FCC 47 CFR PART 15 SUBPART C & INDUSTRY CANADA RSS-210

TEST REPORT

For

802.11n, Dual Band 2T2R Wireless LAN USB Module

Model: WN4516R

Trade Name: LITE-ON

Issued to

Lite-On Technology Corp.
4F, 90, Chien 1 Road, Chung Ho,New Taipei City 23585, 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.)
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service@ccsrf.com
Issued Date: February 11, 2015

Testing Laboratory
1309

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Revision History

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		February 11, 2015		Initial Issue	ALL	Doris Chu

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1. TEST RESULT CERTIFICATION

Applicant:	Lite-On Technology Corp. 4F, 90, Chien 1 Road, Chung Ho,New Taipei City 23585, Taiwan, R.O.C.
Manufacturer:	LITE-ON TECHNOLOGY (Changzhou) CO., LTD 9 Building,No.88 Yanghu Road, Wujin Hi-Tech Industrial Development Zone ,Changzhou City, Jiangsu Province 213100 China
Equipment Under Test:	802.11n, Dual Band 2T2R Wireless LAN USB Module
Trade Name:	LITE-ON
Model:	WN4516R
Date of Test:	January 19 ~ February 3, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
FCC 47 CFR Part 15 Subpart C & Industry Canada RSS-210 Issue 8 December, 2010	No non-compliance noted

We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4: 2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 15.207, 15.209, 15.247 and Industry Canada RSS-210.

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

Approved by:

Miller Lee
Section Manager
Compliance Certification Services Inc.

Reviewed by:

Angel Cheng
Section Manager
Compliance Certification Services Inc.

2. EUT DESCRIPTION

Product	802.11n, Dual Band 2T2R Wireless LAN USB Module
Trade Name	LITE-ON
Model Number	WN4516R
Model Discrepancy	N/A
Received Date	January 13, 2015
Power Adapter	Power form host device
Frequency Range	2412 ~ 2462 MHz
Transmit Power	<table><tr><th>Mode</th><th>Frequency Range</th><th>Output Power (dBm)</th><th>Output Power (W)</th></tr><tr><td>802.11b</td><td>2412 - 2462</td><td>19.64</td><td>0.09204</td></tr><tr><td>802.11g</td><td>2412 - 2462</td><td>24.78</td><td>0.30061</td></tr><tr><td>802.11n Standard-20 MHz</td><td>2412 - 2462</td><td>27.26</td><td>0.5320</td></tr><tr><td>802.11n Standard-40 MHz</td><td>2422 - 2452</td><td>25.26</td><td>0.3355</td></tr></table>
Modulation Technique	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mpbs) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mpbs) 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)
Number of Channels	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
Antenna Specification	PIFA Antenna / Gain: 2.2 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 ID: **PPQ-WN4516R** filing to comply with Section 15.207, 15.209 and 15.247 of the FCC Part 15, Subpart C Rules.*

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47 Part 15.207, 15.209, 15.247 and DA00-705.

The tests documented in this report were performed in accordance with IC RSS-210, IC RSS-Gen, IC RSS-102, IC RSS-212, and ANSI C63.4.

This submittal(s) (test report) is intended for IC Certification with Industry Canada RSS-210.

3.1 EUT CONFIGURATION

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

3.2 EUT EXERCISE

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

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

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

3.3 GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

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

3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]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	([2])
13.36 - 13.41	322 - 335.4		

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] 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: WN4516R) had been tested under operating condition.

The EUT is a 2x2 configuration spatial MIMO (2Tx & 2Rx) without beam forming function that operate in double TX chains and double RX chains. The 2x2 configuration is implemented with two outside TX & RX chains (Chain 0 and 1).

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: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (Y axis) 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	06/03/2015
Power Sensor	Anritsu	MA2411A	0917072	06/03/2015
Spectrum Analyzer	ROHDE&SCHWARZ	FSV40	101073	07/09/2015

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	05/30/2015
Bilog Antenna	Sunol Sciences	JB3	A030105	08/19/2015
Horn Antenna	EMCO	3117	00055165	02/04/2015
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
Test S/W	EZ-EMC (CCS-3A1RE)			

4.3 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
Powerline Conducted Emission	N/A
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.199, Chunghsen Road, Hsintien City, Taipei Hsien, Taiwan, R.O.C.
Tel: 886-2-2217-0894 / Fax: 886-2-2217-1029

☒ No.11, Wugong 6th Rd., Wugu 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 C63.4 and CISPR Publication 22.

5.2 EQUIPMENT

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

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

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

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

5.3LABORATORY 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-210, RSS-310 IDA TS SRD, AS/NZS 4268, AS/NZS 4771, TS 12.1 & 12,2, ETSI EN 300 440-1, ETSI EN 300 440-2, ETSI EN 300 328, ETSI EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 893, ETSI EN 301 489-1/3/7/17 FCC OET Bulletin 65 + Supplement C, EN 50360, EN 50361, EN 50371, RSS 102, EN 50383, EN 50385, EN 50392, IEC 62209, CNS 14958-1, CNS 14959 FCC Method –47 CFR Part 15 Subpart B IEC / EN 61000-3-2, IEC / EN 61000-3-3, IEC / EN 61000-4-2/3/4/5/6/8/11	TAF Testing Laboratory 1309
Canada	Industry Canada	3M Semi Anechoic Chamber (IC 2324G-1 / IC 2324G-2) to perform	Canada 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
1	Notebook PC	TOSHIBA	Satellite M840	N/A	PPD-AR5B225	N/A	AC I/P: Unshielded, 1.8m DC O/P: Unshielded, 1.8m with a core

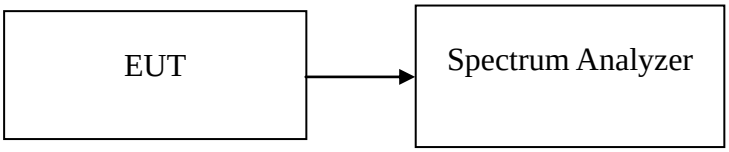
Remark:

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

7. FCC PART 15.247 REQUIREMENTS & RSS-210 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	12.1271
Mid	2437	12.1509
High	2462	12.1173

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.9443
Mid	2437	16.9162
High	2462	16.9772

Test mode: IEEE 802.11n HT 20 MHz mode / Chain 0

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.8732
Mid	2437	17.8524
High	2462	17.8627

Test mode: IEEE 802.11n HT 20 MHz mode / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	17.7479
Mid	2437	17.7431
High	2462	17.7427

Test mode: 802.11n Standard-40 MHz / Chain 0

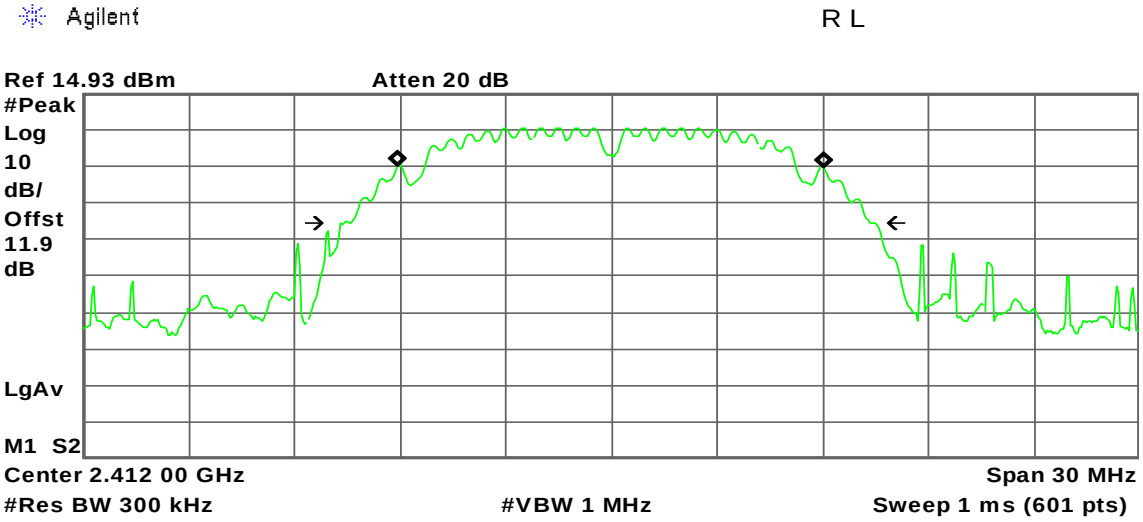
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	35.9116
Mid	2437	35.9401
High	2452	35.9569

Test mode: 802.11n Standard-40 MHz / Chain 1

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2422	35.9555
Mid	2437	35.9641
High	2452	35.9504

Test Plot

IEEE 802.11b mode
99% Bandwidth (CH Low)

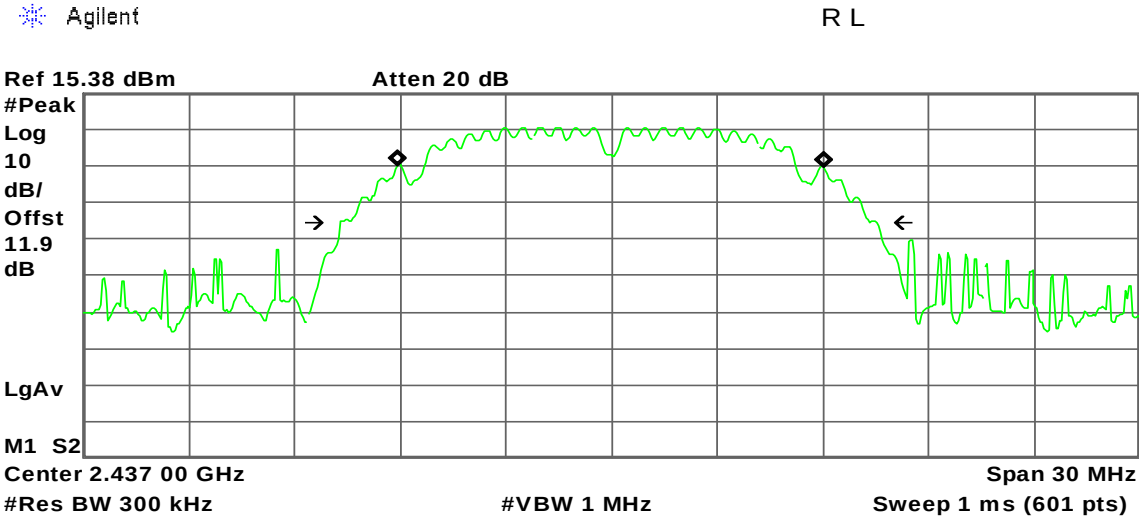


Occupied Bandwidth
12.1271 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -28.355 kHz
x dB Bandwidth 15.042 MHz

99% Bandwidth (CH Mid)

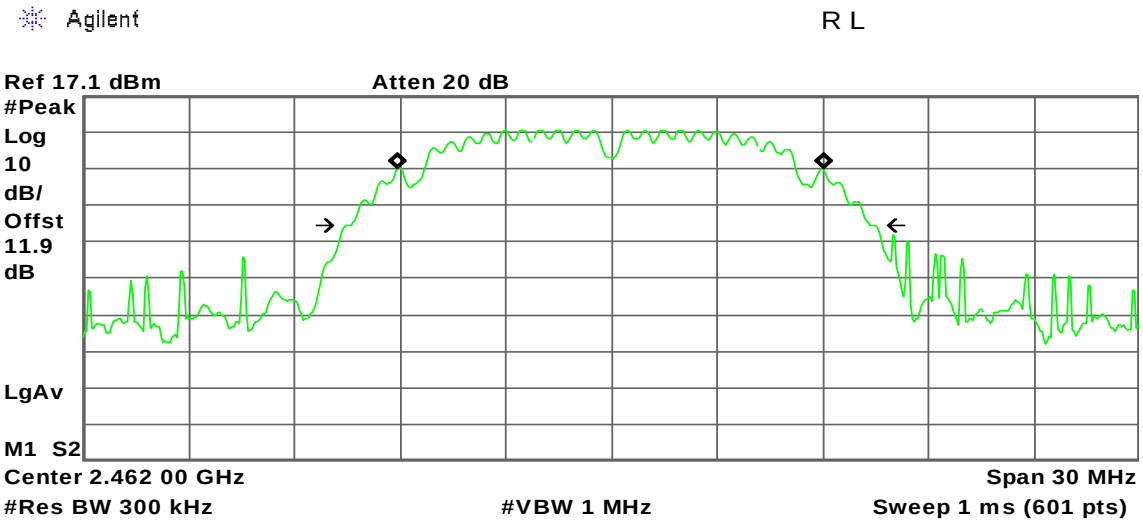


Occupied Bandwidth
12.1509 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -33.687 kHz
x dB Bandwidth 15.244 MHz

99% Bandwidth (CH High)



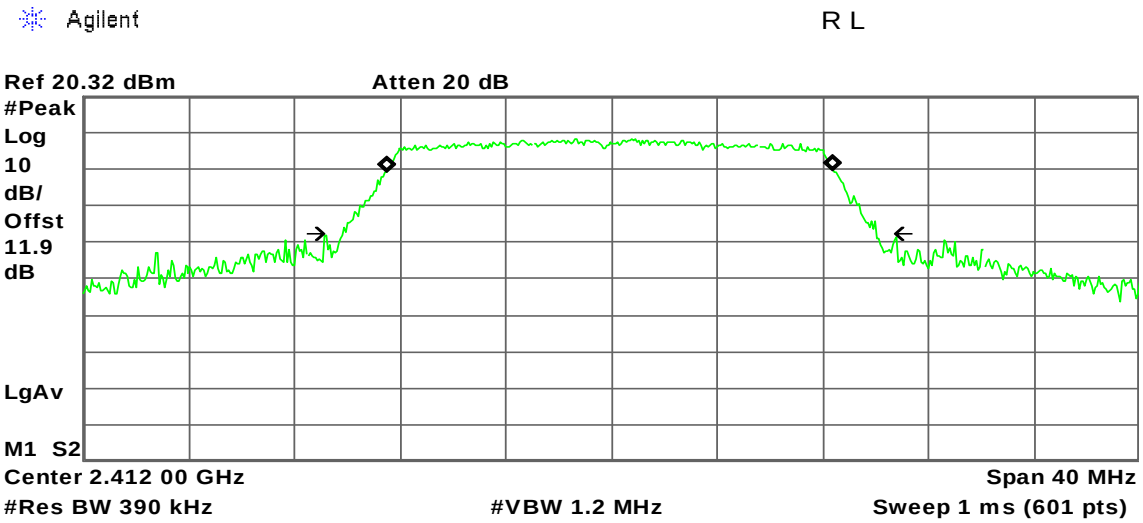
Occupied Bandwidth
12.1173 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -27.098 kHz
x dB Bandwidth 14.719 MHz

IEEE 802.11g mode

99% Bandwidth (CH Low)

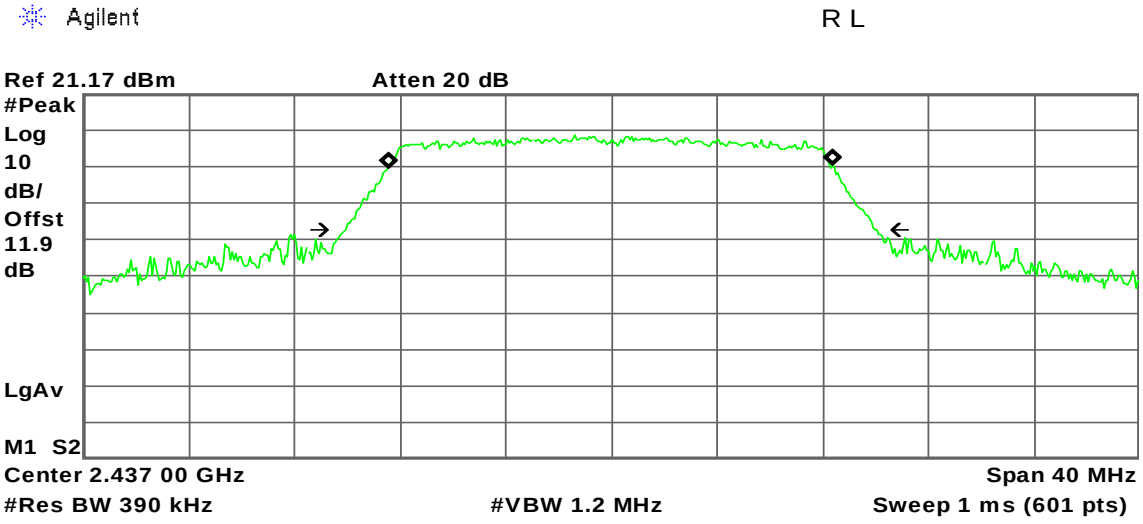


Occupied Bandwidth
16.9443 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -39.099 kHz
x dB Bandwidth 20.248 MHz

99% Bandwidth (CH Mid)

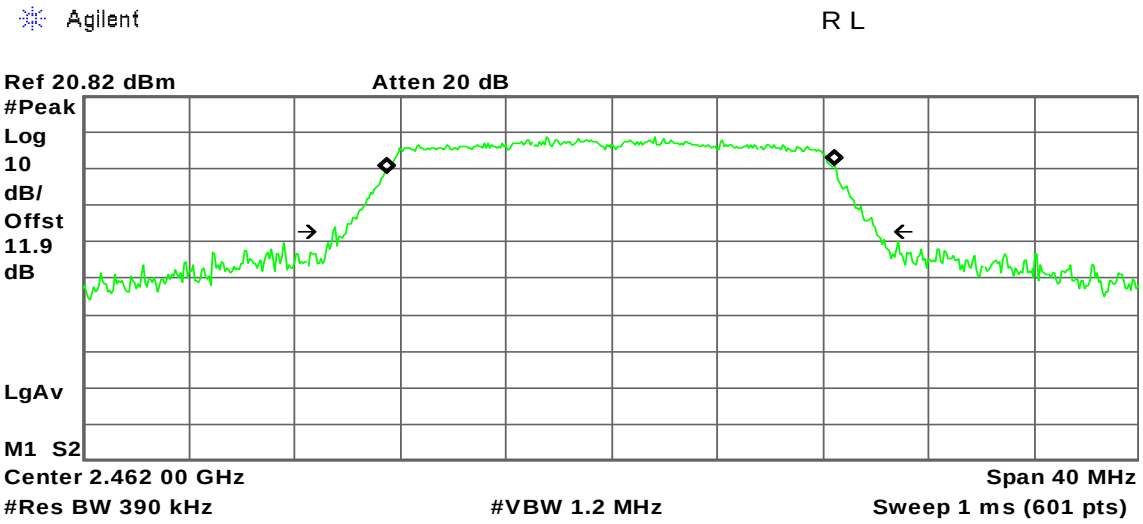


Occupied Bandwidth
16.9162 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -40.025 kHz
x dB Bandwidth 20.014 MHz

99% Bandwidth (CH High)



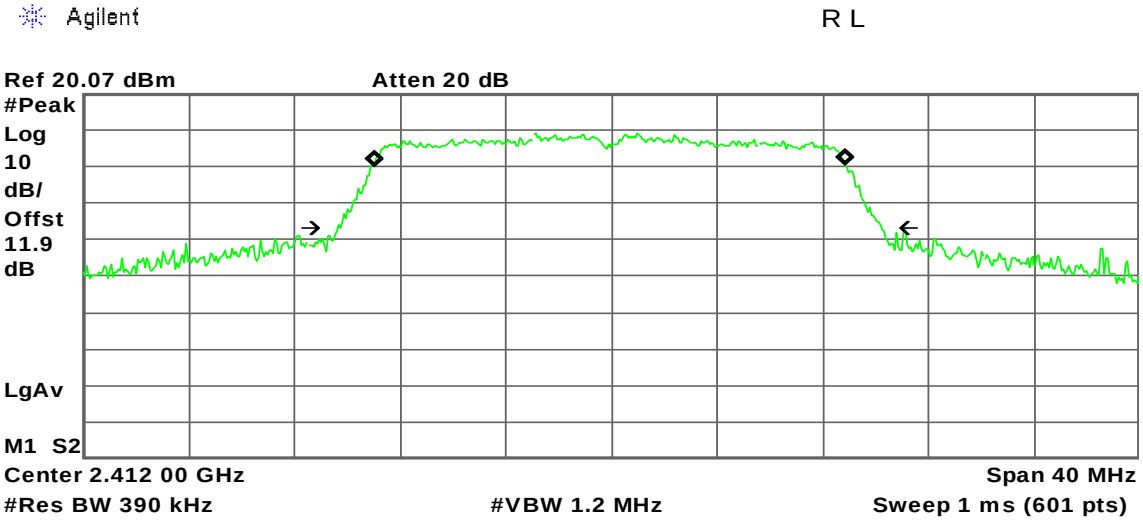
Occupied Bandwidth
16.9772 MHz

Occ BW % Pwr	99.00 %
x dB	-26.00 dB

Transmit Freq Error	-31.019 kHz
x dB Bandwidth	20.584 MHz

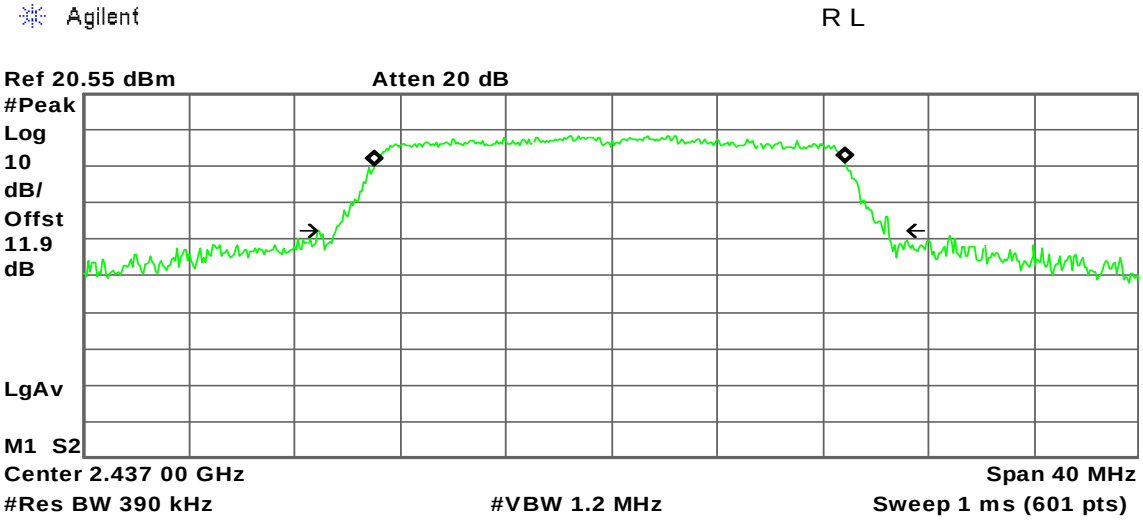
IEEE 802.11n HT 20 MHz mode / Chain 0

99% Bandwidth (CH Low)



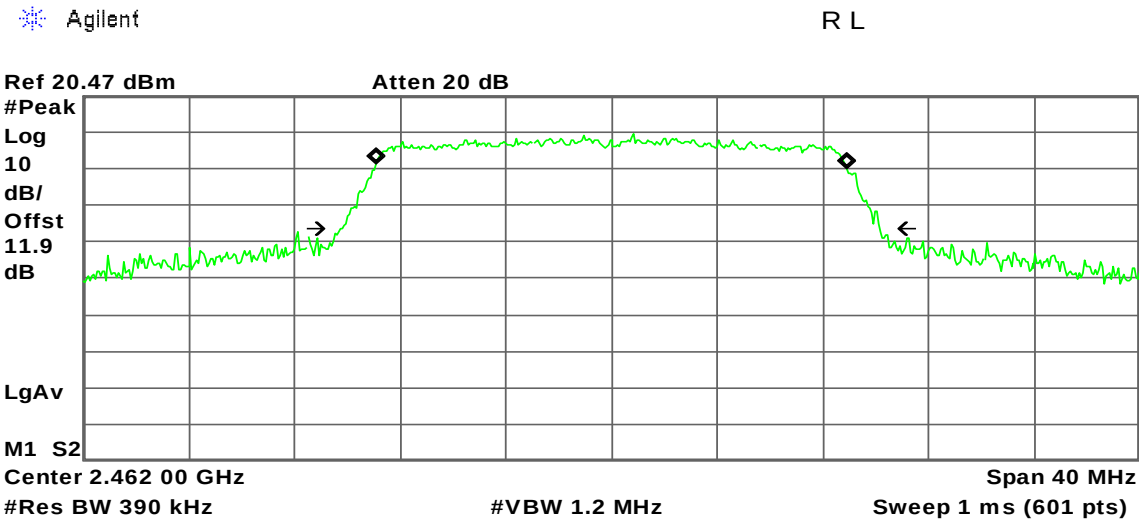
Transmit Freq Error	-66.950 kHz
x dB Bandwidth	20.612 MHz

99% Bandwidth (CH Mid)



Transmit Freq Error	-54.517 kHz
x dB Bandwidth	20.969 MHz

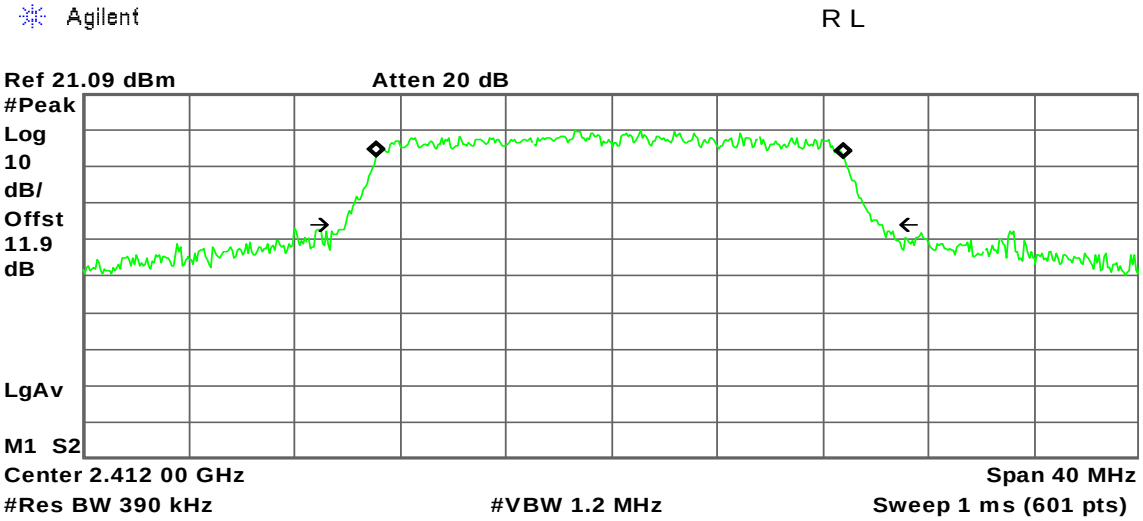
99% Bandwidth (CH High)



Transmit Freq Error	-1.094 kHz
x dB Bandwidth	20.371 MHz

IEEE 802.11n HT 20 MHz mode / Chain 1

99% Bandwidth (CH Low)

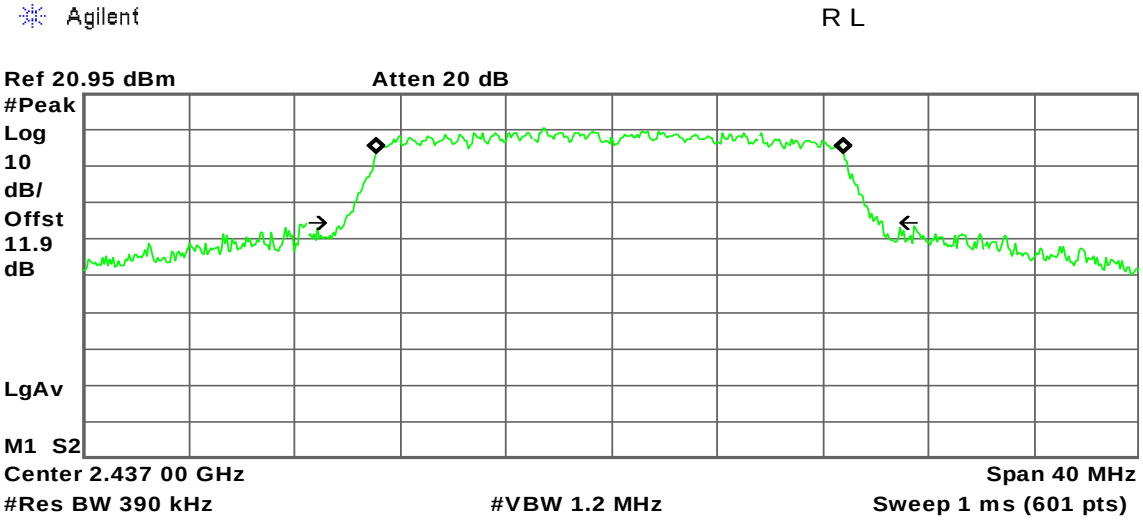


Occupied Bandwidth
17.7479 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -46.825 kHz
x dB Bandwidth 20.326 MHz

99% Bandwidth (CH Mid)

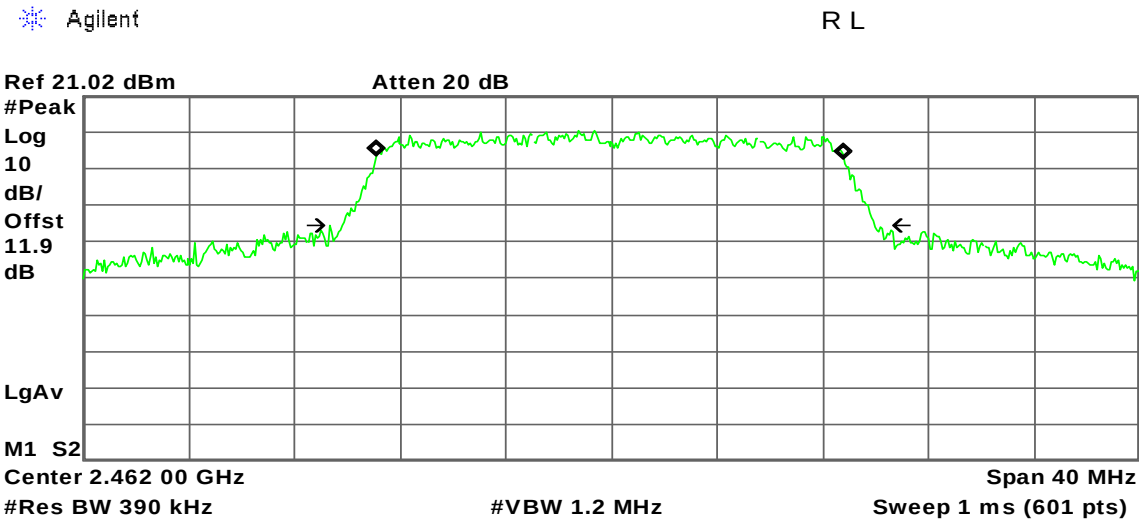


Occupied Bandwidth
17.7431 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -56.321 kHz
x dB Bandwidth 20.383 MHz

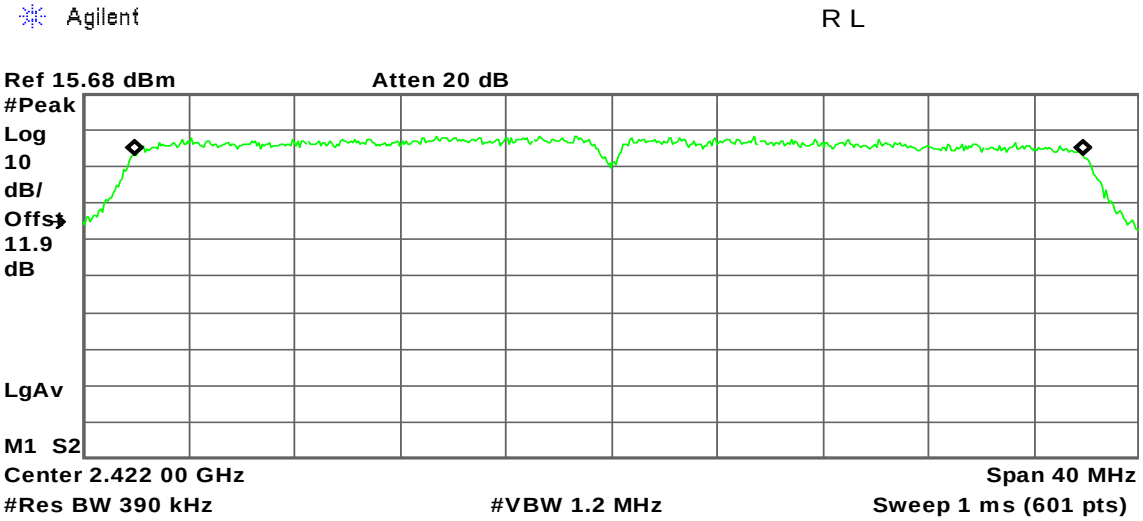
99% Bandwidth (CH High)



Transmit Freq Error	-42.153 kHz
x dB Bandwidth	20.189 MHz

802.11n Standard-40 MHz / Chain 0

99% Bandwidth (CH Low)

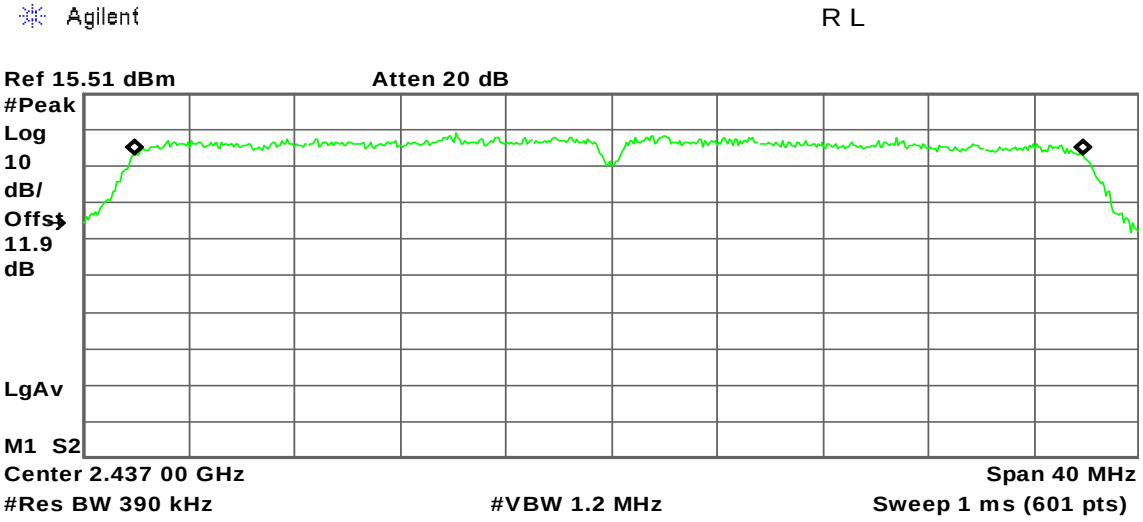


Occupied Bandwidth
35.9116 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -94.491 kHz
x dB Bandwidth 39.994 MHz

99% Bandwidth (CH Mid)

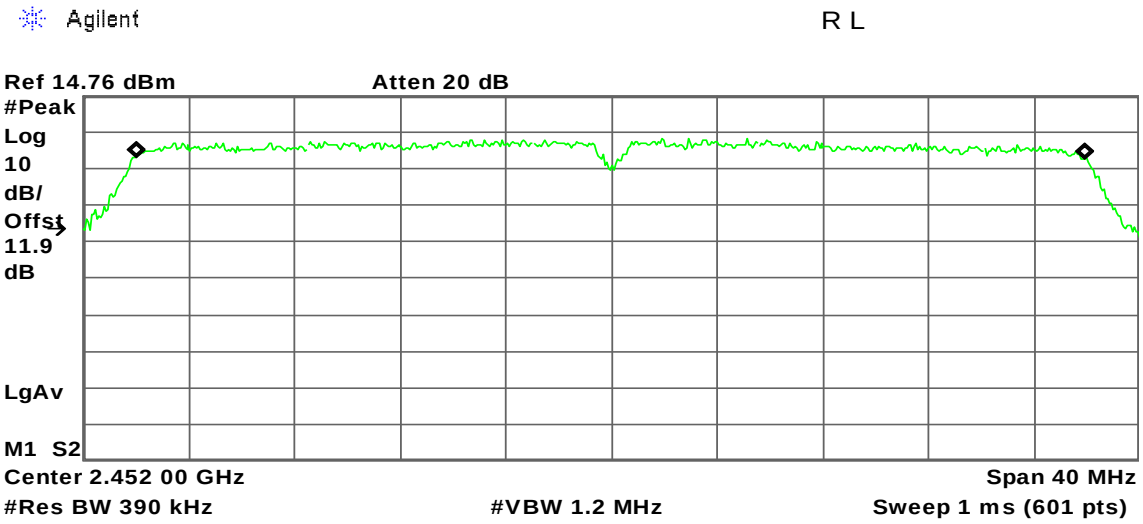


Occupied Bandwidth
35.9401 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -93.208 kHz
x dB Bandwidth 39.853 MHz

99% Bandwidth (CH High)



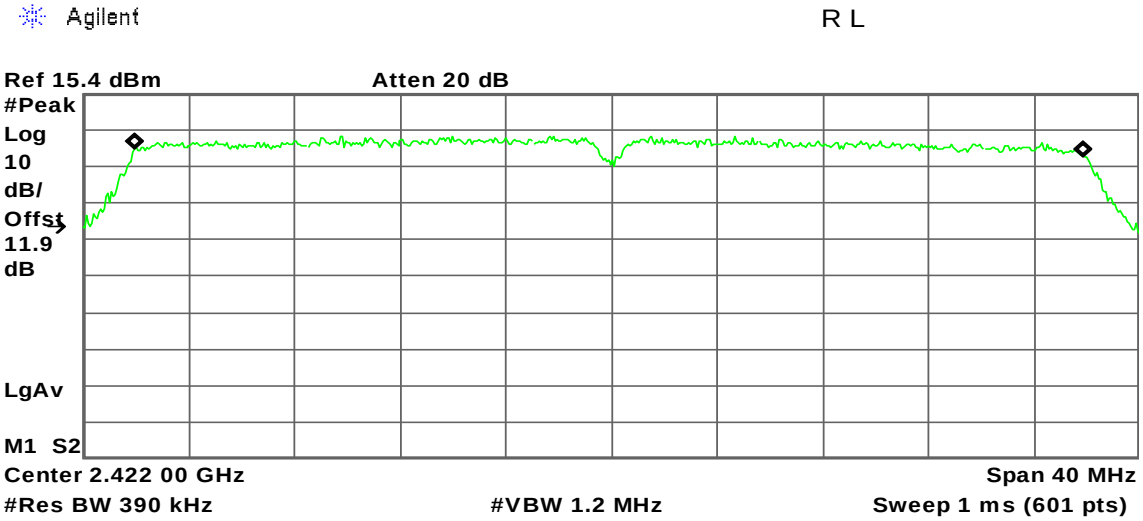
Occupied Bandwidth
35.9569 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error	-53.942 kHz
x dB Bandwidth	39.944 MHz

802.11n Standard-40 MHz / Chain1

99% Bandwidth (CH Low)

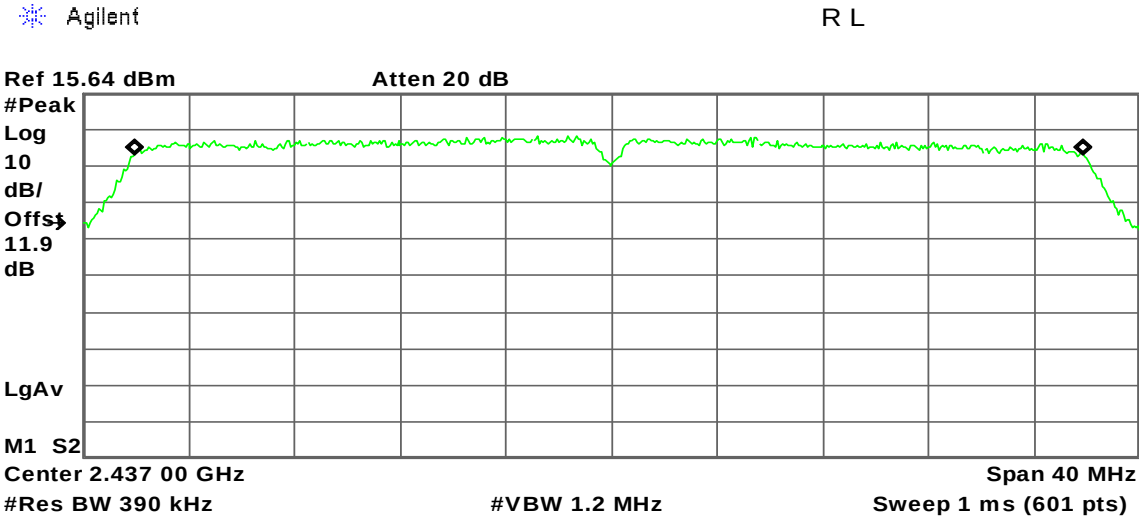


Occupied Bandwidth
35.9555 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -82.783 kHz
x dB Bandwidth 39.937 MHz

99% Bandwidth (CH Mid)

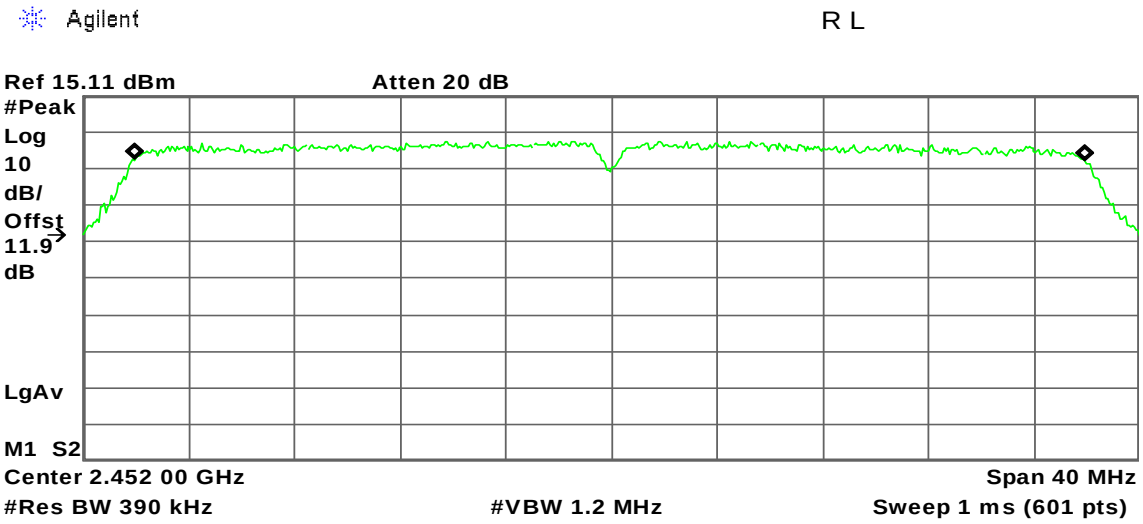


Occupied Bandwidth
35.9641 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

Transmit Freq Error -85.306 kHz
x dB Bandwidth 40.000 MHz

99% Bandwidth (CH High)



Occupied Bandwidth
35.9504 MHz

Occ BW % Pwr 99.00 %
x dB -26.00 dB

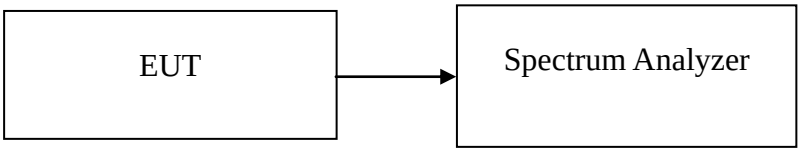
Transmit Freq Error	-66.365 kHz
x dB Bandwidth	39.993 MHz

7.2 6DB BANDWIDTH

LIMIT

According to §15.247(a)(2) & RSS-210 §A8.2(a), 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	10.3334	>500	PASS
Mid	2437	10.3334		PASS
High	2462	10.3334		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	16.4167	>500	PASS
Mid	2437	16.4167		PASS
High	2462	16.5		PASS

Test mode: IEEE 802.11n HT 20 MHz mode / Chain 0

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.75	>500	PASS
Mid	2437	17.6667		PASS
High	2462	17.75		PASS

Test mode: IEEE 802.11n HT 20 MHz mode / Chain 1

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2412	17.75	>500	PASS
Mid	2437	17.75		PASS
High	2462	17.75		PASS

Test mode: IEEE 802.11n HT 40 MHz mode / Chain 0

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.3333	>500	PASS
Mid	2437	36.25		PASS
High	2452	36.25		PASS

