FCC Part 15.247
RSS-247, ISSUE 3, August 2023
RSS-GEN, ISSUE 5, February 2021 Amendment 2
TEST REPORT

For

Radicom Research, Inc.

671 E.Brokaw Road,San Jose,CA 95112,United States

FCC ID: K7T-WIFIHU52
IC: 2377A-WIFIHU52

Report Type:	**Product Type:**
Original Report	WiFiHU52 Module

Report Producer : Coco Lin

Report Number : RXZ240408022RF01

Report Date : 2024-10-18

Reviewed By: Andy Shih

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ240408022	RXZ240408022RF01	2024-10-18	Original Report	Coco Lin

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Radicom Research, Inc.
	671 E.Brokaw Road,San Jose,CA 95112,United States
Brand(Trade) Name	Radicom
Product (Equipment) / PMN	WiFiHU52 Module
Main Model Name	WiFiHU52
HVIN	WiFiHU52, WiFiHU52M-a, WiFiHU52-NE1-a, WiFiHU52S-a, WiFiHU52M-c, WiFiHU52-NE1-c, WiFiHU52S-c
Series Model Name	FCC: WiFiHU52M-a, WiFiHU52M-c, WiFiHU52-HM-a, WiFiHU52-HM-c, WiFiHU52-NE1-a, WiFiHU52-NE1-c, WiFiHU52S-a, WiFiHU52S-c, WiFiHU52-NE2-a, WiFiHU52-NE2-c, WiFiHU52D-a, WiFiHU52D-c, WiFiHU52E, WiFiHU52E-T IC: WiFiHU52M-a, WiFiHU52-NE1-a, WiFiHU52S-a, WiFiHU52M-c, WiFiHU52-NE1-c, WiFiHU52S-c
Model Discrepancy	The major electrical and mechanical constructions of series models are identical to the basic model, the difference lies in the use of different antenna types. Chip Antenna : WiFiHU52, WiFiHU52M-a, WiFiHU52-HM-a, WiFiHU52-NE1-a, WiFiHU52S-a, WiFiHU52-NE2-a, WiFiHU52D-a, WiFiHU52E, WiFiHU52E-T IPEX Connector : WiFiHU52M-c, WiFiHU52-HM-c, WiFiHU52-NE1-c, WiFiHU52S-c, WiFiHU52-NE2-c, WiFiHU52D-c
Frequency Range	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz
Maximum Conducted Peak Output Power	IEEE 802.11b Mode: 23.04 dBm IEEE 802.11g Mode: 24.15 dBm IEEE 802.11n HT20 Mode: 22.49 dBm IEEE 802.11n HT40 Mode: 22.51 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
Power Operation (Voltage Range)	5Vdc from USB
Received Date	2024/04/08
Date of Test	2024/04/09 ~ 2024/05/15

*All measurement and test data in this report was gathered from production sample serial number:

RXZ240408022-1 , RXZ240408022-2 (Assigned by BACL, New Taipei Laboratory).

1.2 Objective

This report is prepared on behalf of *Radicom Research, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules and RSS-247, Issue 3, August 2023, RSS-Gen, Issue 5, February 2021 Amendment 2 of the Innovation, Science and Economic Development Canada.

1.3 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 and KDB 558074 D01 15.247 Meas Guidance v05r02. And RSS-247, Issue 3, August 2023, RSS-Gen, Issue 5, February 2021 Amendment 2 of the Innovation, Science and Economic Development Canada.

1.4 Statement

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.

1.5 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 3.02 dB
RF output power, conducted		+/- 0.57 dB
Power Spectral Density, conducted		+/- 0.60 dB
Occupied Bandwidth		+/- 0.09 %
Unwanted Emissions, conducted		+/- 1.09 dB
Emissions, radiated	9 kHz~30 MHz	+/- 3.20 dB
	30 MHz~1 GHz	+/- 3.30 dB
	1 GHz~18 GHz	+/- 5.14 dB
	18 GHz~40 GHz	+/- 4.75 dB
Temperature		+/- 0.76 °C
Humidity		+/- 0.41 %

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

1.6 Environmental Conditions

Test Site	Test Date	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2024/5/15	22.9	65	1010	Jing
Radiation Spurious Emissions	2024/4/25~2024/5/09	23.2~24.2	57~68	1010	Aaron
Duty Cycle	2024/4/9	23.1	55	1010	Jing
Conducted Spurious Emissions	2024/4/29	25.4	59	1010	Jing
Emission Bandwidth	2024/4/29	25.4	59	1010	Jing
Maximum Output Power	2024/4/29	25.4	59	1010	Jing
100 kHz Bandwidth of Frequency Band Edge	2024/4/29	25.4	59	1010	Jim
Power Spectral Density	2024/4/29	25.4	59	1010	Jing

1.7 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 221, 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.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: TW3732.

2 System Test Configuration

2.1 Description of Test Configuration

For WIFI 2.4GHz 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/n HT20 Modes were tested with channel 1, 6 and 11.

For 802.11n HT40 Mode were tested with channel 3, 6 and 9.

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

The test software was used “MPTool v3.08”

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

Engineering Mode		Power Level Setting		
Test Frequency		Low	Middle	High
Mode	802.11b Mode	53	53	53
	802.11g Mode	51	53	53
	802.11n HT20 Mode	48	48	48
	802.11n HT40 Mode	48	48	48

The worst case data rates are as follows:

802.11b: 1Mbps

802.11g: 6Mbps

802.11n HT20: MCS0

802.11n HT40: MCS0

2.4 Support Equipment List and Details

Description	Manufacturer	Model Number
NB	DELL	E6410
Fixture	RADICOM RESEARCH INC	A9 REV. A1

2.5 External Cable List and Details

Description	Manufacturer	Cable length
USB Cable	BACL	1.2m

2.6 Test Mode

Pre-scan

AC Line Conducted Emissions and Radiated Spurious Emissions

Mode 1: WiFiHU52M-c + Dipole antenna.

Mode 2: WiFiHU52 + Chip antenna.

Worst case is the Mode 1

Mode 1: WiFiHU52M-c + Dipole antenna for all test item.

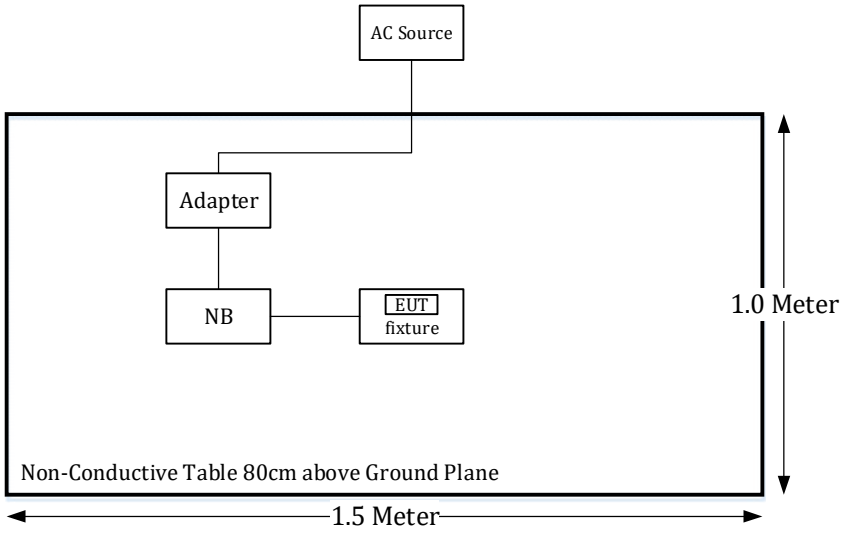
Mode 2: WiFiHU52 + Chip antenna, spot check power, test Radiated Spurious Emissions and AC Line Conducted Emissions

2.7 Block Diagram of Test Setup

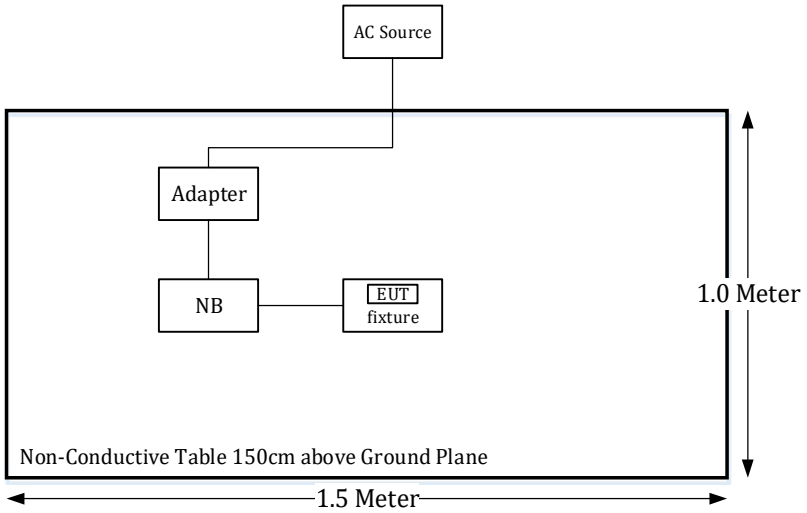
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

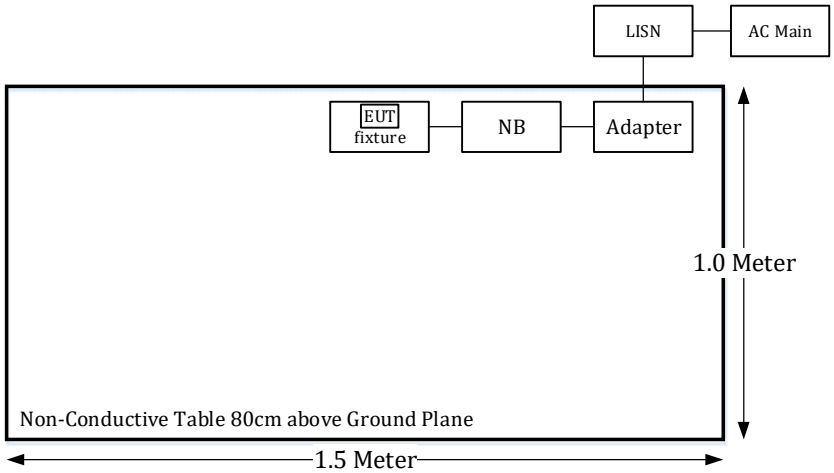
Below 1GHz



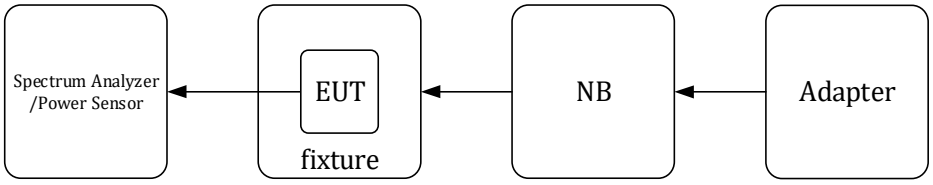
Above 1GHz:



Conduction:



Conducted:



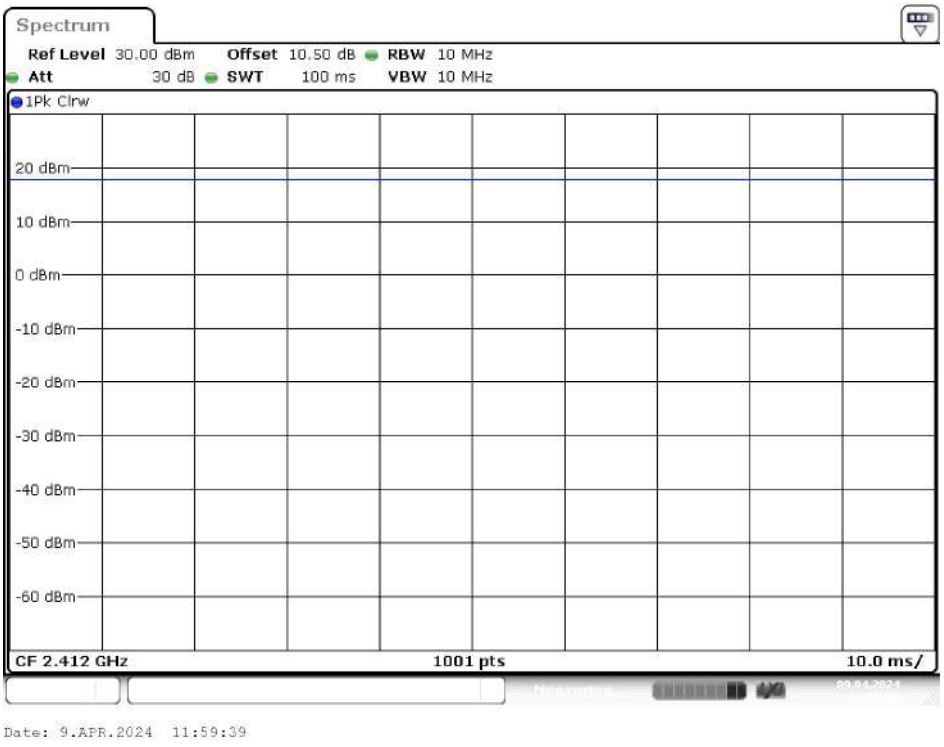
2.8 Duty Cycle

The duty cycle as below:

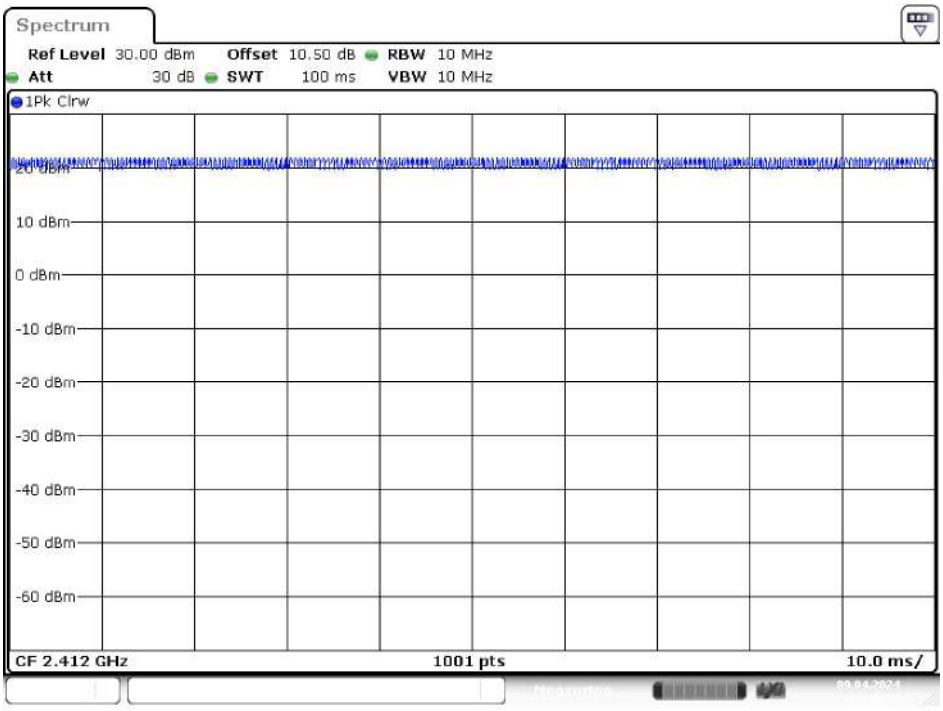
Radio Mode	Ton (ms)	Ton + Toff (ms)	Duty Cycle (%)	1/T (kHz)	VBW Setting (kHz)
802.11b	100	100	100	/	0.01
802.11g	100	100	100	/	0.01
802.11n20	100	100	100	/	0.01
802.11n40	100	100	100	/	0.01

Please refer to the following plots.

B Mode

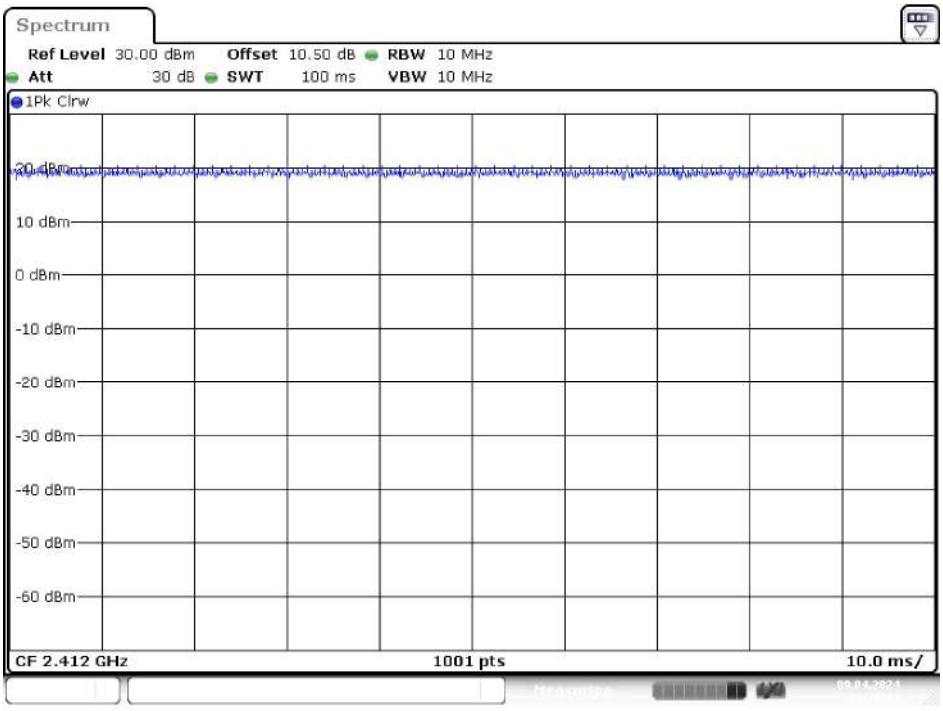


G Mode



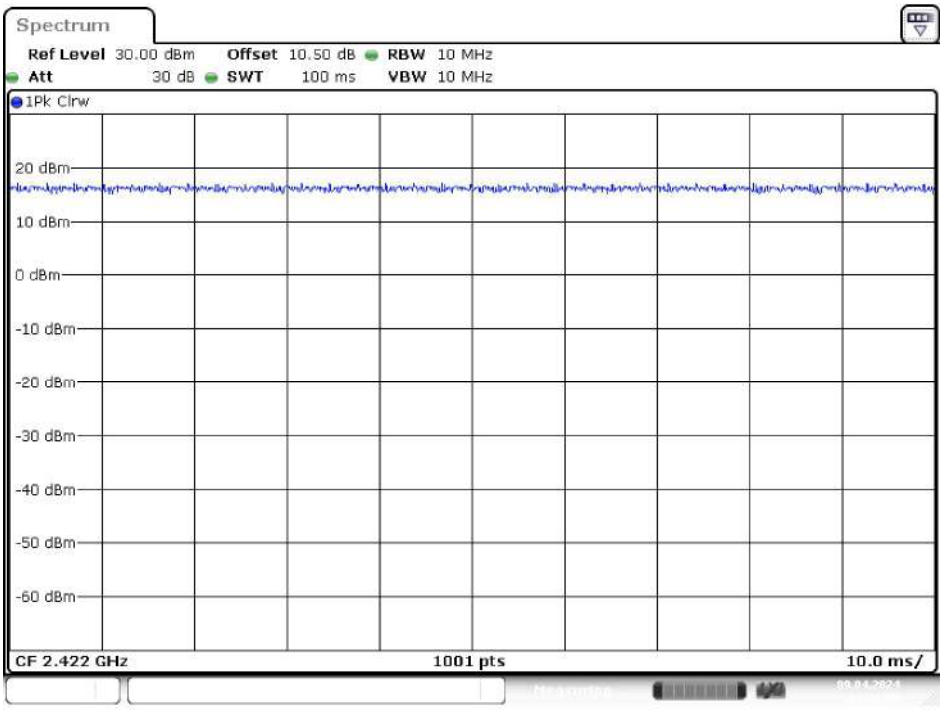
Date: 9.APR.2024 12:18:23

N20 Mode



Date: 9.APR.2024 12:19:43

N40 Mode



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3 Summary of Test Results

Rules	Description of Test	Results
FCC §15.247(i), §1.1307(b)(3)(i)	RF Exposure	Compliance
RSS-102 §2.5.2	Exemption From Routine Evaluation Limits – RF Exposure Evaluation	Compliance
FCC §15.203 RSS-Gen §6.8	Antenna Requirement	Compliance
FCC §15.207(a) RSS-Gen §8.8	AC Line Conducted Emissions	Compliance
FCC §15.205, §15.209, §15.247(d) RSS-247 §5.5 RSS-Gen §8.9 RSS-Gen §8.10	Spurious Emissions	Compliance
FCC §15.247(a)(2) RSS-247 §5.2 a) RSS-Gen §6.7	Emission Bandwidth	Compliance
FCC §15.247(b)(3) RSS-247 §5.4 d)	Maximum Peak Output Power	Compliance
FCC §15.247(d) RSS-247 §5.5	100 kHz Bandwidth of Frequency Band Edge	Compliance
FCC §15.247(e) RSS-247 §5.2 b)	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	2024/2/16	2025/2/14
EMI Test Receiver	Rohde & Schwarz	ESW8	100947	2023/5/22	2024/5/21
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2023/5/18	2024/5/16
RF Cable	EMEC	EM-CB5D	1	2023/6/6	2024/6/4
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiation 3M Room (966-A)					
Active Loop Antenna	ETS-Lindgren	6502	35796	2024/3/27	2025/3/26
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2024/1/19	2025/1/17
Double Ridged Guide Horn Antenna	A.H. system	SAS-571	1020	2023/5/18	2024/5/16
Horn Antenna	ETS-Lindgren	3116	62638	2023/8/25	2024/8/23
Preamplifier	Sonoma	310N	130602	2023/6/16	2024/6/14
Preamplifier	Channel	ERA-100M-18G-01D1748	EC2300051	2024/3/29	2025/3/28
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2024/1/8	2025/1/6
Spectrum Analyzer	Rohde & Schwarz	FSV40	101939	2024/3/27	2025/3/26
EMI Test Receiver	Rohde & Schwarz(R&S)	ESR3	102099	2023/6/16	2024/6/14
Microflex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2024/1/23	2025/1/21
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2024/1/23	2025/1/21
Coaxial Cable	COMMATE	PEWC	8Dr	2023/12/23	2024/12/21
Cable	EMC	EMC105-SM-SM-10000	201003	2024/1/23	2025/1/21
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2023/12/23	2024/12/21
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2024/1/23	2025/1/21
Microflex Cable	ROSNOL	K1K50-UP0264-K1K50-80CM	160309-2	2024/1/23	2025/1/21
Band-stop filter	Woken	STI15-9831	STI15-9831-1	2023/10/20	2024/10/19
High-pass filter	XINGBOKEJI	XBLBQ-GTA54	200108-3-2	2023/10/20	2024/10/19
Software	AUDIX	E3	18621a	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz(R&S)	FSV40	101204	2023/5/30	2024/5/28
Cable	UTIFLEX	UFA210A	9435	2023/10/2	2024/10/1
Power Sensor	Boonton	RTP5006	11037	2023/5/23	2024/5/21
Attenuator	MCL	BW-S10W5+	1419	2024/2/23	2025/2/21

***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), §1.1307(b)(3)(i) - RF Exposure

5.1 Applicable Standard

According to subpart 15.247(i) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^x & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

5.2 RF Exposure Evaluation Result

Project info

Band	Freq (MHz)	Tune-up Power (dBm)	Ant Gain (dBi)	Distances (mm)	Tune-up Power (mW)	ERP (dBm)	ERP (mW)
WiFi 2.4GHz	2412	24.5	2.71	200	281.84	25.06	320.63

§ 1.1307(b)(3)(i)(A) method is not applicable.

§ 1.1307(b)(3)(i)(C)

Band	Freq (MHz)	λ/2π (mm)	Distances applies	ERP Limit (mW)	Result Option C
WiFi 2.4GHz	2412	19.8	apply	768.00	exempt

The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates
ERP (watts) is no more than the calculated value prescribed for that frequency
R must be at least $\lambda/2\pi$
λ is the free-space operating wavelength in meters

Note: The Tune-up output power was declared by the Applicant.
Wi-Fi 2.4G and Wi-Fi 5G can't transmit simultaneously.

Result: The device compliant the MPE-Based Exemption at 20cm distances.

6 RSS-102 §2.5.2 – EXEMPTION FROM ROUTINE EVALUATION LIMITS – RF EXPOSURE EVALUATION

6.1 Applicable Standard

According to RSS-102 2.5.2

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz[Footnote6] and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

6.2 RF Exposure Evaluation Result

Tune-up power = 24.5 dBm

EIRP Tune-up power = 27.21 dBm = 0.53 W

Exemption from Routine Evaluation Limit is:

$1.31 \times 10^{-2}\ f^{0.6834} = 1.31 \times 10^{-2}\ 2412^{0.6834} = 2.68$ W > 0.53 W

Note: The Tune-up output power was declared by the Applicant.
Wi-Fi 2.4G and Wi-Fi 5G can't transmit simultaneously.

Result: The device meets the exemption requirement.

7 FCC §15.203 & RSS-GEN §6.8– Antenna Requirements

7.1 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.

According to RSS-Gen 6.8:

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

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type

7.2 Antenna Information

Manufacturer	Type	Model	Antenna Gain	Impedance
onewave	Chip Antenna	WAN3216F245W36	2.71 dBi	50Ω
Brito	Dipole Antenna	WLAN ANTENNA	2.6 dBi	50Ω

The antenna uses non-standard connectors and meets the requirements of this section. Please refer to EUT photos.

With Chip Antenna models EUT，provides two channels of signal transmission, one for WiFi 2.4GHz and one for WiFi 5GHz.

Result: Compliance

8 FCC §15.207(a) & RSS-GEN §8.8– AC Line Conducted Emissions

8.1 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.

According to RSS-GEN §8.8

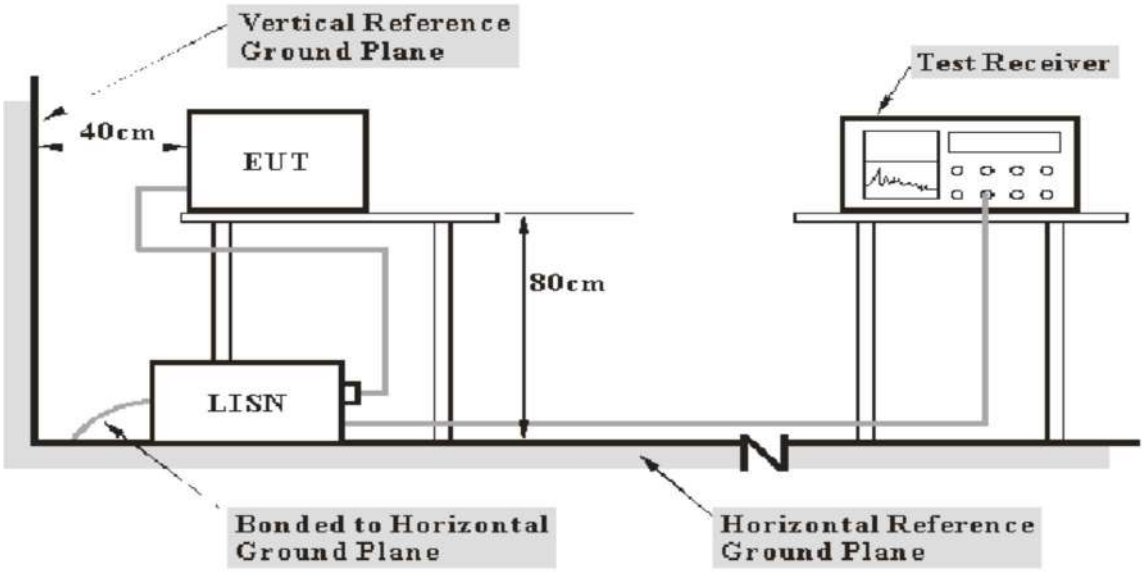
Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

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.

8.2 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 and RSS-GEN limits.

8.3 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

8.4 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.

