

# TEST REPORT

Reference No..... : WTX23X05111880W003  
FCC ID ..... : 2ARTX-LT108  
Applicant ..... : LAVA International Limited  
Address ..... : A-56, Sector-64, Gautam Buddha Nagar, Noida, Uttar Pradesh, 201301  
Manufacturer ..... : LAVA International Limited  
Address ..... : A-154D, Sector-63, Gautam Buddha Nagar, Noida, Uttar Pradesh, 201301  
Product Name ..... : Tablet  
Model No..... : LT108  
Standards ..... : FCC Part 15.407  
Date of Receipt sample .... : 2023-05-23  
Date of Test..... : 2023-05-23 to 2023-06-08  
Date of Issue ..... : 2023-06-08  
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.

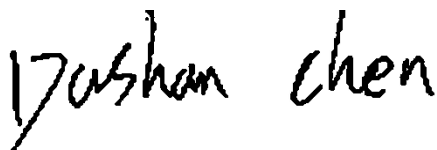
**Prepared By:**

**Waltek Testing Group (Shenzhen) Co., Ltd.**

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,  
Block 70 Bao'an District, Shenzhen, Guangdong, China

Tel.: +86-755-33663308 Fax.: +86-755-33663309 Email: sem@waltek.com.cn

Tested by:



Dashan Chen

Approved by:



Silin Chen

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**Report version**

Version No.	Date of issue	Description
Rev.00	2023-06-08	Original
/	/	/

## 1. GENERAL INFORMATION

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

General Description of EUT	
Product Name:	Tablet
Trade Name:	LAVA
Model No.:	LT108
Adding Model(s):	LT108A, LT108B
Rated Voltage:	DC3.8V
Battery Capacity:	7000mAh
Power Adapter:	/
<p><i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model LT108, but the circuit and the electronic construction do not change, declared by the manufacturer.</i></p>	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ac-VHT80
Frequency Range:	5150-5250MHz, 5250-5350MHz, 5725-5850MHz
RF Output Power:	15.45dBm (Conducted)
Type of Modulation:	QPSK, 16QAM, 64QAM
Type of Antenna:	FPC Antenna
Antenna Gain:	2.27dBi
<p><i>Note: The Antenna Gain is provided by the customer and can affect the validity of results.</i></p>	

## 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.

**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 \*##3646631## into the calculator to enter the engineer mode, 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	5260	5300	5320	5745	5785	5825			
802.11a 6Mbps	24	24	24	24	24	24	25	25	25			
802.11n-HT20 MCS0	22	23	23	22	22	21	24	24	24			
Mode	NCB: 40MHz											
	5190	5230	5270	5310	5755	5795						
802.11n-HT40 MCS0	21	21	21	21	24	24						
Mode	NCB: 80MHz											
	5210		5290		5775							
802.11ac-VH80 MCS0/Nss2	18		20		24							

## **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, Block 70 Bao'an District, Shenzhen, Guangdong, China

### **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,5260MHz,5280MHz,5320MHz, 5745MHz, 5785MHz,5825MHz
TM2	802.11n-HT20	5180MHz,5200MHz,5240MHz,5260MHz,5280MHz,5320MHz, 5745MHz, 5785MHz,5825MHz
TM3	802.11n-HT40	5190MHz,5230MHz,5270MHz,5310MHz,5755MHz,5795MHz
TM4	802.11ac-VH80	5210MHz,5290MHz, 5775MHz
Note: 802.11ac-VHT20, 802.11ac-VHT40 covered by 802.11n-HT20 an802.11n-HT40.		

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
/	/	/	/

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Earphone Cable	1.0	Unshielded	Without Ferrite
USB Cable	0.95	Shielded	With

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	TianYi 100-14IBD	PF0F4ABV
Adapter	Mediacom	BOS050200-02A	/



## 1.8 Measurement Uncertainty

Measurement uncertainty		
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	2944A101 79	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-11A	LP228060 221	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806 235	2023-02-25	2024-02-24
<input checked="" 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	8126-224	2023-02-25	2024-02-24
<input type="checkbox"/> Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2023-02-25	2024-02-24
WTXE1003A 1003	LISN	Rohde & Schwarz	ENV 216	100097	2023-02-25	2024-02-24

<b>Software List</b>			
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Version</b>
EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

\*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 a FPC Antenna, 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 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.

### 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 1 MHz RBW to satisfy directly the 1 MHz 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 1 MHz, 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 (< 1MHz, 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 1 MHz, 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 6 dBi. 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 6 dB emission bandwidth of at least 500KHz for the band 5.715-5.85 GHz. 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 6dB 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.

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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 6 dBi. 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.

### 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 1MHz 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 75MHz 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:

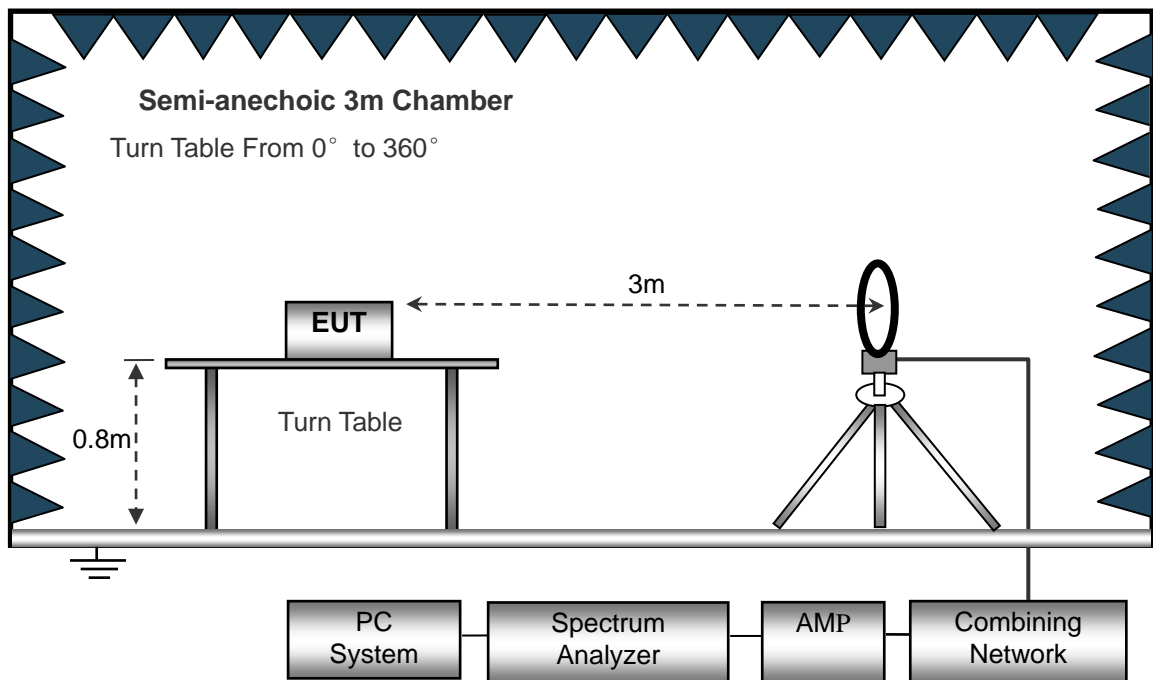
- E is the field strength in V/m;
- d is the measurement distance in meters;
- EIRP is the equivalent isotropically radiated power in watts.

### 8.2 Test Procedure

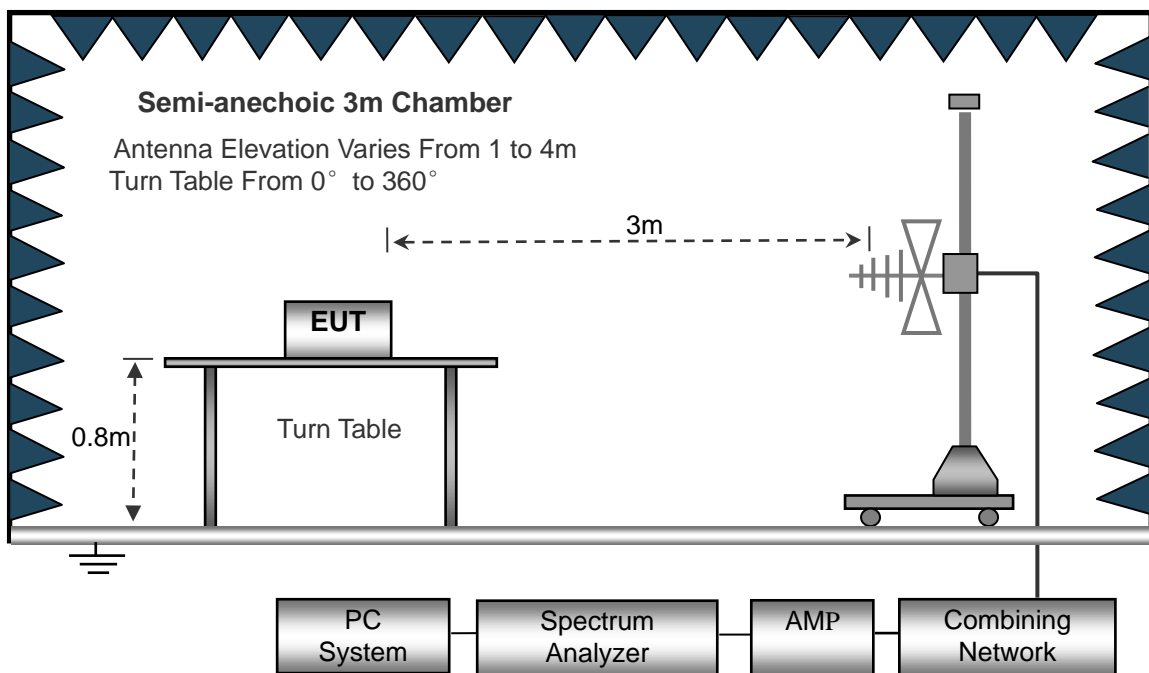
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

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.

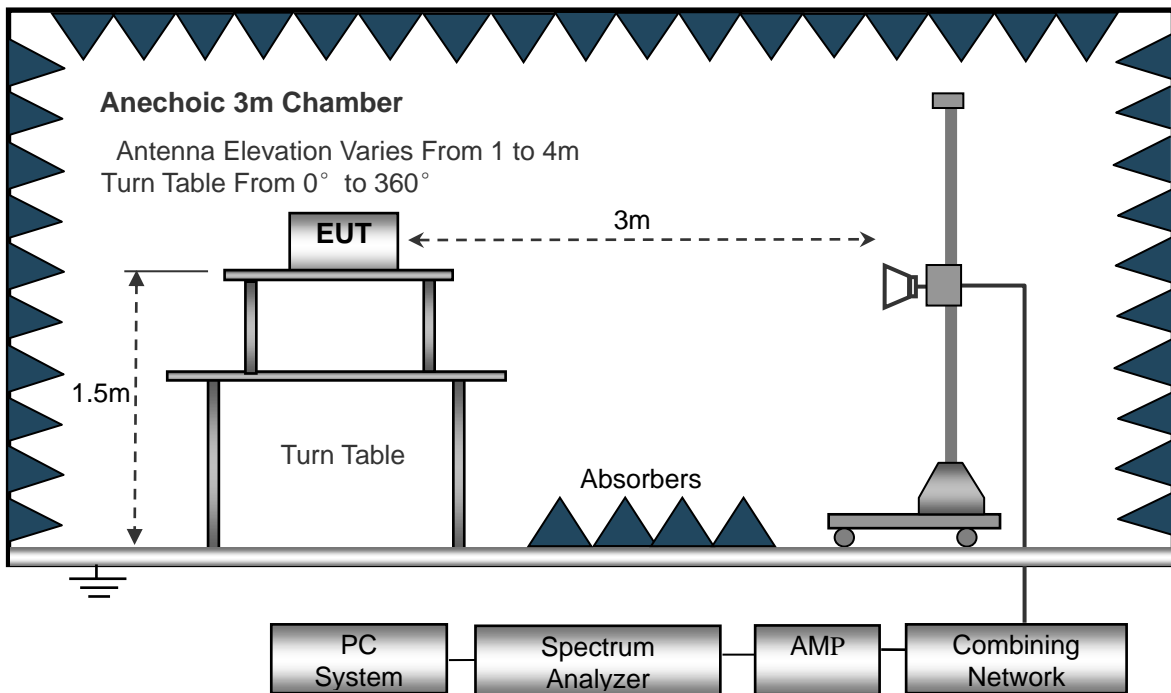


The test setup for emission measurement from 30MHz to 1GHz.





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:

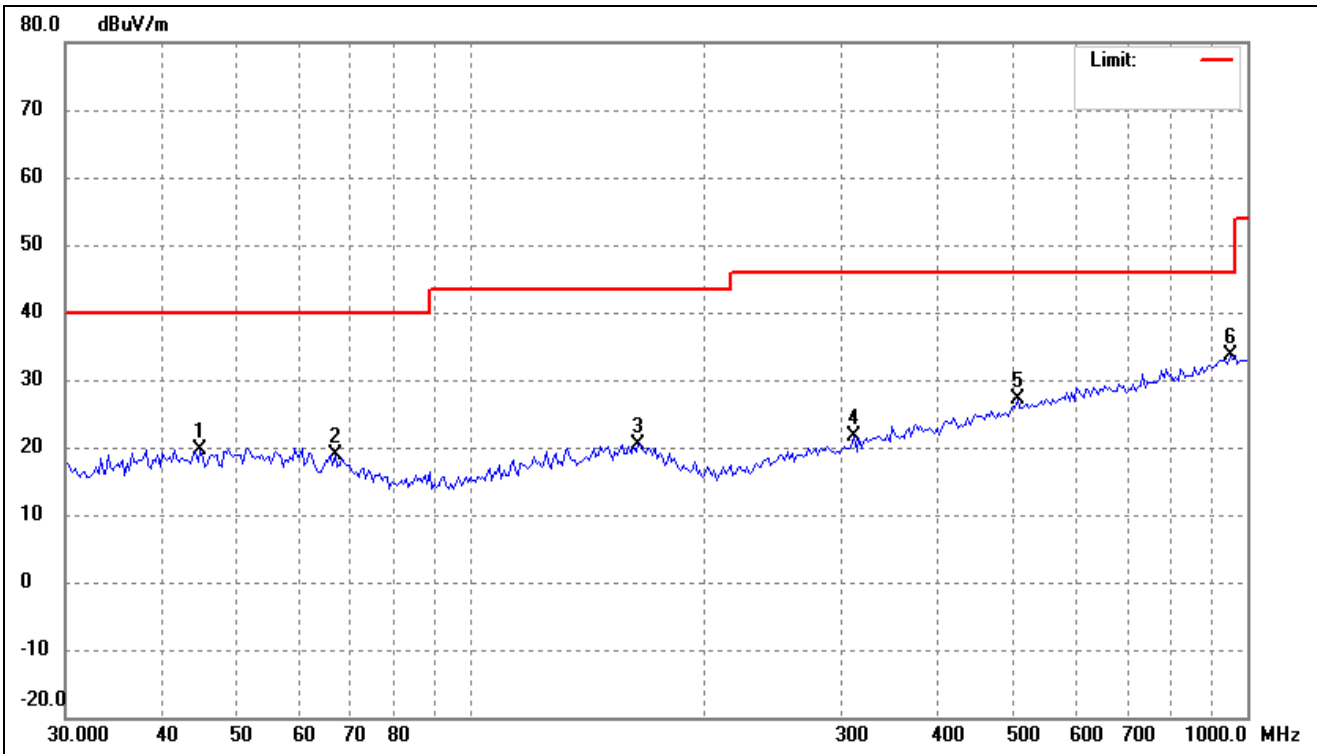
$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

### 8.5 Summary of Test Results/Plots

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

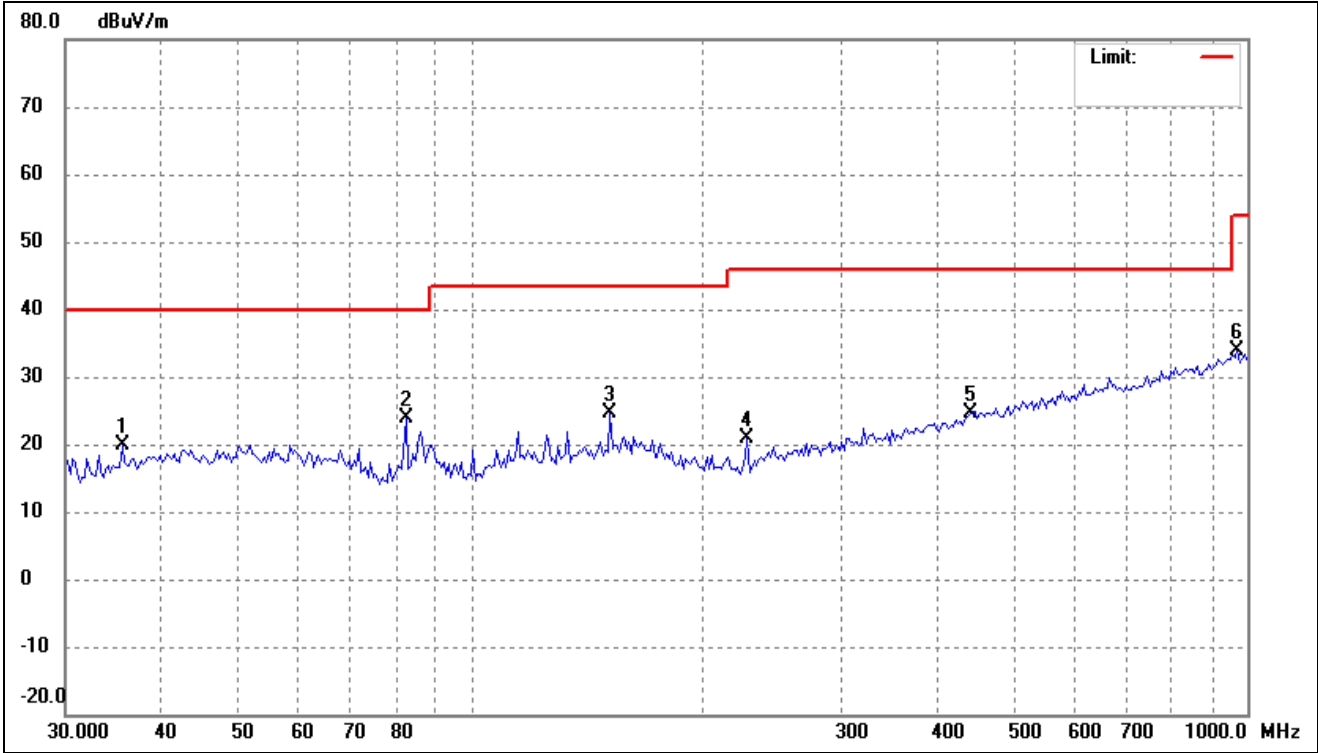
- Spurious Emission From 30MHz to 1GHz
- 5150-5250MHz

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



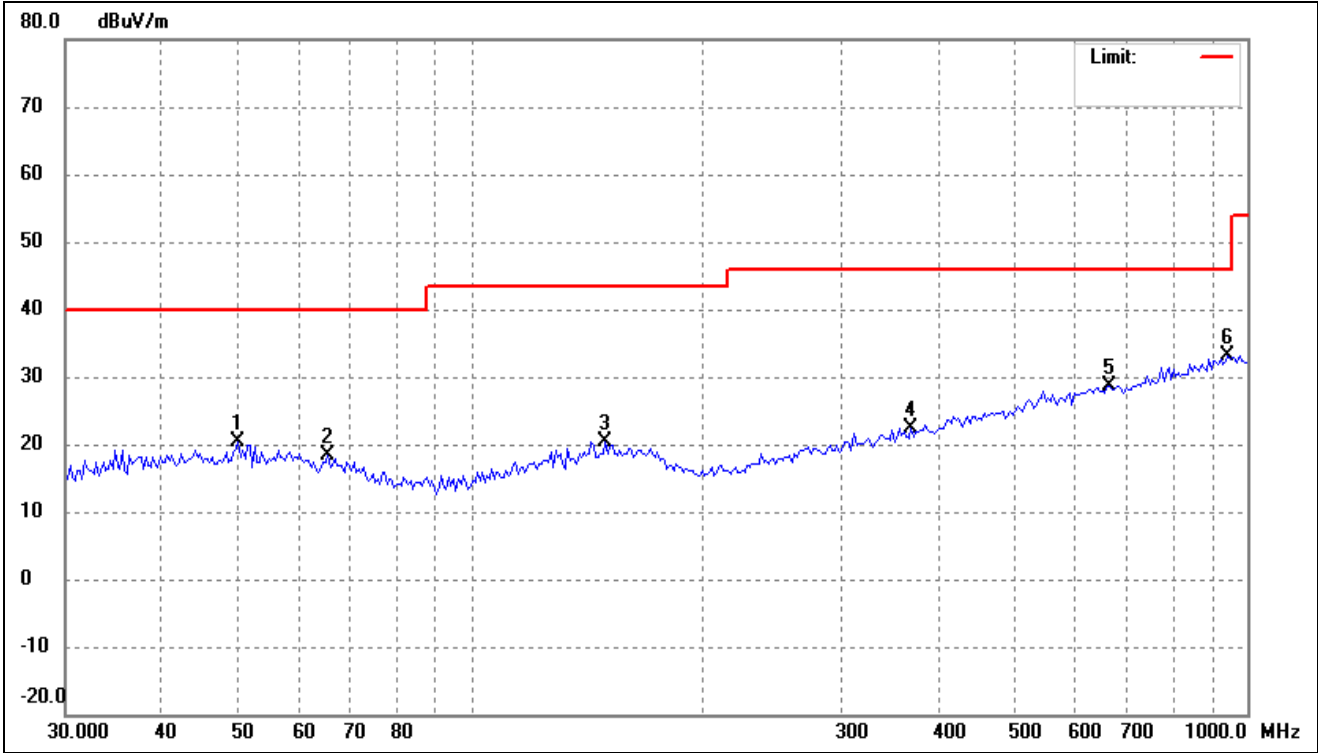
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	44.7793	28.22	-8.47	19.75	40.00	-20.25	-	-	peak
2	66.8395	29.13	-10.18	18.95	40.00	-21.05	-	-	peak
3	164.3129	29.05	-8.72	20.33	43.50	-23.17	-	-	peak
4	311.4519	29.47	-7.93	21.54	46.00	-24.46	-	-	peak
5	505.7891	31.05	-3.80	27.25	46.00	-18.75	-	-	peak
6	952.0001	31.32	2.25	33.57	46.00	-12.43	-	-	peak

