LGAI Technological Center, S.A. (APPLUS)
Campus de la UAB. Ronda de la Font del Carme, s/n.
08193 Bellaterra (Barcelona) (Spain)
T +34 93 567 20 00 / F +34 93 520 20 01
www.appluslaboratories.com

File Number **24/36403477M1**

TEST REPORT
Radiofrequency

Petitioner's Reference:	Verisure Sàrl		
Company Address:	Chemin Jean-Baptiste Vandelle 3, Versoix, Geneva, Switzerland		
Represented by:	James Barnett		
PMN:	Wi-Fi Extender		
Brand:	Verisure	HMN:	GWL-WXTND 489937
Sample #1:	3N75 UMVP	Applus Id:	25556-0001
Sample #2:	3N75 UKDZ	Applus Id:	25556-0002
Result:	**complies**		

It has been tested and complies with the applicable standard. See test result summary section.

Applicable Standard:	
RF standard/s:	**FCC 47 CFR Part 15 Subpart C[1]** **FCC 47 CFR Part 15 Subpart E[1]** **ANSI C63.10 (2013)** **KDB 905462 D02 UNII DFS Compliance Procedures New Rules v02**

[1]The latest modifications of the standard, published at the date of the tests reported in this document, have been considered.

Dates and Test Site:	Applus Barcelona, Bellaterra
Equipment Reception Date	December 12, 2023
Test Initial Date:	January 17, 2024
Test Final Date:	May 14, 2024
Modification Description:	M1

This report replaces and supersedes the report 24/36403477 dated on September 25, 2024.

Modifications performed: Version of ANSI C63.10:2013 is specified in applicable standard. Page 1.
KDB 905462 D02 is included in applicable standard. Page 1.
Frequency stability test included in test report. Page 123
It is responsibility of the petitioner to replace the previous version with this one.

Test Manager: Javier Miguel Nadales Lisbona
Date of issue: Bellaterra, September 25, 2024

JORGE GEIS ESTRADA
Firmado digitalmente por JORGE GEIS ESTRADA
Fecha: 2024.10.22 14:52:25 +02'00'

EMC & Wireless Technical Manager
Electrical and Electronics
LGAI Technological Center S.A.

ENAC
ENSAYO
ISO 17025
Nº9 / LE894

The results refer only and exclusively to the sample, product or material delivered for testing, and tested under conditions stipulated in this document. The equipment has been tested under conditions stipulated by standard(s) quoted in this document. This document will not be reproduced otherwise than in full.
This is the first page of the document, which consists of 289 pages.

1 TEST RESULTS SUMMARY

Test Description	Sample #	DUT Test Modes	Results	Criteria Note
ANTENNA REQUIEREMENTS FCC Part 15.203	#1, #2	Mode 1	PASS	CN4
OCCUPIED BANDWIDTH (99%) & EMISSION BANDWIDTH 26 dB FCC Part 15.407 (a)(e)	#1	Mode 1	PASS	CN4
6 dB BANDWITDH FCC Part 15.407 (a)(e)	#1	Mode 1	PASS	CN4
TRANSMITTER MAXIMUM CONDUCTED OUTPUT POWER FCC Part 15.407 (a)	#1	Mode 1	PASS	CN4
TRANSMITTER MAXIMUM POWER SPECTRAL DENSITY FCC Part 15.407 (a)	#1	Mode 1	PASS	CN4
FREQUENCY STABILITY[1] FCC Part 15.407 (g)	--	--	--	--
BAND EDGE FCC Part 15.407 (b)	#1	Mode 1	PASS	CN4
RADIO FREQUENCY RADIATED EMISSIONS FCC Part 15.407 (b)	#2	Mode 1	PASS	CN4
DYNAMIC FREQUENCY SELECTION FCC Part 15.407 (h)	#1	Mode 2	PASS	CN4

Table 1: Test description

The test results are shown in detail on the following pages.

Note[1]: Not tested. The client provides documentation to the laboratory that ensures compliance with this test.

The criteria to give conformity in those cases where it is not implicit in the standard or specification will be, for EMC emissions tests, a non-simple binary decision rule will be followed with a safety zone equal to the value of the uncertainty (w = U).

In this case, the upper limit of the value of the probability of false acceptance, according to ILAC G8, is 2.5 % and the criteria notes are:

CN1: The measured results are above the upper limit, even considering the uncertainty interval.
CN2: The measured results are above the specified limits, but within the uncertainty interval. It is therefore not possible to state compliance based on the 95% level of confidence. However, the results indicate that non-compliance is more probable than compliance.
CN3: The measured results are below the specified limits, but within the uncertainty interval. It is therefore not possible to state compliance based on the 95% level of confidence. However, the results indicate that compliance is more probable than non-compliance.
CN4: The measured results are within the limits, including the uncertainty interval.

2 INDEX

3 GENERAL DESCRIPTION OF TEST ITEMS

3.1 EQUIPMENT DESCRIPTION

This information has been provided by the customer and it is not covered by the accreditation. LGAI does not assume any responsibility from it.

EQUIPMENT DESCRIPTION			
Description	Wi-Fi Extender which can also be controlled and monitored over our proprietary radio protocol over Sub-GHz ISM (SRD).		
EUT Version	**FVIN**		**HVIN**
	1.0.6		A1
Power supply	1 PH + N	120 V	60 Hz
Equipment Size	**Length**	**Width**	**Height**
	17.5 cm	10.5 cm	2 cm
Modulation	A, N & AC		
Operating Frequency Band U-NII-1	5150 MHz – 5250 MHz		
Operating Frequency Band U-NII-2A	5250MHz – 5350 MHz		
Operating Frequency Band U-NII-2C	5470 MHz – 7250 MHz		
Operating Frequency Band U-NII-3	5725 MHz – 5850 MHz		
Maximum RF Output Power [dBm]	30		
Operating Channel(s) Width(s) [MHz]	20, 40 & 80		
Equipment Type	DTS		
Number of Hopping Channels	N/A		
Emission Designator			
FCC ID	2A93W-GWL-WXTND		

Table 2: Equipment description

RF FEATURES					
Description	**Communication Technology**	**Radio Chipset**	**Brand**	**Module Model**	**Antenna Gain – MIMO[1][dBi]**
	WiFi 5G	SYN4375B4XKFFBG/ BCM4375B4XKFFBG[2]	Synaptics / Broadcom[2]	N/A	+2.72

Table 3: RF Features

Note [1]: For MIMO transmission mode, antenna gain calculations are based on KDB 662911 D01 Multiple Transmitter Output v02r01. Considering that the customer has declared Cyclic Delay Diversity mode.

Note [2]: This is not dual source, just that Synaptics purchased this business line from Broadcom and the PN is renamed, some documentation may refer to those 2 PN

3.2 TEST CONFIGURATION

DUT Operation Modes

Mode #	Description

The customer provides test guidance. Equipment under test is connected to an Rpi. Use the Rpi to set up continuous modulated transmission on individual channels on the EUT.
For MIMO transmission mode chain 3 has been selected on *config.ini* file.

1

U-NII-1 Band

Modulation	Frequency [MHz]	Script
Mode A20	5180	python wltx.py -- Ch 36 -- Rate 6 -- Bw 20
	5200	python wltx.py -- Ch 40 -- Rate 6 -- Bw 20
	5240	python wltx.py -- Ch 48 -- Rate 6 -- Bw 20
Mode N20	5180	python wltx.py -- Ch 36 – MCS 0 -- Bw 20
	5200	python wltx.py -- Ch 40 – MCS 0 -- Bw 20
	5240	python wltx.py -- Ch 48 – MCS 0 -- Bw 20
Mode AC20	5180	python wltx.py -- Ch 36 – MCS 8 -- Bw 20
	5200	python wltx.py -- Ch 40 – MCS 8 -- Bw 20
	5240	python wltx.py -- Ch 48 – MCS 8 -- Bw 20
Mode N40	5190	python wltx.py -- Ch 38 – MCS 0 -- Bw 40
	5230	python wltx.py -- Ch 46 – MCS 0 -- Bw 40
Mode AC40	5190	python wltx.py -- Ch 38 – MCS 0 -- Bw 40
	5230	python wltx.py -- Ch 46 – MCS 8 -- Bw 40
Mode AC80	5210	python wltx.py -- Ch 42 – MCS 8 -- Bw 80

U-NII-2A Band

Modulation	Frequency [MHz]	Script
Mode A20	5260	python wltx.py -- Ch 52 -- Rate 6 -- Bw 20
	5280	python wltx.py -- Ch 56 -- Rate 6 -- Bw 20
	5320	python wltx.py -- Ch 64 -- Rate 6 -- Bw 20
Mode N20	5260	python wltx.py -- Ch 52 – MCS 0 -- Bw 20
	5280	python wltx.py -- Ch 56 – MCS 0 -- Bw 20
	5320	python wltx.py -- Ch 54 – MCS 0 -- Bw 20
Mode AC20	5260	python wltx.py -- Ch 52 – MCS 8 -- Bw 20
	5280	python wltx.py -- Ch 56 – MCS 8 -- Bw 20
	5320	python wltx.py -- Ch 64 – MCS 8 -- Bw 20
Mode N40	5270	python wltx.py -- Ch 54 – MCS 0 -- Bw 40
	5310	python wltx.py -- Ch 62 – MCS 0 -- Bw 40
Mode AC40	5270	python wltx.py -- Ch 54 – MCS 0 -- Bw 40
	5310	python wltx.py -- Ch 62 – MCS 8 -- Bw 40
Mode AC80	5290	python wltx.py -- Ch 58 – MCS 8 -- Bw 80

U-NII-2C Band

Modulation	Frequency [MHz]	Script
Mode A20	5500	python wltx.py -- Ch 100 -- Rate 6 -- Bw 20
	5580	python wltx.py -- Ch 116 -- Rate 6 -- Bw 20
	5700	python wltx.py -- Ch 140 -- Rate 6 -- Bw 20
Mode N20	5500	python wltx.py -- Ch 100 – MCS 0 -- Bw 20
	5580	python wltx.py -- Ch 116 – MCS 0 -- Bw 20
	5700	python wltx.py -- Ch 140 – MCS 0 -- Bw 20
Mode AC20	5500	python wltx.py -- Ch 100 – MCS 8 -- Bw 20
	5580	python wltx.py -- Ch 116 – MCS 8 -- Bw 20
	5700	python wltx.py -- Ch 140 – MCS 8 -- Bw 20
Mode N40	5510	python wltx.py -- Ch 102 – MCS 0 -- Bw 40
	5670	python wltx.py -- Ch 134 – MCS 0 -- Bw 40
Mode AC40	5510	python wltx.py -- Ch 102 – MCS 0 -- Bw 40
	5670	python wltx.py -- Ch 134 – MCS 8 -- Bw 40
Mode AC80	5530	python wltx.py -- Ch 106 – MCS 8 -- Bw 80

U-NII-3 Band

Modulation	Frequency [MHz]	Script
Mode A20	5745	python wltx.py -- Ch 149 -- Rate 6 -- Bw 20
	5785	python wltx.py -- Ch 157 -- Rate 6 -- Bw 20
	5825	python wltx.py -- Ch 165 -- Rate 6 -- Bw 20
Mode N20	5745	python wltx.py -- Ch 149 – MCS 0 -- Bw 20
	5785	python wltx.py -- Ch 157 – MCS 0 -- Bw 20
	5825	python wltx.py -- Ch 165 – MCS 0 -- Bw 20
Mode AC20	5745	python wltx.py -- Ch 149 – MCS 8 -- Bw 20
	5785	python wltx.py -- Ch 157 – MCS 8 -- Bw 20
	5825	python wltx.py -- Ch 165 – MCS 8 -- Bw 20
Mode N40	5755	python wltx.py -- Ch 151 – MCS 0 -- Bw 40
	5795	python wltx.py -- Ch 159 – MCS 0 -- Bw 40
Mode AC40	5755	python wltx.py -- Ch 151 – MCS 0 -- Bw 40
	5795	python wltx.py -- Ch 159 – MCS 8 -- Bw 40
Mode AC80	5775	python wltx.py -- Ch 155 – MCS 8 -- Bw 80

2	The customer provides test guidance. The equipment under test is capable of connecting to an access point. A communication socket is established through the iperf3 commands.

Table 4. Test Configuration

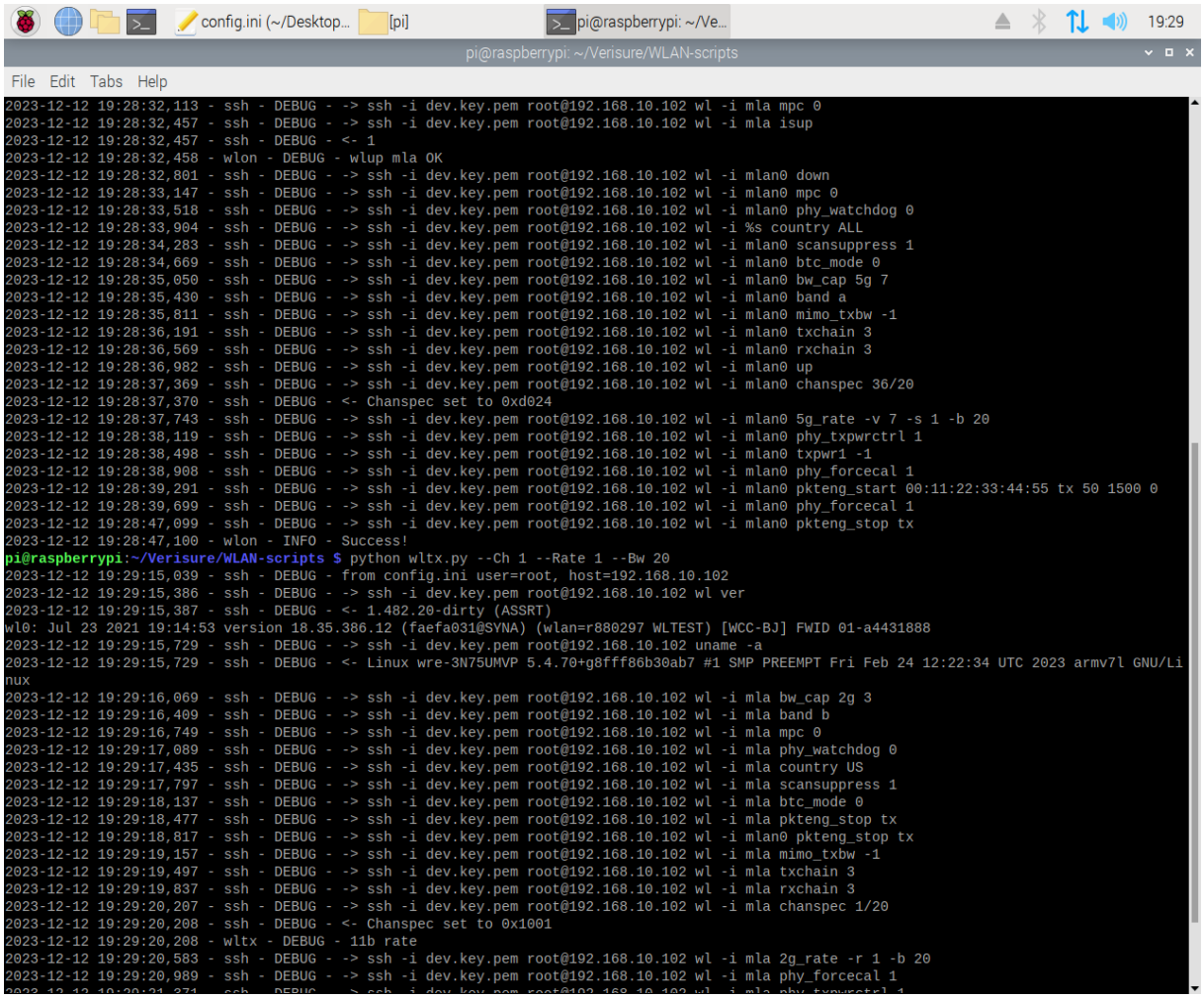

Fig. 1: – Sample Configuration – Mode 1

3.3 PHOTOGRAPHS

Photographs identifying the equipment under test and its auxiliaries, as well as assembly photographs for radiated and conducted tests, can be found in the document with ID: 24/36403478M2

3.4 TEST FACILITIES ID

TEST FACILITIES ID	
FCC Test Firm Registration Number:	507478
ISED Assigned Code:	5766A
CABID	ES0001

Table 5: Test facilities ID

3.5 COMPETENCES AND GUARANTEES

LGAI Technological Center, S.A. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 9/LE894.
In order to assure the traceability to other national and international laboratories, Applus+ Laboratories has a calibration and maintenance program for its measurement equipment.
Applus+ Laboratories 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 Applus+ Laboratories at the time of performance of the test.
Applus+ Laboratories 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.

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 Applus+ Laboratories.

4 TEST RESULTS

4.1 ANTENNA REQUIREMENT

4.1.1 Requirements

For intentional device, according to FCC 47 CFR, 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. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to RSS-Gen, the applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

4.1.2 Summary Test Results

The laboratory checks that the sample has an internal antenna, so that no hardware modifications are possible. Complying with the requirements of this section.

4.2 OCCUPIED CHANNEL BANDWIDTH (99%) & EMISSION BANDWIDTH 20 dB

4.2.1 Test Setup Required

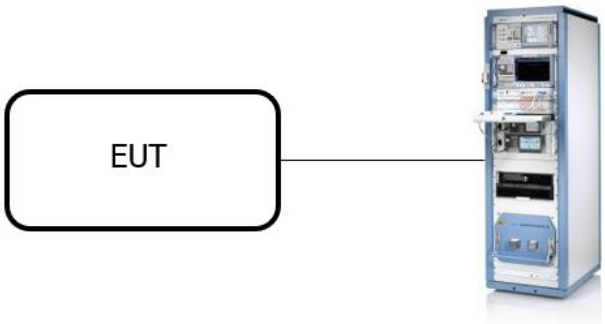

Fig. 2: Set-Up - Occupied Channel Bandwidth & Occupied Channel Bandwidth 99% & Emission Bandwidth 26dB

4.2.2 Requirements

The 99% 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.
Measurements of 99% occupied bandwidth may also optionally be used in lieu of the EBW to define the minimum frequency range over which the spectrum is integrated when measuring maximum conducted output power.

4.2.3 EMI Receiver configuration

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

Central frequency [MHz]	Bandwidth [MHz]	Span [MHz]	Detector	Trace Mode	RBW [kHz]	VBW [kHz]
Channel frequency	20	40	Peak	Max Hold	200	1000
Channel frequency	40	80	Peak	Max Hold	500	2000
Channel frequency	80	160	Peak	Max Hold	1000	3000

Table 6: EMI Receiver configuration – Occupied Channel Bandwidth 99%

Central frequency [MHz]	Bandwidth [MHz]	Span [MHz]	Detector	Trace Mode	RBW [kHz]	VBW [kHz]
Channel frequency	20	40	Peak	Max Hold	200	1000
Channel frequency	40	80	Peak	Max Hold	300	2000
Channel frequency	80	160	Peak	Max Hold	1000	3000

Table 7: EMI Receiver configuration – Emission Bandwidth 26 dB

4.2.4 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
17/01/2024	Javier M. Nadales	-	21.4	44.7	998.1
24/01/2024	Javier M. Nadales	-	22.1	47.2	998.6
25/01/2024	Javier M. Nadales	-	23.7	48.2	1004.3
26/01/2024	Javier M. Nadales	-	21.8	44.5	997.6
29/01/2024	Javier M. Nadales	-	22.1	46.3	1012.3
30/01/2024	Javier M. Nadales	-	22.7	48.1	1002.2

Table 8: Test environmental conditions – Occupied Channel Bandwidth 99% & Emission Bandwidth 26dB

4.2.5 Summary Test Results

4.2.5.1 U-NII-1

Modulation	Operating Frequency [MHz]	99% Bandwidth [MHz]	26 dB Bandwidth [MHz]	Results
Mode A20	5180	16.6	21.5	PASS
	5200	16.6	21.5	PASS
	5240	16.6	21.5	PASS
Mode N20	5180	17.8	22.0	PASS
	5200	17.9	21.9	PASS
	5240	17.9	21.8	PASS
Mode AC20	5180	17.9	21.6	PASS
	5200	17.9	21.6	PASS
	5240	17.9	21.7	PASS
Mode N40	5190	36.4	39.4	PASS
	5230	36.6	39.8	PASS
Mode AC40	5190	36.6	39.9	PASS
	5230	36.6	40.2	PASS
Mode AC80	5210	76.3	83.3	PASS

Table 9: Summary Test Results – Occupied Channel Bandwidth 99% & Emission Bandwidth 26dB

4.2.5.2 U-NII-2A

Modulation	Operating Frequency [MHz]	99% Bandwidth [MHz]	26 dB Bandwidth [MHz]	Results
Mode A20	5260	16.6	21.4	PASS
	5280	16.7	21.5	PASS
	5320	16.6	21.5	PASS
Mode N20	5260	17.9	21.7	PASS
	5280	17.9	21.8	PASS
	5320	17.7	21.7	PASS
Mode AC20	5260	17.9	21.8	PASS
	5280	17.9	21.7	PASS
	5320	17.9	21.6	PASS
Mode N40	5270	36.4	40.0	PASS
	5310	36.4	39.5	PASS
Mode AC40	5270	36.6	39.8	PASS
	5310	36.6	39.8	PASS
Mode AC80	5290	76.7	83.3	PASS

Table 10: Summary Test Results – Occupied Channel Bandwidth 99% & Emission Bandwidth 26dB

4.2.5.3 U-NII-2C

Modulation	Operating Frequency [MHz]	99% Bandwidth [MHz]	26 dB Bandwidth [MHz]	Results
Mode A20	5500	16.7	21.6	PASS
	5580	16.7	21.5	PASS
	5700	16.7	21.4	PASS
Mode N20	5500	17.8	21.8	PASS
	5580	17.9	21.8	PASS
	5700	17.9	21.8	PASS
Mode AC20	5500	17.9	21.5	PASS
	5580	17.9	21.7	PASS
	5700	17.9	21.6	PASS
Mode N40	5510	36.4	39.4	PASS
	5670	36.4	39.8	PASS
Mode AC40	5510	36.9	39.8	PASS
	5670	36.6	39.8	PASS
Mode AC80	5610	76.2	82.8	PASS

Table 11: Summary Test Results – Occupied Channel Bandwidth 99% & Emission Bandwidth 26dB

4.2.5.4 U-NII-3

Modulation	Operating Frequency [MHz]	99% Bandwidth [MHz]	26 dB Bandwidth [MHz]	Results
Mode A20	5745	16.64	21.35	PASS
	5785	16.64	21.25	PASS
	5825	16.64	21.25	PASS
Mode N20	5745	17.94	21.95	PASS
	5785	17.94	22.05	PASS
	5825	17.94	21.55	PASS
Mode AC20	5745	16.64	21.35	PASS
	5785	16.64	21.25	PASS
	5825	16.64	21.25	PASS
Mode N40	5755	36.36	39.84	PASS
	5795	36.36	39.84	PASS
Mode AC40	5755	36.61	39.69	PASS
	5795	36.61	39.84	PASS
Mode AC80	5775	76.24	82.75	PASS

Table 12: Summary Test Results – Occupied Channel Bandwidth 99% & Emission Bandwidth 26dB

