FCC Part 15.247

TEST REPORT

For

Iconnect

NO.9, Aly.58,Ln,112.Ruiguand Rd, Neihu District, Taipei City, Taiwan, R.O.C.

FCC ID: 2AB877612

Report Type:	**Product Type:**
Original Report	802.11ac High-Speed USB Adapter

Report Producer : **Jane Chen** Jane Chen

Report Number : **RXZ211019002RF01**

Report Date : **2021-12-30**

Reviewed By: **Andy Shih** Andy. Shih

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211019002	RXZ211019002RF01	2021-12-30	Original Report	Jane Chen

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Iconnect
	NO.9, Aly.58,Ln,112.Ruiguand Rd, Neihu District, Taipei City, Taiwan, R.O.C.
Manufacturer	ALFA NETWORK Inc.
	4F.-1, NO. 106, Rueiguang Rd., Neihu District, Taipei City, Taiwan, R.O.C.
Brand(Trade) Name	ALFA
Product (Equipment)	802.11ac High-Speed USB Adapter
Main Model Name	AWUS036ACM
Series Model Name	AWUS036ACX, AWSU036AC-X, AWUS036EACX, AWUS036EAC-X, AWUS036ACHX, AWUS036ACH-X, AWUS1900 X: Any alphanumeric character or blank
Model Discrepancy	The major electrical and mechanical constructions of series models are identical to the basic model, except Market segmentation. The model, AWUS036ACM is the testing sample, and the final test data are shown on this test report.
Frequency Range	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz
Transmit Power	IEEE 802.11b Mode: 21.25 dBm IEEE 802.11g Mode: 23.35 dBm IEEE 802.11n HT20 Mode: 23.06 dBm IEEE 802.11n HT40 Mode: 18.06 dBm
Modulation Technique	IEEE 802.11b Mode: DSSS IEEE 802.11g Mode: OFDM IEEE 802.11n HT20 Mode: OFDM IEEE 802.11n HT40 Mode: OFDM
Antenna Specification	Dipole Antenna / 5 dBi
Power Operation (Voltage Range)	☒ DC Type 5V/500mA ☐ Battery ☐ DC Power Supply ☒ from USB Port
Received Date	Oct. 19, 2021
Date of Test	Oct. 25, 2021 ~ Dec. 24, 2021

**All measurement and test data in this report was gathered from production sample serial number: RXZ211019002-01 (Assigned by BACL, New Taipei Laboratory).*

1.2 Objective

This report is prepared on behalf of *Iconnect* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

The objective is to determine compliance with FCC Part 15.247 rules for Output Power, Antenna Requirements, 6 dB Bandwidth, Power Spectral Density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Radiated Spurious Emissions.

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.407 NII submission with FCC ID: 2AB877612

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

KDB 558074 D01 15.247 Meas Guidance v05r02

1.5 Statement of Compliance

Decision Rule: No, (The test results do not include MU judgment)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dBm
Occupied Bandwidth		+/- 0.35 MHz
Unwanted Emissions, conducted		+/- 1.69 dBm
Emissions, radiated	30 MHz~1GHz	+/- 5.22 dB
	1 GHz~18 GHz	+/- 6.12 dB
	18 GHz~40 GHz	+/- 4.99 dB
Temperature		+/- 1.27 °C
Humidity		+/- 3 %

1.7 Environmental Conditions

Test Site	Test Data	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2021/11/3	23	41	1010	Howard Ho
Radiation Spurious Emissions	2021/10/25 ~ 2021/12/24	22.9~24	65~74	1010	Howard Ho
Conducted Spurious Emissions	2021/10/27	23.9	53	1010	Boris Kao
6 dB Emission Bandwidth	2021/10/27	23.9	53	1010	Boris Kao
Maximum Output Power	2021/10/27	23.9	53	1010	Boris Kao
100 kHz Bandwidth of Frequency Band Edge	2021/10/27	23.9	53	1010	Boris Kao
Power Spectral Density	2021/10/27	23.9	53	1010	Boris Kao

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) to collect test data is located on

☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code: 3732) and the FCC designation No.TW3732 under the Mutual Recognition Agreement (MRA) in FCC Test.

2 System Test Configuration

2.1 Description of Test Configuration

For WIFI mode, there are totally 11 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

For 802.11 b/g/n20 Modes were tested with channel 1, 6 and 11.

For 802.11n40 Mode were tested with channel 3, 6 and 9.

The system was configured for testing in engineering mode, which was provided by manufacturer.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

Used “MT7662UQA.exe (Version 1.0.3.19)” software.

Engineering Mode		Power Level Setting					
Test Frequency		Low		Middle		High	
		Chain 0	Chain 1	Chain 0	Chain 1	Chain 0	Chain 1
Mode	802.11b Mode MIMO(CDD)	16	16	16	16	16	16
	802.11g Mode MIMO(CDD)	11	11	11	11	11	11
	802.11n HT20 Mode MIMO(CDD)	11	11	11	11	11	11
	802.11 BHT40 Mode MIMO(CDD)	0A	0A	0A	0A	0A	0A

SISO mode and MIMO mode have the same power level setting and base on output power testing, MIMO mode power than SISO mode large, MIMO mode was selected for full testing.

The device supports MIMO (CDD) at all modes.

The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

802.11b: 1Mbps

802.11g: 6Mbps

802.11n HT20: MCS0

802.11n HT40: MCS0

2.4 Test Mode

Mode 1: Full System (model: AWUS036ACM) for all test item.

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
NB	DELL	E6410	8N7PXN1

2.6 External Cable List and Details

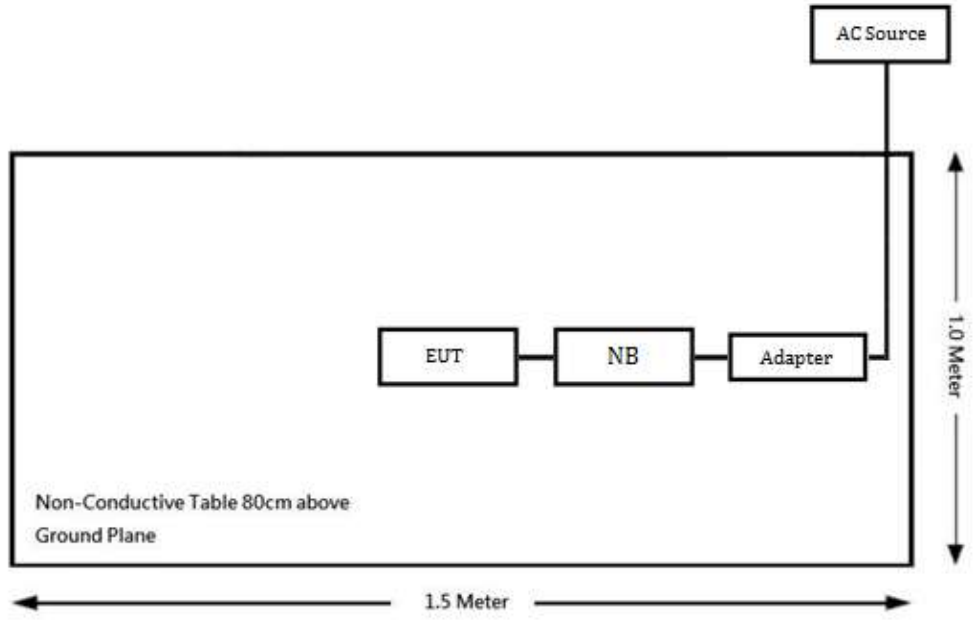
Cable Description	Length (m)	From	To
USB Cable	1	EUT	NB

2.7 Block Diagram of Test Setup

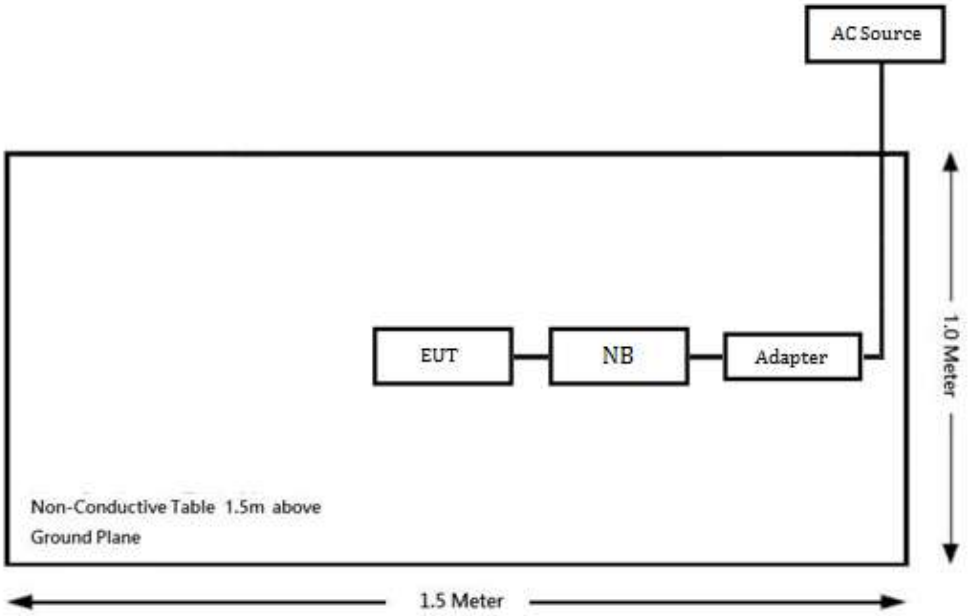
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

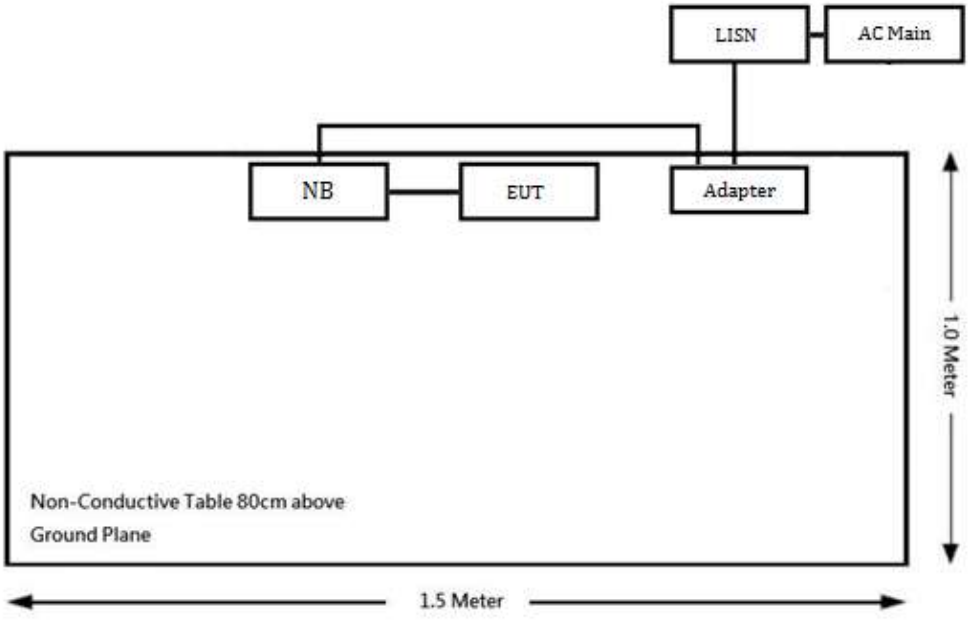
Below 1GHz:



Above 1GHz:



Conduction:



2.8 Duty Cycle

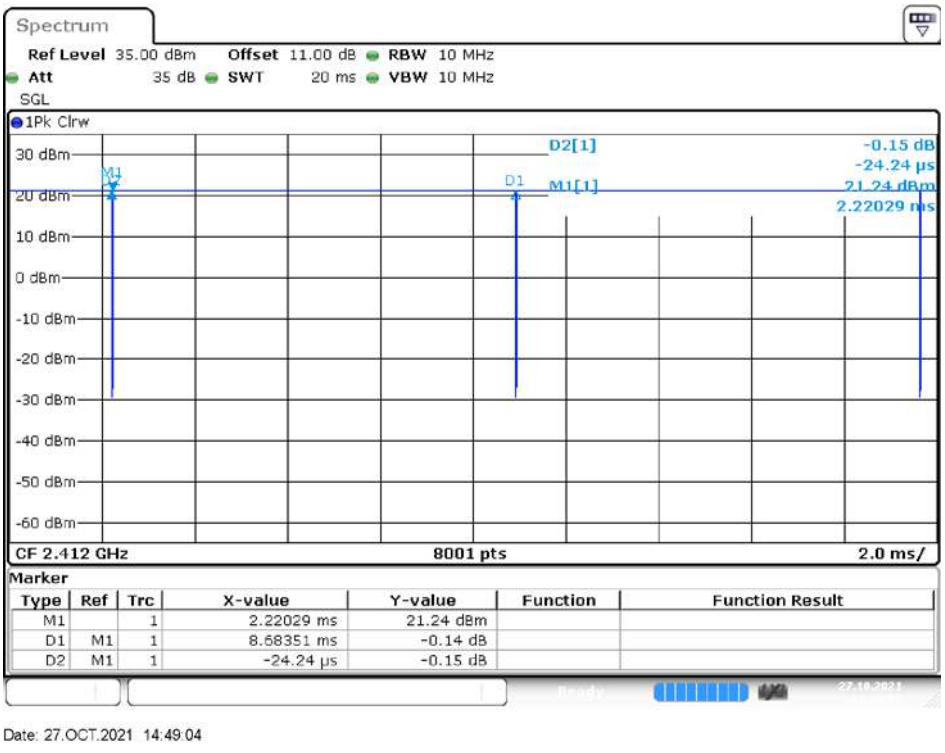
The duty cycle as below:

Radio Mode	On Time (ms)	Off Time (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	8.68	0.02	100	0
802.11g	1.43	0.03	98	0.09
802.11n20	1.34	0.02	98	0.09
802.11n40	0.67	0.02	97	0.13

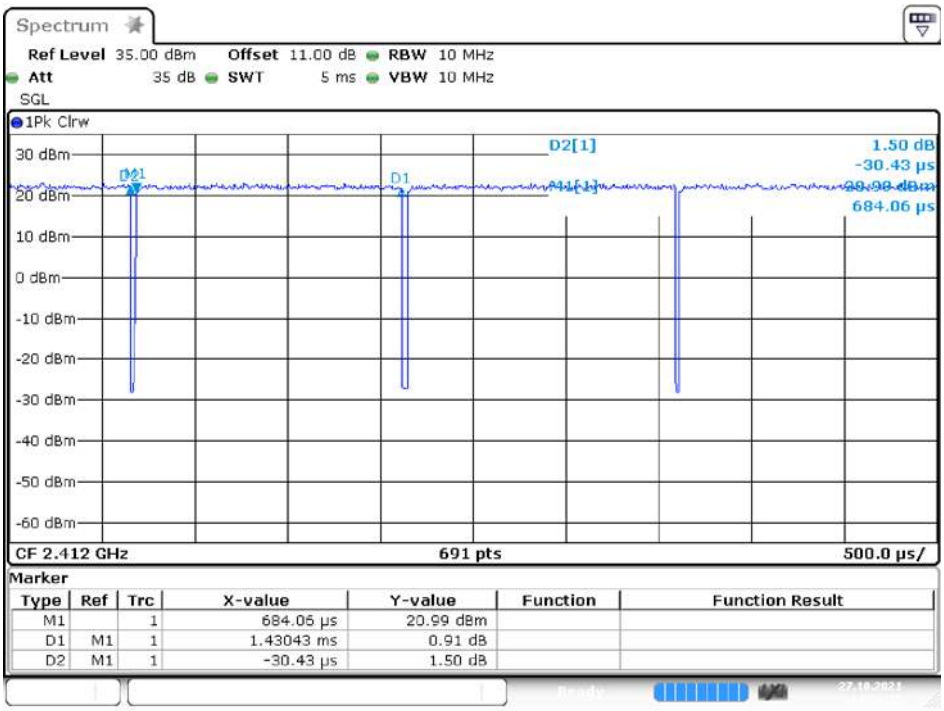
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

B Mode

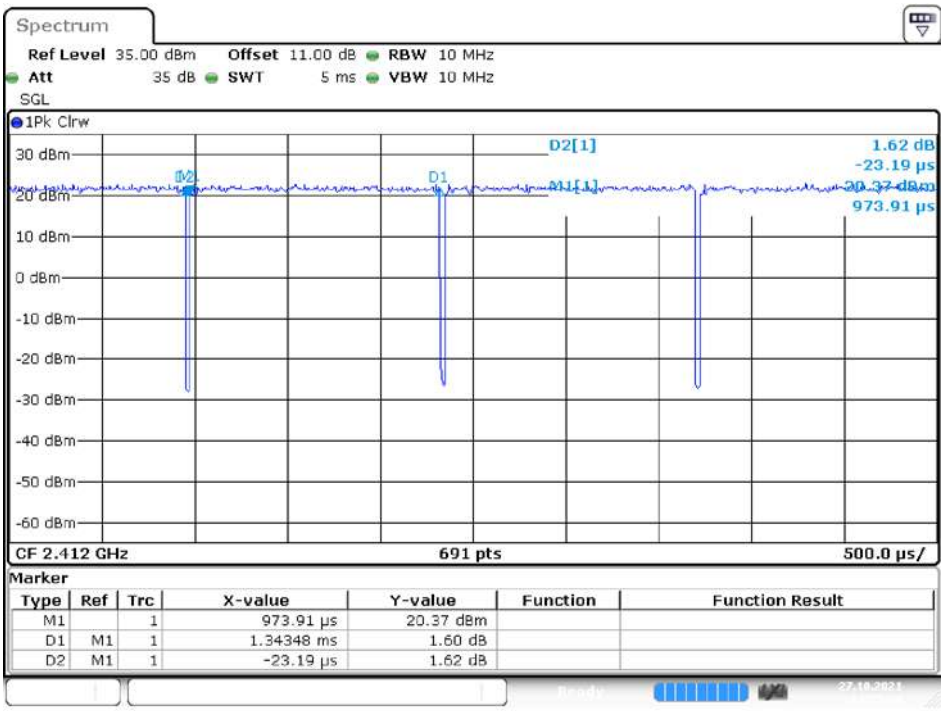


G Mode



Date: 27.OCT.2021 14:34:15

N20 Mode



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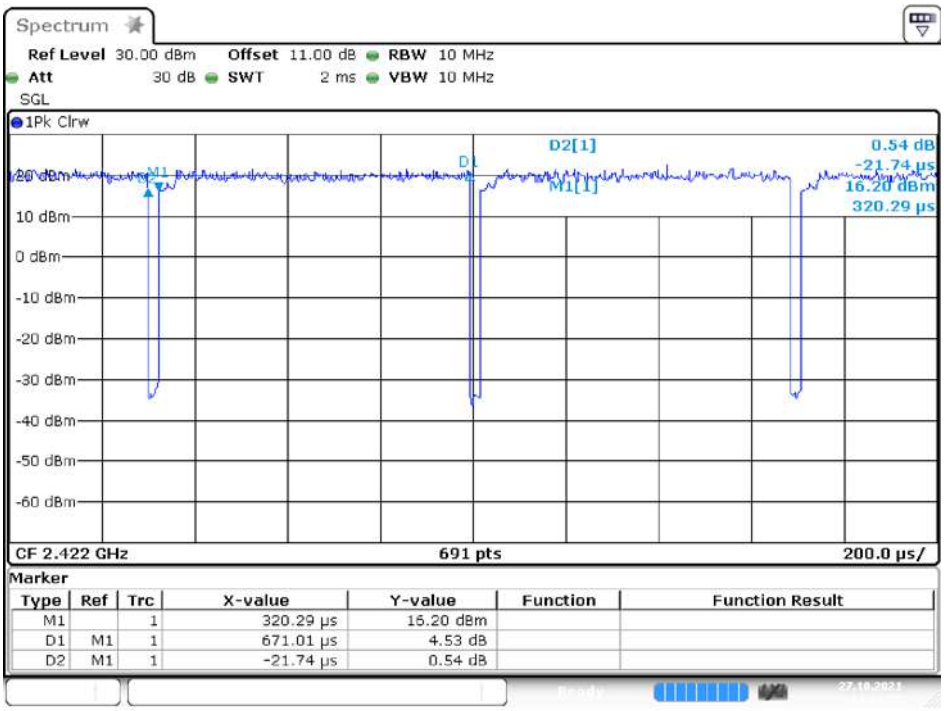
N40 Mode



Date: 27.OCT.2021 14:41:38

3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.247(i), §1.1310, §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR3	102099	2021/6/9	2022/6/8
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/29
RF Cable	EMEC	EM-CB5D	1	2021/6/11	2022/6/11
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2021/1/19	2022/1/18
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2020/11/12	2021/11/11
				2021/11/09	2022/11/08
Horn Antenna	EMCO	SAS-571	1020	2021/4/23	2022/4/22
Horn Antenna	ETS-Lindgren	3116	62638	2021/8/11	2022/8/10
Preamplifier	Sonoma	310N	130602	2021/6/8	2022/6/7
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2020/12/30	2021/12/29
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/1/7	2022/1/6
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
Coaxial Cable	COMMATE	PEWC	8Dr	2020/12/25	2021/12/24
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2021/2/1	2022/1/31
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2020/12/25	2021/12/24
Cable	EMC	EMC105-SM-SM-10000	201003	2021/2/3	2022/2/2
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/3/15	2022/3/14
Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R

Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2021/1/7	2022/1/6
Cable	UTIFLEX	UFA210A	9435	2021/10/5	2022/10/4
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2021/1/28	2022/1/27
Attenuator	MINI-CIRCUITS	BW-S10W5+	1419	2021/1/28	2022/1/27

***Statement of Traceability:** BACL Corp. attests that all of the calibrations on the equipment items listed above were traceable to the SI System of Units via the R.O.C. Center for Measurement Standards of the Electronics Testing Center, Taiwan (ETC) or to another internationally recognized National Metrology Institute (NMI), and were compliant with the current Taiwan Accreditation Foundation (TAF) requirements

5 FCC §15.247(i), §1.1310, § 2.1093 - RF Exposure

5.1 Applicable Standard

According to §2.1093 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance v06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] •

[$\sqrt{f(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

5.2 Applicable Standard

Please refer to the SAR report, report No.: RXZ211019002SA01

6 FCC §15.203 – Antenna Requirements

6.1 Applicable Standard

According to § 15.203,

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna does not exceed 6dBi.

6.2 Antenna List and Details

Manufacturer	Model	Antenna Type	Connector Type	Antenna Gain
ALFA	ARS-NT5B	Dipole Antenna	RP-SMA	5 dBi

The EUT has 2 external identical antenna use a unique type of connector to attach to the EUT, fulfill the requirement of this section.

Result: Compliance

7 FCC §15.207(a) – AC Line Conducted Emissions

7.1 Applicable Standard

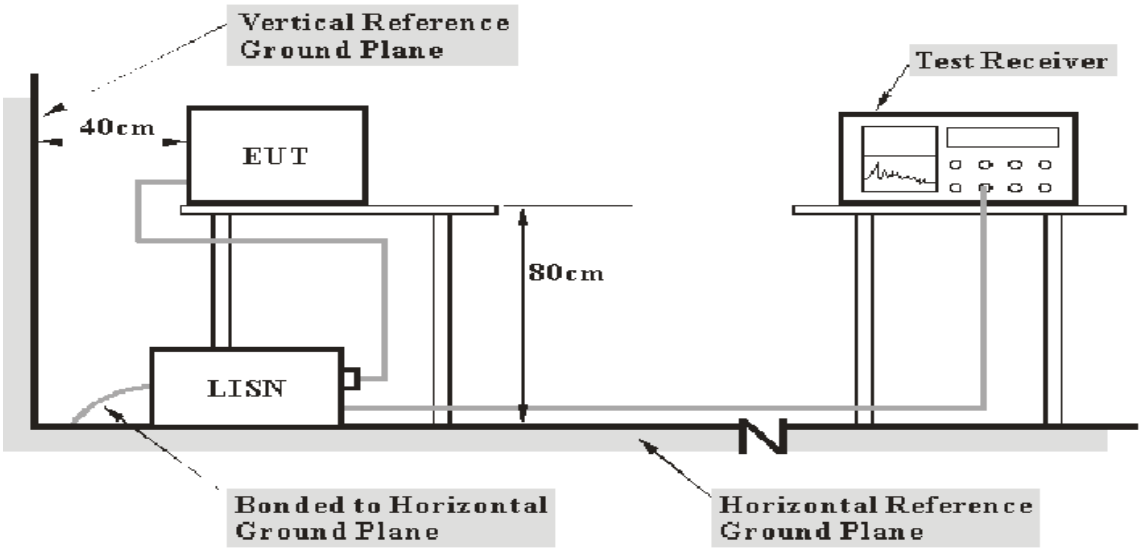
According to §15.207

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56 Note 1	56 to 46 Note 1
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

7.2 EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

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

7.3 EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150kHz to 30MHz.

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

Frequency Range	IF B/W
150kHz – 30MHz	9kHz

7.4 Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

7.5 Corrected Factor & Margin Calculation

The factor is calculated by adding LISN/ISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The “Over Limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for Over Limit calculation is as follows:

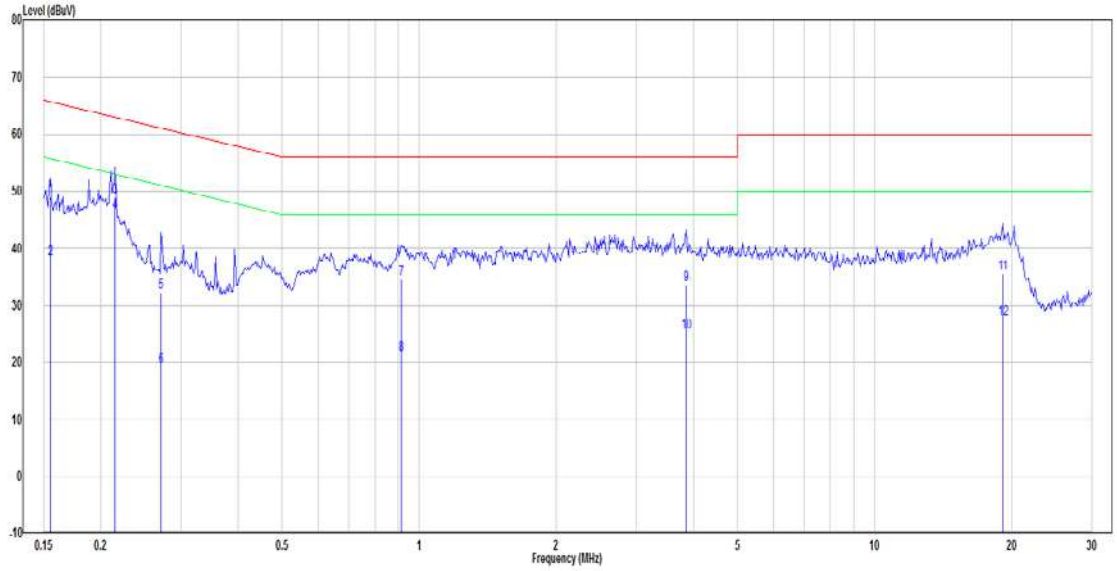
Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

Worst case is 802.11g mode, Middle Channel

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.155	29.51	19.59	49.10	65.74	-16.64	QP
2	0.155	18.48	19.59	38.07	55.74	-17.67	Average
3	0.215	29.50	19.58	49.08	63.01	-13.93	QP
4	0.215	26.71	19.58	46.29	53.01	-6.72	Average
5	0.272	12.63	19.58	32.21	61.07	-28.86	QP
6	0.272	-0.44	19.58	19.14	51.07	-31.93	Average
7	0.914	15.02	19.61	34.63	56.00	-21.37	QP
8	0.914	1.70	19.61	21.31	46.00	-24.69	Average
9	3.860	14.02	19.69	33.71	56.00	-22.29	QP
10	3.860	5.65	19.69	25.34	46.00	-20.66	Average
11	19.122	15.67	19.87	35.54	60.00	-24.46	QP
12	19.122	7.71	19.87	27.58	50.00	-22.42	Average

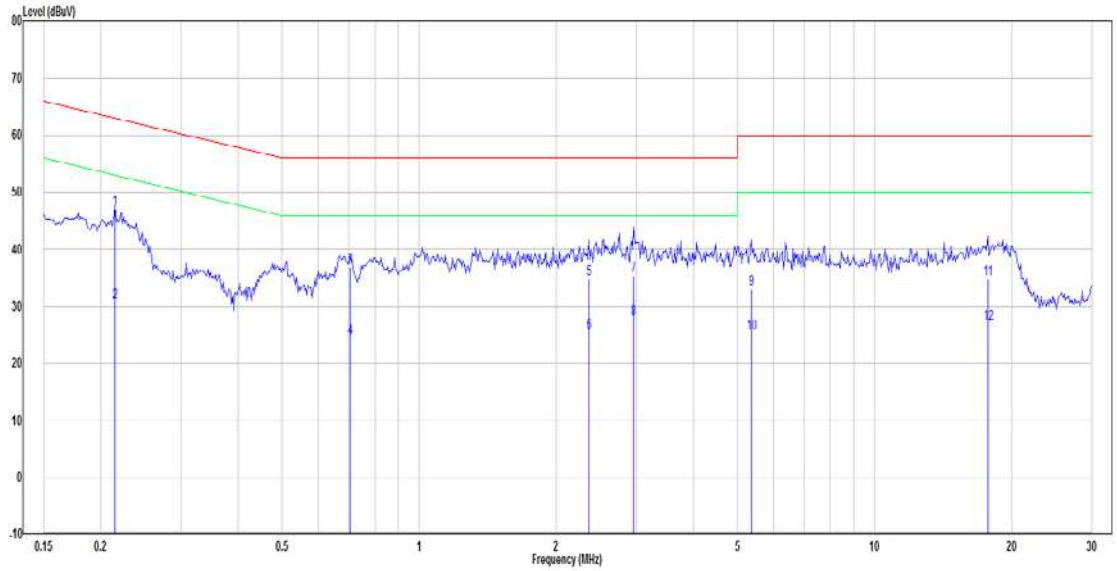
Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Main: AC120 V, 60 Hz, Neutral



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.215	27.51	19.58	47.09	63.01	-15.92	QP
2	0.215	11.06	19.58	30.64	53.01	-22.37	Average
3	0.705	17.26	19.59	36.85	56.00	-19.15	QP
4	0.705	4.83	19.59	24.42	46.00	-21.58	Average
5	2.358	15.07	19.65	34.72	56.00	-21.28	QP
6	2.358	5.87	19.65	25.52	46.00	-20.48	Average
7	2.962	15.69	19.66	35.35	56.00	-20.65	QP
8	2.962	8.09	19.66	27.75	46.00	-18.25	Average
9	5.362	13.26	19.73	32.99	60.00	-27.01	QP
10	5.362	5.54	19.73	25.27	50.00	-24.73	Average
11	17.755	14.95	19.89	34.84	60.00	-25.16	QP
12	17.755	7.21	19.89	27.10	50.00	-22.90	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

8 FCC §15.209, §15.205 , §15.247(d) – Spurious Emissions

8.1 Applicable Standard

As per FCC §15.35(d): Unless otherwise specified, on any frequency or frequencies above 1000 MHz, the radiated emission limits are based on the use of measurement instrumentation employing an average detector function. Unless otherwise specified, measurements above 1000 MHz shall be performed using a minimum resolution bandwidth of 1MHz.

