



**FCC 47 CFR PART 15 SUBPART C**

**TEST REPORT**

**For**

**Notebook Computer**

**Model:**

**Satellite S5\*\*\*\*\*-C\*\*\*\*\***

**Satellite E5\*\*\*\*\*-C\*\*\*\*\***

**Satellite L5\*\*\*\*\*-C\*\*\*\*\***

**Satellite P5\*\*\*\*\*-C\*\*\*\*\***

**Satellite Radius L5\*\*\*\*\*-C\*\*\*\*\***

**Satellite Radius P5\*\*\*\*\*-C\*\*\*\*\***

**Satellite Fusion L5\*\*\*\*\*-C\*\*\*\*\***

(\* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)

**Trade Name: TOSHIBA**

*Issued to*

**Pegatron Corporation**

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

*Issued by*

**Compliance Certification Services Inc.**

**No.11, Wugong 6th Rd., Wugu Dist.,  
New Taipei City 24891, Taiwan. (R.O.C.)**

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**Issued Date: February 24, 2015**



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**Revision History**

Rev.		Issue Date		Revisions	Effect Page	Revised By
00		February 24, 2015		Initial Issue	ALL	Doris Chu



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## 1. TEST RESULT CERTIFICATION

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

**Equipment Under Test:** Notebook Computer

**Trade Name:** TOSHIBA

**Model:** Satellite S5\*\*\*\*\*-C\*\*\*\*\*  
Satellite E5\*\*\*\*\*-C\*\*\*\*\*  
Satellite L5\*\*\*\*\*-C\*\*\*\*\*  
Satellite P5\*\*\*\*\*-C\*\*\*\*\*  
Satellite Radius L5\*\*\*\*\*-C\*\*\*\*\*  
Satellite Radius P5\*\*\*\*\*-C\*\*\*\*\*  
Satellite Fusion L5\*\*\*\*\*-C\*\*\*\*\*  
(\* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)

**Date of Test:** February 6 ~ 14, 2015

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	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.

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

Approved by:

Reviewed by:

Miller Lee  
Section Manager  
Compliance Certification Services Inc.

Angel Cheng  
Section Manager  
Compliance Certification Services Inc.



## 2. EUT DESCRIPTION

<b>Product</b>	Notebook Computer		
<b>Trade Name</b>	TOSHIBA		
<b>Model Number</b>	Satellite S5*****-C***** Satellite E5*****-C***** Satellite L5*****-C***** Satellite P5*****-C***** Satellite Radius L5*****-C***** Satellite Radius P5*****-C***** Satellite Fusion L5*****-C***** (* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose)		
<b>Model Discrepancy</b>	All the above models are identical except for the designation of model numbers. The suffix of “*” (* means 0-9; a-z; A-Z; / ; - ; no symbol, or blank for marketing purpose) on model number is just for marketing purpose only.		
<b>Received Date</b>	January 23, 2015		
<b>WLAN Manufacturer</b>	Intel	<b>Model</b>	3160NGW
<b>Power Rating</b>	1. VDC from Power Adapter TOSHIBA / Model: PA5178U-1ACA I/P: 100-240V, 50-60Hz, 1.7A O/P: 19V, 3.42A 2. Power from Battery TOSHIBA / PA5208U-1BRS Rating 10.8Vdc, 45Wh, 3860mAh		
<b>Frequency Range</b>	2412 ~ 2472 MHz		
<b>Transmit Power</b>	IEEE 802.11b mode: 17.57 dBm IEEE 802.11g mode: 20.19 dBm IEEE 802.11n HT 20 MHz mode: 20.55 dBm IEEE 802.11n HT 40 mode: 20.56 dBm		
<b>Modulation Technique</b>	IEEE 802.11b mode: DSSS (1, 2, 5.5 and 11 Mbps) IEEE 802.11g mode: OFDM (6, 9, 12, 18, 24, 36, 48 and 54 Mbps) IEEE 802.11n HT 20 MHz mode: OFDM (6.5, 13, 19.5, 26, 39, 52, 58.5, 65.0Mbps) IEEE 802.11n HT 40 mode: OFDM (13.5, 27, 40.5, 54, 81, 108, 121.5, 135Mbps)		
<b>Number of Channels</b>	IEEE 802.11b/g mode: 13 Channels IEEE 802.11n HT 20 MHz mode: 13 Channels IEEE 802.11n HT 40 mode: 9 Channels		



<b>Antenna Specification</b>	1. Yageo(Metal) ANTA0TP09551WLAN4 (TX1) / 0.32dBi (Worse) 2. Yageo(IMR) ANTA0TP09551WLAN2 (TX1) / -1.36dBi 3. ACON(Metal) APP6Y-700301 (TX1) / -1.17dBi 4. ACON(IMR) APP6Y-700249 (TX1) /-4.58dBi
<b>Antenna Designation</b>	PIFA Antenna

**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: **VUI-THOR3160** 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, KDB558074.

#### **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.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

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

##### **Radiated Emissions**

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



### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

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

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

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

<sup>2</sup> Above 38.6

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





### 3.5 DESCRIPTION OF TEST MODES

The EUT (model: Satellite S50-C) comes with four types of antenna (model: ANTA0TP09551WLAN4 (TX1) / ANTA0TP09551WLAN2 (TX1) / APP6Y-700301 (TX1) / APP6Y-700249 (TX1)) for sale. After the preliminary test, the antenna ANTA0TP09551WLAN4 (TX1) was found to emit the worst emissions and therefore had been tested under operating condition.

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

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

#### **IEEE 802.11b mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2472MHz) with 1Mbps data rate were chosen for full testing.

#### **IEEE 802.11g mode:**

Channel Low (2412MHz), Channel Mid (2437MHz) and Channel High (2472MHz) 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 (2472MHz) 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 (2462MHz) with 13.5Mbps data rate were chosen for full testing.

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



## 4. INSTRUMENT CALIBRATION

### 4.1 MEASURING INSTRUMENT CALIBRATION

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

### 4.2 MEASUREMENT EQUIPMENT USED

#### Equipment Used for Emissions Measurement

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

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	01/26/2016
Horn Antenna	EMCO	3116	26370	12/25/2015
Turn Table	CCS	CC-T-1F	N/A	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R
Pre-Amplifier	MITEQ	1652-3000	1490939	08/09/2016
Pre-Amplifier	EMC	EMC 01265	4035	08/09/2016
Pre-Amplifier	MITEQ	AMF-6F-260400-40-8P	985646	12/25/2015
Coaxial Cable	Huber+Suhner	102	29212/2	12/25/2015
Coaxial Cable	Huber+Suhner	102	29406/2	12/25/2015
Test S/W	EZ-EMC (CCS-3A1RE)			

Conducted Emission room # B				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
EMI Test Receiver	R&S	ESCI	101073	09/18/2015
LISN	R&S	ENV216	101054	05/18/2015
LISN	SCHWARZBECK	NSLK 8127	8127-541	11/25/2015
Capacitive Voltage Probe	FCC	F-CVP-1	100185	03/09/2015
Test S/W	CCS-3A1-CE			



### 4.3 MEASUREMENT UNCERTAINTY

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

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



## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

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

☒ No.139, Wugong Rd., Wugu Dist., New Taipei City 24891, Taiwan (R.O.C.)

Tel: 886-2-2298-4086 / Fax: 886-2-2298-1470

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City 24891, Taiwan. (R.O.C.)

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

☐ No.81-1, Lane 210, Bade 2nd Rd., Lujhu Township, Taoyuan County 33841, TAIWAN, R.O.C.

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

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

### 5.2 EQUIPMENT



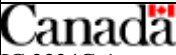
Radiated emissions are measured with one or more of the following types of linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

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

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

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

**5.3 TABLE OF ACCREDITATIONS AND LISTINGS**

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

\* 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	Device Type	Brand	Model	Series No.	FCC ID	Data Cable	Power Cord
	N/A						

**Remark:**

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



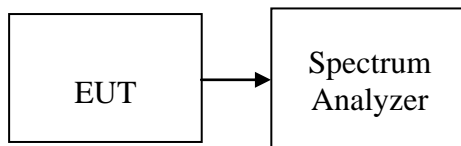
## 7. FCC PART 15.247 REQUIREMENTS

### 7.1 6DB BANDWIDTH

#### LIMIT

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

#### Test Configuration



#### TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. Set the RBW=100kHz the emission bandwidth, VBW  $\geq 3 \times$  RBW, Detector = Peak, Trace mode = max hold, Sweep = auto couple. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

#### TEST RESULTS

*No non-compliance noted*

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

Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
2412	11.3333	>500	PASS
2437	10.5		PASS
2462	10.5		PASS
2467	12.00		PASS
2472	12.00		PASS

**Test mode: IEEE 802.11g mode**

Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
2412	16.5	>500	PASS
2437	16.5		PASS
2462	16.5		PASS
2467	16.5		PASS
2472	16.5		PASS

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

Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
2412	17.8334	>500	PASS
2437	17.8334		PASS
2462	17.8334		PASS
2467	17.83		PASS
2472	17.75		PASS

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

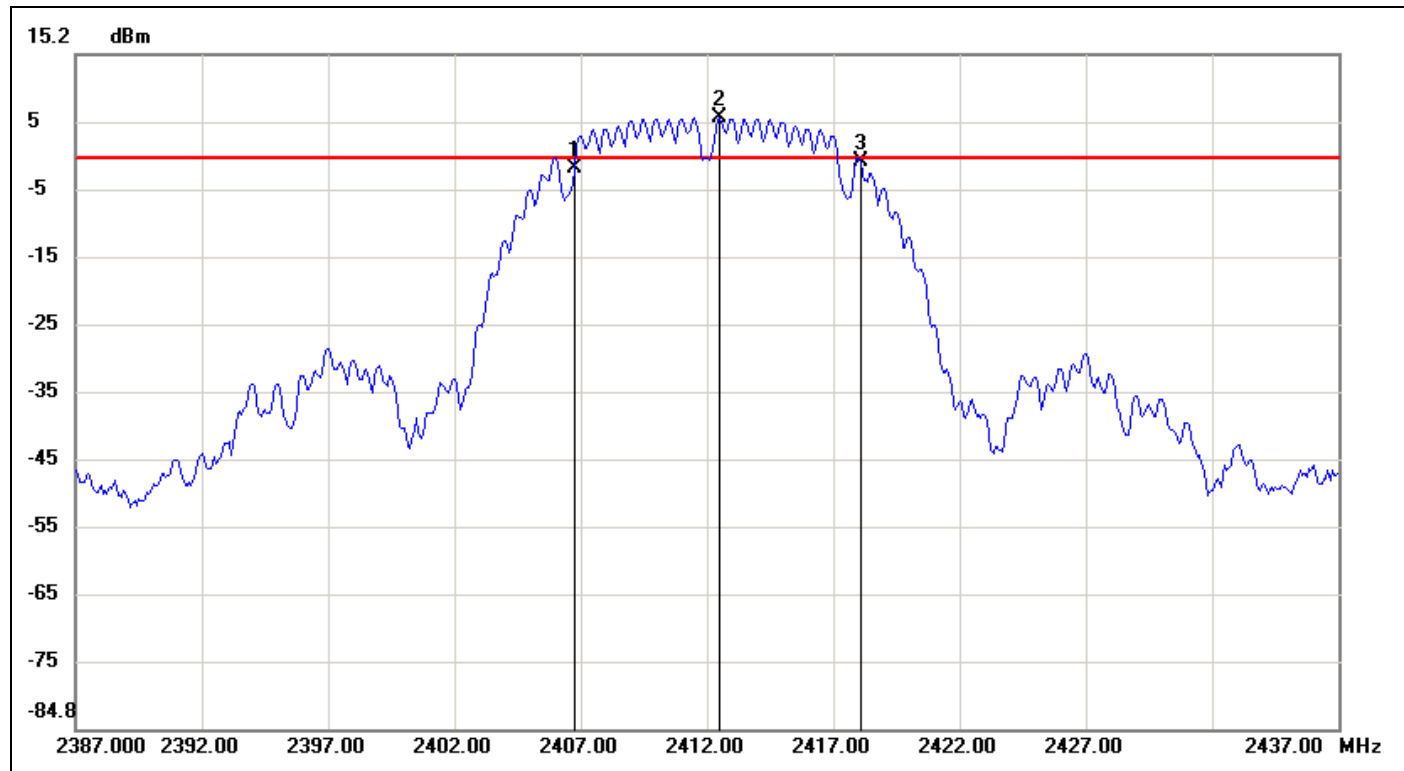
Frequency (MHz)	6dB Bandwidth (MHz)	Limit (kHz)	Result
2422	35.8333	>500	PASS
2437	36.0833		PASS
2452	35.75		PASS
2457	35.83		PASS
2462	35.58		PASS





IEEE 802.11b mode / 2412 MHz

6dB Bandwidth



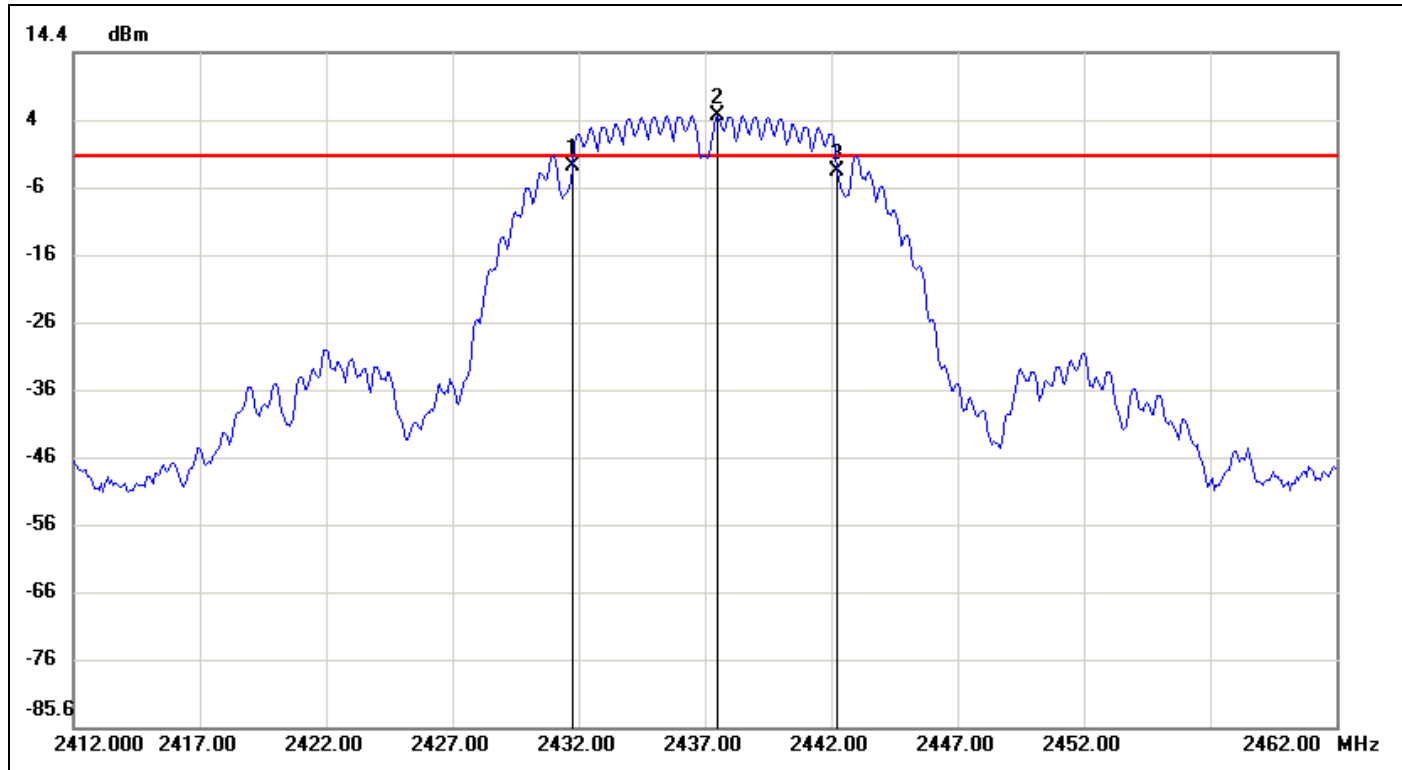
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2406.7500	-1.65	-0.26	-1.39
2	2412.5000	5.74	-0.26	6.00
3	2418.0833	-0.64	-0.26	-0.38

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	11.3333	1.01



IEEE 802.11b mode / 2437 MHz

6dB Bandwidth



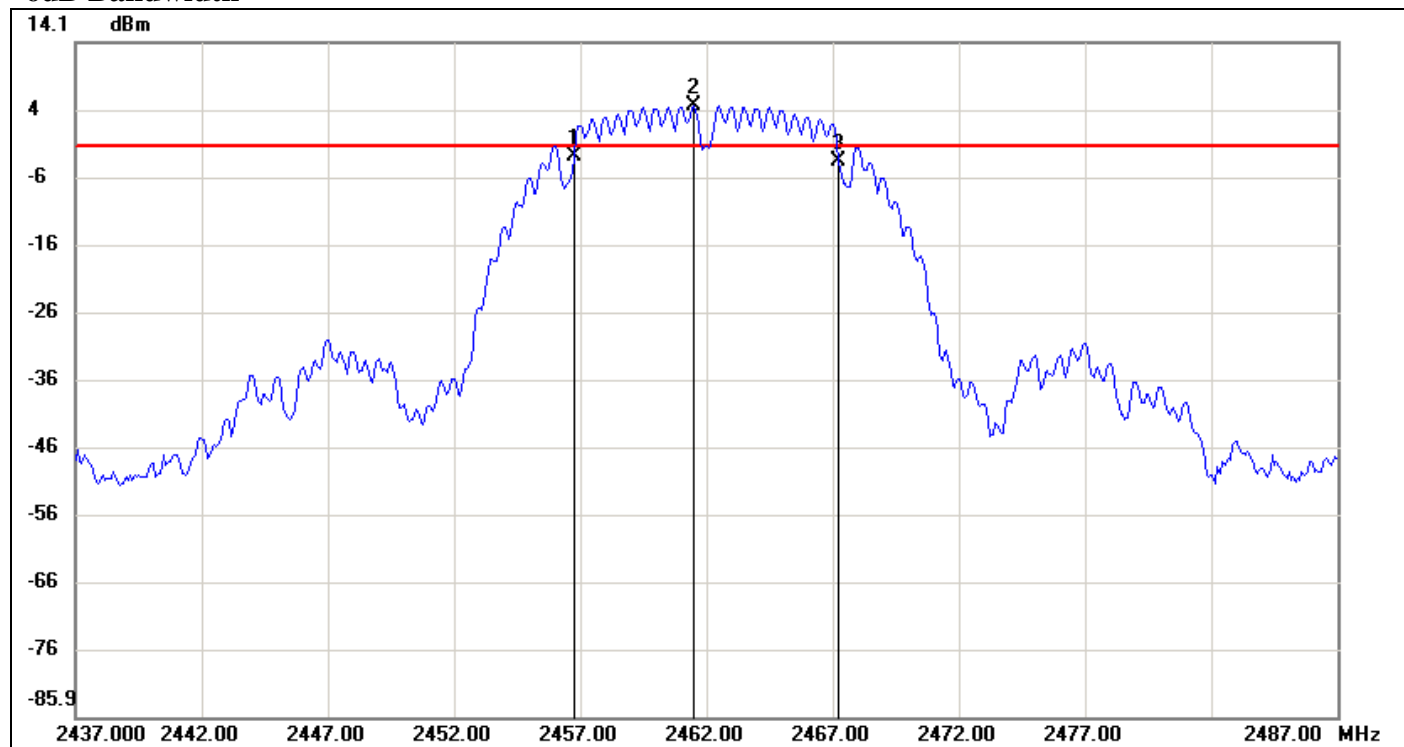
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2431.7500	-2.43	-0.97	-1.46
2	2437.5000	5.03	-0.97	6.00
3	2442.2500	-3.19	-0.97	-2.22

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	10.5	-0.76



IEEE 802.11b mode / 2462 MHz

6dB Bandwidth



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2456.7500	-2.78	-1.32	-1.46
2	2461.5000	4.68	-1.32	6.00
3	2467.2500	-3.55	-1.32	-2.23

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	10.5	-0.77



## IEEE 802.11b mode / 2467 MHz

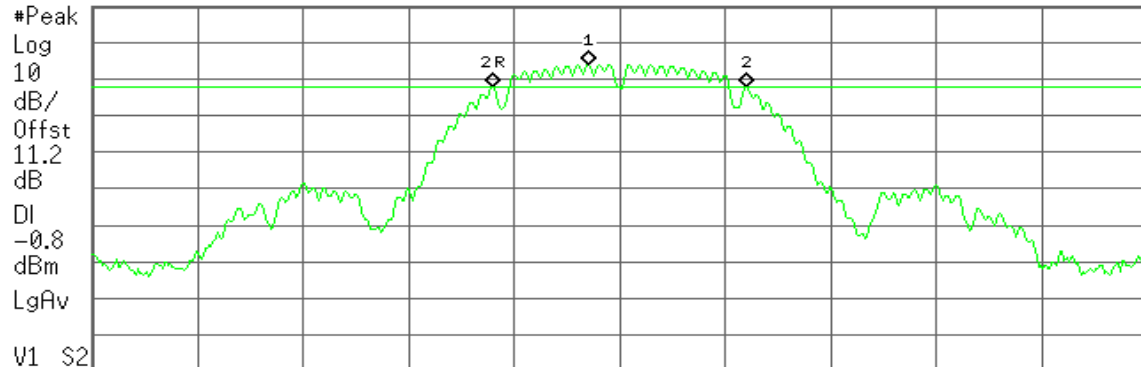
Agilent

R T

▲ Mkr2 12.00 MHz  
-0.12 dB

Ref 21.2 dBm

#Atten 20 dB

V1 S2  
Center 2.467 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.465 50 GHz	5.22 dBm
2R	(1)	Freq	2.461 00 GHz	-0.75 dBm
2Δ	(1)	Freq	12.00 MHz	-0.12 dB

## IEEE 802.11b mode / 2472 MHz

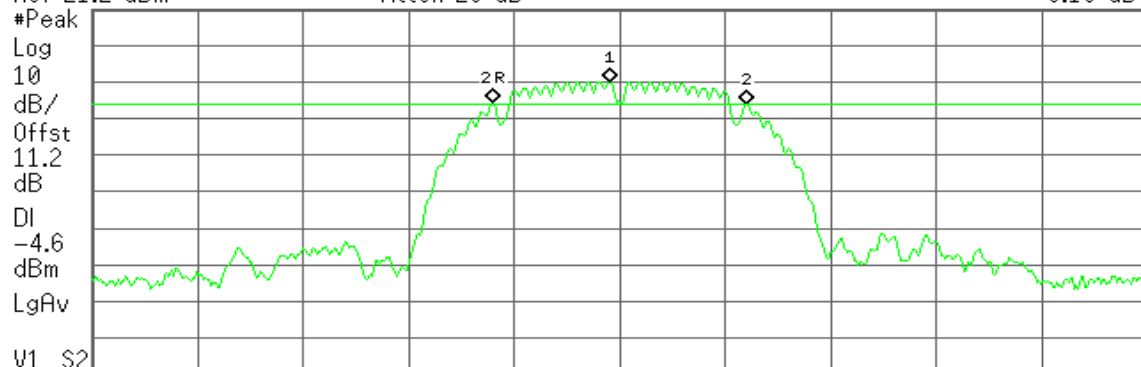
Agilent

R T

▲ Mkr2 12.00 MHz  
-0.16 dB

Ref 21.2 dBm

#Atten 20 dB

V1 S2  
Center 2.472 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 1 MHz

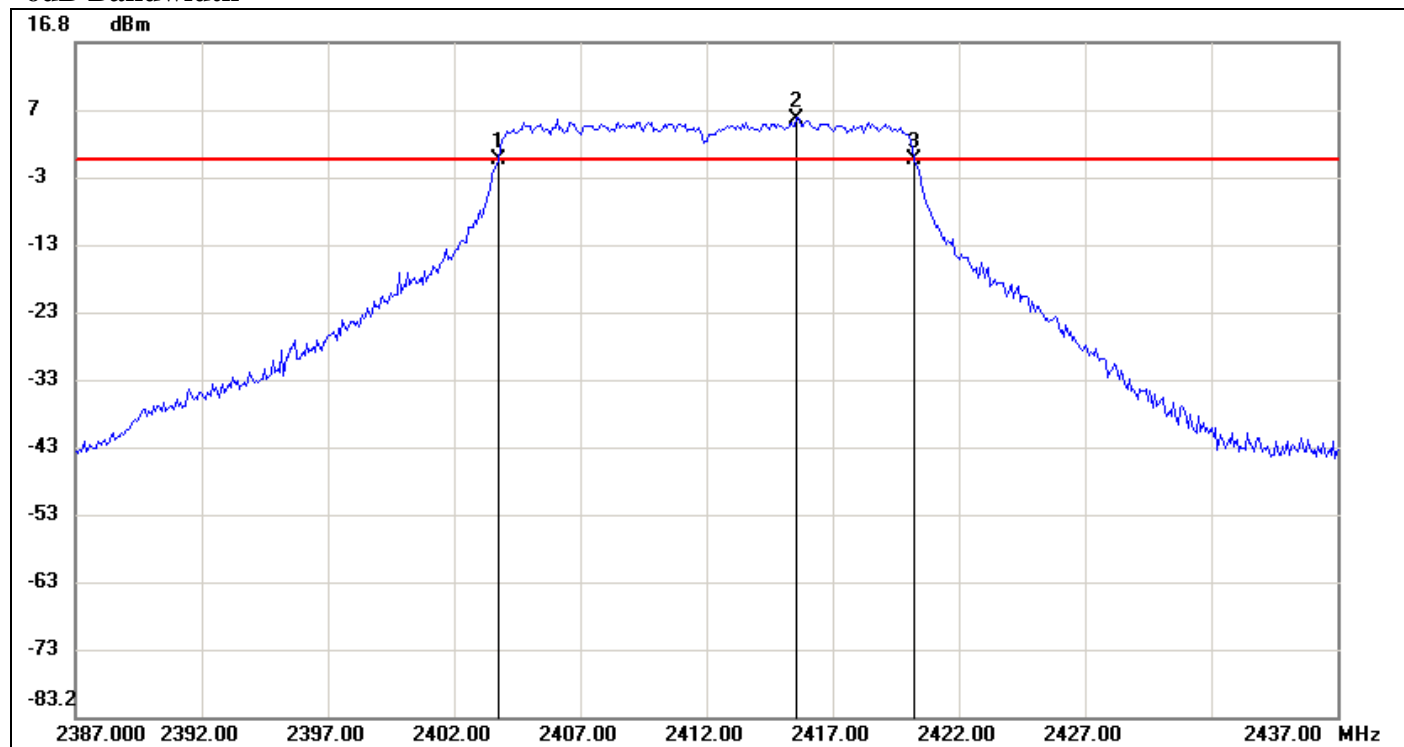
Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.471 50 GHz	1.39 dBm
2R	(1)	Freq	2.466 00 GHz	-4.52 dBm
2Δ	(1)	Freq	12.00 MHz	-0.16 dB



## IEEE 802.11g mode / 2412 MHz

## 6dB Bandwidth



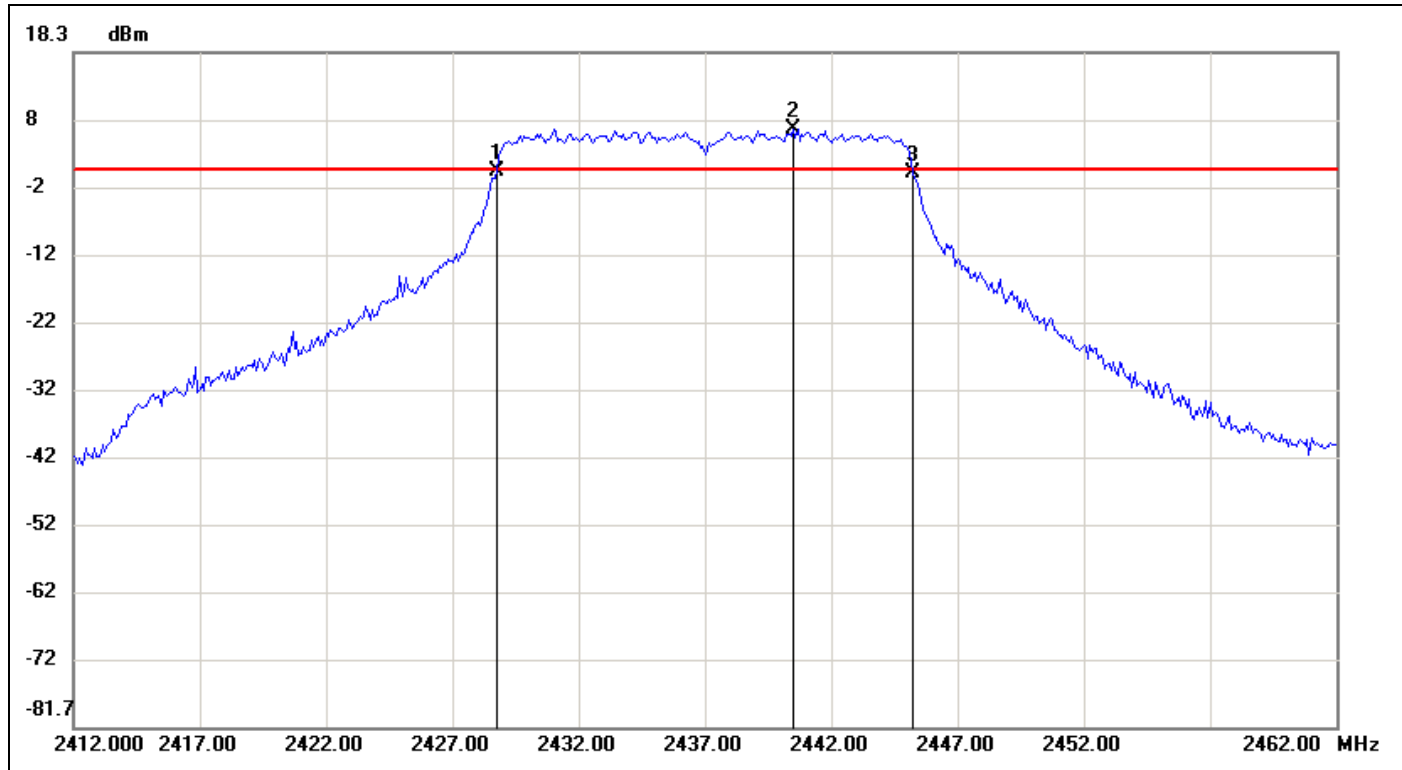
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.7500	-0.54	-0.44	-0.10
2	2415.5833	5.56	-0.44	6.00
3	2420.2500	-0.64	-0.44	-0.20

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	16.5	-0.1



IEEE 802.11g mode / 2437 MHz

6dB Bandwidth



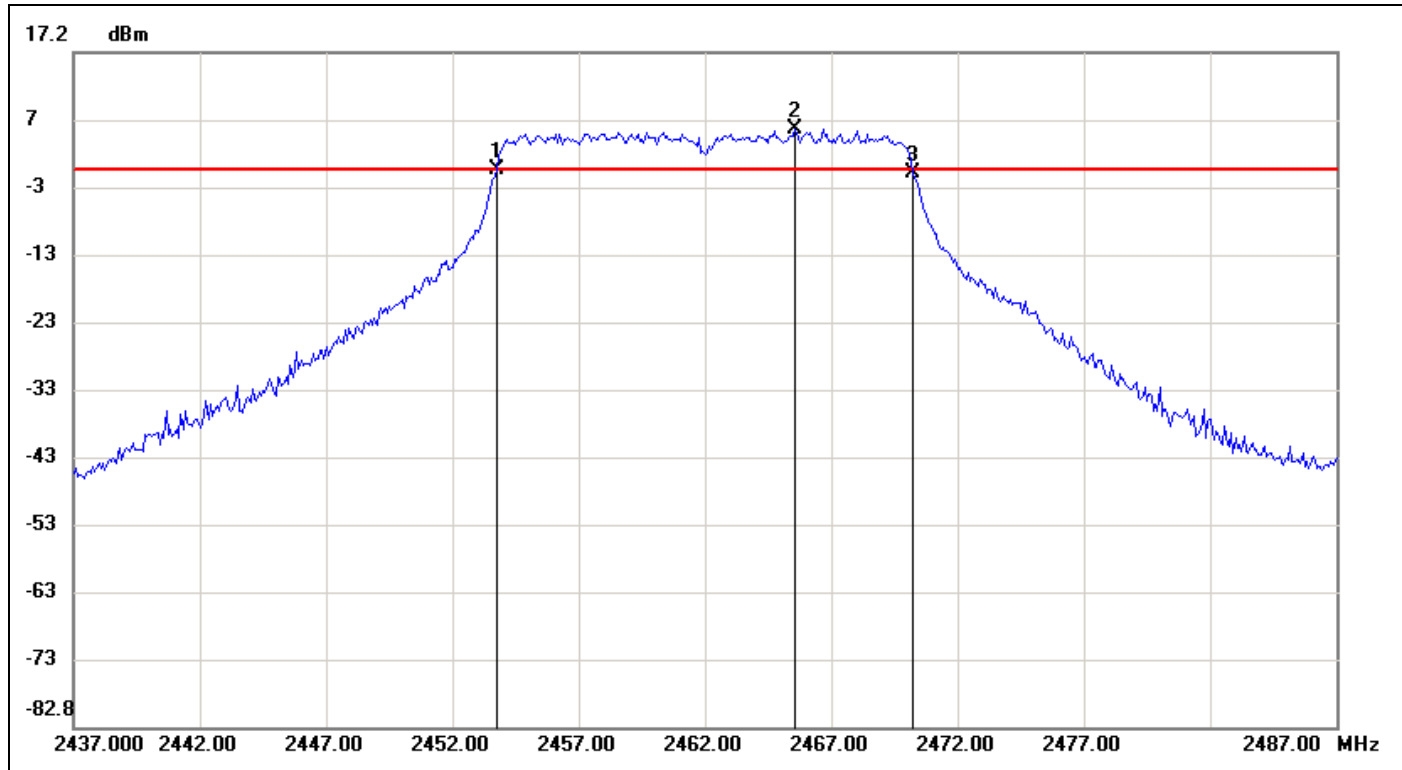
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2428.7500	0.77	0.95	-0.18
2	2440.5000	6.95	0.95	6.00
3	2445.2500	0.49	0.95	-0.46

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	16.5	-0.28



## IEEE 802.11g mode / 2462 MHz

## 6dB Bandwidth



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2453.7500	-0.26	-0.25	-0.01
2	2465.5833	5.75	-0.25	6.00
3	2470.2500	-0.55	-0.25	-0.30

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	16.5	-0.29



## IEEE 802.11g mode / 2467 MHz

Agilent

R T

▲ Mkr2 16.50 MHz  
-0.43 dB

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-1.0

dBm

#LgAv

V1 S2

Center 2.467 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.471 17 GHz	5.02 dBm
2R	(1)	Freq	2.458 75 GHz	-1.42 dBm
2Δ	(1)	Freq	16.50 MHz	-0.43 dB

## IEEE 802.11g mode / 2472 MHz

Agilent

R T

▲ Mkr2 16.50 MHz  
0.27 dB

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-12.4

dBm

#LgAv

V1 S2

Center 2.472 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

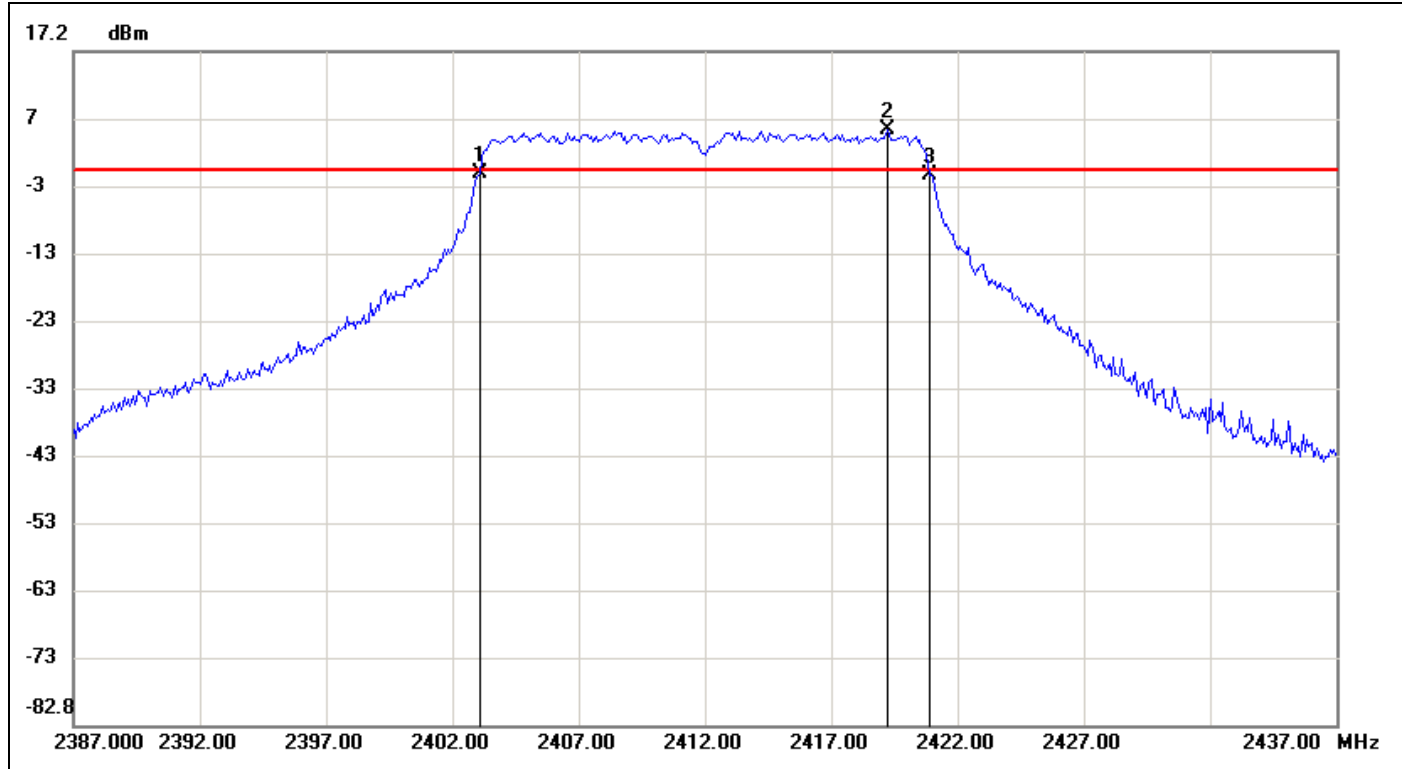
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.474 17 GHz	-6.36 dBm
2R	(1)	Freq	2.463 75 GHz	-12.56 dBm
2Δ	(1)	Freq	16.50 MHz	0.27 dB





IEEE 802.11n HT 20 MHz mode / 2412 MHz

6dB Bandwidth



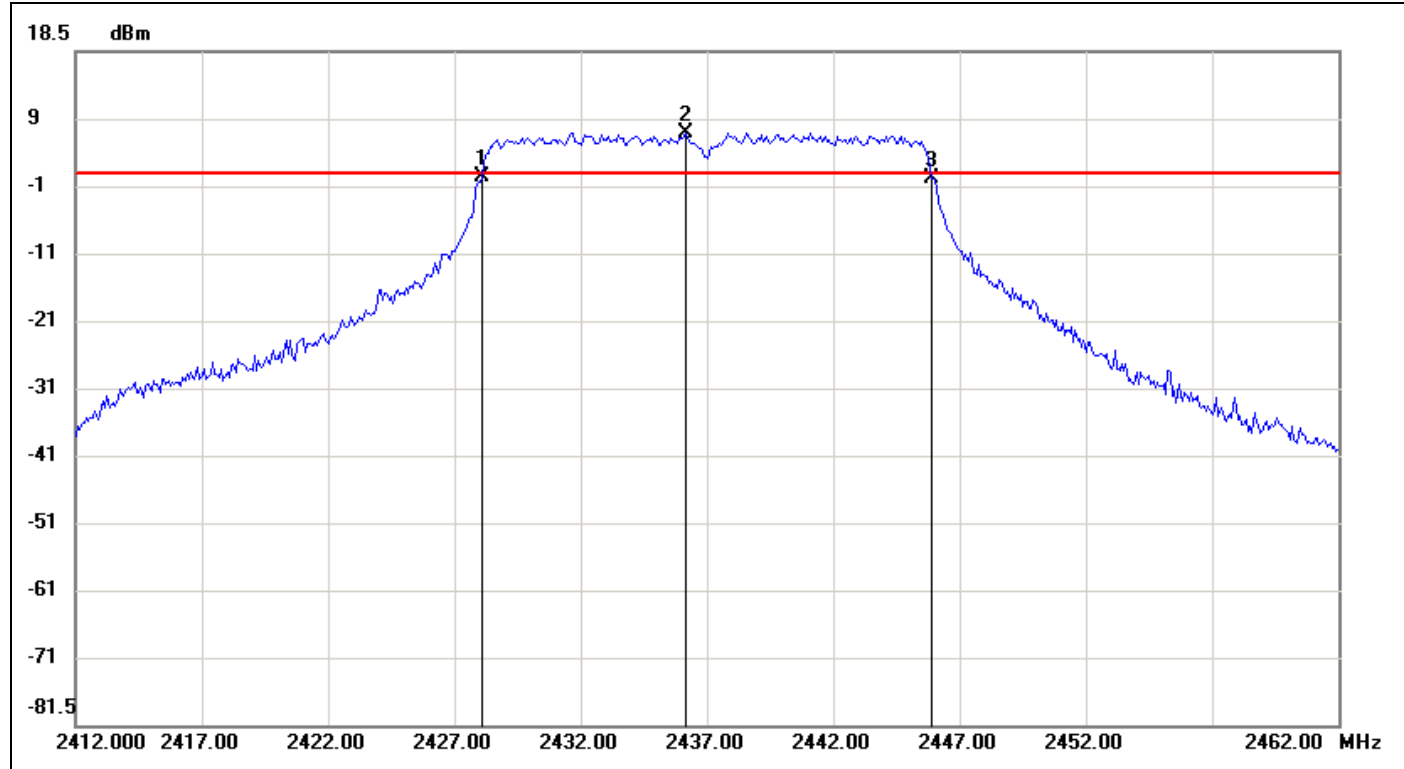
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2403.0833	-0.83	-0.44	-0.39
2	2419.2500	5.56	-0.44	6.00
3	2420.9167	-1.19	-0.44	-0.75

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	17.8334	-0.36



IEEE 802.11n HT 20 MHz mode / 2437 MHz

6dB Bandwidth



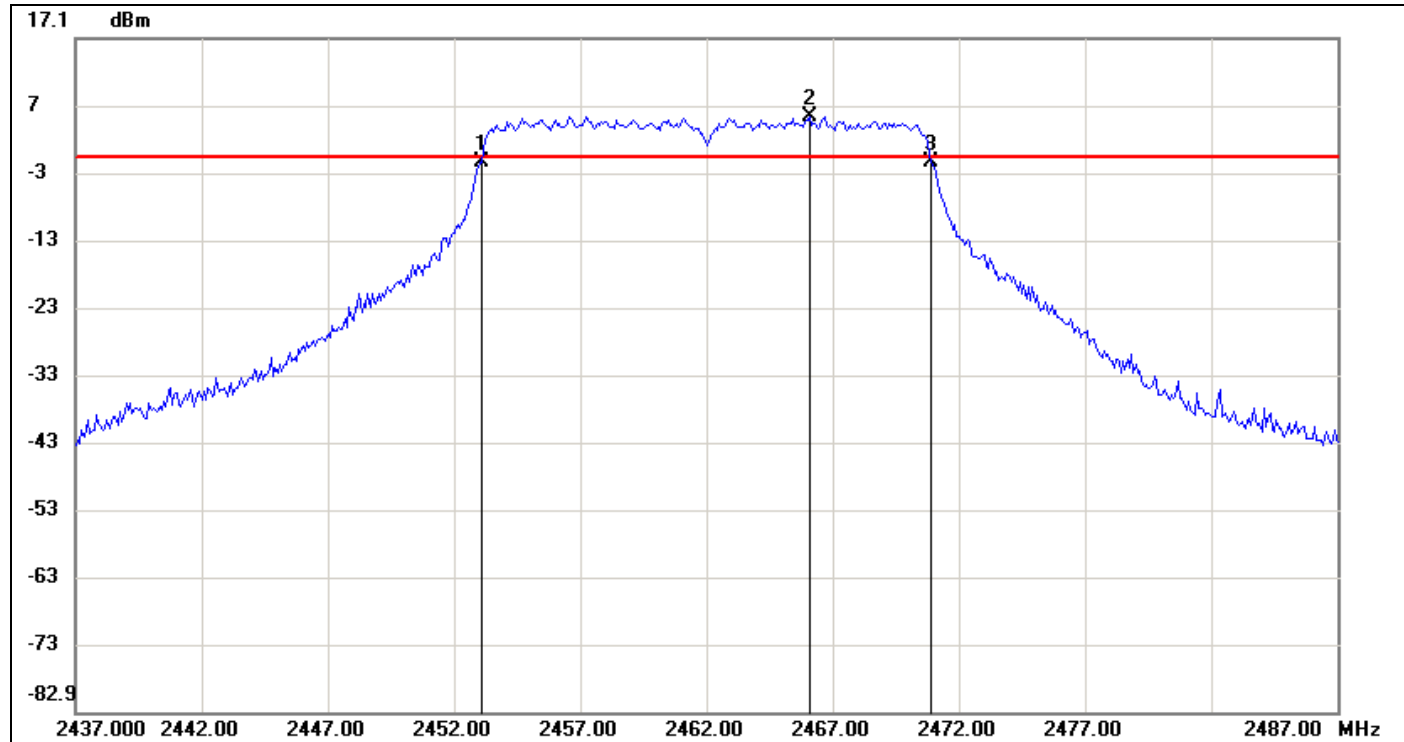
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2428.0833	-0.05	0.46	-0.51
2	2436.1667	6.46	0.46	6.00
3	2445.9167	-0.35	0.46	-0.81