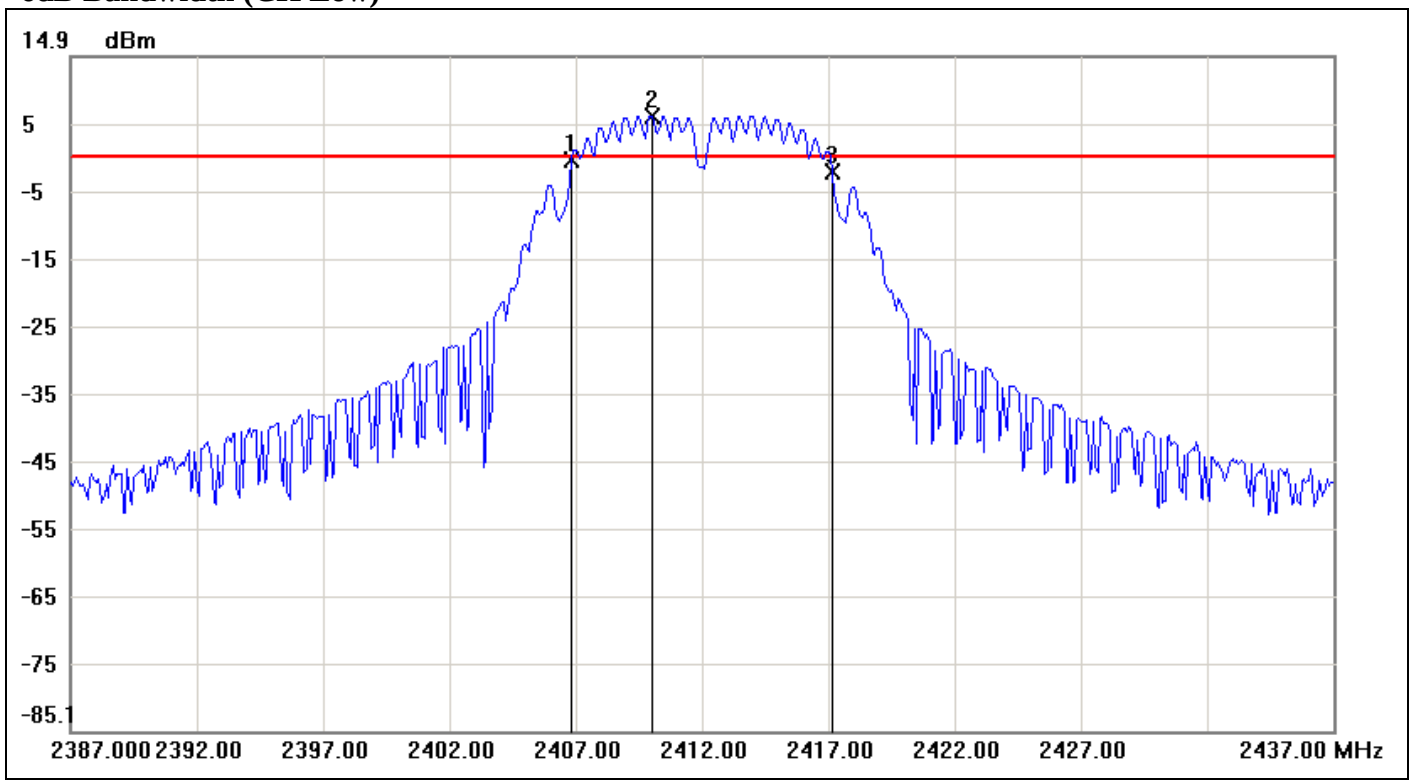
Test mode: IEEE 802.11n HT 40 MHz mode / Chain 1

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
Low	2422	36.0834	>500	PASS
Mid	2437	36.25		PASS
High	2452	36.3333		PASS

Test Plot

IEEE 802.11b mode

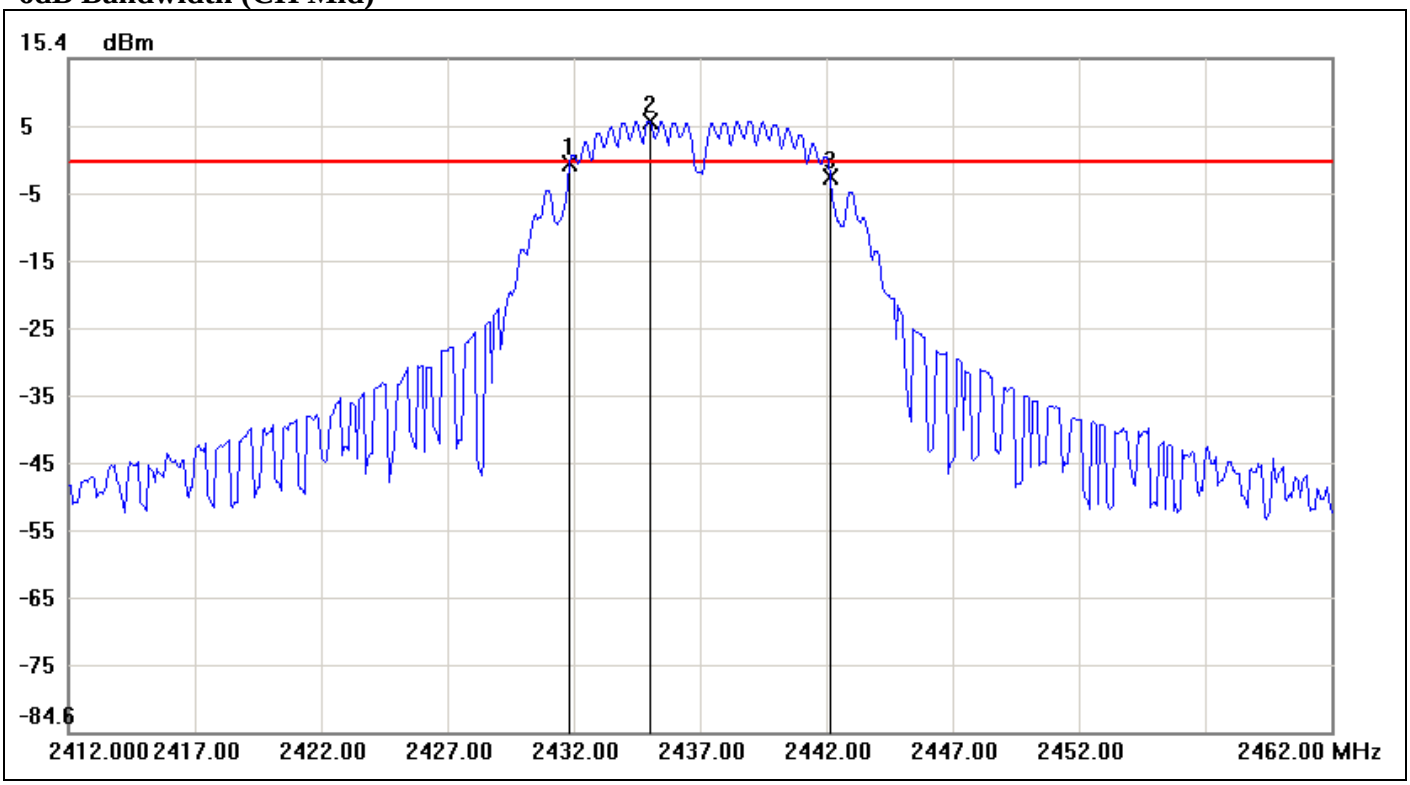
6dB Bandwidth (CH Low)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2406.8333	-0.36	0.09	-0.45
2	2410.0000	6.09	0.09	6.00
3	2417.1667	-2.08	0.09	-2.17

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	10.3334	-1.72

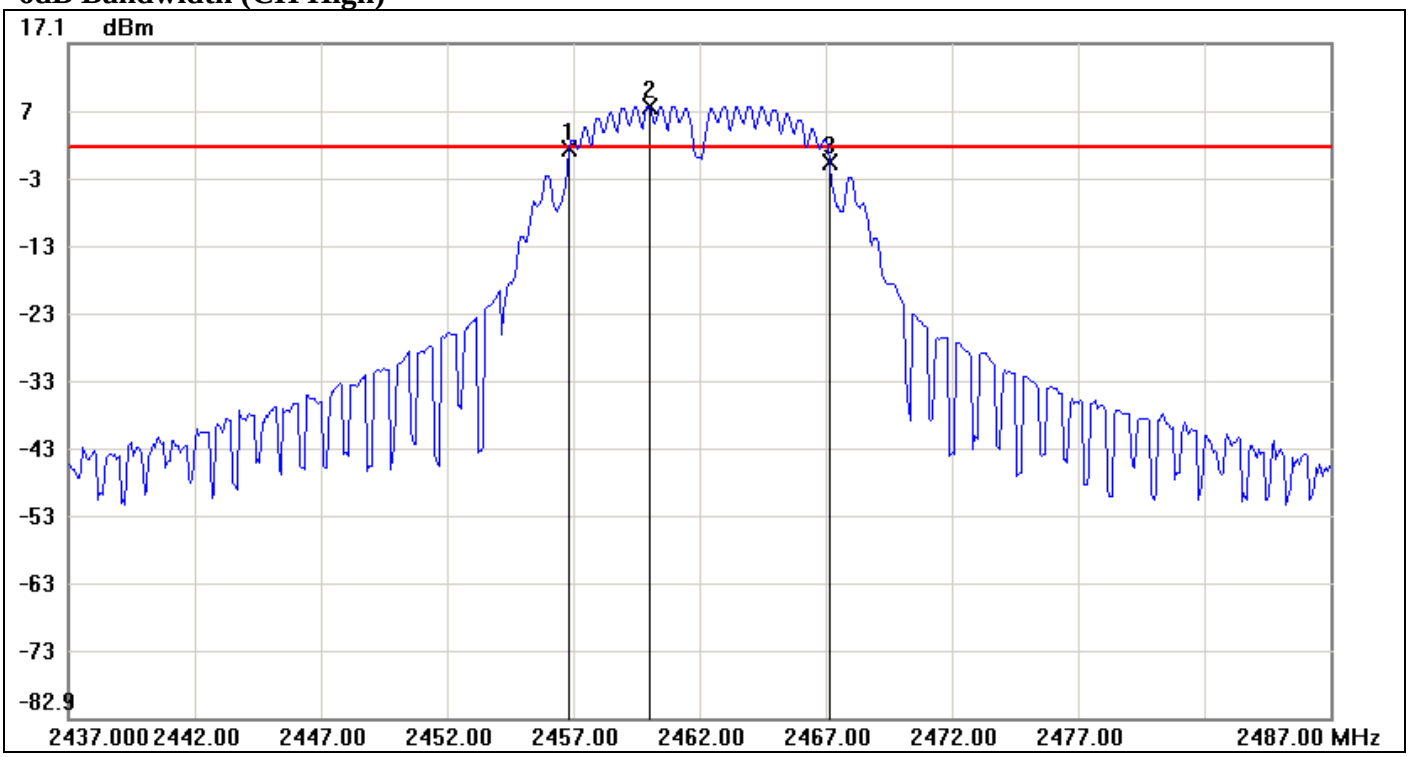
6dB Bandwidth (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2431.8333	-0.19	0.06	-0.25
2	2435.0000	6.06	0.06	6.00
3	2442.1667	-2.20	0.06	-2.26

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	10.3334	-2.01

6dB Bandwidth (CH High)

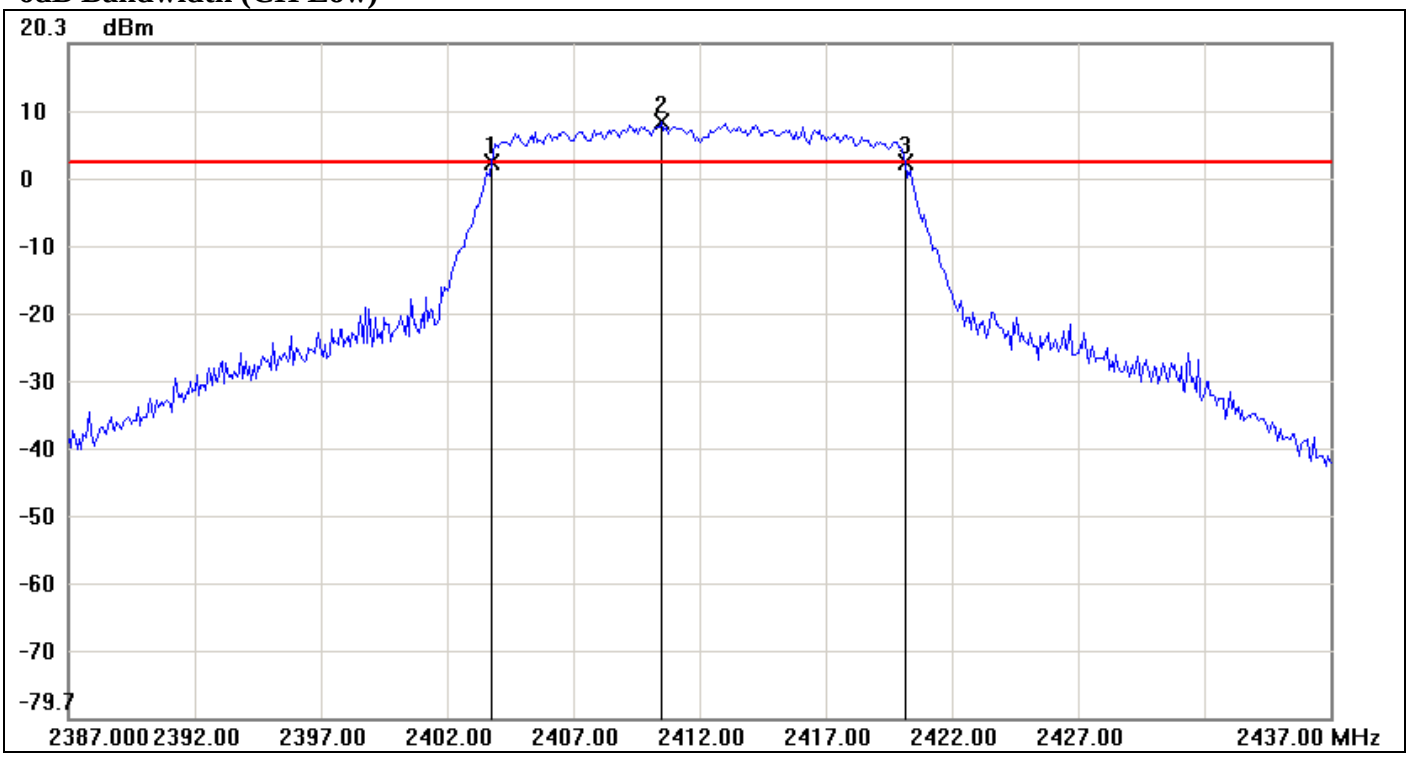


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2456.8333	1.52	1.82	-0.30
2	2460.0000	7.82	1.82	6.00
3	2467.1667	-0.57	1.82	-2.39

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	10.3334	-2.09

IEEE 802.11g mode

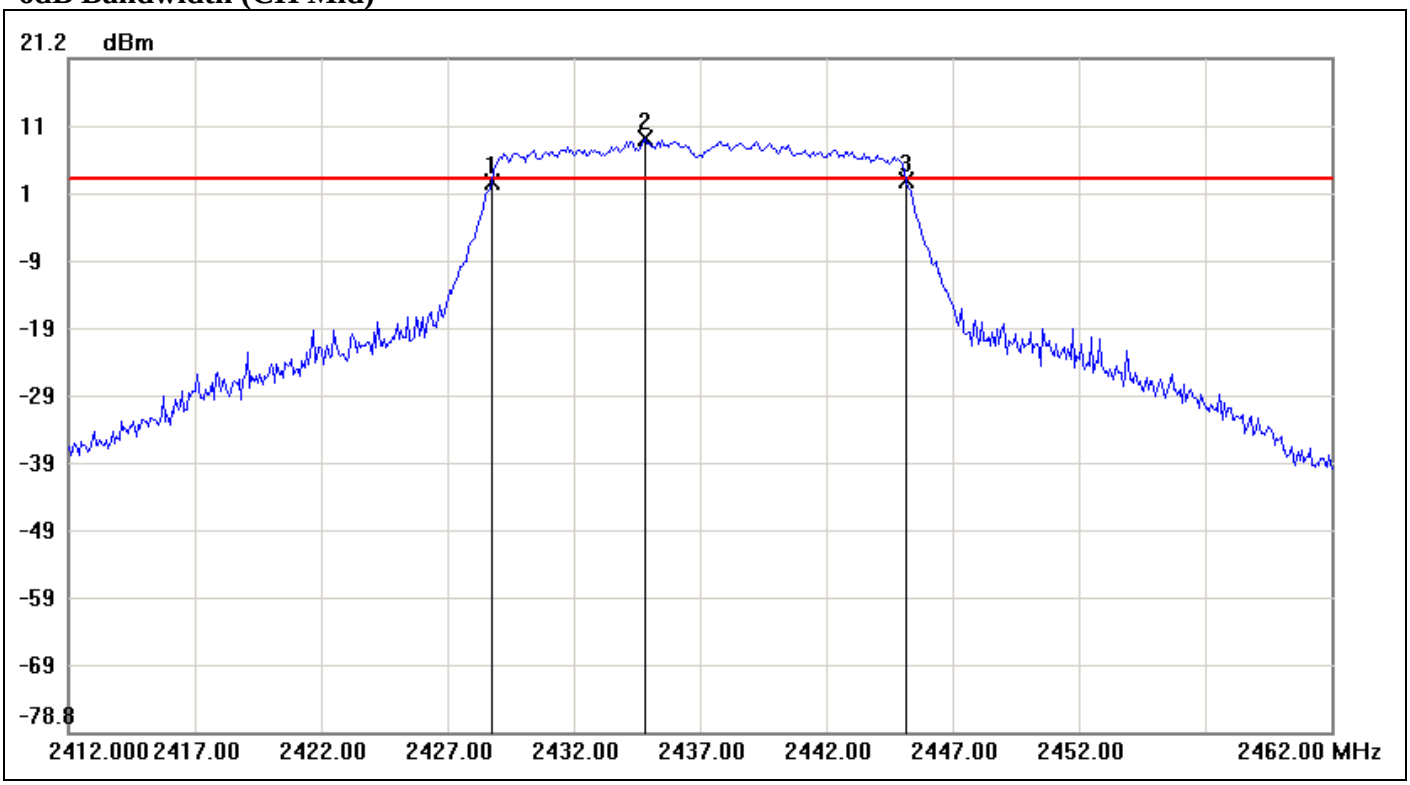
6dB Bandwidth (CH Low)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.7500	2.76	2.81	-0.05
2	2410.5000	8.81	2.81	6.00
3	2420.1667	2.78	2.81	-0.03

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	16.4167	0.02

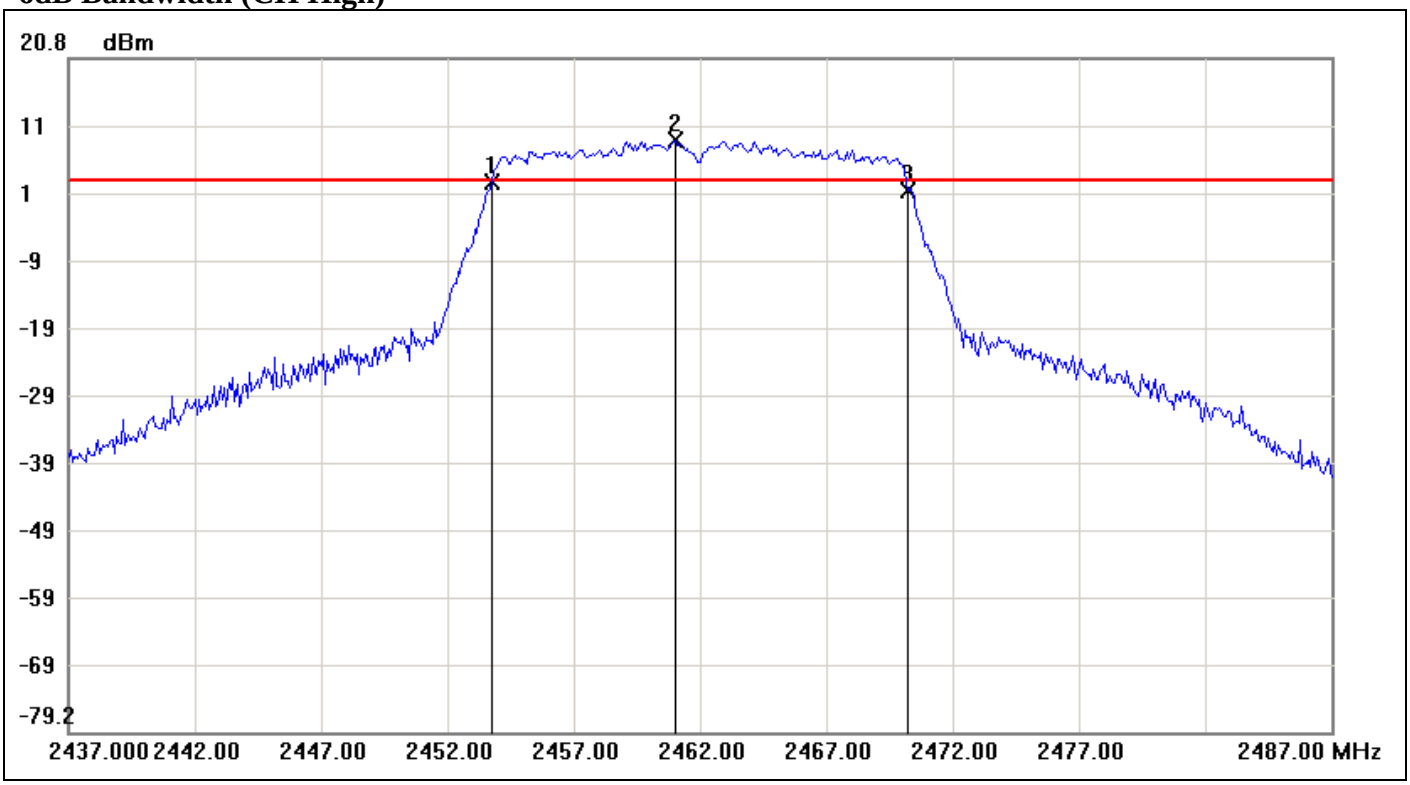
6dB Bandwidth (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2428.7500	2.77	3.37	-0.60
2	2434.8333	9.37	3.37	6.00
3	2445.1667	3.00	3.37	-0.37

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	16.4167	0.23

6dB Bandwidth (CH High)

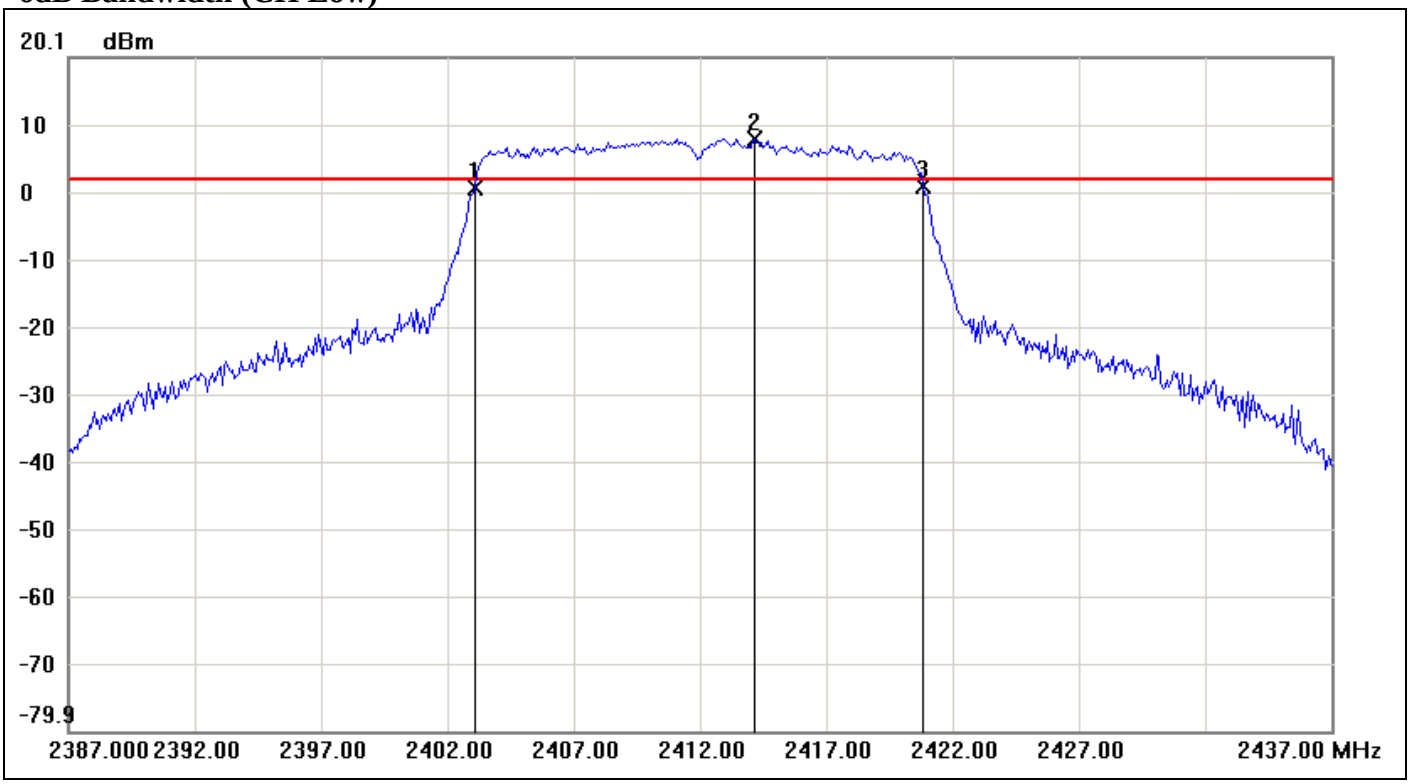


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2453.7500	2.39	2.63	-0.24
2	2461.0000	8.63	2.63	6.00
3	2470.2500	1.23	2.63	-1.40

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	16.5	-1.16

IEEE 802.11n HT 20 MHz mode / Chain 0

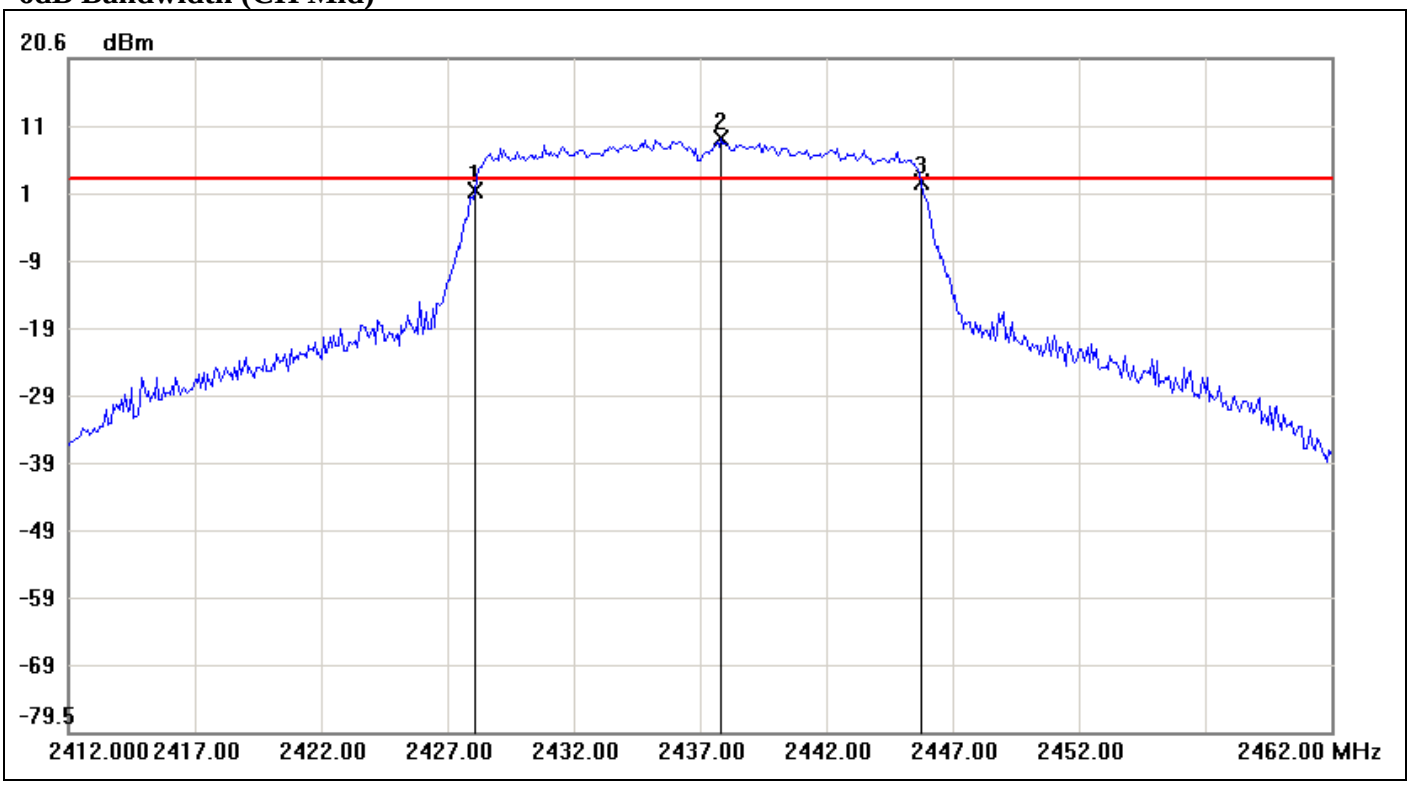
6dB Bandwidth (CH Low)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.0833	0.60	2.00	-1.40
2	2414.1667	8.00	2.00	6.00
3	2420.8333	1.02	2.00	-0.98

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	0.42

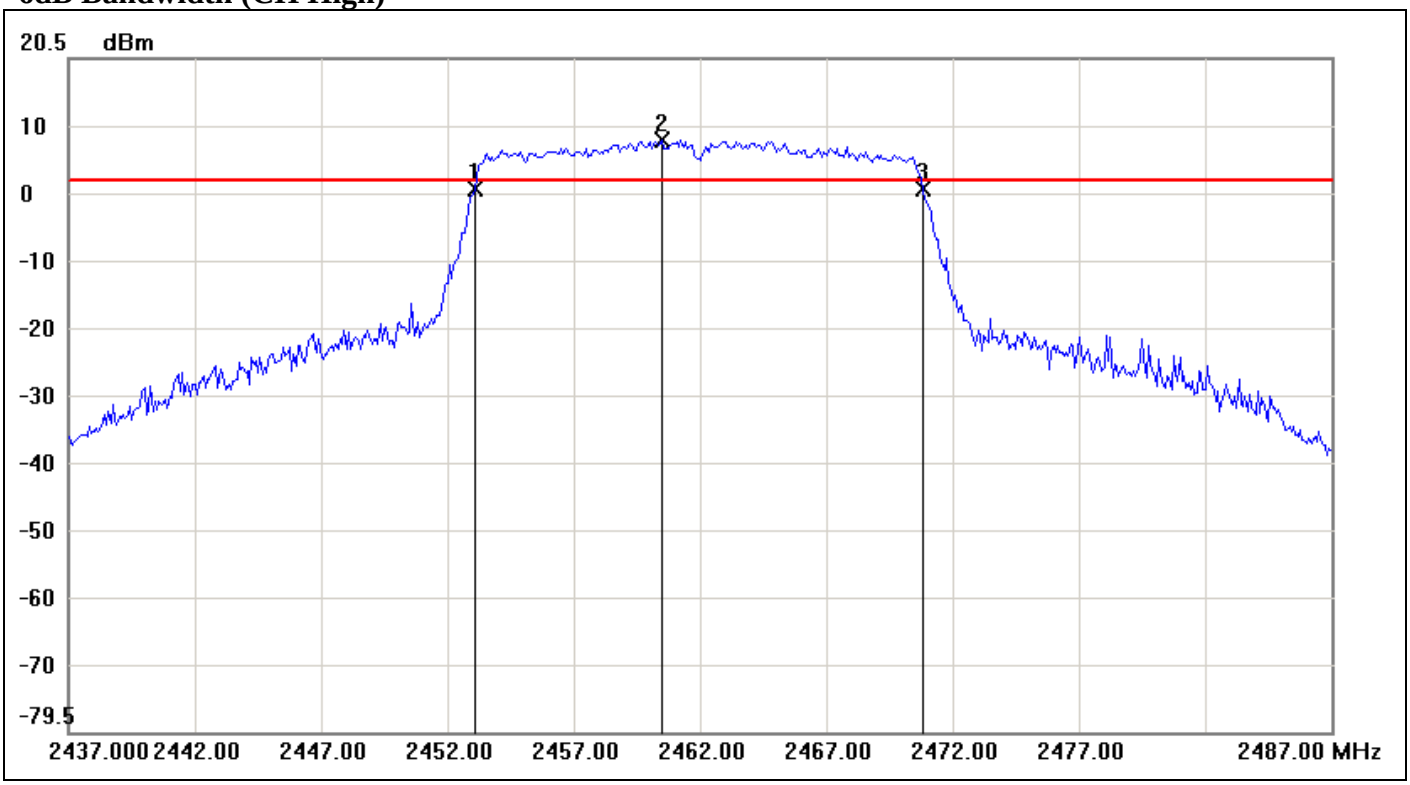
6dB Bandwidth (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2428.0833	0.83	2.66	-1.83
2	2437.8333	8.66	2.66	6.00
3	2445.7500	2.15	2.66	-0.51

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.6667	1.32

6dB Bandwidth (CH High)

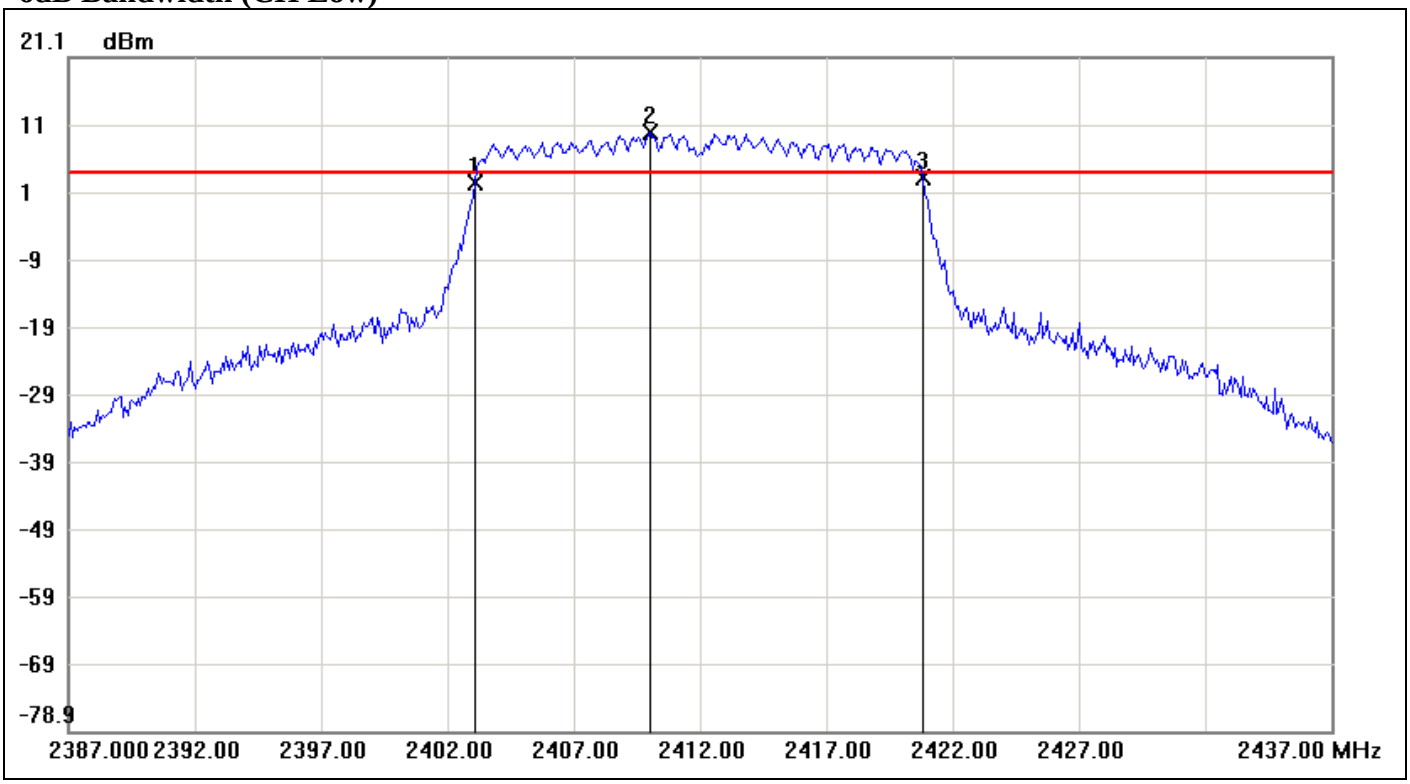


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2453.0833	1.03	2.30	-1.27
2	2460.5000	8.30	2.30	6.00
3	2470.8333	1.06	2.30	-1.24

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	0.03

IEEE 802.11n HT 20 MHz mode / Chain 1

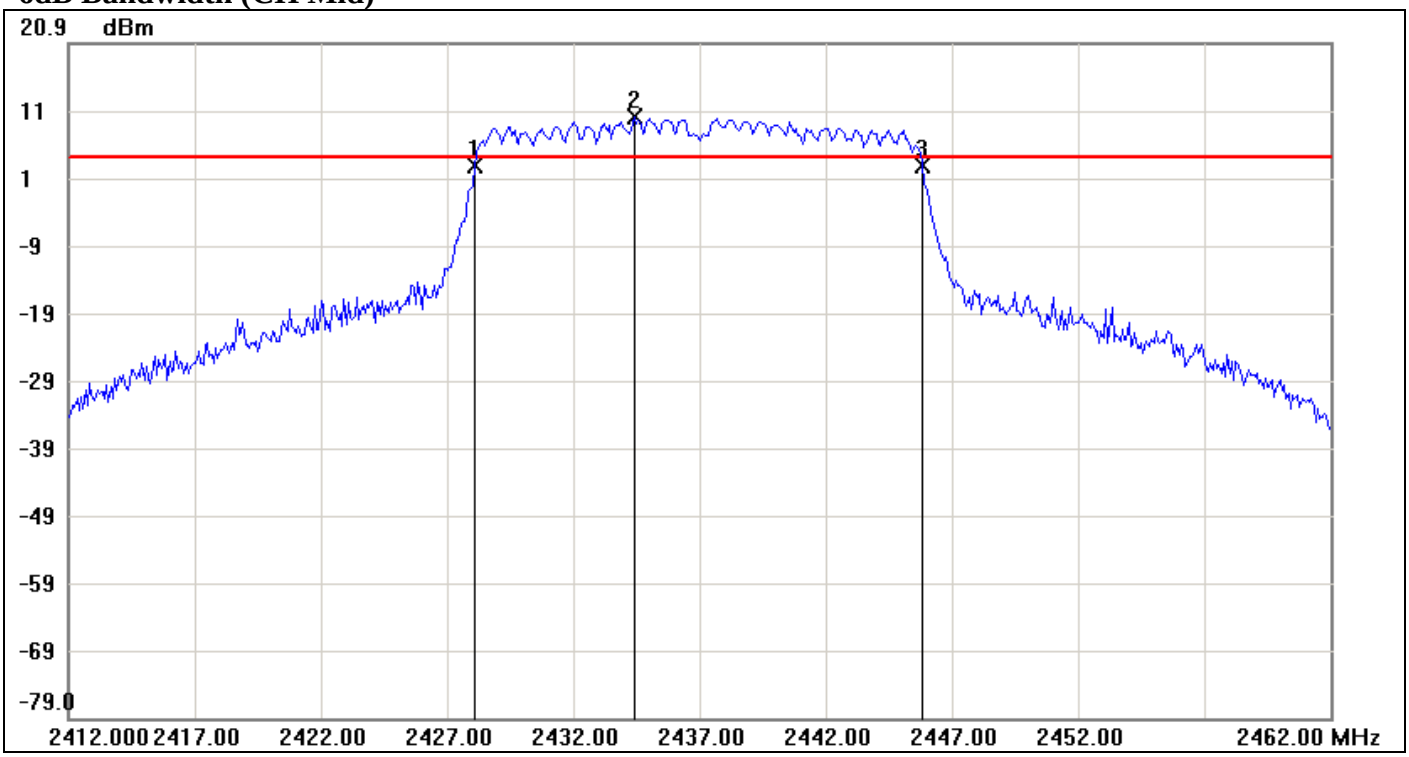
6dB Bandwidth (CH Low)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.0833	2.56	3.87	-1.31
2	2410.0000	9.87	3.87	6.00
3	2420.8333	3.31	3.87	-0.56

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	0.75

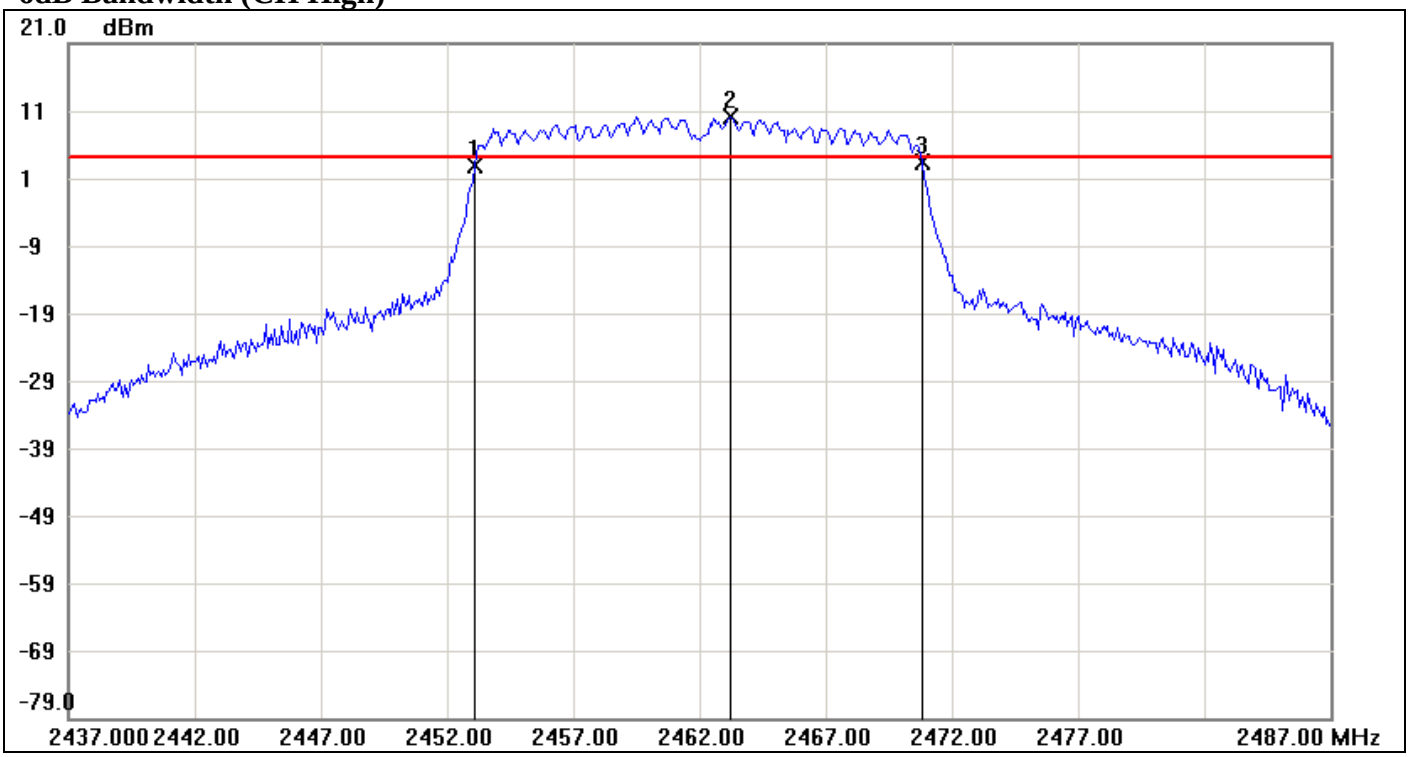
6dB Bandwidth (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2428.0833	2.72	3.97	-1.25
2	2434.4167	9.97	3.97	6.00
3	2445.8333	2.95	3.97	-1.02

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	0.23

6dB Bandwidth (CH High)

