FCC Part 15.247

TEST REPORT

For

ZHEJIANG EBOY TECHNOLOGY CO., LTD.

No.568 Huabao Street, Qianyuan Town, Deqing County, Huzhou City, Zhejiang Province,China,313200

FCC ID: 2AJ3WEBEBAW439

Report Type:	**Product Type:**
Original Report	LED LAMP

Report Producer : Nana Hsu

Report Number : RXZ211229008RF01

Report Date : 2021-01-28

Reviewed By: Andy Shih Andy. Shih

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211229008	RXZ211229008RF01	2021-01-28	Original Report	Nana Hsu

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

<table>
<tr><td rowspan="2">Applicant</td><td colspan="3">ZHEJIANG EBOY TECHNOLOGY CO., LTD.</td></tr>
<tr><td colspan="3">No.568 Huabao Street, Qianyuan Town, Deqing County, Huzhou City, Zhejiang Province,China,313200</td></tr>
<tr><td rowspan="2">Manufacturer</td><td colspan="3">ZHEJIANG EBOY TECHNOLOGY CO., LTD.</td></tr>
<tr><td colspan="3">No.568 Huabao Street, Qianyuan Town, Deqing County, Huzhou City, Zhejiang Province,China,313200</td></tr>
<tr><td>Brand(Trade) Name</td><td colspan="3">N/A</td></tr>
<tr><td>Product (Equipment)</td><td colspan="3">LED LAMP</td></tr>
<tr><td>Main Model Name</td><td colspan="3">EBE-BAW439</td></tr>
<tr><td>Series Model Name</td><td colspan="3">EBE-BAW439-F, BW904, BW914, BW924, BW944, BW210, BW010, BW310, BW410，C-BW904, C-BW914, C-BW924, C-BW944, C-BW210, C-BW010, C-BW310, C-BW410</td></tr>
<tr><td rowspan="4">Model Discrepancy</td><td rowspan="3">Model different</td><td>EBE-BAW439,
EBE-BAW439-F</td><td>The driver board is different:
EBE-BAW439 130mA, Power Factor:0.7；
EBE-BAW439-F 150mA, Power Factor:0.5</td></tr>
<tr><td>EBE-BAW439,
BW904, BW914,
BW924, BW944,
BW210, BW010,
BW310, BW410</td><td>The difference is market segmentation.</td></tr>
<tr><td>EBE-BAW439-F,
C-BW904, C-BW914,
C-BW924, C-BW944,
C-BW210, C-BW010,
C-BW310, C-BW410</td><td>The difference is market segmentation.</td></tr>
<tr><td colspan="3">The model, EBE-BAW439 is the testing sample, and the final test data are shown on this test report.</td></tr>
<tr><td>Frequency Range</td><td colspan="3">IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz
IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz</td></tr>
<tr><td>Transmit Power</td><td colspan="3">IEEE 802.11b Mode: 13.92 dBm
IEEE 802.11g Mode: 21.21 dBm
IEEE 802.11n HT20 Mode: 21.64 dBm
IEEE 802.11n HT40 Mode: 20.53 dBm</td></tr>
<tr><td>Modulation Technique</td><td colspan="3">IEEE 802.11b Mode: DSSS
IEEE 802.11g Mode: OFDM</td></tr>
</table>

	IEEE 802.11n HT20 Mode: OFDM IEEE 802.11n HT40 Mode: OFDM
Power Operation (Voltage Range)	☒ AC 120V/60Hz ☐ Adapter I/P: ☒ By AC Power Cord ☐ PoE
	☐ DC Type ☐ Battery ☐ DC Power Supply ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	Jan 06, 2022
Date of Test	Jan 14, 2022 ~ Jan 20, 2022

*All measurement and test data in this report was gathered from production sample serial number: RXZ211229008-01, RXZ211229008-02 (Assigned by BACL, New Taipei Laboratory).

1.2 Objective

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

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)
It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory).
Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

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

1.7 Environmental Conditions

Test Site	Test Date	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2022/1/20	22.6	63	1010	Boris Kao
Radiation Spurious Emissions	2022/1/14~ 2022/1/17	18.4~20.1	55~57	1010	Aaron Pan
Conducted Spurious Emissions	2022/1/19	22.5	56	1010	Boris Kao
6 dB Emission Bandwidth	2022/1/19	22.5	56	1010	Boris Kao
Maximum Output Power	2022/1/19	22.5	56	1010	Boris Kao
100 kHz Bandwidth of Frequency Band Edge	2022/1/19	22.5	56	1010	Boris Kao
Power Spectral Density	2022/1/19	22.5	56	1010	Boris Kao

1.8 Test Facility

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

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

Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) 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.

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

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

Test Frequency		Low	Middle	High
Power Level Setting	B Mode	10	8	8
	G Mode	37	37	32
	N20 Mode	37	37	32
	N40 Mode	28	28	26

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

Pre-scan

AC Line Conducted Emissions and Radiated Spurious Emissions

Model 1: EBE-BAW439 (Sample serial number: RXZ211229008-01)

Model 2: EBE-BAW439-F (Sample serial number: RXZ211229008-02)

Worst case is the Mode 1: EBE-BAW439

Model 1: EBE-BAW439 for all test item.

Model 2: EBE-BAW439-F test AC Line Conducted Emissions and Below 1GHz Radiated Spurious Emissions.

2.5 Support Equipment List and Details

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

2.6 Support Equipment List and Details

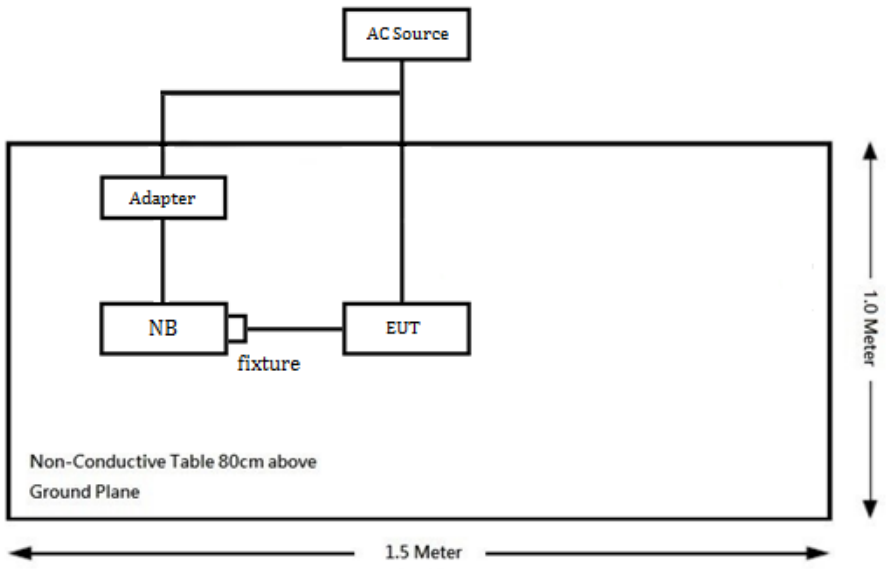
N/A

2.7 Block Diagram of Test Setup

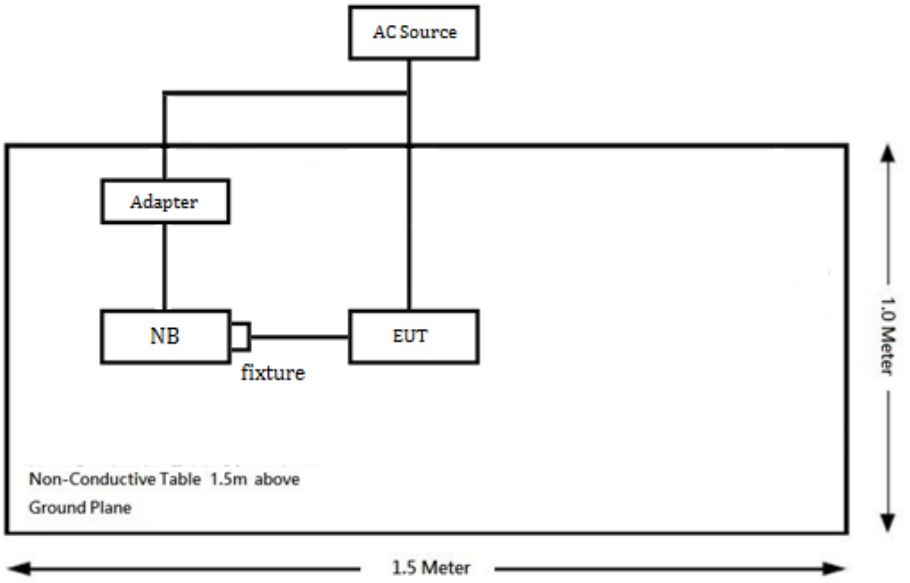
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

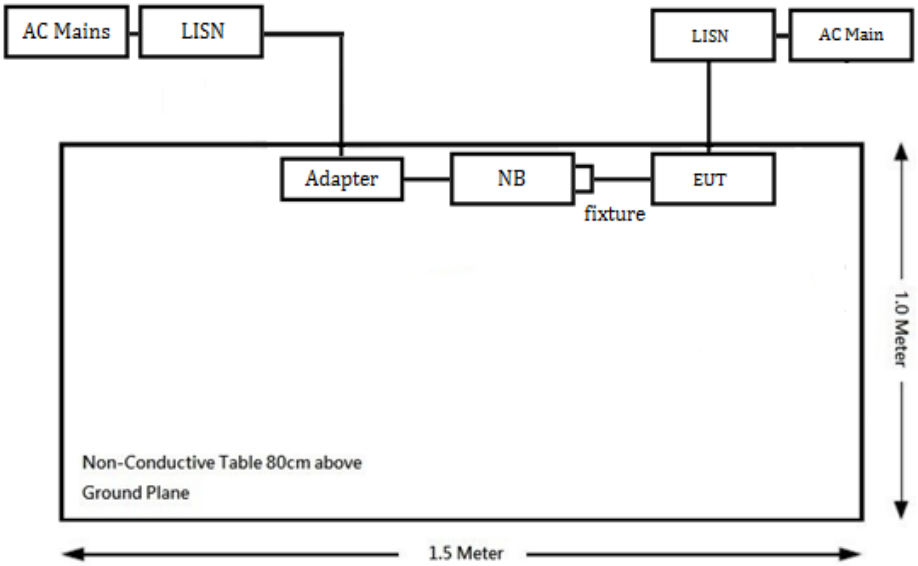
Below 1GHz:



Above 1GHz:



Conduction:



2.8 Duty Cycle

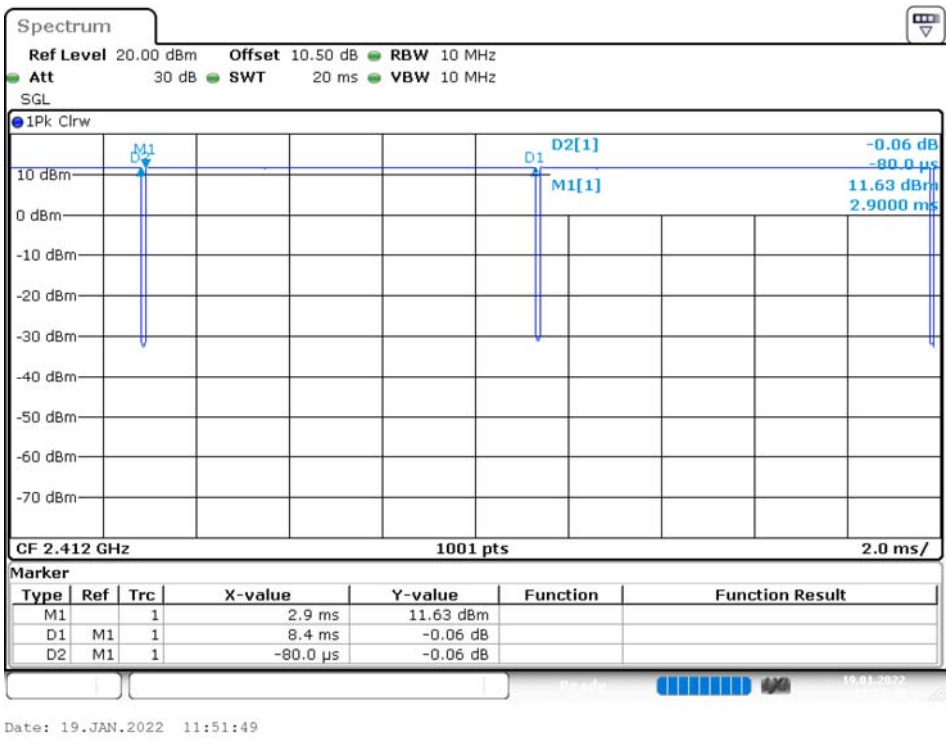
The duty cycle as below:

Radio Mode	On Time (ms)	Off Time (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	8.4	0.08	99	0.04
802.11g	1.395	0.02	99	0.04
802.11n20	1.3	0.02	98	0.09
802.11n40	0.648	0.01	98	0.09

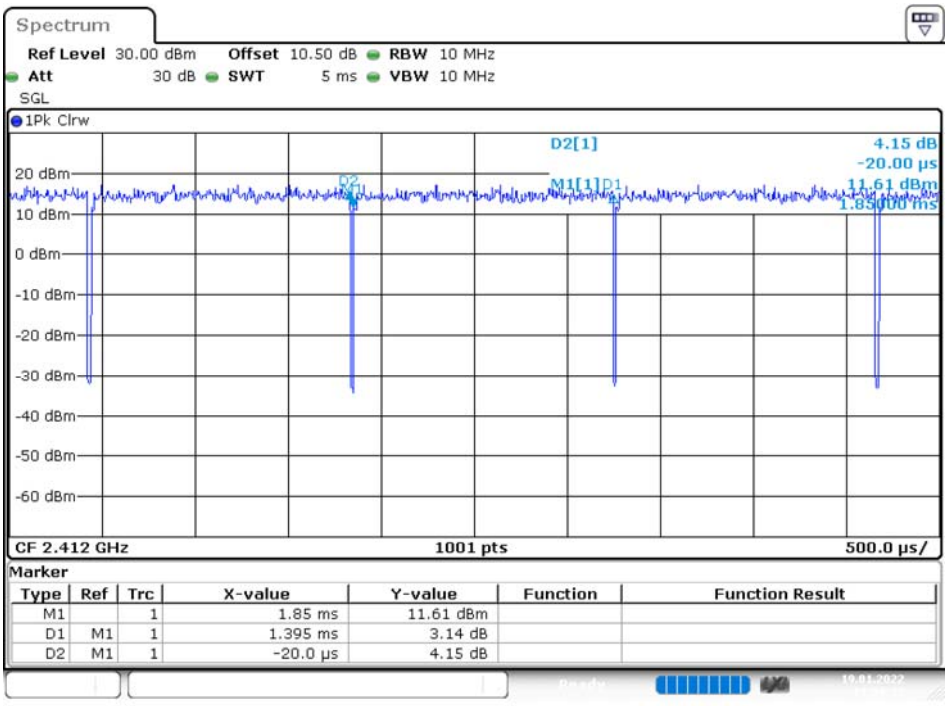
Note: Duty Cycle Correction Factor = 10*log(1/duty cycle)

Please refer to the following plots.

B Mode

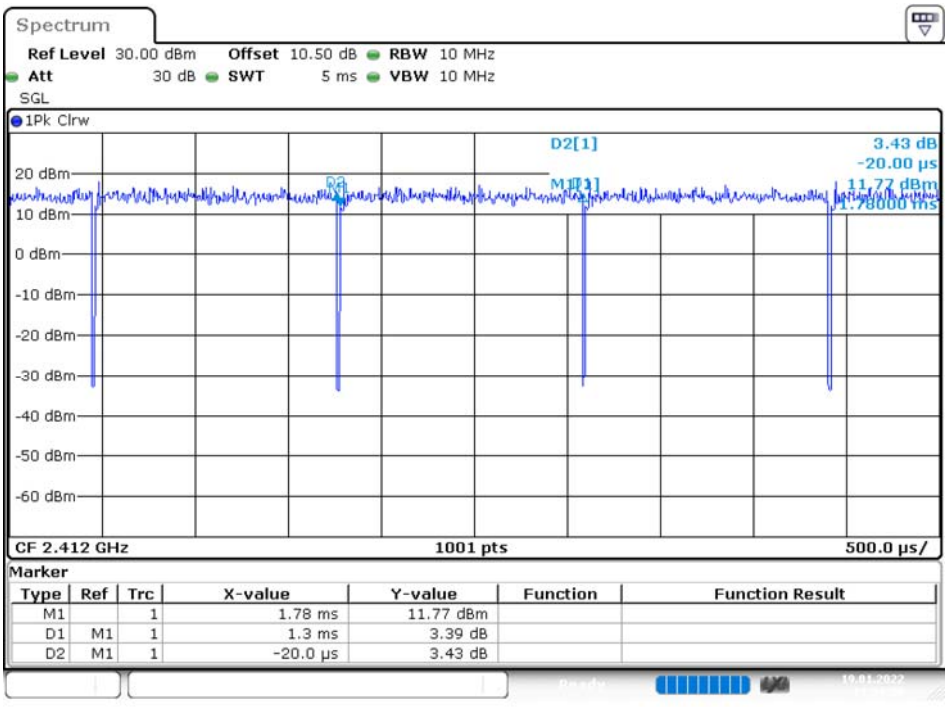


G Mode



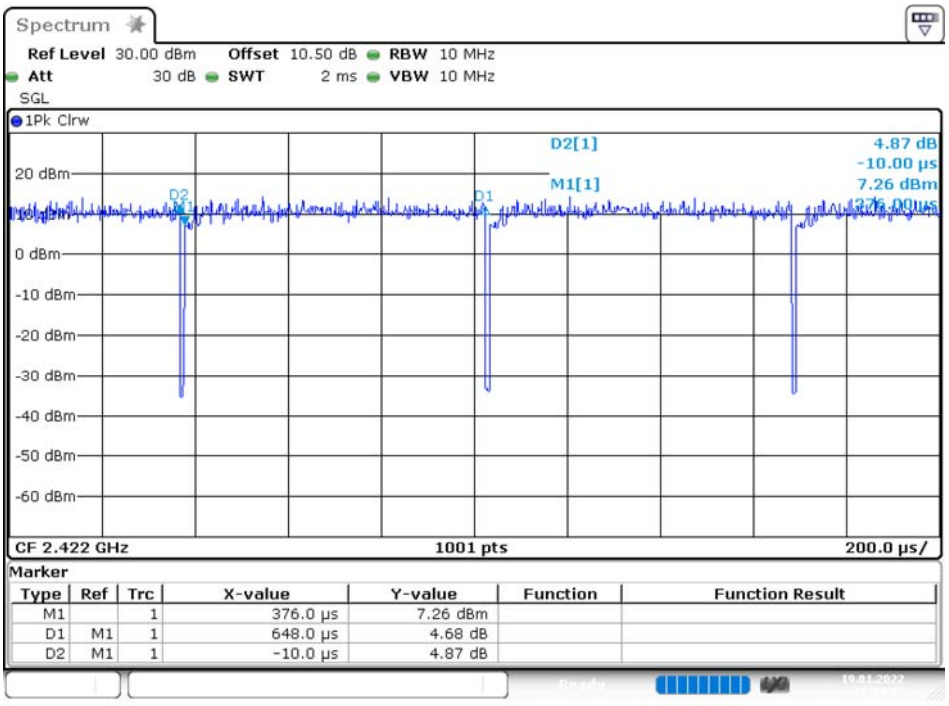
Date: 19.JAN.2022 11:53:13

N20 Mode



Date: 19.JAN.2022 11:53:50

N40 Mode


Spectrum
Ref Level 30.00 dBm Offset 10.50 dB RBW 10 MHz
Att 30 dB SWT 2 ms VBW 10 MHz
SGL
1Pk Clrw
D2[1] 4.87 dB
-10.00 µs
M1[1] 7.26 dBm
376.00µs
20 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
CF 2.422 GHz
1001 pts
200.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 376.0 µs 7.26 dBm
D1 M1 1 648.0 µs 4.68 dB
D2 M1 1 -10.0 µs 4.87 dB
Date: 19.JAN.2022 11:54:37

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	101248	2021/06/08	2022/06/07
LISN	Rohde & Schwarz	ENV216	101612	2022/1/14	2023/1/13
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
Preamplifier	A.H. system Inc.	PAM-0118P	470	2021/3/15	2022/3/14
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2021/12/22	2022/12/21
Spectrum Analyzer	Rohde & Schwarz	FSV40	101204	2021/06/10	2022/06/09
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
Coaxial Cable	COMMATE	PEWC	8Dr	2021/12/19	2022/12/18
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	2021/12/19	2022/12/18
Cable	EMC	EMC105-SM-SM-10000	201003	2021/2/3	2022/2/2
Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R

Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101204	2021/6/10	2022/6/9
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)			
WIFI 2.4G	2412-2462	2.49	1.774	22	158.489	20	0.0559	1

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

Model	Antenna Type	Antenna Gain
N/A	Monopole Antenna	2.49 dBi

Result: Compliance

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

7.1 Applicable Standard

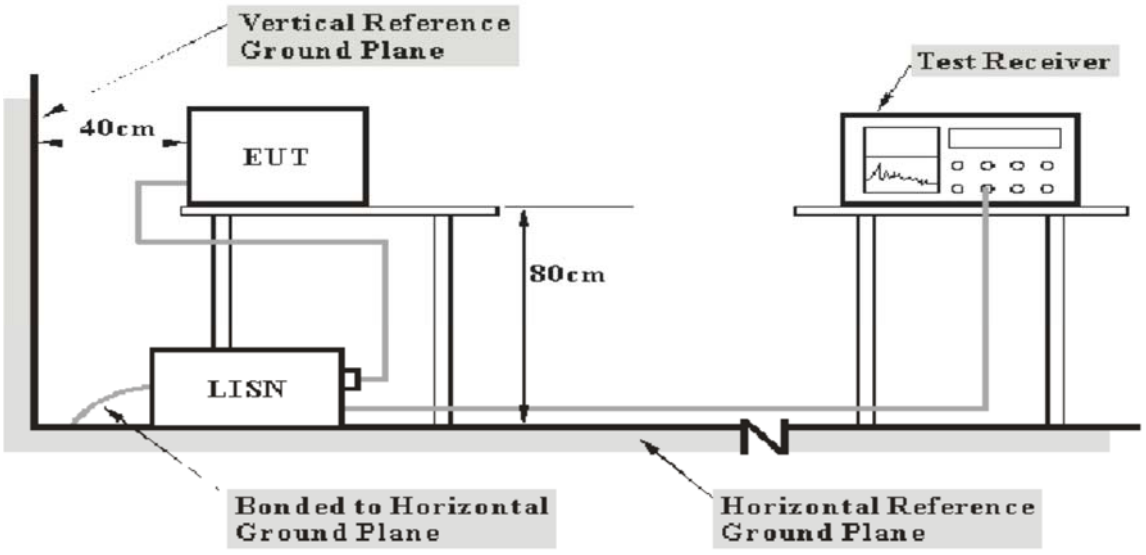
According to §15.207

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:

