TEST REPORT

Reference No.	:	WTX24X02037413W001
FCC ID	:	2BAII-AC1203
Applicant	:	Shenzhen Waterworld Information Co., Ltd.
Address	:	1F, Building3, Dexinchang Wisdom Park, No.23 Heping Road, Longhua district, Shen Zhen city, China
Manufacturer	:	The same as Applicant
Address	:	The same as Applicant
Product Name	:	Wireless Dual Band Gigabit Router
Model No.	:	AC1203
Standards	:	FCC Part 15.407
Date of Receipt sample	:	2024-02-29
Date of Test	:	2024-03-20 to 2024-04-11
Date of Issue	:	2024-04-03
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.

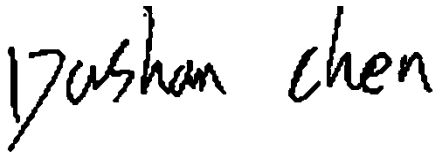
Prepared By:

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

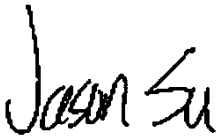
Tel.: +86-755-33663308 Fax.: +86-755-33663309 Email: sem@waltek.com.cn

Tested by:



Dashan Chen

Approved by:



Jason Su

TABLE OF CONTENTS

1. GENERAL INFORMATION 5
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) 5
1.2 TEST STANDARDS 6
1.3 TEST METHODOLOGY 6
1.4 TABLE FOR PARAMETERS OF TEST SOFTWARE SETTING 6
1.5 EUT OPERATING DURING TEST 8
1.6 TEST FACILITY 8
1.7 EUT SETUP AND TEST MODE 9
1.8 MEASUREMENT UNCERTAINTY 10
1.9 TEST EQUIPMENT LIST AND DETAILS 11
2. SUMMARY OF TEST RESULTS 14
3. ANTENNA REQUIREMENT 15
3.1 STANDARD APPLICABLE 15
3.2 EVALUATION INFORMATION 15
4. AUTOMATICALLY DISCONTINUE TRANSMISSION 16
4.1 STANDARD APPLICABLE 16
4.2 SUMMARY OF TEST RESULTS 16
5. POWER SPECTRAL DENSITY 17
5.1 STANDARD APPLICABLE 17
5.2 TEST PROCEDURE 17
5.3 SUMMARY OF TEST RESULTS/PLOTS 18
6. EMISSION BANDWIDTH AND OCCUPIED BANDWIDTH 19
6.1 STANDARD APPLICABLE 19
6.2 TEST PROCEDURE 19
6.3 SUMMARY OF TEST RESULTS/PLOTS 21
7. MAXIMUM CONDUCTED OUTPUT POWER 22
7.1 STANDARD APPLICABLE 22
7.2 TEST PROCEDURE 22
7.3 SUMMARY OF TEST RESULTS/PLOTS 23
8. RADIATED SPURIOUS EMISSIONS 24
8.1 STANDARD APPLICABLE 24
8.2 TEST PROCEDURE 24
8.3 TEST RECEIVER SETUP 26
8.4 CORRECTED AMPLITUDE & MARGIN CALCULATION 26
8.5 SUMMARY OF TEST RESULTS/PLOTS 27
9. FREQUENCY STABILITY 66
9.1 STANDARD APPLICABLE 66
9.2 TEST PROCEDURE 66
9.3 SUMMARY OF TEST RESULTS/PLOTS 66
10 CONDUCTED EMISSIONS 67
10.1 TEST PROCEDURE 67
10.2 BASIC TEST SETUP BLOCK DIAGRAM 67
10.3 TEST RECEIVER SETUP 67
10.4 SUMMARY OF TEST RESULTS/PLOTS 67
APPENDIX SUMMARY 70
APPENDIX A 71
APPENDIX B 89
APPENDIX C 122
APPENDIX D 139

APPENDIX PHOTOGRAPHS.....140

Report version

Version No.	Date of issue	Description
Rev.00	2024-04-03	Original
/	/	/

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

General Description of EUT	
Product Name:	Wireless Dual Band Gigabit Router
Trade Name:	/
Model No.:	AC1203
Adding Model(s):	/
Rated Voltage:	DC12V
Battery Capacity:	/
Power Adapter:	TS-A012-120100E1 Input:AC100-240 50/60Hz 0.4A Output:DC12V1.0A
Note: The test data is gathered from a production sample, provided by the manufacturer.	

Technical Characteristics of EUT	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ac-VHT40, 802.11ac-VHT80
Frequency Range:	5180-5240MHz, 5745-5825MHz
Max. RF Output Power:	5180-5240MHz: Antenna 0: 18.97dBm (Conducted) Antenna 1: 18.90dBm (Conducted) 5745-5825MHz: Antenna 0: 18.95dBm (Conducted) Antenna 1: 18.54dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM, 256QAM
Type of Antenna:	External Antenna
Antenna Gain:	Antenna 0: 5.79dBi Antenna 1: 5.79dBi
Note The Antenna Gain is provided by the customer and can affect the validity of results.	

1.2 Test Standards

The tests were performed according to following standards:

FCC Rules Part 15.407: General technical requirements.
ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
KDB789033 D02 v02r01: Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-Nii) Devices Part 15, Subparte.
KDB662911 D01 Multiple Transmitter Output v02r01: Emissions Testing of Transmitters with Multiple Outputs in the Same Band.

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

1.3 Test Methodology

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

1.4 Table for parameters of Test Software setting

Use “MP_TEST.exe” and follow the instructions given by the manufacturer, 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. Test use the customer default power level, with a duty cycle equal to 100%, and to measure its highest possible emissions level, more detailed description as follows:

Mode	Ant.	Test Frequency (MHz)												
		NCB: 20MHz												
		5180	5200	5240	5260	5300	5320	5500	5580	5700	5720	5745	5785	5825
802.11a 6Mbps	ANT 0	110	110	105	/	/	/	/	/	/	/	108	108	110
	ANT 1	106	106	104	/	/	/	/	/	/	/	106	106	104
802.11n-HT20 MCS0	ANT 0	105	105	100	/	/	/	/	/	/	/	103	103	105
	ANT 1	102	102	100	/	/	/	/	/	/	/	105	105	105

Mode	Ant.	NCB: 40MHz									
		5190	5230	5270	5310	5510	5550	5670	5710	5755	5795
802.11n-HT40 MCS0	ANT 0	105	103	/	/	/	/	/	/	103	103
	ANT 1	100	100	/	/	/	/	/	/	105	105
802.11ac-VHT40 MCS0	ANT 0	100	100	/	/	/	/	/	/	100	100
	ANT 1	98	98	/	/	/	/	/	/	102	102

Mode	Ant.	NCB: 80MHz					
		5210	5290	5530	5610	5690	5775
802.11ac-VH80 MCS0	ANT 0	100	/	/	/	/	98
	ANT 1	98	/	/	/	/	102

1.5 EUT Operating during test

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

1.6 Test Facility

Address of the test laboratory

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

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

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is mai ntained 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, 5745MHz, 5785MHz,5825MHz
TM2	802.11n-HT20	5180MHz,5200MHz,5240MHz, 5745MHz, 5785MHz,5825MHz
TM3	802.11n-HT40	5190MHz,5230MHz, 5755MHz,5795MHz
TM4	802.11ac-VHT40	5190MHz,5230MHz, 5755MHz,5795MHz
TM5	802.11ac-VHT80	5210MHz, 5775 MHz
Note1 : All test modes (different data rate and different modulation) are performed Note 2: The 5GHz WIFI has two antennas and support Multiple Outputs for 802.11n/ac mode for this report; For 5150-5250MHz: Antenna 0 Gain is 5.79dBi; Antenna 1 Gain is 5.79dBi; For 5725-5850MHz: Antenna 0 Gain is 5.79dBi; Antenna 1 Gain is 5.79dBi; According to KDB 662911, for same directional gain: For 5150-5250MHz: Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi =5.79+10log(2) dBi=8.8dBi For 5725-5850MHz: Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi =5.79+10log(2) dBi=8.8dBi		

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

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
DC Cable	1.45	Unshielded	Without Ferrite
Network Cable	1.40	Unshielded	Without Ferrite

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
Network Cable	1.5	Unshielded	Without Ferrite

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	TianYi 100-14IBD	PF0F4ABV

1.8 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Power Spectral Density	Conducted	±1.8dB
Conducted Spurious Emission	Conducted	±2.17dB
Conducted Emissions	Conducted	9-150kHz ±3.74dB
		0.15-30MHz ±3.34dB
Transmitter Spurious Emissions	Radiated	30-200MHz ±4.52dB
		0.2-1GHz ±5.56dB
		1-6GHz ±3.84dB
		6-18GHz ±3.92dB

1.9 Test Equipment List and Details

Fixed asset Number	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
WTXE1041A1001	Communication Tester	Rohde & Schwarz	CMW500	148650	2024-02-24	2025-02-23
WTXE1022A1002	GSM Tester	Rohde & Schwarz	CMU200	114403	2024-02-27	2025-02-26
WTXE1005A1005	Spectrum Analyzer	Agilent	N9020A	US47140102	2024-03-19	2025-03-18
WTXE1084A1001	Spectrum Analyzer	Agilent	N9020A	MY54320548	2024-02-24	2025-02-23
WTXE1044A1001	Signal Generator	Agilent	83752A	3610A01453	2024-02-24	2025-02-23
WTXE1045A1001	Vector Signal Generator	Agilent	N5182A	MY47070202	2024-02-24	2025-02-23
WTXE1018A1001	Power Divider	Weinschel	1506A	PM204	2024-02-29	2025-02-28
☐Chamber A: Below 1GHz						
WTXE1005A1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
WTXE1001A1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
WTXE1007A1001	Amplifier	HP	8447F	2805A03475	2024-02-24	2025-02-23
WTXE1010A1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
WTXE1010A1006	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2024-02-24	2025-02-23
☐Chamber A: Above 1GHz						
WTXE1005A1003	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2024-02-24	2025-02-23
WTXE1001A1001	EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2024-03-19	2025-03-18
WTXE1065A1001	Amplifier	C&D	PAP-1G18	2002	2024-02-27	2025-02-26
WTXE1010A1005	Horn Antenna	ETS	3117	00086197	2024-02-26	2025-02-25
WTXE1010A1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
WTXE1003A1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28

☐Chamber B:Below 1GHz						
WTXE1010A 1006	Trilog Broadband Antenna	Schwarz beck	VULB9163(B)	9163-635	2024-02-24	2025-02-23
WTXE1038A 1001	Amplifier	Agilent	8447D	2944A10457	2024-02-24	2025-02-23
WTXE1001A 1002	EMI Test Receiver	Rohde & Schwarz	ESPI	101391	2024-02-24	2025-02-23
☒Chamber C:Below 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
WTXE1010A 1013-1	Trilog Broadband Antenna	Schwarz beck	VULB 9168	1194	2021-05-28	2024-05-27
WTXE1007A 1002	Amplifier	HP	8447F	2944A03869	2024-02-24	2025-02-23
WTXE1010A 1007	Loop Antenna	Schwarz beck	FMZB 1516	9773	2024-02-26	2025-02-25
☒Chamber C: Above 1GHz						
WTXE1093A 1001	EMI Test Receiver	Rohde & Schwarz	ESIB 26	100401	2024-02-27	2025-02-26
WTXE1103A 1005	Horn Antenna	POAM	RTF-118A	1820	2023-03-10	2026-03-09
WTXE1103A 1006	Amplifier	Tonscend	TAP01018050	AP22E806235	2024-02-27	2025-02-26
WTXE1010A 1010	DRG Horn Antenna	A.H. SYSTEMS	SAS-574	571	2024-03-17	2025-03-16
WTXE1003A 1001	Pre-amplifier	Schwarzbeck	BBV 9721	9721-031	2024-02-29	2025-02-28
☐Conducted Room 1#						
WTXE1104A 1029	EMI Test Receiver	Rohde & Schwarz	ESCI	100525	2023-12-12	2024-12-11
WTXE1002A 1001	Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2024-02-24	2025-02-23
WTXE1003A 1001	AC LISN	Schwarz beck	NSLK8126	8126-279	2024-02-24	2025-02-23
☒Conducted Room 2#						
WTXE1001A 1004	EMI Test Receiver	Rohde & Schwarz	ESPI	101259	2024-02-24	2025-02-23
WTXE1003A 1003	LISN	Rohde & Schwarz	ENV 216	100097	2024-02-24	2025-02-23

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

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

2. SUMMARY OF TEST RESULTS

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

3.1 Standard Applicable

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

3.2 Evaluation Information

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

4. Automatically Discontinue Transmission

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

5.1 Standard Applicable

Section 15.407(a) Power limits:

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

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

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

5.2 Test Procedure

According to 789033 D02 v02r01 General UNII Test Procedures New Rules v02, the following is the measurement procedure.
For devices operating in the bands 5.15-5.25GHz, 5.25-5.35GHz, and 5.47-5.725GHz, the above procedures make use of 1MHz RBW to satisfy directly the 1MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85GHz, the rules specify a measurement bandwidth of 500kHz. Many spectrum analyzers do not have 500kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1MHz, or 500kHz, “provided that the measured power is integrated over the full

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

a) Set RBW ≥ 1/T, where T is defined in section II.B.l.a).
b) Set VBW ≥ 3 RBW.
c) If measurement bandwidth of Maximum PSD is specified in 500kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
d) If measurement bandwidth of Maximum PSD is specified in 1MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1MHz) 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=100kHZ 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

6.1 Standard Applicable

According to 15.407(a) and (e):

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

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

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

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

6.2 Test Procedure

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

1. Emission Bandwidth (EBW)
a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.

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

2. Minimum Emission Bandwidth for the band 5.725-5.85GHz
Section 15.407(e) specifies the minimum 6dB emission bandwidth of at least 500KHz for the band 5.715-5.85GHz. The following procedure shall be used for measuring this bandwidth:
a) Set RBW = 100kHz.
b) Set the video bandwidth (VBW) ≥ 3 × RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
Note: The automatic bandwidth measurement capability of a spectrum analyzer or EMI receiver may be employed if it implements the functionality described above.

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

The following procedure shall be used for measuring (99 %) power bandwidth:
1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 * 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.

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

7.1 Standard Applicable

Section 15.407(a) Power limits:

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

(2) For the 5.25-5.35GHz and 5.47-5.725GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250mW or 11dBm + 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 ≥ 3MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ 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 ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.

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

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

7.3 Summary of Test Results/Plots

Please refer to Appendix C

8. Radiated Spurious Emissions

8.1 Standard Applicable

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

(1) For transmitters operating in the 5.15-5.25GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of −27dBm/MHz.

(2) For transmitters operating in the 5.25-5.35GHz band: All emissions outside of the 5.15-5.35GHz band shall not exceed an e.i.r.p. of −27dBm/MHz.

(3) For transmitters operating in the 5.47-5.725GHz band: All emissions outside of the 5.47-5.725GHz band shall not exceed an e.i.r.p. of −27dBm/MHz.

(4) For transmitters operating in the 5.725-5.85GHz band:

(i) All emissions shall be limited to a level of −27dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10dBm/MHz at 25MHz above or below the band edge, and from 25MHz above or below the band edge increasing linearly to a level of 15.6dBm/MHz at 5MHz above or below the band edge, and from 5MHz above or below the band edge increasing linearly to a level of 27dBm/MHz at the band edge.

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

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

789033 D02 v02r01 General UNII Test Procedures New Rules v01

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

EIRP = ((E*d)^2) / 30

where:

• E is the field strength in V/m;

• d is the measurement distance in meters;

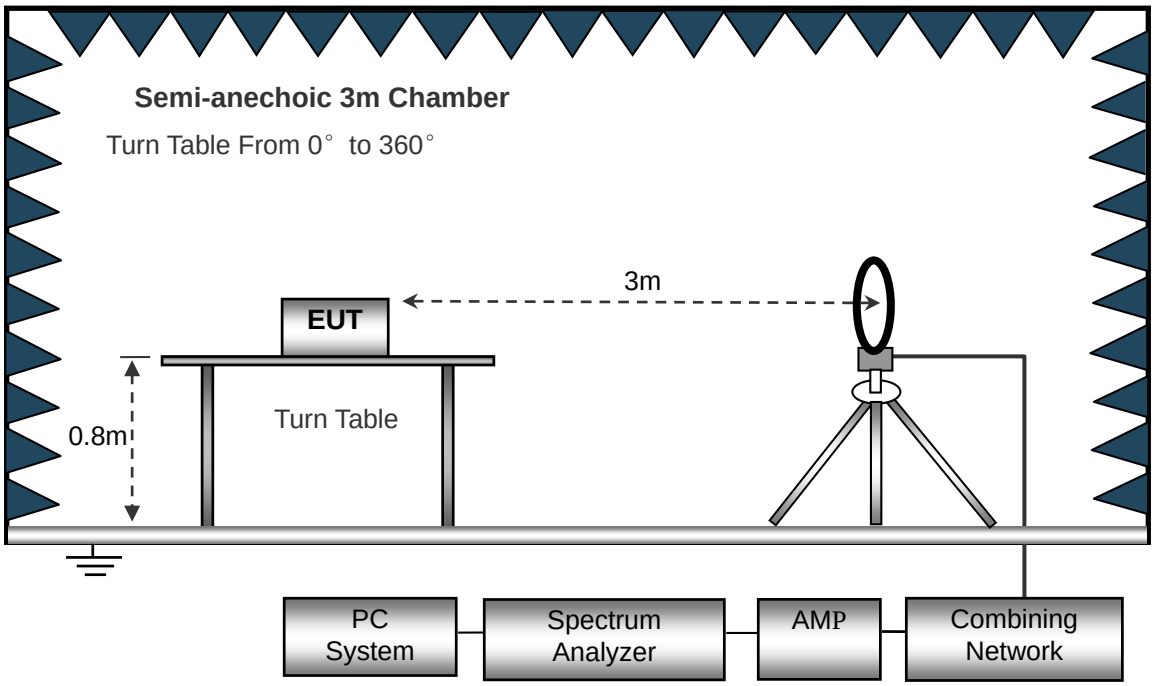
• EIRP is the equivalent isotropically radiated power in watts.

8.2 Test Procedure

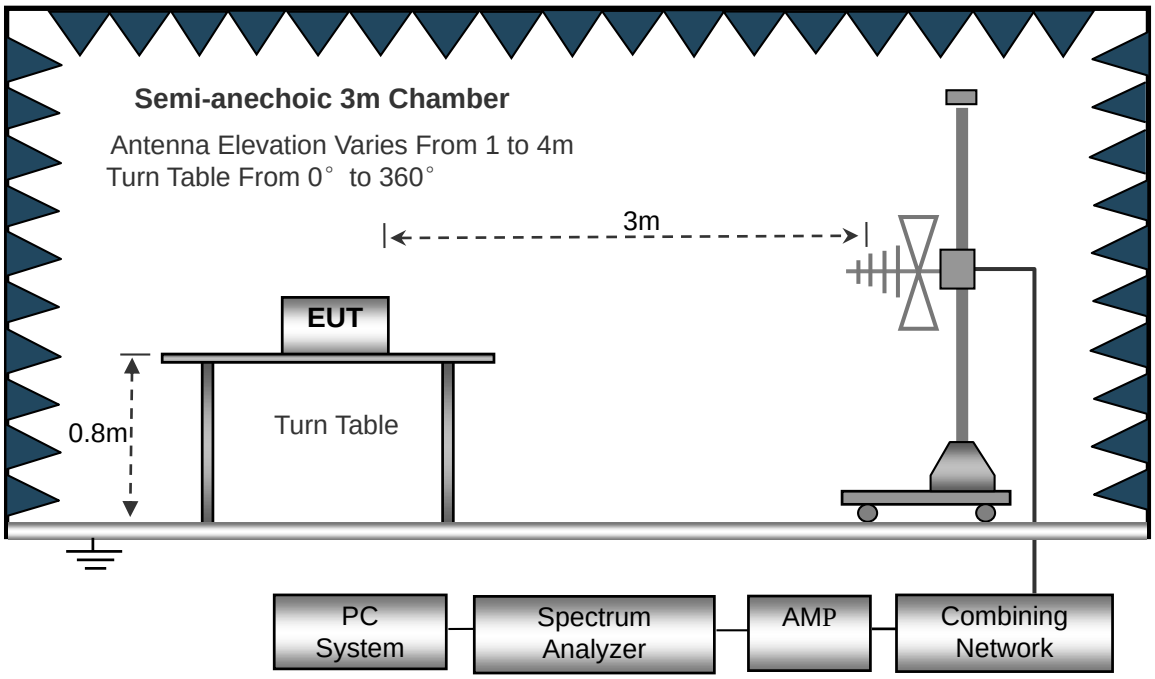
The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.407(b)(6) and FCC Part 15.209 Limit..

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

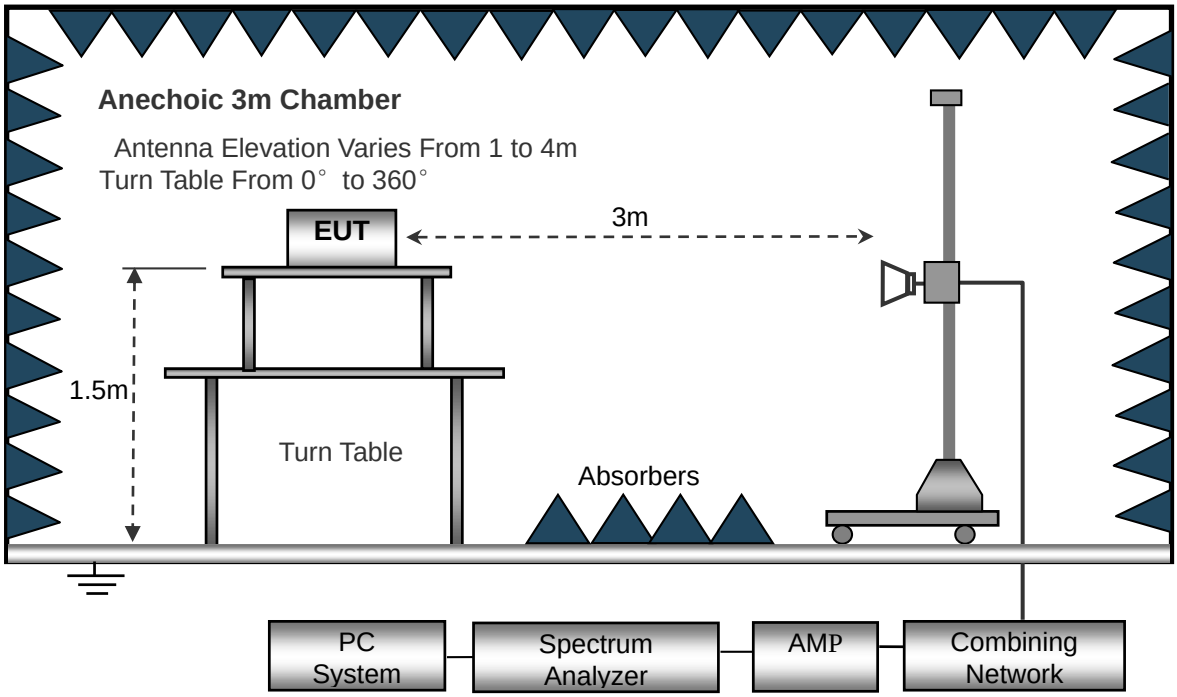
The test setup for emission measurement below 30MHz.



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



The test setup for emission measurement above 1GHz.



8.3 Test Receiver Setup

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

For peak detector:
RBW = 1000kHz, VBW = 3000kHz, Sweep Time = Auto

For average detector:
RBW = 1000kHz, VBW = 10Hz, Sweep Time = Auto

8.4 Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Indicated Reading + Ant. Factor + Cable Loss – Ampl. Gain

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

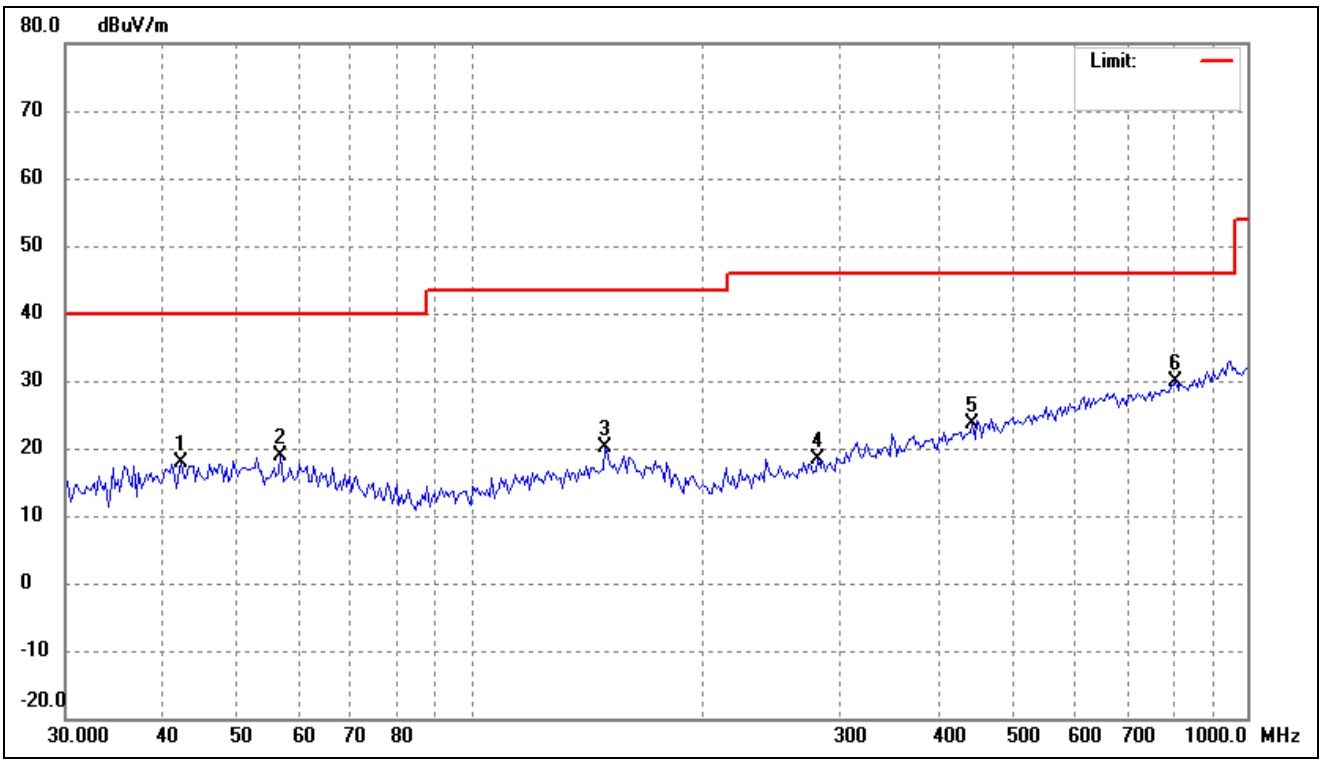
Margin = Corr. Ampl. – FCC Part 15 Limit

8.5 Summary of Test Results/Plots

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

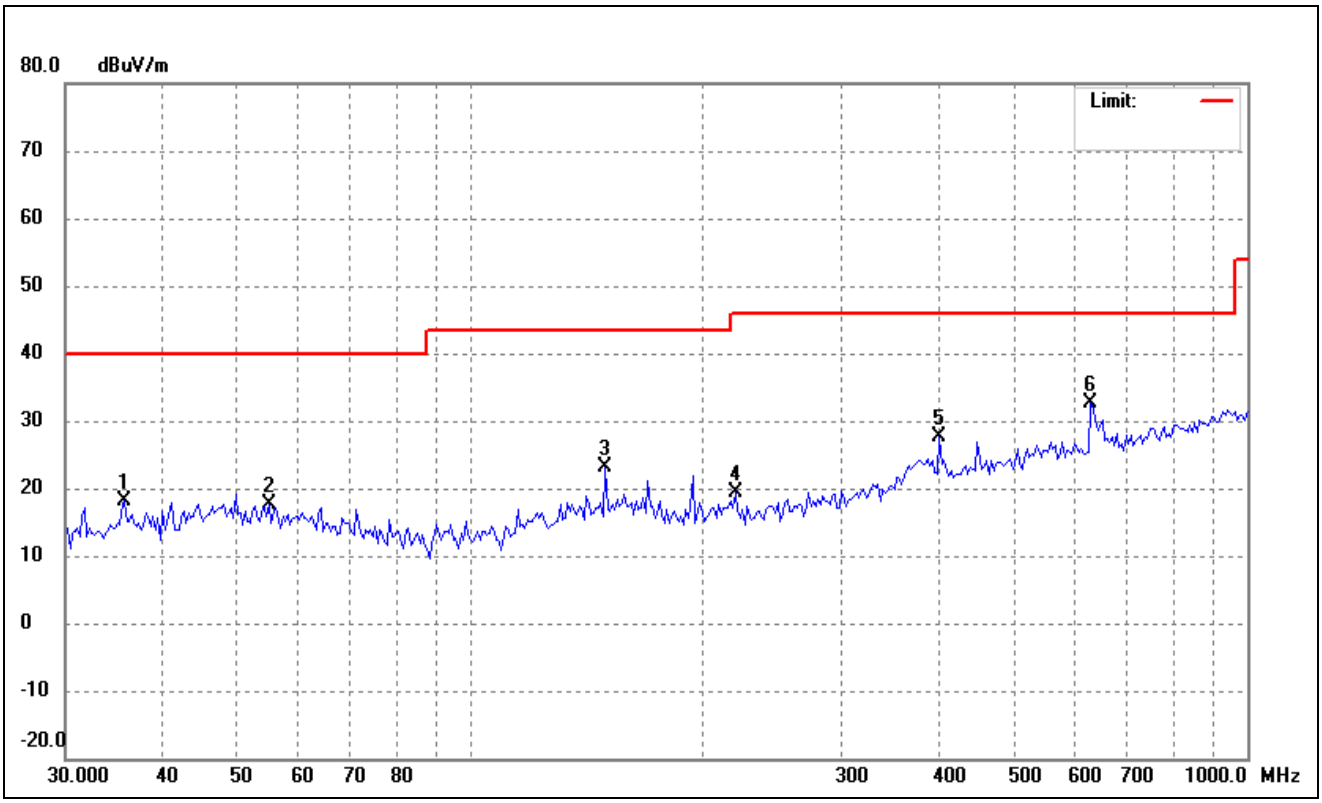
- Spurious Emission From 30MHz to 1GHz
- 5180-5240MHz
- Antenna 0+ Antenna 1

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



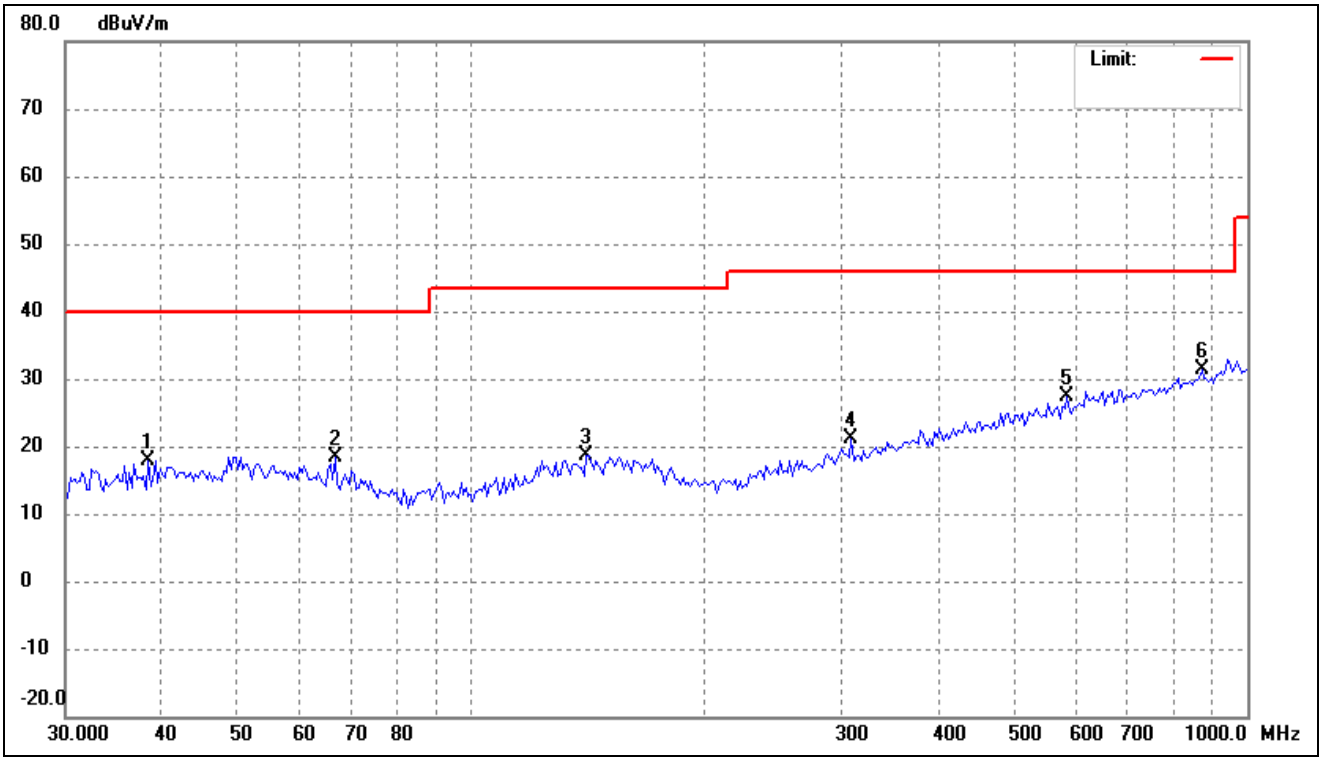
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	42.3314	26.30	-8.48	17.82	40.00	-22.18	-	-	peak
2	56.8644	27.60	-8.75	18.85	40.00	-21.15	-	-	peak
3	148.9175	28.71	-8.68	20.03	43.50	-23.47	-	-	peak
4	280.2936	27.42	-8.93	18.49	46.00	-27.51	-	-	peak
5	442.5722	28.41	-4.79	23.62	46.00	-22.38	-	-	peak
6	809.9238	29.38	0.39	29.77	46.00	-16.23	-	-	peak

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



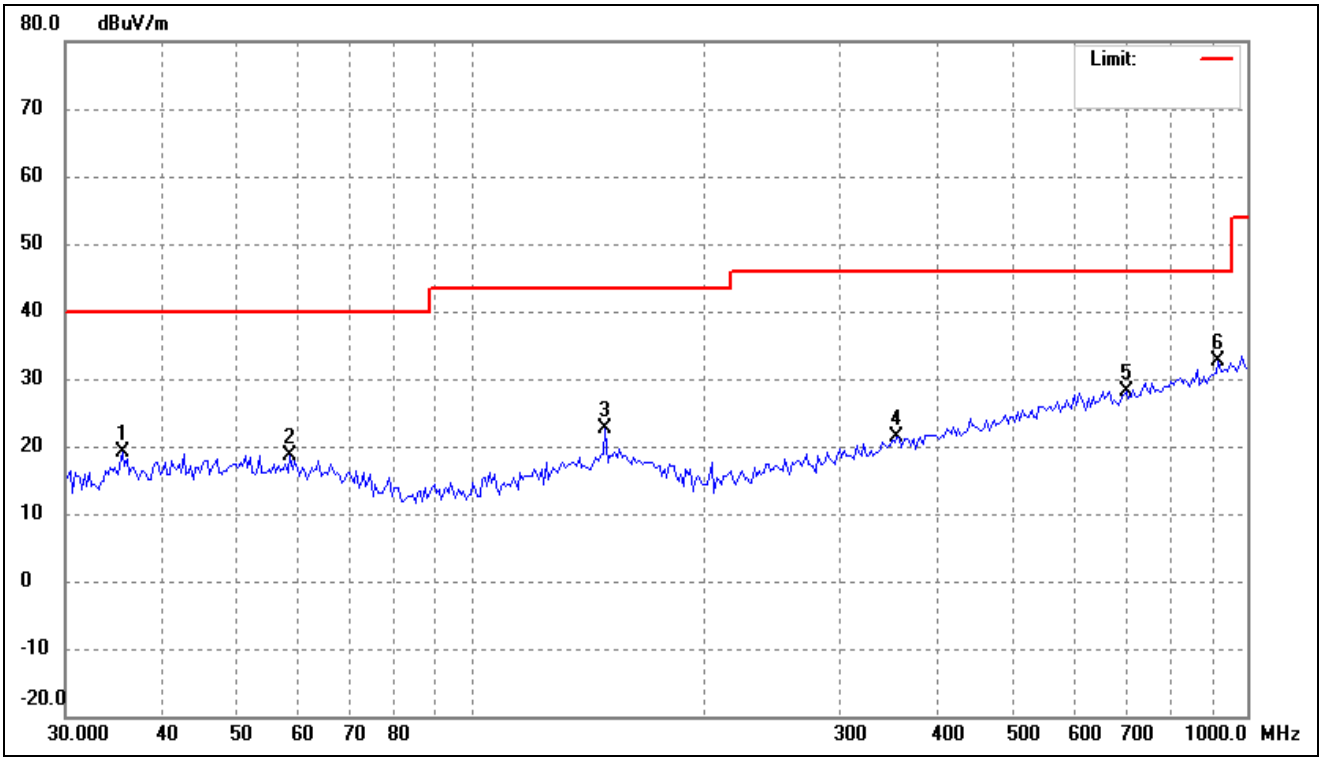
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.7616	27.48	-9.39	18.09	40.00	-21.91	-	-	peak
2	54.9011	26.31	-8.62	17.69	40.00	-22.31	-	-	peak
3	148.9174	31.79	-8.68	23.11	43.50	-20.39	-	-	peak
4	219.1785	31.39	-12.08	19.31	46.00	-26.69	-	-	peak
5	401.1049	33.60	-5.93	27.67	46.00	-18.33	-	-	peak
6	628.8935	33.93	-1.38	32.55	46.00	-13.45	-	-	peak