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



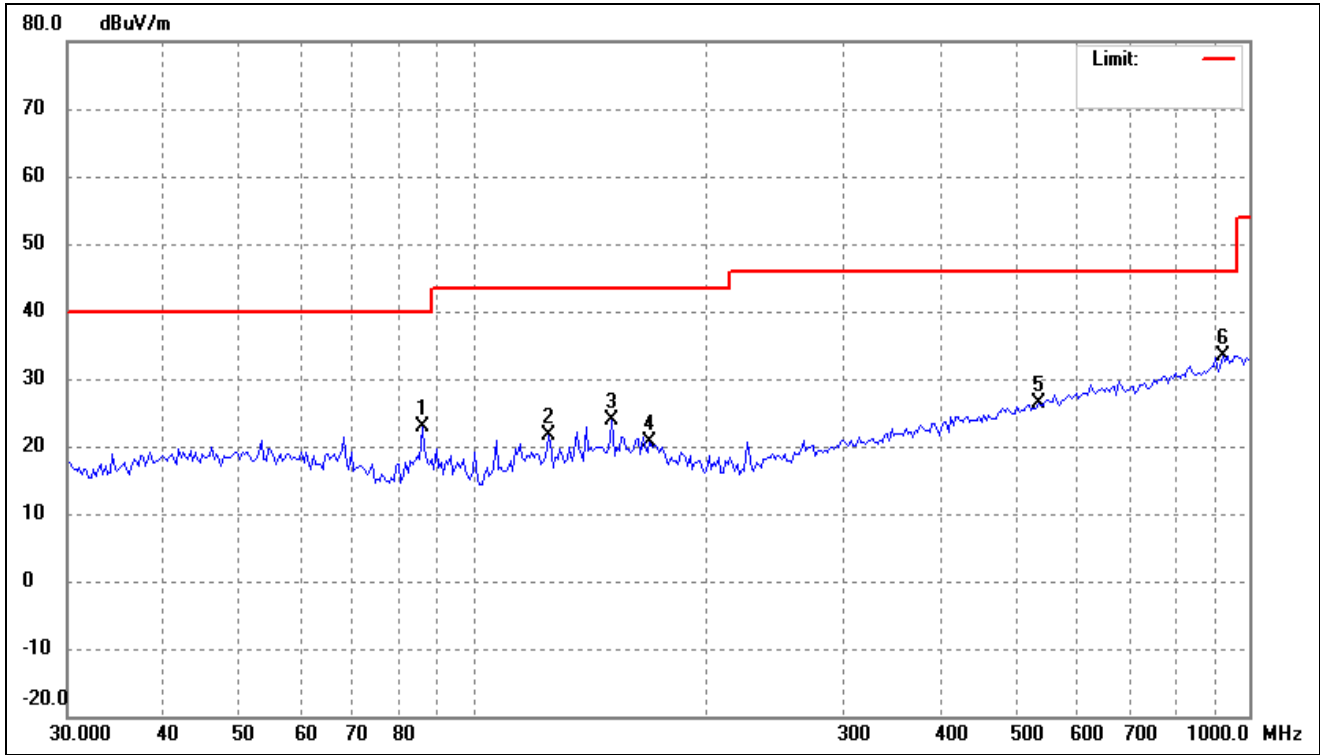
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	35.5112	29.20	-9.44	19.76	40.00	-20.24	-	-	peak
2	82.5257	36.79	-13.00	23.79	40.00	-16.21	-	-	peak
3	151.0252	33.27	-8.61	24.66	43.50	-18.84	-	-	peak
4	227.0164	32.59	-11.76	20.83	46.00	-25.17	-	-	peak
5	439.4730	29.50	-4.88	24.62	46.00	-21.38	-	-	peak
6	972.2827	31.64	2.27	33.91	54.00	-20.09	-	-	peak

802.11a(Worst case)			
Test Channel	5240MHz	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.1080	28.39	-8.09	20.30	40.00	-19.70	-	-	peak
2	65.4452	28.24	-9.93	18.31	40.00	-21.69	-	-	peak
3	148.9175	29.14	-8.68	20.46	43.50	-23.04	-	-	peak
4	368.6681	29.06	-6.63	22.43	46.00	-23.57	-	-	peak
5	665.2610	30.01	-1.27	28.74	46.00	-17.26	-	-	peak
6	945.3336	31.03	2.15	33.18	46.00	-12.82	-	-	peak

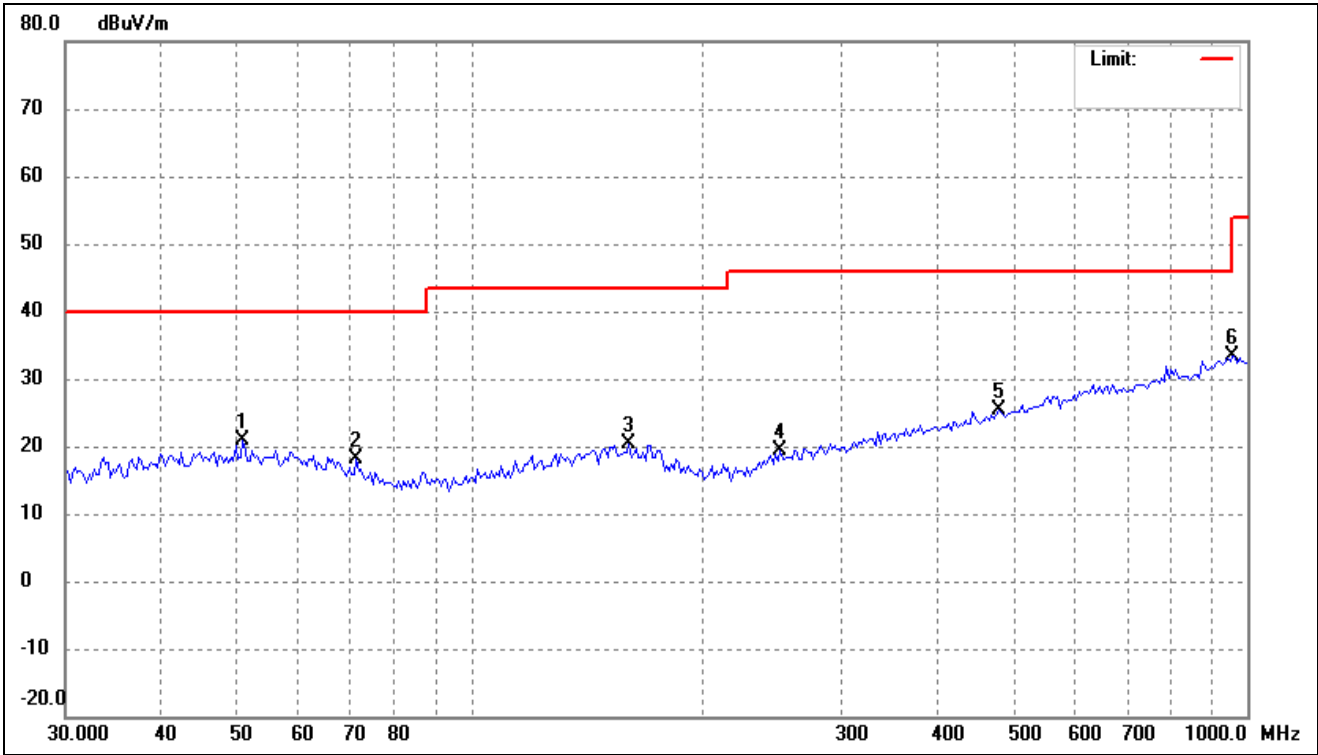
802.11a(Worst case)			
Test Channel	5240MHz	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	86.0796	35.90	-13.04	22.86	40.00	-17.14	-	-	peak
2	124.9249	31.75	-10.19	21.56	43.50	-21.94	-	-	peak
3	151.0252	32.39	-8.61	23.78	43.50	-19.72	-	-	peak
4	168.9970	29.47	-8.85	20.62	43.50	-22.88	-	-	peak
5	535.0377	29.59	-3.25	26.34	46.00	-19.66	-	-	peak
6	925.6132	31.74	1.74	33.48	46.00	-12.52	-	-	peak

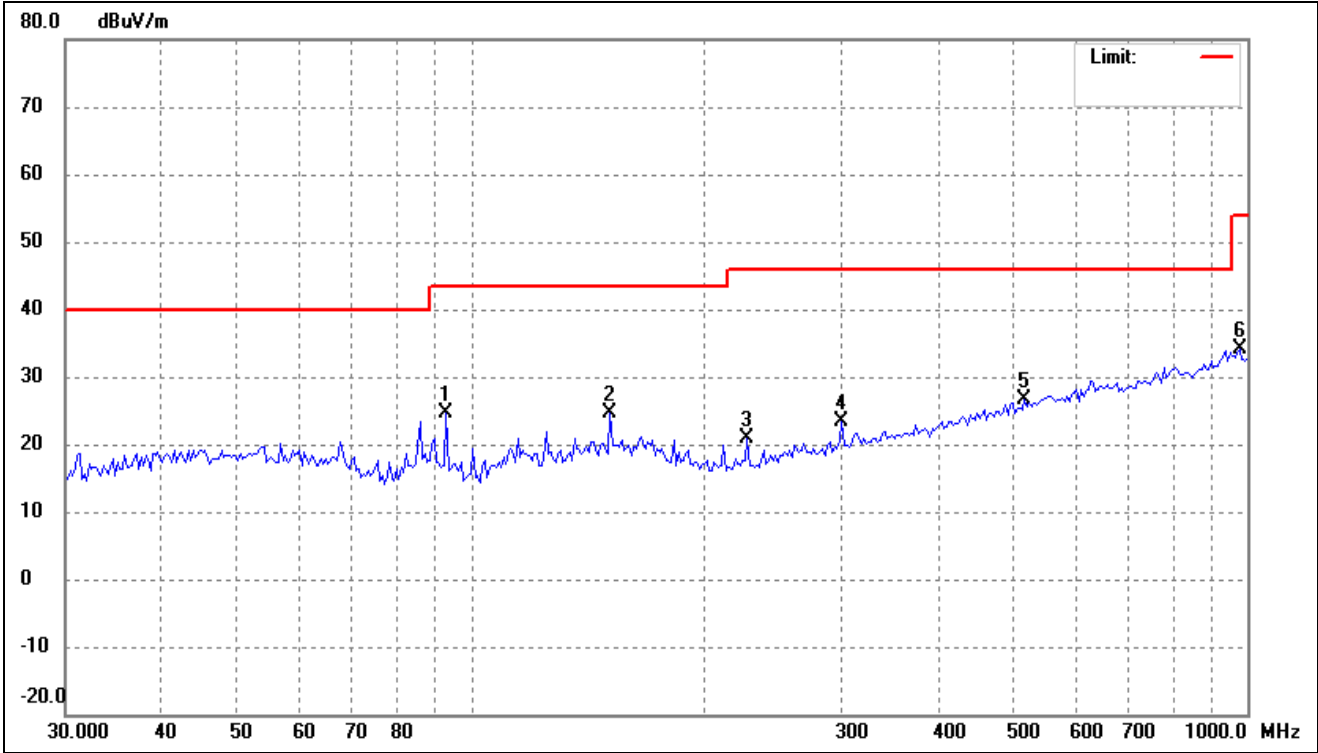
➤ 5250-5350MHz

802.11a(Worst case)			
Test Channel	5260MHz	Polarity:	Horizontal



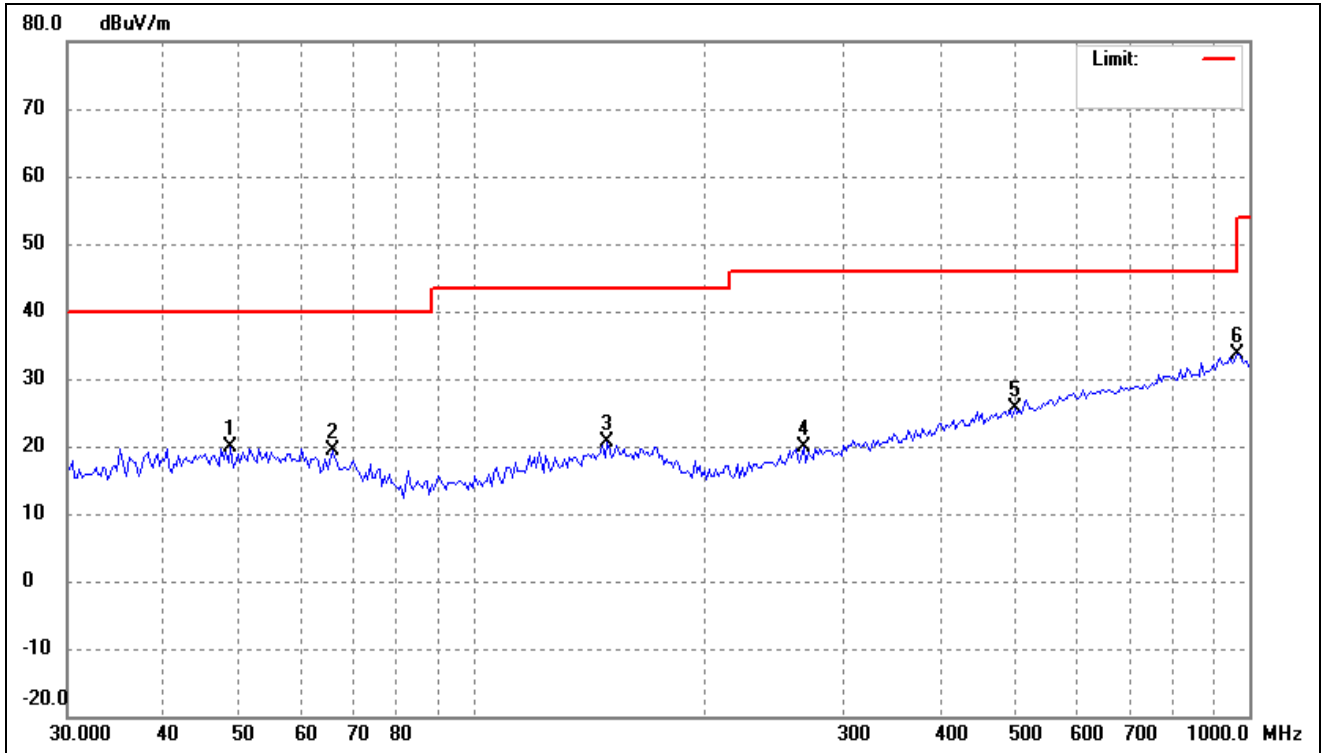
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	50.8172	29.01	-8.17	20.84	40.00	-19.16	-	-	peak
2	71.2033	29.14	-11.03	18.11	40.00	-21.89	-	-	peak
3	159.7586	28.95	-8.61	20.34	43.50	-23.16	-	-	peak
4	250.4859	29.47	-10.18	19.29	46.00	-26.71	-	-	peak
5	478.1394	29.70	-4.20	25.50	46.00	-20.50	-	-	peak
6	958.7135	31.18	2.26	33.44	46.00	-12.56	-	-	peak

802.11a(Worst case)			
Test Channel	5260MHz	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	92.9974	37.55	-12.93	24.62	43.50	-18.88	-	-	peak
2	151.0252	33.18	-8.61	24.57	43.50	-18.93	-	-	peak
3	227.0164	32.57	-11.76	20.81	46.00	-25.19	-	-	peak
4	300.6988	31.58	-8.24	23.34	46.00	-22.66	-	-	peak
5	516.5651	30.21	-3.65	26.56	46.00	-19.44	-	-	peak
6	979.1392	31.74	2.28	34.02	54.00	-19.98	-	-	peak

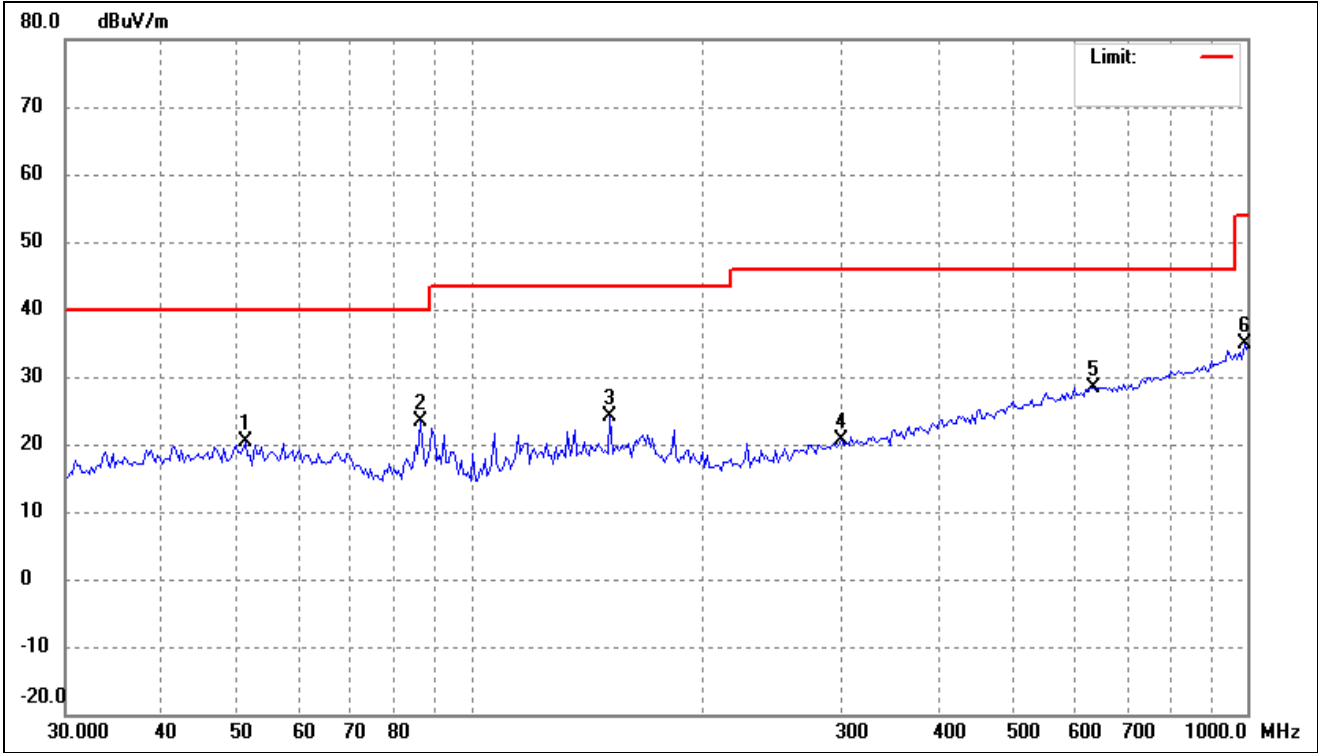
802.11a(Worst case)			
Test Channel	5320MHz	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	48.7191	28.08	-8.18	19.90	40.00	-20.10	-	-	peak
2	65.9067	29.39	-10.02	19.37	40.00	-20.63	-	-	peak
3	148.9175	29.33	-8.68	20.65	43.50	-22.85	-	-	peak
4	266.8395	29.26	-9.46	19.80	46.00	-26.20	-	-	peak
5	498.7303	29.54	-3.92	25.62	46.00	-20.38	-	-	peak
6	965.4742	31.26	2.27	33.53	54.00	-20.47	-	-	peak



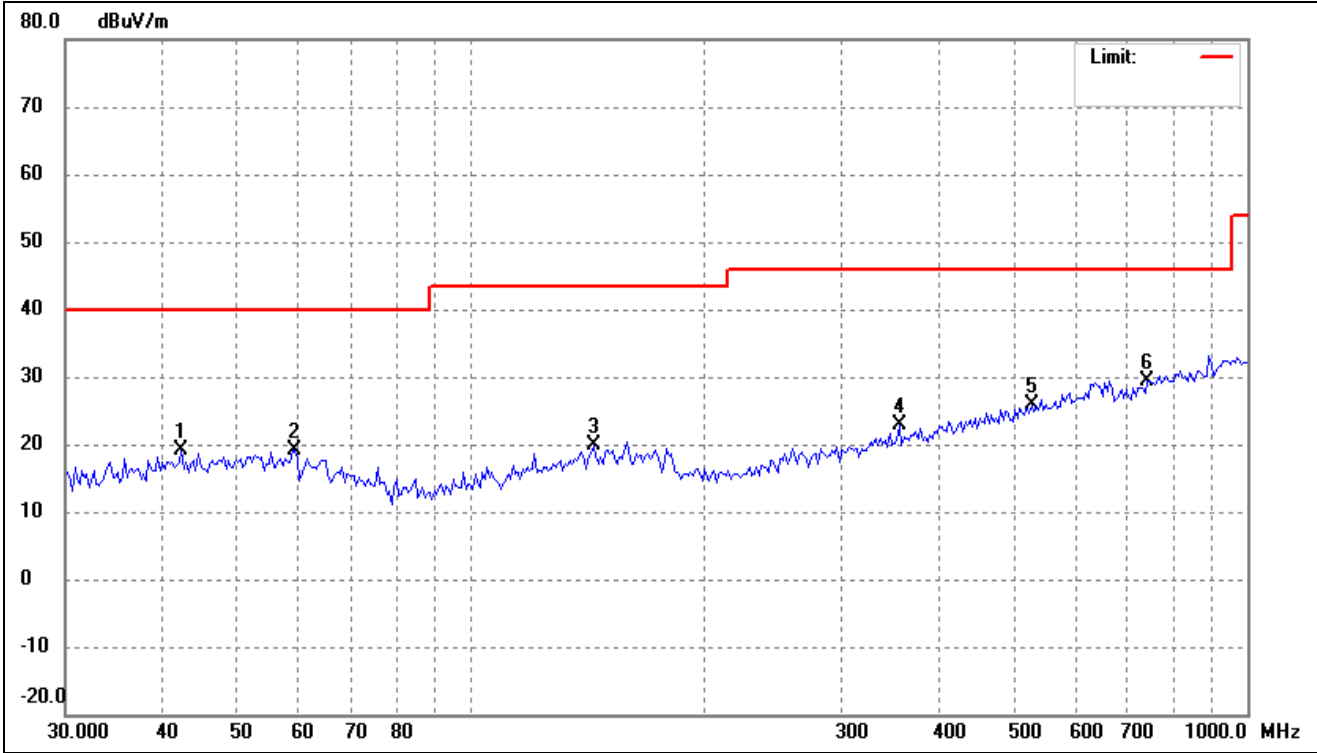
802.11a(Worst case)			
Test Channel	5320MHz	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	51.1756	28.55	-8.22	20.33	40.00	-19.67	-	-	peak
2	86.0796	36.37	-13.04	23.33	40.00	-16.67	-	-	peak
3	151.0252	32.71	-8.61	24.10	43.50	-19.40	-	-	peak
4	300.6988	28.83	-8.24	20.59	46.00	-25.41	-	-	peak
5	628.8936	29.76	-1.38	28.38	46.00	-17.62	-	-	peak
6	992.9975	32.63	2.30	34.93	54.00	-19.07	-	-	peak

