FCC Part 15.247

TEST REPORT

For

Ningbo Litesun Electronics Co.,Ltd

Simen Town, yuyao, Zhejiang, China, 315472

FCC ID: 2AMQ8 -WIFI-016

Report Type: Original Report	**Product Type:** CURRENT TAPS WITH SURGE PROTECTOR

Report Producer : Nana Hsu Nana

Report Number : RXZ211025008RF01

Report Date : 2021-12-16

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211025008	RXZ211025008RF01	2021-12-16	Original Report	Nana Hsu

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Ningbo Litesun Electronics Co.,Ltd
	Simen Town, yuyao, Zhejiang, China, 315472
Manufacturer	Ningbo Litesun Electronics Co.,Ltd
	Simen Town, yuyao, Zhejiang, China, 315472
Brand(Trade) Name	LITESUN
Product (Equipment)	CURRENT TAPS WITH SURGE PROTECTOR
Main Model Name	LA-9A-12
Frequency Range	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz
Transmit Power	IEEE 802.11b Mode: 20.10 dBm IEEE 802.11g Mode: 18.15 dBm IEEE 802.11n HT20 Mode: 18.25 dBm
Modulation Technique	IEEE 802.11b Mode: DSSS IEEE 802.11g Mode: OFDM IEEE 802.11n HT20 Mode: OFDM
Power Operation (Voltage Range)	☒ AC 125V/60Hz, 15A, 1875W ☐ Adapter ☒ By AC Power ☐ PoE
	☐ DC Type ☐ Battery ☐ DC Power Supply ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	Oct, 25 2021
Date of Test	Nov 02, 2021 ~ Dec 16, 2021

*All measurement and test data in this report was gathered from production sample serial number: RXZ211025008 (Assigned by BACL).

1.2 Objective

This report is prepared on behalf of *Ningbo Litesun Electronics Co.,Ltd* 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)

N/A.

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. is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dBm
Occupied Bandwidth		+/- 0.35 MHz
Unwanted Emissions, conducted		+/- 1.69 dBm
Emissions, radiated	30 MHz~1GHz	+/- 5.22 dB
	1 GHz~6 GHz	+/- 6.12 dB
	18 GHz~40 GHz	+/- 4.99 dB
Temperature		+/- 1.27 °C
Humidity		+/- 3 %

1.7 Environmental Conditions

Test Site	Test Data	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2021/12/08	23	41	1010	Howard.Ho
Radiation Spurious Emissions	2021/11/02 ~ 2021/12/16	22.6 ~ 23	66 ~ 74	1010	Howard.Ho
Conducted Spurious Emissions	2021/11/04	24.6	58	1010	Ken
6 dB Emission Bandwidth	2021/11/04	24.6	58	1010	Ken
Maximum Output Power	2021/11/04	24.6	58	1010	Ken
100 kHz Bandwidth of Frequency Band Edge	2021/11/04	24.6	58	1010	Ken
Power Spectral Density	2021/11/04	24.6	58	1010	Ken

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. 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. Lab 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.

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

The test software was used “Beken Wi-Fi Test Tool V1.6.0”

Test Frequency		Low	Middle	High
Power Level Setting	802.11b Mode	79	79	79
	802.11g Mode	79	79	79
	802.11n HT20 Mode	79	79	79

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

2.4 Test Mode

Mode 1: Full System (model: LA-9A-12) for all test item.

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
NB	DELL	E6410	8N7PXN1
Fixture Cable	N/A	N/A	N/A
Light Bubble	Yousheng Industrial	120V, 300W	N/A
Light Bubble	Yousheng Industrial	120V, 60W	N/A
Light Bubble	Yousheng Industrial	120V, 10W	N/A
Dummy Load	N/A	5 ohm	N/A

2.6 External Cable List and Details

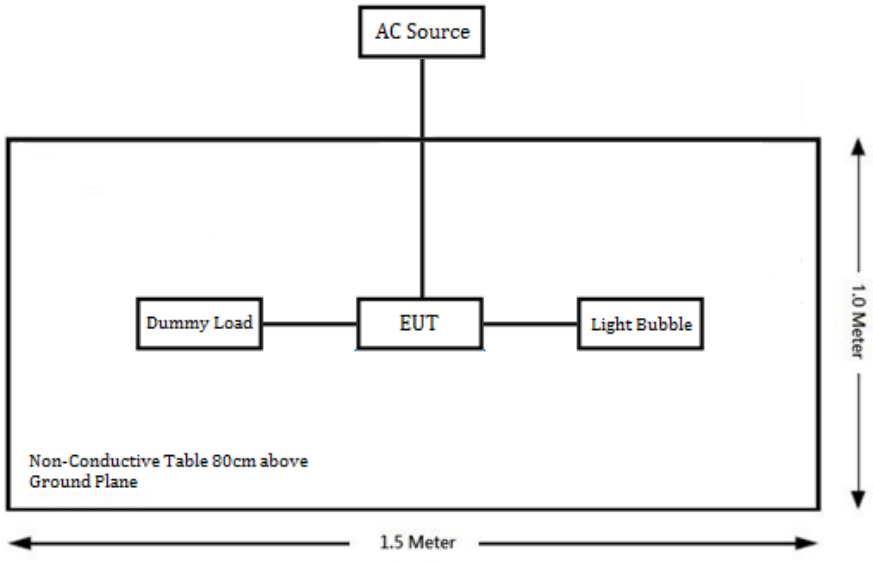
Cable Description	Length (m)	From	To
Fixture Cable	0.1	Fixture	EUT
Power Cable	0.8	EUT	Light Bubble

2.7 Block Diagram of Test Setup

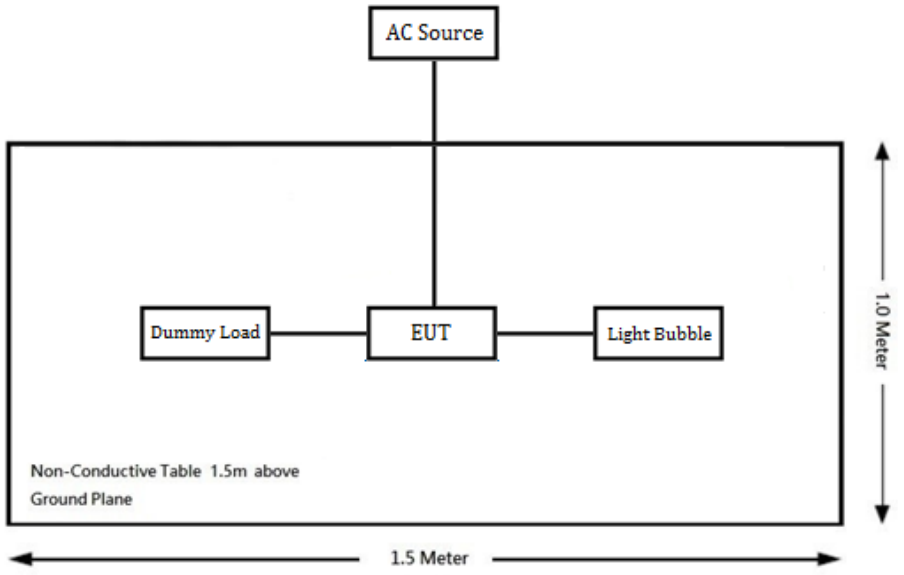
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

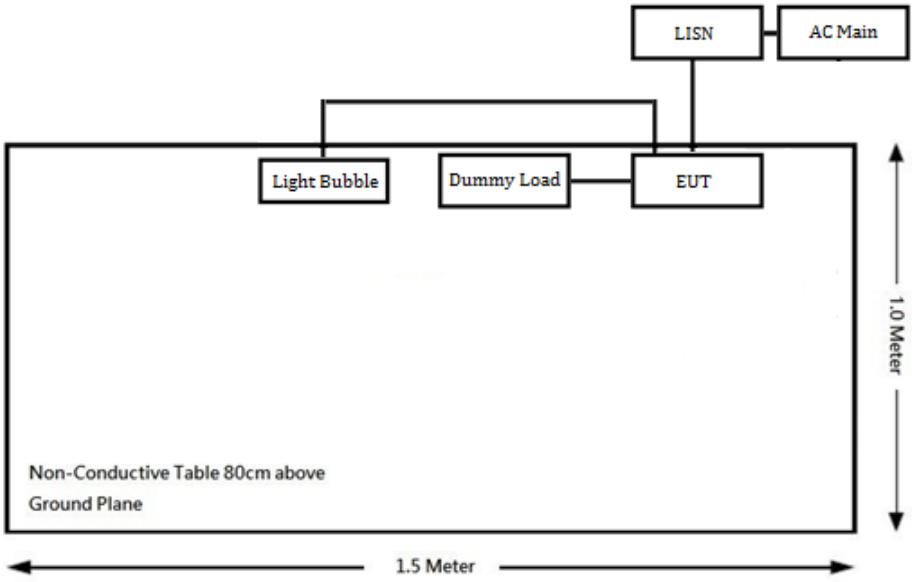
Below 1GHz:



Above 1GHz:



Conduction:



2.8 Duty Cycle

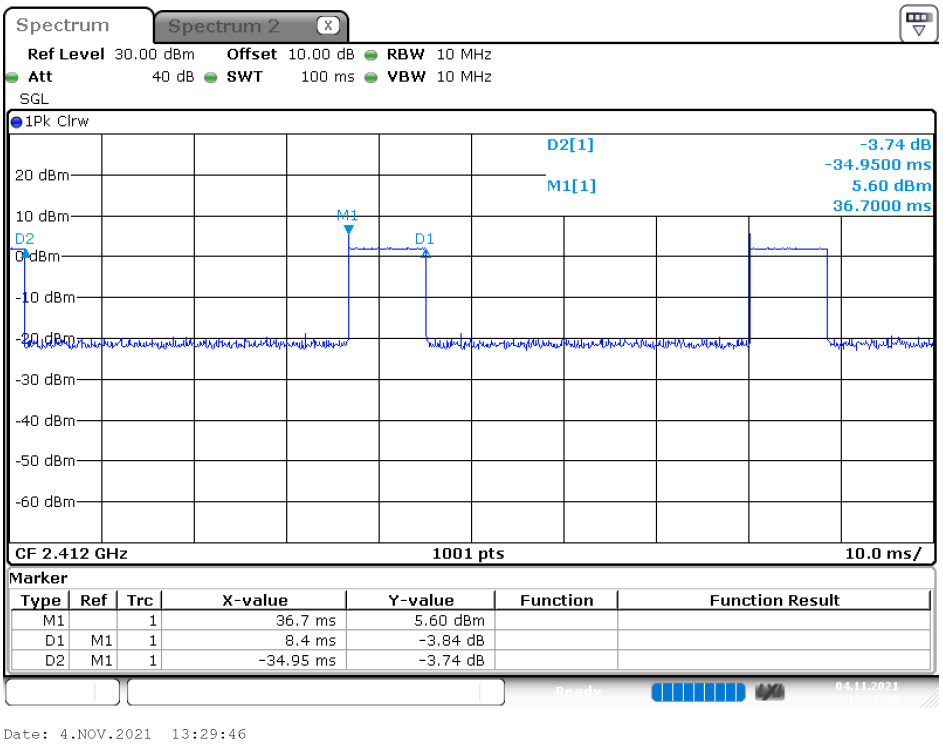
The duty cycle as below:

Radio Mode	On Time (ms)	Off Time (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	8.4	34.95	19	7.21
802.11g	1.4	12.6	10	10.00
802.11n HT20	1.25	11.75	10	10.00

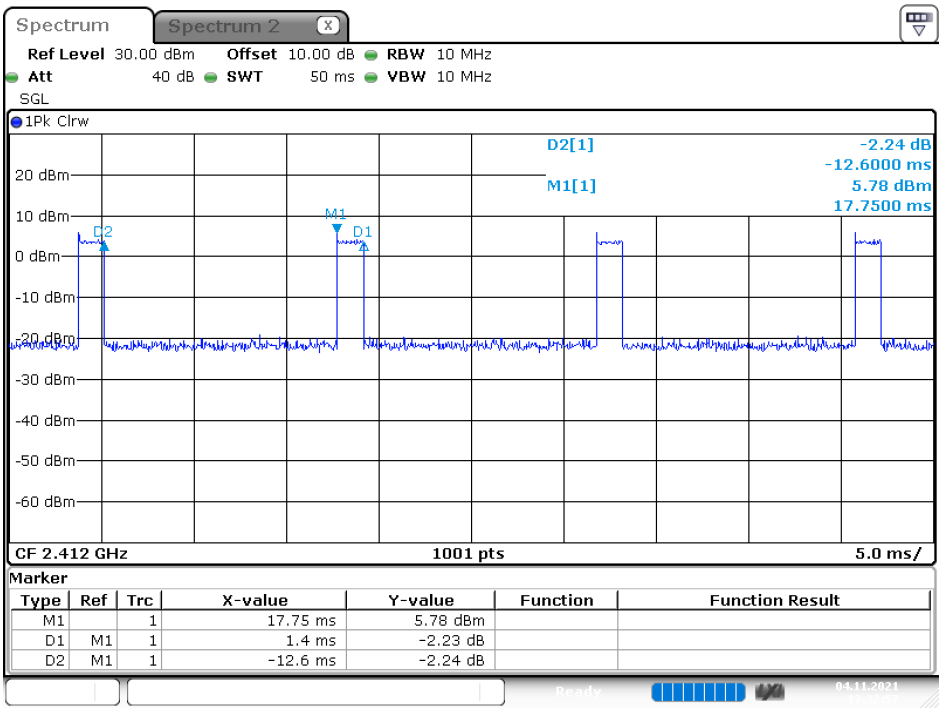
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

B Mode

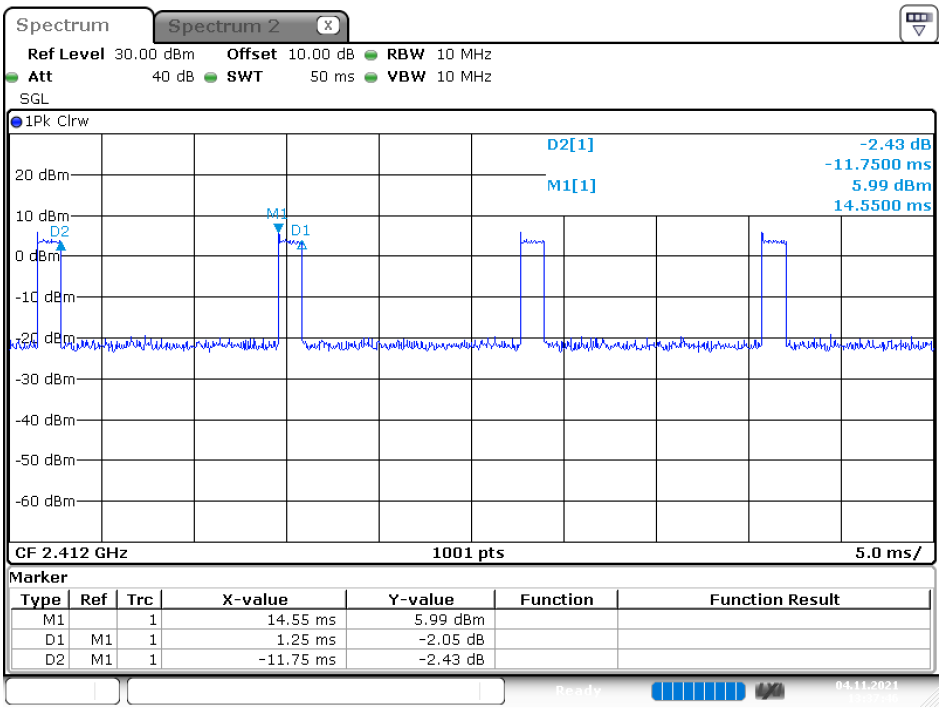


G Mode



Date: 4.NOV.2021 13:32:57

N20 Mode



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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
LISN	Rohde & Schwarz	ENV216	101248	2021/06/08	2022/06/07
EMI Test Receiver	Rohde & Schwarz	ESR3	102099	2021/6/9	2022/6/8
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/29
RF Cable	EMEC	EM-CB5D	001	2021/6/11	2022/6/11
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2021/01/19	2022/01/18
Horn Antenna	EMCO	3115	9311-4158	2021/08/26	2022/08/25
Horn Antenna	ETS-Lindgren	3116	62638	2021/08/11	2022/08/10
Preamplifier	Sonoma	310N	130602	2021/06/08	2022/06/07
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/03/15	2022/03/14
Microware Preamplifier	EM Electronics Corporation	EM18G40G	060656	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2020/11/12	2021/11/11
				2021/11/09	2022/11/08
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/01/07	2022/01/06
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
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	60772	N.C.R	N.C.R

Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2021/01/07	2022/01/06
Cable	UTIFLEX	UFA210A	9435	2021/10/05	2022/10/04
Attenuator	MCL	BW-S10W5+	1419	2021/01/28	2022/01/27
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2021/01/28	2022/01/27

***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)			
WI-FI	2412-2462	2.5	1.778	20.5	112.202	20	0.0397	1

Note: the maximum antenna gain was used for evaluation.

