FCC Part 15.247

TEST REPORT

For

Iconnect

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

FCC ID: 2AB877610

Report Type:	**Product Type:**
Original Report	WiFi 802.11ac outdoor USB adapter

Report Producer : **Jane Chen** Jane Chen

Report Number : **RXZ211018004RF01**

Report Date : **2022-01-04**

Reviewed By: **Andy Shih** Andy Shih

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211018004	RXZ211018004RF01	2022-01-04	Original Report	Jane Chen

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Iconnect
	NO.9, Aly.58,Ln,112.Ruiguand Rd, Neihu District, Taipei City, Taiwan, R.O.C.
Manufacturer	ALFA NETWORK Inc.
	4F.-1, NO. 106, Rueiguang Rd., Neihu District, Taipei City, Taiwan, R.O.C.
Brand(Trade) Name	ALFA
Product (Equipment)	WiFi 802.11ac outdoor USB adapter
Main Model Name	Tube-UAC2
Series Model Name	Tube-UAC3,Tube-UACXXX,Tube-UXXX,AWUS036ACHM, AWUS036ACH-C,AWUS036ACU, AWUS036EACS, AWUS036ACT,AWUS036EACU,AWUS036ACZ,AWUS036EACZ X: Any alphanumeric character or blank
Model Discrepancy	The major electrical and mechanical constructions of series models are identical to the basic model, except Market segmentation. The model, Tube-UAC2 is the testing sample, and the final test data are shown on this test report.
Frequency Range	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz
Transmit Power	IEEE 802.11b Mode: 19.12 dBm IEEE 802.11g Mode: 24.99 dBm IEEE 802.11n HT20 Mode: 24.91 dBm IEEE 802.11n HT40 Mode: 23.09 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)	☐ AC Type ☐ Adapter ☐ PoE
	☒ DC Type ☐ Battery ☒ External from USB Cable, 5Vdc ☐ External DC Adapter
Received Date	Oct. 18, 2021
Date of Test	Nov. 1, 2021~ Jan. 3, 2022

*All measurement and test data in this report was gathered from production sample serial number: RXZ211018004-01 (Assigned by BACL, New Taipei Laboratory)

1.2 Objective

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

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

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.407 UNII submission with FCC ID: 2AB877610

1.4 Test Methodology

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

KDB 558074 D01 15.247 Meas Guidance v05r02

1.5 Statement of Compliance

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

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

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

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

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dBm
Occupied Bandwidth		+/- 0.35 MHz
Unwanted Emissions, conducted		+/- 1.69 dBm
Emissions, radiated	30 MHz~1GHz	+/- 5.46 dB
	1 GHz~18 GHz	+/- 5.24 dB
	18 GHz~40 GHz	+/- 5.86 dB
Temperature		+/- 1.27 °C
Humidity		+/- 3 %

1.7 Environmental Conditions

Test Site	Test Data	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2021/12/6	20.3	55	1010	Howard
Radiation Spurious Emissions	2021/12/1~2021/12/2	20.1~21.4	62	1010	Aaron
Conducted Spurious Emissions	2021/11/1	24.1	51	1010	Howard
6 dB Emission Bandwidth	2021/11/1	24.1	51	1010	Howard
Maximum Output Power	2021/11/1	24.1	51	1010	Howard
100 kHz Bandwidth of Frequency Band Edge	2021/11/1	24.1	51	1010	Howard
Power Spectral Density	2021/11/1~2022/1/3	21.9~24.1	51	1010	Howard

1.8 Test Facility

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

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

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

2 System Test Configuration

2.1 Description of Test Configuration

For WIFI mode, there are totally 11 channels.

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

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

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

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

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

Used “MT76xxU QA V2.0.10.2” software.

Test Frequency		Low	Mid	High
Power Level Setting	B Mode	default	default	default
	G Mode	09	default	10
	N20 Mode	0D	default	0D
	N40 Mode	03	default	06

The EUT was configured for testing in an engineering mode which was provided by the manufacturer. The worst-case data rates are determined to be as follows for each mode based upon investigations by measuring the average power and PSD across all data rates bandwidths, and modulations.

802.11b: 1Mbps

802.11g: 6Mbps

802.11n HT20: MCS0

802.11n HT40: MCS0

2.4 Test Mode

Full System (model: TUBE-UAC2) for all test item.

2.5 Support Equipment List and Details

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

2.6 External Cable List and Details

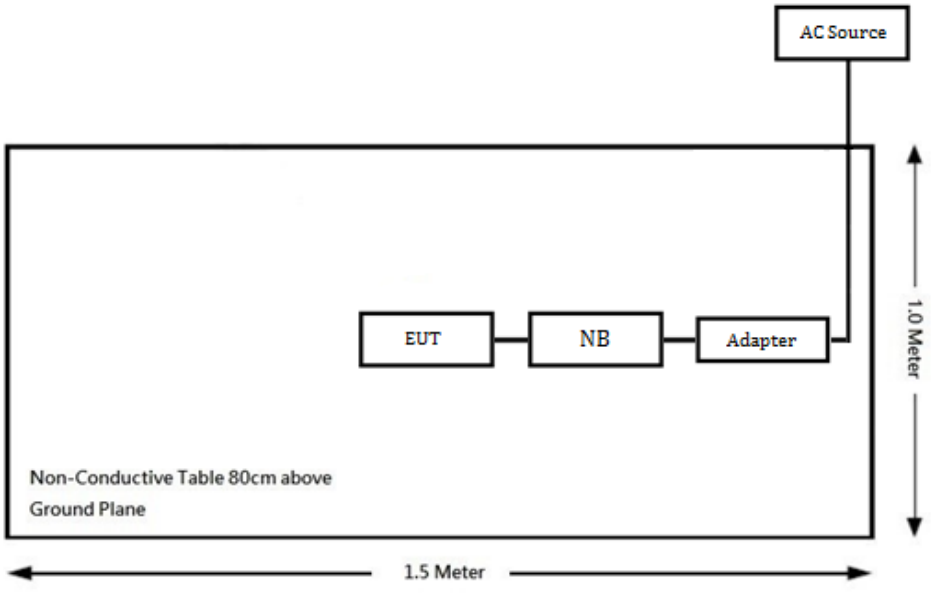
Cable Description	Length (m)	From	To
USB Cable	4.8	EUT	NB

2.7 Block Diagram of Test Setup

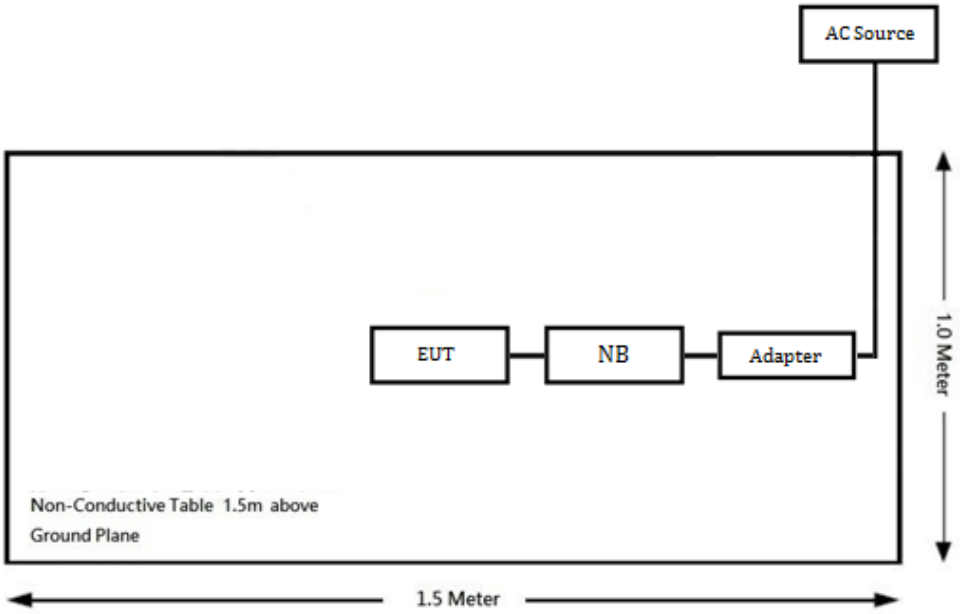
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

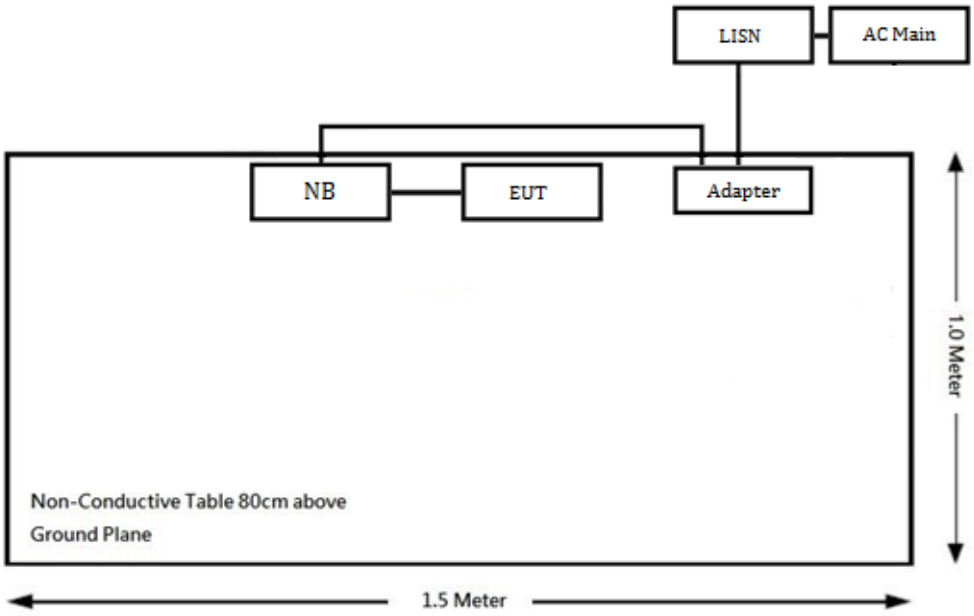
Below 1GHz:



Above 1GHz:



Conduction:



2.8 Duty Cycle

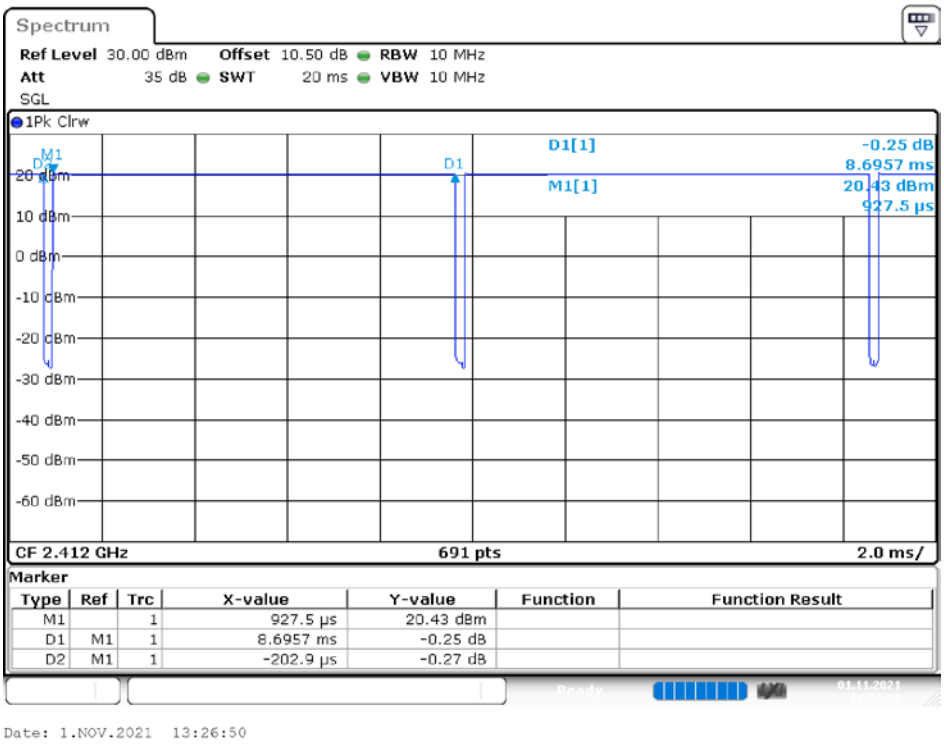
The duty cycle as below:

Radio Mode	On Time (ms)	Off Time (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	8.696	0.203	98	0.09
802.11g	1.442	0.203	88	0.56
802.11n20	1.348	0.203	87	0.60
802.11n40	0.670	0.203	77	1.14

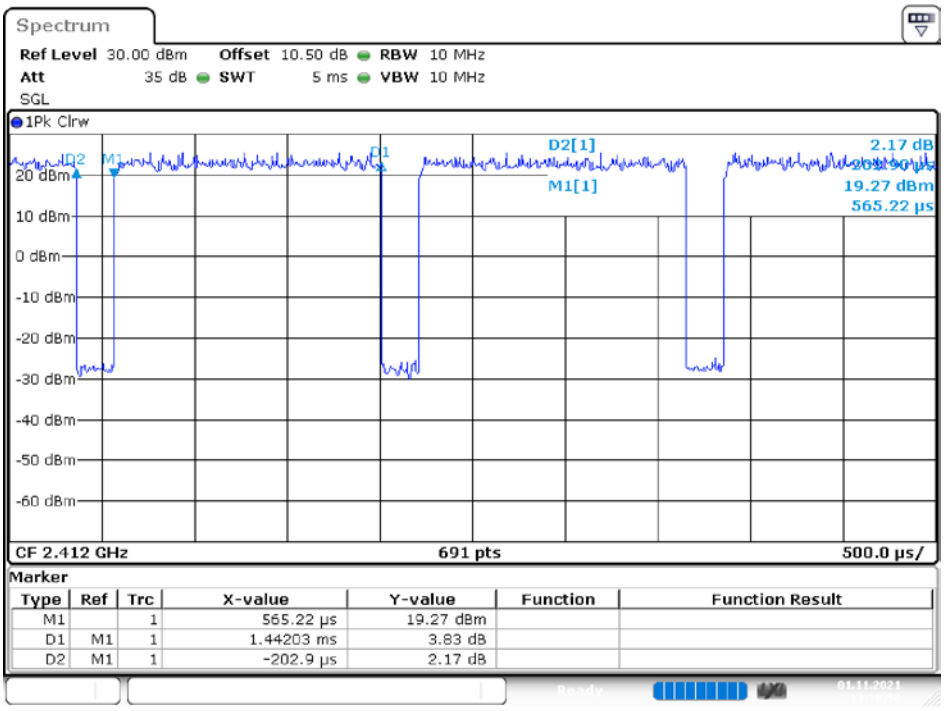
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

B Mode

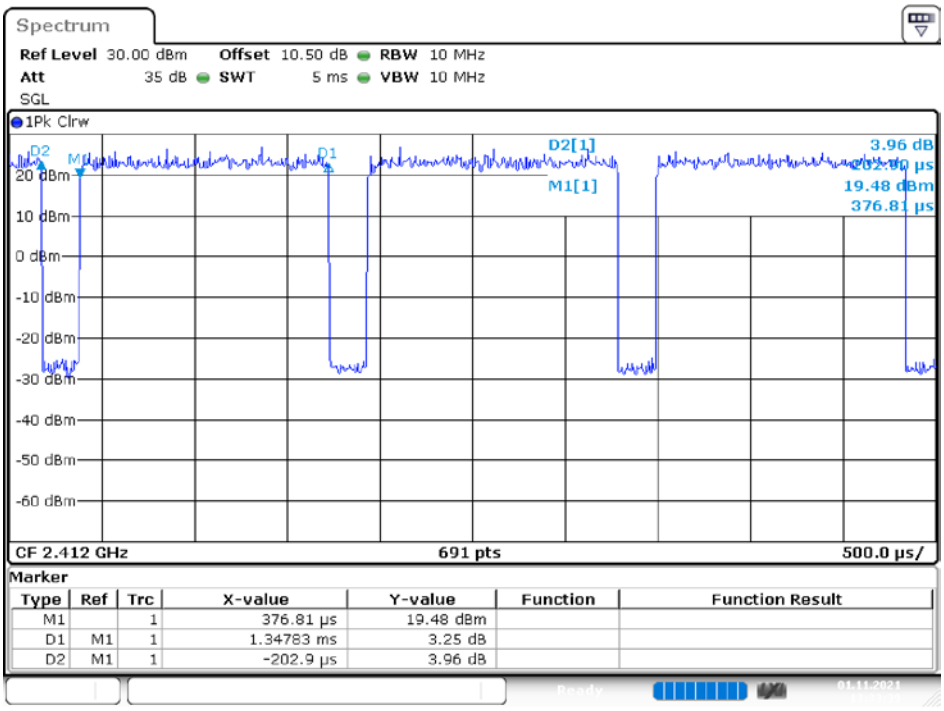


G Mode



Date: 1.NOV.2021 13:30:51

N20 Mode



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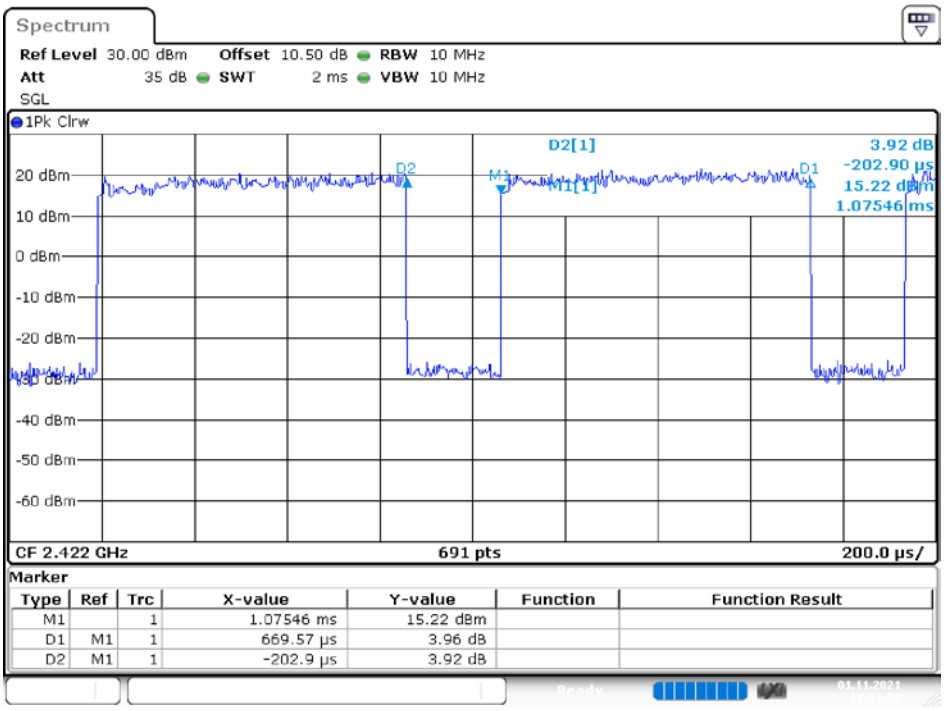
N40 Mode


Spectrum
Ref Level 30.00 dBm Offset 10.50 dB RBW 10 MHz
Att 35 dB SWT 2 ms VBW 10 MHz
SGL
1Pk Clrw
D2[1] 3.92 dB
-202.90 µs
M1[1] 15.22 dBm
1.07546 ms
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.422 GHz
691 pts
200.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 1.07546 ms 15.22 dBm
D1 M1 1 669.57 µs 3.96 dB
D2 M1 1 -202.9 µs 3.92 dB
Date: 1.NOV.2021 13:39:59

3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.247(i), §1.1310, §2.1091	Maximum Permissible Exposure (MPE)	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR3	102099	2021/6/9	2022/6/8
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/28
RF Cable	EMEC	EM-CB5D	1	2021/6/11	2022/6/10
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2021/1/19	2022/1/18
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2021/11/9	2022/11/8
Horn Antenna	EMCO	SAS-571	1020	2021/4/23	2022/4/22
Horn Antenna	ETS-Lindgren	3116	62638	2021/8/11	2022/8/10
Preamplifier	Sonoma	310N	130602	2021/6/8	2022/6/7
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2020/12/30	2021/12/29
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/1/7	2022/1/6
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
Coaxial Cable	COMMATE	PEWC	8Dr	2020/12/25	2021/12/24
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2021/2/1	2022/1/31
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2020/12/25	2021/12/24
Cable	EMC	EMC105-SM-SM-10000	201003	2021/2/3	2022/2/2
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/3/15	2022/3/14
Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R

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

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

5 FCC §15.247(i), §1.1310, § 2.1091 - Maximum Permissible Exposure (MPE)

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.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Averaging Time (minutes)**
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30
30–300	27.5	0.073	0.2	30
300–1500	/	/	f/1500	30
1500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm^2);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

5.2 RF Exposure Evaluation Result

MPE evaluation:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G WIFI	2412-2462	5	3.162	25	316.228	20	0.1989	1
5G WIFI B1	5150-5250	5	3.162	18.5	70.795	20	0.0445	1
5G WIFI B4	5725-5825	5	3.162	13.5	22.387	20	0.0141	1

Note: Wi-Fi 2.4G and Wi-Fi 5G can't transmit simultaneously.