4.2.6 Test Results

4.2.6.1 Sample #1. Mode #1. U-NII-1. Modulation A20

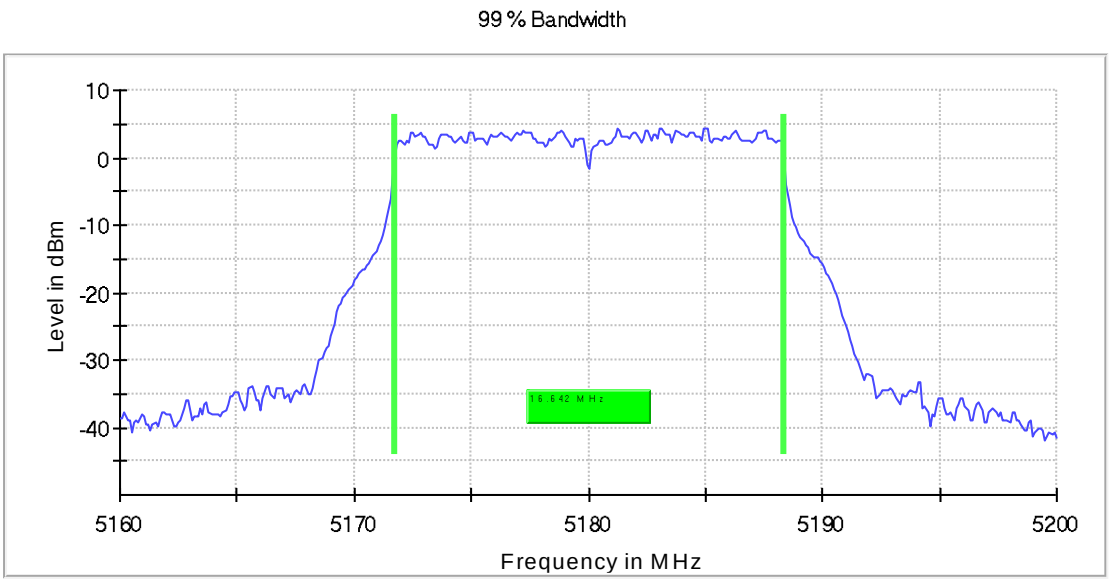

Fig. 3: Low Channel - 99% Occupied Channel Bandwidth

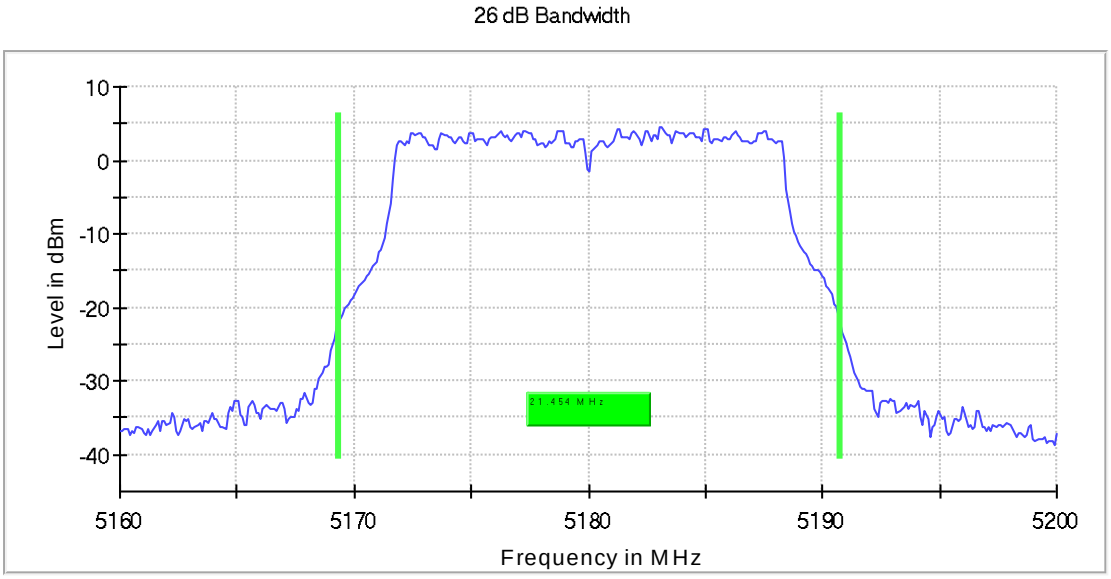

Fig. 4: Low Channel - Emission Bandwidth 26 dB

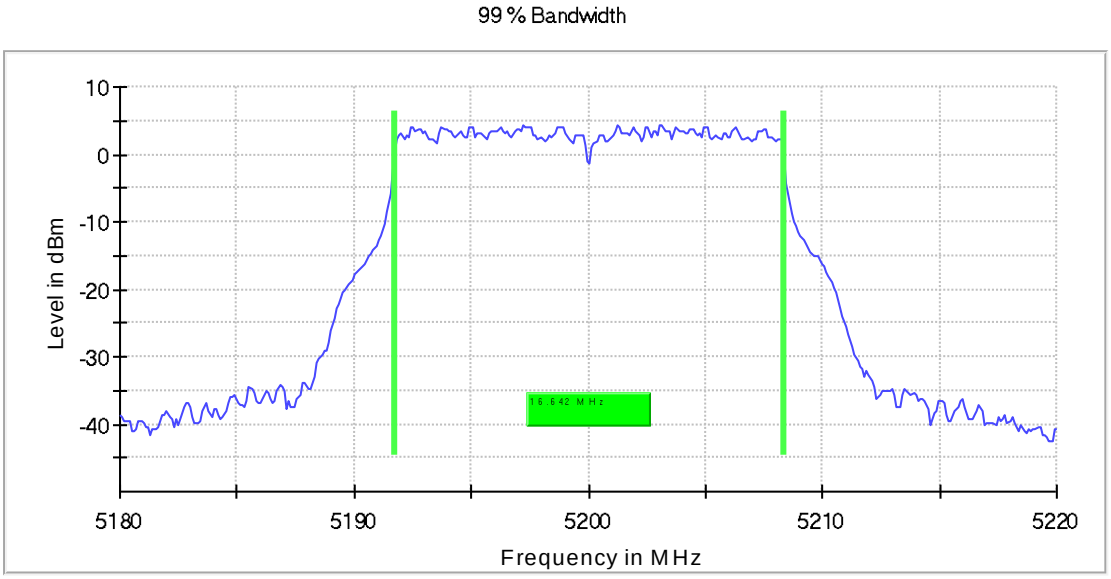

Fig. 5: Middle Channel - 99% Occupied Channel Bandwidth

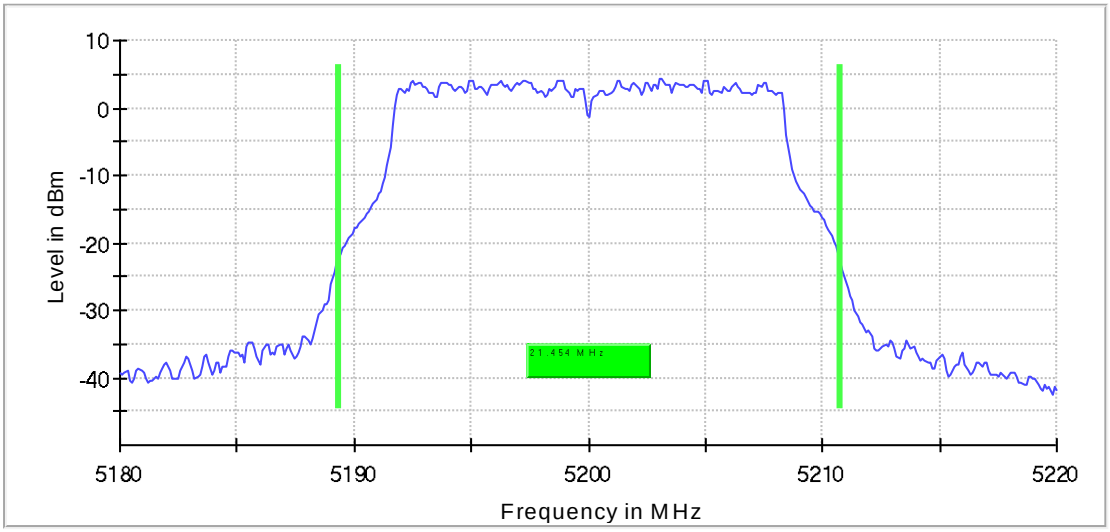

Fig. 6: Middle Channel - Emission Bandwidth 26 dB

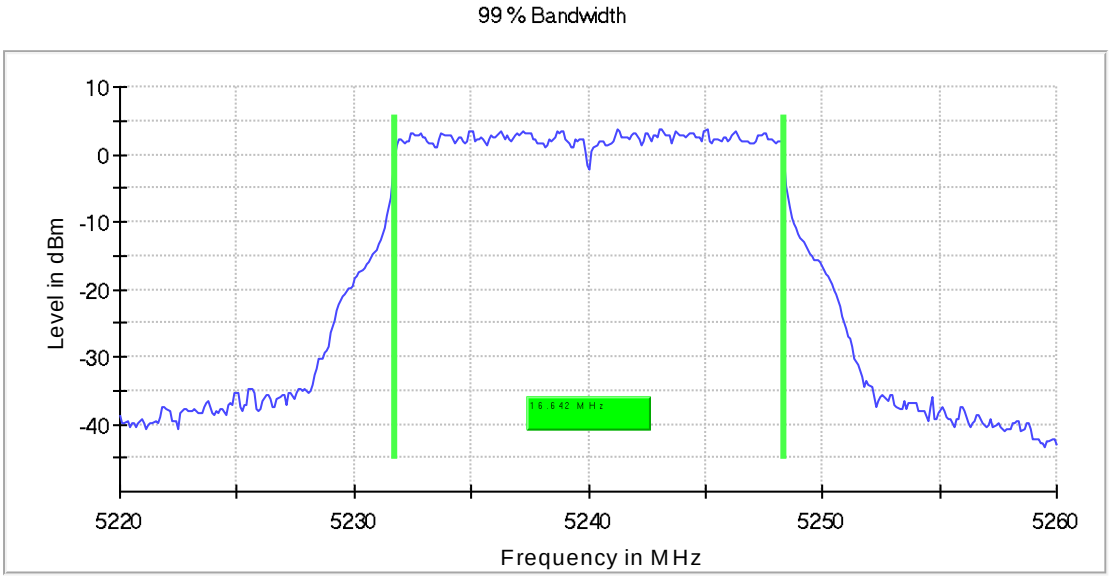

Fig. 7: High Channel - 99% Occupied Channel Bandwidth

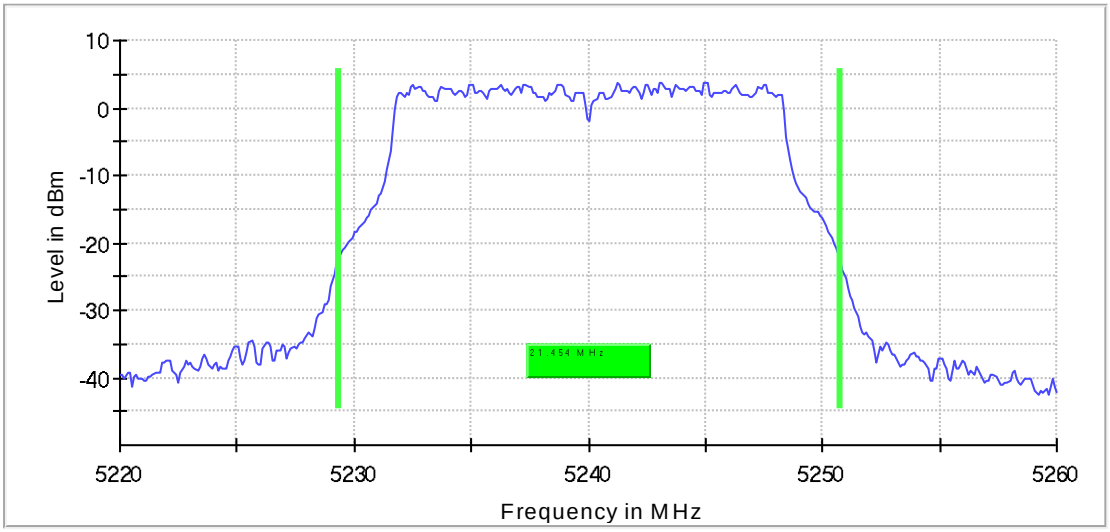

Fig. 8: High Channel - Emission Bandwidth 26 dB

4.2.6.2 Sample #1. Mode #1. U-NII-1. Modulation N20

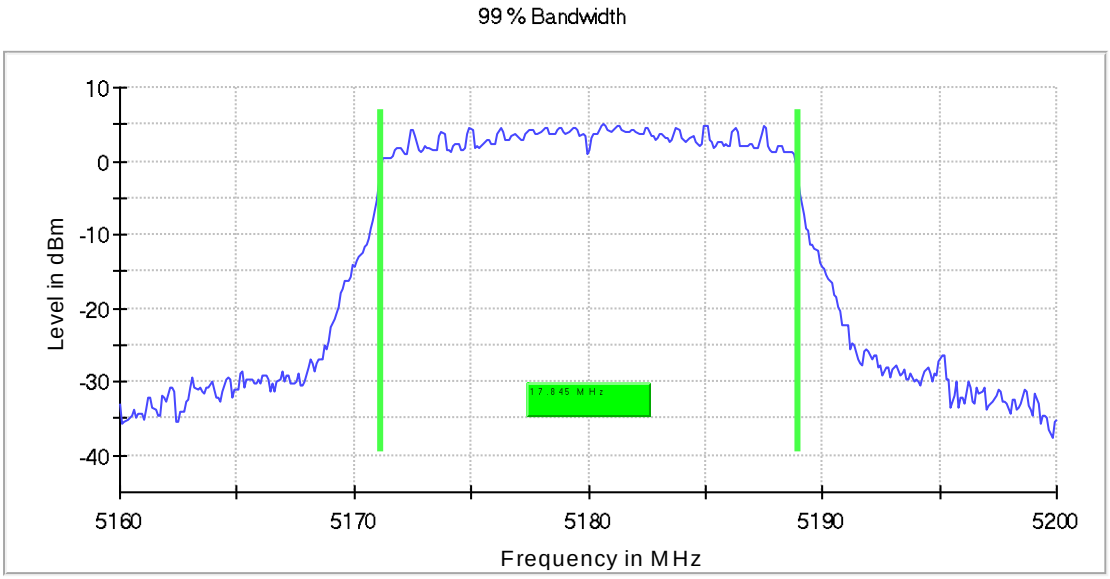

Fig. 9: Low Channel - 99% Occupied Channel Bandwidth

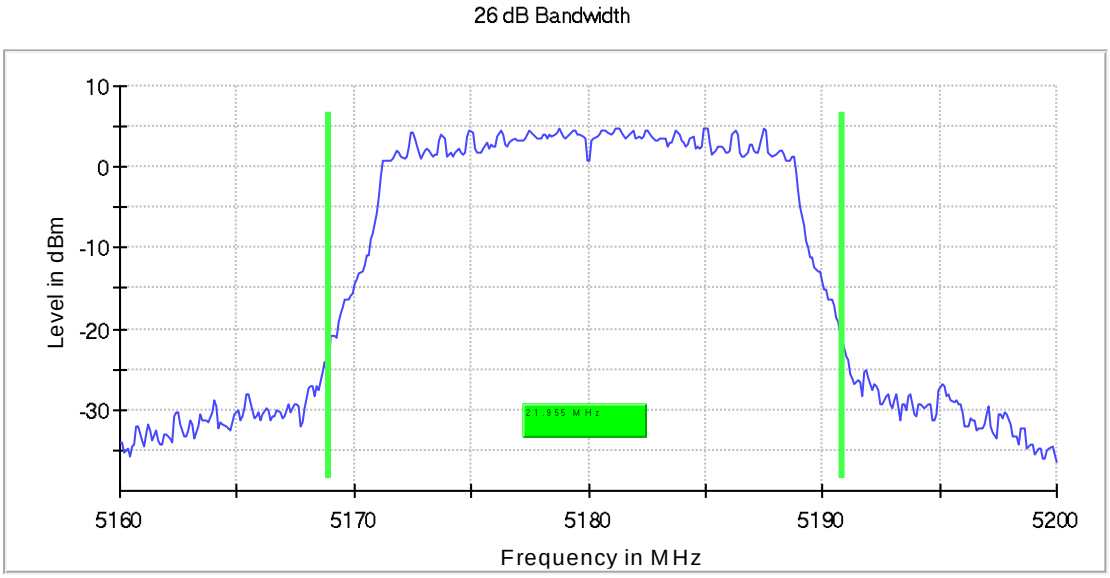

Fig. 10: Low Channel - Emission Bandwidth 26 dB

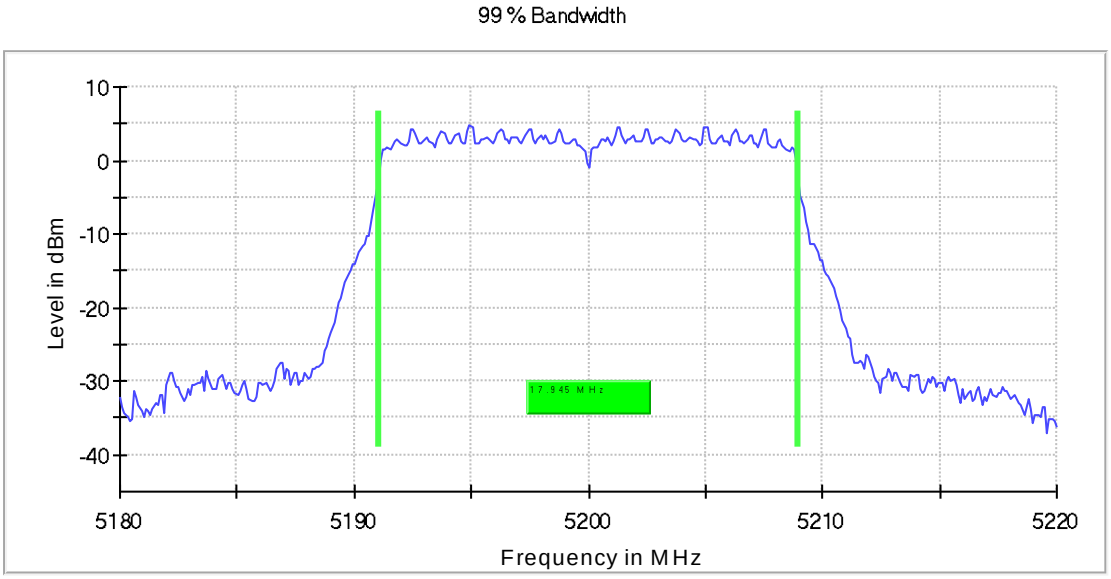

Fig. 11: Middle Channel - 99% Occupied Channel Bandwidth

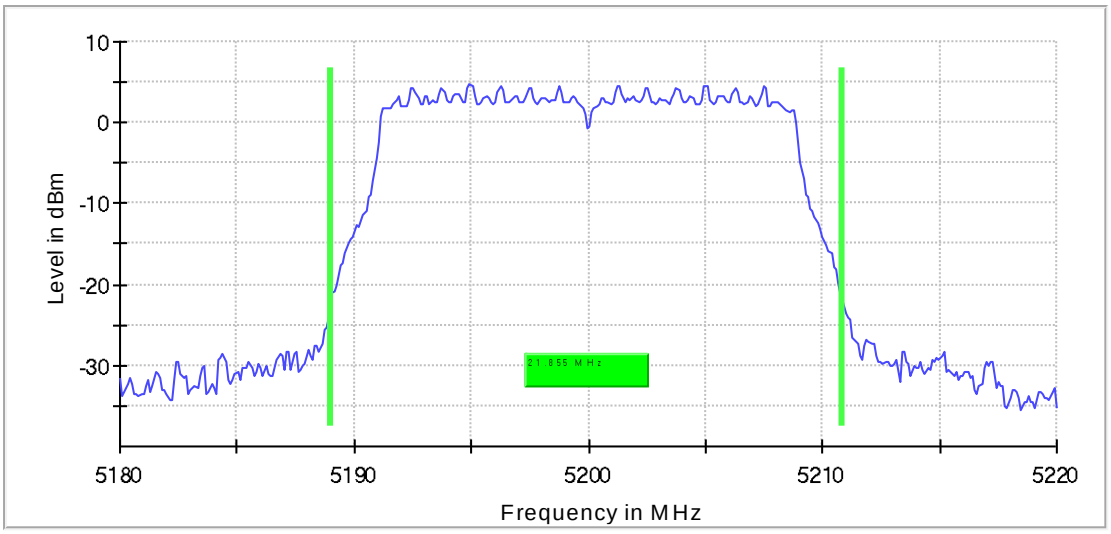

Fig. 12: Middle Channel - Emission Bandwidth 26 dB

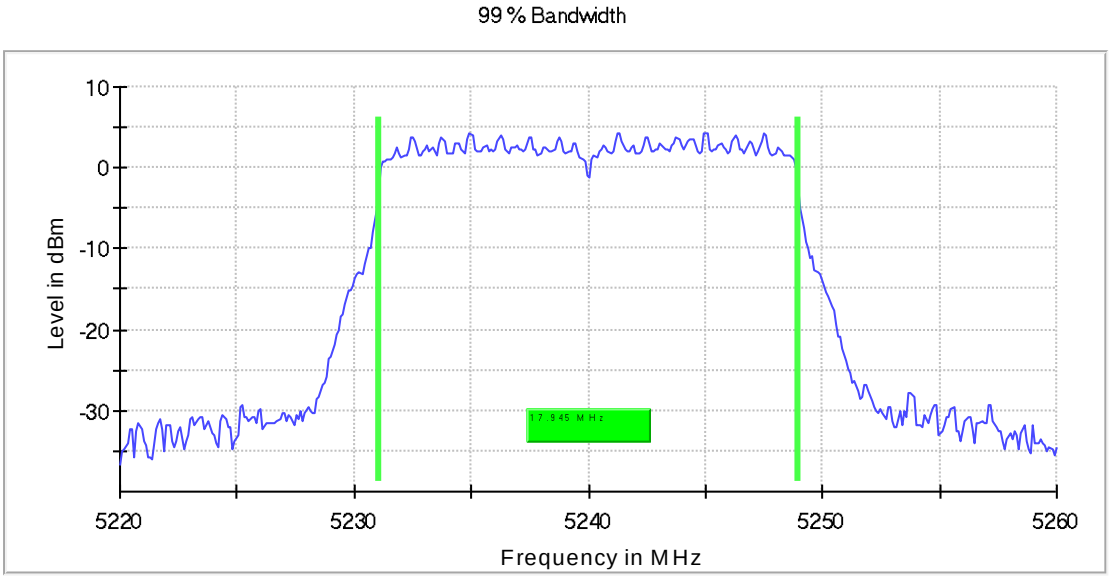

Fig. 13: High Channel - 99% Occupied Channel Bandwidth

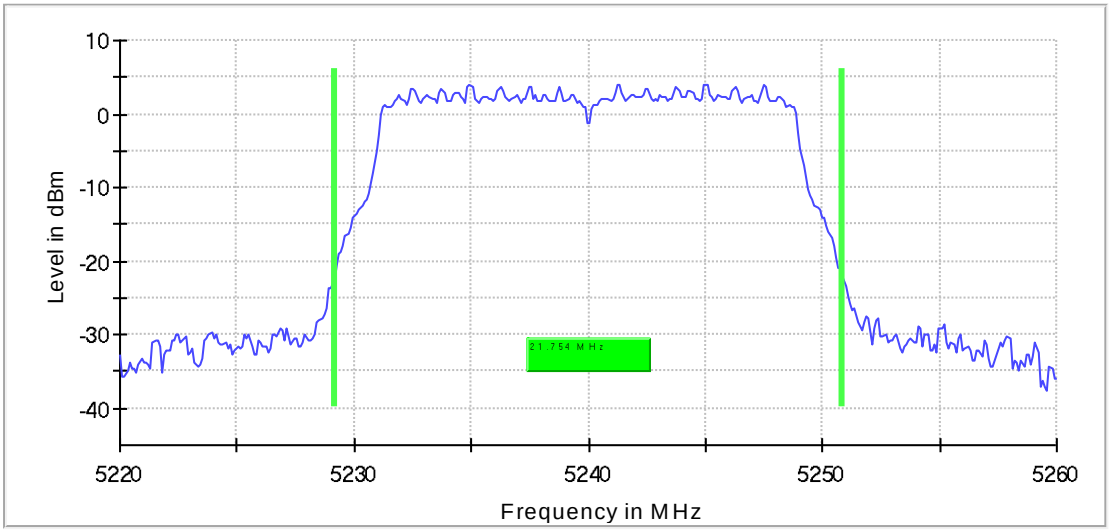

Fig. 14: High Channel - Emission Bandwidth 26 dB

4.2.6.3 Sample #1. Mode #1. U-NII-1. Modulation AC20

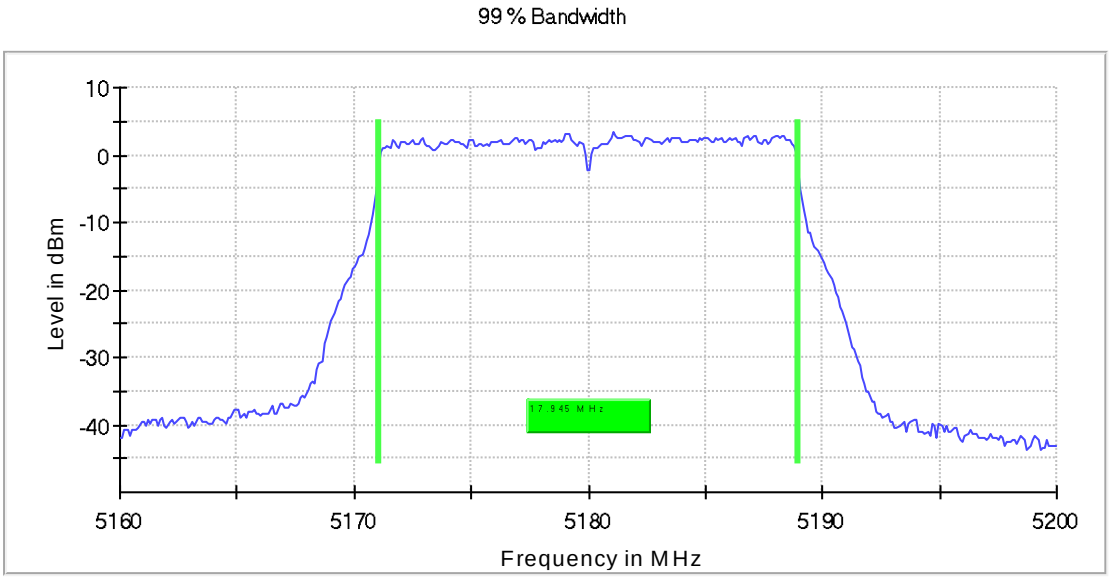

Fig. 15: Low Channel - 99% Occupied Channel Bandwidth

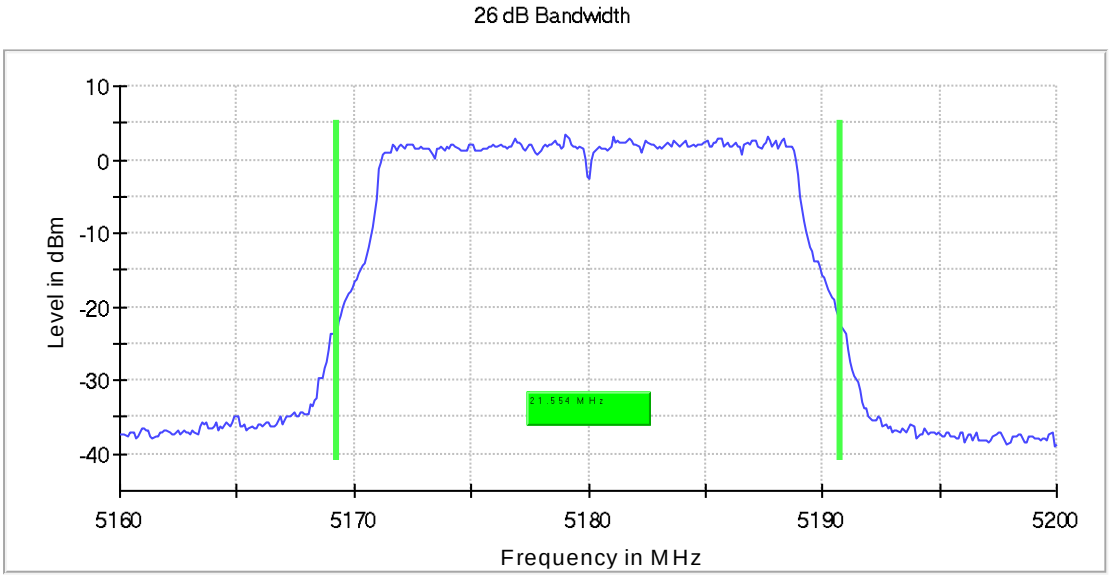

Fig. 16: Low Channel - Emission Bandwidth 26 dB

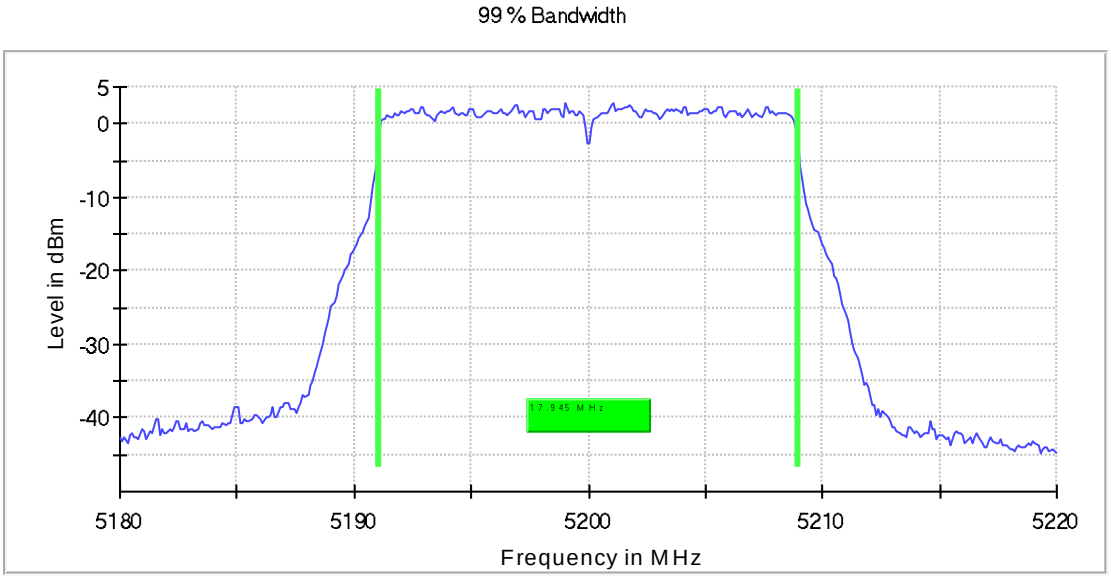

Fig. 17: Middle Channel - 99% Occupied Channel Bandwidth

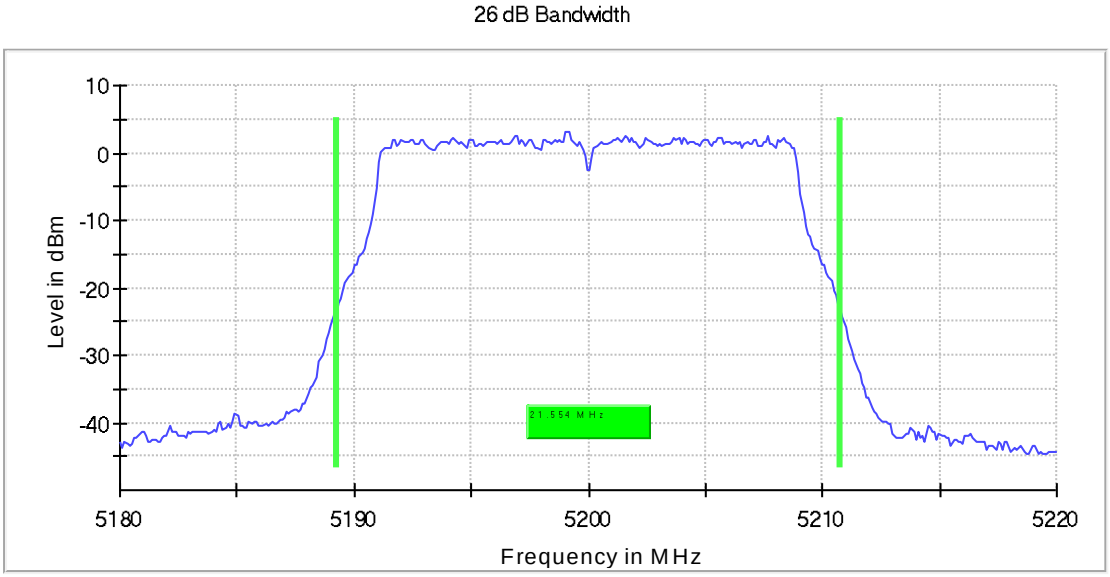

Fig. 18: Middle Channel - Emission Bandwidth 26 dB

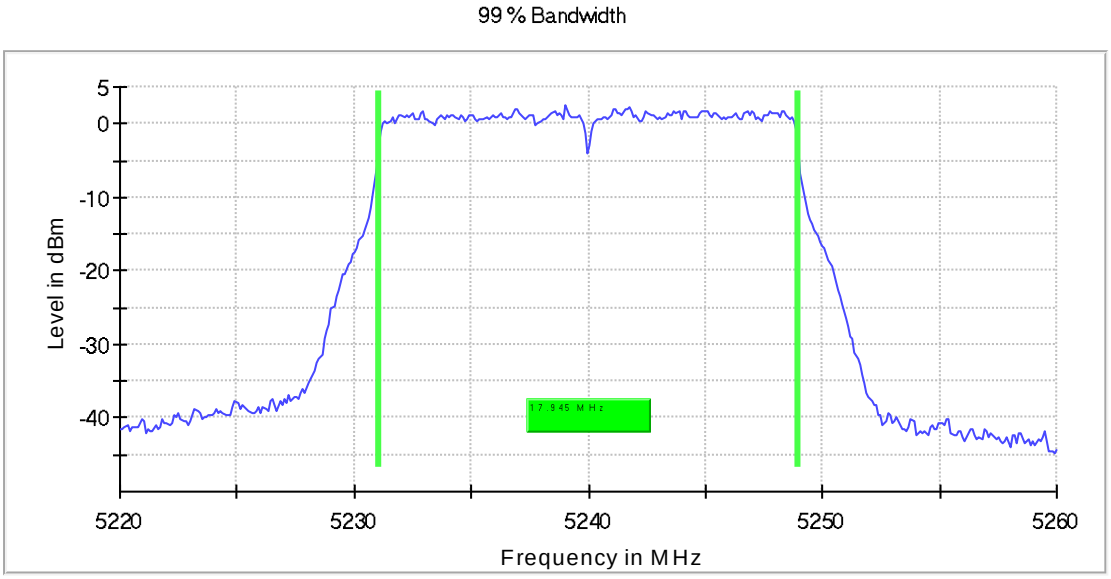

Fig. 19: High Channel - 99% Occupied Channel Bandwidth

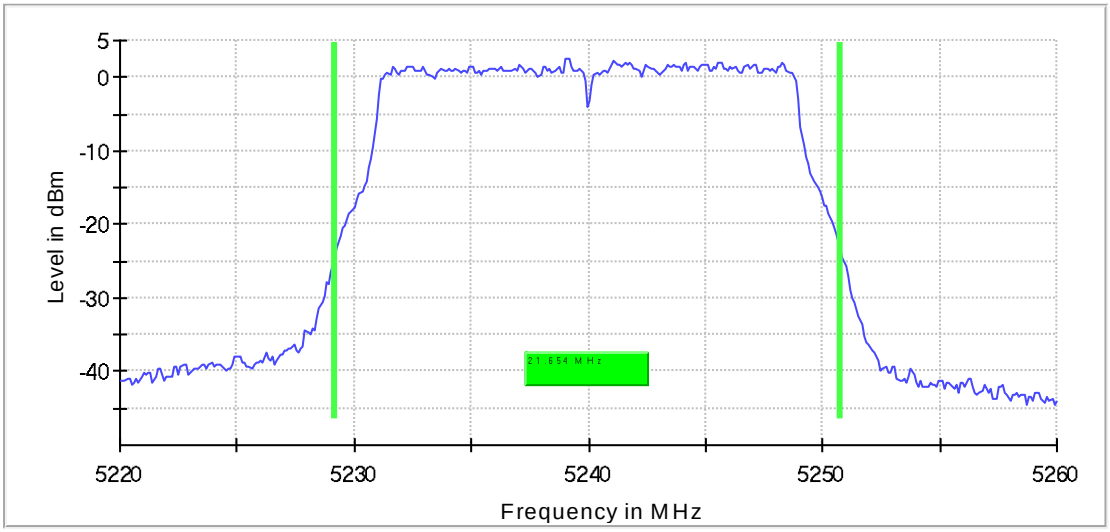

Fig. 20: High Channel - Emission Bandwidth 26 dB

4.2.6.4 Sample #1. Mode #1. U-NII-1. Modulation N40

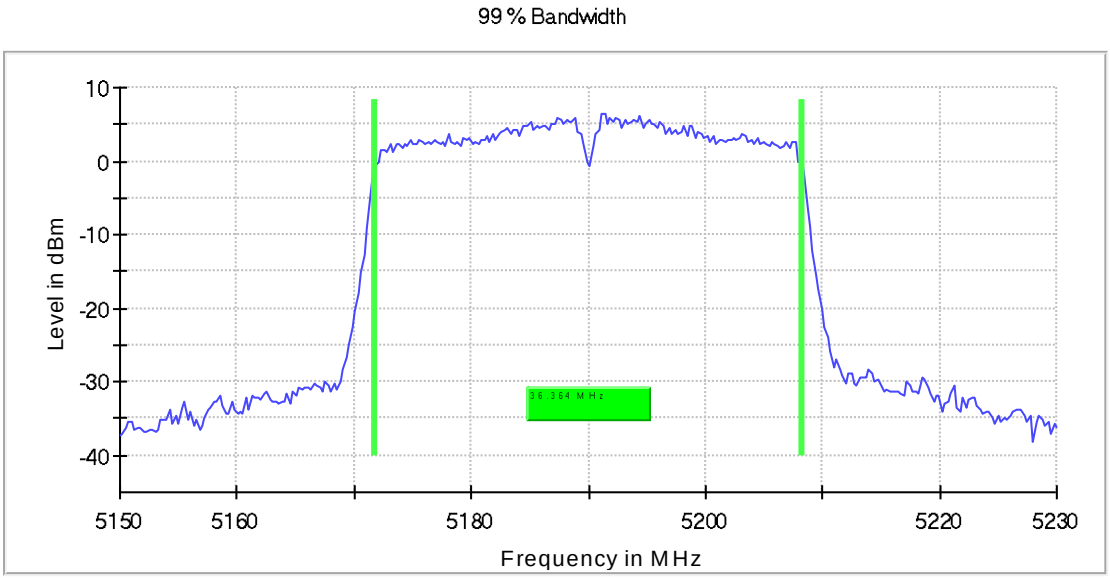

Fig. 21: Low Channel - 99% Occupied Channel Bandwidth

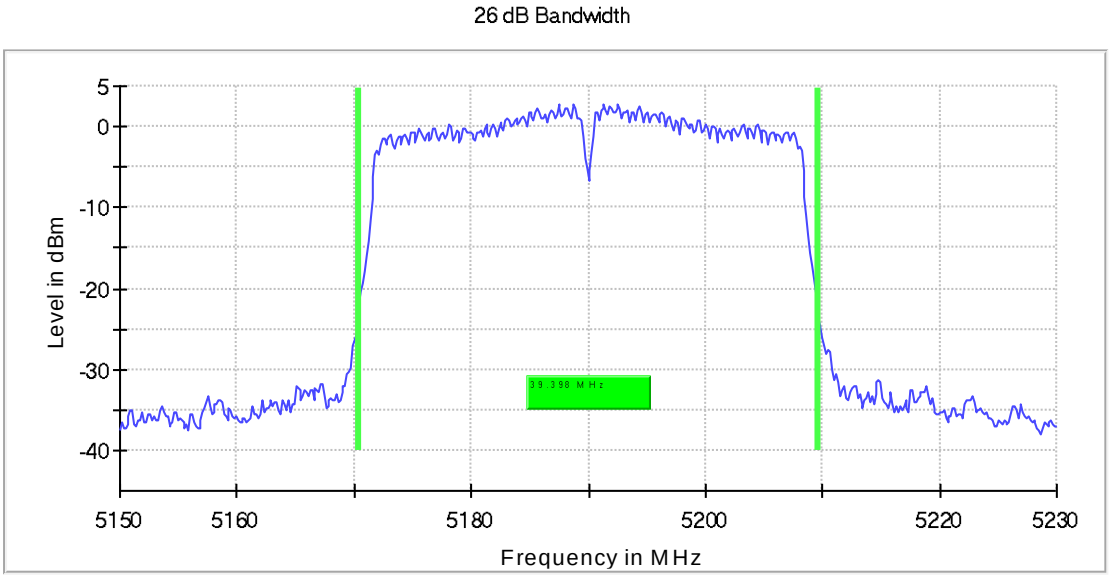

Fig. 22: Low Channel - Emission Bandwidth 26 dB

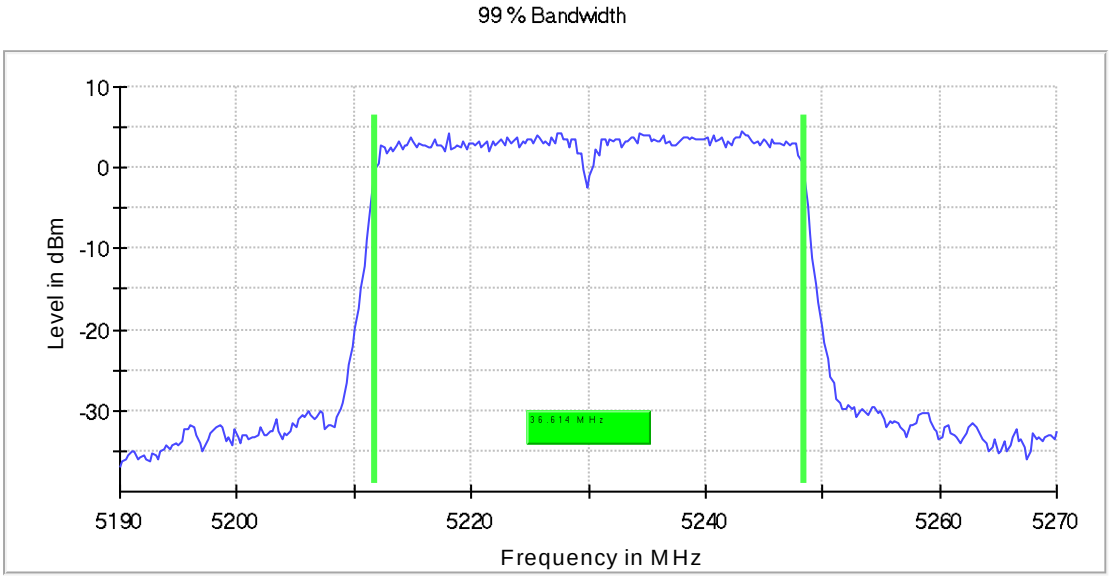

Fig. 23: High Channel - 99% Occupied Channel Bandwidth

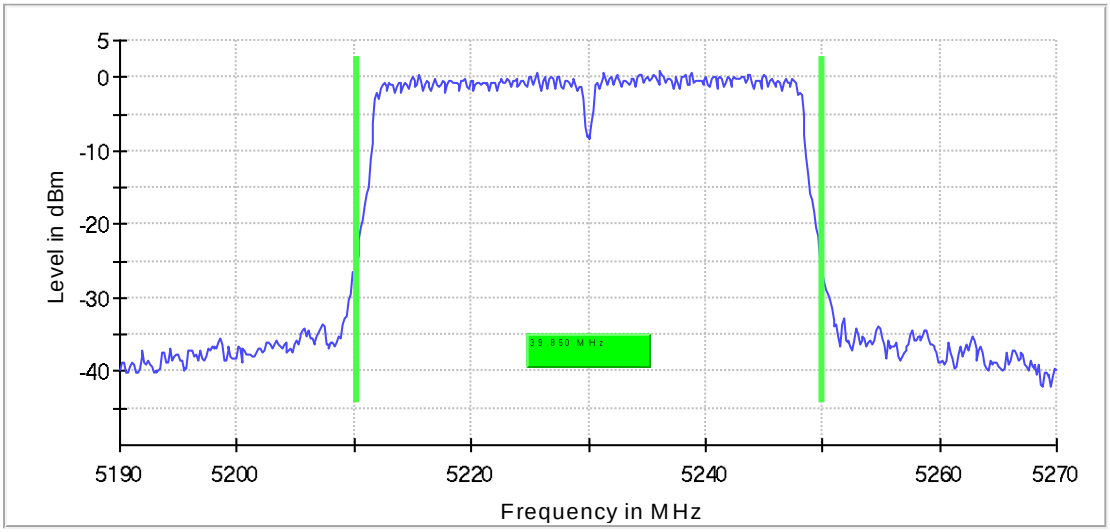

Fig. 24: High Channel - Emission Bandwidth 26 dB

4.2.6.5 Sample #1. Mode #1. U-NII-1. Modulation AC40

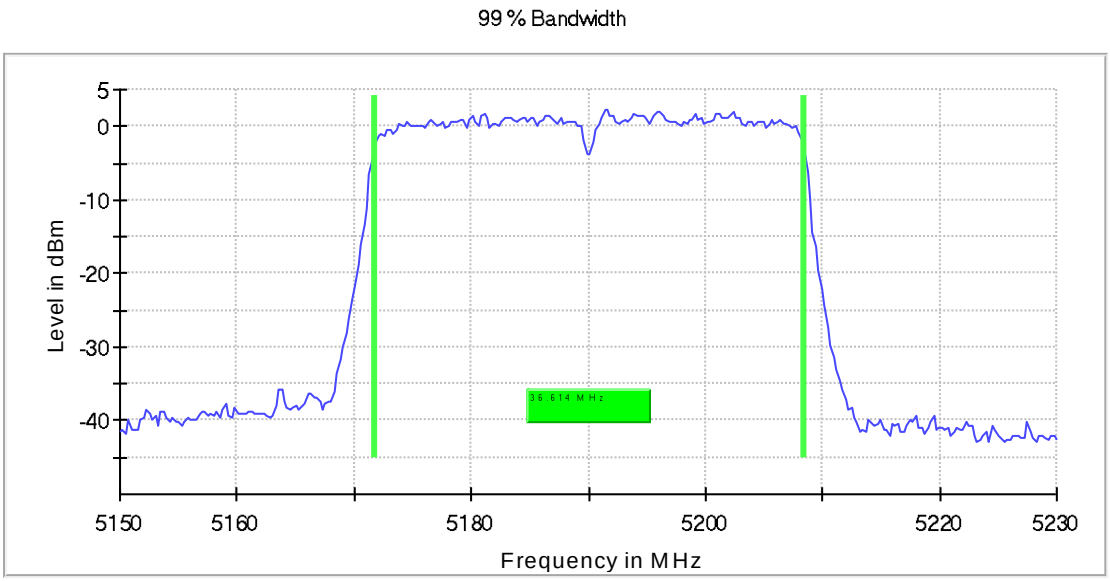

Fig. 25: Low Channel - 99% Occupied Channel Bandwidth

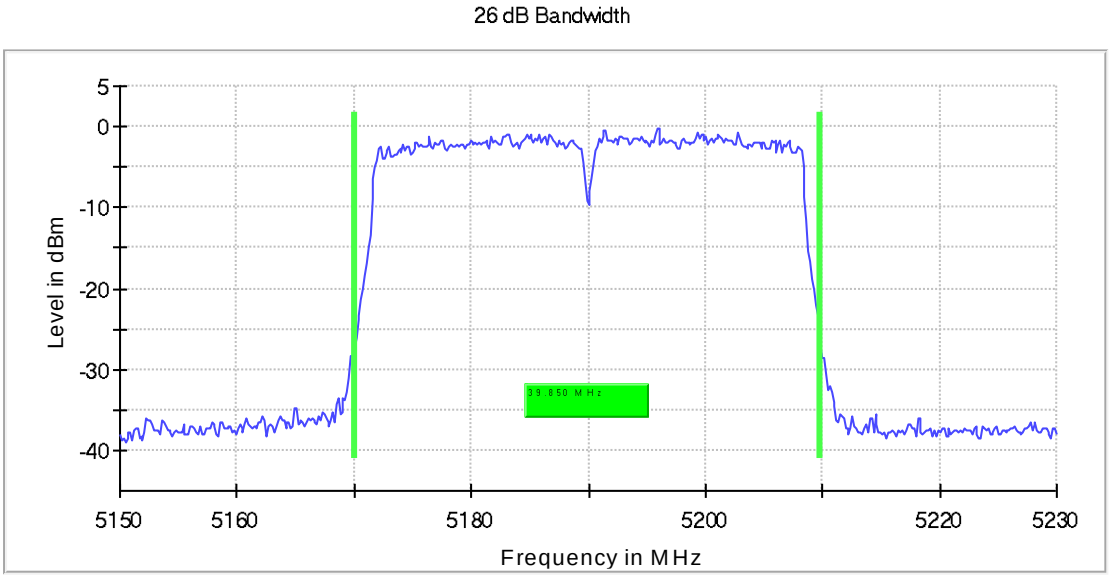

Fig. 26: Low Channel - Emission Bandwidth 26 dB

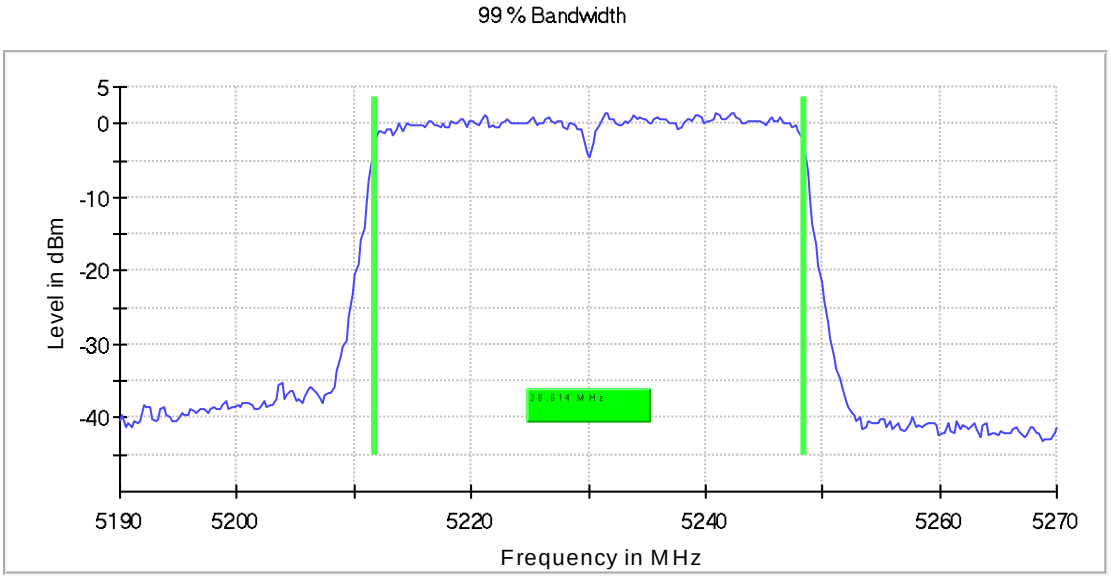

Fig. 27: High Channel - 99% Occupied Channel Bandwidth

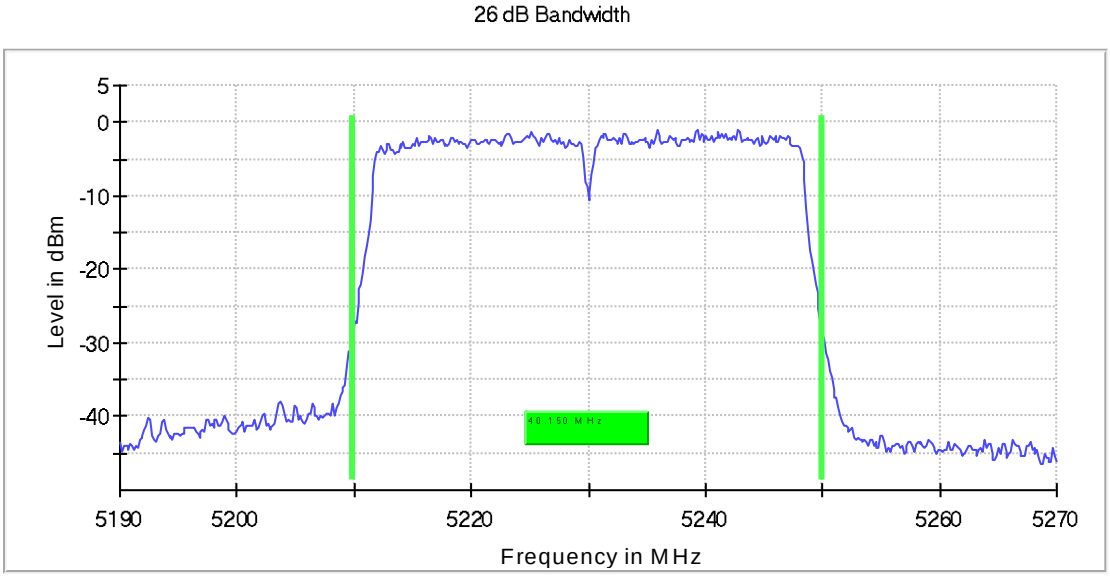

Fig. 28: High Channel - Emission Bandwidth 26 dB

4.2.6.6 Sample #1. Mode #1. U-NII-1. Modulation AC80

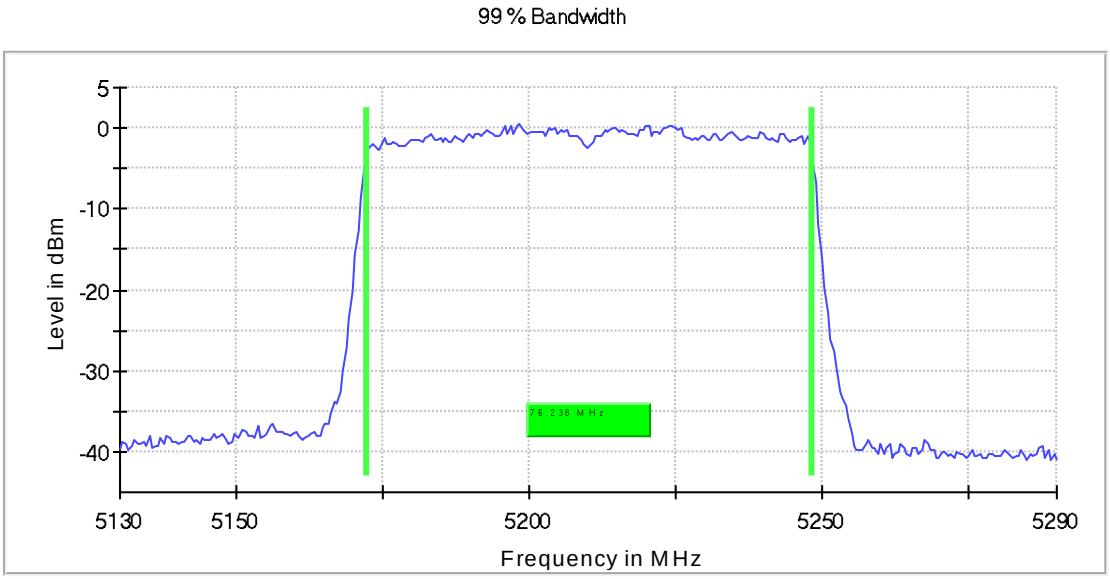

Fig. 29: Low Channel - 99% Occupied Channel Bandwidth

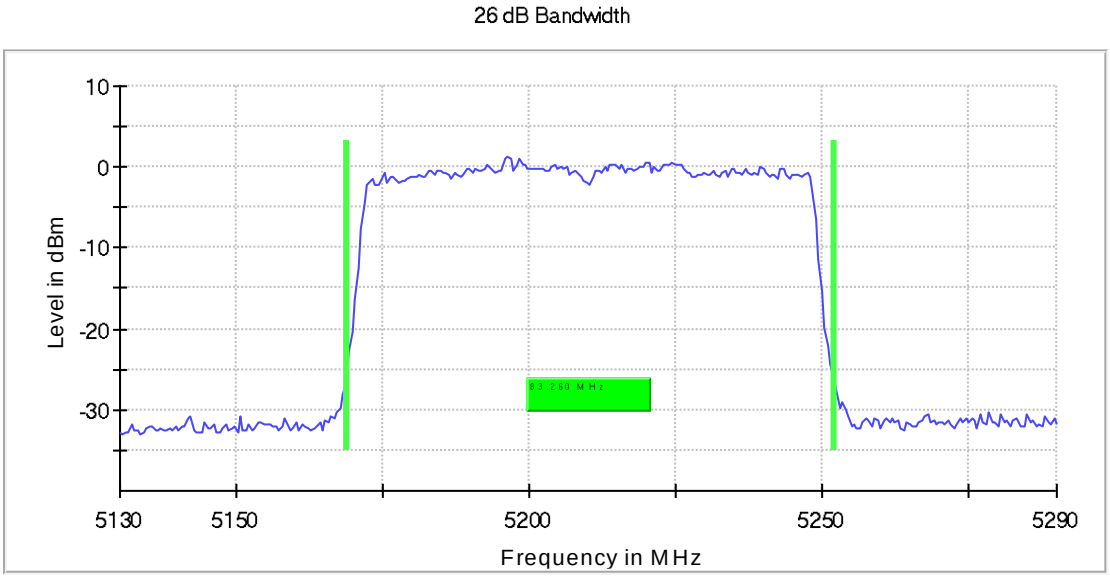

Fig. 30: Low Channel - Emission Bandwidth 26 dB

4.2.6.7 Sample #1. Mode #1. U-NII-2A. Modulation A20

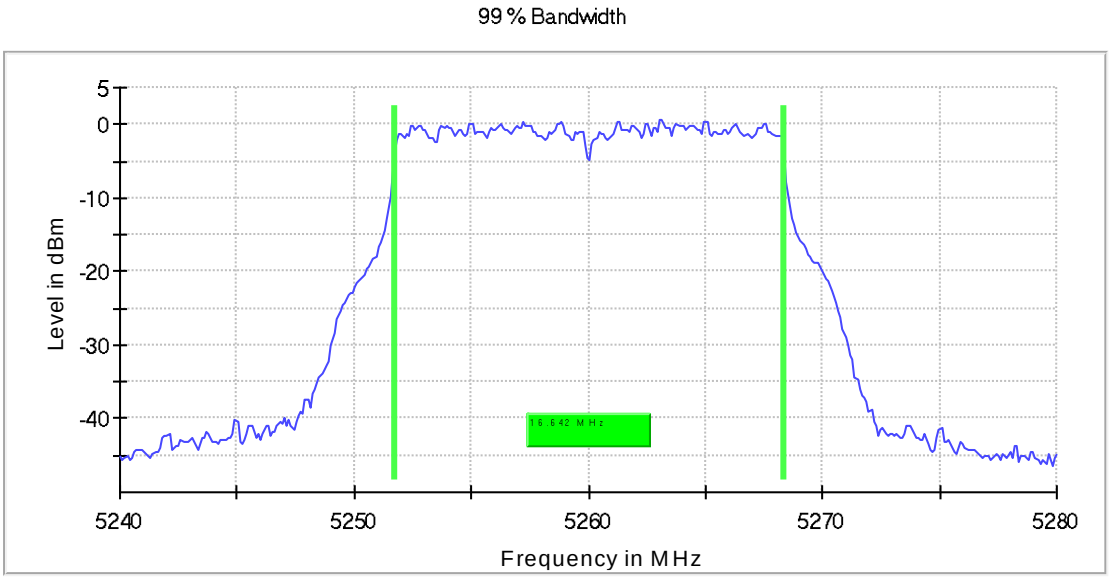

Fig. 31: Low Channel - 99% Occupied Channel Bandwidth

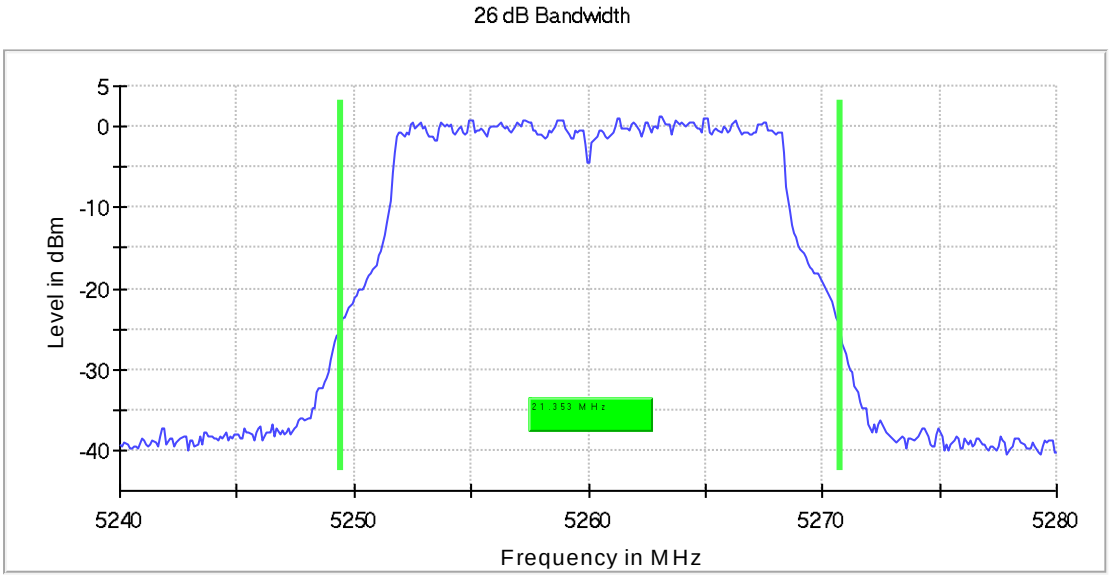

Fig. 32: Low Channel - Emission Bandwidth 26 dB