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
Ningbo Litesun Electronics Co.,Ltd	N/A	PCB	2.5 dBi

Result: Compliance

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

7.1 Applicable Standard

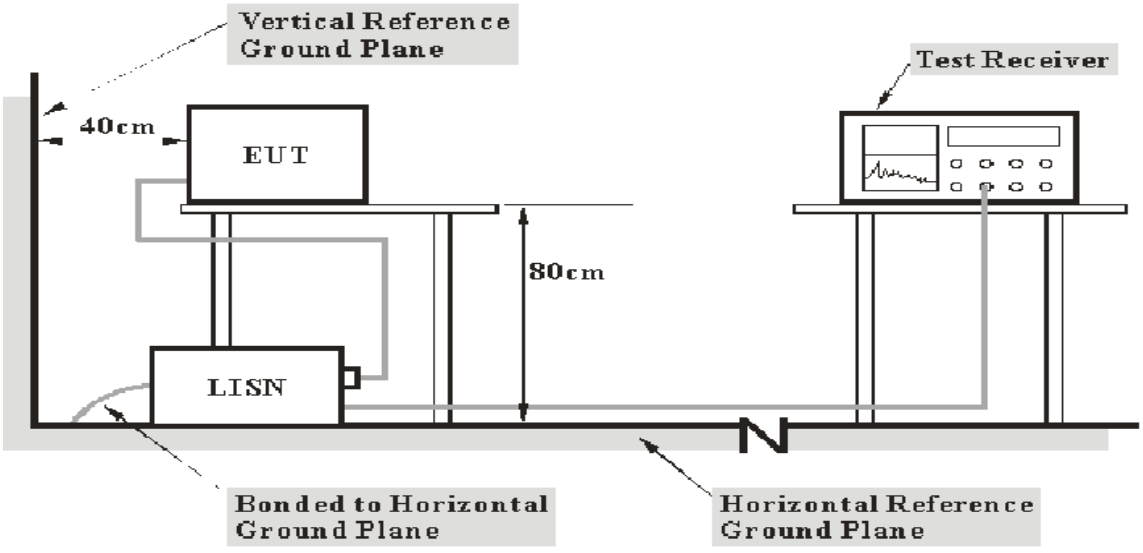
According to §15.207

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 1)	56 to 46 (Note 1)
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

7.2 EUT Setup



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

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

7.3 EMI Test Receiver Setup

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

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

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

7.4 Test Procedure

During the conducted emission test, the EUT is connected to the LISN via the power cord.

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

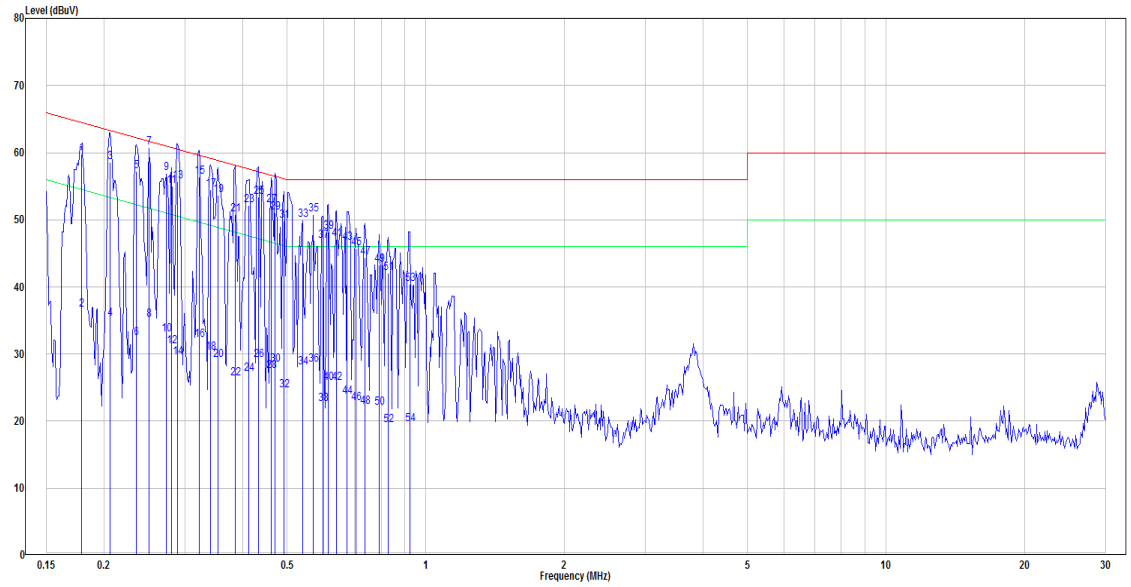
The “Over Limit” column of the following data tables indicates the degree of compliance with the applicable limit. For example, an over limit of -7 dB means the emission is 7 dB below the limit. The equation for Over Limit calculation is as follows:

Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

Main: AC120 V, 60 Hz, Line



No.	Frequency (MHz)	Reading (dBµV)	Correct Factor(dB)	Result (dBµV)	Limit (dBµV)	Over limit (dB)	Remark
1	0.179	40.19	19.59	59.78	64.55	-4.77	QP
2	0.179	17.00	19.59	36.59	54.55	-17.96	Average
3	0.206	39.01	19.58	58.59	63.36	-4.77	QP
4	0.206	15.65	19.58	35.23	53.36	-18.13	Average
5	0.235	37.60	19.58	57.18	62.26	-5.08	QP
6	0.235	12.81	19.58	32.39	52.26	-19.87	Average
7	0.251	41.21	19.58	60.79	61.73	-0.94	QP
8	0.251	15.57	19.58	35.15	51.73	-16.58	Average
9	0.273	37.28	19.58	56.86	61.03	-4.17	QP
10	0.273	13.27	19.58	32.85	51.03	-18.18	Average
11	0.280	35.50	19.58	55.08	60.81	-5.73	QP
12	0.280	11.56	19.58	31.14	50.81	-19.67	Average
13	0.289	36.09	19.58	55.67	60.54	-4.87	QP
14	0.289	9.93	19.58	29.51	50.54	-21.03	Average
15	0.322	36.74	19.58	56.32	59.66	-3.34	QP
16	0.322	12.46	19.58	32.04	49.66	-17.62	Average
17	0.341	34.85	19.58	54.43	59.18	-4.75	QP
18	0.341	10.62	19.58	30.20	49.18	-18.98	Average
19	0.354	34.13	19.58	53.71	58.87	-5.16	QP
20	0.354	9.54	19.58	29.12	48.87	-19.75	Average

21	0.385	31.25	19.58	50.83	58.17	-7.34	QP
22	0.385	6.73	19.58	26.31	48.17	-21.86	Average
23	0.413	32.61	19.58	52.19	57.59	-5.40	QP
24	0.413	7.49	19.58	27.07	47.59	-20.52	Average
25	0.433	33.78	19.59	53.37	57.20	-3.83	QP
26	0.433	9.55	19.59	29.14	47.20	-18.06	Average
27	0.461	32.54	19.59	52.13	56.67	-4.54	QP
28	0.461	7.81	19.59	27.40	46.67	-19.27	Average
29	0.471	31.44	19.59	51.03	56.49	-5.46	QP
30	0.471	8.82	19.59	28.41	46.49	-18.08	Average
31	0.491	30.21	19.59	49.80	56.14	-6.34	QP
32	0.491	5.03	19.59	24.62	46.14	-21.52	Average
33	0.541	30.37	19.59	49.96	56.00	-6.04	QP
34	0.541	8.42	19.59	28.01	46.00	-17.99	Average
35	0.570	31.17	19.59	50.76	56.00	-5.24	QP
36	0.570	8.86	19.59	28.45	46.00	-17.55	Average
37	0.598	27.28	19.60	46.88	56.00	-9.12	QP
38	0.598	2.96	19.60	22.56	46.00	-23.44	Average
39	0.614	28.56	19.60	48.16	56.00	-7.84	QP
40	0.614	6.04	19.60	25.64	46.00	-20.36	Average
41	0.641	27.49	19.60	47.09	56.00	-8.91	QP
42	0.641	6.01	19.60	25.61	46.00	-20.39	Average
43	0.675	26.92	19.60	46.52	56.00	-9.48	QP
44	0.675	4.06	19.60	23.66	46.00	-22.34	Average
45	0.705	26.12	19.60	45.72	56.00	-10.28	QP
46	0.705	3.00	19.60	22.60	46.00	-23.40	Average
47	0.739	24.77	19.60	44.37	56.00	-11.63	QP
48	0.739	2.54	19.60	22.14	46.00	-23.86	Average
49	0.792	23.65	19.60	43.25	56.00	-12.75	QP
50	0.792	2.42	19.60	22.02	46.00	-23.98	Average
51	0.830	22.44	19.60	42.04	56.00	-13.96	QP
52	0.830	-0.20	19.60	19.40	46.00	-26.60	Average
53	0.923	20.86	19.61	40.47	56.00	-15.53	QP
54	0.923	-0.10	19.61	19.51	46.00	-26.49	Average

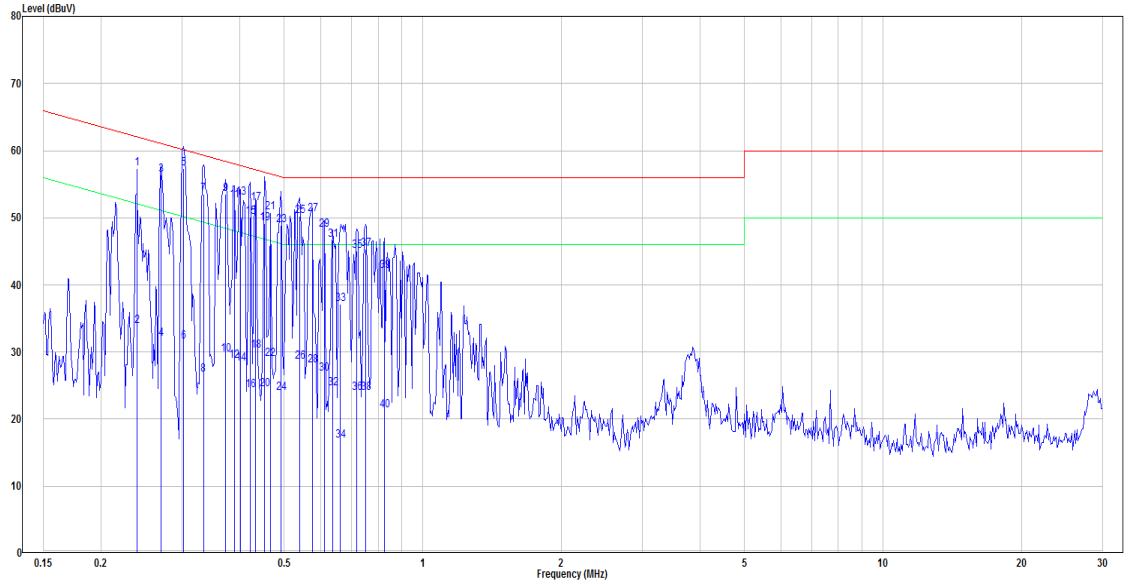
Note:

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	0.239	37.71	19.58	57.29	62.13	-4.84	QP
2	0.239	14.25	19.58	33.83	52.13	-18.30	Average
3	0.270	36.74	19.58	56.32	61.12	-4.80	QP
4	0.270	12.42	19.58	32.00	51.12	-19.12	Average
5	0.302	37.70	19.58	57.28	60.19	-2.91	QP
6	0.302	12.00	19.58	31.58	50.19	-18.61	Average
7	0.334	33.98	19.58	53.56	59.35	-5.79	QP
8	0.334	6.99	19.58	26.57	49.35	-22.78	Average
9	0.373	33.88	19.58	53.46	58.43	-4.97	QP
10	0.373	10.08	19.58	29.66	48.43	-18.77	Average
11	0.389	32.95	19.58	52.53	58.08	-5.55	QP
12	0.389	9.05	19.58	28.63	48.08	-19.45	Average
13	0.402	33.45	19.58	53.03	57.81	-4.78	QP
14	0.402	8.68	19.58	28.26	47.81	-19.55	Average
15	0.421	30.51	19.58	50.09	57.42	-7.33	QP
16	0.421	4.70	19.58	24.28	47.42	-23.14	Average
17	0.433	32.51	19.59	52.10	57.20	-5.10	QP
18	0.433	10.64	19.59	30.23	47.20	-16.97	Average
19	0.454	29.61	19.59	49.20	56.80	-7.60	QP
20	0.454	4.91	19.59	24.50	46.80	-22.30	Average
21	0.466	31.23	19.59	50.82	56.58	-5.76	QP
22	0.466	9.37	19.59	28.96	46.58	-17.62	Average

23	0.491	29.32	19.59	48.91	56.14	-7.23	QP
24	0.491	4.37	19.59	23.96	46.14	-22.18	Average
25	0.541	30.60	19.59	50.19	56.00	-5.81	QP
26	0.541	8.88	19.59	28.47	46.00	-17.53	Average
27	0.576	30.94	19.59	50.53	56.00	-5.47	QP
28	0.576	8.40	19.59	27.99	46.00	-18.01	Average
29	0.611	28.61	19.59	48.20	56.00	-7.80	QP
30	0.611	7.12	19.59	26.71	46.00	-19.29	Average
31	0.637	27.06	19.59	46.65	56.00	-9.35	QP
32	0.637	5.03	19.59	24.62	46.00	-21.38	Average
33	0.661	17.56	19.59	37.15	56.00	-18.85	QP
34	0.661	-2.80	19.59	16.79	46.00	-29.21	Average
35	0.720	25.47	19.59	45.06	56.00	-10.94	QP
36	0.720	4.35	19.59	23.94	46.00	-22.06	Average
37	0.751	25.71	19.60	45.31	56.00	-10.69	QP
38	0.751	4.34	19.60	23.94	46.00	-22.06	Average
39	0.826	22.48	19.60	42.08	56.00	-13.92	QP
40	0.826	1.69	19.60	21.29	46.00	-24.71	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:

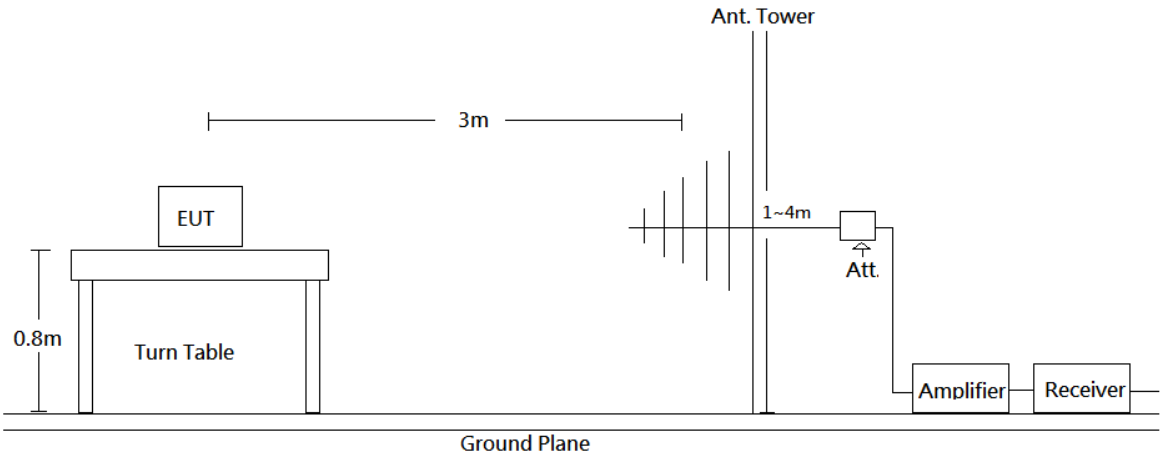
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** 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.