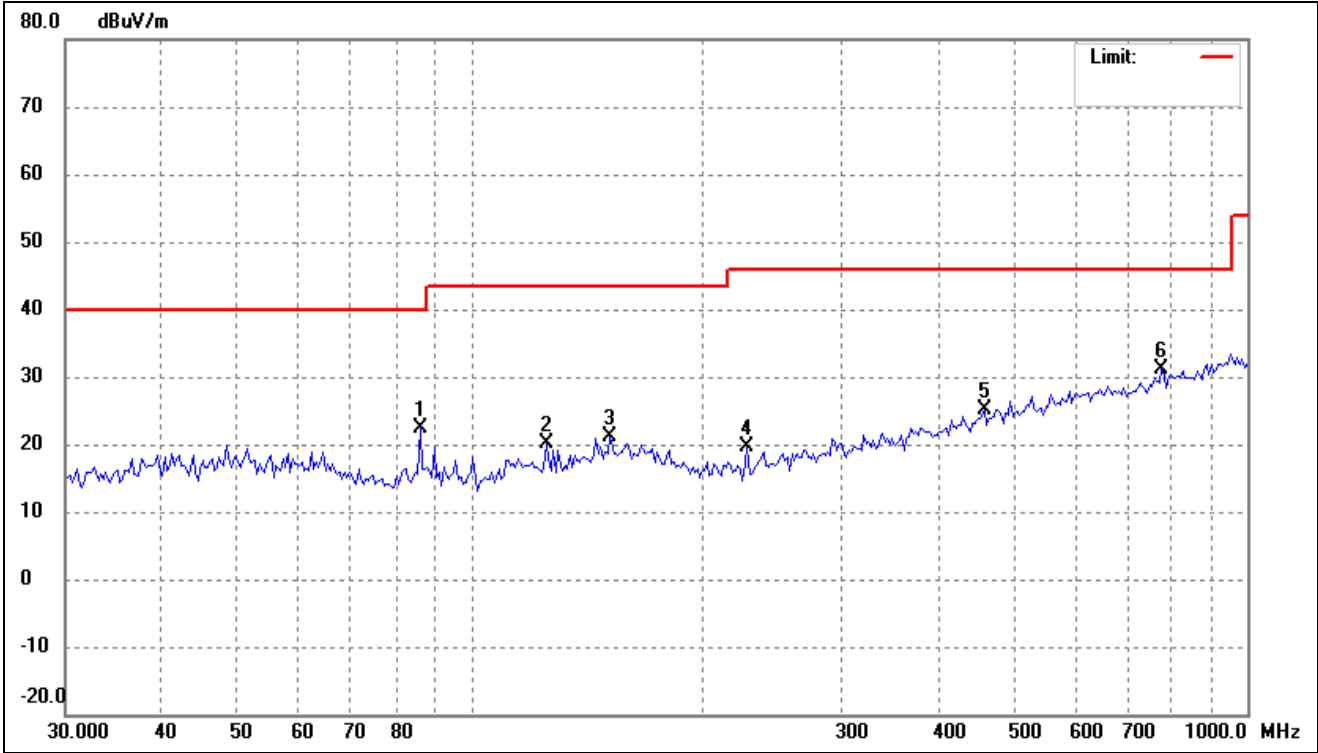
➤ 5725-5850MHz

802.11a(worst case)			
Test Channel	5745MHz	Polarity:	Horizontal



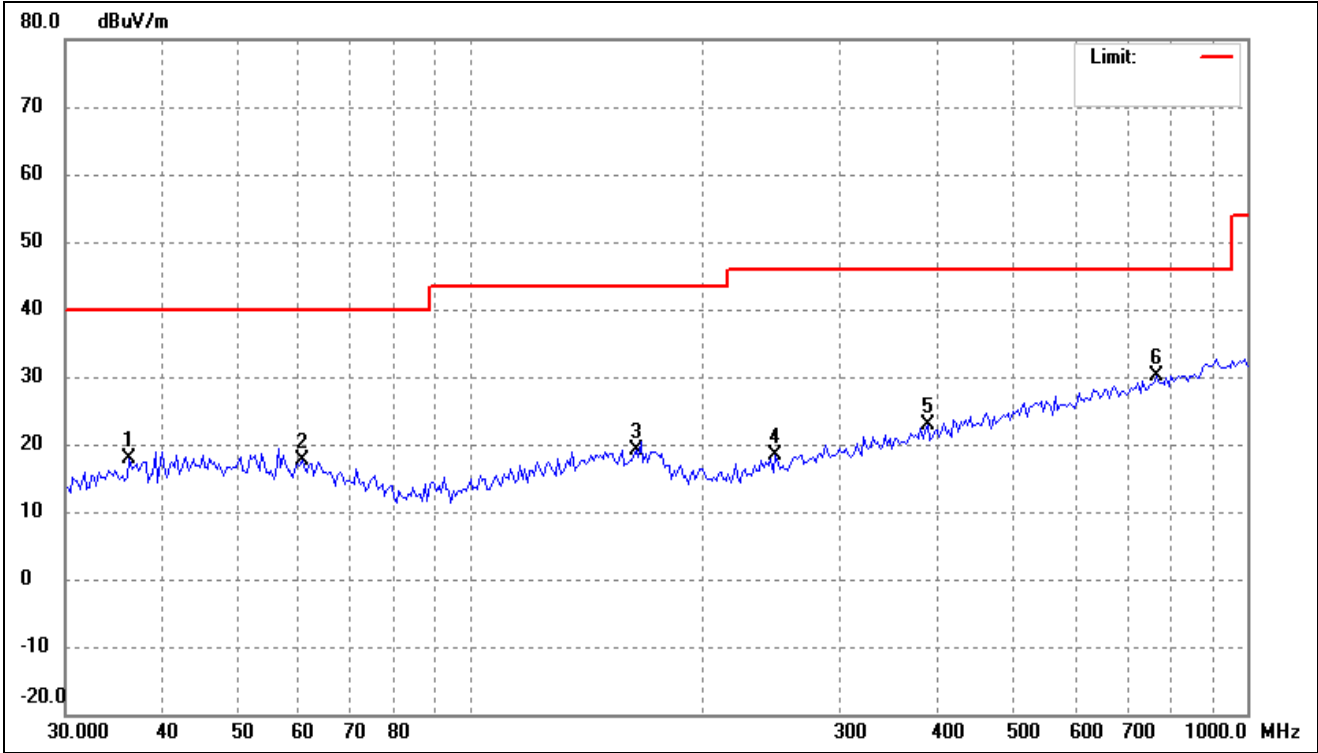
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	42.3314	27.69	-8.48	19.21	40.00	-20.79	-	-	peak
2	59.3133	28.13	-8.90	19.23	40.00	-20.77	-	-	peak
3	143.7760	29.11	-9.11	20.00	43.50	-23.50	-	-	peak
4	355.9397	29.73	-6.96	22.77	46.00	-23.23	-	-	peak
5	527.5707	29.39	-3.45	25.94	46.00	-20.06	-	-	peak
6	744.4265	29.72	-0.27	29.45	46.00	-16.55	-	-	peak

802.11a(worst case)			
Test Channel	5745MHz	Polarity:	Vertical



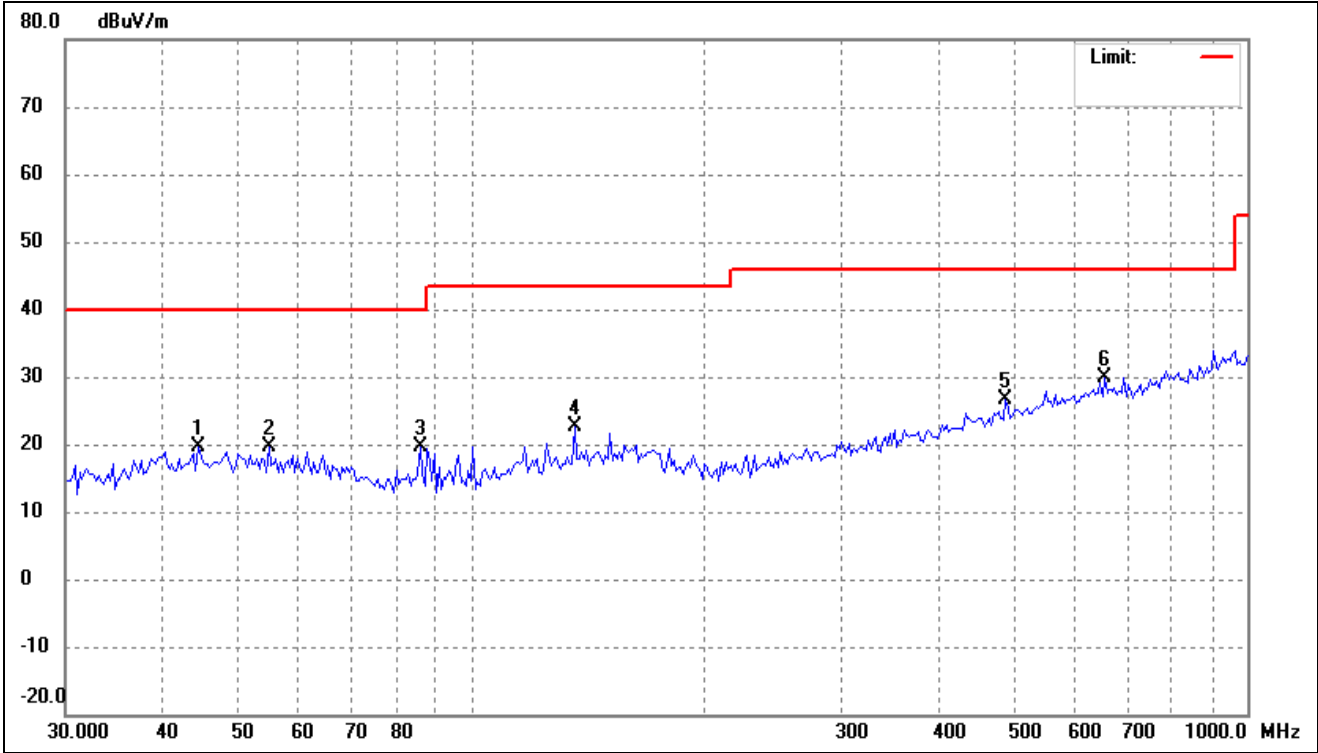
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	86.0796	35.45	-13.04	22.41	40.00	-17.59	-	-	peak
2	124.9249	30.24	-10.19	20.05	43.50	-23.45	-	-	peak
3	151.0252	29.73	-8.61	21.12	43.50	-22.38	-	-	peak
4	227.0164	31.50	-11.76	19.74	46.00	-26.26	-	-	peak
5	458.3987	29.49	-4.47	25.02	46.00	-20.98	-	-	peak
6	776.4849	31.01	0.08	31.09	46.00	-14.91	-	-	peak

802.11a(worst case)			
Test Channel	5825MHz	Polarity:	Horizontal



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	36.2678	27.13	-9.28	17.85	40.00	-22.15	-	-	peak
2	60.5769	26.70	-9.04	17.66	40.00	-22.34	-	-	peak
3	163.1623	27.82	-8.70	19.12	43.50	-24.38	-	-	peak
4	246.9901	28.61	-10.30	18.31	46.00	-27.69	-	-	peak
5	387.2565	29.16	-6.22	22.94	46.00	-23.06	-	-	peak
6	765.6482	30.24	-0.01	30.23	46.00	-15.77	-	-	peak

802.11a(worst case)			
Test Channel	5825MHz	Polarity:	Vertical



No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	44.4657	28.03	-8.47	19.56	40.00	-20.44	-	-	peak
2	54.9011	28.30	-8.62	19.68	40.00	-20.32	-	-	peak
3	86.0796	32.64	-13.04	19.60	40.00	-20.40	-	-	peak
4	135.9163	32.32	-9.61	22.71	43.50	-20.79	-	-	peak
5	488.3263	30.73	-4.06	26.67	46.00	-19.33	-	-	peak
6	655.9766	31.13	-1.30	29.83	46.00	-16.17	-	-	peak

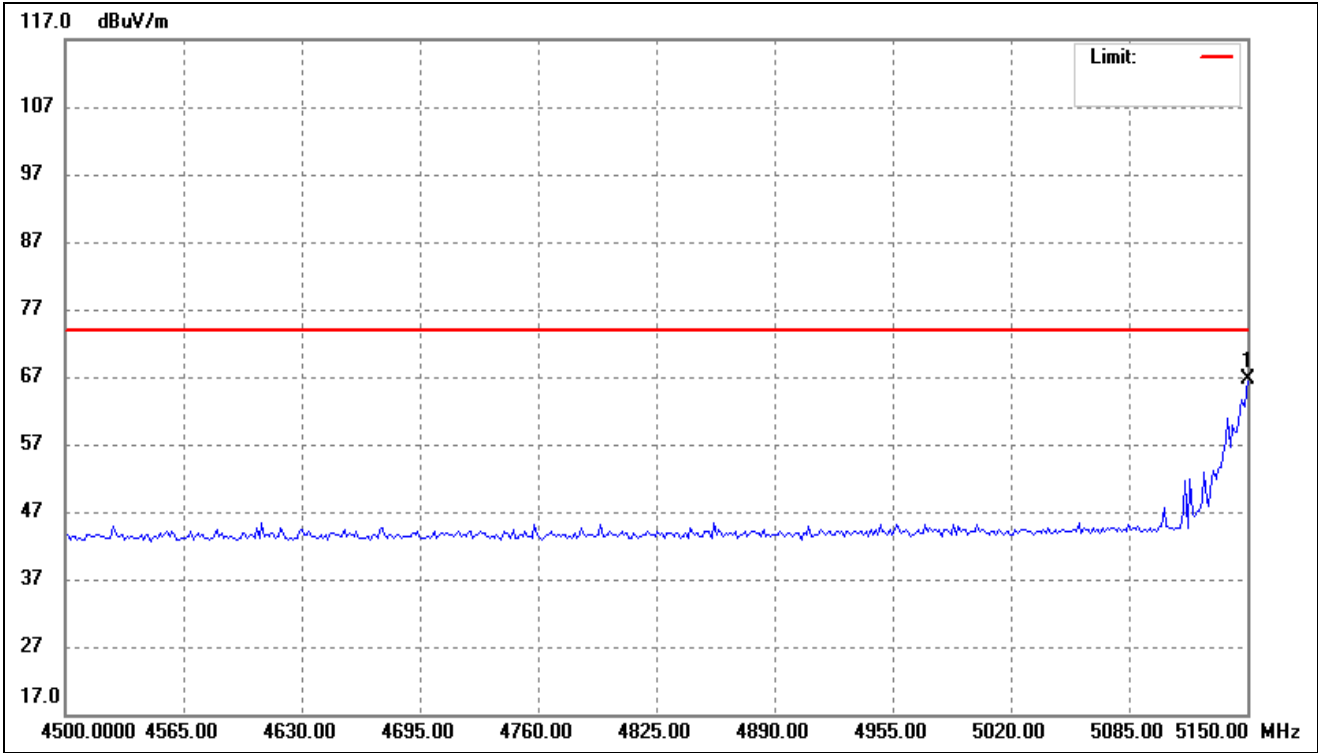
Remark: '-' Means' the test Degree and Height are not recorded by the test software and only show the worst case in the test report.

➤ Spurious Emission above 1GHz

5150-5250MHz (worst case)

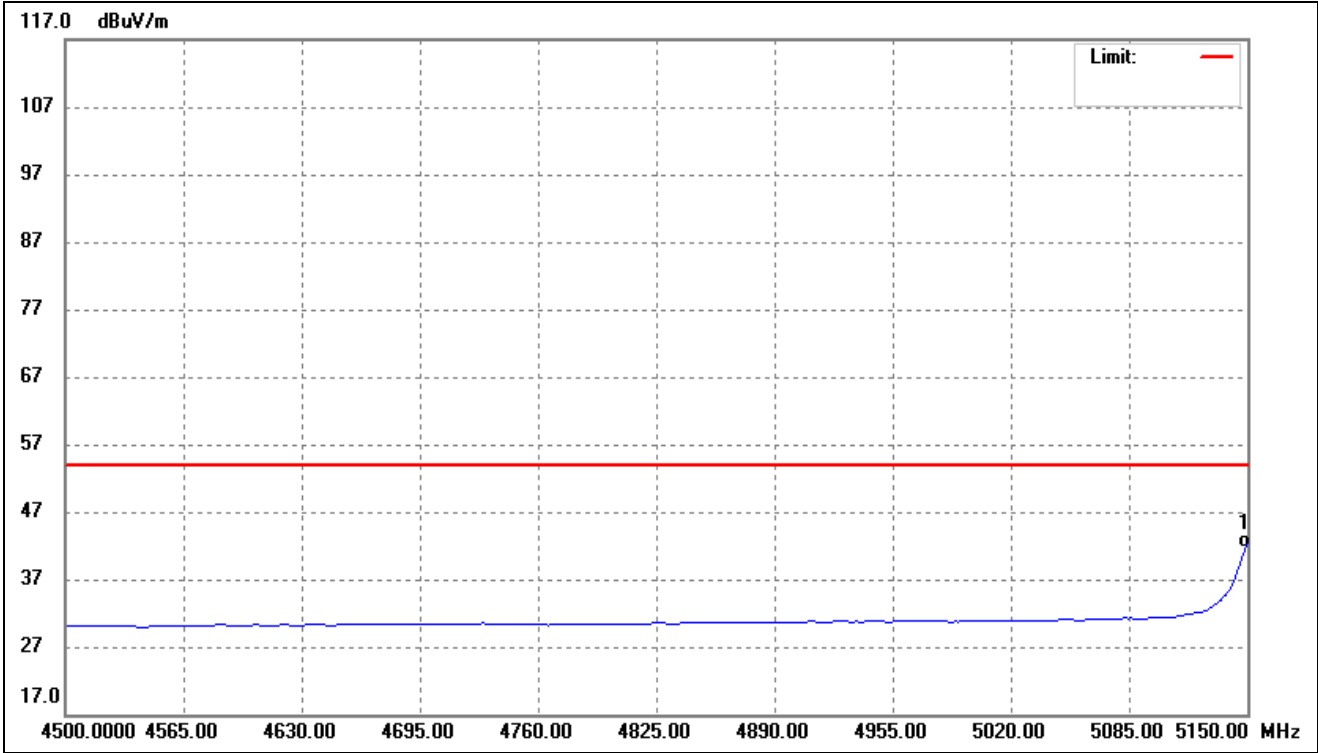
802.11a- Restricted Bandedge (worst case)

Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal (worst case)
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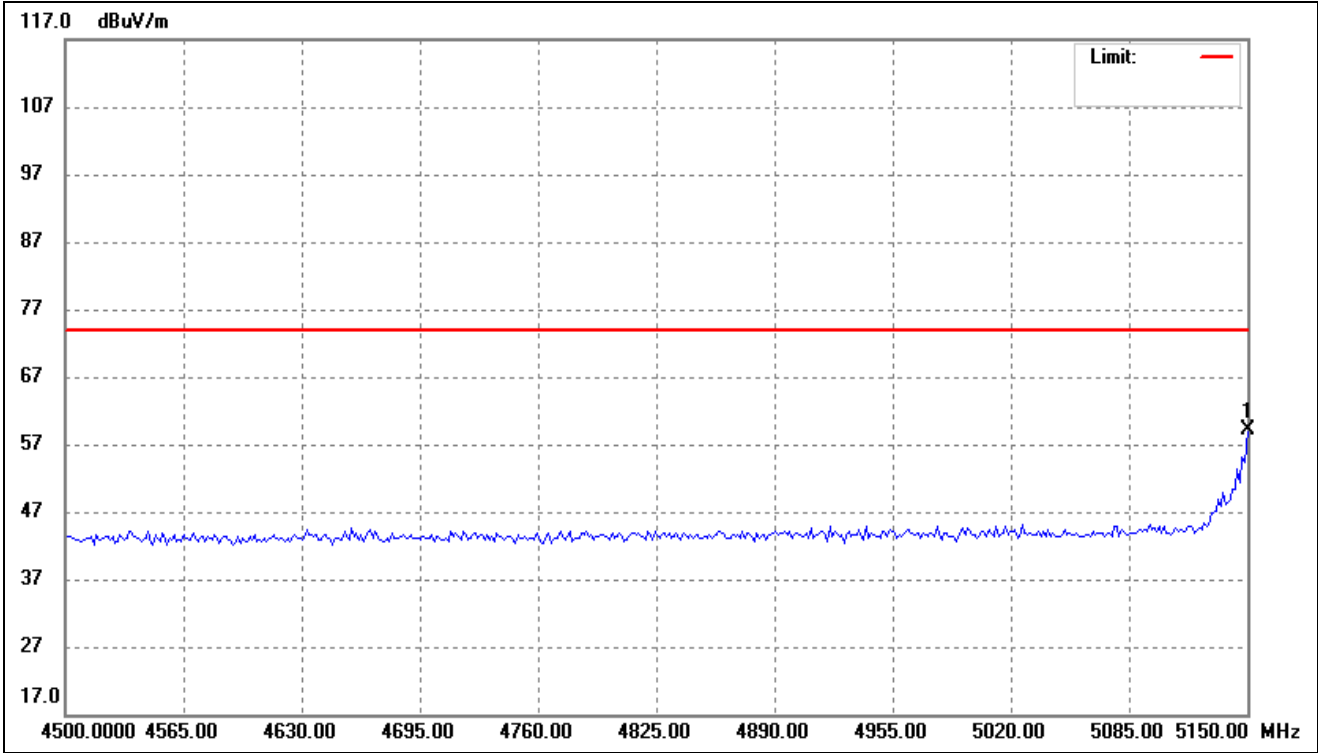
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	78.24	-11.66	66.58	74.00	-7.42	-	-	peak

802.11a- Restricted Bandedge (worst case)			
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	54.19	-11.66	42.53	54.00	-11.47	-	-	AVG

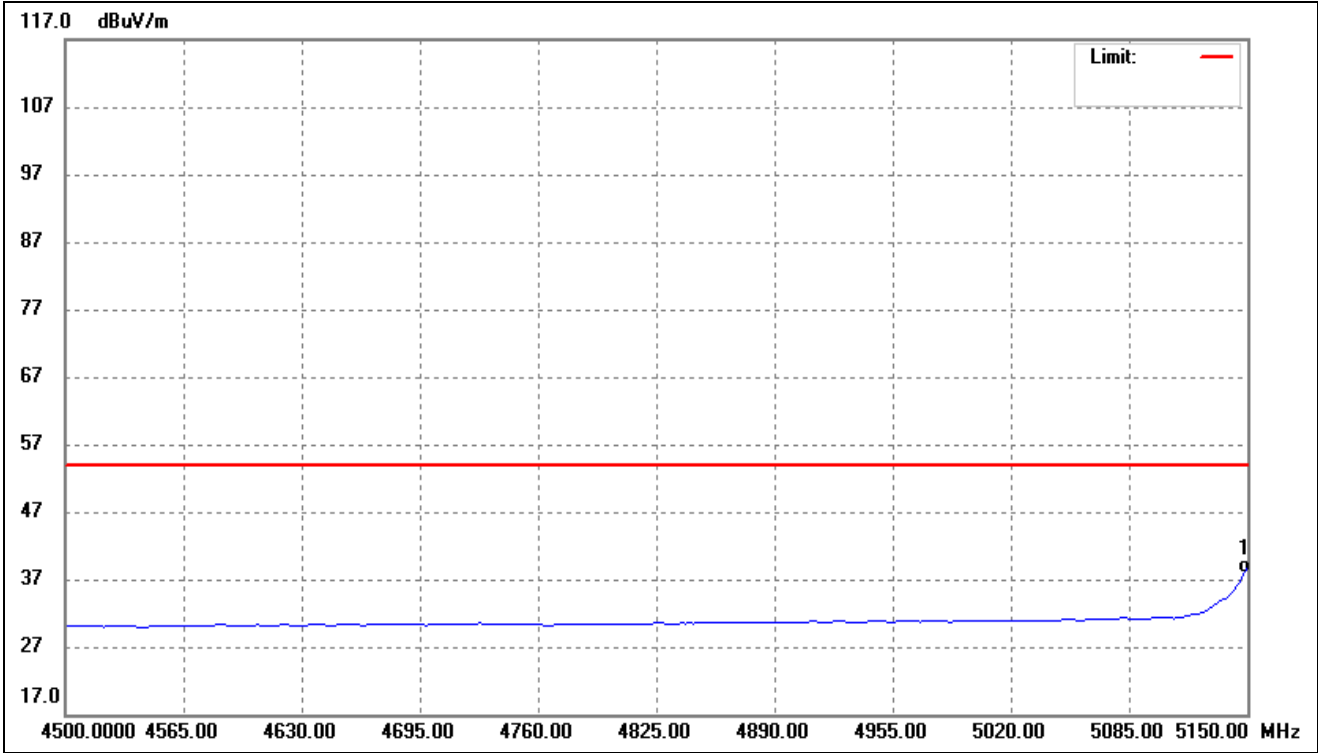
802.11n-20- Restricted Bandedge (worst case)			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal (worst case)



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	70.76	-11.66	59.10	74.00	-14.90	-	-	peak

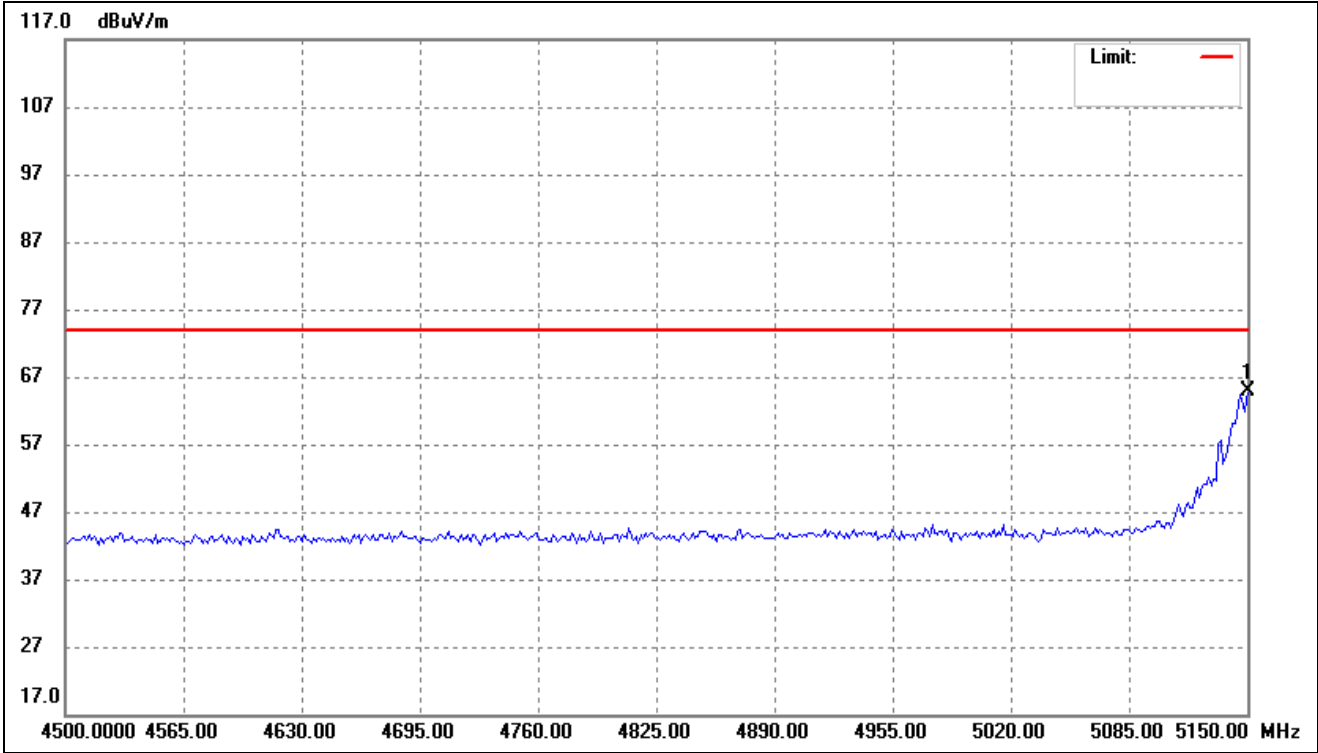


802.11n-20-- Restricted Bandedge (worst case)			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal (worst case)