As Per FCC §15.205(a) except as show in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 – 0.110 0.495 – 0.505 2.1735 – 2.1905 4.125 – 4.128 4.17725 – 4.17775 4.20725 – 4.20775 6.215 – 6.218 6.26775 – 6.26825 6.31175 – 6.31225 8.291 – 8.294 8.362 – 8.366 8.37625 – 8.38675 8.41425 – 8.41475 12.29 – 12.293 12.51975 – 12.52025 12.57675 – 12.57725 13.36 – 13.41	16.42 – 16.423 16.69475 – 16.69525 16.80425 – 16.80475 25.5 – 25.67 37.5 – 38.25 73 – 74.6 74.8 – 75.2 108 – 121.94 123 – 138 149.9 – 150.05 156.52475 – 156.52525 156.7 – 156.9 162.0125 –167.17 167.72 – 173.2 240 – 285 322 – 335.4 399.9 – 410	608 – 614 960 – 1240 1300 – 1427 1435 – 1626.5 1645.5 – 1646.5 1660 – 1710 1718.8 – 1722.2 2200 – 2300 2310 – 2390 2483.5 – 2500 2690 – 2900 3260 – 3267 3.332 – 3.339 3 3458 – 3 358 3.600 – 4.400	4. 5 – 5. 15 5. 35 – 5. 46 7.25 – 7.75 8.025 – 8.5 9.0 – 9.2 9.3 – 9.5 10.6 – 12.7 13.25 – 13.4 14.47 – 14.5 15.35 – 16.2 17.7 – 21.4 22.01 – 23.12 23.6 – 24.0 31.2 – 31.8 36.43 – 36.5 Above 38.6

As per FCC §15.209(a): Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

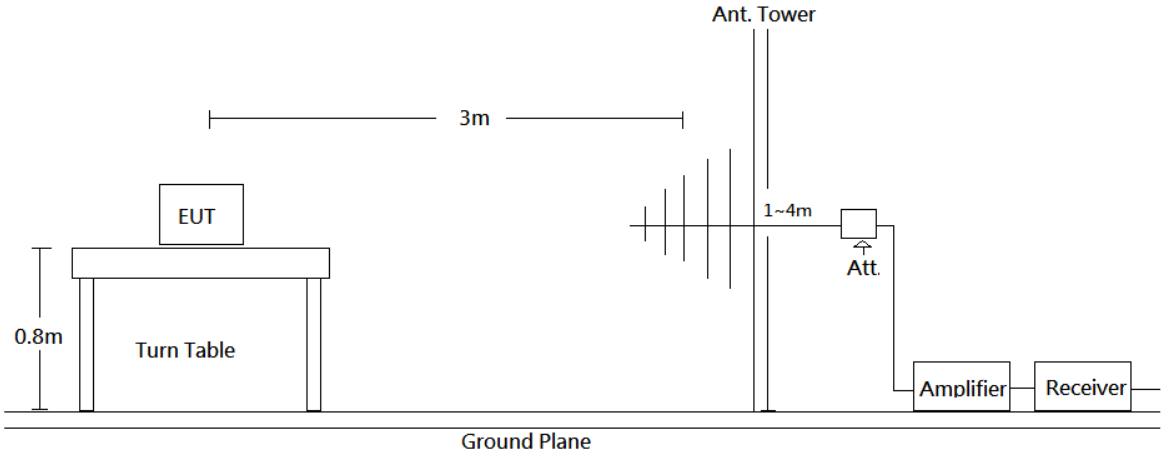
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

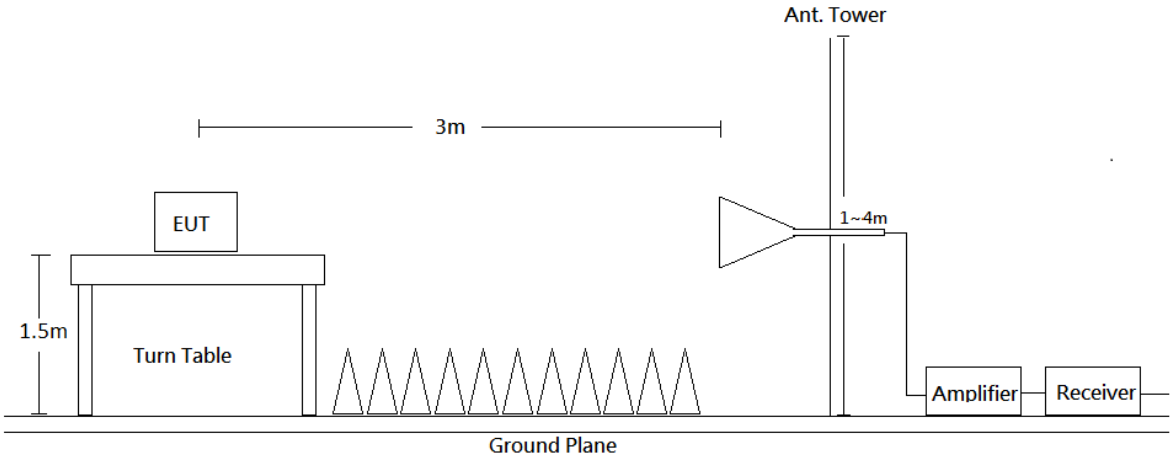
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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).

8.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



Radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part 15.209 and FCC 15.247 Limits.

8.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 26.5 GHz. During the radiated emission test, the EMI test receiver was set with the following configurations measurement method 6.3 in ANSI C63.10.

Frequency Range	RBW	VBW	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	/	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	3 MHz	>98%	Ave
	1 MHz	1/T	<98%	Ave

8.4 Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All data was recorded in the Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

8.5 Corrected Factor & Margin Calculation

The Correct Factor is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Result – Limit

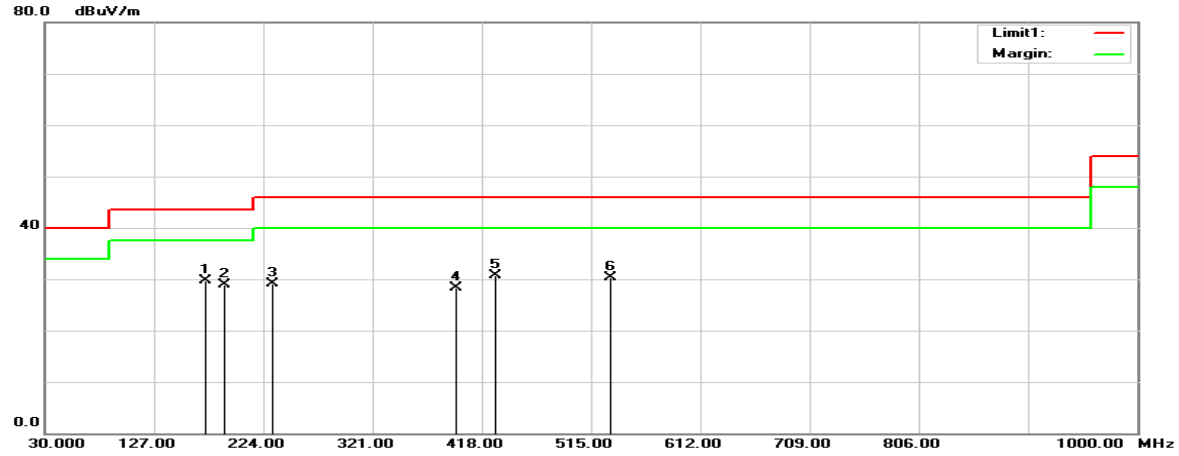
8.6 Test Results

Test Mode: Transmitting

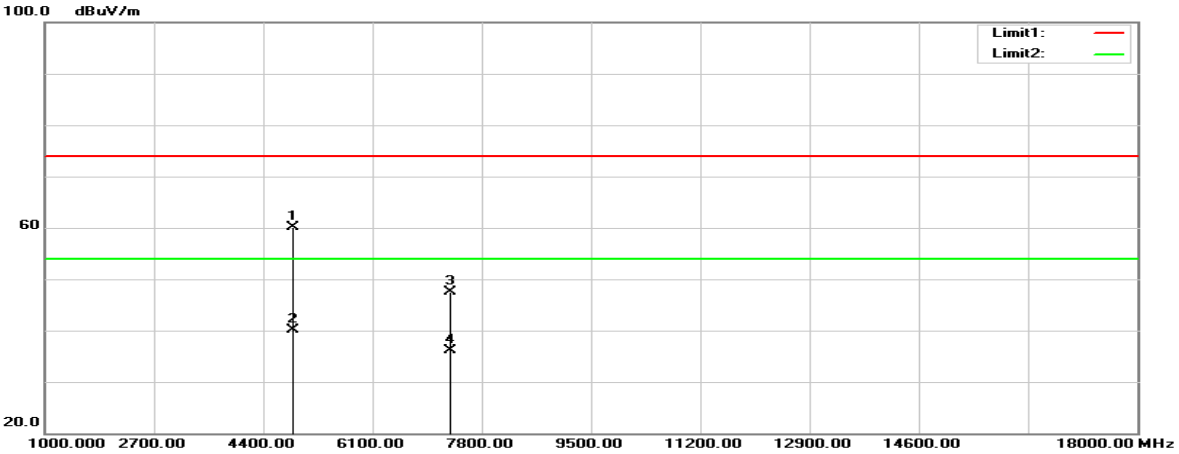
(Pre-scan with three orthogonal axis, and worse case as Z axis.)

Horizontal (worst case is 802.11g mode Middle channel)

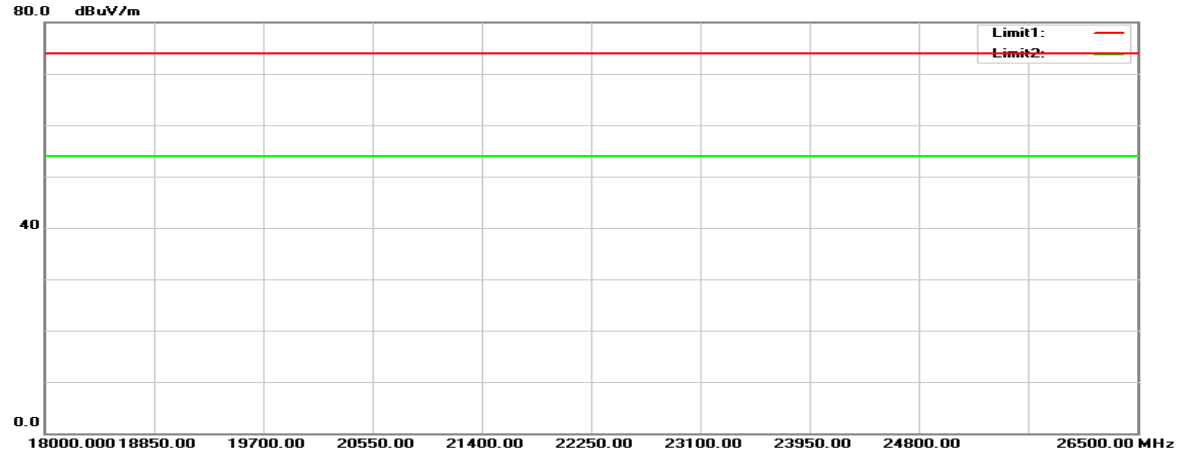
30MHz-1GHz:



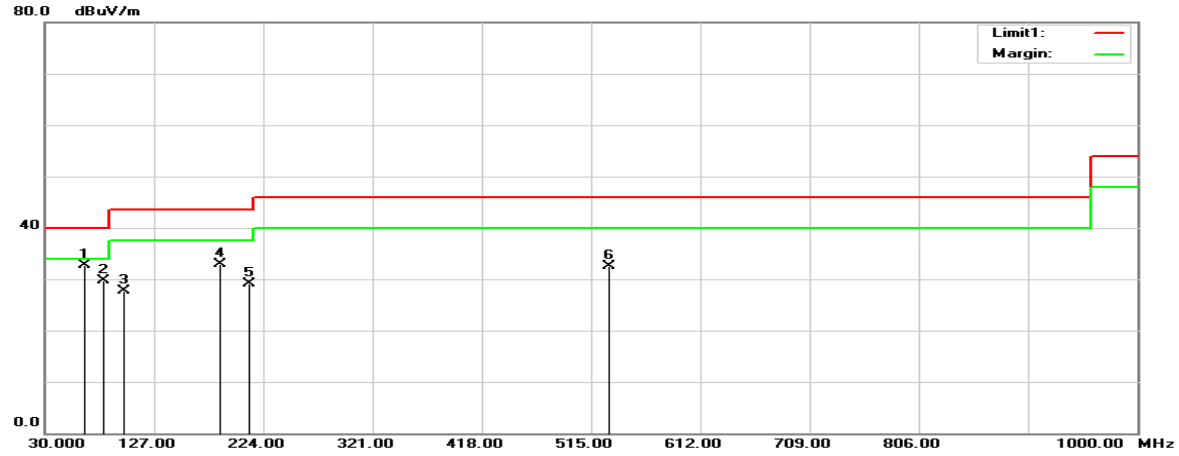
1GHz-18GHz:



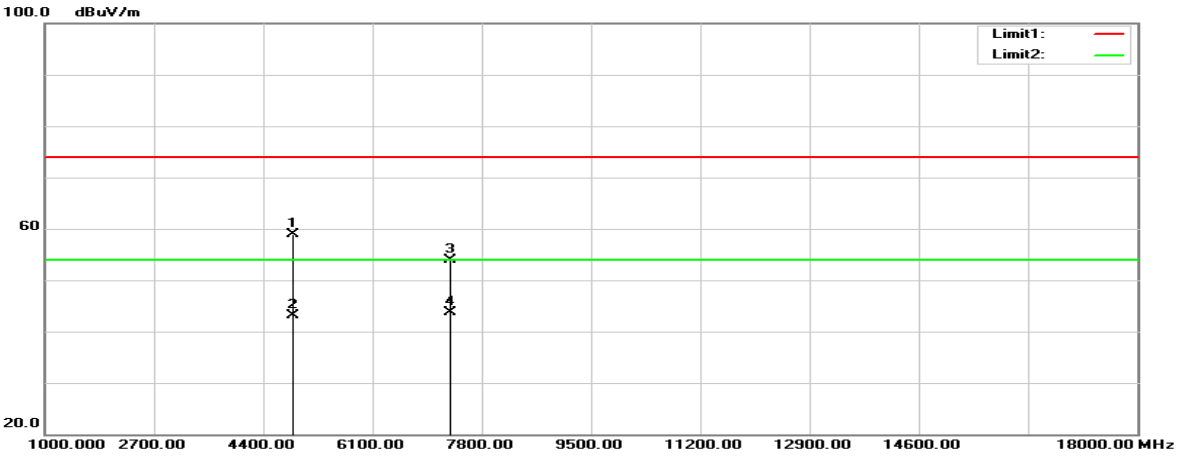
18GHz-26.5GHz:



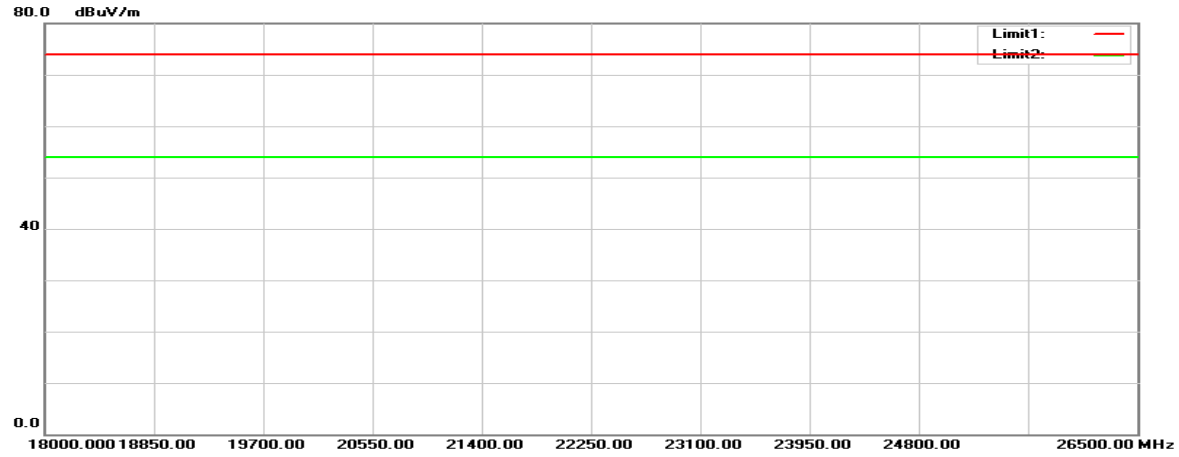
Vertical



1GHz-18GHz:



18GHz-26.5GHz:



Below 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
172.5900	42.04	-12.37	29.67	43.50	-13.83	100	263	peak
190.0500	41.60	-12.67	28.93	43.50	-14.57	100	271	peak
232.7300	41.65	-12.54	29.11	46.00	-16.89	100	358	peak
394.7200	36.25	-7.87	28.38	46.00	-17.62	100	19	peak
429.6400	37.66	-6.94	30.72	46.00	-15.28	100	19	peak
532.4600	35.98	-5.64	30.34	46.00	-15.66	100	354	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
65.8900	49.42	-16.75	32.67	40.00	-7.33	100	192	peak
82.3800	46.41	-16.62	29.79	40.00	-10.21	100	299	peak
99.8400	41.85	-14.06	27.79	43.50	-15.71	100	99	peak
185.2000	45.82	-12.89	32.93	43.50	-10.57	100	289	peak
211.3900	42.33	-13.28	29.05	43.50	-14.45	100	301	peak
530.5200	38.23	-5.63	32.60	46.00	-13.40	100	91	peak

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Above 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low channel								
2390.000	69.67	-10.23	59.44	74.00	-14.56	135	209	peak
2390.000	56.62	-10.23	46.39	54.00	-7.61	135	209	AVG
2412.000	112.61	-10.06	102.55	N/A	N/A	135	209	peak
2412.000	107.68	-10.06	97.62	N/A	N/A	135	209	AVG
4824.000	50.72	-3.27	47.45	74.00	-26.55	122	310	peak
4824.000	48.05	-3.27	44.78	54.00	-9.22	122	310	AVG
7326.000	43.74	4.08	47.82	74.00	-26.18	147	277	peak
7326.000	33.65	4.08	37.73	54.00	-16.27	147	277	AVG
B Mode, Middle channel								
2437.000	113.06	-9.85	103.21	N/A	N/A	155	214	peak
2437.000	108.35	-9.85	98.50	N/A	N/A	155	214	AVG
4874.000	51.25	-3.07	48.18	74.00	-25.82	130	360	peak
4874.000	49.22	-3.07	46.15	54.00	-7.85	130	360	AVG
7311.000	43.14	4.04	47.18	74.00	-26.82	156	59	peak
7311.000	32.80	4.04	36.84	54.00	-17.16	156	59	AVG
B Mode, High channel								
2462.000	109.38	-9.56	99.82	N/A	N/A	135	281	peak
2462.000	104.75	-9.56	95.19	N/A	N/A	135	281	AVG
2486.000	69.70	-9.23	60.47	74.00	-13.53	135	281	peak
2486.000	53.38	-9.23	44.15	54.00	-9.85	135	281	AVG
4924.000	53.22	-1.63	51.59	74.00	-22.41	131	315	peak
4924.000	51.13	-1.63	49.50	54.00	-4.50	131	315	AVG
7386.000	43.03	5.20	48.23	74.00	-25.77	142	292	peak
7386.000	33.76	5.20	38.96	54.00	-15.04	142	292	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low channel								
2390.000	79.70	-10.23	69.47	74.00	-4.53	146	30	peak
2390.000	62.35	-10.23	52.12	54.00	-1.88	146	30	AVG
2412.000	122.36	-10.06	112.30	N/A	N/A	146	30	peak
2412.000	118.05	-10.06	107.99	N/A	N/A	146	30	AVG
4824.000	58.42	-2.15	56.27	74.00	-17.73	179	322	peak
4824.000	55.66	-2.15	53.51	54.00	-0.49	179	322	AVG
7236.000	45.12	4.55	49.67	74.00	-24.33	110	263	peak
7236.000	34.28	4.55	38.83	54.00	-15.17	110	263	AVG
B Mode, Middle channel								
2437.000	122.32	-9.85	112.47	N/A	N/A	145	29	peak
2437.000	117.39	-9.85	107.54	N/A	N/A	145	29	AVG
4874.000	57.56	-1.92	55.64	74.00	-18.36	150	313	peak
4874.000	54.53	-1.92	52.61	54.00	-1.39	150	313	AVG
7311.000	43.24	5.08	48.32	74.00	-25.68	150	215	peak
7311.000	32.99	5.08	38.07	54.00	-15.93	150	215	AVG
B Mode, High channel								
2462.000	124.31	-9.56	114.75	N/A	N/A	147	19	peak
2462.000	119.70	-9.56	110.14	N/A	N/A	147	19	AVG
2484.500	81.62	-9.25	72.37	74.00	-1.63	147	19	peak
2484.500	62.15	-9.25	52.90	54.00	-1.10	147	19	AVG
4924.000	57.08	-1.63	55.45	74.00	-18.55	150	331	peak
4924.000	54.82	-1.63	53.19	54.00	-0.81	150	331	AVG
7386.000	43.75	5.20	48.95	74.00	-25.05	150	217	peak
7386.000	32.84	5.20	38.04	54.00	-15.96	150	217	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low channel								
2390.000	66.10	-10.23	55.87	74.00	-18.13	134	213	peak
2390.000	54.14	-10.23	43.91	54.00	-10.09	134	213	AVG
2412.000	108.15	-10.06	98.09	N/A	N/A	134	213	peak
2412.000	97.48	-10.06	87.42	N/A	N/A	134	213	AVG
4824.000	48.37	-3.27	45.10	74.00	-28.90	157	78	peak
4824.000	33.42	-3.27	30.15	54.00	-23.85	157	78	AVG
7236.000	42.66	3.48	46.14	74.00	-27.86	143	263	peak
7236.000	33.32	3.48	36.80	54.00	-17.20	143	263	AVG
G Mode, Middle channel								
2437.000	107.53	-9.85	97.68	N/A	N/A	134	212	peak
2437.000	97.39	-9.85	87.54	N/A	N/A	134	212	AVG
4874.000	50.28	-1.92	48.36	74.00	-25.64	150	158	peak
4874.000	35.49	-1.92	33.57	54.00	-20.43	150	158	AVG
7311.000	43.44	5.08	48.52	74.00	-25.48	150	114	peak
7311.000	32.15	5.08	37.23	54.00	-16.77	150	114	AVG
G Mode, High channel								
2462.000	106.01	-9.56	96.45	N/A	N/A	108	44	peak
2462.000	95.72	-9.56	86.16	N/A	N/A	108	44	AVG
2498.400	67.20	-9.04	58.16	74.00	-15.84	108	44	peak
2498.400	53.79	-9.04	44.75	54.00	-9.25	108	44	AVG
4924.000	47.01	-2.82	44.19	74.00	-29.81	157	216	peak
4924.000	34.02	-2.82	31.20	54.00	-22.80	157	216	AVG
7386.000	42.43	4.19	46.62	74.00	-27.38	144	355	peak
7386.000	33.50	4.19	37.69	54.00	-16.31	144	355	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low channel								
2390.000	76.85	-10.23	66.62	74.00	-7.38	140	99	peak
2390.000	61.18	-10.23	50.95	54.00	-3.05	140	99	AVG
2412.000	116.68	-10.06	106.62	N/A	N/A	140	99	peak
2412.000	109.26	-10.06	99.20	N/A	N/A	140	99	AVG
4824.000	52.07	-3.27	48.80	74.00	-25.20	153	99	peak
4824.000	39.73	-3.27	36.46	54.00	-17.54	153	99	AVG
7236.000	46.01	3.48	49.49	74.00	-24.51	146	254	peak
7236.000	33.15	3.48	36.63	54.00	-17.37	146	254	AVG
G Mode, Middle channel								
2437.000	118.24	-9.85	108.39	N/A	N/A	151	81	peak
2437.000	107.40	-9.85	97.55	N/A	N/A	151	81	AVG
4874.000	52.44	-1.92	50.52	74.00	-23.48	150	285	peak
4874.000	40.02	-1.92	38.10	54.00	-15.90	150	285	AVG
7311.000	49.78	5.08	54.86	74.00	-19.14	150	131	peak
7311.000	39.70	5.08	44.78	54.00	-9.22	150	131	AVG
G Mode, High channel								
2462.000	118.73	-9.56	109.17	N/A	N/A	145	23	peak
2462.000	108.64	-9.56	99.08	N/A	N/A	145	23	AVG
2483.500	80.84	-9.26	71.58	74.00	-2.42	145	23	peak
2483.500	61.20	-9.26	51.94	54.00	-2.06	145	23	AVG
4924.000	49.47	-2.82	46.65	74.00	-27.35	153	241	peak
4924.000	34.76	-2.82	31.94	54.00	-22.06	153	241	AVG
7386.000	43.48	4.19	47.67	74.00	-26.33	147	116	peak
7386.000	33.51	4.19	37.70	54.00	-16.30	147	116	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBμV)	Correct Factor(dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2390.000	65.16	-10.23	54.93	74.00	-19.07	132	227	peak
2390.000	53.95	-10.23	43.72	54.00	-10.28	132	227	AVG
2412.000	105.90	-10.06	95.84	N/A	N/A	132	227	peak
2412.000	95.72	-10.06	85.66	N/A	N/A	132	227	AVG
4824.000	44.93	-3.27	41.66	74.00	-32.34	143	241	peak
4824.000	34.69	-3.27	31.42	54.00	-22.58	143	241	AVG
7236.000	43.28	3.48	46.76	74.00	-27.24	159	138	peak
7236.000	32.93	3.48	36.41	54.00	-17.59	159	138	AVG
N20 Mode, Middle channel								
2437.000	106.54	-9.85	96.69	N/A	N/A	111	234	peak
2437.000	96.58	-9.85	86.73	N/A	N/A	111	234	AVG
4874.000	52.16	-3.07	49.09	74.00	-24.91	145	312	peak
4874.000	40.99	-3.07	37.92	54.00	-16.08	145	312	AVG
7311.000	44.61	4.04	48.65	74.00	-25.35	153	224	peak
7311.000	31.35	4.04	35.39	54.00	-18.61	153	224	AVG
N20 Mode, High channel								
2462.000	106.22	-9.56	96.66	N/A	N/A	122	134	peak
2462.000	96.17	-9.56	86.61	N/A	N/A	122	134	AVG
2491.800	66.69	-9.14	57.55	74.00	-16.45	122	134	peak
2491.800	53.88	-9.14	44.74	54.00	-9.26	122	134	AVG
4924.000	45.38	-2.82	42.56	74.00	-31.44	152	331	peak
4924.000	33.14	-2.82	30.32	54.00	-23.68	152	331	AVG
7386.000	44.32	4.19	48.51	74.00	-25.49	144	193	peak
7386.000	31.08	4.19	35.27	54.00	-18.73	144	193	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2390.000	77.97	-10.23	67.74	74.00	-6.26	146	20	peak
2390.000	62.45	-10.23	52.22	54.00	-1.78	146	20	AVG
2412.000	117.99	-10.06	107.93	N/A	N/A	146	20	peak
2412.000	107.98	-10.06	97.92	N/A	N/A	146	20	AVG
4824.000	50.63	-3.27	47.36	74.00	-26.64	153	246	peak
4824.000	38.03	-3.27	34.76	54.00	-19.24	153	246	AVG
7236.000	43.67	3.48	47.15	74.00	-26.85	141	173	peak
7236.000	33.44	3.48	36.92	54.00	-17.08	141	173	AVG
N20 Mode, Middle channel								
2437.000	117.13	-9.85	107.28	N/A	N/A	150	251	peak
2437.000	106.67	-9.85	96.82	N/A	N/A	150	251	AVG
4874.000	56.23	-3.07	53.16	74.00	-20.84	126	148	peak
4874.000	44.81	-3.07	41.74	54.00	-12.26	126	148	AVG
7311.000	51.32	4.04	55.36	74.00	-18.64	152	311	peak
7311.000	41.22	4.04	45.26	54.00	-8.74	152	311	AVG
N20 Mode, High channel								
2462.000	115.73	-9.56	106.17	N/A	N/A	145	211	peak
2462.000	105.12	-9.56	95.56	N/A	N/A	145	211	AVG
2483.500	77.10	-9.26	67.84	74.00	-6.16	145	211	peak
2483.500	61.33	-9.26	52.07	54.00	-1.93	145	211	AVG
4924.000	48.03	-2.82	45.21	74.00	-28.79	145	213	peak
4924.000	34.88	-2.82	32.06	54.00	-21.94	145	213	AVG
7386.000	44.33	4.19	48.52	74.00	-25.48	152	83	peak
7386.000	31.69	4.19	35.88	54.00	-18.12	152	83	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
2386.692	70.96	-10.26	60.70	74.00	-13.30	149	37	peak
2386.692	58.16	-10.26	47.90	54.00	-6.10	149	37	AVG
2422.000	104.26	-9.97	94.29	N/A	N/A	149	37	peak
2422.000	93.52	-9.97	83.55	N/A	N/A	149	37	AVG
4844.000	45.62	-3.25	42.37	74.00	-31.63	124	143	peak
4844.000	33.51	-3.25	30.26	54.00	-23.74	124	143	AVG
7266.000	42.49	3.77	46.26	74.00	-27.74	153	277	peak
7266.000	30.56	3.77	34.33	54.00	-19.67	153	277	AVG
N40 Mode, Middle channel								
2390.000	70.93	-10.23	60.70	74.00	-13.30	139	35	peak
2390.000	57.83	-10.23	47.60	54.00	-6.40	139	35	AVG
2437.000	104.39	-9.85	94.54	N/A	N/A	139	35	peak
2437.000	93.94	-9.85	84.09	N/A	N/A	139	35	AVG
2483.500	70.31	-9.26	61.05	74.00	-12.95	139	35	peak
2483.500	57.86	-9.26	48.60	54.00	-5.40	139	35	AVG
4874.000	49.79	-3.07	46.72	74.00	-27.28	152	113	peak
4874.000	35.51	-3.07	32.44	54.00	-21.56	152	113	AVG
7311.000	42.97	4.04	47.01	74.00	-26.99	141	246	peak
7311.000	30.99	4.04	35.03	54.00	-18.97	141	246	AVG
N40 Mode, High channel								
2452.000	95.38	-9.71	85.67	N/A	N/A	240	101	peak
2452.000	85.55	-9.71	75.84	N/A	N/A	240	101	AVG
2483.500	68.20	-9.26	58.94	74.00	-15.06	240	101	peak
2483.500	57.90	-9.26	48.64	54.00	-5.36	240	101	AVG
4904.000	45.16	-2.88	42.28	74.00	-31.72	149	217	peak
4904.000	33.53	-2.88	30.65	54.00	-23.35	149	217	AVG
7356.000	43.62	4.16	47.78	74.00	-26.22	156	244	peak
7356.000	31.13	4.16	35.29	54.00	-18.71	156	244	AVG

Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
2386.692	78.75	-10.26	68.49	74.00	-5.51	150	33	peak
2386.692	63.09	-10.26	52.83	54.00	-1.17	150	33	AVG
2422.000	113.49	-9.97	103.52	N/A	N/A	150	33	peak
2422.000	102.54	-9.97	92.57	N/A	N/A	150	33	AVG
4844.000	46.03	-3.25	42.78	74.00	-31.22	146	26	peak
4844.000	33.23	-3.25	29.98	54.00	-24.02	146	26	AVG
7266.000	42.85	3.77	46.62	74.00	-27.38	154	171	peak
7266.000	30.61	3.77	34.38	54.00	-19.62	154	171	AVG
N40 Mode, Middle channel								
2390.000	76.65	-10.23	66.42	74.00	-7.58	164	34	peak
2390.000	59.37	-10.23	49.14	54.00	-4.86	164	34	AVG
2437.000	113.76	-9.85	103.91	N/A	N/A	164	34	peak
2437.000	103.42	-9.85	93.57	N/A	N/A	164	34	AVG
2483.500	72.99	-9.26	63.73	74.00	-10.27	164	34	peak
2483.500	59.50	-9.26	50.24	54.00	-3.76	164	34	AVG
4874.000	47.50	-3.07	44.43	74.00	-29.57	145	167	peak
4874.000	33.45	-3.07	30.38	54.00	-23.62	145	167	AVG
7311.000	43.93	4.04	47.97	74.00	-26.03	151	312	peak
7311.000	31.79	4.04	35.83	54.00	-18.17	151	312	AVG
N40 Mode, High channel								
2452.000	111.85	-9.71	102.14	N/A	N/A	228	75	peak
2452.000	101.46	-9.71	91.75	N/A	N/A	228	75	AVG
2486.840	79.69	-9.21	70.48	74.00	-3.52	228	75	peak
2486.840	61.70	-9.21	52.49	54.00	-1.51	228	75	AVG
4904.000	45.39	-2.88	42.51	74.00	-31.49	151	274	peak
4904.000	33.93	-2.88	31.05	54.00	-22.95	151	274	AVG
7356.000	42.84	4.16	47.00	74.00	-27.00	146	122	peak
7356.000	31.27	4.16	35.43	54.00	-18.57	142	122	AVG

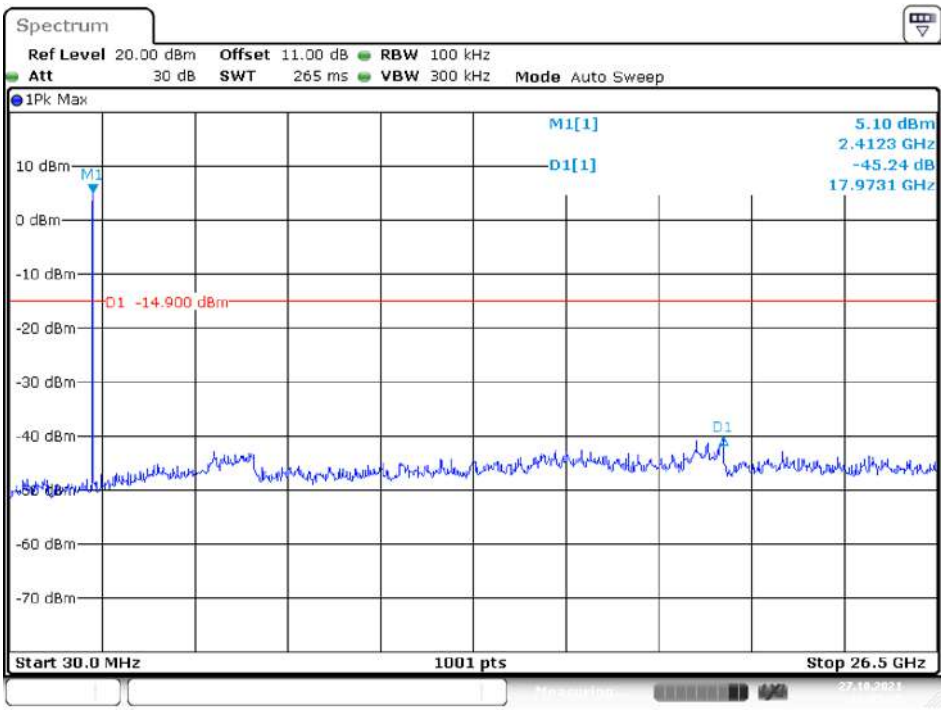
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)		Limit (dBc)	Result
		Chain 0	Chain 1		
B Mode					
Low	2412	45.24	46.24	≥ 20	PASS
Middle	2437	44.49	44.54	≥ 20	PASS
High	2462	46.22	43.67	≥ 20	PASS
G Mode					
Low	2412	39.91	39.88	≥ 20	PASS
Middle	2437	40.11	39.13	≥ 20	PASS
High	2462	36.87	39.90	≥ 20	PASS
N20 Mode					
Low	2412	34.80	36.02	≥ 20	PASS
Middle	2437	38.67	41.77	≥ 20	PASS
High	2462	37.92	33.60	≥ 20	PASS
N40 Mode					
Low	2422	34.15	32.45	≥ 20	PASS
Middle	2437	37.45	36.50	≥ 20	PASS
High	2452	31.09	29.46	≥ 20	PASS