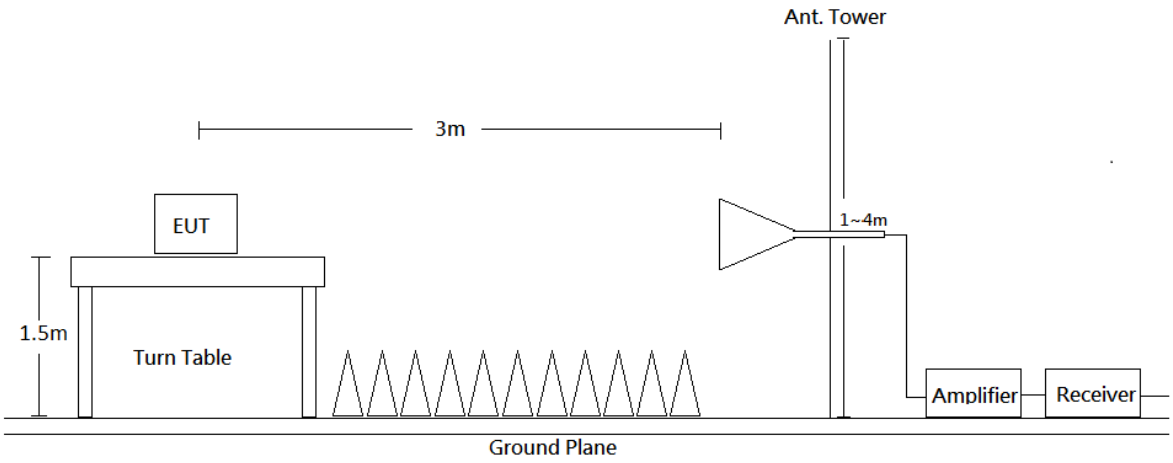
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the 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. 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

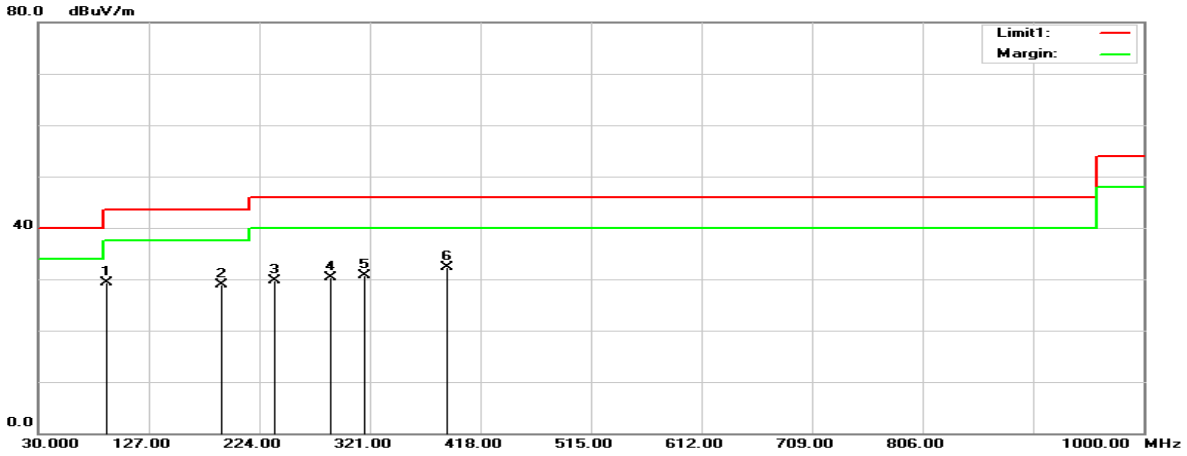
8.6 Test Results

Test Mode: Transmitting

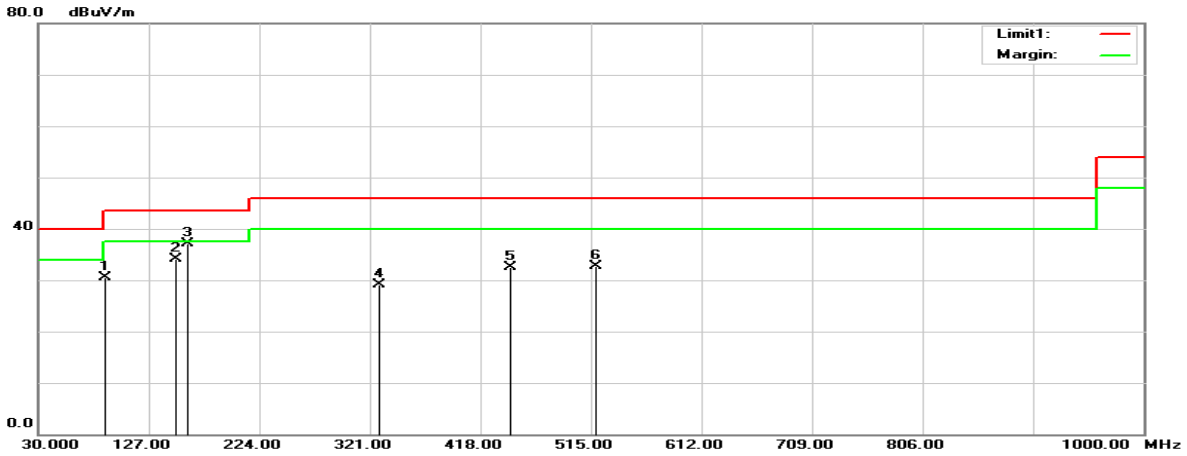
(Pre-scan with three orthogonal axis, and worse case as X axis.)

30MHz-1GHz: (worst case is 802.11n HT20 mode High channel)

Horizontal

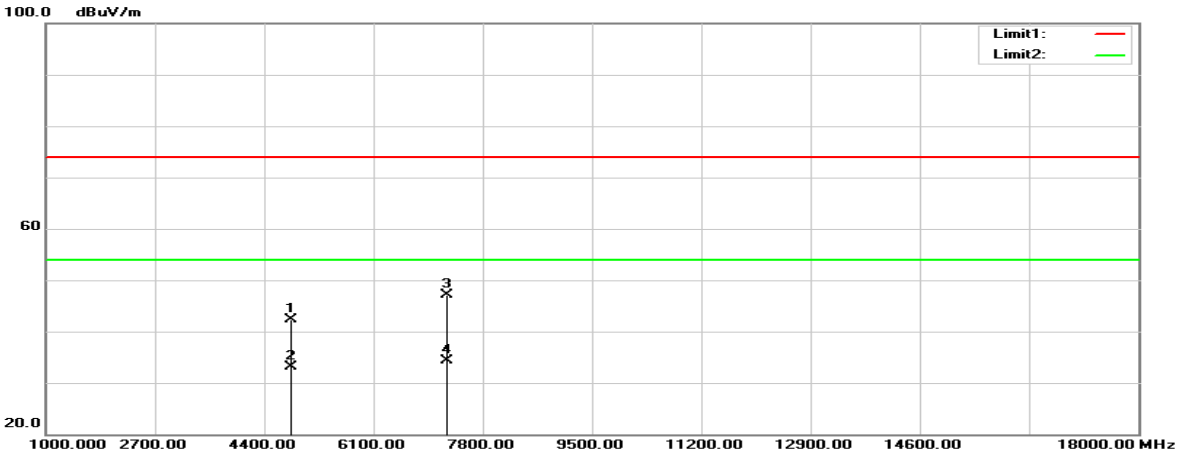


Vertical

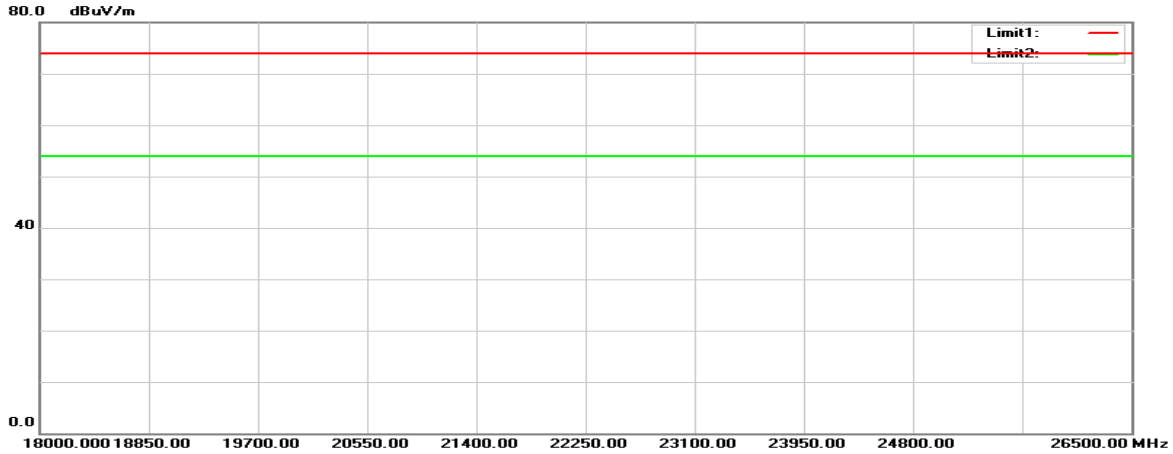


Horizontal (worst case is 802.11n HT20 mode High channel)

1GHz-18GHz:

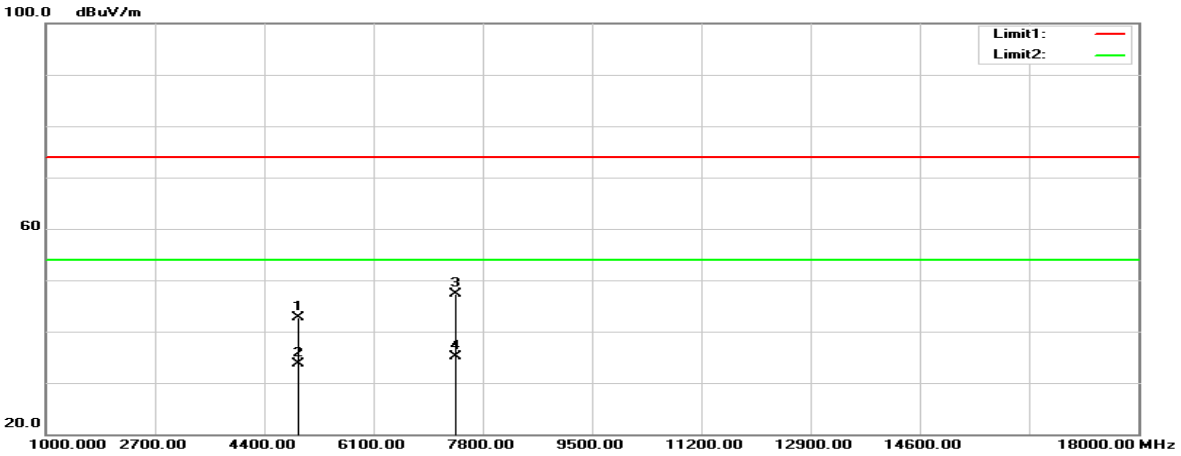


18GHz-26.5GHz:

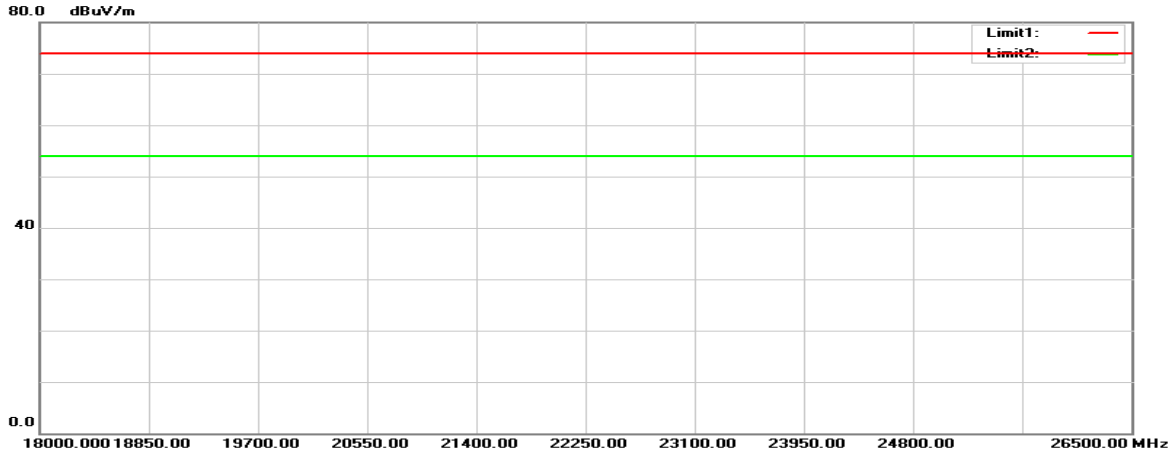


Vertical (worst case is 802.11n HT20 mode High channel)

1GHz-18GHz:



18GHz-26.5GHz:



Below 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
90.1400	45.90	-16.53	29.37	43.50	-14.13	100	243	peak
191.0200	41.57	-12.58	28.99	43.50	-14.51	100	187	peak
237.5800	42.09	-12.34	29.75	46.00	-16.25	100	59	peak
286.0800	40.38	-10.15	30.23	46.00	-15.77	100	316	peak
316.1500	40.39	-9.69	30.70	46.00	-15.30	100	175	peak
388.9000	40.45	-8.08	32.37	46.00	-13.63	100	211	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
89.1700	47.18	-16.70	30.48	43.50	-13.02	100	318	peak
150.2800	45.00	-10.99	34.01	43.50	-9.49	100	159	peak
160.9500	48.36	-11.33	37.03	43.50	-6.47	100	255	peak
328.7600	38.57	-9.46	29.11	46.00	-16.89	100	23	peak
444.1900	39.17	-6.61	32.56	46.00	-13.44	100	117	peak
519.8500	38.42	-5.64	32.78	46.00	-13.22	100	99	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								
2387.056	71.06	-9.48	61.58	74.00	-12.42	124	341	peak
2387.056	59.01	-9.48	49.53	54.00	-4.47	124	341	AVG
2412.000	112.87	-9.28	103.59	NA	NA	124	341	peak
2412.000	104.93	-9.28	95.65	NA	NA	124	341	AVG
4824.000	51.28	-2.15	49.13	74.00	-24.87	142	4	peak
4824.000	46.52	-2.15	44.37	54.00	-9.63	142	4	AVG
7236.000	42.85	4.55	47.40	74.00	-26.60	150	154	peak
7236.000	30.11	4.55	34.66	54.00	-19.34	150	154	AVG
B Mode, Middle channel								
2437.000	113.45	-9.06	104.39	NA	NA	137	332	peak
2437.000	105.78	-9.06	96.72	NA	NA	137	322	AVG
4874.000	54.95	-1.92	53.03	74.00	-20.97	117	1	peak
4874.000	50.22	-1.92	48.30	54.00	-5.70	117	1	AVG
7311.000	42.05	5.08	47.13	74.00	-26.87	138	130	peak
7311.000	30.11	5.08	35.19	54.00	-18.81	138	130	AVG
B Mode, High channel								
2462.000	114.25	-8.77	105.48	NA	NA	152	337	peak
2462.000	106.15	-8.77	97.38	NA	NA	152	337	AVG
2487.616	68.47	-8.39	60.08	74.00	-13.92	152	337	peak
2487.616	58.47	-8.39	50.08	54.00	-3.92	152	337	AVG
4924.000	50.01	-1.63	48.38	74.00	-25.62	142	342	peak
4924.000	46.91	-1.63	45.28	54.00	-8.72	142	342	AVG
7386.000	41.90	5.20	47.10	74.00	-26.90	156	237	peak
7386.000	30.03	5.20	35.23	54.00	-18.77	156	237	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								
2386.608	65.99	-9.49	56.50	74.00	-17.50	123	223	peak
2386.608	53.98	-9.49	44.49	54.00	-9.51	123	223	AVG
2412.000	107.36	-9.28	98.08	NA	NA	123	223	peak
2412.000	98.97	-9.28	89.69	NA	NA	123	223	AVG
4824.000	50.73	-2.15	48.58	74.00	-25.42	126	145	peak
4824.000	43.13	-2.15	40.98	54.00	-13.02	126	145	AVG
7236.000	42.87	4.55	47.42	74.00	-26.58	152	282	peak
7236.000	30.25	4.55	34.80	54.00	-19.20	152	282	AVG
B Mode, Middle channel								
2437.000	110.16	-9.06	101.10	NA	NA	154	232	peak
2437.000	102.86	-9.06	93.80	NA	NA	154	232	AVG
4874.000	55.26	-1.92	53.34	74.00	-20.66	137	250	peak
4874.000	49.82	-1.92	47.90	54.00	-6.10	137	250	AVG
7311.000	42.23	5.08	47.31	74.00	-26.69	144	238	peak
7311.000	30.02	5.08	35.10	54.00	-18.90	144	238	AVG
B Mode, High channel								
2462.000	111.13	-8.77	102.36	NA	NA	145	234	peak
2462.000	102.82	-8.77	94.05	NA	NA	145	234	AVG
2487.712	65.30	-8.39	56.91	74.00	-17.09	145	234	peak
2487.712	54.48	-8.39	46.09	54.00	-7.91	145	234	AVG
4924.000	51.52	-1.63	49.89	74.00	-24.11	133	312	peak
4924.000	47.93	-1.63	46.30	54.00	-7.70	133	312	AVG
7386.000	42.03	5.20	47.23	74.00	-26.77	145	186	peak
7386.000	29.79	5.20	34.99	54.00	-19.01	145	186	AVG