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	17.8334	-0.3



IEEE 802.11n HT 20 MHz mode / 2462 MHz

6dB Bandwidth



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2453.0833	-1.19	-0.51	-0.68
2	2466.0833	5.49	-0.51	6.00
3	2470.9167	-1.35	-0.51	-0.84

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	17.8334	-0.16



## IEEE 802.11n HT 20 MHz mode / 2467 MHz

Agilent

R T

▲ Mkr2 17.83 MHz  
-0.68 dB

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-1.9

dBm

#LgAv

V1 S2

Center 2.467 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 1 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.466 17 GHz	4.06 dBm
2R	(1)	Freq	2.458 08 GHz	-2.03 dBm
2Δ	(1)	Freq	17.83 MHz	-0.68 dB

## IEEE 802.11n HT 20 MHz mode / 2472 MHz

Agilent

R T

▲ Mkr2 17.75 MHz  
0.21 dB

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-13.0

dBm

#LgAv

V1 S2

Center 2.472 00 GHz

Span 50 MHz

#Res BW 300 kHz

#VBW 1 MHz

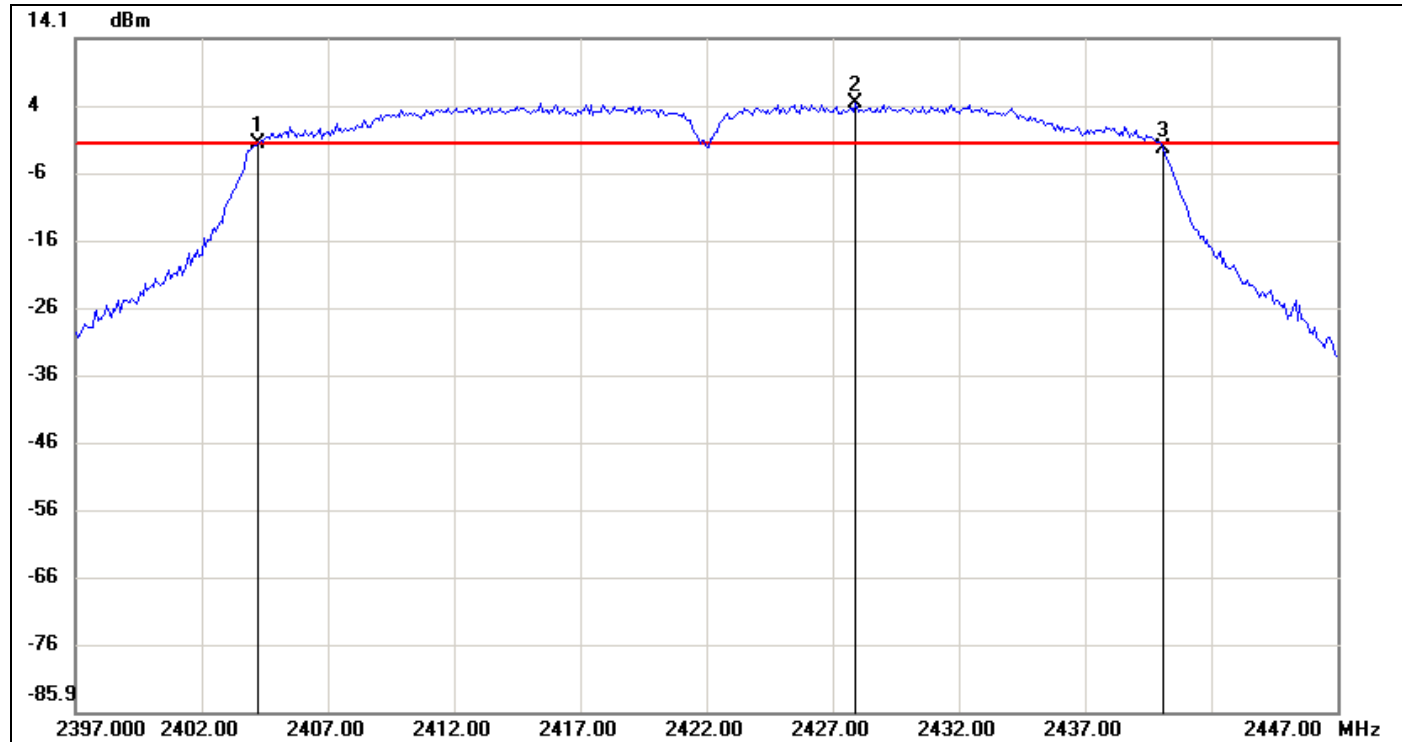
Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.467 25 GHz	-7.01 dBm
2R	(1)	Freq	2.463 08 GHz	-13.59 dBm
2Δ	(1)	Freq	17.75 MHz	0.21 dB



## IEEE 802.11n HT 40 mode / 2422 MHz

## 6dB Bandwidth



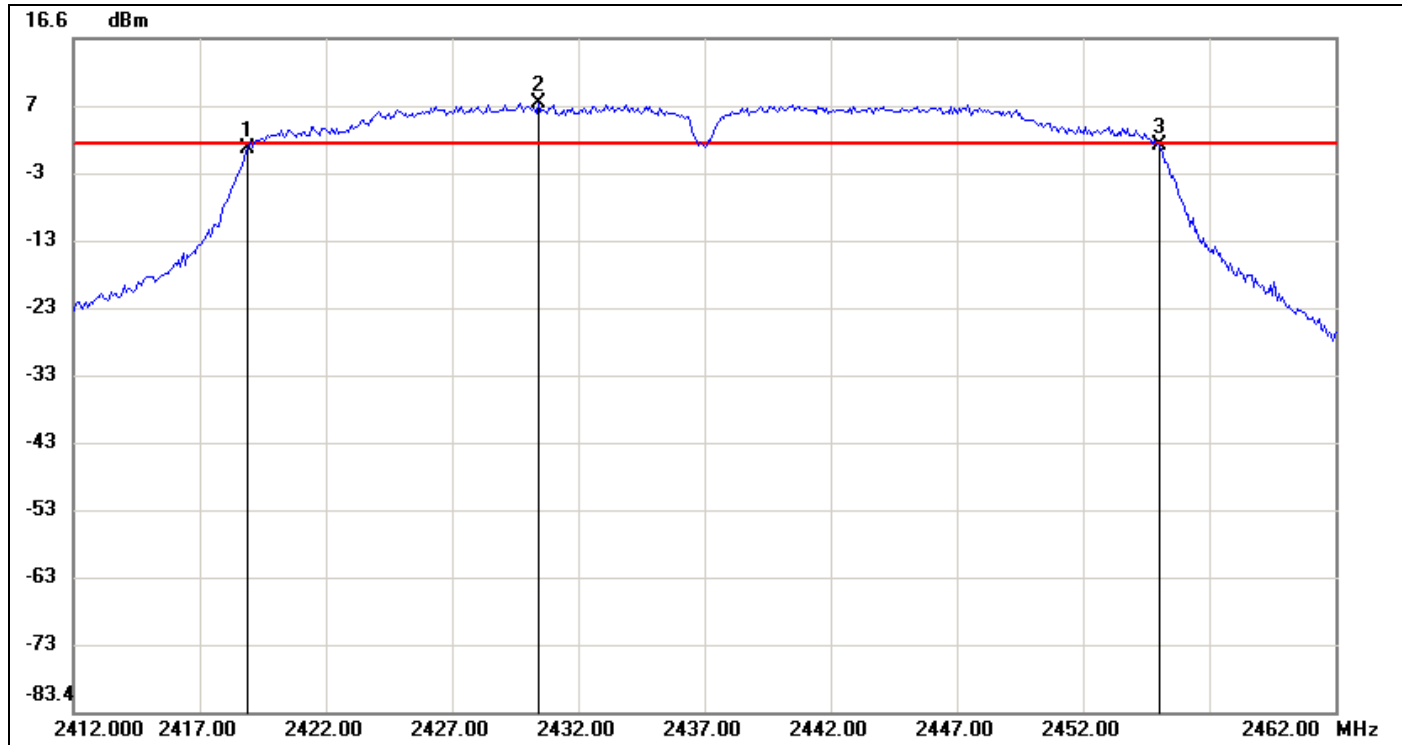
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2404.2500	-1.53	-1.51	-0.02
2	2427.9167	4.49	-1.51	6.00
3	2440.0833	-2.36	-1.51	-0.85

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	35.8333	-0.83



IEEE 802.11n HT 40 mode / 2437 MHz

6dB Bandwidth



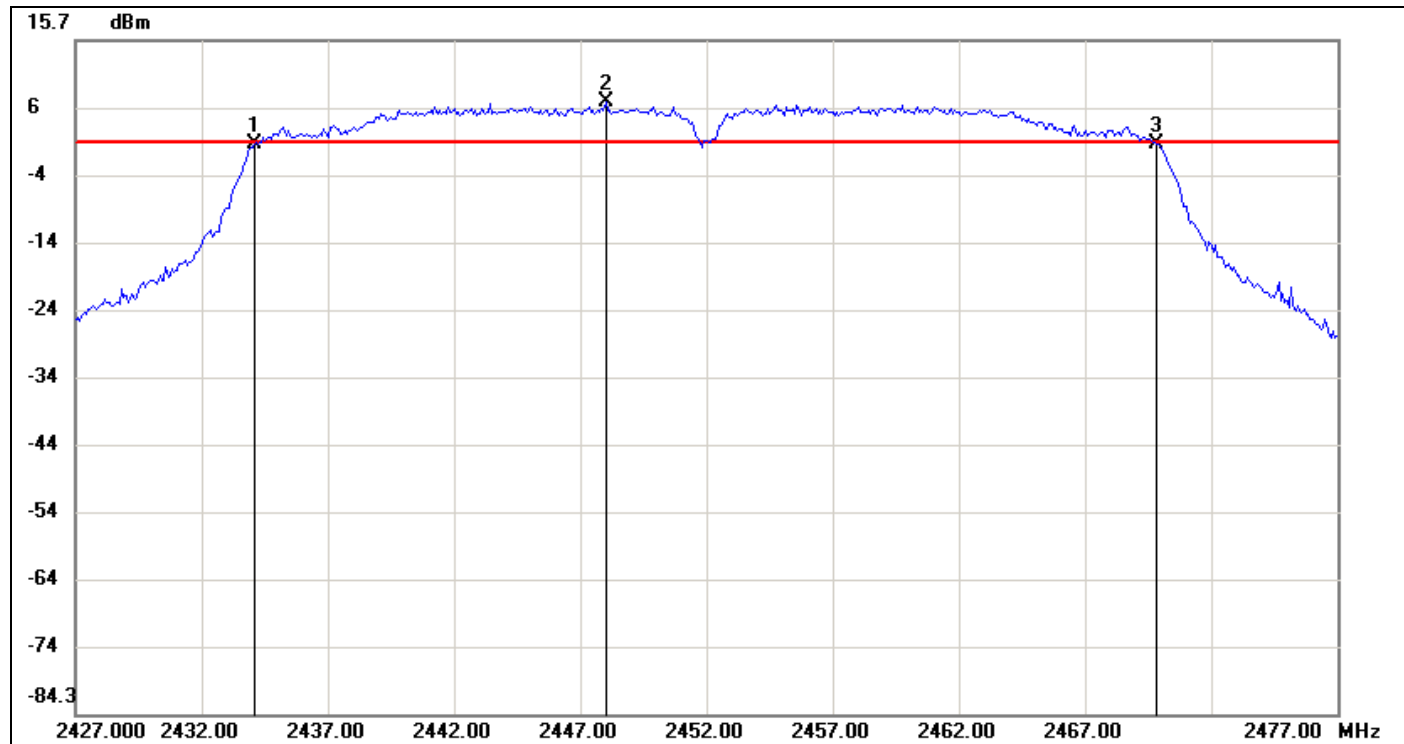
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2418.9167	0.18	1.02	-0.84
2	2430.4167	7.02	1.02	6.00
3	2455.0000	0.58	1.02	-0.44

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	36.0833	0.4



IEEE 802.11n HT 40 mode / 2452 MHz

6dB Bandwidth



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2434.0833	0.33	0.42	-0.09
2	2448.0000	6.42	0.42	6.00
3	2469.8333	0.35	0.42	-0.07

No.		$\Delta$ Frequency(MHz)	$\Delta$ Level(dB)
1	mk3-mk1	35.75	0.02



## IEEE 802.11n HT 40 mode / 2457 MHz

Agilent

R T

Mkr2 35.83 MHz  
0.16 dB

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

0.4

dBm

#LgAv

V1 S2

Center 2.457 00 GHz

Span 50 MHz

#Res BW 510 kHz

#VBW 2 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.448 42 GHz	6.43 dBm
2R	(1)	Freq	2.439 00 GHz	0.22 dBm
2Δ	(1)	Freq	35.83 MHz	0.16 dB

## IEEE 802.11n HT 40 mode / 2462 MHz

Agilent

R T

Mkr2 35.58 MHz  
0.15 dB

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-13.4

dBm

#LgAv

V1 S2

Center 2.462 00 GHz

Span 50 MHz

#Res BW 510 kHz

#VBW 2 MHz

Sweep 1 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.453 83 GHz	-7.40 dBm
2R	(1)	Freq	2.444 17 GHz	-13.14 dBm
2Δ	(1)	Freq	35.58 MHz	0.15 dB





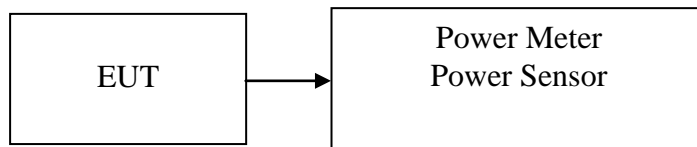
## 7.2 PEAK POWER

### 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.

### 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**

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
2412	17.42	0.05521	1.00	PASS
2437	17.49	0.05610		PASS
2462	17.45	0.05559		PASS
2467	<b>*17.57</b>	0.05715		PASS
2472	13.33	0.02153		PASS

**Test mode: IEEE 802.11g mode**

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
2412	19.37	0.08650	1.00	PASS
2437	<b>*20.19</b>	0.10447		PASS
2462	19.27	0.08453		PASS
2467	19.12	0.08166		PASS
2472	7.16	0.00520		PASS

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

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
2412	20.31	0.10740	1.00	PASS
2437	<b>*20.55</b>	0.11350		PASS
2462	20.33	0.10789		PASS
2467	18.88	0.07727		PASS
2472	6.94	0.00494		PASS

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

Frequency (MHz)	Output Power (dBm)	Output Power (W)	Limit (W)	Result
2422	19.37	0.08650	1.00	PASS
2437	<b>*20.56</b>	0.11376		PASS
2452	20.34	0.10814		PASS
2457	19.44	0.08790		PASS
2462	6.95	0.00495		PASS

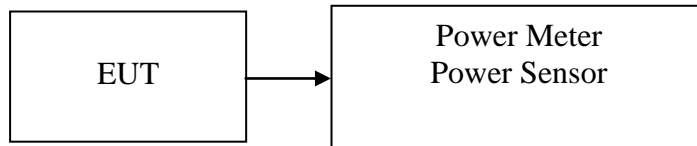


## **7.3 AVERAGE POWER**

### **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 avg power detection.



## **TEST RESULTS**

*No non-compliance noted*

### **Test Data**

#### **Test mode: IEEE 802.11b mode**

Frequency (MHz)	Output Power (dBm)	Output Power (W)
2412	14.92	0.03105
2437	14.93	0.03112
2462	14.96	0.03133
2467	14.48	0.02805
2472	10.77	0.01194

#### **Test mode: IEEE 802.11g mode**

Frequency (MHz)	Output Power (dBm)	Output Power (W)
2412	13.96	0.02489
2437	14.93	0.03112
2462	13.90	0.02455
2467	13.65	0.02317
2472	1.66	0.00147

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

Frequency (MHz)	Output Power (dBm)	Output Power (W)
2412	13.96	0.02489
2437	14.89	0.03083
2462	13.91	0.02460
2467	13.31	0.02143
2472	1.32	0.00136

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

Frequency (MHz)	Output Power (dBm)	Output Power (W)
2422	12.58	0.01811
2437	14.91	0.03097
2452	13.96	0.02489
2457	13.86	0.02432
2462	1.55	0.00143



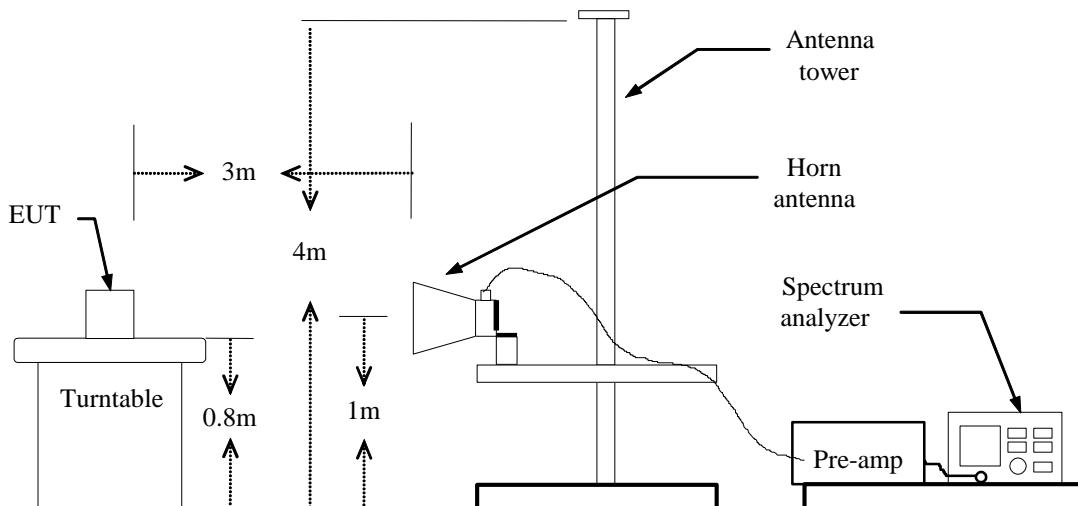
## 7.4 BAND EDGES MEASUREMENT

### LIMIT

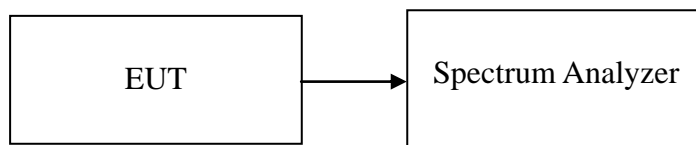
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

### Test Configuration

#### For Radiated



#### For Conducted





## **TEST PROCEDURE**

### **For Radiated**

1. The EUT is placed on a turntable, which is 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=1MHz / VBW=3MHz / Sweep=AUTO
  - (b) AVERAGE: RBW=1MHz,  
if duty cycle  $\geq 98\%$ , VBW=10Hz.  
if duty cycle  $< 98\%$  VBW=1/T.  
**IEEE 802.11b mode:**  $\geq 98\%$ , VBW=10Hz  
**IEEE 802.11g mode:**  $\geq 98\%$ , VBW=10Hz  
**IEEE 802.11n HT 20 MHz mode:**  $\geq 98\%$ , VBW=10Hz  
**IEEE 802.11n HT 40 MHz mode:** 96%=VBW 2kHz
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.

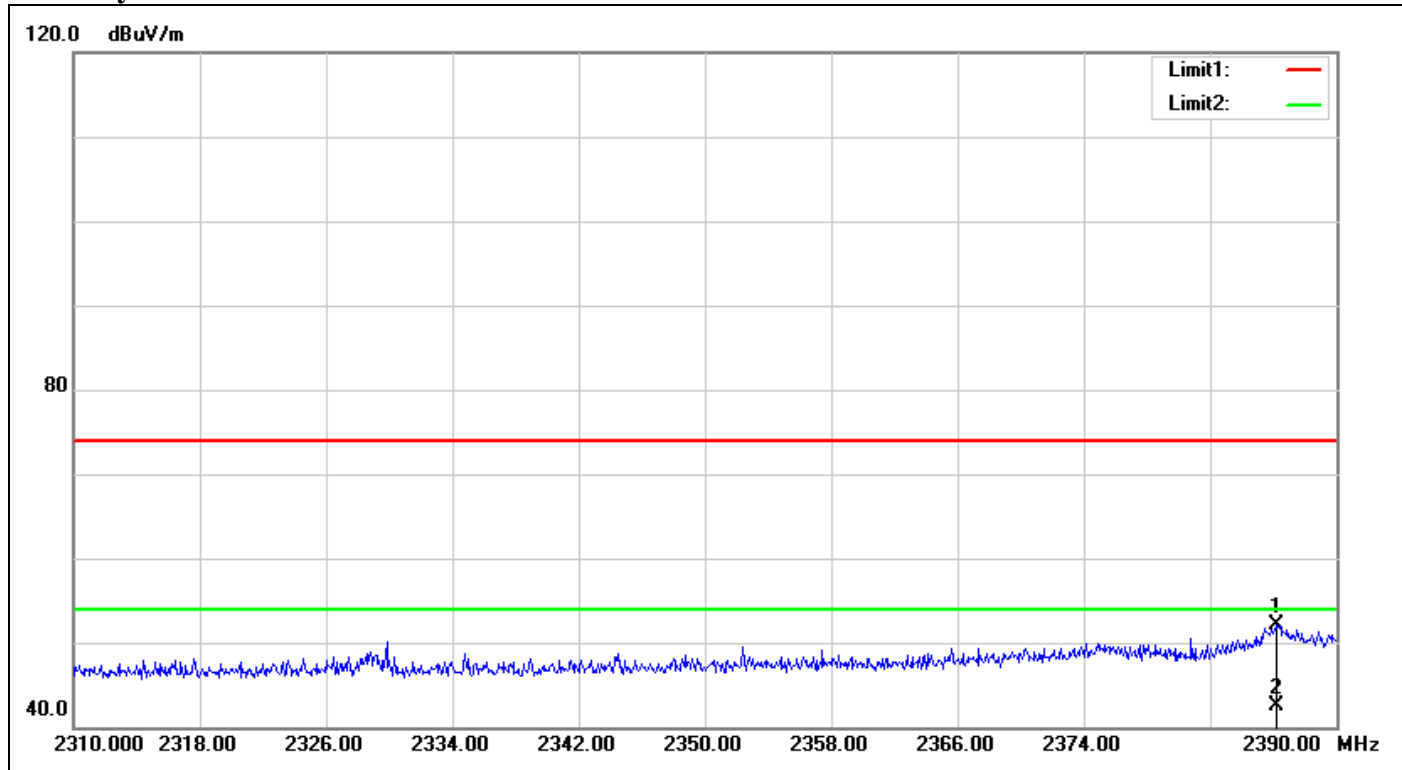
## **TEST RESULTS**

Refer to attach spectrum analyzer data chart.



**Band Edges (IEEE 802.11b mode / 2412 MHz)**

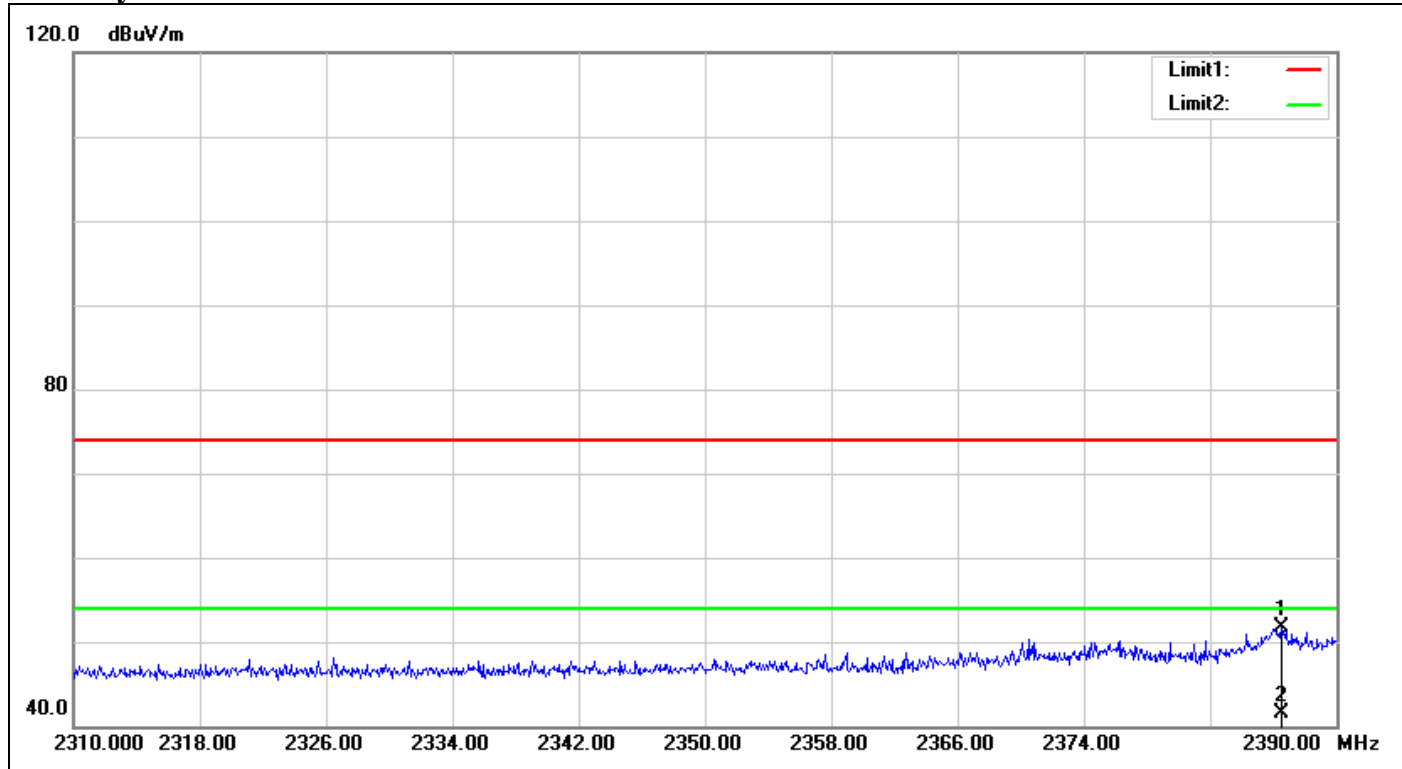
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2386.240	55.82	-3.80	52.02	74.00	-21.98	100	232	peak
2	2386.240	46.27	-3.80	42.47	54.00	-11.53	100	232	AVG



**Polarity: Horizontal**



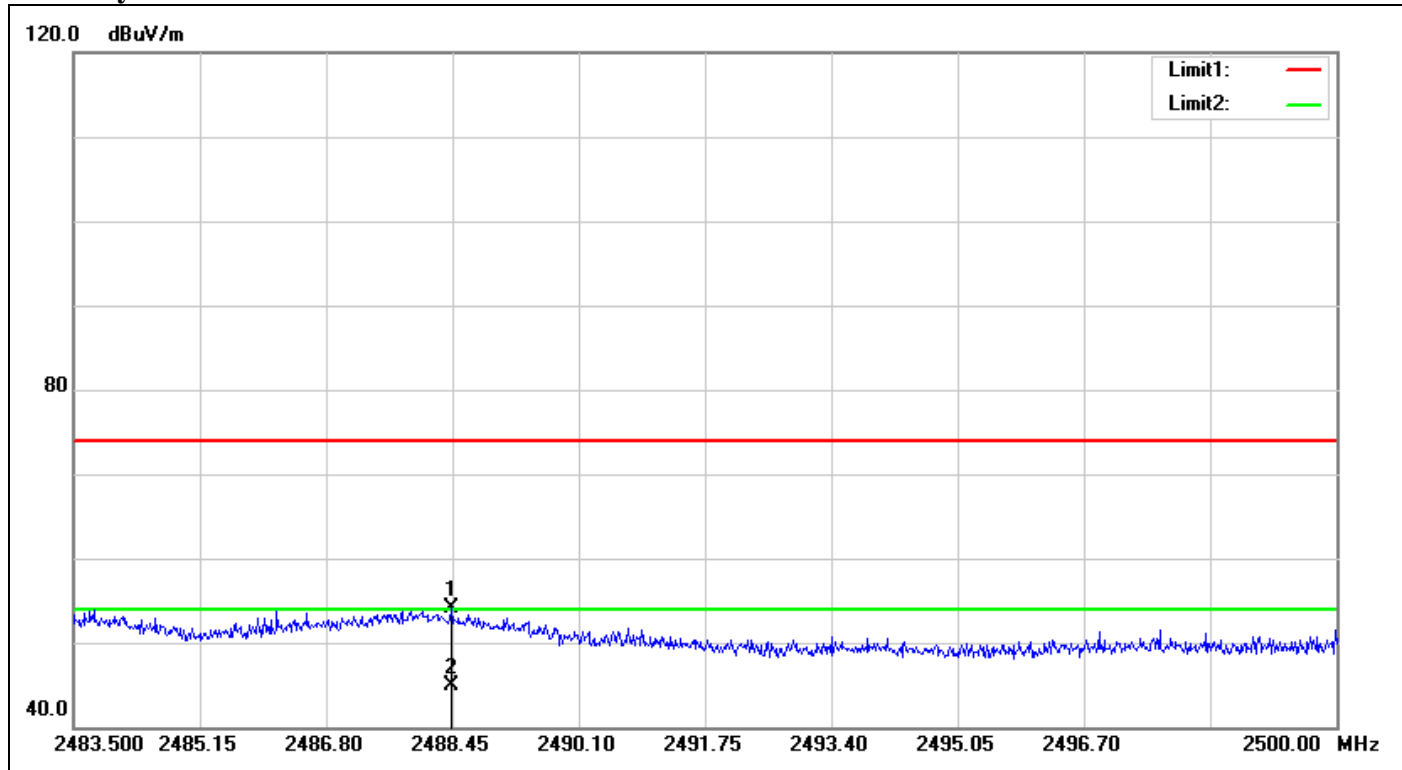
No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2386.480	55.53	-3.80	51.73	74.00	-22.27	100	38	peak
2	2386.480	45.32	-3.80	41.52	54.00	-12.48	100	38	AVG





**Band Edges (IEEE 802.11b mode / 2462 MHz)**

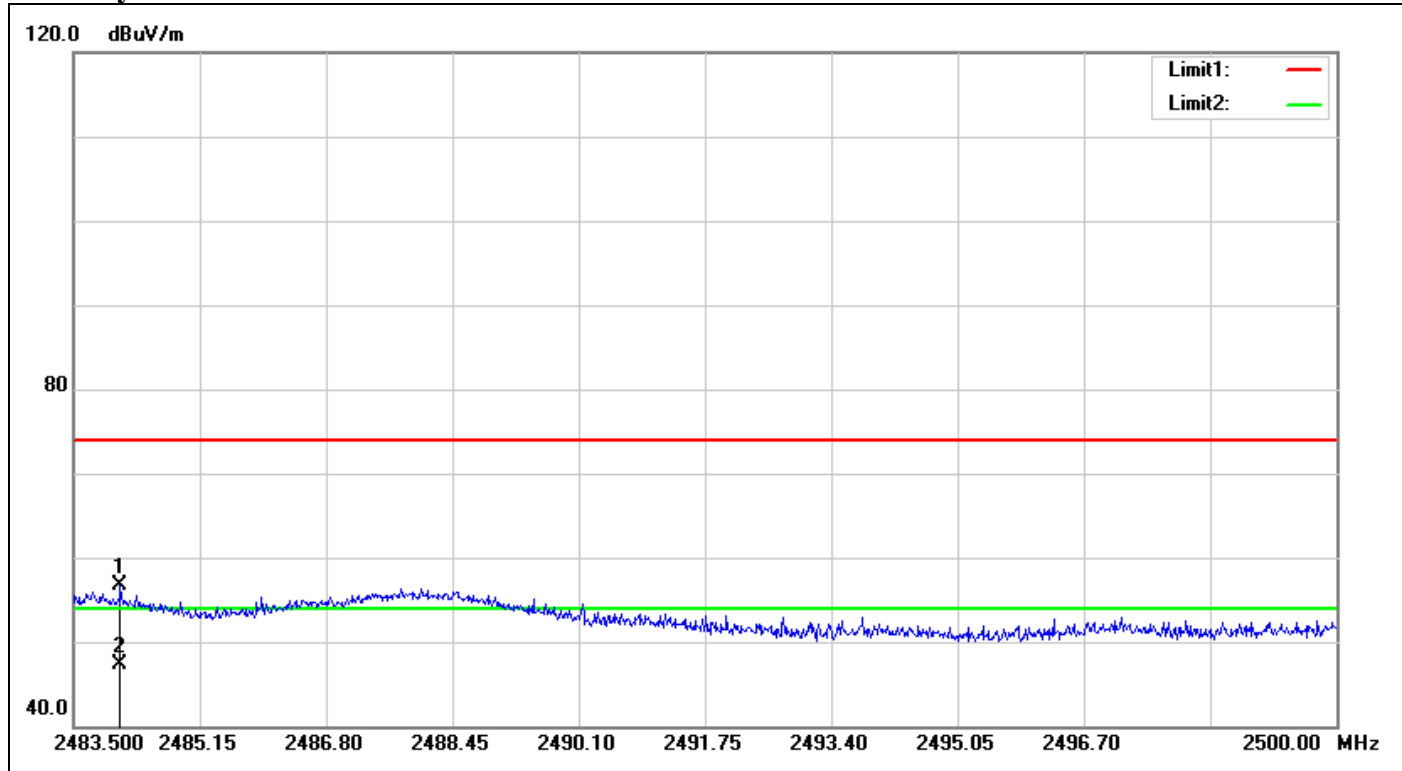
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2488.434	57.26	-3.23	54.03	74.00	-19.97	100	343	peak
2	2488.434	48.17	-3.23	44.94	54.00	-9.06	100	343	AVG



**Polarity: Horizontal**

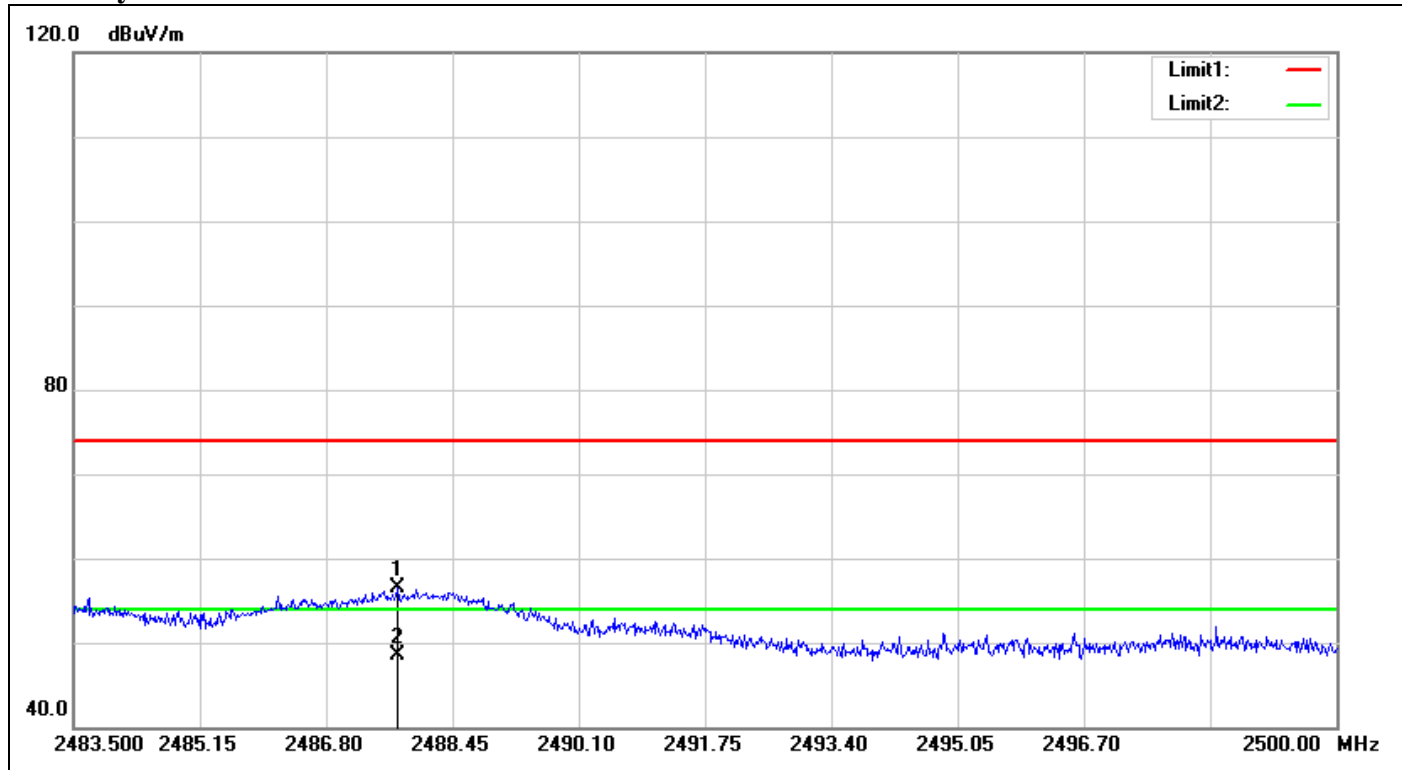


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2484.110	59.92	-3.27	56.65	74.00	-17.35	100	70	peak
2	2484.110	50.48	-3.27	47.21	54.00	-6.79	100	70	AVG



**Band Edges (IEEE 802.11b mode / 2467 MHz)**

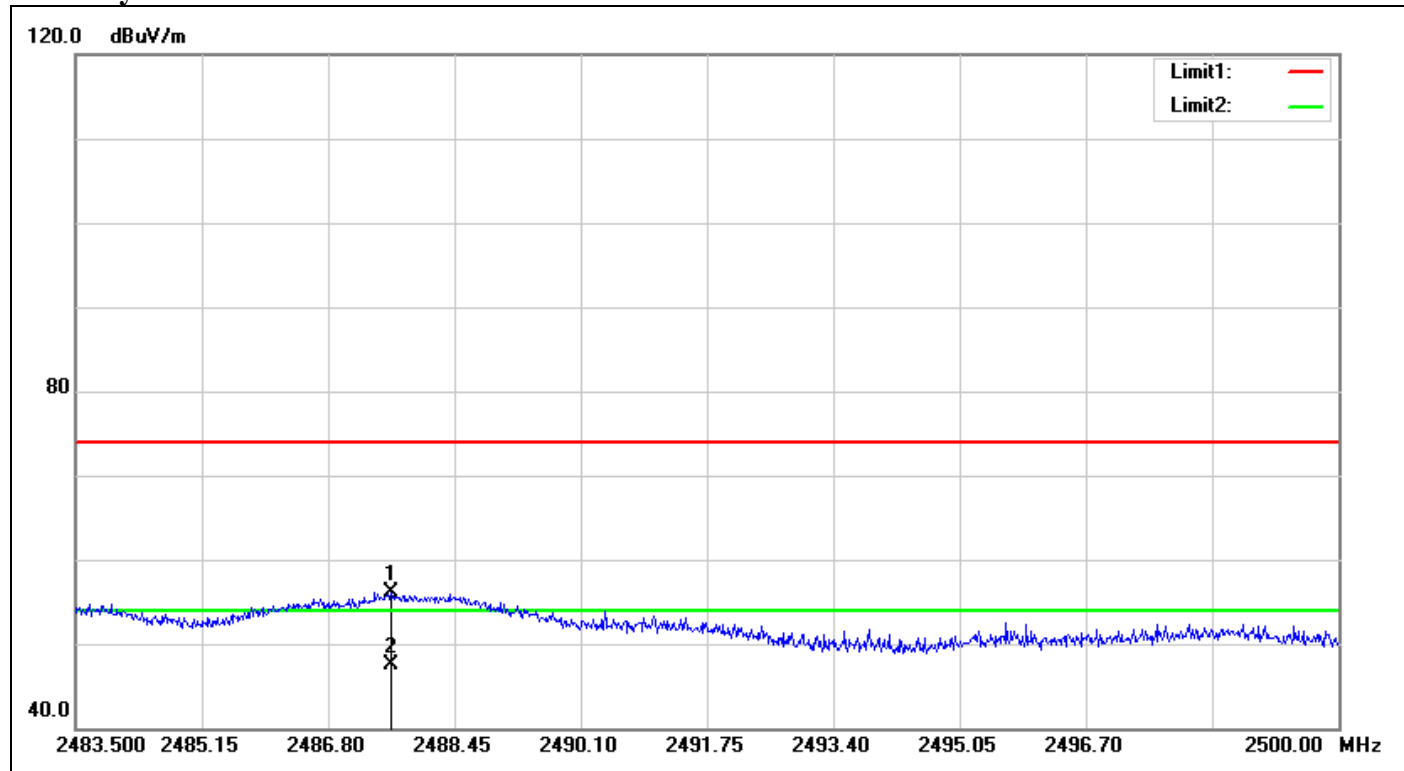
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2487.724	59.70	-3.23	56.47	74.00	-17.53	100	82	peak
2	2487.724	51.81	-3.23	48.58	54.00	-5.42	100	82	AVG



**Polarity: Horizontal**

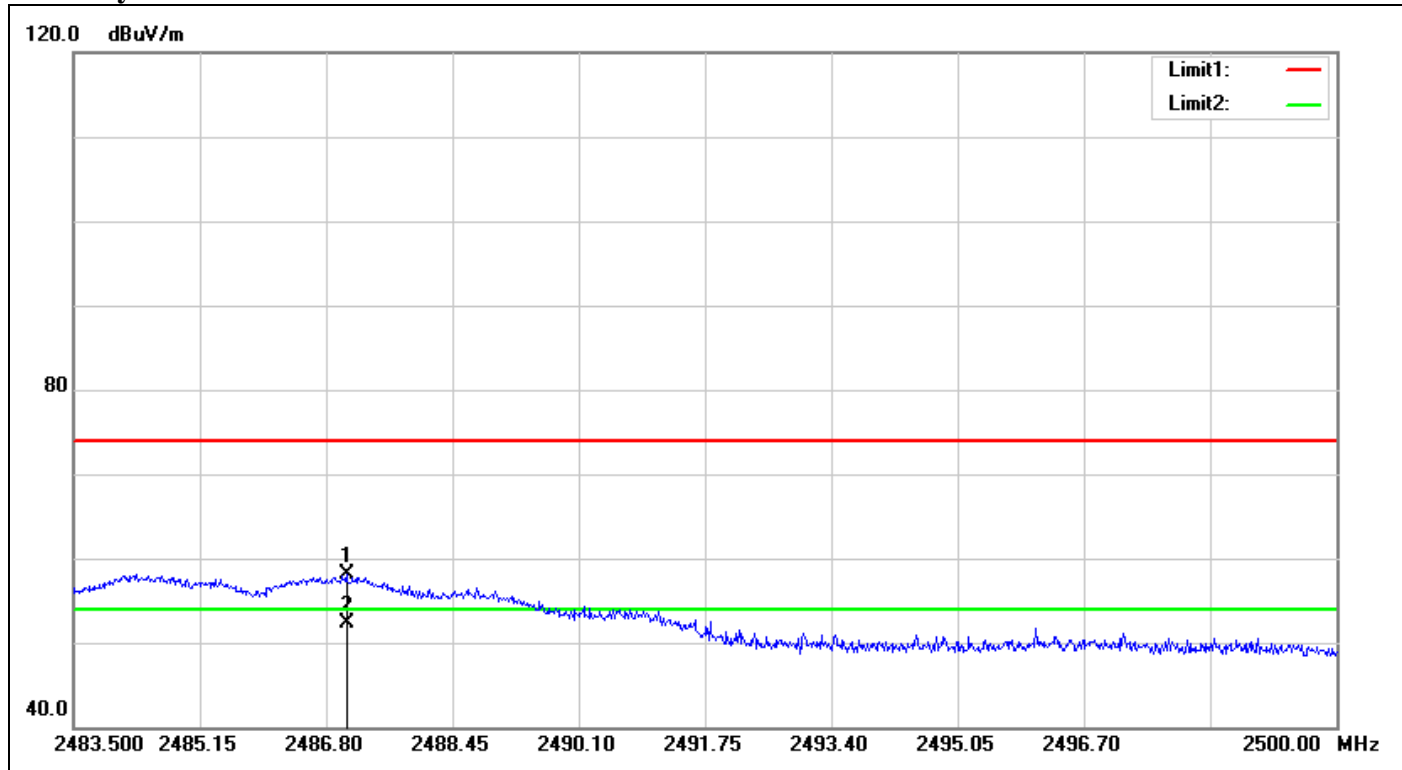


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2487.625	59.28	-3.23	56.05	74.00	-17.95	100	280	peak
2	2487.625	50.74	-3.23	47.51	54.00	-6.49	100	280	AVG