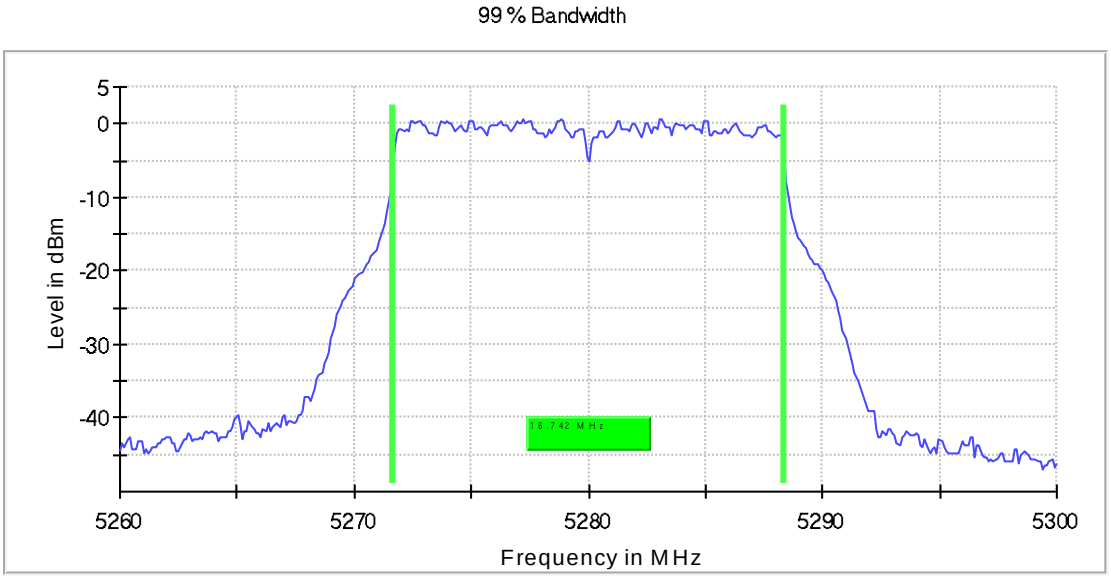

Fig. 33: Middle Channel - 99% Occupied Channel Bandwidth

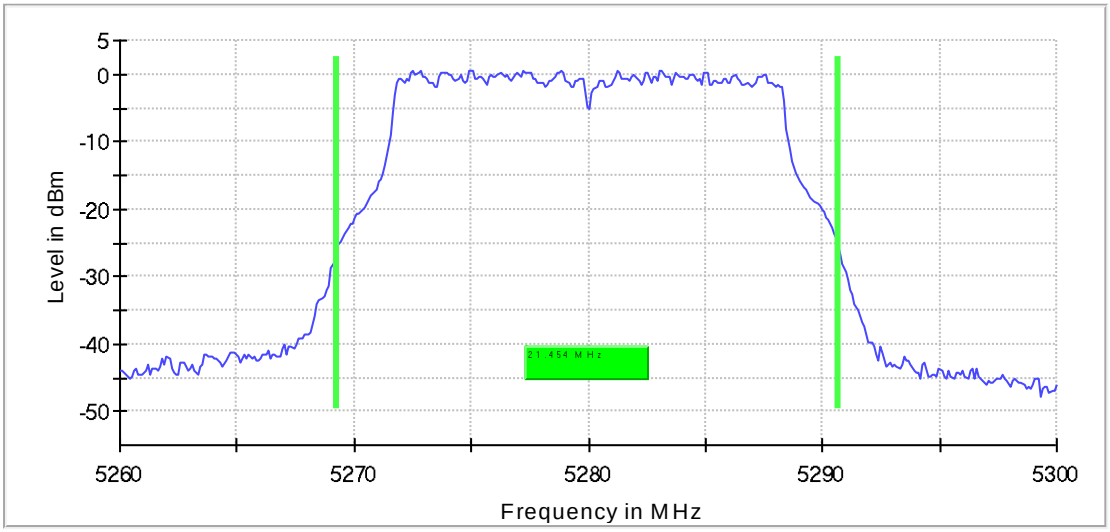

Fig. 34: Middle Channel - Emission Bandwidth 26 dB

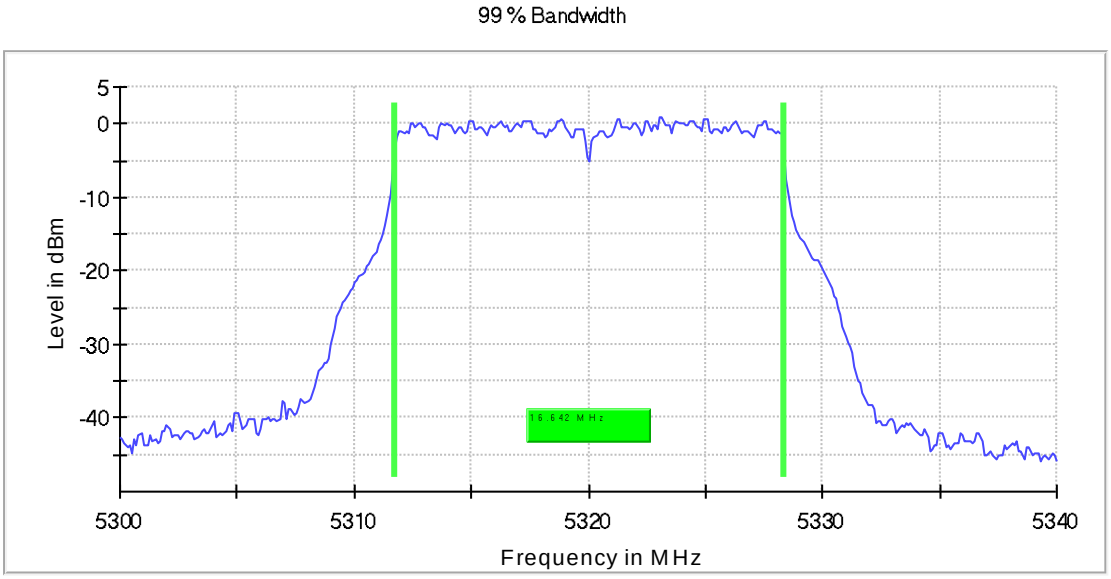

Fig. 35: High Channel - 99% Occupied Channel Bandwidth

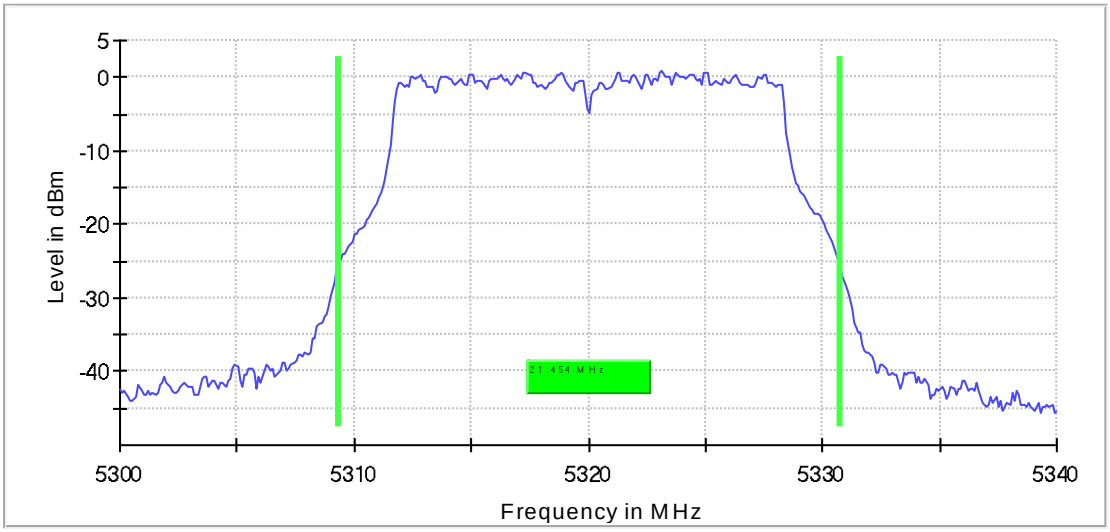

Fig. 36: High Channel - Emission Bandwidth 26 dB

4.2.6.8 Sample #1. Mode #1. U-NII-2A. Modulation N20

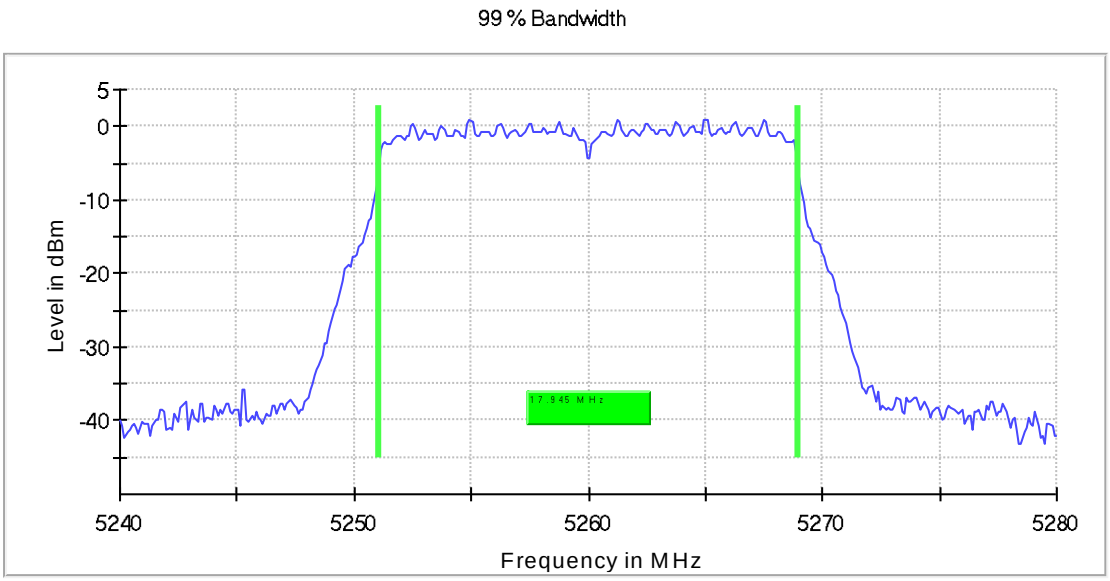

Fig. 37: Low Channel - 99% Occupied Channel Bandwidth

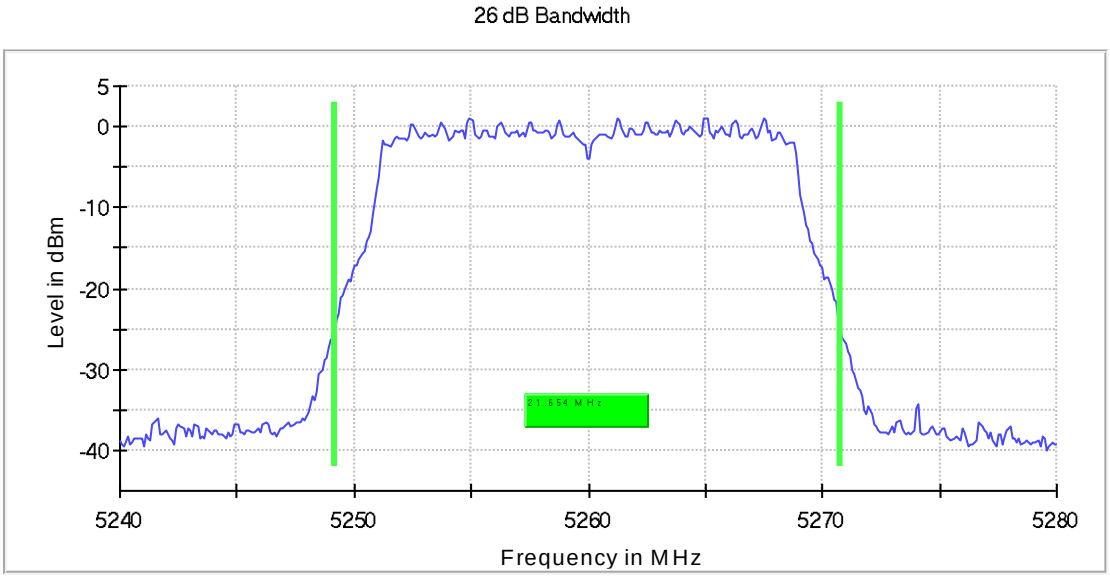

Fig. 38: Low Channel - Emission Bandwidth 26 dB

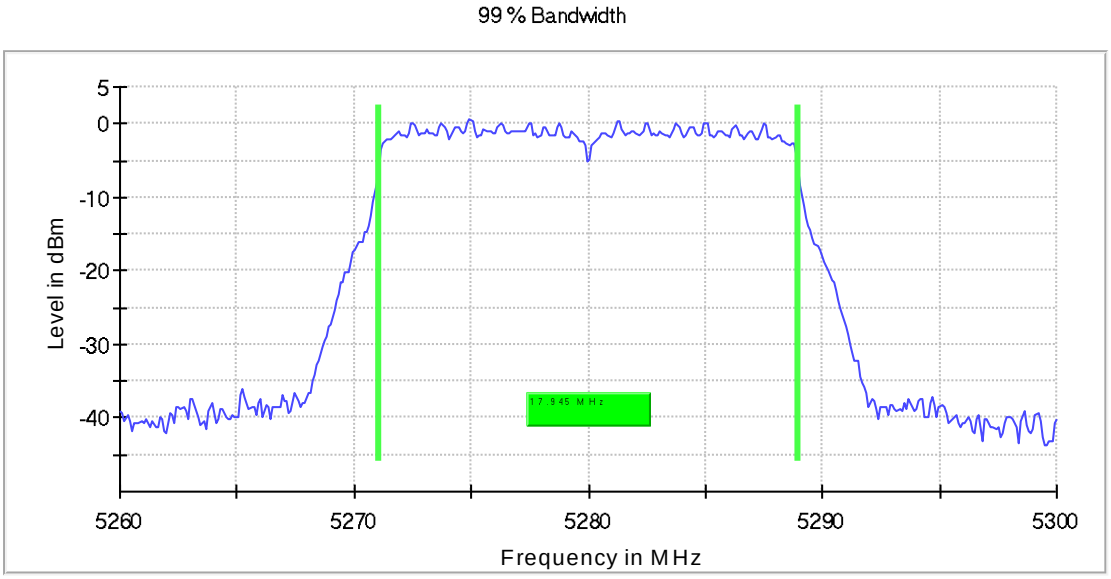

Fig. 39: Middle Channel - 99% Occupied Channel Bandwidth

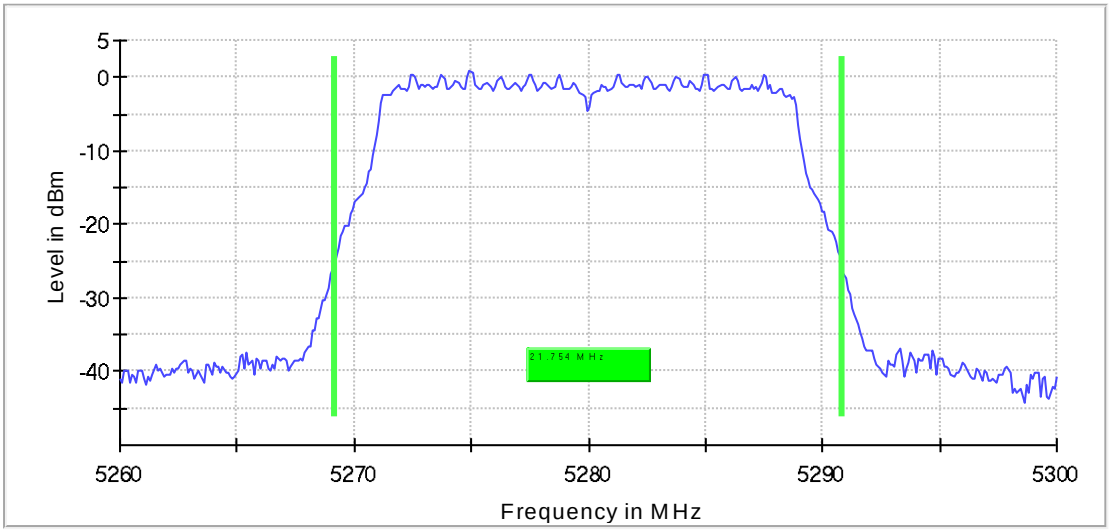

Fig. 40: Middle Channel - Emission Bandwidth 26 dB

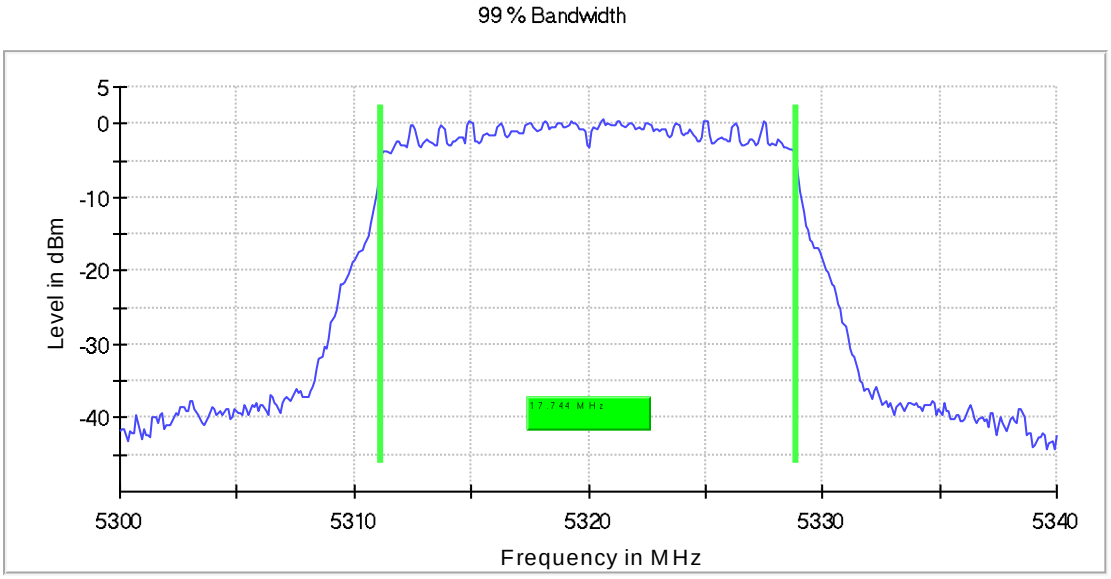

Fig. 41: High Channel - 99% Occupied Channel Bandwidth

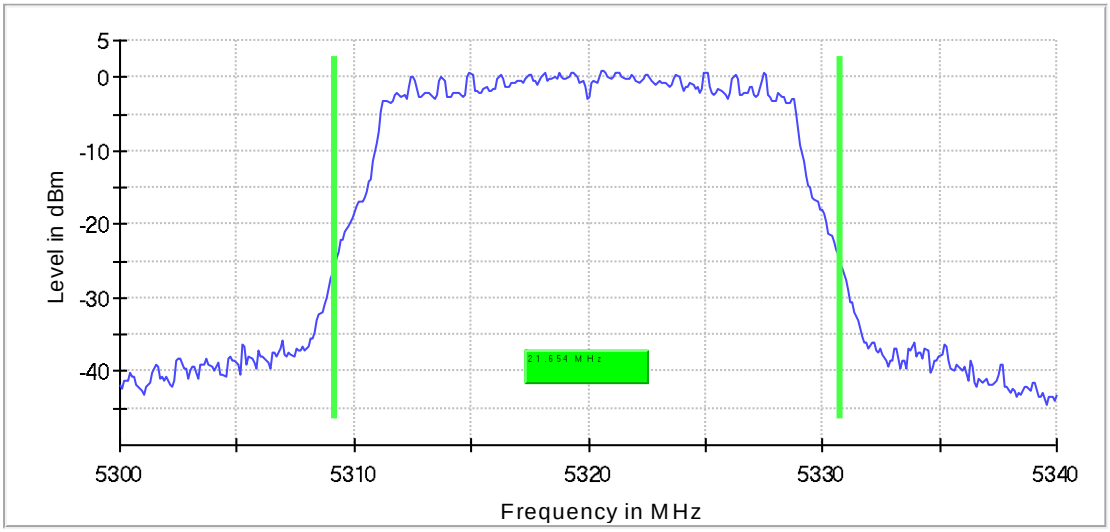

Fig. 42: High Channel - Emission Bandwidth 26 dB

4.2.6.9 Sample #1. Mode #1. U-NII-2A. Modulation AC20

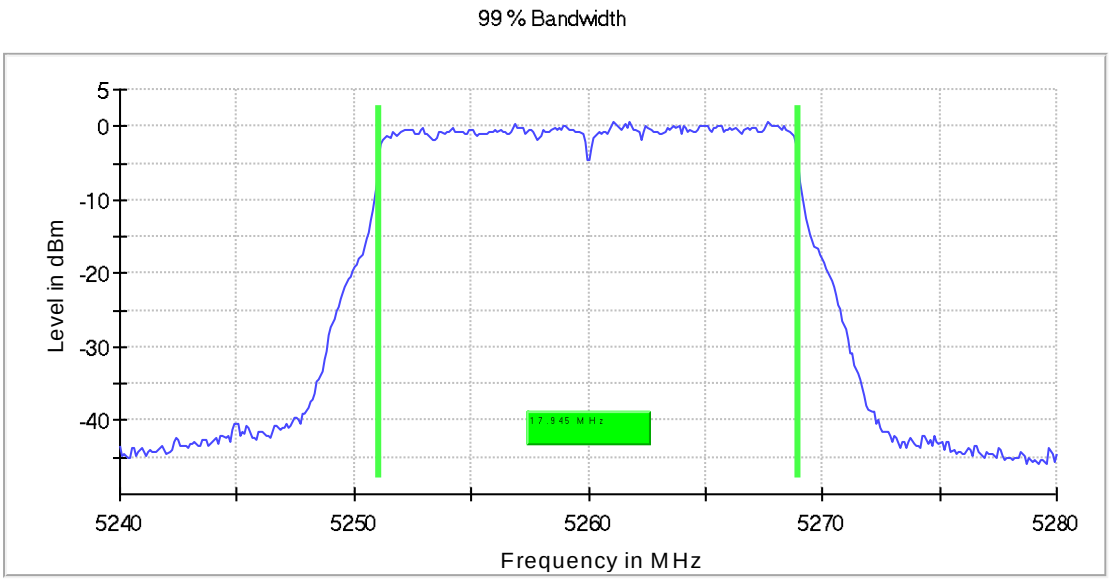

Fig. 43: Low Channel - 99% Occupied Channel Bandwidth

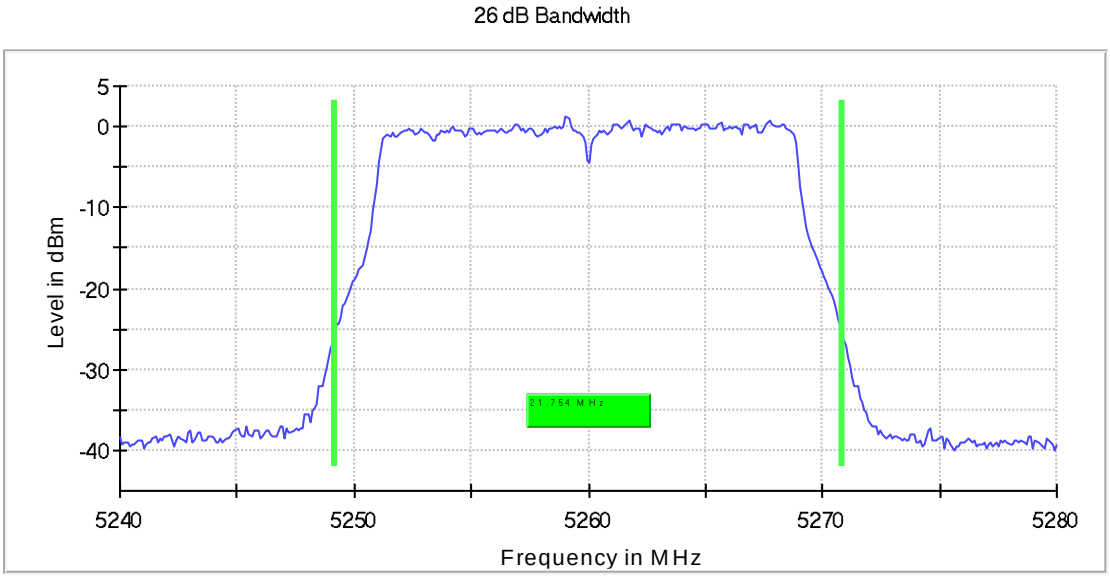

Fig. 44: Low Channel - Emission Bandwidth 26 dB

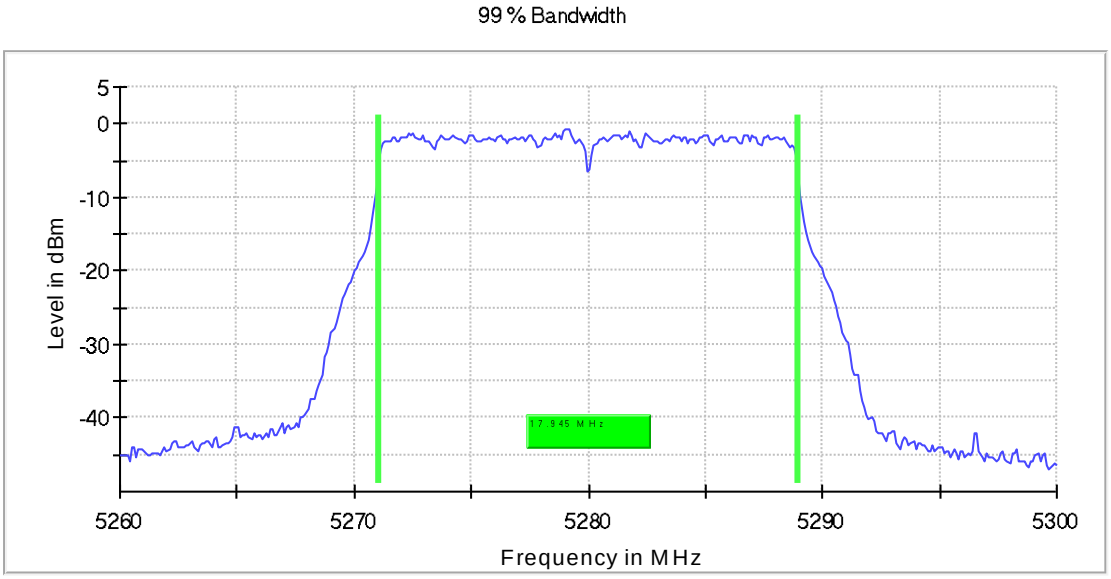

Fig. 45: Middle Channel - 99% Occupied Channel Bandwidth

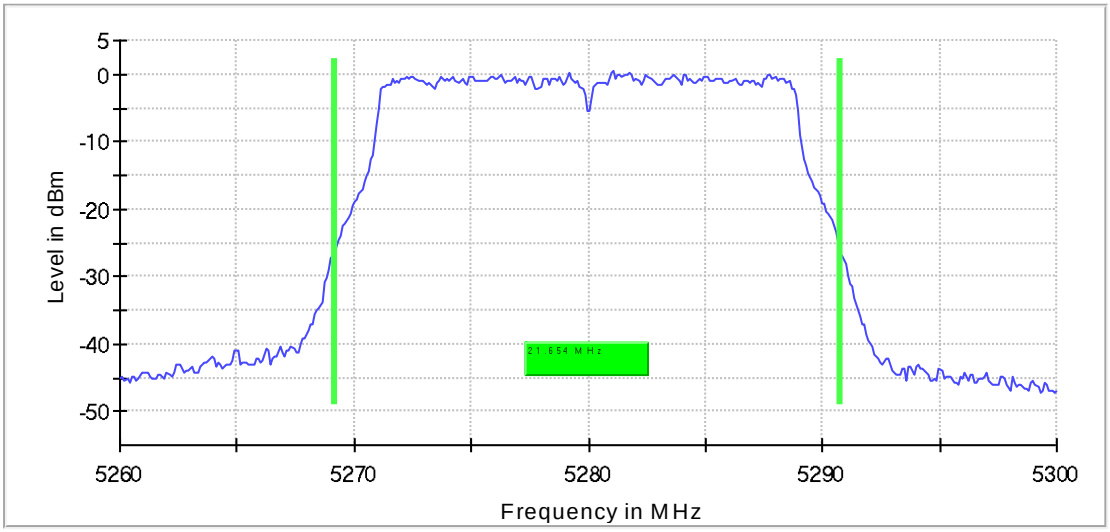

Fig. 46: Middle Channel - Emission Bandwidth 26 dB

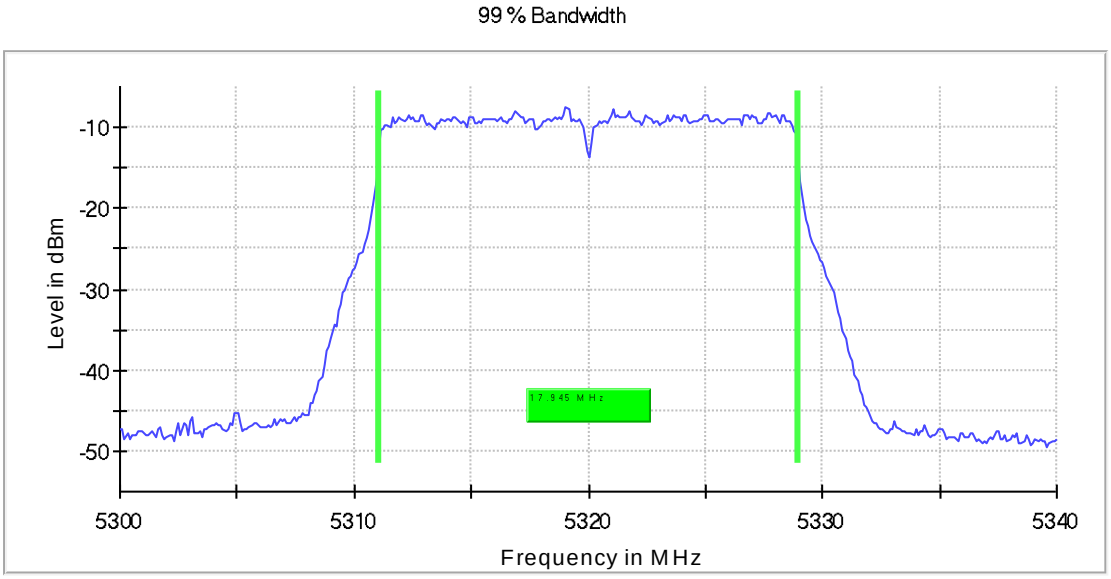

Fig. 47: High Channel - 99% Occupied Channel Bandwidth

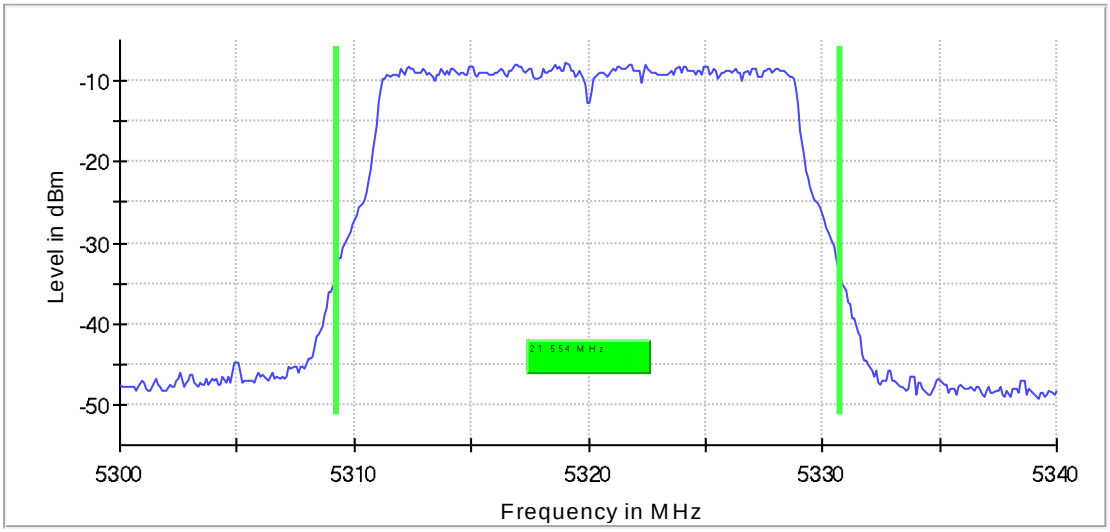

Fig. 48: High Channel - Emission Bandwidth 26 dB

4.2.6.10 Sample #1. Mode #1. U-NII-2A. Modulation N40

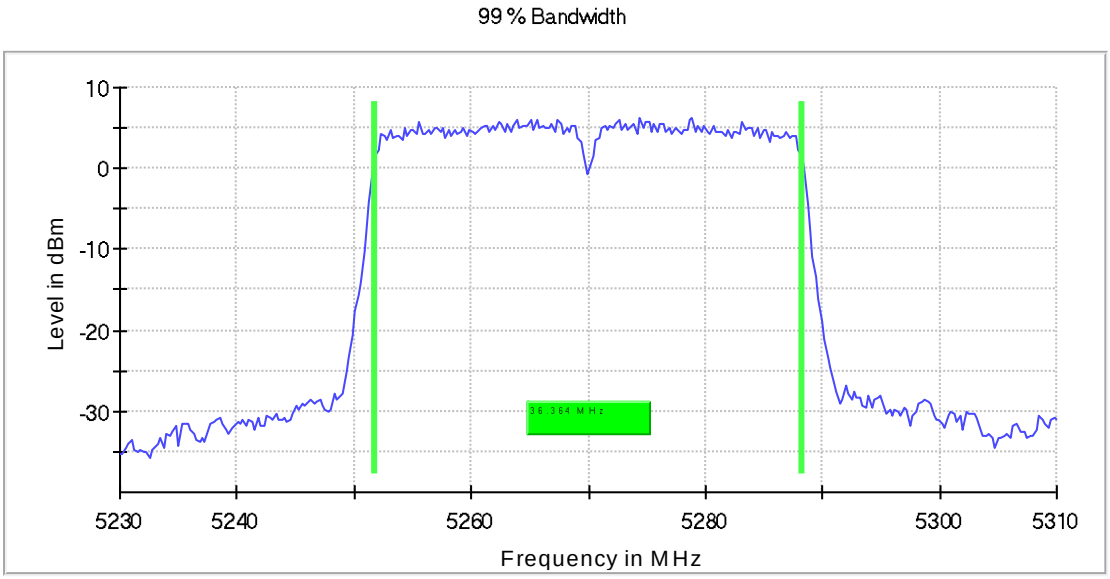

Fig. 49: Low Channel - 99% Occupied Channel Bandwidth

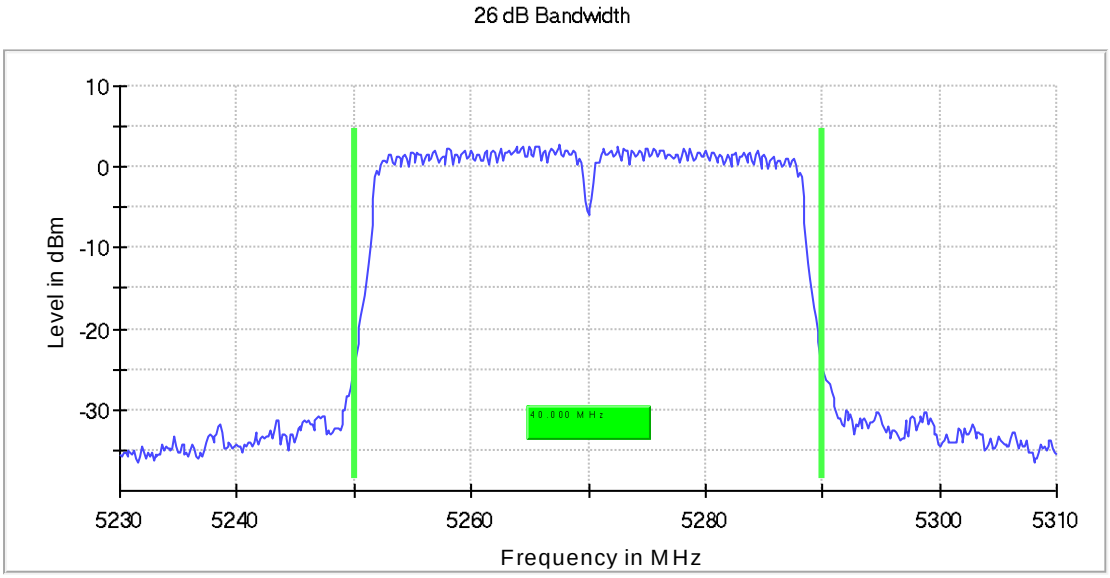

Fig. 50: Low Channel - Emission Bandwidth 26 dB

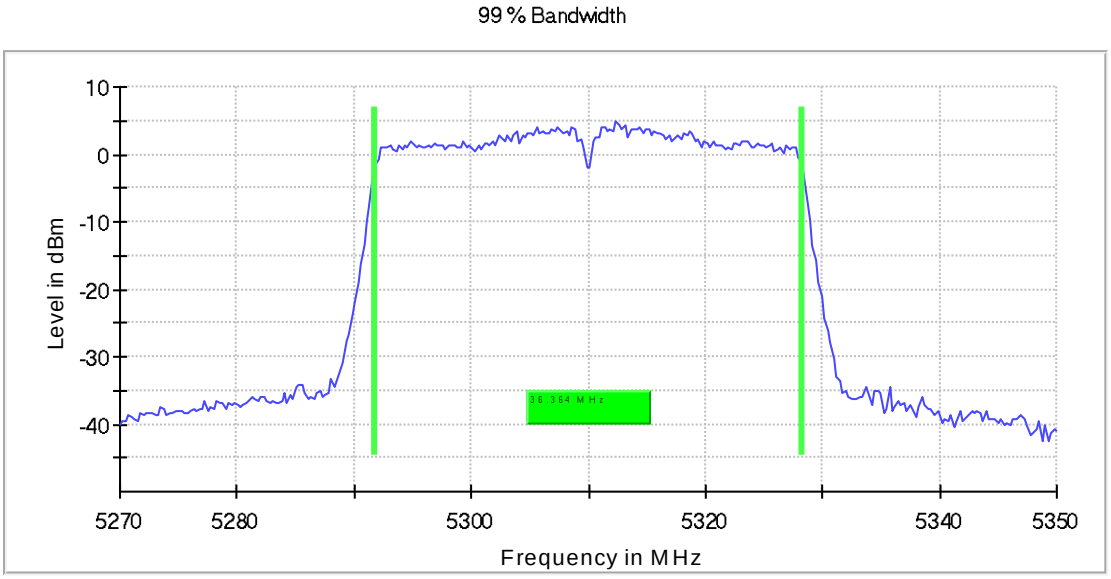

Fig. 51: High Channel - 99% Occupied Channel Bandwidth

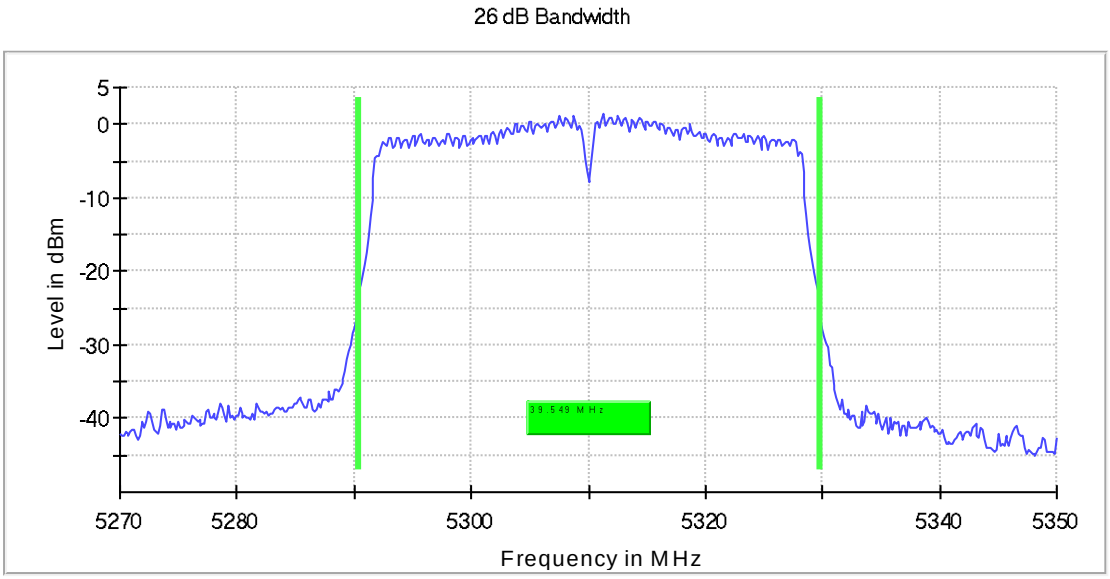

Fig. 52: High Channel - Emission Bandwidth 26 dB

4.2.6.11 Sample #1. Mode #1. U-NII-2A. Modulation AC40

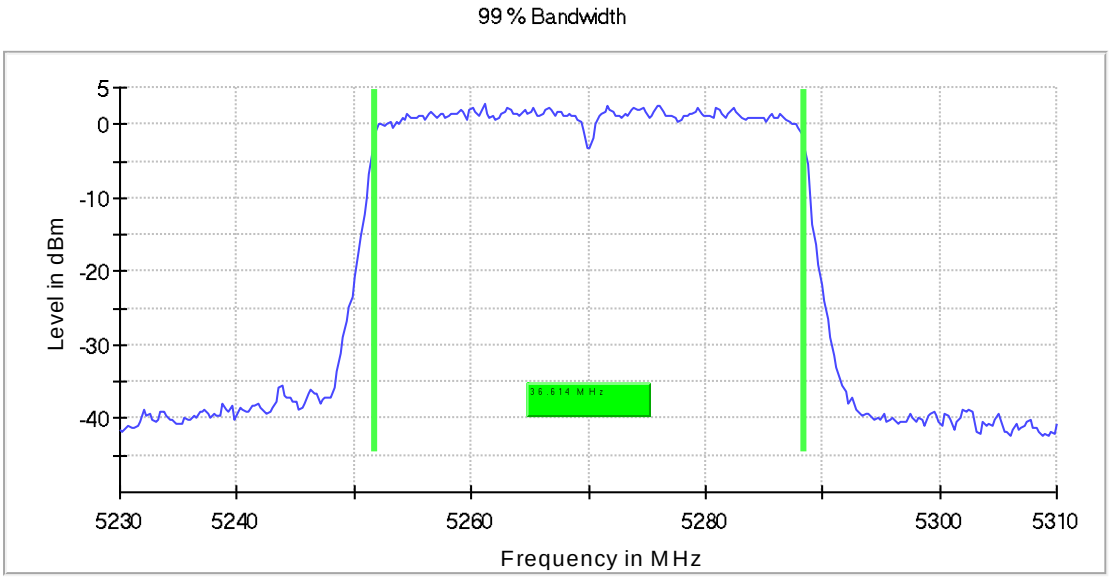

Fig. 53: Low Channel - 99% Occupied Channel Bandwidth

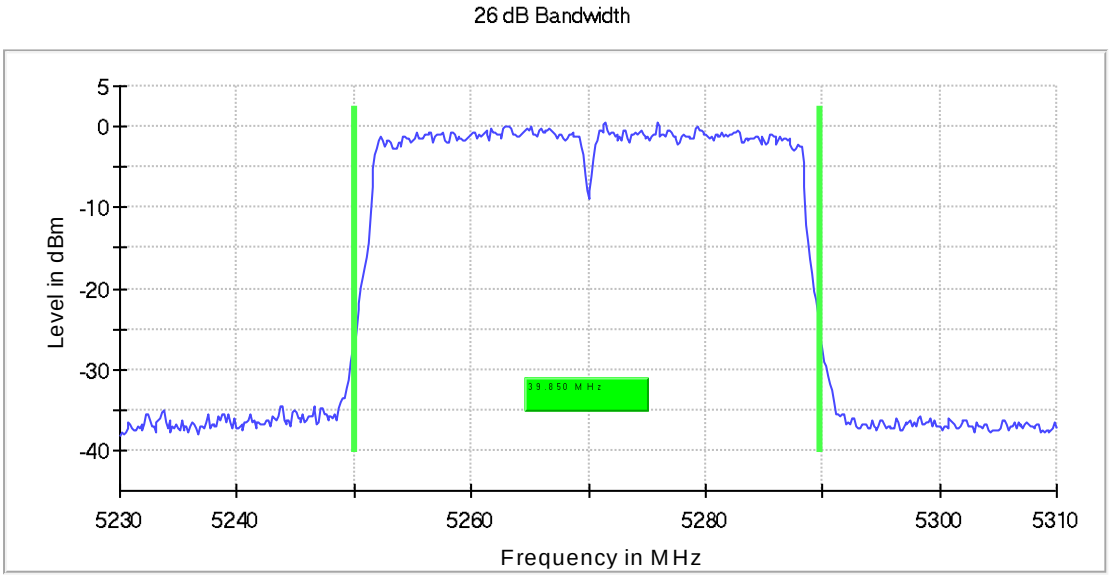

Fig. 54: Low Channel - Emission Bandwidth 26 dB

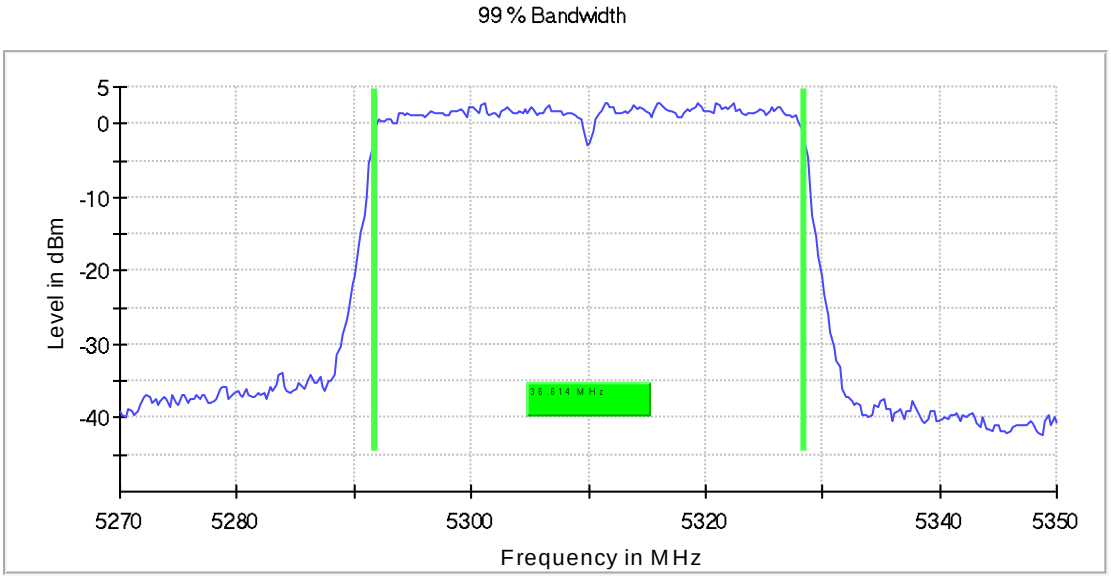

Fig. 55: High Channel - 99% Occupied Channel Bandwidth

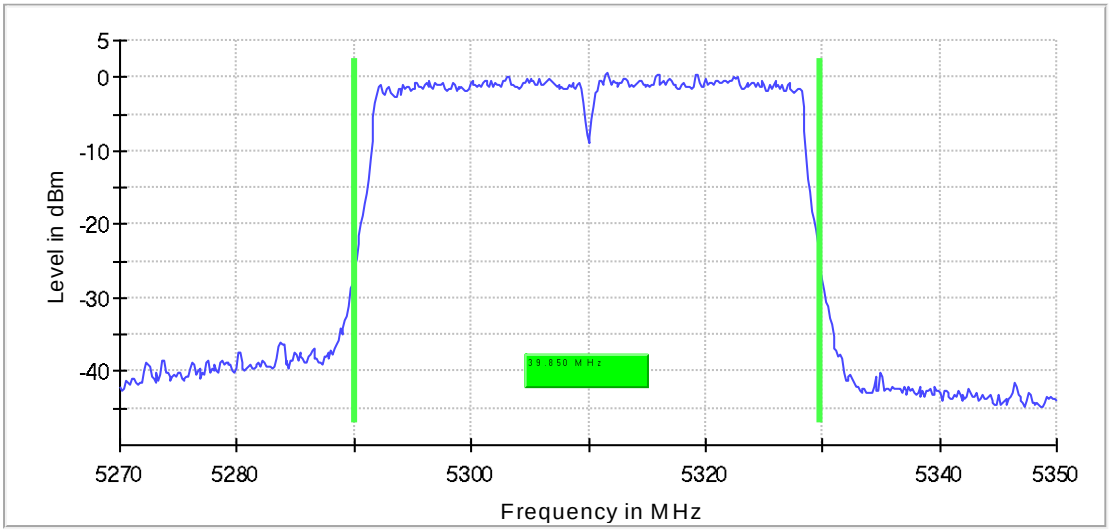

Fig. 56: High Channel - Emission Bandwidth 26 dB

4.2.6.12 Sample #1. Mode #1. U-NII-2A. Modulation AC80

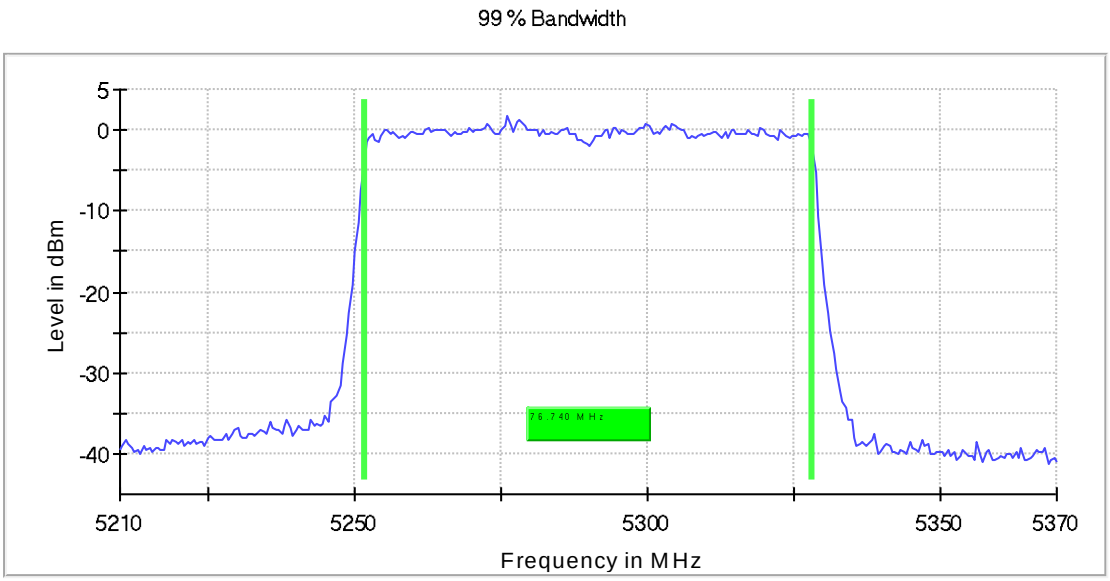

Fig. 57: Low Channel - 99% Occupied Channel Bandwidth

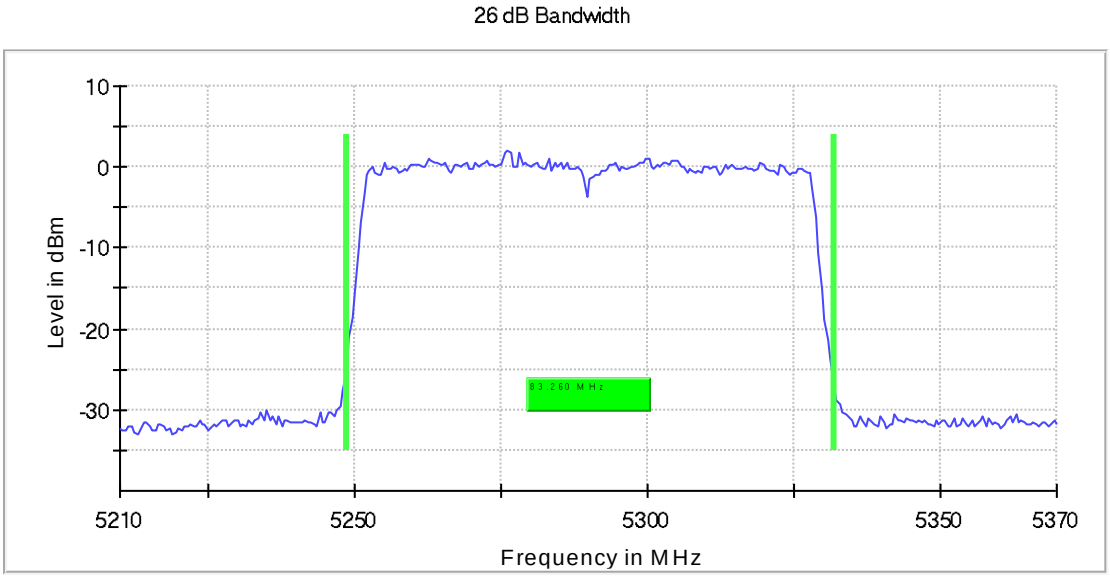

Fig. 58: Low Channel - Emission Bandwidth 26 dB

4.2.6.13 Sample #1. Mode #1. U-NII-2C. Modulation A20

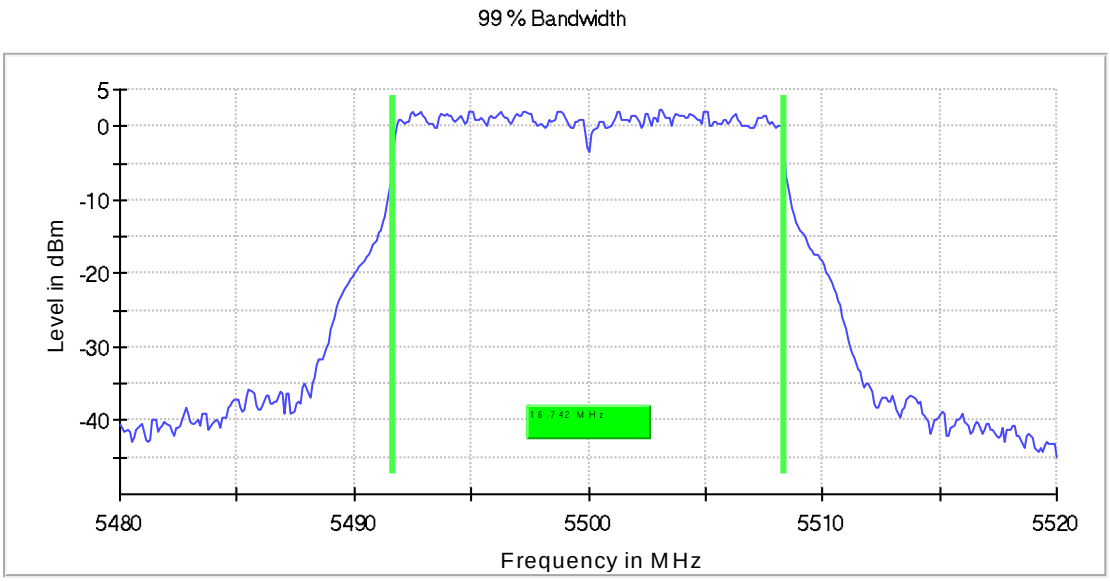

Fig. 59: Low Channel - 99% Occupied Channel Bandwidth

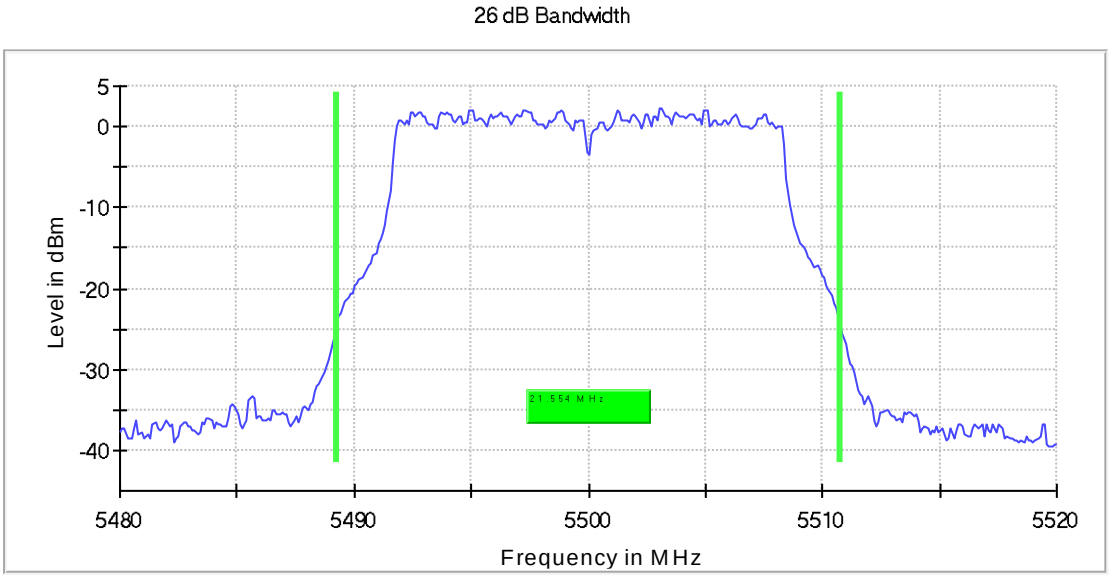

Fig. 60: Low Channel - Emission Bandwidth 26 dB

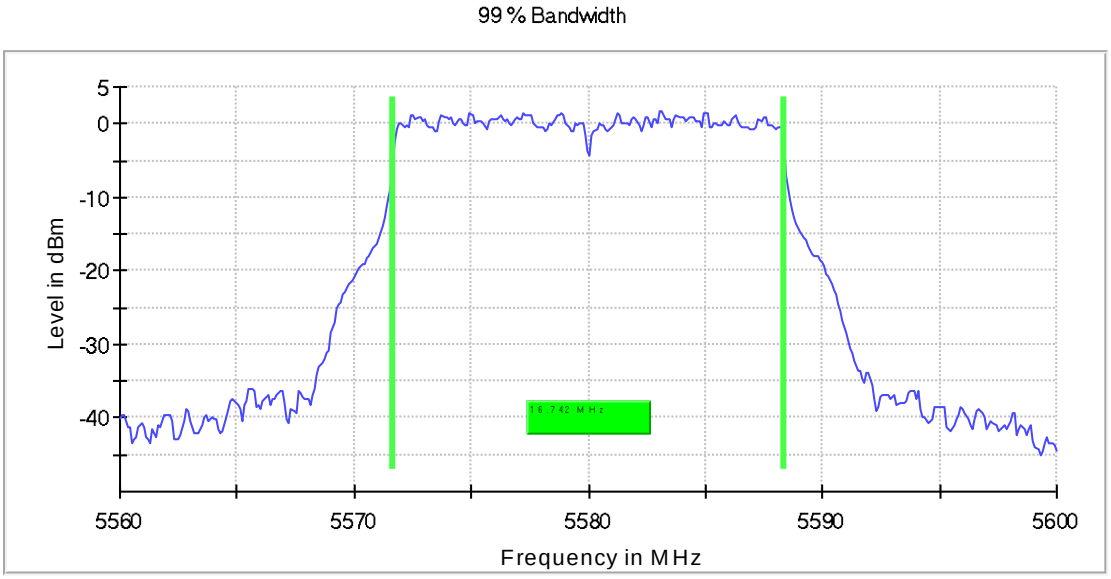

Fig. 61: Middle Channel - 99% Occupied Channel Bandwidth

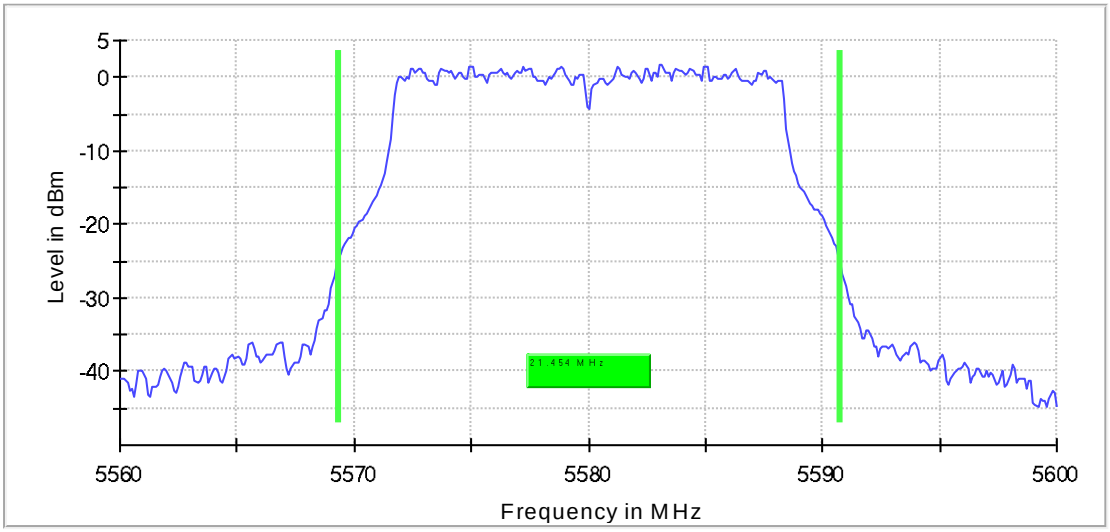

Fig. 62: Middle Channel - Emission Bandwidth 26 dB

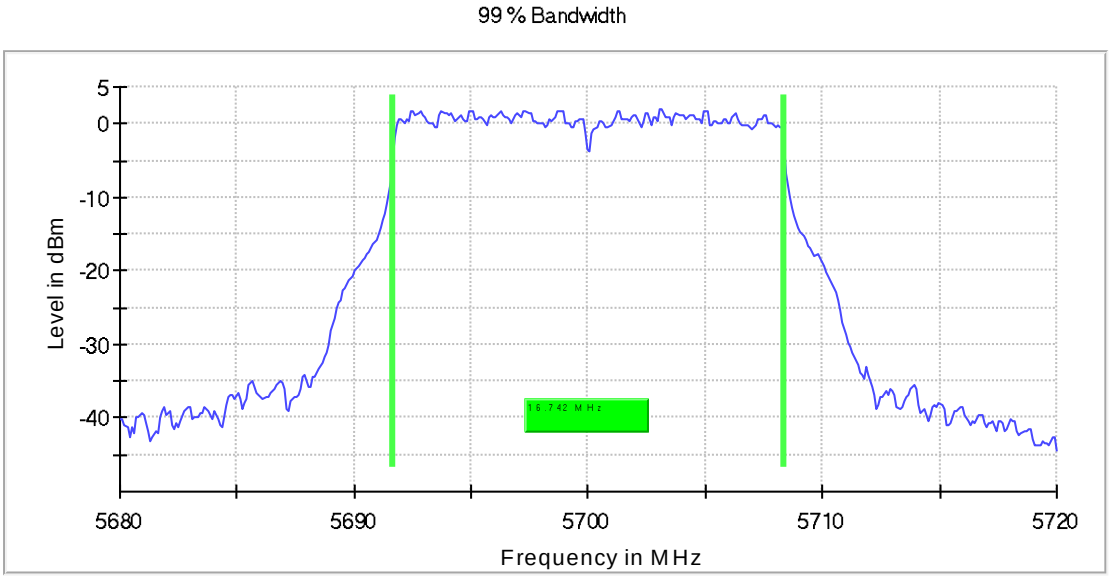