8.5 Corrected Factor & Over Limit 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 = Result – Limit Line

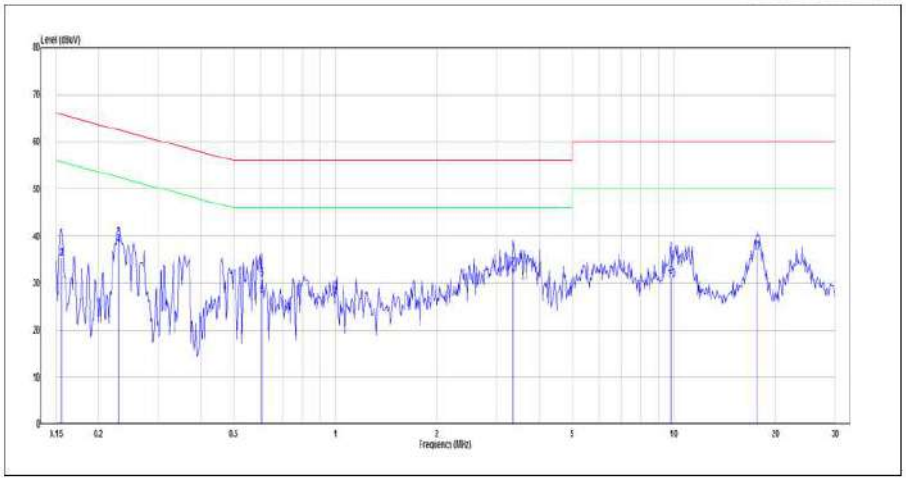
8.6 Test Results

Test Mode: Transmitting

Main: AC120 V, 60 Hz

Mode1: Worst case is 802.11b mode low channel

Line



No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.155	15.94	19.44	35.38	65.74	-30.36	QP	Line
2	0.155	15.65	19.44	35.09	55.74	-20.65	Average	Line
3	0.229	20.22	19.45	39.67	62.48	-22.81	QP	Line
4	0.229	18.51	19.45	37.96	52.48	-14.52	Average	Line
5	0.604	11.26	19.62	30.88	56.00	-25.12	QP	Line
6	0.604	7.67	19.62	27.29	46.00	-18.71	Average	Line
7	3.364	13.06	20.06	33.12	56.00	-22.88	QP	Line
8	3.364	11.65	20.06	31.71	46.00	-14.29	Average	Line
9	9.809	11.28	20.08	31.36	60.00	-28.64	QP	Line
10	9.809	10.58	20.08	30.66	50.00	-19.34	Average	Line
11	17.568	16.53	20.33	36.86	60.00	-23.14	QP	Line
12	17.568	16.16	20.33	36.49	50.00	-13.51	Average	Line

Note:
Result = Reading + Factor
Over Limit = Result – Limit Line
Factor = (LISN, ISN, PLC or current probe) Factor + Cable Loss + Attenuator

Neutral

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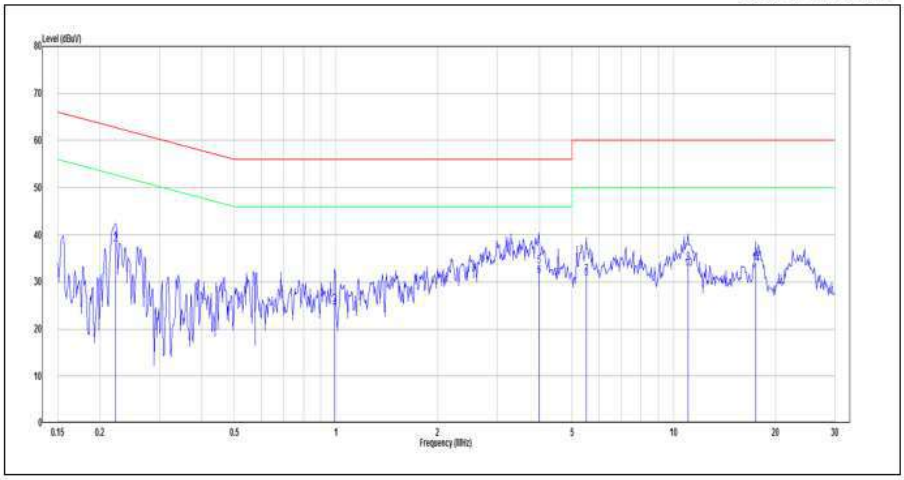


No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.222	19.01	19.46	38.47	62.74	-24.27	QP	Neutral
2	0.222	18.54	19.46	38.00	52.74	-14.74	Average	Neutral
3	0.989	5.31	19.82	25.13	56.00	-30.87	QP	Neutral
4	0.989	4.43	19.82	24.25	46.00	-21.75	Average	Neutral
5	3.985	13.29	20.08	33.37	56.00	-22.63	QP	Neutral
6	3.985	11.26	20.08	31.34	46.00	-14.66	Average	Neutral
7	5.505	11.25	20.11	31.36	60.00	-28.64	QP	Neutral
8	5.505	10.65	20.11	30.76	50.00	-19.24	Average	Neutral
9	11.021	13.84	20.14	33.98	60.00	-26.02	QP	Neutral
10	11.021	12.70	20.14	32.84	50.00	-17.16	Average	Neutral
11	17.475	13.24	20.38	33.62	60.00	-26.38	QP	Neutral
12	17.475	13.74	20.38	34.12	50.00	-15.88	Average	Neutral

Note:

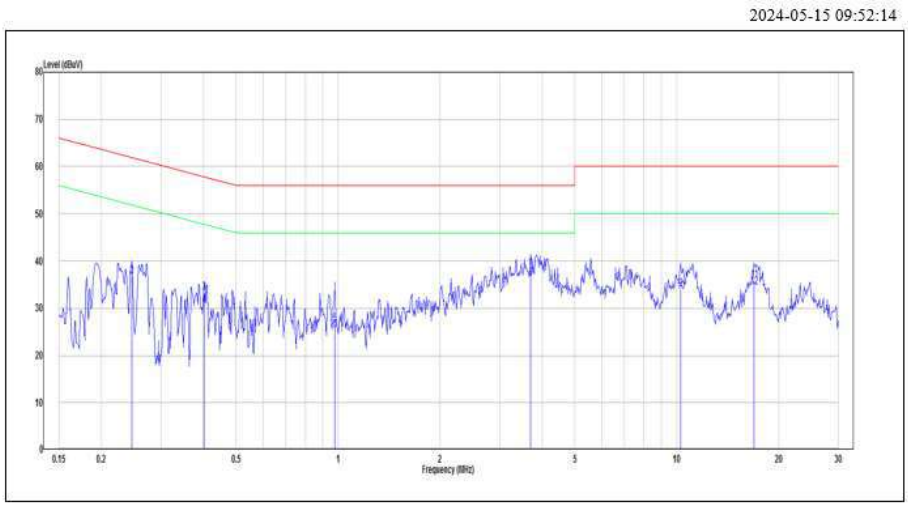
Result = Reading + Factor

Over Limit = Result – Limit Line

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

Mode2: Worst case is 802.11g mode low channel

Line



No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.246	17.34	19.46	36.80	61.91	-25.11	QP	Line
2	0.246	17.17	19.46	36.63	51.91	-15.28	Average	Line
3	0.402	13.71	19.53	33.24	57.81	-24.57	QP	Line
4	0.402	11.02	19.53	30.55	47.81	-17.26	Average	Line
5	0.979	6.80	19.81	26.61	56.00	-29.39	QP	Line
6	0.979	5.56	19.81	25.37	46.00	-20.63	Average	Line
7	3.700	18.14	20.07	38.21	56.00	-17.79	QP	Line
8	3.700	16.16	20.07	36.23	46.00	-9.77	Average	Line
9	10.288	14.01	20.09	34.10	60.00	-25.90	QP	Line
10	10.288	13.47	20.09	33.56	50.00	-16.44	Average	Line
11	16.928	15.57	20.30	35.87	60.00	-24.13	QP	Line
12	16.928	14.04	20.30	34.34	50.00	-15.66	Average	Line

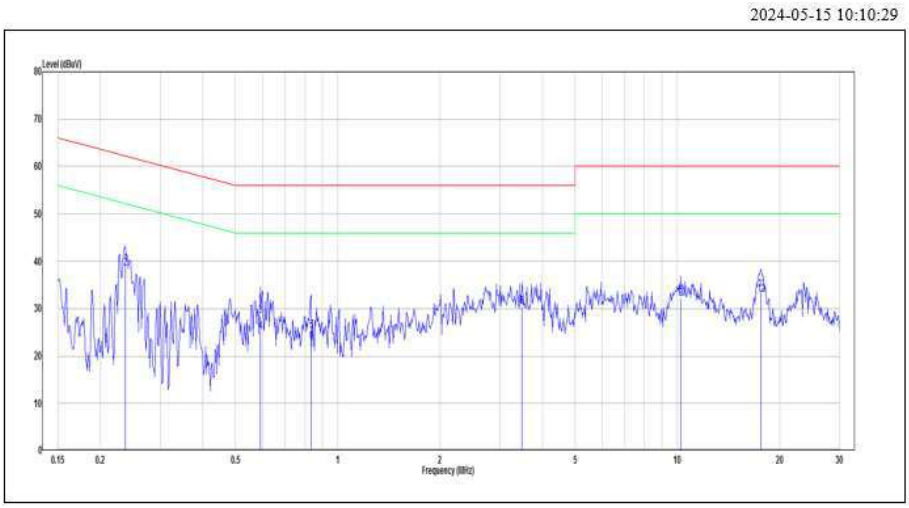
Note:

Result = Reading + Factor

Over Limit = Result – Limit Line

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

Neutral



No.	Frequency (MHz)	Reading dBuV	Correct Factor(dB)	Result dBuV	Limit dBuV	Over limit (dB)	Remark	Phase
1	0.237	19.93	19.47	39.40	62.22	-22.82	QP	Neutral
2	0.237	18.99	19.47	38.46	52.22	-13.76	Average	Neutral
3	0.592	8.90	19.63	28.53	56.00	-27.47	QP	Neutral
4	0.592	5.52	19.63	25.15	46.00	-20.85	Average	Neutral
5	0.835	5.59	19.75	25.34	56.00	-30.66	QP	Neutral
6	0.835	3.28	19.75	23.03	46.00	-22.97	Average	Neutral
7	3.491	10.34	20.07	30.41	56.00	-25.59	QP	Neutral
8	3.491	10.19	20.07	30.26	46.00	-15.74	Average	Neutral
9	10.233	11.84	20.11	31.95	60.00	-28.05	QP	Neutral
10	10.233	12.06	20.11	32.17	50.00	-17.83	Average	Neutral
11	17.661	13.64	20.39	34.03	60.00	-25.97	QP	Neutral
12	17.661	12.50	20.39	32.89	50.00	-17.11	Average	Neutral

Note:

Result = Reading + Factor

Over Limit = Result – Limit Line

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

9 FCC §15.209, §15.205, §15.247(d) & RSS-GEN §8.9, §8.10 – Spurious Emissions

9.1 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 RSS-Gen 8.10,

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

(a)The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).

(b)Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.

(c)Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

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

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 RSS-GEN §8.9: Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5 – General field strength limits at frequencies above 30 MHz

Frequency (MHz)	Field Strength (μV/m at 3 m)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz

Frequency (MHz)	Field Strength (H-Field) (μA/m)	Measurement distance (m)
9 - 490 kHz[Note 1]	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

Note 2: The limit was added 51.5dB to convert the limit from dBuA/m to dBuV/m.

According to ANSI C63.10-2013, section 5.3.3

Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field, and the emissions to be measured can be detected by the measurement equipment (see 4.3.4). Measurements shall not be performed at a distance greater than 30 m for frequencies above 30 MHz, unless it can be further demonstrated that measurements at a distance of 30 m or less are impractical. Measurements from 18 GHz to 40 GHz are typically made at distances significantly less than 3 m from the EUT. When performing

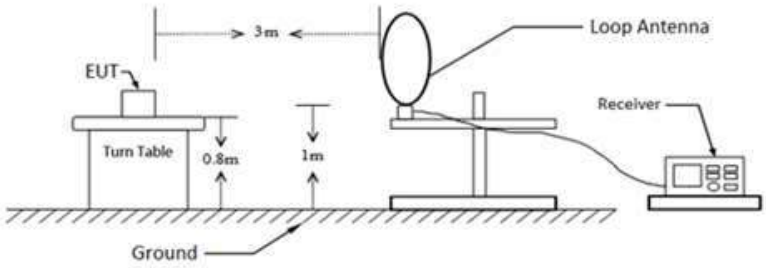
measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade of distance (inverse of linear distance for field-strength measurements or inverse of linear distance-squared for power-density measurements).

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).

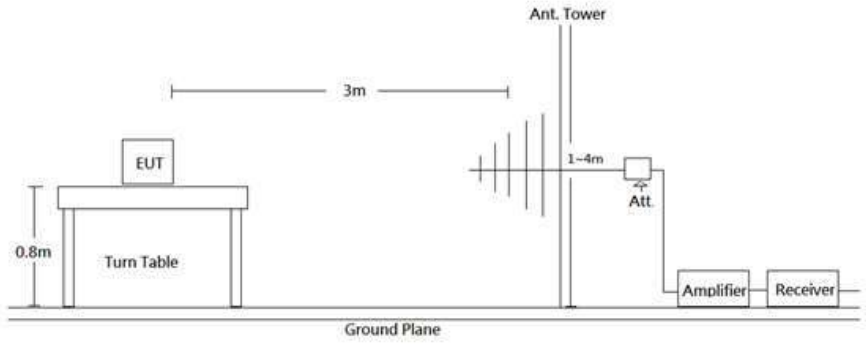
As per RSS-247 5.5,
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

9.2 EUT Setup

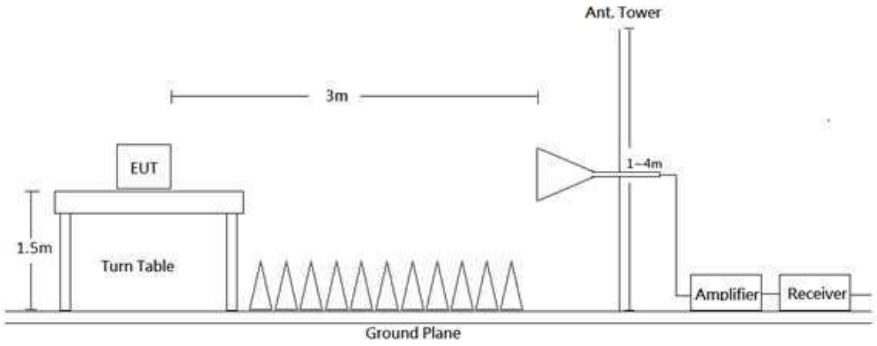
9kHz-30MHz:



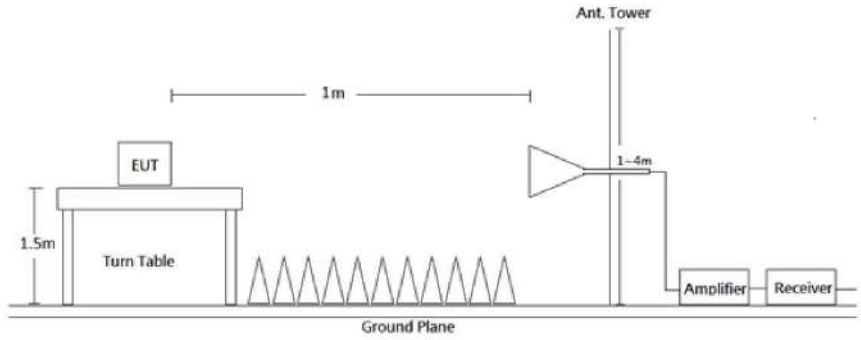
30MHz-1GHz:



1-18 GHz:



18-26.5 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, FCC 15.247 and RSS-Gen, RSS-247 Limits.

9.3 EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 9kHz 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
9 kHz - 150 kHz	200 Hz/300 Hz	1 kHz	/	QP/AV
150 kHz - 30 MHz	9 kHz/10 kHz	30 kHz	/	QP/AV
30-1000 MHz	120 kHz	300 kHz	/	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	>98%	Ave
	1 MHz	1/T	<98%	Ave

Note: T is minimum transmission duration

9.4 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 Quasi-peak and average detector mode from 9 kHz to 30 MHz, Quasi-peak detector mode from 30 MHz to 1 GHz and PK and average detector modes for frequencies above 1 GHz.

9.5 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 = Level – Limit

9.6 Test Results

Test Mode: Transmitting

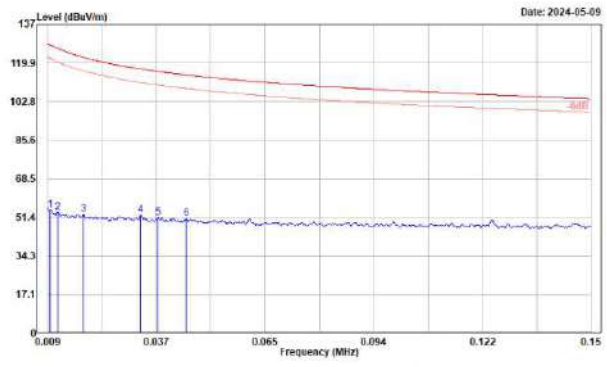
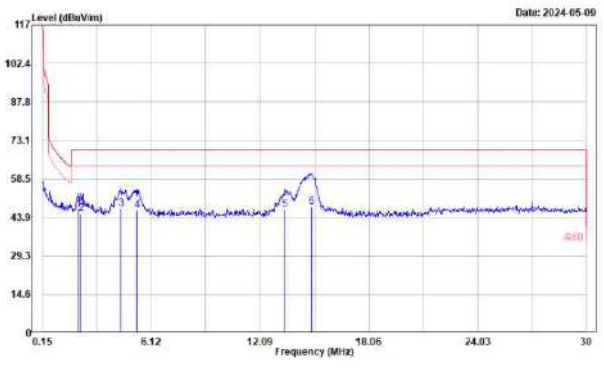
(Pre-scan with three orthogonal axis, and worse case as Y axis.)

Mode 1:

9kHz-30MHz:

(Worst case is 802.11b mode)

(Pre-scan using three directional polarities, worst case as parallel.)

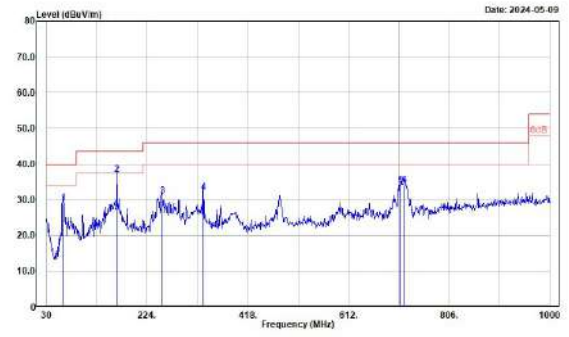
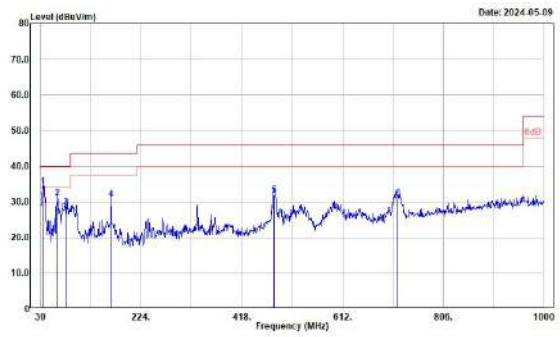
9kHz-150kHz	150kHz-30MHz
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
0.010	37.57	17.07	54.64	127.86	-73.22	100	150	Average
0.012	37.15	16.49	53.64	126.26	-72.62	100	154	Average
0.018	37.50	15.23	52.73	122.35	-69.62	100	206	Average
0.033	39.04	13.40	52.44	117.21	-64.77	100	99	Average
0.038	38.22	12.96	51.18	116.10	-64.92	100	120	Average
0.045	38.04	12.67	50.71	114.55	-63.84	100	117	Average

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2.120	36.15	10.70	46.85	69.54	-22.69	100	222	QP
2.269	34.58	10.67	45.25	69.54	-24.29	100	204	QP
4.478	36.51	10.64	47.15	69.54	-22.39	100	336	QP
5.314	35.47	11.05	46.52	69.54	-23.02	100	108	QP
13.463	35.44	11.47	46.91	69.54	-22.63	100	325	QP
14.926	36.38	11.51	47.89	69.54	-21.65	100	108	QP

30MHz-1GHz:

(Worst case is 802.11b mode)

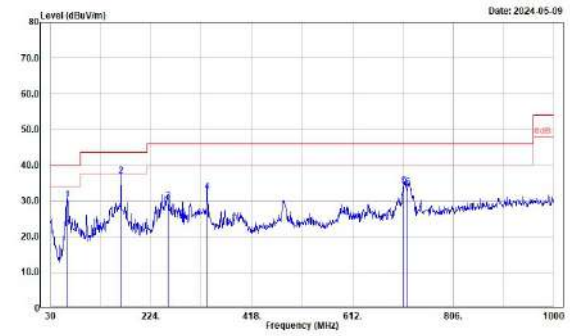
Low channel	
Horizontal	**Vertical**
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
62.980	44.97	-15.95	29.02	40.00	-10.98	100	164	QP
165.800	48.21	-11.05	37.16	43.50	-6.34	100	124	QP
253.100	42.33	-11.38	30.95	46.00	-15.05	100	109	QP
332.640	40.67	-8.53	32.14	46.00	-13.86	100	318	QP
712.880	35.78	-1.68	34.10	46.00	-11.90	100	146	QP
719.670	35.64	-1.60	34.04	46.00	-11.96	100	142	QP

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
34.850	40.65	-6.42	34.23	40.00	-5.77	100	180	QP
62.980	46.99	-15.95	31.04	40.00	-8.96	100	70	QP
79.470	44.45	-15.97	28.48	40.00	-11.52	100	135	QP
165.800	41.87	-11.05	30.82	43.50	-12.68	100	217	QP
480.080	37.09	-5.17	31.92	46.00	-14.08	100	306	QP
718.700	32.59	-1.61	30.98	46.00	-15.02	100	156	QP

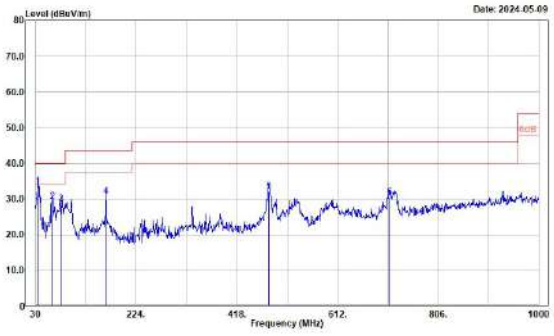
Middle channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
62.980	46.29	-15.95	30.34	40.00	-9.66	100	162	QP
165.800	47.85	-11.05	36.80	43.50	-6.70	100	122	QP
256.010	41.11	-11.27	29.84	46.00	-16.16	100	108	QP
331.670	41.04	-8.55	32.49	46.00	-13.51	100	331	QP
710.940	35.92	-1.74	34.18	46.00	-11.82	100	144	QP
718.700	35.46	-1.61	33.85	46.00	-12.15	100	140	QP

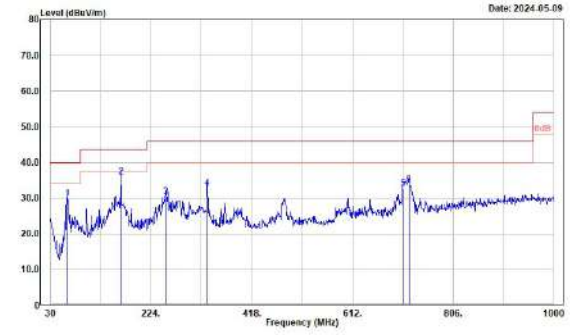
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
34.850	40.04	-6.42	33.62	40.00	-6.38	100	116	QP
62.980	45.14	-15.95	29.19	40.00	-10.81	100	238	QP
79.470	44.49	-15.97	28.52	40.00	-11.48	100	360	QP
165.800	41.91	-11.05	30.86	43.50	-12.64	100	192	QP
480.080	37.35	-5.17	32.18	46.00	-13.82	100	296	QP
711.910	32.32	-1.71	30.61	46.00	-15.39	100	131	QP

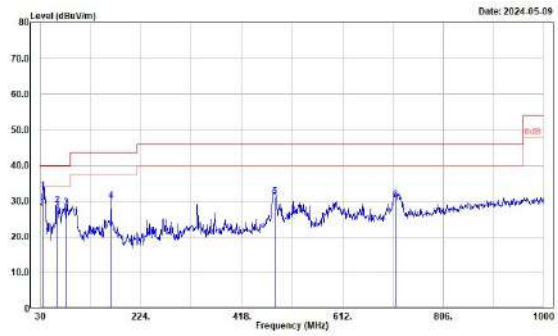
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
62.980	45.88	-15.95	29.93	40.00	-10.07	100	149	QP
165.800	47.08	-11.05	36.03	43.50	-7.47	100	134	QP
252.130	41.70	-11.38	30.32	46.00	-15.68	100	126	QP
331.670	41.24	-8.55	32.69	46.00	-13.31	100	341	QP
709.000	34.50	-1.79	32.71	46.00	-13.29	100	149	QP
720.640	35.51	-1.59	33.92	46.00	-12.08	100	145	QP

Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
34.850	39.34	-6.42	32.92	40.00	-7.08	100	10	QP
62.980	44.79	-15.95	28.84	40.00	-11.16	100	105	QP
79.470	44.22	-15.97	28.25	40.00	-11.75	100	124	QP
165.800	41.16	-11.05	30.11	43.50	-13.39	100	25	QP
482.020	36.43	-5.13	31.30	46.00	-14.70	100	305	QP
713.850	32.11	-1.65	30.46	46.00	-15.54	100	139	QP

Level = Reading + Factor.

Margin = Level – Limit.

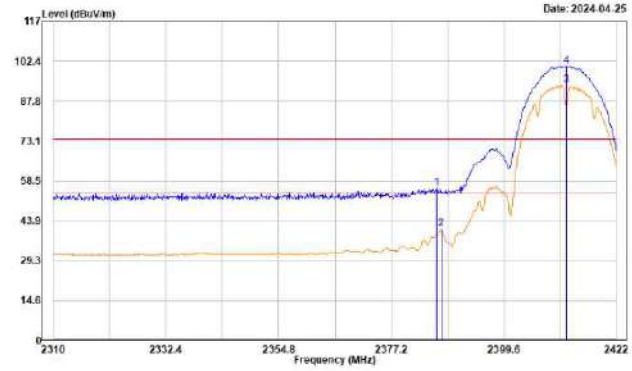
Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Band-Edge:

802.11b Mode

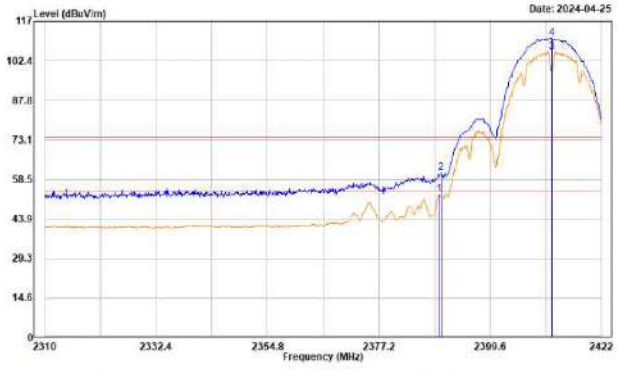
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2386.272	66.78	-10.99	55.79	74.00	-18.21	122	146	Peak
2387.168	51.97	-10.99	40.98	54.00	-13.02	122	146	Average
2412.000	104.45	-10.92	93.53			122	146	Average
2412.000	111.51	-10.92	100.59			122	146	Peak

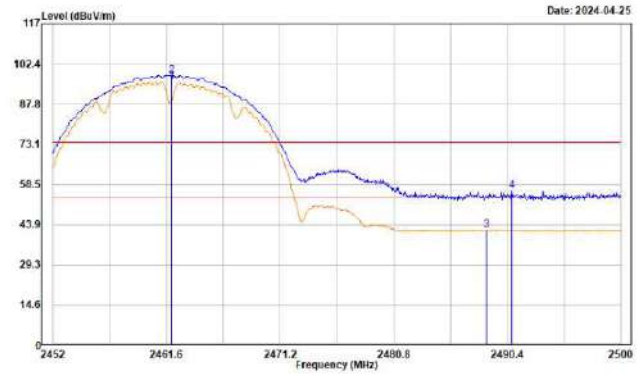
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.296	63.84	-10.97	52.87	54.00	-1.13	143	221	Average
2389.744	71.86	-10.97	60.89	74.00	-13.11	143	221	Peak
2412.000	116.52	-10.92	105.60			143	221	Average
2412.000	121.50	-10.92	110.58			143	221	Peak

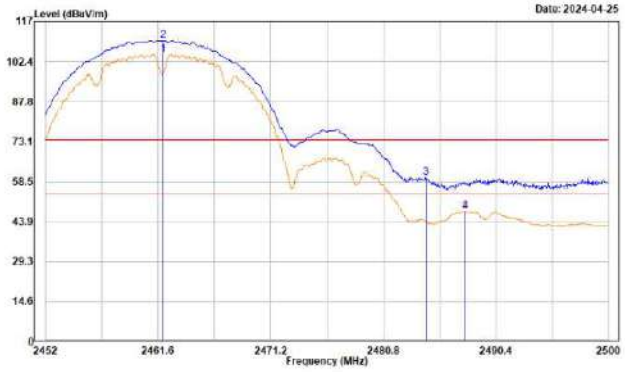
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	106.55	-10.78	95.77			182	333	Average
2462.000	108.78	-10.78	98.00			182	333	Peak
2488.672	52.35	-10.46	41.89	54.00	-12.11	182	333	Average
2490.784	66.51	-10.43	56.08	74.00	-17.92	182	333	Peak

Vertical

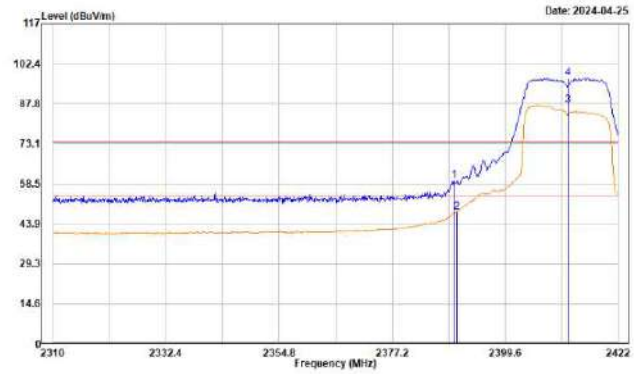


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	115.79	-10.78	105.01			116	14	Average
2462.000	120.89	-10.78	110.11			116	14	Peak
2484.448	70.46	-10.50	59.96	74.00	-14.04	116	14	Peak
2487.760	58.01	-10.47	47.54	54.00	-6.46	116	14	Average

802.11g mode

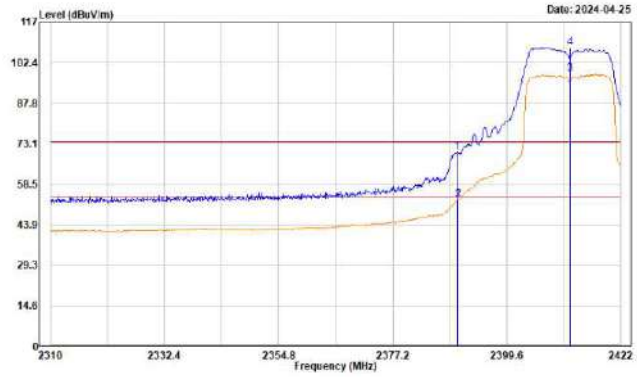
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.488	70.70	-10.97	59.73	74.00	-14.27	141	149	Peak
2389.968	59.31	-10.97	48.34	54.00	-5.66	141	149	Average
2412.000	98.13	-10.92	87.21			141	149	Average
2412.000	108.08	-10.92	97.16			141	149	Peak

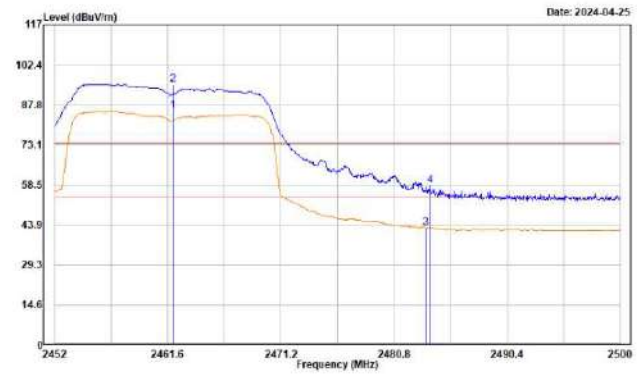
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.856	81.14	-10.97	70.17	74.00	-3.83	166	298	Peak
2389.968	63.89	-10.97	52.92	54.00	-1.08	166	298	Average
2412.000	109.11	-10.92	98.19			166	298	Average
2412.000	118.83	-10.92	107.91			166	298	Peak

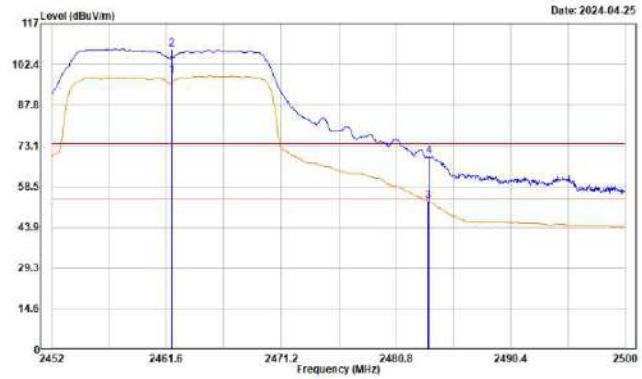
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	96.31	-10.78	85.53			161	128	Average
2462.000	106.03	-10.78	95.25			161	128	Peak
2483.500	53.47	-10.51	42.96	54.00	-11.04	161	128	Average
2483.824	68.81	-10.50	58.31	74.00	-15.69	161	128	Peak

Vertical

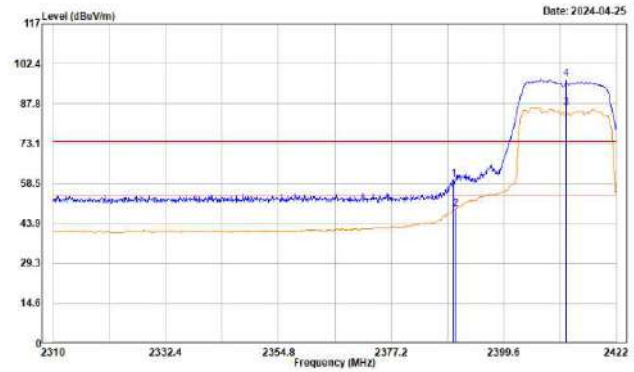


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	108.94	-10.78	98.16			169	17	Average
2462.000	118.69	-10.78	107.91			169	17	Peak
2483.500	63.76	-10.51	53.25	54.00	-0.75	169	17	Average
2483.536	79.91	-10.51	69.40	74.00	-4.60	169	17	Peak

