

# TEST REPORT

**Reference No.**..... : WTH23X12272408W001  
**FCC ID** ..... : 2BAR2-BGAIK4KASTTX  
**Applicant** ..... : Vetech Enterprise Inc. dba BZBGEAR  
**Address** ..... : 830 National Dr Ste 140, Sacramento CA 95834 United States  
**Manufacturer** ..... : The same as Applicant  
**Address** ..... : The same as Applicant  
**Product Name** ..... : 4K HDMI Wireless Extender  
**Model No.**..... : BG-AIR4KAST  
**Standards** ..... : FCC Part 15.407  
**Date of Receipt sample** .... : 2023-12-21  
**Date of Test**..... : 2023-12-21 to 2024-01-24  
**Date of Issue** ..... : 2024-01-24  
**Test Report Form No.** ..... : WTX\_Part 15\_407W  
**Test Result**..... : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of approver.

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**Report version**

Version No.	Date of issue	Description
Rev.00	2024-01-24	Original
/	/	/

## 1. GENERAL INFORMATION

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### 1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	4K HDMI Wireless Extender
Trade Name:	BZBGEAR
Model No.:	BG-AIR4KAST
Adding Model(s):	/
Rated Voltage:	DC5V
Battery Capacity:	/
Power Adapter:	NBS12E050200VU Input:AC100-240 50/60Hz 0.3A Output:DC5V2.0A
<i>Note: The test data is gathered from a production sample, provided by the manufacturer.</i>	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n-HT20 , 802.11n-HT40, 802.11ac-VHT20 , 802.11ac-VHT40, 802.11ac-VHT80
Frequency Range:	5180-5240MHz
Max. RF Output Power:	Antenna 1:15.80dBm (Conducted) Antenna 2:15.70dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM,256QAM
Type of Antenna:	External Antenna
Antenna Gain:	5.93dBi
<i>Note The Antenna Gain is provided by the customer and can affect the validity of results.</i>	

## 1.2 Test Standards

The tests were performed according to following standards:

**FCC Rules Part 15.407:** General technical requirements.

**ANSI C63.10-2013:** American National Standard for Testing Unlicensed Wireless Devices.

**KDB789033 D02 v02r01:** Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-Nii) Devices Part 15, Subparte.

**KDB662911 D01 Multiple Transmitter Output v02r01:** Emissions Testing of Transmitters with Multiple Outputs in the Same Band.

**Maintenance of compliance** is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

## 1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, KDB789033 D02 v02r01. The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes were adapted accordingly in reference to the Operating Instructions.

### 1.4 Table for parameters of Test Software setting

Enter the fixed frequency using adb.exe, you can start to test. During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Mode	Test Frequency (MHz)											
	NCB: 20MHz											
	5180	5200	5240									
802.11a 6Mbps	16	15	14									
802.11n-HT20 MCS0	13	13	12									
802.11ac-VHT20 MCS0	11	11	10									

Mode	NCB: 40MHz									
	5190	5230								
802.11n-HT40 MCS0	12	12								
802.11ac-VHT40 MCS0	11	10								
Mode	NCB: 80MHz									
	5210									
802.11ac-VHT80 MCS0/Nss2	9									

## 1.5 EUT Operating during test

EUT was programmed to be in continuously transmitting mode. During the test, EUT operation to normal function and programs under Android were executed.

## 1.6 Test Facility

### Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C. (518101)

### FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

### Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Waltek Testing Group (Shenzhen) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A and the CAB identifier is CN0057.



## 1.7 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	802.11a	5180MHz,5200MHz,5240MHz
TM2	802.11n-HT20	5180MHz,5200MHz,5240MHz
TM3	802.11n-HT40	5190MHz,5230MHz
TM4	802.11ac-VHT80	5210MHz

Note1: All test modes (different data rate and different modulation) are performed, but only the worst case is recorded in this report; 802.11ac-VHT20, 802.11ac-VHT40 covered by 802.11n-HT20 and 802.11n-HT40.  
 Note 2: The 5GHz WIFI has two antennas and support Multiple Outputs for 802.11n/ac mode for this report;  
 For 5150-5250MHz: Antenna 1 Gain is 5.93dBi; Antenna 2 Gain is 5.93dBi;  
 According to KDB 662911, for same directional gain:  
 For 5150-5250MHz: Directional gain =  $G_{ANT} + 10 \log(N_{ANT})$  dBi = 5.93+10log(2) dBi=8.9dBi

Test Conditions	
Temperature:	22~25 °C
Relative Humidity:	45~55 %.
ATM Pressure:	1019 mbar

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC Cable	1.5	Unshielded	Without Ferrite
IR blaster extension cable	1.0	Unshielded	Without Ferrite
IR receiver extension cable	1.0	Unshielded	Without Ferrite

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	TianYi 100-14IBD	PF0F4ABV
HDMI Wireless Extender	Lenkeng	LKV699-BZB01 Receiver	/

**1.8 Measurement Uncertainty**

<b>Measurement uncertainty</b>		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	$\pm 0.42\text{dB}$
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Power Spectral Density	Conducted	$\pm 1.8\text{dB}$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Conducted Emissions	Conducted	9-150kHz $\pm 3.74\text{dB}$
		0.15-30MHz $\pm 3.34\text{dB}$
Transmitter Spurious Emissions	Radiated	30-200MHz $\pm 4.52\text{dB}$
		0.2-1GHz $\pm 5.56\text{dB}$
		1-6GHz $\pm 3.84\text{dB}$
		6-18GHz $\pm 3.92\text{dB}$

**1.9 Test Equipment List and Details**

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1041A 1001	Communication Tester	Rohde & Schwarz	CMW500	148650	2023-02-25	2024-02-24
WTXE1022A 1002	GSM Tester	Rohde & Schwarz	CMU200	114403	2023-02-25	2024-02-24
WTXE1005A 1005	Spectrum Analyzer	Agilent	N9020A	US471401 02	2023-02-25	2024-02-24
WTXE1084A 1001	Spectrum Analyzer	Agilent	N9020A	MY543205 48	2023-02-25	2024-02-24
WTXE1044A 1001	Signal Generator	Agilent	83752A	3610A014 53	2023-02-25	2024-02-24
WTXE1045A 1001	Vector Signal Generator	Agilent	N5182A	MY470702 02	2023-02-25	2024-02-24
WTXE1018A 1001	Power Divider	Weinschel	1506A	PM204	2023-02-25	2024-02-24
WTXE1045A 1001	Power Divider	RF-Lambda	RFLT4W5M18G	14110400 027	2023-02-25	2024-02-24
<input type="checkbox"/> Chamber A: Below 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/03 5	2023-02-25	2024-02-24
WTXE1007A 1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/00 5	2023-02-25	2024-02-24
WTXE1007A 1001	Amplifier	HP	8447F	2805A034 75	2023-02-25	2024-02-24
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
WTXE1010A 1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2023-03-20	2026-03-19
<input type="checkbox"/> Chamber A: Above 1GHz						
WTXE1005A 1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/03 5	2023-02-25	2024-02-24
WTXE1007A 1001	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/00 5	2023-02-25	2024-02-24
WTXE1065A 1001	Amplifier	C&D	PAP-1G18	14918	2023-02-25	2024-02-24
WTXE1010A 1005	Horn Antenna	ETS	3117	00086197	2021-03-19	2024-03-18
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18

WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24
<input type="checkbox"/> Chamber B: Below 1GHz						
WTXE1010A 1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2021-04-09	2024-04-08
WTXE1038A 1001	Amplifier	Agilent	8447D	2944A104 57	2023-02-25	2024-02-24
WTXE1001A 1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2023-02-25	2024-02-24
<input checked="" type="checkbox"/> Chamber C: Below 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
WTXE1010A 1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2021-05-28	2024-05-27
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-20	2024-03-19
WTXE1007A 1002	Amplifier	HP	8447F	2944A038 69	2023-02-25	2024-02-24
<input checked="" type="checkbox"/> Chamber C: Above 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2023-02-25	2024-02-24
WTXE1103A 1005	Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2023-02-25	2024-02-24
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2021-03-19	2024-03-18
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2023-02-25	2024-02-24
<input type="checkbox"/> Conducted Room 1#						
WTXE1001A 1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2023-02-25	2024-02-24
WTXE1002A 1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2023-02-25	2024-02-24
WTXE1003A 1001	AC LISN	Schwarz beck	NSLK8126	8126-279	2023-02-25	2024-02-24
<input checked="" type="checkbox"/> Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2023-02-25	2024-02-24
WTXE1003A	LISN	Rohde &	ENV 216	100097	2023-02-25	2024-02-24

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1003		Schwarz				
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Software List			
Description	Manufacturer	Model	Version
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission Room 1#)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission Room 2#)*	SKET	EMC-I	V2.0

\*Remark: indicates software version used in the compliance certification testing.

## 2. SUMMARY OF TEST RESULTS

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FCC Rules	Description of Test Item	Result
§15.203; §15.405	Antenna Requirement	Compliant
15.407 (c)	Automatically Discontinue Transmission	Compliant
§15.207; §15.407(b)(6)	Conducted Emission	Compliant
§15.407(a)(1),(2)	Power Spectral Density	Compliant
§15.407(e)	Emission Bandwidth and Occupied Bandwidth	Compliant
§15.407(a)(1),(2)	Maximum Conducted Output Power	Compliant
§15.407(b)(1),(2),(3),(4)	Undesirable emission	Compliant
§15.205; §15.407(b)(1),(2),(3)	Radiated Emission	Compliant
§15.407(g)	Frequency Stability	Compliant
§15.407(h)	Dynamic Frequency Selection (DFS)	Compliant

N/A: Not applicable.

### **3. Antenna Requirement**

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#### **3.1 Standard Applicable**

According to FCC Part 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

#### **3.2 Evaluation Information**

This product has two External antennas, fulfill the requirement of this section.

## **4. Automatically Discontinue Transmission**

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### **4.1 Standard Applicable**

According to FCC Part 15.407(c), the device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

### **4.2 Summary of Test Results**

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.



## 5. Power Spectral Density

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### 5.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25GHz.

(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or  $11\text{dBm} + 10 \log B$ , where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(3) For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

### 5.2 Test Procedure

According to 789033 D02 v02r01 General UNII Test Procedures New Rules v02, the following is the measurement procedure.

For devices operating in the bands 5.15-5.25GHz, 5.25-5.35GHz, and 5.47-5.725GHz, the above procedures make use of 1MHz RBW to satisfy directly the 1MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85GHz, the rules specify a measurement bandwidth of 500kHz. Many spectrum analyzers do not have 500kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1MHz, or 500kHz, "provided that the measured power is integrated over the full

reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1MHz, or 500kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500kHz) and integrated over 1 MHz, or 500kHz bandwidth, the following adjustments to the procedures apply:

- a) Set  $RBW \geq 1/T$ , where T is defined in section II.B.I.a).
- b) Set  $VBW \geq 3 RBW$ .
- c) If measurement bandwidth of Maximum PSD is specified in 500kHz, add  $10\log(500\text{kHz}/RBW)$  to the measured result, whereas  $RBW (< 500\text{kHz})$  is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
- d) If measurement bandwidth of Maximum PSD is specified in 1MHz, add  $10\log(1\text{MHz}/RBW)$  to the measured result, whereas  $RBW (< 1\text{MHz})$  is the reduced resolution bandwidth of spectrum analyzer set during measurement.
- e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100kHz for the sections 5.c) and 5.d) above, since  $RBW=100\text{kHz}$  is available on nearly all spectrum analyzers.

### **5.3 Summary of Test Results/Plots**

**Please refer to Appendix A**

## 6. Emission Bandwidth and Occupied Bandwidth

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### 6.1 Standard Applicable

According to 15.407(a) and (e):

(1) For the band 5.15-5.25GHz.

(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or  $11\text{dBm} + 10 \log B$ , where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(3) For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(e) Within the 5.725-5.85GHz band, the minimum 6dB bandwidth of U-NII devices shall be at least 500kHz.

### 6.2 Test Procedure

According to 789033 D02 v02r0r section C&D, the following is the measurement procedure.

1. Emission Bandwidth (EBW)

- a) Set RBW = approximately 1% of the emission bandwidth.
- b) Set the VBW > RBW.

- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Measure the maximum width of the emission that is 26dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

## 2. Minimum Emission Bandwidth for the band 5.725-5.85GHz

Section 15.407(e) specifies the minimum 6dB emission bandwidth of at least 500KHz for the band 5.715-5.85GHz. The following procedure shall be used for measuring this bandwidth:

- a) Set RBW = 100kHz.
- b) Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
- c) Detector = Peak.
- d) Trace mode = max hold.
- e) Sweep = auto couple.
- f) Allow the trace to stabilize.
- g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

## D. 99 Percent Occupied Bandwidth

The 99-percent occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission. Measurement of the 99-percent occupied bandwidth is required only as a condition for using the optional band-edge measurement techniques described in section II.G.3.d). Measurements of 99-percent occupied bandwidth may also optionally be used in lieu of the EBW to 789033 D02 v02r01 General UNII Test Procedures New Rules v01 define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power as described in section II.E. However, the EBW must be measured to determine bandwidth dependent limits on maximum conducted output power in accordance with 15.407(a).

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW  $\geq 3 \times$  RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency.

Reference No.: WTH23X12272408W001

The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.

### **6.3 Summary of Test Results/Plots**

**Please refer to Appendix B**

## 7. Maximum Conducted Output Power

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### 7.1 Standard Applicable

Section 15.407(a) Power limits:

(1) For the band 5.15-5.25GHz.

(iv) For mobile and portable client devices in the 5.15-5.25GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250mW provided the maximum antenna gain does not exceed 6dBi. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or  $11\text{dBm} + 10 \log B$ , where B is the 26dB emission bandwidth in megahertz. In addition, the maximum power spectral density shall not exceed 11dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

(3) For the band 5.725-5.85GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30dBm in any 500kHz band. If transmitting antennas of directional gain greater than 6dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

### 7.2 Test Procedure

According to KDB789033 D02 v02r01 section E, the following is the measurement procedure.

- (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- (ii) Set RBW = 1MHz.
- (iii) Set VBW  $\geq$  3MHz.
- (iv) Number of points in sweep  $\geq$  2 Span / RBW. (This ensures that bin-to-bin spacing is  $\leq$  RBW/2, so that

narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle  $\geq$  98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

### **7.3 Summary of Test Results/Plots**

**Please refer to Appendix C**

## 8. Radiated Spurious Emissions

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### 8.1 Standard Applicable

According to §15.407(b), undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- (1) For transmitters operating in the 5.15-5.25GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of -27dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of -27dBm/MHz.
- (3) For transmitters operating in the 5.47-5.725GHz band: All emissions outside of the 5.47-5.725GHz band shall not exceed an e.i.r.p. of -27dBm/MHz.
- (4) For transmitters operating in the 5.725-5.85GHz band:
  - (i) All emissions shall be limited to a level of -27dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10dBm/MHz at 25MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6dBm/MHz at 5MHz above or below the band edge, and from 5MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

According to §15.407(b)(6), Unwanted emissions below 1GHz must comply with the general field strength limits set forth in §15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

According to §15.407(b)(7), The provisions of §15.205 apply to intentional radiators operating under this section.

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If radiated measurements are performed, field strength is then converted to EIRP as follows:

$$\text{EIRP} = ((E*d)^2) / 30$$

where:

- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

### 8.2 Test Procedure

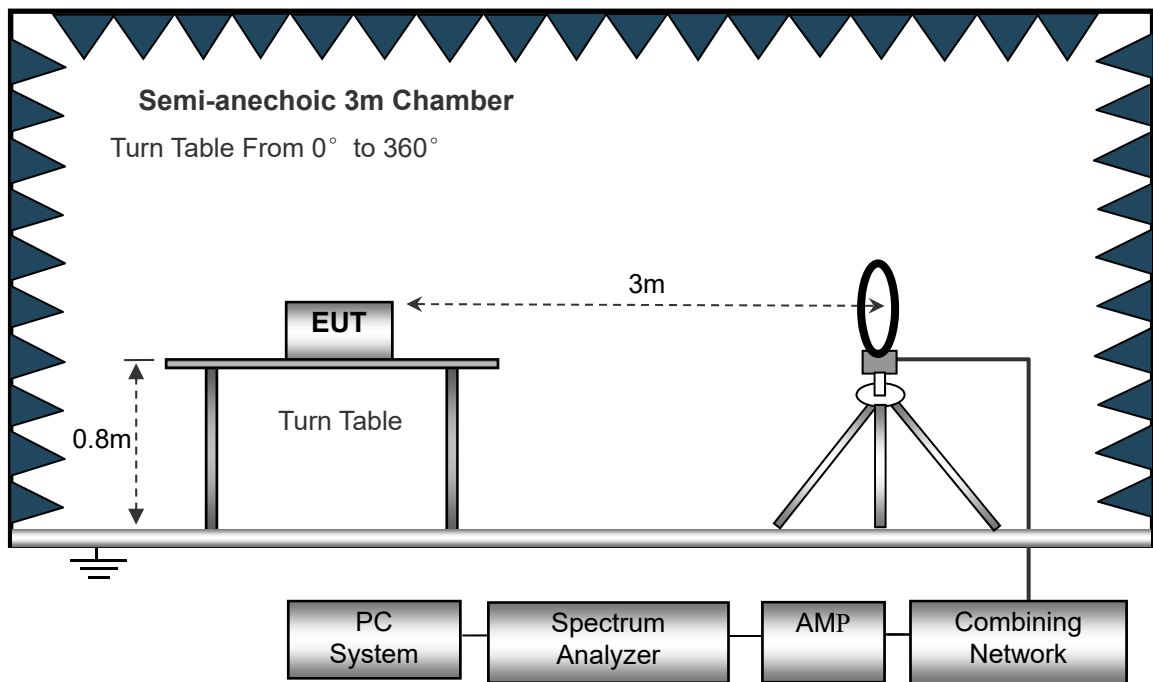
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle.

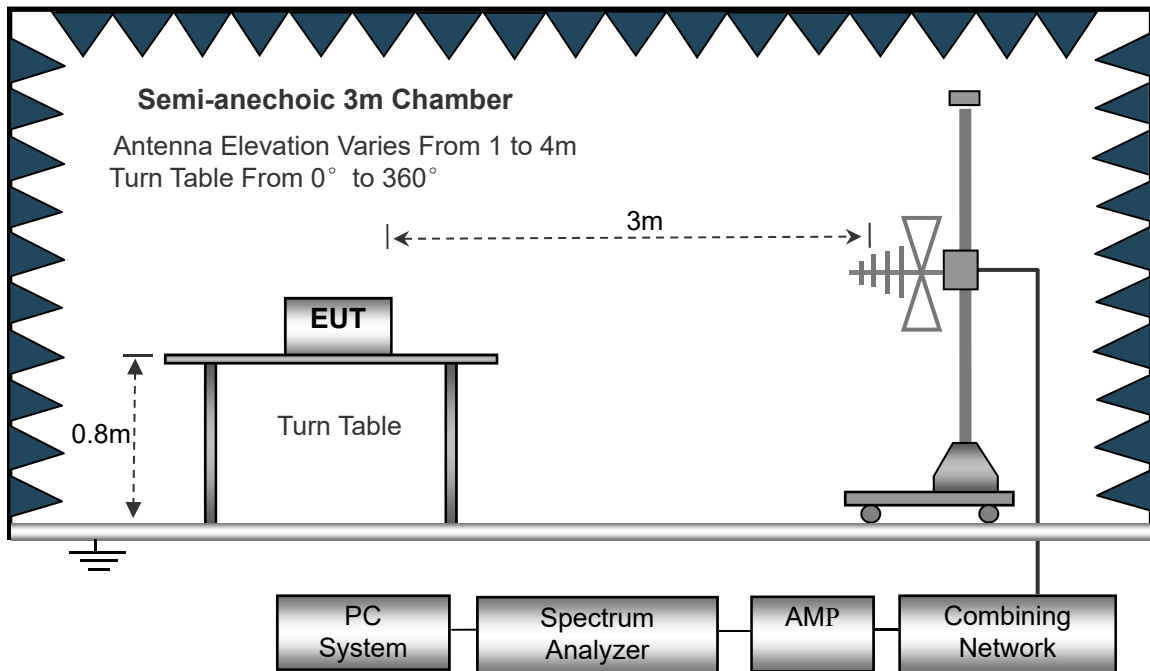
The spacing between the peripherals was 10cm.



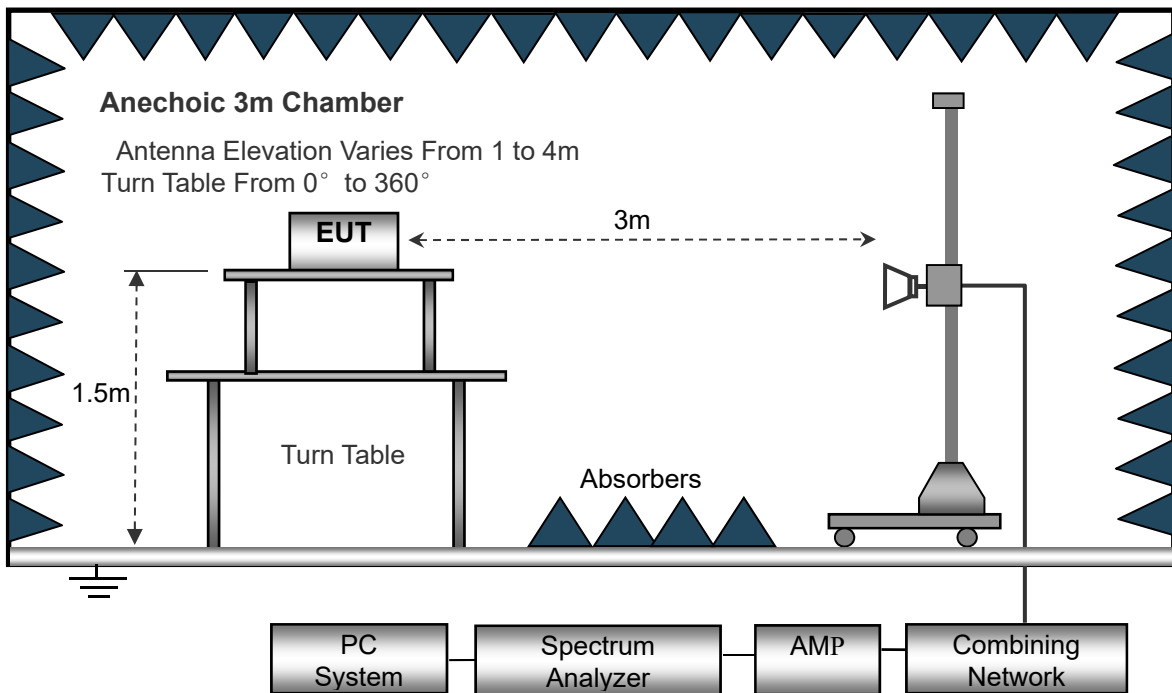
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1GHz.