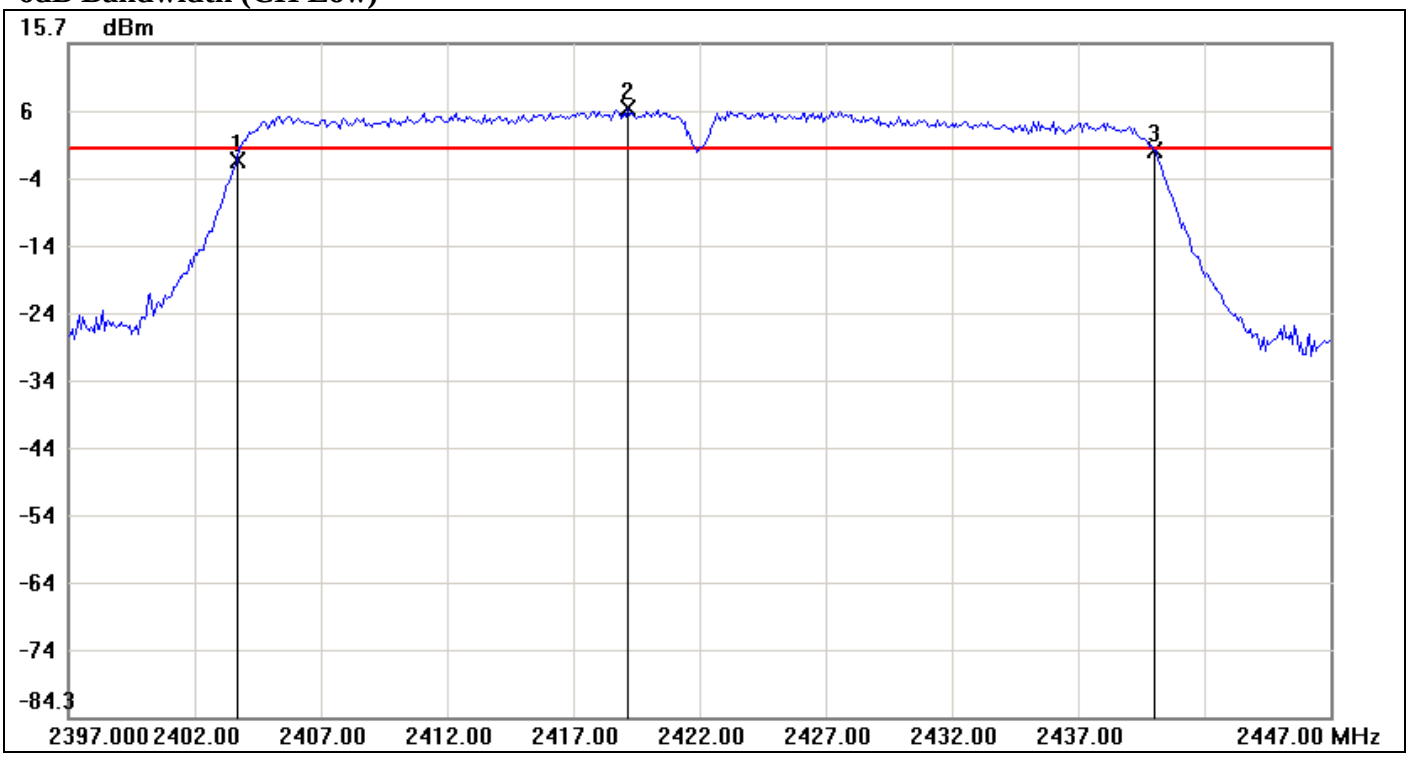


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2453.0833	3.00	4.13	-1.13
2	2463.2500	10.13	4.13	6.00
3	2470.8333	3.36	4.13	-0.77

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	17.75	0.36

IEEE 802.11n HT 40 MHz mode / Chain 0

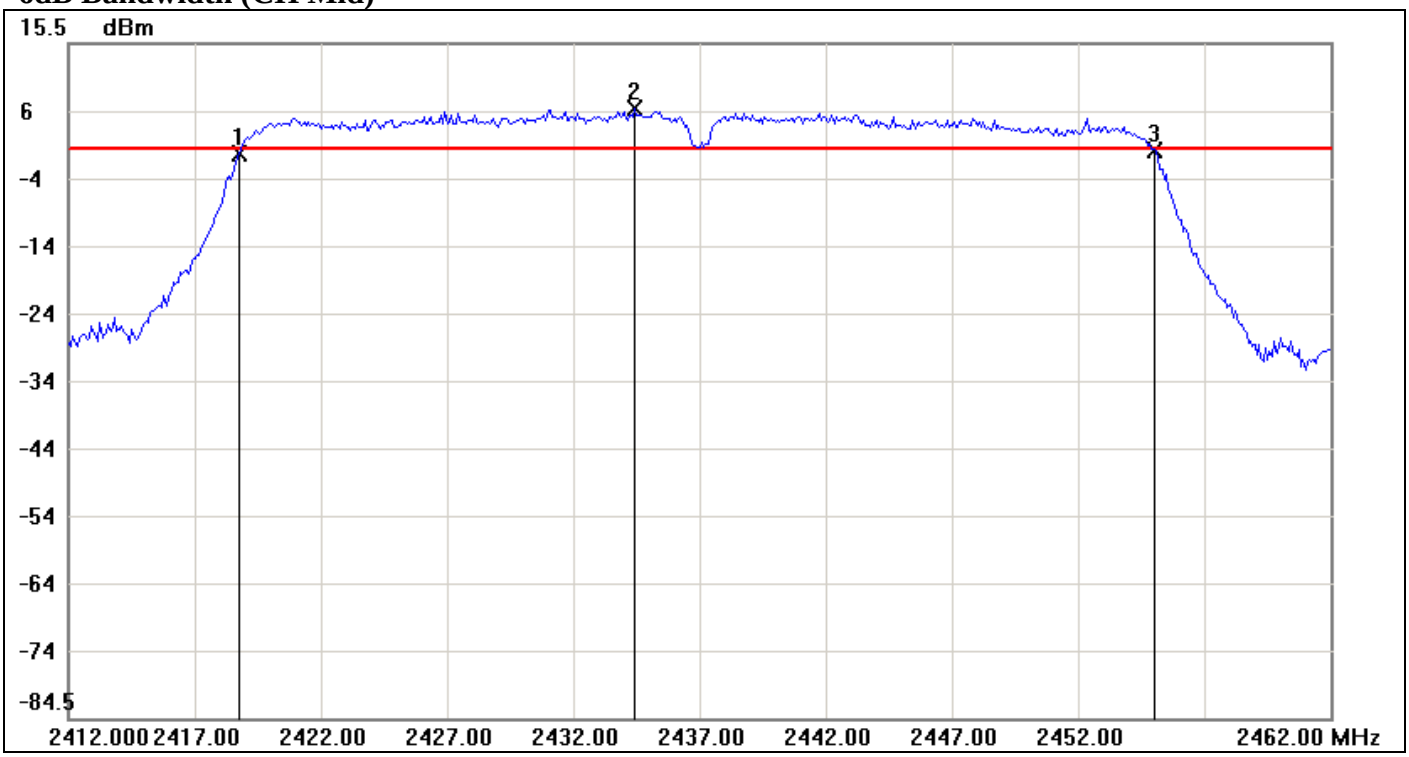
6dB Bandwidth (CH Low)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.6667	-1.76	-0.04	-1.72
2	2419.1667	5.96	-0.04	6.00
3	2440.0000	-0.18	-0.04	-0.14

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.3333	1.58

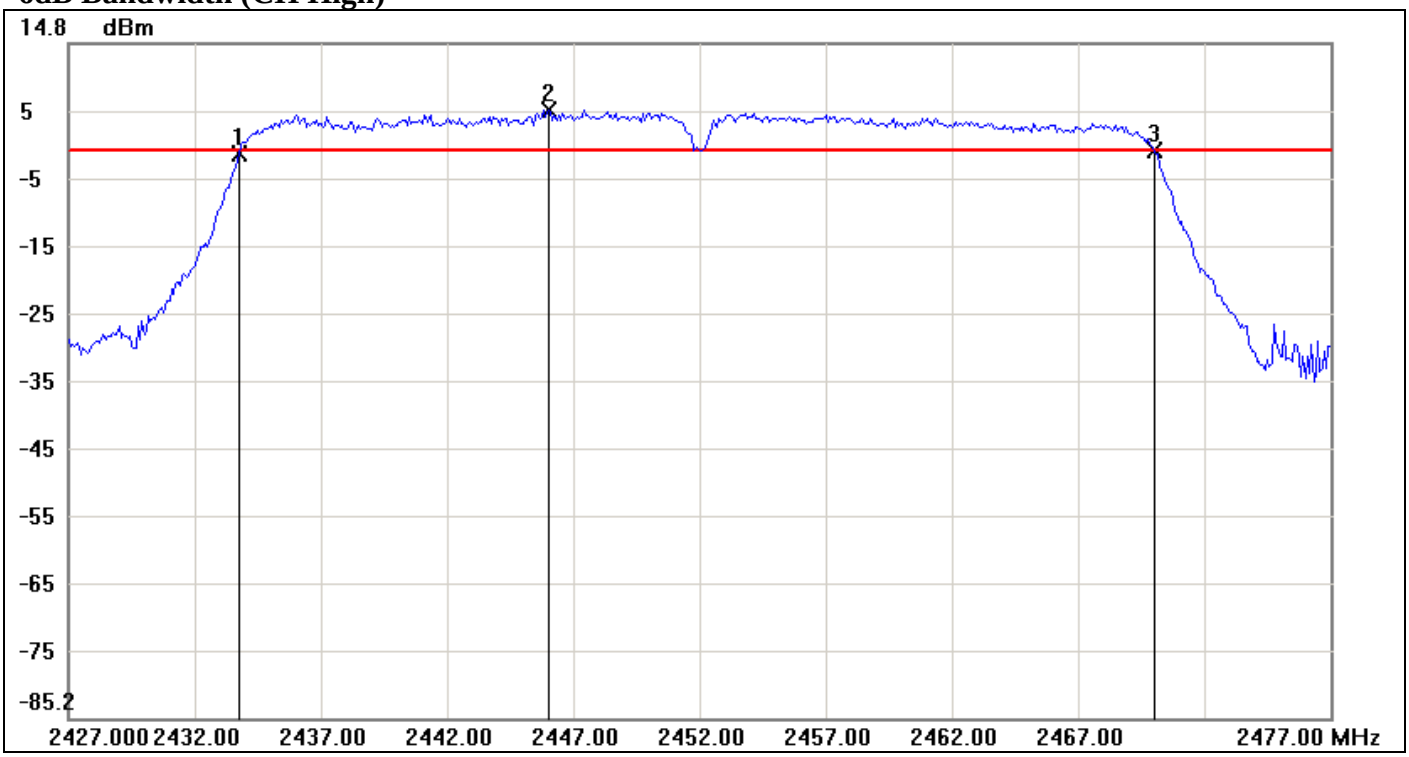
6dB Bandwidth (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2418.7500	-0.91	-0.22	-0.69
2	2434.4167	5.78	-0.22	6.00
3	2455.0000	-0.24	-0.22	-0.02

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.25	0.67

6dB Bandwidth (CH High)

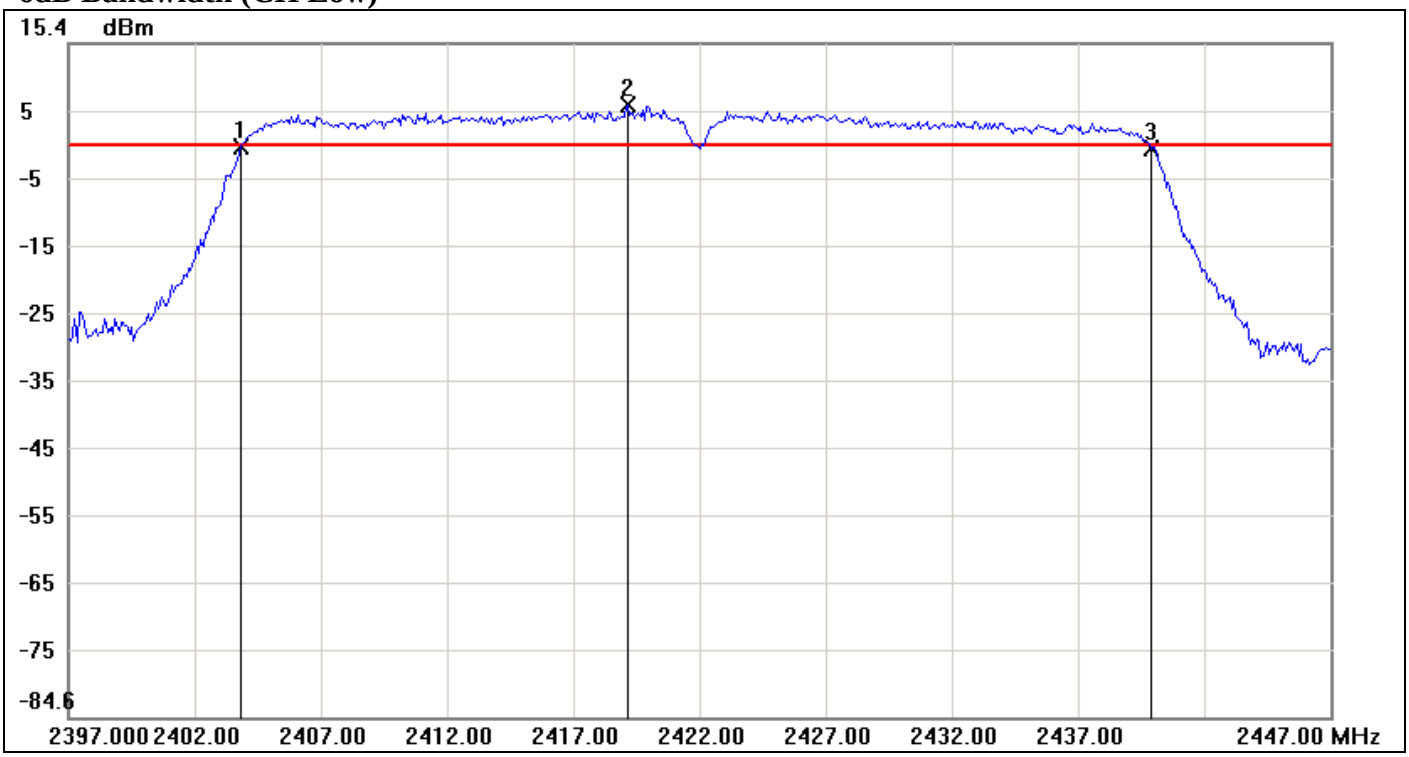


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2433.7500	-1.65	-1.10	-0.55
2	2446.0000	4.90	-1.10	6.00
3	2470.0000	-1.15	-1.10	-0.05

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.25	0.5

IEEE 802.11n HT 40 MHz mode / Chain 1

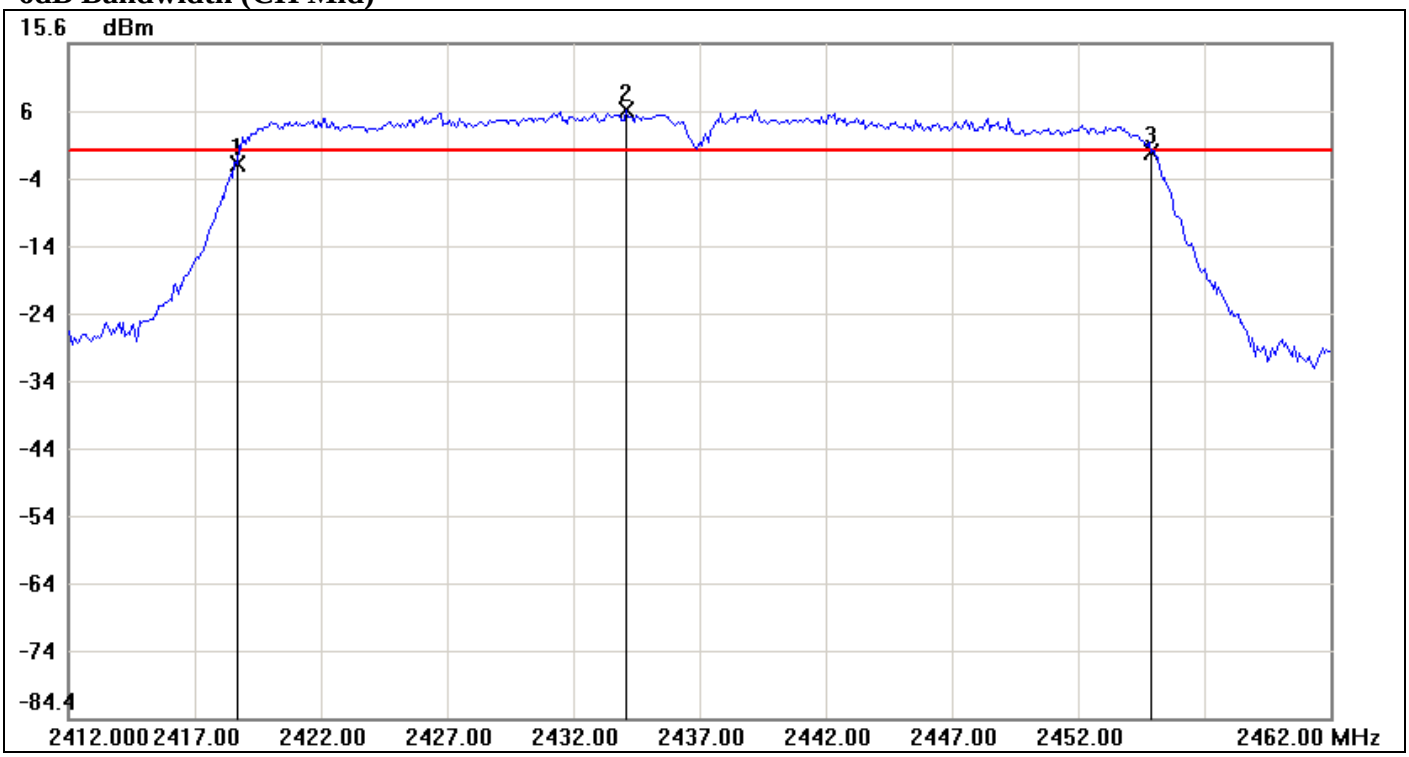
6dB Bandwidth (CH Low)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.8333	-0.04	0.39	-0.43
2	2419.1667	6.39	0.39	6.00
3	2439.9167	-0.22	0.39	-0.61

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.0834	-0.18

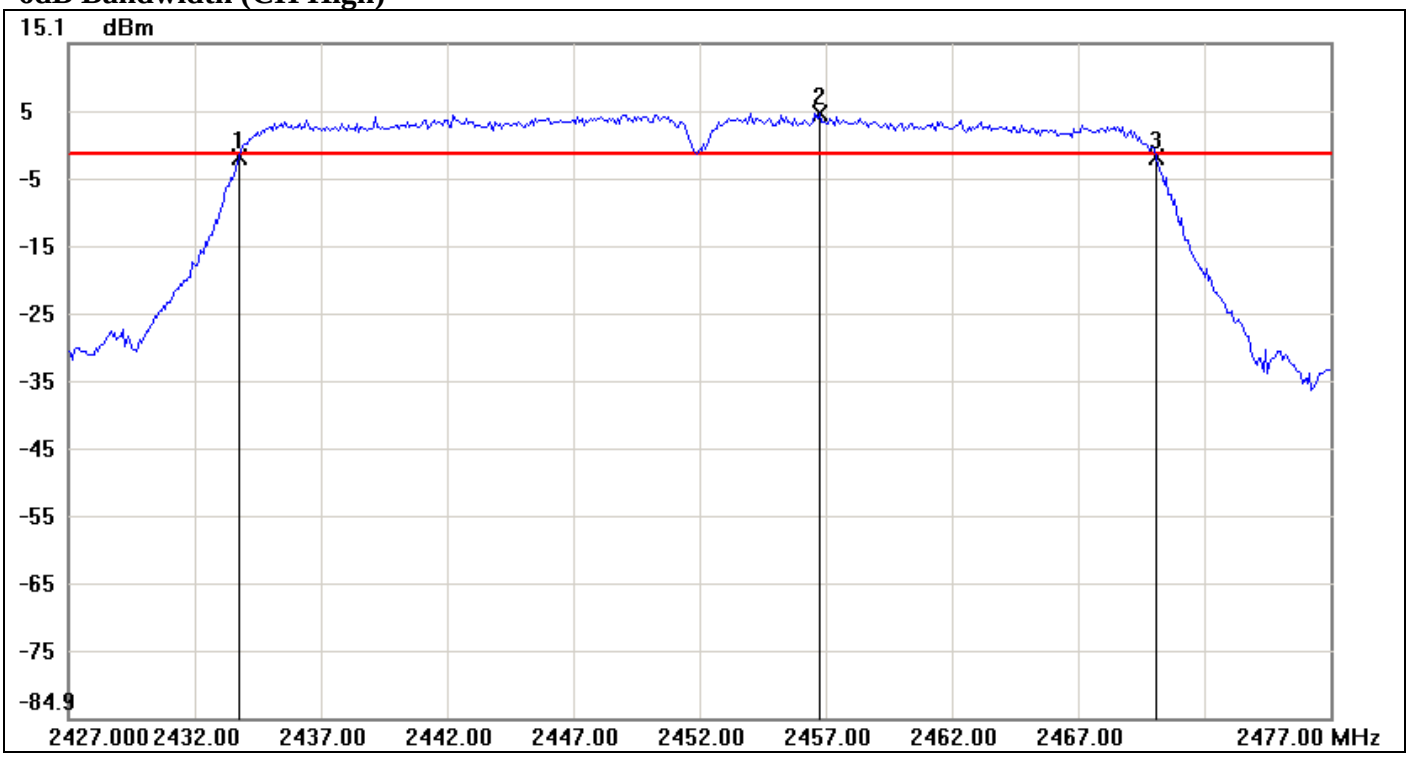
6dB Bandwidth (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2418.6667	-2.14	-0.13	-2.01
2	2434.0833	5.87	-0.13	6.00
3	2454.9167	-0.37	-0.13	-0.24

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.25	1.77

6dB Bandwidth (CH High)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2433.7500	-1.81	-1.15	-0.66
2	2456.7500	4.85	-1.15	6.00
3	2470.0833	-1.66	-1.15	-0.51

No.		△Frequency(MHz)	△Level(dB)
1	mk3-mk1	36.3333	0.15

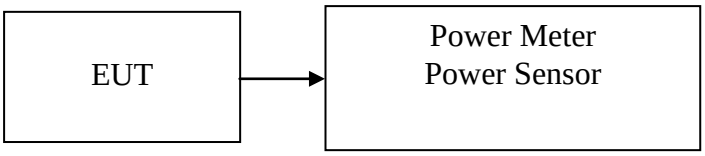
7.3 PEAK POWER

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-210 §A8.4(4), 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	17.23	0.05284	1.00	PASS
Mid	2437	17.94	0.06223		PASS
High	2462	***19.64**	0.09204		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	23.87	0.24378	1.00	PASS
Mid	2437	***24.78**	0.30061		PASS
High	2462	24.61	0.28907		PASS

Test mode: IEEE 802.11n HT 20 MHz mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2412	23.02	23.91	26.50	0.4465	1.00	PASS
Mid	2437	23.51	24.67	27.14	0.5175		PASS
High	2462	23.89	24.58	***27.26**	0.5320		PASS

Test mode: IEEE 802.11n HT 40 MHz mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Output Power (dBm)	Output Power (W)	Limit (W)	Result
Low	2422	22.13	22.02	25.09	0.3225	1.00	PASS
Mid	2437	22.37	22.12	***25.26**	0.3355		PASS
High	2452	21.89	21.91	24.91	0.3098		PASS

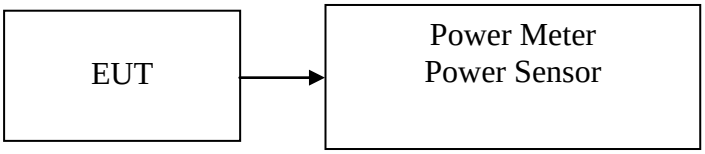
Remark: *Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000) + Chain 1 (10^(Output Power /10)/1000))*

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	13.72	0.02355
Mid	2437	14.45	0.02786
High	2462	15.95	0.03936

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	Output Power (dBm)	Output Power (W)
Low	2412	14.54	0.02844
Mid	2437	15.48	0.03532
High	2462	15.42	0.03483

Test mode: IEEE 802.11n HT 20 MHz mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Output Power (dBm)
Low	2412	13.30	14.51	16.96
Mid	2437	13.91	15.58	17.84
High	2462	14.53	15.76	18.20

Test mode: IEEE 802.11n HT 40 MHz mode

Channel	Frequency (MHz)	Chain 0 Output Power (dBm)	Chain 1 Output Power (dBm)	Total Output Power (dBm)
Low	2422	11.13	10.59	13.88
Mid	2437	11.01	10.95	13.99
High	2452	10.35	10.45	13.41

Remark: *Total Output Power (w) = Chain 0 (10^(Output Power /10)/1000) + Chain 1 (10^(Output Power /10)/1000)*

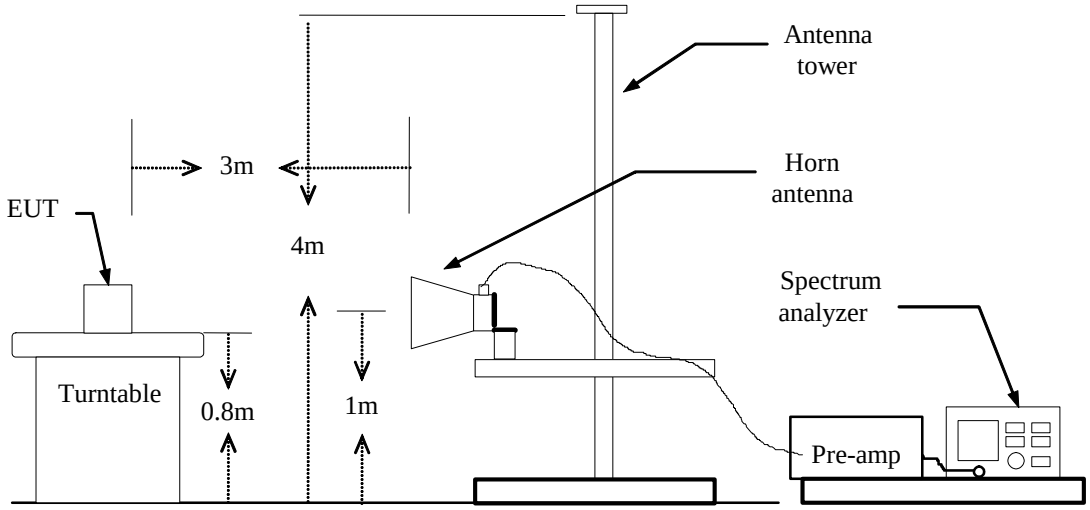
7.5 BAND EDGES MEASUREMENT

LIMIT

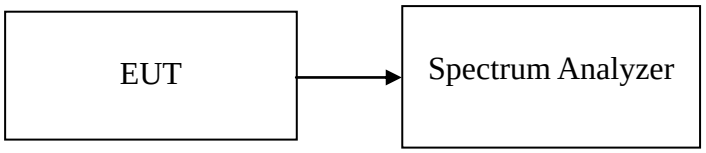
According to §15.247(d) & RSS-210 §A8.5, in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band 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 0.8m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:
   (a) PEAK: RBW=VBW=1MHz / Sweep=AUTO
   (b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO
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.

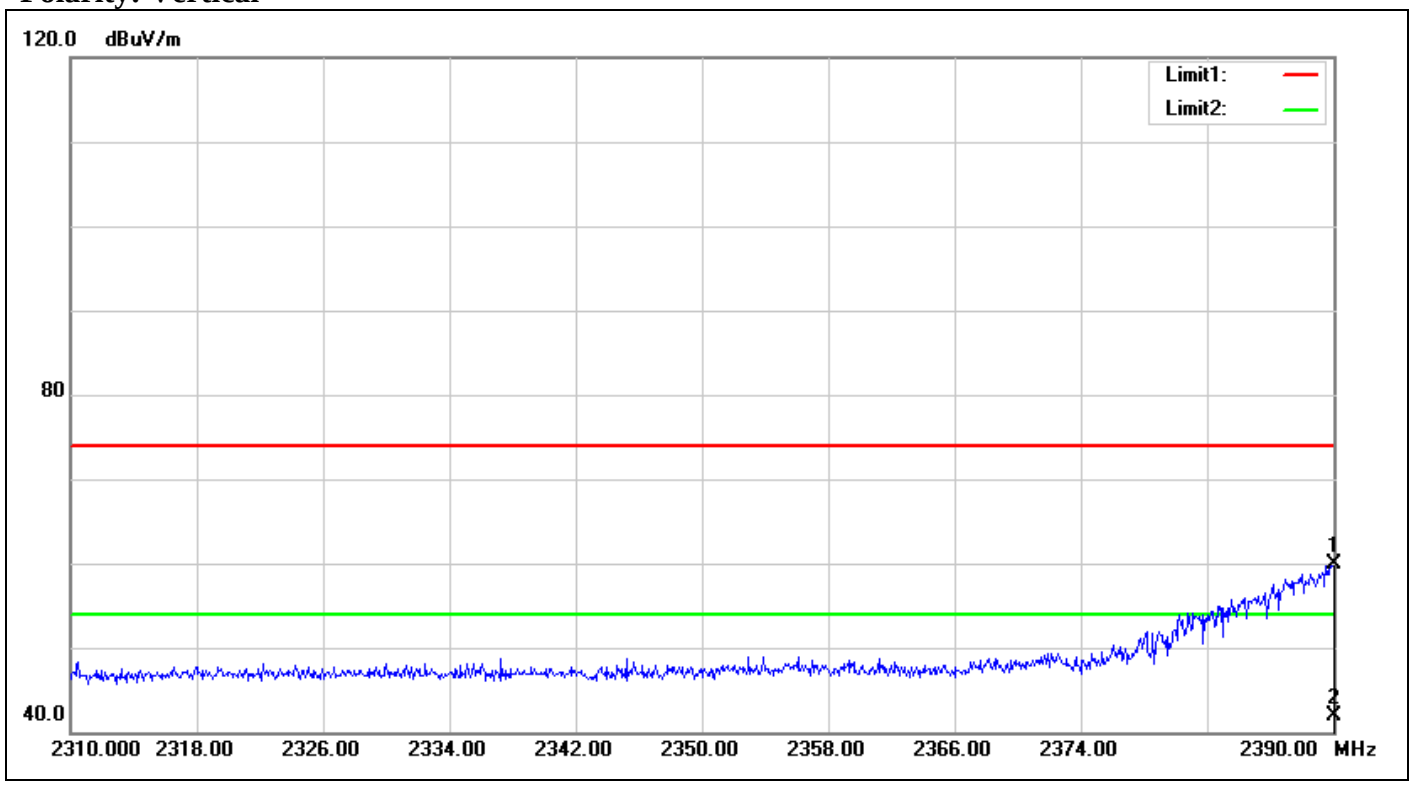
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

TEST RESULTS

Refer to attach spectrum analyzer data chart.

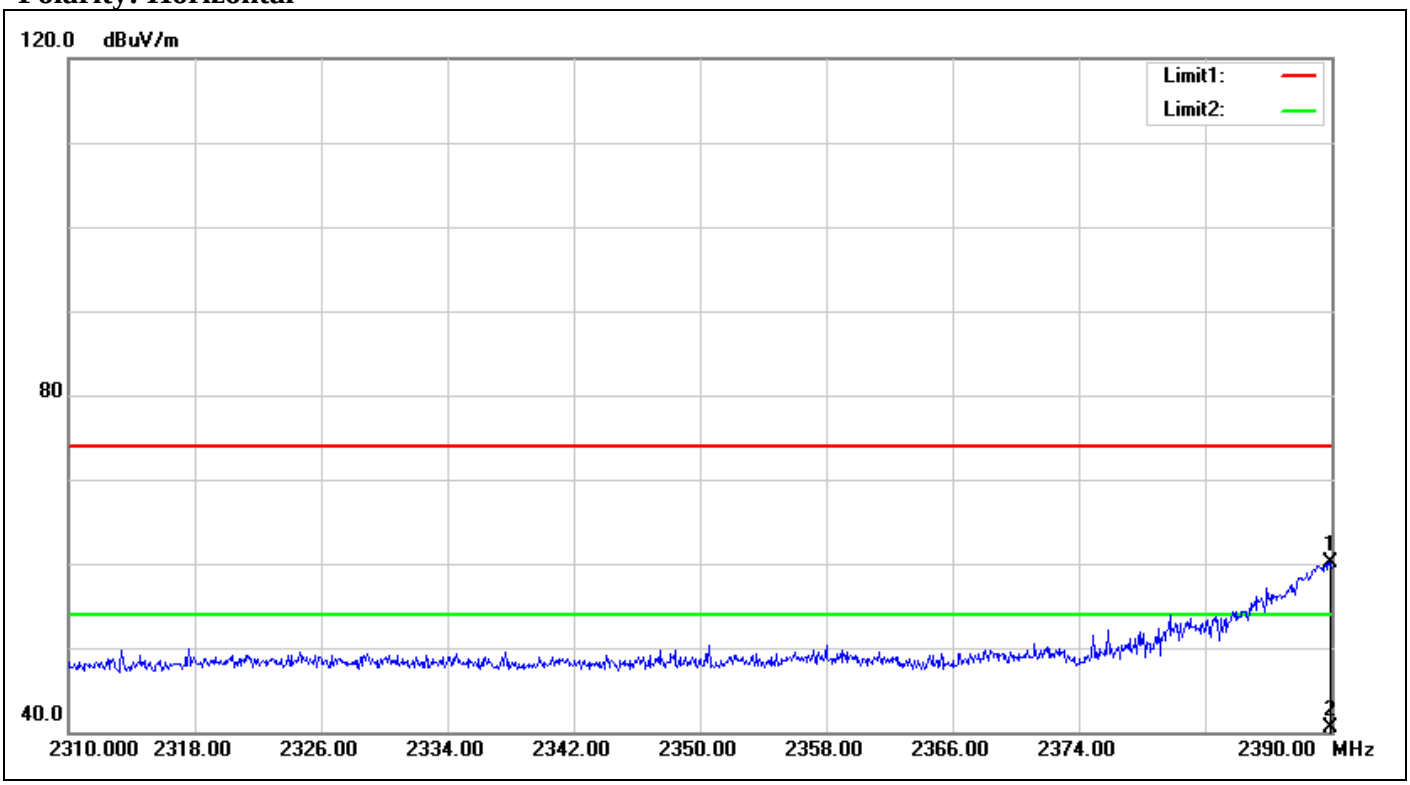
Band Edges (IEEE 802.11b mode / CH Low)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2390.000	63.65	-3.77	59.88	74.00	-14.12	100	65	peak
2	2390.000	45.60	-3.77	41.83	54.00	-12.17	100	65	AVG

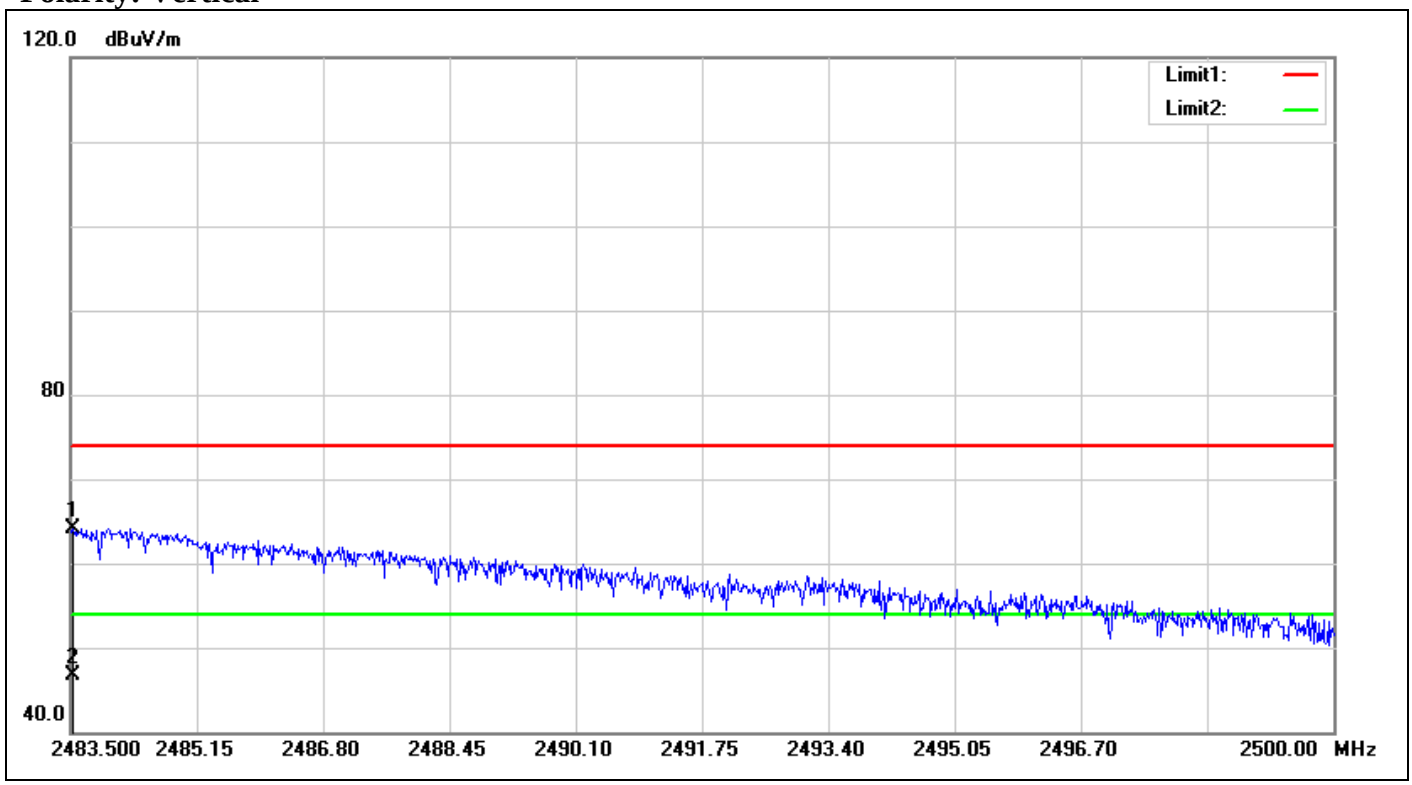
Polarity: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2389.920	63.89	-3.77	60.12	74.00	-13.88	100	204	peak
2	2389.920	44.30	-3.77	40.53	54.00	-13.47	100	204	AVG

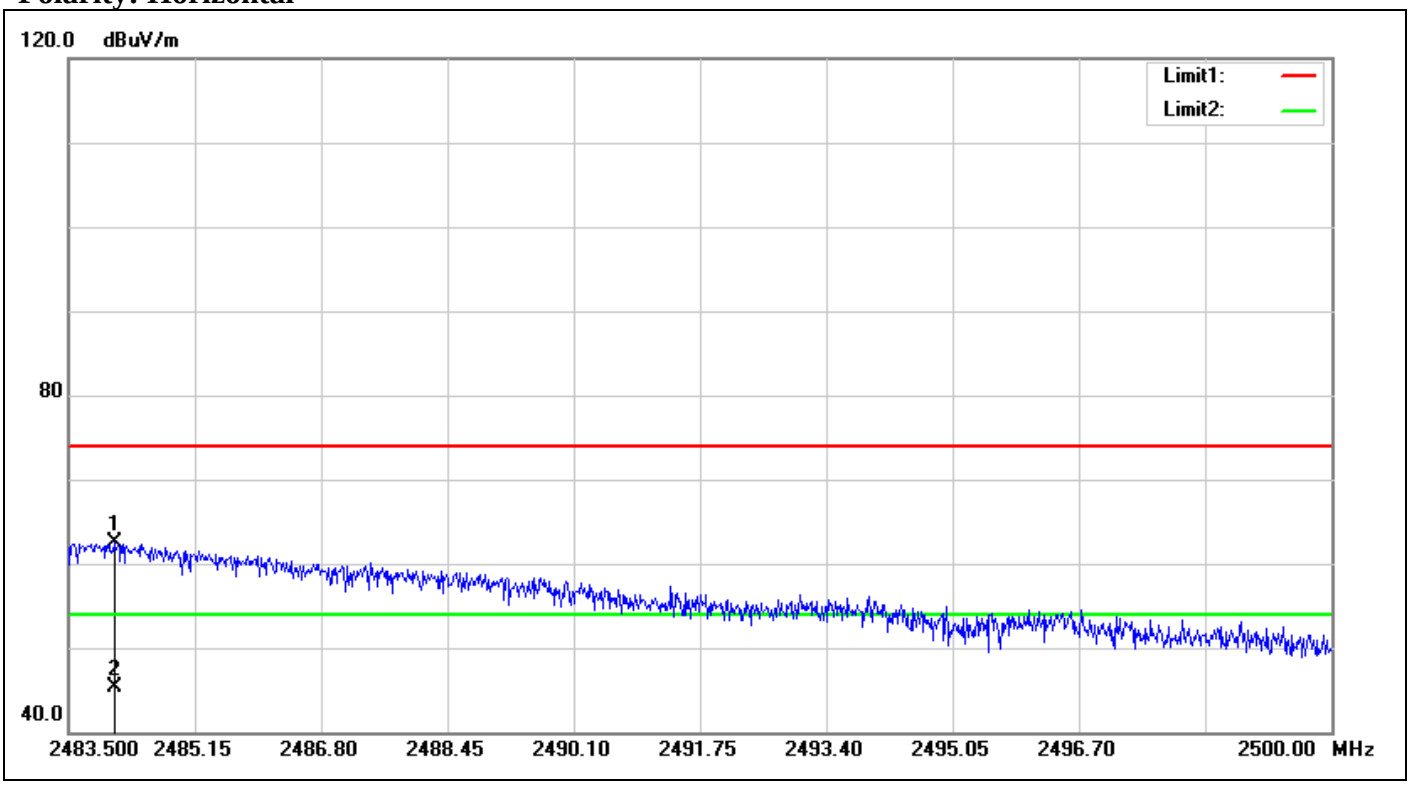
Band Edges (IEEE 802.11b mode / CH High)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2483.533	67.41	-3.27	64.14	74.00	-9.86	100	57	peak
2	2483.533	50.06	-3.27	46.79	54.00	-7.21	100	57	AVG

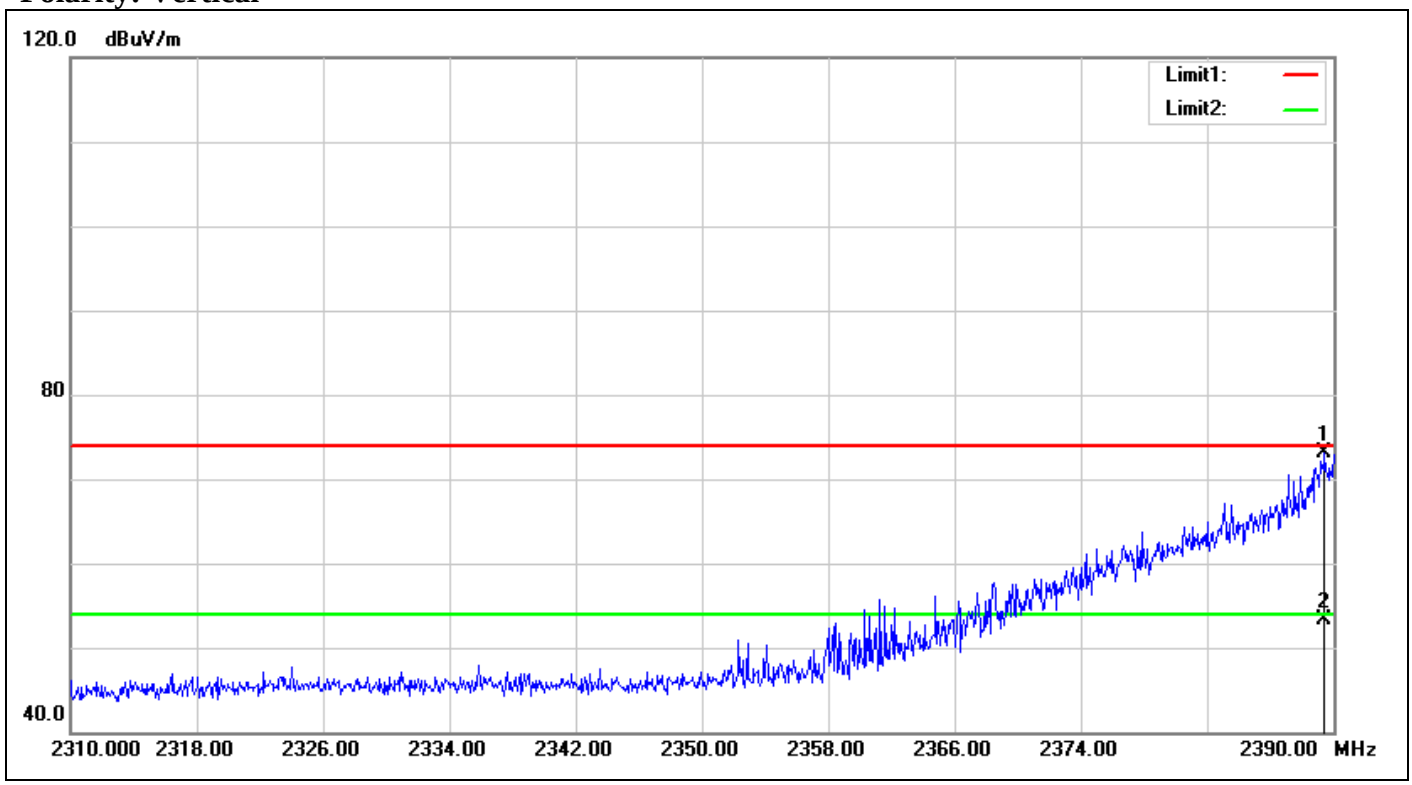
Polarity: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2484.094	65.74	-3.27	62.47	74.00	-11.53	100	310	peak
2	2484.094	48.53	-3.27	45.26	54.00	-8.74	100	310	AVG

