

Test report No:

ISED CABid: ES1909

NIE: 69536RRF.010A1

Test Report

USA FCC Part 15.407, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Automotive infotainment System
(*) Trademark	BMW
(*) Model and /or type reference	MGU FQ
Other identification of the product	HW version: 3.2 SW version: K18_21w43.1-1 FCC ID: T8GMGUFQ IC: 6434A-MGUFQ
(*) Features	USB 2.0 (including support for Apple Devices), Bluetooth, WLAN Modul 2.4 / 5 GHz, GNSS, AR-CAM input, Video-out APIX3, CAN, 100Base-T1 and 1000Base-T1
Applicant	HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH BECKER-GOERING-STR. 16, 76307 KARLSBAD, GERMANY
Test method requested, standard	USA FCC Part 15.407 (10-1-20) Edition: Unlicensed National Information Infrastructure (U-NII) Devices. General technical requirements. USA FCC Part 15.209 (10-1-20) Edition: Radiated emission limits; general requirements. CANADA RSS-247 Issue 2 (February 2017). CANADA RSS-Gen Issue 5 (April 2018). Guidance for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Rafael López EMC Consumer & RF Lab. Manager
Date of issue	2022-01-25
Report template No	FDT08_23 (*) "Data provided by the client"

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Competences and guarantees

DEKRA Testing and Certification is a testing laboratory accredited by the National Accreditation Body (ENAC - Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification is a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory, CABid: ES1909, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification at the time of performance of the test.

DEKRA Testing and Certification is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Testing and Certification.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification internal document PODT000.

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample consists of a MGU Head-Unit. The main functionalities are: Navigation, USB, voice recognition and several interfaces to the vehicle and Bluetooth / WLAN. The Head-unit provides different interfaces like: Video-out APIX2 (for the connection of an external Display), 3 USB interfaces (including support for Apple devices), CAN and 100Base-T1.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of result.

Usage of samples

Samples undergoing test have been selected by: The client.

- Sample S/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
69536B/036	Automotive infotainment System	MGU FQ	B49299M278000021	2021/11/11

Auxiliary elements used with the Sample S/01:

Control N°	Description	Model	Serial N°	Date of reception
69536B/026	OABR_converter board	---	---	2021/11/11
69536B/027	OABR_converter cable	---	---	2021/11/11
69536B/028	Power cable DC	---	---	2021/11/11
69536B/031	Harness	---	---	2021/11/11

Sample S/01 has undergone the following test(s): The Conducted tests indicated in the Appendixes A, B, C.

- Sample S/02 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
69536B/045	Automotive infotainment System	MGU FQ	B49289M278000031	2021/11/11
69536B/033	BT/WLAN antenna	---	---	2021/11/11
69536B/035	BT/WLAN antenna	---	---	2021/11/11

Auxiliary elements used with the Sample S/02:

Control N°	Description	Model	Serial N°	Date of reception
69536B/026	OABR_converter board	---	---	2021/11/11
69536B/027	OABR_converter cable	---	---	2021/11/11
69536B/028	Power cable DC	---	---	2021/11/11
69536B/031	Harness	---	---	2021/11/11

Sample S/02 has undergone the following test(s): The Radiated tests indicated in the Appendixes B, C.

Test sample description

Ports..... :	Port name and description		Cable				
			Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾	
	2xFakra			☒	☒	☐	
	USB1 connector – CONM-SM 4POL ROS D4S20Y-40MA5-B			☐	☒	☐	
	USB2 connector – CONM-SM 4POL ROS D4S20Y-40MA5-C			☐	☒	☐	
	USB3 connector – CONM-SM 4POL ROS D4S20Y-40MA5-E			☐	☒	☐	
	APIX2 connector – CONM-SM 4+2POL ROS 99S22A-40MA5-D			☒	☐	☐	
	Car Main-connector – CONM 16POL TYC 2300483-s			☒	☐	☐	
	Ethernet BroadR-Reach, 100 BASE-T1			☒	☐	☐	
GNSS connector			☒	☒	☐		
Supplementary information to the ports..... :	---						
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐ AC:	☐	☐	☐	☐	☐	
☒ DC: 12Vdc							
Rated Power	---						
Clock frequencies.....	---						
Other parameters	---						
Software version	K18_21w43.1-1						
Hardware version	3.2						
Dimensions in cm (W x H x D)	---						
Mounting position	☐	Table top equipment					
	☐	Wall/Ceiling mounted equipment					
	☐	Floor standing equipment					
	☐	Hand-held equipment					
	☒	Other: automotive dashboard					
Modules/parts..... :	Module/parts of test item		Type	Manufacturer			

Accessories (not part of the test item)	Description		Type	Manufacturer			

Documents as provided by the applicant..... :	Description		File name	Issue date			

⁽³⁾ Only for Medical Equipment

Identification of the client

HARMAN BECKER AUTOMOTIVE SYSTEMS GMBH
BECKER-GOERING-STR. 16
76307 KARLSBAD, GERMANY

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2021-11-20
Date (finish)	2021-12-02

Document history

Report number	Date	Description
69536RRF.010	2022-01-20	First release
69536RRF.010A1	2022-01-25	First modification due to typos. This modification test report cancels and replaces the test report 69536RRF.010

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Nicolás Salguero, José Manuel Jiménez and Javier Miguel Nadales.

Used instrumentation:

Radiated Measurements

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber III FRANKONIA SAC-3	N.A.	N.A.
2.	Shielded Room FRANKONIA	N.A.	N.A.
3.	HYBRID BILOG ANTENNA 30MHz-6GHz ETS LINDGREN 3142E	2021/09	2024/09
4.	PRE-AMPLIFIER G>30dB 17-40GHz BONN ELEKTRONIK BLMA 1840-4A	2021/09	2022/09
5.	HORN ANTENNA 1-18GHz SCHWARZBECK MESS- ELEKTRONIK BBHA 9120 D	2021/07	2024/07
6.	Broadband Horn antenna 18 - 40 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9170	2020/05	2023/05
7.	PREAMPLIFIER 30dB 500MHz-18GHz NARDA AMF-3D-00501800-24-10P	2021/01	2022/01
8.	PREAMPLIFIER 30dB 500MHz-18GHz SCHWARZBECK BBV 9718 C	2021/06	2022/06
9.	PRE-AMPLIFIER G>30dB 17-40GHz BONN ELEKTRONIK BLMA 1840-4A	2021/09	2022/09
10.	EMI TEST RECEIVER 20Hz-26.5GHz ROHDE AND SCHWARZ ESU26	2021/11	2023/11
11.	EMI TEST RECEIVER 20Hz-40GHz ROHDE AND SCHWARZ ESU40	2021/11	2023/11
12.	EMI TEST RECEIVER 2Hz-44GHz ROHDE AND SCHWARZ ESW44	2021/09	2023/09
13.	DC POWER SUPPLY 150V/22A AGILENT TECHNOLOGIES N8740A	N.A.	N.A.
14.	Digital Multimeter FLUKE 179	2021/11	2022/11

Conducted Measurements:

		Last Calibration	Due Calibration
1.	Shielded Room ETS LINDGREN S101	N/A	N/A
2.	Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40	2021/02	2023/02
3.	DC Power Supply, 40V/40A ROHDE AND SCHWARZ NGPE 40/40	N.A.	N.A.
4.	Digital Multimeter FLUKE 179	2021/06	2022/06
5.	OPEN SWITCH UNIT UP TO 7.5 GHz OSP150 ROHDE AND SCHWARZ	2021/08	2023/08

Testing verdicts

Not applicable:	N/A
Pass:	P
Fail:	F
Not measured:	N/M

Summary

A. Common requirements for all bands

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		Verdict	Remark
Duty Cycle		P	
99% Occupied Bandwidth		P	
26 dB Emission Bandwidth (EBW)		P	
<u>Supplementary information and remarks:</u>			
(1) None.			

B. U-NII-1 Band: 5.15 - 5.25 GHz

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.407 (a)(1)(iv)	Transmitter Maximum conducted Output Power	P	
RSS-247 6.2.1.1	Transmitter Maximum Equivalent Isotropically Radiated Power EIRP	P	
FCC 15.407 (a)(1)(iv)	Transmitter Maximum Power Spectral Density	P	
RSS-247 6.2.1.1	Transmitter EIRP Spectral Density	P	
FCC 15.407 (b)(1)(6) / RSS-247 6.2.1.2	Transmitter Out of Band Radiated Emissions	P	
FCC 15.407 (b)(1) / RSS-247 6.2.1.2	Transmitter Band Edge Radiated Emissions	P	
<u>Supplementary information and remarks:</u>			
None.			

C. U-NII-3 Band: 5.725 - 5.85 GHz

FCC PART 15 PARAGRAPH / RSS-247			
Requirement – Test case		Verdict	Remark
FCC 15.407 (a)(3) / RSS-247 6.2.4.1	Transmitter Maximum conducted Output Power	P	
FCC 15.407 (e) / RSS-247 6.2.4.1	6 dB bandwidth.	P	
FCC 15.407 (a)(3) / RSS-247 6.2.4.1	Transmitter Maximum Power Spectral Density	P	
FCC 15.407 (b)(4) / RSS-247 6.2.4.2	Transmitter Band Edge Radiated Emissions	P	
FCC 15.407 (b)(4)(6) / RSS-247 6.2.4.2	Transmitter Out of Band Radiated Emissions	P	
<u>Supplementary information and remarks:</u>			
None			

Appendix A: Test Common requirements for all bands

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Duty Cycle 12

99% Occupied Bandwidth 14

26 dB Emission Bandwidth (EBW) 30

Duty Cycle

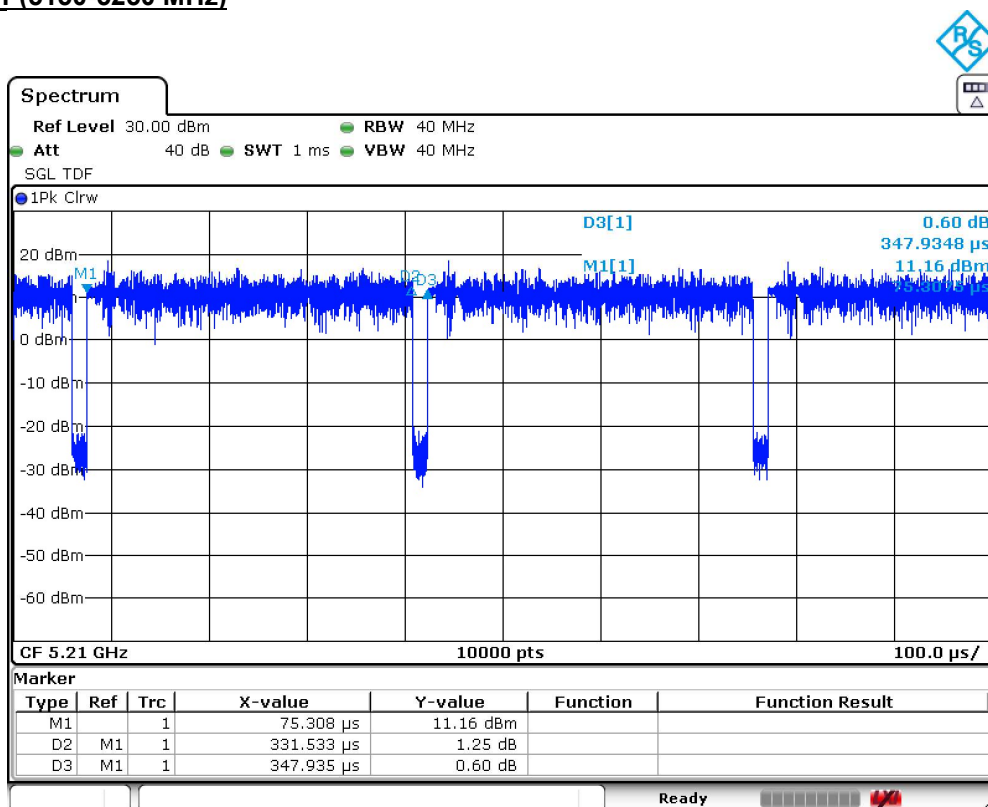
RESULTS:

The results below are for data rates with a duty cycle less than 98%. The results for all rest of modes having a value > 98%.

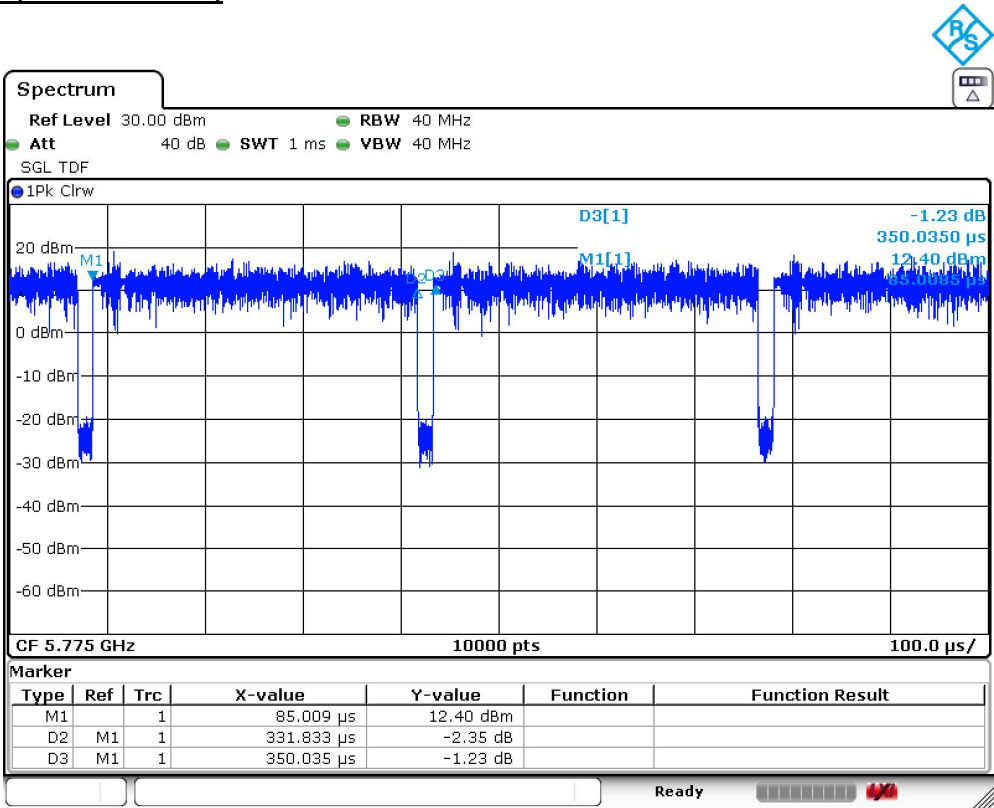
Mode	Sub-band U-NII-1			Sub-band U-NII-3		
	Pulse Duration (ms)	Period (ms)	Duty Cycle Correction (dB)	Pulse Duration (ms)	Period (ms)	Duty Cycle Correction (dB)
802.11ac80	0.33153	0.34793	0.21	0.33183	0.35003	0.23

Mode 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)



U-NII-3 (5725-5850 MHz)



99% Occupied Bandwidth

RESULTS:

Mode 802.11 a20:

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	16.70	16.70	16.60
Measurement uncertainty (%)	<±1.17		

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
99% Occupied Bandwidth (MHz)	16.60	16.70	16.70
Measurement uncertainty (%)	<±1.17		

Mode 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	17.60	17.70	17.60
Measurement uncertainty (%)	<±1.17		

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
99% Occupied Bandwidth (MHz)	17.60	17.60	17.60
Measurement uncertainty (%)	<±1.17		

Mode 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
99% Occupied Bandwidth (MHz)	17.70	17.70	17.70
Measurement uncertainty (%)	<±1.17		

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
99% Occupied Bandwidth (MHz)	17.60	17.70	17.70
Measurement uncertainty (%)	<±1.17		

Mode 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
99% Occupied Bandwidth (MHz)	36.25	36.25
Measurement uncertainty (%)	<±1.15	

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 151 (5755 MHz)	High Channel 159 (5795 MHz)
99% Occupied Bandwidth (MHz)	36.50	36.25
Measurement uncertainty (%)	<±1.15	

Mode 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
99% Occupied Bandwidth (MHz)	36.25	36.25
Measurement uncertainty (%)	<±1.15	

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 151 (5755 MHz)	High Channel 159 (5795 MHz)
99% Occupied Bandwidth (MHz)	36.50	36.25
Measurement uncertainty (%)	<±1.15	

Mode 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)

Channel	Single Channel 42 (5210 MHz)
99% Occupied Bandwidth (MHz)	76.50
Measurement uncertainty (%)	<±1.20

U-NII-3 (5725-5850 MHz)

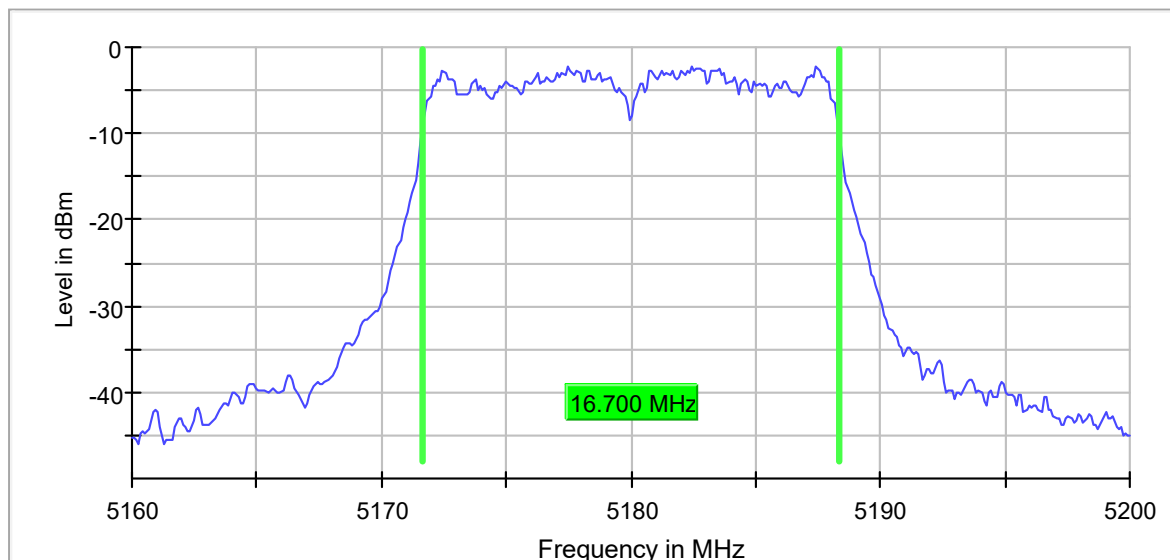
Channels	Single Channel 155 (5775 MHz)
99% Occupied Bandwidth (MHz)	76.45
Measurement uncertainty (%)	<±1.20

Mode 802.11 a20:

U-NII-1 (5150-5250 MHz)

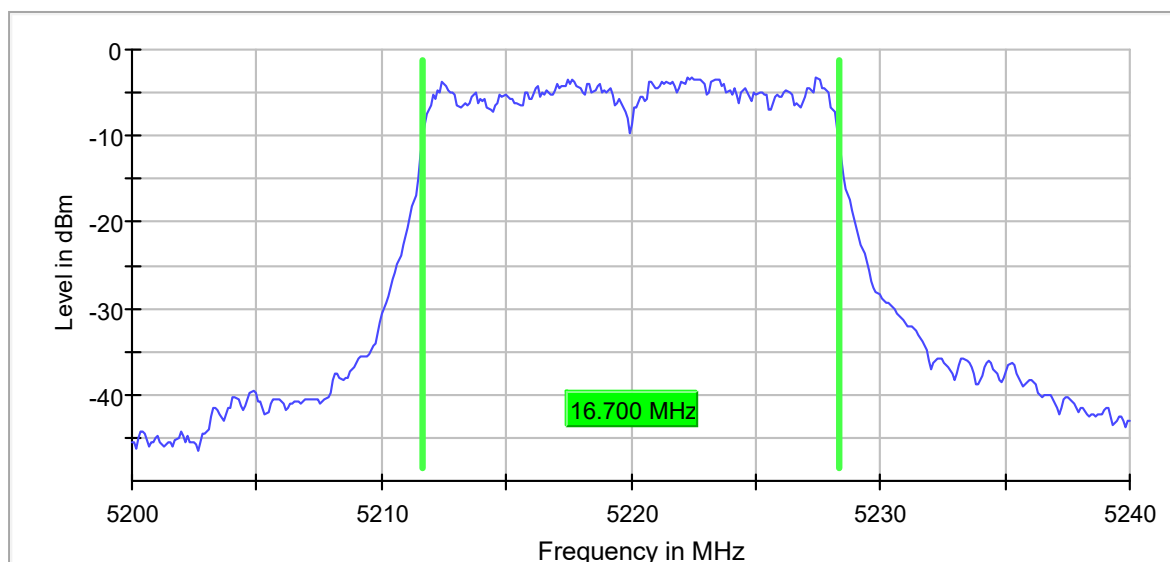
- Low Channel 36 (5180 MHz):

99 % Bandwidth

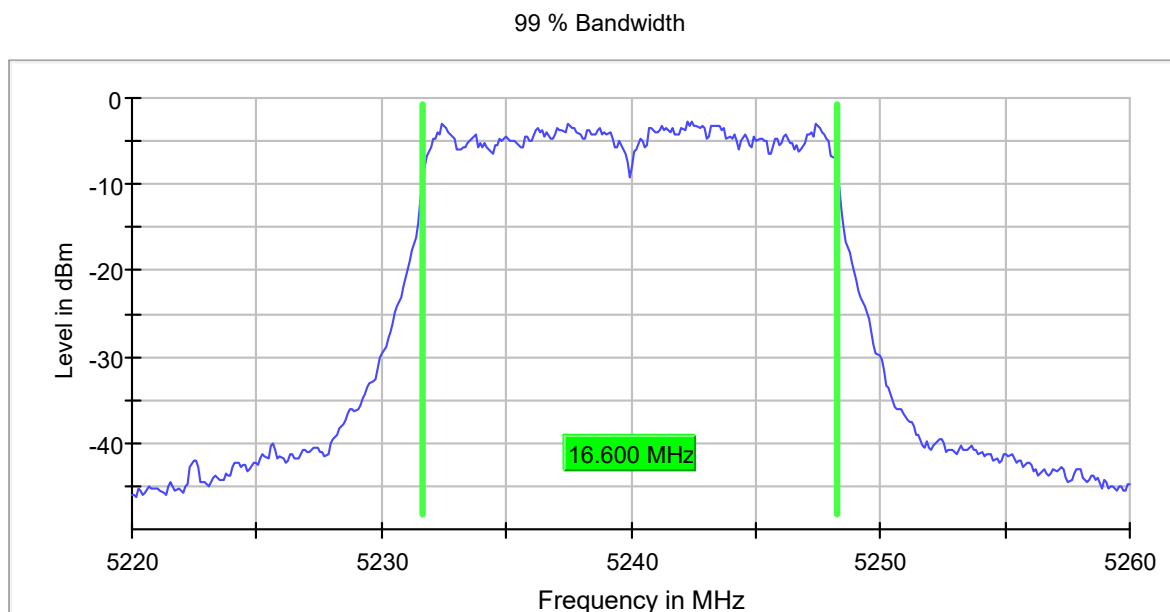


- Middle Channel 44 (5220 MHz):

99 % Bandwidth

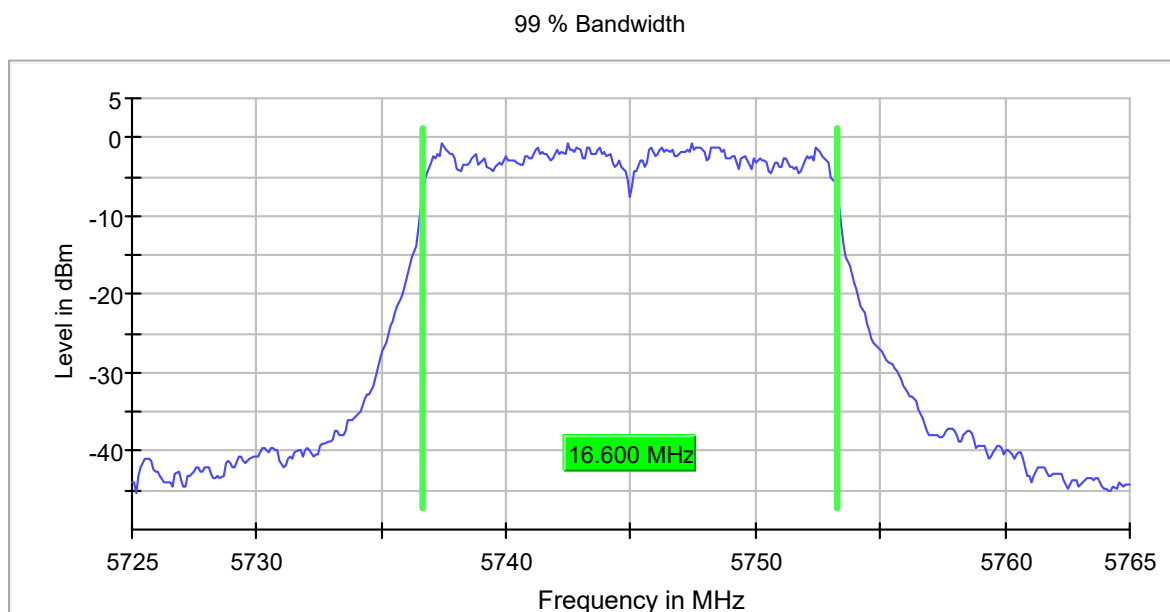


- High Channel 48 (5240 MHz):



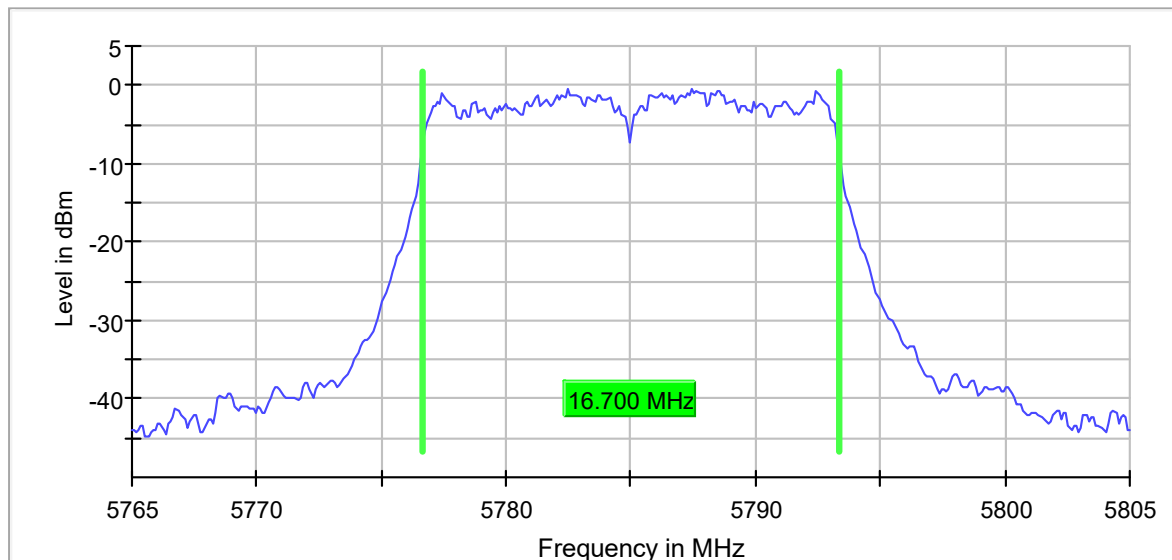
U-NII-3 (5725-5850 MHz)

- Low Channel 149 (5745 MHz):



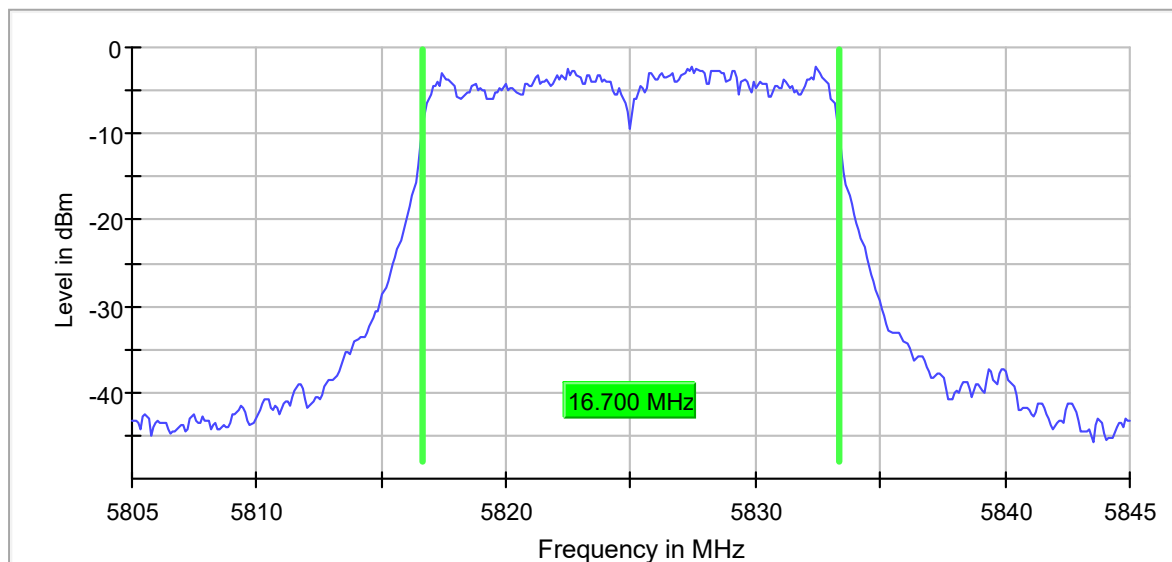
- Middle Channel 157 (5785 MHz):

99 % Bandwidth



- High Channel 165 (5825 MHz):