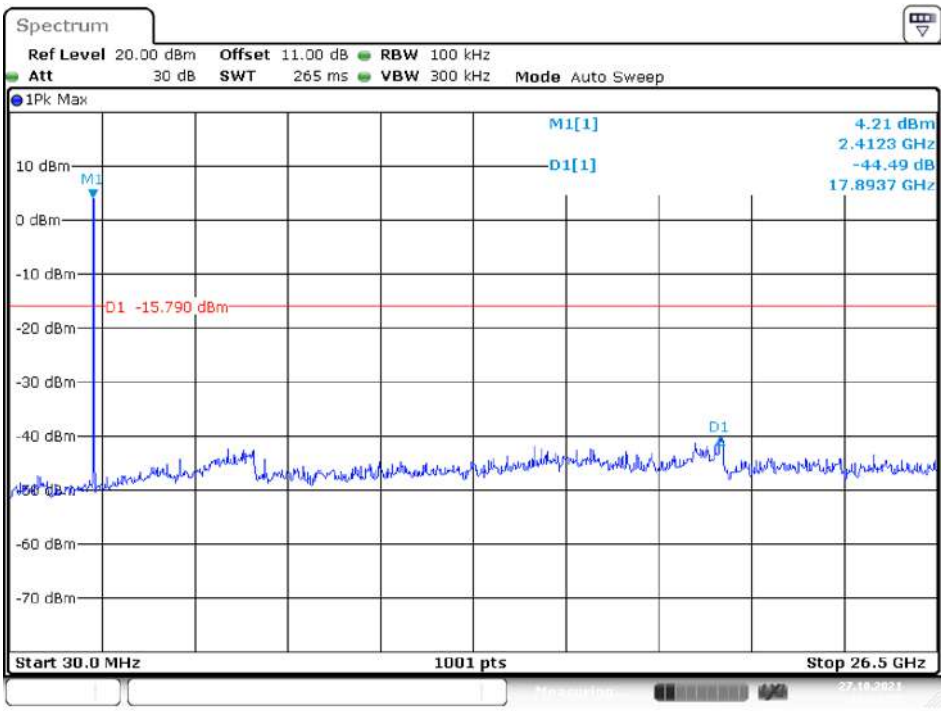
B Mode (Chain 0)

Low Channel



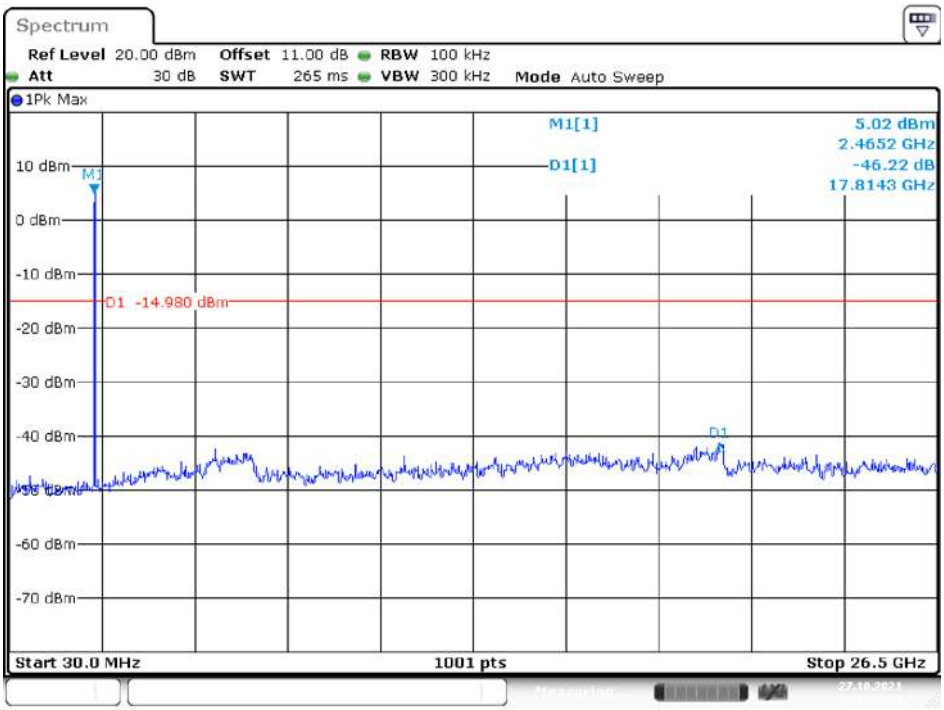
Date: 27.OCT.2021 16:05:46

Middle Channel



Date: 27.OCT.2021 16:11:21

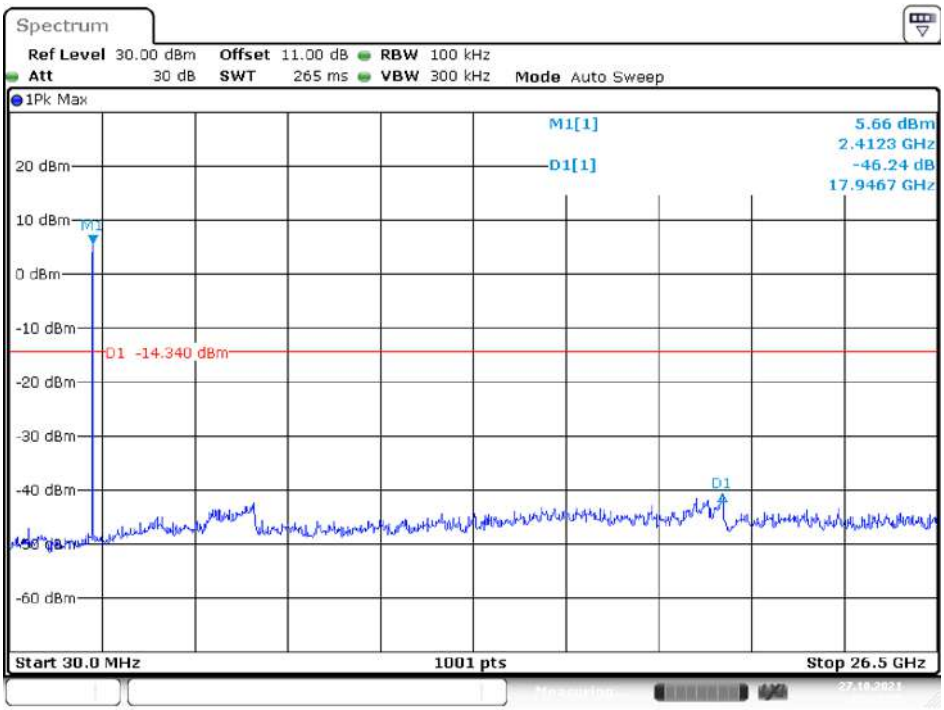
High Channel



Date: 27.OCT.2021 16:14:45

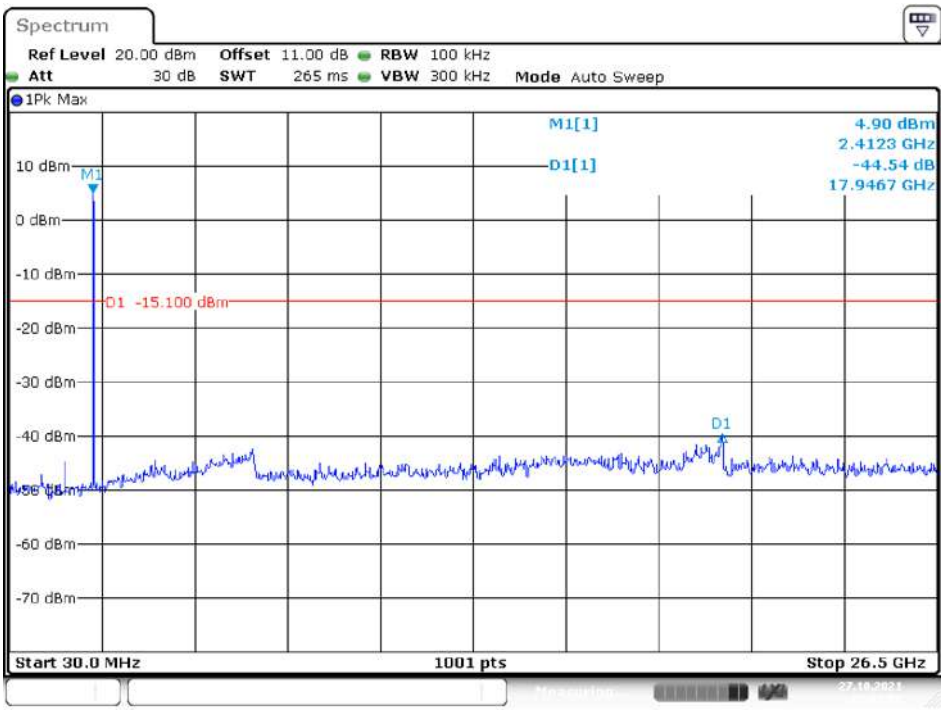
B Mode (Chain 1)

Low Channel



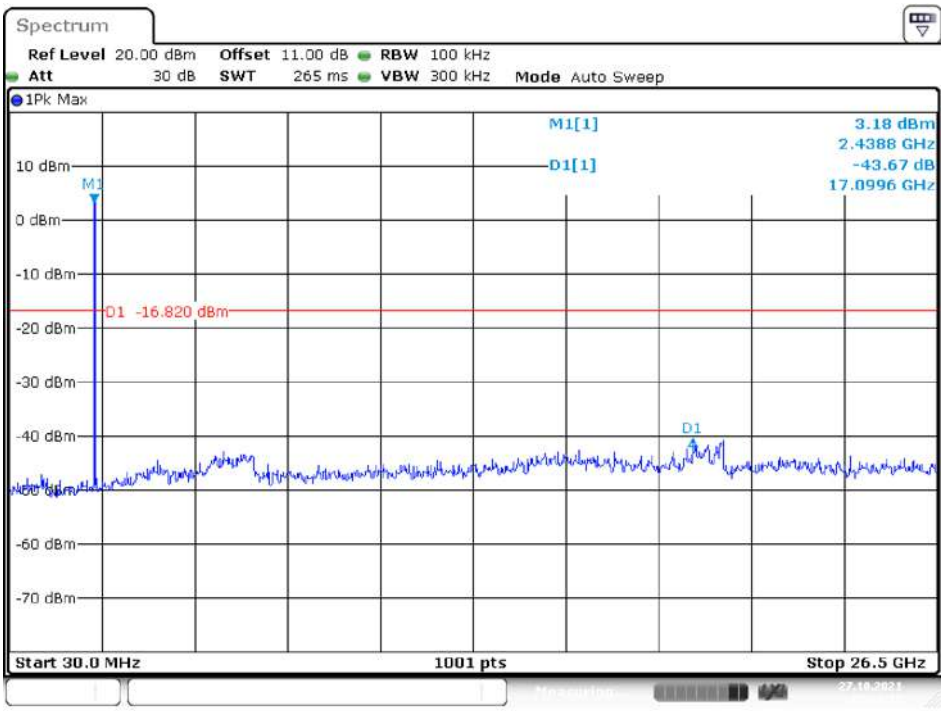
Date: 27.OCT.2021 15:12:25

Middle Channel



Date: 27.OCT.2021 15:08:09

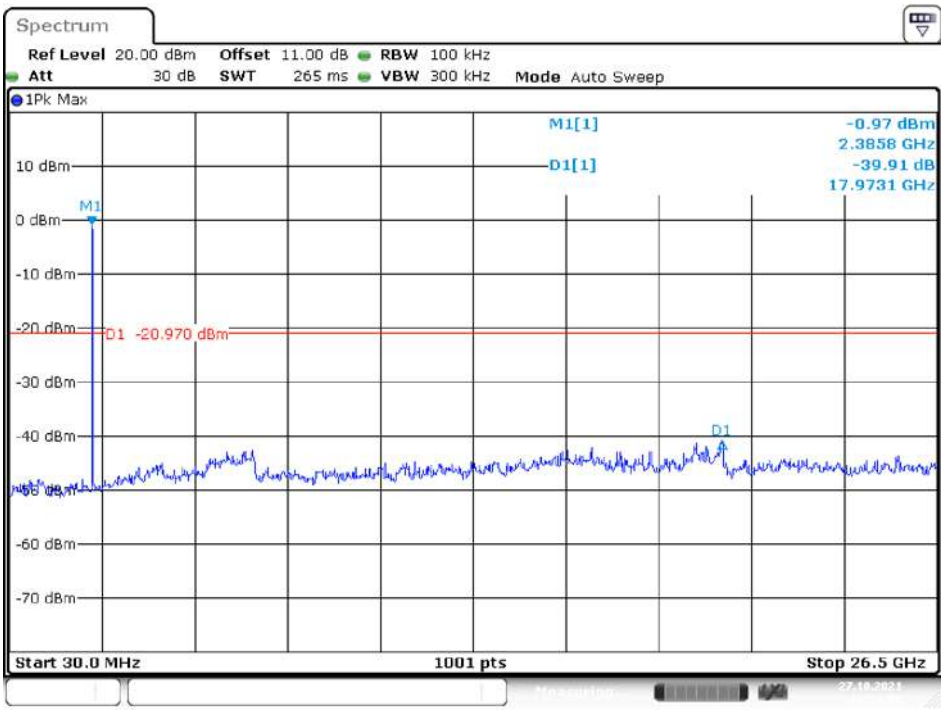
High Channel



Date: 27.OCT.2021 15:10:14

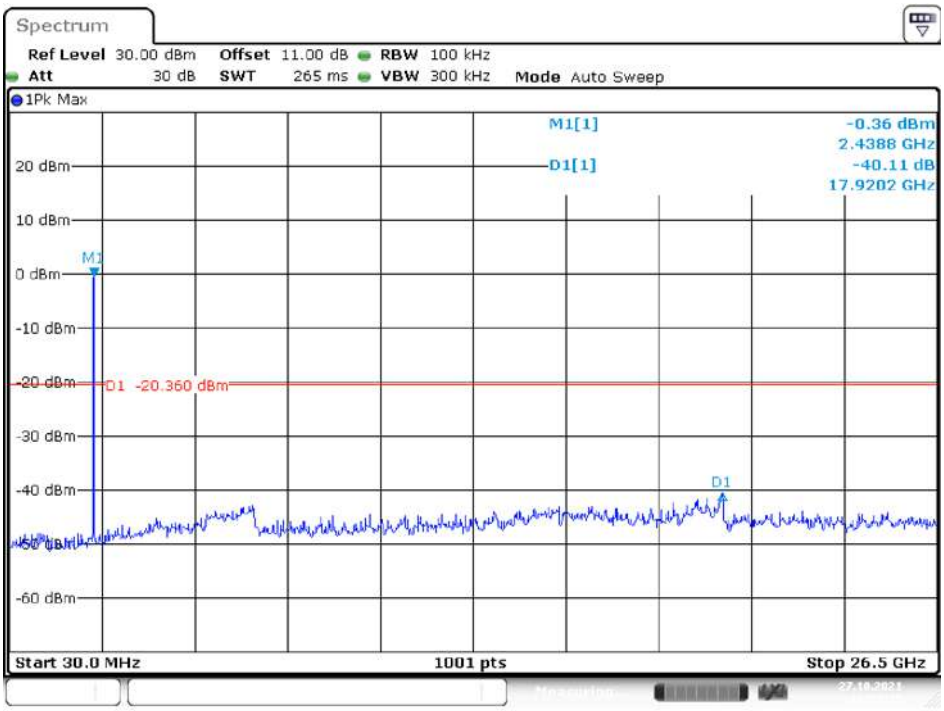
G Mode (Chain 0)

Low Channel



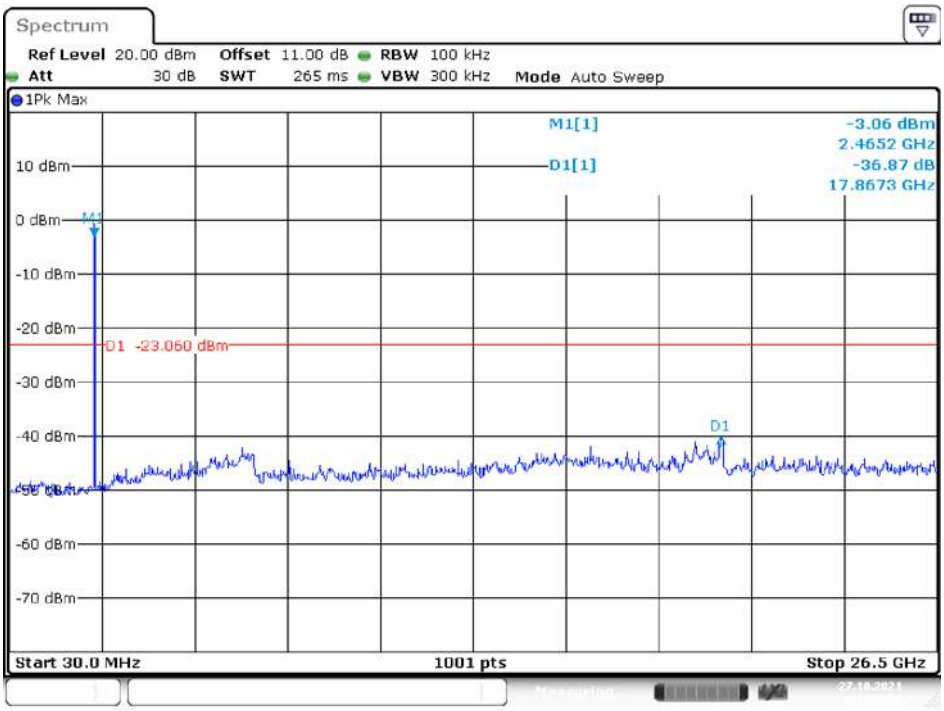
Date: 27.OCT.2021 16:26:00

Middle Channel



Date: 27.OCT.2021 16:23:15

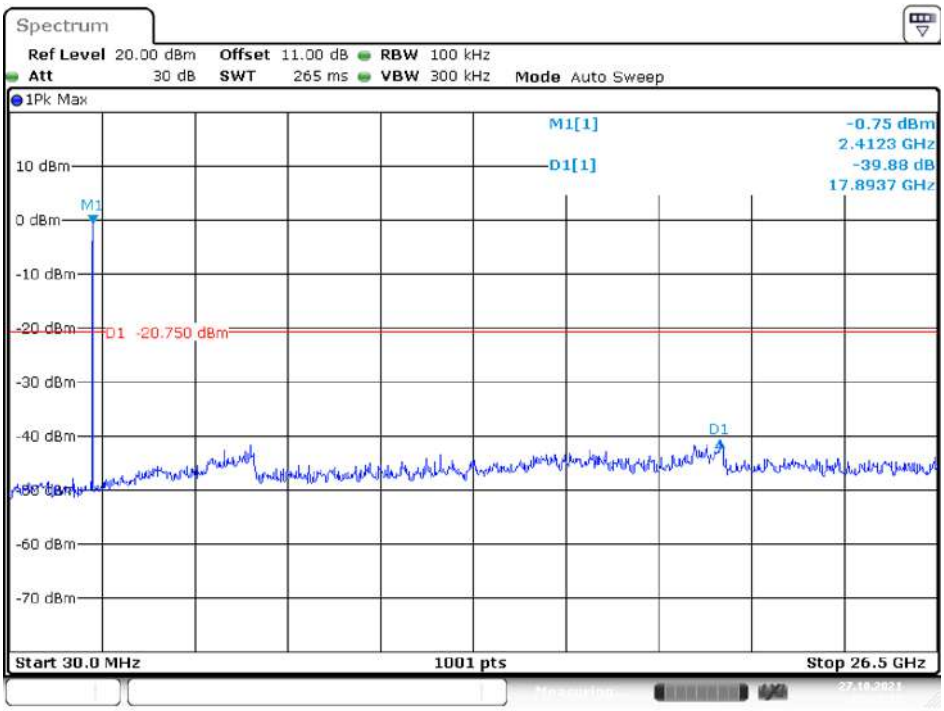
High Channel



Date: 27.OCT.2021 16:28:06

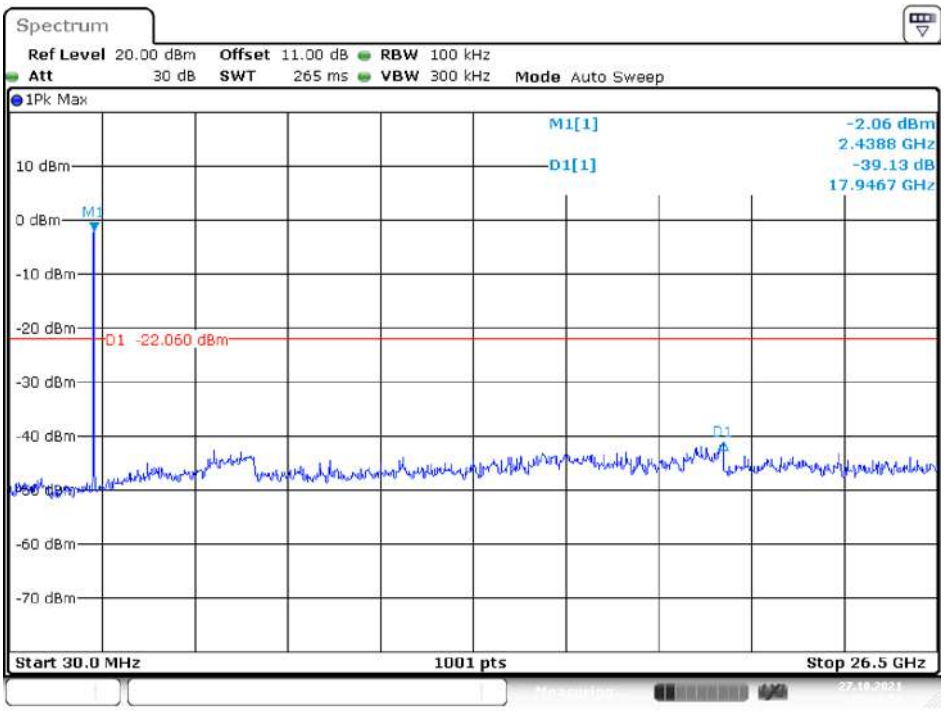
G Mode (Chain 1)

Low Channel



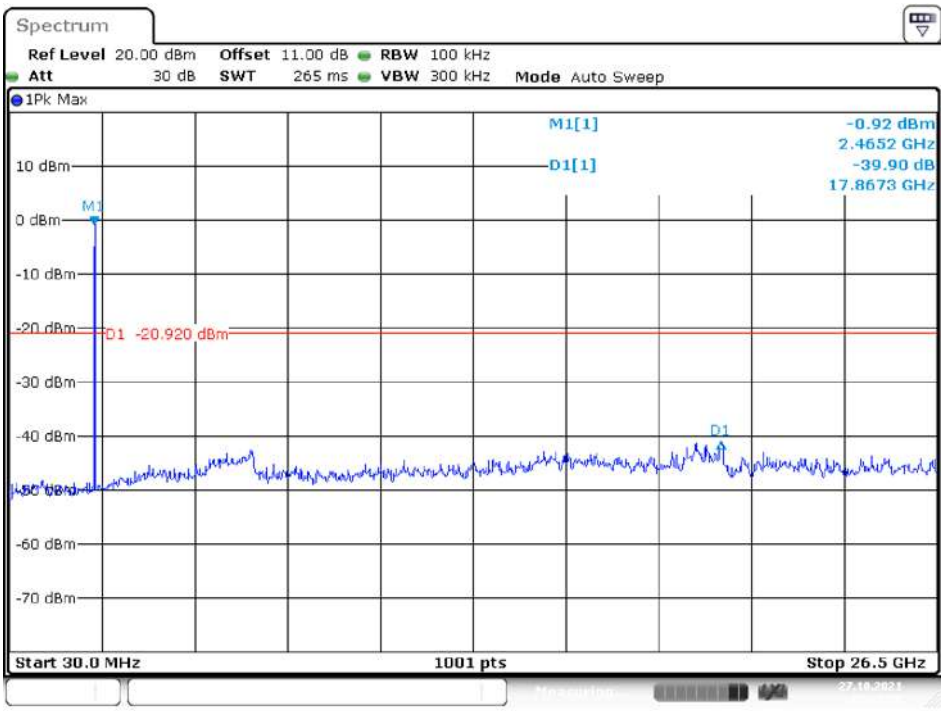
Date: 27.OCT.2021 15:17:11

Middle Channel



Date: 27.OCT.2021 15:14:54

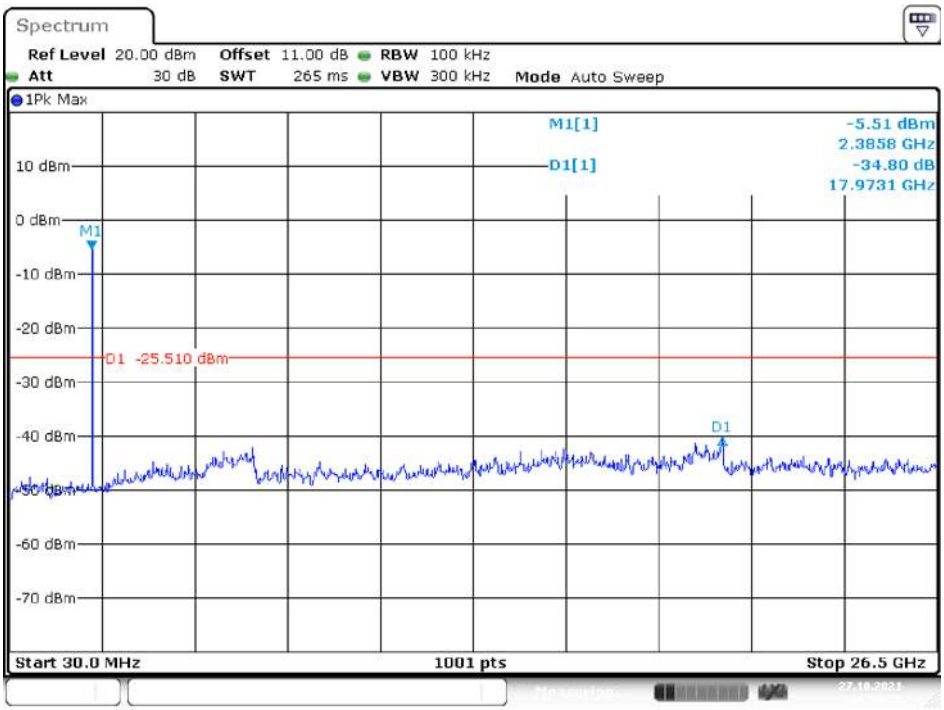
High Channel



Date: 27.OCT.2021 15:19:29

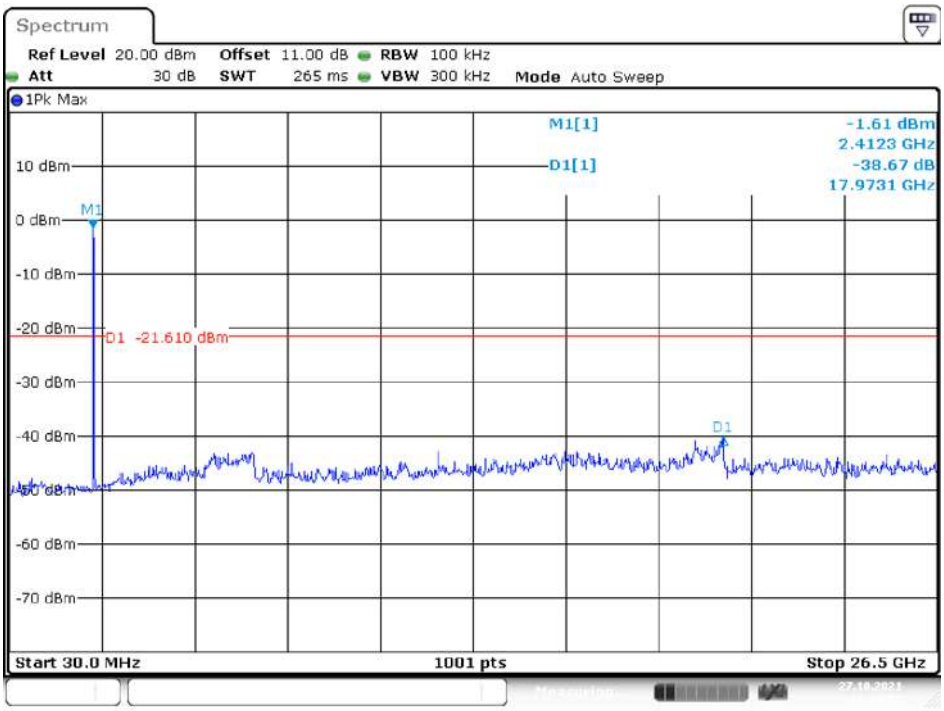
N20 Mode (Chain 0)