Fig. 63: High Channel - 99% Occupied Channel Bandwidth

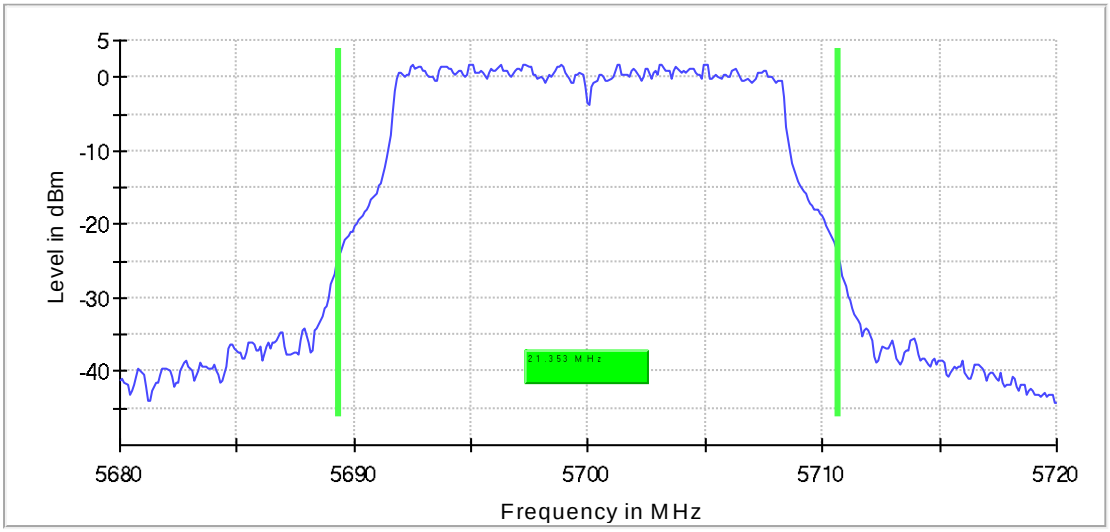

Fig. 64: High Channel - Emission Bandwidth 26 dB

4.2.6.14 Sample #1. Mode #1. U-NII-2C. Modulation N20

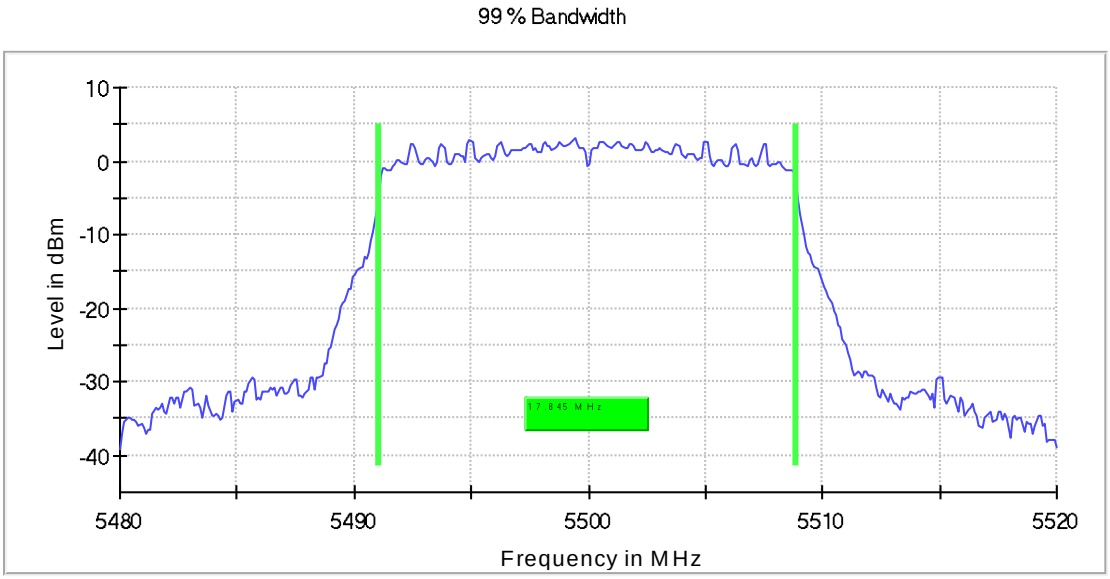

Fig. 65: Low Channel - 99% Occupied Channel Bandwidth

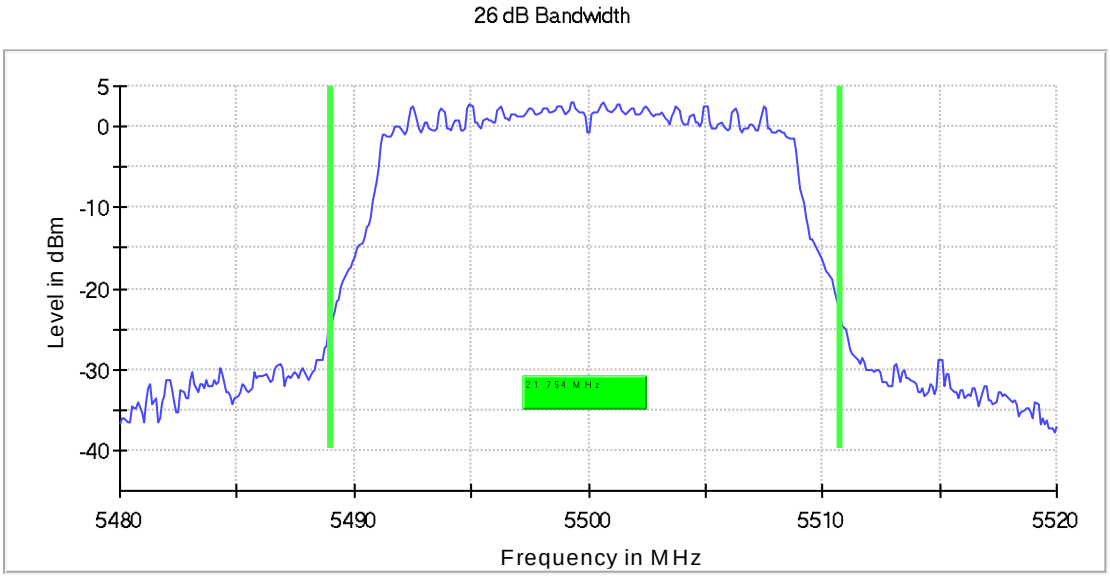

Fig. 66: Low Channel - Emission Bandwidth 26 dB

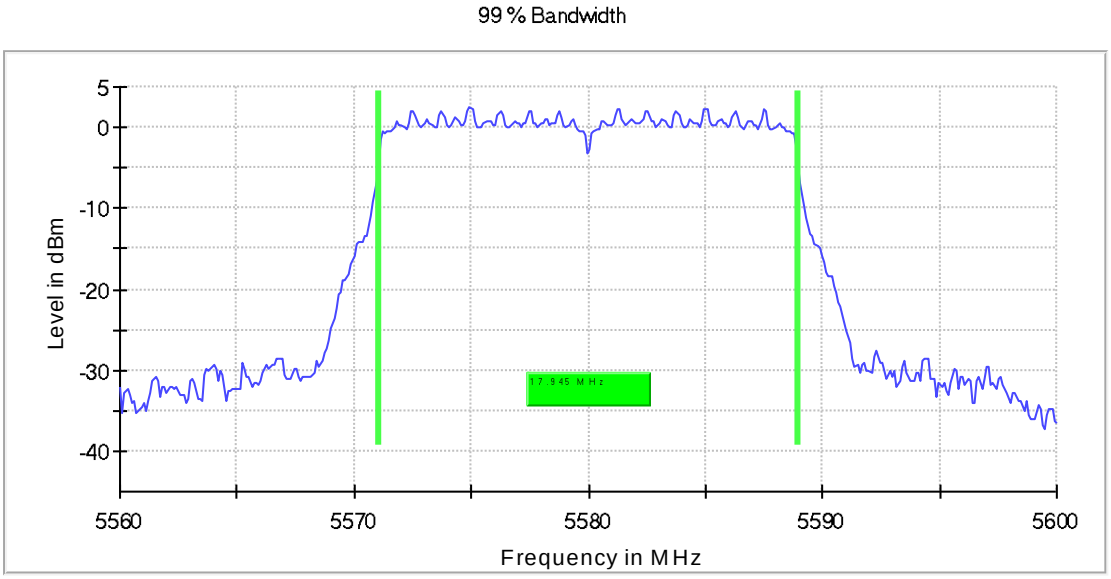

Fig. 67: Middle Channel - 99% Occupied Channel Bandwidth

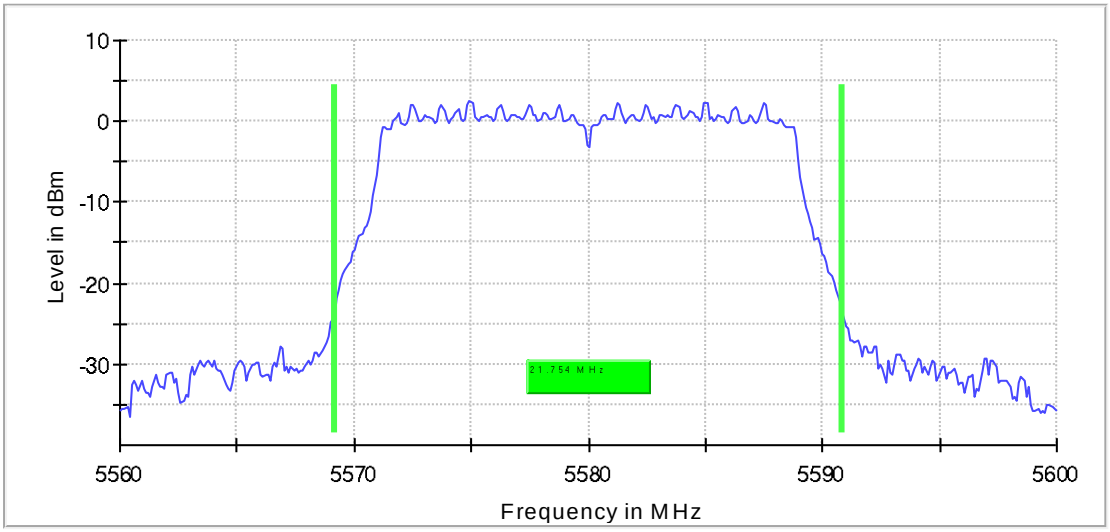

Fig. 68: Middle Channel - Emission Bandwidth 26 dB

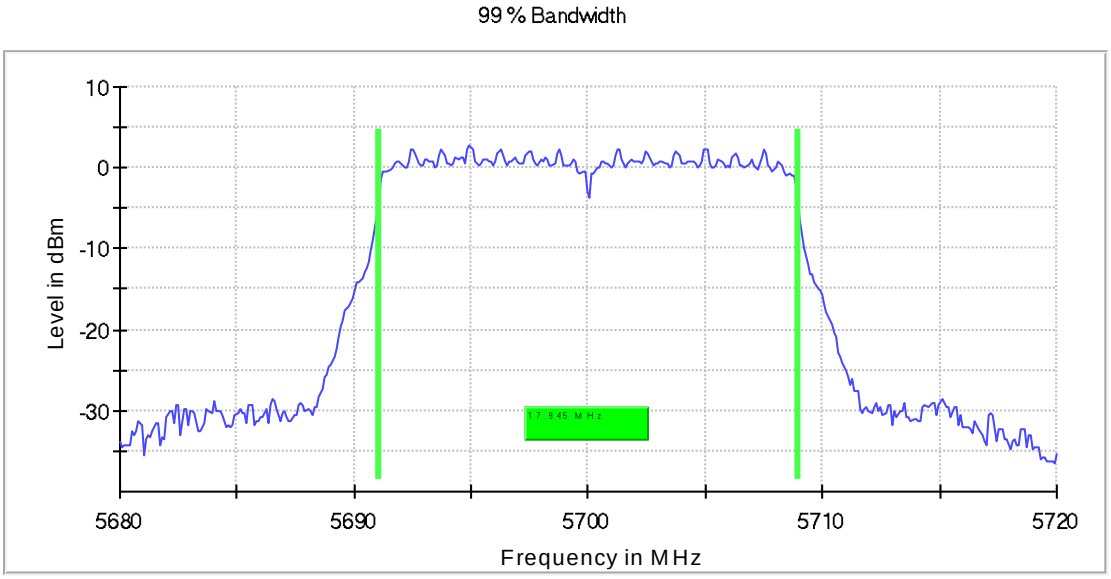

Fig. 69: High Channel - 99% Occupied Channel Bandwidth

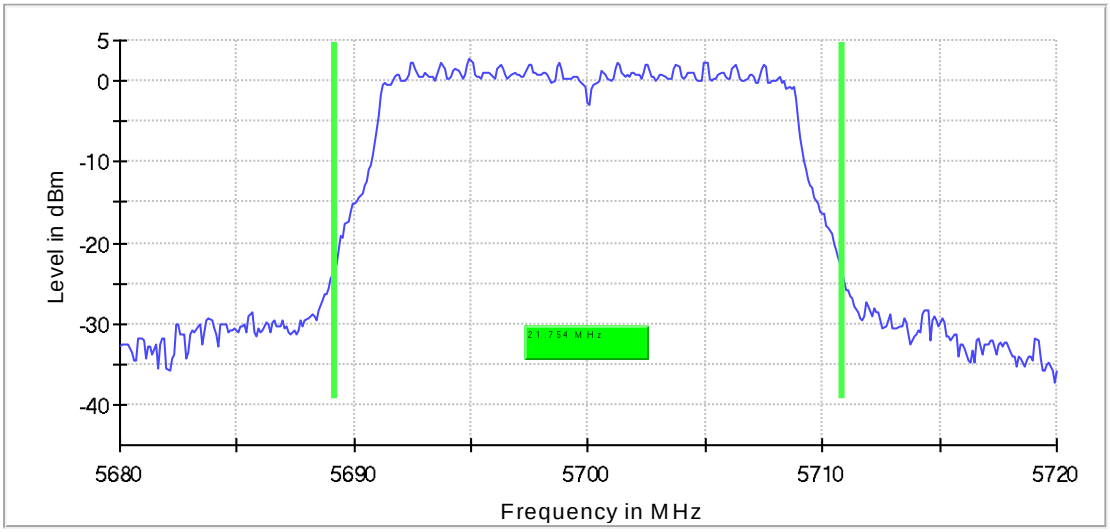

Fig. 70: -High Channel - Emission Bandwidth 26 dB

4.2.6.15 Sample #1. Mode #1. U-NII-2C. Modulation AC20

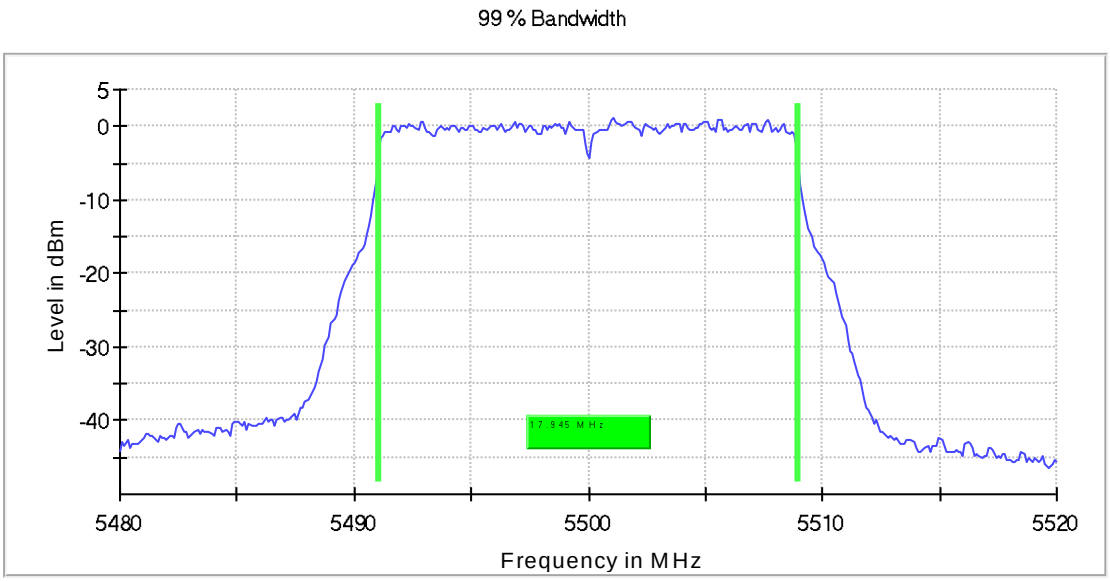

Fig. 71: Low Channel - 99% Occupied Channel Bandwidth

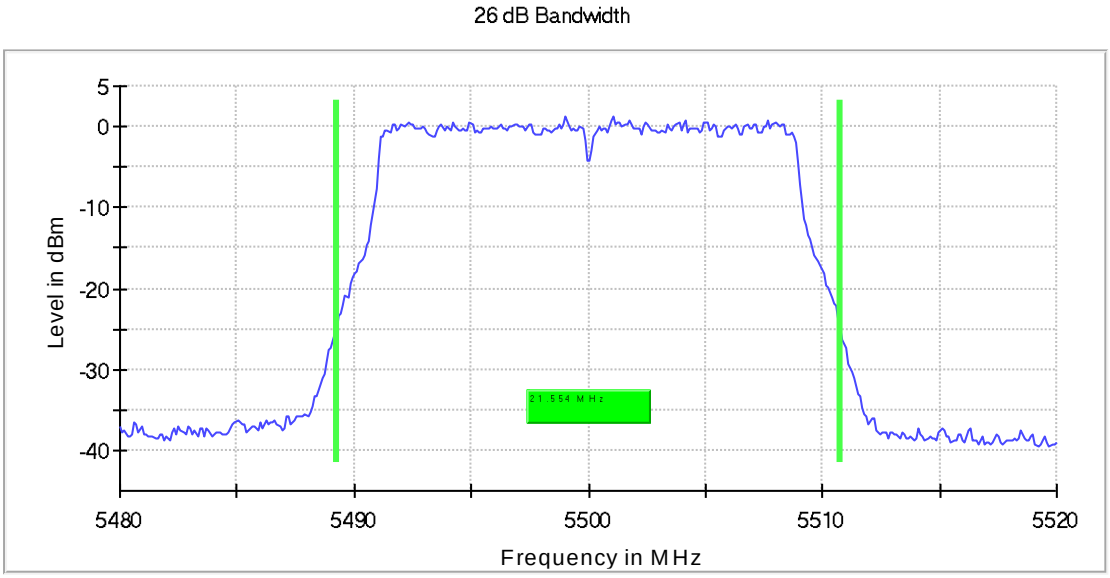

Fig. 72: Low Channel - Emission Bandwidth 26 dB

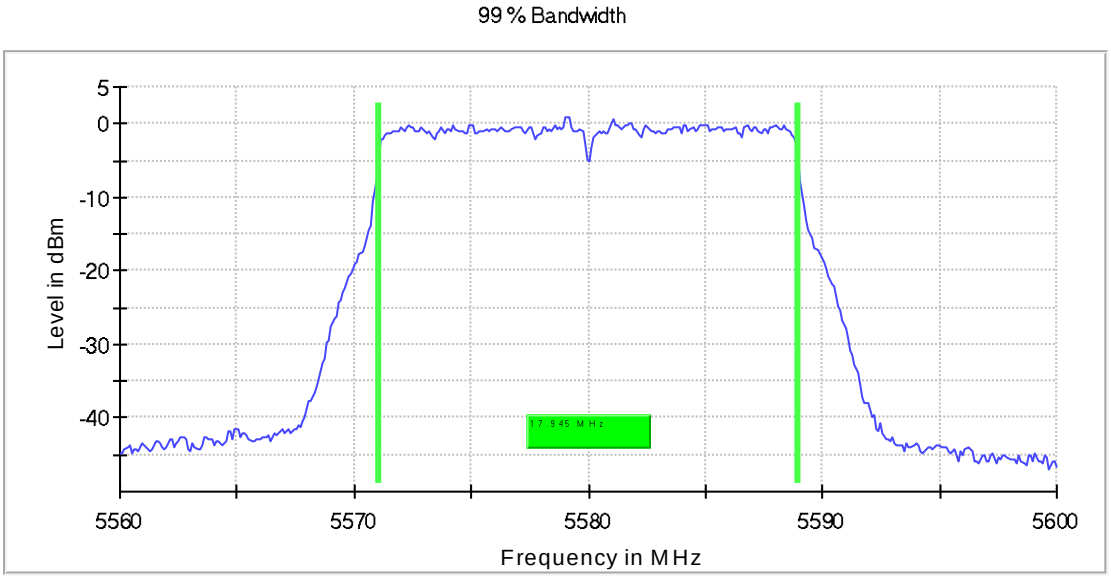

Fig. 73: -Middle Channel - 99% Occupied Channel Bandwidth

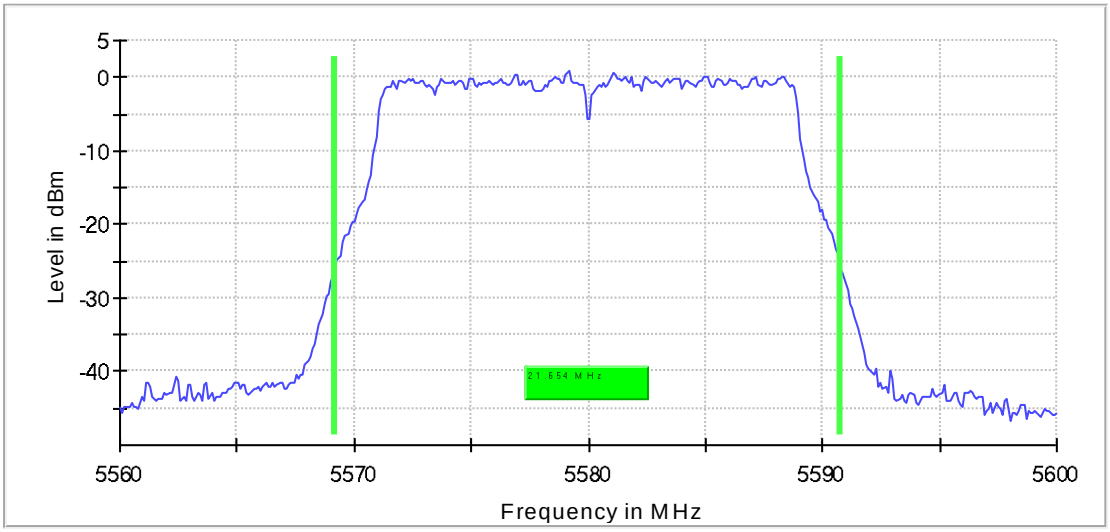

Fig. 74: Middle Channel - Emission Bandwidth 26 dB

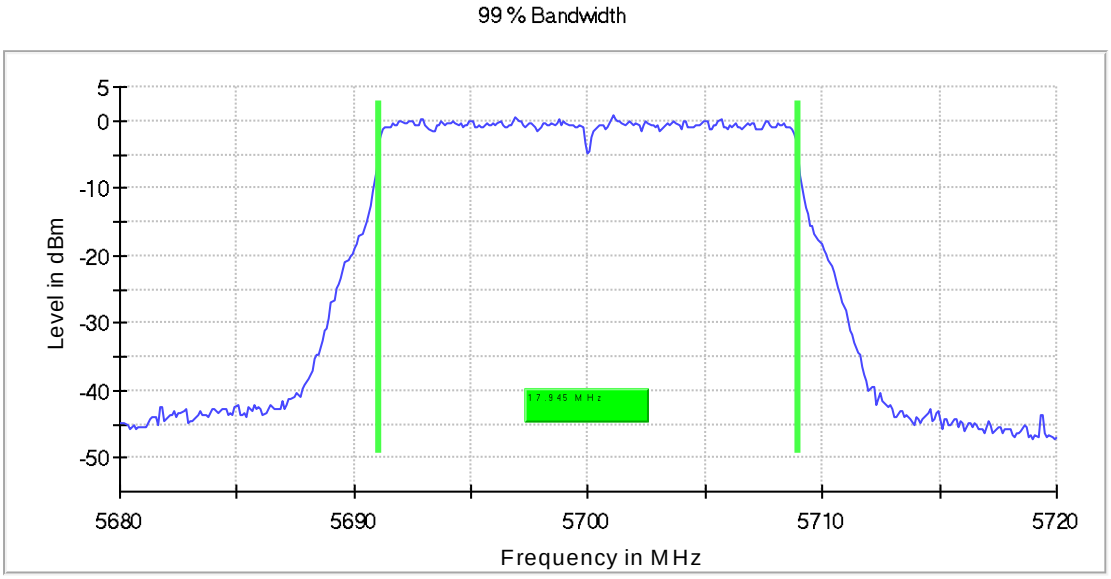

Fig. 75: High Channel - 99% Occupied Channel Bandwidth

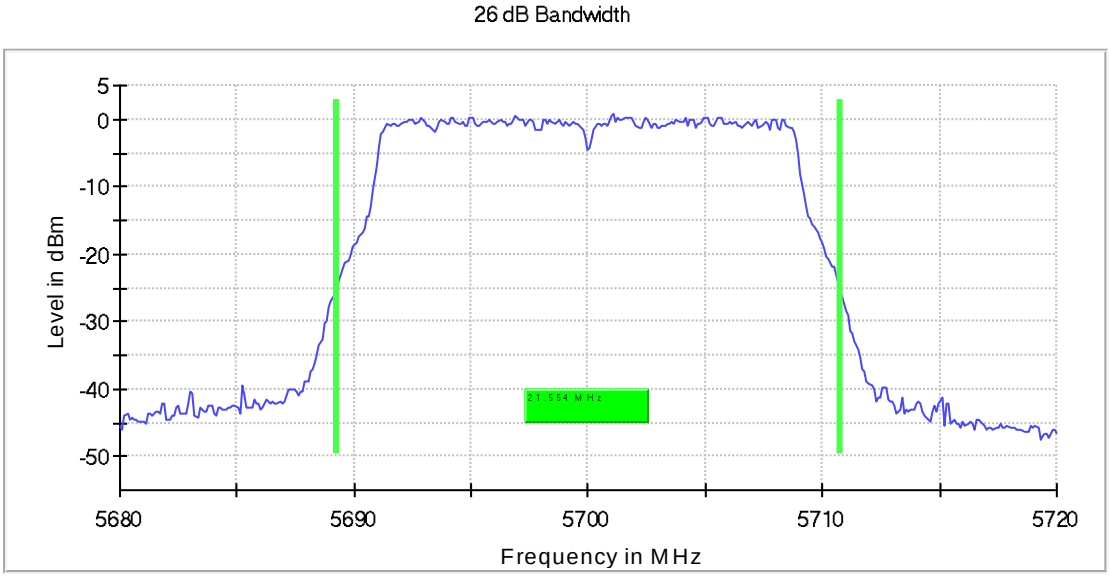

Fig. 76: High Channel - Emission Bandwidth 26 dB

4.2.6.16 Sample #1. Mode #1. U-NII-2C. Modulation N40

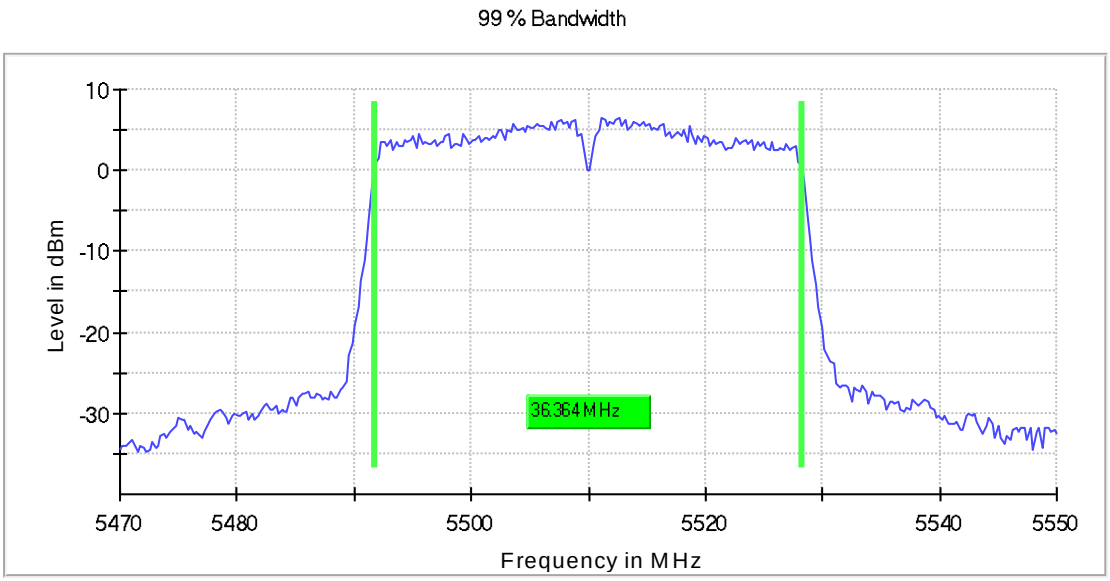

Fig. 77: -Low Channel - 99% Occupied Channel Bandwidth

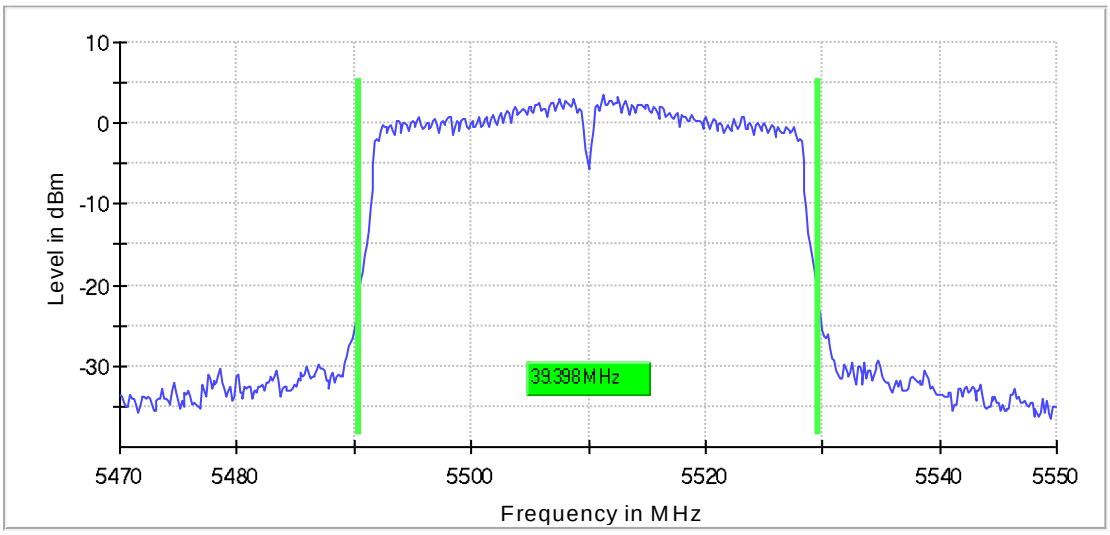

Fig. 78: Low Channel - Emission Bandwidth 26 dB

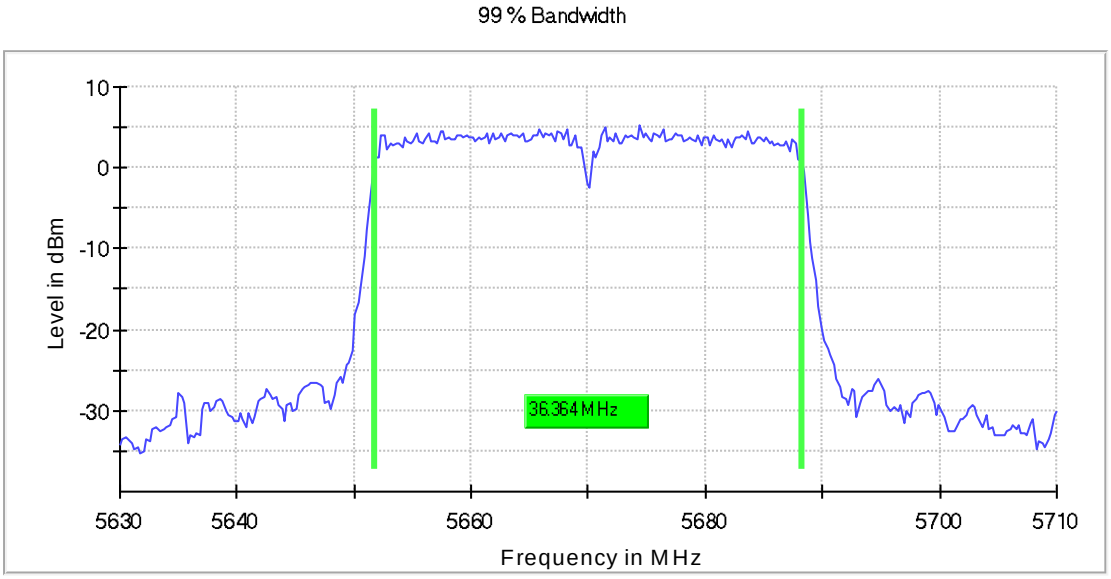

Fig. 79: High Channel - 99% Occupied Channel Bandwidth

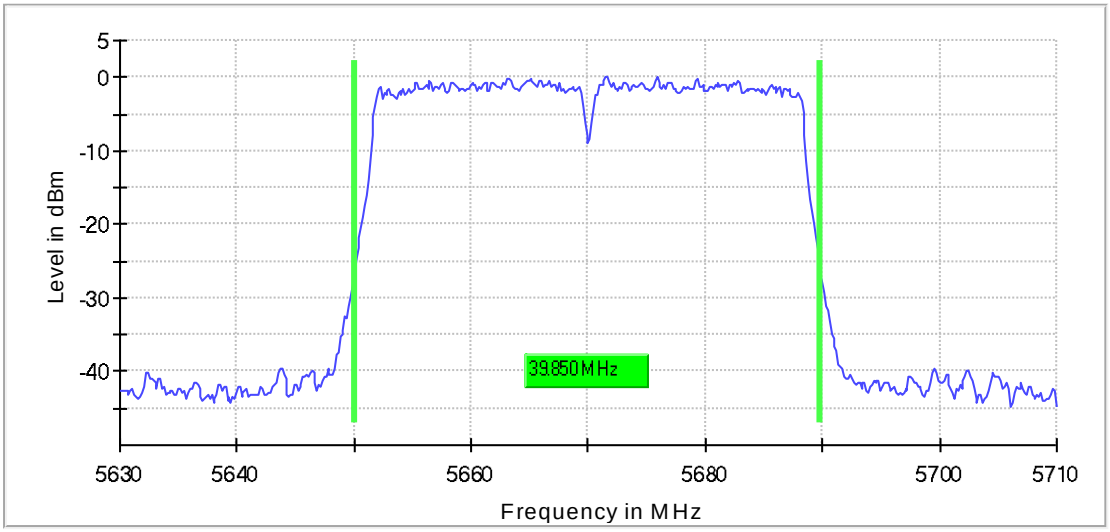

Fig. 80: High Channel - Emission Bandwidth 26 dB

4.2.6.17 Sample #1. Mode #1. U-NII-2C. Modulation AC40

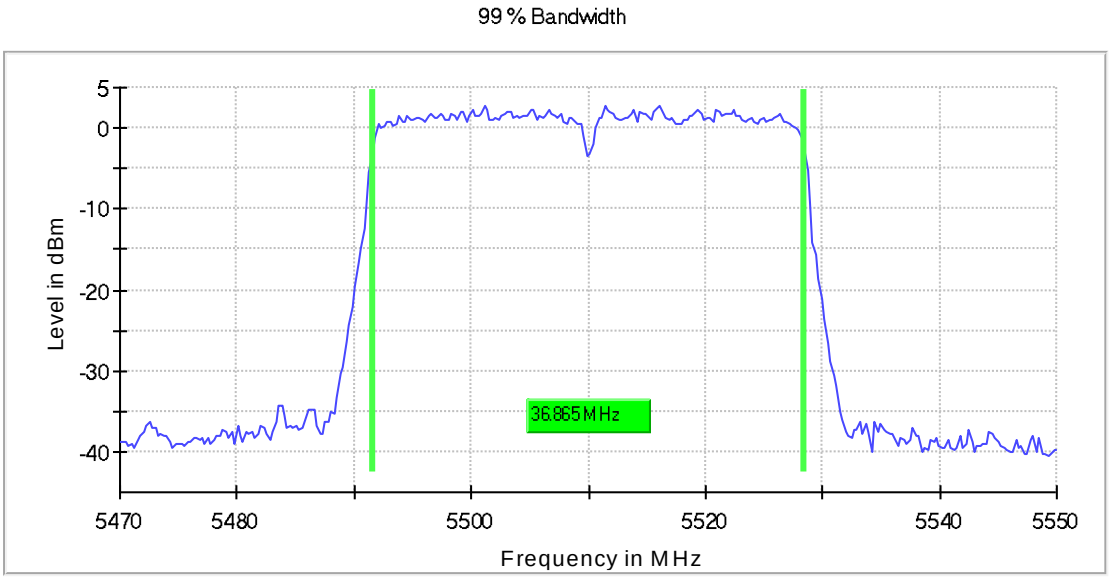

Fig. 81: Low Channel - 99% Occupied Channel Bandwidth

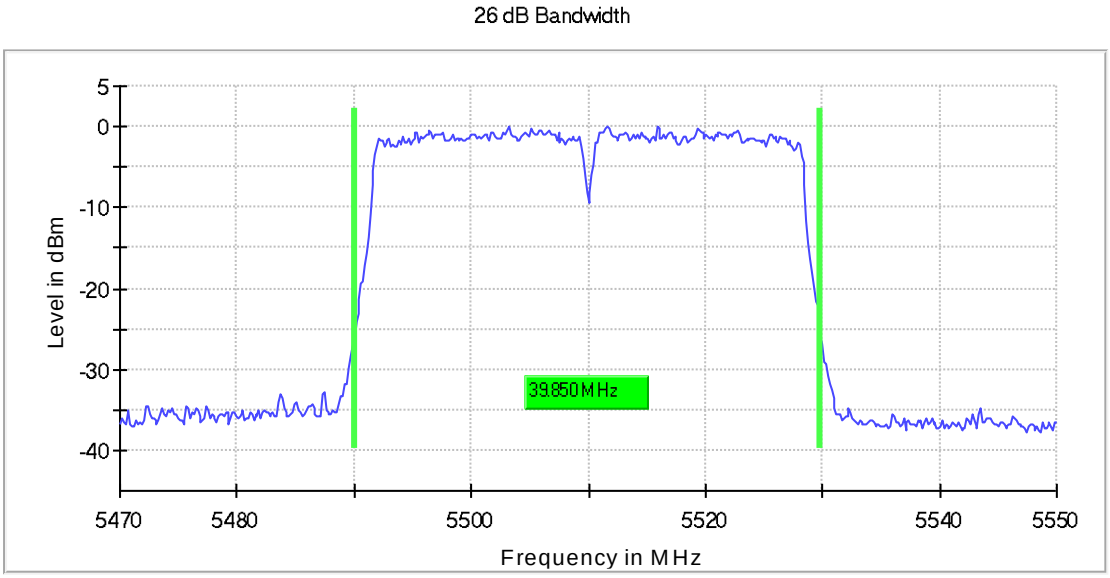

Fig. 82: Low Channel - Emission Bandwidth 26 dB

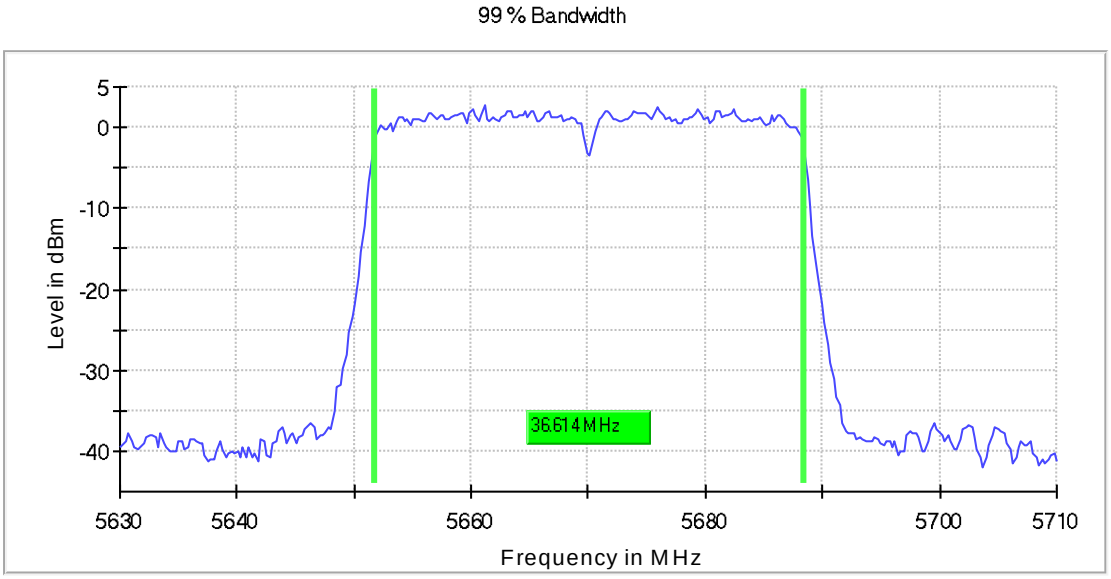

Fig. 83: High Channel - 99% Occupied Channel Bandwidth

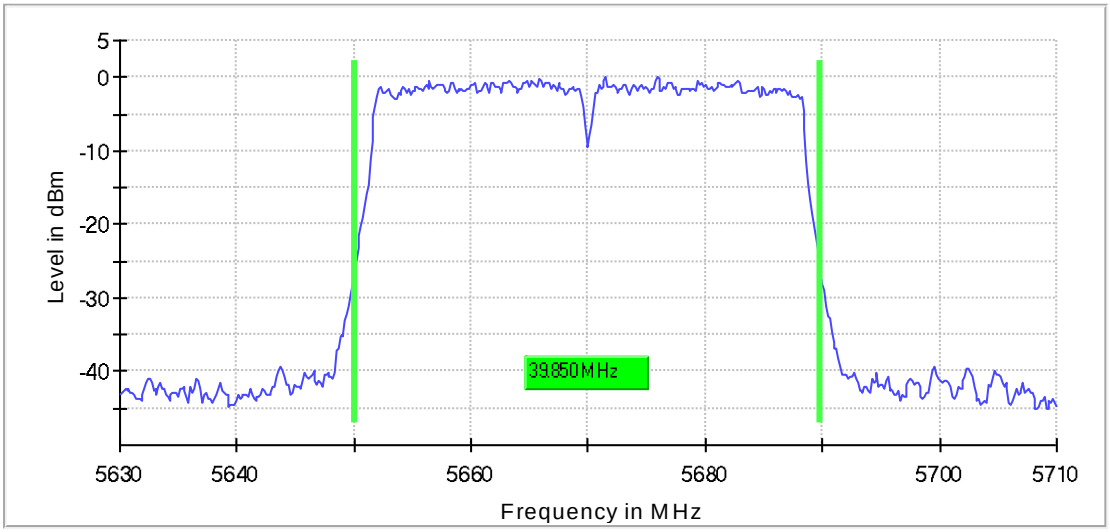

Fig. 84: High Channel - Emission Bandwidth 26 dB

4.2.6.18 Sample #1. Mode #1. U-NII-2C. Modulation AC80

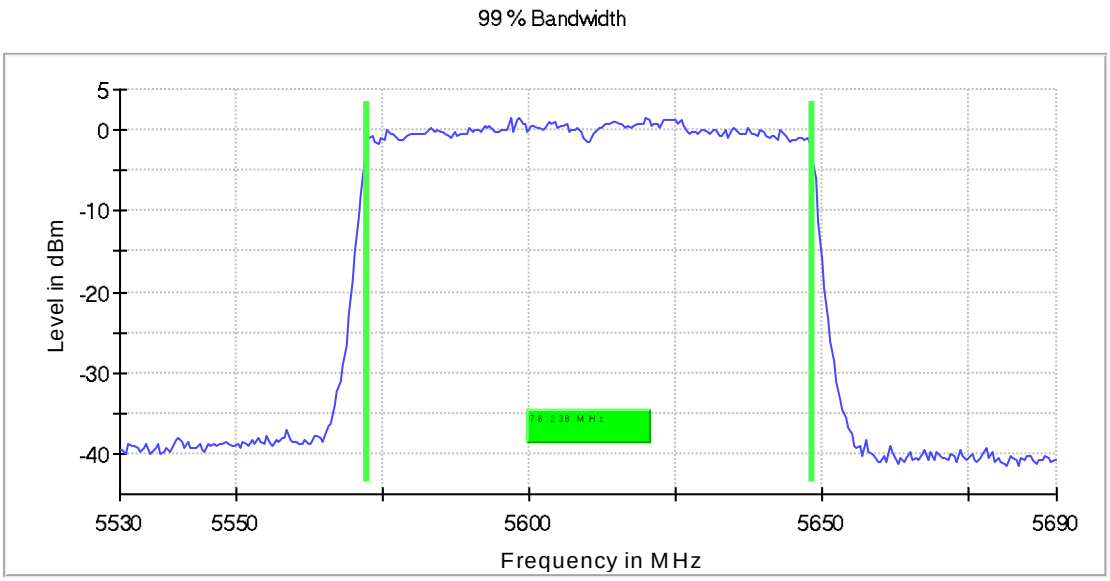

Fig. 85: Low Channel - 99% Occupied Channel Bandwidth

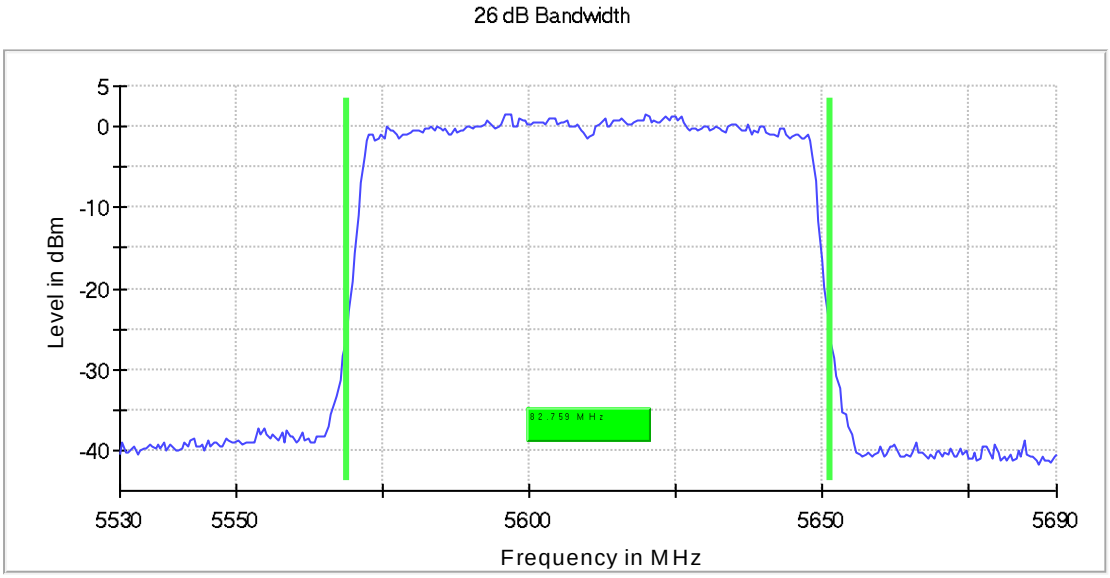

Fig. 86: -Low Channel - Emission Bandwidth 26 dB

4.2.6.19 Sample #1. Mode #1. U-NII-3. Modulation A20

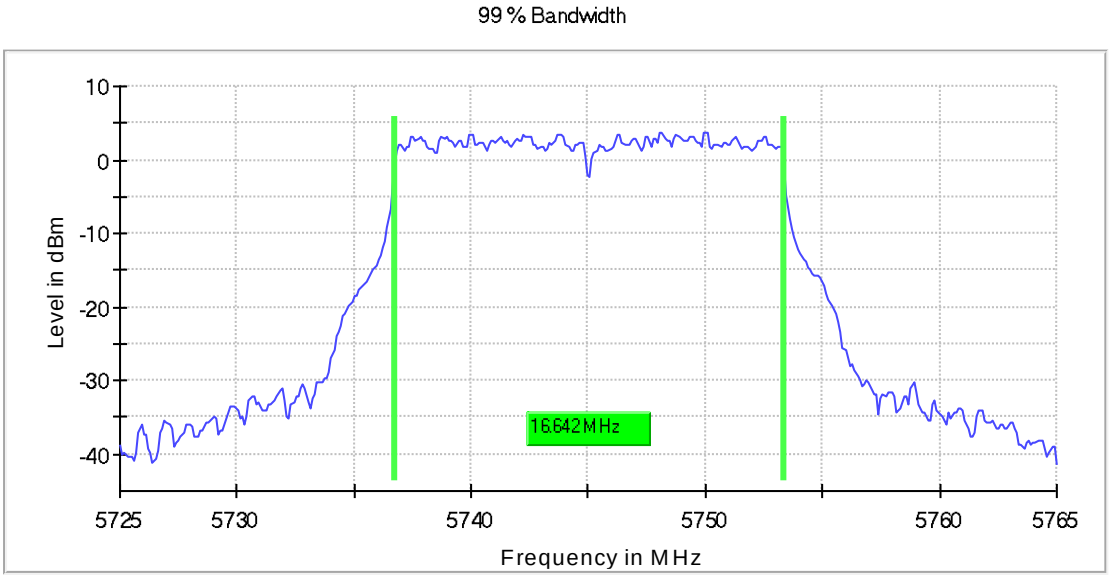

Fig. 87: Low Channel - 99% Occupied Channel Bandwidth

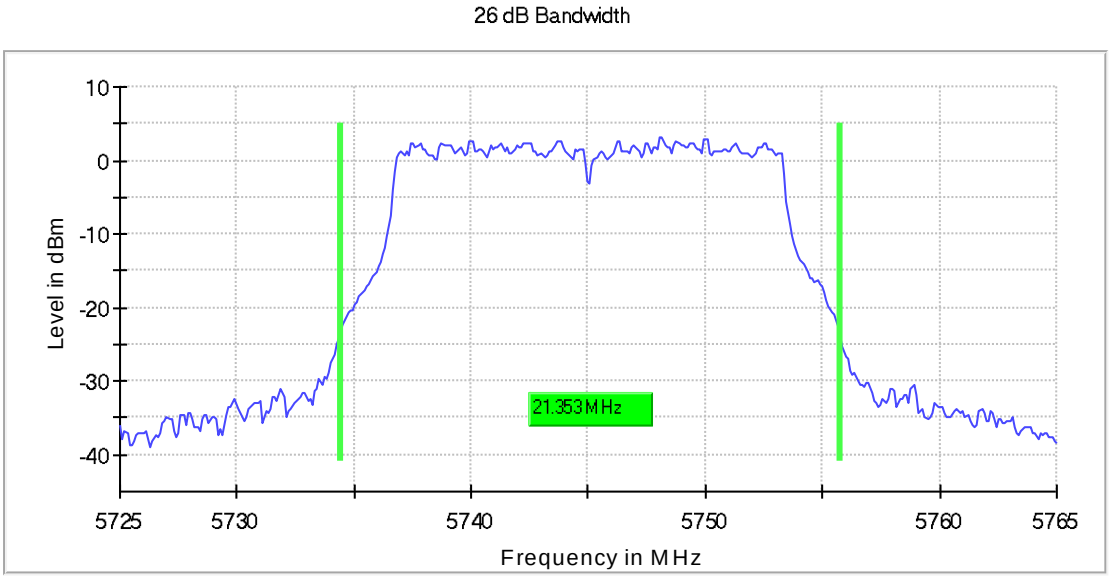

Fig. 88: Low Channel - Emission Bandwidth 26 dB

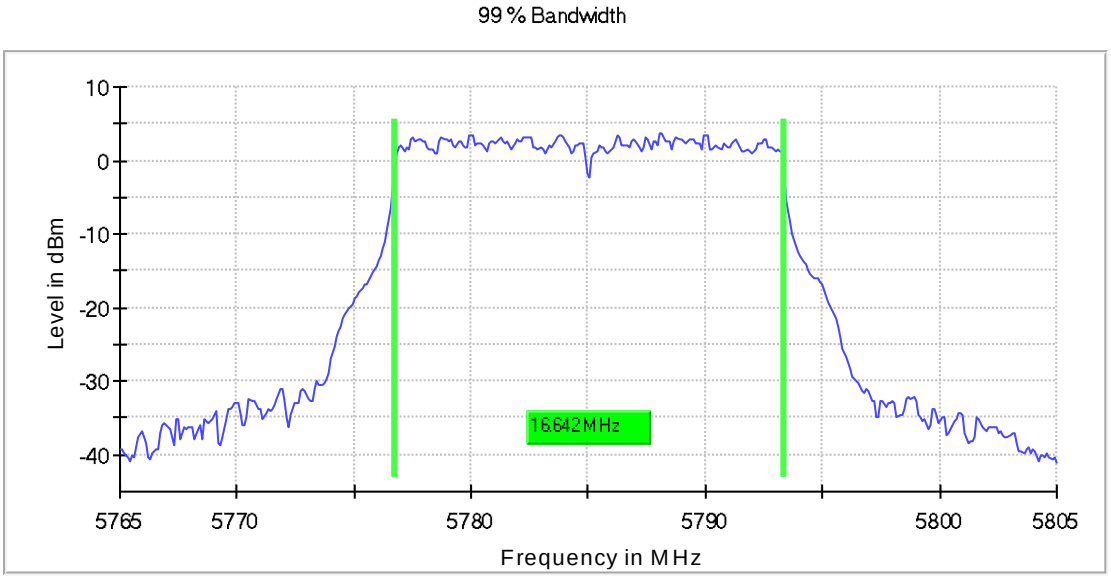

Fig. 89: Middle Channel - 99% Occupied Channel Bandwidth

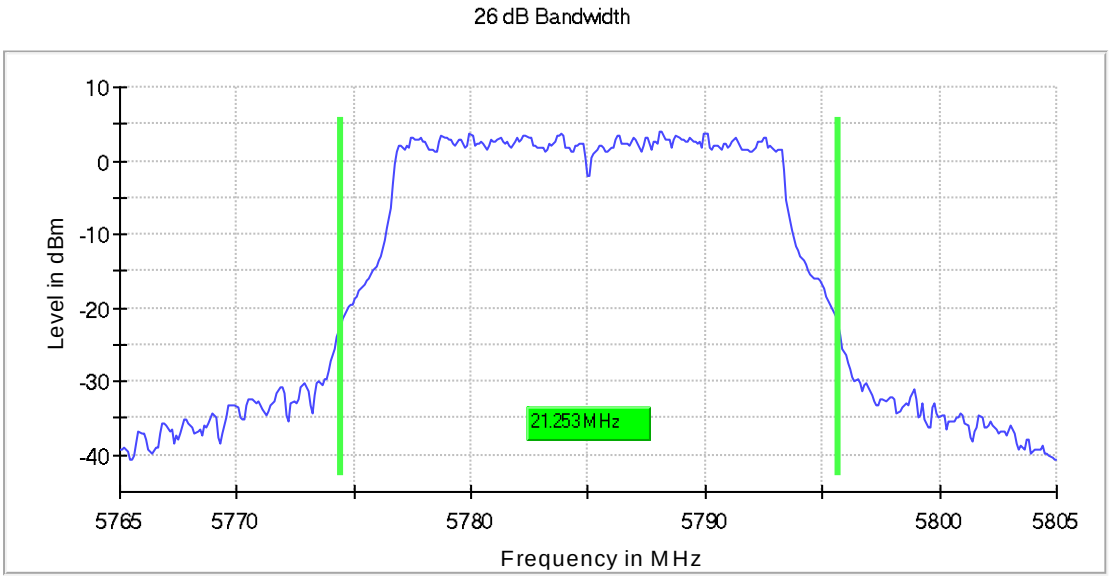

Fig. 90: Middle Channel - Emission Bandwidth 26 dB

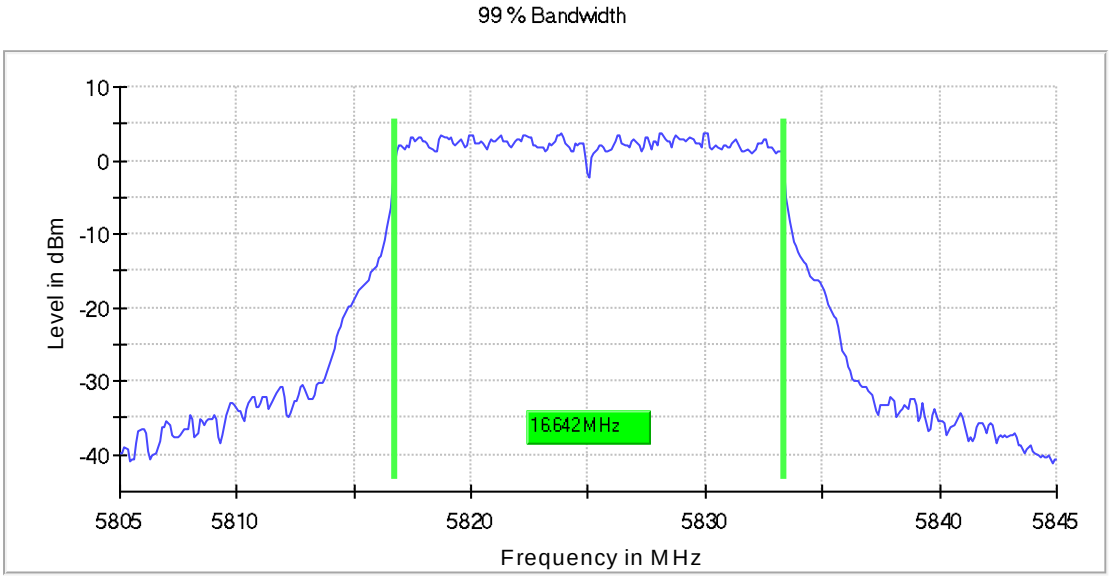

Fig. 91: High Channel - 99% Occupied Channel Bandwidth

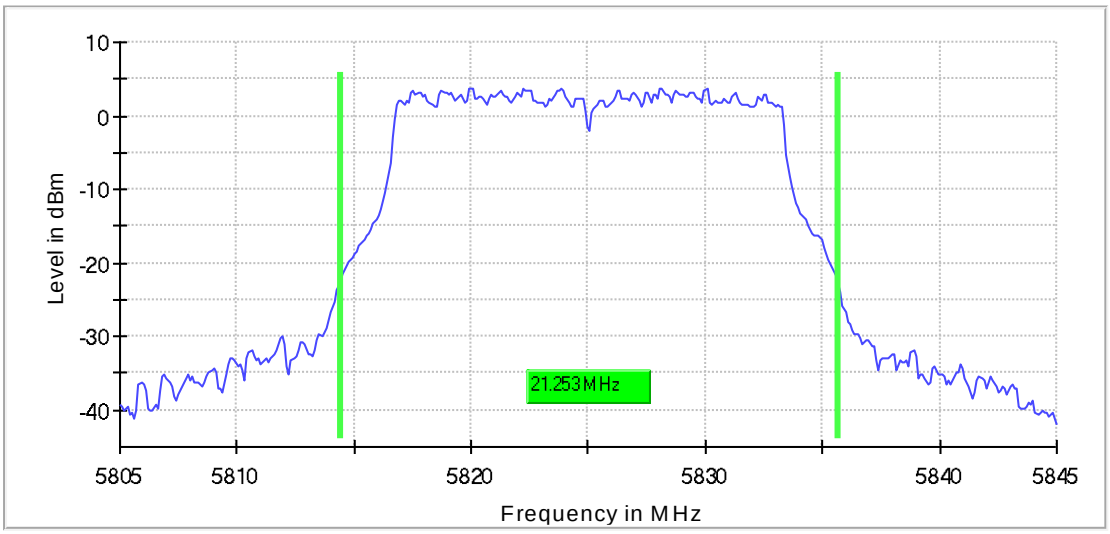

Fig. 92: High Channel - Emission Bandwidth 26 dB

4.2.6.20 Sample #1. Mode #1. U-NII-3. Modulation N20