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



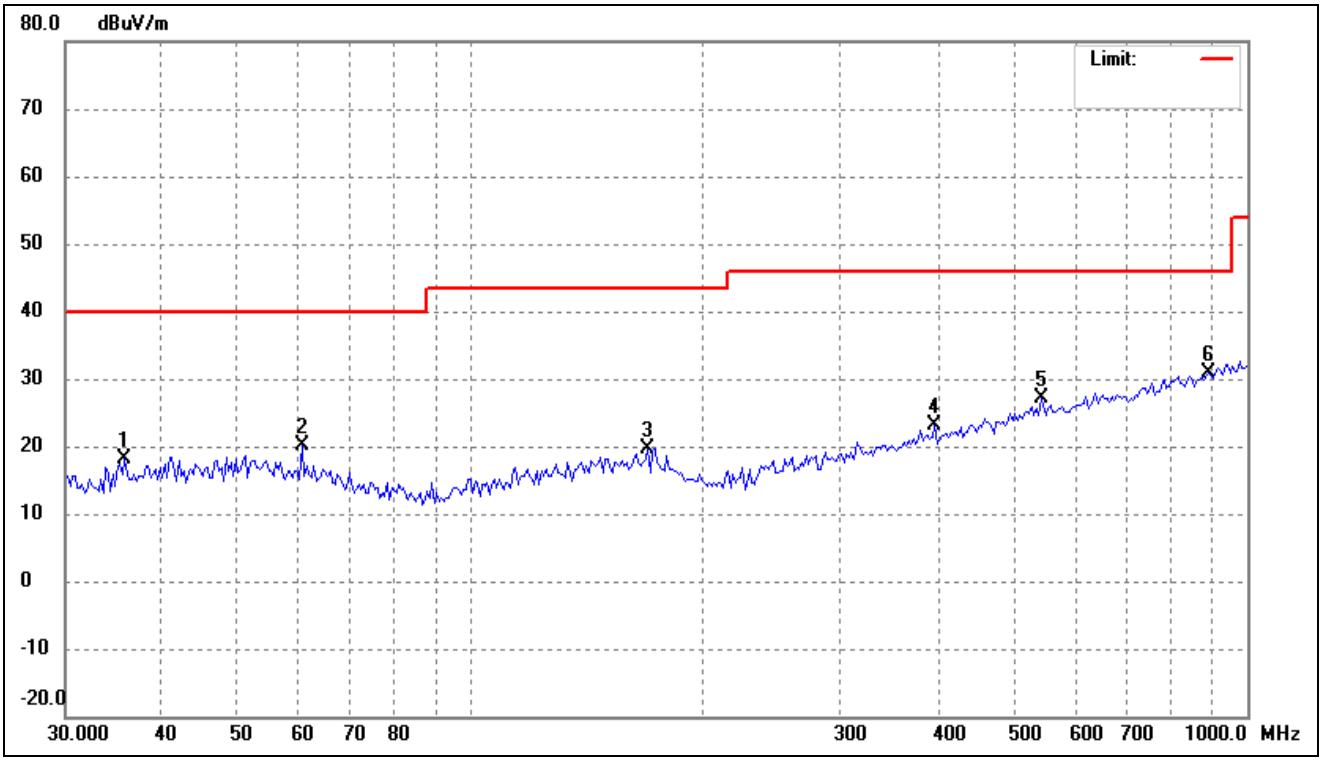
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	38.3651	26.80	-8.83	17.97	40.00	-22.03	-	-	peak
2	66.8395	28.62	-10.18	18.44	40.00	-21.56	-	-	peak
3	140.7767	27.98	-9.37	18.61	43.50	-24.89	-	-	peak
4	309.2710	29.09	-8.00	21.09	46.00	-24.91	-	-	peak
5	586.2172	29.44	-2.03	27.41	46.00	-18.59	-	-	peak
6	875.0133	30.31	0.97	31.28	46.00	-14.72	-	-	peak

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



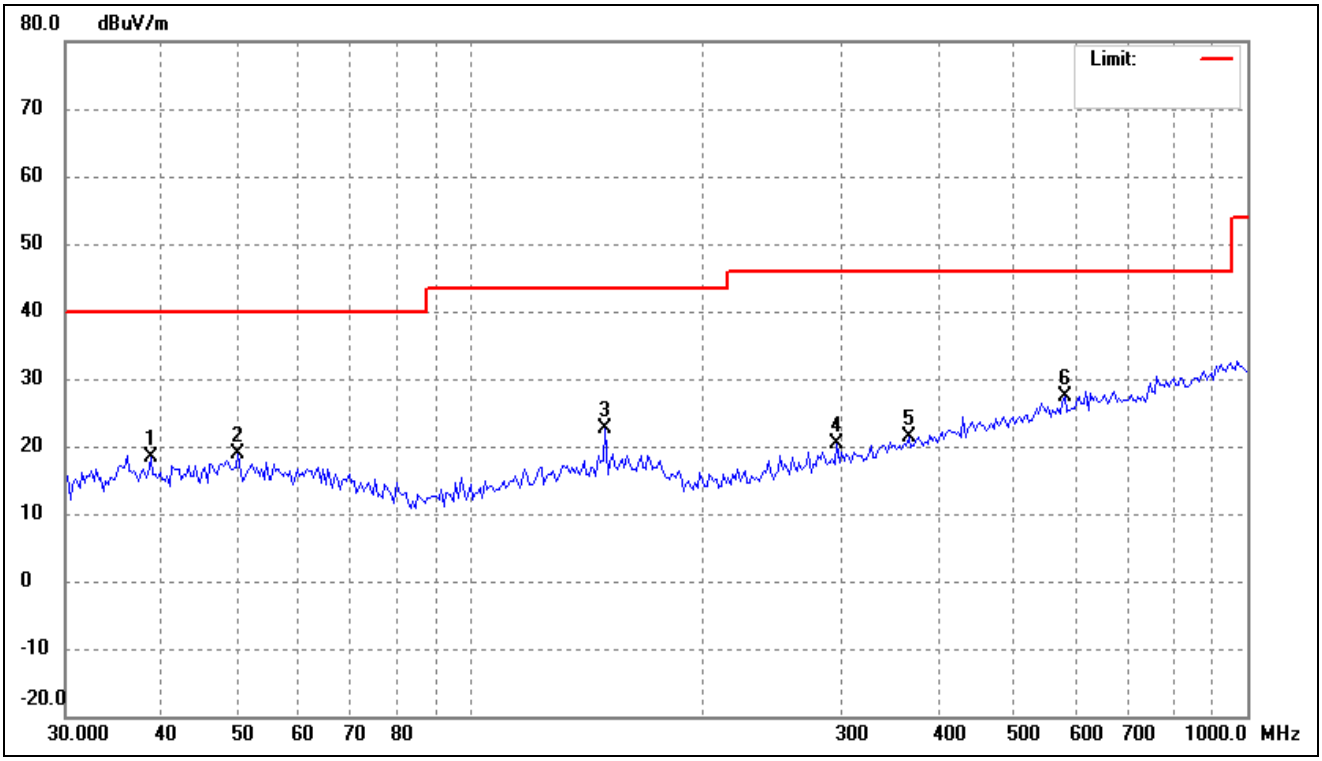
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.5112	28.50	-9.44	19.06	40.00	-20.94	-	-	peak
2	58.4855	27.49	-8.84	18.65	40.00	-21.35	-	-	peak
3	148.9175	31.32	-8.68	22.64	43.50	-20.86	-	-	peak
4	353.4472	28.38	-7.02	21.36	46.00	-24.64	-	-	peak
5	698.8035	29.24	-1.10	28.14	46.00	-17.86	-	-	peak
6	919.1315	30.95	1.59	32.54	46.00	-13.46	-	-	peak

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



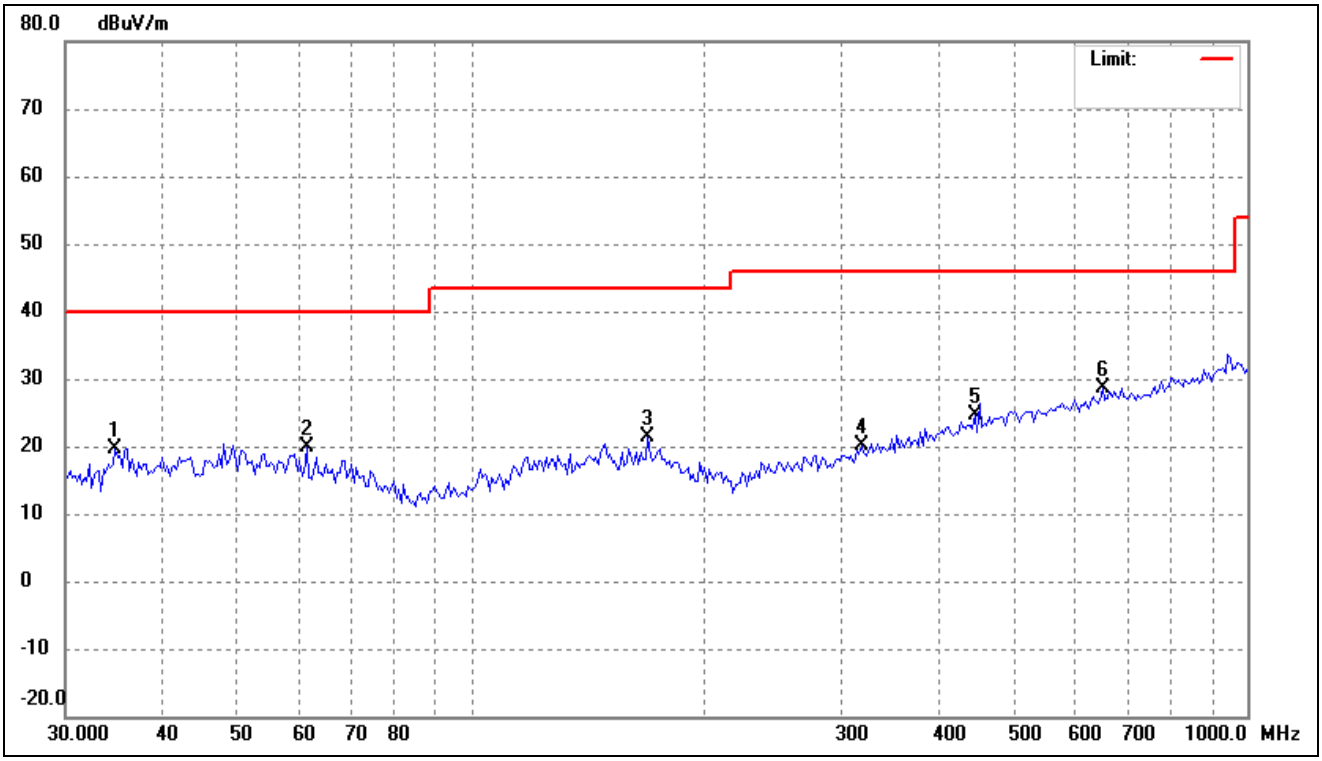
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.7617	27.40	-9.39	18.01	40.00	-21.99	-	-	peak
2	60.5769	29.14	-9.04	20.10	40.00	-19.90	-	-	peak
3	168.9970	28.55	-8.85	19.70	43.50	-23.80	-	-	peak
4	395.5071	29.18	-6.05	23.13	46.00	-22.87	-	-	peak
5	542.6104	30.24	-3.05	27.19	46.00	-18.81	-	-	peak
6	893.6557	29.87	1.13	31.00	46.00	-15.00	-	-	peak

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



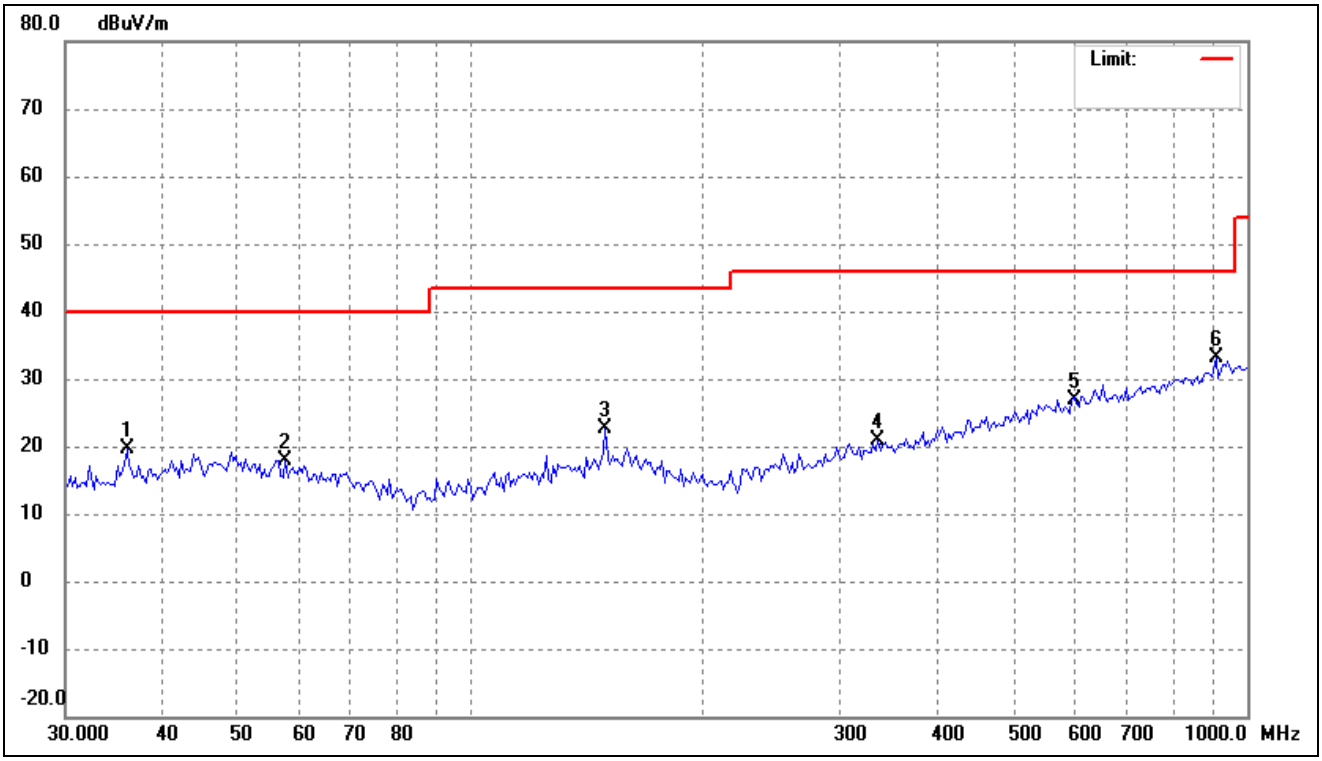
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	38.6357	27.18	-8.78	18.40	40.00	-21.60	-	-	peak
2	50.1080	26.89	-8.09	18.80	40.00	-21.20	-	-	peak
3	148.9175	31.32	-8.68	22.64	43.50	-20.86	-	-	peak
4	296.5023	28.88	-8.38	20.50	46.00	-25.50	-	-	peak
5	366.0866	28.15	-6.70	21.45	46.00	-24.55	-	-	peak
6	582.1122	29.56	-2.11	27.45	46.00	-18.55	-	-	peak

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



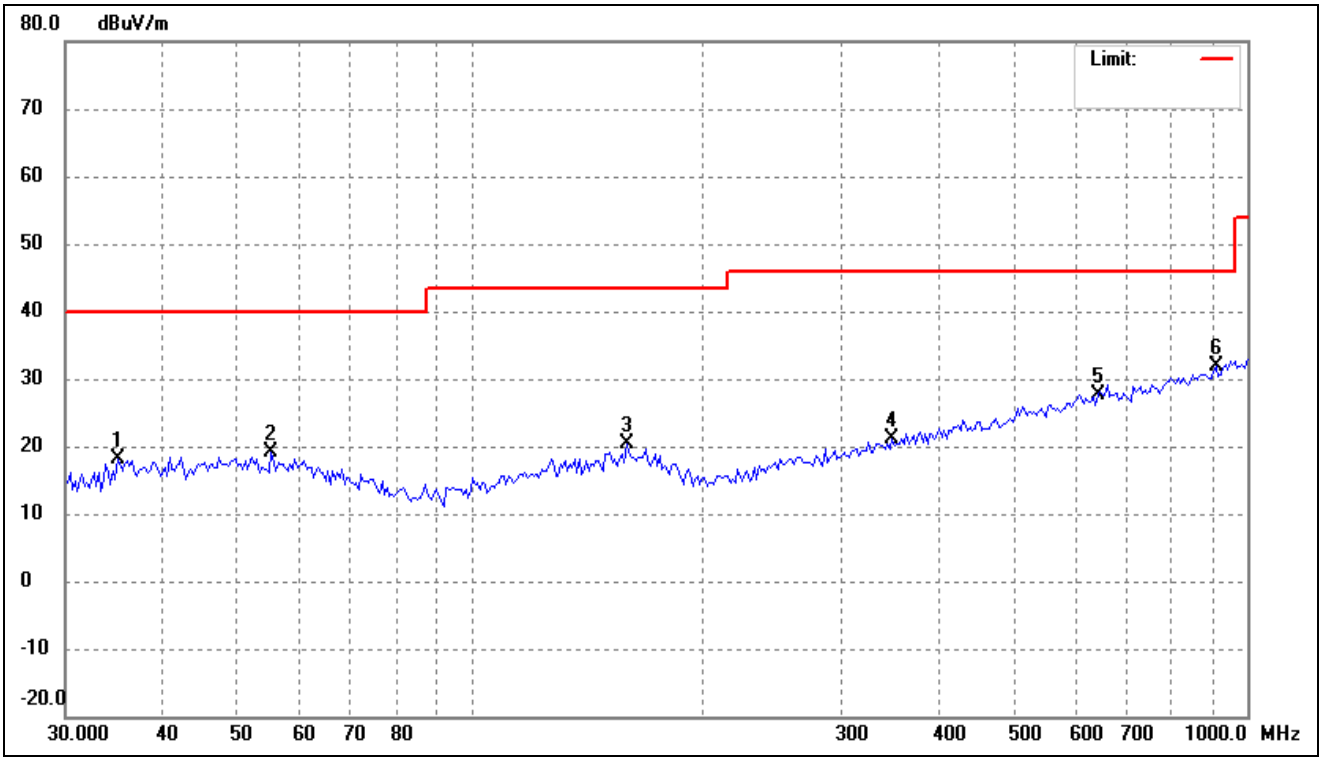
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	34.7705	29.29	-9.59	19.70	40.00	-20.30	-	-	peak
2	61.4343	29.15	-9.20	19.95	40.00	-20.05	-	-	peak
3	168.9970	30.15	-8.85	21.30	43.50	-22.20	-	-	peak
4	318.0875	27.86	-7.75	20.11	46.00	-25.89	-	-	peak
5	445.6932	29.38	-4.71	24.67	46.00	-21.33	-	-	peak
6	651.3831	30.00	-1.30	28.70	46.00	-17.30	-	-	peak

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



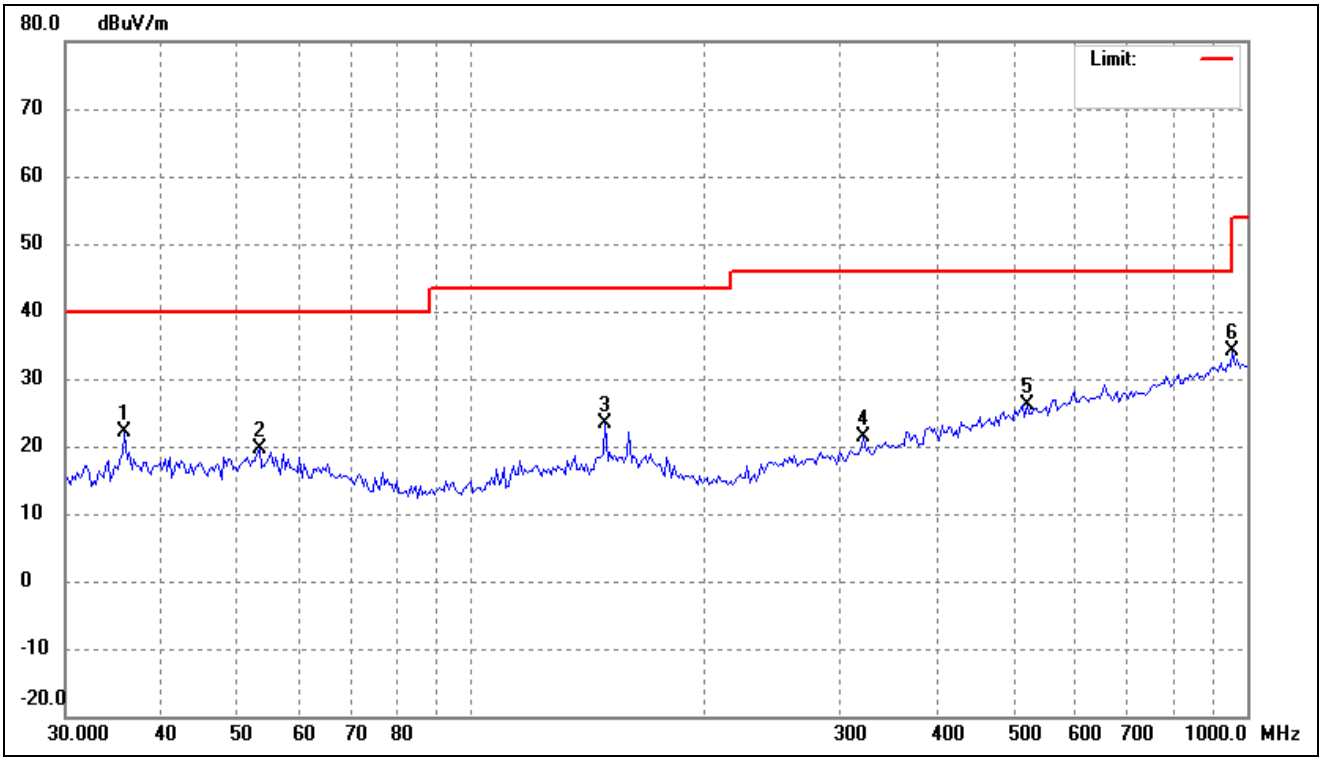
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	36.0139	28.89	-9.33	19.56	40.00	-20.44	-	-	peak
2	57.6693	26.65	-8.79	17.86	40.00	-22.14	-	-	peak
3	148.9175	31.27	-8.68	22.59	43.50	-20.91	-	-	peak
4	334.1255	28.30	-7.39	20.91	46.00	-25.09	-	-	peak
5	594.5143	28.86	-1.86	27.00	46.00	-19.00	-	-	peak
6	912.6953	31.58	1.46	33.04	46.00	-12.96	-	-	peak

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



No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.0157	27.70	-9.55	18.15	40.00	-21.85	-	-	peak
2	55.2883	27.69	-8.64	19.05	40.00	-20.95	-	-	peak
3	158.6399	28.93	-8.61	20.32	43.50	-23.18	-	-	peak
4	348.5145	28.20	-7.14	21.06	46.00	-24.94	-	-	peak
5	642.2923	29.02	-1.33	27.69	46.00	-18.31	-	-	peak
6	912.6953	30.46	1.46	31.92	46.00	-14.08	-	-	peak

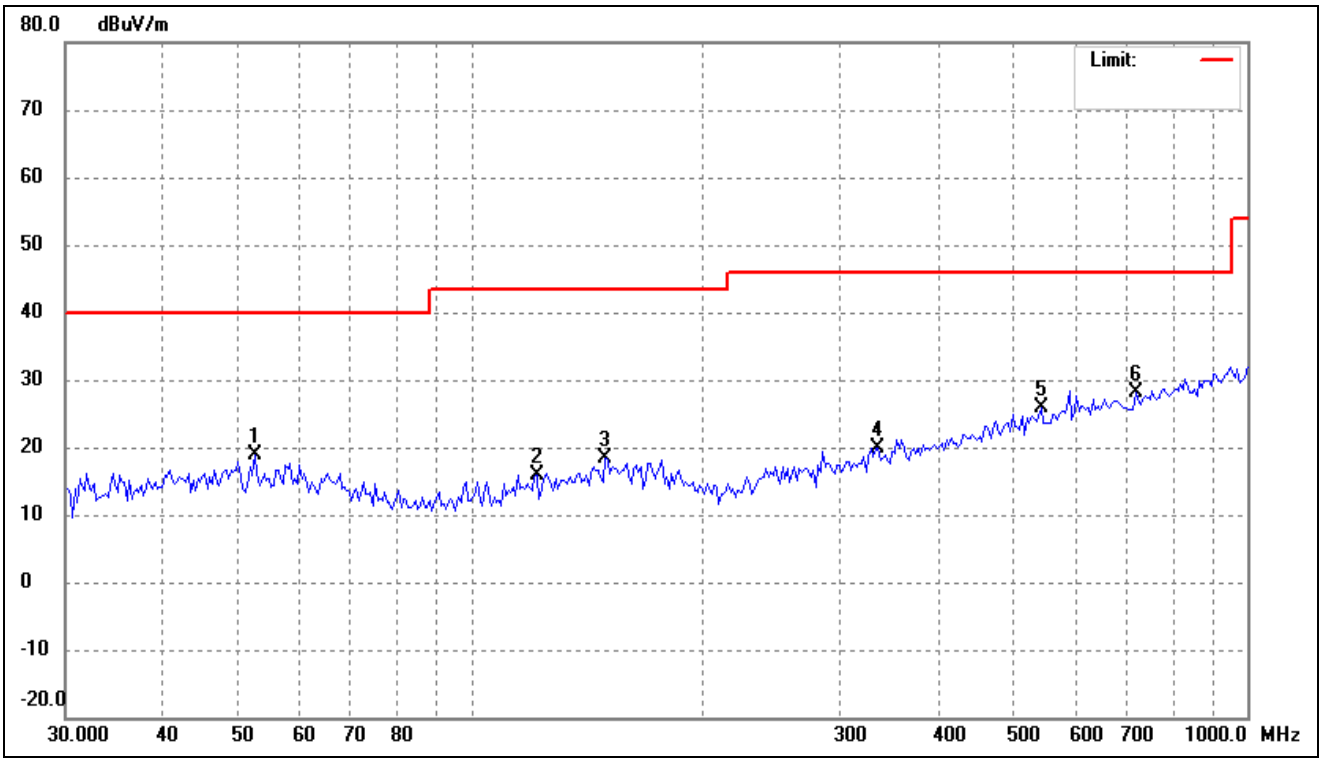
802.11ac-VHT80			
Test Channel	5210MHz(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.7617	31.57	-9.39	22.18	40.00	-17.82	-	-	peak
2	53.3794	28.04	-8.45	19.59	40.00	-20.41	-	-	peak
3	148.9175	32.10	-8.68	23.42	43.50	-20.08	-	-	peak
4	320.3306	28.97	-7.68	21.29	46.00	-24.71	-	-	peak
5	520.2079	29.67	-3.59	26.08	46.00	-19.92	-	-	peak
6	958.7135	31.87	2.26	34.13	46.00	-11.87	-	-	peak

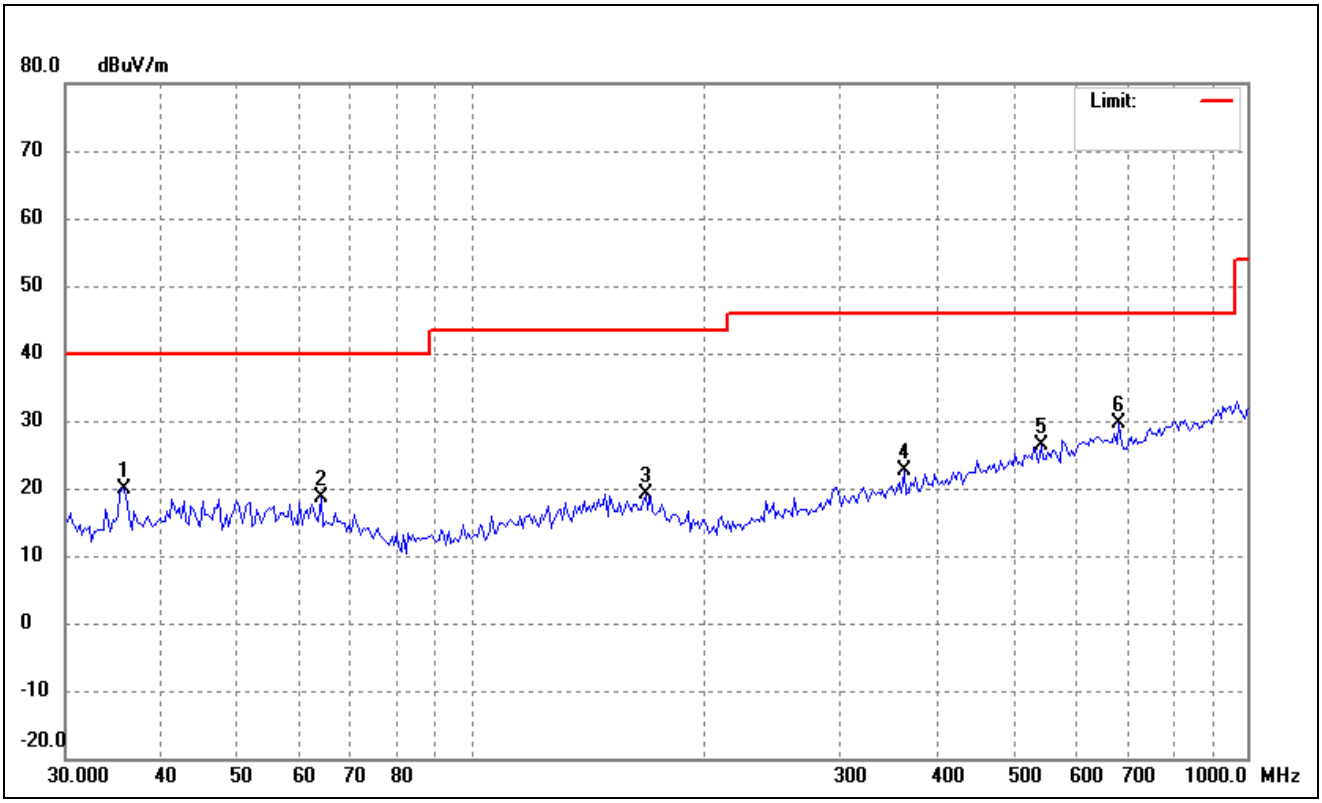
- 5745-5825MHz
- Antenna 0

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



No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	52.6344	27.14	-8.37	18.77	40.00	-21.23	-	-	peak
2	121.4623	26.40	-10.43	15.97	43.50	-27.53	-	-	peak
3	148.9174	27.01	-8.68	18.33	43.50	-25.17	-	-	peak
4	334.1255	27.37	-7.39	19.98	46.00	-26.02	-	-	peak
5	542.6103	28.99	-3.05	25.94	46.00	-20.06	-	-	peak
6	718.7246	28.92	-0.75	28.17	46.00	-17.83	-	-	peak

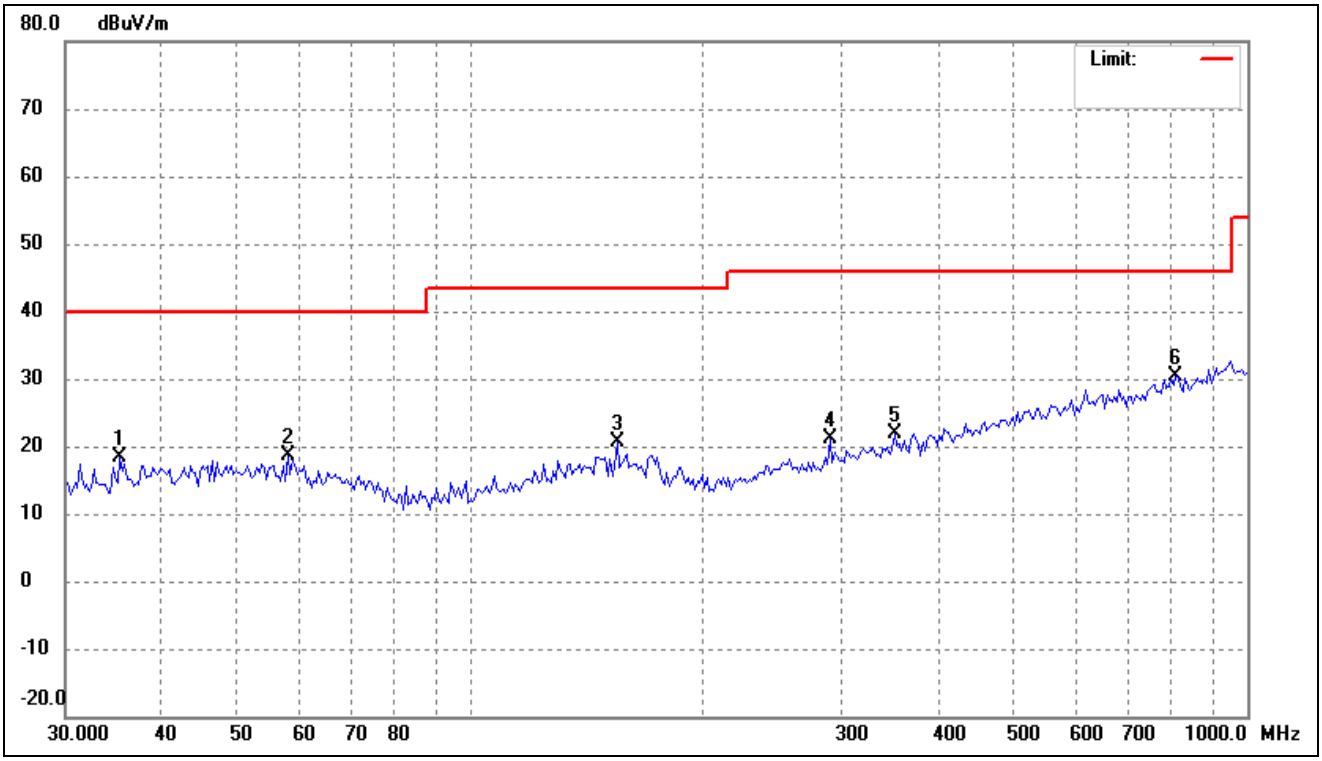
802.11a			
Test Channel	5745MHz(worst case)	Polarity:	Vertical



No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.7616	29.33	-9.39	19.94	40.00	-20.06	-	-	peak
2	64.0799	28.35	-9.68	18.67	40.00	-21.33	-	-	peak
3	167.8136	28.03	-8.82	19.21	43.50	-24.29	-	-	peak
4	360.9774	29.56	-6.83	22.73	46.00	-23.27	-	-	peak
5	542.6103	29.35	-3.05	26.30	46.00	-19.70	-	-	peak
6	684.2258	30.72	-1.20	29.52	46.00	-16.48	-	-	peak