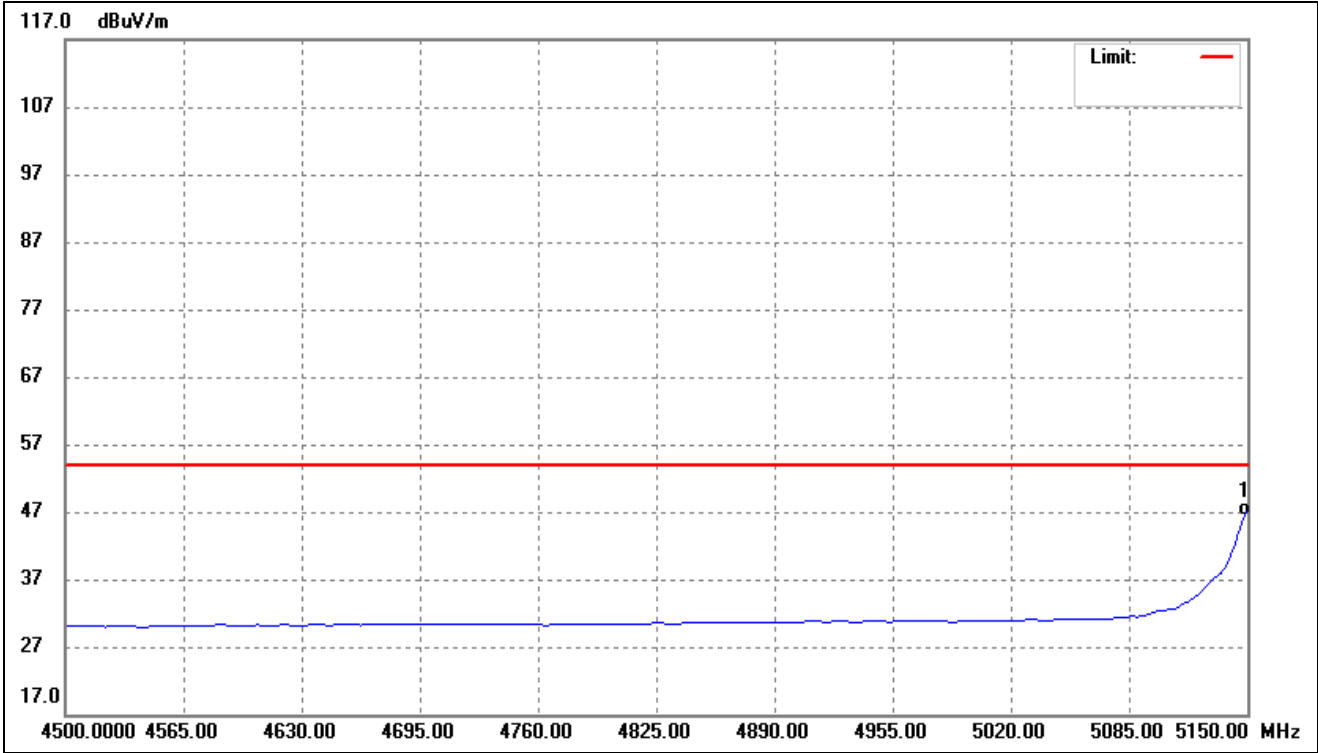
No.	Frequency (MHz)	Reading (dBuV/m)	Correct (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	50.51	-11.66	38.85	54.00	-15.15	-	-	AVG

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



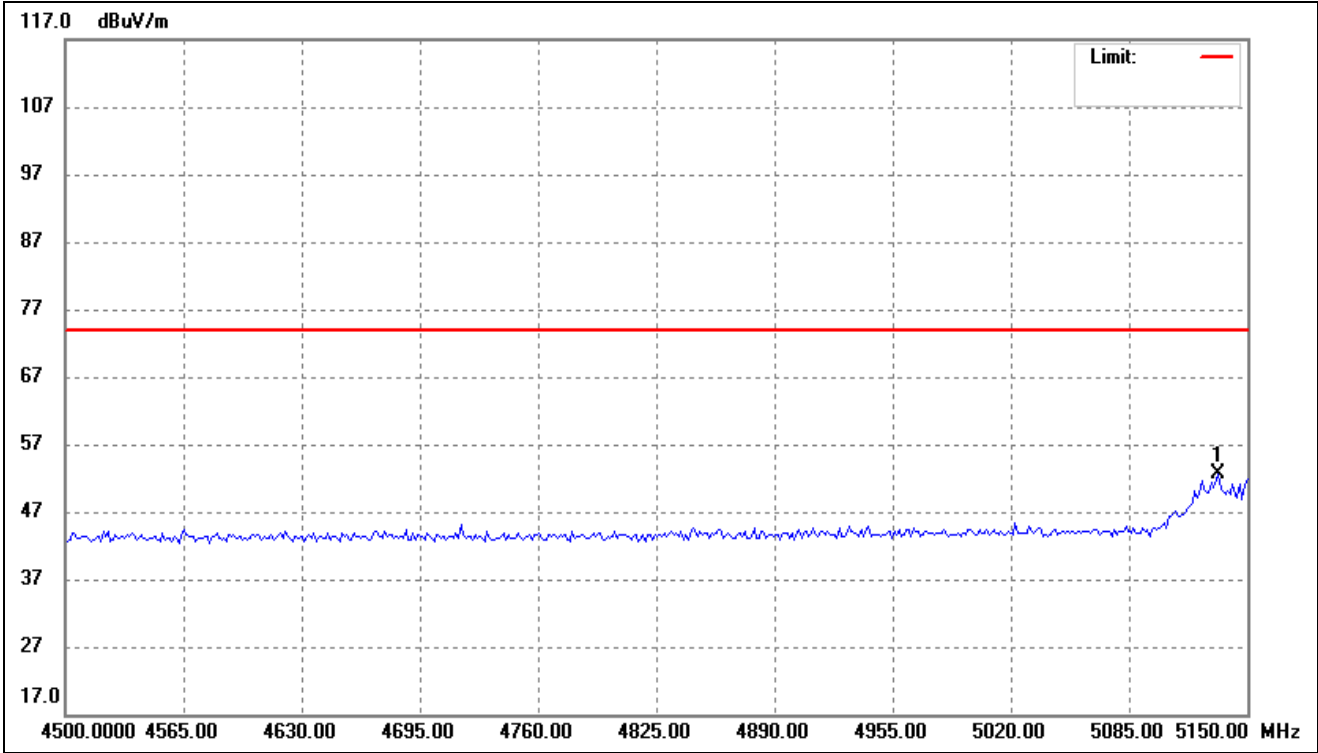
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	76.57	-11.66	64.91	74.00	-9.09	-	-	peak

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



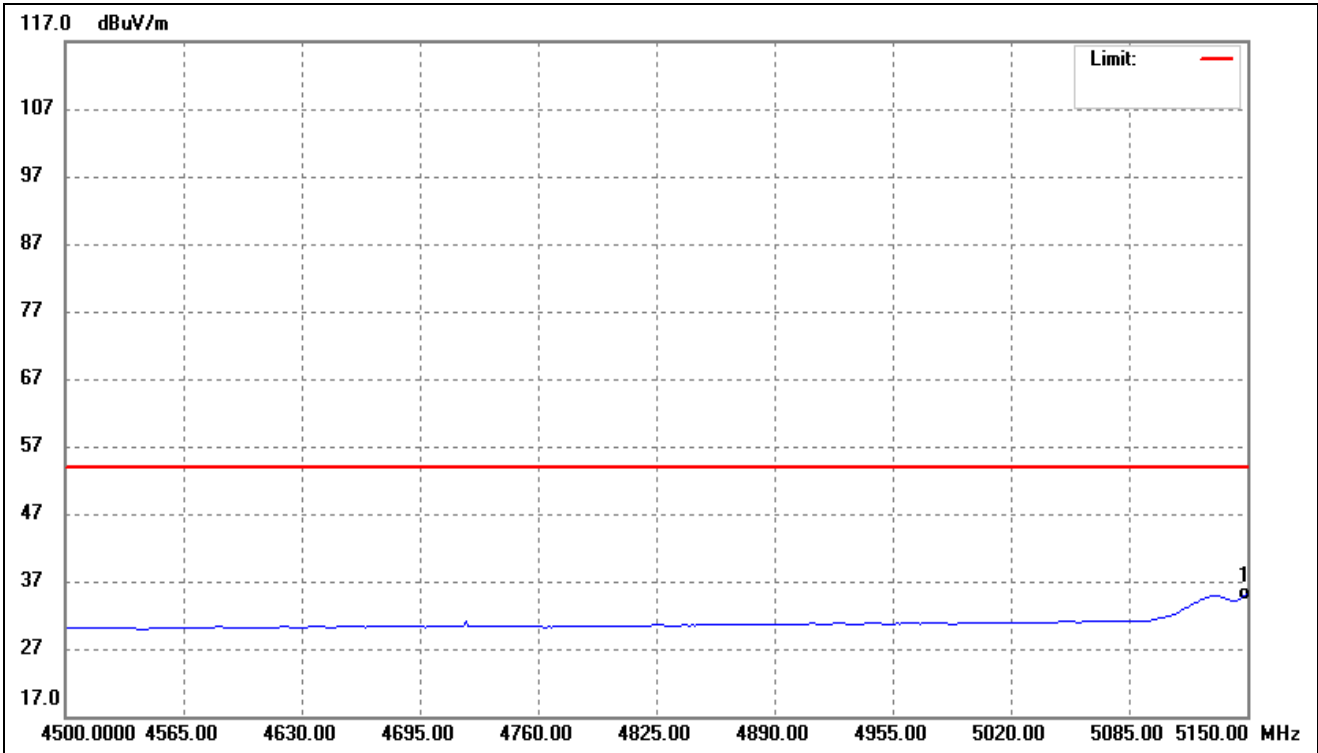
No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree ( )	Height (cm)	Remark
1	5150.000	59.15	-11.66	47.49	54.00	-6.51	-	-	AVG

802.11ac-HT80- Restricted Bandedge (worst case)			
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	5134.369	64.26	-11.73	52.53	74.00	-21.47	-	-	peak

802.11ac-HT80- Restricted Bandedge (worst case)			
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	46.76	-11.66	35.10	54.00	-18.90	-	-	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.*

- For the frequency band 5.15-5.25GHz, 5.250-5.350GHz, 5.725-5.850GHz (802.11a)
- 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 (5180MHz)							
10360	56.97	7.11	64.08	74	-9.92	H	PK
15540	39.11	7.11	46.22	54	-7.78	H	AV
10360	58.41	7.11	65.52	74	-8.48	V	PK
15540	38.51	7.11	45.62	54	-8.38	V	AV
Middle Channel (5200MHz)							
10400	55.05	7.22	62.27	74	-11.73	H	PK
15600	38.79	7.22	46.01	54	-7.99	H	AV
10400	58.74	7.22	65.96	74	-8.04	V	PK
15600	40.90	7.22	48.12	54	-5.88	V	AV
High Channel (5240MHz)							
10480	58.29	7.69	65.98	74	-8.02	H	PK
15720	39.39	7.69	47.08	54	-6.92	H	AV
10480	58.43	7.69	66.12	74	-7.88	V	PK
15720	39.73	7.69	47.42	54	-6.58	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5260MHz)							
10520	55.36	7.96	63.32	74	-10.68	H	PK
15780	39.42	7.96	47.38	54	-6.62	H	AV
10520	57.18	7.96	65.14	74	-8.86	V	PK
15780	40.91	7.96	48.87	54	-5.13	V	AV
Middle Channel (5280MHz)							
10560	57.28	8.02	65.30	74	-8.70	H	PK
15840	40.35	8.02	48.37	54	-5.63	H	AV
10560	58.77	8.02	66.79	74	-7.21	V	PK
15840	38.24	8.02	46.26	54	-7.74	V	AV
High Channel (5320MHz)							
10640	55.04	8.35	63.39	74	-10.61	H	PK
15960	41.01	8.35	49.36	54	-4.64	H	AV
10640	58.55	8.35	66.90	74	-7.10	V	PK
15960	40.18	8.35	48.53	54	-5.47	V	AV

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5745MHz)							
11490	58.14	9.45	67.59	74	-6.41	H	PK
17235	42.64	9.45	52.09	54	-1.91	H	AV
11490	55.01	9.45	64.46	74	-9.54	V	PK
17235	39.41	9.45	48.86	54	-5.14	V	AV
Middle Channel (5785MHz)							
11570	58.47	9.62	68.09	74	-5.91	H	PK
17355	39.72	9.62	49.34	54	-4.66	H	AV
11570	56.14	9.62	65.76	74	-8.24	V	PK
17355	39.55	9.62	49.17	54	-4.83	V	AV
High Channel (5825MHz)							
11650	55.13	9.84	64.97	74	-9.03	H	PK
17475	38.12	9.84	47.96	54	-6.04	H	AV
11650	58.29	9.84	68.13	74	-5.87	V	PK
17475	39.13	9.84	48.97	54	-5.03	V	AV

➤ Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-41.74	-27
Highest	Above 5350	-40.63	-27

Note: the data just list the worst cases

➤ Out of Band edge for 5250-5350MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-40.15	-27
Highest	Above 5350	-39.69	-27

Note: the data just list the worst cases

➤ Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-42.16	-27
	5715 to 5725	-37.59	-17
Highest	5850 to 5860	-36.28	-17
	Above 5860	-41.20	-27

Note: the data just list the worst cases

- For the frequency band 5.15-5.25GHz, 5.250-5.350GHz, 5.725-5.850GHz (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	55.32	7.11	62.43	74	-11.57	H	PK
10360	40.93	7.11	48.04	54	-5.96	H	AV
10360	55.76	7.11	62.87	74	-11.13	V	PK
10360	41.57	7.11	48.68	54	-5.32	V	AV
Middle Channel (5200MHz)							
10400	56.44	7.22	63.66	74	-10.34	H	PK
10400	39.09	7.22	46.31	54	-7.69	H	AV
10400	57.21	7.22	64.43	74	-9.57	V	PK
10400	39.44	7.22	46.66	54	-7.34	V	AV
High Channel (5240MHz)							
10480	58.63	7.69	66.32	74	-7.68	H	PK
10480	41.70	7.69	49.39	54	-4.61	H	AV
10480	58.74	7.69	66.43	74	-7.57	V	PK
10480	41.85	7.69	49.54	54	-4.46	V	AV

Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5260MHz)							
10520	57.22	7.96	65.18	74	-8.82	H	PK
10520	39.52	7.96	47.48	54	-6.52	H	AV
10520	57.76	7.96	65.72	74	-8.28	V	PK
10520	39.87	7.96	47.83	54	-6.17	V	AV
Middle Channel (5280MHz)							
10560	58.37	8.02	66.39	74	-7.61	H	PK
10560	39.86	8.02	47.88	54	-6.12	H	AV
10560	57.90	8.02	65.92	74	-8.08	V	PK
10560	38.76	8.02	46.78	54	-7.22	V	AV
High Channel (5320MHz)							
10640	55.34	8.35	63.69	74	-10.31	H	PK
10640	39.47	8.35	47.82	54	-6.18	H	AV
10640	55.27	8.35	63.62	74	-10.38	V	PK
10640	38.39	8.35	46.74	54	-7.26	V	AV



Frequency (MHz)	Reading (dBuV/m)	Correct dB	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polar H/V	Detector
Low Channel (5745MHz)							
11490	57.91	9.45	67.36	74	-6.64	H	PK
11490	38.89	9.45	48.34	54	-5.66	H	AV
11490	57.26	9.45	66.71	74	-7.29	V	PK
11490	38.54	9.45	47.99	54	-6.01	V	AV
Middle Channel (5785MHz)							
11570	58.71	9.62	68.33	74	-5.67	H	PK
11570	38.28	9.62	47.90	54	-6.10	H	AV
11570	55.82	9.62	65.44	74	-8.56	V	PK
11570	40.82	9.62	50.44	54	-3.56	V	AV
High Channel (5825MHz)							
11650	57.63	9.84	67.47	74	-6.53	H	PK
11650	38.00	9.84	47.84	54	-6.16	H	AV
11650	55.37	9.84	65.21	74	-8.79	V	PK
11650	38.87	9.84	48.71	54	-5.29	V	AV

➤ Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-43.57	-27
Highest	Above 5350	-42.19	-27

Note: the data just list the worst cases

➤ Out of Band edge for 5250-5350MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-45.67	-27
Highest	Above 5350	-44.10	-27

Note: the data just list the worst cases

➤ Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-43.59	-27
	5715 to 5725	-37.54	-17
Highest	5850 to 5860	-36.91	-17
	Above 5860	-38.25	-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, 5.250-5.350GHz, 5.725-5.850GHz (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	58.80	7.89	66.69	74	-7.31	H	PK
10380	39.94	7.89	47.83	54	-6.17	H	AV
10380	58.97	7.89	66.86	74	-7.14	V	PK
10380	40.94	7.89	48.83	54	-5.17	V	AV
High Channel (5230MHz)							
10460	56.11	7.97	64.08	74	-9.92	H	PK
10460	40.91	7.97	48.88	54	-5.12	H	AV
10460	57.41	7.97	65.38	74	-8.62	V	PK
10460	38.45	7.97	46.42	54	-7.58	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5270MHz)							
10540	57.00	8.16	65.16	74	-8.84	H	PK
10540	39.68	8.16	47.84	54	-6.16	H	AV
10540	55.47	8.16	63.63	74	-10.37	V	PK
10540	40.64	8.16	48.80	54	-5.20	V	AV
High Channel (5310MHz)							
10620	57.52	8.57	66.09	74	-7.91	H	PK
10620	39.38	8.57	47.95	54	-6.05	H	AV
10620	57.12	8.57	65.69	74	-8.31	V	PK
10620	40.57	8.57	49.14	54	-4.86	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5755MHz)							
11510	56.12	9.45	65.57	74	-8.43	H	PK
11510	39.39	9.45	48.84	54	-5.16	H	AV
11510	57.09	9.45	66.54	74	-7.46	V	PK
11510	38.74	9.45	48.19	54	-5.81	V	AV
High Channel (5795MHz)							
11590	55.93	9.27	65.20	74	-8.80	H	PK
11590	39.15	9.27	48.42	54	-5.58	H	AV
11590	56.74	9.27	66.01	74	-7.99	V	PK
11590	39.27	9.27	48.54	54	-5.46	V	AV

## ➤ Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-38.62	-27
Highest	Above 5350	-42.35	-27
Note: the data just list the worst cases			

## ➤ Out of Band edge for 5250-5350MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-42.69	-27
Highest	Above 5350	-38.46	-27
Note: the data just list the worst cases			

## ➤ Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-38.54	-27
	5715 to 5725	-37.16	-17
Highest	5850 to 5860	-35.69	-17
	Above 5860	-42.66	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz, 5.250-5.350GHz, 5.725-5.850GHz (802.11ac VH80)
- 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	55.02	7.53	62.55	74	-11.45	H	PK
10420	40.00	7.53	47.53	54	-6.47	H	AV
10420	57.26	7.53	64.79	74	-9.21	H	PK
10420	39.79	7.53	47.32	54	-6.68	H	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
5290MHz							
10580	56.13	7.95	64.08	74	-9.92	H	PK
10580	41.22	7.95	49.17	54	-4.83	H	AV
10580	58.60	7.95	66.55	74	-7.45	V	PK
10580	38.12	7.95	46.07	54	-7.93	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
5775MHz							
11550	56.04	9.93	65.97	74	-8.03	H	PK
11550	40.73	9.93	50.66	54	-3.34	H	AV
11550	55.96	9.93	65.89	74	-8.11	V	PK
11550	41.44	9.93	51.37	54	-2.63	V	AV

## ➤ Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-42.19	-27
Highest	Above 5350	-38.46	-27
Note: the data just list the worst cases			

## ➤ Out of Band edge for 5250-5350MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-40.38	-27
Highest	Above 5350	-39.62	-27
Note: the data just list the worst cases			

## ➤ Out of Band edge for 5725-5850MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5715	-38.54	-27
	5715 to 5725	-33.69	-17
Highest	5850 to 5860	-32.52	-17
	Above 5860	-41.20	-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**