Result: MPE evaluation meets the requirements of the **20cm** standard.

6 FCC §15.203 – Antenna Requirements

6.1 Applicable Standard

According to § 15.203,

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

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

6.2 Antenna List and Details

Manufacturer	Model	Antenna Type	Antenna Gain
ALFA Network	AOA-2458-79AF	Dual-Band Antenna	5 dBi

Result: Compliance

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

7.1 Applicable Standard

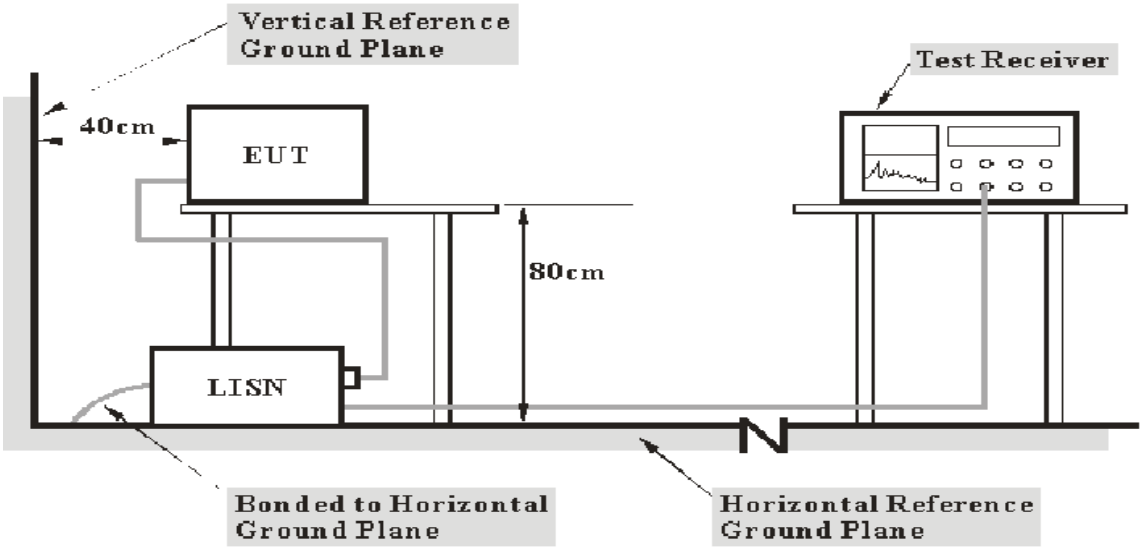
According to §15.207

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

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

Note : Decreases with the logarithm of the frequency.

7.2 EUT Setup



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

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

7.3 EMI Test Receiver Setup

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

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

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

7.4 Test Procedure

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

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

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

7.5 Corrected Factor & Margin Calculation

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

Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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

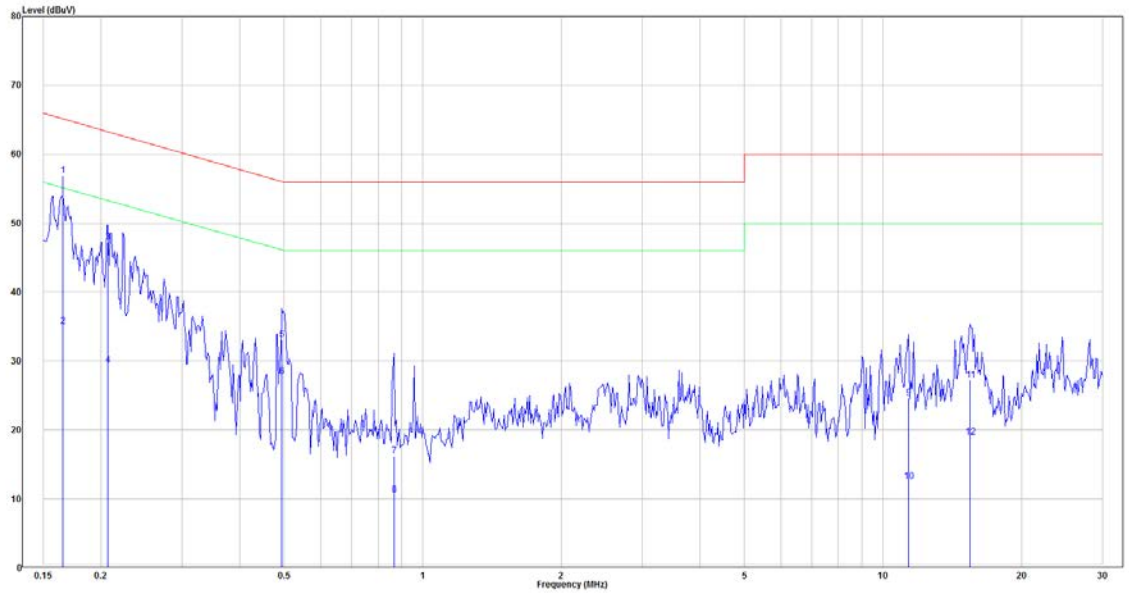
Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

Worst case is 802.11b mode low channel.

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.165	37.31	19.59	56.90	65.21	-8.31	QP
2	0.165	15.46	19.59	35.05	55.21	-20.16	Average
3	0.207	27.66	19.58	47.24	63.32	-16.08	QP
4	0.207	9.79	19.58	29.37	53.32	-23.95	Average
5	0.494	13.49	19.59	33.08	56.10	-23.02	QP
6	0.494	8.18	19.59	27.77	46.10	-18.33	Average
7	0.866	-3.35	19.61	16.26	56.00	-39.74	QP
8	0.866	-9.04	19.61	10.57	46.00	-35.43	Average
9	11.377	4.82	19.82	24.64	60.00	-35.36	QP
10	11.377	-7.35	19.82	12.47	50.00	-37.53	Average
11	15.470	7.36	19.85	27.21	60.00	-32.79	QP
12	15.470	-0.92	19.85	18.93	50.00	-31.07	Average

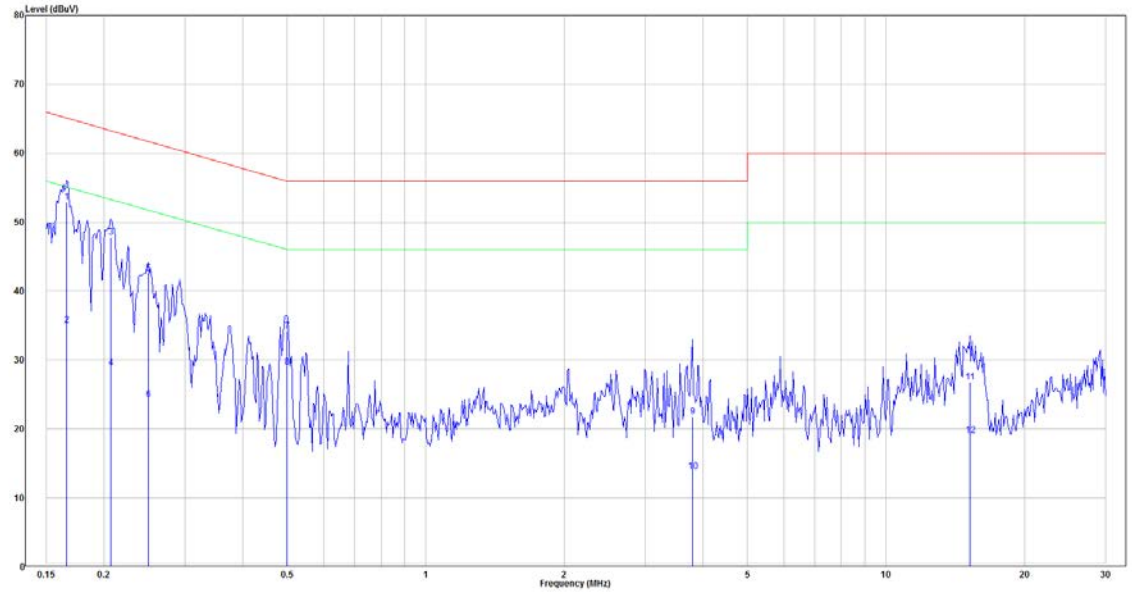
Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

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

Main: AC120 V, 60 Hz, Neutral



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.166	33.26	19.59	52.85	65.16	-12.31	QP
2	0.166	15.41	19.59	35.00	55.16	-20.16	Average
3	0.207	28.17	19.58	47.75	63.32	-15.57	QP
4	0.207	9.29	19.58	28.87	53.32	-24.45	Average
5	0.249	23.01	19.58	42.59	61.78	-19.19	QP
6	0.249	4.70	19.58	24.28	51.78	-27.50	Average
7	0.499	14.63	19.59	34.22	56.01	-21.79	QP
8	0.499	9.39	19.59	28.98	46.01	-17.03	Average
9	3.799	2.13	19.68	21.81	56.00	-34.19	QP
10	3.799	-5.82	19.68	13.86	46.00	-32.14	Average
11	15.226	6.96	19.87	26.83	60.00	-33.17	QP
12	15.226	-0.79	19.87	19.08	50.00	-30.92	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

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

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

8.1 Applicable Standard

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

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

MHz	MHz	MHz	GHz
0.090 – 0.110	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

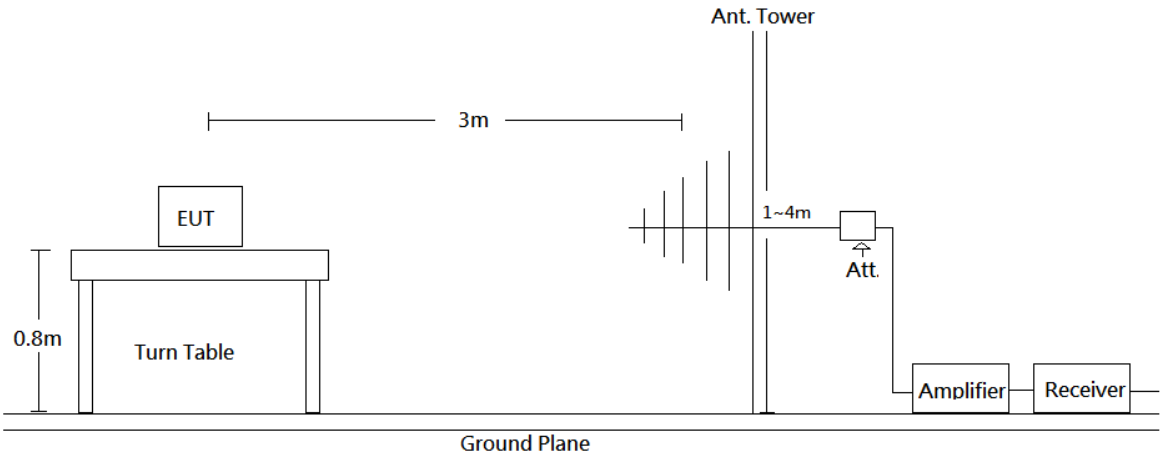
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the

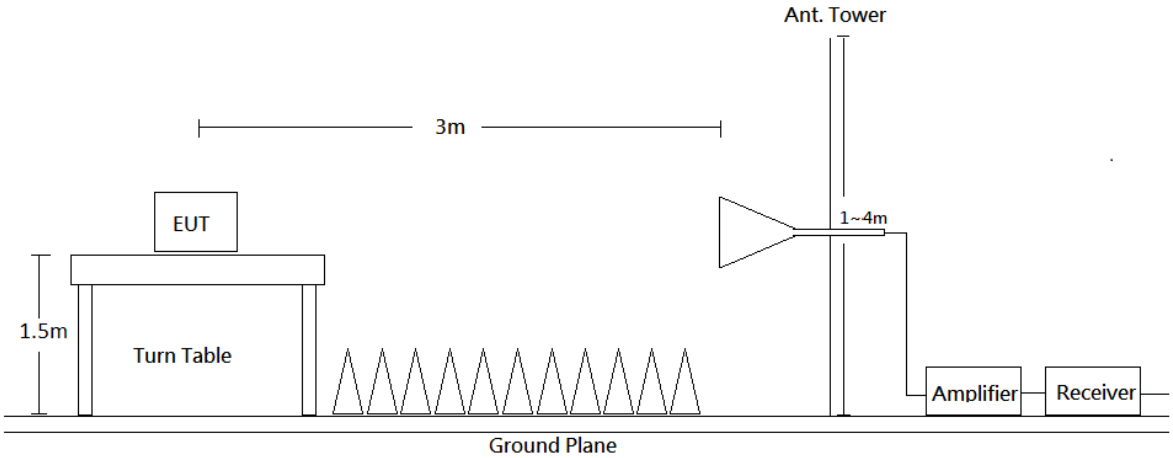
intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c).

8.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



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

8.3 EMI Test Receiver & Spectrum Analyzer Setup

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

Frequency Range	RBW	VBW	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/		QP
Above 1 GHz	1 MHz	3 MHz		PK
	1 MHz	10 Hz	>98%	Ave
	1 MHz	1/T	<98%	Ave

8.4 Test Procedure

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

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

8.5 Corrected Factor & Margin Calculation

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

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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

Margin = Result – Limit

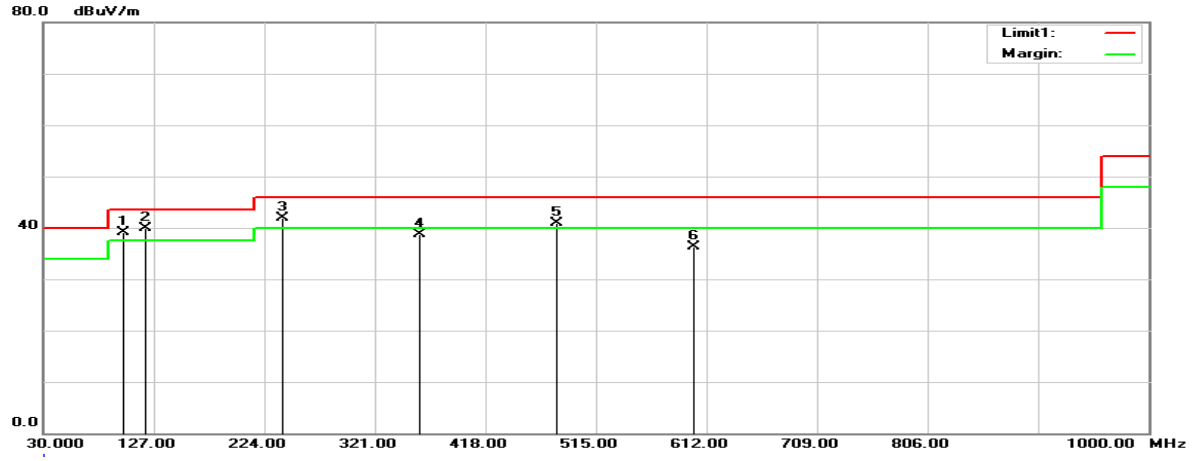
8.6 Test Results

Test Mode: Transmitting

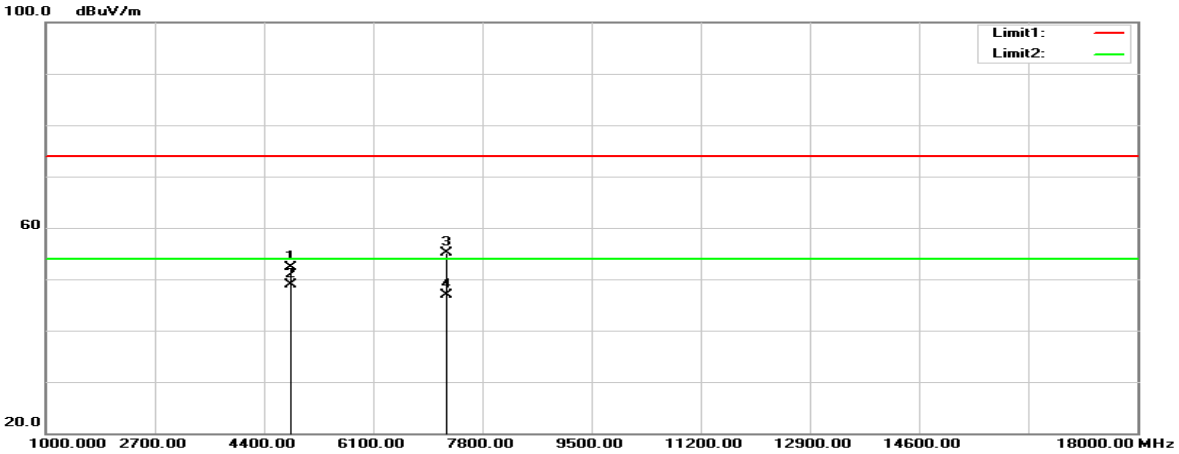
(Pre-scan with three orthogonal axis, and worse case as Z axis.)