Low Channel



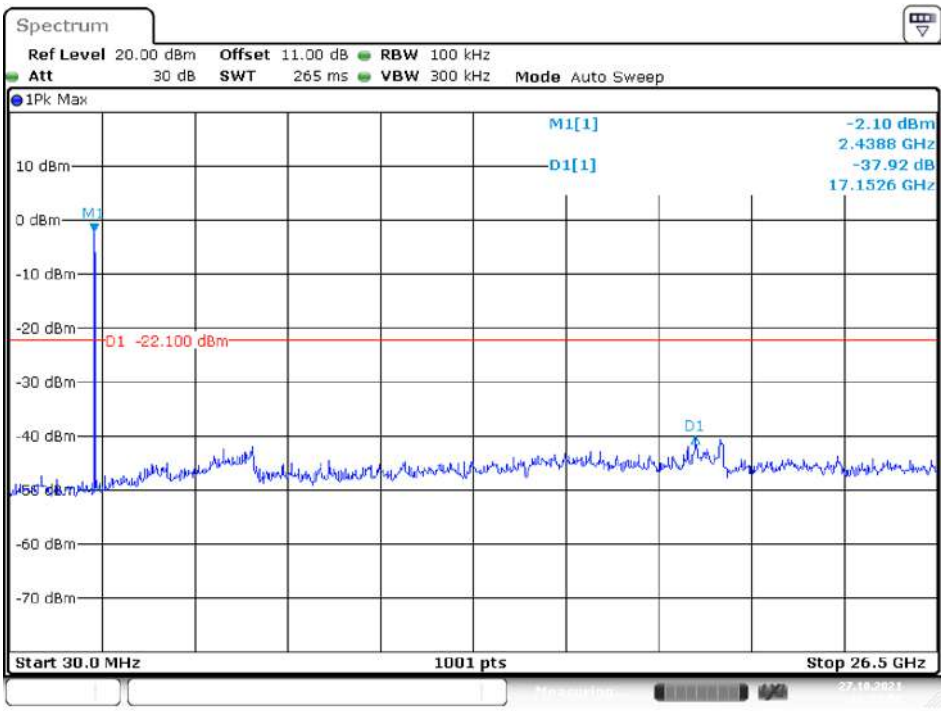
Date: 27.OCT.2021 16:50:29

Middle Channel



Date: 27.OCT.2021 16:48:08

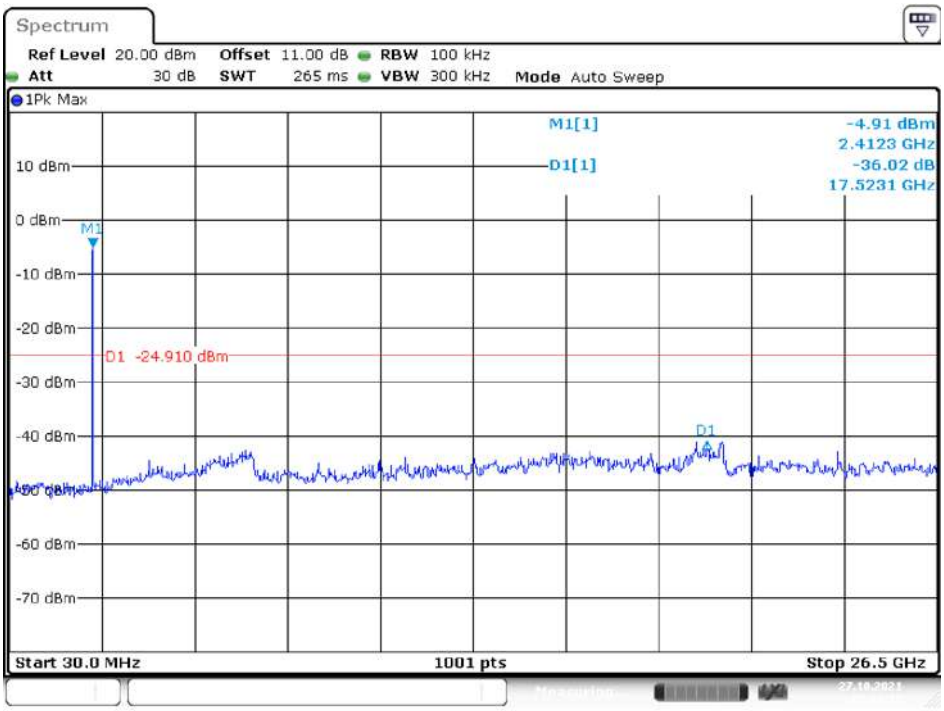
High Channel



Date: 27.OCT.2021 16:52:59

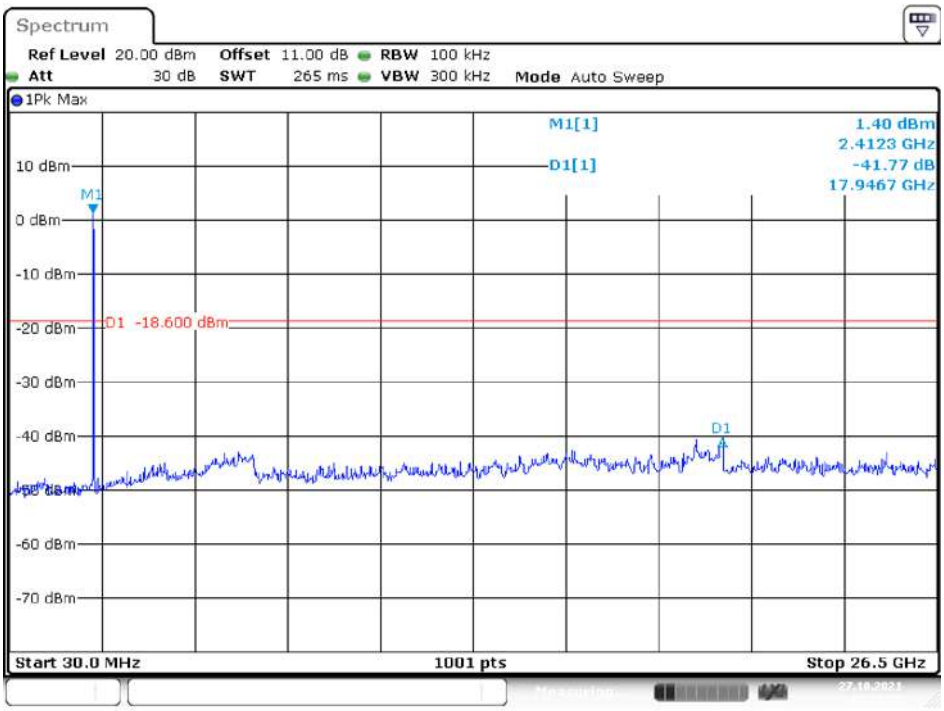
N20 Mode (Chain 1)

Low Channel



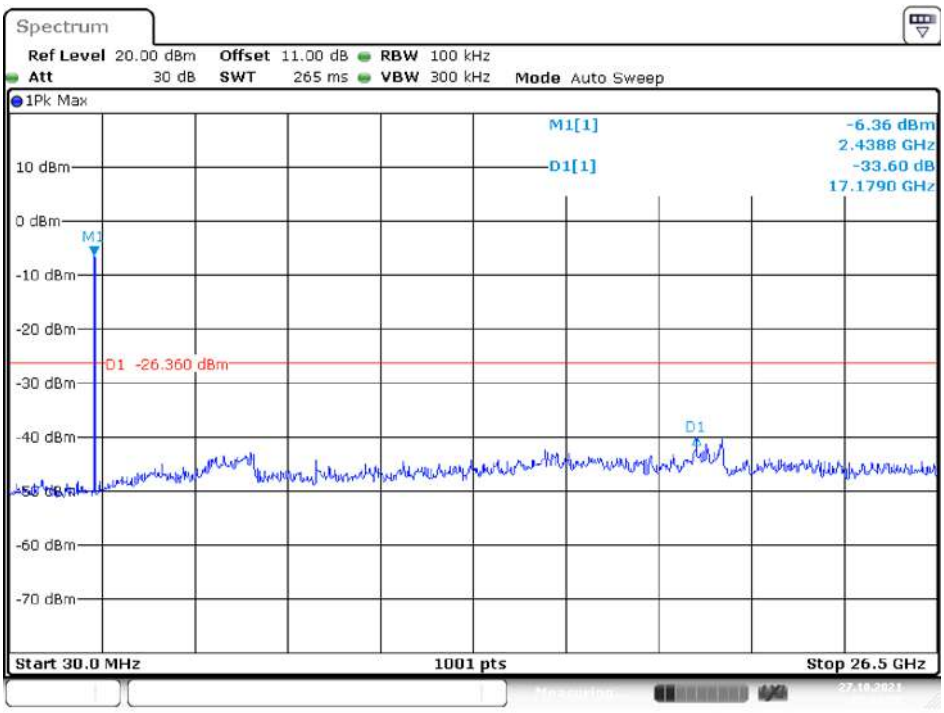
Date: 27.OCT.2021 15:41:11

Middle Channel



Date: 27.OCT.2021 15:37:37

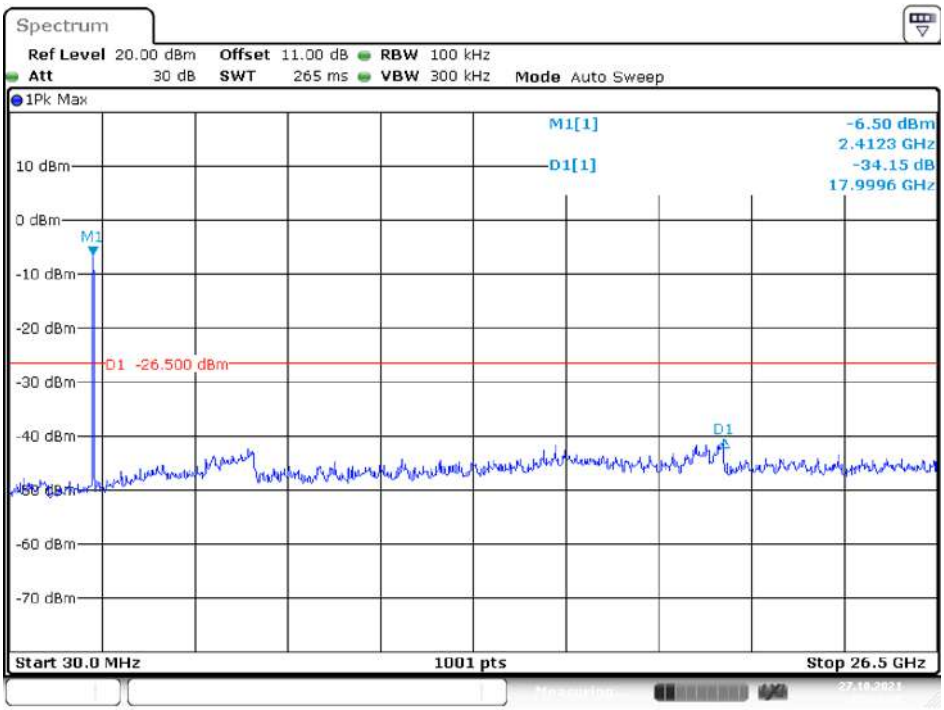
High Channel



Date: 27.OCT.2021 15:43:21

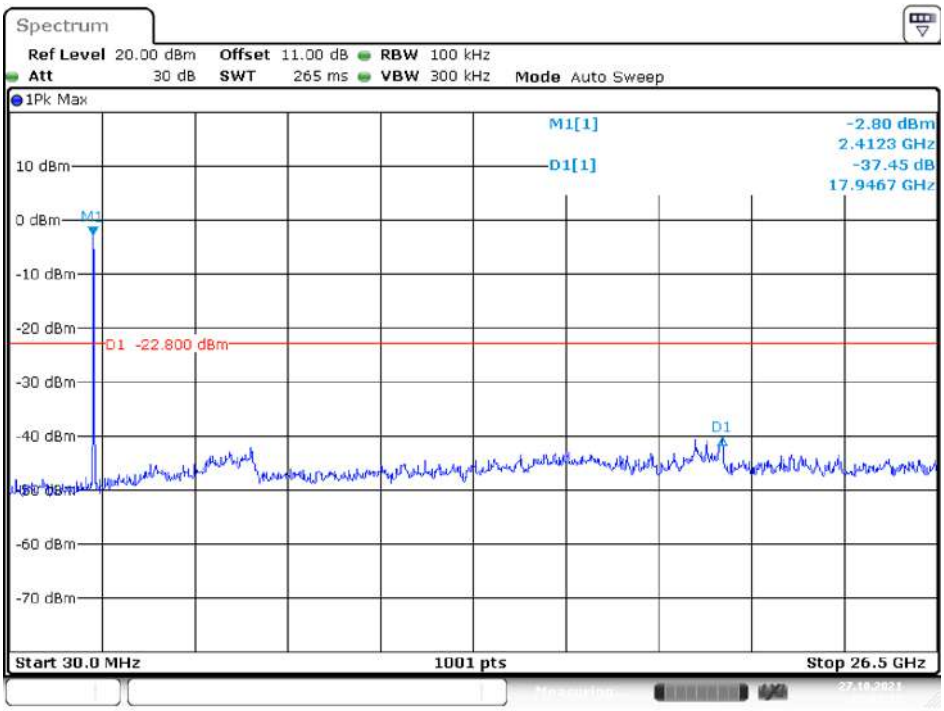
N40 Mode (Chain 0)

Low Channel



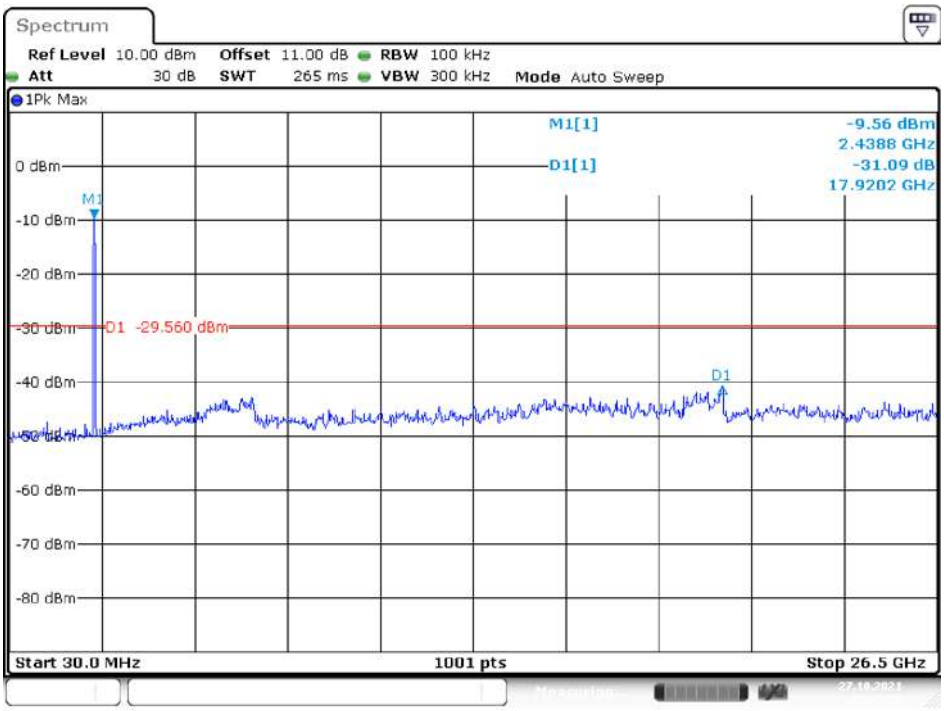
Date: 27.OCT.2021 17:10:49

Middle Channel



Date: 27.OCT.2021 17:07:17

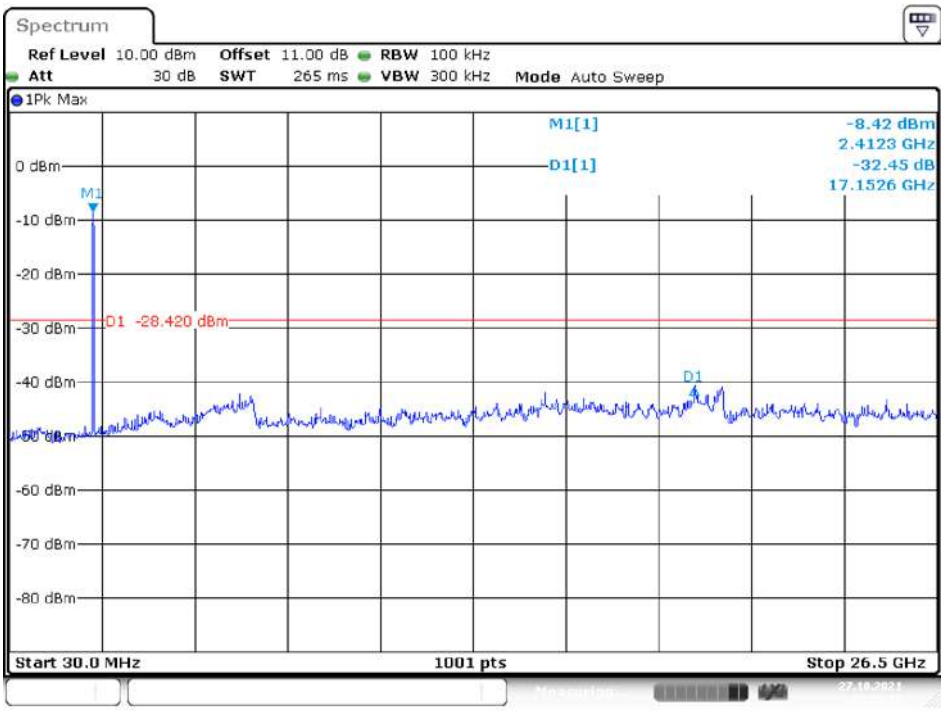
High Channel



Date: 27.OCT.2021 17:15:23

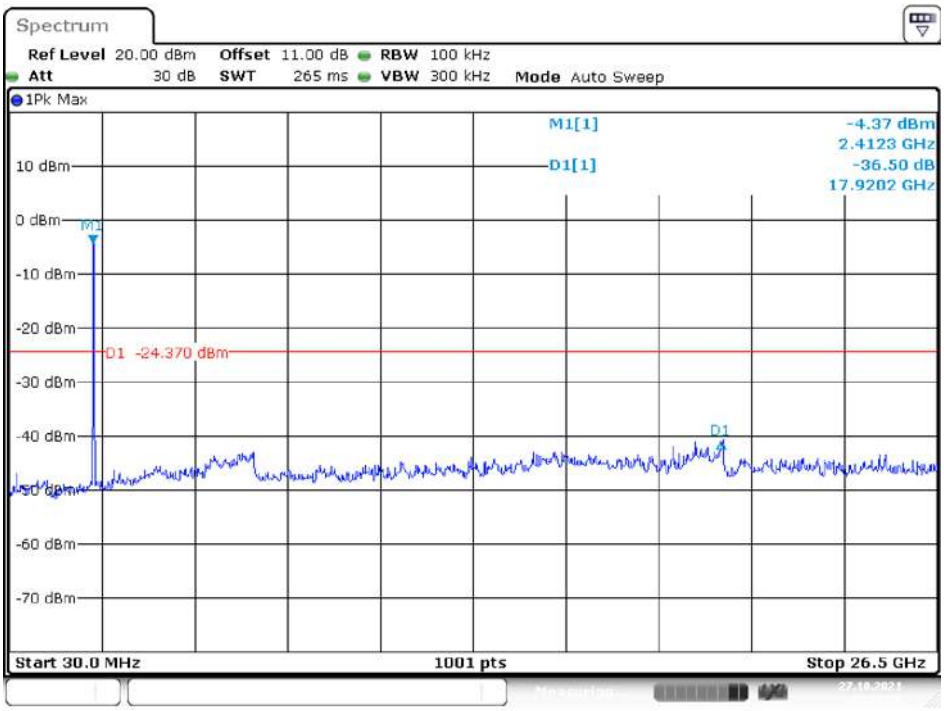
N40 Mode (Chain 1)

Low Channel



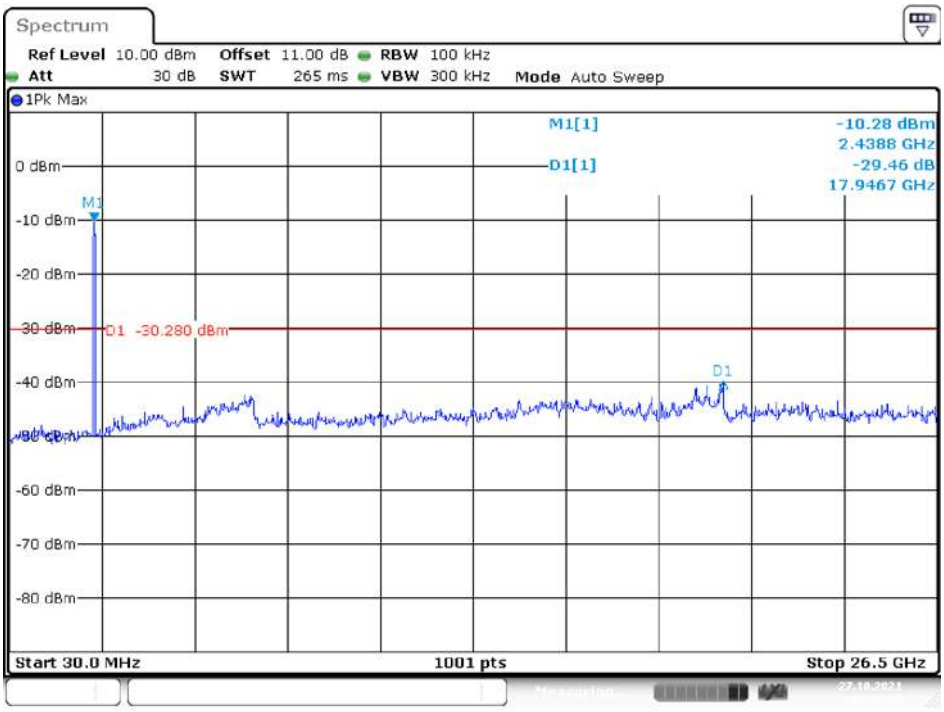
Date: 27.OCT.2021 15:55:18

Middle Channel



Date: 27.OCT.2021 15:52:29

High Channel



Date: 27.OCT.2021 15:57:46

9 FCC §15.247(a)(2) – 6 dB Emission Bandwidth

9.1 Applicable Standard

According to FCC §15.247(a)(2).

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

9.2 Test Procedure

The steps for the first option are as follows:

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

g) Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

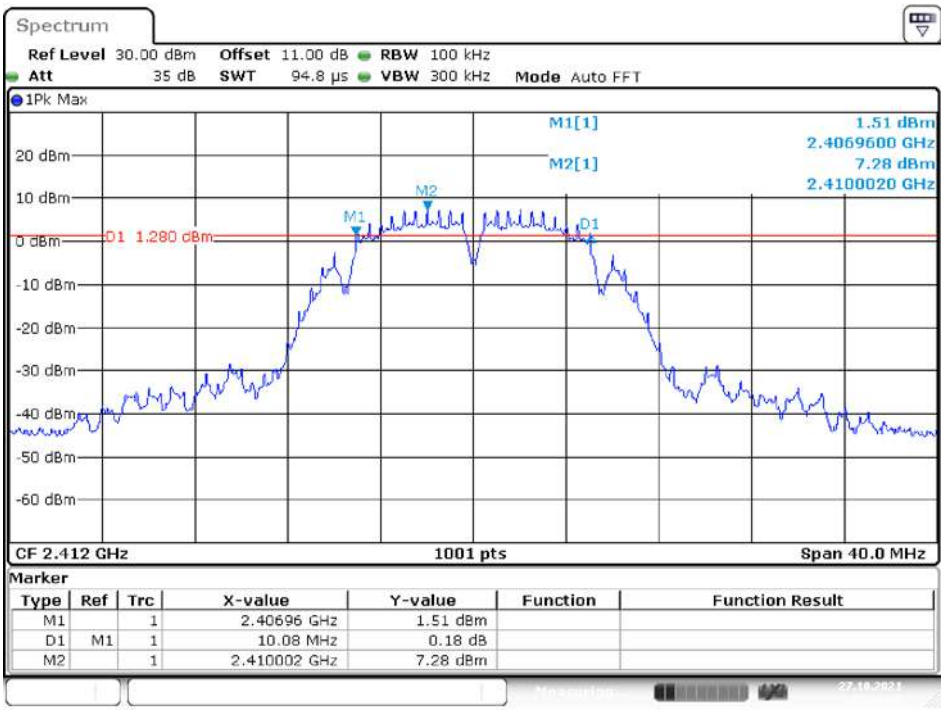
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)		Limit (kHz)	Result
		Chain 0	Chain 1		
B Mode					
Low	2412	10.08	10.08	> 500	PASS
Middle	2437	10.08	10.08	> 500	PASS
High	2462	10.08	10.08	> 500	PASS
G Mode					
Low	2412	16.32	16.32	> 500	PASS
Middle	2437	16.32	16.32	> 500	PASS
High	2462	16.32	16.32	> 500	PASS
N20 Mode					
Low	2412	17.40	17.28	> 500	PASS
Middle	2437	17.40	17.32	> 500	PASS
High	2462	17.28	17.28	> 500	PASS
N40 Mode					
Low	2422	35.52	35.52	> 500	PASS
Middle	2437	35.68	35.52	> 500	PASS
High	2452	35.68	35.44	> 500	PASS

Please refer to the following plots

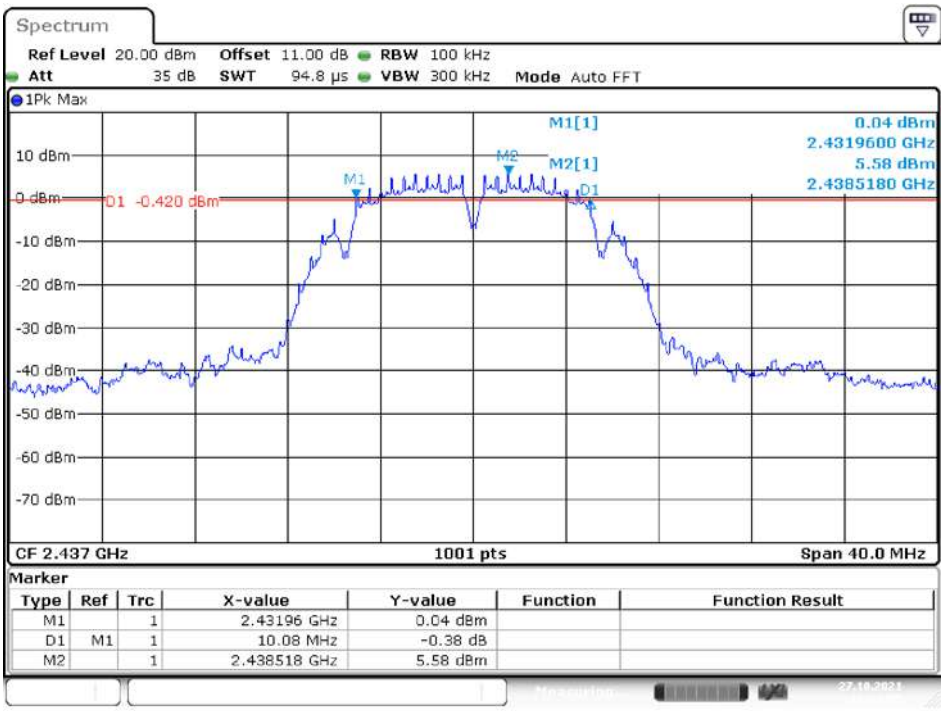
B Mode (Chain 0)

Low Channel



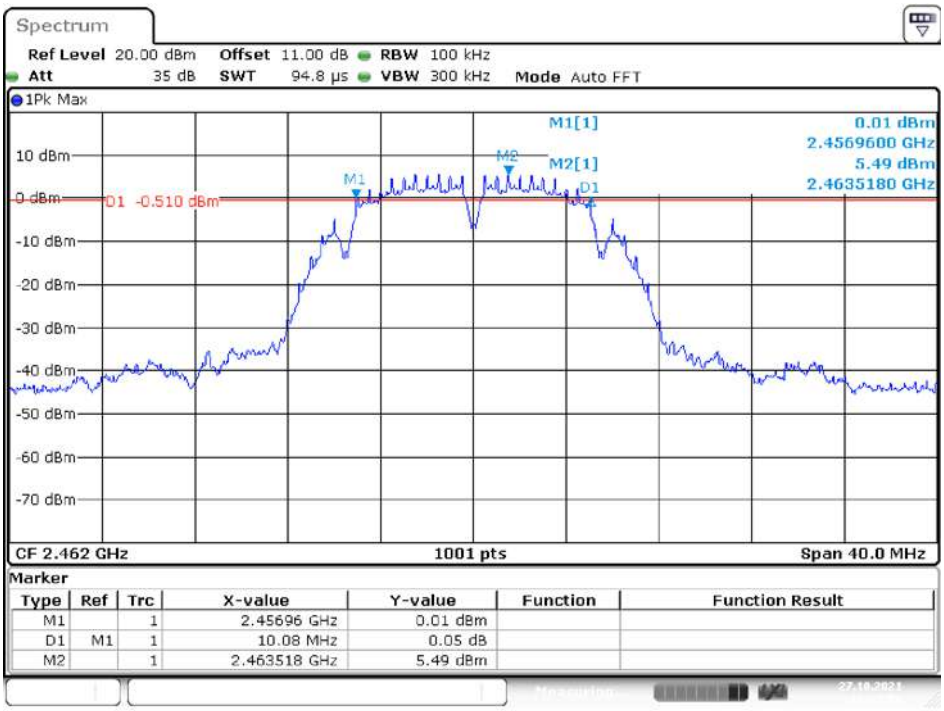
Date: 27.OCT.2021 15:11:43

Middle Channel



Date: 27.OCT.2021 16:10:56

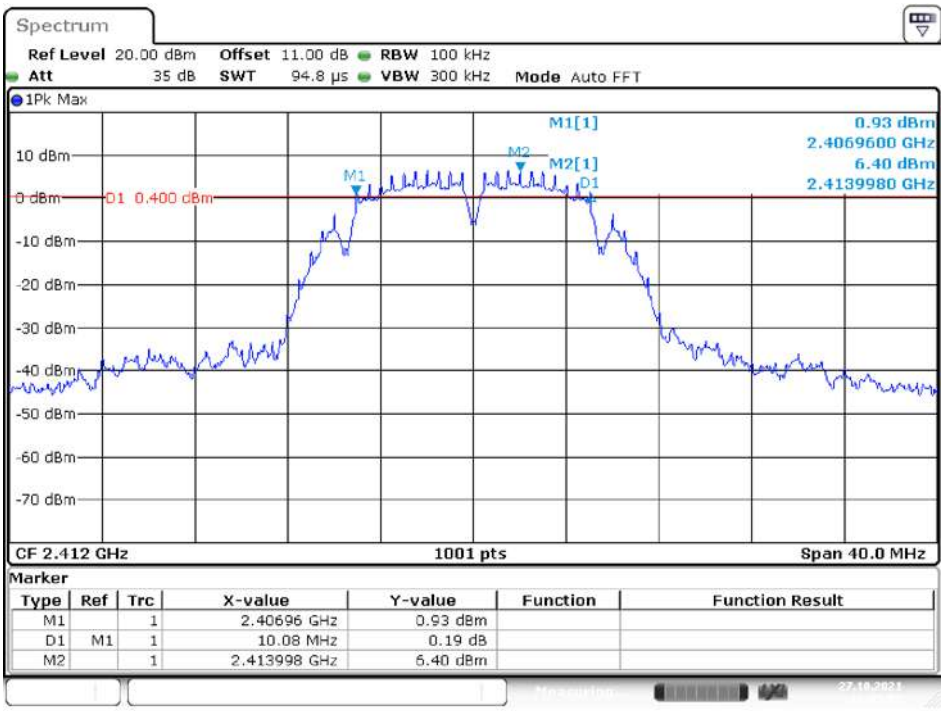
High Channel



Date: 27.OCT.2021 16:18:06

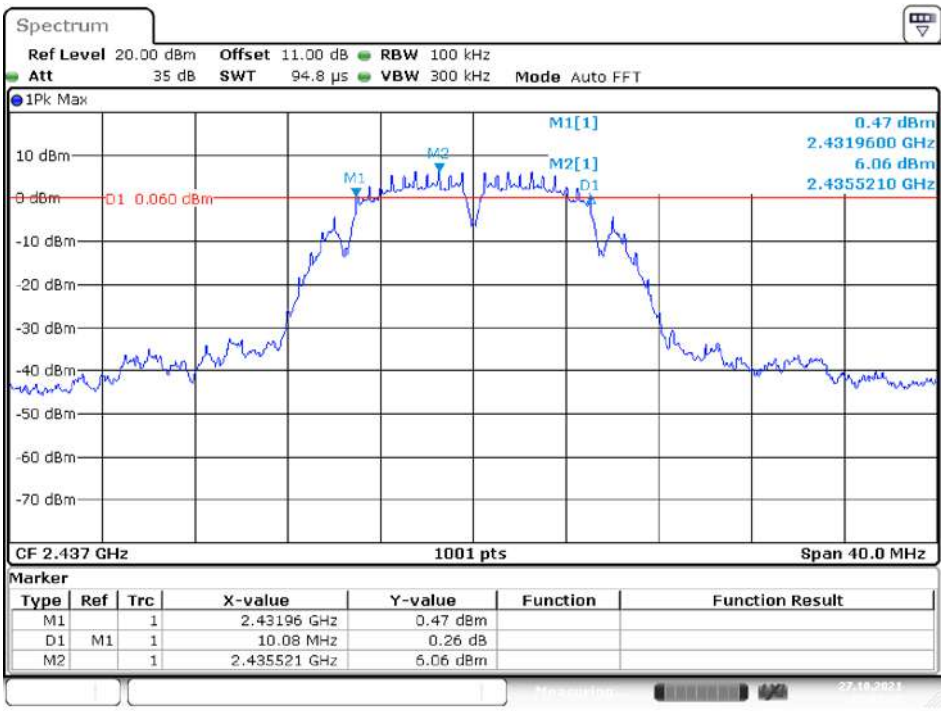
B Mode (Chain 1)