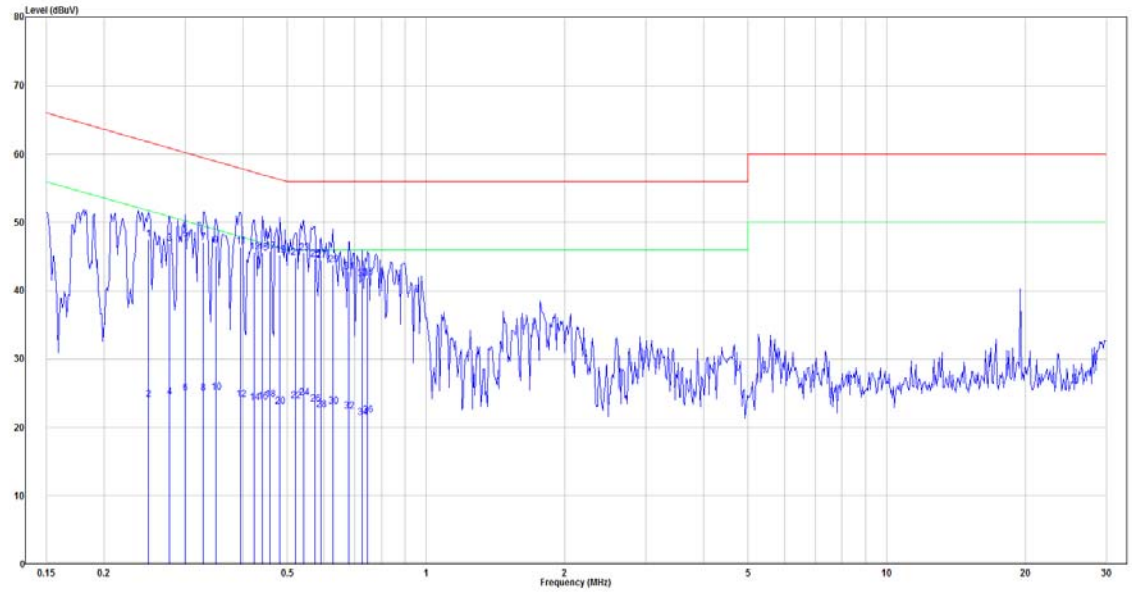
Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

Model 1: EBE-BAW439

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.249	27.96	19.50	47.46	61.78	-14.32	QP
2	0.249	4.50	19.50	24.00	51.78	-27.78	Average
3	0.277	27.48	19.51	46.99	60.90	-13.91	QP
4	0.277	4.84	19.51	24.35	50.90	-26.55	Average
5	0.300	27.96	19.51	47.47	60.24	-12.77	QP
6	0.300	5.49	19.51	25.00	50.24	-25.24	Average
7	0.329	27.55	19.51	47.06	59.49	-12.43	QP
8	0.329	5.48	19.51	24.99	49.49	-24.50	Average
9	0.350	27.08	19.51	46.59	58.96	-12.37	QP
10	0.350	5.53	19.51	25.04	48.96	-23.92	Average
11	0.396	26.94	19.51	46.45	57.95	-11.50	QP
12	0.396	4.49	19.51	24.00	47.95	-23.95	Average
13	0.424	26.18	19.52	45.70	57.37	-11.67	QP
14	0.424	4.10	19.52	23.62	47.37	-23.75	Average
15	0.442	26.02	19.52	45.54	57.02	-11.48	QP
16	0.442	4.16	19.52	23.68	47.02	-23.34	Average
17	0.459	26.26	19.52	45.78	56.71	-10.93	QP
18	0.459	4.50	19.52	24.02	46.71	-22.69	Average
19	0.481	25.64	19.52	45.16	56.32	-11.16	QP

20	0.481	3.51	19.52	23.03	46.32	-23.29	Average
21	0.521	25.38	19.52	44.90	56.00	-11.10	QP
22	0.521	4.26	19.52	23.78	46.00	-22.22	Average
23	0.544	26.06	19.52	45.58	56.00	-10.42	QP
24	0.544	4.78	19.52	24.30	46.00	-21.70	Average
25	0.573	25.11	19.52	44.63	56.00	-11.37	QP
26	0.573	3.88	19.52	23.40	46.00	-22.60	Average
27	0.592	25.02	19.53	44.55	56.00	-11.45	QP
28	0.592	2.99	19.53	22.52	46.00	-23.48	Average
29	0.627	24.24	19.53	43.77	56.00	-12.23	QP
30	0.627	3.52	19.53	23.05	46.00	-22.95	Average
31	0.679	23.22	19.53	42.75	56.00	-13.25	QP
32	0.679	2.74	19.53	22.27	46.00	-23.73	Average
33	0.727	22.20	19.53	41.73	56.00	-14.27	QP
34	0.727	1.86	19.53	21.39	46.00	-24.61	Average
35	0.747	22.40	19.53	41.93	56.00	-14.07	QP
36	0.747	2.24	19.53	21.77	46.00	-24.23	Average

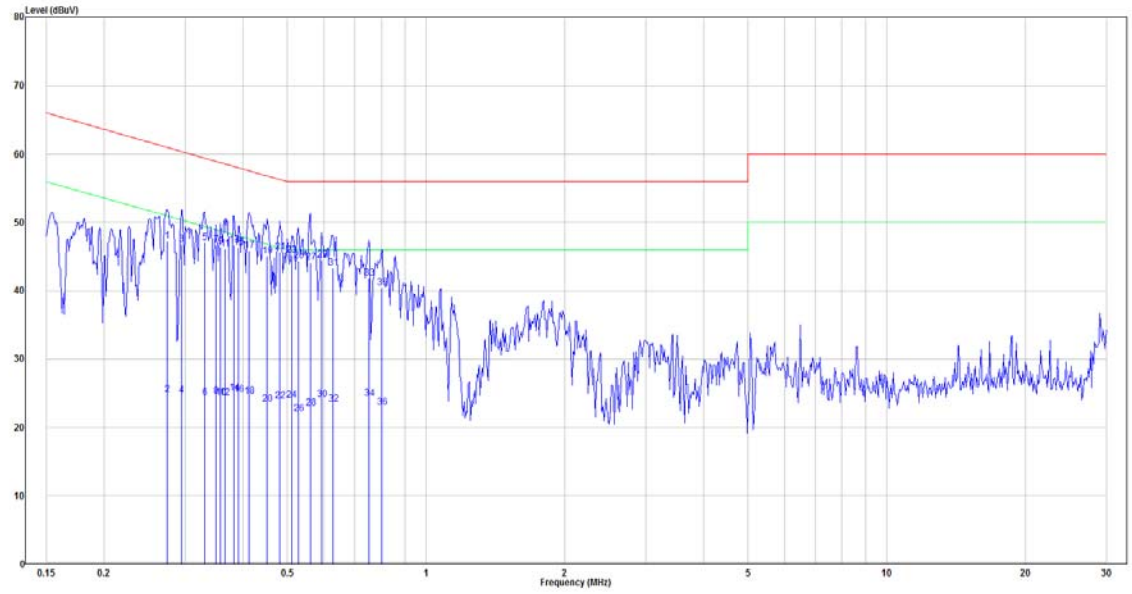
Note:

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)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.274	27.83	19.50	47.33	60.98	-13.65	QP
2	0.274	5.22	19.50	24.72	50.98	-26.26	Average
3	0.294	27.28	19.50	46.78	60.41	-13.63	QP
4	0.294	5.07	19.50	24.57	50.41	-25.84	Average
5	0.330	27.55	19.51	47.06	59.44	-12.38	QP
6	0.330	4.79	19.51	24.30	49.44	-25.14	Average
7	0.350	27.21	19.51	46.72	58.96	-12.24	QP
8	0.350	5.03	19.51	24.54	48.96	-24.42	Average
9	0.358	26.93	19.51	46.44	58.78	-12.34	QP
10	0.358	4.74	19.51	24.25	48.78	-24.53	Average
11	0.365	26.62	19.51	46.13	58.61	-12.48	QP
12	0.365	4.82	19.51	24.33	48.61	-24.28	Average
13	0.383	27.18	19.51	46.69	58.21	-11.52	QP
14	0.383	5.43	19.51	24.94	48.21	-23.27	Average
15	0.391	26.82	19.51	46.33	58.03	-11.70	QP
16	0.391	5.28	19.51	24.79	48.03	-23.24	Average
17	0.413	26.42	19.51	45.93	57.59	-11.66	QP
18	0.413	4.95	19.51	24.46	47.59	-23.13	Average
19	0.452	25.58	19.52	45.10	56.85	-11.75	QP
20	0.452	3.87	19.52	23.39	46.85	-23.46	Average
21	0.481	26.16	19.52	45.68	56.32	-10.64	QP
22	0.481	4.27	19.52	23.79	46.32	-22.53	Average

23	0.510	25.74	19.52	45.26	56.00	-10.74	QP
24	0.510	4.42	19.52	23.94	46.00	-22.06	Average
25	0.529	24.83	19.52	44.35	56.00	-11.65	QP
26	0.529	2.45	19.52	21.97	46.00	-24.03	Average
27	0.561	24.67	19.52	44.19	56.00	-11.81	QP
28	0.561	3.29	19.52	22.81	46.00	-23.19	Average
29	0.595	24.99	19.52	44.51	56.00	-11.49	QP
30	0.595	4.47	19.52	23.99	46.00	-22.01	Average
31	0.627	23.84	19.52	43.36	56.00	-12.64	QP
32	0.627	3.78	19.52	23.30	46.00	-22.70	Average
33	0.751	22.37	19.53	41.90	56.00	-14.10	QP
34	0.751	4.59	19.53	24.12	46.00	-21.88	Average
35	0.800	20.91	19.53	40.44	56.00	-15.56	QP
36	0.800	3.36	19.53	22.89	46.00	-23.11	Average

Note:

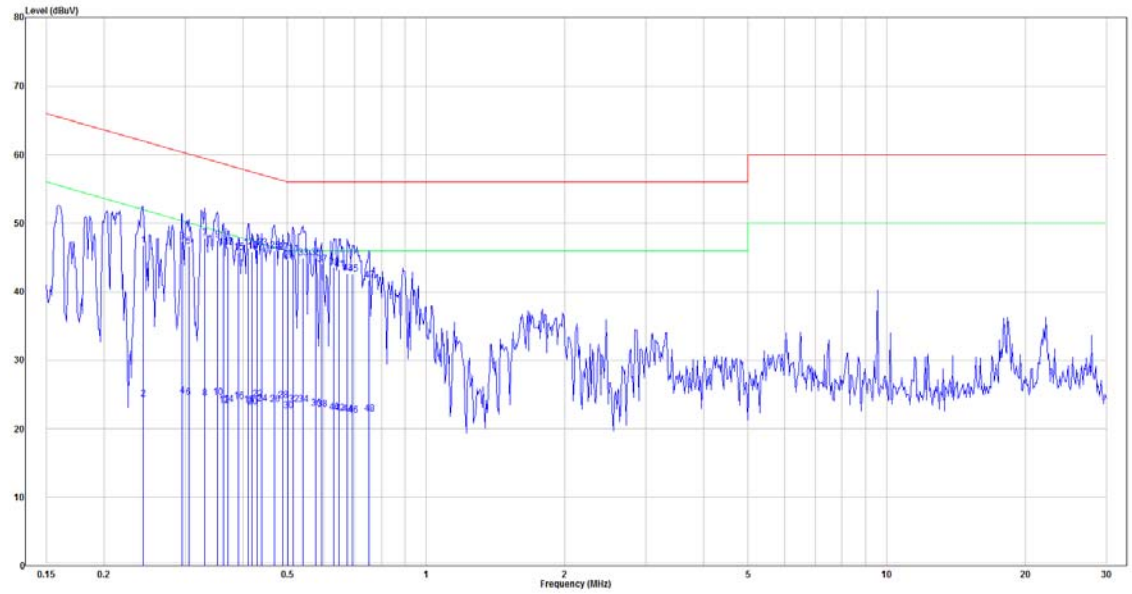
Level = Read Level + Factor

Over Limit = Level – Limit Line

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

Model 2: EBE-BAW439-F

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.243	27.30	19.50	46.80	62.00	-15.20	QP
2	0.243	4.73	19.50	24.23	52.00	-27.77	Average
3	0.296	27.84	19.51	47.35	60.37	-13.02	QP
4	0.296	5.26	19.51	24.77	50.37	-25.60	Average
5	0.305	27.14	19.51	46.65	60.10	-13.45	QP
6	0.305	5.04	19.51	24.55	50.10	-25.55	Average
7	0.330	28.29	19.51	47.80	59.44	-11.64	QP
8	0.330	4.89	19.51	24.40	49.44	-25.04	Average
9	0.352	28.06	19.51	47.57	58.91	-11.34	QP
10	0.352	5.00	19.51	24.51	48.91	-24.40	Average
11	0.363	27.02	19.51	46.53	58.65	-12.12	QP
12	0.363	3.87	19.51	23.38	48.65	-25.27	Average
13	0.371	27.00	19.51	46.51	58.47	-11.96	QP
14	0.371	3.97	19.51	23.48	48.47	-24.99	Average
15	0.391	26.30	19.51	45.81	58.03	-12.22	QP
16	0.391	4.46	19.51	23.97	48.03	-24.06	Average
17	0.410	26.90	19.51	46.41	57.64	-11.23	QP
18	0.410	3.85	19.51	23.36	47.64	-24.28	Average
19	0.419	26.41	19.51	45.92	57.46	-11.54	QP
20	0.419	3.60	19.51	23.11	47.46	-24.35	Average
21	0.431	26.56	19.52	46.08	57.24	-11.16	QP

22	0.431	4.73	19.52	24.25	47.24	-22.99	Average
23	0.440	26.89	19.52	46.41	57.07	-10.66	QP
24	0.440	4.08	19.52	23.60	47.07	-23.47	Average
25	0.469	26.51	19.52	46.03	56.54	-10.51	QP
26	0.469	3.95	19.52	23.47	46.54	-23.07	Average
27	0.489	26.28	19.52	45.80	56.19	-10.39	QP
28	0.489	4.54	19.52	24.06	46.19	-22.13	Average
29	0.502	25.15	19.52	44.67	56.00	-11.33	QP
30	0.502	3.06	19.52	22.58	46.00	-23.42	Average
31	0.516	26.07	19.52	45.59	56.00	-10.41	QP
32	0.516	3.97	19.52	23.49	46.00	-22.51	Average
33	0.541	25.48	19.52	45.00	56.00	-11.00	QP
34	0.541	3.94	19.52	23.46	46.00	-22.54	Average
35	0.576	25.42	19.52	44.94	56.00	-11.06	QP
36	0.576	3.41	19.52	22.93	46.00	-23.07	Average
37	0.595	24.58	19.53	44.11	56.00	-11.89	QP
38	0.595	3.29	19.53	22.82	46.00	-23.18	Average
39	0.630	24.07	19.53	43.60	56.00	-12.40	QP
40	0.630	2.85	19.53	22.38	46.00	-23.62	Average
41	0.647	23.70	19.53	43.23	56.00	-12.77	QP
42	0.647	2.72	19.53	22.25	46.00	-23.75	Average
43	0.675	23.15	19.53	42.68	56.00	-13.32	QP
44	0.675	2.63	19.53	22.16	46.00	-23.84	Average
45	0.694	23.09	19.53	42.62	56.00	-13.38	QP
46	0.694	2.36	19.53	21.89	46.00	-24.11	Average
47	0.751	22.13	19.53	41.66	56.00	-14.34	QP
48	0.751	2.56	19.53	22.09	46.00	-23.91	Average

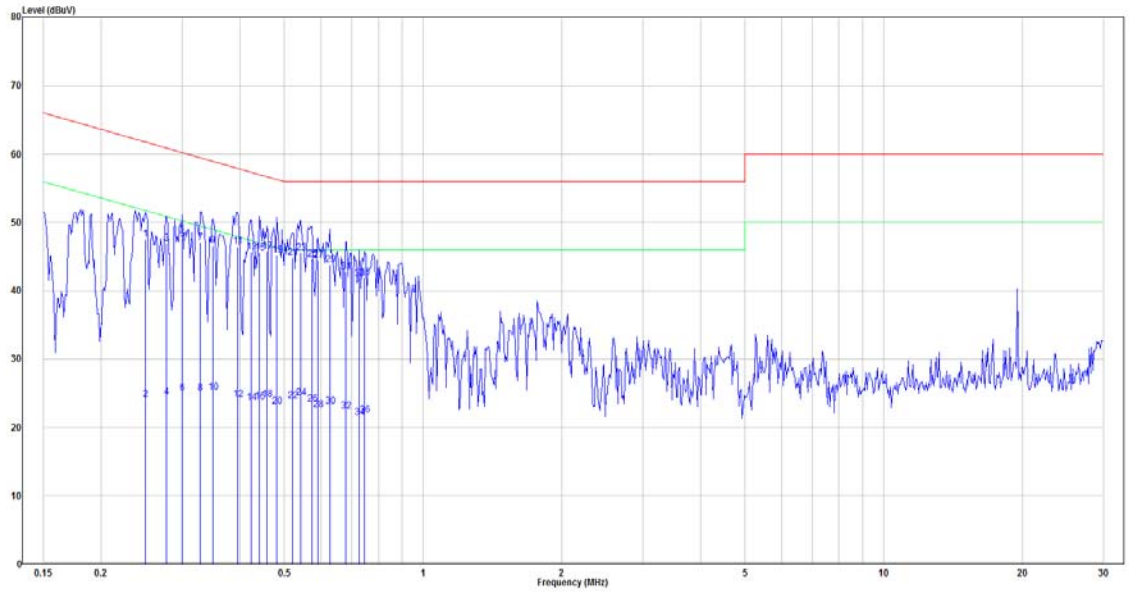
Note:

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)	(dBuV)	Factor(dB)	(dBuV)	(dBuV)	(dB)	
1	0.305	27.04	19.50	46.54	60.10	-13.56	QP
2	0.305	5.05	19.50	24.55	50.10	-25.55	Average
3	0.312	28.08	19.50	47.58	59.93	-12.35	QP
4	0.312	5.67	19.50	25.17	49.93	-24.76	Average
5	0.327	27.68	19.50	47.18	59.53	-12.35	QP
6	0.327	4.00	19.50	23.50	49.53	-26.03	Average
7	0.341	27.73	19.51	47.24	59.18	-11.94	QP
8	0.341	4.92	19.51	24.43	49.18	-24.75	Average
9	0.354	27.56	19.51	47.07	58.87	-11.80	QP
10	0.354	4.70	19.51	24.21	48.87	-24.66	Average
11	0.363	27.13	19.51	46.64	58.65	-12.01	QP
12	0.363	4.21	19.51	23.72	48.65	-24.93	Average
13	0.383	26.86	19.51	46.37	58.21	-11.84	QP
14	0.383	4.48	19.51	23.99	48.21	-24.22	Average
15	0.398	26.88	19.51	46.39	57.90	-11.51	QP
16	0.398	5.49	19.51	25.00	47.90	-22.90	Average
17	0.410	27.18	19.51	46.69	57.64	-10.95	QP
18	0.410	4.65	19.51	24.16	47.64	-23.48	Average
19	0.431	26.85	19.52	46.37	57.24	-10.87	QP
20	0.431	5.51	19.52	25.03	47.24	-22.21	Average
21	0.437	26.17	19.52	45.69	57.11	-11.42	QP
22	0.437	4.29	19.52	23.81	47.11	-23.30	Average

23	0.449	26.18	19.52	45.70	56.89	-11.19	QP
24	0.449	4.49	19.52	24.01	46.89	-22.88	Average
25	0.469	25.41	19.52	44.93	56.54	-11.61	QP
26	0.469	3.60	19.52	23.12	46.54	-23.42	Average
27	0.484	26.20	19.52	45.72	56.27	-10.55	QP
28	0.484	4.62	19.52	24.14	46.27	-22.13	Average
29	0.516	25.58	19.52	45.10	56.00	-10.90	QP
30	0.516	4.09	19.52	23.61	46.00	-22.39	Average
31	0.541	25.62	19.52	45.14	56.00	-10.86	QP
32	0.541	4.65	19.52	24.17	46.00	-21.83	Average
33	0.564	25.81	19.52	45.33	56.00	-10.67	QP
34	0.564	4.53	19.52	24.05	46.00	-21.95	Average
35	0.611	23.85	19.52	43.37	56.00	-12.63	QP
36	0.611	3.67	19.52	23.19	46.00	-22.81	Average
37	0.634	23.84	19.52	43.36	56.00	-12.64	QP
38	0.634	3.14	19.52	22.66	46.00	-23.34	Average
39	0.647	23.84	19.52	43.36	56.00	-12.64	QP
40	0.647	4.23	19.52	23.75	46.00	-22.25	Average
41	0.665	23.25	19.52	42.77	56.00	-13.23	QP
42	0.665	3.32	19.52	22.84	46.00	-23.16	Average
43	0.731	22.12	19.52	41.64	56.00	-14.36	QP
44	0.731	2.77	19.52	22.29	46.00	-23.71	Average
45	0.743	22.53	19.52	42.05	56.00	-13.95	QP
46	0.743	2.63	19.52	22.15	46.00	-23.85	Average
47	0.788	21.06	19.53	40.59	56.00	-15.41	QP
48	0.788	2.98	19.53	22.51	46.00	-23.49	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:

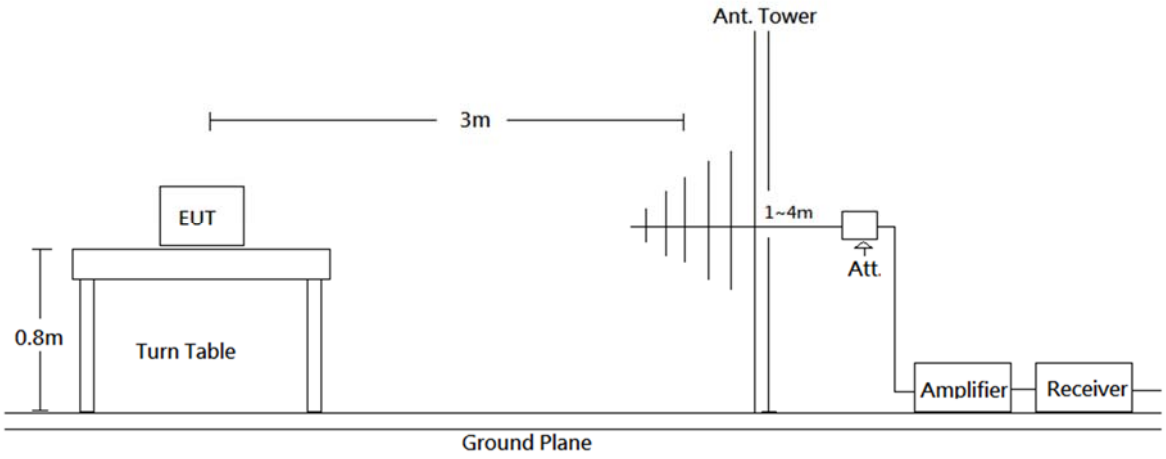
Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100**	3
88 - 216	150**	3
216 - 960	200**	3
Above 960	500	3

** 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.

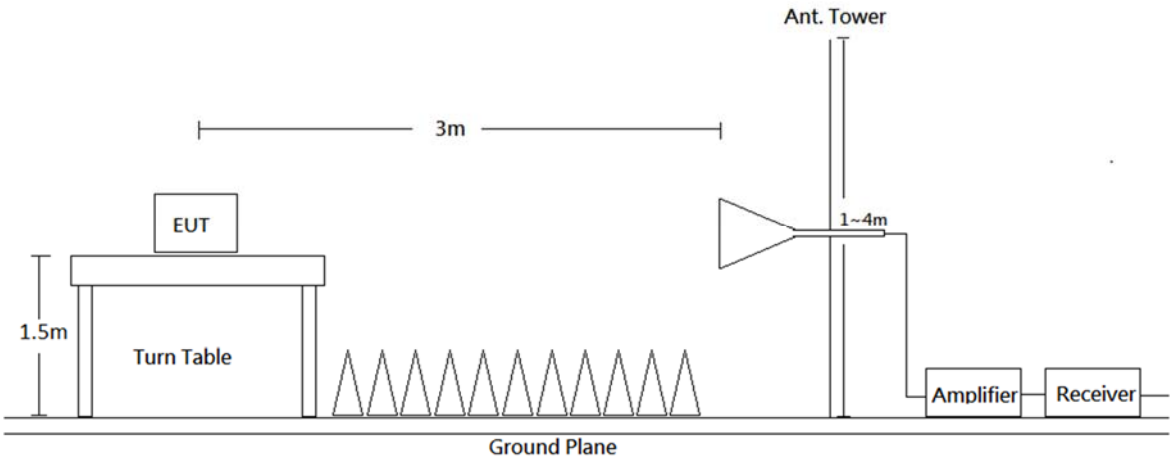
As per FCC §15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the 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	3 MHz	>98%	Ave
	1 MHz	1/T	<98%	Ave

Note: T is minimum transmission duration

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

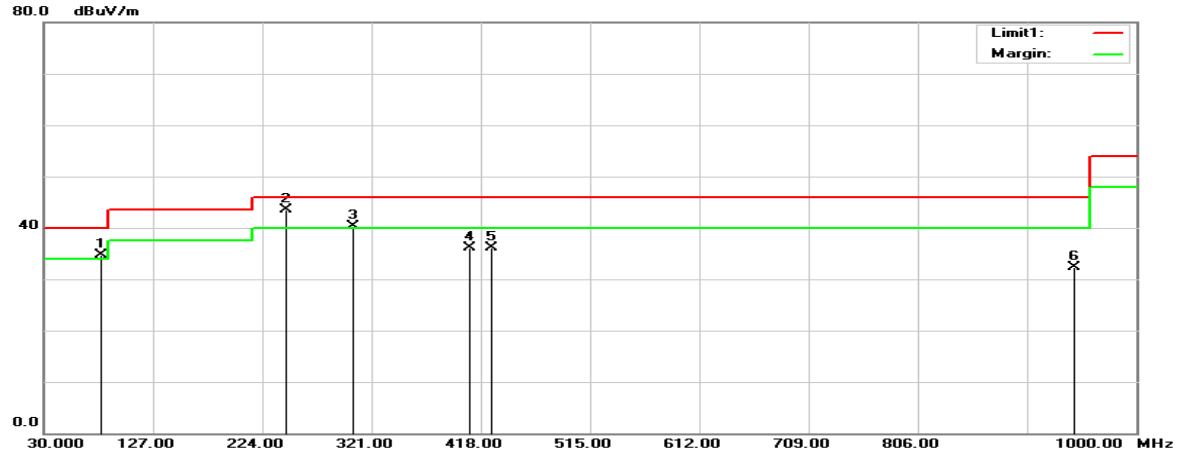
Test Mode: Transmitting

Model 1: EBE-BAW439

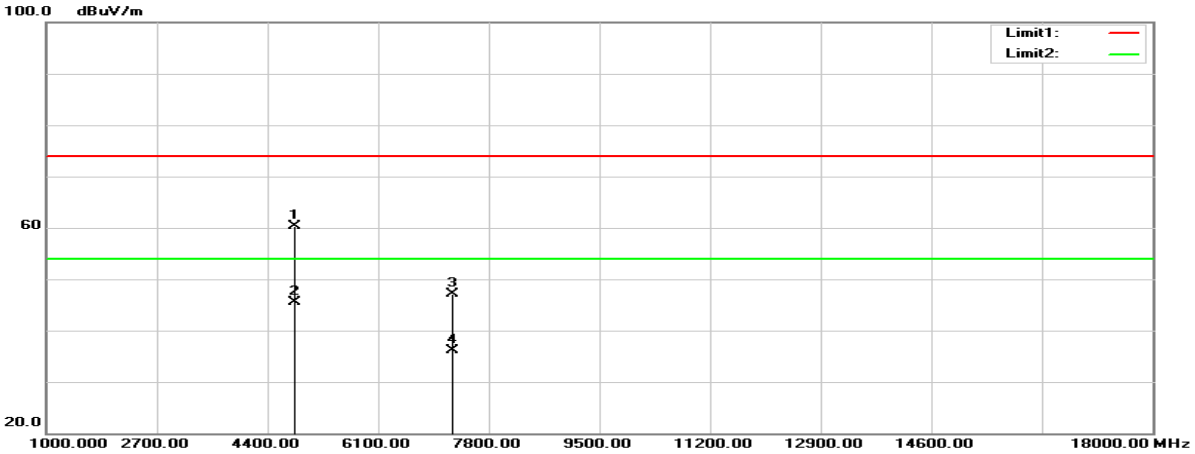
(Pre-scan with three orthogonal axis, and worse case as Z axis.)

Horizontal (worst case is 802.n20 mode Low channel)

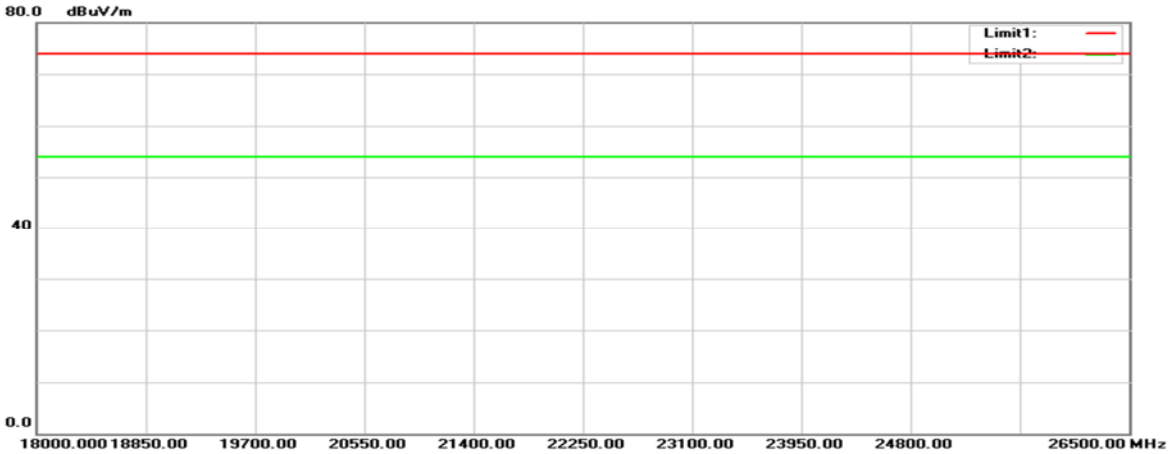
30MHz-1GHz:



1GHz-18GHz:

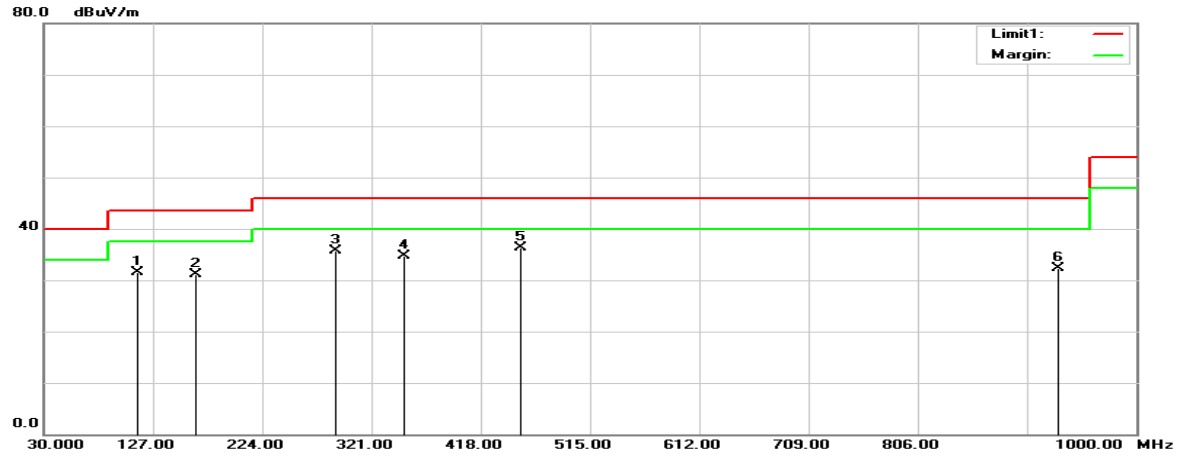


18GHz-26.5GHz:

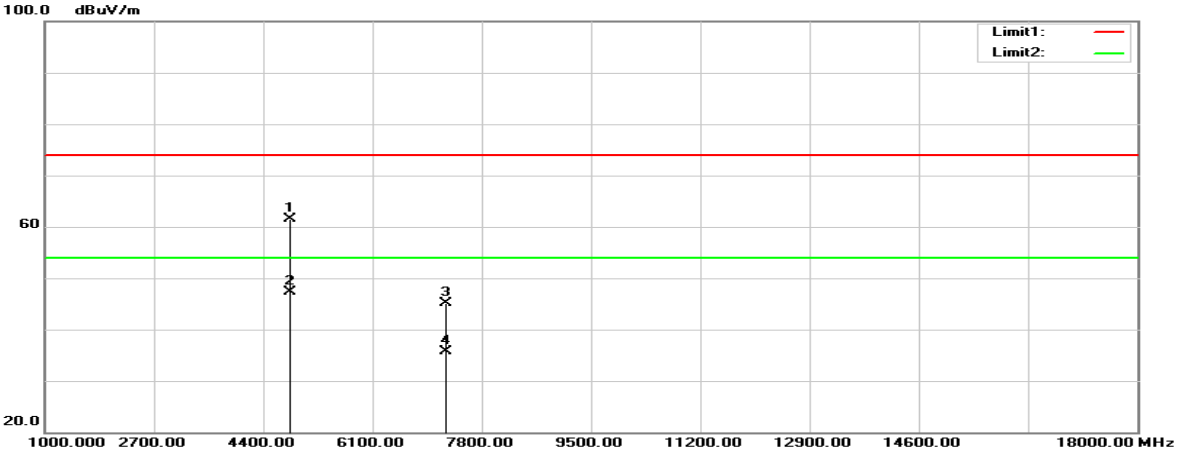


Vertical (worst case is 802.n20 mode Low channel)

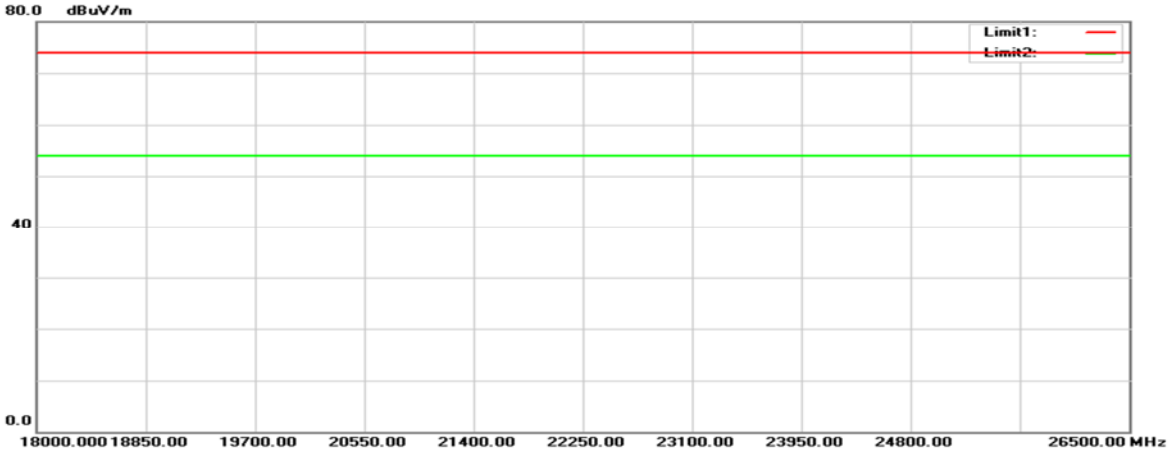
30MHz-1GHz:



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
81.4100	51.25	-16.62	34.63	40.00	-5.37	100	354	peak
245.3400	55.79	-12.24	43.55	46.00	-2.45	100	137	peak
304.5100	50.32	-10.00	40.32	46.00	-5.68	100	235	peak
408.3000	43.77	-7.75	36.02	46.00	-9.98	100	28	peak
427.7000	43.26	-7.06	36.20	46.00	-9.80	100	16	peak
944.7100	30.09	2.12	32.21	46.00	-13.79	100	234	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
113.4200	42.75	-11.20	31.55	43.50	-11.95	100	132	peak
164.8300	42.72	-11.61	31.11	43.50	-12.39	100	224	peak
288.9900	45.80	-10.00	35.80	46.00	-10.20	100	85	peak
350.1000	43.96	-9.30	34.66	46.00	-11.34	100	65	peak
452.9200	42.65	-6.43	36.22	46.00	-9.78	100	138	peak
930.1600	30.43	1.84	32.27	46.00	-13.73	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								
2386.496	64.71	-9.49	55.22	74.00	-18.78	165	65	peak
2386.496	58.24	-9.49	48.75	54.00	-5.25	165	65	AVG
4824.000	57.07	-2.15	54.92	74.00	-19.08	160	210	peak
4824.000	55.12	-2.15	52.97	54.00	-1.03	160	210	AVG
7236.000	42.41	4.55	46.96	74.00	-27.04	145	158	peak
7236.000	32.56	4.55	37.11	54.00	-16.89	145	158	AVG
B Mode, Middle channel								
2389.134	62.58	-9.47	53.11	74.00	-20.89	144	66	peak
2389.134	53.86	-9.47	44.39	54.00	-9.61	144	66	AVG
2484.482	64.84	-8.44	56.40	74.00	-17.60	144	66	peak
2484.482	56.40	-8.44	47.96	54.00	-6.04	144	66	AVG
4874.000	57.53	-1.92	55.61	74.00	-18.39	165	205	peak
4874.000	54.33	-1.92	52.41	54.00	-1.59	165	205	AVG
7311.000	41.97	5.08	47.05	74.00	-26.95	142	168	peak
7311.000	31.54	5.08	36.62	54.00	-17.38	142	168	AVG
B Mode, High channel								
2483.500	67.61	-8.45	59.16	74.00	-14.84	109	71	peak
2483.500	61.29	-8.45	52.84	54.00	-1.16	109	71	AVG
4924.000	57.45	-1.63	55.82	74.00	-18.18	190	201	peak
4924.000	54.19	-1.63	52.56	54.00	-1.44	190	201	AVG
7386.000	40.56	5.20	45.76	74.00	-28.24	166	314	peak
7386.000	31.28	5.20	36.48	54.00	-17.52	166	314	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								
2385.712	64.74	-9.49	55.25	74.00	-18.75	203	119	peak
2385.712	56.84	-9.49	47.35	54.00	-6.65	203	119	AVG
4824.000	56.28	-2.15	54.13	74.00	-19.87	148	270	peak
4824.000	54.81	-2.15	52.66	54.00	-1.34	148	270	AVG
7236.000	41.95	4.55	46.50	74.00	-27.50	166	237	peak
7236.000	31.64	4.55	36.19	54.00	-17.81	166	237	AVG
B Mode, Middle channel								
2389.376	63.80	-9.46	54.34	74.00	-19.66	158	115	peak
2389.376	54.06	-9.46	44.60	54.00	-9.40	158	115	AVG
2484.240	64.98	-8.44	56.54	74.00	-17.46	158	115	peak
2484.240	56.34	-8.44	47.90	54.00	-6.10	158	115	AVG
4874.000	59.45	-1.92	57.53	74.00	-16.47	125	242	peak
4874.000	54.87	-1.92	52.95	54.00	-1.05	125	242	AVG
7311.000	41.75	5.08	46.83	74.00	-27.17	138	146	peak
7311.000	31.58	5.08	36.66	54.00	-17.34	138	146	AVG
B Mode, High channel								
2483.500	68.74	-8.45	60.29	74.00	-13.71	182	114	peak
2483.500	60.71	-8.45	52.26	54.00	-1.74	182	114	AVG
4924.000	56.87	-1.63	55.24	74.00	-18.76	126	237	peak
4924.000	54.13	-1.63	52.50	54.00	-1.50	126	237	AVG
7386.000	41.78	5.20	46.98	74.00	-27.02	166	134	peak
7386.000	31.49	5.20	36.69	54.00	-17.31	166	134	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	82.39	-9.46	72.93	74.00	-1.07	118	66	peak
2390.000	62.13	-9.46	52.67	54.00	-1.33	118	66	AVG
4824.000	62.18	-2.15	60.03	74.00	-13.97	159	210	peak
4824.000	47.59	-2.15	45.44	54.00	-8.56	159	210	AVG
7236.000	42.53	4.55	47.08	74.00	-26.92	145	147	peak
7236.000	31.66	4.55	36.21	54.00	-17.79	145	147	AVG
G Mode, Middle channel								
2390.000	61.68	-9.46	52.22	74.00	-21.78	118	64	peak
2390.000	49.20	-9.46	39.74	54.00	-14.26	118	64	AVG
2483.500	62.34	-8.45	53.89	74.00	-20.11	118	64	peak
2483.500	46.98	-8.45	38.53	54.00	-15.47	118	64	AVG
4874.000	62.49	-1.92	60.57	74.00	-13.43	166	235	peak
4874.000	47.25	-1.92	45.33	54.00	-8.67	166	235	AVG
7311.000	40.74	5.08	45.82	74.00	-28.18	148	146	peak
7311.000	31.22	5.08	36.30	54.00	-17.70	148	146	AVG
G Mode, High channel								
2484.304	77.26	-8.44	68.82	74.00	-5.18	160	63	peak
2484.304	61.15	-8.44	52.71	54.00	-1.29	160	63	AVG
4924.000	62.55	-1.63	60.92	74.00	-13.08	162	166	peak
4924.000	47.38	-1.63	45.75	54.00	-8.25	162	166	AVG
7386.000	40.84	5.20	46.04	74.00	-27.96	172	148	peak
7386.000	31.56	5.20	36.76	54.00	-17.24	172	148	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
G Mode, Low channel								
2390.000	81.77	-9.46	72.31	74.00	-1.69	182	114	peak
2390.000	61.66	-9.46	52.20	54.00	-1.80	182	114	AVG
4824.000	63.47	-2.15	61.32	74.00	-12.68	142	14	peak
4824.000	49.23	-2.15	47.08	54.00	-6.92	142	14	AVG
7236.000	44.68	4.55	49.23	74.00	-24.77	163	159	peak
7236.000	33.28	4.55	37.83	54.00	-16.17	163	159	AVG
G Mode, Middle channel								
2390.000	60.64	-9.46	51.18	74.00	-22.82	156	115	peak
2390.000	48.39	-9.46	38.93	54.00	-15.07	156	115	AVG
2483.500	61.40	-8.45	52.95	74.00	-21.05	156	115	peak
2483.500	46.96	-8.45	38.51	54.00	-15.49	156	115	AVG
4874.000	63.28	-1.92	61.36	74.00	-12.64	166	134	peak
4874.000	49.56	-1.92	47.64	54.00	-6.36	166	134	AVG
7311.000	42.43	5.08	47.51	74.00	-26.49	158	28	peak
7311.000	31.56	5.08	36.64	54.00	-17.36	158	28	AVG
G Mode, High channel								
2484.112	78.54	-8.44	70.10	74.00	-3.90	175	113	peak
2484.112	61.36	-8.44	52.92	54.00	-1.08	175	113	AVG
4924.000	63.44	-1.63	61.81	74.00	-12.19	163	144	peak
4924.000	49.57	-1.63	47.94	54.00	-6.06	163	144	AVG
7386.000	40.46	5.20	45.66	74.00	-28.34	178	58	peak
7386.000	31.66	5.20	36.86	54.00	-17.14	178	58	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	82.31	-9.46	72.85	74.00	-1.15	163	70	peak
2390.000	61.64	-9.46	52.18	54.00	-1.82	163	70	AVG
4824.000	62.55	-2.15	60.40	74.00	-13.60	158	235	peak
4824.000	47.69	-2.15	45.54	54.00	-8.46	158	235	AVG
7236.000	42.51	4.55	47.06	74.00	-26.94	133	187	peak
7236.000	31.57	4.55	36.12	54.00	-17.88	133	187	AVG
N20 Mode, Middle channel								
2384.536	61.90	-9.50	52.40	74.00	-21.60	147	60	peak
2384.536	49.25	-9.50	39.75	54.00	-14.25	147	60	AVG
2483.500	59.93	-8.45	51.48	74.00	-22.52	147	60	peak
2483.500	46.64	-8.45	38.19	54.00	-15.81	147	60	AVG
4874.000	62.35	-1.92	60.43	74.00	-13.57	155	247	peak
4874.000	47.75	-1.92	45.83	54.00	-8.17	155	247	AVG
7311.000	41.56	5.08	46.64	74.00	-27.36	134	169	peak
7311.000	31.54	5.08	36.62	54.00	-17.38	134	169	AVG
N20 Mode, High channel								
2483.500	79.26	-8.45	70.81	74.00	-3.19	154	65	peak
2483.500	60.63	-8.45	52.18	54.00	-1.82	154	65	AVG
4924.000	62.58	-1.63	60.95	74.00	-13.05	134	246	peak
4924.000	47.21	-1.63	45.58	54.00	-8.42	134	246	AVG
7386.000	40.68	5.20	45.88	74.00	-28.12	146	169	peak
7386.000	31.26	5.20	36.46	54.00	-17.54	146	169	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2390.000	82.13	-9.46	72.67	74.00	-1.33	188	117	peak
2390.000	61.47	-9.46	52.01	54.00	-1.99	188	117	AVG
4824.000	63.58	-2.15	61.43	74.00	-12.57	144	18	peak
4824.000	49.55	-2.15	47.40	54.00	-6.60	144	18	AVG
7236.000	40.50	4.55	45.05	74.00	-28.95	165	157	peak
7236.000	31.08	4.55	35.63	54.00	-18.37	165	157	AVG
N20 Mode, Middle channel								
2390.000	57.77	-9.46	48.31	74.00	-25.69	189	115	peak
2390.000	48.50	-9.46	39.04	54.00	-14.96	189	115	AVG
2483.500	60.84	-8.45	52.39	74.00	-21.61	189	115	peak
2483.500	47.35	-8.45	38.90	54.00	-15.10	189	115	AVG
4874.000	63.45	-1.92	61.53	74.00	-12.47	148	32	peak
4874.000	49.00	-1.92	47.08	54.00	-6.92	148	32	AVG
7311.000	40.59	5.08	45.67	74.00	-28.33	164	157	peak
7311.000	31.47	5.08	36.55	54.00	-17.45	164	157	AVG
N20 Mode, High channel								
2483.500	79.62	-8.45	71.17	74.00	-2.83	183	114	peak
2483.500	61.18	-8.45	52.73	54.00	-1.27	183	114	AVG
4924.000	62.47	-1.63	60.84	74.00	-13.16	147	214	peak
4924.000	47.24	-1.63	45.61	54.00	-8.39	147	214	AVG
7386.000	40.81	5.20	46.01	74.00	-27.99	163	162	peak
7386.000	31.45	5.20	36.65	54.00	-17.35	163	162	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								
2390.000	79.11	-9.46	69.65	74.00	-4.35	157	67	peak
2390.000	61.98	-9.46	52.52	54.00	-1.48	157	67	AVG
4844.000	62.47	-2.11	60.36	74.00	-13.64	147	225	peak
4844.000	47.59	-2.11	45.48	54.00	-8.52	147	225	AVG
7266.000	42.35	4.83	47.18	74.00	-26.82	136	147	peak
7266.000	31.54	4.83	36.37	54.00	-17.63	136	147	AVG
N40 Mode, Middle channel								
2385.988	69.47	-9.49	59.98	74.00	-14.02	146	61	peak
2385.988	50.40	-9.49	40.91	54.00	-13.09	146	61	AVG
2483.500	70.31	-8.45	61.86	74.00	-12.14	146	61	peak
2483.500	50.89	-8.45	42.44	54.00	-11.56	146	61	AVG
4874.000	62.69	-1.92	60.77	74.00	-13.23	166	247	peak
4874.000	47.51	-1.92	45.59	54.00	-8.41	166	247	AVG
7311.000	41.56	5.08	46.64	74.00	-27.36	137	169	peak
7311.000	31.28	5.08	36.36	54.00	-17.64	137	169	AVG
N40 Mode, High channel								
2483.500	78.97	-8.45	70.52	74.00	-3.48	137	67	peak
2483.500	61.11	-8.45	52.66	54.00	-1.34	137	67	AVG
4904.000	62.47	-1.71	60.76	74.00	-13.24	166	247	peak
4904.000	47.61	-1.71	45.90	54.00	-8.10	166	247	AVG
7356.000	42.58	5.18	47.76	74.00	-26.24	154	133	peak
7356.000	31.67	5.18	36.85	54.00	-17.15	154	133	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

