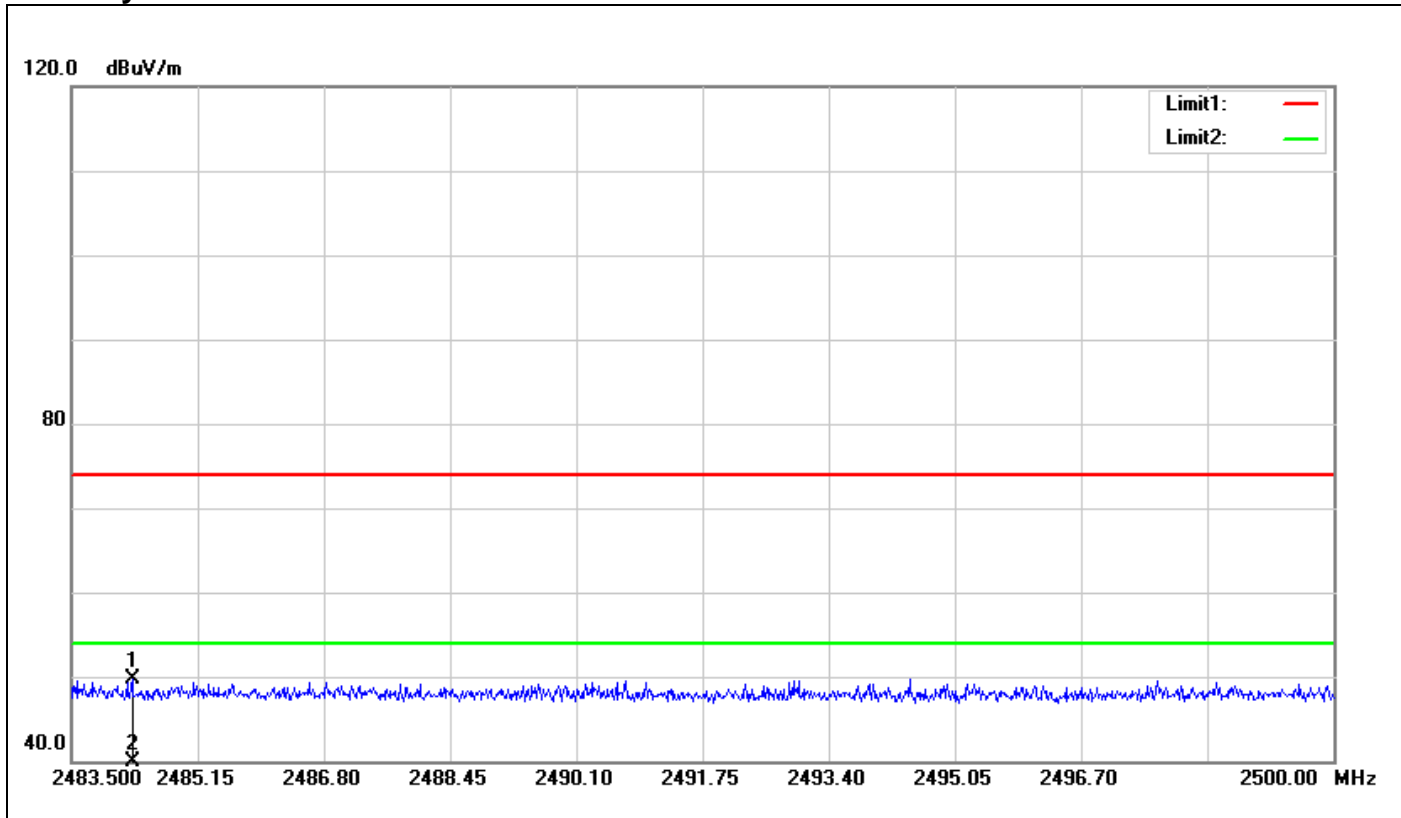
**Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2381.760	51.68	-2.56	49.12	74.00	-24.88	100	308	peak
2	2381.760	38.44	-2.56	35.88	54.00	-18.12	100	308	AVG

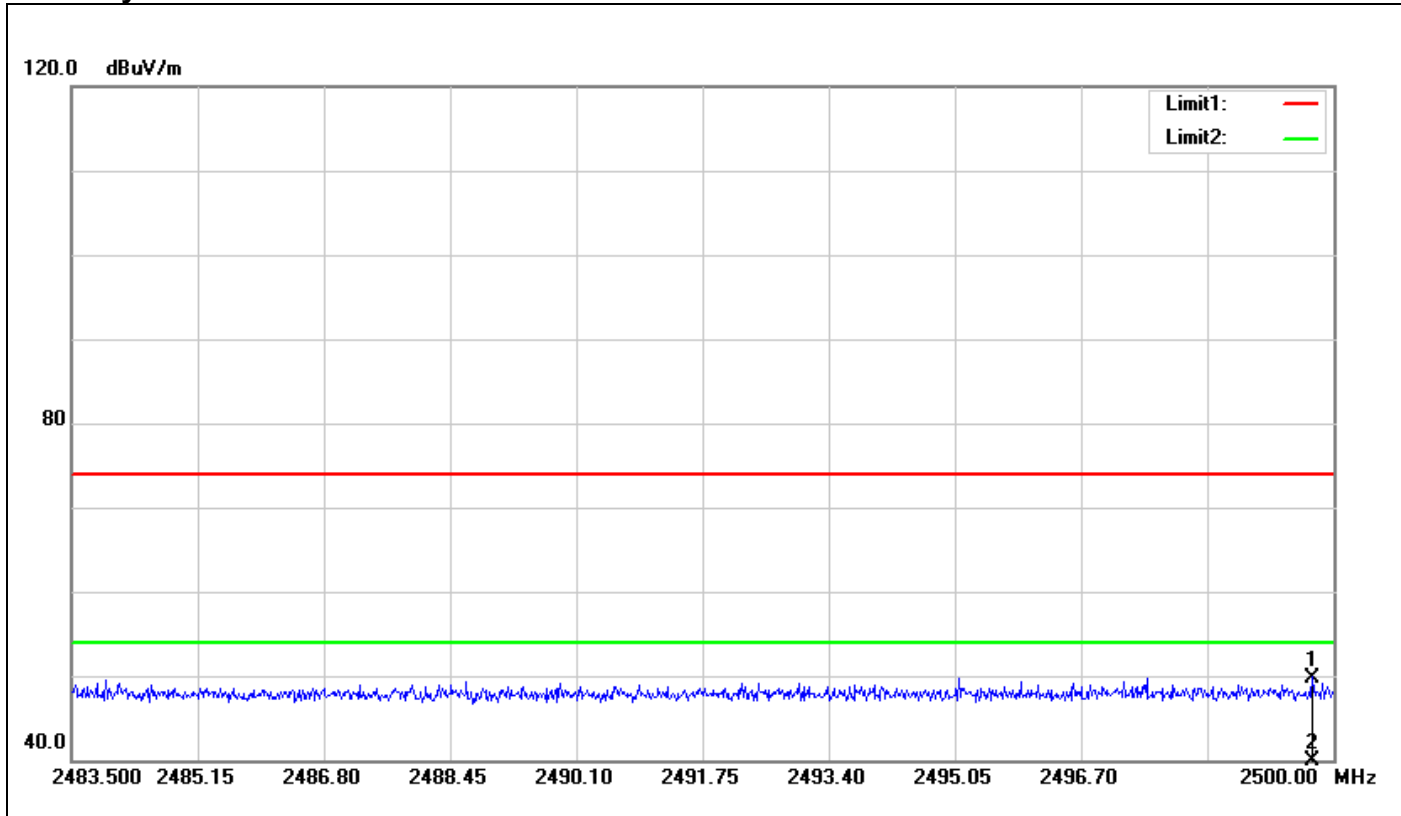
**Band Edges (IEEE 802.11b mode / CH High)**

**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree ( ° )	Remark
1	2484.292	51.69	-1.99	49.70	74.00	-24.30	100	179	peak
2	2484.292	38.02	-1.99	36.03	54.00	-17.97	100	179	AVG

**Polarity: Horizontal**

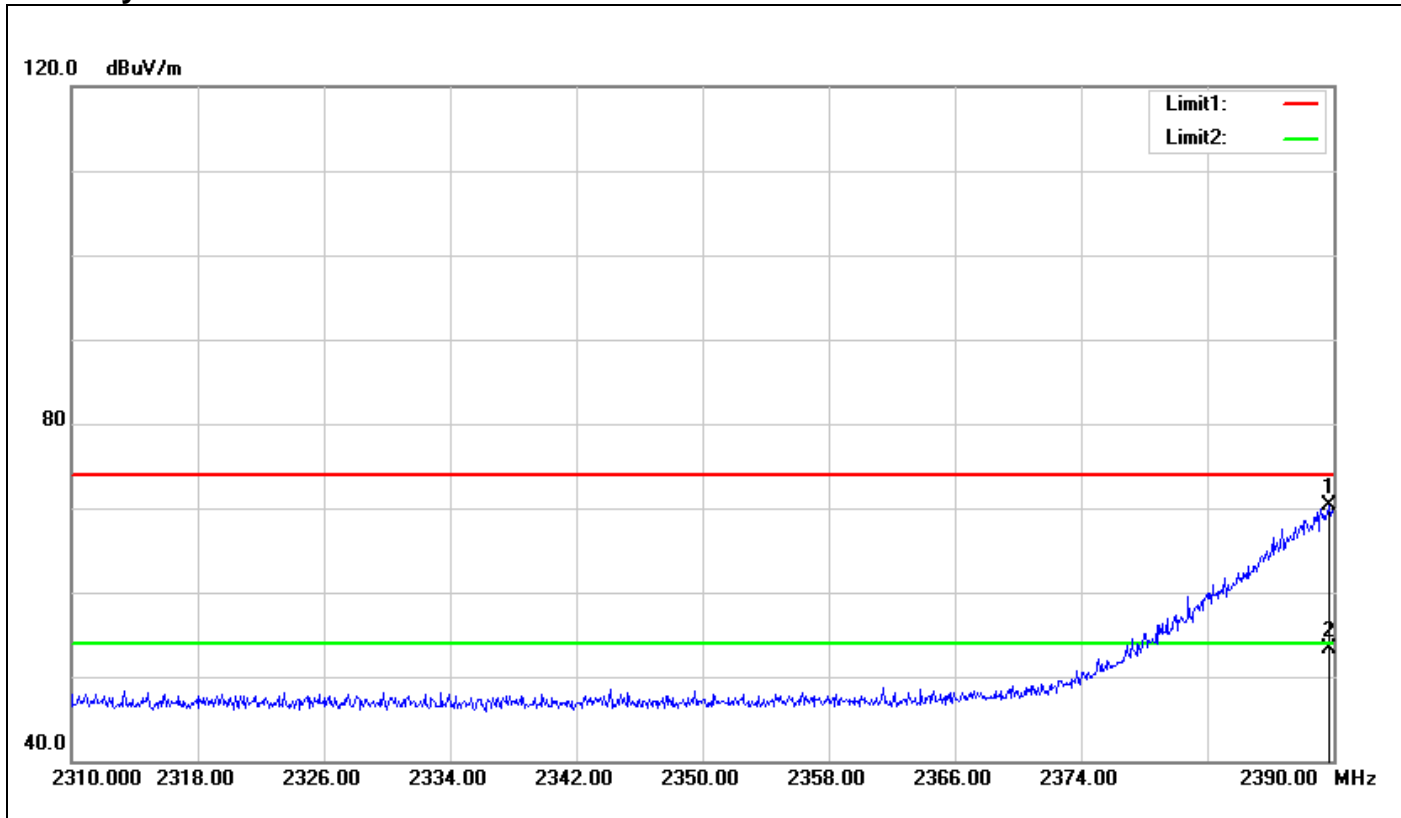


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2499.720	51.66	-1.86	49.80	74.00	-24.20	100	351	peak
2	2499.720	37.54	-1.86	35.68	54.00	-18.32	100	351	AVG



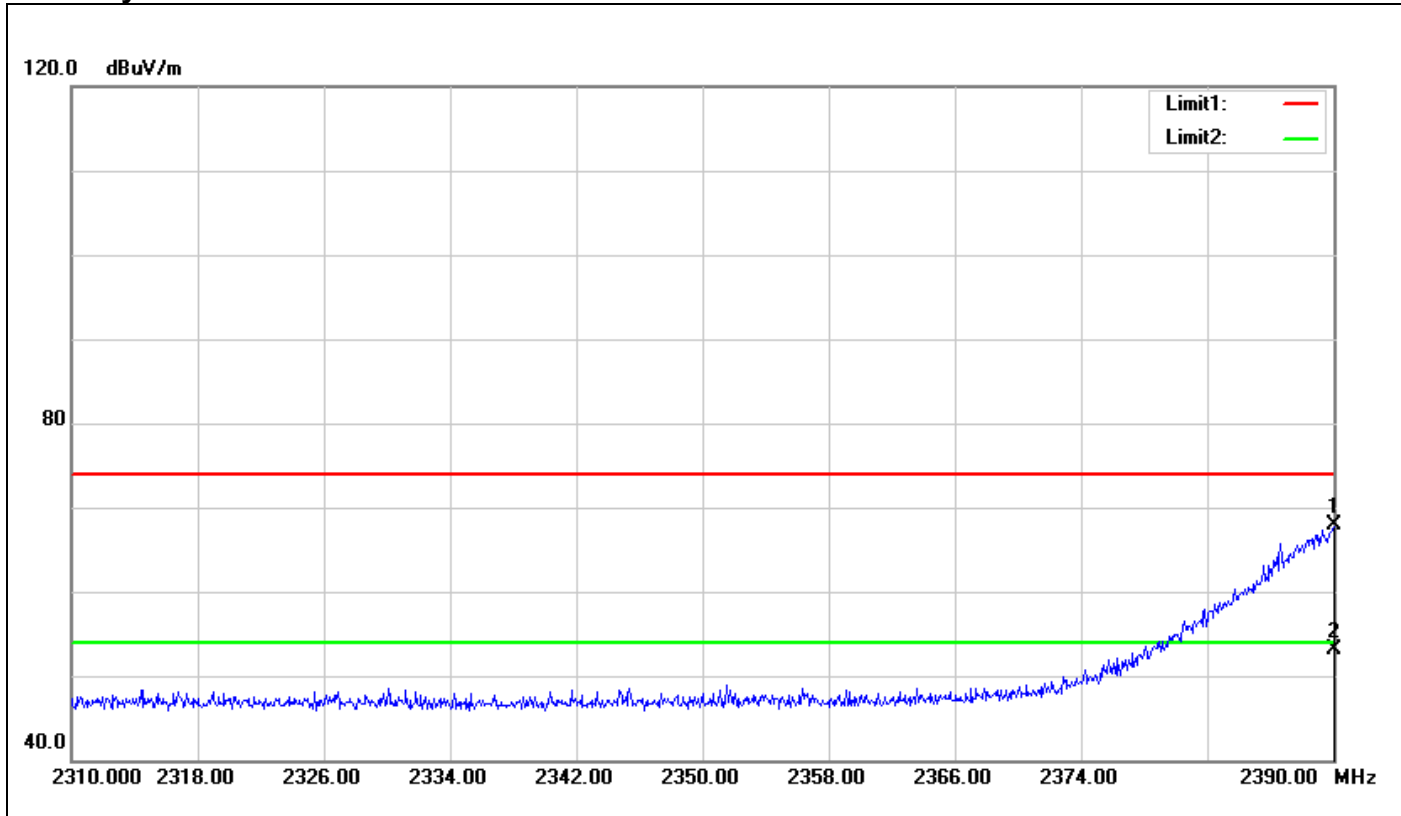
**Band Edges (IEEE 802.11g mode / CH Low)**

**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2389.760	72.70	-2.49	70.21	74.00	-3.79	100	282	peak
2	2389.760	55.73	-2.49	53.24	54.00	-0.76	100	282	AVG

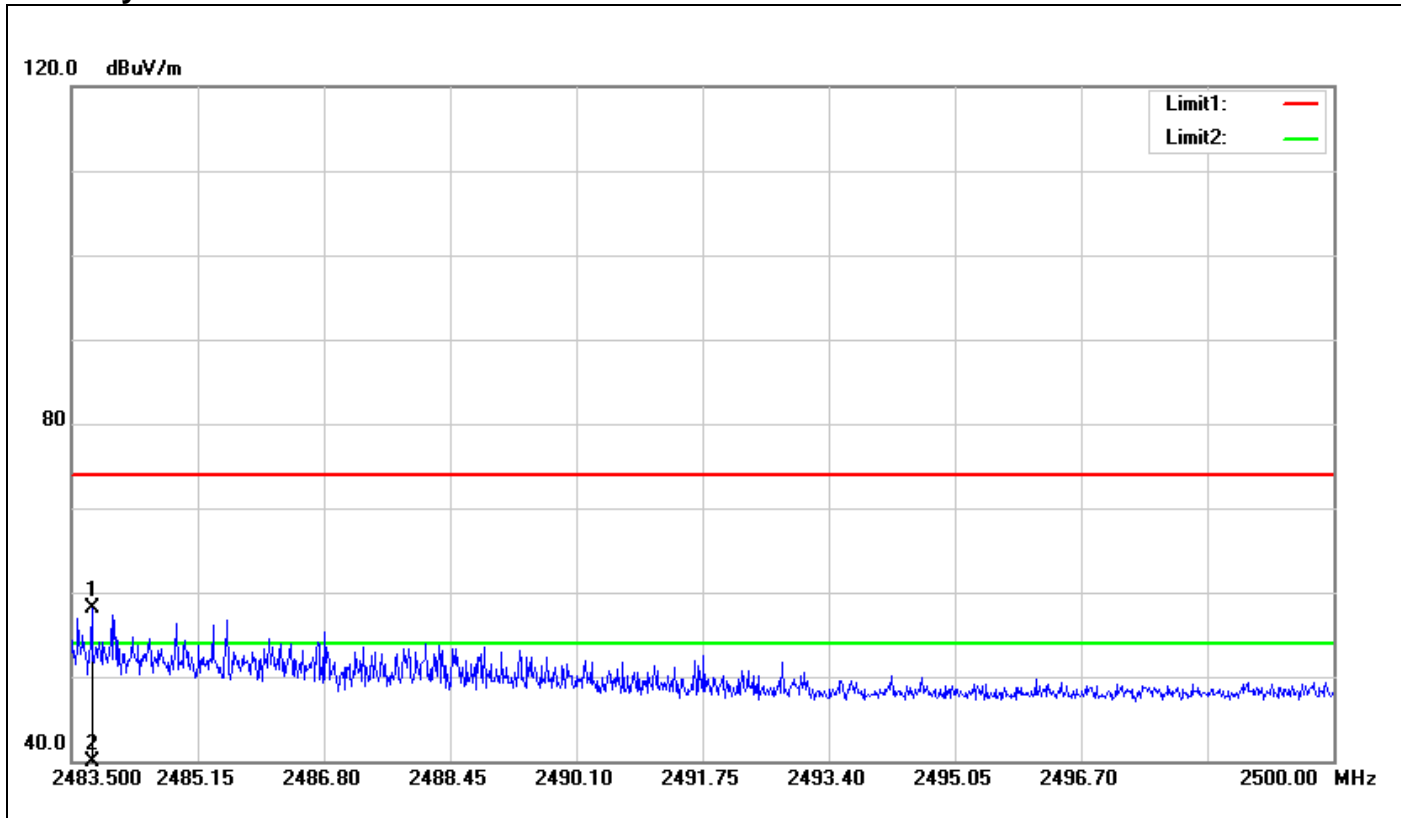
**Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2390.000	70.33	-2.49	67.84	74.00	-6.16	100	355	peak
2	2390.000	55.59	-2.49	53.10	54.00	-0.90	100	355	AVG

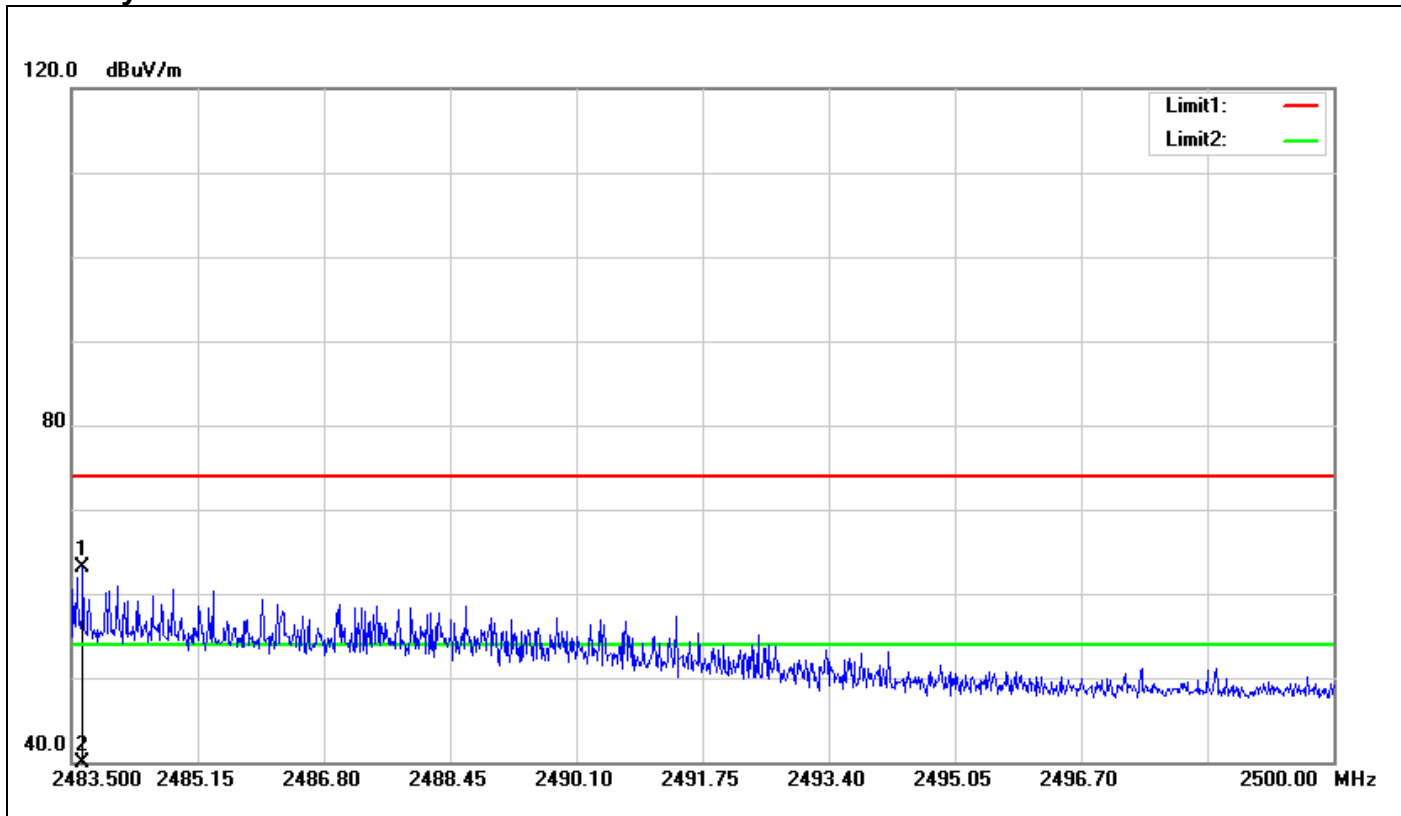
**Band Edges (IEEE 802.11g mode / CH High)**

**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2483.764	60.03	-1.99	58.04	74.00	-15.96	100	197	peak
2	2483.764	40.83	-1.99	38.84	54.00	-15.16	100	197	AVG

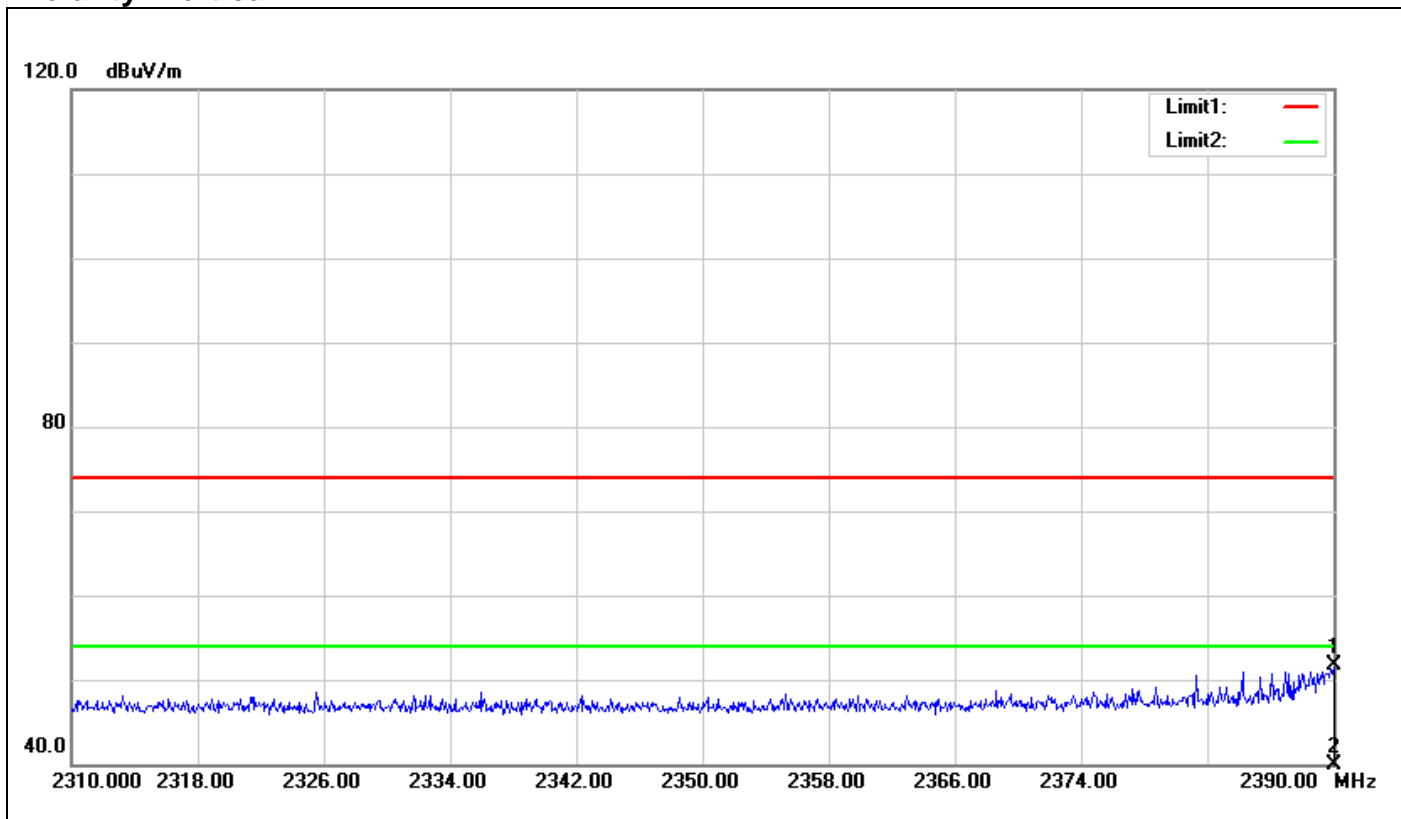
**Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2483.648	65.09	-1.99	63.10	74.00	-10.90	100	91	peak
2	2483.648	40.89	-1.99	38.90	54.00	-15.10	100	91	AVG

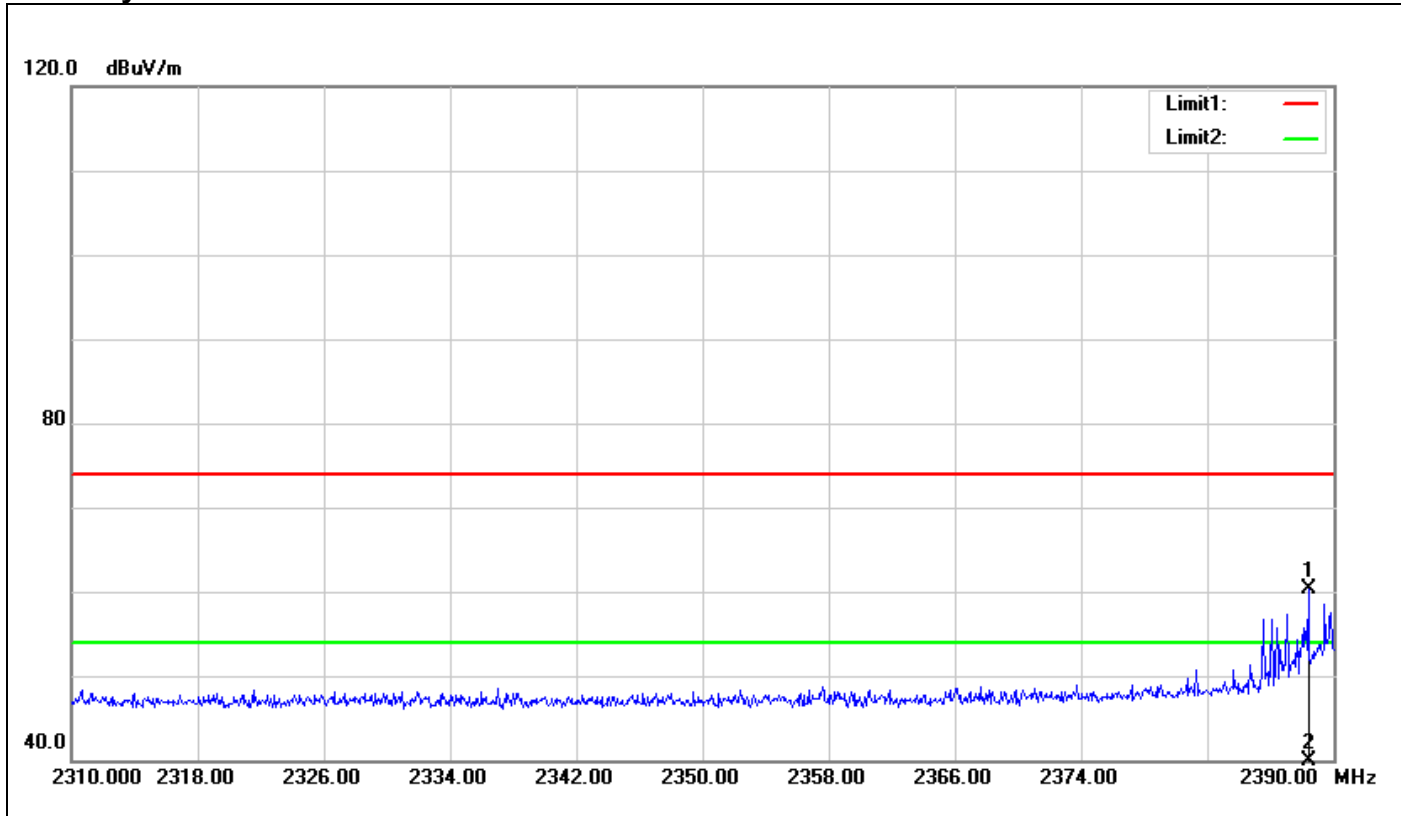
**Band Edges (IEEE 802.11n HT 20 MHz mode / CH Low)**

**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2390.000	54.15	-2.49	51.66	74.00	-22.34	100	17	peak
2	2390.000	38.92	-2.49	36.43	54.00	-17.57	100	17	AVG

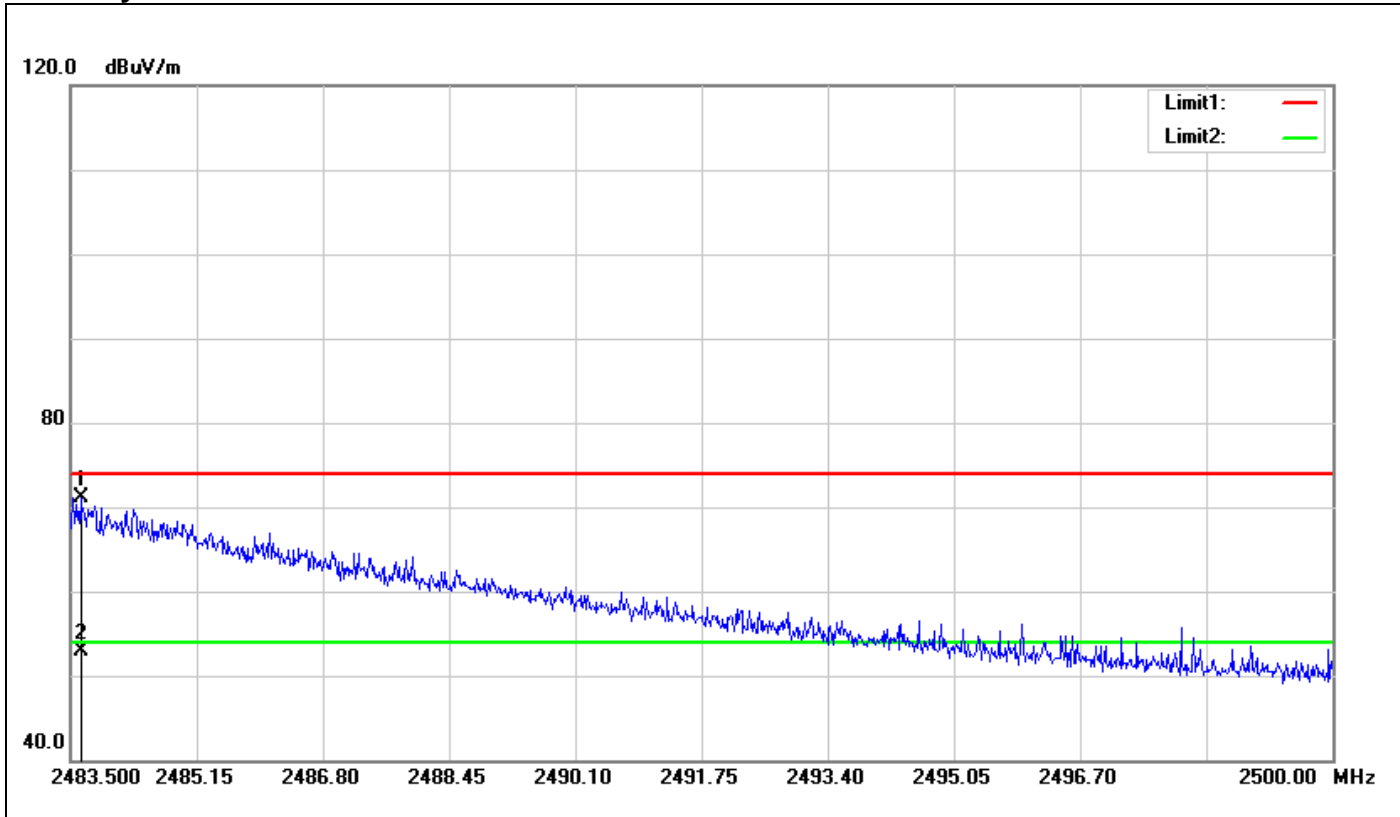
**Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2388.400	62.77	-2.50	60.27	74.00	-13.73	100	175	peak
2	2388.400	40.04	-2.50	37.54	54.00	-16.46	100	175	AVG

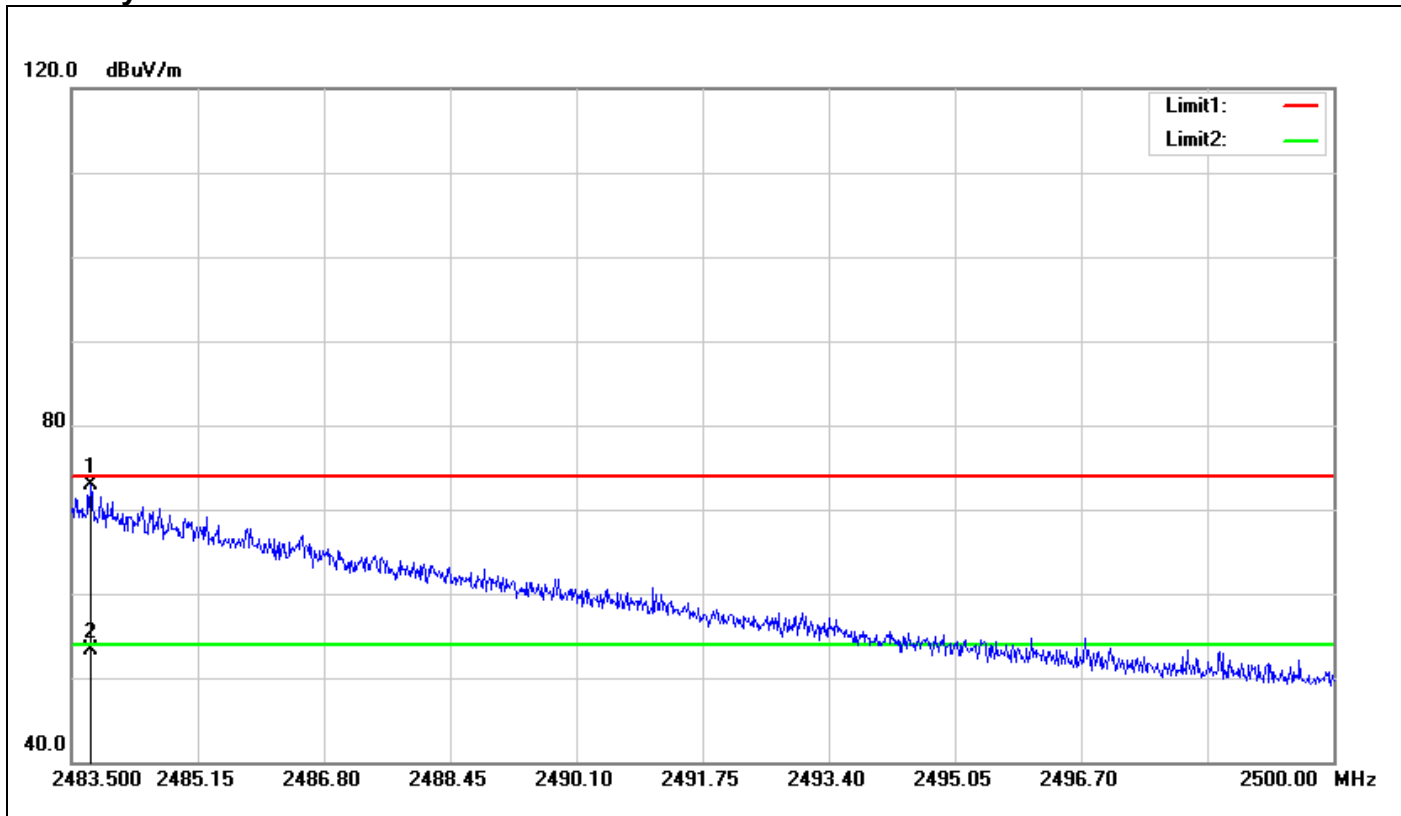
**Band Edges (IEEE 802.11n HT 20 MHz mode / CH High)**