Horizontal (worst case is 802.11b mode low channel)

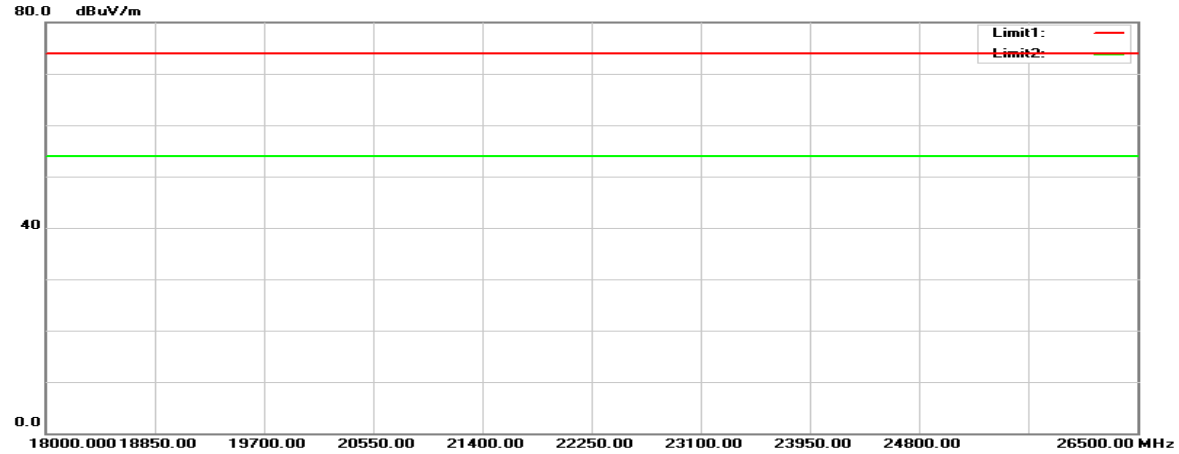
30MHz-1GHz



1GHz-18GHz:

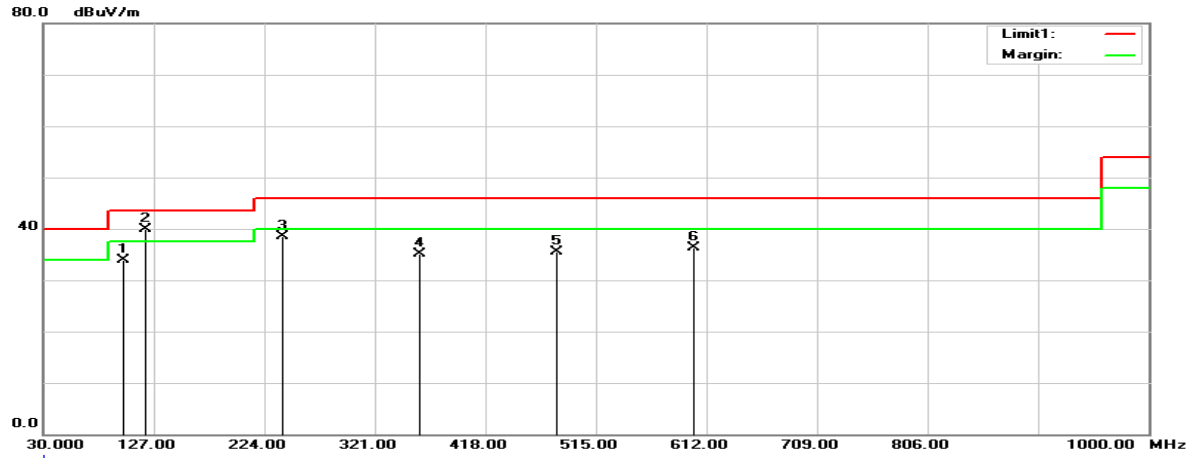


18GHz-26.5GHz:

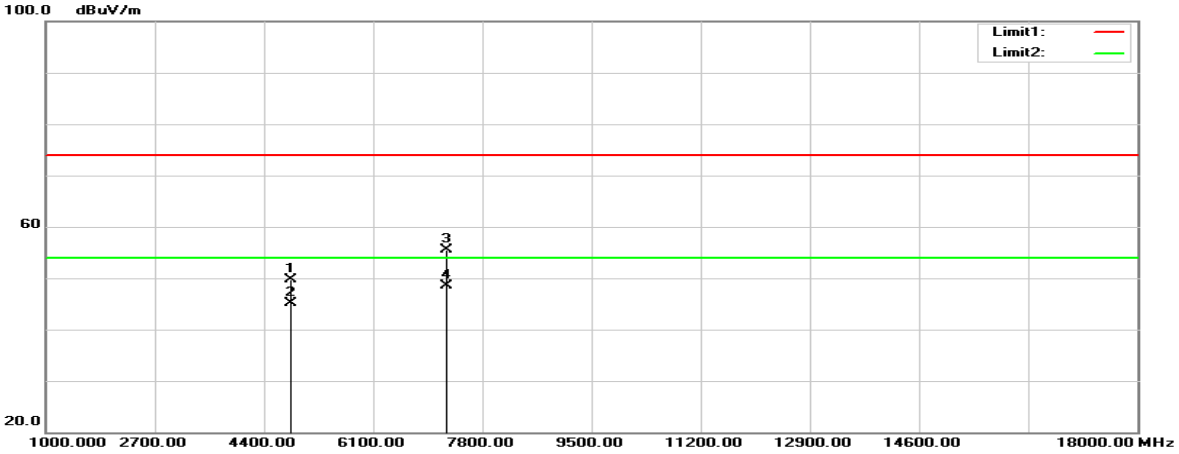


Vertical

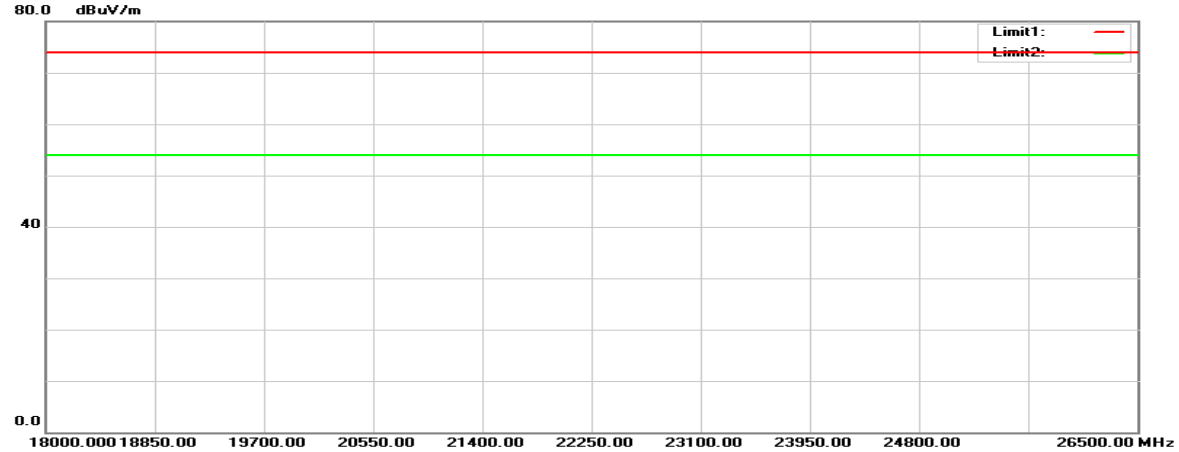
30MHz-1GHz



1GHz-18GHz:



18GHz-26.5GHz:



Below 1GHz

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBµV)	Factor(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)	
99.8400	53.14	-14.06	39.08	43.50	-4.42	100	138	peak
119.2400	50.43	-10.54	39.89	43.50	-3.61	100	255	peak
239.5200	54.15	-12.25	41.90	46.00	-4.10	100	48	peak
359.8000	47.57	-8.91	38.66	46.00	-7.34	100	96	peak
480.0800	46.89	-6.00	40.89	46.00	-5.11	100	322	peak
600.3600	41.47	-5.13	36.34	46.00	-9.66	100	135	peak

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBµV)	Factor(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)	
99.8400	47.96	-14.06	33.90	43.50	-9.60	100	238	peak
119.2400	50.54	-10.54	40.00	43.50	-3.50	100	144	peak
239.5200	50.70	-12.25	38.45	46.00	-7.55	100	156	peak
359.8000	44.07	-8.91	35.16	46.00	-10.84	100	239	peak
480.0800	41.53	-6.00	35.53	46.00	-10.47	100	328	peak
600.3600	41.52	-5.13	36.39	46.00	-9.61	100	144	peak

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

Above 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low channel								
2388.736	67.01	-9.47	57.54	74.00	-16.46	186	96	peak
2388.736	52.70	-9.47	43.23	54.00	-10.77	186	96	AVG
2412.000	107.46	-9.28	98.18	N/A	N/A	186	96	peak
2412.000	103.04	-9.28	93.76	N/A	N/A	186	96	AVG
4824.000	54.44	-2.15	52.29	74.00	-21.71	131	150	peak
4824.000	51.14	-2.15	48.99	54.00	-5.01	131	150	AVG
7236.000	50.50	4.55	55.05	74.00	-18.95	188	316	peak
7236.000	42.45	4.55	47.00	54.00	-7.00	188	316	AVG
B Mode, Middle channel								
2437.000	108.27	-9.06	99.21	N/A	N/A	193	100	peak
2437.000	103.83	-9.06	94.77	N/A	N/A	193	100	AVG
4874.000	52.43	-1.92	50.51	74.00	-23.49	136	139	peak
4874.000	50.57	-1.92	48.65	54.00	-5.35	136	139	AVG
7311.000	46.72	5.08	51.80	74.00	-22.20	145	312	peak
7311.000	39.64	5.08	44.72	54.00	-9.28	145	312	AVG
B Mode, High channel								
2462.000	108.04	-8.77	99.27	N/A	N/A	182	104	peak
2462.000	103.73	-8.77	94.96	N/A	N/A	182	104	AVG
2494.720	66.59	-8.28	58.31	74.00	-15.69	182	104	peak
2494.720	52.97	-8.28	44.69	54.00	-9.31	182	104	AVG
4924.000	54.06	-1.63	52.43	74.00	-21.57	211	145	peak
4924.000	51.25	-1.63	49.62	54.00	-4.38	211	145	AVG
7386.000	48.53	5.20	53.73	74.00	-20.27	185	29	peak
7386.000	38.26	5.20	43.46	54.00	-10.54	185	29	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
B Mode, Low channel								
2389.520	70.54	-9.46	61.08	74.00	-12.92	158	307	peak
2389.520	58.88	-9.46	49.42	54.00	-4.58	158	307	AVG
2412.000	118.94	-9.28	109.66	N/A	N/A	158	307	peak
2412.000	114.43	-9.28	105.15	N/A	N/A	158	307	AVG
4824.000	51.88	-2.15	49.73	74.00	-24.27	148	145	peak
4824.000	47.34	-2.15	45.19	54.00	-8.81	148	145	AVG
7236.000	51.03	4.55	55.58	74.00	-18.42	106	358	peak
7236.000	43.95	4.55	48.50	54.00	-5.50	106	358	AVG
B Mode, Middle channel								
2437.000	117.55	-9.06	108.49	N/A	N/A	152	196	peak
2437.000	113.07	-9.06	104.01	N/A	N/A	152	196	AVG
4874.000	52.20	-1.92	50.28	74.00	-23.72	141	147	peak
4874.000	47.41	-1.92	45.49	54.00	-8.51	141	147	AVG
7311.000	48.48	5.08	53.56	74.00	-20.44	158	359	peak
7311.000	42.49	5.08	47.57	54.00	-6.43	158	359	AVG
B Mode, High channel								
2462.000	116.96	-8.77	108.19	N/A	N/A	183	165	peak
2462.000	112.62	-8.77	103.85	N/A	N/A	183	165	AVG
2484.016	68.39	-8.44	59.95	74.00	-14.05	183	165	peak
2484.016	55.88	-8.44	47.44	54.00	-6.56	183	165	AVG
4924.000	52.05	-1.63	50.42	74.00	-23.58	161	147	peak
4924.000	48.67	-1.63	47.04	54.00	-6.96	161	147	AVG
7386.000	50.25	5.20	55.45	74.00	-18.55	128	358	peak
7386.000	43.35	5.20	48.55	54.00	-5.45	128	358	AVG

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

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low channel								
2387.952	70.81	-9.48	61.33	74.00	-12.67	191	102	peak
2387.952	54.34	-9.48	44.86	54.00	-9.14	191	102	AVG
2412.000	106.21	-9.28	96.93	N/A	N/A	191	102	peak
2412.000	96.10	-9.28	86.82	N/A	N/A	191	102	AVG
4824.000	50.81	-2.15	48.66	74.00	-25.34	162	147	peak
4824.000	36.90	-2.15	34.75	54.00	-19.25	162	147	AVG
7236.000	46.89	4.55	51.44	74.00	-22.56	149	25	peak
7236.000	32.69	4.55	37.24	54.00	-16.76	149	25	AVG
G Mode, Middle channel								
2437.000	110.04	-9.06	100.98	N/A	N/A	198	96	peak
2437.000	99.36	-9.06	90.30	N/A	N/A	198	96	AVG
4874.000	55.93	-1.92	54.01	74.00	-19.99	181	139	peak
4874.000	42.73	-1.92	40.81	54.00	-13.19	181	139	AVG
7311.000	51.71	5.08	56.79	74.00	-17.21	185	321	peak
7311.000	37.63	5.08	42.71	54.00	-11.29	185	321	AVG
G Mode, High channel								
2462.000	109.74	-8.77	100.97	N/A	N/A	197	94	peak
2462.000	99.24	-8.77	90.47	N/A	N/A	197	94	AVG
2484.112	73.13	-8.44	64.69	74.00	-9.31	197	94	peak
2484.112	55.46	-8.44	47.02	54.00	-6.98	197	94	AVG
4924.000	53.60	-1.63	51.97	74.00	-22.03	133	147	peak
4924.000	40.60	-1.63	38.97	54.00	-15.03	133	147	AVG
7386.000	48.77	5.20	53.97	74.00	-20.03	189	326	peak
7386.000	35.33	5.20	40.53	54.00	-13.47	189	326	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low channel								
2388.176	80.03	-9.47	70.56	74.00	-3.44	150	198	peak
2388.176	61.46	-9.47	51.99	54.00	-2.01	150	198	AVG
2412.000	116.65	-9.28	107.37	N/A	N/A	150	198	peak
2412.000	106.05	-9.28	96.77	N/A	N/A	150	198	AVG
4824.000	48.19	-2.15	46.04	74.00	-27.96	130	137	peak
4824.000	35.18	-2.15	33.03	54.00	-20.97	130	137	AVG
7236.000	45.57	4.55	50.12	74.00	-23.88	152	49	peak
7236.000	30.73	4.55	35.28	54.00	-18.72	152	49	AVG
G Mode, Middle channel								
2437.000	119.52	-9.06	110.46	N/A	N/A	153	292	peak
2437.000	109.58	-9.06	100.52	N/A	N/A	153	292	AVG
4874.000	52.47	-1.92	50.55	74.00	-23.45	151	165	peak
4874.000	39.49	-1.92	37.57	54.00	-16.43	151	165	AVG
7311.000	54.99	5.08	60.07	74.00	-13.93	216	1	peak
7311.000	39.30	5.08	44.38	54.00	-9.62	216	1	AVG
G Mode, High channel								
2462.000	117.03	-8.77	108.26	N/A	N/A	147	304	peak
2462.000	106.69	-8.77	97.92	N/A	N/A	147	304	AVG
2484.256	80.79	-8.44	72.35	74.00	-1.65	147	304	peak
2484.256	60.27	-8.44	51.83	54.00	-2.17	147	304	AVG
4924.000	52.92	-1.63	51.29	74.00	-22.71	151	181	peak
4924.000	39.63	-1.63	38.00	54.00	-16.00	151	181	AVG
7386.000	50.30	5.20	55.50	74.00	-18.50	212	310	peak
7386.000	34.60	5.20	39.80	54.00	-14.20	212	310	AVG

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

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2389.408	75.81	-9.46	66.35	74.00	-7.65	186	102	peak
2389.408	57.16	-9.46	47.70	54.00	-6.30	186	102	AVG
2412.000	107.53	-9.28	98.25	N/A	N/A	186	102	peak
2412.000	97.08	-9.28	87.80	N/A	N/A	186	102	AVG
4824.000	55.13	-2.15	52.98	74.00	-21.02	211	144	peak
4824.000	40.01	-2.15	37.86	54.00	-16.14	211	144	AVG
7236.000	49.61	4.55	54.16	74.00	-19.84	169	14	peak
7236.000	34.62	4.55	39.17	54.00	-14.83	169	14	AVG
N20 Mode, Middle channel								
2437.000	109.62	-9.06	100.56	N/A	N/A	200	98	peak
2437.000	99.58	-9.06	90.52	N/A	N/A	200	98	AVG
4874.000	57.18	-1.92	55.26	74.00	-18.74	213	137	peak
4874.000	42.73	-1.92	40.81	54.00	-13.19	213	137	AVG
7311.000	51.98	5.08	57.06	74.00	-16.94	193	310	peak
7311.000	37.13	5.08	42.21	54.00	-11.79	193	310	AVG
N20 Mode, High channel								
2462.000	108.04	-8.77	99.27	N/A	N/A	195	97	peak
2462.000	98.07	-8.77	89.30	N/A	N/A	195	97	AVG
2483.632	71.33	-8.45	62.88	74.00	-11.12	195	97	peak
2483.632	54.03	-8.45	45.58	54.00	-8.42	195	97	AVG
4924.000	52.60	-1.63	50.97	74.00	-23.03	212	173	peak
4924.000	37.97	-1.63	36.34	54.00	-17.66	212	173	AVG
7386.000	45.50	5.20	50.70	74.00	-23.30	183	301	peak
7386.000	31.63	5.20	36.83	54.00	-17.17	183	301	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2389.744	82.29	-9.46	72.83	74.00	-1.17	141	302	peak
2389.744	61.96	-9.46	52.50	54.00	-1.50	141	302	AVG
2412.000	115.62	-9.28	106.34	N/A	N/A	141	302	peak
2412.000	105.10	-9.28	95.82	N/A	N/A	141	302	AVG
4824.000	51.52	-2.15	49.37	74.00	-24.63	142	152	peak
4824.000	37.35	-2.15	35.20	54.00	-18.80	142	152	AVG
7236.000	52.08	4.55	56.63	74.00	-17.37	187	353	peak
7236.000	34.61	4.55	39.16	54.00	-14.84	187	353	AVG
N20 Mode, Middle channel								
2437.000	120.53	-9.06	111.47	N/A	N/A	150	303	peak
2437.000	110.66	-9.06	101.60	N/A	N/A	150	303	AVG
4874.000	52.71	-1.92	50.79	74.00	-23.21	148	155	peak
4874.000	38.97	-1.92	37.05	54.00	-16.95	148	155	AVG
7311.000	55.50	5.08	60.58	74.00	-13.42	217	356	peak
7311.000	38.76	5.08	43.84	54.00	-10.16	217	356	AVG
N20 Mode, High channel								
2462.000	117.64	-8.77	108.87	N/A	N/A	159	167	peak
2462.000	107.82	-8.77	99.05	N/A	N/A	159	167	AVG
2484.832	79.62	-8.43	71.19	74.00	-2.81	159	167	peak
2484.832	60.13	-8.43	51.70	54.00	-2.30	159	167	AVG
4924.000	52.36	-1.63	50.73	74.00	-23.27	162	145	peak
4924.000	37.54	-1.63	35.91	54.00	-18.09	162	145	AVG
7386.000	50.97	5.20	56.17	74.00	-17.83	179	352	peak
7386.000	34.17	5.20	39.37	54.00	-14.63	179	352	AVG

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

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
2386.164	72.89	-9.49	63.40	74.00	-10.60	192	100	peak
2386.164	57.47	-9.49	47.98	54.00	-6.02	192	100	AVG
2422.000	101.44	-9.18	92.26	N/A	N/A	192	100	peak
2422.000	91.77	-9.18	82.59	N/A	N/A	192	100	AVG
4844.000	48.50	-2.11	46.39	74.00	-27.61	213	150	peak
4844.000	35.67	-2.11	33.56	54.00	-20.44	213	150	AVG
7266.000	44.49	4.83	49.32	74.00	-24.68	162	311	peak
7266.000	31.46	4.83	36.29	54.00	-17.71	162	311	AVG
N40 Mode, Middle channel								
2437.000	106.37	-9.06	97.31	N/A	N/A	193	103	peak
2437.000	96.61	-9.06	87.55	N/A	N/A	193	103	AVG
4874.000	53.77	-1.92	51.85	74.00	-22.15	216	158	peak
4874.000	40.98	-1.92	39.06	54.00	-14.94	216	158	AVG
7311.000	46.64	5.08	51.72	74.00	-22.28	200	302	peak
7311.000	33.71	5.08	38.79	54.00	-15.21	200	302	AVG
N40 Mode, High channel								
2452.000	101.50	-8.92	92.58	N/A	N/A	182	103	peak
2452.000	91.46	-8.92	82.54	N/A	N/A	182	103	AVG
2489.732	69.11	-8.36	60.75	74.00	-13.25	182	103	peak
2489.732	54.92	-8.36	46.56	54.00	-7.44	182	103	AVG
4904.000	46.14	-1.71	44.43	74.00	-29.57	149	222	peak
4904.000	33.72	-1.71	32.01	54.00	-21.99	149	222	AVG
7356.000	43.56	5.18	48.74	74.00	-25.26	156	338	peak
7356.000	31.10	5.18	36.28	54.00	-17.72	156	338	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
2387.220	78.56	-9.48	69.08	74.00	-4.92	177	317	peak
2387.220	62.47	-9.48	52.99	54.00	-1.01	177	317	AVG
2422.000	109.05	-9.18	99.87	N/A	N/A	177	317	peak
2422.000	98.91	-9.18	89.73	N/A	N/A	177	317	AVG
4844.000	46.29	-2.11	44.18	74.00	-29.82	155	156	peak
4844.000	33.72	-2.11	31.61	54.00	-22.39	155	156	AVG
7266.000	44.64	4.83	49.47	74.00	-24.53	152	316	peak
7266.000	31.23	4.83	36.06	54.00	-17.94	152	316	AVG
N40 Mode, Middle channel								
2437.000	116.83	-9.06	107.77	N/A	N/A	150	195	peak
2437.000	107.03	-9.06	97.97	N/A	N/A	150	195	AVG
4874.000	51.39	-1.92	49.47	74.00	-24.53	149	171	peak
4874.000	38.65	-1.92	36.73	54.00	-17.27	149	171	AVG
7311.000	50.56	5.08	55.64	74.00	-18.36	203	346	peak
7311.000	36.57	5.08	41.65	54.00	-12.35	203	346	AVG
N40 Mode, High channel								
2452.000	112.00	-8.92	103.08	N/A	N/A	160	165	peak
2452.000	102.08	-8.92	93.16	N/A	N/A	160	165	AVG
2484.496	76.58	-8.44	68.14	74.00	-5.86	160	165	peak
2484.496	61.28	-8.44	52.84	54.00	-1.16	160	165	AVG
4904.000	46.70	-1.71	44.99	74.00	-29.01	166	235	peak
4904.000	33.81	-1.71	32.10	54.00	-21.90	166	235	AVG
7356.000	44.49	5.18	49.67	74.00	-24.33	150	151	peak
7356.000	31.25	5.18	36.43	54.00	-17.57	150	151	AVG