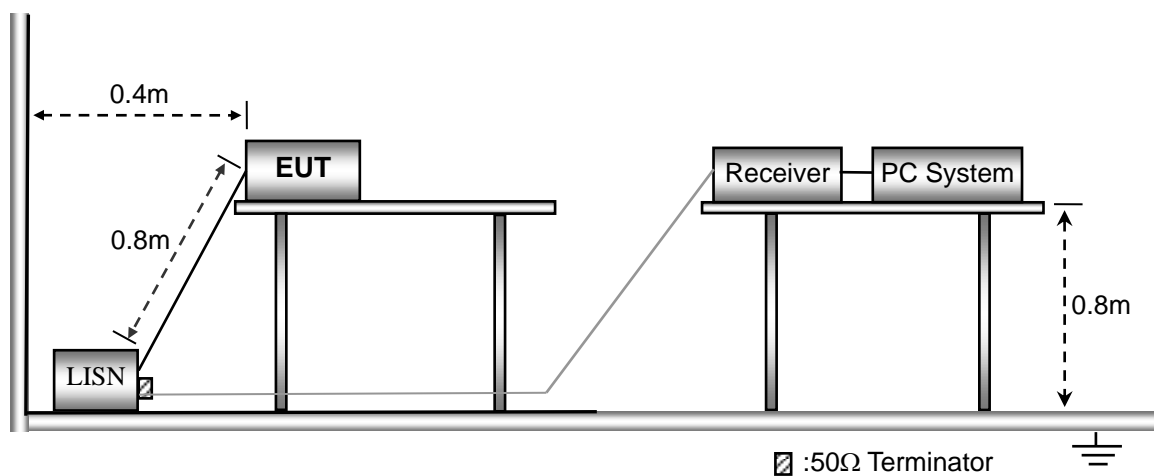
## 10. Conducted Emissions

### 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



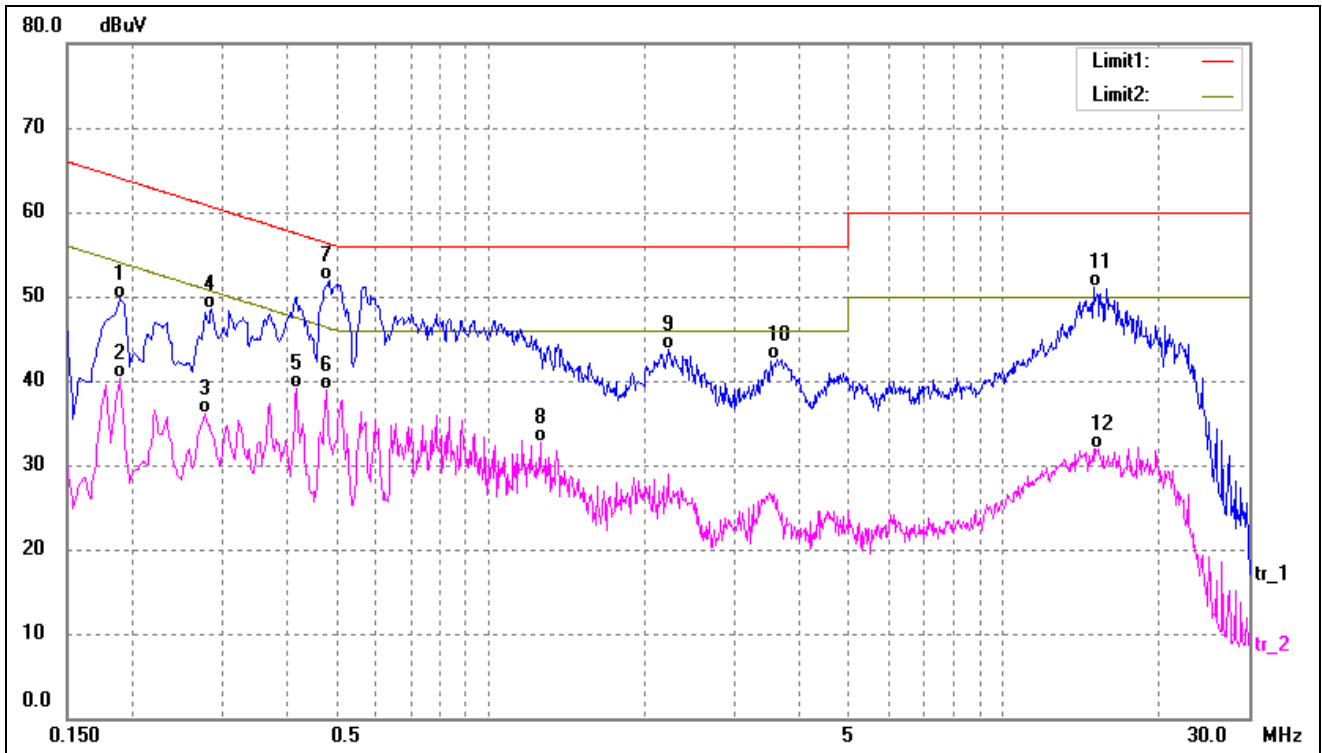
### 10.3 Test Receiver Setup

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

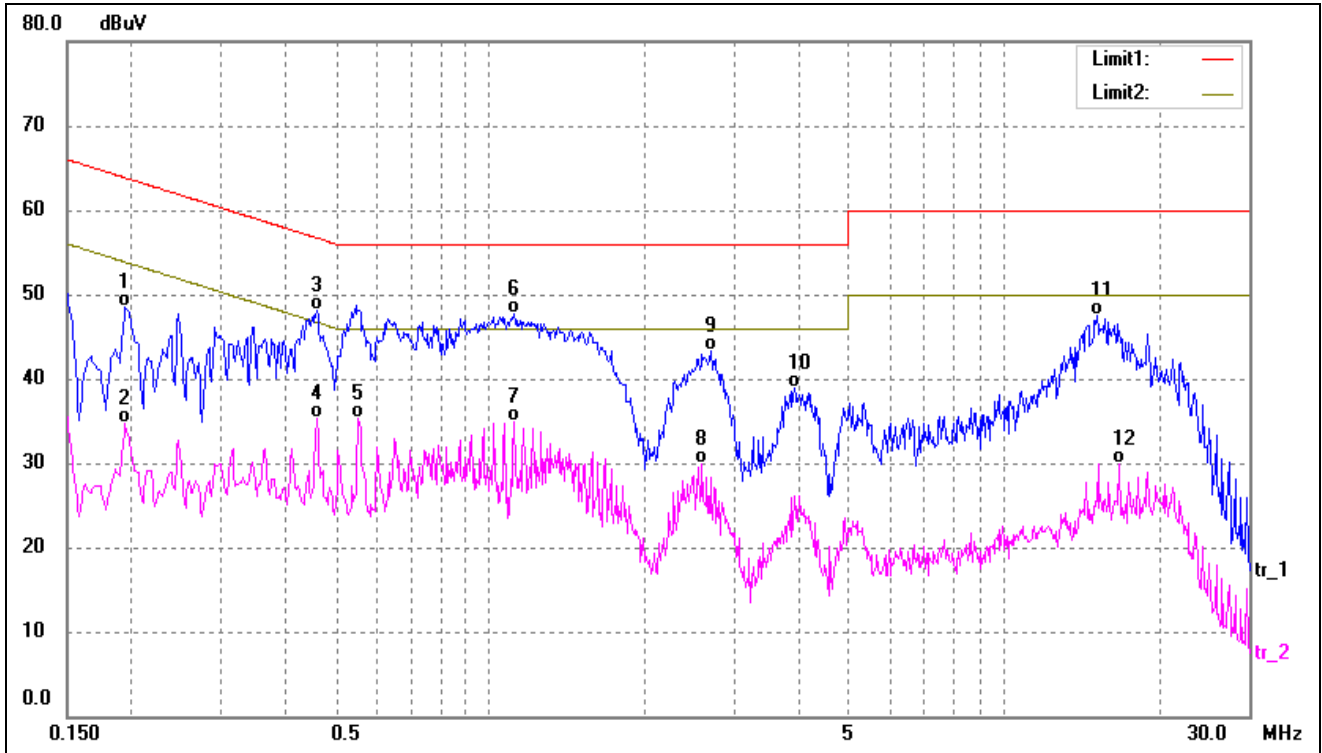
Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1900	39.41	10.39	49.80	64.04	-14.24	QP
2	0.1900	30.00	10.39	40.39	54.04	-13.65	AVG
3	0.2780	25.77	10.31	36.08	50.88	-14.80	AVG
4	0.2860	38.23	10.31	48.54	60.64	-12.10	QP
5	0.4180	28.88	10.26	39.14	47.49	-8.35	AVG
6	0.4780	28.67	10.23	38.90	46.37	-7.47	AVG
7*	0.4860	41.67	10.23	51.90	56.24	-4.34	QP
8	1.2500	22.56	10.19	32.75	46.00	-13.25	AVG
9	2.2220	33.39	10.33	43.72	56.00	-12.28	QP
10	3.6220	32.12	10.36	42.48	56.00	-13.52	QP
11	14.9700	40.84	10.22	51.06	60.00	-8.94	QP
12	15.2500	21.76	10.22	31.98	50.00	-18.02	AVG



Test Mode	Communication	AC120V 60Hz	Polarity:	Line
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No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.1940	38.19	10.39	48.58	63.86	-15.28	QP
2	0.1940	24.31	10.39	34.70	53.86	-19.16	AVG
3	0.4580	37.88	10.25	48.13	56.73	-8.60	QP
4	0.4580	25.09	10.25	35.34	46.73	-11.39	AVG
5	0.5540	25.10	10.22	35.32	46.00	-10.68	AVG
6*	1.1140	37.59	10.16	47.75	56.00	-8.25	QP
7	1.1140	24.81	10.16	34.97	46.00	-11.03	AVG
8	2.5940	19.54	10.34	29.88	46.00	-16.12	AVG
9	2.6900	32.98	10.34	43.32	56.00	-12.68	QP
10	3.9020	28.46	10.36	38.82	56.00	-17.18	QP
11	15.2020	37.29	10.22	47.51	60.00	-12.49	QP
12	16.7740	19.71	10.28	29.99	50.00	-20.01	AVG

## APPENDIX SUMMARY

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Project No.	WTX23X05111880W	Test Engineer	Elin Su
Start date	2023/5/31	Finish date	2023/6/1
Temperature	23°C	Humidity	59%
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

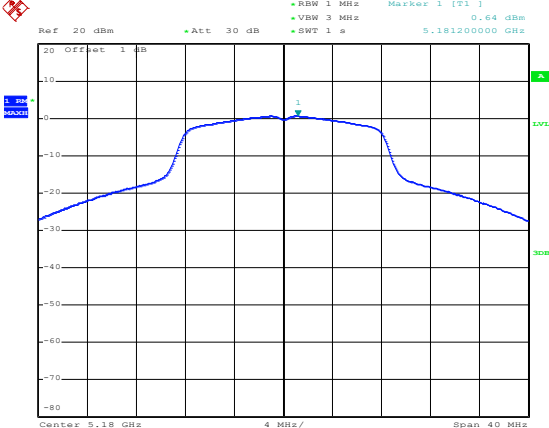
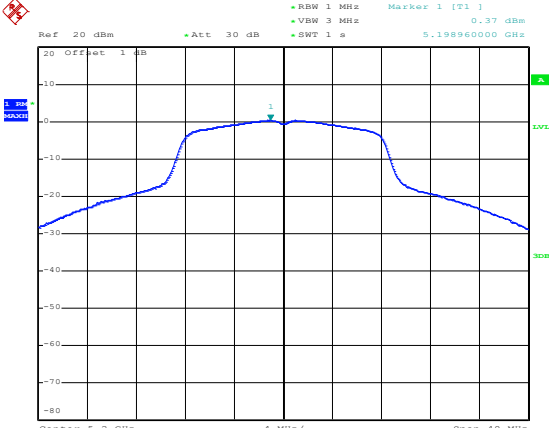
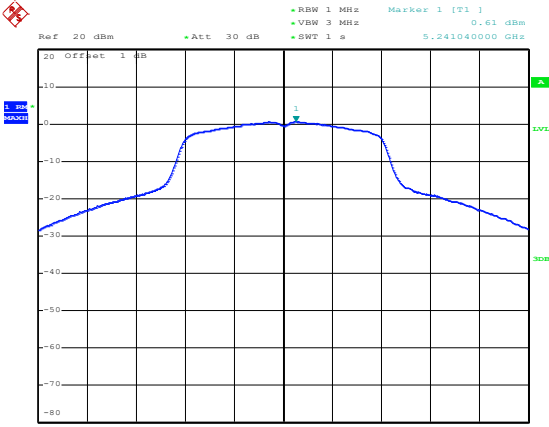
**APPENDIX A**

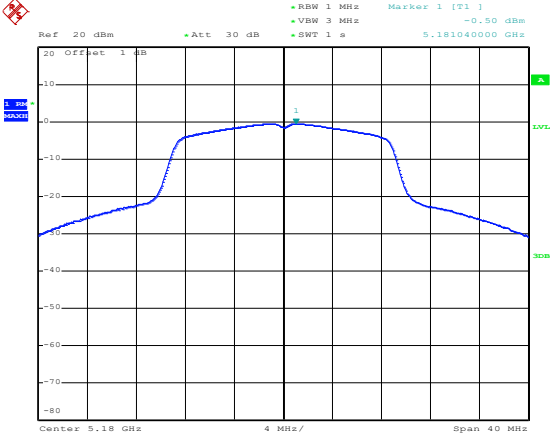
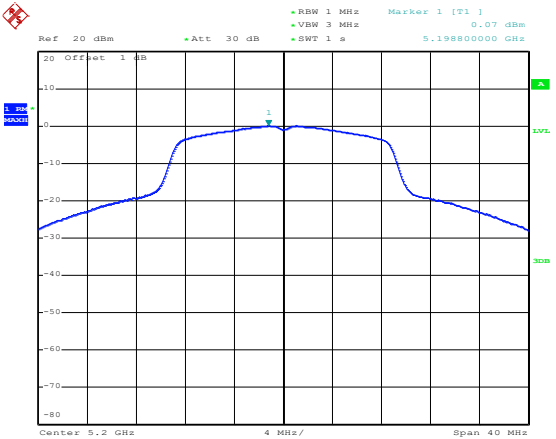
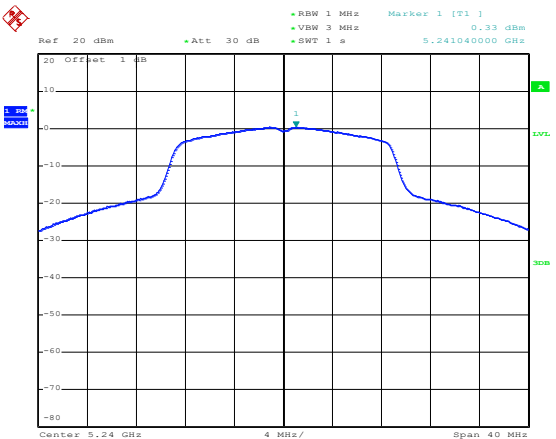
<b>Power Spectral Density</b>			
<b>U-NII-1:5150-5250MHz</b>			
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5180	0.64	11
	5200	0.37	11
	5240	0.61	11
802.11n-HT20	5180	-0.50	11
	5200	0.07	11
	5240	0.33	11
802.11n-HT40	5190	-3.78	11
	5230	-3.95	11
802.11ac-HT80	5210	-10.77	11

<b>U-NII-2A: 5250-5350MHz</b>			
Operating mode	Test Channel	Power Spectral Density dBm/MHz	Limit (dBm/MHz)
802.11a	5260	0.49	11
	5280	0.85	11
	5320	1.03	11
802.11n-HT20	5260	0.28	11
	5280	0.18	11
	5320	-0.39	11
802.11n-HT40	5270	-3.40	11
	5310	-3.30	11
802.11ac-HT80	5290	-7.66	11

<b>U-NII-3: 5725-5850MHz</b>					
Operating mode	Test Channel	Power Spectral Density dBm/300kHz	Factor	Power Spectral Density* dBm/500kHz	Limit dBm/500kHz
802.11a	5745	4.29	2.22	6.51	30
	5785	3.97	2.22	6.19	30
	5825	3.61	2.22	5.83	30
802.11n-HT20	5745	3.22	2.22	5.44	30
	5785	3.02	2.22	5.24	30
	5825	2.81	2.22	5.03	30
802.11n HT40	5755	0.34	2.22	2.56	30
	5795	0.17	2.22	2.39	30
802.11ac VH80	5775	-2.97	2.22	-0.75	30
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22					

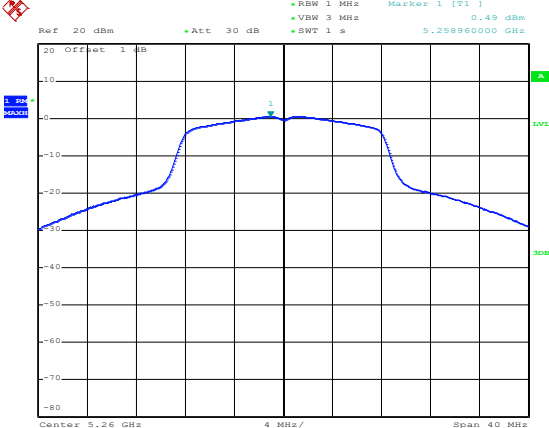
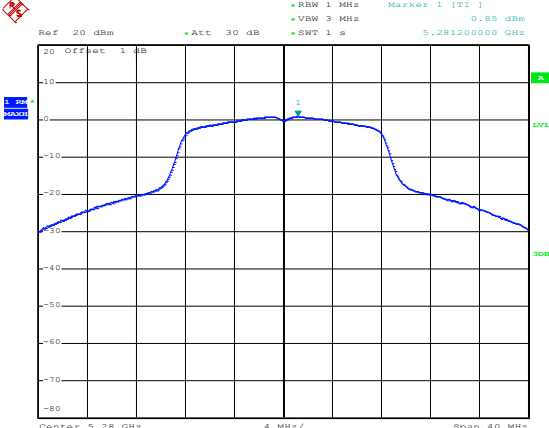
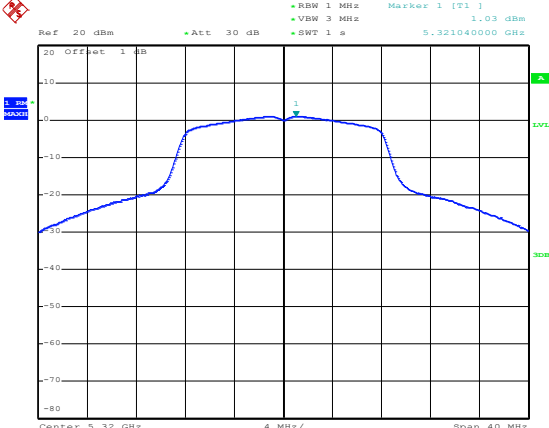
5150-5250MHz

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<p>802.11a-Middle</p>	 <p>Date: 1.JUN.2023 11:51:15</p>
<p>802.11a-High</p>	 <p>Date: 1.JUN.2023 11:51:29</p>

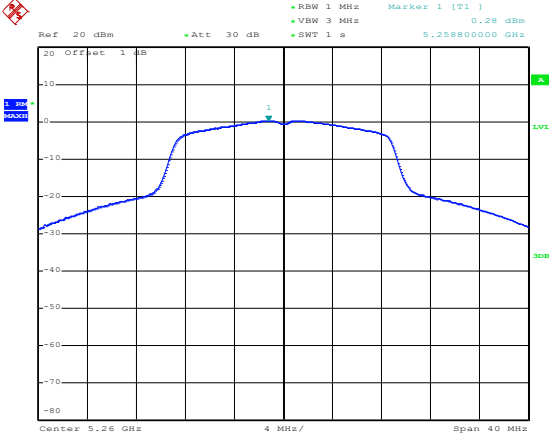
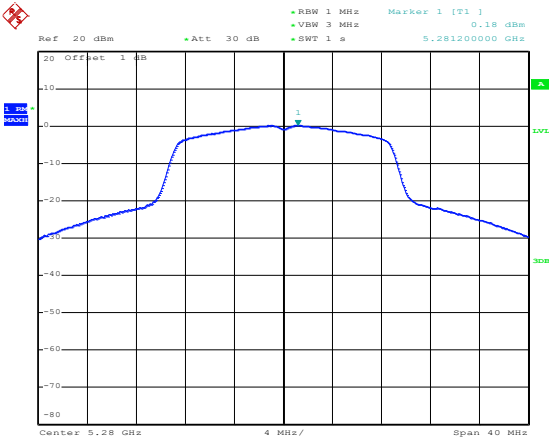
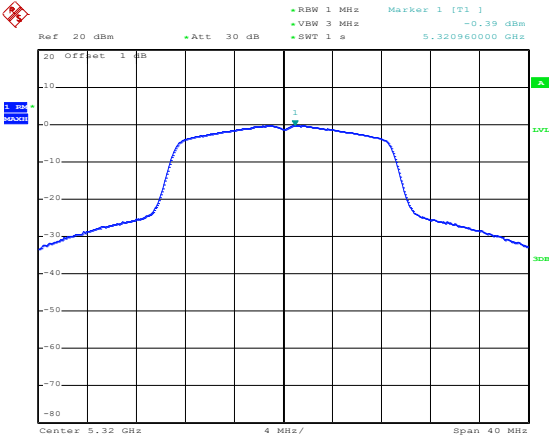
<p>802.11n-HT20-Low</p>	 <p>Date: 1.JUN.2023 11:51:45</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 11:51:57</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 11:52:11</p>

<p>802.11n-HT40-Low</p>	<p>Ref 20 dBm    +Att 30 dB    +RBW 1 MHz    Marker 1 [F1]    -3.78 dBm          +VBW 3 MHz    +SWT 1 s    5.188900000 GHz</p> <p>20 Offset 1 dB          10          0          -10          -20          -30          -40          -50          -60          -70          -80</p> <p>Center 5.19 GHz    8 MHz/    Span 80 MHz</p> <p>Date: 1.JUN.2023 11:52:44</p>
<p>802.11n-HT40-High</p>	<p>Ref 20 dBm    +Att 30 dB    +RBW 1 MHz    Marker 1 [F1]    -3.95 dBm          +VBW 3 MHz    +SWT 1 s    5.231600000 GHz</p> <p>20 Offset 1 dB          10          0          -10          -20          -30          -40          -50          -60          -70          -80</p> <p>Center 5.23 GHz    8 MHz/    Span 80 MHz</p> <p>Date: 1.JUN.2023 11:53:02</p>
<p>802.11ac-HT80-Low</p>	<p>Ref 20 dBm    +Att 30 dB    +RBW 1 MHz    Marker 1 [F1]    -10.77 dBm          +VBW 3 MHz    +SWT 1 s    5.207600000 GHz</p> <p>20 Offset 1 dB          10          0          -10          -20          -30          -40          -50          -60          -70          -80</p> <p>Center 5.21 GHz    16 MHz/    Span 160 MHz</p> <p>Date: 1.JUN.2023 11:55:31</p>

5250-5350MHz

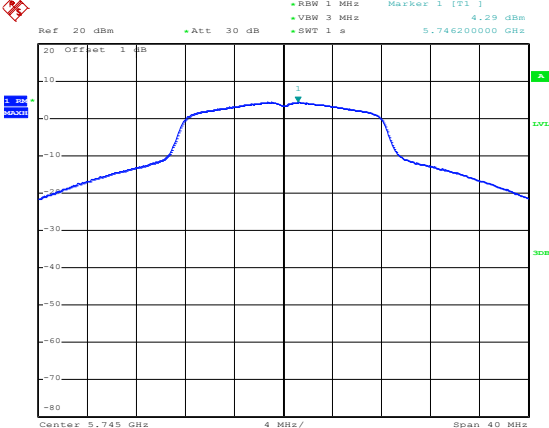
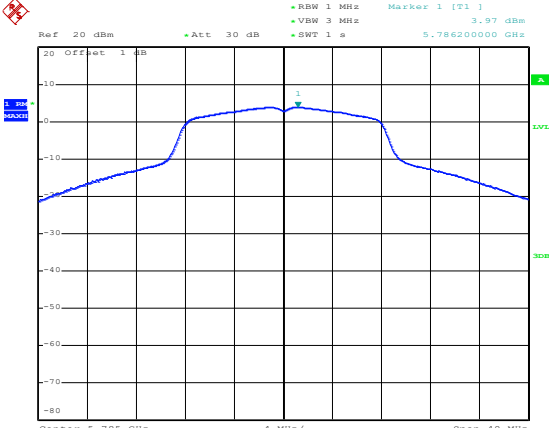
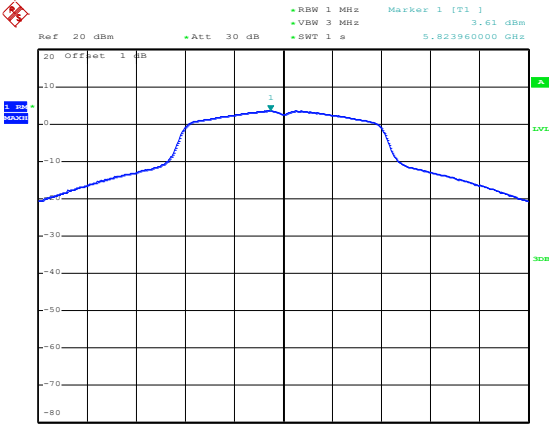
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<p>802.11a-Middle</p>	 <p>Date: 1.JUN.2023 11:56:41</p>
<p>802.11a-High</p>	 <p>Date: 1.JUN.2023 11:57:00</p>

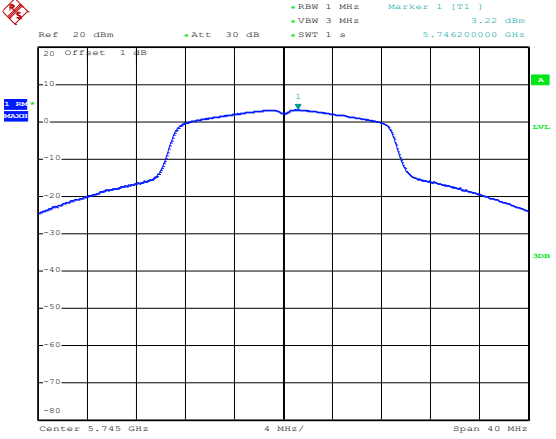
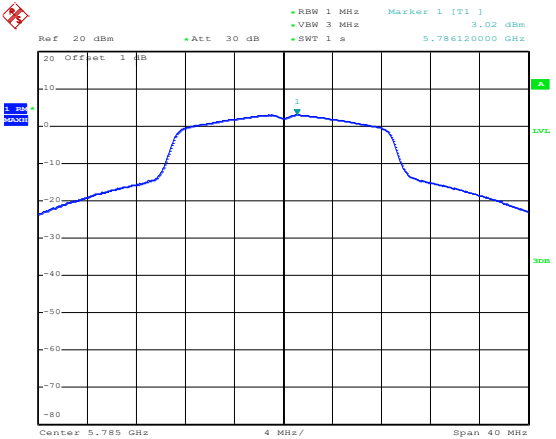
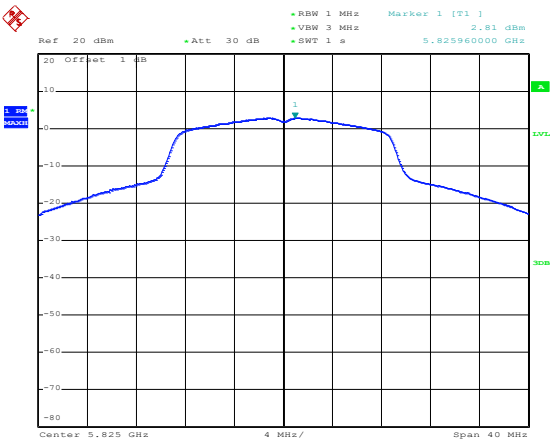