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

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low channel								
2390.000	70.97	-9.46	61.51	74.00	-12.49	151	328	peak
2390.000	57.36	-9.46	47.90	54.00	-6.10	151	328	AVG
2412.000	111.18	-9.28	101.90	NA	NA	151	328	peak
2412.000	100.90	-9.28	91.62	NA	NA	151	328	AVG
4824.000	47.58	-2.15	45.43	74.00	-28.57	132	146	peak
4824.000	38.94	-2.15	36.79	54.00	-17.21	132	146	AVG
7236.000	42.24	4.55	46.79	74.00	-27.21	153	211	peak
7236.000	30.11	4.55	34.66	54.00	-19.34	153	211	AVG
G Mode, Middle channel								
2437.000	112.89	-9.06	103.83	NA	NA	136	331	peak
2437.000	102.80	-9.06	93.74	NA	NA	136	331	AVG
4874.000	44.28	-1.92	42.36	74.00	-31.64	150	351	peak
4874.000	37.50	-1.92	35.58	54.00	-18.42	150	351	AVG
7311.000	41.88	5.08	46.96	74.00	-27.04	152	241	peak
7311.000	30.01	5.08	35.09	54.00	-18.91	152	241	AVG
G Mode, High channel								
2462.000	114.26	-8.77	105.49	NA	NA	133	331	peak
2462.000	104.15	-8.77	95.38	NA	NA	133	331	AVG
2483.500	73.12	-8.45	64.67	74.00	-9.33	133	331	peak
2483.500	59.69	-8.45	51.24	54.00	-2.76	133	331	AVG
4924.000	45.29	-1.63	43.66	74.00	-30.34	146	309	peak
4924.000	35.34	-1.63	33.71	54.00	-20.29	146	309	AVG
7386.000	41.86	5.20	47.06	74.00	-26.94	145	216	peak
7386.000	29.95	5.20	35.15	54.00	-18.85	145	216	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								
2387.392	67.31	-9.48	57.83	74.00	-16.17	133	226	peak
2387.392	53.58	-9.48	44.10	54.00	-9.90	133	226	AVG
2412.000	106.91	-9.28	97.63	NA	NA	133	226	peak
2412.000	96.79	-9.28	87.51	NA	NA	133	226	AVG
4824.000	44.27	-2.15	42.12	74.00	-31.88	145	221	peak
4824.000	39.02	-2.15	36.87	54.00	-17.13	145	221	AVG
7236.000	41.95	4.55	46.50	74.00	-27.50	159	171	peak
7236.000	30.08	4.55	34.63	54.00	-19.37	159	171	AVG
G Mode, Middle channel								
2437.000	109.12	-9.06	100.06	NA	NA	148	227	peak
2437.000	98.69	-9.06	89.63	NA	NA	148	227	AVG
4874.000	43.89	-1.92	41.97	74.00	-32.03	157	148	peak
4874.000	33.61	-1.92	31.69	54.00	-22.31	157	148	AVG
7311.000	41.97	5.08	47.05	74.00	-26.95	144	219	peak
7311.000	29.95	5.08	35.03	54.00	-18.97	144	219	AVG
G Mode, High channel								
2462.000	109.62	-8.77	100.85	NA	NA	156	234	peak
2462.000	99.48	-8.77	90.71	NA	NA	156	234	AVG
2483.500	69.84	-8.45	61.39	74.00	-12.61	156	234	peak
2483.500	56.10	-8.45	47.65	54.00	-6.35	156	234	AVG
4924.000	44.92	-1.63	43.29	74.00	-30.71	134	135	peak
4924.000	34.50	-1.63	32.87	54.00	-21.13	134	135	AVG
7386.000	41.85	5.20	47.05	74.00	-26.95	149	277	peak
7386.000	29.94	5.20	35.14	54.00	-18.86	149	277	AVG

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

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2390.000	71.34	-9.46	61.88	74.00	-12.12	130	328	peak
2390.000	57.74	-9.46	48.28	54.00	-5.72	130	328	AVG
2412.000	112.02	-9.28	102.74	NA	NA	130	328	peak
2412.000	100.85	-9.28	91.57	NA	NA	130	328	AVG
4824.000	48.37	-2.15	46.22	74.00	-27.78	148	111	peak
4824.000	39.98	-2.15	37.83	54.00	-16.17	148	111	AVG
7236.000	41.90	4.55	46.45	74.00	-27.55	152	89	peak
7236.000	30.08	4.55	34.63	54.00	-19.37	152	89	AVG
N20 Mode, Middle channel								
2437.000	114.11	-9.06	105.05	NA	NA	139	330	peak
2437.000	102.82	-9.06	93.76	NA	NA	139	330	AVG
4874.000	48.34	-1.92	46.42	74.00	-27.58	127	115	peak
4874.000	38.13	-1.92	36.21	54.00	-17.79	127	115	AVG
7311.000	42.76	5.08	47.84	74.00	-26.16	151	248	peak
7311.000	30.05	5.08	35.13	54.00	-18.87	151	248	AVG
N20 Mode, High channel								
2462.000	115.24	-8.77	106.47	NA	NA	129	332	peak
2462.000	104.05	-8.77	95.28	NA	NA	129	332	AVG
2484.496	74.85	-8.44	66.41	74.00	-7.59	129	332	peak
2484.496	59.86	-8.44	51.42	54.00	-2.58	129	332	AVG
4824.000	44.51	-2.15	42.36	74.00	-31.64	141	221	peak
4824.000	35.16	-2.15	33.01	54.00	-20.99	141	221	AVG
7236.000	42.54	4.55	47.09	74.00	-26.91	148	139	peak
7236.000	29.79	4.55	34.34	54.00	-19.66	148	139	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								
2388.512	66.38	-9.47	56.91	74.00	-17.09	140	223	peak
2388.512	53.14	-9.47	43.67	54.00	-10.33	140	223	AVG
2412.000	108.37	-9.28	99.09	NA	NA	140	223	peak
2412.000	97.09	-9.28	87.81	NA	NA	140	223	AVG
4824.000	46.17	-2.15	44.02	74.00	-29.98	153	226	peak
4824.000	38.01	-2.15	35.86	54.00	-18.14	153	226	AVG
7236.000	43.22	4.55	47.77	74.00	-26.23	156	273	peak
7236.000	30.15	4.55	34.70	54.00	-19.30	156	273	AVG
N20 Mode, Middle channel								
2437.000	109.49	-9.06	100.43	NA	NA	147	230	peak
2437.000	98.15	-9.06	89.09	NA	NA	147	230	AVG
4874.000	44.10	-1.92	42.18	74.00	-31.82	123	254	peak
4874.000	37.62	-1.92	35.70	54.00	-18.30	123	254	AVG
7311.000	41.92	5.08	47.00	74.00	-27.00	142	197	peak
7311.000	30.06	5.08	35.14	54.00	-18.86	142	197	AVG
N20 Mode, High channel								
2462.000	110.54	-8.77	101.77	NA	NA	147	232	peak
2462.000	98.37	-8.77	89.60	NA	NA	147	232	AVG
2484.016	69.76	-8.44	61.32	74.00	-12.68	147	232	peak
2484.016	54.81	-8.44	46.37	54.00	-7.63	147	232	AVG
4924.000	44.38	-1.63	42.75	74.00	-31.25	149	179	peak
4924.000	35.32	-1.63	33.69	54.00	-20.31	149	179	AVG
7386.000	42.03	5.20	47.23	74.00	-26.77	153	246	peak
7386.000	29.89	5.20	35.09	54.00	-18.91	153	246	AVG

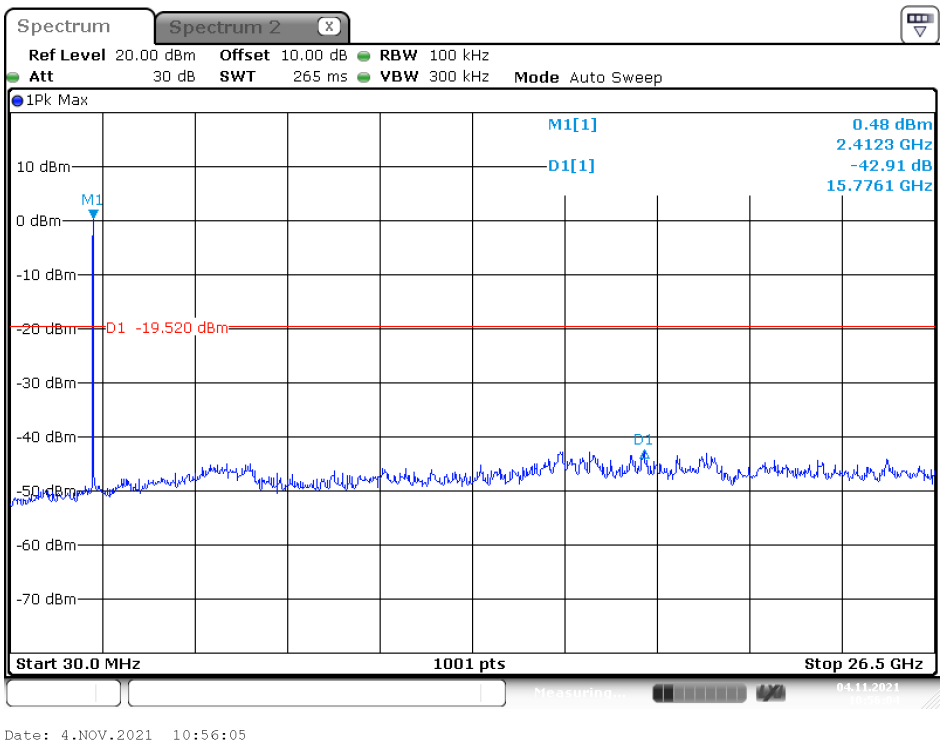
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	42.91	≥ 20	PASS
Mid	2437	42.03	≥ 20	PASS
High	2462	40.56	≥ 20	PASS
G Mode				
Low	2412	38.99	≥ 20	PASS
Mid	2437	39.13	≥ 20	PASS
High	2462	38.54	≥ 20	PASS
N20 Mode				
Low	2412	36.09	≥ 20	PASS
Mid	2437	39.25	≥ 20	PASS
High	2462	40.49	≥ 20	PASS