99 % Bandwidth

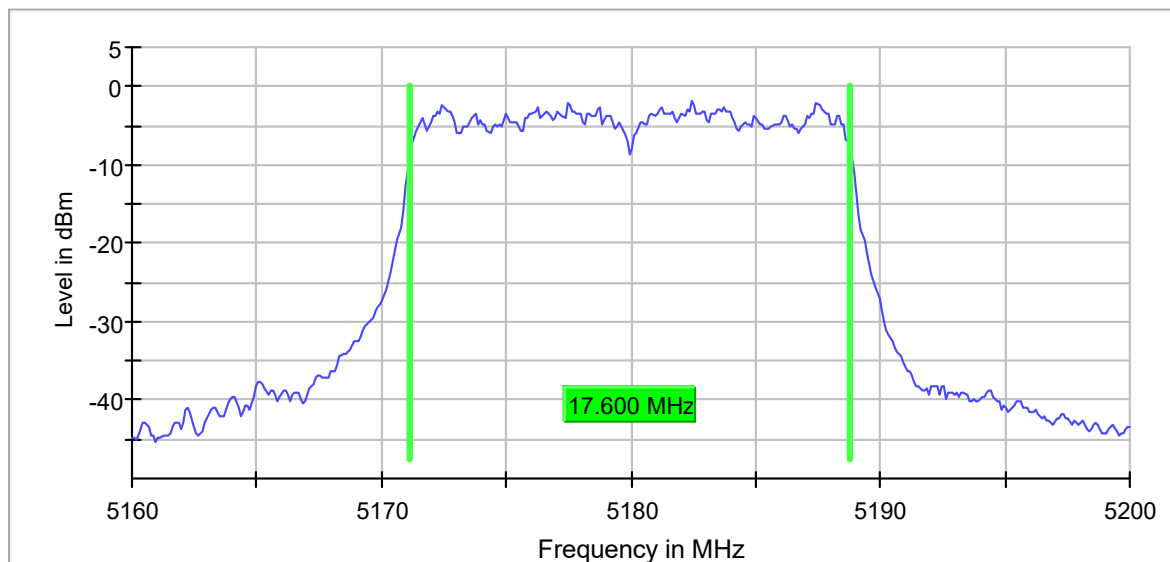


Mode 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz)

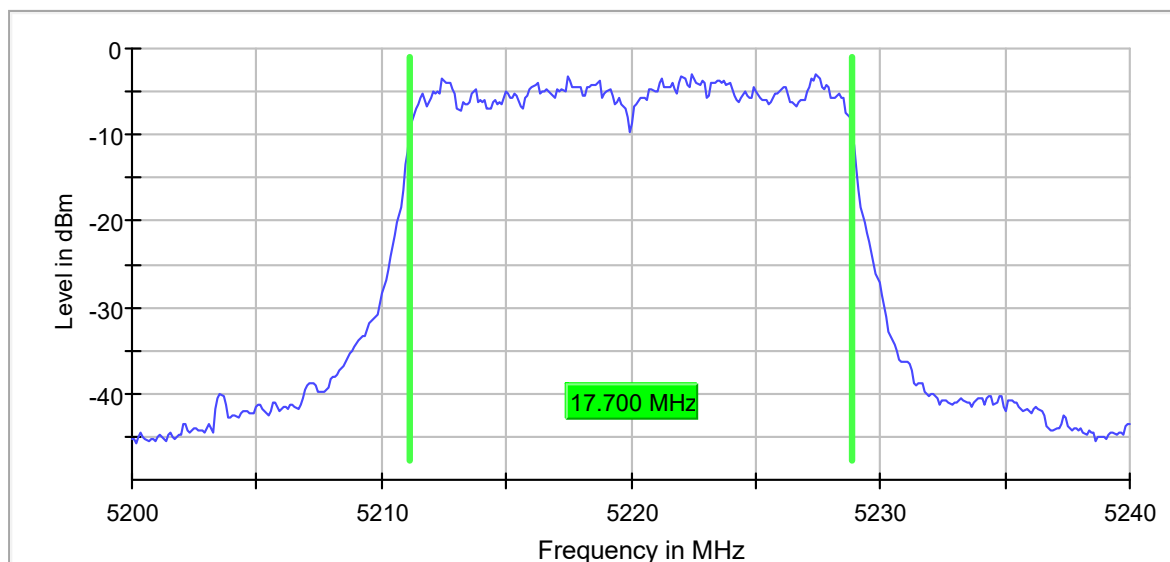
- Low Channel 36 (5180 MHz):

99 % Bandwidth

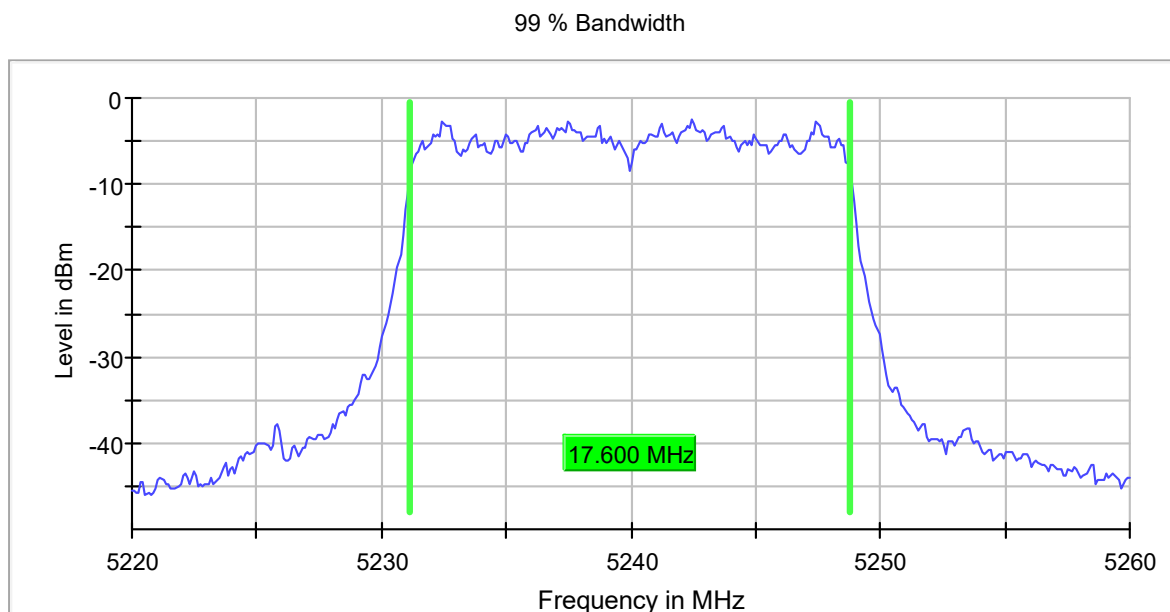


- Middle Channel 44 (5220 MHz):

99 % Bandwidth

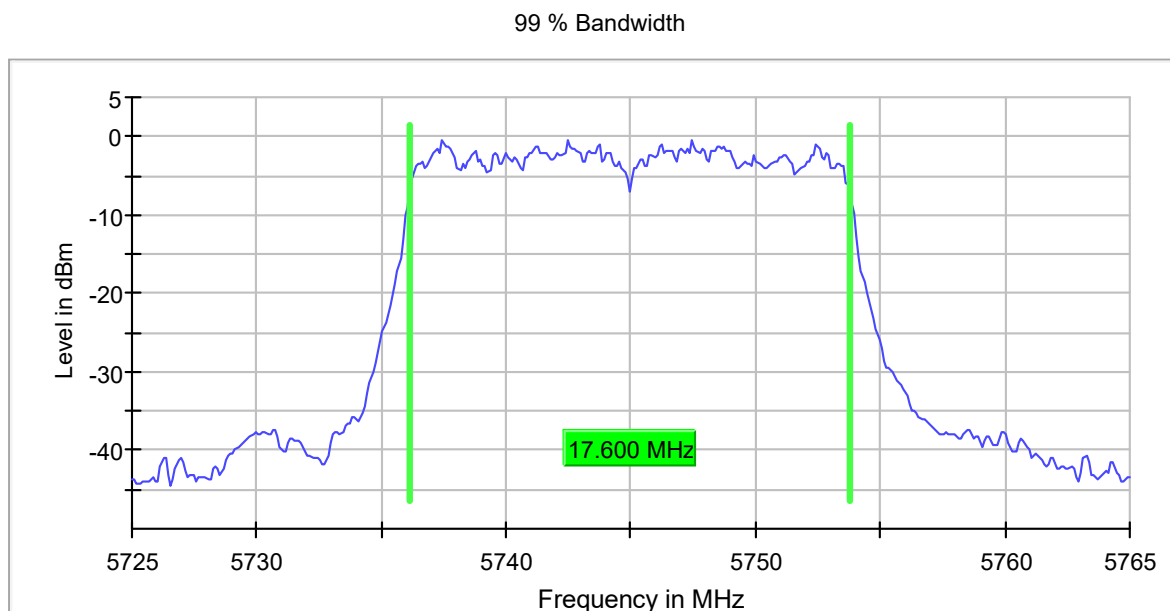


- High Channel 48 (5240 MHz):



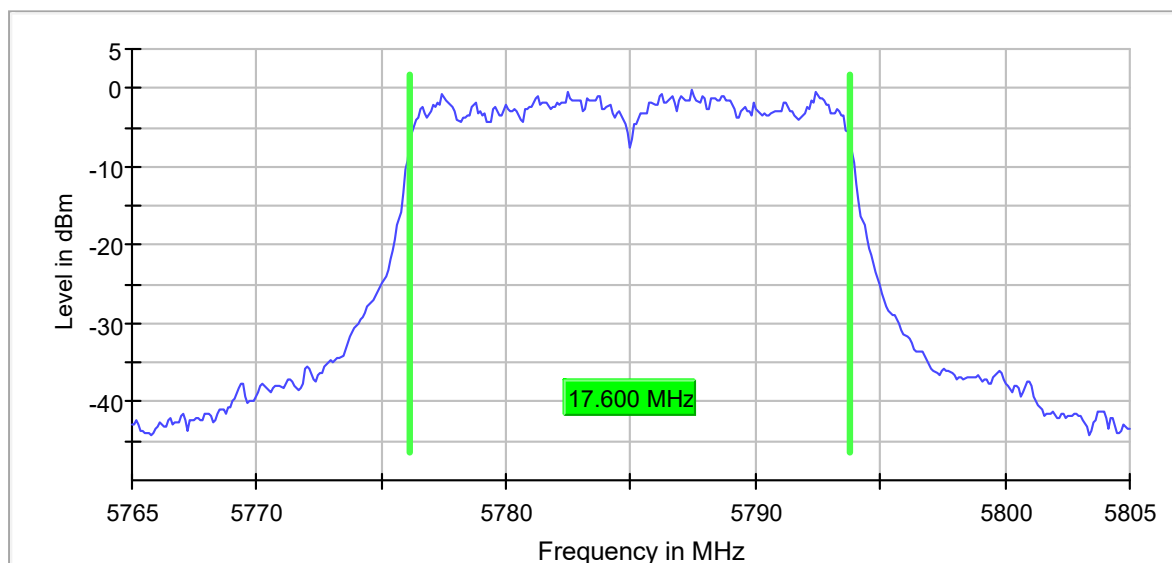
U-NII-3 (5725-5850 MHz)

- Low Channel 149 (5745 MHz):



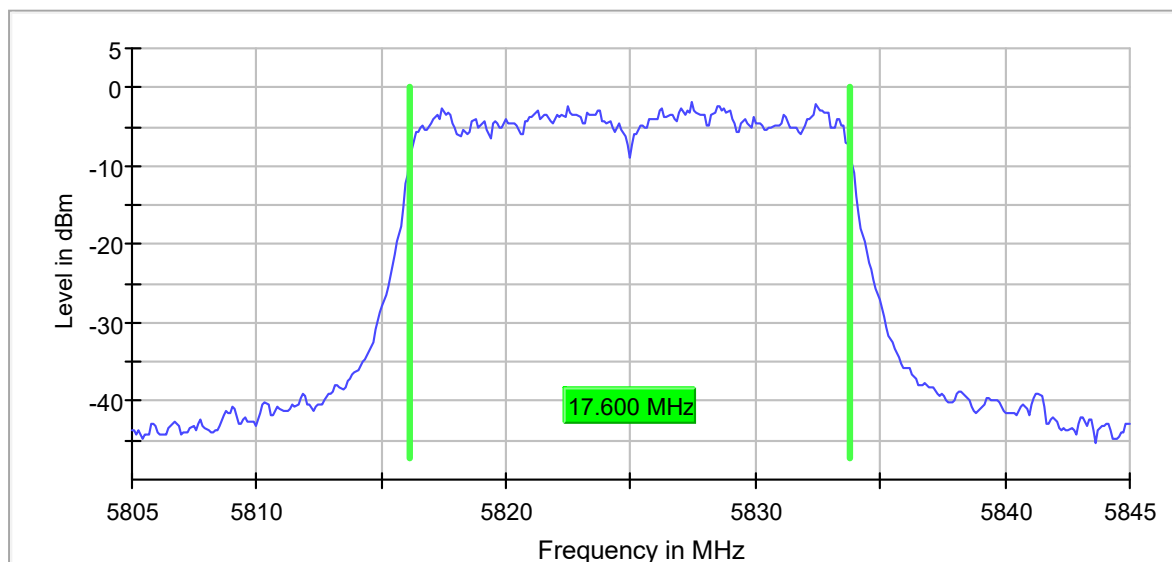
- Middle Channel 157 (5785 MHz):

99 % Bandwidth



- High Channel 165 (5825 MHz):

99 % Bandwidth

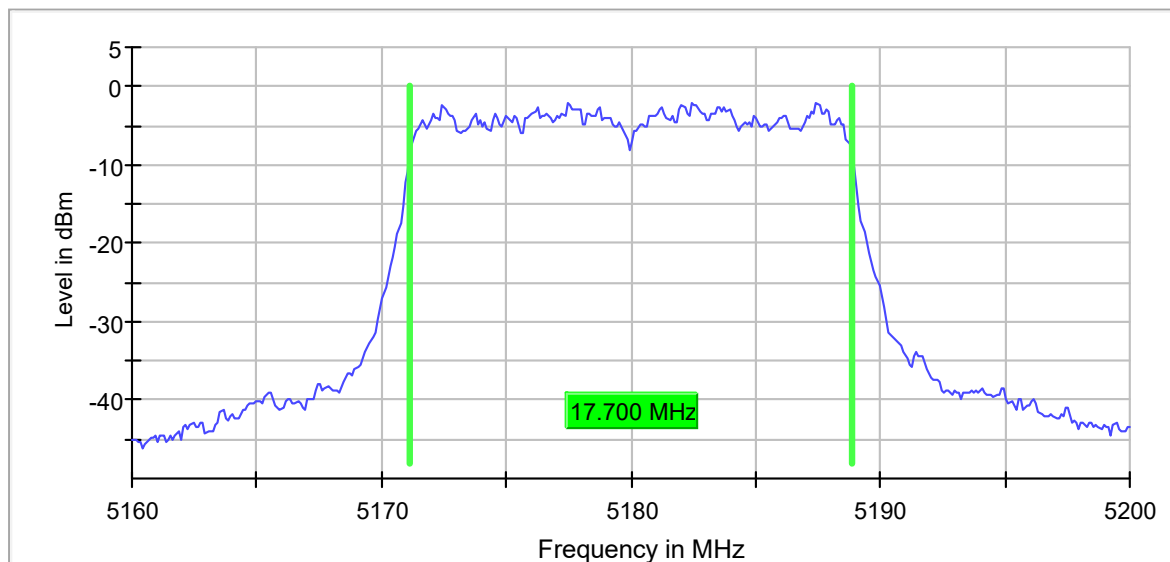


Mode 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz)

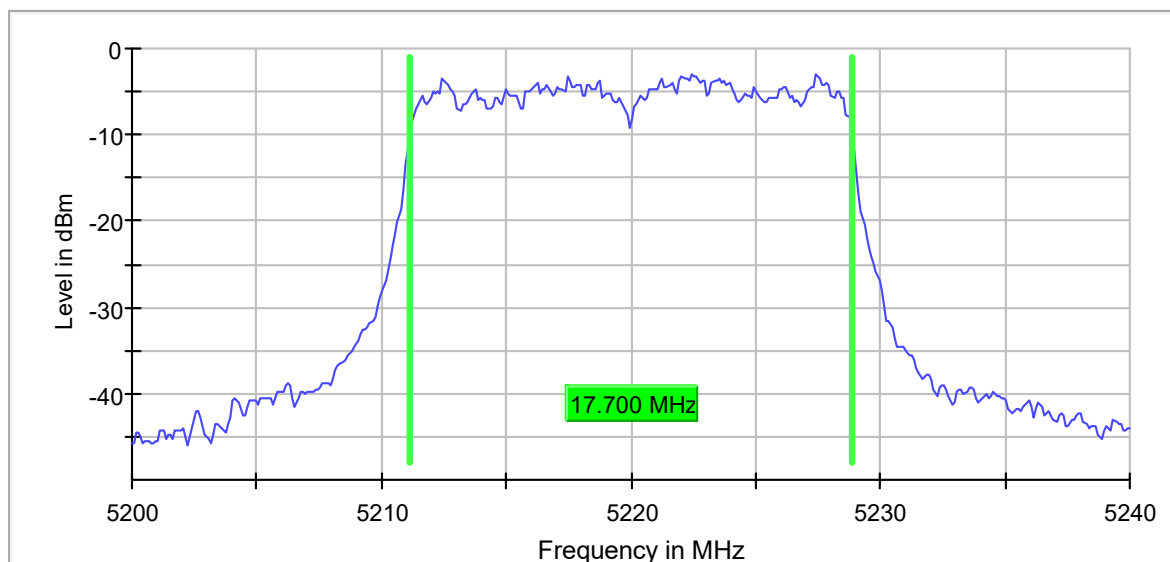
- Low Channel 36 (5180 MHz):

99 % Bandwidth

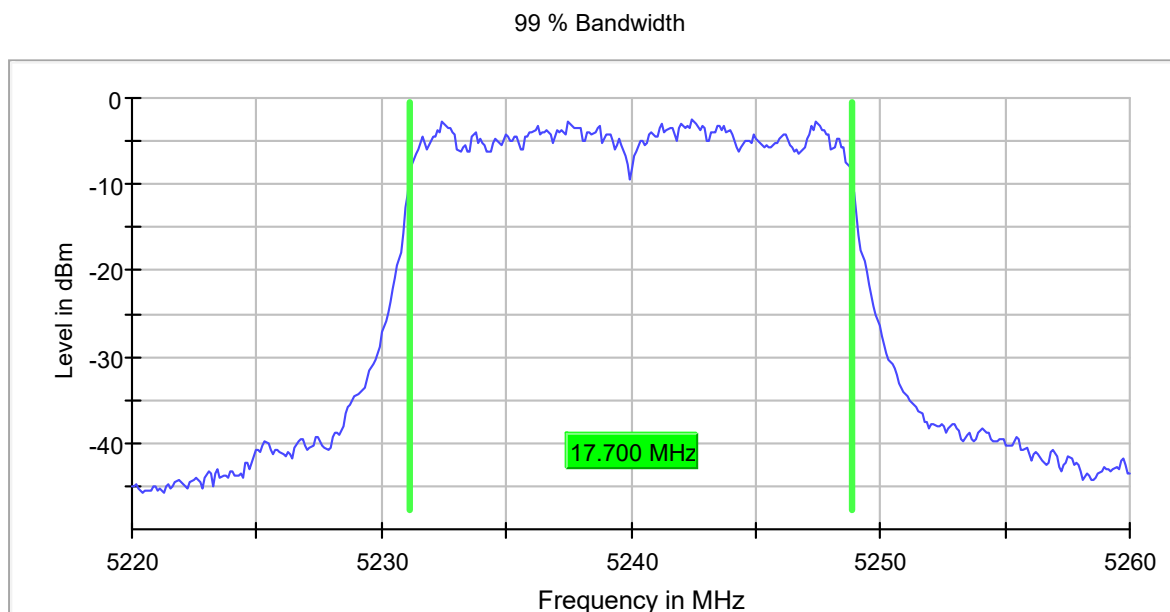


- Middle Channel 44 (5220 MHz):

99 % Bandwidth

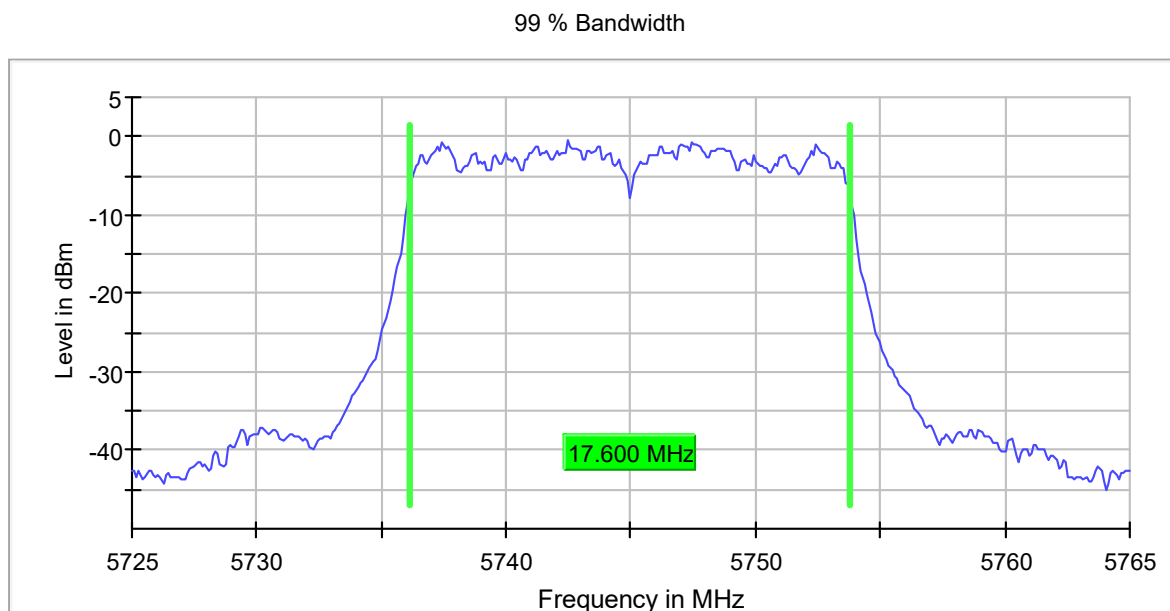


- High Channel 48 (5240 MHz):



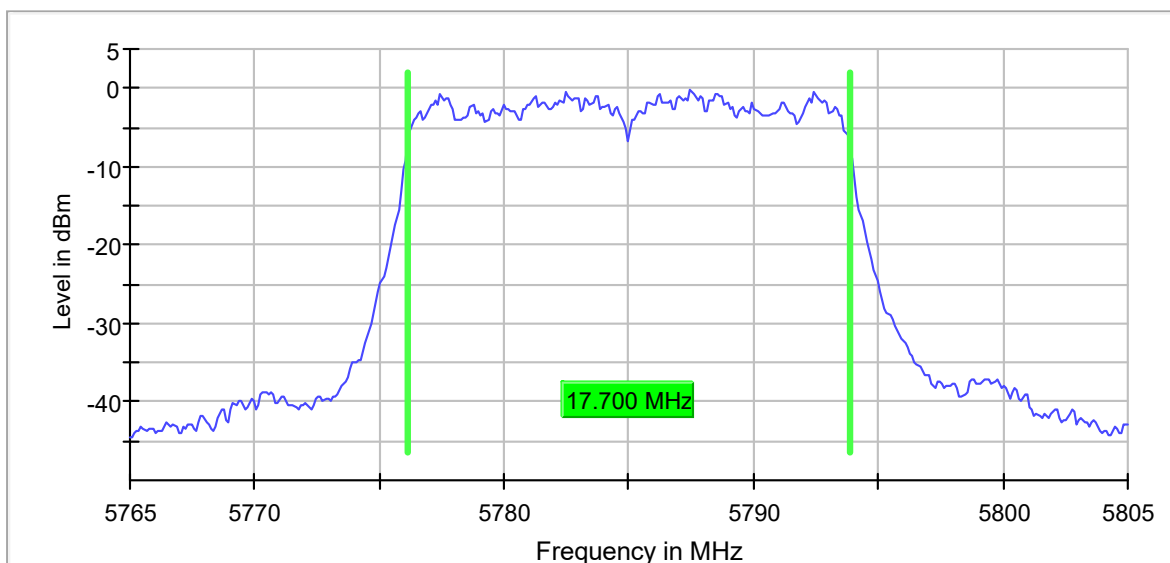
U-NII-3 (5725-5850 MHz)

- Low Channel 149 (5745 MHz):



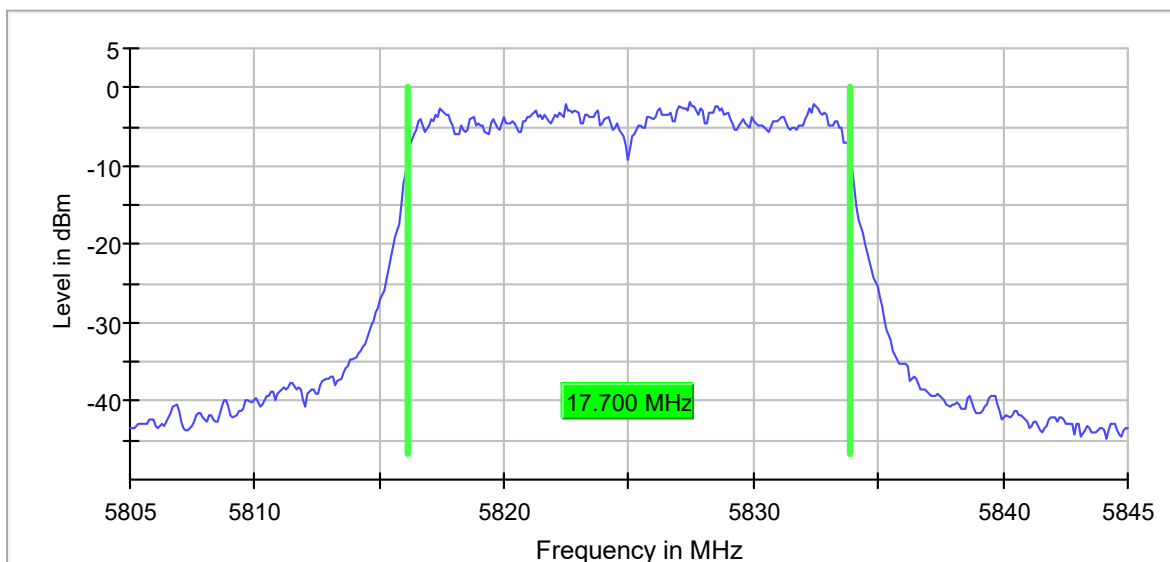
- Middle Channel 157 (5785 MHz):

99 % Bandwidth



- High Channel 165 (5825 MHz):

99 % Bandwidth

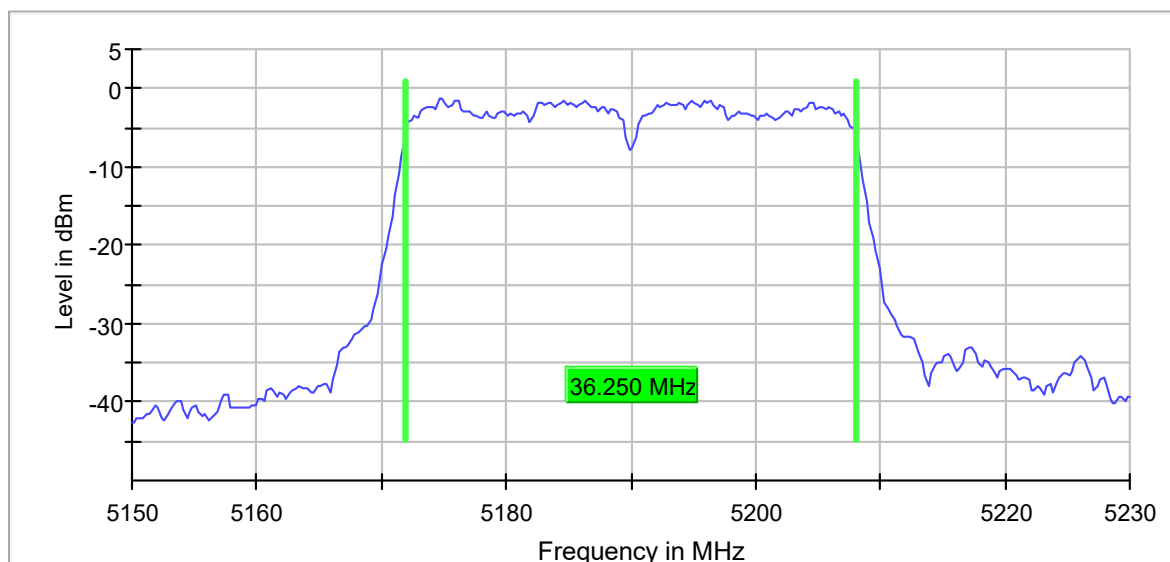


Mode 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz)

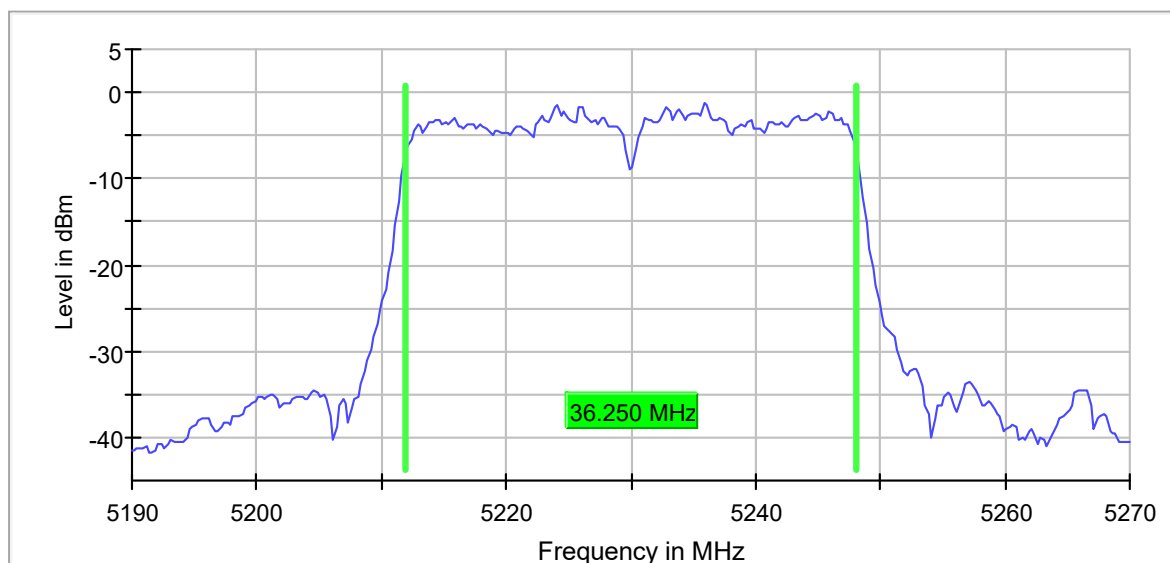
- Low Channel 38 (5190 MHz):

99 % Bandwidth



- High Channel 46 (5230 MHz):