Low Channel



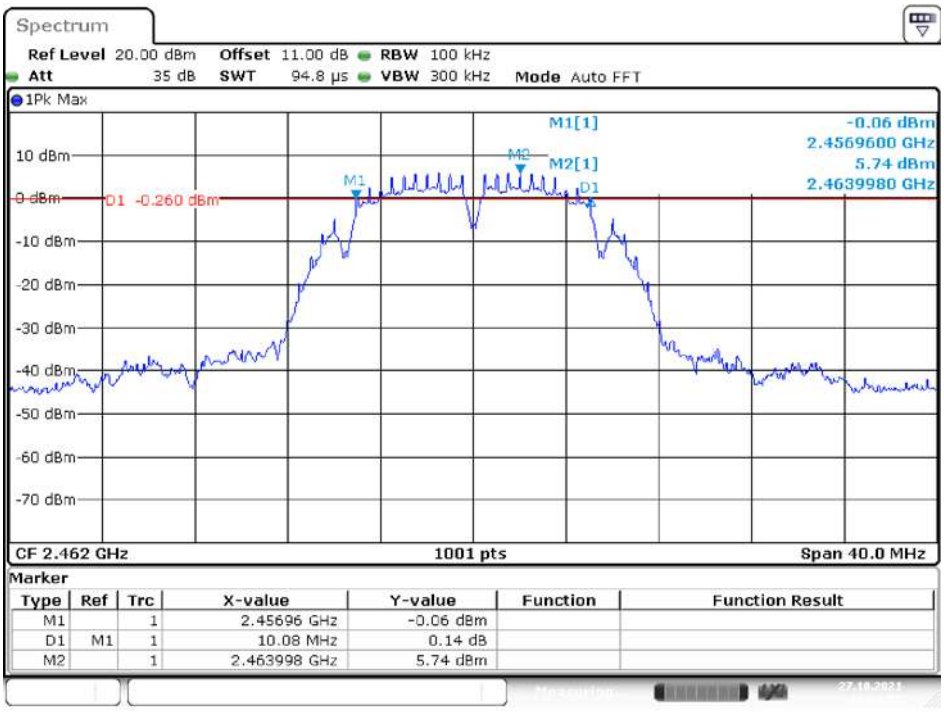
Date: 27.OCT.2021 16:05:03

Middle Channel



Date: 27.OCT.2021 15:07:43

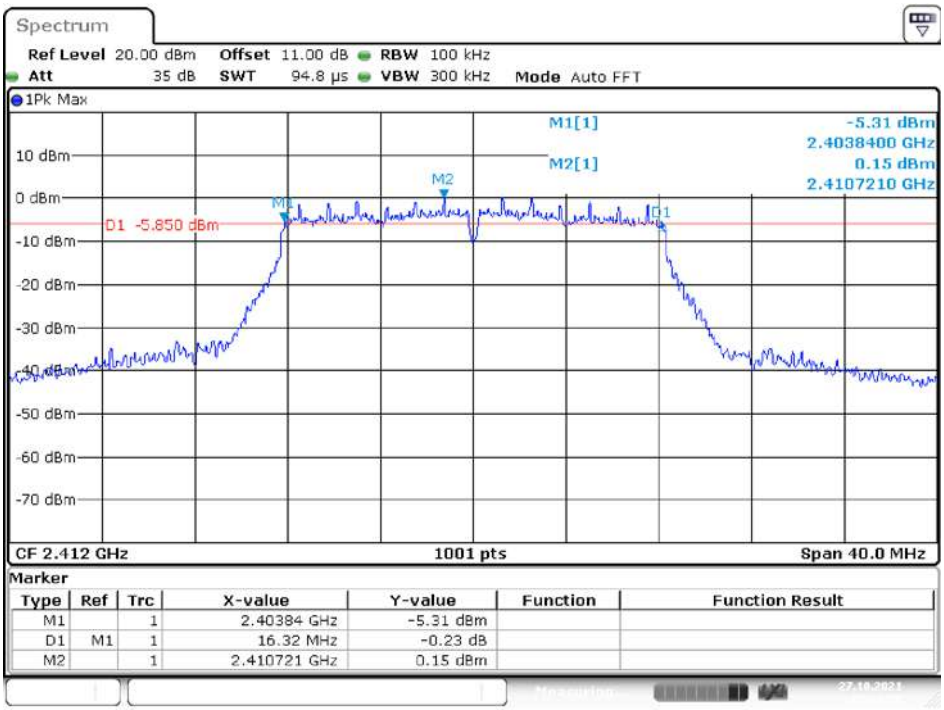
High Channel



Date: 27.OCT.2021 16:14:02

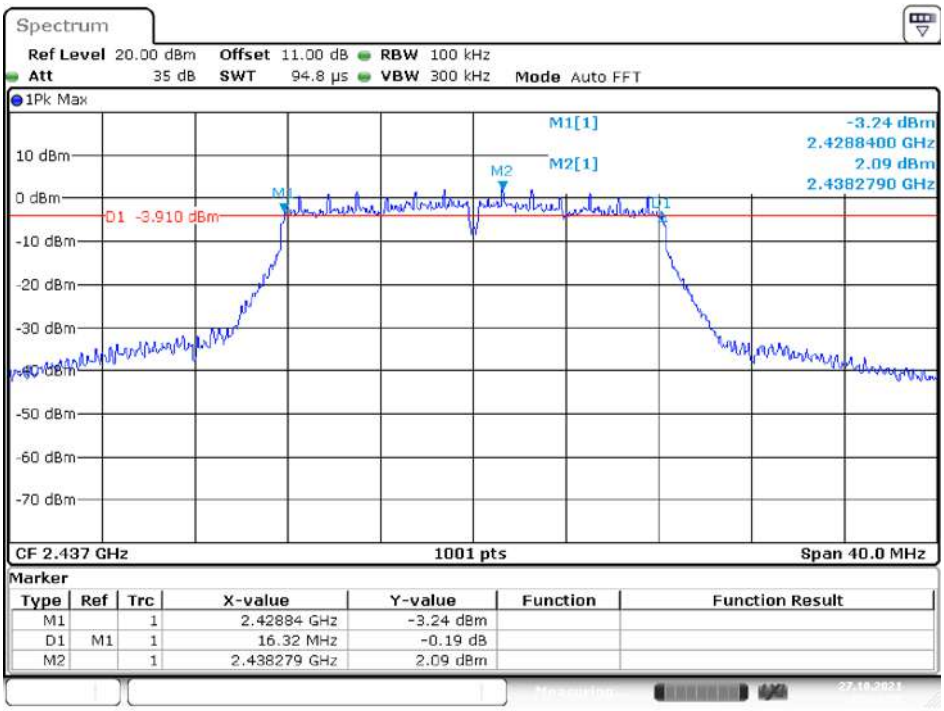
G Mode (Chain 0)

Low Channel



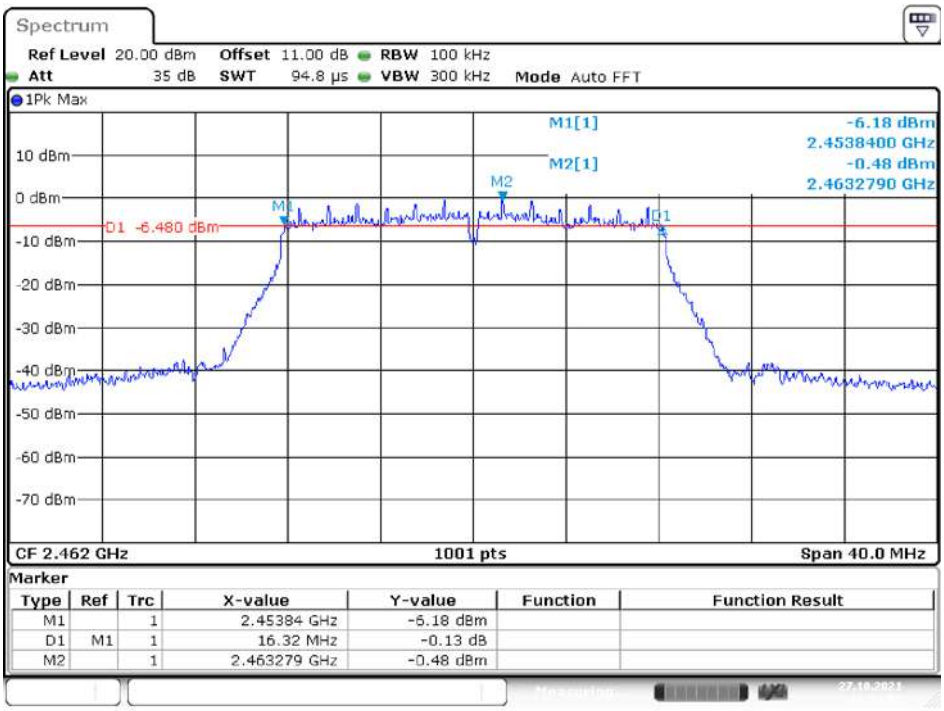
Date: 27.OCT.2021 15:16:29

Middle Channel



Date: 27.OCT.2021 15:14:28

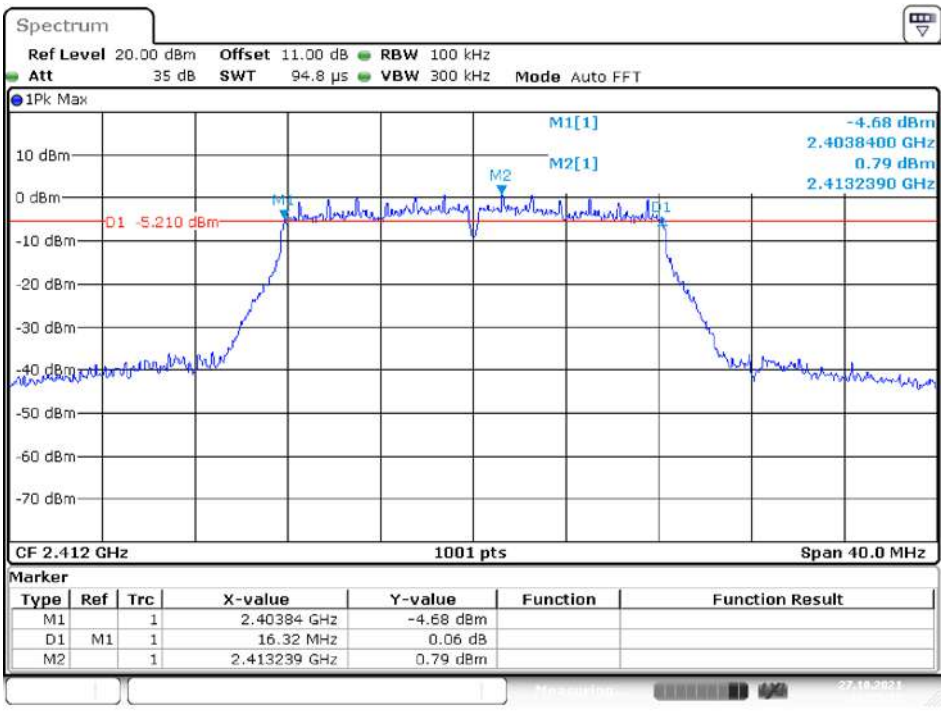
High Channel



Date: 27.OCT.2021 16:36:01

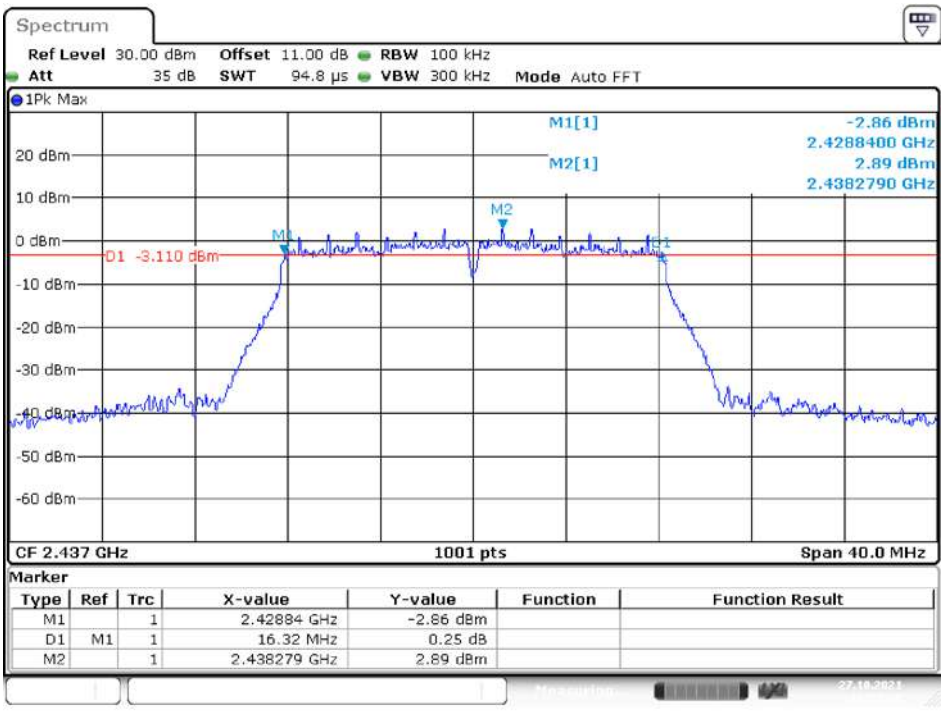
G Mode (Chain 1)

Low Channel



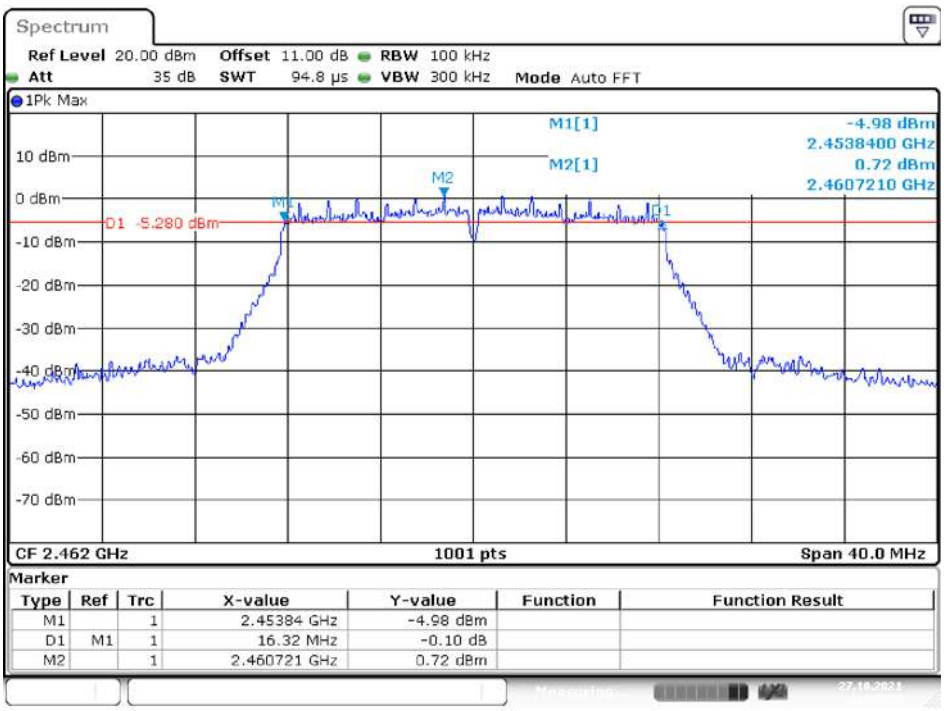
Date: 27.OCT.2021 16:25:17

Middle Channel



Date: 27.OCT.2021 16:22:49

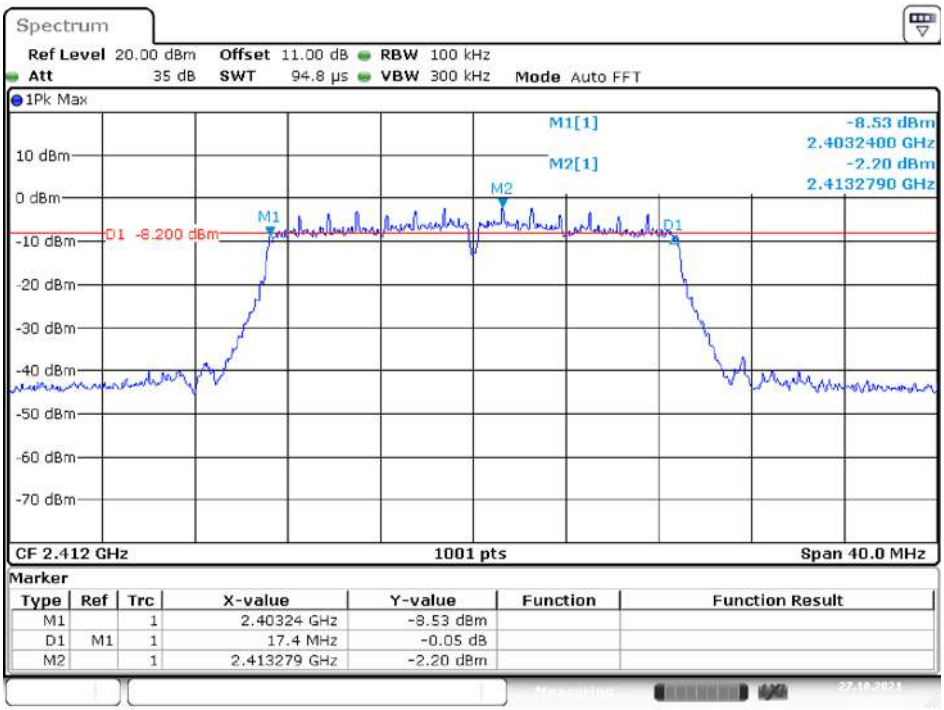
High Channel



Date: 27.OCT.2021 16:27:24

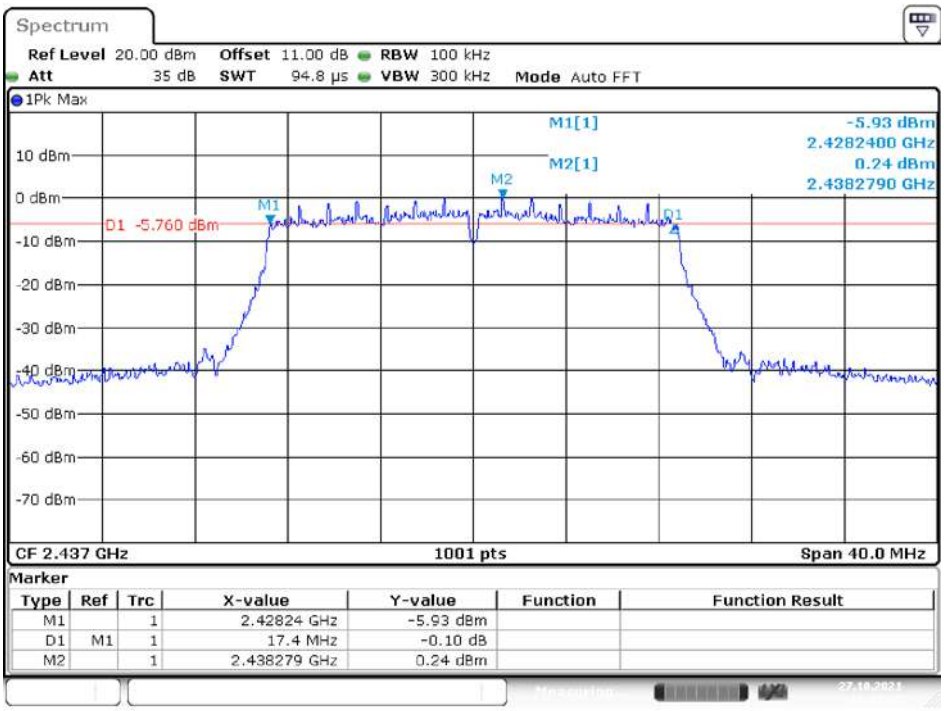
N20 Mode (Chain 0)

Low Channel



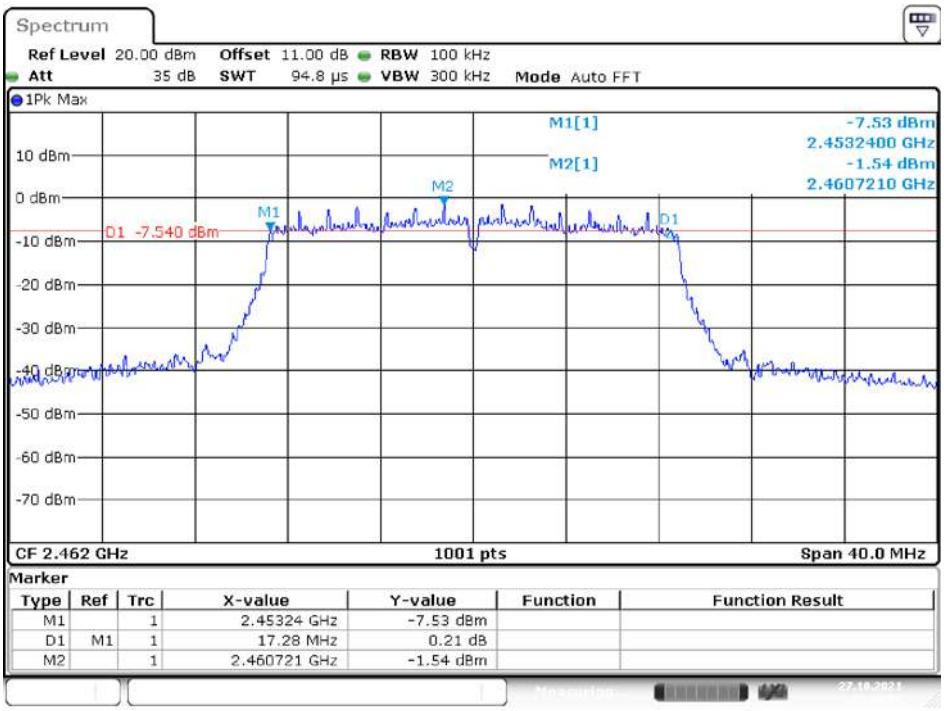
Date: 27.OCT.2021 16:49:46

Middle Channel



Date: 27.OCT.2021 16:47:42

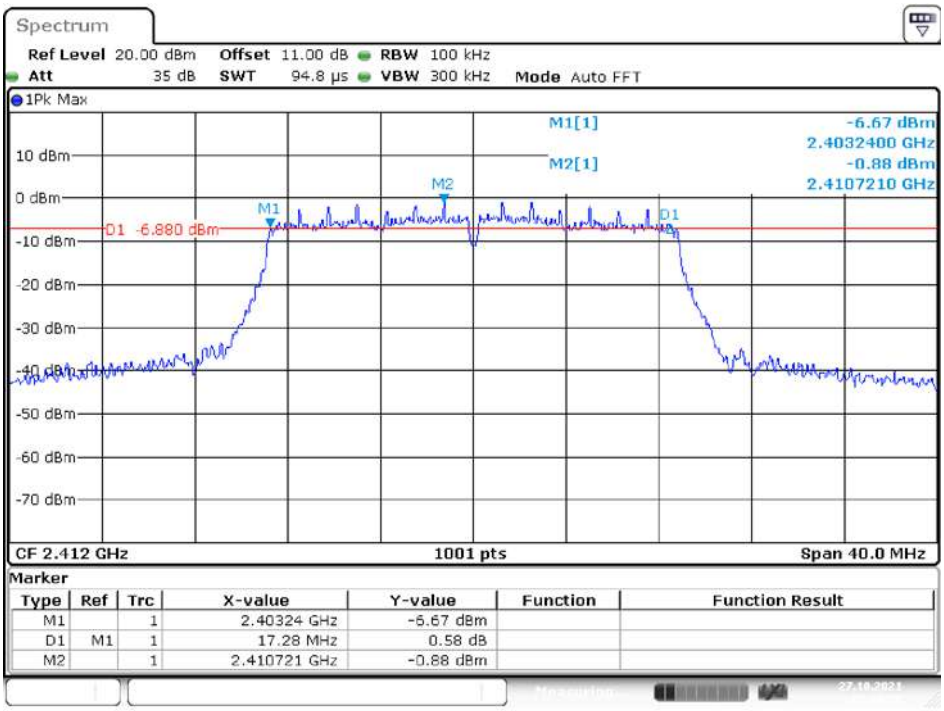
High Channel



Date: 27.OCT.2021 15:49:09

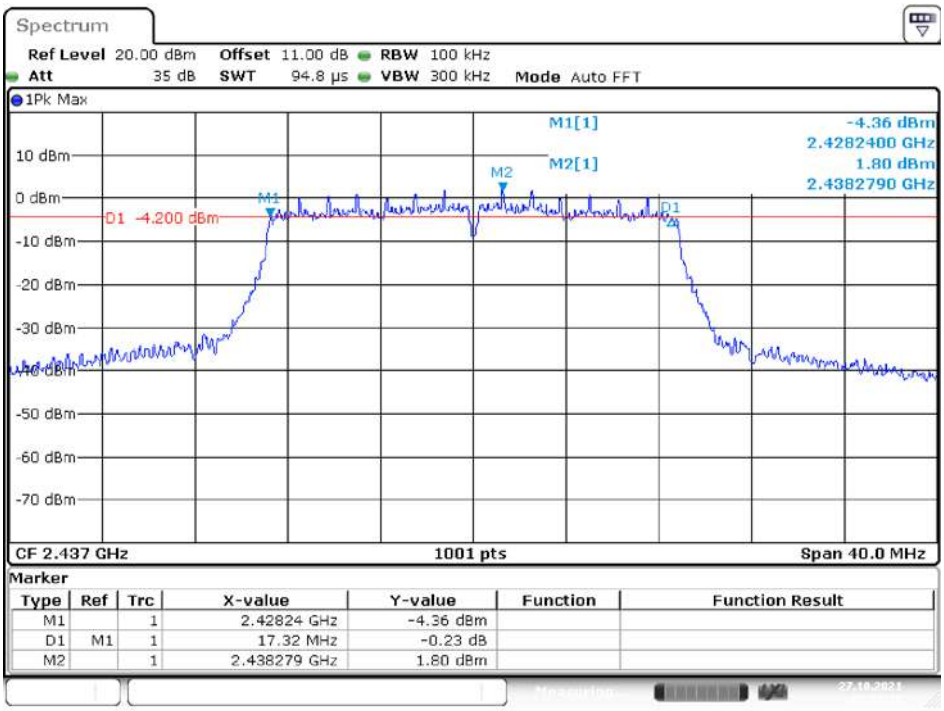
N20 Mode (Chain 1)

Low Channel



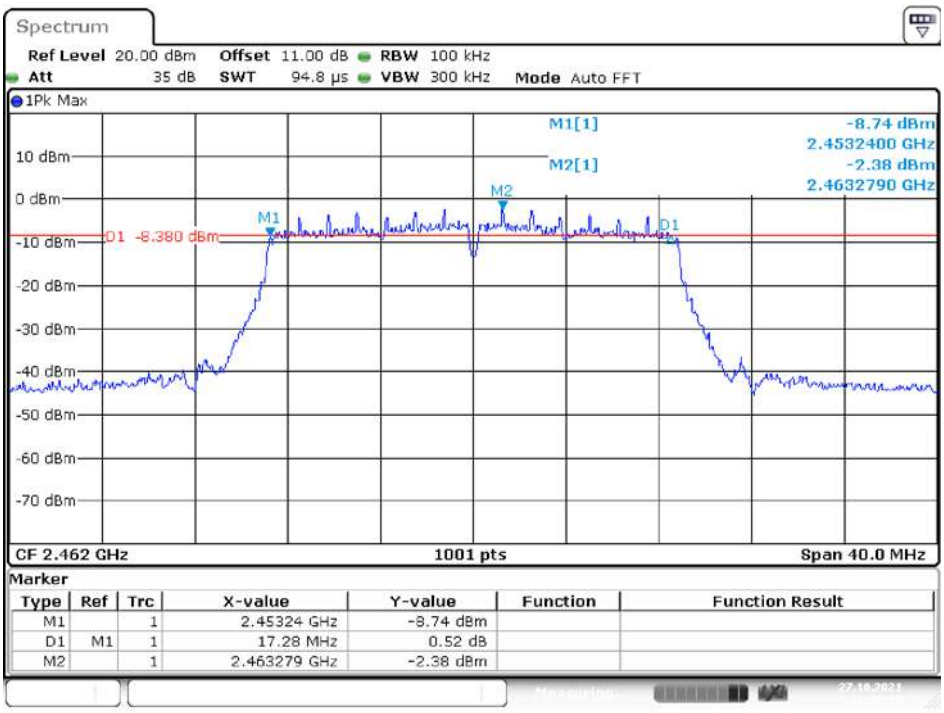
Date: 27.OCT.2021 15:40:29

Middle Channel



Date: 27.OCT.2021 15:37:11

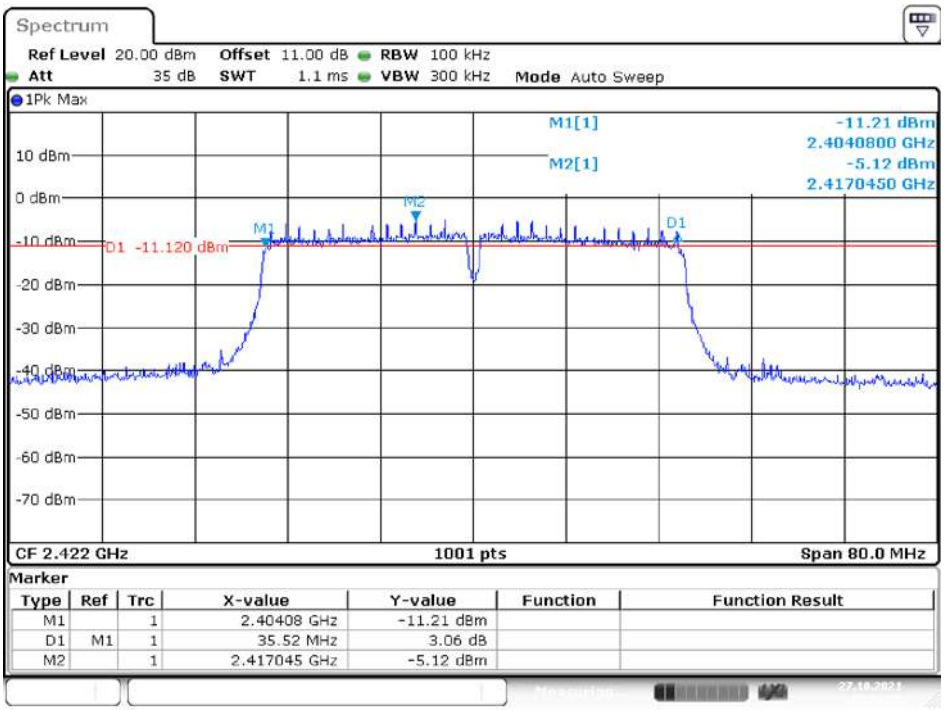
High Channel



Date: 27.OCT.2021 16:52:17

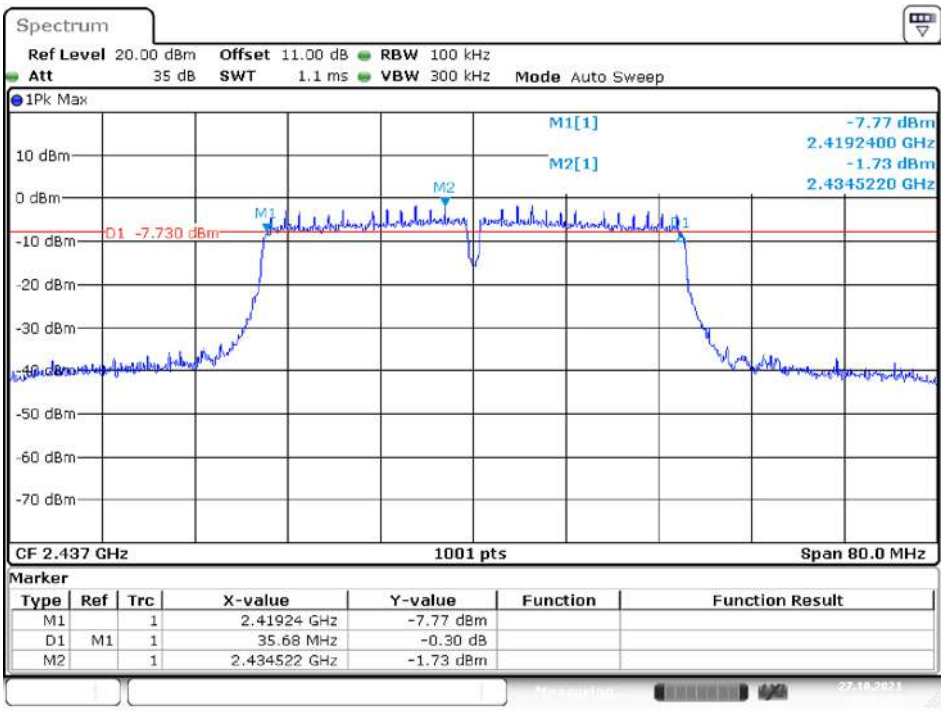
N40 Mode (Chain 0)