802.11n HT20 Mode

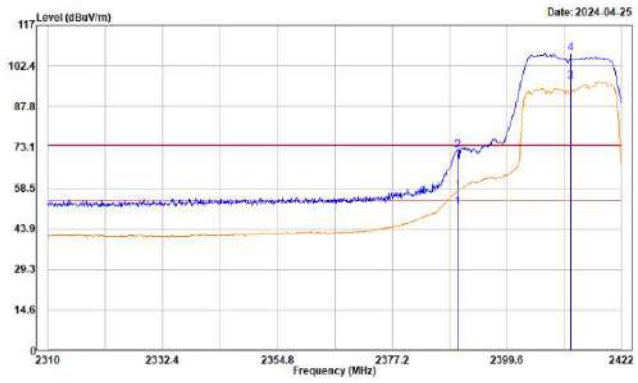
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.632	70.79	-10.97	59.82	74.00	-14.18	124	146	Peak
2389.968	60.08	-10.97	49.11	54.00	-4.89	124	146	Average
2412.000	97.27	-10.92	86.35			124	146	Average
2412.000	107.57	-10.92	96.65			124	146	Peak

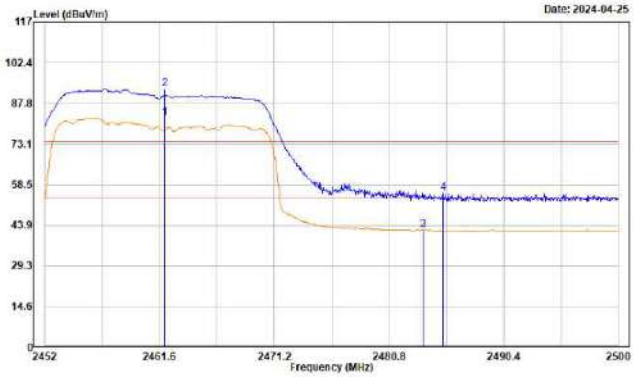
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.968	62.55	-10.97	51.58	54.00	-2.42	137	247	Average
2389.968	83.07	-10.97	72.10	74.00	-1.90	137	247	Peak
2412.000	107.53	-10.92	96.61			137	247	Average
2412.000	117.77	-10.92	106.85			137	247	Peak

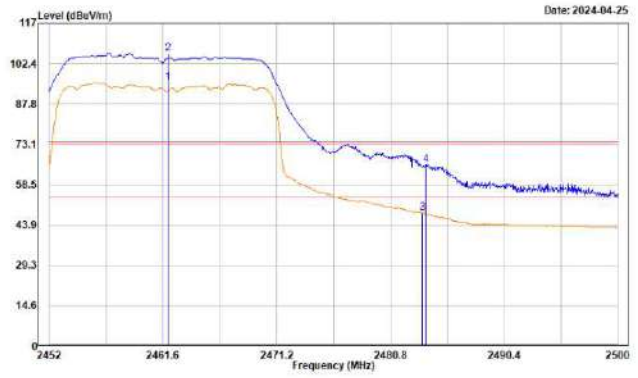
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	93.09	-10.78	82.31			185	126	Average
2462.000	103.79	-10.78	93.01			185	126	Peak
2483.632	52.65	-10.51	42.14	54.00	-11.86	185	126	Average
2485.312	66.13	-10.50	55.63	74.00	-18.37	185	126	Peak

Vertical

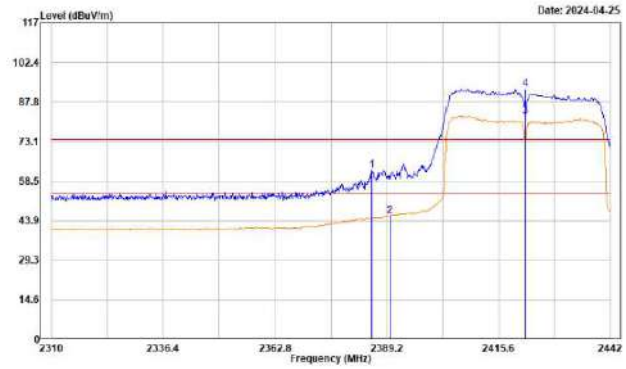


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	106.11	-10.78	95.33			166	8	Average
2462.000	116.76	-10.78	105.98			167	15	Peak
2483.500	58.83	-10.51	48.32	54.00	-5.68	166	8	Average
2483.776	76.22	-10.50	65.72	74.00	-8.28	167	15	Peak

802.11n HT40 Mode

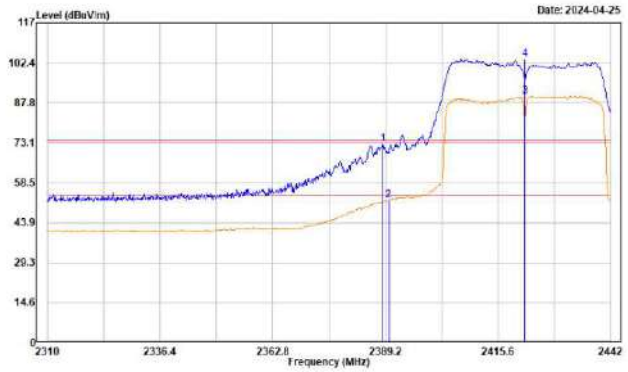
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2385.636	73.45	-11.00	62.45	74.00	-11.55	170	128	Peak
2389.992	56.78	-10.97	45.81	54.00	-8.19	170	128	Average
2422.000	93.39	-10.91	82.48			170	128	Average
2422.000	103.54	-10.91	92.63			170	128	Peak

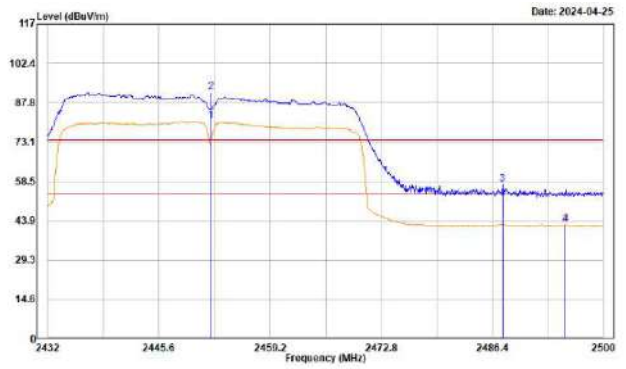
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2388.672	83.47	-10.98	72.49	74.00	-1.51	137	269	Peak
2389.992	63.09	-10.97	52.12	54.00	-1.88	137	269	Average
2422.000	100.95	-10.91	90.04			137	269	Average
2422.000	114.65	-10.91	103.74			137	269	Peak

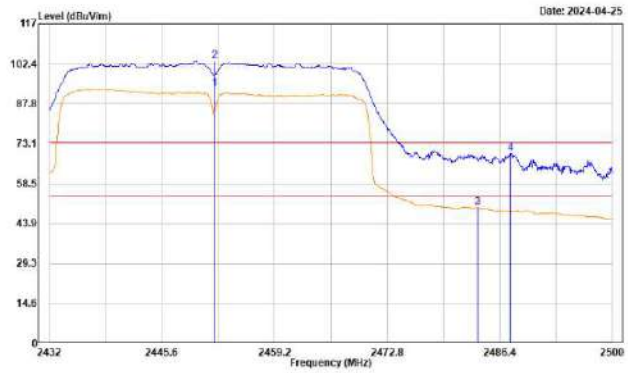
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2452.000	91.75	-10.89	80.86			157	129	Average
2452.000	102.37	-10.89	91.48			157	129	Peak
2487.624	67.73	-10.47	57.26	74.00	-16.74	157	129	Peak
2495.308	52.90	-10.38	42.52	54.00	-11.48	157	129	Average

Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2452.000	104.08	-10.89	93.19			122	299	Average
2452.000	114.34	-10.89	103.45			122	299	Peak
2483.748	60.18	-10.51	49.67	54.00	-4.33	122	299	Average
2487.692	79.89	-10.47	69.42	74.00	-4.58	122	299	Peak

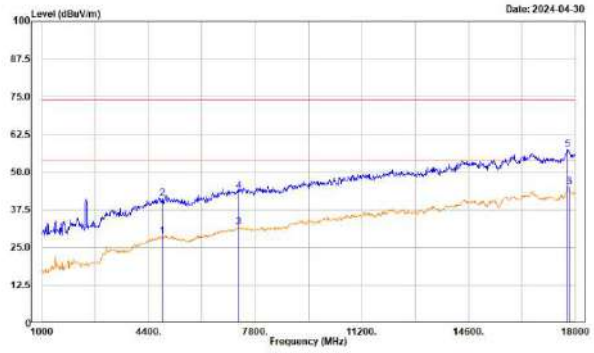
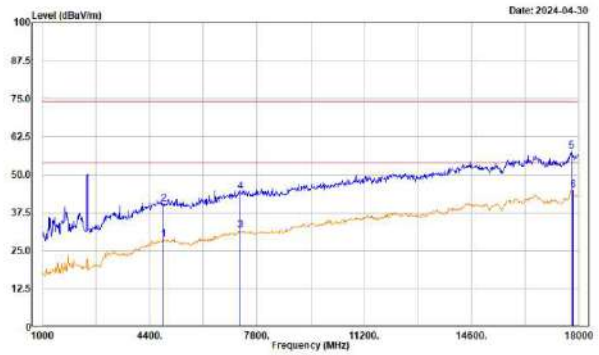
Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

(worst case is 802.11b mode, low channel)

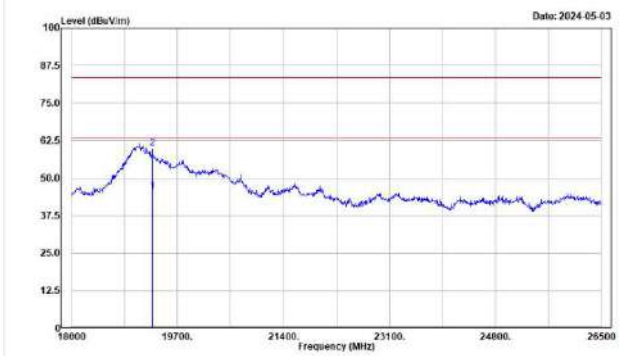
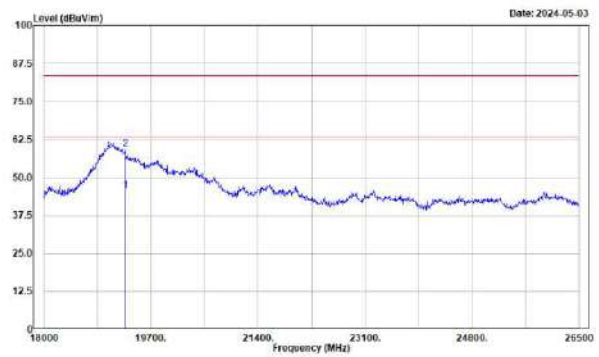
1GHz-18GHz:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4844.000	32.71	-3.90	28.81	54.00	-25.19	104	131	Average
4844.000	45.15	-3.90	41.25	74.00	-32.75	104	131	Peak
7266.000	31.16	0.47	31.63	54.00	-22.37	155	206	Average
7266.000	43.28	0.47	43.75	74.00	-30.25	155	206	Peak
17762.000	44.47	13.06	57.53	74.00	-16.47	107	45	Peak
17813.000	31.97	13.12	45.09	54.00	-8.91	107	45	Average

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4844.000	32.69	-3.90	28.79	54.00	-25.21	162	356	Average
4844.000	44.35	-3.90	40.45	74.00	-33.55	162	356	Peak
7266.000	31.11	0.47	31.58	54.00	-22.42	153	250	Average
7266.000	44.00	0.47	44.47	74.00	-29.53	153	250	Peak
17779.000	44.53	13.07	57.60	74.00	-16.40	150	52	Peak
17813.000	31.99	13.12	45.11	54.00	-8.89	150	52	Average

18GHz-26.5GHz:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19296.000	30.07	15.44	45.51	63.50	-17.99	156	15	Average
19296.000	44.36	15.44	59.80	83.50	-23.70	156	15	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19296.000	30.15	15.44	45.59	63.50	-17.91	152	360	Average
19296.000	43.91	15.44	59.35	83.50	-24.15	152	360	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

For 18-26.5GHz Convert the test distance limit of 3 meters to a limit of 1 meter:

Conversion factor = 20 log (1m/3m) = 9.5 dB , Limit = 54+9.5 = 63.50 dBuV/m @ 1m

Above 1GHz

802.11b Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	54.48	-3.95	50.53	54.00	-3.47	117	105	Average
4824.000	56.83	-3.95	52.88	74.00	-21.12	117	105	Peak
7236.000	38.80	0.45	39.25	54.00	-14.75	126	210	Average
7236.000	48.21	0.45	48.66	74.00	-25.34	126	210	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	56.08	-3.95	52.13	54.00	-1.87	121	253	Average
4824.000	58.14	-3.95	54.19	74.00	-19.81	121	253	Peak
7236.000	42.54	0.45	42.99	54.00	-11.01	242	222	Average
7236.000	50.37	0.45	50.82	74.00	-23.18	242	222	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	53.58	-3.83	49.75	54.00	-4.25	134	325	Average
4874.000	56.26	-3.83	52.43	74.00	-21.57	134	325	Peak
7311.000	36.93	0.43	37.36	54.00	-16.64	112	212	Average
7311.000	46.95	0.43	47.38	74.00	-26.62	112	212	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	55.33	-3.83	51.50	54.00	-2.50	133	262	Average
4874.000	57.32	-3.83	53.49	74.00	-20.51	133	262	Peak
7311.000	40.61	0.43	41.04	54.00	-12.96	238	229	Average
7311.000	48.36	0.43	48.79	74.00	-25.21	238	229	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	54.23	-3.63	50.60	54.00	-3.40	107	105	Average
4924.000	57.04	-3.63	53.41	74.00	-20.59	107	105	Peak
7386.000	34.88	0.54	35.42	54.00	-18.58	122	221	Average
7386.000	46.09	0.54	46.63	74.00	-27.37	122	221	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	54.24	-3.63	50.61	54.00	-3.39	123	285	Average
4924.000	56.57	-3.63	52.94	74.00	-21.06	123	285	Peak
7386.000	39.64	0.54	40.18	54.00	-13.82	222	250	Average
7386.000	48.39	0.54	48.93	74.00	-25.07	222	250	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

802.11g Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	36.81	-3.95	32.86	54.00	-21.14	105	304	Average
4824.000	52.42	-3.95	48.47	74.00	-25.53	105	304	Peak
7236.000	32.89	0.45	33.34	54.00	-20.66	152	239	Average
7236.000	42.88	0.45	43.33	74.00	-30.67	152	239	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	34.41	-3.95	30.46	54.00	-23.54	253	49	Average
4824.000	49.13	-3.95	45.18	74.00	-28.82	253	49	Peak
7236.000	36.29	0.45	36.74	54.00	-17.26	133	3	Average
7236.000	51.85	0.45	52.30	74.00	-21.70	133	3	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	34.46	-3.83	30.63	54.00	-23.37	105	253	Average
4874.000	49.03	-3.83	45.20	74.00	-28.80	105	253	Peak
7311.000	31.79	0.43	32.22	54.00	-21.78	156	24	Average
7311.000	43.80	0.43	44.23	74.00	-29.77	156	24	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	36.21	-3.83	32.38	54.00	-21.62	158	251	Average
4874.000	49.54	-3.83	45.71	74.00	-28.29	158	251	Peak
7311.000	34.97	0.43	35.40	54.00	-18.60	156	340	Average
7311.000	49.26	0.43	49.69	74.00	-24.31	156	340	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	36.14	-3.63	32.51	54.00	-21.49	104	266	Average
4924.000	51.48	-3.63	47.85	74.00	-26.15	104	266	Peak
7386.000	31.49	0.54	32.03	54.00	-21.97	150	198	Average
7386.000	43.00	0.54	43.54	74.00	-30.46	150	198	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	34.91	-3.63	31.28	54.00	-22.72	168	4	Average
4924.000	49.34	-3.63	45.71	74.00	-28.29	168	4	Peak
7386.000	33.63	0.54	34.17	54.00	-19.83	139	305	Average
7386.000	48.89	0.54	49.43	74.00	-24.57	139	305	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

802.11n HT20 Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	34.68	-3.95	30.73	54.00	-23.27	132	253	Average
4824.000	48.21	-3.95	44.26	74.00	-29.74	132	253	Peak
7236.000	31.56	0.45	32.01	54.00	-21.99	151	356	Average
7236.000	43.36	0.45	43.81	74.00	-30.19	151	356	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	35.28	-3.95	31.33	54.00	-22.67	159	13	Average
4824.000	47.57	-3.95	43.62	74.00	-30.38	159	13	Peak
7236.000	32.32	0.45	32.77	54.00	-21.23	154	342	Average
7236.000	43.94	0.45	44.39	74.00	-29.61	154	342	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	32.94	-3.83	29.11	54.00	-24.89	128	252	Average
4874.000	45.47	-3.83	41.64	74.00	-32.36	128	252	Peak
7311.000	31.53	0.43	31.96	54.00	-22.04	156	255	Average
7311.000	43.20	0.43	43.63	74.00	-30.37	156	255	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	33.27	-3.83	29.44	54.00	-24.56	164	110	Average
4874.000	44.28	-3.83	40.45	74.00	-33.55	164	110	Peak
7311.000	31.78	0.43	32.21	54.00	-21.79	153	329	Average
7311.000	43.33	0.43	43.76	74.00	-30.24	153	329	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	32.33	-3.63	28.70	54.00	-25.30	152	124	Average
4924.000	45.58	-3.63	41.95	74.00	-32.05	152	124	Peak
7386.000	30.59	0.54	31.13	54.00	-22.87	156	2	Average
7386.000	43.30	0.54	43.84	74.00	-30.16	156	2	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	35.34	-3.63	31.71	54.00	-22.29	158	0	Average
4924.000	49.46	-3.63	45.83	74.00	-28.17	158	0	Peak
7386.000	31.67	0.54	32.21	54.00	-21.79	153	353	Average
7386.000	43.01	0.54	43.55	74.00	-30.45	153	353	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

802.11n HT40 Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4844.000	32.71	-3.90	28.81	54.00	-25.19	104	131	Average
4844.000	45.15	-3.90	41.25	74.00	-32.75	104	131	Peak
7266.000	31.16	0.47	31.63	54.00	-22.37	155	206	Average
7266.000	43.28	0.47	43.75	74.00	-30.25	155	206	Peak
17762.000	44.47	13.06	57.53	74.00	-16.47	107	45	Peak
17813.000	31.97	13.12	45.09	54.00	-8.91	107	45	Average

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4844.000	32.69	-3.90	28.79	54.00	-25.21	162	356	Average
4844.000	44.35	-3.90	40.45	74.00	-33.55	162	356	Peak
7266.000	31.11	0.47	31.58	54.00	-22.42	153	250	Average
7266.000	44.00	0.47	44.47	74.00	-29.53	153	250	Peak
17779.000	44.53	13.07	57.60	74.00	-16.40	150	52	Peak
17813.000	31.99	13.12	45.11	54.00	-8.89	150	52	Average

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	32.84	-3.83	29.01	54.00	-24.99	128	285	Average
4874.000	44.11	-3.83	40.28	74.00	-33.72	128	285	Peak
7311.000	31.59	0.43	32.02	54.00	-21.98	152	104	Average
7311.000	43.81	0.43	44.24	74.00	-29.76	152	104	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	33.05	-3.83	29.22	54.00	-24.78	161	75	Average
4874.000	44.05	-3.83	40.22	74.00	-33.78	161	75	Peak
7311.000	31.58	0.43	32.01	54.00	-21.99	155	313	Average
7311.000	44.05	0.43	44.48	74.00	-29.52	155	313	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4904.000	32.81	-3.76	29.05	54.00	-24.95	133	43	Average
4904.000	44.54	-3.76	40.78	74.00	-33.22	133	43	Peak
7356.000	31.95	0.53	32.48	54.00	-21.52	151	1	Average
7356.000	43.17	0.53	43.70	74.00	-30.30	151	1	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4904.000	33.02	-3.76	29.26	54.00	-24.74	158	232	Average
4904.000	45.60	-3.76	41.84	74.00	-32.16	158	232	Peak
7356.000	31.98	0.53	32.51	54.00	-21.49	154	316	Average
7356.000	43.87	0.53	44.40	74.00	-29.60	154	316	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

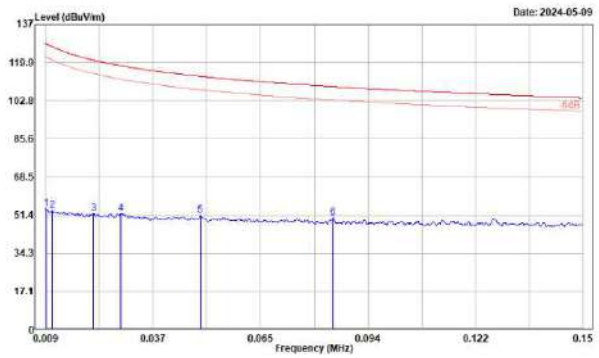
Mode 2:

9kHz-30MHz:

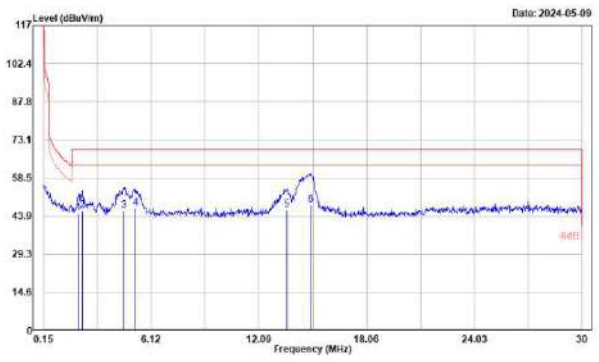
(Worst case is 802.11g mode, high channel)

(Pre-scan using three directional polarities, worst case as parallel.)

9kHz-150kHz	150kHz-30MHz



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
0.009	36.60	17.46	54.06	128.25	-74.19	100	77	Average
0.011	36.69	16.68	53.37	127.03	-73.66	100	205	Average
0.022	37.44	14.72	52.16	120.94	-68.78	100	6	Average
0.029	38.12	13.86	51.98	118.43	-66.45	100	158	Average
0.050	38.61	12.61	51.22	113.69	-62.47	100	111	Average
0.084	38.76	11.23	49.99	109.07	-59.08	100	208	Average

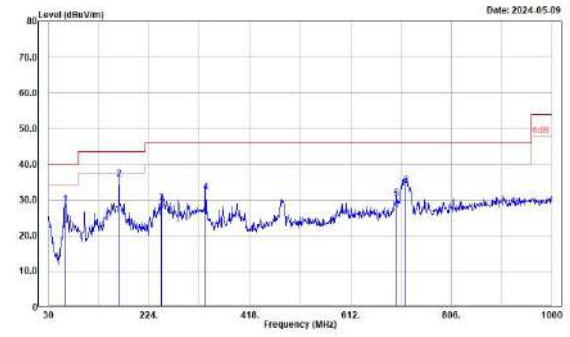


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2.060	34.24	10.72	44.96	69.54	-24.58	100	174	QP
2.299	35.19	10.66	45.85	69.54	-23.69	100	115	QP
4.598	35.46	10.65	46.11	69.54	-23.43	100	302	QP
5.254	35.89	10.98	46.87	69.54	-22.67	100	285	QP
13.642	34.83	11.48	46.31	69.54	-23.23	100	100	QP
14.985	36.60	11.52	48.12	69.54	-21.42	100	84	QP

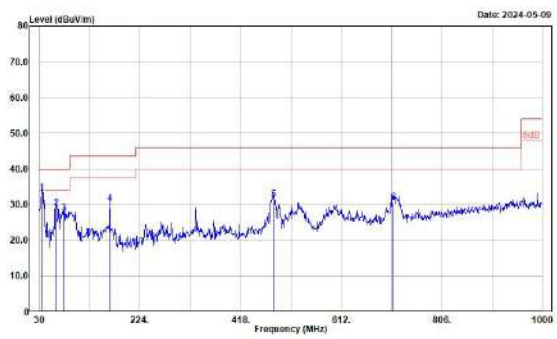
30MHz-1GHz:

(Worst case is 802.11g mode)

Low channel	
Horizontal	**Vertical**



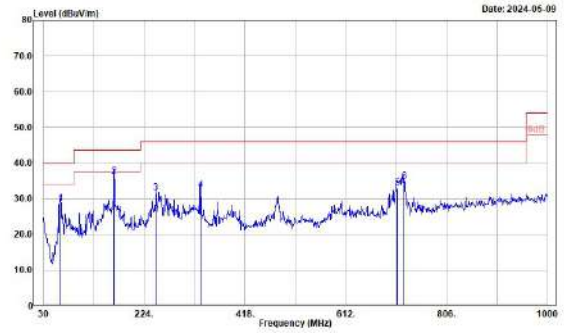
Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
62.980	44.77	-15.95	28.82	40.00	-11.18	100	164	QP
165.800	46.81	-11.05	35.76	43.50	-7.74	100	132	QP
248.250	40.58	-11.35	29.23	46.00	-16.77	100	100	QP
332.640	40.51	-8.53	31.98	46.00	-14.02	100	347	QP
700.270	32.29	-1.93	30.36	46.00	-15.64	100	144	QP
717.730	35.63	-1.61	34.02	46.00	-11.98	100	144	QP



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
34.850	39.70	-6.42	33.28	40.00	-6.72	100	199	QP
62.980	45.08	-15.95	29.13	40.00	-10.87	100	51	QP
77.530	43.34	-15.84	27.50	40.00	-12.50	100	59	QP
165.800	41.34	-11.05	30.29	43.50	-13.21	100	203	QP
482.020	36.50	-5.13	31.37	46.00	-14.63	100	306	QP
711.910	32.19	-1.71	30.48	46.00	-15.52	100	161	QP

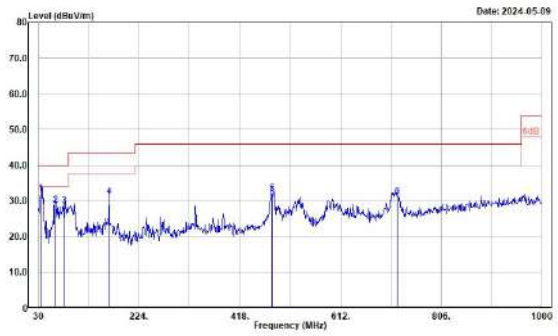
Middle channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
62.980	44.53	-15.95	28.58	40.00	-11.42	100	167	QP
165.800	47.33	-11.05	36.28	43.50	-7.22	100	258	QP
246.310	42.95	-11.32	31.63	46.00	-14.37	100	102	QP
332.640	41.15	-8.53	32.62	46.00	-13.38	100	351	QP
710.940	34.79	-1.74	33.05	46.00	-12.95	100	148	QP
724.520	36.33	-1.48	34.85	46.00	-11.15	100	144	QP

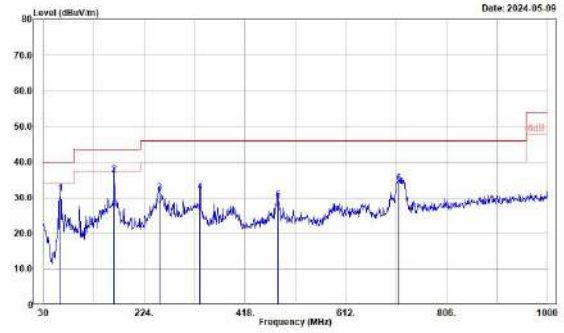
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
34.850	38.55	-6.42	32.13	40.00	-7.87	100	267	QP
62.980	44.89	-15.95	28.94	40.00	-11.06	100	259	QP
79.470	44.56	-15.97	28.59	40.00	-11.41	100	140	QP
165.800	42.33	-11.05	31.28	43.50	-12.22	100	206	QP
480.080	37.21	-5.17	32.04	46.00	-13.96	100	309	QP
721.610	32.69	-1.55	31.14	46.00	-14.86	100	148	QP

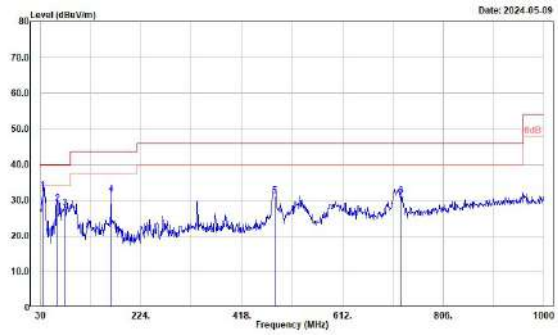
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
62.980	47.08	-15.95	31.13	40.00	-8.87	100	146	QP
165.800	47.57	-11.05	36.52	43.50	-6.98	100	116	QP
253.100	42.84	-11.38	31.46	46.00	-14.54	100	108	QP
331.670	40.25	-8.55	31.70	46.00	-14.30	100	313	QP
481.050	34.42	-5.15	29.27	46.00	-16.73	100	89	QP
713.850	35.76	-1.65	34.11	46.00	-11.89	100	146	QP

Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
34.850	39.22	-6.42	32.80	40.00	-7.20	100	219	QP
62.980	44.90	-15.95	28.95	40.00	-11.05	100	238	QP
77.530	43.59	-15.84	27.75	40.00	-12.25	100	47	QP
165.800	42.80	-11.05	31.75	43.50	-11.75	100	215	QP
481.050	36.30	-5.15	31.15	46.00	-14.85	100	300	QP
724.520	32.62	-1.48	31.14	46.00	-14.86	100	143	QP

Level = Reading + Factor.

Margin = Level – Limit.