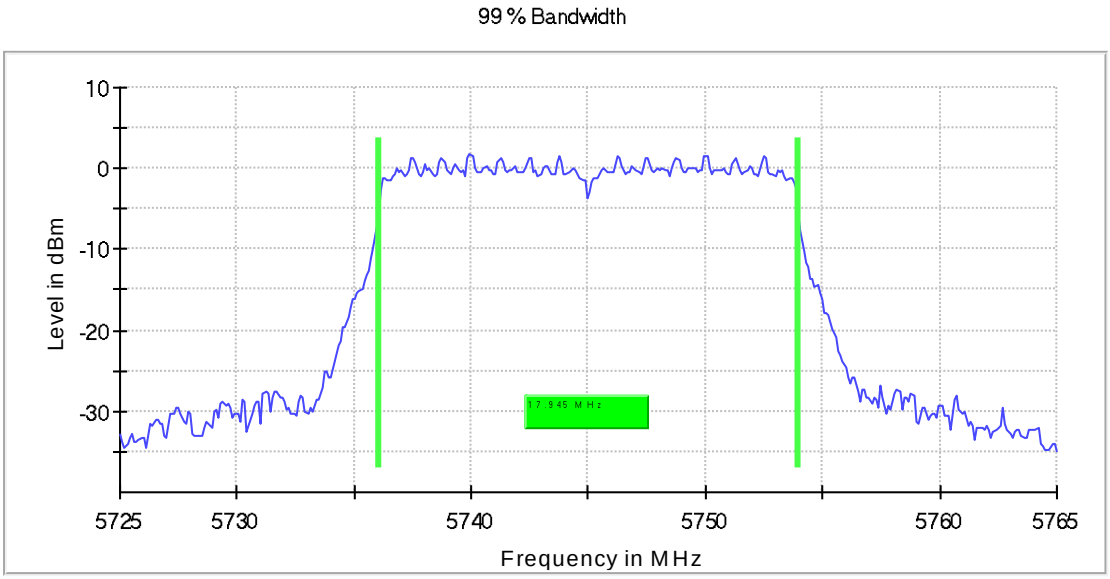

Fig. 93: Low Channel - 99% Occupied Channel Bandwidth

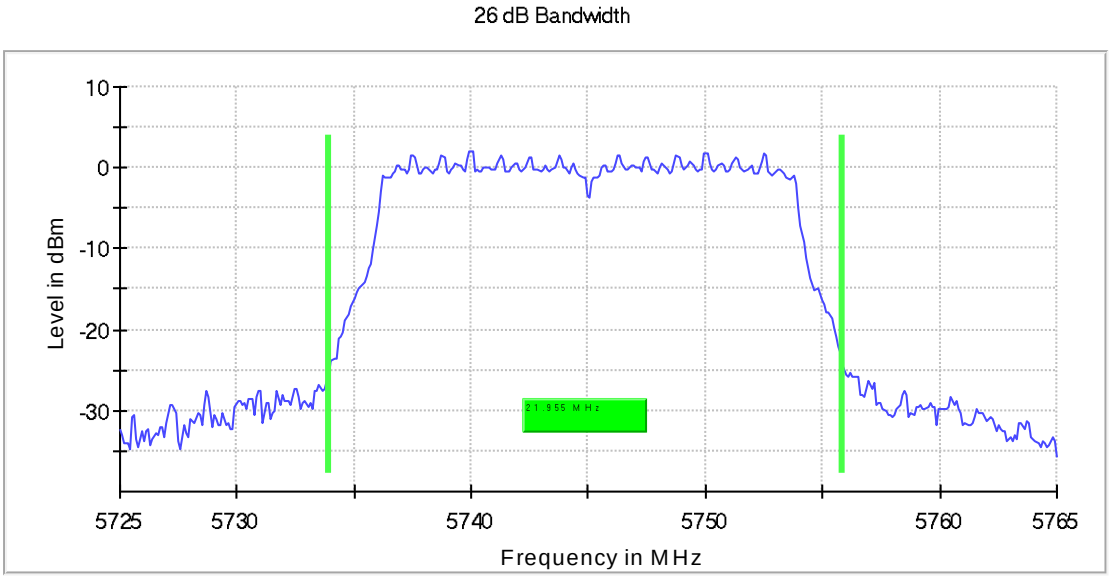

Fig. 94: Low Channel - Emission Bandwidth 26 dB

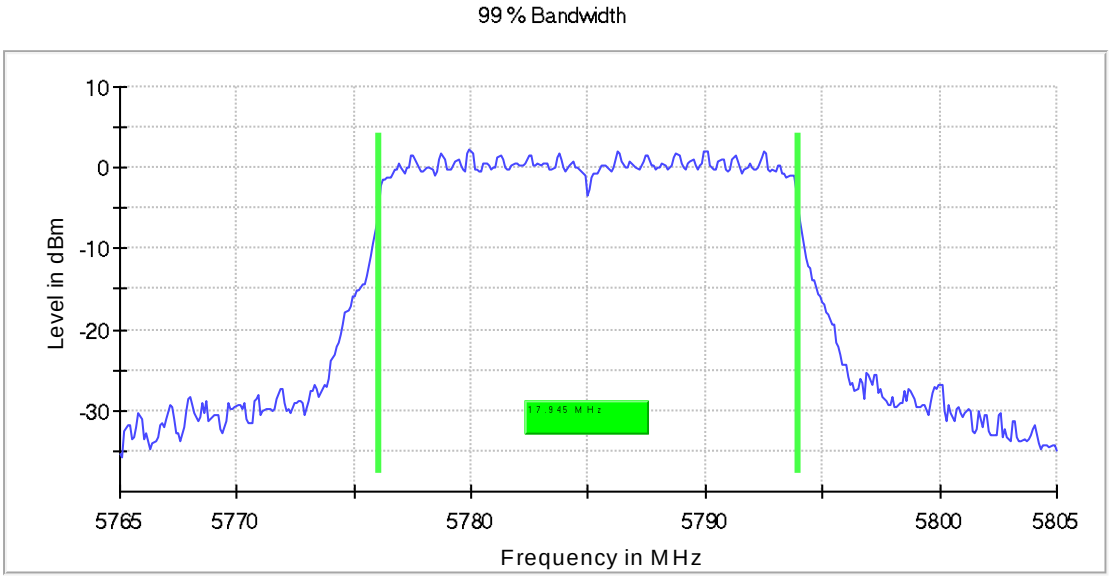

Fig. 95: Middle Channel - 99% Occupied Channel Bandwidth

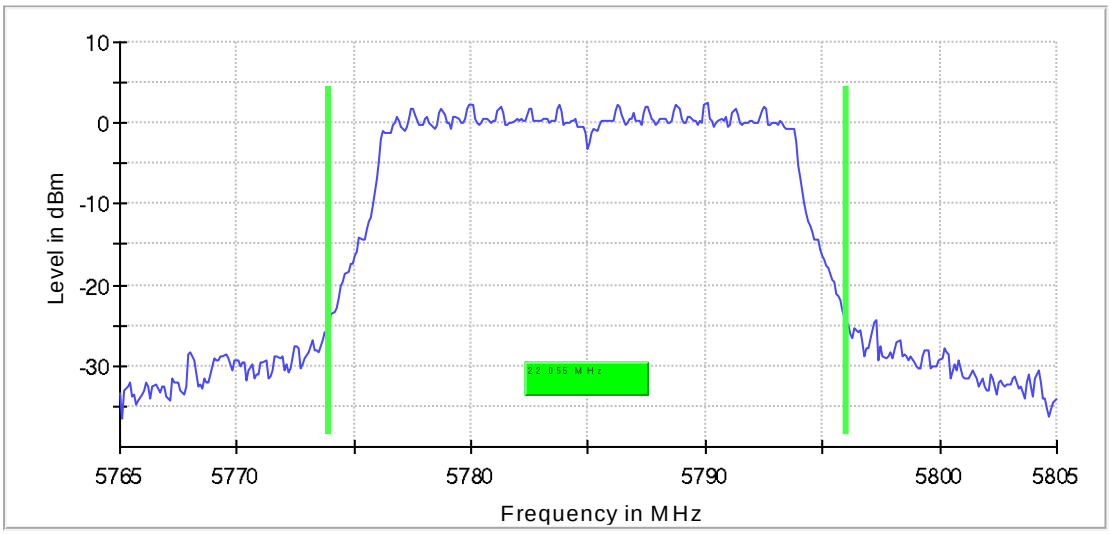

Fig. 96: Middle Channel - Emission Bandwidth 26 dB

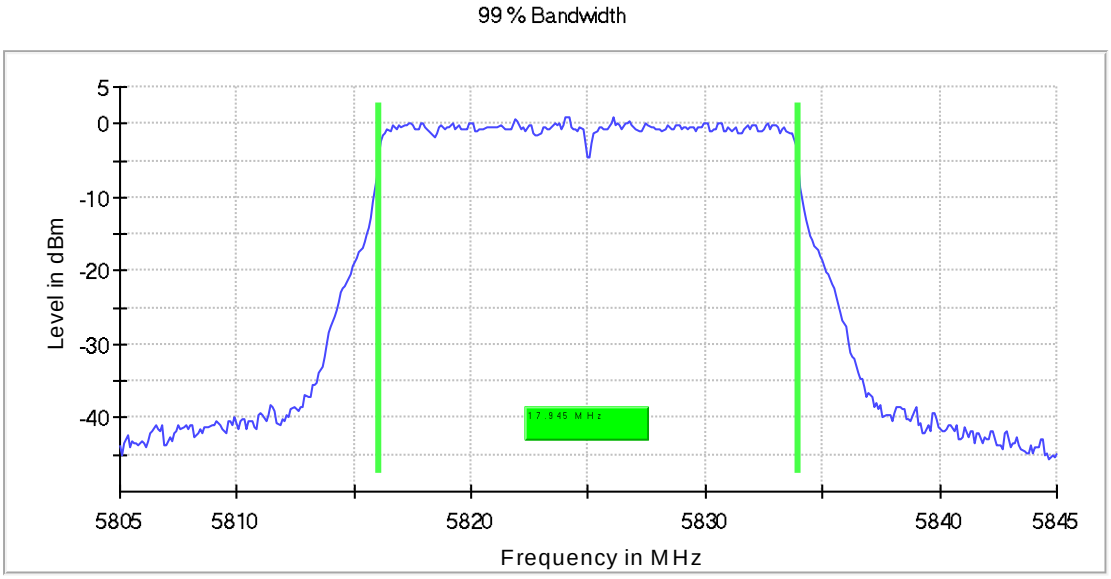

Fig. 97: High Channel - 99% Occupied Channel Bandwidth

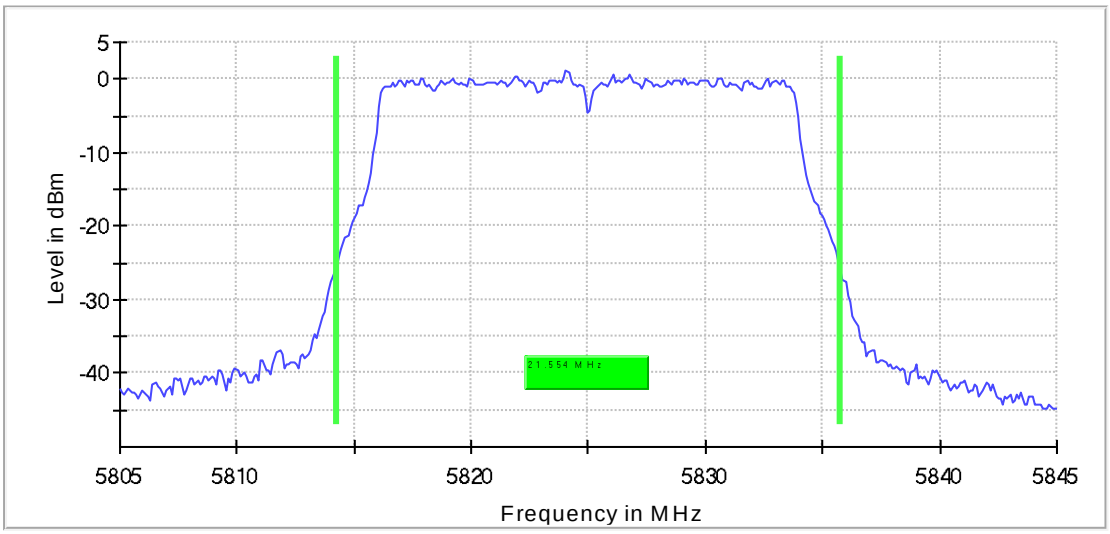

Fig. 98: High Channel - Emission Bandwidth 26 dB

4.2.6.21 Sample #1. Mode #1. U-NII-3. Modulation AC20

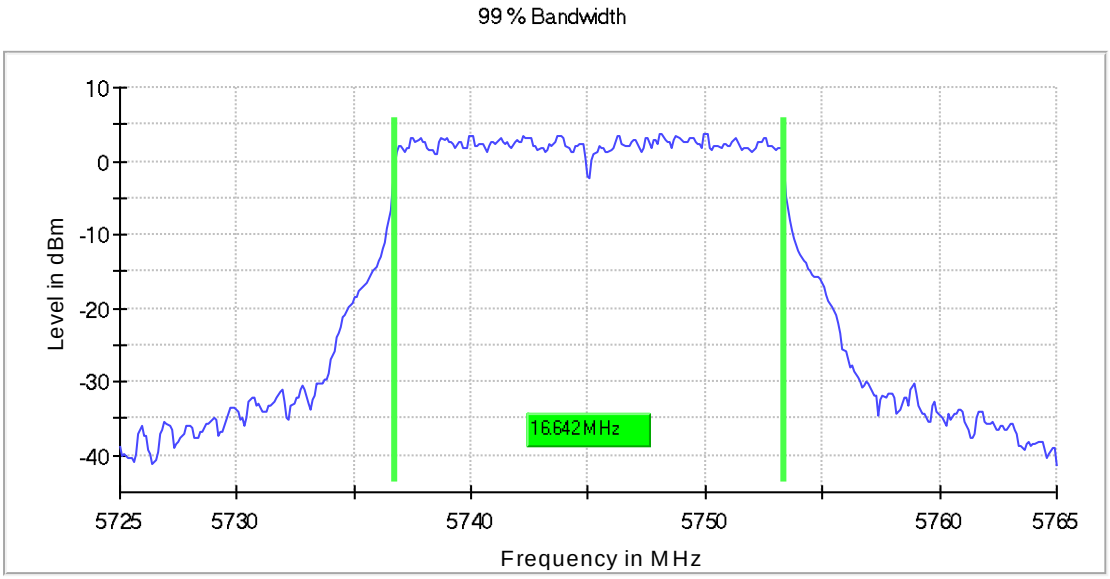

Fig. 99: Low Channel - 99% Occupied Channel Bandwidth

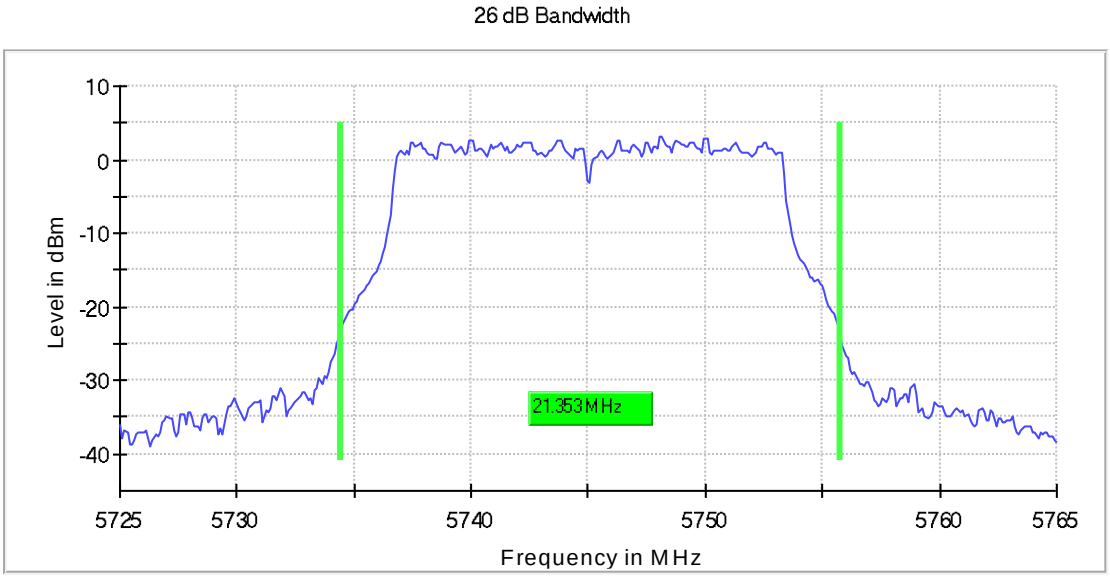

Fig. 100: Low Channel - Emission Bandwidth 26 dB

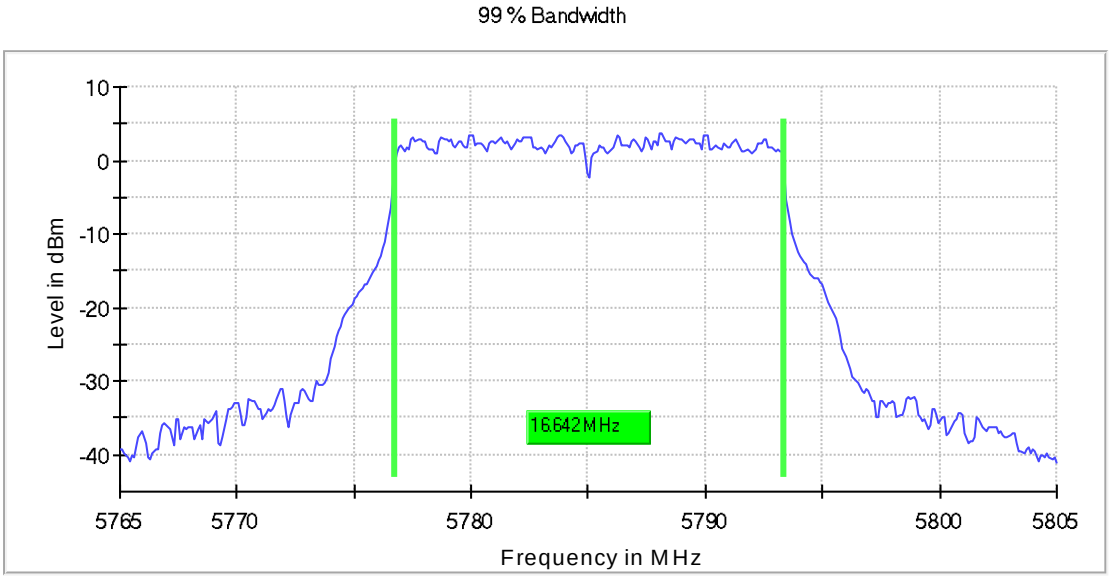

Fig. 101: Middle Channel - 99% Occupied Channel Bandwidth

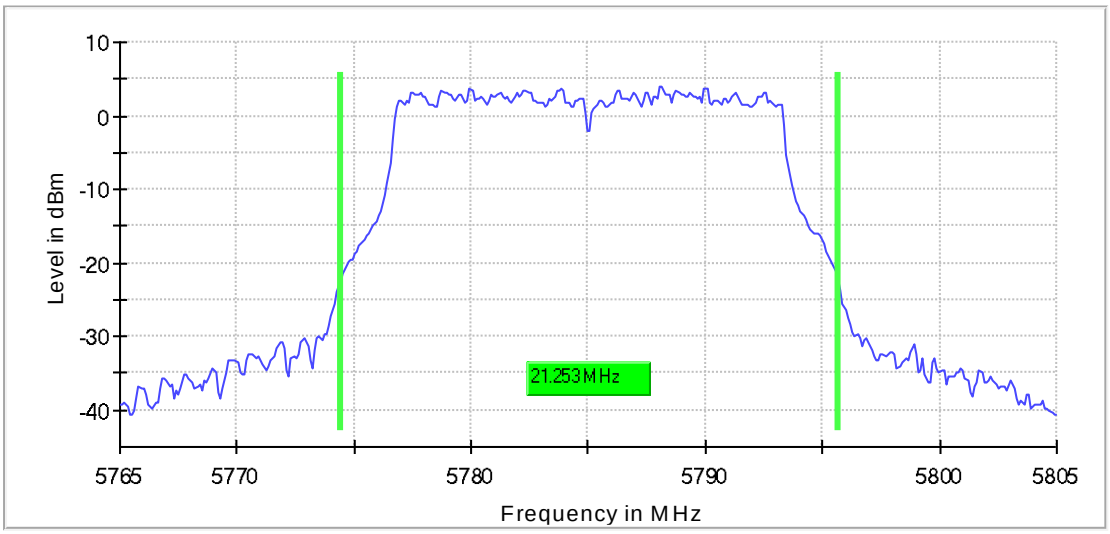

Fig. 102: Middle Channel - Emission Bandwidth 26 dB

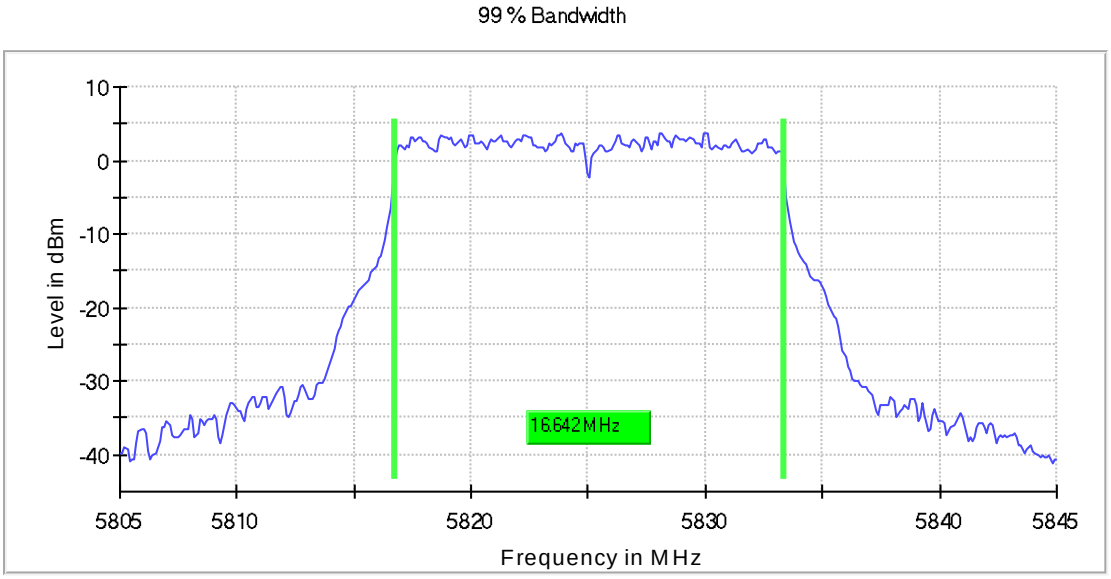

Fig. 103: High Channel - 99% Occupied Channel Bandwidth

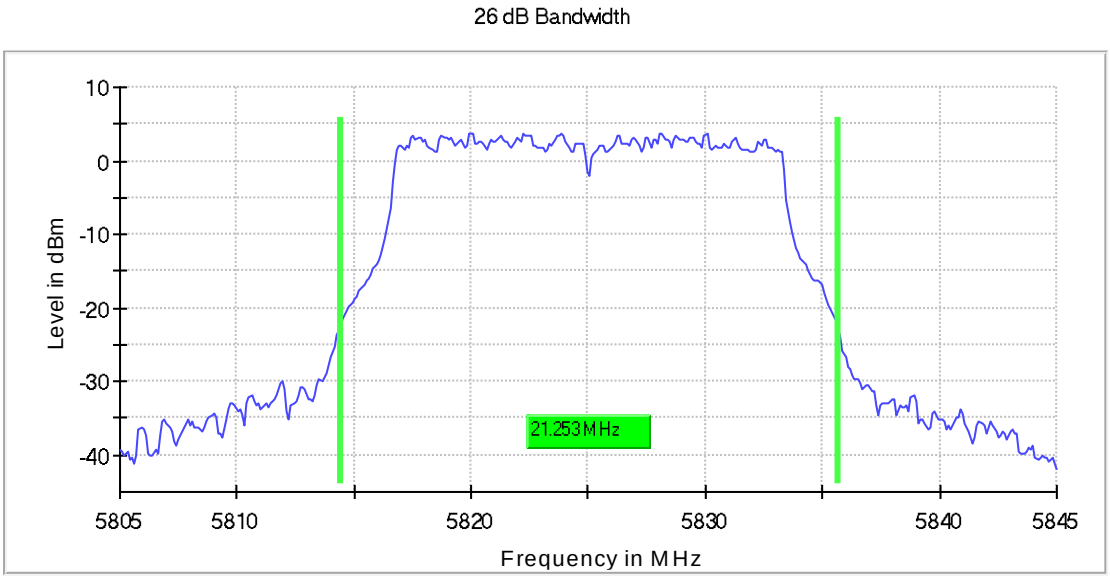

Fig. 104: High Channel - Emission Bandwidth 26 dB

4.2.6.22 Sample #1. Mode #1. U-NII-3. Modulation N40

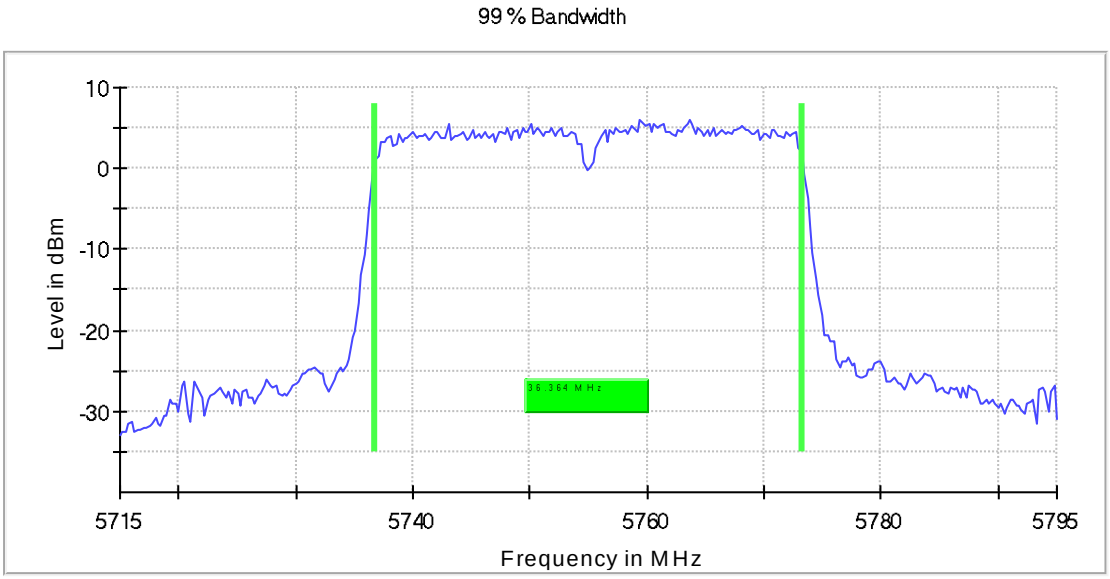

Fig. 105: -Low Channel - 99% Occupied Channel Bandwidth

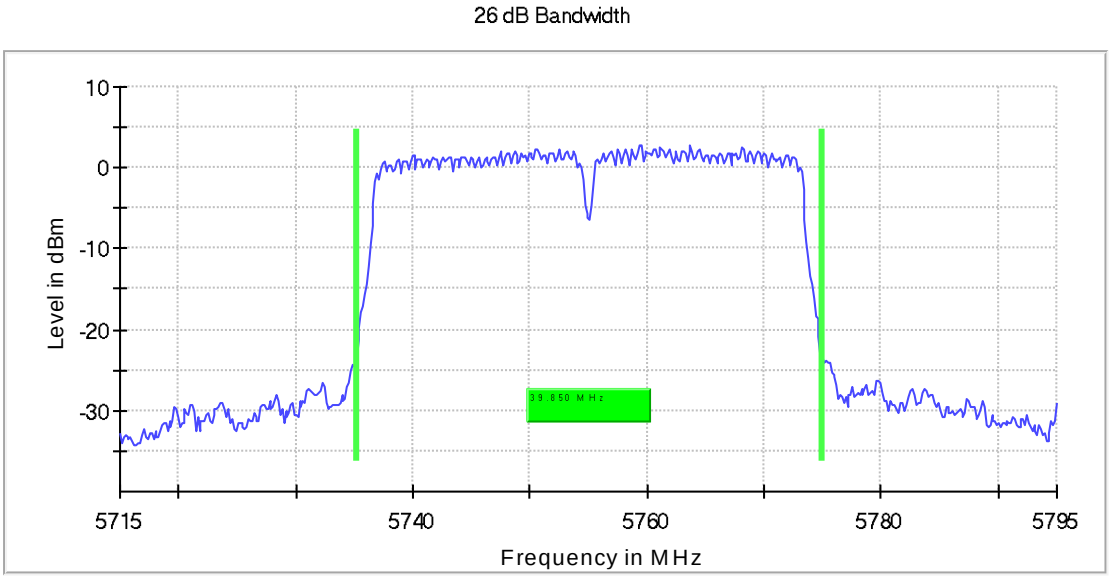

Fig. 106: Low Channel - Emission Bandwidth 26 dB

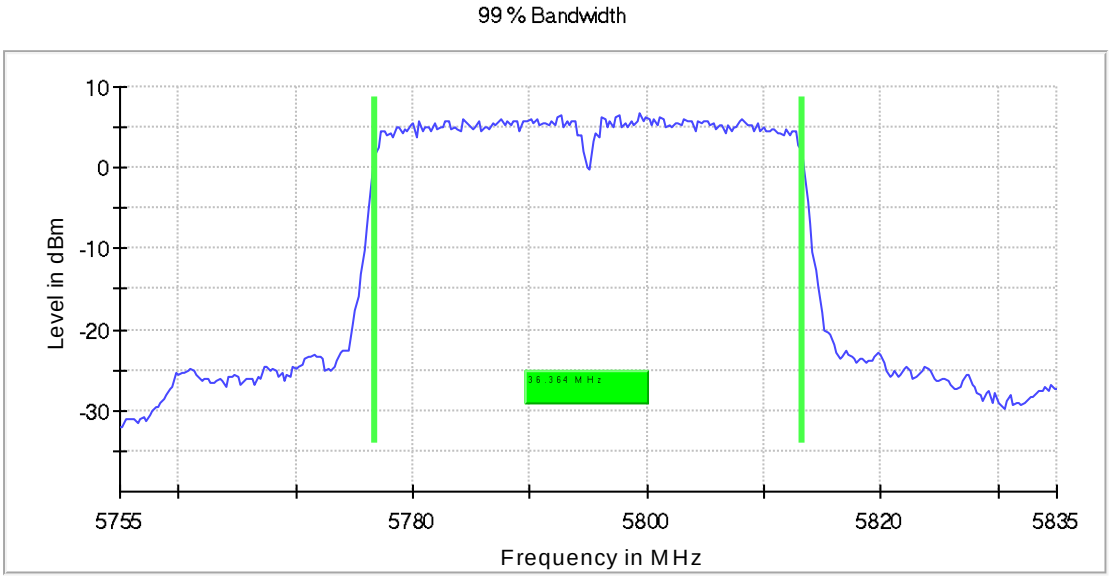

Fig. 107: High Channel - 99% Occupied Channel Bandwidth

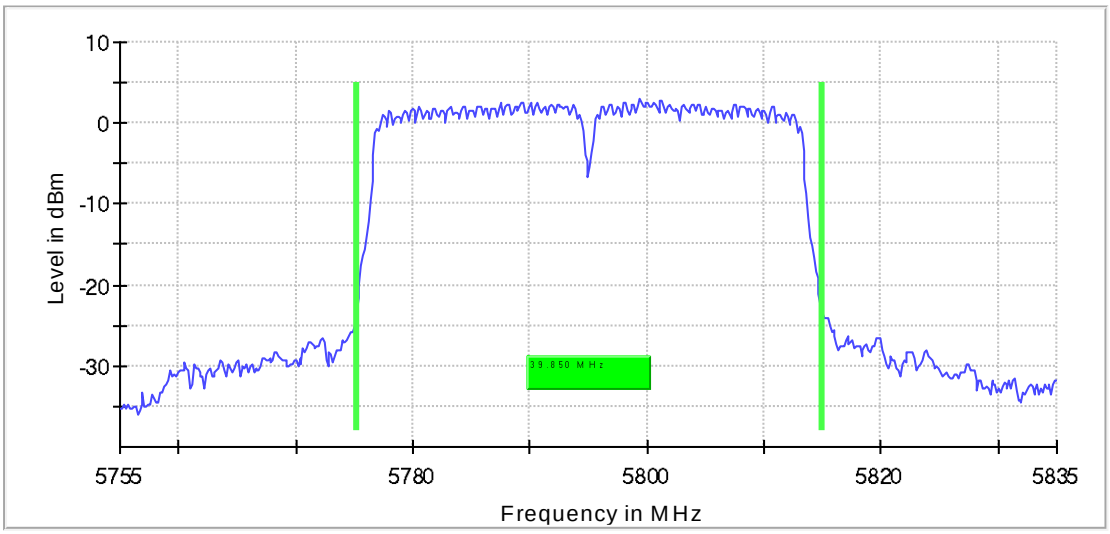

Fig. 108: High Channel - Emission Bandwidth 26 dB

4.2.6.23 Sample #1. Mode #1. U-NII-3. Modulation AC40

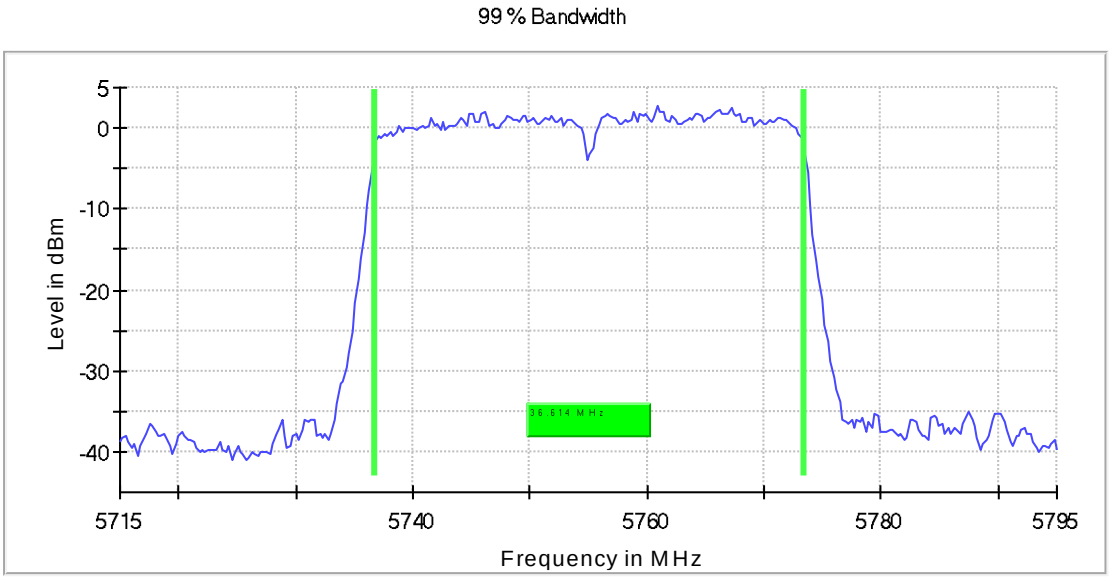

Fig. 109: Low Channel - 99% Occupied Channel Bandwidth

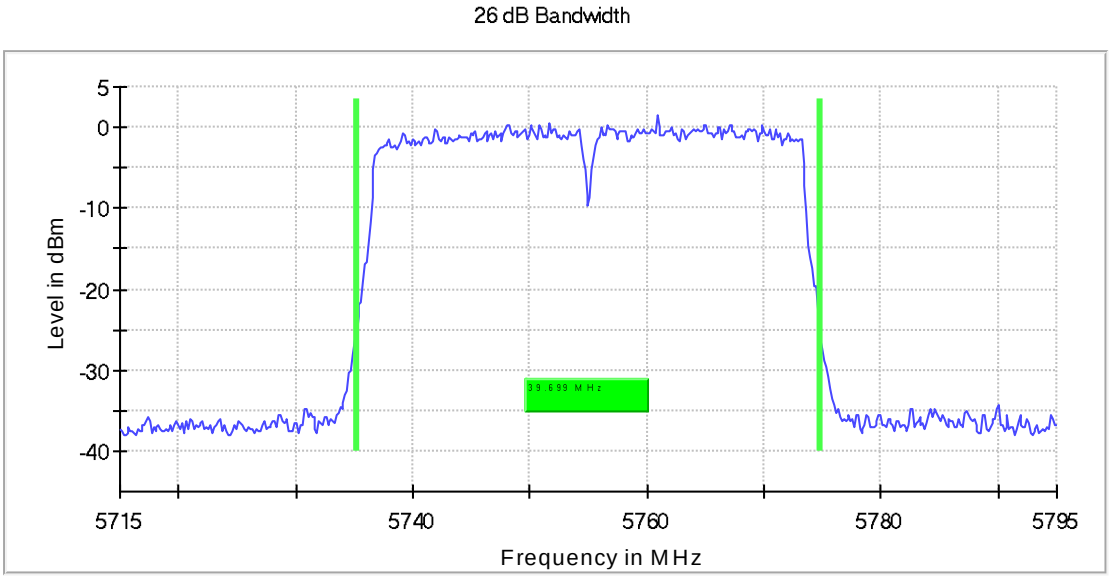

Fig. 110: Low Channel - Emission Bandwidth 26 dB

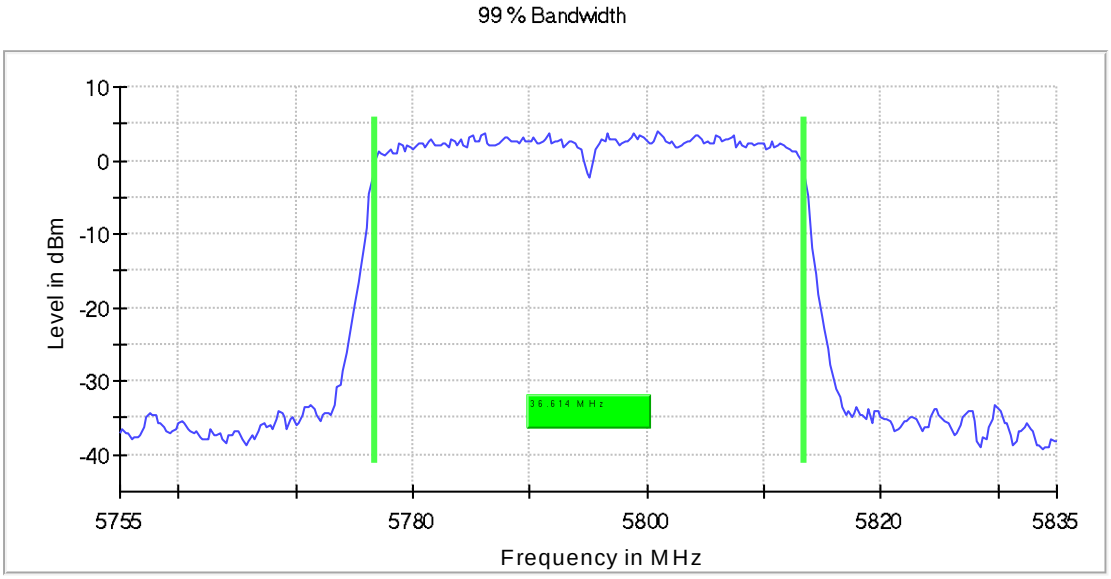

Fig. 111: High Channel - 99% Occupied Channel Bandwidth

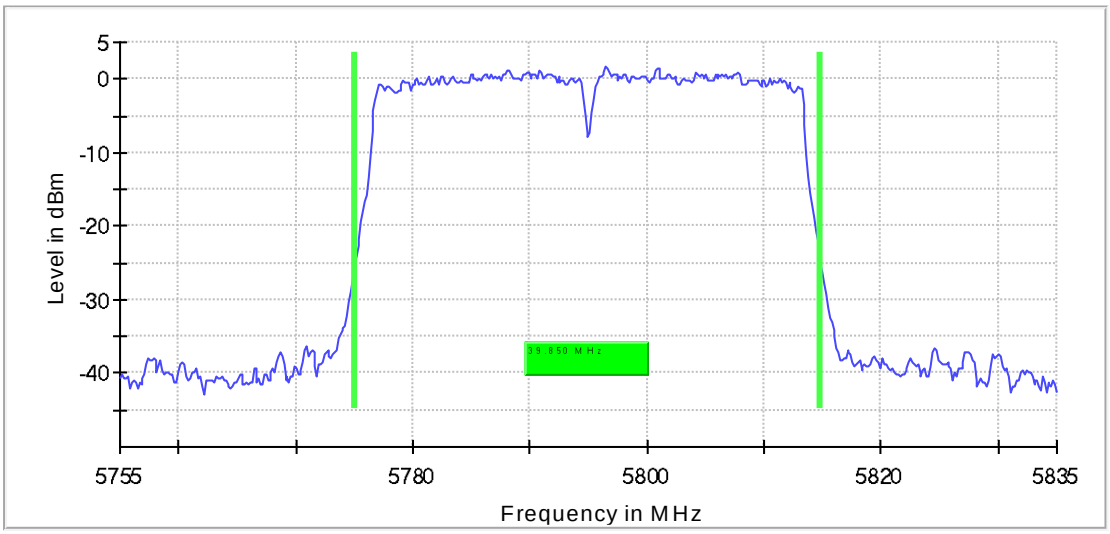

Fig. 112: High Channel - Emission Bandwidth 26 dB

4.2.6.24 Sample #1. Mode #1. U-NII-3. Modulation AC80

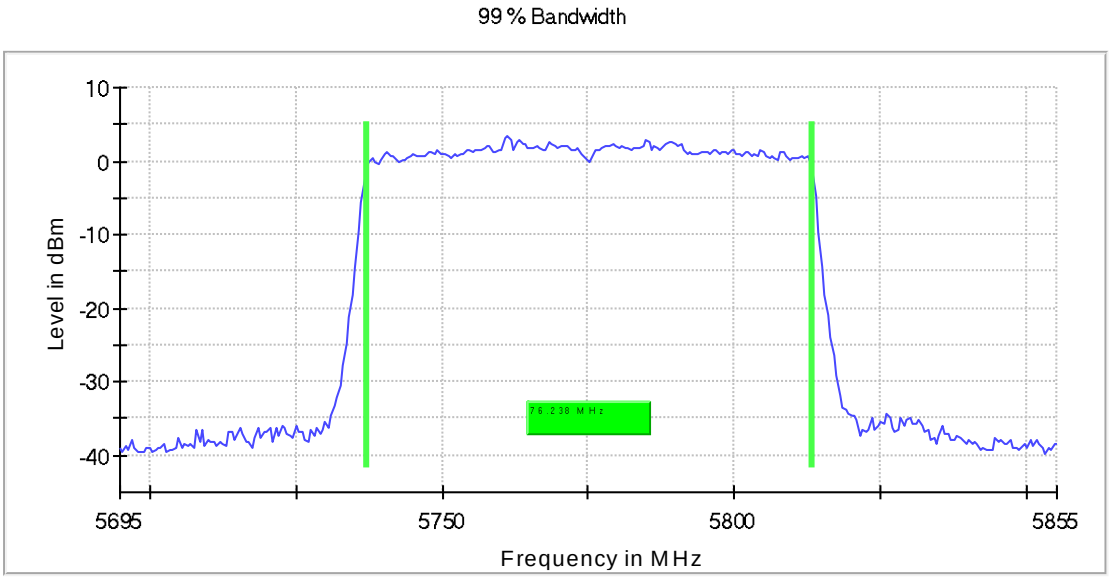

Fig. 113: Low Channel - 99% Occupied Channel Bandwidth

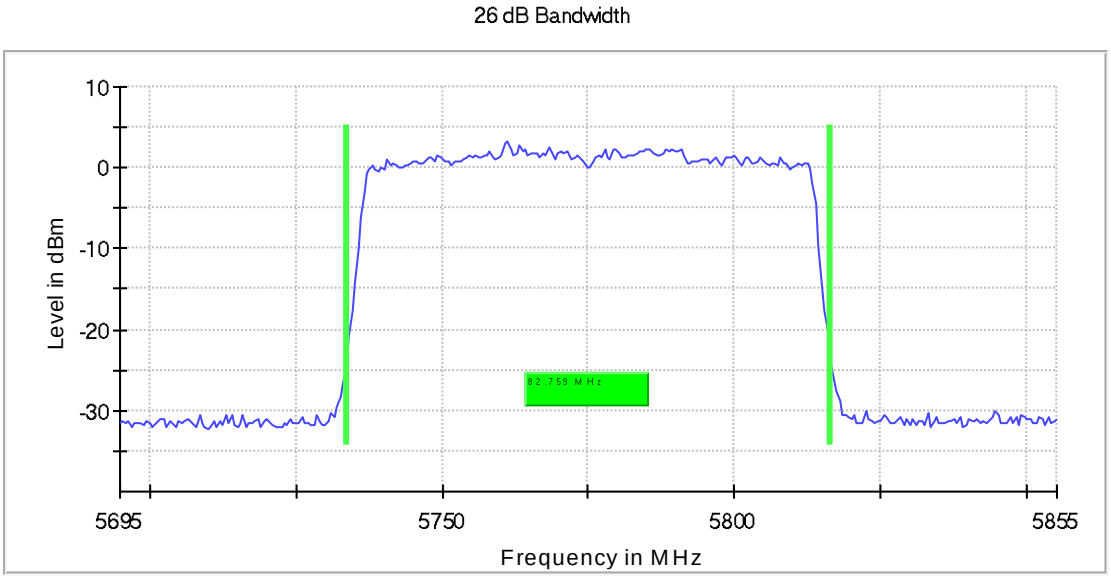

Fig. 114: Low Channel - Emission Bandwidth 26 dB

4.2.7 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
RF SWICTH	ROHDE & SCHWARZ	OSP120 + OSPB157W8	1042701	24/03/2022	24/03/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042546	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024
EMC32. EMC MEASUREMENT SOFTWARE	ROHDE & SCHWARZ	R&S. EMC32	104624	-	-
DIGITAL THERMO-HYGROMETER	TESTO	608-H1	1041916	09/02/2024	09/02/2025
SHIELDED CHAMBER SR0	ALBATROSS	SR	1042267	-	-

Table 13: Test Instruments – 99% Occupied Channel Bandwidth & Emission Bandwidth 26dB

4.2.8 Uncertainty

Test Type	Test Description	Uncertainty
Emission	RF Bandwidth measurements	±76.0 Hz

Table 14: Uncertainties - 99% Occupied Channel Bandwidth & Emission Bandwidth 26dB

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.3 DTS BANDWIDTH

4.3.1 Test Setup Required

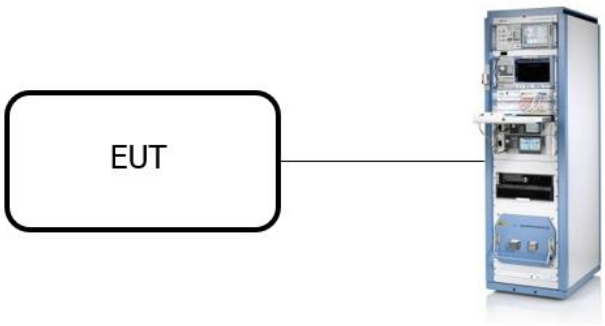

Fig. 115: DTS Bandwidth setup of table top equipment.