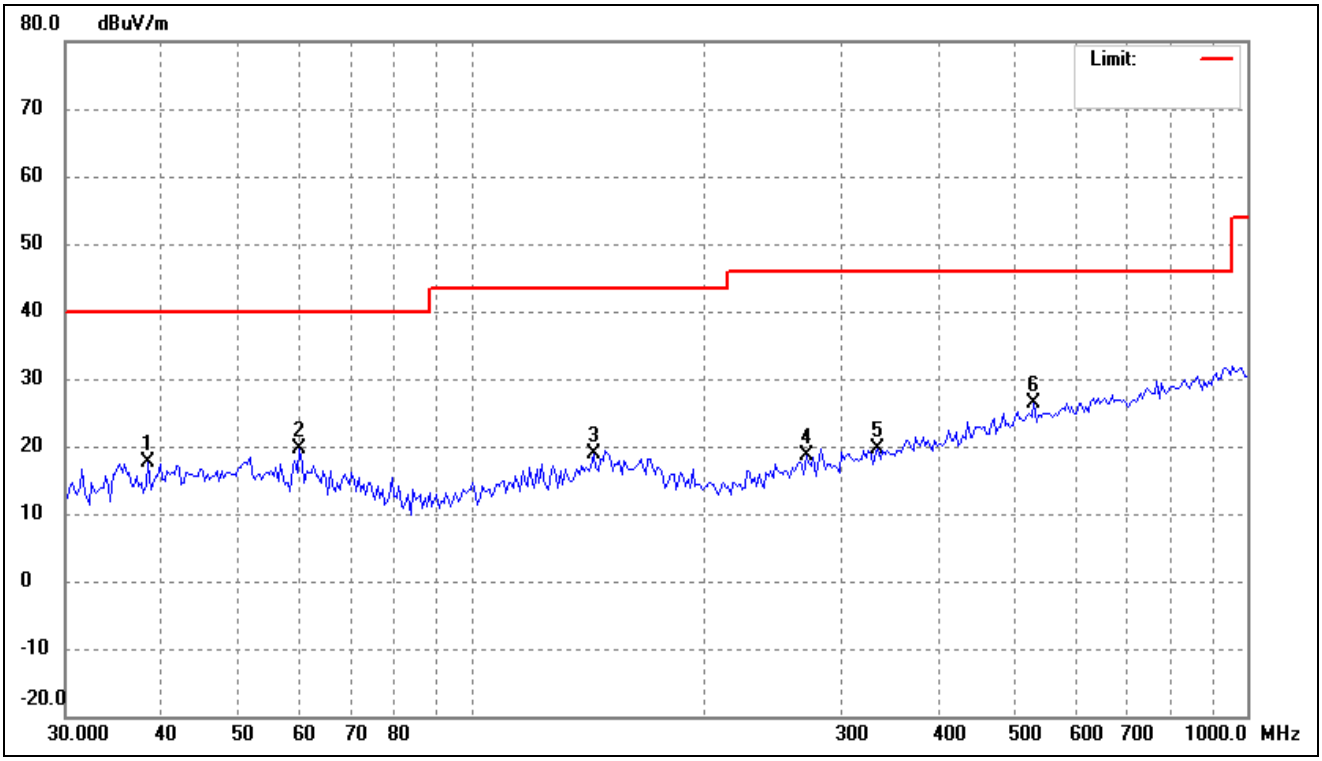
Antenna 0+ Antenna 1

802.11n-HT20			
Test Channel	5745MHz(worst case)	Polarity:	Horizontal



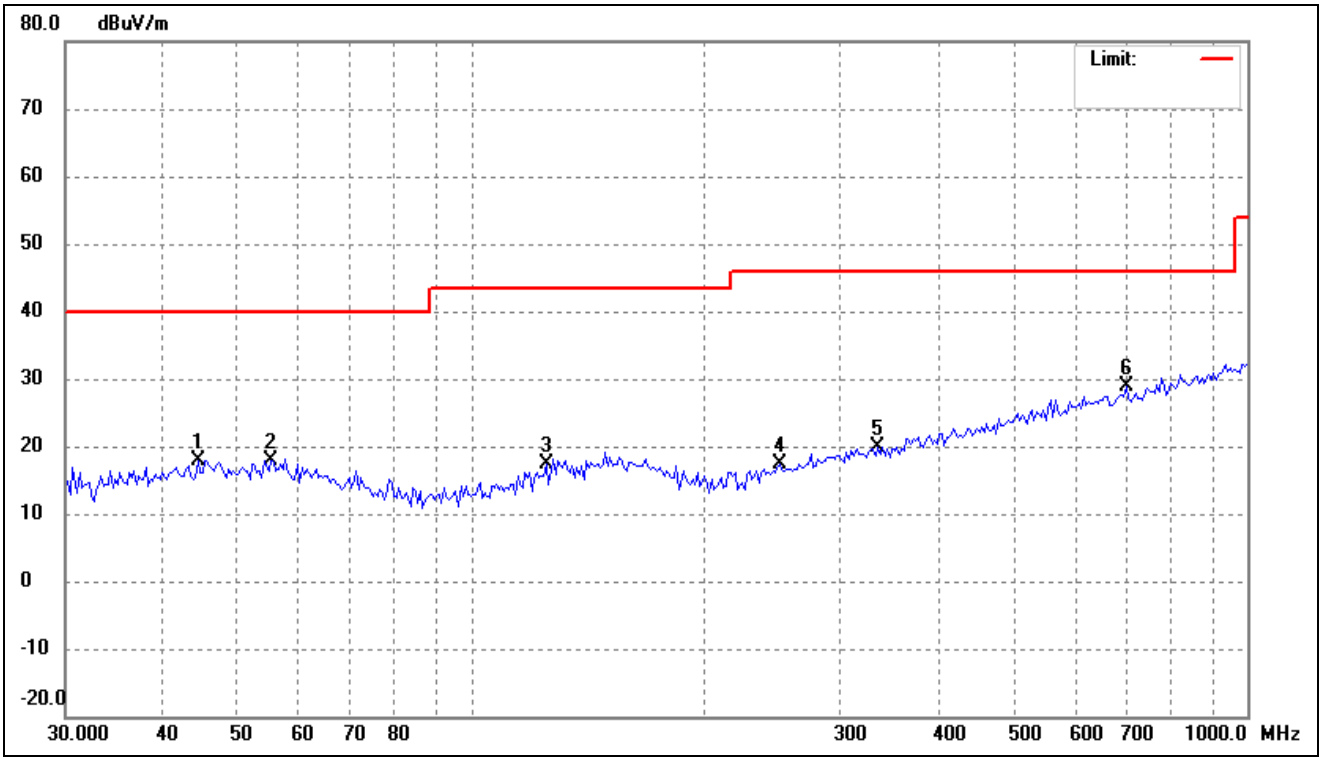
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	35.2625	27.77	-9.50	18.27	40.00	-21.73	-	-	peak
2	58.0759	27.55	-8.82	18.73	40.00	-21.27	-	-	peak
3	154.2428	29.25	-8.60	20.65	43.50	-22.85	-	-	peak
4	290.3169	29.74	-8.59	21.15	46.00	-24.85	-	-	peak
5	350.9721	28.92	-7.09	21.83	46.00	-24.17	-	-	peak
6	809.9238	29.93	0.39	30.32	46.00	-15.68	-	-	peak

802.11n-HT20			
Test Channel	5745MHz(worst case)	Polarity:	Vertical



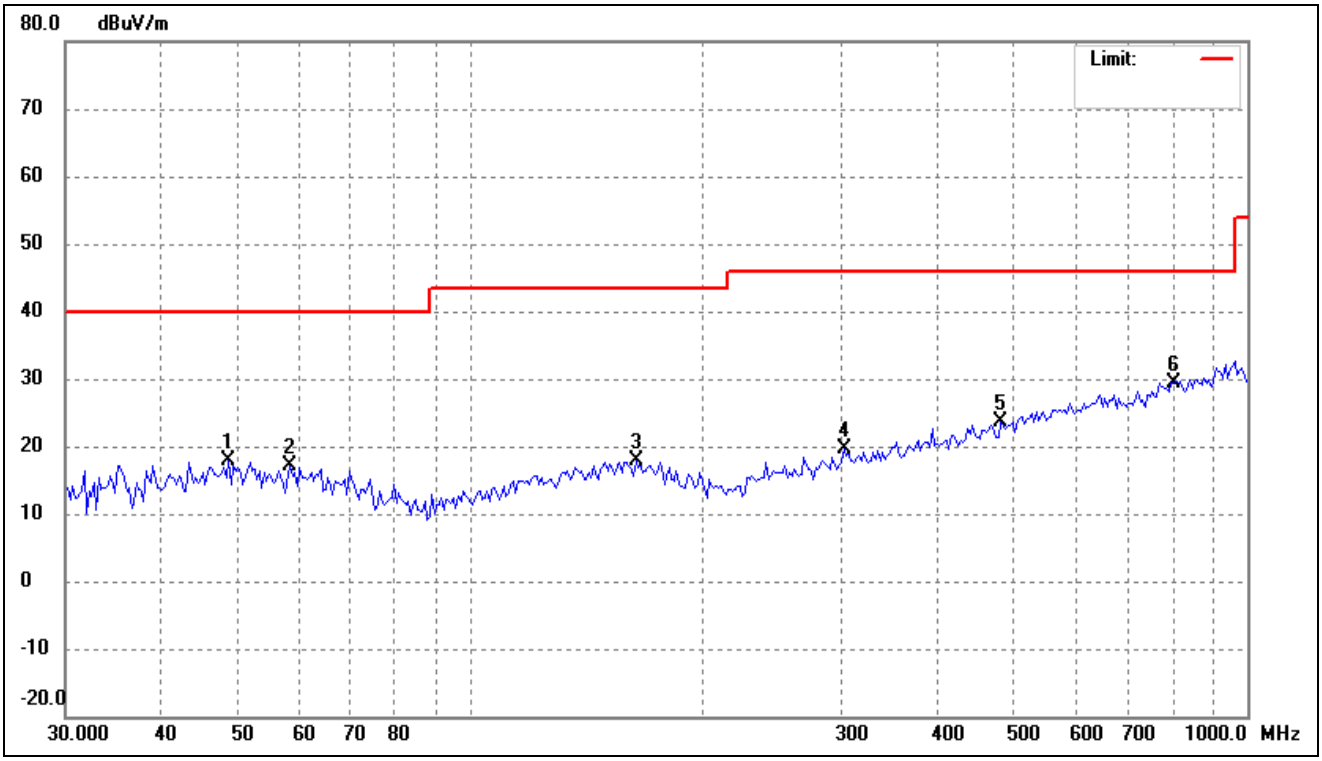
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	38.3651	26.36	-8.83	17.53	40.00	-22.47	-	-	peak
2	60.1527	28.67	-8.97	19.70	40.00	-20.30	-	-	peak
3	143.7759	27.94	-9.11	18.83	43.50	-24.67	-	-	peak
4	270.6162	27.94	-9.30	18.64	46.00	-27.36	-	-	peak
5	334.1255	27.06	-7.39	19.67	46.00	-26.33	-	-	peak
6	531.2910	29.77	-3.35	26.42	46.00	-19.58	-	-	peak

802.11n-HT40			
Test Channel	5755MHz(worst case)	Polarity:	Horizontal



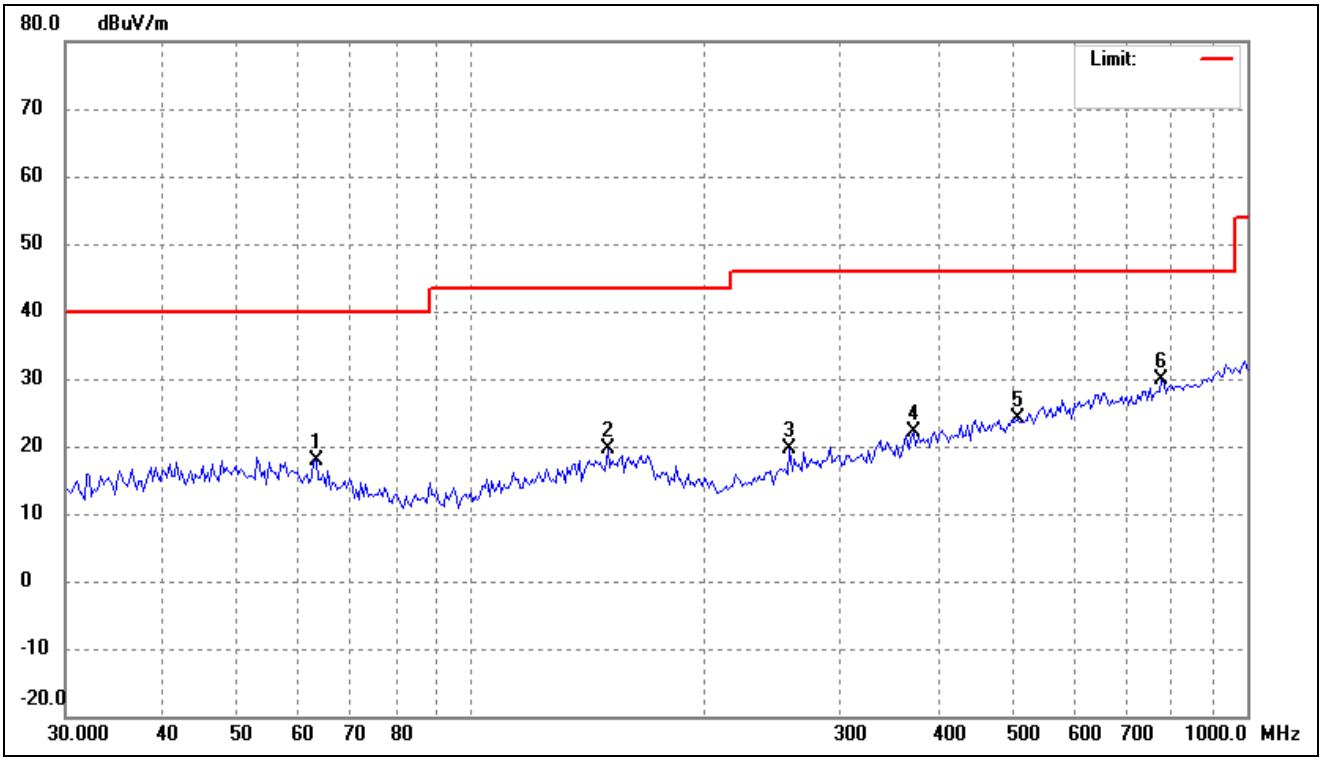
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	44.4657	26.39	-8.47	17.92	40.00	-22.08	-	-	peak
2	55.2882	26.53	-8.64	17.89	40.00	-22.11	-	-	peak
3	124.9249	27.47	-10.19	17.28	43.50	-26.22	-	-	peak
4	250.4859	27.56	-10.18	17.38	46.00	-28.62	-	-	peak
5	334.1255	27.24	-7.39	19.85	46.00	-26.15	-	-	peak
6	698.8035	30.08	-1.10	28.98	46.00	-17.02	-	-	peak

802.11n-HT40			
Test Channel	5755MHz(worst case)	Polarity:	Vertical



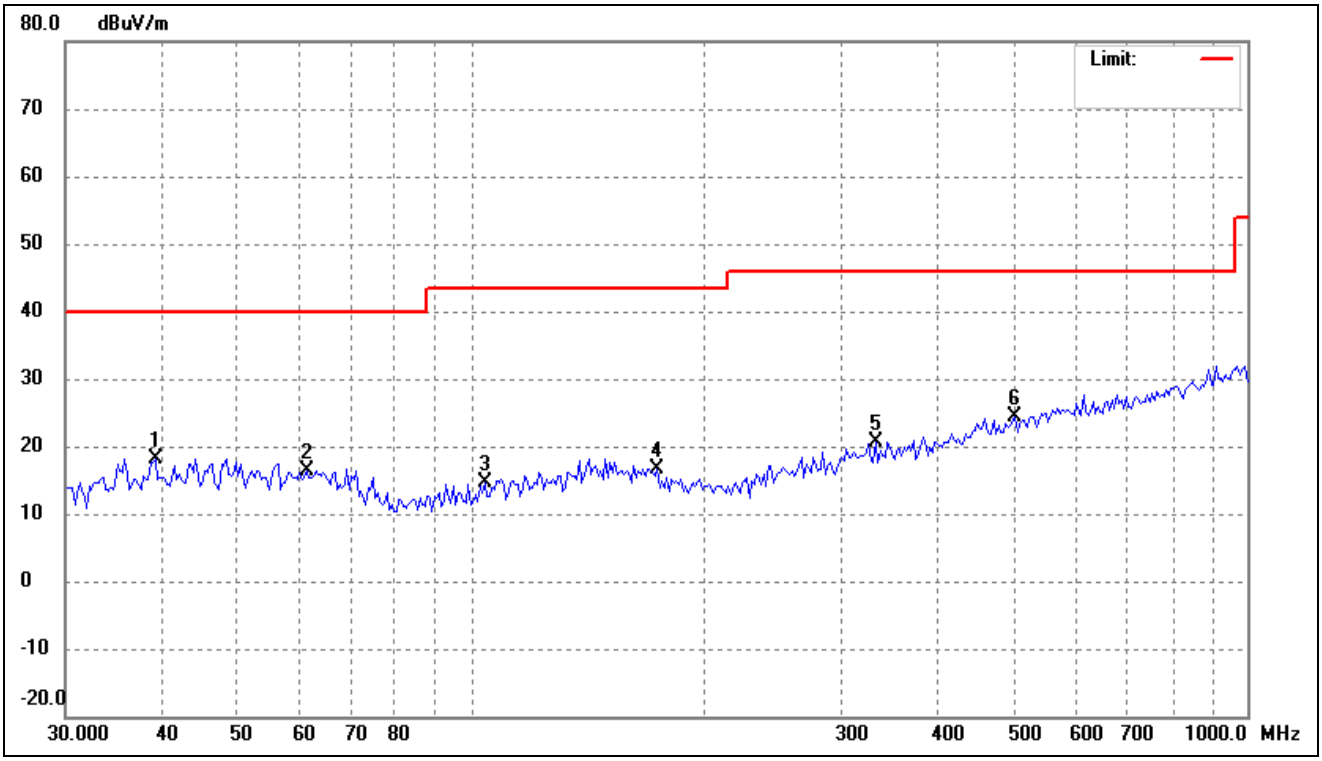
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	48.7191	26.18	-8.18	18.00	40.00	-22.00	-	-	peak
2	58.4854	26.04	-8.84	17.20	40.00	-22.80	-	-	peak
3	163.1622	26.61	-8.70	17.91	43.50	-25.59	-	-	peak
4	302.8193	27.82	-8.18	19.64	46.00	-26.36	-	-	peak
5	481.5112	27.69	-4.15	23.54	46.00	-22.46	-	-	peak
6	804.2522	29.11	0.34	29.45	46.00	-16.55	-	-	peak

802.11ac-VHT40			
Test Channel	5755MHz(worst case)	Polarity:	Horizontal



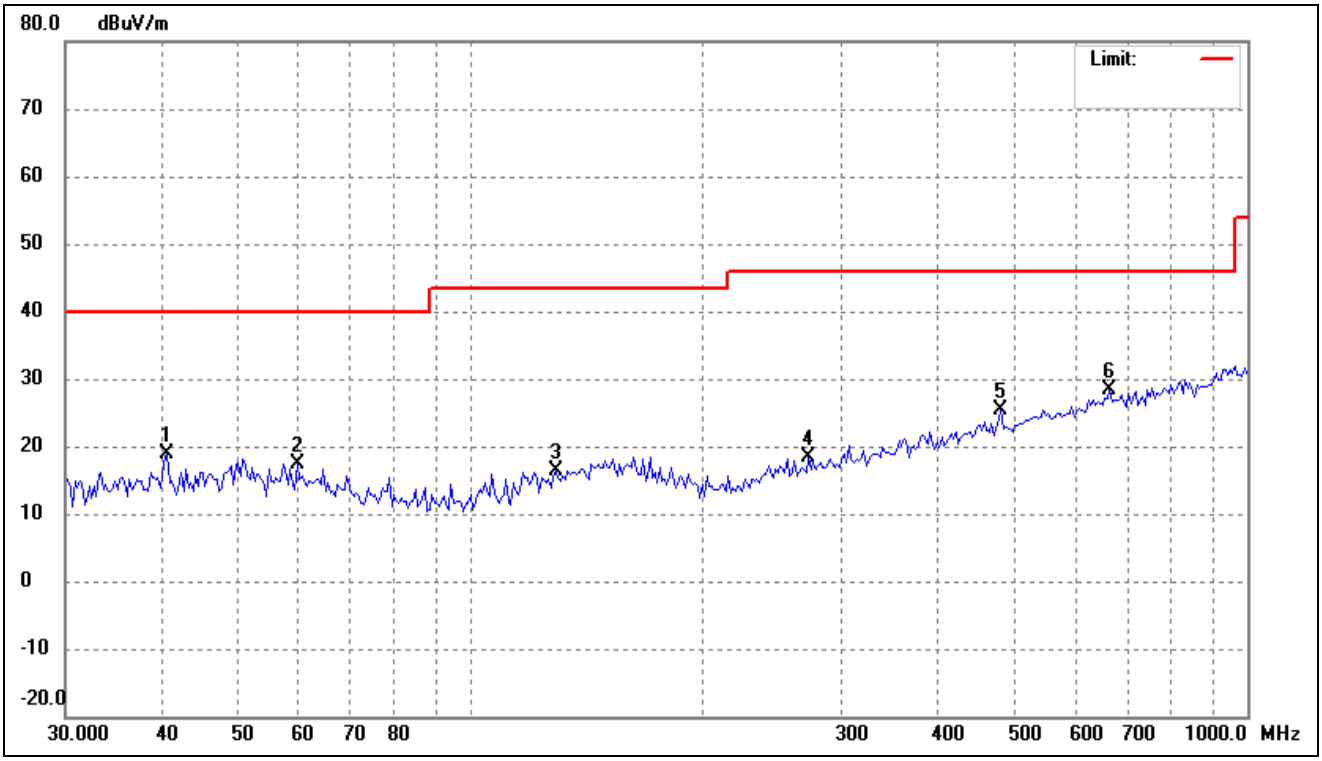
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	63.1856	27.47	-9.52	17.95	40.00	-22.05	-	-	peak
2	149.9676	28.13	-8.59	19.54	43.50	-23.96	-	-	peak
3	257.6266	29.43	-9.87	19.56	46.00	-26.44	-	-	peak
4	371.2680	28.73	-6.57	22.16	46.00	-23.84	-	-	peak
5	505.7890	28.03	-3.80	24.23	46.00	-21.77	-	-	peak
6	776.4848	29.81	0.08	29.89	46.00	-16.11	-	-	peak

802.11ac-VHT40			
Test Channel	5755MHz(worst case)	Polarity:	Vertical



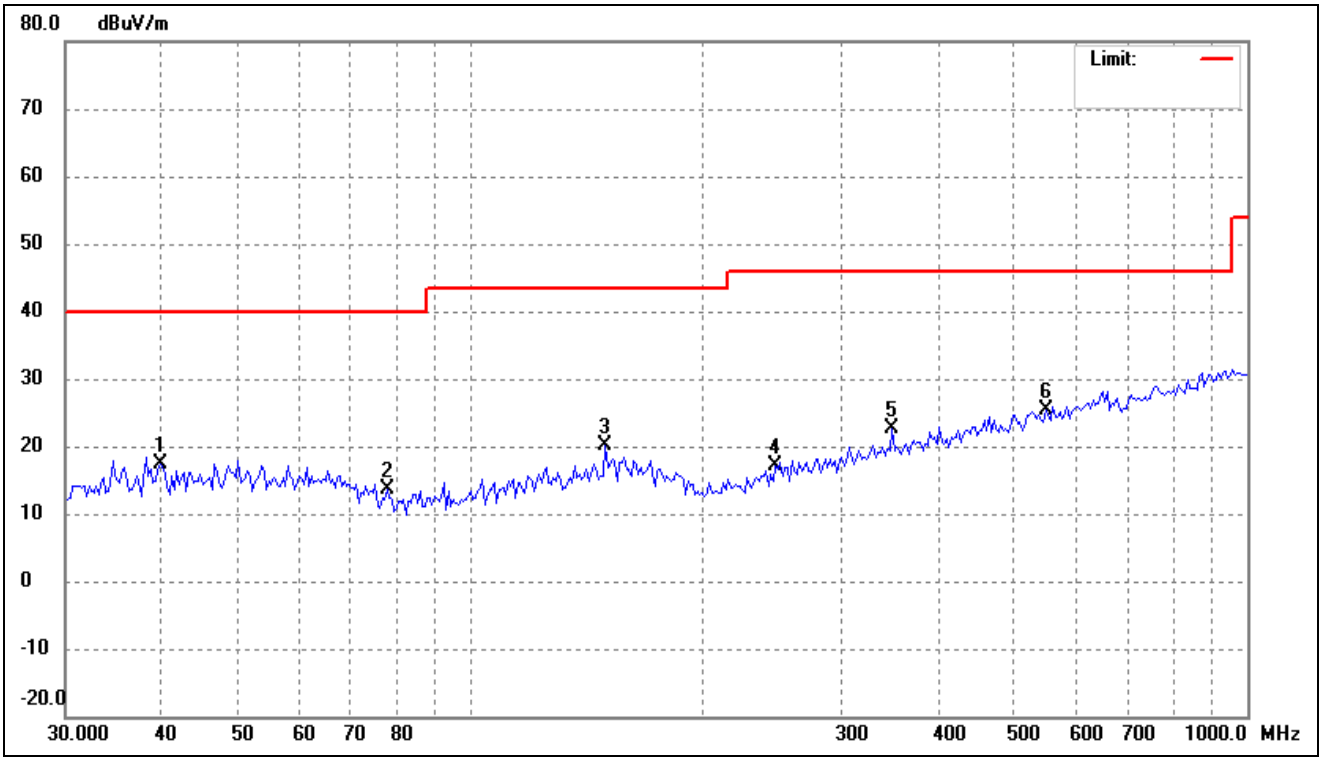
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	39.1824	26.86	-8.65	18.21	40.00	-21.79	-	-	peak
2	61.4343	25.64	-9.20	16.44	40.00	-23.56	-	-	peak
3	104.0640	26.69	-12.12	14.57	43.50	-28.93	-	-	peak
4	173.8147	26.09	-9.42	16.67	43.50	-26.83	-	-	peak
5	331.7857	28.04	-7.43	20.61	46.00	-25.39	-	-	peak
6	502.2472	28.18	-3.87	24.31	46.00	-21.69	-	-	peak

802.11ac-VHT80			
Test Channel	5775MHz(worst case)	Polarity:	Horizontal



No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	40.5836	27.48	-8.48	19.00	40.00	-21.00	-	-	peak
2	59.7315	26.36	-8.92	17.44	40.00	-22.56	-	-	peak
3	128.4862	26.25	-9.96	16.29	43.50	-27.21	-	-	peak
4	272.5245	27.69	-9.22	18.47	46.00	-27.53	-	-	peak
5	481.5112	29.55	-4.15	25.40	46.00	-20.60	-	-	peak
6	665.2609	29.53	-1.27	28.26	46.00	-17.74	-	-	peak

802.11ac-VHT80			
Test Channel	5775MHz(worst case)	Polarity:	Vertical



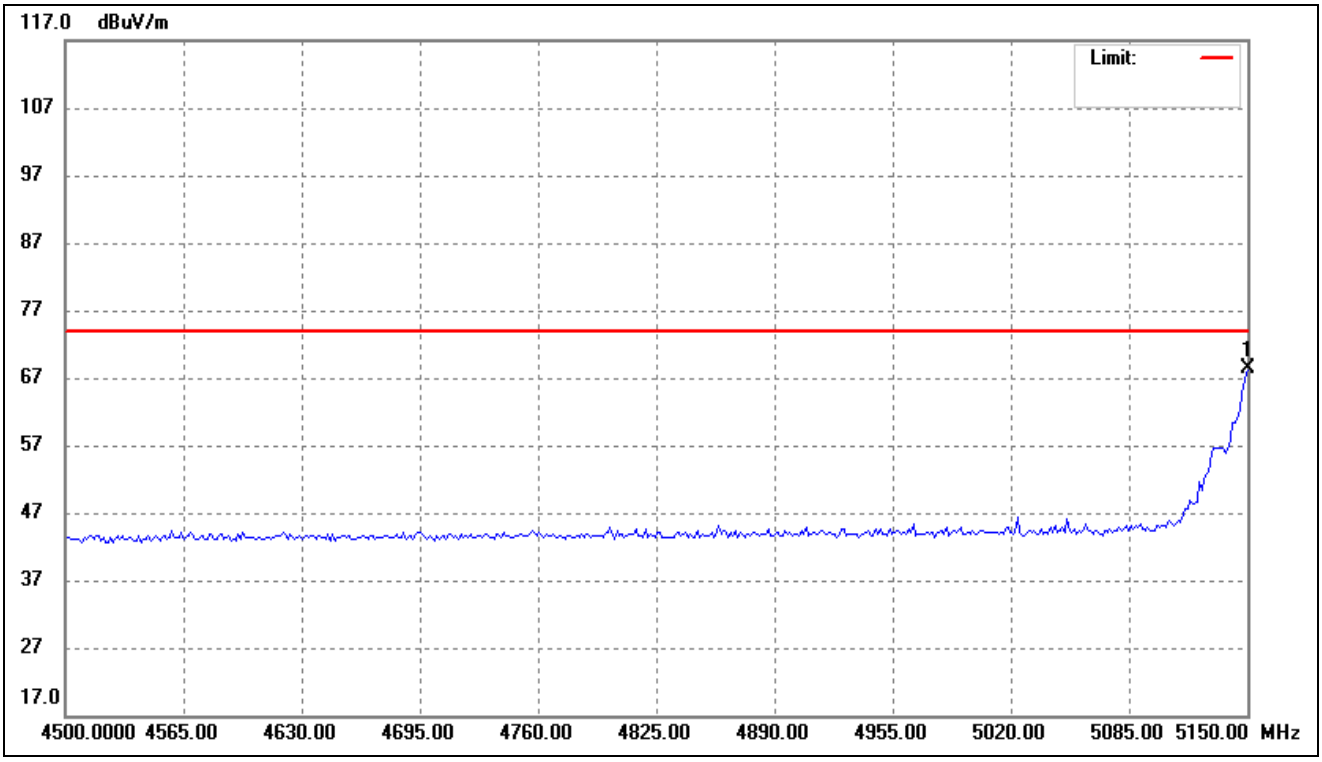
No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	39.7370	25.97	-8.54	17.43	40.00	-22.57	-	-	peak
2	78.0143	26.05	-12.53	13.52	40.00	-26.48	-	-	peak
3	148.9174	28.82	-8.68	20.14	43.50	-23.36	-	-	peak
4	246.9901	27.36	-10.30	17.06	46.00	-28.94	-	-	peak
5	348.5144	29.68	-7.14	22.54	46.00	-23.46	-	-	peak
6	550.2902	28.25	-2.84	25.41	46.00	-20.59	-	-	peak

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

- Spurious Emission above 1GHz

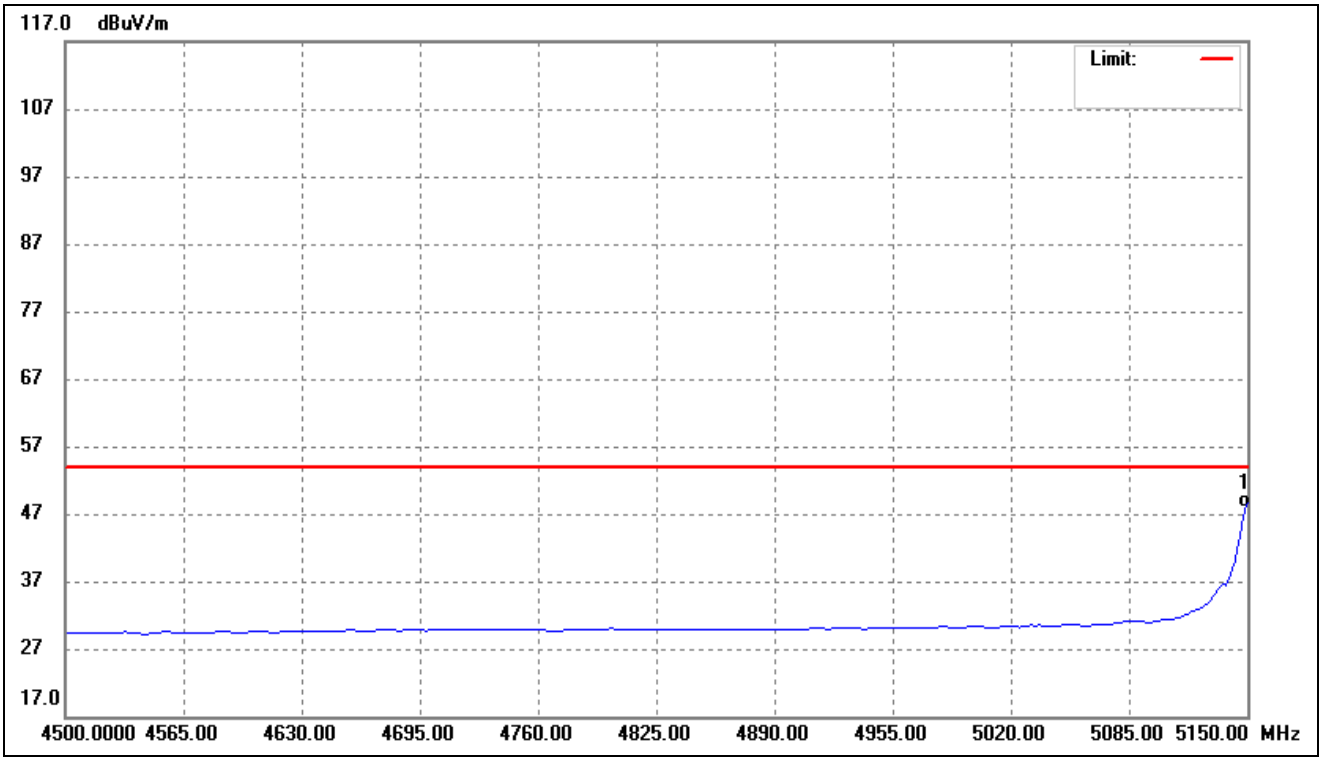
- Antenna 0

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



No.	Frequency	Reading	Corr.	Result	Limit	Margin	Deg.	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	79.99	-11.65	68.34	74.00	-5.66	-	-	peak

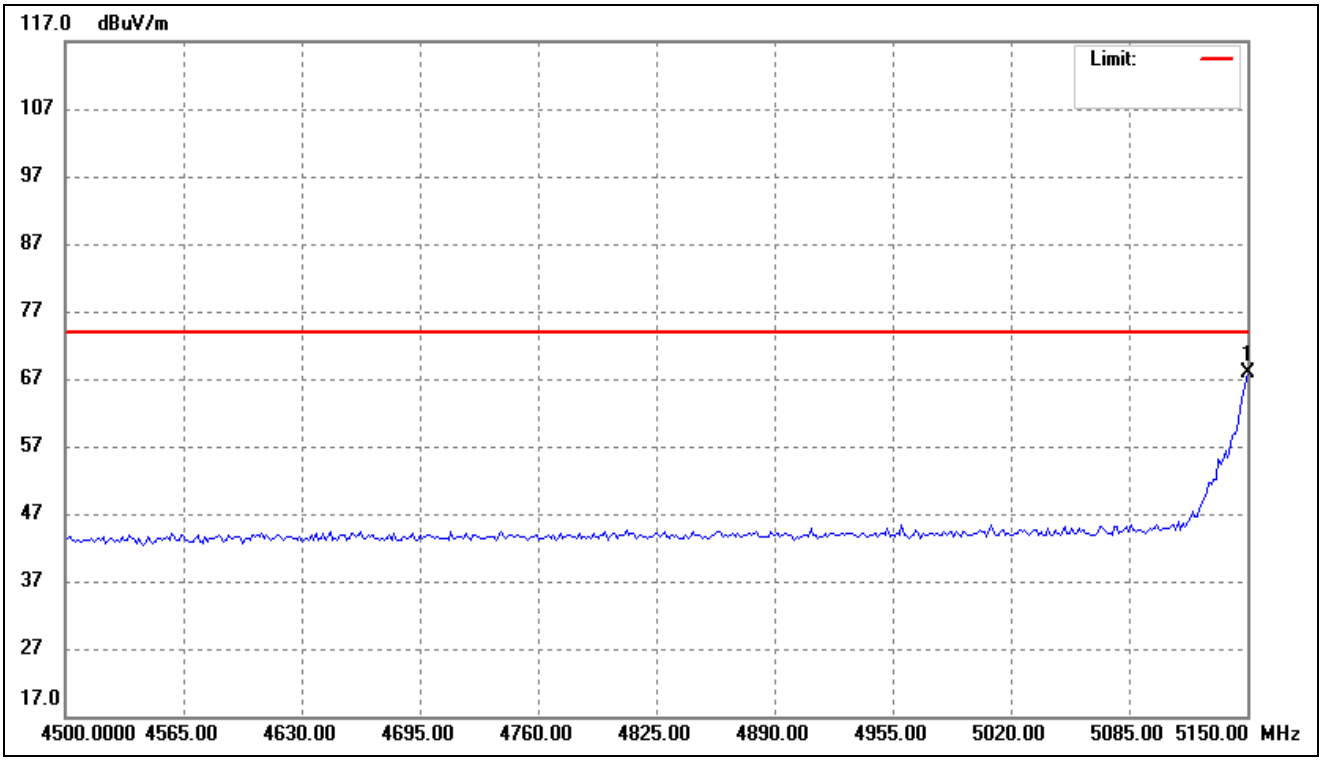
802.11a- Restricted Bandedge			
Test Channel	band 5.15-5.25GHz	Polarity:	Horizontal(worst case)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	60.64	-11.65	48.99	54.00	-5.01	-	-	AVG

