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: 2AJ3WEBEBSW513

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

Report Producer : Jane Chen

Report Number : RXZ211227006RF01

Report Date : 2022-03-29

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211227006	RXZ211227006RF01	2022-03-29	Original Report	Jane Chen

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	ZHEJIANG EBOY TECHNOLOGY CO., LTD.
	No.568 Huabao Street, Qianyuan Town, Deqing County,Huzhou City, Zhejiang Province,China,313200
Manufacturer	ZHEJIANG EBOY TECHNOLOGY CO., LTD.
	No.568 Huabao Street, Qianyuan Town, Deqing County,Huzhou City, Zhejiang Province,China,313200
Brand(Trade) Name	N/A
Product (Equipment)	LED LAMP
Main Model Name	EBE-BSW513
Series Model Name	EBE-BSW222, PR902003-US-2, PR902003-US-4, PR902004-US-2, PR902004-US-4, EBE-SHW96, EBESHW99, PR902001-US-2, PR902001-US, 902001-US-2, 902001-US
Model Discrepancy	The major electrical and mechanical constructions of series models are identical to the basic model, except different shell material. The model, EBE-BSW513 is the testing sample, and the final test data are shown on this test report.
Frequency Range	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz
Transmit Power	IEEE 802.11b Mode: 14.85 dBm IEEE 802.11g Mode: 15.24 dBm IEEE 802.11n HT20 Mode: 15.44 dBm IEEE 802.11n HT40 Mode: 13.84 dBm
Modulation Technique	IEEE 802.11b Mode: DSSS IEEE 802.11g/ n HT20/ n HT40 Mode: OFDM
Power Operation (Voltage Range)	☒ AC 120V/60Hz ☐ Adapter ☒ By AC Power Cord ☐ PoE
	☐ DC Type ☐ Battery ☐ DC Power Supply ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	Dec. 27, 2021
Date of Test	Jan. 20, 2022 ~Mar. 23, 2022

*All measurement and test data in this report was gathered from production sample serial number: RXZ211227006-01 , RXZ211227006-02 (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)

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

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

1.7 Environmental Conditions

Test Site	Test Data	Temperature (℃)	Relative Humidity (%)	ATM Pressure (hPa)	Test Engineer
AC Line Conducted Emissions	2022/1/25	25.1	60	1010	Boris
Radiation Spurious Emissions	2022/1/20 ~ 2022/1/22 , 2022/3/23	20.1~22.1 , 24.1	66~74 , 61	1010	Aaron
Conducted Spurious Emissions	2022/1/24	20.6	59	1010	Aaron
6 dB Emission Bandwidth	2022/1/24	20.6	59	1010	Aaron
Maximum Output Power	2022/1/24	20.6	59	1010	Aaron
100 kHz Bandwidth of Frequency Band Edge	2022/1/24	20.6	59	1010	Aaron
Power Spectral Density	2022/1/24	20.6	59	1010	Aaron

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 “Wifi Test Tool v1.6.0 release”

Test Frequency		Low	Mid	High
Power Level Setting	B Mode	10	10	10
	G Mode	15	15	15
	N20 Mode	15	15	15
	N40 Mode	15	15	15

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-BSW513 (Sample serial number: RXZ211227006-01).

Model 2: PR902001-US (Sample serial number: RXZ211227006-02).

Worst case is the Model 1: EBE-BSW513.

Model 1: EBE-BSW513 completes all test items.

Model 2: PR902001-US test AC Line Conducted Emissions and Radiated Spurious Emissions below 1GHz.

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 External Cable List and Details

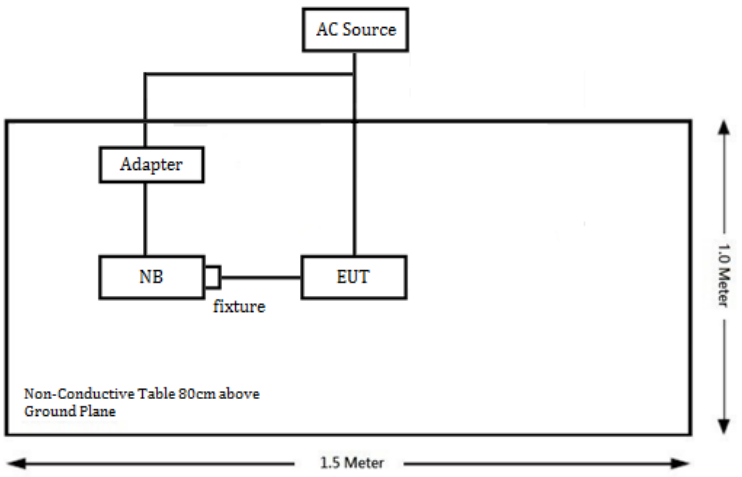
Cable Description	Length (m)	From	To
control cable	0.08	EUT	Fixture
Power cable	1.5	EUT	AC Source

2.7 Block Diagram of Test Setup

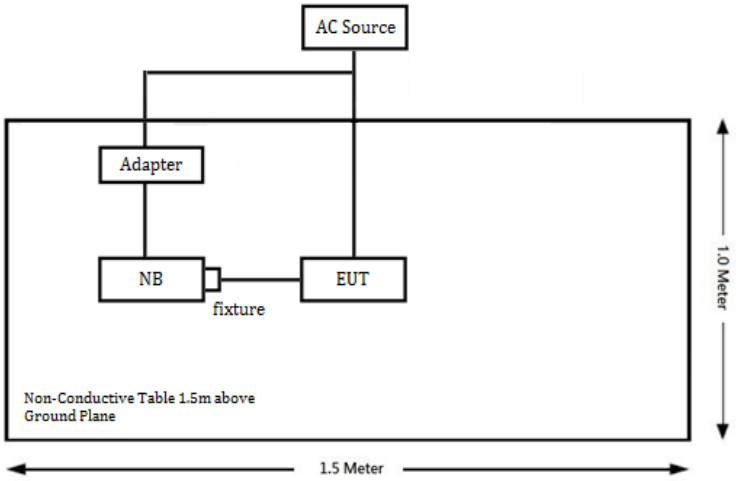
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