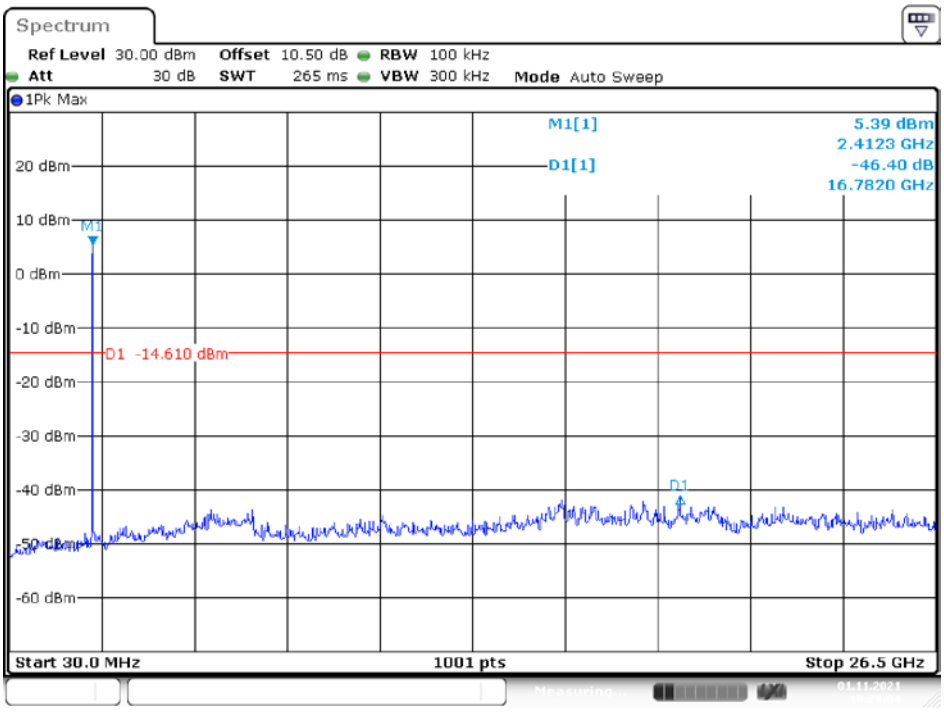
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

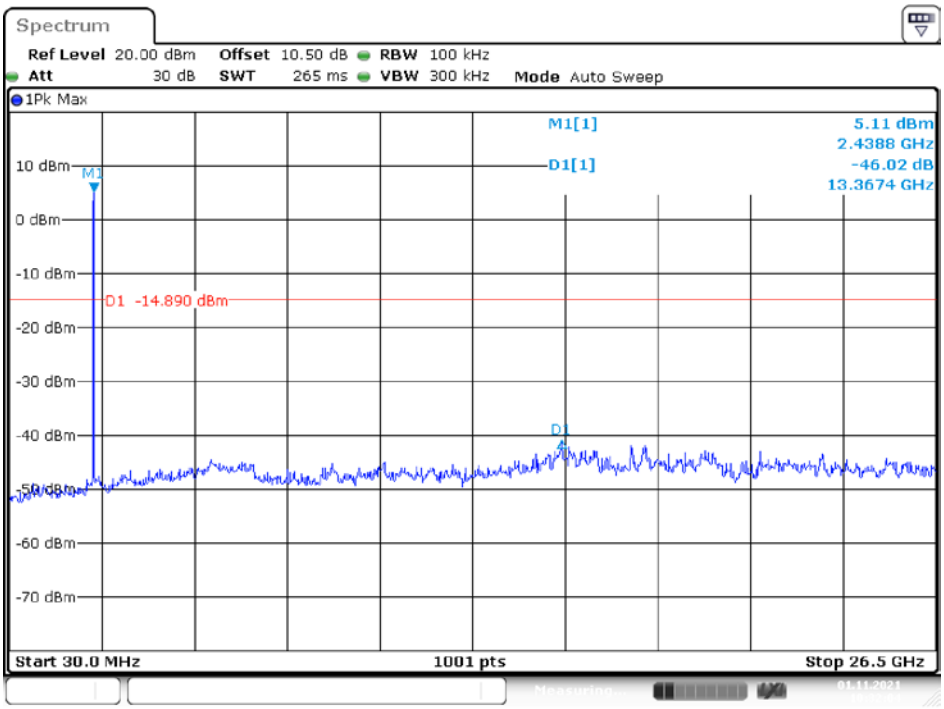
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	46.40	≥ 20	PASS
Middle	2437	46.02	≥ 20	PASS
High	2462	45.86	≥ 20	PASS
G Mode				
Low	2412	44.44	≥ 20	PASS
Middle	2437	44.08	≥ 20	PASS
High	2462	44.61	≥ 20	PASS
N20 Mode				
Low	2412	42.14	≥ 20	PASS
Middle	2437	46.51	≥ 20	PASS
High	2462	41.76	≥ 20	PASS
N40 Mode				
Low	2422	42.38	≥ 20	PASS
Middle	2437	42.97	≥ 20	PASS
High	2452	40.38	≥ 20	PASS