**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2483.632	73.03	-1.99	71.04	74.00	-2.96	100	18	peak
2	2483.632	54.96	-1.99	52.97	54.00	-1.03	100	18	AVG

**Polarity: Horizontal**

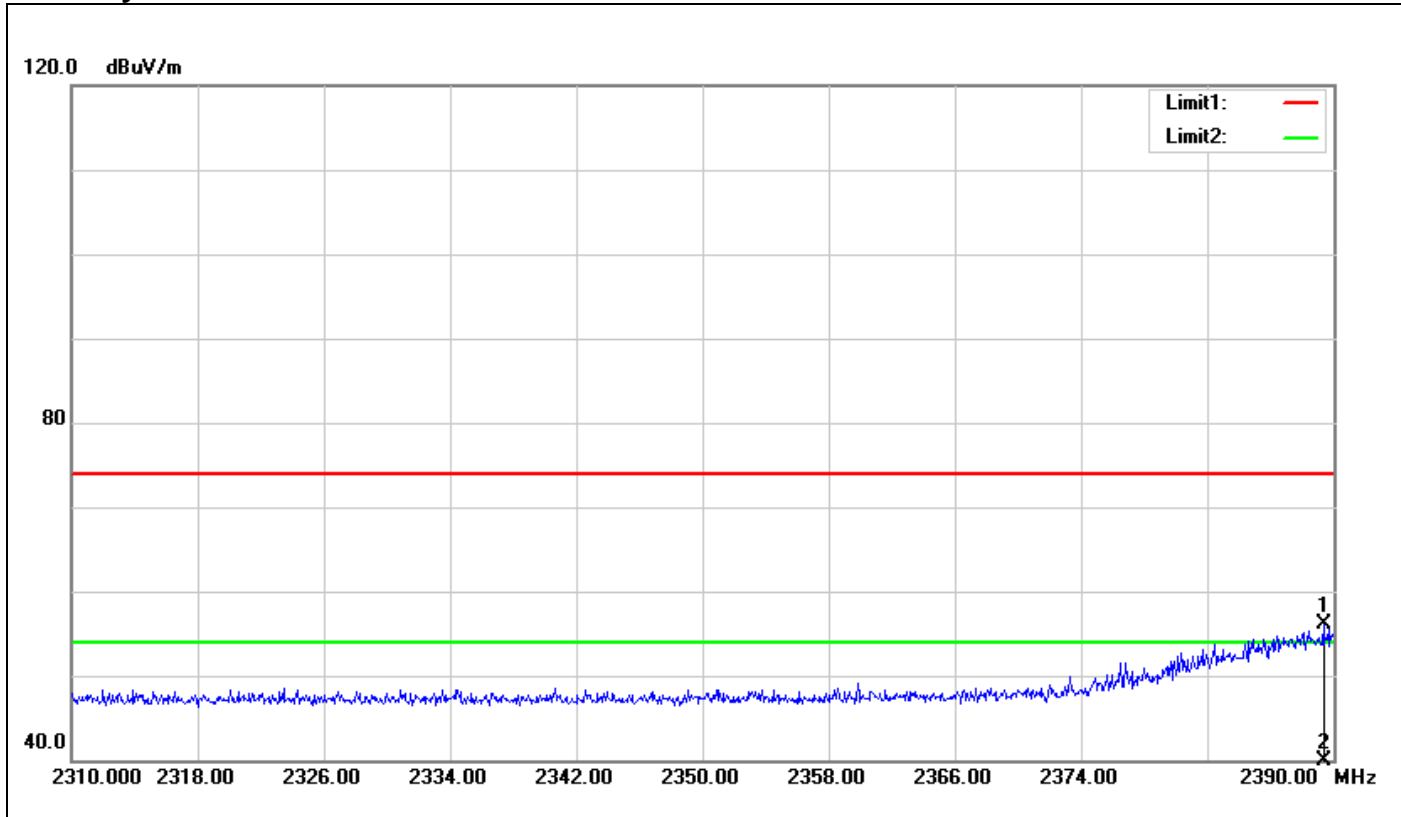


No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2483.747	74.83	-1.99	72.84	74.00	-1.16	100	186	peak
2	2483.747	55.32	-1.99	53.33	54.00	-0.67	100	186	AVG



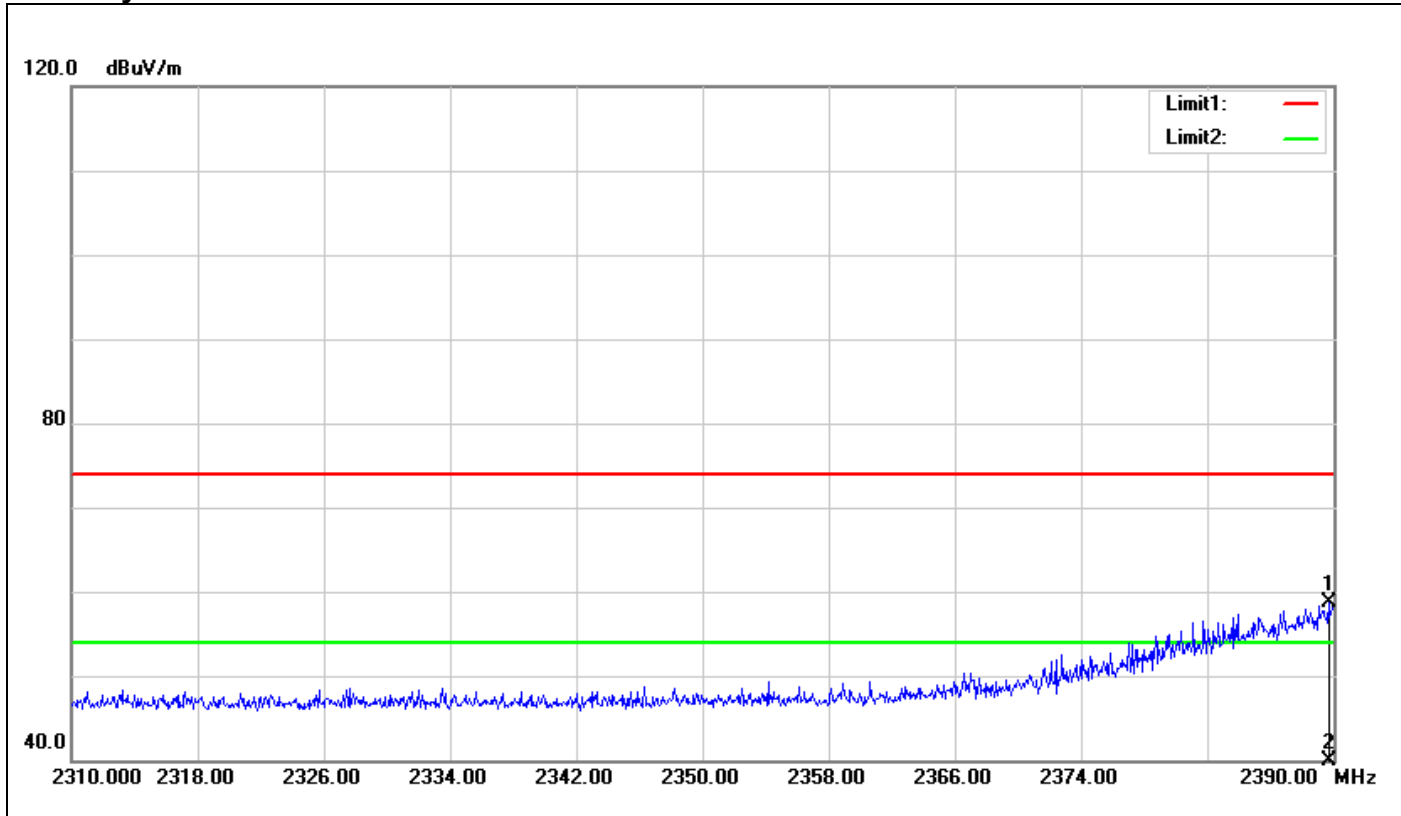
**Band Edges (IEEE 802.11n HT 40 MHz mode / CH Low)**

**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2389.360	58.57	-2.50	56.07	74.00	-17.93	100	298	peak
2	2389.360	40.37	-2.50	37.87	54.00	-16.13	100	298	AVG

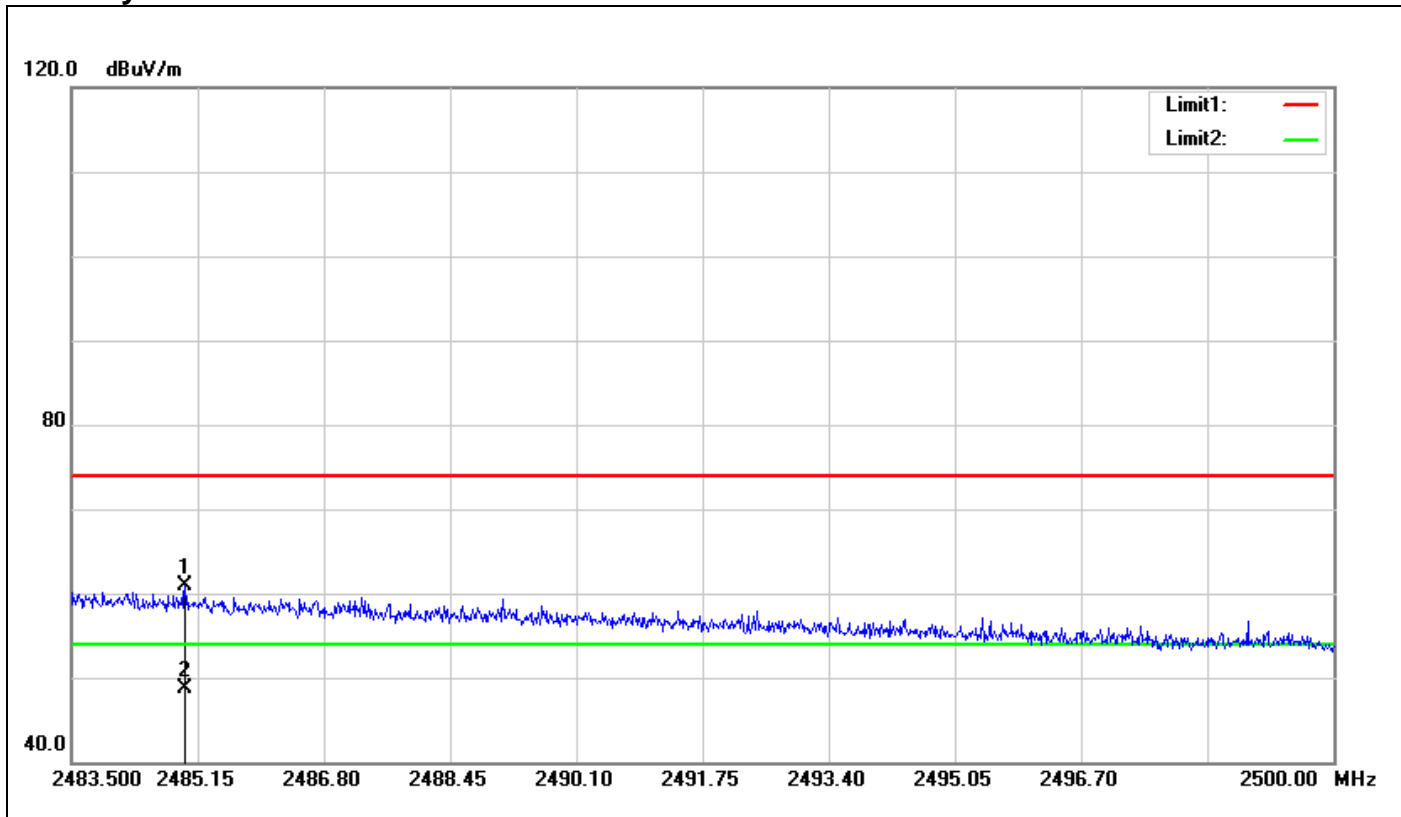
**Polarity: Horizontal**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2389.680	61.14	-2.49	58.65	74.00	-15.35	100	124	peak
2	2389.680	41.92	-2.49	39.43	54.00	-14.57	100	124	AVG

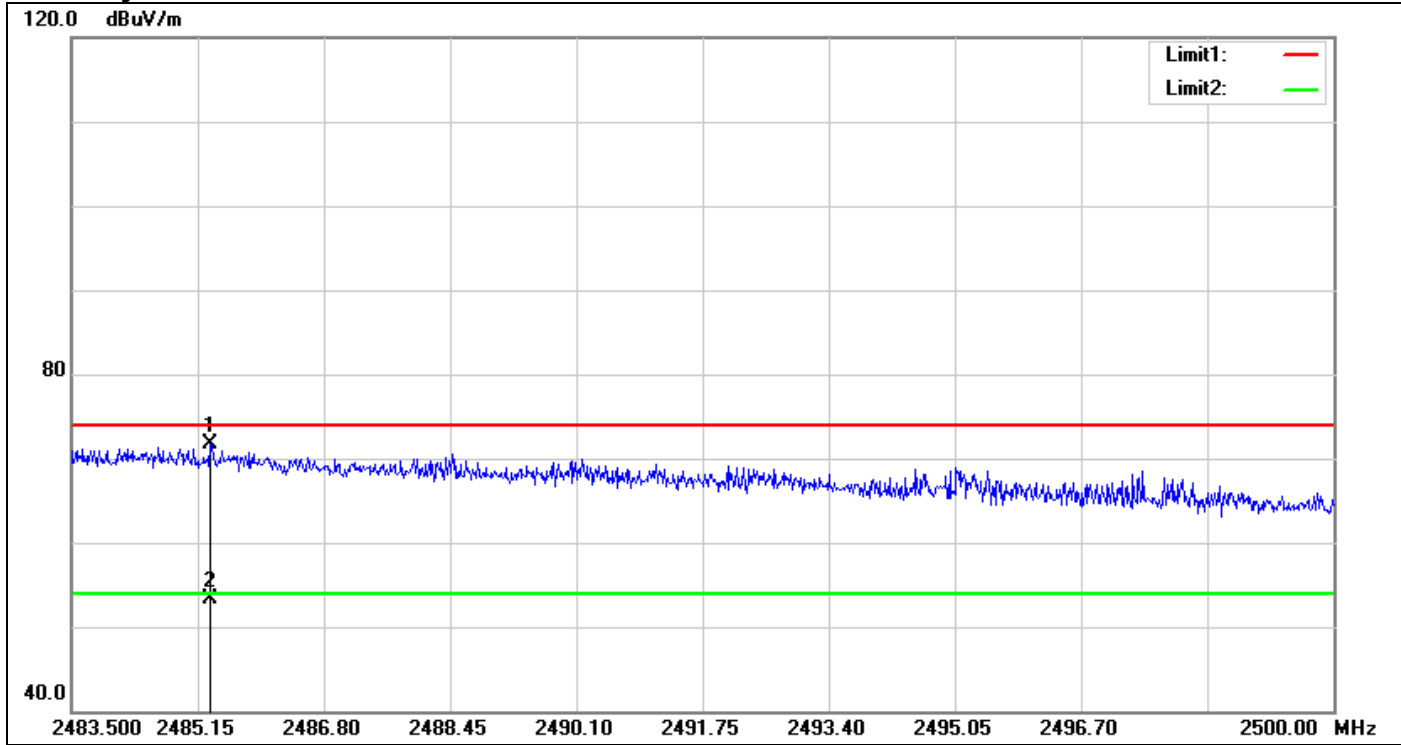
**Band Edges (IEEE 802.11n HT 40 MHz mode / CH High)**

**Polarity: Vertical**



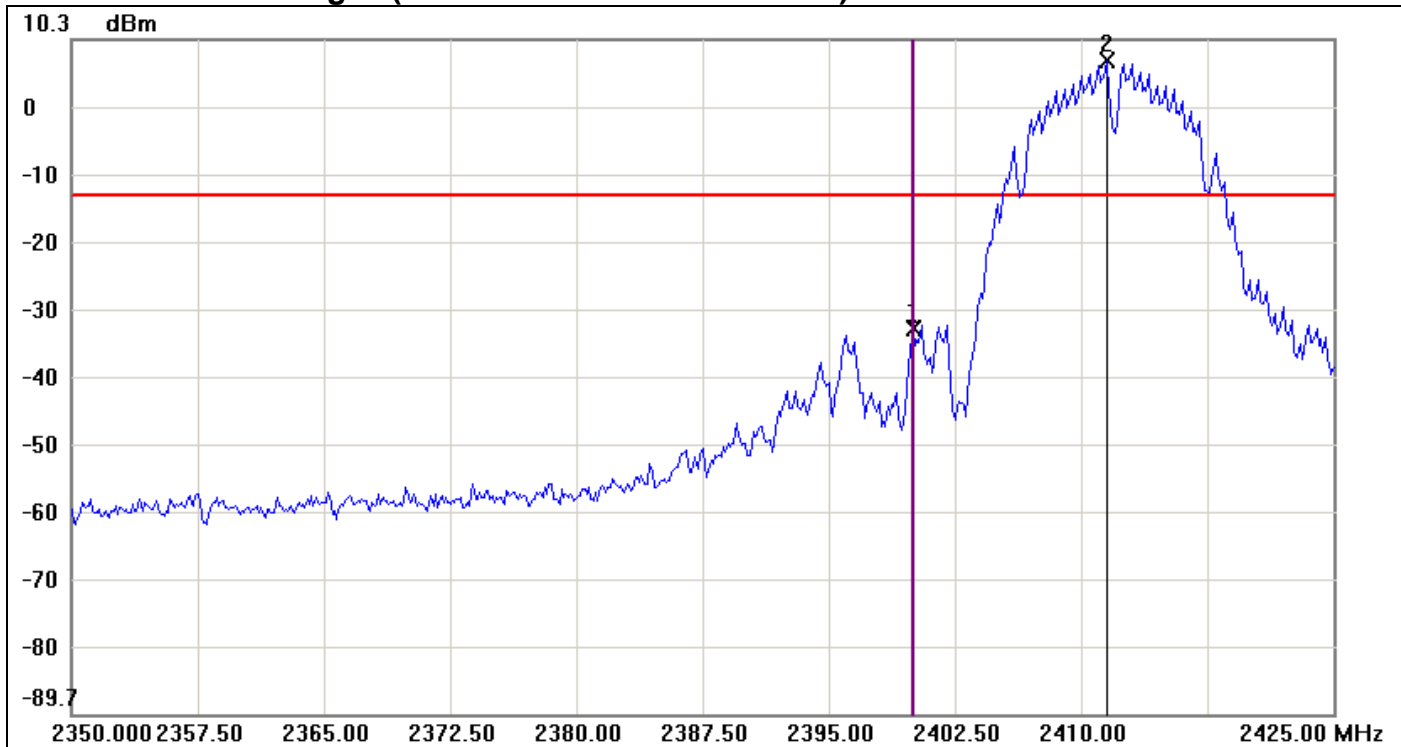
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2484.985	62.88	-1.98	60.90	74.00	-13.10	100	307	peak
2	2484.985	50.78	-1.98	48.80	54.00	-5.20	100	307	AVG

**Polarity: Horizontal**



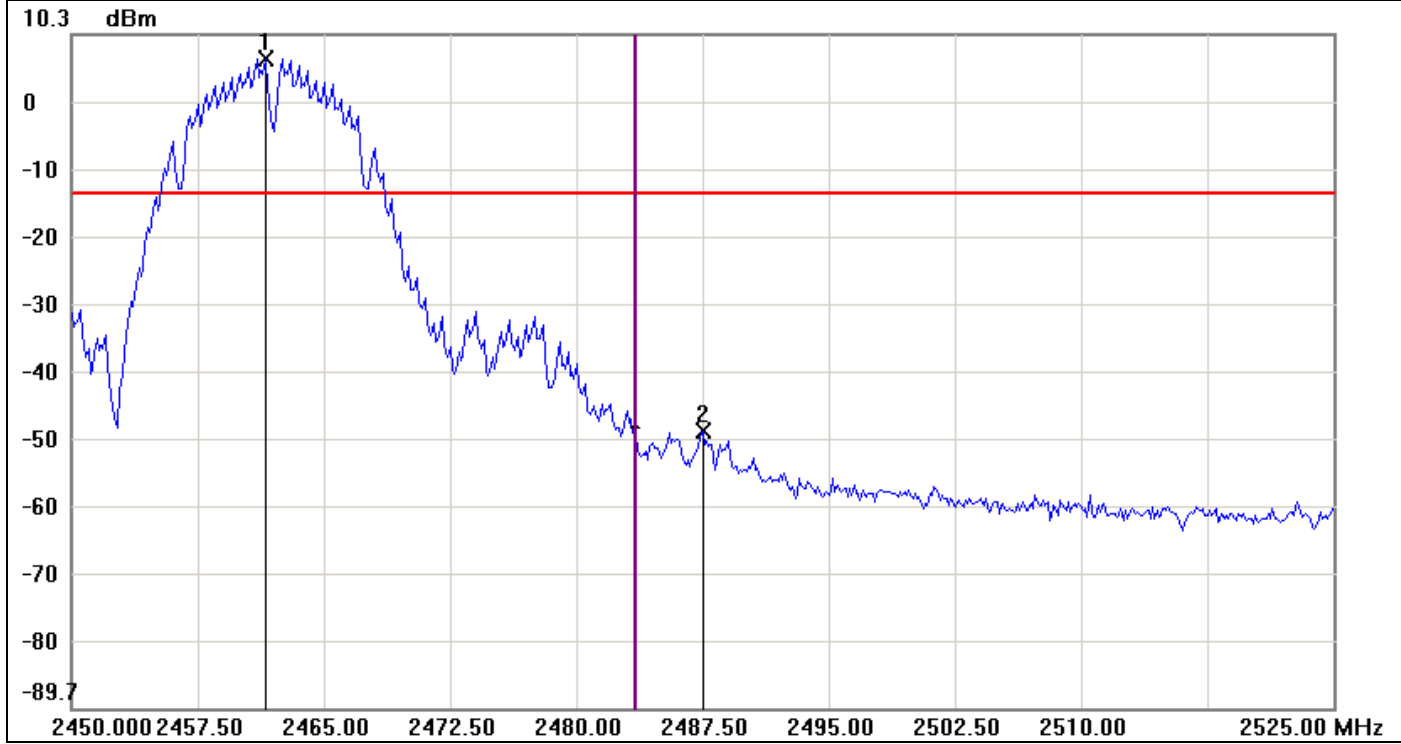
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2485.315	73.75	-1.98	71.77	74.00	-2.23	100	98	peak
2	2485.315	55.19	-1.98	53.21	54.00	-0.79	100	98	AVG

**Test Plot**  
**Conducted Band Edges (IEEE 802.11b mode / CH Low)**



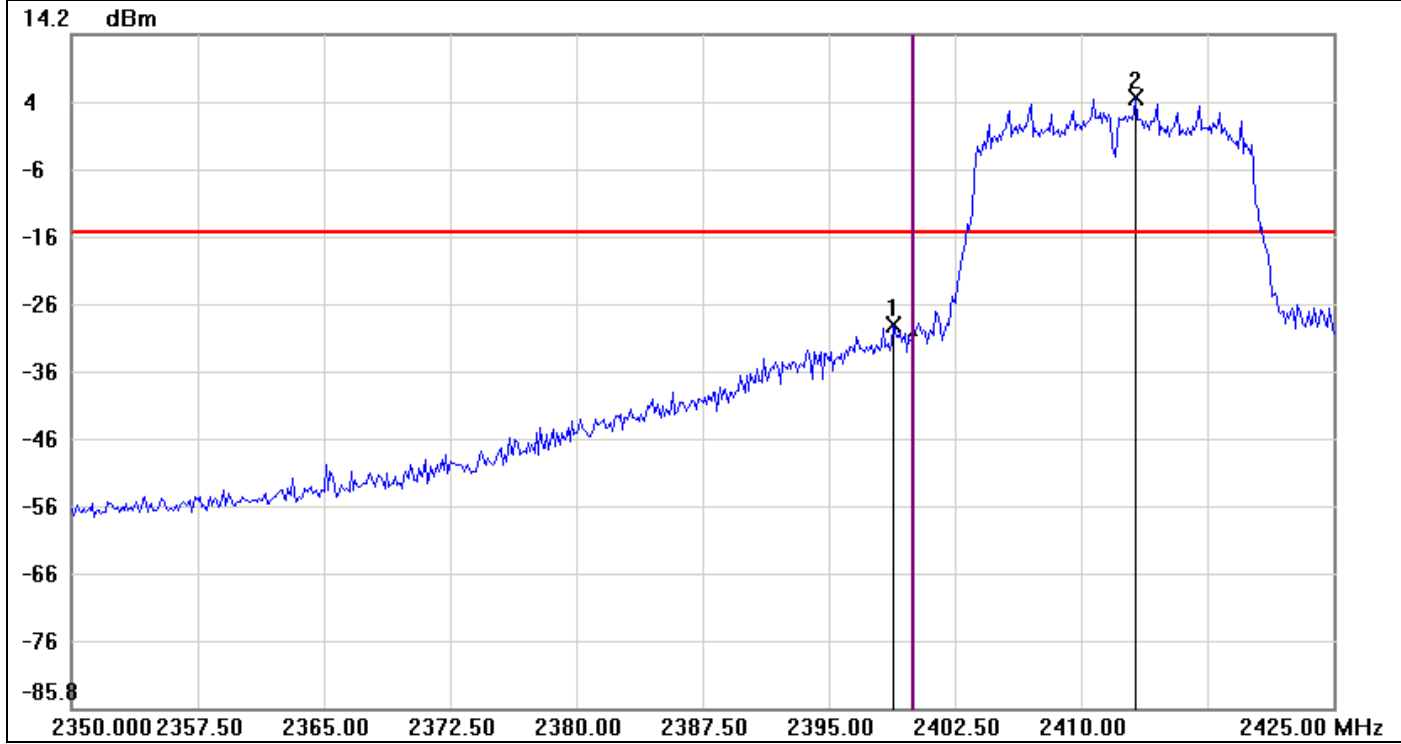
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2400.0000	-32.69	-12.89	-19.80
2	2411.5000	7.11	-12.89	20.00

**Conducted Band Edges (IEEE 802.11b mode / CH High)**



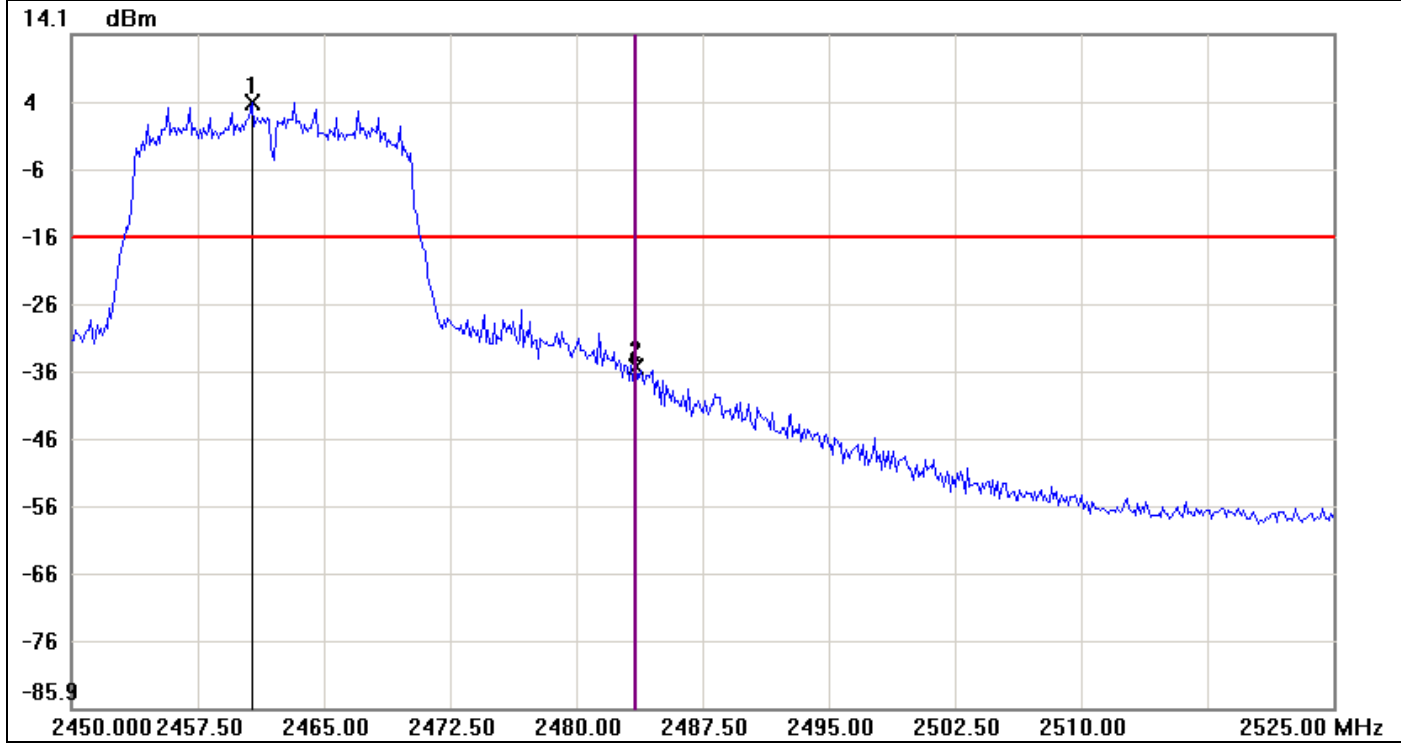
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2461.5000	6.79	-13.21	20.00
2	2487.5000	-48.55	-13.21	-35.34

**Conducted Band Edges (IEEE 802.11g mode / CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2398.8750	-28.97	-15.26	-13.71
2	2413.2500	4.74	-15.26	20.00

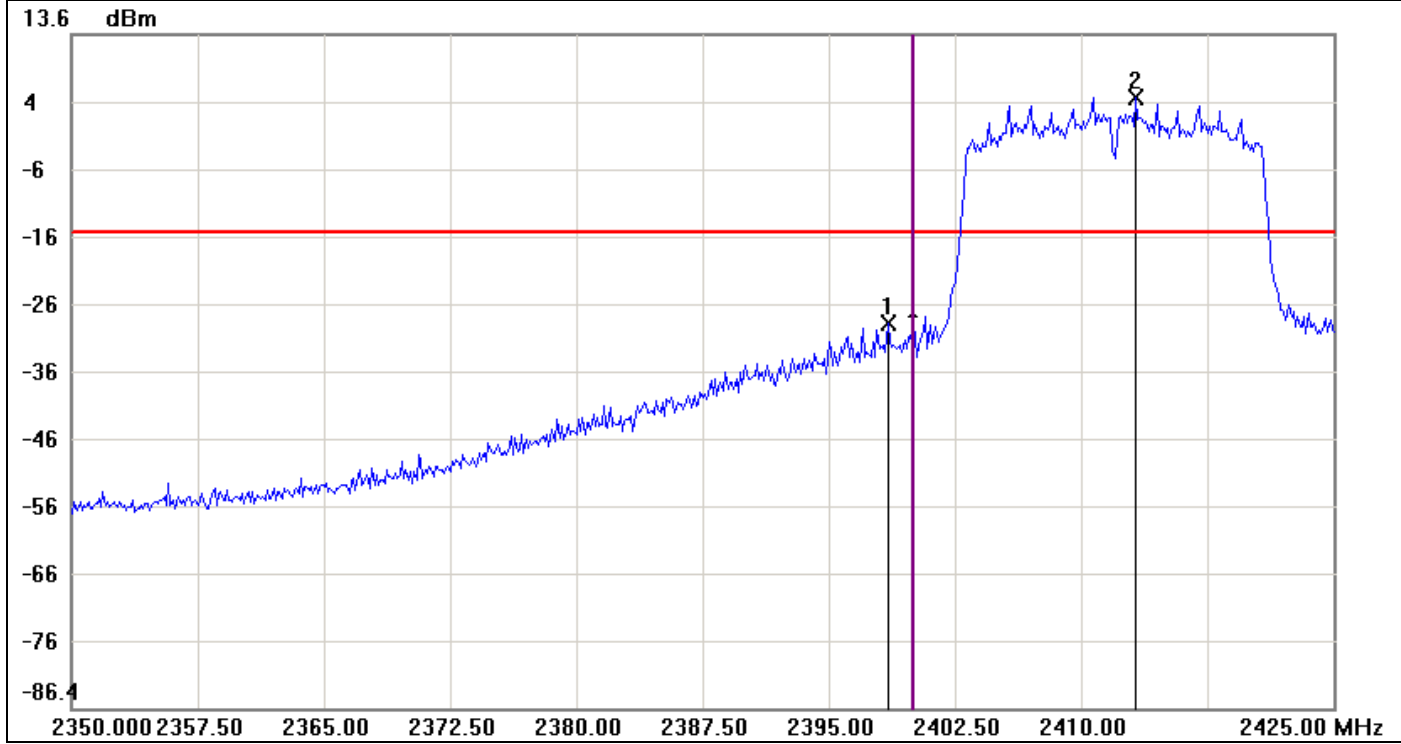
**Conducted Band Edges (IEEE 802.11g mode / CH High)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2460.7500	4.11	-15.89	20.00
2	2483.5000	-35.23	-15.89	-19.34