### 8.3 Test Receiver Setup

During the radiated emission test for above 1GHz, the test receiver was set with the following configurations:

For peak detector:

RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:

RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

### 8.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

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

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dB $\mu$ V means the emission is 6dB $\mu$ V below the maximum limit for Class B. The equation for margin calculation is as follows:

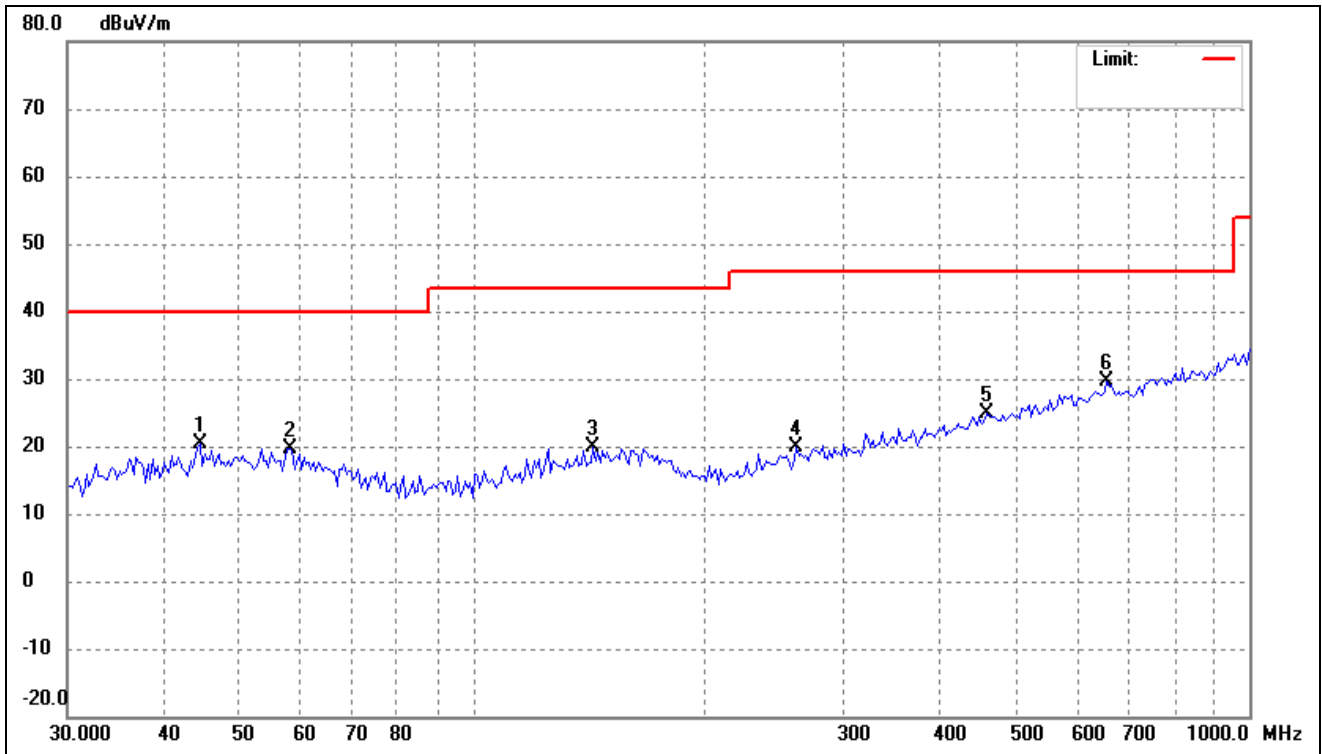
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

### 8.5 Summary of Test Results/Plots

**Note:** this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

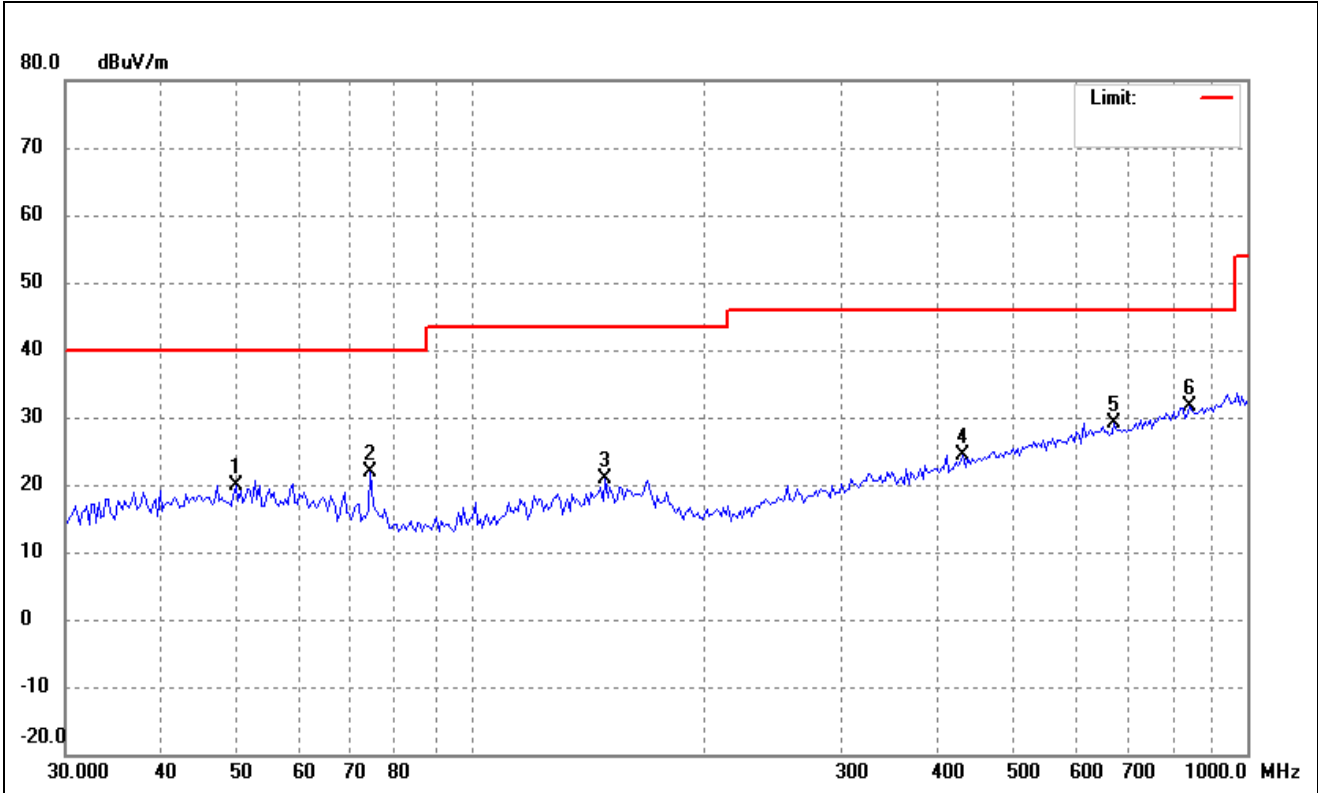
- Spurious Emission From 30MHz to 1GHz
- Antenna 1(Worst case)
- 5150-5250MHz

802.11a			
Test Channel	5180MHz(Worst case)	Polarity:	Horizontal



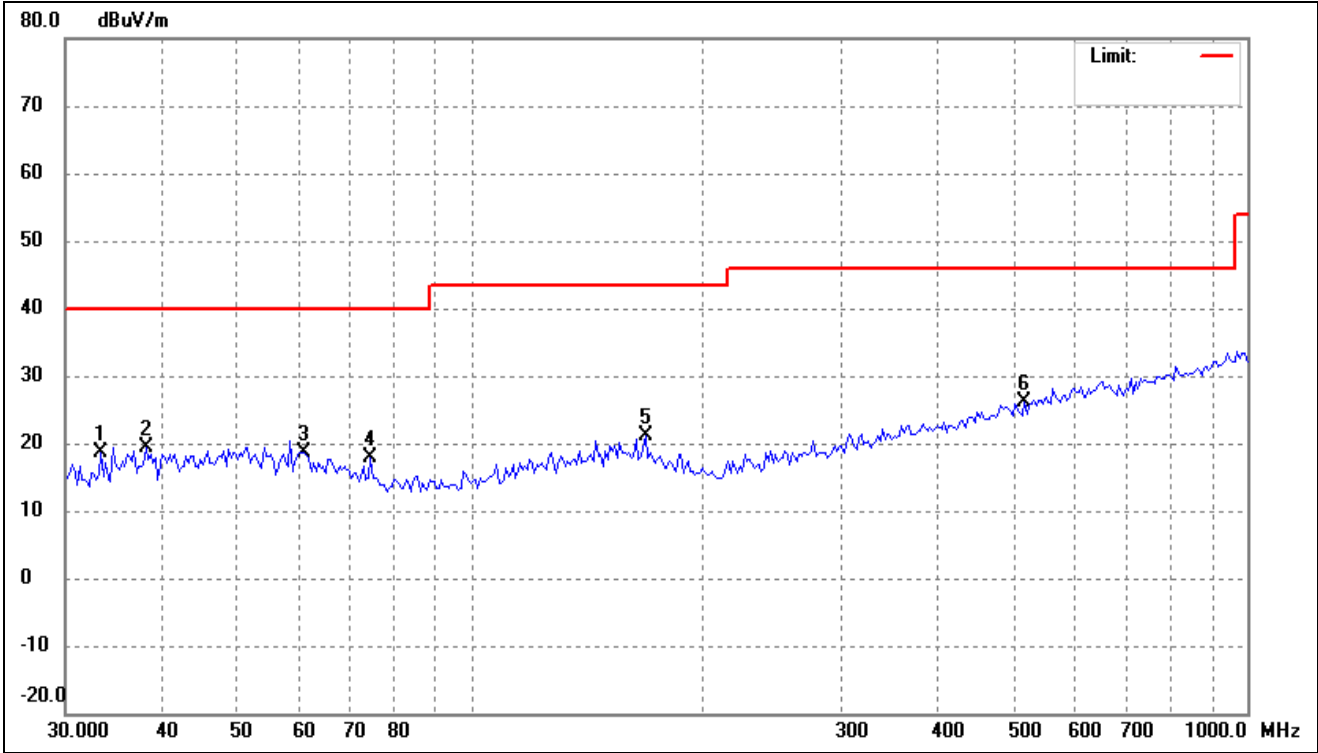
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	44.4657	28.84	-8.47	20.37	40.00	-19.63	-	-	peak
2	58.0759	28.49	-8.82	19.67	40.00	-20.33	-	-	peak
3	142.7692	29.12	-9.20	19.92	43.50	-23.58	-	-	peak
4	261.2730	29.67	-9.71	19.96	46.00	-26.04	-	-	peak
5	458.3987	29.31	-4.47	24.84	46.00	-21.16	-	-	peak
6	655.9766	30.86	-1.30	29.56	46.00	-16.44	-	-	peak

802.11a			
Test Channel	5180MHz(Worst case)	Polarity:	Vertical



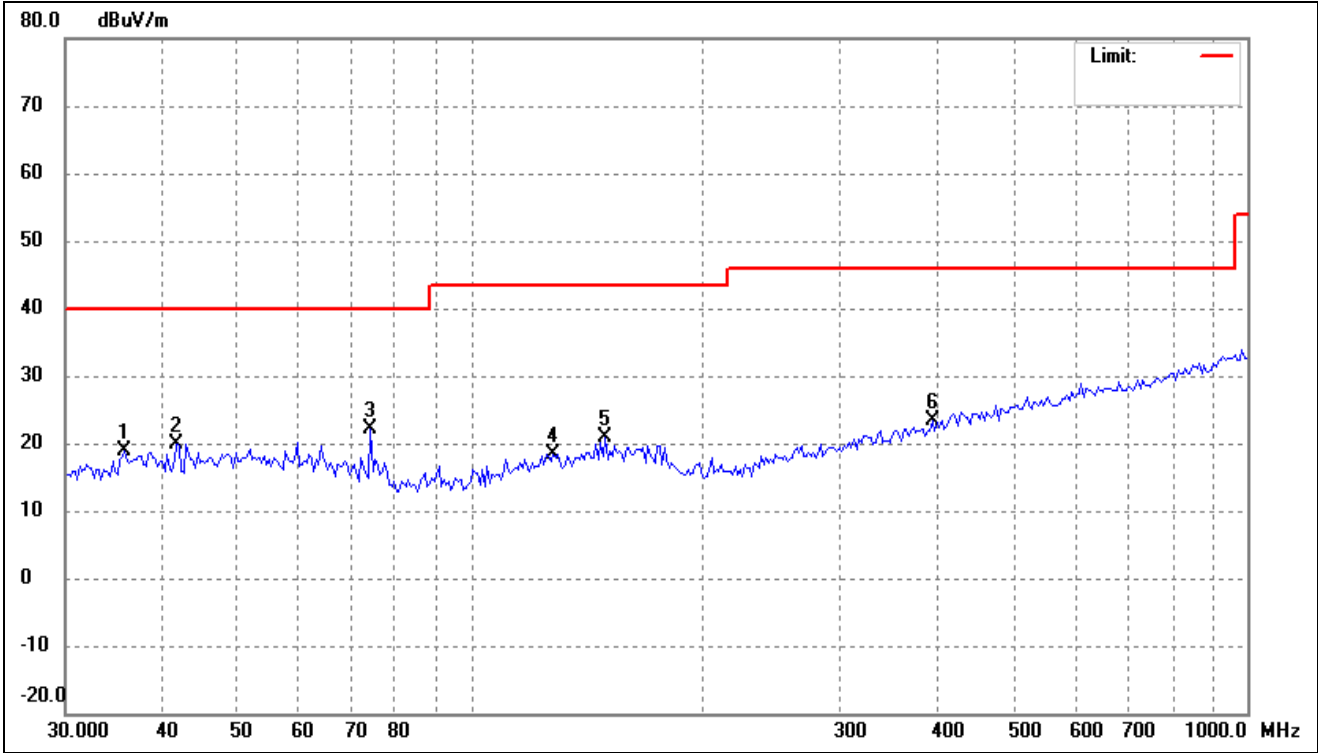
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	49.7571	28.05	-8.09	19.96	40.00	-20.04	-	-	peak
2	74.2696	33.61	-11.70	21.91	40.00	-18.09	-	-	peak
3	148.9175	29.47	-8.68	20.79	43.50	-22.71	-	-	peak
4	430.3053	29.58	-5.14	24.44	46.00	-21.56	-	-	peak
5	674.6768	30.40	-1.25	29.15	46.00	-16.85	-	-	peak
6	844.8028	31.01	0.69	31.70	46.00	-14.30	-	-	peak

802.11n-HT20			
Test Channel	5180MHz(worst case)	Polarity:	Horizontal



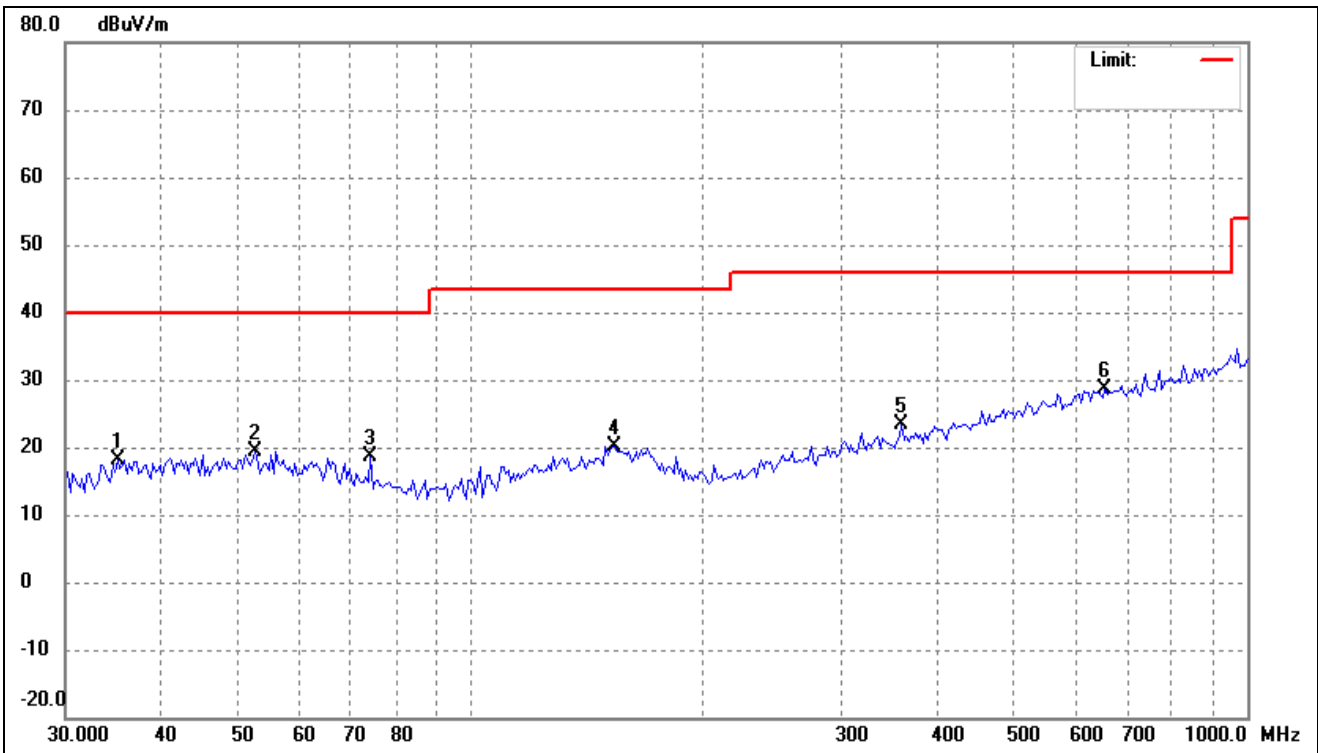
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	33.3349	28.35	-9.76	18.59	40.00	-21.41	-	-	peak
2	38.0965	28.37	-8.89	19.48	40.00	-20.52	-	-	peak
3	61.0041	27.86	-9.11	18.75	40.00	-21.25	-	-	peak
4	74.2696	29.57	-11.70	17.87	40.00	-22.13	-	-	peak
5	167.8136	30.03	-8.82	21.21	43.50	-22.29	-	-	peak
6	516.5651	29.87	-3.65	26.22	46.00	-19.78	-	-	peak

802.11n-HT20			
Test Channel	5180MHz(worst case)	Polarity:	Vertical



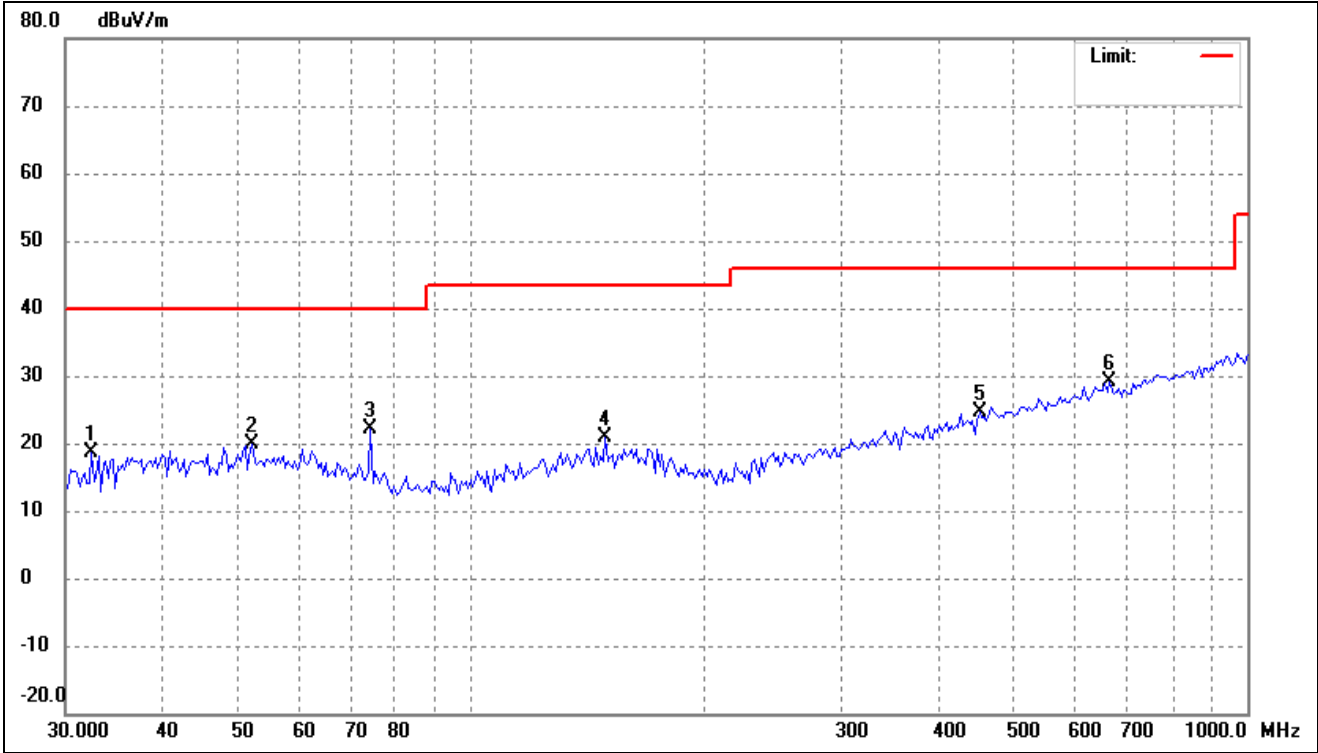
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	35.7617	28.39	-9.39	19.00	40.00	-21.00	-	-	peak
2	41.7406	28.43	-8.47	19.96	40.00	-20.04	-	-	peak
3	74.2696	33.71	-11.70	22.01	40.00	-17.99	-	-	peak
4	127.5865	28.37	-10.01	18.36	43.50	-25.14	-	-	peak
5	148.9175	29.57	-8.68	20.89	43.50	-22.61	-	-	peak
6	392.7376	29.55	-6.11	23.44	46.00	-22.56	-	-	peak

802.11ac-VHT20			
Test Channel	5180MHz(worst case)	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	35.0157	27.79	-9.55	18.24	40.00	-21.76	-	-	peak
2	52.6345	27.79	-8.37	19.42	40.00	-20.58	-	-	peak
3	74.2696	30.26	-11.70	18.56	40.00	-21.44	-	-	peak
4	153.1627	28.76	-8.61	20.15	43.50	-23.35	-	-	peak
5	358.4497	30.24	-6.89	23.35	46.00	-22.65	-	-	peak
6	655.9766	29.95	-1.30	28.65	46.00	-17.35	-	-	peak

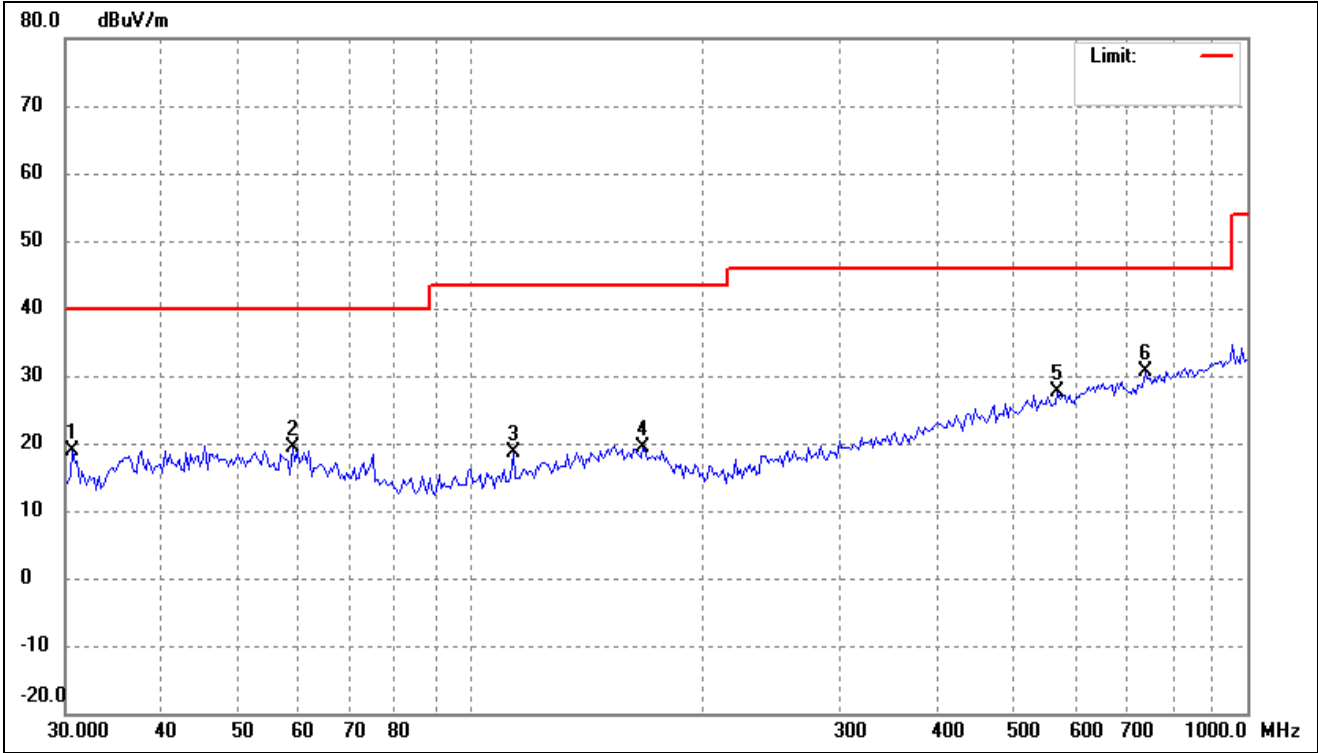
802.11ac-VHT20			
Test Channel	5180MHz(worst case)	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	32.4109	28.63	-9.88	18.75	40.00	-21.25	-	-	peak
2	52.2659	28.11	-8.33	19.78	40.00	-20.22	-	-	peak
3	74.2696	33.92	-11.70	22.22	40.00	-17.78	-	-	peak
4	148.9175	29.53	-8.68	20.85	43.50	-22.65	-	-	peak
5	452.0013	29.19	-4.56	24.63	46.00	-21.37	-	-	peak
6	665.2610	30.51	-1.27	29.24	46.00	-16.76	-	-	peak