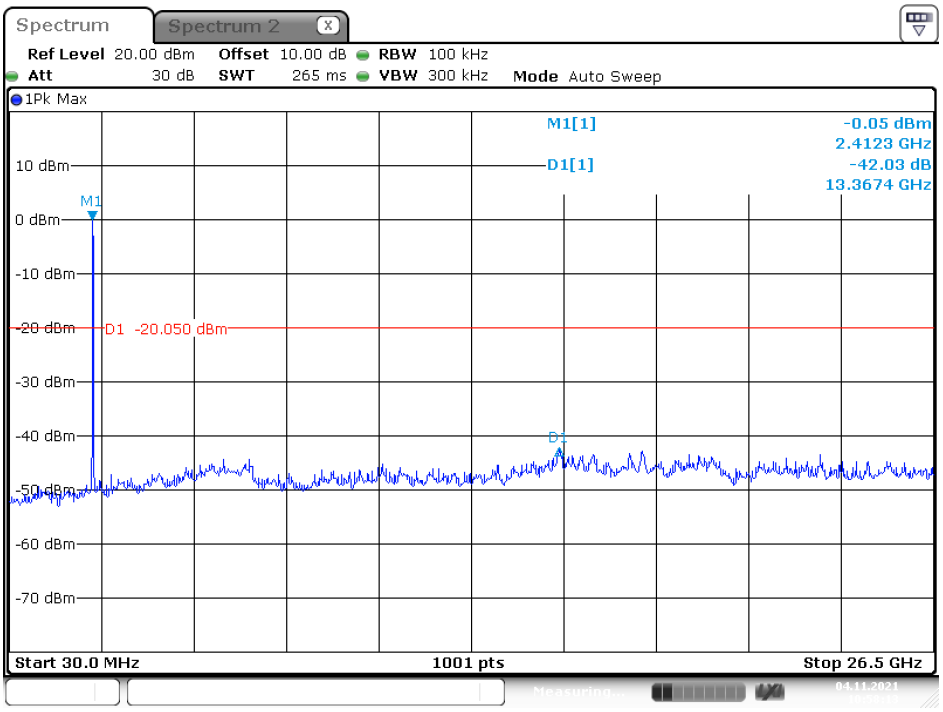
B Mode

Low Channel



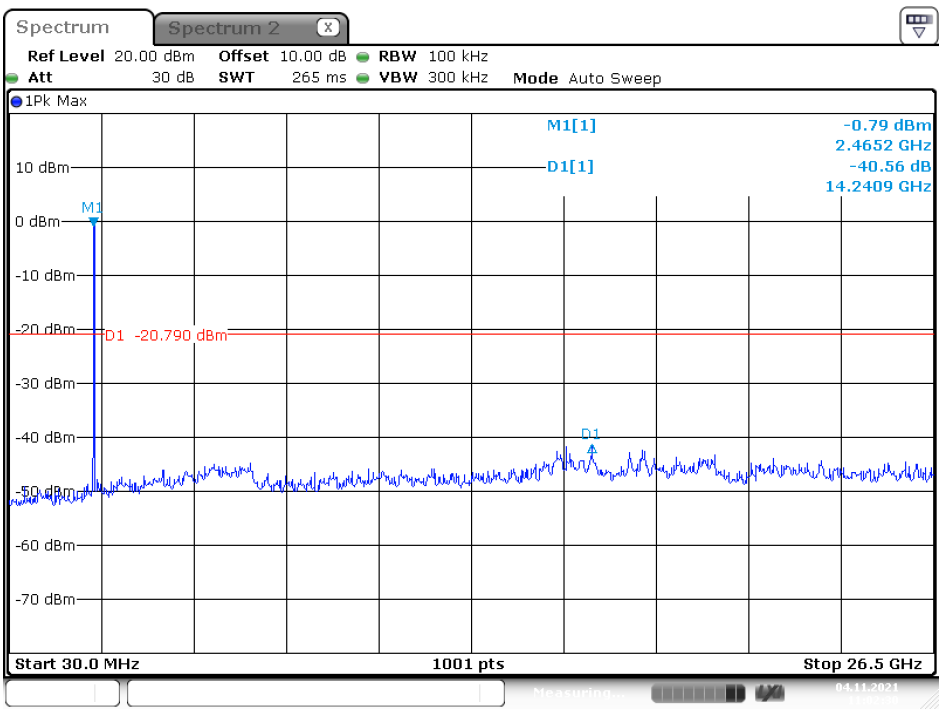
Date: 4.NOV.2021 10:56:05

Middle Channel



Date: 4.NOV.2021 10:58:14

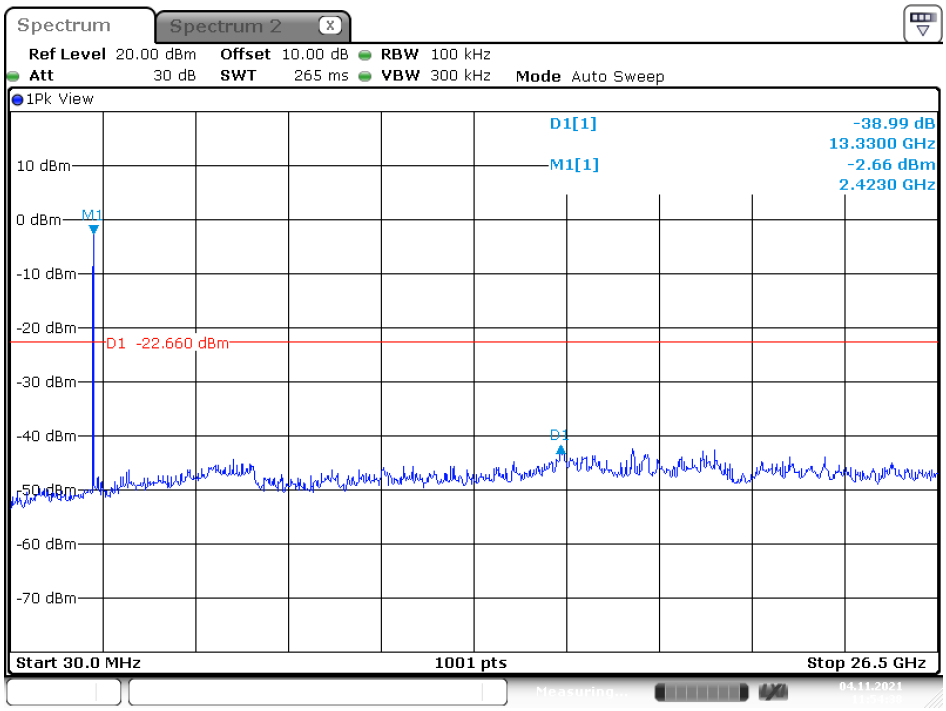
High Channel



Date: 4.NOV.2021 11:02:31

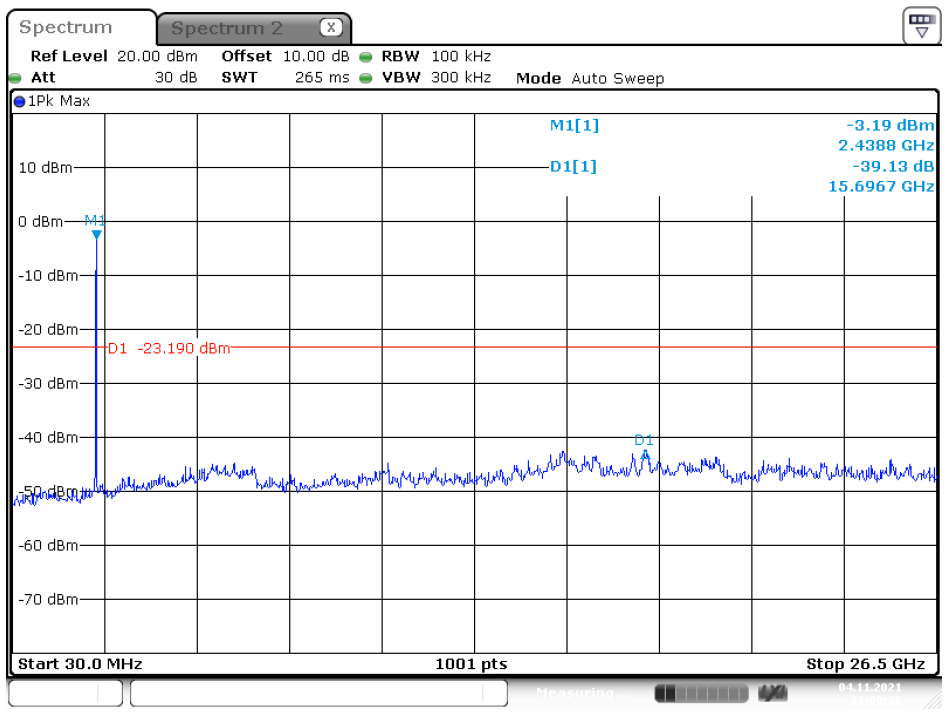
G Mode

Low Channel



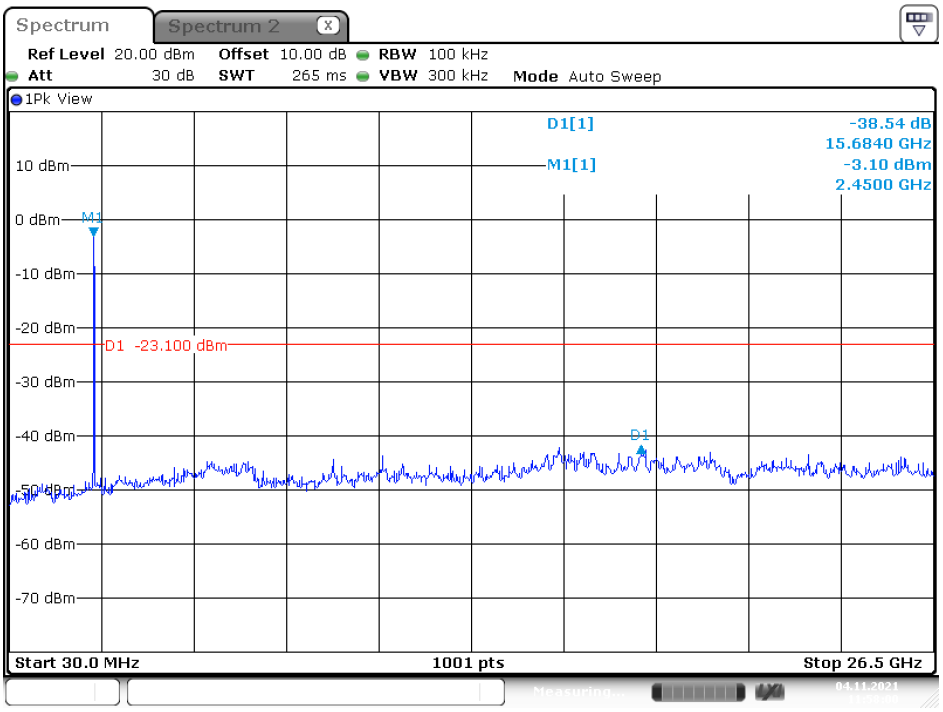
Date: 4.NOV.2021 11:54:37

Middle Channel



Date: 4.NOV.2021 11:09:38

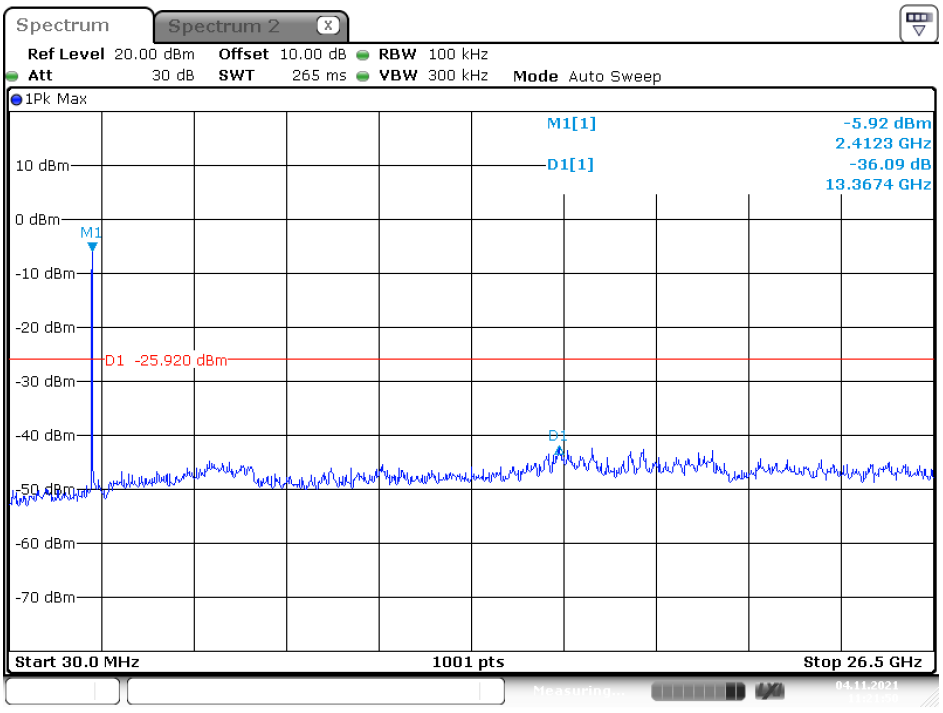
High Channel



Date: 4.NOV.2021 11:58:00

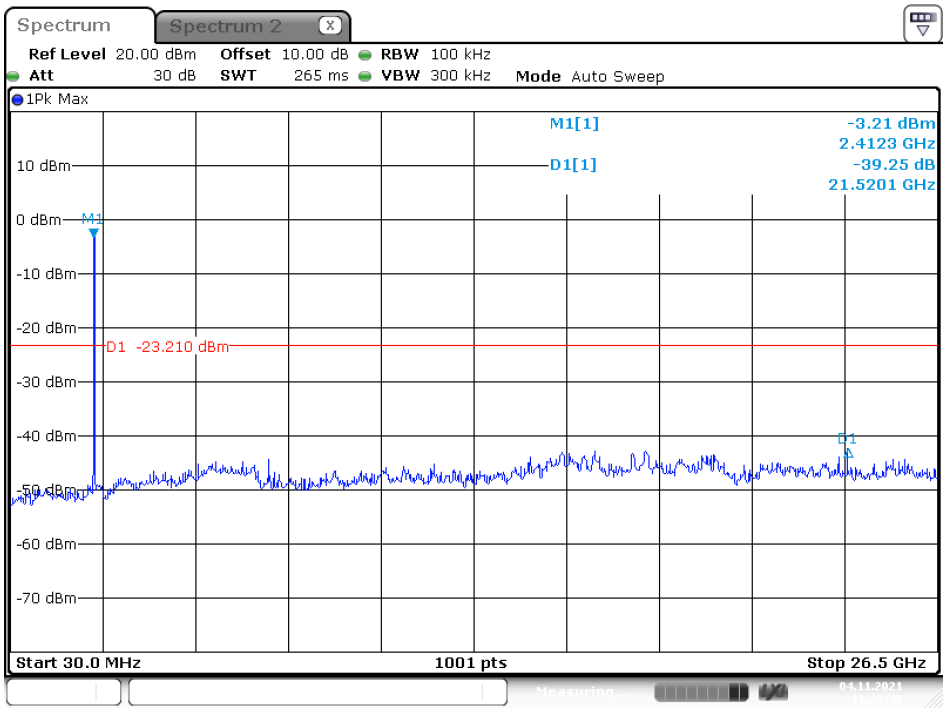
N20 Mode

Low Channel



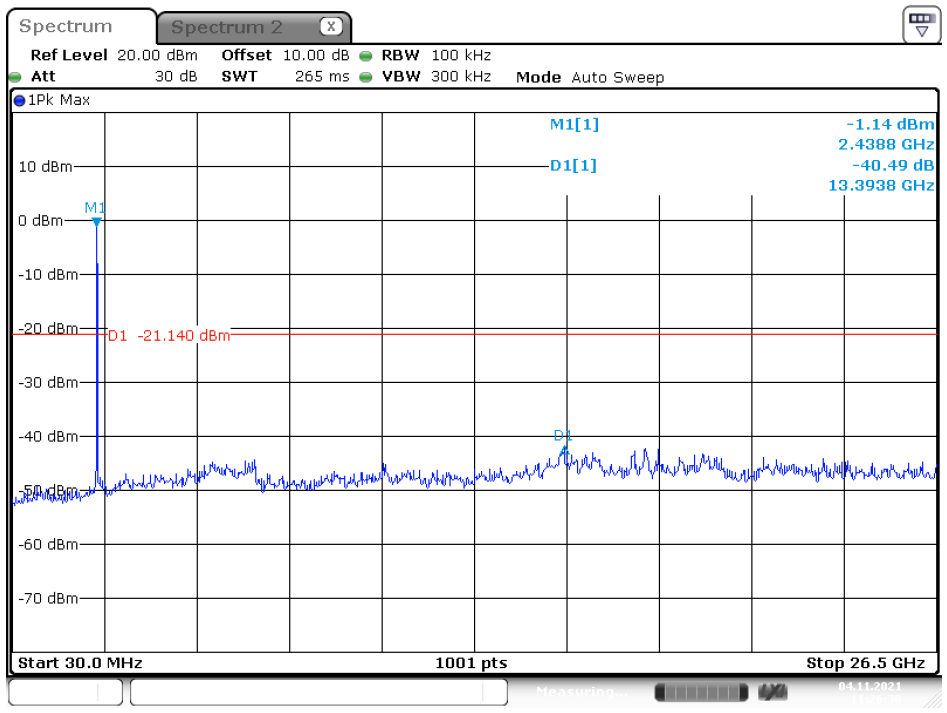
Date: 4.NOV.2021 11:21:51

Middle Channel



Date: 4.NOV.2021 11:23:48

High Channel



Date: 4.NOV.2021 11:26:30

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.

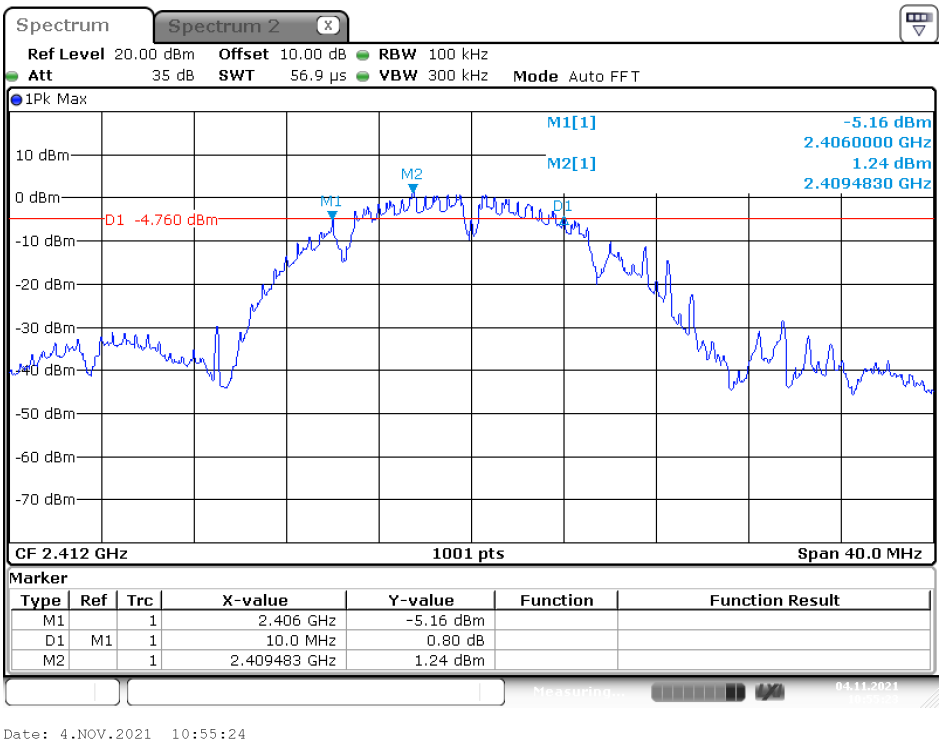
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
B Mode				
Low	2412	10.00	> 500	PASS
Middle	2437	7.64	> 500	PASS
High	2462	8.24	> 500	PASS
G Mode				
Low	2412	15.16	> 500	PASS
Middle	2437	15.20	> 500	PASS
High	2462	15.16	> 500	PASS
N20 Mode				
Low	2412	15.16	> 500	PASS
Middle	2437	15.16	> 500	PASS
High	2462	15.16	> 500	PASS