B Mode

Low Channel

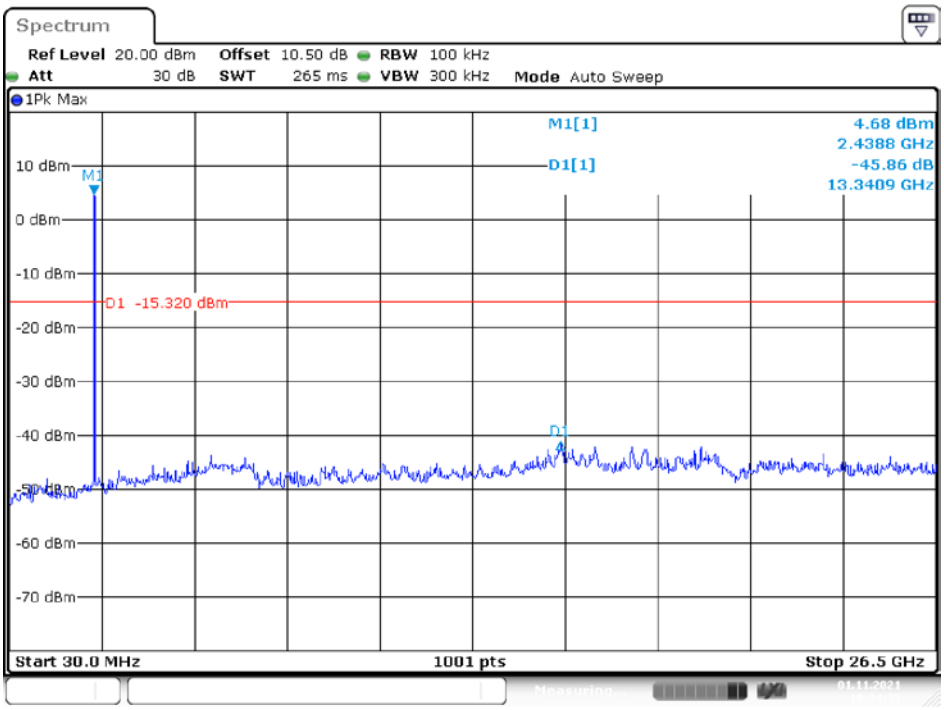


Middle Channel



Date: 1.NOV.2021 10:32:05

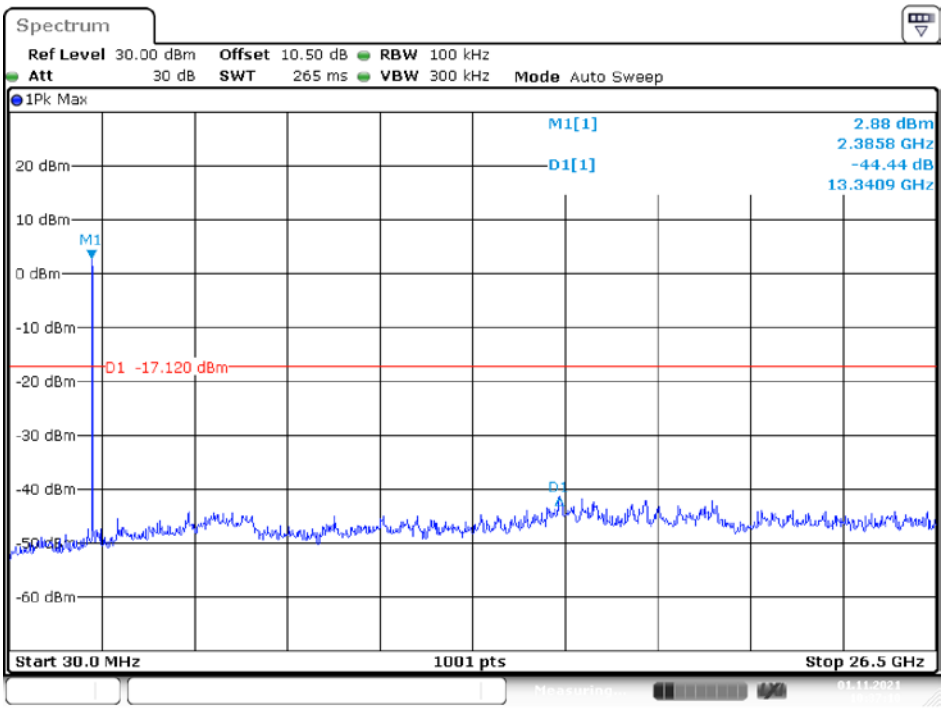
High Channel



Date: 1.NOV.2021 10:34:35

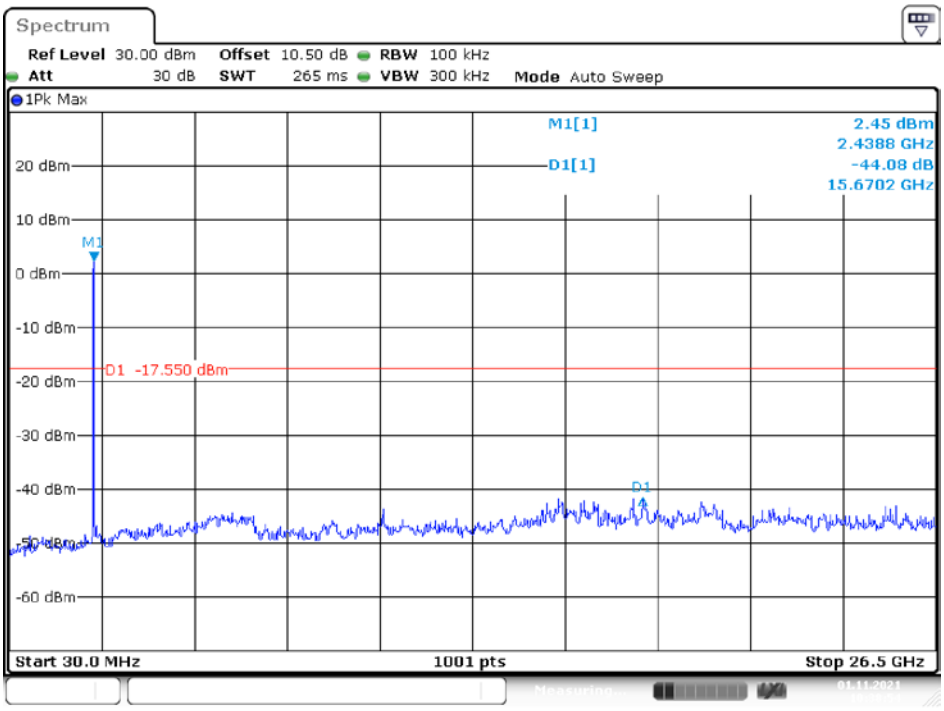
G Mode

Low Channel



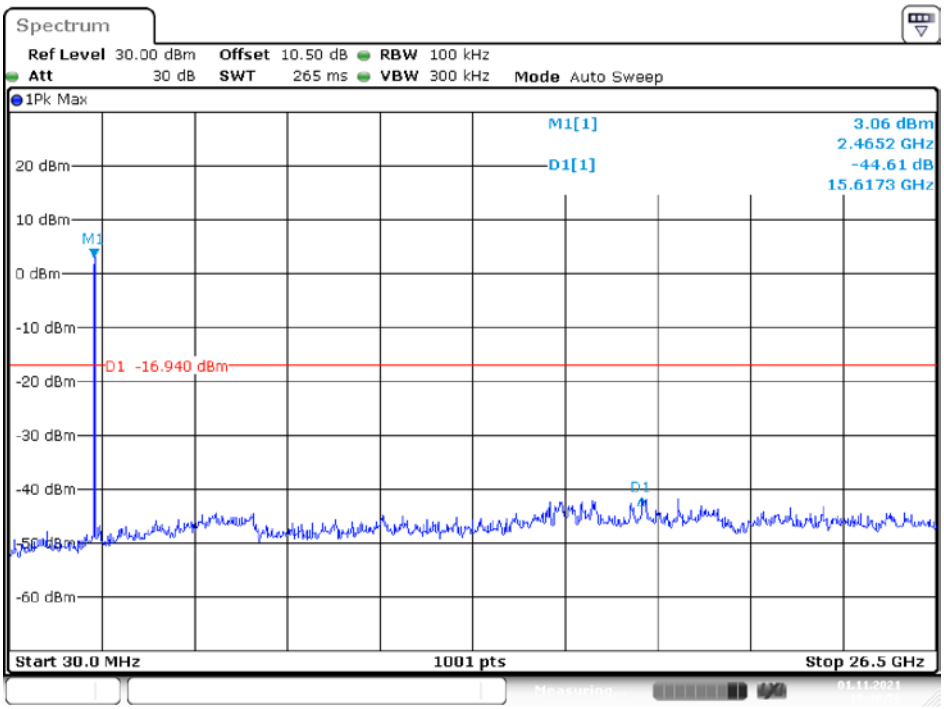
Date: 1.NOV.2021 10:37:11

Middle Channel



Date: 1.NOV.2021 10:38:55

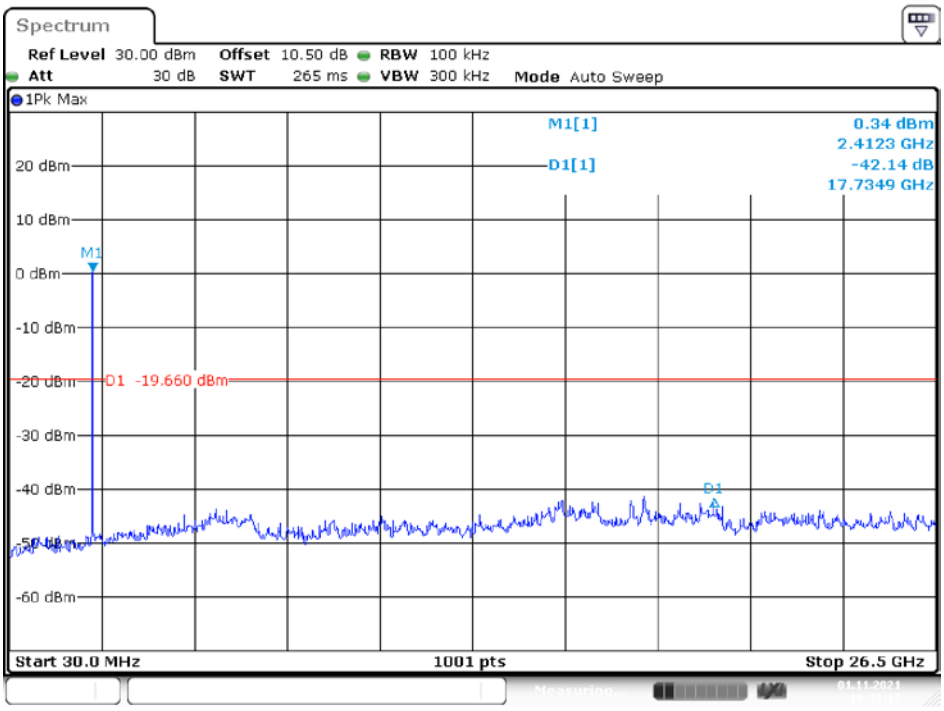
High Channel



Date: 1.NOV.2021 10:40:57

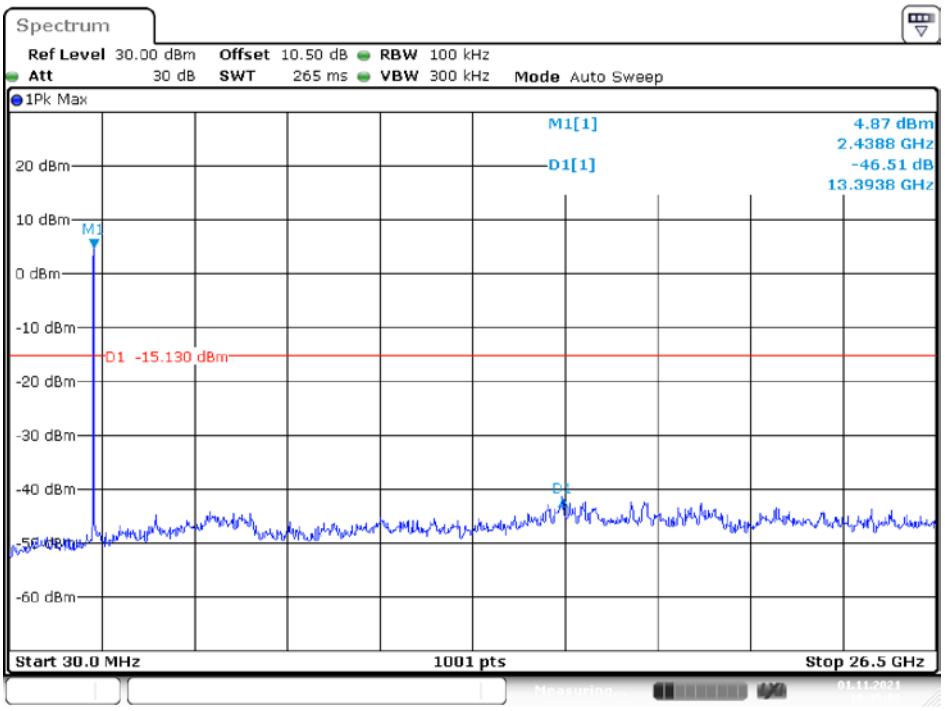
N20 Mode

Low Channel



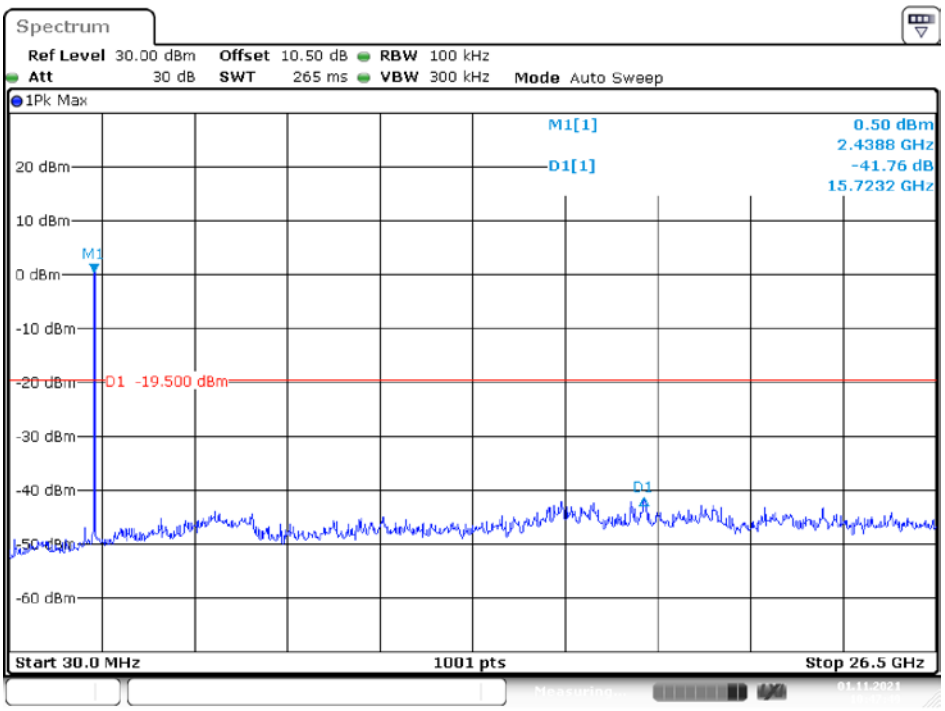
Date: 1.NOV.2021 10:43:17

Middle Channel



Date: 1.NOV.2021 10:45:00

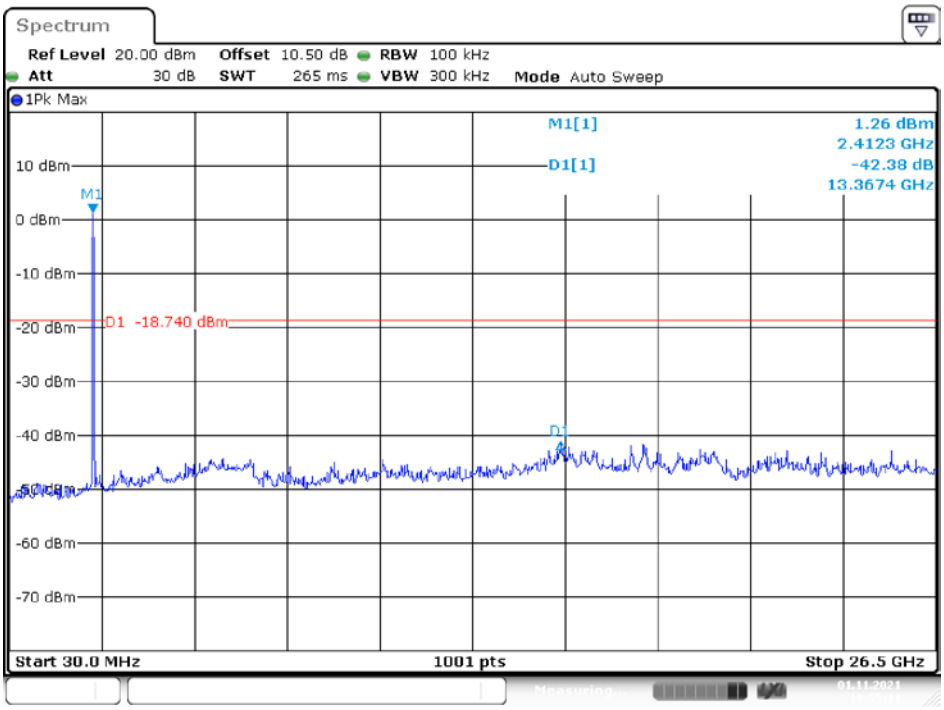
High Channel



Date: 1.NOV.2021 10:47:50

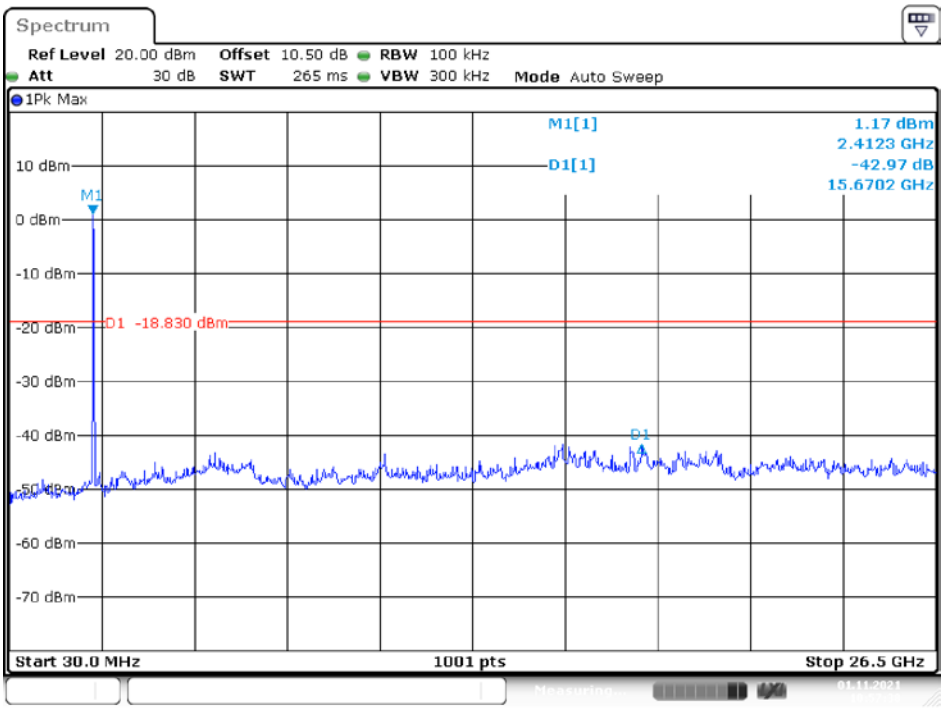
N40 Mode

Low Channel



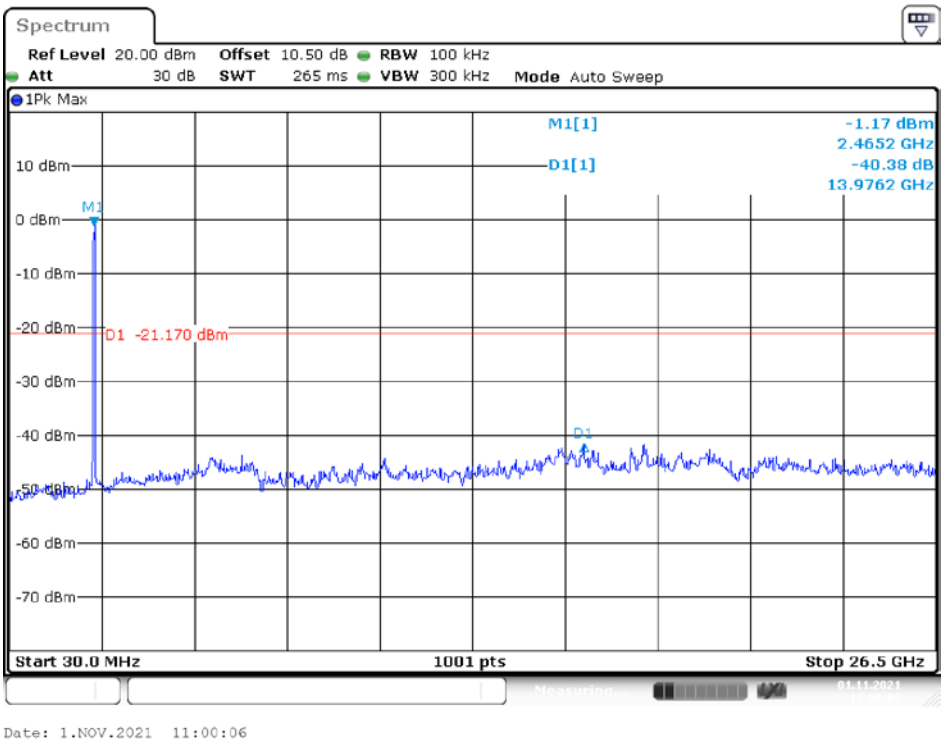
Date: 1.NOV.2021 10:55:12

Middle Channel



Date: 1.NOV.2021 10:57:38

High Channel



Date: 1.NOV.2021 11:00:06

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

9.1 Applicable Standard

According to FCC §15.247(a)(2).

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

9.2 Test Procedure

The steps for the first option are as follows:

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

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

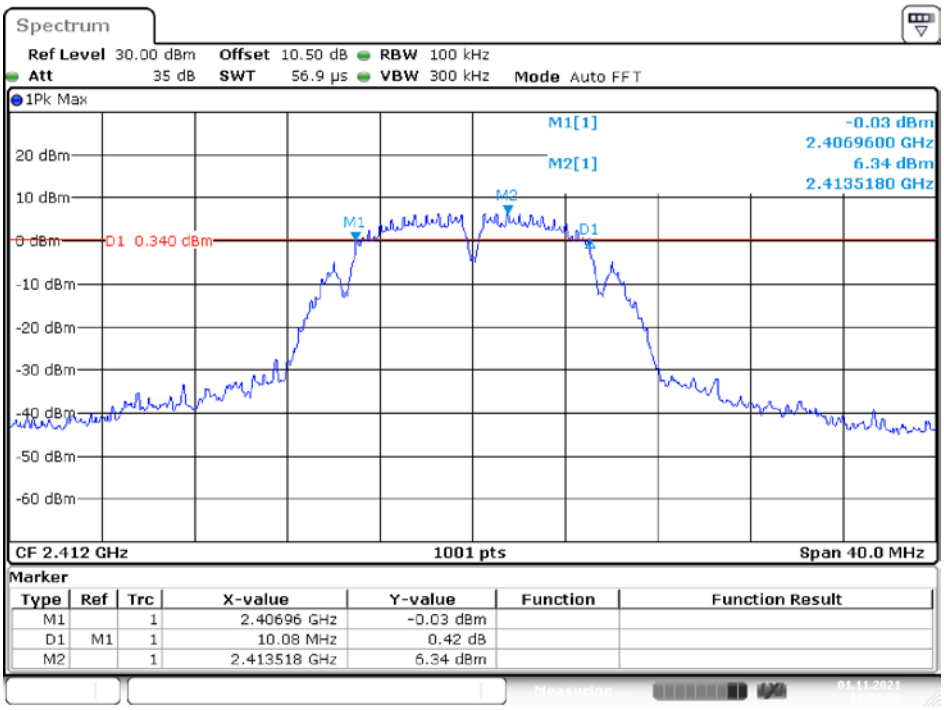
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
B Mode				
Low	2412	10.08	> 500	PASS
Middle	2437	10.08	> 500	PASS
High	2462	10.08	> 500	PASS
G Mode				
Low	2412	16.32	> 500	PASS
Middle	2437	16.32	> 500	PASS
High	2462	16.32	> 500	PASS
N20 Mode				
Low	2412	17.04	> 500	PASS
Middle	2437	17.04	> 500	PASS
High	2462	17.04	> 500	PASS
N40 Mode				
Low	2422	35.76	> 500	PASS
Middle	2437	35.76	> 500	PASS
High	2452	36.00	> 500	PASS