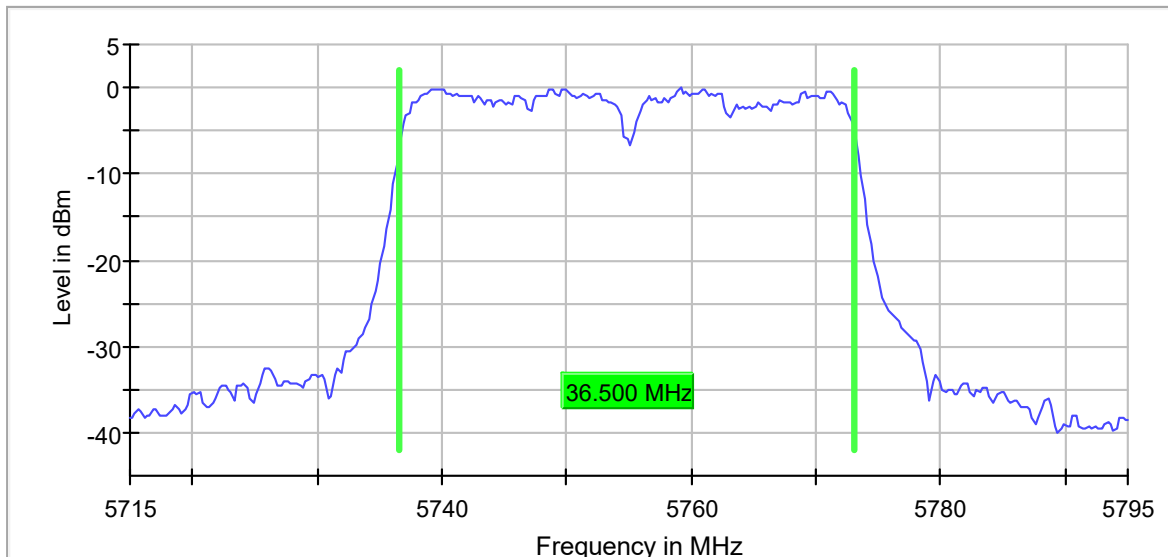
99 % Bandwidth



U-NII-3 (5725-5850 MHz)

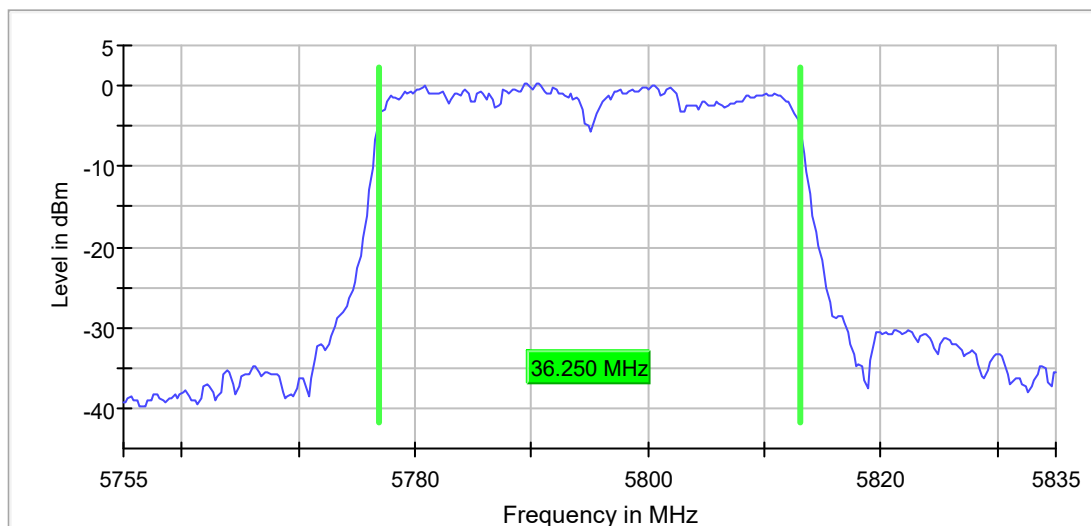
- Low Channel 151 (5755 MHz):

99 % Bandwidth



- High Channel 159 (5795 MHz):

99 % Bandwidth

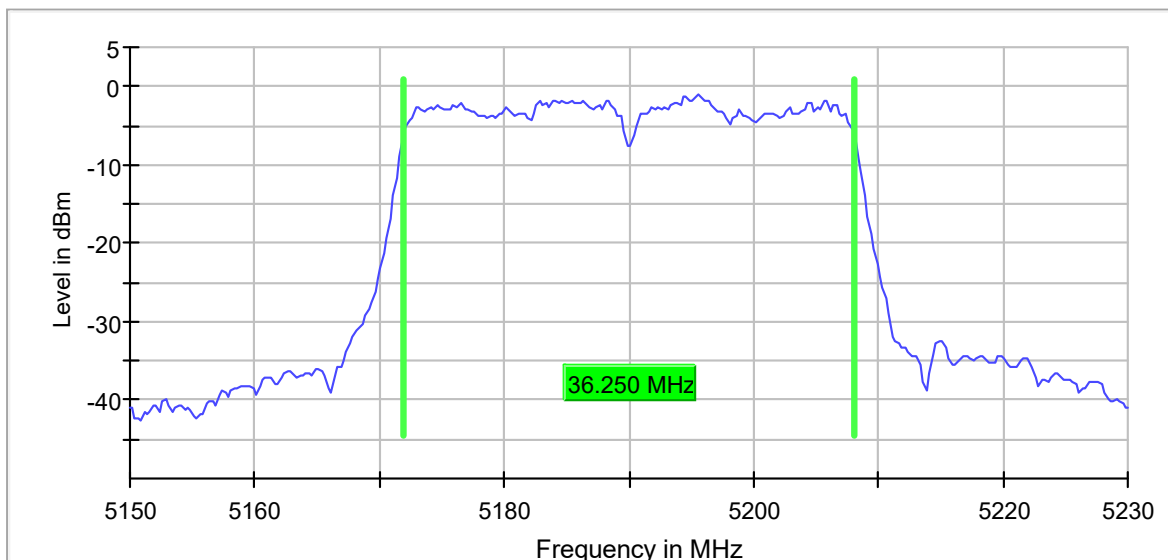


Mode 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz)

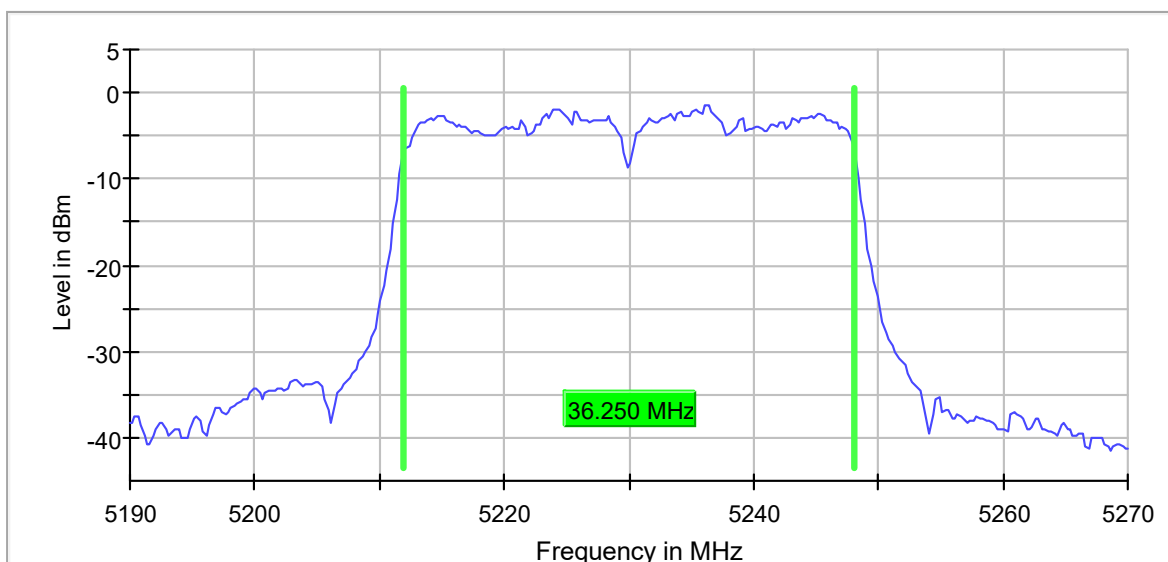
- Low Channel 38 (5190 MHz):

99 % Bandwidth



- High Channel 46 (5230 MHz):

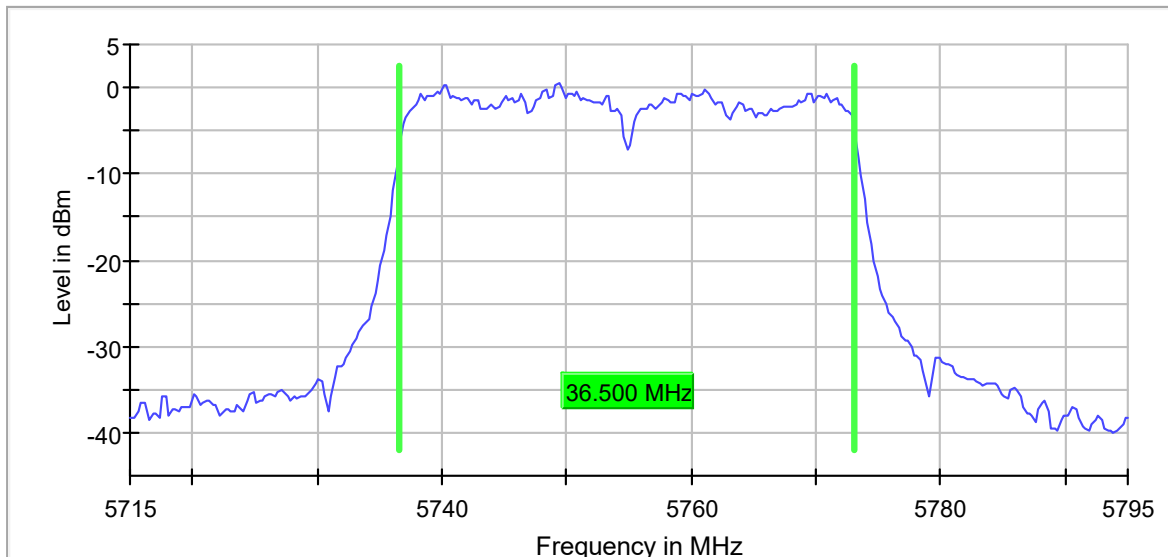
99 % Bandwidth



U-NII-3 (5725-5850 MHz)

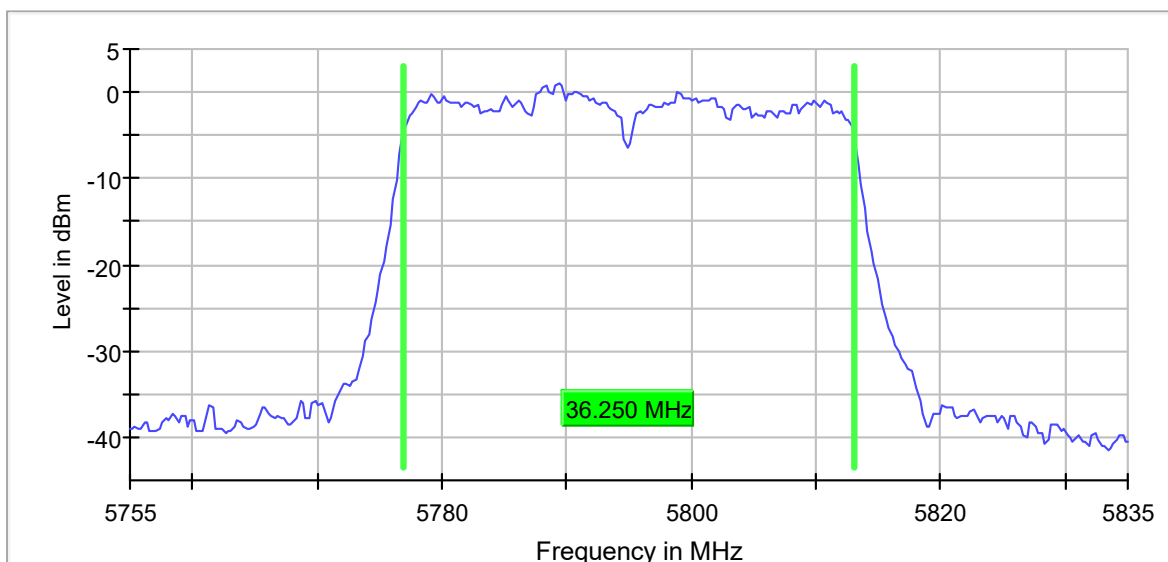
- Low Channel 151 (5755 MHz):

99 % Bandwidth



- High Channel 159 (5795 MHz):

99 % Bandwidth

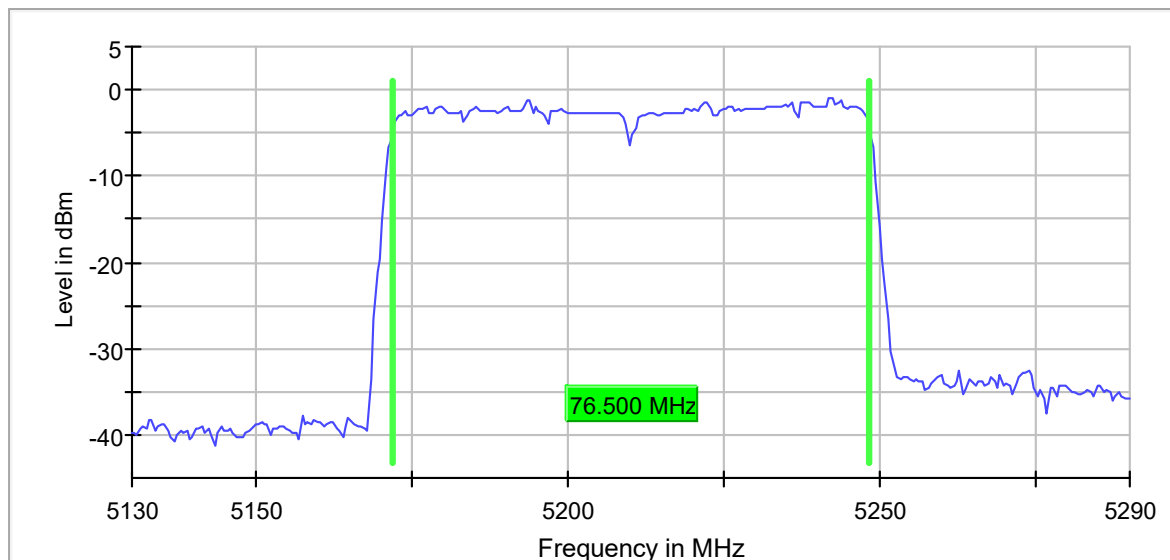


Mode 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)

- Single Channel 42 (5210 MHz):

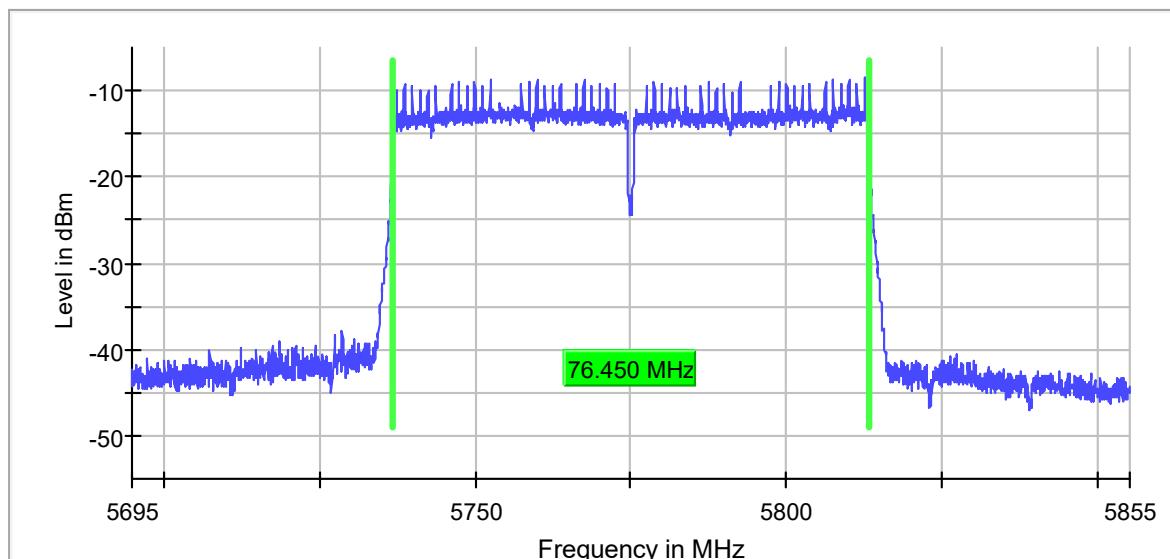
99 % Bandwidth



U-NII-3 (5725-5850 MHz)

- Single Channel 155 (5775 MHz):

6 dB Bandwidth



26 dB Emission Bandwidth (EBW)

RESULTS:

The 26 dB Emission Bandwidth was measured using the method according to point C) 1) of 789033 D02 General UNII Test Procedures New Rules v02r01.

Mode 802.11 a20:

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
-26 dBc bandwidth (MHz)	19.90	19.80	19.90
Measurement uncertainty (%)	<±1.17		

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
-26 dBc bandwidth (MHz)	19.80	19.80	19.90
Measurement uncertainty (%)	<±1.17		

Mode 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
-26 dBc bandwidth (MHz)	20.30	20.30	20.20
Measurement uncertainty (%)	<±1.17		

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
-26 dBc bandwidth (MHz)	20.30	20.20	20.40
Measurement uncertainty (%)	<±1.17		

Mode 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
-26 dBc bandwidth (MHz)	20.40	20.20	20.30
Measurement uncertainty (%)	<±1.17		

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 149 (5745 MHz)	Middle Channel 157 (5785 MHz)	High Channel 165 (5825 MHz)
-26 dBc bandwidth (MHz)	20.20	20.20	20.10
Measurement uncertainty (%)	<±1.17		

Mode 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
-26 dBc bandwidth (MHz)	41.12	40.97
Measurement uncertainty (%)	<±1.15	

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 151 (5755 MHz)	High Channel 159 (5795 MHz)
-26 dBc bandwidth (MHz)	40.67	40.82
Measurement uncertainty (%)	<±1.15	

Mode 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz)

Channels	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
-26 dBc bandwidth (MHz)	40.82	40.67
Measurement uncertainty (%)	<±1.15	

U-NII-3 (5725-5850 MHz)

Channels	Low Channel 151 (5755 MHz)	High Channel 159 (5795 MHz)
-26 dBc bandwidth (MHz)	40.67	40.52
Measurement uncertainty (%)	<±1.15	

Mode 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)

Channel	Single Channel 42 (5210 MHz)
-26 dBc bandwidth (MHz)	82.50
Measurement uncertainty (%)	<±1.20

U-NII-3 (5725-5850 MHz)

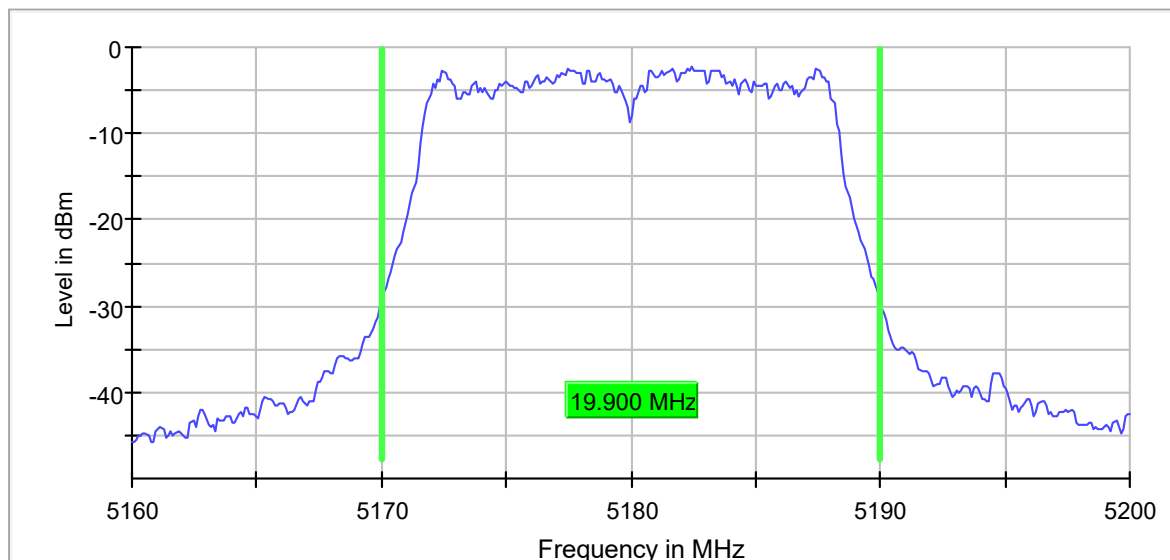
Channels	Single Channel 155 (5775 MHz)
-26 dBc bandwidth (MHz)	83.00
Measurement uncertainty (%)	<±1.20

Mode 802.11 a20:

U-NII-1 (5150-5250 MHz)

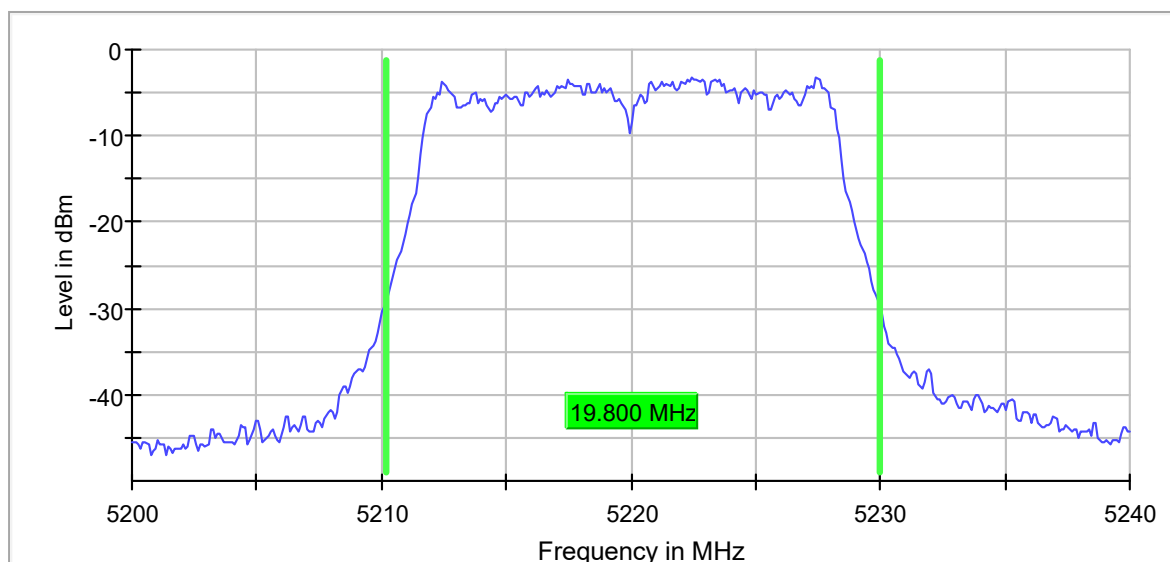
- Low Channel 36 (5180 MHz):

26 dB Bandwidth



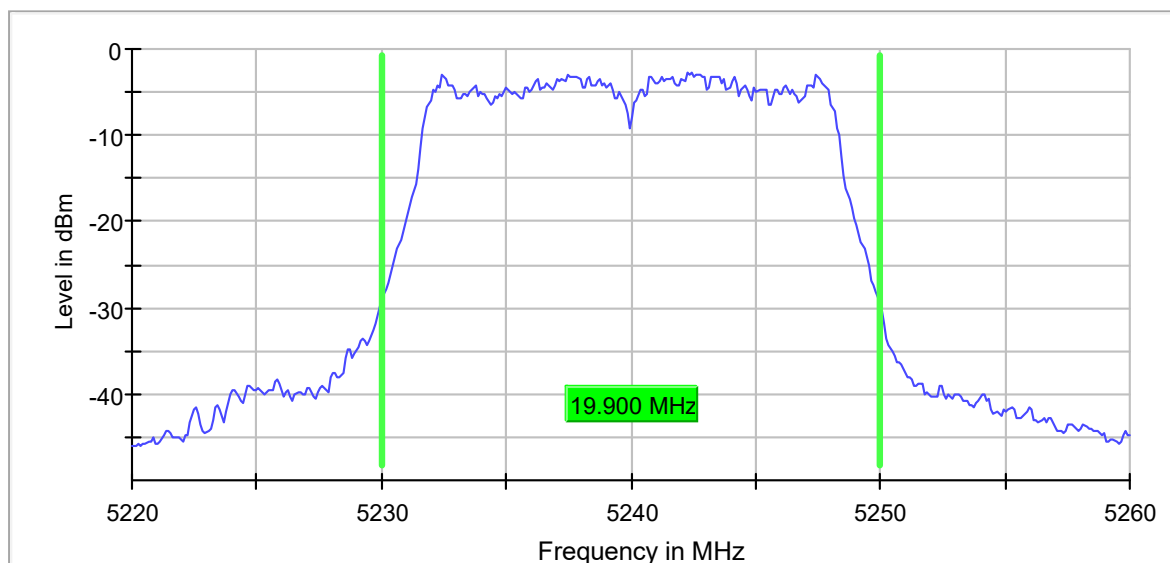
- Middle Channel 44 (5220 MHz):

26 dB Bandwidth



- High Channel 48 (5240 MHz):

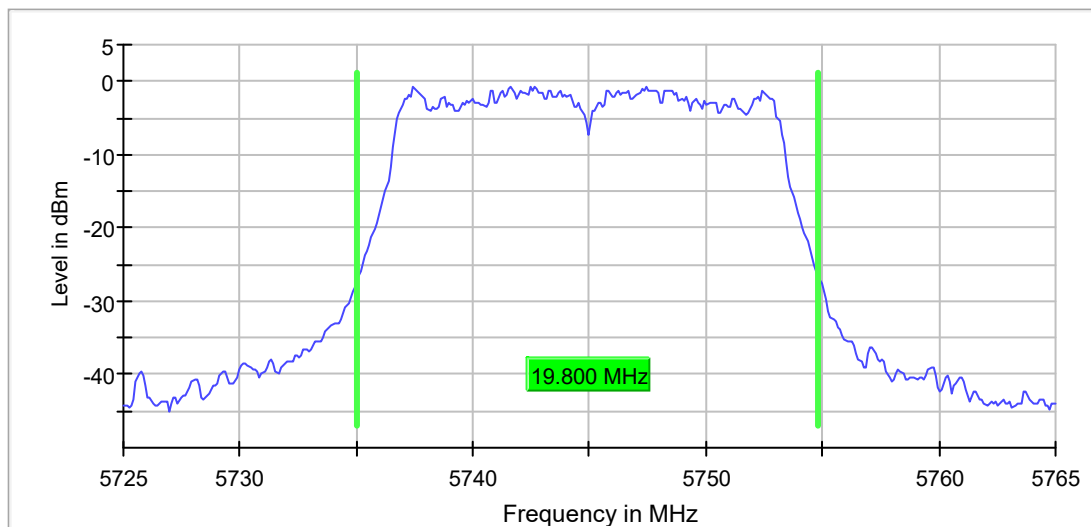
26 dB Bandwidth



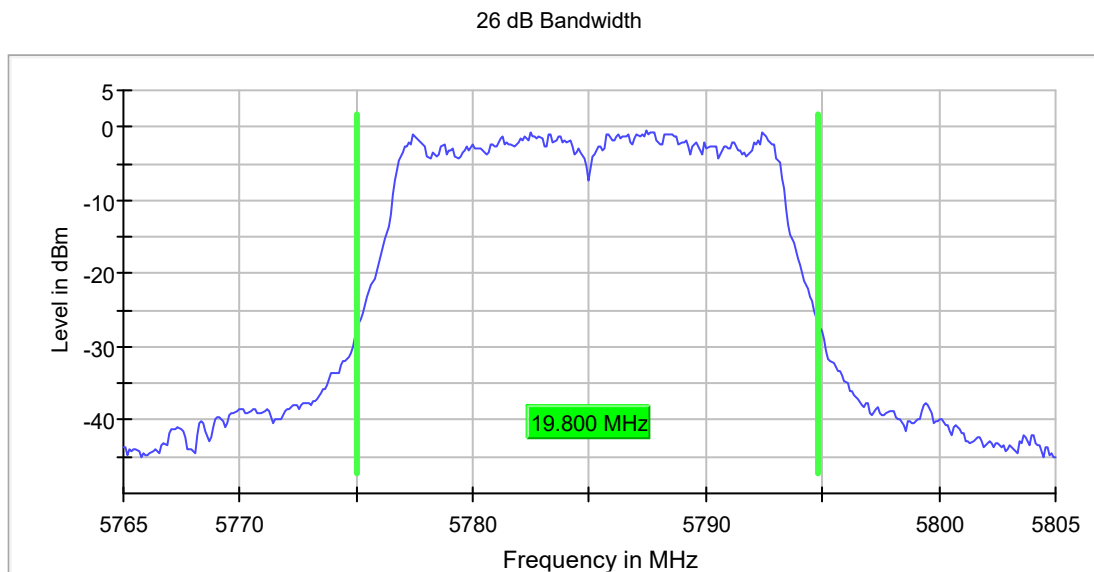
U-NII-3 (5725-5850 MHz)

- Low Channel 149 (5745 MHz):

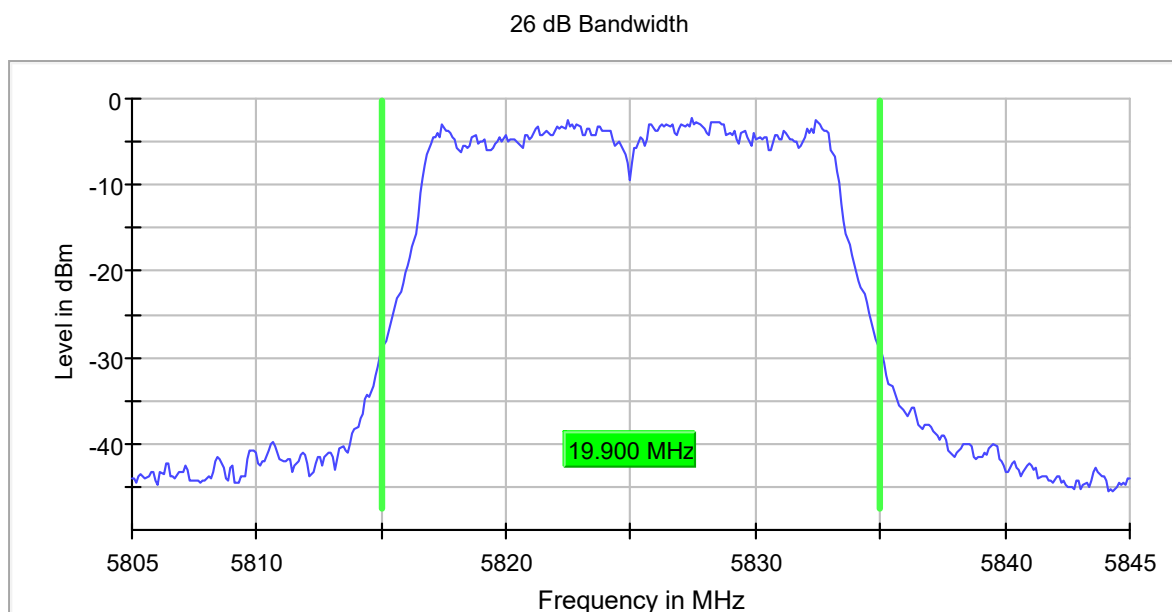
26 dB Bandwidth



- Middle Channel 157 (5785 MHz):