## Band Edges (IEEE 802.11b mode / 2472 MHz)

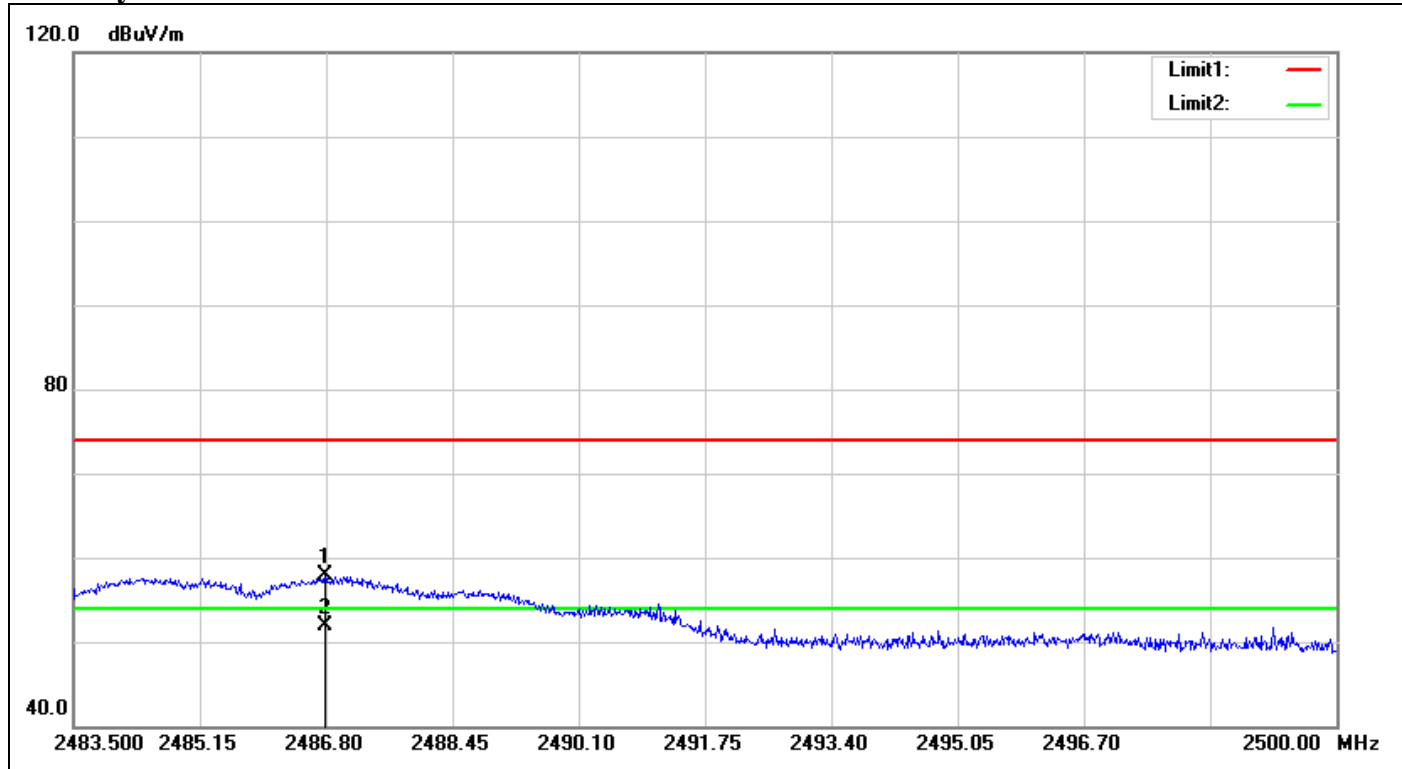
Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2487.064	61.39	-3.24	58.15	74.00	-15.85	100	291	peak
2	2487.064	55.55	-3.24	52.31	54.00	-1.69	100	291	AVG



**Polarity: Horizontal**

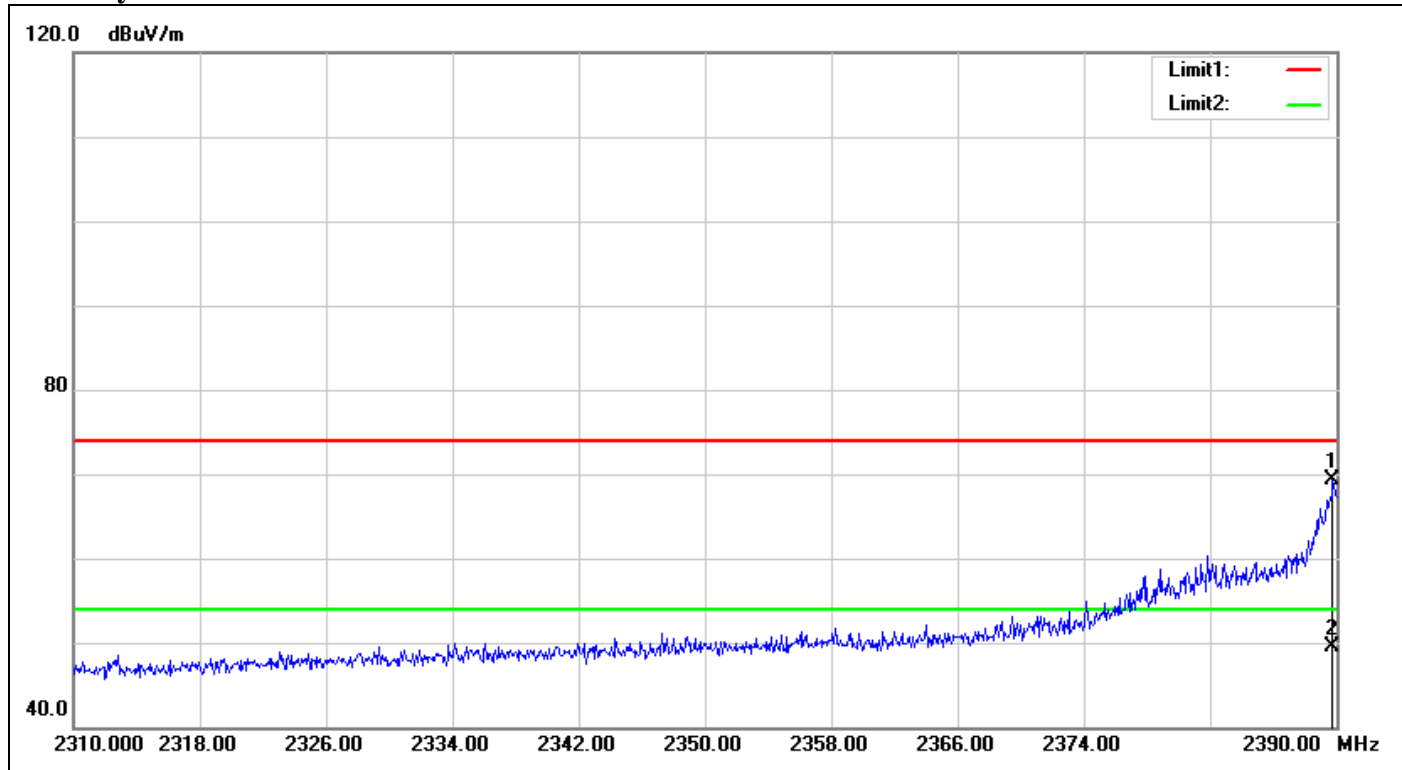


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2486.784	61.14	-3.24	57.90	74.00	-16.10	100	269	peak
2	2486.784	55.06	-3.24	51.82	54.00	-2.18	100	269	AVG



## Band Edges (IEEE 802.11g mode / 2412 MHz)

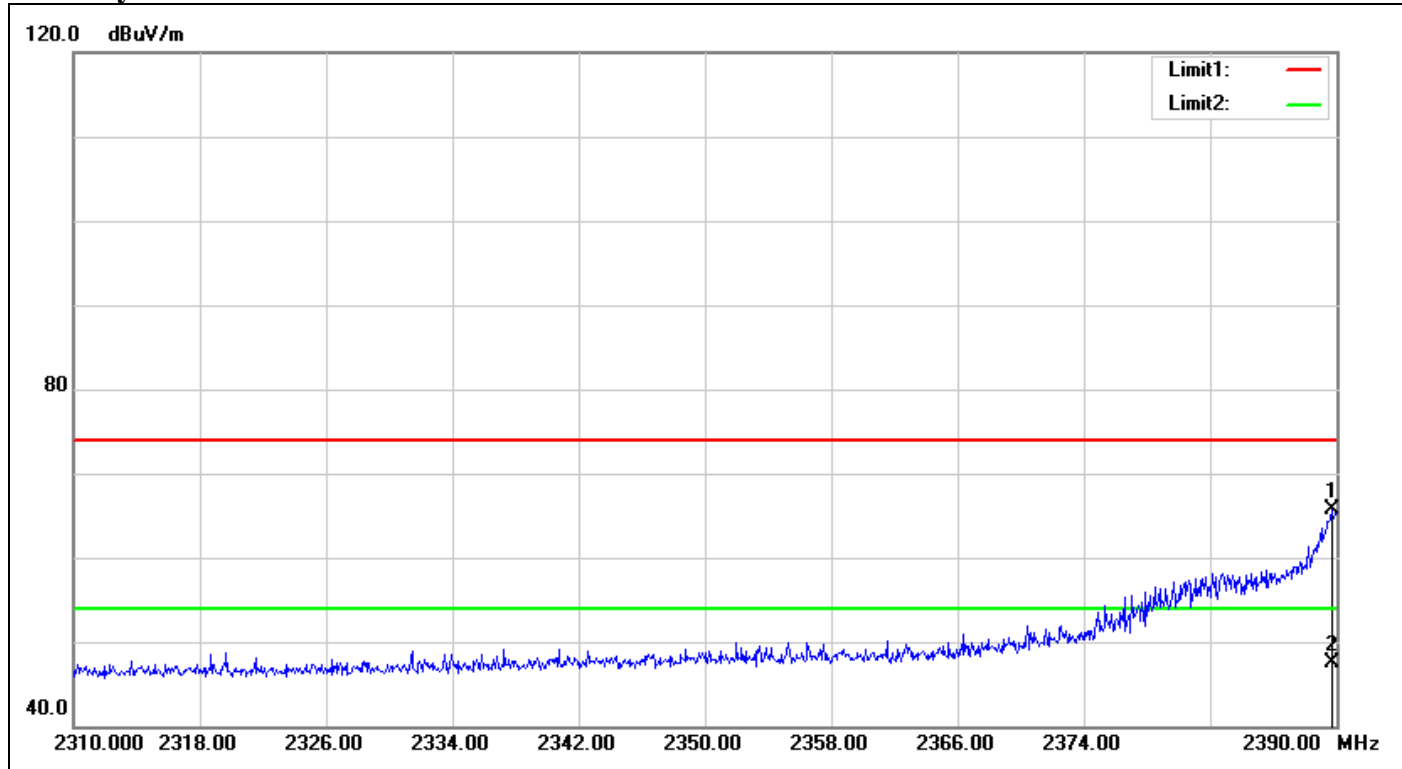
Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2389.760	73.00	-3.77	69.23	74.00	-4.77	100	174	peak
2	2389.760	53.18	-3.77	49.41	54.00	-4.59	100	174	AVG



**Polarity: Horizontal**



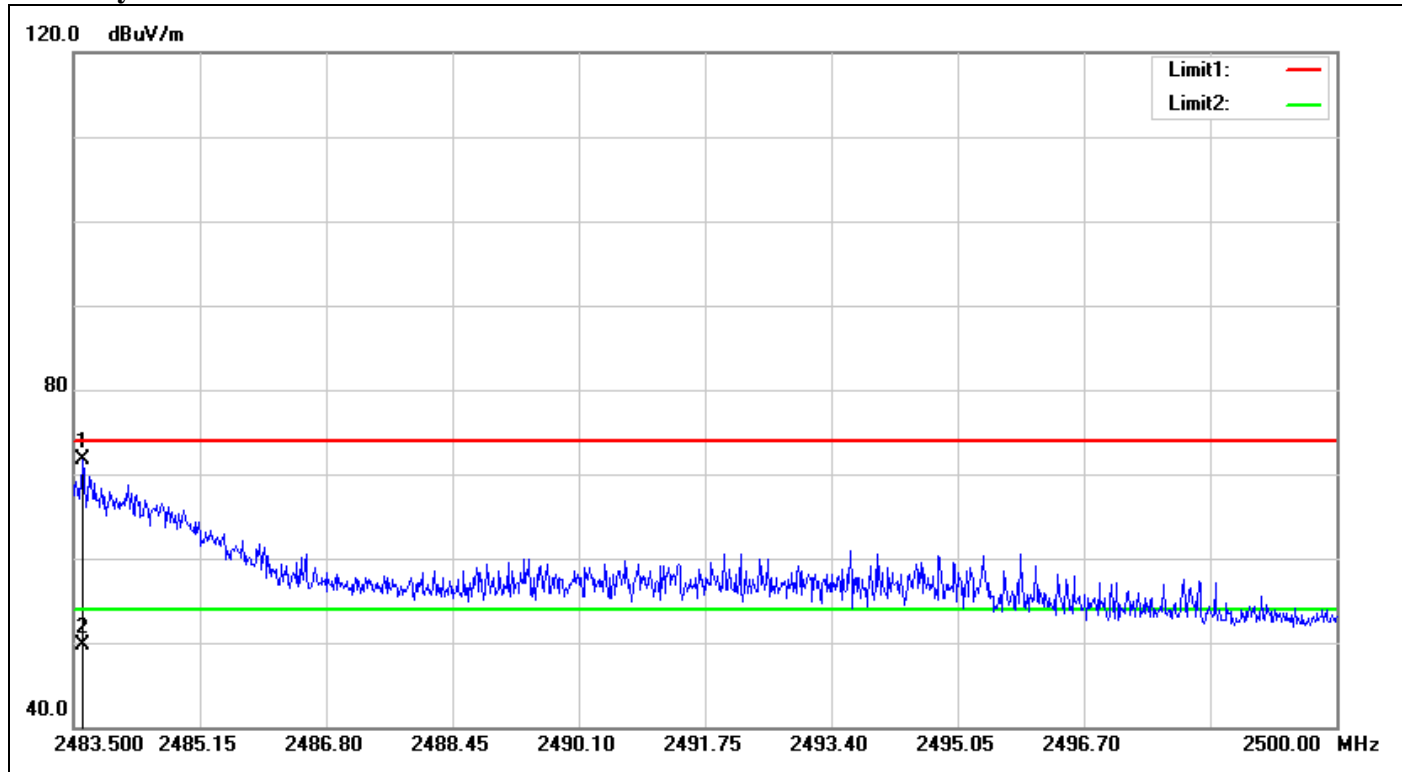
No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2389.680	69.53	-3.77	65.76	74.00	-8.24	100	43	peak
2	2389.680	51.33	-3.77	47.56	54.00	-6.44	100	43	AVG





**Band Edges (IEEE 802.11g mode / 2462 MHz)**

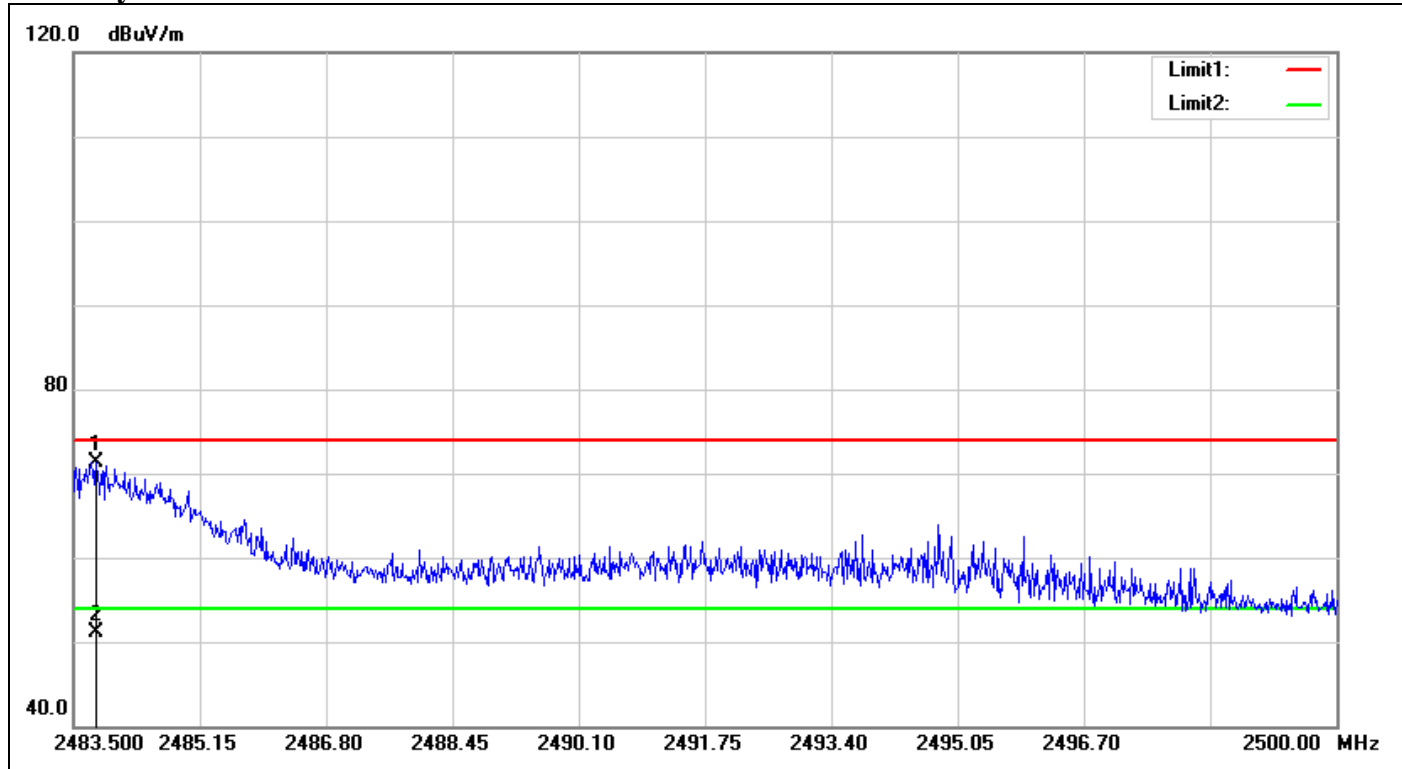
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.615	74.99	-3.27	71.72	74.00	-2.28	100	82	peak
2	2483.615	53.04	-3.27	49.77	54.00	-4.23	100	82	AVG



**Polarity: Horizontal**

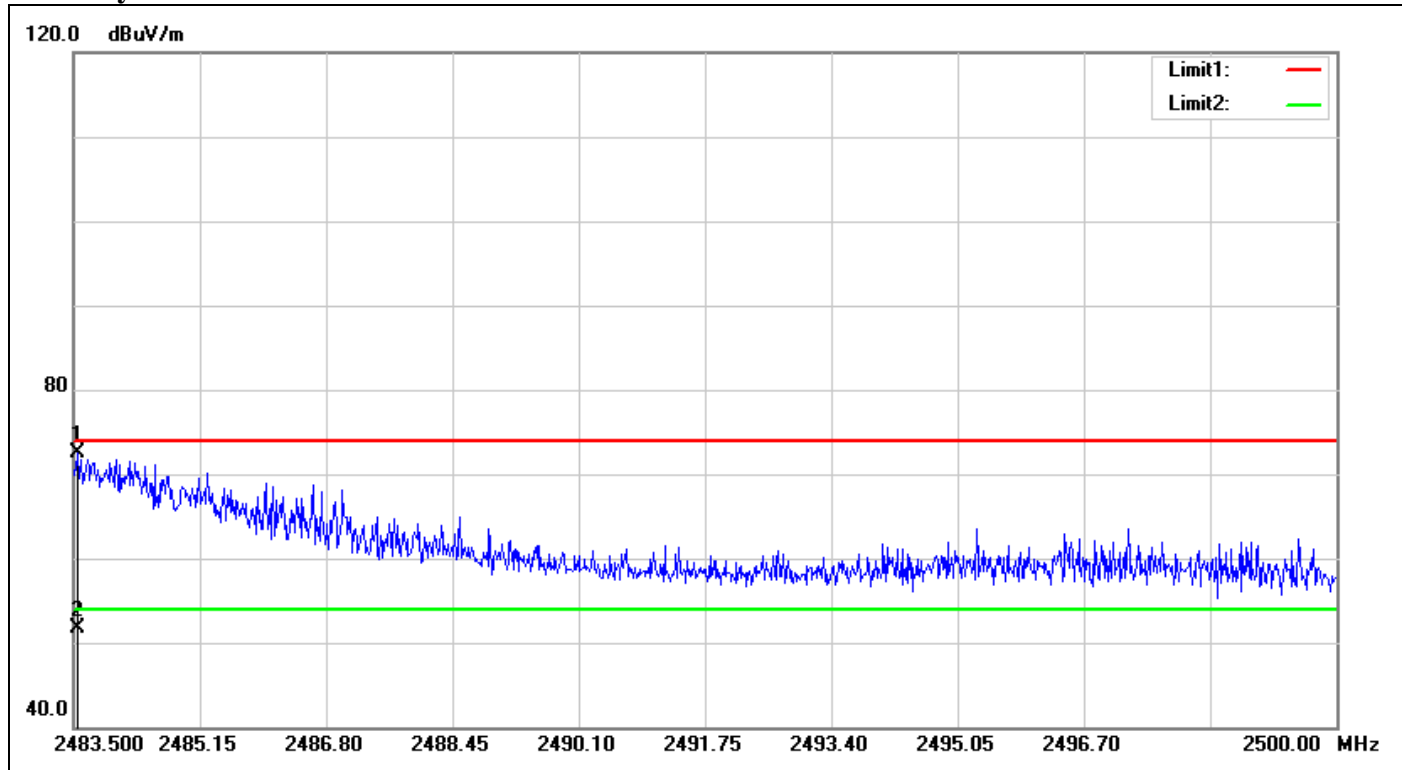


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.797	74.53	-3.27	71.26	74.00	-2.74	100	354	peak
2	2483.797	54.44	-3.27	51.17	54.00	-2.83	100	354	AVG



## Band Edges (IEEE 802.11g mode / 2467 MHz)

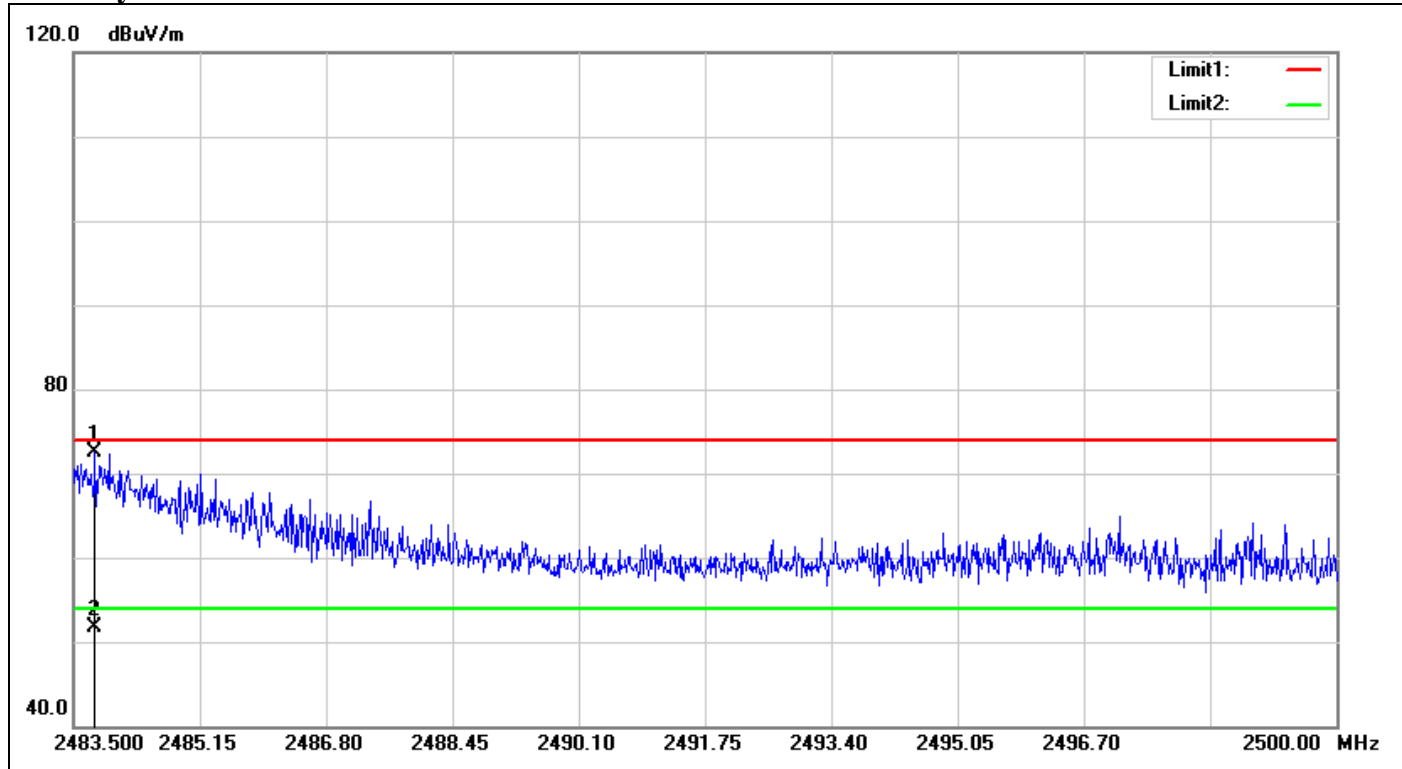
Polarity: Vertical



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.550	75.87	-3.27	72.60	74.00	-1.40	100	8	peak
2	2483.550	55.02	-3.27	51.75	54.00	-2.25	100	8	AVG



**Polarity: Horizontal**

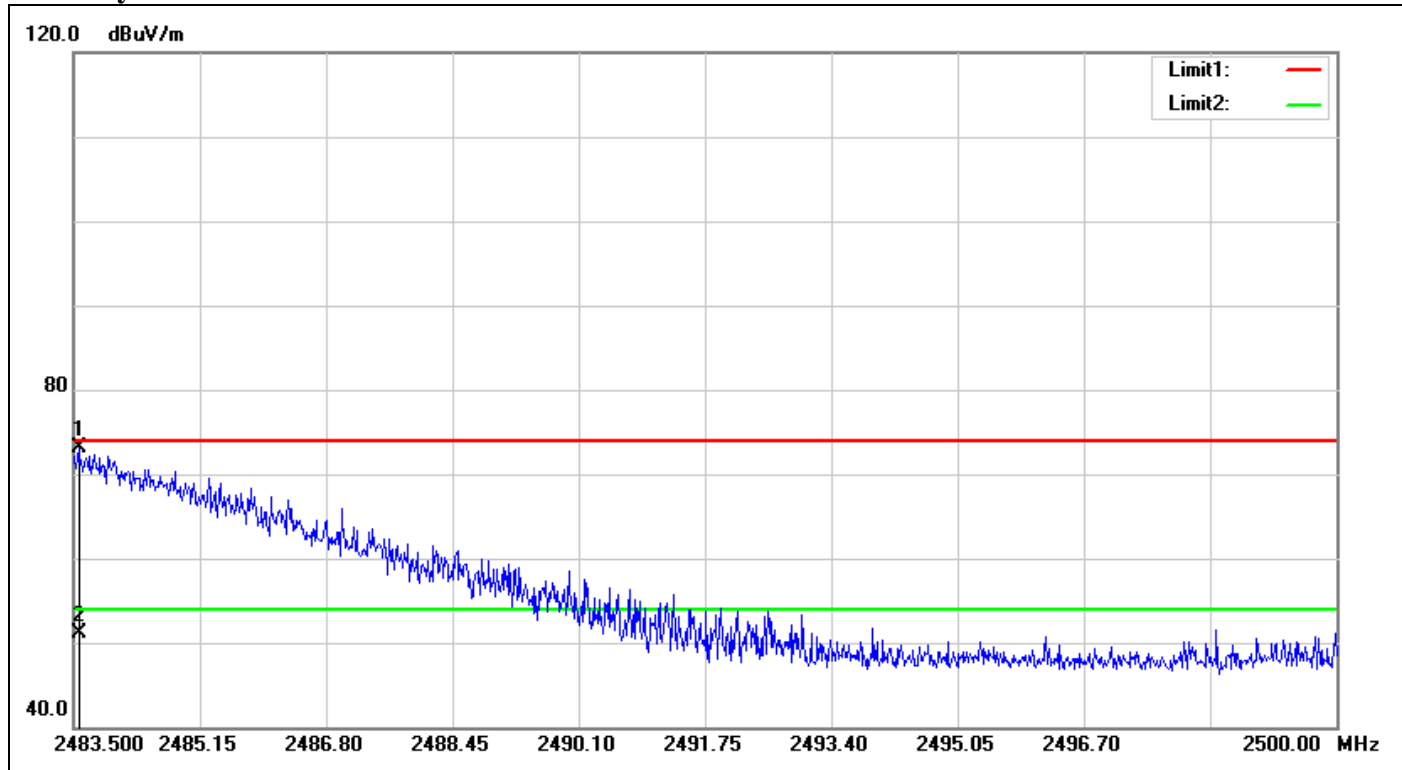


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.780	75.67	-3.27	72.40	74.00	-1.60			peak
2	2483.780	54.95	-3.27	51.68	54.00	-2.32			AVG



**Band Edges (IEEE 802.11g mode / 2472 MHz)**

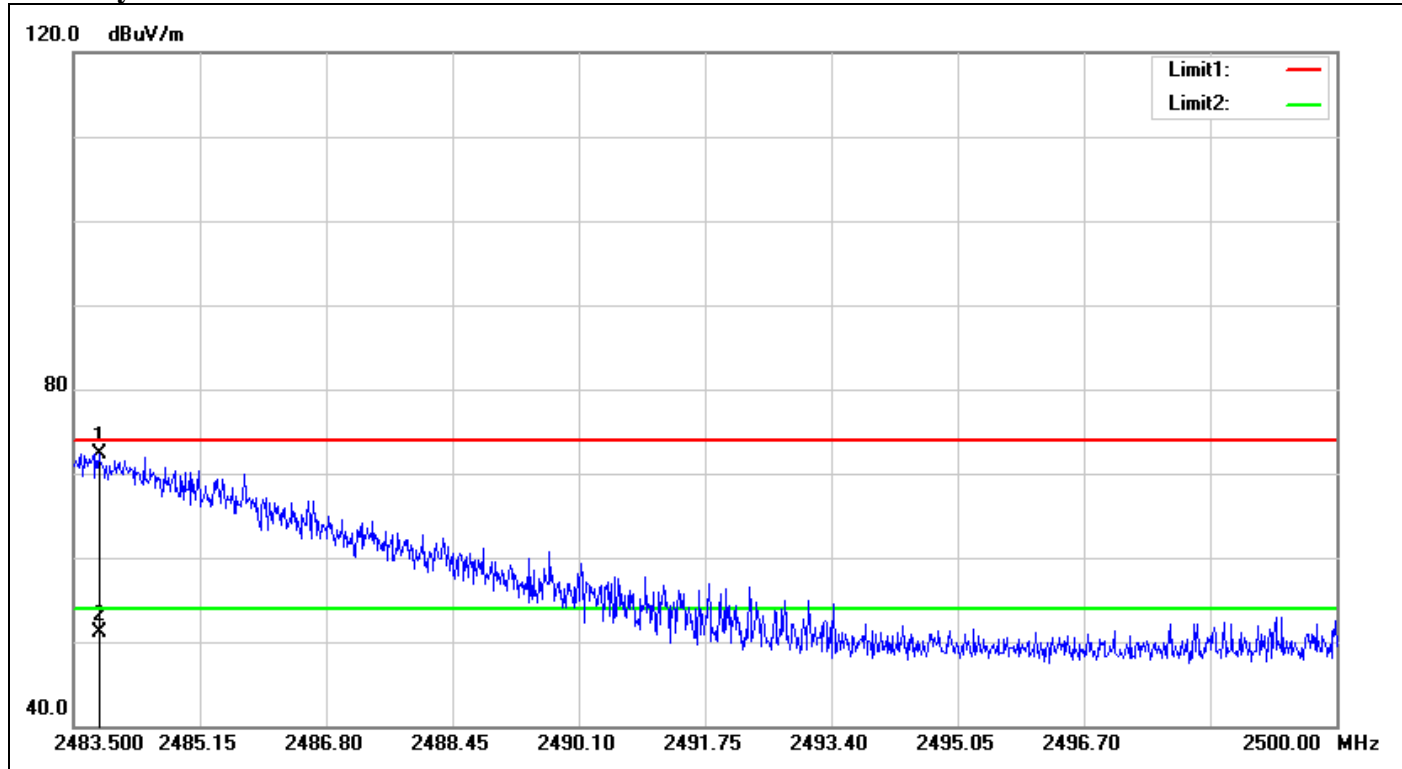
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.566	76.42	-3.27	73.15	74.00	-0.85			peak
2	2483.566	54.31	-3.27	51.04	54.00	-2.96			AVG



**Polarity: Horizontal**

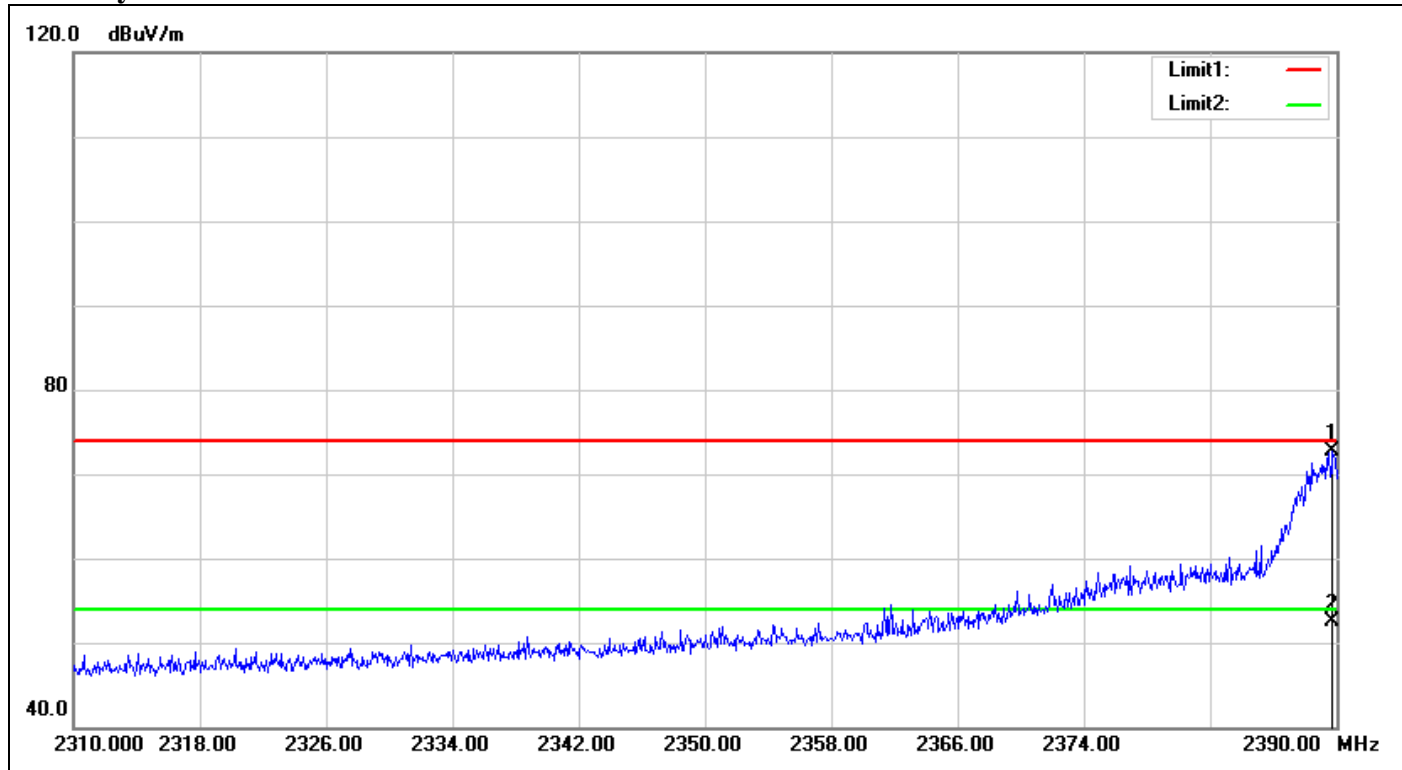


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.830	75.64	-3.27	72.37	74.00	-1.63	100	19	peak
2	2483.830	54.38	-3.27	51.11	54.00	-2.89	100	19	AVG



**Band Edges (IEEE 802.11n HT 20 MHz mode / 2412 MHz)**

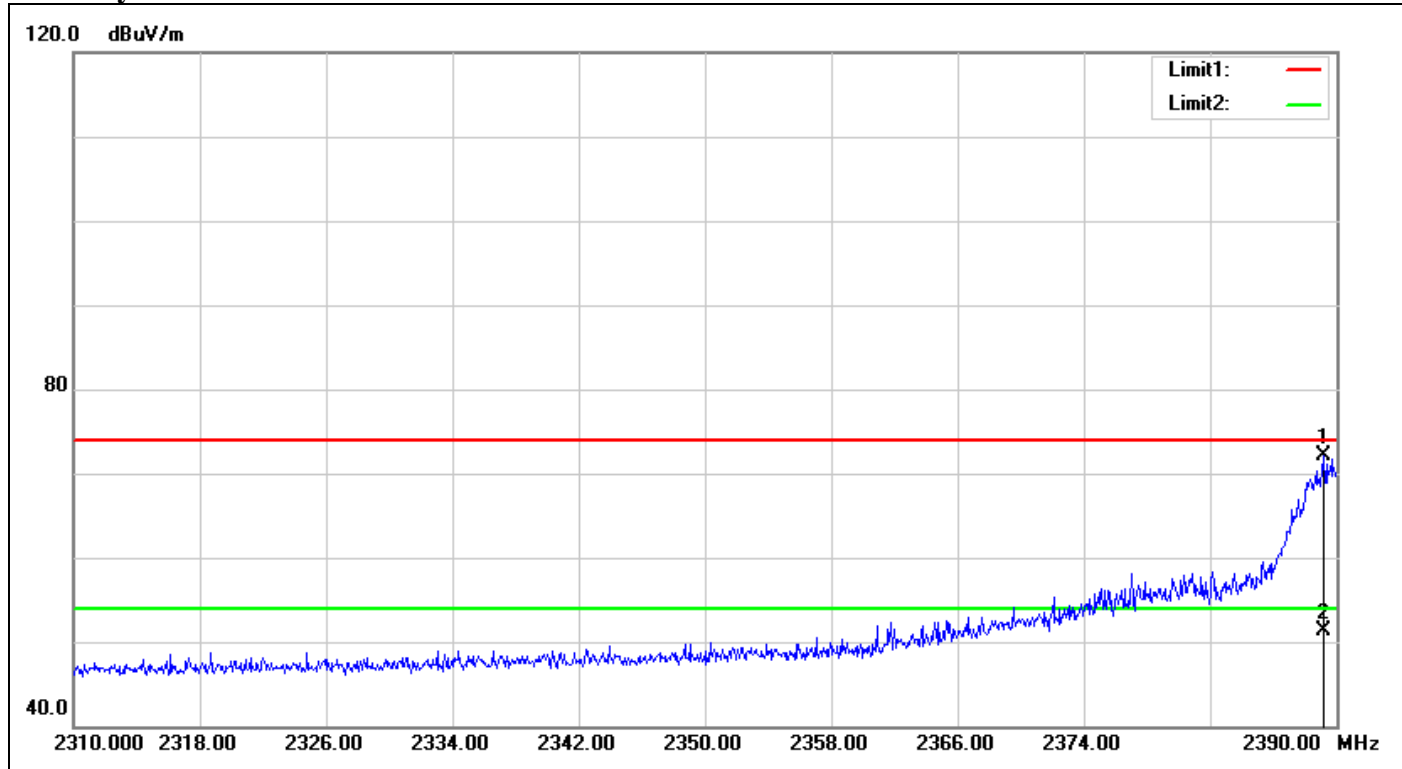
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2389.760	76.49	-3.77	72.72	74.00	-1.28	100	356	peak
2	2389.760	56.27	-3.77	52.50	54.00	-1.50	100	356	AVG



**Polarity: Horizontal**



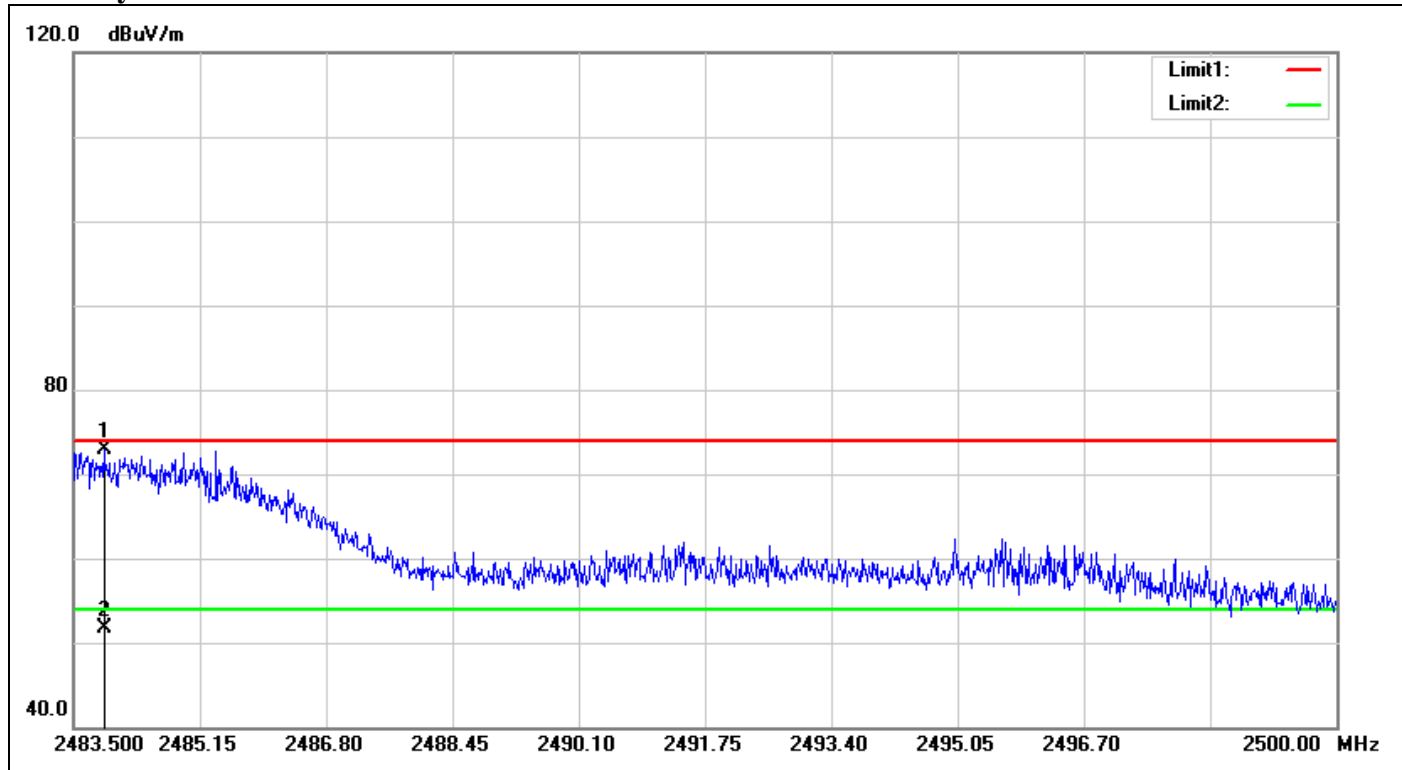
No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2389.200	75.83	-3.78	72.05	74.00	-1.95	100	25	peak
2	2389.200	54.99	-3.78	51.21	54.00	-2.79	100	25	AVG





**Band Edges (IEEE 802.11n HT 20 MHz mode / 2462 MHz)**

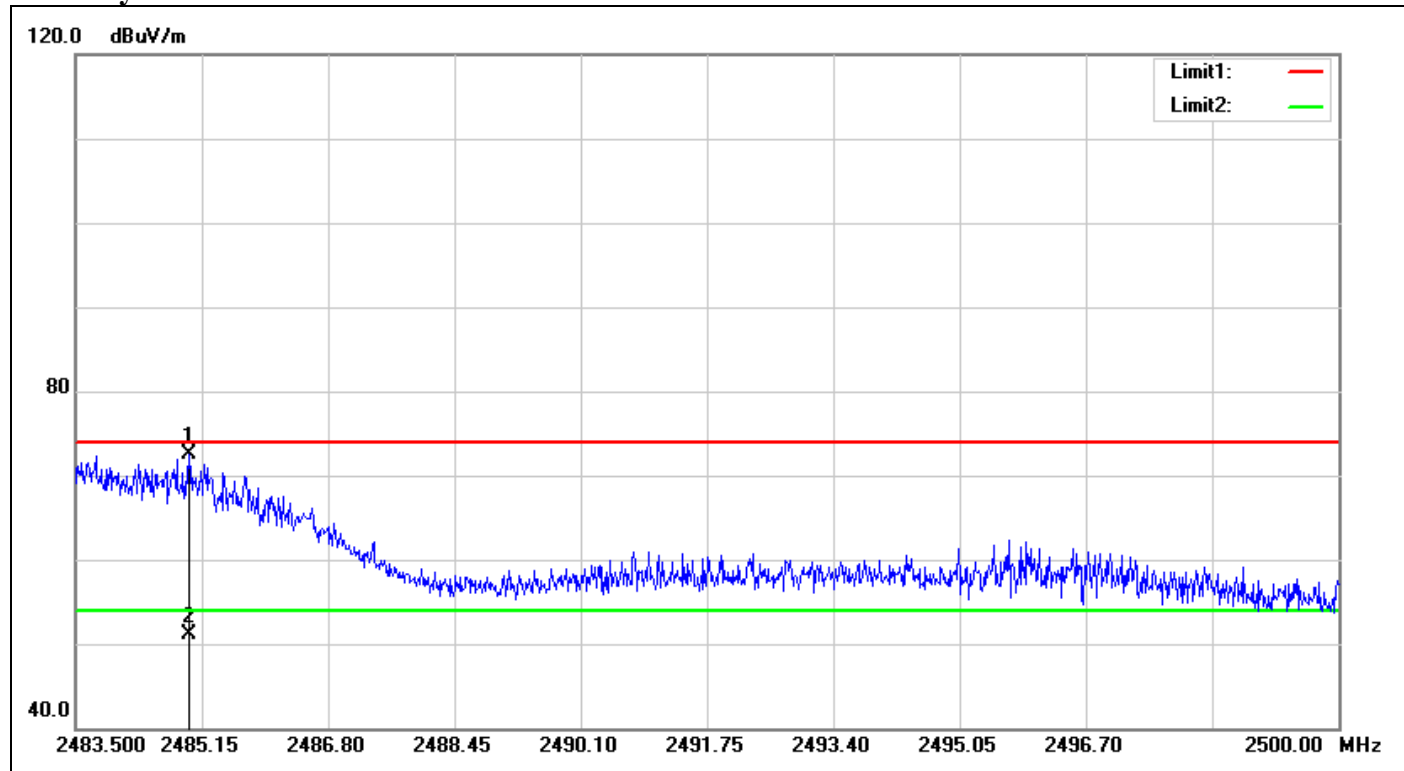
**Polarity: Vertical**



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree ( ° )	Remark
1	2483.896	76.08	-3.27	72.81	74.00	-1.19	100	224	peak
2	2483.896	55.05	-3.27	51.78	54.00	-2.22	100	224	AVG