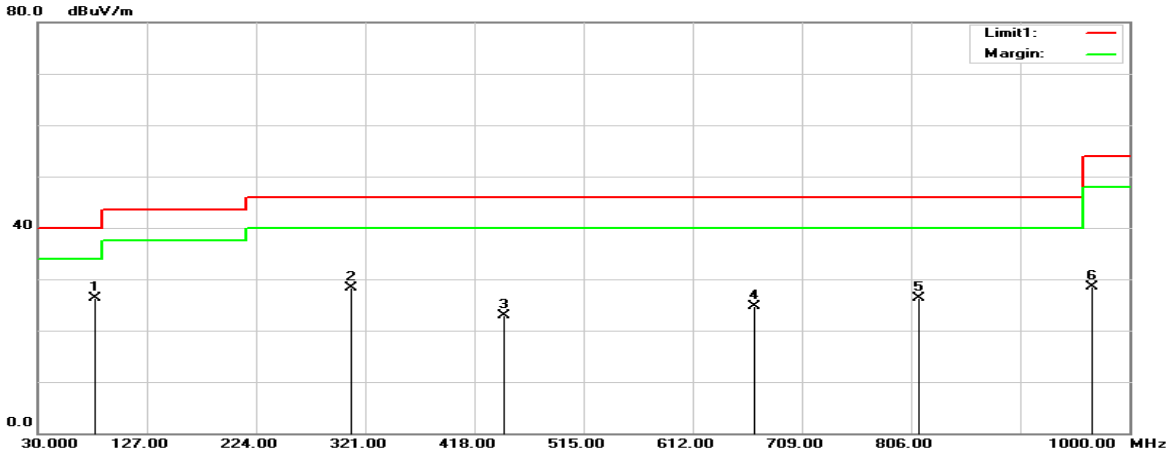
Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
2390.000	79.58	-9.46	70.12	74.00	-3.88	161	113	peak
2390.000	61.64	-9.46	52.18	54.00	-1.82	161	113	AVG
4844.000	62.46	-2.11	60.35	74.00	-13.65	166	225	peak
4844.000	47.59	-2.11	45.48	54.00	-8.52	166	225	AVG
7266.000	42.67	4.83	47.50	74.00	-26.50	173	347	peak
7266.000	31.68	4.83	36.51	54.00	-17.49	173	347	AVG
N40 Mode, Middle channel								
2385.262	69.20	-9.50	59.70	74.00	-14.30	153	114	peak
2385.262	50.24	-9.50	40.74	54.00	-13.26	153	114	AVG
2483.500	70.61	-8.45	62.16	74.00	-11.84	153	114	peak
2483.500	50.99	-8.45	42.54	54.00	-11.46	153	114	AVG
4874.000	62.47	-1.92	60.55	74.00	-13.45	147	215	peak
4874.000	48.56	-1.92	46.64	54.00	-7.36	147	215	AVG
7311.000	42.33	5.08	47.41	74.00	-26.59	169	344	peak
7311.000	31.67	5.08	36.75	54.00	-17.25	169	344	AVG
N40 Mode, High channel								
2483.500	79.89	-8.45	71.44	74.00	-2.56	190	112	peak
2483.500	61.23	-8.45	52.78	54.00	-1.22	190	112	AVG
4904.000	62.33	-1.71	60.62	74.00	-13.38	166	311	peak
4904.000	48.63	-1.71	46.92	54.00	-7.08	166	311	AVG
7356.000	41.89	5.18	47.07	74.00	-26.93	158	218	peak
7356.000	31.64	5.18	36.82	54.00	-17.18	158	218	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.

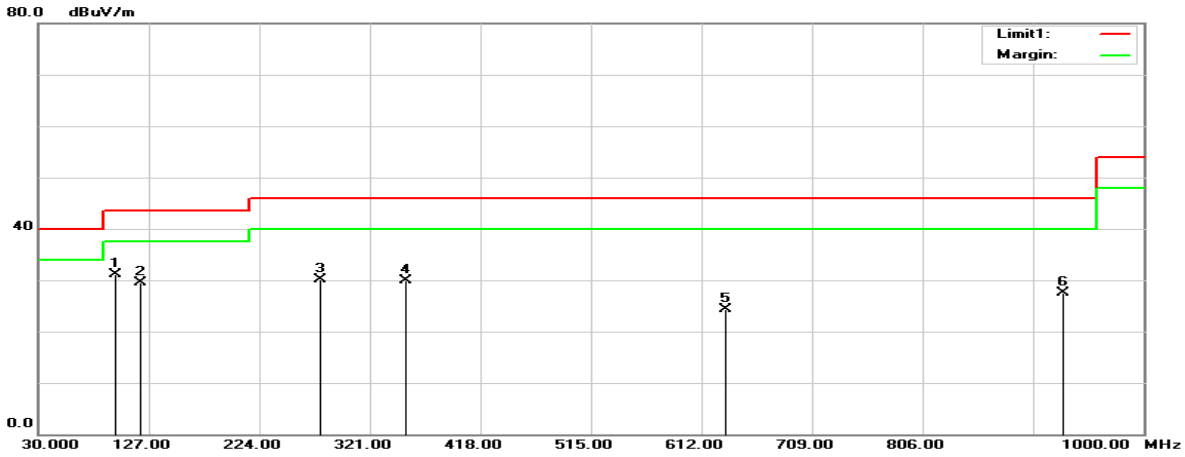
Model 2: EBE-BAW439-F

30MHz-1GHz:

Horizontal



Vertical



Below 1GHz

Horizontal

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBµV)	Factor(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)	
81.4100	42.98	-16.62	26.36	40.00	-13.64	100	125	peak
308.3900	38.16	-9.91	28.25	46.00	-17.75	100	325	peak
444.1900	29.55	-6.61	22.94	46.00	-23.06	100	255	peak
666.3200	28.14	-3.38	24.76	46.00	-21.24	100	88	peak
812.7900	26.97	-0.76	26.21	46.00	-19.79	100	46	peak
967.0200	25.99	2.48	28.47	54.00	-25.53	100	116	peak

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBµV)	Factor(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)	
97.9000	45.80	-14.71	31.09	43.50	-12.41	100	125	peak
119.2400	40.05	-10.54	29.51	43.50	-13.99	100	254	peak
277.3500	40.32	-10.29	30.03	46.00	-15.97	100	357	peak
352.0400	39.01	-9.20	29.81	46.00	-16.19	100	16	peak
633.3400	28.71	-4.37	24.34	46.00	-21.66	100	58	peak
929.1900	25.71	1.81	27.52	46.00	-18.48	100	298	peak

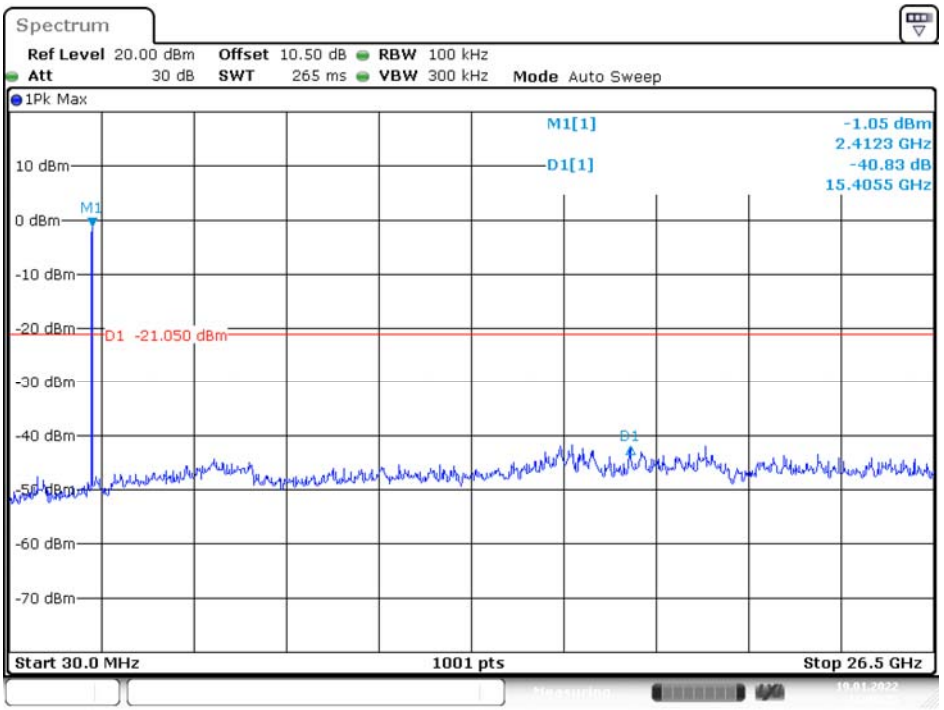
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	40.83	≥ 20	PASS
Middle	2437	39.28	≥ 20	PASS
High	2462	39.81	≥ 20	PASS
G Mode				
Low	2412	41.25	≥ 20	PASS
Middle	2437	39.48	≥ 20	PASS
High	2462	38.45	≥ 20	PASS
N20 Mode				
Low	2412	39.02	≥ 20	PASS
Middle	2437	38.70	≥ 20	PASS
High	2462	40.32	≥ 20	PASS
N40 Mode				
Low	2422	34.52	≥ 20	PASS
Middle	2437	35.23	≥ 20	PASS
High	2452	35.02	≥ 20	PASS

B Mode

Low Channel



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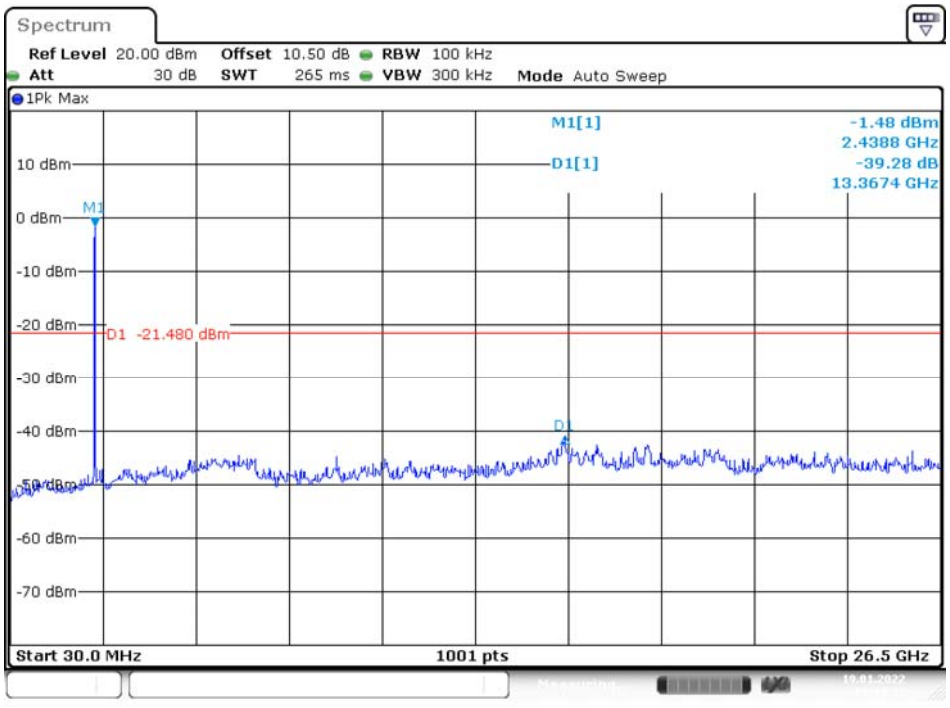
Middle Channel



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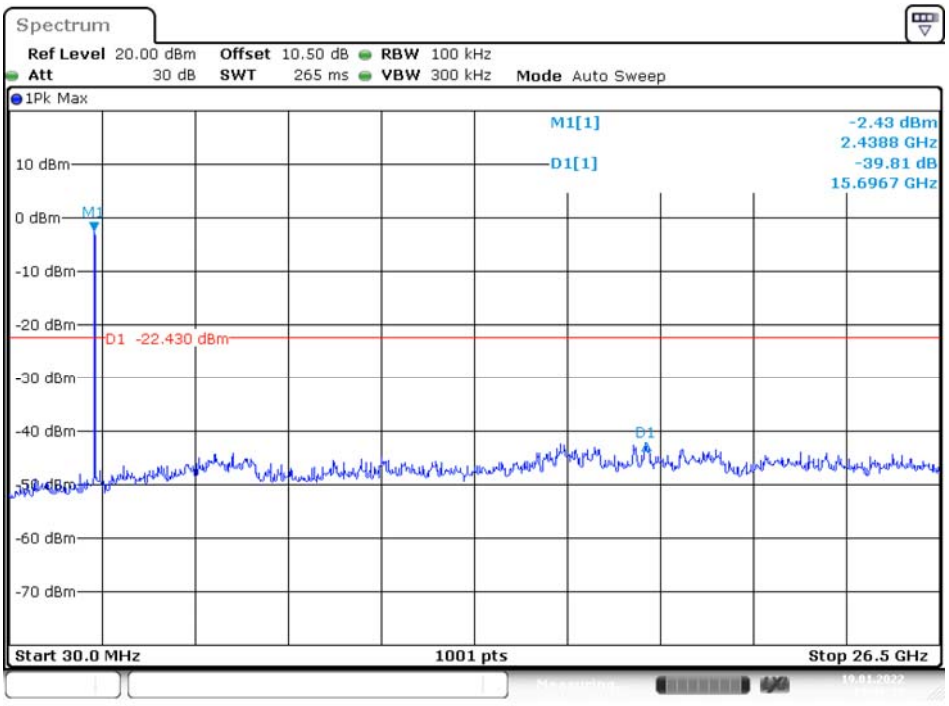
High Channel



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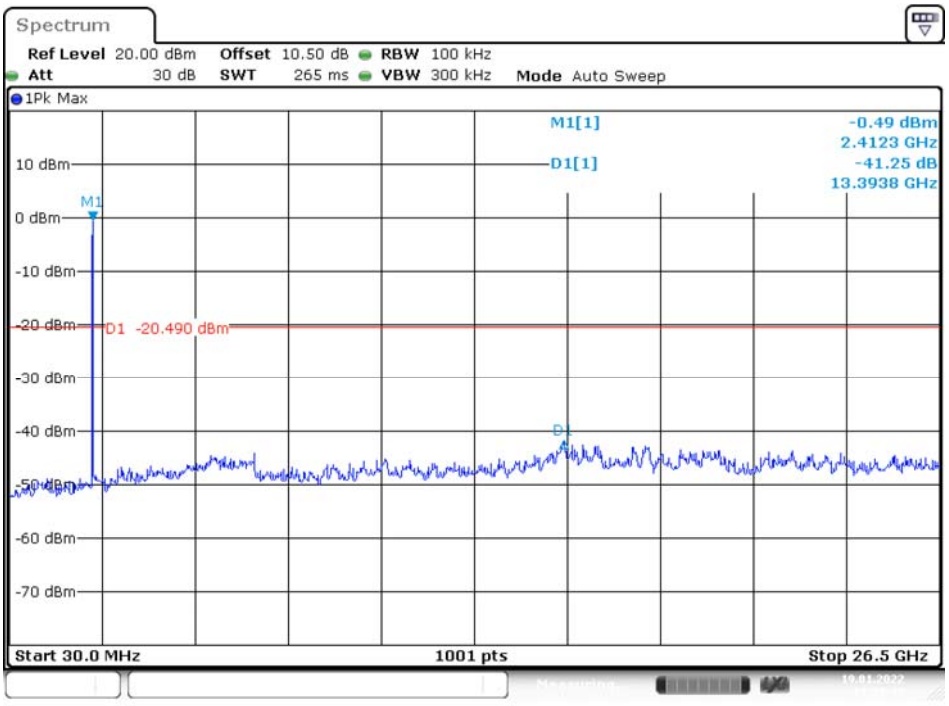
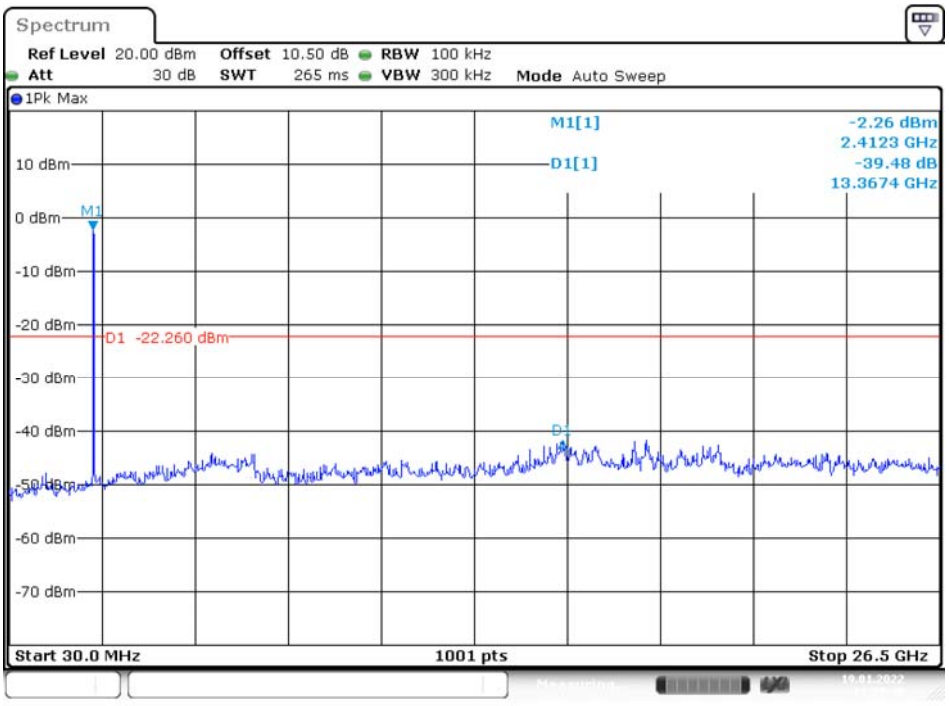
G Mode