- High Channel 165 (5825 MHz):

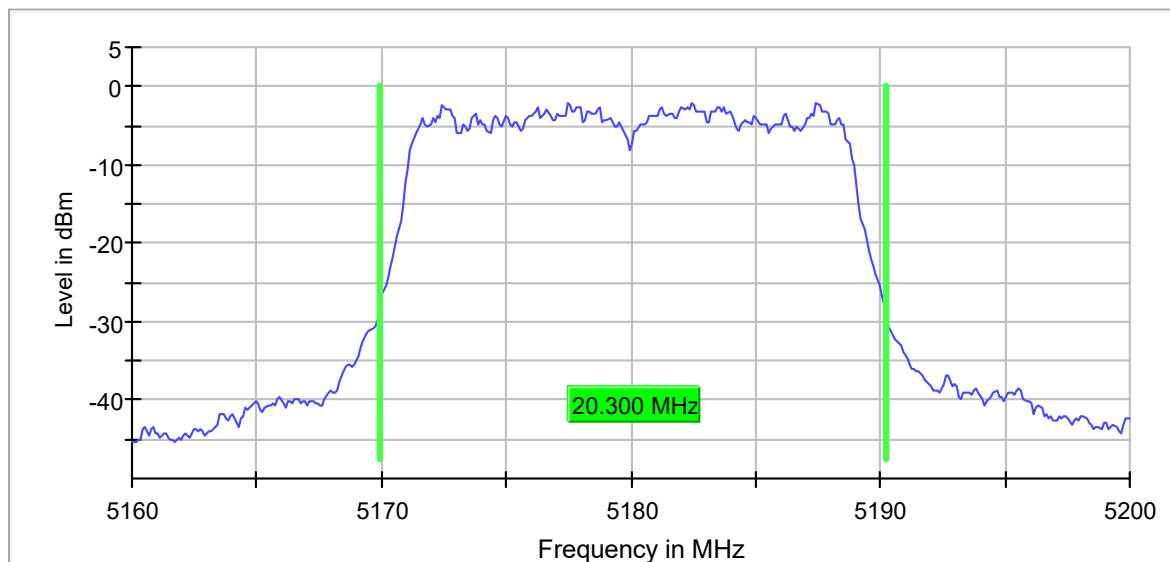


Mode 802.11 n20 (HT20):

U-NII-1 (5150-5250 MHz)

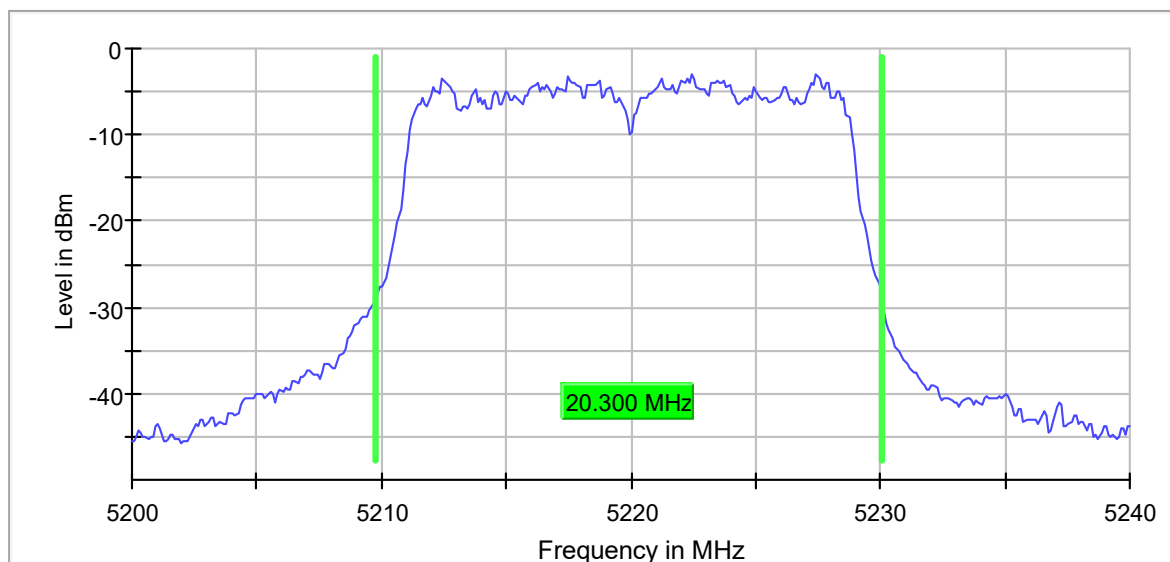
- Low Channel 36 (5180 MHz):

26 dB Bandwidth



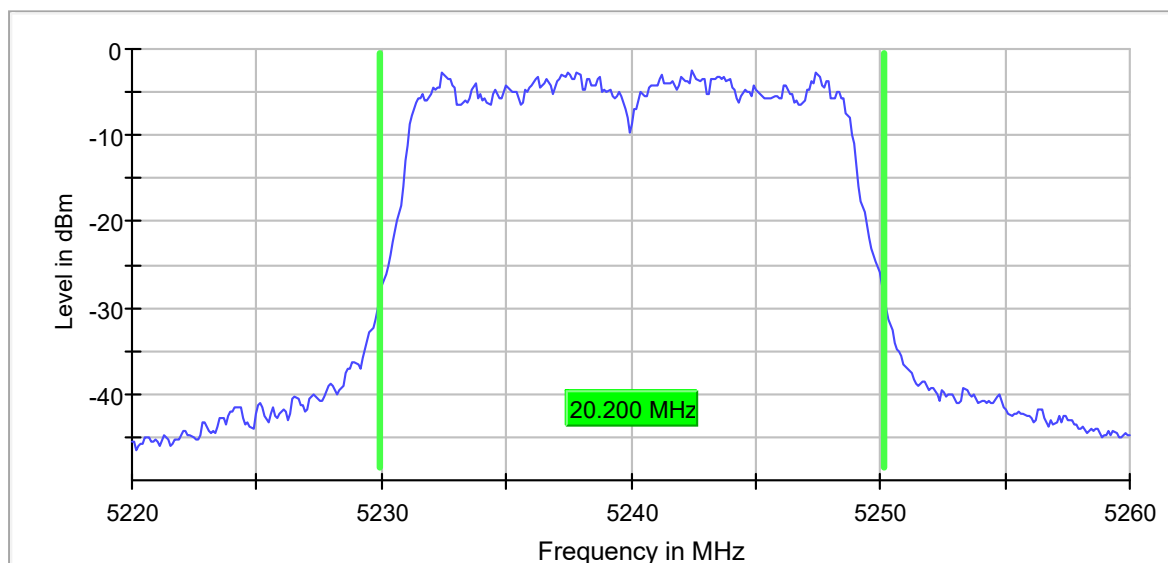
- Middle Channel 44 (5220 MHz):

26 dB Bandwidth



- High Channel 48 (5240 MHz):

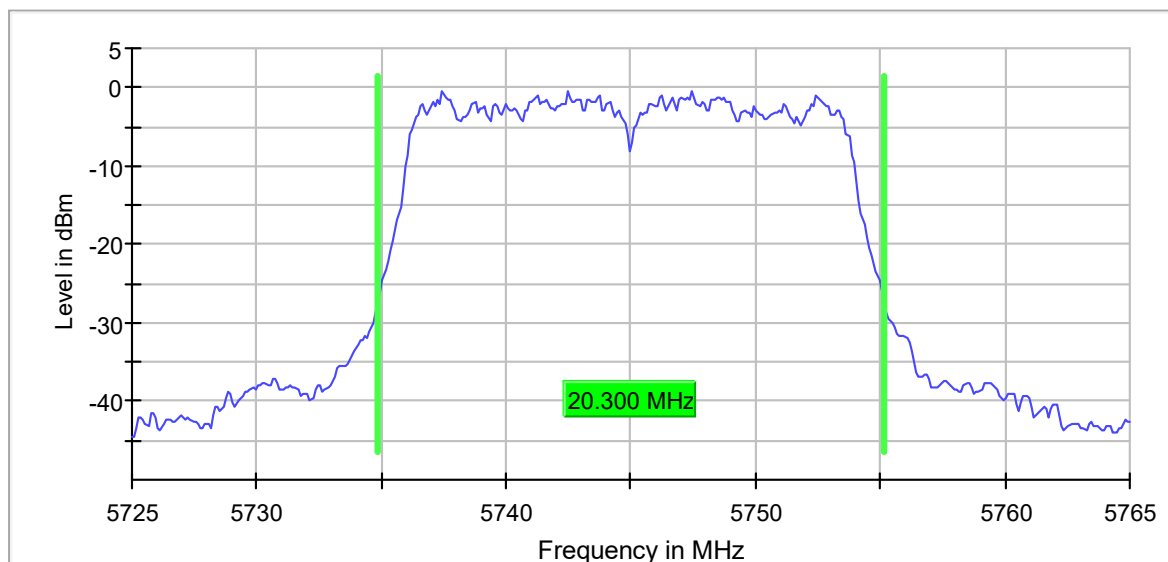
26 dB Bandwidth



U-NII-3 (5725-5850 MHz)

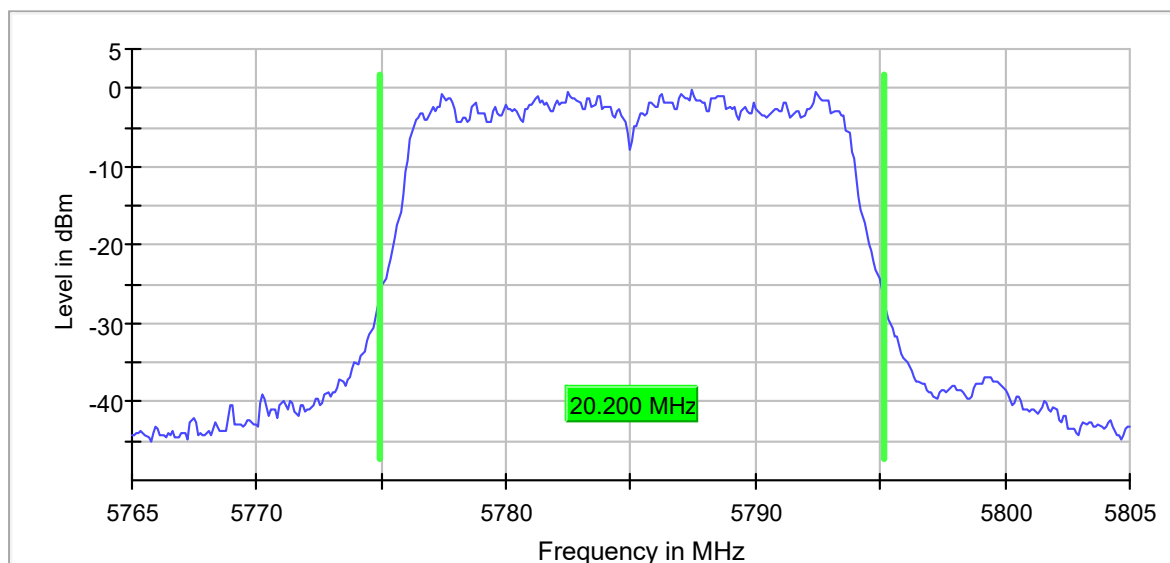
- Low Channel 149 (5745 MHz):

26 dB Bandwidth



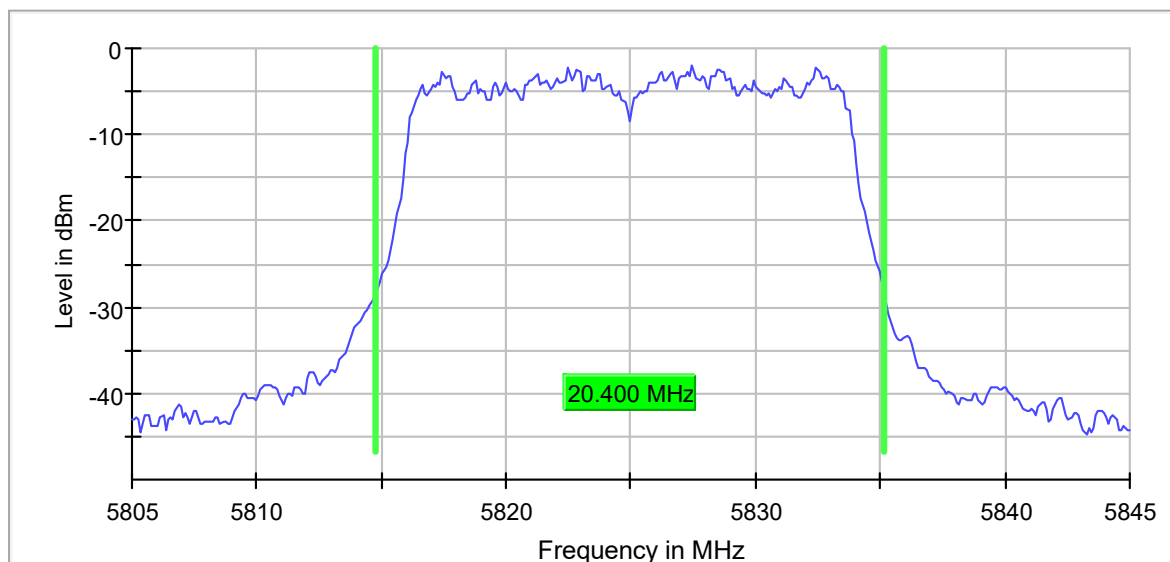
- Middle Channel 157 (5785 MHz):

26 dB Bandwidth



- High Channel 165 (5825 MHz):

26 dB Bandwidth

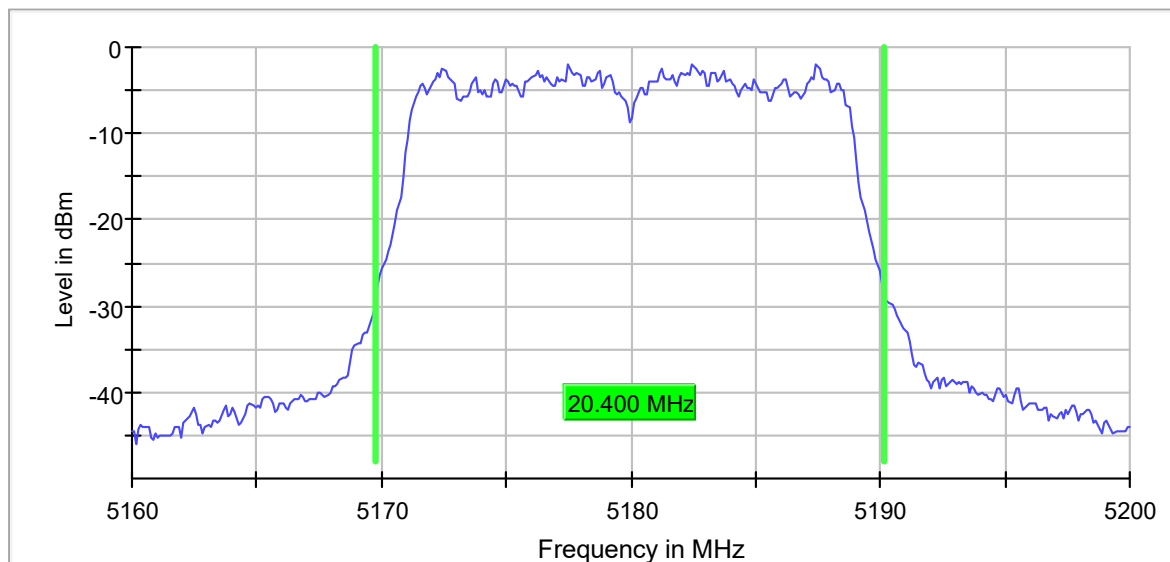


Mode 802.11 ac20 (VHT20):

U-NII-1 (5150-5250 MHz)

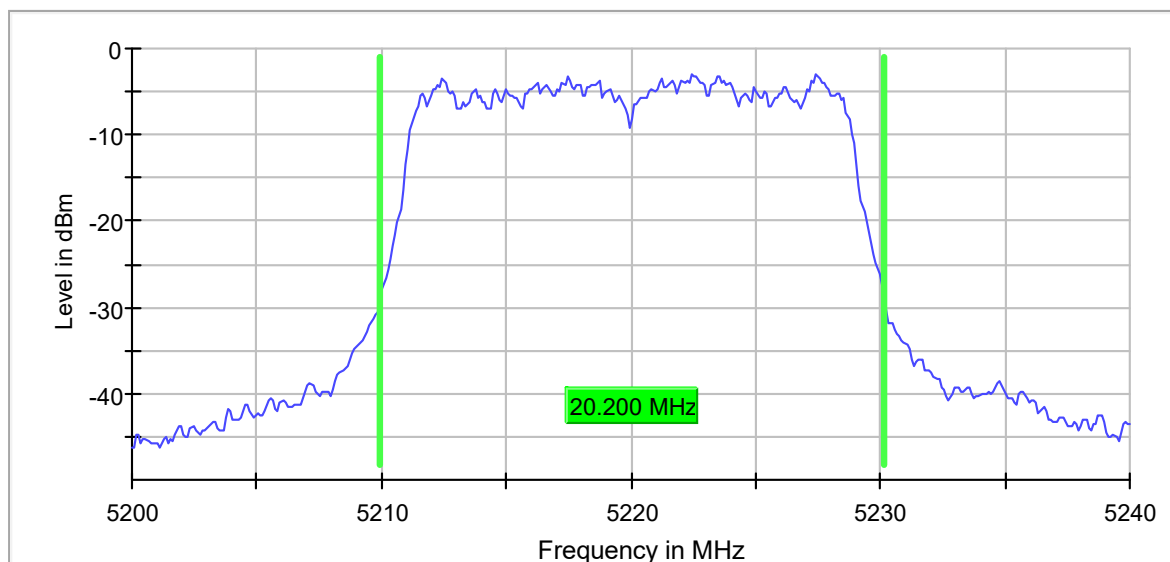
- Low Channel 36 (5180 MHz):

26 dB Bandwidth



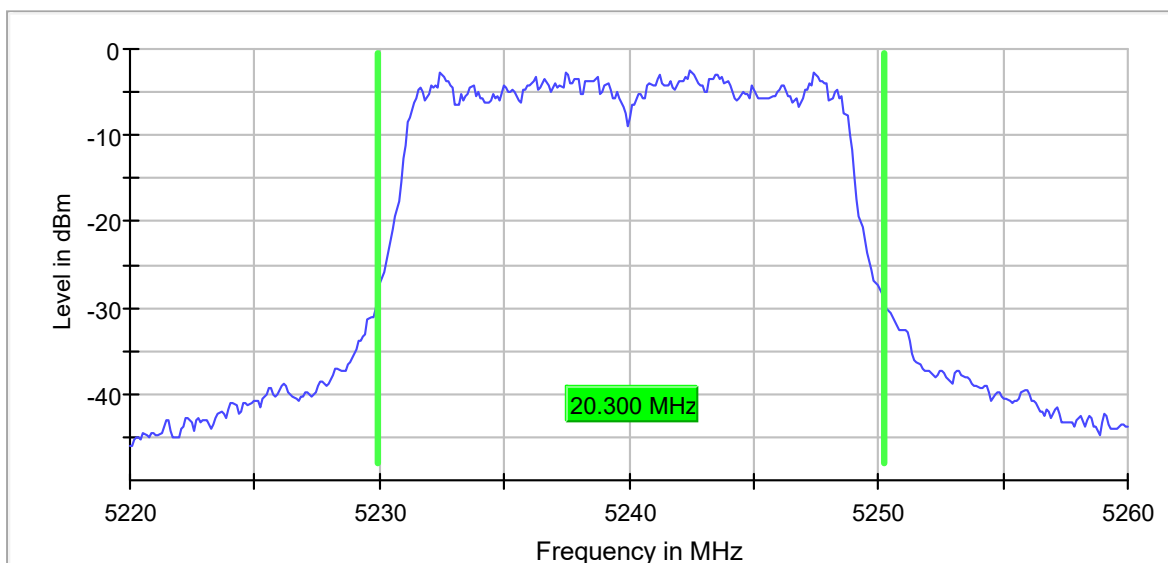
- Middle Channel 44 (5220 MHz):

26 dB Bandwidth



- High Channel 48 (5240 MHz):

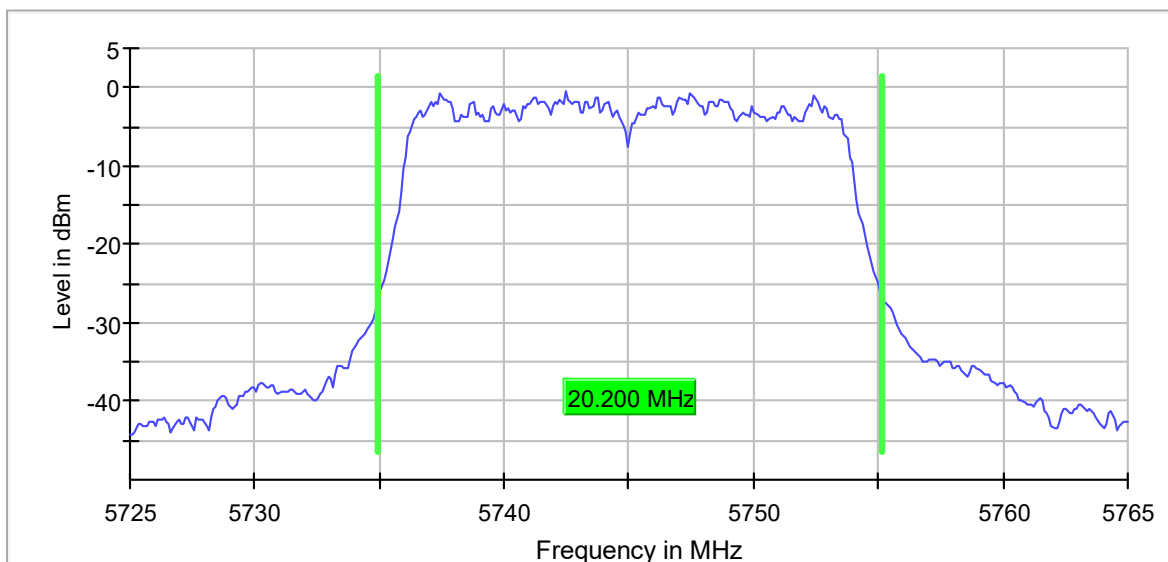
26 dB Bandwidth



U-NII-3 (5725-5850 MHz)

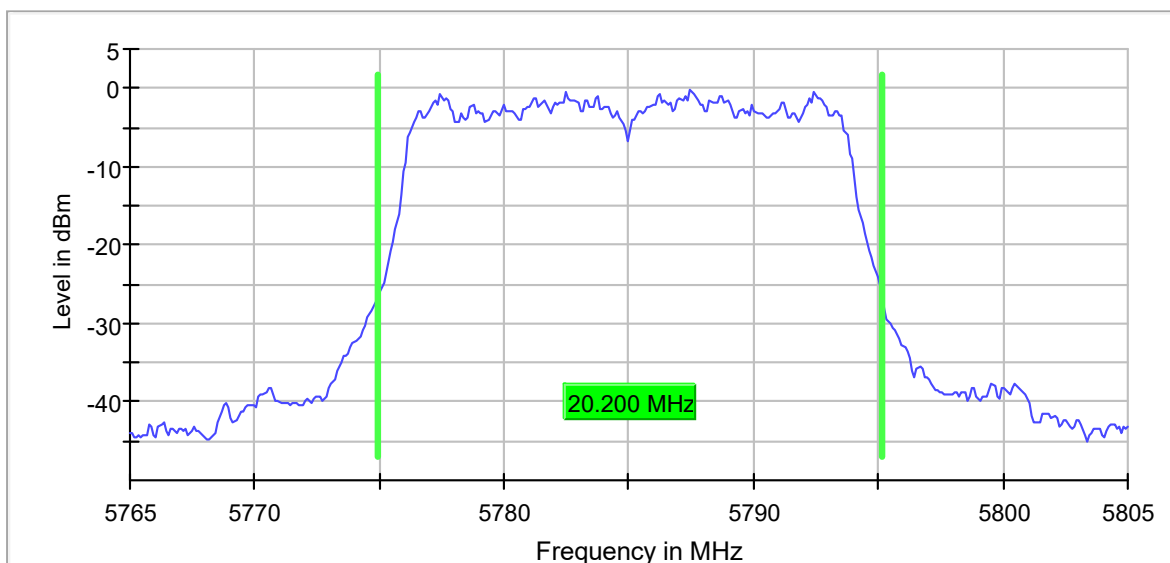
- Low Channel 149 (5745 MHz):

26 dB Bandwidth



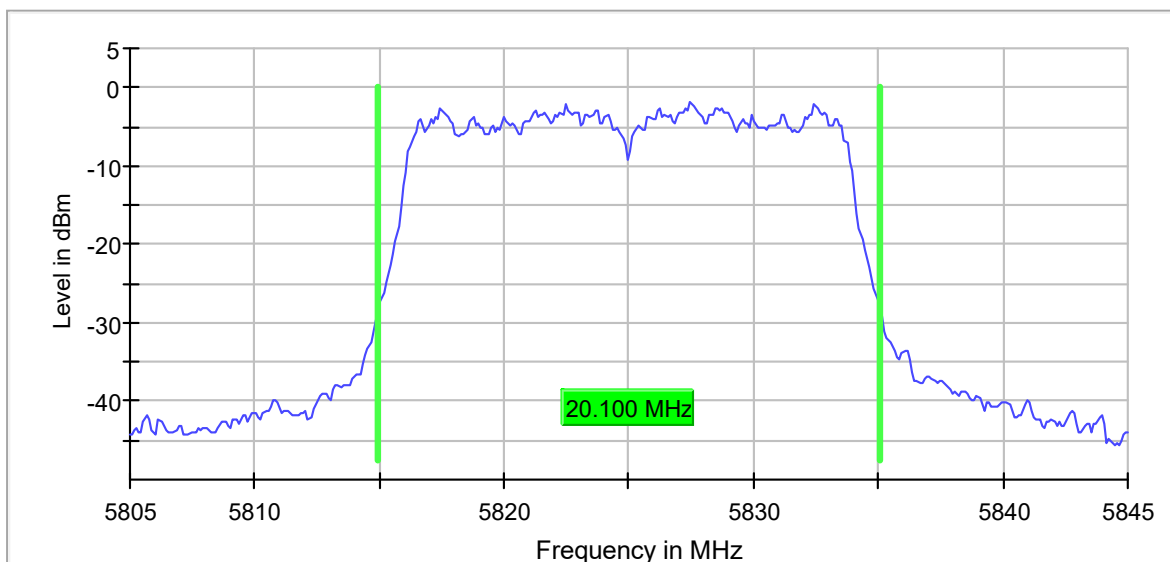
- Middle Channel 157 (5785 MHz):

26 dB Bandwidth



- High Channel 165 (5825 MHz):

26 dB Bandwidth

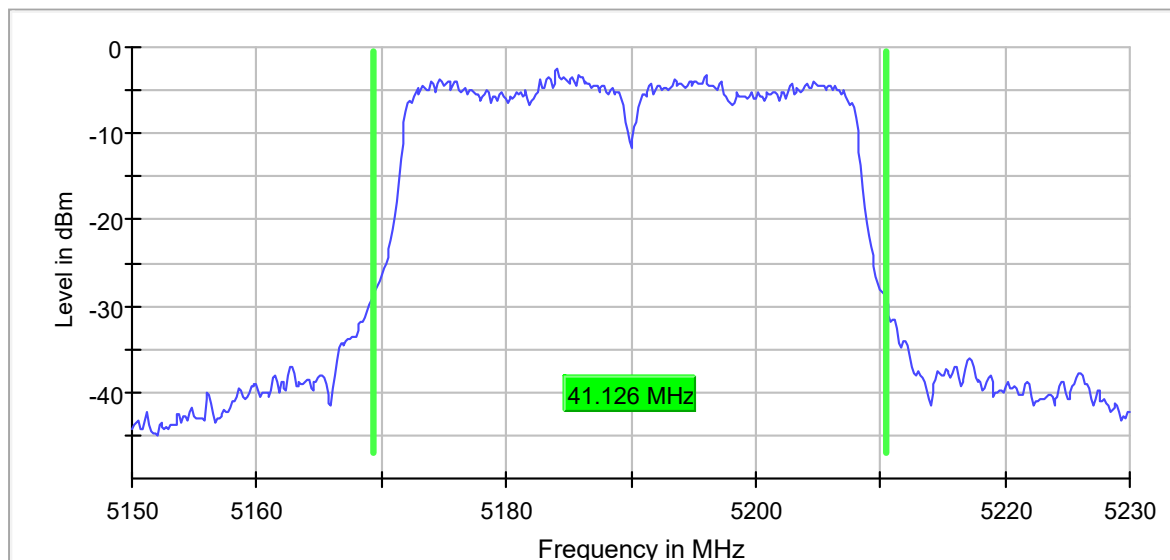


Mode 802.11 n40 (HT40):

U-NII-1 (5150-5250 MHz)

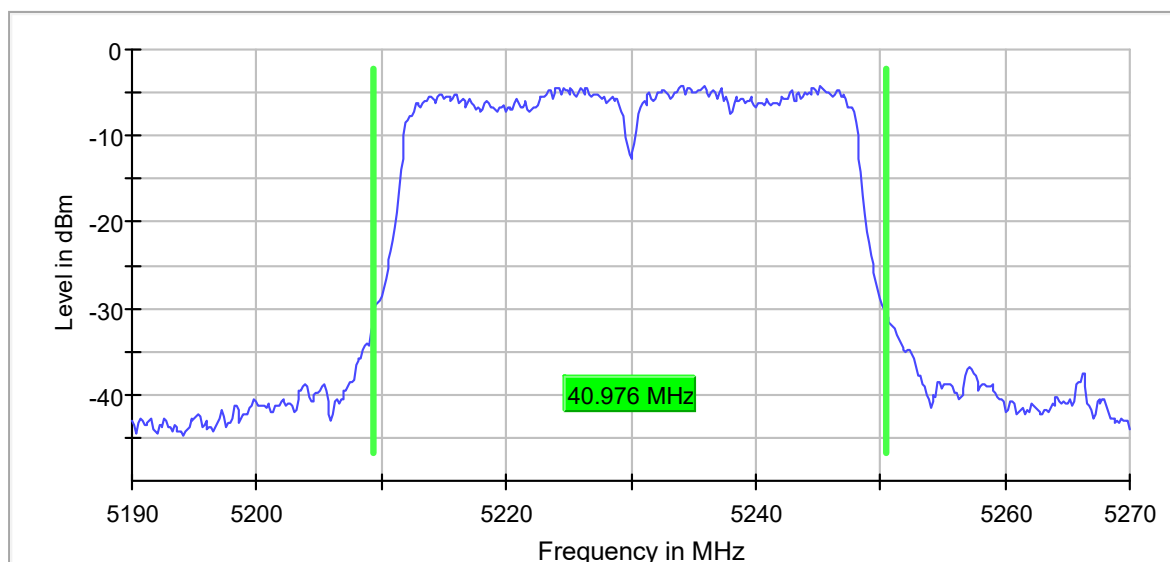
- Low Channel 38 (5190 MHz):