Please refer to the following plots

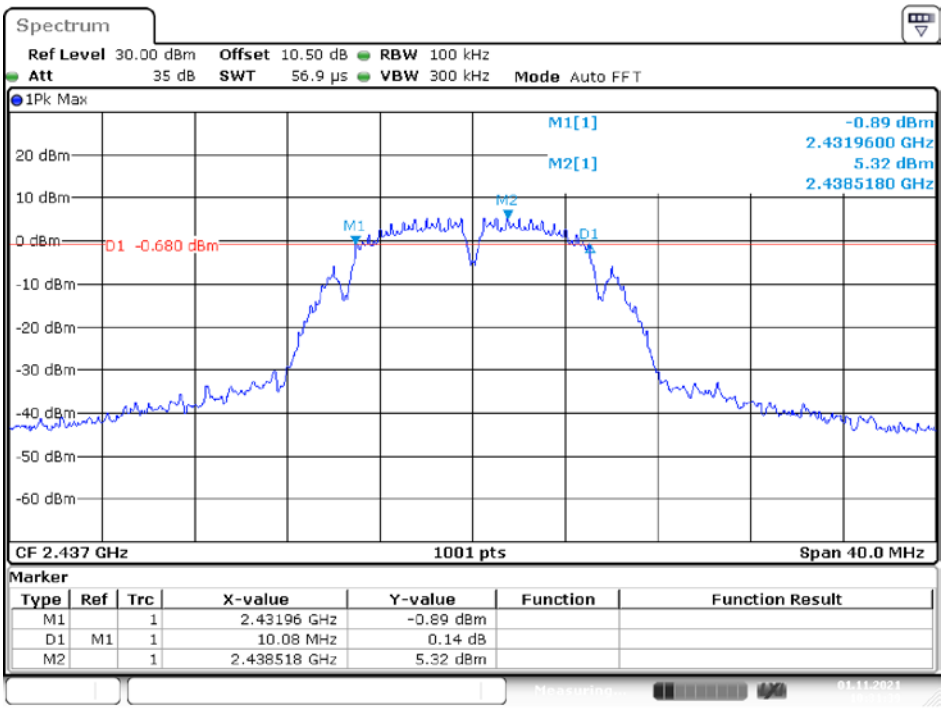
B Mode

Low Channel



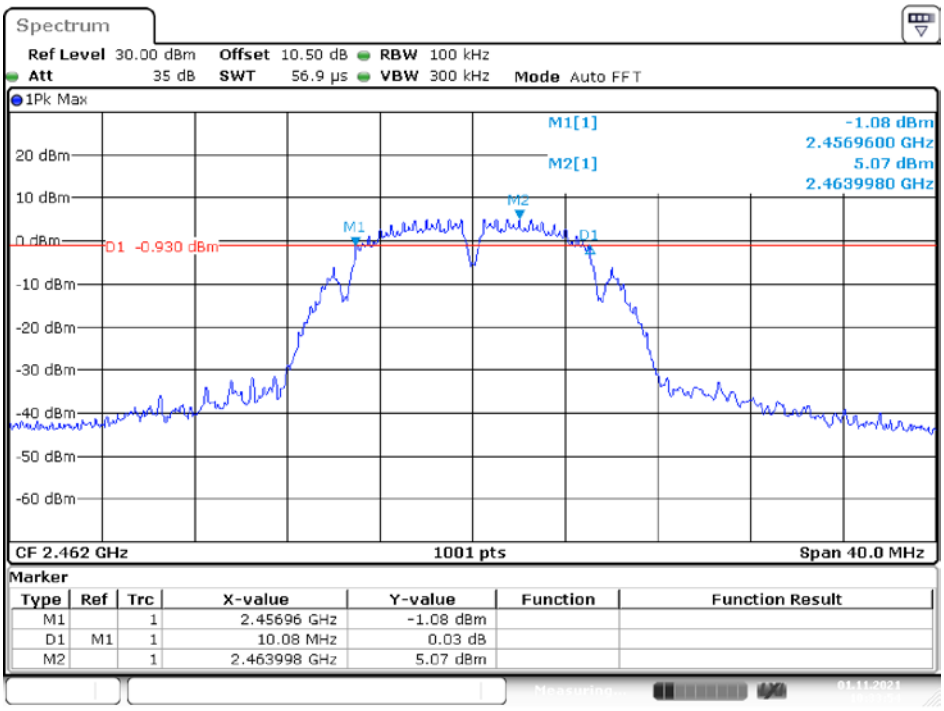
Date: 1.NOV.2021 10:28:24

Middle Channel



Date: 1.NOV.2021 10:31:40

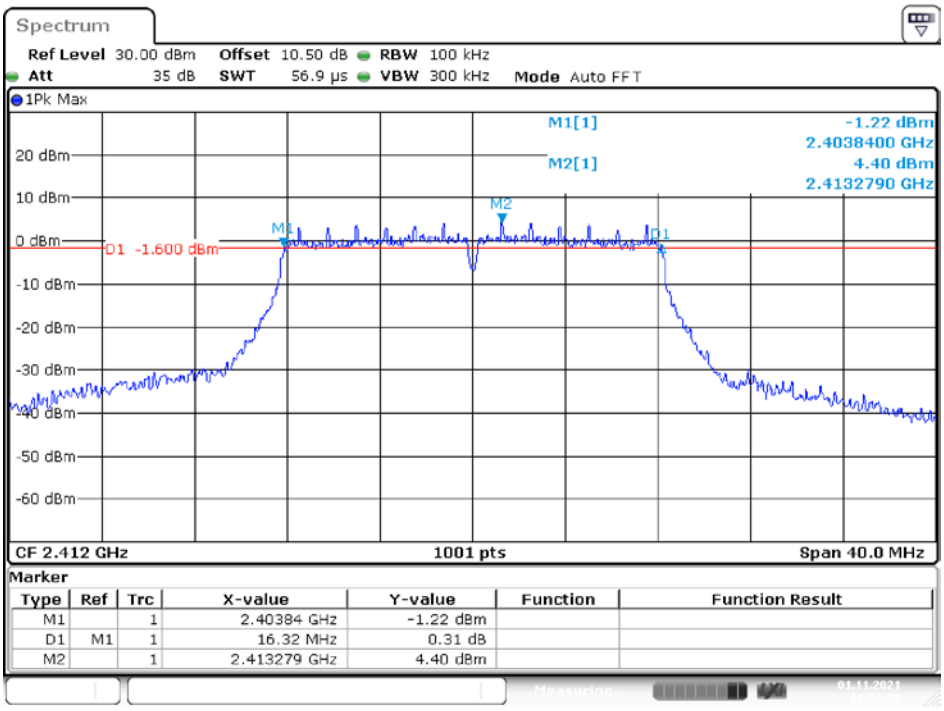
High Channel



Date: 1.NOV.2021 10:33:55

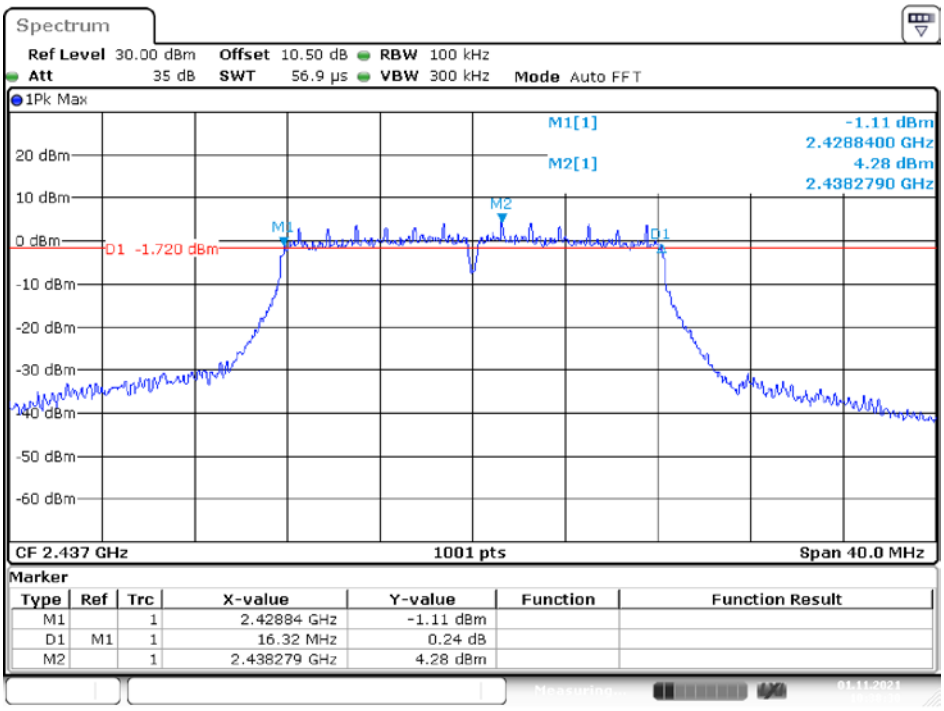
G Mode

Low Channel



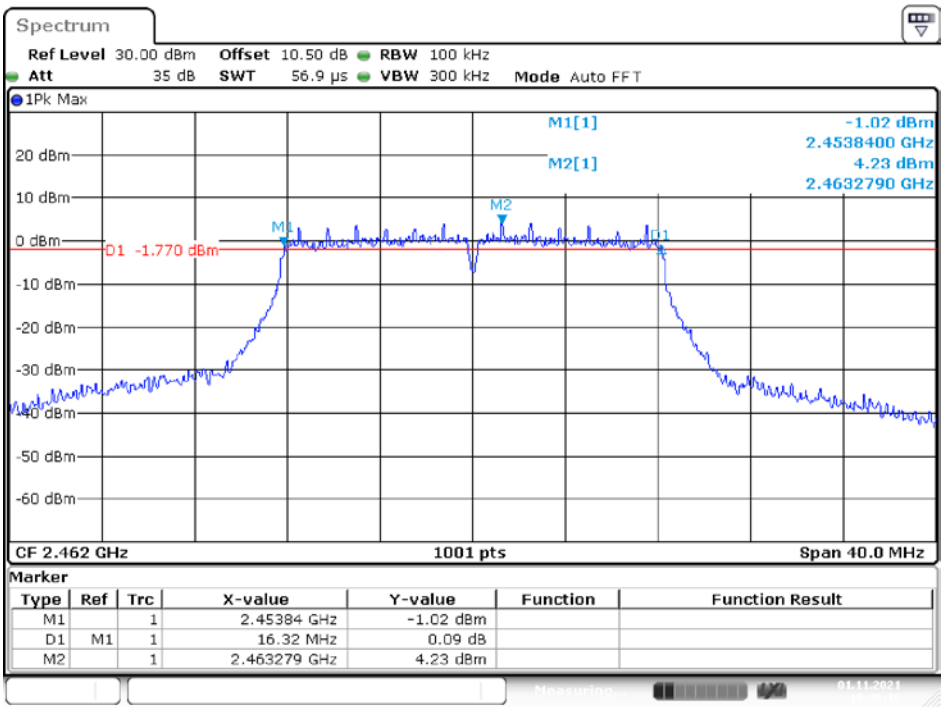
Date: 1.NOV.2021 10:36:30

Middle Channel



Date: 1.NOV.2021 10:38:30

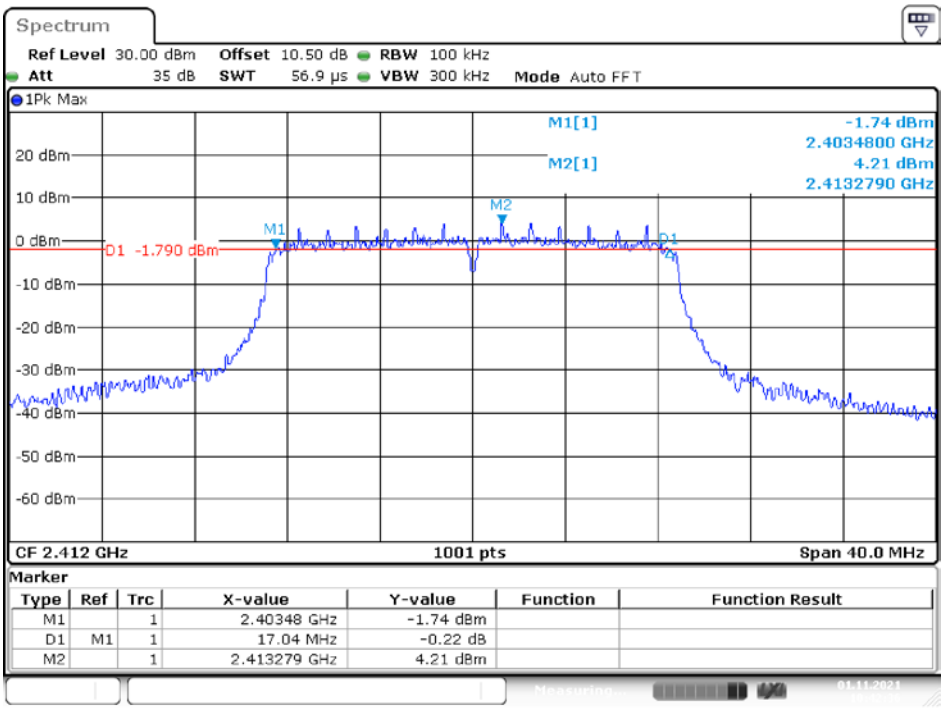
High Channel



Date: 1.NOV.2021 10:40:17

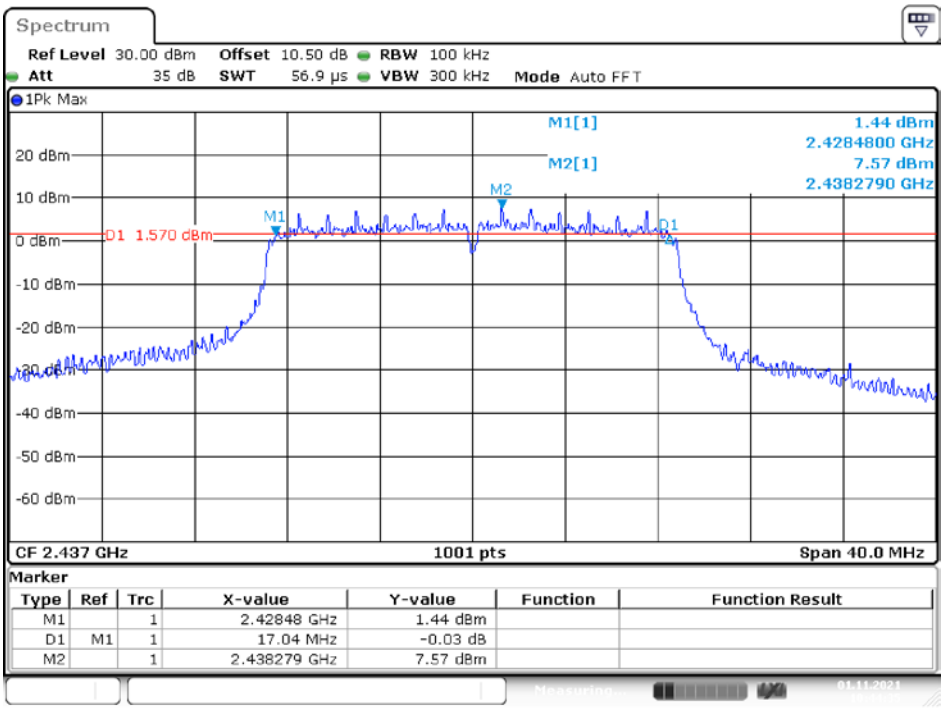
N20 Mode

Low Channel



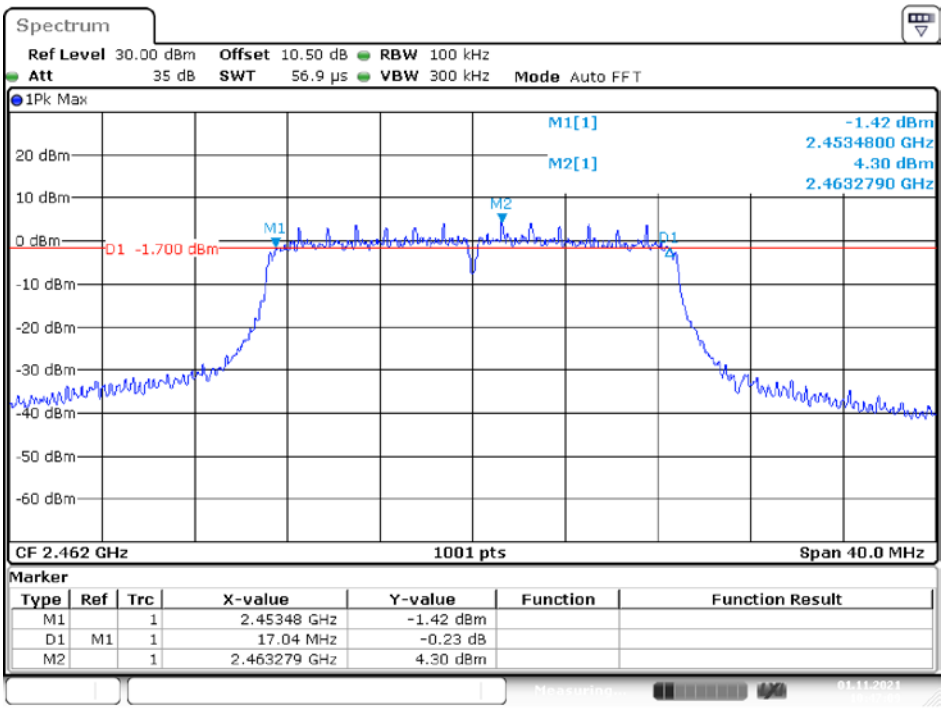
Date: 1.NOV.2021 10:42:37

Middle Channel



Date: 1.NOV.2021 10:44:35

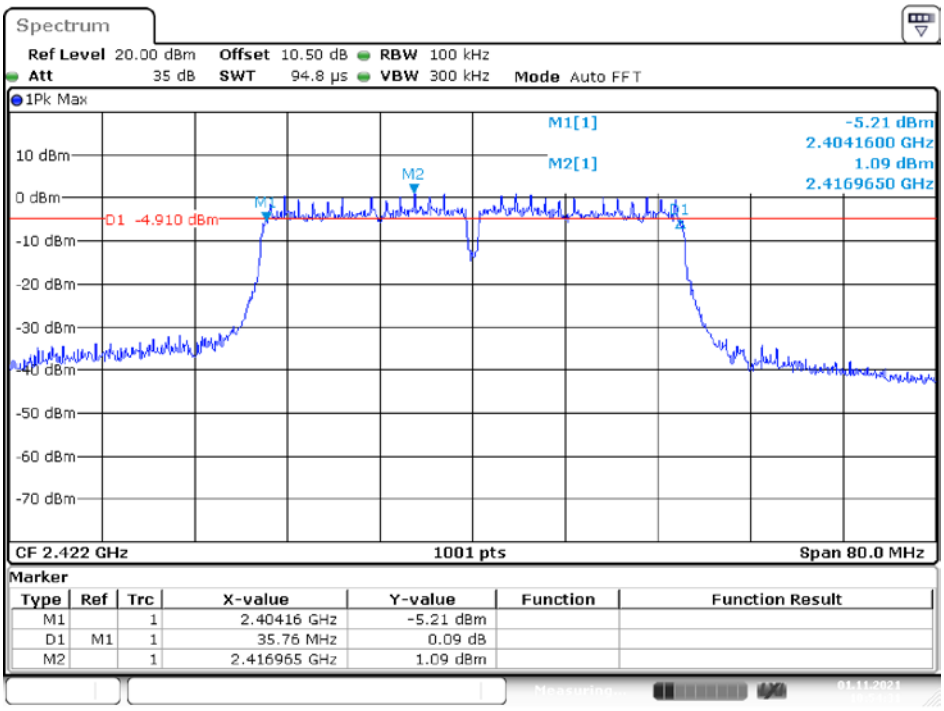
High Channel



Date: 1.NOV.2021 10:47:09

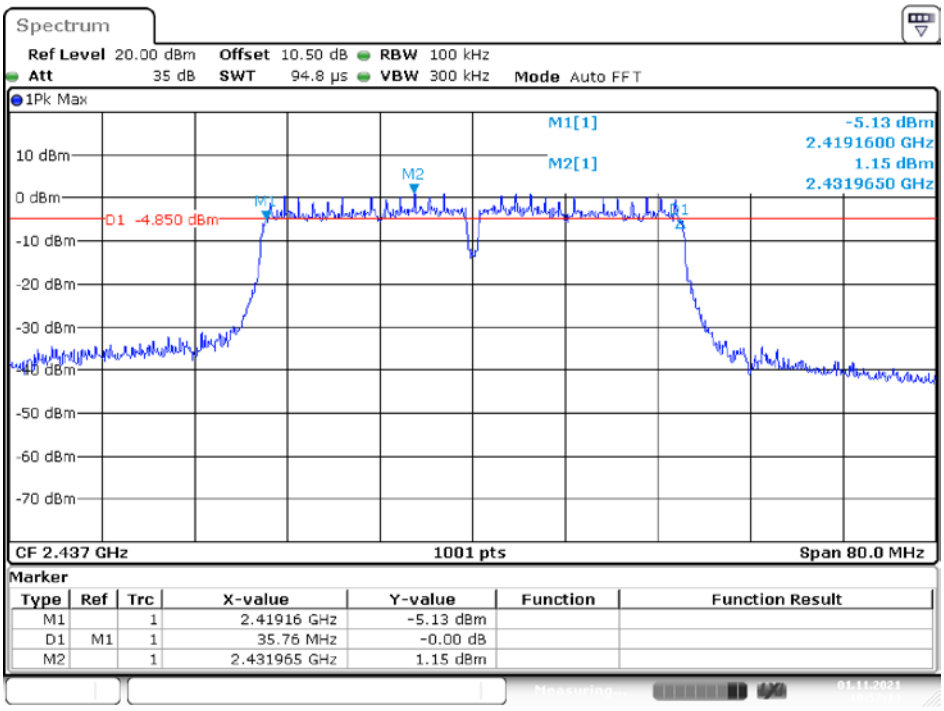
N40 Mode

Low Channel



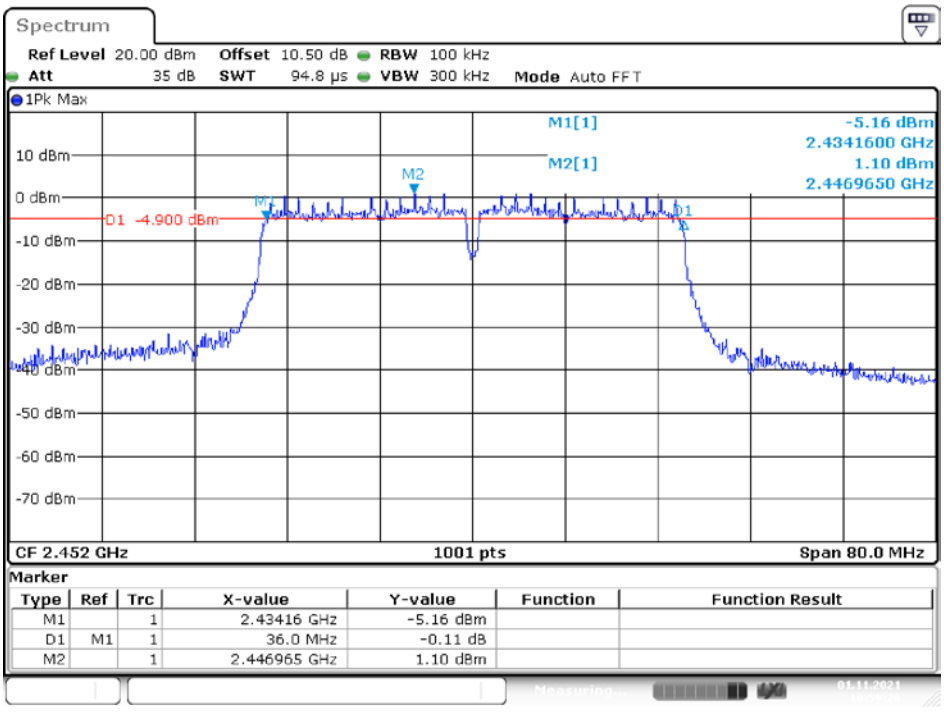
Date: 1.NOV.2021 10:54:31

Middle Channel



Date: 1.NOV.2021 10:57:14

High Channel



Date: 1.NOV.2021 10:59:26

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

10.1 Applicable Standard

According to FCC §15.247(b) (3).

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

10.2 Test Procedure

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

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

10.3 Test Results

Conducted Peak Output Power

Channel	Frequency (MHz)	Power (dBm)	Power (W)	Limit (W)	Result
802.11b Mode					
Low	2412	19.12	0.082	1	PASS
Middle	2437	18.83	0.076	1	PASS
High	2462	18.49	0.071	1	PASS
802.11g Mode					
Low	2412	24.49	0.281	1	PASS
Middle	2437	24.99	0.316	1	PASS
High	2462	24.89	0.308	1	PASS
802.11n HT20 Mode					
Low	2412	24.91	0.310	1	PASS
Middle	2437	24.75	0.299	1	PASS
High	2462	24.71	0.296	1	PASS
802.11n HT40 Mode					
Low	2422	23.09	0.204	1	PASS
Middle	2437	22.91	0.195	1	PASS
High	2452	22.89	0.195	1	PASS

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

11.1 Applicable Standard

According to FCC §15.247(d).

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

11.2 Test Procedure

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

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

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

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

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

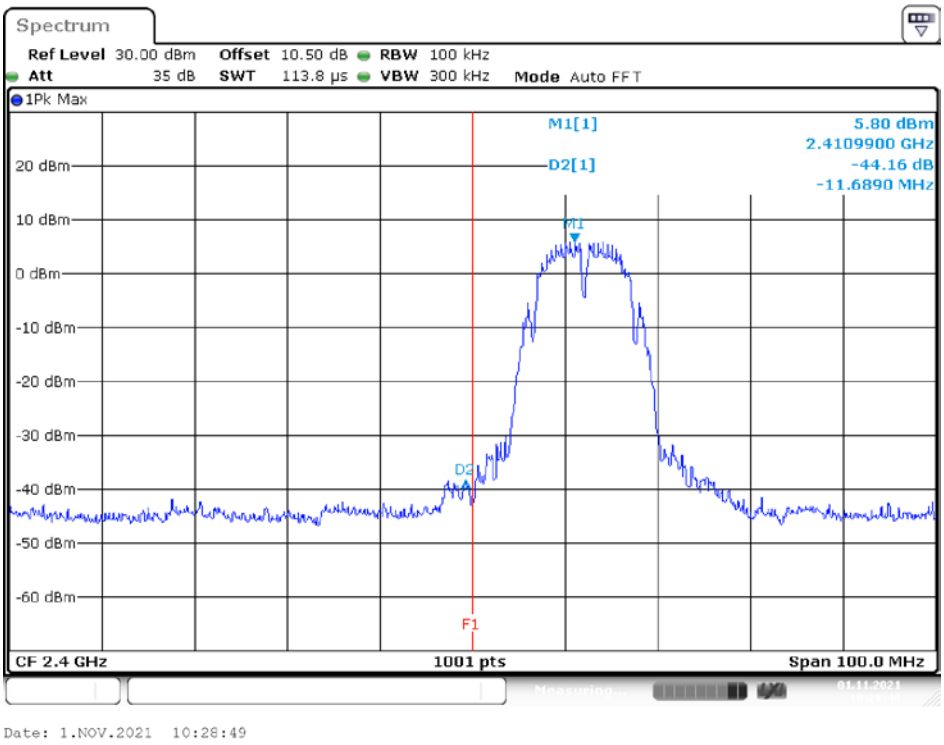
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	44.16	≥ 20	PASS
High	2462	46.46	≥ 20	PASS
G Mode				
Low	2412	35.48	≥ 20	PASS
High	2462	44.76	≥ 20	PASS
N20 Mode				
Low	2412	35.15	≥ 20	PASS
High	2462	45.57	≥ 20	PASS
N40 Mode				
Low	2422	32.98	≥ 20	PASS
High	2452	39.63	≥ 20	PASS

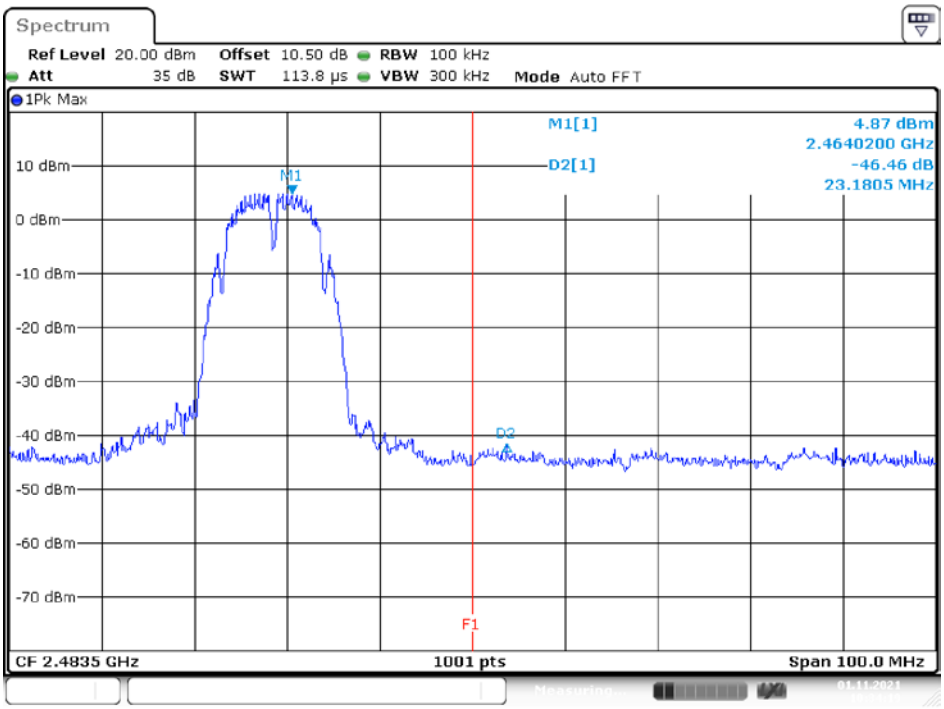
Please refer to the following plots.