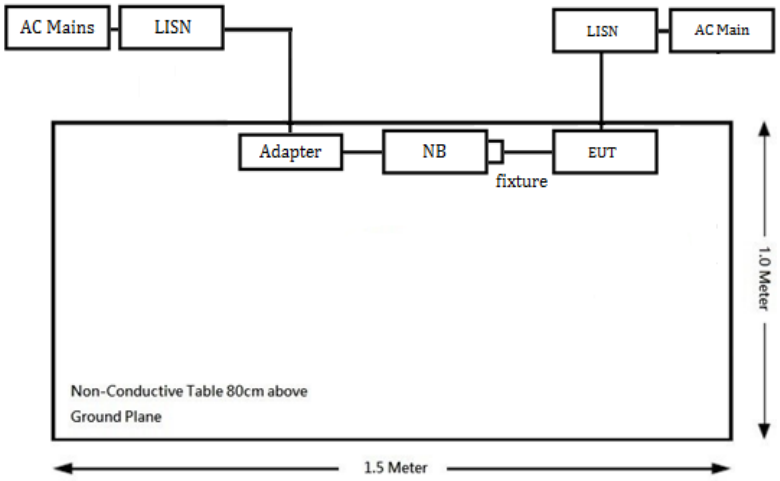
Below 1GHz:



Above 1GHz:



Conduction:



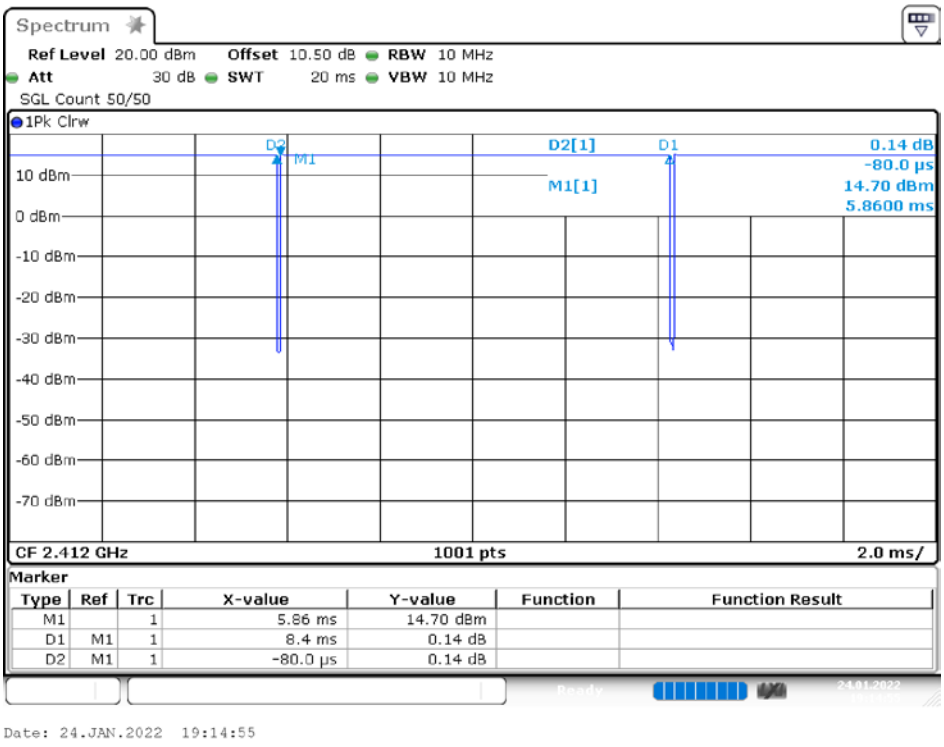
2.8 Duty Cycle

The duty cycle as below:

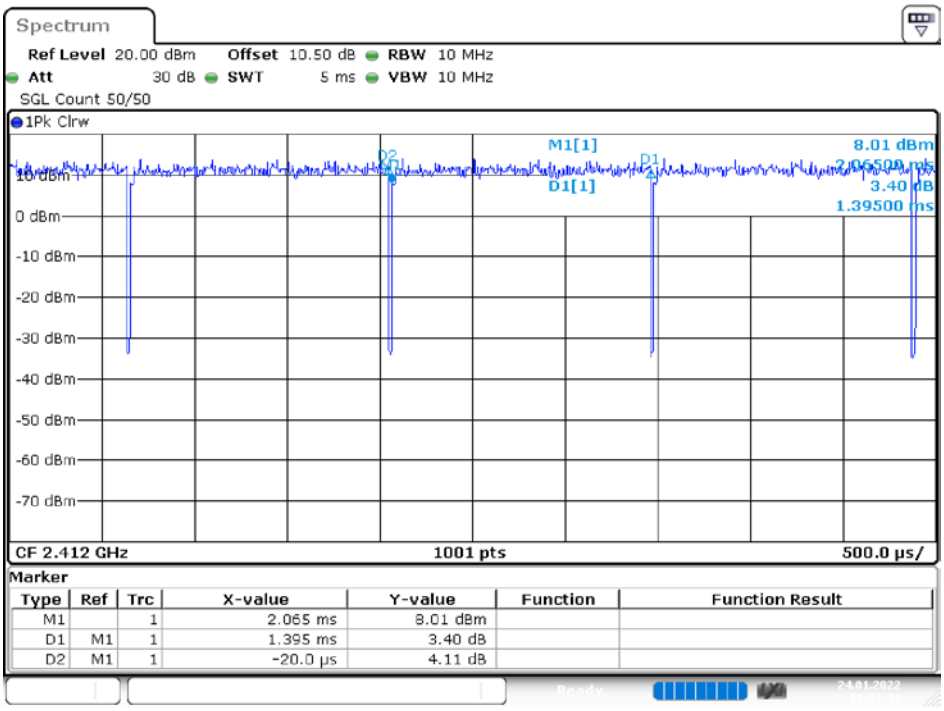
Radio Mode	T_{on} (ms)	$T_{on}+T_{off}$ (ms)	Duty Cycle (%)
802.11b	8.4	8.48	99
802.11g	1.395	1.415	99
802.11n20	1.3	1.32	98
802.11n40	0.648	0.659	98

Please refer to the following plots.