Low Channel



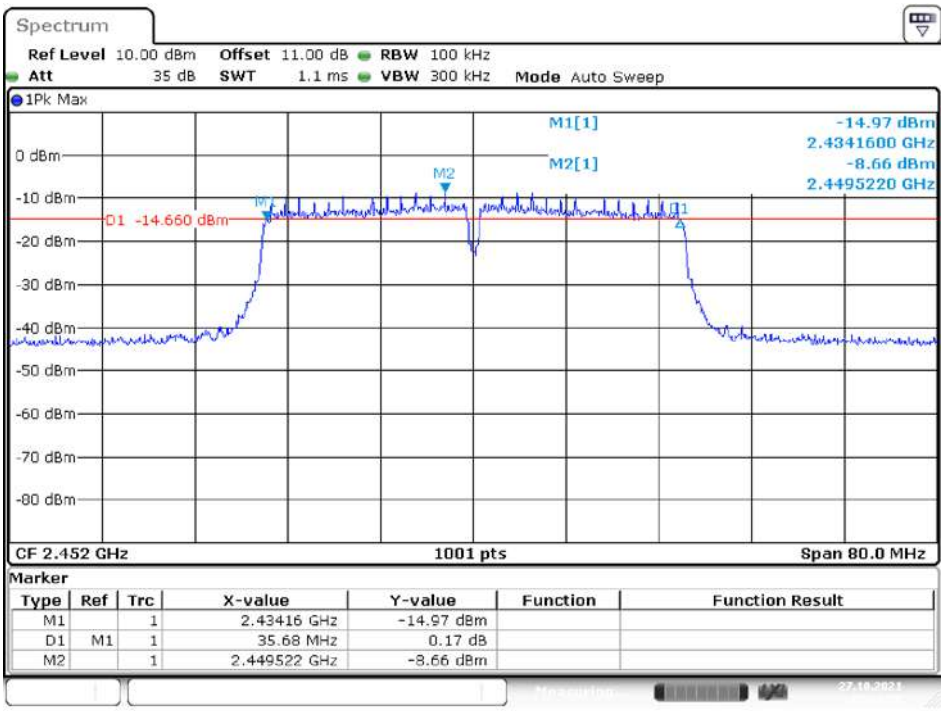
Date: 27.OCT.2021 15:54:35

Middle Channel



Date: 27.OCT.2021 17:06:51

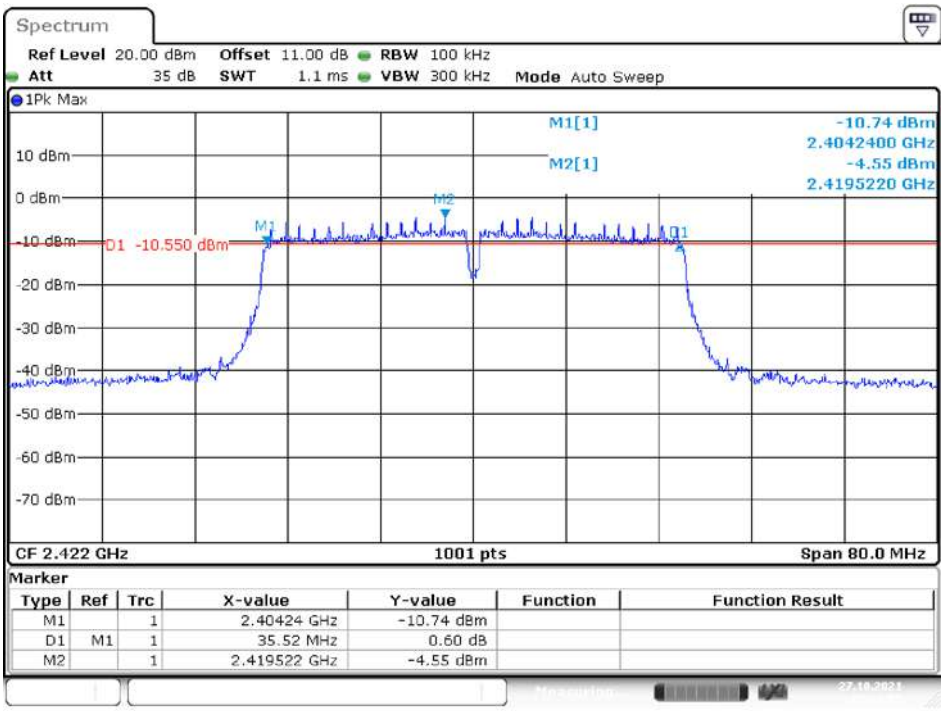
High Channel



Date: 27.OCT.2021 17:14:40

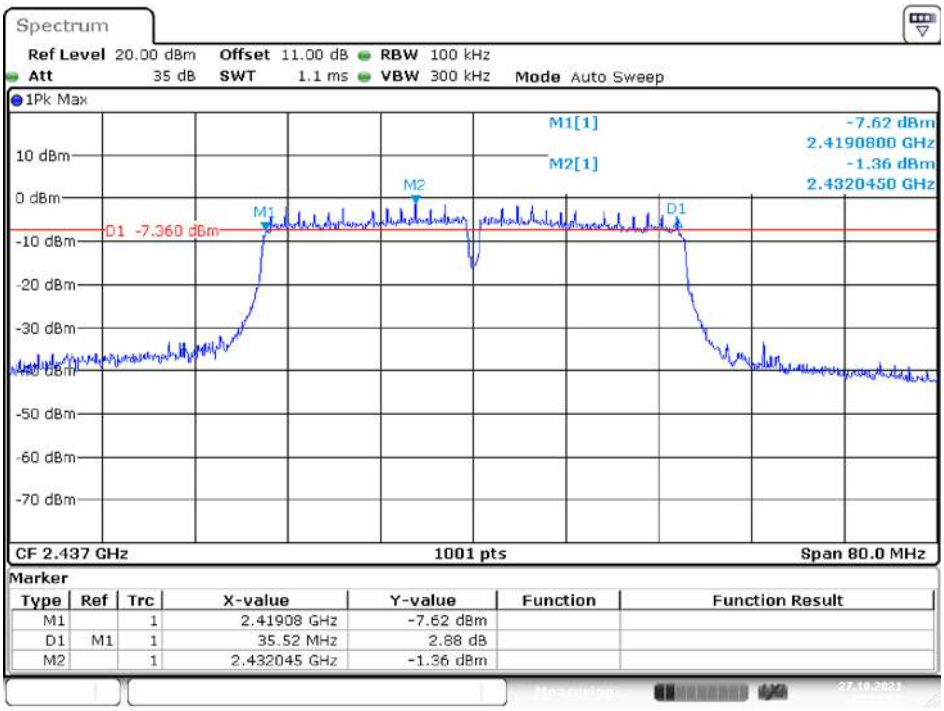
N40 Mode (Chain 1)

Low Channel



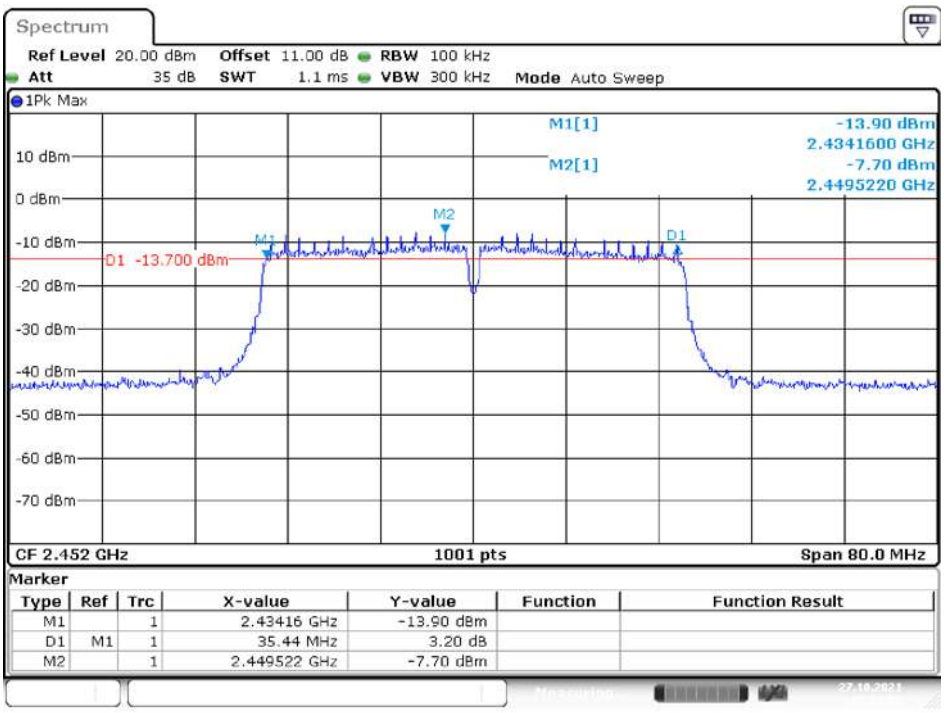
Date: 27.OCT.2021 17:10:06

Middle Channel



Date: 27.OCT.2021 15:52:03

High Channel



Date: 27.OCT.2021 15:57:02

10 FCC §15.247(b)(3) – Maximum Output Power

10.1 Applicable Standard

According to FCC §15.247(b) (3).

Systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

10.2 Test Procedure

1. Place the EUT on a bench and set it in transmitting mode.

2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to measuring equipment.

10.3 Test Results

Conducted Peak Output Power

Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)		Total Power (dBm)	Limit (dBm)	Result
		Chain 0	Chain 1			
802.11b Mode						
Low	2412	19.14	17.11	21.25	30	PASS
Middle	2437	18.52	16.81	20.76	30	PASS
High	2462	18.66	17.50	21.13	30	PASS
802.11g Mode						
Low	2412	20.41	19.58	23.03	30	PASS
Middle	2437	20.56	20.11	23.35	30	PASS
High	2462	20.55	20.05	23.32	30	PASS
802.11n HT20 Mode						
Low	2412	19.58	20.47	23.06	30	PASS
Middle	2437	18.81	18.82	21.83	30	PASS
High	2462	19.66	19.22	22.46	30	PASS
802.11n HT40 Mode						
Low	2422	14.11	15.83	18.06	30	PASS
Middle	2437	13.45	15.49	17.60	30	PASS
High	2452	14.06	15.59	17.90	30	PASS

According to FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For power measurements on IEEE 802.11 devices, Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4.

The device have two antenna, so array gain is 0 dB.

11 FCC§15.247(d) – 100 kHz Bandwidth of Frequency Band Edge

11.1 Applicable Standard

According to FCC §15.247(d).

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

11.2 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.

3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.

4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.

5. Repeat above procedures until all measured frequencies were complete.

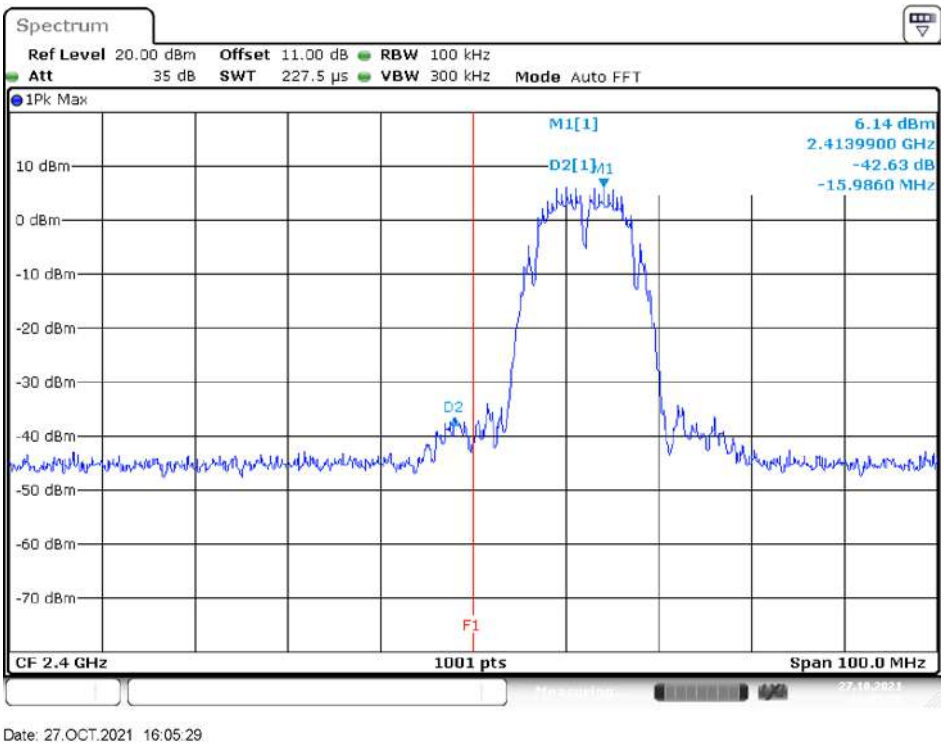
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)		Limit (dBc)	Result
		Chain 0	Chain 1		
B Mode					
Low	2412	42.63	40.95	≥ 20	PASS
High	2462	45.23	46.74	≥ 20	PASS
G Mode					
Low	2412	38.91	33.92	≥ 20	PASS
High	2462	40.04	39.66	≥ 20	PASS
N20 Mode					
Low	2412	39.01	36.08	≥ 20	PASS
High	2462	39.55	39.09	≥ 20	PASS
N40 Mode					
Low	2422	34.57	33.88	≥ 20	PASS
High	2452	32.73	32.87	≥ 20	PASS

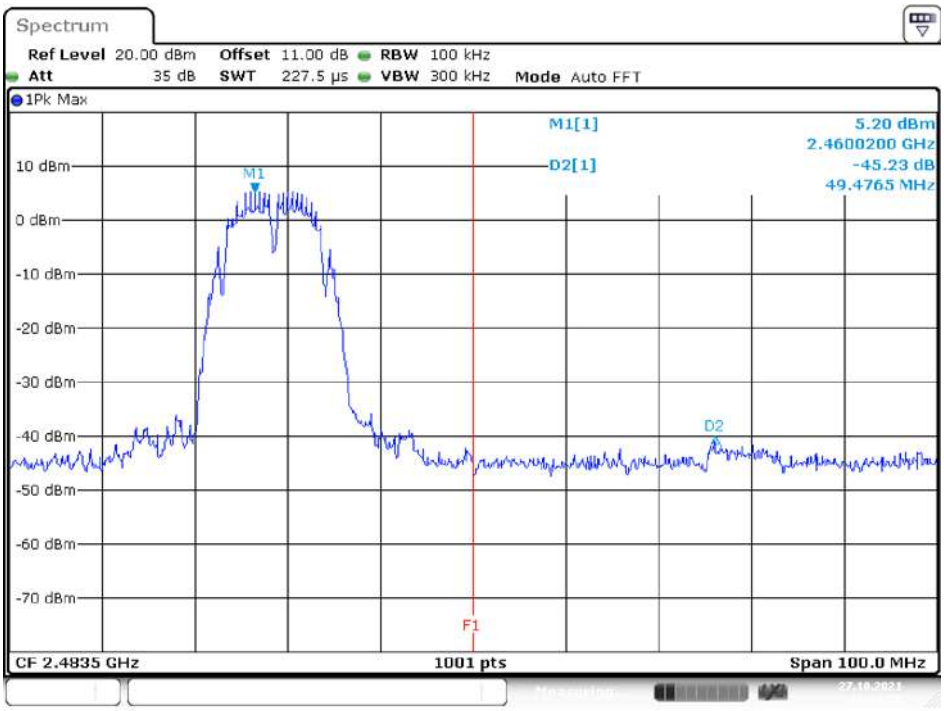
Please refer to the following plots.

B Mode (Chain 0)

Band Edge, Left Side



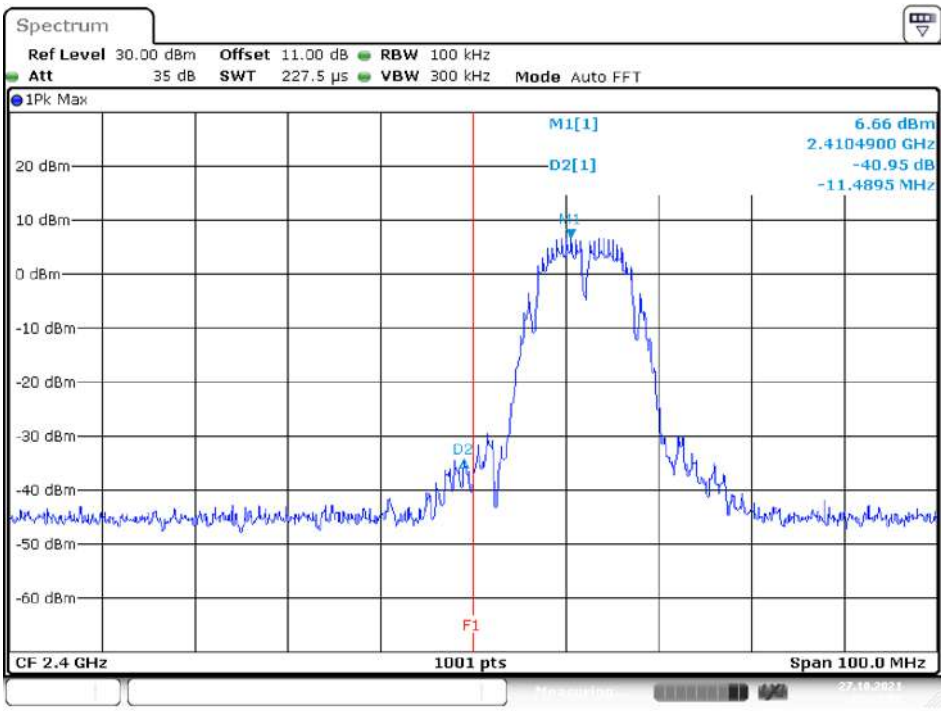
Band Edge, Right Side



Date: 27.OCT.2021 16:14:28

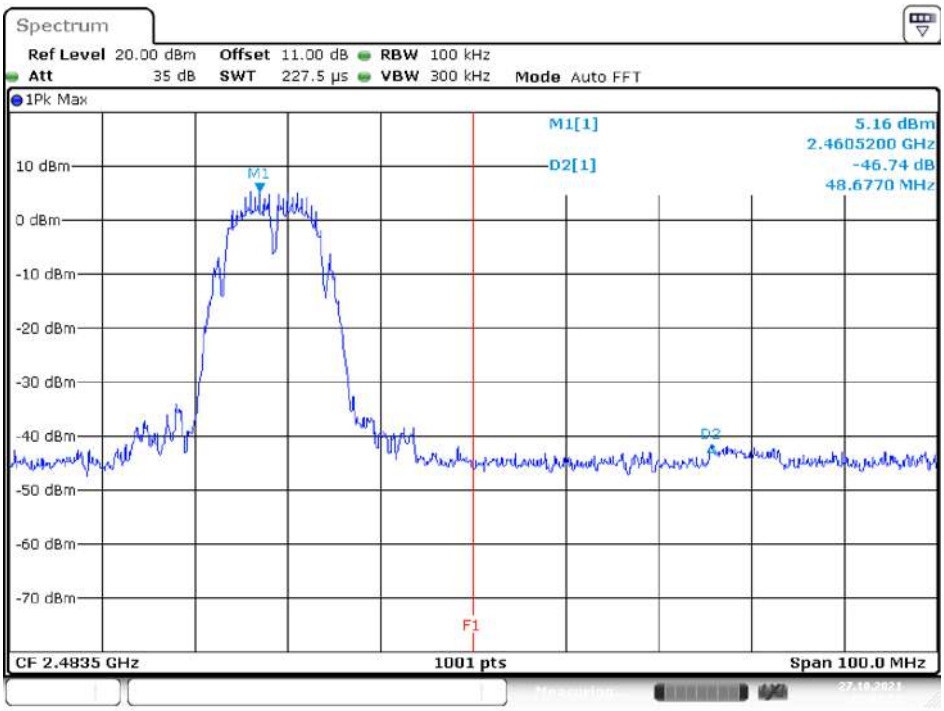
B Mode (Chain 1)

Band Edge, Left Side



Date: 27.OCT.2021 15:12:09

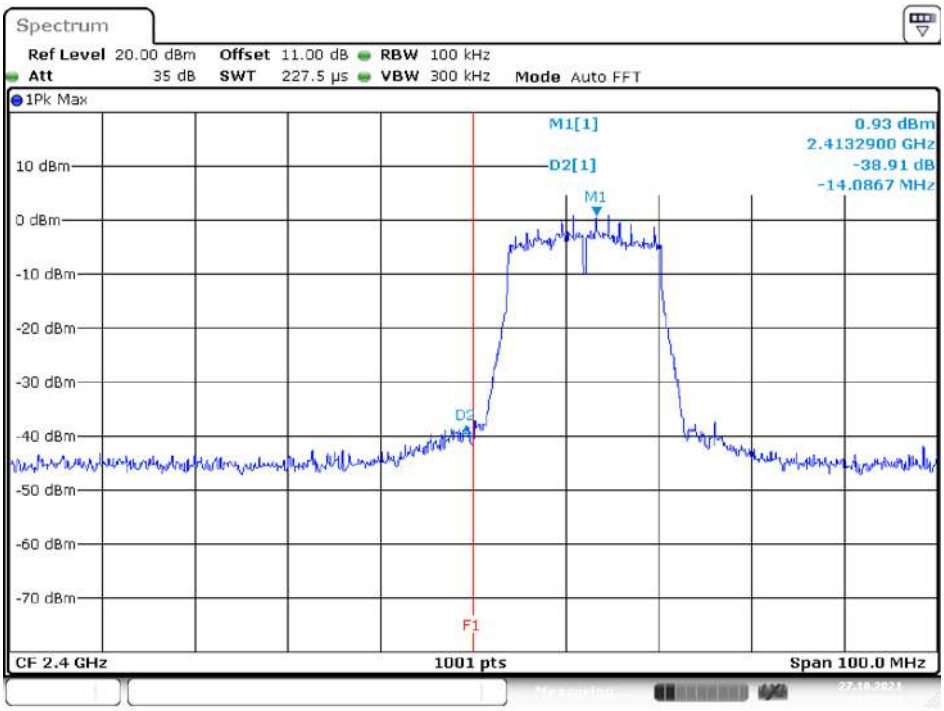
Band Edge, Right Side



Date: 27.OCT.2021 15:09:57

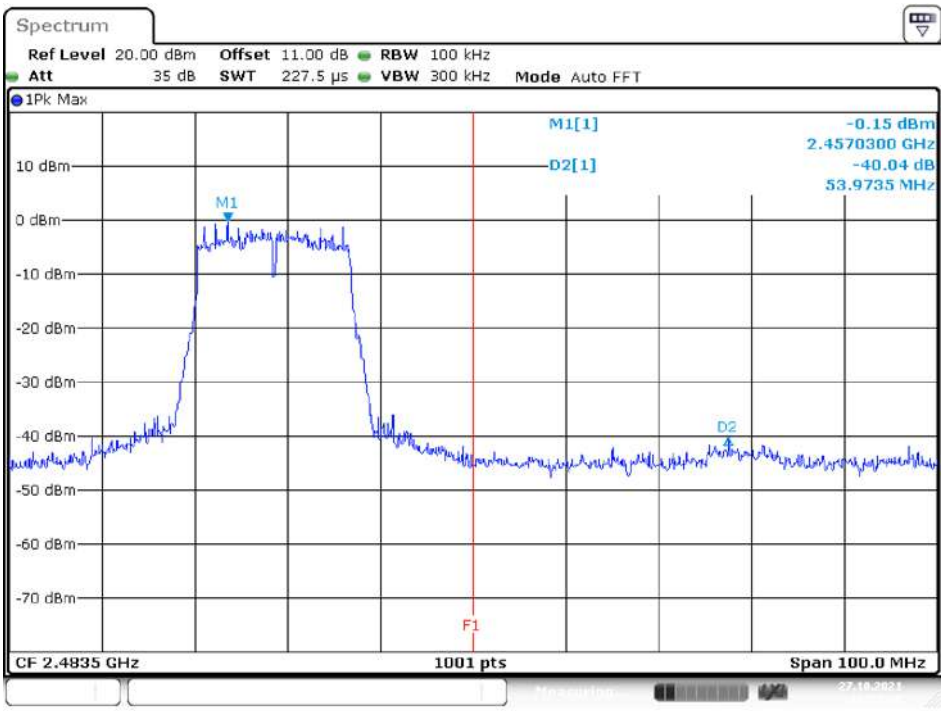
G Mode (Chain 0)

Band Edge, Left Side



Date: 27.OCT.2021 16:25:44

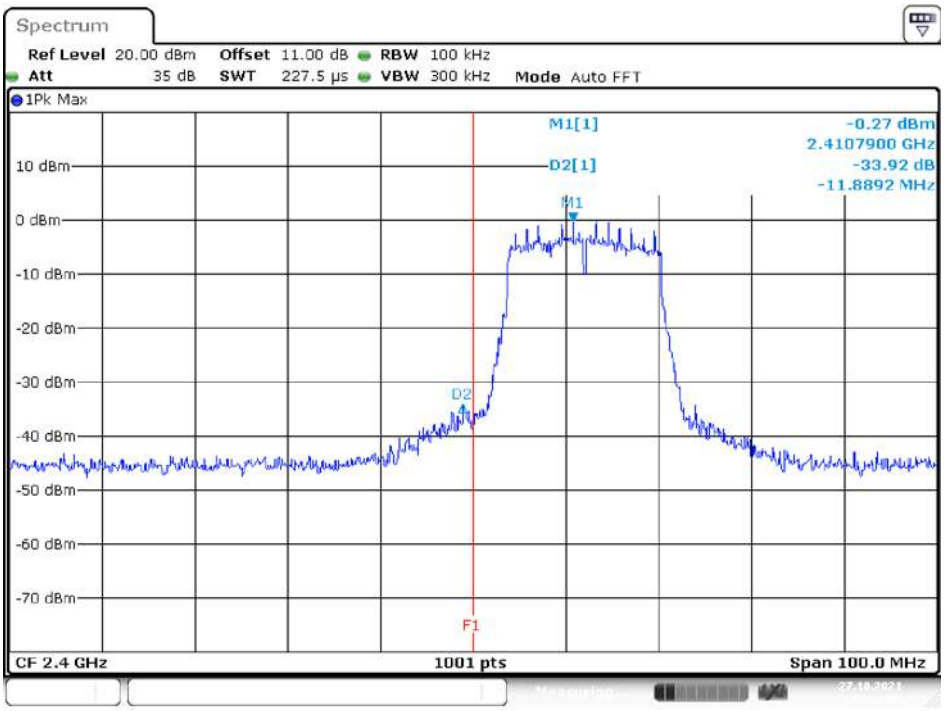
Band Edge, Right Side



Date: 27.OCT.2021 16:27:50

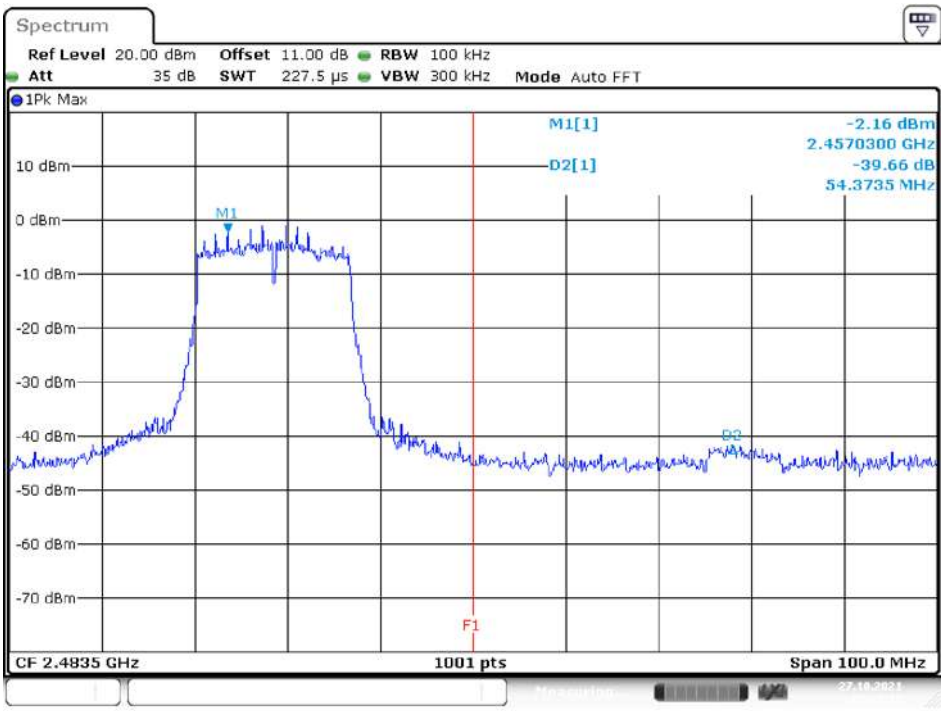
G Mode (Chain 1)

Band Edge, Left Side



Date: 27.OCT.2021 15:16:55

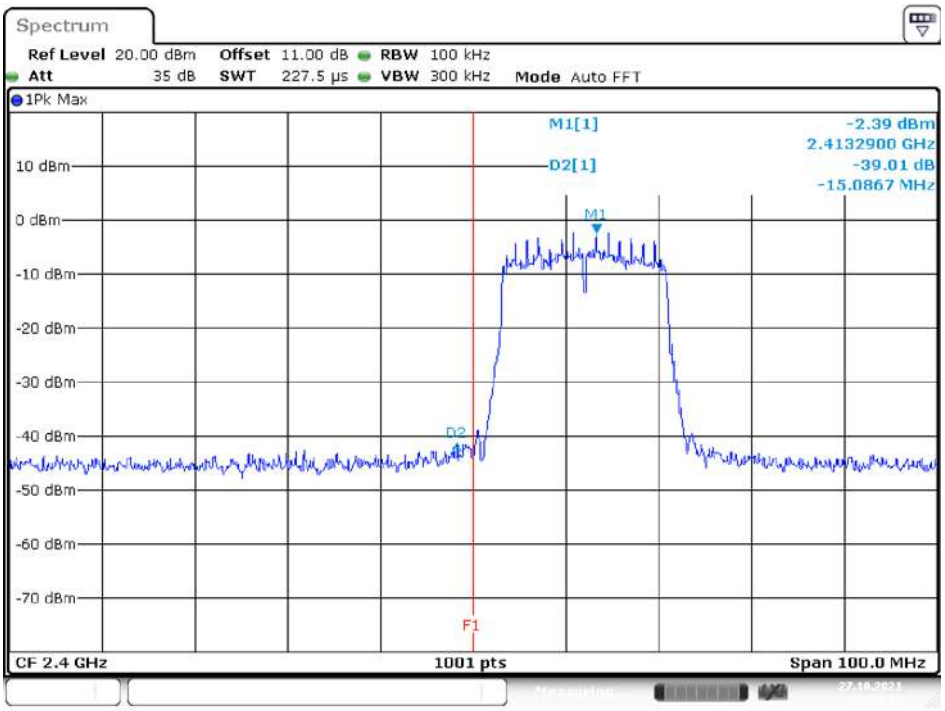
Band Edge, Right Side



Date: 27.OCT.2021 15:19:13

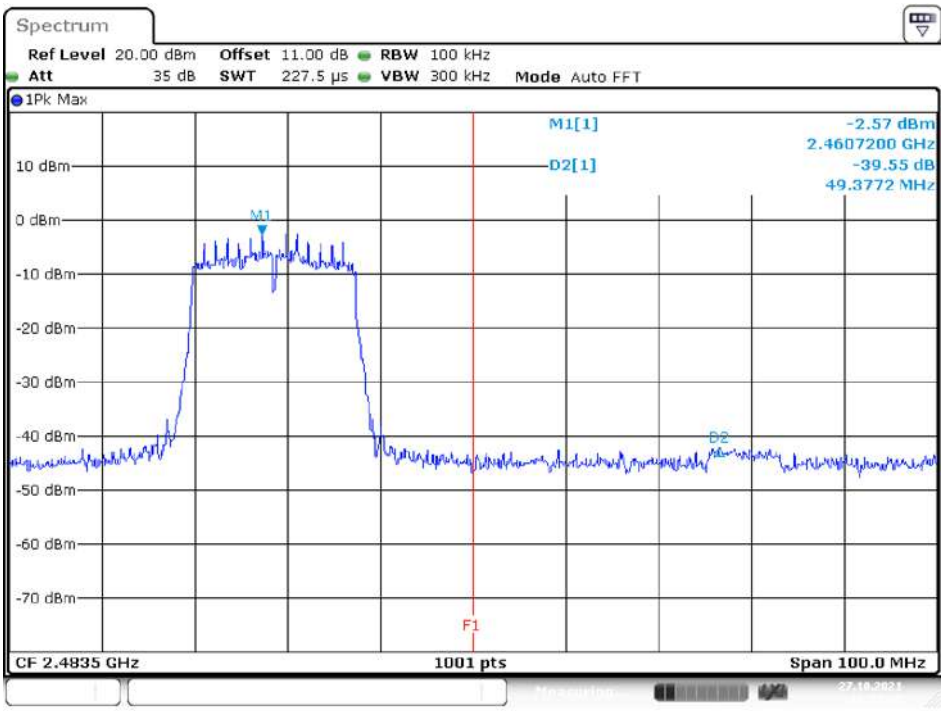
N20 Mode (Chain 0)