**Polarity: Horizontal**

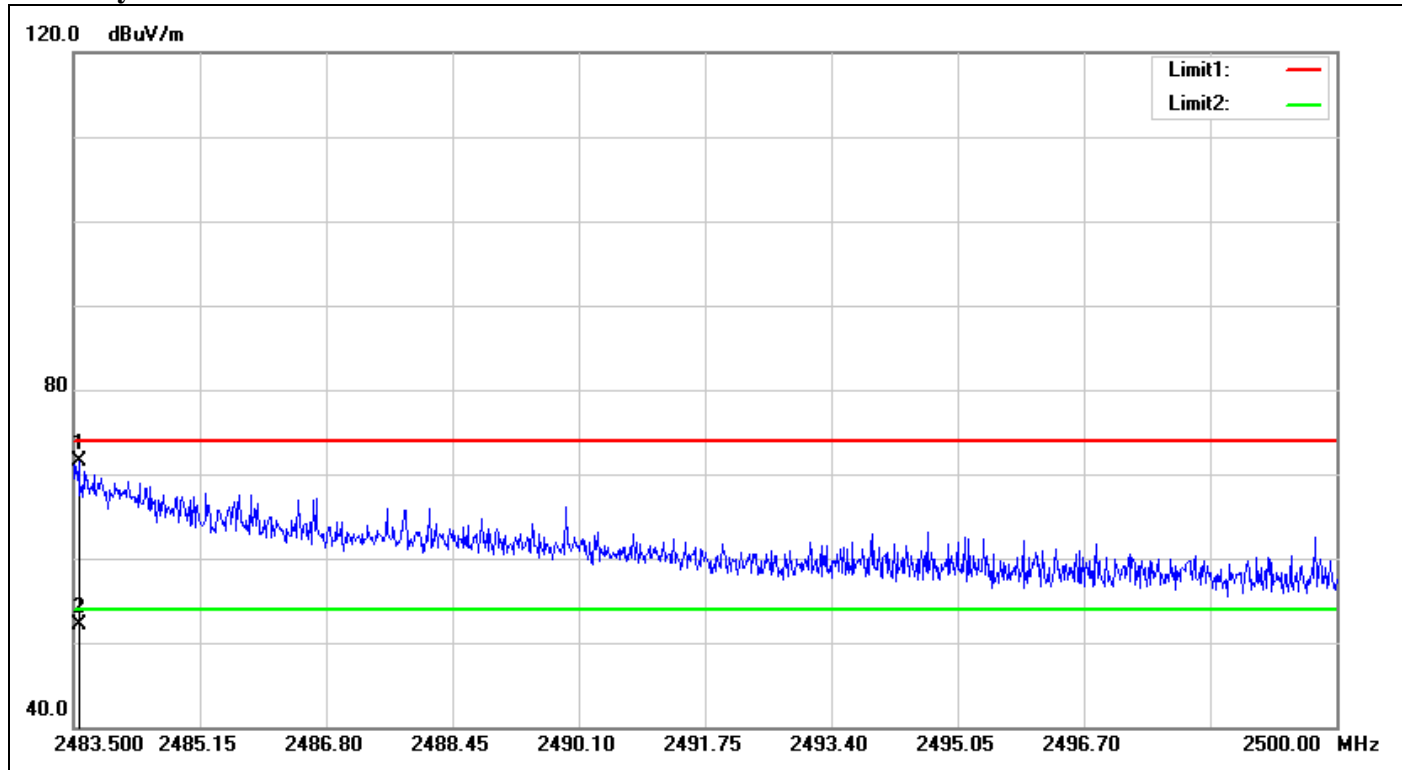


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2484.985	75.66	-3.26	72.40	74.00	-1.60	100	321	peak
2	2484.985	54.35	-3.26	51.09	54.00	-2.91	100	321	AVG



**Band Edges (IEEE 802.11n HT 20 MHz mode / 2467 MHz)**

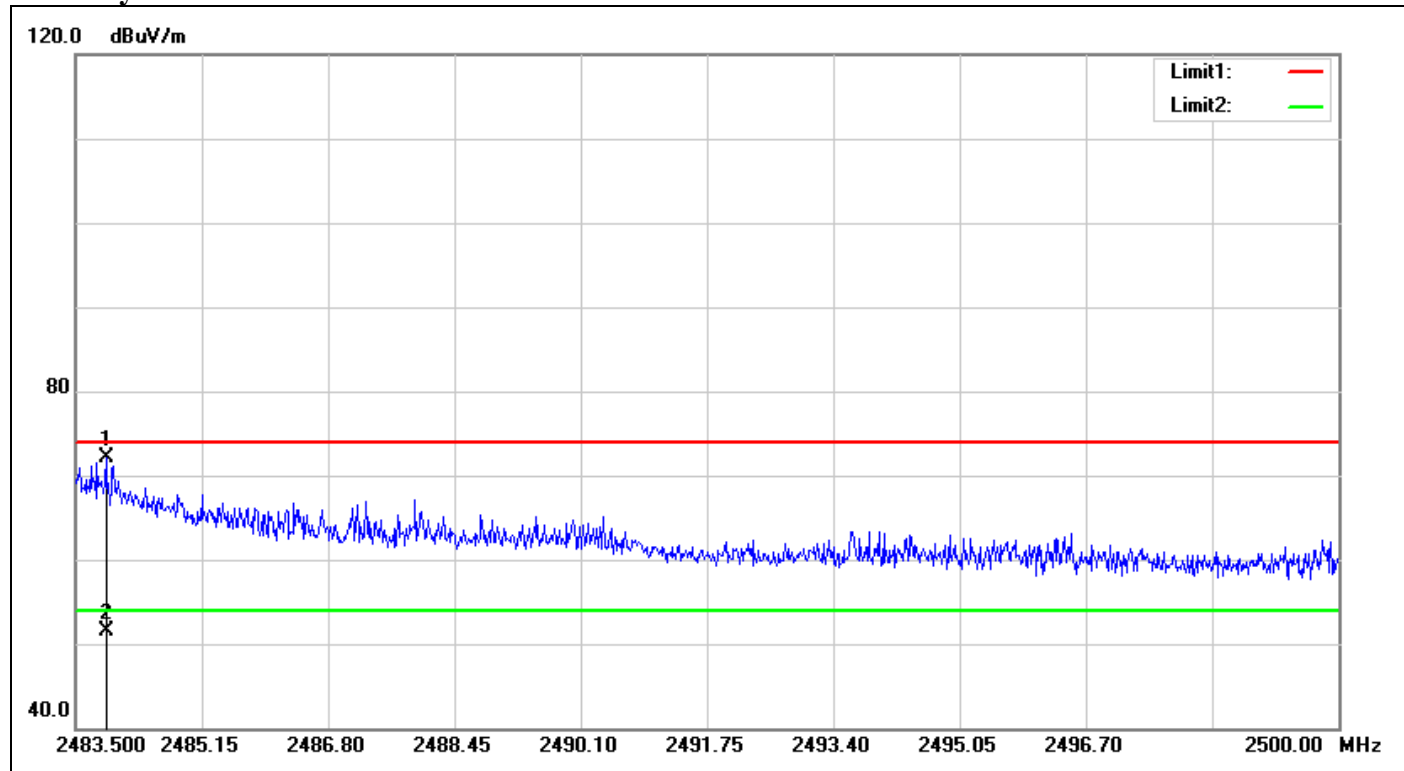
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.566	74.70	-3.27	71.43	74.00	-2.57	100	8	peak
2	2483.566	55.28	-3.27	52.01	54.00	-1.99	100	8	AVG



**Polarity: Horizontal**

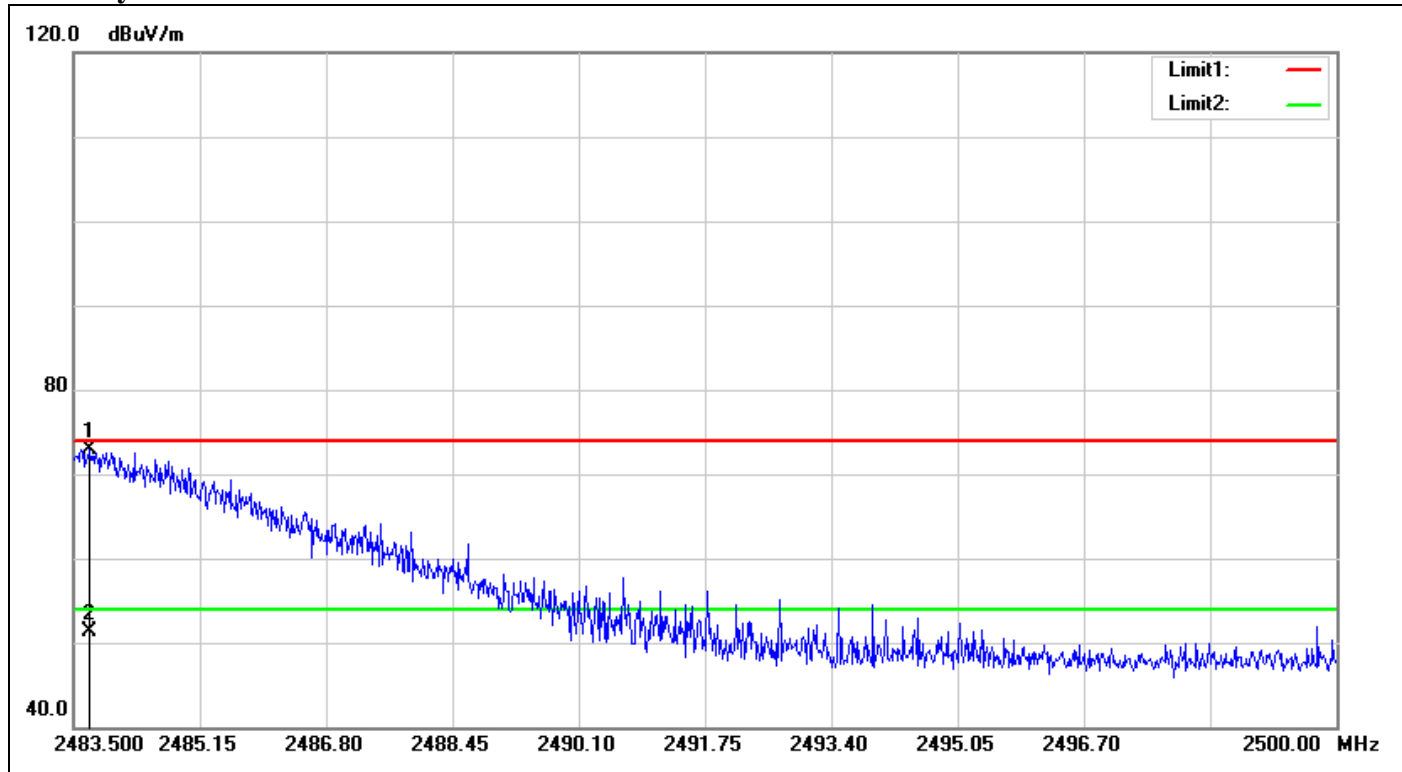


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.896	75.34	-3.27	72.07	74.00	-1.93	100	5	peak
2	2483.896	54.77	-3.27	51.50	54.00	-2.50	100	5	AVG



**Band Edges (IEEE 802.11n HT 20 MHz mode / 2472 MHz)**

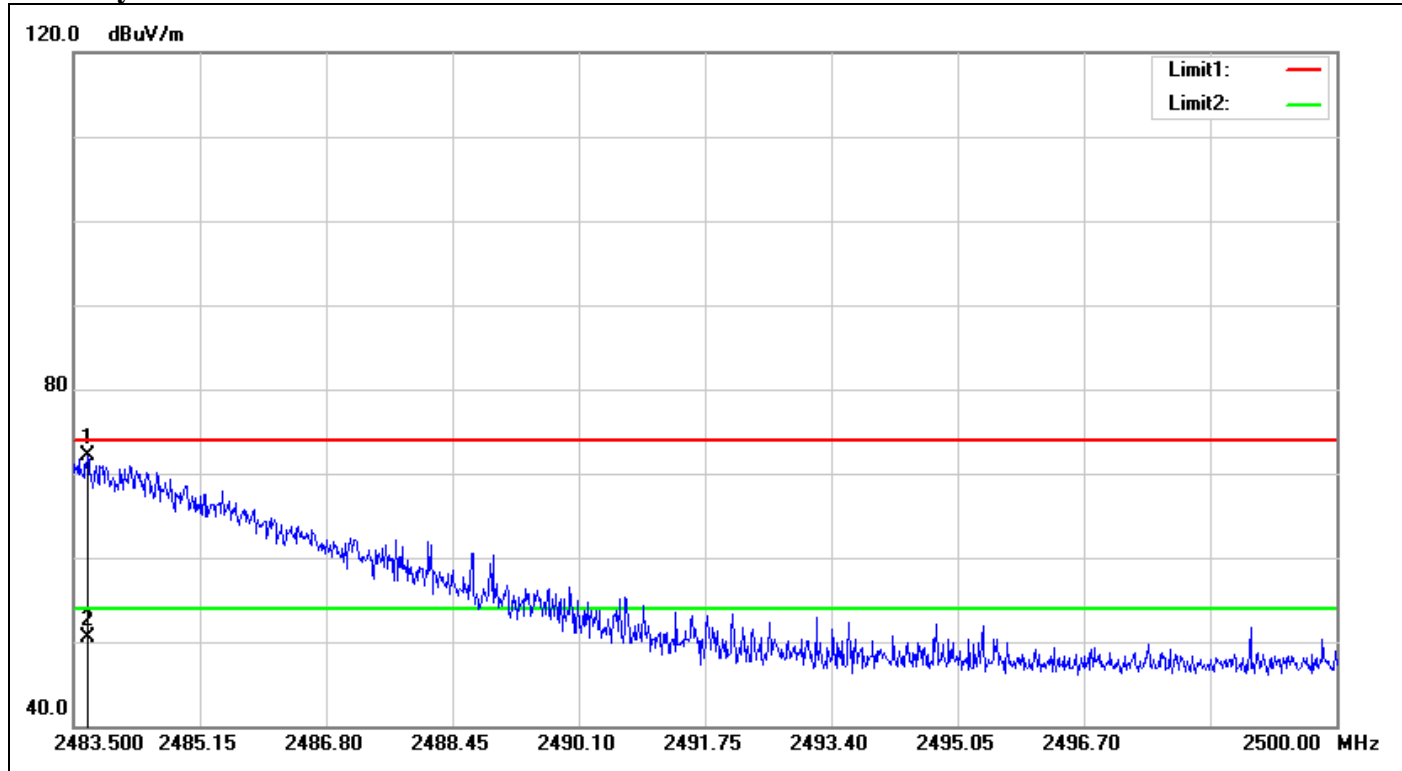
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.715	76.23	-3.27	72.96	74.00	-1.04	100	104	peak
2	2483.715	54.55	-3.27	51.28	54.00	-2.72	100	104	AVG



**Polarity: Horizontal**

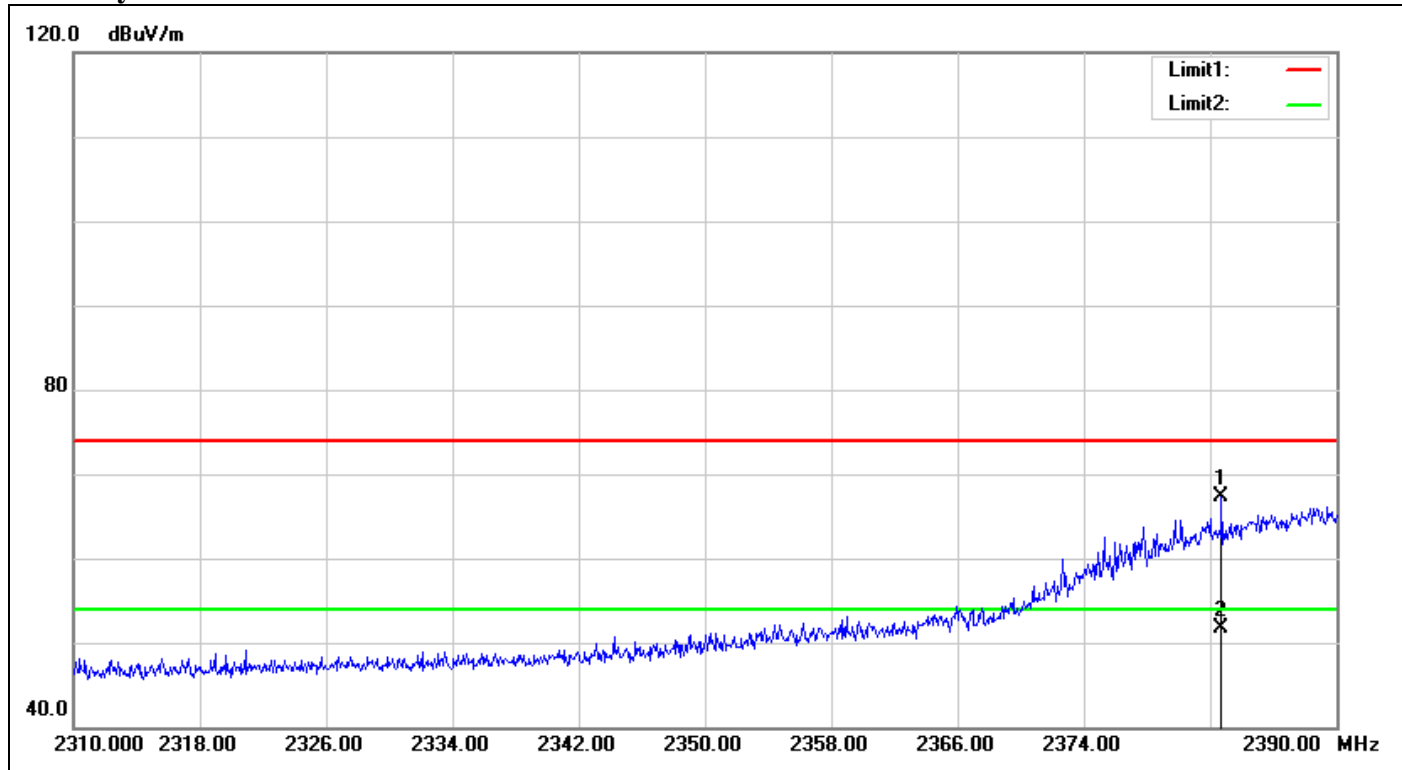


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.682	75.36	-3.27	72.09	74.00	-1.91	100	247	peak
2	2483.682	53.73	-3.27	50.46	54.00	-3.54	100	247	AVG



**Band Edges (IEEE 802.11n HT 40 mode / 2422 MHz)**

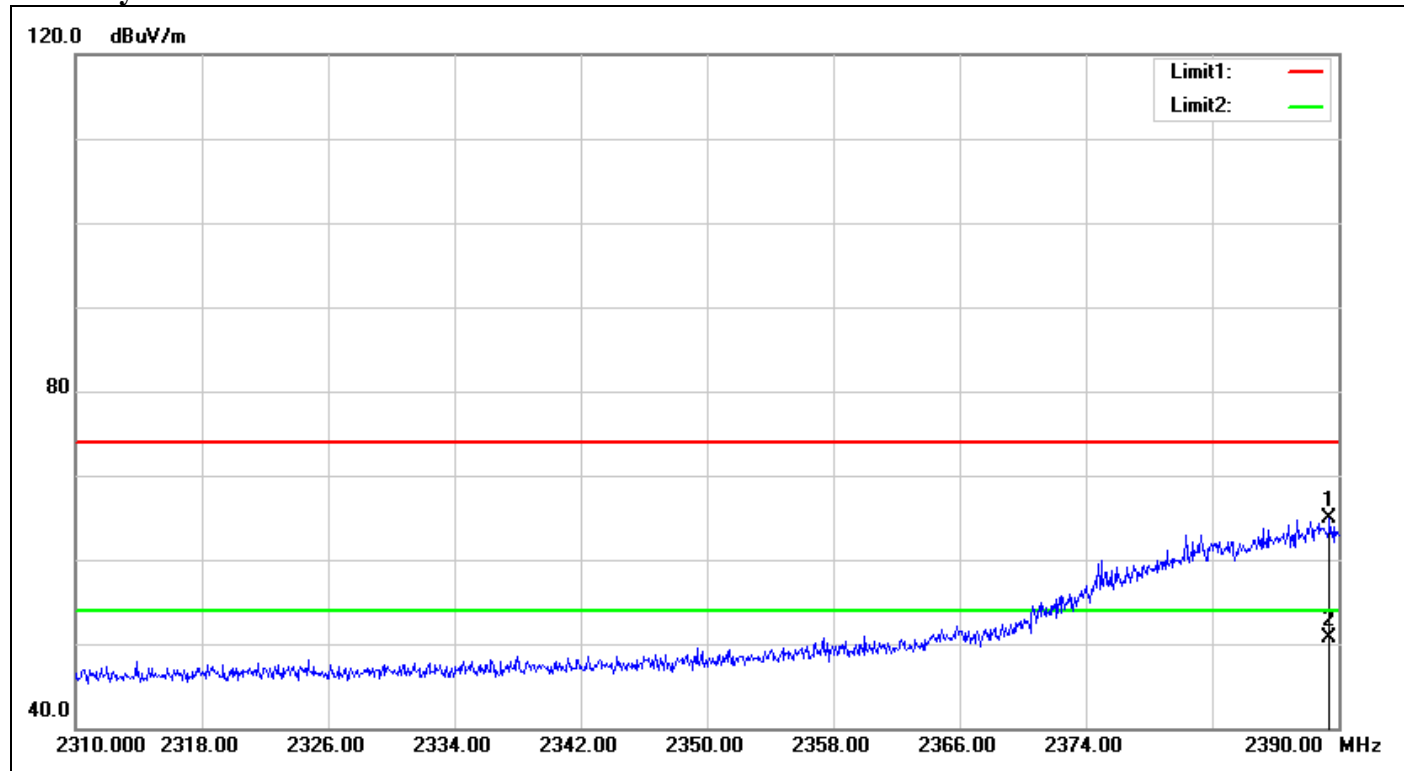
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2382.720	71.12	-3.84	67.28	74.00	-6.72	100	288	peak
2	2382.720	55.64	-3.84	51.80	54.00	-2.20	100	288	AVG



**Polarity: Horizontal**



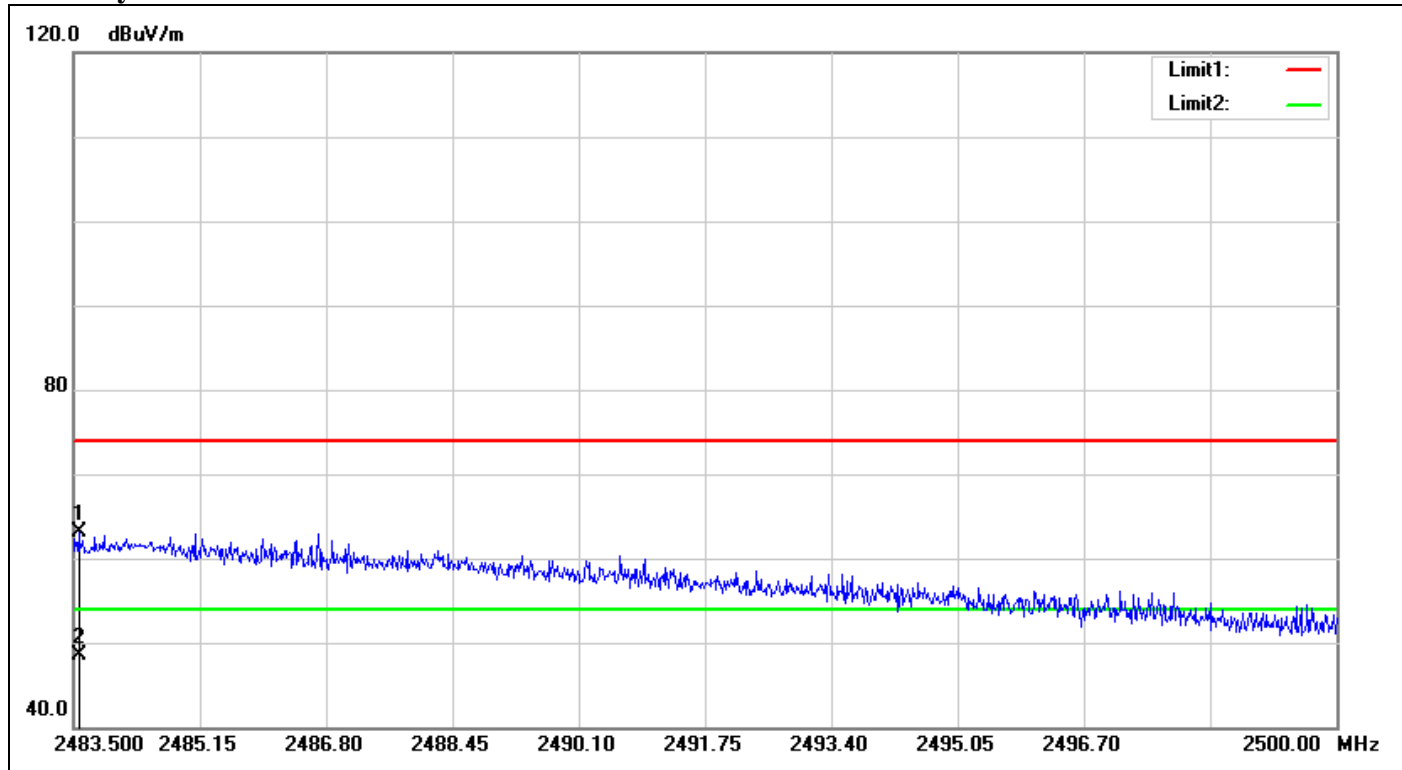
No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2389.440	68.72	-3.78	64.94	74.00	-9.06	100	274	peak
2	2389.440	54.45	-3.78	50.67	54.00	-3.33	100	274	AVG





**Band Edges (IEEE 802.11n HT 40 mode / 2452 MHz)**

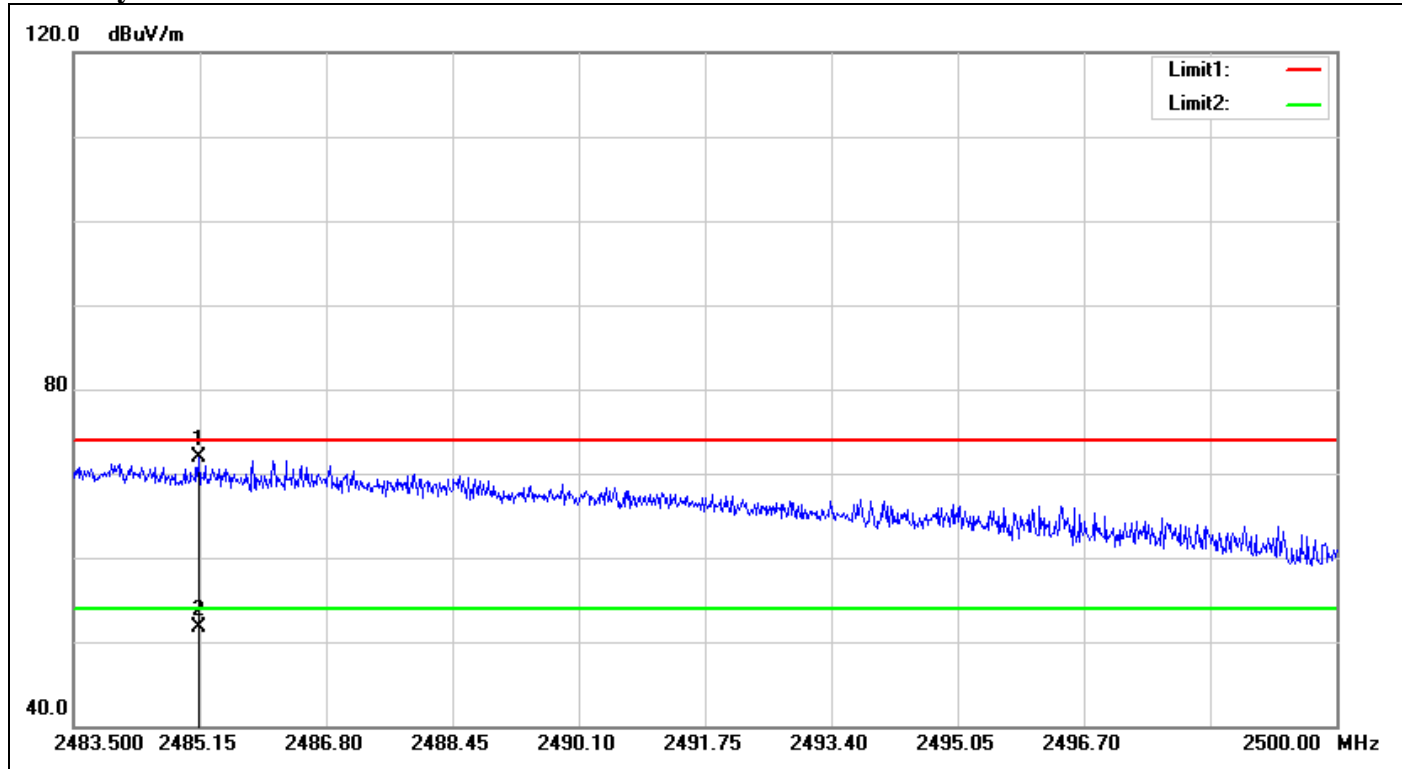
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.566	66.41	-3.27	63.14	74.00	-10.86	100	247	peak
2	2483.566	51.68	-3.27	48.41	54.00	-5.59	100	247	AVG



**Polarity: Horizontal**

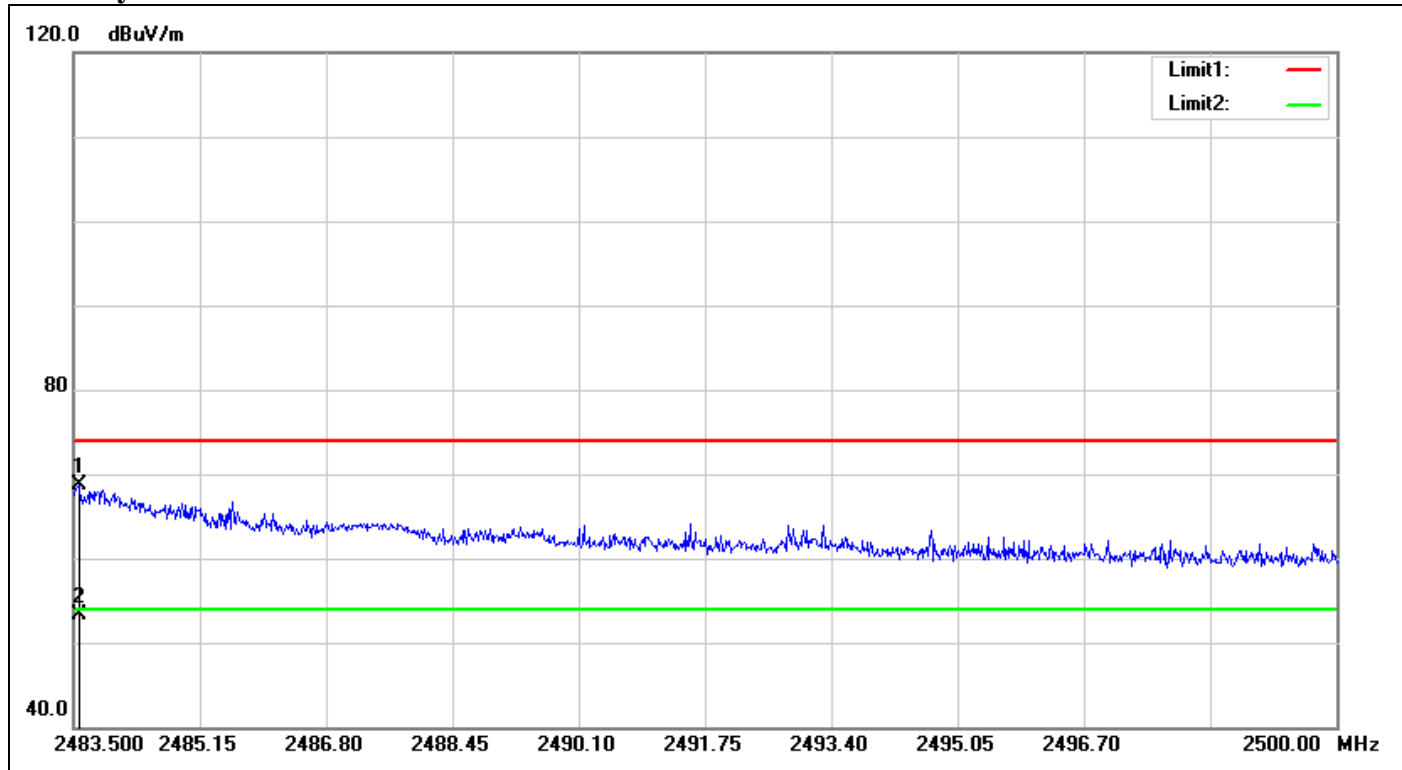


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2485.133	75.07	-3.26	71.81	74.00	-2.19	100	220	peak
2	2485.133	54.91	-3.26	51.65	54.00	-2.35	100	220	AVG



**Band Edges (IEEE 802.11n HT 40 mode / 2457 MHz)**

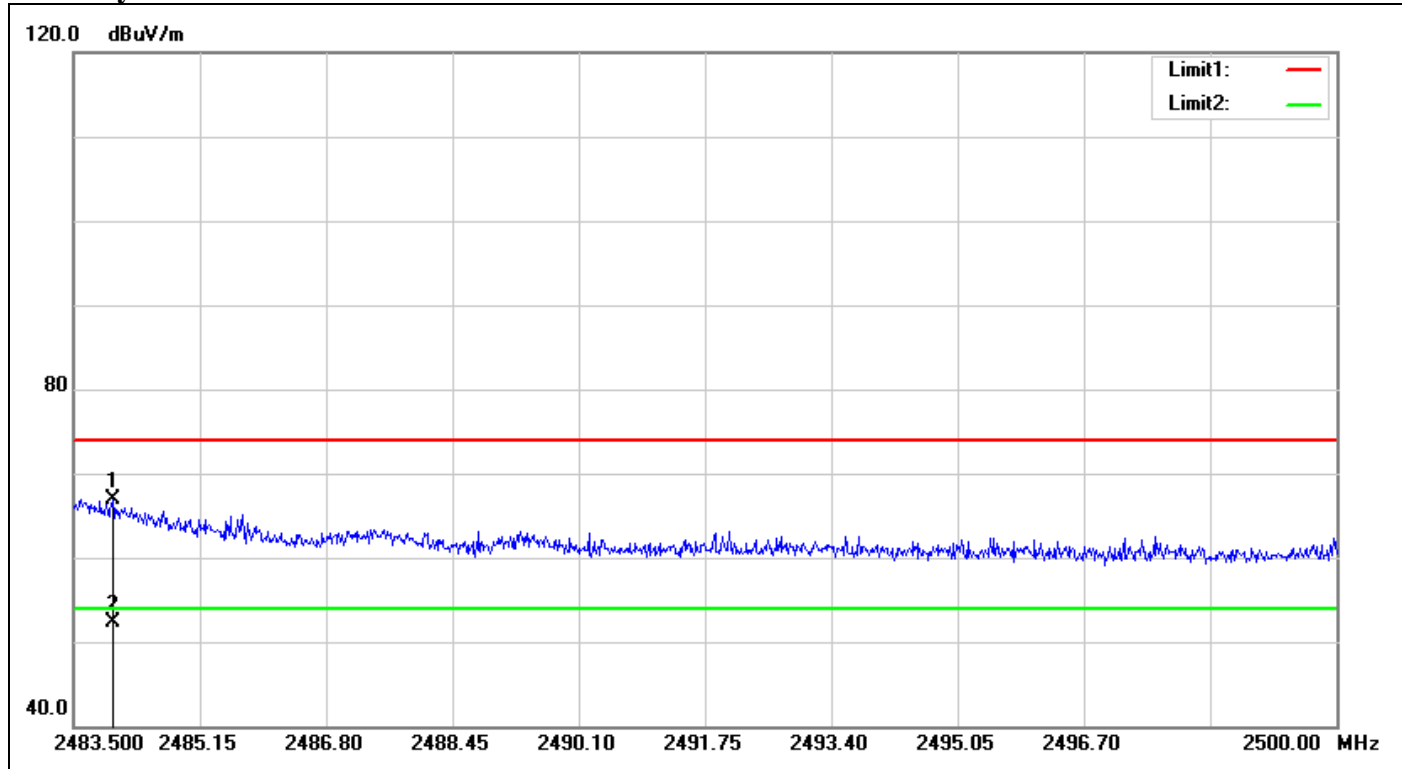
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.566	71.93	-3.27	68.66	74.00	-5.34	100	2	peak
2	2483.566	56.56	-3.27	53.29	54.00	-0.71	100	2	AVG



**Polarity: Horizontal**

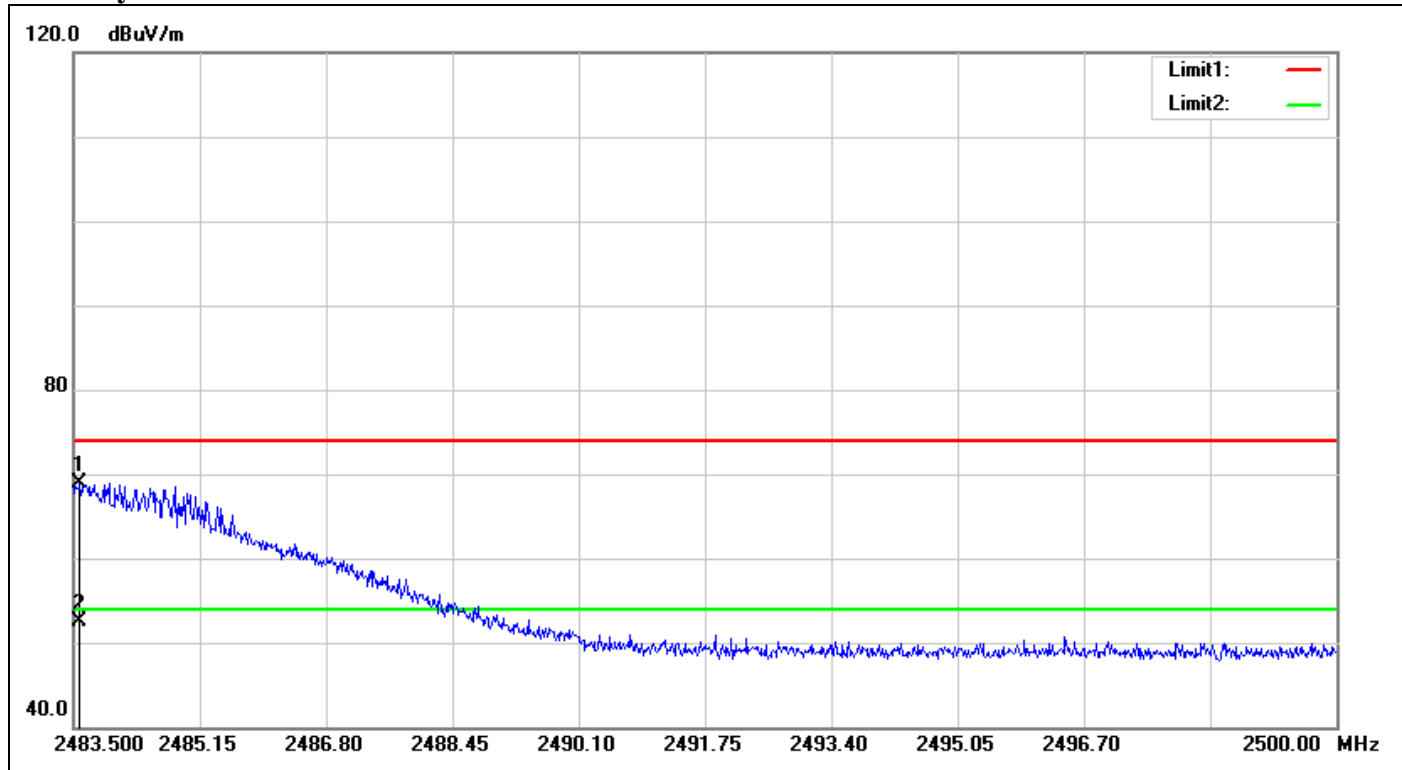


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2484.012	70.17	-3.27	66.90	74.00	-7.10	100	20	peak
2	2484.012	55.52	-3.27	52.25	54.00	-1.75	100	20	AVG



**Band Edges (IEEE 802.11n HT 40 mode / 2462 MHz)**

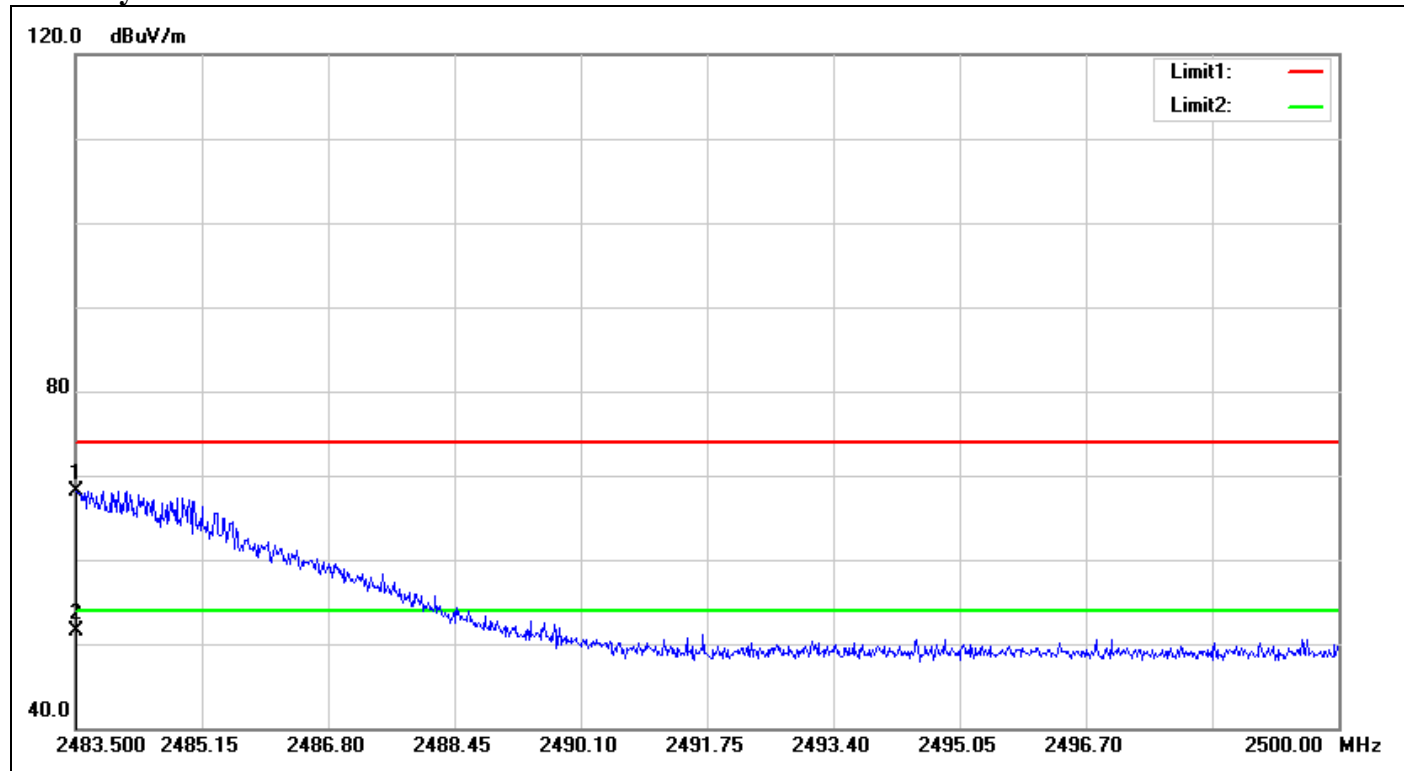
**Polarity: Vertical**



No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.582	72.21	-3.27	68.94	74.00	-5.06	100	269	peak
2	2483.582	55.73	-3.27	52.46	54.00	-1.54	100	269	AVG



**Polarity: Horizontal**

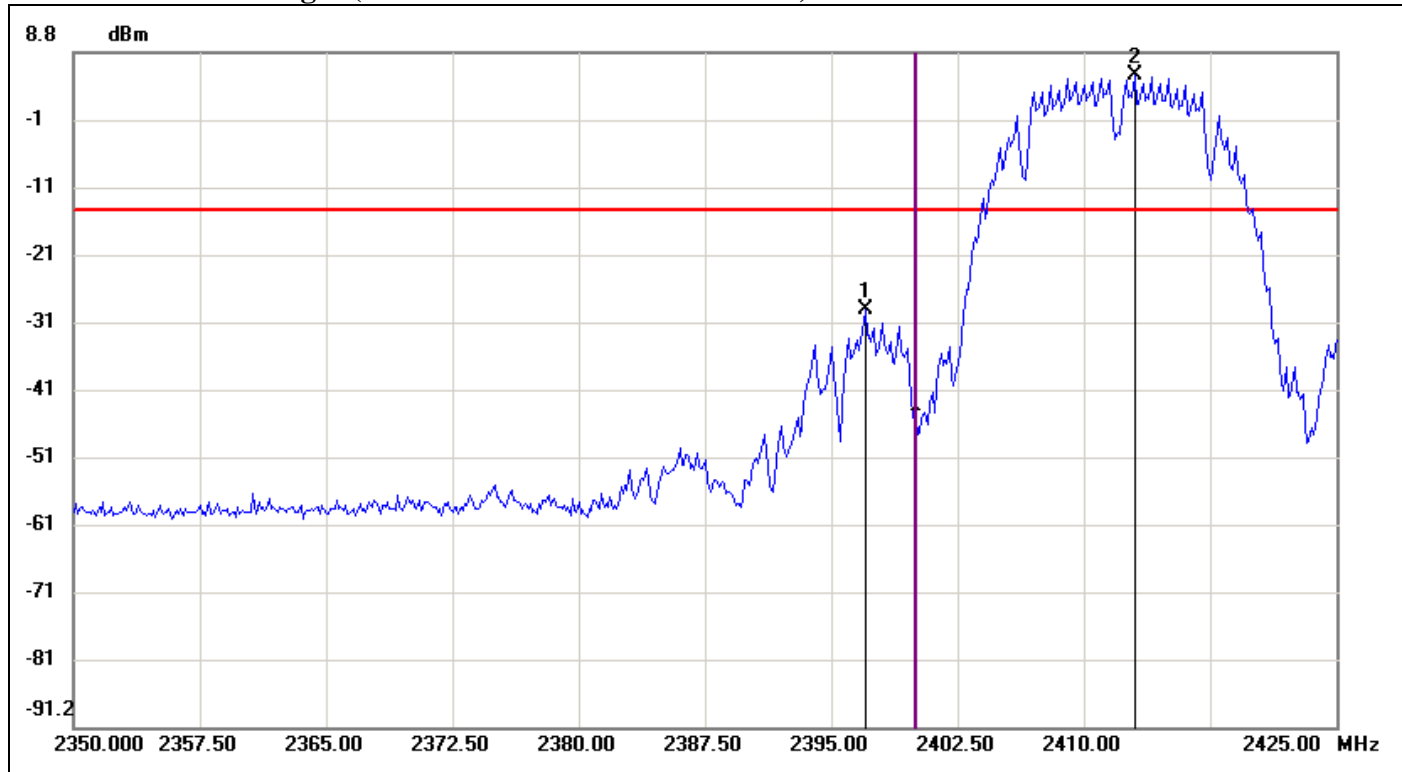


No.	Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
	(MHz)	(dBuV)	Factor(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	( ° )	
1	2483.500	71.44	-3.27	68.17	74.00	-5.83	100	52	peak
2	2483.500	54.77	-3.27	51.50	54.00	-2.50	100	52	AVG