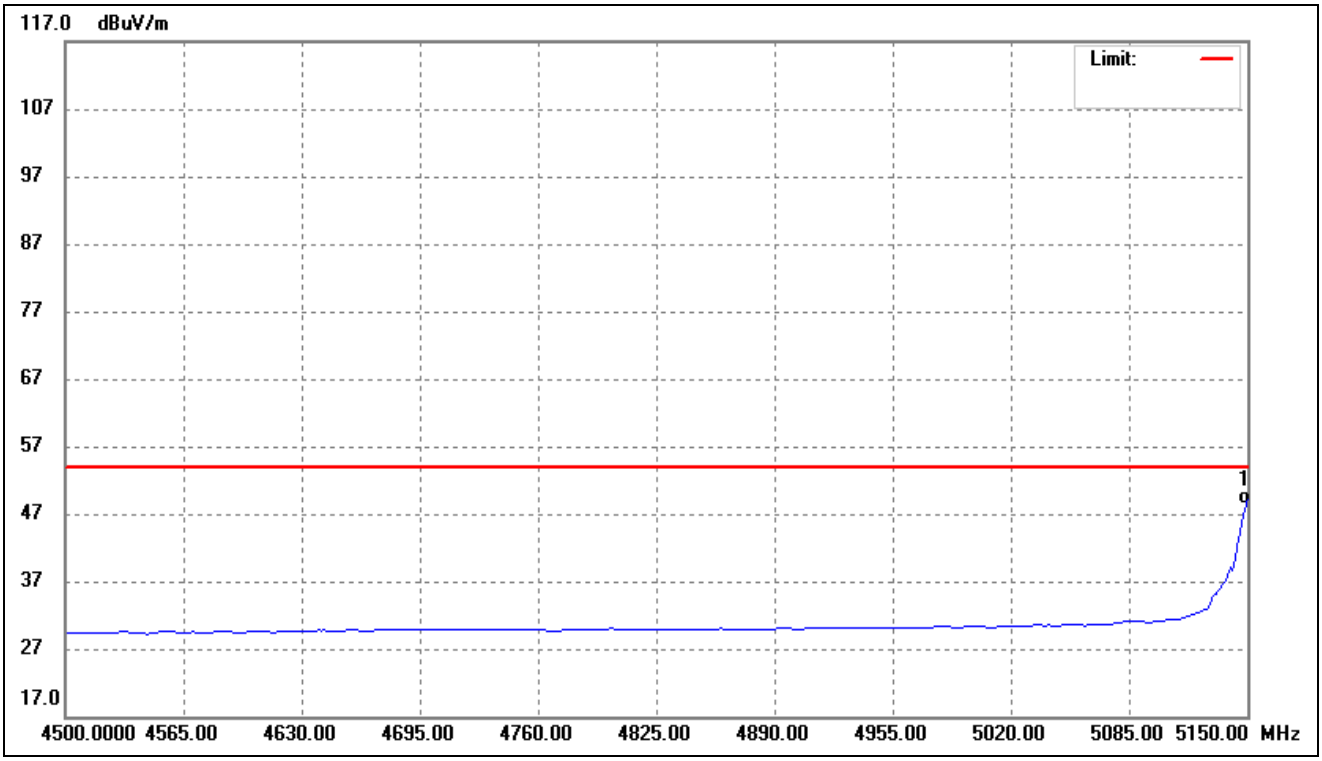
➢ Antenna 0+ Antenna 1

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



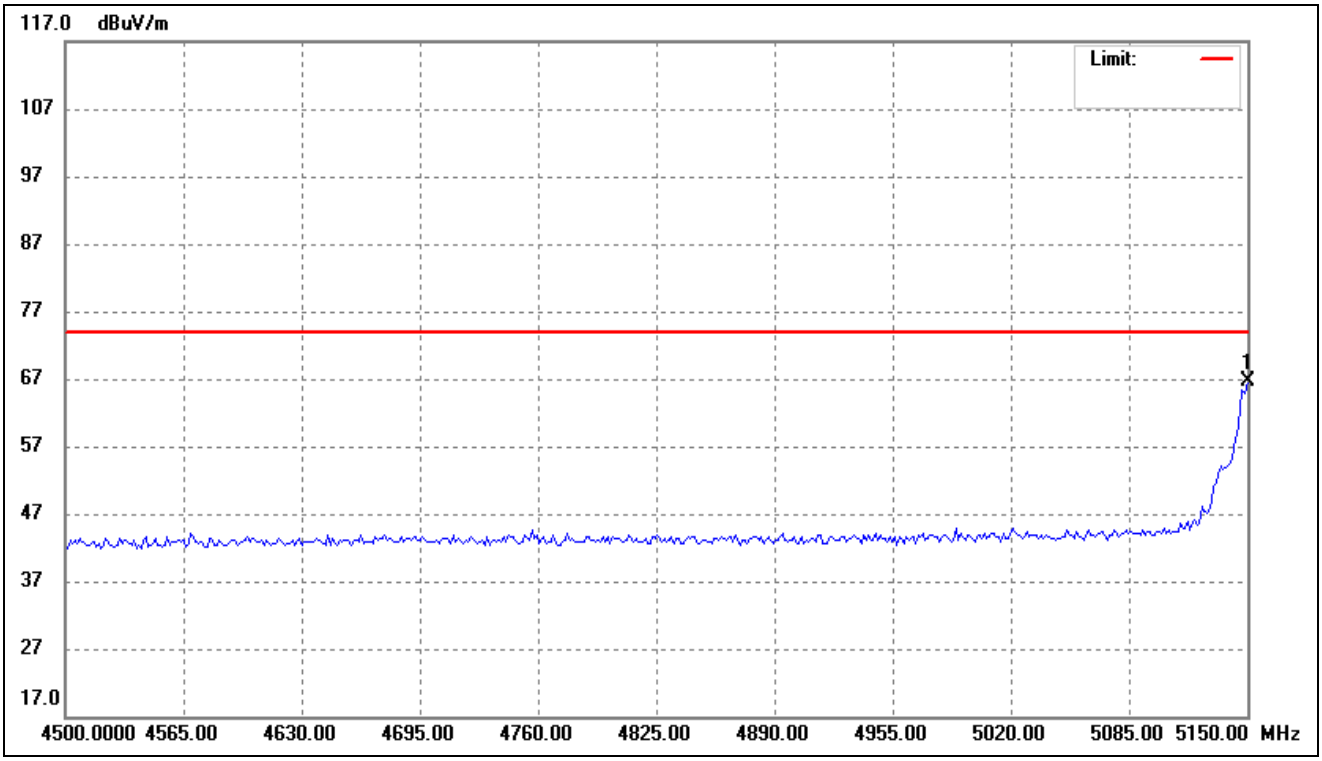
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	79.55	-11.65	67.90	74.00	-6.10	-	-	peak

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



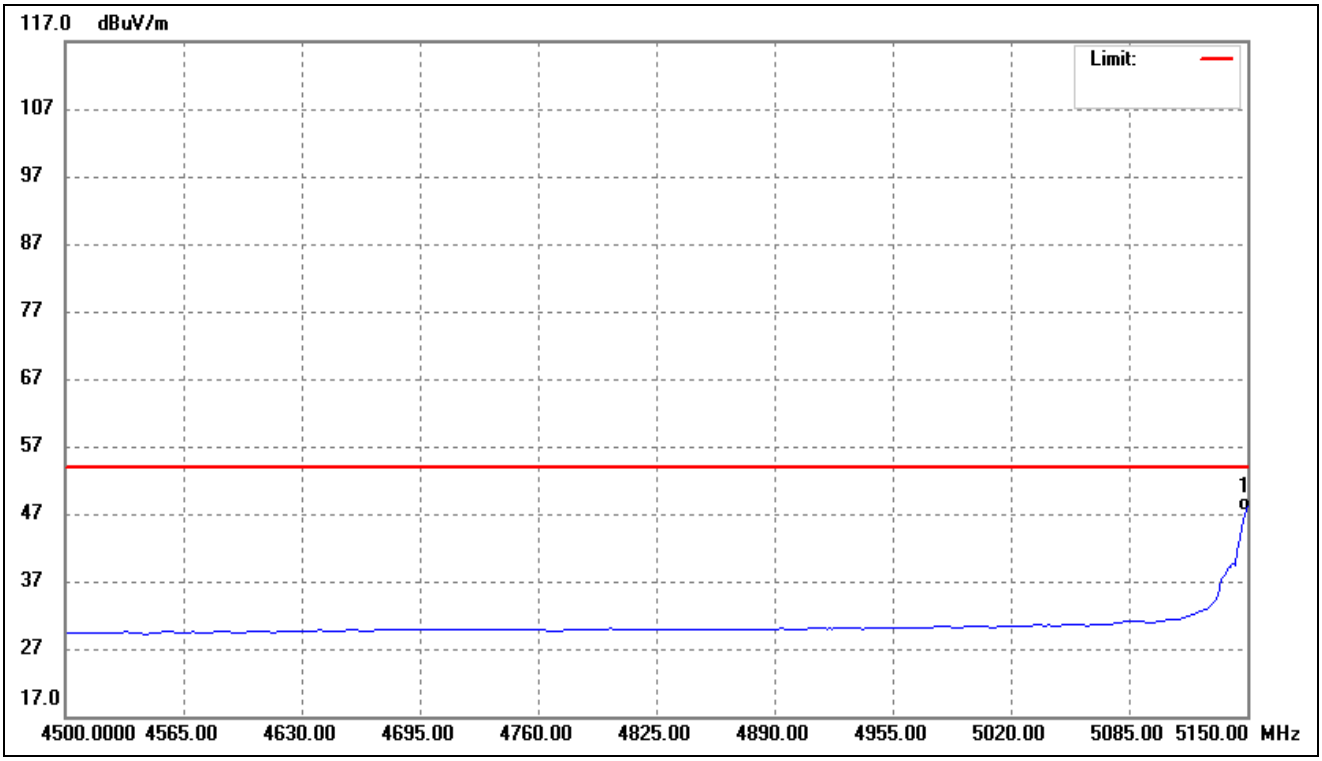
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	60.94	-11.65	49.29	54.00	-4.71	-	-	AVG

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



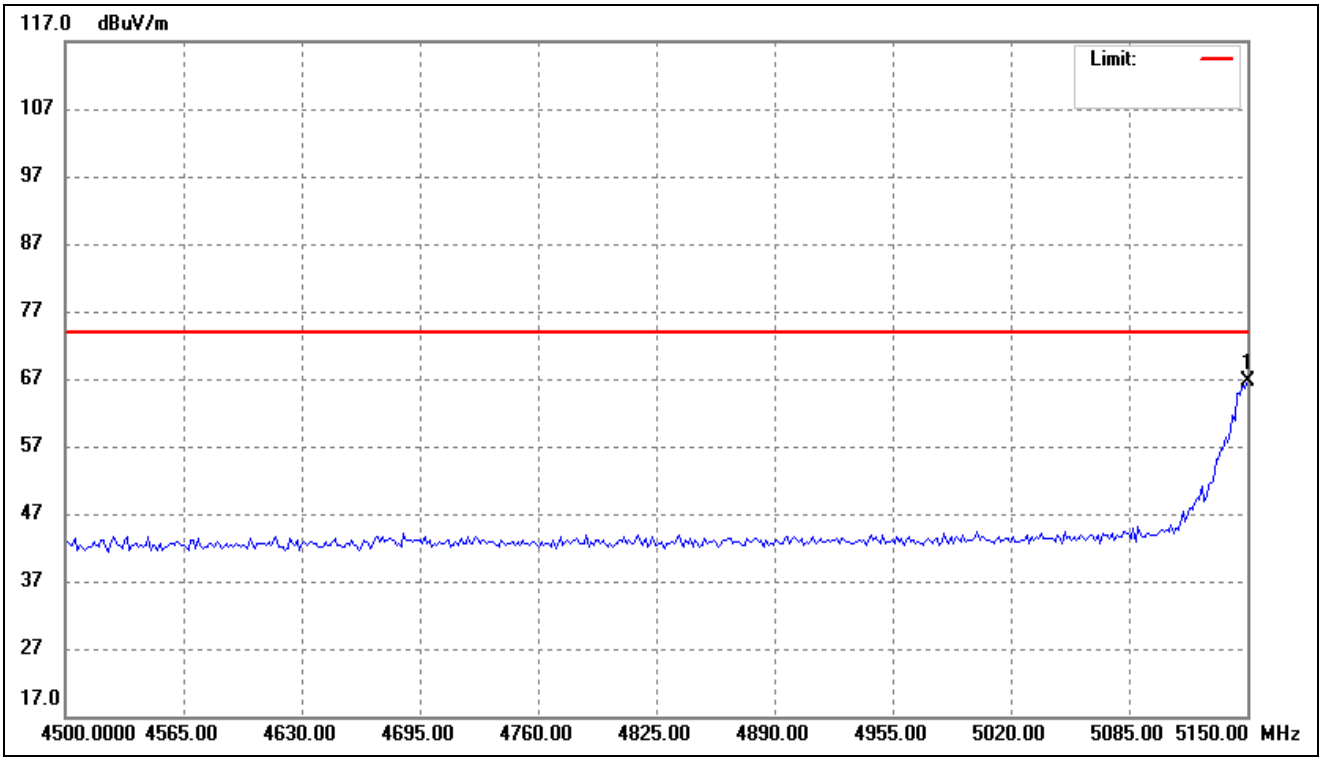
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	78.17	-11.65	66.52	74.00	-7.48	-	-	peak

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



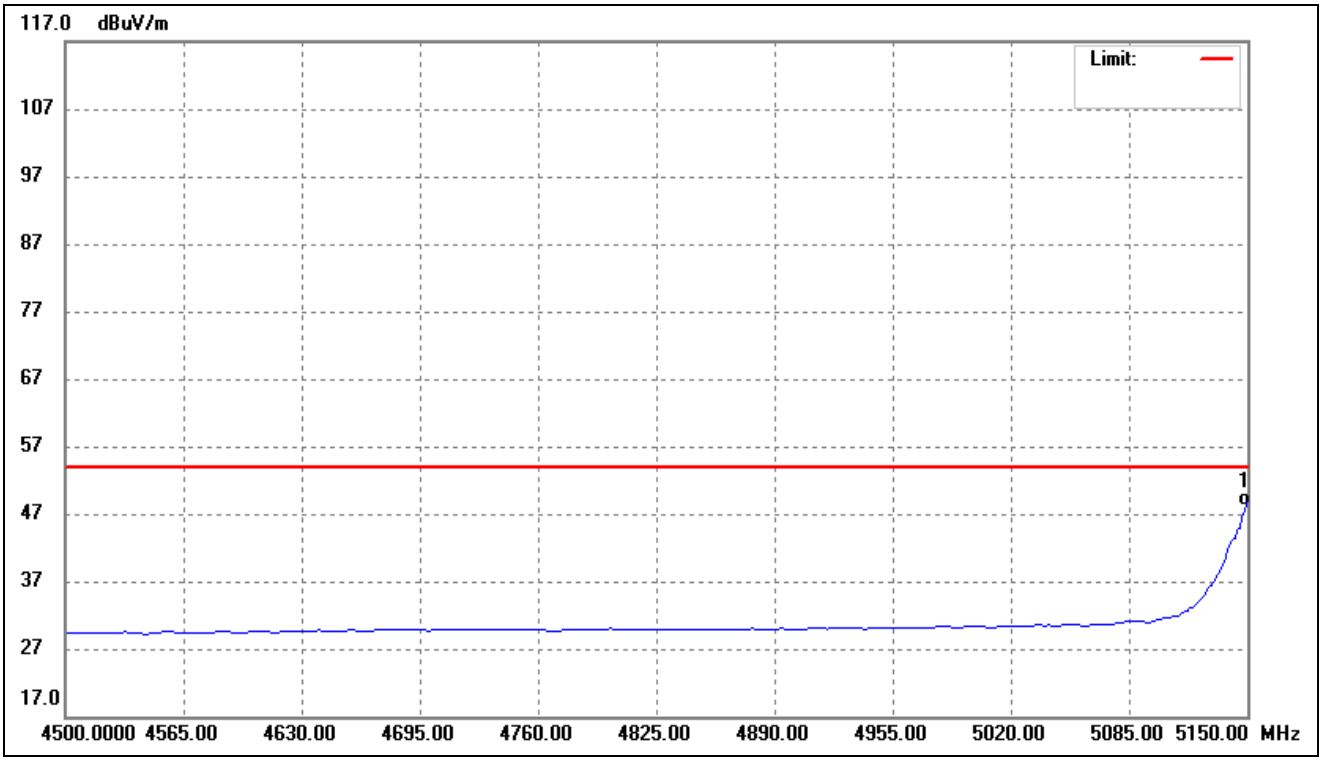
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	60.05	-11.65	48.40	54.00	-5.60	-	-	AVG

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



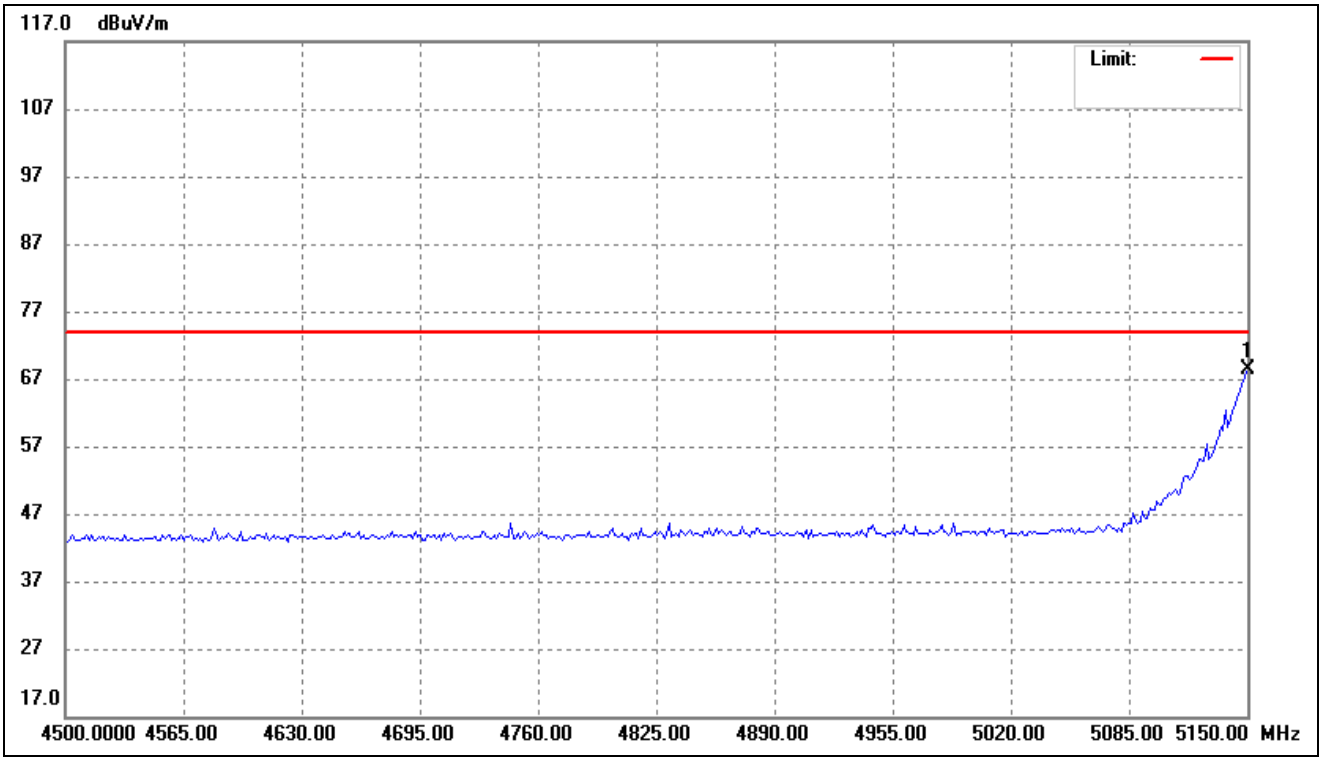
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	78.37	-11.65	66.72	74.00	-7.28	-	-	peak

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



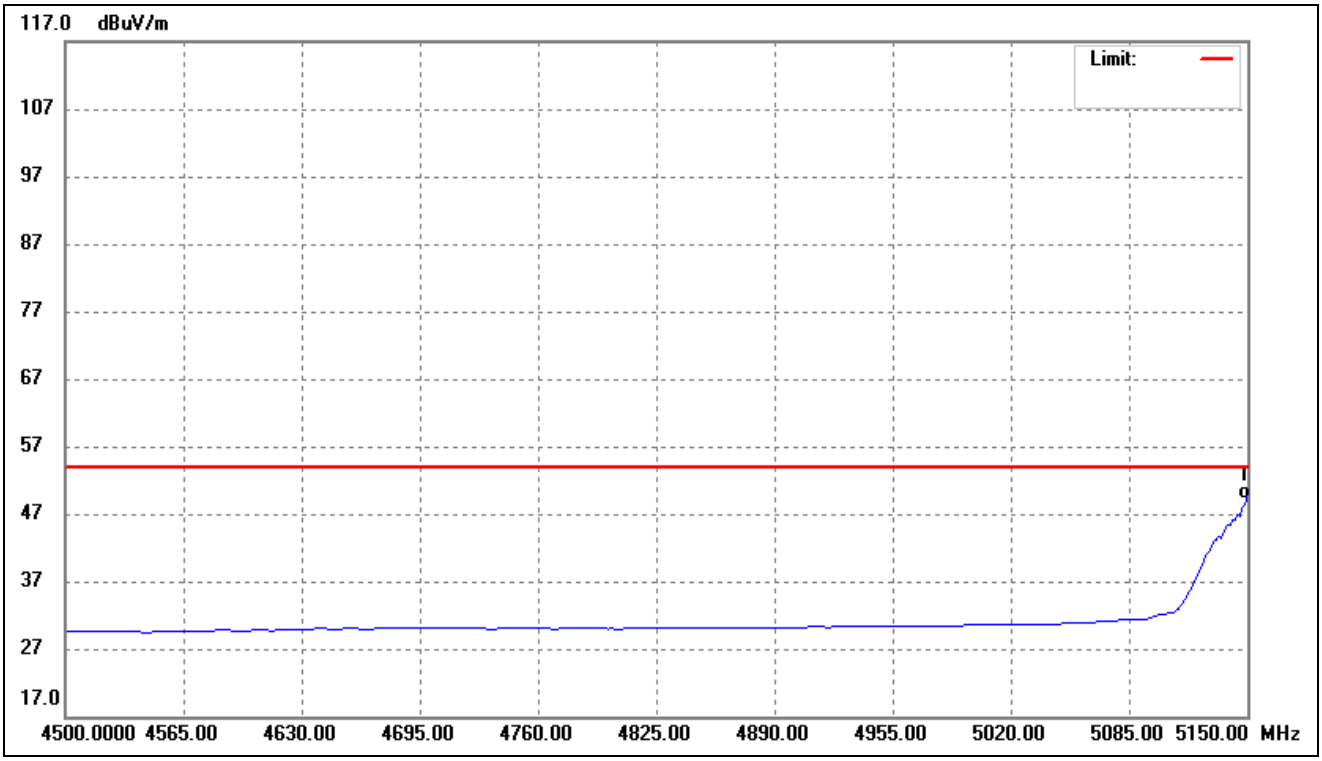
No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	60.68	-11.65	49.03	54.00	-4.97	-	-	AVG

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	79.93	-11.65	68.28	74.00	-5.72	-	-	peak

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



No.	Frequency	Reading	Correct	Result	Limit	Margin	Degree	Height	Remark
	(MHz)	(dBuV/m)	dB/m	(dBuV/m)	(dBuV/m)	(dB)	( )	(cm)	
1	5150.000	61.86	-11.65	50.21	54.00	-3.79	-	-	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, 5.725-5.850GHz (802.11a)
- Antenna 0
- 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	56.02	7.11	63.13	74	-10.87	H	PK
10360	39.49	7.11	46.60	54	-7.40	H	AV
10360	55.44	7.11	62.55	74	-11.45	V	PK
10360	38.15	7.11	45.26	54	-8.74	V	AV
Middle Channel (5200MHz)							
10400	58.08	7.22	65.30	74	-8.70	H	PK
10400	38.41	7.22	45.63	54	-8.37	H	AV
10400	55.35	7.22	62.57	74	-11.43	V	PK
10400	38.77	7.22	45.99	54	-8.01	V	AV
High Channel (5240MHz)							
10480	56.68	7.69	64.37	74	-9.63	H	PK
10480	40.78	7.69	48.47	54	-5.53	H	AV
10480	57.10	7.69	64.79	74	-9.21	V	PK
10480	38.02	7.69	45.71	54	-8.29	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5745MHz)							
11490	55.09	9.45	64.54	74	-9.46	H	PK
11490	41.08	9.45	50.53	54	-3.47	H	AV
11490	58.56	9.45	68.01	74	-5.99	V	PK
11490	38.72	9.45	48.17	54	-5.83	V	AV
Middle Channel (5785MHz)							
11570	56.89	9.62	66.51	74	-7.49	H	PK
11570	40.24	9.62	49.86	54	-4.14	H	AV
11570	58.02	9.62	67.64	74	-6.36	V	PK
11570	41.98	9.62	51.60	54	-2.40	V	AV
High Channel (5825MHz)							
11650	58.45	9.84	68.29	74	-5.71	H	PK
11650	38.50	9.84	48.34	54	-5.66	H	AV
11650	55.88	9.84	65.72	74	-8.28	V	PK
11650	40.25	9.84	50.09	54	-3.91	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-36.85	-27
Highest	Above 5350	-35.27	-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	-36.59	-27
	5715 to 5725	-35.24	-17
Highest	5850 to 5860	-26.30	-17
	Above 5860	-35.48	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11n HT20)
- Antenna 0+ Antenna 1
- 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	56.23	7.11	63.34	74	-10.66	H	PK
10360	39.33	7.11	46.44	54	-7.56	H	AV
10360	57.57	7.11	64.68	74	-9.32	V	PK
10360	40.58	7.11	47.69	54	-6.31	V	AV
Middle Channel (5200MHz)							
10400	58.01	7.22	65.23	74	-8.77	H	PK
10400	38.24	7.22	45.46	54	-8.54	H	AV
10400	57.98	7.22	65.20	74	-8.80	V	PK
10400	38.12	7.22	45.34	54	-8.66	V	AV
High Channel (5240MHz)							
10480	58.42	7.69	66.11	74	-7.89	H	PK
10480	38.10	7.69	45.79	54	-8.21	H	AV
10480	55.85	7.69	63.54	74	-10.46	V	PK
10480	39.98	7.69	47.67	54	-6.33	V	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
Low Channel (5745MHz)							
11490	58.22	9.45	67.67	74	-6.33	H	PK
11490	39.17	9.45	48.62	54	-5.38	H	AV
11490	57.86	9.45	67.31	74	-6.69	V	PK
11490	40.15	9.45	49.60	54	-4.40	V	AV
Middle Channel (5785MHz)							
11570	57.53	9.62	67.15	74	-6.85	H	PK
11570	40.73	9.62	50.35	54	-3.65	H	AV
11570	55.57	9.62	65.19	74	-8.81	V	PK
11570	38.34	9.62	47.96	54	-6.04	V	AV
High Channel (5825MHz)							
11650	55.07	9.84	64.91	74	-9.09	H	PK
11650	40.18	9.84	50.02	54	-3.98	H	AV
11650	57.15	9.84	66.99	74	-7.01	V	PK
11650	38.60	9.84	48.44	54	-5.56	V	AV

- Out of Band edge 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-38.87	-27
Highest	Above 5350	-42.29	-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	-39.67	-27
	5715 to 5725	-35.59	-17
Highest	5850 to 5860	-34.34	-17
	Above 5860	-36.25	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz5.725-5.850GHz (802.11n HT40)
- Antenna 0 & Antenna 1
- 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	56.08	7.89	63.97	74	-10.03	H	PK
10380	39.79	7.89	47.68	54	-6.32	H	AV
10380	58.55	7.89	66.44	74	-7.56	V	PK
10380	39.43	7.89	47.32	54	-6.68	V	AV
High Channel (5230MHz)							
10460	55.73	7.97	63.70	74	-10.30	H	PK
10460	40.01	7.97	47.98	54	-6.02	H	AV
10460	58.35	7.97	66.32	74	-7.68	V	PK
10460	39.14	7.97	47.11	54	-6.89	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	58.78	9.45	68.23	74	-5.77	H	PK
11510	40.98	9.45	50.43	54	-3.57	H	AV
11510	55.12	9.45	64.57	74	-9.43	V	PK
11510	40.79	9.45	50.24	54	-3.76	V	AV
High Channel (5795MHz)							
11590	58.91	9.27	68.18	74	-5.82	H	PK
11590	40.54	9.27	49.81	54	-4.19	H	AV
11590	55.97	9.27	65.24	74	-8.76	V	PK
11590	39.34	9.27	48.61	54	-5.39	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-35.24	-27
Highest	Above 5350	-36.96	-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	-38.51	-27
	5715 to 5725	-32.49	-17
Highest	5850 to 5860	-36.35	-17
	Above 5860	-37.53	-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, 5.725-5.850GHz (802.11ac VHT40)
- Antenna 0 & Antenna 1
- 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	56.85	7.89	64.74	74	-9.26	H	PK
10380	38.33	7.89	46.22	54	-7.78	H	AV
10380	58.31	7.89	66.20	74	-7.80	V	PK
10380	41.28	7.89	49.17	54	-4.83	V	AV
High Channel (5230MHz)							
10460	58.00	7.97	65.97	74	-8.03	H	PK
10460	38.21	7.97	46.18	54	-7.82	H	AV
10460	55.15	7.97	63.12	74	-10.88	V	PK
10460	38.95	7.97	46.92	54	-7.08	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	58.79	9.45	68.24	74	-5.76	H	PK
11510	41.54	9.45	50.99	54	-3.01	H	AV
11510	55.60	9.45	65.05	74	-8.95	V	PK
11510	40.84	9.45	50.29	54	-3.71	V	AV
High Channel (5795MHz)							
11590	56.35	9.27	65.62	74	-8.38	H	PK
11590	41.03	9.27	50.30	54	-3.70	H	AV
11590	57.63	9.27	66.90	74	-7.10	V	PK
11590	42.00	9.27	51.27	54	-2.73	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-35.58	-27
Highest	Above 5350	-36.30	-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	-36.58	-27
	5715 to 5725	-31.27	-17
Highest	5850 to 5860	-30.19	-17
	Above 5860	-35.67	-27
Note: the data just list the worst cases			

- For the frequency band 5.15-5.25GHz, 5.725-5.850GHz (802.11ac VH80)
- Antenna 0 & Antenna 1
- 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	57.63	7.53	65.16	74	-8.84	H	PK
10420	38.52	7.53	46.05	54	-7.95	H	AV
10420	56.06	7.53	63.59	74	-10.41	H	PK
10420	40.18	7.53	47.71	54	-6.29	H	AV

Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
(MHz)	(dBuV/m)	dB	(dBuV/m)	(dBuV/m)	(dB)	H/V	
5775MHz							
11550	56.98	9.93	66.91	74	-7.09	H	PK
11550	39.74	9.93	49.67	54	-4.33	H	AV
11550	55.46	9.93	65.39	74	-8.61	V	PK
11550	41.80	9.93	51.73	54	-2.27	V	AV

- Out of Band edge for 5150-5250MHz

Test CH.	Test Segment	Result	Limit
	MHz	dBm/MHz	dBm/MHz
Lowest	Below 5150	-38.82	-27
Highest	Above 5350	-36.46	-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	-39.89	-27
	5715 to 5725	-33.57	-17
Highest	5850 to 5860	-30.26	-17
	Above 5860	-38.31	-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

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

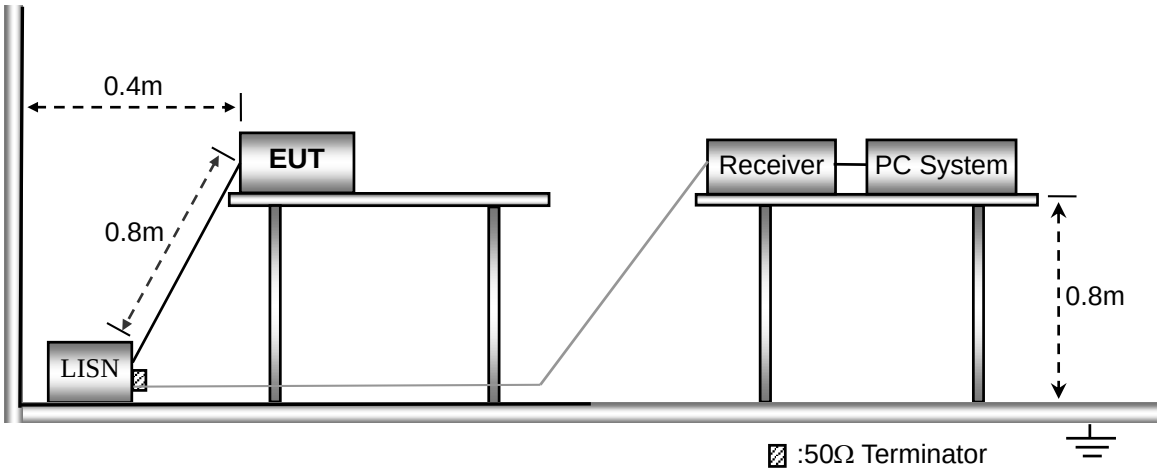
Please refer to Appendix D

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



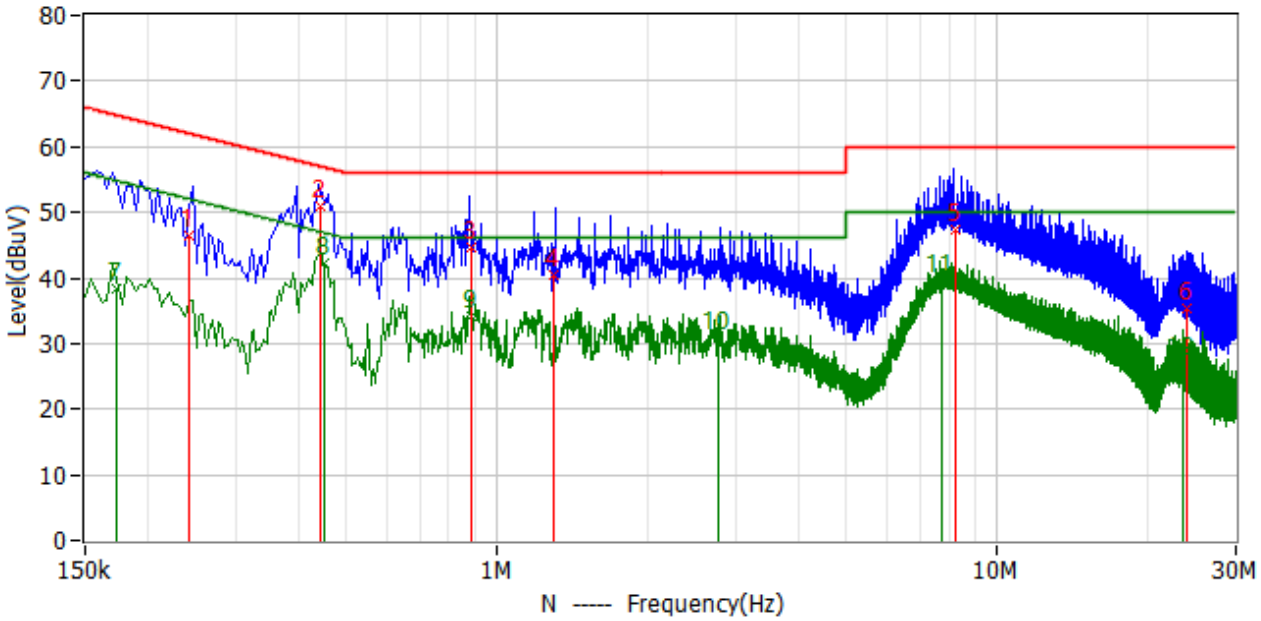
10.3 Test Receiver Setup

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

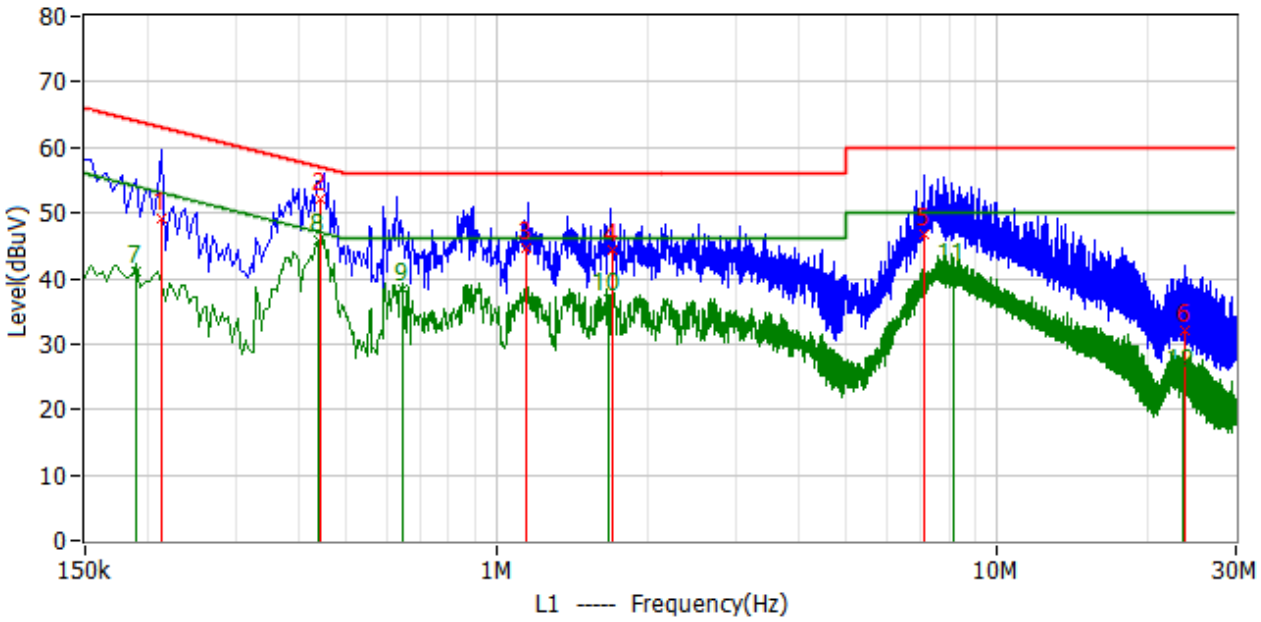
10.4 Summary of Test Results/Plots

Test Mode	Communication	AC120V 60Hz	Polarity:	Neutral



No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector
1	242.000kHz	36.7	9.8	46.5	62.0	-15.5	QP
2	442.000kHz	41.1	9.8	50.9	57.0	-6.2	QP
3	886.000kHz	35.0	9.7	44.7	56.0	-11.3	QP
4	1.298MHz	30.7	9.7	40.4	56.0	-15.6	QP
5	8.222MHz	37.5	9.9	47.4	60.0	-12.6	QP
6	23.894MHz	25.0	10.3	35.3	60.0	-24.7	QP
7	174.000kHz	28.8	9.7	38.5	54.8	-16.3	CAV
8	450.000kHz	32.3	9.8	42.1	46.9	-4.8	CAV
9	890.000kHz	24.5	9.7	34.2	46.0	-11.8	CAV
10	2.778MHz	21.3	9.7	31.0	46.0	-15.0	CAV
11	7.726MHz	29.9	9.8	39.7	50.0	-10.3	CAV
12	23.534MHz	16.8	10.2	27.0	50.0	-23.0	CAV