<p>802.11n-HT20-Low</p>	 <p>Date: 1.JUN.2023 11:57:28</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 11:57:44</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 11:58:04</p>

<p>802.11n-HT40-Low</p>	<p>Ref 20 dBm    +Att 30 dB    +RBW 1 MHz    Marker 1 [T1]    -3.40 dBm  +VBW 3 MHz  +SWT 1 s    5.271440000 GHz</p> <p>20 Offset 1 dB  -10  0  -10  -20  -30  -40  -50  -60  -70  -80</p> <p>Center 5.27 GHz    8 MHz/    Span 80 MHz</p> <p>Date: 1.JUN.2023 11:58:39</p>
<p>802.11n-HT40-High</p>	<p>Ref 20 dBm    +Att 30 dB    +RBW 1 MHz    Marker 1 [T1]    -3.30 dBm  +VBW 3 MHz  +SWT 1 s    5.312080000 GHz</p> <p>20 Offset 1 dB  -10  0  -10  -20  -30  -40  -50  -60  -70  -80</p> <p>Center 5.31 GHz    8 MHz/    Span 80 MHz</p> <p>Date: 1.JUN.2023 11:58:54</p>
<p>802.11ac-HT80-Low</p>	<p>Ref 20 dBm    +Att 30 dB    +RBW 1 MHz    Marker 1 [T1]    -7.66 dBm  +VBW 3 MHz  +SWT 1 s    5.292880000 GHz</p> <p>20 Offset 1 dB  -10  0  -10  -20  -30  -40  -50  -60  -70  -80</p> <p>Center 5.29 GHz    16 MHz/    Span 160 MHz</p> <p>Date: 1.JUN.2023 11:59:48</p>

5725-5850MHz

<p>802.11a-Low</p>	 <p>Ref 20 dBm    Att 30 dB    RBW 1 MHz    VBW 3 MHz    SWT 1 s    Marker 1 [T1] 4.29 dBm    5.74620000 GHz</p> <p>20 Offset 1 dB</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 5.745 GHz    4 MHz/    Span 40 MHz</p> <p>Date: 1.JUN.2023 12:01:05</p>
<p>802.11a-Middle</p>	 <p>Ref 20 dBm    Att 30 dB    RBW 1 MHz    VBW 3 MHz    SWT 1 s    Marker 1 [T1] 3.97 dBm    5.78620000 GHz</p> <p>20 Offset 1 dB</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 5.785 GHz    4 MHz/    Span 40 MHz</p> <p>Date: 1.JUN.2023 12:01:23</p>
<p>802.11a-High</p>	 <p>Ref 20 dBm    Att 30 dB    RBW 1 MHz    VBW 3 MHz    SWT 1 s    Marker 1 [T1] 3.61 dBm    5.82396000 GHz</p> <p>20 Offset 1 dB</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 5.825 GHz    4 MHz/    Span 40 MHz</p> <p>Date: 1.JUN.2023 12:01:39</p>

<p>802.11n-HT20-Low</p>	 <p>Date: 1.JUN.2023 12:02:25</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 12:02:43</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 12:03:07</p>

<p>802.11n-HT40-Low</p>	<p>Date: 1.JUN.2023 12:03:25</p>
<p>802.11n-HT40-High</p>	<p>Date: 1.JUN.2023 12:03:46</p>
<p>802.11ac-HT80-Low</p>	<p>Date: 1.JUN.2023 12:04:17</p>

## APPENDIX B

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### Emission Bandwidth and Occupied Bandwidth

U-NII-1:5150-5250MHz				
Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5180	26.30	17.20	Pass
	5200	27.50	17.30	Pass
	5240	26.00	17.40	Pass
802.11n-HT20	5180	22.00	18.20	Pass
	5200	23.70	18.20	Pass
	5240	26.30	18.30	Pass
802.11n-HT40	5190	41.20	37.40	Pass
	5230	41.00	37.60	Pass
802.11ac-HT80	5210	86.80	76.80	Pass

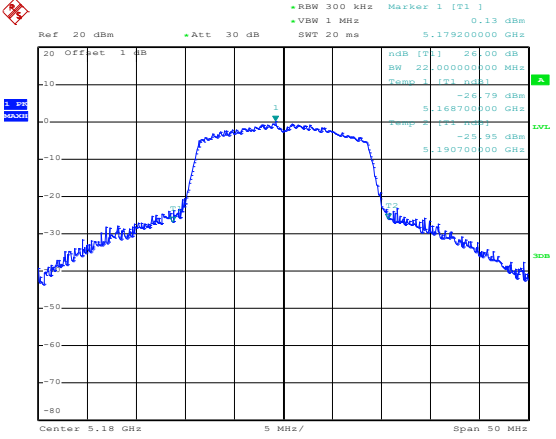
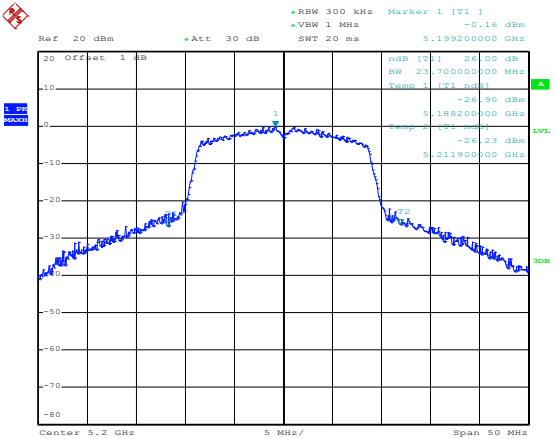
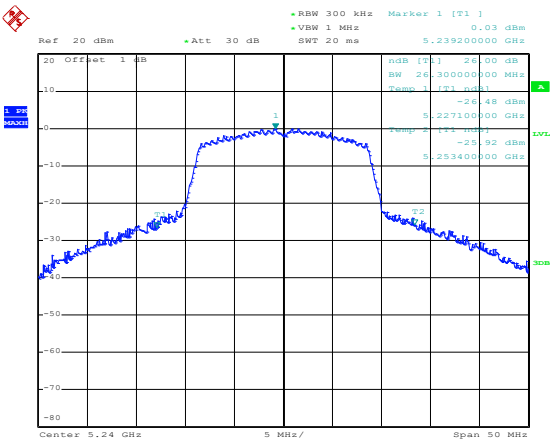
U-NII-2A: 5250-5350MHz				
Test Mode	Test Channel MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	Limit MHz
802.11a	5260	24.60	17.20	Pass
	5280	26.00	17.30	Pass
	5320	23.50	17.40	Pass
802.11n-HT20	5260	25.30	18.20	Pass
	5280	24.60	18.20	Pass
	5320	26.00	18.20	Pass
802.11n-HT40	5270	41.20	37.40	Pass
	5310	41.40	37.40	Pass
802.11ac-HT80	5290	92.40	76.40	Pass

<b>U-NII-3: 5725-5850MHz</b>				
<b>Test Mode</b>	<b>Test Channel MHz</b>	<b>6 dB Bandwidth MHz</b>	<b>99% Bandwidth MHz</b>	<b>Limit MHz</b>
802.11a	5745	16.60	17.20	≥500
	5785	16.60	17.10	≥500
	5825	16.40	17.00	≥500
802.11n-HT20	5745	17.80	18.10	≥500
	5785	17.80	18.10	≥500
	5825	17.80	18.00	≥500
802.11n-HT40	5755	36.80	37.00	≥500
	5795	36.80	37.00	≥500
802.11ac VH80	5775	77.60	76.80	≥500

**26 dB Bandwidth**  
**5150-5250MHz**

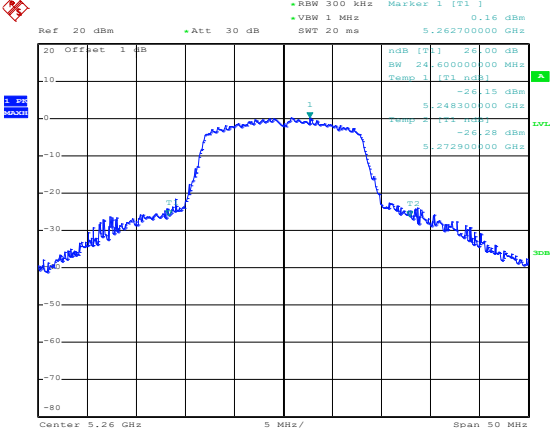
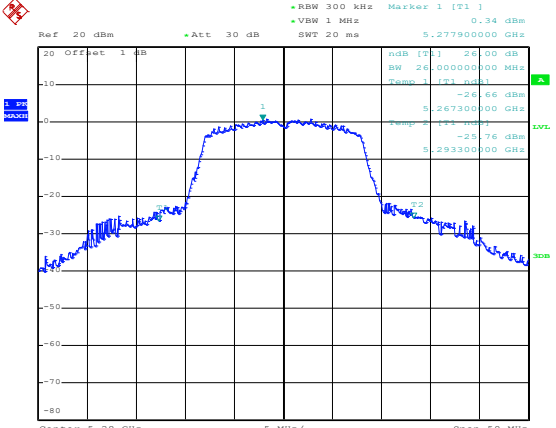
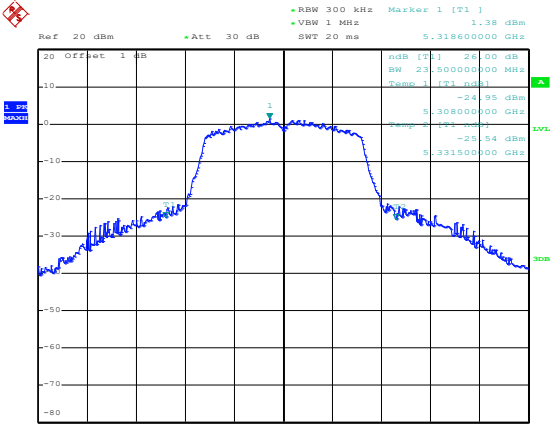
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<p>802.11a-Middle</p>	<p>Date: 1.JUN.2023 14:33:31</p>
<p>802.11a-High</p>	<p>Date: 1.JUN.2023 14:33:54</p>

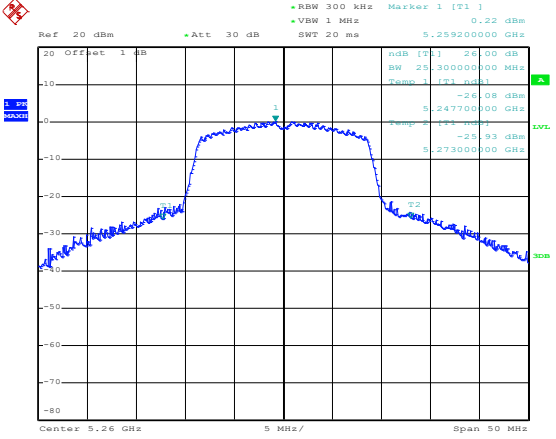
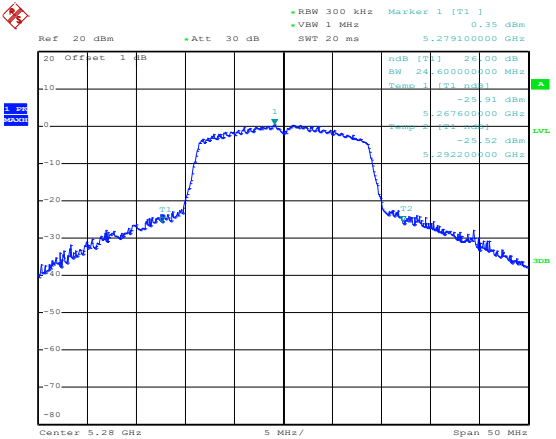
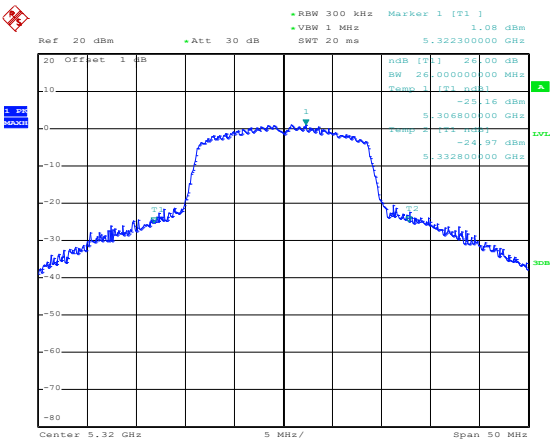


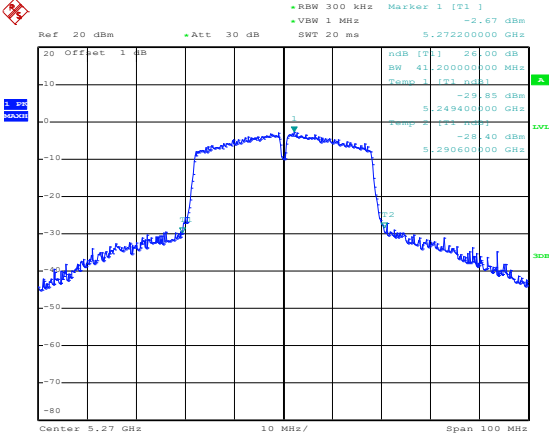
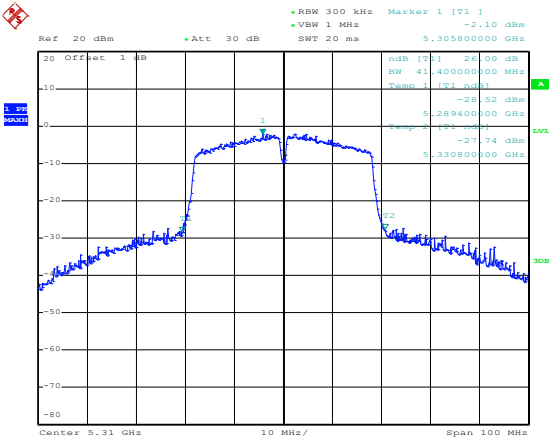
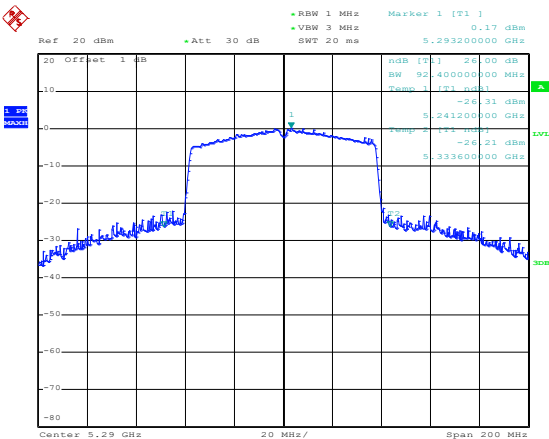
<p>802.11n-HT20-Low</p>	 <p>Ref 20 dBm    +Att 30 dB</p> <p>RBW 300 kHz    Marker 1 [T1]    0.13 dBm      VBW 1 MHz      SWT 20 ms    5.179200000 GHz</p> <p>Offset 1 dB</p> <p>ndB [T1]    26.00 dB      BW 22.00000000 MHz      Temp 1 [T1] ndB</p> <p>1    -26.79 dBm      5.168700000 GHz</p> <p>2    -25.95 dBm      5.190700000 GHz</p> <p>Center 5.18 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 1.JUN.2023 14:34:18</p>
<p>802.11n-HT20-Middle</p>	 <p>Ref 20 dBm    +Att 30 dB</p> <p>RBW 300 kHz    Marker 1 [T1]    -0.16 dBm      VBW 1 MHz      SWT 20 ms    5.199200000 GHz</p> <p>Offset 1 dB</p> <p>ndB [T1]    26.00 dB      BW 23.70000000 MHz      Temp 1 [T1] ndB</p> <p>1    -26.90 dBm      5.188200000 GHz</p> <p>2    -24.23 dBm      5.211900000 GHz</p> <p>Center 5.2 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 1.JUN.2023 14:34:50</p>
<p>802.11n-HT20-High</p>	 <p>Ref 20 dBm    +Att 30 dB</p> <p>RBW 300 kHz    Marker 1 [T1]    0.03 dBm      VBW 1 MHz      SWT 20 ms    5.239200000 GHz</p> <p>Offset 1 dB</p> <p>ndB [T1]    26.00 dB      BW 26.30000000 MHz      Temp 1 [T1] ndB</p> <p>1    -26.48 dBm      5.227100000 GHz</p> <p>2    -25.92 dBm      5.253400000 GHz</p> <p>Center 5.24 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 1.JUN.2023 14:35:32</p>

<p>802.11n-HT40-Low</p>	<p>             Ref 20 dBm    +Att 30 dB              +RBW 300 kHz    Marker 1 [T1]    -3.22 dBm              +VSW 1 MHz              +SWT 20 ms    5.192200000 GHz         </p> <p>             20 Offset 1 dB              ndB [T1]    28.00 dB              BW 41.20000000 MHz              Temp 1 [T1] ndB              -29.46 dBm              5.169400000 GHz              -28.60 dBm              5.210600000 GHz         </p> <p>             Center 5.19 GHz    10 MHz/    Span 100 MHz         </p> <p>Date: 1.JUN.2023 14:36:04</p>
<p>802.11n-HT40-High</p>	<p>             Ref 20 dBm    +Att 30 dB              +RBW 300 kHz    Marker 1 [T1]    -2.85 dBm              +VSW 1 MHz              +SWT 20 ms    5.232400000 GHz         </p> <p>             20 Offset 1 dB              ndB [T1]    28.00 dB              BW 41.00000000 MHz              Temp 1 [T1] ndB              -28.97 dBm              5.209600000 GHz              -28.97 dBm              5.250600000 GHz         </p> <p>             Center 5.23 GHz    10 MHz/    Span 100 MHz         </p> <p>Date: 1.JUN.2023 14:36:35</p>
<p>802.11ac-HT80-Low</p>	<p>             Ref 20 dBm    +Att 30 dB              +RBW 1 MHz    Marker 1 [T1]    -1.67 dBm              +VSW 3 MHz              +SWT 20 ms    5.212800000 GHz         </p> <p>             20 Offset 1 dB              ndB [T1]    28.00 dB              BW 86.80000000 MHz              Temp 1 [T1] ndB              -27.75 dBm              5.169200000 GHz              -27.82 dBm              5.252000000 GHz         </p> <p>             Center 5.21 GHz    20 MHz/    Span 200 MHz         </p> <p>Date: 1.JUN.2023 14:40:53</p>

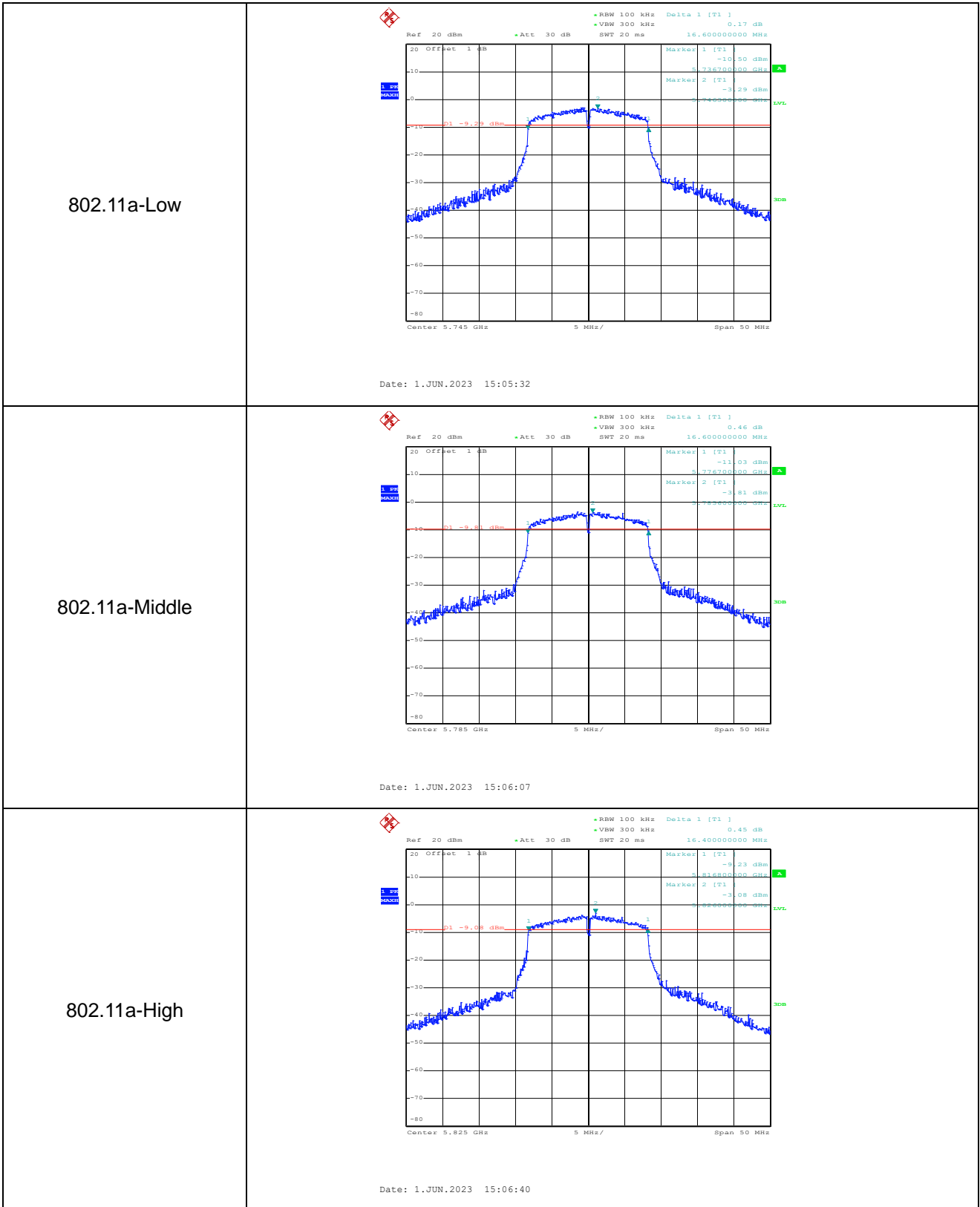
5250-5350MHz

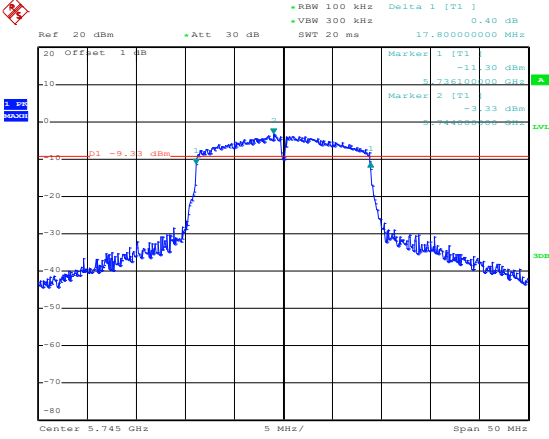
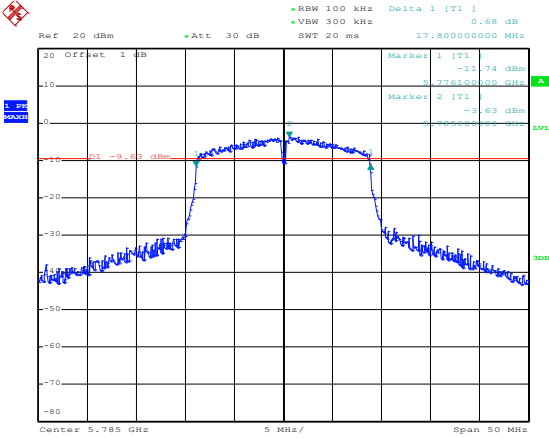
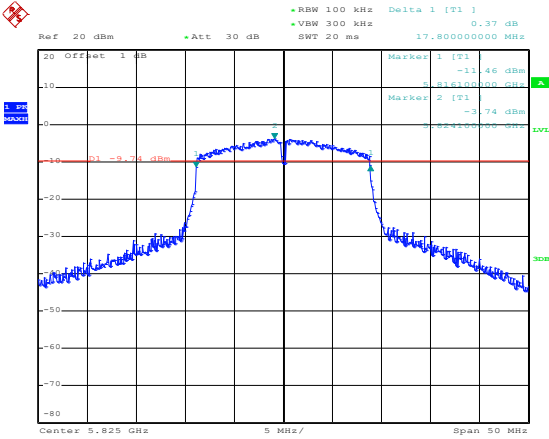
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<p>802.11a-Middle</p>	 <p>Date: 1.JUN.2023 14:45:33</p>
<p>802.11a-High</p>	 <p>Date: 1.JUN.2023 14:45:57</p>