Low Channel



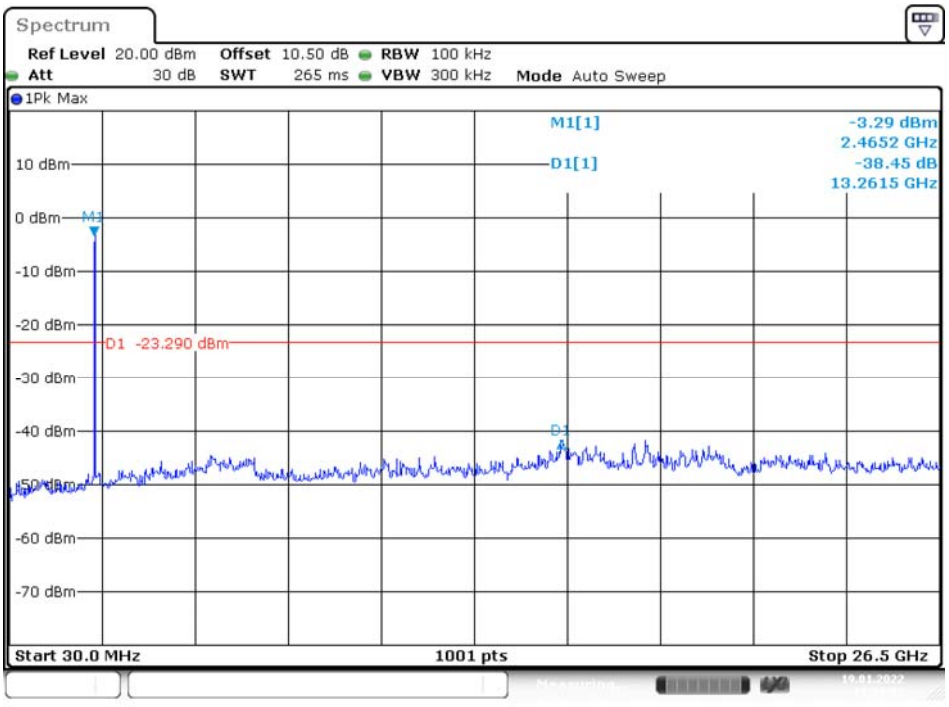
Date: 19.JAN.2022 11:39:43

Middle Channel



Date: 19.JAN.2022 11:37:49

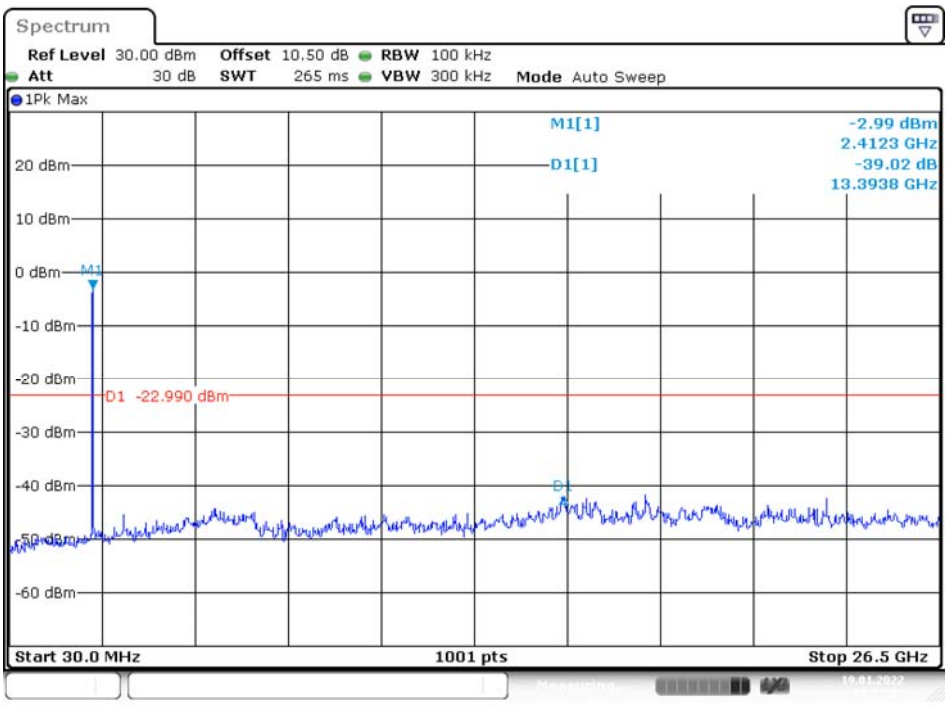
High Channel



Date: 19.JAN.2022 11:36:07

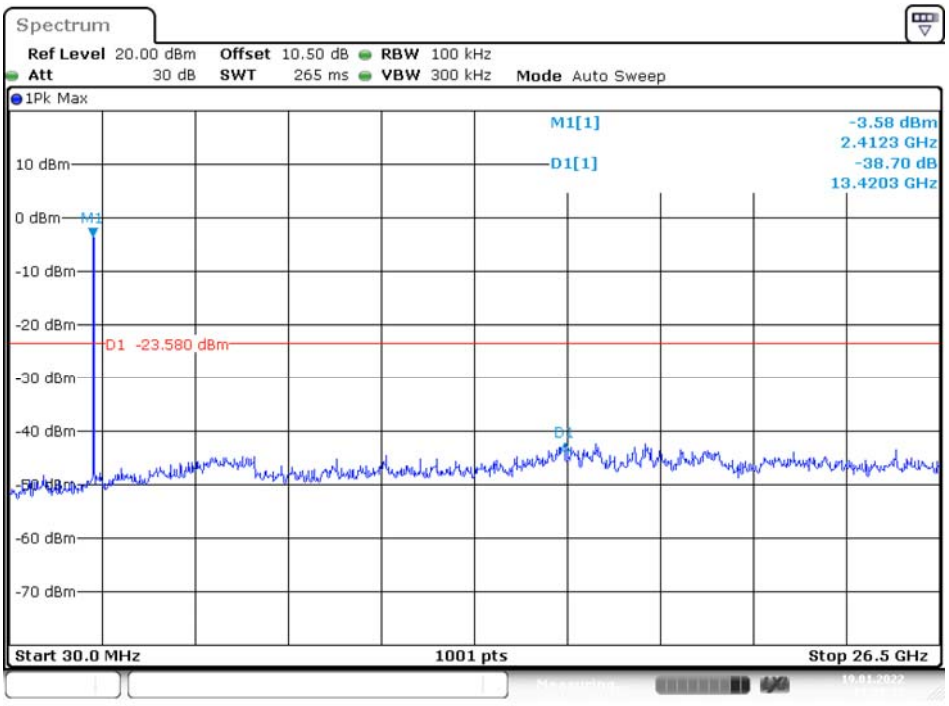
N20 Mode

Low Channel



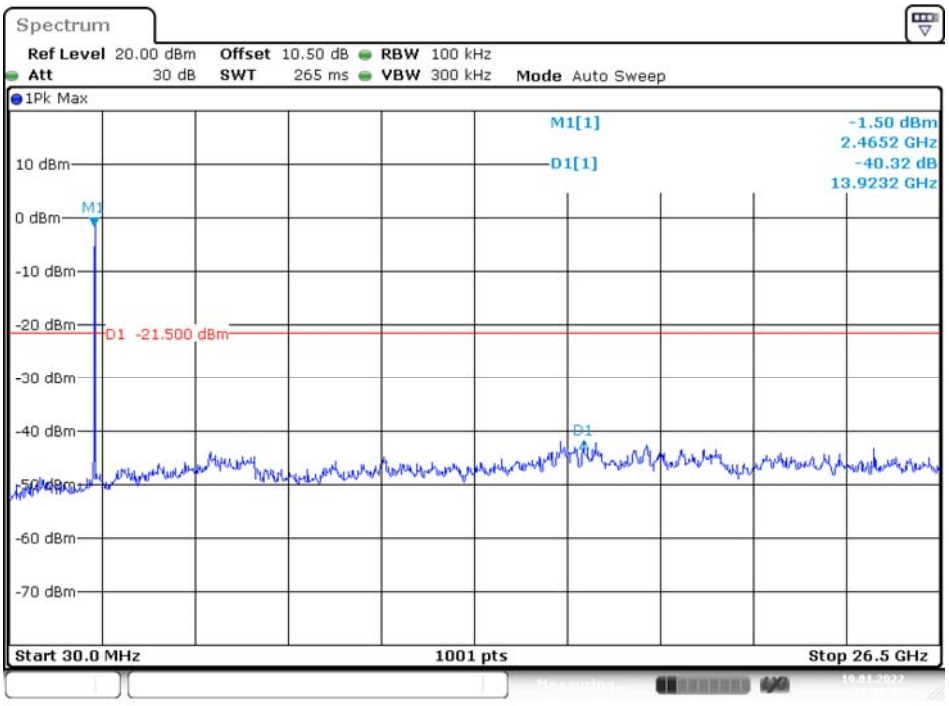
Date: 19.JAN.2022 11:27:31

Middle Channel



Date: 19.JAN.2022 11:29:12

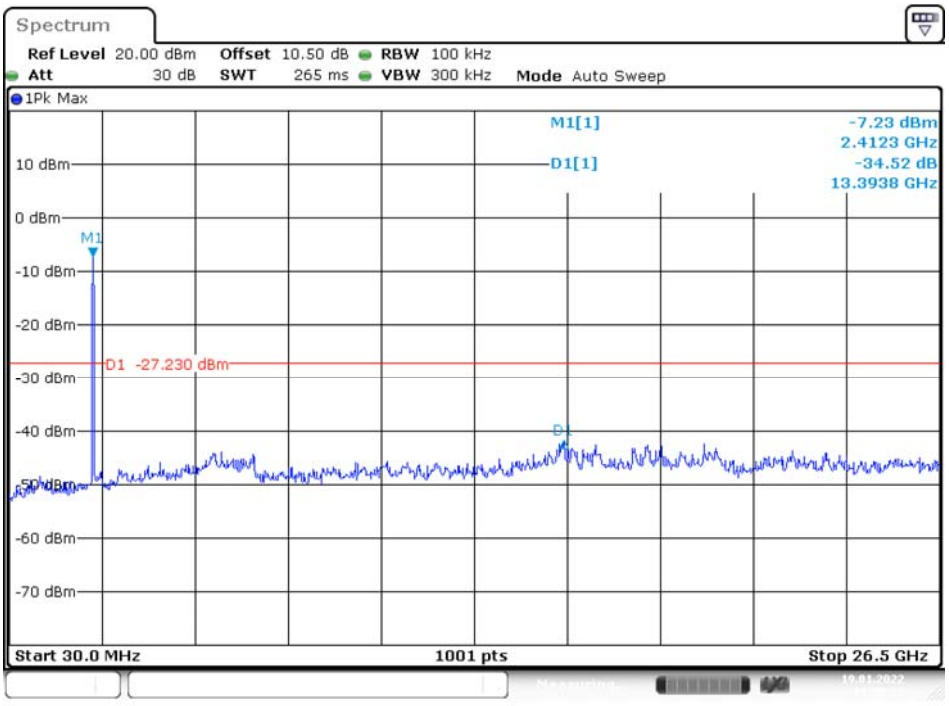
High Channel



Date: 19.JAN.2022 11:31:28

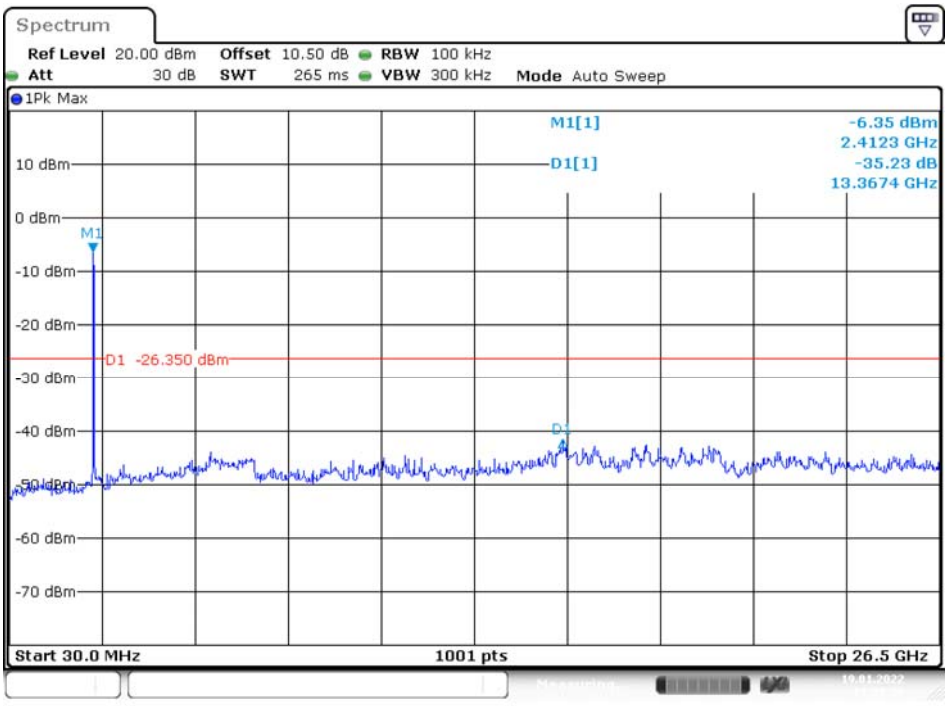
N40 Mode

Low Channel



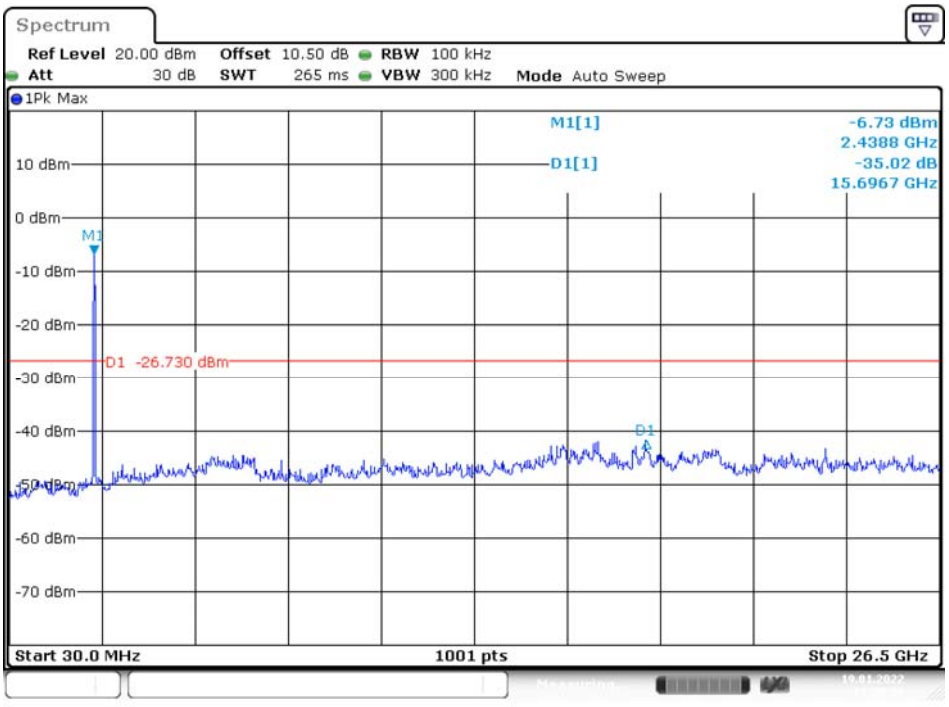
Date: 19.JAN.2022 11:25:22

Middle Channel



Date: 19.JAN.2022 11:23:26

High Channel



Date: 19.JAN.2022 11:20:36

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.

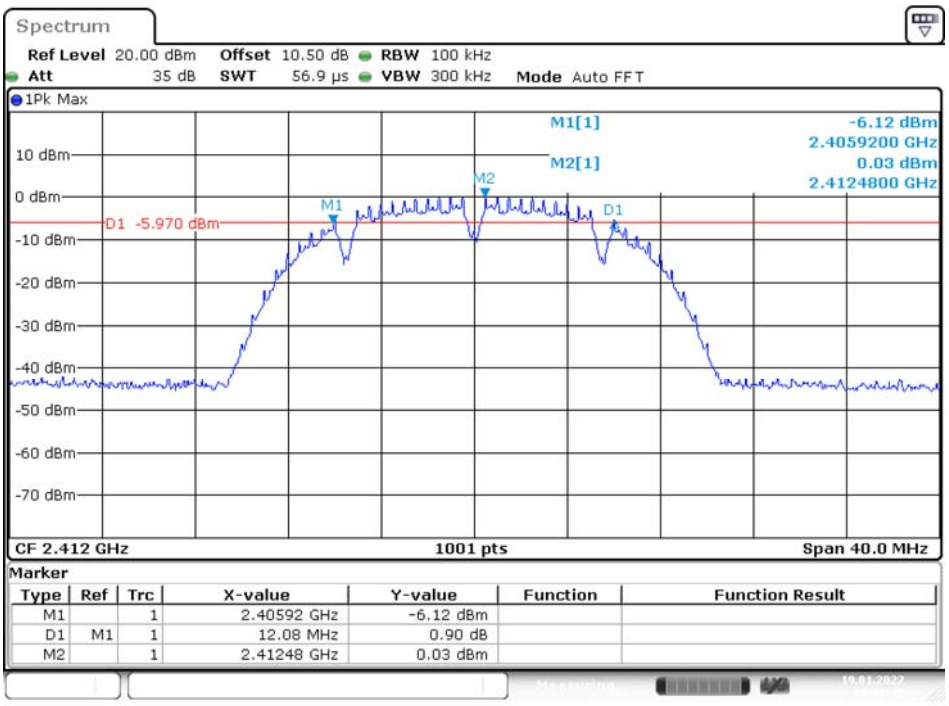
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
B Mode				
Low	2412	12.08	> 500	PASS
Middle	2437	12.08	> 500	PASS
High	2462	12.12	> 500	PASS
G Mode				
Low	2412	16.04	> 500	PASS
Middle	2437	16.04	> 500	PASS
High	2462	15.68	> 500	PASS
N20 Mode				
Low	2412	15.04	> 500	PASS
Middle	2437	15.08	> 500	PASS
High	2462	15.08	> 500	PASS
N40 Mode				
Low	2422	35.12	> 500	PASS
Middle	2437	35.12	> 500	PASS
High	2452	35.12	> 500	PASS