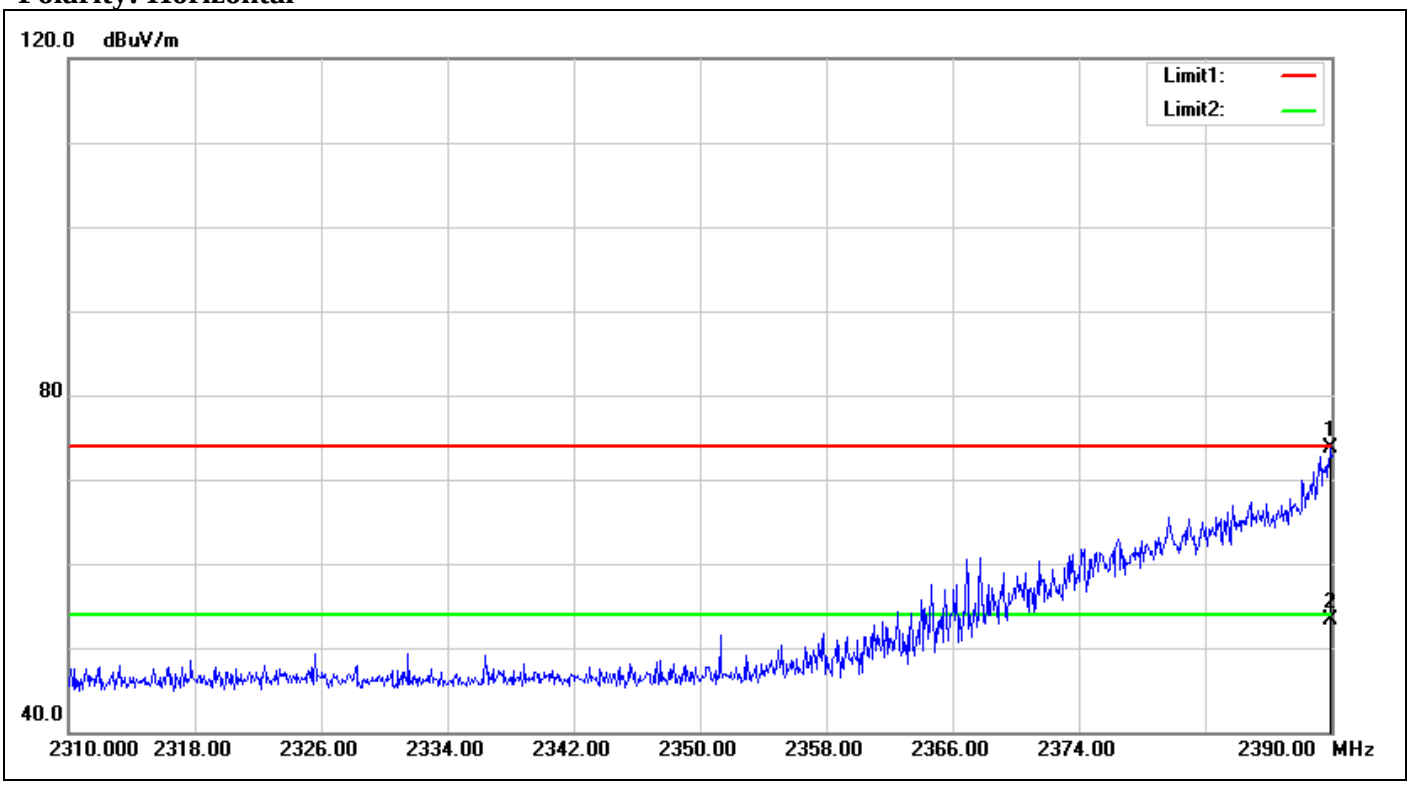
Band Edges (IEEE 802.11g mode / CH Low)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2389.440	76.98	-3.78	73.20	74.00	-0.80	100	322	peak
2	2389.440	56.99	-3.78	53.21	54.00	-0.79	100	322	AVG

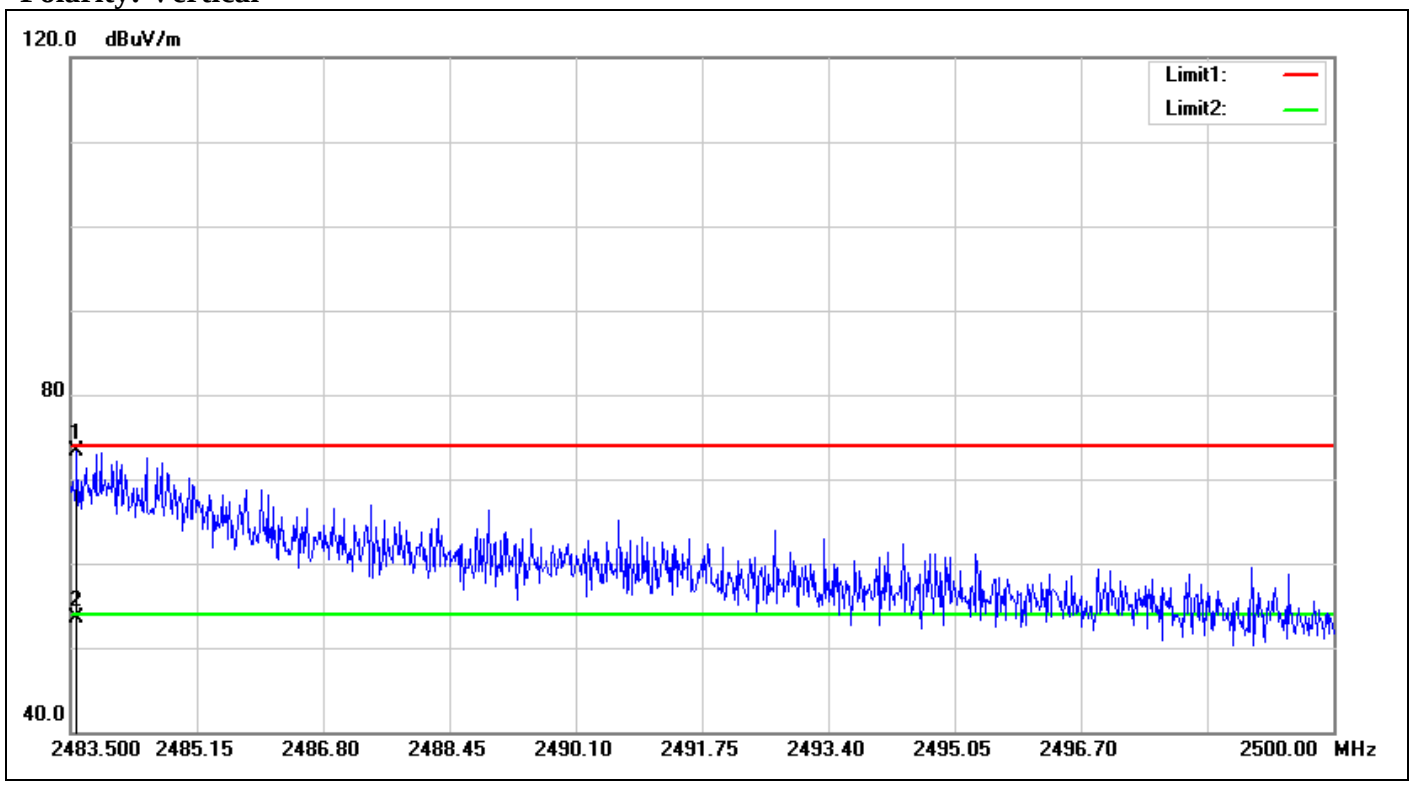
Polarity: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2389.920	77.39	-3.77	73.62	74.00	-0.38	100	0	peak
2	2389.920	57.07	-3.77	53.30	54.00	-0.70	100	0	AVG

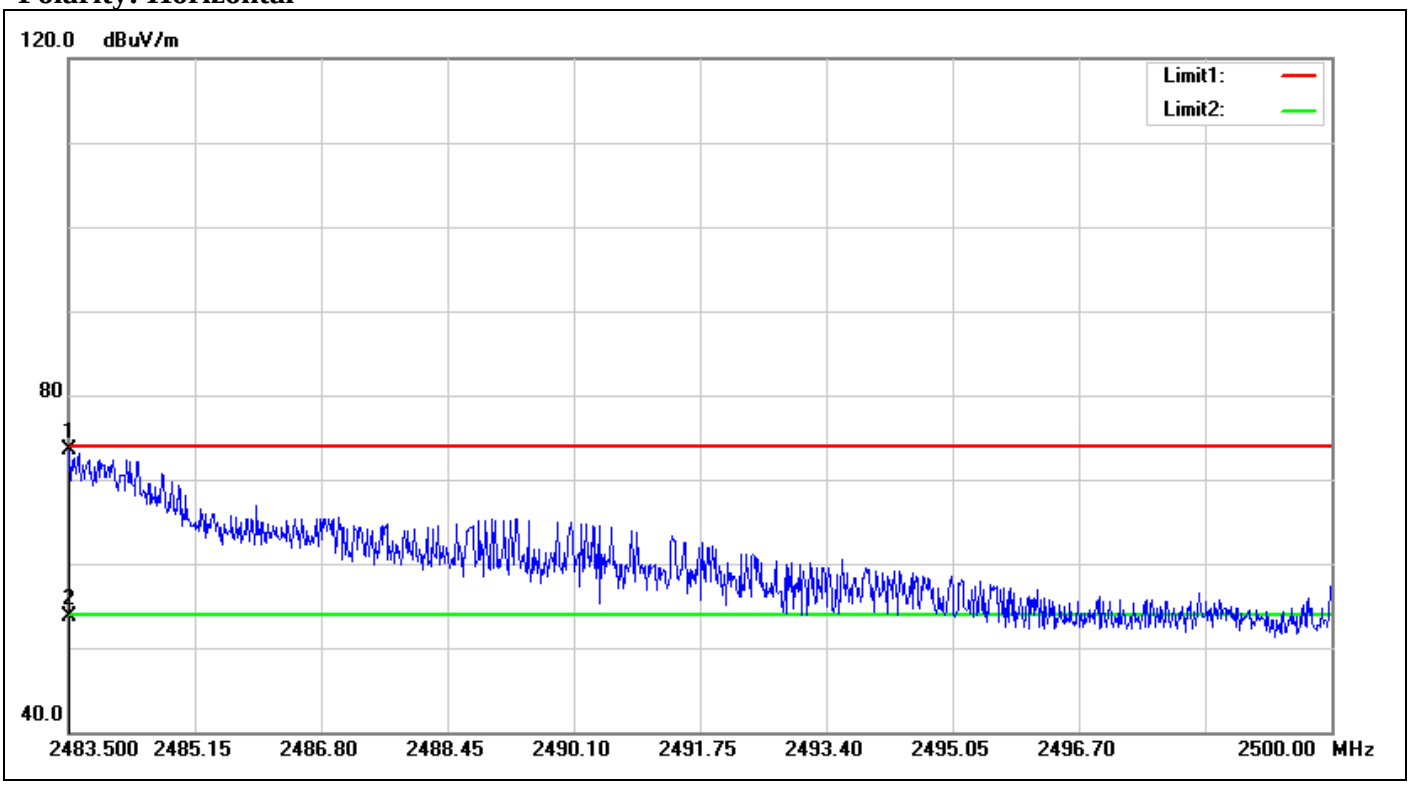
Band Edges (IEEE 802.11g mode / CH High)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2483.582	76.53	-3.27	73.26	74.00	-0.74	100	49	peak
2	2483.582	56.68	-3.27	53.41	54.00	-0.59	100	49	AVG

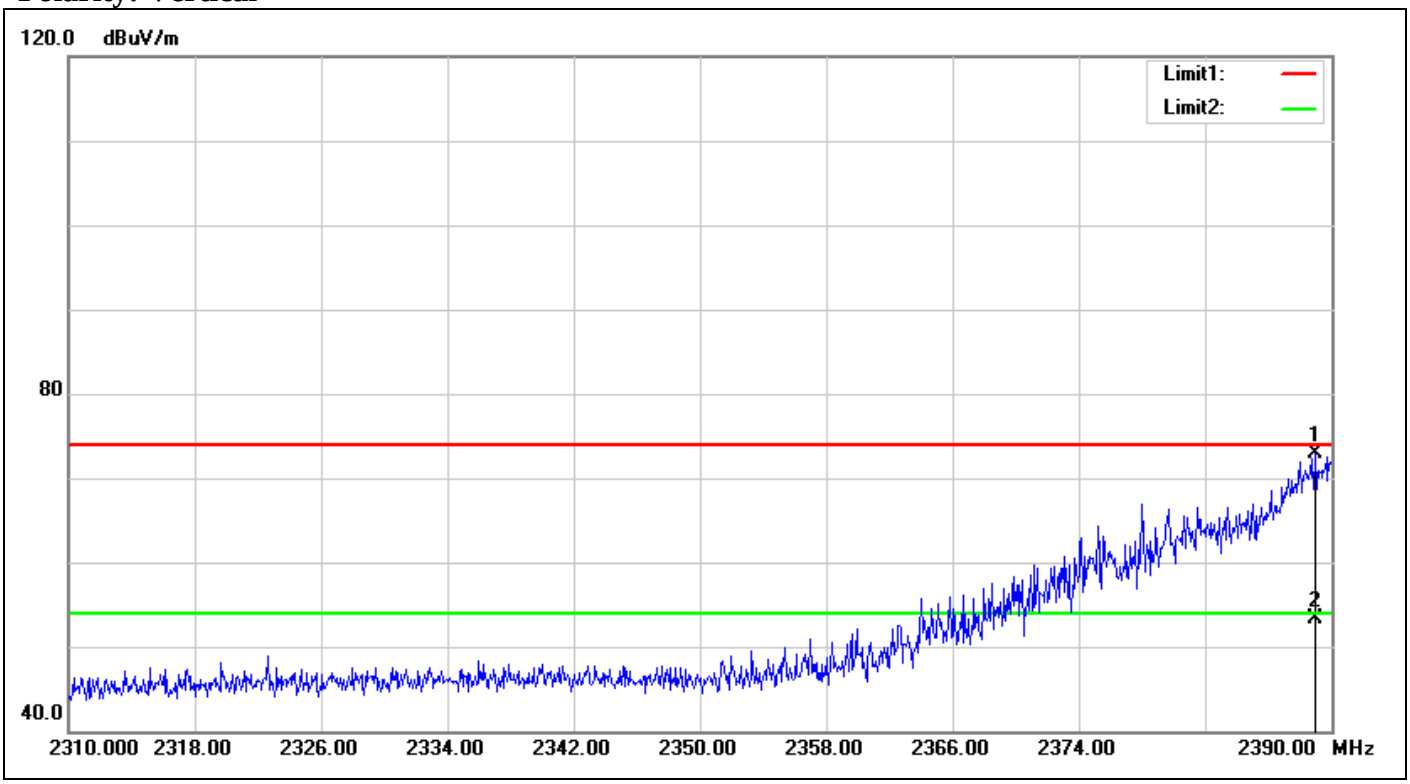
Polarity: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2483.517	76.69	-3.27	73.42	74.00	-0.58	100	328	peak
2	2483.517	57.06	-3.27	53.79	54.00	-0.21	100	328	AVG

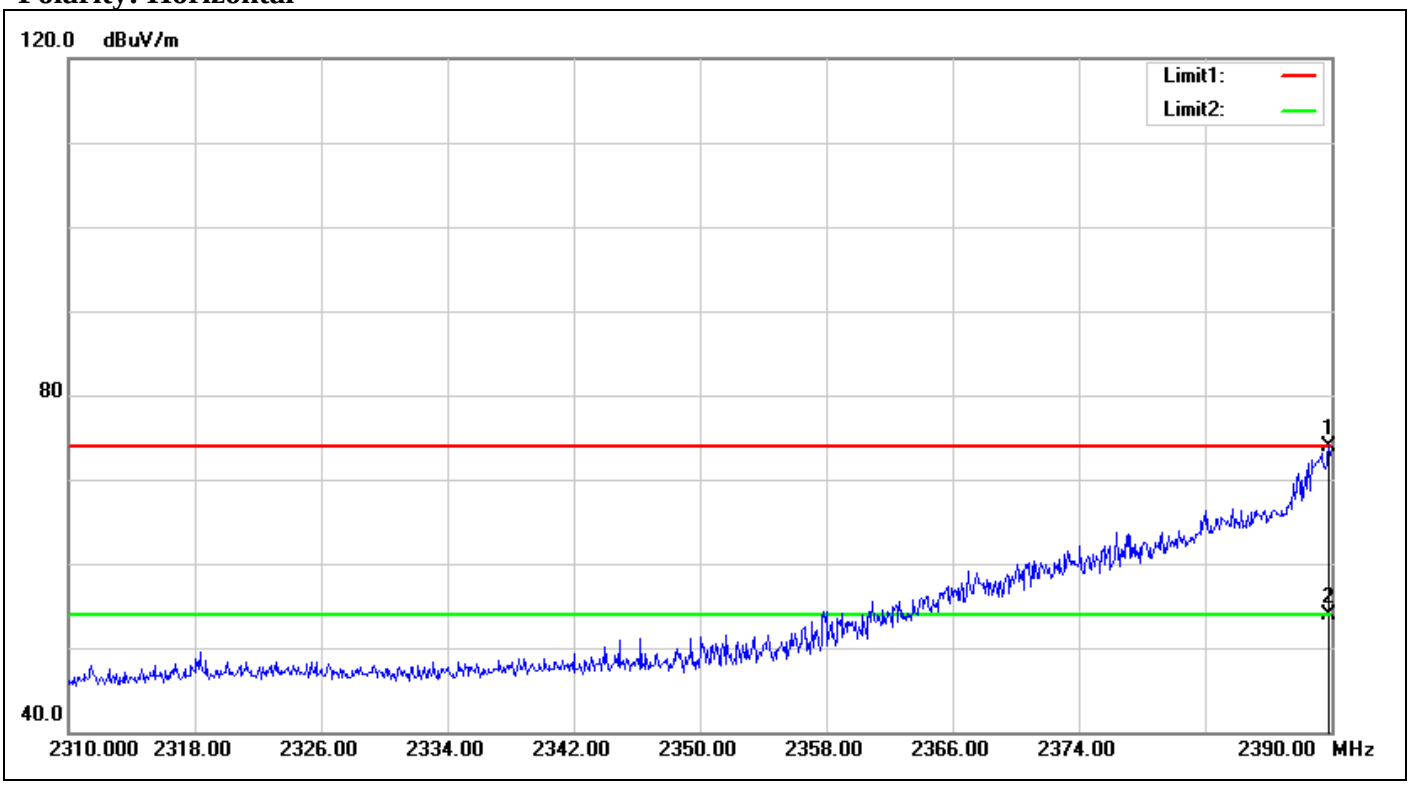
Band Edges (IEEE 802.11n HT 20 MHz mode / CH Low)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2388.960	76.62	-3.78	72.84	74.00	-1.16	100	239	peak
2	2388.960	57.10	-3.78	53.32	54.00	-0.68	100	239	AVG

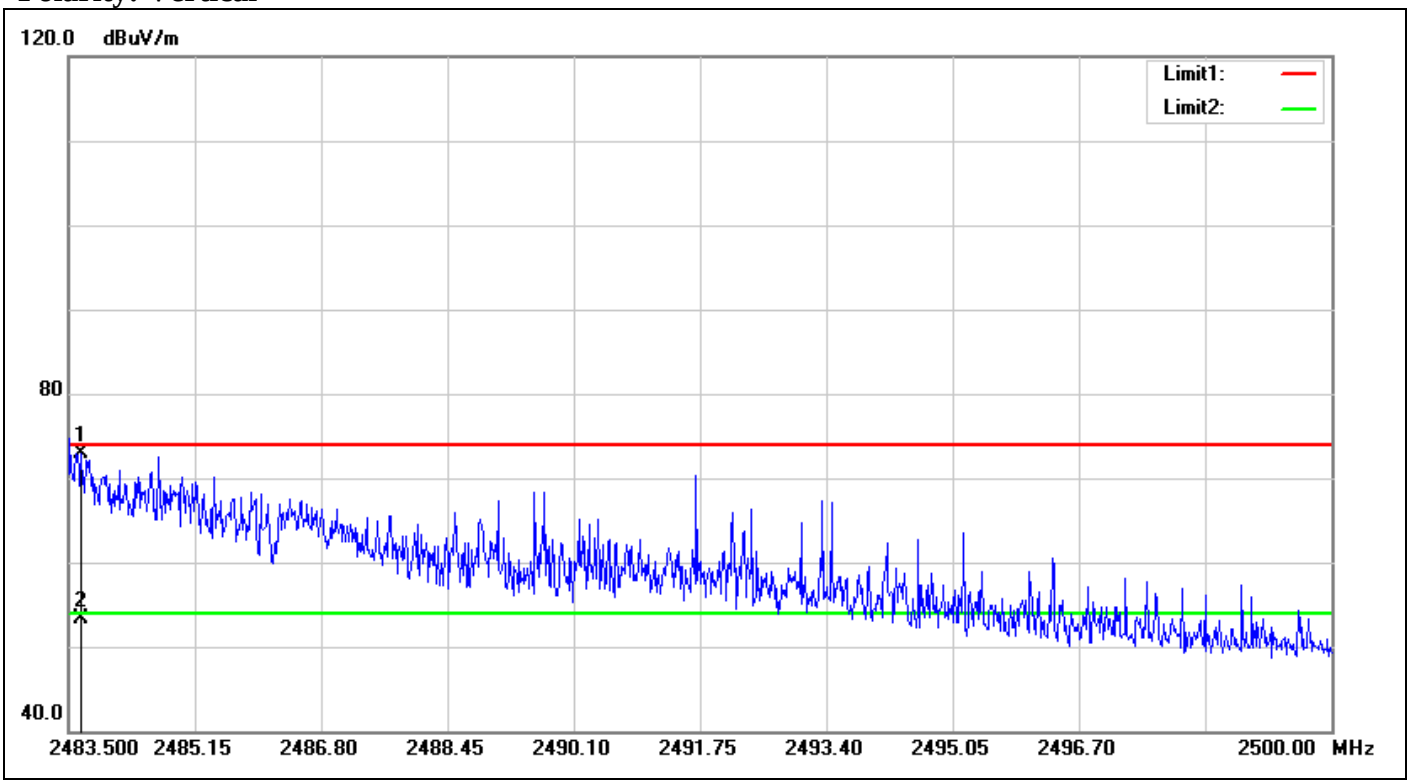
Polarity: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2389.840	77.74	-3.77	73.97	74.00	-0.03	100	112	peak
2	2389.840	57.58	-3.77	53.81	54.00	-0.19	100	112	AVG

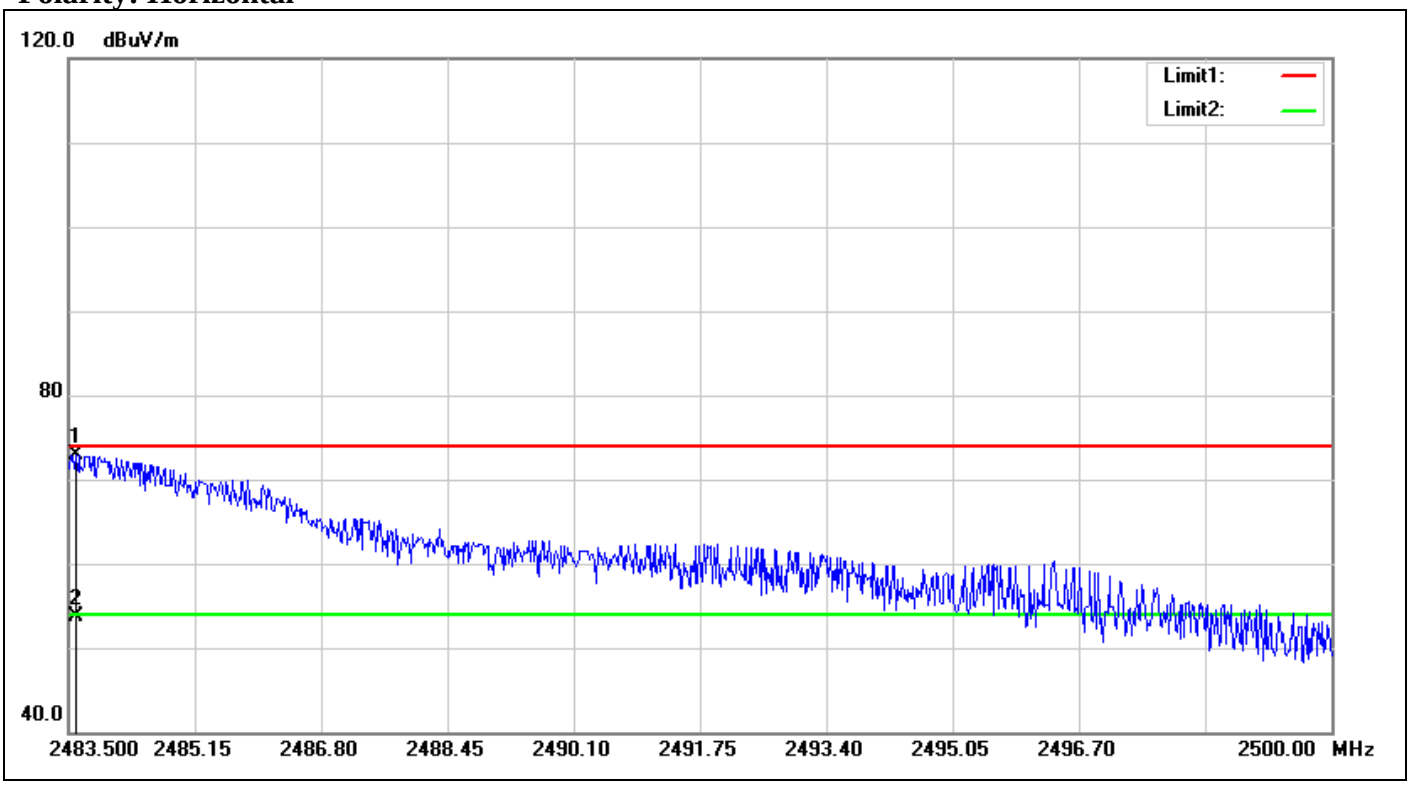
Band Edges (IEEE 802.11n HT 20 MHz mode / CH High)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2483.665	76.24	-3.27	72.97	74.00	-1.03	100	359	peak
2	2483.665	56.65	-3.27	53.38	74.00	-20.62	100	359	peak

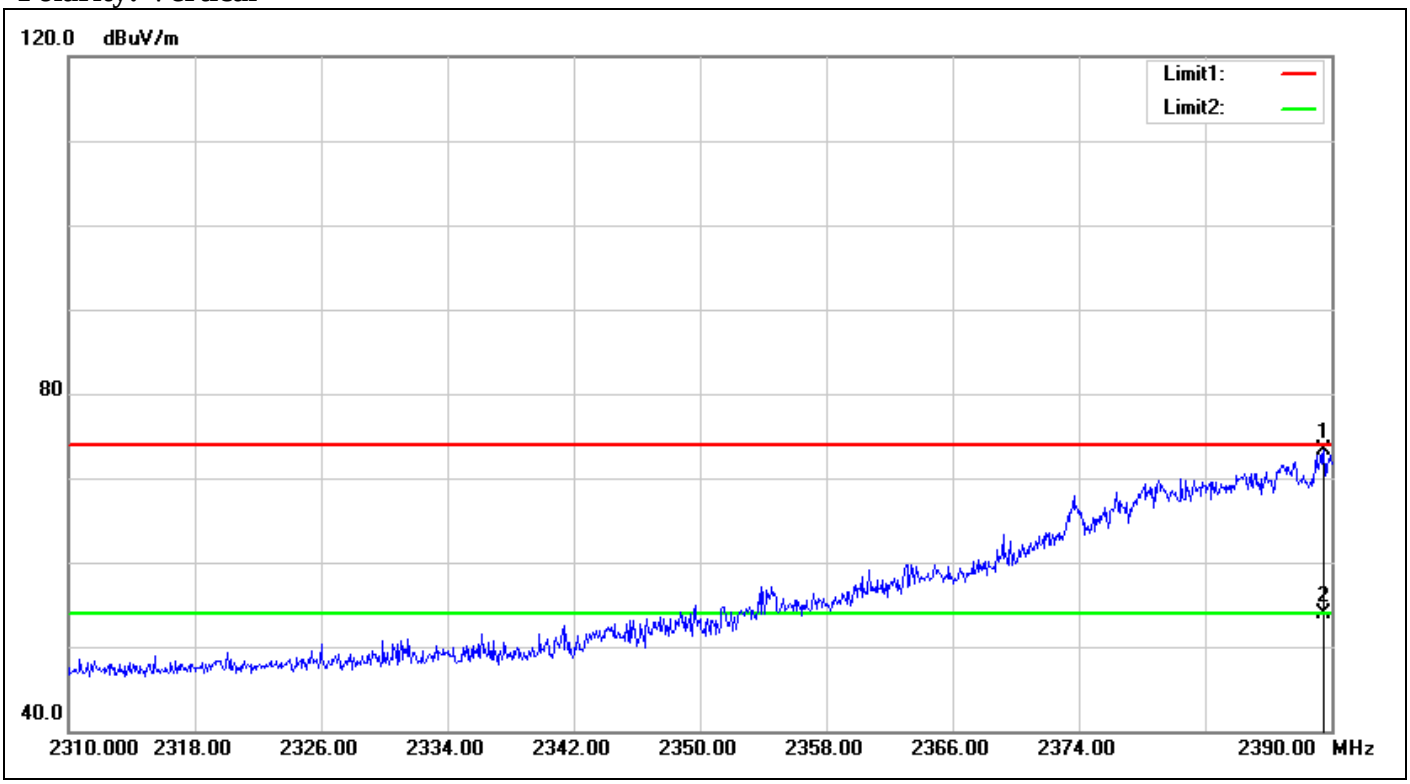
Polarity: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2483.599	76.26	-3.27	72.99	74.00	-1.01	100	130	peak
2	2483.599	57.04	-3.27	53.77	54.00	-0.23	100	130	AVG

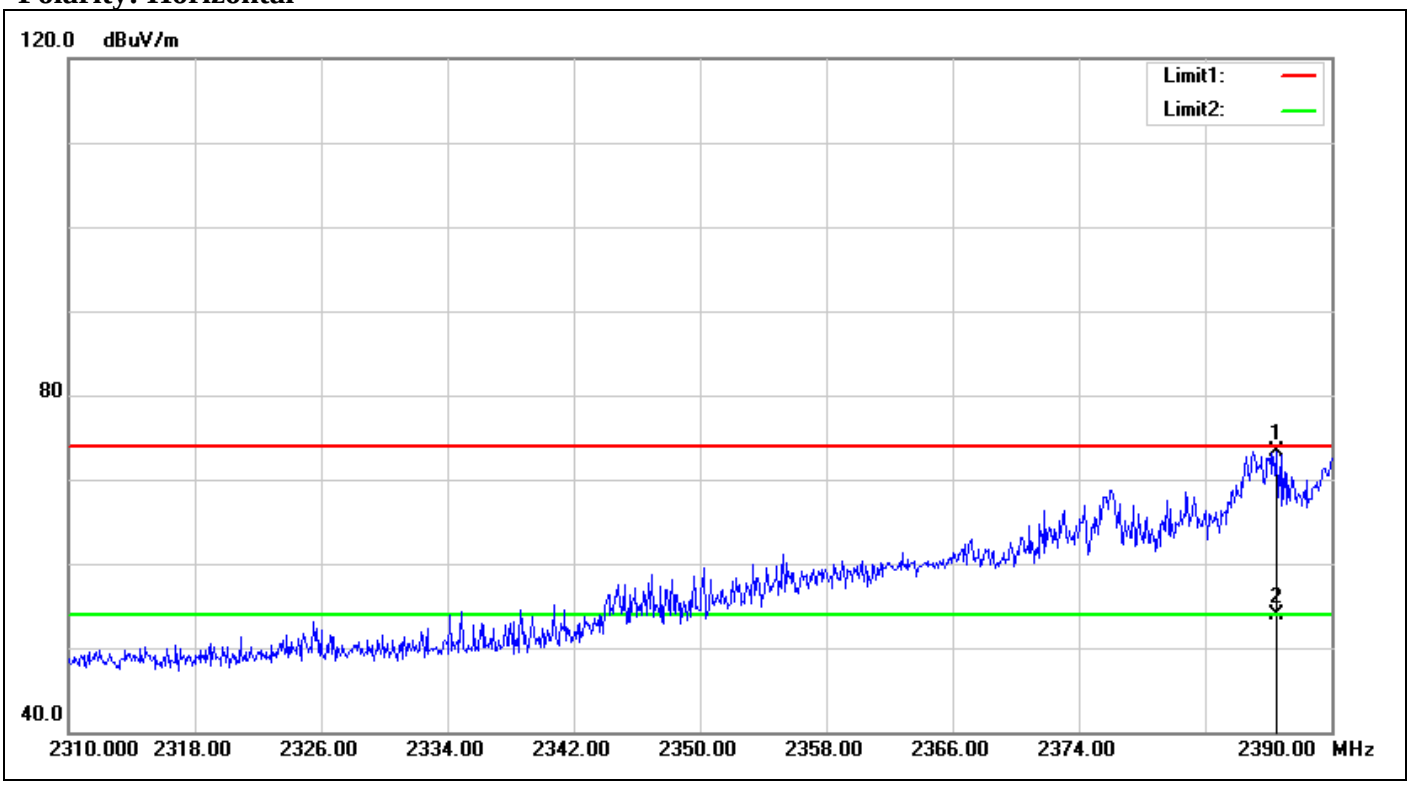
Band Edges (IEEE 802.11n HT 40 MHz mode / CH Low)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2389.520	77.03	-3.77	73.26	74.00	-0.74	100	72	peak
2	2389.520	57.66	-3.77	53.89	54.00	-0.11	100	72	AVG

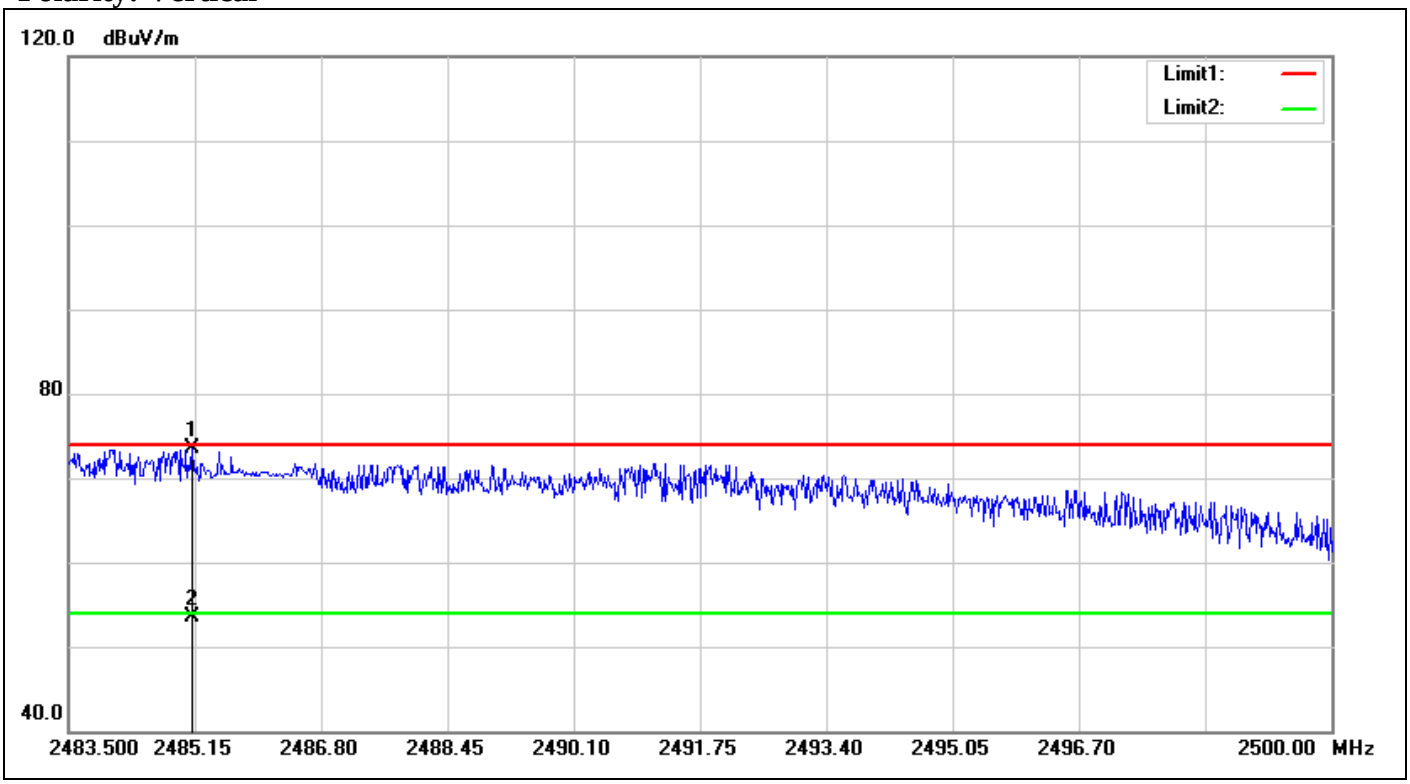
Polarity: Horizontal



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2386.560	77.18	-3.80	73.38	74.00	-0.62	100	300	peak
2	2386.560	57.61	-3.80	53.81	54.00	-0.19	100	300	AVG

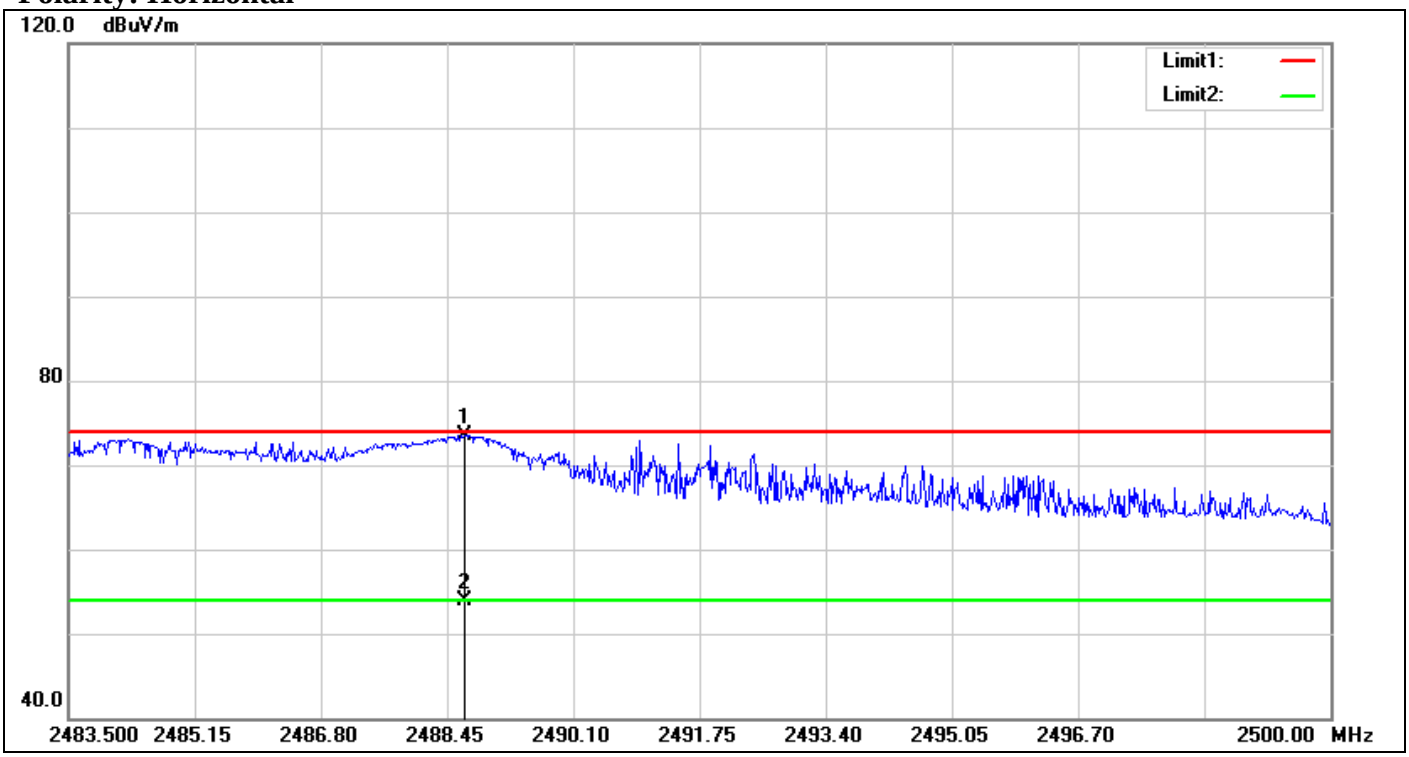
Band Edges (IEEE 802.11n HT 40 MHz mode / CH High)

Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(°)	
1	2485.117	76.74	-3.26	73.48	74.00	-0.52	100	269	peak
2	2485.117	56.82	-3.26	53.56	54.00	-0.44	100	269	AVG

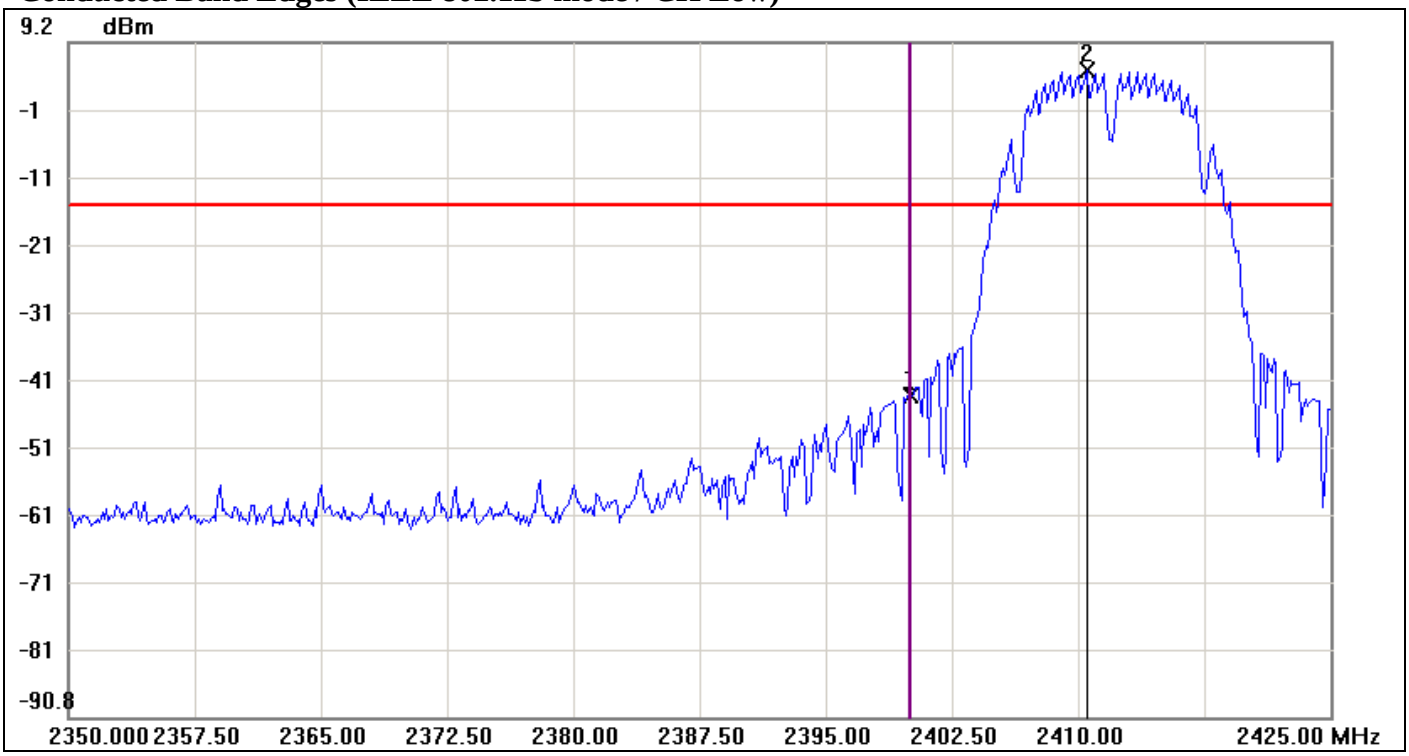
Polarity: Horizontal



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	2488.681	76.71	-3.22	73.49	74.00	-0.51	100	236	peak
2	2488.681	57.08	-3.22	53.86	54.00	-0.14	100	236	AVG