26 dB Bandwidth



- High Channel 46 (5230 MHz):

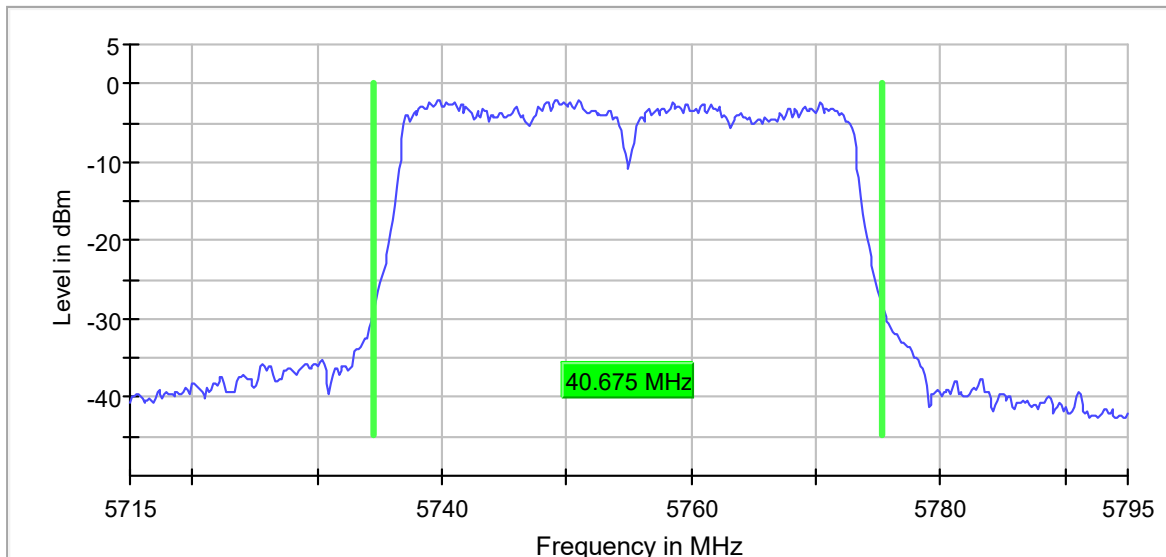
26 dB Bandwidth



U-NII-3 (5725-5850 MHz)

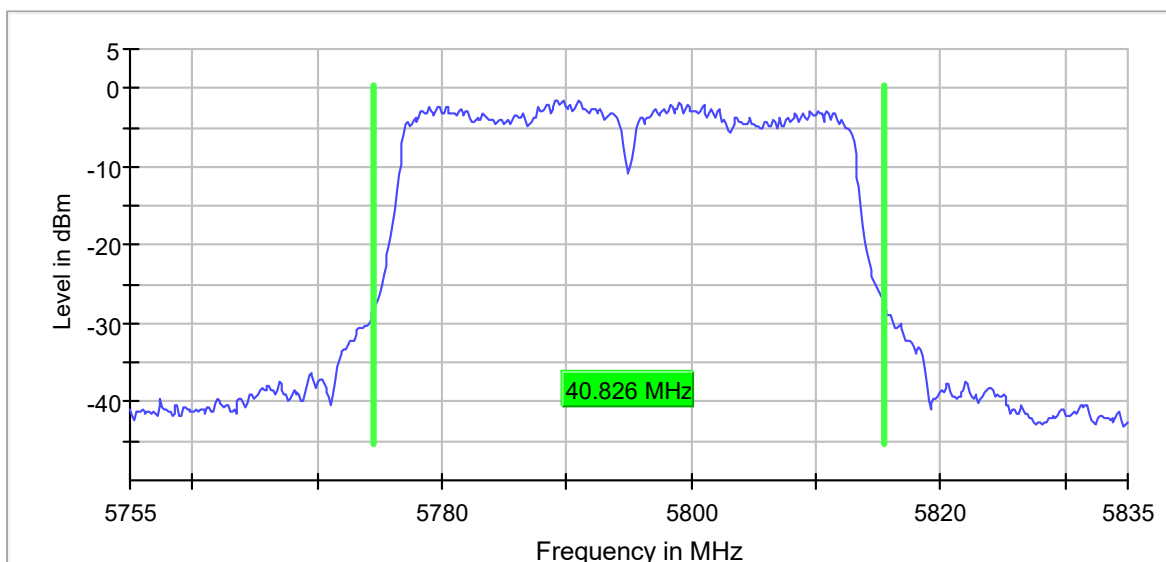
- Low Channel 151 (5755 MHz):

26 dB Bandwidth



- High Channel 159 (5795 MHz):

26 dB Bandwidth

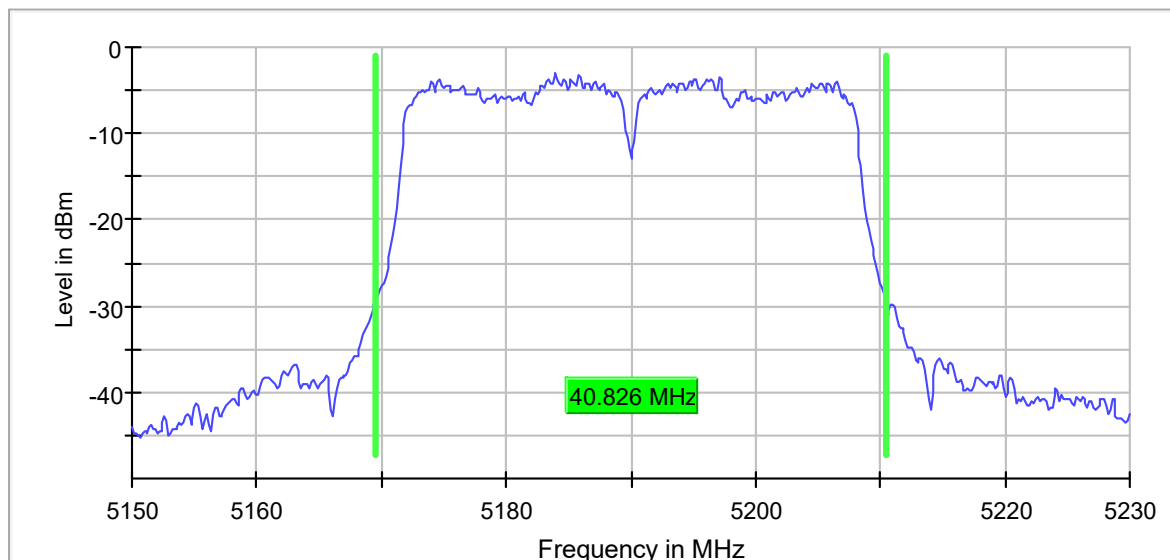


Mode 802.11 ac40 (VHT40):

U-NII-1 (5150-5250 MHz)

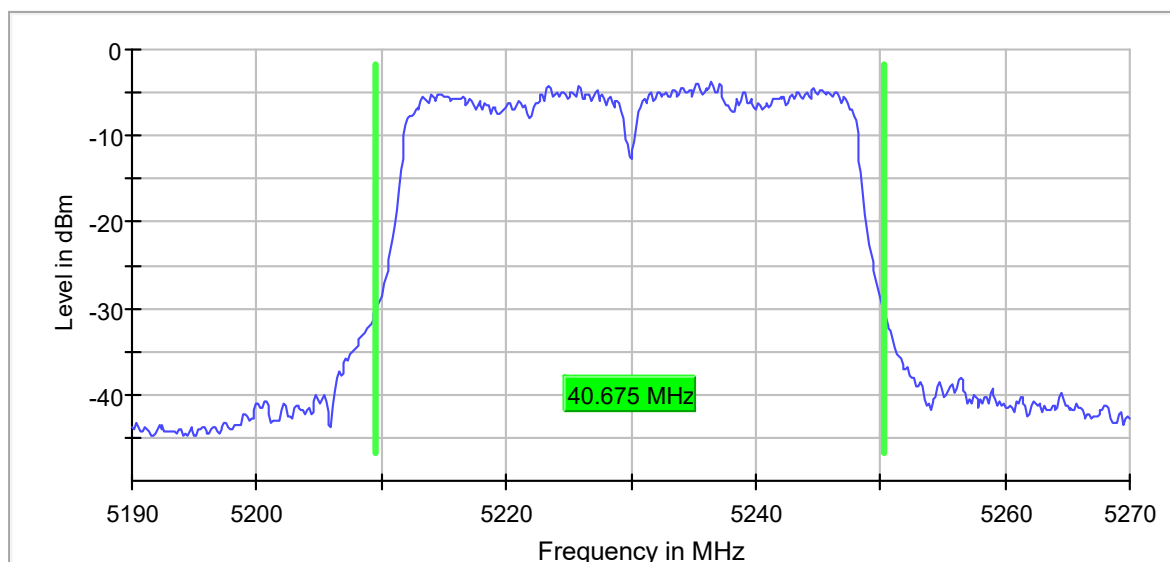
- Low Channel 38 (5190 MHz):

26 dB Bandwidth



- High Channel 46 (5230 MHz):

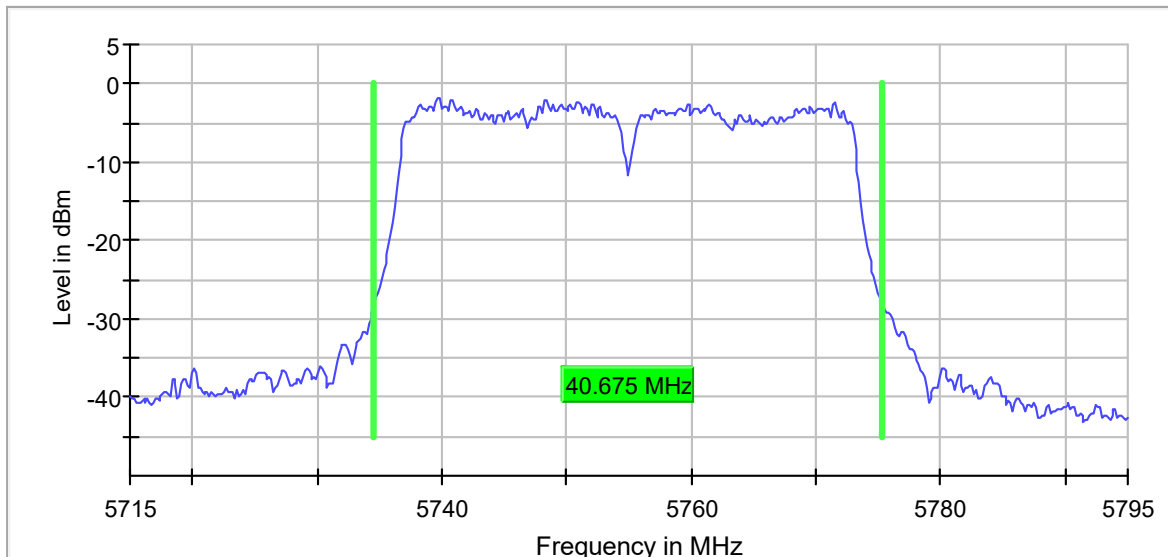
26 dB Bandwidth



U-NII-3 (5725-5850 MHz)

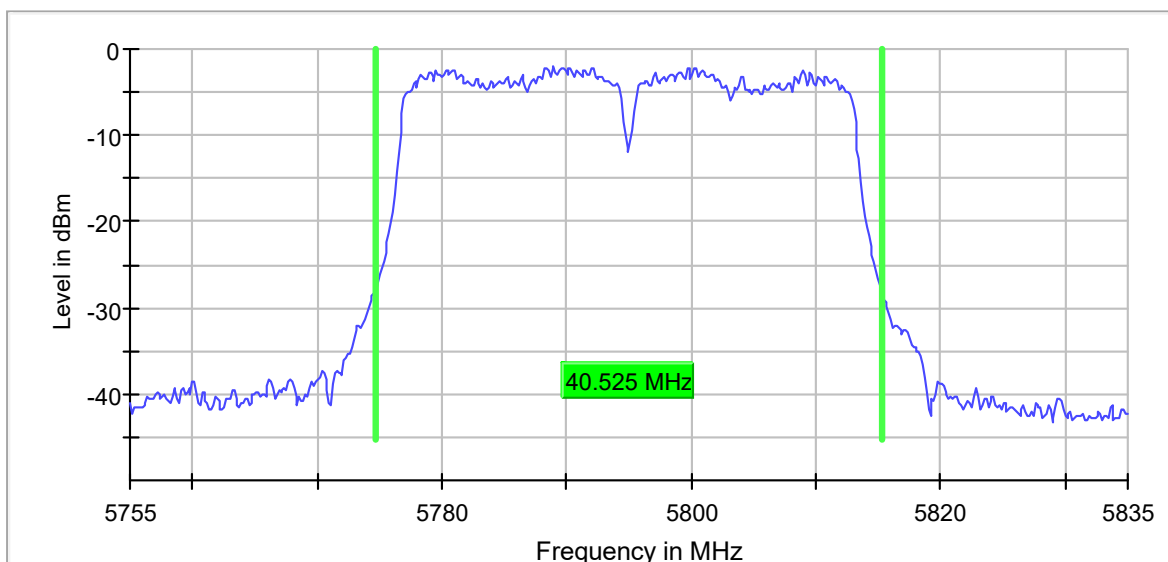
- Low Channel 151 (5755 MHz):

26 dB Bandwidth



- High Channel 159 (5795 MHz):

26 dB Bandwidth

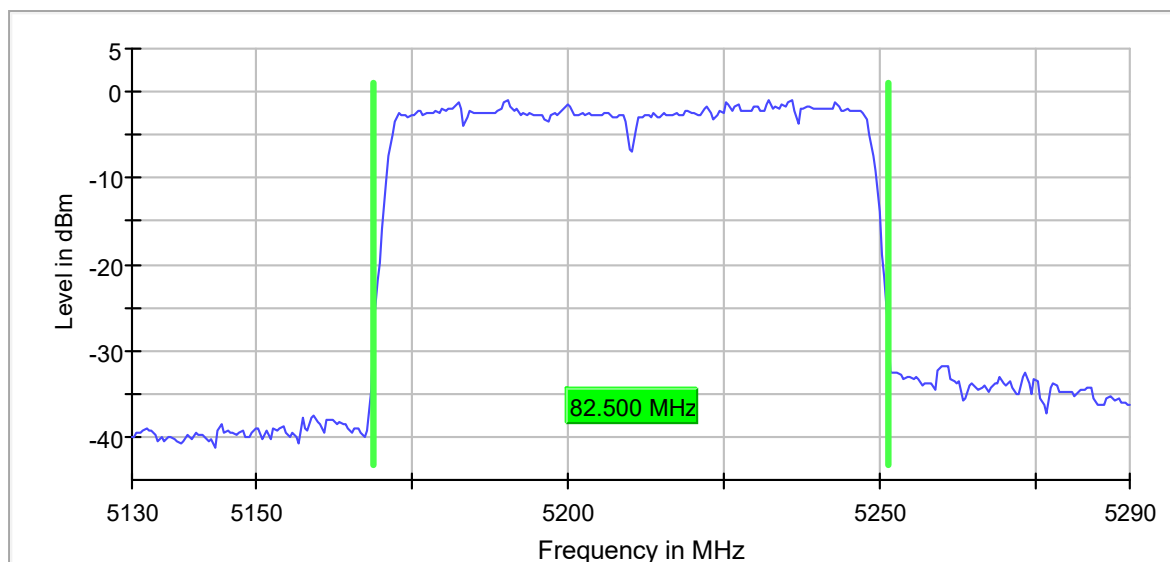


Mode 802.11 ac80 (VHT80):

U-NII-1 (5150-5250 MHz)

- Single Channel 42 (5210 MHz):

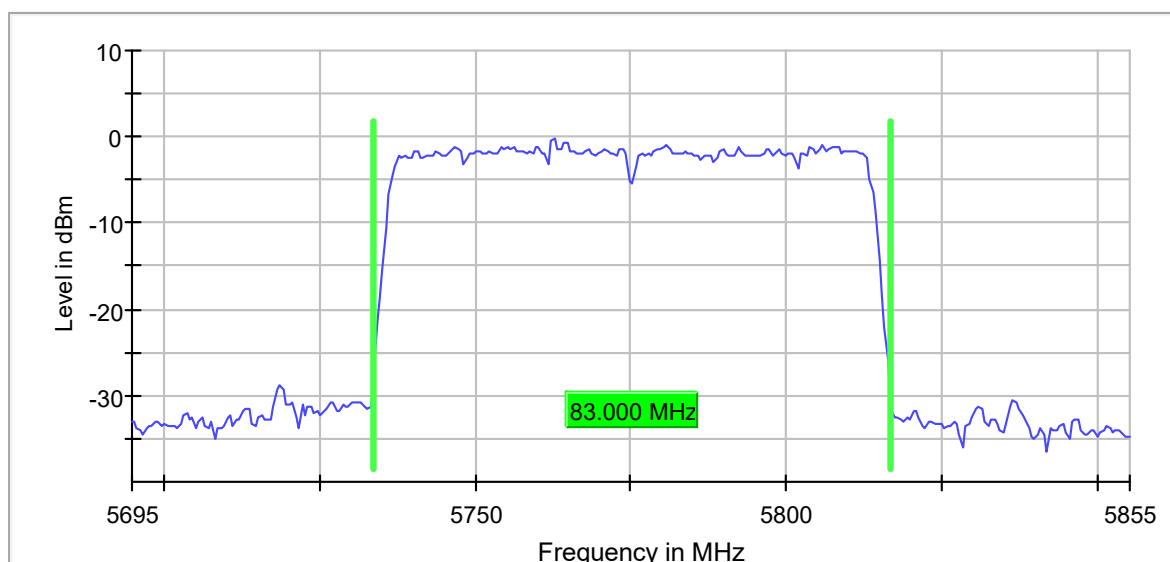
26 dB Bandwidth



U-NII-3 (5725-5850 MHz)

- Single Channel 155 (5775 MHz):

26 dB Bandwidth



Appendix B: Tests results for the U-NII-1 Band 5.15 – 5.25 GHz

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TEST CONDITIONS	49
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TEST CONDITIONS

POWER SUPPLY (V):

V nominal: 12 Vdc.
Type of Power Supply: DC External (Car Battery).

ANTENNA:

Type of Antenna: External.
Maximum Declared Antenna Gain: -2.8 dBi

TEST FREQUENCIES:

Technology Tested:	WLAN (IEEE 802.11 a,n,ac) / U-NII-1	
Modes:	802.11a20: 6, 9, 12, 18, 24, 36, 48 & 54 Mbps	
	802.11n HT20: MCS0 to MCS7	
	802.11n HT40: MCS0 to MCS7	
	802.11ac VHT20: MCS0 to MCS9	
	802.11ac VHT40: MCS0 to MCS9	
	802.11ac VHT80: MCS0 to MCS9	
Setting of cores / ports:	One port.	
Beamforming:	No.	
Frequency Range:	5150 MHz to 5250 MHz	
Channel Spacing:	20 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 36	5180
	Middle: 40	5200
	High: 48	5240
Channel Spacing:	40 MHz	
Transmit Channels	Channel	Channel Frequency (MHz)
	Low: 38	5190
	High: 46	5230
Channel Spacing:	80 MHz	
Transmit Channels	Middle: 42	5210

The test set-up was made in accordance to the general provisions of FCC Unlicensed National Information Infrastructure (U-NII) Devices 789033 D02 General U-NII Test Procedures New Rules v02r01 dated Dec 14, 2017.

The EUT was tested in the following operating mode:

- Continuously transmitting with a modulated carrier at maximum power in all required channels using the supported data rates/modulations types.

The field strength at the band edges was evaluated for each mode on the lowest and highest channels at the rated power for the channel under test.

For all modes, the EUT was configured in test mode using a software application. The application was used to enable a continuous transmission and to select the test channels as required. The client supplied instructions to configure the EUT. The customer supplied a document containing the setup instructions.

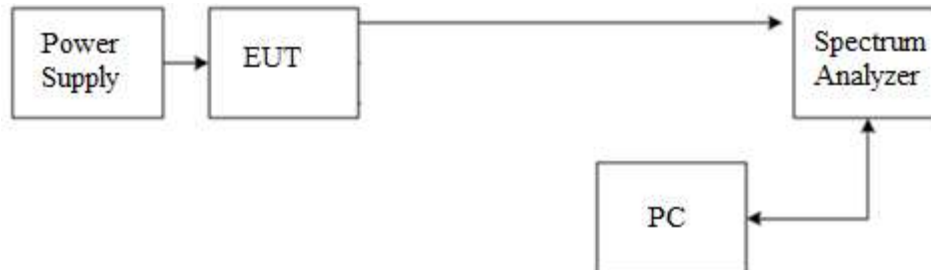
The worst cases for testing were identified for output power and spurious levels at the band edges which were selected based on preliminary testing that correspond to next data rates:

- 802.11 a20: 6 Mbps
- 802.11 n HT20: MCS0
- 802.11 n HT40: MCS0
- 802.11 ac VHT20: MCS0
- 802.11 ac VHT40: MCS0
- 802.11 ac VHT80: MCS0

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and connected to the spectrum analyzer using a low loss RF cable. The reading in the spectrum analyzer is corrected taking into account the internal and external RF cable loss.

For all modes:



The DC supply voltage is applied using an external power supply.

RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-18 GHz Double ridge horn antenna) is situated at a distance of 3 m and a distance of 1m for the frequency range 17 GHz-40 GHz (18 GHz-40 GHz horn antenna).

For radiated emissions in the range 17 GHz-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

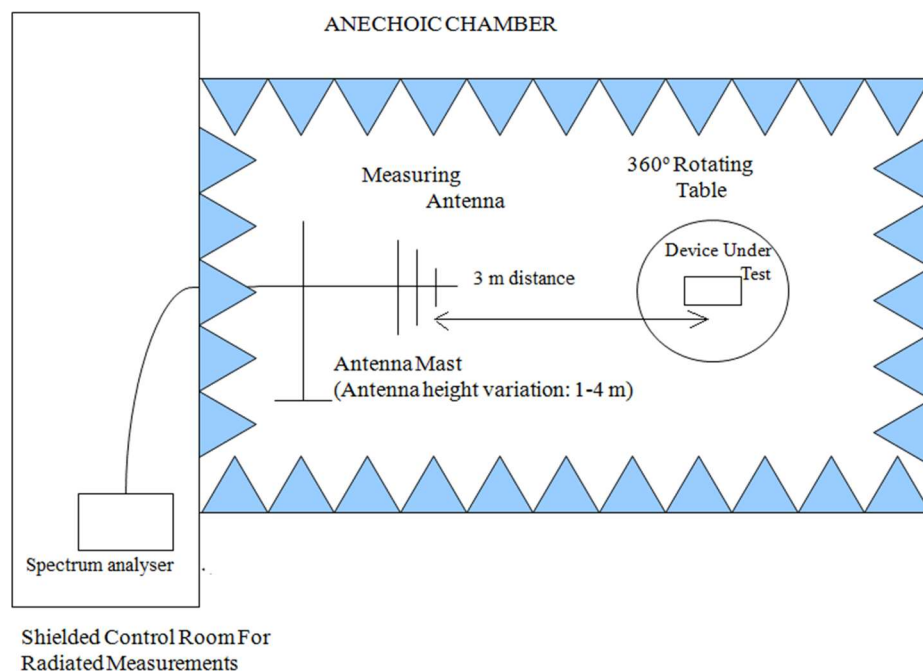
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

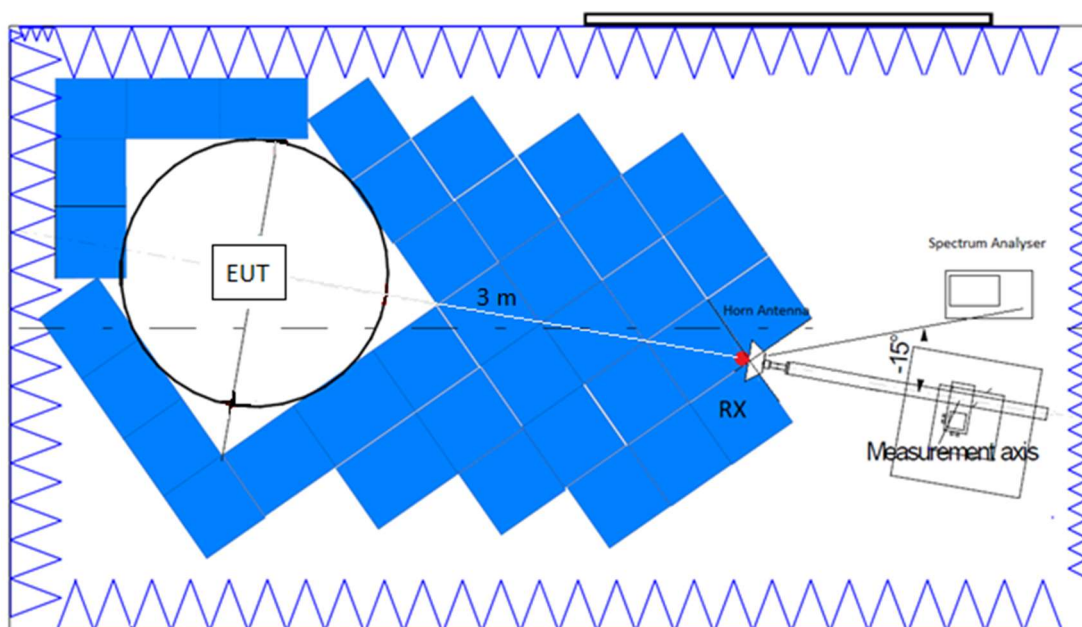
The final measured value, for the given emission, in the tables below incorporates the calibrated antenna factor and cable loss.

A resolution bandwidth / video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

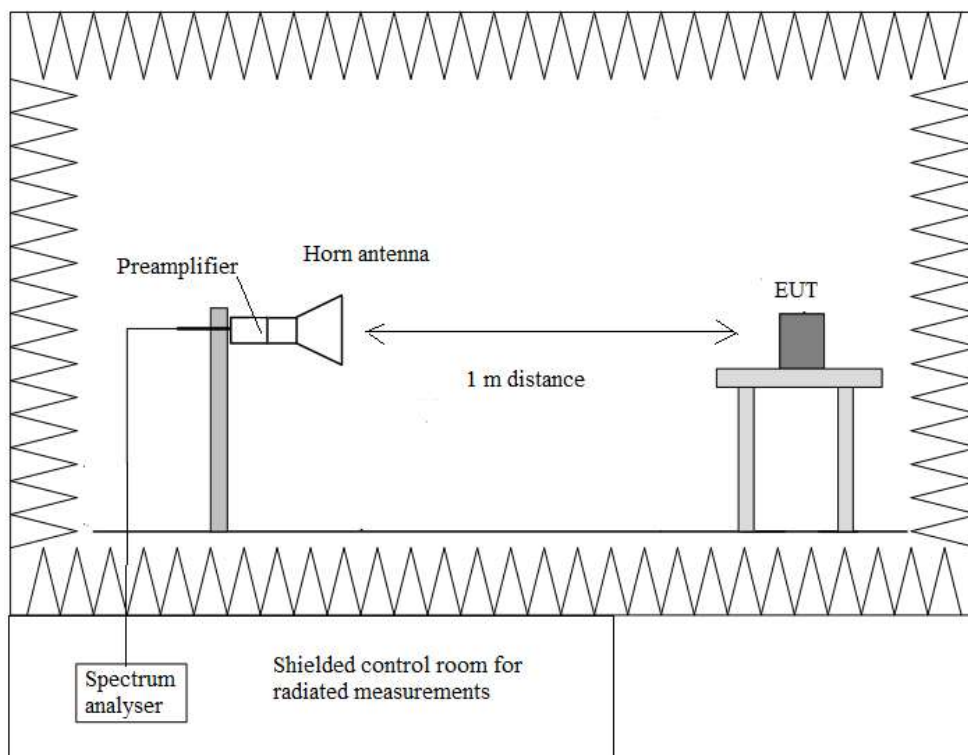
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



FCC 15.407 (a)(1)(iv). Transmitter Maximum Conducted Output Power / RSS-247

6.2.1.1. Transmitter Maximum Equivalent Isotropically Radiated Power

SPECIFICATION:

FCC 15.407: For client devices in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24 dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-247: For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or $1.76 + 10 \log_{10} B$, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.

RESULTS:

The maximum conducted output power was measured using the channel power integration method according to point E) 2) b) (Method SA-1) of 789033 D02 General UNII Test Procedures New Rules v02r01 when the duty cycle is >98% and the channel power integration method according to point E) 2) d) (Method SA-2) of 789033 D02 General UNII Test Procedures New Rules v02r01 when the duty cycle is <98%.

For data rates where the EUT was transmitting at <98% duty cycle, the duty calculated in Appendix A was added to the measured power in order to calculate the total average power during the actual transmission time.

The e.i.r.p. levels are calculated by adding the declared maximum antenna gain (dBi).

For all modes of operation, the antenna gain is less than 6 dBi.