Band Edge, Left Side



Date: 27.OCT.2021 16:50:12

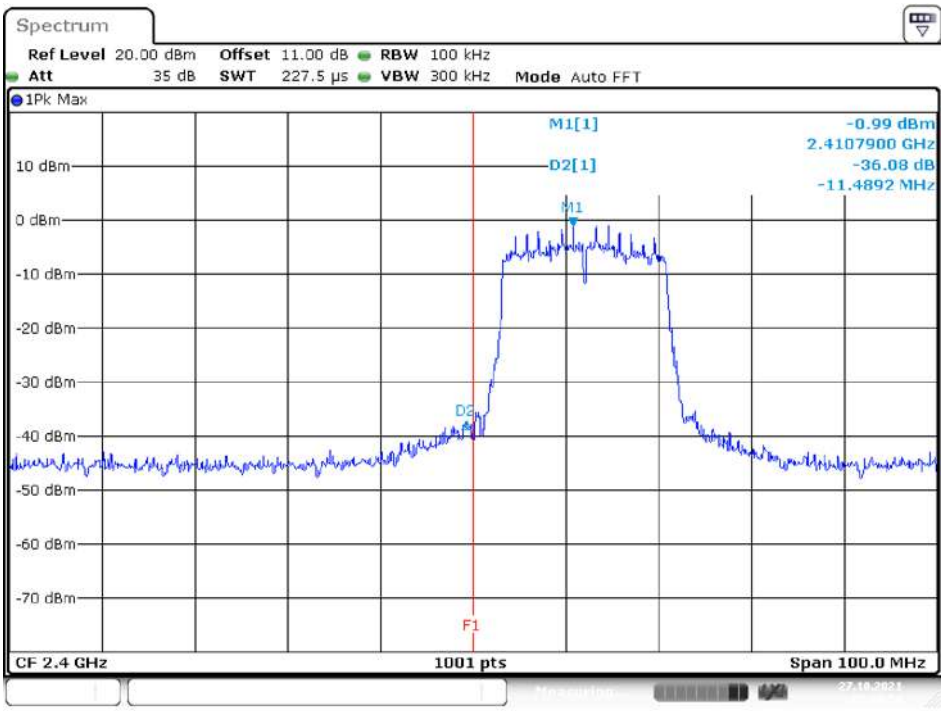
Band Edge, Right Side



Date: 27.OCT.2021 16:52:43

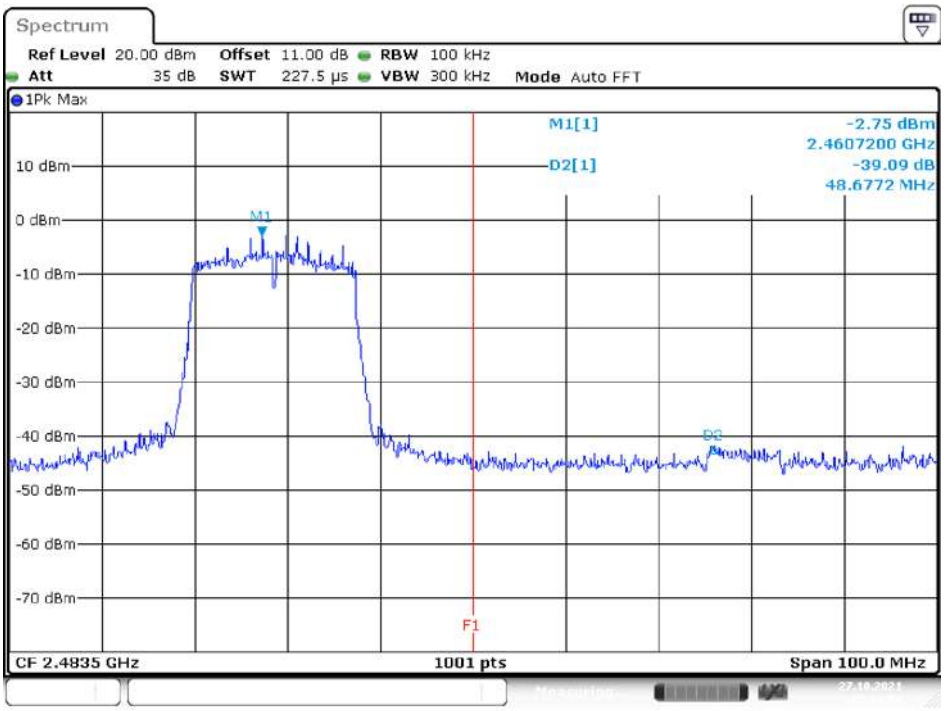
N20 Mode (Chain 1)

Band Edge, Left Side



Date: 27.OCT.2021 15:40:55

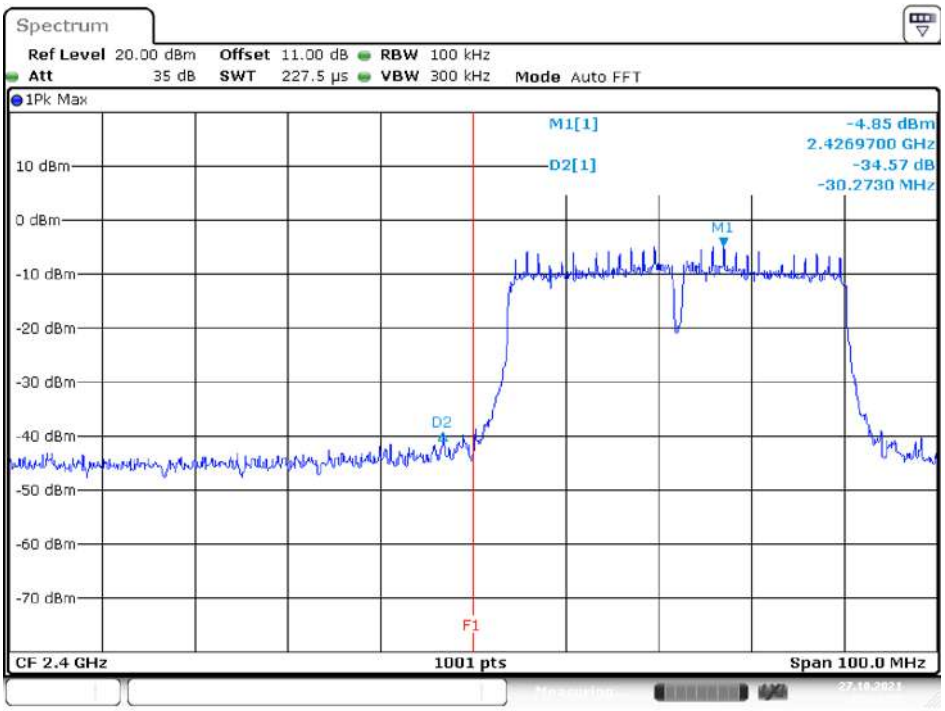
Band Edge, Right Side



Date: 27.OCT.2021 15:43:05

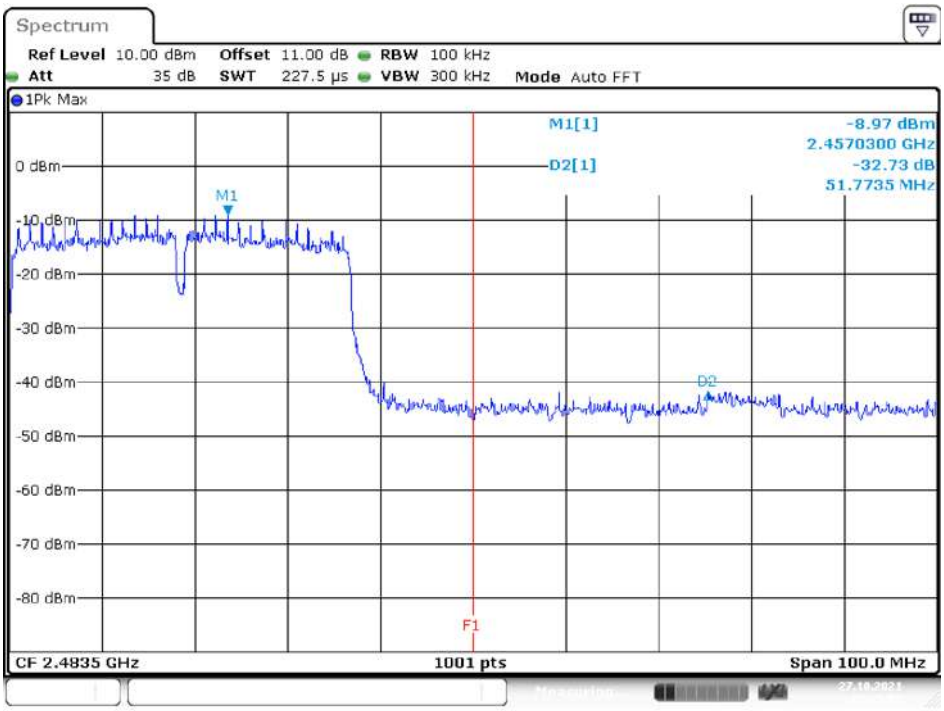
N40 Mode (Chain 0)

Band Edge, Left Side



Date: 27.OCT.2021 17:10:33

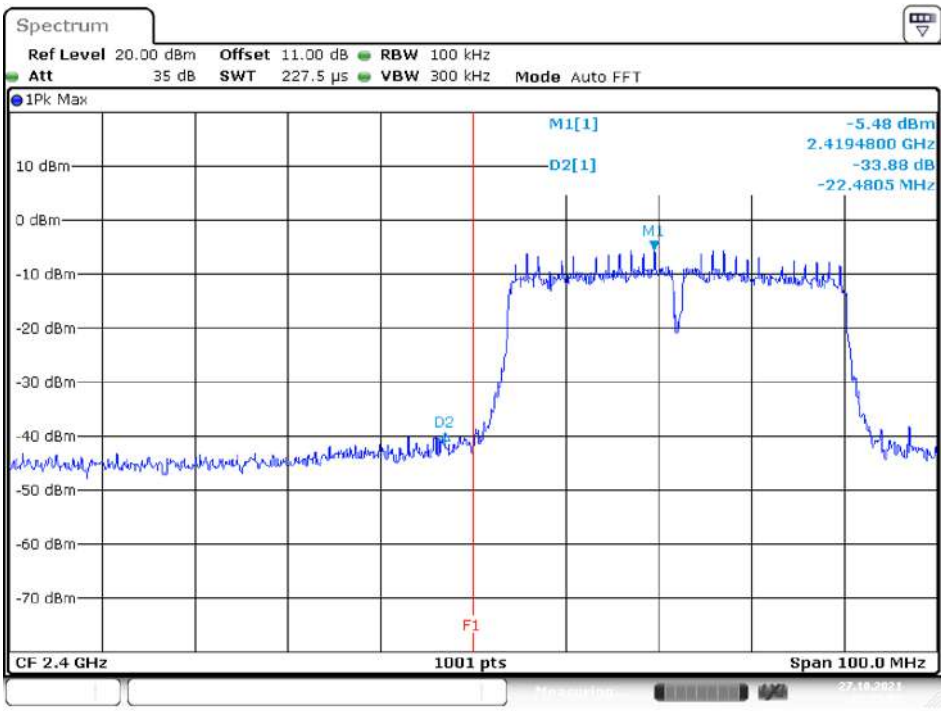
Band Edge, Right Side



Date: 27.OCT.2021 17:15:06

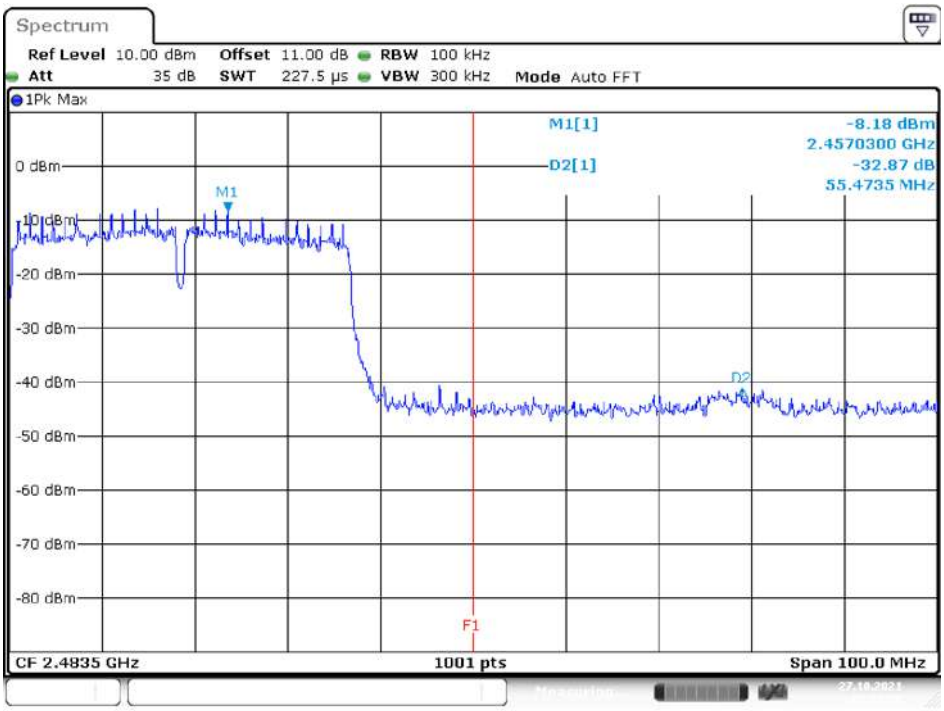
N40 Mode (Chain 1)

Band Edge, Left Side



Date: 27.OCT.2021 15:55:02

Band Edge, Right Side



Date: 27.OCT.2021 15:57:29

12 FCC §15.247(e) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e).

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

12.2 Test Procedure

According to ANSI C63.10-2013

a) Set analyzer center frequency to DTS channel center frequency.

b) Set the span to 1.5 times the DTS bandwidth.

c) Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

i) Use the peak marker function to determine the maximum amplitude level within the RBW.

j) If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat

12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)			Limit (dBm/3 kHz)	Result
		Chain 0	Chain 1	Total		
B Mode						
Low	2412	-6.04	-5.95	-2.98	5.99	PASS
Middle	2437	-7.48	-7.10	-4.28	5.99	PASS
High	2462	-7.71	-7.31	-4.50	5.99	PASS
G Mode						
Low	2412	-12.32	-11.83	-9.06	5.99	PASS
Middle	2437	-10.65	-10.17	-7.39	5.99	PASS
High	2462	-12.11	-11.85	-8.97	5.99	PASS
N20 Mode						
Low	2412	-14.16	-13.89	-11.01	5.99	PASS
Middle	2437	-11.66	-11.09	-8.36	5.99	PASS
High	2462	-14.25	-13.80	-11.01	5.99	PASS
N40 Mode						
Low	2422	-18.91	-18.54	-15.71	5.99	PASS
Middle	2437	-15.06	-14.97	-12.00	5.99	PASS
High	2452	-21.75	-21.04	-18.37	5.99	PASS

The device is a client device. the 2 antenna maximum antenna gain are 5 dBi, and employed Cyclic Delay Diversity (CDD) for 802.11 MIMO transmitting, per KDB 662911 D01 Multiple Transmitter Output v02r01, for Power spectral density (PSD) measurements on the devices:

Array Gain = 10 log(NANT/NSS) dB.

So:

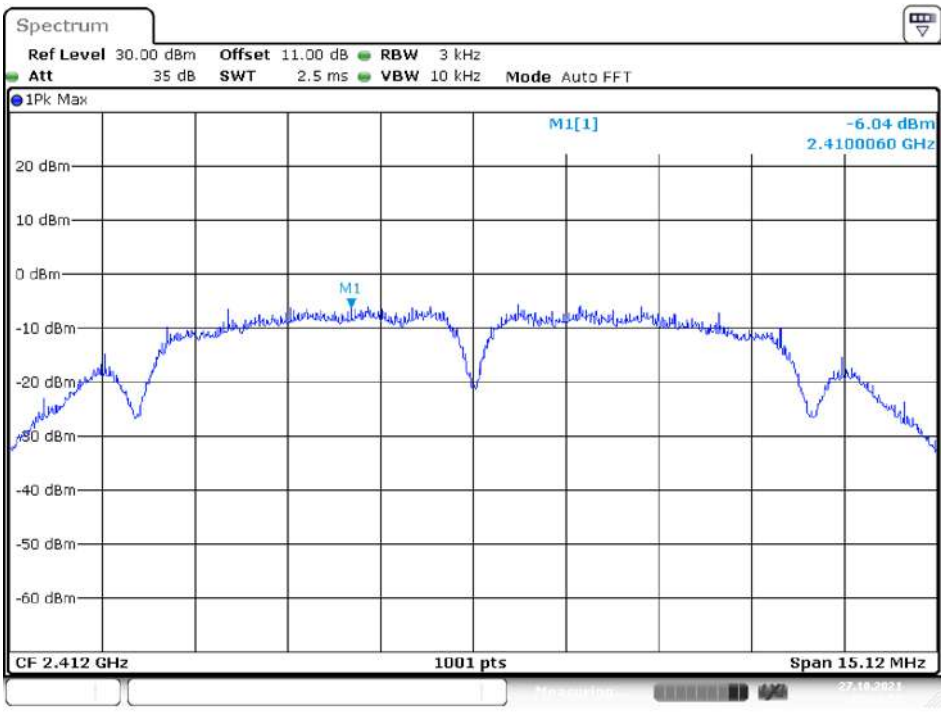
Directional gain = GANT + Array Gain =5 +10*log(2) = 8.01 dBi

The Power density Limits was reduce 2.01 dB

Please refer to the following plots

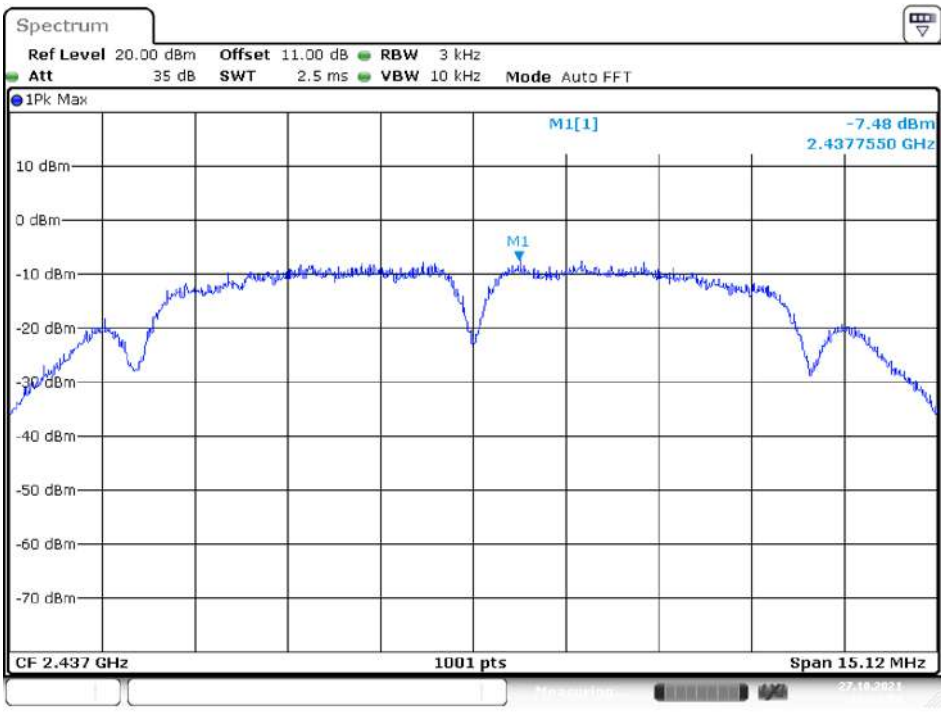
B Mode (Chain 0)

Low Channel



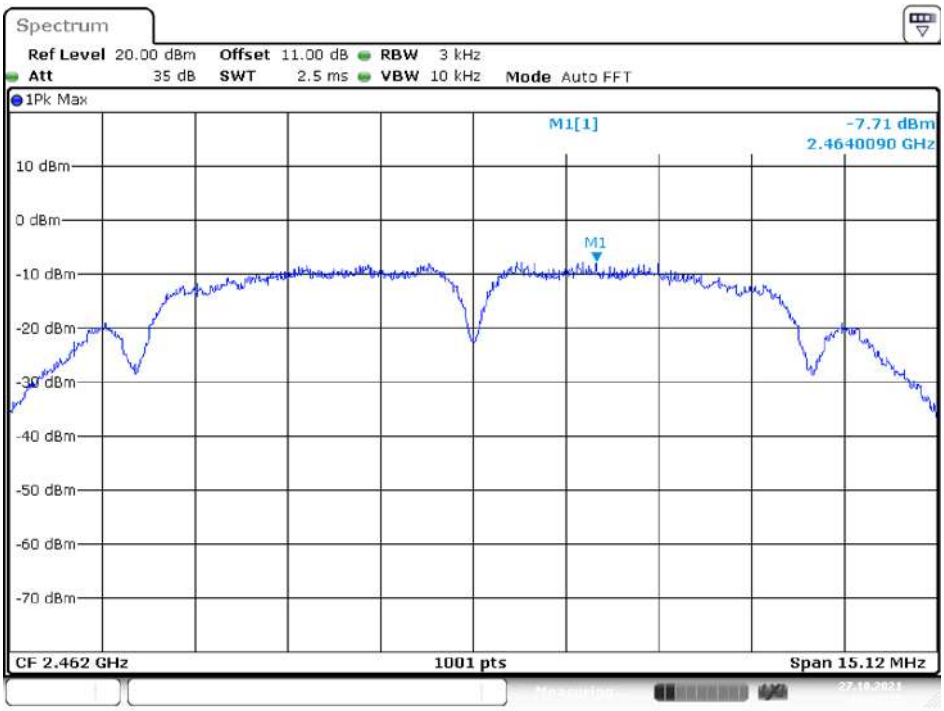
Date: 27.OCT.2021 15:11:52

Middle Channel



Date: 27.OCT.2021 16:11:05

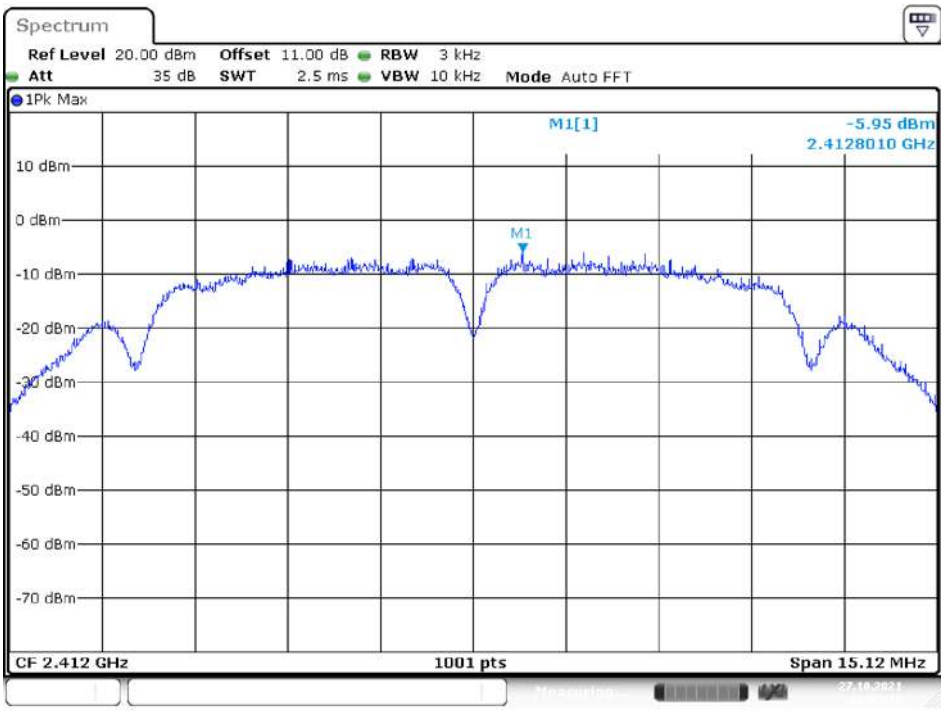
High Channel



Date: 27.OCT.2021 16:18:16

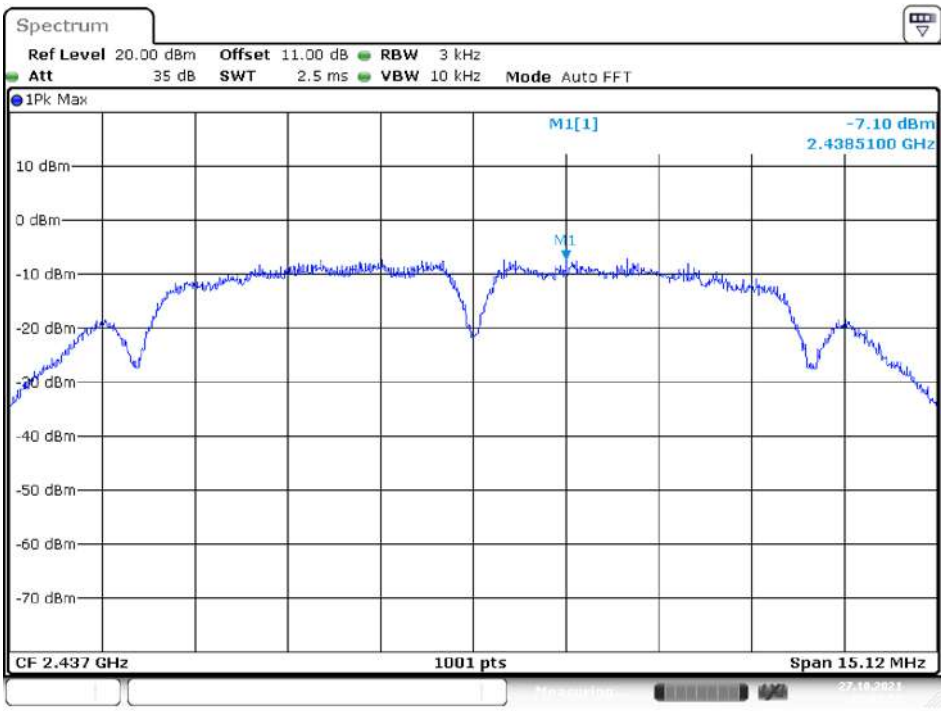
B Mode (Chain 1)

Low Channel



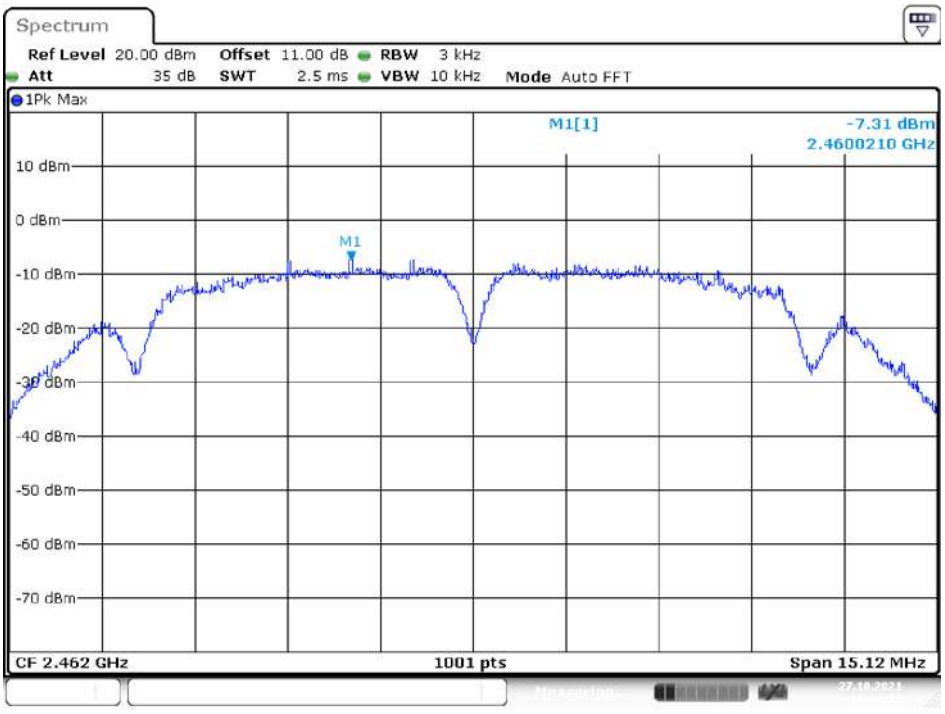
Date: 27.OCT.2021 16:05:12

Middle Channel



Date: 27.OCT.2021 15:07:52

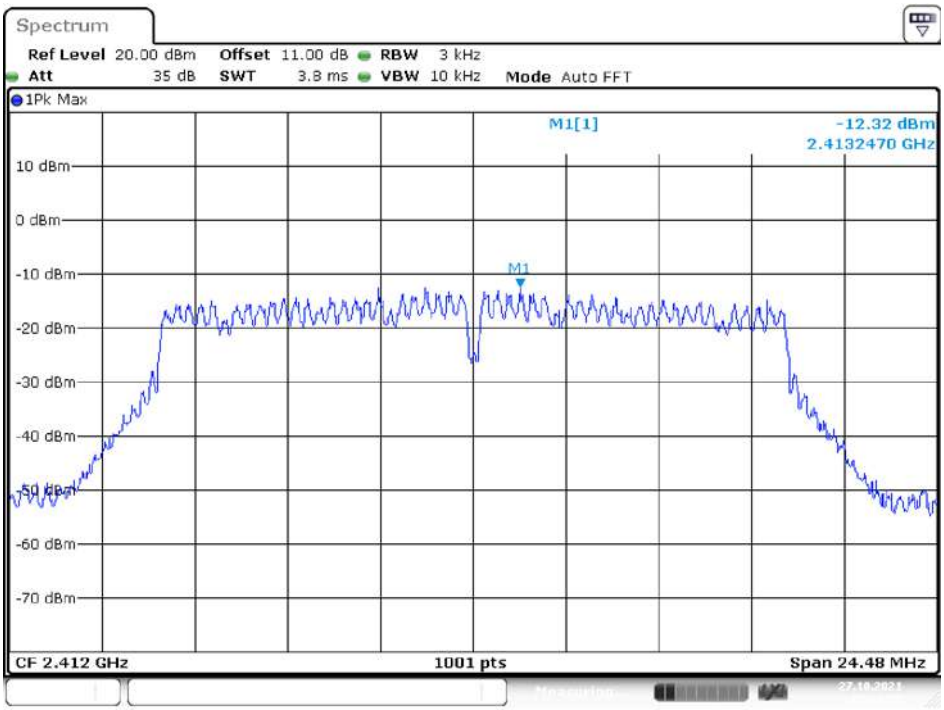
High Channel



Date: 27.OCT.2021 16:14:11

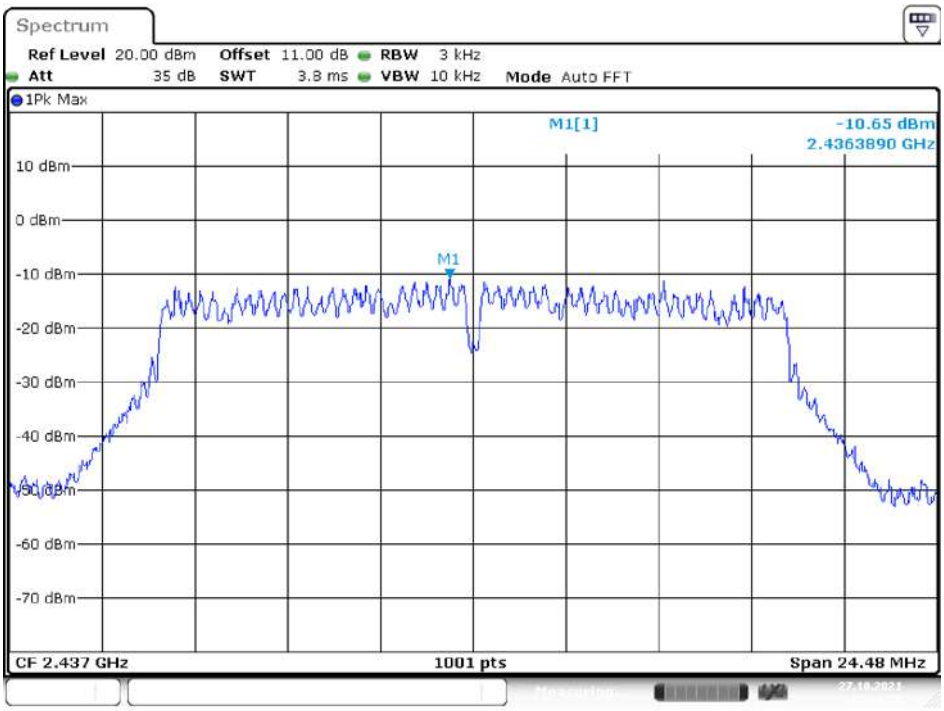
G Mode (Chain 0)