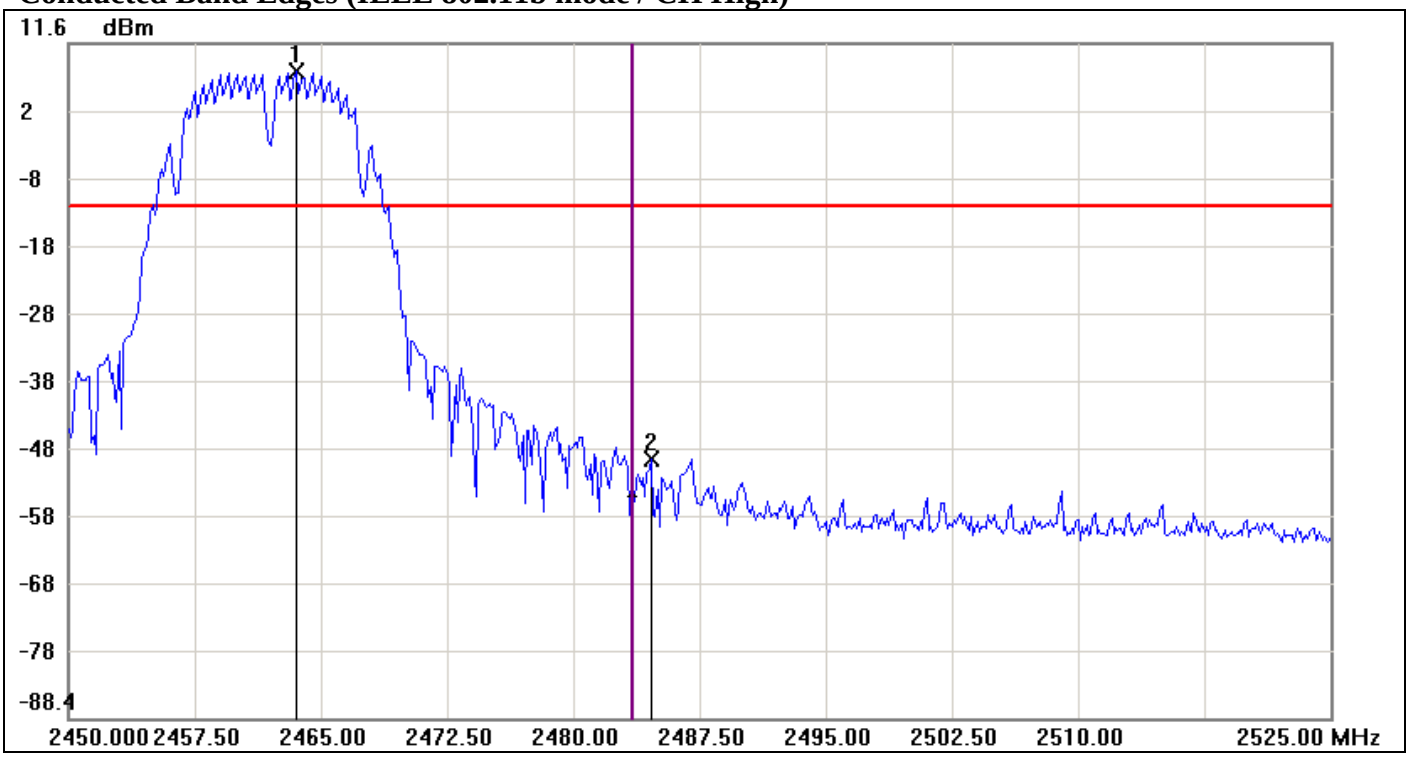
Test Plot

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



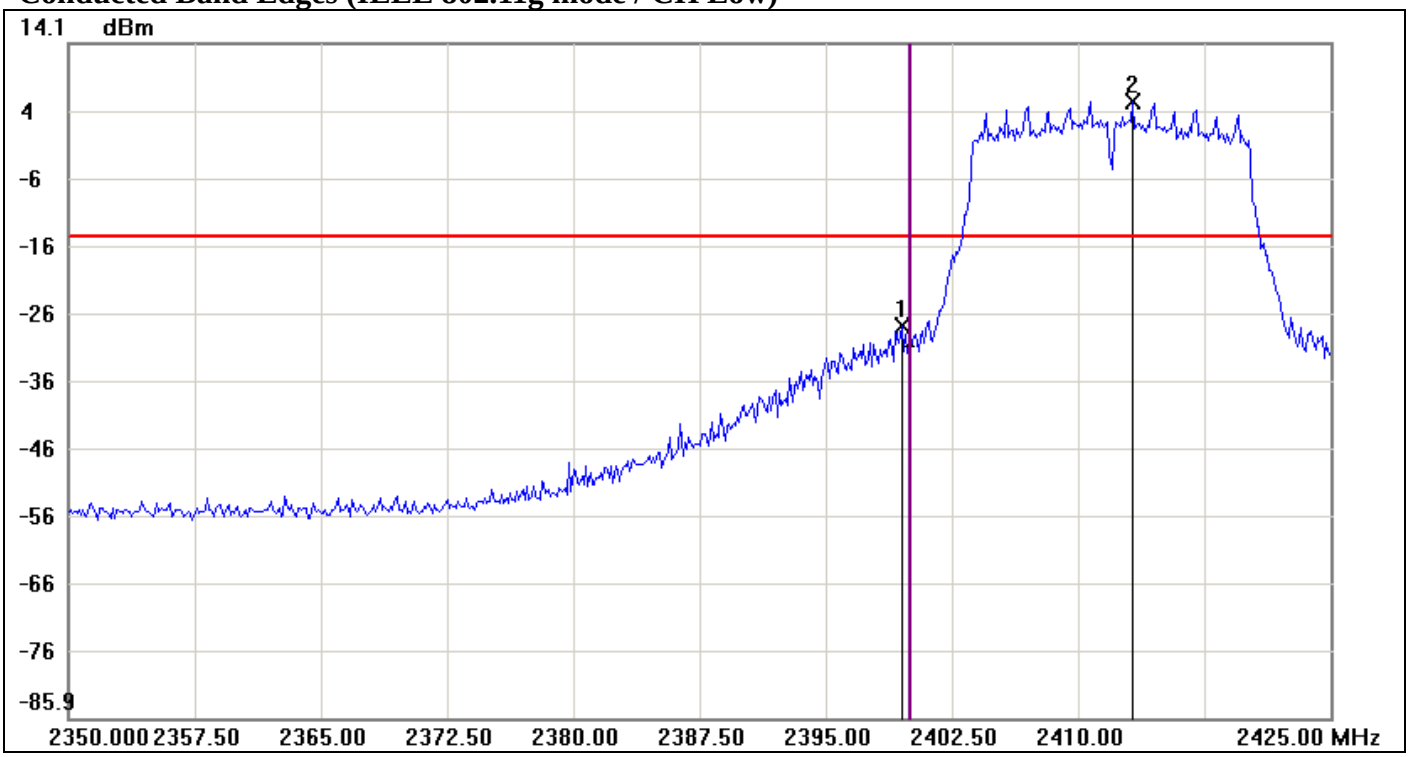
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2400.0000	-43.04	-14.87	-28.17
2	2410.5000	5.13	-14.87	20.00

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



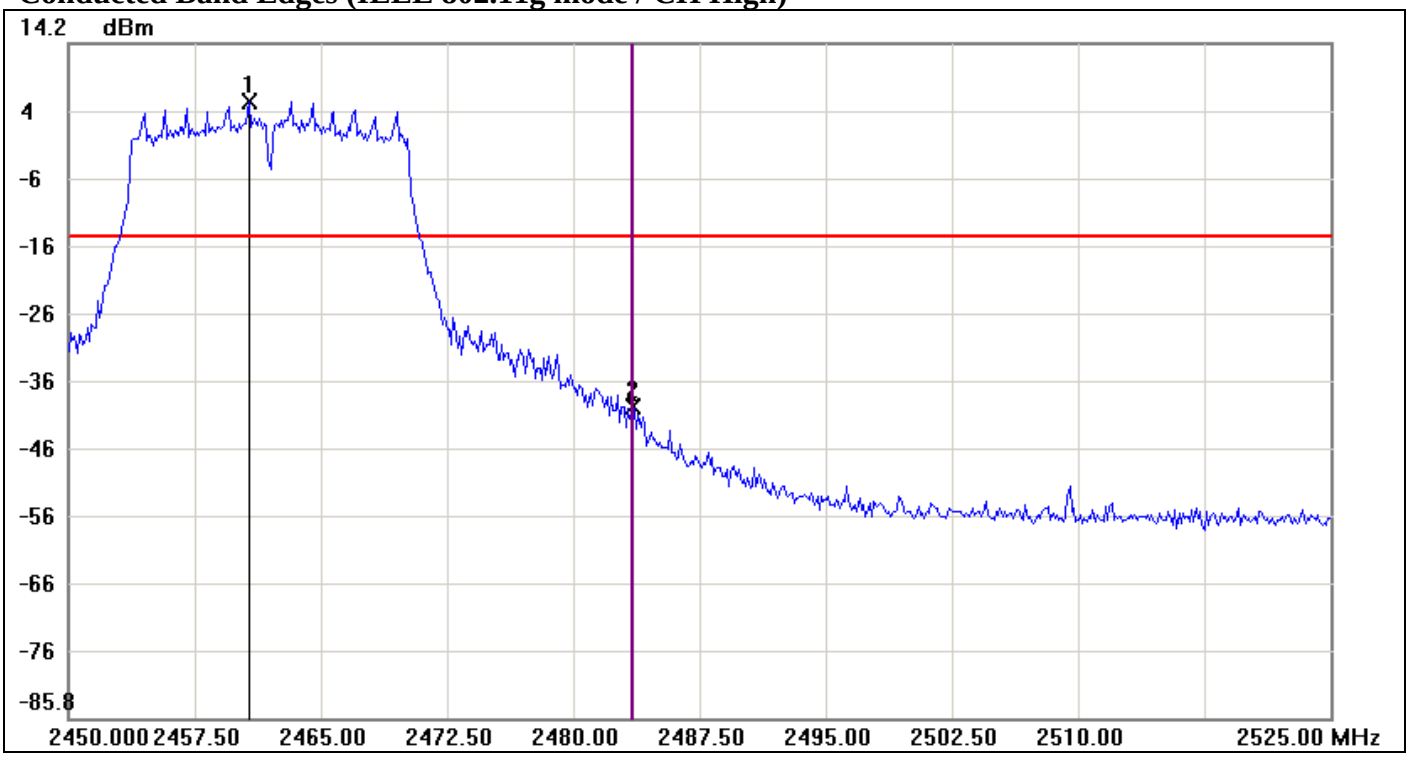
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.5000	7.51	-12.49	20.00
2	2484.6250	-50.00	-12.49	-37.51

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



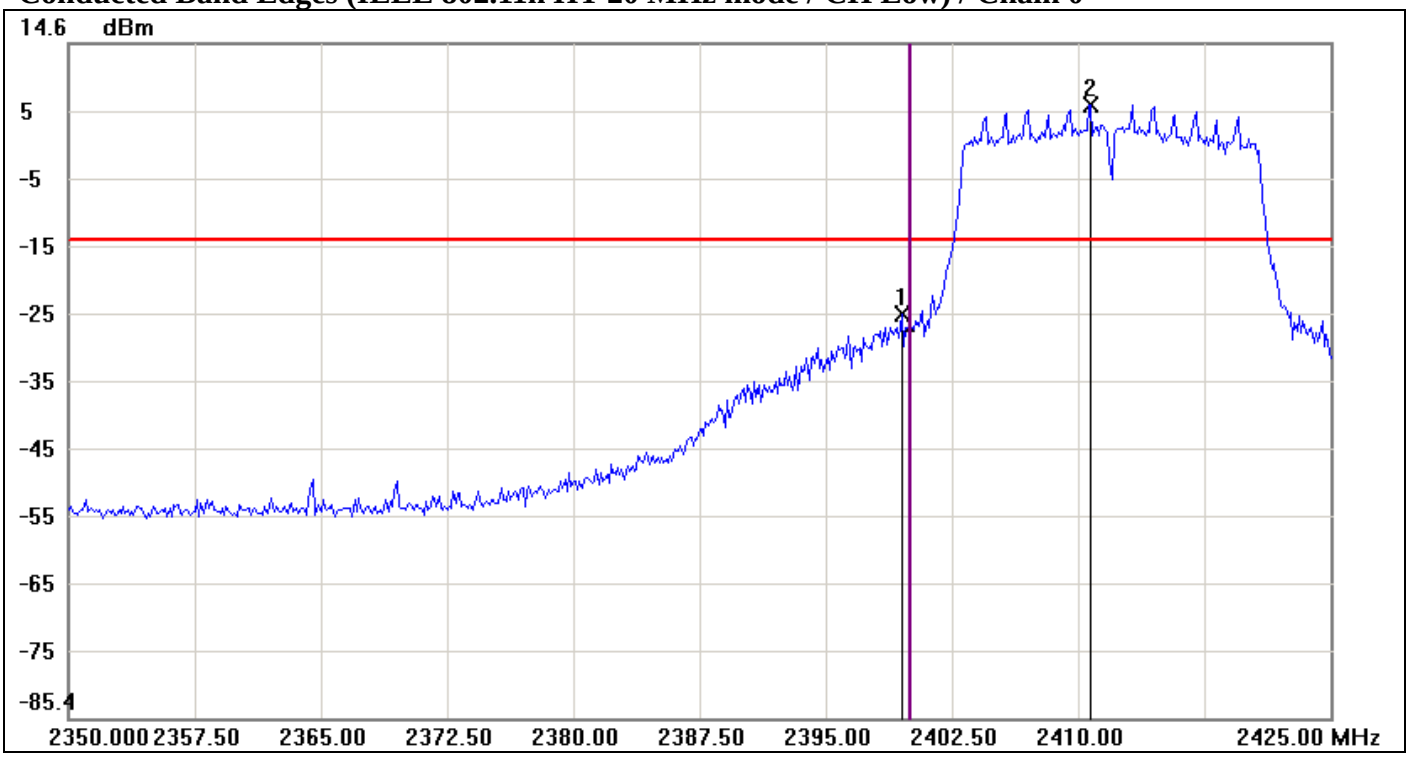
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2399.5000	-27.72	-14.54	-13.18
2	2413.2500	5.46	-14.54	20.00

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



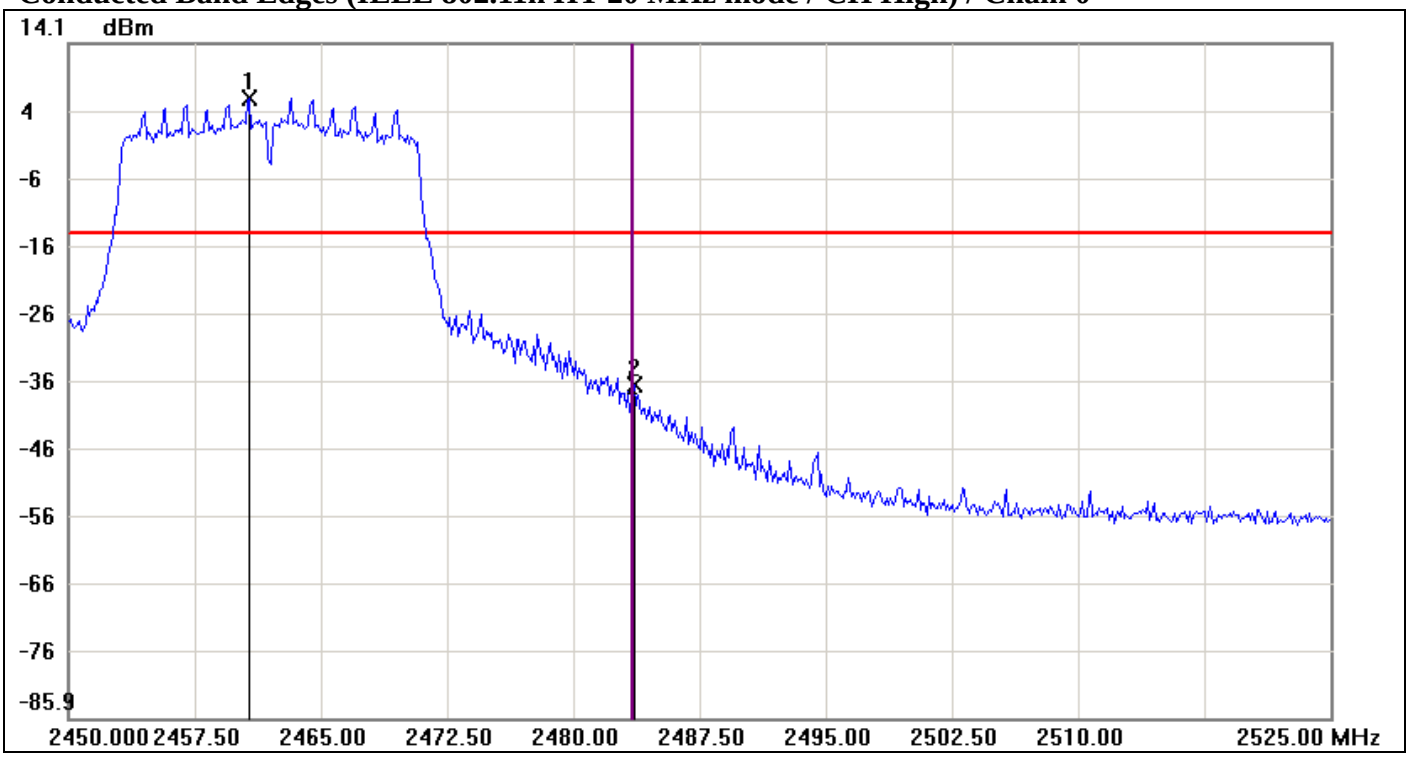
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2460.7500	5.63	-14.37	20.00
2	2483.5000	-39.66	-14.37	-25.29

Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / CH Low) / Chain 0



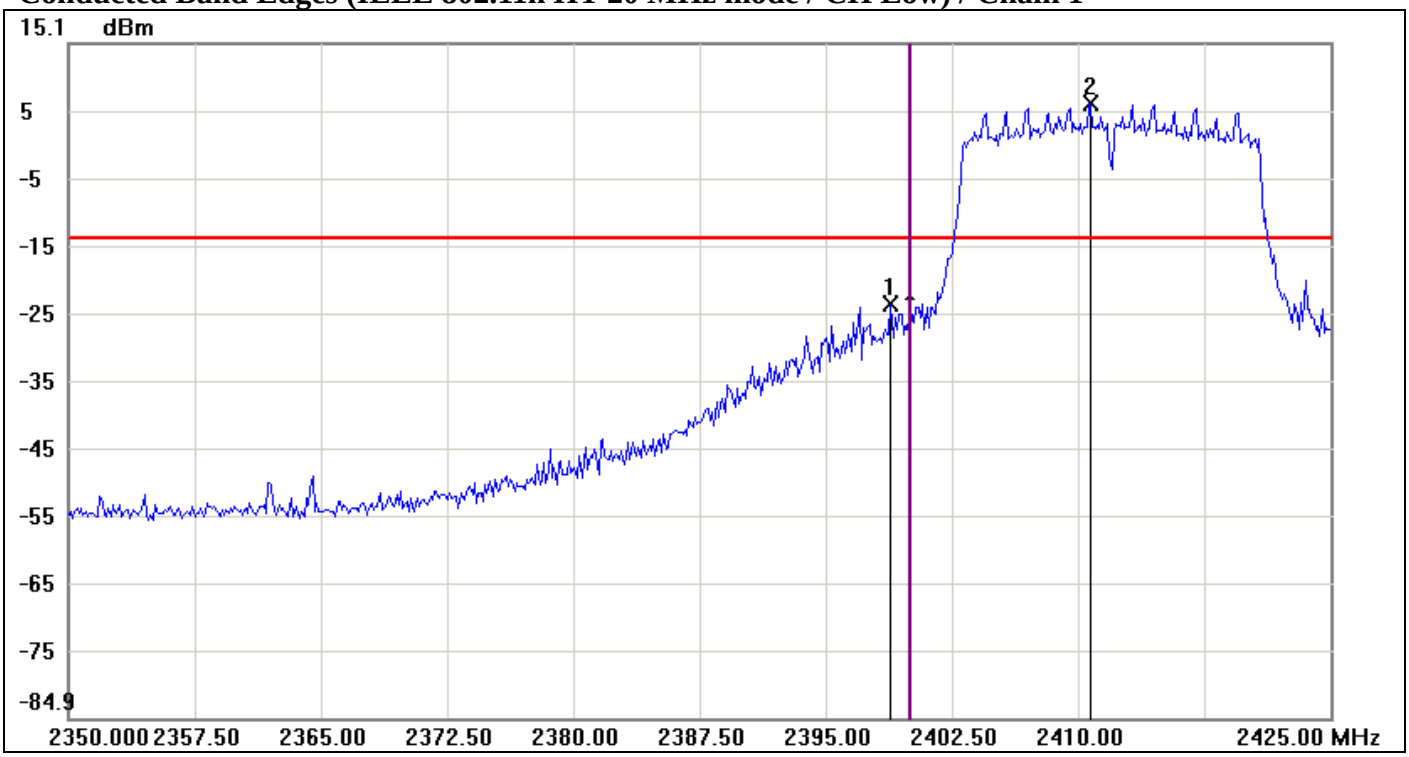
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2399.5000	-25.38	-14.42	-10.96
2	2410.7500	5.58	-14.42	20.00

Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / CH High) / Chain 0



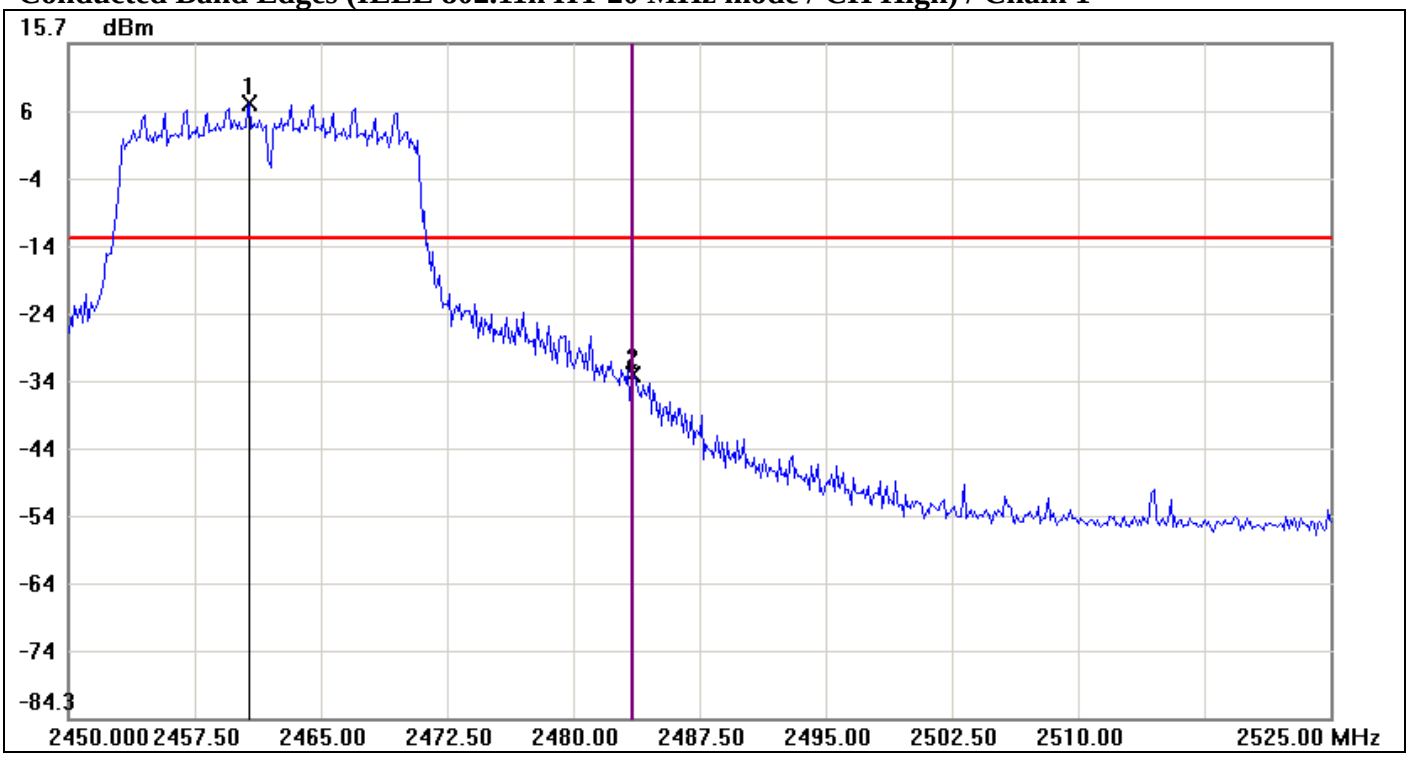
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2460.7500	5.93	-14.07	20.00
2	2483.6250	-36.51	-14.07	-22.44

Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / CH Low) / Chain 1



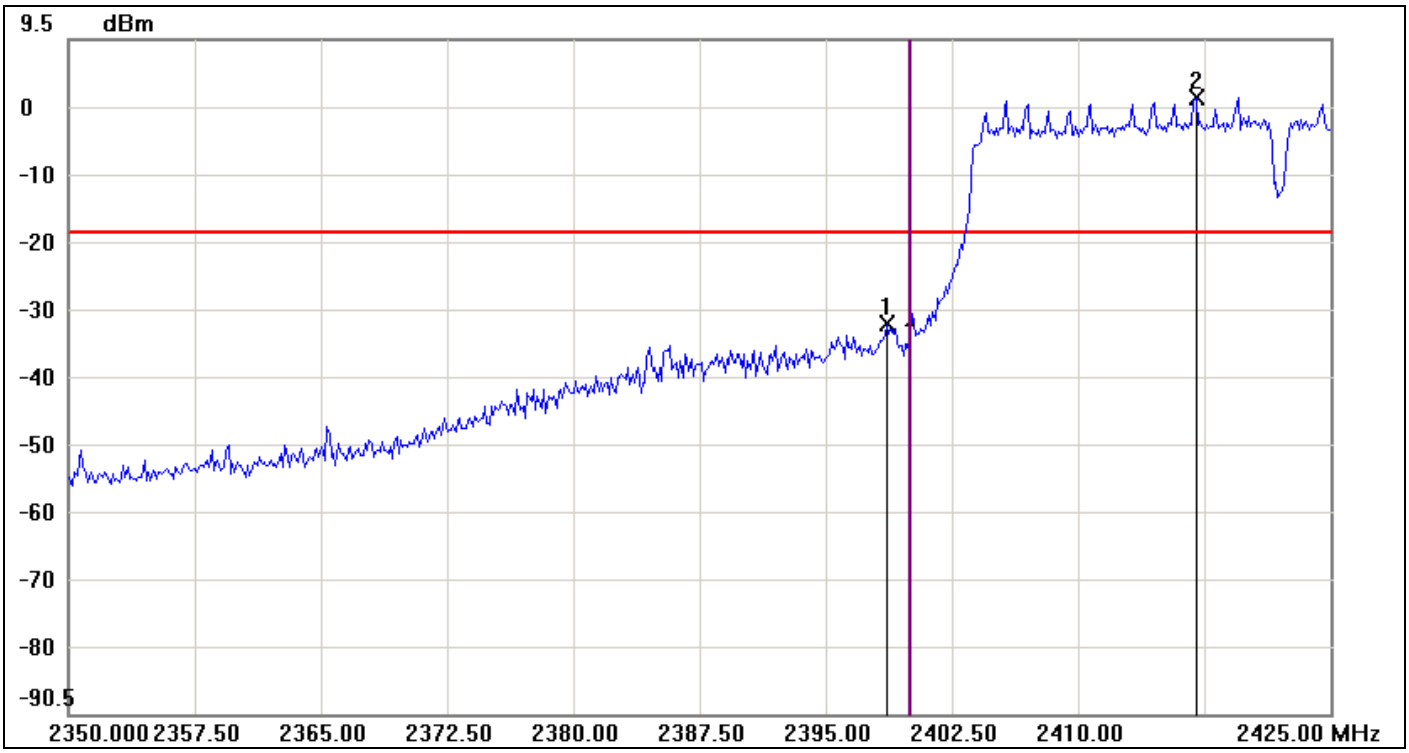
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2398.8750	-23.57	-13.80	-9.77
2	2410.7500	6.20	-13.80	20.00

Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / CH High) / Chain 1



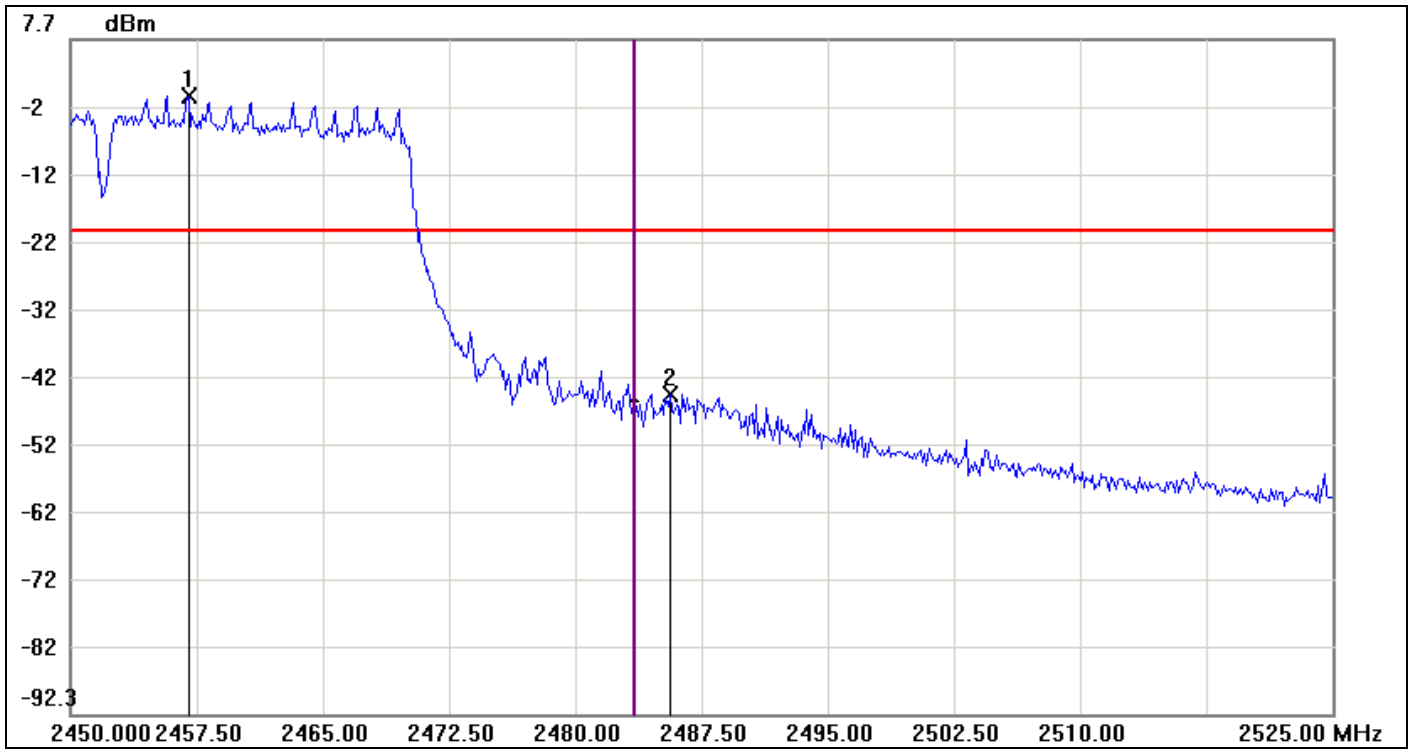
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2460.7500	6.68	-13.32	20.00
2	2483.5000	-33.52	-13.32	-20.20

Conducted Band Edges (IEEE 802.11n HT 40 MHz mode / CH Low) / Chain 0



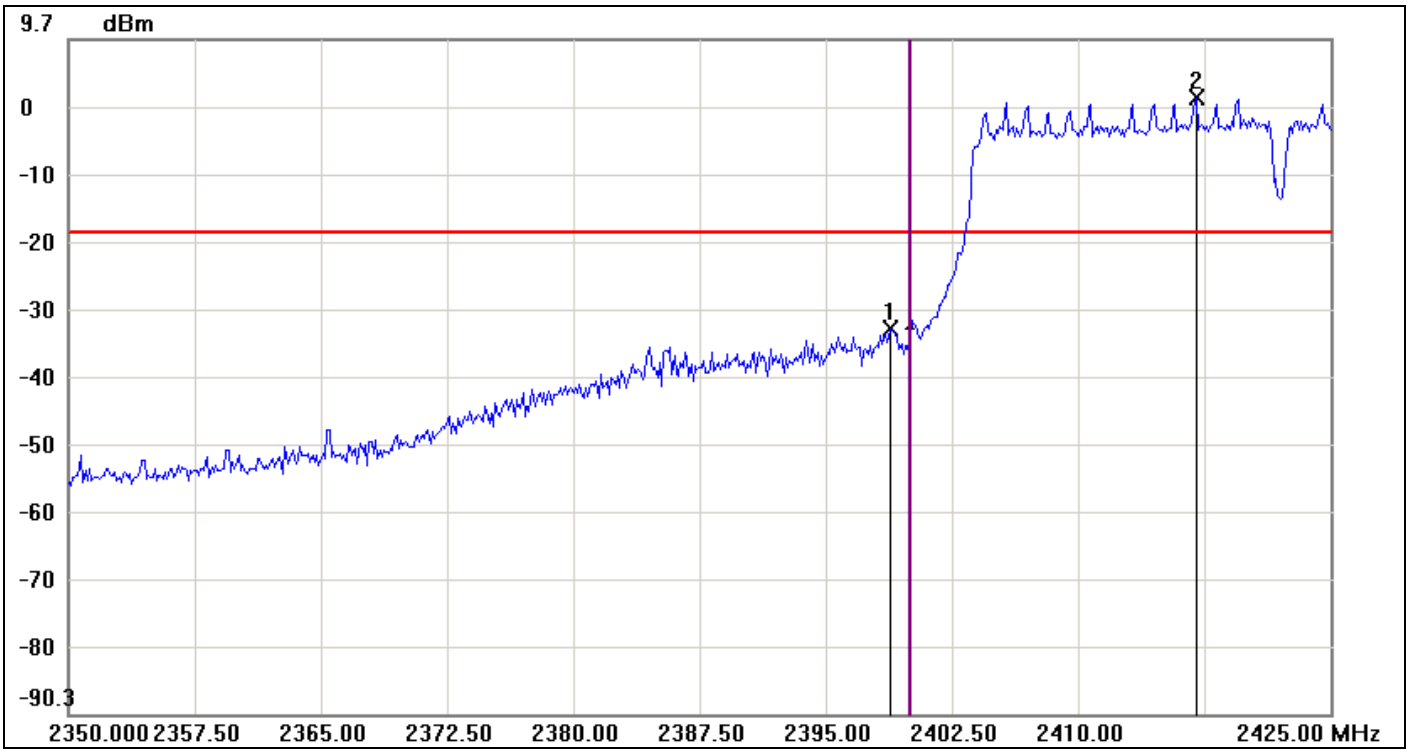
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2398.6250	-32.70	-19.07	-13.63
2	2417.0000	0.93	-19.07	20.00

Conducted Band Edges (IEEE 802.11n HT 40 MHz mode / CH High) / Chain 0



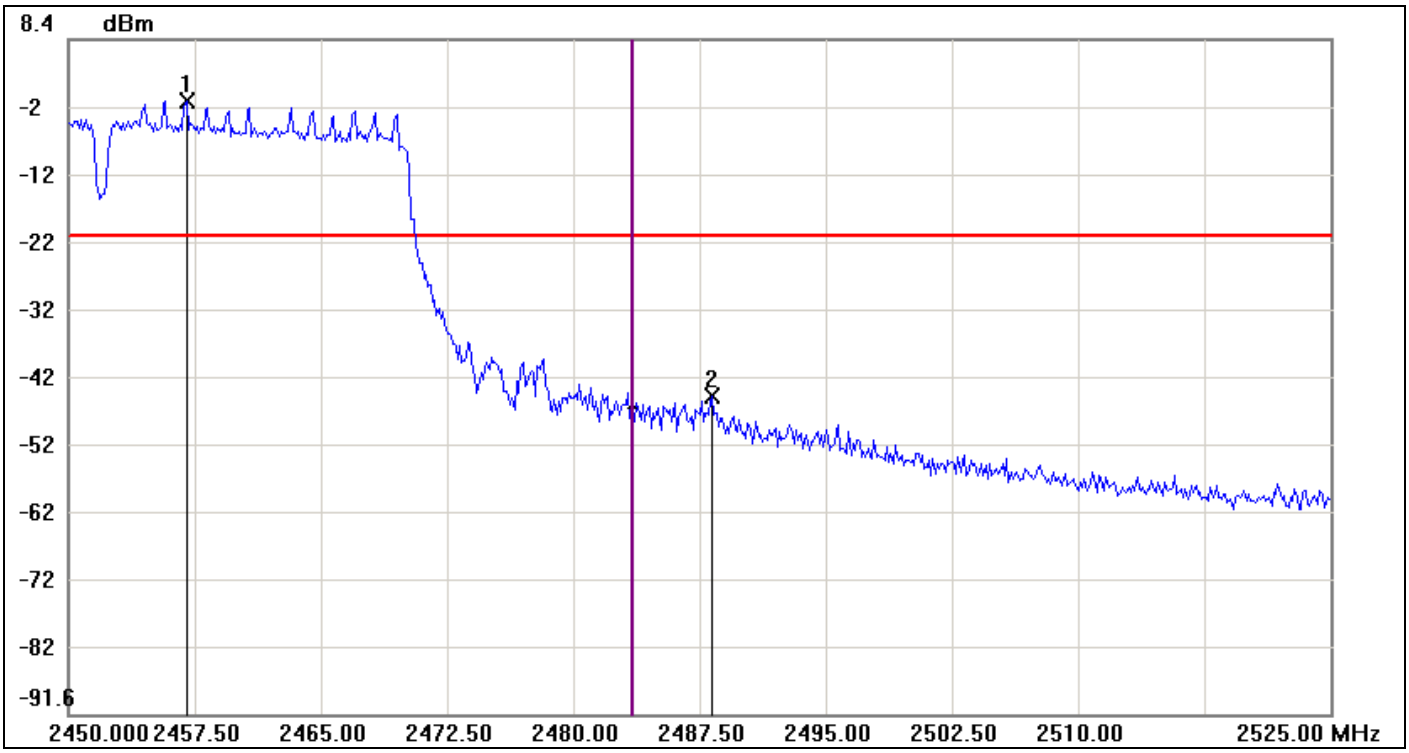
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2457.0000	-0.61	-20.61	20.00
2	2485.6250	-44.89	-20.61	-24.28

Conducted Band Edges (IEEE 802.11n HT 40 MHz mode / CH Low) / Chain 1



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2398.8750	-33.17	-19.06	-14.11
2	2417.0000	0.94	-19.06	20.00

Conducted Band Edges (IEEE 802.11n HT 40 MHz mode / CH High) / Chain 1



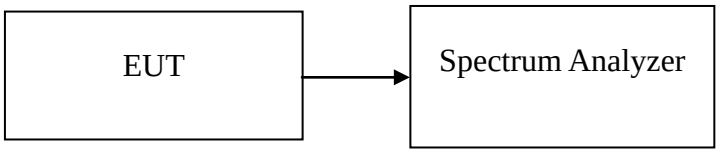
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2457.0000	-0.63	-20.63	20.00
2	2488.2500	-44.47	-20.63	-23.84

7.6 PEAK POWER SPECTRAL DENSITY

LIMIT

1. According to §15.247(e) & RSS-210 §A8.2, 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-210 §A8.3, 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	-3.54	8.00	PASS
Mid	2437	-2.69		PASS
High	2462	-0.73		PASS

Test mode: IEEE 802.11g mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-2.13	8.00	PASS
Mid	2437	-1.23		PASS
High	2462	-1.56		PASS

Test mode: IEEE 802.11n HT 20 MHz mode

Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	2412	-1.59	-1.98	1.23	8.00	PASS
Mid	2437	-3.41	-1.72	0.53		PASS
High	2462	-2.44	-0.62	1.57		PASS

Test mode: IEEE 802.11n HT 40 MHz mode

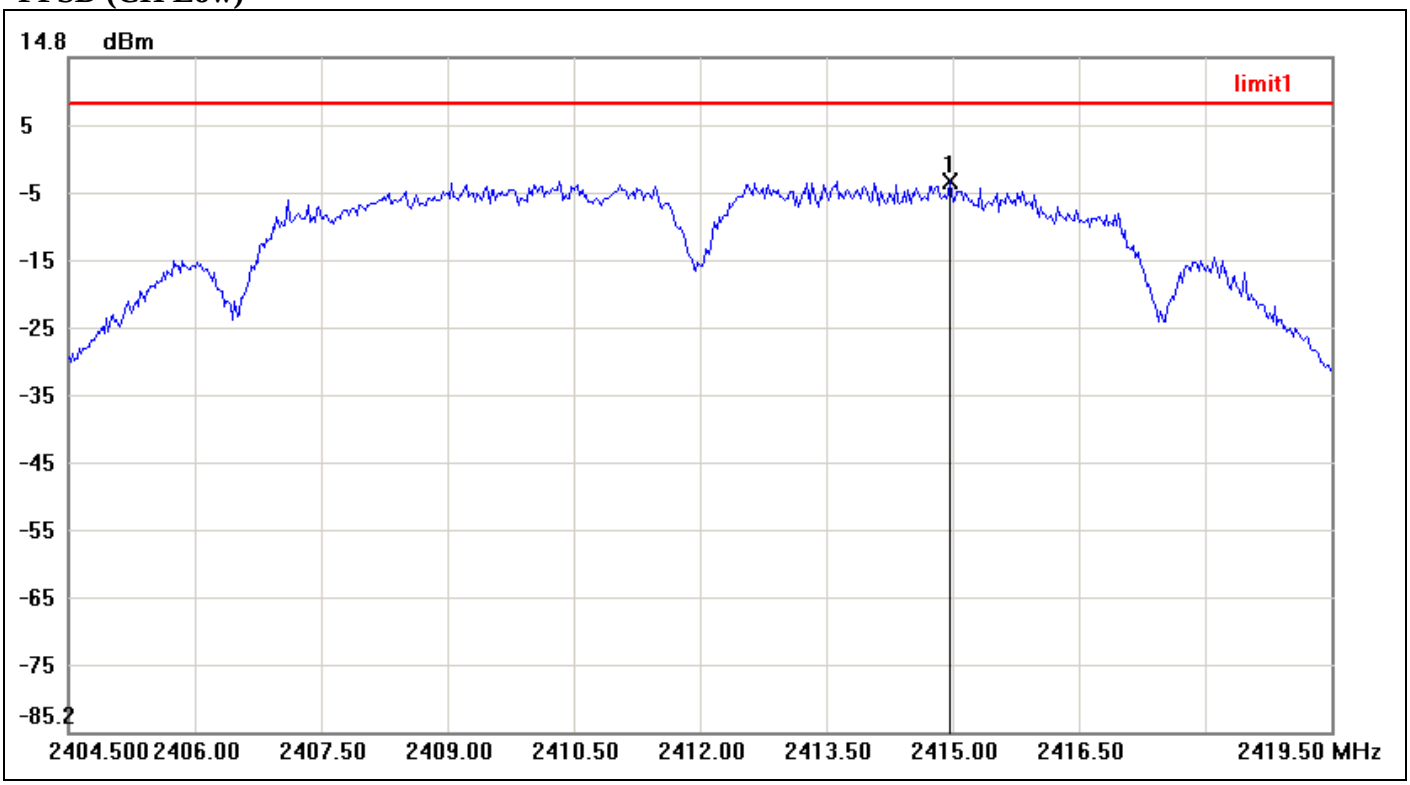
Channel	Frequency (MHz)	Chain 0 PPSD (dBm)	Chain 1 PPSD (dBm)	PPSD (dBm)	Limit (dBm)	Result
Low	2422	-7.14	-7.70	-4.40	8.00	PASS
Mid	2437	-8.49	-8.36	-5.41		PASS
High	2452	-8.72	-9.83	-6.23		PASS

Remark: *Total PPSD (dBm) = 10*LOG(10^(Chain 0 PPSD / 10)+10^(Chain 1 PPSD /10))*

Test Plot

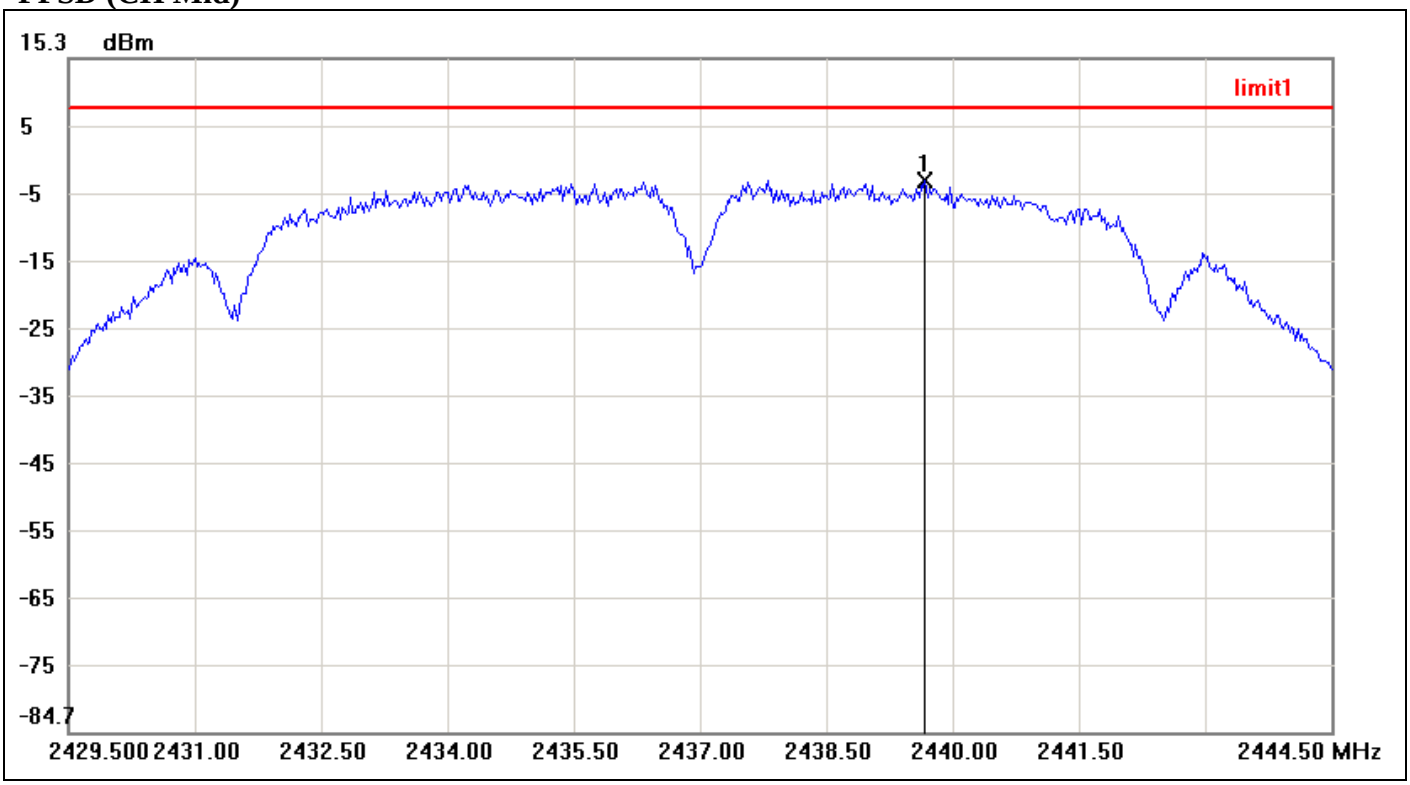
IEEE 802.11b mode

PPSD (CH Low)