Maximum Declared Antenna Gain: -2.8 dBi

Mode 802.11 a20:

	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Max. Conducted Power (dBm)	9.47	8.53	8.96
Max. EIRP power (dBm)	6.67	5.73	6.16
Measurement uncertainty (dB)	<±0.48		

Mode 802.11 n20 (HT20):

	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Max. Conducted Power (dBm)	9.40	8.58	8.90
Max. EIRP power (dBm)	6.60	5.80	6.10
Measurement uncertainty (dB)	<±0.48		

Mode 802.11 ac20 (VHT20):

	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Max. Conducted Power (dBm)	9.46	8.59	8.96
Max. EIRP power (dBm)	6.66	5.79	6.16
Measurement uncertainty (dB)	<±0.48		

Mode 802.11 n40 (HT40):

	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Max. Conducted Power (dBm)	9.37	8.71
Max. EIRP power (dBm)	6.57	5.91
Measurement uncertainty (dB)	<±0.48	

Mode 802.11 ac40 (VHT40):

	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Max. Conducted Power (dBm)	9.37	8.72
Max. EIRP Power (dBm)	6.57	5.92
Measurement uncertainty (dB)	<±0.48	

Mode 802.11 ac80 (VHT80):

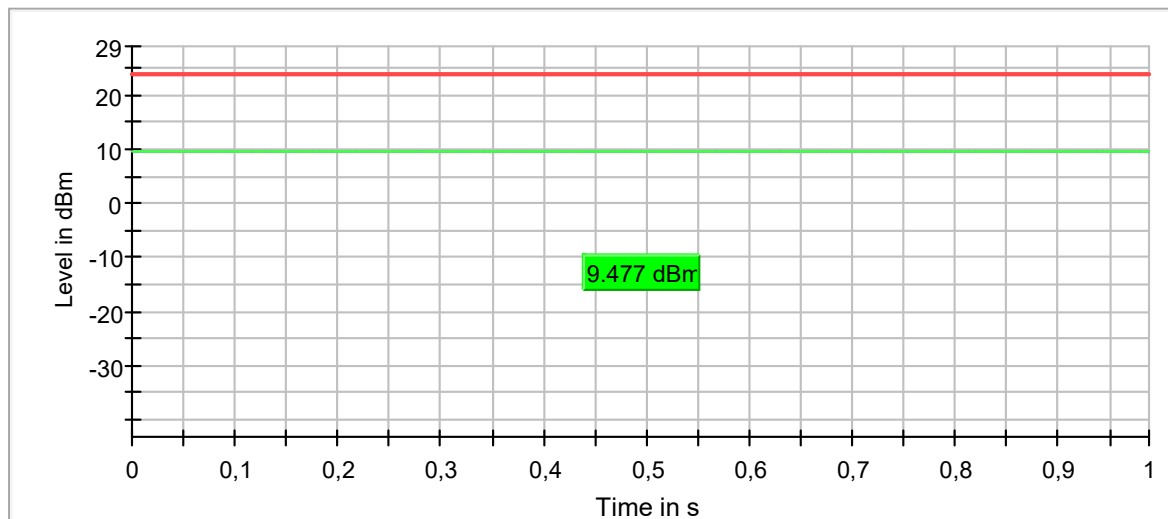
	Single Channel 42 (5210 MHz)
Max. Conducted Power (dBm)	9.63
Duty Cycle Correction Factor (dB)	0.21
Max. Conducted Power Corrected (dBm)	9.84
Max. EIRP Power Corrected (dBm)	7.04
Measurement uncertainty (dB)	<±0.48

Verdict: PASS

Mode 802.11 a20:

- Low Channel:

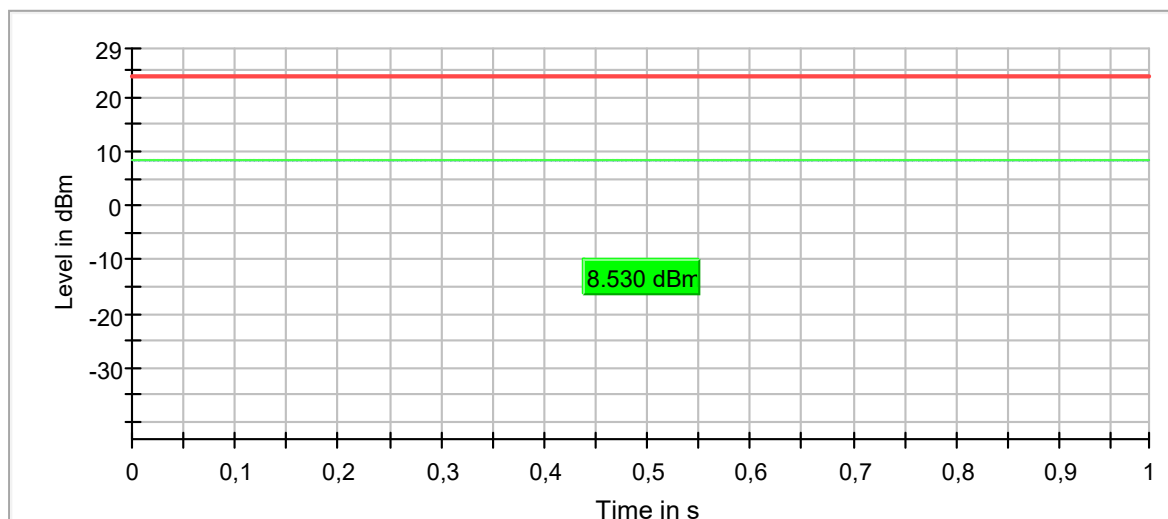
Gated Trace



— Gated Trace — Overall — Limit

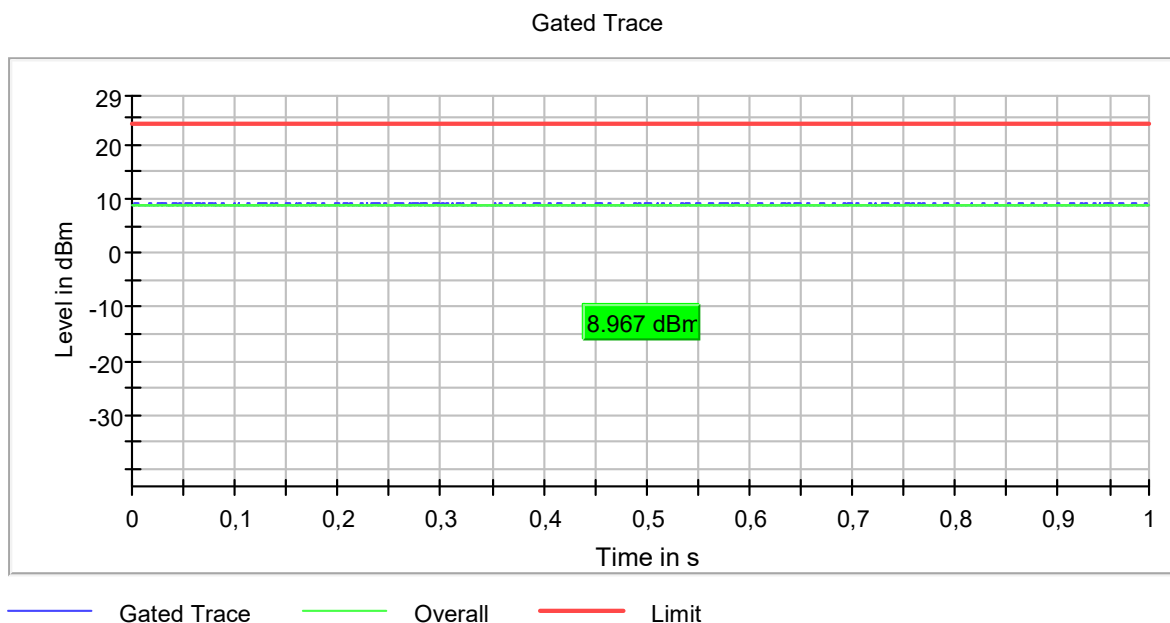
- Middle Channel:

Gated Trace



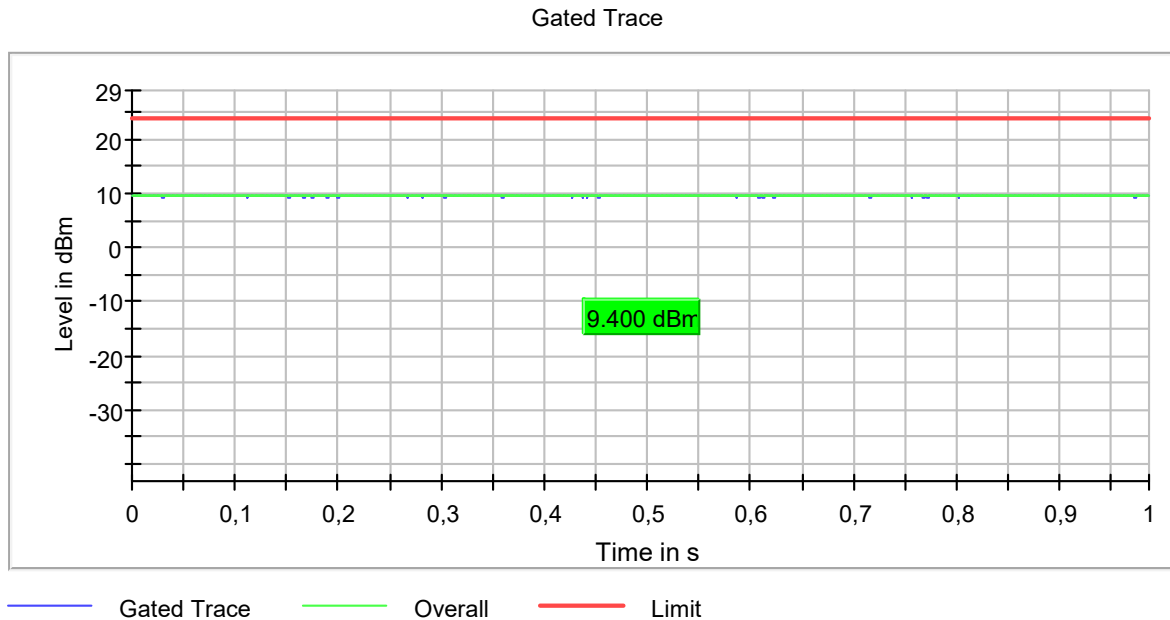
— Gated Trace — Overall — Limit

- High Channel:

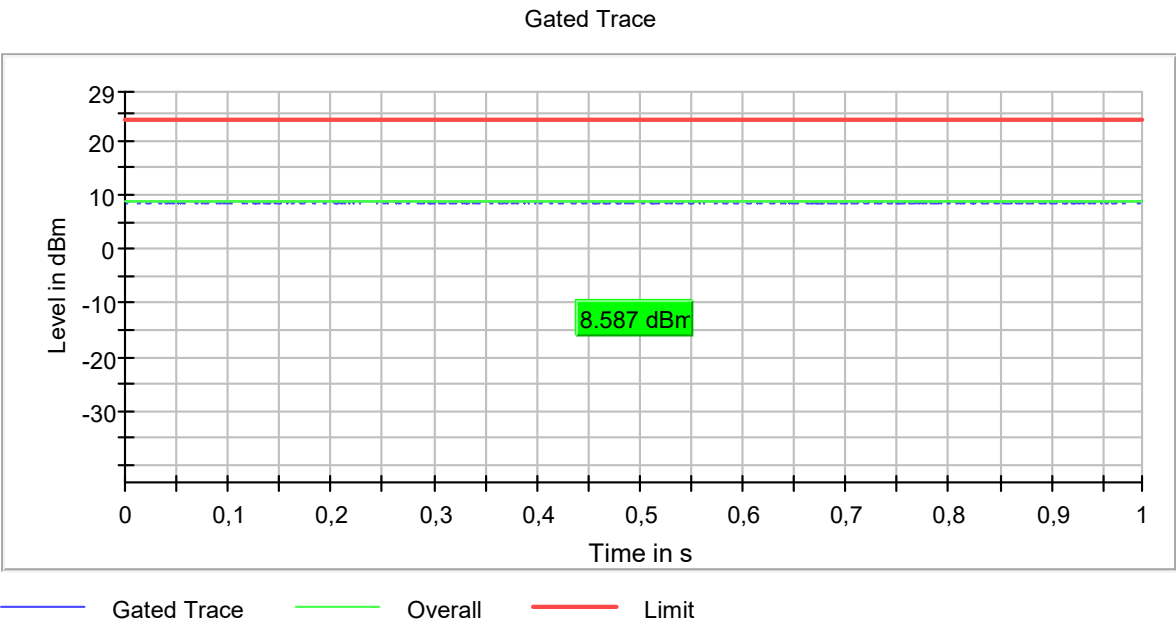


Mode 802.11 n20 (HT20):

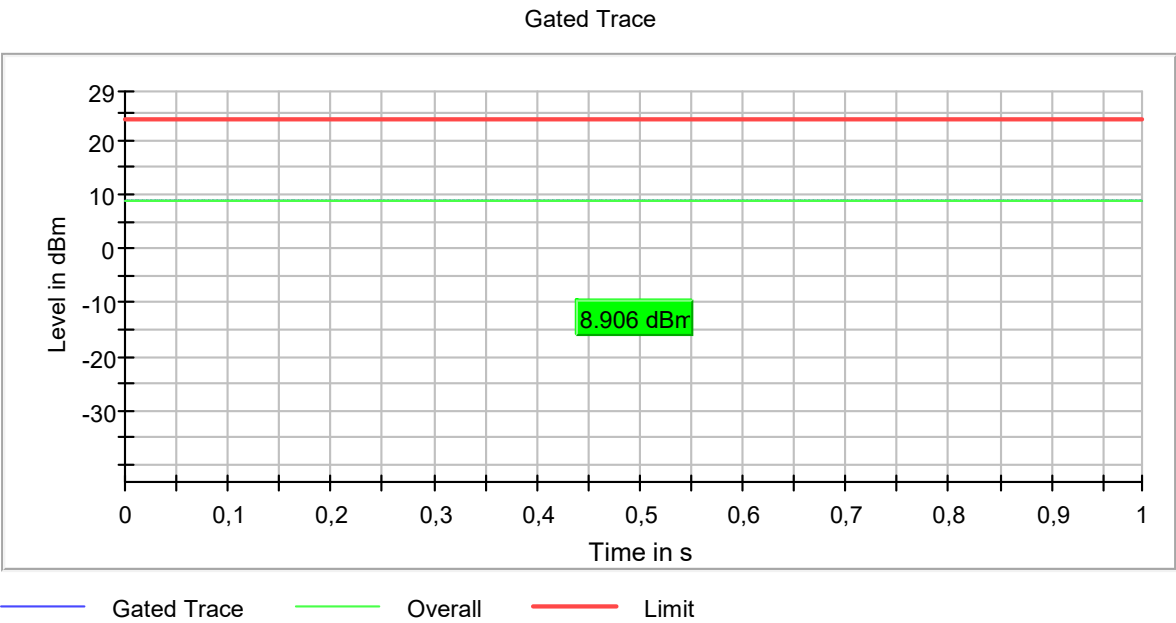
- Low Channel:



- Middle Channel:

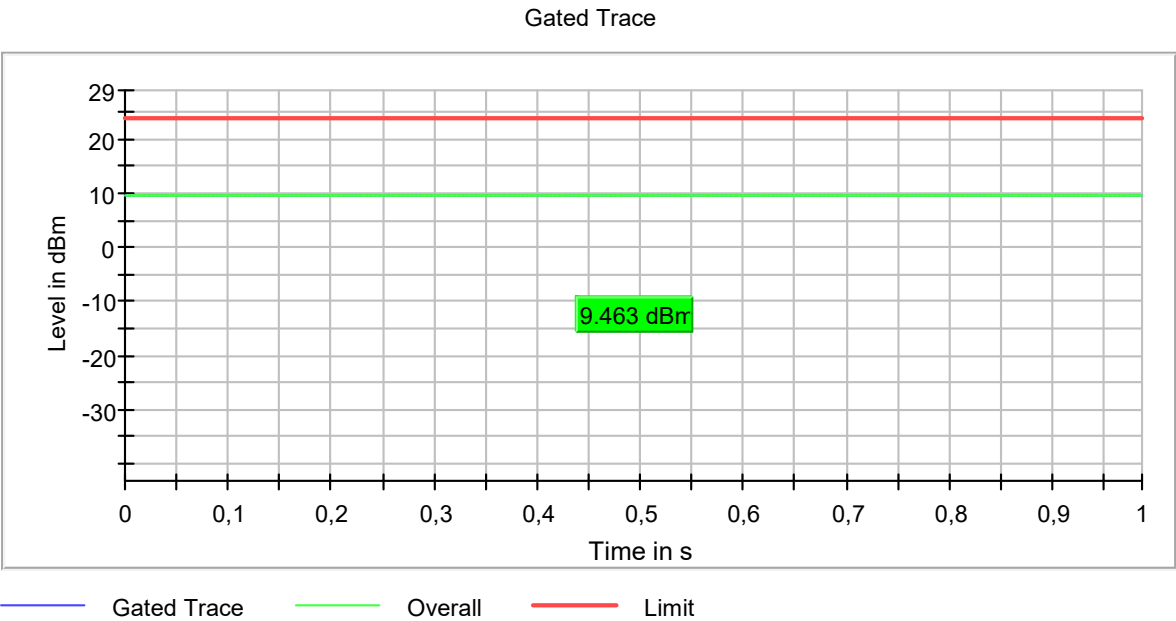


- High Channel:

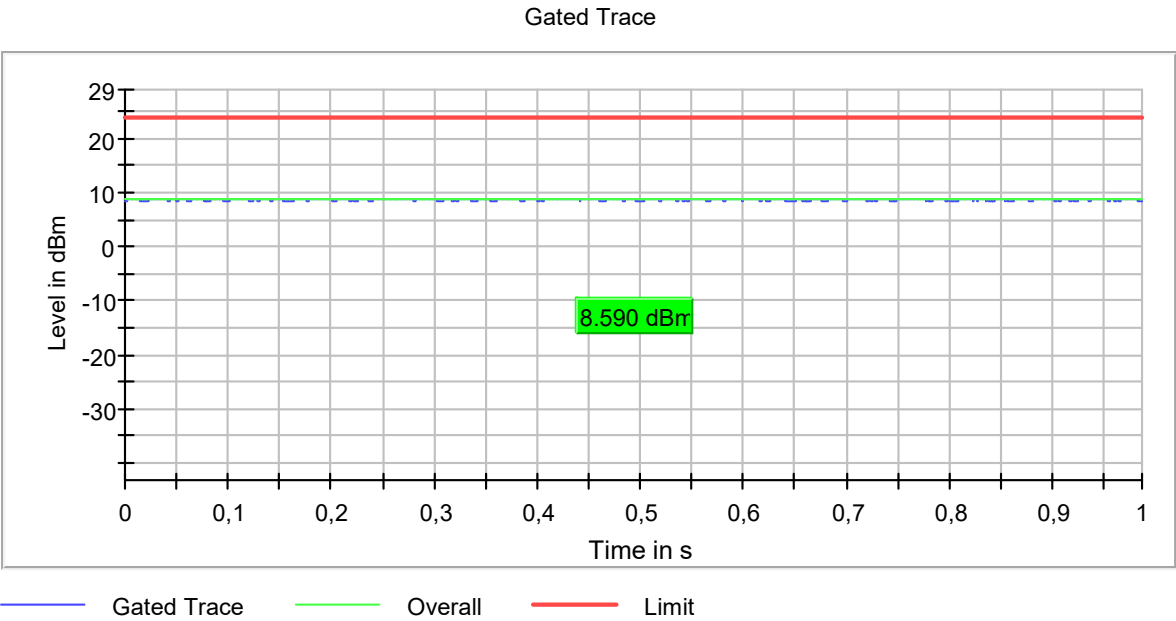


Mode 802.11 ac20 (VHT20):

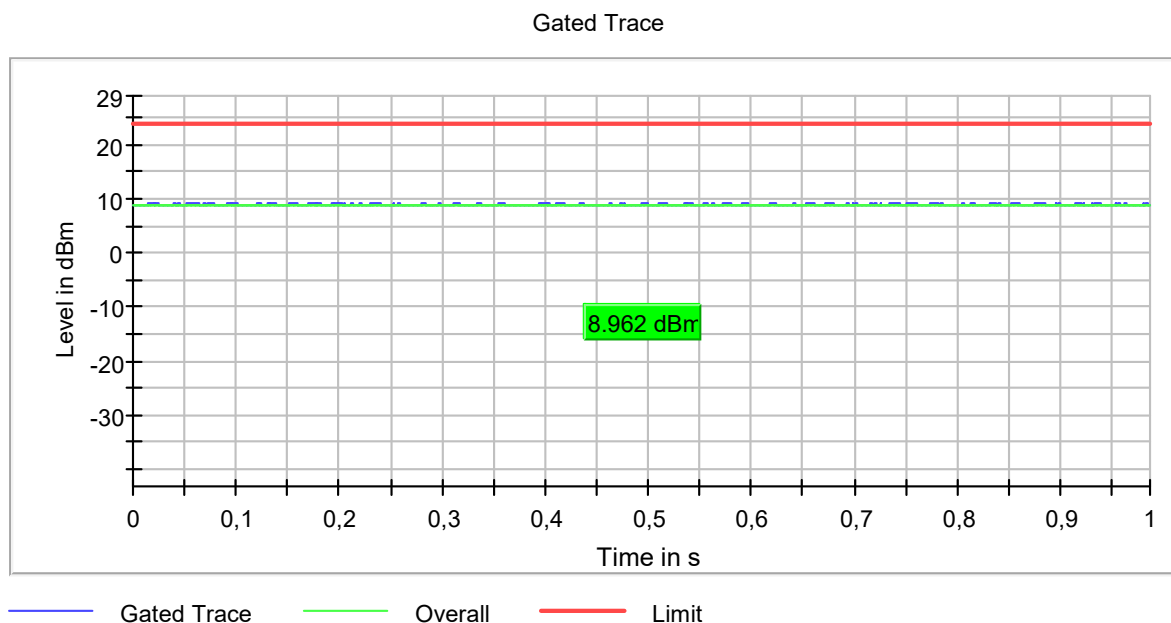
- Low Channel:



- Middle Channel:

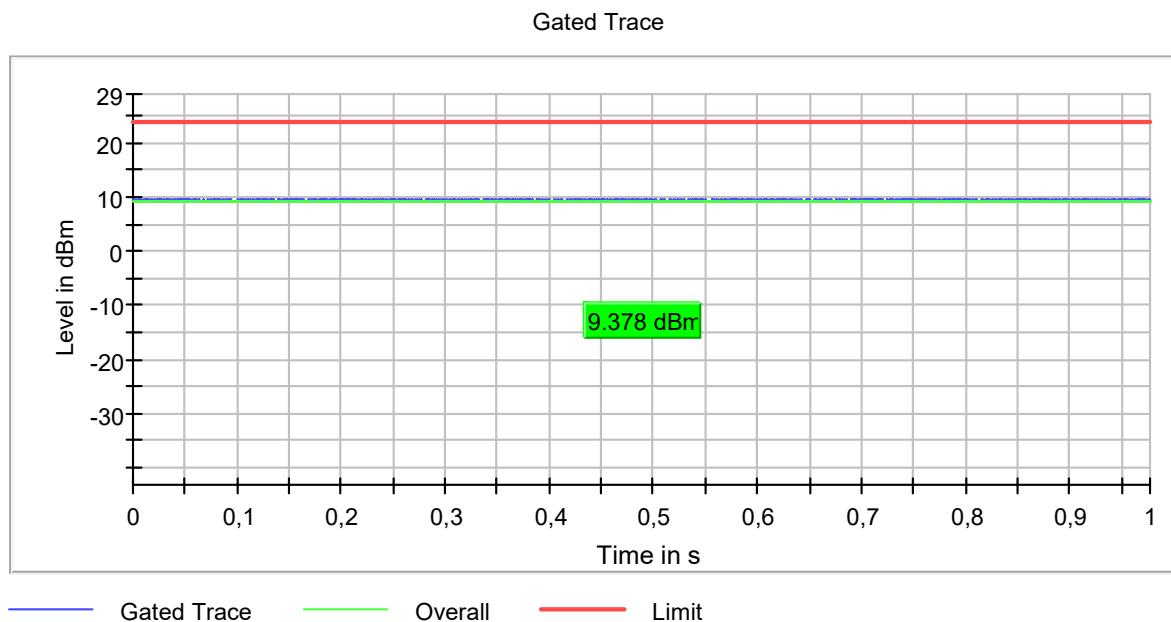


- High Channel:

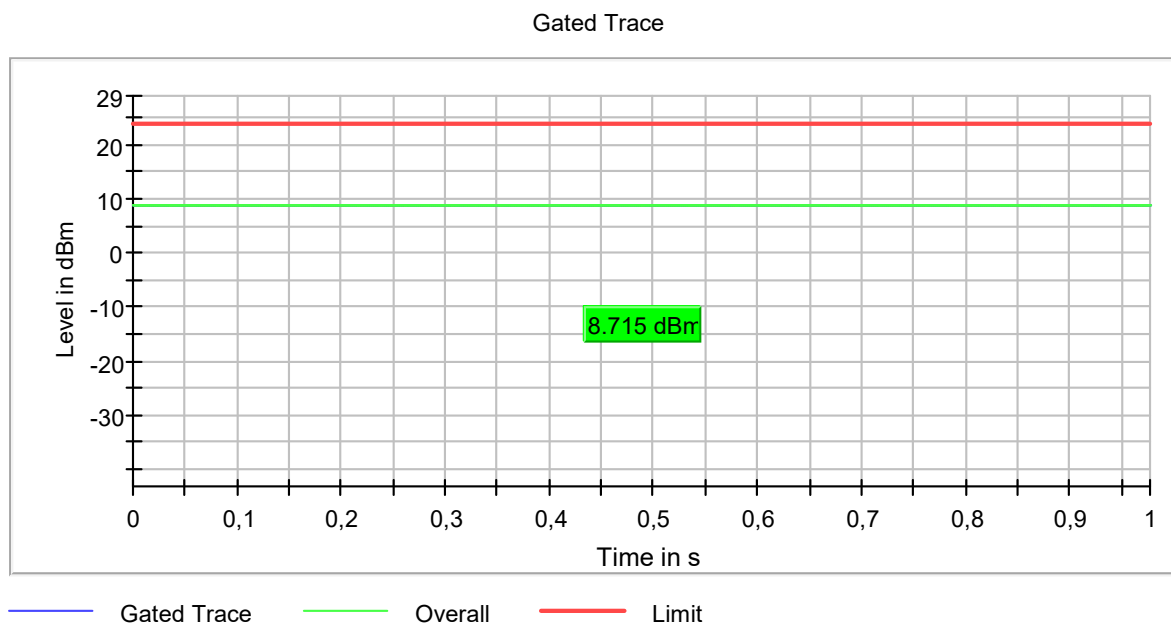


Mode 802.11 n40 (HT40):

- Low Channel:

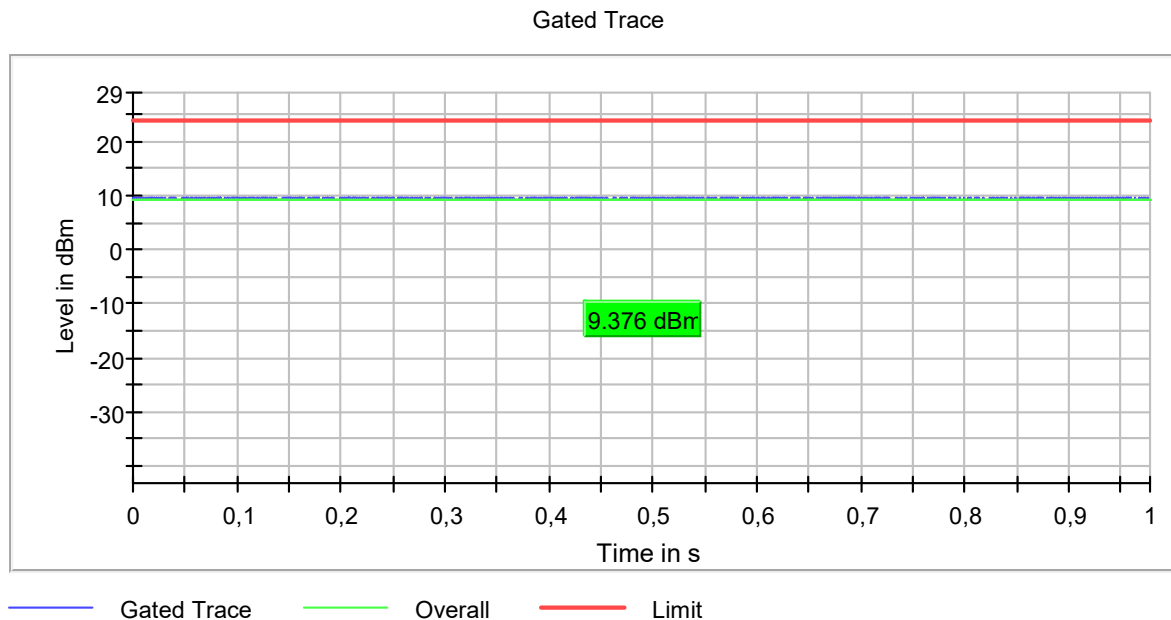


- High Channel:

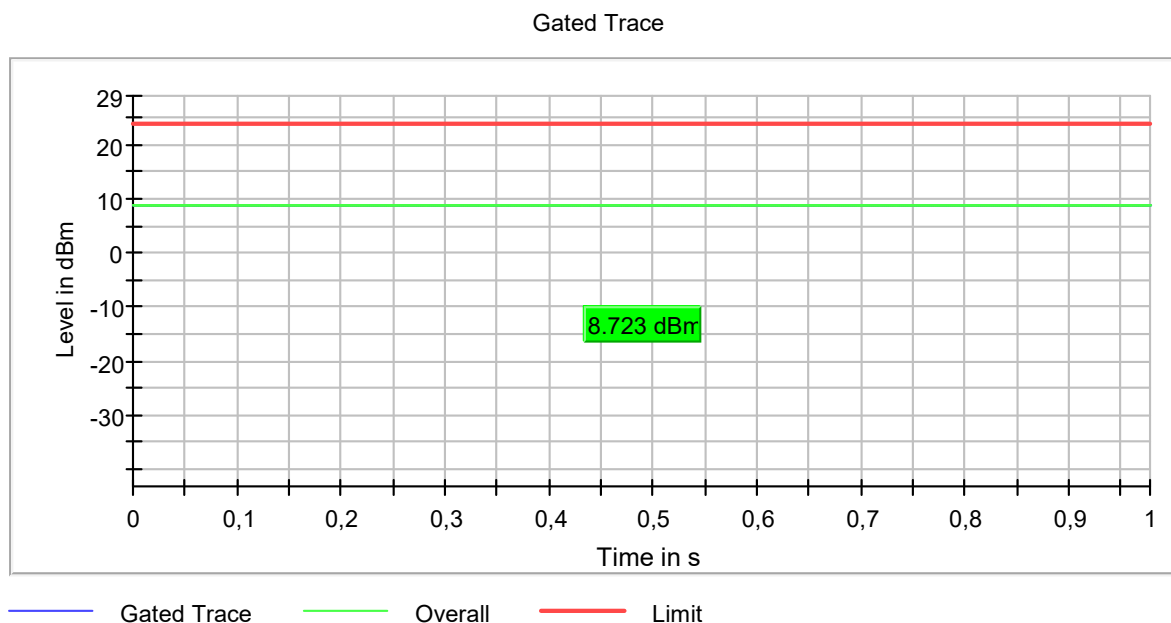


Mode 802.11 ac40 (VHT40):

- Low Channel:

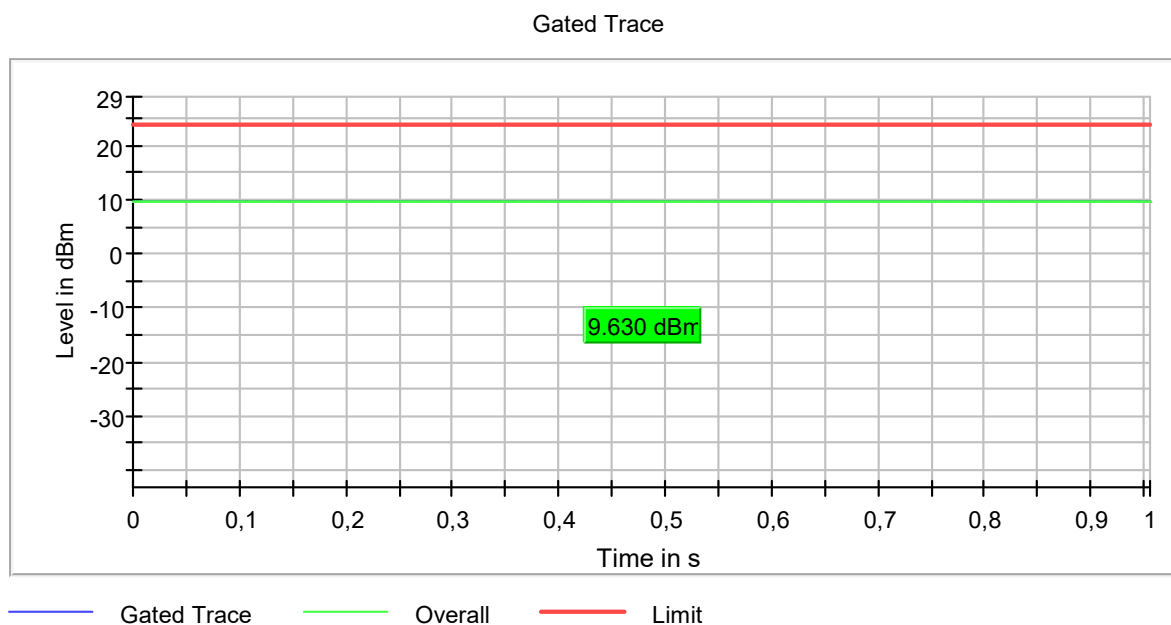


- High Channel:



Mode 802.11 ac80 (VHT80):

- Single Channel:



FCC 15.407 (a)(1)(iv). Transmitter Maximum Power Spectral Density / RSS-247

6.2.1.1. Transmitter EIRP Spectral Density

SPECIFICATION:

FCC 15.407: The maximum power spectral density shall not exceed 11 dBm 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 6 dBi.