Please refer to the following plots

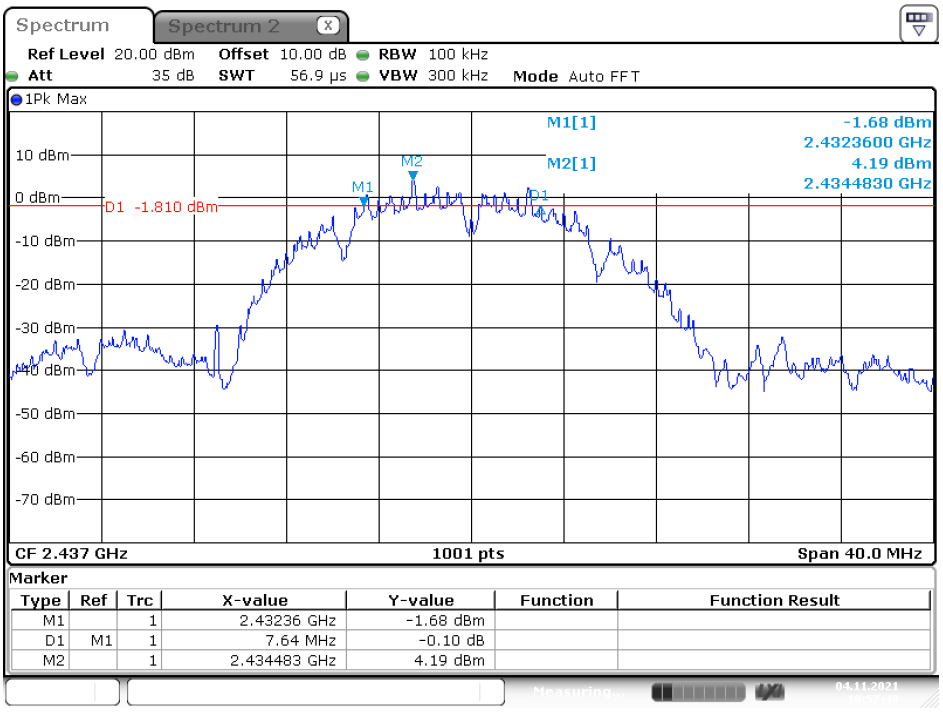
B Mode

Low Channel



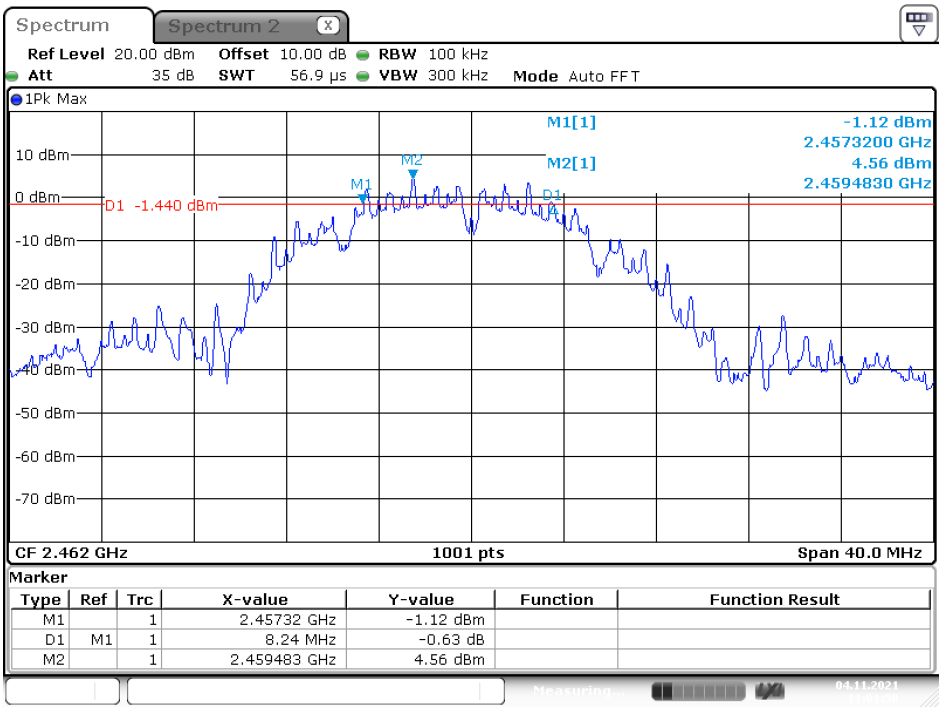
Date: 4.NOV.2021 10:55:24

Middle Channel



Date: 4.NOV.2021 10:57:49

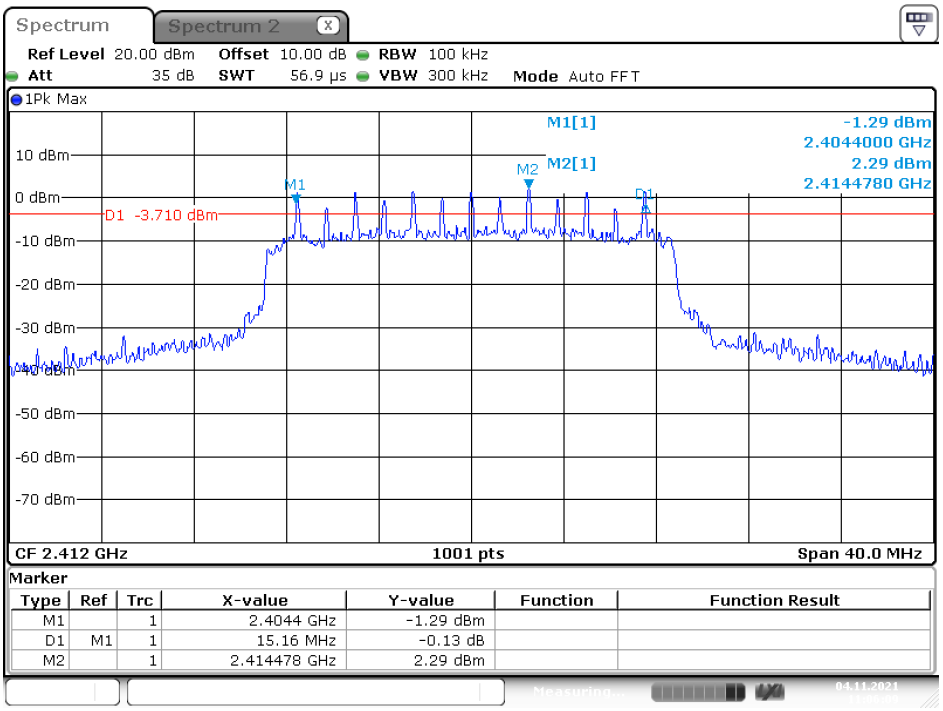
High Channel



Date: 4.NOV.2021 11:01:50

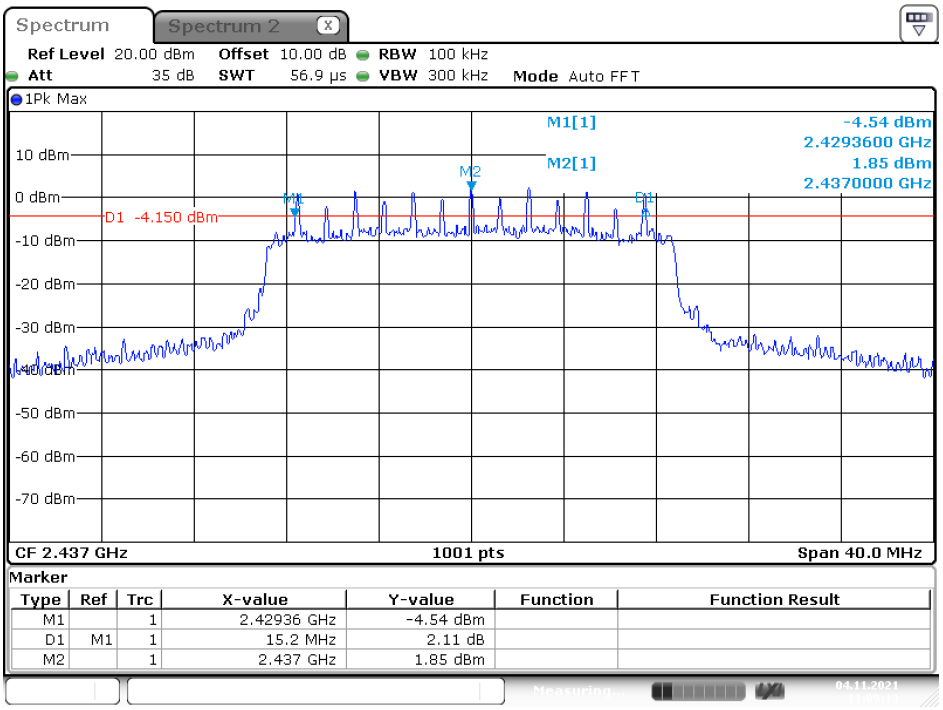
G Mode

Low Channel



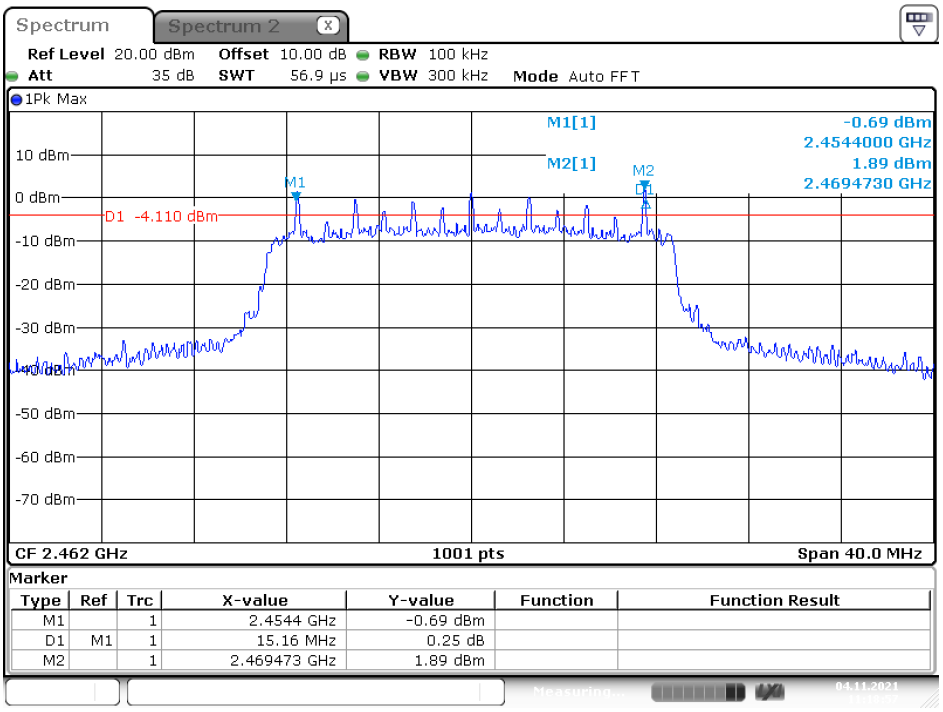
Date: 4.NOV.2021 11:06:09

Middle Channel



Date: 4.NOV.2021 11:09:14

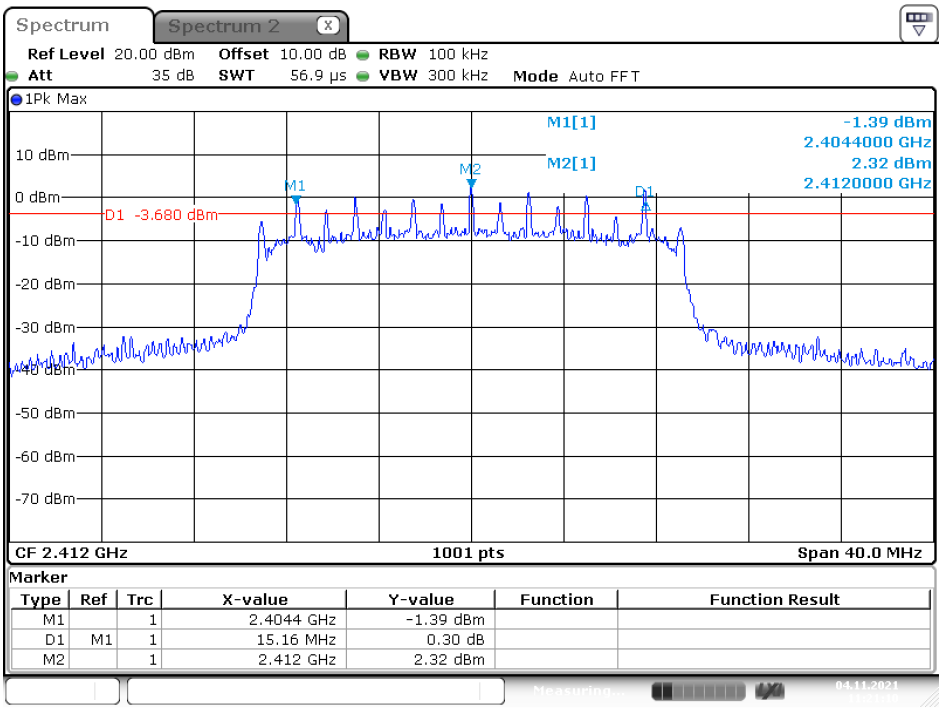
High Channel



Date: 4.NOV.2021 11:18:58

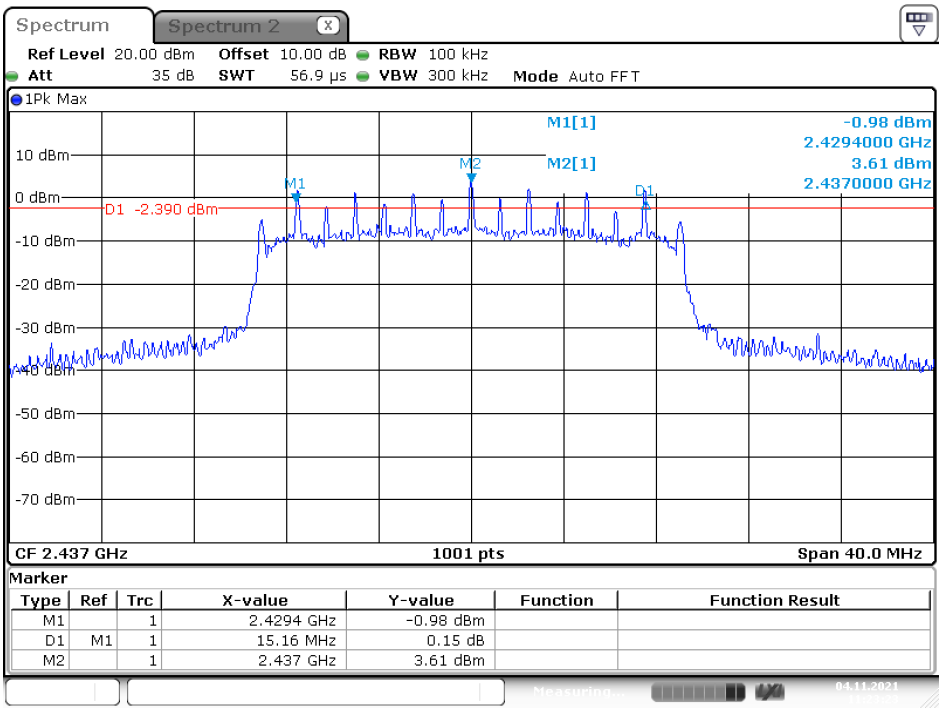
N20 Mode

Low Channel



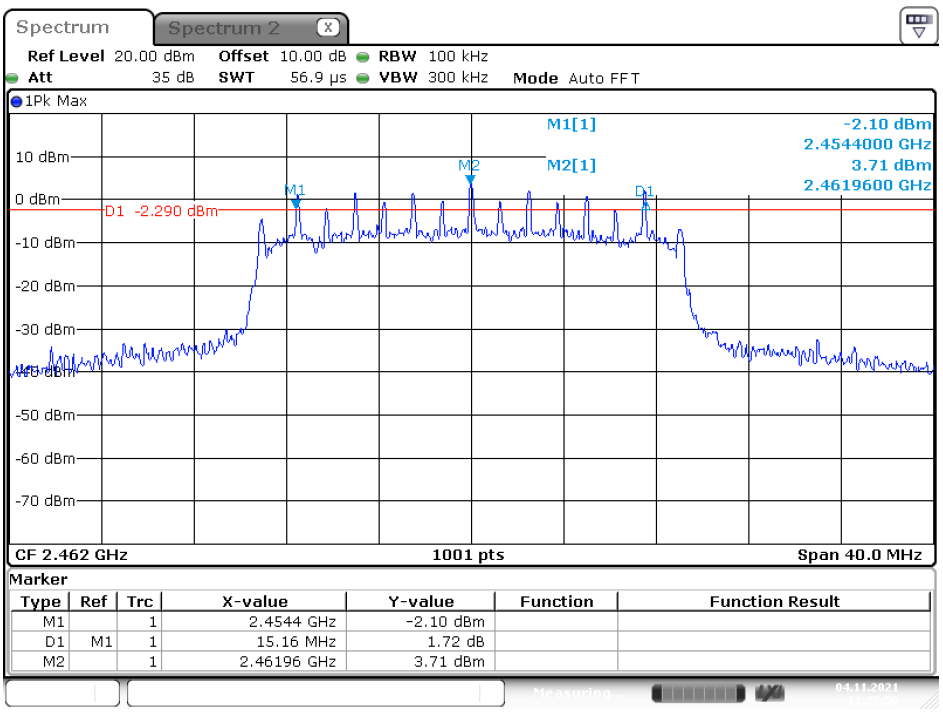
Date: 4.NOV.2021 11:21:11

Middle Channel



Date: 4.NOV.2021 11:23:23

High Channel



Date: 4.NOV.2021 11:25:50

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	20.02	0.100	1	PASS
Middle	2437	20.10	0.102	1	PASS
High	2462	20.08	0.102	1	PASS
802.11g Mode					
Low	2412	18.15	0.065	1	PASS
Middle	2437	17.97	0.063	1	PASS
High	2462	17.59	0.057	1	PASS
802.11n HT20 Mode					
Low	2412	18.25	0.067	1	PASS
Middle	2437	18.13	0.065	1	PASS
High	2462	17.45	0.056	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.