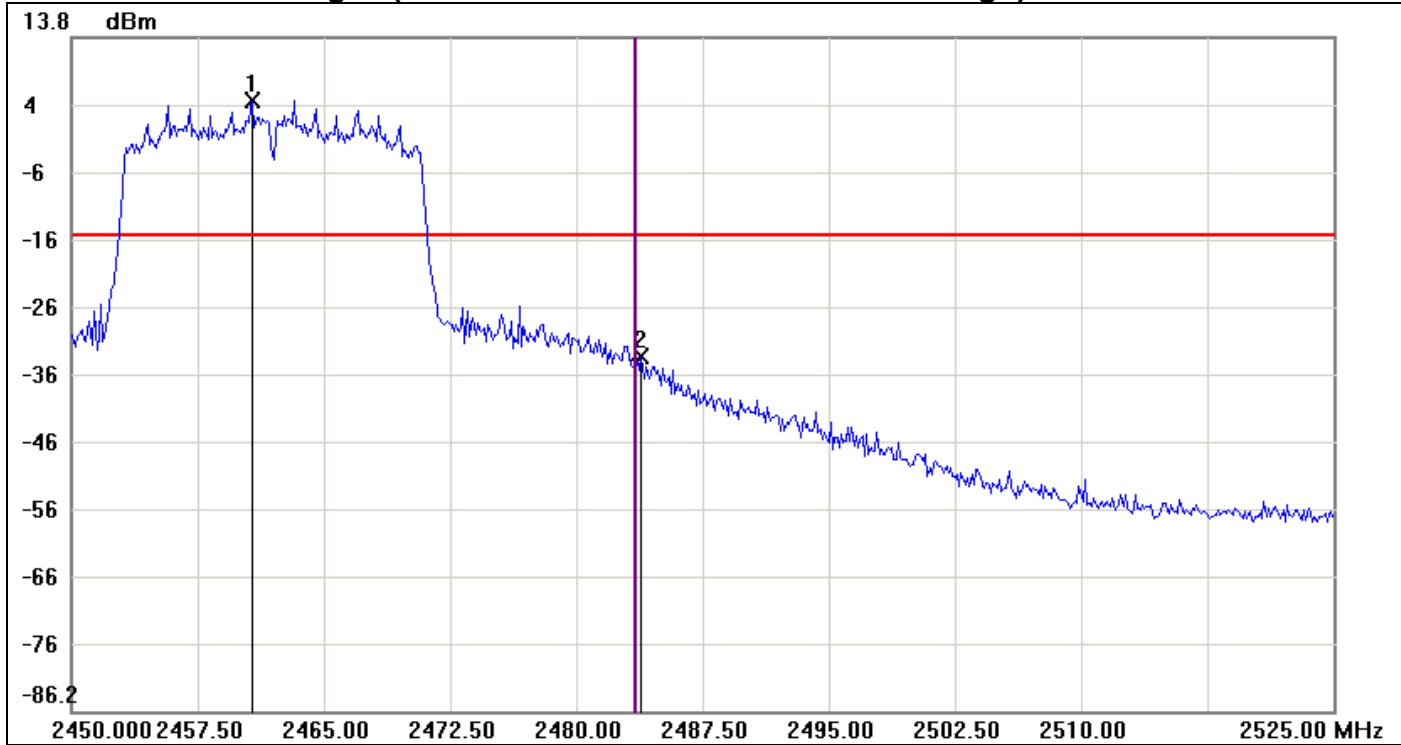


**Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / CH Low)**



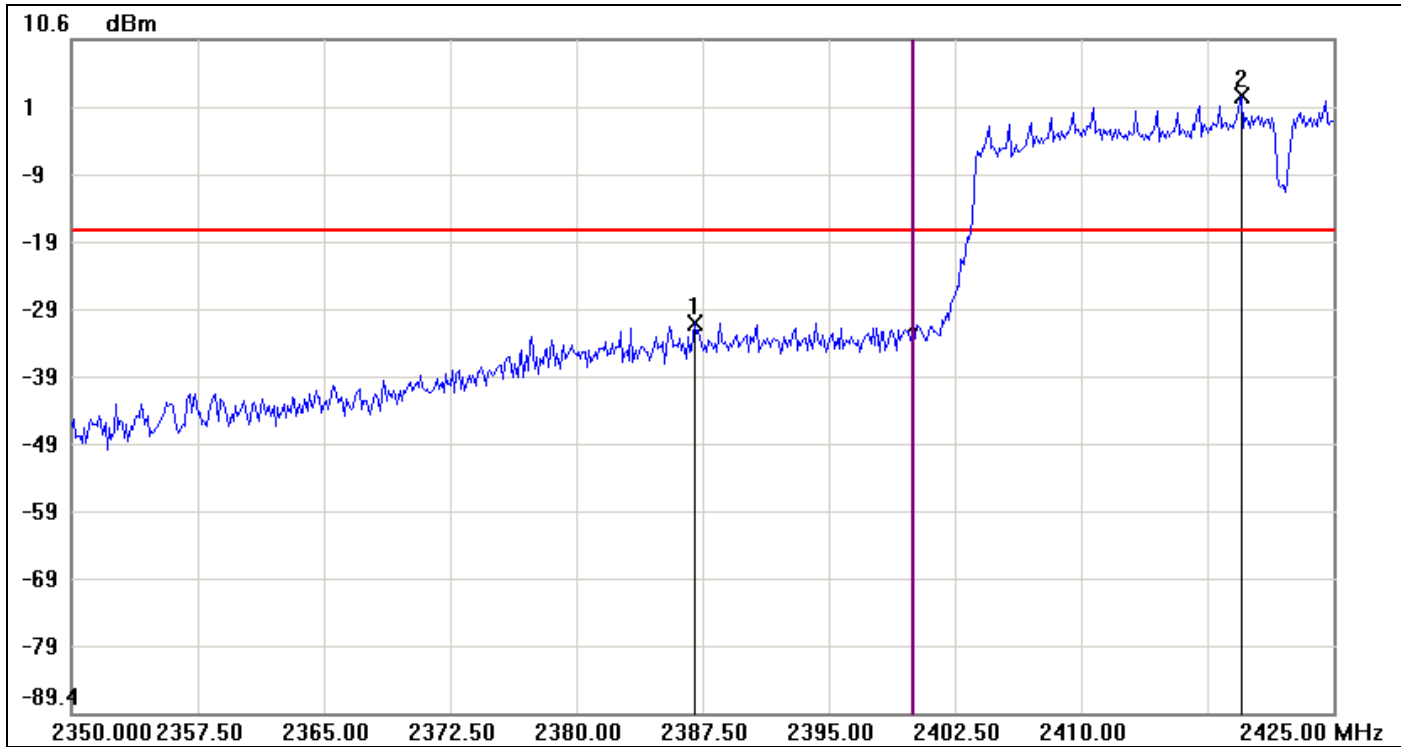
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2398.5000	-29.27	-15.81	-13.46
2	2413.2500	4.19	-15.81	20.00

**Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / CH High)**



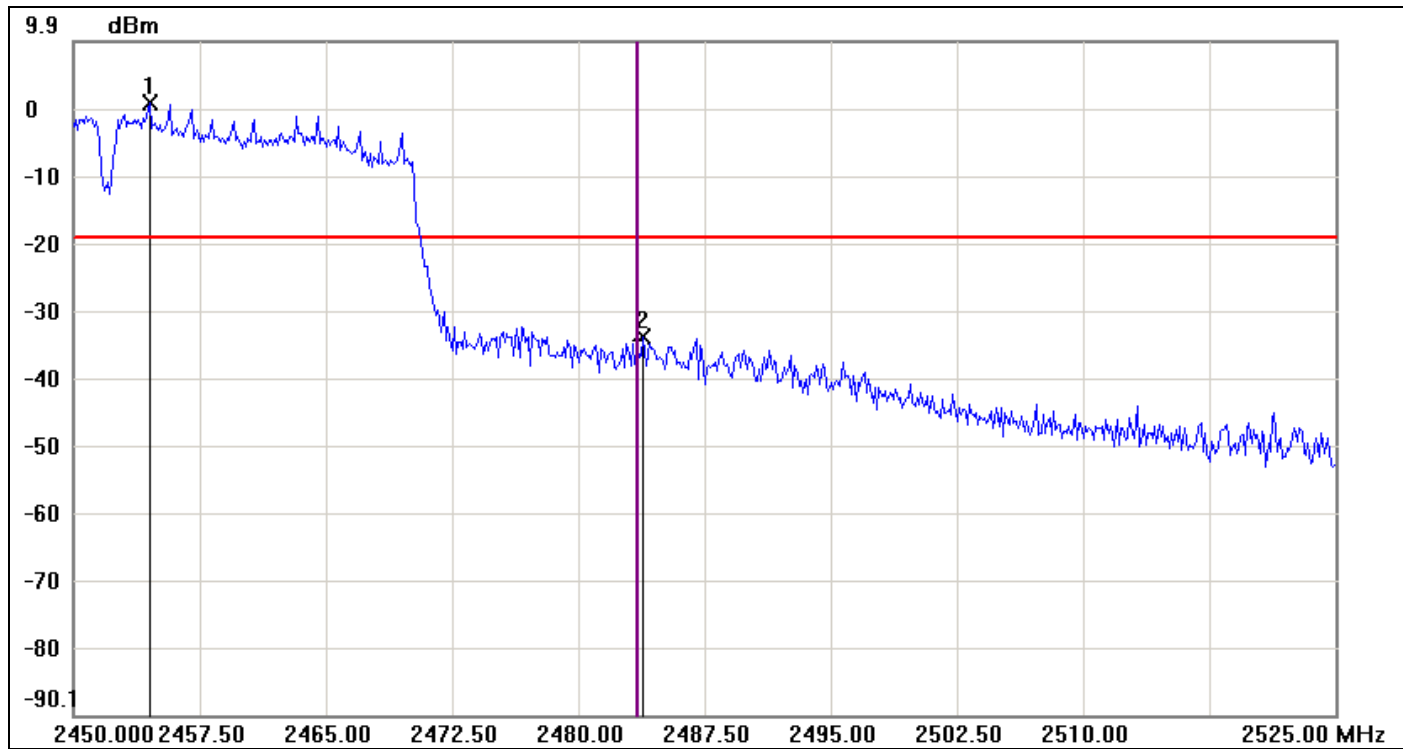
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2460.7500	4.38	-15.62	20.00
2	2483.8750	-33.51	-15.62	-17.89

**Conducted Band Edges (IEEE 802.11n HT 40 MHz mode / CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2387.0000	-31.48	-17.90	-13.58
2	2419.5000	2.10	-17.90	20.00

**Conducted Band Edges (IEEE 802.11n HT 40 MHz mode / CH High)**



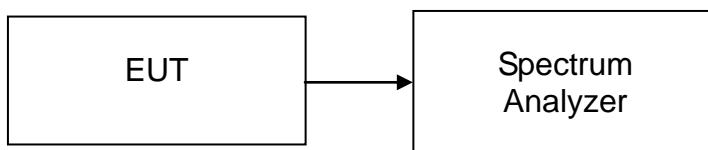
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2454.5000	0.77	-19.23	20.00
2	2483.8750	-33.94	-19.23	-14.71

## 7.6 PEAK POWER SPECTRAL DENSITY

### LIMIT

1. According to §15.247(e) & RSS-247, 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.
2. According to §15.247(f) & RSS-247, the digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode. 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 = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep time = 100 s
3. Record the max reading.
4. Repeat the above procedure until the measurements for all frequencies are completed.

### TEST RESULTS

*No non-compliance noted*

**Test Data**

**Test mode: IEEE 802.11b mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-1.70	8.00	PASS
Mid	2437	-1.22		PASS
High	2462	-0.68		PASS

**Test mode: IEEE 802.11g mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-2.78	8.00	PASS
Mid	2437	-2.82		PASS
High	2462	-3.22		PASS

**Test mode: IEEE 802.11n HT 20 MHz mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-3.77	8.00	PASS
Mid	2437	-3.71		PASS
High	2462	-3.00		PASS

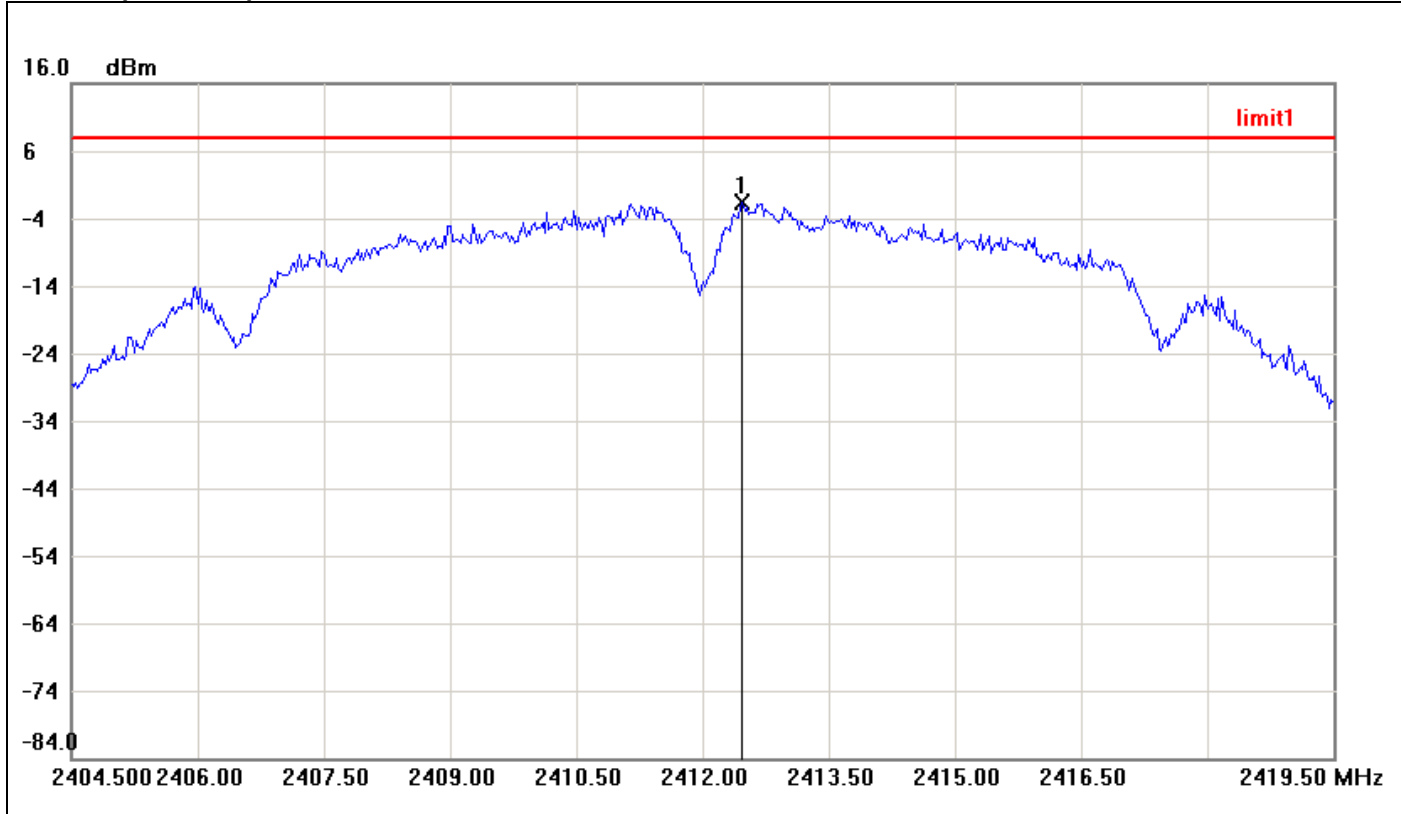
**Test mode: IEEE 802.11n HT 40 MHz mode**

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-5.37	8.00	PASS
Mid	2437	-7.10		PASS
High	2452	-7.12		PASS

**Test Plot**

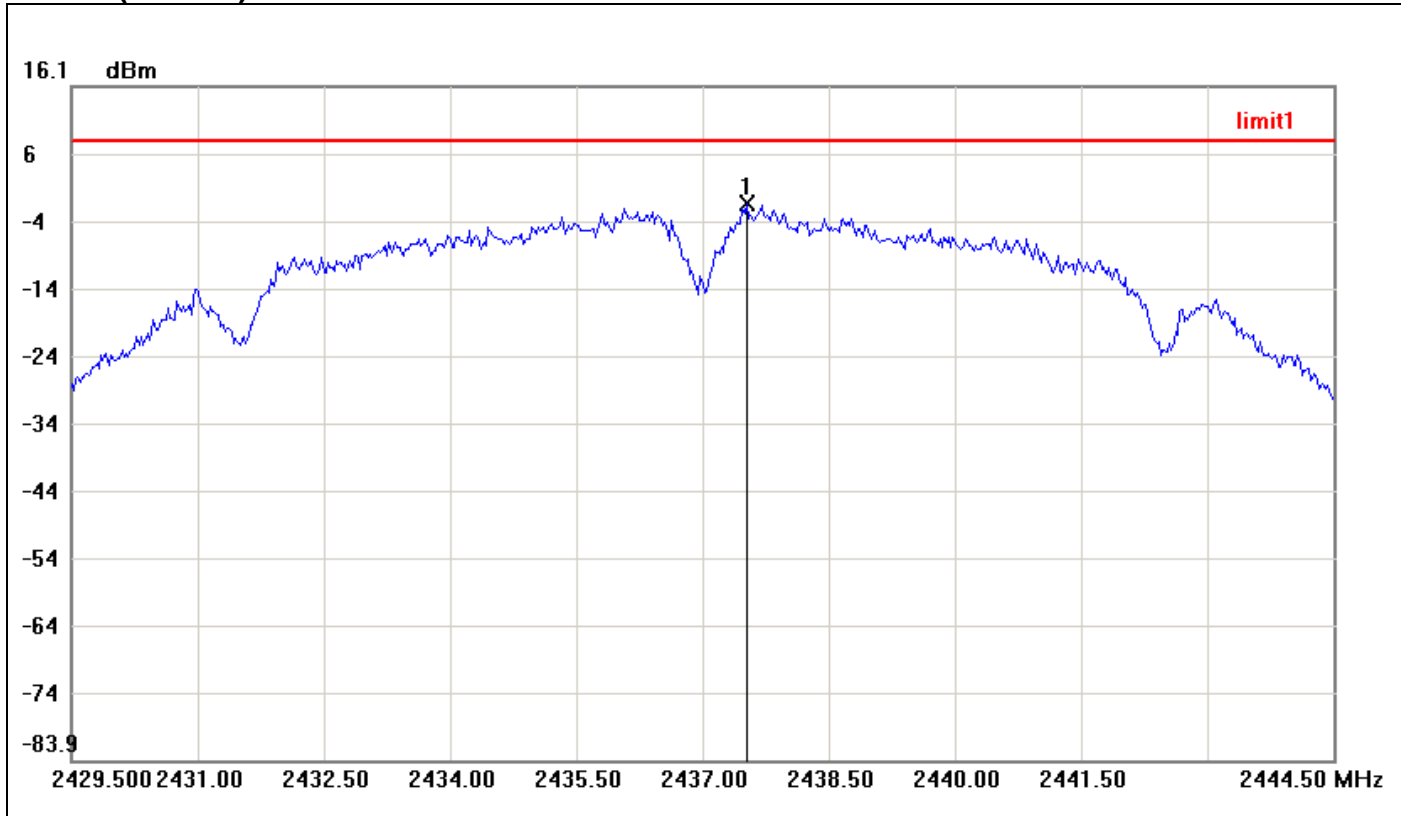
**IEEE 802.11b mode**

**PPSD (CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2412.4750	-1.70	8.00	-9.70

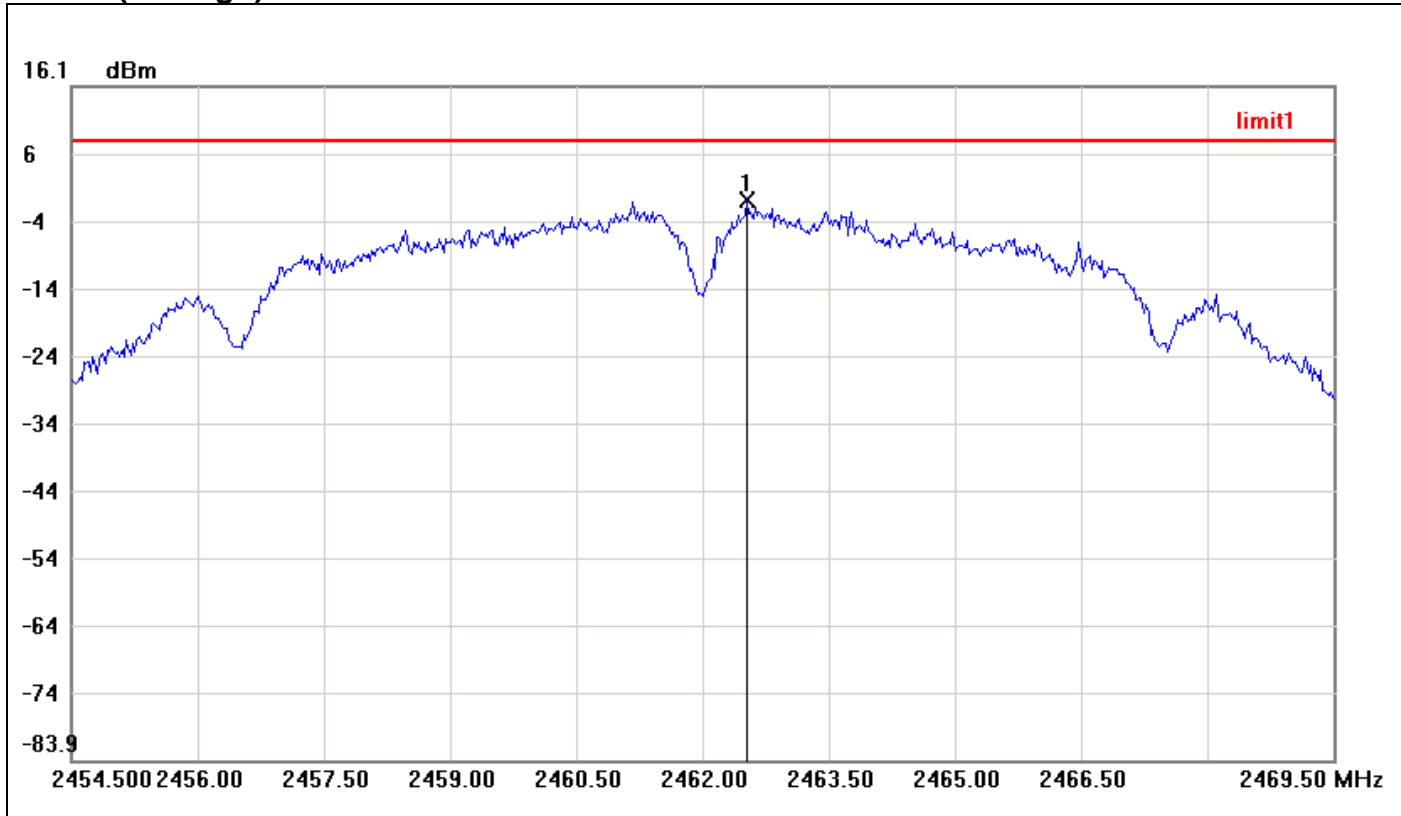
**PPSD (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2437.5250	-1.22	8.00	-9.22



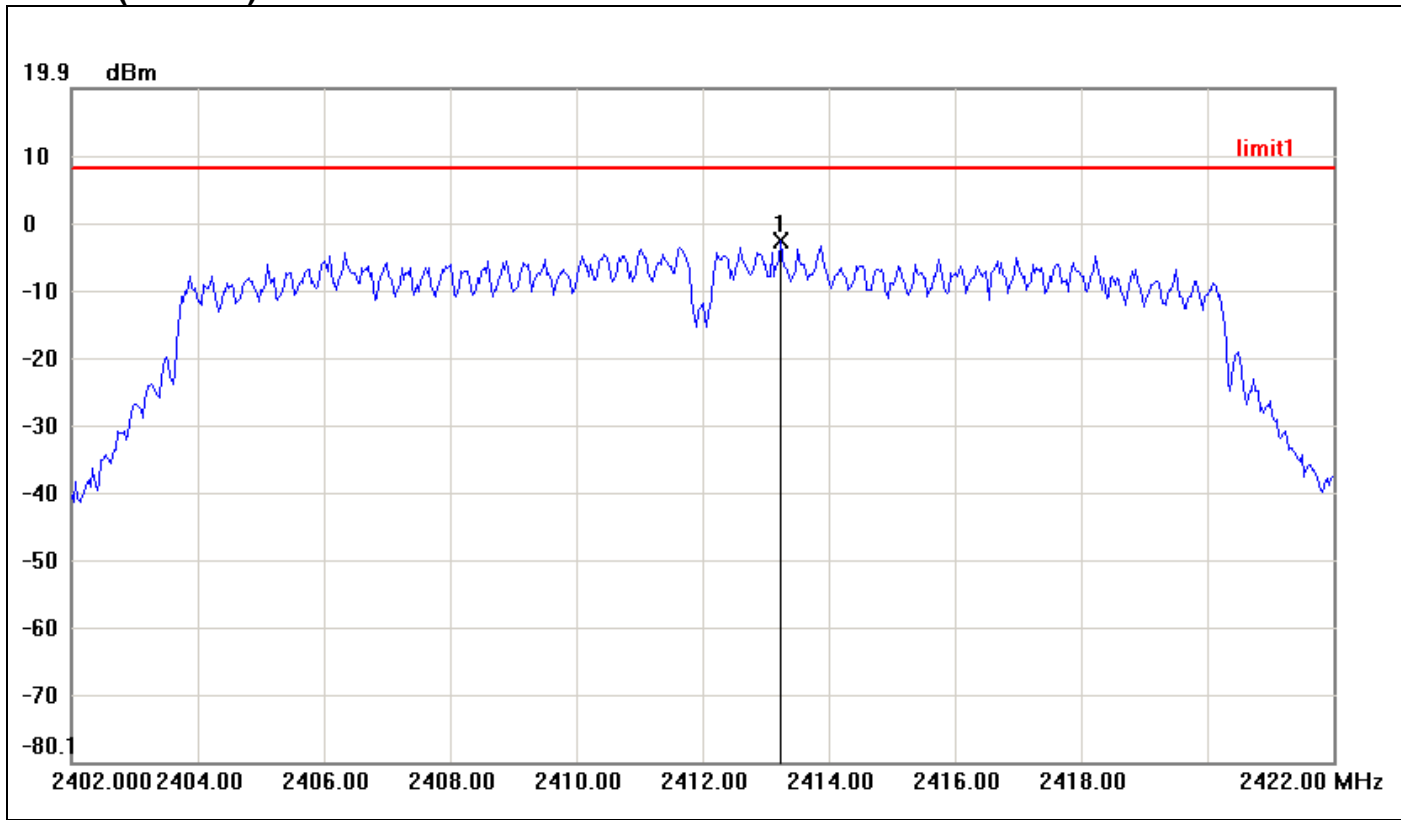
**PPSD (CH High)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2462.5250	-0.68	8.00	-8.68

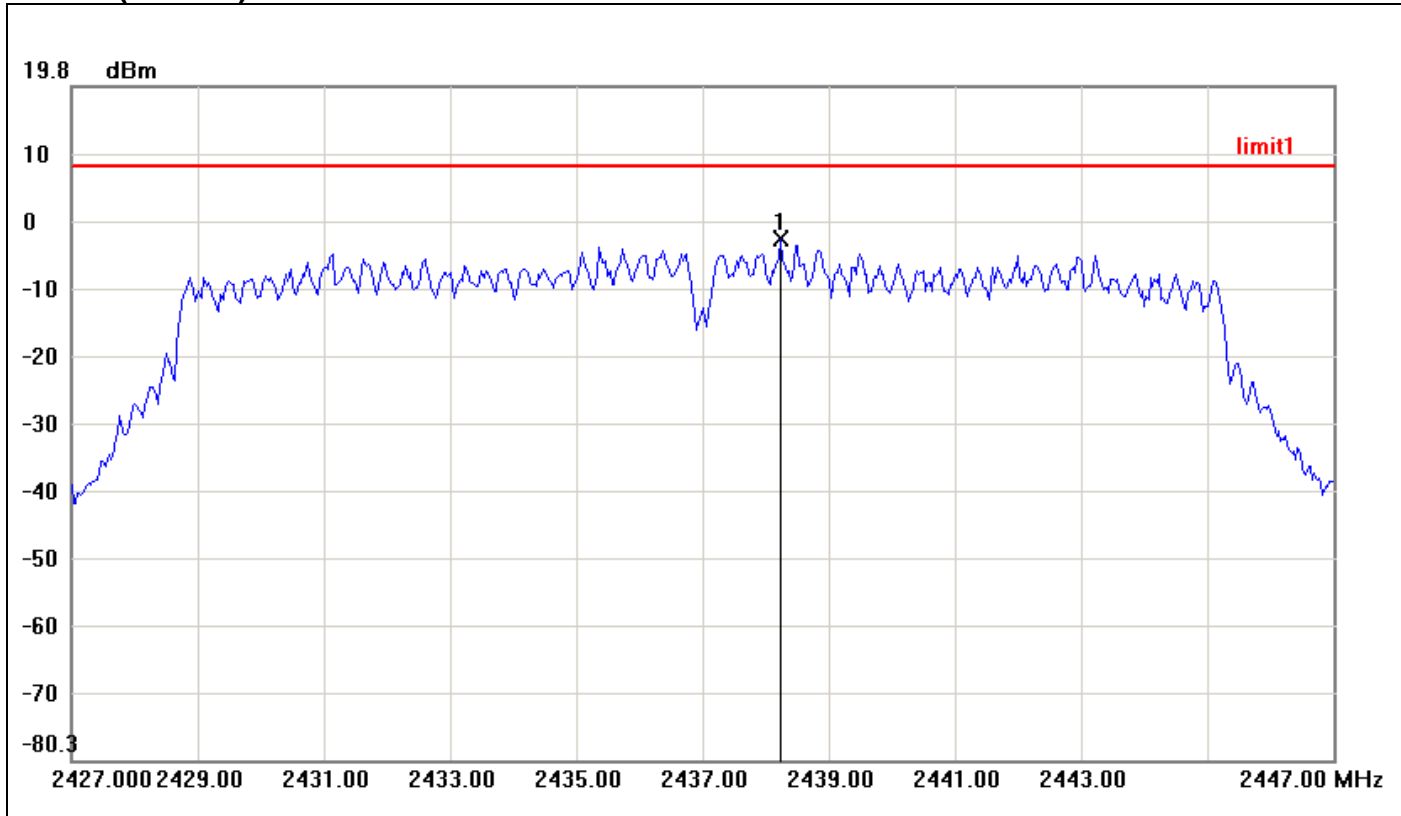
**IEEE 802.11g mode**

**PPSD (CH Low)**



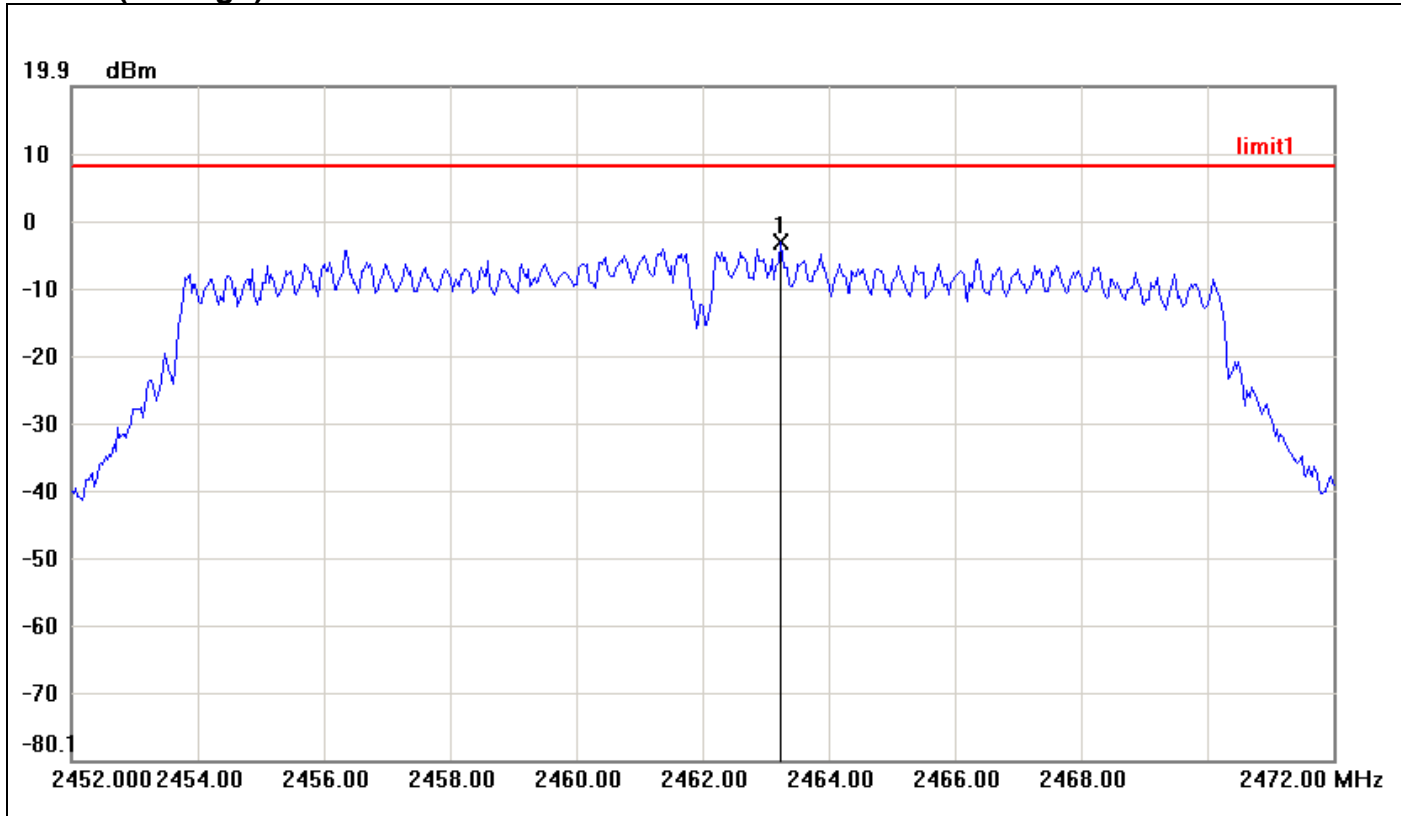
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2413.2333	-2.78	8.00	-10.78

**PPSD (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2438.2333	-2.82	8.00	-10.82

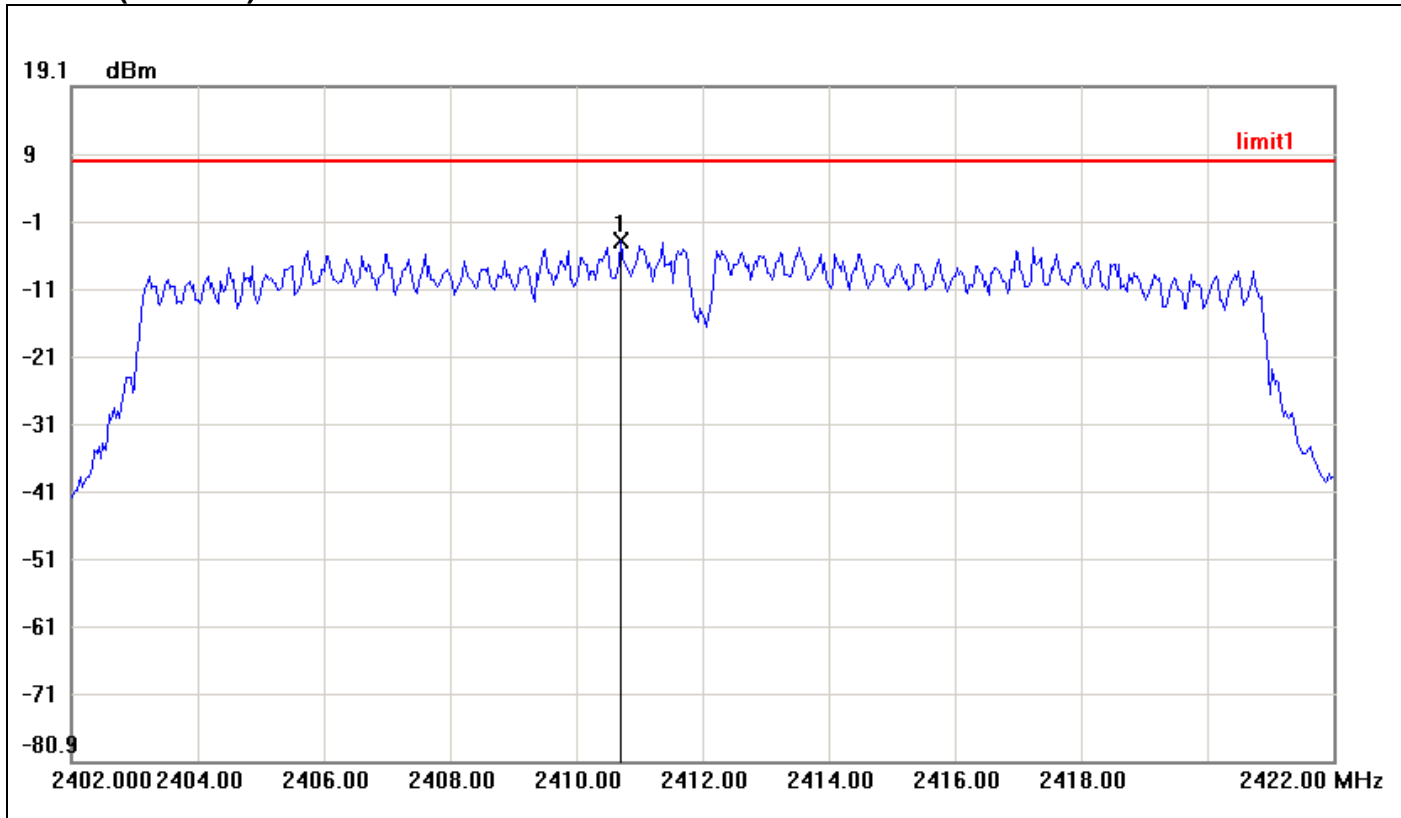
**PPSD (CH High)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.2333	-3.22	8.00	-11.22