Test Mode	Communication	AC120V 60Hz	Polarity:	Line



No.	Frequency	Reading dBuV	Factor dB	Level dBuV	Limit dBuV	Delta dB	Detector
1	214.000kHz	39.4	9.7	49.1	63.0	-13.9	QP
2	442.000kHz	42.3	9.8	52.1	57.0	-5.0	QP
3	1.146MHz	34.7	9.8	44.5	56.0	-11.5	QP
4	1.694MHz	34.4	9.8	44.2	56.0	-11.8	QP
5	7.162MHz	37.1	9.7	46.8	60.0	-13.2	QP
6	23.654MHz	22.1	10.1	32.2	60.0	-27.8	QP
7	190.000kHz	31.4	9.7	41.1	54.0	-12.9	CAV
8	438.000kHz	36.1	9.8	45.9	47.1	-1.2	CAV
9	650.000kHz	28.6	9.7	38.3	46.0	-7.7	CAV
10	1.666MHz	27.1	9.8	36.9	46.0	-9.1	CAV
11	8.182MHz	31.4	9.8	41.2	50.0	-8.8	CAV
12	23.434MHz	15.0	10.1	25.1	50.0	-24.9	CAV

APPENDIX SUMMARY

Project No.	WTX24X02037413W	Test Engineer	Elin Su
Start date	2024/3/28	Finish date	2024/4/10
Temperature	22℃	Humidity	51%
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

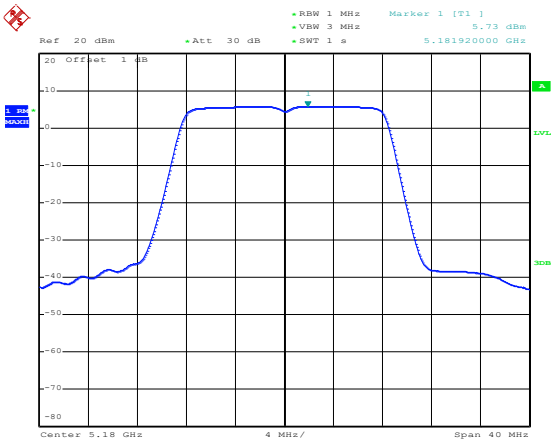
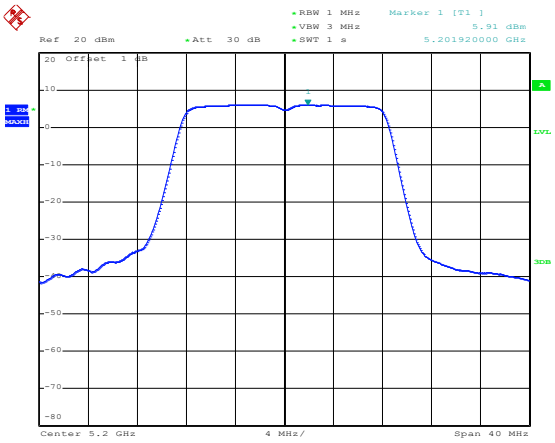
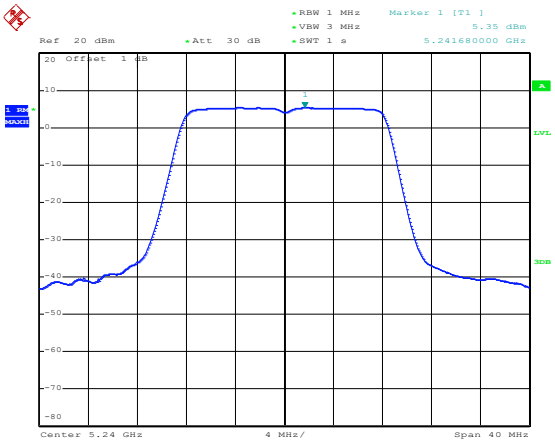
Power Spectral Density					
U-NII-1:5150-5250MHz					
Operating mode	Test Channel	ANT 0 dBm/MHz	ANT 1 dBm/MHz	Total dBm/MHz	Limit (dBm/MHz)
802.11a	5180	5.73	5.75	/	11.0
	5200	5.91	5.87	/	11.0
	5240	5.35	6.09	/	11.0
802.11n-HT20	5180	2.37	3.00	5.71	8.2
	5200	2.71	3.03	5.88	8.2
	5240	2.75	3.25	6.02	8.2
802.11n-HT40	5190	-1.05	-0.44	2.28	8.2
	5230	-0.73	-0.39	2.45	8.2
802.11ac-VHT40	5190	-0.63	-0.61	2.39	8.2
	5230	-0.35	0.05	2.86	8.2
802.11ac-VHT80	5210	-3.65	-3.28	-0.45	8.2

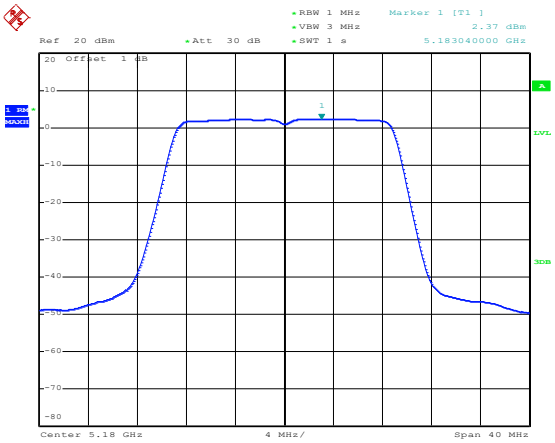
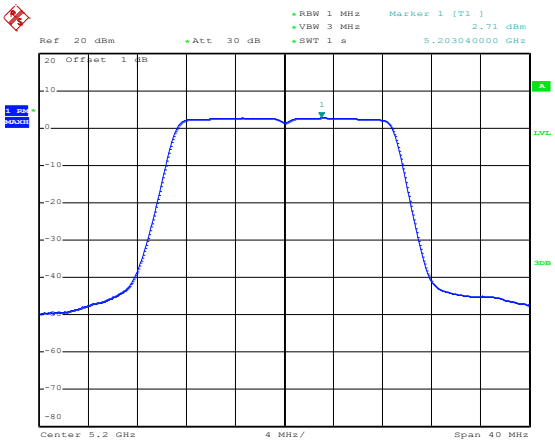
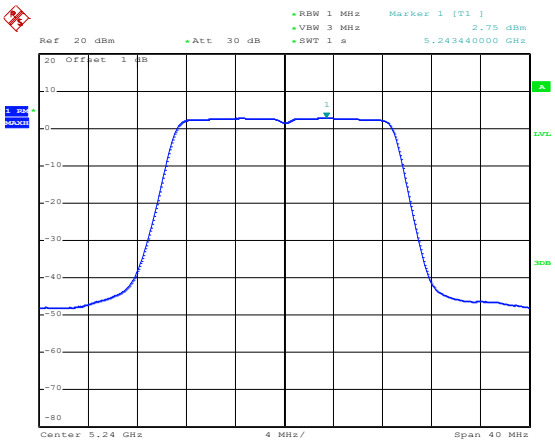
Power Spectral Density							
U-NII-3: 5725-5850MHz							
Operating mode	Test Channel	ANT 0 dBm/300kHz	ANT 1 dBm/300kHz	Factor	ANT 0 dBm/500kHz*	ANT 1 dBm/500kHz*	Limit dBm/500kHz
802.11a	5745	2.43	1.73	2.22	4.65	3.95	30
	5785	2.26	1.83	2.22	4.48	4.05	30
	5825	2.19	1.71	2.22	4.41	3.93	30
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22							

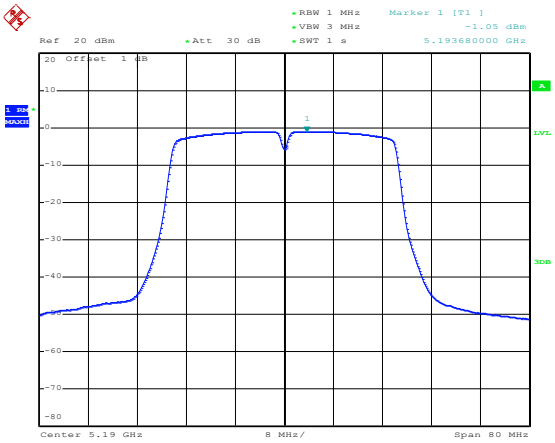
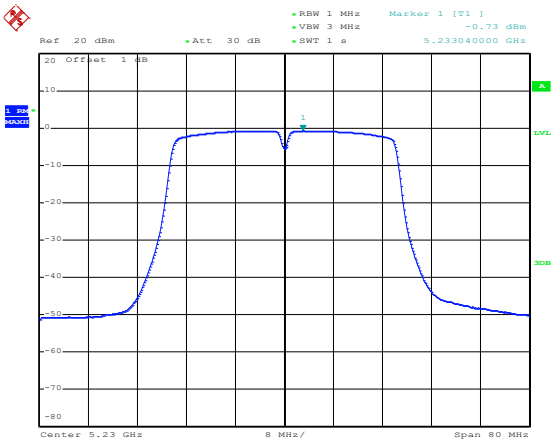
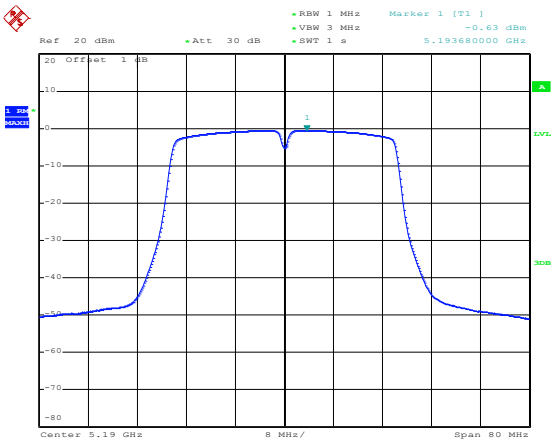
Power Spectral Density						
U-NII-3: 5725-5850MHz						
Operating mode	Test Channel	ANT 0 dBm/300kHz	ANT 1 dBm/300kHz	Factor	Total dBm/500kHz*	Limit dBm/500kHz
802.11n-HT20	5745	0.87	1.06	2.22	4.15	27.2
	5785	0.55	0.93	2.22	3.7	27.2
	5825	0.72	0.46	2.22	3.4	27.2
802.11n-HT40	5755	-2.23	-2.07	2.22	-4.3	27.2
	5795	-2.49	-2.15	2.22	-4.64	27.2
802.11ac-VHT 40	5755	-2.16	-2.77	2.22	-4.93	27.2
	5795	-2.58	-2.83	2.22	-5.41	27.2
802.11ac-VHT 80	5775	-6.37	-5.92	2.22	-12.29	27.2
*Note: Maximum PSD=PSD(dBm/300kHz)+10log(500kHz/300kHz)=2.22						

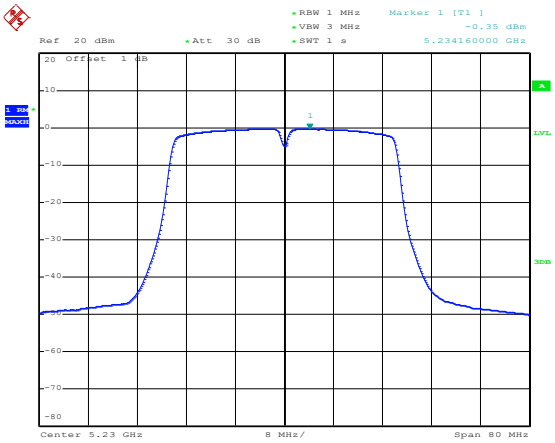
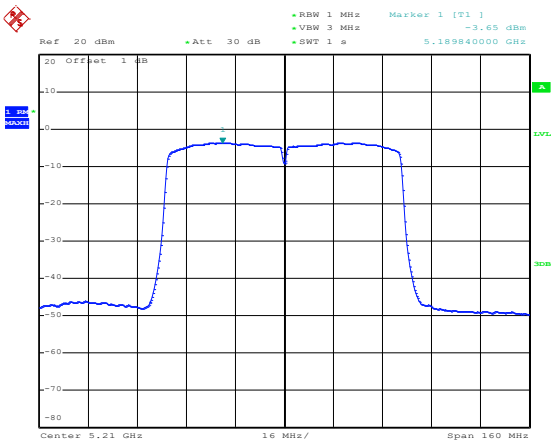
ANT 0

5150-5250MHz

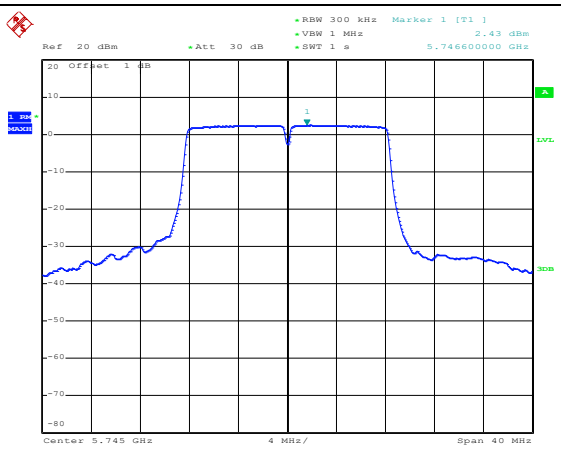
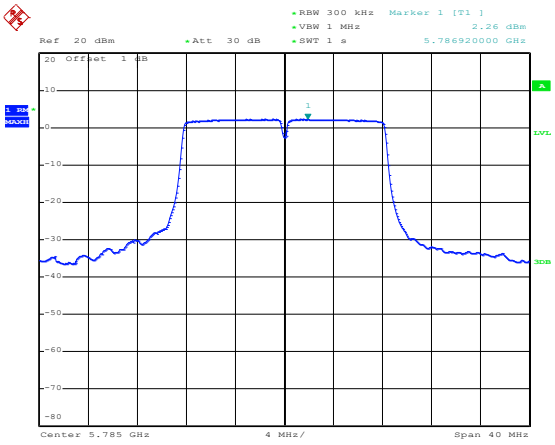
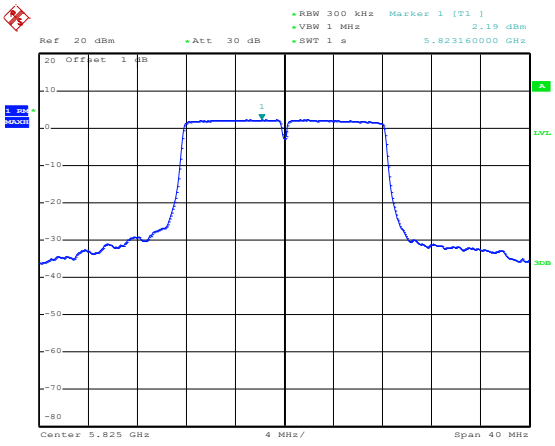
802.11a-Low	 Date: 10.APR.2024 15:04:19
802.11a-Middle	 Date: 10.APR.2024 15:04:34
802.11a-High	 Date: 10.APR.2024 15:05:41

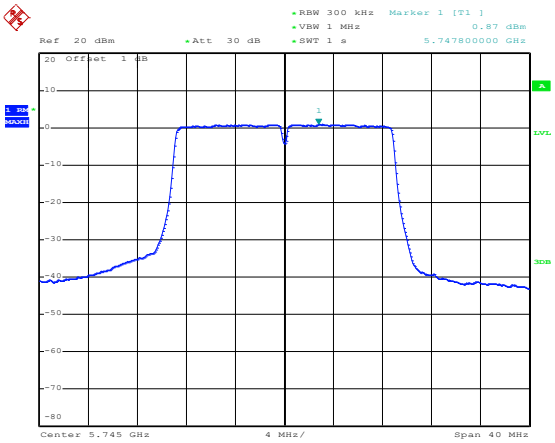
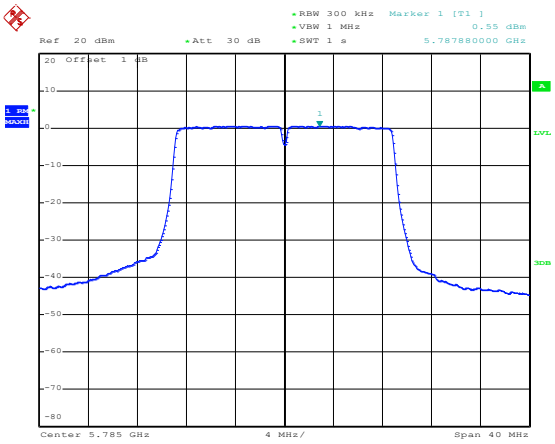
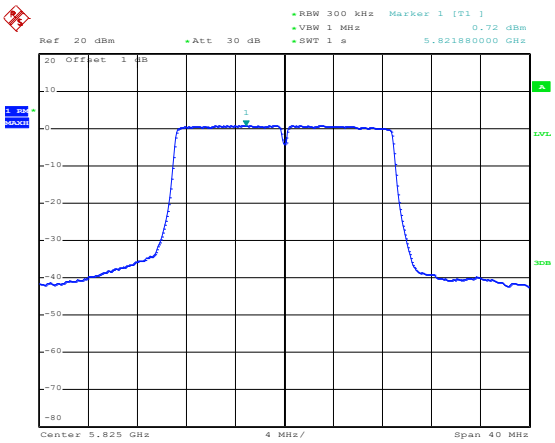
802.11n-HT20-Low	 Date: 10.APR.2024 15:06:02
802.11n-HT20-Middle	 Date: 10.APR.2024 15:06:23
802.11n-HT20-High	 Date: 10.APR.2024 15:06:38

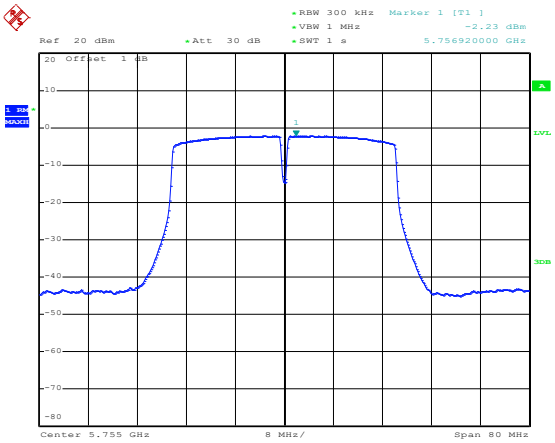
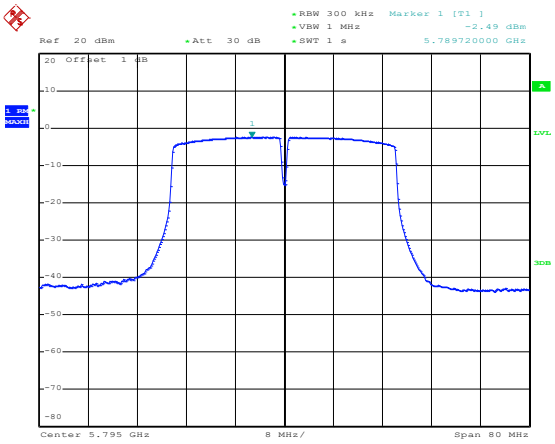
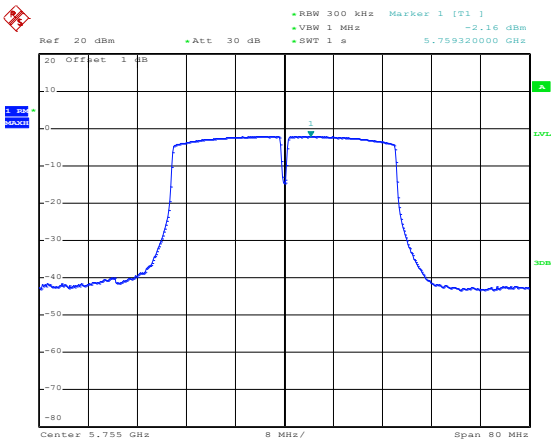
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-VHT40-Low	

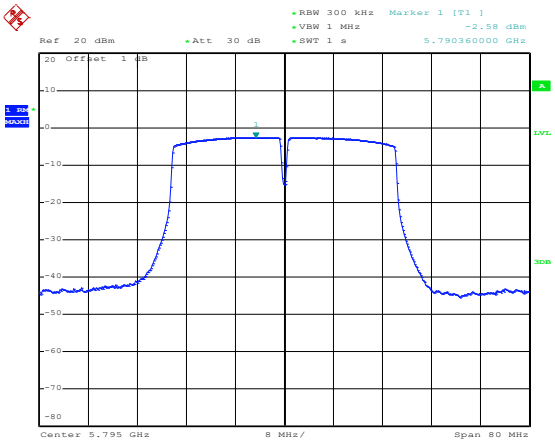
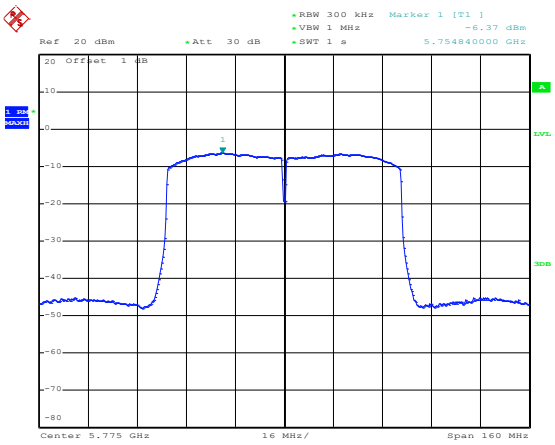
802.11ac-VHT40-High	
802.11ac-VHT80	

5725-5850MHz

802.11a-Low	
802.11a-Middle	
802.11a-High	

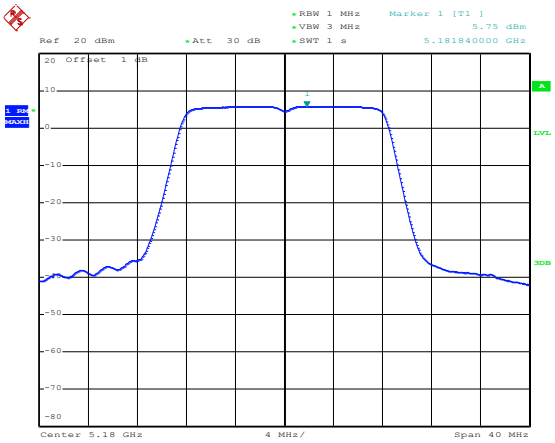
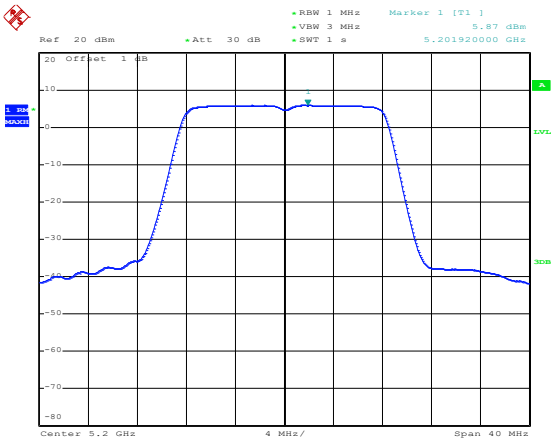
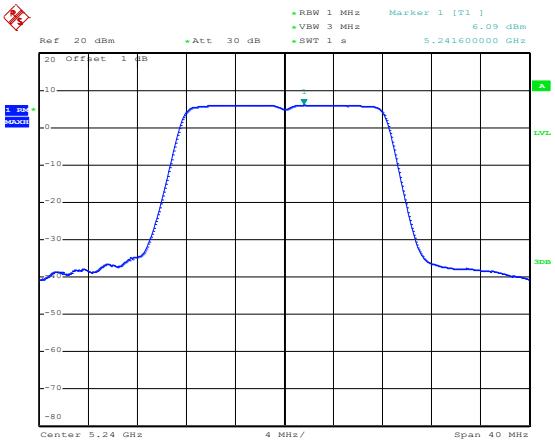
802.11n-HT20-Low	 Date: 31.MAR.2024 17:48:58
802.11n-HT20-Middle	 Date: 31.MAR.2024 17:49:13
802.11n-HT20-High	 Date: 31.MAR.2024 17:49:28

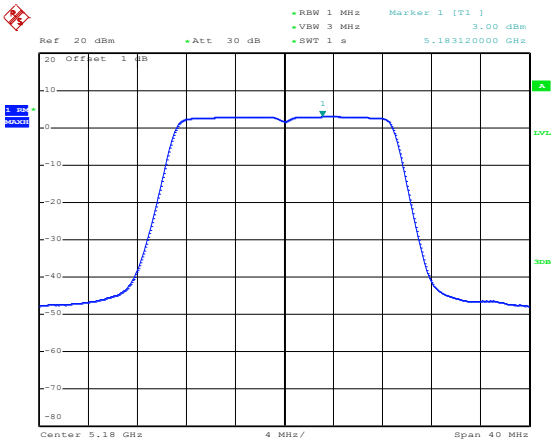
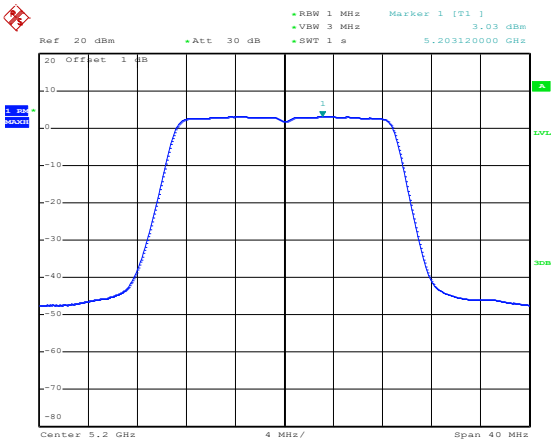
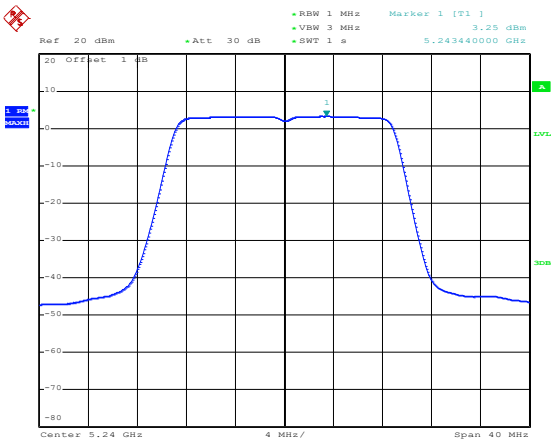
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-VHT40-Low	

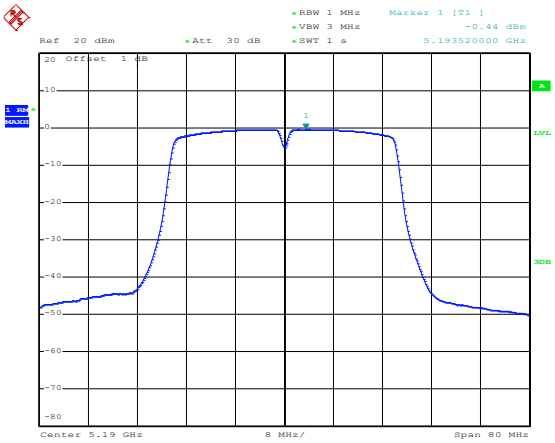
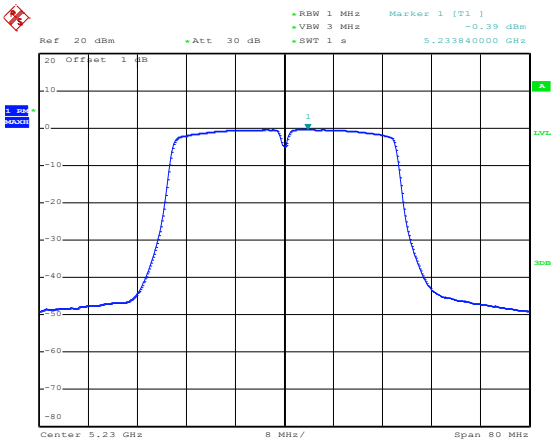
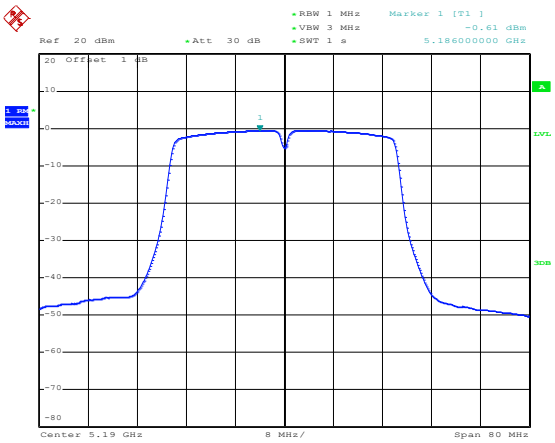
802.11ac-VHT40-High	
802.11ac-VHT80	

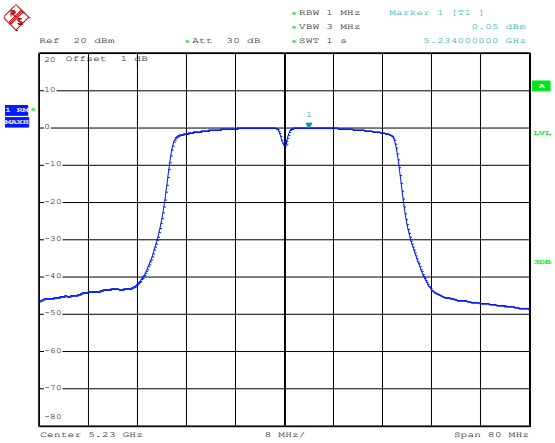
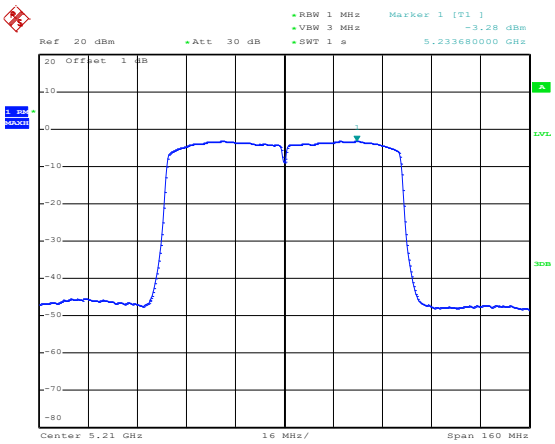
ANT 1

5150-5250MHz

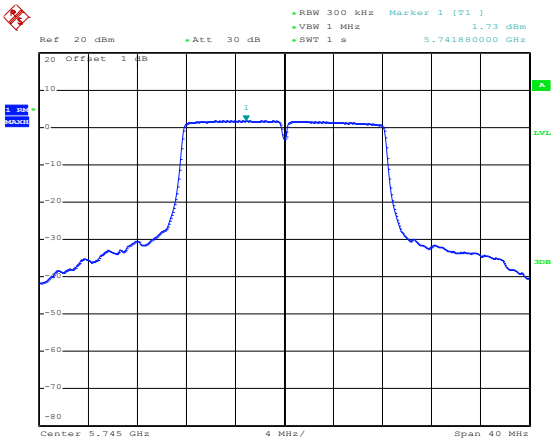
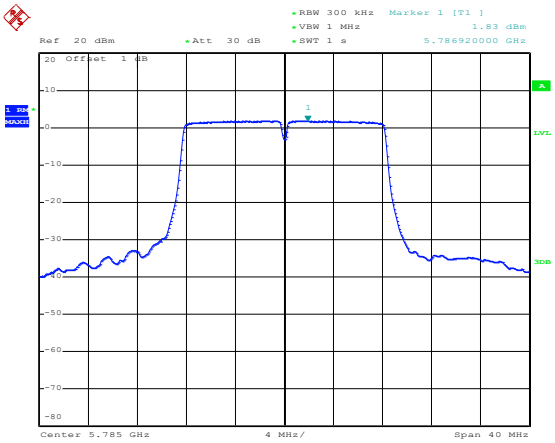
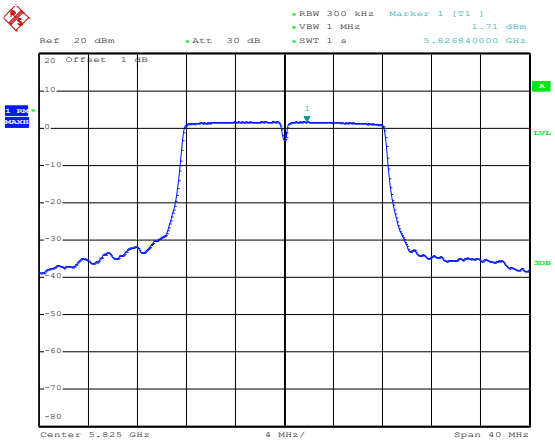
802.11a-Low	 Date: 10.APR.2024 15:10:30
802.11a-Middle	 Date: 10.APR.2024 15:11:02
802.11a-High	 Date: 10.APR.2024 15:11:20