B Mode

Band Edge, Left Side



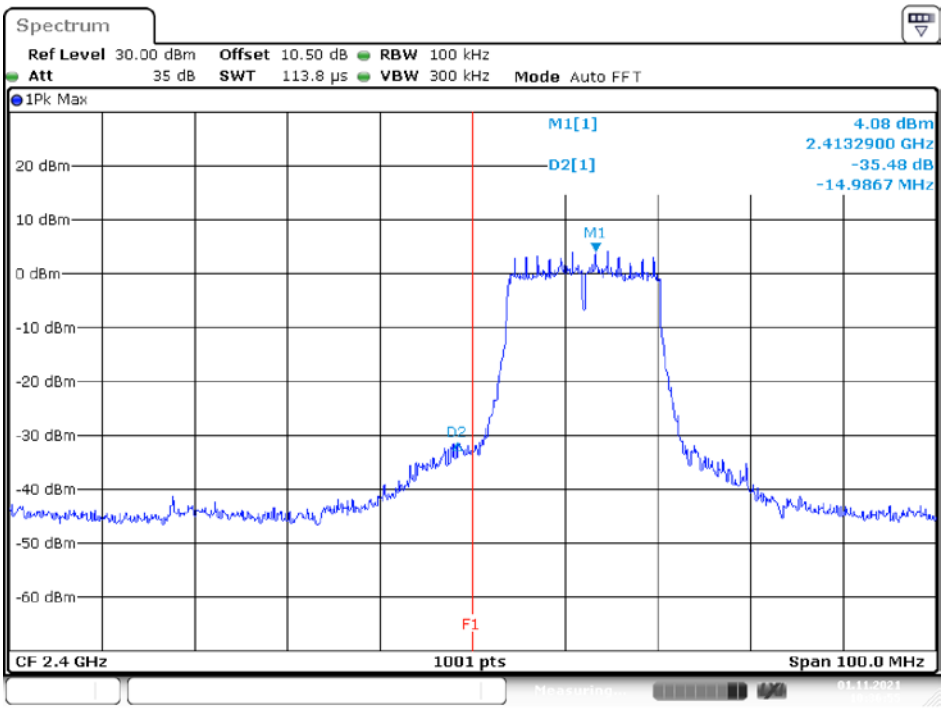
Band Edge, Right Side



Date: 1.NOV.2021 10:34:20

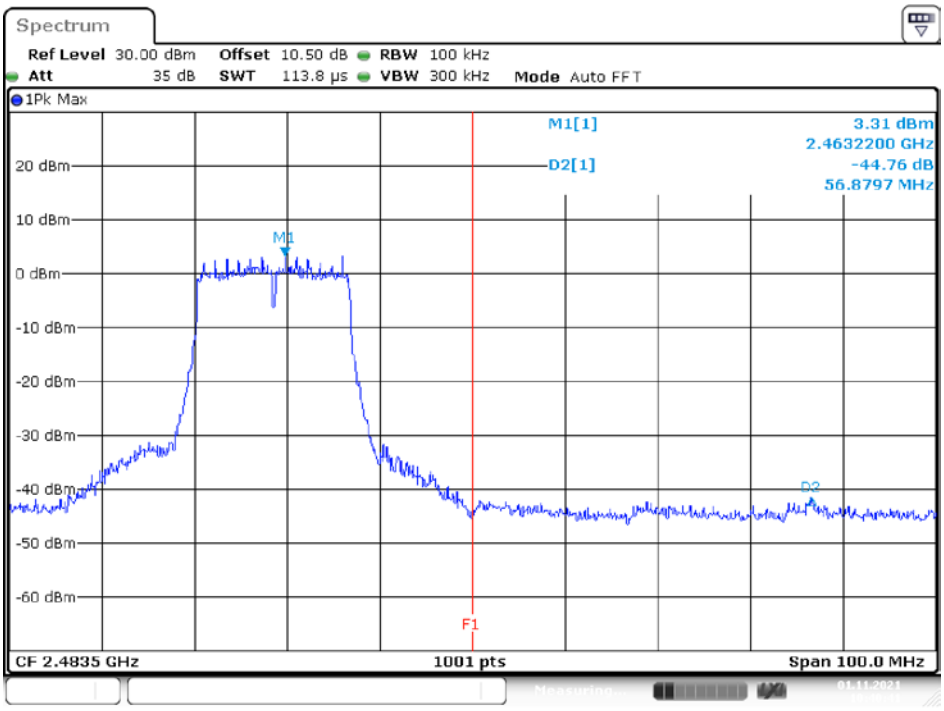
G Mode

Band Edge, Left Side



Date: 1.NOV.2021 10:36:55

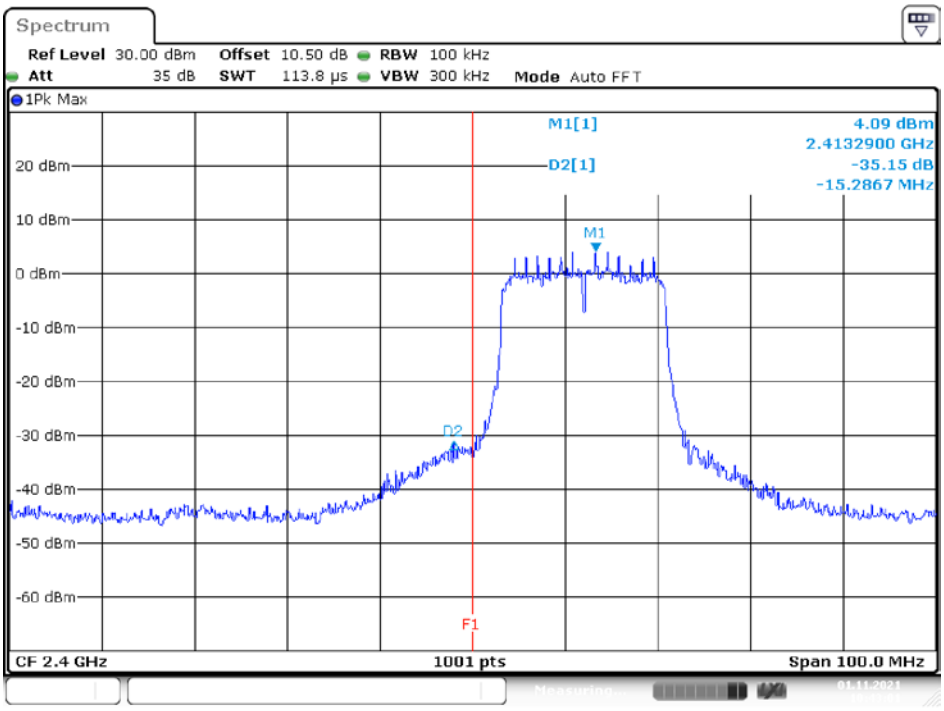
Band Edge, Right Side



Date: 1.NOV.2021 10:40:41

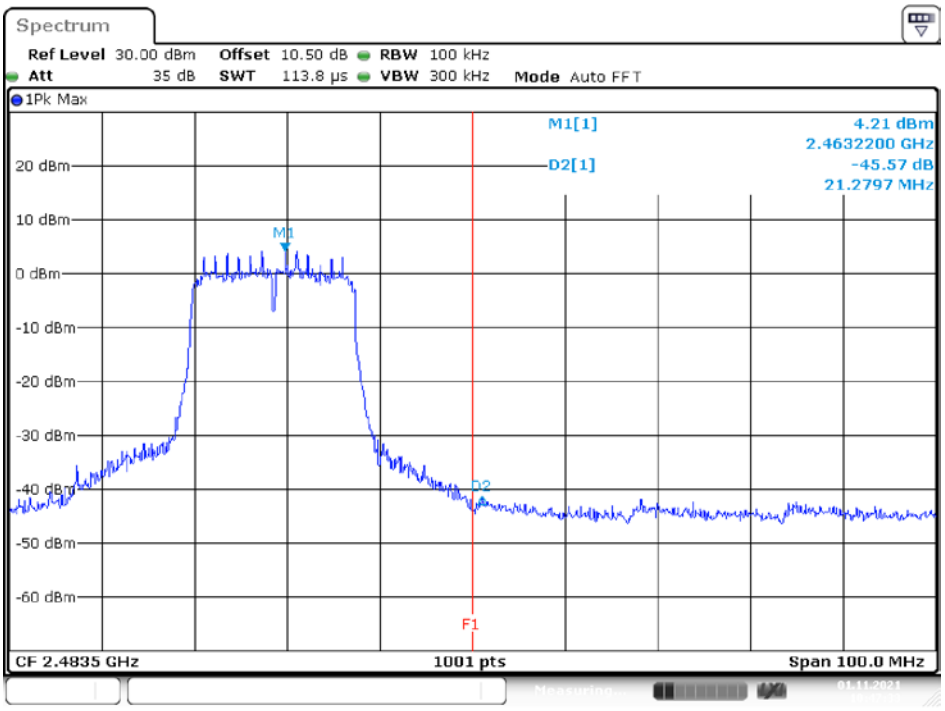
N20 Mode

Band Edge, Left Side



Date: 1.NOV.2021 10:43:02

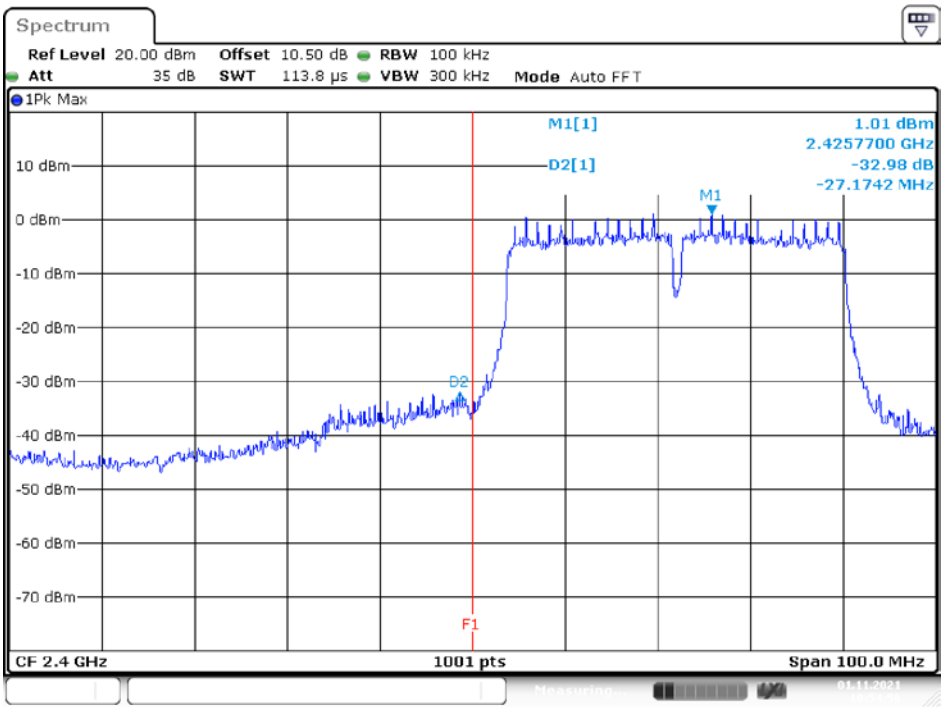
Band Edge, Right Side



Date: 1.NOV.2021 10:47:34

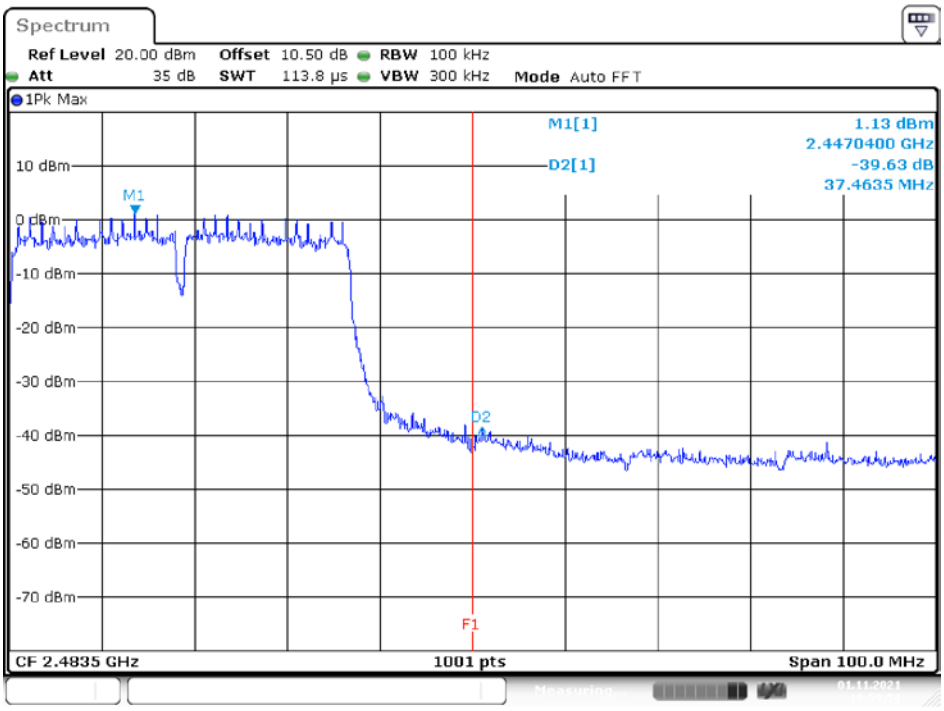
N40 Mode

Band Edge, Left Side



Date: 1.NOV.2021 10:54:56

Band Edge, Right Side



Date: 1.NOV.2021 10:59:51

12 FCC §15.247(e) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e).

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

12.2 Test Procedure

According to ANSI C63.10-2013

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

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

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

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

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

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

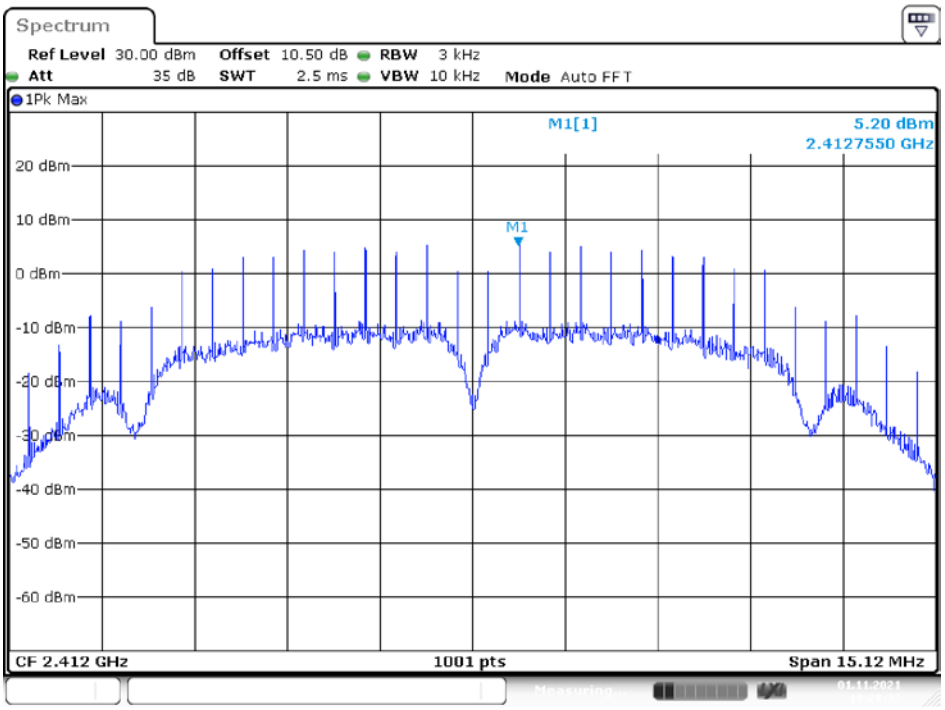
12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	5.20	8	PASS
Middle	2437	4.31	8	PASS
High	2462	4.12	8	PASS
G Mode				
Low	2412	-10.95	8	PASS
Middle	2437	-10.59	8	PASS
High	2462	-10.56	8	PASS
N20 Mode				
Low	2412	-10.60	8	PASS
Middle	2437	-9.97	8	PASS
High	2462	-10.21	8	PASS
N40 Mode				
Low	2422	-13.89	8	PASS
Middle	2437	-13.43	8	PASS
High	2452	-13.85	8	PASS