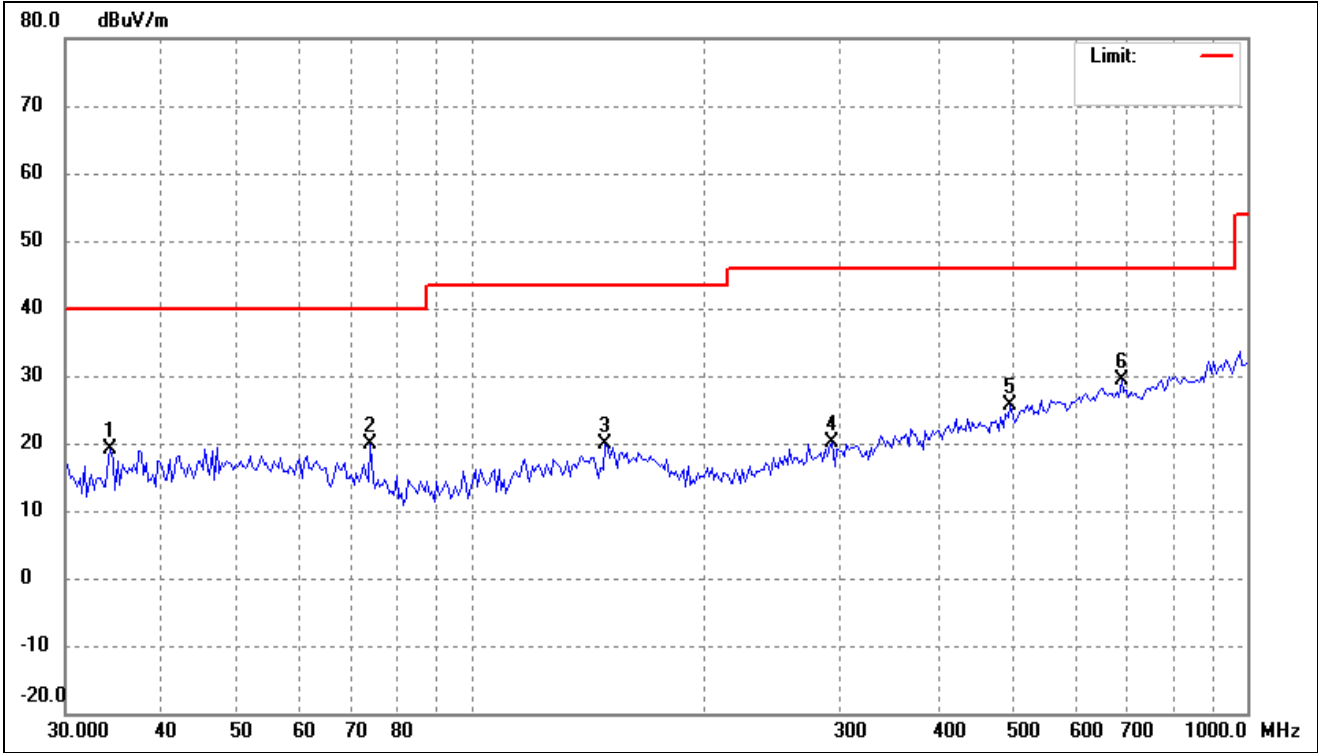


802.11n-HT40			
Test Channel	5190MHz(worst case)	Polarity:	Horizontal



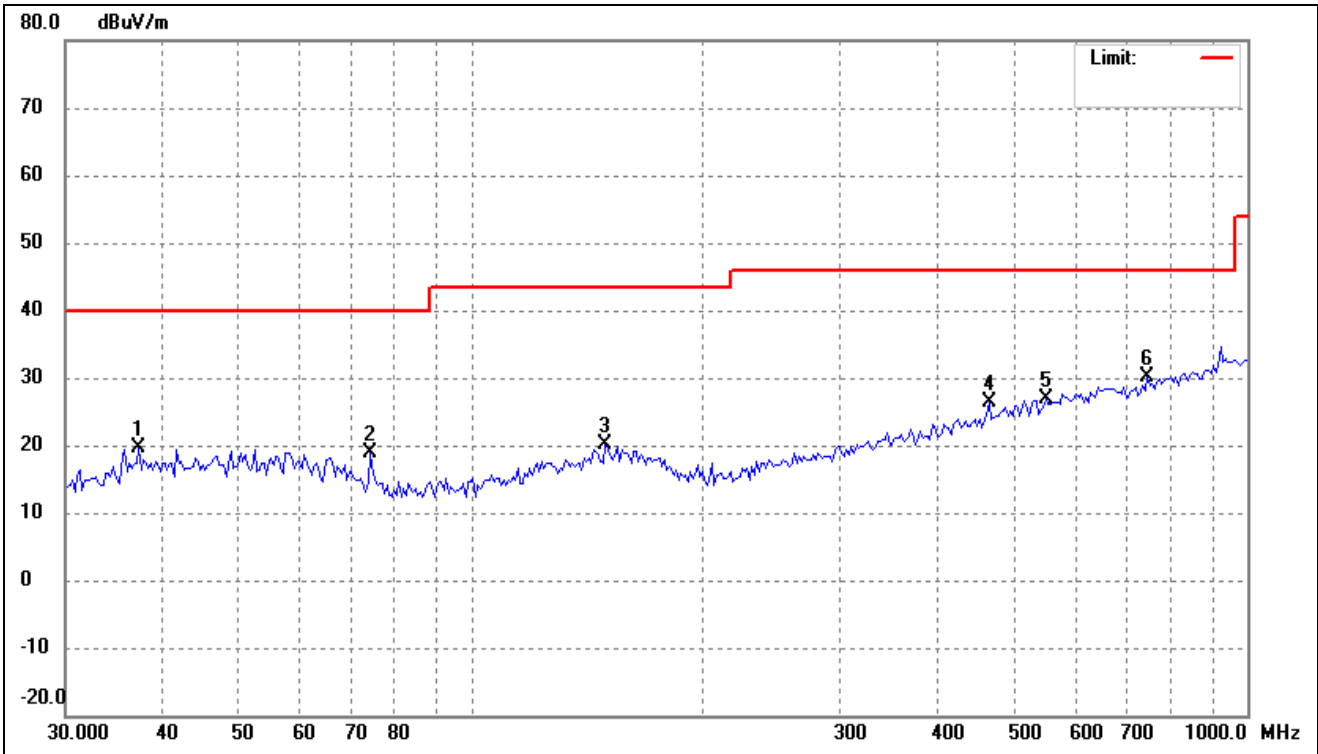
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	30.6392	28.92	-10.11	18.81	40.00	-21.19	-	-	peak
2	58.8979	28.33	-8.87	19.46	40.00	-20.54	-	-	peak
3	113.2200	29.77	-11.24	18.53	43.50	-24.97	-	-	peak
4	166.6385	28.09	-8.79	19.30	43.50	-24.20	-	-	peak
5	569.9688	30.06	-2.36	27.70	46.00	-18.30	-	-	peak
6	739.2136	30.90	-0.37	30.53	46.00	-15.47	-	-	peak

802.11n-HT40			
Test Channel	5190MHz(worst case)	Polarity:	Vertical



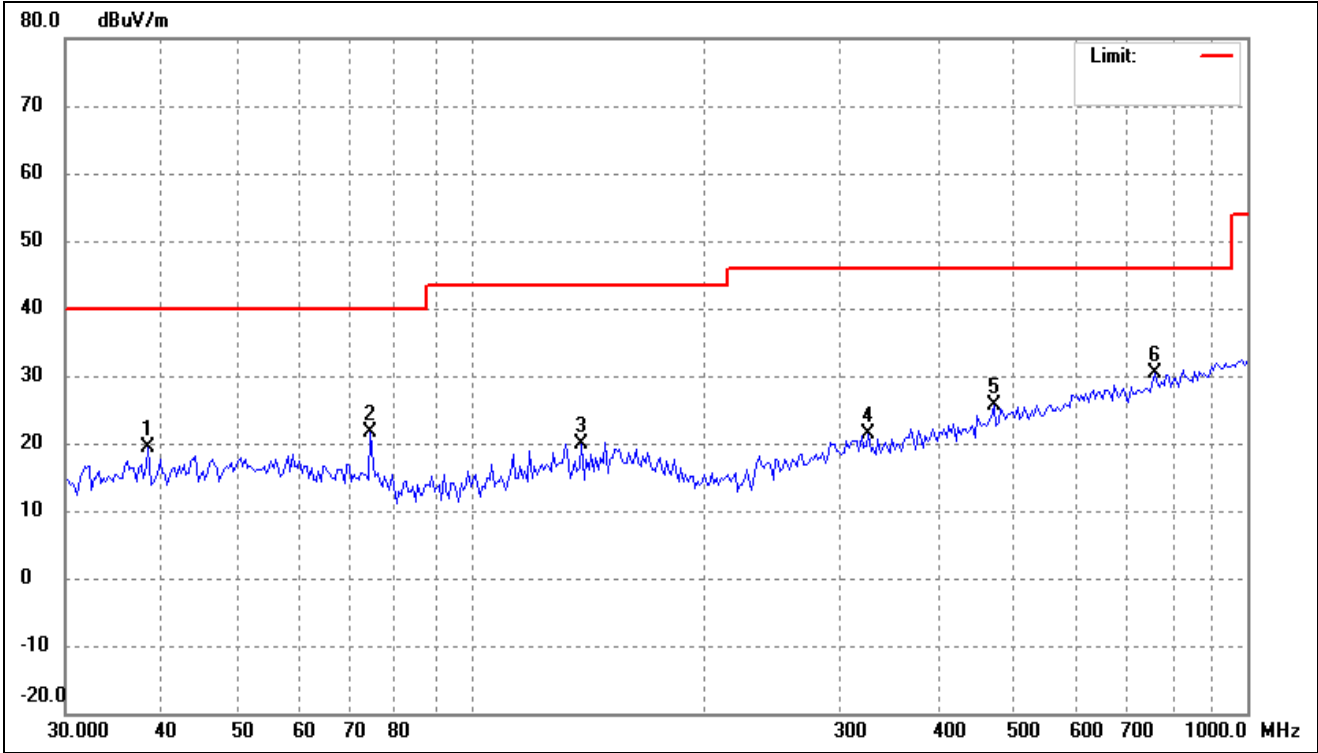
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	34.2852	28.88	-9.65	19.23	40.00	-20.77	-	-	peak
2	74.2696	31.68	-11.70	19.98	40.00	-20.02	-	-	peak
3	148.9175	28.65	-8.68	19.97	43.50	-23.53	-	-	peak
4	292.3643	28.55	-8.52	20.03	46.00	-25.97	-	-	peak
5	495.2379	29.61	-3.97	25.64	46.00	-20.36	-	-	peak
6	689.0510	30.55	-1.16	29.39	46.00	-16.61	-	-	peak

802.11ac-VHT40			
Test Channel	5190MHz(worst case)	Polarity:	Horizontal



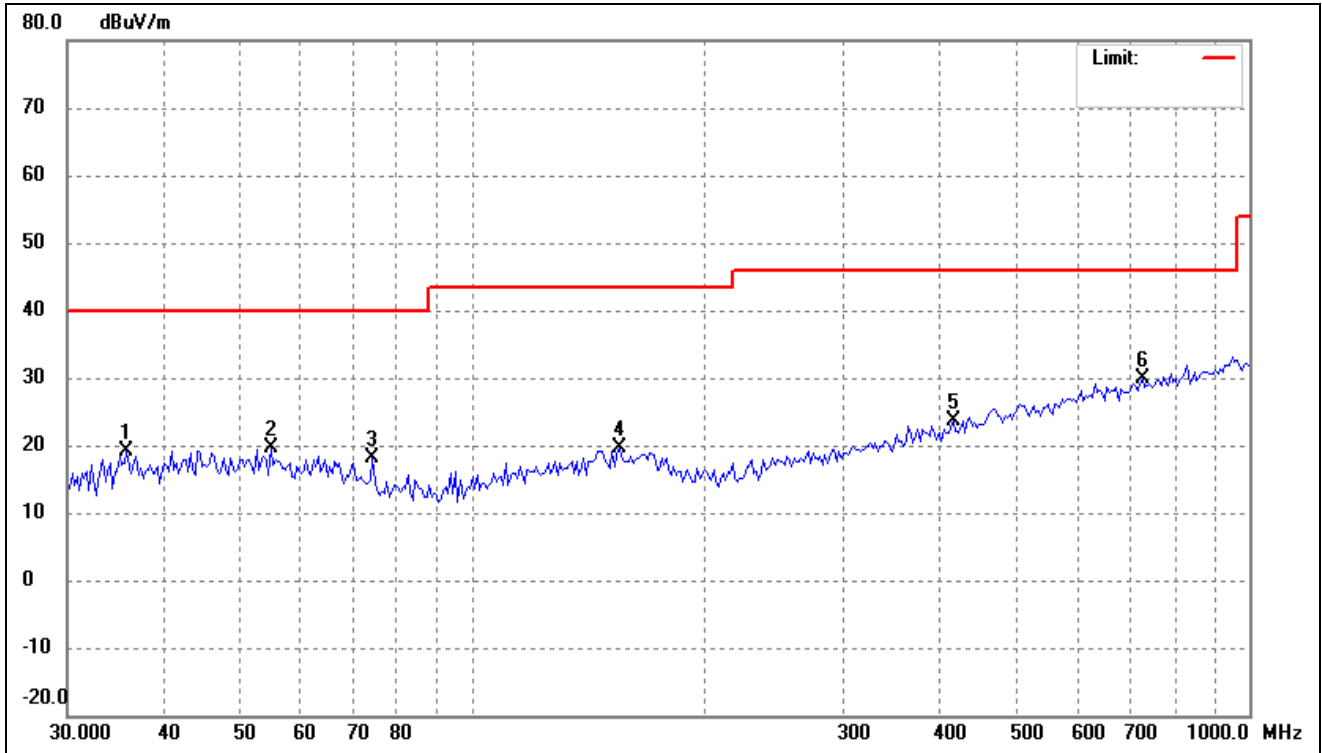
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	37.3017	28.58	-9.06	19.52	40.00	-20.48	-	-	peak
2	74.2696	30.50	-11.70	18.80	40.00	-21.20	-	-	peak
3	148.9175	28.69	-8.68	20.01	43.50	-23.49	-	-	peak
4	464.8867	30.65	-4.37	26.28	46.00	-19.72	-	-	peak
5	550.2902	29.61	-2.84	26.77	46.00	-19.23	-	-	peak
6	744.4265	30.37	-0.27	30.10	46.00	-15.90	-	-	peak

802.11ac-VHT40			
Test Channel	5190MHz(worst case)	Polarity:	Vertical



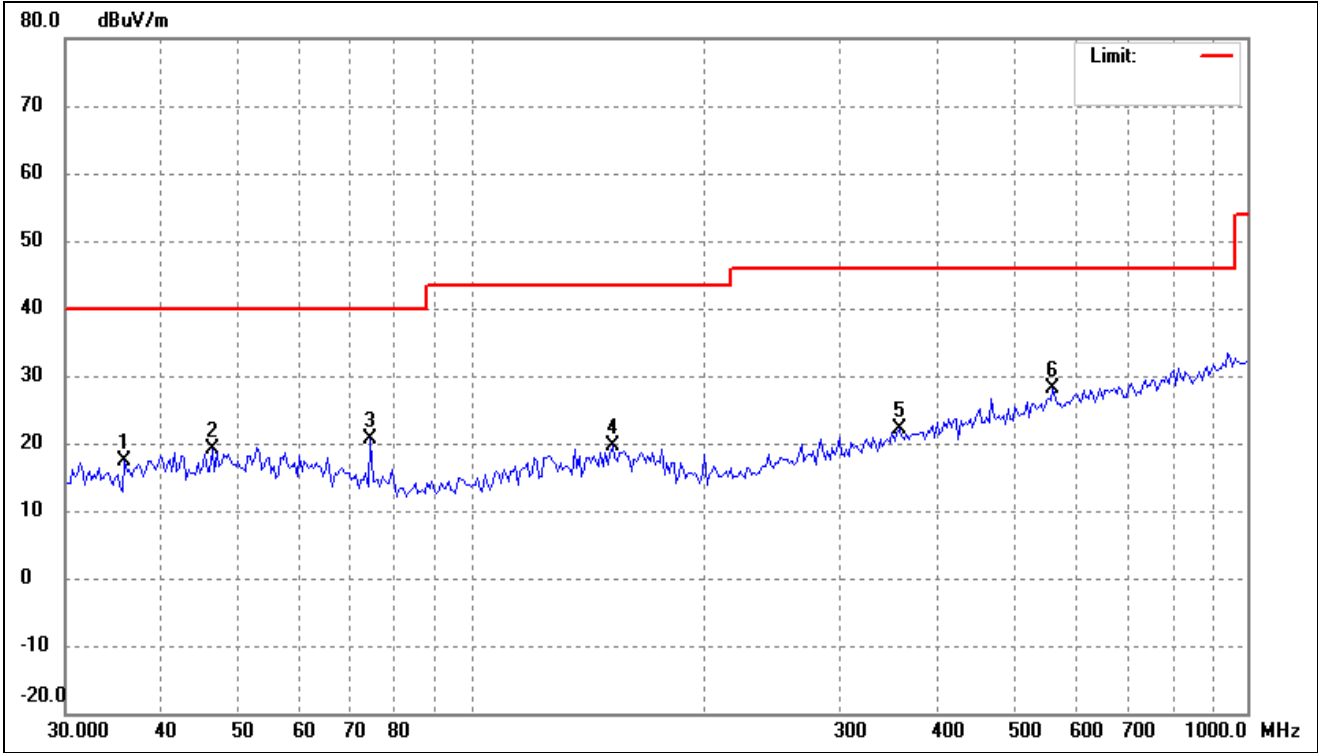
No.	Frequency (MHz)	Reading (dBuV/m)	Corr. (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	38.3651	28.21	-8.83	19.38	40.00	-20.62	-	-	peak
2	74.2696	33.24	-11.70	21.54	40.00	-18.46	-	-	peak
3	138.8120	29.37	-9.48	19.89	43.50	-23.61	-	-	peak
4	324.8645	28.86	-7.55	21.31	46.00	-24.69	-	-	peak
5	471.4665	29.89	-4.29	25.60	46.00	-20.40	-	-	peak
6	760.2867	30.50	-0.07	30.43	46.00	-15.57	-	-	peak

802.11ac-VHT80			
Test Channel	5210MHz(worst case)	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	35.7617	28.54	-9.39	19.15	40.00	-20.85	-	-	peak
2	54.9011	28.15	-8.62	19.53	40.00	-20.47	-	-	peak
3	74.2696	29.85	-11.70	18.15	40.00	-21.85	-	-	peak
4	154.2428	28.11	-8.60	19.51	43.50	-23.99	-	-	peak
5	415.4486	29.24	-5.54	23.70	46.00	-22.30	-	-	peak
6	728.8971	30.41	-0.56	29.85	46.00	-16.15	-	-	peak

802.11ac-VHT80			
Test Channel	5210MHz(worst case)	Polarity:	Vertical

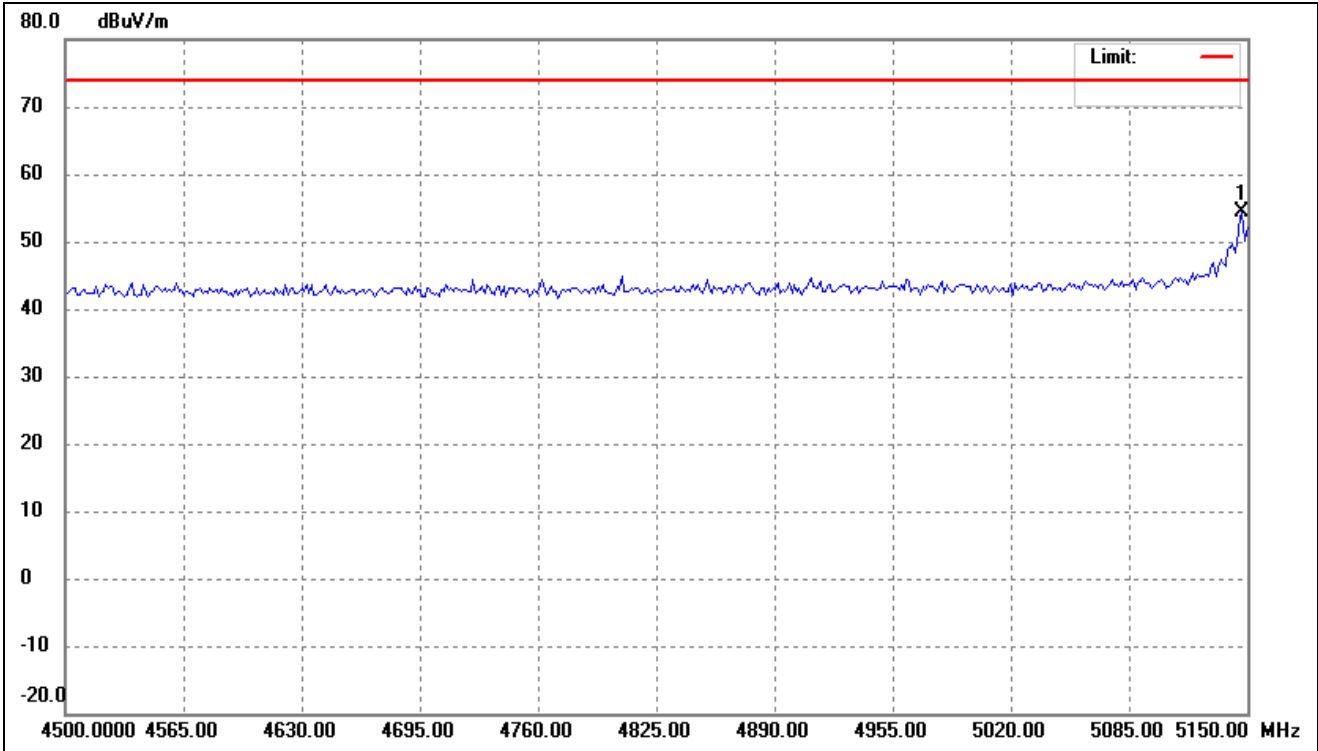


No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	35.7617	26.83	-9.39	17.44	40.00	-22.56	-	-	peak
2	46.3806	27.44	-8.37	19.07	40.00	-20.93	-	-	peak
3	74.2696	32.31	-11.70	20.61	40.00	-19.39	-	-	peak
4	152.0902	28.12	-8.60	19.52	43.50	-23.98	-	-	peak
5	355.9397	29.12	-6.96	22.16	46.00	-23.84	-	-	peak
6	562.0143	30.68	-2.55	28.13	46.00	-17.87	-	-	peak

Remark: '-' Means the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

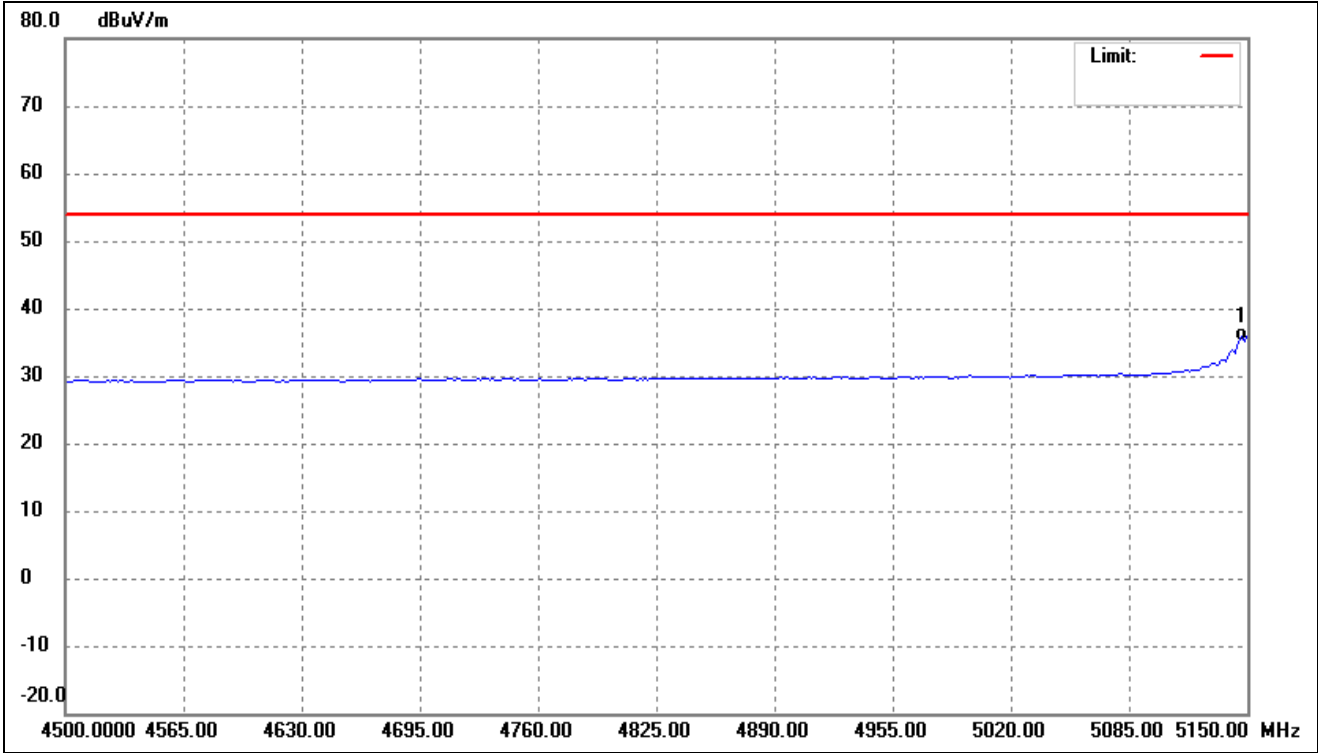
- Spurious Emission above 1GHz
- Antenna 1(worst case)

802.11a- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Corr. dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Deg. ( )	Height (cm)	Remark
1	5147.395	66.13	-11.67	54.46	74.00	-19.54	-	-	peak

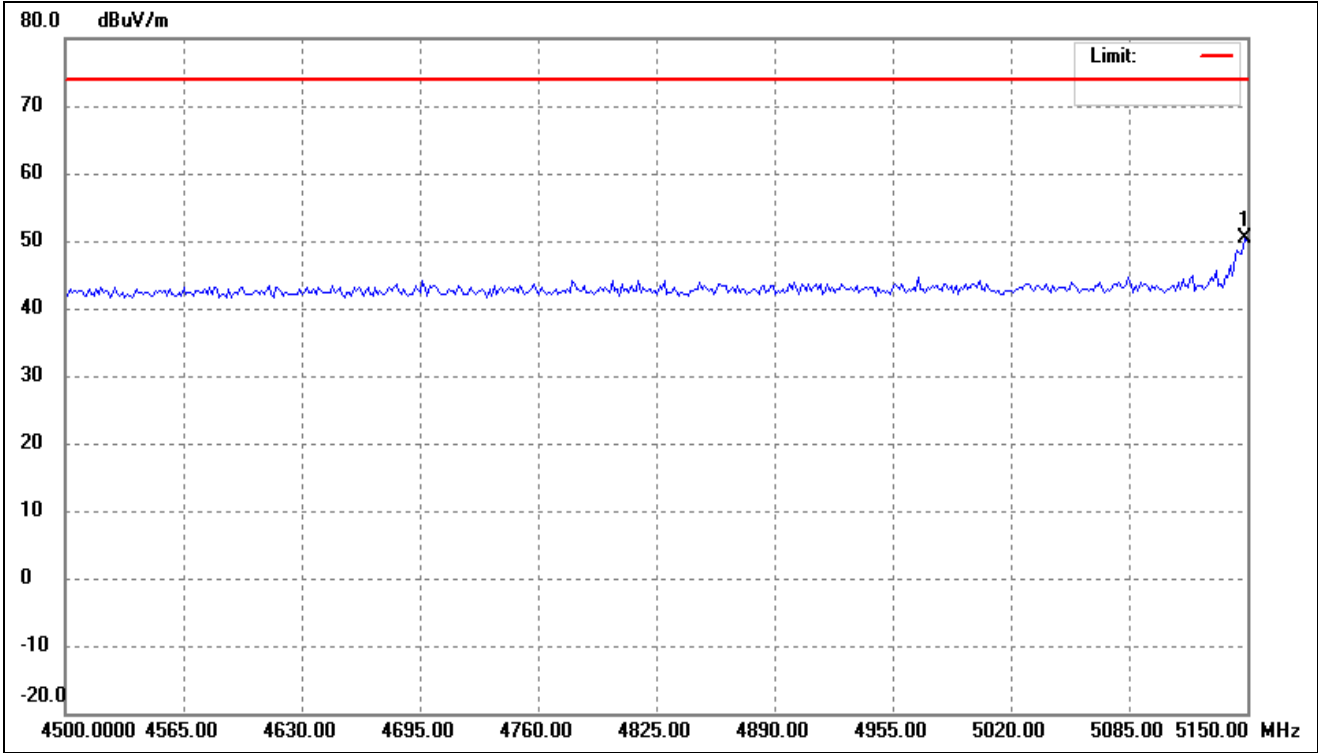
802.11a- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	47.90	-11.66	36.24	54.00	-17.76	-	-	AVG