Please refer to the following plots

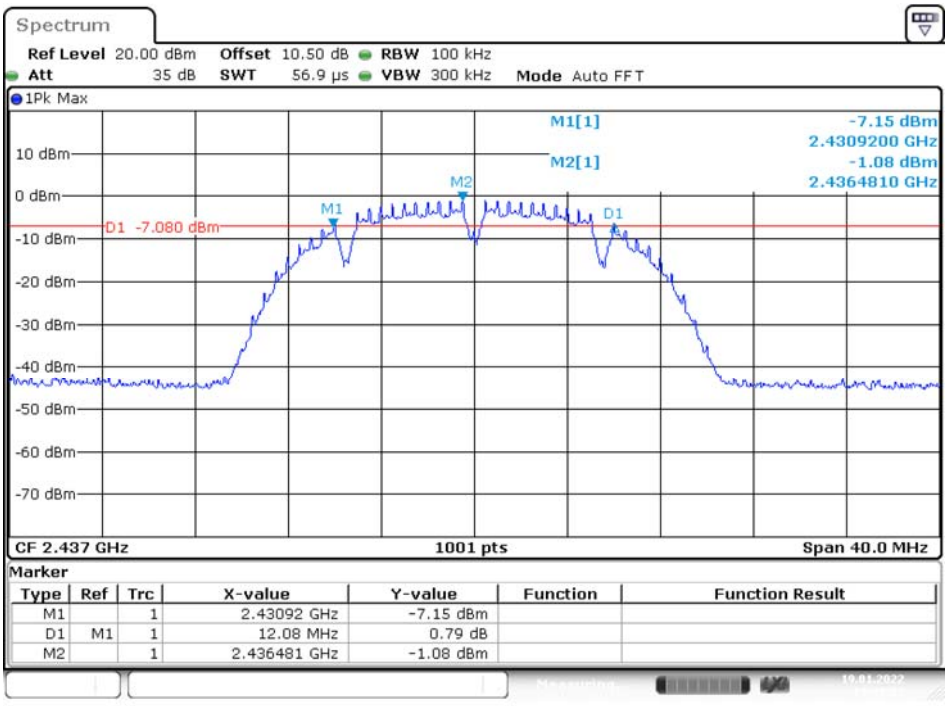
B Mode

Low Channel



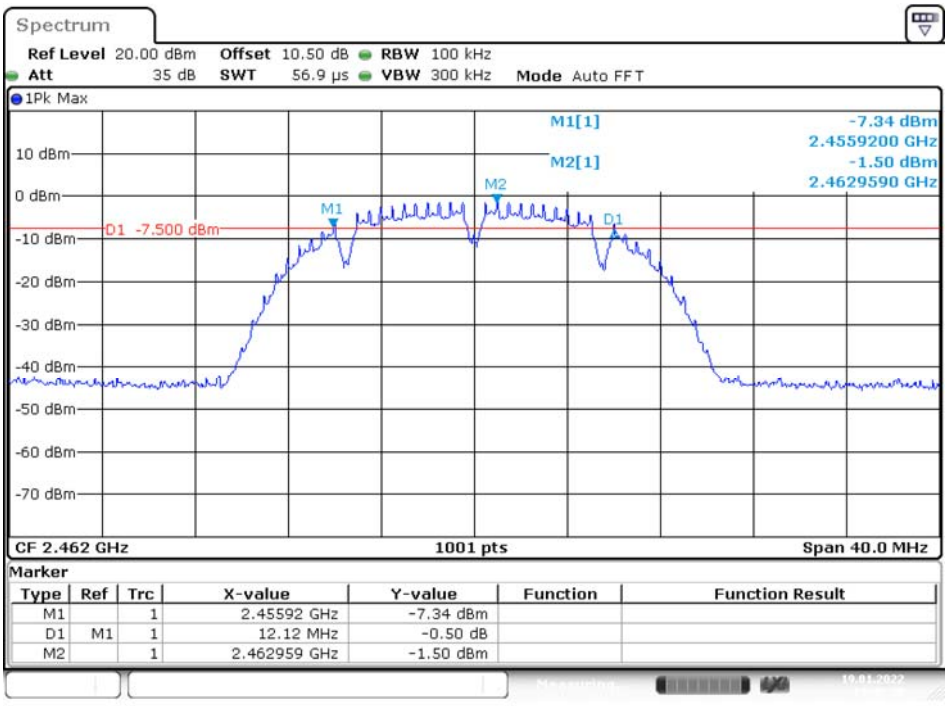
Date: 19.JAN.2022 11:41:45

Middle Channel



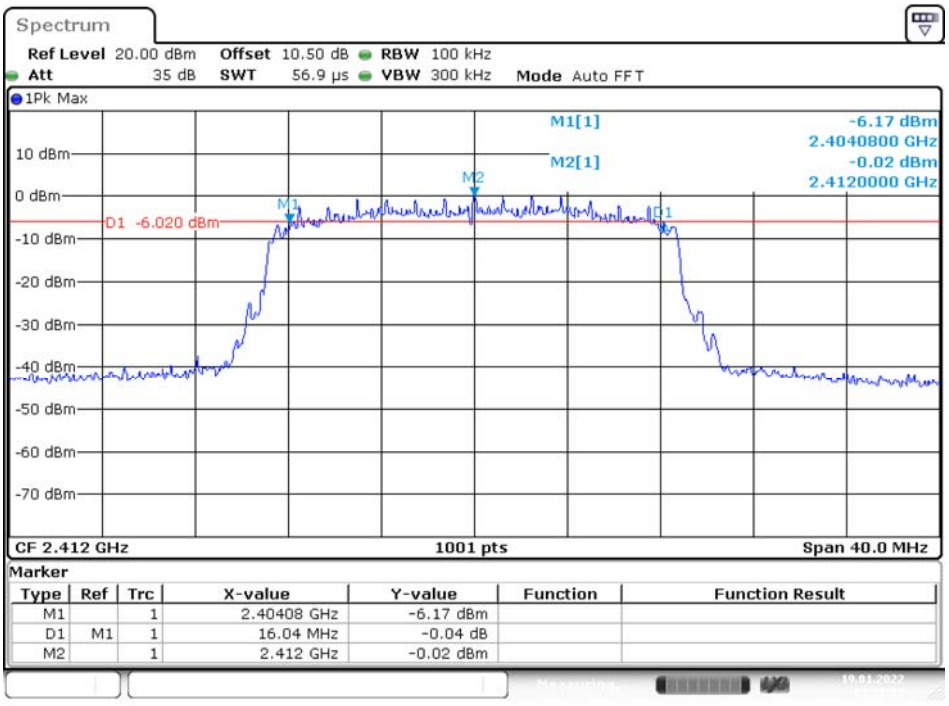
Date: 19.JAN.2022 11:43:52

High Channel

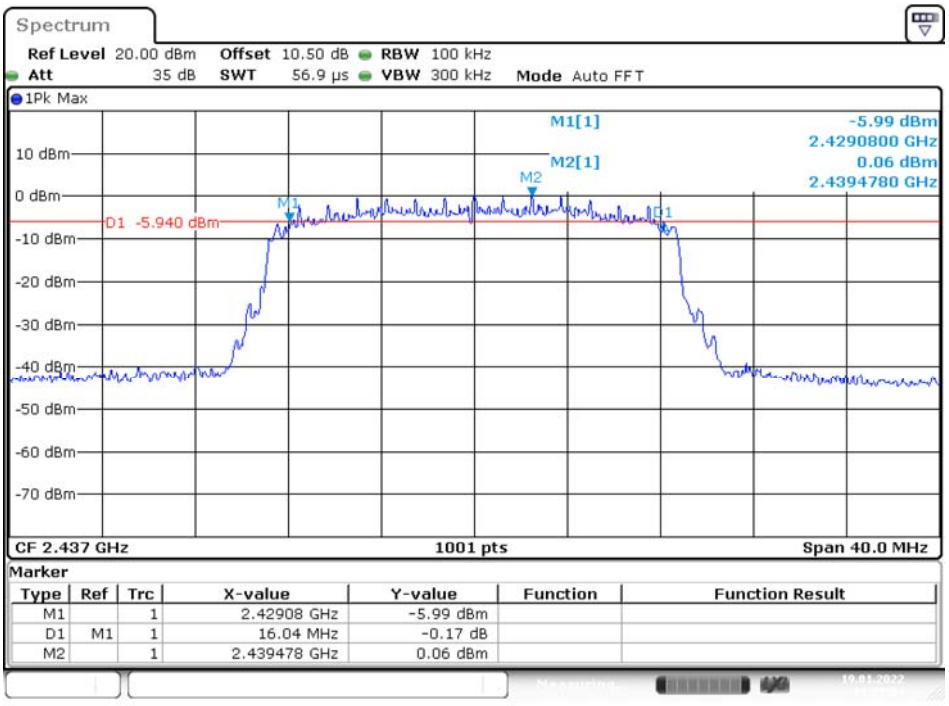


G Mode

Low Channel

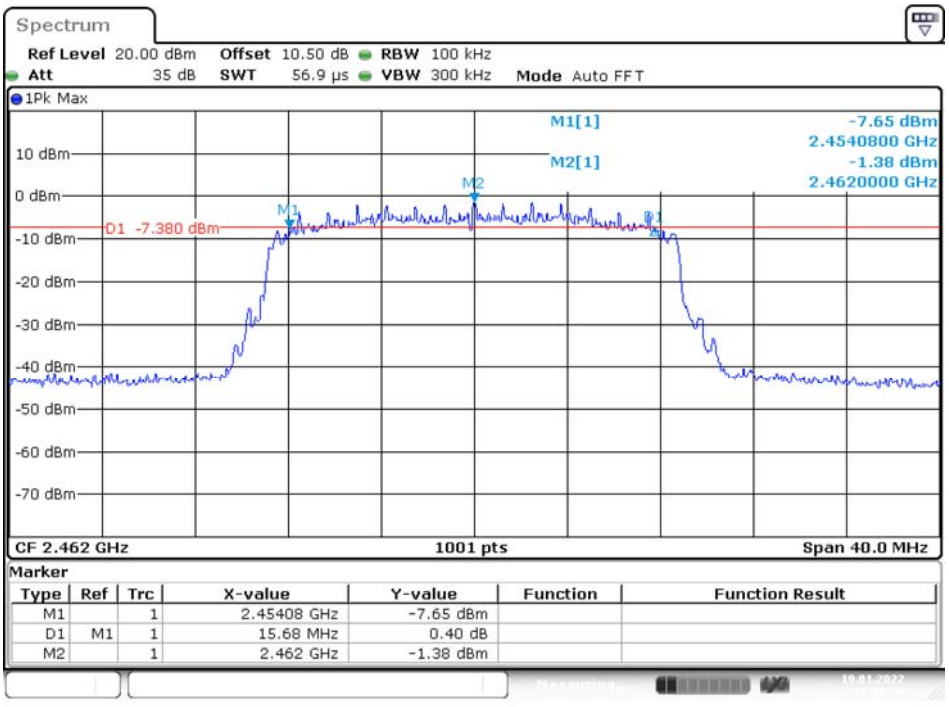


Middle Channel



Date: 19.JAN.2022 11:37:24

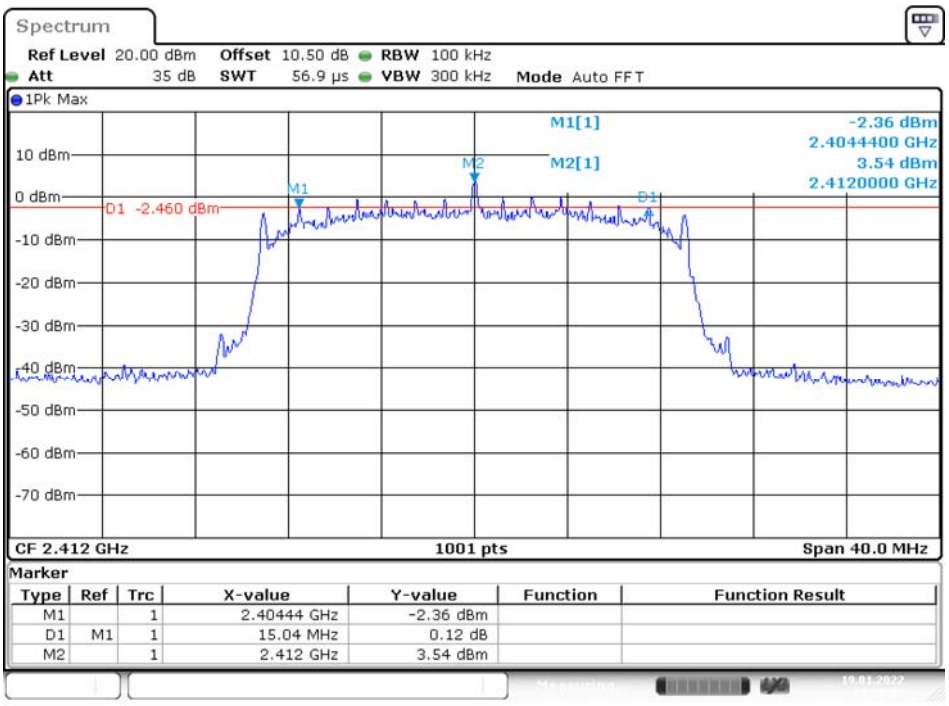
High Channel



Date: 19.JAN.2022 11:35:26

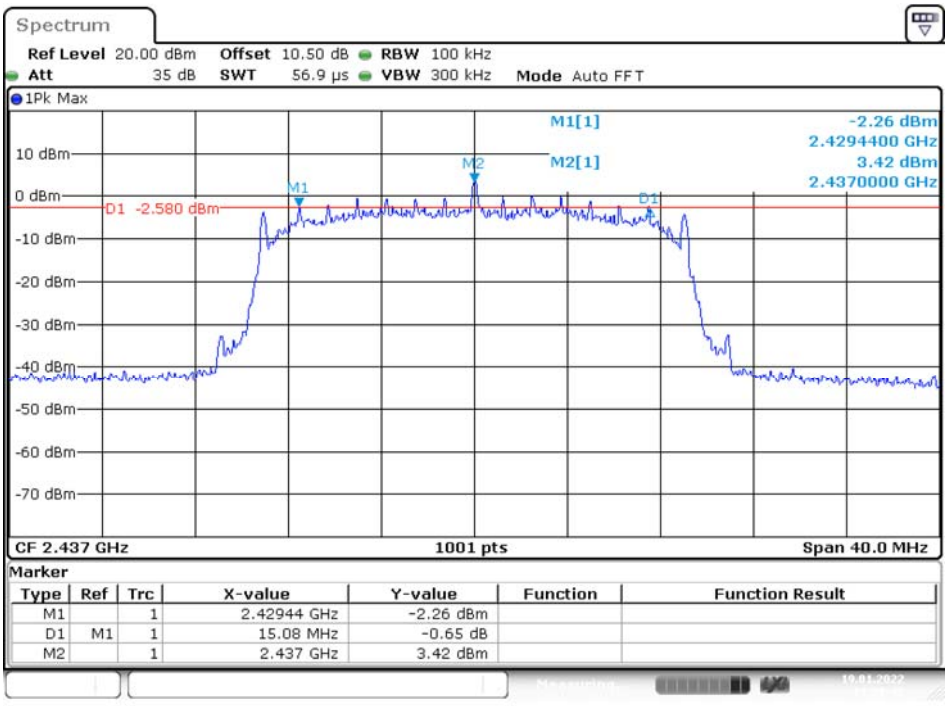
N20 Mode

Low Channel



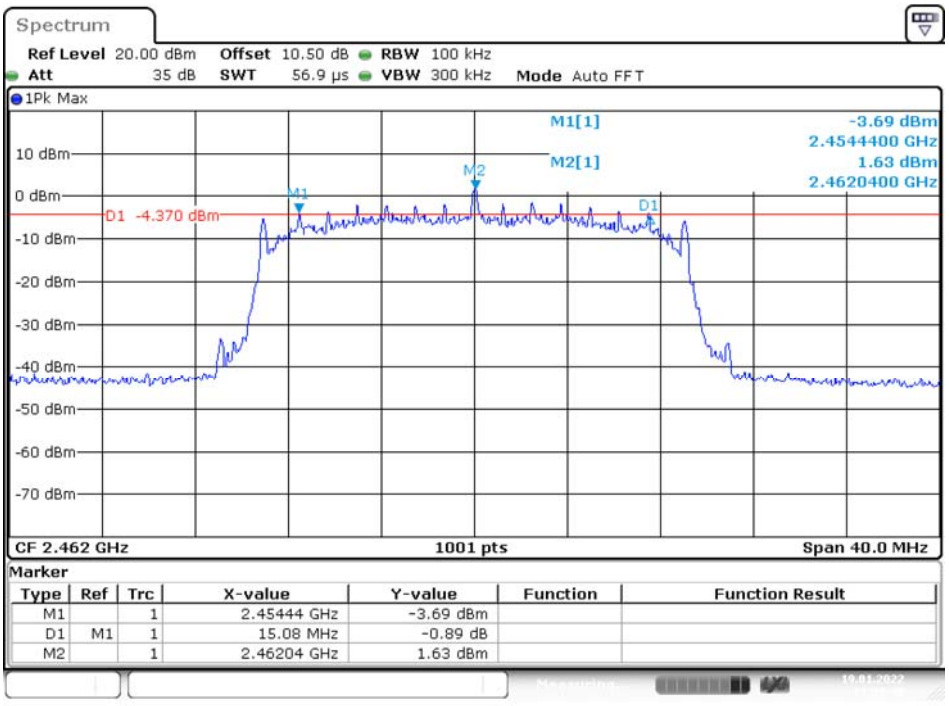
Date: 19.JAN.2022 11:26:51

Middle Channel



Date: 19.JAN.2022 11:28:47

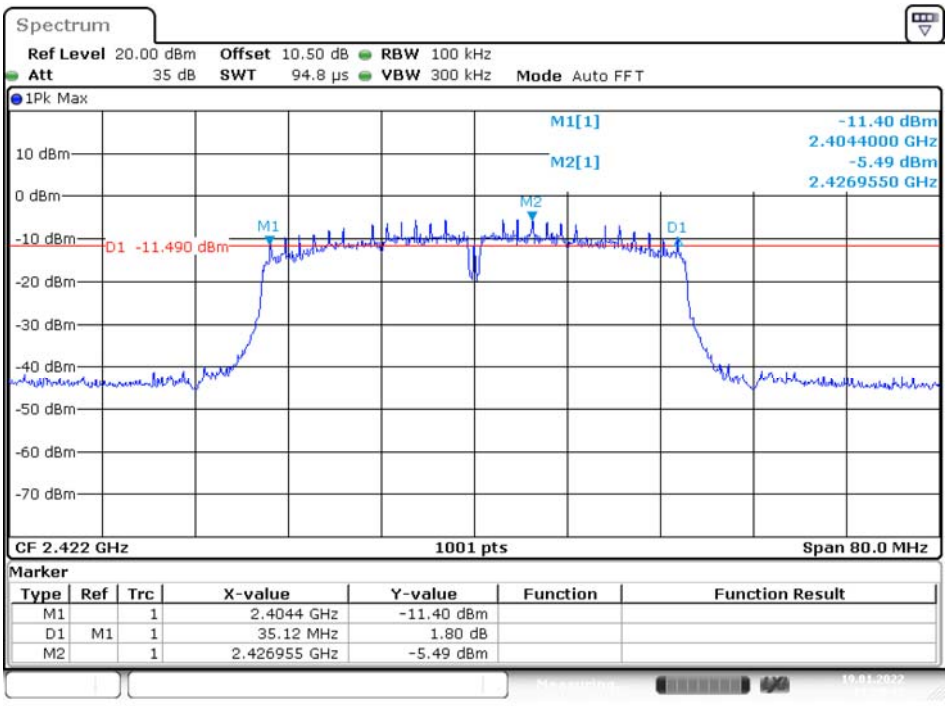
High Channel



Date: 19.JAN.2022 11:30:48

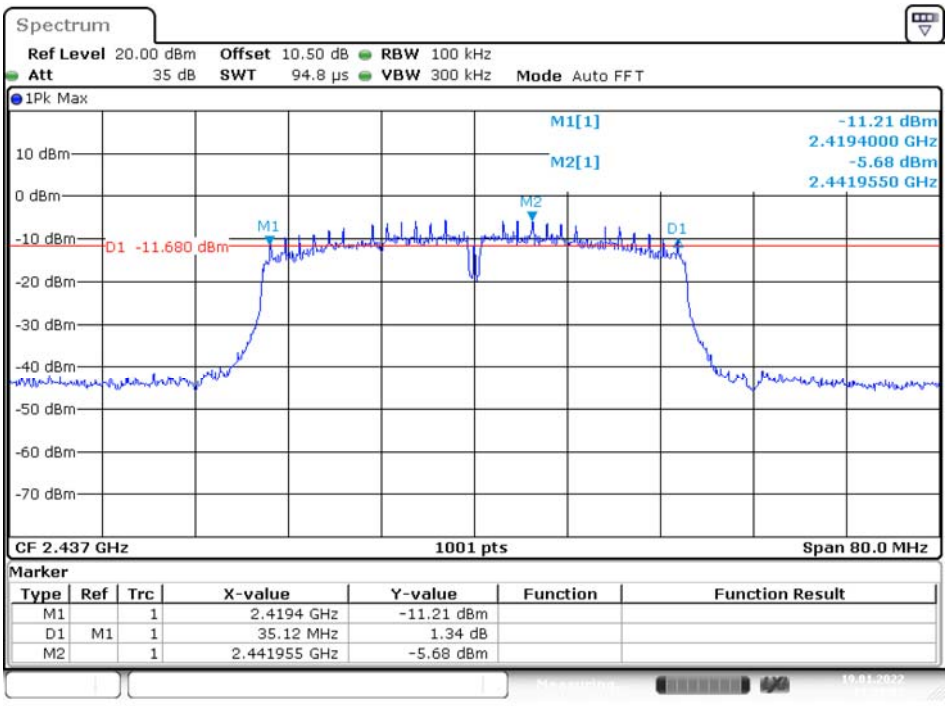
N40 Mode

Low Channel



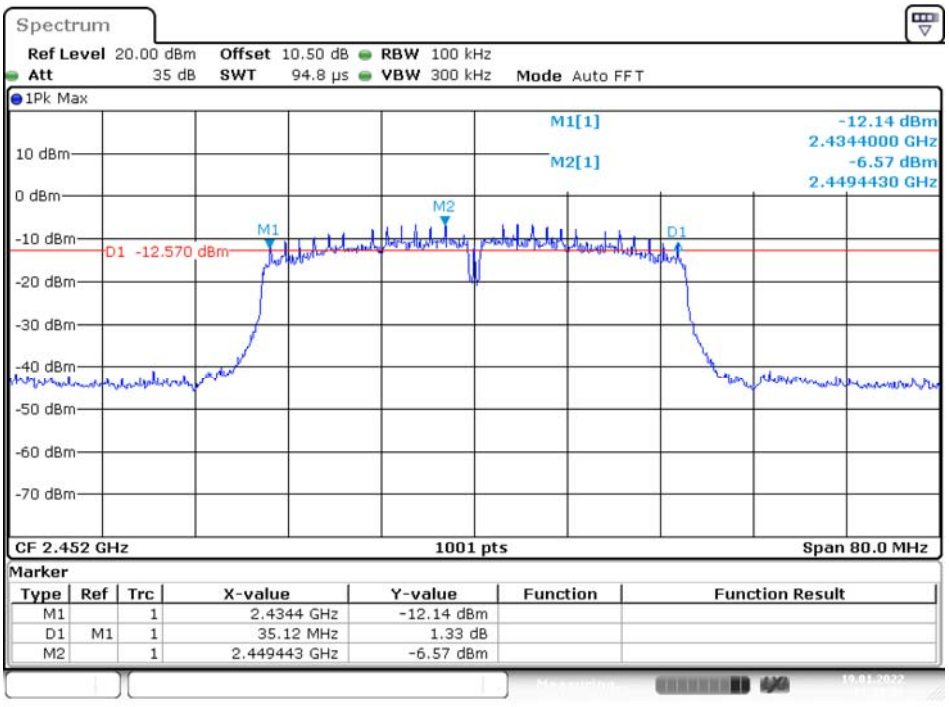
Date: 19.JAN.2022 11:24:41

Middle Channel



Date: 19.JAN.2022 11:23:01

High Channel



Date: 19.JAN.2022 11:19:55

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
B Mode					
Low	2412	13.92	0.025	1	PASS
Middle	2437	13.01	0.020	1	PASS
High	2462	12.67	0.018	1	PASS
G Mode					
Low	2412	21.21	0.132	1	PASS
Middle	2437	21.09	0.129	1	PASS
High	2462	20.02	0.100	1	PASS
N20 Mode					
Low	2412	21.64	0.146	1	PASS
Middle	2437	21.26	0.134	1	PASS
High	2462	20.01	0.100	1	PASS
N40 Mode					
Low	2422	20.53	0.113	1	PASS
Middle	2437	20.36	0.109	1	PASS
High	2452	20.06	0.101	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.