## Test Plot

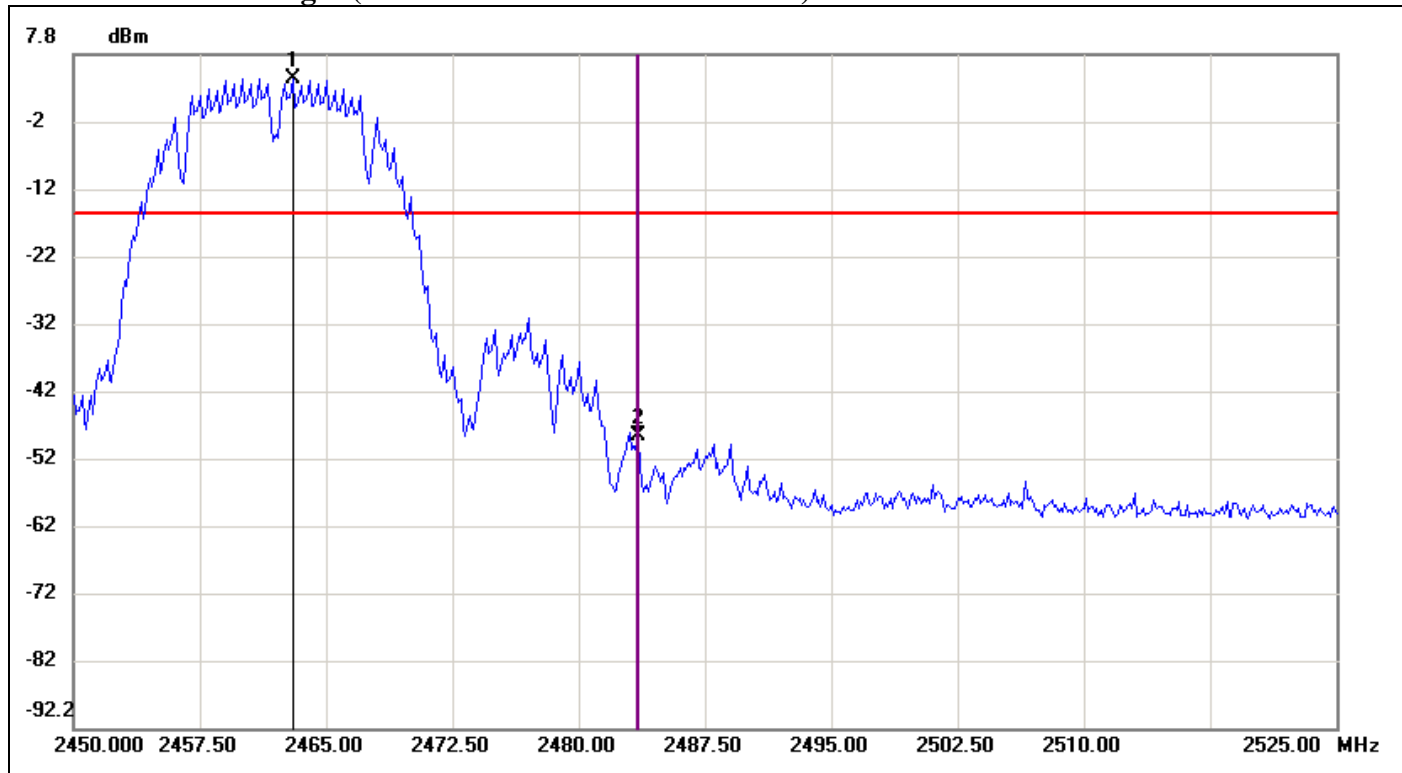
### Conducted Band Edges (IEEE 802.11b mode / 2412 MHz)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2397.0000	-29.31	-14.61	-14.70
2	2413.0000	5.39	-14.61	20.00



Conducted Band Edges (IEEE 802.11b mode / 2462 MHz)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.0000	4.27	-15.73	20.00
2	2483.5000	-48.93	-15.73	-33.20



**Conducted Band Edges (IEEE 802.11b mode / 2467 MHz)**

Agilent

R T

Mkr2 2.484 00 GHz  
-31.06 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-14.0

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.469 00 GHz	6.02 dBm
2	(1)	Freq	2.484 00 GHz	-31.06 dBm

**Conducted Band Edges (IEEE 802.11b mode / 2472 MHz)**

Agilent

R T

Mkr2 2.484 50 GHz  
-42.08 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-18.9

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

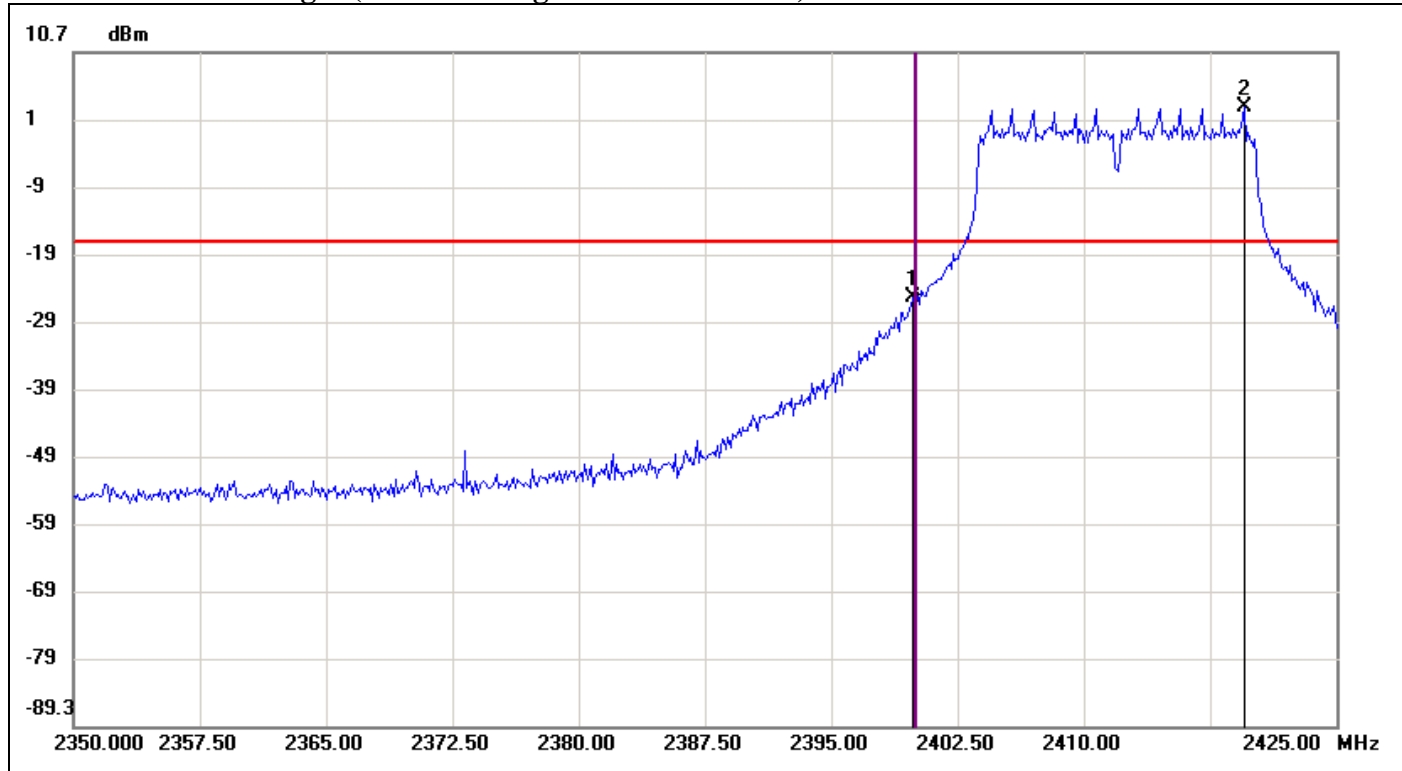
#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.473 00 GHz	1.14 dBm
2	(1)	Freq	2.484 50 GHz	-42.08 dBm



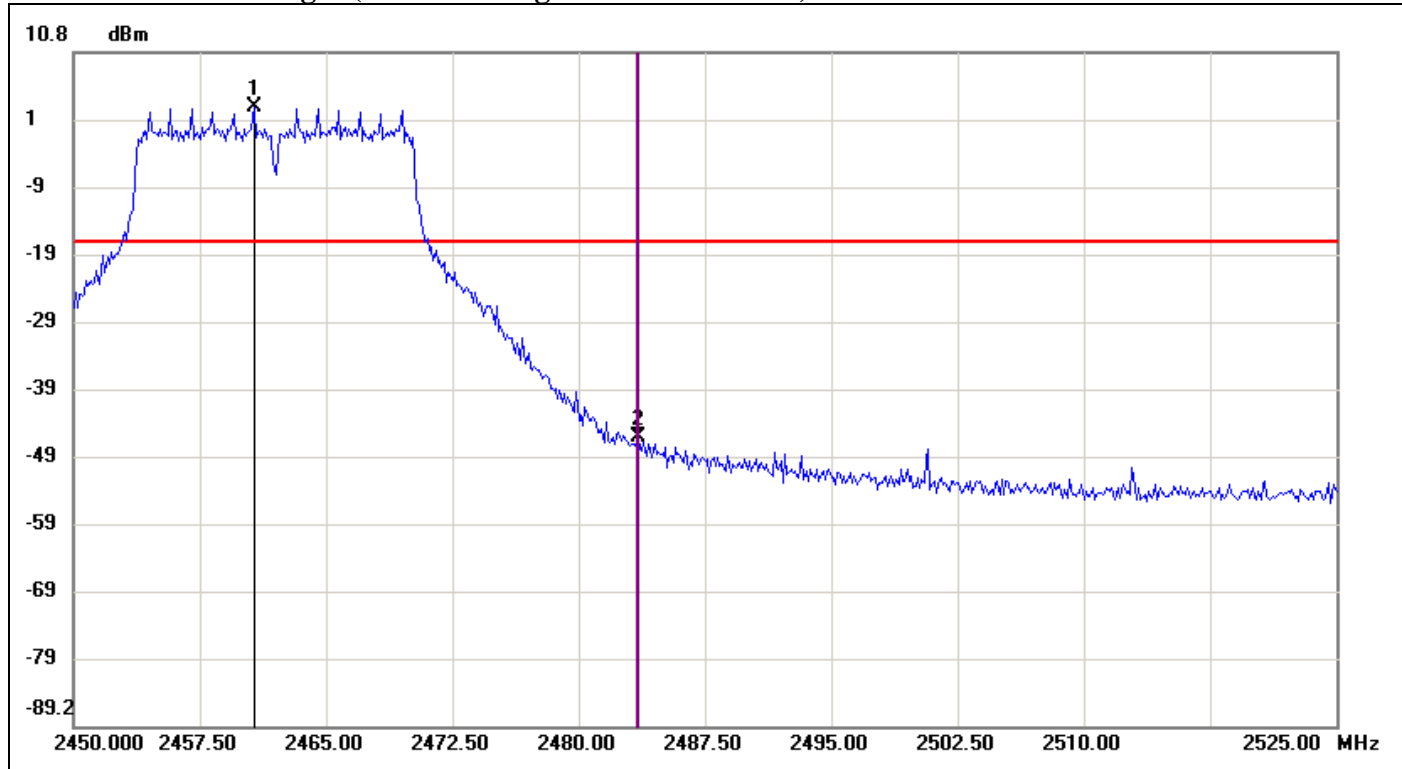
Conducted Band Edges (IEEE 802.11g mode / 2412 MHz)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2399.8750	-25.69	-17.48	-8.21
2	2419.5000	2.52	-17.48	20.00



Conducted Band Edges (IEEE 802.11g mode / 2462 MHz)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2460.7500	2.63	-17.37	20.00
2	2483.5000	-46.23	-17.37	-28.86

**Conducted Band Edges (IEEE 802.11g mode / 2467 MHz)**

Agilent

R T

Mkr2 2.483 62 GHz  
-40.92 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-17.5

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.465 75 GHz	2.52 dBm
2	(1)	Freq	2.483 62 GHz	-40.92 dBm

**Conducted Band Edges (IEEE 802.11g mode / 2472 MHz)**

Agilent

R T

Mkr2 2.483 50 GHz  
-35.91 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-28.9

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

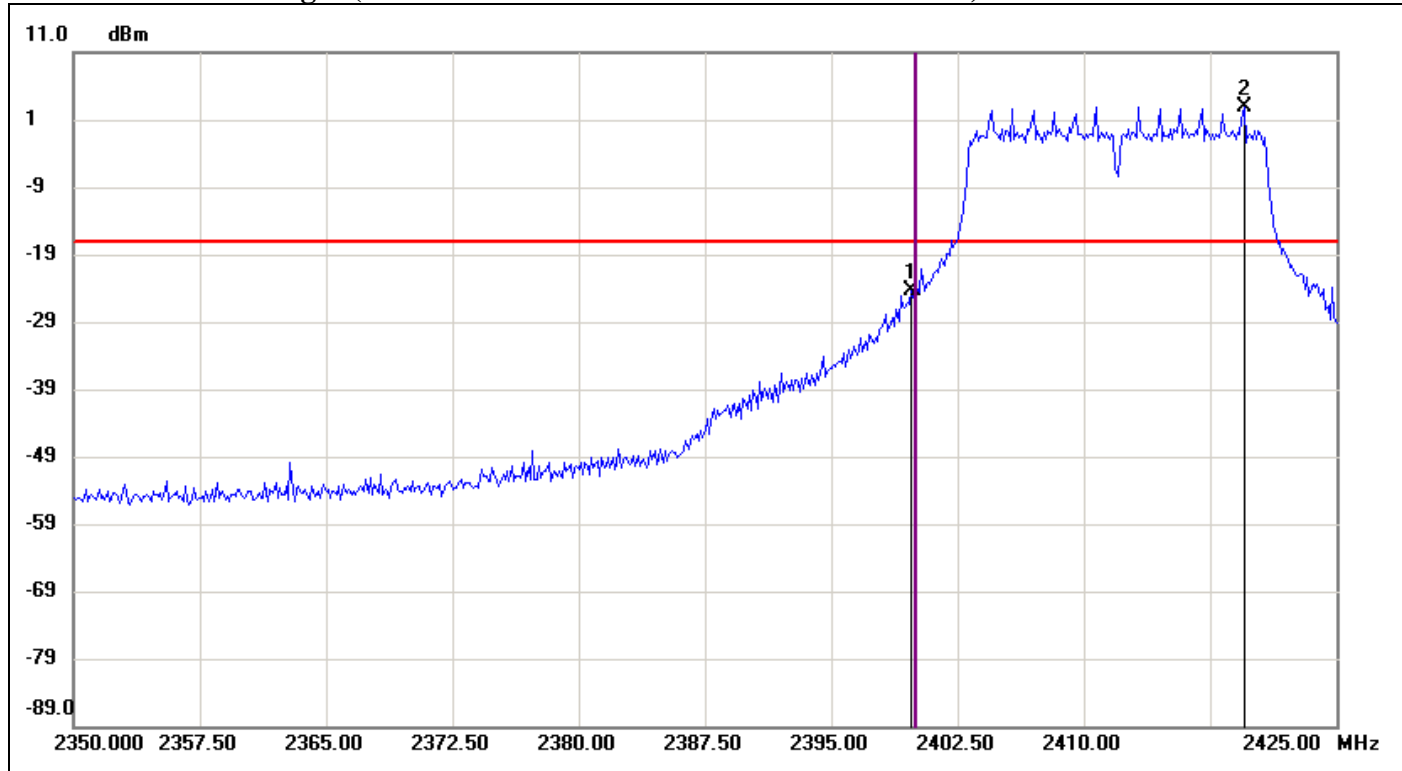
#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.470 75 GHz	-8.94 dBm
2	(1)	Freq	2.483 50 GHz	-35.91 dBm



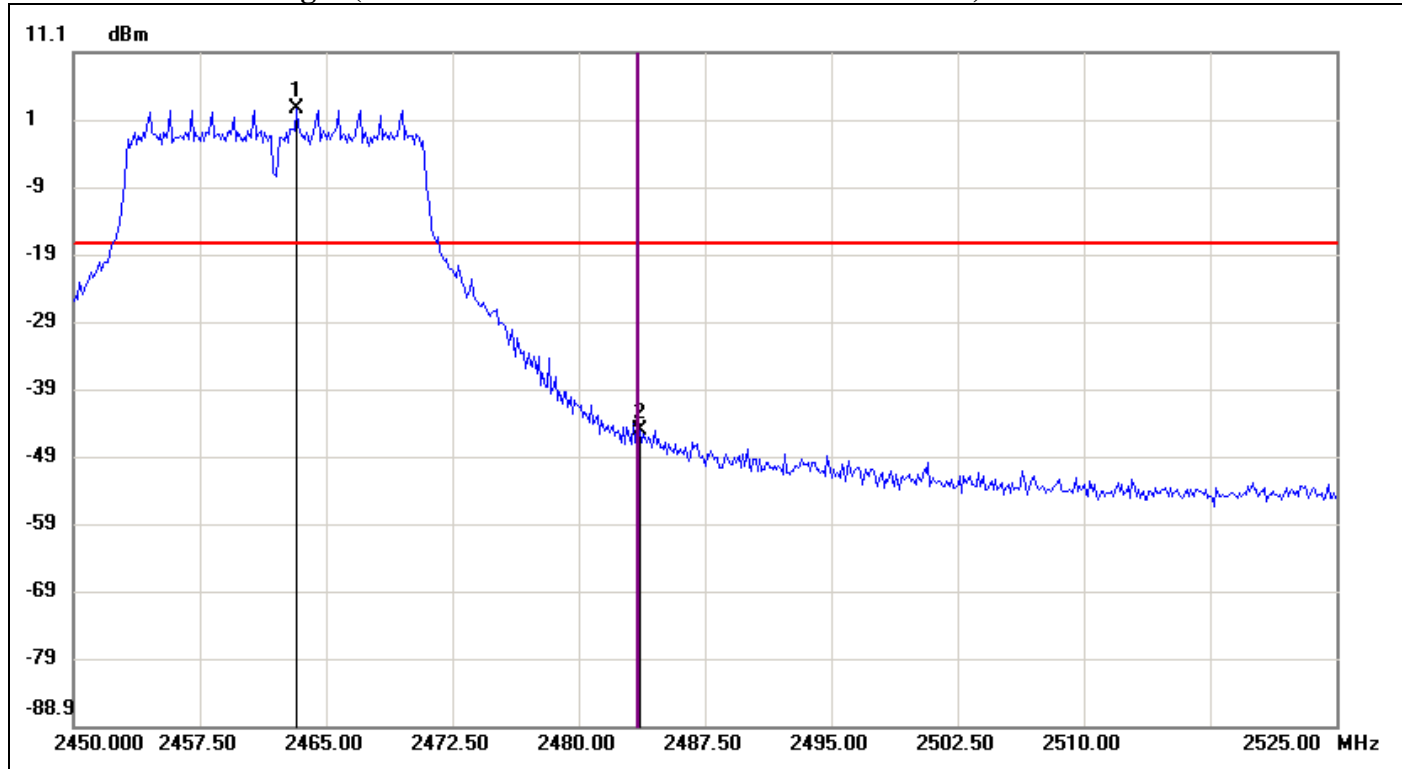
Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / 2412 MHz)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2399.7500	-24.33	-17.06	-7.27
2	2419.5000	2.94	-17.06	20.00



Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / 2462 MHz)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.2500	2.69	-17.31	20.00
2	2483.6250	-44.97	-17.31	-27.66

**Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / 2467MHz)**

Agilent

R T

Mkr2 2.483 50 GHz  
-39.03 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-17.5

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.459 50 GHz	2.45 dBm
2	(1)	Freq	2.483 50 GHz	-39.03 dBm

**Conducted Band Edges (IEEE 802.11n HT 20 MHz mode / 2472MHz)**

Agilent

R T

Mkr2 2.483 50 GHz  
-37.80 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-30.0

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

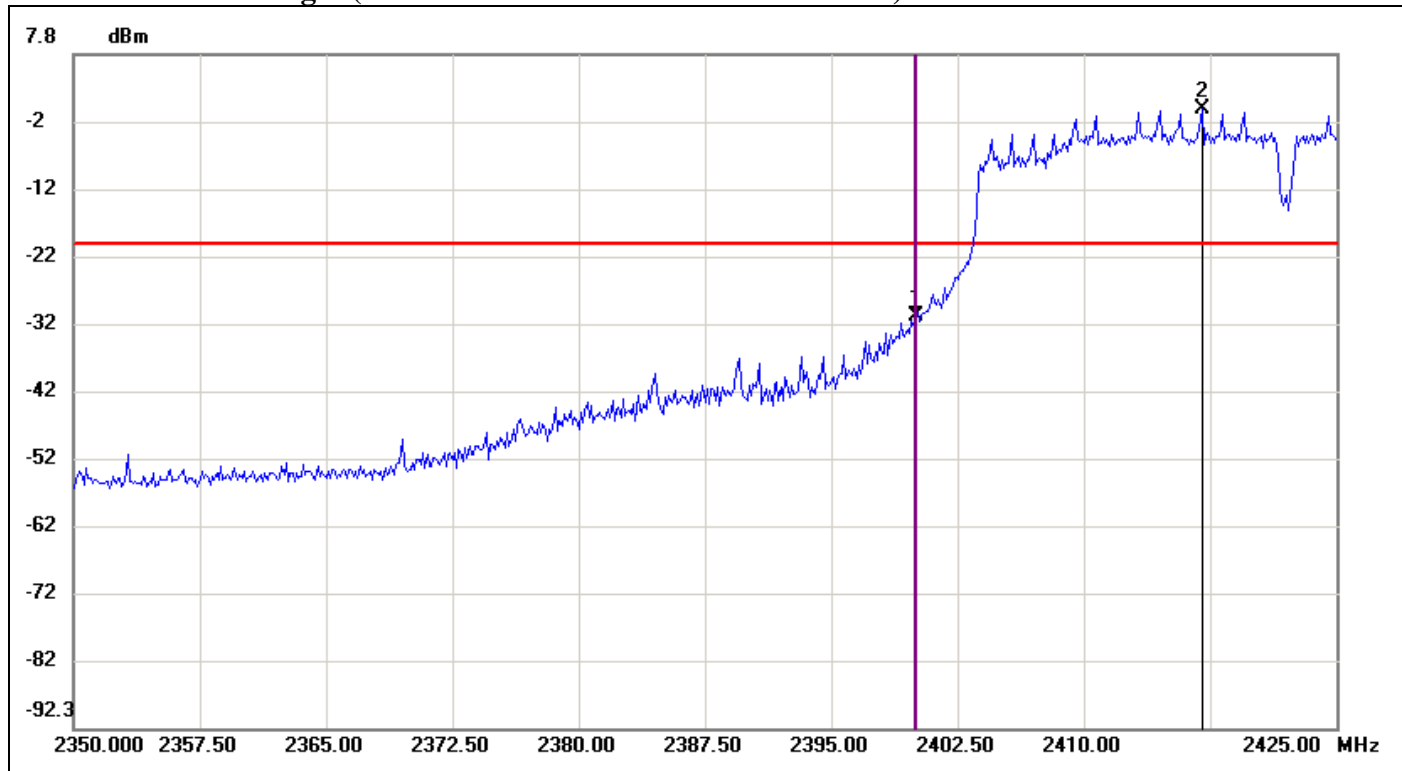
#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.465 75 GHz	-9.99 dBm
2	(1)	Freq	2.483 50 GHz	-37.80 dBm



Conducted Band Edges (IEEE 802.11n HT 40 mode / 2422 MHz)

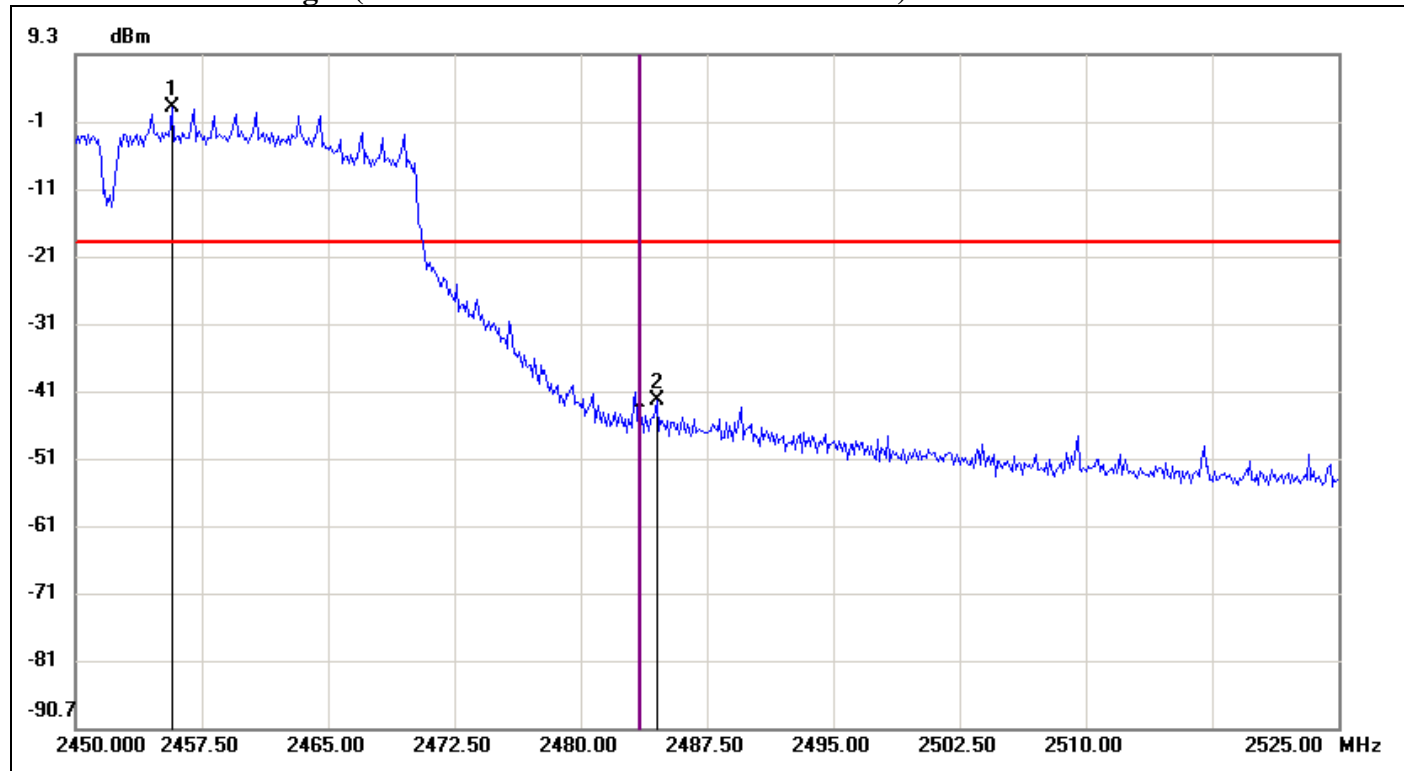


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2400.0000	-31.10	-20.49	-10.61
2	2417.0000	-0.49	-20.49	20.00





Conducted Band Edges (IEEE 802.11n HT 40 mode / 2452 MHz)



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2455.7500	1.38	-18.62	20.00
2	2484.5000	-41.94	-18.62	-23.32

**Conducted Band Edges (IEEE 802.11n HT 40 mode / 2457MHz)**

Agilent

R T

Mkr2 2.483 50 GHz  
-39.03 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-17.5

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.459 50 GHz	2.45 dBm
2	(1)	Freq	2.483 50 GHz	-39.03 dBm

**Conducted Band Edges (IEEE 802.11n HT 40 mode / 2462MHz)**

Agilent

R T

Mkr2 2.483 50 GHz  
-43.38 dBm

Ref 21.2 dBm

#Atten 20 dB

#Peak

Log

10

dB/

Offst

11.2

dB

DI

-31.8

dBm

#LgAv

V1 S2

Start 2.450 00 GHz

Stop 2.525 00 GHz

#Res BW 100 kHz

#VBW 300 kHz

Sweep 7.2 ms (601 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.453 25 GHz	-11.76 dBm
2	(1)	Freq	2.483 50 GHz	-43.38 dBm

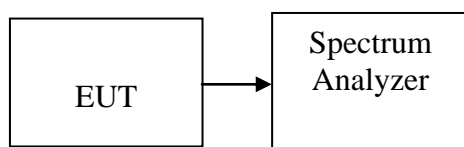


## 7.5 PEAK POWER SPECTRAL DENSITY

### LIMIT

1. According to §15.247(e), 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), 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

The transmitter output is connected to a spectrum analyzer. Set the RBW = 3 kHz, VBW = 10 kHz, span to 1.5 times the DTS bandwidth, Detector = peak, Trace mode = max hold, Sweep = auto couple. Use the peak marker function to determine the maximum amplitude level within the RBW.



## **TEST RESULTS**

*No non-compliance noted*

### **Test Data**

#### **Test mode: IEEE 802.11b mode**

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	5.08	8.00	PASS
2437	4.30		PASS
2462	3.96		PASS
2467	6.10		PASS
2472	0.21		PASS

#### **Test mode: IEEE 802.11g mode**

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	-1.55	8.00	PASS
2437	-0.18		PASS
2462	-2.10		PASS
2467	-2.30		PASS
2472	-13.60		PASS

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

Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
2412	-1.49	8.00	PASS
2437	-0.53		PASS
2462	-1.63		PASS
2467	-2.51		PASS
2472	-14.01		PASS

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

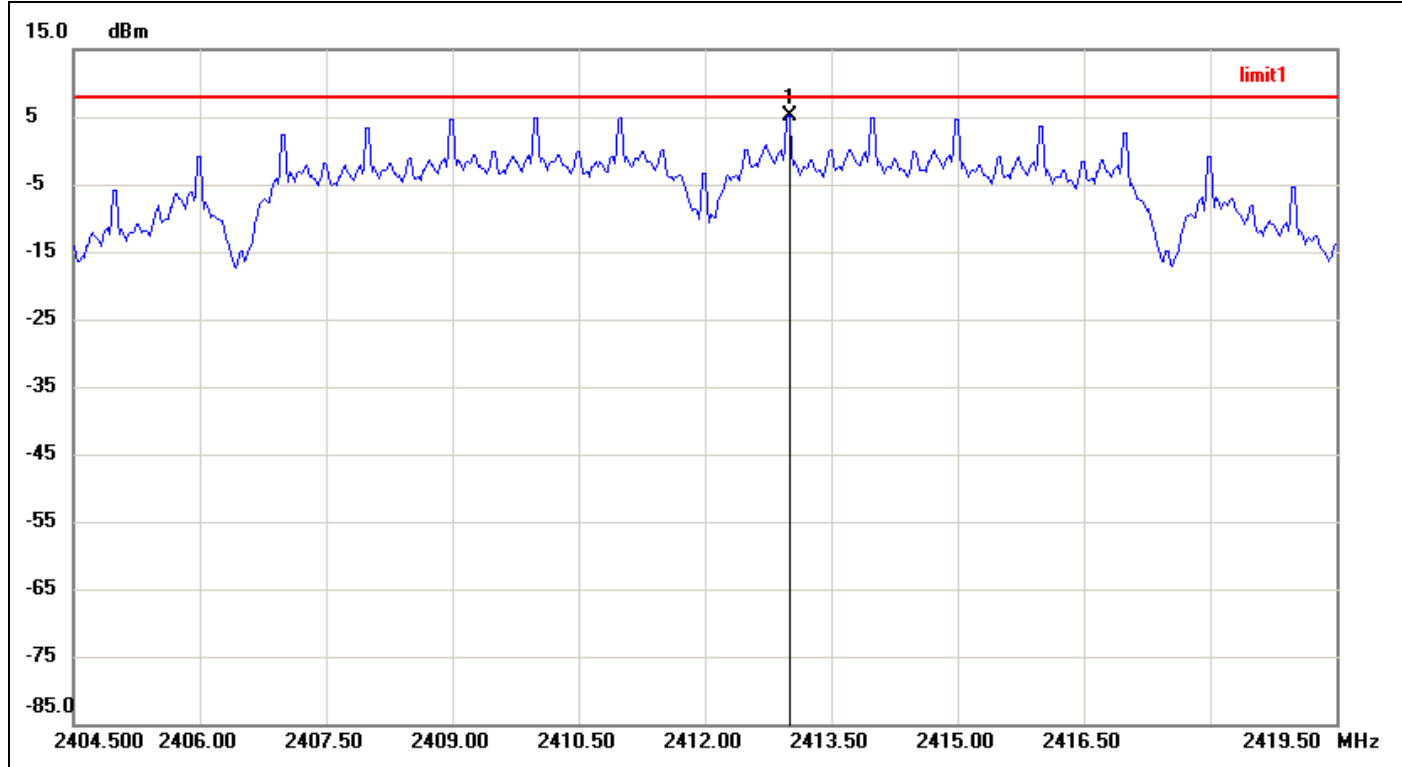
Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Result
2422	-4.81	8.00	PASS
2437	-3.00		PASS
2452	-3.84		PASS
2457	-3.74		PASS
2462	-16.76		PASS