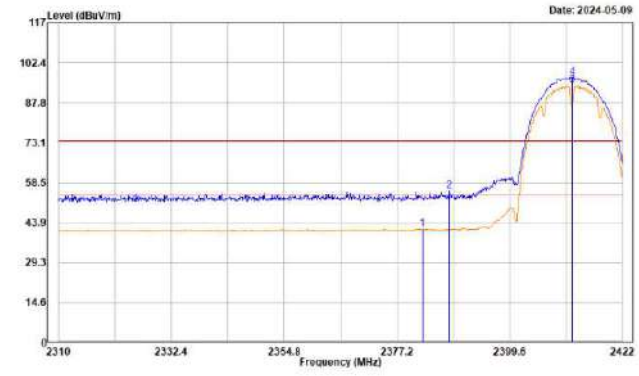
Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Band-Edge:

802.11b Mode

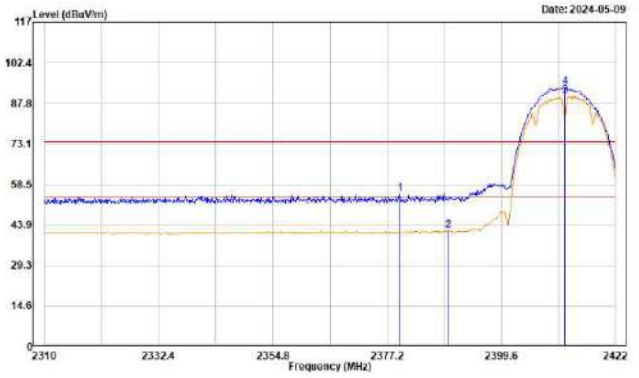
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2382.352	52.59	-11.02	41.57	54.00	-12.43	203	198	Average
2387.616	66.41	-10.98	55.43	74.00	-18.57	203	198	Peak
2412.000	105.01	-10.92	94.09			203	198	Average
2412.000	108.08	-10.92	97.16			203	198	Peak

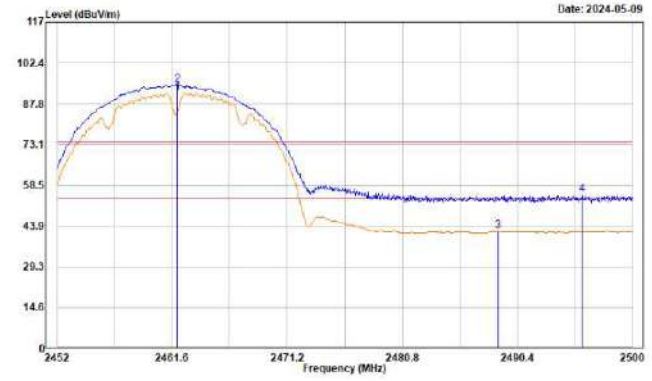
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2379.664	66.29	-11.03	55.26	74.00	-18.74	152	101	Peak
2389.072	52.91	-10.97	41.94	54.00	-12.06	152	101	Average
2412.000	101.25	-10.92	90.33			152	101	Average
2412.000	104.31	-10.92	93.39			152	101	Peak

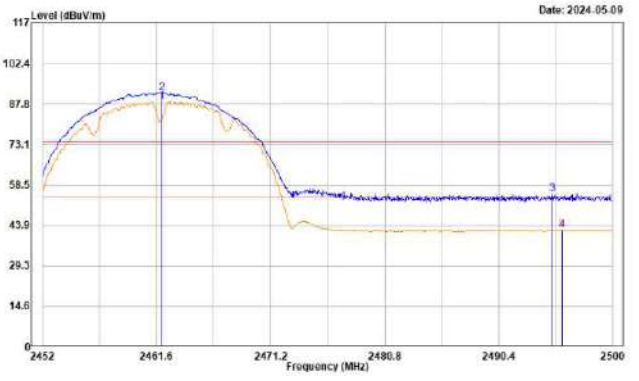
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	102.28	-10.78	91.50			143	235	Average
2462.000	105.30	-10.78	94.52			143	235	Peak
2488.816	52.58	-10.45	42.13	54.00	-11.87	143	235	Average
2495.824	65.49	-10.37	55.12	74.00	-18.88	143	235	Peak

Vertical

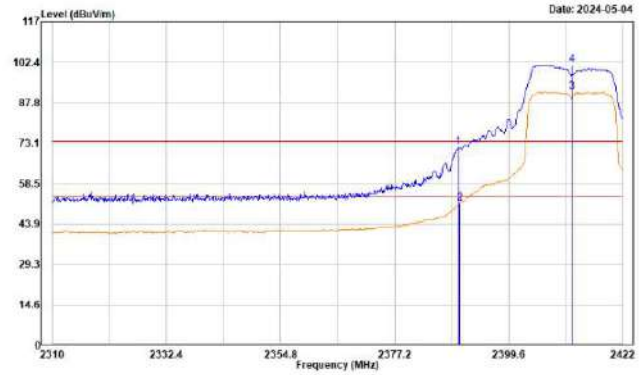


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	99.33	-10.78	88.55			182	171	Average
2462.000	102.51	-10.78	91.73			182	171	Peak
2494.912	65.49	-10.38	55.11	74.00	-18.89	182	171	Peak
2495.728	52.50	-10.37	42.13	54.00	-11.87	182	171	Average

802.11g mode

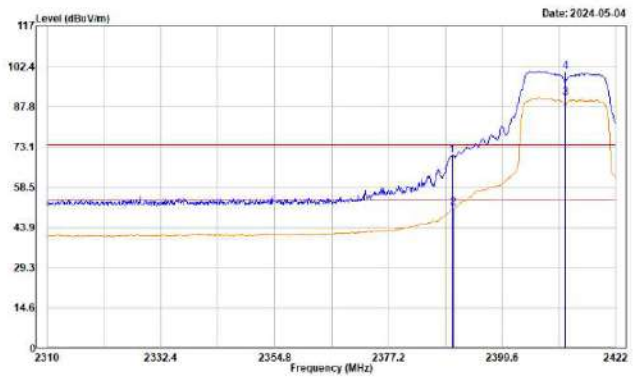
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.744	82.63	-10.97	71.66	74.00	-2.34	140	160	Peak
2389.968	62.34	-10.97	51.37	54.00	-2.63	140	160	Average
2412.000	102.67	-10.92	91.75			140	160	Average
2412.000	112.42	-10.92	101.50			140	160	Peak

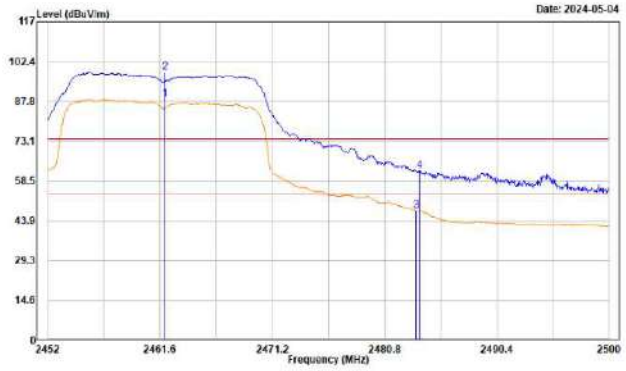
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.744	81.18	-10.97	70.21	74.00	-3.79	194	200	Peak
2389.968	61.97	-10.97	51.00	54.00	-3.00	194	200	Average
2412.000	101.90	-10.92	90.98			194	200	Average
2412.000	111.50	-10.92	100.58			194	200	Peak

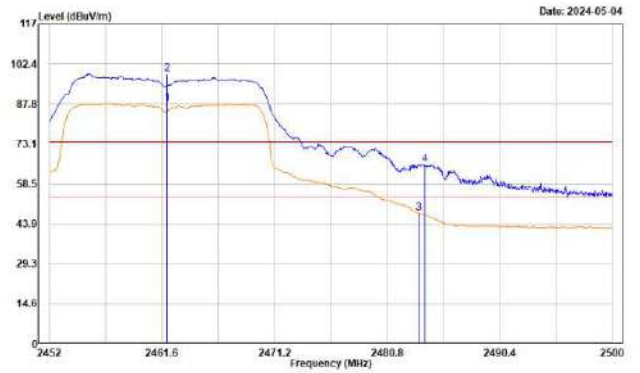
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	99.27	-10.78	88.49			135	159	Average
2462.000	109.18	-10.78	98.40			135	159	Peak
2483.500	58.17	-10.51	47.66	54.00	-6.34	135	159	Average
2483.776	72.75	-10.50	62.25	74.00	-11.75	135	159	Peak

Vertical

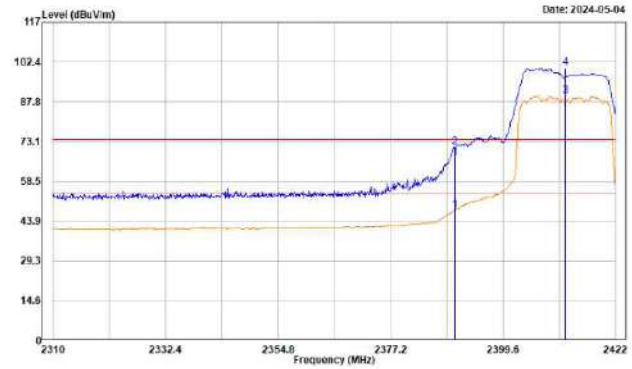


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	98.70	-10.78	87.92			218	202	Average
2462.000	109.38	-10.78	98.60			218	202	Peak
2483.500	58.44	-10.51	47.93	54.00	-6.07	218	202	Average
2484.016	76.28	-10.50	65.78	74.00	-8.22	218	202	Peak

802.11n HT20 Mode

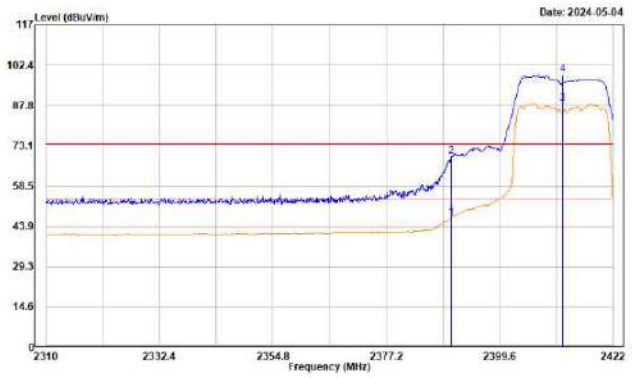
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.968	58.86	-10.97	47.89	54.00	-6.11	142	162	Average
2389.968	82.04	-10.97	71.07	74.00	-2.93	142	162	Peak
2412.000	100.81	-10.92	89.89			142	162	Average
2412.000	110.99	-10.92	100.07			142	162	Peak

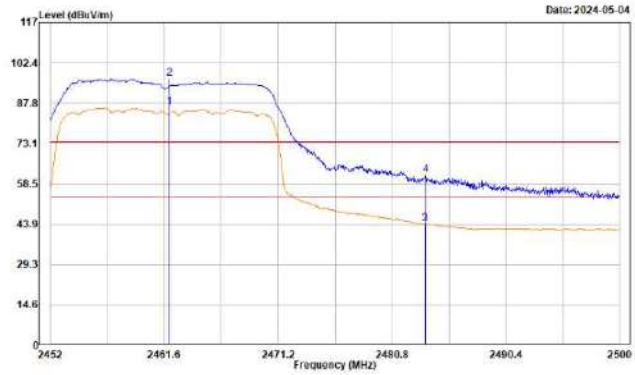
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2389.968	57.82	-10.97	46.85	54.00	-7.15	194	203	Average
2389.968	80.14	-10.97	69.17	74.00	-4.83	194	203	Peak
2412.000	99.38	-10.92	88.46			194	203	Average
2412.000	109.70	-10.92	98.78			194	203	Peak

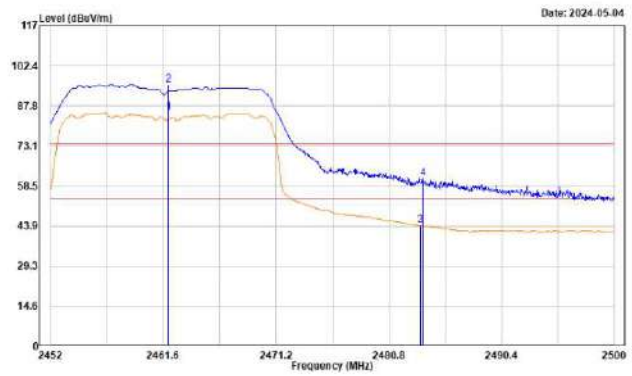
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	96.92	-10.78	86.14			127	161	Average
2462.000	107.33	-10.78	96.55			127	161	Peak
2483.536	54.65	-10.51	44.14	54.00	-9.86	127	161	Average
2483.632	72.48	-10.51	61.97	74.00	-12.03	127	161	Peak

Vertical

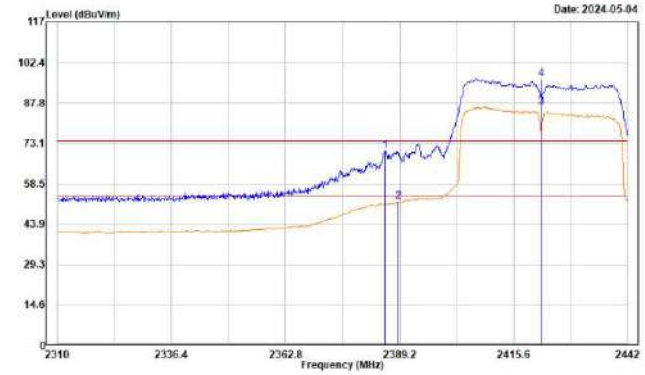


Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2462.000	95.93	-10.78	85.15			177	203	Average
2462.000	106.28	-10.78	95.50			177	203	Peak
2483.500	54.55	-10.51	44.04	54.00	-9.96	177	203	Average
2483.680	71.60	-10.51	61.09	74.00	-12.91	177	203	Peak

802.11n HT40 Mode

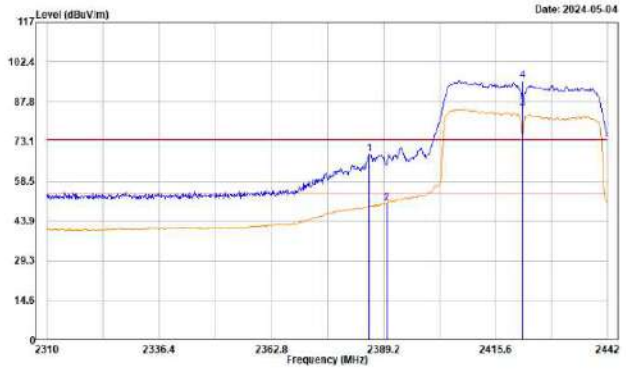
Low channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2385.900	81.30	-11.00	70.30	74.00	-3.70	141	160	Peak
2388.936	63.09	-10.97	52.12	54.00	-1.88	141	160	Average
2422.000	97.13	-10.91	86.22			141	160	Average
2422.000	107.25	-10.91	96.34			141	160	Peak

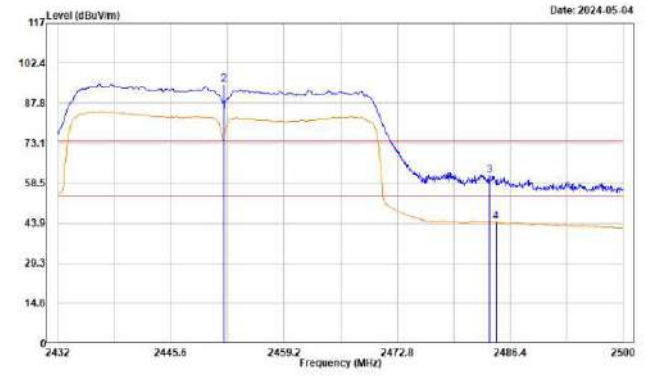
Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2385.900	79.44	-11.00	68.44	74.00	-5.56	193	202	Peak
2389.992	61.52	-10.97	50.55	54.00	-3.45	193	202	Average
2422.000	96.14	-10.91	85.23			193	202	Average
2422.000	106.30	-10.91	95.39			193	202	Peak

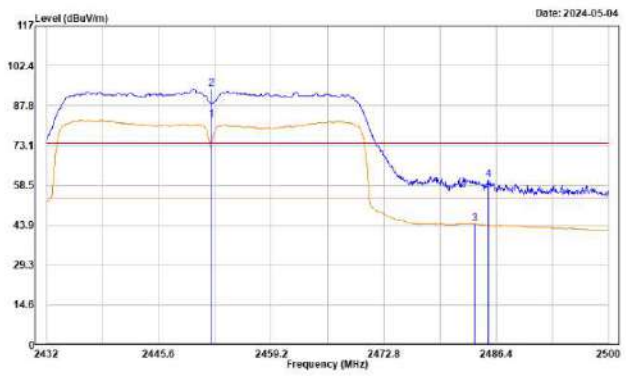
High channel

Horizontal



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2452.000	95.52	-10.89	84.63			145	160	Average
2452.000	105.43	-10.89	94.54			145	160	Peak
2483.884	71.68	-10.50	61.18	74.00	-12.82	145	160	Peak
2484.700	55.03	-10.49	44.54	54.00	-9.46	145	160	Average

Vertical



Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
2452.000	93.31	-10.89	82.42			219	201	Average
2452.000	104.61	-10.89	93.72			219	201	Peak
2483.816	54.92	-10.50	44.42	54.00	-9.58	219	201	Average
2485.448	71.20	-10.49	60.71	74.00	-13.29	219	201	Peak

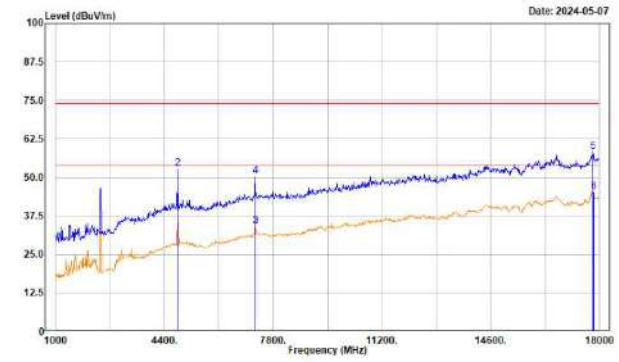
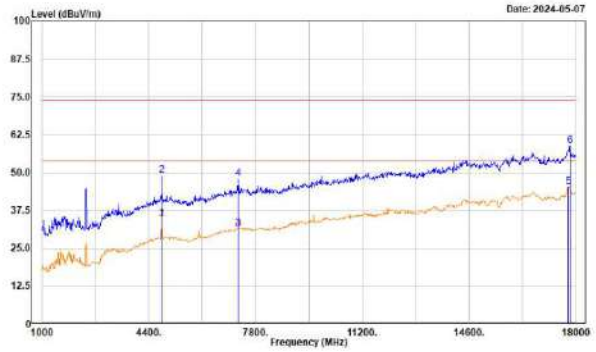
Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

(Worst case is 802.11g mode, low channel)

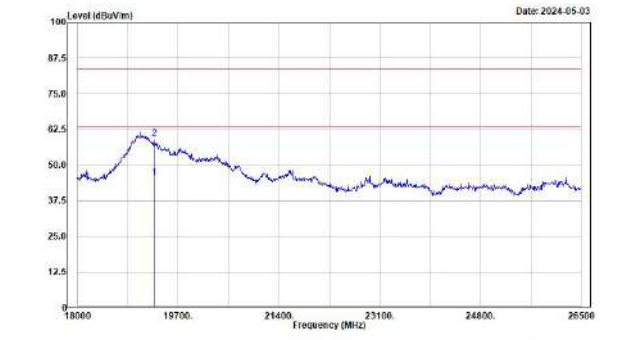
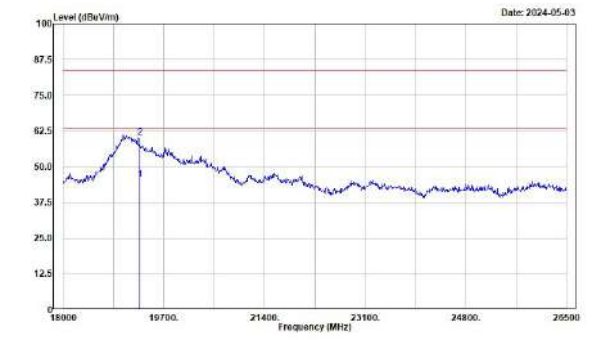
1GHz-18GHz:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	42.55	-3.95	38.60	54.00	-15.40	275	349	Average
4824.000	56.77	-3.95	52.82	74.00	-21.18	275	349	Peak
7236.000	33.67	0.45	34.12	54.00	-19.88	131	181	Average
7236.000	50.00	0.45	50.45	74.00	-23.55	131	181	Peak
17796.000	45.27	13.08	58.35	74.00	-15.65	150	360	Peak
17813.000	32.18	13.12	45.30	54.00	-8.70	150	360	Average

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	38.63	-3.95	34.68	54.00	-19.32	150	0	Average
4824.000	53.06	-3.95	49.11	74.00	-24.89	112	323	Peak
7236.000	31.12	0.45	31.57	54.00	-22.43	150	0	Average
7236.000	47.42	0.45	47.87	74.00	-26.13	156	186	Peak
17762.000	32.16	13.06	45.22	54.00	-8.78	150	342	Average
17813.000	45.71	13.12	58.83	74.00	-15.17	150	342	Peak

18GHz-26.5GHz:

Horizontal	Vertical
	

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19296.000	30.22	15.44	45.66	63.50	-17.84	153	204	Average
19296.000	43.52	15.44	58.96	83.50	-24.54	153	204	Peak

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
19296.000	30.12	15.44	45.56	63.50	-17.94	151	190	Average
19296.000	44.62	15.44	60.06	83.50	-23.44	151	190	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

For 18-26.5GHz Convert the test distance limit of 3 meters to a limit of 1 meter:

Conversion factor = 20 log (1m/3m) = 9.5 dB , Limit = 54+9.5 = 63.50 dBuV/m @ 1m

Above 1GHz

802.11b Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	56.30	-3.95	52.35	54.00	-1.65	117	102	Average
4824.000	58.02	-3.95	54.07	74.00	-19.93	117	102	Peak
7236.000	32.71	0.45	33.16	54.00	-20.84	150	307	Average
7236.000	45.07	0.45	45.52	74.00	-28.48	150	307	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	50.36	-3.95	46.41	54.00	-7.59	117	313	Average
4824.000	54.19	-3.95	50.24	74.00	-23.76	117	313	Peak
7236.000	32.47	0.45	32.92	54.00	-21.08	156	70	Average
7236.000	44.01	0.45	44.46	74.00	-29.54	156	70	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	53.56	-3.83	49.73	54.00	-4.27	107	117	Average
4874.000	55.98	-3.83	52.15	74.00	-21.85	107	117	Peak
7311.000	31.74	0.43	32.17	54.00	-21.83	151	29	Average
7311.000	43.71	0.43	44.14	74.00	-29.86	151	29	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	48.40	-3.83	44.57	54.00	-9.43	108	345	Average
4874.000	53.00	-3.83	49.17	74.00	-24.83	108	345	Peak
7311.000	31.76	0.43	32.19	54.00	-21.81	154	86	Average
7311.000	44.53	0.43	44.96	74.00	-29.04	154	86	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	51.44	-3.63	47.81	54.00	-6.19	108	343	Average
4924.000	55.45	-3.63	51.82	74.00	-22.18	108	343	Peak
7386.000	31.58	0.54	32.12	54.00	-21.88	156	347	Average
7386.000	43.17	0.54	43.71	74.00	-30.29	156	347	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	50.52	-3.63	46.89	54.00	-7.11	107	325	Average
4924.000	54.62	-3.63	50.99	74.00	-23.01	107	325	Peak
7386.000	32.36	0.54	32.90	54.00	-21.10	155	357	Average
7386.000	43.37	0.54	43.91	74.00	-30.09	155	357	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

802.11g Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	42.55	-3.95	38.60	54.00	-15.40	275	349	Average
4824.000	56.77	-3.95	52.82	74.00	-21.18	275	349	Peak
7236.000	33.67	0.45	34.12	54.00	-19.88	131	181	Average
7236.000	50.00	0.45	50.45	74.00	-23.55	131	181	Peak
17796.000	45.27	13.08	58.35	74.00	-15.65	150	360	Peak
17813.000	32.18	13.12	45.30	54.00	-8.70	150	360	Average

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	38.63	-3.95	34.68	54.00	-19.32	150	0	Average
4824.000	53.06	-3.95	49.11	74.00	-24.89	112	323	Peak
7236.000	31.12	0.45	31.57	54.00	-22.43	150	0	Average
7236.000	47.42	0.45	47.87	74.00	-26.13	156	186	Peak
17762.000	32.16	13.06	45.22	54.00	-8.78	150	342	Average
17813.000	45.71	13.12	58.83	74.00	-15.17	150	342	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	42.17	-3.83	38.34	54.00	-15.66	285	321	Average
4874.000	56.85	-3.83	53.02	74.00	-20.98	285	321	Peak
7311.000	34.51	0.43	34.94	54.00	-19.06	135	169	Average
7311.000	49.38	0.43	49.81	74.00	-24.19	135	169	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	40.69	-3.83	36.86	54.00	-17.14	115	17	Average
4874.000	54.32	-3.83	50.49	74.00	-23.51	115	17	Peak
7311.000	33.65	0.43	34.08	54.00	-19.92	156	318	Average
7311.000	47.66	0.43	48.09	74.00	-25.91	156	318	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	42.93	-3.63	39.30	54.00	-14.70	208	328	Average
4924.000	56.84	-3.63	53.21	74.00	-20.79	208	328	Peak
7386.000	35.75	0.54	36.29	54.00	-17.71	132	221	Average
7386.000	49.53	0.54	50.07	74.00	-23.93	132	221	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	40.18	-3.63	36.55	54.00	-17.45	118	0	Average
4924.000	54.37	-3.63	50.74	74.00	-23.26	118	0	Peak
7386.000	34.05	0.54	34.59	54.00	-19.41	151	360	Average
7386.000	47.52	0.54	48.06	74.00	-25.94	151	360	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

802.11n HT20 Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	38.39	-3.95	34.44	54.00	-19.56	132	124	Average
4824.000	52.80	-3.95	48.85	74.00	-25.15	132	124	Peak
7236.000	32.47	0.45	32.92	54.00	-21.08	151	248	Average
7236.000	43.88	0.45	44.33	74.00	-29.67	151	248	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4824.000	36.60	-3.95	32.65	54.00	-21.35	153	9	Average
4824.000	50.45	-3.95	46.50	74.00	-27.50	153	9	Peak
7236.000	32.73	0.45	33.18	54.00	-20.82	157	339	Average
7236.000	45.19	0.45	45.64	74.00	-28.36	157	339	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	37.74	-3.83	33.91	54.00	-20.09	135	124	Average
4874.000	51.59	-3.83	47.76	74.00	-26.24	135	124	Peak
7311.000	31.83	0.43	32.26	54.00	-21.74	156	360	Average
7311.000	44.39	0.43	44.82	74.00	-29.18	156	360	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	37.54	-3.83	33.71	54.00	-20.29	152	316	Average
4874.000	51.42	-3.83	47.59	74.00	-26.41	152	316	Peak
7311.000	32.63	0.43	33.06	54.00	-20.94	156	182	Average
7311.000	44.67	0.43	45.10	74.00	-28.90	156	182	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	38.17	-3.63	34.54	54.00	-19.46	154	346	Average
4924.000	52.61	-3.63	48.98	74.00	-25.02	154	346	Peak
7386.000	32.08	0.54	32.62	54.00	-21.38	156	252	Average
7386.000	44.05	0.54	44.59	74.00	-29.41	156	252	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4924.000	38.00	-3.63	34.37	54.00	-19.63	157	251	Average
4924.000	51.98	-3.63	48.35	74.00	-25.65	157	251	Peak
7386.000	32.70	0.54	33.24	54.00	-20.76	152	360	Average
7386.000	43.84	0.54	44.38	74.00	-29.62	152	360	Peak

Level = Reading + Factor.

Margin = Level – Limit.

Factor = Antenna Factor + Cable Loss – Amplifier Gain.

802.11n HT40 Mode:

Low channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4844.000	36.38	-3.90	32.48	54.00	-21.52	139	5	Average
4844.000	49.63	-3.90	45.73	74.00	-28.27	139	5	Peak
7266.000	32.10	0.47	32.57	54.00	-21.43	155	230	Average
7266.000	43.09	0.47	43.56	74.00	-30.44	155	230	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4844.000	35.33	-3.90	31.43	54.00	-22.57	157	357	Average
4844.000	48.70	-3.90	44.80	74.00	-29.20	157	357	Peak
7266.000	32.35	0.47	32.82	54.00	-21.18	151	104	Average
7266.000	44.21	0.47	44.68	74.00	-29.32	151	104	Peak

Middle channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	36.65	-3.83	32.82	54.00	-21.18	137	116	Average
4874.000	50.37	-3.83	46.54	74.00	-27.46	137	116	Peak
7311.000	31.70	0.43	32.13	54.00	-21.87	152	177	Average
7311.000	44.16	0.43	44.59	74.00	-29.41	152	177	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4874.000	35.17	-3.83	31.34	54.00	-22.66	155	0	Average
4874.000	49.34	-3.83	45.51	74.00	-28.49	155	0	Peak
7311.000	32.15	0.43	32.58	54.00	-21.42	151	297	Average
7311.000	45.01	0.43	45.44	74.00	-28.56	151	297	Peak

High channel

Horizontal

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4904.000	37.07	-3.76	33.31	54.00	-20.69	133	323	Average
4904.000	50.96	-3.76	47.20	74.00	-26.80	133	323	Peak
7356.000	32.84	0.53	33.37	54.00	-20.63	158	155	Average
7356.000	43.60	0.53	44.13	74.00	-29.87	158	155	Peak

Vertical

Freq.	Reading	Factor	Level	Limit	Margin	Height	Degree	Remark
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	(cm)	(°)	
4904.000	35.71	-3.76	31.95	54.00	-22.05	151	64	Average
4904.000	49.49	-3.76	45.73	74.00	-28.27	151	64	Peak
7356.000	32.68	0.53	33.21	54.00	-20.79	157	241	Average
7356.000	44.07	0.53	44.60	74.00	-29.40	157	241	Peak

Level = Reading + Factor.

Margin = Level – Limit.

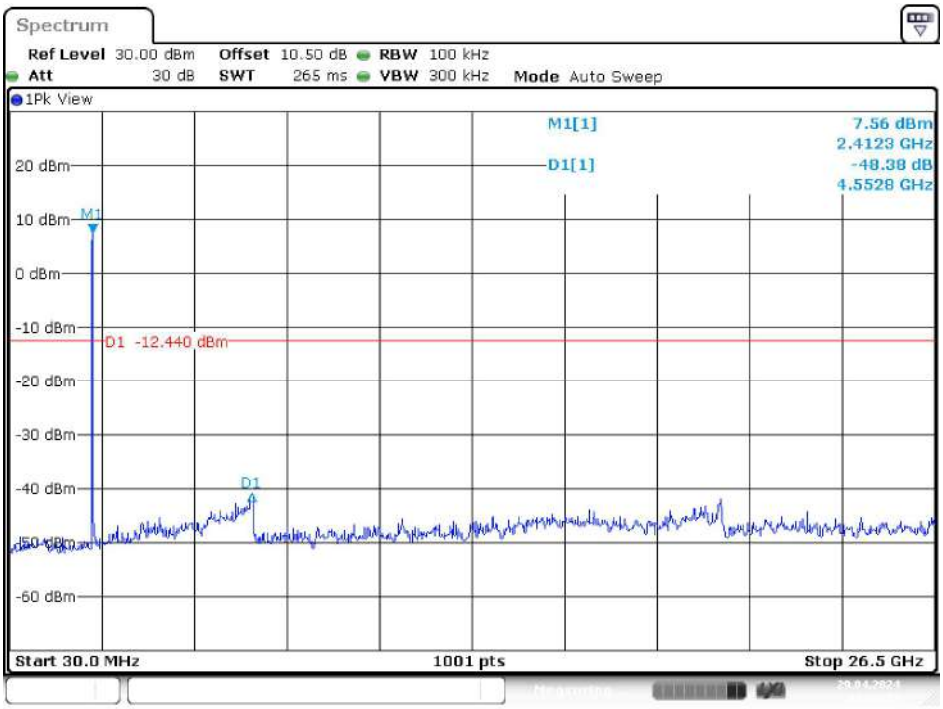
Factor = Antenna Factor + Cable Loss – Amplifier Gain.