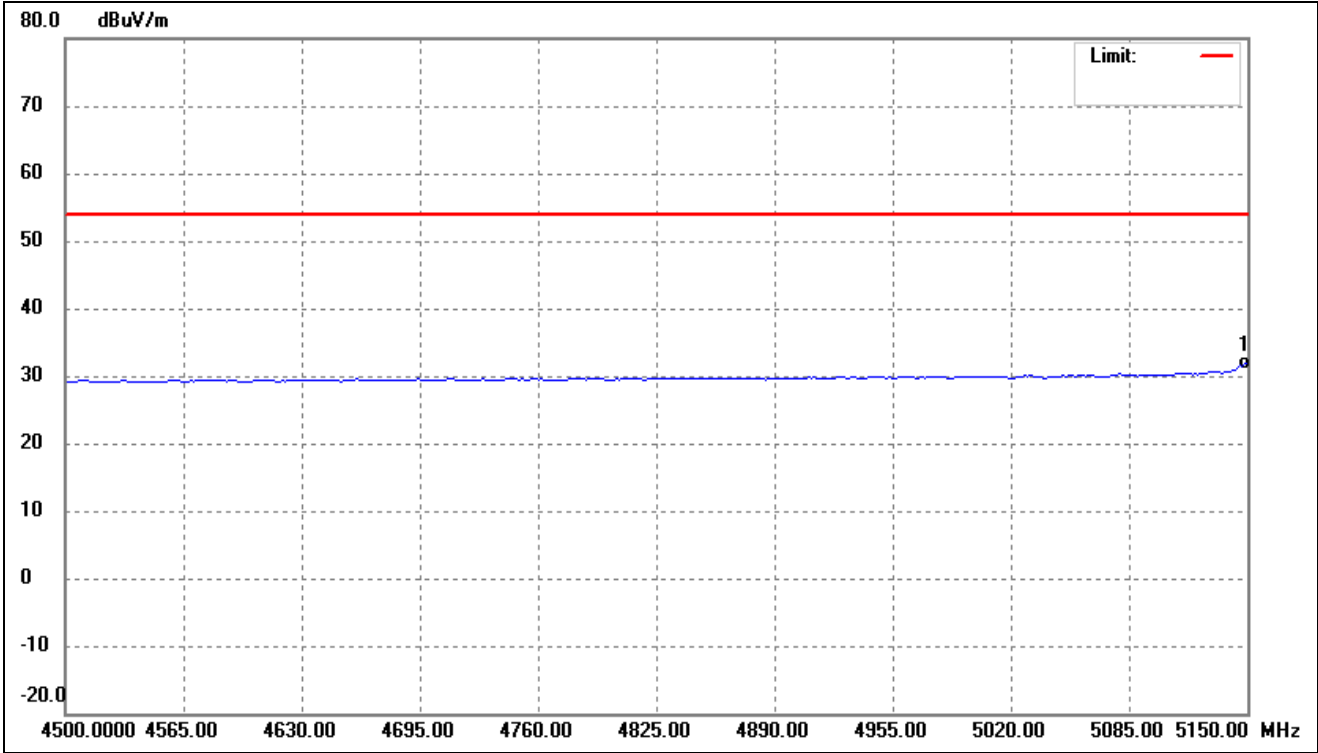


802.11n-HT20- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



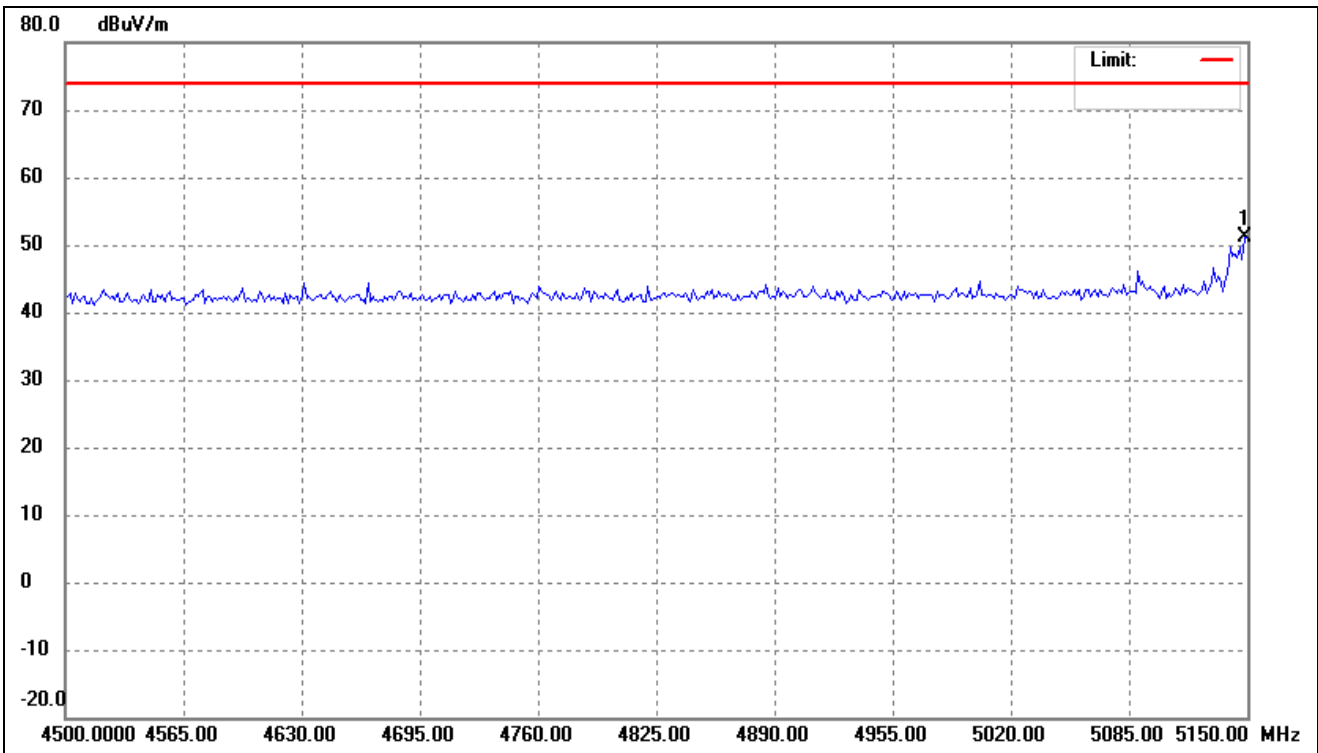
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5148.697	61.93	-11.66	50.27	74.00	-23.73	-	-	peak

802.11n-HT20- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



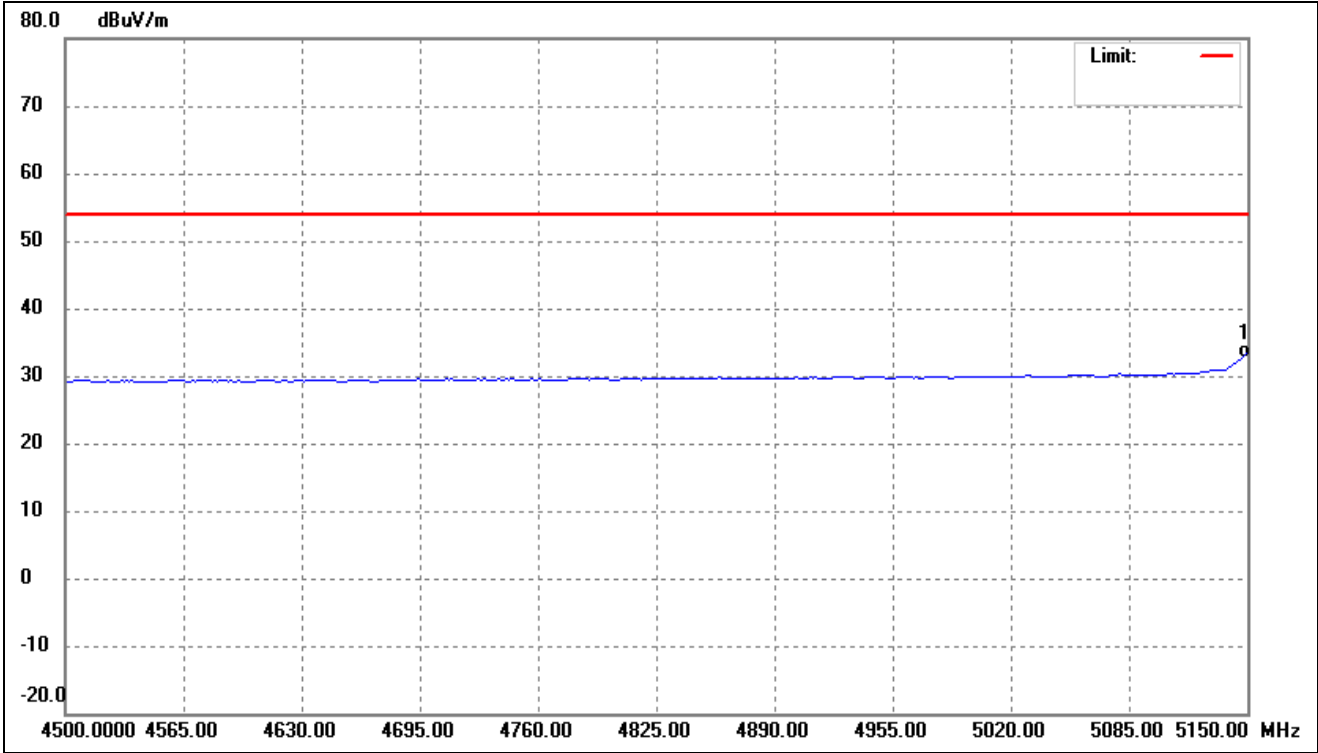
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	43.43	-11.66	31.77	54.00	-22.23	-	-	AVG

802.11ac-VHT20- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



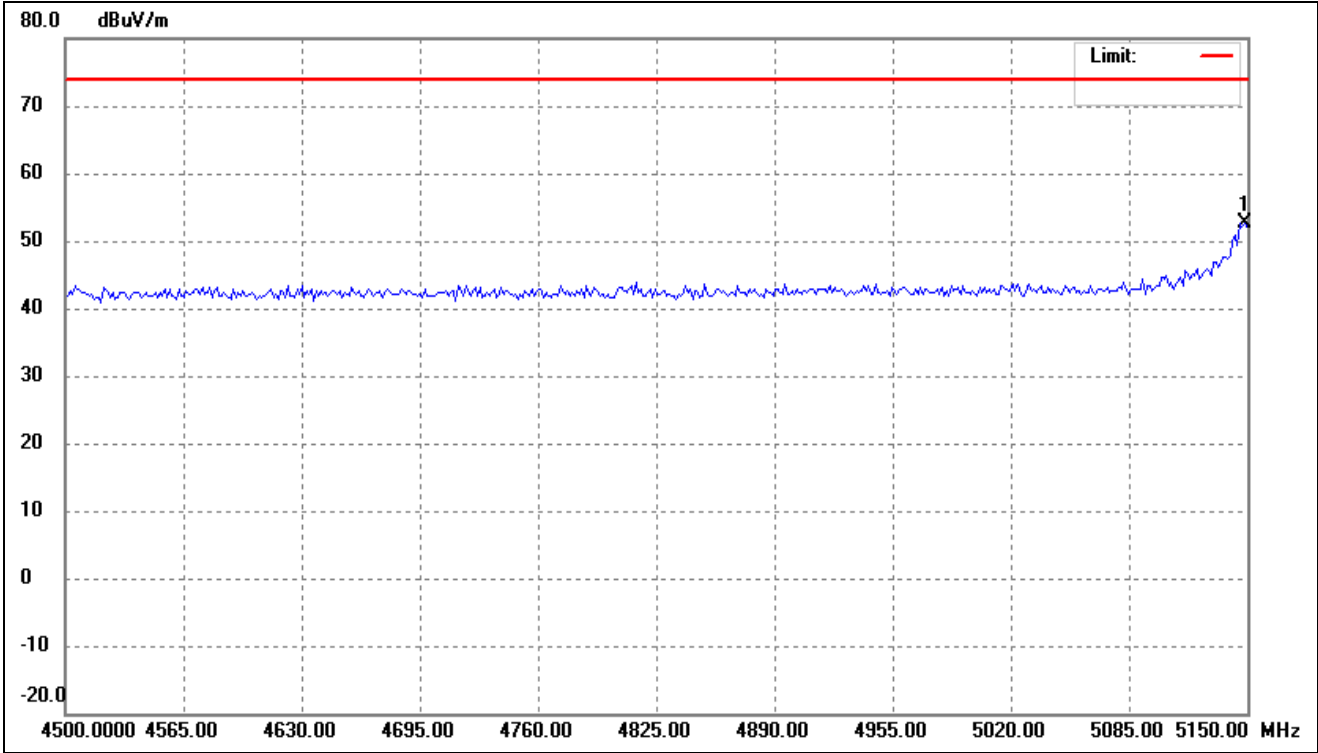
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5148.697	62.71	-11.66	51.05	74.00	-22.95	-	-	peak

802.11ac-VHT20- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



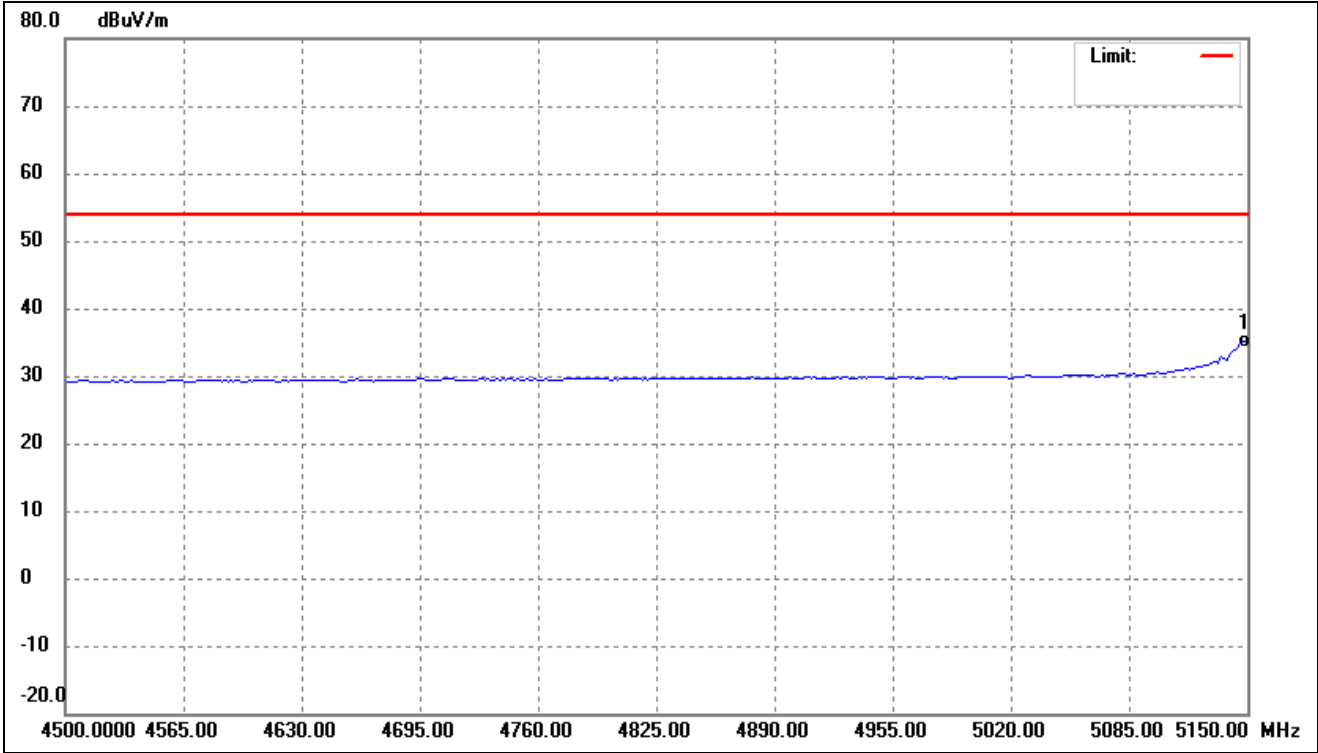
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	45.33	-11.66	33.67	54.00	-20.33	-	-	AVG

802.11n-HT40- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



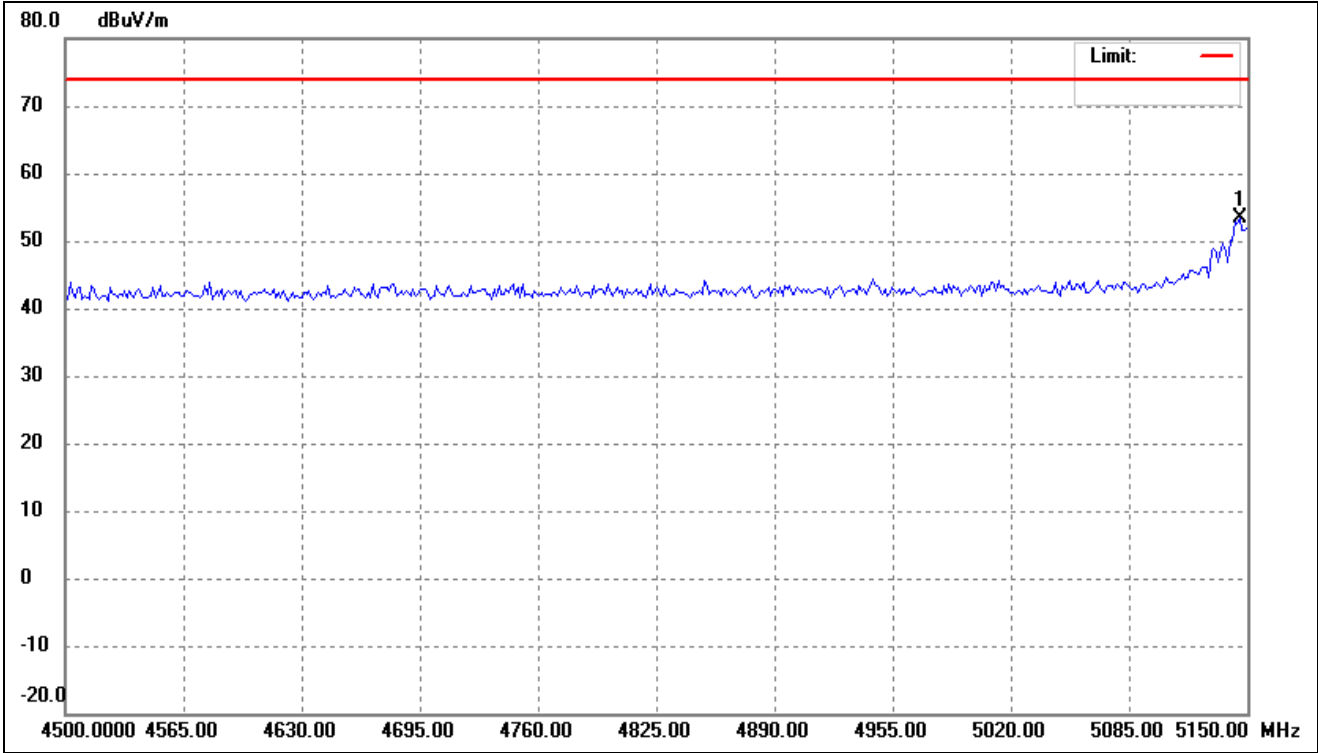
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5148.697	64.28	-11.66	52.62	74.00	-21.38	-	-	peak

802.11n-HT40- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



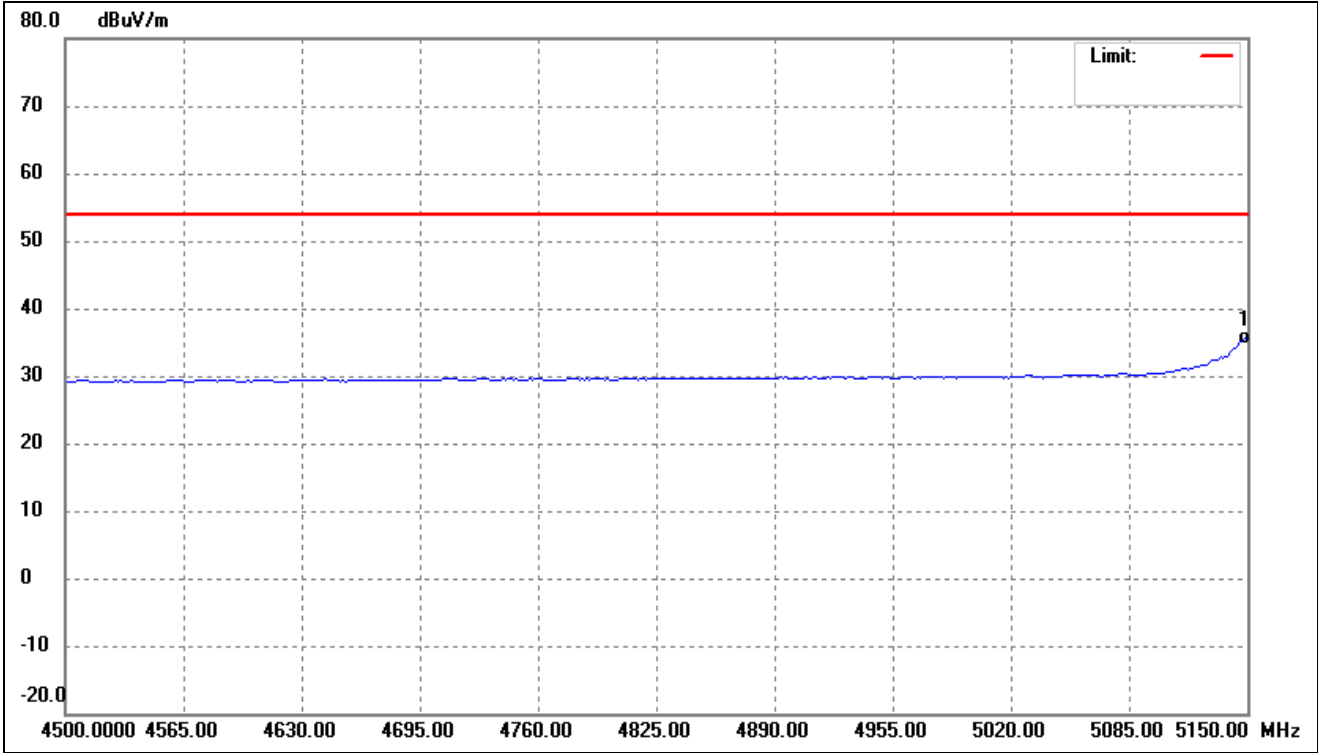
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5148.697	46.78	-11.66	35.12	54.00	-18.88	-	-	AVG

802.11ac-VHT40- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5146.092	65.15	-11.67	53.48	74.00	-20.52	-	-	peak

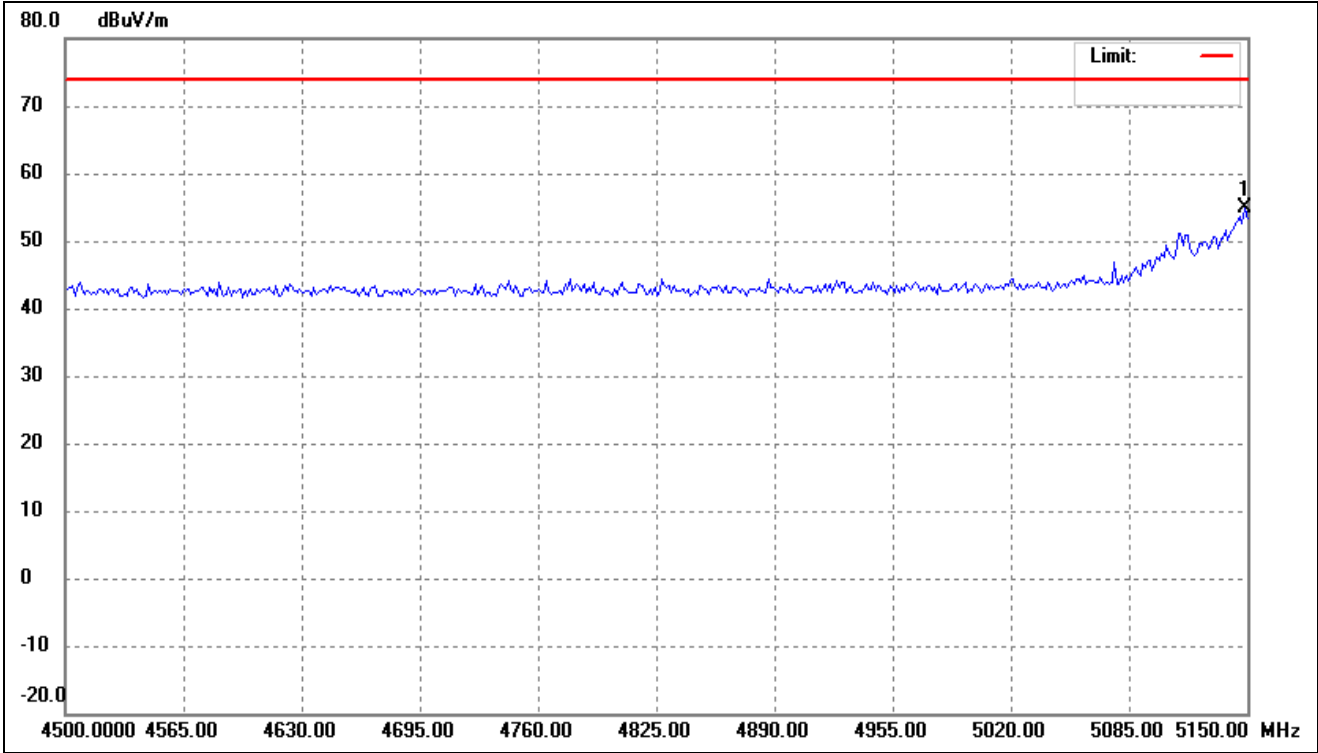
802.11ac-VHT40- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	47.33	-11.66	35.67	54.00	-18.33	-	-	AVG