## Test Plot

IEEE 802.11b mode / 2412 MHz

## PPSD

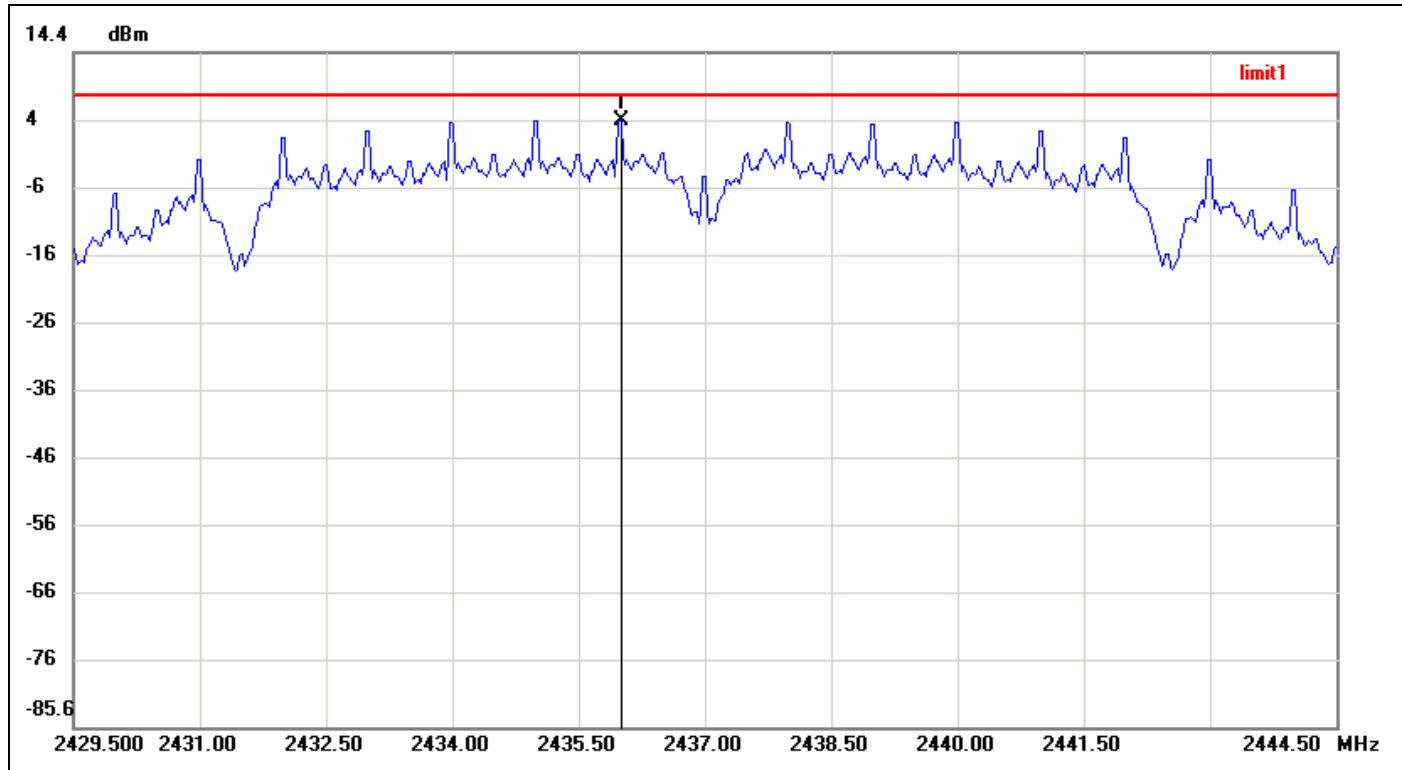


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2413.0000	5.08	8.00	-2.92



IEEE 802.11b mode / 2437 MHz

PPSD

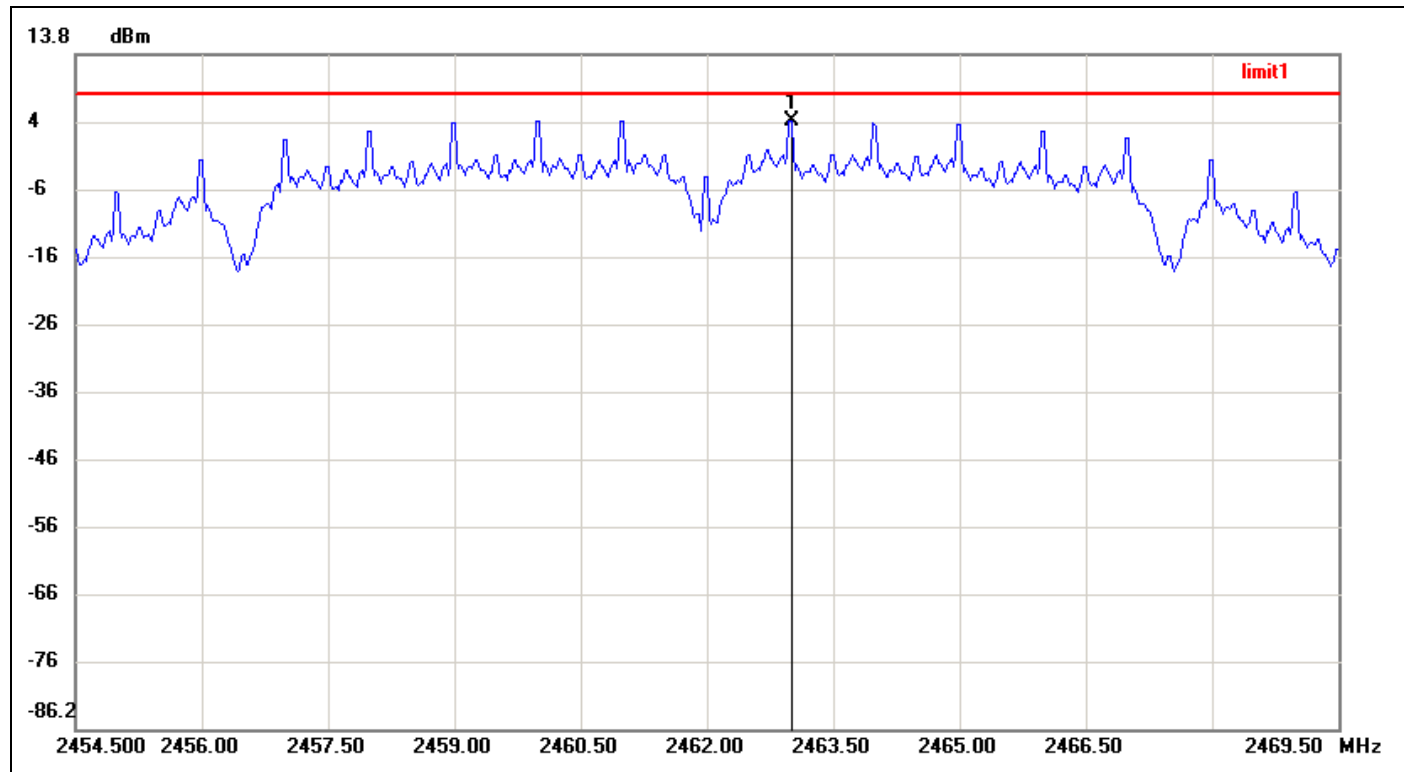


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2436.0000	4.30	8.00	-3.70



IEEE 802.11b mode / 2462 MHz

PPSD

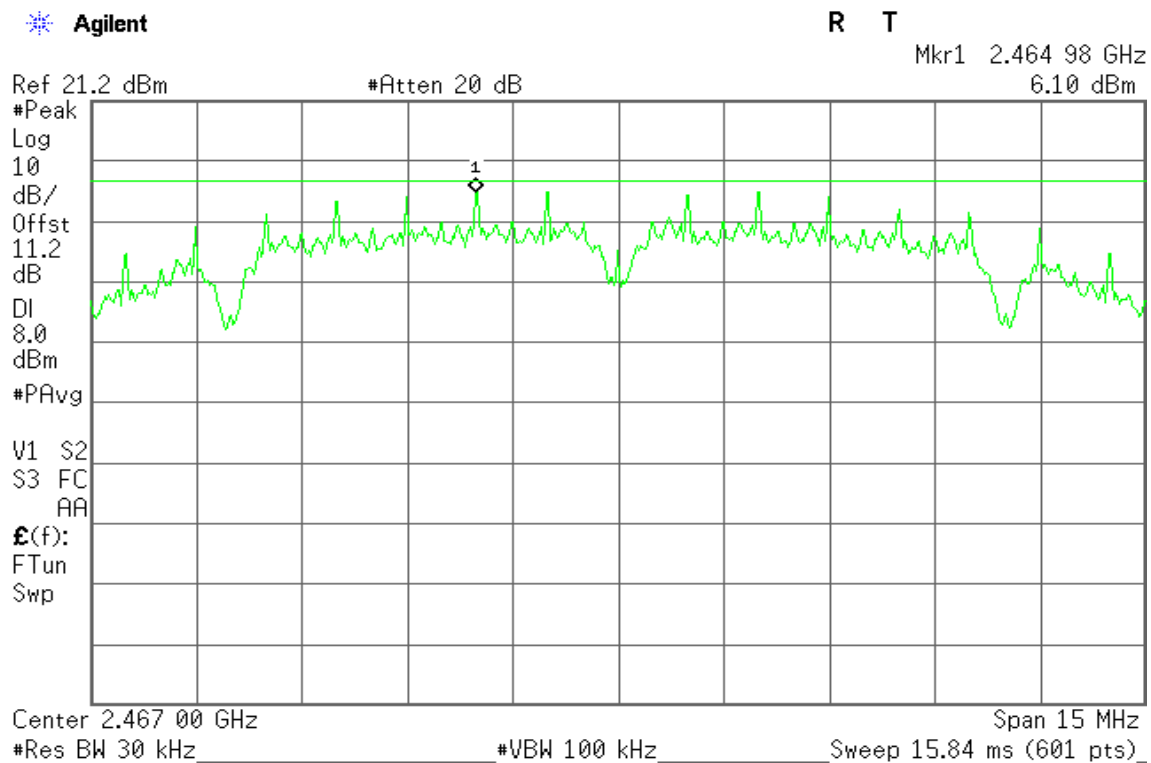


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.0000	3.96	8.00	-4.04



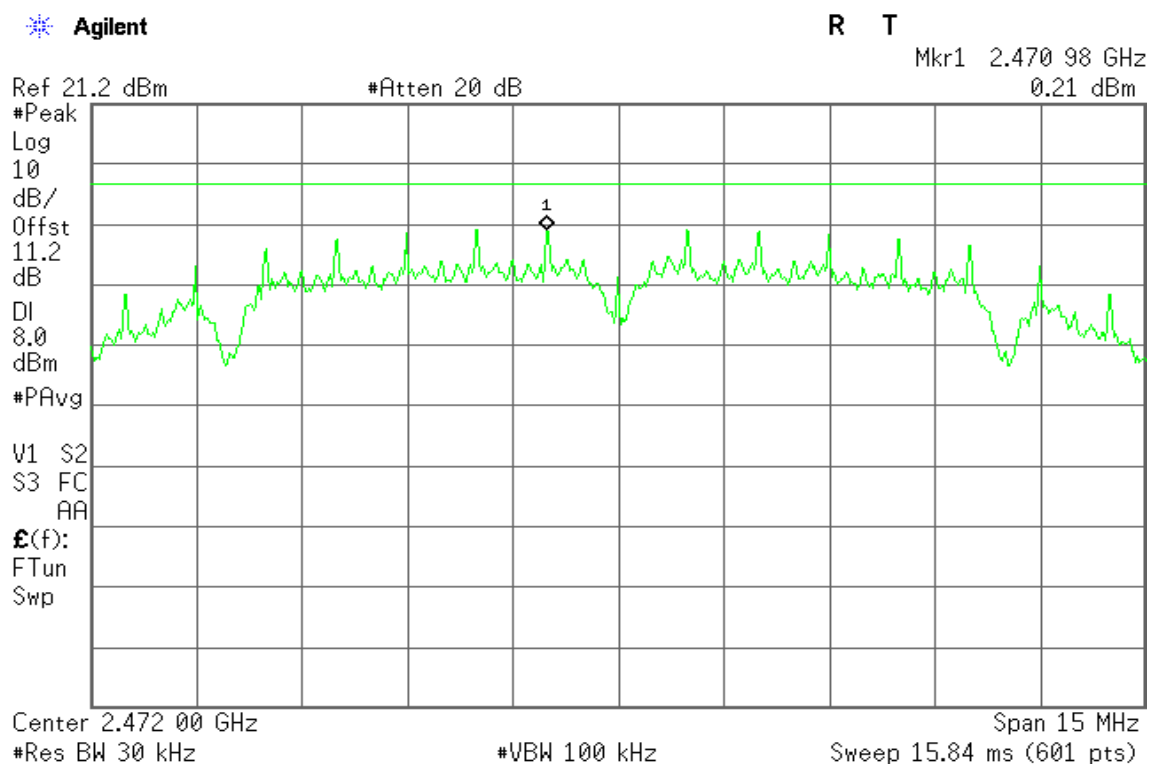
## IEEE 802.11b mode / 2467 MHz

### PPSD



## IEEE 802.11b mode / 2472 MHz

### PPSD

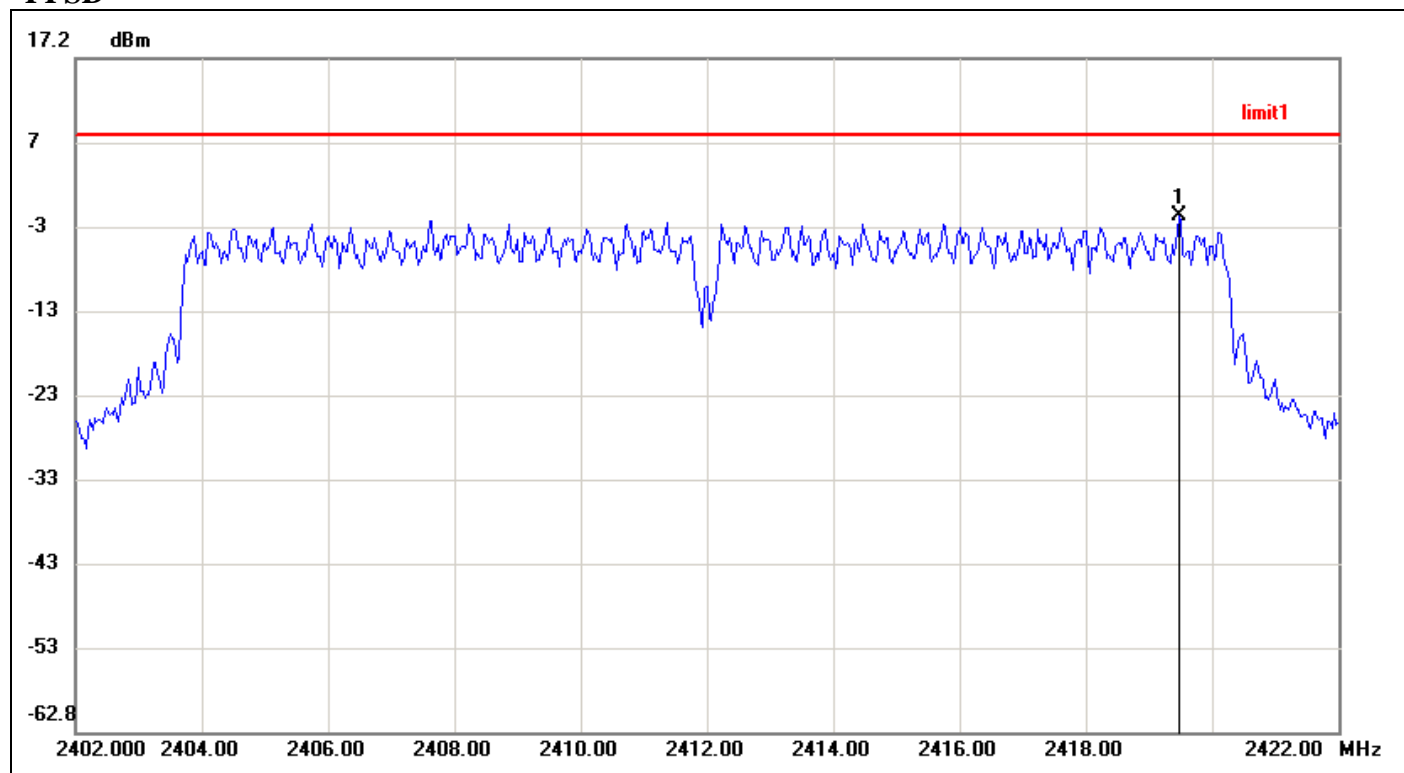






IEEE 802.11g mode / 2412 MHz

PPSD

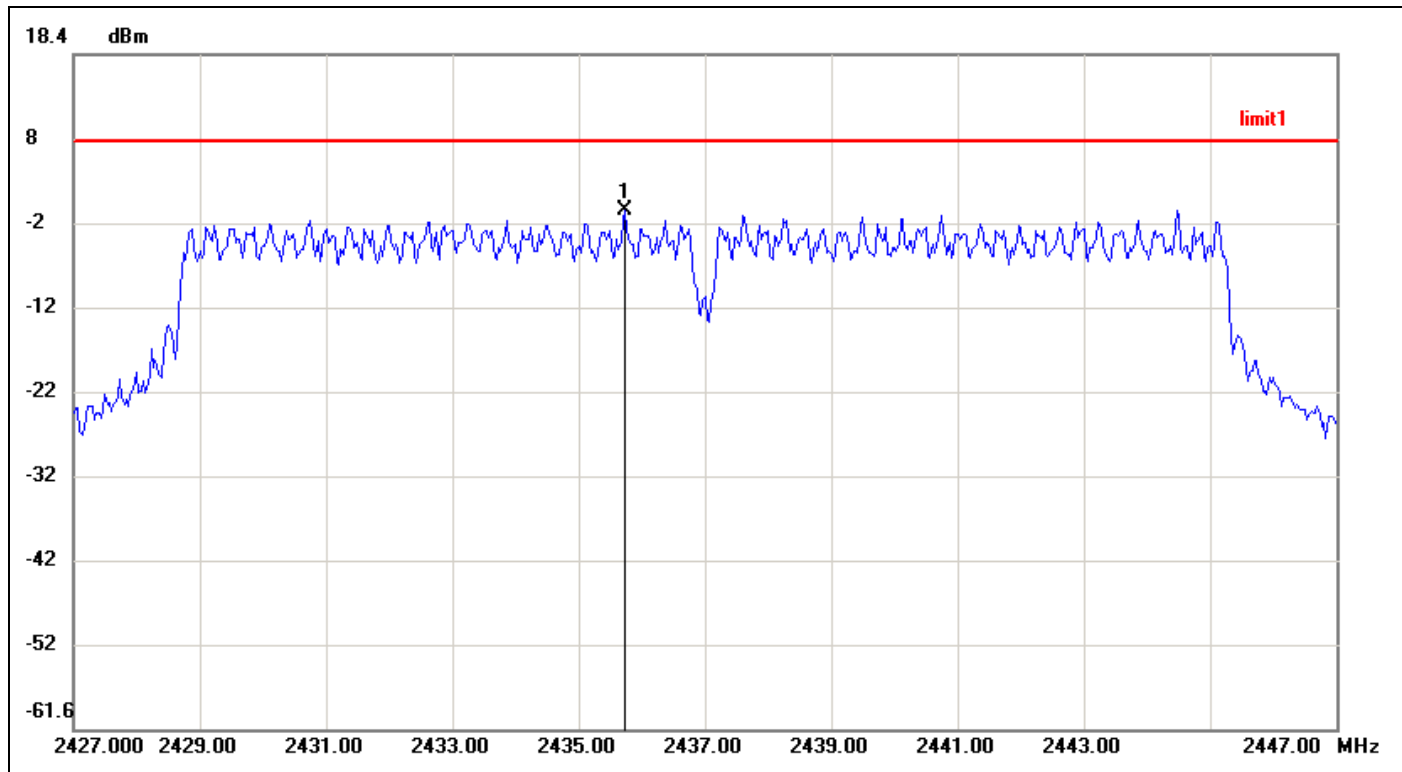


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2419.4667	-1.55	8.00	-9.55



IEEE 802.11g mode / 2437 MHz

PPSD

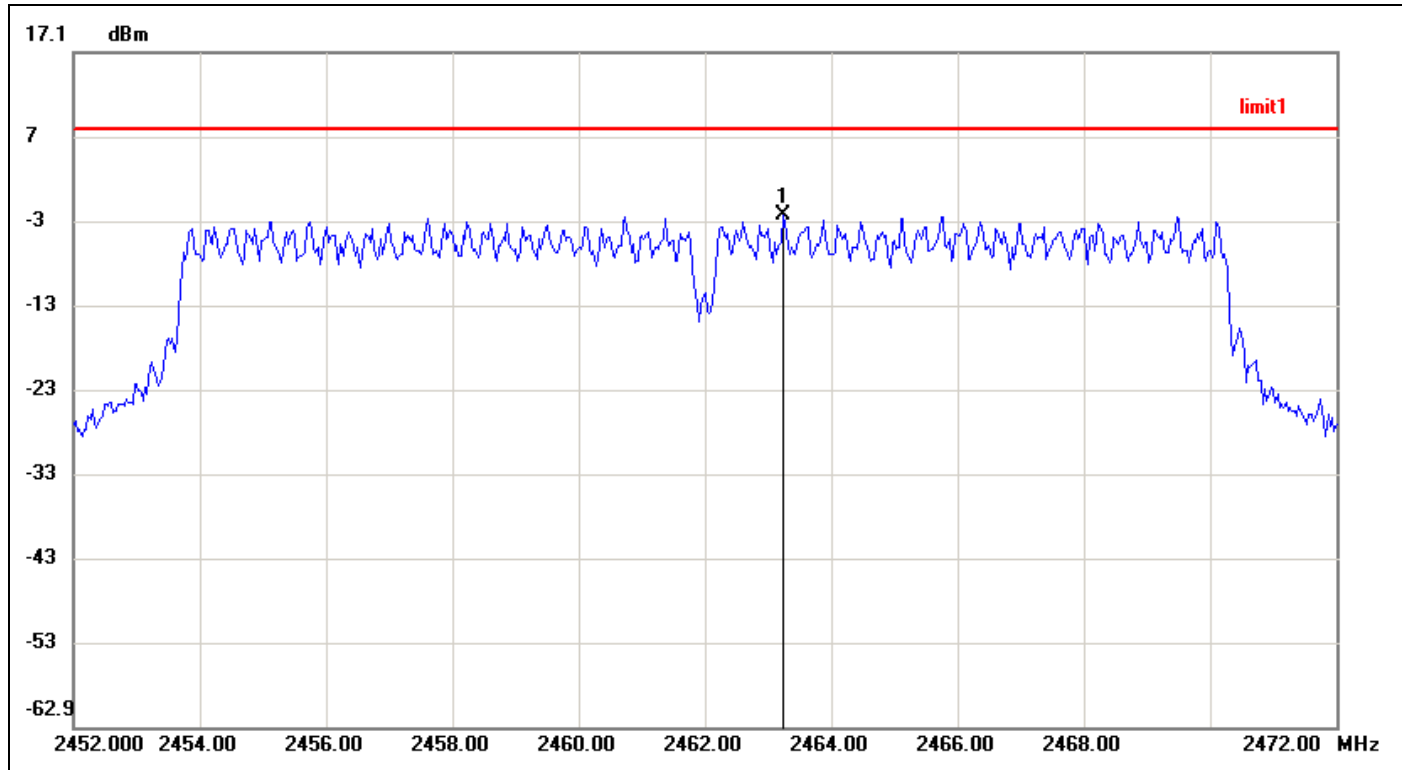


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2435.7333	-0.18	8.00	-8.18

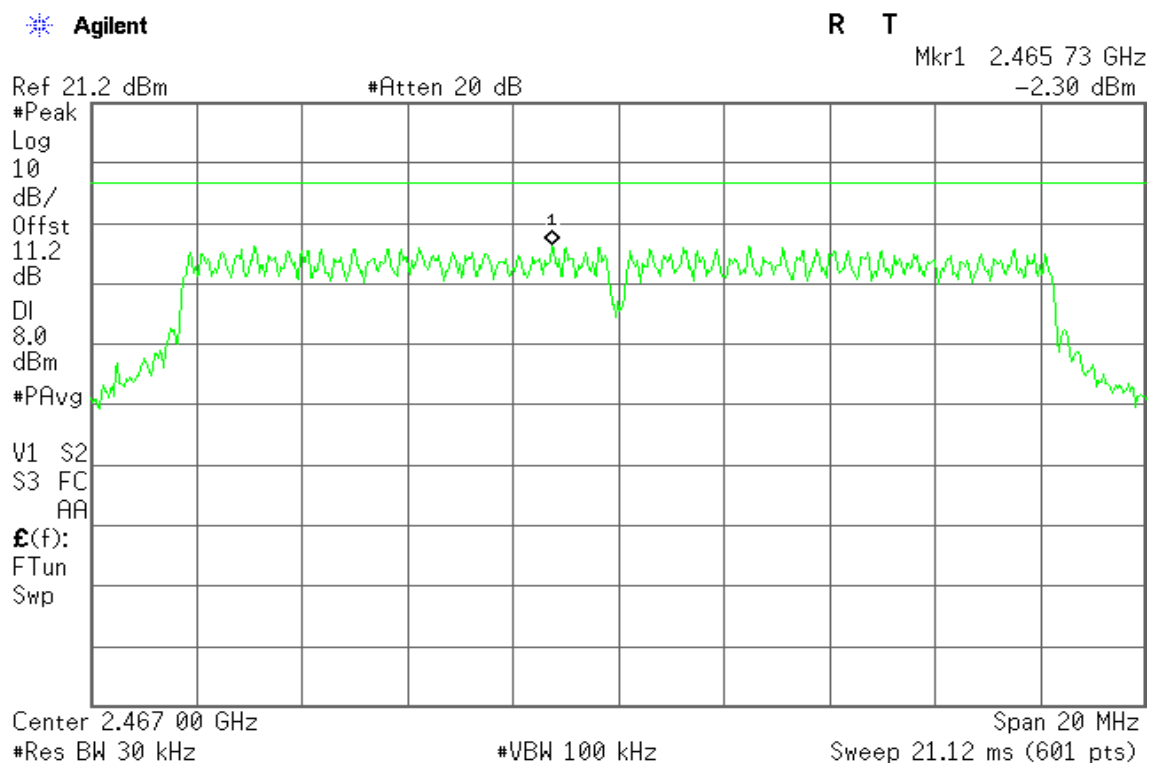
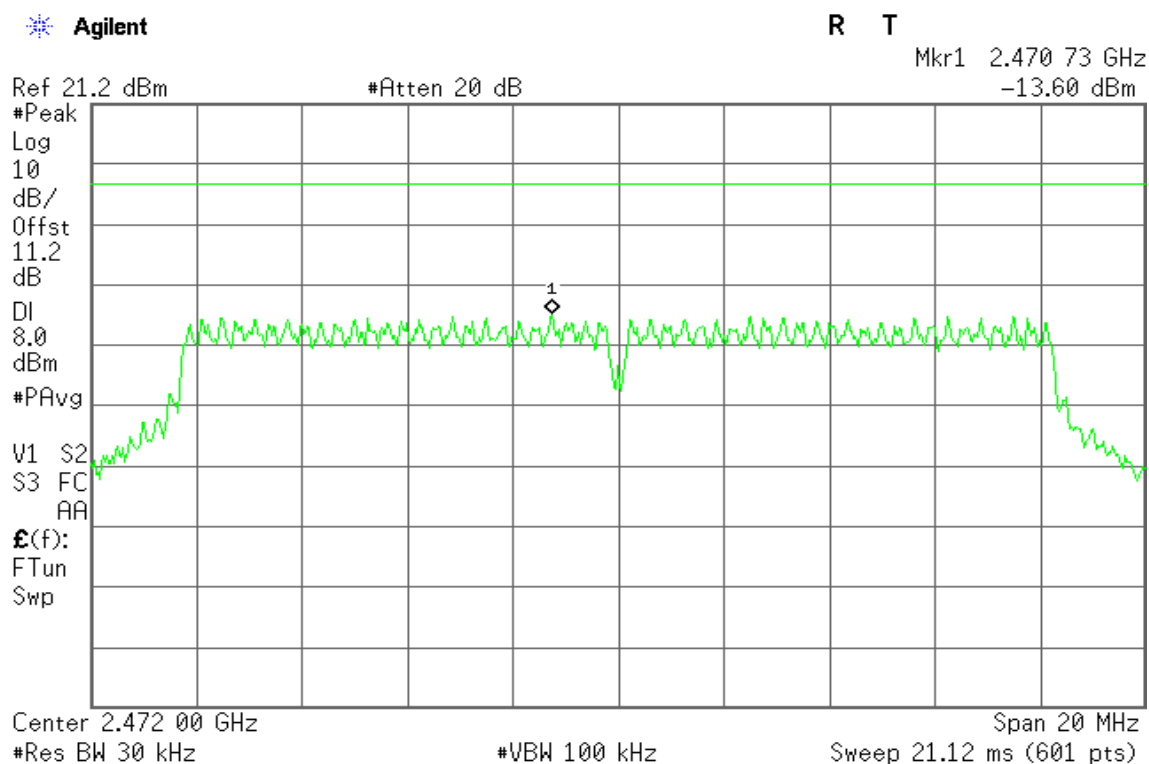


IEEE 802.11g mode / 2462 MHz

PPSD



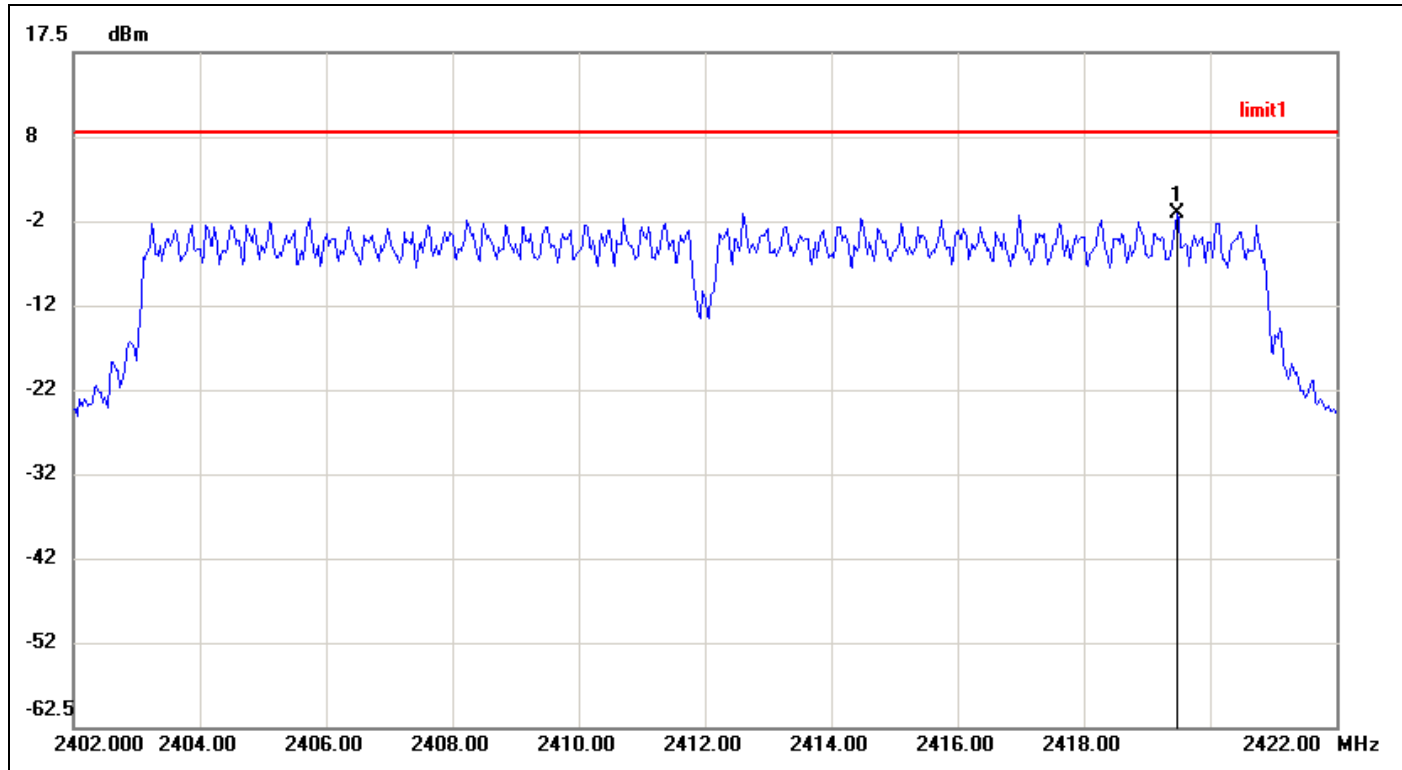
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2463.2333	-2.10	8.00	-10.10

**IEEE 802.11g mode / 2467 MHz****PPSD****IEEE 802.11g mode / 2472 MHz****PPSD**



IEEE 802.11n HT 20 MHz mode / 2412 MHz

PPSD

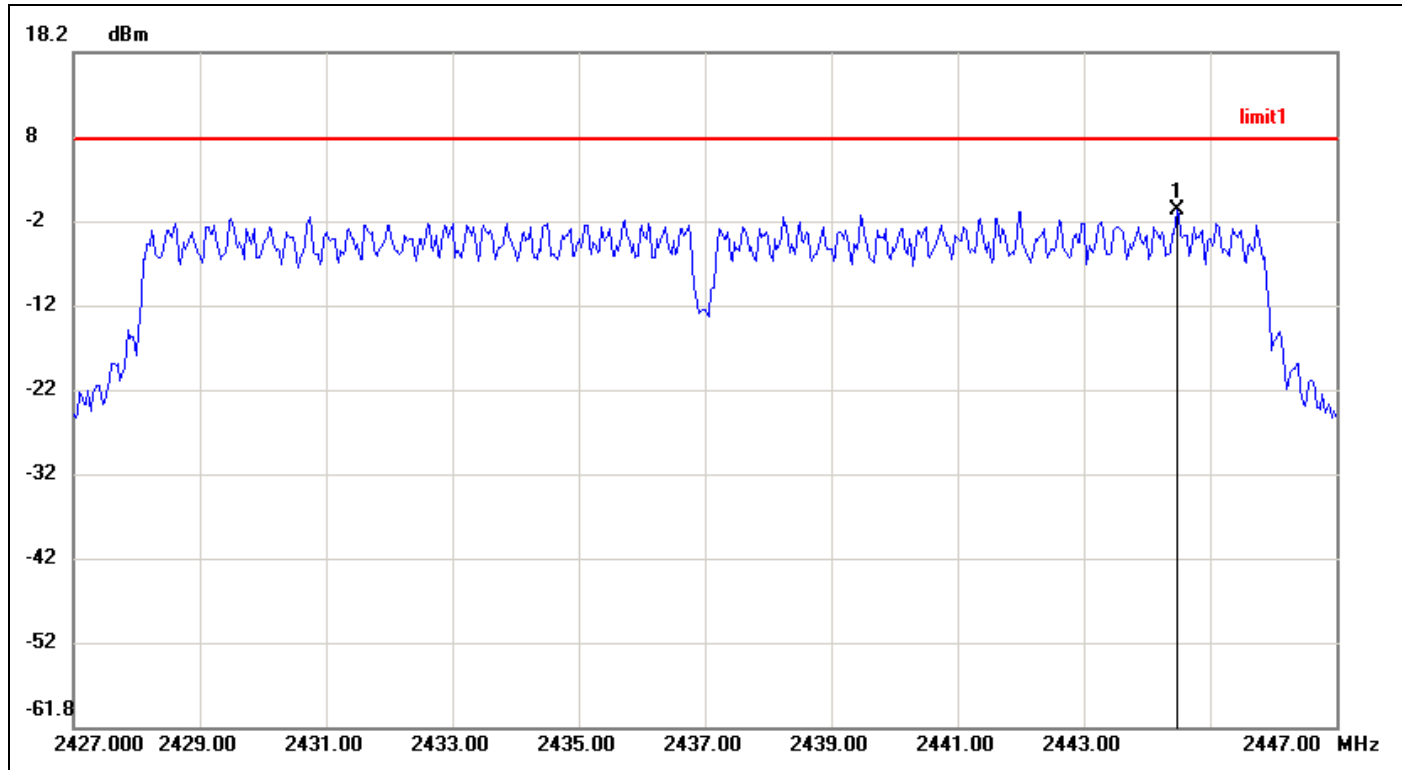


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2419.4667	-1.49	8.00	-9.49



IEEE 802.11n HT 20 MHz mode / 2437 MHz

PPSD

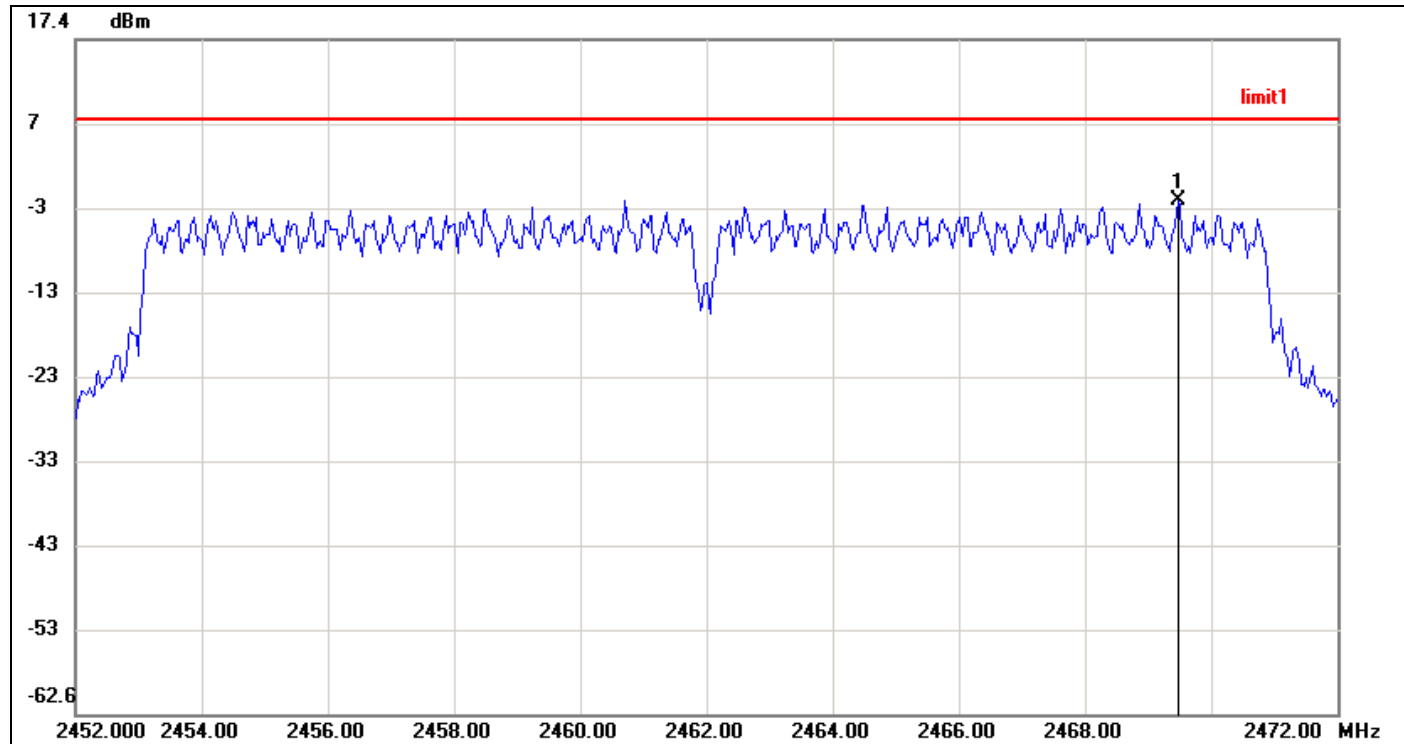


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2444.4667	-0.53	8.00	-8.53



IEEE 802.11n HT 20 MHz mode / 2462 MHz

PPSD

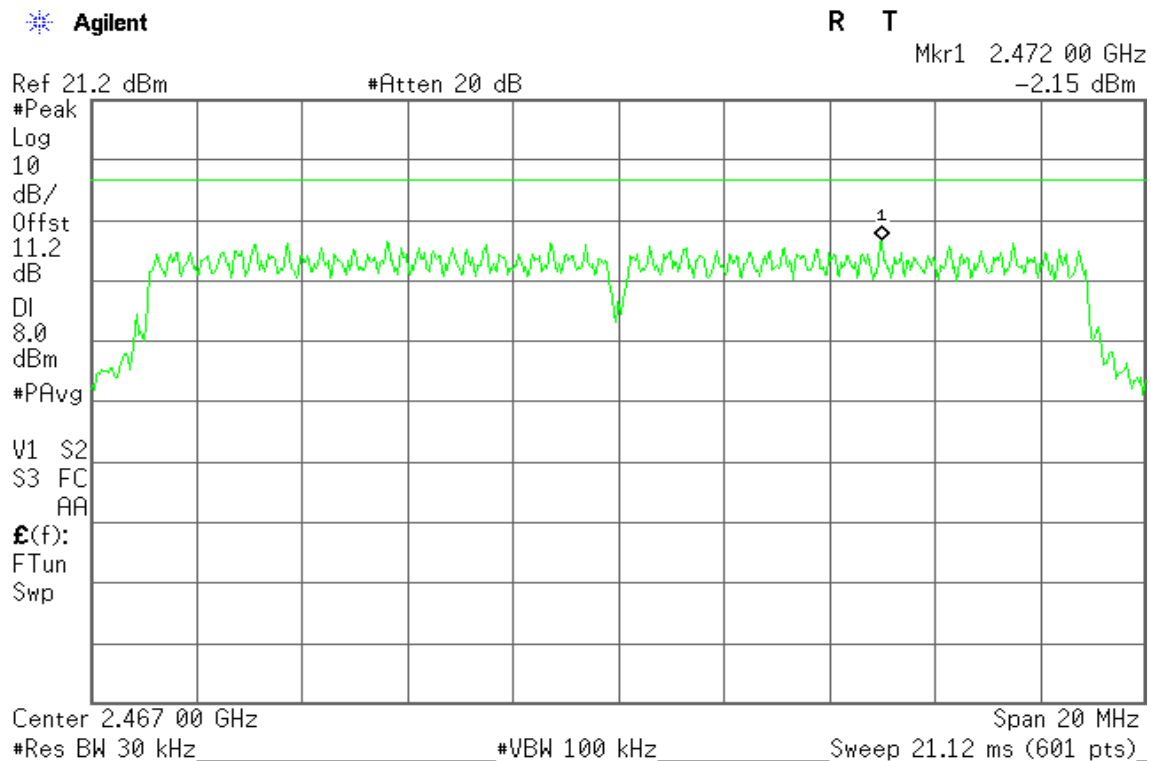


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2469.4667	-1.63	8.00	-9.63



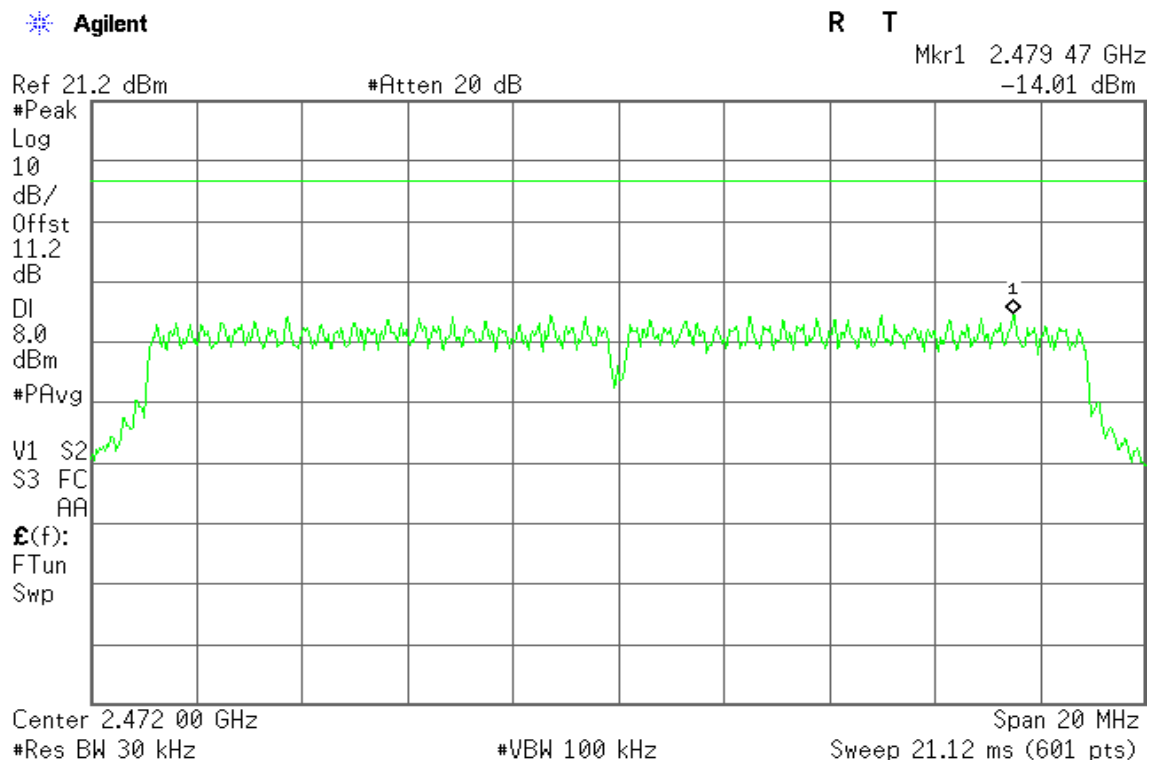
## IEEE 802.11n HT 20 MHz mode / 2467 MHz

## PPSD



## IEEE 802.11n HT 20 MHz mode / 2472 MHz

## PPSD

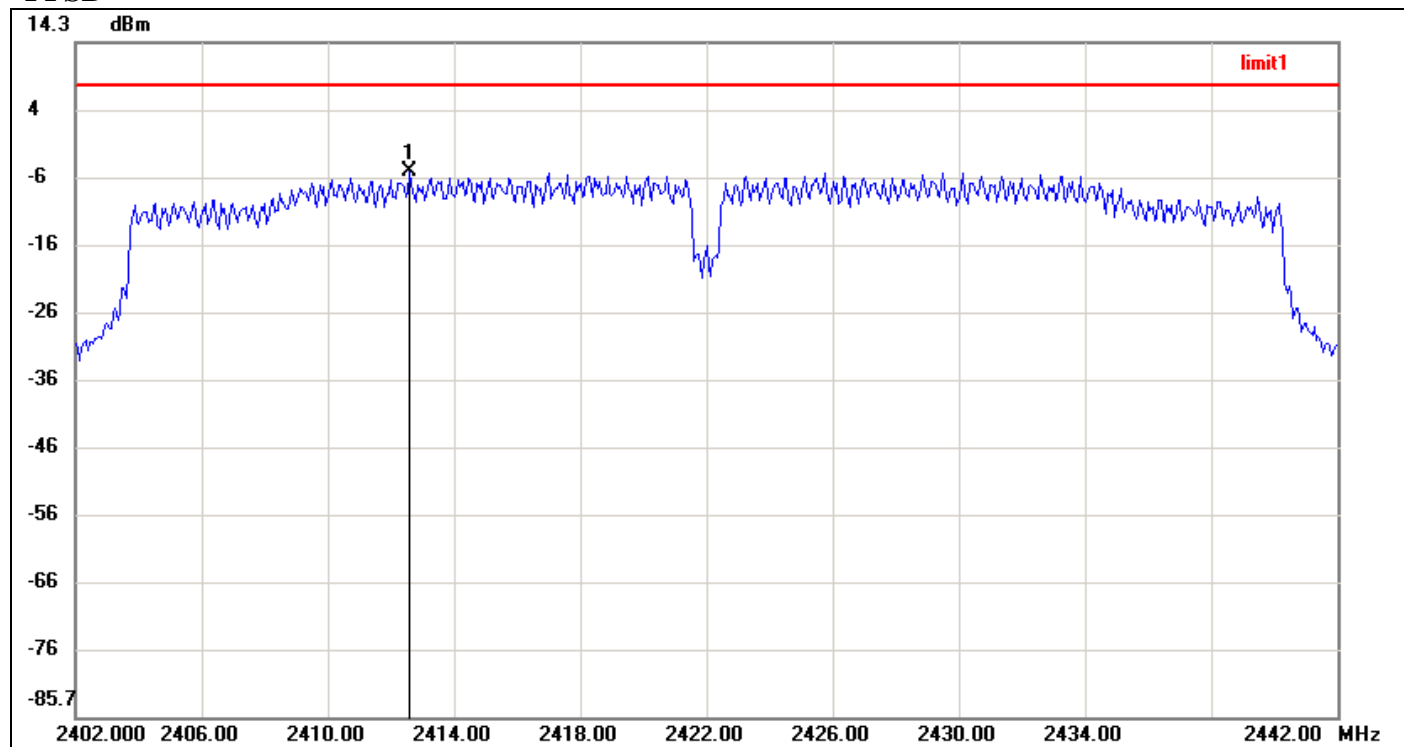






IEEE 802.11n HT 40 mode / 2422 MHz

PPSD

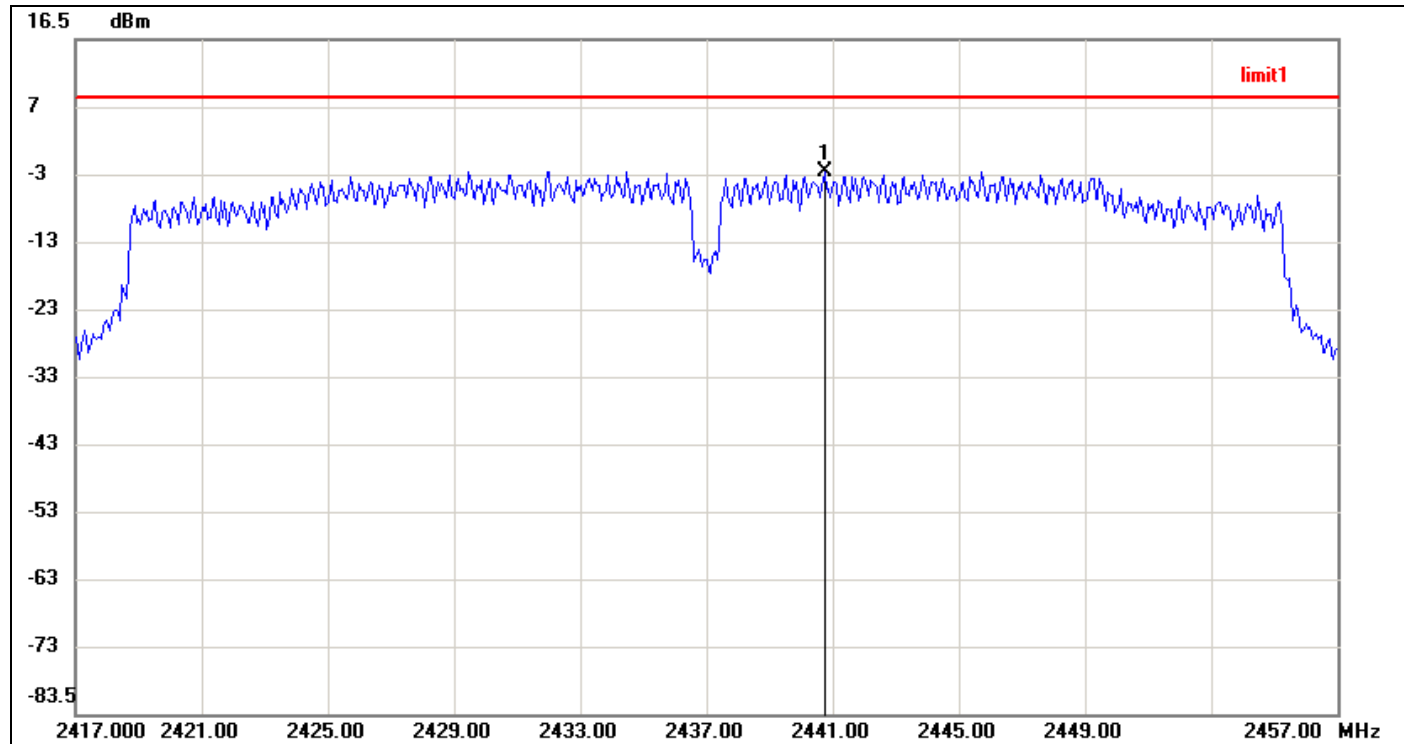


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2412.6000	-4.81	8.00	-12.81



IEEE 802.11n HT 40 mode / 2437 MHz

PPSD

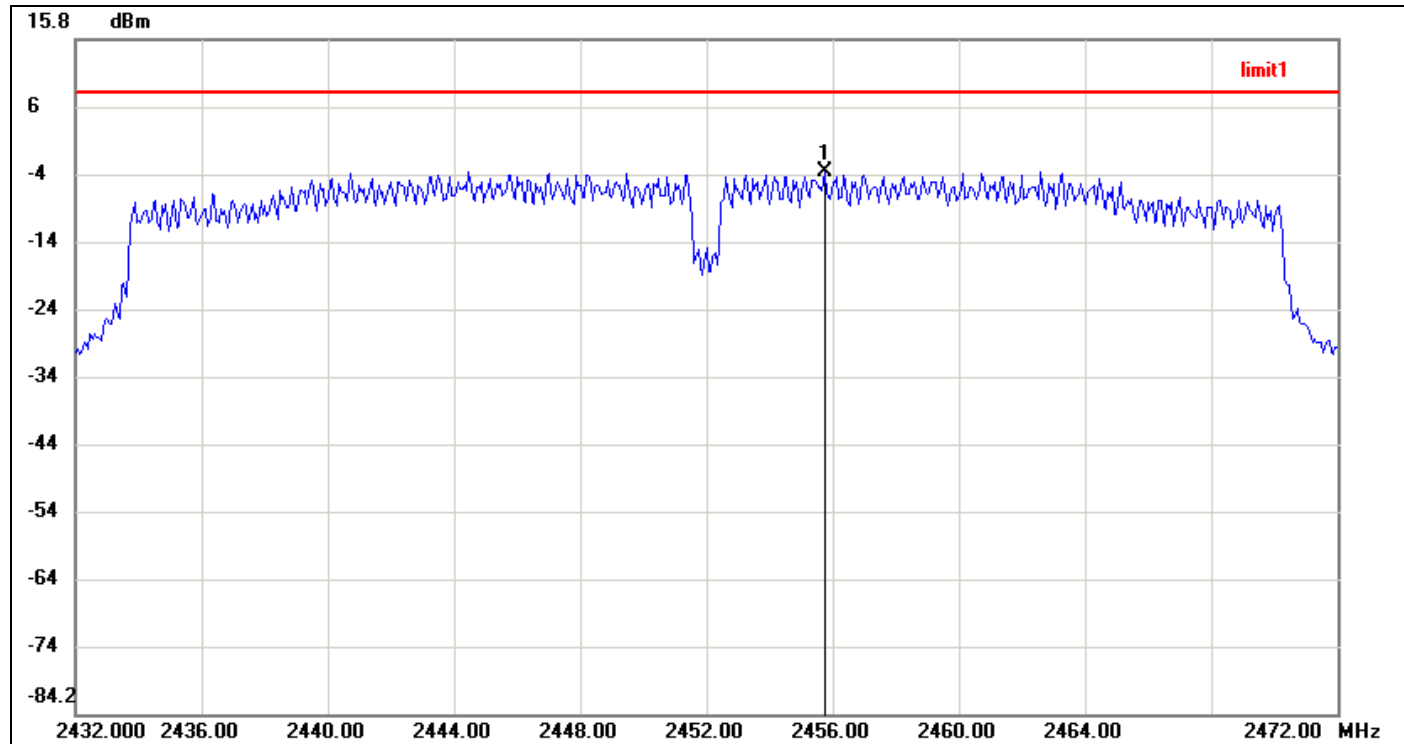


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2440.7333	-3.00	8.00	-11.00



IEEE 802.11n HT 40 mode / 2452 MHz

PPSD

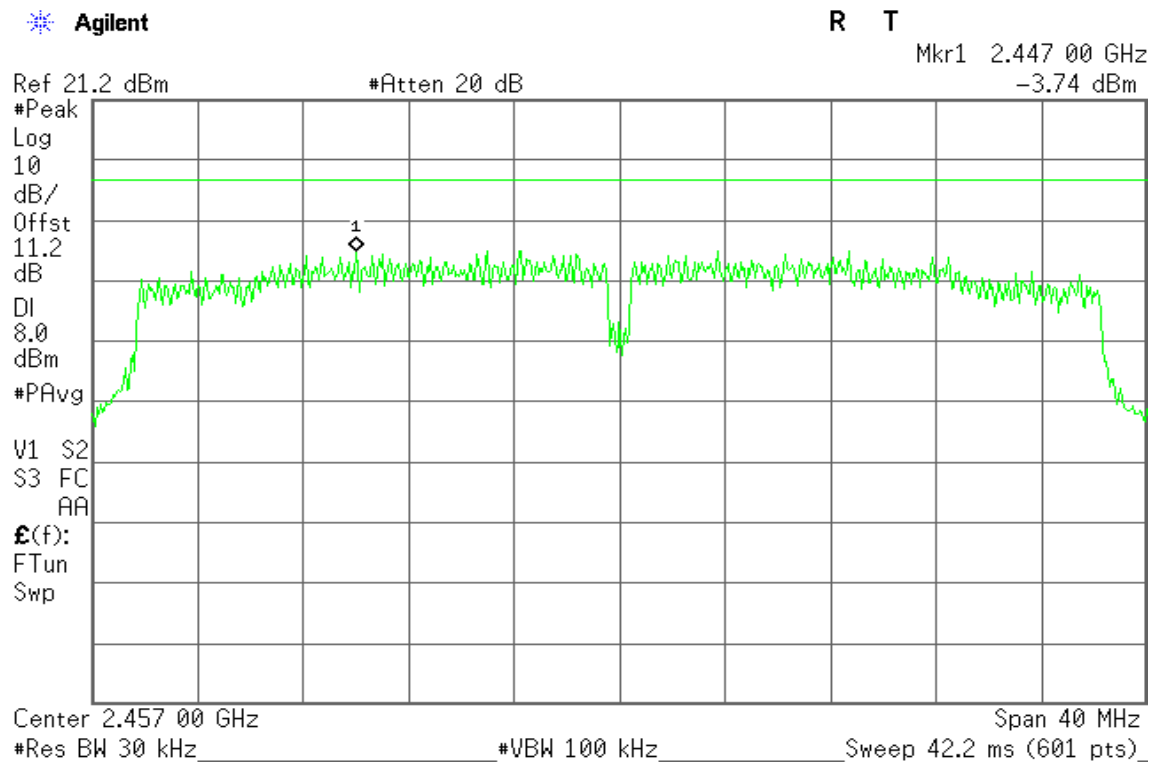


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2455.7333	-3.84	8.00	-11.84



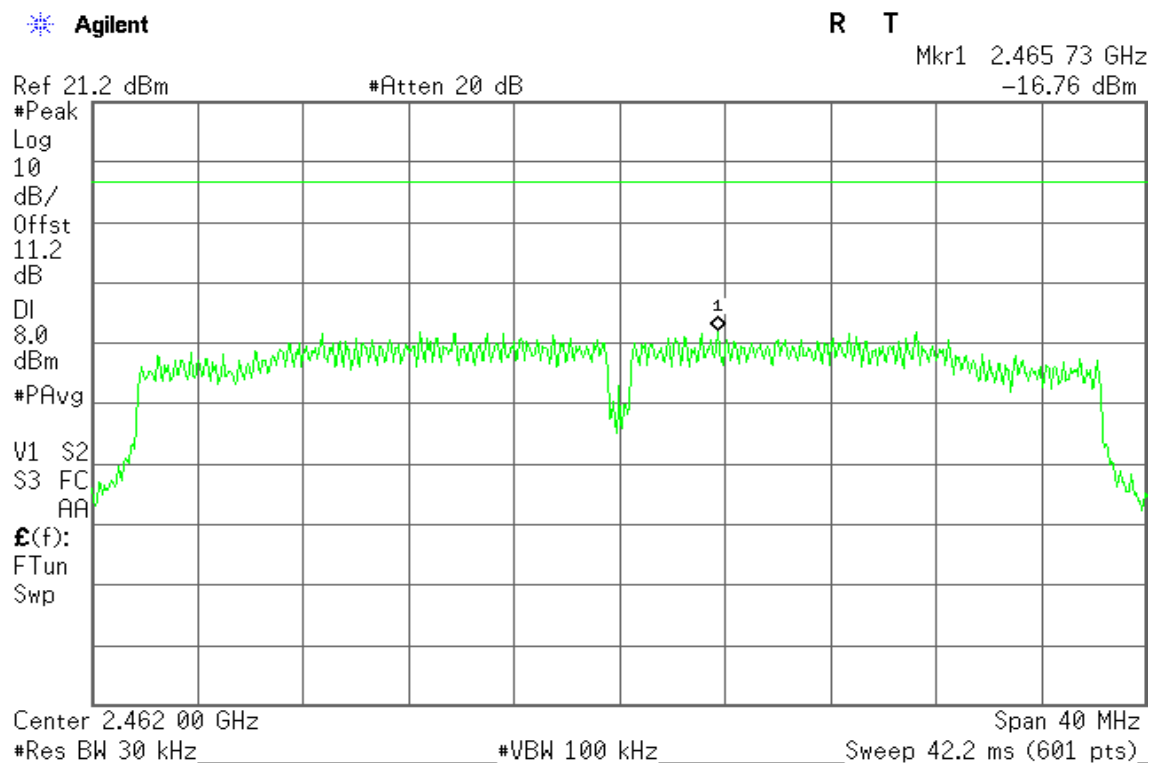
## IEEE 802.11n HT 40 mode / 2457 MHz

## PPSD



## IEEE 802.11n HT 40 mode / 2462 MHz

## PPSD





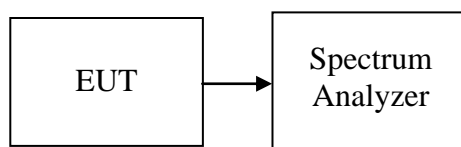
## 7.6 SPURIOUS EMISSIONS

### 7.6.1 Conducted Measurement

#### **LIMIT**

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a) (see Section 15.205(c)).