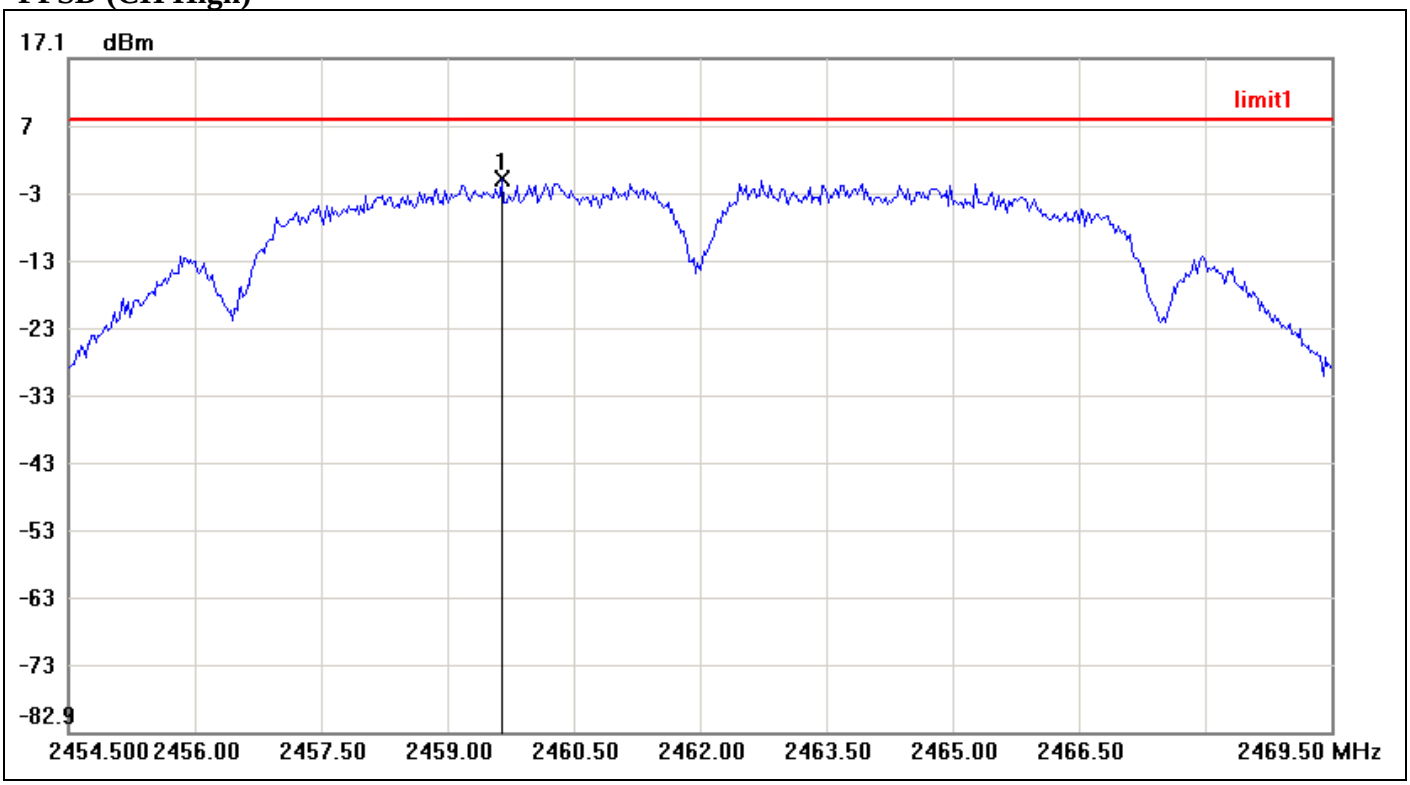
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2414.9750	-3.54	8.00	-11.54

PPSD (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2439.6750	-2.69	8.00	-10.69

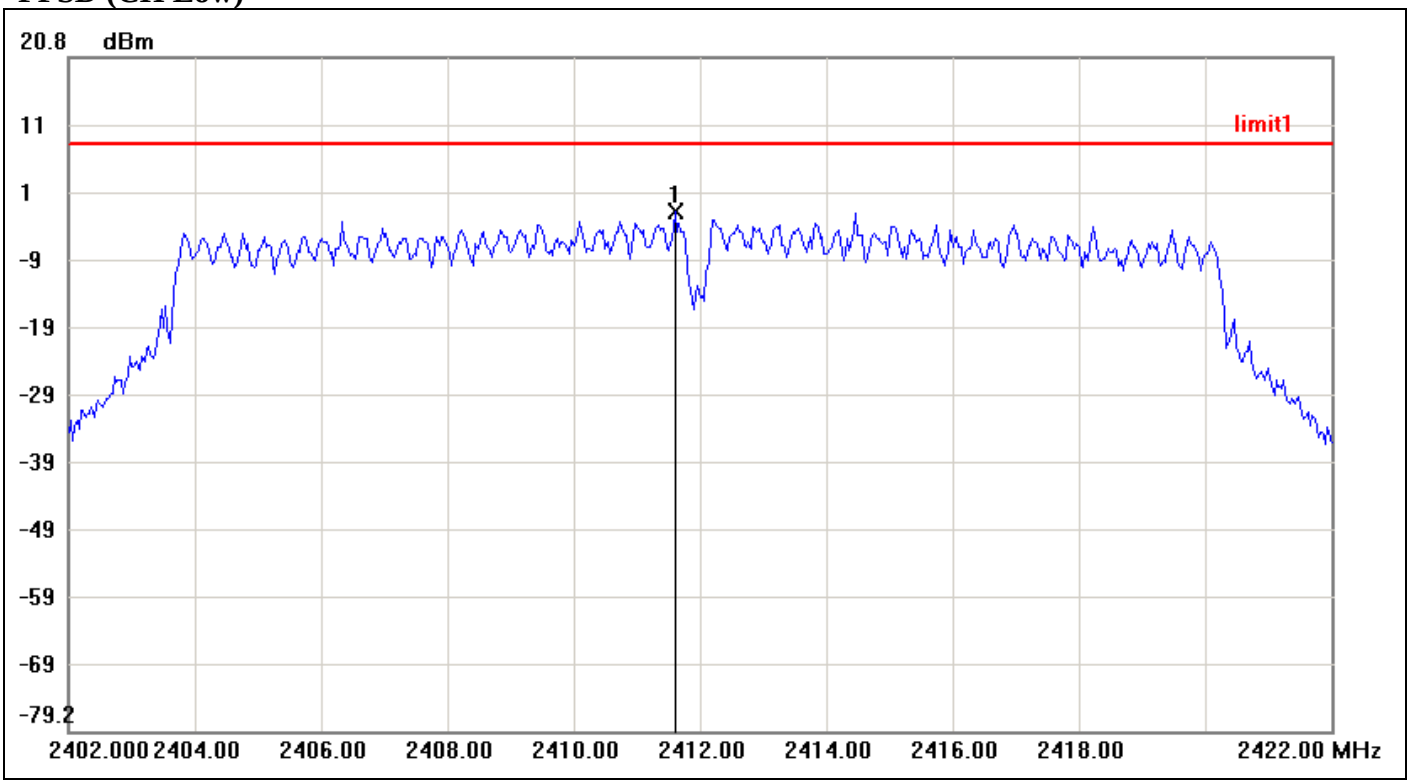
PPSD (CH High)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2459.6500	-0.73	8.00	-8.73

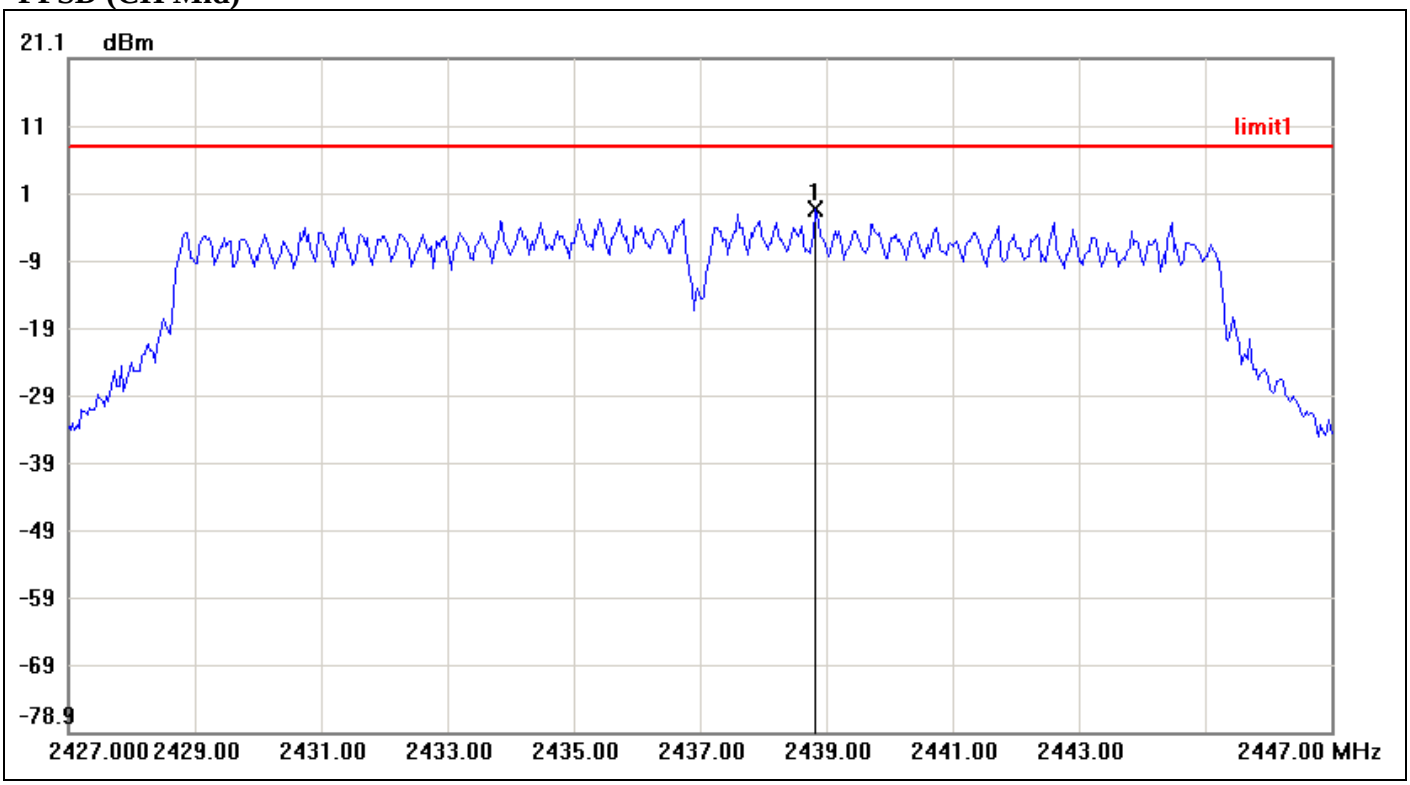
IEEE 802.11g mode

PPSD (CH Low)



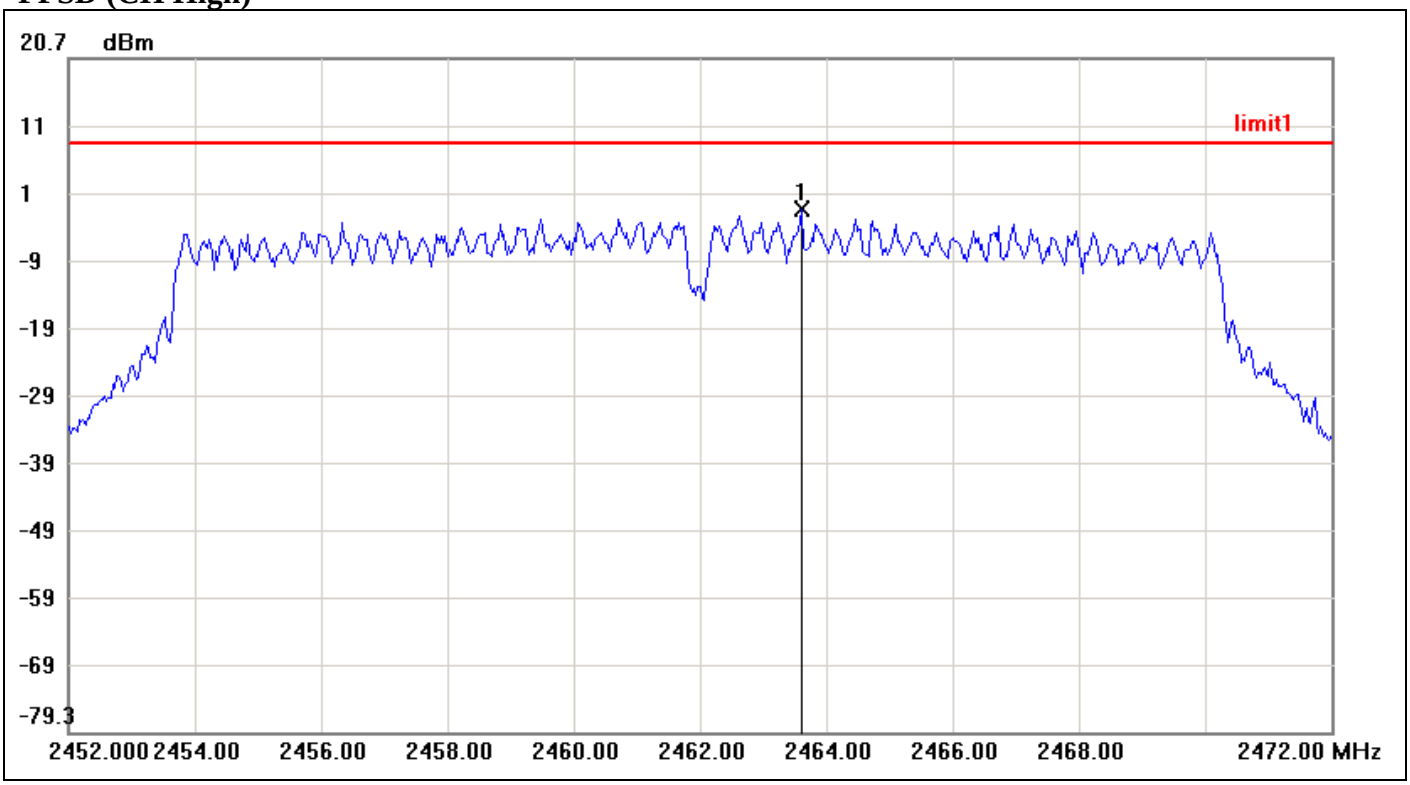
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2411.6000	-2.13	8.00	-10.13

PPSD (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2438.8333	-1.23	8.00	-9.23

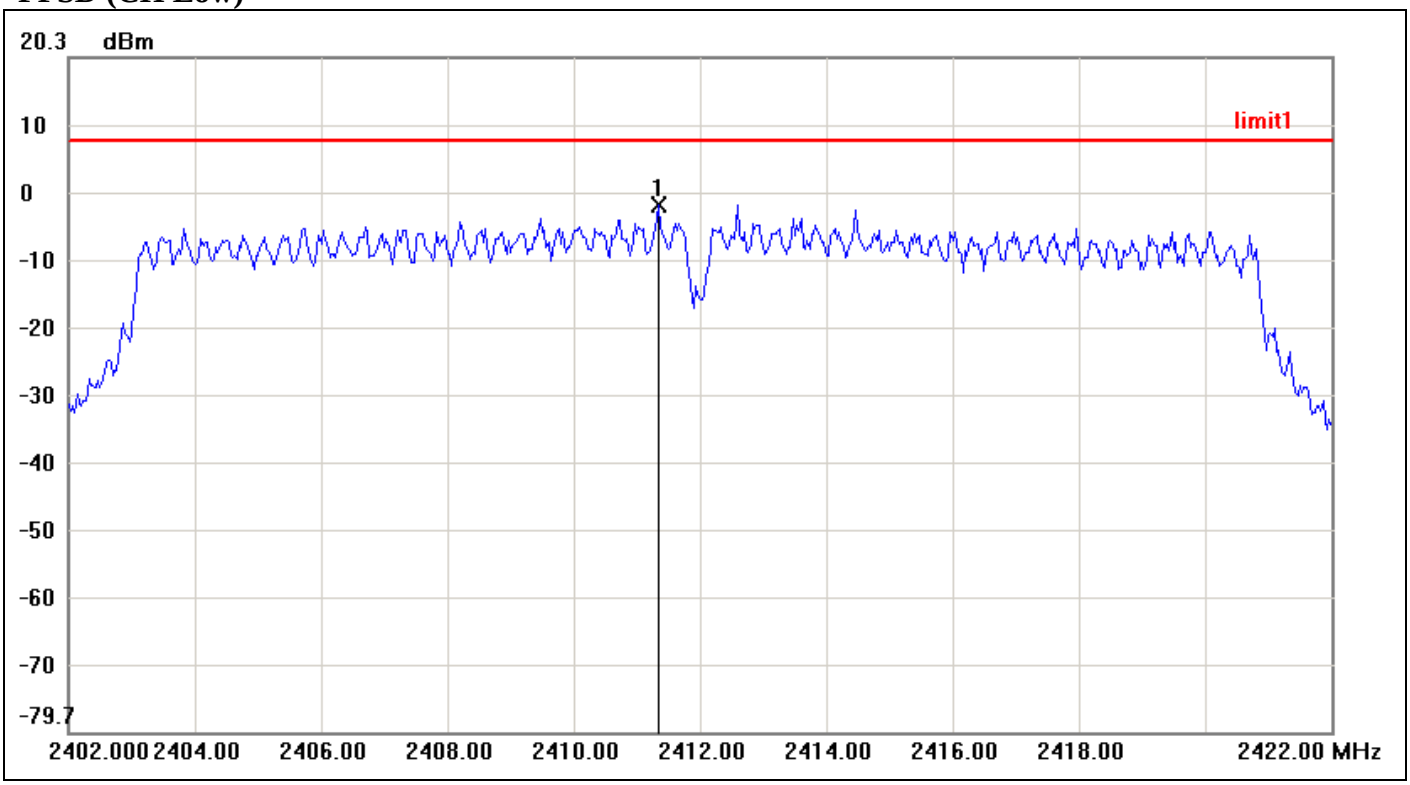
PPSD (CH High)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.6000	-1.56	8.00	-9.56

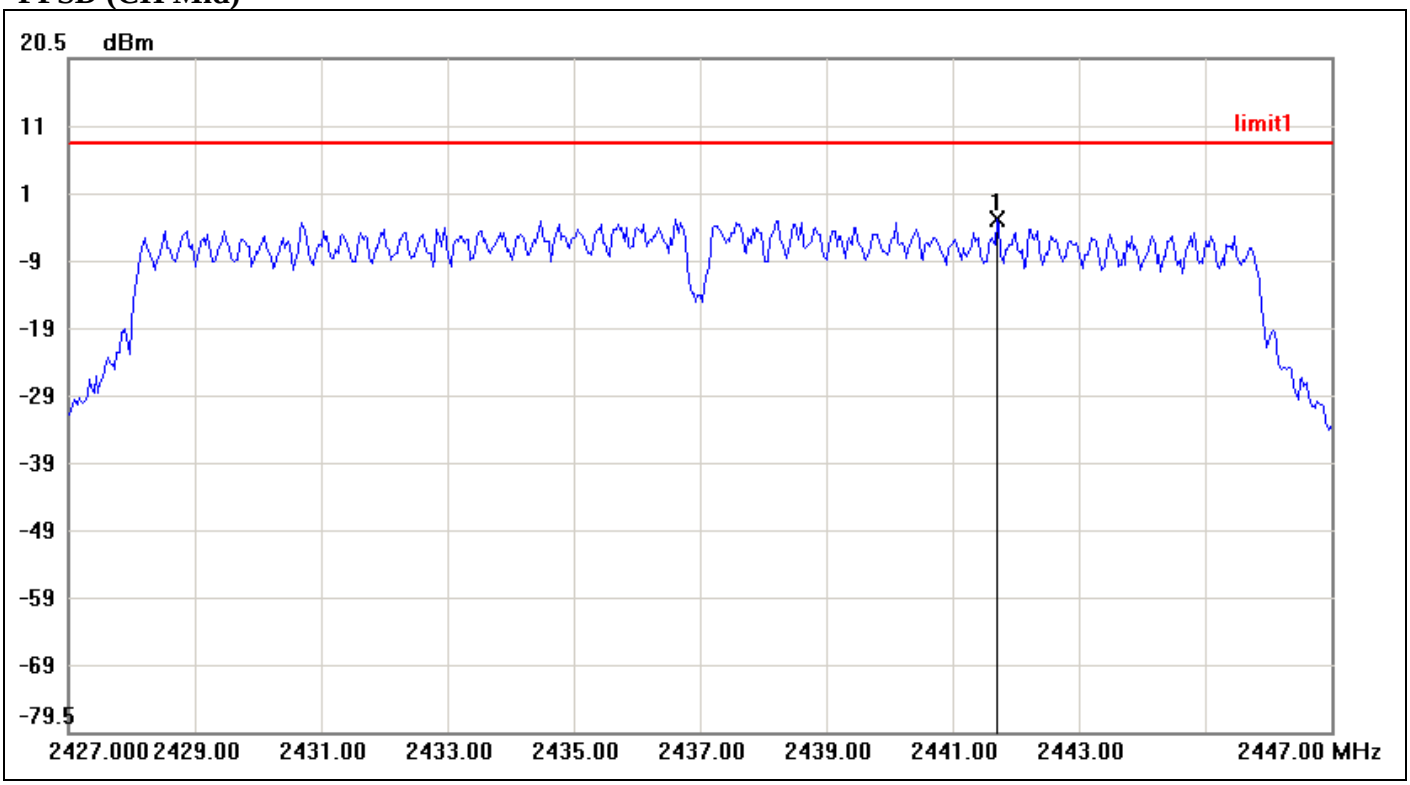
IEEE 802.11n HT 20 MHz mode / Chain 0

PPSD (CH Low)



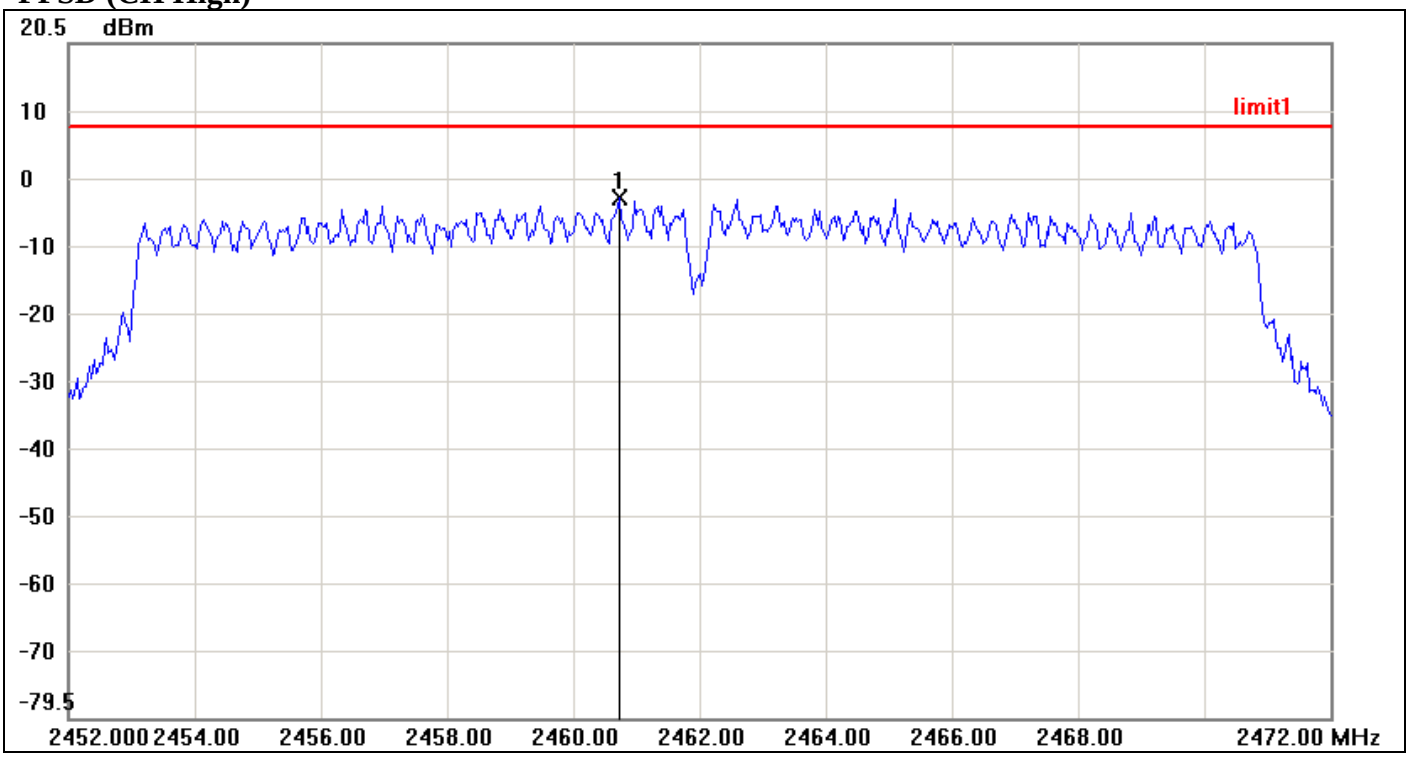
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2411.3333	-1.59	8.00	-9.59

PPSD (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2441.7000	-3.41	8.00	-11.41

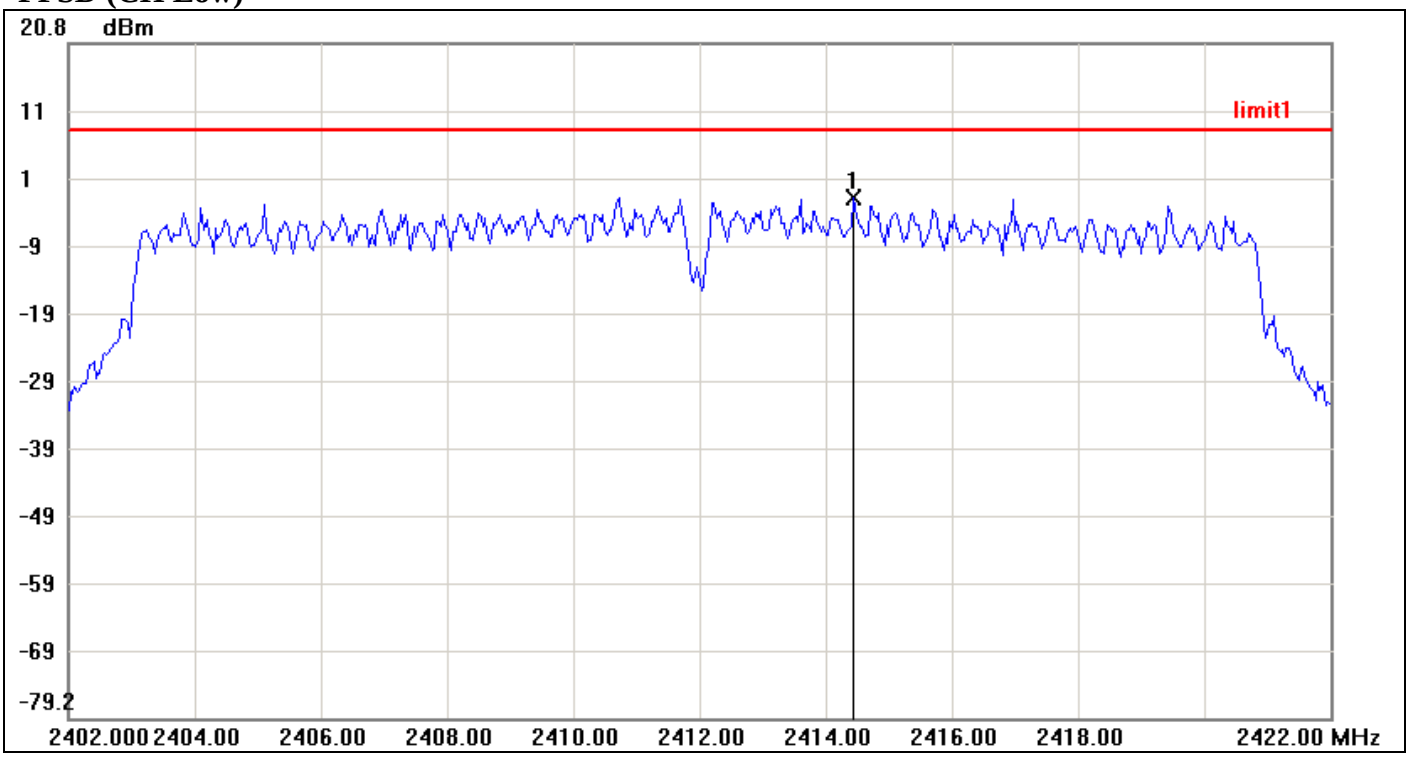
PPSD (CH High)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2460.7333	-2.44	8.00	-10.44

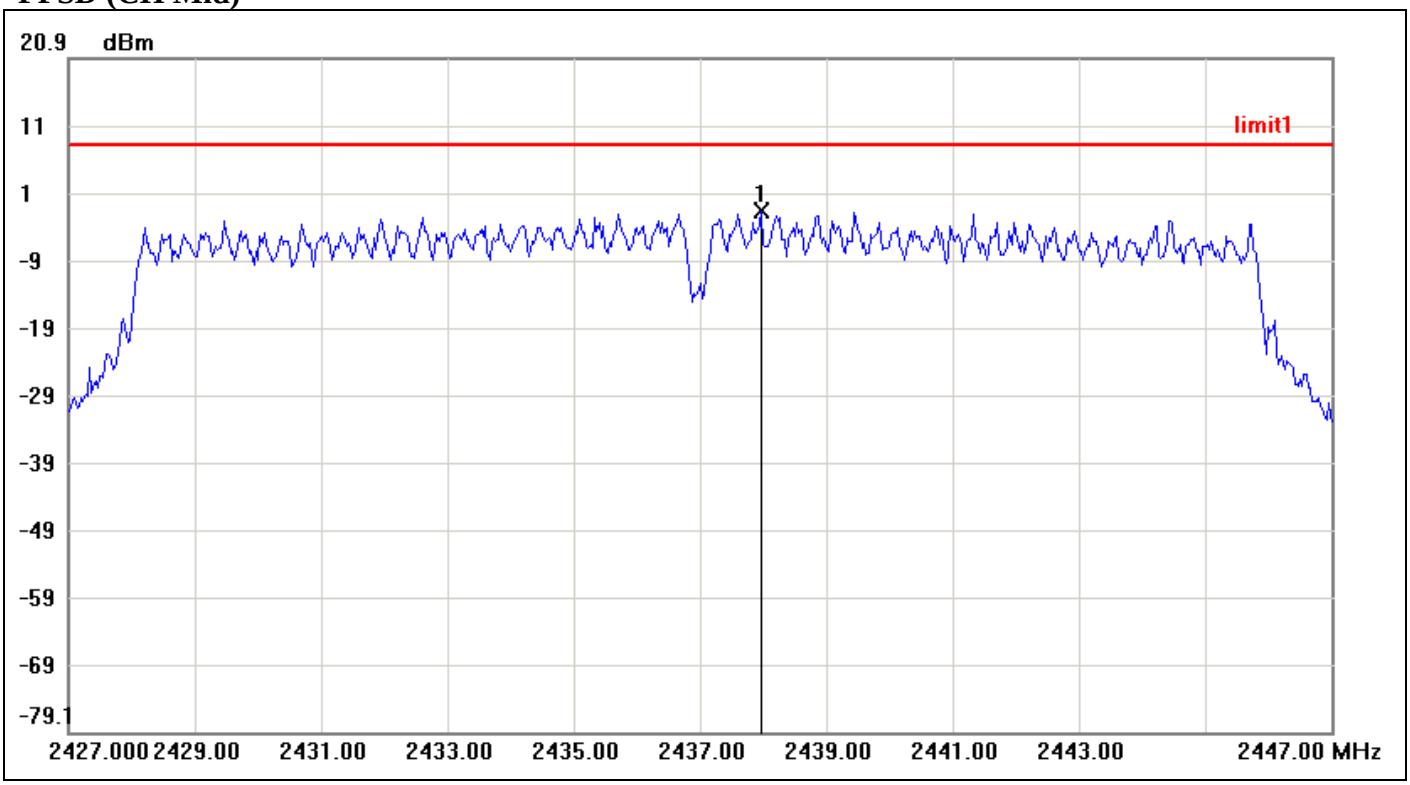
IEEE 802.11n HT 20 MHz mode / Chain 1

PPSD (CH Low)



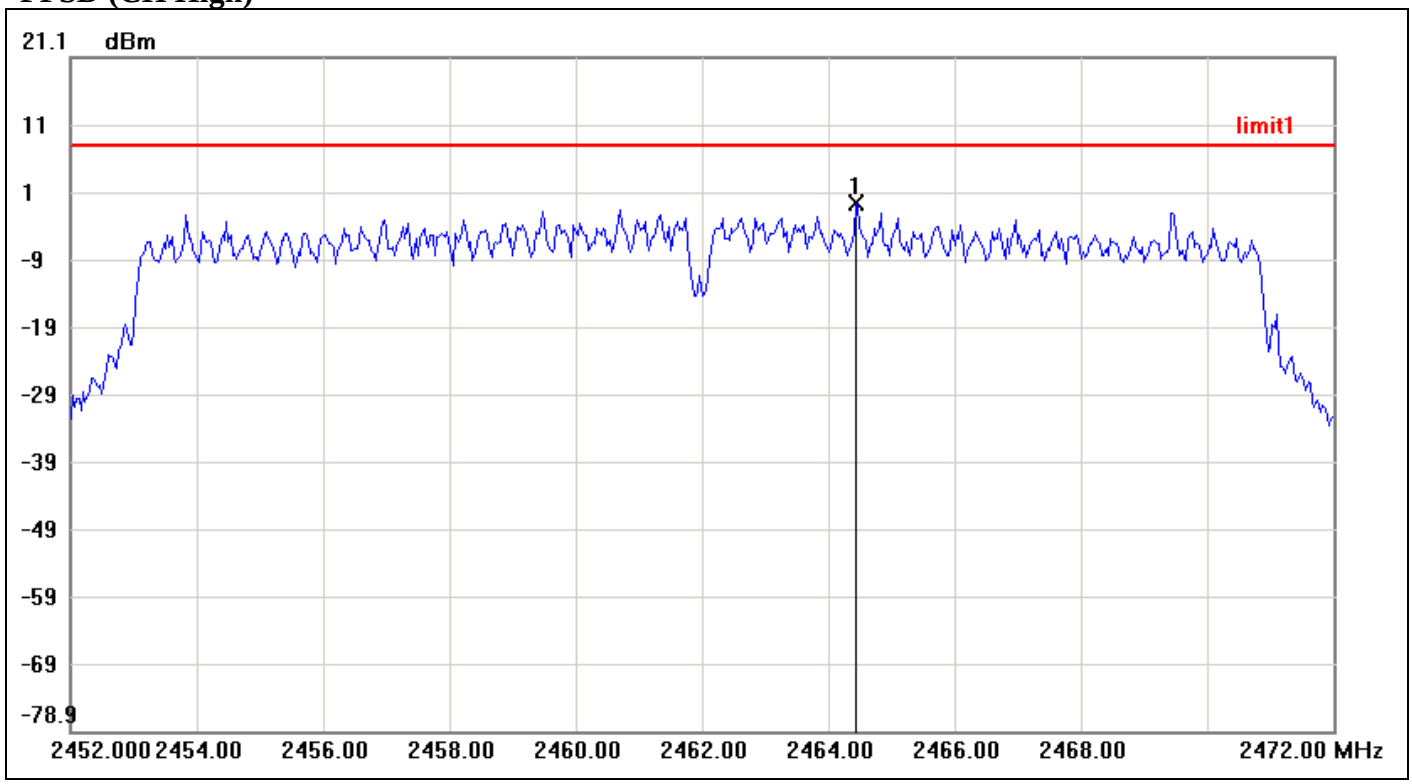
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2414.4333	-1.98	8.00	-9.98

PPSD (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2437.9667	-1.72	8.00	-9.72

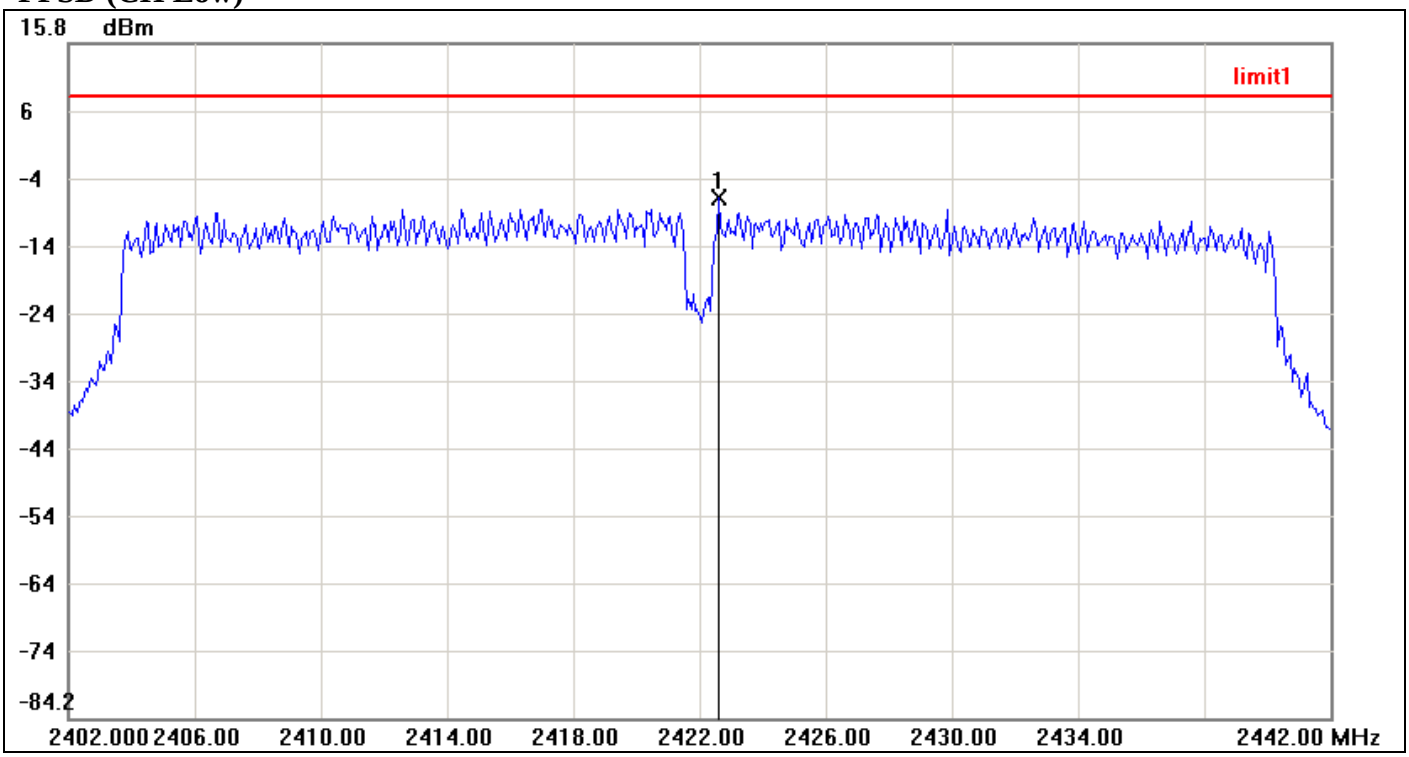
PPSD (CH High)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2464.4333	-0.62	8.00	-8.62

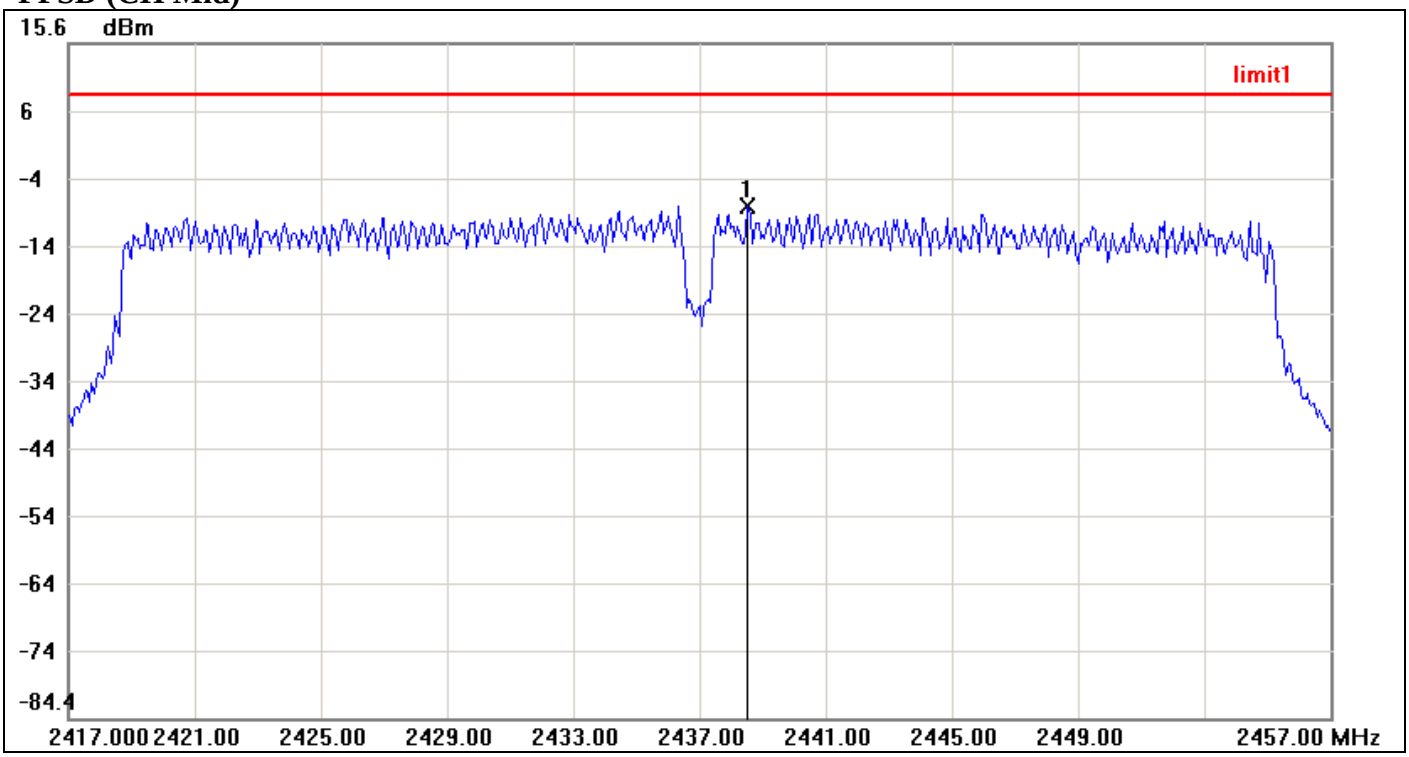
IEEE 802.11n HT 40 MHz mode / Chain 0

PPSD (CH Low)



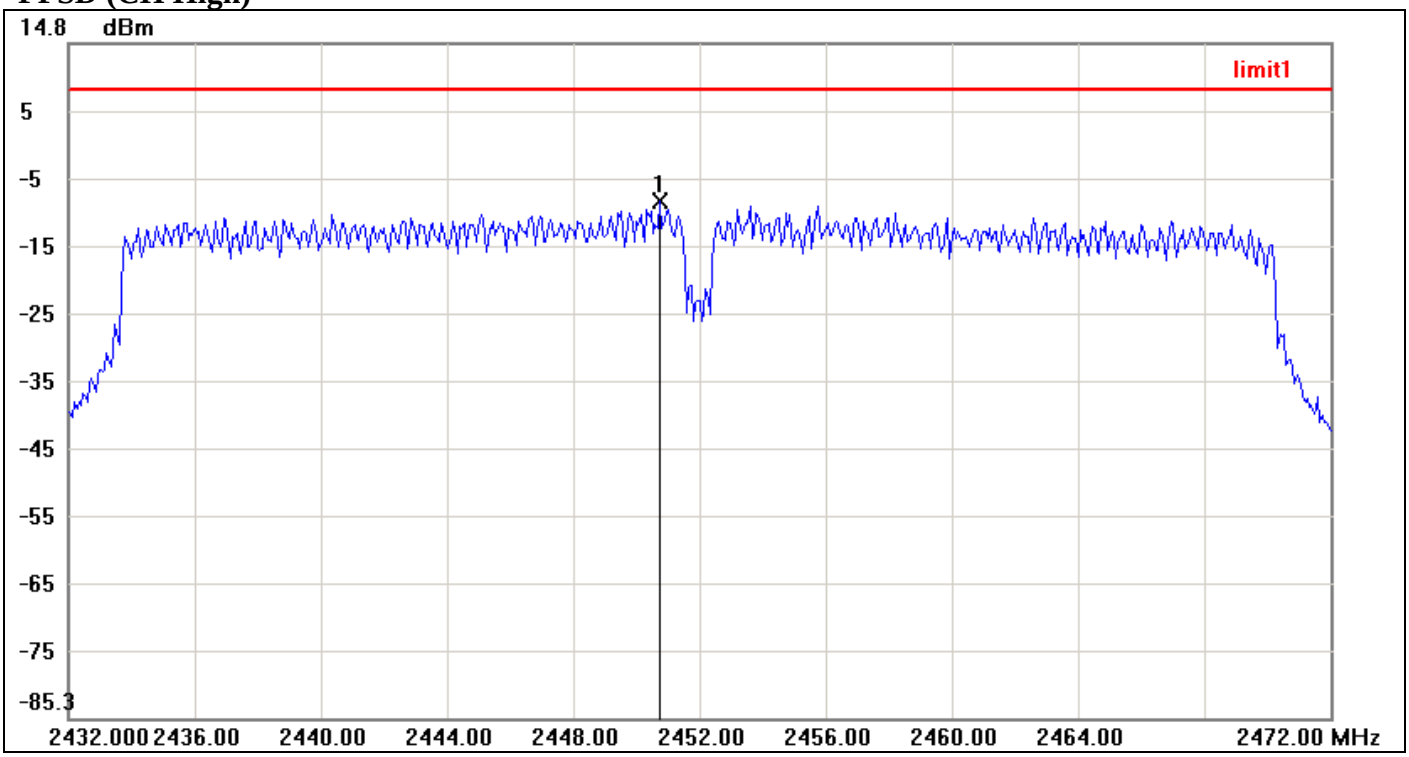
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2422.6000	-7.14	8.00	-15.14