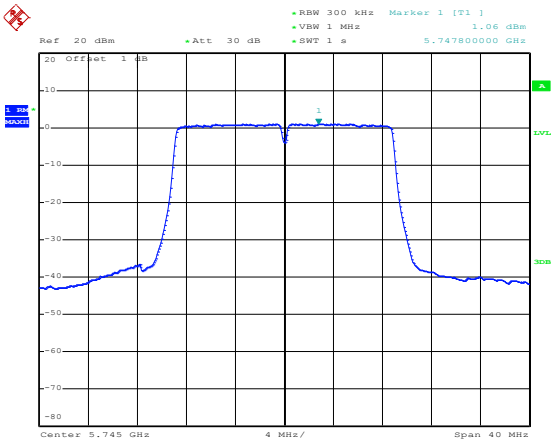
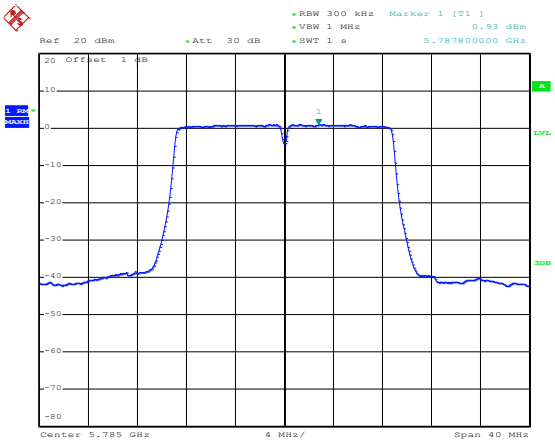
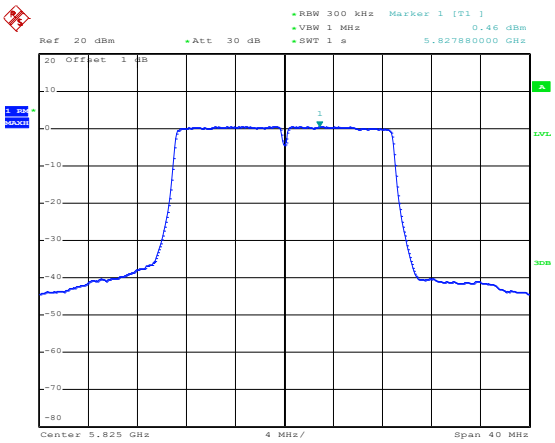
802.11n-HT20-Low	 Date: 10.APR.2024 15:11:51
802.11n-HT20-Middle	 Date: 10.APR.2024 15:12:11
802.11n-HT20-High	 Date: 10.APR.2024 15:12:41

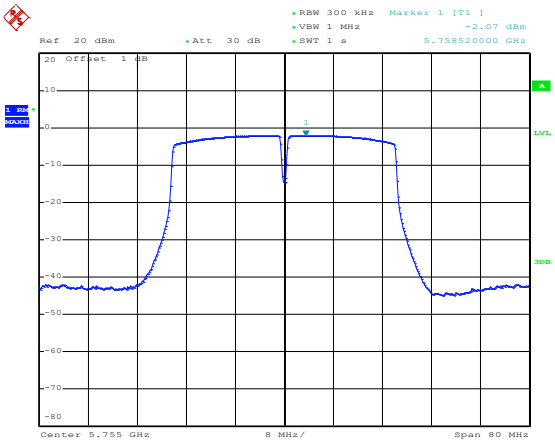
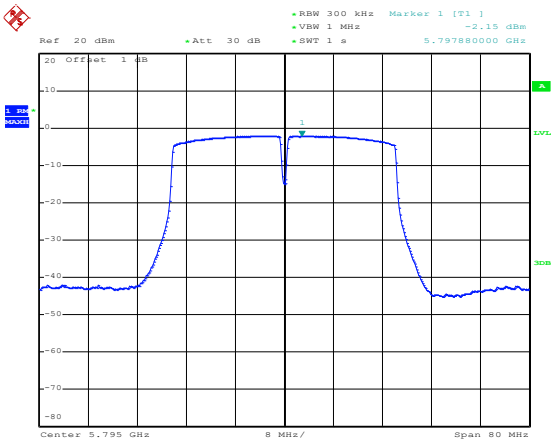
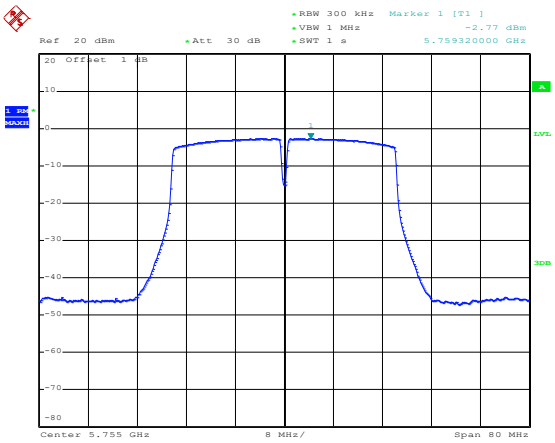
802.11n-HT40-Low	 Date: 10.APR.2024 15:13:38
802.11n-HT40-High	 Date: 10.APR.2024 15:13:51
802.11ac-VHT40-Low	 Date: 10.APR.2024 15:14:12

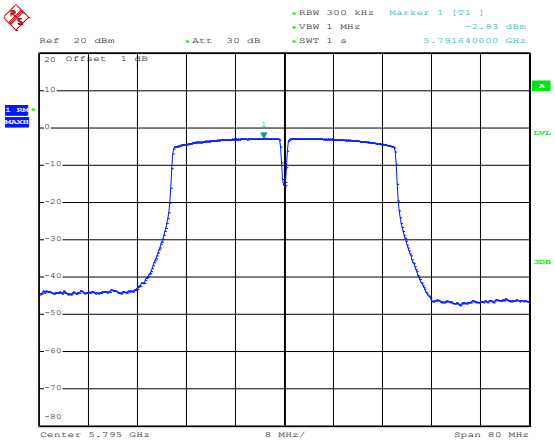
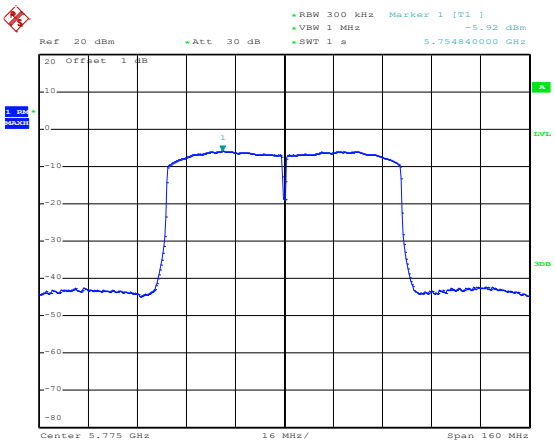
802.11ac-VHT40-High	 Date: 10.APR.2024 15:15:45
802.11ac-VHT80	 Date: 10.APR.2024 15:16:25

5725-5850MHz

802.11a-Low	
802.11a-Middle	
802.11a-High	

802.11n-HT20-Low	 Date: 31.MAR.2024 17:53:59
802.11n-HT20-Middle	 Date: 31.MAR.2024 17:54:10
802.11n-HT20-High	 Date: 31.MAR.2024 17:54:21

802.11n-HT40-Low	 Date: 31.MAR.2024 17:54:41
802.11n-HT40-High	 Date: 31.MAR.2024 17:54:50
802.11ac-VHT40-Low	 Date: 31.MAR.2024 17:55:08

802.11ac-VHT40-High	
802.11ac-VHT80	

APPENDIX B

Emission Bandwidth and Occupied Bandwidth

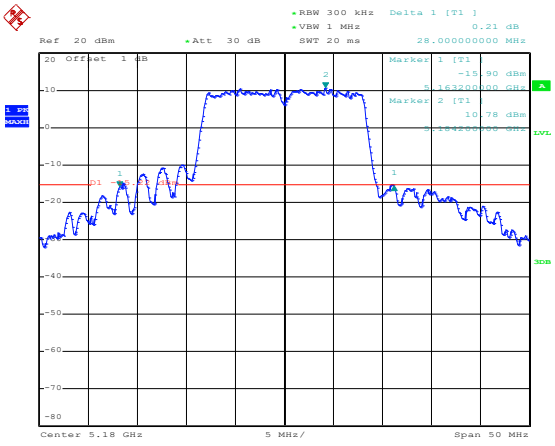
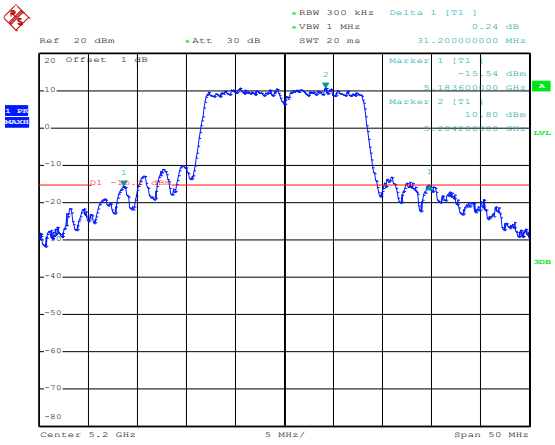
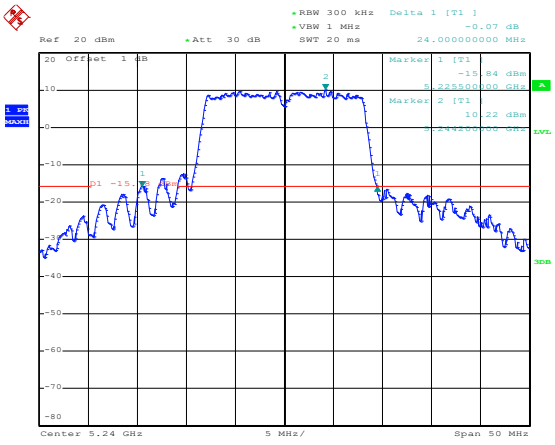
U-NII-1:5150-5250MHz						
Test Mode	Test Channel MHz	ANT 0		ANT 1		Result
		26 dB Bandwidth MHz	99% Bandwidth MHz	26 dB Bandwidth MHz	99% Bandwidth MHz	
802.11a	5180	28.00	16.70	24.10	16.60	Pass
	5200	31.20	16.70	24.30	16.70	Pass
	5240	24.00	16.70	26.00	16.70	Pass
802.11n-HT20	5180	19.90	17.70	19.90	17.70	Pass
	5200	19.90	17.70	19.90	17.70	Pass
	5240	19.90	17.70	19.90	17.70	Pass
802.11n-HT40	5190	41.00	36.60	41.00	36.60	Pass
	5230	41.00	36.80	41.00	36.60	Pass
802.11ac-VHT40	5190	41.00	36.60	40.80	36.60	Pass
	5230	41.00	36.60	40.80	36.60	Pass
802.11ac-VHT80	5210	82.40	75.60	82.40	75.20	Pass

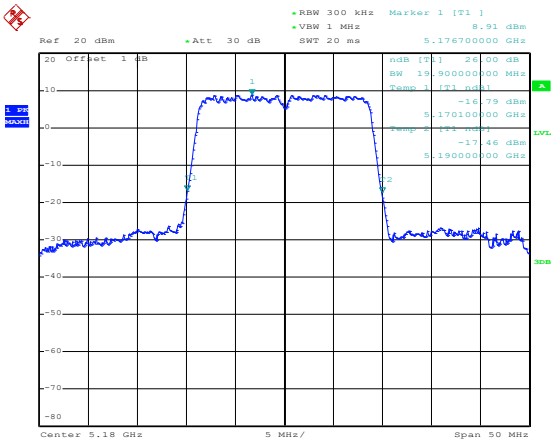
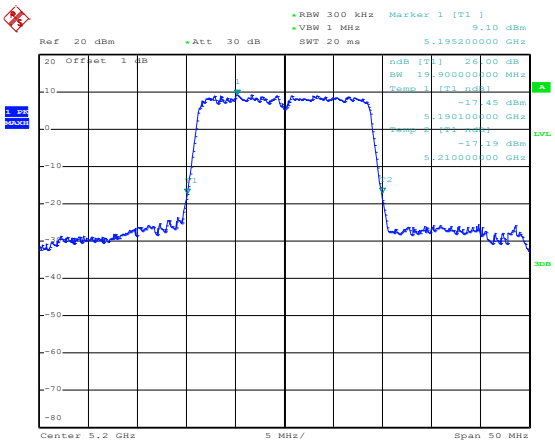
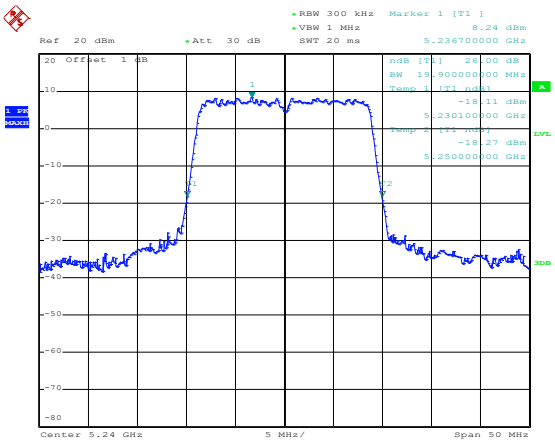
U-NII-3: 5725-5850MHz						
Test Mode	Test Channel MHz	ANT 0		ANT 1		Limit kHz
		6 dB Bandwidth MHz	99% Bandwidth MHz	6 dB Bandwidth MHz	99% Bandwidth MHz	
802.11a	5745	16.60	16.80	16.60	16.90	≥500
	5785	16.80	16.90	16.70	16.90	≥500
	5825	16.80	17.00	16.70	17.00	≥500
802.11n-HT20	5745	17.90	17.70	17.90	17.70	≥500
	5785	17.80	17.70	17.80	17.70	≥500
	5825	17.90	17.70	17.90	17.70	≥500
802.11n-HT40	5755	36.80	36.80	36.80	37.00	≥500
	5795	36.80	36.80	36.80	36.80	≥500
802.11ac-VHT40	5755	36.80	36.60	36.80	36.80	≥500
	5795	36.80	36.80	36.80	36.80	≥500
802.11ac-VHT80	5775	76.80	76.00	77.60	75.20	≥500

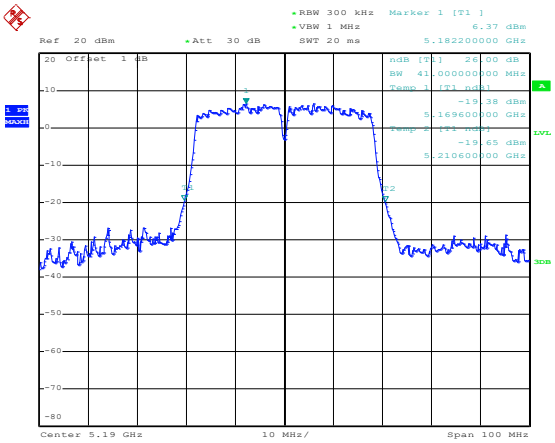
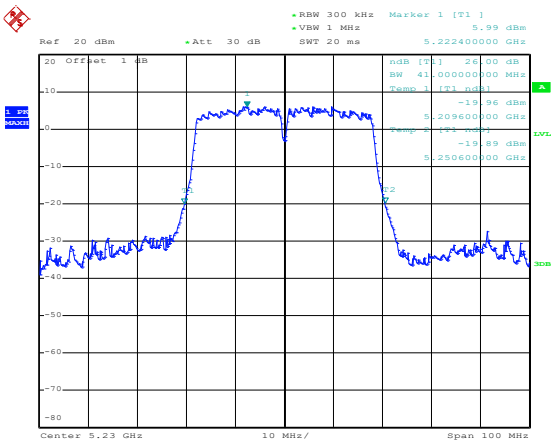
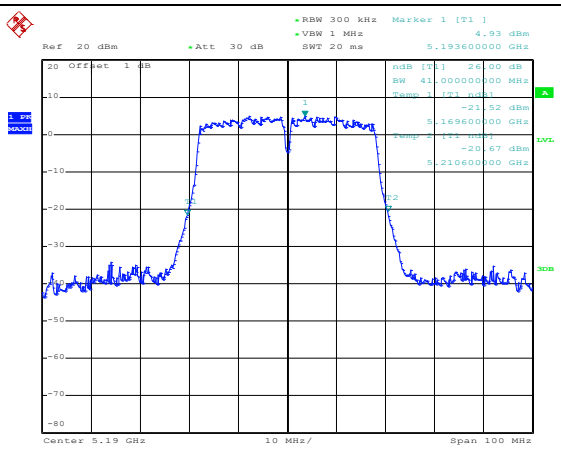
26 dB Bandwidth MHz

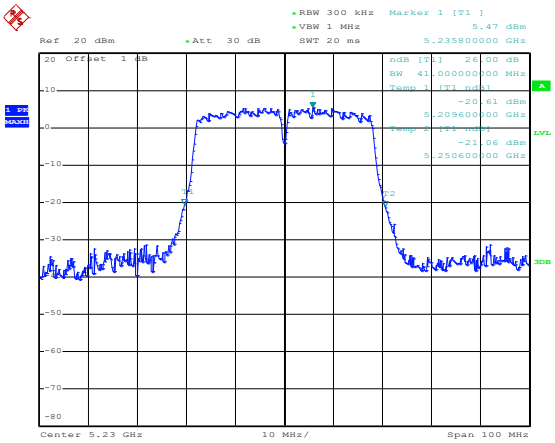
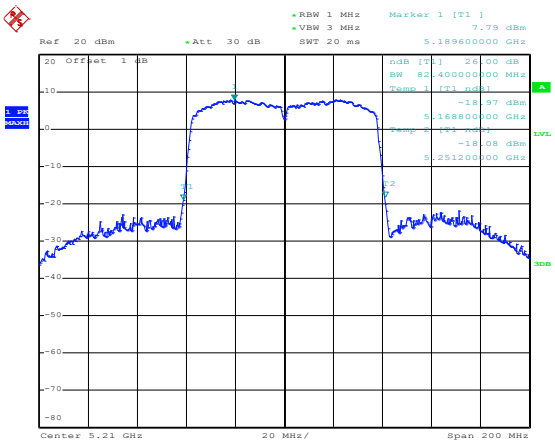
ANT 0

5150-5250MHz

802.11a-Low	 Date: 31.MAR.2024 18:14:16
802.11a-Middle	 Date: 31.MAR.2024 18:14:57
802.11a-High	 Date: 31.MAR.2024 18:16:22

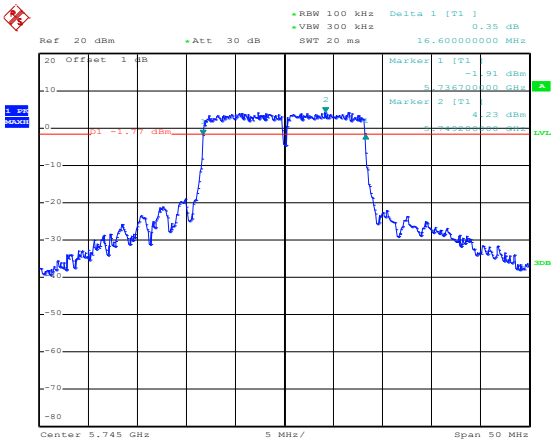
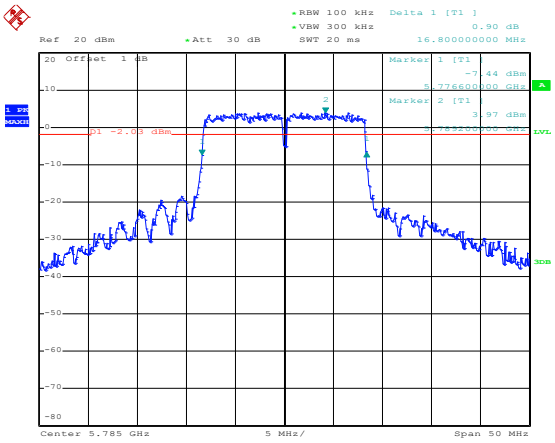
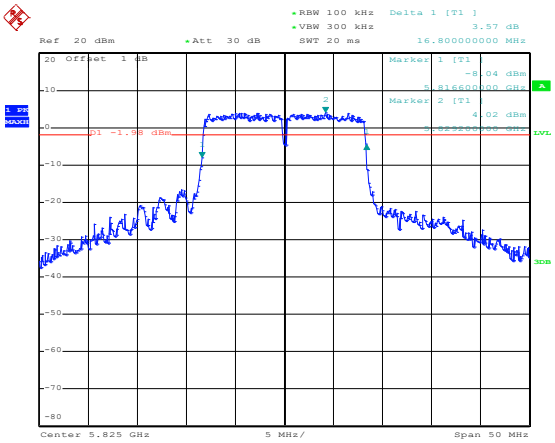
802.11n-HT20-Low	 Date: 31.MAR.2024 18:16:55
802.11n-HT20-Middle	 Date: 31.MAR.2024 18:17:10
802.11n-HT20-High	 Date: 31.MAR.2024 18:17:35

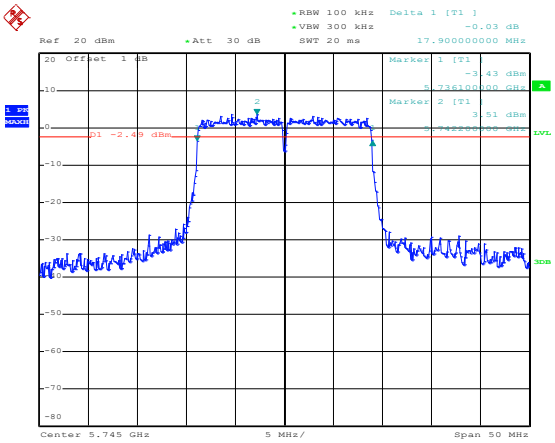
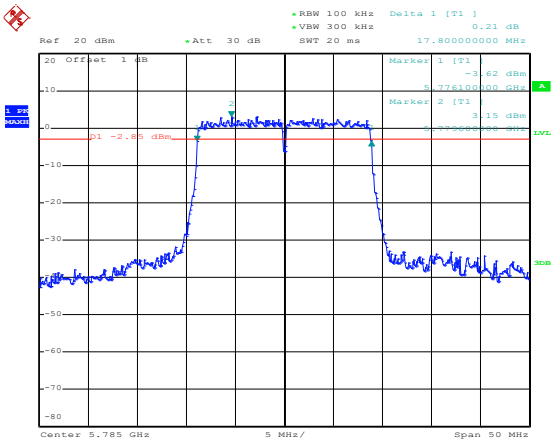
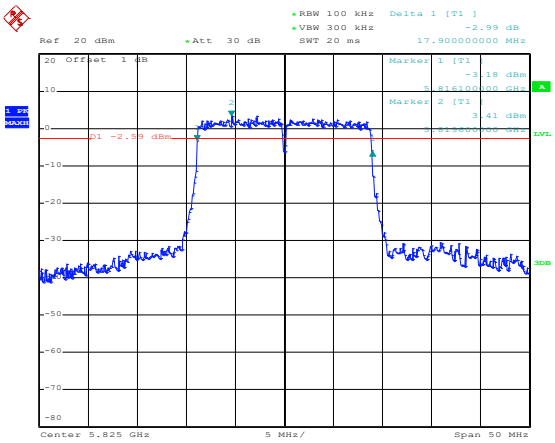
802.11n-HT40-Low	 Date: 31.MAR.2024 18:19:15
802.11n-HT40-High	 Date: 31.MAR.2024 18:19:44
802.11ac-VHT40-Low	 Date: 31.MAR.2024 18:21:45

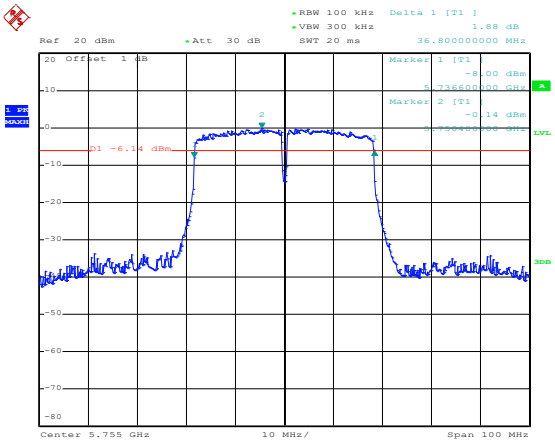
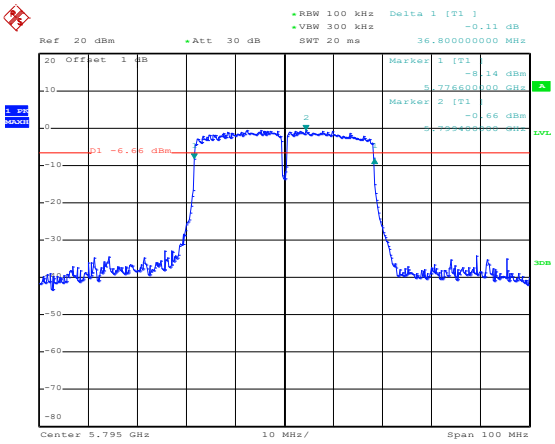
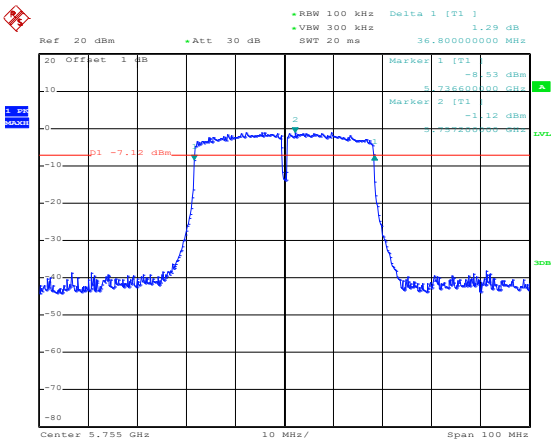
802.11ac-VHT40-High	
802.11ac-VHT80	

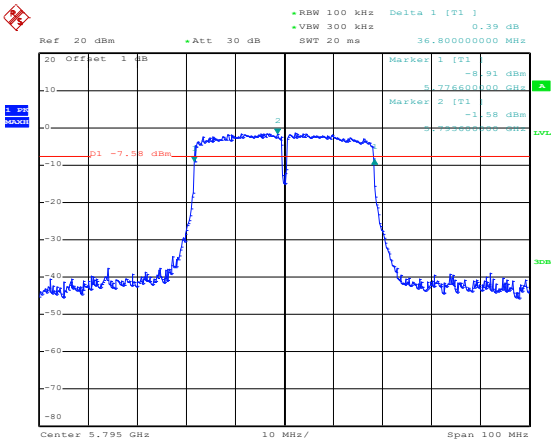
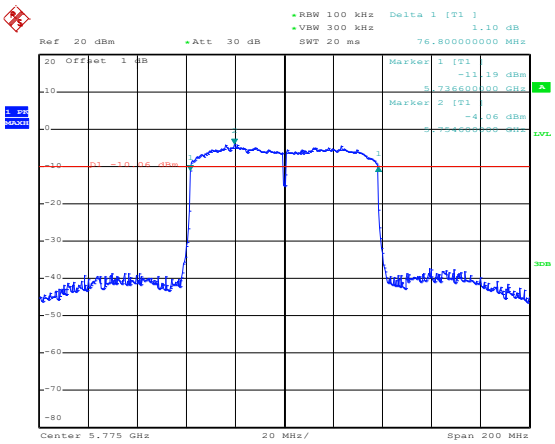
6 dB Bandwidth MHz

5725-5850MHz

802.11a-Low	 Date: 31.MAR.2024 18:24:42
802.11a-Middle	 Date: 31.MAR.2024 18:25:09
802.11a-High	 Date: 31.MAR.2024 18:25:41

802.11n-HT20-Low	
802.11n-HT20-Middle	
802.11n-HT20-High	

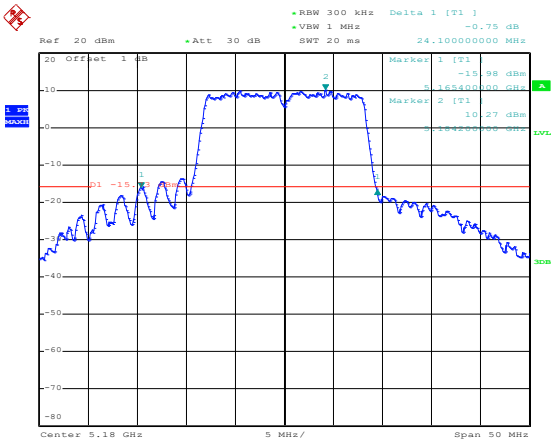
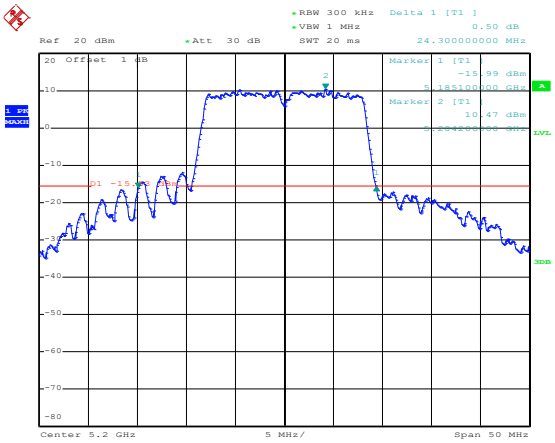
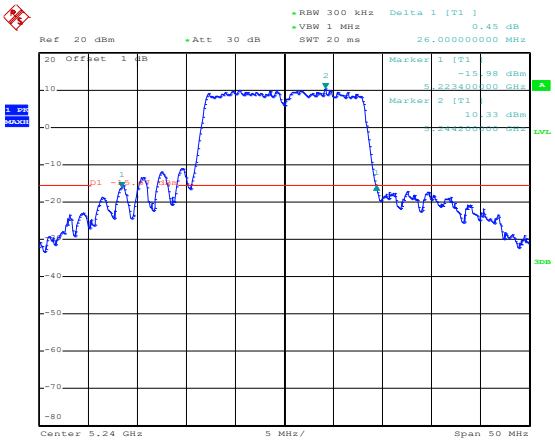
802.11n-HT40-Low	 Date: 31.MAR.2024 18:29:01
802.11n-HT40-High	 Date: 31.MAR.2024 18:29:36
802.11ac-VHT40-Low	 Date: 31.MAR.2024 18:30:13

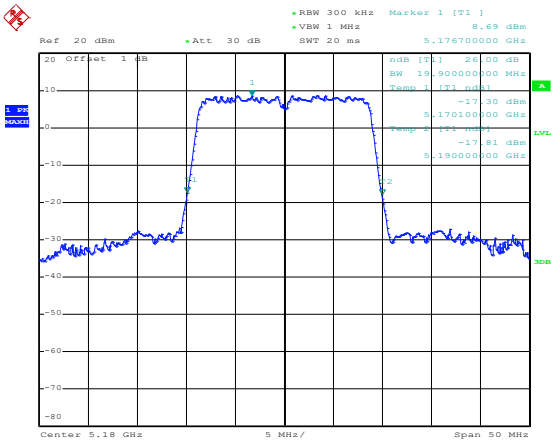
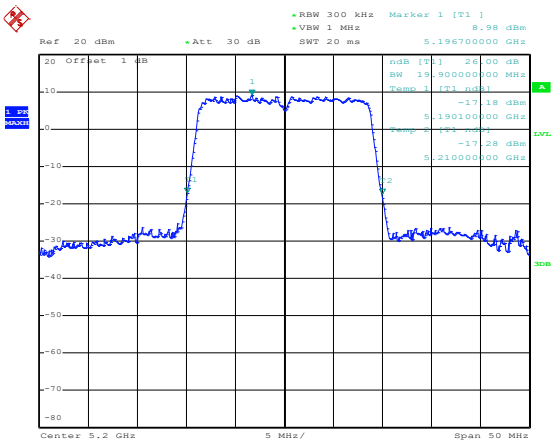
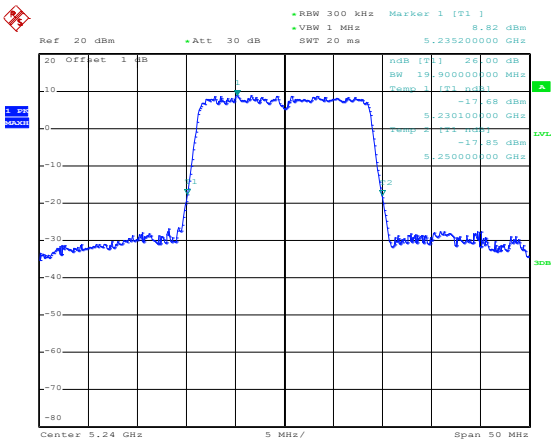
802.11ac-VHT40-High	 Date: 31.MAR.2024 18:30:41
802.11ac-VHT80	 Date: 31.MAR.2024 18:31:22

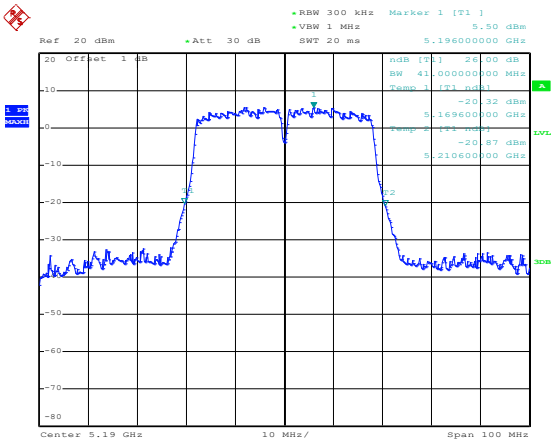
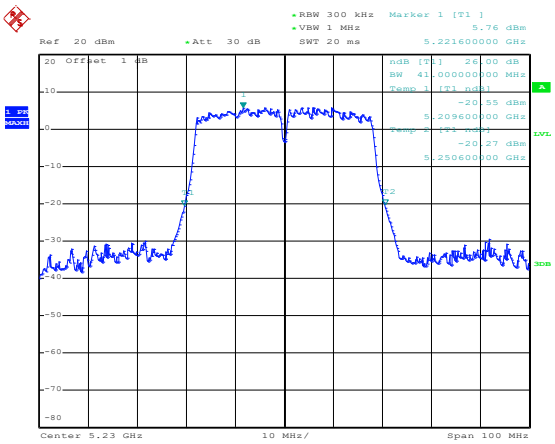
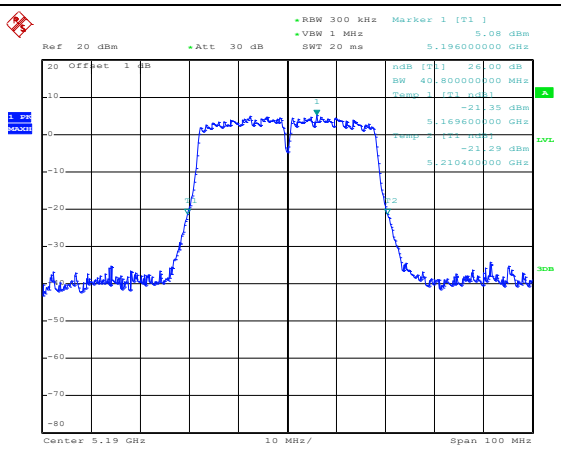
26 dB Bandwidth MHz

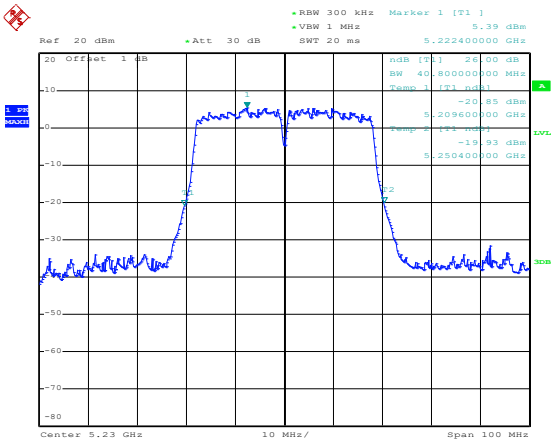
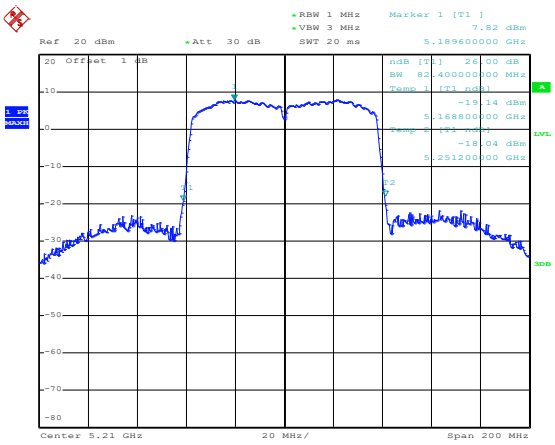
ANT 1

5150-5250MHz

802.11a-Low	 Date: 31.MAR.2024 18:57:25
802.11a-Middle	 Date: 31.MAR.2024 18:58:13
802.11a-High	 Date: 31.MAR.2024 18:58:51