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	48.38	≥ 20	PASS
Middle	2437	49.12	≥ 20	PASS
High	2462	49.63	≥ 20	PASS
G Mode				
Low	2412	40.79	≥ 20	PASS
Middle	2437	41.61	≥ 20	PASS
High	2462	41.57	≥ 20	PASS
N20 Mode				
Low	2412	38.45	≥ 20	PASS
Middle	2437	38.92	≥ 20	PASS
High	2462	39.74	≥ 20	PASS
N40 Mode				
Low	2422	34.68	≥ 20	PASS
Middle	2437	35.09	≥ 20	PASS
High	2452	35.74	≥ 20	PASS

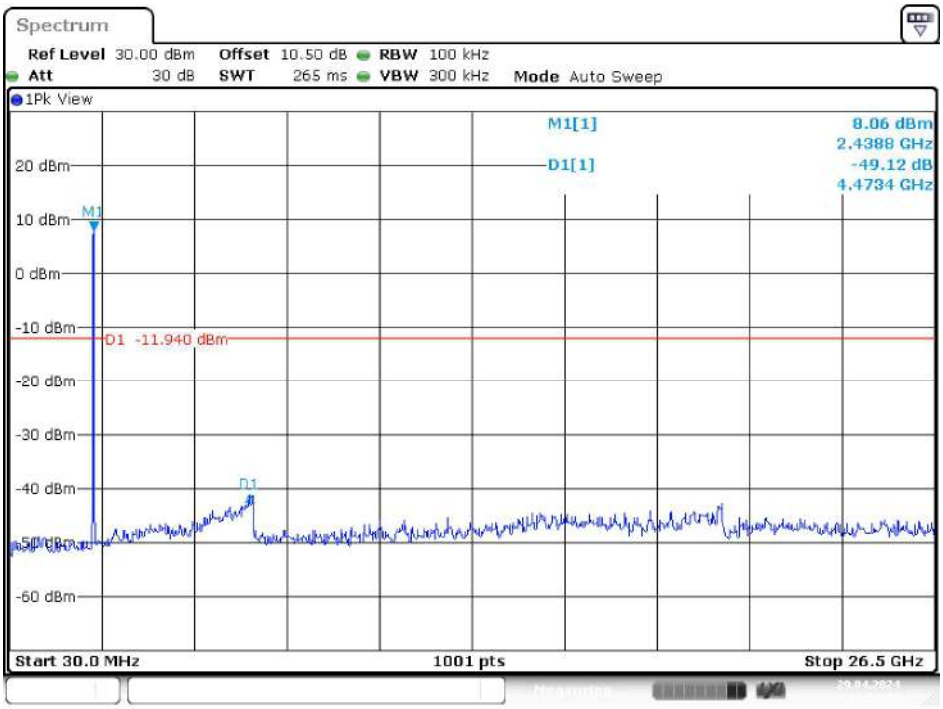
B Mode

Low Channel



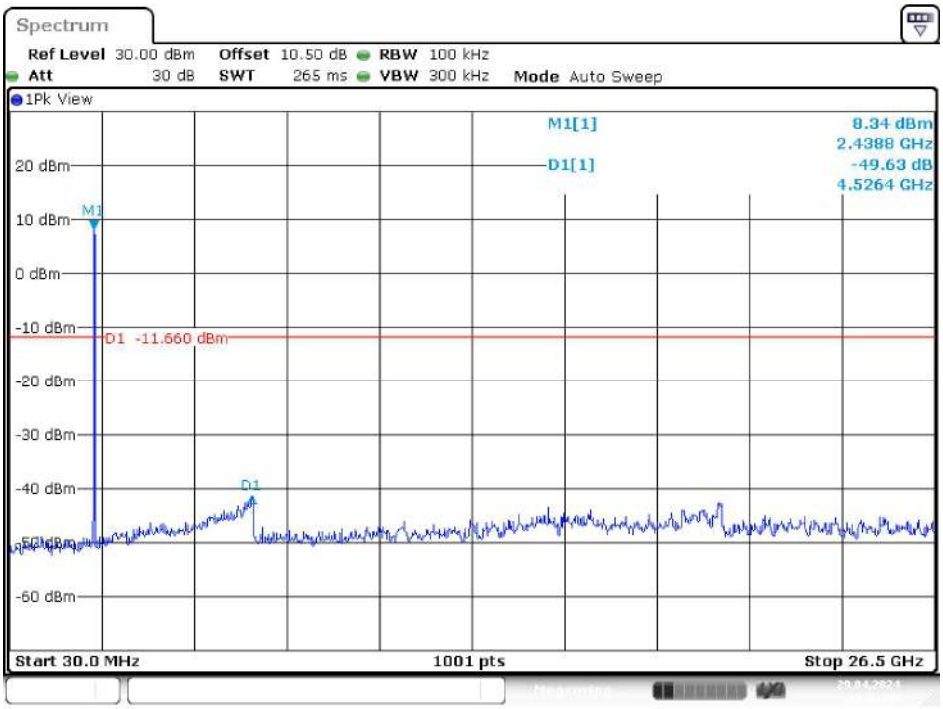
Date: 29.APR.2024 09:47:16

Middle Channel



Date: 29.APR.2024 09:52:33

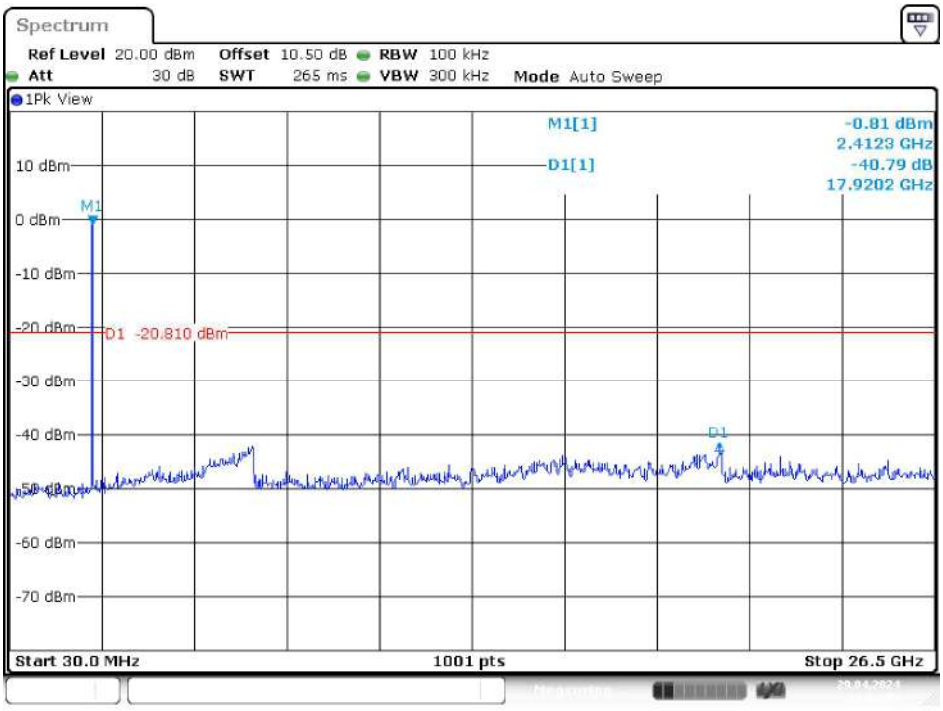
High Channel



Date: 29.APR.2024 10:01:49

G Mode

Low Channel



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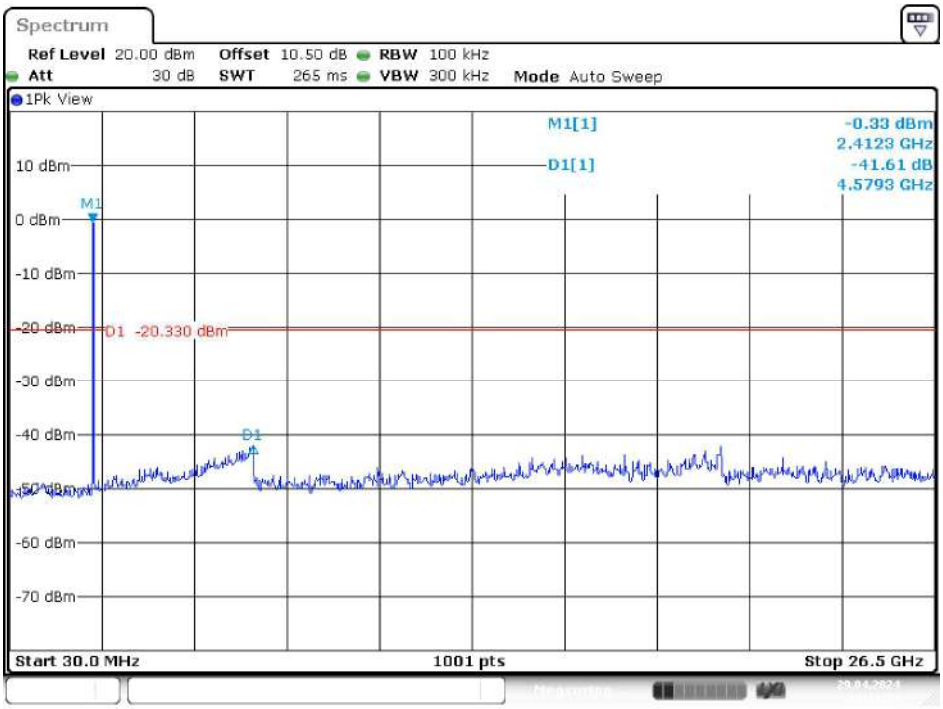
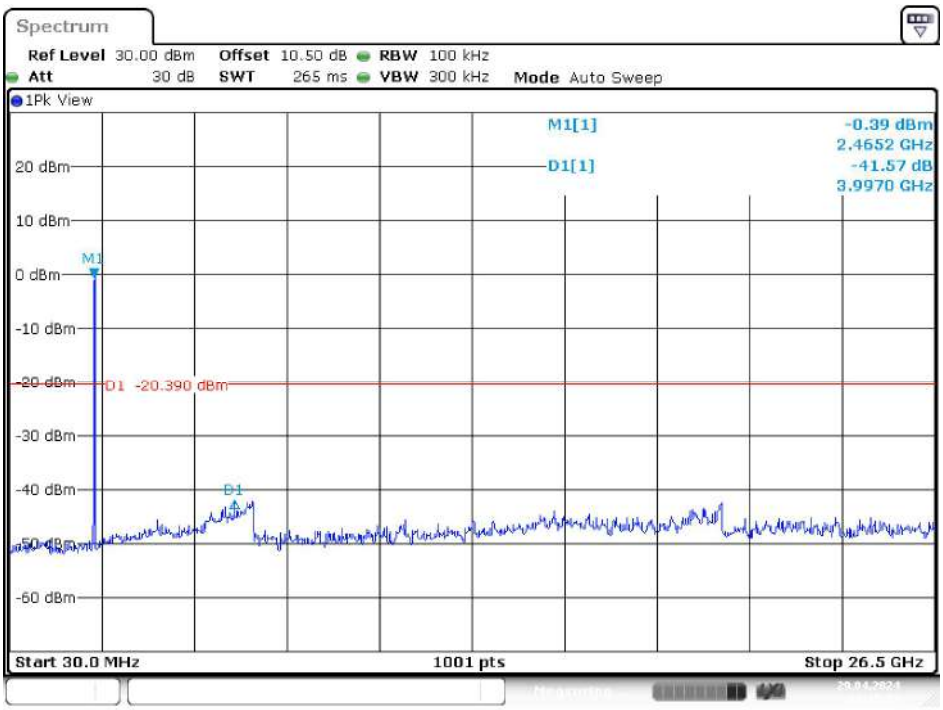
Middle Channel



Date: 29.APR.2024 10:11:23

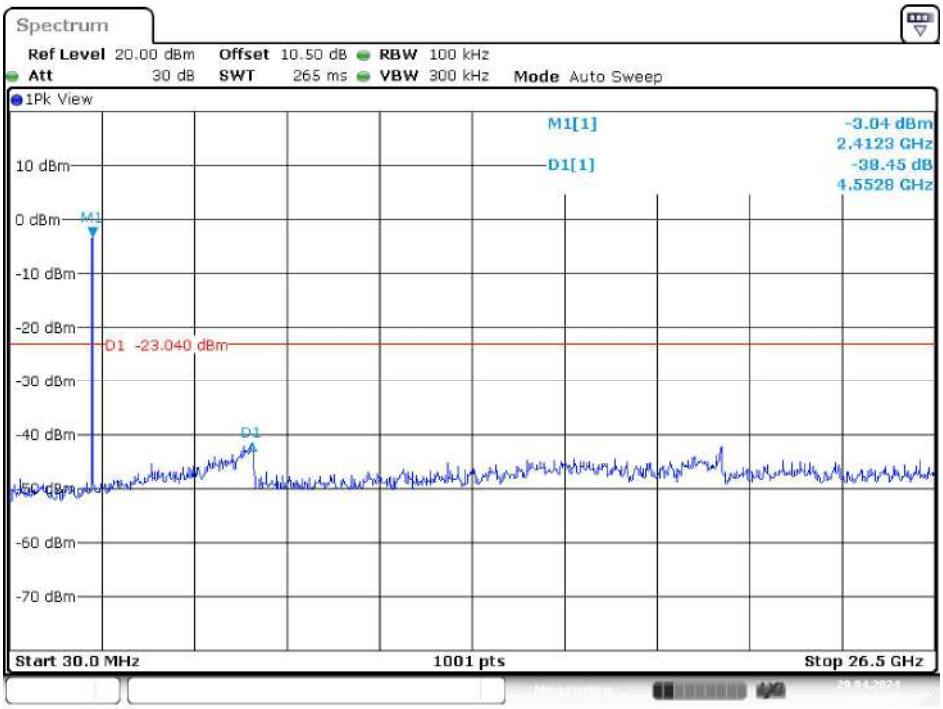
High Channel



Date: 29.APR.2024 10:15:16

N20 Mode

Low Channel



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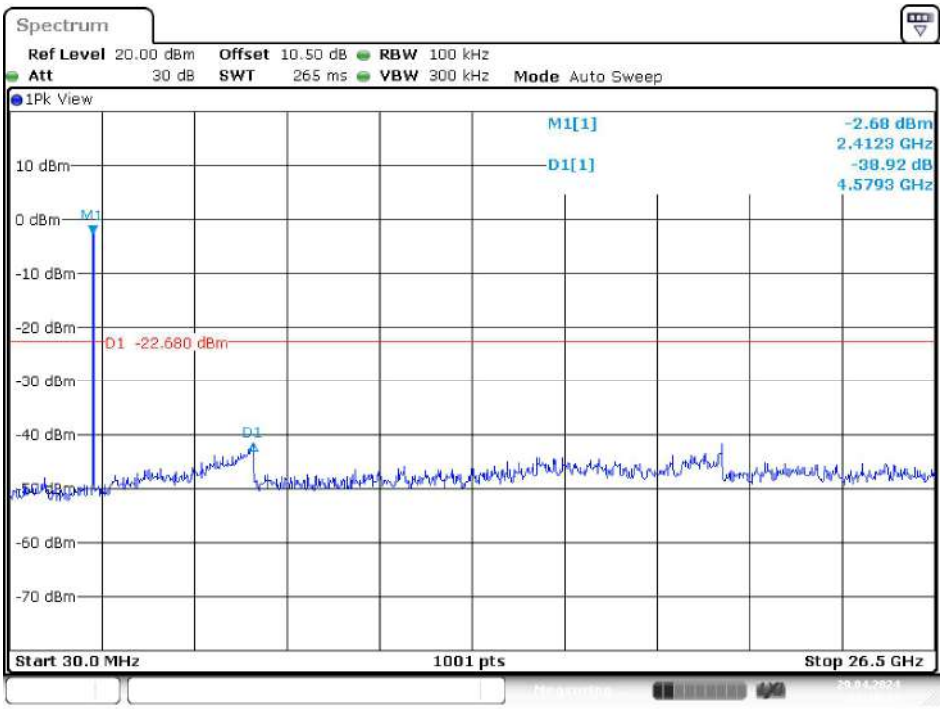
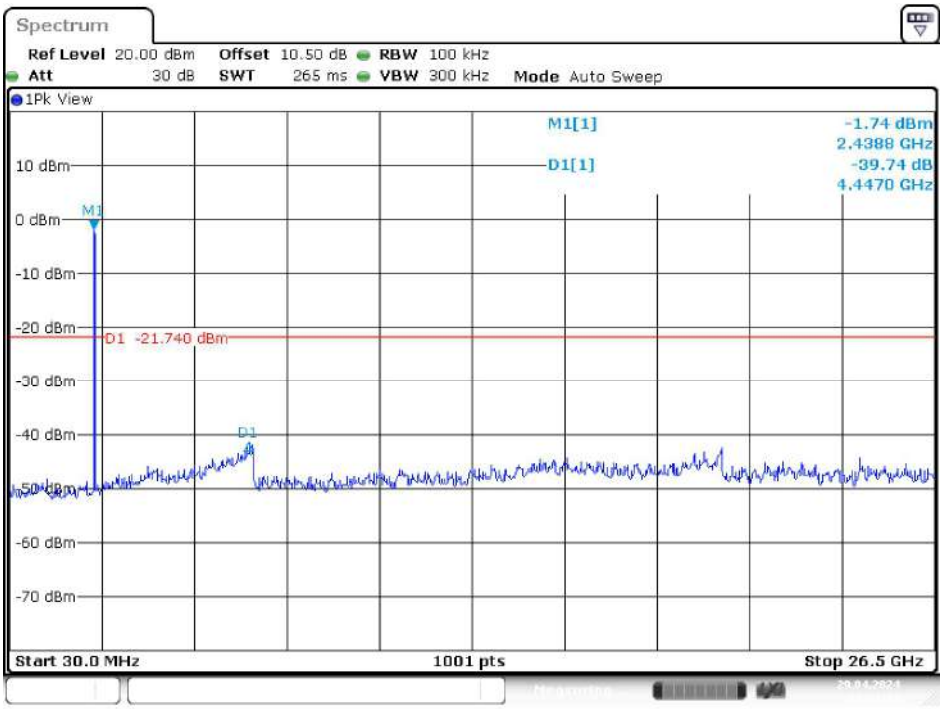
Middle Channel



Date: 29.APR.2024 10:19:24

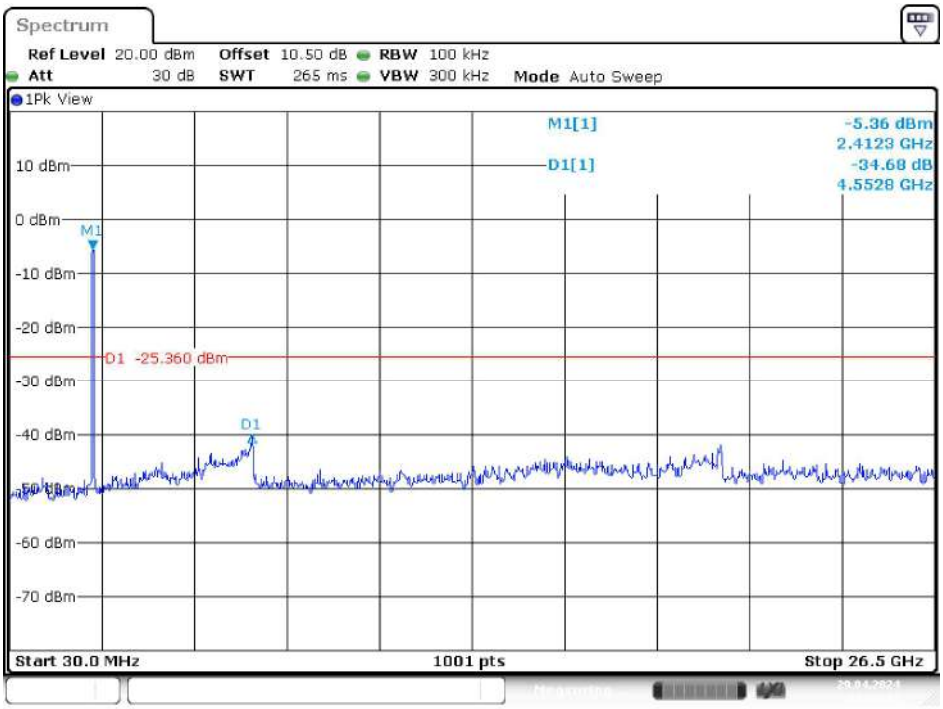
High Channel



Date: 29.APR.2024 10:21:41

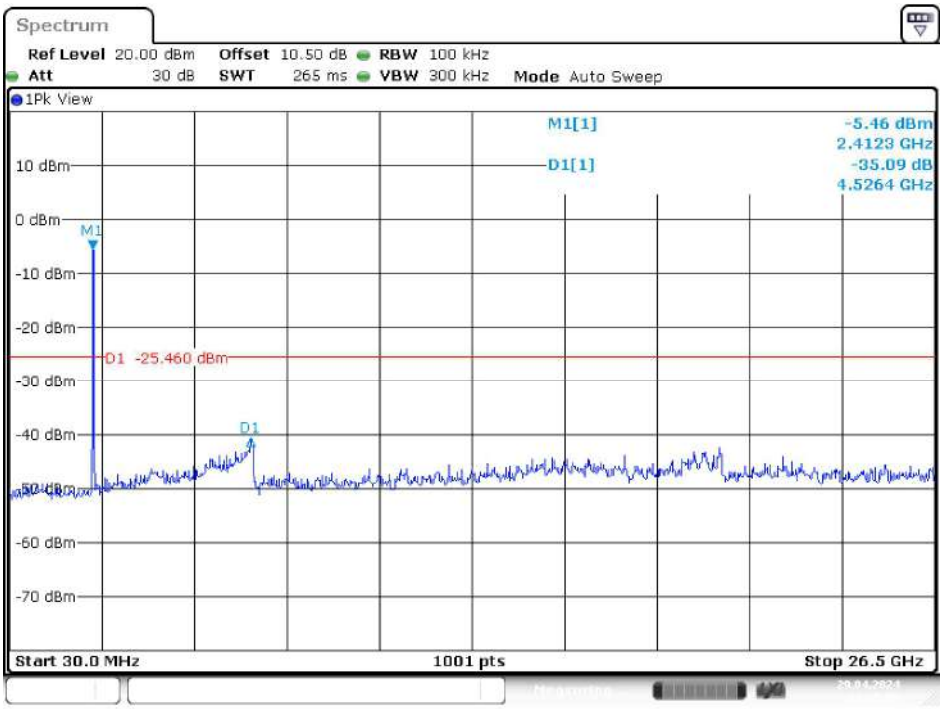
N40 Mode

Low Channel



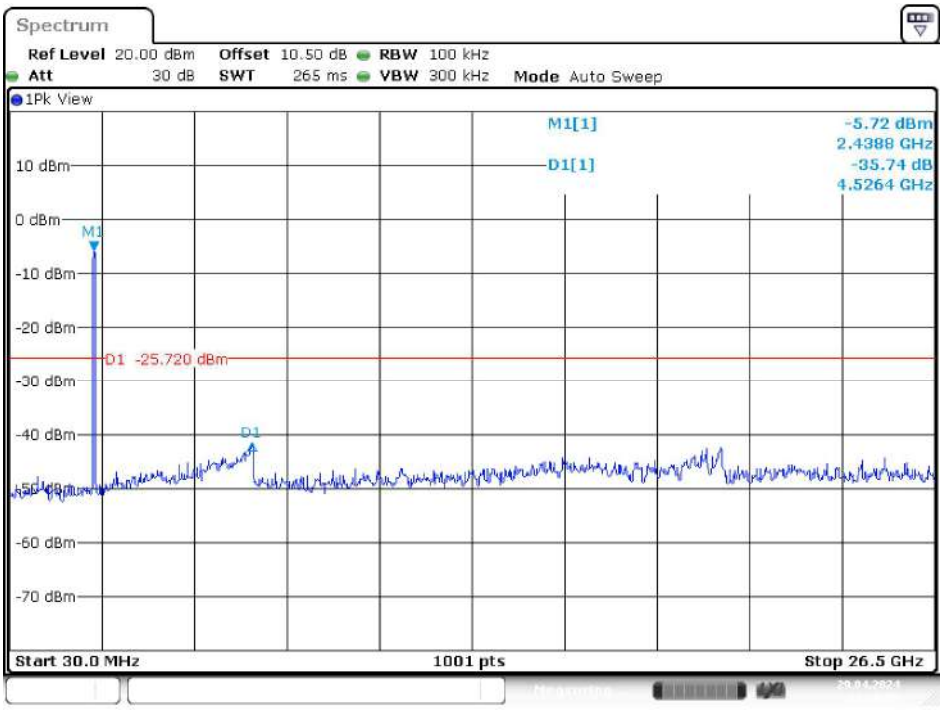
Date: 29.APR.2024 10:24:12

Middle Channel



Date: 29.APR.2024 10:25:56

High Channel



Date: 29.APR.2024 10:29:05

10 FCC §15.247(a)(2) & RSS-247 §5.2(a), RSS-GEN §6.7 – 6 dB Emission Bandwidth & Occupied Bandwidth

10.1 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.

According to RSS-247 §5.2 (a)

The minimum 6 dB bandwidth shall be 500 kHz.

According to RSS-GEN §6.7

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

10.2 Test Procedure

According to ANSI C63.10-2013, section 11.8

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.

According to ANSI C63.10-2013 Section 6.9.3

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).

10.3 Test Results

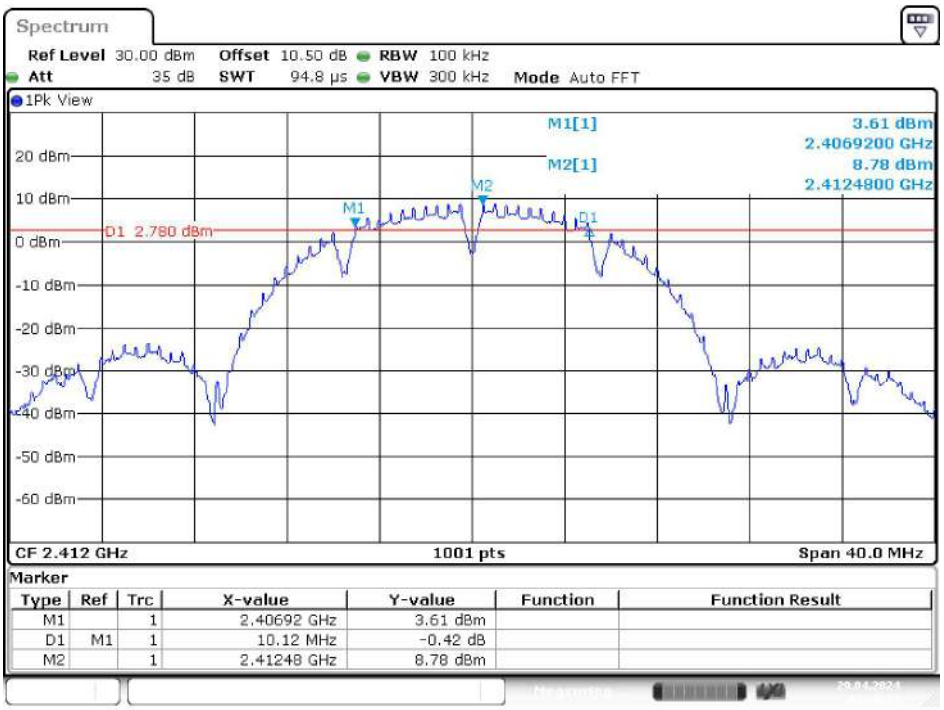
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (kHz)	Result
B Mode					
Low	2412	10.12	15.18	> 500	PASS
Middle	2437	10.12	15.18	> 500	PASS
High	2462	10.12	15.14	> 500	PASS
G Mode					
Low	2412	16.60	16.62	> 500	PASS
Middle	2437	16.56	16.58	> 500	PASS
High	2462	16.56	16.62	> 500	PASS
N20 Mode					
Low	2412	17.76	17.70	> 500	PASS
Middle	2437	17.72	17.78	> 500	PASS
High	2462	17.76	17.74	> 500	PASS
N40 Mode					
Low	2422	36.48	36.60	> 500	PASS
Middle	2437	36.48	36.60	> 500	PASS
High	2452	36.48	36.60	> 500	PASS