#### **Test Configuration**



#### **TEST PROCEDURE**

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

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

Measurements are made over the 13GHz to 26GHz range with the transmitter set to the lowest, middle, and highest channels.

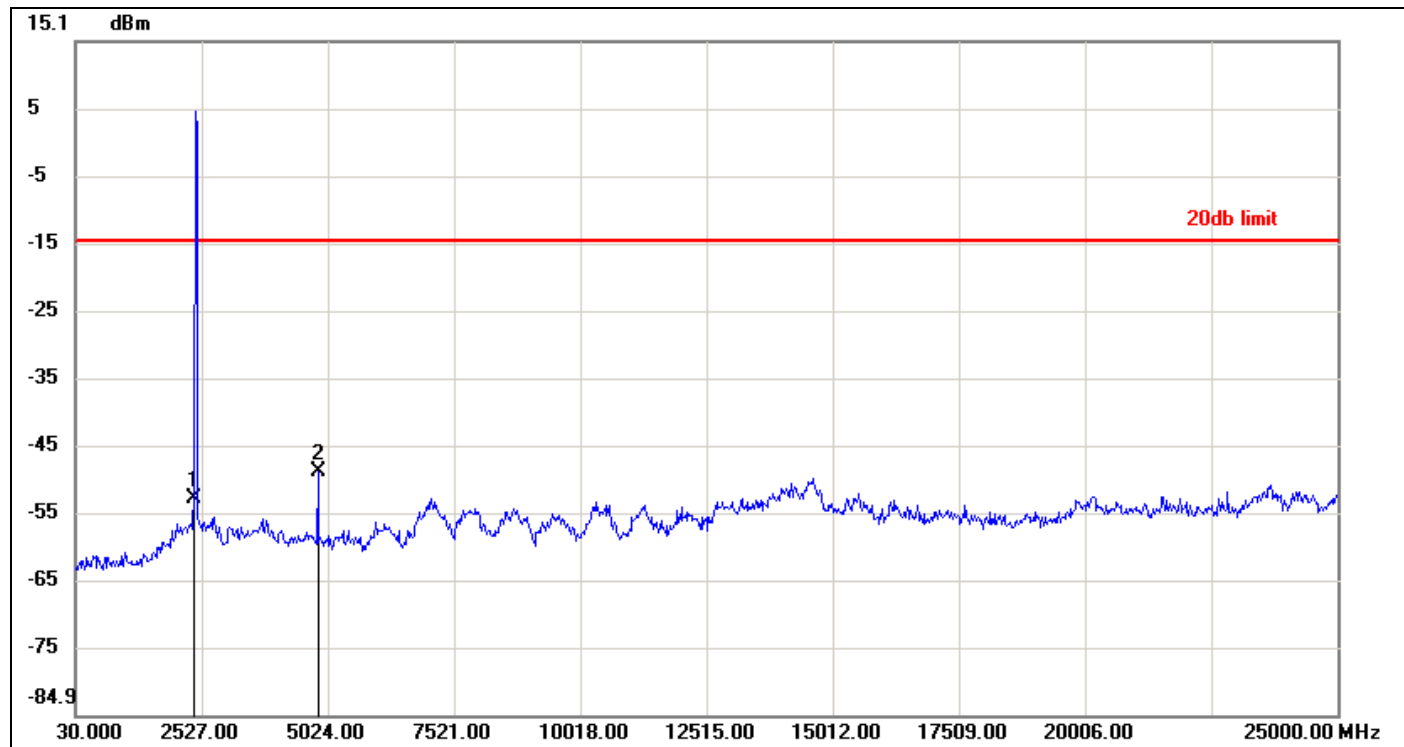
#### **TEST RESULTS**

*No non-compliance noted.*



**Test Plot**

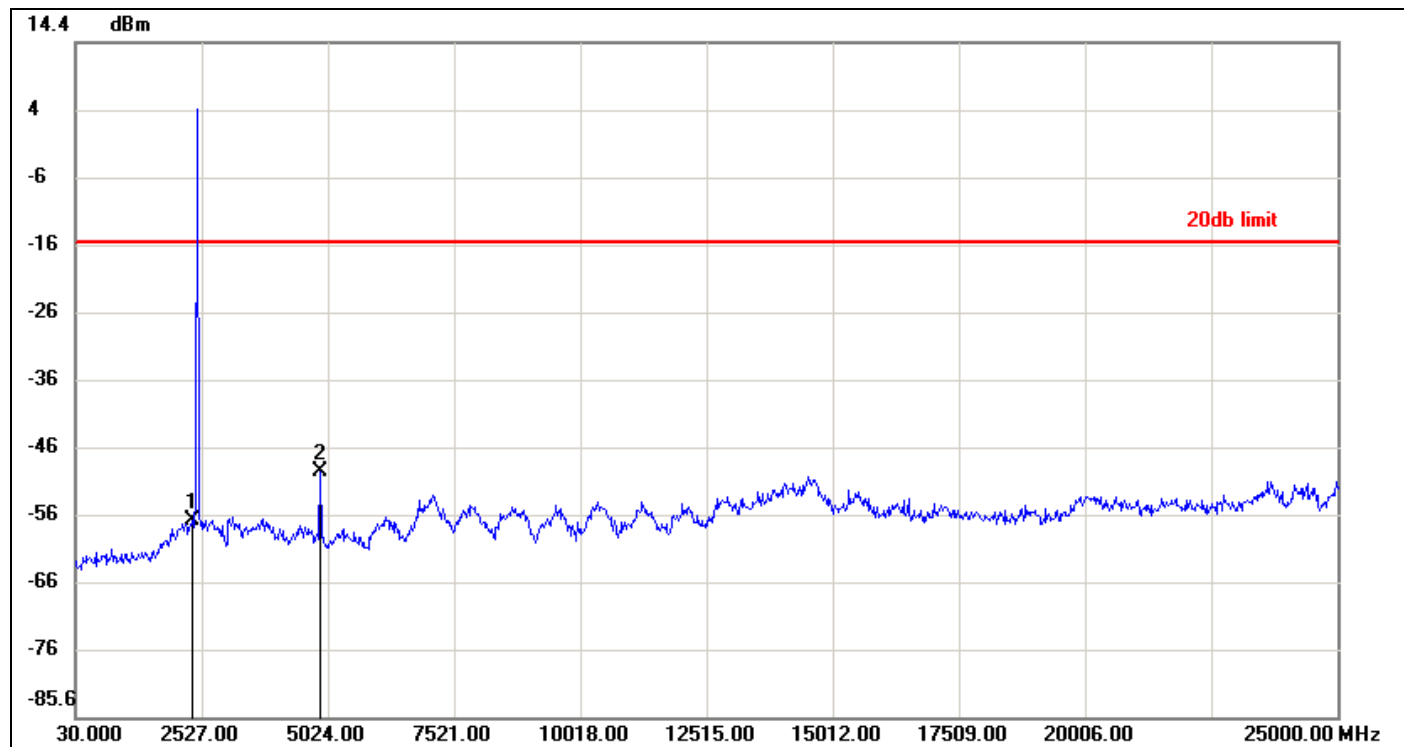
**IEEE 802.11b mode / 2412 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-52.66	-14.48	-38.18
2	4824.2400	-48.71	-14.48	-34.23



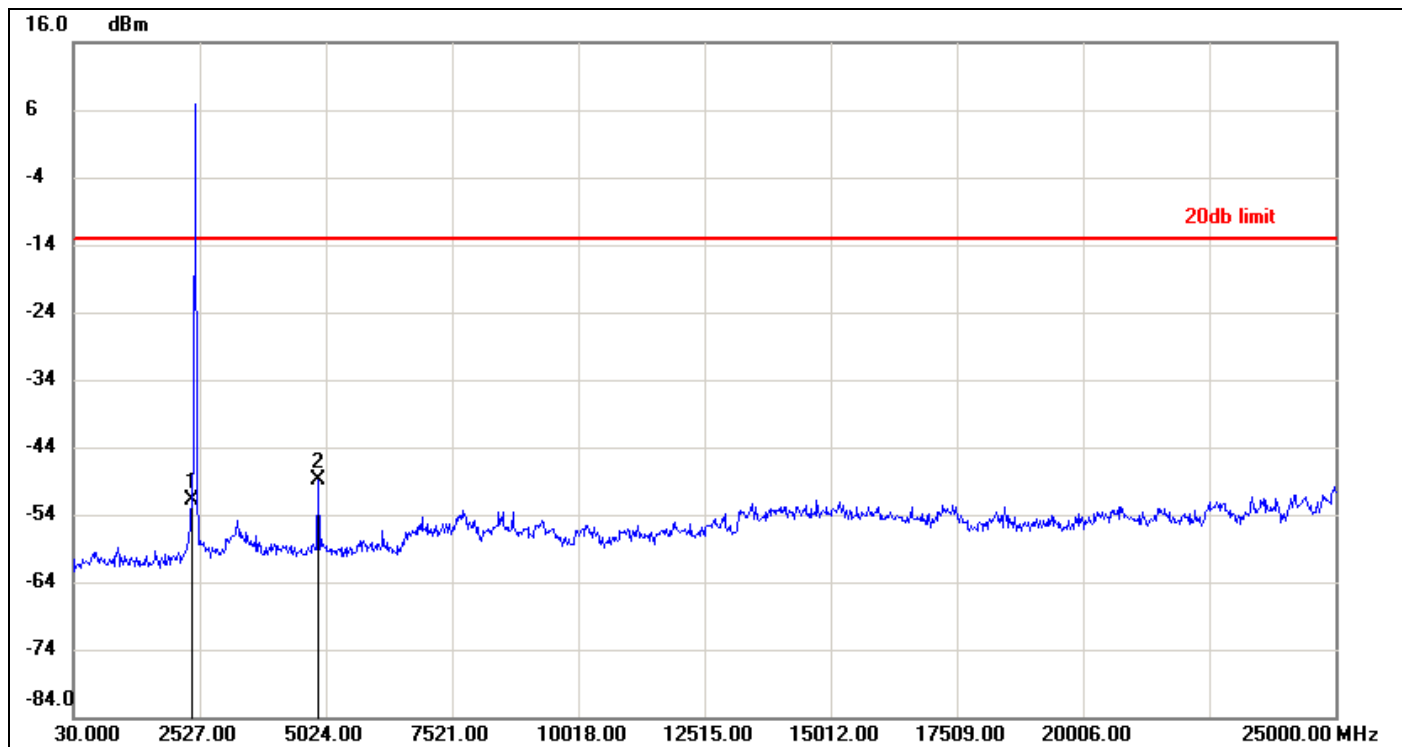
**IEEE 802.11b mode / 2437 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2352.2100	-56.39	-15.24	-41.15
2	4874.1800	-49.24	-15.24	-34.00



**IEEE 802.11b mode / 2462 MHz**

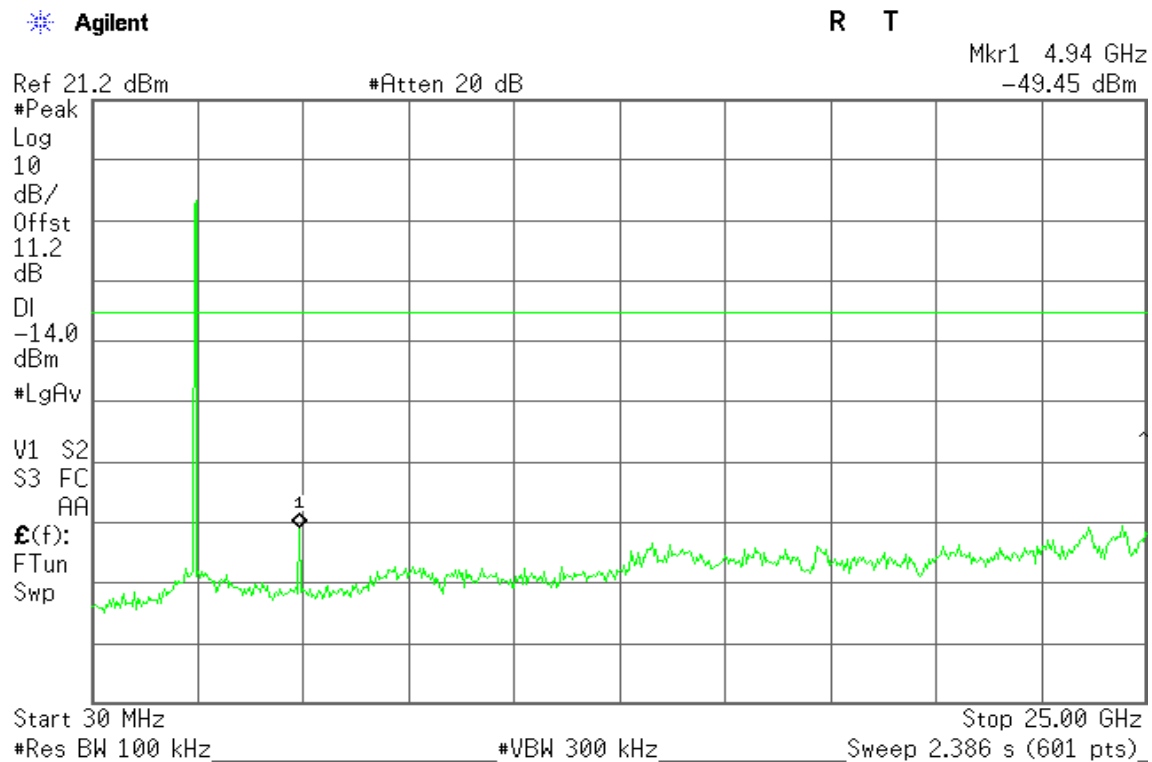


No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-51.93	-13.23	-38.70
2	4874.1800	-48.79	-13.23	-35.56

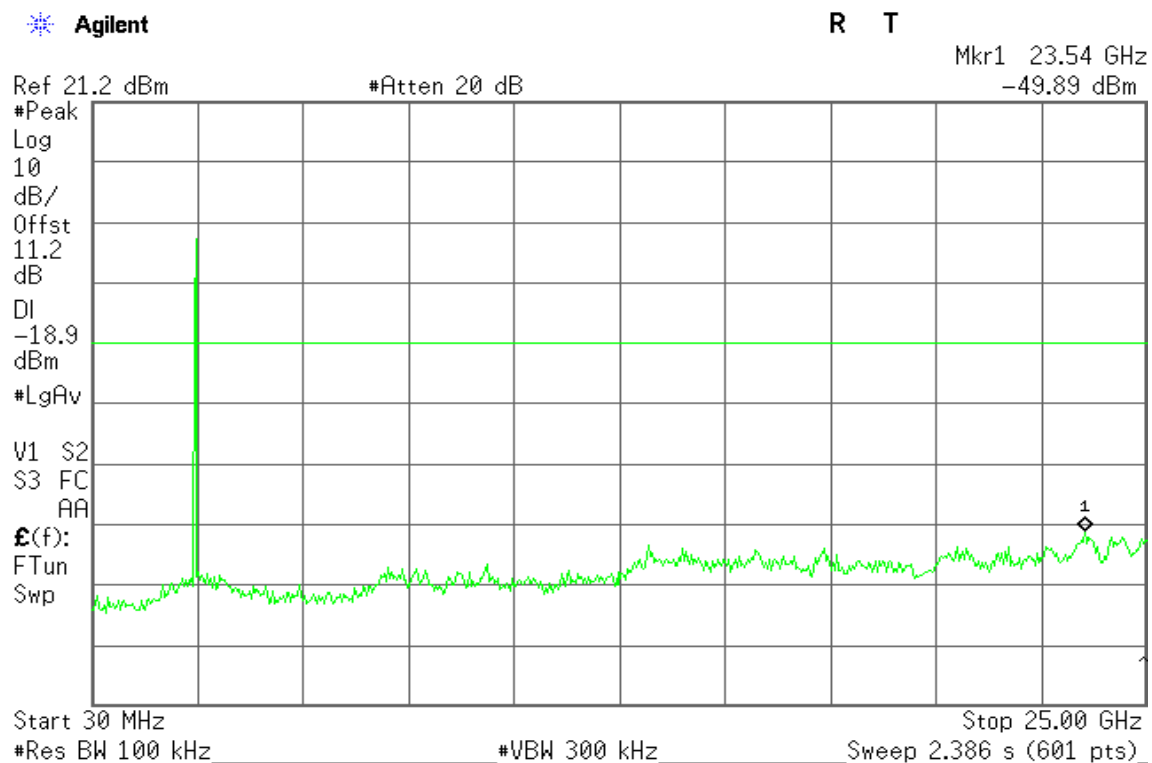




### IEEE 802.11b mode / 2467 MHz

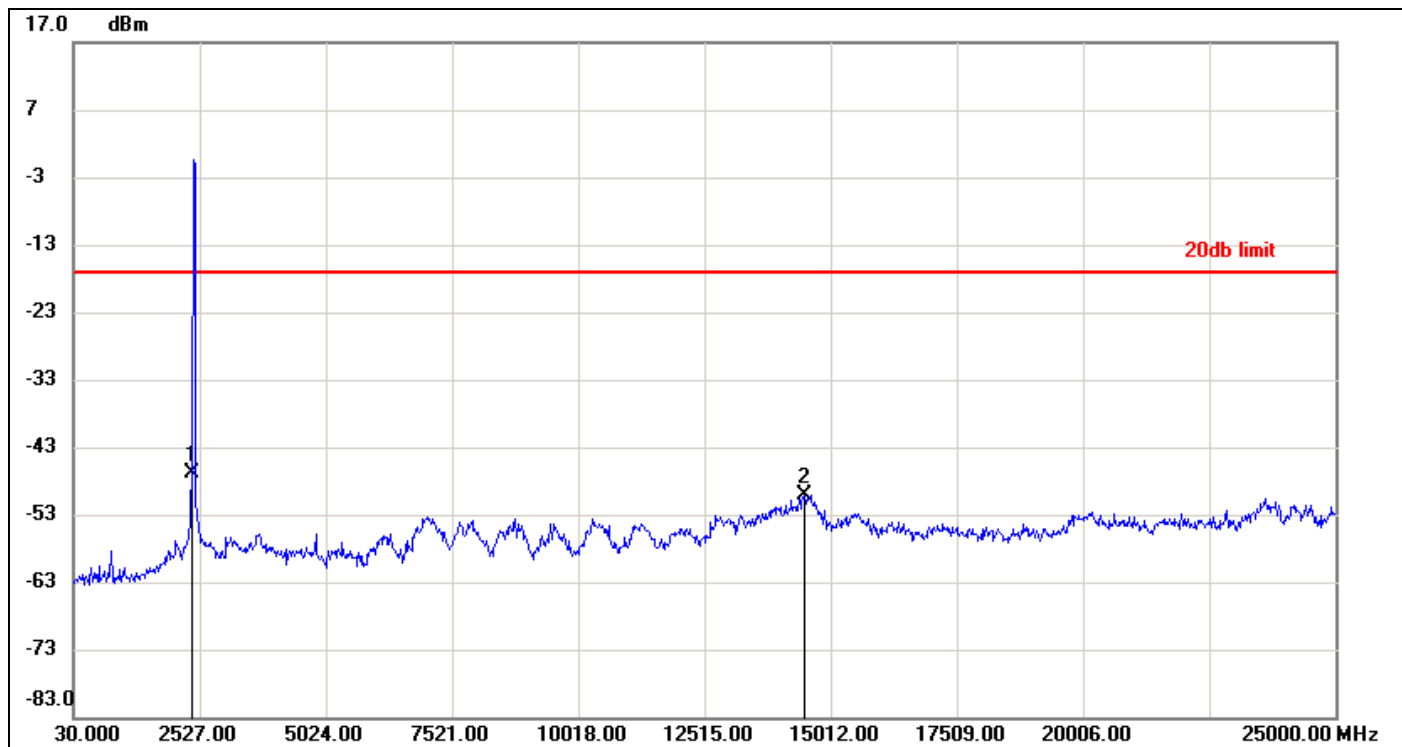


### IEEE 802.11b mode / 2472 MHz





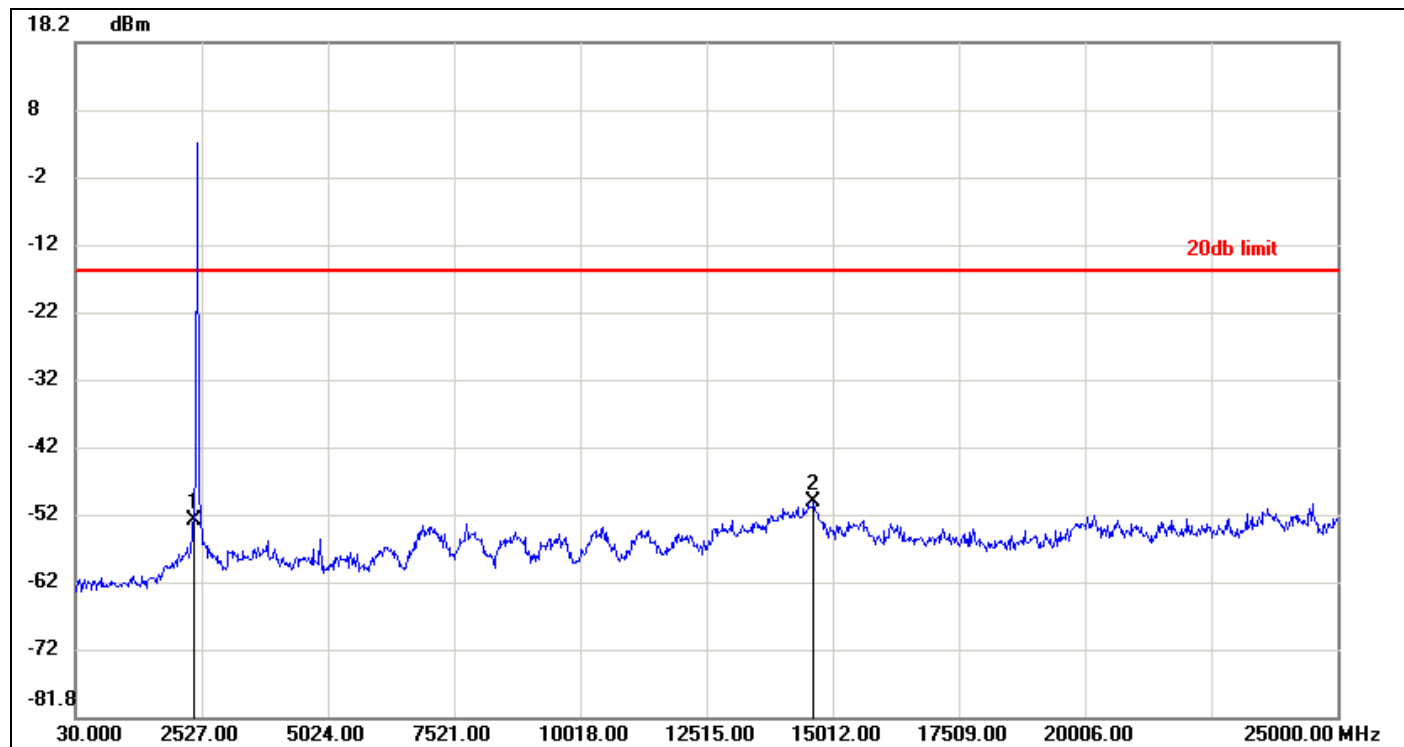
**IEEE 802.11g mode / 2412 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-46.95	-16.99	-29.96
2	14487.6300	-50.07	-16.99	-33.08



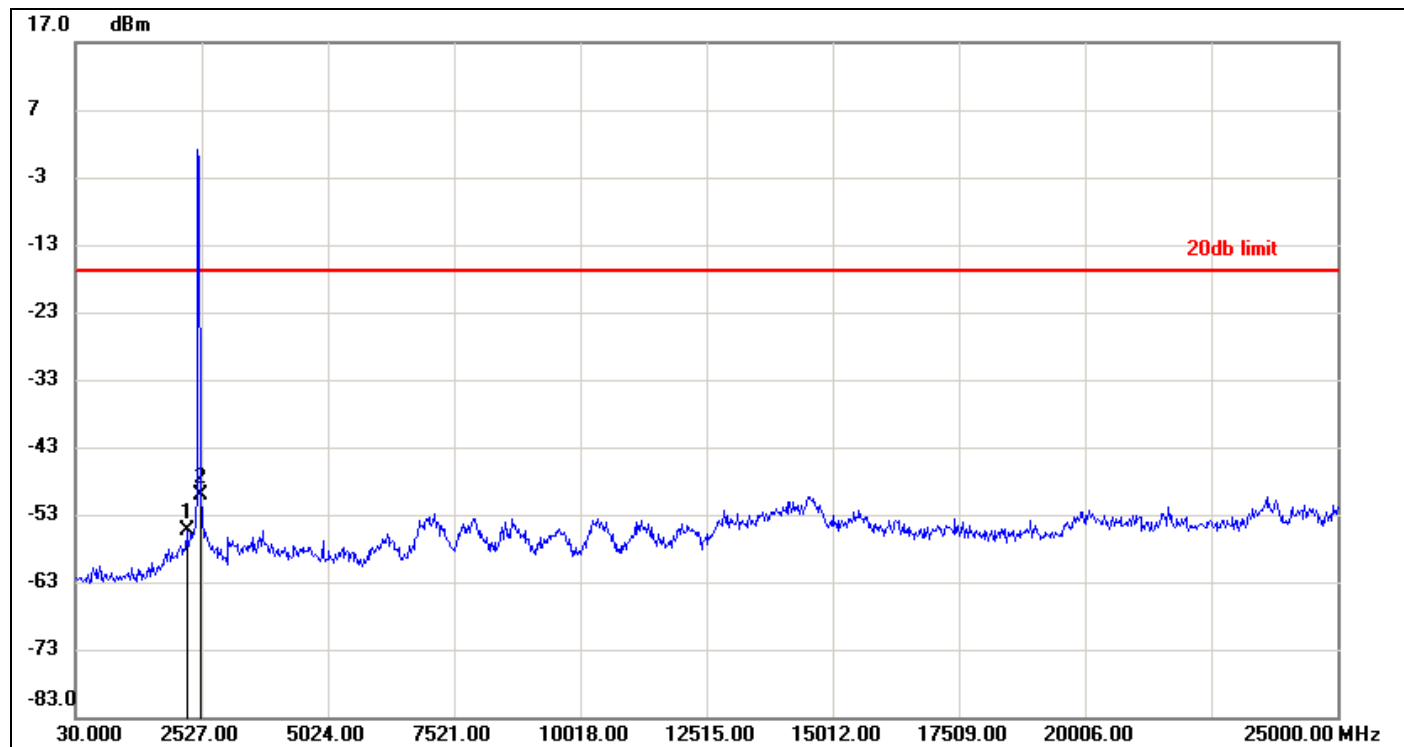
**IEEE 802.11g mode / 2437 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-52.78	-15.78	-37.00
2	14637.4500	-49.98	-15.78	-34.20



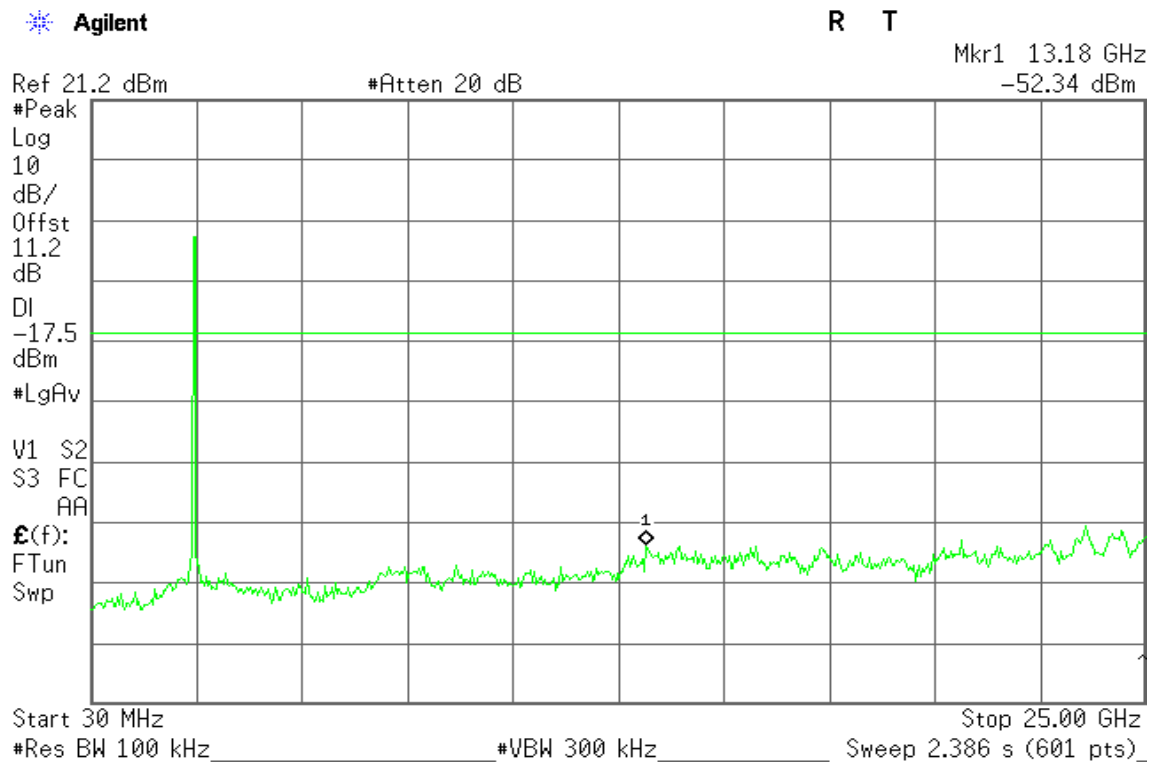
**IEEE 802.11g mode / 2462 MHz**



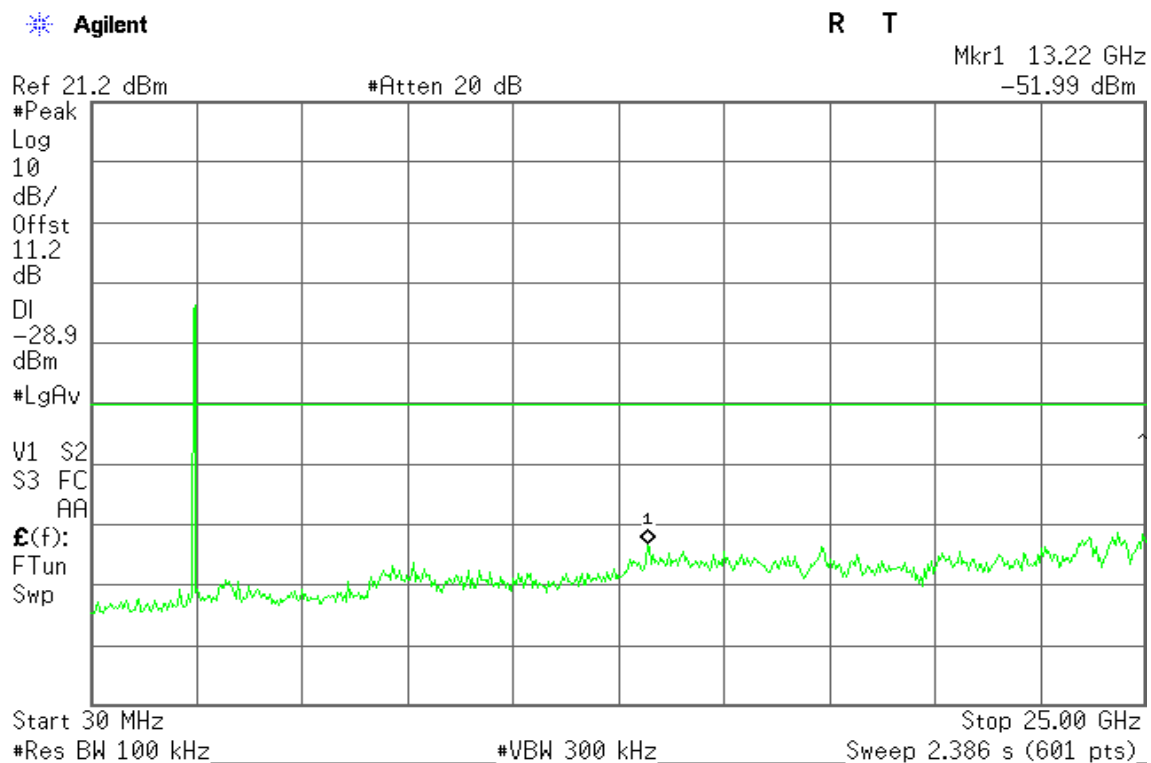
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2227.3600	-55.45	-16.76	-38.69
2	2502.0300	-50.01	-16.76	-33.25



### IEEE 802.11g mode / 2467 MHz

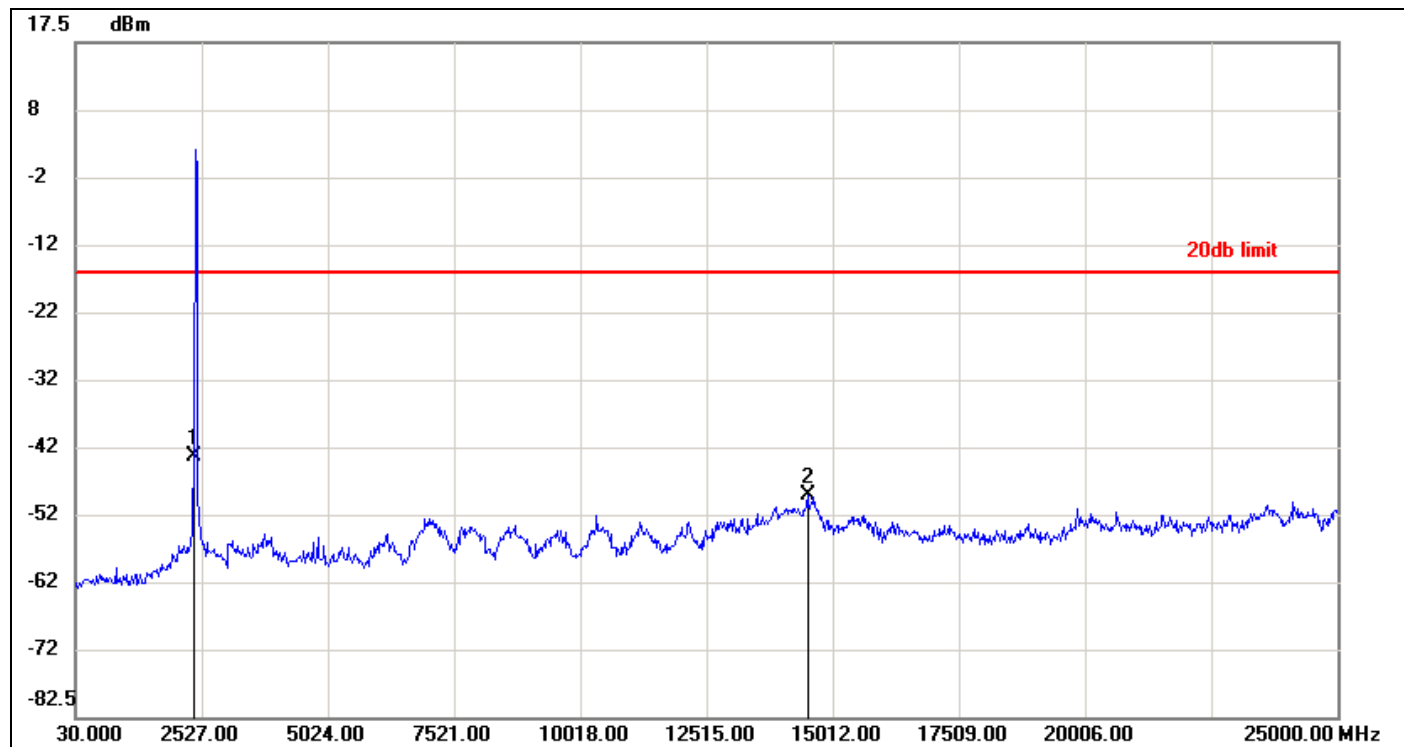


### IEEE 802.11g mode / 2472 MHz





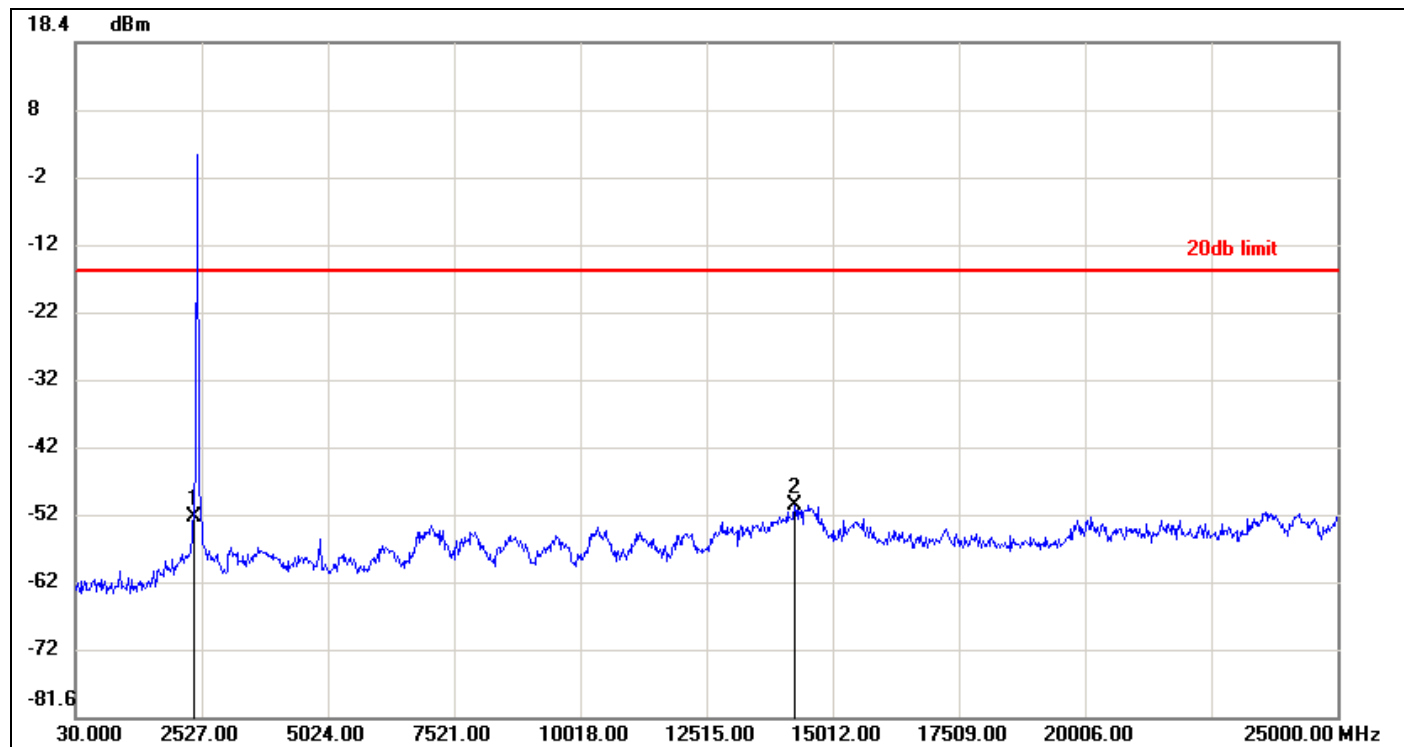
**IEEE 802.11n HT 20 MHz mode / 2412 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-43.74	-16.51	-27.23
2	14512.6000	-49.52	-16.51	-33.01



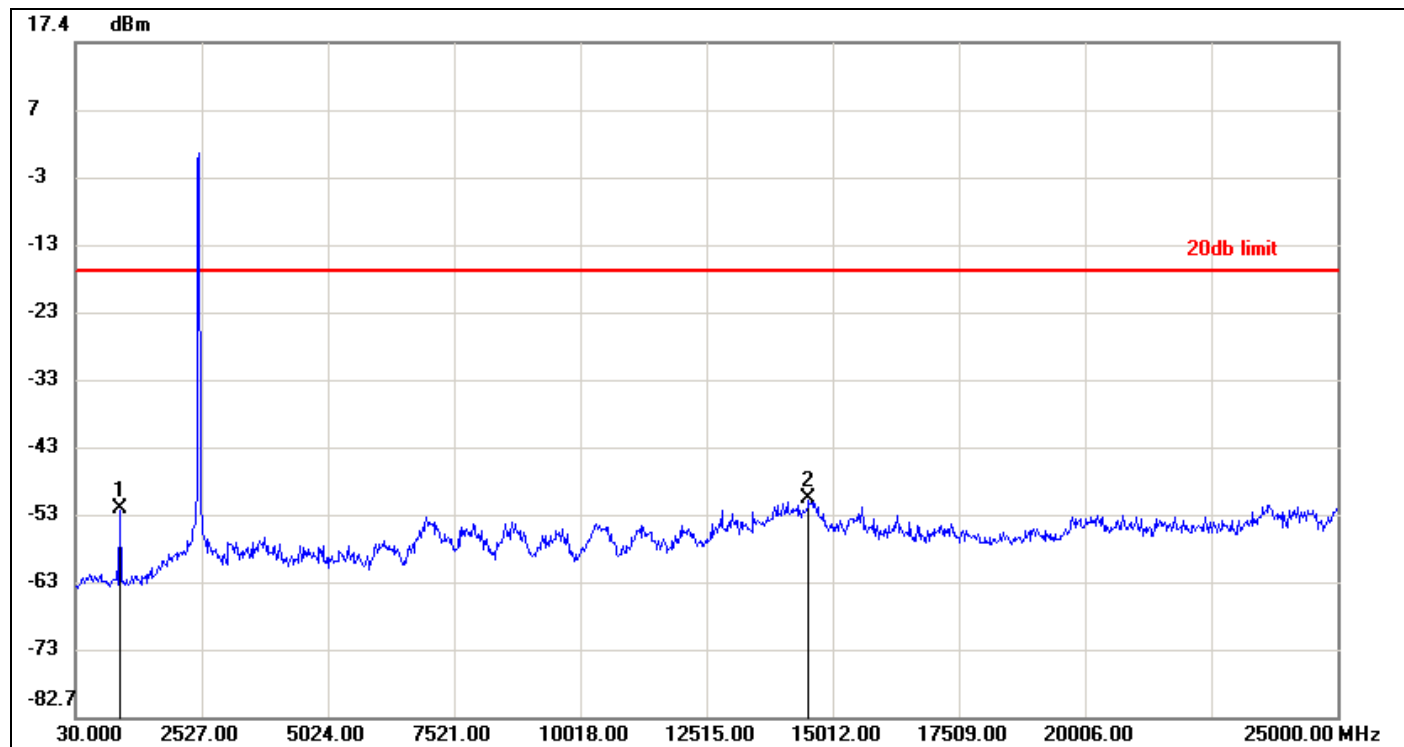
**IEEE 802.11n HT 20 MHz mode / 2437 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-51.83	-15.34	-36.49
2	14262.9000	-50.26	-15.34	-34.92