B Mode



G Mode



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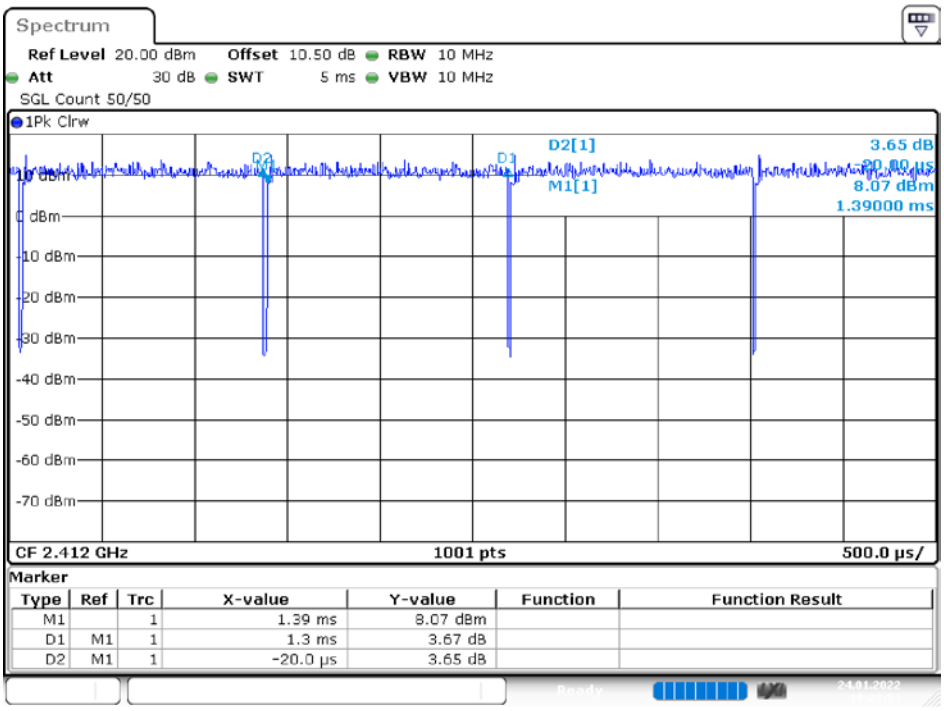
N20 Mode



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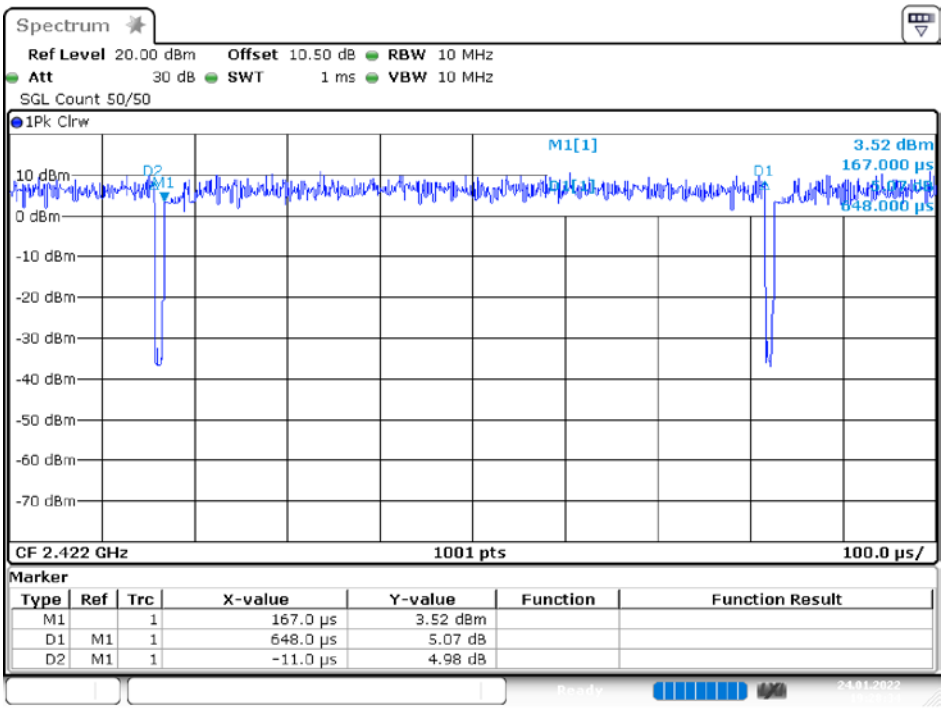
N40 Mode



Date: 24.JAN.2022 19:28:34

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	2022/1/14	2023/1/13
LISN	Rohde & Schwarz	ENV216	101248	2021/6/8	2022/6/7
EMI Test Receiver	Rohde & Schwarz	ESW8	100947	2021/7/23	2022/7/22
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 & EMEC	JB3 /EM-ATT18-6-NN	A061204 /ATT-09-003	2021/1/25	2022/1/24
				2022/2/16	2023/2/15
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	466	2021/11/4	2022/11/3
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2021/12/27	2022/12/26
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2022/1/13	2023/1/12
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2021/11/9	2022/11/8
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
				2022/1/24	2023/1/23
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
				2022/1/24	2023/1/23
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
				2022/1/24	2023/1/23

Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2021/2/1	2022/1/31
				2022/1/24	2023/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-50CM	15120-1	2021/2/1	2022/1/31
				2022/2/11	2023/2/10
Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R
Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101941	2021/12/27	2022/12/26
Cable	UTIFLEX	UFA210A	9435	2021/10/5	2022/10/4
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2022/1/24	2023/1/23
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	1.2	1.318	15.5	35.481	20	0.0093	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