PPSD (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2438.5333	-8.49	8.00	-16.49

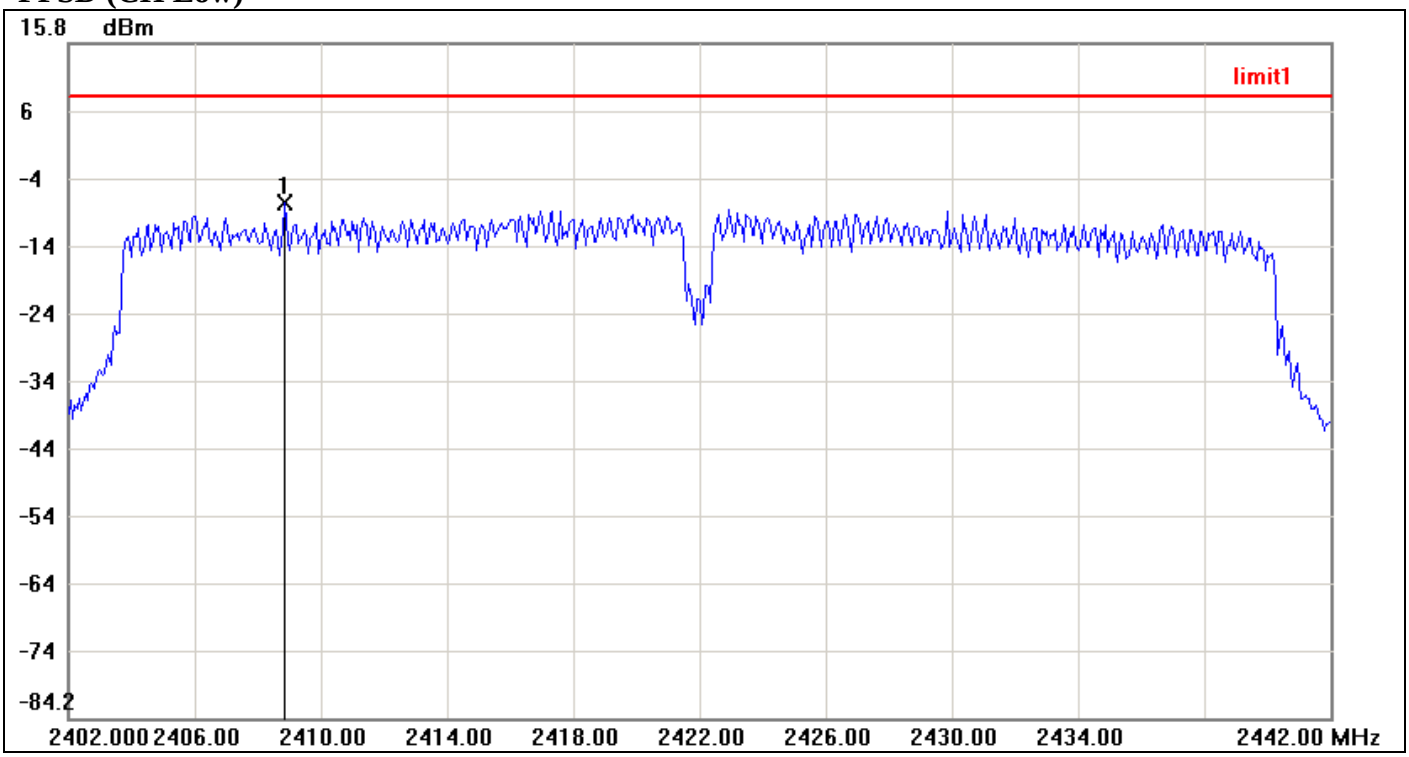
PPSD (CH High)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2450.7333	-8.72	8.00	-16.72

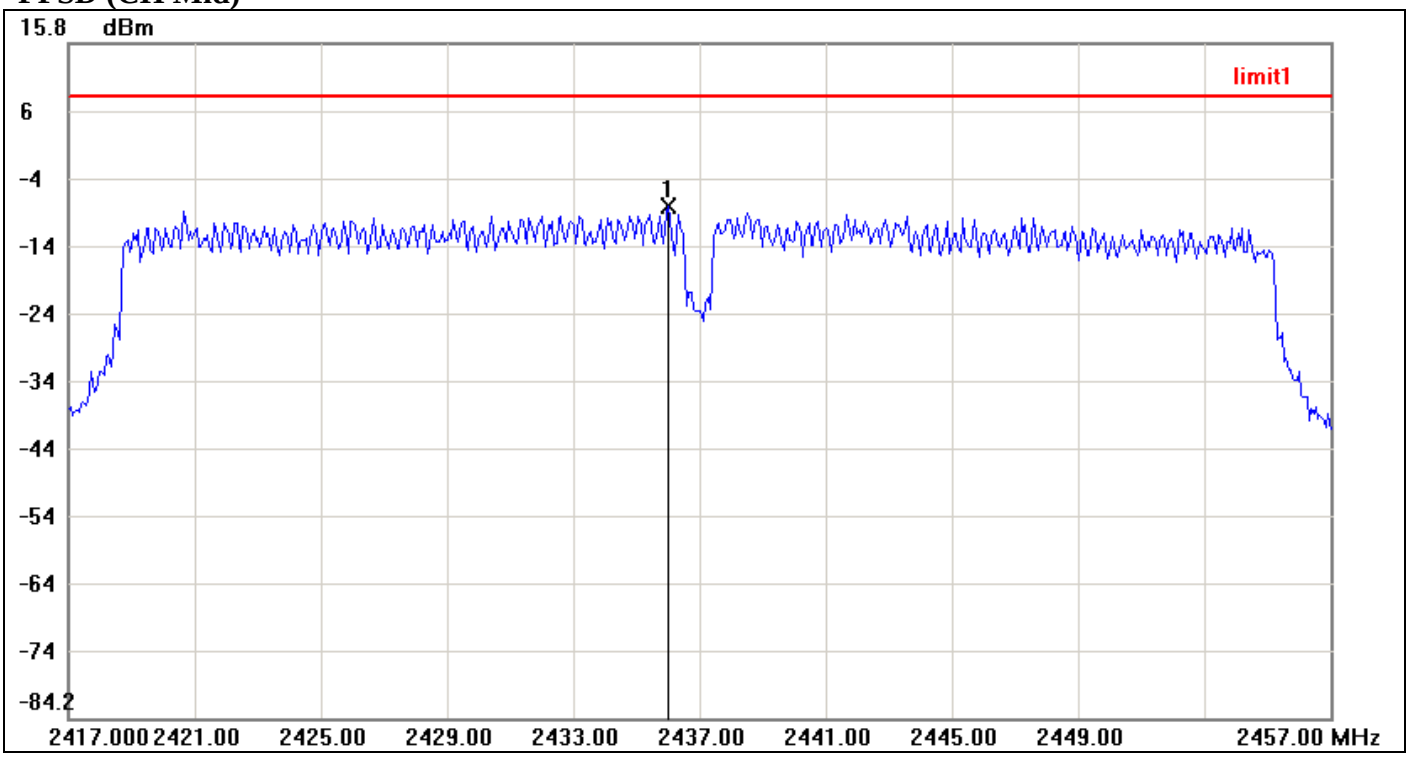
IEEE 802.11n HT 40 MHz mode / Chain 1

PPSD (CH Low)



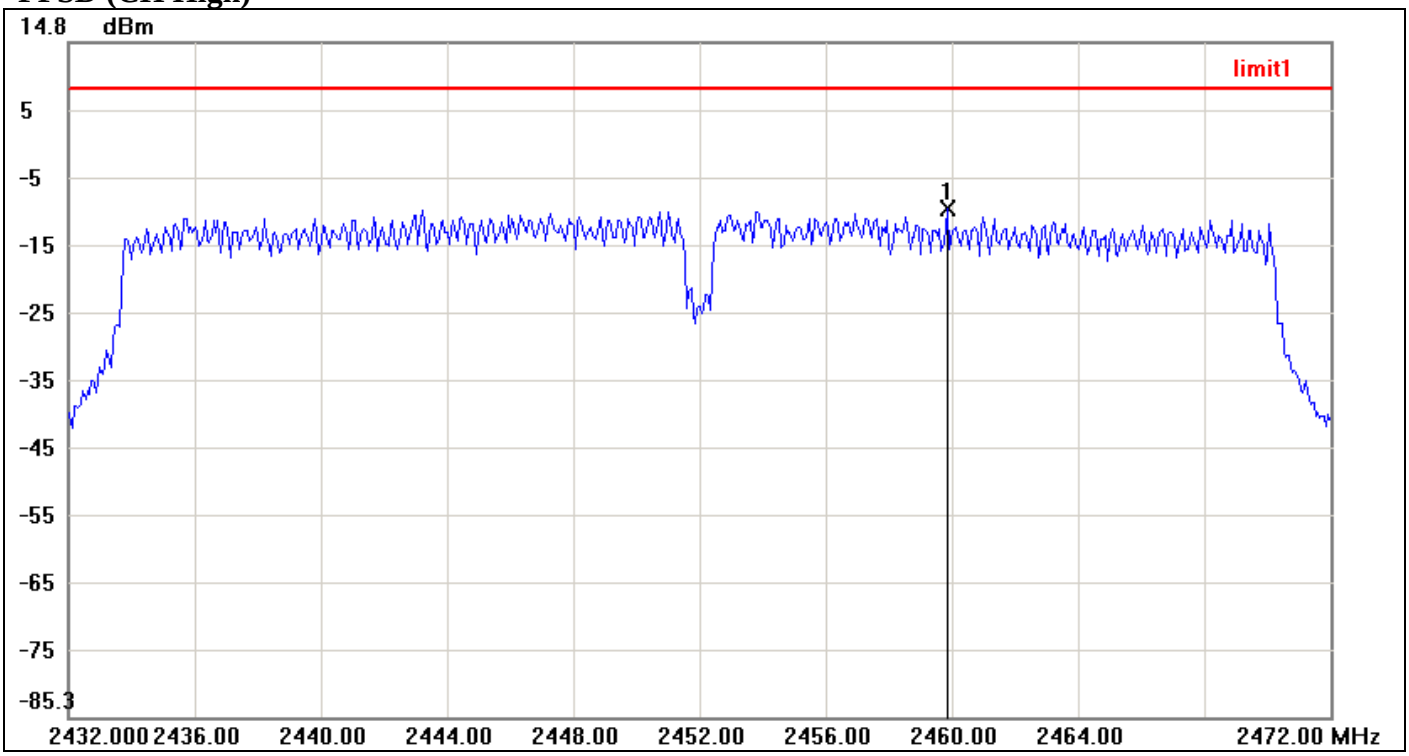
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2408.8667	-7.70	8.00	-15.70

PPSD (CH Mid)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2436.0000	-8.36	8.00	-16.36

PPSD (CH High)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2459.8667	-9.83	8.00	-17.83

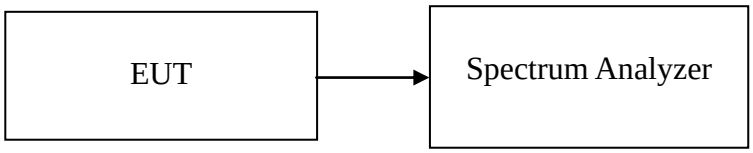
7.7 SPURIOUS EMISSIONS

7.7.1 Conducted Measurement

LIMIT

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

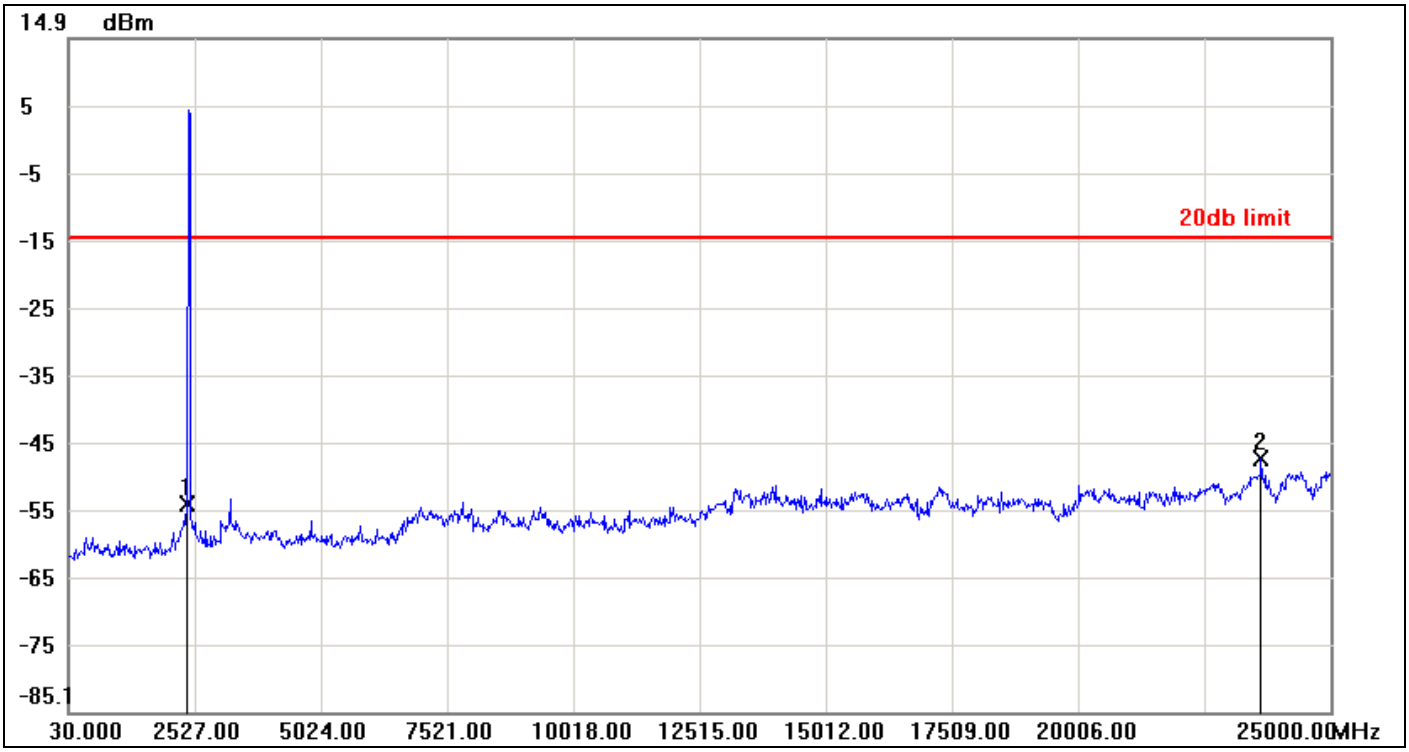
TEST RESULTS

No non-compliance noted

Test Plot

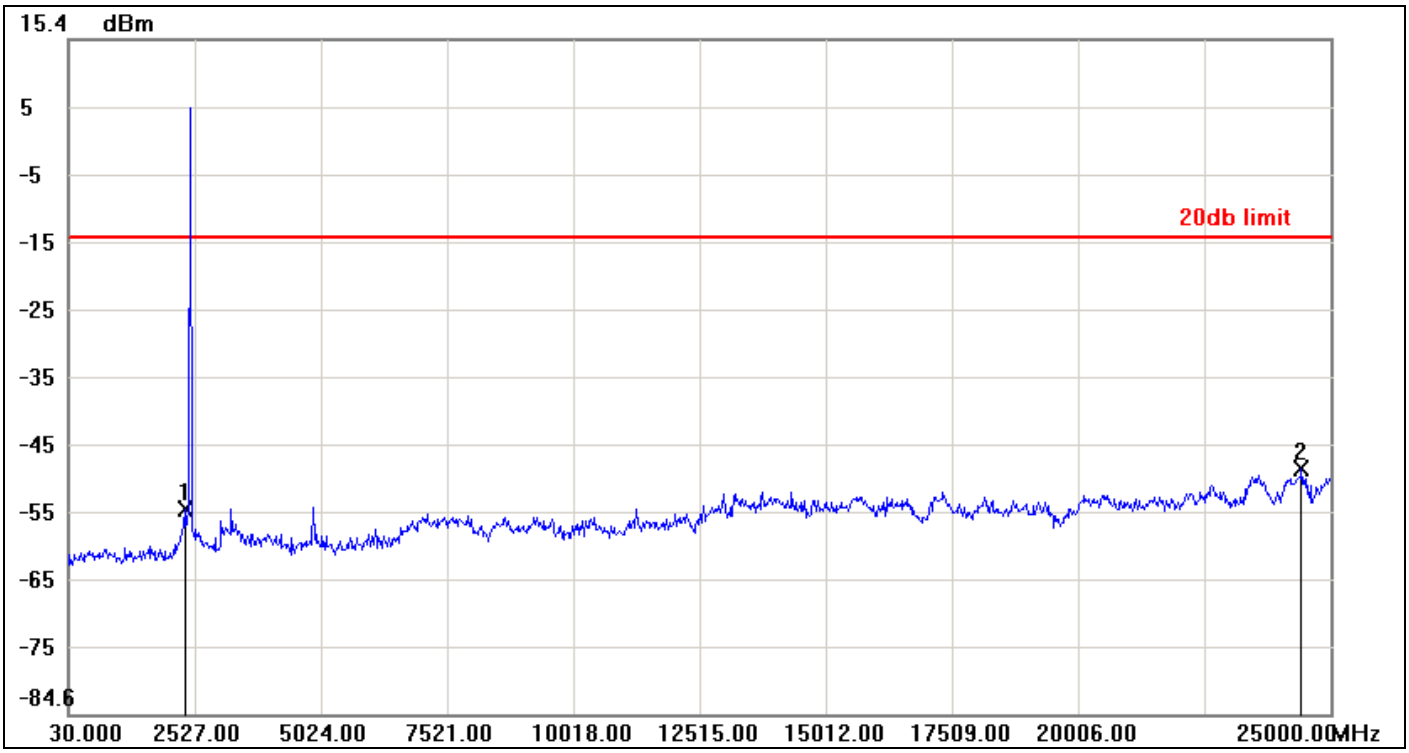
IEEE 802.11b mode

CH Low



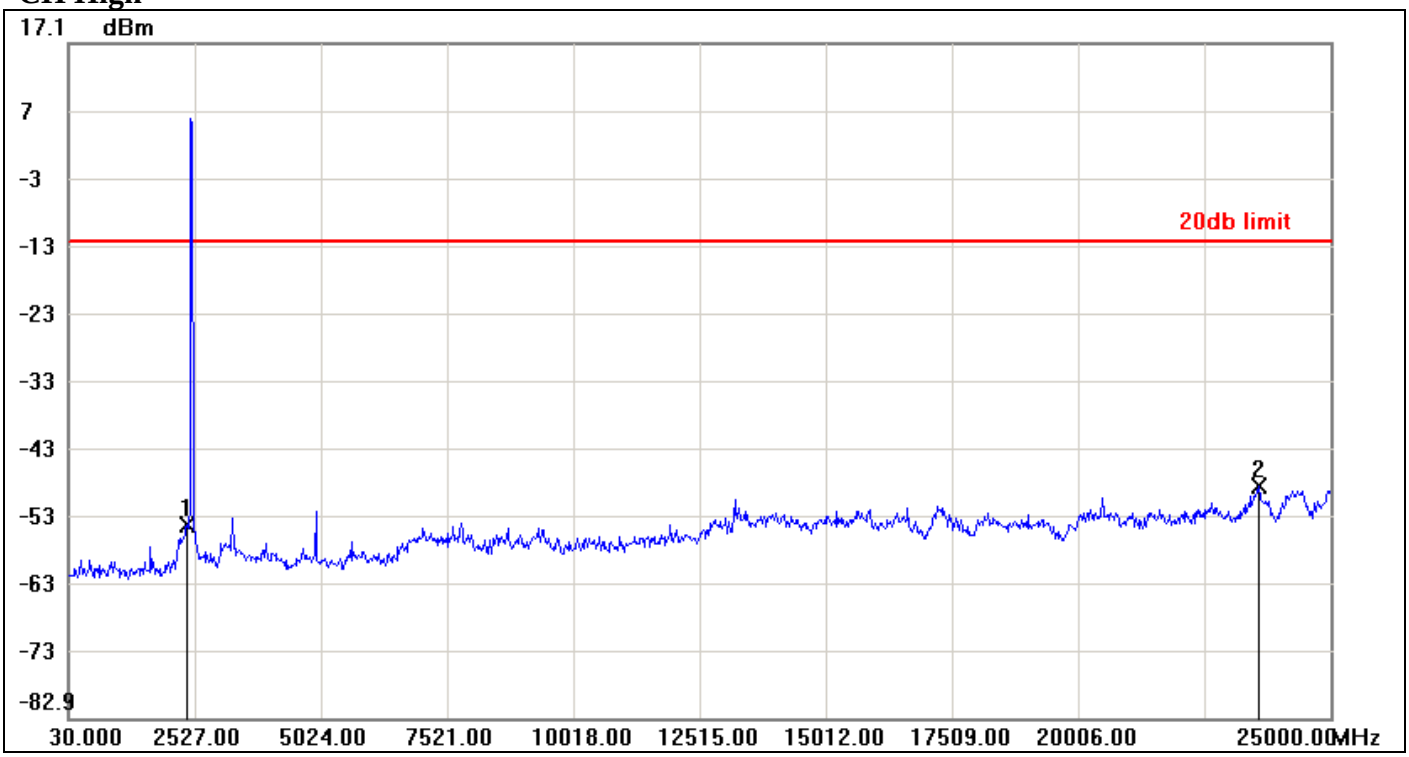
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-54.24	-14.67	-39.57
2	23626.6500	-47.55	-14.67	-32.88

CH Mid



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2327.2400	-54.36	-14.02	-40.34
2	24425.6900	-48.27	-14.02	-34.25

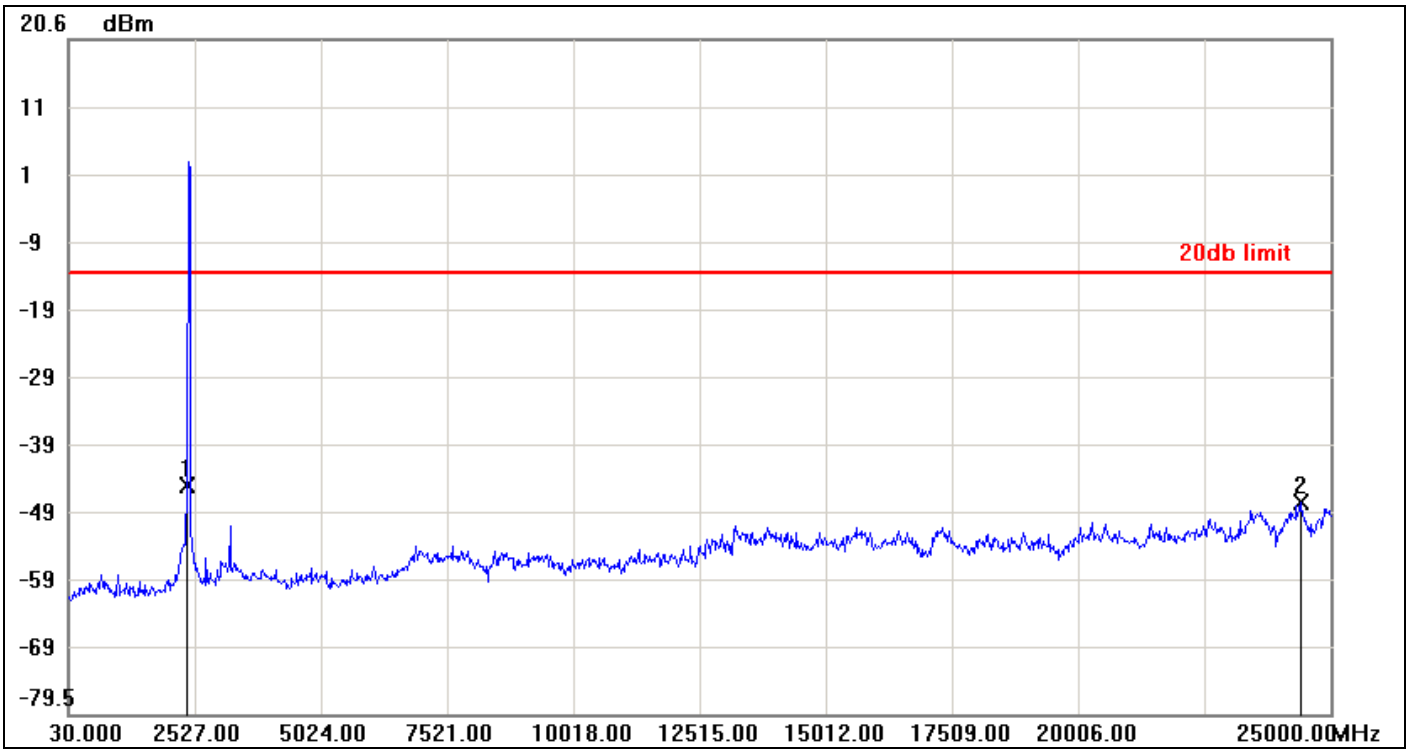
CH High



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-54.30	-12.40	-41.90
2	23576.7100	-48.61	-12.40	-36.21

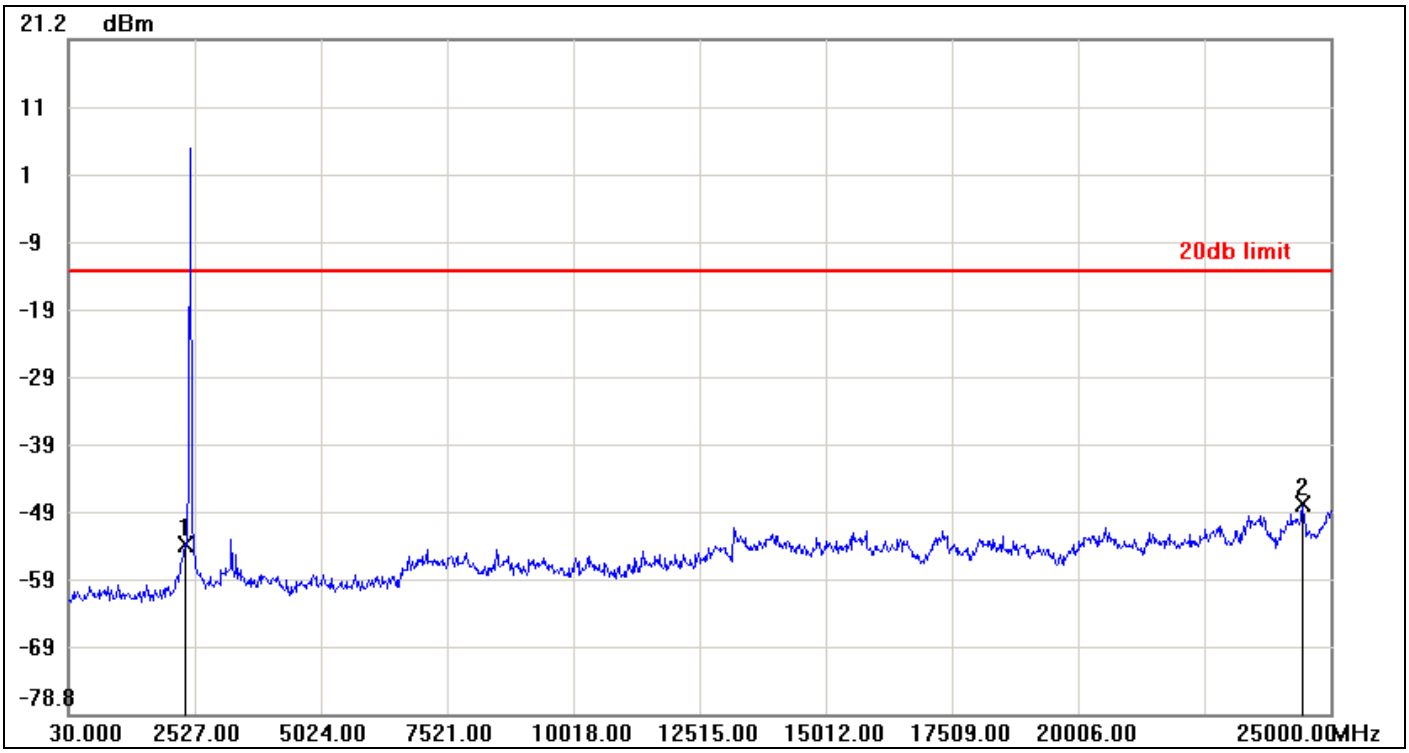
IEEE 802.11g mode

CH Low



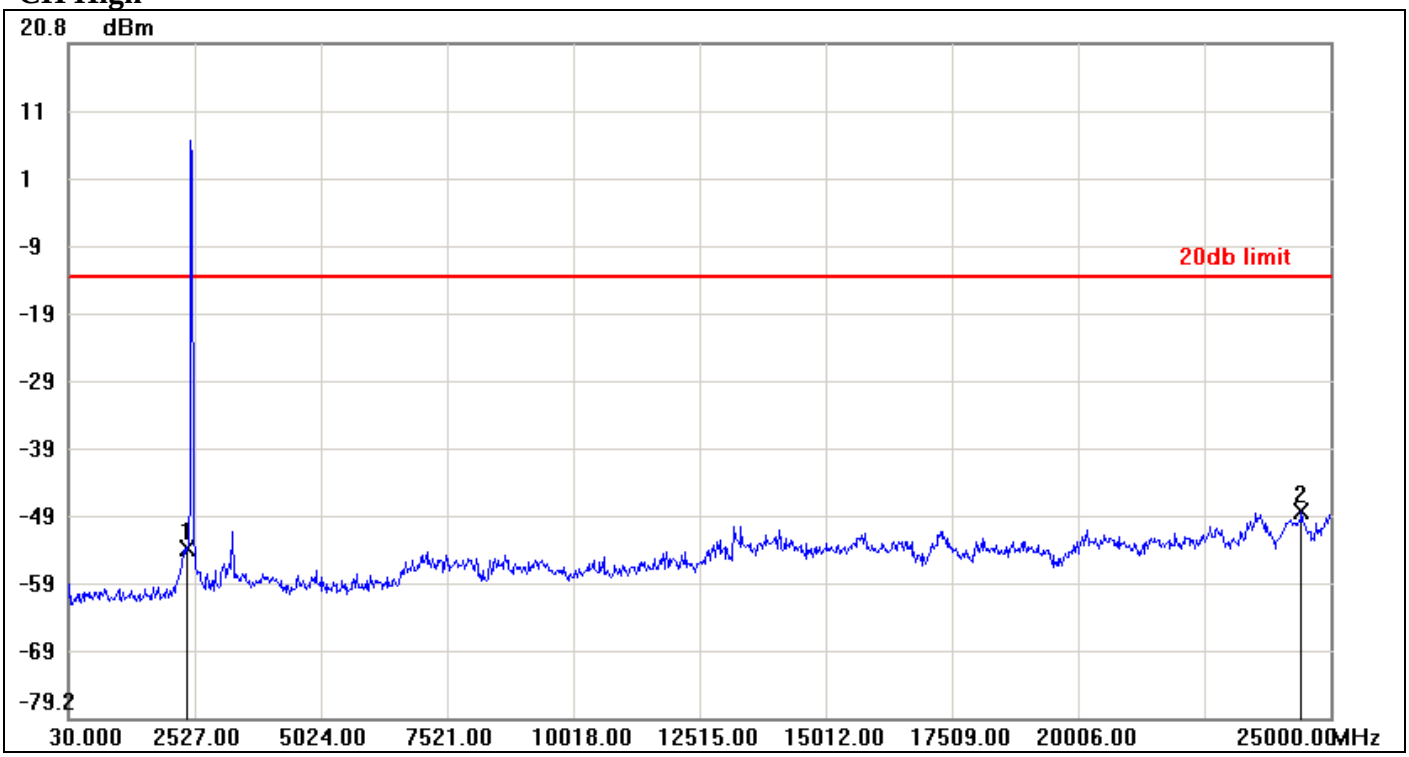
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-45.56	-13.96	-31.60
2	24400.7200	-48.13	-13.96	-34.17

CH Mid



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2327.2400	-53.52	-13.23	-40.29
2	24450.6600	-47.76	-13.23	-34.53

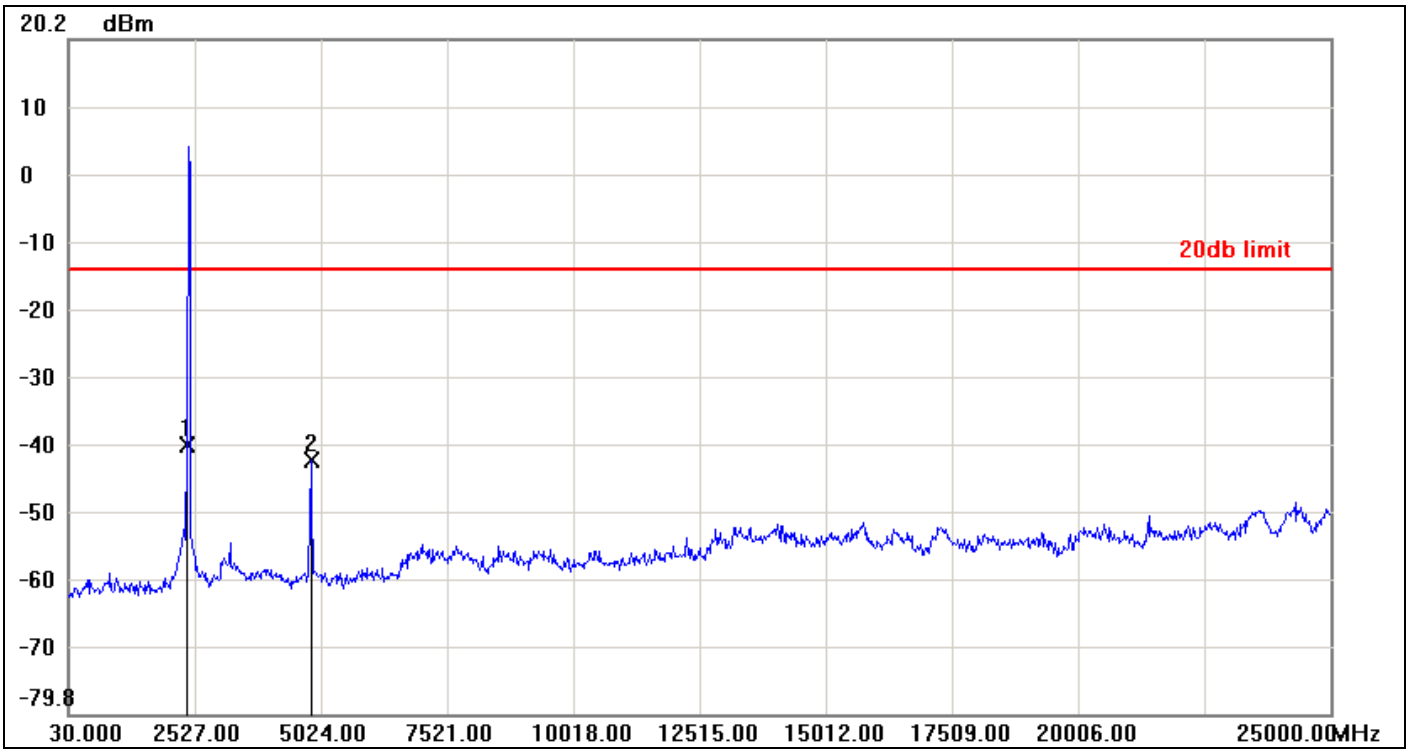
CH High



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-54.12	-13.84	-40.28
2	24425.6900	-48.53	-13.84	-34.69

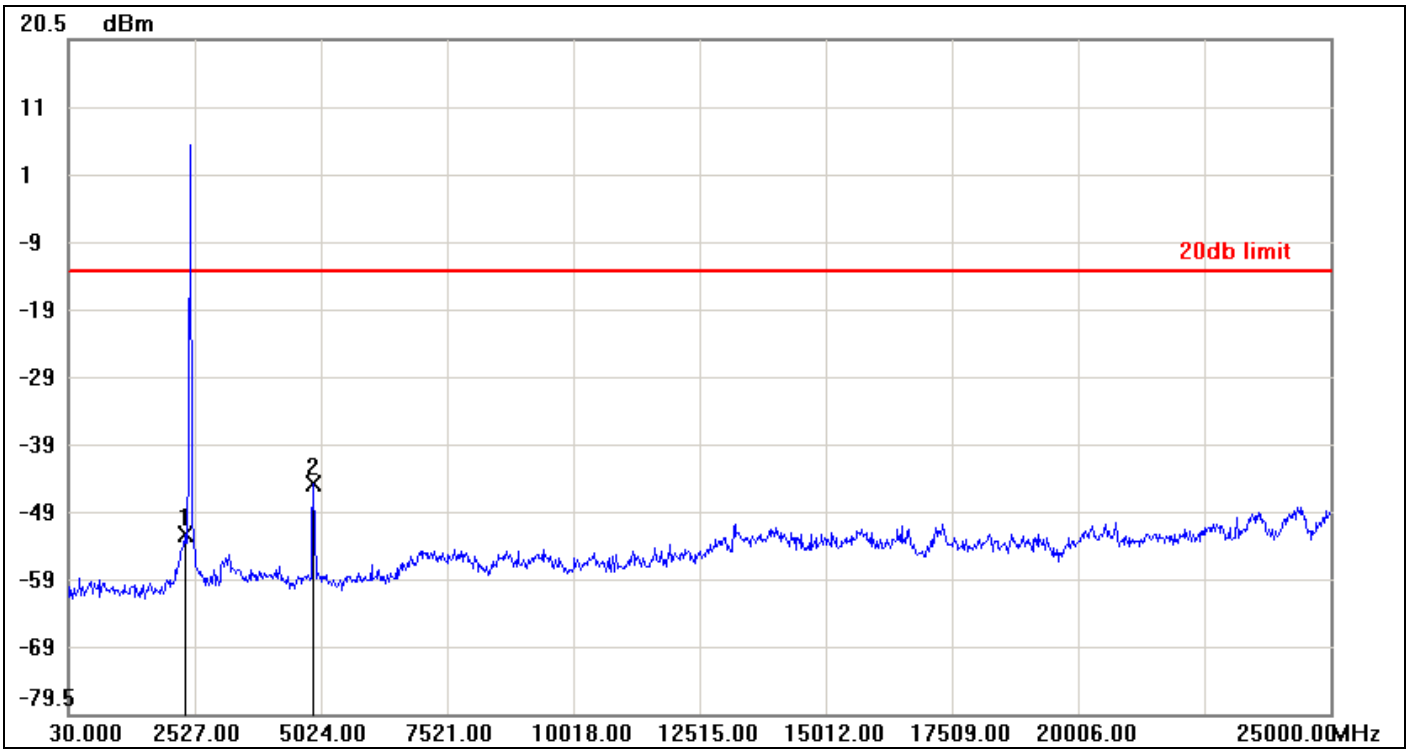
IEEE 802.11n HT 20 MHz mode / Chain 0

CH Low



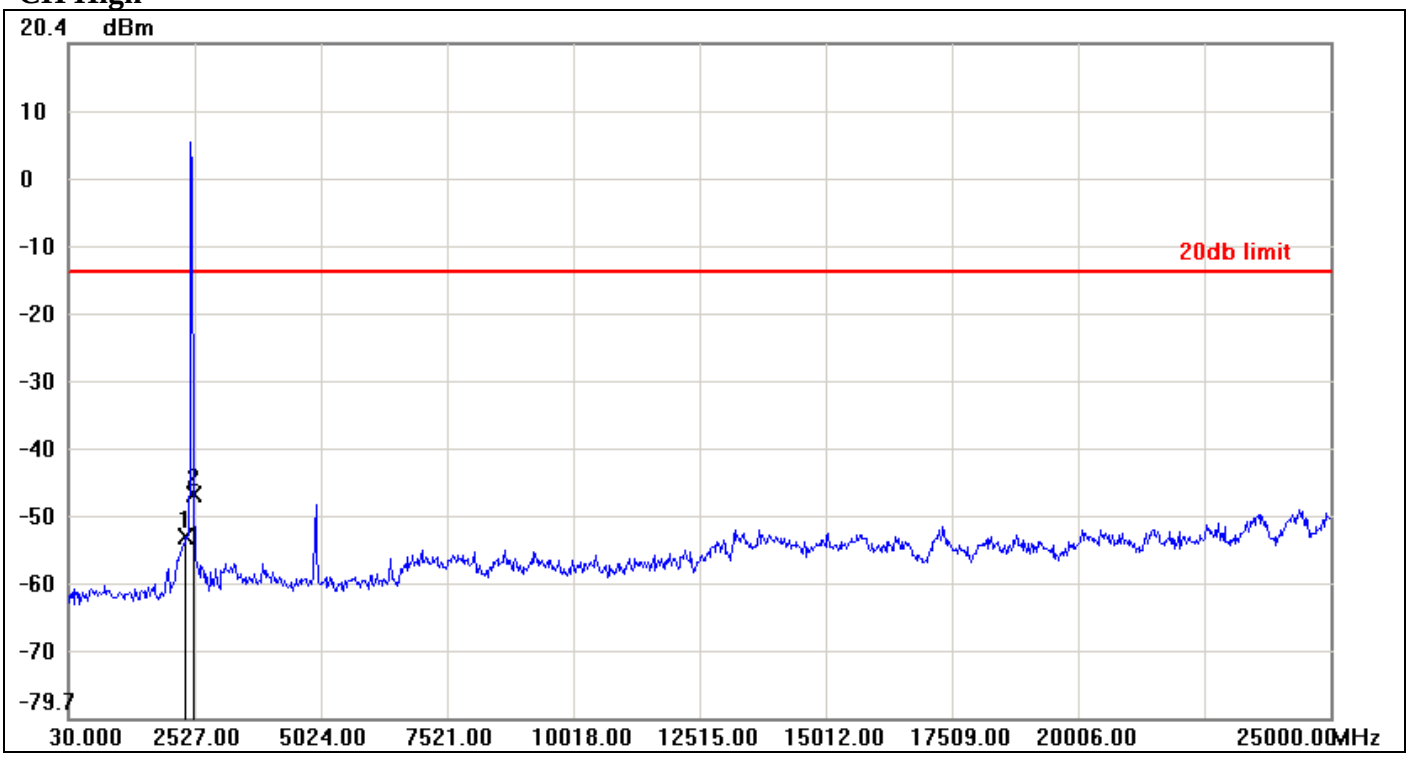
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-40.00	-13.85	-26.15
2	4824.2400	-42.22	-13.85	-28.37

CH Mid



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2327.2400	-52.95	-13.93	-39.02
2	4874.1800	-45.34	-13.93	-31.41