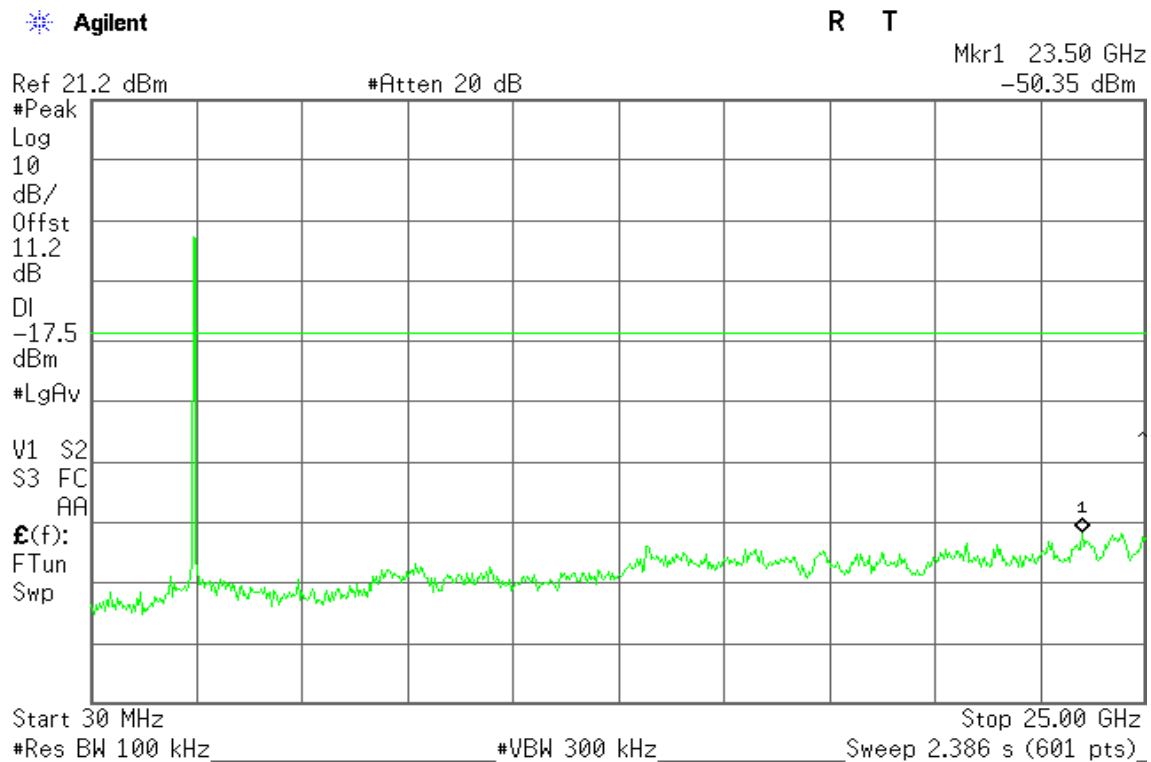
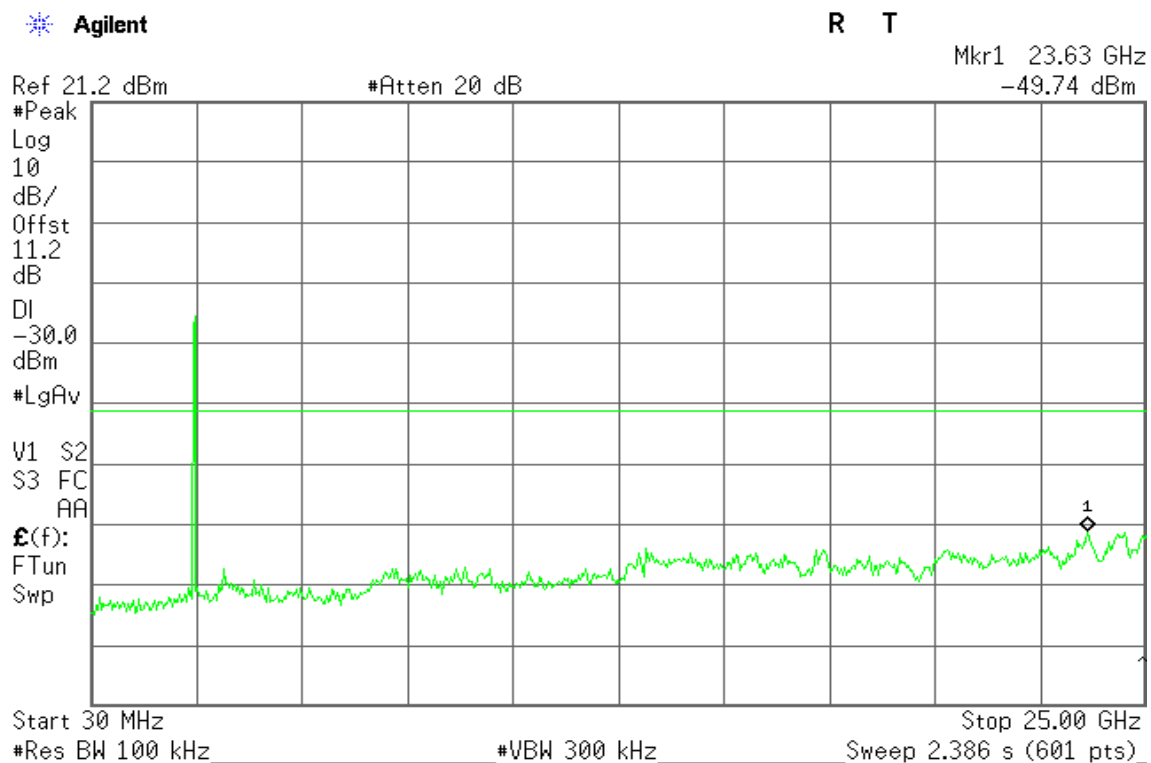


**IEEE 802.11n HT 20 MHz mode / 2462 MHz**



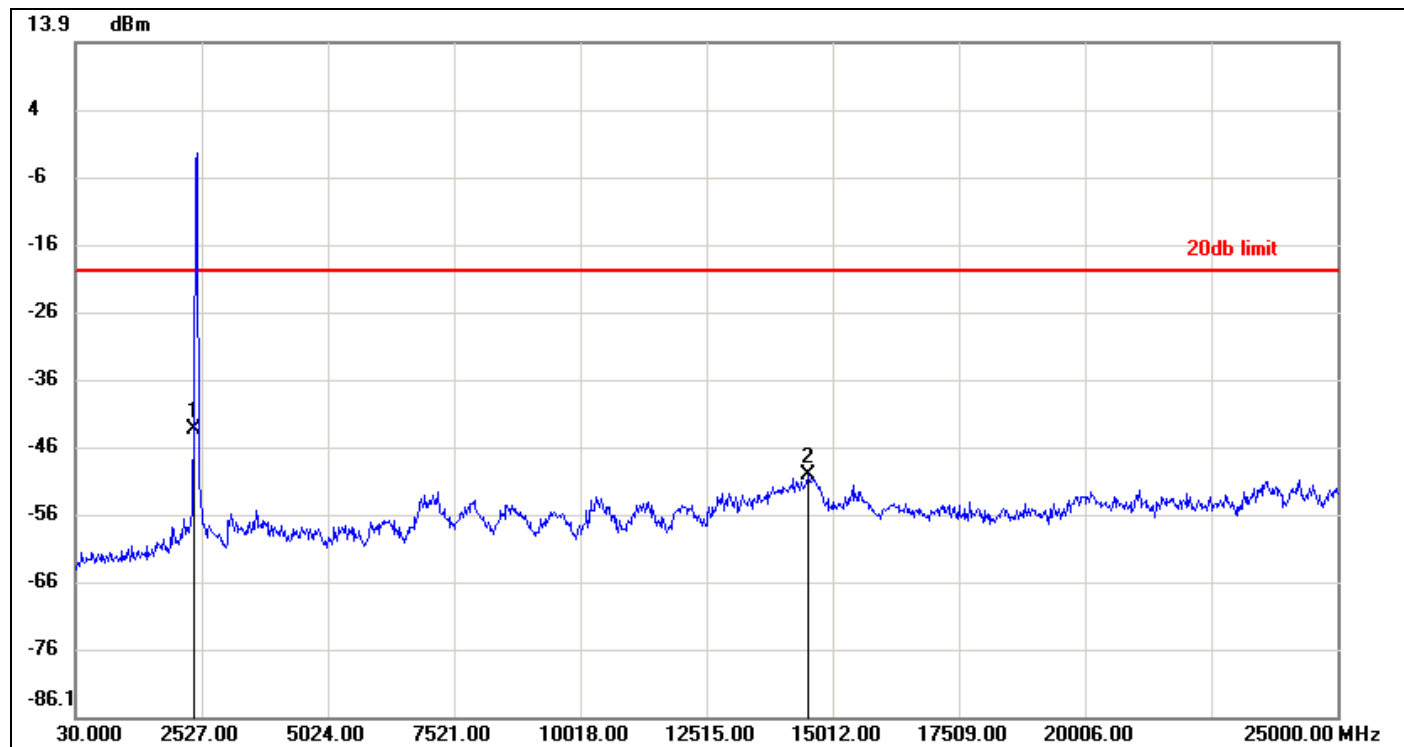
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	903.9500	-51.90	-16.60	-35.30
2	14537.5700	-50.40	-16.60	-33.80



**IEEE 802.11n HT 20 MHz mode / 2467 MHz****IEEE 802.11n HT 20 MHz mode / 2472 MHz**



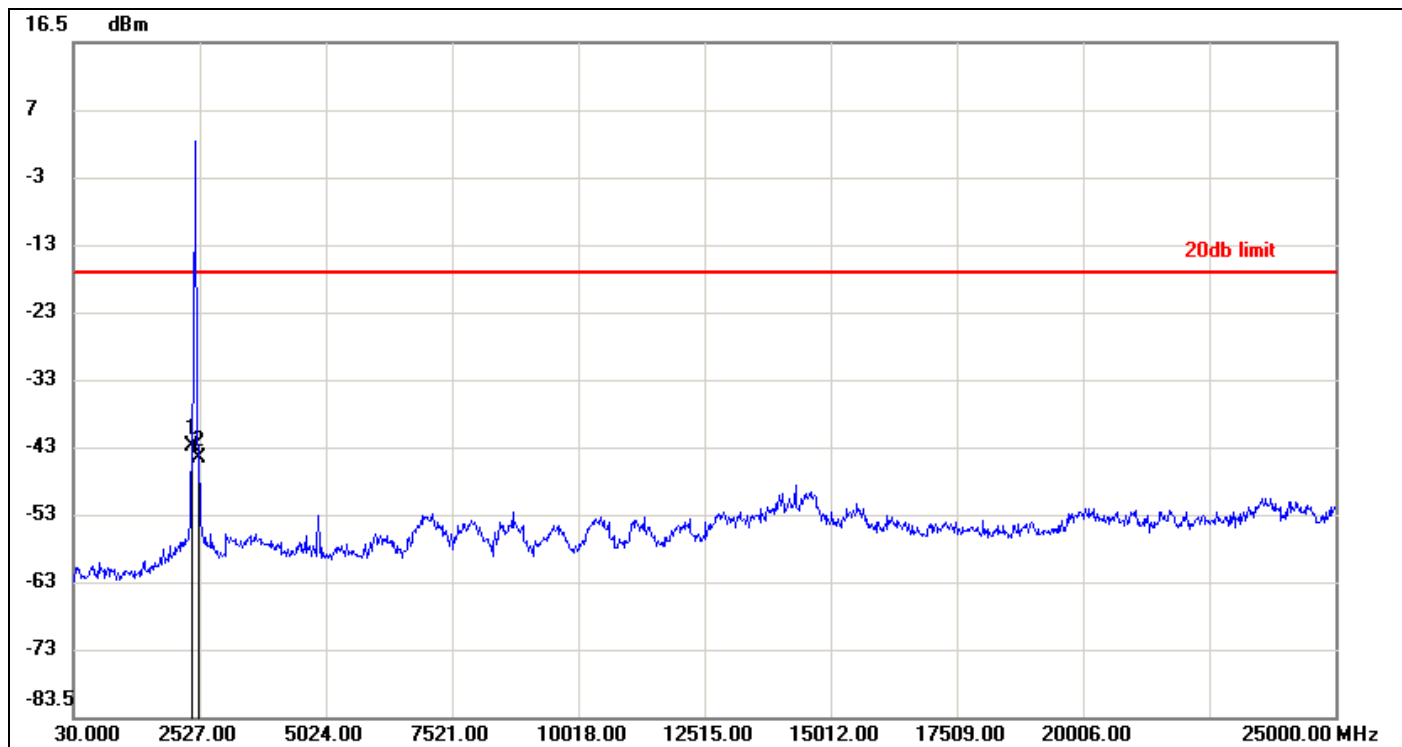
**IEEE 802.11n HT 40 mode / 2422 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-43.45	-20.08	-23.37
2	14537.5700	-50.25	-20.08	-30.17



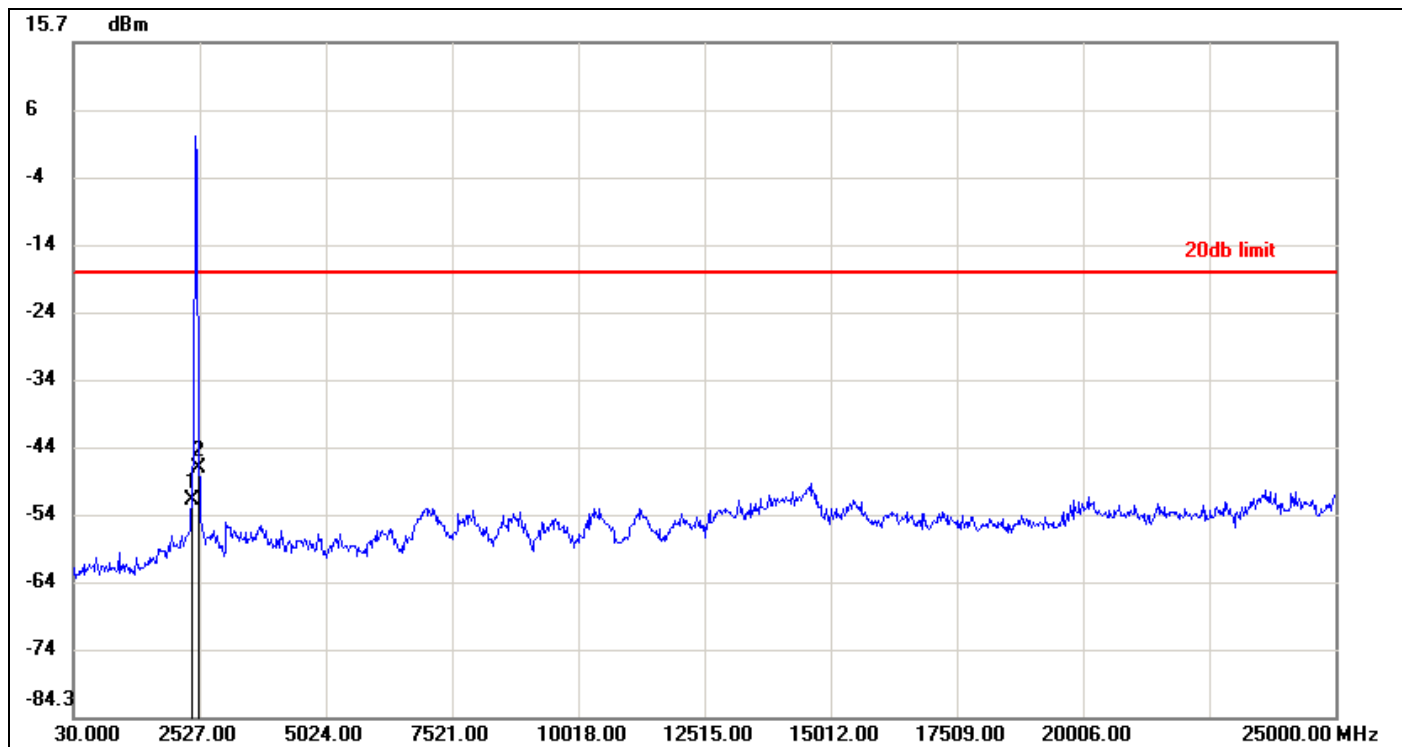
**IEEE 802.11n HT 40 mode / 2437 MHz**



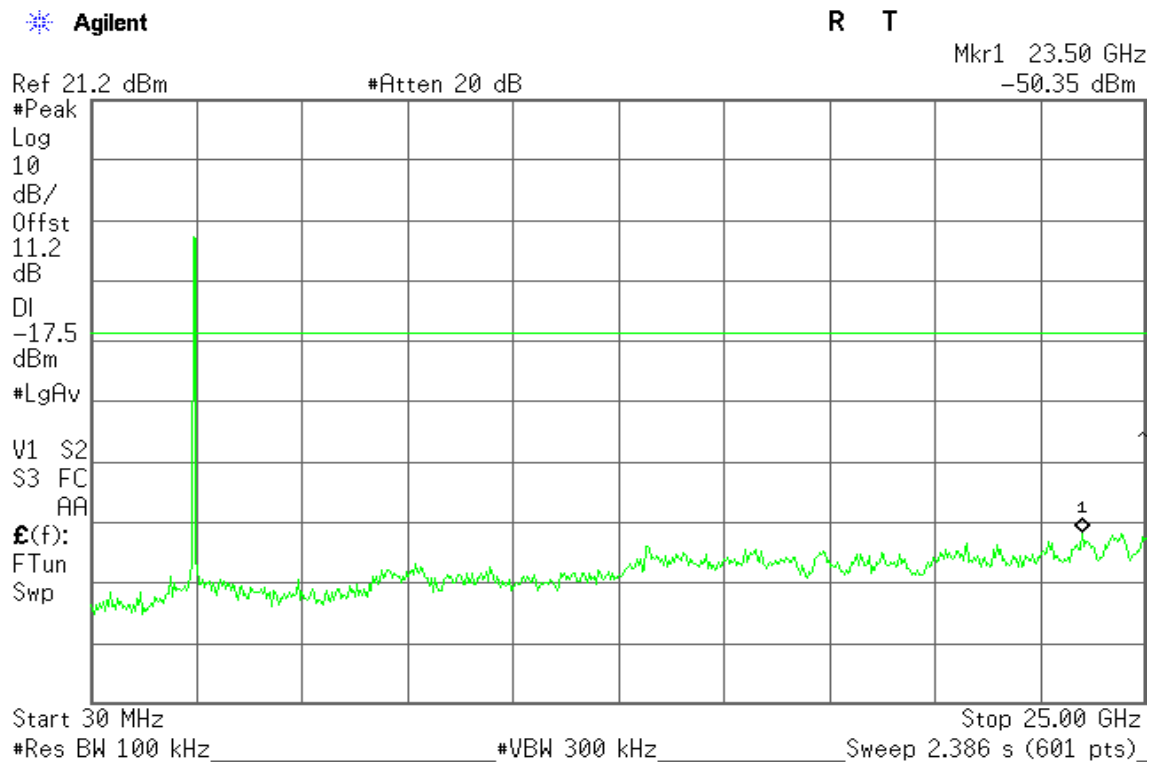
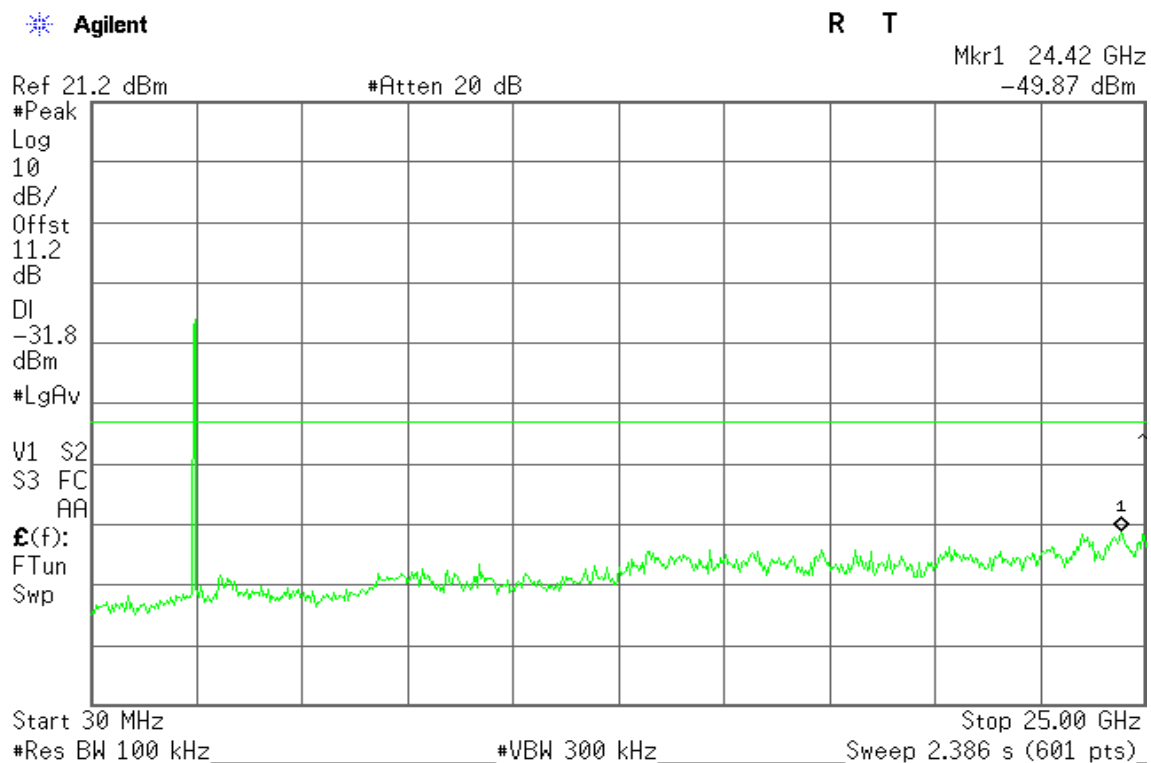
No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-43.46	-17.57	-25.89
2	2502.0300	-45.07	-17.57	-27.50



**IEEE 802.11n HT 40 mode / 2452 MHz**



No.	Frequency(MHz)	Result(dBm)	Limit(dBm)	Margin(dBm)
1	2377.1800	-52.16	-18.36	-33.80
2	2502.0300	-47.40	-18.36	-29.04

**IEEE 802.11n HT 40 mode / 2457 MHz****IEEE 802.11n HT 40 mode / 2462 MHz**



## 7.7 RADIATED EMISSIONS

### LIMIT

1. According to §15.209(a), except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

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

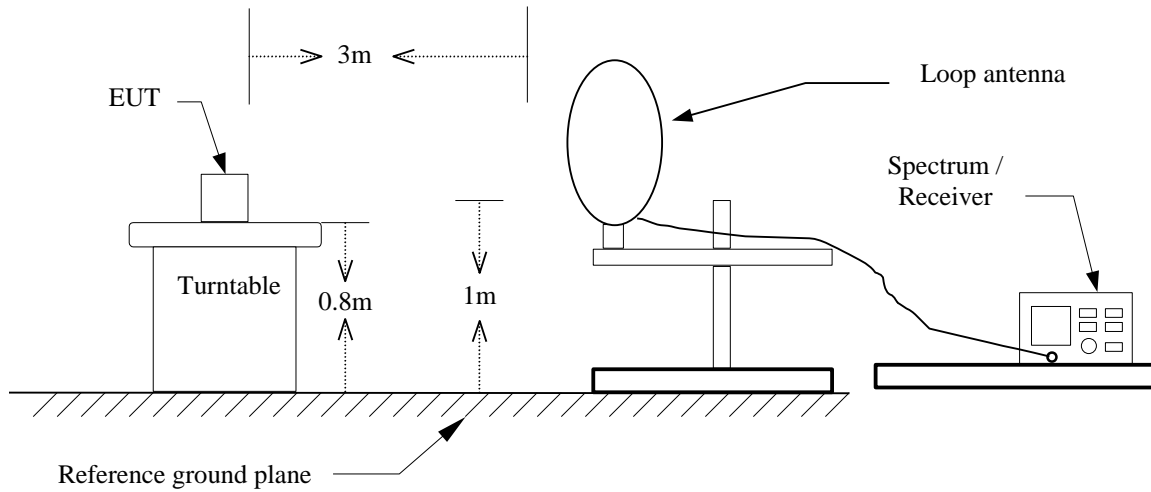
2. In the emission table above, the tighter limit applies at the band edges.

Frequency (MHz)	Field Strength (μV/m at 3-meter)	Field Strength (dBμV/m at 3-meter)
0.009 - 0.490	2400/F(kHz) +80	20LOG((2400/F(kHz))+80)
0.490 - 1.705	24000/F(kHz) +40	20LOG((24000/F(kHz))+40)
1.705 – 30.0	30	69.54
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

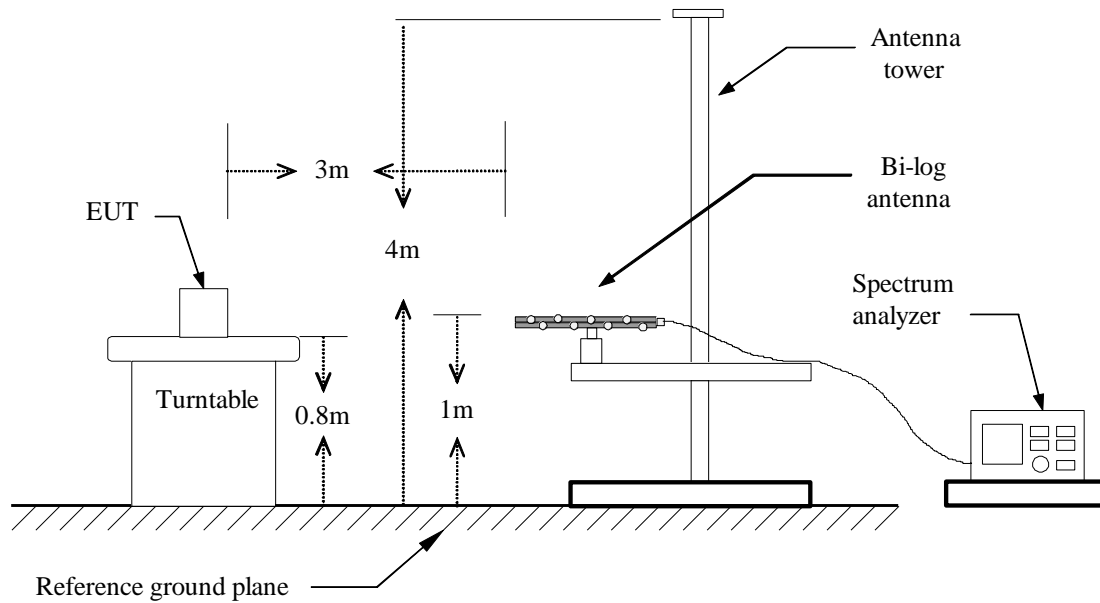


## Test Configuration

**9kHz ~ 30MHz**

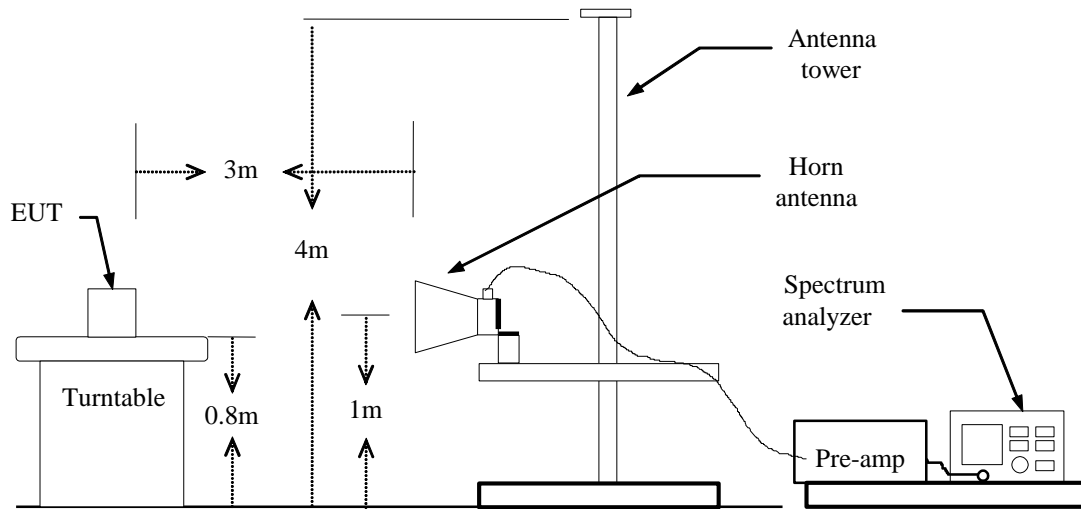


**30MHz ~ 1GHz**





Above 1 GHz







## **TEST PROCEDURE**

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

Below 1GHz:

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

Above 1GHz:

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

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

**IEEE 802.11b mode:**  $\geq 98\%$ , VBW=10Hz

**IEEE 802.11g mode:**  $\geq 98\%$ , VBW=10Hz

**IEEE 802.11n HT 20 MHz mode:**  $\geq 98\%$ , VBW=10Hz

**IEEE 802.11n HT 40 MHz mode:**  $96\% = \text{VBW } 2\text{kHz}$

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

**TEST RESULTS****Below 1GHz****Operation Mode:** Normal Link**Test Date:** February 14, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
36.7900	44.92	-14.85	30.07	40.00	-9.93	peak	V
157.0700	46.07	-18.19	27.88	43.50	-15.62	peak	V
233.7000	53.49	-18.73	34.76	46.00	-11.24	peak	V
268.6200	54.05	-17.04	37.01	46.00	-8.99	peak	V
450.0100	43.07	-12.66	30.41	46.00	-15.59	peak	V
594.5400	40.42	-10.56	29.86	46.00	-16.14	peak	V
36.7900	47.70	-14.85	32.85	40.00	-7.15	peak	H
157.0700	53.57	-18.19	35.38	43.50	-8.12	peak	H
234.6700	57.83	-18.71	39.12	46.00	-6.88	peak	H
255.0400	57.12	-18.04	39.08	46.00	-6.92	peak	H
366.5900	49.03	-14.80	34.23	46.00	-11.77	peak	H
450.0100	48.47	-12.66	35.81	46.00	-10.19	peak	H

***Remark:***

- 1. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz)*
- 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 / 2412 MHz**Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
1702.000	49.65	-6.46	43.19	74.00	-30.81	peak	V
3200.000	46.74	-1.63	45.11	74.00	-28.89	peak	V
4780.000	46.50	3.97	50.47	74.00	-23.53	peak	V
N/A							
1654.000	50.71	-6.71	44.00	74.00	-30.00	peak	H
3200.000	45.96	-1.63	44.33	74.00	-29.67	peak	H
4825.000	45.37	4.01	49.38	74.00	-24.62	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 / 2437 MHz**Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
1616.000	49.82	-6.92	42.90	74.00	-31.10	peak	V
3185.000	47.87	-1.67	46.20	74.00	-27.80	peak	V
4875.000	46.54	3.92	50.46	74.00	-23.54	peak	V
N/A							
1456.000	50.52	-7.72	42.80	74.00	-31.20	peak	H
3200.000	45.50	-1.63	43.87	74.00	-30.13	peak	H
4875.000	46.71	3.92	50.63	74.00	-23.37	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 / 2462 MHz**Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
1656.000	50.68	-6.70	43.98	74.00	-30.02	peak	V
3195.000	47.54	-1.64	45.90	74.00	-28.10	peak	V
4925.000	46.63	3.90	50.53	74.00	-23.47	peak	V
N/A							
1490.000	52.07	-7.57	44.50	74.00	-29.50	peak	H
3190.000	41.91	-1.65	40.26	74.00	-33.74	peak	H
4925.000	46.73	3.90	50.63	74.00	-23.37	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 / 2467 MHz**Test Date:** February 27, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1962.000	55.63	-5.08	50.55	74.00	-23.45	peak	V
4795.000	43.46	4.03	47.49	74.00	-26.51	peak	V
7110.000	37.10	10.52	47.62	74.00	-26.38	peak	V
N/A							
1598.000	56.48	-7.01	49.47	74.00	-24.53	peak	H
4935.000	41.61	3.91	45.52	74.00	-28.48	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.  $\text{Margin (dB)} = \text{Remark result (dBuV/m)} - \text{Average limit (dBuV/m)}$ .

**Operation Mode:** TX / IEEE 802.11b / 2472 MHz**Test Date:** February 27, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1968.000	53.61	-5.05	48.56	74.00	-25.44	peak	V
N/A							
1968.000	56.00	-5.05	50.95	74.00	-23.05	peak	H
3190.000	44.06	-1.65	42.41	74.00	-31.59	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 / 2412 MHz**Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
1760.000	50.41	-6.15	44.26	74.00	-29.74	peak	V
3185.000	44.86	-1.67	43.19	74.00	-30.81	peak	V
4795.000	45.56	4.03	49.59	74.00	-24.41	peak	V
N/A							
1446.000	49.95	-7.77	42.18	74.00	-31.82	peak	H
3195.000	44.43	-1.64	42.79	74.00	-31.21	peak	H
4810.000	41.16	4.03	45.19	74.00	-28.81	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 / 2437 MHz**Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
1198.000	53.70	-8.86	44.84	74.00	-29.16	peak	V
3190.000	45.66	-1.65	44.01	74.00	-29.99	peak	V
4875.000	45.02	3.92	48.94	74.00	-25.06	peak	V
N/A							
1992.000	52.20	-4.92	47.28	74.00	-26.72	peak	H
3200.000	43.17	-1.63	41.54	74.00	-32.46	peak	H
4875.000	43.09	3.92	47.01	74.00	-26.99	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 / 2462 MHz**Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
1770.000	50.17	-6.10	44.07	74.00	-29.93	peak	V
3195.000	45.29	-1.64	43.65	74.00	-30.35	peak	V
4930.000	43.35	3.90	47.25	74.00	-26.75	peak	V
N/A							
1584.000	51.76	-7.08	44.68	74.00	-29.32	peak	H
3185.000	47.11	-1.67	45.44	74.00	-28.56	peak	H
4925.000	42.79	3.90	46.69	74.00	-27.31	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 / 2467 MHz**Test Date:** February 27, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1196.000	58.78	-8.87	49.91	74.00	-24.09	peak	V
4940.000	43.50	3.91	47.41	74.00	-26.59	peak	V
N/A							
1964.000	58.06	-5.07	52.99	74.00	-21.01	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 / 2472 MHz**Test Date:** February 27, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1596.000	57.82	-7.02	50.80	74.00	-23.20	peak	V
N/A							
1598.000	58.85	-7.01	51.84	74.00	-22.16	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 20 MHz mode / 2412 MHz **Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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	49.65	-5.97	43.68	74.00	-30.32	peak	V
3195.000	43.17	-1.64	41.53	74.00	-32.47	peak	V
4795.000	45.01	4.03	49.04	74.00	-24.96	peak	V
N/A							
1476.000	50.63	-7.64	42.99	74.00	-31.01	peak	H
3190.000	45.11	-1.65	43.46	74.00	-30.54	peak	H
4830.000	42.82	4.00	46.82	74.00	-27.18	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 20 MHz mode / 2437 MHz **Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
1594.000	50.50	-7.03	43.47	74.00	-30.53	peak	V
3195.000	45.05	-1.64	43.41	74.00	-30.59	peak	V
4875.000	45.30	3.92	49.22	74.00	-24.78	peak	V
N/A							
1392.000	52.81	-8.01	44.80	74.00	-29.20	peak	H
3190.000	46.74	-1.65	45.09	74.00	-28.91	peak	H
4870.000	42.27	3.93	46.20	74.00	-27.80	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 20 MHz mode / 2462 MHz **Test Date:** February 6, 2015**Temperature:** 27°C**Tested by:** Dennis Li**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)
2000.000	50.81	-4.88	45.93	74.00	-28.07	peak	V
3195.000	46.19	-1.64	44.55	74.00	-29.45	peak	V
4925.000	43.14	3.90	47.04	74.00	-26.96	peak	V
N/A							
1502.000	51.90	-7.52	44.38	74.00	-29.62	peak	H
3200.000	44.45	-1.63	42.82	74.00	-31.18	peak	H
4925.000	43.93	3.90	47.83	74.00	-26.17	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.  $\text{Margin (dB)} = \text{Remark result (dBuV/m)} - \text{Average limit (dBuV/m)}$ .

**Operation Mode:** TX / IEEE 802.11n HT 20 MHz mode / 2467 MHz **Test Date:** February 27, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1600.000	58.55	-7.00	51.55	74.00	-22.45	peak	V
4940.000	41.77	3.91	45.68	74.00	-28.32	peak	V
N/A							
1964.000	55.45	-5.07	50.38	74.00	-23.62	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 20 MHz mode / 2472 MHz **Test Date:** February 27, 2015**Temperature:** 27°C**Tested by:** Andy Shi**Humidity:** 53% RH**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1968.000	56.68	-5.05	51.63	74.00	-22.37	peak	V
N/A							
1962.000	55.09	-5.08	50.01	74.00	-23.99	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 mode  
/ 2422 MHz

**Test Date:** February 6, 2015

**Temperature:** 27°C

**Tested by:** Dennis Li

**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)
1802.000	49.63	-5.93	43.70	74.00	-30.30	peak	V
3195.000	46.24	-1.64	44.60	74.00	-29.40	peak	V
4800.000	44.67	4.05	48.72	74.00	-25.28	peak	V
N/A							
1704.000	51.04	-6.45	44.59	74.00	-29.41	peak	H
3195.000	45.07	-1.64	43.43	74.00	-30.57	peak	H
4855.000	39.45	3.96	43.41	74.00	-30.59	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 mode  
/ 2437 MHz

**Test Date:** February 6, 2015

**Temperature:** 27°C

**Tested by:** Dennis Li

**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)
1598.000	51.59	-7.01	44.58	74.00	-29.42	peak	V
3190.000	46.01	-1.65	44.36	74.00	-29.64	peak	V
4865.000	44.42	3.94	48.36	74.00	-25.64	peak	V
N/A							
1846.000	50.23	-5.70	44.53	74.00	-29.47	peak	H
3195.000	44.51	-1.64	42.87	74.00	-31.13	peak	H
4880.000	40.69	3.91	44.60	74.00	-29.40	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 mode  
/ 2452 MHz

**Test Date:** February 6, 2015

**Temperature:** 27°C

**Tested by:** Dennis Li

**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)
1196.000	53.04	-8.87	44.17	74.00	-29.83	peak	V
3185.000	46.23	-1.67	44.56	74.00	-29.44	peak	V
4790.000	42.77	4.01	46.78	74.00	-27.22	peak	V
N/A							
1304.000	53.08	-8.39	44.69	74.00	-29.31	peak	H
3200.000	45.43	-1.63	43.80	74.00	-30.20	peak	H
4915.000	42.22	3.89	46.11	74.00	-27.89	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 mode  
/ 2457 MHz

**Test Date:** February 27, 2015

**Temperature:** 27°C

**Tested by:** Andy Shi

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1598.000	58.46	-7.01	51.45	74.00	-22.55	peak	V
4910.000	40.71	3.89	44.60	74.00	-29.40	peak	V
N/A							
1598.000	58.31	-7.01	51.30	74.00	-22.70	peak	H
N/A							

**Remark:**

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



**Operation Mode:** TX / IEEE 802.11n HT 40 mode  
/ 2462 MHz

**Test Date:** February 27, 2015

**Temperature:** 27°C

**Tested by:** Andy Shi

**Humidity:** 53% RH

**Polarity:** Ver. / Hor.

Frequency (MHz)	Reading (dBuV)	Correction Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant. Pol. (H/V)
1398.000	57.49	-7.98	49.51	74.00	-24.49	peak	V
N/A							
1398.000	57.49	-7.98	49.51	74.00	-24.49	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).



## 7.8 POWERLINE CONDUCTED EMISSIONS

### **LIMIT**

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

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

\* Decreases with the logarithm of the frequency.

### **Test Configuration**

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### **TEST PROCEDURE**

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

**TEST RESULTS**

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

**Test Data**

**Operation Mode:** Normal Link      **Test Date:** February 14, 2015  
**Temperature:** 24°C      **Tested by:** Ken Tsai  
**Humidity:** 50% RH

Freq. (MHz)	QP Reading (dBuV)	AV Reading (dBuV)	Corr. factor (dB/m)	QP Result (dBuV/m)	AV Result (dBuV/m)	QP Limit (dBuV)	AV Limit (dBuV)	QP Margin (dB)	AV Margin (dB)	Note
0.2678	33.00	31.98	9.58	42.58	41.56	61.18	51.19	-18.60	-9.63	L1
0.4876	22.71	16.02	9.58	32.29	25.60	56.21	46.21	-23.92	-20.61	L1
0.5197	36.26	27.46	9.58	45.84	37.04	56.00	46.00	-10.16	-8.96	L1
0.7229	28.38	17.64	9.59	37.97	27.23	56.00	46.00	-18.03	-18.77	L1
0.8562	28.61	17.66	9.59	38.20	27.25	56.00	46.00	-17.80	-18.75	L1
2.5752	26.91	16.17	9.60	36.51	25.77	56.00	46.00	-19.49	-20.23	L1
0.2679	32.58	31.73	9.63	42.21	41.36	61.18	51.18	-18.97	-9.82	L2
0.5039	28.72	19.06	9.63	38.35	28.69	56.00	46.00	-17.65	-17.31	L2
0.5917	26.90	17.19	9.63	36.53	26.82	56.00	46.00	-19.47	-19.18	L2
0.7316	22.93	13.73	9.64	32.57	23.37	56.00	46.00	-23.43	-22.63	L2
1.4299	18.52	11.75	9.64	28.16	21.39	56.00	46.00	-27.84	-24.61	L2
2.5111	20.16	12.60	9.65	29.81	22.25	56.00	46.00	-26.19	-23.75	L2

**Remark:**

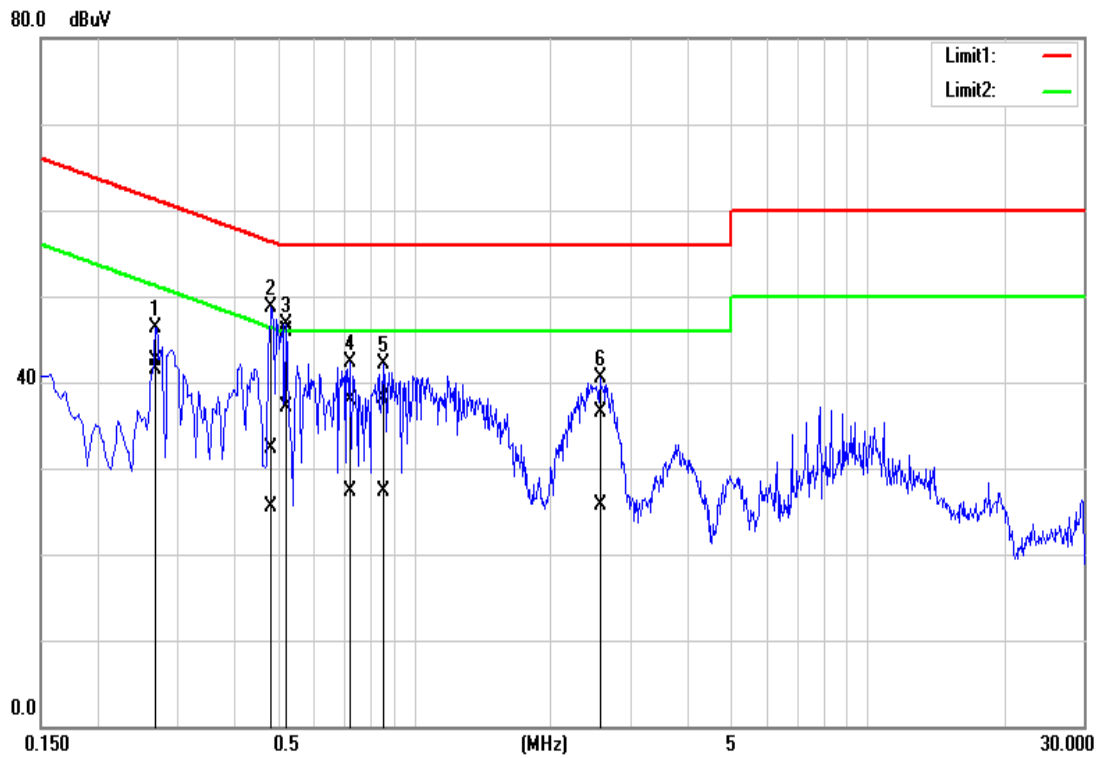
1. Measuring frequencies from 0.15 MHz to 30MHz.
2. The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Quasi-peak detector and average detector.
3. The IF bandwidth of SPA between 0.15MHz and 30MHz was 10 kHz; the IF bandwidth of Test Receiver between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





## Test Plots

### Conducted emissions (Line 1)



### Conducted emissions (Line 2)