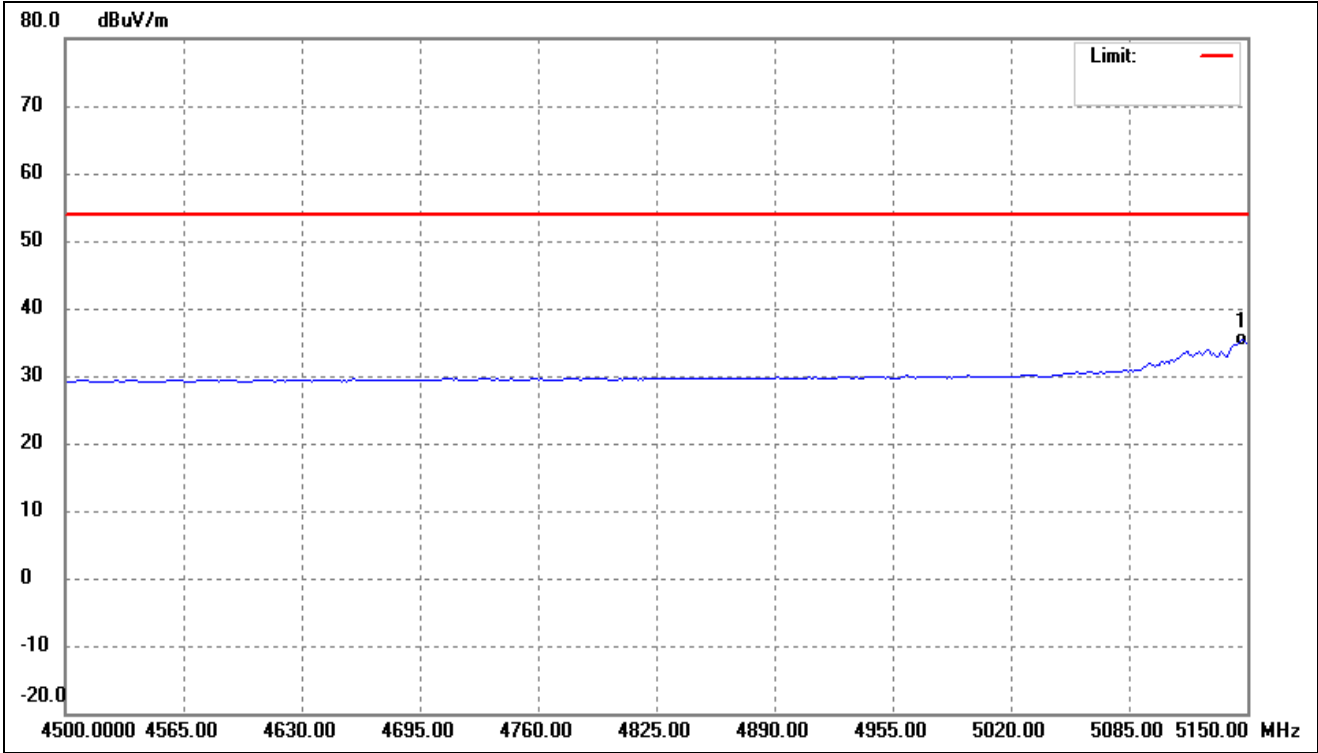


802.11ac-VHT80- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5148.697	66.61	-11.66	54.95	74.00	-19.05	-	-	peak

802.11ac-VHT80- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5147.395	46.98	-11.67	35.31	54.00	-18.69	-	-	AVG

Note: The Restricted Bandedge was tested in Horizontal /Vertical and the worst case position data was reported.

Remark: '-Means' the test Degree and Height is not recorded by the test software and only show the worst case in the test report.

- Antenna 1(worst case)
- For the frequency band 5.15-5.25GHz(802.11a)
- Harmonics And Spurious Emissions

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5180MHz)							
10360	55.20	7.11	62.31	74	-11.69	H	PK
10360	38.92	7.11	46.03	54	-7.97	H	AV
10360	56.36	7.11	63.47	74	-10.53	V	PK
10360	41.94	7.11	49.05	54	-4.95	V	AV
Middle Channel (5200MHz)							
10400	56.43	7.22	63.65	74	-10.35	H	PK
10400	40.71	7.22	47.93	54	-6.07	H	AV
10400	57.39	7.22	64.61	74	-9.39	V	PK
10400	39.45	7.22	46.67	54	-7.33	V	AV
High Channel (5240MHz)							
10480	58.91	7.69	66.60	74	-7.40	H	PK
10480	39.62	7.69	47.31	54	-6.69	H	AV
10480	57.01	7.69	64.70	74	-9.30	V	PK
10480	39.17	7.69	46.86	54	-7.14	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-43.79	-27
Highest	Above 5350	-43.38	-27

Note: the data just list the worst cases

- For the frequency band 5.15-5.25GHz (802.11n-HT20)
- Harmonics And Spurious Emissions

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5180MHz)							
10360	55.93	7.11	63.04	74	-10.96	H	PK
10360	38.06	7.11	45.17	54	-8.83	H	AV
10360	57.84	7.11	64.95	74	-9.05	V	PK
10360	38.21	7.11	45.32	54	-8.68	V	AV
Middle Channel (5200MHz)							
10400	56.05	7.22	63.27	74	-10.73	H	PK
10400	41.39	7.22	48.61	54	-5.39	H	AV
10400	57.04	7.22	64.26	74	-9.74	V	PK
10400	38.74	7.22	45.96	54	-8.04	V	AV
High Channel (5240MHz)							
10480	57.65	7.69	65.34	74	-8.66	H	PK
10480	40.87	7.69	48.56	54	-5.44	H	AV
10480	58.62	7.69	66.31	74	-7.69	V	PK
10480	38.43	7.69	46.12	54	-7.88	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-39.42	-27
Highest	Above 5350	-39.96	-27

Note: the data just list the worst cases.

Note: this EUT was tested in the low, high channel and the worst case position data was reported.

- For the frequency band 5.15-5.25GHz (802.11ac-VHT20)
- Harmonics And Spurious Emissions

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5180MHz)							
10360	55.34	7.11	62.45	74	-11.55	H	PK
10360	40.45	7.11	47.56	54	-6.44	H	AV
10360	55.90	7.11	63.01	74	-10.99	V	PK
10360	41.33	7.11	48.44	54	-5.56	V	AV
Middle Channel (5200MHz)							
10400	57.28	7.22	64.50	74	-9.50	H	PK
10400	41.35	7.22	48.57	54	-5.43	H	AV
10400	58.21	7.22	65.43	74	-8.57	V	PK
10400	41.52	7.22	48.74	54	-5.26	V	AV
High Channel (5240MHz)							
10480	55.58	7.69	63.27	74	-10.73	H	PK
10480	38.18	7.69	45.87	54	-8.13	H	AV
10480	58.62	7.69	66.31	74	-7.69	V	PK
10480	38.61	7.69	46.30	54	-7.70	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-38.51	-27
Highest	Above 5350	-39.76	-27

Note: the data just list the worst cases.

- For the frequency band 5.15-5.25GHz (802.11n-HT40)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5190MHz)							
10380	57.05	7.89	64.94	74	-9.06	H	PK
10380	38.81	7.89	46.70	54	-7.30	H	AV
10380	56.31	7.89	64.20	74	-9.80	V	PK
10380	41.00	7.89	48.89	54	-5.11	V	AV
High Channel (5230MHz)							
10460	56.81	7.97	64.78	74	-9.22	H	PK
10460	38.10	7.97	46.07	54	-7.93	H	AV
10460	58.57	7.97	66.54	74	-7.46	V	PK
10460	39.58	7.97	47.55	54	-6.45	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-38.59	-27
Highest	Above 5350	-39.64	-27

Note: the data just list the worst cases.

- For the frequency band 5.15-5.25GHz (802.11ac-VHT40)
- Harmonics And Spurious Emissions

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5190MHz)							
10380	57.37	7.89	65.26	74	-8.74	H	PK
10380	38.77	7.89	46.66	54	-7.34	H	AV
10380	57.33	7.89	65.22	74	-8.78	V	PK
10380	40.52	7.89	48.41	54	-5.59	V	AV
High Channel (5230MHz)							
10460	57.01	7.97	64.98	74	-9.02	H	PK
10460	39.01	7.97	46.98	54	-7.02	H	AV
10460	57.96	7.97	65.93	74	-8.07	V	PK
10460	41.28	7.97	49.25	54	-4.75	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-38.61	-27
Highest	Above 5350	-39.53	-27

Note: the data just list the worst cases.

- For the frequency band 5.15-5.25GHz (802.11ac-VHT80)
- Harmonics And Spurious Emissions

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
5210MHz							
10420	56.90	7.53	64.43	74	-9.57	H	PK
10420	41.97	7.53	49.50	54	-4.50	H	AV
10420	55.70	7.53	63.23	74	-10.77	H	PK
10420	38.01	7.53	45.54	54	-8.46	H	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-37.24	-27
Highest	Above 5350	-36.51	-27

Note: the data just list the worst cases.

*Note: Testing is carried out with frequency rang 9kHz to 40GHz, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*



## **9. Frequency Stability**

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### **9.1 Standard Applicable**

According to §15.407(g), manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the users manual.

### **9.2 Test Procedure**

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode.

### **9.3 Summary of Test Results/Plots**

**Please refer to Appendix D**

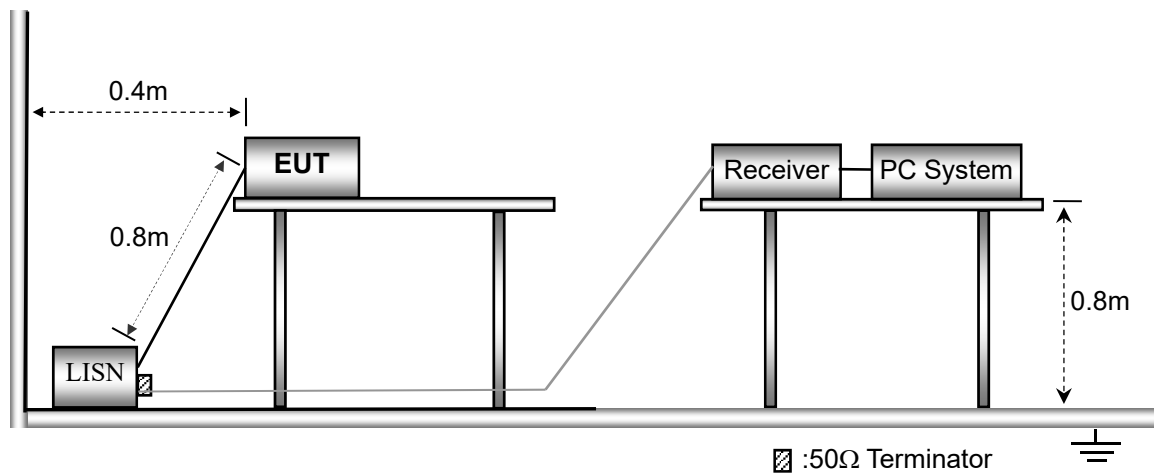
## 10 Conducted Emissions

### 10.1 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40cm long in the middle. The spacing between the peripherals was 10cm.

### 10.2 Basic Test Setup Block Diagram



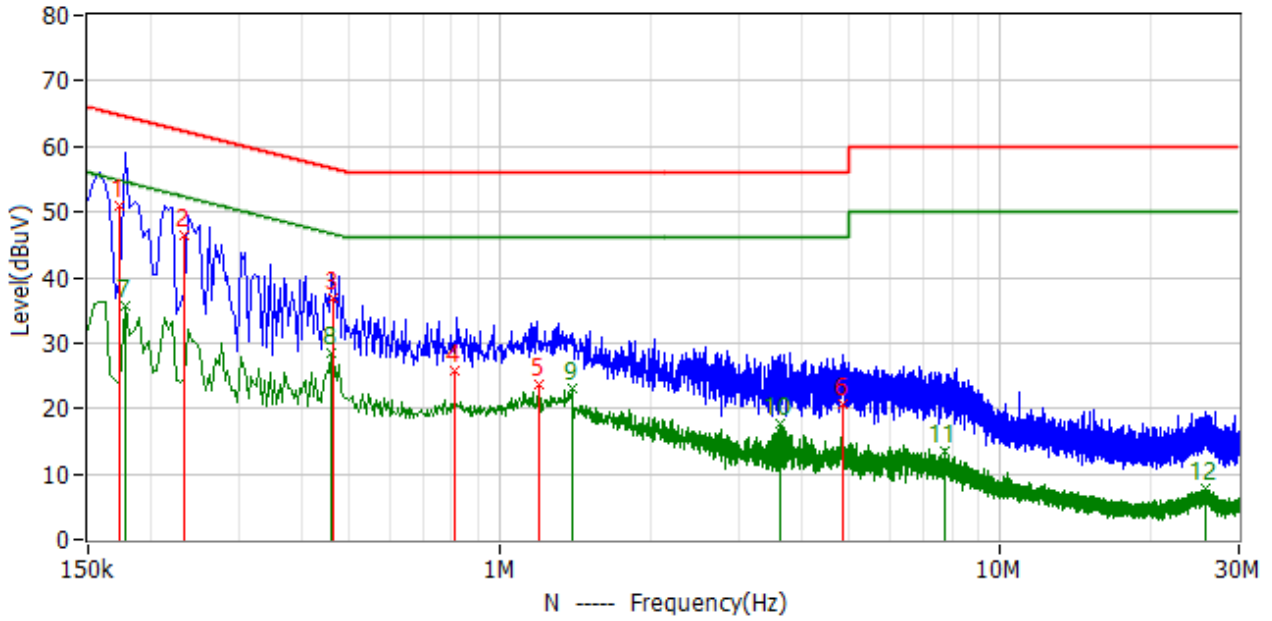
### 10.3 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

Start Frequency .....	150kHz
Stop Frequency .....	30MHz
Sweep Speed .....	Auto
IF Bandwidth.....	10kHz
Quasi-Peak Adapter Bandwidth .....	9kHz
Quasi-Peak Adapter Mode .....	Normal

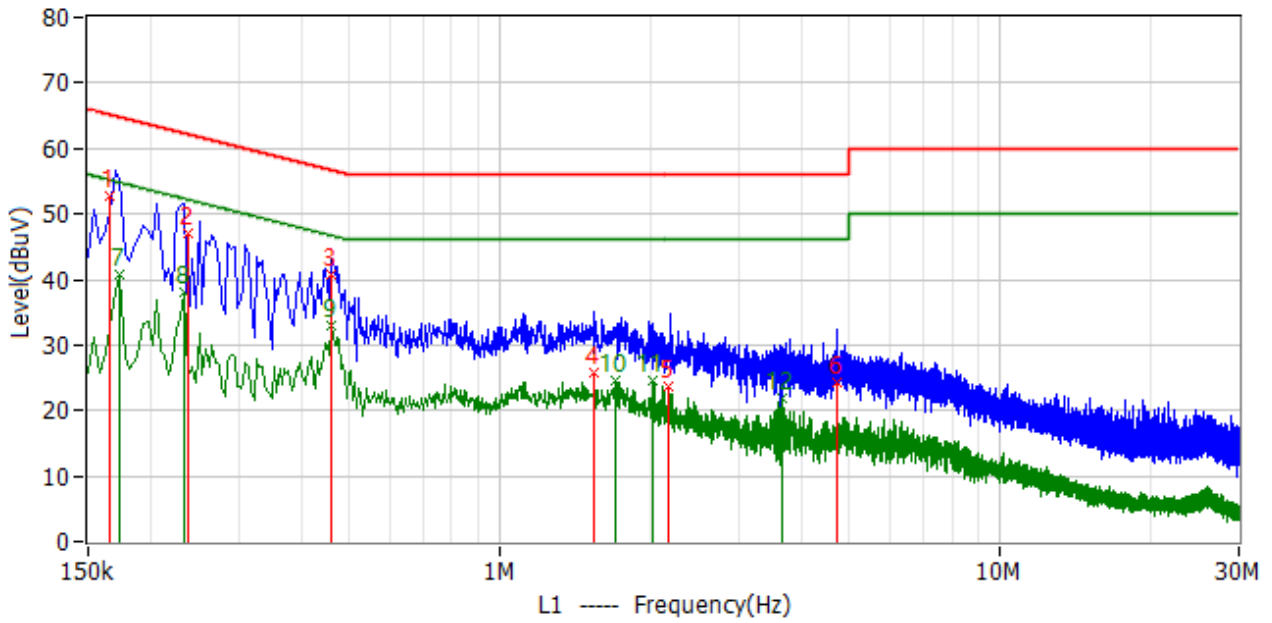
### 10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
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No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector
1	174.000kHz	41.3	9.7	51.0	64.8	-13.7	QP
2	234.000kHz	36.6	9.8	46.4	62.3	-15.9	QP
3	462.000kHz	27.1	9.7	36.8	56.7	-19.9	QP
4	810.000kHz	16.1	9.7	25.8	56.0	-30.2	QP
5	1.194MHz	13.9	9.7	23.6	56.0	-32.4	QP
6	4.862MHz	10.9	9.8	20.7	56.0	-35.3	QP
7*	178.000kHz	26.1	9.7	35.8	54.6	-18.8	AV
8*	458.000kHz	18.7	9.7	28.4	46.7	-18.4	AV
9*	1.394MHz	13.3	9.7	23.0	46.0	-23.0	AV
10*	3.614MHz	8.0	9.8	17.8	46.0	-28.2	AV
11*	7.750MHz	3.8	9.8	13.6	50.0	-36.4	AV
12*	25.846MHz	-2.4	10.3	7.9	50.0	-42.1	AV

Test Mode	Communication	AC120V 60Hz	Polarity:	Line
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No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector
1	166.000kHz	42.9	9.8	52.7	65.2	-12.4	QP
2	238.000kHz	37.1	9.8	46.9	62.2	-15.3	QP
3	458.000kHz	31.0	9.8	40.8	56.7	-15.9	QP
4	1.538MHz	15.9	9.8	25.7	56.0	-30.3	QP
5	2.178MHz	14.0	9.8	23.8	56.0	-32.2	QP
6	4.714MHz	14.5	9.9	24.4	56.0	-31.6	QP
7*	174.000kHz	30.8	9.8	40.6	54.8	-14.2	AV
8*	234.000kHz	28.3	9.8	38.1	52.3	-14.2	AV
9*	458.000kHz	23.2	9.8	33.0	46.7	-13.8	AV
10*	1.702MHz	14.8	9.8	24.6	46.0	-21.4	AV
11*	2.010MHz	14.8	9.8	24.6	46.0	-21.4	AV
12*	3.654MHz	12.1	9.9	22.0	46.0	-24.0	AV

## APPENDIX SUMMARY

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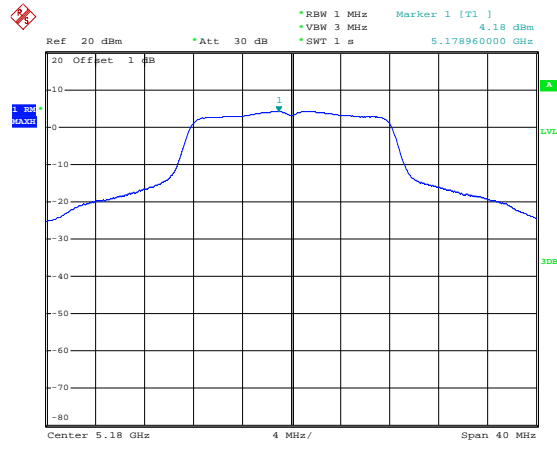
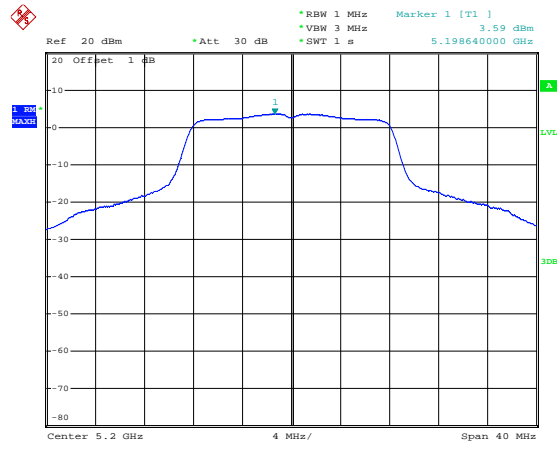
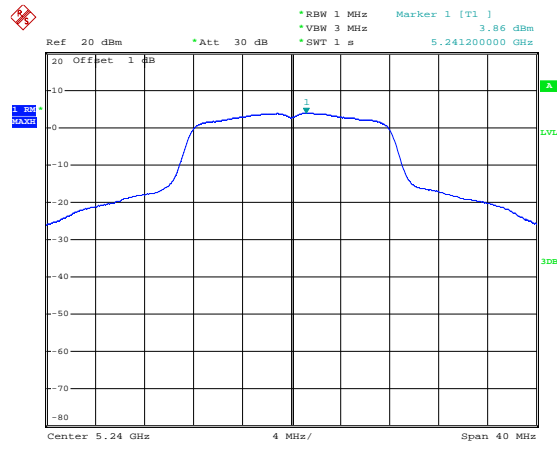
Project No.	WTH23X12272408W	Test Engineer	Elin Su
Start date	2024/1/6	Finish date	2024/1/6
Temperature	23°C	Humidity	54%
RF specifications	U-NII		

APPENDIX	Description of Test Item	Result
A	Power Spectral Density	Compliant
B	Emission Bandwidth and Occupied Bandwidth	Compliant
C	Maximum Conducted Output Power	Compliant
D	Frequency Stability	Compliant

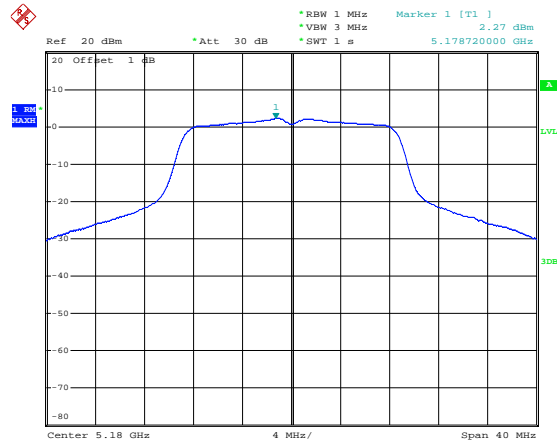
**APPENDIX A**

<b>Power Spectral Density</b>					
<b>U-NII-1:5150-5250MHz</b>					
Operating mode	Test Channel	ANT 1 dBm/MHz	ANT 2 dBm/MHz	Total dBm/MHz	Limit (dBm/MHz)
802.11a	5180	4.18	4.17	/	11
	5200	3.59	4.15	/	11
	5240	3.86	4.00	/	11
802.11n-HT20	5180	2.27	2.16	5.23	11
	5200	2.25	2.18	5.23	11
	5240	1.54	2.42	5.01	11
802.11n-HT40	5190	-1.98	-1.73	1.16	11
	5230	-2.12	-1.68	1.12	11
802.11ac-VHT20	5180	1.35	2.33	4.88	11
	5200	1.38	2.16	4.80	11
	5240	1.57	2.44	5.04	11
802.11ac-VHT40	5190	-1.76	-1.73	1.27	11
	5230	-2.15	-1.71	1.09	11
802.11ac-VHT80	5210	-6.96	-6.46	-3.69	11

**ANT 1**  
**5150-5250MHz**

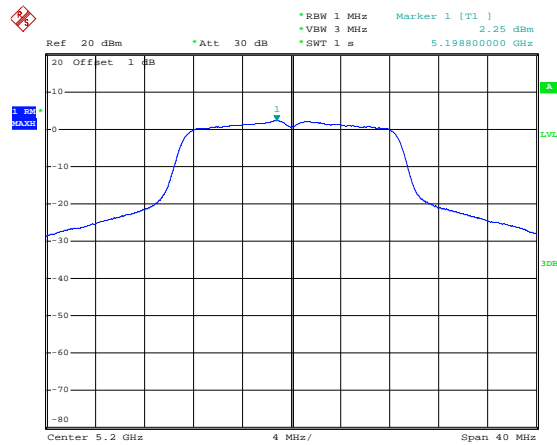
<p>802.11a-Low</p>	 <p>Ref 20 dBm *Att 30 dB *RBW 1 MHz *VSW 3 MHz *SWT 1 s Marker 1 [T1] 4.18 dBm 5.179960000 GHz</p> <p>20 Offset 1 dB</p> <p>1 dB</p> <p>100</p> <p>10</p> <p>0</p> <p>-10</p> <p>-20</p> <p>-30</p> <p>-40</p> <p>-50</p> <p>-60</p> <p>-70</p> <p>-80</p> <p>Center 5.18 GHz 4 MHz/ Span 40 MHz</p> <p>Date: 6.JAN.2024 15:04:37</p>
<p>802.11a-Middle</p>	 <p>Ref 20 dBm *Att 30 dB *RBW 1 MHz *VSW 3 MHz *SWT 1 s Marker 1 [T1] 3.59 dBm 5.198640000 GHz</p> <p>20 Offset 1 dB</p> <p>1 dB</p> <p>100</p> <p>10</p> <p>0</p> <p>-10</p> <p>-20</p> <p>-30</p> <p>-40</p> <p>-50</p> <p>-60</p> <p>-70</p> <p>-80</p> <p>Center 5.2 GHz 4 MHz/ Span 40 MHz</p> <p>Date: 6.JAN.2024 15:05:05</p>
<p>802.11a-High</p>	 <p>Ref 20 dBm *Att 30 dB *RBW 1 MHz *VSW 3 MHz *SWT 1 s Marker 1 [T1] 3.86 dBm 5.241200000 GHz</p> <p>20 Offset 1 dB</p> <p>1 dB</p> <p>100</p> <p>10</p> <p>0</p> <p>-10</p> <p>-20</p> <p>-30</p> <p>-40</p> <p>-50</p> <p>-60</p> <p>-70</p> <p>-80</p> <p>Center 5.24 GHz 4 MHz/ Span 40 MHz</p> <p>Date: 6.JAN.2024 15:05:28</p>