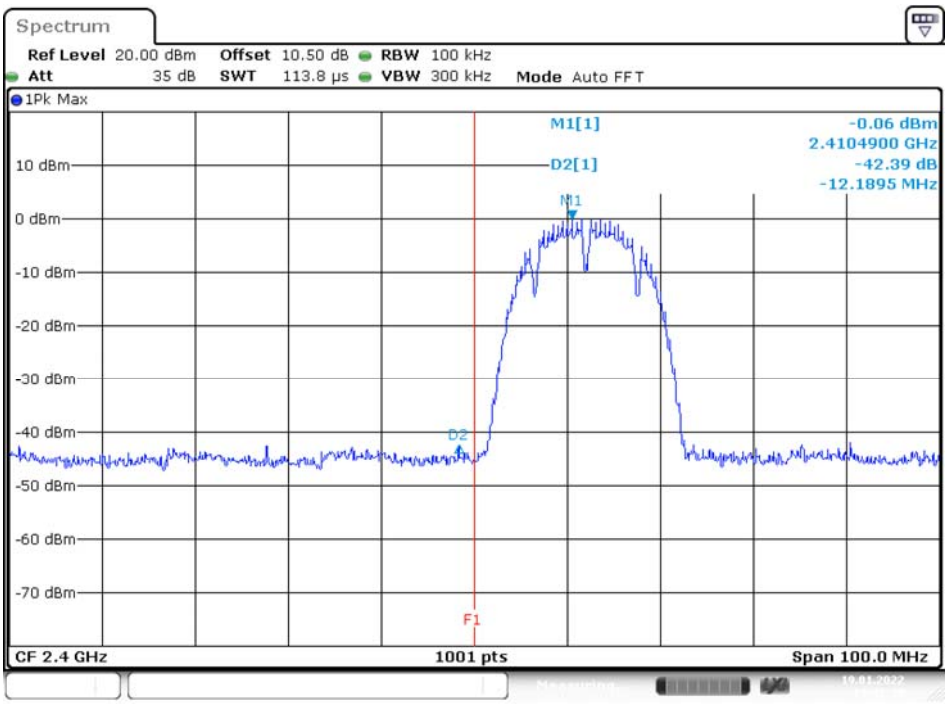
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	42.39	≥ 20	PASS
High	2462	40.27	≥ 20	PASS
G Mode				
Low	2412	41.39	≥ 20	PASS
High	2462	40.05	≥ 20	PASS
N20 Mode				
Low	2412	44.27	≥ 20	PASS
High	2462	43.74	≥ 20	PASS
N40 Mode				
Low	2422	36.70	≥ 20	PASS
High	2452	35.88	≥ 20	PASS

Please refer to the following plots.

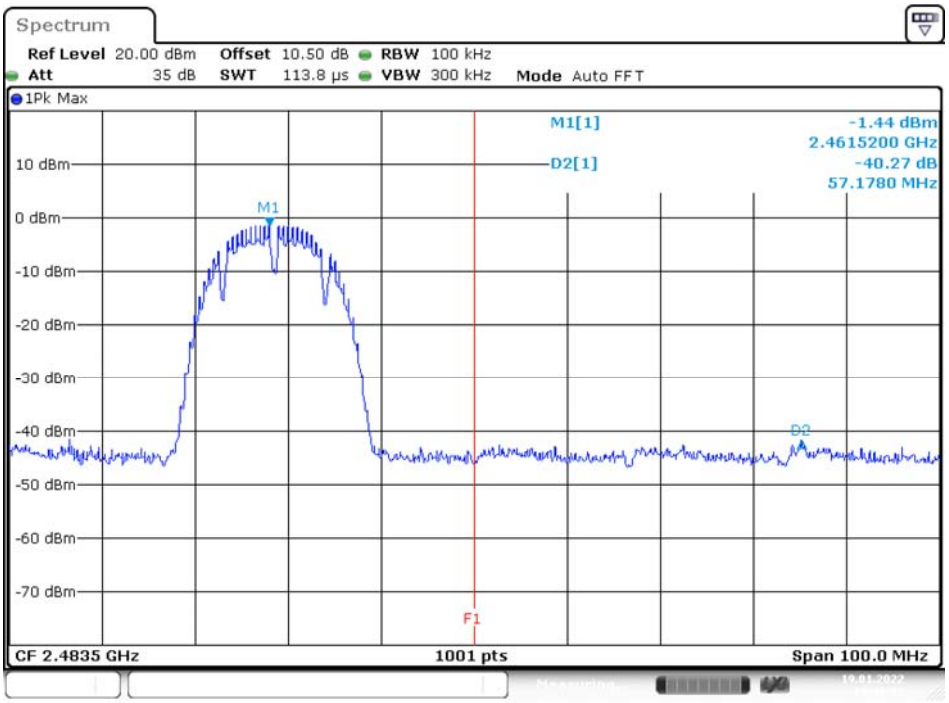
B Mode

Band Edge, Left Side



Date: 19.JAN.2022 11:42:10

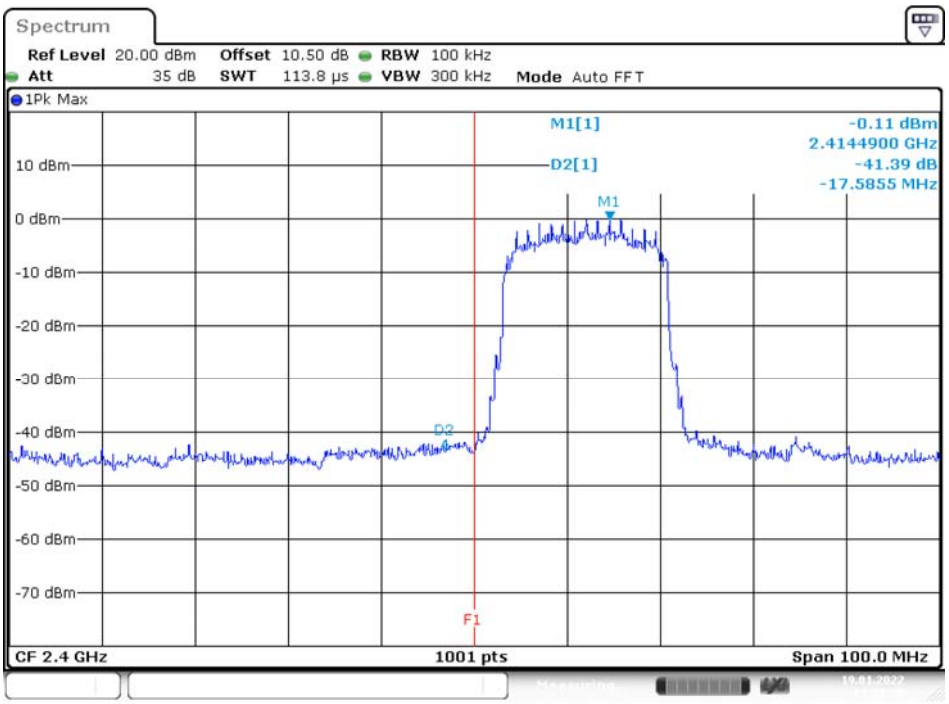
Band Edge, Right Side



Date: 19.JAN.2022 11:46:02

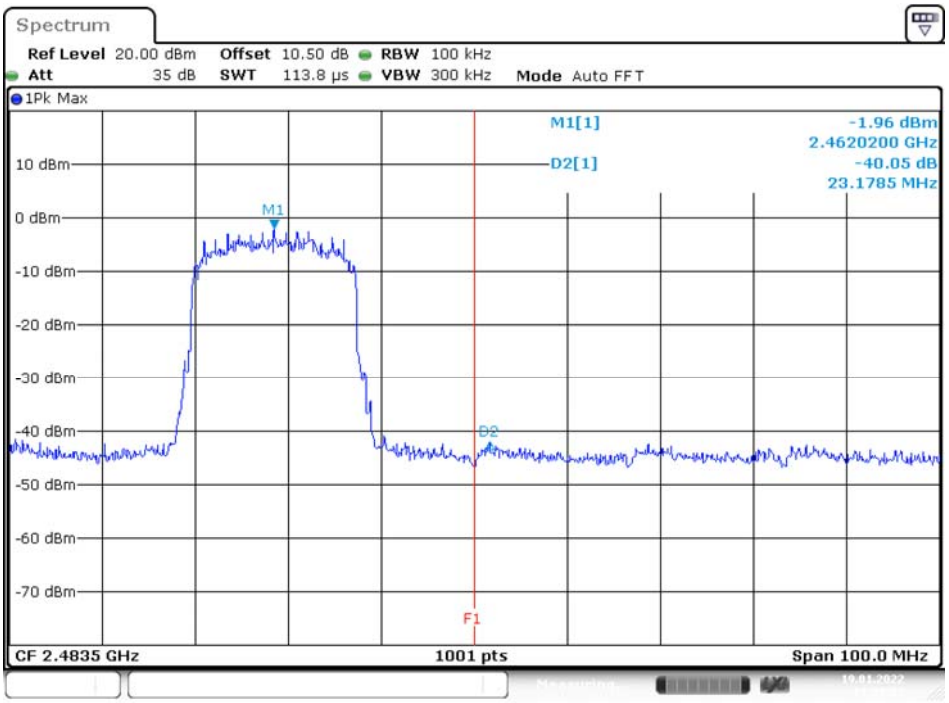
G Mode

Band Edge, Left Side



Date: 19.JAN.2022 11:39:28

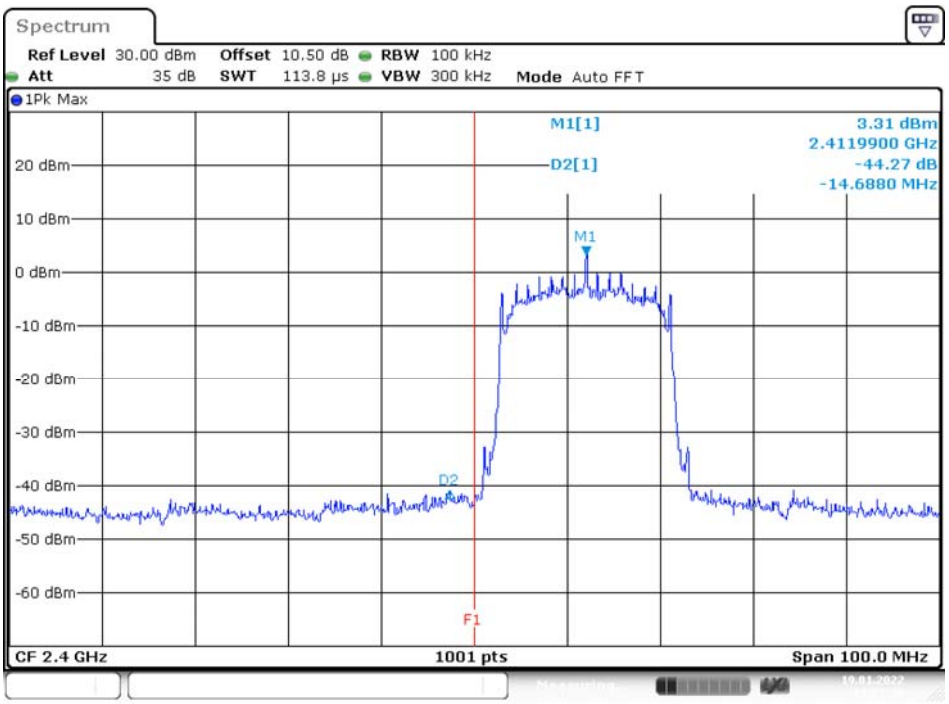
Band Edge, Right Side



Date: 19.JAN.2022 11:35:51

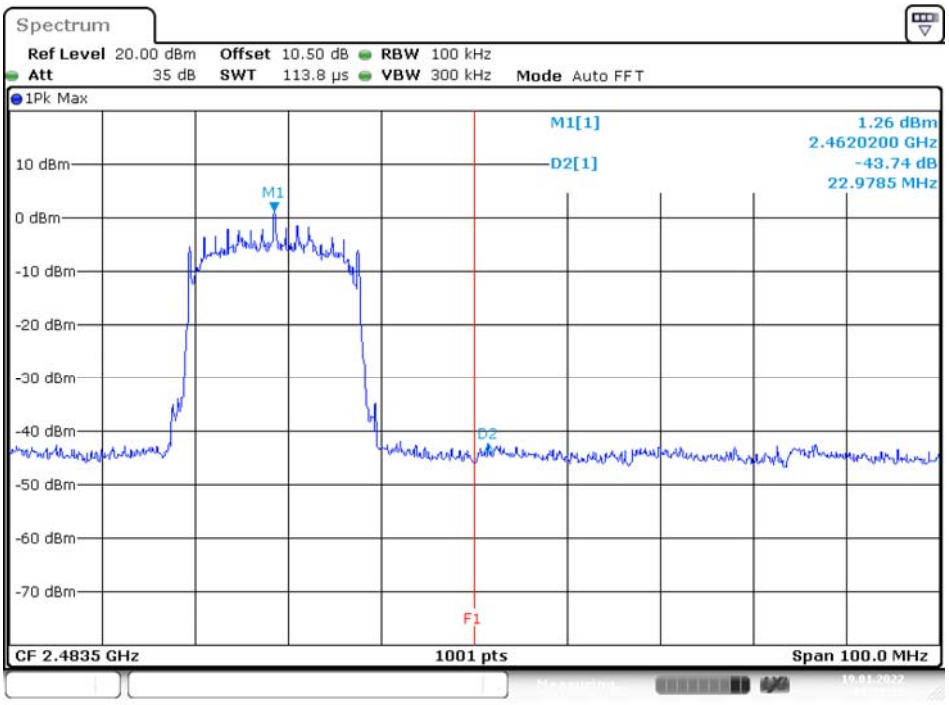
N20 Mode

Band Edge, Left Side



Date: 19.JAN.2022 11:27:16

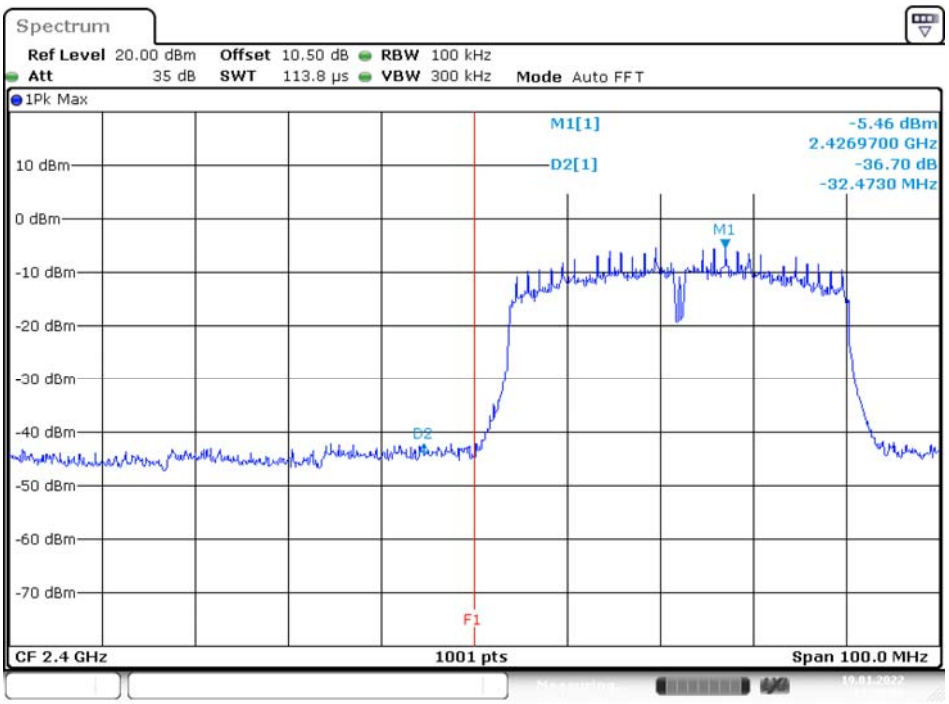
Band Edge, Right Side



Date: 19.JAN.2022 11:31:12

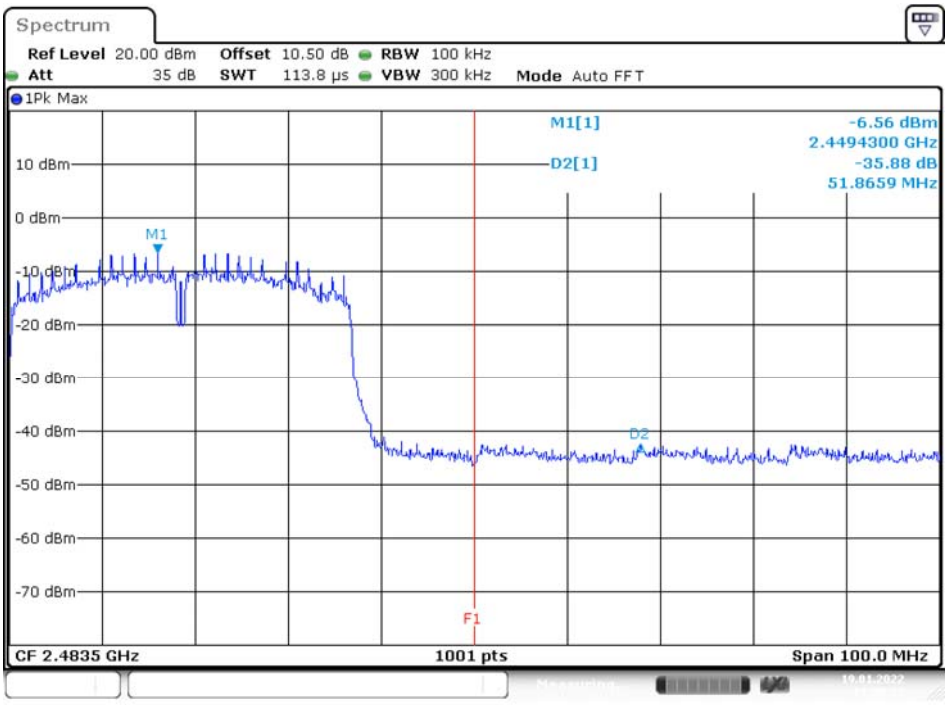
N40 Mode

Band Edge, Left Side



Date: 19.JAN.2022 11:25:06

Band Edge, Right Side



Date: 19.JAN.2022 11:20:21

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

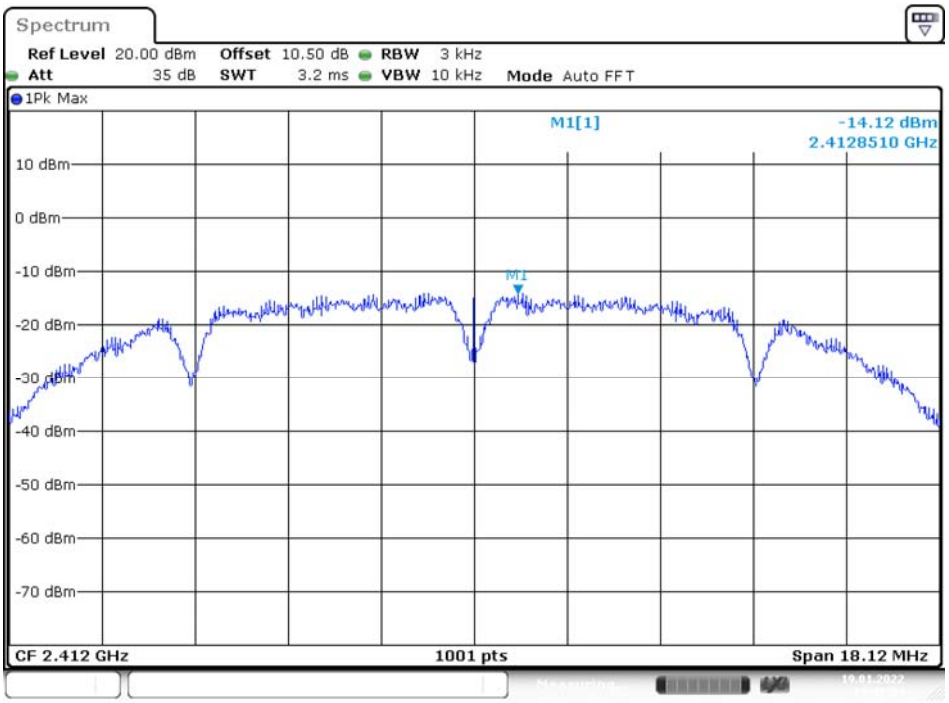
12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-14.12	8	PASS
Middle	2437	-14.70	8	PASS
High	2462	-15.42	8	PASS
G Mode				
Low	2412	-13.34	8	PASS
Middle	2437	-13.34	8	PASS
High	2462	-13.87	8	PASS
N20 Mode				
Low	2412	-12.37	8	PASS
Middle	2437	-12.40	8	PASS
High	2462	-12.83	8	PASS
N40 Mode				
Low	2422	-12.55	8	PASS
Middle	2437	-12.78	8	PASS
High	2452	-14.15	8	PASS