Please refer to the following plots

6 dB Emission Bandwidth

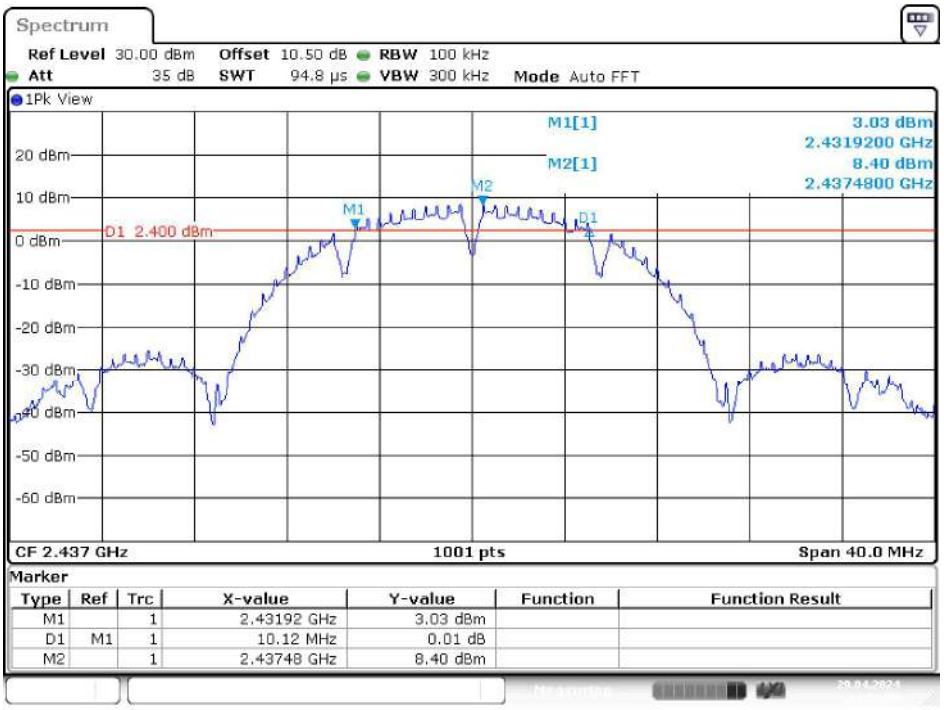
B Mode

Low Channel



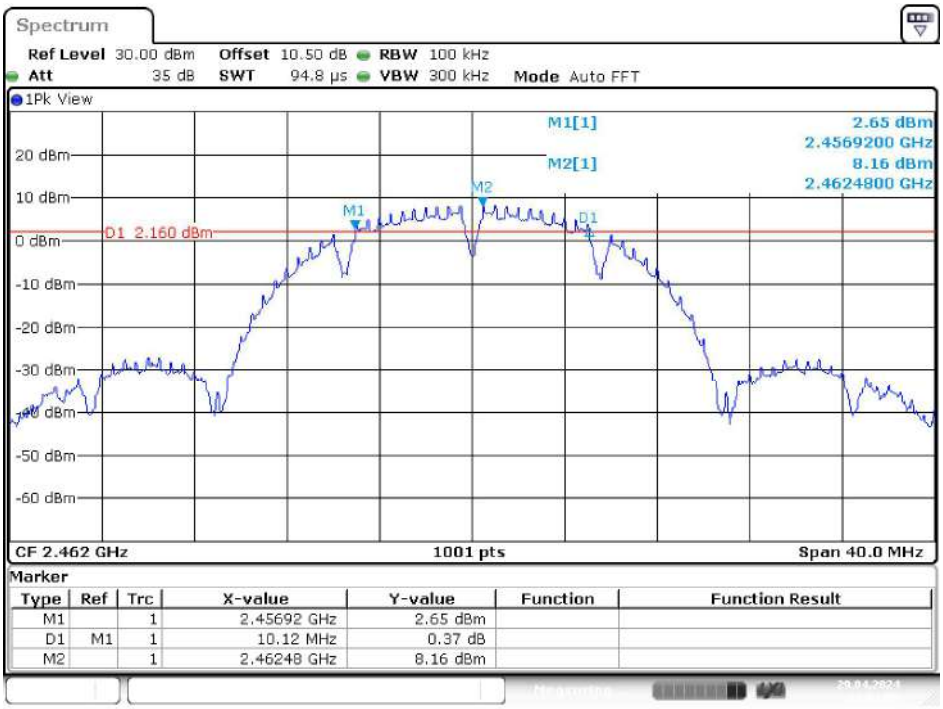
Date: 29.APR.2024 09:46:35

Middle Channel



Date: 29.APR.2024 09:52:09

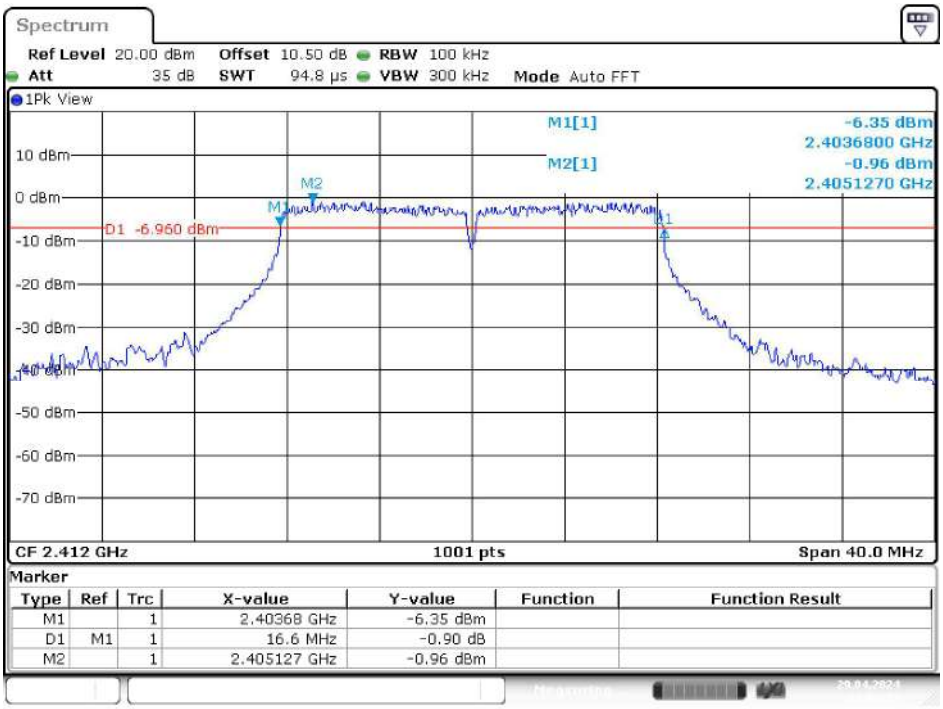
High Channel



Date: 29.APR.2024 10:01:08

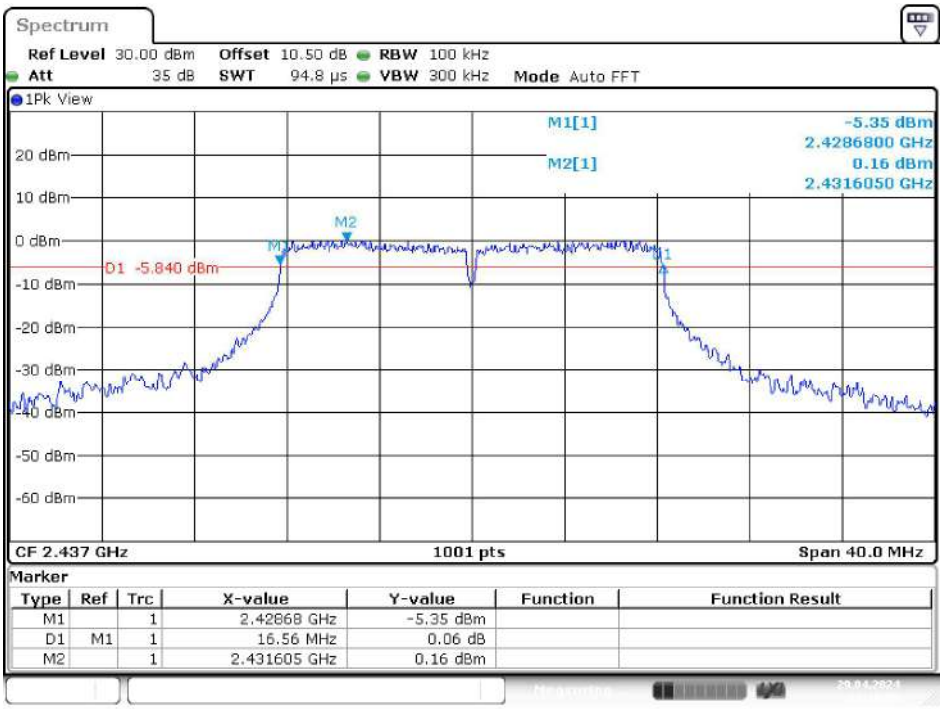
G Mode

Low Channel



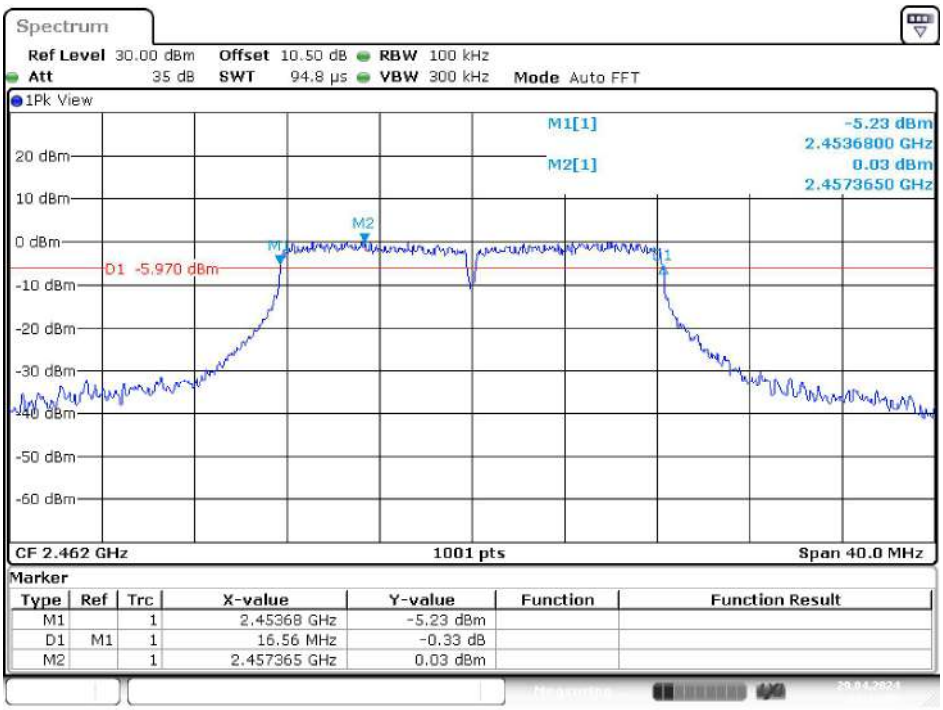
Date: 29.APR.2024 10:03:23

Middle Channel



Date: 29.APR.2024 10:10:58

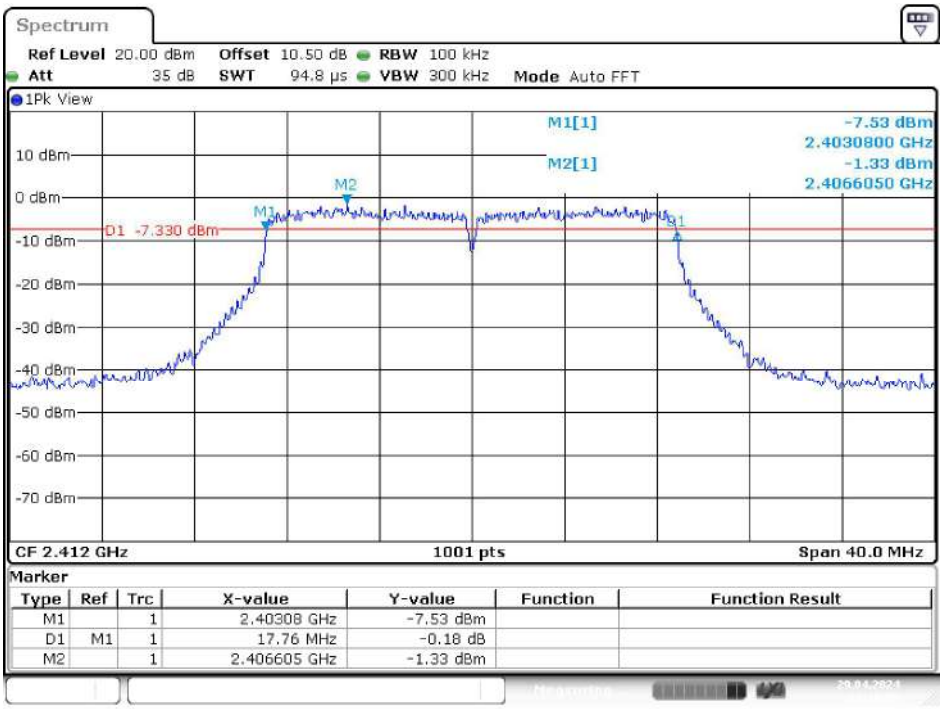
High Channel



Date: 29.APR.2024 10:14:36

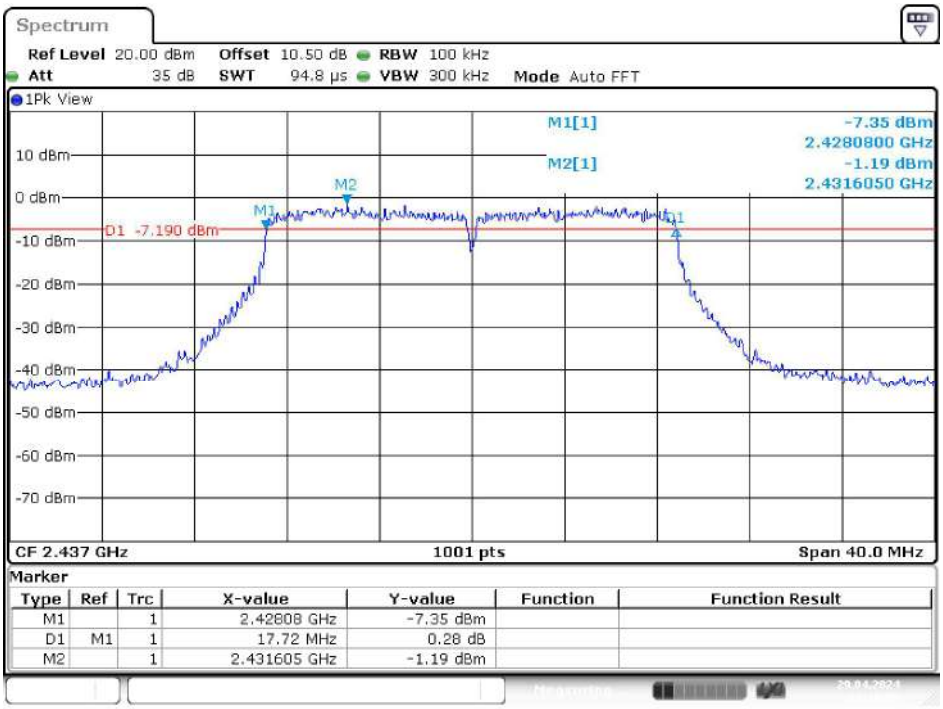
N20 Mode

Low Channel



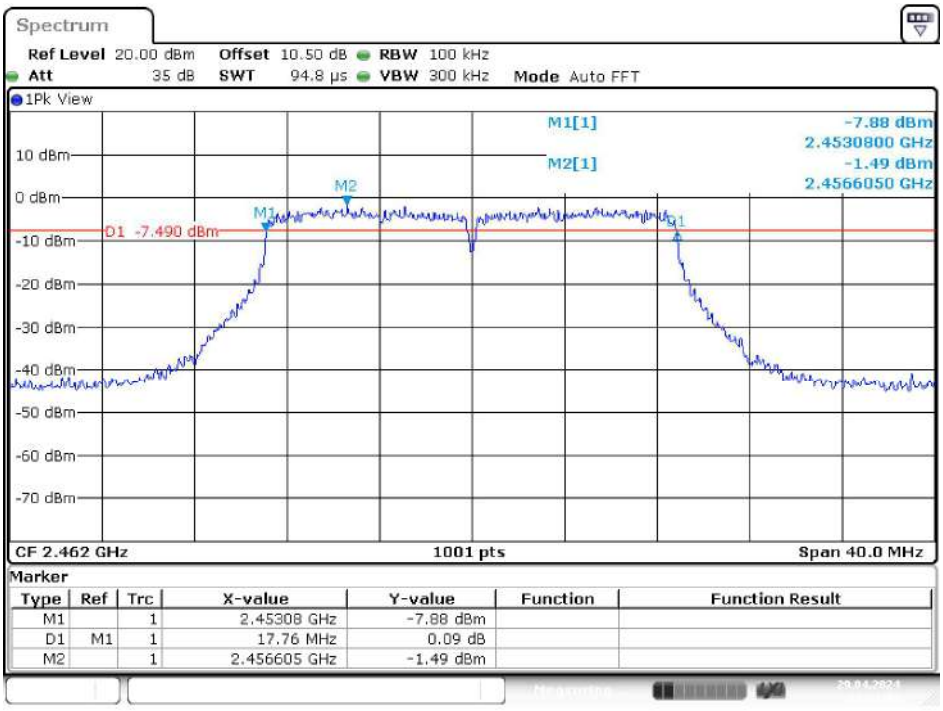
Date: 29.APR.2024 10:16:40

Middle Channel



Date: 29.APR.2024 10:18:59

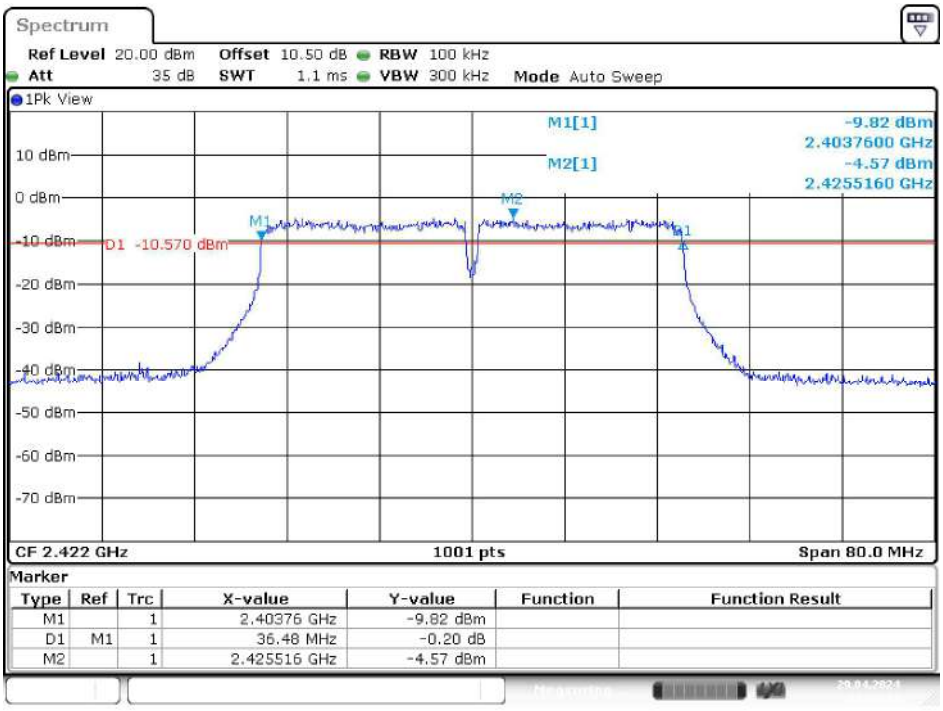
High Channel



Date: 29.APR.2024 10:21:01

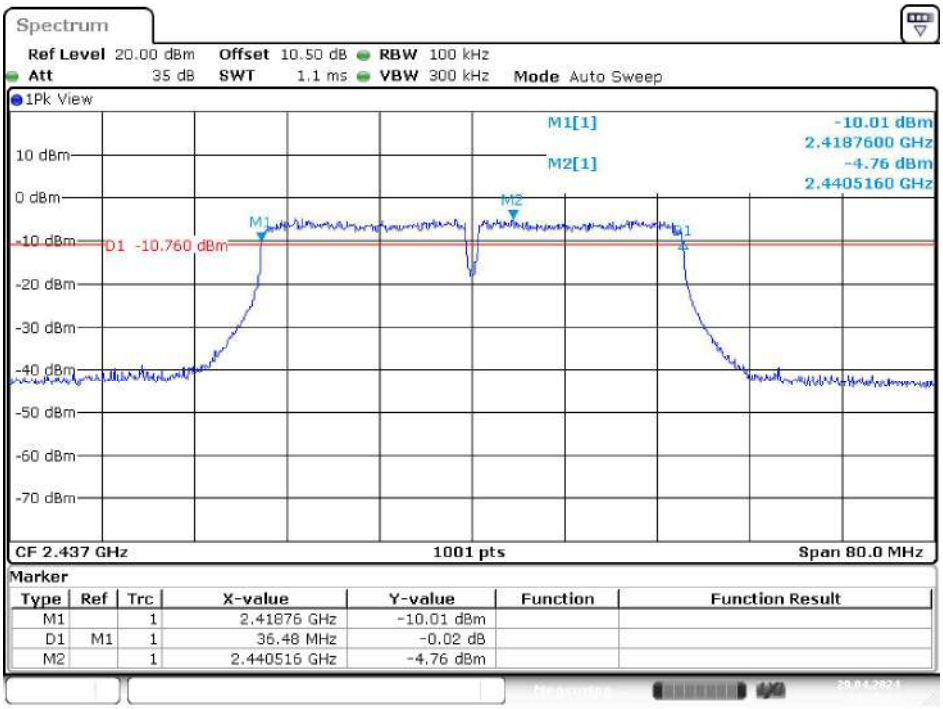
N40 Mode

Low Channel



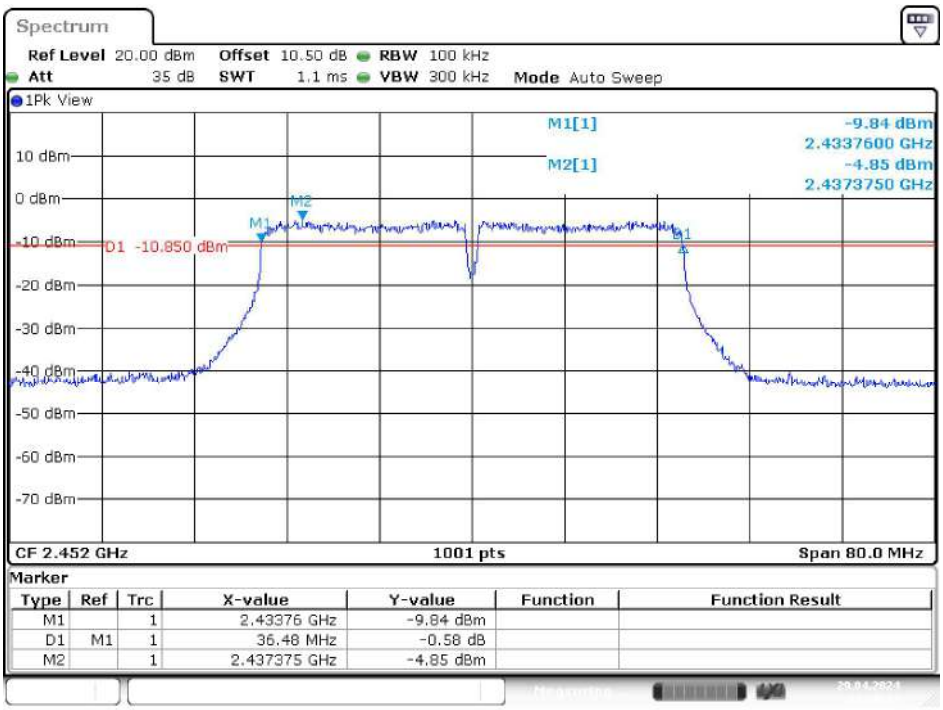
Date: 29.APR.2024 10:23:32

Middle Channel



Date: 29.APR.2024 10:25:31

High Channel

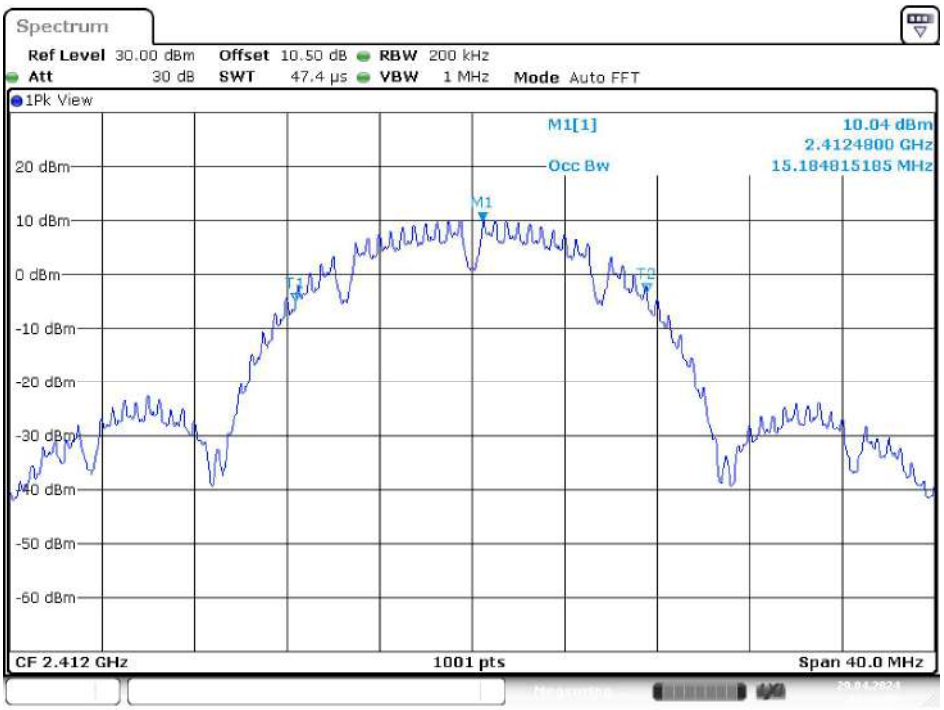


Date: 29.APR.2024 10:28:25

99% Bandwidth

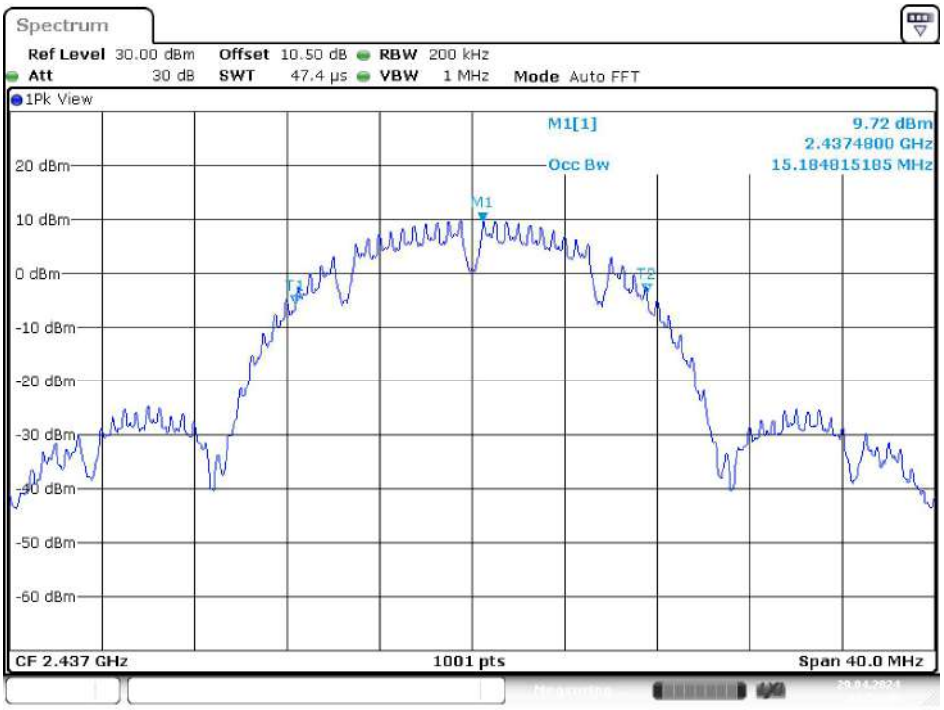
B Mode

Low Channel



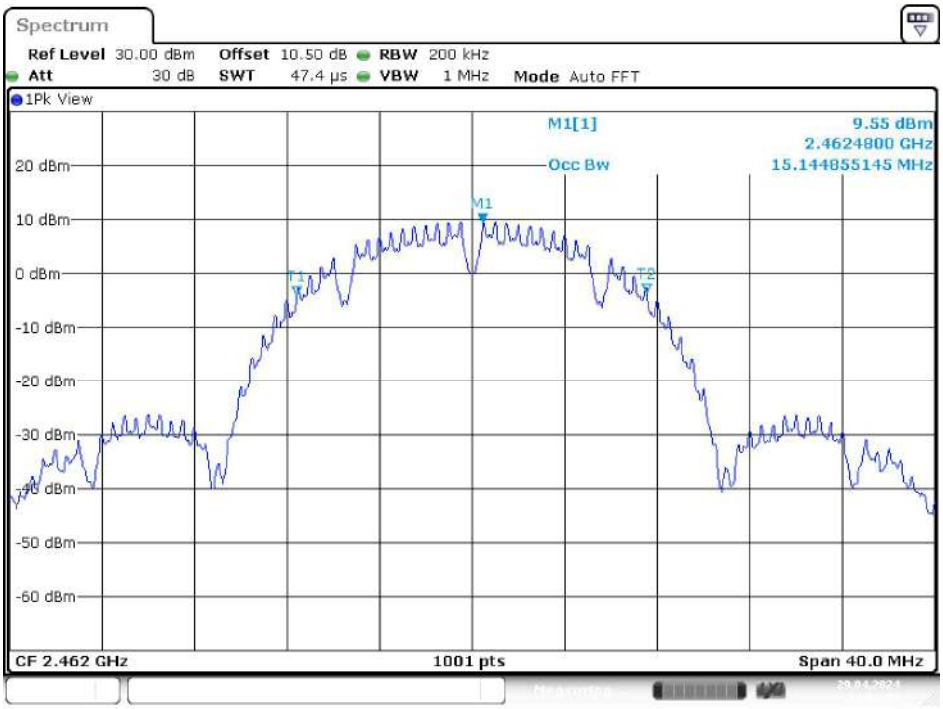
Date: 29.APR.2024 09:47:31

Middle Channel



Date: 29.APR.2024 09:52:48

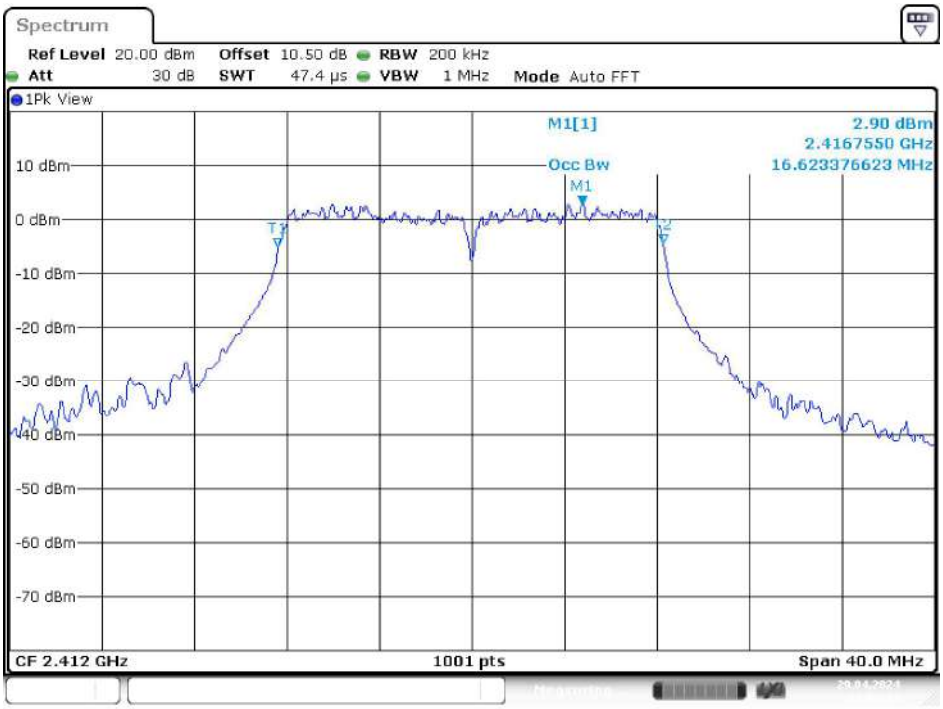
High Channel



Date: 29.APR.2024 10:02:04

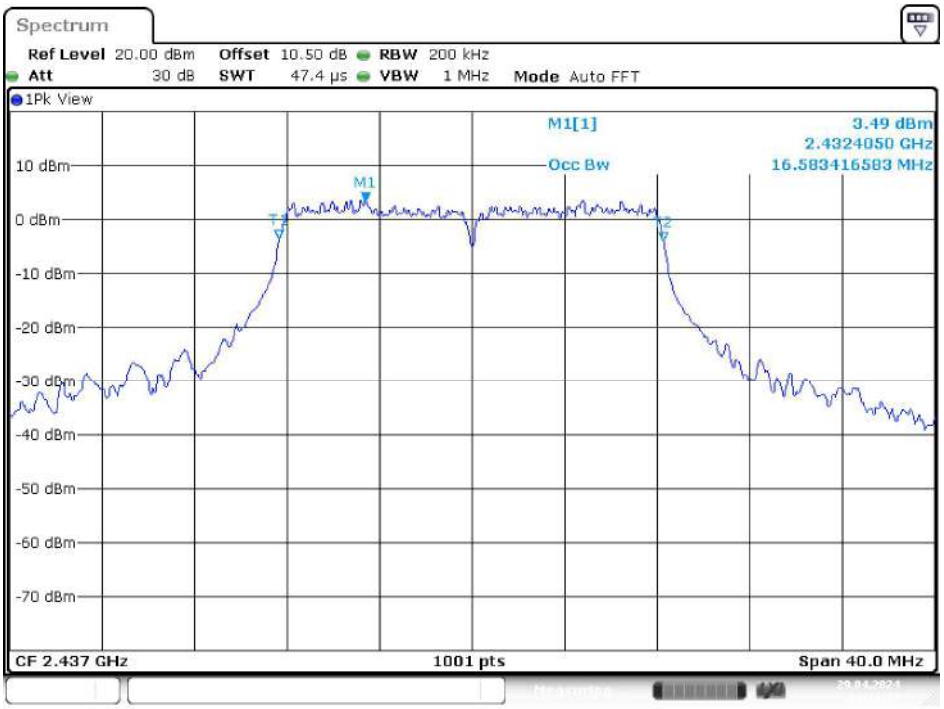
G Mode

Low Channel



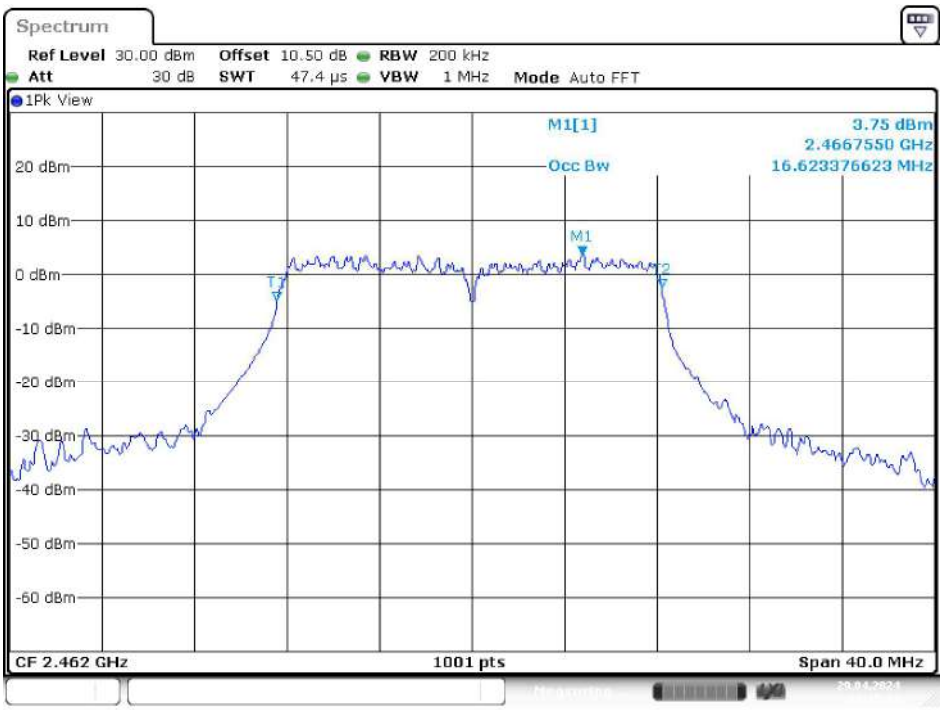
Date: 29.APR.2024 10:04:19

Middle Channel



Date: 29.APR.2024 10:11:38

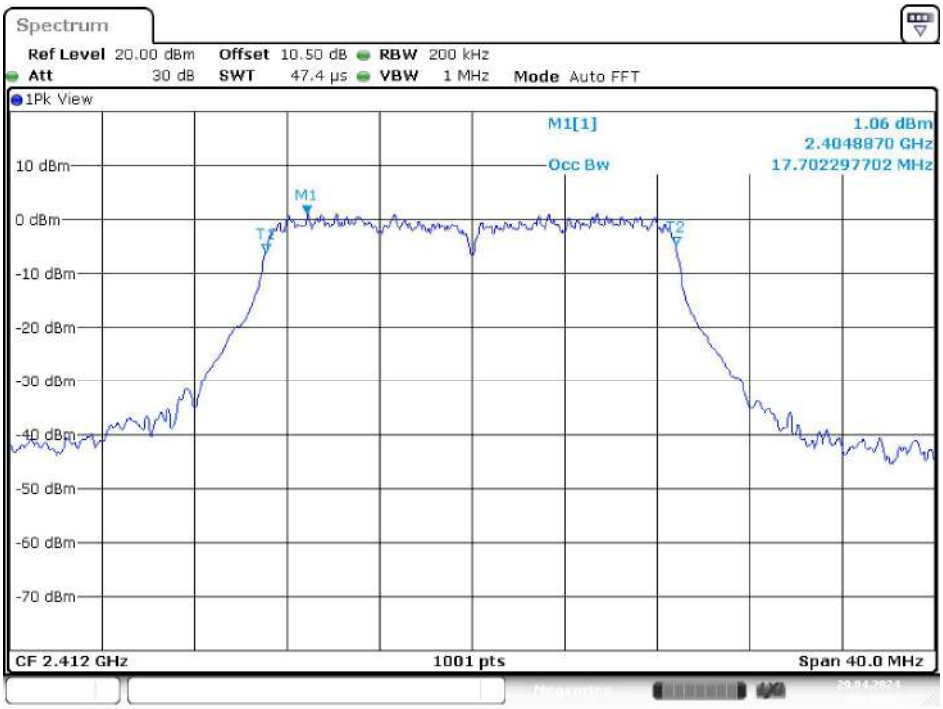
High Channel



Date: 29.APR.2024 10:15:31

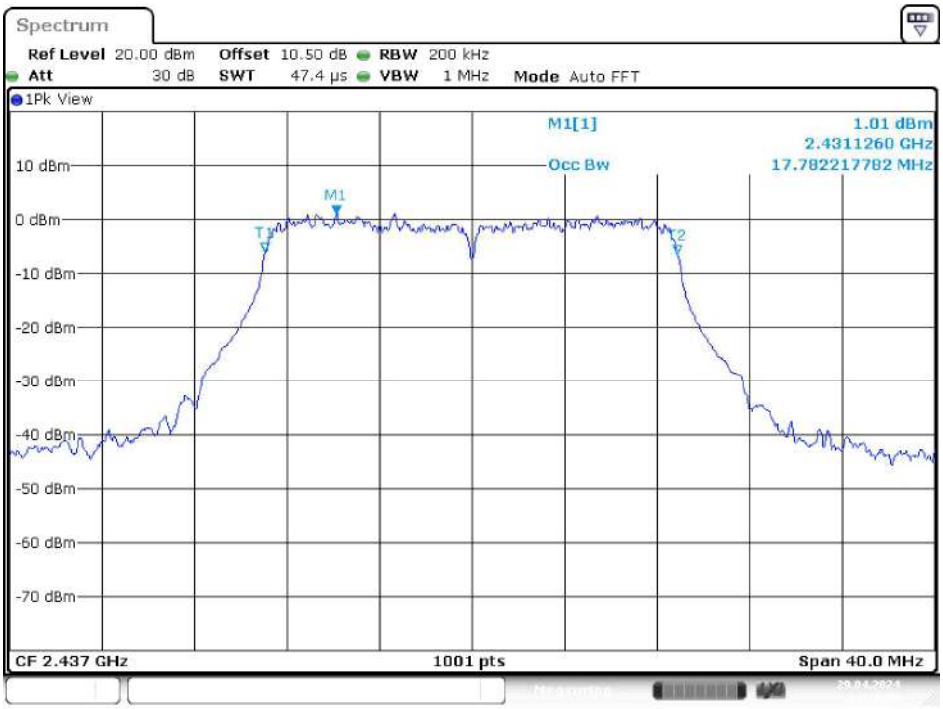
N20 Mode

Low Channel



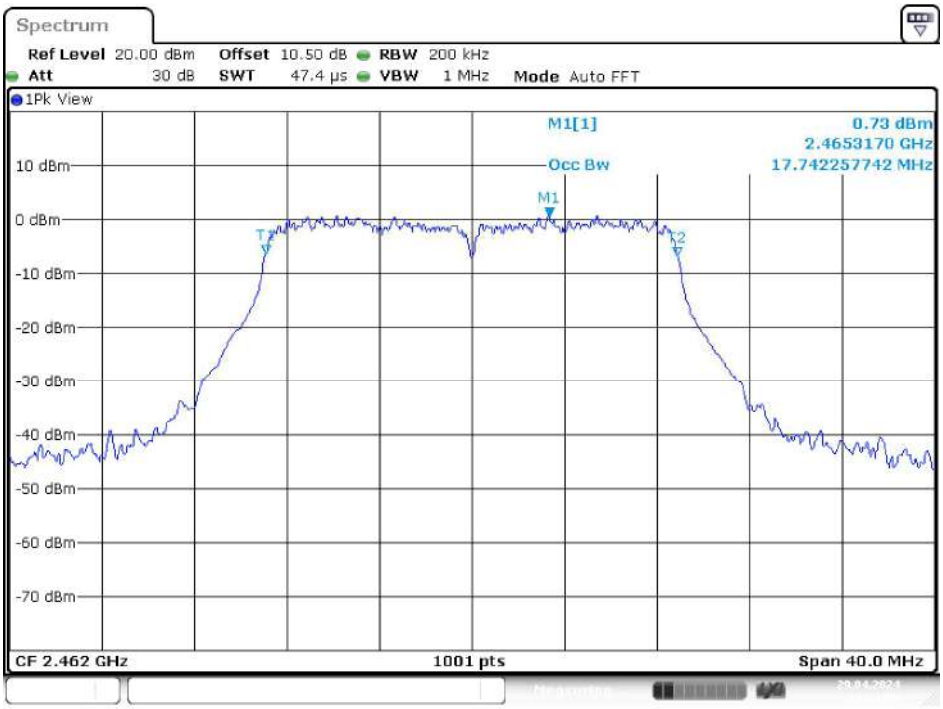
Date: 29.APR.2024 10:17:35

Middle Channel



Date: 29.APR.2024 10:19:39

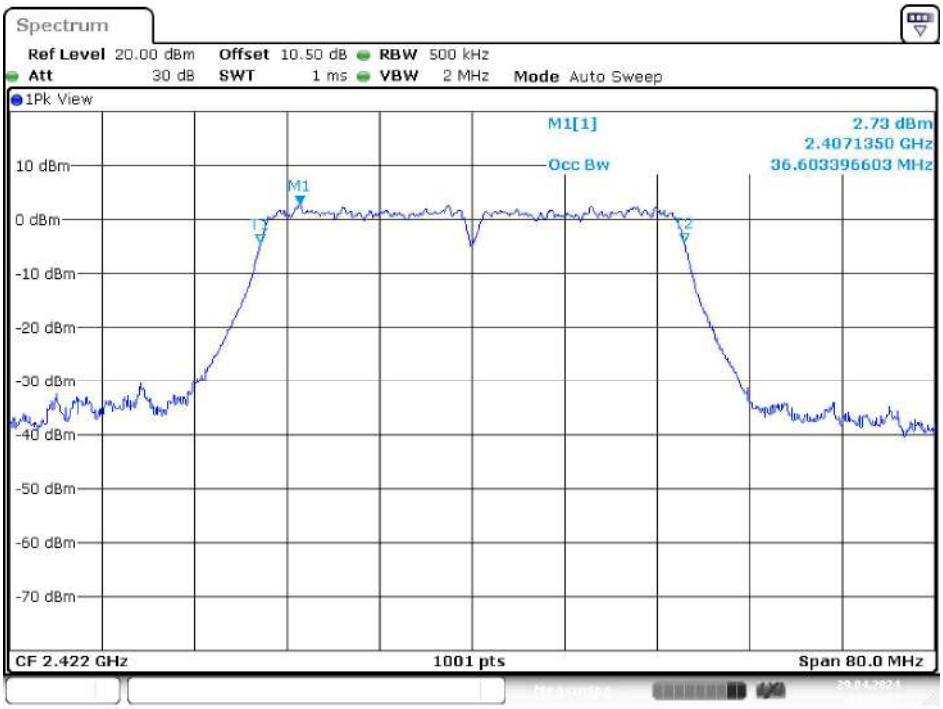
High Channel



Date: 29.APR.2024 10:21:56

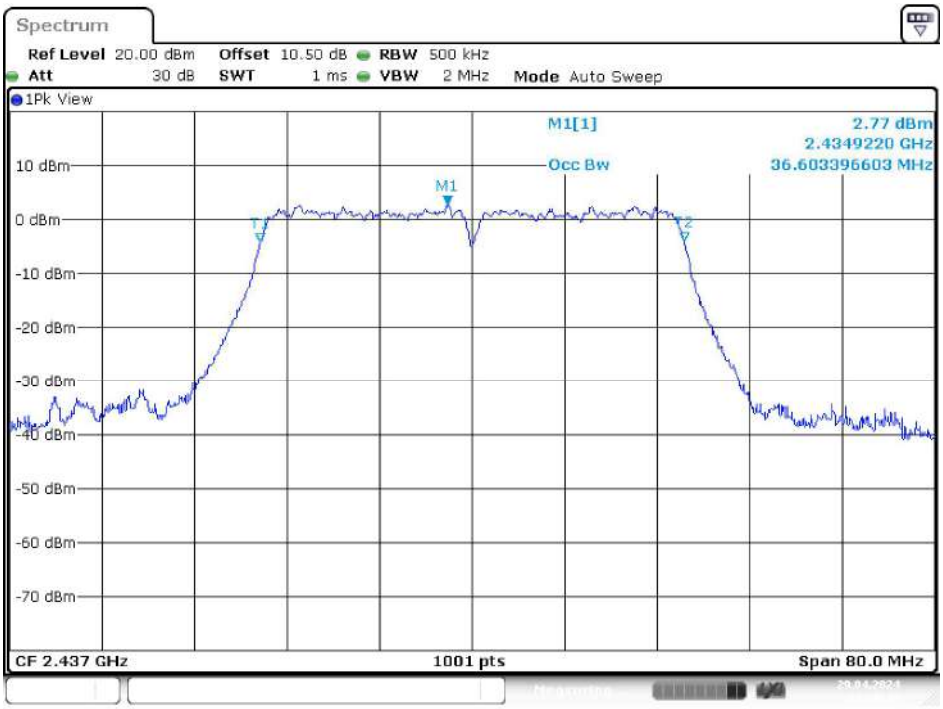
N40 Mode

Low Channel



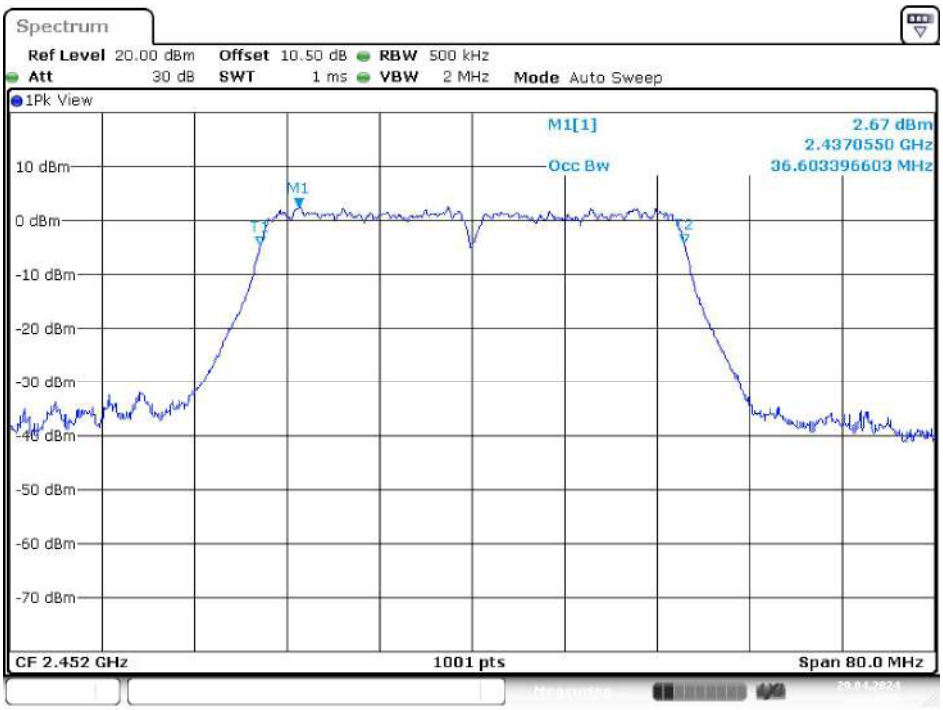
Date: 29.APR.2024 10:24:27

Middle Channel



Date: 29.APR.2024 10:26:11

High Channel



Date: 29.APR.2024 10:29:20

11 FCC §15.247(b)(3) & RSS-247 §5.4(d) – Maximum Output Power

11.1 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.

According to RSS-247 §5.4(d).

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling 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 transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

11.2 Test Procedure

According to ANSI C63.10-2013, section 11.9.1.3

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.

11.3 Test Results

Conducted Peak Output Power

Pre-scan Mode 1 and Mode 2, Worst case is the Mode 1

Mode 1

Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)	Limit (dBm)	Antenna Gain (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)
802.11b Mode						
Low	2412	23.02	30	2.71	25.73	36
Middle	2437	23.04	30	2.71	25.75	36
High	2462	22.86	30	2.71	25.57	36
802.11g Mode						
Low	2412	23.87	30	2.71	26.58	36
Middle	2437	24.15	30	2.71	26.86	36
High	2462	24.11	30	2.71	26.82	36
802.11n HT20 Mode						
Low	2412	22.44	30	2.71	25.15	36
Middle	2437	22.49	30	2.71	25.20	36
High	2462	22.21	30	2.71	24.92	36
802.11n HT40 Mode						
Low	2422	22.45	30	2.71	25.16	36
Middle	2437	22.51	30	2.71	25.22	36
High	2452	22.31	30	2.71	25.02	36

Mode 2 (spot check the worst case channel) :

Channel	Frequency (MHz)	Conducted Peak Output Power (dBm)	Limit (dBm)	Antenna Gain (dBi)	EIRP Power (dBm)	EIRP Power Limit (dBm)
802.11g Mode						
Middle	2437	24.13	30	2.71	26.84	36

Result: The test data results of Mode 1 and Mode 2 are close.

12 FCC §15.247(d) & RSS-247 §5.5 – 100 kHz Bandwidth of Frequency Band Edge

12.1 Applicable Standard

According to 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)).

According to RSS-247 §5.5.

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

12.2 Test Procedure

According to ANSI C63.10-2013 Section 11.11

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = 100 kHz.
3. Set the VBW ≥ [3 × RBW].
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) is attenuated by at least the minimum requirements specified in 11.11. Report the three highest emissions relative to the limit.

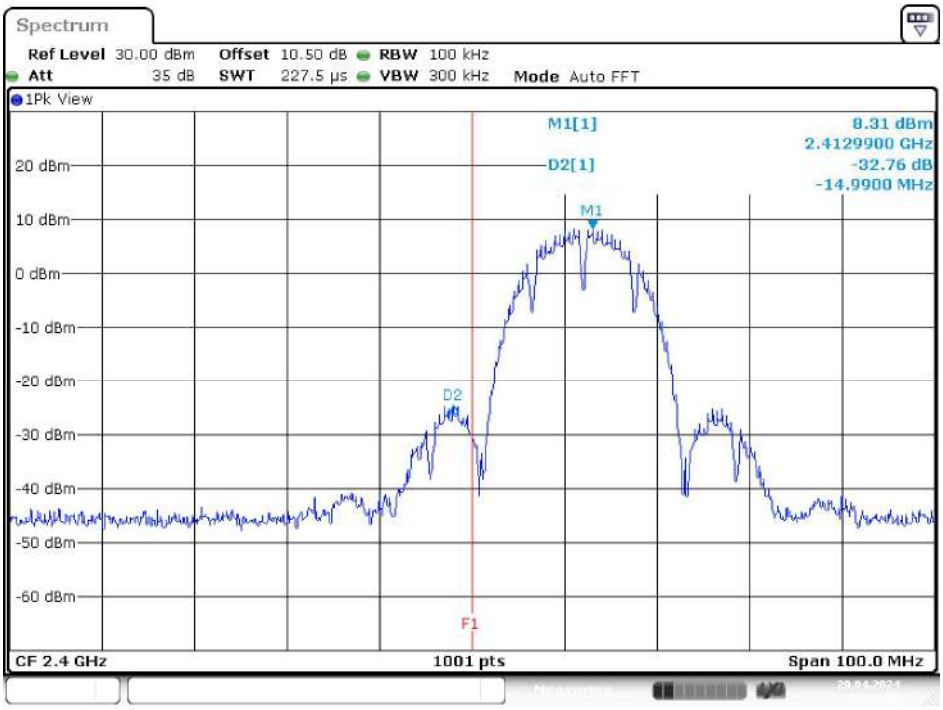
12.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	32.76	≥ 20	PASS
High	2462	49.49	≥ 20	PASS
G Mode				
Low	2412	31.56	≥ 20	PASS
High	2462	41.18	≥ 20	PASS
N20 Mode				
Low	2412	34.41	≥ 20	PASS
High	2462	39.76	≥ 20	PASS
N40 Mode				
Low	2422	32.68	≥ 20	PASS
High	2452	36.14	≥ 20	PASS

Please refer to the following plots

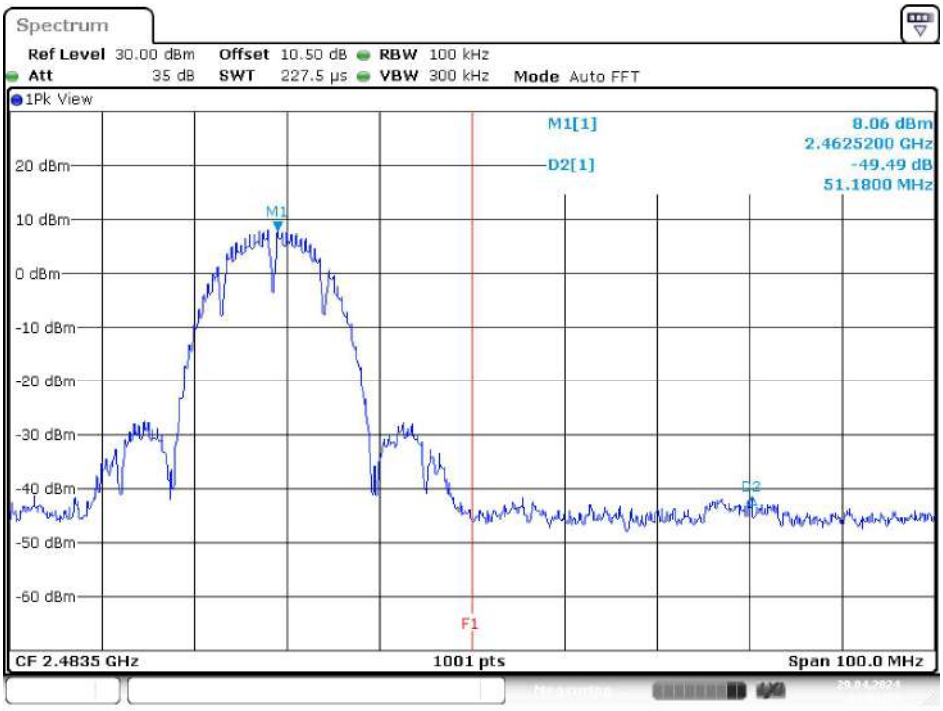
B Mode

Band Edge, Left Side



Date: 29.APR.2024 09:47:00

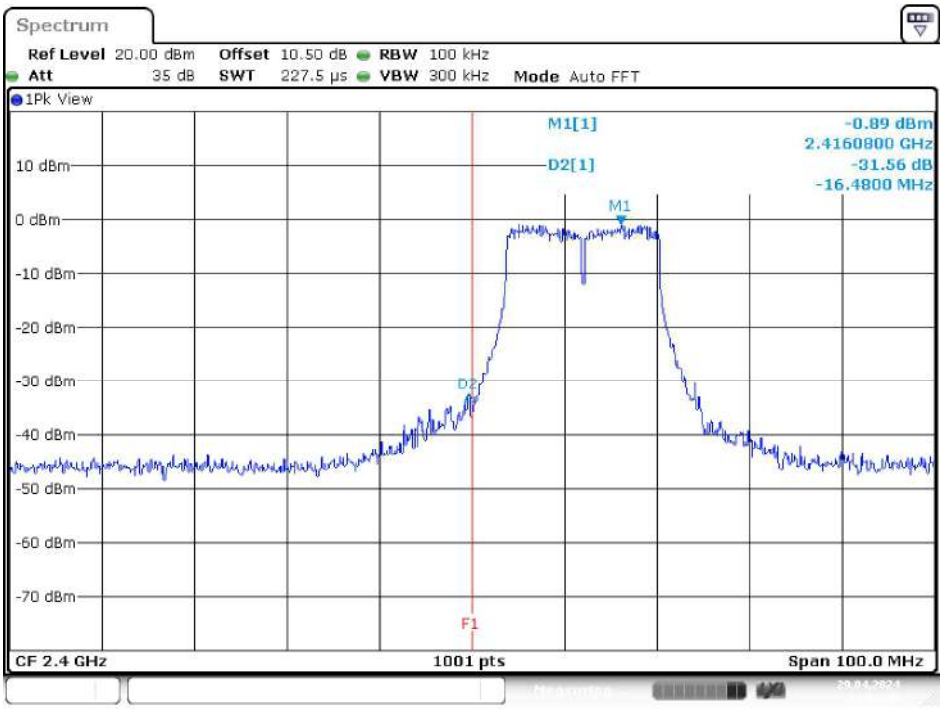
Band Edge, Right Side



Date: 29.APR.2024 10:01:33

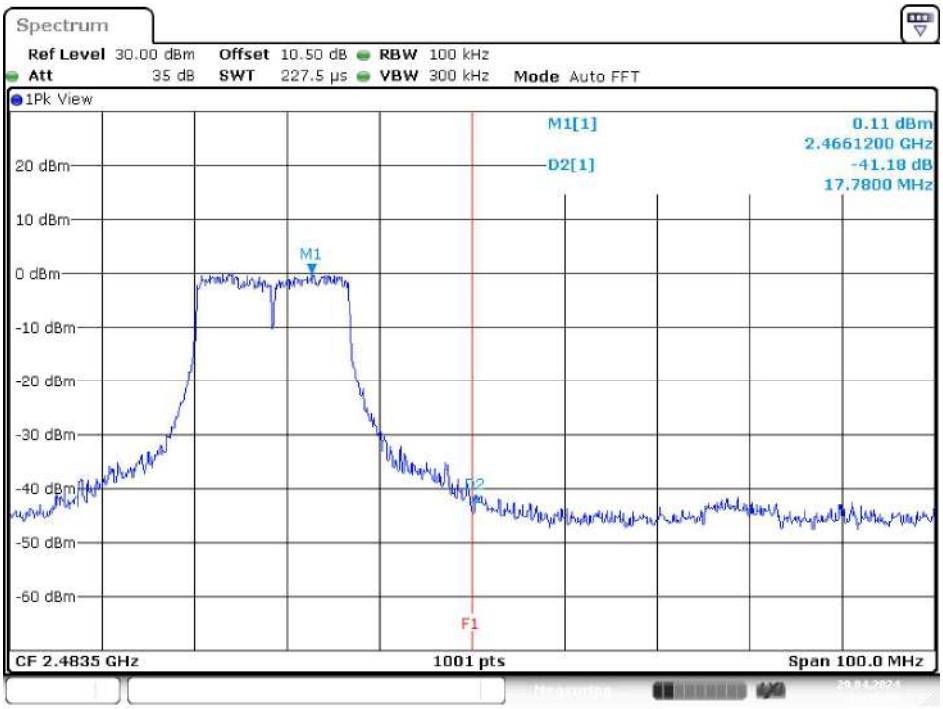
G Mode

Band Edge, Left Side



Date: 29.APR.2024 10:03:48

Band Edge, Right Side



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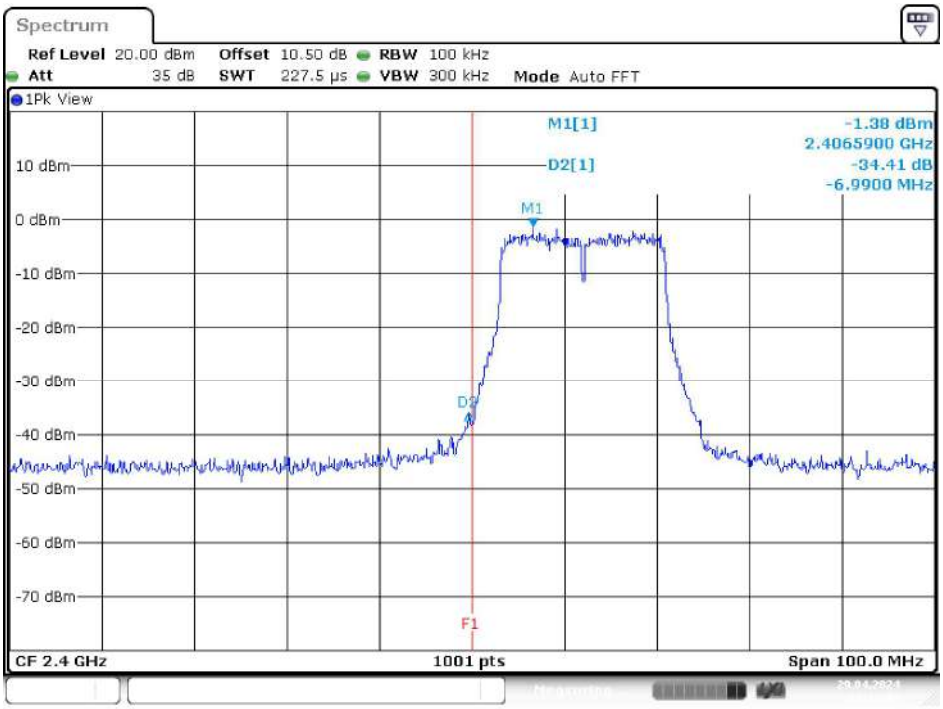
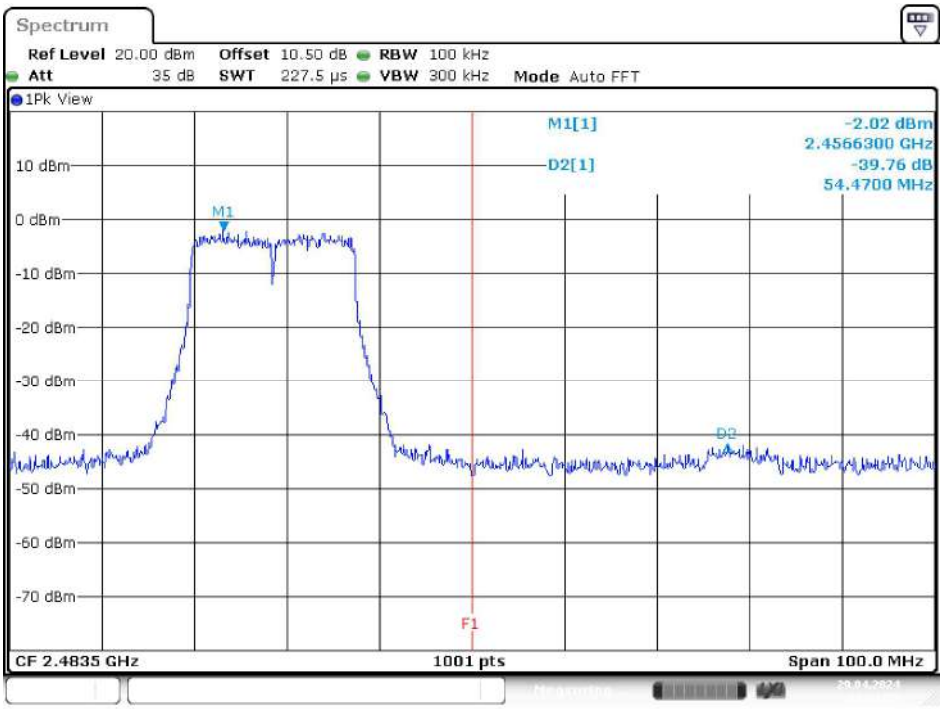
N20 Mode

Band Edge, Left Side



Date: 29.APR.2024 10:17:04

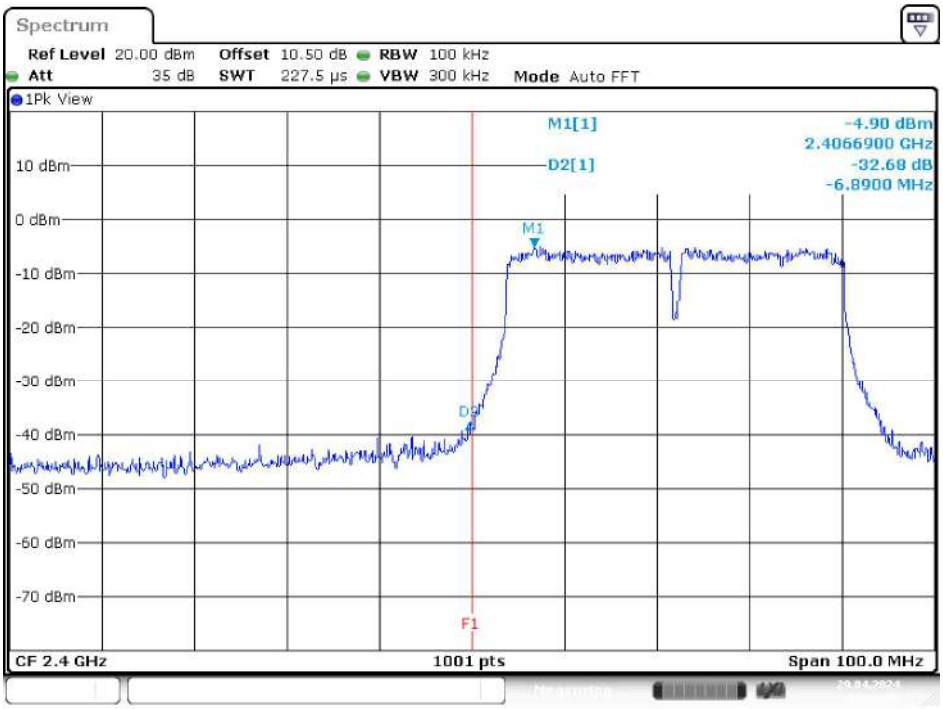
Band Edge, Right Side



Date: 29.APR.2024 10:21:26

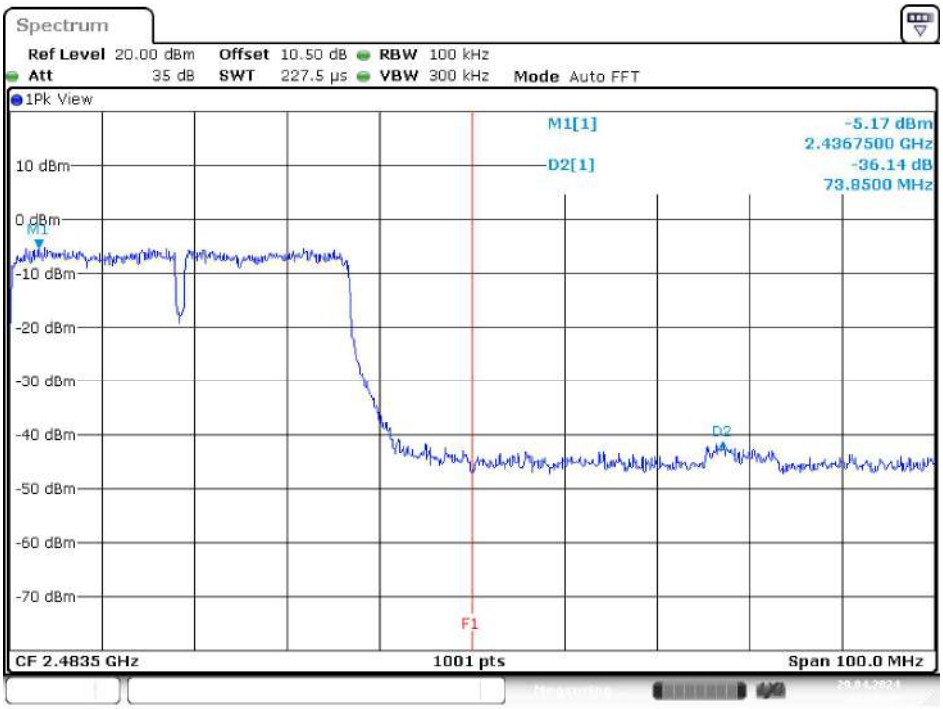
N40 Mode

Band Edge, Left Side



Date: 29.APR.2024 10:23:57

Band Edge, Right Side



Date: 29.APR.2024 10:26:50

13 FCC §15.247(e) & RSS-247 §5.2(b) – Power Spectral Density

13.1 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.