Low Channel



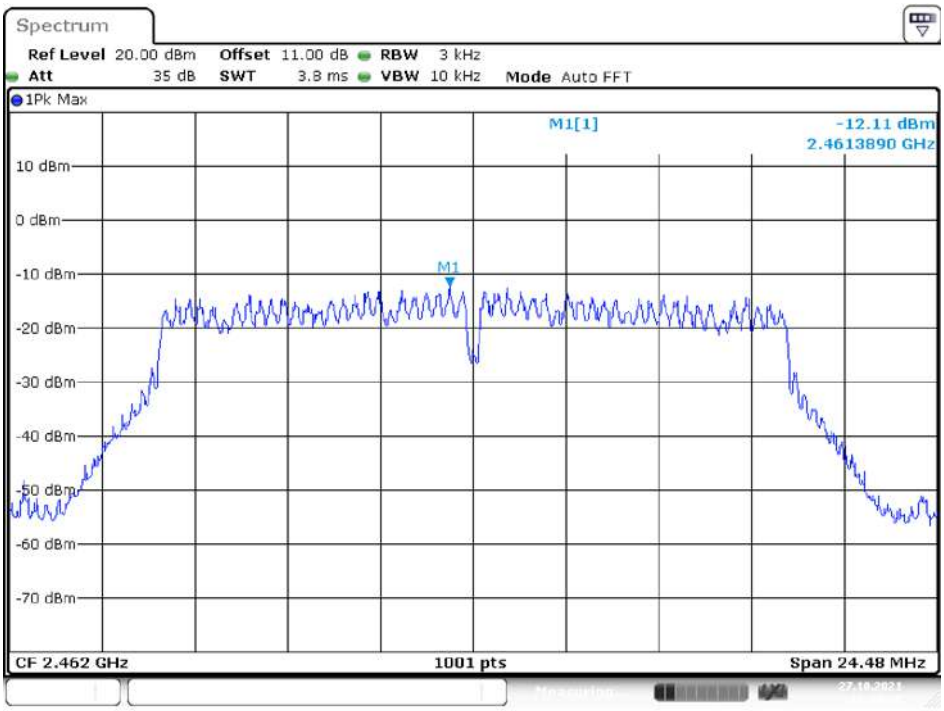
Date: 27.OCT.2021 15:16:38

Middle Channel



Date: 27.OCT.2021 15:14:38

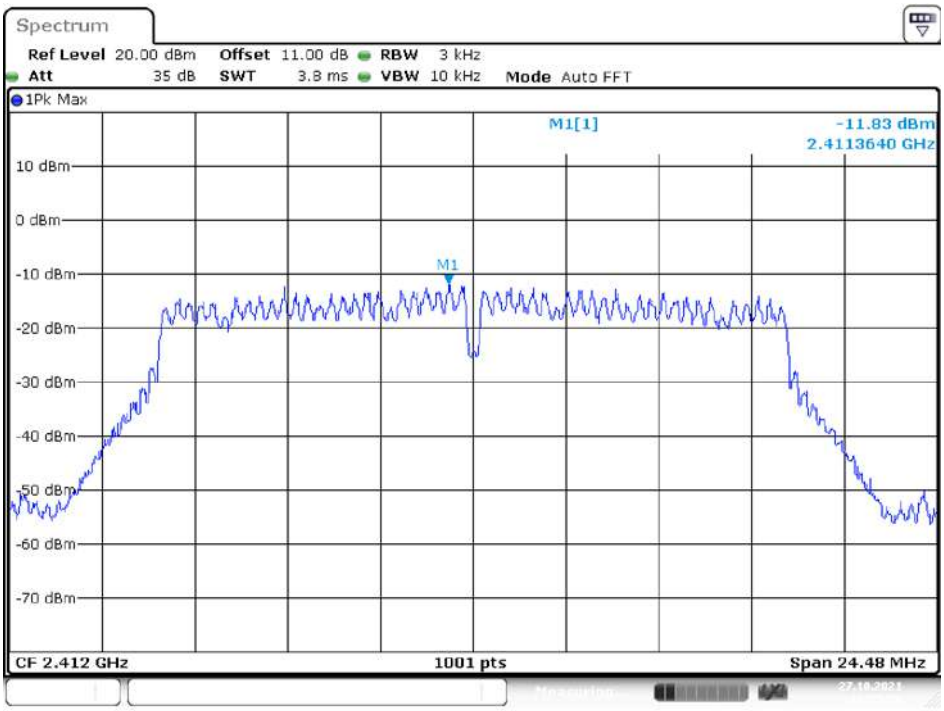
High Channel



Date: 27.OCT.2021 16:40:49

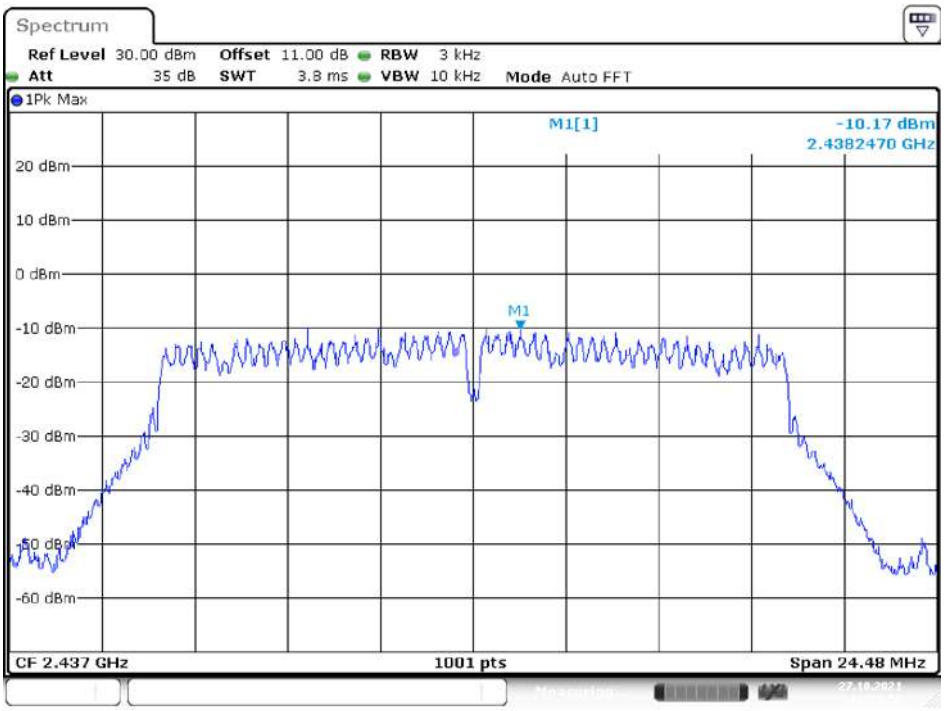
G Mode (Chain 1)

Low Channel



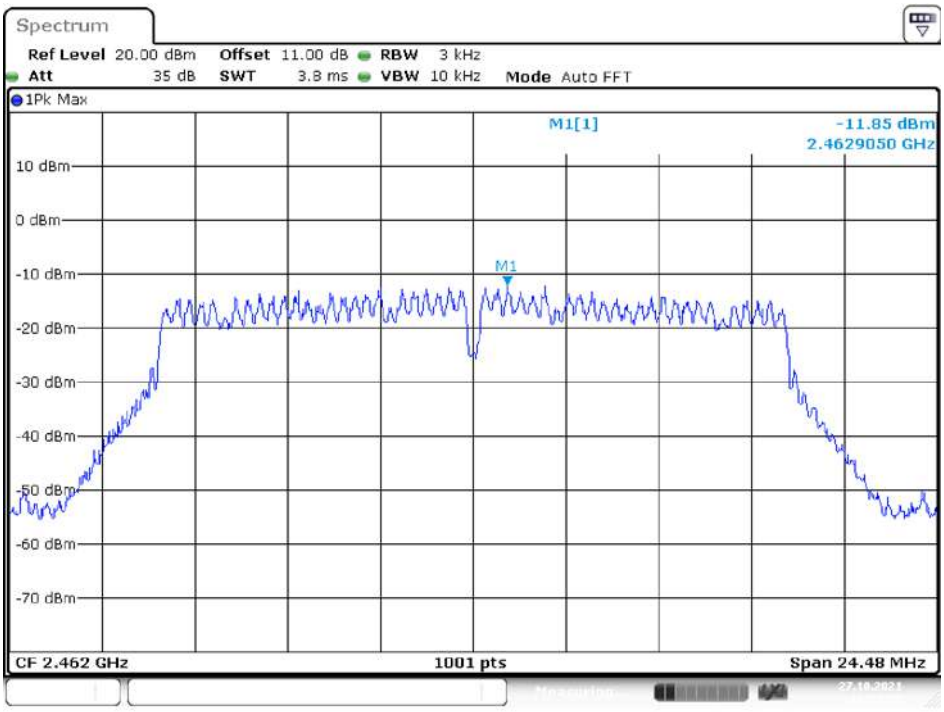
Date: 27.OCT.2021 16:25:27

Middle Channel



Date: 27.OCT.2021 16:22:58

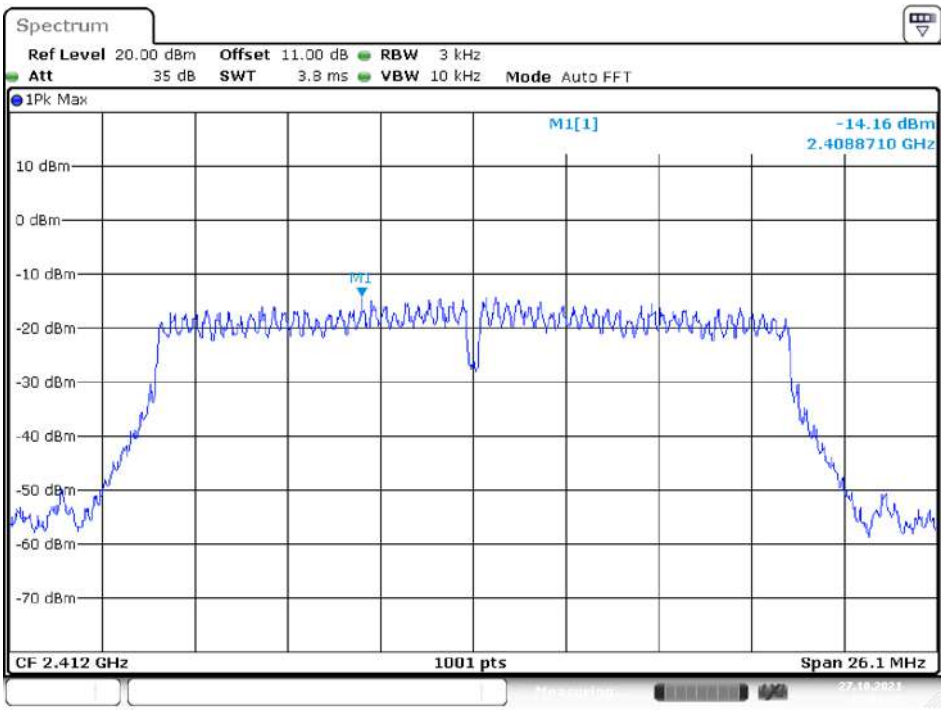
High Channel



Date: 27.OCT.2021 16:27:33

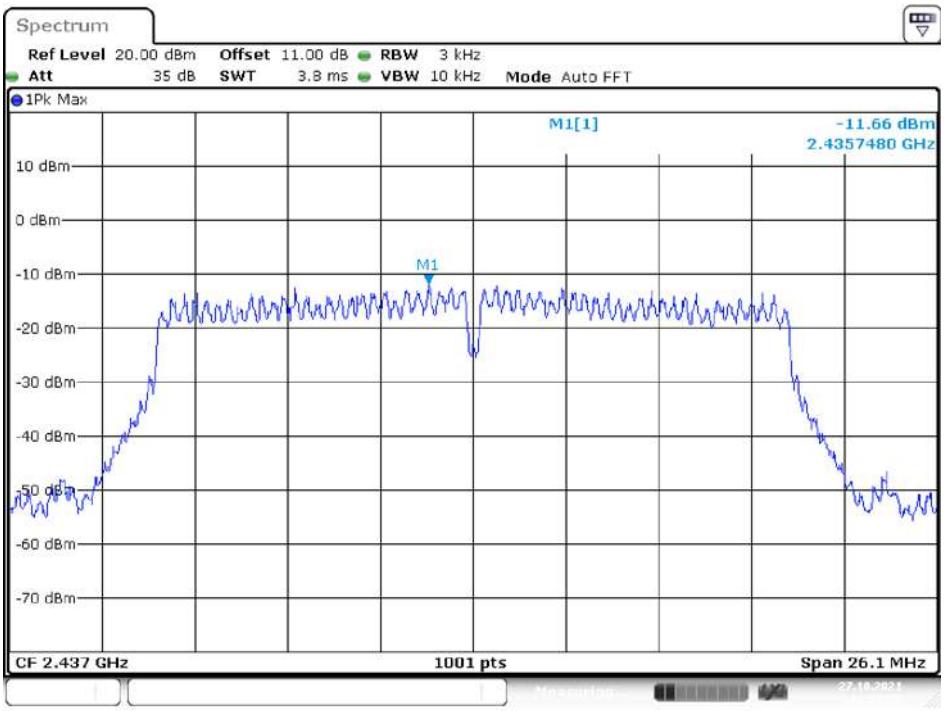
N20 Mode (Chain 0)

Low Channel



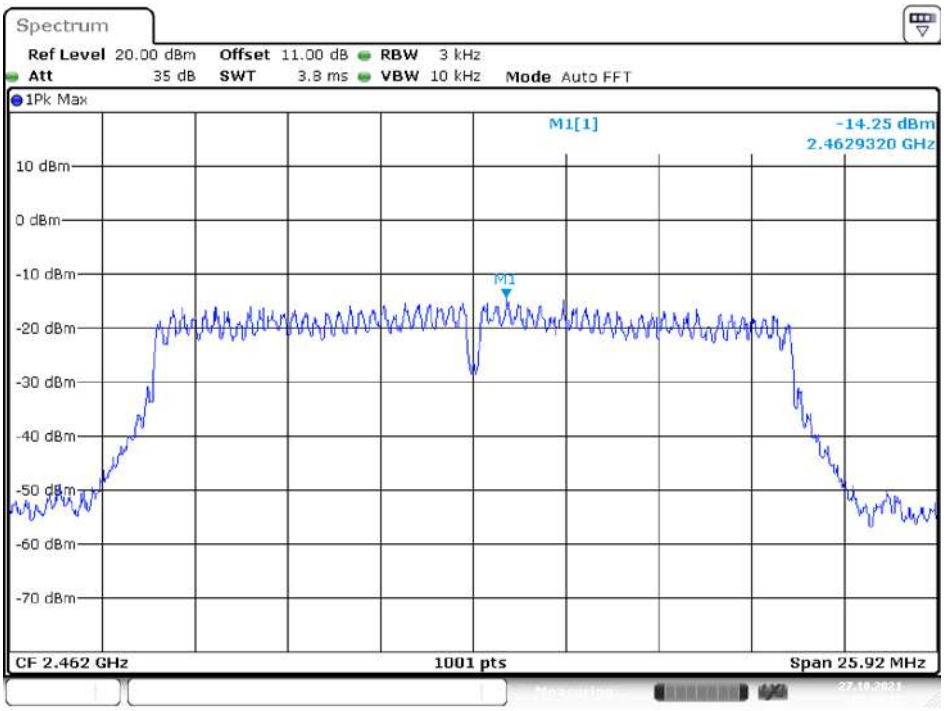
Date: 27.OCT.2021 17:01:42

Middle Channel



Date: 27.OCT.2021 16:58:31

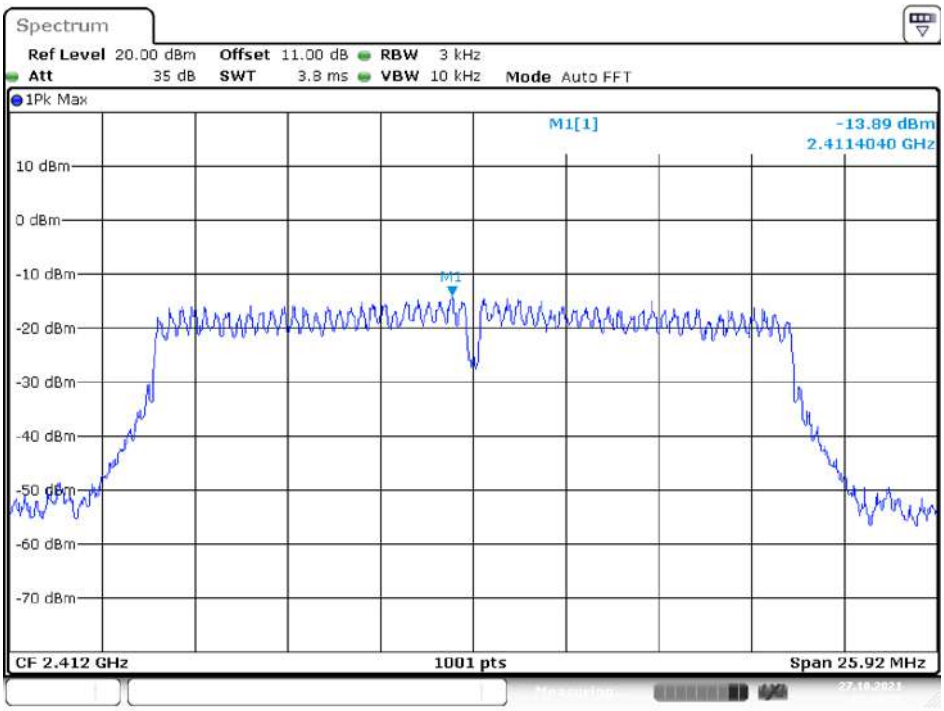
High Channel



Date: 27.OCT.2021 15:49:18

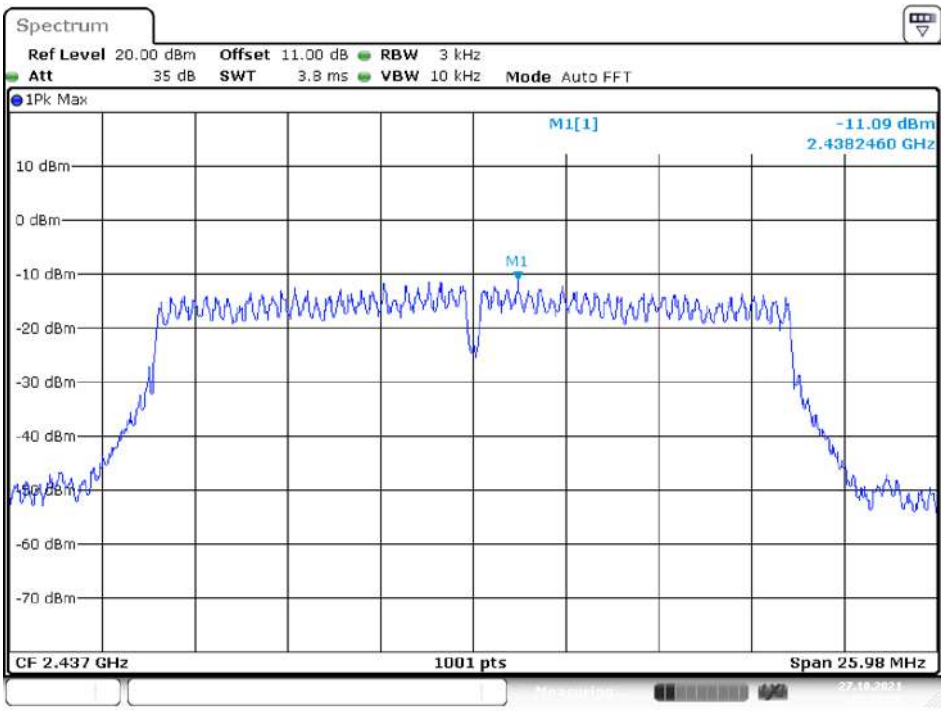
N20 Mode (Chain 1)

Low Channel



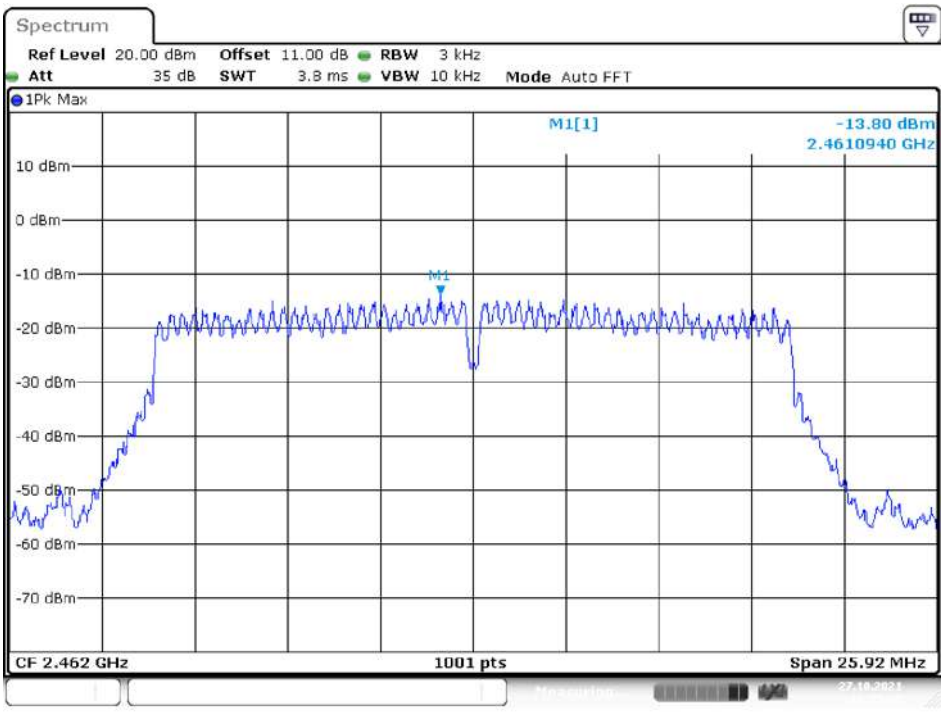
Date: 27.OCT.2021 15:40:38

Middle Channel



Date: 27.OCT.2021 15:37:20

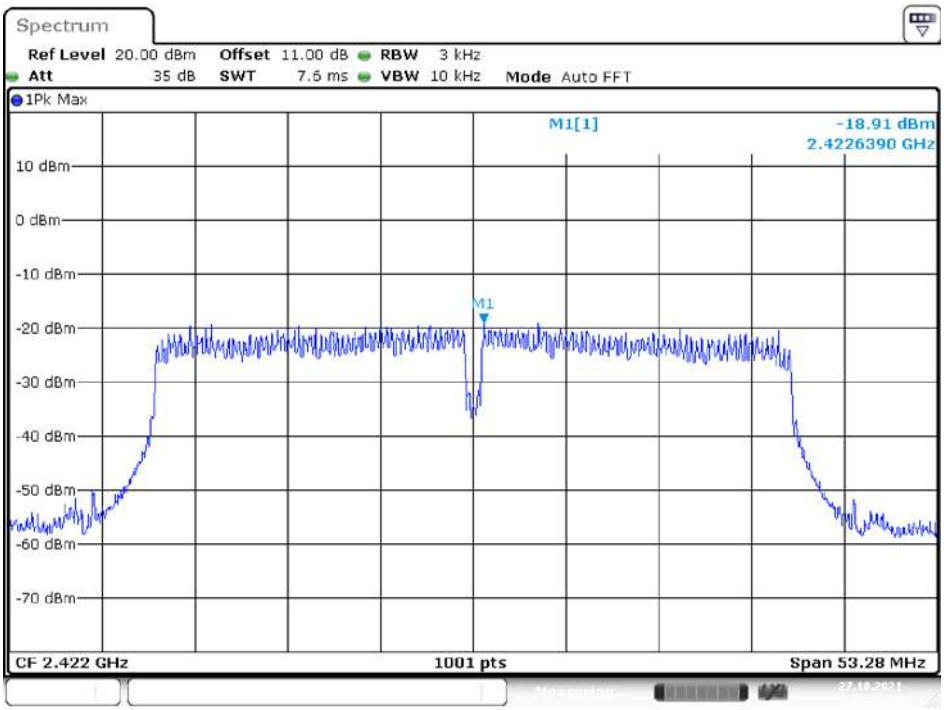
High Channel



Date: 27.OCT.2021 16:55:42

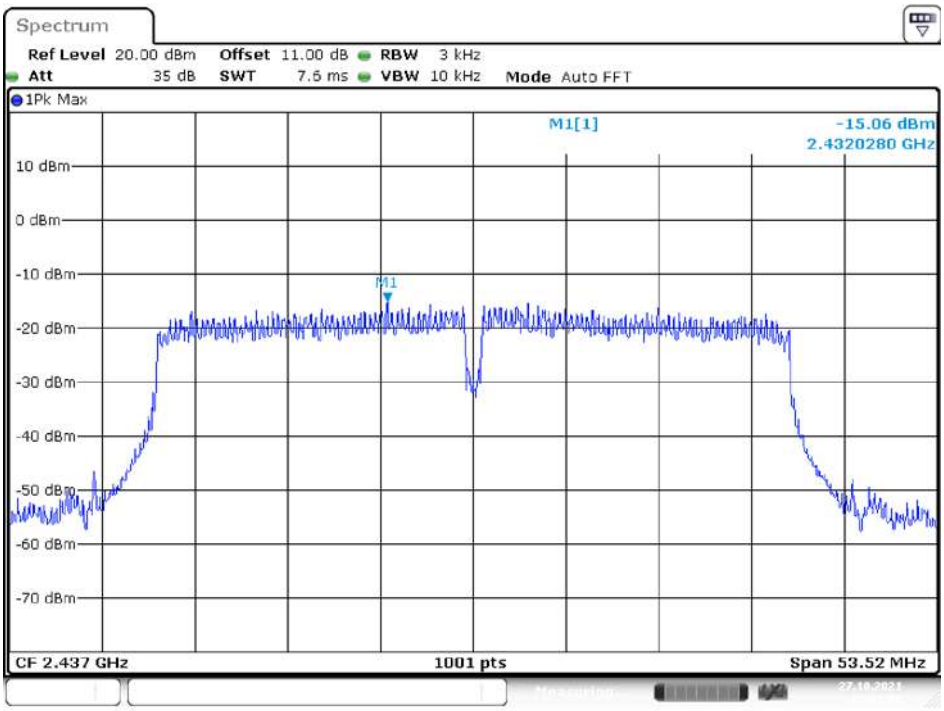
N40 Mode (Chain 0)

Low Channel



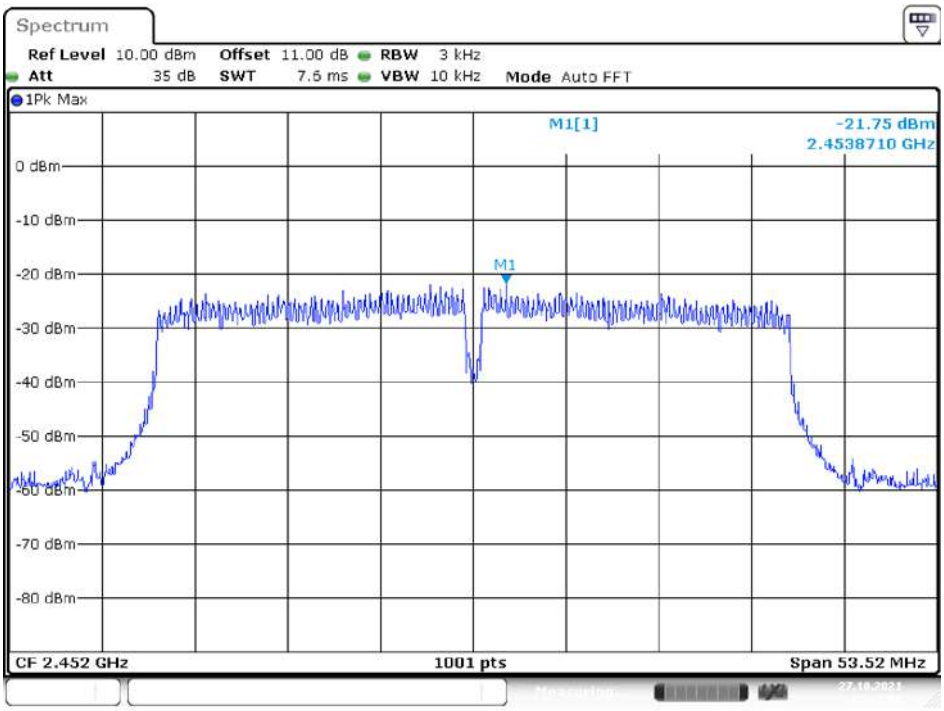
Date: 27.OCT.2021 15:54:44

Middle Channel



Date: 27.OCT.2021 17:07:00

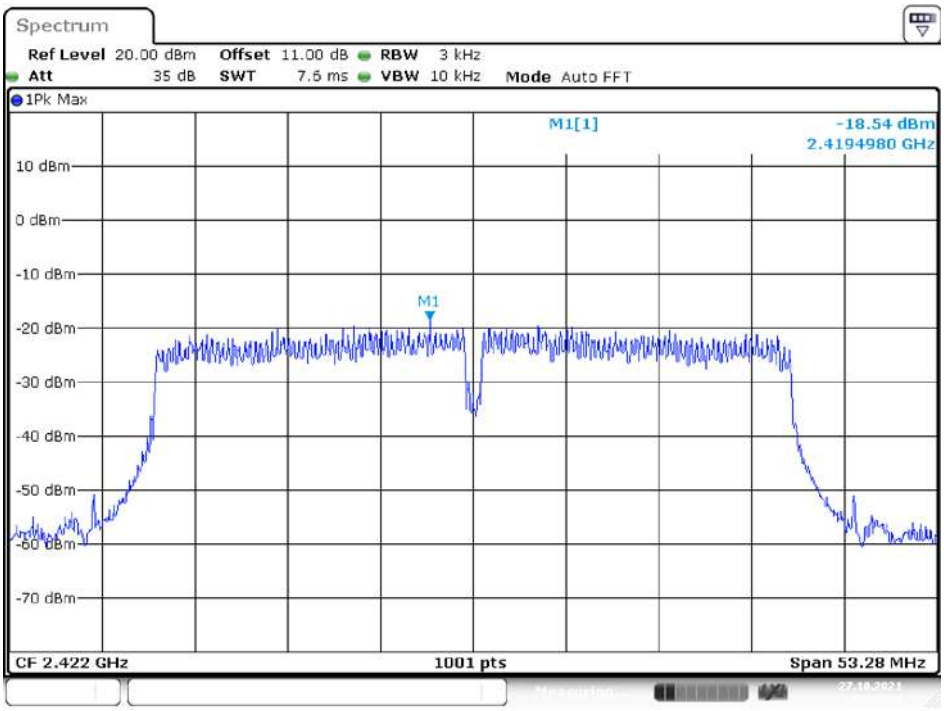
High Channel



Date: 27.OCT.2021 17:17:09

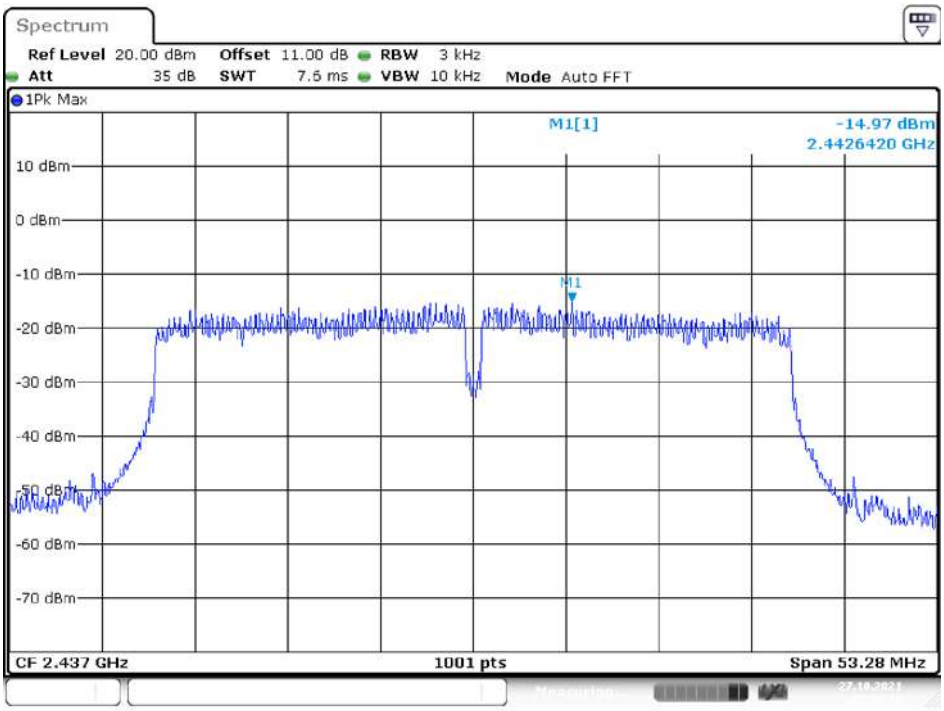
N40 Mode (Chain 1)

Low Channel



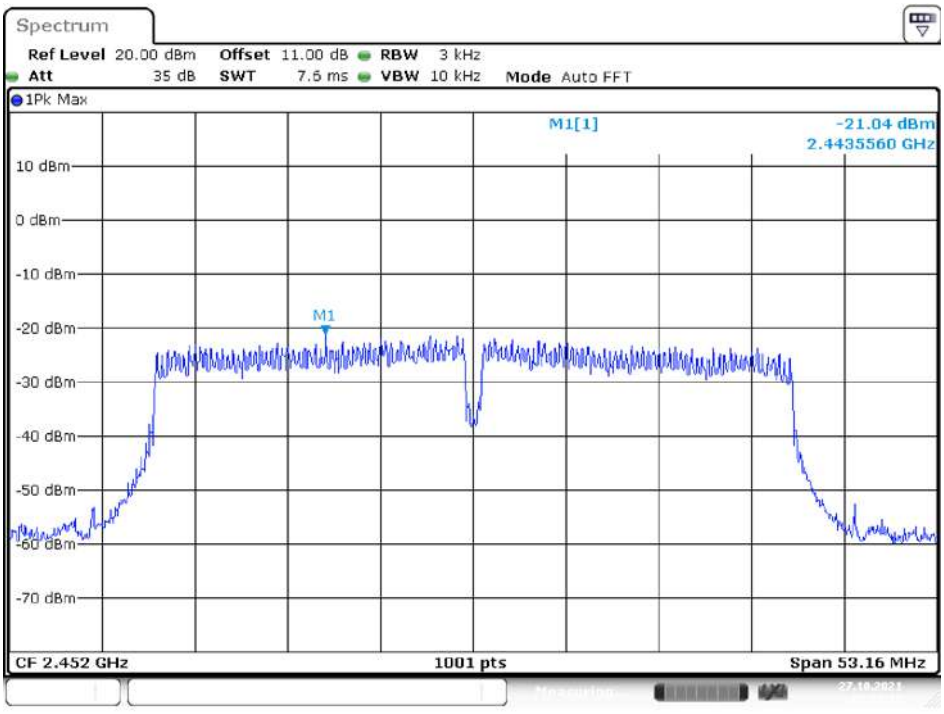
Date: 27.OCT.2021 17:12:35

Middle Channel



Date: 27.OCT.2021 15:52:13

High Channel



Date: 27.OCT.2021 15:57:12

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