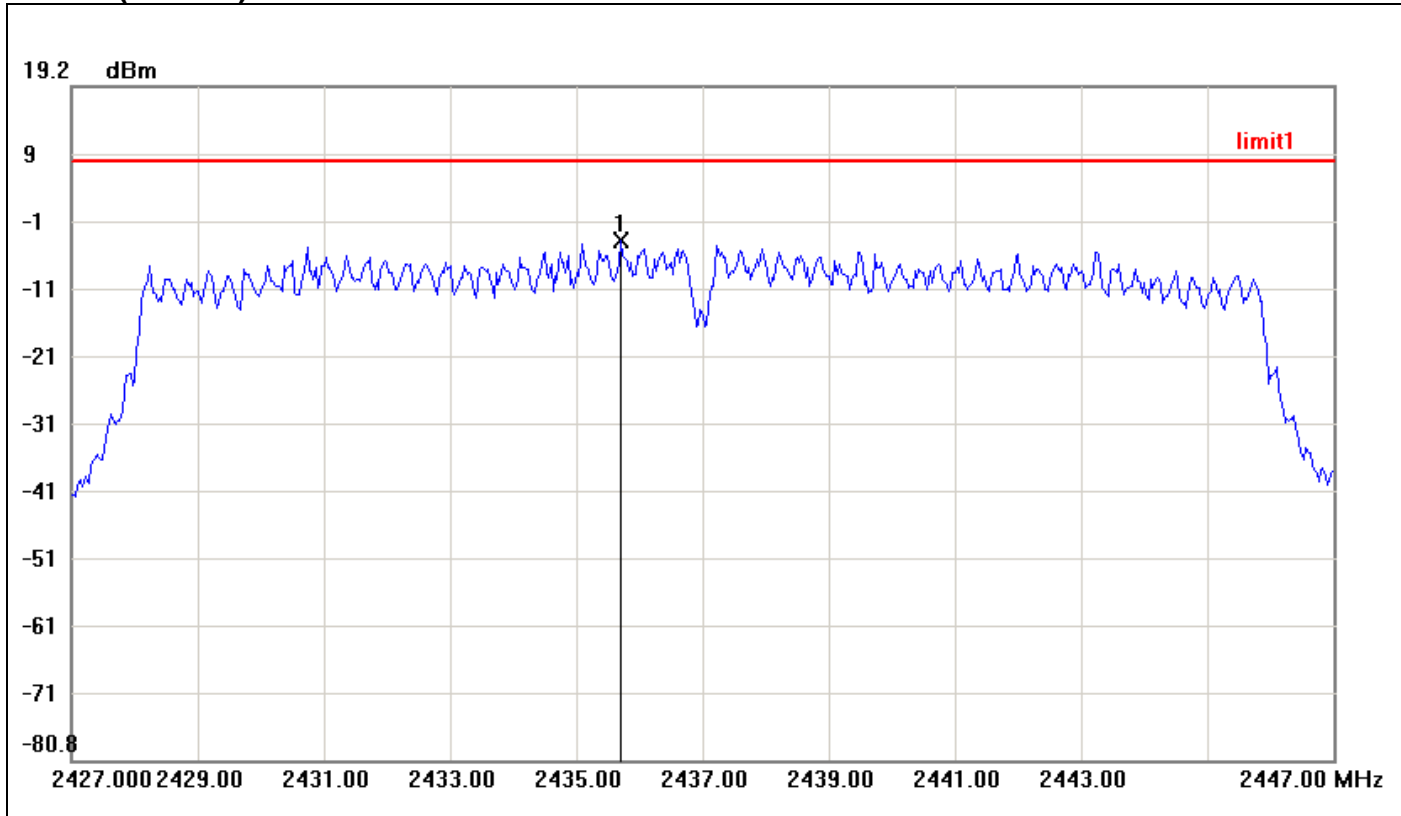
**IEEE 802.11n HT 20 MHz mode**

**PPSD (CH Low)**



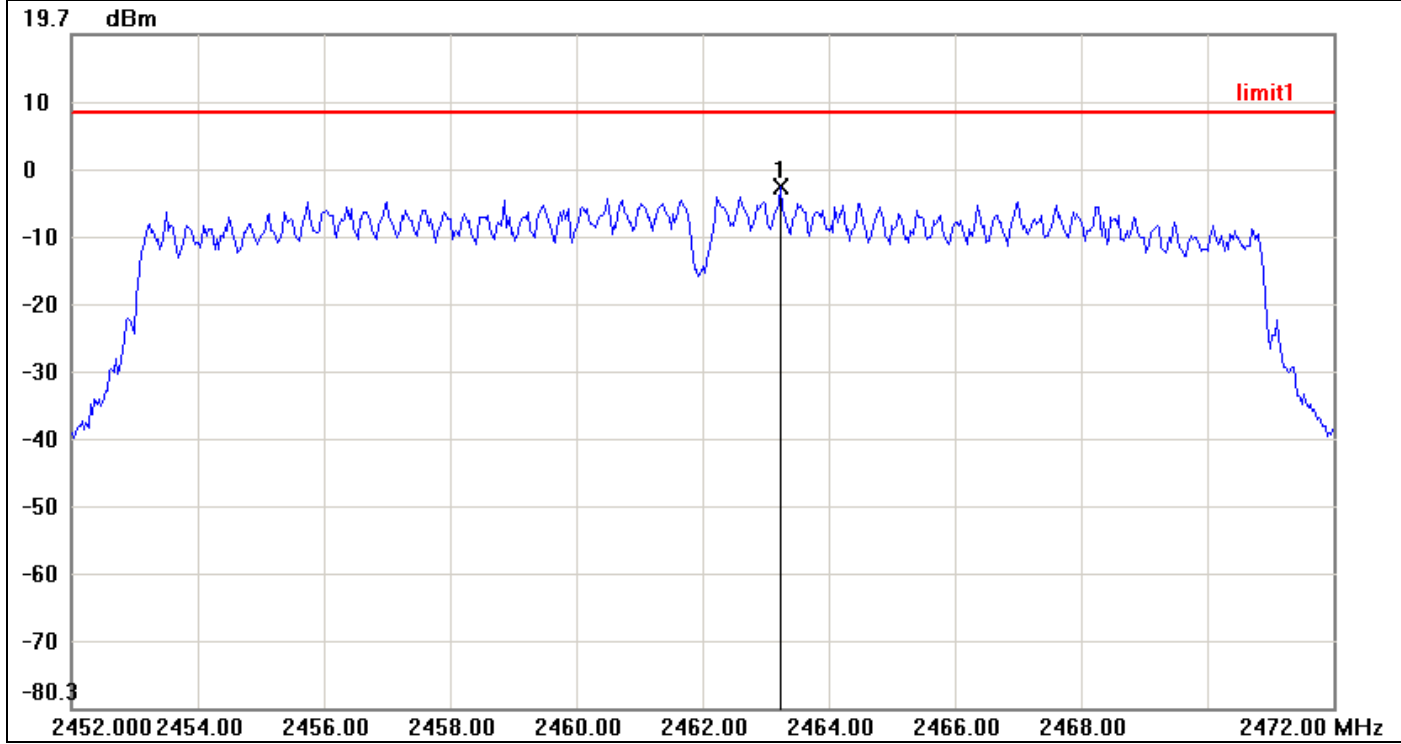
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2410.7000	-3.77	8.00	-11.77

**PPSD (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2435.7000	-3.71	8.00	-11.71

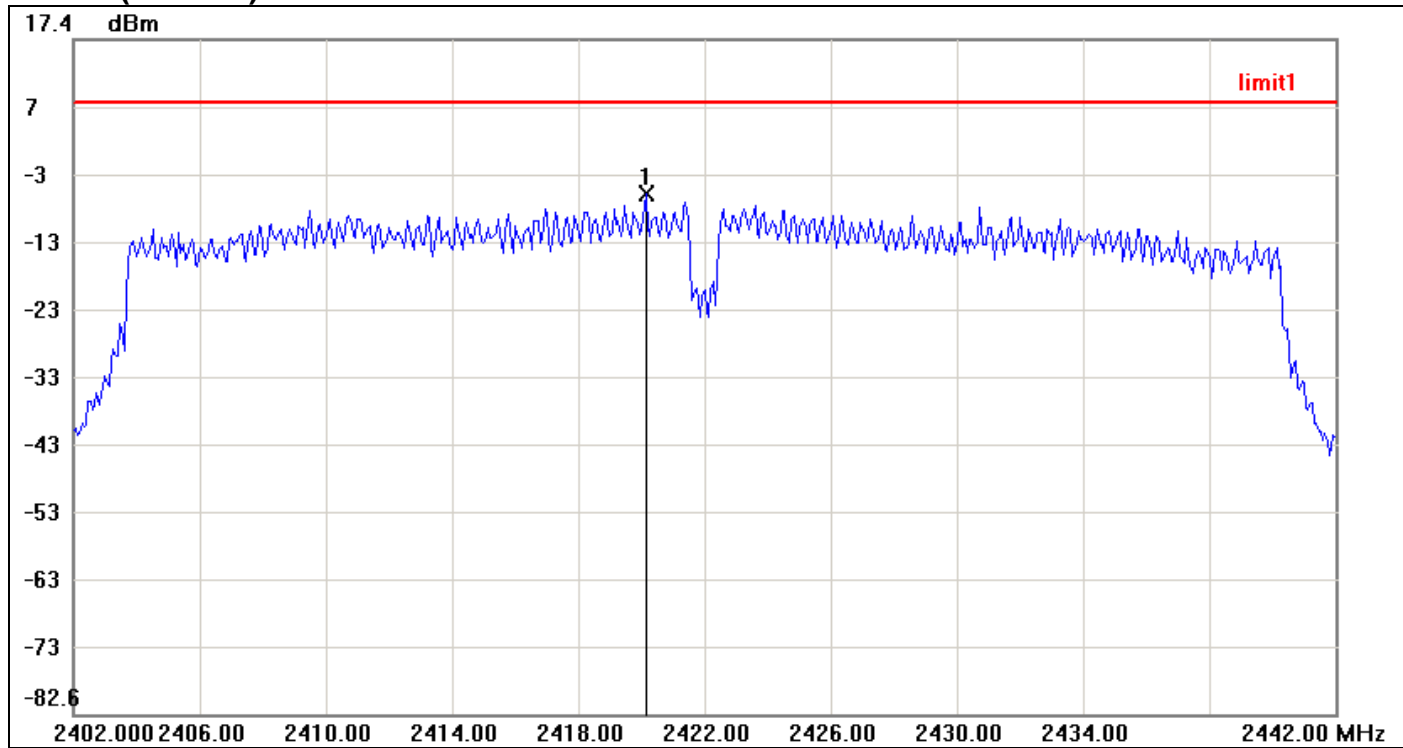
**PPSD (CH High)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.2333	-3.00	8.00	-11.00

**IEEE 802.11n HT 40 MHz mode**

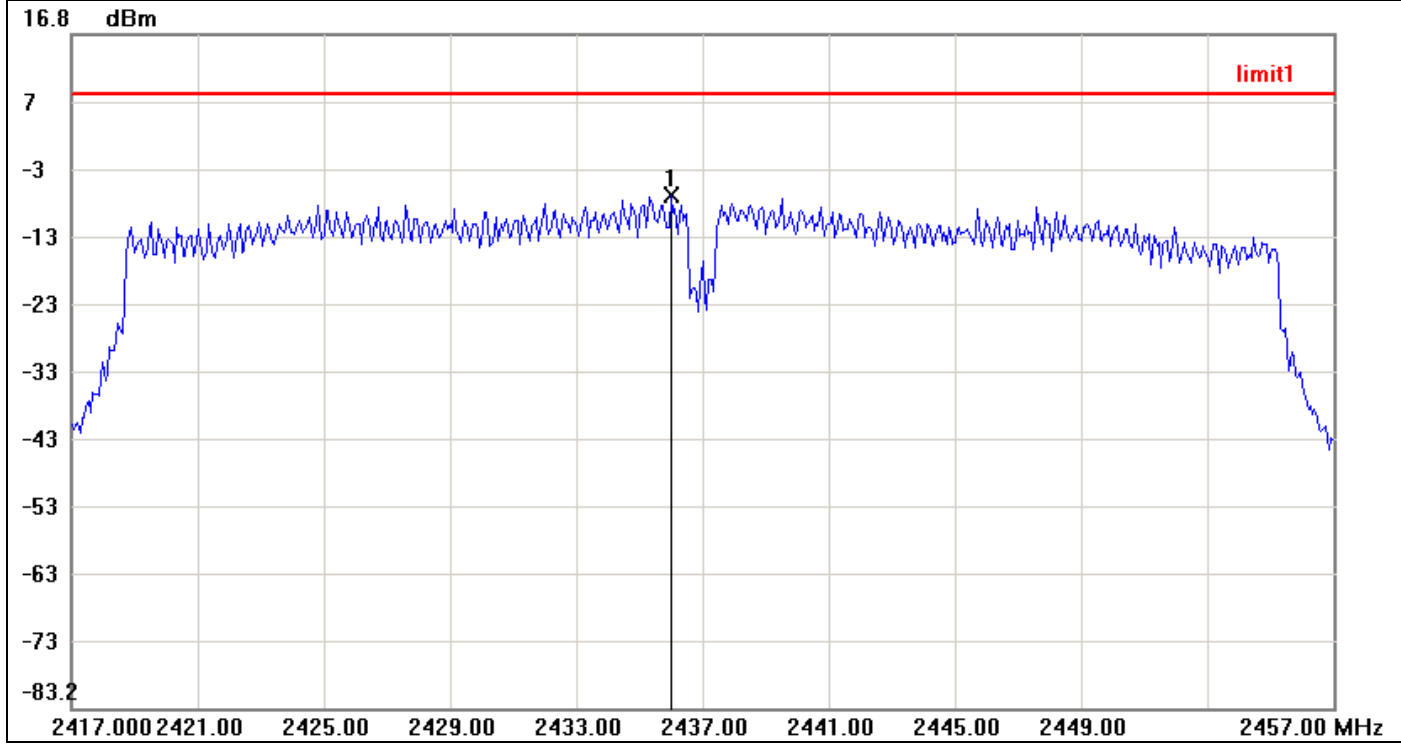
**PPSD (CH Low)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2420.1333	-5.37	8.00	-13.37

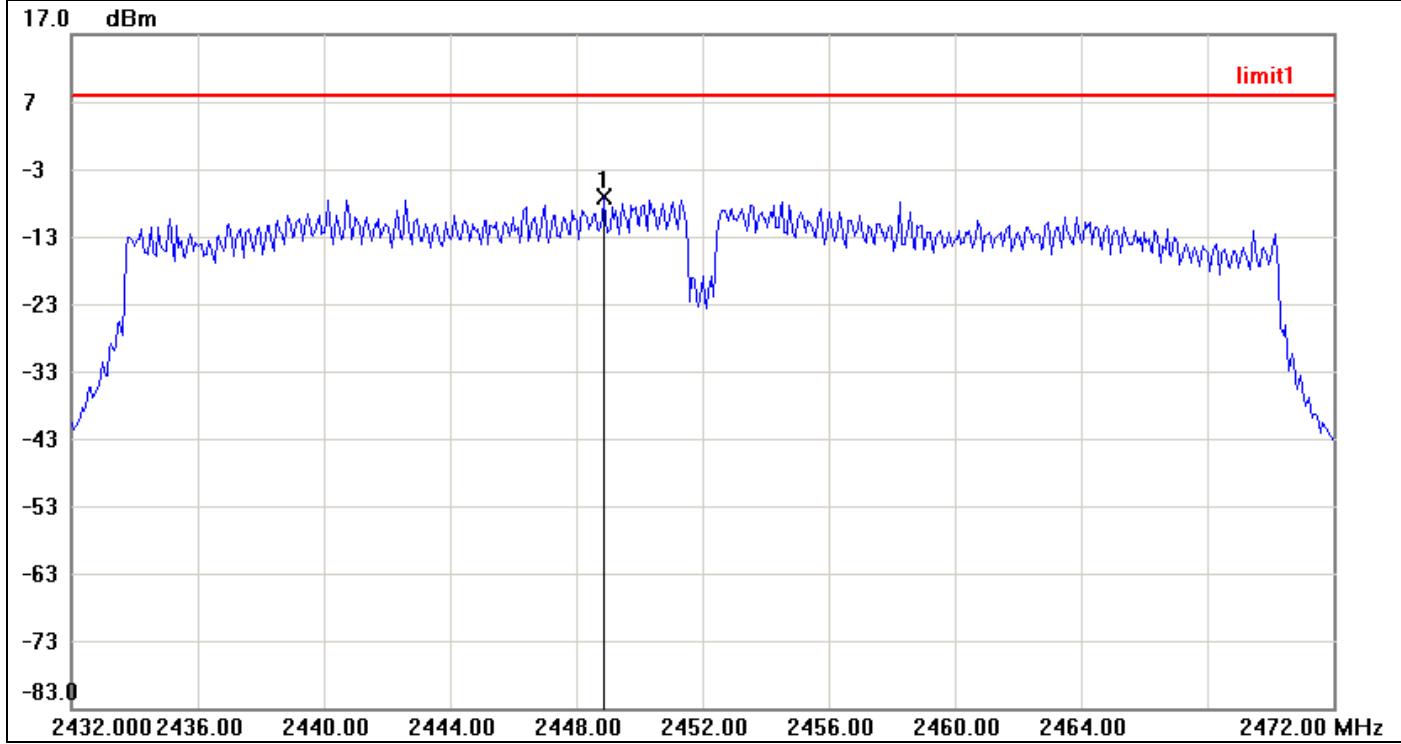


**PPSD (CH Mid)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2436.0000	-7.10	8.00	-15.10

**PPSD (CH High)**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2448.8667	-7.12	8.00	-15.12

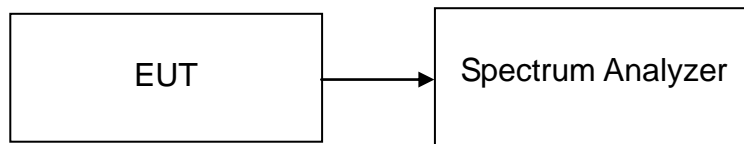
## 7.7 SPURIOUS EMISSIONS

### 7.7.1 Conducted Measurement

#### LIMIT

According to §15.247(d) & RSS-247, 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

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

Measurements are made over the 30MHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

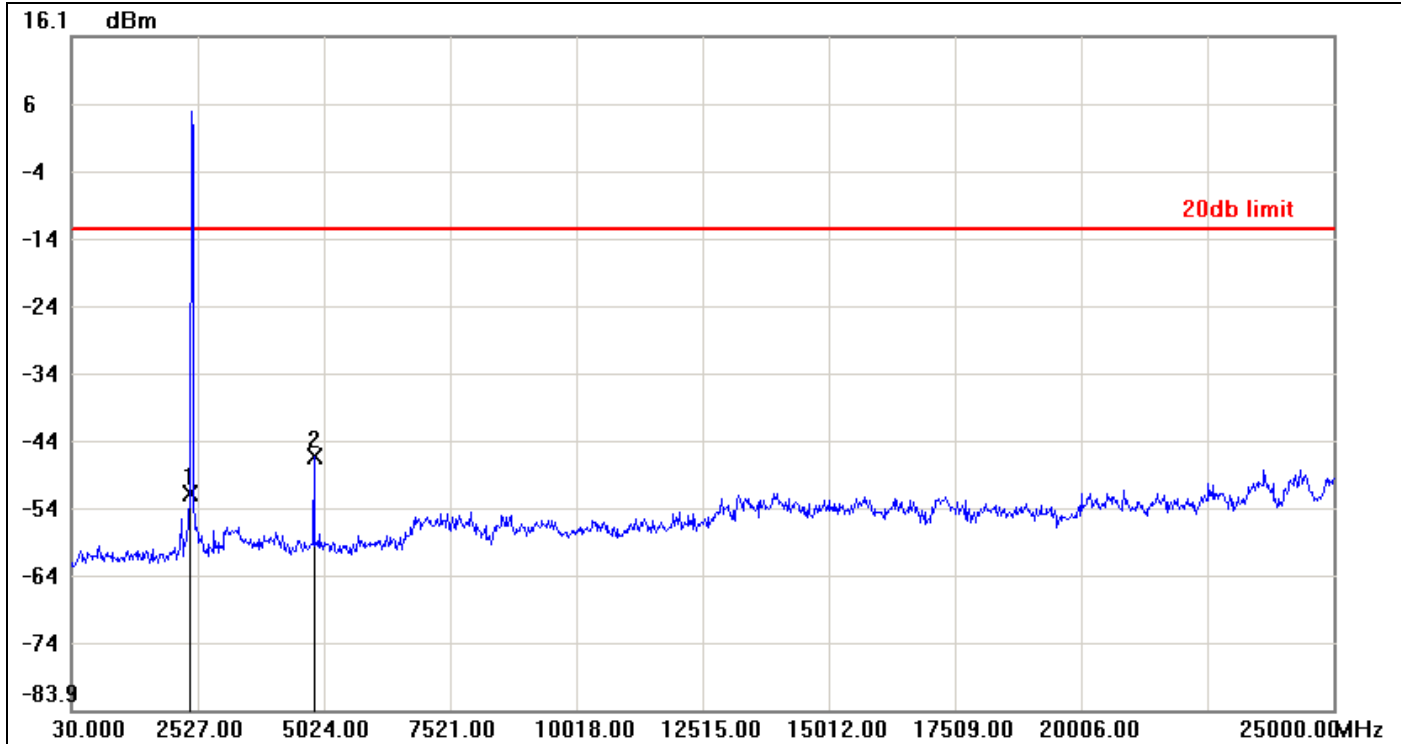
#### TEST RESULTS

*No non-compliance noted*

**Test Plot**

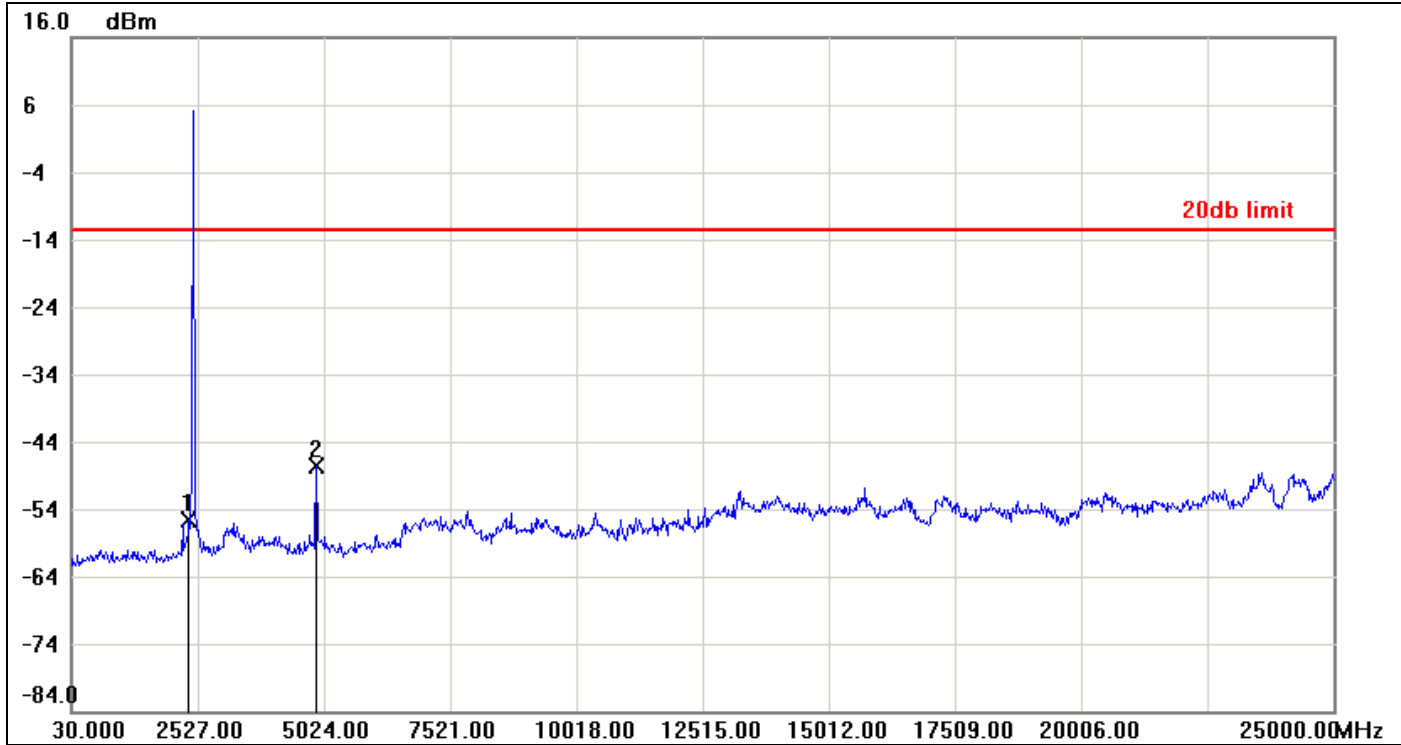
**IEEE 802.11b mode**

**CH Low**



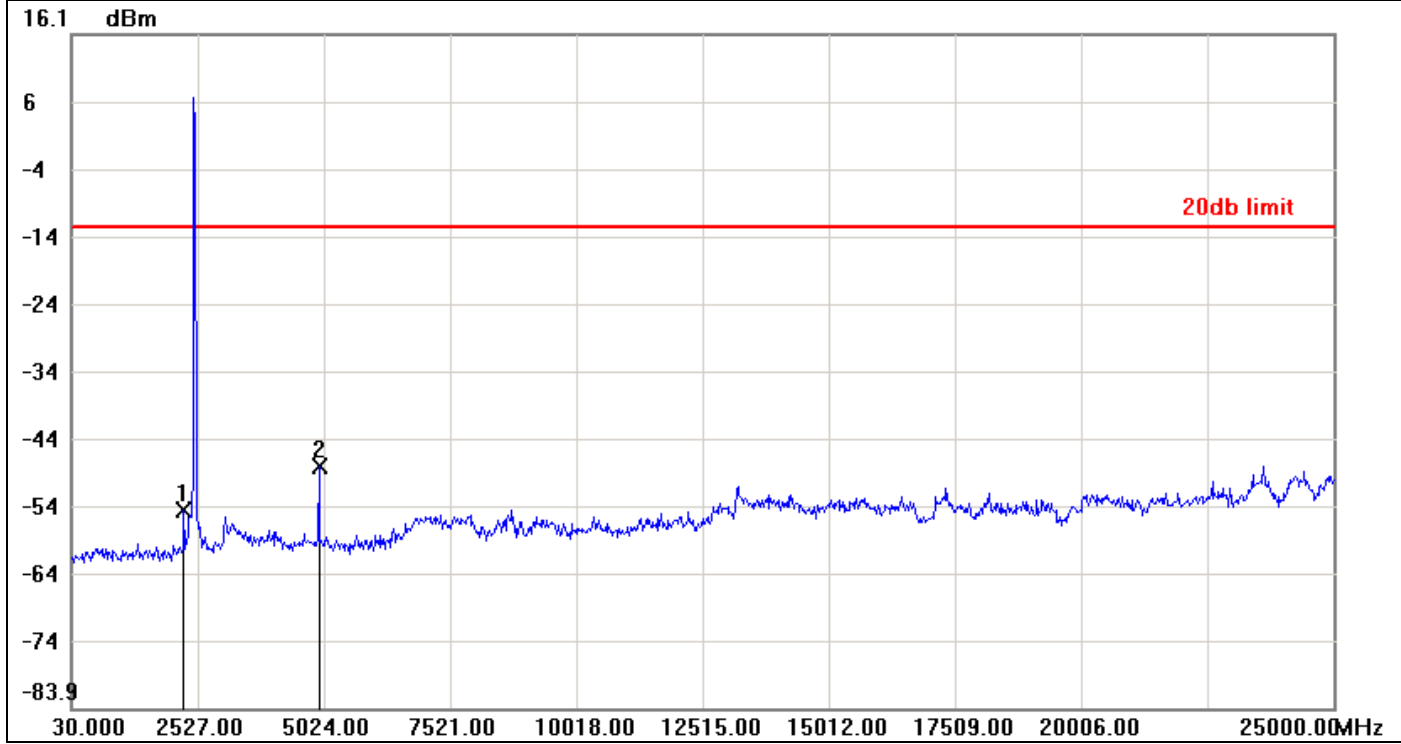
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-51.73	-12.62	-39.11
2	4824.2400	-46.31	-12.62	-33.69

**CH Mid**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2352.2100	-55.66	-12.68	-42.98
2	4874.1800	-47.55	-12.68	-34.87

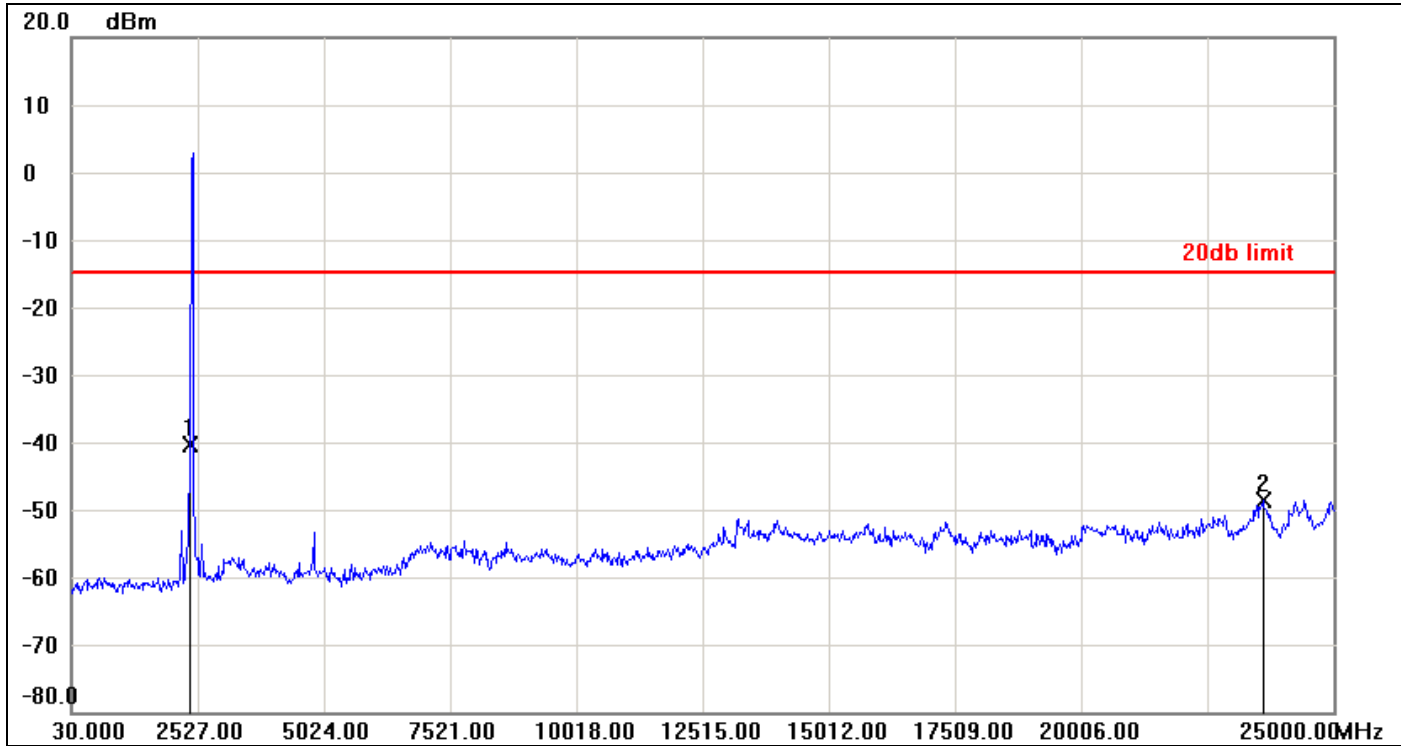
**CH High**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2252.3300	-54.62	-12.61	-42.01
2	4924.1200	-47.92	-12.61	-35.31

**IEEE 802.11g mode**

**CH Low**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-40.31	-14.78	-25.53
2	23601.6800	-48.55	-14.78	-33.77

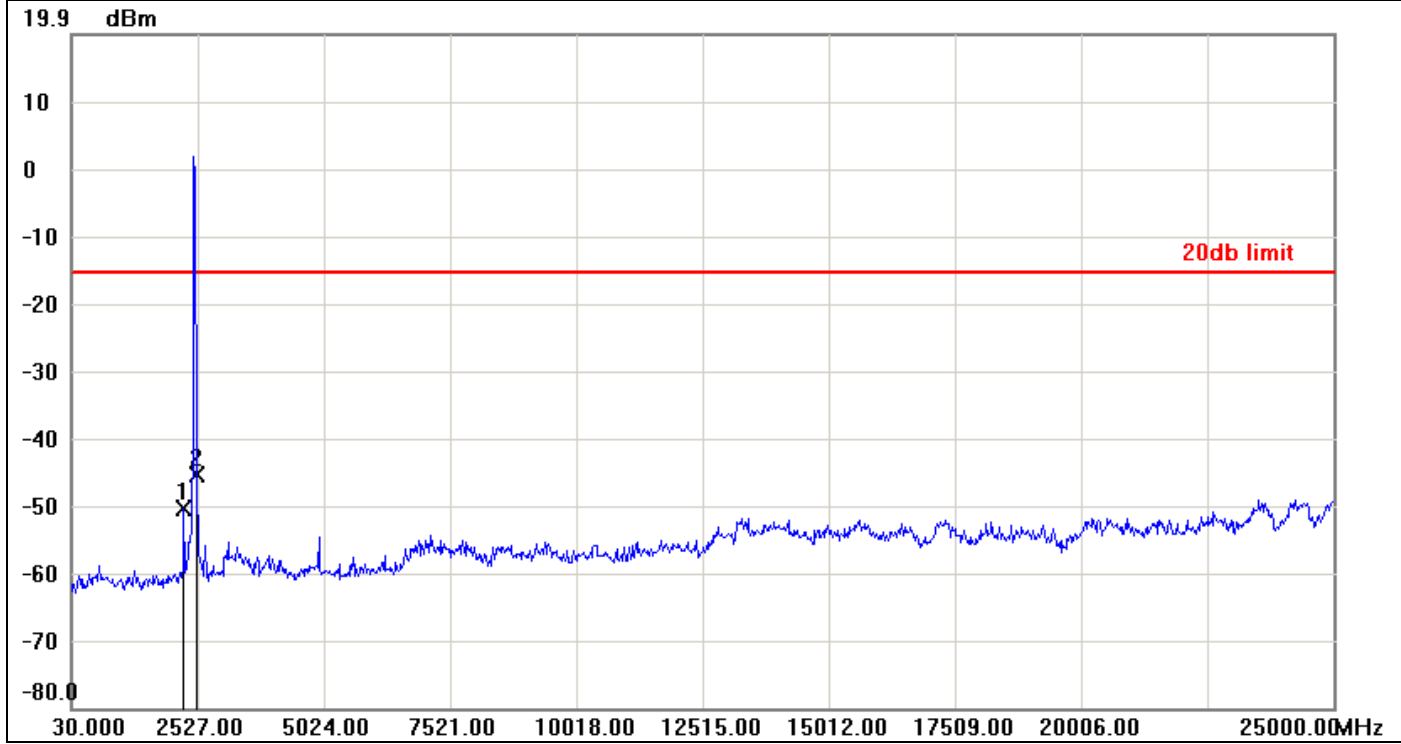
**CH Mid**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2227.3600	-52.49	-15.32	-37.17
2	23501.8000	-47.94	-15.32	-32.62



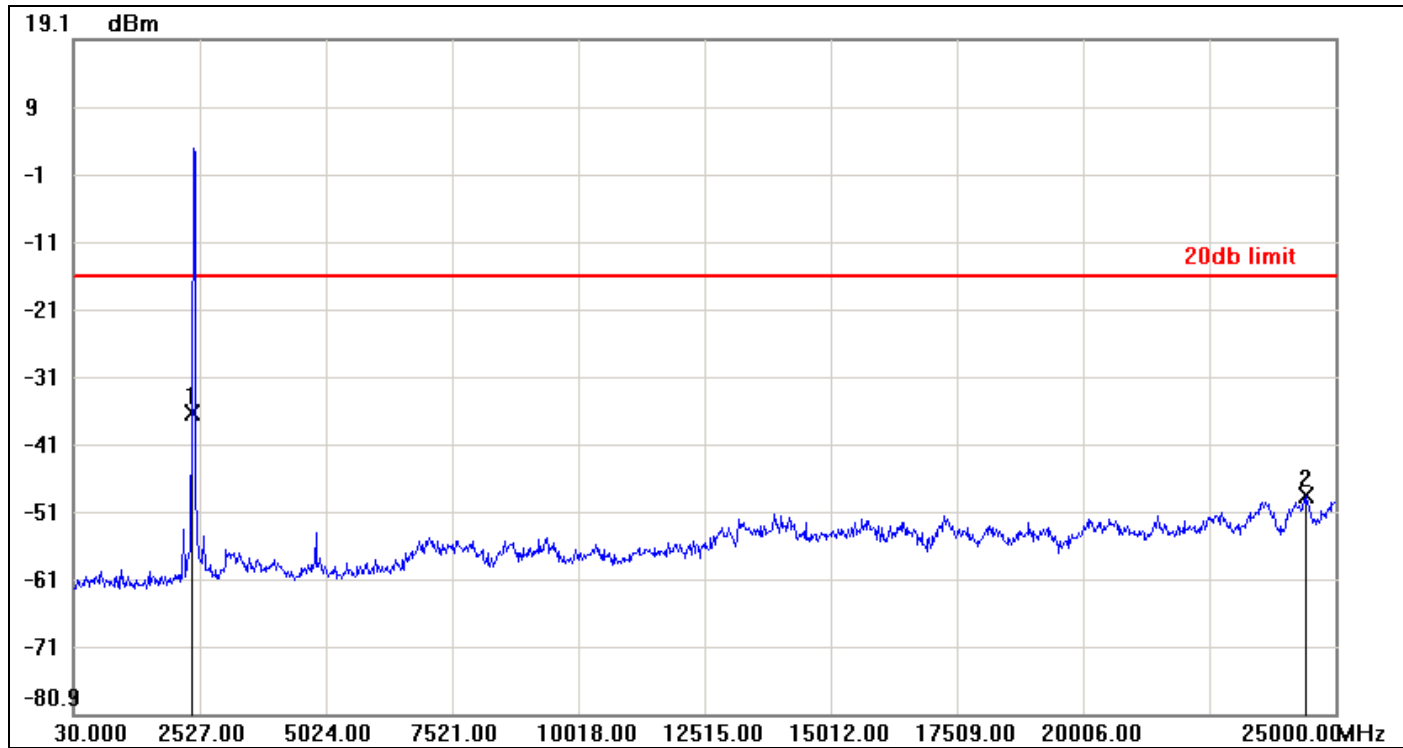
**CH High**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2252.3300	-50.35	-15.40	-34.95
2	2502.0300	-45.52	-15.40	-30.12