4.3.2 Requirements

Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

4.3.3 EMI Receiver configuration

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

Central frequency [MHz]	Span [MHz]	Detector	Trace Mode	RBW [kHz]	VBW [kHz]
Channel frequency	40	Peak	Max Hold	100	300
Channel frequency	80	Peak	Max Hold	100	300
Channel frequency	160	Peak	Max Hold	100	300

Table 15: EMI Receiver configuration – DTS Bandwidth

4.3.4 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
24/01/2024	Javier M. Nadales	-	20.8	49.2	1008.3
25/01/2024	Javier M. Nadales	-	21.4	44.7	998.1

Table 16: Test environmental conditions – DTS Bandwidth

4.3.5 Summary Test Results

Modulation	Operating Frequency [MHz]	DTS Bandwidth [MHz]	Results
Mode A20	5745	16.6	PASS
	5785	16.6	PASS
	5825	16.6	PASS
Mode N20	5745	17.9	PASS
	5785	17.7	PASS
	5825	17.9	PASS
Mode AC20	5745	17.9	PASS
	5785	17.9	PASS
	5825	17.9	PASS
Mode N40	5755	36.5	PASS
	5795	36.5	PASS
Mode AC40	5755	36.6	PASS
	5795	36.5	PASS
Mode AC80	5775	76.5	PASS

Table 17: Summary Test Results – DTS Bandwidth

4.3.6 Test Results

4.3.6.1 Sample #1. Mode #1. U-NII-3. Modulation A20

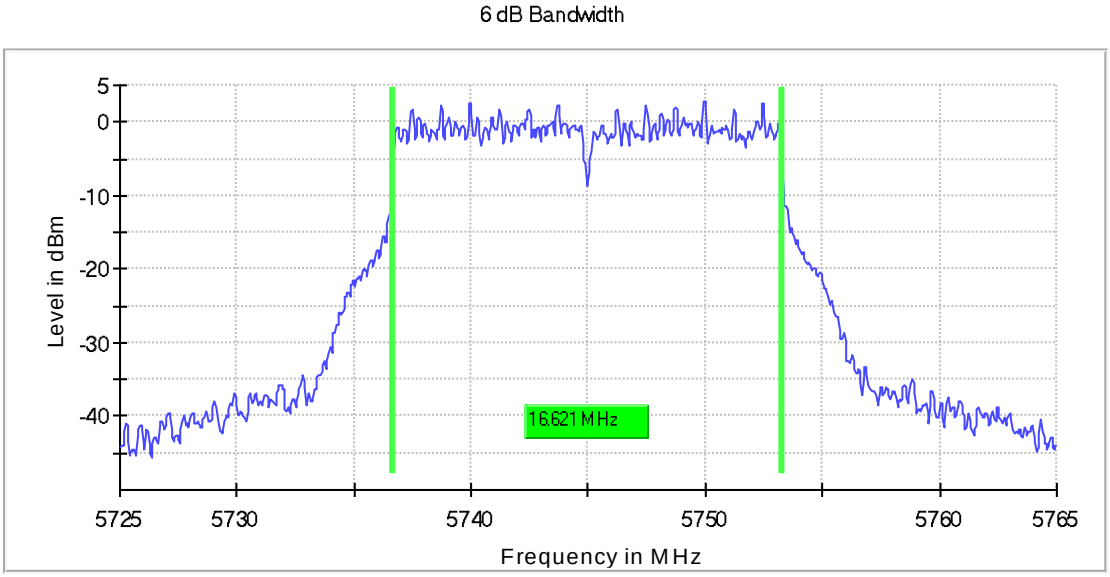

Fig. 116: Low Channel - DTS Bandwidth

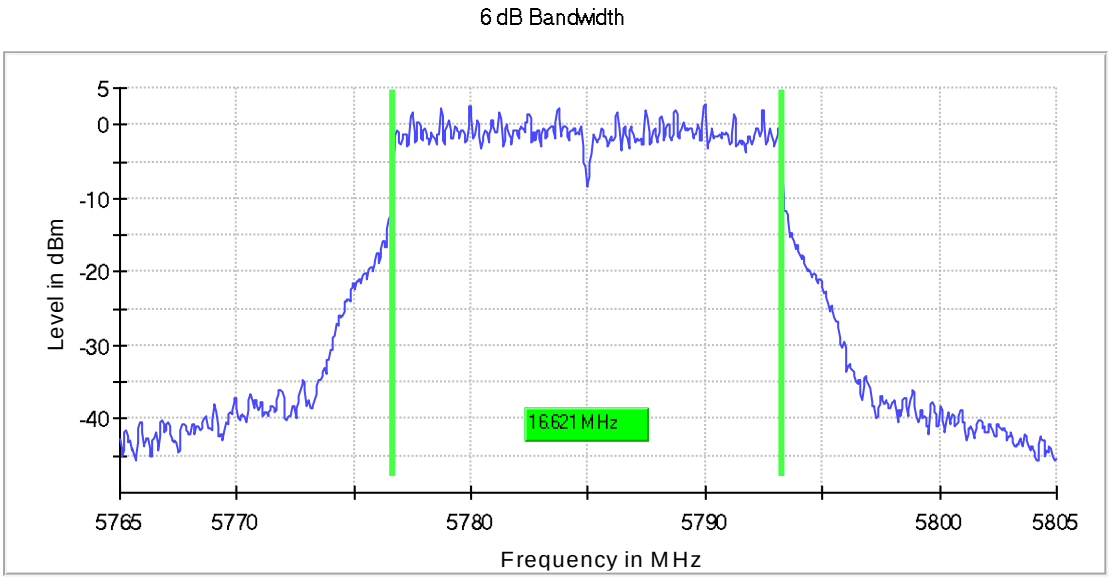

Fig. 117: Middle Channel - DTS Bandwidth

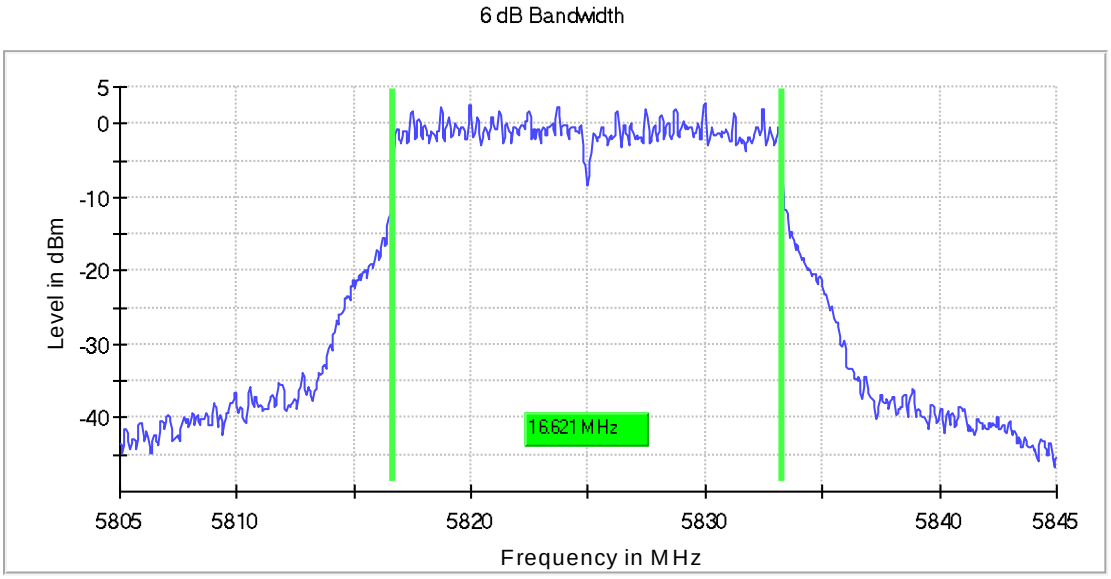

Fig. 118: High Channel - DTS Bandwidth

4.3.6.2 Sample #1. Mode #1. U-NII-3. Modulation N20

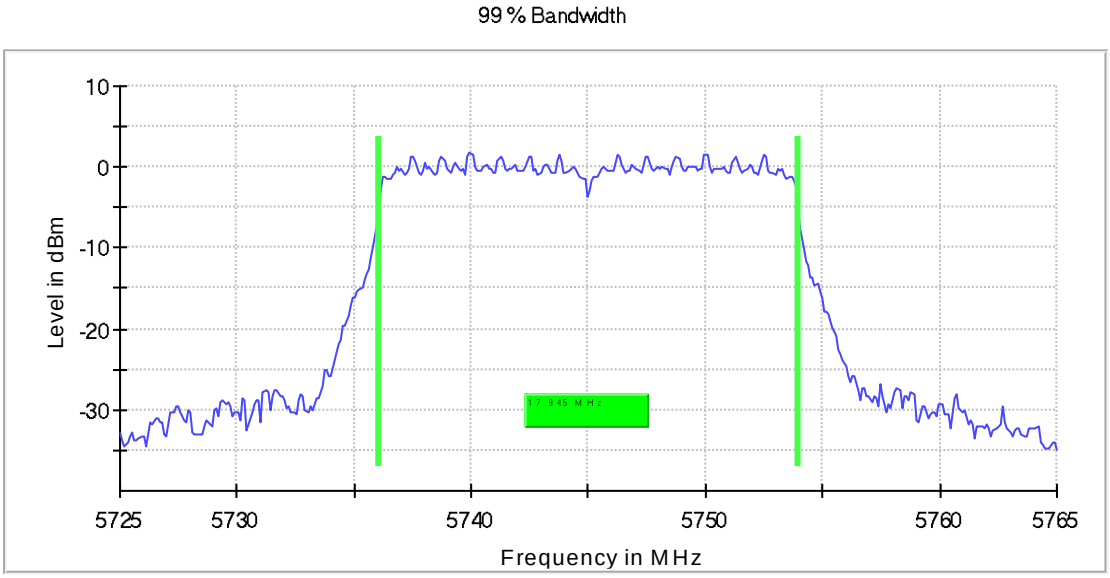

Fig. 119: Low Channel - DTS Bandwidth

6 dB Bandwidth

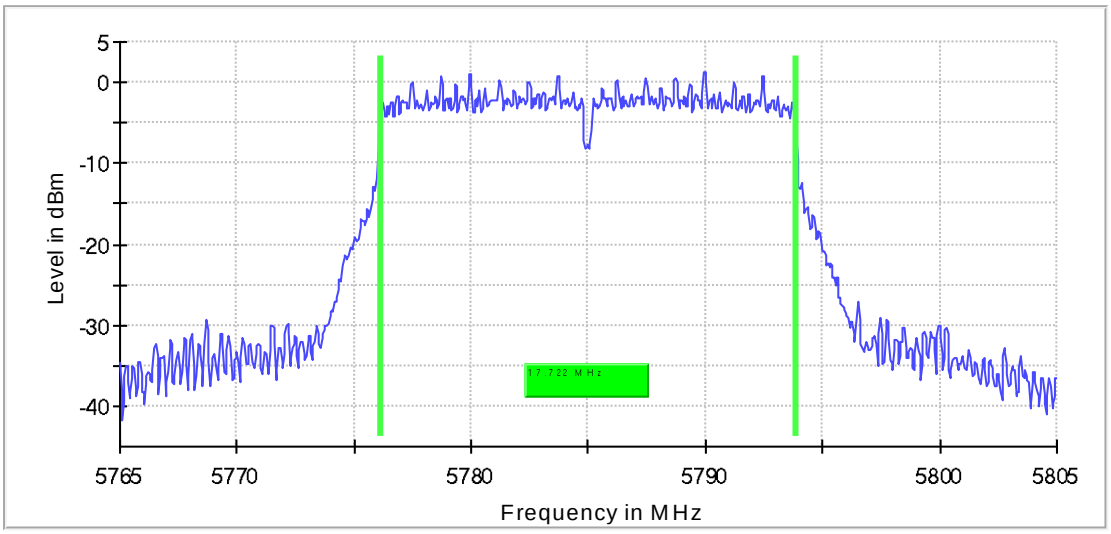

Fig. 120: Middle Channel - DTS Bandwidth

6 dB Bandwidth

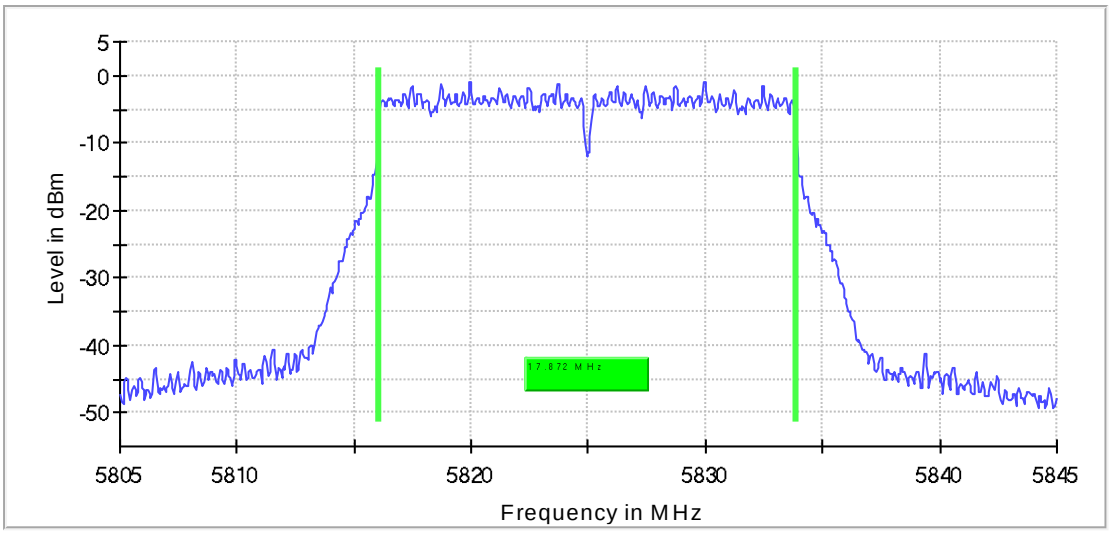

Fig. 121: High Channel - DTS Bandwidth

4.3.6.3 Sample #1. Mode #1. U-NII-3. Modulation AC20

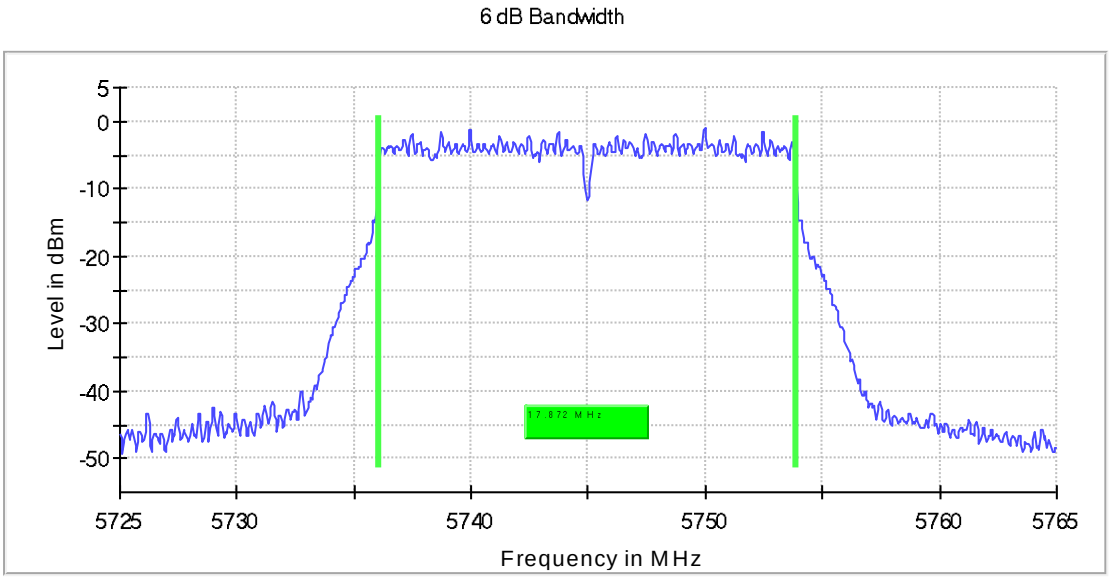

Fig. 122: Low Channel - DTS Bandwidth

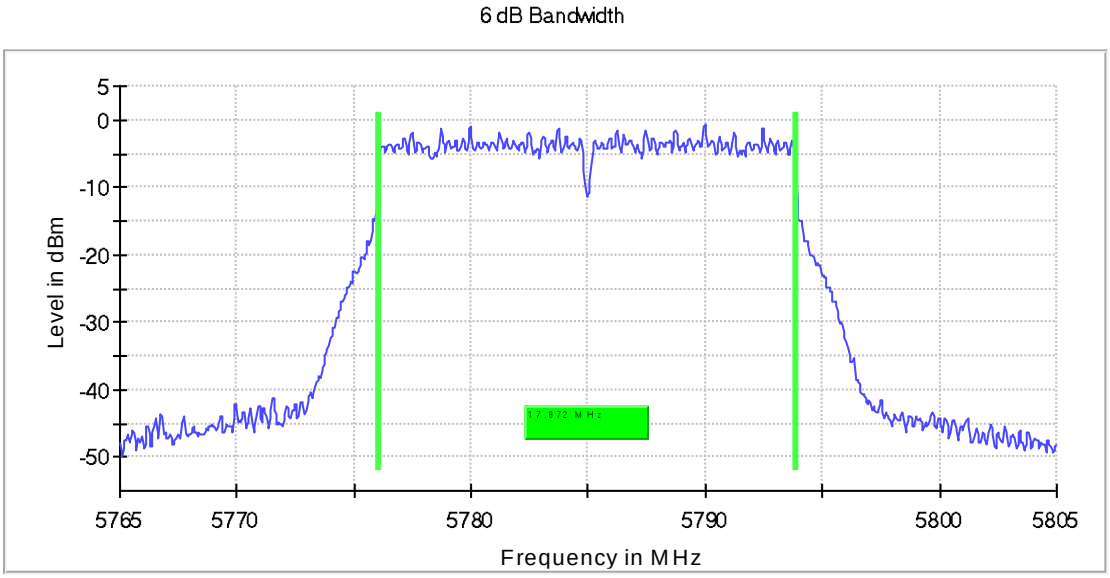

Fig. 123: Middle Channel - DTS Bandwidth

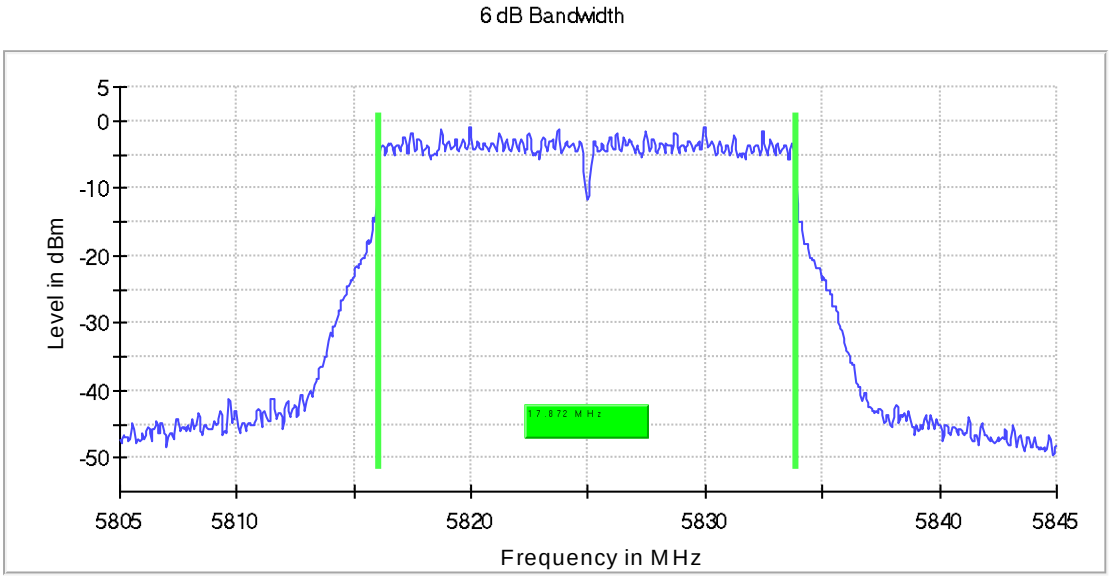

Fig. 124: High Channel - DTS Bandwidth

4.3.6.4 Sample #1. Mode #1. U-NII-3. Modulation N40

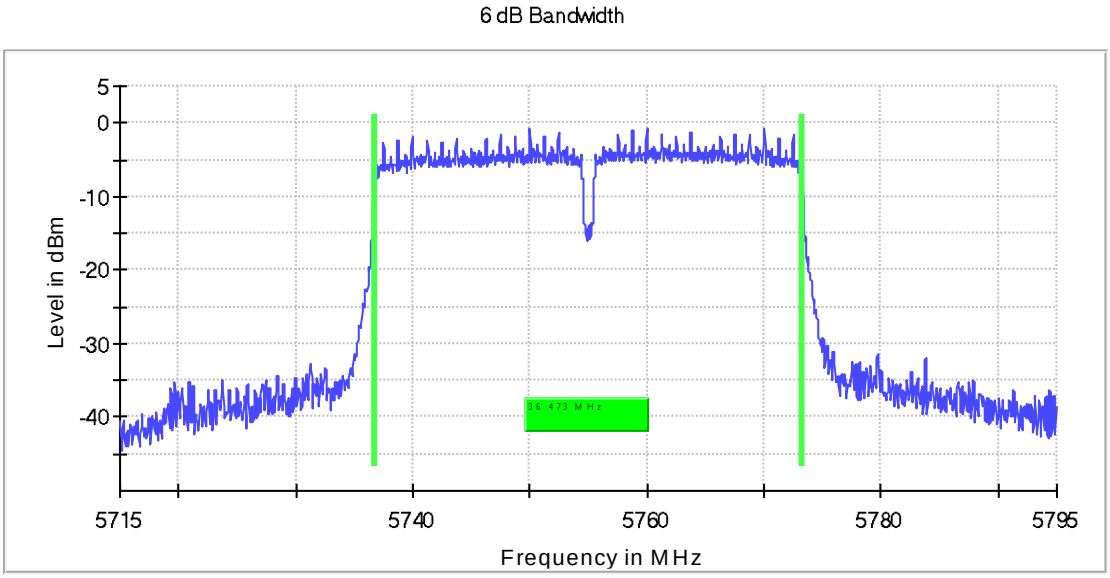

Fig. 125: Low Channel - DTS Bandwidth

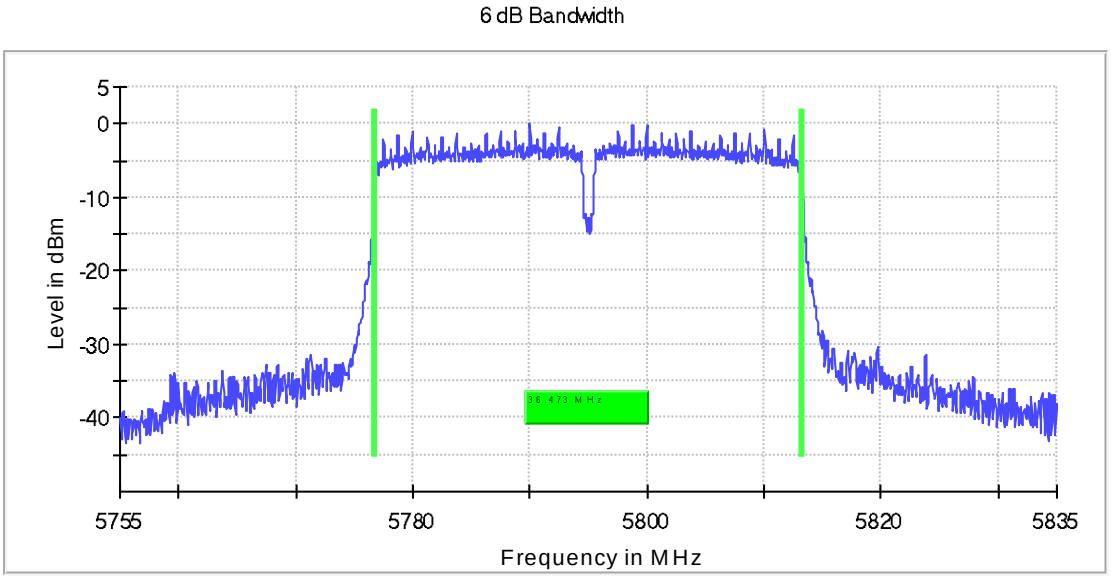

Fig. 126: High Channel - DTS Bandwidth

4.3.6.5 Sample #1. Mode #1. U-NII-3. Modulation AC40

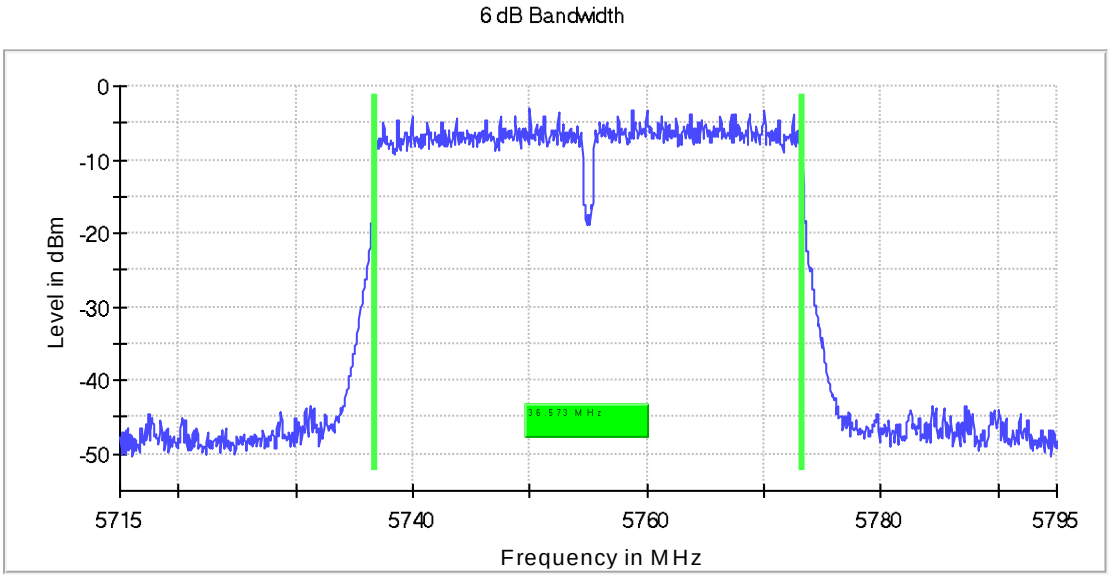

Fig. 127: Low Channel - DTS Bandwidth

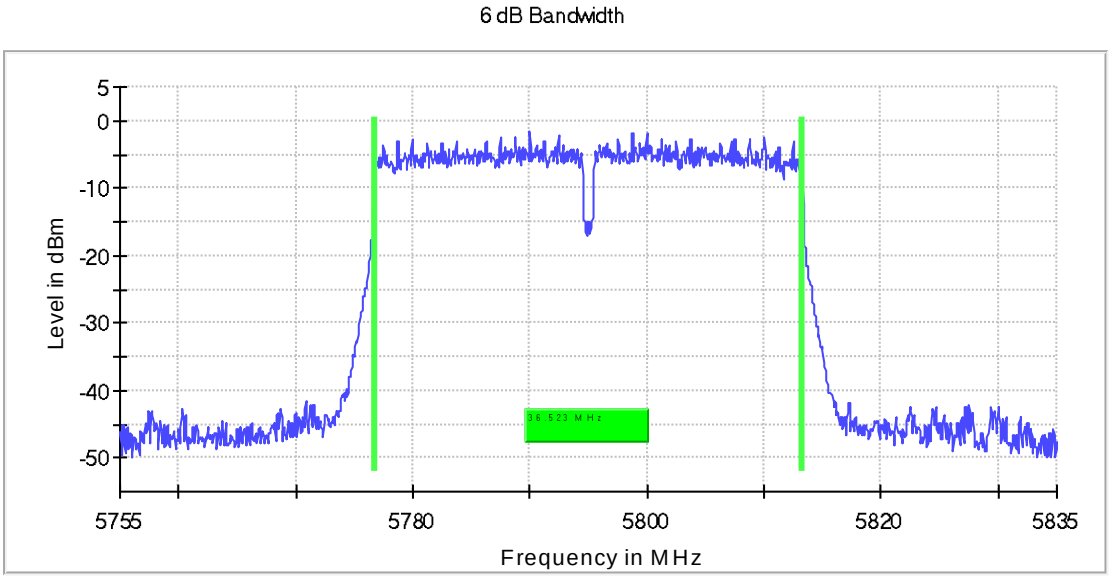

Fig. 128: High Channel - DTS Bandwidth

4.3.6.6 Sample #1. Mode #1. U-NII-3. Modulation AC80

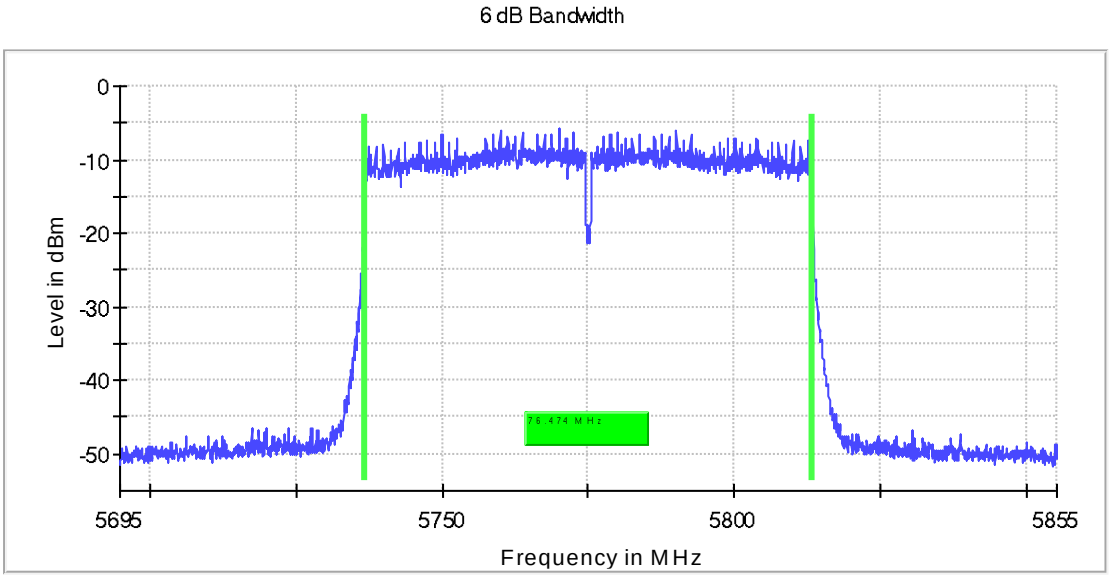

Fig. 129: Low Channel - DTS Bandwidth

4.3.7 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
RF SWICTH	ROHDE & SCHWARZ	OSP120 + OSPB157W8	1042701	24/03/2022	24/03/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042546	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024
EMC32. EMC MEASUREMENT SOFTWARE	ROHDE & SCHWARZ	R&S. EMC32	104624	-	-
DIGITAL THERMO-HYGROMETER	TESTO	608-H1	1041916	09/02/2024	09/02/2025
SHIELDED CHAMBER SR0	ALBATROSS	SR	1042267	-	-

Table 18: Test Instruments – DTS Bandwidth

4.3.8 Uncertainty

Test Type	Test Description	Uncertainty
Emission	RF bandwidth measurements	±76.0 Hz

Table 19: Uncertainties - DTS Bandwidth

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.4 TRANSMITTER MAXIMUM CONDUCTED OUTPUT POWER

4.4.1 Test Setup Required

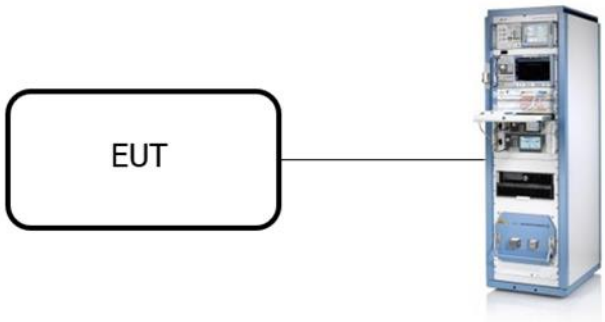

Fig. 130: Set-Up - Transmitter Maximum Conducted Output Power

4.4.2 Requirements

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, 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.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, 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.

For the band 5.725-5.850 GHz, 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 30 dBm in any 500-kHz 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

4.4.3 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
17/01/2024	Javier M. Nadales	-	21.4	44.7	998.1
24/01/2024	Javier M. Nadales	-	22.1	47.2	998.6
25/01/2024	Javier M. Nadales	-	23.7	48.2	1004.3
26/01/2024	Javier M. Nadales	-	21.8	44.5	997.6
29/01/2024	Javier M. Nadales	-	22.1	46.3	1012.3
30/01/2024	Javier M. Nadales	-	22.7	48.1	1002.2

Table 20: Test environmental conditions – Transmitter Maximum Conducted Output Power

4.4.4 Test Results

4.4.4.1 U-NII-1

Measurement using a RF average power meter.

Modulation	Operating Frequency [MHz]	Gated RMS [dBm]	Limit [dBm]	Results
Mode A20	5180	18.9	24	PASS
	5200	18.7	24	PASS
	5240	18.2	24	PASS
Mode N20	5180	19.2	24	PASS
	5200	19.0	24	PASS
	5240	18.6	24	PASS
Mode AC20	5180	16.9	24	PASS
	5200	16.6	24	PASS
	5240	16.2	24	PASS
Mode N40	5190	18.2	24	PASS
	5230	17.9	24	PASS
Mode AC40	5190	15.9	24	PASS
	5230	15.4	24	PASS
Mode AC80	5210	15.6	24	PASS

Table 21: Summary Test Results – Transmitter Maximum Conducted Output Power

4.4.4.2 U-NII-2A

Measurement using a RF average power meter.

Modulation	Operating Frequency [MHz]	Gated RMS [dBm]	Limit [dBm]	Results
Mode A20	5260	17.4	24	PASS
	5280	17.3	24	PASS
	5320	17.7	24	PASS
Mode N20	5260	17.2	24	PASS
	5280	17.1	24	PASS
	5320	17.3	24	PASS
Mode AC20	5260	16.6	24	PASS
	5280	16.5	24	PASS
	5320	17.2	24	PASS
Mode N40	5270	18.9	24	PASS
	5310	16.7	24	PASS
Mode AC40	5270	16.6	24	PASS
	5310	16.5	24	PASS
Mode AC80	5290	16.1	24	PASS

Table 22: Summary Test Results – Transmitter Maximum Conducted Output Power

4.4.4.3 U-NII-2C

Measurement using a RF average power meter.

Modulation	Operating Frequency [MHz]	Gated RMS [dBm]	Limit [dBm]	Results
Mode A20	5500	18.4	24	PASS
	5580	18.1	24	PASS
	5700	18.4	24	PASS
Mode N20	5500	19.0	24	PASS
	5580	18.7	24	PASS
	5700	18.8	24	PASS
Mode AC20	5500	16.4	24	PASS
	5580	16.4	24	PASS
	5700	16.6	24	PASS
Mode N40	5510	18.3	24	PASS
	5670	16.0	24	PASS
Mode AC40	5510	16.0	24	PASS
	5670	16.0	24	PASS
Mode AC80	5610	15.5	24	PASS

Table 23: Summary Test Results – Transmitter Maximum Conducted Output Power

4.4.4.4 U-NII-3

Measurement using a RF average power meter.

Modulation	Operating Frequency [MHz]	Gated RMS [dBm]	Limit [dBm]	Results
Mode A20	5745	18.8	30	PASS
	5785	18.4	30	PASS
	5825	18.7	30	PASS
Mode N20	5745	18.8	30	PASS
	5785	18.2	30	PASS
	5825	16.4	30	PASS
Mode AC20	5745	16.4	30	PASS
	5785	15.9	30	PASS
	5825	16.4	30	PASS
Mode N40	5755	19.0	30	PASS
	5795	18.7	30	PASS
Mode AC40	5755	16.6	30	PASS
	5795	16.1	30	PASS
Mode AC80	5775	15.9	30	PASS

Table 24: Summary Test Results – Transmitter Maximum Conducted Output Power

4.4.5 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
RF SWICTH	ROHDE & SCHWARZ	OSP120 + OSPB157W8	1042701	24/03/2022	24/03/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042546	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024
EMC32. EMC MEASUREMENT SOFTWARE	ROHDE & SCHWARZ	R&S. EMC32	104624	-	-
DIGITAL THERMO-HYGROMETER	TESTO	608-H1	1041916	09/02/2024	09/02/2025
SHIELDED CHAMBER SR0	ALBATROSS	SR	1042267	-	-

Table 25: Test Instruments – Maximum Peak Conducted Output Power

4.4.6 Uncertainty

Test Type	Test Description	Uncertainty
Emissions	RF output power measurements [Conducted]	±1.3 dB

Table 26: Uncertainties - Maximum Peak Conducted Output Power

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.

4.5 TRANSMITTER MAXIMUM POWER SPECTRAL DENSITY

4.5.1 Test Setup Required

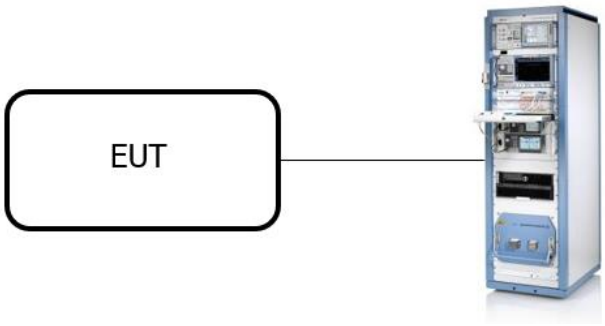

Fig. 131: Set-Up - Transmitter Maximum Power Spectral Density

4.5.2 Requirements

For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. In addition, 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.

For the 5.25-5.35 GHz and 5.47-5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz. In addition, 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.

For the band 5.725-5.850 GHz, 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 30 dBm in any 500-kHz 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

4.5.3 EMI Receiver configuration

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

Central frequency [MHz]	Bandwidth [MHz]	Span [MHz]	Detector	Trace Mode	RBW [kHz]	VBW [kHz]
Channel frequency	20	40	RMS	Average Power	1000	3000
Channel frequency	40	80	RMS	Average Power	1000	3000
Channel frequency	80	160	RMS	Average Power	1000	3000

Table 27: EMI Receiver configuration – Transmitter Maximum Power Spectral Density

Central frequency [MHz]	Bandwidth [MHz]	Span [MHz]	Detector	Trace Mode	RBW [kHz]	VBW [kHz]
Channel frequency	20	40	RMS	Average Power	500	2000
Channel frequency	40	80	RMS	Average Power	500	2000
Channel frequency	80	160	RMS	Average Power	500	2000

Table 28: EMI Receiver configuration – Transmitter Maximum Power Spectral Density – U-NII-3

4.5.4 Test Environmental Conditions

Test Date	Technician	Supervisor	Temperature [ºC]	Humidity [%]	Atm. Pressure [mbar]
17/01/2024	Javier M. Nadales	-	21.4	44.7	998.1
24/01/2024	Javier M. Nadales	-	22.1	47.2	998.6
25/01/2024	Javier M. Nadales	-	23.7	48.2	1004.3
26/01/2024	Javier M. Nadales	-	21.8	44.5	997.6
29/01/2024	Javier M. Nadales	-	22.1	46.3	1012.3
30/01/2024	Javier M. Nadales	-	22.7	48.1	1002.2

Table 29: Test environmental conditions – Transmitter Maximum Power Spectral Density

4.5.5 Summary Test Results

4.5.5.1 U-NII-1

Modulation	Operating Frequency [MHz]	PSD [dBm]	Limit [dBm]	Results
Mode A20	5180	5.2	11	PASS
	5200	5.1	11	PASS
	5240	4.5	11	PASS
Mode N20	5180	7.0	11	PASS
	5200	5.5	11	PASS
	5240	4.8	11	PASS
Mode AC20	5180	2.7	11	PASS
	5200	2.2	11	PASS
	5240	1.6	11	PASS
Mode N40	5190	1.0	11	PASS
	5230	0.0	11	PASS
Mode AC40	5190	-3.0	11	PASS
	5230	-3.7	11	PASS
Mode AC80	5210	-7.7	11	PASS

Table 30: Summary Test Results – Transmitter Maximum Power Spectral Density

4.5.5.2 U-NII-2A

Modulation	Operating Frequency [MHz]	PSD [dBm]	Limit [dBm]	Results
Mode A20	5260	2.6	11.0	PASS
	5280	2.5	11.0	PASS
	5320	2.6	11.0	PASS
Mode N20	5260	3.0	11.0	PASS
	5280	2.7	11.0	PASS
	5320	4.0	11.0	PASS
Mode AC20	5260	1.7	11.0	PASS
	5280	1.1	11.0	PASS
	5320	-7.2	11.0	PASS
Mode N40	5270	1.9	11.0	PASS
	5310	1.0	11.0	PASS
Mode AC40	5270	-1.7	11.0	PASS
	5310	-1.5	11.0	PASS
Mode AC80	5290	-6.7	11.0	PASS

Table 31: Summary Test Results – Transmitter Maximum Power Spectral Density

4.5.5.3 U-NII-2C

Modulation	Operating Frequency [MHz]	PSD [dBm]	Limit [dBm]	Results
Mode A20	5500	4.4	11.0	PASS
	5580	3.6	11.0	PASS
	5700	4.2	11.0	PASS
Mode N20	5500	6.1	11.0	PASS
	5580	4.3	11.0	PASS
	5700	4.6	11.0	PASS
Mode AC20	5500	2.4	11.0	PASS
	5580	1.0	11.0	PASS
	5700	1.2	11.0	PASS
Mode N40	5510	2.6	11.0	PASS
	5670	1.4	11.0	PASS
Mode AC40	5510	-2.0	11.0	PASS
	5670	-2.1	11.0	PASS
Mode AC80	5610	-6.2	11.0	PASS

Table 32: Summary Test Results – Transmitter Maximum Power Spectral Density

4.5.5.4 U-NII-3

Modulation	Operating Frequency [MHz]	PSD [dBm]	Limit [dBm]	Results
Mode A20	5745	2.0	30.0	PASS
	5785	2.4	30.0	PASS
	5825	3.3	30.0	PASS
Mode N20	5745	1.5	30.0	PASS
	5785	1.4	30.0	PASS
	5825	-0.5	30.0	PASS
Mode AC20	5745	-1.4	30.0	PASS
	5785	-1.3	30.0	PASS
	5825	-0.6	30.0	PASS
Mode N40	5755	-1.2	30.0	PASS
	5795	-0.1	30.0	PASS
Mode AC40	5755	-4.3	30.0	PASS
	5795	-3.4	30.0	PASS
Mode AC80	5775	-7.6	30.0	PASS