802.11n-HT20-Low



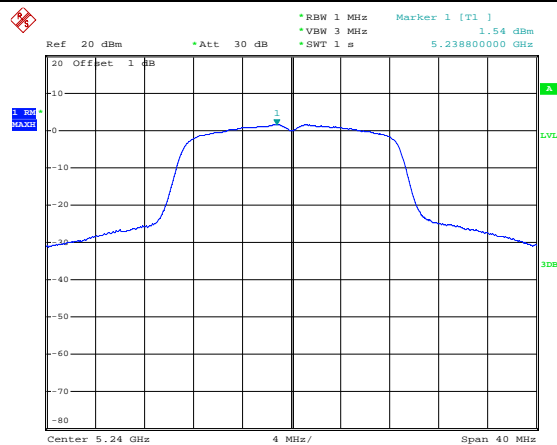
Date: 6.JAN.2024 15:05:57

802.11n-HT20-Middle



Date: 6.JAN.2024 15:06:18

802.11n-HT20-High



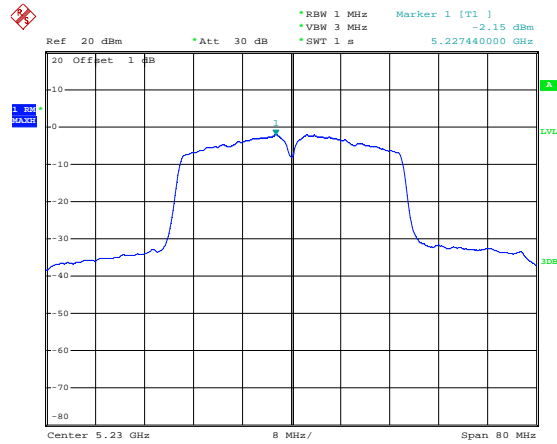
Date: 6.JAN.2024 15:06:41



<p>802.11n-HT40-Low</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 1 MHz    Marker 1 [T1]    -1.98 dBm      *VBW 3 MHz    *SWT 1 s    5.18720000 GHz</p> <p>20 Offset 1 dB    LVL      -10      -20      -30      -40      -50      -60      -70      -80</p> <p>Center 5.19 GHz    8 MHz/    Span 80 MHz</p> <p>Date: 6.JAN.2024 15:07:14</p>
<p>802.11n-HT40-High</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 1 MHz    Marker 1 [T1]    -2.12 dBm      *VBW 3 MHz    *SWT 1 s    5.227440000 GHz</p> <p>20 Offset 1 dB    LVL      -10      -20      -30      -40      -50      -60      -70      -80</p> <p>Center 5.23 GHz    8 MHz/    Span 80 MHz</p> <p>Date: 6.JAN.2024 15:08:35</p>
<p>802.11ac-VHT20-Low</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 1 MHz    Marker 1 [T1]    1.35 dBm      *VBW 3 MHz    *SWT 1 s    5.178720000 GHz</p> <p>20 Offset 1 dB    LVL      -10      -20      -30      -40      -50      -60      -70      -80</p> <p>Center 5.18 GHz    4 MHz/    Span 40 MHz</p> <p>Date: 6.JAN.2024 15:09:16</p>

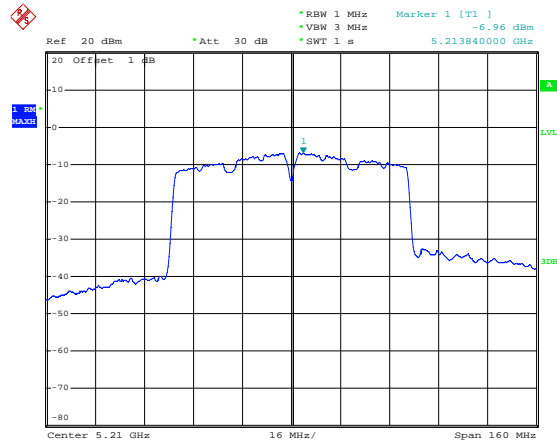
<p>802.11ac-VHT20- Middle</p>	<p>Date: 6.JAN.2024 15:09:39</p>
<p>802.11ac-VHT20- High</p>	<p>Date: 6.JAN.2024 15:09:59</p>
<p>802.11ac-VHT40- Low</p>	<p>Date: 6.JAN.2024 15:11:14</p>

802.11ac-VHT40-High



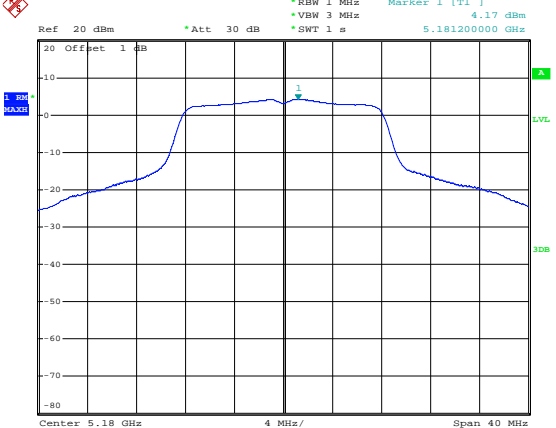
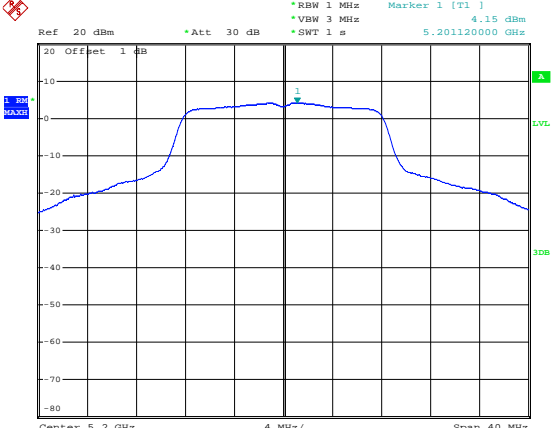
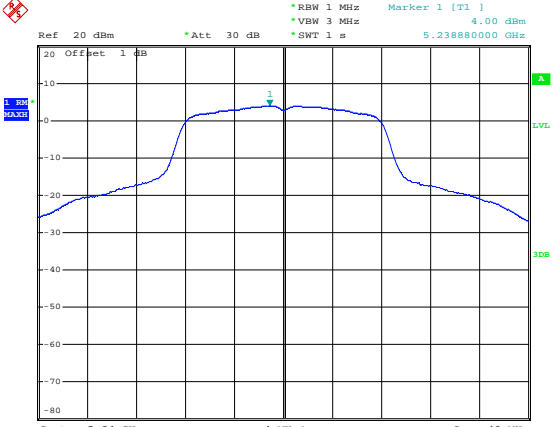
Date: 6.JAN.2024 15:12:15

802.11ac-VHT80



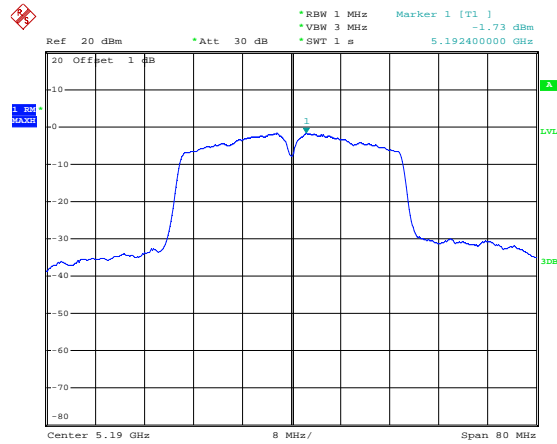
Date: 6.JAN.2024 15:13:42

**ANT 2**  
**5150-5250MHz**

<p>802.11a-Low</p>	 <p>Ref 20 dBm *Att 30 dB *RBW 1 MHz *VSW 3 MHz *SWT 1 s Marker 1 [T1] 4.17 dBm 5.18120000 GHz</p> <p>20 Offset 1 dB</p> <p>Center 5.18 GHz 4 MHz/ Span 40 MHz</p> <p>Date: 6.JAN.2024 16:01:52</p>
<p>802.11a-Middle</p>	 <p>Ref 20 dBm *Att 30 dB *RBW 1 MHz *VSW 3 MHz *SWT 1 s Marker 1 [T1] 4.15 dBm 5.20112000 GHz</p> <p>20 Offset 1 dB</p> <p>Center 5.2 GHz 4 MHz/ Span 40 MHz</p> <p>Date: 6.JAN.2024 16:02:11</p>
<p>802.11a-High</p>	 <p>Ref 20 dBm *Att 30 dB *RBW 1 MHz *VSW 3 MHz *SWT 1 s Marker 1 [T1] 4.00 dBm 5.23888000 GHz</p> <p>20 Offset 1 dB</p> <p>Center 5.24 GHz 4 MHz/ Span 40 MHz</p> <p>Date: 6.JAN.2024 16:02:30</p>

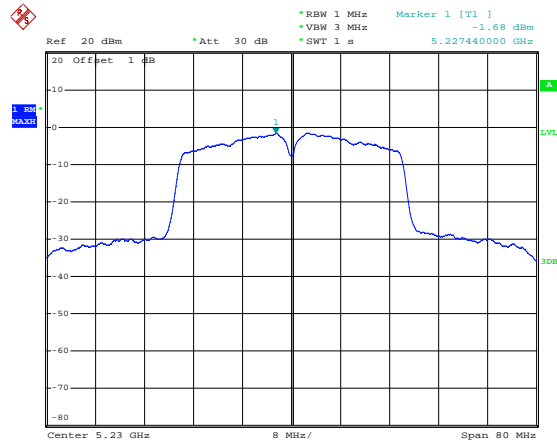
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<p>802.11n-HT20-Middle</p>	<p>Date: 6.JAN.2024 16:03:03</p>
<p>802.11n-HT20-High</p>	<p>Date: 6.JAN.2024 16:03:20</p>

802.11n-HT40-Low



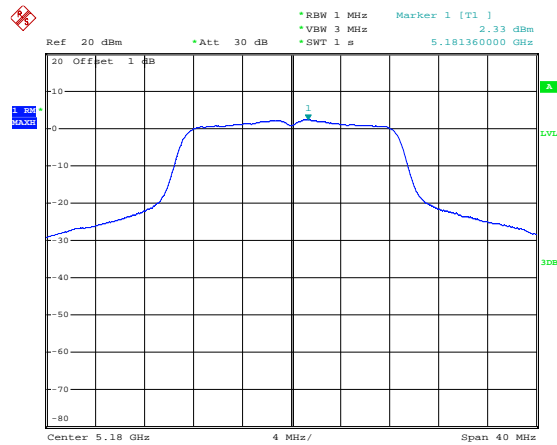
Date: 6.JAN.2024 16:03:43

802.11n-HT40-High



Date: 6.JAN.2024 16:04:03

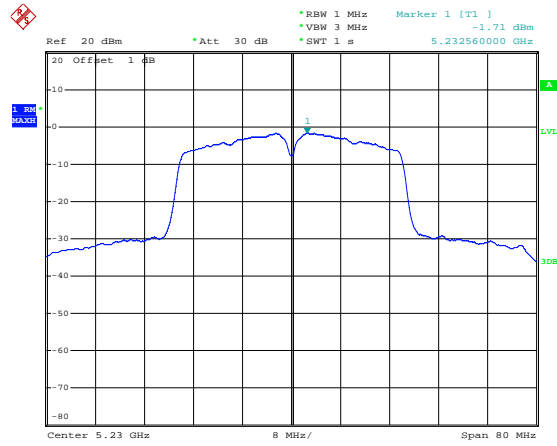
802.11ac-VHT20-Low



Date: 6.JAN.2024 16:04:21

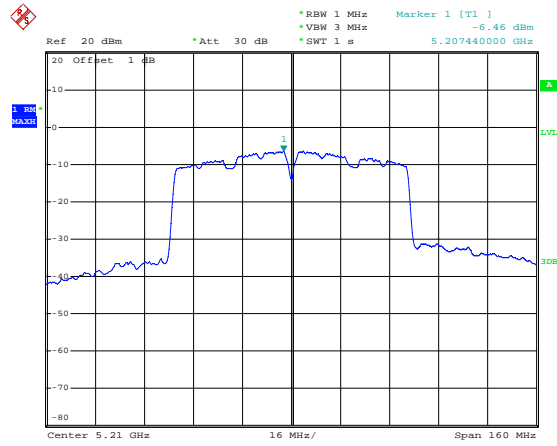
<p>802.11ac-VHT20- Middle</p>	<p>Date: 6.JAN.2024 16:04:37</p>
<p>802.11ac-VHT20- High</p>	<p>Date: 6.JAN.2024 16:04:53</p>
<p>802.11ac-VHT40- Low</p>	<p>Date: 6.JAN.2024 16:05:14</p>

802.11ac-VHT40-High



Date: 6.JAN.2024 16:05:39

802.11ac-VHT80



Date: 6.JAN.2024 16:06:05



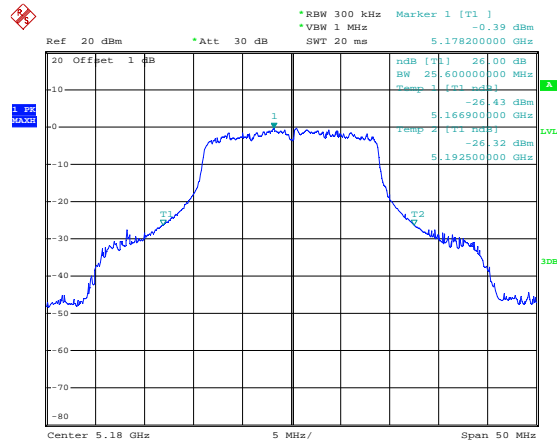
**APPENDIX B****Emission Bandwidth and Occupied Bandwidth**

<b>U-NII-1:5150-5250MHz</b>						
<b>Test Mode</b>	<b>Test Channel MHz</b>	<b>ANT 1</b>		<b>ANT 2</b>		<b>Result</b>
		<b>26 dB Bandwidth MHz</b>	<b>99% Bandwidth MHz</b>	<b>26 dB Bandwidth MHz</b>	<b>99% Bandwidth MHz</b>	
802.11a	5180	25.10	17.20	26.90	18.20	Pass
	5200	25.10	17.40	26.70	18.30	Pass
	5240	20.10	16.60	20.30	17.00	Pass
802.11n-HT20	5180	25.60	18.20	24.80	18.10	Pass
	5200	25.50	18.20	24.20	18.10	Pass
	5240	20.40	17.70	20.40	17.80	Pass
802.11n-HT40	5190	39.60	36.20	39.40	36.20	Pass
	5230	39.80	36.40	39.80	36.40	Pass
802.11ac-VHT20	5180	25.70	18.30	24.40	18.20	Pass
	5200	25.60	18.30	24.40	18.10	Pass
	5240	20.50	17.70	20.40	17.80	Pass
802.11ac-VHT40	5190	40.00	36.20	39.40	36.20	Pass
	5230	39.80	36.20	39.60	36.20	Pass
802.11ac-VHT80	5210	80.40	75.60	80.80	75.60	Pass

**ANT 1**  
**5150-5250MHz**

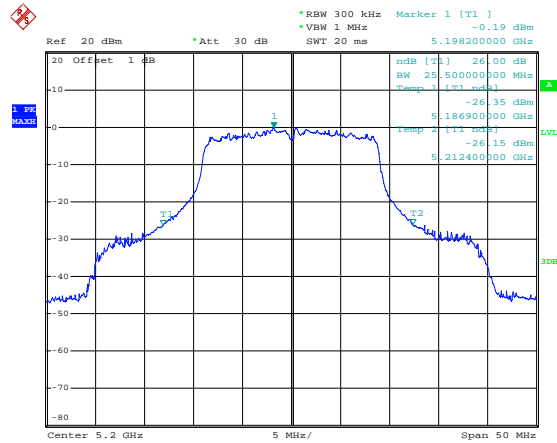
<p>802.11a-Low</p>	<p>Date: 6.JAN.2024 15:22:55</p>
<p>802.11a-Middle</p>	<p>Date: 6.JAN.2024 15:23:23</p>
<p>802.11a-High</p>	<p>Date: 6.JAN.2024 15:22:26</p>

802.11n-HT20-Low



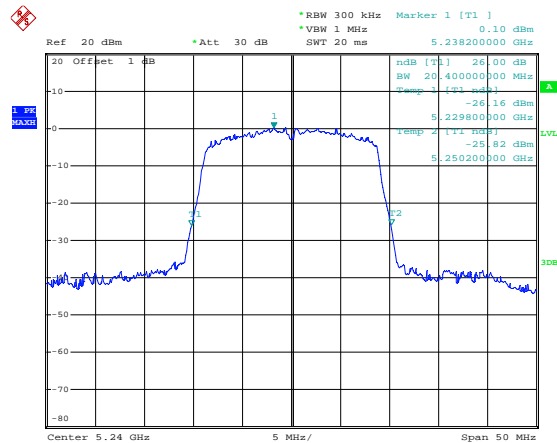
Date: 6.JAN.2024 15:23:55

802.11n-HT20-Middle



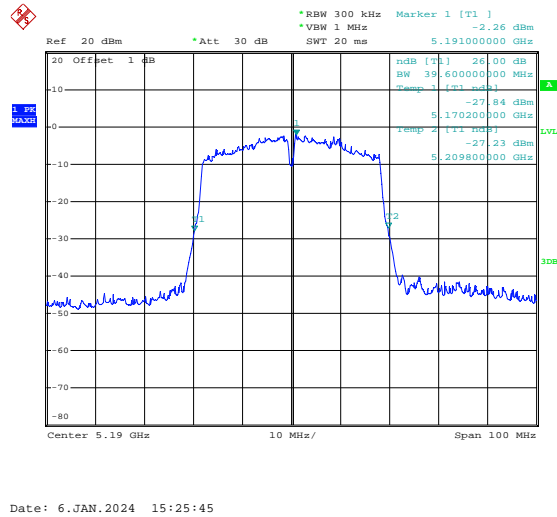
Date: 6.JAN.2024 15:24:28

802.11n-HT20-High

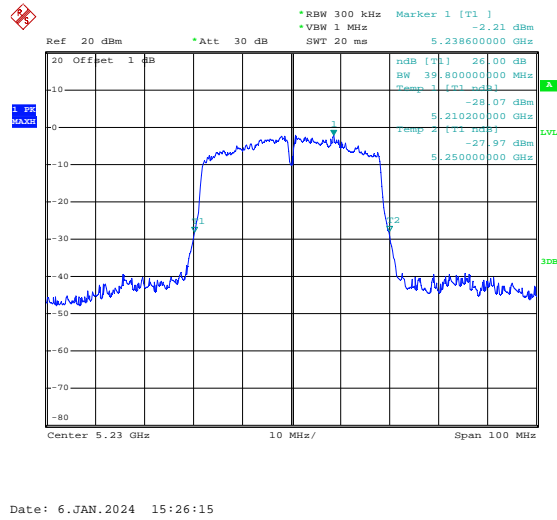


Date: 6.JAN.2024 15:25:02

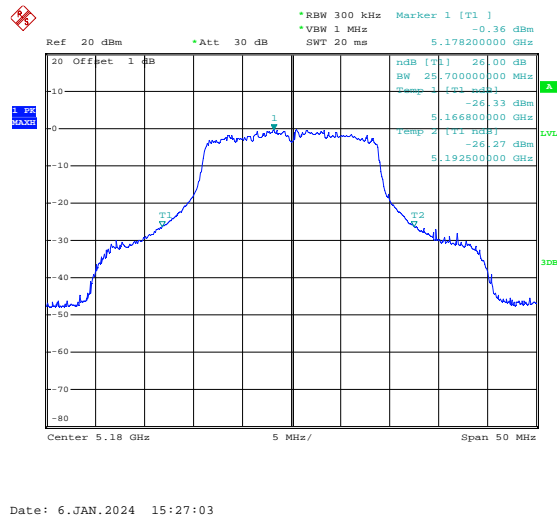
802.11n-HT40-Low



802.11n-HT40-High

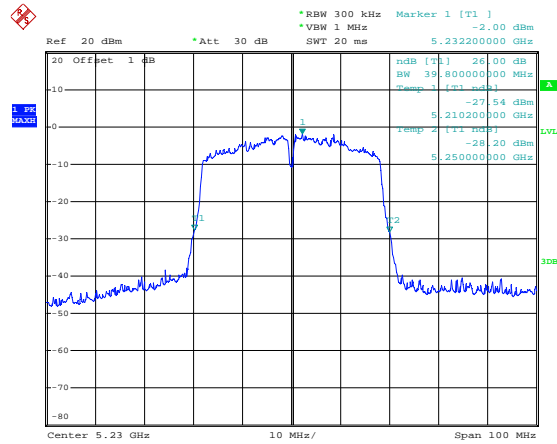


802.11ac-VHT20-Low



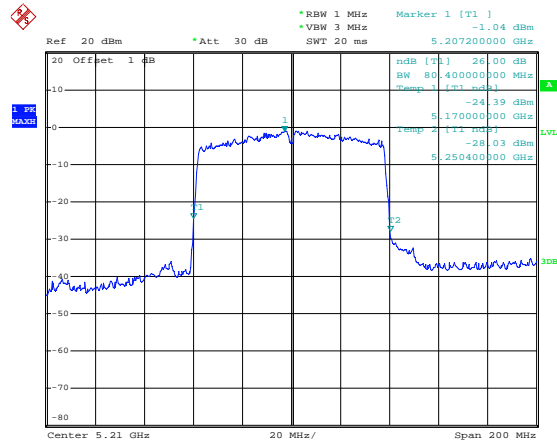
<p>802.11ac-VHT20- Middle</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 300 kHz    Marker 1 [T1]    -0.30 dBm      *VBW 1 MHz    SWT 20 ms    5.198200000 GHz</p> <p>20 Offset 1 dB    ndB [T1] 26.00 dB      BW 25.600000000 MHz      -26.42 dBm      5.186900000 GHz      Temp 2 [T2] -26.47 dBm      5.212500000 GHz</p> <p>Center 5.2 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 6.JAN.2024 15:27:48</p>
<p>802.11ac-VHT20- High</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 300 kHz    Marker 1 [T1]    0.12 dBm      *VBW 1 MHz    SWT 20 ms    5.241900000 GHz</p> <p>20 Offset 1 dB    ndB [T1] 26.00 dB      BW 20.500000000 MHz      -25.73 dBm      5.229800000 GHz      Temp 2 [T2] -25.95 dBm      5.250300000 GHz</p> <p>Center 5.24 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 6.JAN.2024 15:28:20</p>
<p>802.11ac-VHT40- Low</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 300 kHz    Marker 1 [T1]    -2.60 dBm      *VBW 1 MHz    SWT 20 ms    5.188200000 GHz</p> <p>20 Offset 1 dB    ndB [T1] 26.00 dB      BW 40.000000000 MHz      -28.59 dBm      5.170000000 GHz      Temp 2 [T2] -28.24 dBm      5.210000000 GHz</p> <p>Center 5.19 GHz    10 MHz/    Span 100 MHz</p> <p>Date: 6.JAN.2024 15:29:04</p>

802.11ac-VHT40-High

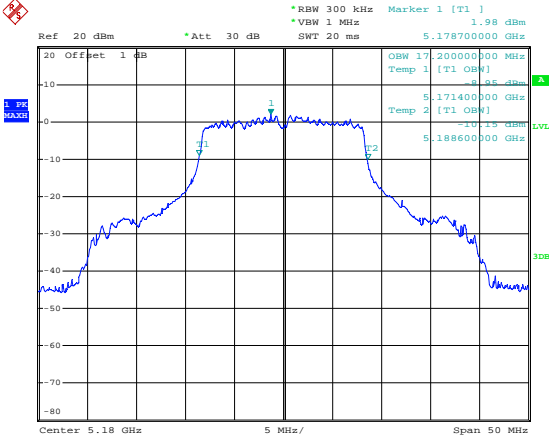
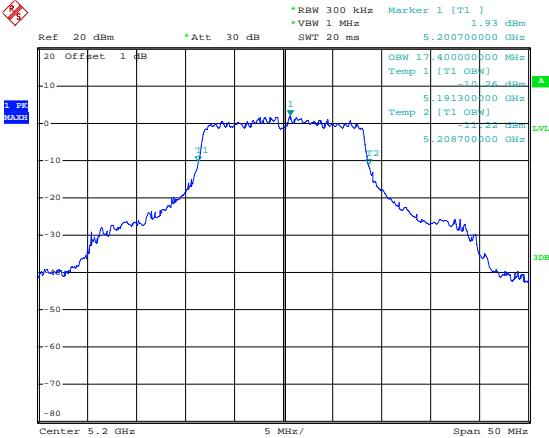
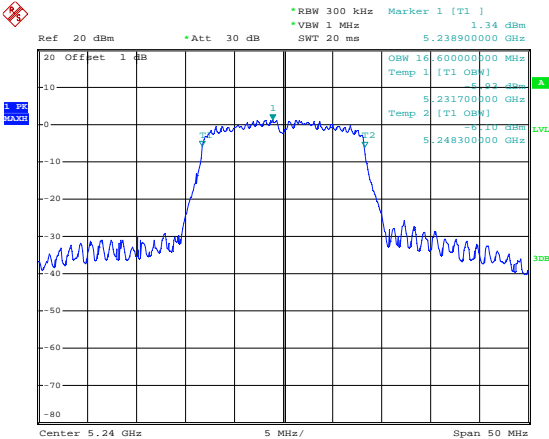