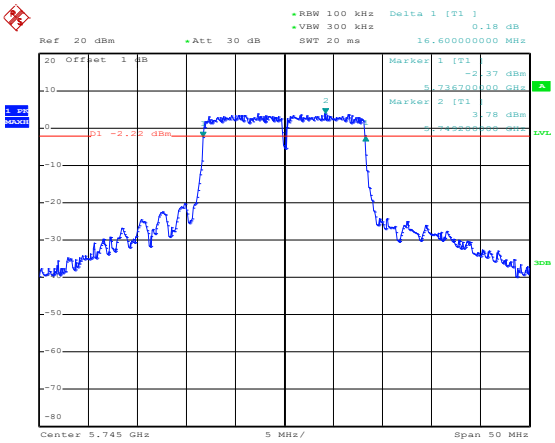
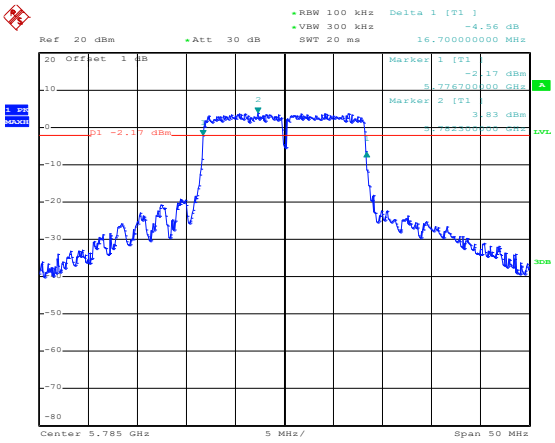
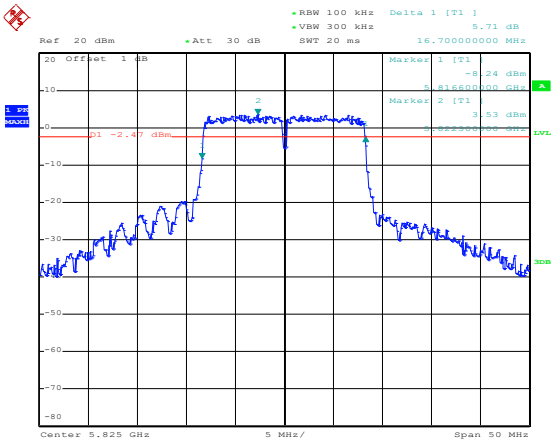
802.11n-HT20-Low	 Date: 31.MAR.2024 18:59:30
802.11n-HT20-Middle	 Date: 31.MAR.2024 18:59:41
802.11n-HT20-High	 Date: 31.MAR.2024 18:59:53

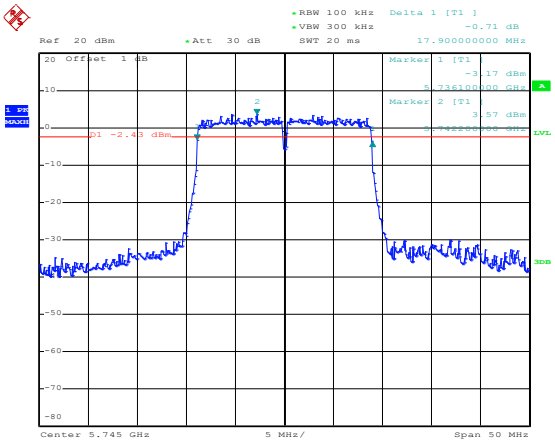
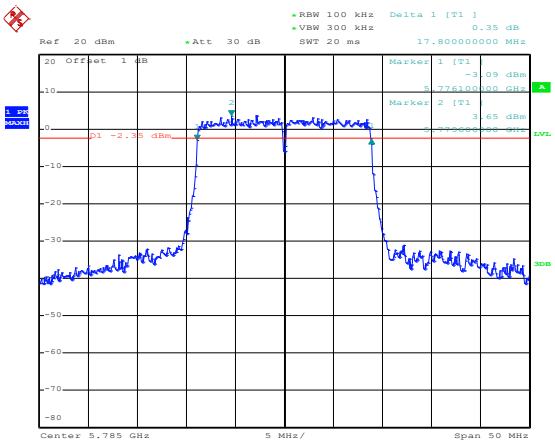
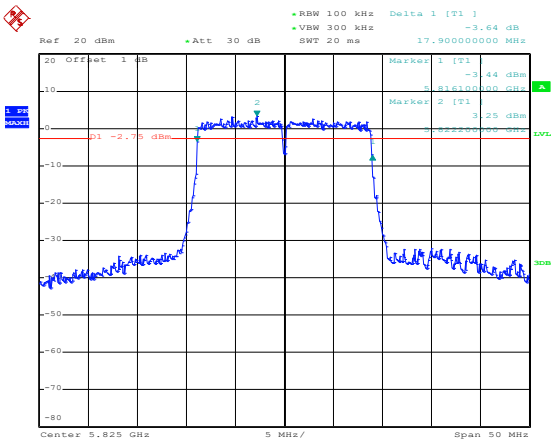
802.11n-HT40-Low	 Date: 31.MAR.2024 19:00:15
802.11n-HT40-High	 Date: 31.MAR.2024 19:00:27
802.11ac-VHT40-Low	 Date: 31.MAR.2024 19:00:44

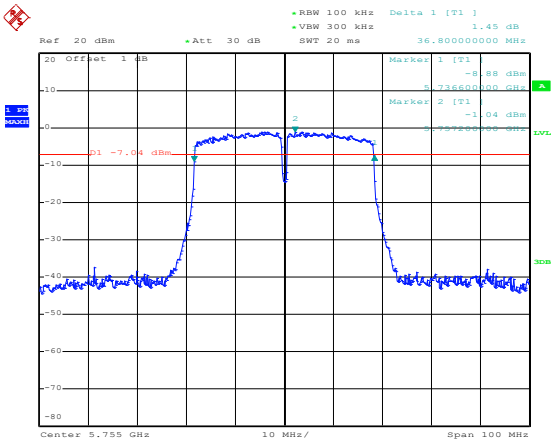
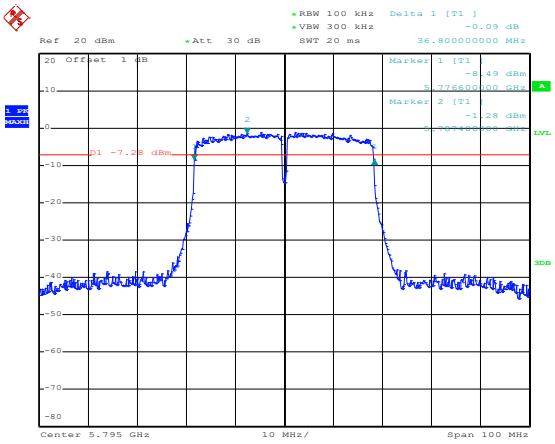
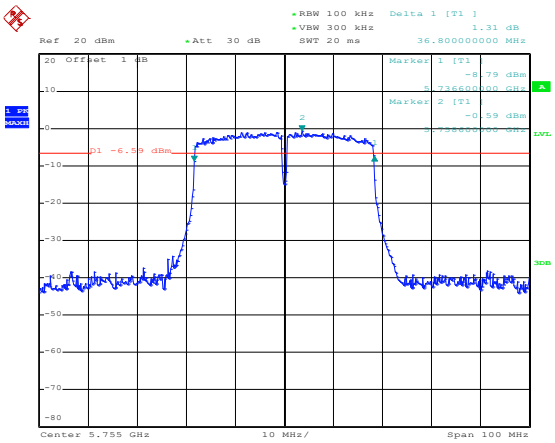
802.11ac-VHT40-High	 Date: 31.MAR.2024 19:00:59
802.11ac-VHT80	 Date: 31.MAR.2024 19:01:20

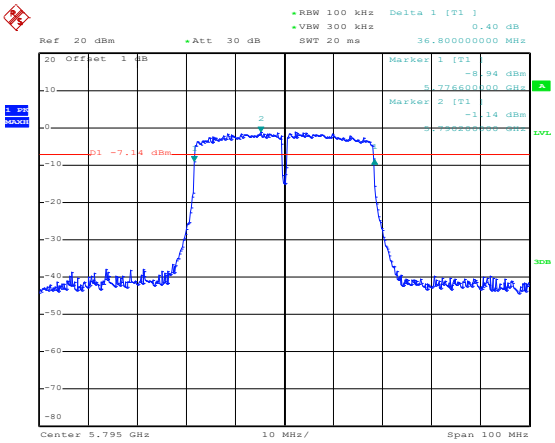
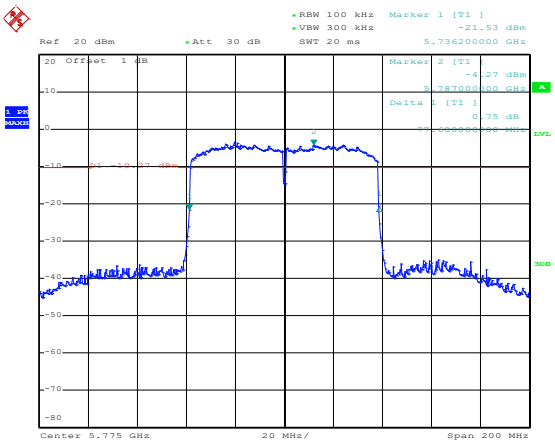
6 dB Bandwidth MHz

5725-5850MHz

802.11a-Low	 Date: 31.MAR.2024 18:46:40
802.11a-Middle	 Date: 31.MAR.2024 18:47:17
802.11a-High	 Date: 31.MAR.2024 18:47:44

802.11n-HT20-Low	 Date: 31.MAR.2024 18:48:24
802.11n-HT20-Middle	 Date: 31.MAR.2024 18:48:54
802.11n-HT20-High	 Date: 31.MAR.2024 18:49:21

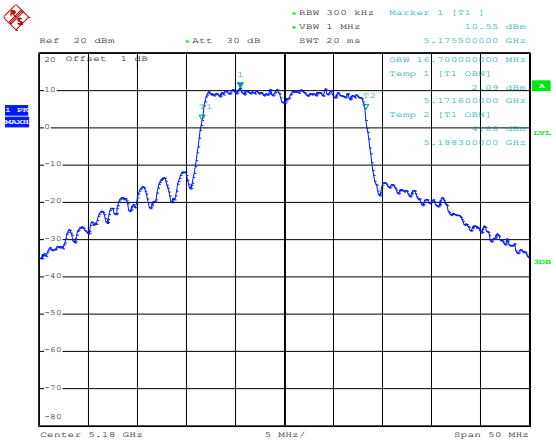
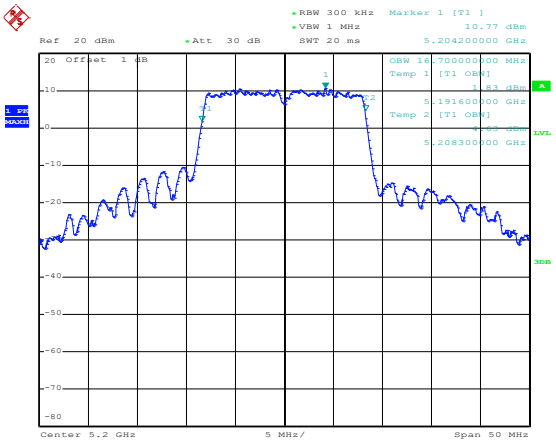
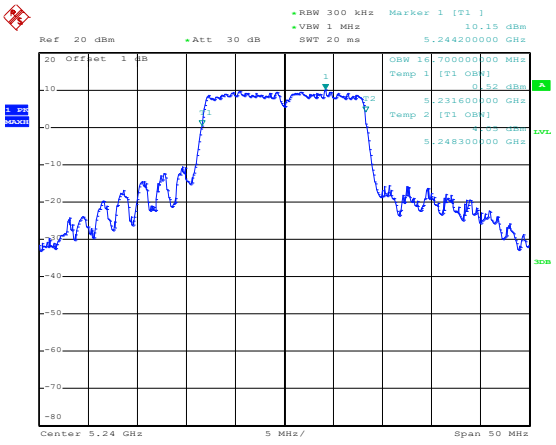
802.11n-HT40-Low	 Date: 31.MAR.2024 18:50:03
802.11n-HT40-High	 Date: 31.MAR.2024 18:50:33
802.11ac-VHT40-Low	 Date: 31.MAR.2024 18:51:10

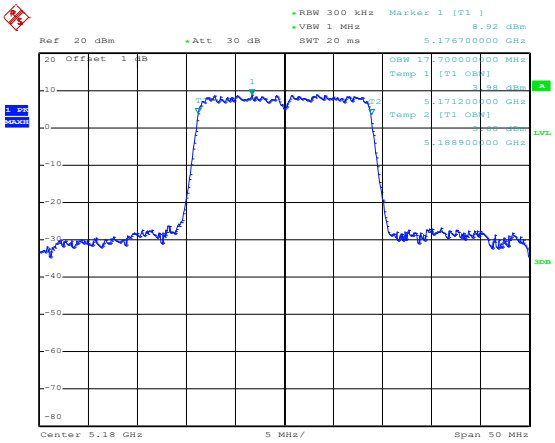
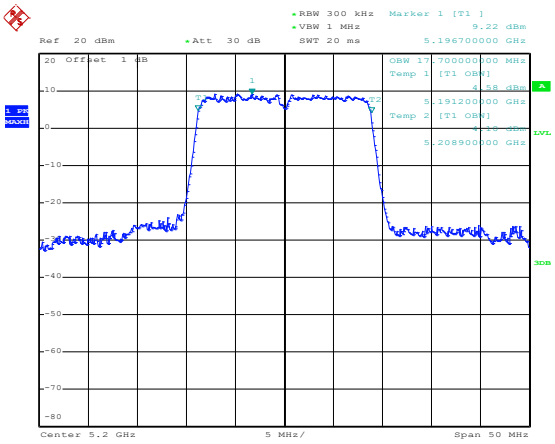
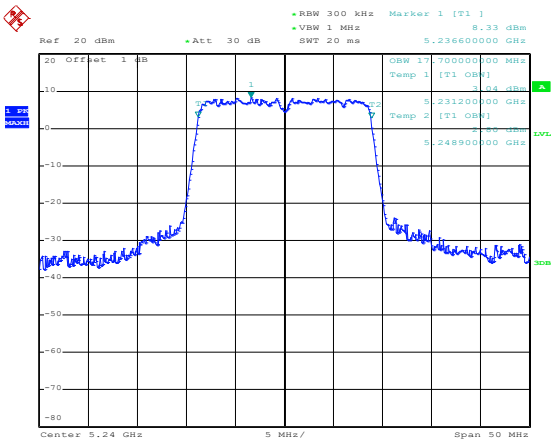
802.11ac-VHT40-High	
802.11ac-VHT80	

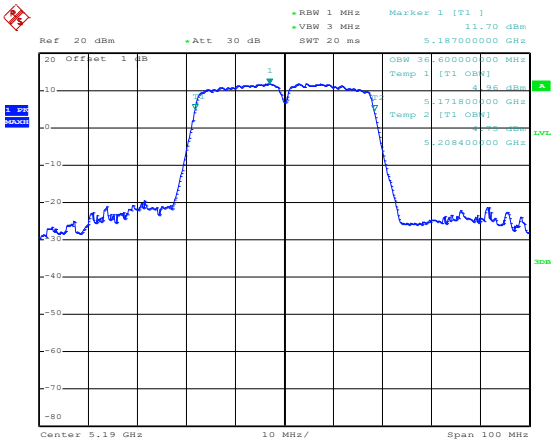
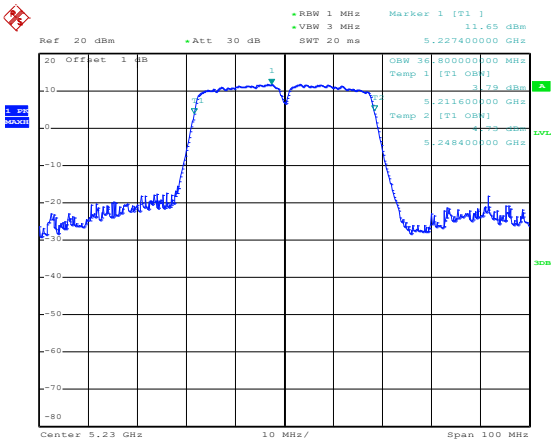
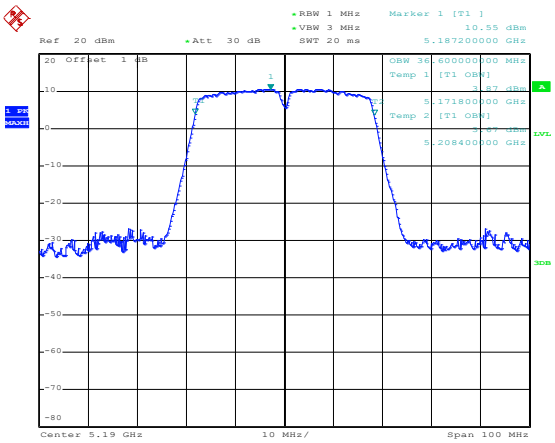
99% Bandwidth MHz

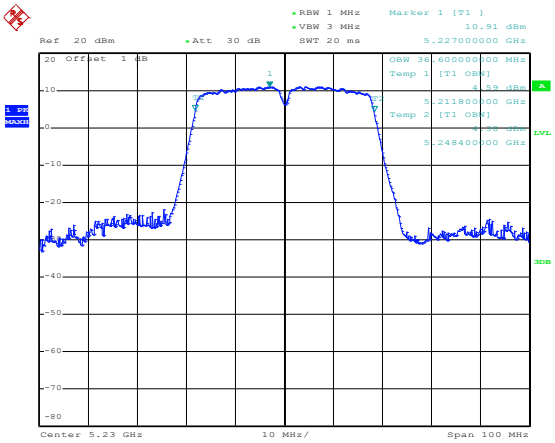
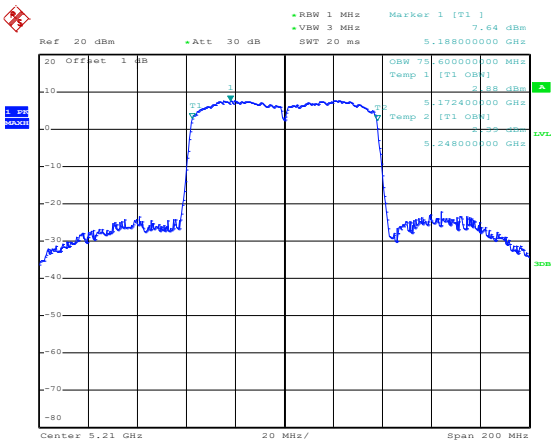
ANT 0

5150-5250MHz

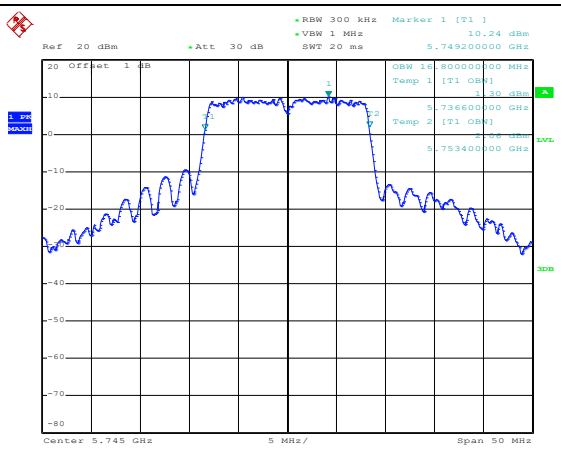
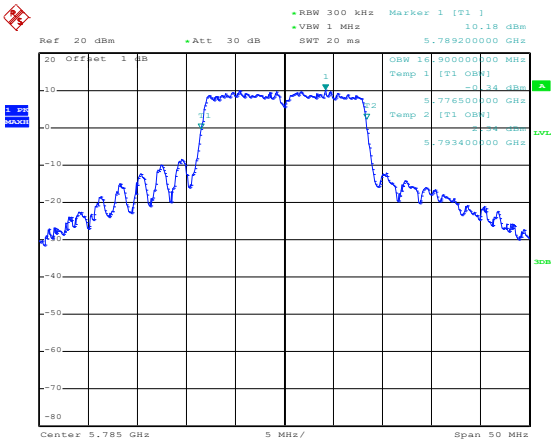
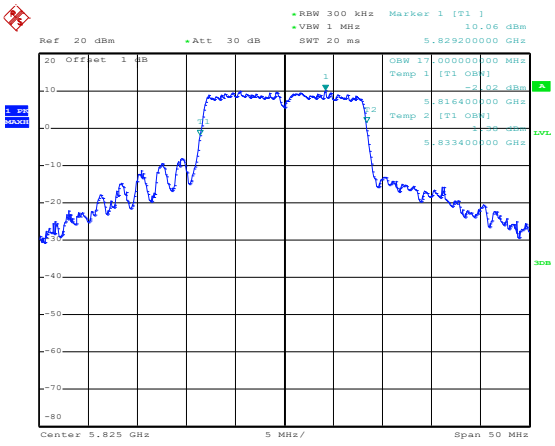
802.11a-Low	 Date: 31.MAR.2024 18:06:51
802.11a-Middle	 Date: 31.MAR.2024 18:07:13
802.11a-High	 Date: 31.MAR.2024 18:07:27

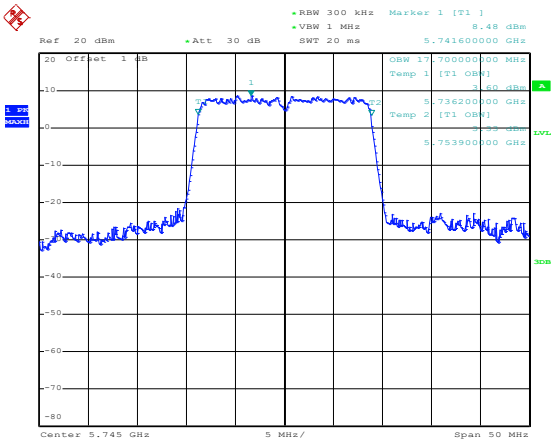
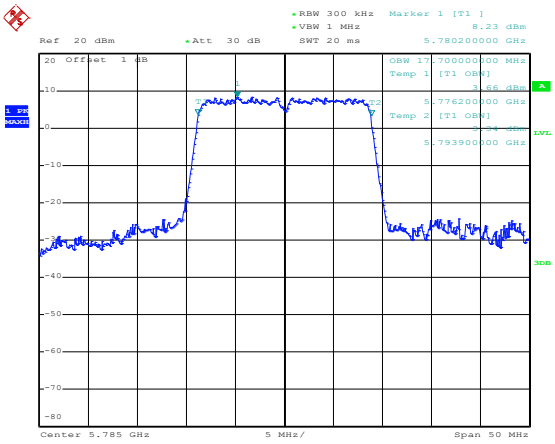
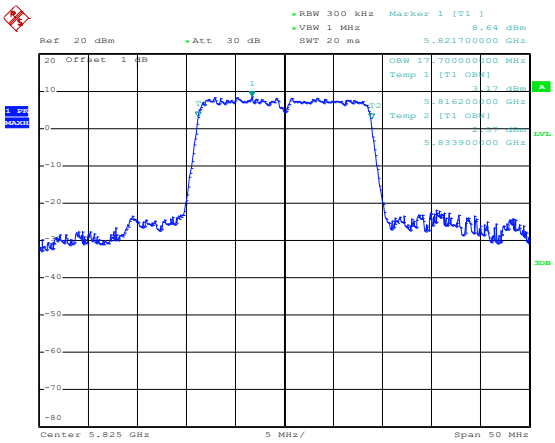
802.11n-HT20-Low	 Date: 31.MAR.2024 18:07:42
802.11n-HT20-Middle	 Date: 31.MAR.2024 18:07:58
802.11n-HT20-High	 Date: 31.MAR.2024 18:08:13

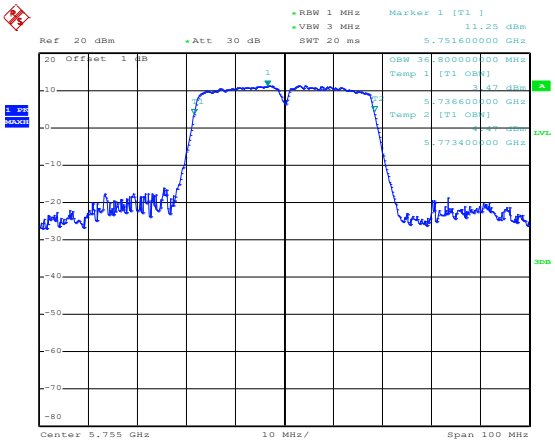
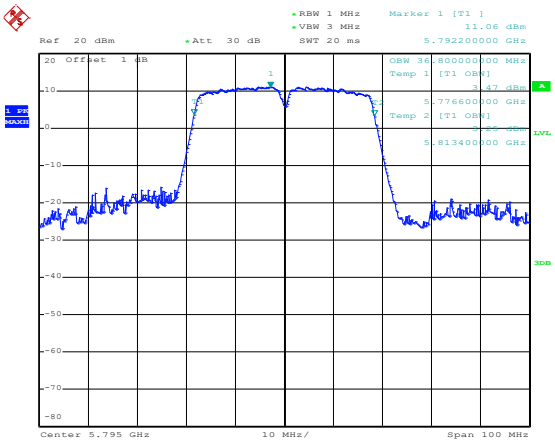
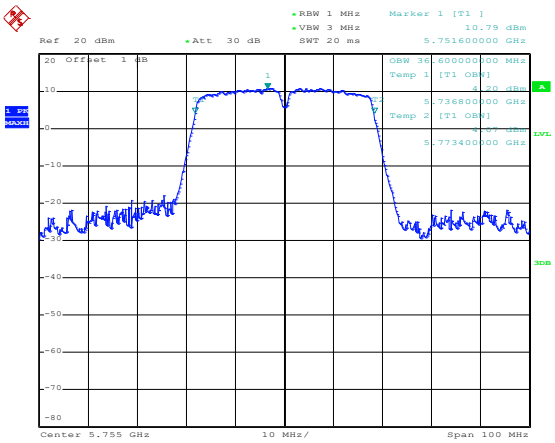
802.11n-HT40-Low	 Date: 31.MAR.2024 18:08:41
802.11n-HT40-High	 Date: 31.MAR.2024 18:09:16
802.11ac-VHT40-Low	 Date: 31.MAR.2024 18:09:51

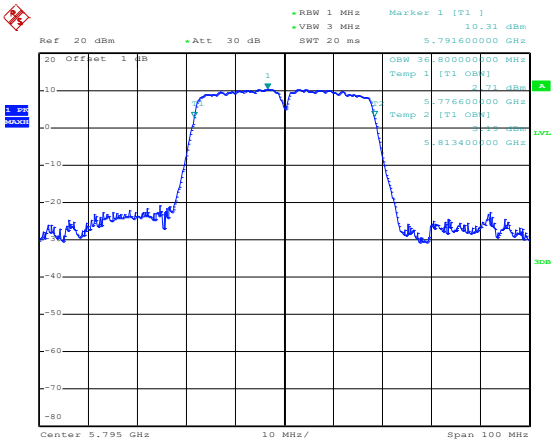
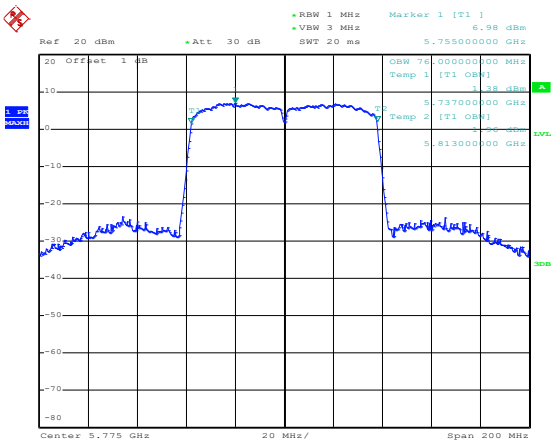
802.11ac-VHT40-High	
802.11ac-VHT80	

5725-5850MHz

802.11a-Low	
802.11a-Middle	
802.11a-High	

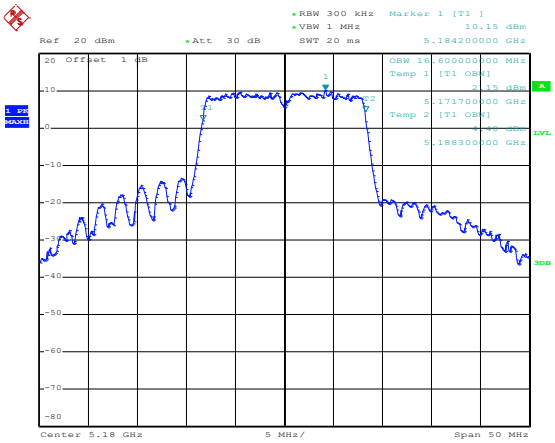
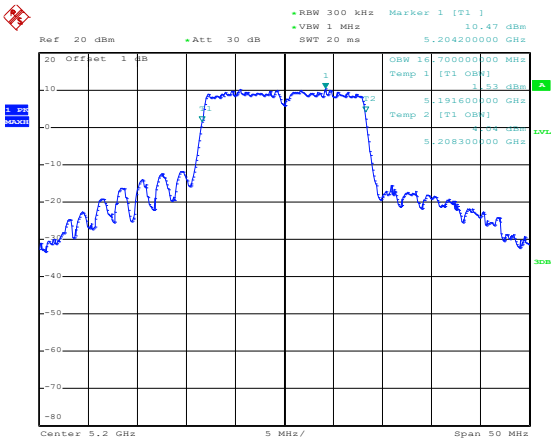
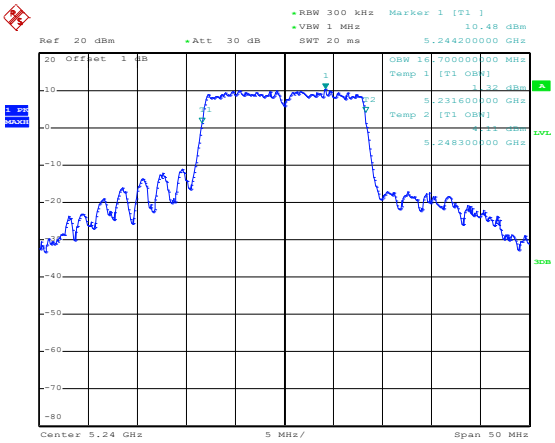
802.11n-HT20-Low	 Date: 31.MAR.2024 18:33:38
802.11n-HT20-Middle	 Date: 31.MAR.2024 18:33:50
802.11n-HT20-High	 Date: 31.MAR.2024 18:34:05

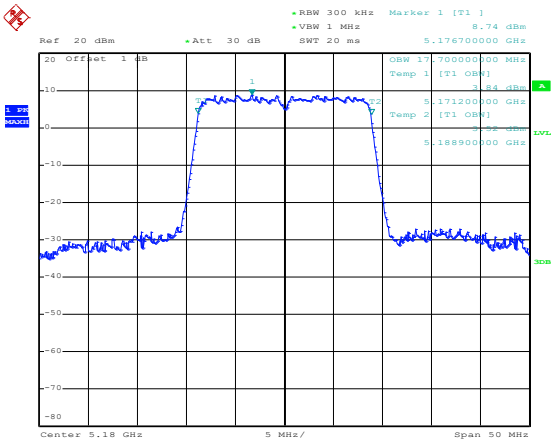
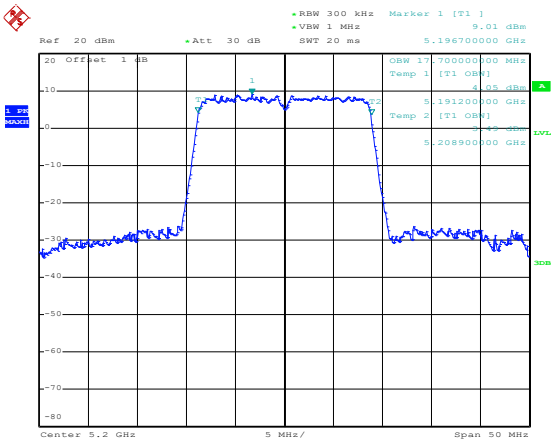
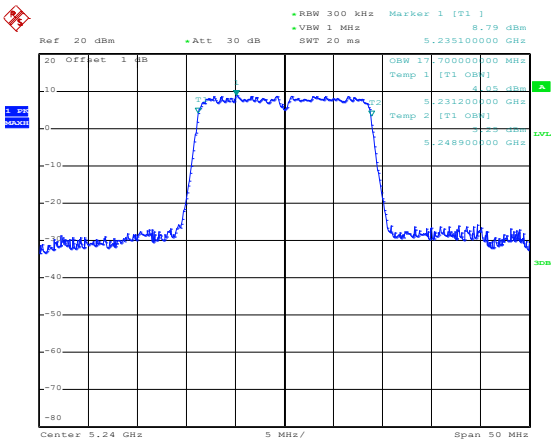
802.11n-HT40-Low	 Date: 31.MAR.2024 18:34:35
802.11n-HT40-High	 Date: 31.MAR.2024 18:34:49
802.11ac-VHT40-Low	 Date: 31.MAR.2024 18:35:07

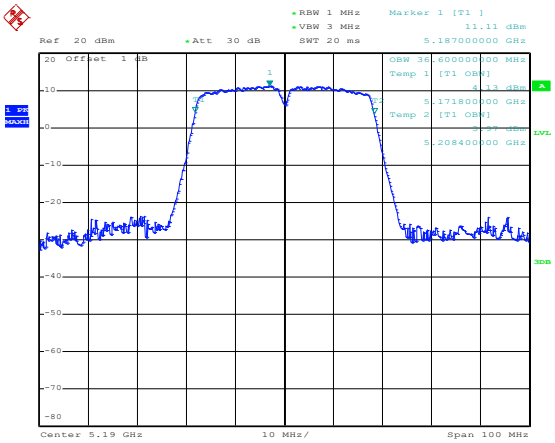
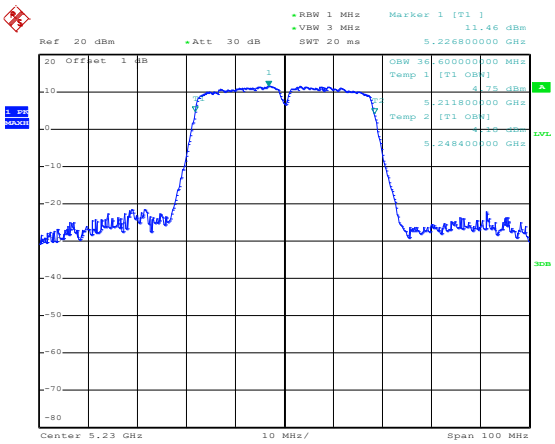
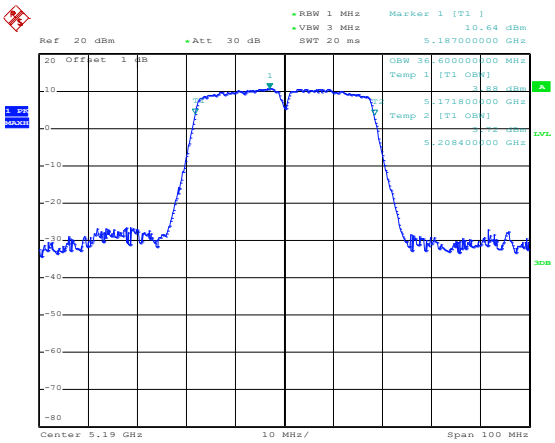
802.11ac-VHT40-High	
802.11ac-VHT80	

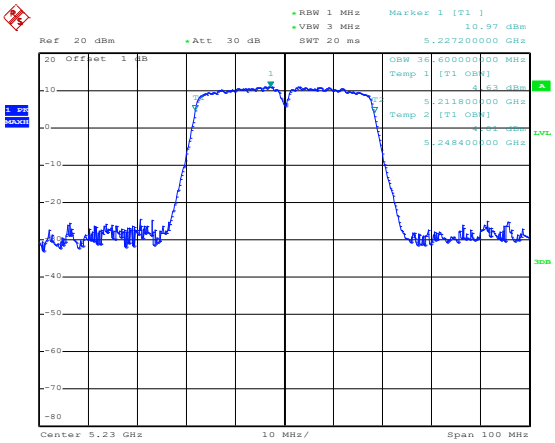
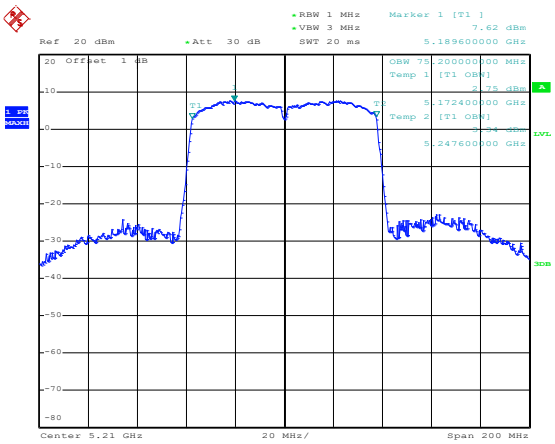
ANT 1