Table 33: Summary Test Results – Transmitter Maximum Power Spectral Density

4.5.6 Test Results

4.5.6.1 Sample #1. Mode #1. U-NII-1. Modulation A20

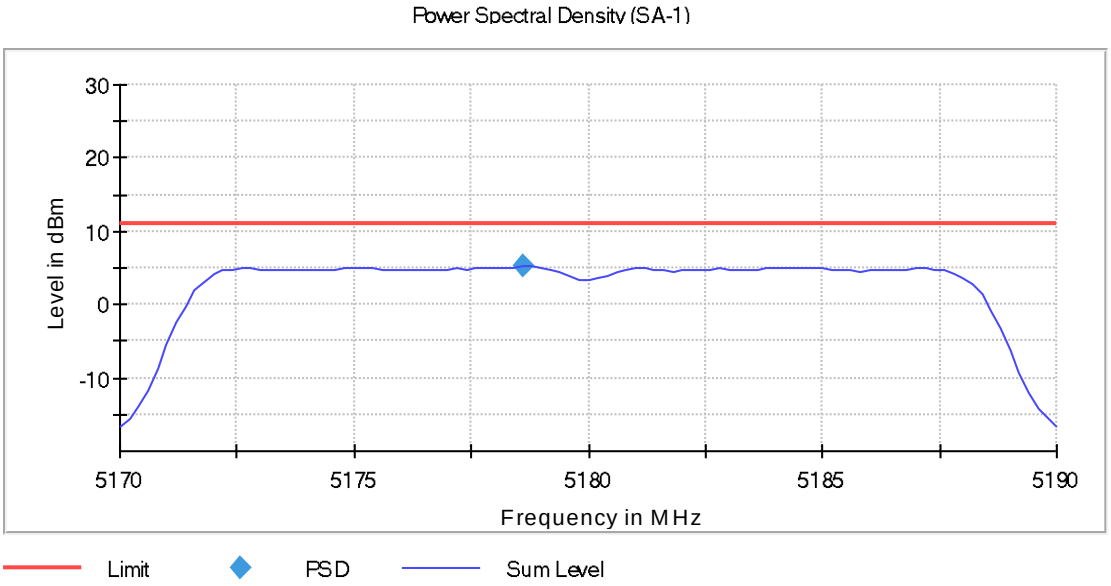

Fig. 132: Low Channel – PSD

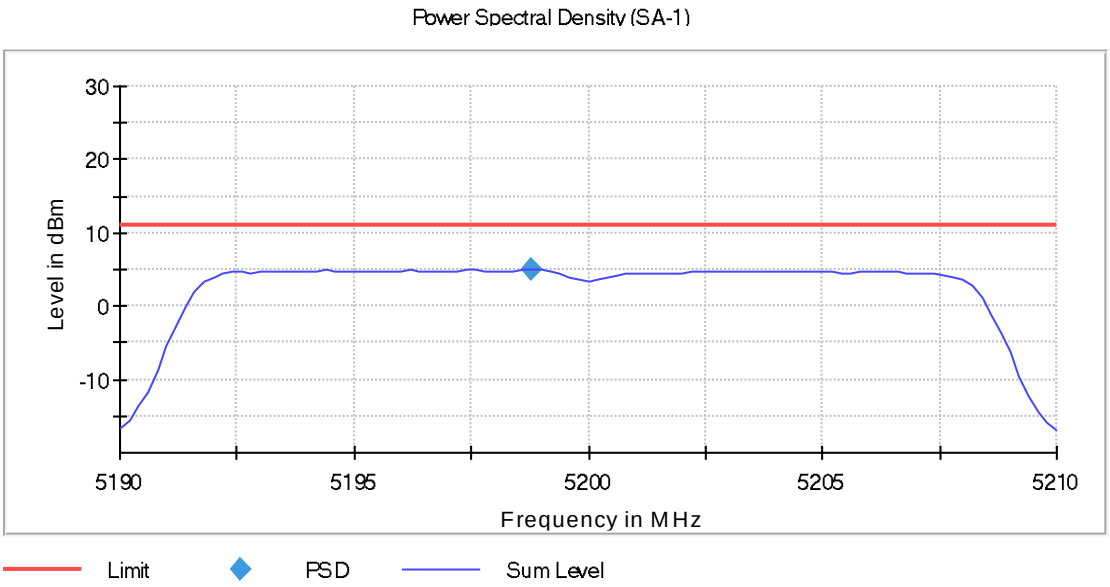

Fig. 133: Middle Channel – PSD

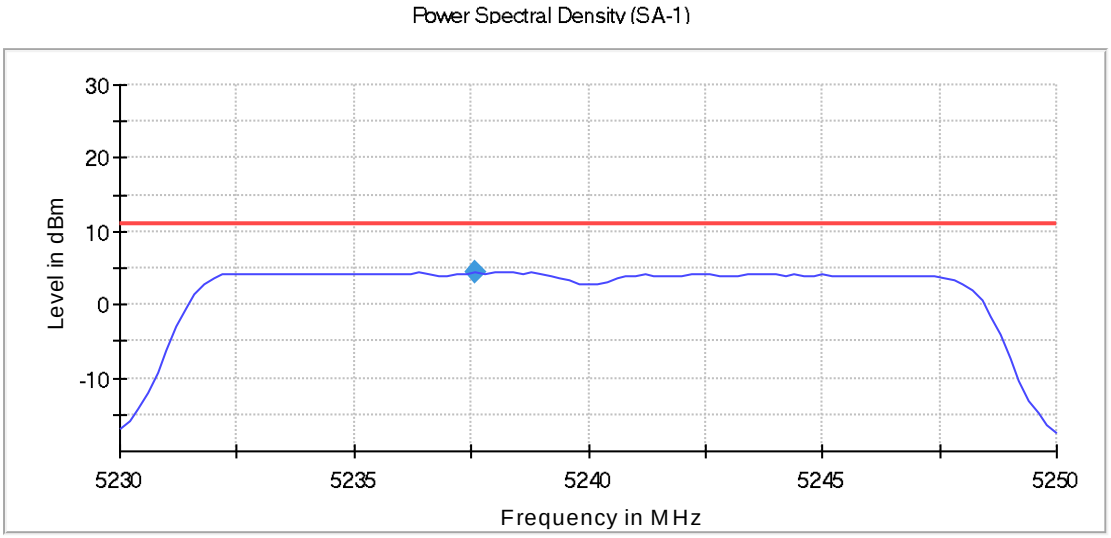

Fig. 134: High Channel – PSD

4.5.6.2 Sample #1. Mode #1. U-NII-1. Modulation N20

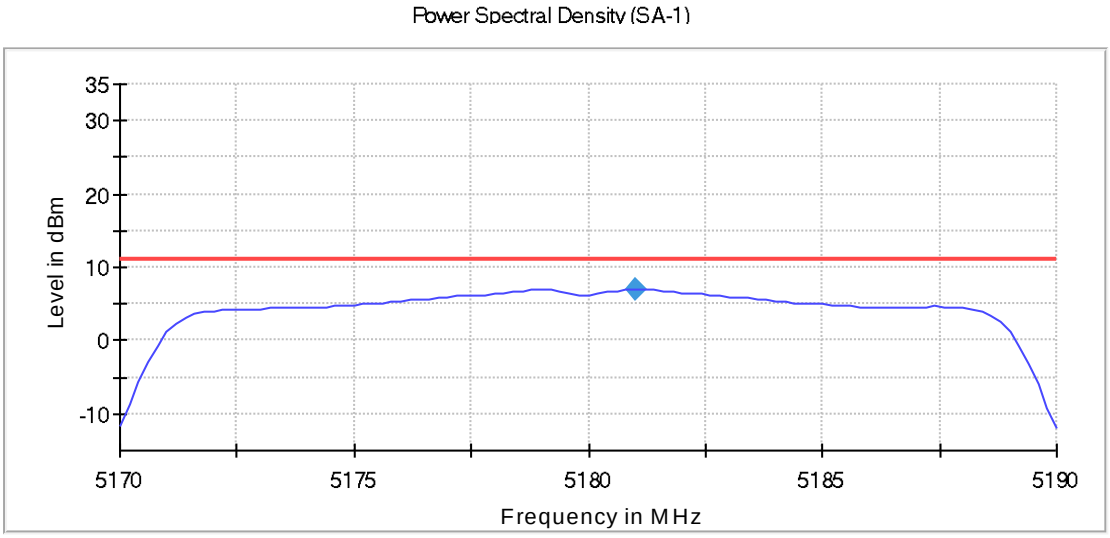

Fig. 135: Low Channel – PSD

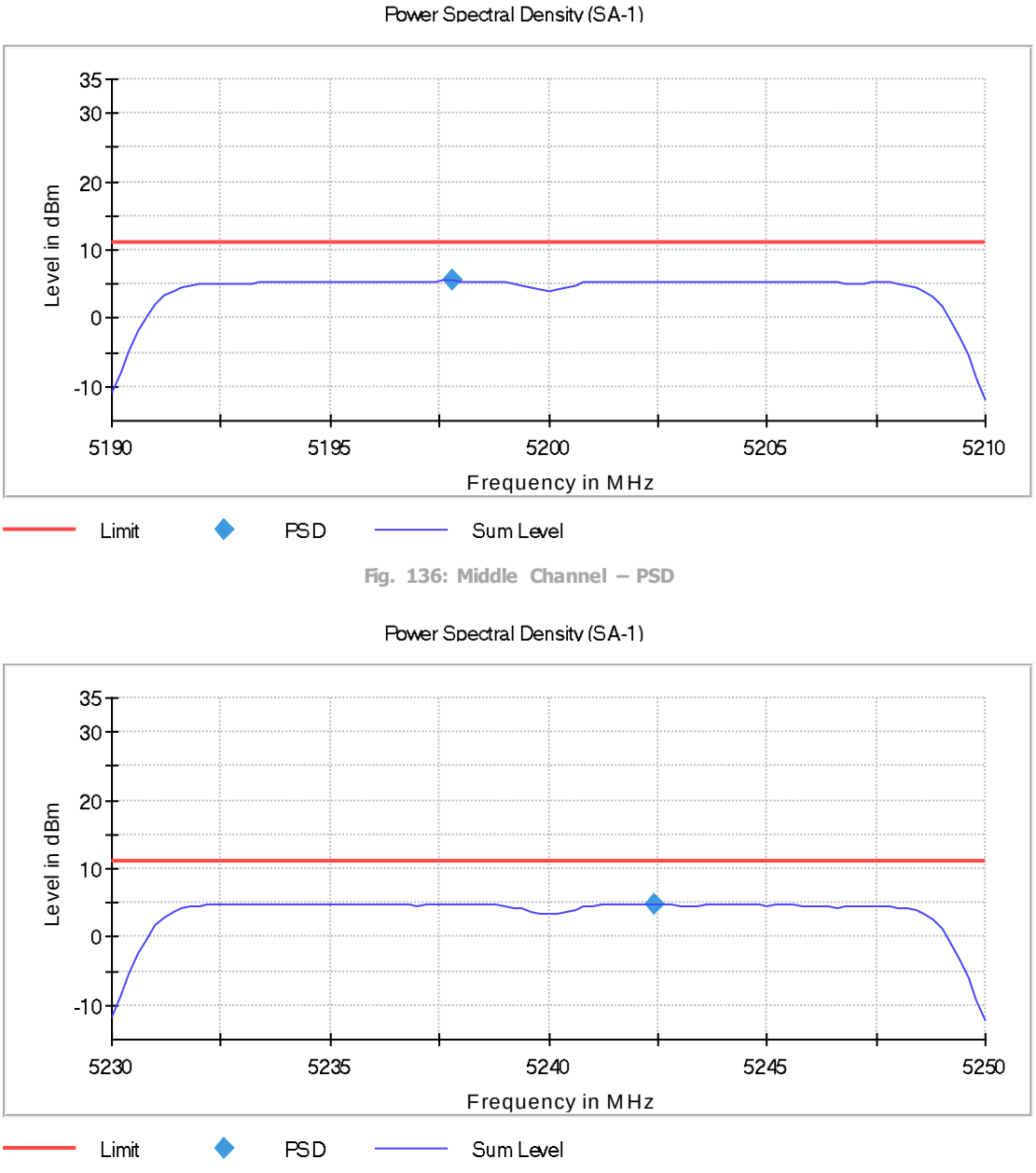

Fig. 136: Middle Channel – PSD

Fig. 137: High Channel – PSD

4.5.6.3 Sample #1. Mode #1. U-NII-1. Modulation AC20

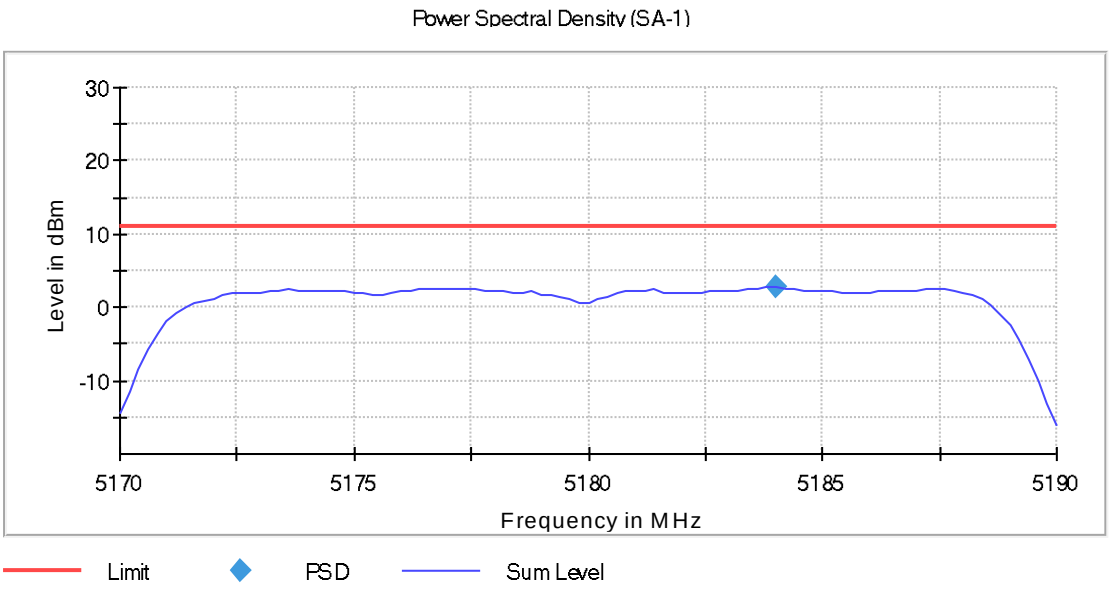

Fig. 138: Low Channel – PSD

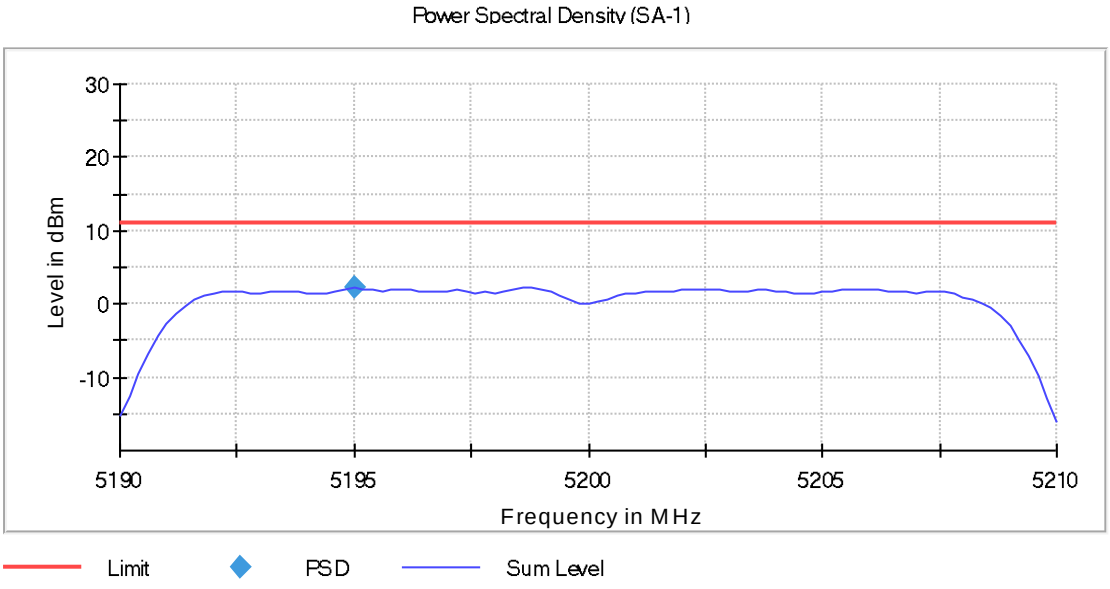

Fig. 139: Middle Channel – PSD

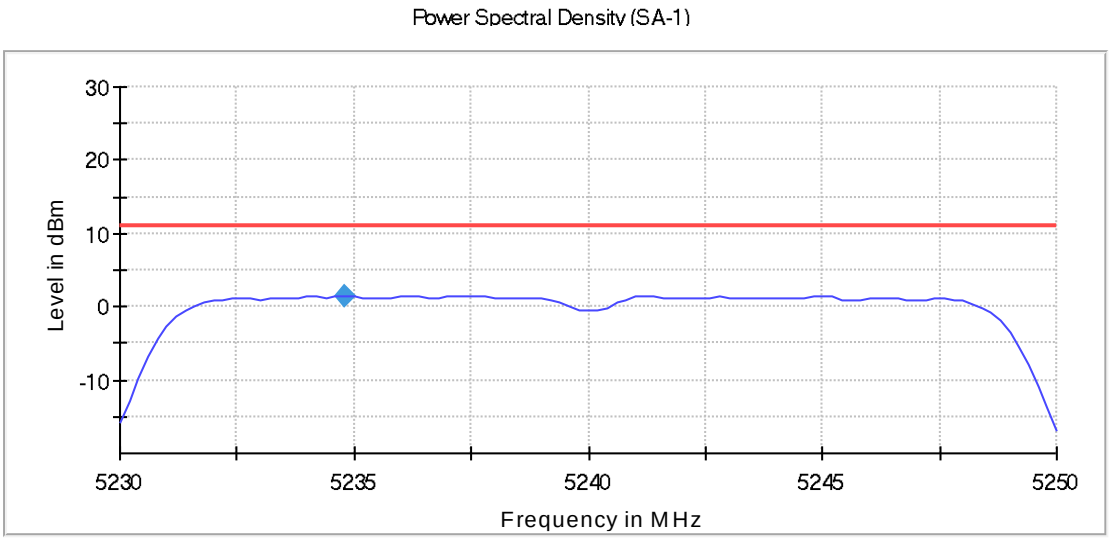

Fig. 140: High Channel – PSD

4.5.6.4 Sample #1. Mode #1. U-NII-1. Modulation N40

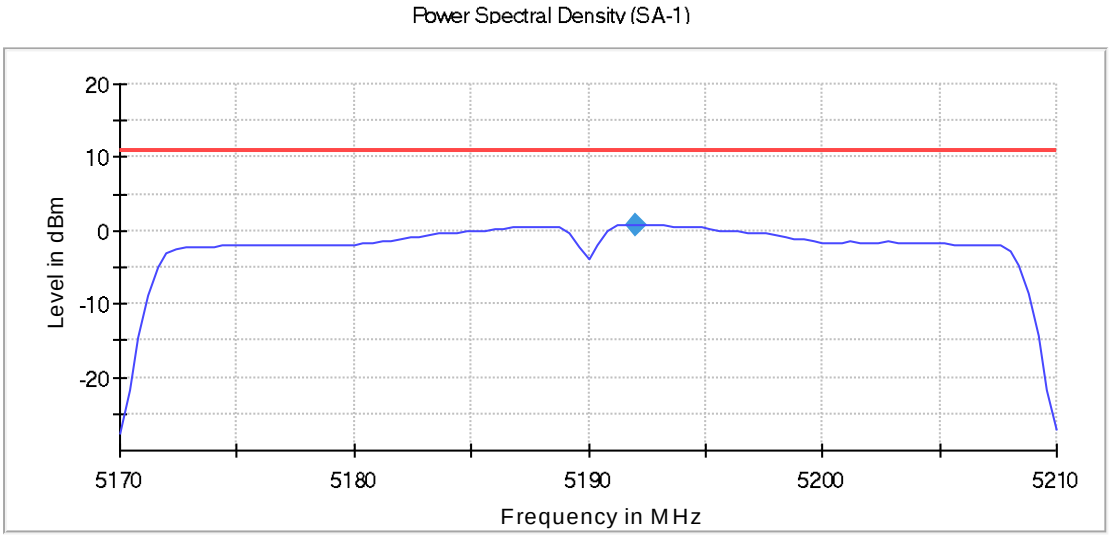

Fig. 141: Low Channel – PSD

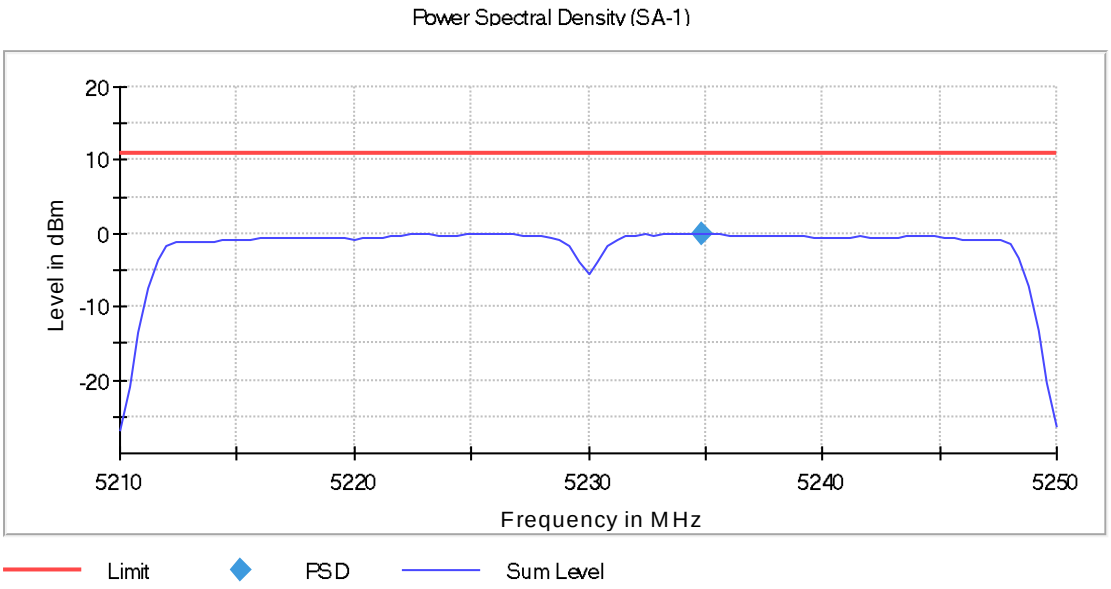

Fig. 142: High Channel – PSD

4.5.6.5 Sample #1. Mode #1. U-NII-1. Modulation AC40

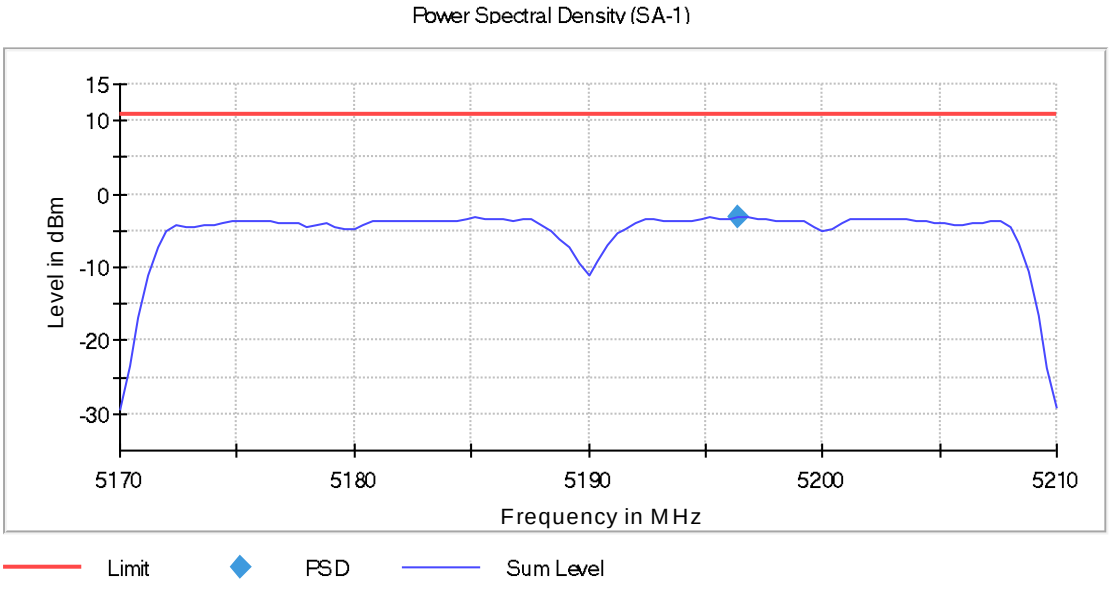

Fig. 143: Low Channel – PSD

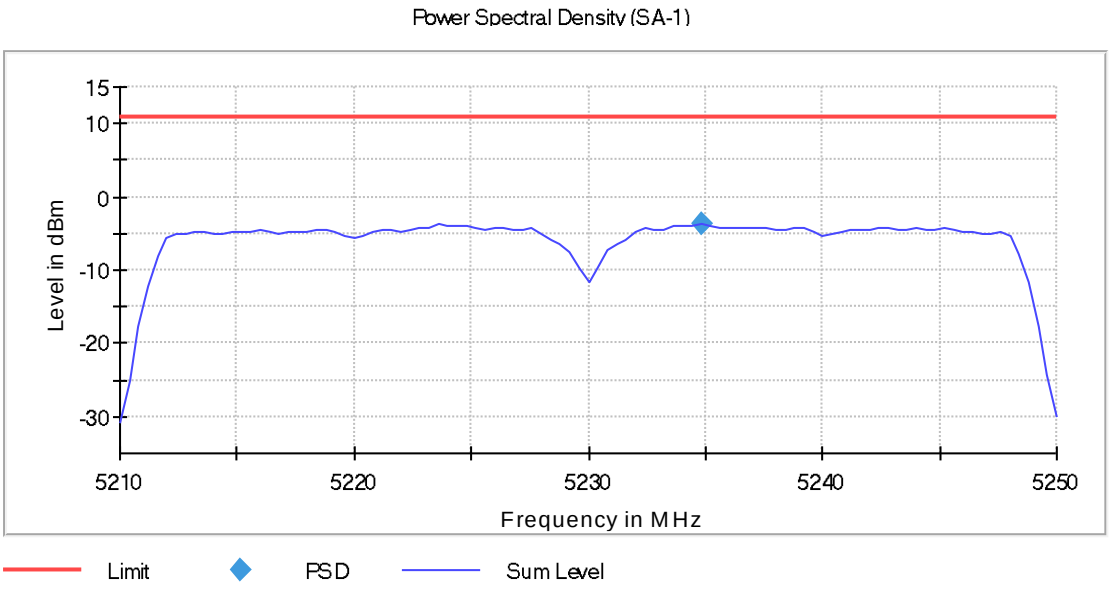

Fig. 144: High Channel – PSD

4.5.6.6 Sample #1. Mode #1. U-NII-1. Modulation AC80

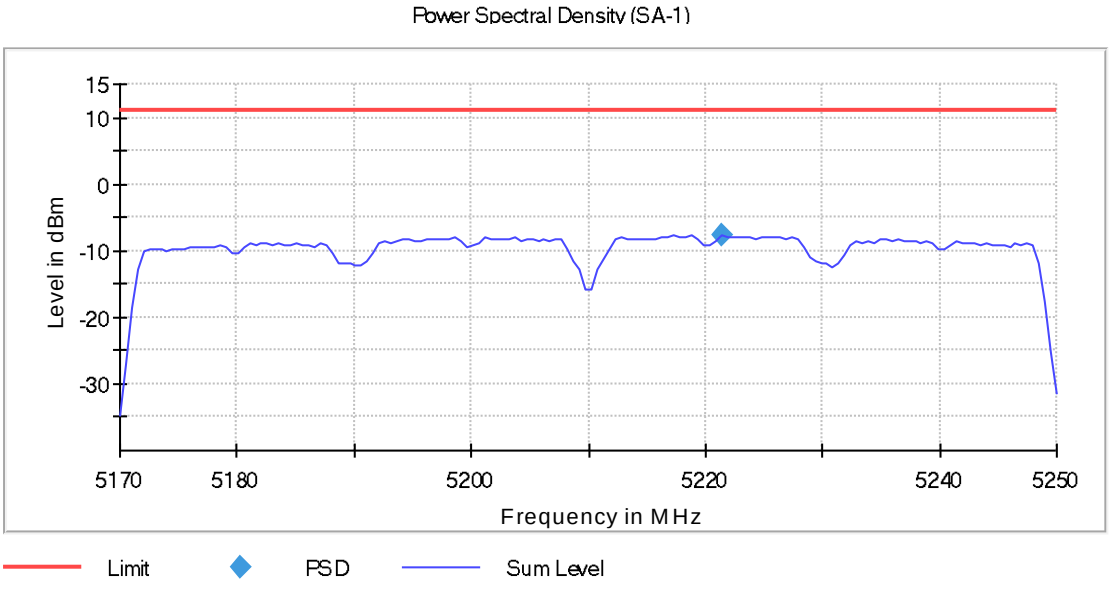

Fig. 145: Low Channel – PSD

4.5.6.7 Sample #1. Mode #1. U-NII-2A. Modulation A20

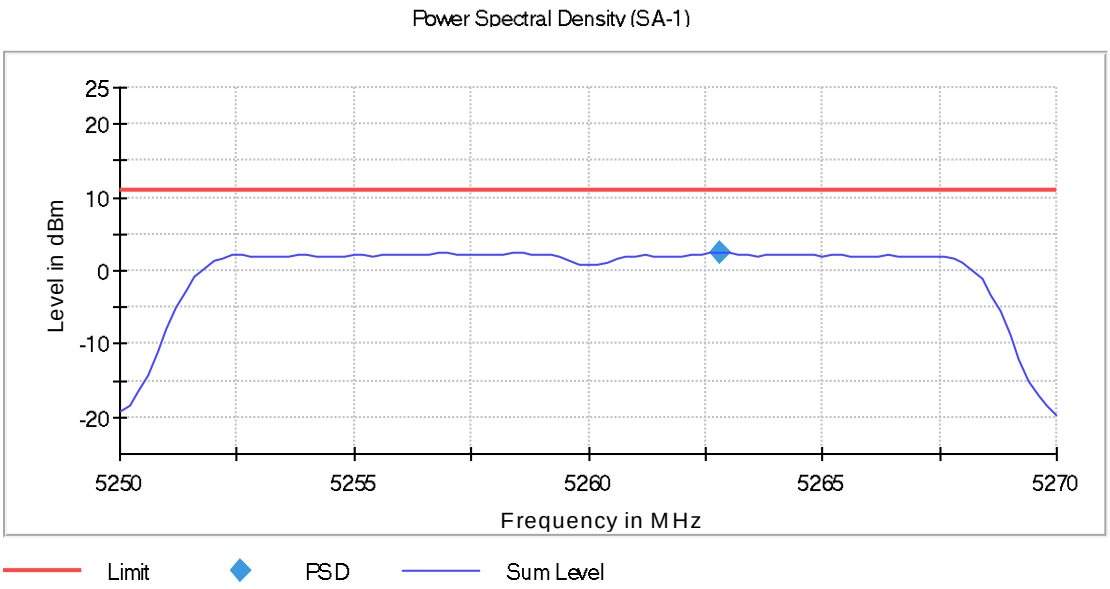

Fig. 146: Low Channel – PSD

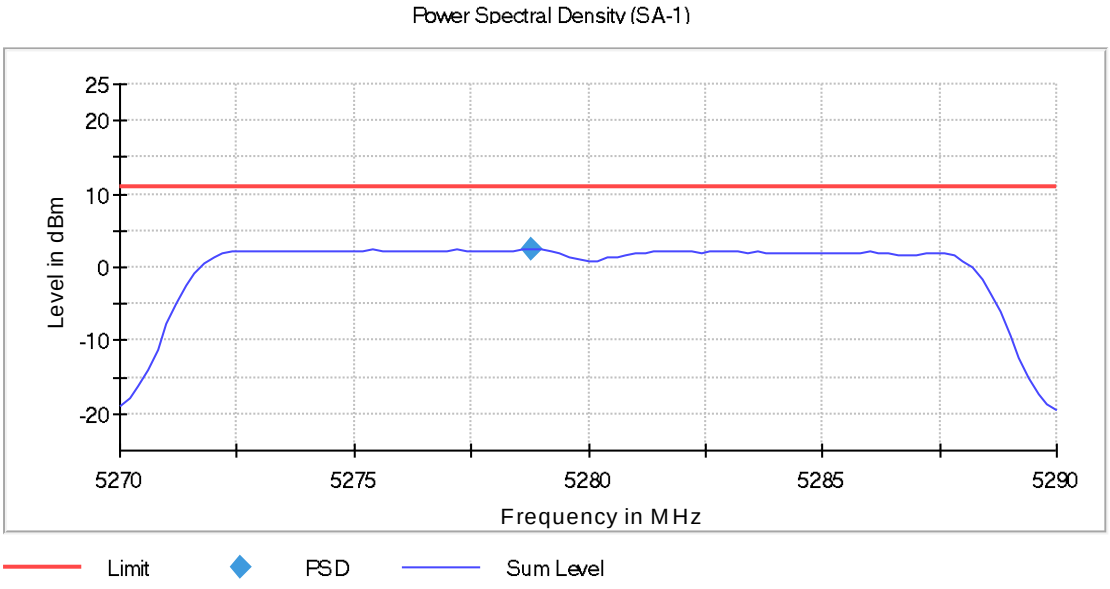

Fig. 147: Middle Channel – PSD

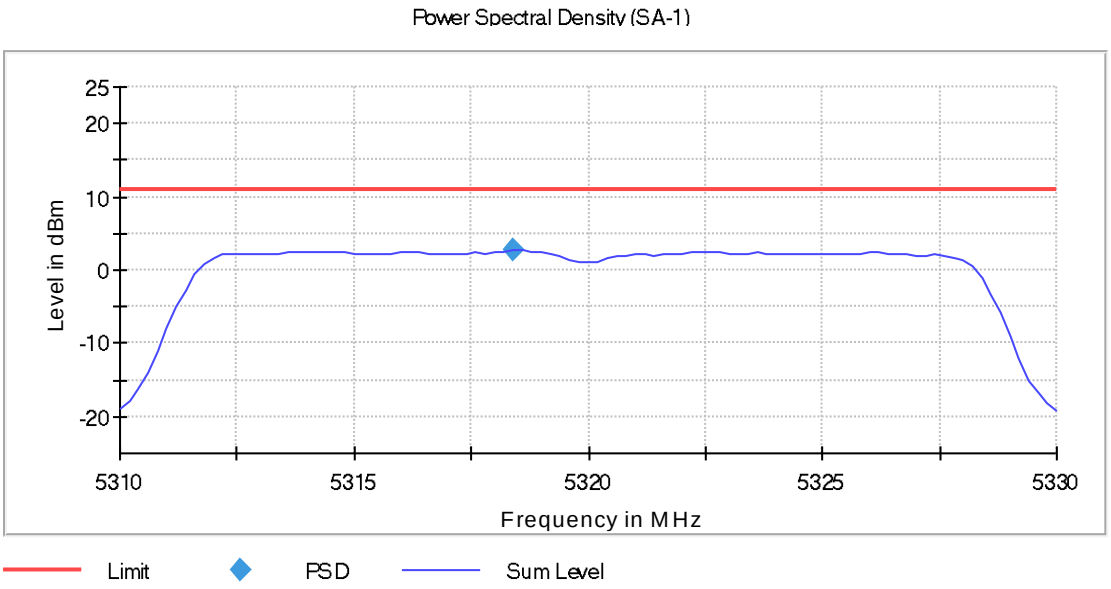

Fig. 148: High Channel – PSD

4.5.6.8 Sample #1. Mode #1. U-NII-2A. Modulation N20

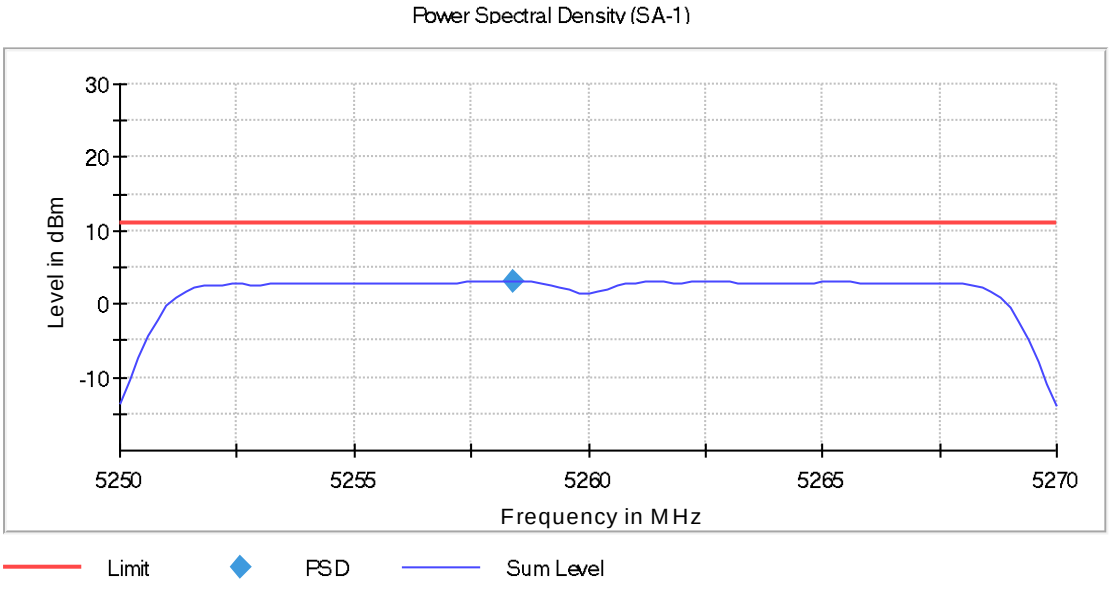

Fig. 149: Low Channel – PSD

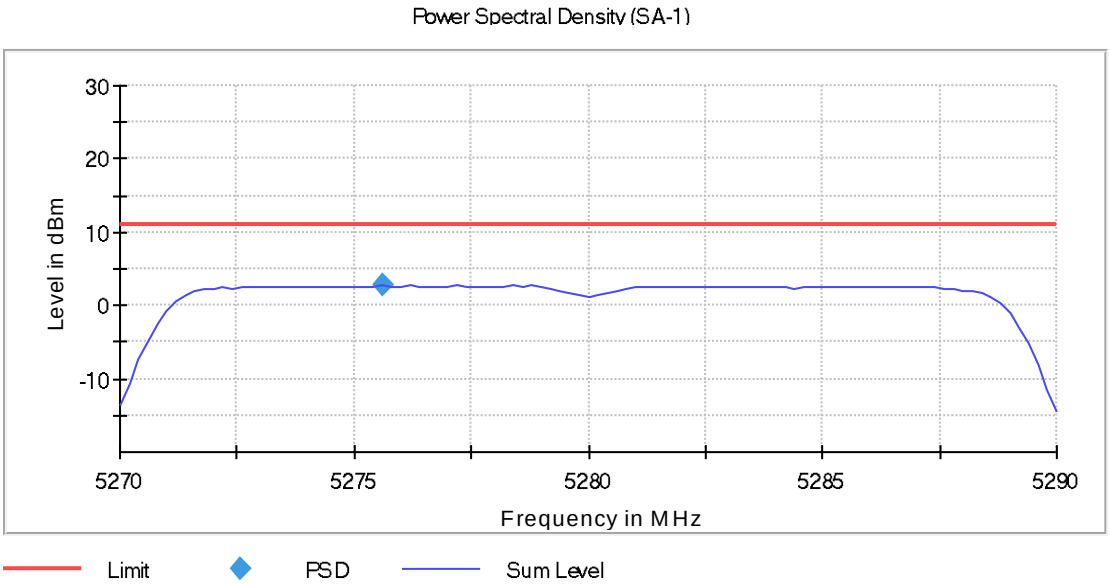

Fig. 150: Middle Channel – PSD

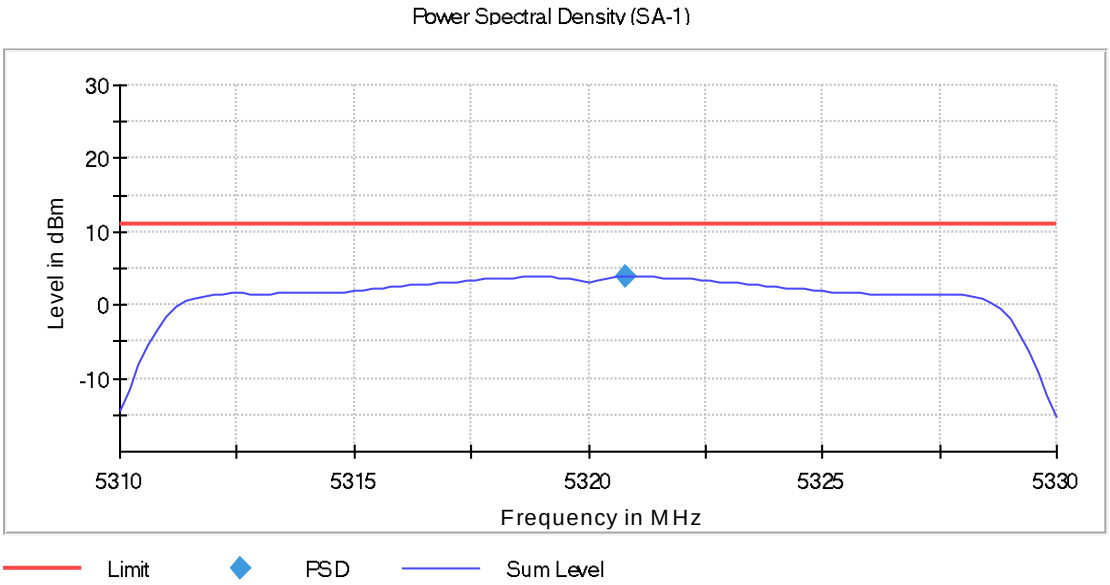

Fig. 151: High Channel – PSD

4.5.6.9 Sample #1. Mode #1. U-NII-2A. Modulation AC20

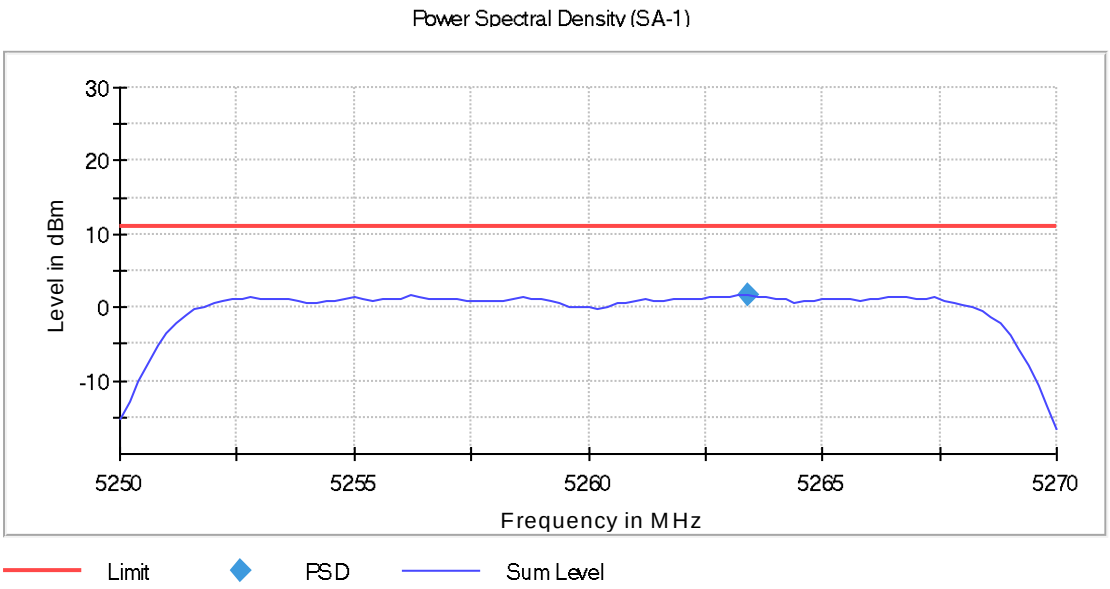

Fig. 152: Low Channel – PSD

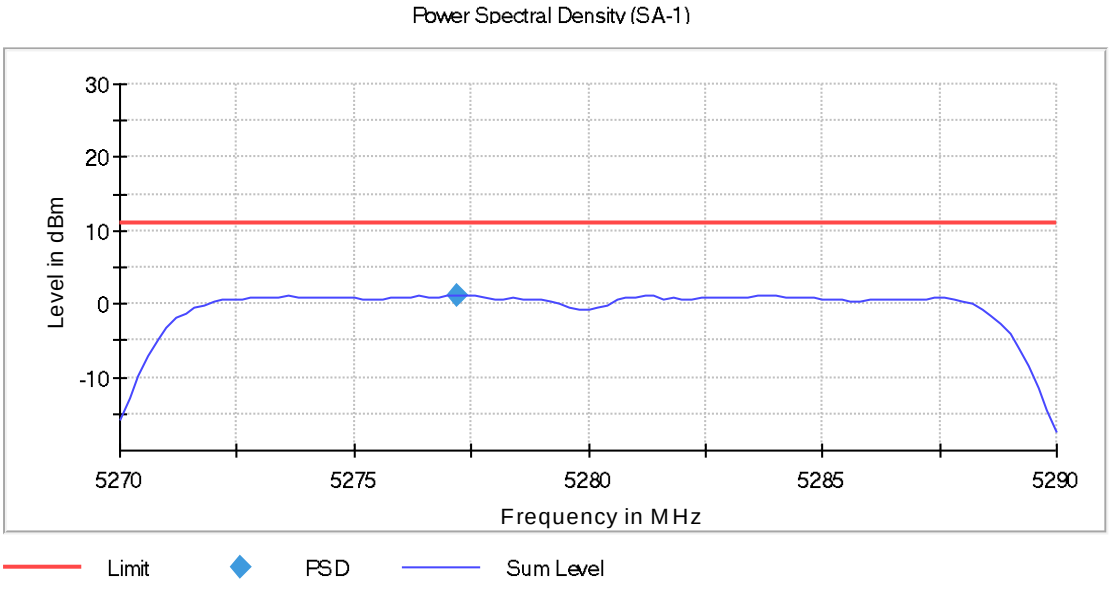

Fig. 153: Middle Channel – PSD

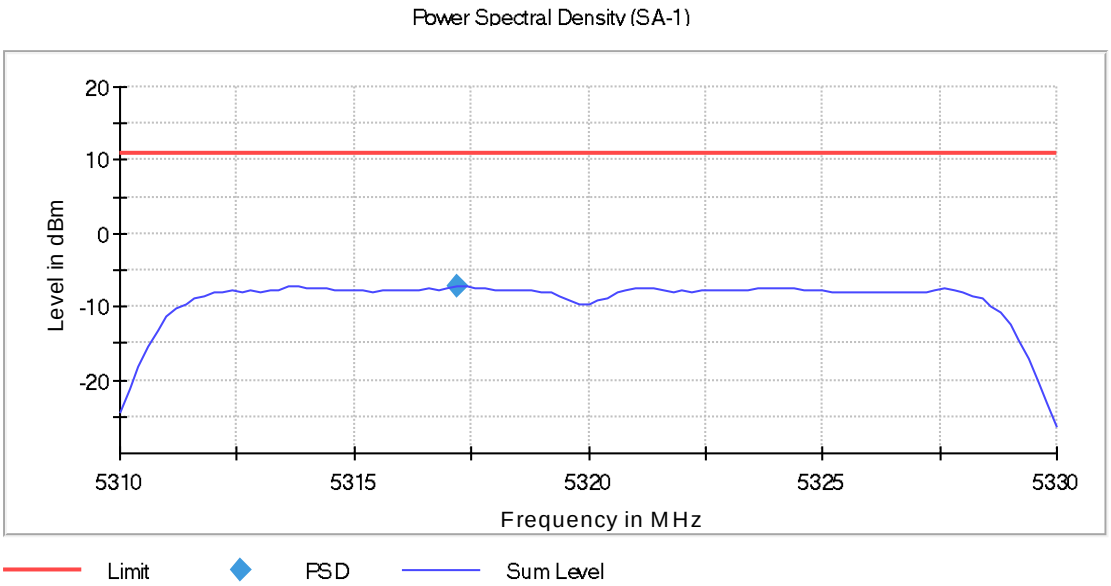

Fig. 154: High Channel – PSD

4.5.6.10 Sample #1. Mode #1. U-NII-2A. Modulation N40

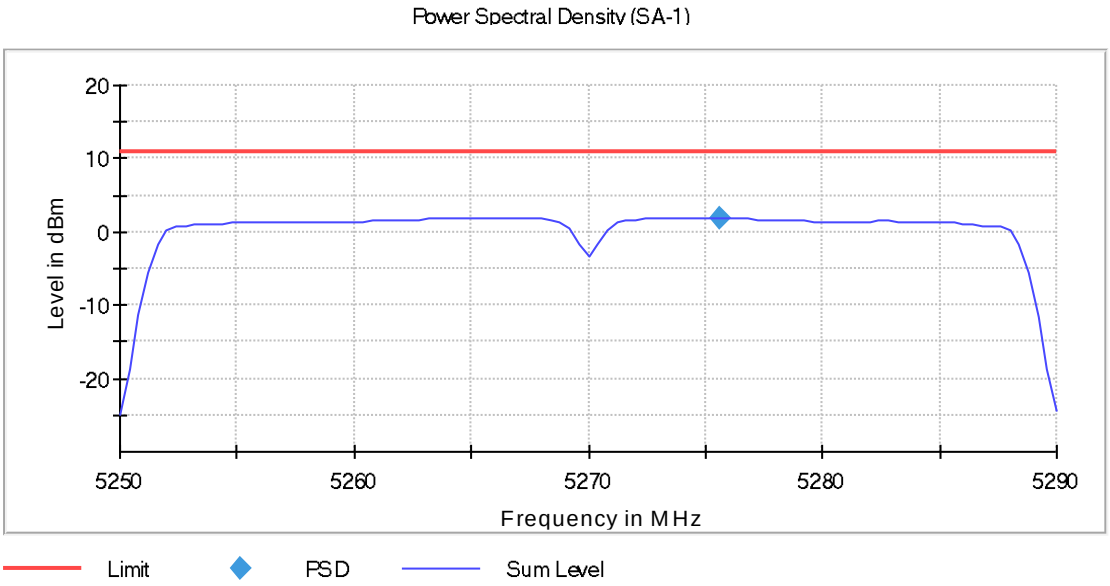

Fig. 155: Low Channel – PSD

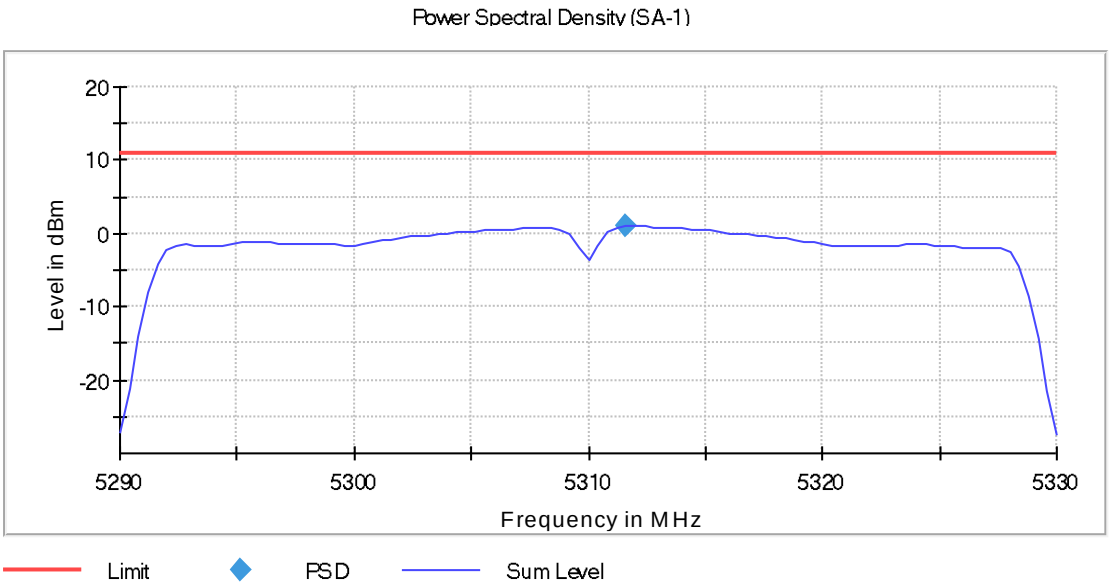

Fig. 156: High Channel – PSD

4.5.6.11 Sample #1. Mode #1. U-NII-2A. Modulation AC40

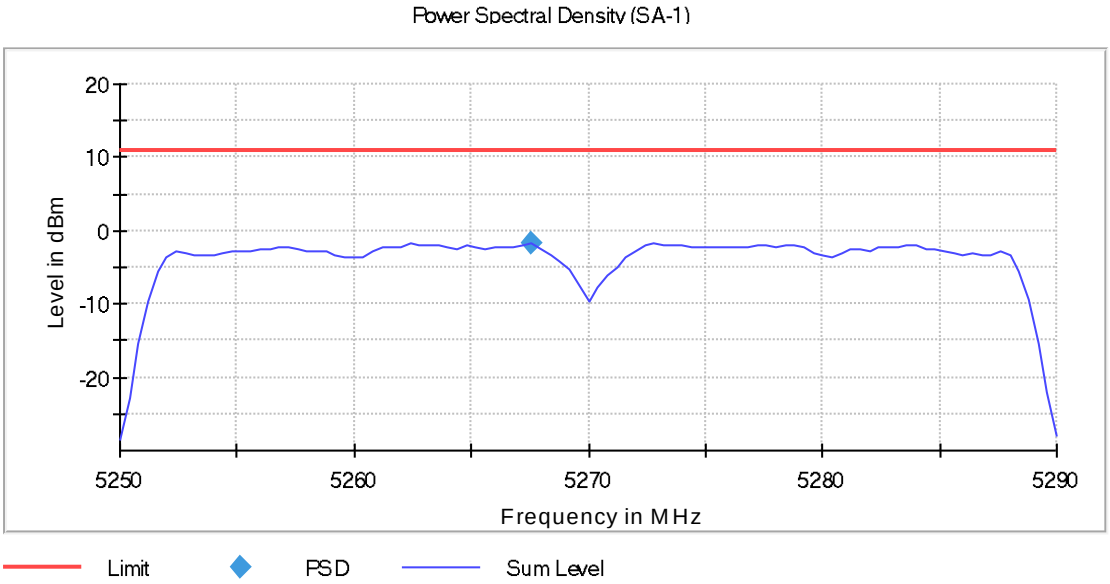

Fig. 157: Low Channel – PSD

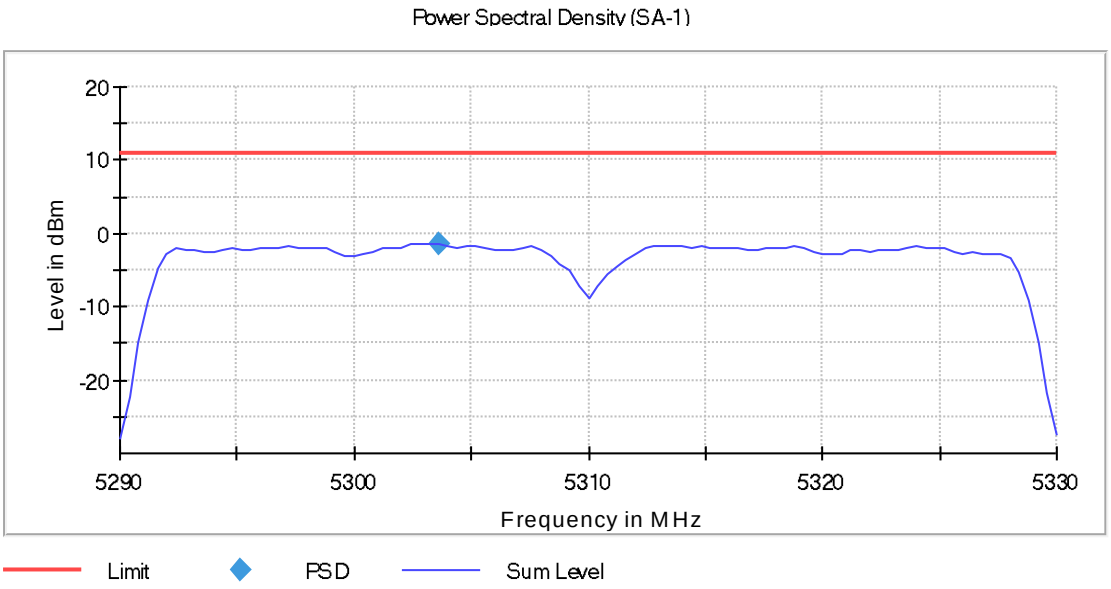

Fig. 158: High Channel – PSD

4.5.6.12 Sample #1. Mode #1. U-NII-2A. Modulation AC80

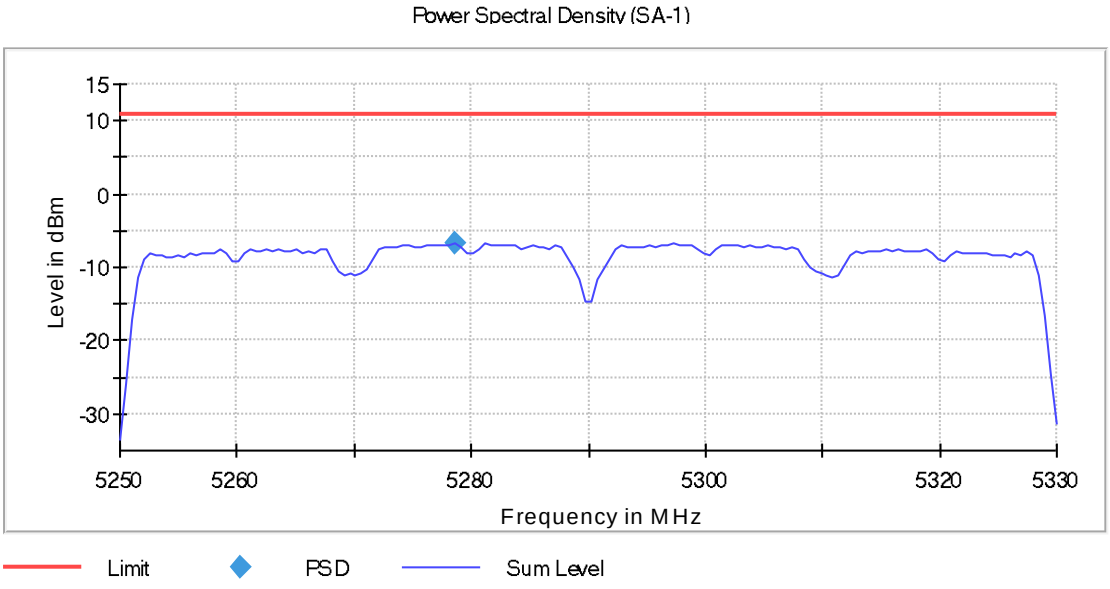

Fig. 159: Low Channel – PSD

4.5.6.13 Sample #1. Mode #1. U-NII-2C. Modulation A20

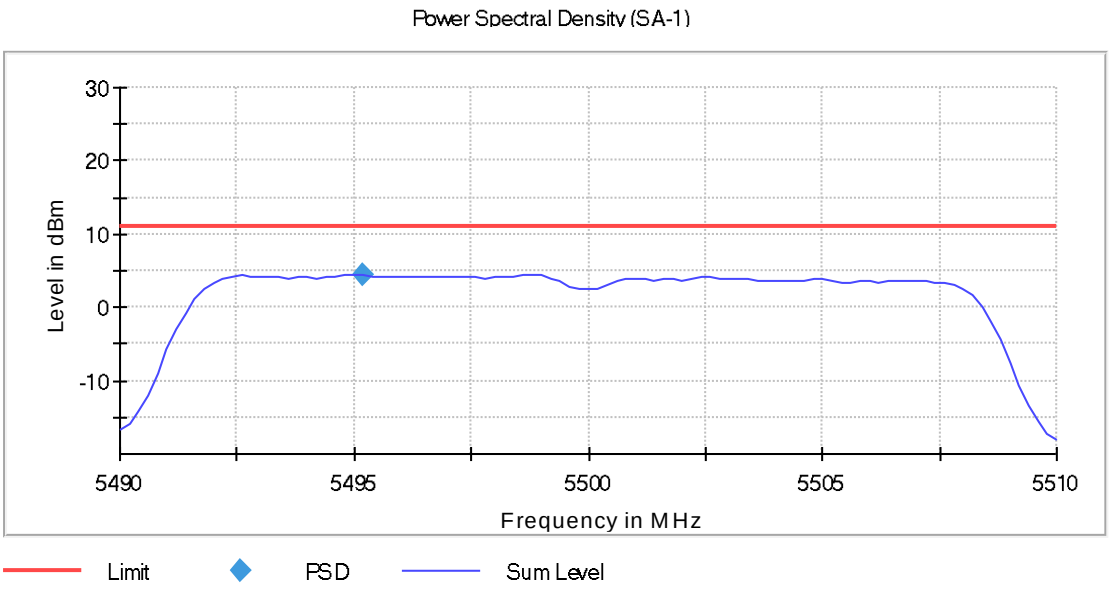

Fig. 160: Low Channel – PSD

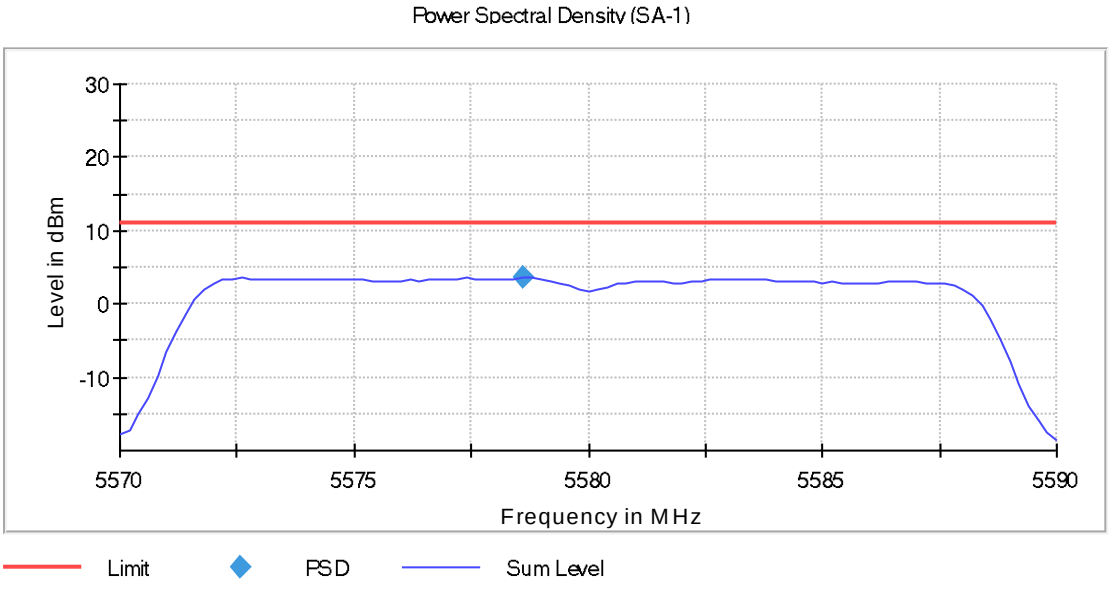

Fig. 161: Middle Channel – PSD

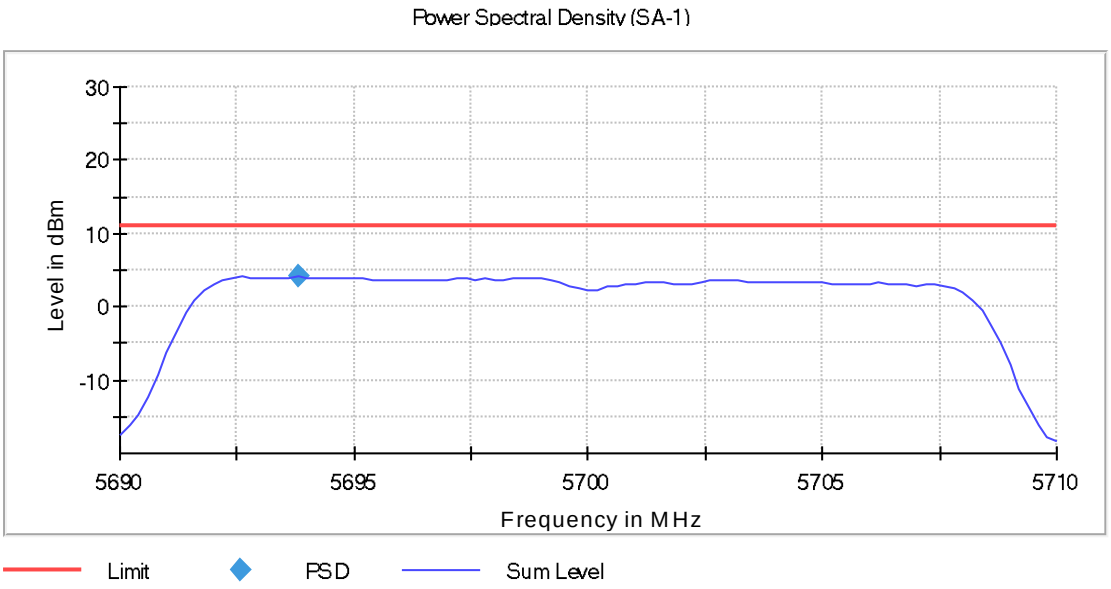

Fig. 162: High Channel – PSD

4.5.6.14 Sample #1. Mode #1. U-NII-2C. Modulation N20

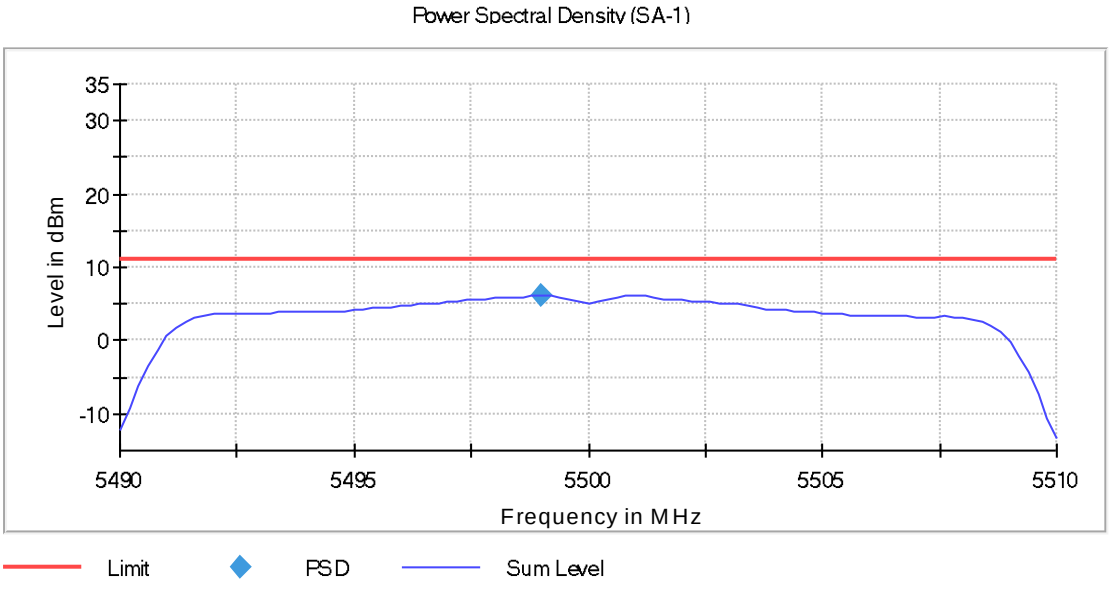

Fig. 163: Low Channel – PSD

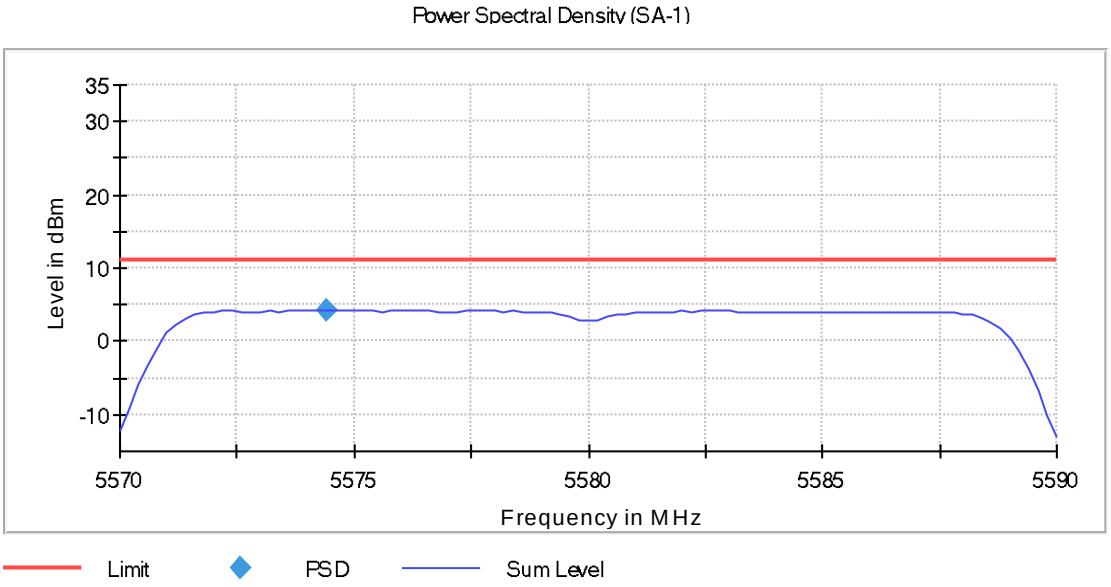

Fig. 164: Middle Channel – PSD