According to RSS-247 §5.2(b).

The transmitter power spectral density conducted from the transmitter 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 section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

13.2 Test Procedure

According to ANSI C63.10-2013, section 11.10.2

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS bandwidth.
3. Set the RBW to 3 kHz ≤ RBW ≤ 100 kHz.
4. Set the VBW ≥ [3 × RBW].
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds requirement, then reduce RBW (but no less than 3 kHz) and repeat

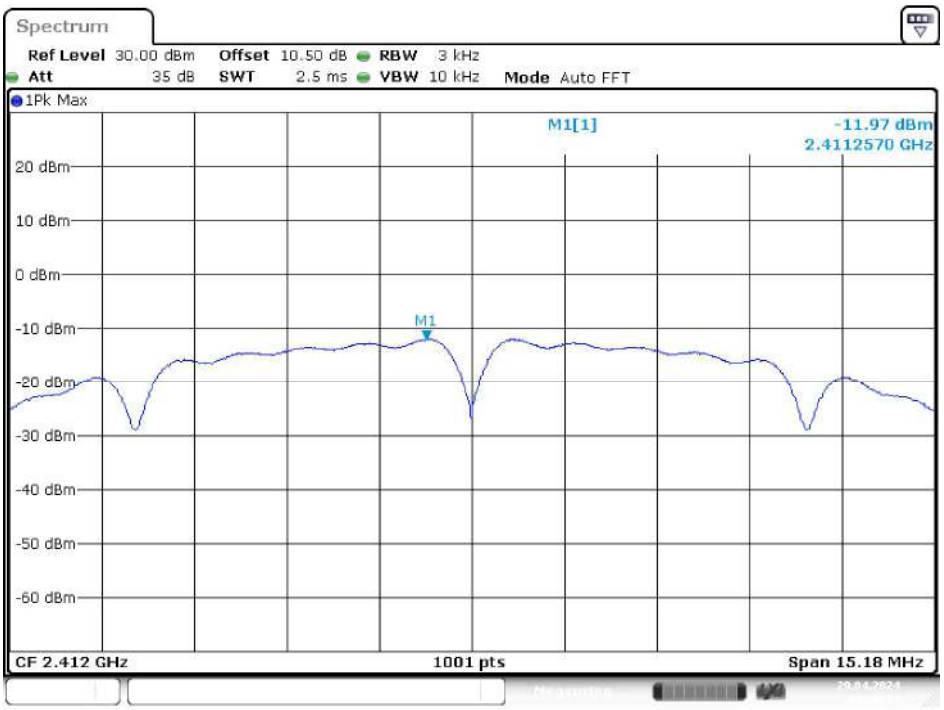
13.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-11.97	8	PASS
Middle	2437	-12.34	8	PASS
High	2462	-12.50	8	PASS
G Mode				
Low	2412	-15.61	8	PASS
Middle	2437	-14.36	8	PASS
High	2462	-14.47	8	PASS
N20 Mode				
Low	2412	-15.56	8	PASS
Middle	2437	-15.11	8	PASS
High	2462	-15.98	8	PASS
N40 mode				
Low	2422	-17.38	8	PASS
Mid	2437	-17.49	8	PASS
High	2452	-16.61	8	PASS

Please refer to the following plots

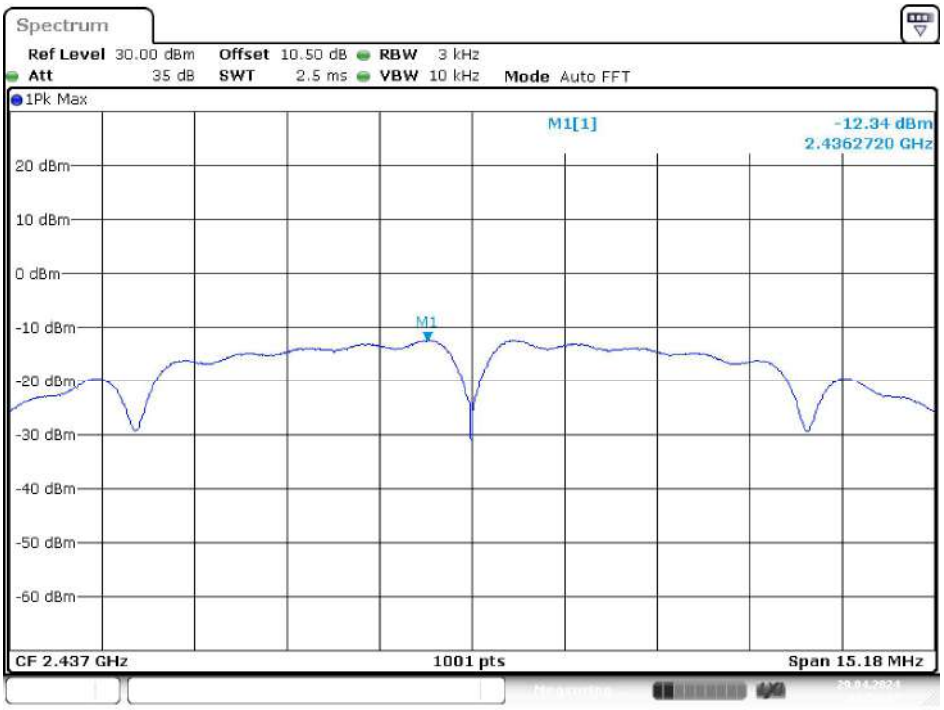
B Mode

Low Channel



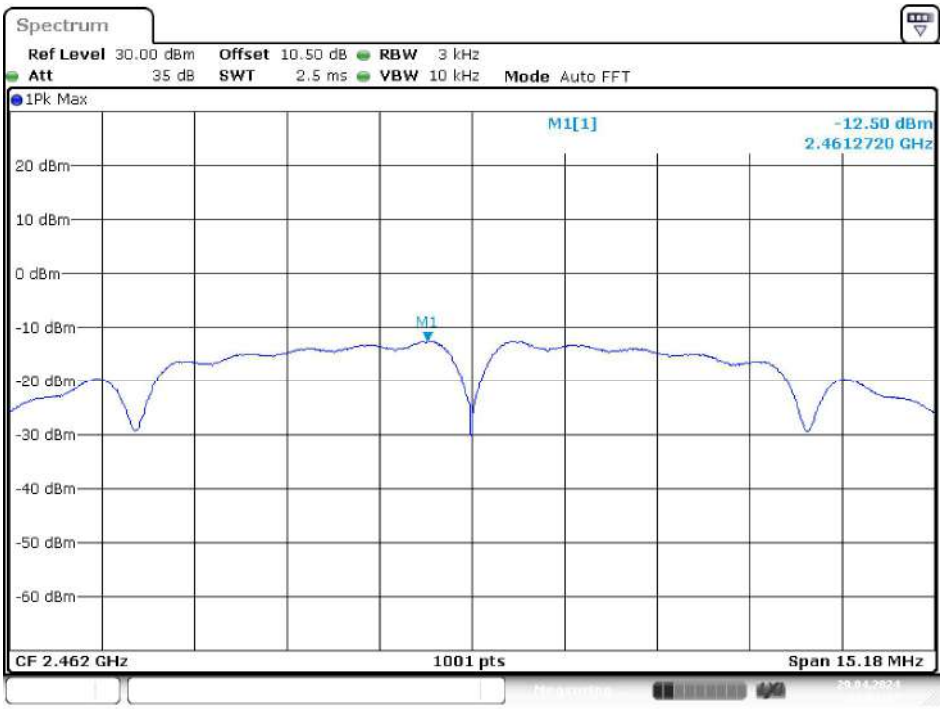
Date: 29.APR.2024 09:46:44

Middle Channel



Date: 29.APR.2024 09:52:18

High Channel



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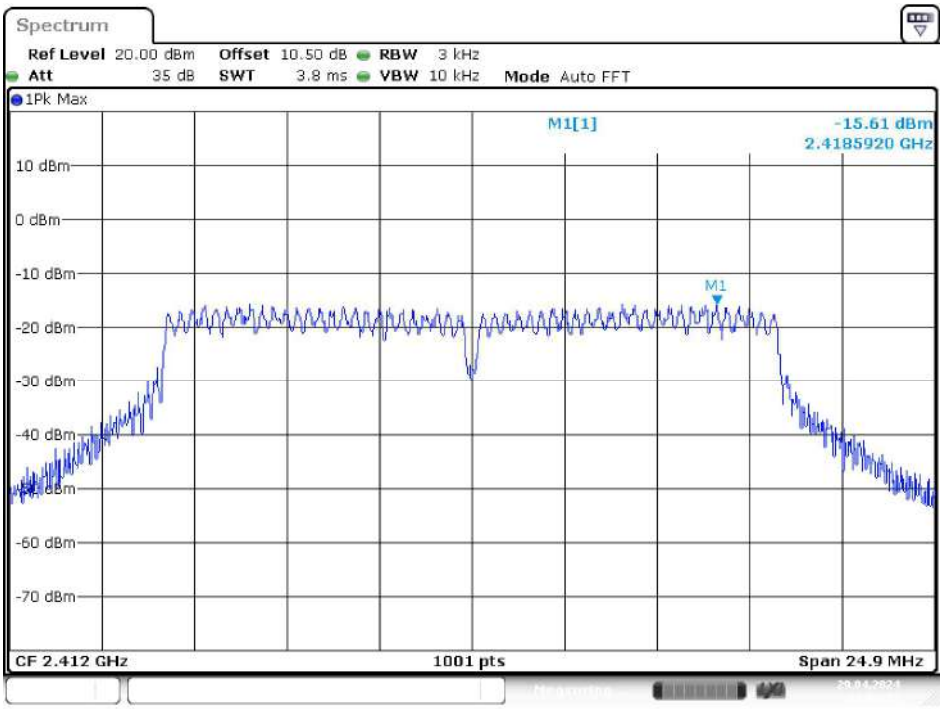
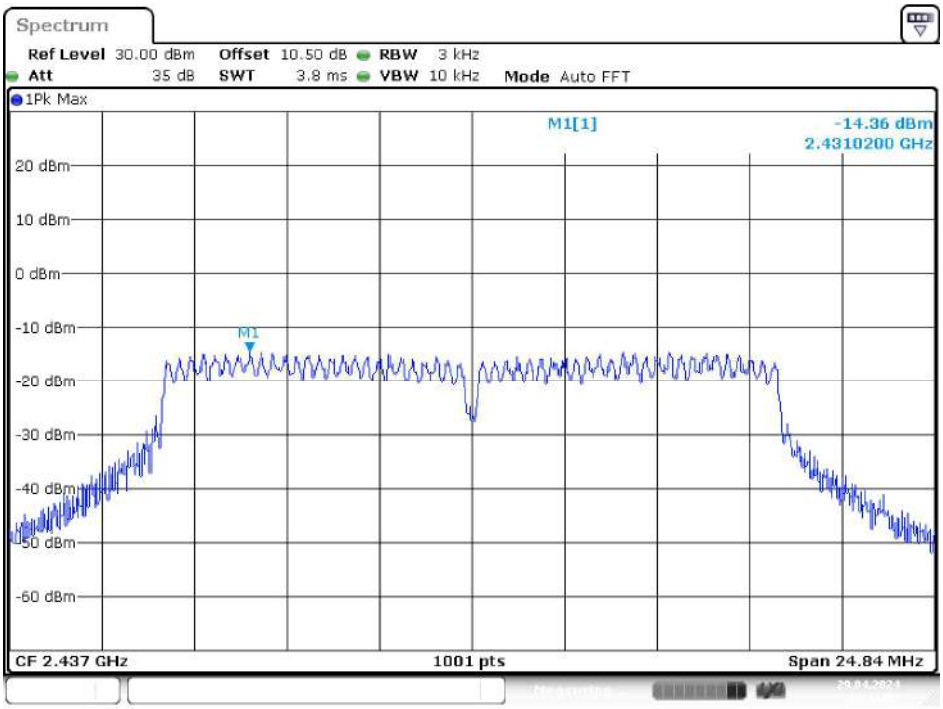
G Mode

Low Channel



Date: 29.APR.2024 10:03:32

Middle Channel



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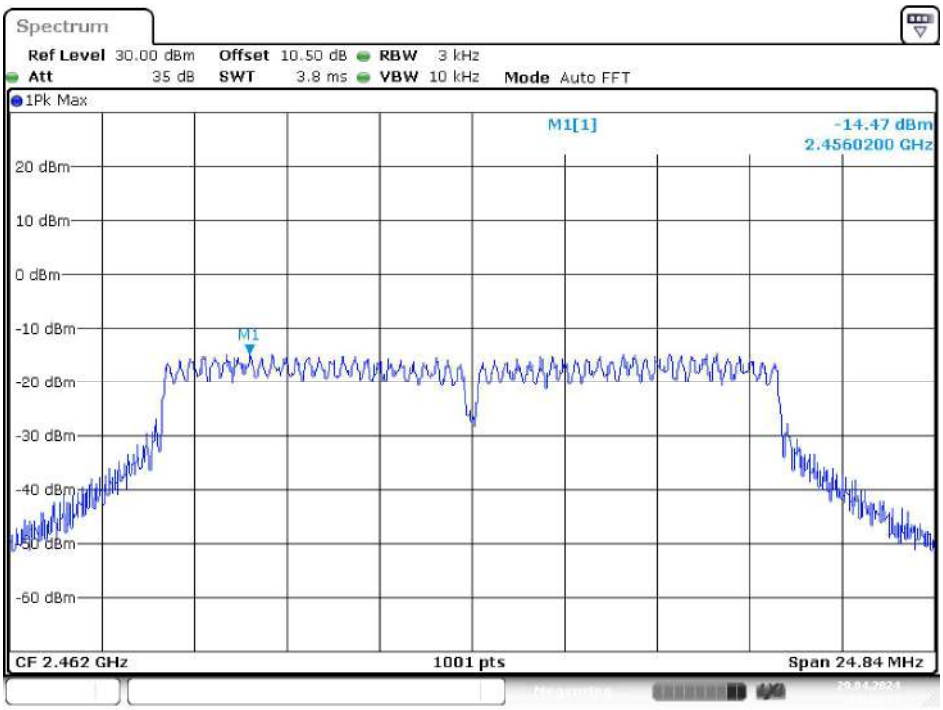
High Channel



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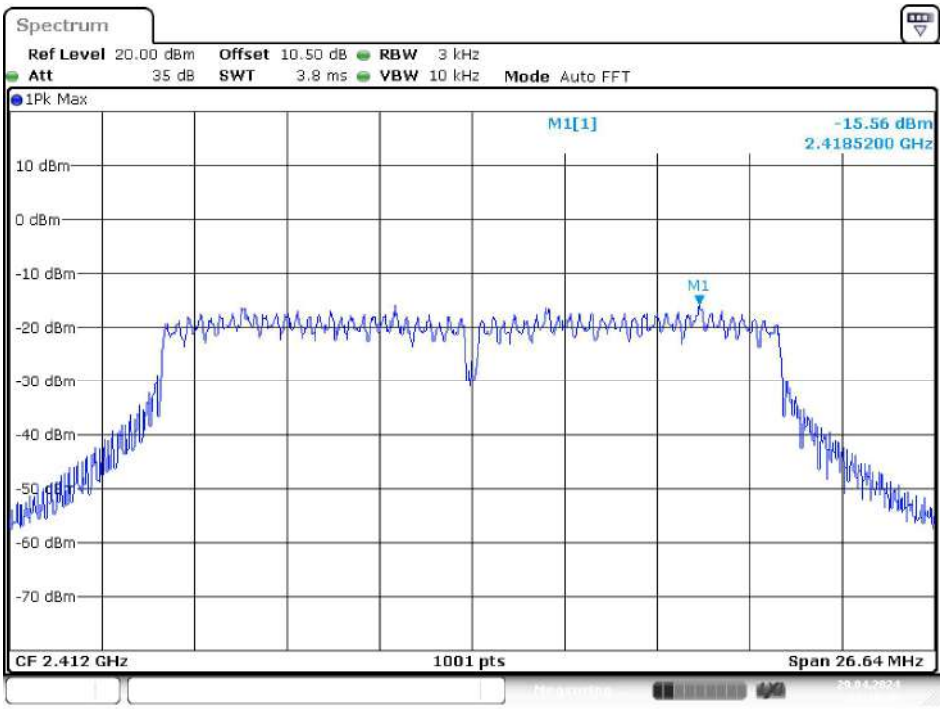
N20 Mode

Low Channel



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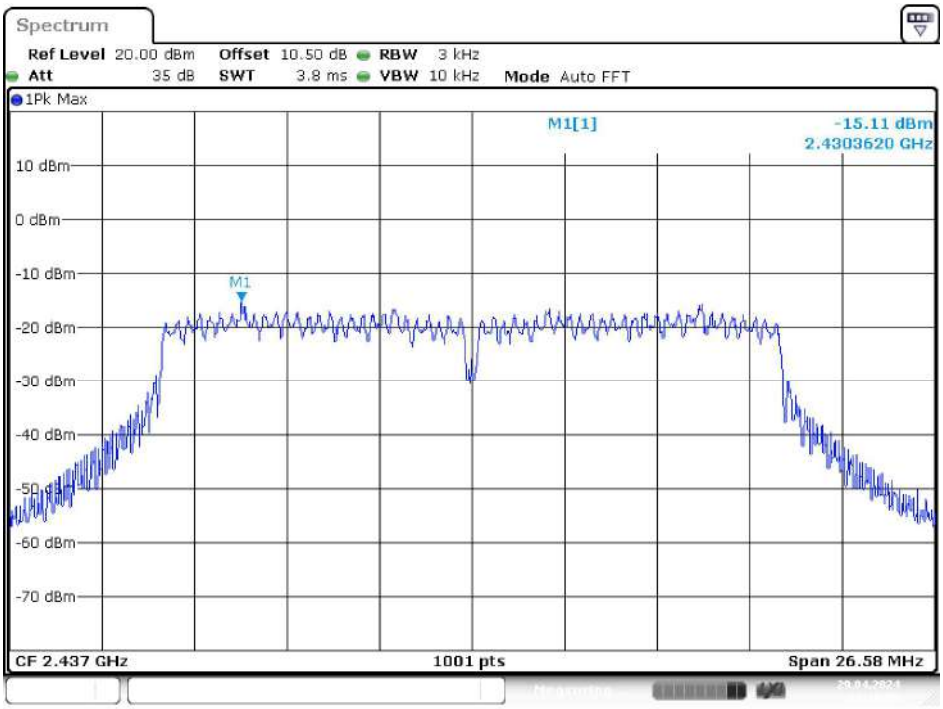
Middle Channel



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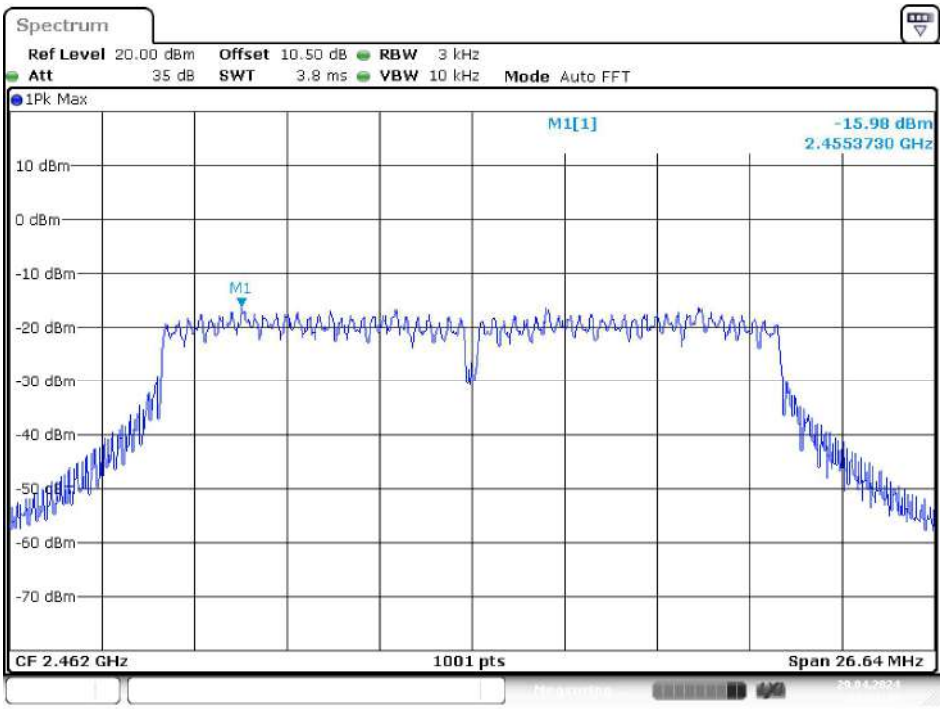
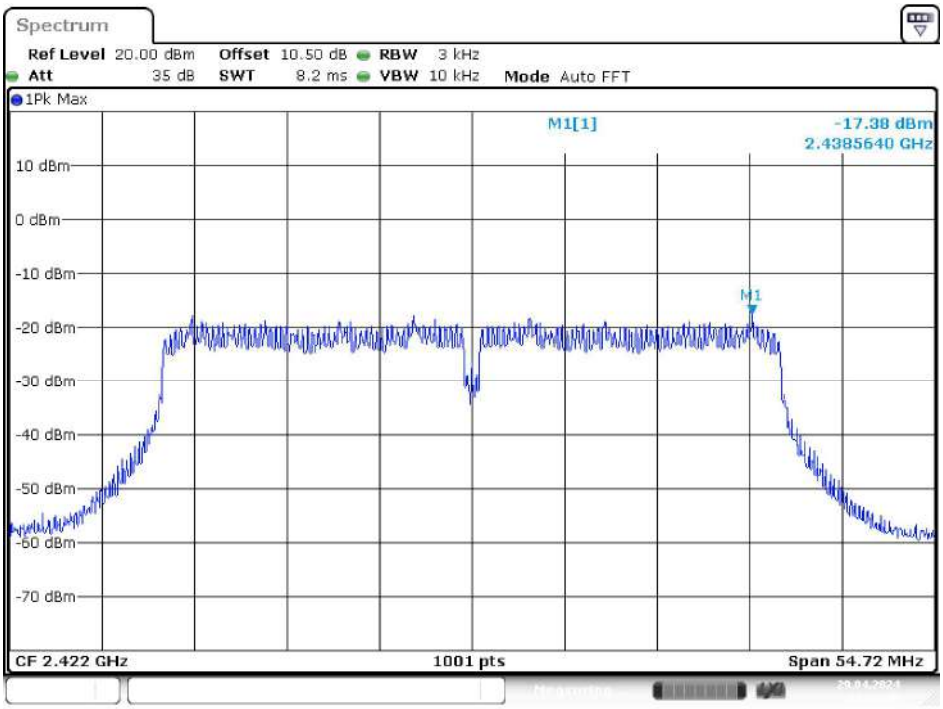
High Channel



Date: 29.APR.2024 10:21:10

N40 Mode

Low Channel



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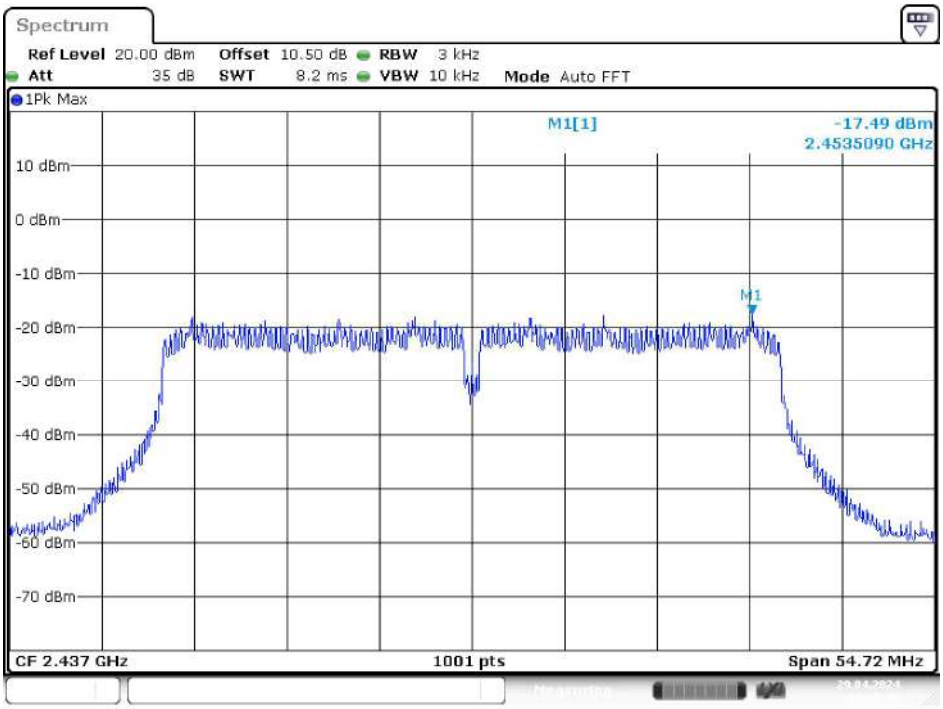
Middle Channel



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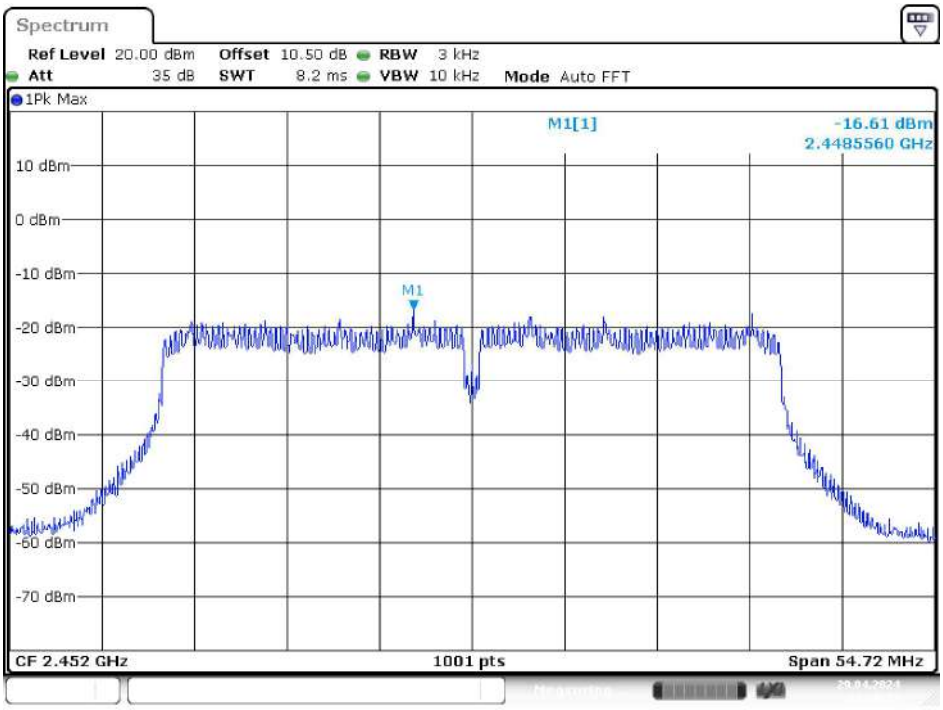
High Channel



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