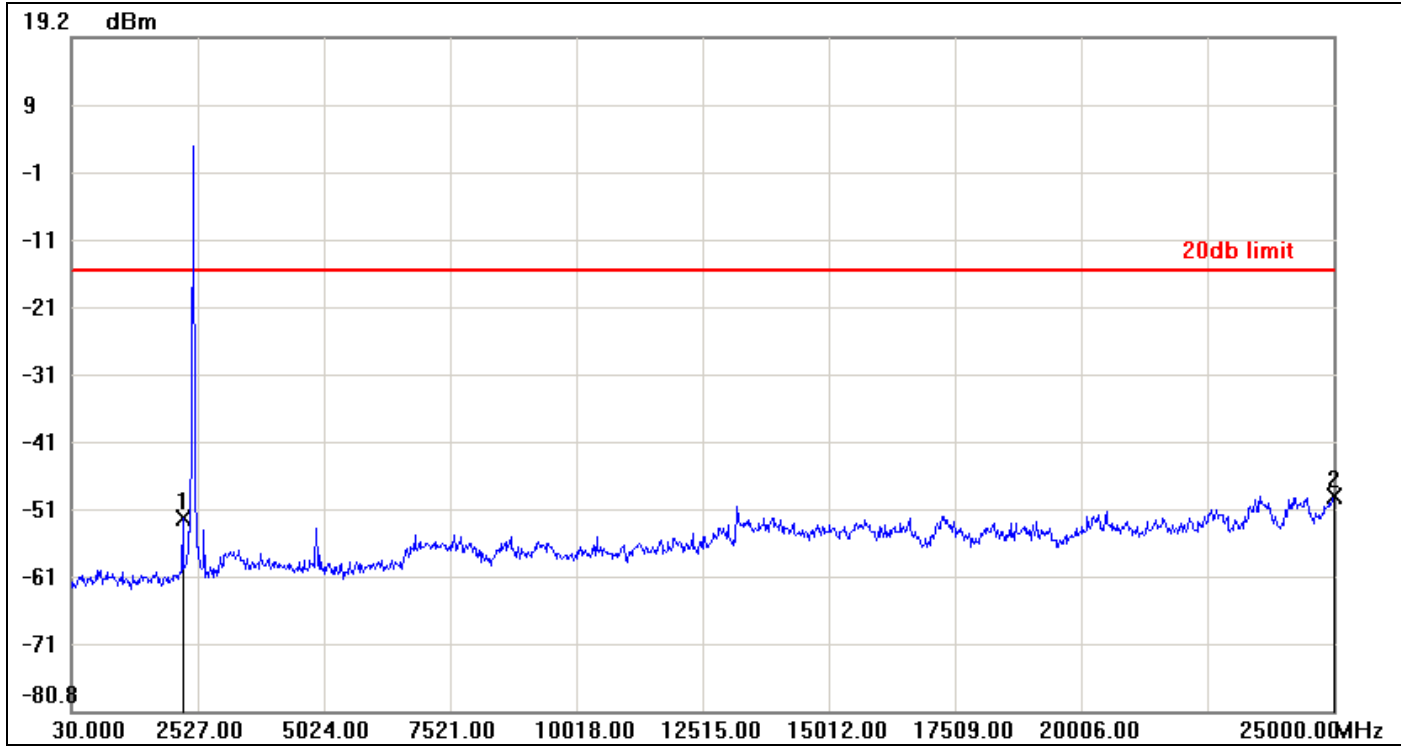
**IEEE 802.11n HT 20 MHz mode**

**CH Low**



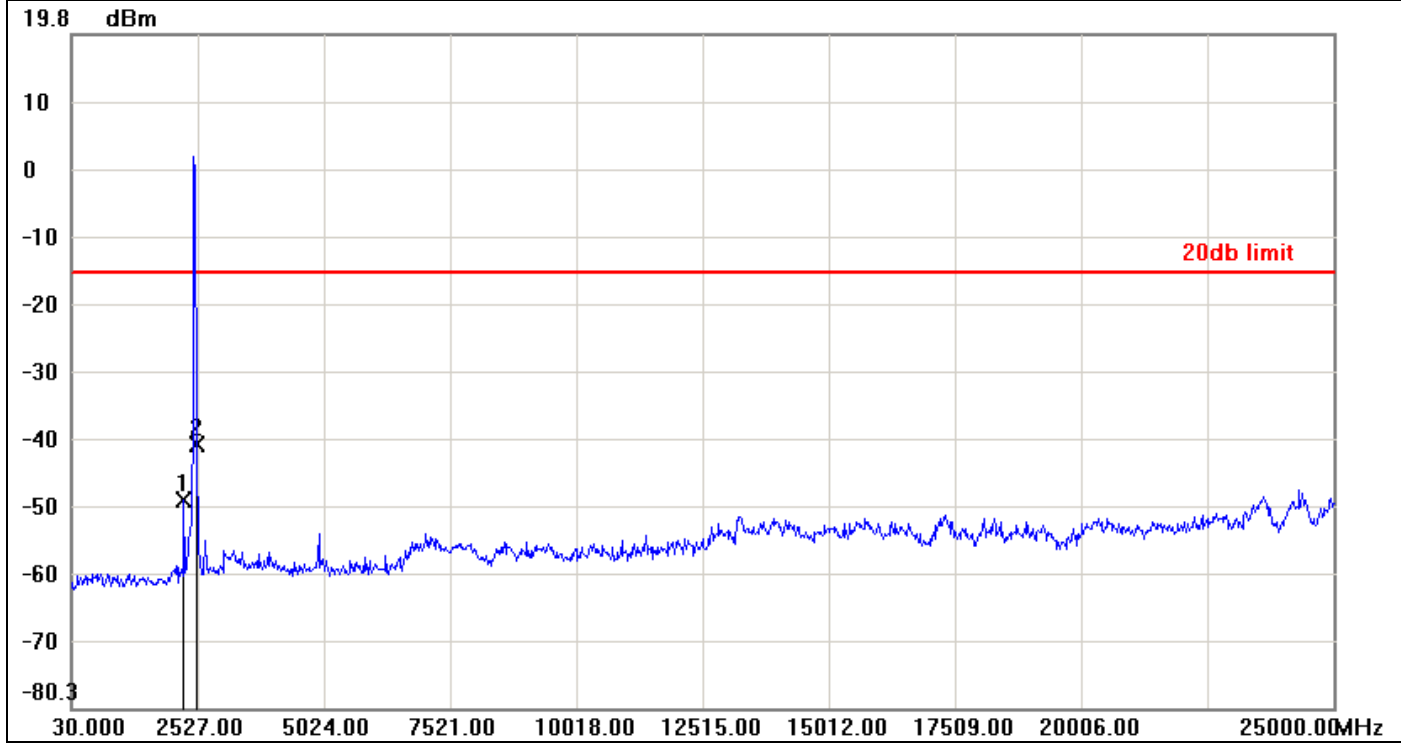
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-36.23	-15.91	-20.32
2	24425.6900	-48.65	-15.91	-32.74

**CH Mid**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2227.3600	-52.17	-15.37	-36.80
2	25000.0000	-48.83	-15.37	-33.46

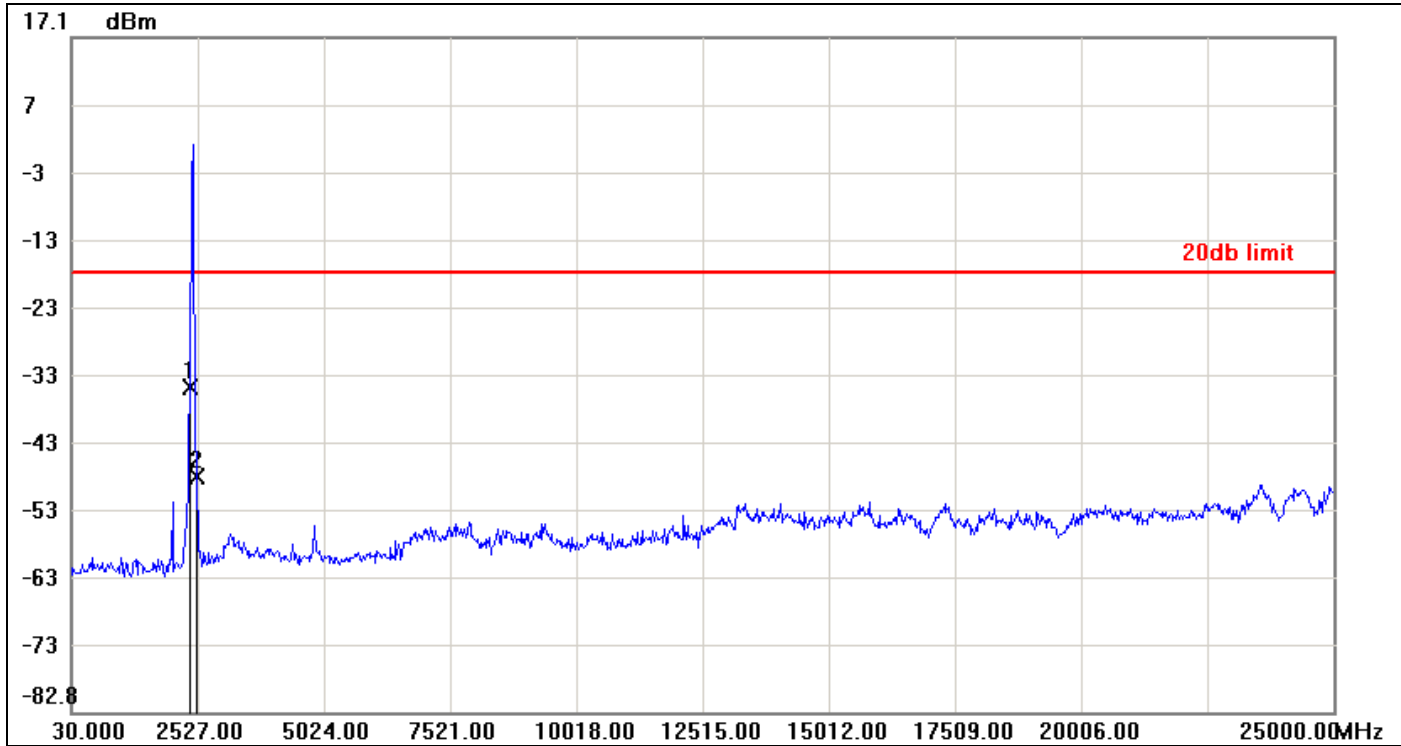
**CH High**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2252.3300	-49.49	-15.53	-33.96
2	2502.0300	-41.13	-15.53	-25.60

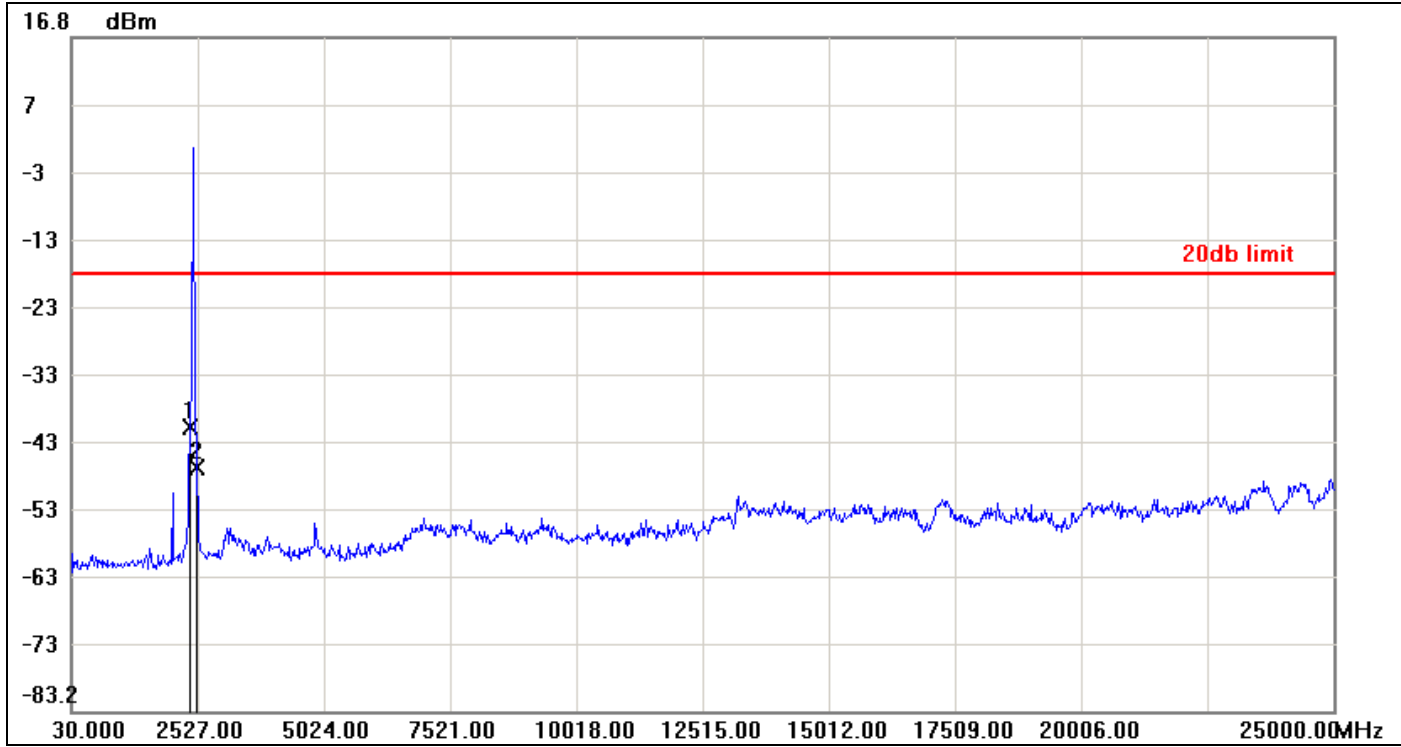
**IEEE 802.11n HT 40 MHz mode**

**CH Low**



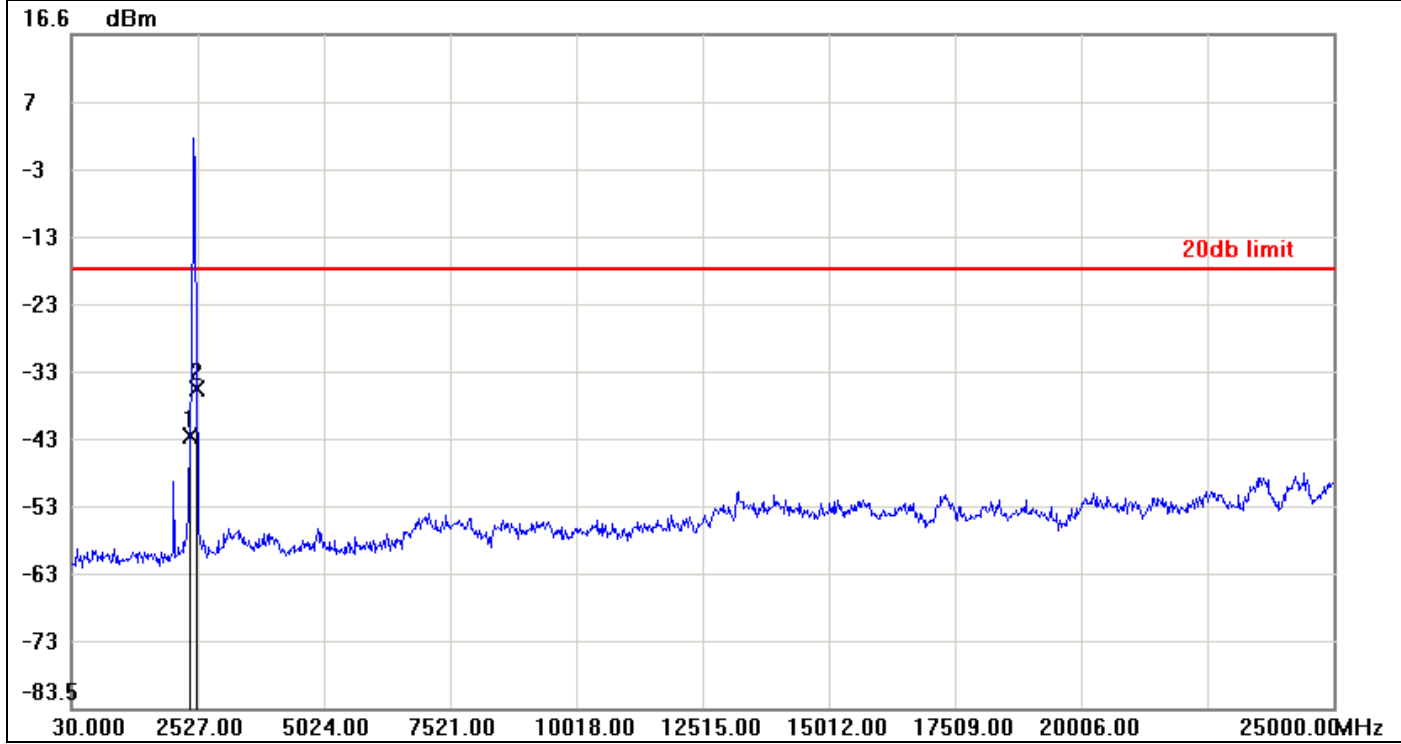
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-34.63	-17.80	-16.83
2	2502.0300	-48.05	-17.80	-30.25

**CH Mid**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-41.10	-18.39	-22.71
2	2502.0300	-47.06	-18.39	-28.67

**CH High**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-42.95	-18.34	-24.61
2	2502.0300	-36.18	-18.34	-17.84

## 7.8 RADIATED EMISSIONS

### LIMIT

All spurious emissions shall comply with the limits of §15.209(a) and RSS-Gen Table 2 & Table 5.

### RSS-Gen Table 2 & Table 5: 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:** \*Measurements for compliance with limits in the above table may be performed at distances other than 3 metres, in accordance with Section 7.2.7.

Transmitting devices are not permitted in Table 1 bands or, unless stated otherwise, in TV bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-806 MHz).

### RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

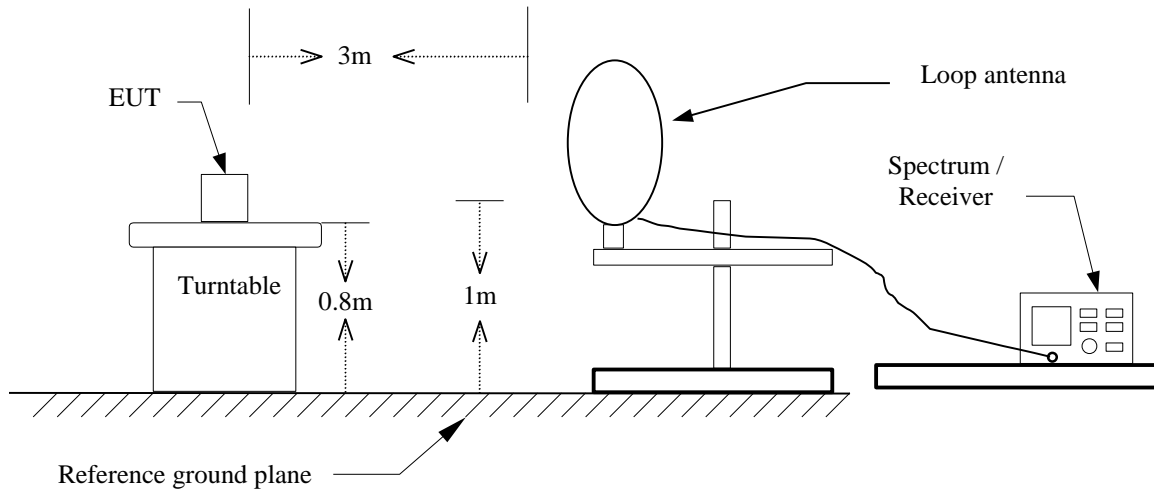
Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/377F (F in kHz)	3000
490-1,705 kHz	24,000/F (F in kHz)	24,000/377F (F in kHz)	30
1.705-30 MHz	30	N/A	30

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

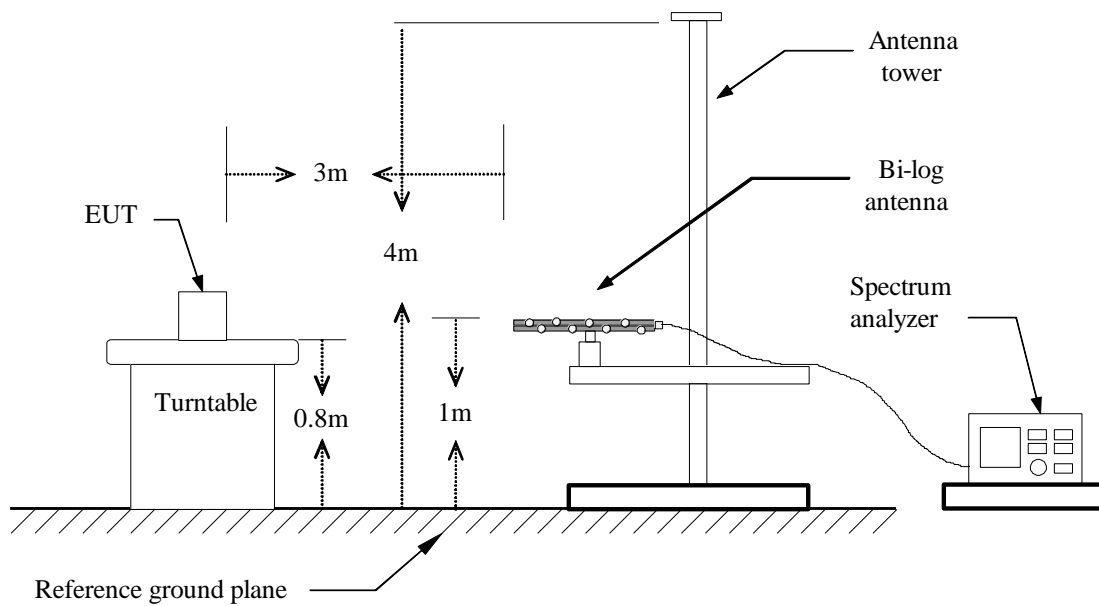


**Test Configuration**

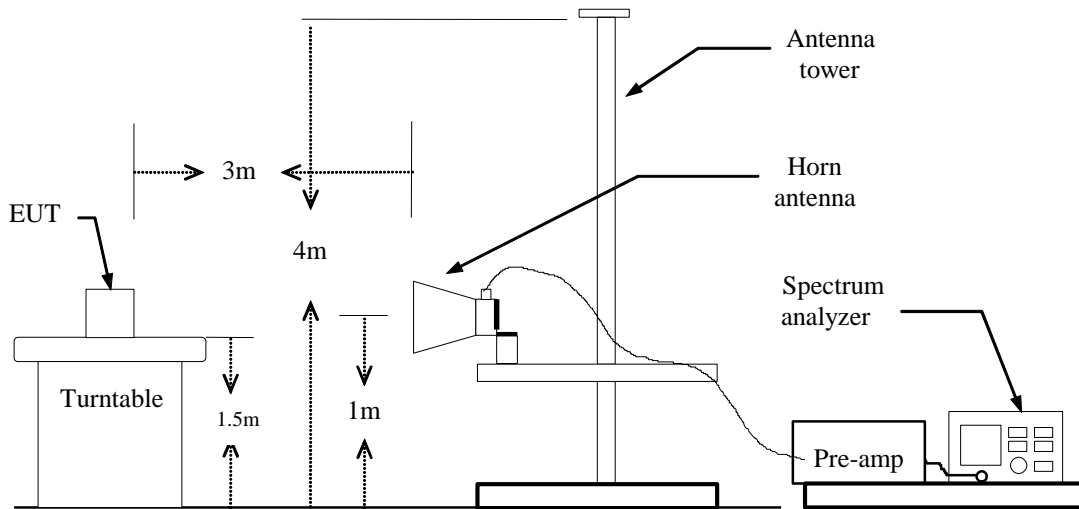
**9kHz ~ 30MHz**



**30MHz ~ 1GHz**



**Above 1 GHz**



## **TEST PROCEDURE**

1. The EUT is placed on a turntable, which is 1.5m 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=1MHz / VBW=3MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz,  
if duty cycle  $\geq 98\%$ , VBW=10Hz.  
if duty cycle  $< 98\%$  VBW=1/T.

**IEEE 802.11b mode:** = 95%, VBW=82Hz

**IEEE 802.11g mode:** = 95%, VBW=510Hz

**IEEE 802.11n HT 20 MHz mode:** = 95%, VBW=560Hz

**IEEE 802.11n HT 40 MHz mode:** = 91%, VBW=1.1KHz

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

### **Below 30MHz**

*No emissions to be recorded.*

*(Since no specific emission noted beyond the background noise floor.)*

*Remark: 1. The measurement below 30MHz is tested with a loop antenna per KDB460108.  
2. For 15.31(o) for the reporting of emissions that are more than 20dB below the limit.*

**Below 1GHz**

**Operation Mode:** Normal Link

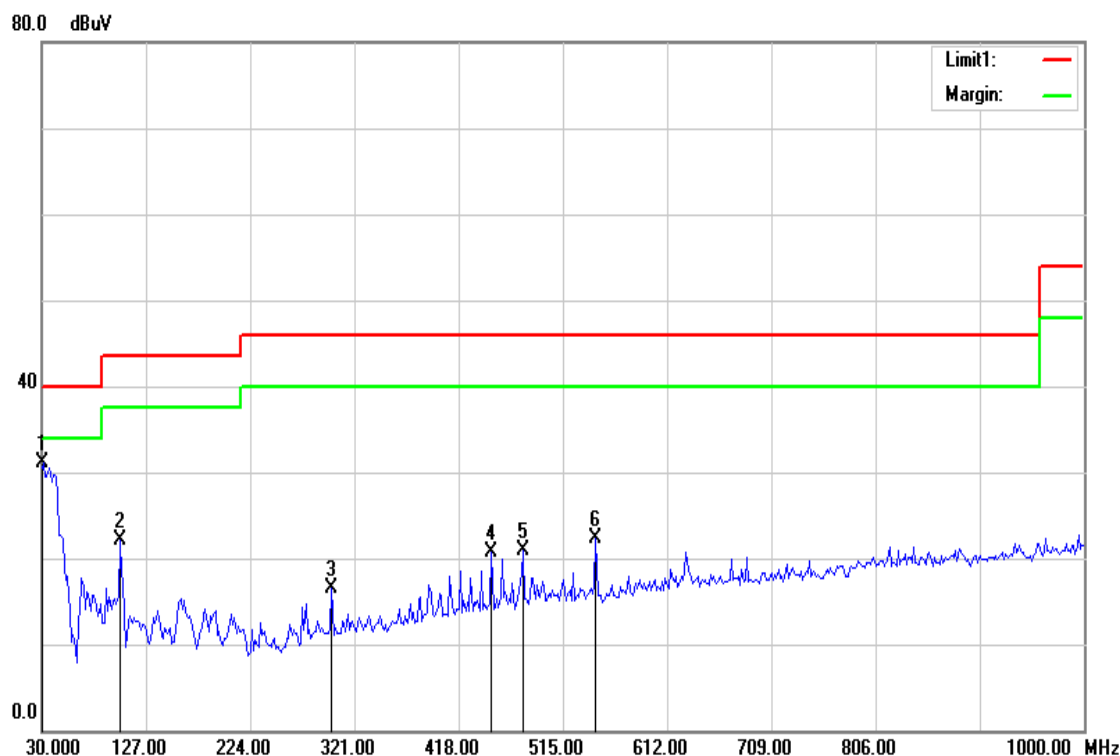
**Test Date:** July 21, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver.



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
31.6167	52.81	-21.64	31.17	40.00	-8.83	Peak	V
102.7500	53.29	-31.23	22.06	43.50	-21.44	Peak	V
299.9833	44.19	-27.73	16.46	46.00	-29.54	Peak	V
448.7167	44.97	-24.24	20.73	46.00	-25.27	Peak	V
477.8167	44.68	-23.78	20.90	46.00	-25.10	Peak	V
545.7167	45.12	-22.84	22.28	46.00	-23.72	Peak	V

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz 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) = Result (dBuV/m) – Limit (dBuV/m).

**Operation Mode:** Normal Link

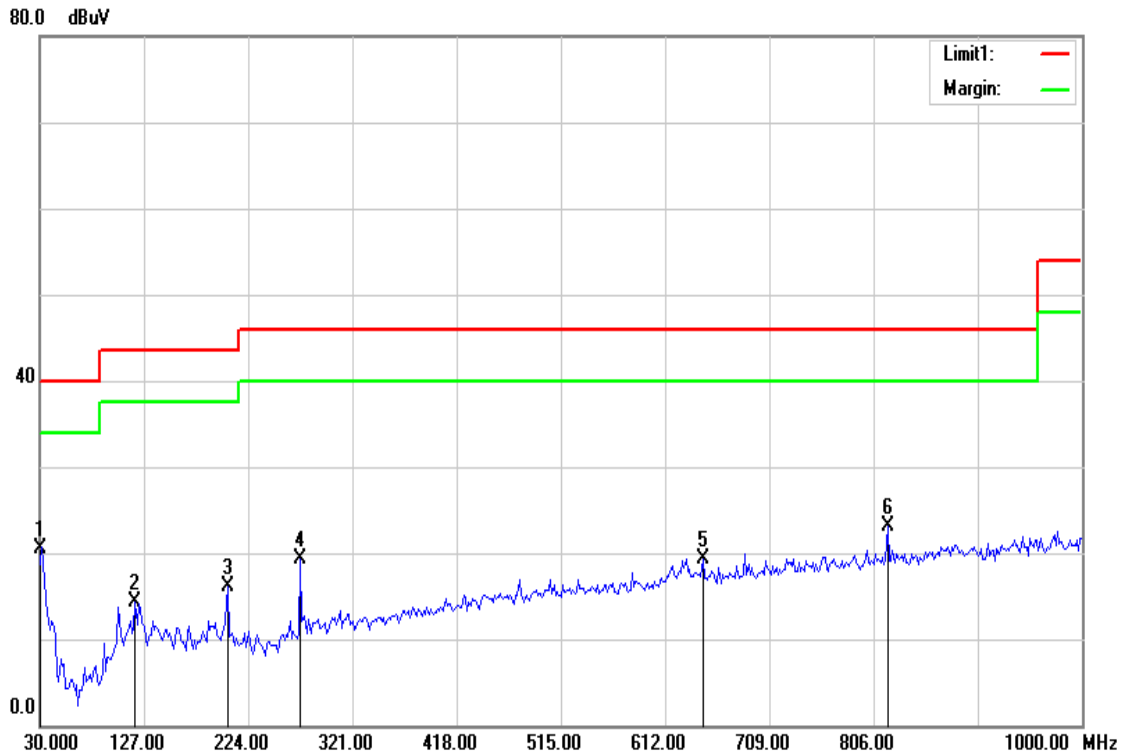
**Test Date:** July 21, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Hor.



Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
31.6167	42.24	-21.64	20.60	40.00	-19.40	peak	H
118.9167	42.78	-28.44	14.34	43.50	-29.16	peak	H
204.6000	45.18	-29.01	16.17	43.50	-27.33	peak	H
272.5000	47.53	-28.16	19.37	46.00	-26.63	peak	H
647.5667	40.09	-20.79	19.30	46.00	-26.70	peak	H
818.9333	41.74	-18.71	23.03	46.00	-22.97	peak	H

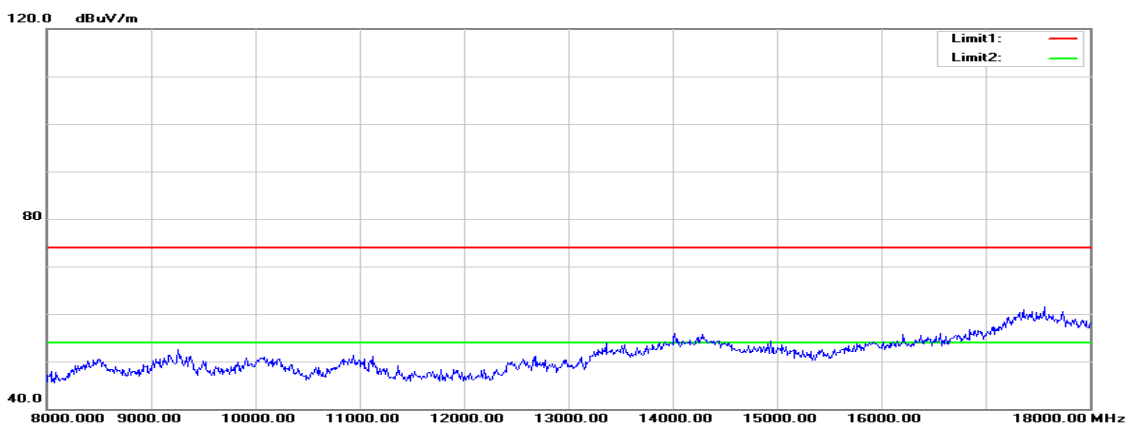
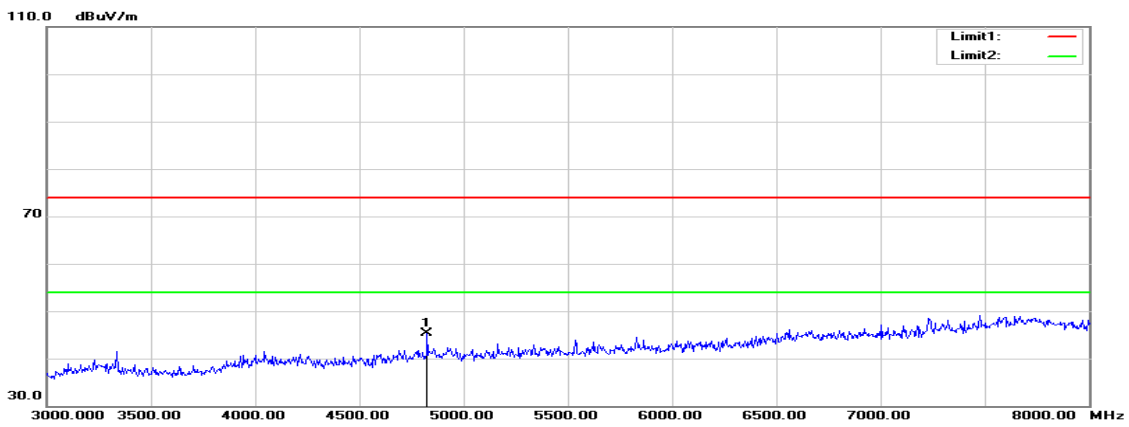
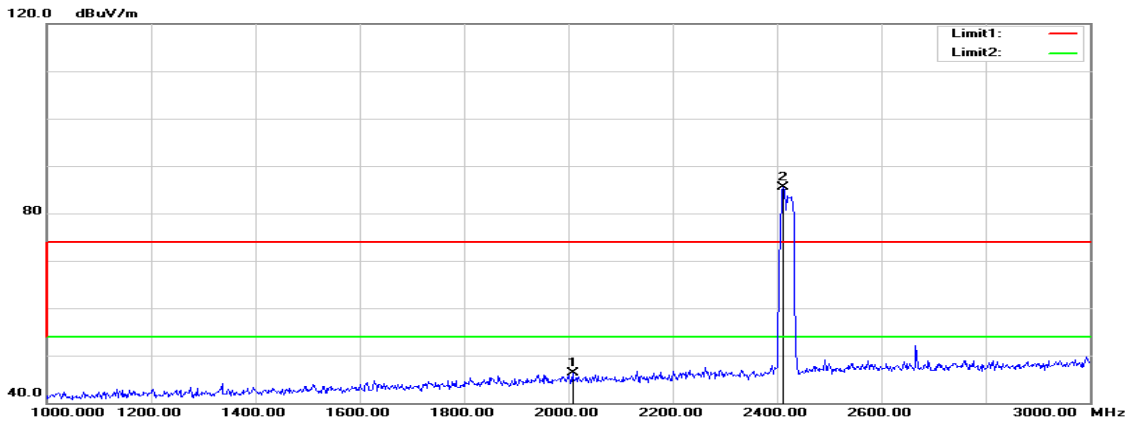
**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz 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) = Result (dBuV/m) – Limit (dBuV/m).