Please refer to the following plots

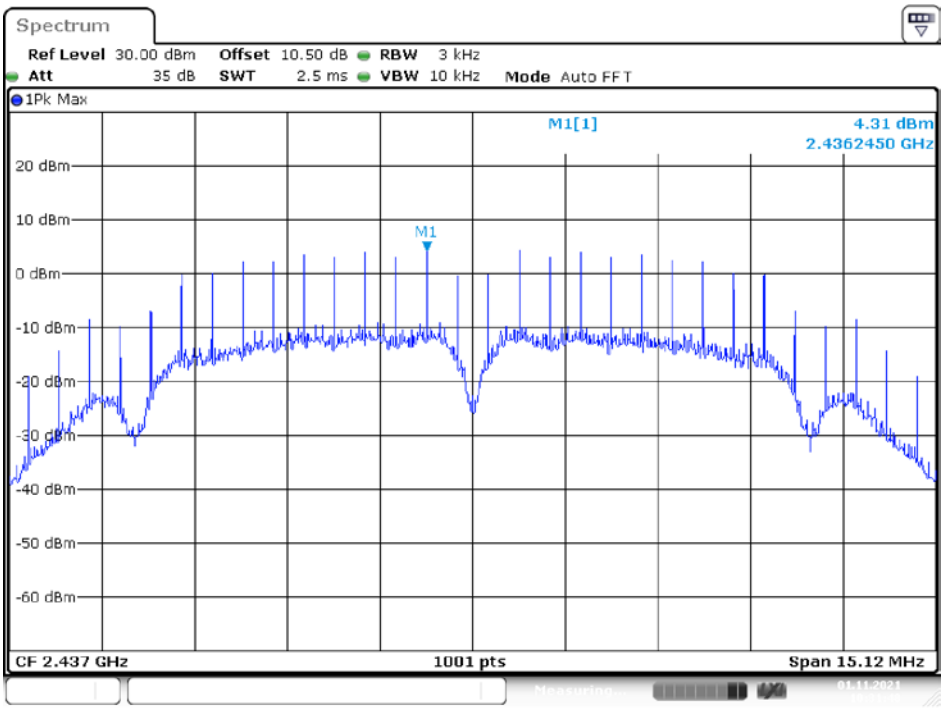
B Mode

Low Channel



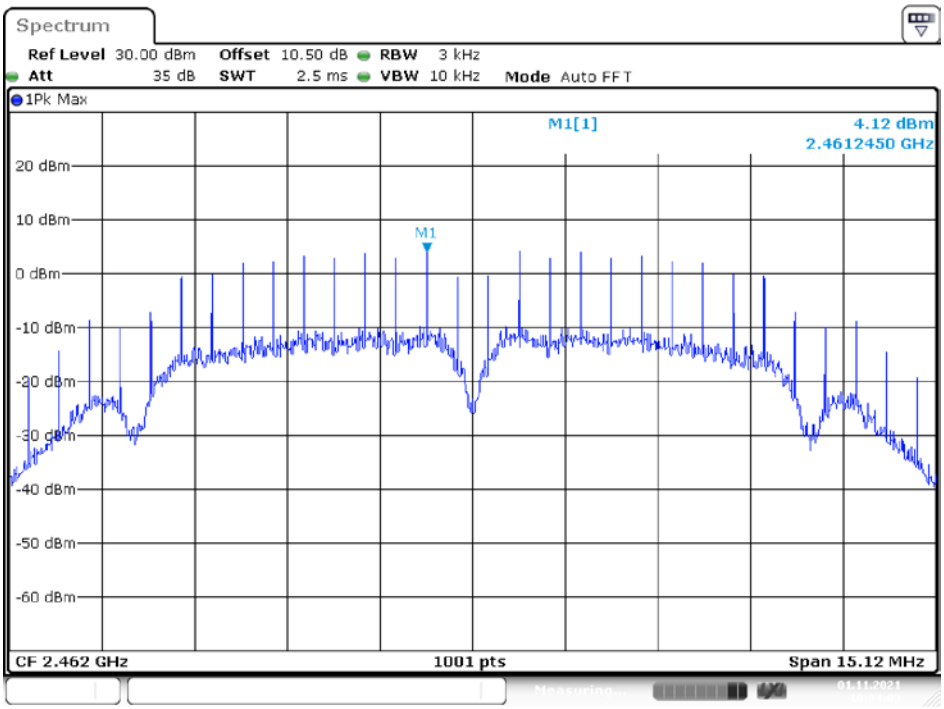
Date: 1.NOV.2021 10:28:33

Middle Channel



Date: 1.NOV.2021 10:31:49

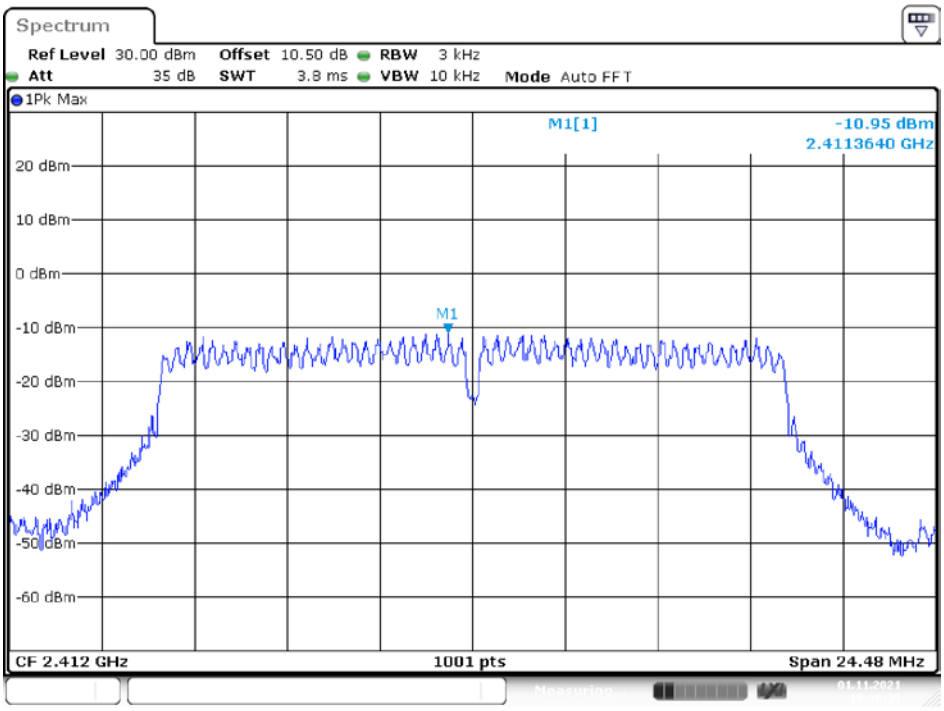
High Channel



Date: 1.NOV.2021 10:34:04

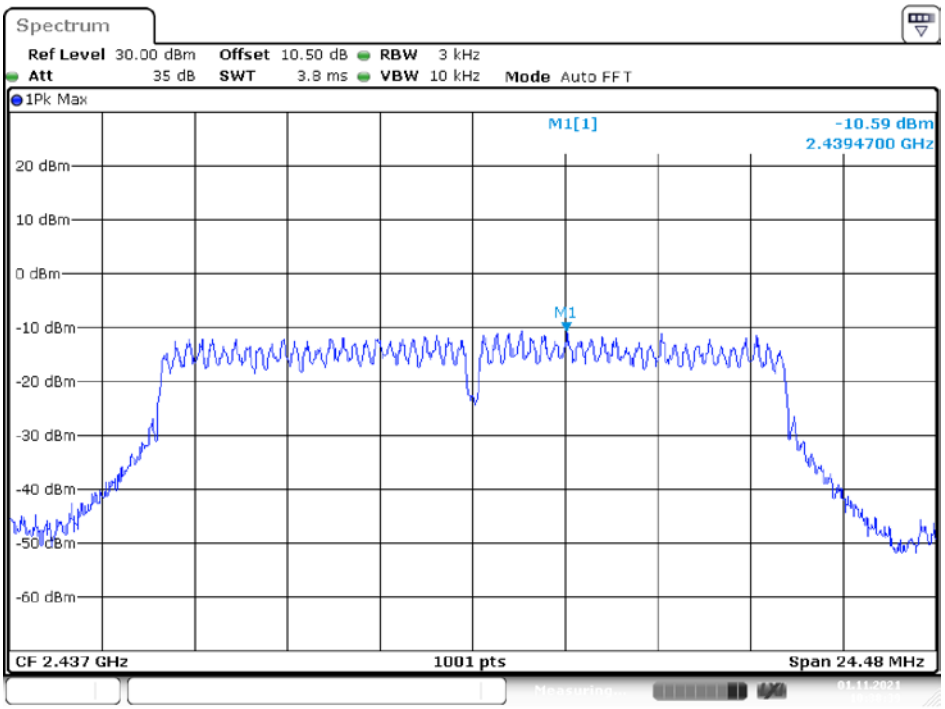
G Mode

Low Channel



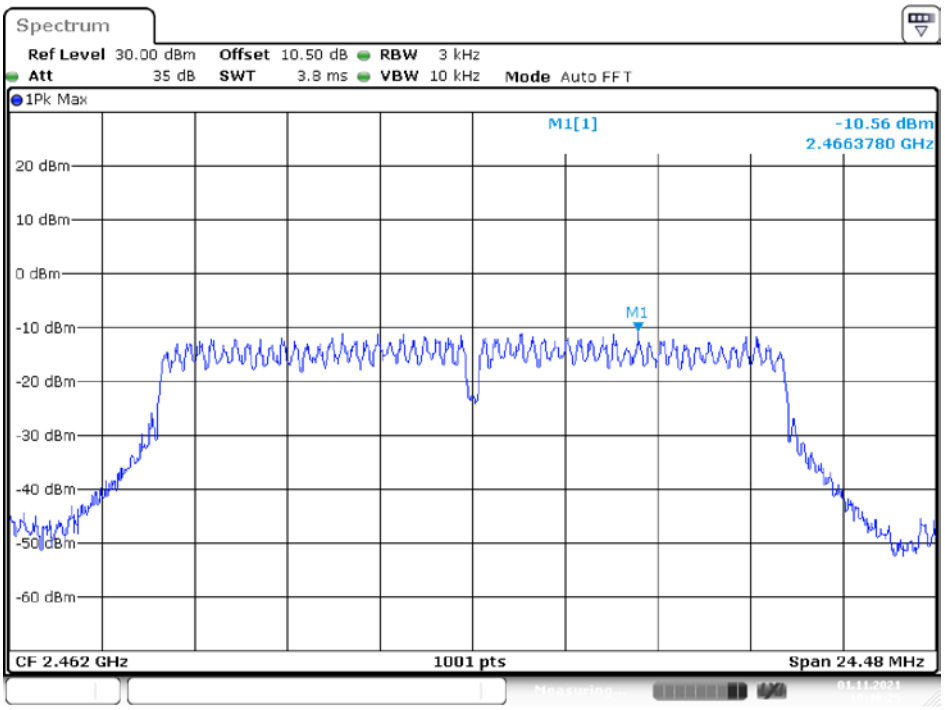
Date: 1.NOV.2021 10:36:39

Middle Channel



Date: 1.NOV.2021 10:38:39

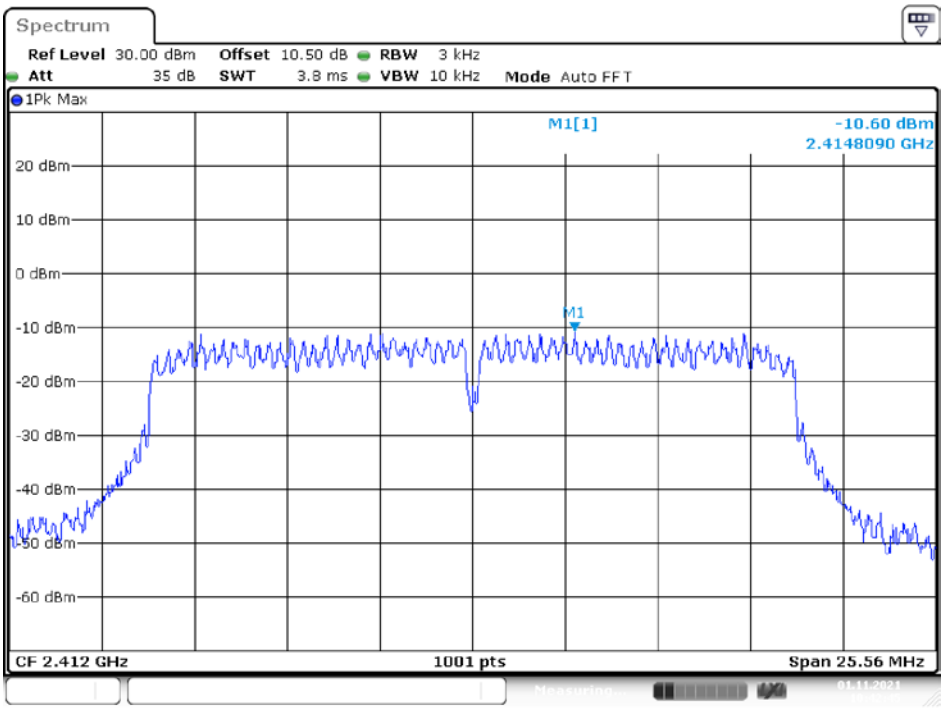
High Channel



Date: 1.NOV.2021 10:40:26

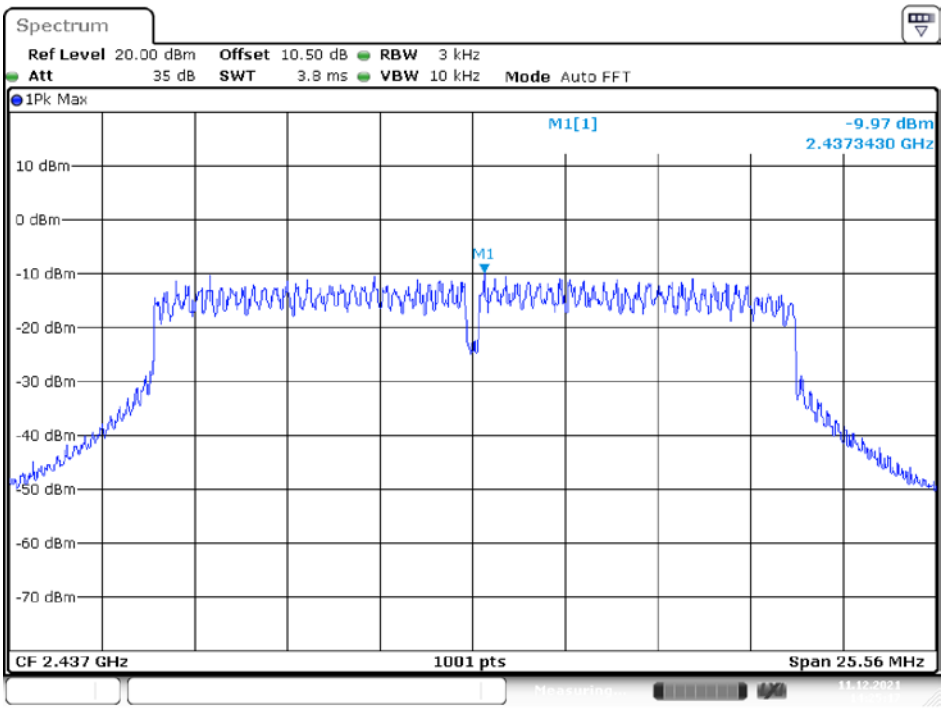
N20 Mode

Low Channel



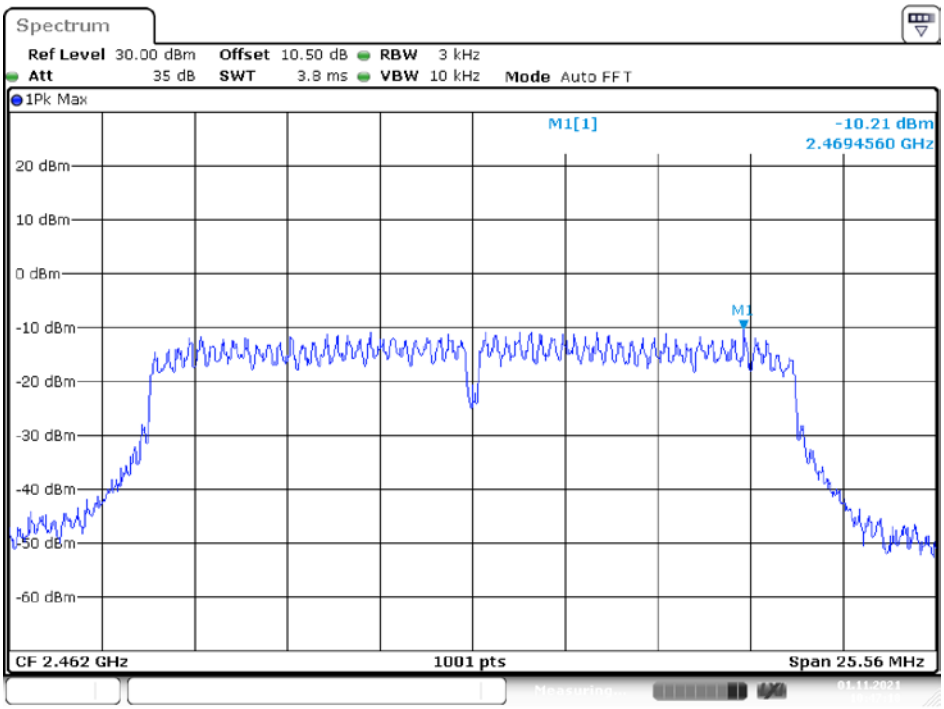
Date: 1.NOV.2021 10:42:46

Middle Channel



Date: 3.JAN.2022 12:22:56

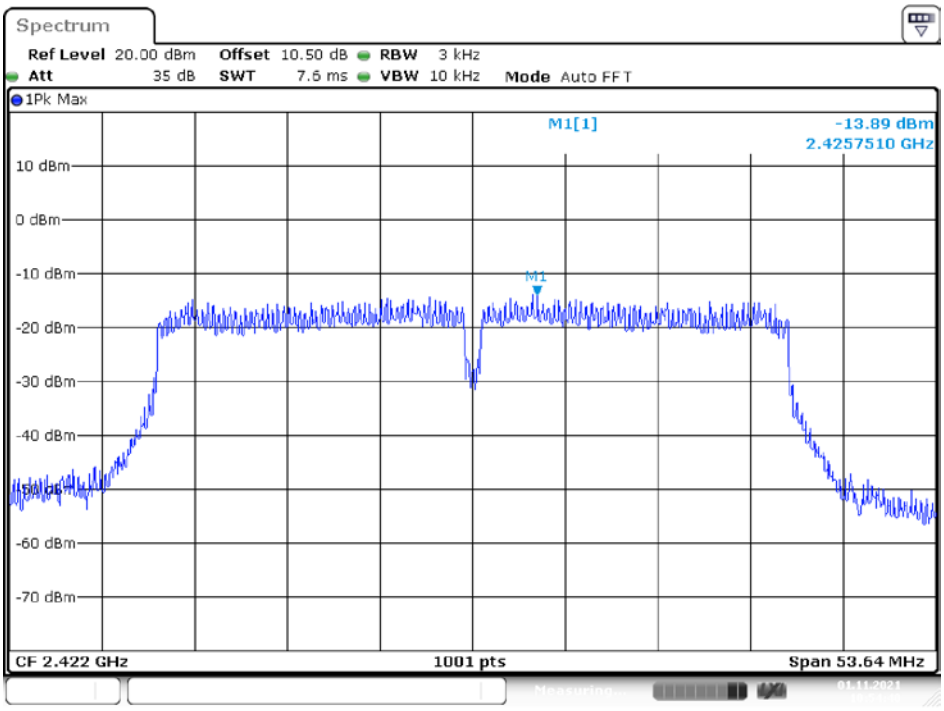
High Channel



Date: 1.NOV.2021 10:47:18

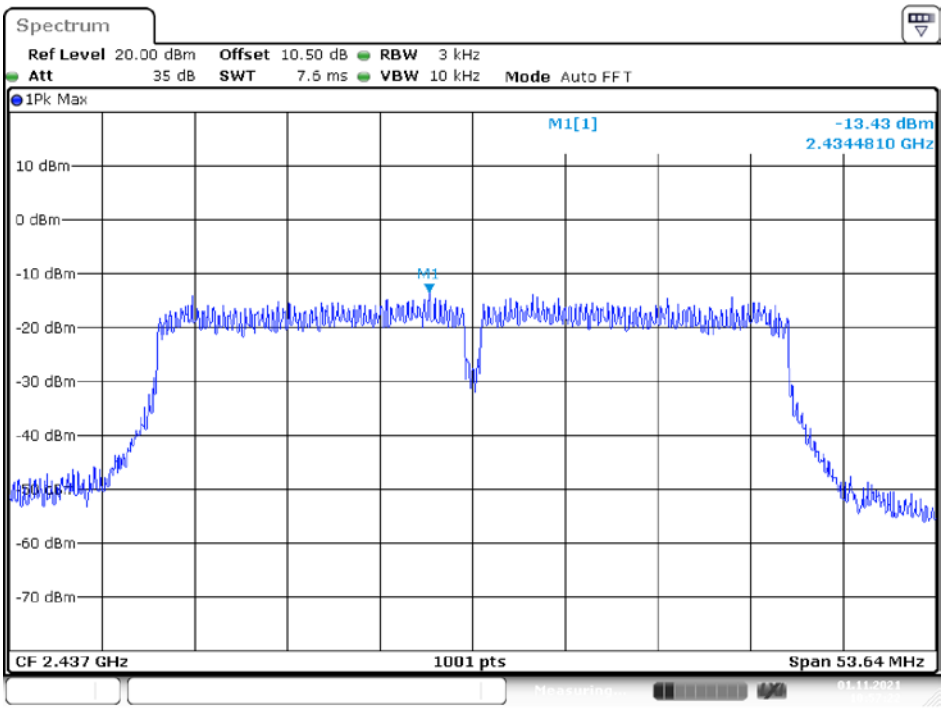
N40 Mode

Low Channel



Date: 1.NOV.2021 10:54:40

Middle Channel



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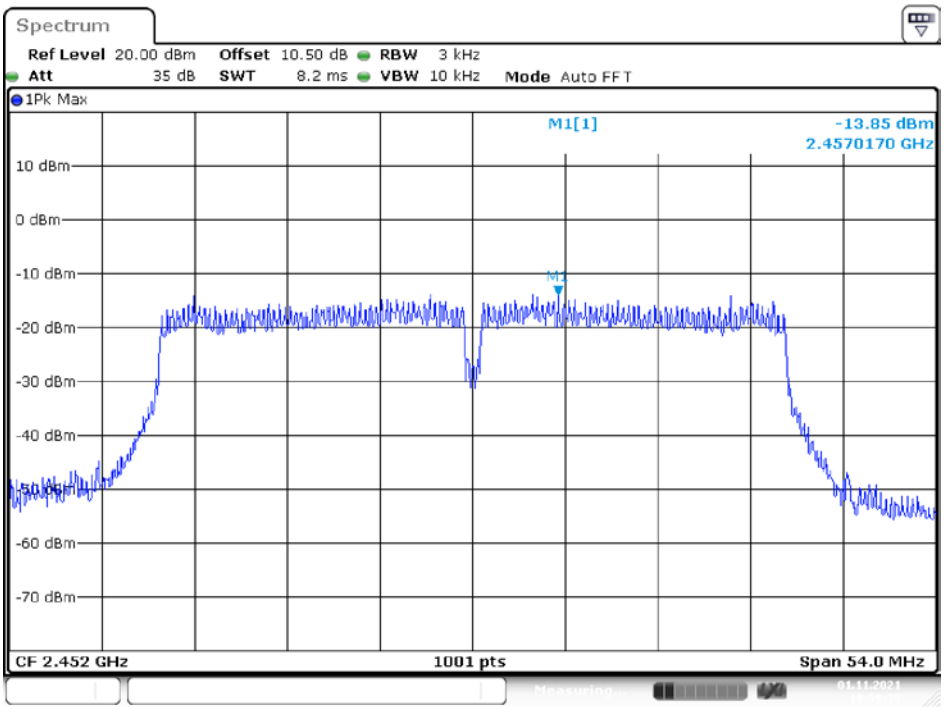
High Channel



Date: 1.NOV.2021 10:59:35

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