<p>802.11n-HT20-Low</p>	 <p>Ref 20 dBm    +Att 30 dB    RBW 300 kHz    Marker 1 [T1] 0.22 dBm      +VBW 1 MHz    SWT 20 ms    5.259200000 GHz</p> <p>20 Offset 1 dB    ndB [T1] 26.00 dB      -10    BW 25.300000000 MHz      0    Temp 1 [T1] ndB      -10    -26.08 dBm      -20    5.247700000 GHz      -30    Temp 2 [T1] ndB      -40    -25.93 dBm      -50    5.273000000 GHz      -60    -25.93 dBm      -70    -25.93 dBm      -80    -25.93 dBm</p> <p>Center 5.26 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 1.JUN.2023 14:46:56</p>
<p>802.11n-HT20-Middle</p>	 <p>Ref 20 dBm    +Att 30 dB    RBW 300 kHz    Marker 1 [T1] 0.35 dBm      +VBW 1 MHz    SWT 20 ms    5.279100000 GHz</p> <p>20 Offset 1 dB    ndB [T1] 26.00 dB      -10    BW 24.600000000 MHz      0    Temp 1 [T1] ndB      -10    -25.91 dBm      -20    5.267600000 GHz      -30    Temp 2 [T1] ndB      -40    -25.52 dBm      -50    5.292200000 GHz      -60    -25.52 dBm      -70    -25.52 dBm      -80    -25.52 dBm</p> <p>Center 5.28 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 1.JUN.2023 14:47:29</p>
<p>802.11n-HT20-High</p>	 <p>Ref 20 dBm    +Att 30 dB    RBW 300 kHz    Marker 1 [T1] 1.08 dBm      +VBW 1 MHz    SWT 20 ms    5.322300000 GHz</p> <p>20 Offset 1 dB    ndB [T1] 26.00 dB      -10    BW 26.000000000 MHz      0    Temp 1 [T1] ndB      -10    -25.16 dBm      -20    5.306800000 GHz      -30    Temp 2 [T1] ndB      -40    -24.97 dBm      -50    5.332800000 GHz      -60    -24.97 dBm      -70    -24.97 dBm      -80    -24.97 dBm</p> <p>Center 5.32 GHz    5 MHz/    Span 50 MHz</p> <p>Date: 1.JUN.2023 14:48:05</p>

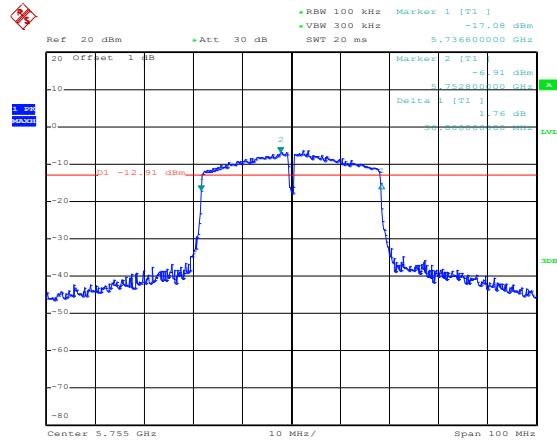
<p>802.11n-HT40-Low</p>	 <p>Ref 20 dBm +Att 30 dB          RBW 300 kHz Marker 1 [T1] -2.67 dBm          VBW 1 MHz          SWT 20 ms 5.272200000 GHz</p> <p>ndB [T1] 26.00 dB          BW 41.200000000 MHz          Temp 1 [T1] null</p> <p>-29.85 dBm          5.249400000 GHz          -28.40 dBm          5.290600000 GHz</p> <p>Center 5.27 GHz 10 MHz/ Span 100 MHz</p> <p>Date: 1.JUN.2023 14:48:27</p>
<p>802.11n-HT40-High</p>	 <p>Ref 20 dBm +Att 30 dB          RBW 300 kHz Marker 1 [T1] -2.10 dBm          VBW 1 MHz          SWT 20 ms 5.305800000 GHz</p> <p>ndB [T1] 26.00 dB          BW 41.400000000 MHz          Temp 1 [T1] null</p> <p>-28.52 dBm          5.289400000 GHz          -27.74 dBm          5.330800000 GHz</p> <p>Center 5.31 GHz 10 MHz/ Span 100 MHz</p> <p>Date: 1.JUN.2023 14:48:50</p>
<p>802.11ac-HT80-Low</p>	 <p>Ref 20 dBm +Att 30 dB          RBW 1 MHz Marker 1 [T1] 0.17 dBm          VBW 3 MHz          SWT 20 ms 5.293200000 GHz</p> <p>ndB [T1] 26.00 dB          BW 92.400000000 MHz          Temp 1 [T1] null</p> <p>-26.31 dBm          5.243200000 GHz          -25.21 dBm          5.333600000 GHz</p> <p>Center 5.29 GHz 20 MHz/ Span 200 MHz</p> <p>Date: 1.JUN.2023 14:49:26</p>

**6 dB Bandwidth**  
**5725-5850MHz**



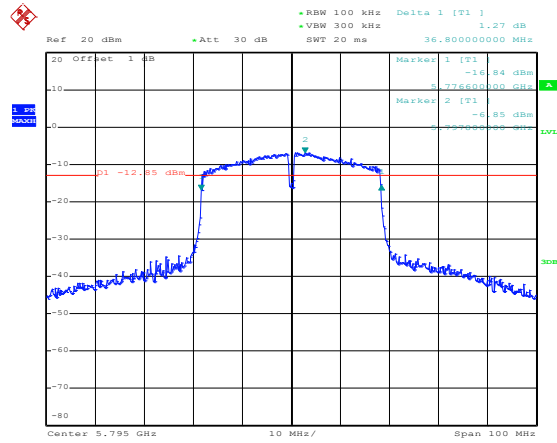
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<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 15:08:02</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 15:08:54</p>

802.11n-HT40-Low



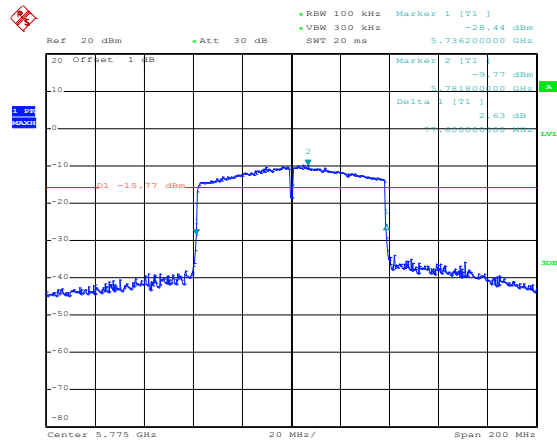
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802.11n-HT40-High



Date: 1.JUN.2023 15:10:34

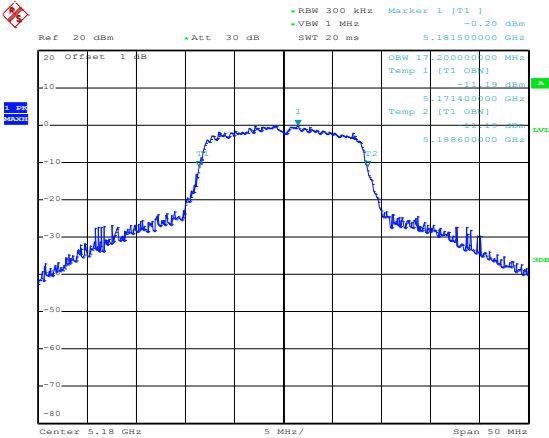
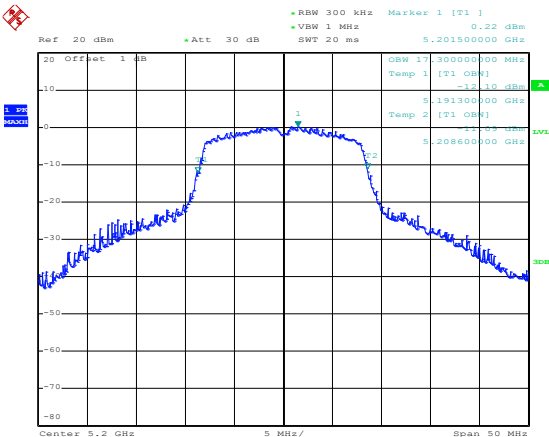
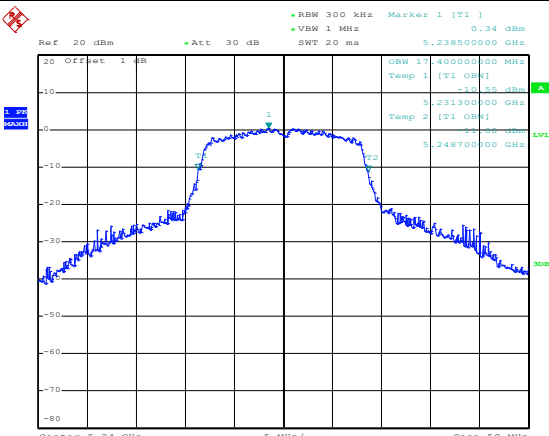
802.11ac-HT80-Low

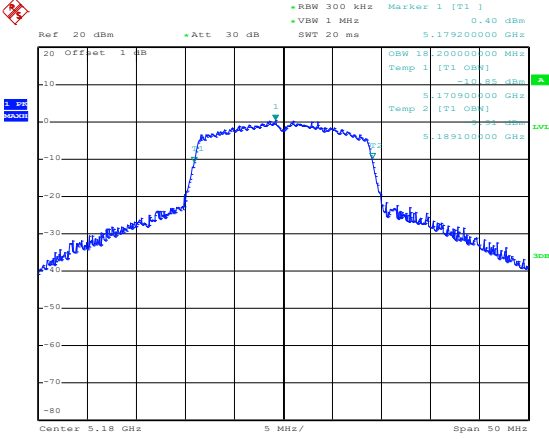
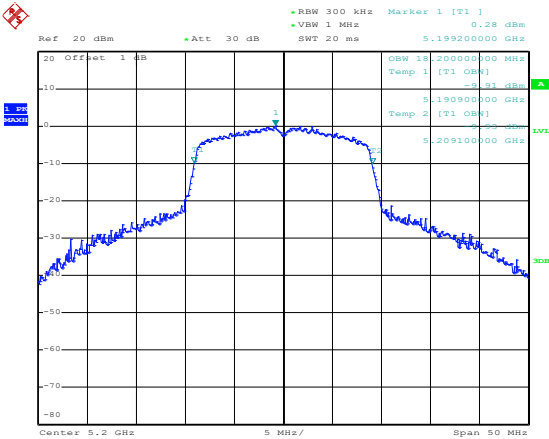
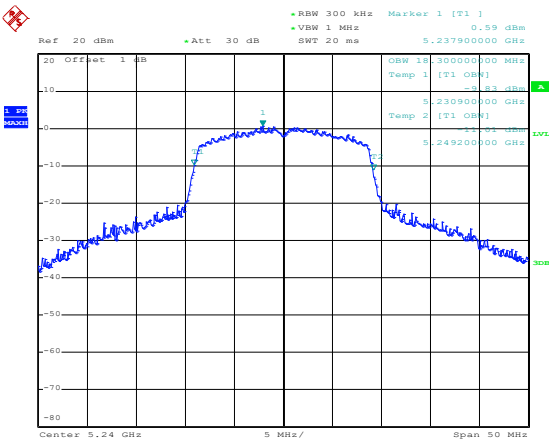


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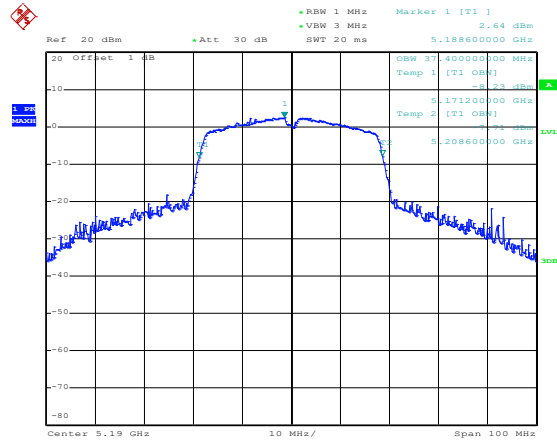


**99% Bandwidth**  
**5150-5250MHz**

<p>802.11a-Low</p>	 <p>Ref 20 dBm +Att 30 dB RBW 300 kHz Marker 1 [T1] -0.20 dBm VBW 1 MHz 5.183500000 GHz SWT 20 ms</p> <p>Offset 1 dB</p> <p>OSW 17.200000000 MHz Temp 1 [T1] 0dB -12.19 dBm 5.173400000 GHz Temp 2 [T1] 0dB -12.45 dBm 5.188600000 GHz</p> <p>Center 5.18 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 1.JUN.2023 14:26:51</p>
<p>802.11a-Middle</p>	 <p>Ref 20 dBm +Att 30 dB RBW 300 kHz Marker 1 [T1] 0.22 dBm VBW 1 MHz 5.201500000 GHz SWT 20 ms</p> <p>Offset 1 dB</p> <p>OSW 17.300000000 MHz Temp 1 [T1] 0dB -12.10 dBm 5.191300000 GHz Temp 2 [T1] 0dB -12.05 dBm 5.208600000 GHz</p> <p>Center 5.2 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 1.JUN.2023 14:27:06</p>
<p>802.11a-High</p>	 <p>Ref 20 dBm +Att 30 dB RBW 300 kHz Marker 1 [T1] 0.34 dBm VBW 1 MHz 5.238500000 GHz SWT 20 ms</p> <p>Offset 1 dB</p> <p>OSW 17.400000000 MHz Temp 1 [T1] 0dB -10.65 dBm 5.231300000 GHz Temp 2 [T1] 0dB -10.60 dBm 5.248700000 GHz</p> <p>Center 5.24 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 1.JUN.2023 14:27:31</p>

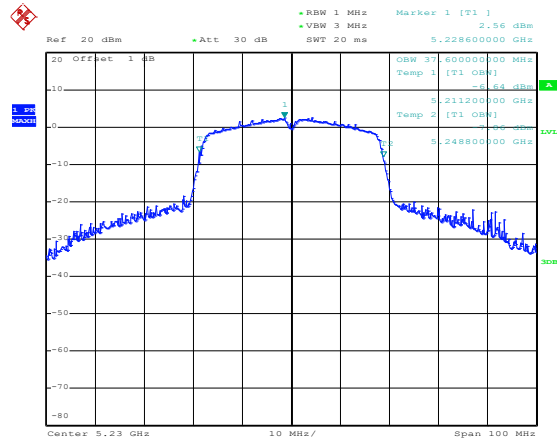
<p>802.11n-HT20-Low</p>	 <p>Ref 20 dBm +Att 30 dB</p> <p>RBW 300 kHz Marker 1 [T1] 0.40 dBm          VBW 1 MHz          SWT 20 ms 5.179200000 GHz</p> <p>Offset 1 dB</p> <p>OSW 18.20000000 MHz          Temp 1 [T1] 0dB          -10.85 dBm          5.170900000 GHz          Temp 2 [T1] 0dB          -10.85 dBm          5.189100000 GHz</p> <p>Center 5.18 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 1.JUN.2023 14:27:56</p>
<p>802.11n-HT20-Middle</p>	 <p>Ref 20 dBm +Att 30 dB</p> <p>RBW 300 kHz Marker 1 [T1] 0.28 dBm          VBW 1 MHz          SWT 20 ms 5.199200000 GHz</p> <p>Offset 1 dB</p> <p>OSW 18.20000000 MHz          Temp 1 [T1] 0dB          -10.81 dBm          5.190900000 GHz          Temp 2 [T1] 0dB          -10.81 dBm          5.209100000 GHz</p> <p>Center 5.2 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 1.JUN.2023 14:28:16</p>
<p>802.11n-HT20-High</p>	 <p>Ref 20 dBm +Att 30 dB</p> <p>RBW 300 kHz Marker 1 [T1] 0.59 dBm          VBW 1 MHz          SWT 20 ms 5.237900000 GHz</p> <p>Offset 1 dB</p> <p>OSW 18.30000000 MHz          Temp 1 [T1] 0dB          -10.83 dBm          5.230900000 GHz          Temp 2 [T1] 0dB          -10.83 dBm          5.249200000 GHz</p> <p>Center 5.24 GHz 5 MHz/ Span 50 MHz</p> <p>Date: 1.JUN.2023 14:28:35</p>

802.11n-HT40-Low



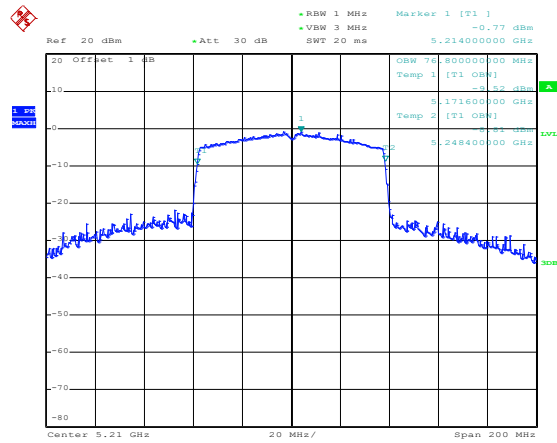
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802.11n-HT40-High



Date: 1.JUN.2023 14:29:36

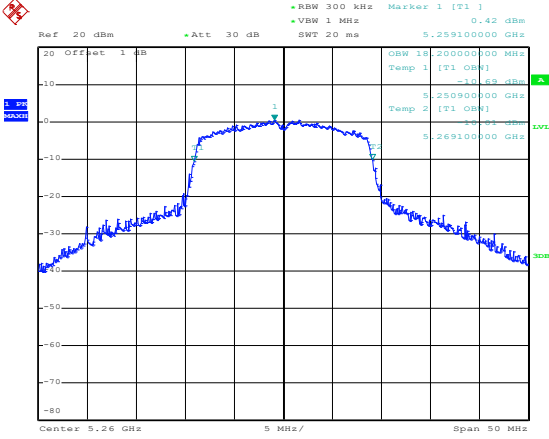
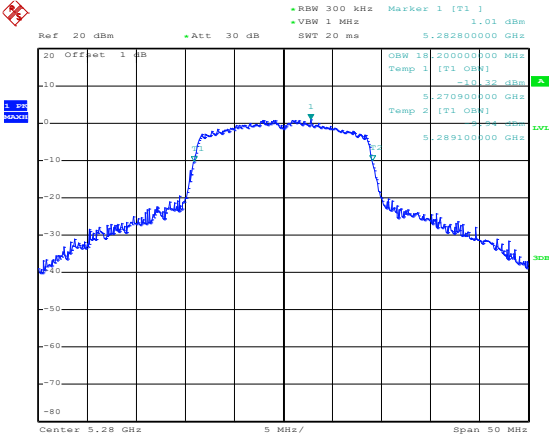
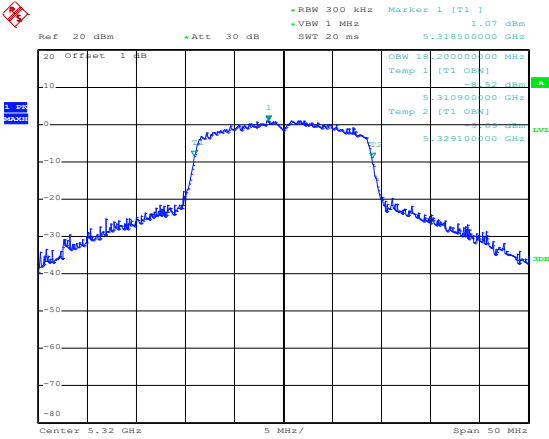
802.11ac-HT80-Low



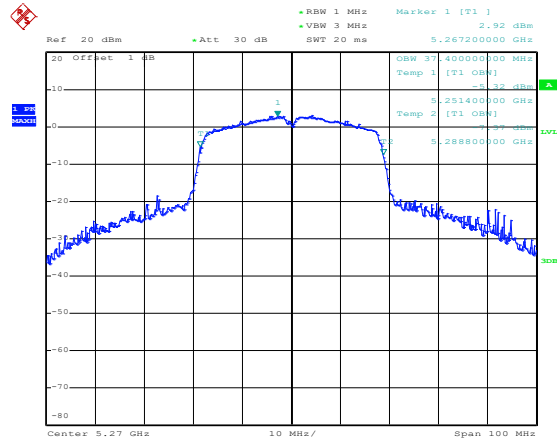
Date: 1.JUN.2023 14:30:43

5250-5350MHz

<p>802.11a-Low</p>	<p>Date: 1.JUN.2023 14:51:07</p>
<p>802.11a-Middle</p>	<p>Date: 1.JUN.2023 14:51:19</p>
<p>802.11a-High</p>	<p>Date: 1.JUN.2023 14:51:37</p>

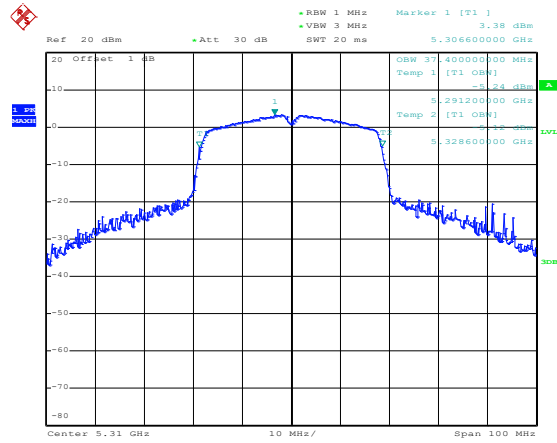
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<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 14:52:09</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 14:52:26</p>

802.11n-HT40-Low



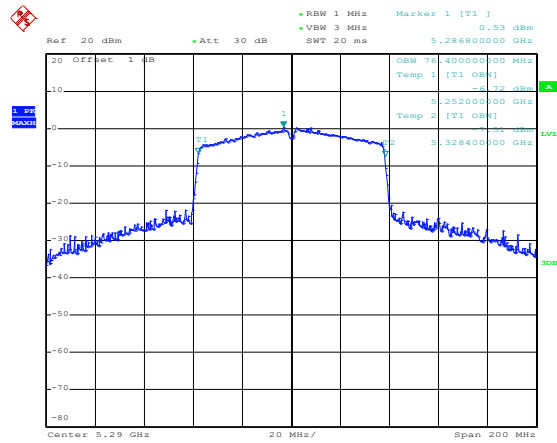
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802.11n-HT40-High