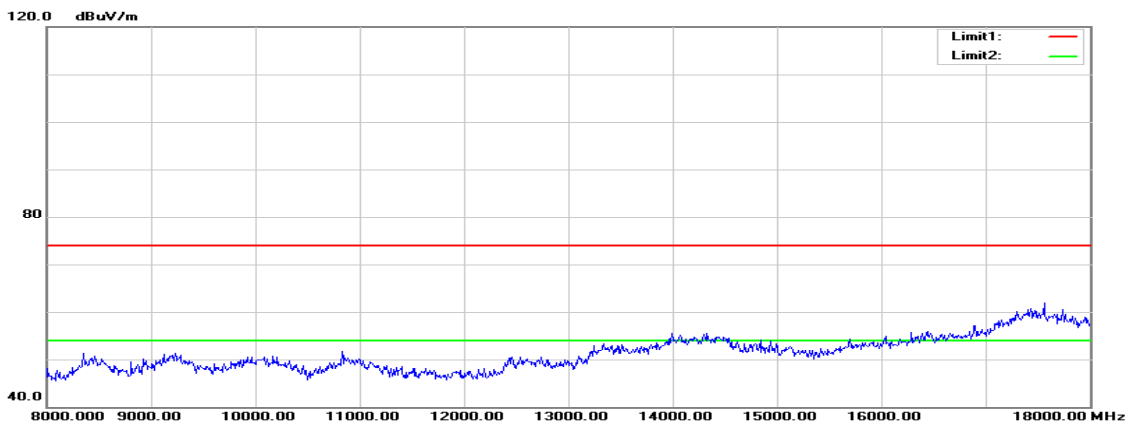
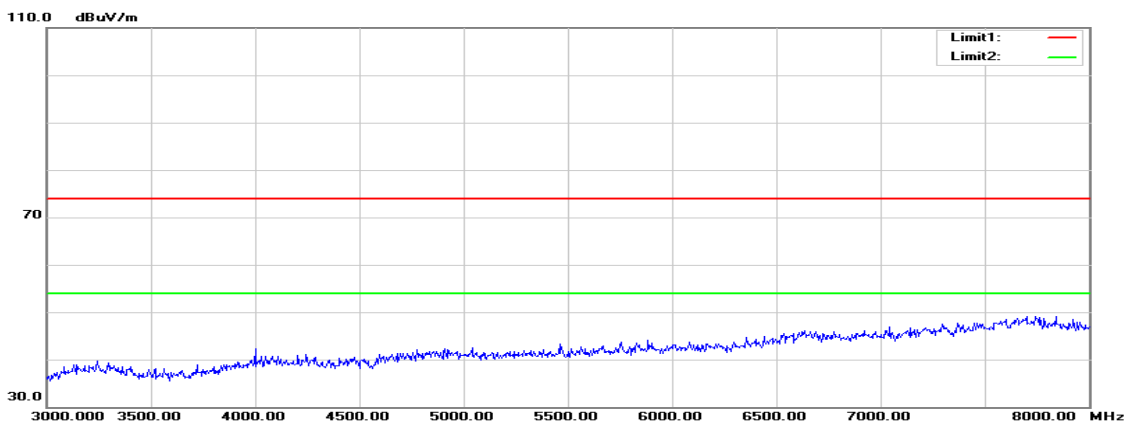
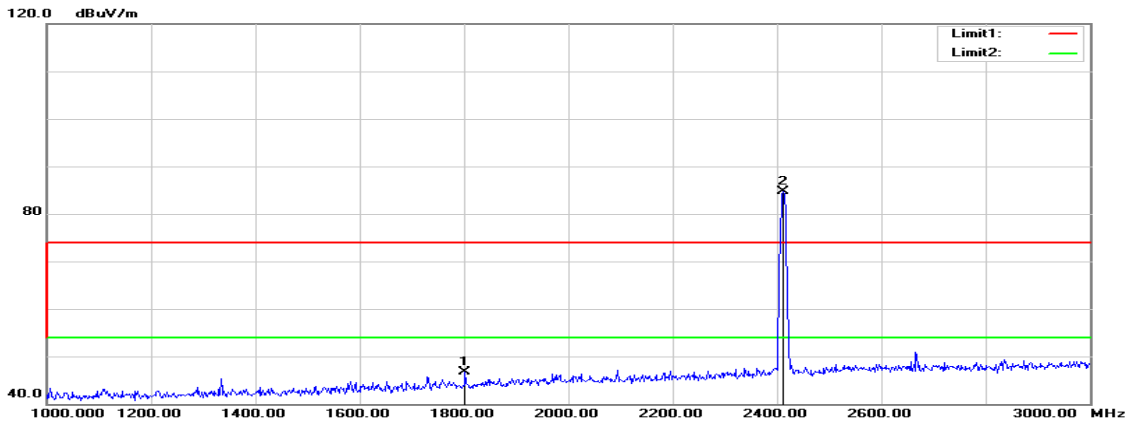
**Above 1 GHz**

**TX / IEEE 802.11b / CH Low**

**Polarity: Vertical**



Polarity: Horizontal



**Above 1 GHz**

**Operation Mode:** TX / IEEE 802.11b / CH Low

**Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2008.000	50.00	-3.61	46.39	74.00	-27.61	peak	V
4825.000	40.21	5.10	45.31	74.00	-28.69	peak	V
N/A							
1802.000	51.25	-4.63	46.62	74.00	-27.38	peak	H
N/A							

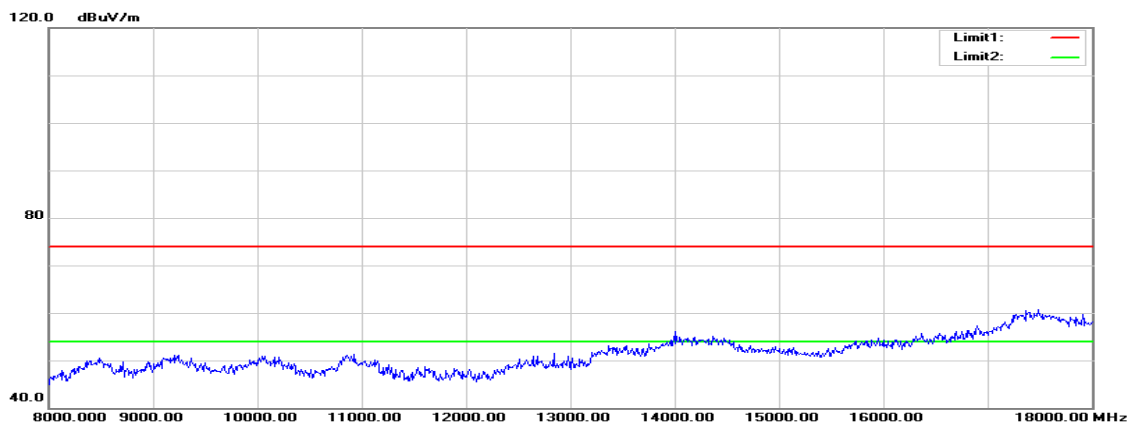
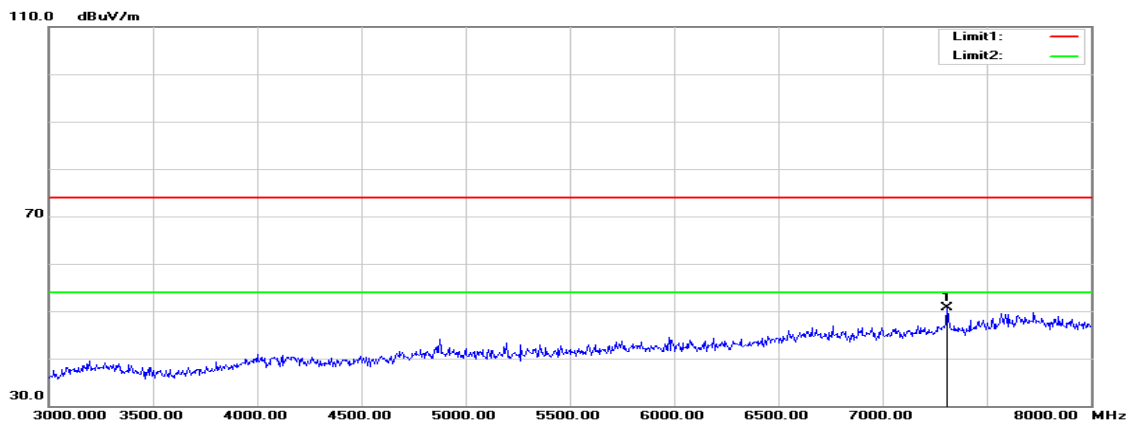
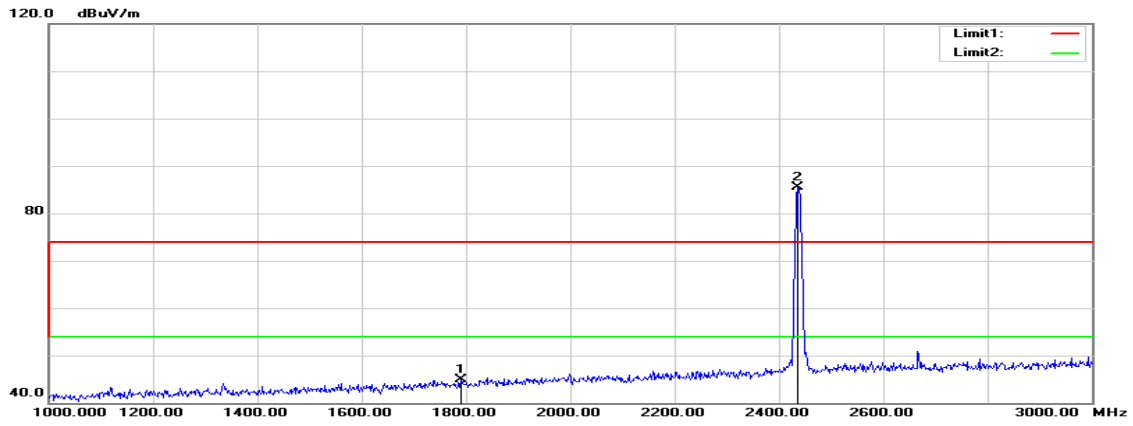
**Remark:**

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).

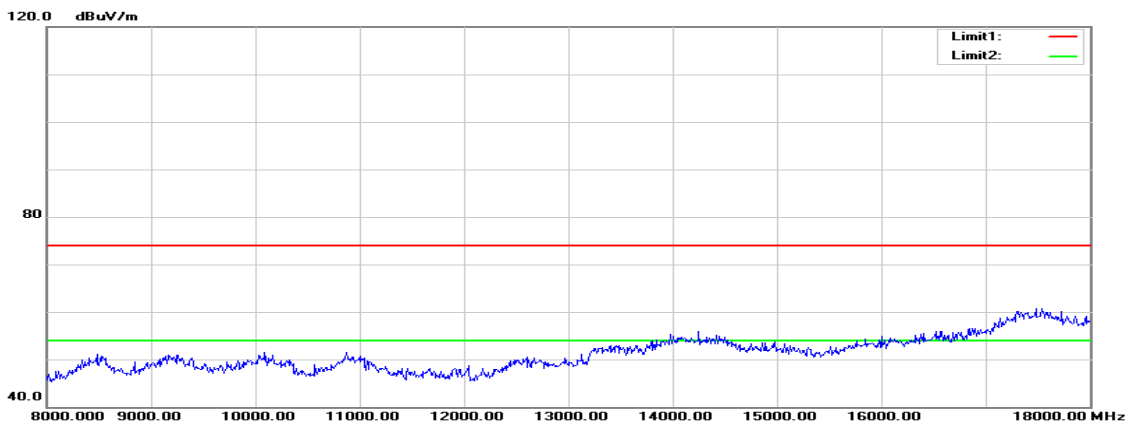
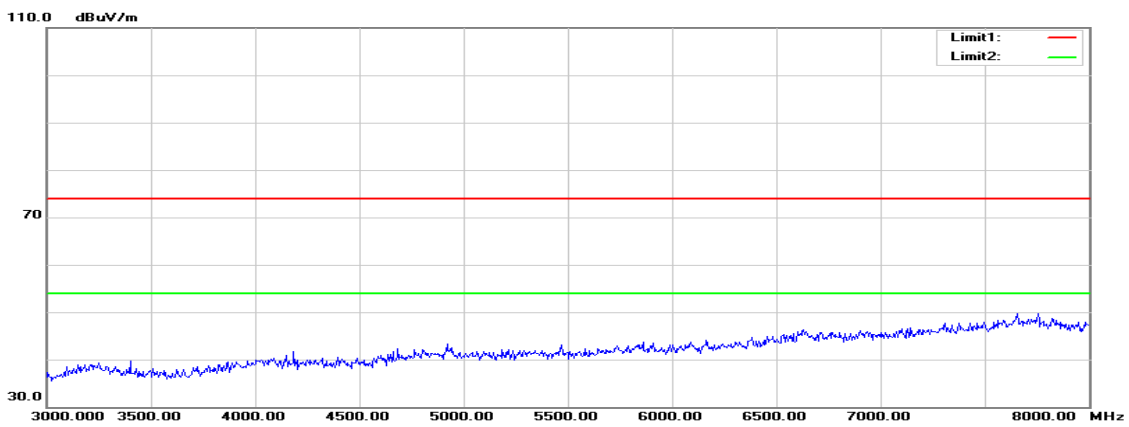
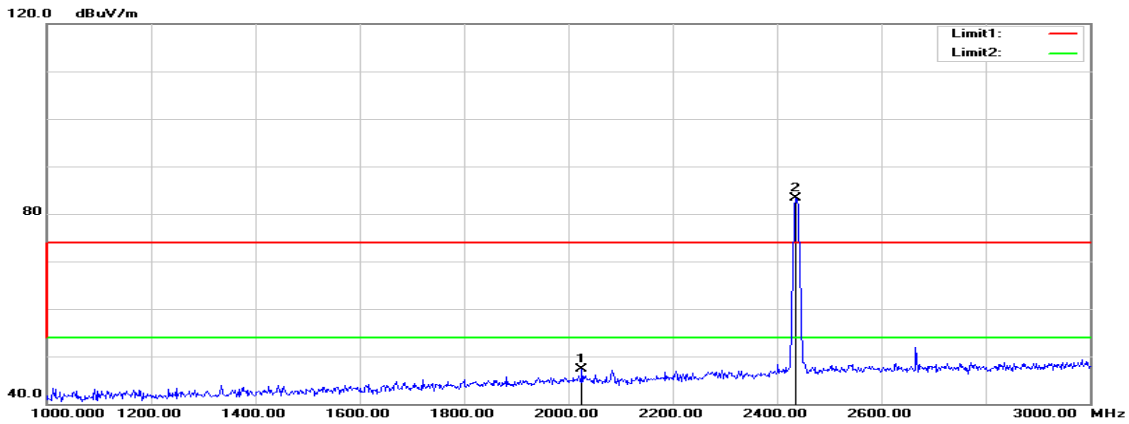


**TX / IEEE 802.11b / CH Mid**

**Polarity: Vertical**



Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11b / CH Mid

**Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

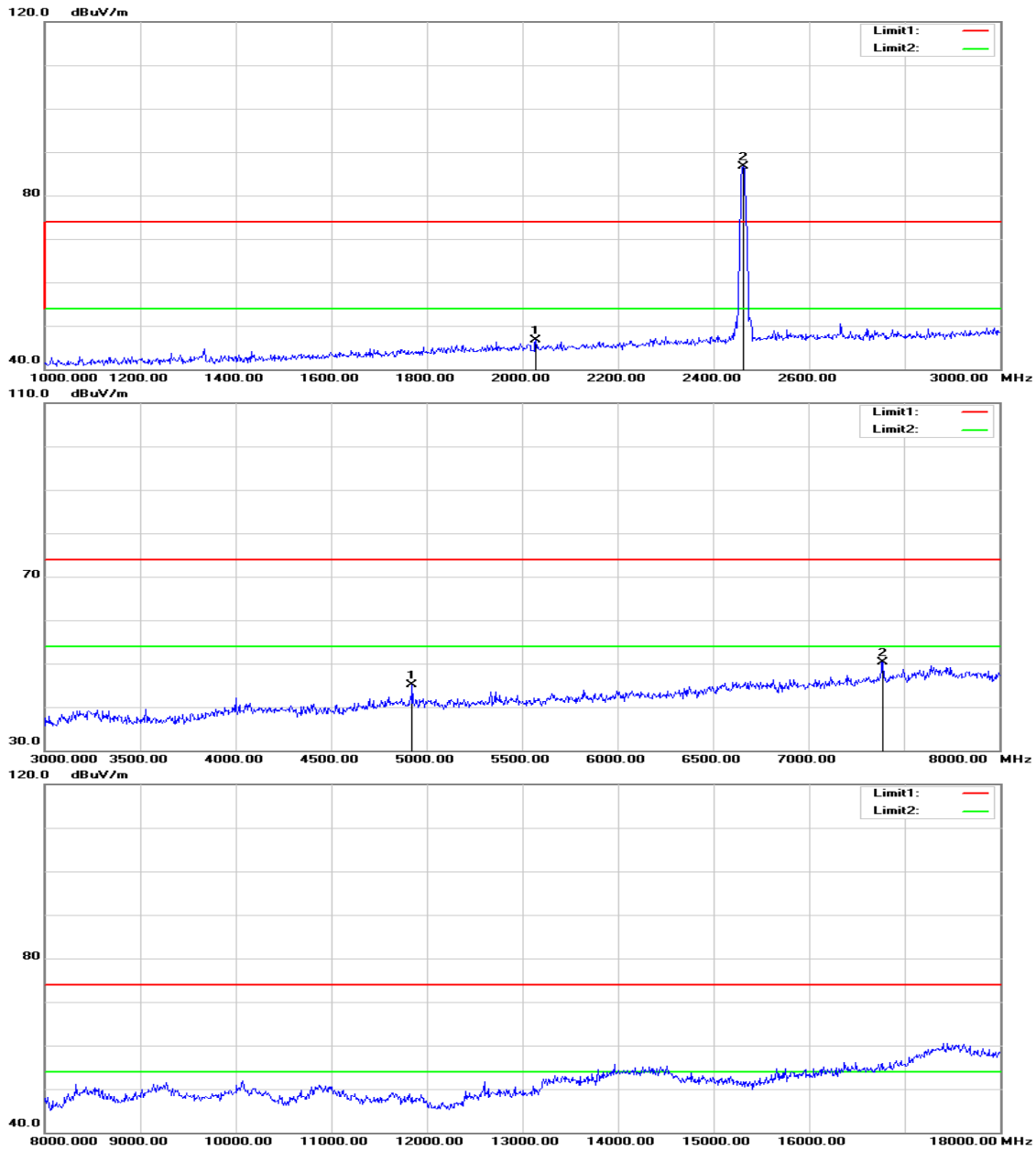
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1790.000	49.54	-4.69	44.85	74.00	-29.15	peak	V
7310.000	37.80	12.94	50.74	74.00	-23.26	peak	V
N/A							
2026.000	50.97	-3.63	47.34	74.00	-26.66	peak	H
N/A							

**Remark:**

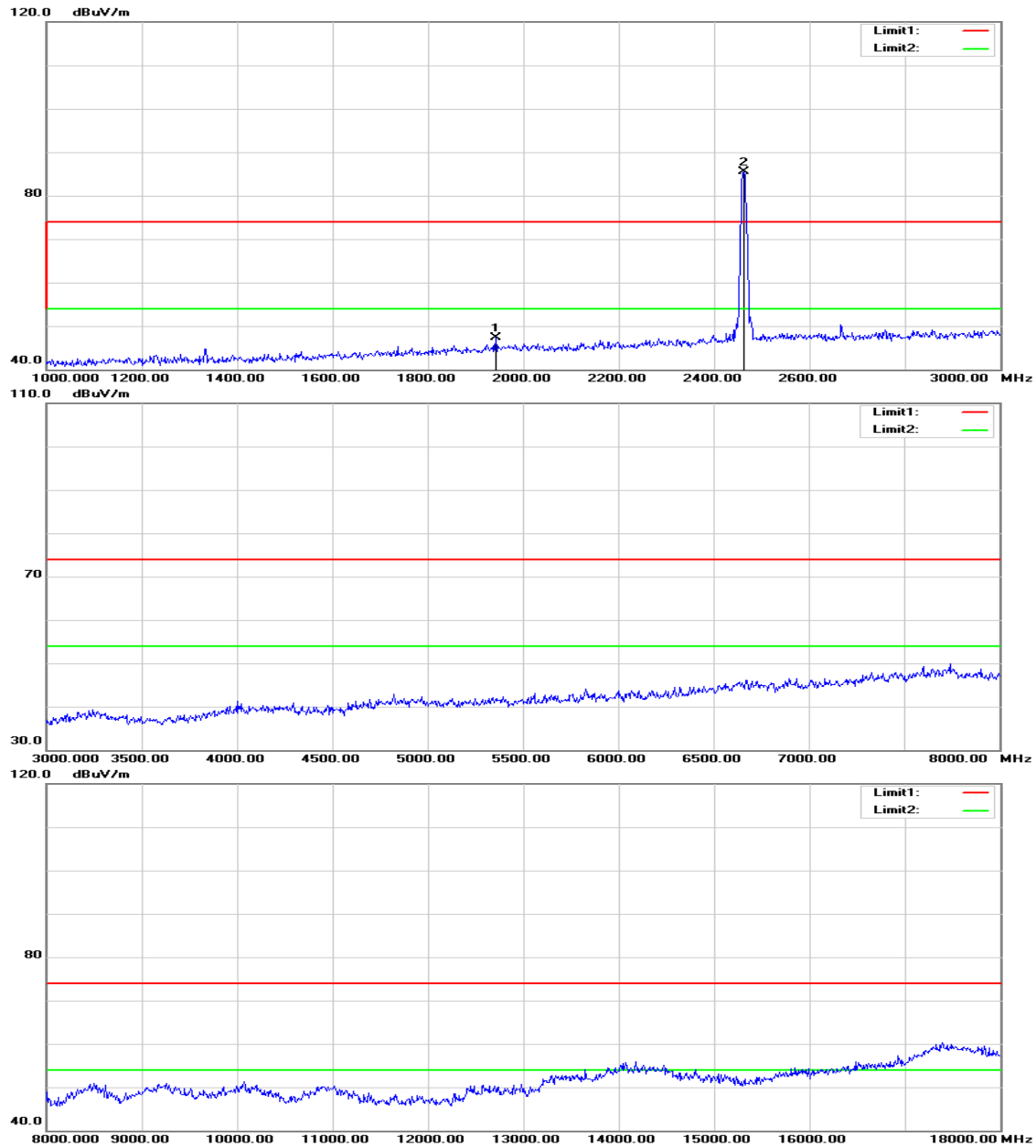
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11b / CH High**

**Polarity: Vertical**



### Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11b / CH High

**Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

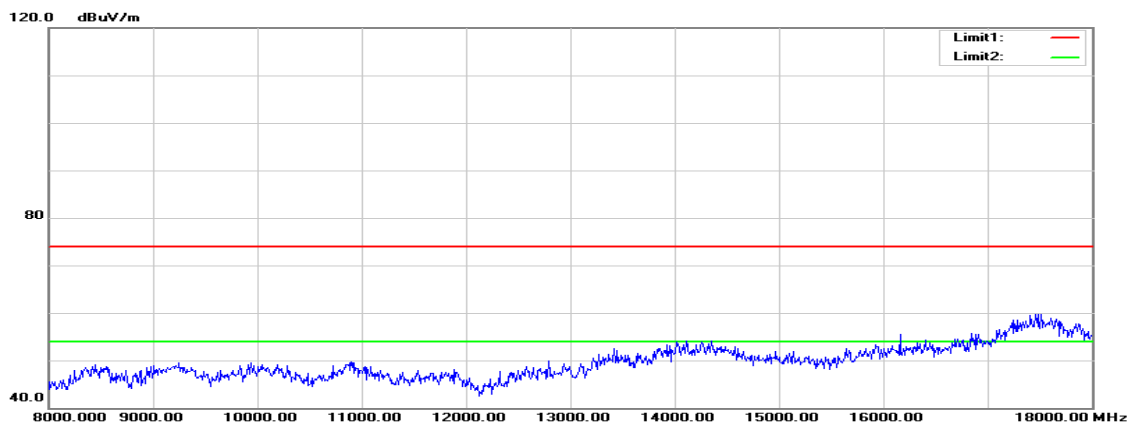
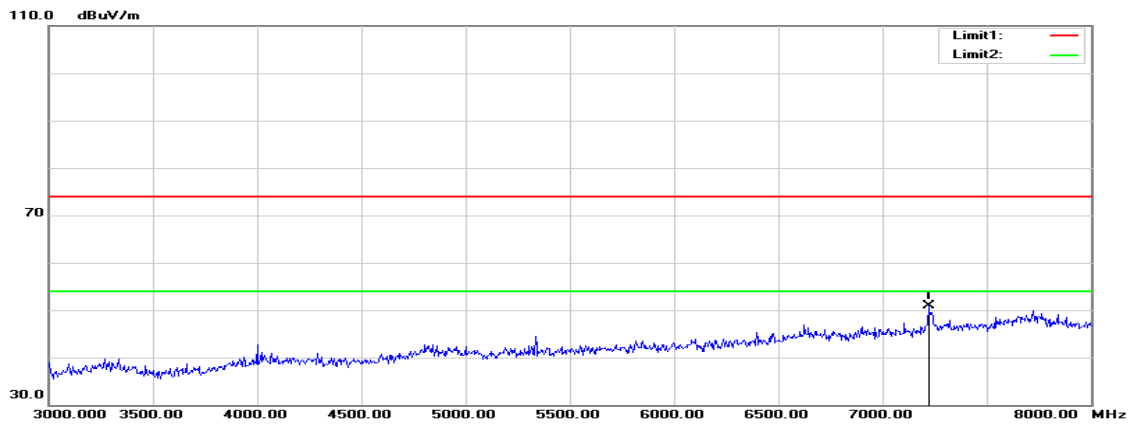
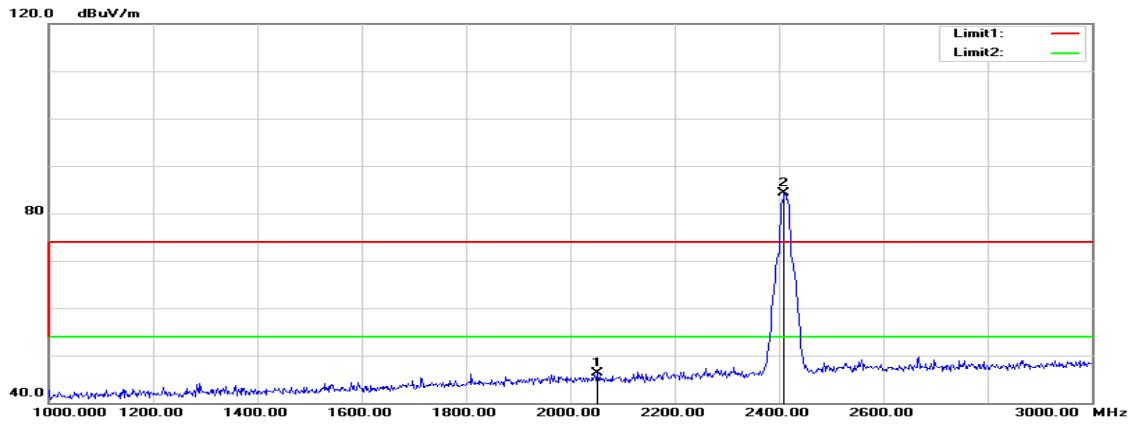
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2028.000	50.25	-3.63	46.62	74.00	-27.38	peak	V
4925.000	39.70	5.37	45.07	74.00	-28.93	peak	V
7390.000	37.15	13.18	50.33	74.00	-23.67	peak	V
N/A							
1942.000	51.29	-3.90	47.39	74.00	-26.61	peak	H
N/A							

**Remark:**

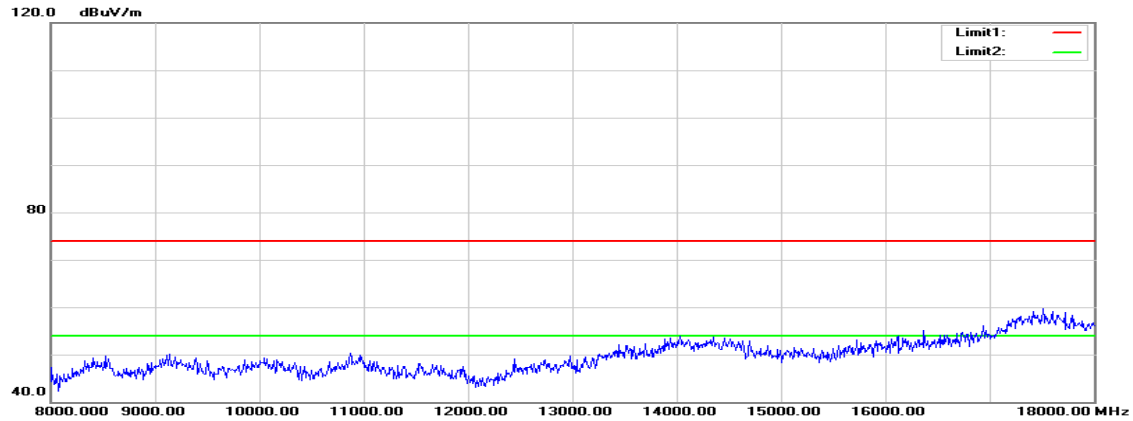
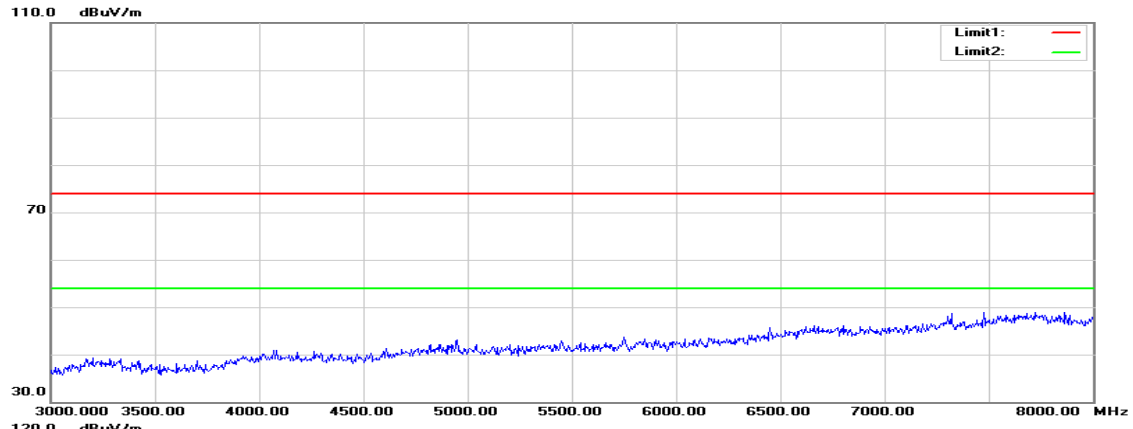
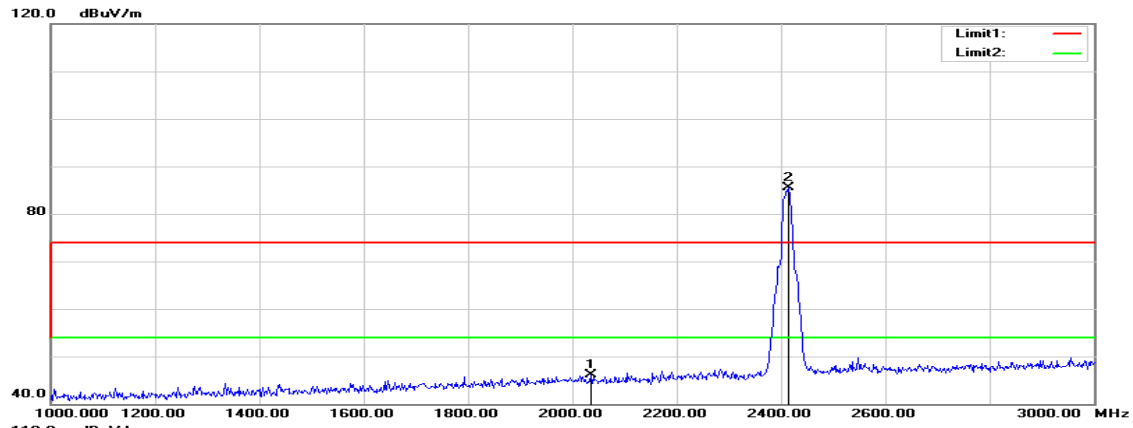
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11g / CH Low**

**Polarity: Vertical**



Polarity: Horizontal





**Operation Mode:** TX / IEEE 802.11g / CH Low

**Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

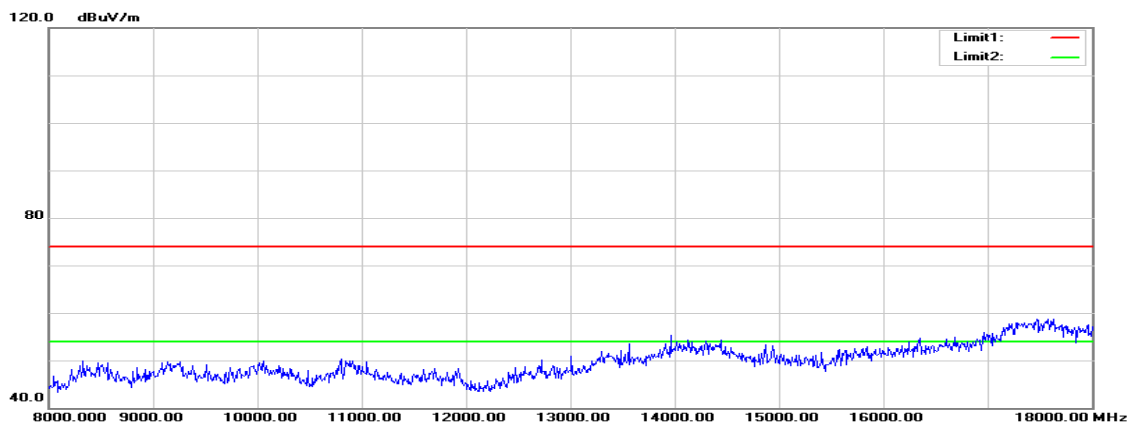
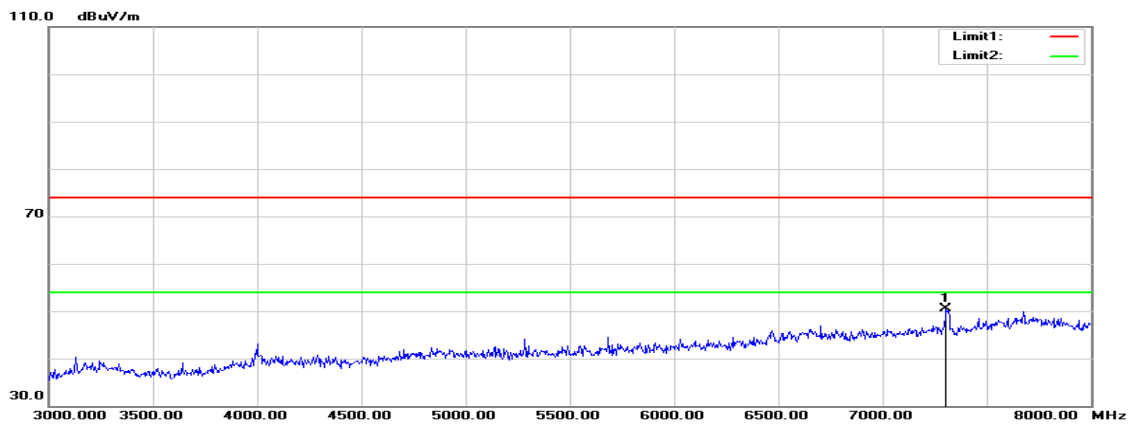
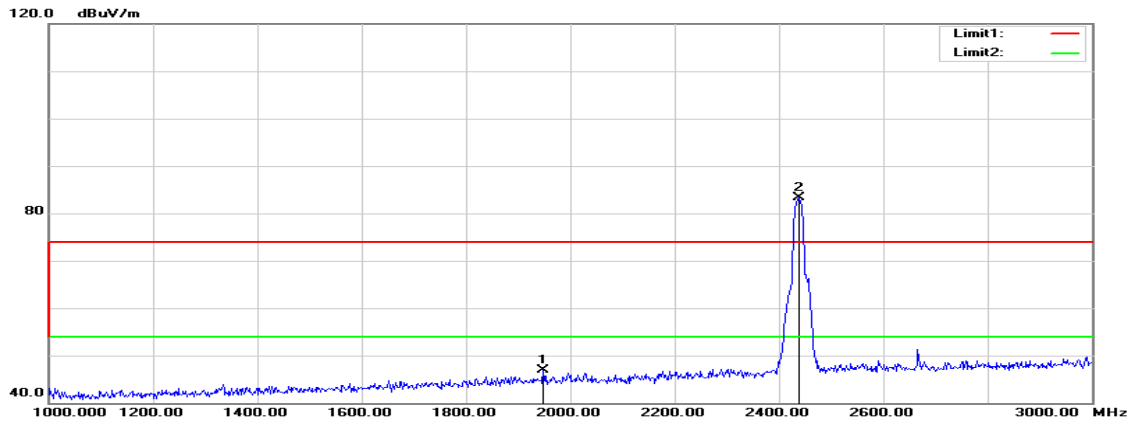
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2052.000	49.92	-3.65	46.27	74.00	-27.73	peak	V
7220.000	38.21	12.66	50.87	74.00	-23.13	peak	V
N/A							
2036.000	49.67	-3.64	46.03	74.00	-27.97	peak	H
N/A							

**Remark:**

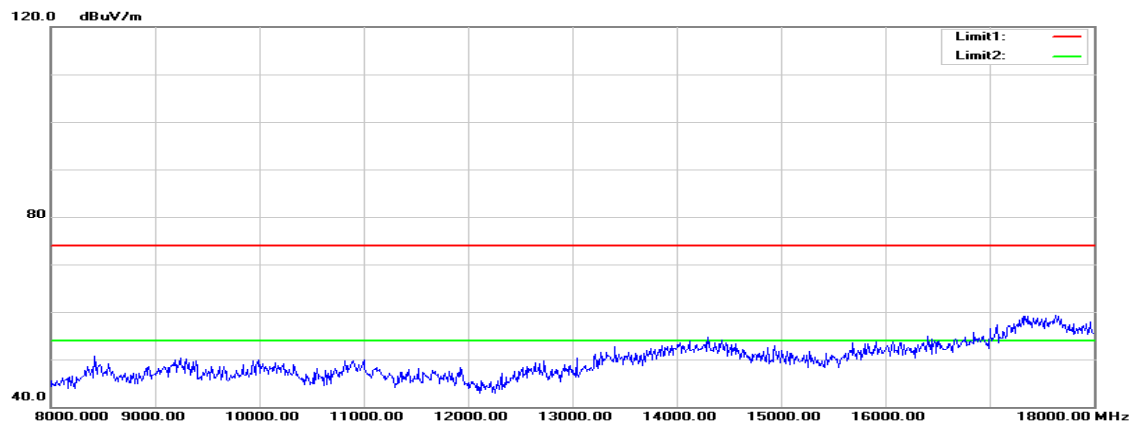
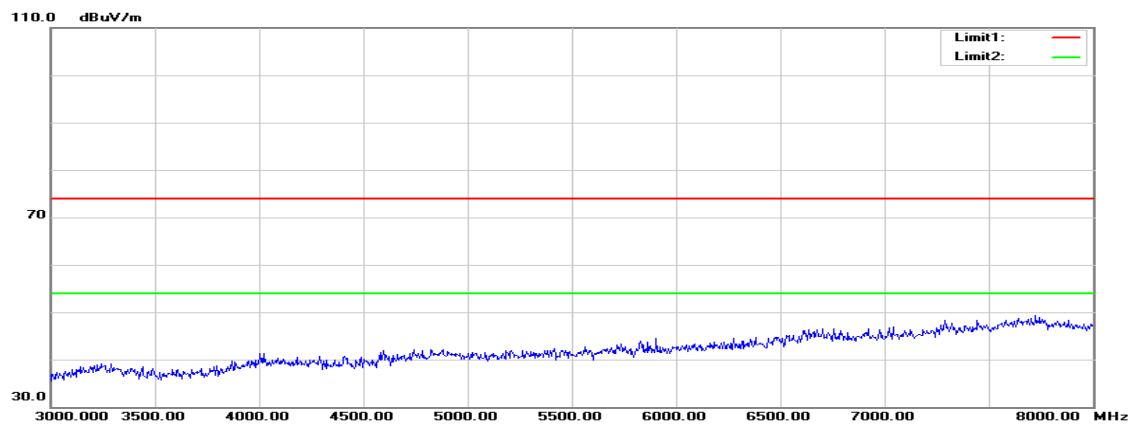
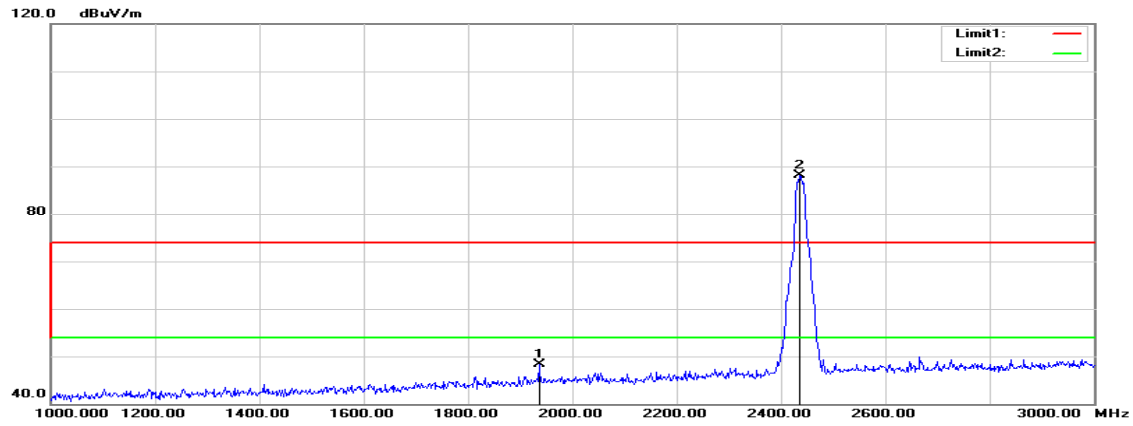
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11g / CH Mid**