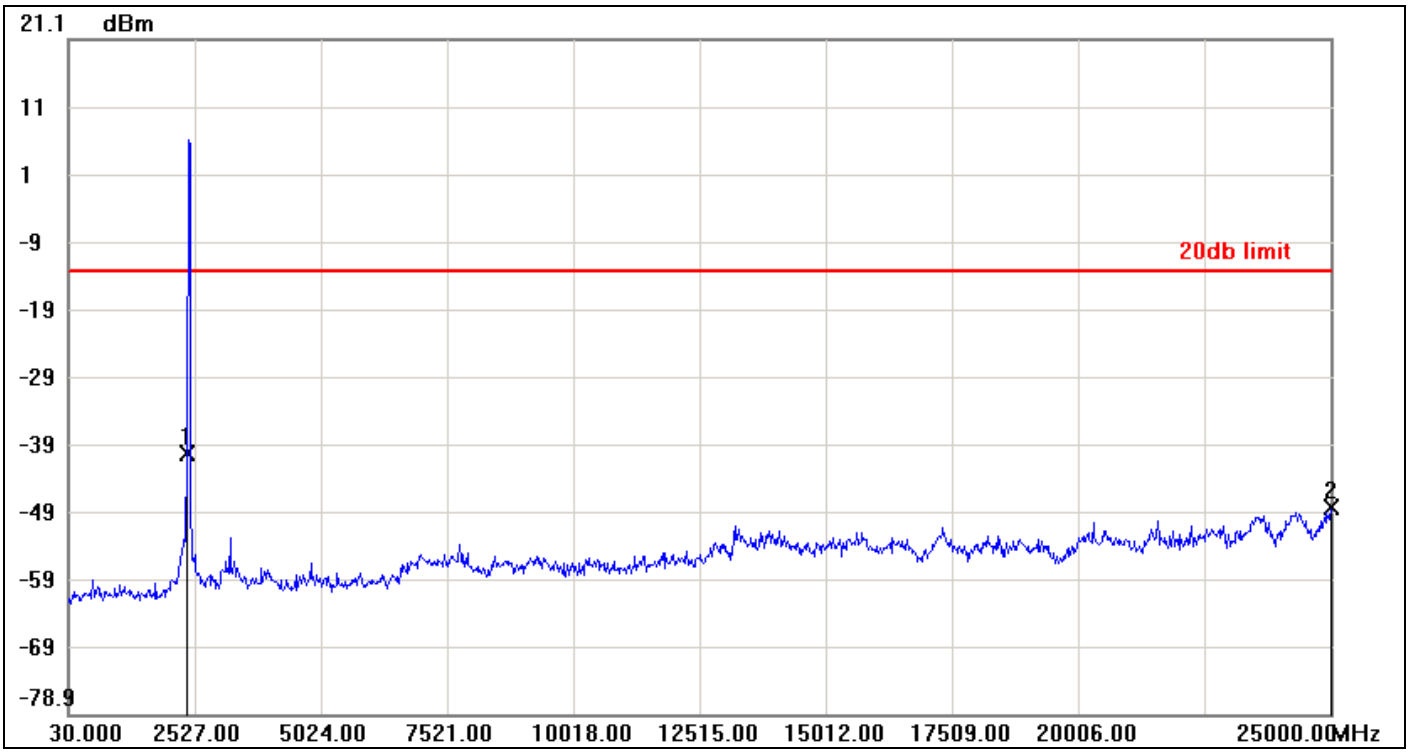
CH High



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2352.2100	-52.78	-13.44	-39.34
2	2502.0300	-46.41	-13.44	-32.97

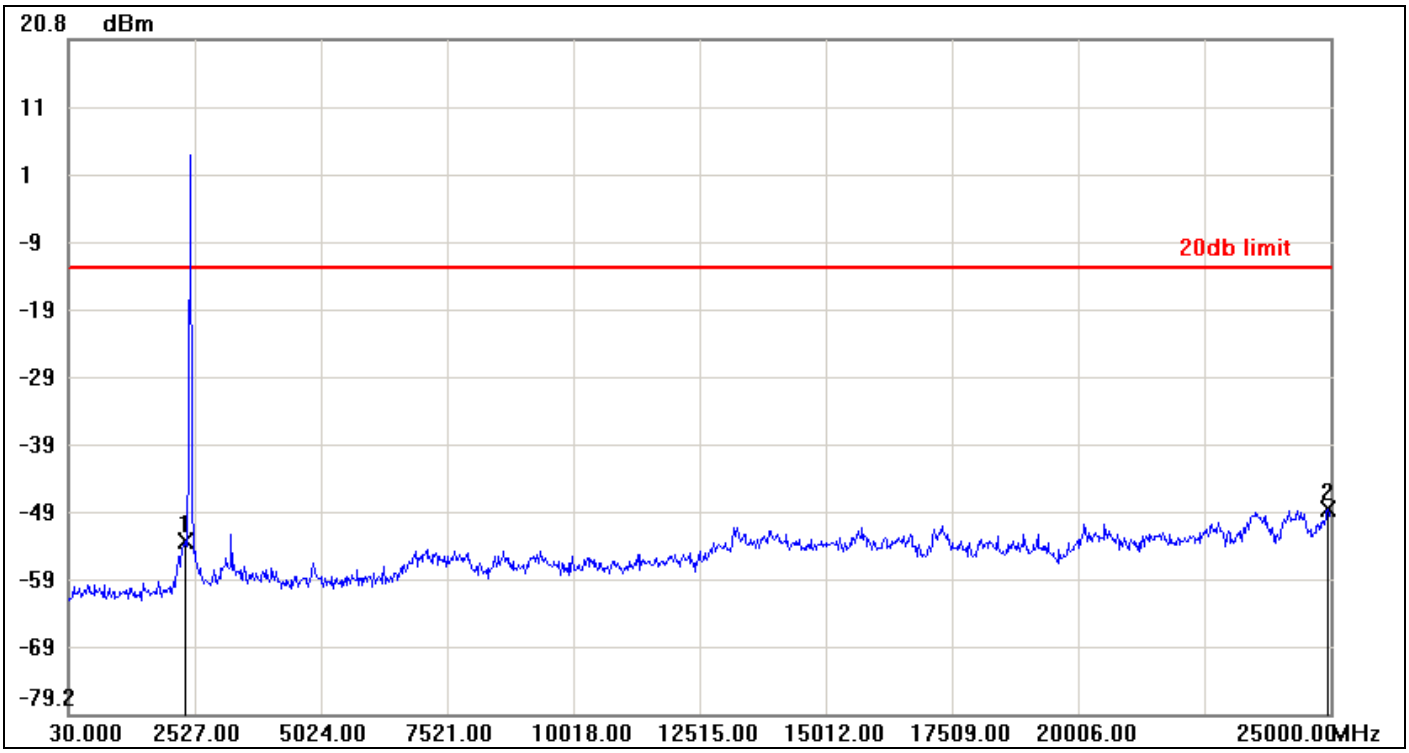
IEEE 802.11n HT 20 MHz mode / Chain 1

CH Low



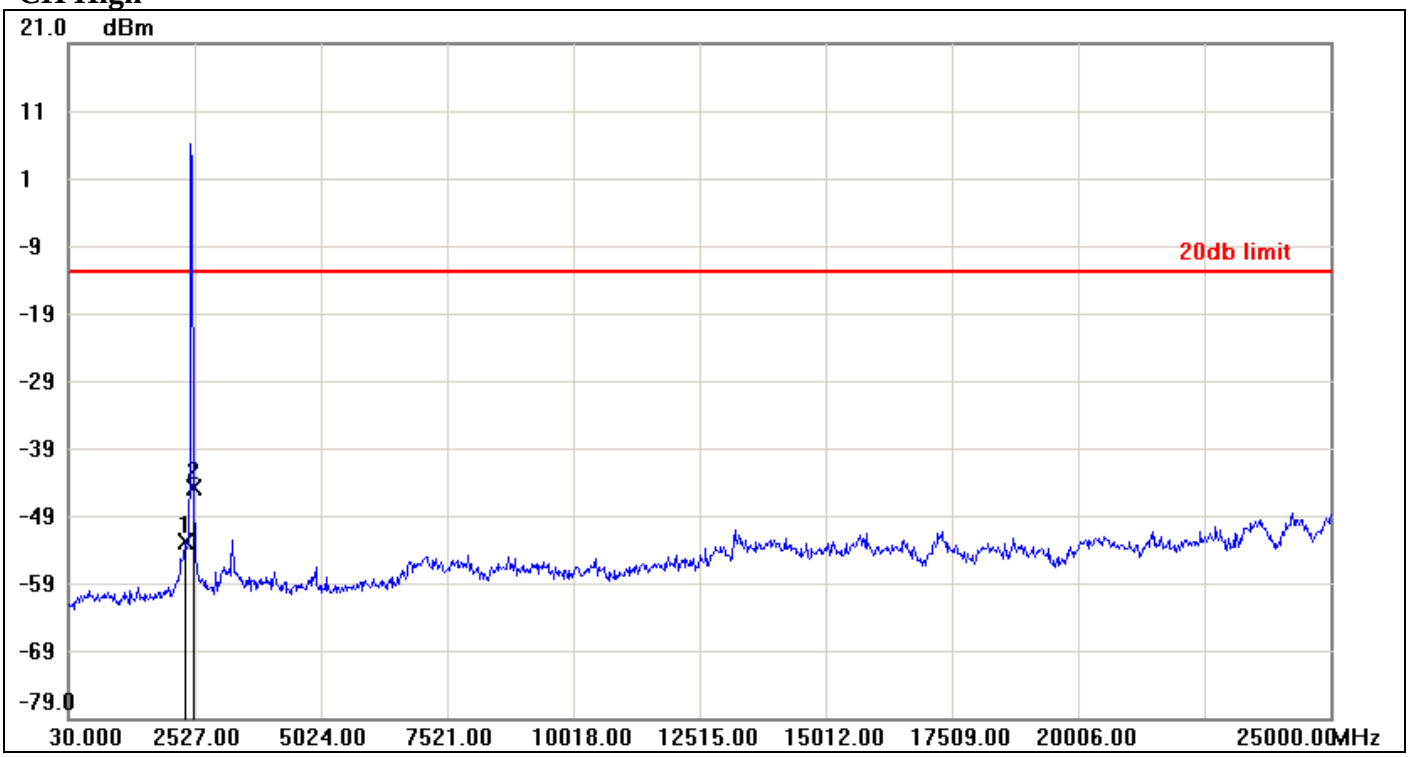
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-40.34	-13.39	-26.95
2	25000.0000	-48.21	-13.39	-34.82

CH Mid



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2327.2400	-53.49	-12.94	-40.55
2	24950.0600	-48.80	-12.94	-35.86

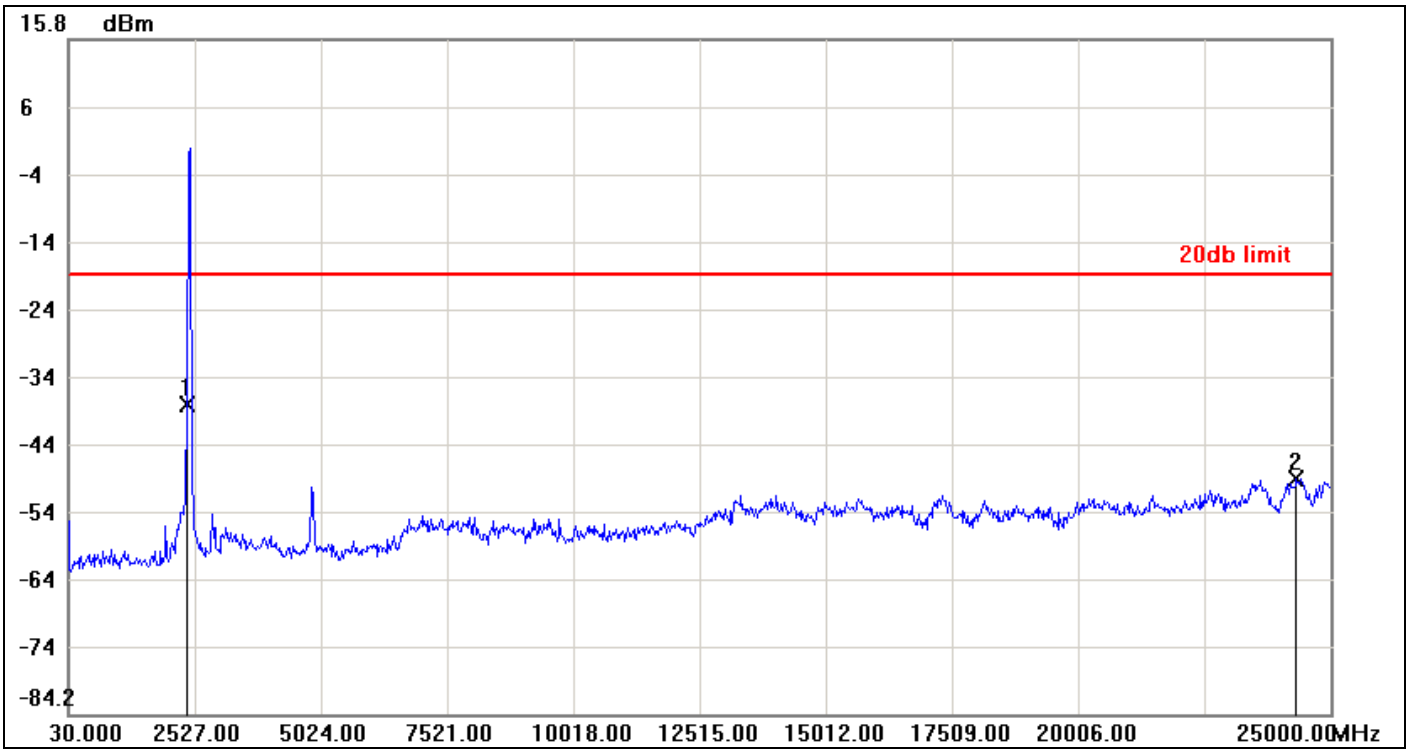
CH High



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2327.2400	-52.94	-12.77	-40.17
2	2502.0300	-44.98	-12.77	-32.21

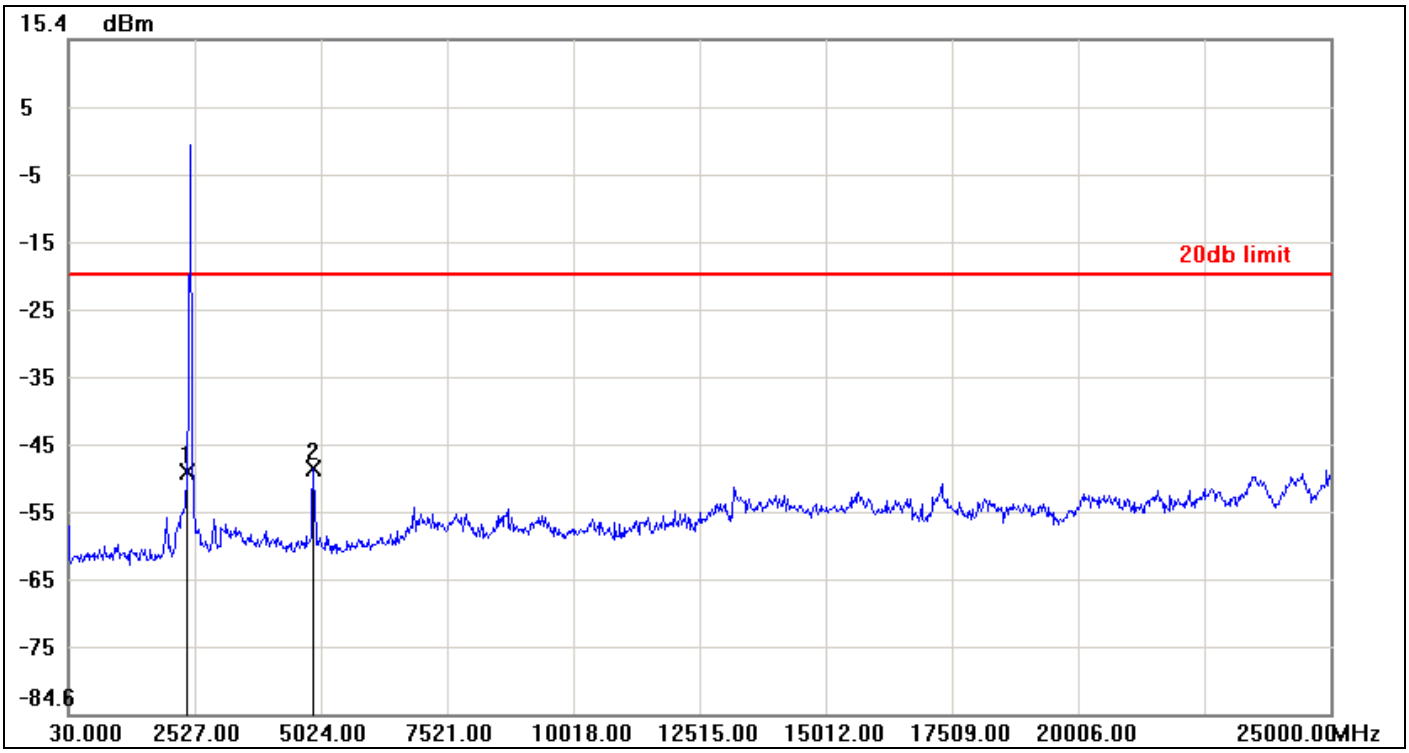
IEEE 802.11n HT 40 MHz mode / Chain 0

CH Low



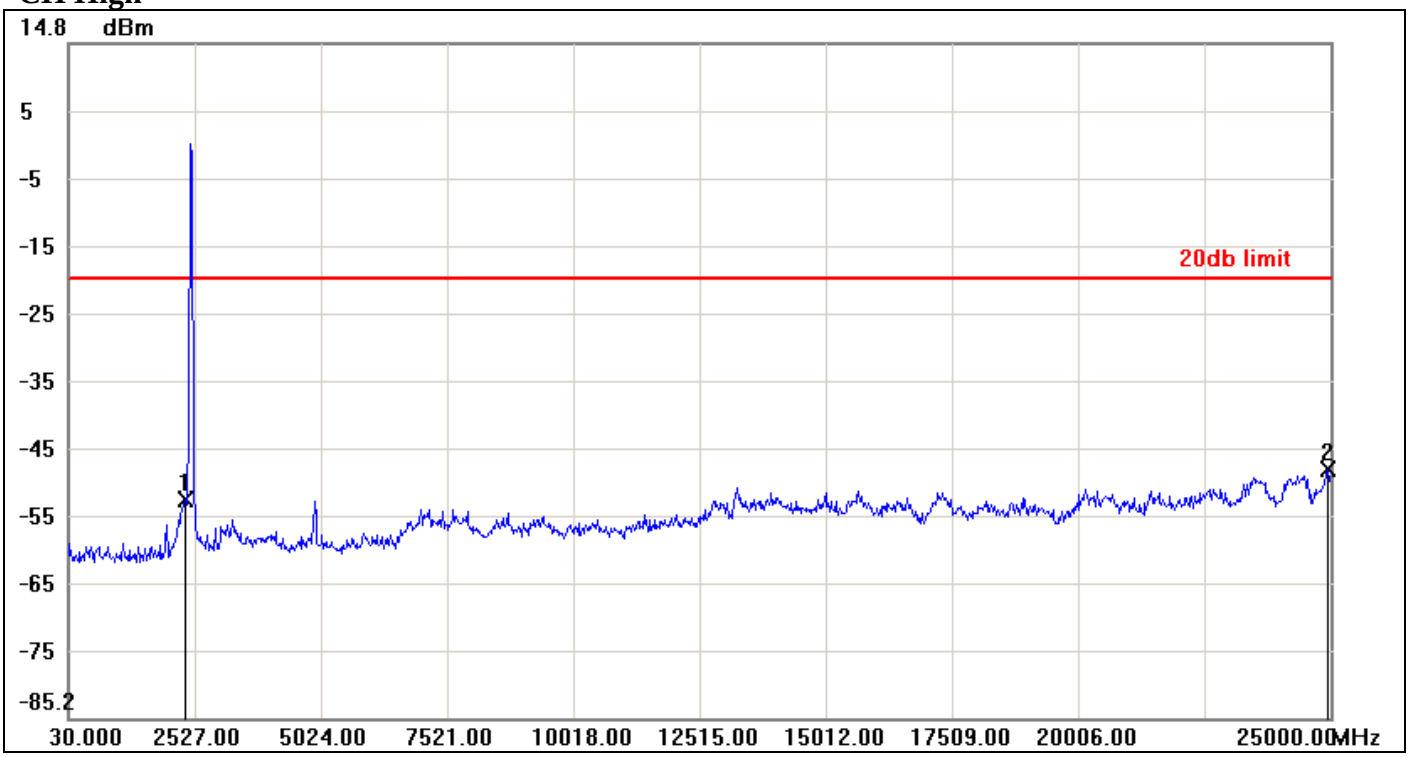
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-38.39	-18.93	-19.46
2	24325.8100	-49.21	-18.93	-30.28

CH Mid



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-48.68	-19.39	-29.29
2	4874.1800	-48.23	-19.39	-28.84

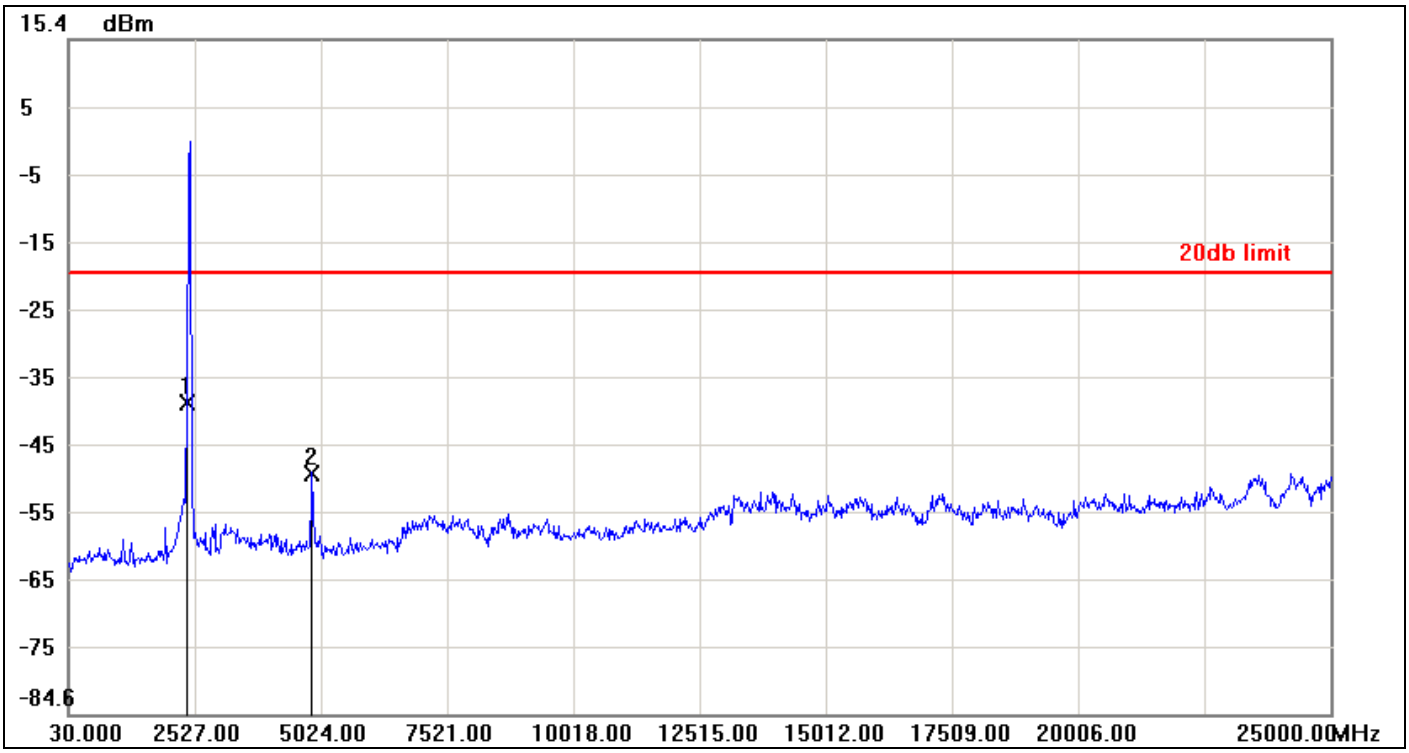
CH High



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2352.2100	-52.91	-20.16	-32.75
2	24950.0600	-48.31	-20.16	-28.15

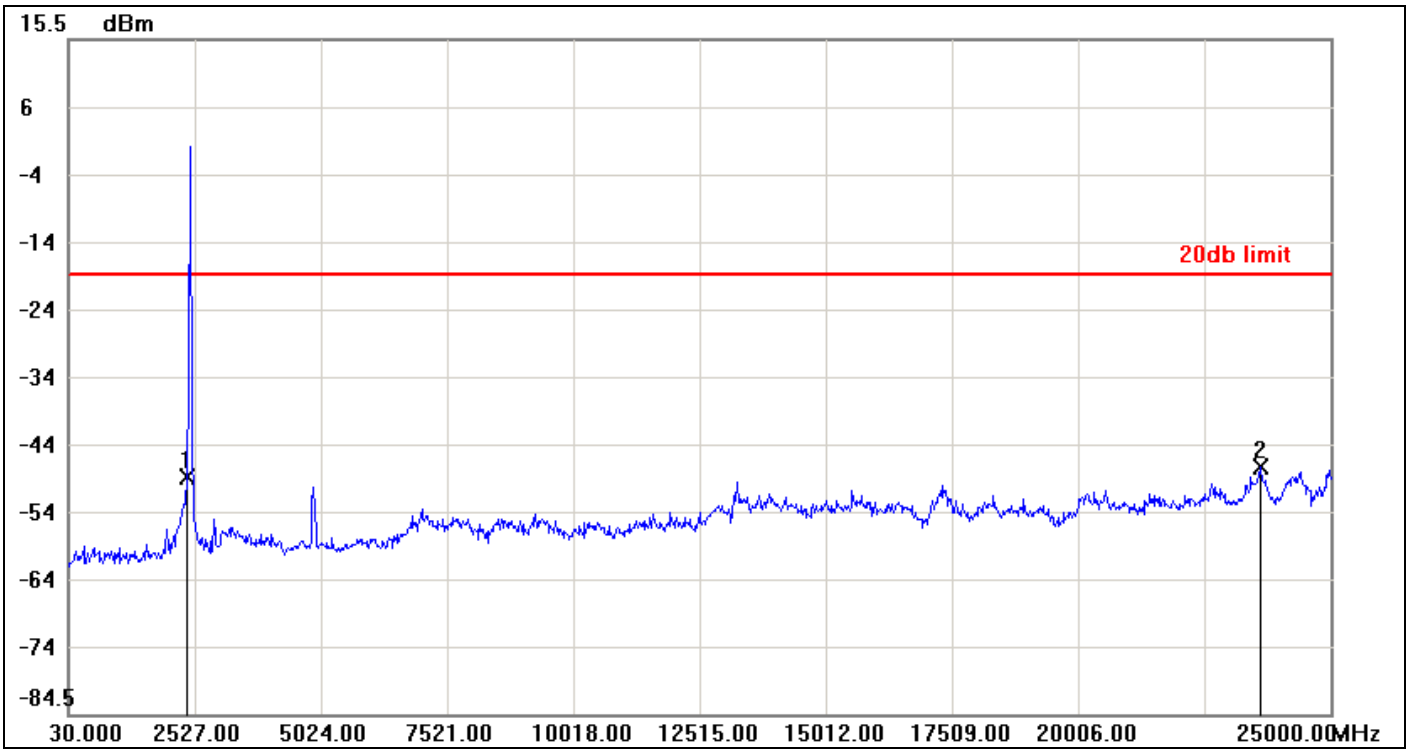
IEEE 802.11n HT 40 MHz mode / Chain 1

CH Low



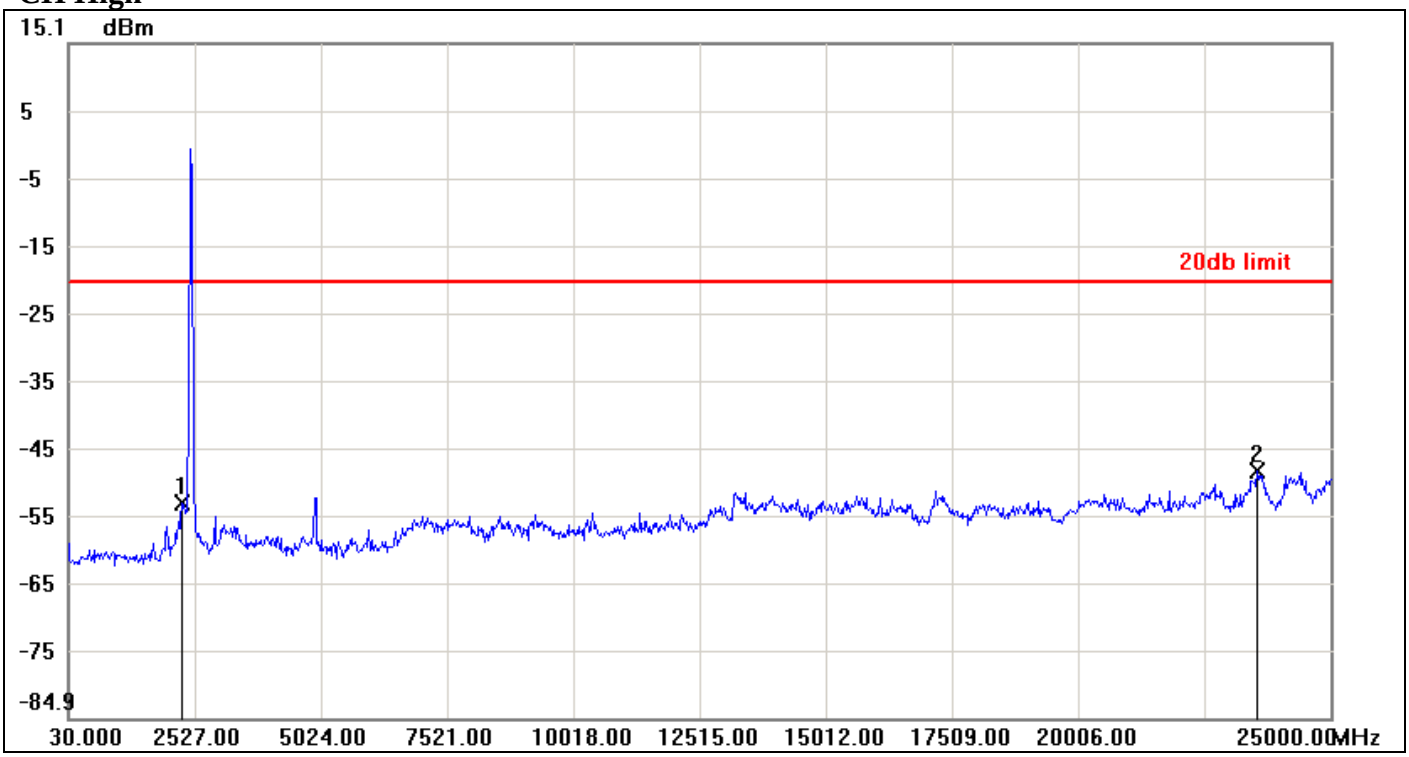
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-38.51	-19.28	-19.23
2	4849.2100	-48.85	-19.28	-29.57

CH Mid



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-49.47	-19.37	-30.10
2	23626.6500	-47.97	-19.37	-28.60

CH High



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2277.3000	-52.96	-20.16	-32.80
2	23551.7400	-48.37	-20.16	-28.21

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 (Note)

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).

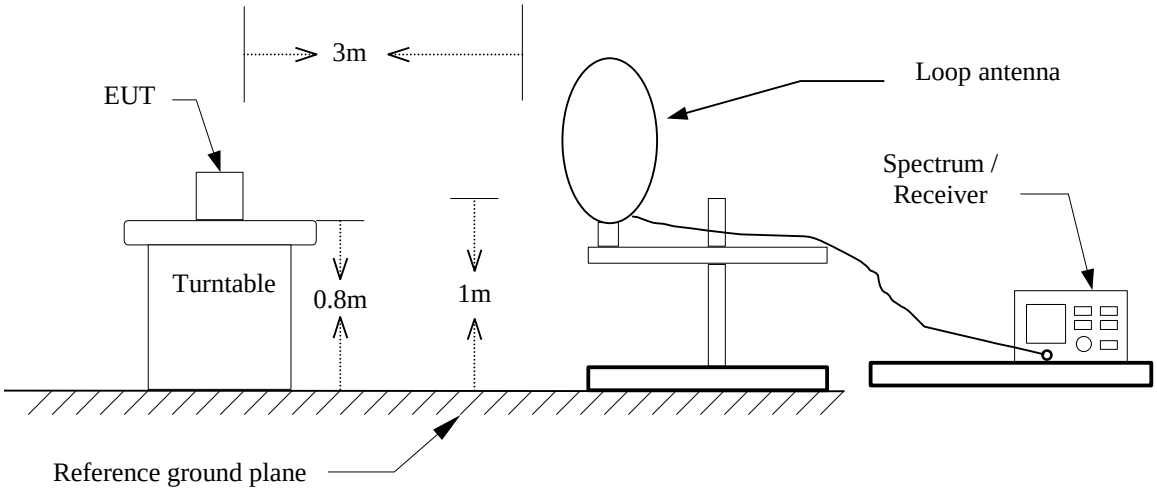
RSS-Gen Table 6: General Field Strength Limits for Transmitters at Frequencies Below 30 MHz (Transmit)

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

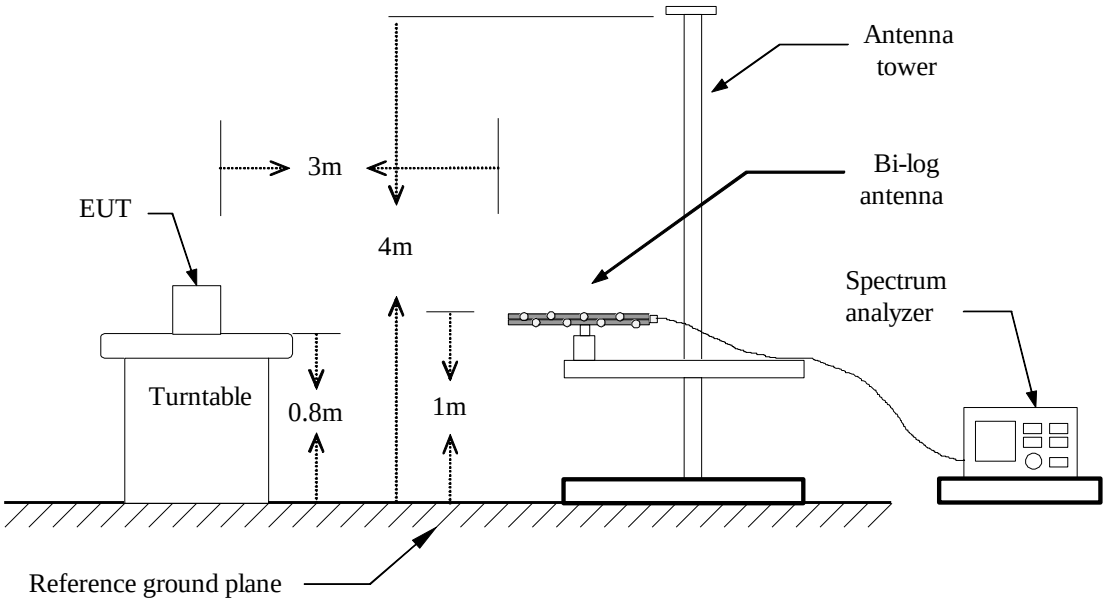
Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average detector.

Test Configuration

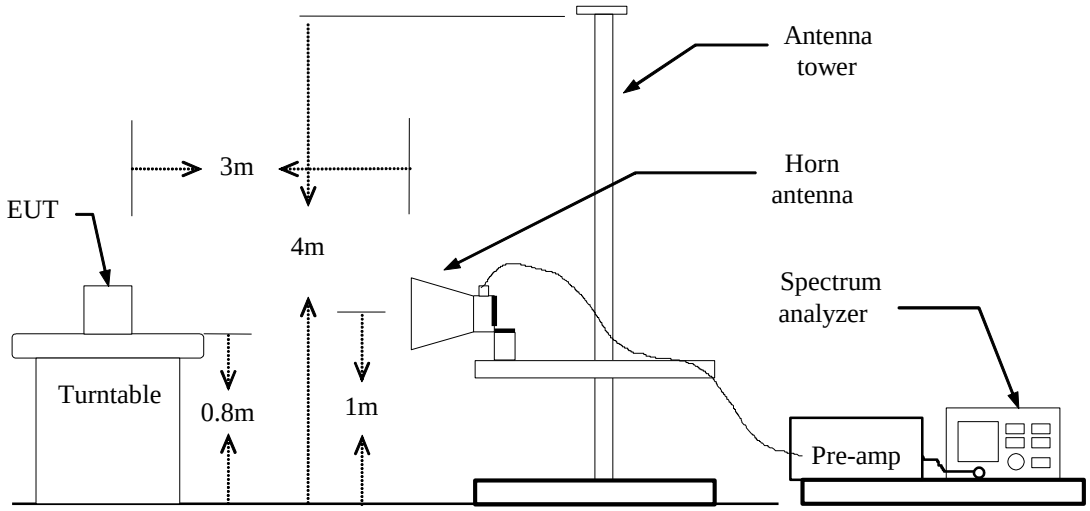
9kHz ~ 30MHz



30MHz ~ 1GHz



Above 1 GHz


Antenna
tower
3m
Horn
antenna
EUT
4m
Spectrum
analyzer
Turntable
0.8m
1m
Pre-amp

TEST PROCEDURE

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

   Below 1GHz:

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

   Above 1GHz:

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

   (b) AVERAGE: RBW=1MHz / VBW=300Hz / Sweep=AUTO
7. Repeat above procedures until the measurements for all frequencies are complete.

Below 1GHz

Operation Mode: Normal Link **Test Date:** January 20, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
94.0200	47.26	-22.37	24.89	43.50	-18.61	Peak	V
253.1000	43.53	-18.18	25.35	46.00	-20.65	Peak	V
376.2900	43.53	-14.57	28.96	46.00	-17.04	Peak	V
478.1400	44.05	-12.19	31.86	46.00	-14.14	Peak	V
600.3600	44.44	-10.50	33.94	46.00	-12.06	Peak	V
900.0900	34.92	-6.16	28.76	46.00	-17.24	Peak	V
30.0000	47.82	-9.87	37.95	40.00	-2.05	peak	H
40.6700	53.90	-17.58	36.32	40.00	-3.68	peak	H
376.2900	54.43	-14.57	39.86	46.00	-6.14	peak	H
478.1400	53.41	-12.19	41.22	46.00	-4.78	peak	H
749.7400	34.02	-7.88	26.14	46.00	-19.86	peak	H
900.0900	42.01	-6.16	35.85	46.00	-10.15	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

Operation Mode: TX / IEEE 802.11b / CH Low **Test Date:** February 3, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1800.000	52.13	-5.94	46.19	74.00	-27.81	peak	V
3190.000	43.90	-1.65	42.25	74.00	-31.75	peak	V
4825.000	57.32	4.01	61.33	74.00	-12.67	peak	V
4825.000	49.39	4.01	53.40	54.00	-0.60	AVG	V
N/A							
2102.000	55.11	-4.97	50.14	74.00	-23.86	peak	H
3215.000	45.35	-1.59	43.76	74.00	-30.24	peak	H
4825.000	48.85	4.01	52.86	74.00	-21.14	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).*

Operation Mode: TX / IEEE 802.11b / CH Mid **Test Date:** February 3, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1832.000	51.12	-5.77	45.35	74.00	-28.65	peak	V
3865.000	43.00	0.65	43.65	74.00	-30.35	peak	V
4875.000	55.99	3.92	59.91	74.00	-14.09	peak	V
4875.000	49.79	3.92	53.71	54.00	-0.29	AVG	V
N/A							
2136.000	51.87	-4.78	47.09	74.00	-26.91	peak	H
3250.000	45.57	-1.51	44.06	74.00	-29.94	peak	H
4875.000	53.54	3.92	57.46	74.00	-16.54	peak	H
4875.000	49.53	3.92	53.45	54.00	-0.55	AVG	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).*

Operation Mode: TX / IEEE 802.11b / CH High **Test Date:** February 3, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
2106.000	50.80	-4.95	45.85	74.00	-28.15	peak	V
3105.000	46.67	-1.86	44.81	74.00	-29.19	peak	V
4925.000	52.95	3.90	56.85	74.00	-17.15	peak	V
4925.000	49.55	3.90	53.45	54.00	-0.55	AVG	V
N/A							
2256.000	51.07	-4.35	46.72	74.00	-27.28	peak	H
3285.000	45.84	-1.43	44.41	74.00	-29.59	peak	H
4925.000	54.77	3.90	58.67	74.00	-15.33	peak	H
4925.000	49.79	3.90	53.69	54.00	-0.31	AVG	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).*

Operation Mode: TX / IEEE 802.11g / CH Low **Test Date:** January 19, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1812.000	52.29	-5.88	46.41	74.00	-27.59	peak	V
3105.000	47.60	-1.86	45.74	74.00	-28.26	peak	V
4825.000	52.01	4.01	56.02	74.00	-17.98	peak	V
4825.000	37.11	4.01	41.12	54.00	-12.88	AVG	V
N/A							
1792.000	52.03	-5.98	46.05	74.00	-27.95	peak	H
4200.000	41.65	1.99	43.64	74.00	-30.36	peak	H
4820.000	49.01	4.02	53.03	74.00	-20.97	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).*

Operation Mode: TX / IEEE 802.11g / CH Mid **Test Date:** February 4, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1794.000	55.53	-5.97	49.56	74.00	-24.44	peak	V
3185.000	45.24	-1.67	43.57	74.00	-30.43	peak	V
4870.000	54.25	3.93	58.18	74.00	-15.82	peak	V
4870.000	39.58	3.93	43.51	54.00	-10.49	AVG	V
N/A							
2176.000	53.42	-4.56	48.86	74.00	-25.14	peak	H
3250.000	47.03	-1.51	45.52	74.00	-28.48	peak	H
4870.000	54.72	3.93	58.65	74.00	-15.35	peak	H
4870.000	38.38	3.93	42.31	54.00	-11.69	AVG	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).*

Operation Mode: TX / IEEE 802.11g / CH High **Test Date:** February 4, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1922.000	50.83	-5.29	45.54	74.00	-28.46	peak	V
4925.000	52.88	3.90	56.78	74.00	-17.22	peak	V
4925.000	35.24	3.90	39.14	54.00	-14.86	AVG	V
7495.000	39.60	10.90	50.50	74.00	-23.50	peak	V
N/A							
2182.000	53.30	-4.53	48.77	74.00	-25.23	peak	H
3285.000	45.05	-1.43	43.62	74.00	-30.38	peak	H
4925.000	50.64	3.90	54.54	74.00	-19.46	peak	H
4925.000	39.76	3.90	43.66	54.00	-10.34	AVG	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).*

Operation Mode: TX / IEEE 802.11n HT 20 MHz mode / CH Low **Test Date:** February 4, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1934.000	50.52	-5.23	45.29	74.00	-28.71	peak	V
4825.000	52.41	4.01	56.42	74.00	-17.58	peak	V
4825.000	41.21	4.01	45.22	54.00	-8.78	AVG	V
7470.000	41.58	10.87	52.45	74.00	-21.55	peak	V
N/A							
1924.000	53.73	-5.28	48.45	74.00	-25.55	peak	H
4820.000	54.16	4.02	58.18	74.00	-15.82	peak	H
4820.000	42.44	4.02	46.46	54.00	-7.54	AVG	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).*

Operation Mode: TX / IEEE 802.11n HT 20 MHz mode / CH Mid **Test Date:** February 4, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1816.000	53.12	-5.86	47.26	74.00	-26.74	peak	V
3185.000	45.72	-1.67	44.05	74.00	-29.95	peak	V
4875.000	54.74	3.92	58.66	74.00	-15.34	peak	V
4875.000	40.91	3.92	44.83	54.00	-9.17	AVG	V
N/A							
1922.000	57.10	-5.29	51.81	74.00	-22.19	peak	H
4820.000	49.79	4.02	53.81	74.00	-20.19	peak	H
4820.000	40.75	4.02	44.77	54.00	-9.23	AVG	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).*

Operation Mode: TX / IEEE 802.11n HT 20 MHz mode / CH High **Test Date:** February 4, 2015

Temperature: 27℃ **Tested by:** Owen Wu

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)
1998.000	54.07	-4.89	49.18	74.00	-24.82	peak	V
4930.000	53.52	3.90	57.42	74.00	-16.58	peak	V
4930.000	41.90	3.90	45.80	54.00	-8.20	AVG	V
N/A							
2162.000	53.64	-4.64	49.00	74.00	-25.00	peak	H
3280.000	43.82	-1.44	42.38	74.00	-31.62	peak	H
4920.000	48.50	3.90	52.40	74.00	-21.60	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).*

Operation Mode:	TX / IEEE 802.11n HT 40 MHz mode / CH Low	**Test Date:**	February 4, 2015
Temperature:	27℃	**Tested by:**	Owen Wu
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)
1924.000	50.90	-5.28	45.62	74.00	-28.38	peak	V
3200.000	47.10	-1.63	45.47	74.00	-28.53	peak	V
4840.000	47.79	3.98	51.77	74.00	-22.23	peak	V
N/A							
2158.000	58.17	-4.66	53.51	74.00	-20.49	peak	H
3230.000	45.34	-1.56	43.78	74.00	-30.22	peak	H
4855.000	45.26	3.96	49.22	74.00	-24.78	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).*

Operation Mode:	TX / IEEE 802.11n HT 40 MHz mode / CH Mid	**Test Date:**	February 4, 2015
Temperature:	27℃	**Tested by:**	Owen Wu
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)
2100.000	54.13	-4.98	49.15	74.00	-24.85	peak	V
3885.000	44.04	0.74	44.78	74.00	-29.22	peak	V
4870.000	55.15	3.93	59.08	74.00	-14.92	peak	V
4870.000	36.98	3.93	40.91	54.00	-13.09	AVG	V
N/A							
2900.000	53.29	-2.31	50.98	74.00	-23.02	peak	H
3250.000	45.89	-1.51	44.38	74.00	-29.62	peak	H
4875.000	48.60	3.92	52.52	74.00	-21.48	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).*

Operation Mode:	TX / IEEE 802.11n HT 40 MHz mode / CH High	**Test Date:**	February 4, 2015
Temperature:	27℃	**Tested by:**	Owen Wu
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)
1922.000	51.52	-5.29	46.23	74.00	-27.77	peak	V
3200.000	47.31	-1.63	45.68	74.00	-28.32	peak	V
4900.000	43.78	3.88	47.66	74.00	-26.34	peak	V
N/A							
2202.000	52.13	-4.43	47.70	74.00	-26.30	peak	H
3270.000	44.09	-1.46	42.63	74.00	-31.37	peak	H
4905.000	43.98	3.88	47.86	74.00	-26.14	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 µH/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 (dBµV)	
	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

Not applicable, because EUT not connect to AC Main Source direct.