RSS-247: The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

RESULTS:

The maximum power spectral density (PSD) was measured using the method according to point F) referencing E.2.b) (Method SA-1) and E.2.b) (Method SA-2) of Guidance 789033 D02 General UNII Test Procedures New Rules v02r01.

The PSD test uses the same setup as the transmitter maximum conducted output power test. The result of the Peak PSD was measured by colocation a marker on the peak of the signal and the results are in the tables below.

The e.i.r.p. levels are calculated by adding the declared maximum antenna gain (dBi).

For all modes of operation, the antenna gain is < 6 dBi.

Maximum Declared Antenna Gain: -2.8 dBi

Mode 802.11 a20:

	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Average PSD (dBm/MHz)	2.06	1.06	1.55
Maximum EIRP PSD (dBm/MHz)	-0.74	-1.74	-1.25
Measurement uncertainty (dB)	<±0.99		

Mode 802.11 n20 (HT20):

	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Average PSD (dBm/MHz)	1.76	0.73	1.24
Maximum EIRP PSD (dBm/MHz)	-1.04	-2.07	-1.56
Measurement uncertainty (dB)	<±0.99		

Mode 802.11 ac20 (VHT20):

	Low Channel 36 (5180 MHz)	Middle Channel 44 (5220 MHz)	High Channel 48 (5240 MHz)
Maximum Average PSD (dBm/MHz)	1.79	0.84	1.22
Maximum EIRP PSD (dBm/MHz)	-1.01	-1.96	-1.58
Measurement uncertainty (dB)	<±0.99		

Mode 802.11 n40 (HT40):

	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Average PSD (dBm/MHz)	-1.25	-1.86
Maximum EIRP PSD (dBm/MHz)	-4.05	-4.66
Measurement uncertainty (dB)	<±0.99	

Mode 802.11 ac40 (VHT40):

	Low Channel 38 (5190 MHz)	High Channel 46 (5230 MHz)
Maximum Average PSD (dBm/MHz)	-1.30	-1.92
Maximum EIRP PSD (dBm/MHz)	-4.10	-4.72
Measurement uncertainty (dB)	<±0.99	

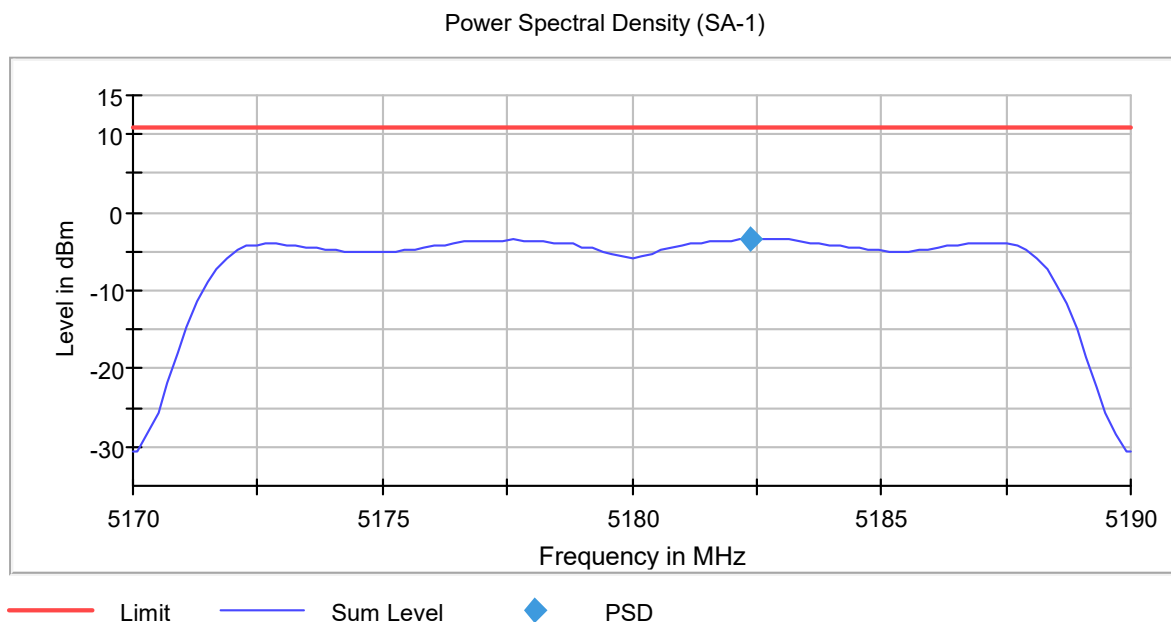
Mode 802.11 ac80 (VHT80):

	Single Channel 42 (5210 MHz)
Maximum Average PSD (dBm/MHz)	-4.55
Duty Cycle Correction Factor (dB)	0.21
Maximum Average PSD Corrected (dBm/MHz)	-4.34
Maximum EIRP PSD Corrected (dBm/MHz)	-7.14
Measurement uncertainty (dB)	<±0.99

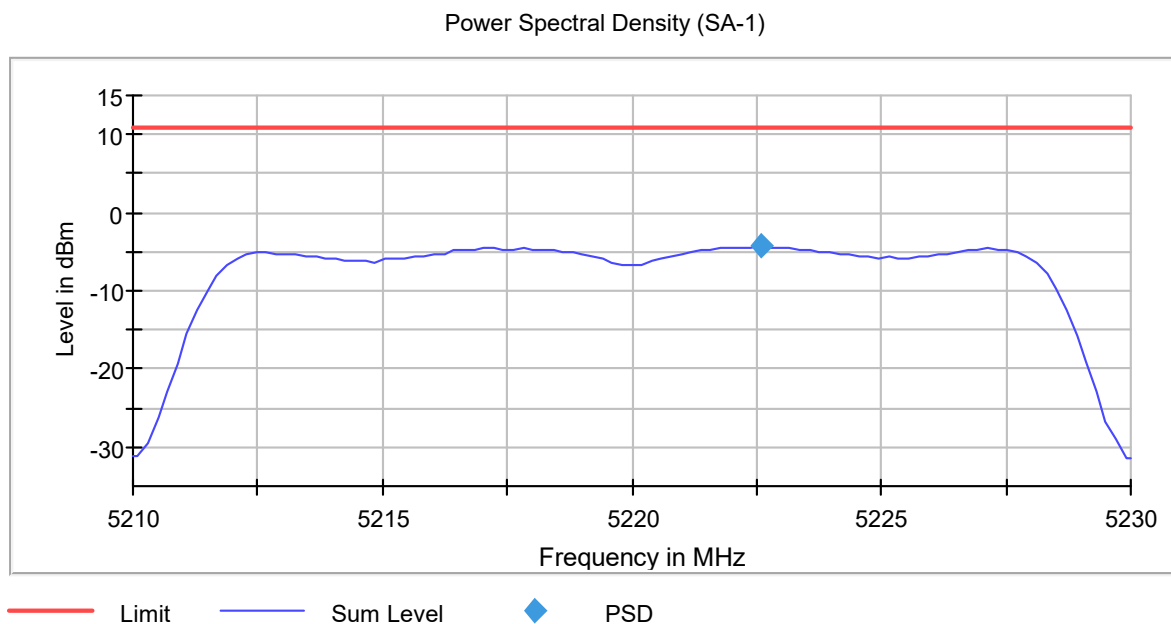
Verdict: PASS

Mode 802.11 a20:

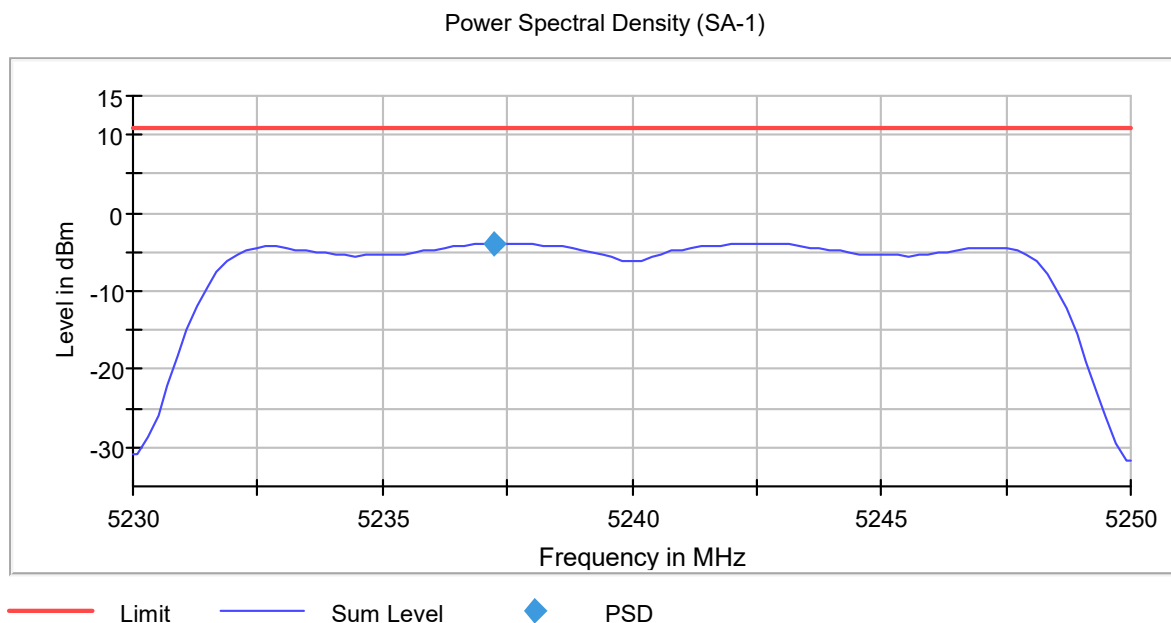
- Low Channel:



- Middle Channel:

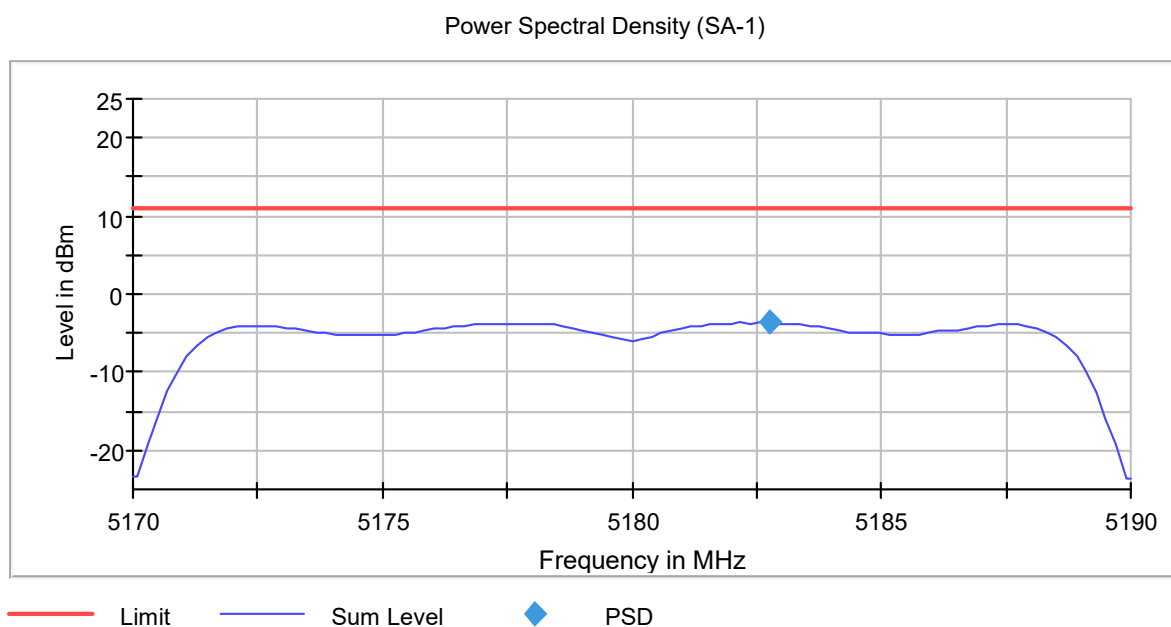


- High Channel:

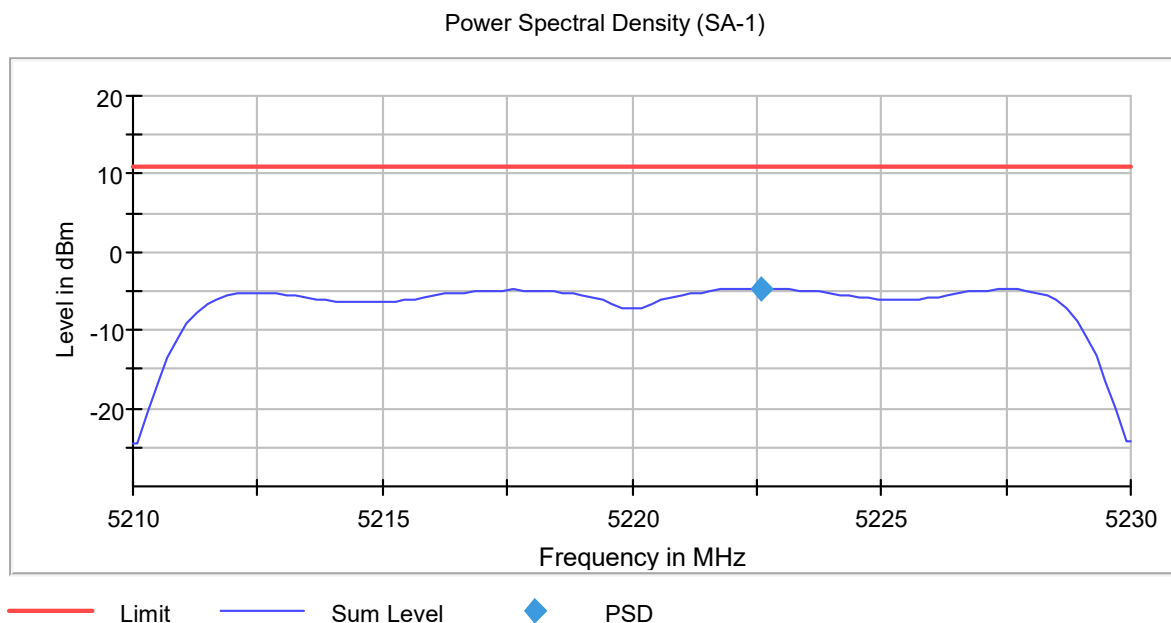


Mode 802.11 n20 (HT20):

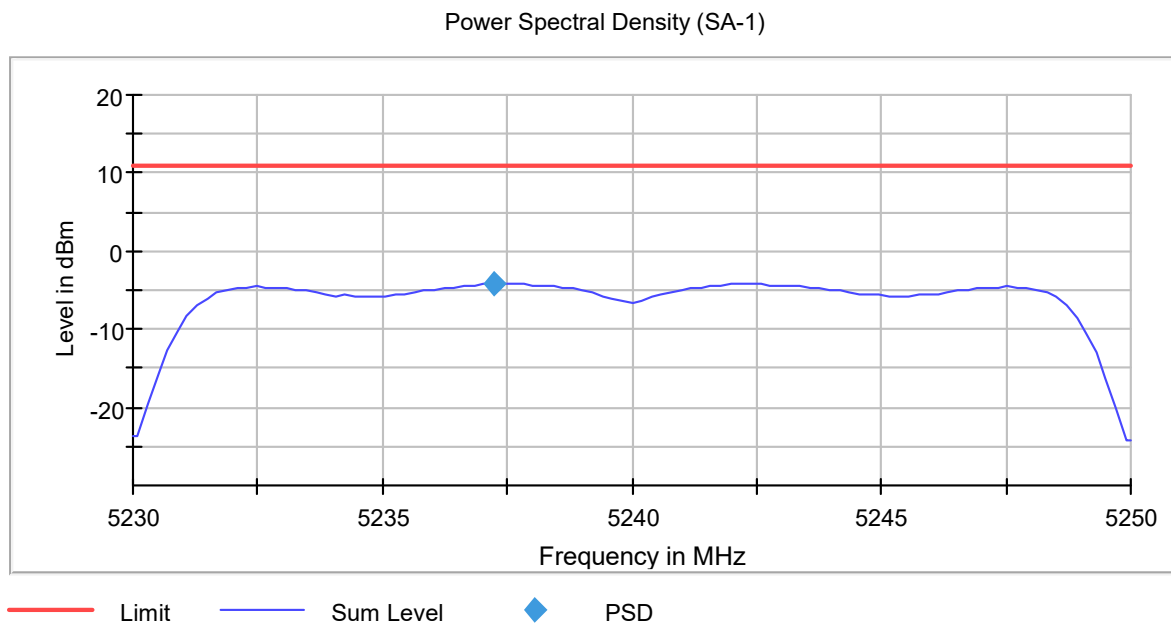
- Low Channel:



- Middle Channel:

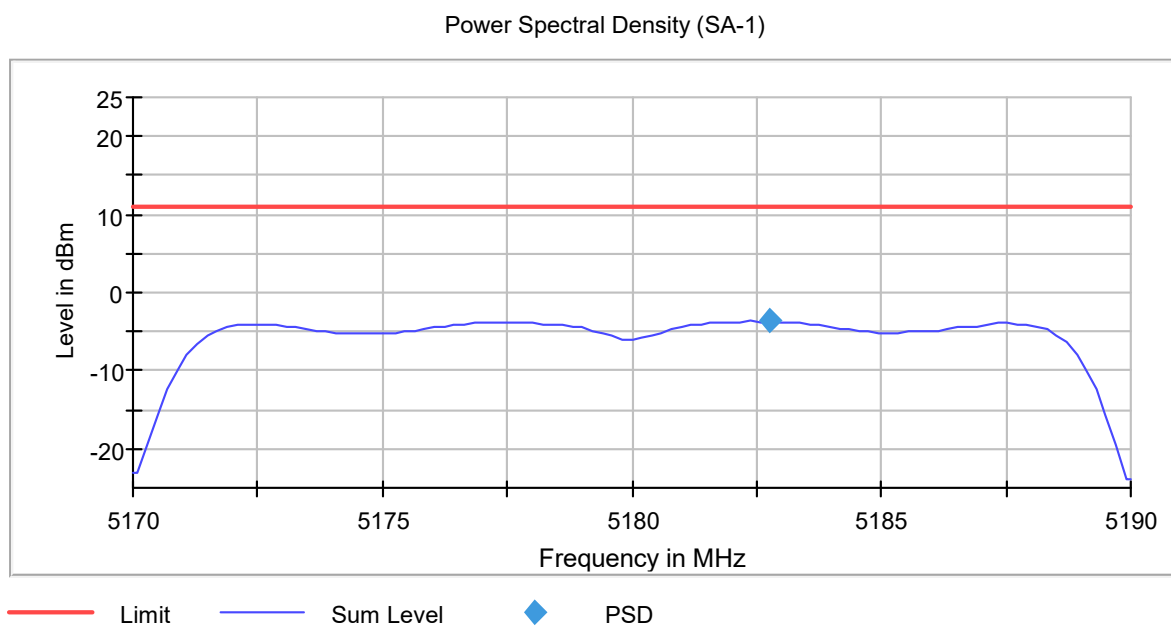


- High Channel:

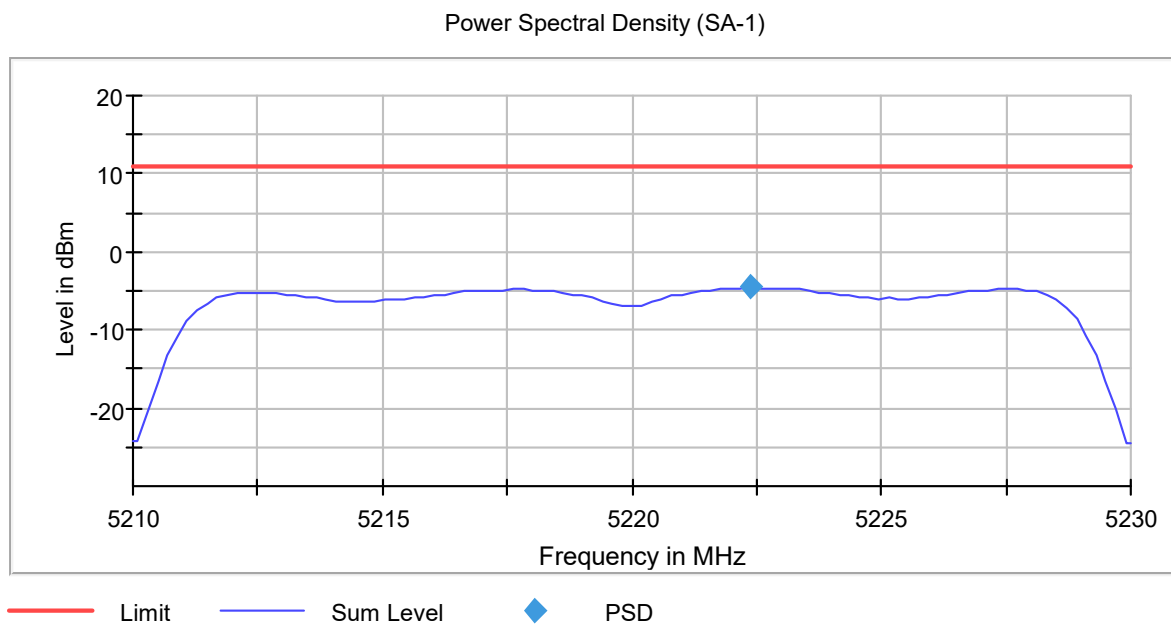


Mode 802.11 ac20 (VHT20):

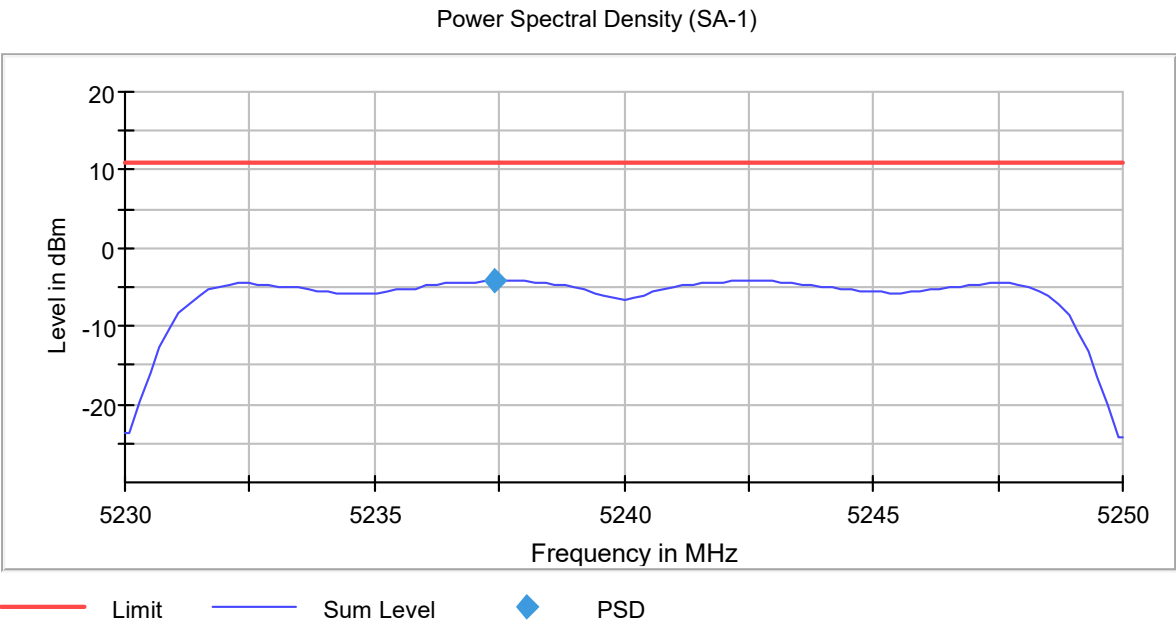
- Low Channel:



- Middle Channel:

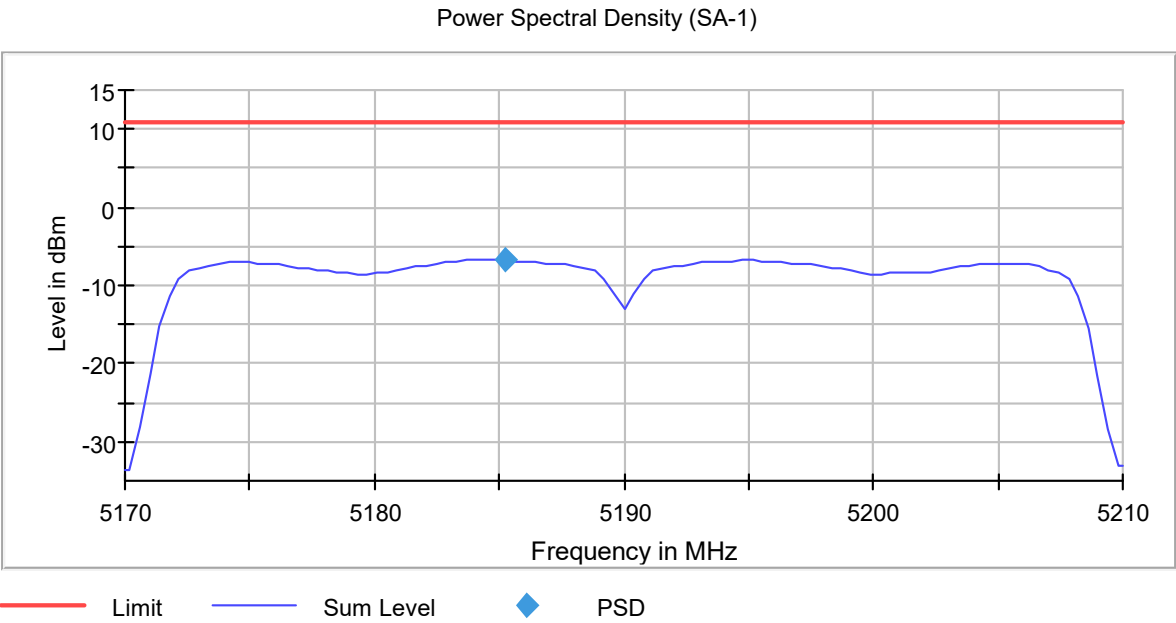


- High Channel:

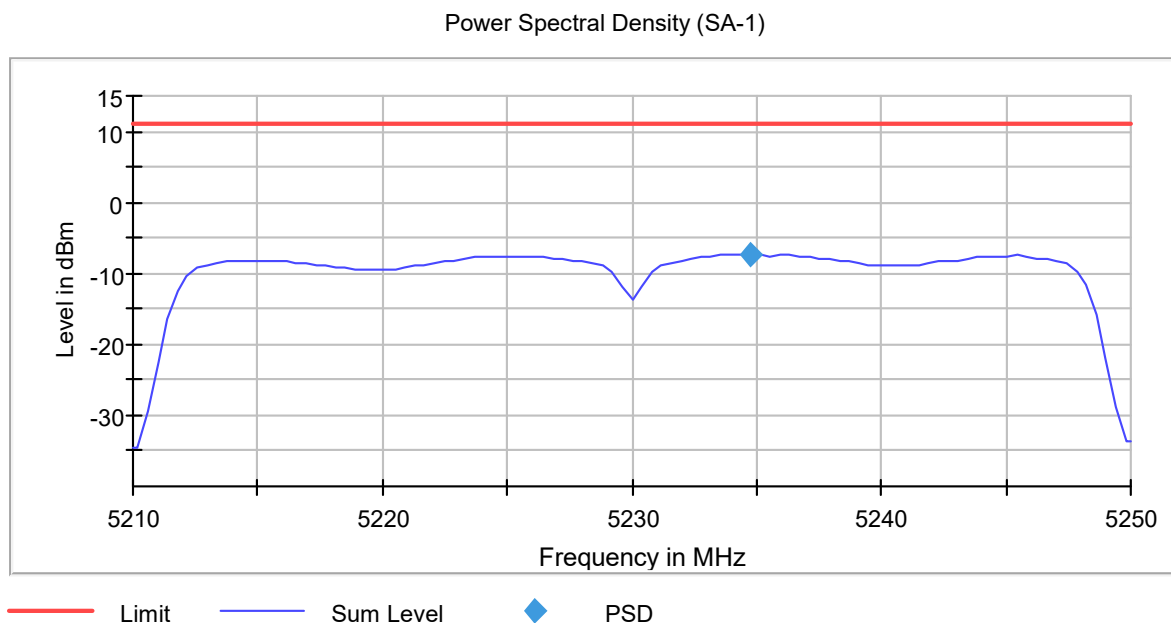


Mode 802.11 n40 (HT40):

- Low Channel:

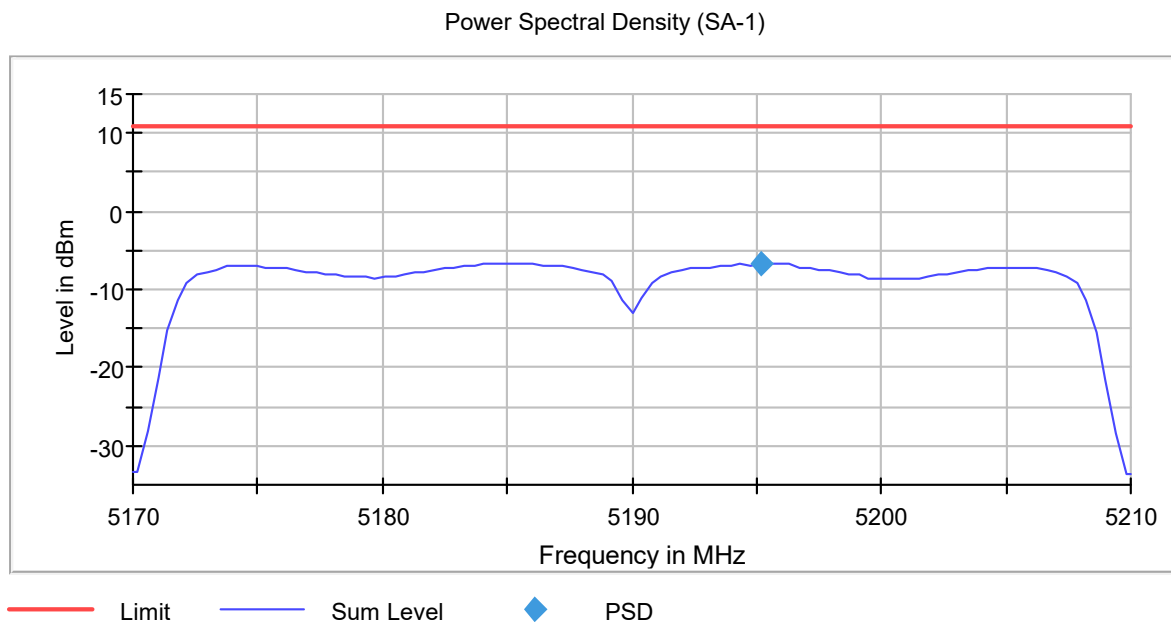


- High Channel:

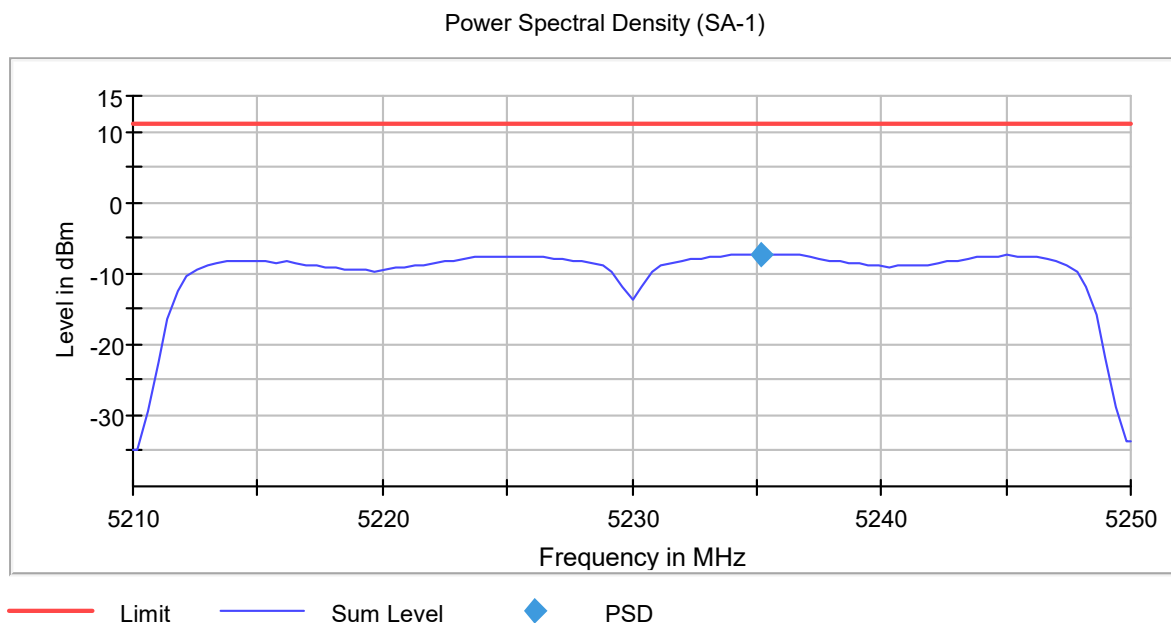


Mode 802.11 ac40 (VHT40):

- Low Channel:

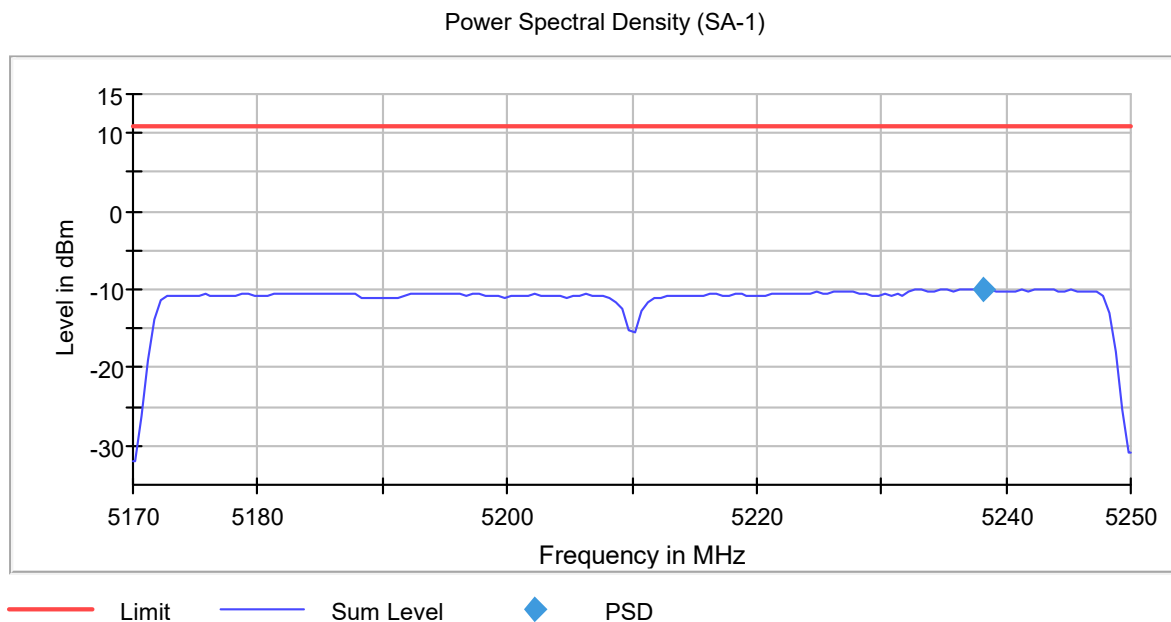


- High Channel:



Mode 802.11 ac80 (VHT80):

- Single Channel:



FCC 15.407 (b)(1)(6) / RSS-247 6.2.1.2. Transmitter Out of Band Radiated Emissions

SPECIFICATION:

For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz (68.23 dBμV/m at 3 m distance).

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)):

Frequency Range (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 40000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

Measurements were made in both horizontal and vertical planes of polarization.

All tests were performed in a semi-anechoic chamber at a distance of 1m for the frequency range 1 GHz-40 GHz and a distance of 3m for frequency range 30 MHz-1 GHz.

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

OUT OF BAND EMISSIONS: For spurious emissions outside of the U-NII-1 band edge Restricted Bands 4.50-5.15 GHz and 5.35-5.46 GHz, the OFDM worst mode case was determined after preliminary measurements of the E.I.R.P. density (radiated).

The Low, Middle and High Channels were tested.

- **Worst case:** **802.11 a20** (index 6 Mbps).

Frequency range 30 MHz - 1 GHz (worst case):

The spurious emissions below 1 GHz do not depend on either the operating channel or the modulation mode selected in the EUT.

No spurious frequencies detected at less than 20 dB below the limit.

Measurement Uncertainty (dB): $<\pm 5.10$

Frequency range 1 - 40 GHz (worst case):

The results in the next tables show the maximum measured levels in the 1 - 40 GHz frequency range.

The Low, Middle and High Channels were measured for out-of-band emissions for the worst mode.

Spurious frequencies in the restricted bands with peak levels above the average limit (54 dB μ V/m at 3 m) are measured with an average detector for checking compliance with the average limit.

- LOW CHANNEL. No spurious frequencies at less than 20 dB below the limit.

- MIDDLE CHANNEL. No spurious frequencies at less than 20 dB below the limit.

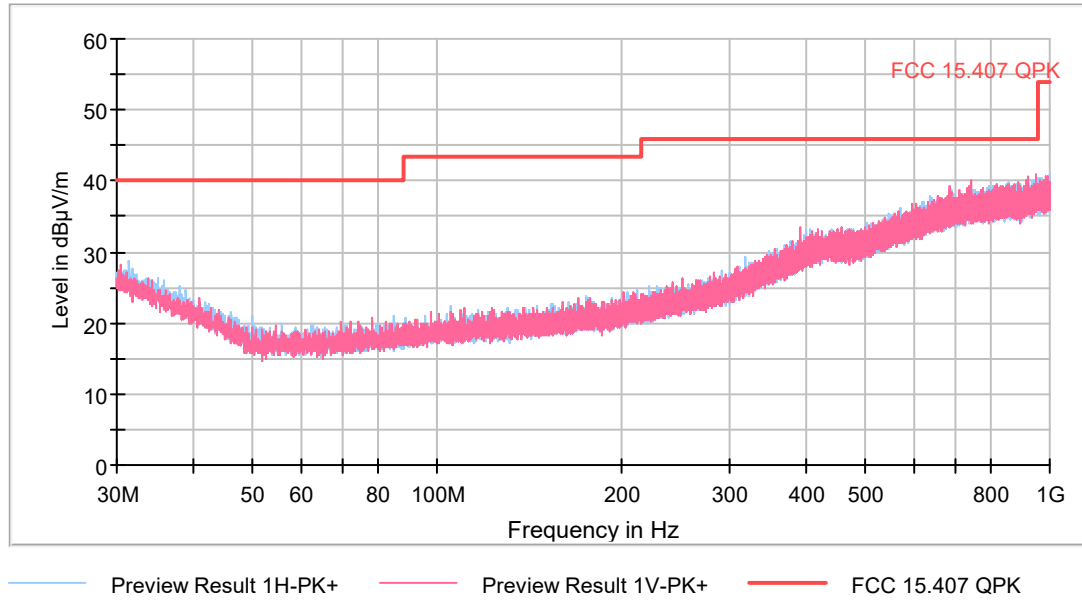
- HIGH CHANNEL. No spurious frequencies at less than 20 dB below the limit.

Measurement Uncertainty (dB):
1 GHz - 7 GHz $<\pm 4.60$
7 GHz - 17 GHz $<\pm 5.13$
17 GHz - 26.5 GHz $<\pm 5.08$
26.5 GHz - 40 GHz $<\pm 5.33$

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz (worst case):

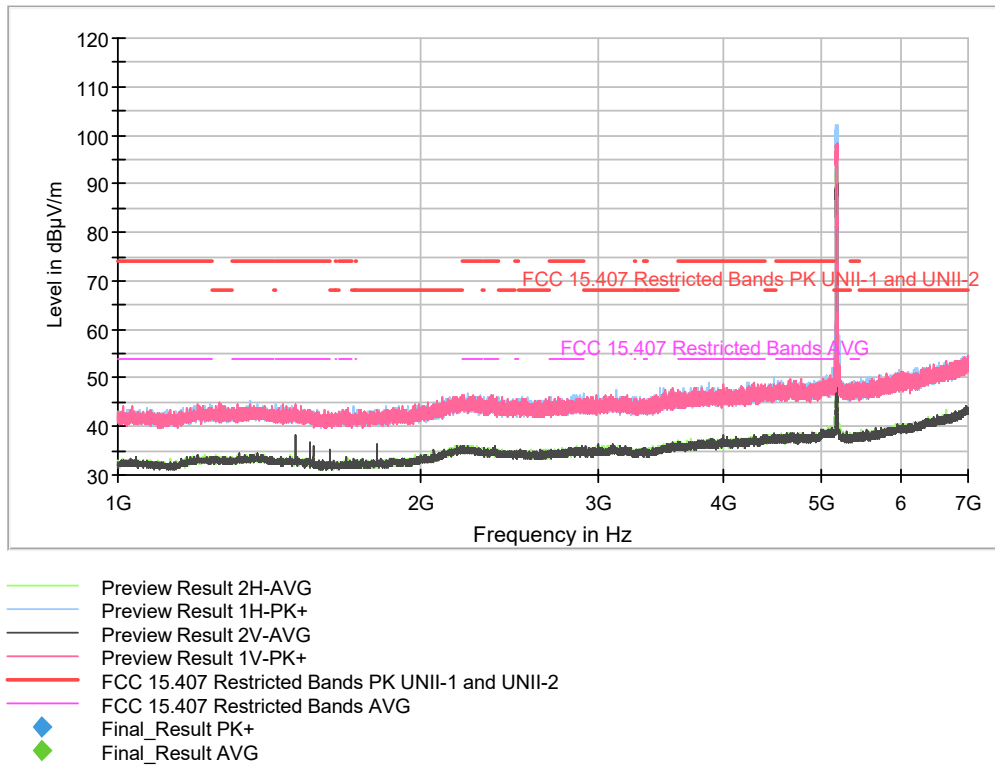
This plot is valid for the Low, Middle and High Channels and all the modulation modes.



FREQUENCY RANGE 1 - 7 GHz (worst mode):

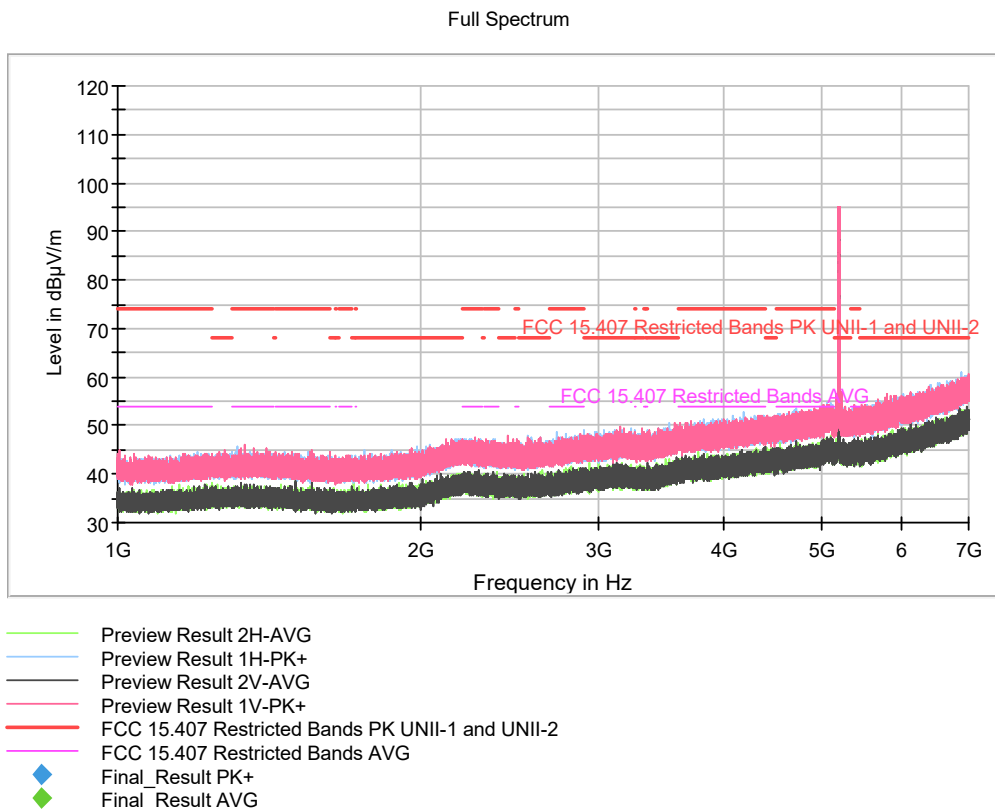
- Low Channel:

Full Spectrum



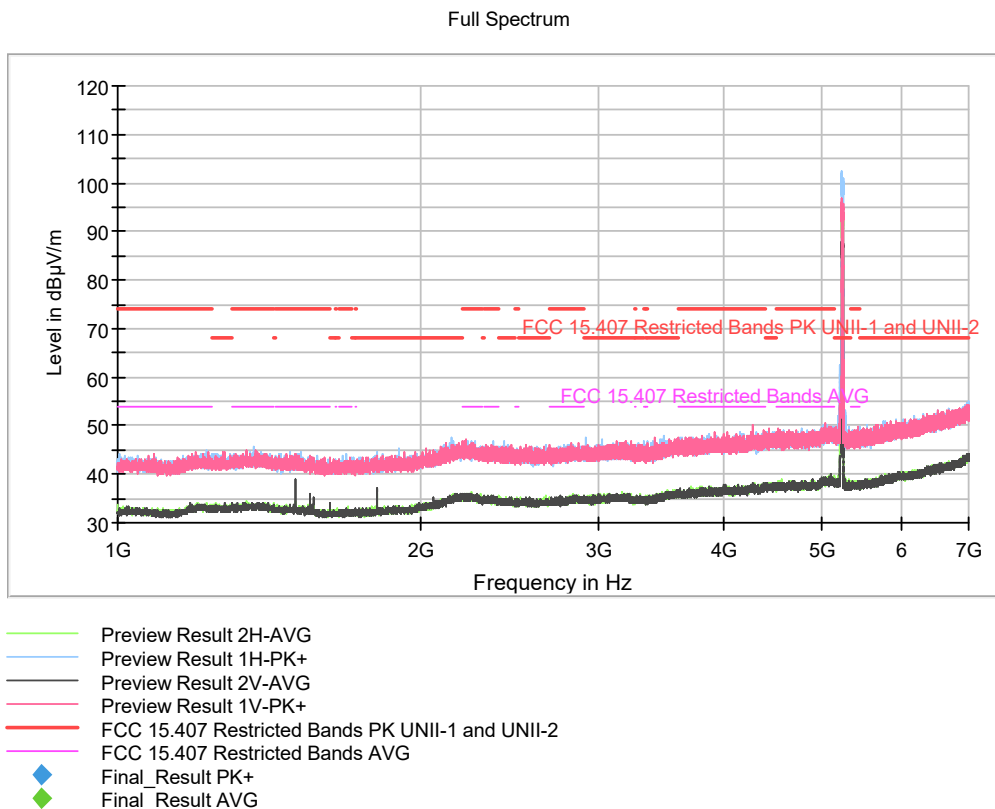
The peak above the limit is the carrier frequency.

- Middle Channel:



The peak above the limit is the carrier frequency.

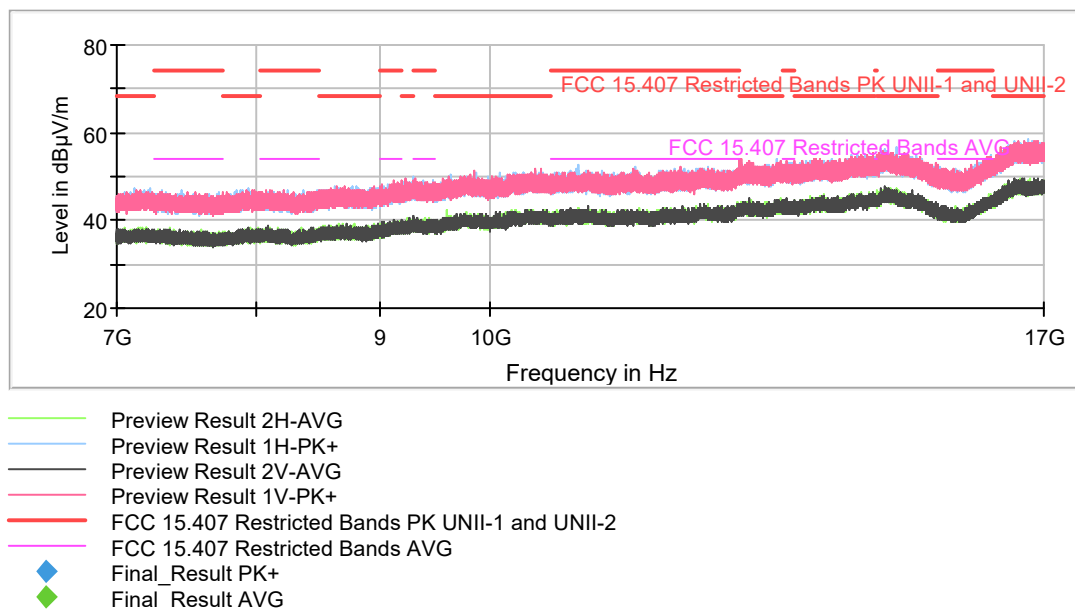
- High Channel:



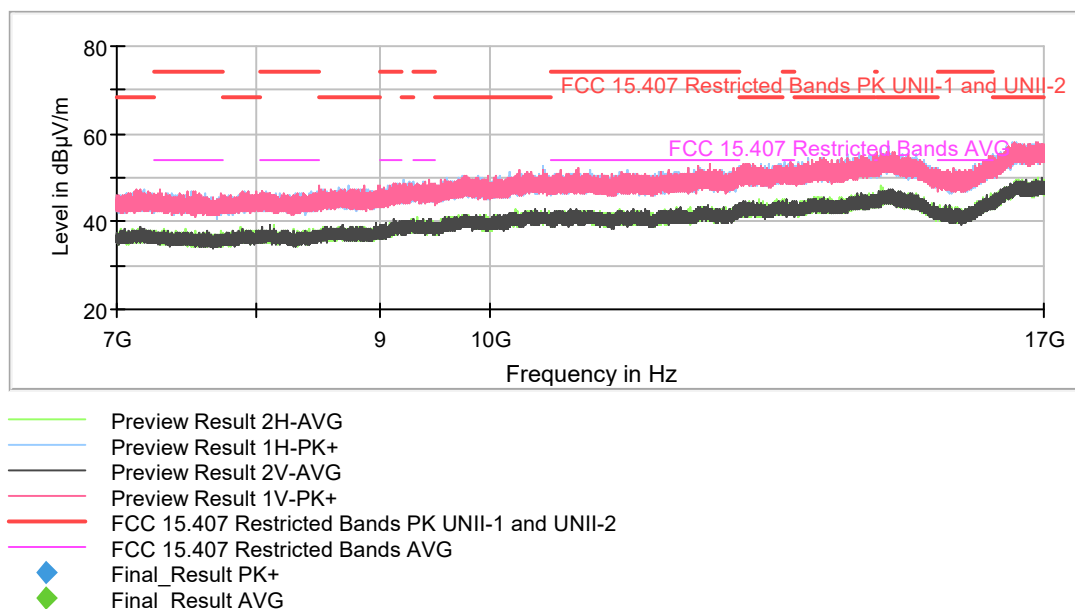
The peak above the limit is the carrier frequency.

FREQUENCY RANGE 7 - 17 GHz (worst mode):

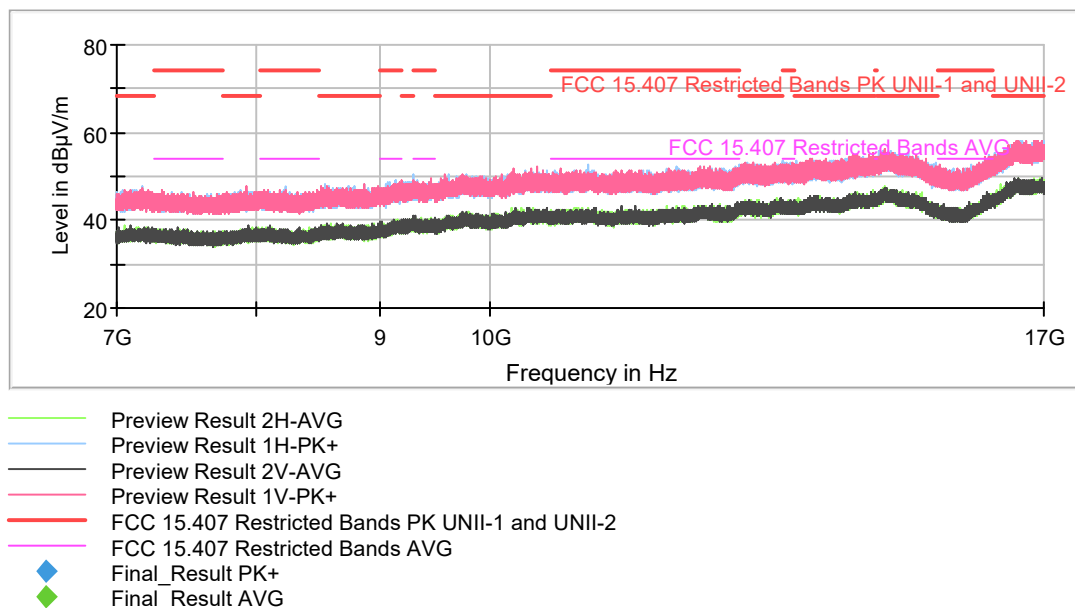
- Low Channel:



- Middle Channel:

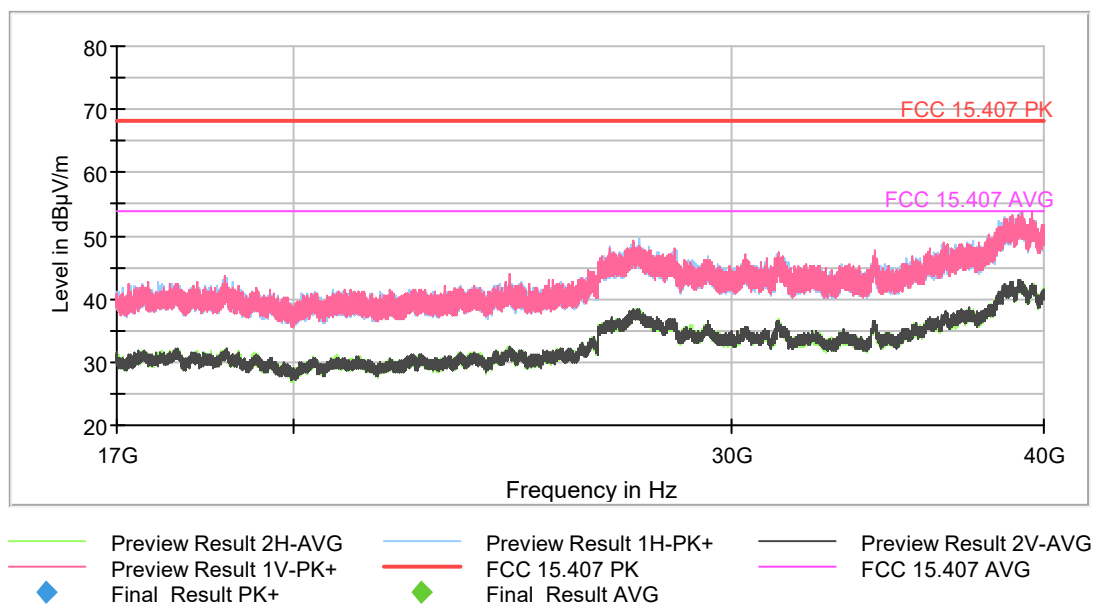


- High Channel:



FREQUENCY RANGE 17 - 40 GHz:

This plot is valid for the Low, Middle and High Channels and all the modulation modes.



FCC 15.407 (b)(1) / RSS-247 6.2.1.2. Transmitter Band Edge Radiated Emissions

SPECIFICATION:

For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz (68.23 dBμV/m at 3 m distance).

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)):

Frequency Range (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
960 - 40000	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

Measurements were made in both horizontal and vertical planes of polarization.

All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27dBm/MHz. There are restricted bands of operation below band edge at 4.50-5.15 GHz also above the upper band edge at 5.35-5.46 GHz therefore the provision of FCC Part 15.205 apply.

Field strength measurements using peak and average detector performed in the restricted bands below 5.15 GHz and above 5.35 GHz.

Test performed on the following worst cases modes in all relevant tests channels:

- 802.11a: 6 Mbit/s.
- 802.11n HT20: MCS0.
- 802.11ac VHT20: MCS0.
- 802.11n HT40: MCS0.
- 802.11ac VHT40: MCS0.
- 802.11ac VHT80: MCS0.

BAND EDGE EMISSIONS:

- **802.11 a20:**

- Lower Band Edge Channel 36 (5180 MHz). Inside the Restricted Band 4.50-5.15 GHz:

No spurious frequencies at less than 20 dB below the limit.

- Upper Band Edge Channel 48 (5240 MHz). Inside the Restricted Band 5.35-5.46 GHz:

No spurious frequencies at less than 20 dB below the limit.

- **802.11 n20:**

- Lower Band Edge Channel 36 (5180 MHz). Inside the Restricted Band 4.50-5.15 GHz:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
5.1440	54.43	H	Peak	<± 4.60
	45.27		Average	

- Upper Band Edge Channel 48 (5240 MHz). Inside the Restricted Band 5.35-5.46 GHz:

No spurious frequencies at less than 20 dB below the limit.

- **802.11 ac20:**

- Lower Band Edge Channel 36 (5180 MHz). Inside the Restricted Band 4.50-5.15 GHz:

No spurious frequencies at less than 20 dB below the limit.

- Upper Band Edge Channel 48 (5240 MHz). Inside the Restricted Band 5.35-5.46 GHz:

No spurious frequencies at less than 20 dB below the limit.

- **802.11 n40:**

- Lower Band Edge Channel 38 (5190 MHz). Inside the Restricted Band 4.50-5.15 GHz:

No spurious frequencies at less than 20 dB below the limit.

- Upper Band Edge Channel 46 (5230 MHz). Inside the Restricted Band 5.35-5.46 GHz:

No spurious frequencies at less than 20 dB below the limit.

- **802.11 ac40:**

- Lower Band Edge Channel 38 (5190 MHz). Inside the Restricted Band 4.50-5.15 GHz:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
5.1290	58.78	H	Peak	<± 4.60
	43.14		Average	

- Upper Band Edge Channel 46 (5230 MHz). Inside the Restricted Band 5.35-5.46 GHz:

No spurious frequencies at less than 20 dB below the limit.

- **802.11 ac80:**

- Lower Band Edge Channel 42 (5210 MHz). Inside the Restricted Band 4.50-5.15 GHz:

Spurious frequencies at less than 20 dB below the limit:

Spurious frequency (GHz)	Emission Level (dBμV/m)	Polarization	Detector	Measurement Uncertainty (dB)
5.1100	54.91	H	Peak	<± 4.60
	49.57		Average	

- Upper Band Edge Channel 42 (5210 MHz). Inside the Restricted Band 5.35-5.46 GHz:

No spurious frequencies at less than 20 dB below the limit.

Verdict: PASS