**Polarity: Vertical**



Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11g / CH Mid

**Test Date:** June 6, 2015

**Temperature:** 27°C

**Tested by:** Andy Shi

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

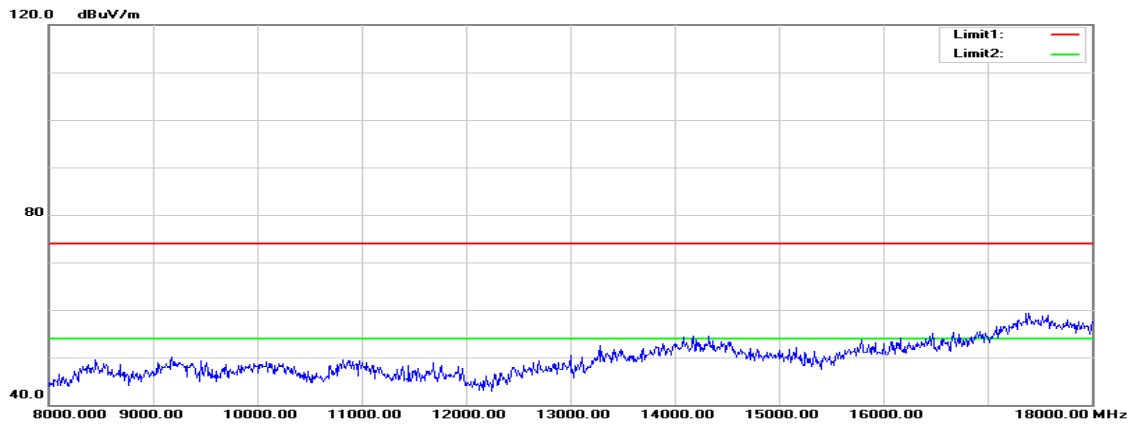
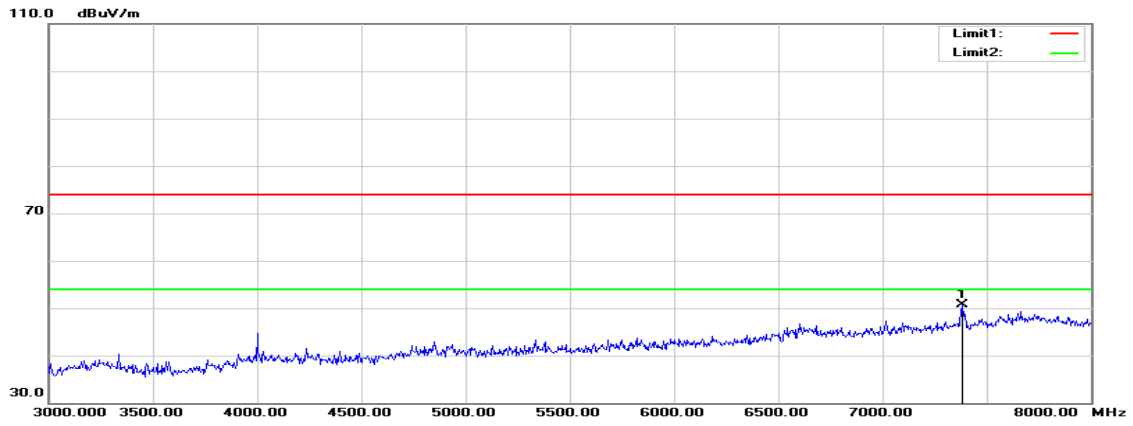
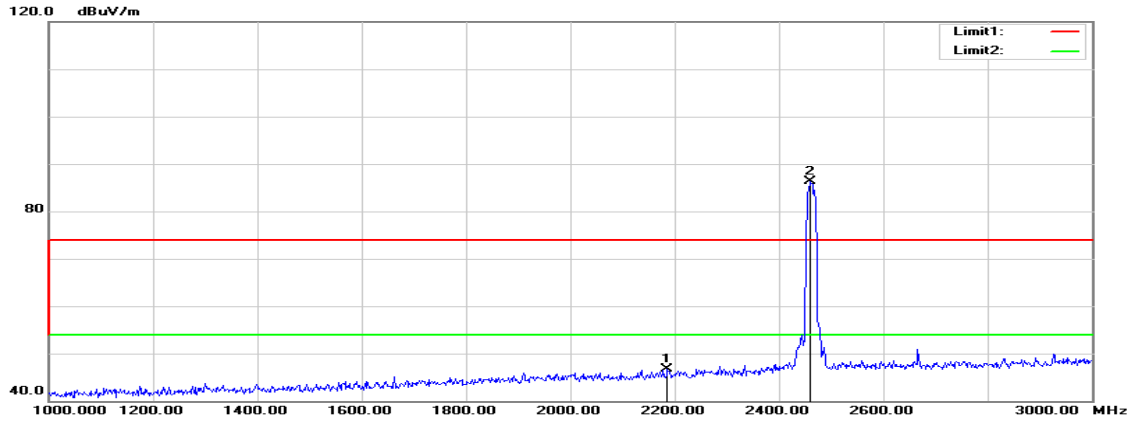
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1948.000	50.84	-3.87	46.97	74.00	-27.03	peak	V
7305.000	37.49	12.92	50.41	74.00	-23.59	peak	V
N/A							
1936.000	52.16	-3.93	48.23	74.00	-25.77	peak	H
N/A							

**Remark:**

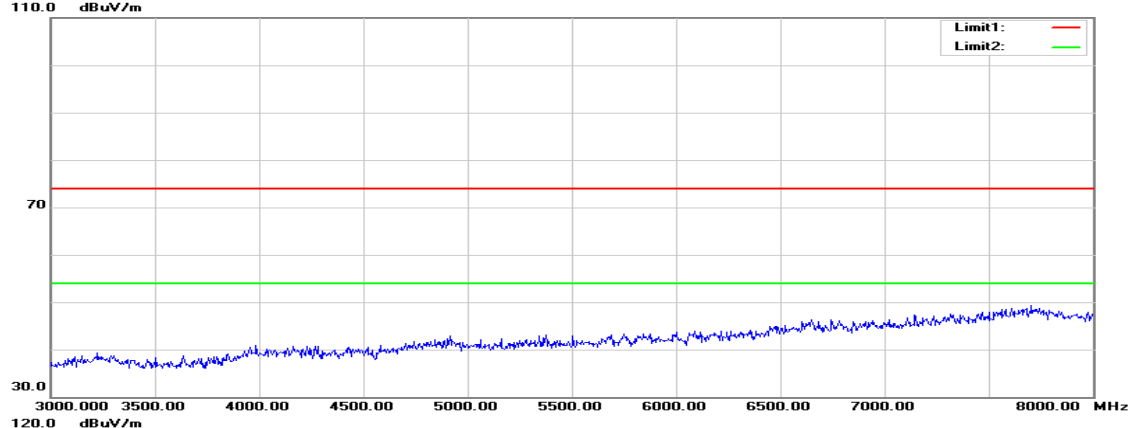
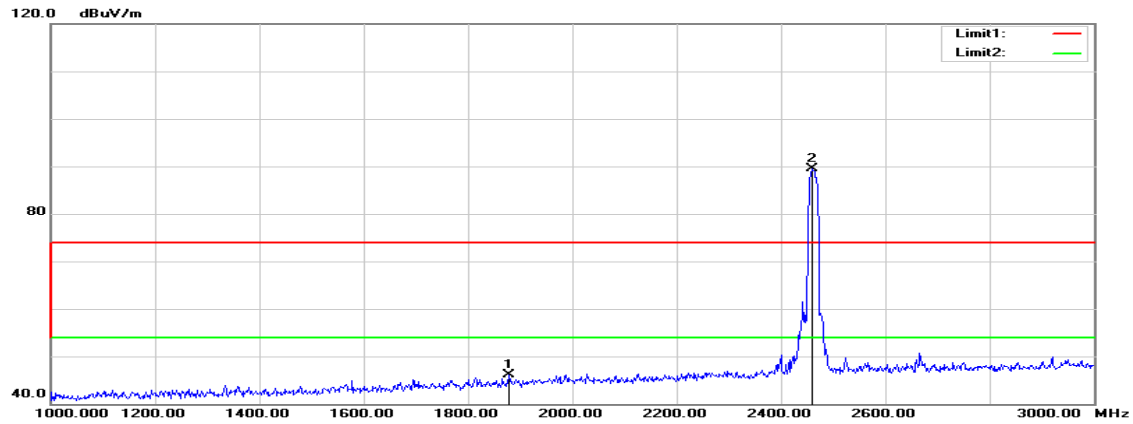
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11g / CH High**

**Polarity: Vertical**



Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11g / CH High

**Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

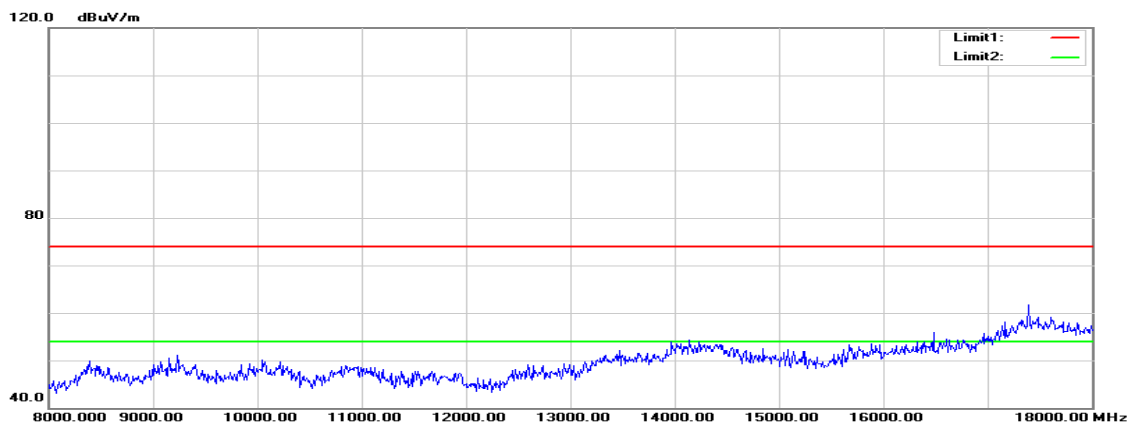
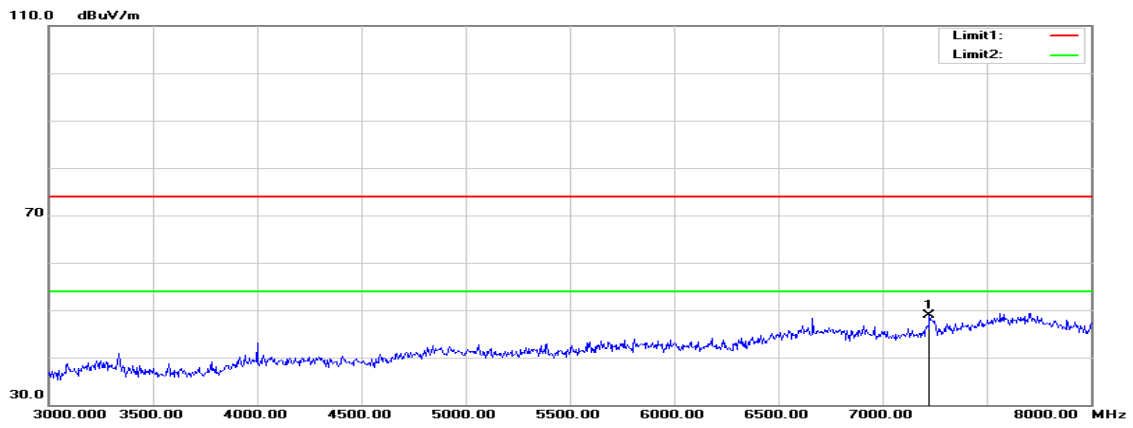
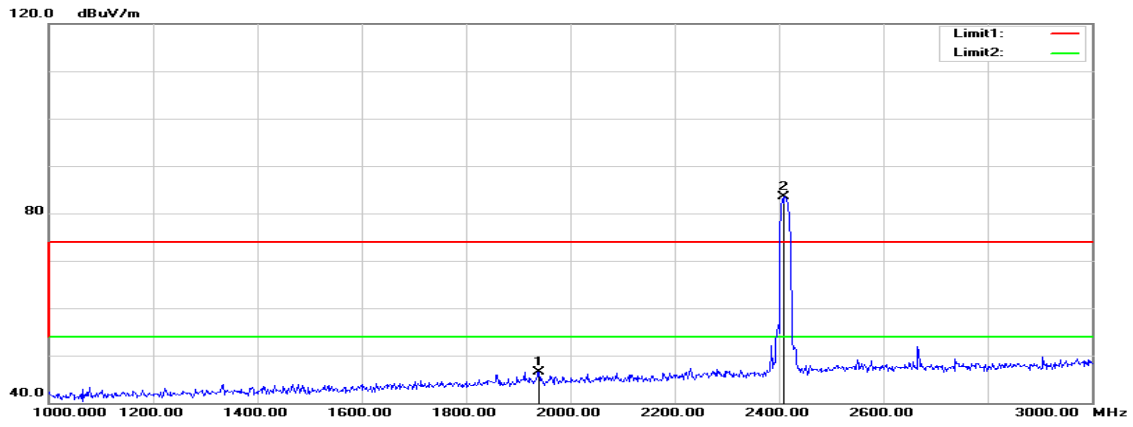
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
2186.000	50.02	-3.23	46.79	74.00	-27.21	peak	V
7385.000	37.62	13.16	50.78	74.00	-23.22	peak	V
N/A							
1878.000	50.27	-4.23	46.04	74.00	-27.96	peak	H
N/A							

**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).

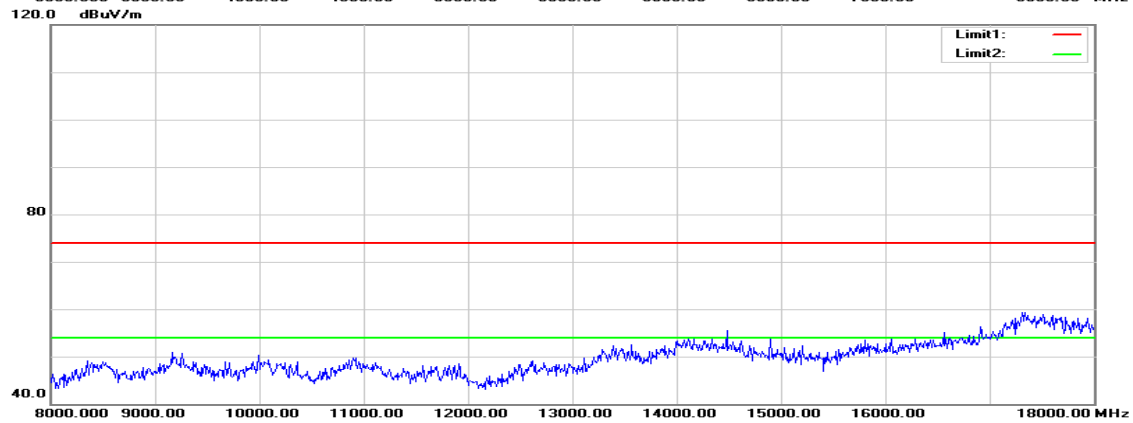
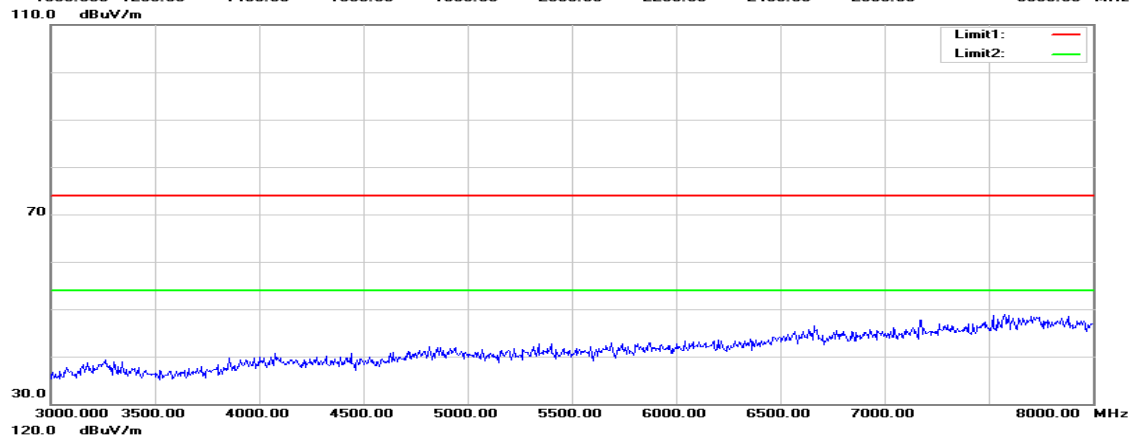
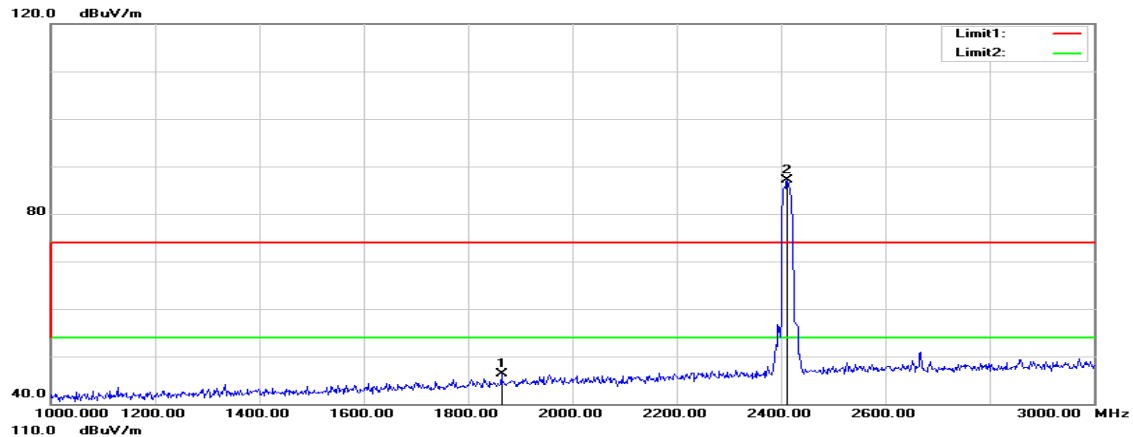
**TX / IEEE 802.11n HT 20 MHz mode / CH Low**

**Polarity: Vertical**





Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH Low    **Test Date:** August 9, 2015  
**Temperature:** 27°C    **Tested by:** Jason Lu  
**Humidity:** 53% RH    **Polarity:** Ver. / Hor.

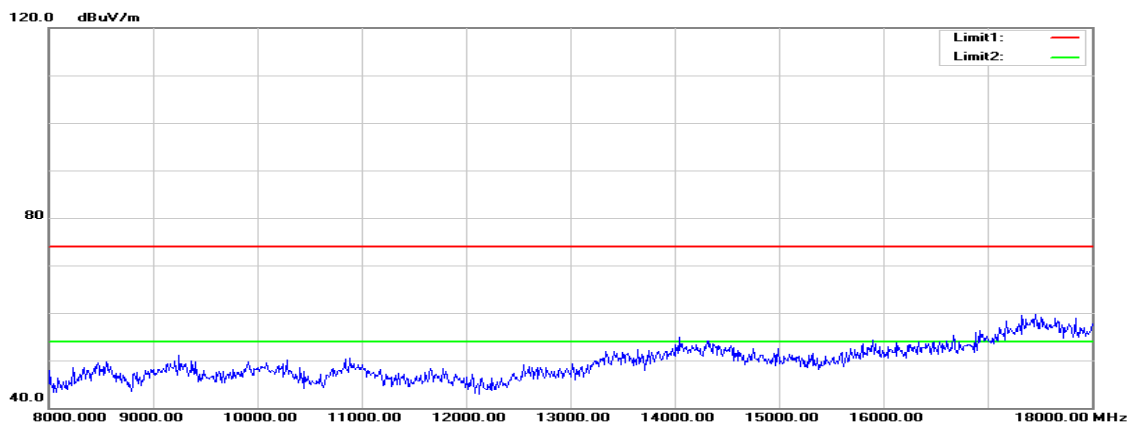
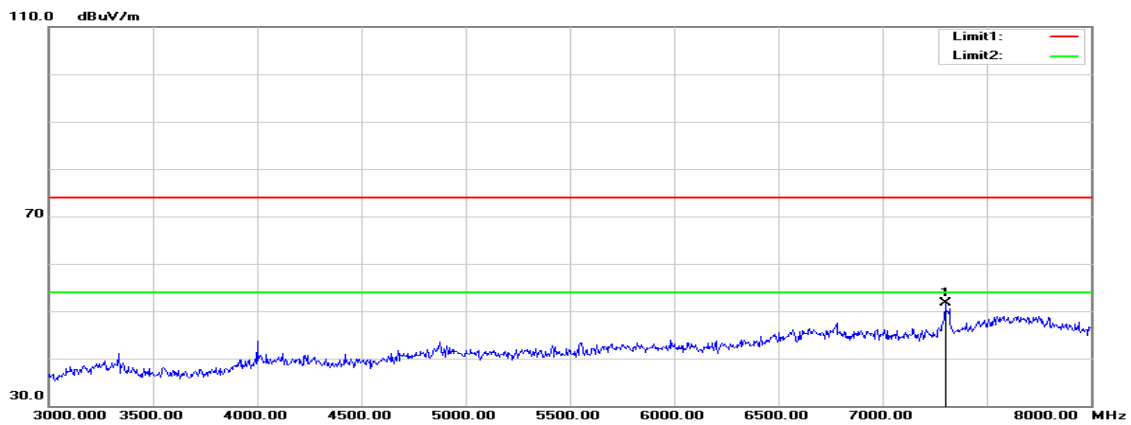
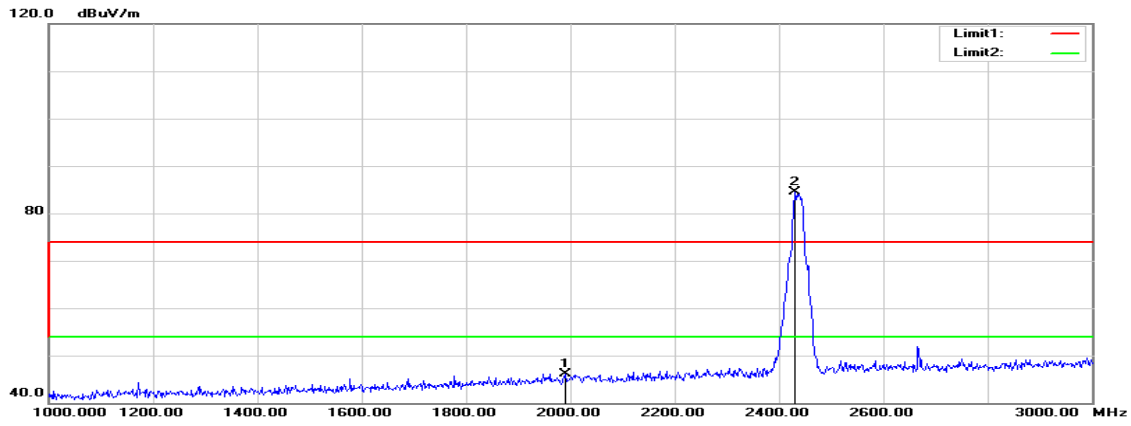
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1940.000	50.47	-3.91	46.56	74.00	-27.44	peak	V
7225.000	36.23	12.68	48.91	74.00	-25.09	peak	V
N/A							
1864.000	50.60	-4.30	46.30	74.00	-27.70	peak	H
N/A							

**Remark:**

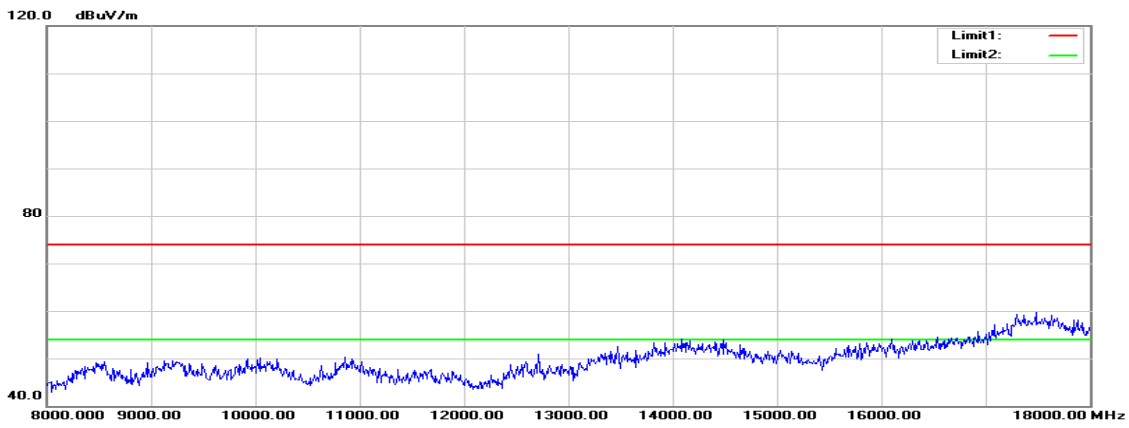
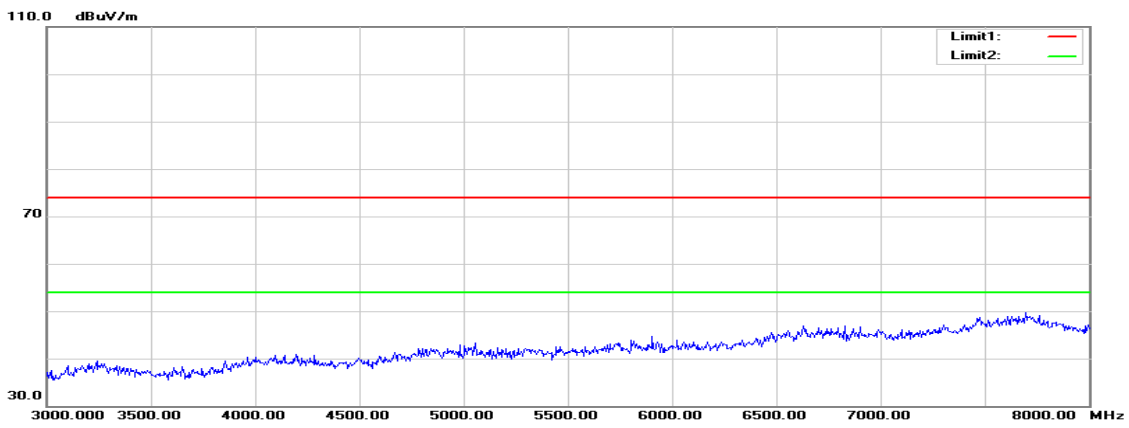
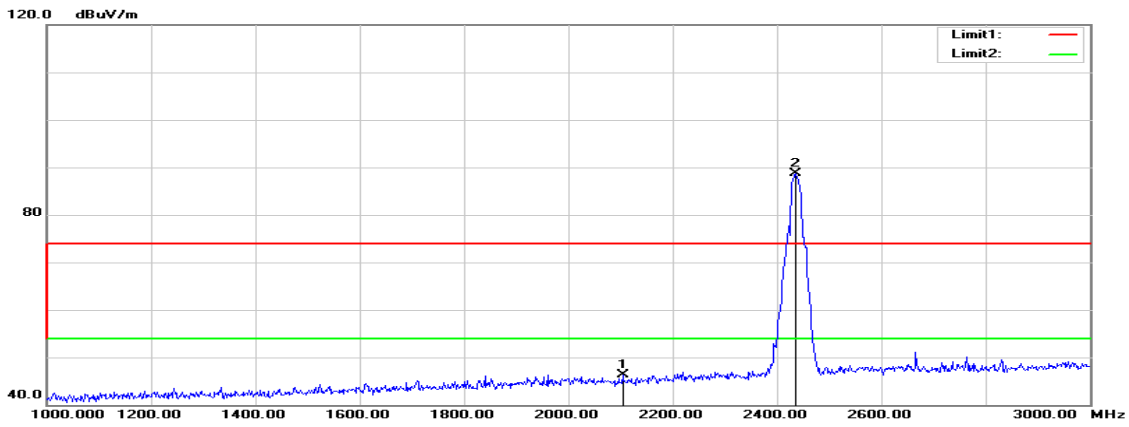
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11n HT 20 MHz mode / CH Mid**

**Polarity: Vertical**



Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH Mid    **Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

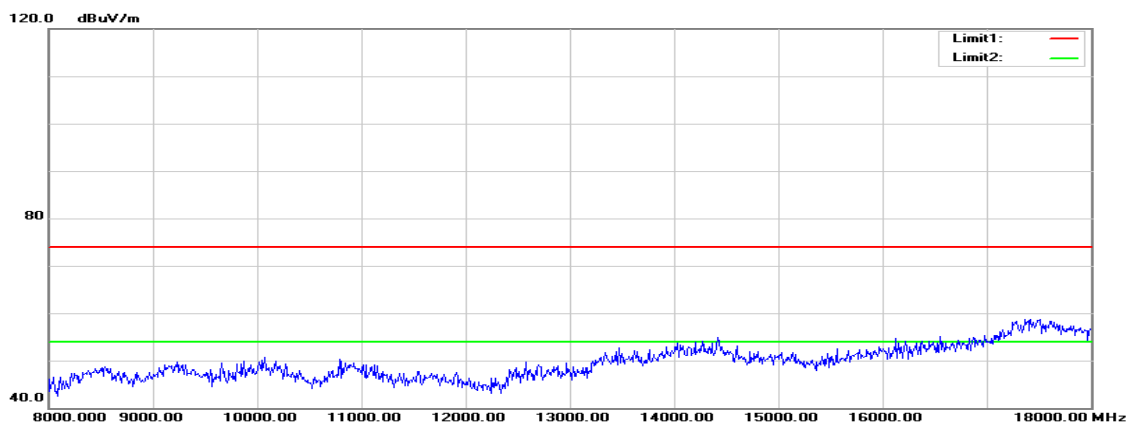
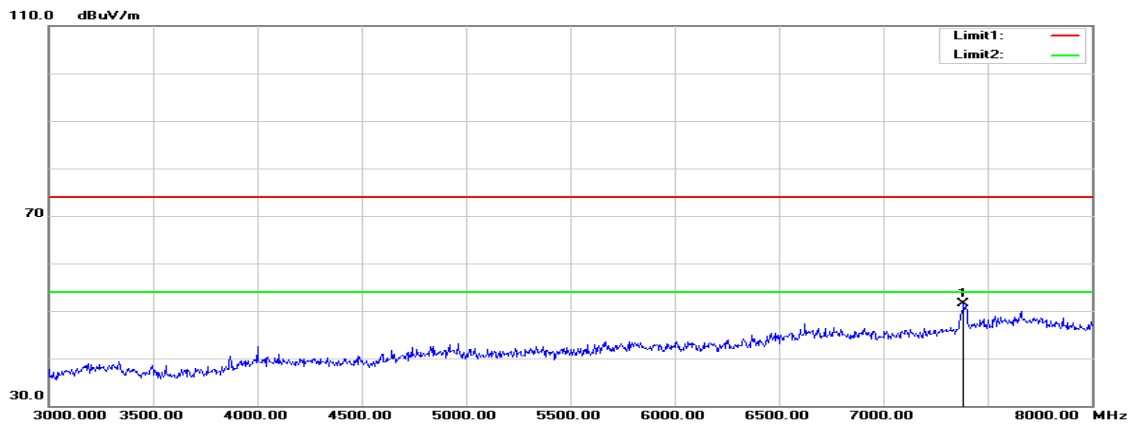
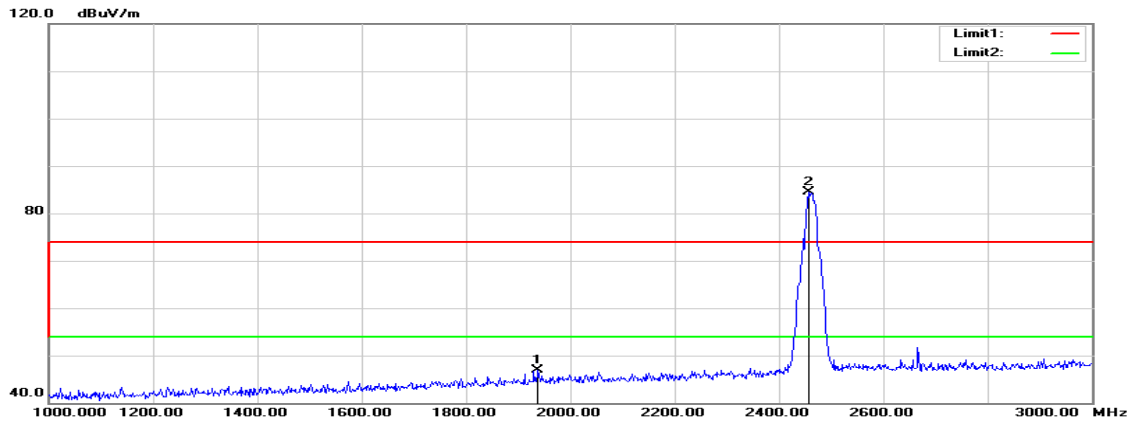
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1990.000	49.84	-3.65	46.19	74.00	-27.81	peak	V
7300.000	38.88	12.91	51.79	74.00	-22.21	peak	V
N/A							
2104.000	50.05	-3.68	46.37	74.00	-27.63	peak	H
N/A							