5150-5250MHz

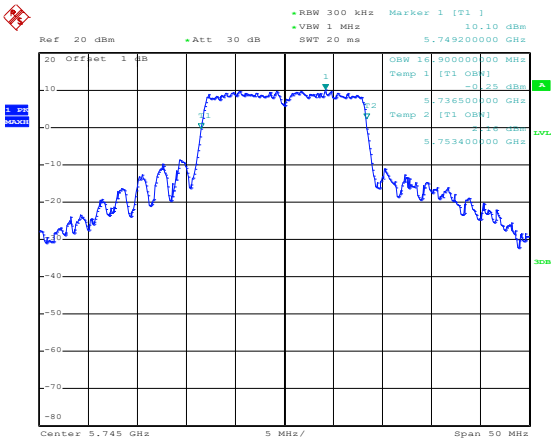
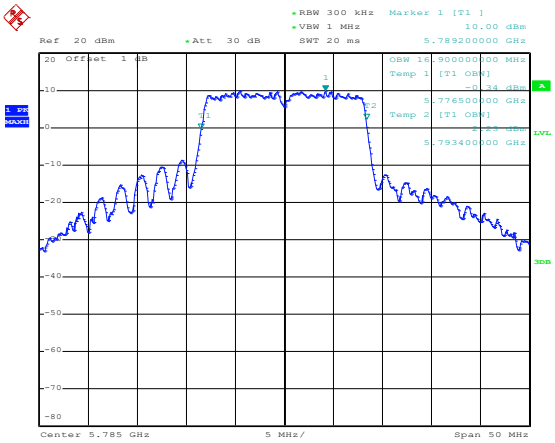
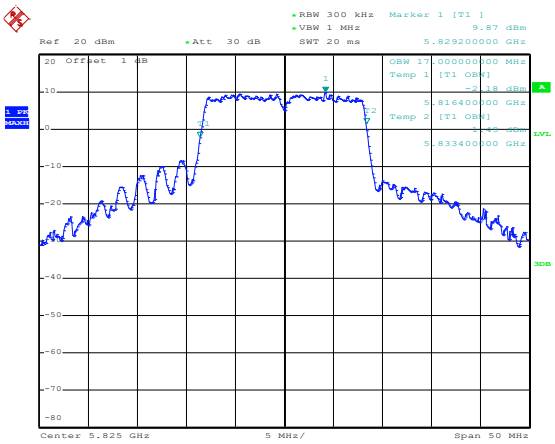
802.11a-Low	 Date: 31.MAR.2024 18:53:51
802.11a-Middle	 Date: 31.MAR.2024 18:54:03
802.11a-High	 Date: 31.MAR.2024 18:54:17

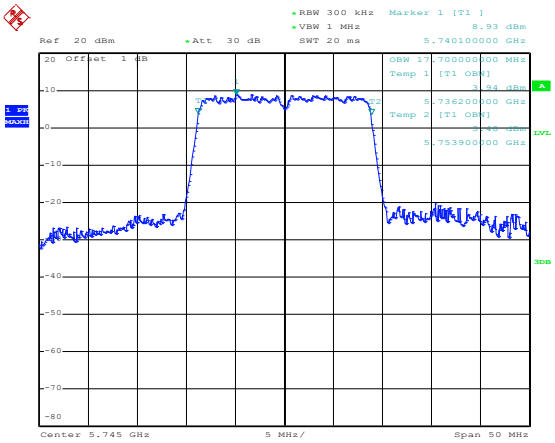
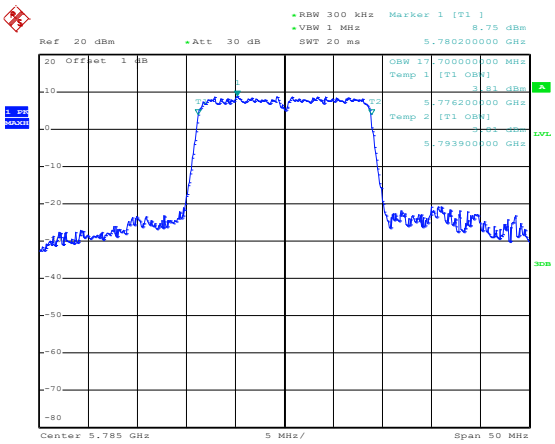
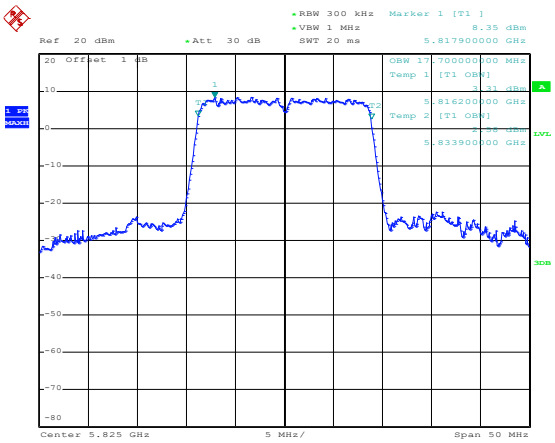
802.11n-HT20-Low	 Date: 31.MAR.2024 18:54:34
802.11n-HT20-Middle	 Date: 31.MAR.2024 18:54:47
802.11n-HT20-High	 Date: 31.MAR.2024 18:55:05

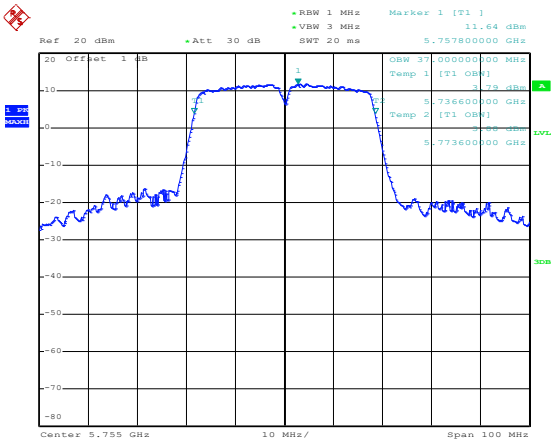
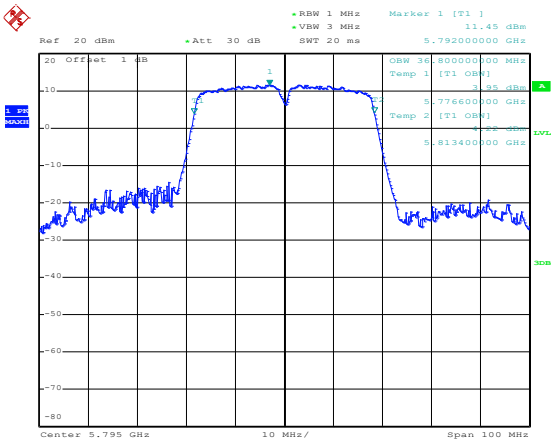
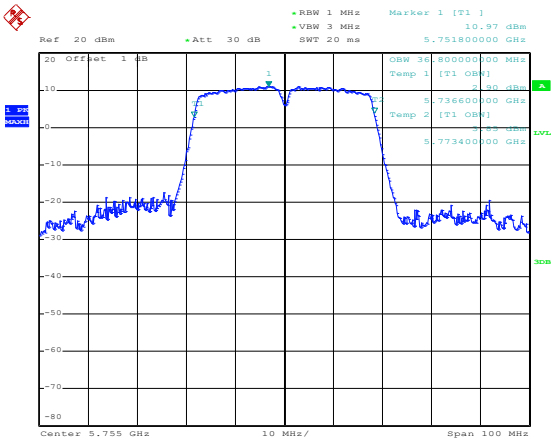
802.11n-HT40-Low	
802.11n-HT40-High	
802.11ac-VHT40-Low	

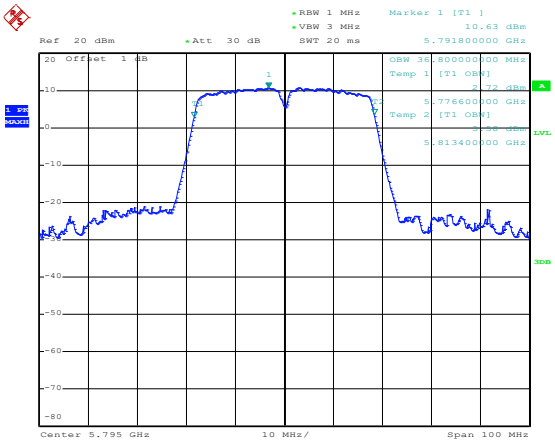
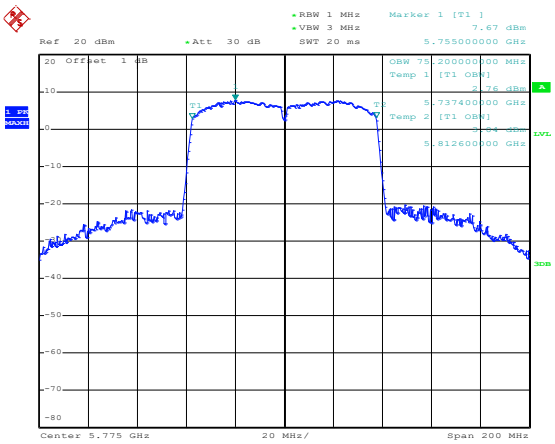
802.11ac-VHT40-High	
802.11ac-VHT80	

5725-5850MHz

802.11a-Low	
802.11a-Middle	
802.11a-High	

802.11n-HT20-Low	 Date: 31.MAR.2024 18:40:28
802.11n-HT20-Middle	 Date: 31.MAR.2024 18:40:42
802.11n-HT20-High	 Date: 31.MAR.2024 18:40:58

802.11n-HT40-Low	 Date: 31.MAR.2024 18:42:19
802.11n-HT40-High	 Date: 31.MAR.2024 18:42:34
802.11ac-VHT40-Low	 Date: 31.MAR.2024 18:42:53

802.11ac-VHT40-High	 Date: 31.MAR.2024 18:43:16
802.11ac-VHT80	 Date: 31.MAR.2024 18:43:48

APPENDIX C

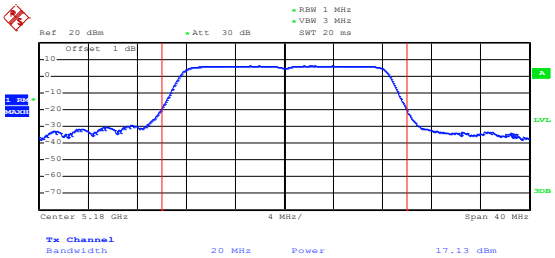
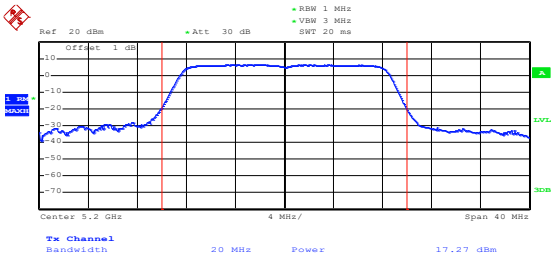
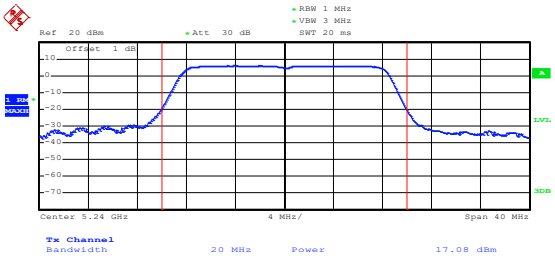
Maximum Conducted Output Power

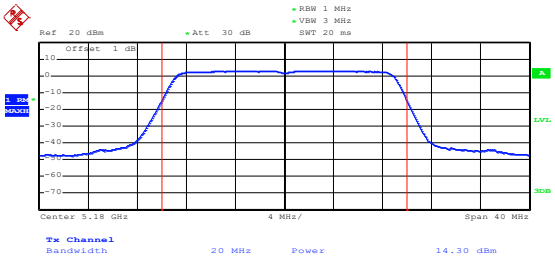
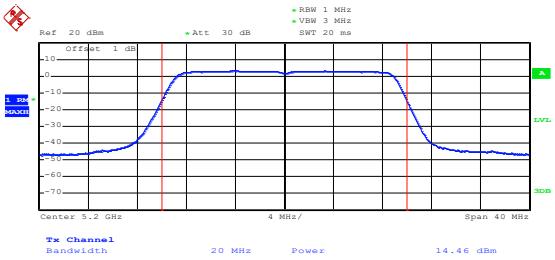
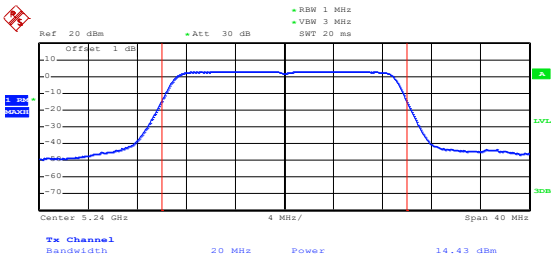
U-NII-1:5150-5250MHz					
Test mode	Frequency MHz	Output Power dBm		Total dBm	Limit dBm
		ANT 0	ANT 1		
802.11a	5180	17.13	17.32	/	23.98
	5200	17.27	17.49	/	23.98
	5240	17.08	17.58	/	23.98
802.11n-HT20	5180	14.30	14.65	17.49	21.18
	5200	14.46	14.74	17.61	21.18
	5240	14.43	14.83	17.64	21.18
802.11n-HT40	5190	14.13	14.34	17.25	21.18
	5230	14.26	14.57	17.43	21.18
802.11ac-VHT40	5190	14.32	14.38	17.36	21.18
	5230	14.47	14.61	17.55	21.18
802.11ac-VHT80	5210	13.90	13.93	16.93	21.18

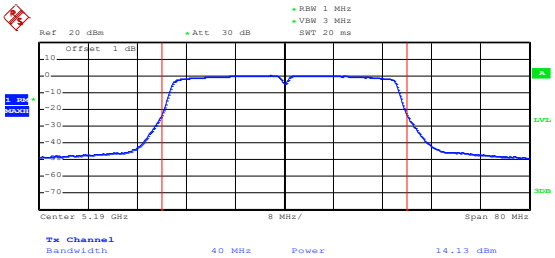
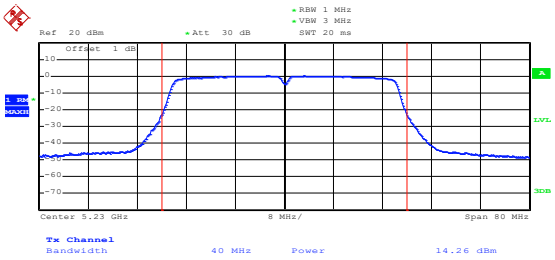
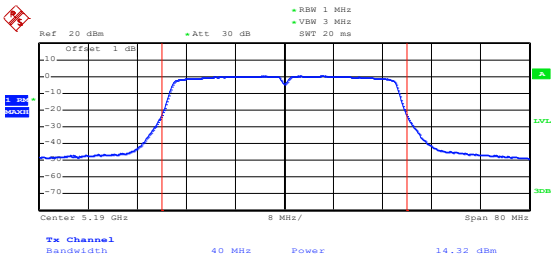
U-NII-3: 5725-5850MHz					
Test mode	Frequency MHz	Output Power dBm		Total dBm	Limit dBm
		ANT 0	ANT 1		
802.11a	5745	18.95	18.54	/	30.00
	5785	18.70	18.52	/	30.00
	5825	18.59	18.50	/	30.00
802.11n-HT20	5745	17.70	17.73	20.73	27.2
	5785	17.48	17.67	20.59	27.2
	5825	17.52	18.02	20.79	27.2
802.11n-HT40	5755	17.47	17.57	20.53	27.2
	5795	17.23	17.62	20.44	27.2
802.11n-VHT40	5755	16.83	16.74	19.80	27.2
	5795	16.54	16.72	19.64	27.2
802.11ac-VHT80	5775	16.13	16.64	19.40	27.2

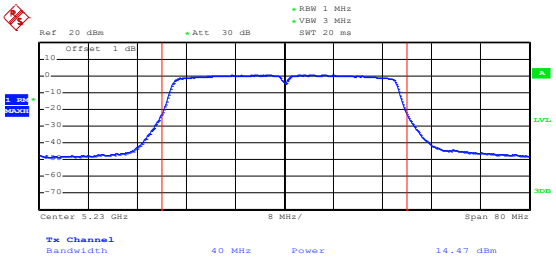
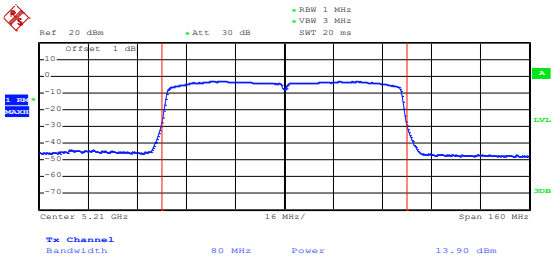
ANT 0

5150-5250MHz

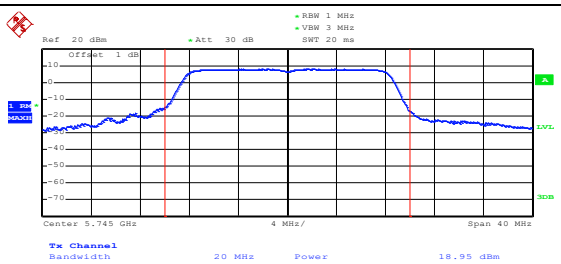
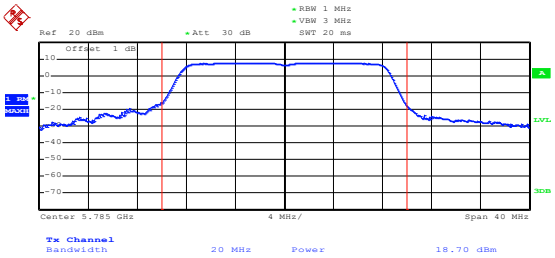
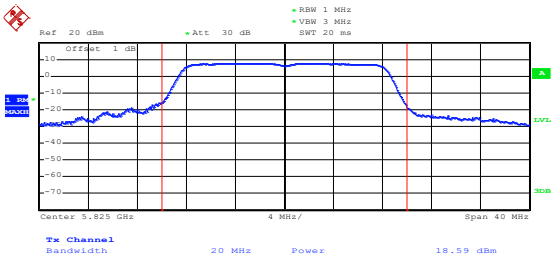
802.11a-Low	 Date: 10.APR.2024 14:36:45
802.11a-Middle	 Date: 10.APR.2024 14:37:01
802.11a-High	 Date: 10.APR.2024 14:37:26

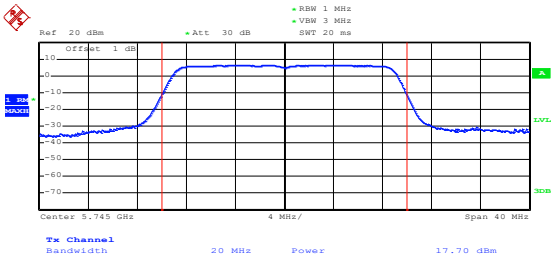
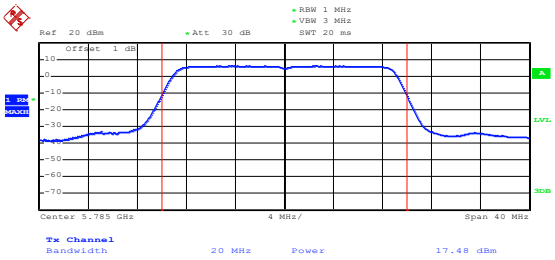
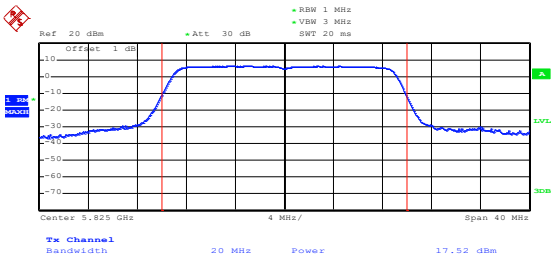
802.11n-HT20-Low	 Date: 10.APR.2024 14:38:25
802.11n-HT20-Middle	 Date: 10.APR.2024 14:38:37
802.11n-HT20-High	 Date: 10.APR.2024 14:38:51

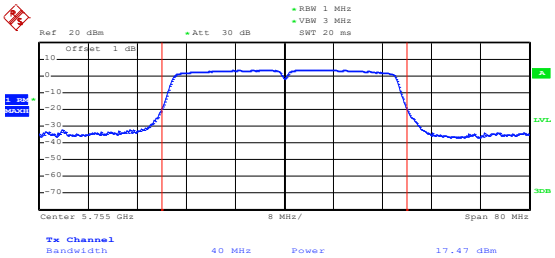
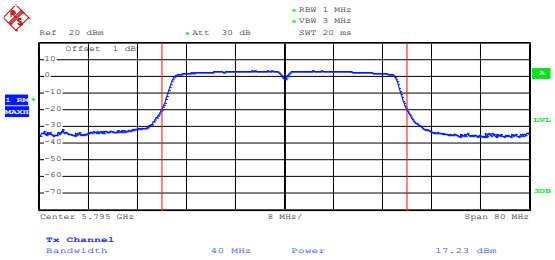
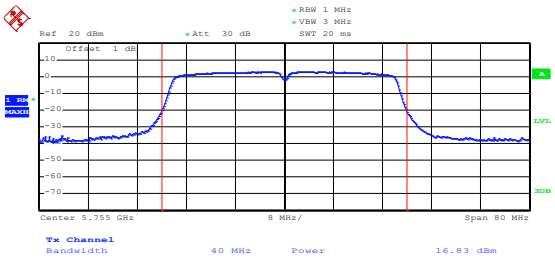
802.11n-HT40-Low	 Date: 10.APR.2024 14:39:40
802.11n-HT40-High	 Date: 10.APR.2024 14:40:05
802.11ac-VHT40-Low	 Date: 10.APR.2024 14:40:34

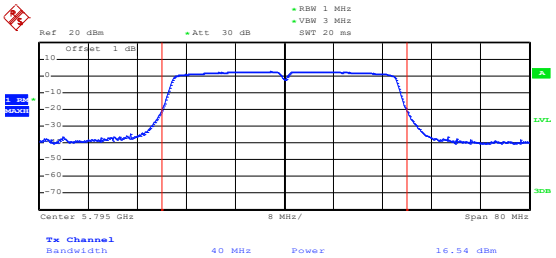
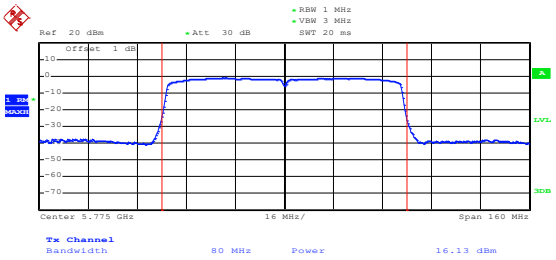
802.11ac-VHT40-High	 Date: 10.APR.2024 14:56:41
802.11ac-VHT80	 Date: 10.APR.2024 14:57:01

5725-5850MHz

802.11a-Low	 Date: 28.MAR.2024 16:49:42
802.11a-Middle	 Date: 28.MAR.2024 16:50:18
802.11a-High	 Date: 28.MAR.2024 16:52:05

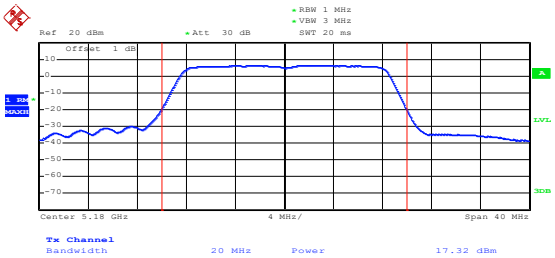
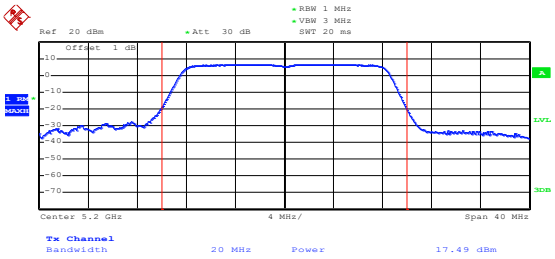
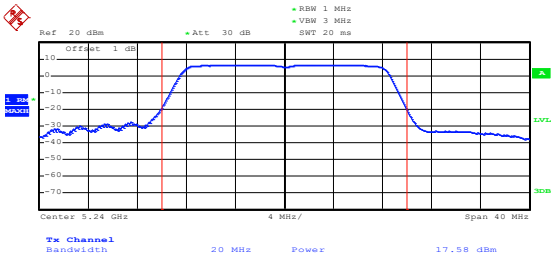
802.11n-HT20-Low	 Date: 28.MAR.2024 16:53:22
802.11n-HT20-Middle	 Date: 28.MAR.2024 16:53:57
802.11n-HT20-High	 Date: 28.MAR.2024 16:54:40

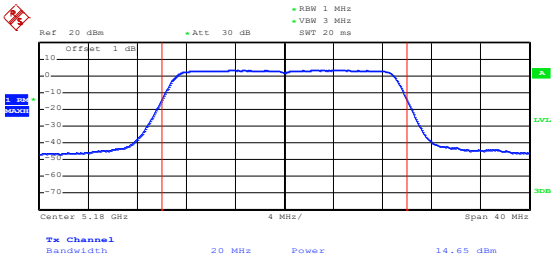
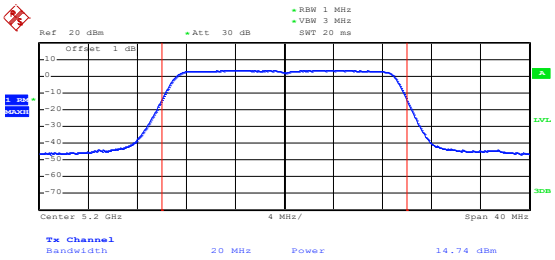
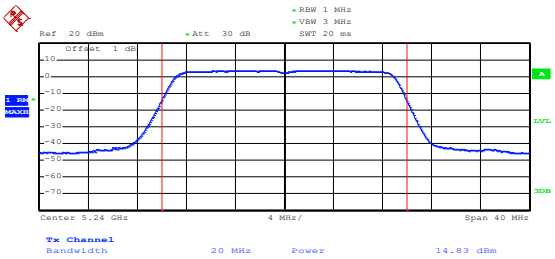
802.11n-HT40-Low	 Date: 28.MAR.2024 16:55:30
802.11n-HT40-High	 Date: 28.MAR.2024 16:55:50
802.11ac-VHT40-Low	 Date: 28.MAR.2024 16:56:31

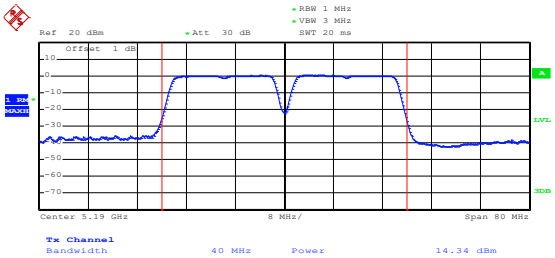
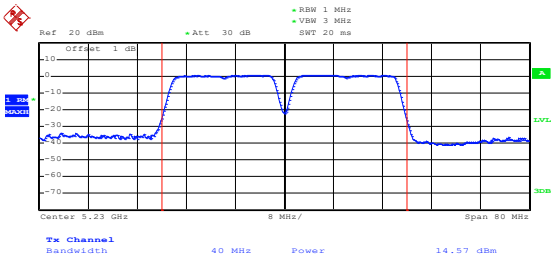
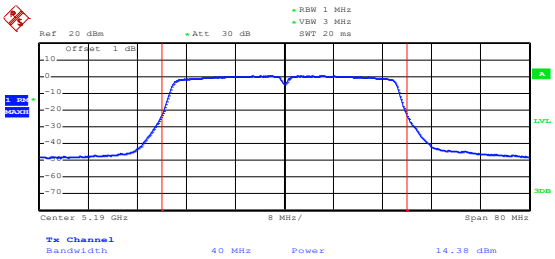
802.11ac-VHT40-High	 Date: 28.MAR.2024 16:56:53
802.11ac-VHT80	 Date: 28.MAR.2024 16:57:46

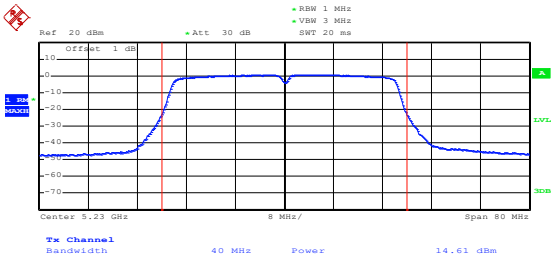
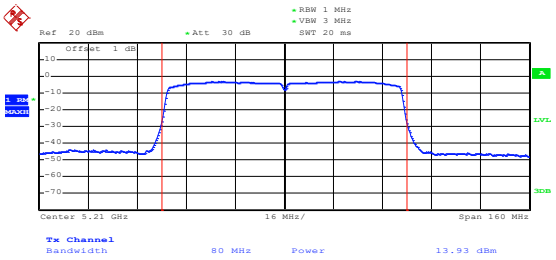
ANT 1

5150-5250MHz

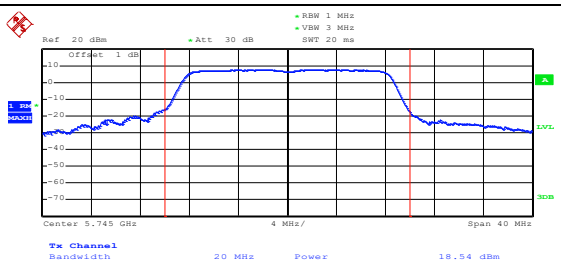
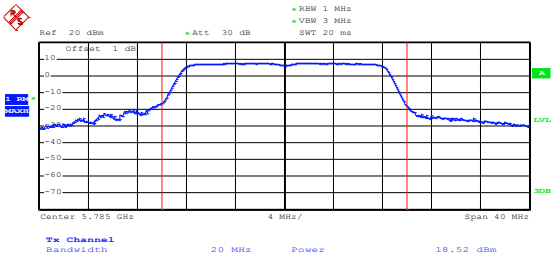
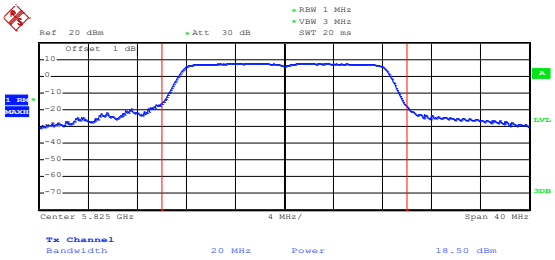
802.11a-Low	 Date: 10.APR.2024 14:27:21
802.11a-Middle	 Date: 10.APR.2024 14:27:43
802.11a-High	 Date: 10.APR.2024 14:28:00

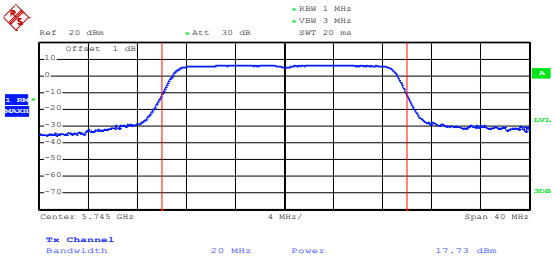
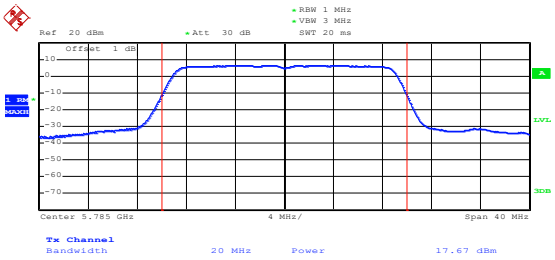
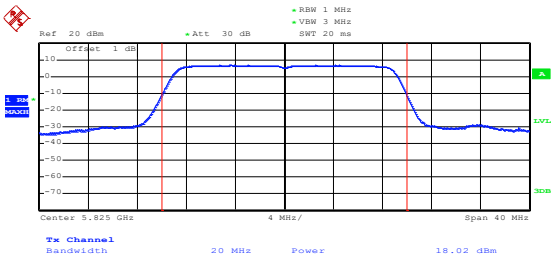
802.11n-HT20-Low	 Date: 10.APR.2024 14:30:11
802.11n-HT20-Middle	 Date: 10.APR.2024 14:30:42
802.11n-HT20-High	 Date: 10.APR.2024 14:30:55

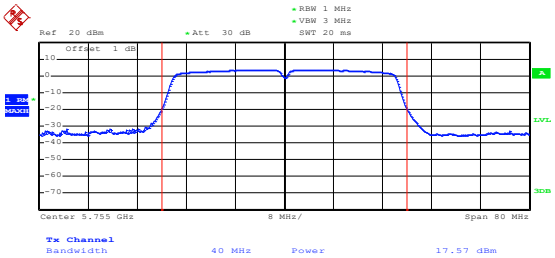
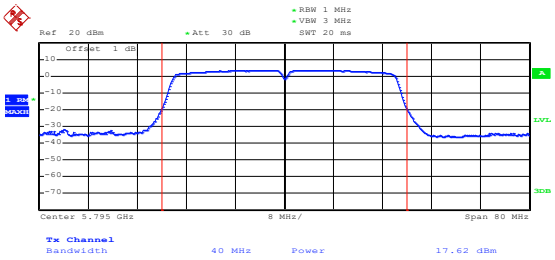
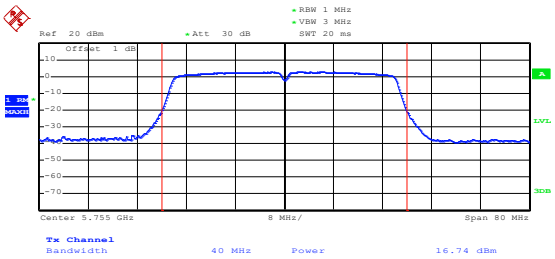
802.11n-HT40-Low	 Date: 10.APR.2024 14:31:38
802.11n-HT40-High	 Date: 10.APR.2024 14:31:51
802.11ac-VHT40-Low	 Date: 10.APR.2024 14:33:07

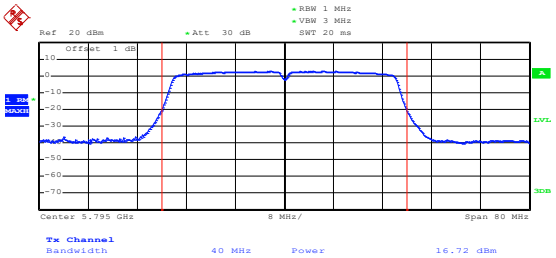
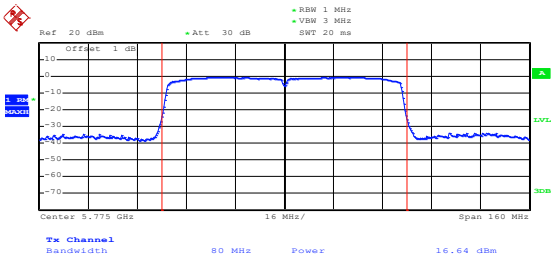
802.11ac-VHT40-High	 Date: 10.APR.2024 14:33:20
802.11ac-VHT80	 Date: 10.APR.2024 14:33:58

5725-5850MHz

802.11a-Low	 Date: 28.MAR.2024 17:37:25
802.11a-Middle	 Date: 28.MAR.2024 17:37:41
802.11a-High	 Date: 28.MAR.2024 17:38:32

802.11n-HT20-Low	 Date: 28.MAR.2024 17:38:56
802.11n-HT20-Middle	 Date: 28.MAR.2024 17:39:27
802.11n-HT20-High	 Date: 28.MAR.2024 18:29:39

802.11n-HT40-Low	 Date: 28.MAR.2024 18:31:20
802.11n-HT40-High	 Date: 28.MAR.2024 18:31:45
802.11ac-VHT40-Low	 Date: 28.MAR.2024 18:32:48

802.11ac-VHT40-High	 Date: 28.MAR.2024 18:33:11
802.11ac-VHT80	 Date: 28.MAR.2024 18:33:34

APPENDIX D

Frequency Stability

U-NII-1:5150-5250MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	12	-30	501	0.096
100%		-20	505	0.097
100%		-10	498	0.096
100%		0	502	0.096
100%		+10	500	0.096
100%		+20	500	0.096
100%		+30	496	0.095
100%		+40	498	0.096
100%		+50	501	0.096
Low Battery power	10.2	+20	502	0.096
High Battery power	13.8	+20	499	0.096

U-NII-3:5725-5850MHz worst case at 802.11a middle channel				
Voltage(%)	Power(VDC)	TEMP(°C)	Freq.Dev(Hz)	Deviation
100%	12	-30	504	0.087
100%		-20	497	0.086
100%		-10	501	0.087
100%		0	502	0.087
100%		+10	503	0.087
100%		+20	500	0.086
100%		+30	502	0.087
100%		+40	496	0.086
100%		+50	503	0.087
Low Battery power	10.2	+20	503	0.087
High Battery power	13.8	+20	503	0.087

APPENDIX PHOTOGRAPHS

Please refer to “ANNEX”

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