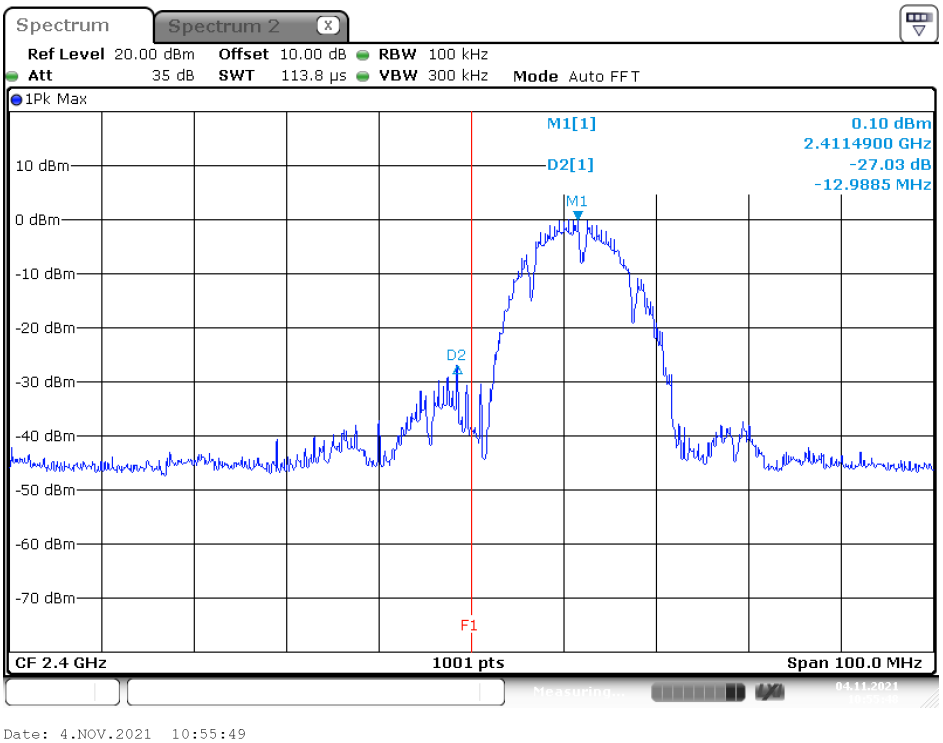
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	27.03	≥ 20	PASS
High	2462	43.63	≥ 20	PASS
G Mode				
Low	2412	33.07	≥ 20	PASS
High	2462	37.08	≥ 20	PASS
N20 Mode				
Low	2412	33.32	≥ 20	PASS
High	2462	37.77	≥ 20	PASS

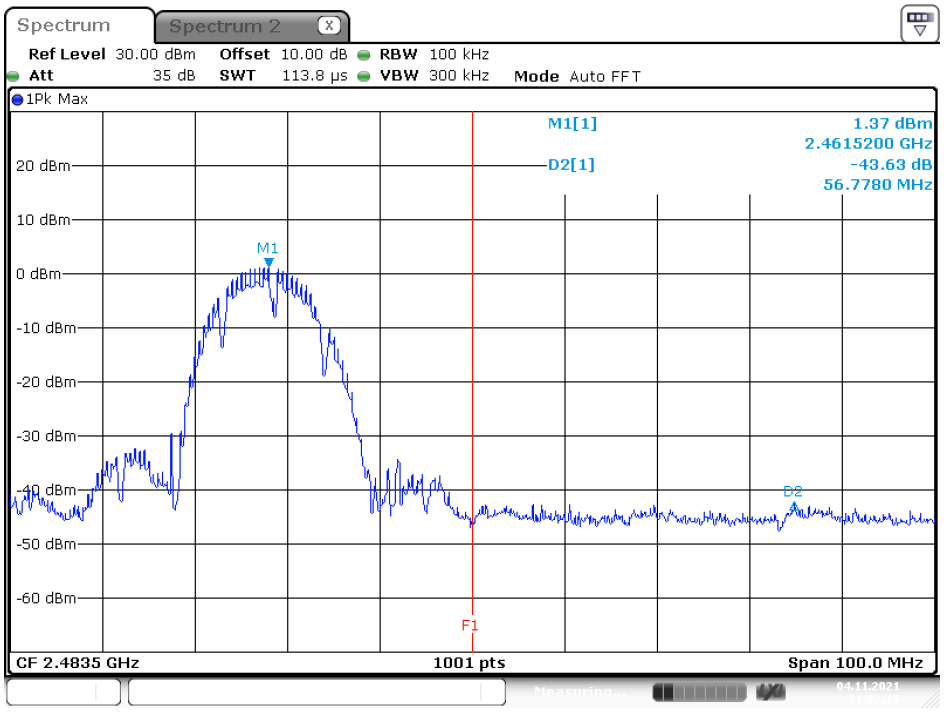
Please refer to the following plots.

B Mode

Band Edge, Left Side



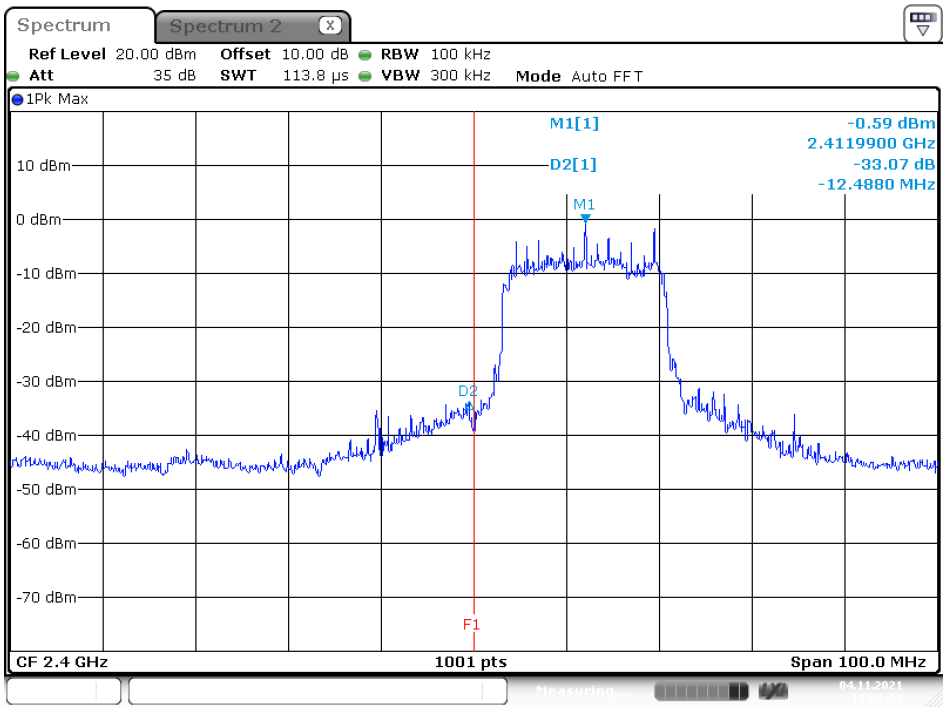
Band Edge, Right Side



Date: 4.NOV.2021 11:02:15

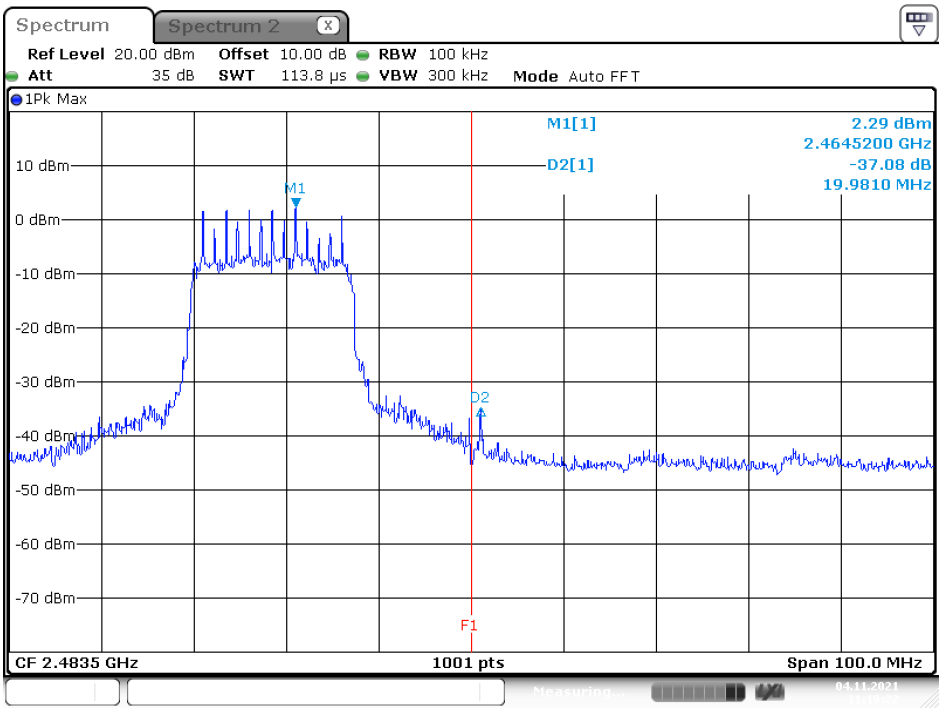
G Mode

Band Edge, Left Side



Date: 4.NOV.2021 11:06:34

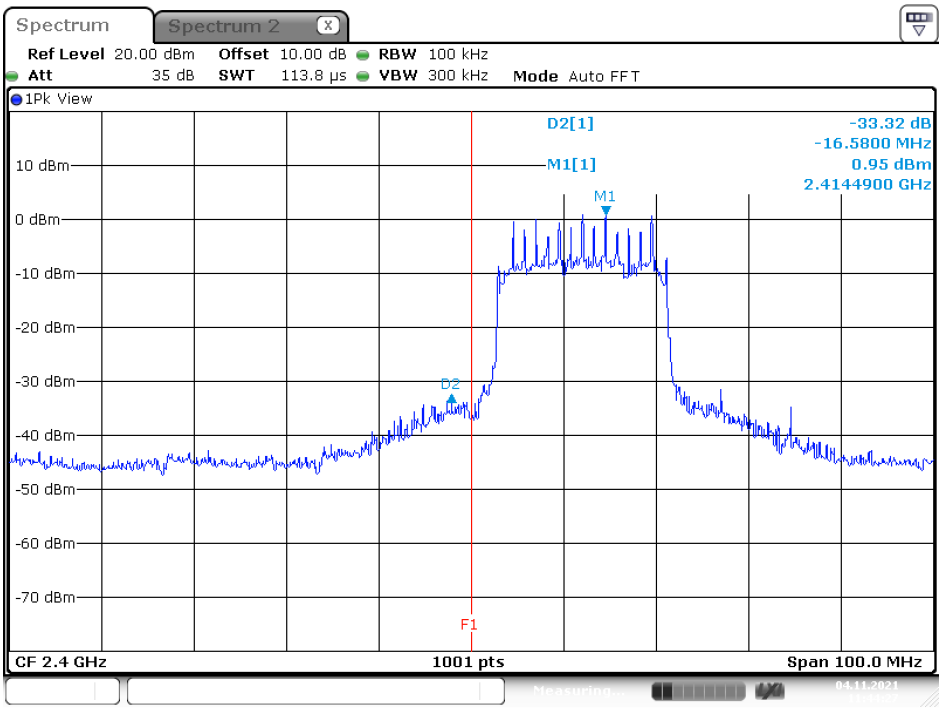
Band Edge, Right Side



Date: 4.NOV.2021 11:19:23

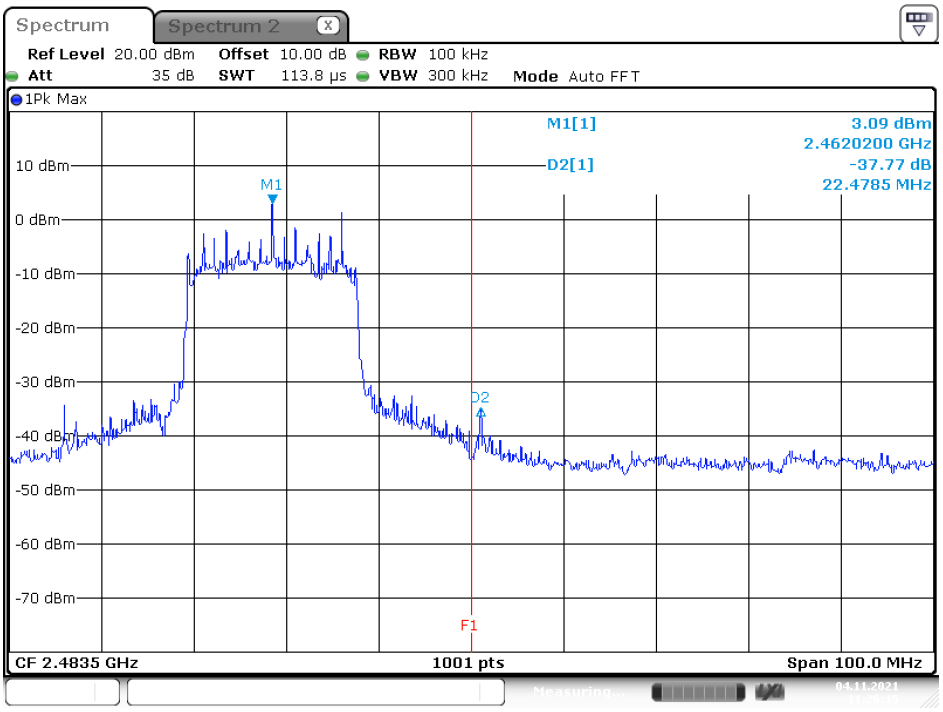
N20 Mode

Band Edge, Left Side



Date: 4.NOV.2021 11:44:27

Band Edge, Right Side



Date: 4.NOV.2021 11:26:15

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

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

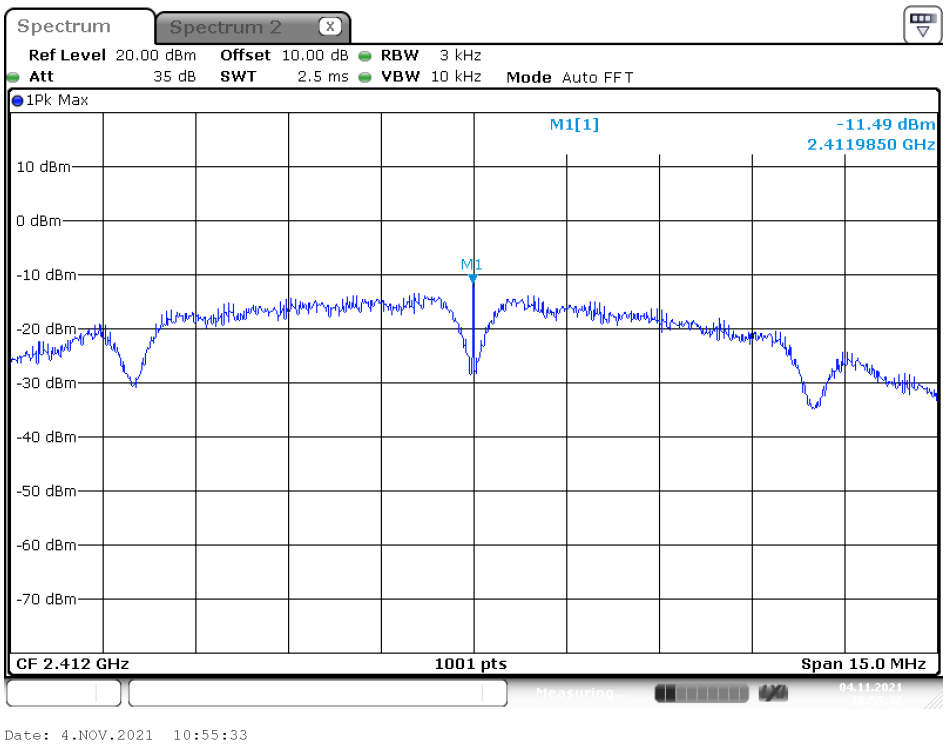
12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-11.49	8	PASS
Middle	2437	-10.69	8	PASS
High	2462	-10.52	8	PASS
G Mode				
Low	2412	-9.45	8	PASS
Middle	2437	-8.99	8	PASS
High	2462	-8.85	8	PASS
N20 Mode				
Low	2412	-9.20	8	PASS
Middle	2437	-8.66	8	PASS
High	2462	-8.72	8	PASS