Date: 6.JAN.2024 15:29:39

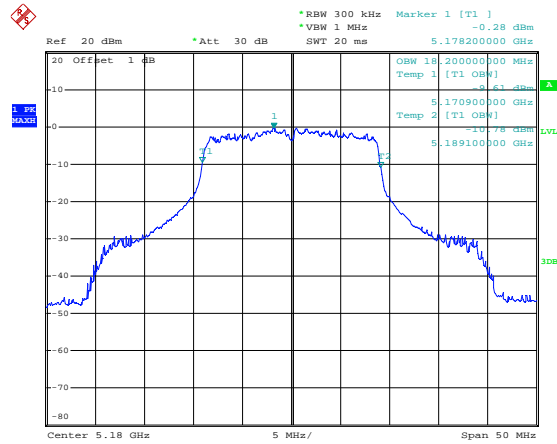
802.11ac-VHT80



Date: 6.JAN.2024 15:30:36

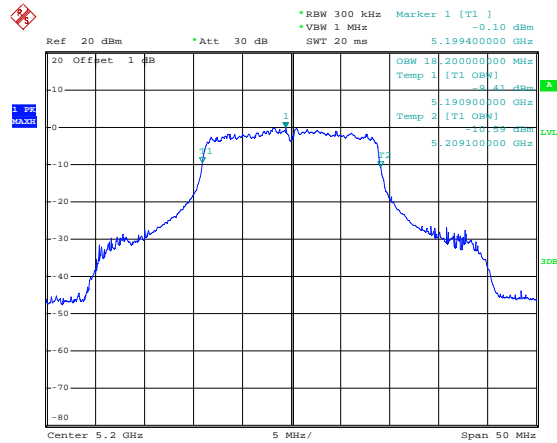
<p>802.11a-Low</p>	 <p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.178700000 GHz</p> <p>OBW 17.200000000 MHz Temp 1 [T1 OBW] -1.98 dBm 5.171400000 GHz Temp 2 [T1 OBW] -10.15 dBm 5.188600000 GHz</p> <p>Center 5.18 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 6.JAN.2024 15:33:13</p>
<p>802.11a-Middle</p>	 <p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.200700000 GHz</p> <p>OBW 17.400000000 MHz Temp 1 [T1 OBW] -1.93 dBm 5.191300000 GHz Temp 2 [T1 OBW] -10.26 dBm 5.208700000 GHz</p> <p>Center 5.2 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 6.JAN.2024 15:33:53</p>
<p>802.11a-High</p>	 <p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.238900000 GHz</p> <p>OBW 16.600000000 MHz Temp 1 [T1 OBW] -1.34 dBm 5.231700000 GHz Temp 2 [T1 OBW] -10.10 dBm 5.248300000 GHz</p> <p>Center 5.24 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 6.JAN.2024 15:34:31</p>

802.11n-HT20-Low



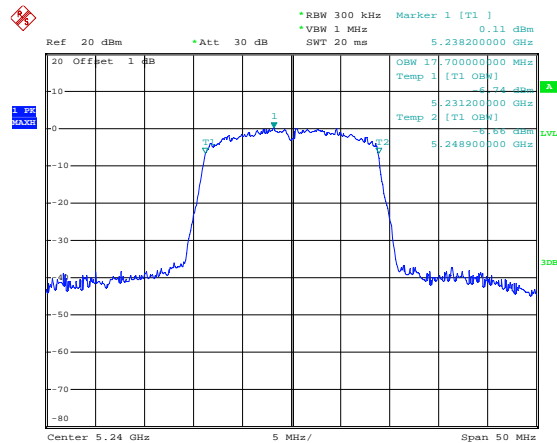
Date: 6.JAN.2024 15:34:55

802.11n-HT20-Middle



Date: 6.JAN.2024 15:35:27

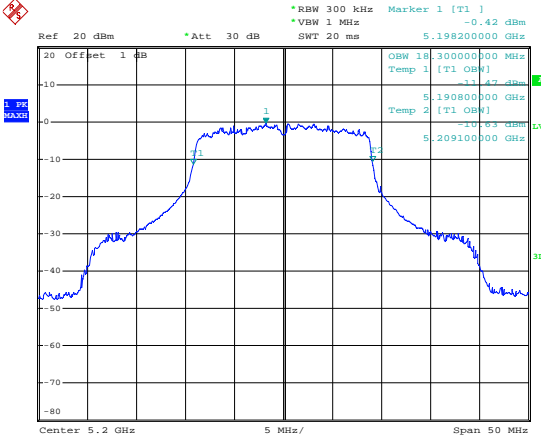
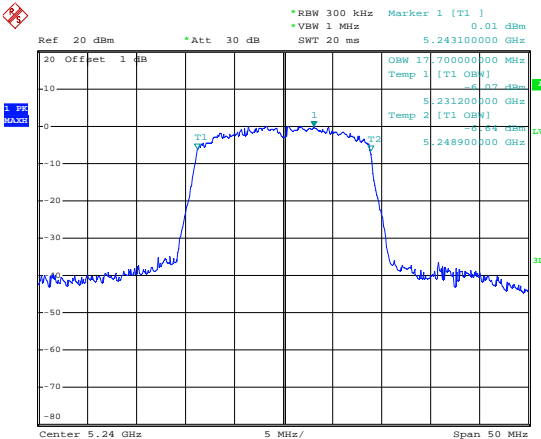
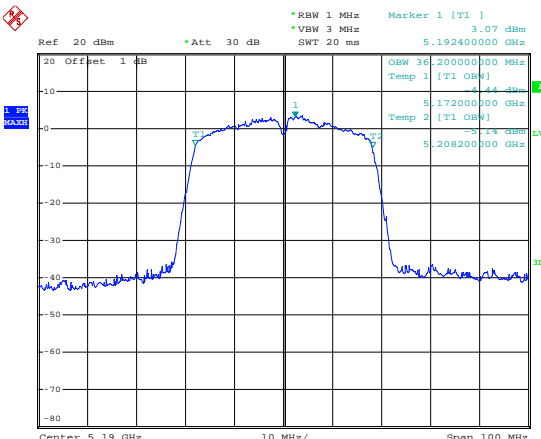
802.11n-HT20-High



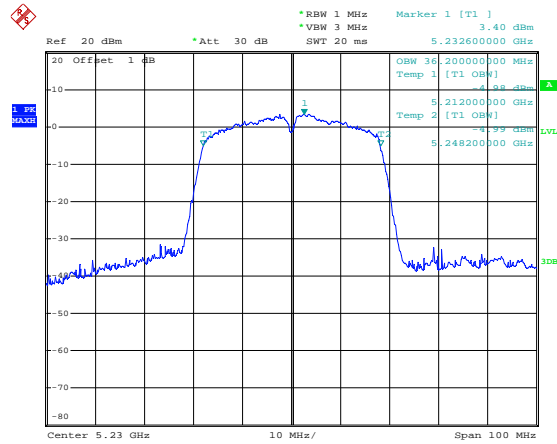
Date: 6.JAN.2024 15:35:55



<p>802.11n-HT40-Low</p>	<p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.187800000 GHz</p> <p>Marker 1 [T1] 3.44 dBm</p> <p>OBW 36.200000000 MHz Temp 1 [T1 OBW] -1.69 dBm 5.172000000 GHz Temp 2 [T1 OBW] -5.54 dBm 5.208200000 GHz</p> <p>Center 5.19 GHz 10 MHz/ Span 100 MHz</p> <p>Date: 6.JAN.2024 15:36:24</p>
<p>802.11n-HT40-High</p>	<p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.232000000 GHz</p> <p>Marker 1 [T1] 3.68 dBm</p> <p>OBW 36.400000000 MHz Temp 1 [T1 OBW] -1.64 dBm 5.211800000 GHz Temp 2 [T1 OBW] -5.74 dBm 5.248200000 GHz</p> <p>Center 5.23 GHz 10 MHz/ Span 100 MHz</p> <p>Date: 6.JAN.2024 15:36:56</p>
<p>802.11ac-VHT20-Low</p>	<p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.178100000 GHz</p> <p>Marker 1 [T1] -0.36 dBm</p> <p>OBW 18.300000000 MHz Temp 1 [T1 OBW] -11.47 dBm 5.170800000 GHz Temp 2 [T1 OBW] -14.88 dBm 5.189100000 GHz</p> <p>Center 5.18 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 6.JAN.2024 15:37:40</p>

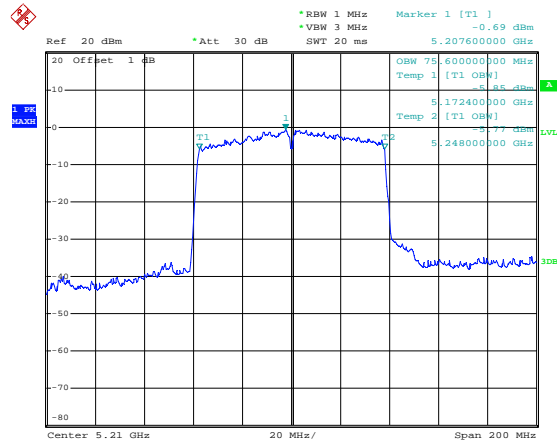
<p>802.11ac-VHT20- Middle</p>	 <p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.198200000 GHz</p> <p>Marker 1 [T1] -0.42 dBm</p> <p>OBW 18.300000000 MHz Temp 1 [T1 OBW] -11.47 dBm 5.190800000 GHz Temp 2 [T1 OBW] -10.63 dBm 5.209100000 GHz</p> <p>Center 5.2 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 6.JAN.2024 15:38:12</p>
<p>802.11ac-VHT20- High</p>	 <p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.243100000 GHz</p> <p>Marker 1 [T1] 0.01 dBm</p> <p>OBW 17.700000000 MHz Temp 1 [T1 OBW] -6.07 dBm 5.231200000 GHz Temp 2 [T1 OBW] -6.84 dBm 5.248900000 GHz</p> <p>Center 5.24 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 6.JAN.2024 15:38:40</p>
<p>802.11ac-VHT40- Low</p>	 <p>Ref 20 dBm *Att 30 dB SWT 20 ms 5.192400000 GHz</p> <p>Marker 1 [T1] 3.07 dBm</p> <p>OBW 36.200000000 MHz Temp 1 [T1 OBW] 4.44 dBm 5.172000000 GHz Temp 2 [T1 OBW] -1.14 dBm 5.208200000 GHz</p> <p>Center 5.19 GHz 10 MHz/ Span 100 MHz</p> <p>Date: 6.JAN.2024 15:39:12</p>

802.11ac-VHT40-High



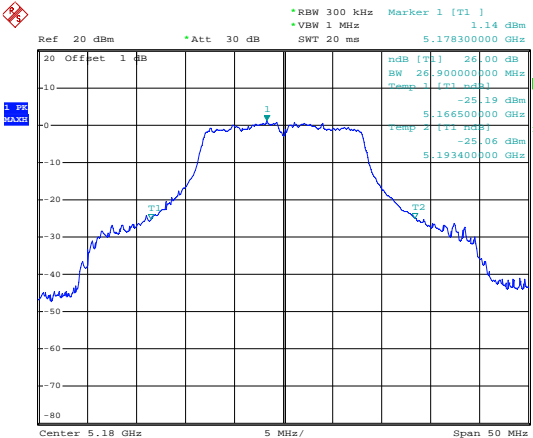
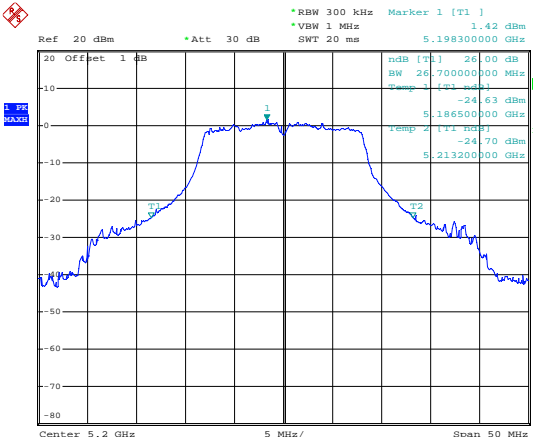
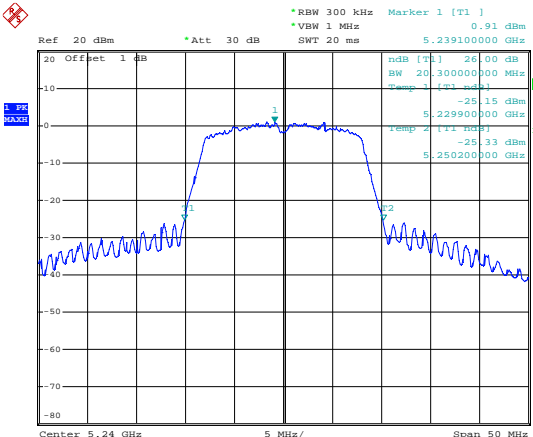
Date: 6.JAN.2024 15:39:40

802.11ac-VHT80

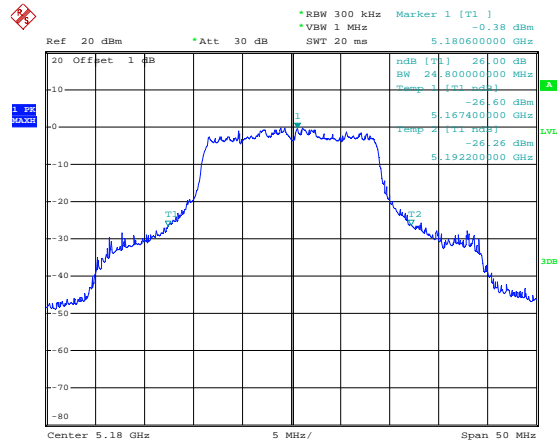


Date: 6.JAN.2024 15:40:25

**ANT 2**  
**5150-5250MHz**

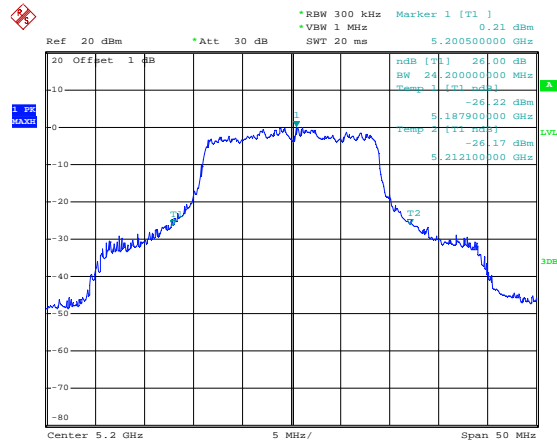
<p>802.11a-Low</p>	 <p>Date: 6.JAN.2024 16:22:47</p>
<p>802.11a-Middle</p>	 <p>Date: 6.JAN.2024 16:23:25</p>
<p>802.11a-High</p>	 <p>Date: 6.JAN.2024 16:22:23</p>

802.11n-HT20-Low



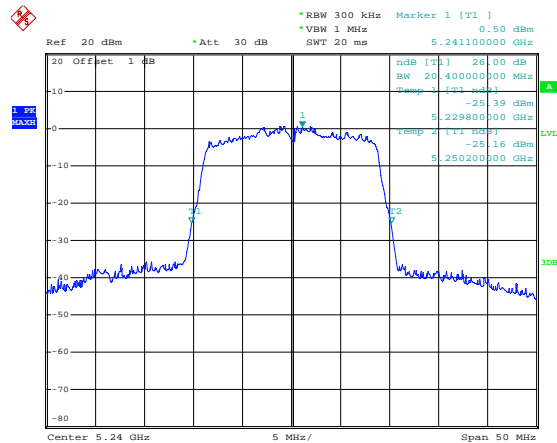
Date: 6.JAN.2024 16:23:45

802.11n-HT20-Middle



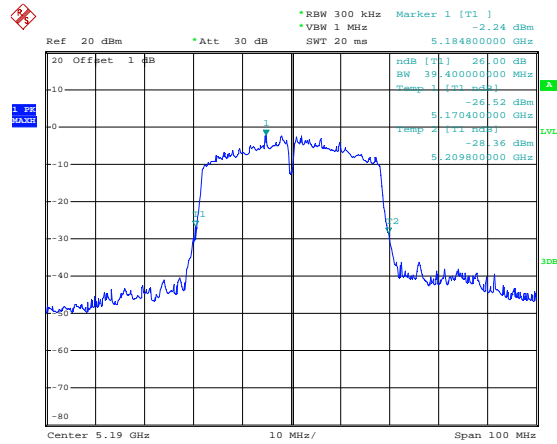
Date: 6.JAN.2024 16:24:06

802.11n-HT20-High



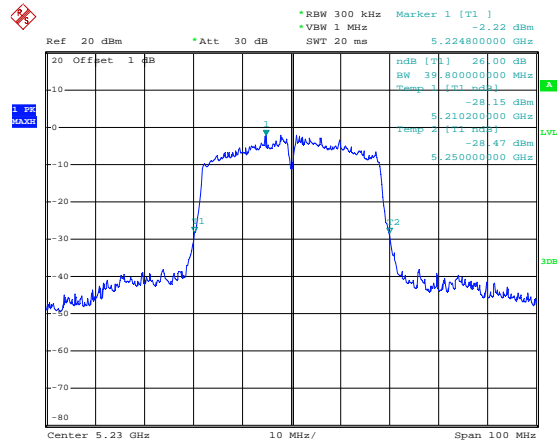
Date: 6.JAN.2024 16:24:28

802.11n-HT40-Low



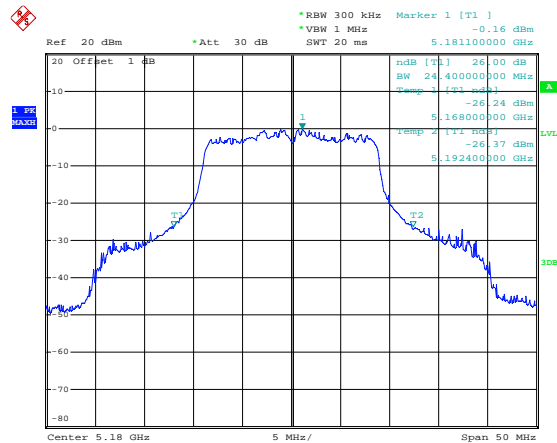
Date: 6.JAN.2024 16:24:51

802.11n-HT40-High

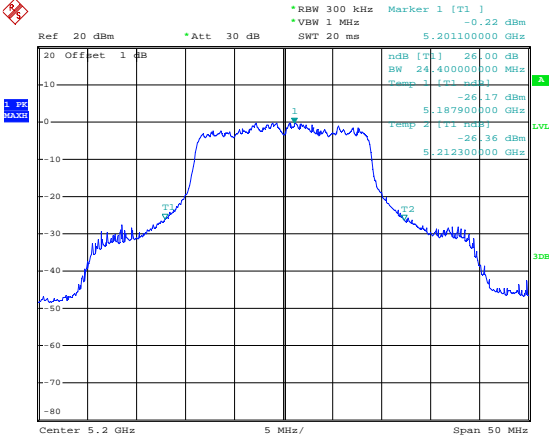
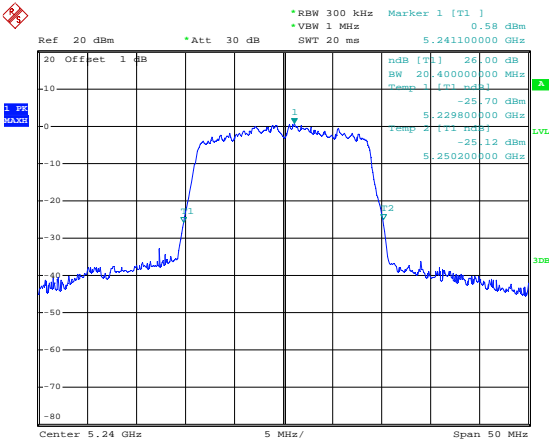
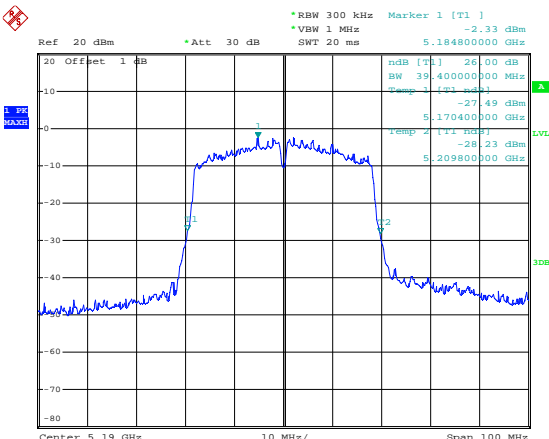


Date: 6.JAN.2024 16:25:15

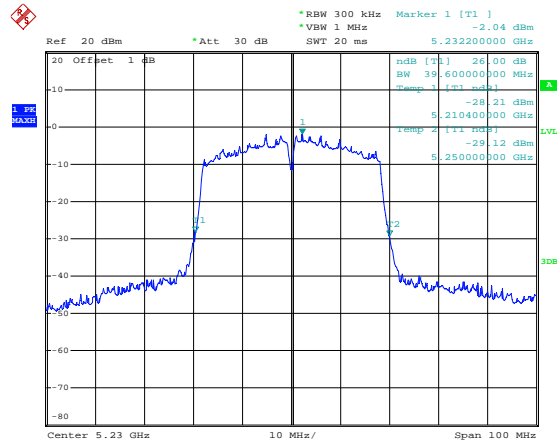
802.11ac-VHT20-Low



Date: 6.JAN.2024 16:25:46

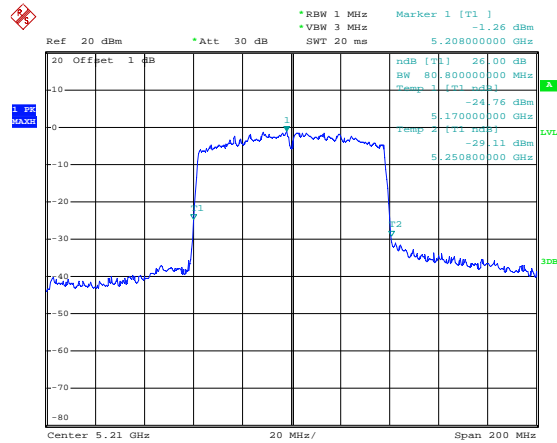
<p>802.11ac-VHT20- Middle</p>	 <p>Date: 6.JAN.2024 16:26:13</p>
<p>802.11ac-VHT20- High</p>	 <p>Date: 6.JAN.2024 16:26:34</p>
<p>802.11ac-VHT40- Low</p>	 <p>Date: 6.JAN.2024 16:27:00</p>

802.11ac-VHT40-High



Date: 6.JAN.2024 16:27:30

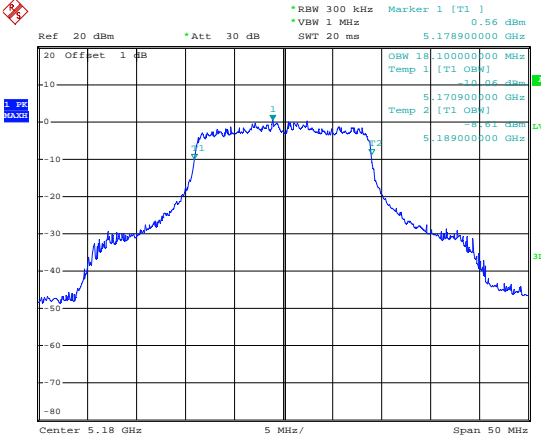
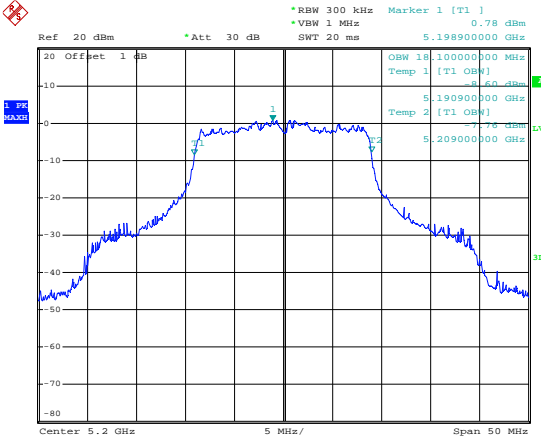
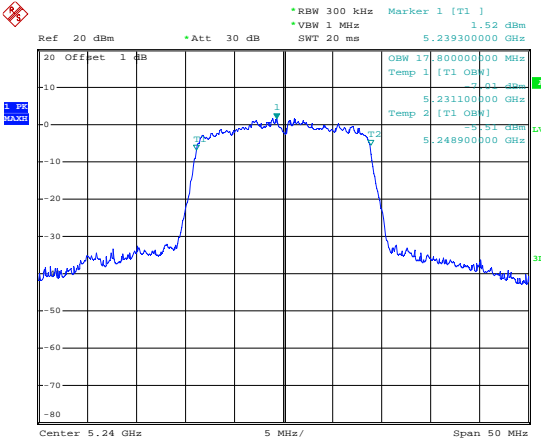
802.11ac-VHT80