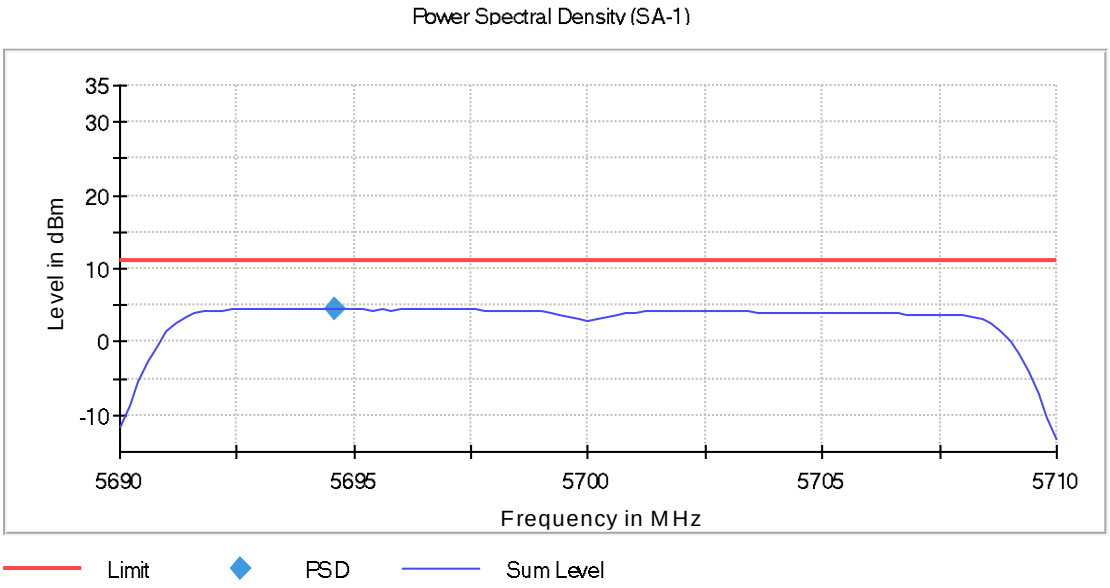

Fig. 165: High Channel – PSD

4.5.6.15 Sample #1. Mode #1. U-NII-2C. Modulation AC20

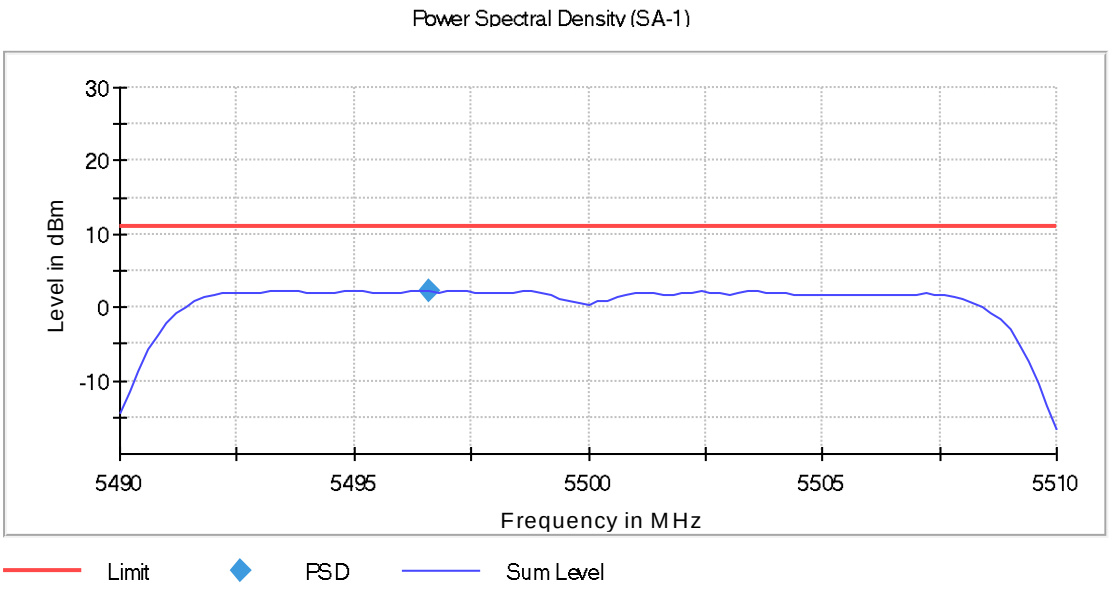

Fig. 166: Low Channel – PSD

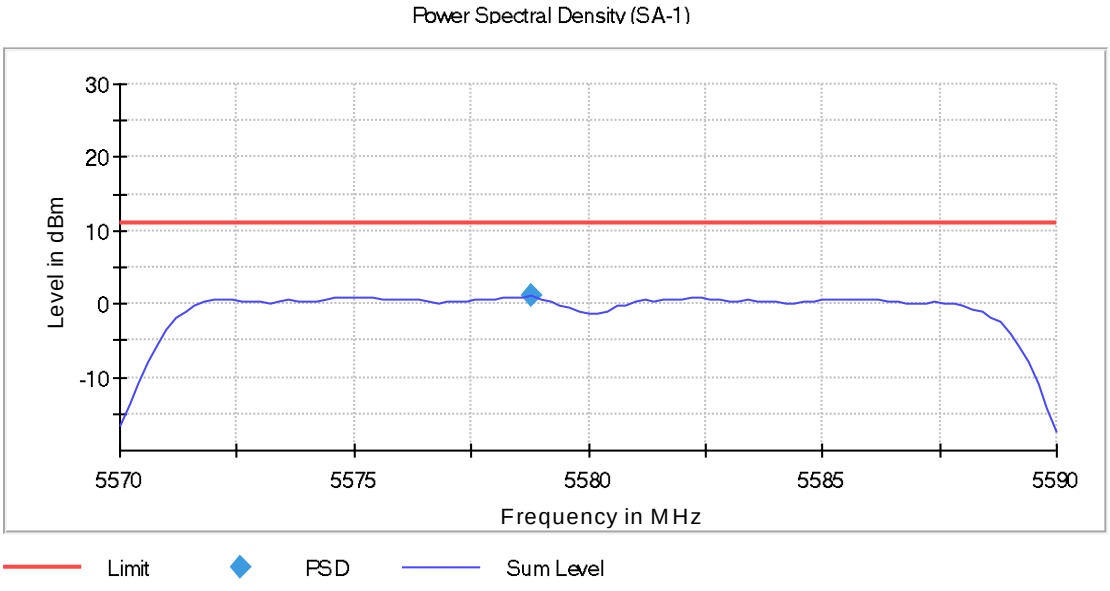

Fig. 167: Middle Channel – PSD

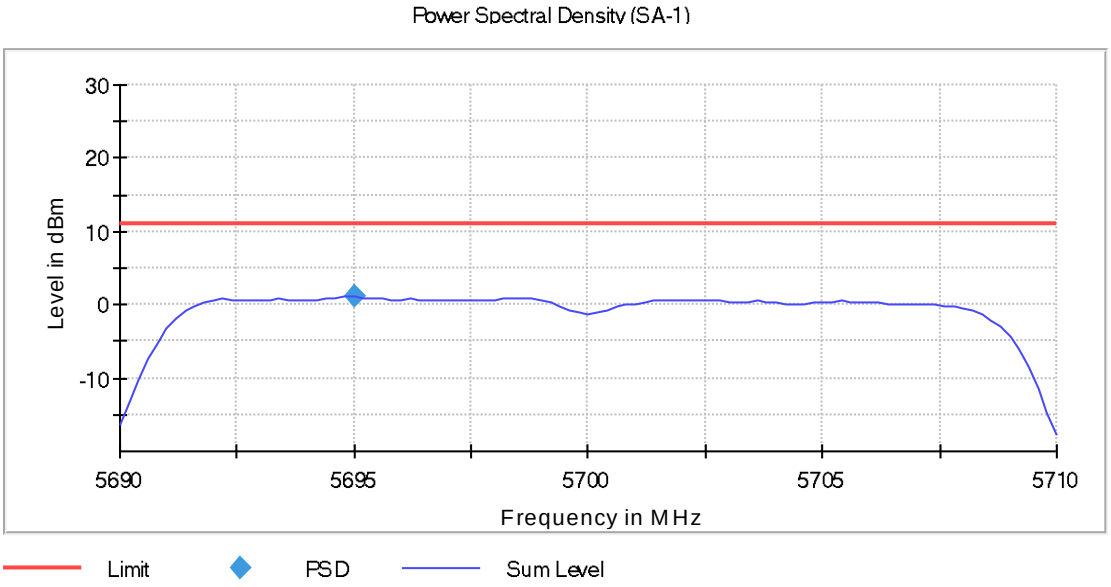

Fig. 168: High Channel – PSD

4.5.6.16 Sample #1. Mode #1. U-NII-2C. Modulation N40

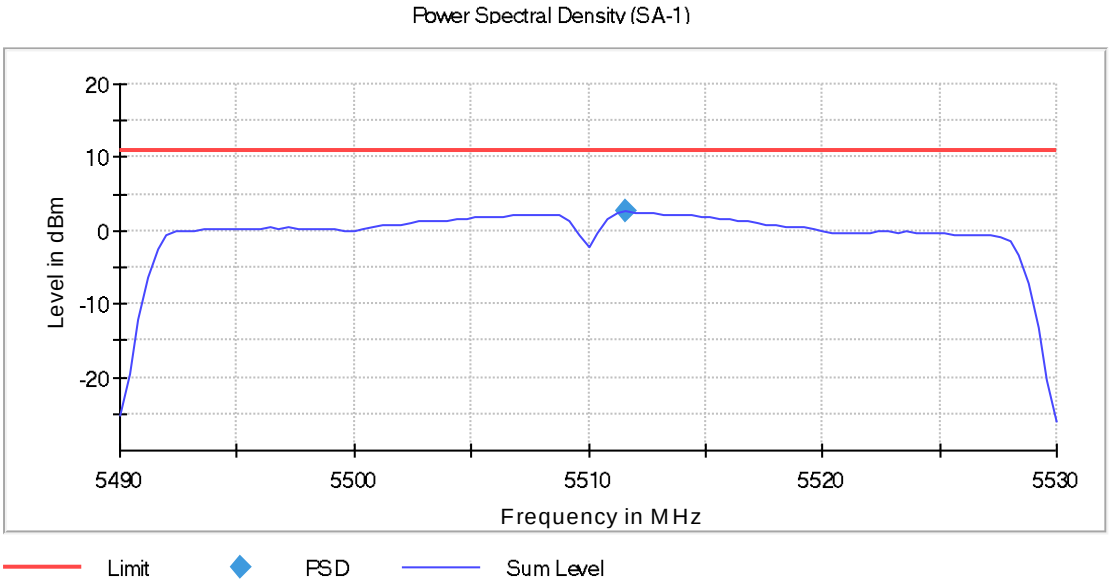

Fig. 169: Low Channel – PSD

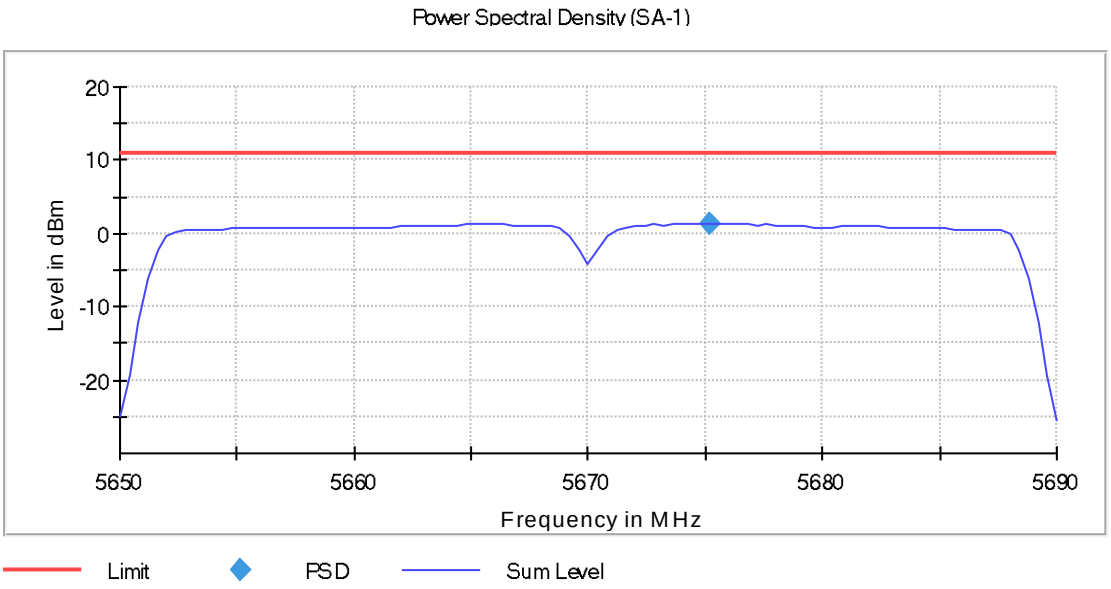

Fig. 170: High Channel – PSD

4.5.6.17 Sample #1. Mode #1. U-NII-2C. Modulation AC40

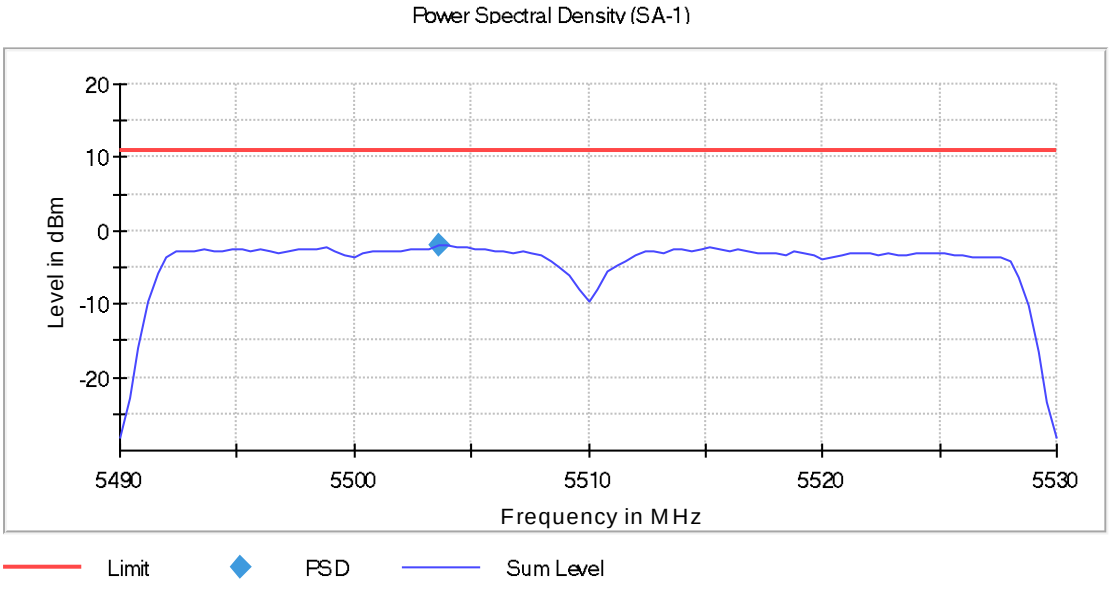

Fig. 171: Low Channel – PSD

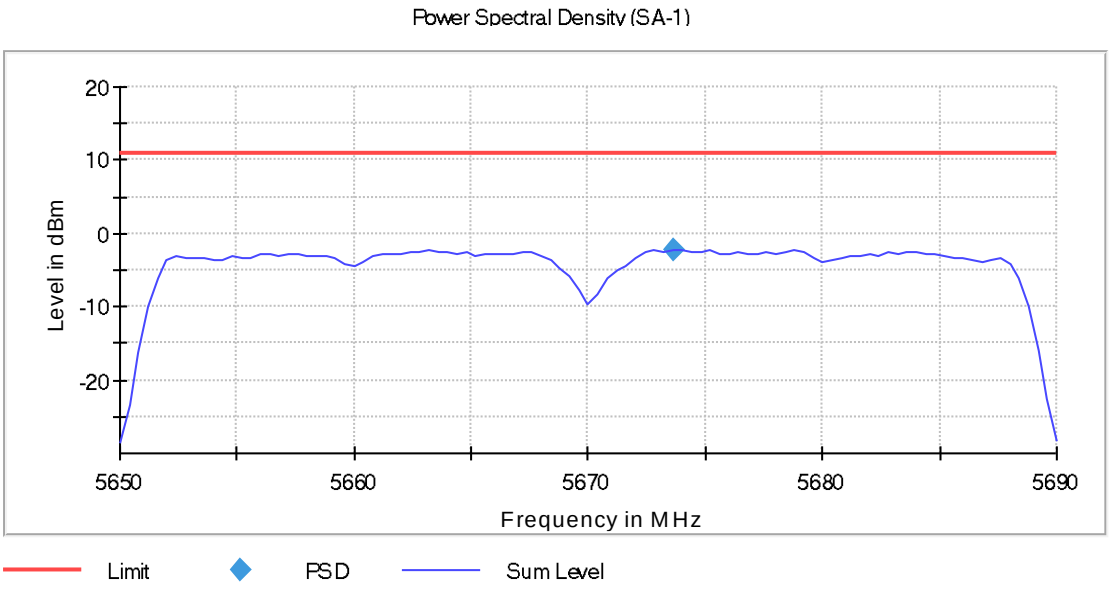

Fig. 172: High Channel – PSD

4.5.6.18 Sample #1. Mode #1. U-NII-2C. Modulation AC80

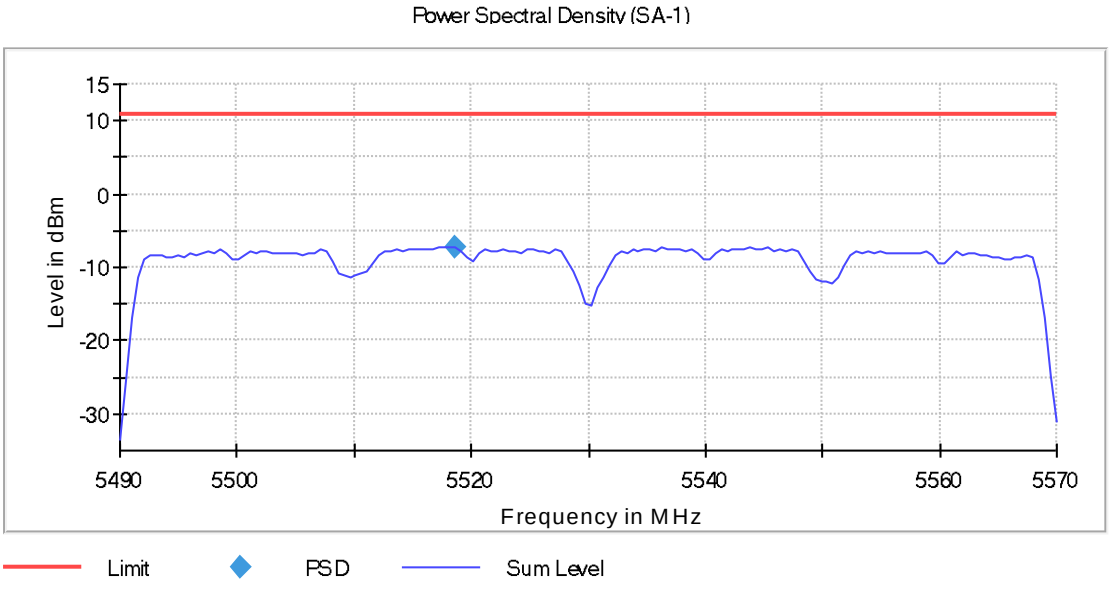

Fig. 173: Low Channel – PSD

4.5.6.19 Sample #1. Mode #1. U-NII-3. Modulation A20

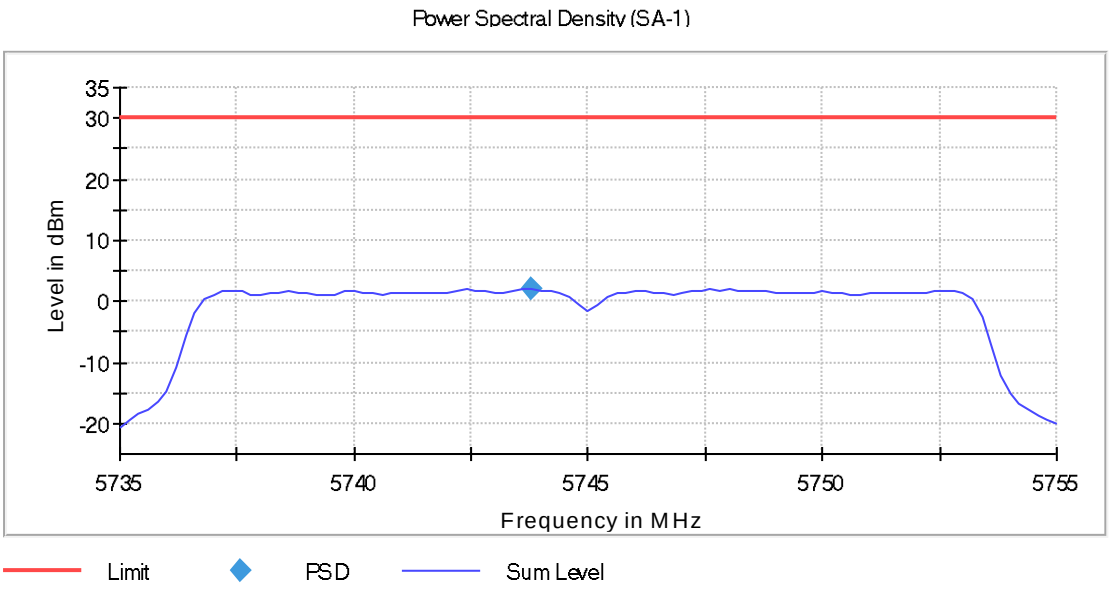

Fig. 174: Low Channel – PSD

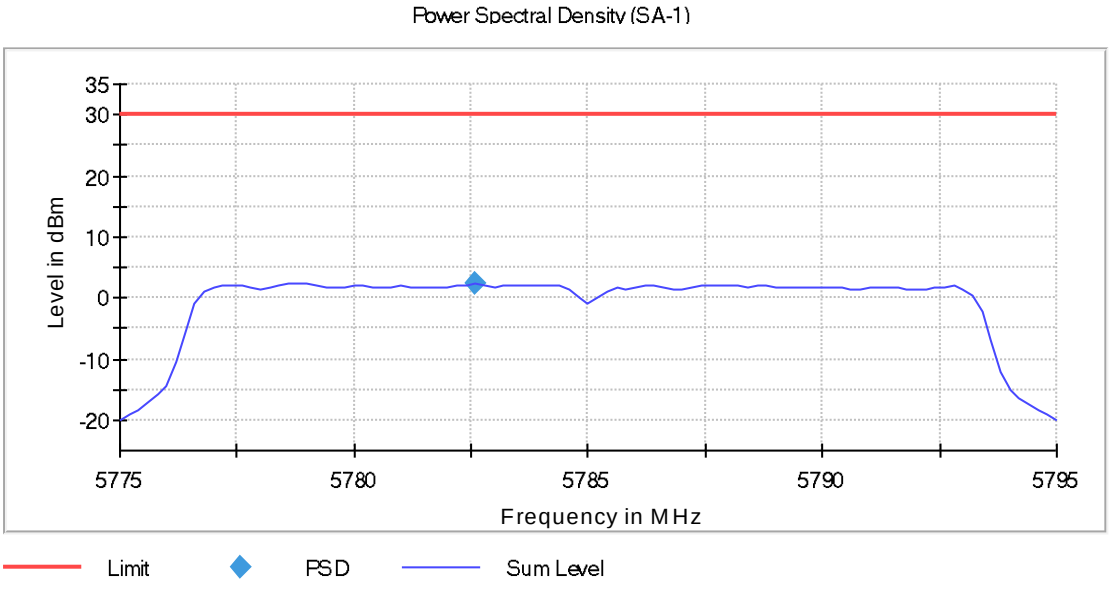

Fig. 175: Middle Channel – PSD

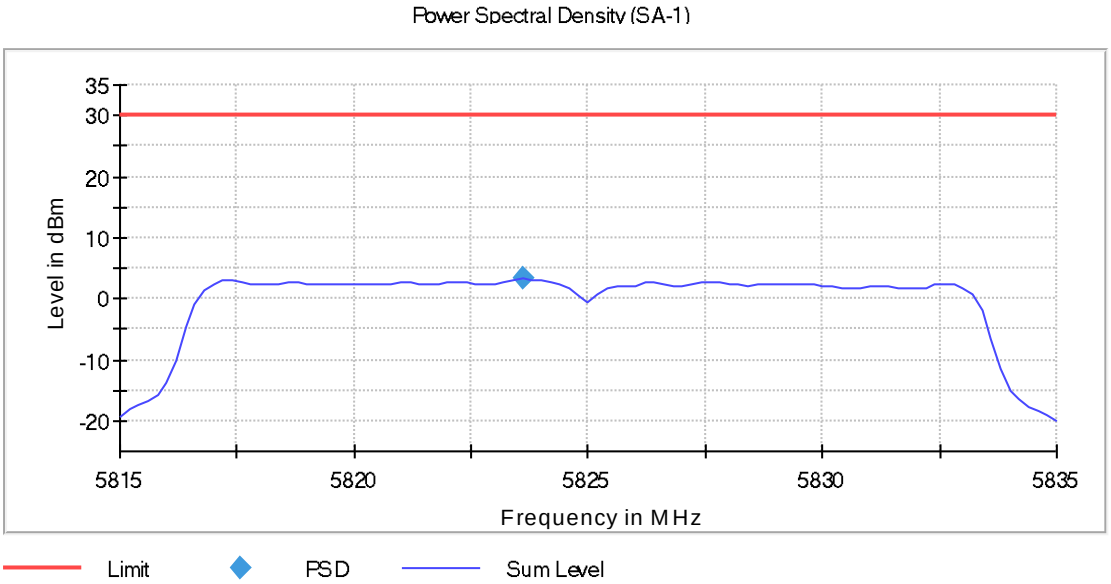

Fig. 176: High Channel – PSD

4.5.6.20 Sample #1. Mode #1. U-NII-3. Modulation N20

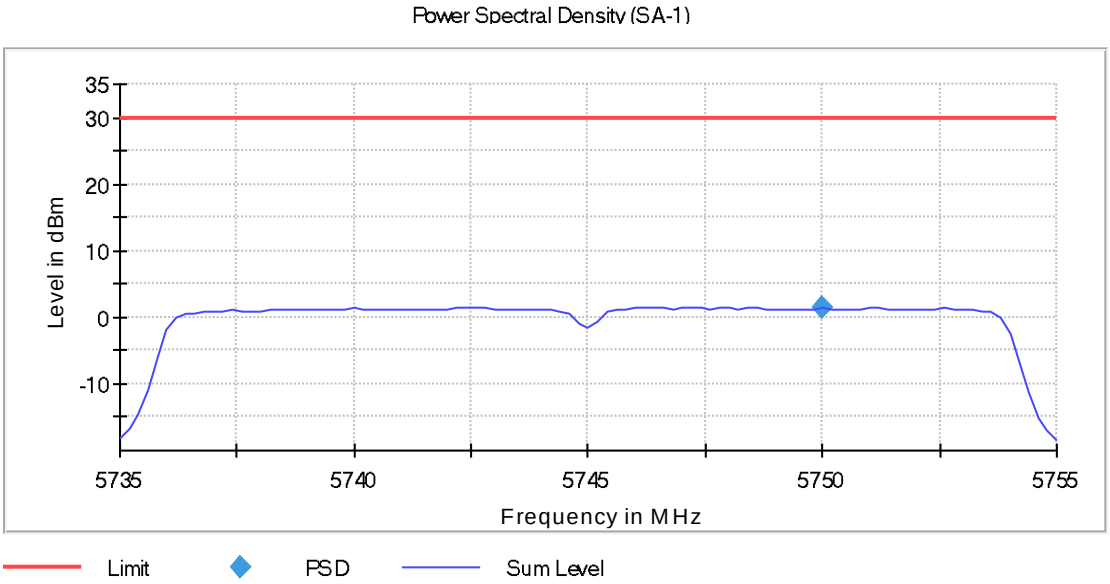

Fig. 177: Low Channel – PSD

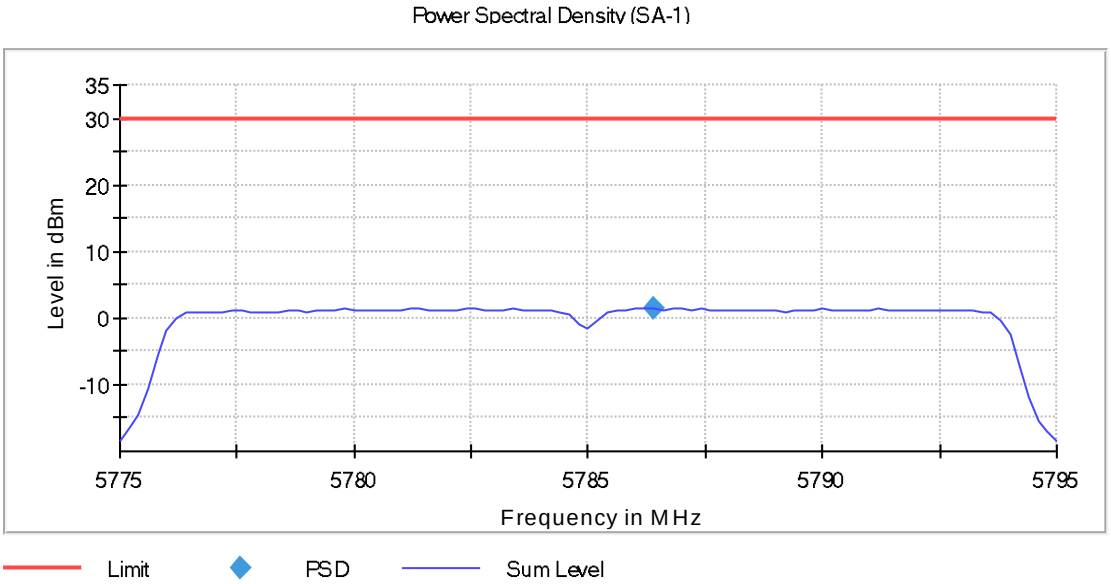

Fig. 178: Middle Channel – PSD

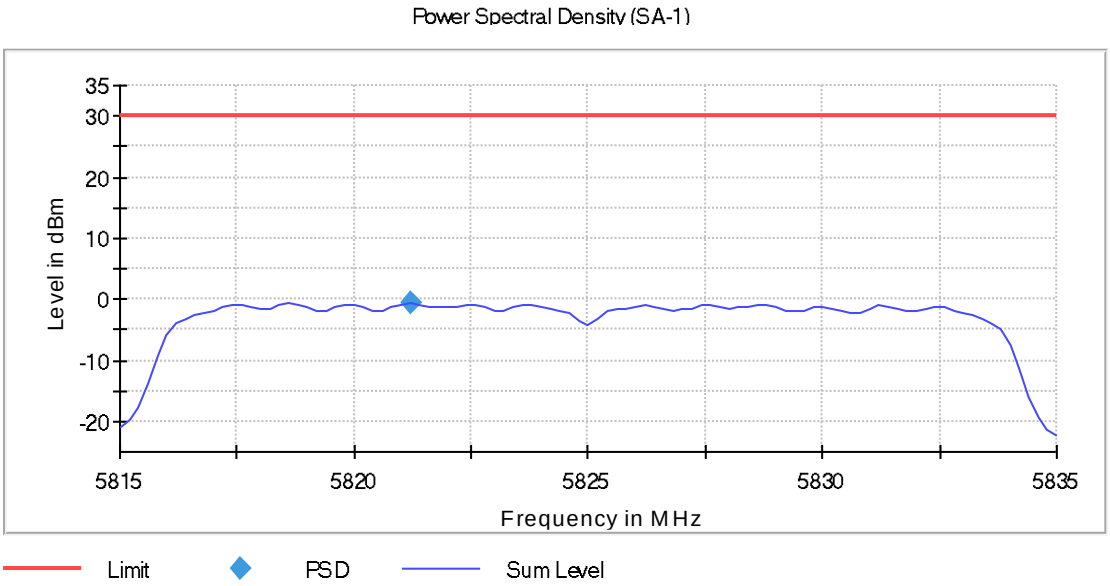

Fig. 179: High Channel – PSD

4.5.6.21 Sample #1. Mode #1. U-NII-3. Modulation AC20

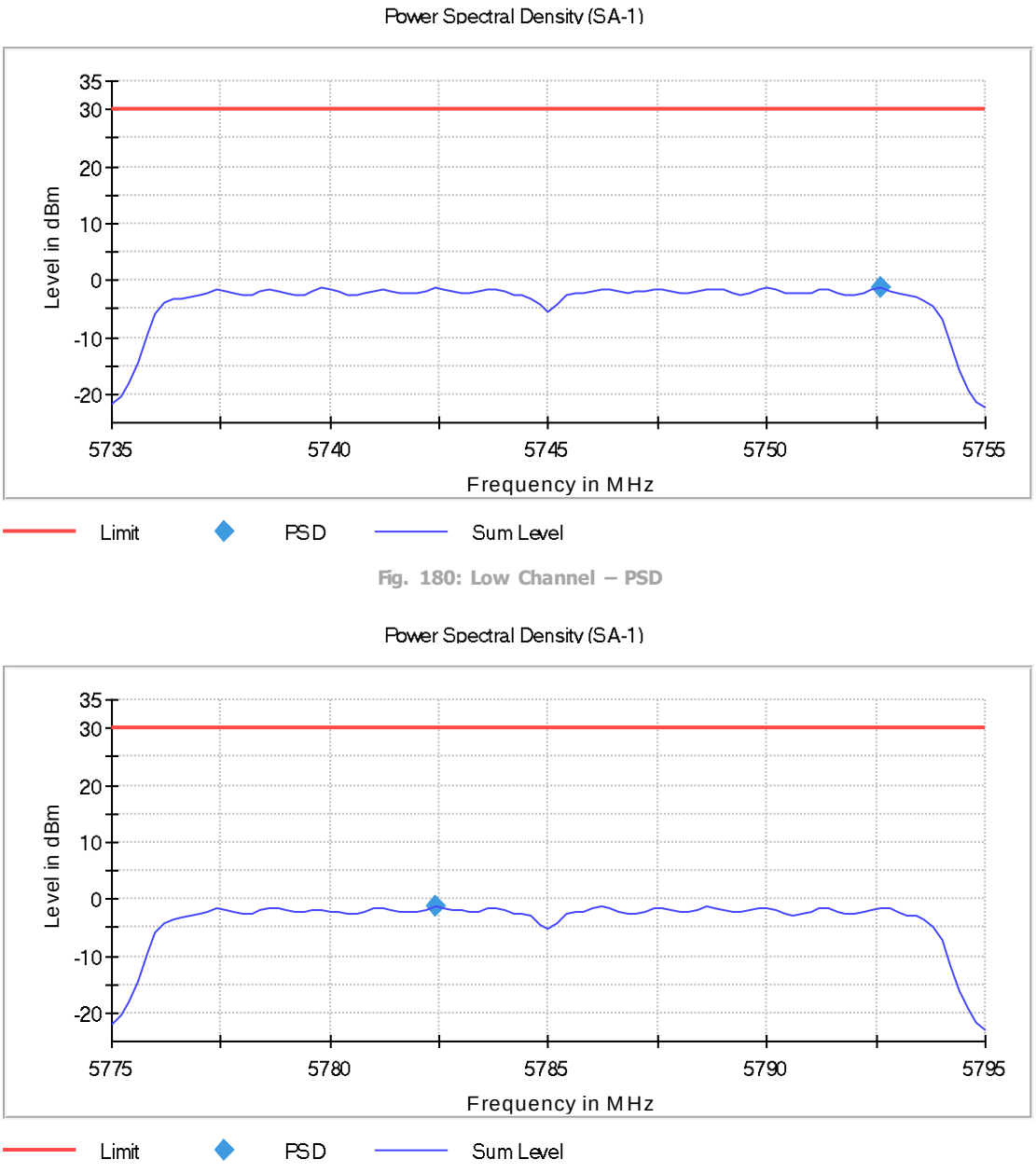

Fig. 180: Low Channel – PSD

Fig. 181: Middle Channel – PSD

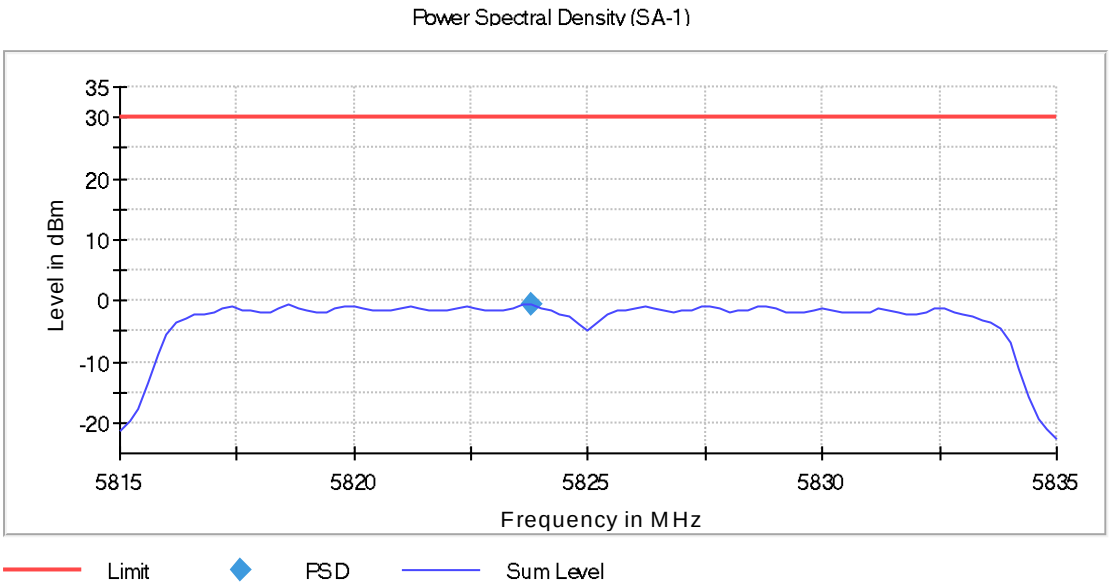

Fig. 182: High Channel – PSD

4.5.6.22 Sample #1. Mode #1. U-NII-3. Modulation N40

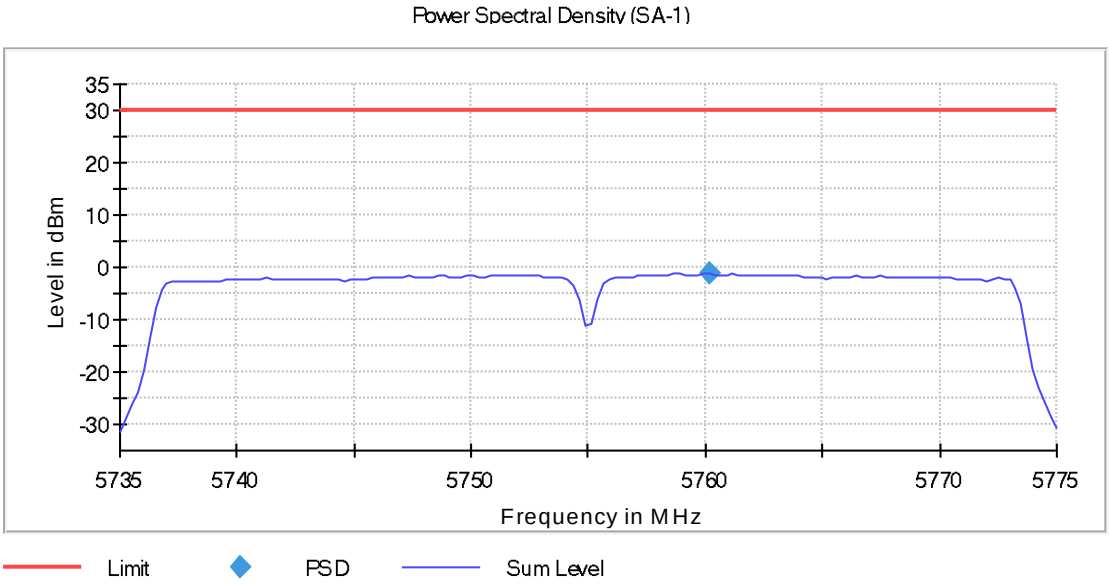

Fig. 183: Low Channel – PSD

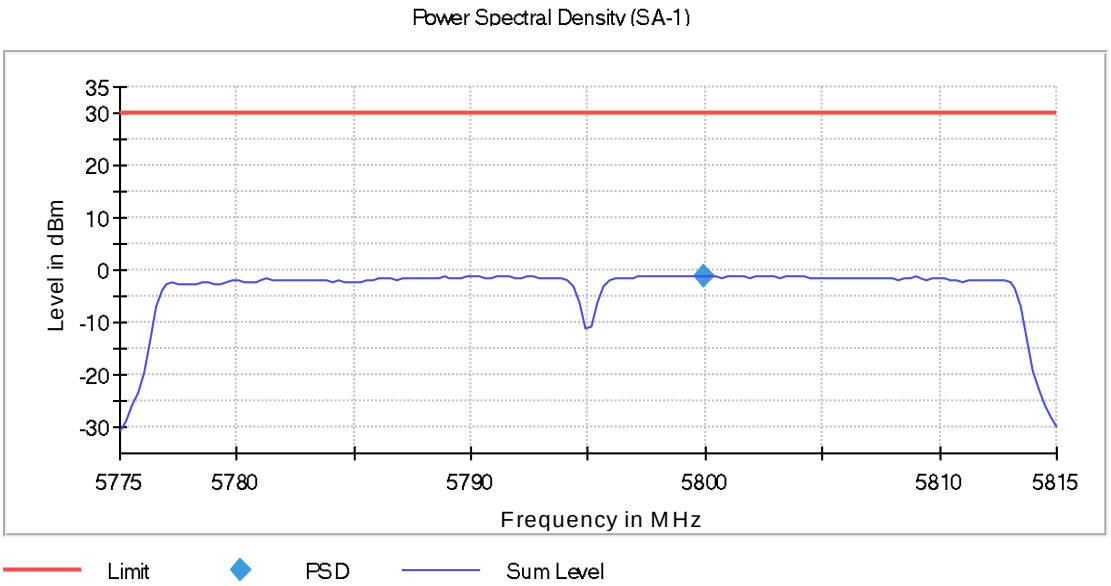

Fig. 184: High Channel – PSD

4.5.6.23 Sample #1. Mode #1. U-NII-3. Modulation AC40

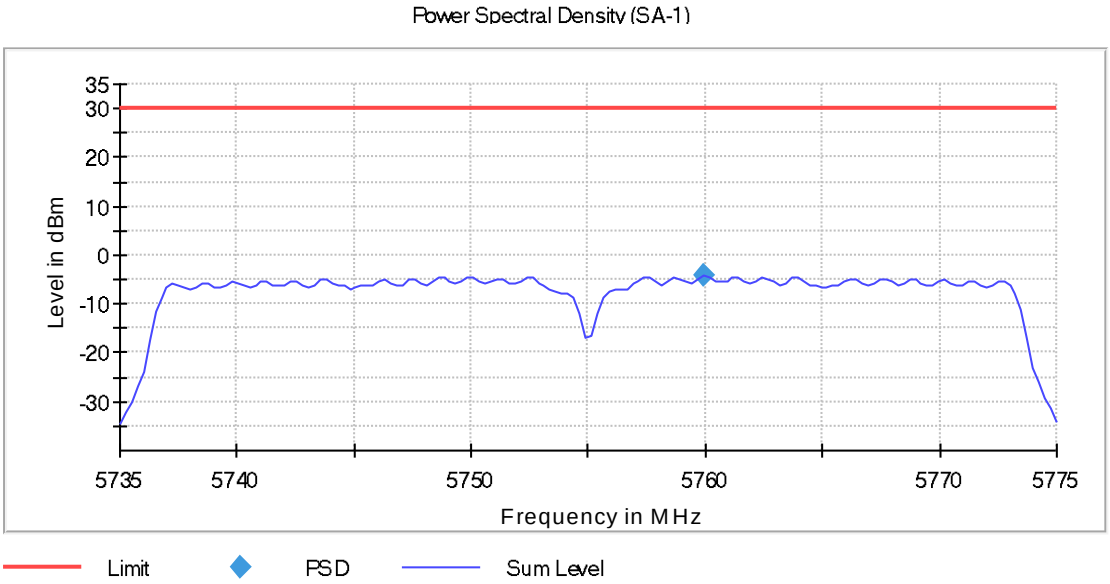

Fig. 185: Low Channel – PSD

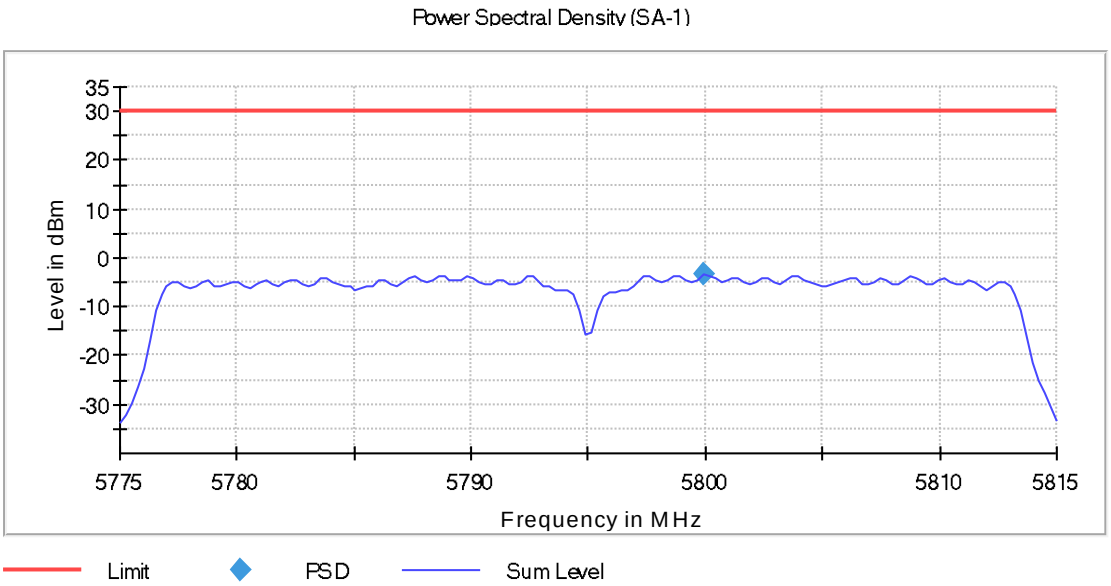

Fig. 186: High Channel – PSD

4.5.6.24 Sample #1. Mode #1. U-NII-3. Modulation AC80

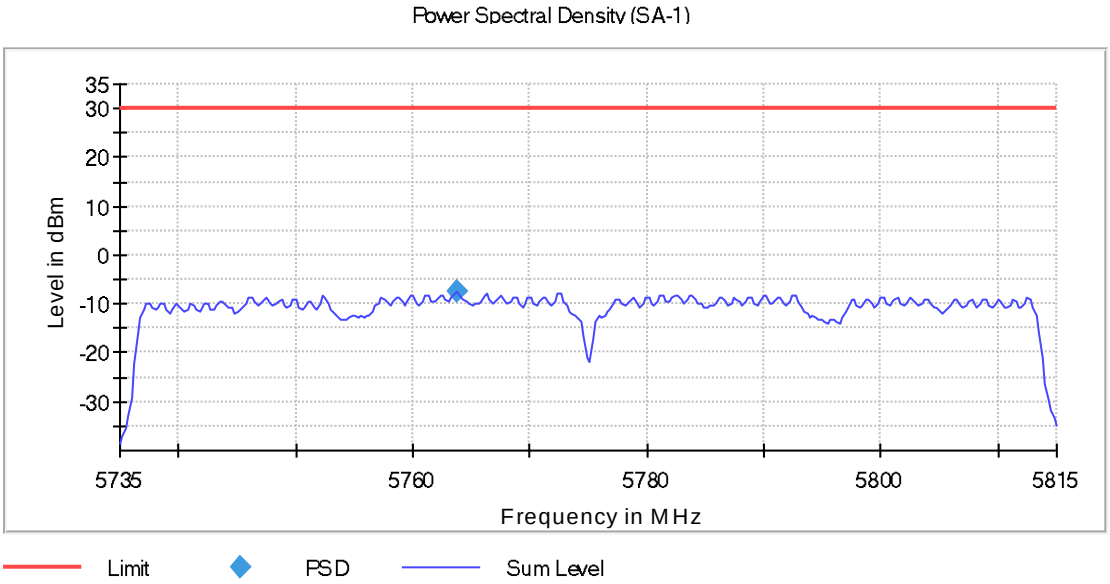

Fig. 187: Low Channel – PSD

4.5.7 Test Equipment Used

Equipment	Brand	Model	Applus Ref.	Last Calibration	Next Calibration
SIGNAL SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSVA3044	1042700	23/02/2022	15/11/2024
RF SWICTH	ROHDE & SCHWARZ	OSP120 + OSPB157W8	1042701	24/03/2022	24/03/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042545	18/05/2023	18/05/2024
RF CABLE 40 GHz	HUBERSUHNER	SF102	1042546	18/05/2023	18/05/2024
RF CABLE	ASTROLAB	32026-29094-29094-24TC	1041565	16/05/2023	16/05/2024
EMC32. EMC MEASUREMENT SOFTWARE	ROHDE & SCHWARZ	R&S. EMC32	104624	-	-
DIGITAL THERMO-HYGROMETER	TESTO	608-H1	1041916	09/02/2024	09/02/2025
SHIELDED CHAMBER SR0	ALBATROSS	SR	1042267	-	-

Table 34: Test Instruments – Power Spectral Density

4.5.8 Uncertainty

Test Type	Test Description	Uncertainty
Emissions	Power spectral density measurements [Conducted]	±2.6 dB

Table 35: Uncertainties - Power Spectral Density

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, which for normal distribution corresponds to a coverage probability of approximately 95%.