Please refer to the following plots

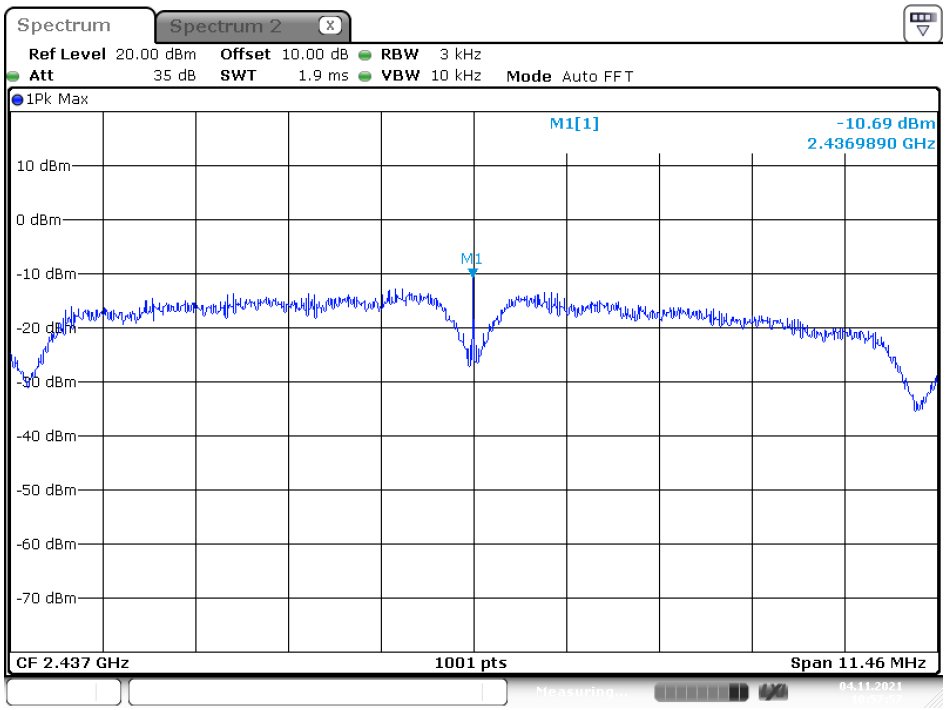
B Mode

Low Channel



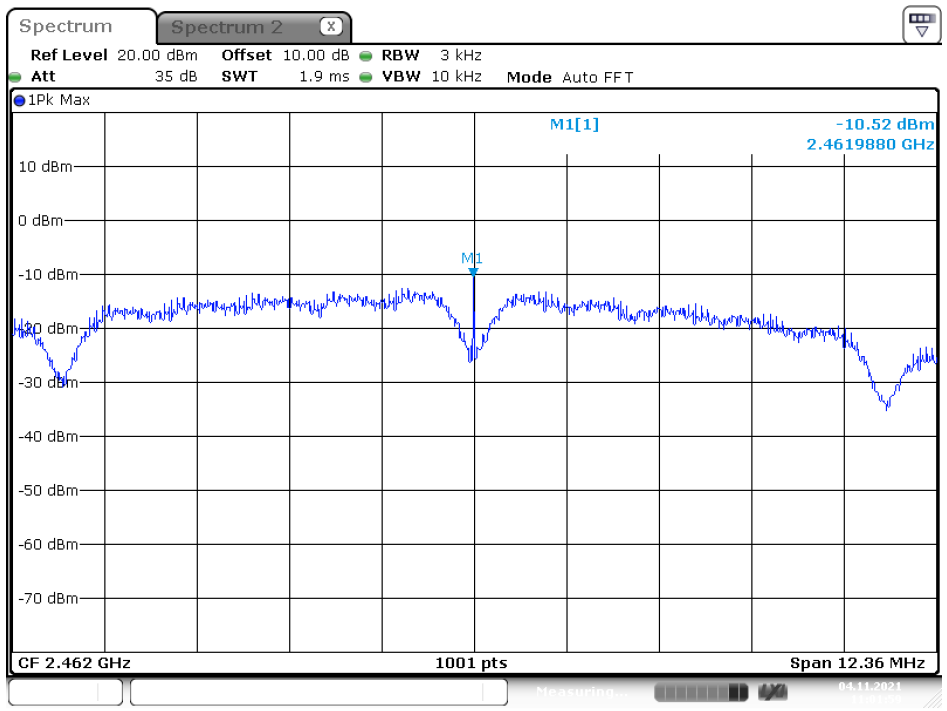
Date: 4.NOV.2021 10:55:33

Middle Channel



Date: 4.NOV.2021 10:57:58

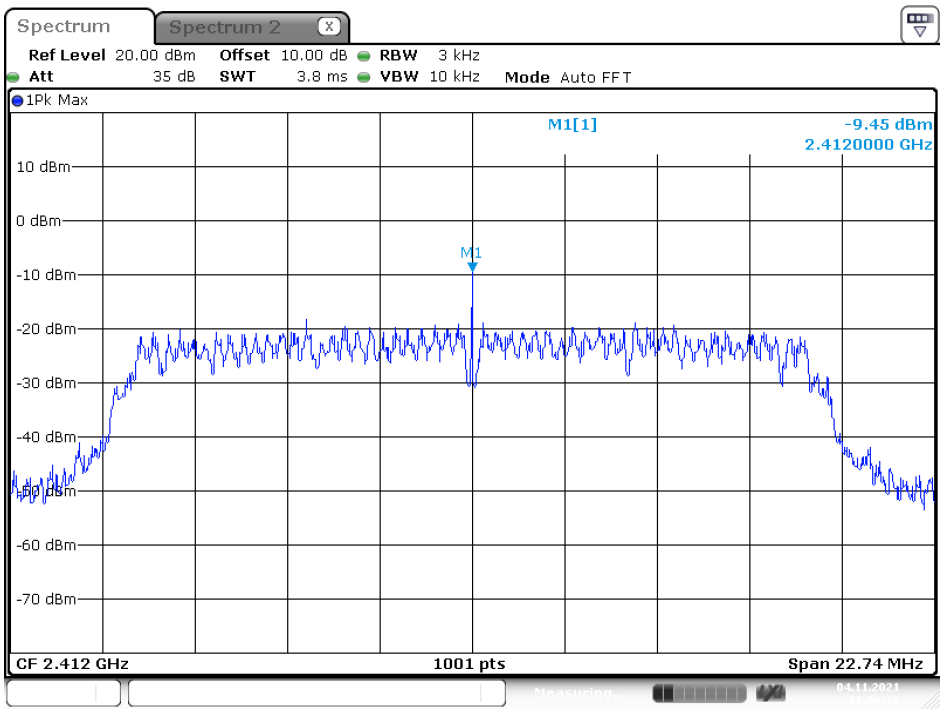
High Channel



Date: 4.NOV.2021 11:01:59

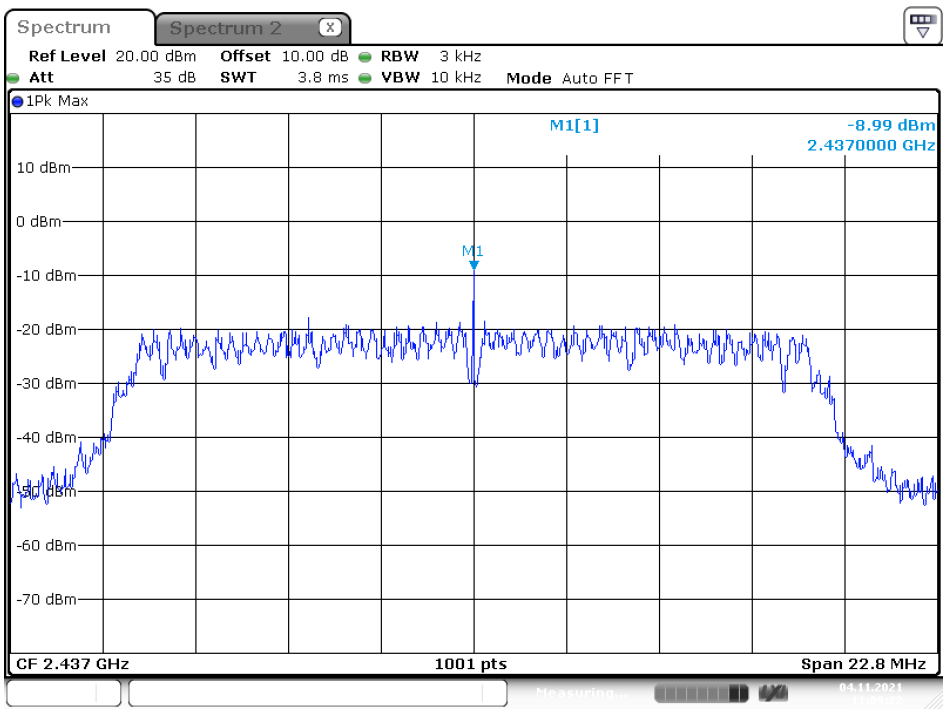
G Mode

Low Channel



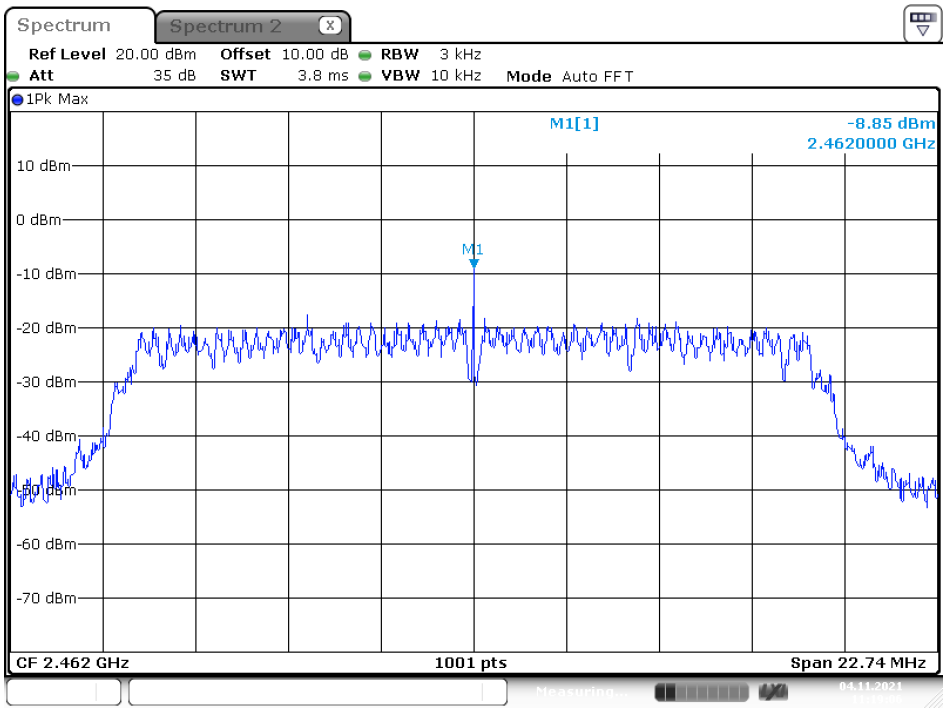
Date: 4.NOV.2021 11:06:18

Middle Channel



Date: 4.NOV.2021 11:09:23

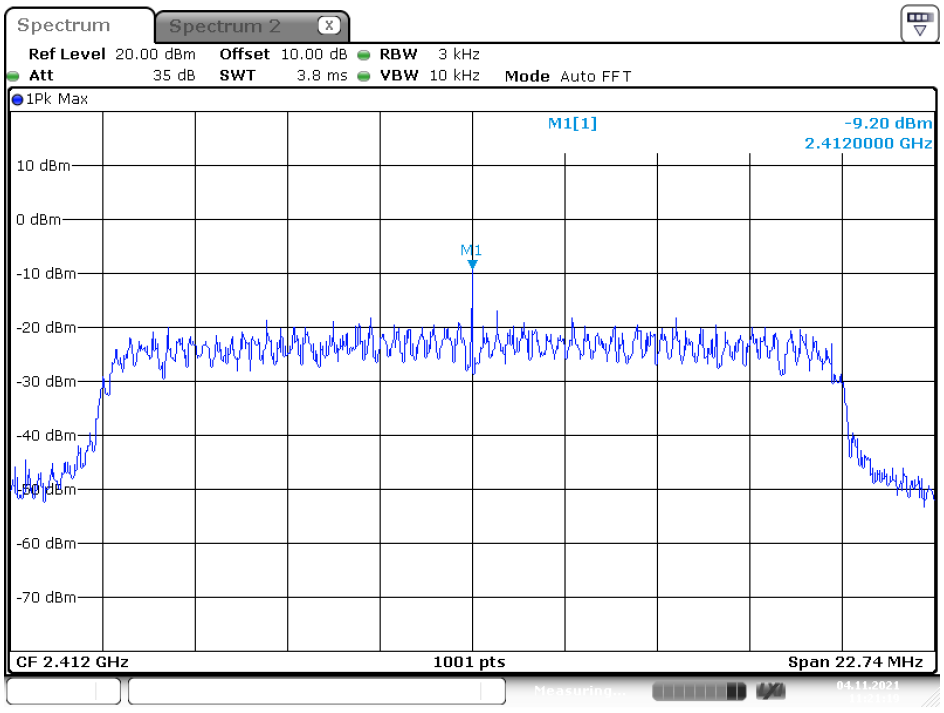
High Channel



Date: 4.NOV.2021 11:19:07

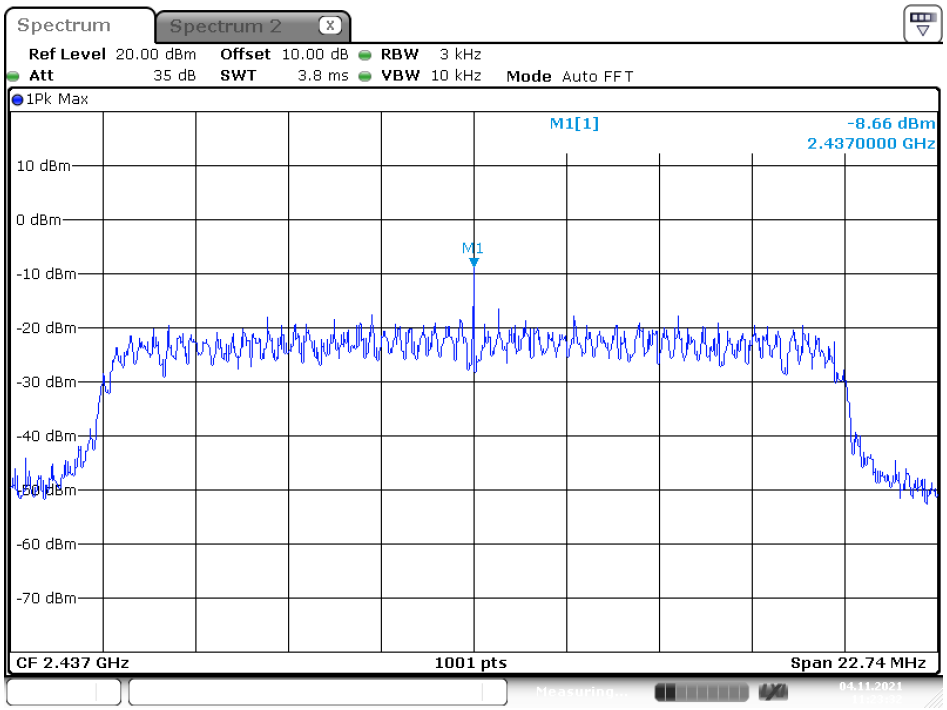
N20 Mode

Low Channel



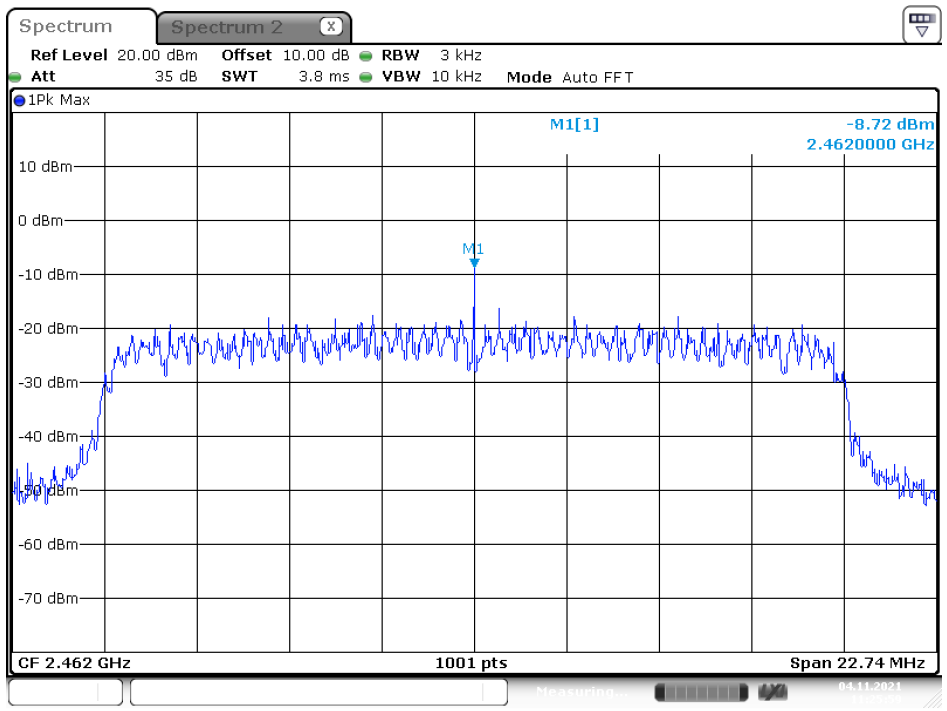
Date: 4.NOV.2021 11:21:20

Middle Channel



Date: 4.NOV.2021 11:23:32

High Channel



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