**Remark:**

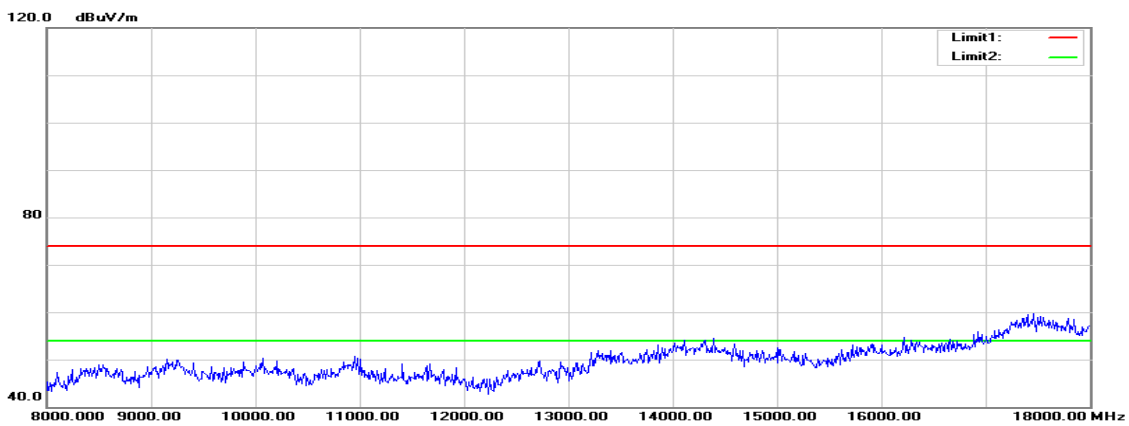
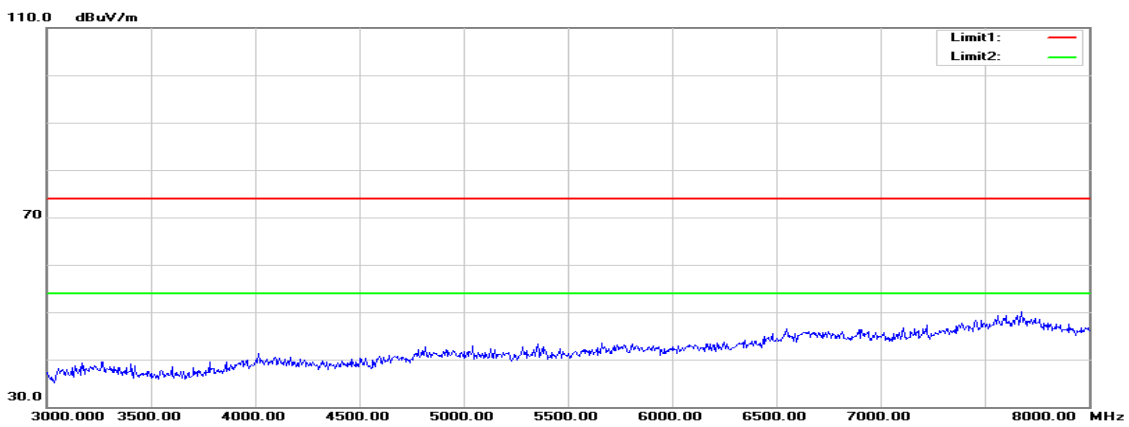
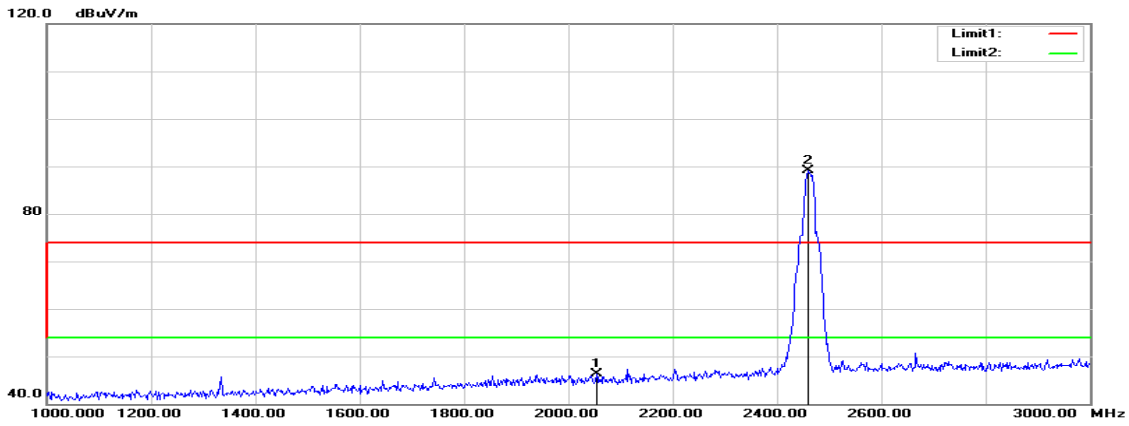
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11n HT 20 MHz mode / CH High**

**Polarity: Vertical**



Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / CH High    **Test Date:** August 9, 2015  
**Temperature:** 27°C    **Tested by:** Jason Lu  
**Humidity:** 53% RH    **Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1938.000	50.87	-3.92	46.95	74.00	-27.05	peak	V
7385.000	38.31	13.16	51.47	74.00	-22.53	peak	V
N/A							
2054.000	49.88	-3.65	46.23	74.00	-27.77	peak	H
N/A							

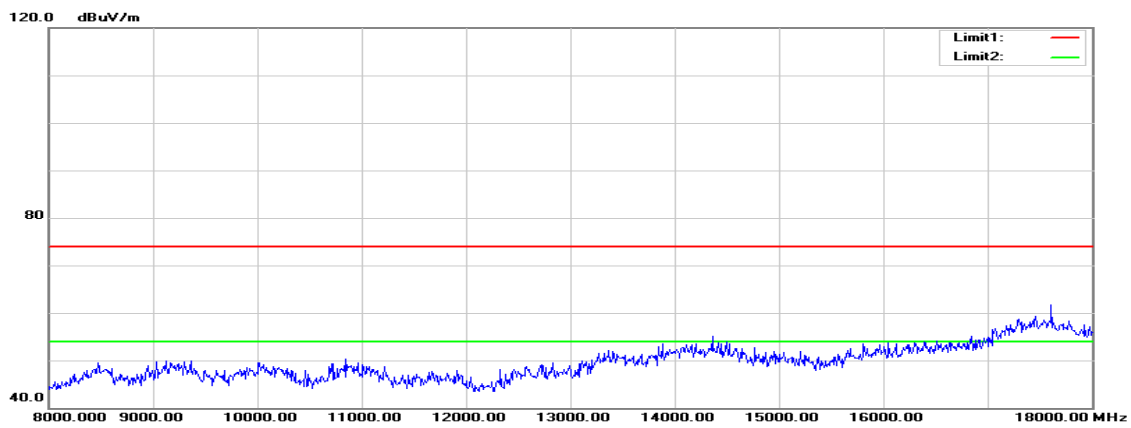
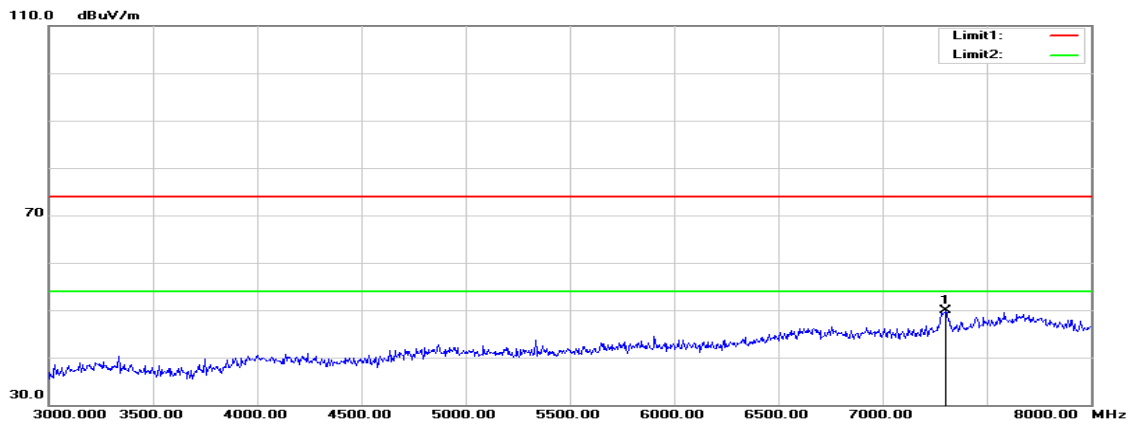
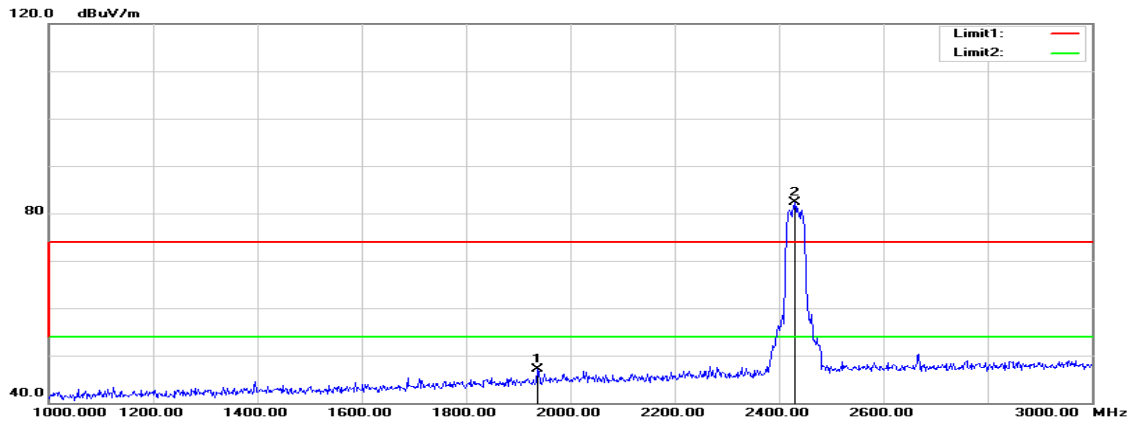
**Remark:**

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).

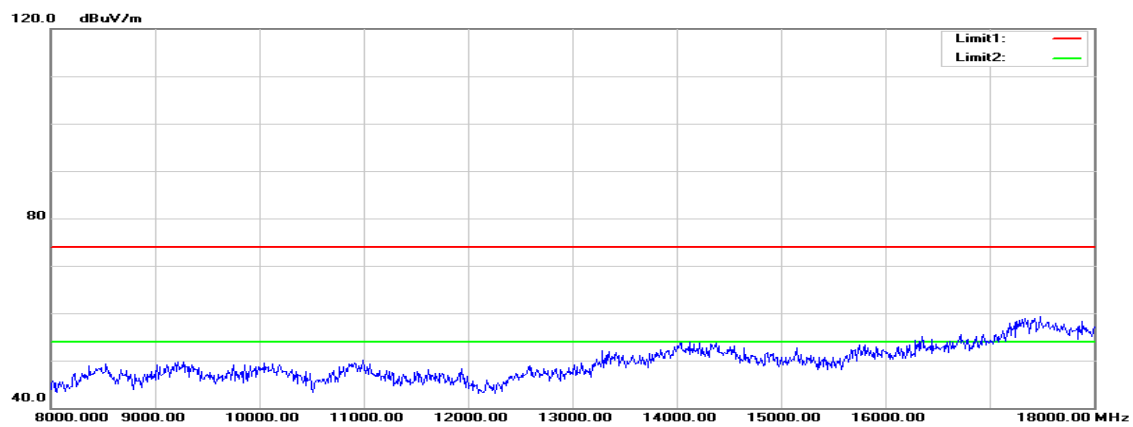
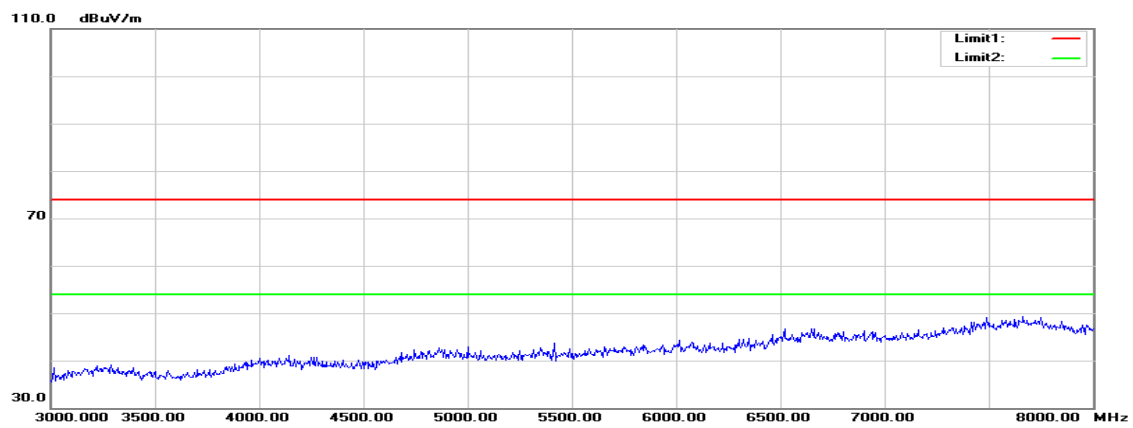
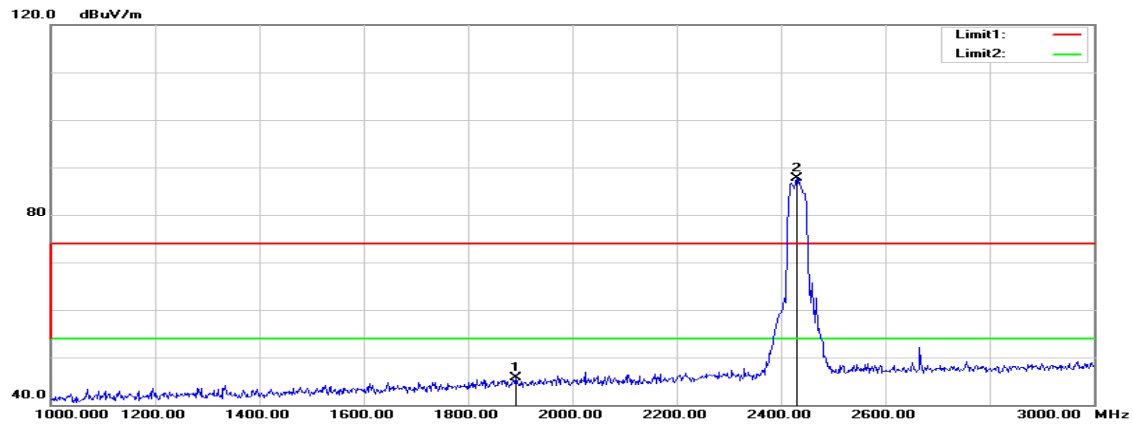


**TX / IEEE 802.11n HT 40 MHz mode / CH Low**

**Polarity: Vertical**



Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode / CH Low    **Test Date:** August 9, 2015  
**Temperature:** 27°C    **Tested by:** Jason Lu  
**Humidity:** 53% RH    **Polarity:** Ver. / Hor.

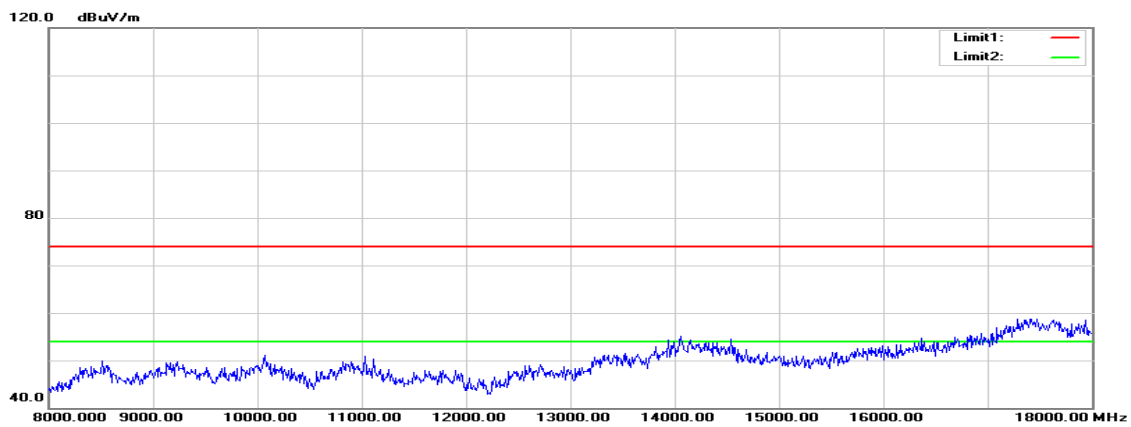
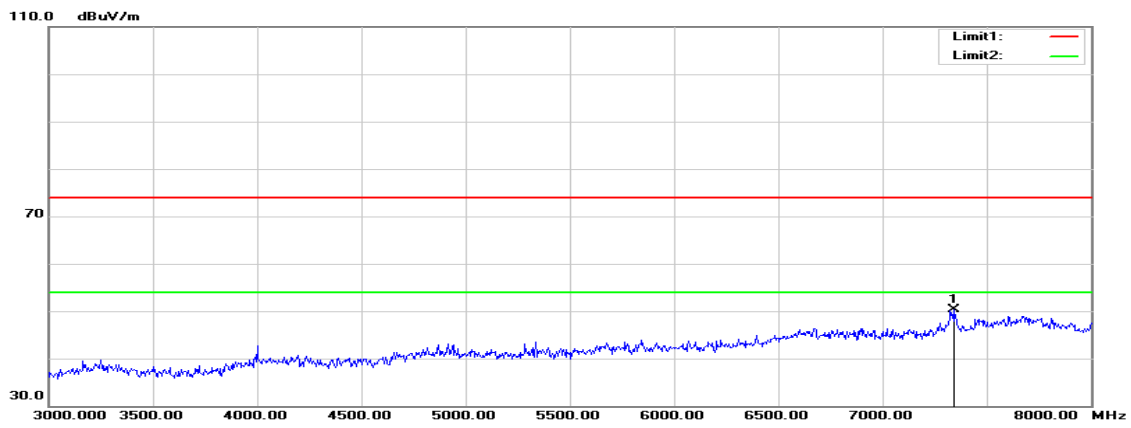
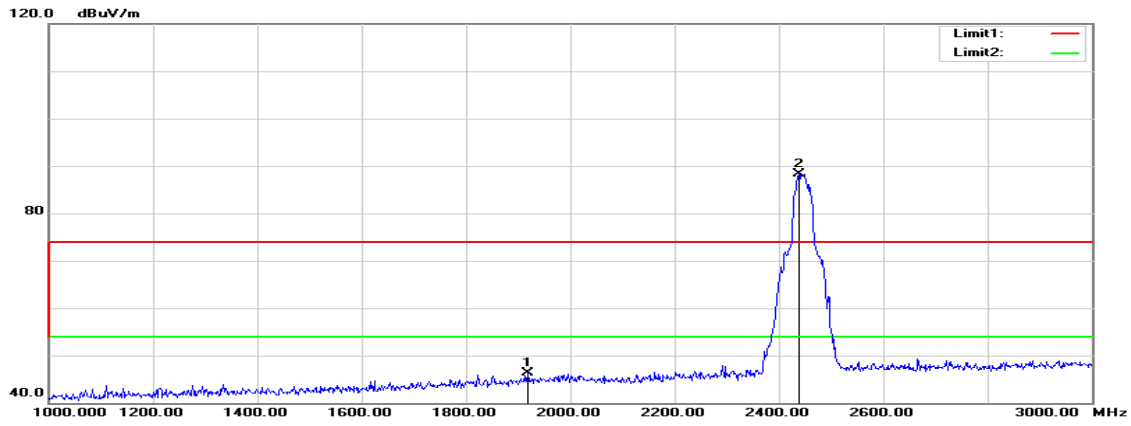
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1936.000	50.94	-3.93	47.01	74.00	-26.99	peak	V
7305.000	36.99	12.92	49.91	74.00	-24.09	peak	V
N/A							
1892.000	49.93	-4.16	45.77	74.00	-28.23	peak	H
N/A							

**Remark:**

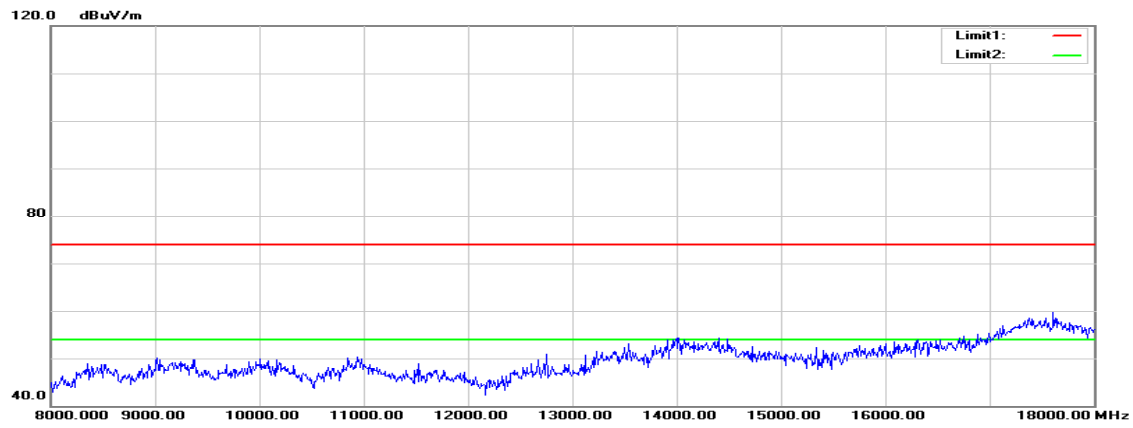
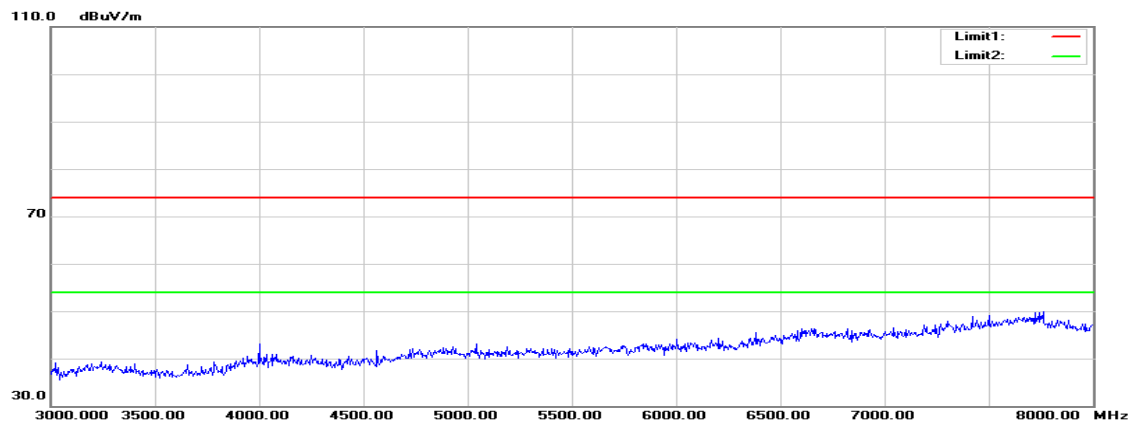
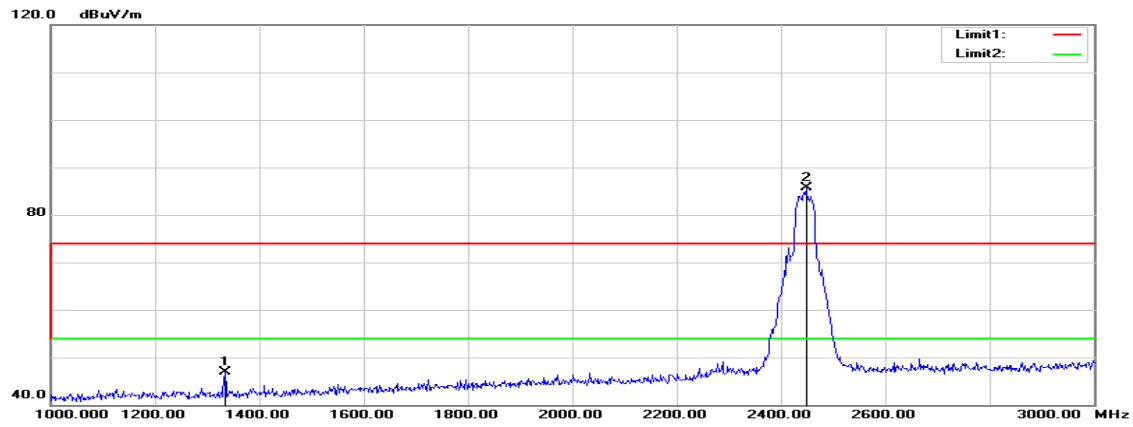
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11n HT 40 MHz mode / CH Mid**

**Polarity: Vertical**



Polarity: Horizontal



**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode  
/ CH Mid

**Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

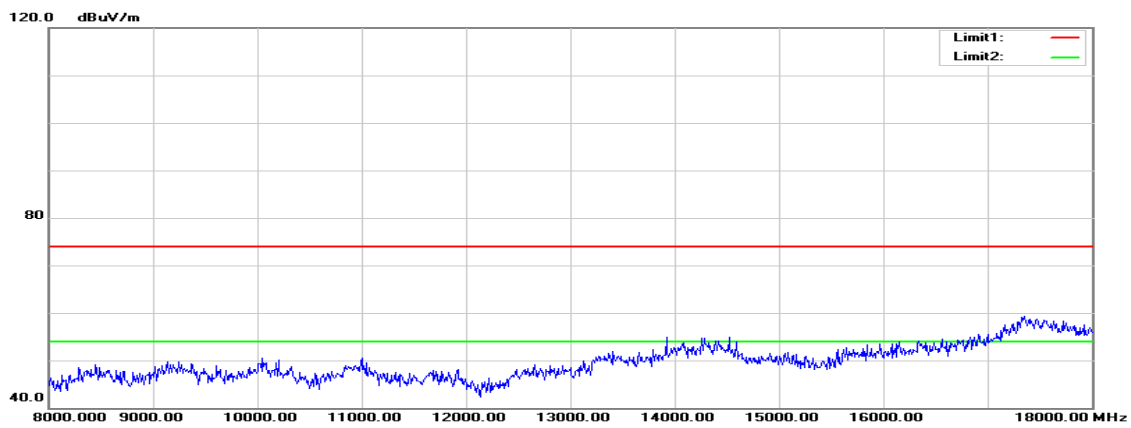
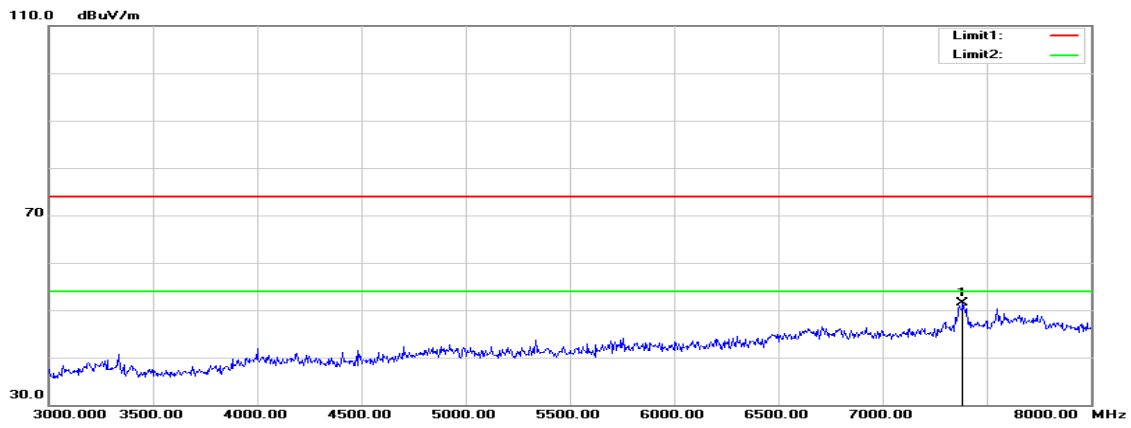
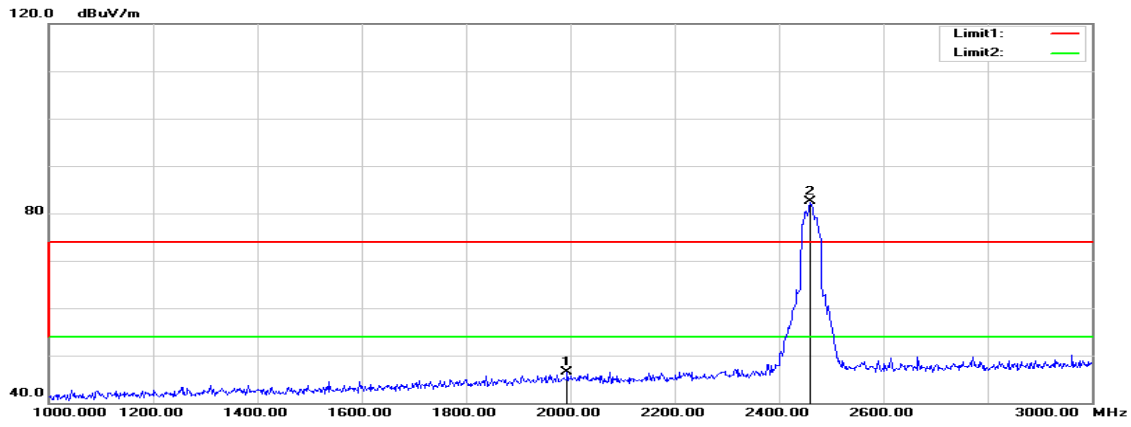
Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1918.000	50.27	-4.02	46.25	74.00	-27.75	peak	V
7340.000	37.23	13.03	50.26	74.00	-23.74	peak	V
N/A							
1334.000	53.62	-6.77	46.85	74.00	-27.15	peak	H
N/A							

**Remark:**

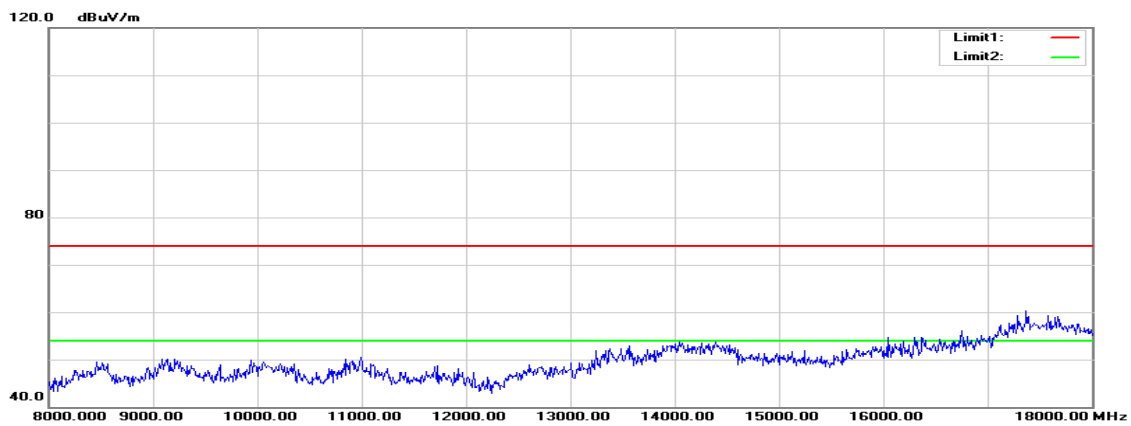
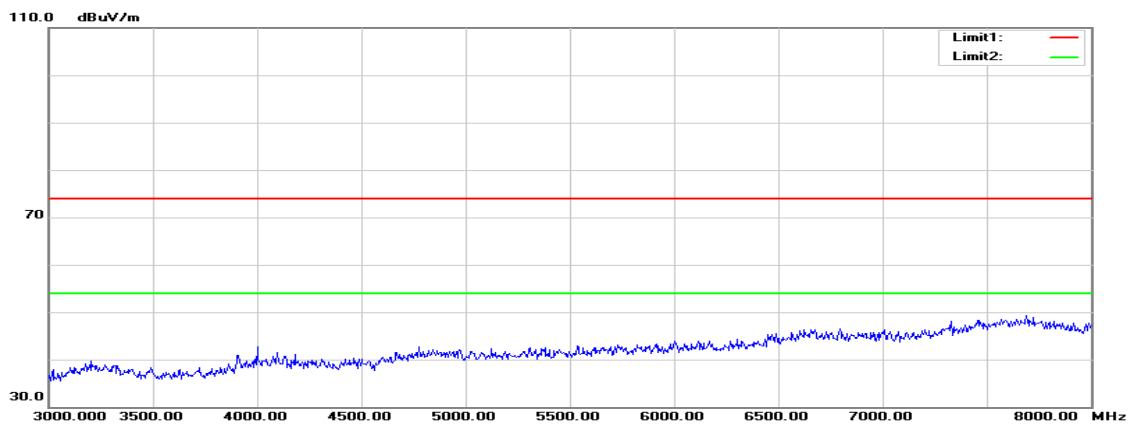
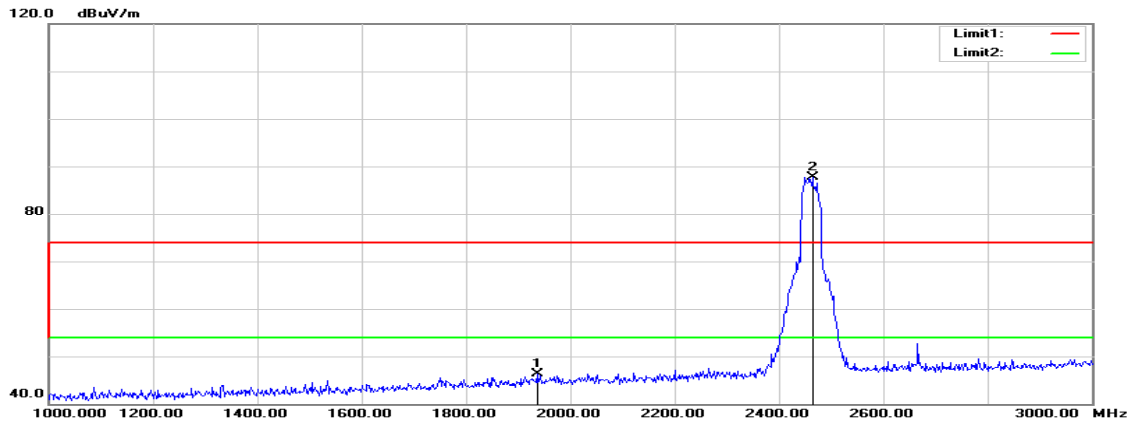
1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Radiated emissions measured in frequency above 1000MHz were made with an instrument using peak/average detector mode.
3. Average test would be performed if the peak result were greater than the average limit 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).

**TX / IEEE 802.11n HT 40 MHz mode / CH High**

**Polarity: Vertical**



Polarity: Horizontal





**Operation Mode:** TX / IEEE 802.11n HT 40 MHz mode / CH High **Test Date:** August 9, 2015

**Temperature:** 27°C

**Tested by:** Jason Lu

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1994.000	50.13	-3.63	46.50	74.00	-27.50	peak	V
7385.000	38.30	13.16	51.46	74.00	-22.54	peak	V
N/A							
1936.000	50.16	-3.93	46.23	74.00	-27.77	peak	H
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).*

## 7.9 POWERLINE CONDUCTED EMISSIONS

### LIMIT

According to §15.207(a) & RSS-Gen §7.2.4, 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**

**Operation Mode:** Normal Link                      **Test Date:** August 5, 2015  
**Temperature:** 26°C                                      **Tested by:** David Shu  
**Humidity:** 60% RH

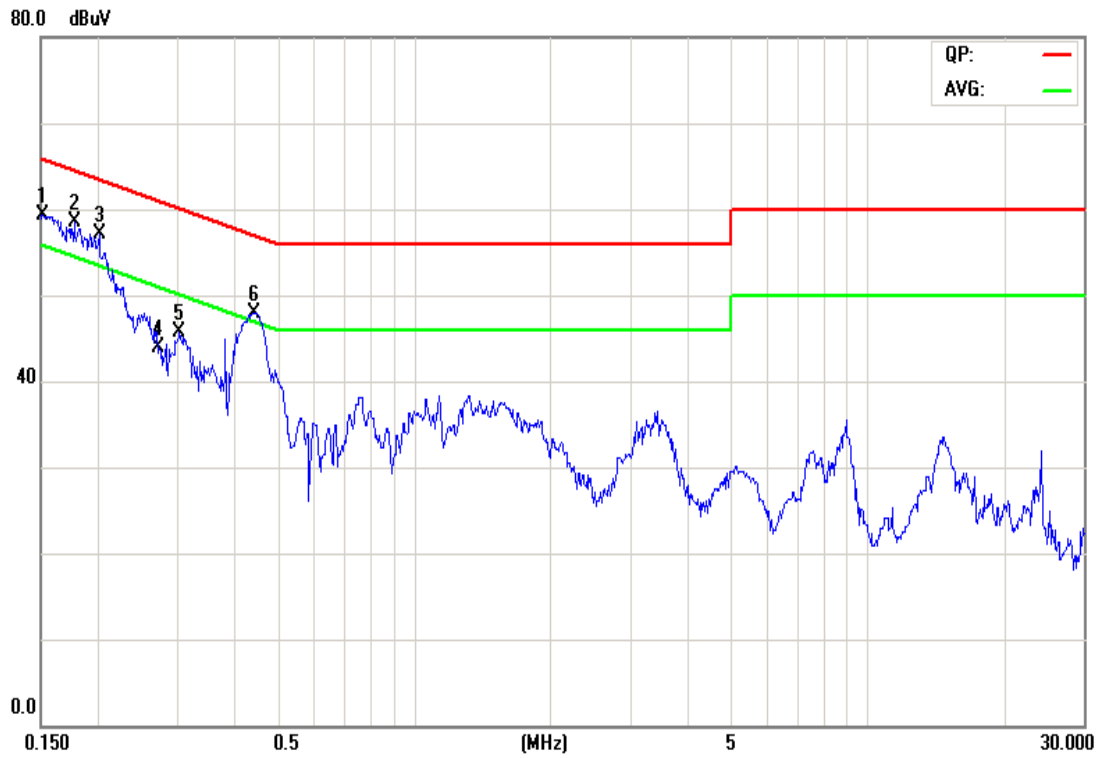
Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.1527	56.41	50.68	0.09	56.50	50.77	65.85	55.85	-9.35	-5.08	L1
0.1780	51.22	44.62	0.09	51.31	44.71	64.58	54.58	-13.27	-9.87	L1
0.2009	49.77	43.96	0.09	49.86	44.05	63.57	53.57	-13.71	-9.52	L1
0.2732	36.86	27.35	0.09	36.95	27.44	61.02	51.02	-24.07	-23.58	L1
0.3050	41.12	35.97	0.10	41.22	36.07	60.11	50.11	-18.89	-14.04	L1
0.4398	44.75	31.69	0.10	44.85	31.79	57.07	47.07	-12.22	-15.28	L1
0.1601	52.59	44.32	0.09	52.68	44.41	65.46	55.46	-12.78	-11.05	L2
0.1826	50.30	42.42	0.09	50.39	42.51	64.37	54.37	-13.98	-11.86	L2
0.1964	48.75	41.69	0.09	48.84	41.78	63.76	53.76	-14.92	-11.98	L2
0.2350	39.73	30.27	0.09	39.82	30.36	62.27	52.27	-22.45	-21.91	L2
0.4402	44.67	31.78	0.09	44.76	31.87	57.06	47.06	-12.30	-15.19	L2
0.7541	35.27	28.02	0.10	35.37	28.12	56.00	46.00	-20.63	-17.88	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)**