Please refer to the following plots

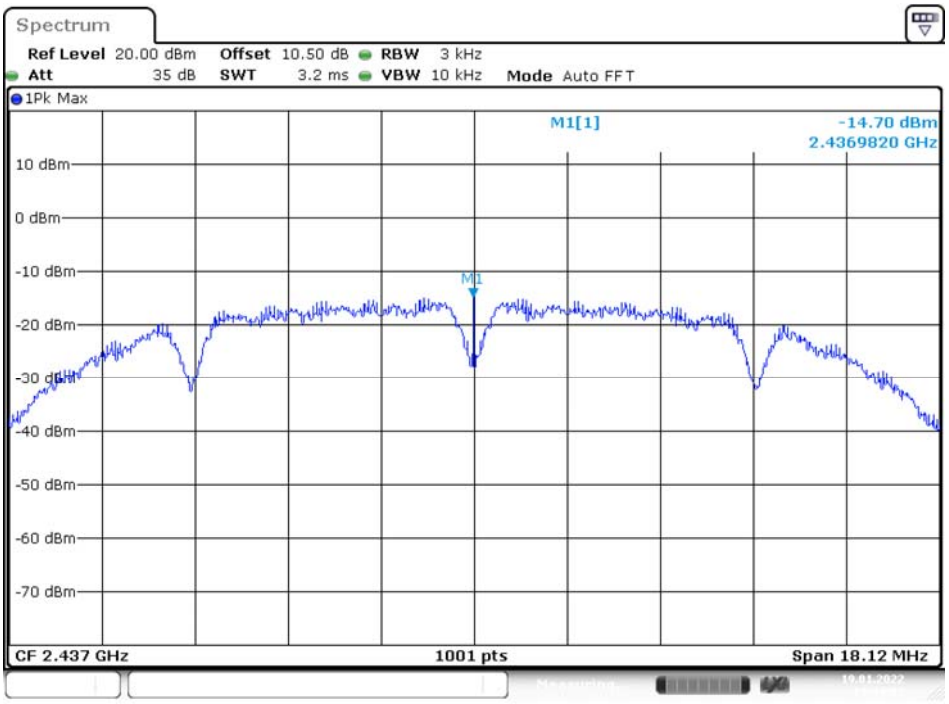
B Mode

Low Channel



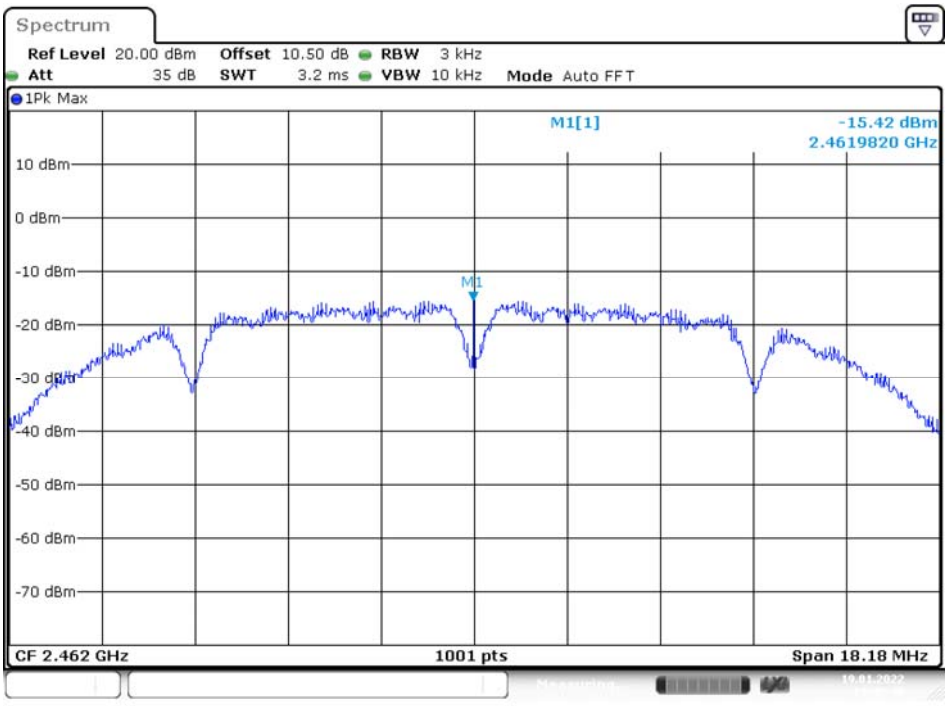
Date: 19.JAN.2022 11:41:54

Middle Channel



Date: 19.JAN.2022 11:44:01

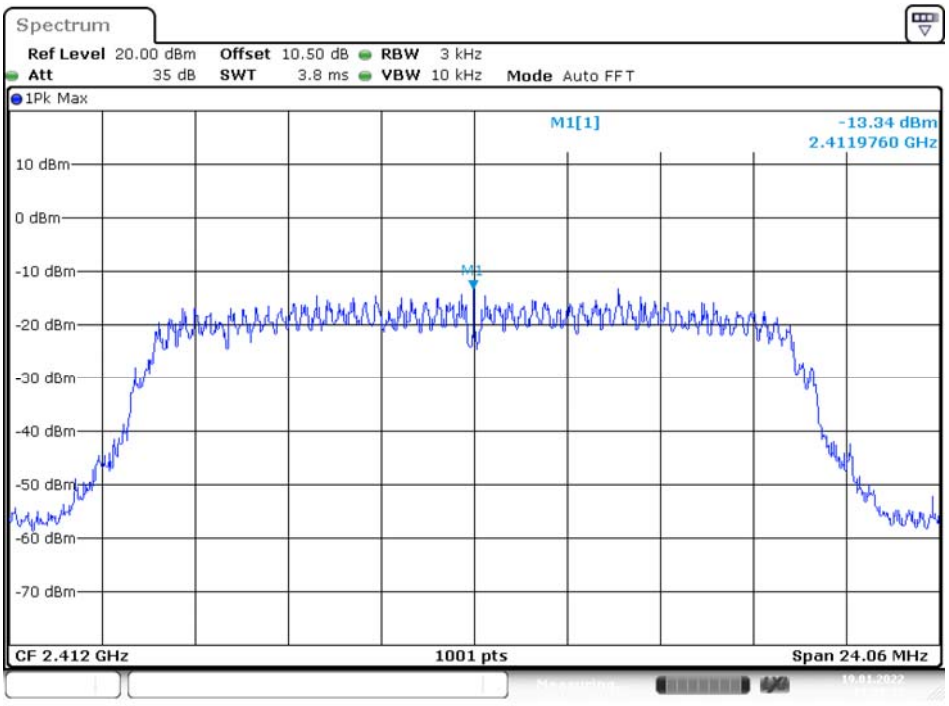
High Channel



Date: 19.JAN.2022 11:45:46

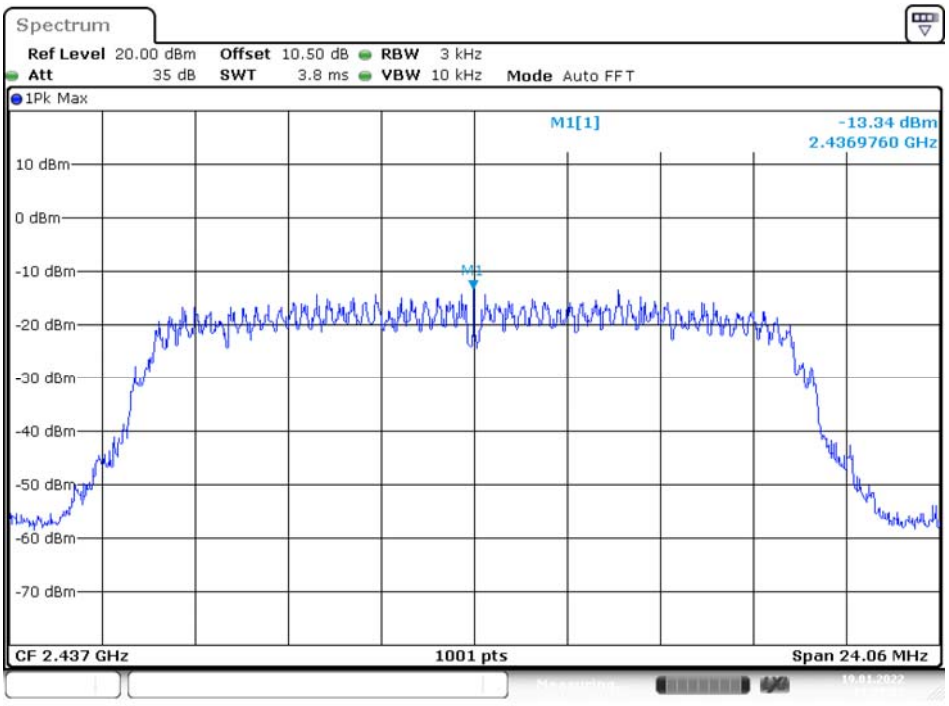
G Mode

Low Channel



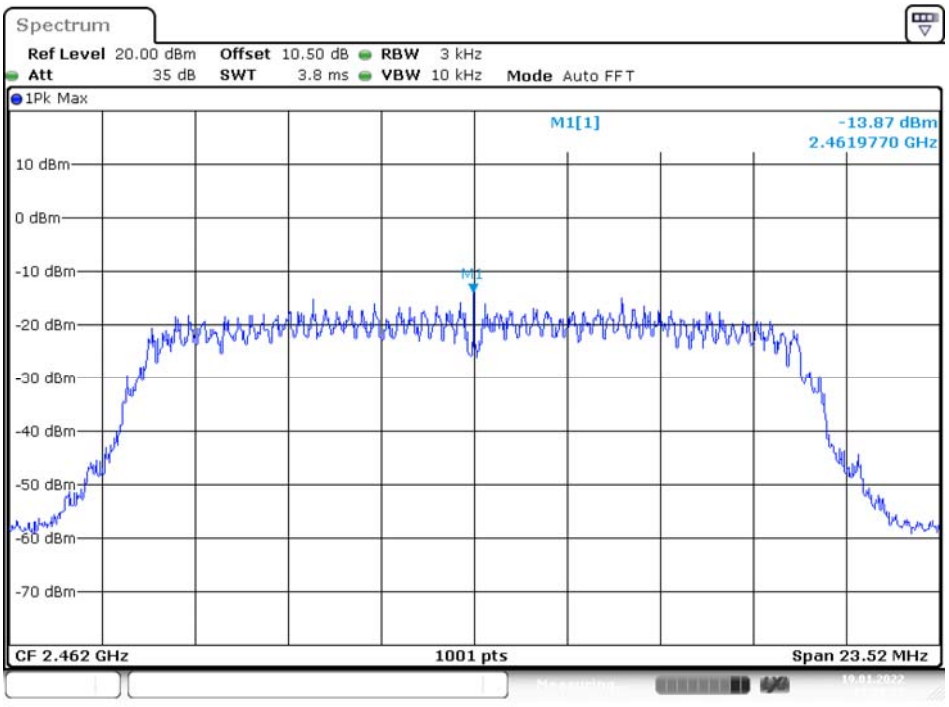
Date: 19.JAN.2022 11:39:12

Middle Channel



Date: 19.JAN.2022 11:37:33

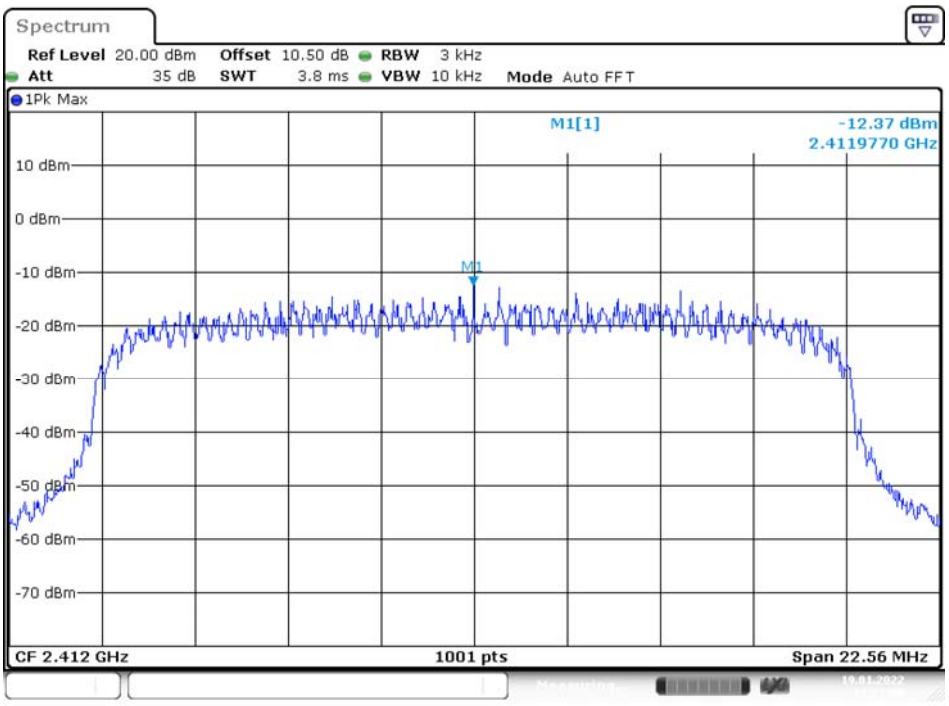
High Channel



Date: 19.JAN.2022 11:35:35

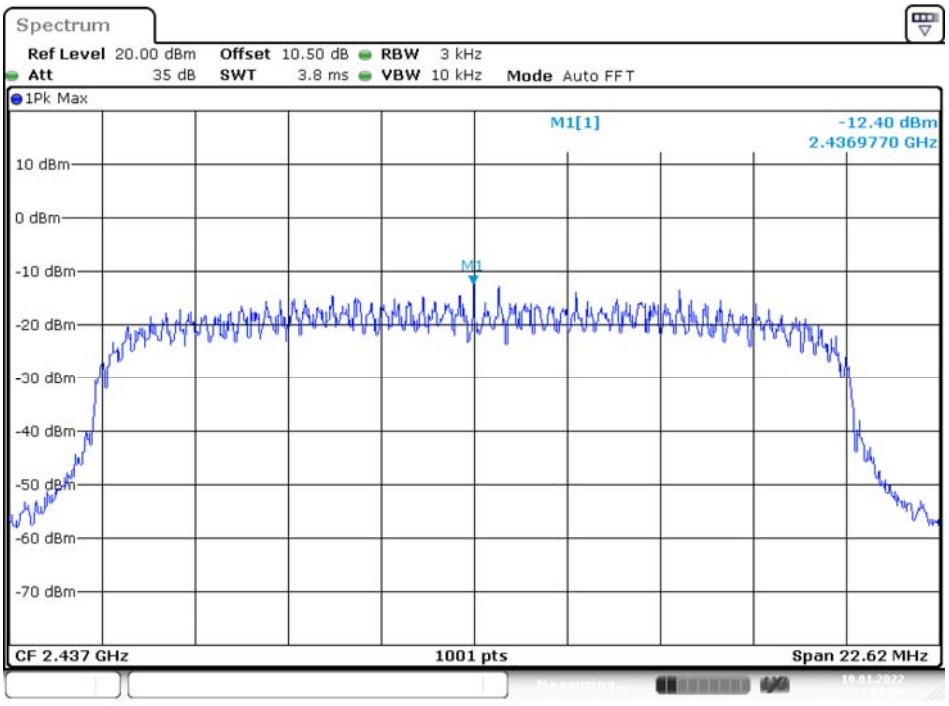
N20 Mode

Low Channel



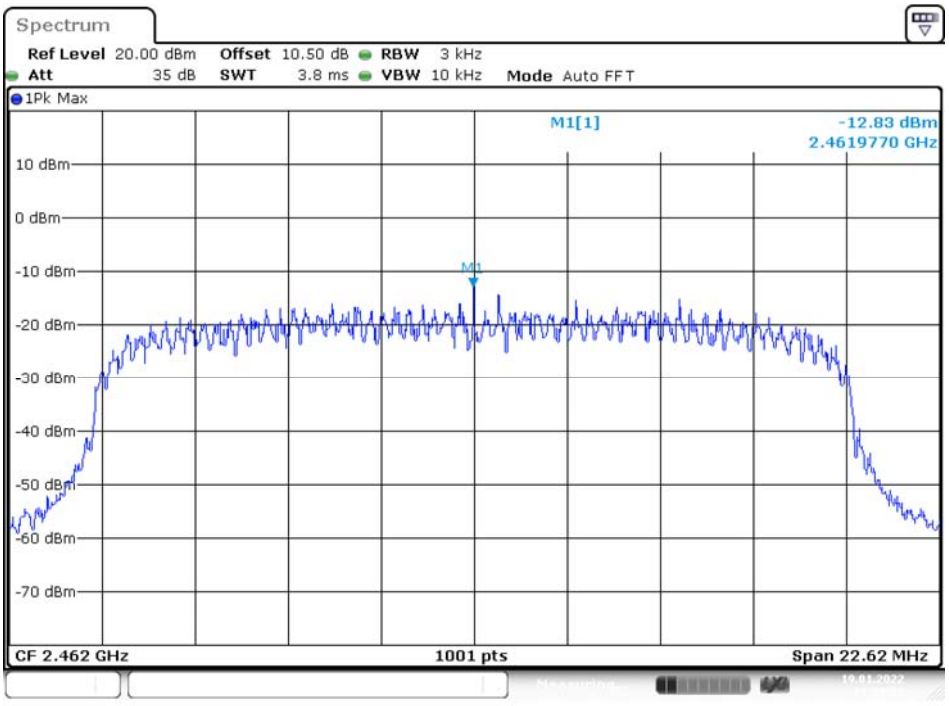
Date: 19.JAN.2022 11:27:00

Middle Channel



Date: 19.JAN.2022 11:28:56

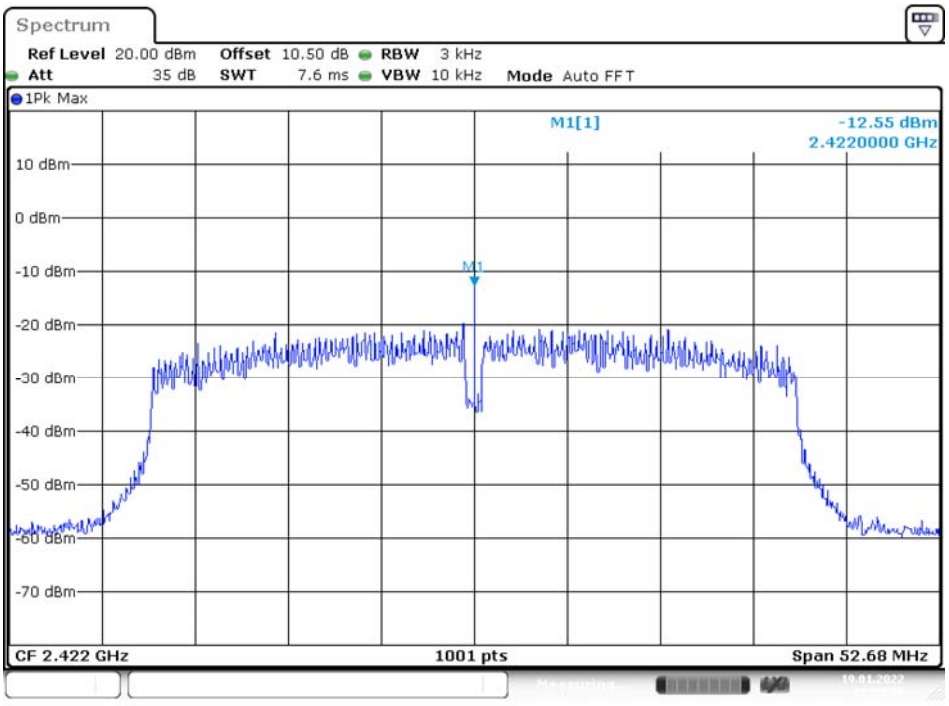
High Channel



Date: 19.JAN.2022 11:30:57

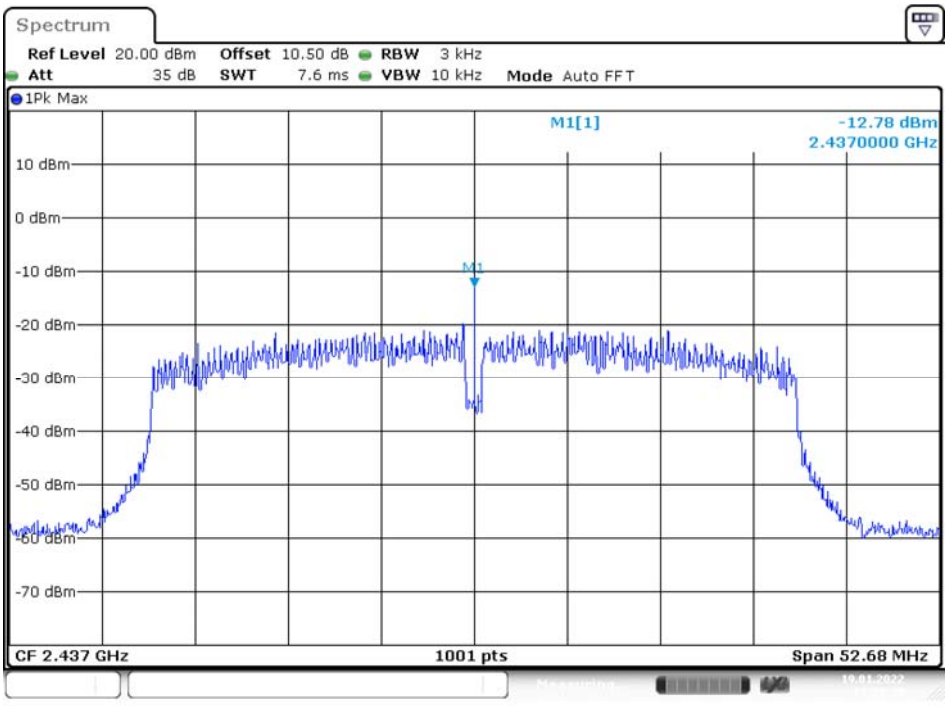
N40 Mode

Low Channel



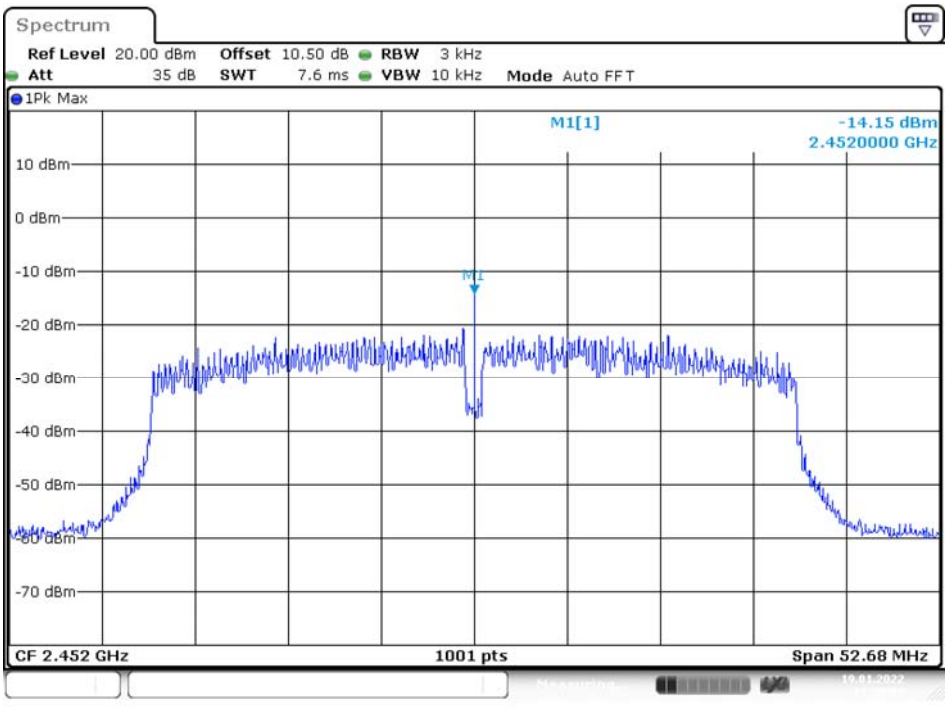
Date: 19.JAN.2022 11:24:50

Middle Channel



Date: 19.JAN.2022 11:23:10

High Channel



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