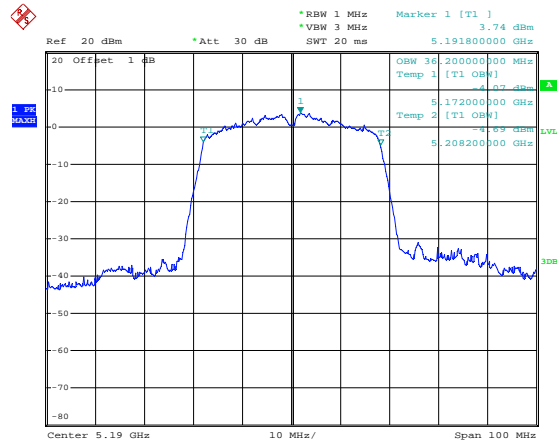
Date: 6.JAN.2024 16:28:16



<p>802.11a-Low</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 300 kHz    Marker 1 [T1] 0.90 dBm      *VBW 1 MHz    SWT 20 ms    5.178300000 GHz</p> <p>20 Offset 1 dB    OBW 18.200000000 MHz      Temp 1 [T1] 0.87 dBm      5.170900000 GHz    -13.87 dBm      Temp 2 [T1] 0.87 dBm      5.189100000 GHz    -13.81 dBm</p> <p>Center 5.18 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 6.JAN.2024 16:30:00</p>
<p>802.11a-Middle</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 300 kHz    Marker 1 [T1] 1.18 dBm      *VBW 1 MHz    SWT 20 ms    5.198400000 GHz</p> <p>20 Offset 1 dB    OBW 18.300000000 MHz      Temp 1 [T1] 0.87 dBm      5.190800000 GHz    -13.17 dBm      Temp 2 [T1] 0.87 dBm      5.209100000 GHz    -13.90 dBm</p> <p>Center 5.2 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 6.JAN.2024 16:30:35</p>
<p>802.11a-High</p>	<p>Ref 20 dBm    *Att 30 dB    *RBW 300 kHz    Marker 1 [T1] 1.29 dBm      *VBW 1 MHz    SWT 20 ms    5.237300000 GHz</p> <p>20 Offset 1 dB    OBW 17.000000000 MHz      Temp 1 [T1] 0.87 dBm      5.231500000 GHz    -13.89 dBm      Temp 2 [T1] 0.87 dBm      5.248500000 GHz    -14.22 dBm</p> <p>Center 5.24 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 6.JAN.2024 16:30:57</p>

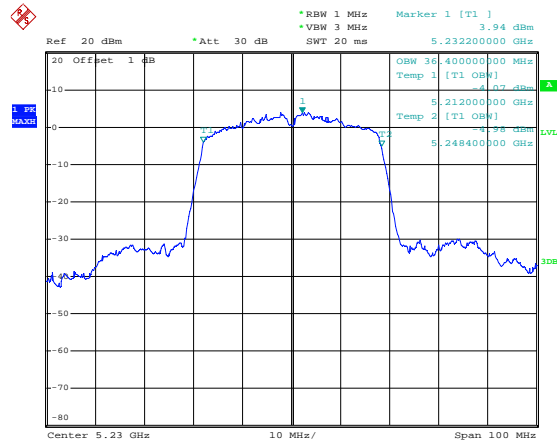
<p>802.11n-HT20-Low</p>	 <p>Date: 6.JAN.2024 16:31:21</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 6.JAN.2024 16:31:50</p>
<p>802.11n-HT20-High</p>	 <p>Date: 6.JAN.2024 16:32:23</p>

802.11n-HT40-Low



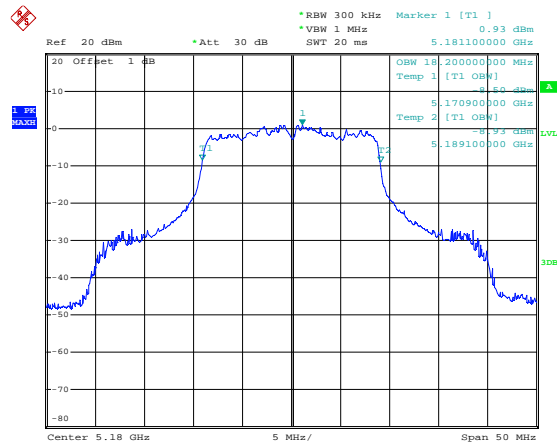
Date: 6.JAN.2024 16:32:56

802.11n-HT40-High

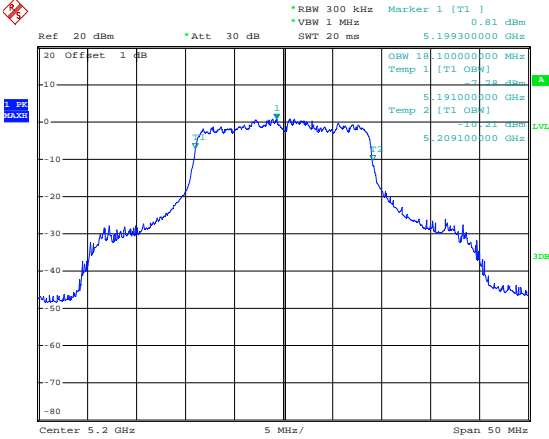
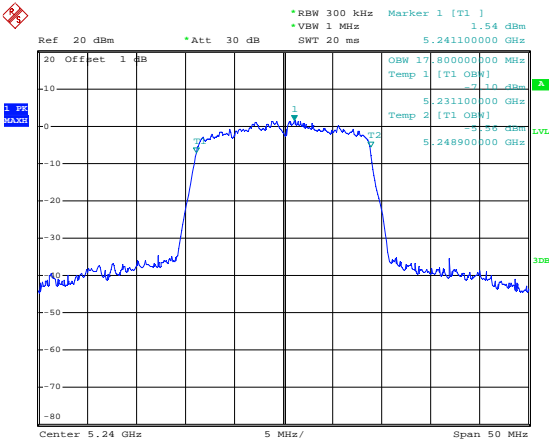
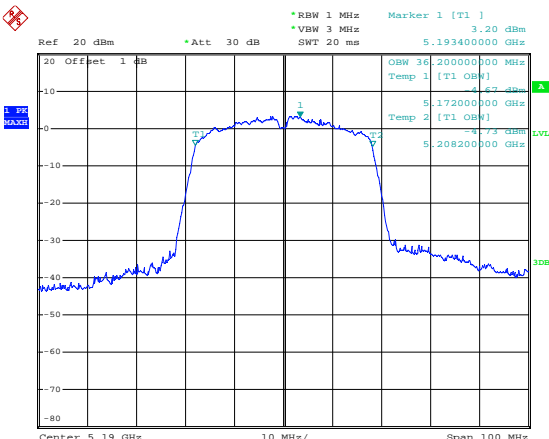


Date: 6.JAN.2024 16:33:27

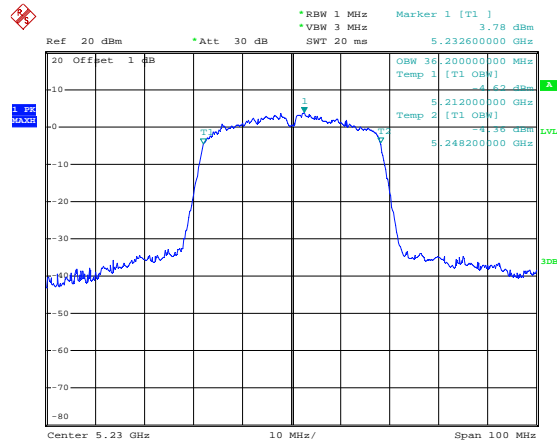
802.11ac-VHT20-Low



Date: 6.JAN.2024 16:34:01

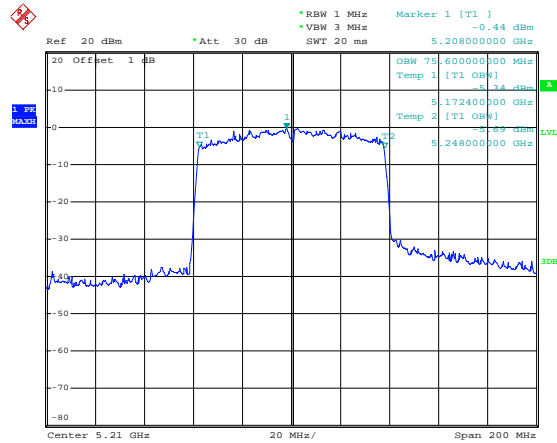
<p>802.11ac-VHT20- Middle</p>	 <p>Date: 6.JAN.2024 16:34:27</p>
<p>802.11ac-VHT20- High</p>	 <p>Date: 6.JAN.2024 16:34:51</p>
<p>802.11ac-VHT40- Low</p>	 <p>Date: 6.JAN.2024 16:35:23</p>

802.11ac-VHT40-High



Date: 6.JAN.2024 16:35:47

802.11ac-VHT80



Date: 6.JAN.2024 16:36:17

## APPENDIX C

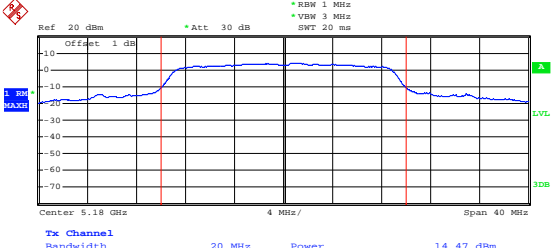
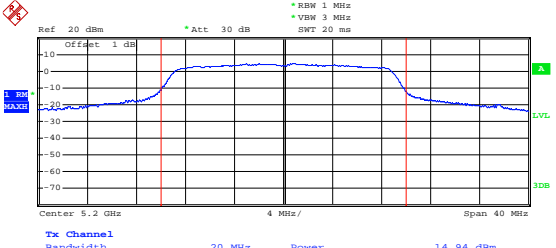
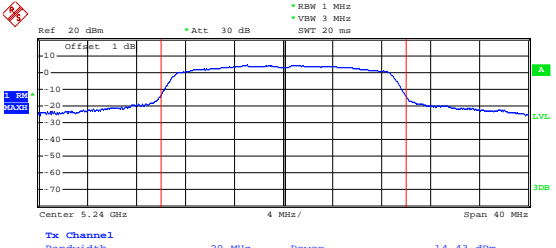
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### Maximum Conducted Output Power

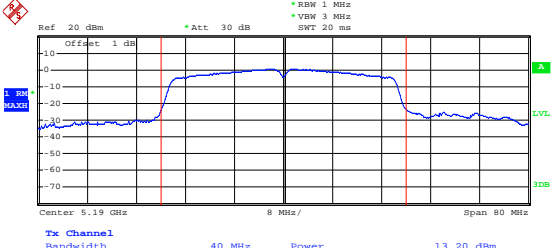
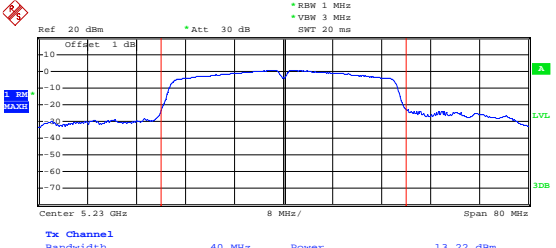
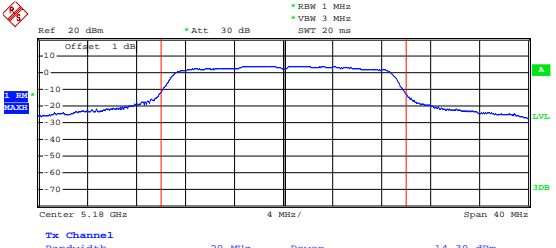
U-NII-1:5150-5250MHz					
Test mode	Frequency MHz	Output Power dBm		Total dBm	Limit dBm
		ANT 1	ANT 2		
802.11a	5180	15.42	15.55	/	23.98
	5200	15.35	15.70	/	23.98
	5240	15.80	15.38	/	23.98
802.11n-HT20	5180	14.47	14.47	17.48	23.98
	5200	14.94	14.73	17.85	23.98
	5240	14.43	14.75	17.60	23.98
802.11n-HT40	5190	13.20	13.32	16.27	23.98
	5230	13.22	13.31	16.28	23.98
802.11ac-VHT20	5180	14.30	14.60	17.46	23.98
	5200	14.25	14.43	17.35	23.98
	5240	14.25	14.52	17.40	23.98
802.11ac-VHT40	5190	13.35	13.20	16.29	23.98
	5230	13.19	13.32	16.27	23.98
802.11ac-VHT80	5210	12.68	12.96	15.83	23.98

**ANT 1**  
**5150-5250MHz**

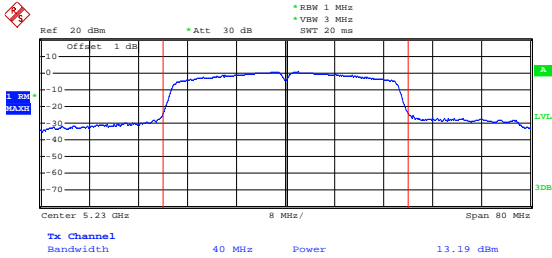
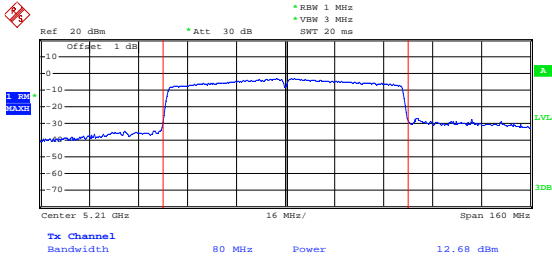
<p>802.11a-Low</p>	<p>Date: 6.JAN.2024 14:21:38</p>
<p>802.11a-Middle</p>	<p>Date: 6.JAN.2024 14:23:22</p>
<p>802.11a-High</p>	<p>Date: 6.JAN.2024 14:24:18</p>

<p>802.11n-HT20-Low</p>	 <p>Ref 20 dBm    * Att 30 dB    RBW 1 MHz          Offset 1 dB    VBW 3 MHz    SMT 20 ms</p> <p>Center 5.18 GHz    4 MHz/    Span 40 MHz</p> <p><b>Tx Channel</b>          Bandwidth    20 MHz    Power    14.47 dBm</p> <p>Date: 6.JAN.2024 14:42:03</p>
<p>802.11n-HT20-Middle</p>	 <p>Ref 20 dBm    * Att 30 dB    RBW 1 MHz          Offset 1 dB    VBW 3 MHz    SMT 20 ms</p> <p>Center 5.2 GHz    4 MHz/    Span 40 MHz</p> <p><b>Tx Channel</b>          Bandwidth    20 MHz    Power    14.94 dBm</p> <p>Date: 6.JAN.2024 14:43:07</p>
<p>802.11n-HT20-High</p>	 <p>Ref 20 dBm    * Att 30 dB    RBW 1 MHz          Offset 1 dB    VBW 3 MHz    SMT 20 ms</p> <p>Center 5.24 GHz    4 MHz/    Span 40 MHz</p> <p><b>Tx Channel</b>          Bandwidth    20 MHz    Power    14.43 dBm</p> <p>Date: 6.JAN.2024 14:44:46</p>

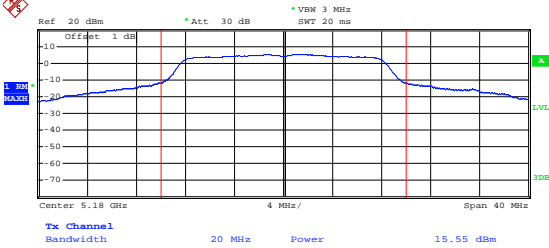
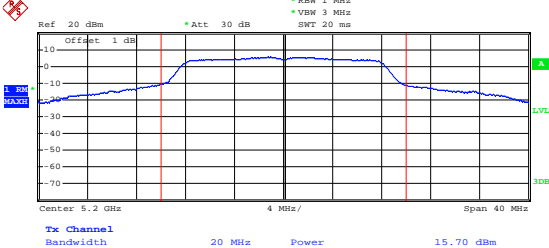
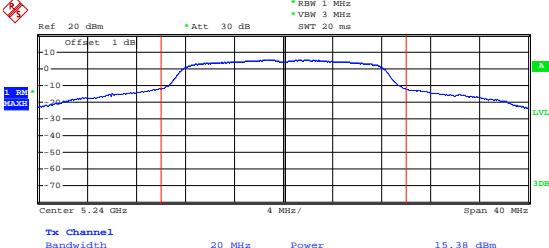


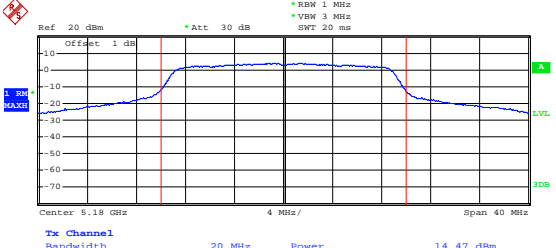
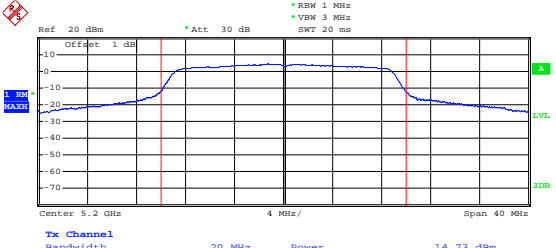
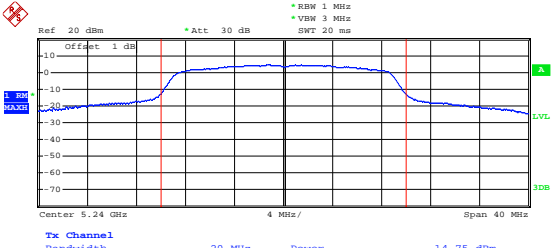
<p>802.11n-HT40-Low</p>	 <p>Ref 20 dBm    * Att 30 dB    RBW 1 MHz          Offset 1 dB    VBW 3 MHz    SMT 20 ms</p> <p>Center 5.19 GHz    8 MHz/    Span 80 MHz</p> <p>Tx Channel          Bandwidth 40 MHz    Power 13.20 dBm</p> <p>Date: 6.JAN.2024 14:46:47</p>
<p>802.11n-HT40-High</p>	 <p>Ref 20 dBm    * Att 30 dB    RBW 1 MHz          Offset 1 dB    VBW 3 MHz    SMT 20 ms</p> <p>Center 5.23 GHz    8 MHz/    Span 80 MHz</p> <p>Tx Channel          Bandwidth 40 MHz    Power 13.22 dBm</p> <p>Date: 6.JAN.2024 14:48:44</p>
<p>802.11ac-VHT20-Low</p>	 <p>Ref 20 dBm    * Att 30 dB    RBW 1 MHz          Offset 1 dB    VBW 3 MHz    SMT 20 ms</p> <p>Center 5.18 GHz    4 MHz/    Span 40 MHz</p> <p>Tx Channel          Bandwidth 20 MHz    Power 14.30 dBm</p> <p>Date: 6.JAN.2024 14:53:18</p>

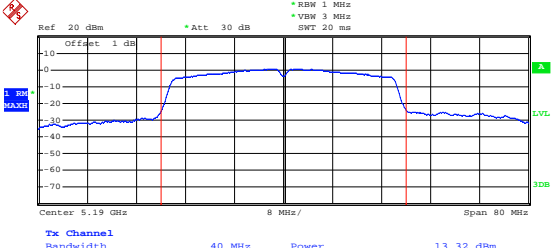
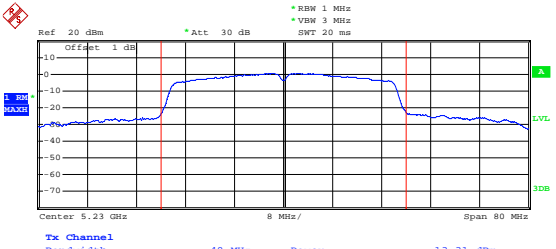
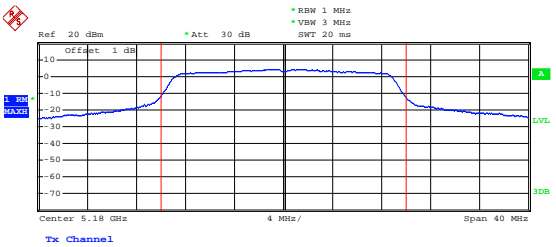
<p>802.11ac-VHT20- Middle</p>	<p>Date: 6.JAN.2024 14:55:08</p>
<p>802.11ac-VHT20- High</p>	<p>Date: 6.JAN.2024 14:56:11</p>
<p>802.11ac-VHT40- Low</p>	<p>Date: 6.JAN.2024 14:58:13</p>

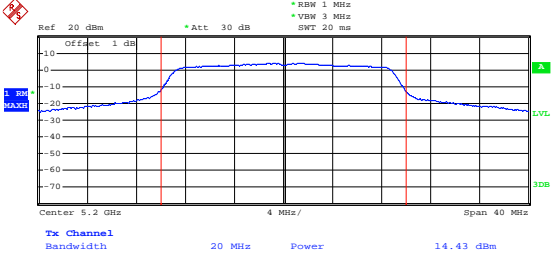
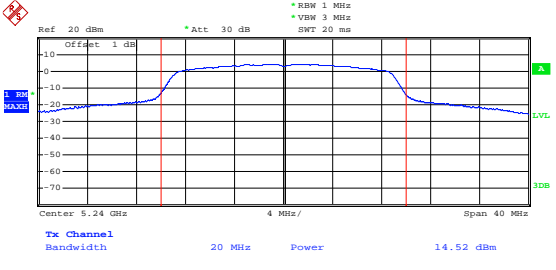
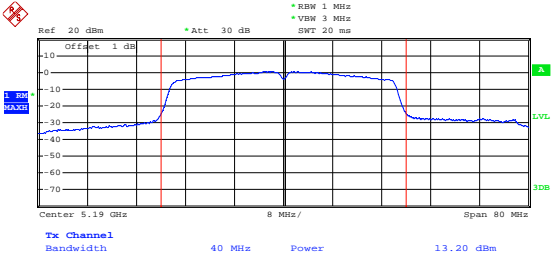
<p>802.11ac-VHT40-High</p>	 <p>Date: 6.JAN.2024 15:01:44</p>
<p>802.11ac-VHT80</p>	 <p>Date: 6.JAN.2024 15:02:59</p>

**ANT 2**  
**5150-5250MHz**

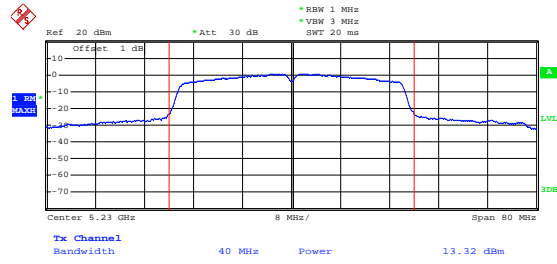
<p>802.11a-Low</p>	 <p>Ref 20 dBm    *Att 30 dB    RBW 1 MHz Offset 1 dB    VBW 3 MHz    SNT 20 ms</p> <p>Center 5.18 GHz    4 MHz/    Span 40 MHz</p> <p>Tx Channel    Bandwidth    20 MHz    Power    15.55 dBm</p> <p>Date: 6.JAN.2024 15:47:03</p>
<p>802.11a-Middle</p>	 <p>Ref 20 dBm    *Att 30 dB    RBW 1 MHz Offset 1 dB    VBW 3 MHz    SNT 20 ms</p> <p>Center 5.2 GHz    4 MHz/    Span 40 MHz</p> <p>Tx Channel    Bandwidth    20 MHz    Power    15.70 dBm</p> <p>Date: 6.JAN.2024 15:48:00</p>
<p>802.11a-High</p>	 <p>Ref 20 dBm    *Att 30 dB    RBW 1 MHz Offset 1 dB    VBW 3 MHz    SNT 20 ms</p> <p>Center 5.24 GHz    4 MHz/    Span 40 MHz</p> <p>Tx Channel    Bandwidth    20 MHz    Power    15.38 dBm</p> <p>Date: 6.JAN.2024 15:49:18</p>

<p>802.11n-HT20-Low</p>	 <p>Date: 6.JAN.2024 15:49:56</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 6.JAN.2024 15:50:30</p>
<p>802.11n-HT20-High</p>	 <p>Date: 6.JAN.2024 15:51:40</p>

<p>802.11n-HT40-Low</p>	 <p>Center 5.19 GHz Tx Channel Bandwidth 40 MHz Power 13.32 dBm</p> <p>Date: 6.JAN.2024 15:53:13</p>
<p>802.11n-HT40-High</p>	 <p>Center 5.23 GHz Tx Channel Bandwidth 40 MHz Power 13.31 dBm</p> <p>Date: 6.JAN.2024 15:54:23</p>
<p>802.11ac-VHT20-Low</p>	 <p>Center 5.18 GHz Tx Channel Bandwidth 20 MHz Power 14.60 dBm</p> <p>Date: 6.JAN.2024 15:56:57</p>

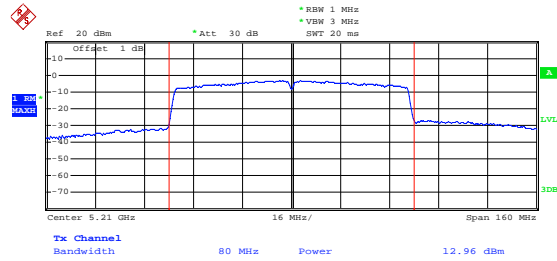
<p>802.11ac-VHT20- Middle</p>	 <p>Date: 6.JAN.2024 15:57:32</p>
<p>802.11ac-VHT20- High</p>	 <p>Date: 6.JAN.2024 15:58:09</p>
<p>802.11ac-VHT40- Low</p>	 <p>Date: 6.JAN.2024 15:58:55</p>

802.11ac-VHT40-High



Date: 6.JAN.2024 15:59:36

802.11ac-VHT80



Date: 6.JAN.2024 16:00:18



## APPENDIX D

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### Frequency Stability

U-NII-1:5150-5250MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	5.0	-30	497	0.096
100%		-20	504	0.097
100%		-10	497	0.096
100%		0	501	0.096
100%		+10	498	0.096
100%		+20	501	0.096
100%		+30	497	0.096
100%		+40	500	0.096
100%		+50	497	0.095
Low Battery power		5.50	+20	496
High Battery power	4.50	+20	505	0.097

## APPENDIX PHOTOGRAPHS

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Please refer to "ANNEX"

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