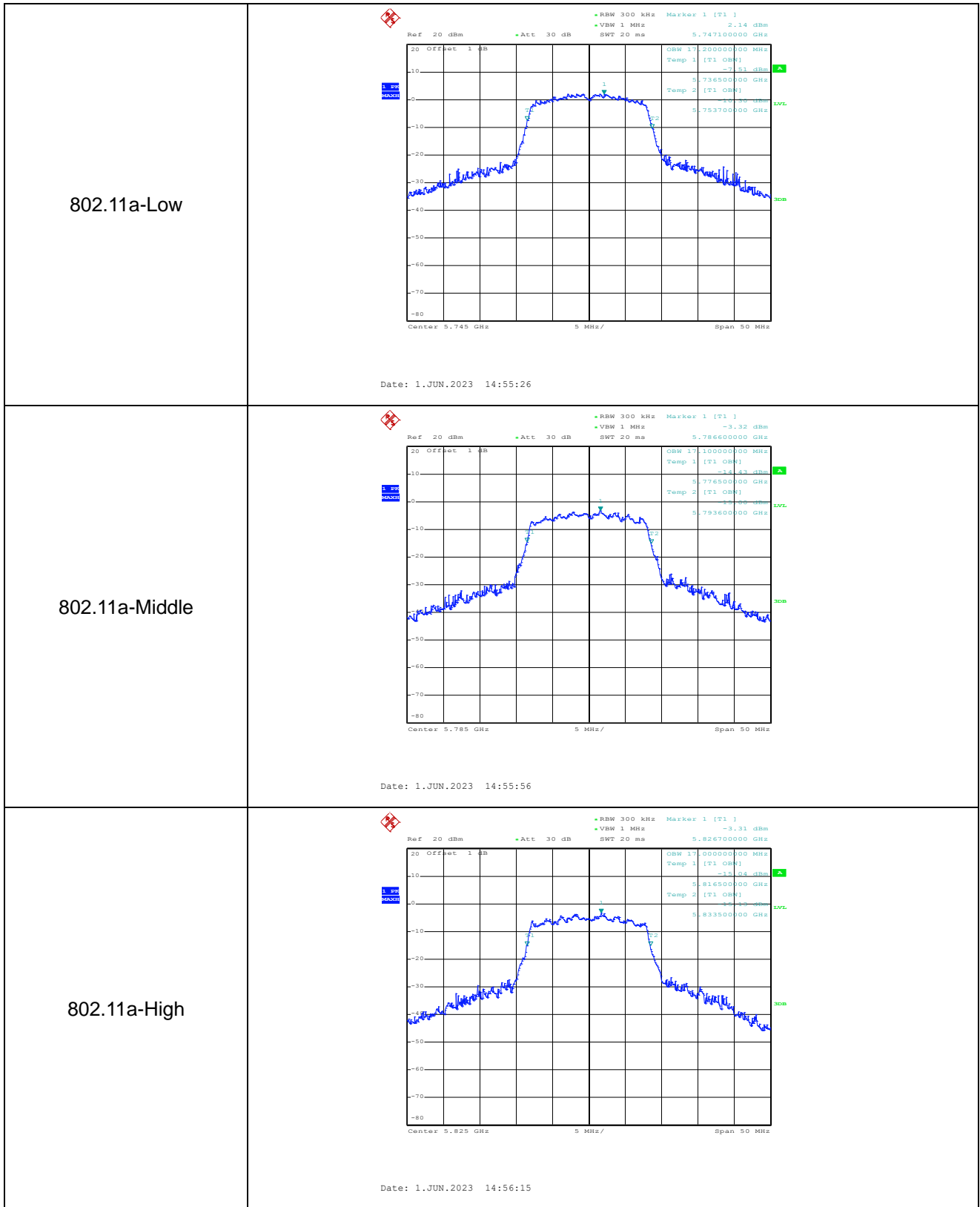
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802.11ac-HT80-Low

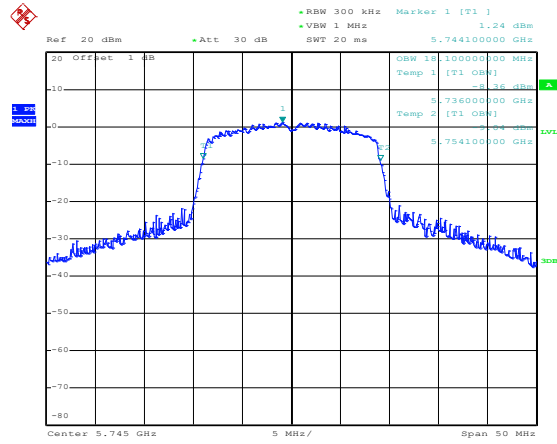


Date: 1.JUN.2023 14:54:06

5725-5850MHz

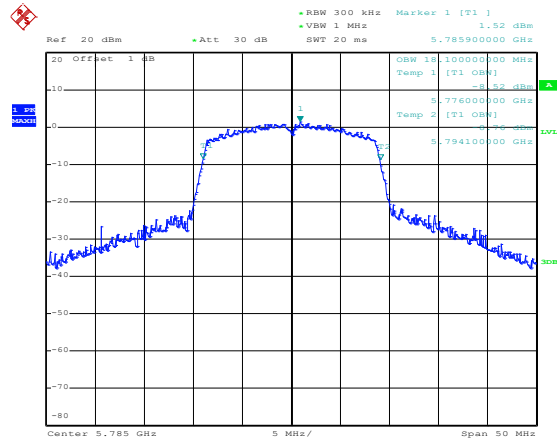


802.11n-HT20-Low



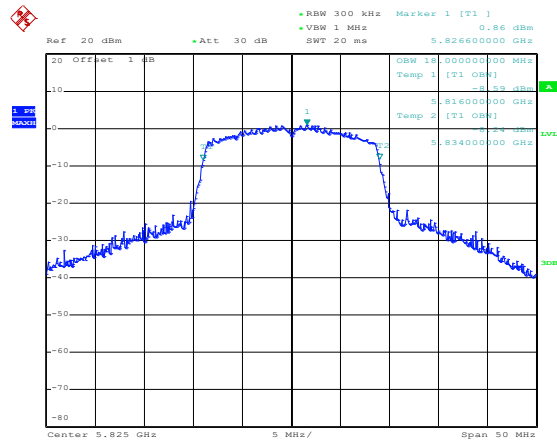
Date: 1.JUN.2023 14:56:36

802.11n-HT20-Middle



Date: 1.JUN.2023 14:56:58

802.11n-HT20-High



Date: 1.JUN.2023 14:57:13



<p>802.11n-HT40-Low</p>	<p>Date: 1.JUN.2023 14:58:11</p>
<p>802.11n-HT40-High</p>	<p>Date: 1.JUN.2023 14:58:35</p>
<p>802.11ac-HT80-Low</p>	<p>Date: 1.JUN.2023 14:59:17</p>

## APPENDIX C

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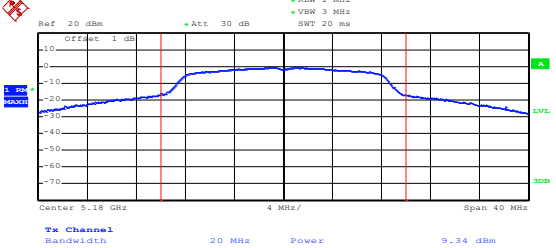
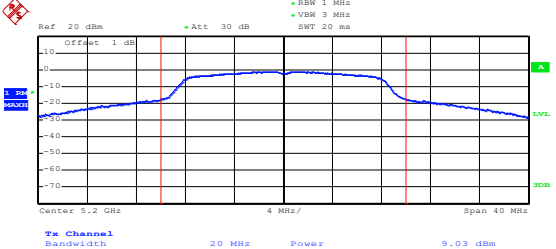
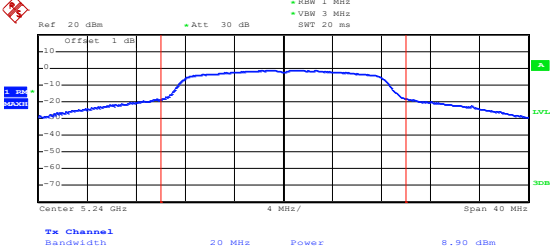
### Maximum Conducted Output Power

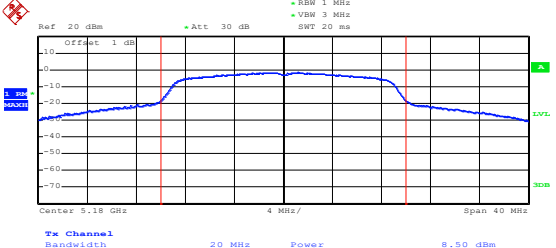
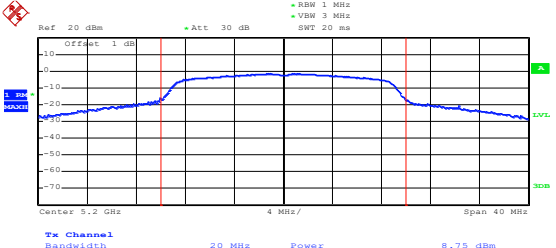
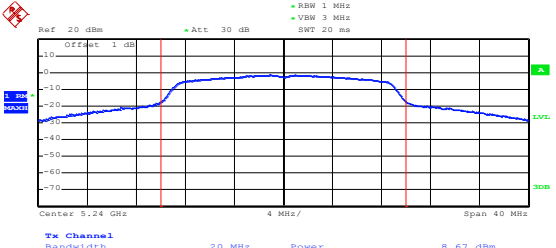
<b>U-NII-1:5150-5250MHz</b>			
Test mode	Frequency MHz	Output Power dBm	Limit dBm
802.11a	5180	9.34	23.98
	5200	9.03	23.98
	5240	8.90	23.98
802.11n-HT20	5180	8.50	23.98
	5200	8.75	23.98
	5240	8.67	23.98
802.11n-HT40	5190	7.41	23.98
	5230	7.39	23.98
802.11ac VH80	5210	6.54	23.98

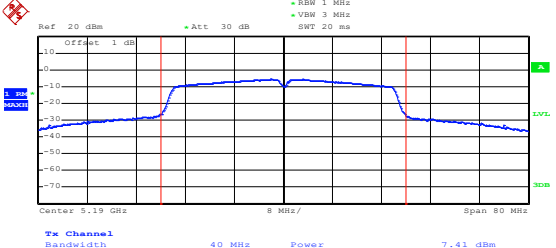
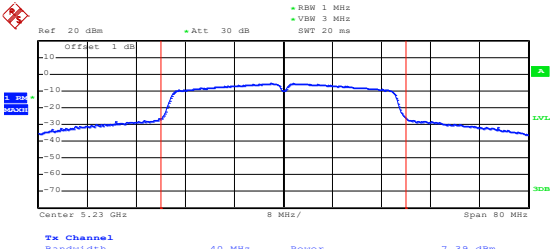
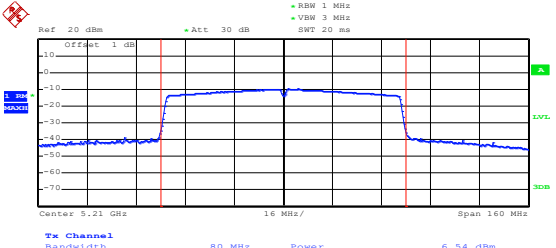
<b>U-NII-2A: 5250-5350MHz</b>			
Test mode	Frequency MHz	Output Power dBm	Limit dBm
802.11a	5260	11.31	23.98
	5280	11.66	23.98
	5320	11.91	23.98
802.11n-HT20	5260	10.44	23.98
	5280	10.77	23.98
	5320	10.68	23.98
802.11n-HT40	5270	10.19	23.98
	5310	10.67	23.98
802.11ac VH80	5290	9.48	23.98

<b>U-NII-3: 5725-5850MHz</b>			
Test mode	Frequency MHz	Output Power dBm	Limit dBm
802.11a	5745	15.45	30.00
	5785	15.09	30.00
	5825	14.67	30.00
802.11n-HT20	5745	14.38	30.00
	5785	14.31	30.00
	5825	14.11	30.00
802.11n-HT40	5755	14.29	30.00
	5795	14.05	30.00
802.11ac VH80	5775	13.93	30.00

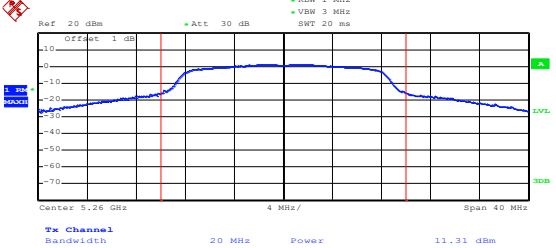
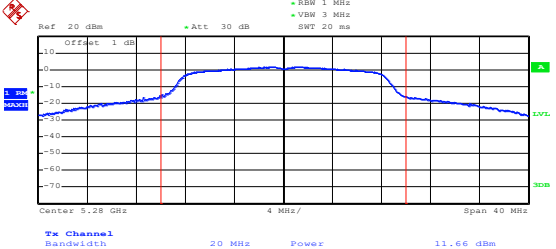
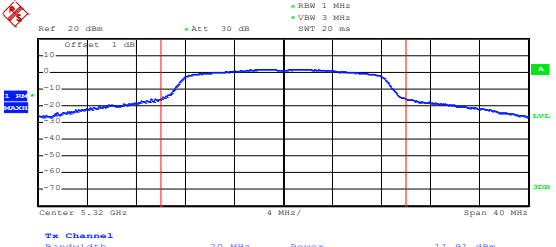
5150-5250MHz

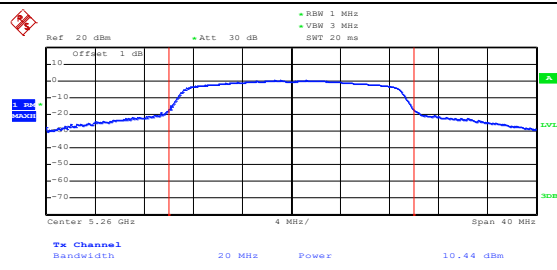
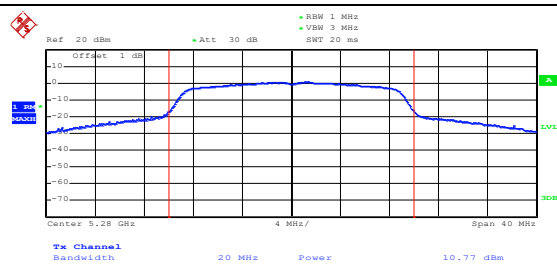
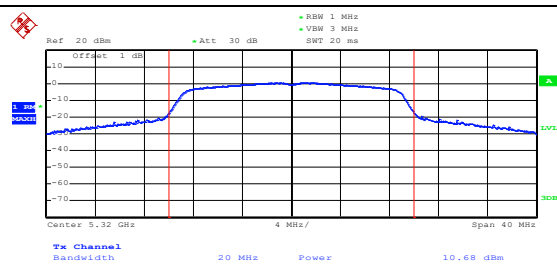
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<p>802.11a-Middle</p>	 <p>Date: 1.JUN.2023 09:54:02</p>
<p>802.11a-High</p>	 <p>Date: 1.JUN.2023 09:54:36</p>

<p>802.11n-HT20-Low</p>	 <p>Date: 1.JUN.2023 10:00:37</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 10:01:03</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 10:01:30</p>

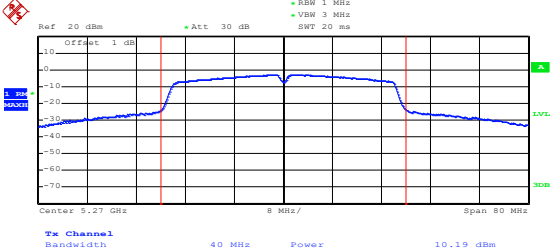
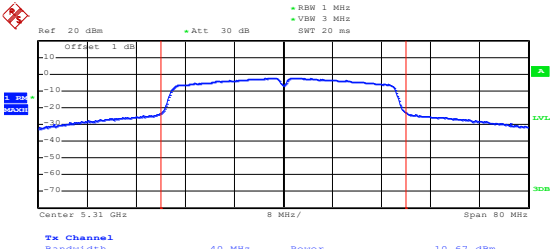
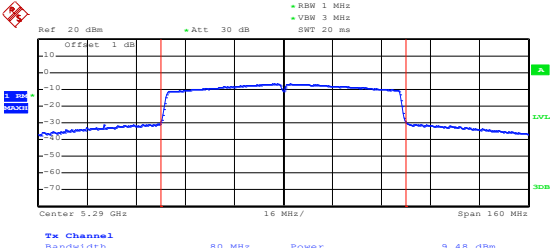
<p>802.11n-HT40-Low</p>	 <p>Date: 1.JUN.2023 10:20:45</p>
<p>802.11n-HT40-High</p>	 <p>Date: 1.JUN.2023 10:21:05</p>
<p>802.11ac-HT80-Low</p>	 <p>Date: 1.JUN.2023 11:19:04</p>

5250-5350MHz

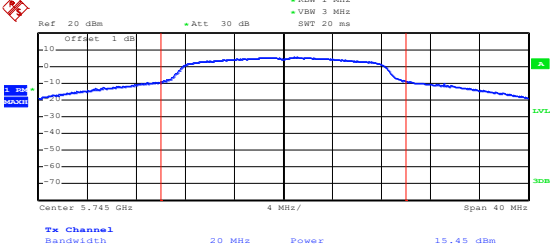
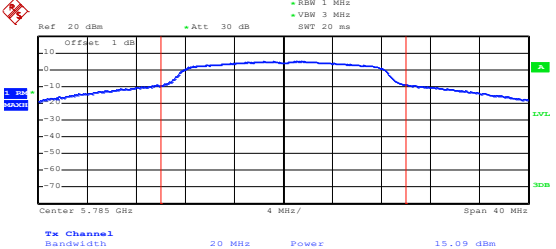
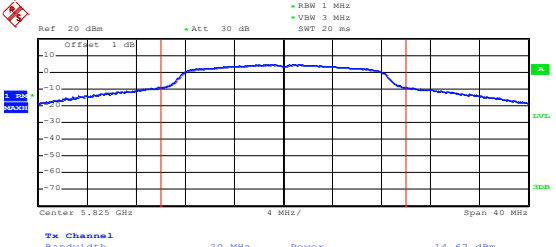
<p>802.11a-Low</p>	 <p>Ref: 20 dBm    Offset: 1 dB    Att: 30 dB    RBW: 1 MHz    VBW: 3 MHz    SNT: 20 ms</p> <p>Center: 5.26 GHz    Span: 40 MHz</p> <p>Tx Channel Bandwidth: 20 MHz    Power: 11.31 dBm</p> <p>Date: 1.JUN.2023 11:24:39</p>
<p>802.11a-Middle</p>	 <p>Ref: 20 dBm    Offset: 1 dB    Att: 30 dB    RBW: 1 MHz    VBW: 3 MHz    SNT: 20 ms</p> <p>Center: 5.28 GHz    Span: 40 MHz</p> <p>Tx Channel Bandwidth: 20 MHz    Power: 11.66 dBm</p> <p>Date: 1.JUN.2023 11:25:03</p>
<p>802.11a-High</p>	 <p>Ref: 20 dBm    Offset: 1 dB    Att: 30 dB    RBW: 1 MHz    VBW: 3 MHz    SNT: 20 ms</p> <p>Center: 5.32 GHz    Span: 40 MHz</p> <p>Tx Channel Bandwidth: 20 MHz    Power: 11.91 dBm</p> <p>Date: 1.JUN.2023 11:25:22</p>

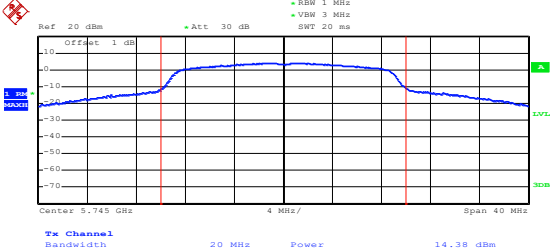
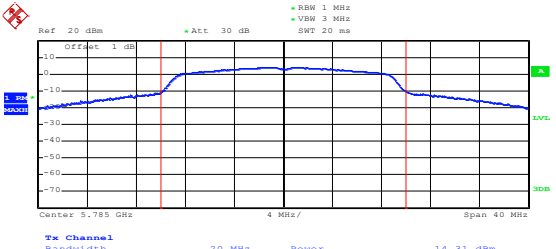
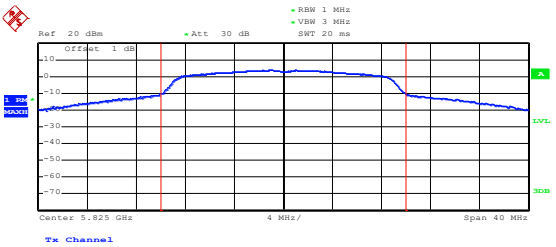
<p>802.11n-HT20-Low</p>	 <p>Date: 1.JUN.2023 11:26:18</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 11:26:34</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 11:27:25</p>

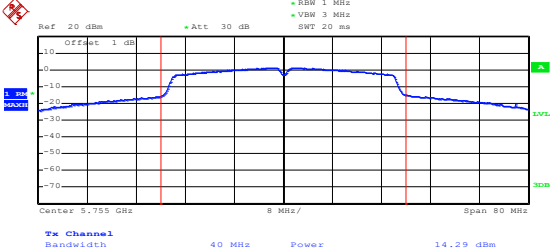
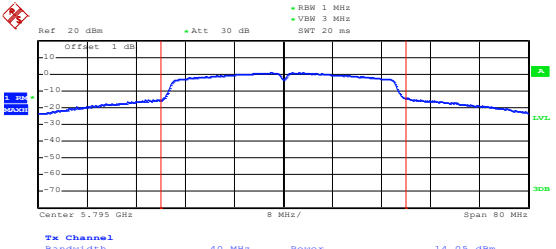
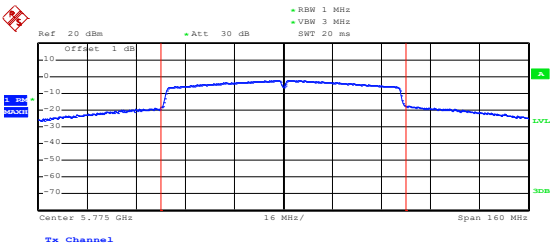


<p>802.11n-HT40-Low</p>	 <p>Date: 1 JUN 2023 11:33:54</p>
<p>802.11n-HT40-High</p>	 <p>Date: 1 JUN 2023 11:34:28</p>
<p>802.11ac-HT80-Low</p>	 <p>Date: 1 JUN 2023 11:35:27</p>

5725-5850MHz

<p>802.11a-Low</p>	 <p>Date: 1.JUN.2023 11:41:27</p>
<p>802.11a-Middle</p>	 <p>Date: 1.JUN.2023 11:41:54</p>
<p>802.11a-High</p>	 <p>Date: 1.JUN.2023 11:42:34</p>

<p>802.11n-HT20-Low</p>	 <p>Date: 1.JUN.2023 11:44:19</p>
<p>802.11n-HT20-Middle</p>	 <p>Date: 1.JUN.2023 11:44:44</p>
<p>802.11n-HT20-High</p>	 <p>Date: 1.JUN.2023 11:45:08</p>

<p>802.11n-HT40-Low</p>	 <p>Date: 1.JUN.2023 11:45:45</p>
<p>802.11n-HT40-High</p>	 <p>Date: 1.JUN.2023 11:46:23</p>
<p>802.11ac-HT80-Low</p>	 <p>Date: 1.JUN.2023 11:47:47</p>

## APPENDIX D

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### Frequency Stability

<b>U-NII-1:5150-5250MHz worst case at 802.11a middle channel</b>				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	3.8	-30	621	0.1194
100%		-20	469	0.0902
100%		-10	349	0.0671
100%		0	632	0.1215
100%		+10	165	0.0317
100%		+20	194	0.0373
100%		+30	296	0.0569
100%		+40	432	0.0831
100%		+50	246	0.0473
Low Battery power		4.35	+20	432
High Battery power	3.5	+20	570	0.1096

<b>U-NII-1: 5250-5350MHz worst case at 802.11a middle channel</b>				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	3.8	-30	546	0.1034
100%		-20	354	0.0670
100%		-10	396	0.0750
100%		0	421	0.0797
100%		+10	329	0.0623
100%		+20	185	0.0350
100%		+30	246	0.0466
100%		+40	479	0.0907
100%		+50	329	0.0623
Low Battery power		4.35	+20	458
High Battery power	3.5	+20	562	0.1064

<b>U-NII-1:5725-5850MHz worst case at 802.11a middle channel</b>				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	3.8	-30	492	0.0850
100%		-20	326	0.0564
100%		-10	598	0.1034
100%		0	164	0.0283
100%		+10	489	0.0845
100%		+20	166	0.0287
100%		+30	448	0.0774
100%		+40	184	0.0318
100%		+50	648	0.1120
Low Battery power		4.35	+20	484
High Battery power	3.5	+20	459	0.0793

## APPENDIX PHOTOGRAPHS

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Please refer to "ANNEX"

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