Manufacturer	Model	Antenna Type	Antenna Gain
tuya	3216	Chip Antenna	1.2 dBi

Result: Compliance

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

7.1 Applicable Standard

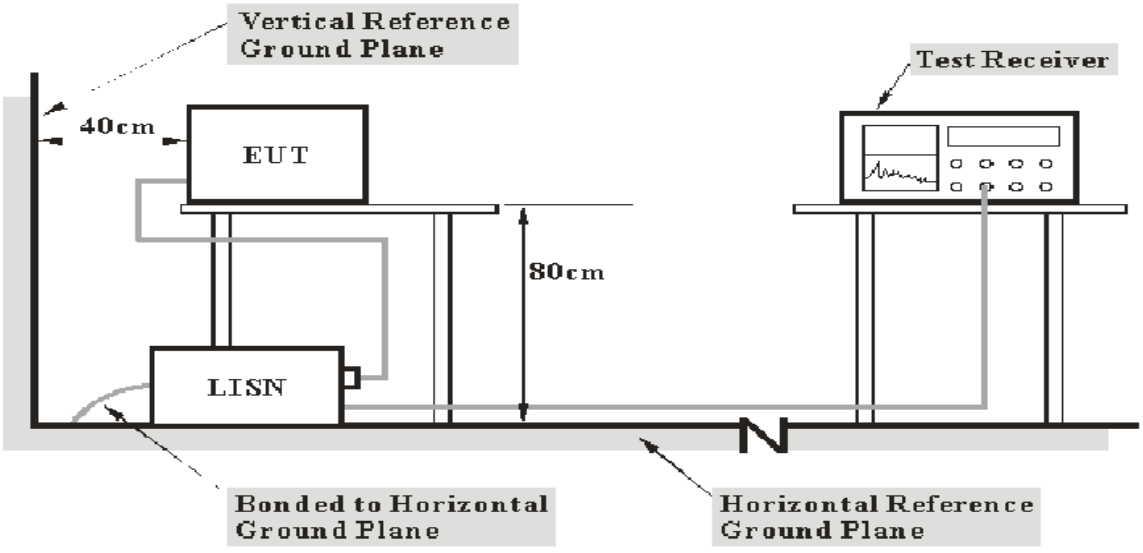
According to §15.207

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

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

Note: Decreases with the logarithm of the frequency.

7.2 EUT Setup



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

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

7.3 EMI Test Receiver Setup

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

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

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

7.4 Test Procedure

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

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

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

7.5 Corrected Factor & Margin Calculation

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

Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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

Over Limit = Level – Limit Line

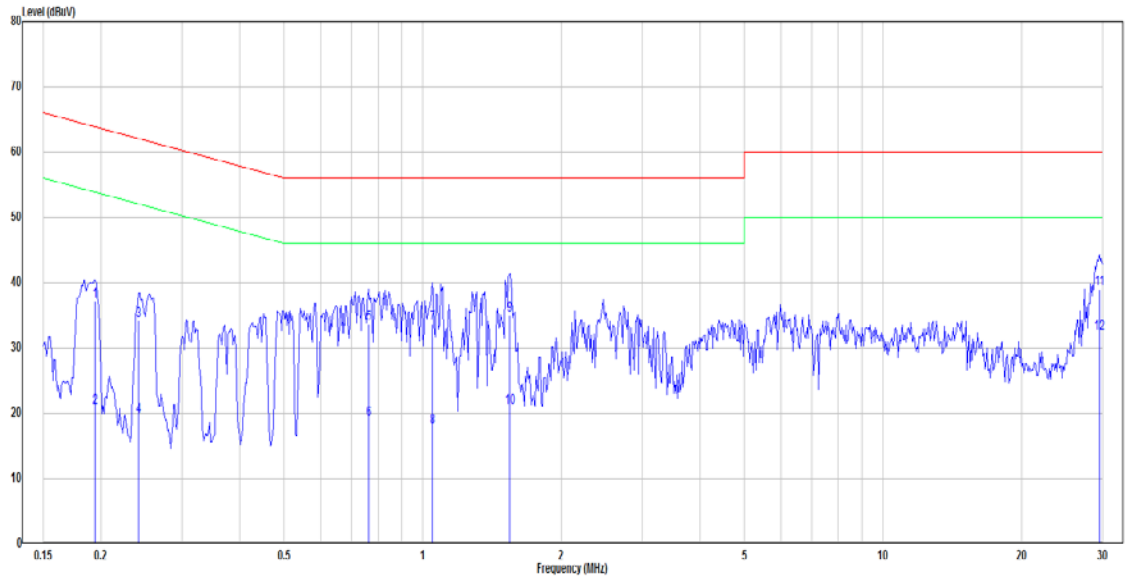
7.6 Test Results

Test Mode: Transmitting

(Worst case is 802.11b mode, Middle Channel)

Model : EBE-BSW513

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.194	17.72	19.50	37.22	63.84	-26.62	QP
2	0.194	1.39	19.50	20.89	53.84	-32.95	Average
3	0.242	14.64	19.50	34.14	62.04	-27.90	QP
4	0.242	0.03	19.50	19.53	52.04	-32.51	Average
5	0.763	14.11	19.53	33.64	56.00	-22.36	QP
6	0.763	-0.48	19.53	19.05	46.00	-26.95	Average
7	1.049	14.16	19.54	33.70	56.00	-22.30	QP
8	1.049	-1.75	19.54	17.79	46.00	-28.21	Average
9	1.544	15.37	19.56	34.93	56.00	-21.07	QP
10	1.544	1.30	19.56	20.86	46.00	-25.14	Average
11	29.527	18.99	19.96	38.95	60.00	-21.05	QP
12	29.527	12.21	19.96	32.17	50.00	-17.83	Average

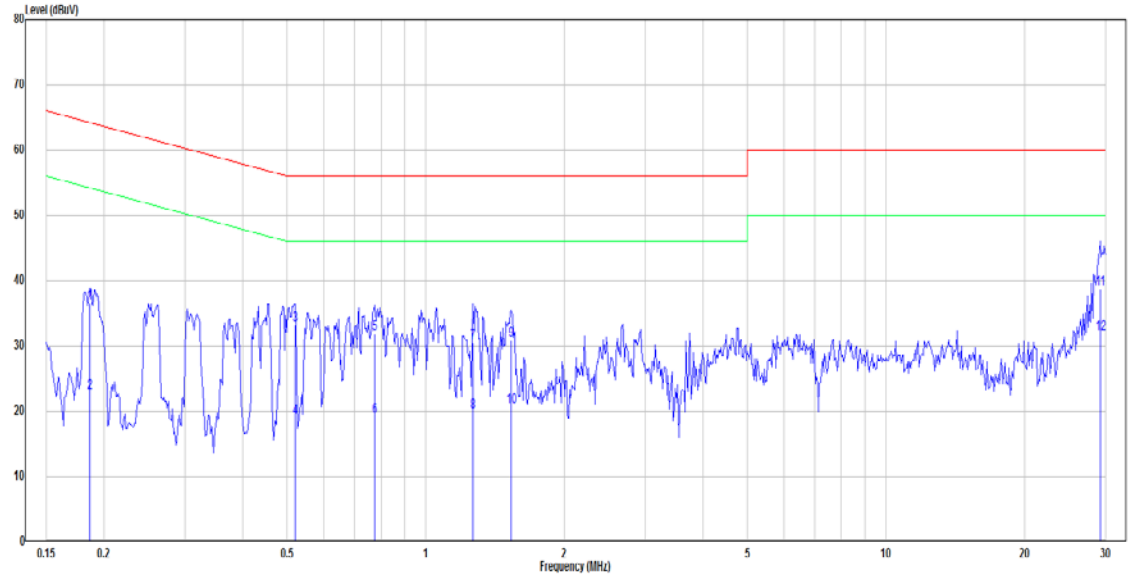
Note:

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	0.186	17.03	19.49	36.52	64.20	-27.68	QP
2	0.186	3.34	19.49	22.83	54.20	-31.37	Average
3	0.521	13.69	19.52	33.21	56.00	-22.79	QP
4	0.521	-0.59	19.52	18.93	46.00	-27.07	Average
5	0.775	12.27	19.53	31.80	56.00	-24.20	QP
6	0.775	-0.40	19.53	19.13	46.00	-26.87	Average
7	1.269	10.95	19.54	30.49	56.00	-25.51	QP
8	1.269	0.34	19.54	19.88	46.00	-26.12	Average
9	1.535	11.32	19.55	30.87	56.00	-25.13	QP
10	1.535	1.09	19.55	20.64	46.00	-25.36	Average
11	29.216	18.73	20.01	38.74	60.00	-21.26	QP
12	29.216	11.77	20.01	31.78	50.00	-18.22	Average

Note:

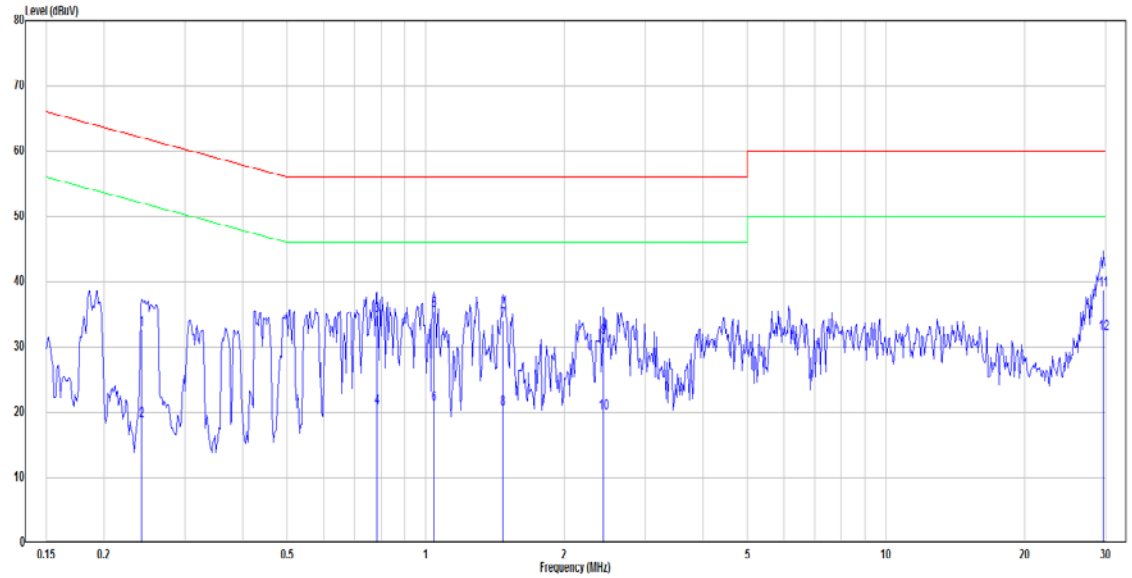
Level = Read Level + Factor

Over Limit = Level – Limit Line

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

Model : PR902001-US

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.242	13.22	19.50	32.72	62.04	-29.32	QP
2	0.242	-0.88	19.50	18.62	52.04	-33.42	Average
3	0.783	15.35	19.53	34.88	56.00	-21.12	QP
4	0.783	1.17	19.53	20.70	46.00	-25.30	Average
5	1.043	15.90	19.54	35.44	56.00	-20.56	QP
6	1.043	1.63	19.54	21.17	46.00	-24.83	Average
7	1.472	14.43	19.56	33.99	56.00	-22.01	QP
8	1.472	0.94	19.56	20.50	46.00	-25.50	Average
9	2.435	11.83	19.59	31.42	56.00	-24.58	QP
10	2.435	0.16	19.59	19.75	46.00	-26.25	Average
11	29.684	18.65	19.96	38.61	60.00	-21.39	QP
12	29.684	12.12	19.96	32.08	50.00	-17.92	Average

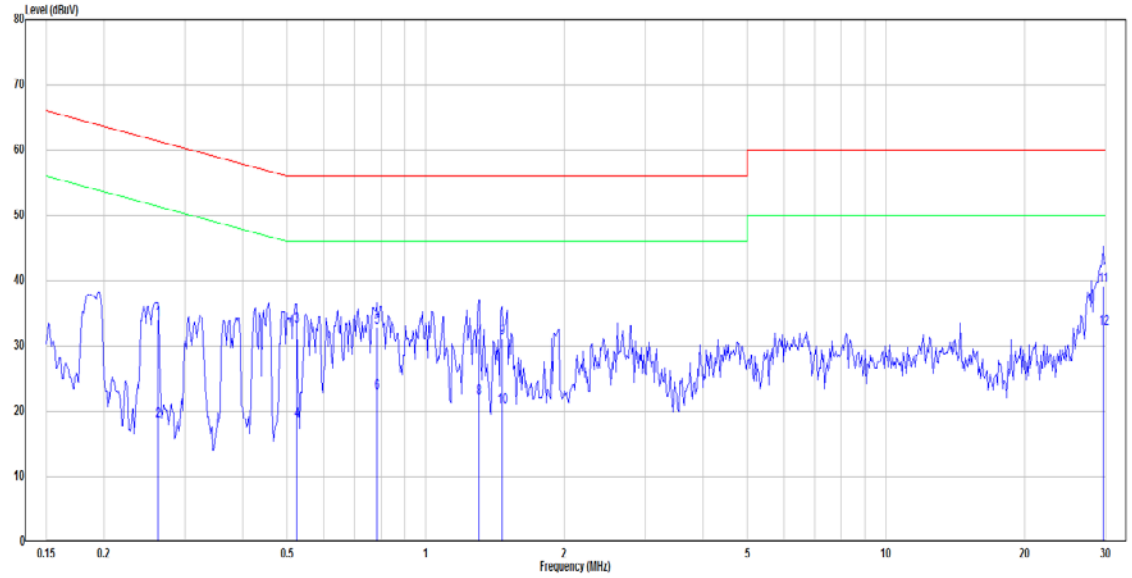
Note:

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	0.262	14.46	19.50	33.96	61.38	-27.42	QP
2	0.262	-1.06	19.50	18.44	51.38	-32.94	Average
3	0.524	13.40	19.52	32.92	56.00	-23.08	QP
4	0.524	-1.08	19.52	18.44	46.00	-27.56	Average
5	0.783	13.37	19.53	32.90	56.00	-23.10	QP
6	0.783	3.38	19.53	22.91	46.00	-23.09	Average
7	1.303	11.55	19.54	31.09	56.00	-24.91	QP
8	1.303	2.42	19.54	21.96	46.00	-24.04	Average
9	1.464	11.61	19.55	31.16	56.00	-24.84	QP
10	1.464	1.07	19.55	20.62	46.00	-25.38	Average
11	29.684	19.18	20.02	39.20	60.00	-20.80	QP
12	29.684	12.61	20.02	32.63	50.00	-17.37	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

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

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

8.1 Applicable Standard

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

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

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

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

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

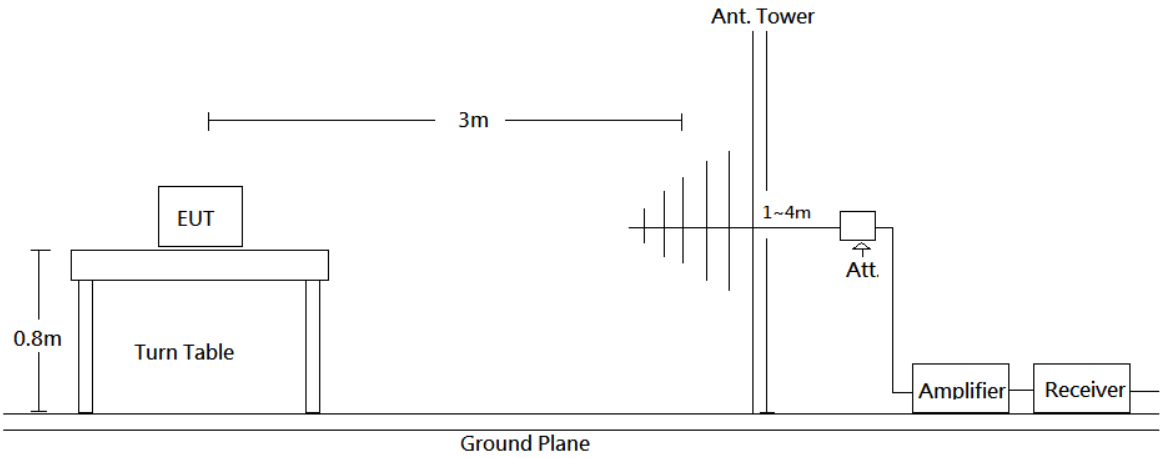
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

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

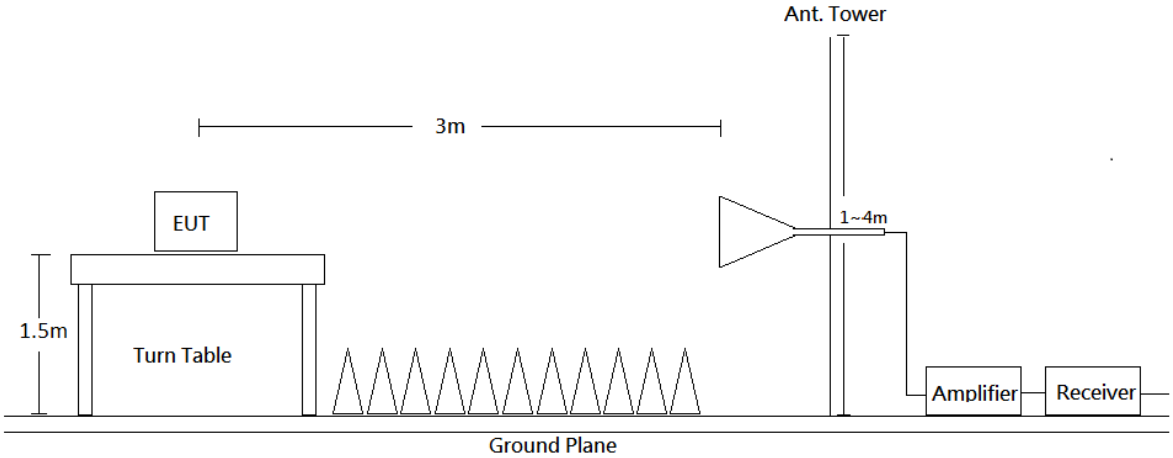
intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the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

8.2 EUT Setup

Below 1 GHz:



Above 1 GHz:



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

8.3 EMI Test Receiver & Spectrum Analyzer Setup

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

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

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

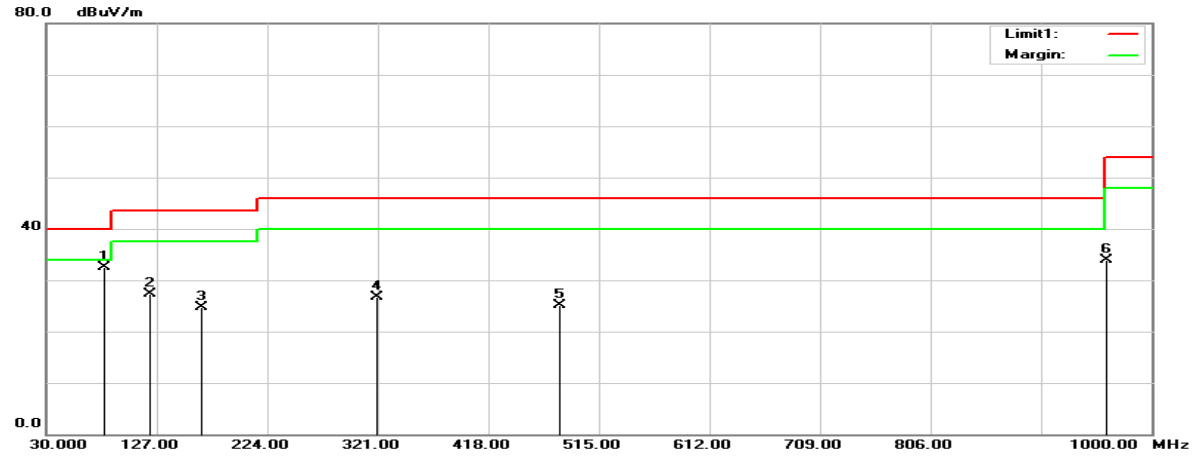
Test Mode: Transmitting

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

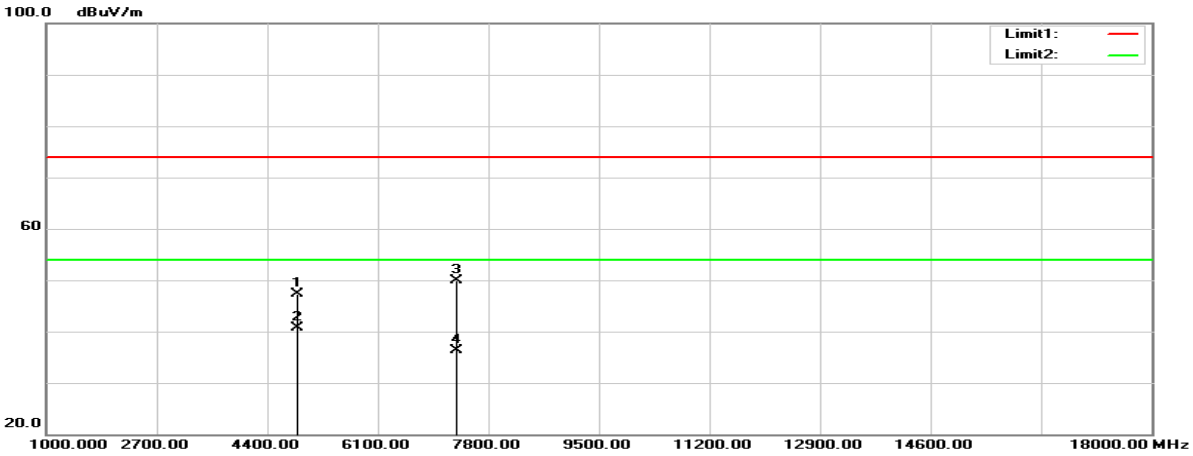
Model : EBE-BSW513

Horizontal (worst case is 802.11b mode Middle channel)

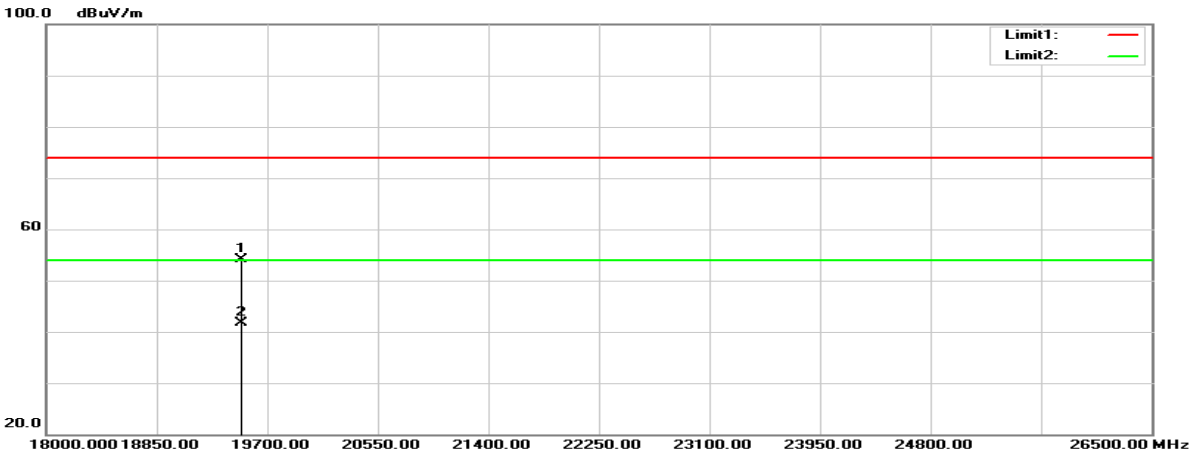
30MHz-1GHz:



1GHz-18GHz:

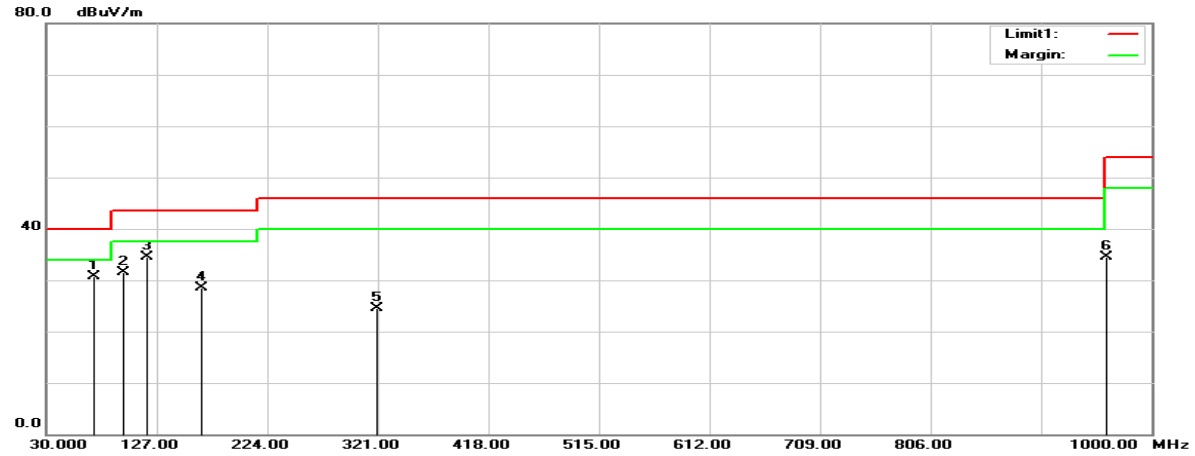


18GHz-26.5GHz:

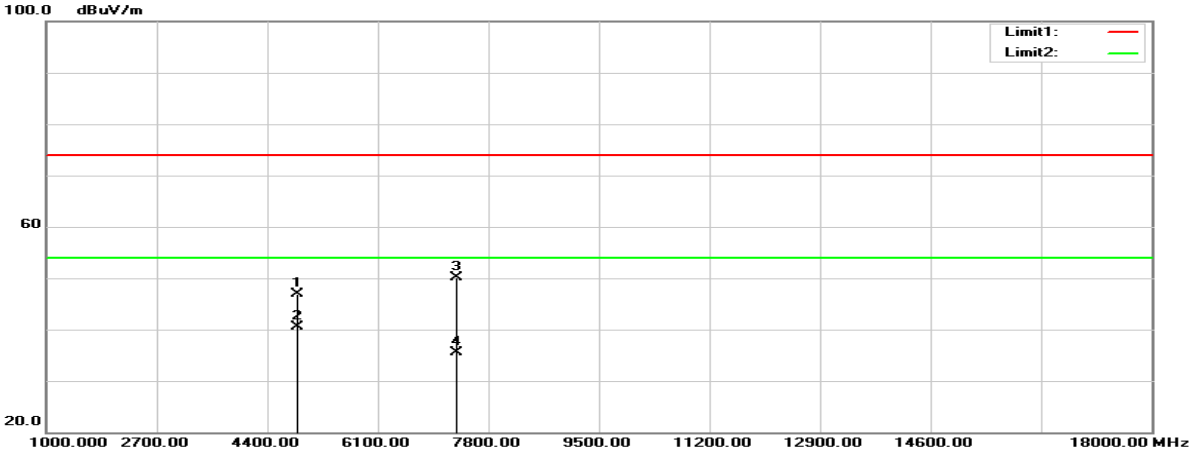


Vertical (worst case is 802.11b mode Middle channel)

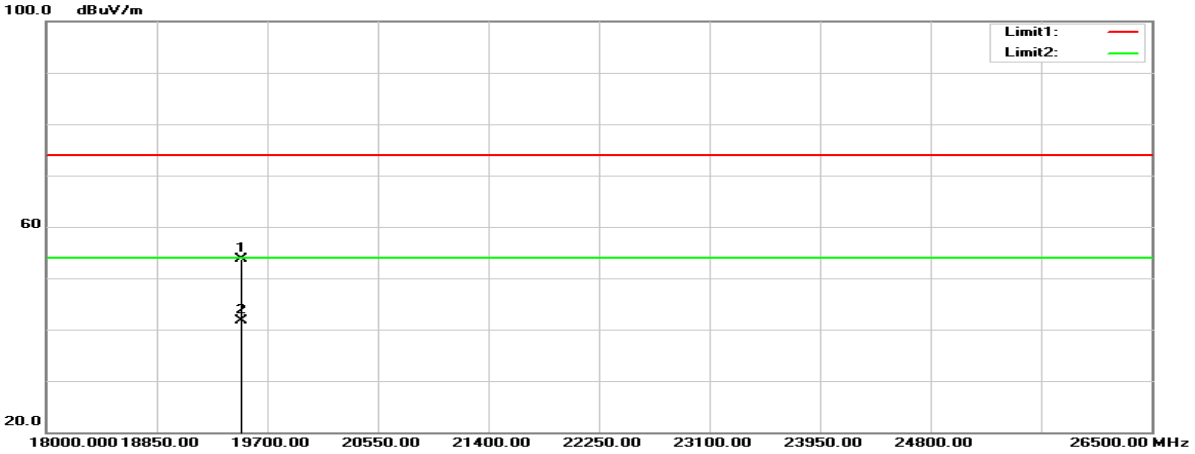
30MHz-1GHz:



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	49.15	-16.62	32.53	40.00	-7.47	100	135	peak
121.1800	37.47	-10.21	27.26	43.50	-16.24	100	222	peak
165.8000	36.33	-11.71	24.62	43.50	-18.88	100	85	peak
320.0300	36.36	-9.63	26.73	46.00	-19.27	100	68	peak
480.0800	31.12	-6.00	25.12	46.00	-20.88	100	197	peak
960.2300	31.46	2.35	33.81	54.00	-20.19	100	327	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
71.7100	46.77	-16.14	30.63	40.00	-9.37	100	231	peak
97.9000	46.30	-14.71	31.59	43.50	-11.91	100	118	peak
118.2700	45.11	-10.69	34.42	43.50	-9.08	100	75	peak
165.8000	40.12	-11.71	28.41	43.50	-15.09	100	86	peak
320.0300	34.21	-9.63	24.58	46.00	-21.42	100	138	peak
960.2300	32.25	2.35	34.60	54.00	-19.40	100	325	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								
2385.936	63.11	-9.49	53.62	74.00	-20.38	144	174	peak
2385.936	53.35	-9.49	43.86	54.00	-10.14	144	174	AVG
4824.000	47.98	-2.15	45.83	74.00	-28.17	144	185	peak
4824.000	41.86	-2.15	39.71	54.00	-14.29	144	185	AVG
7236.000	44.74	4.55	49.29	74.00	-24.71	152	201	peak
7236.000	31.34	4.55	35.89	54.00	-18.11	152	201	AVG
19296.000	54.14	-0.45	53.69	74.00	-20.31	146	216	peak
19296.000	41.39	-0.45	40.94	54.00	-13.06	146	216	AVG
B Mode, Middle channel								
4874.000	49.20	-1.92	47.28	74.00	-26.72	150	224	peak
4874.000	42.71	-1.92	40.79	54.00	-13.21	150	224	AVG
7311.000	44.92	5.08	50.00	74.00	-24.00	153	320	peak
7311.000	31.21	5.08	36.29	54.00	-17.71	153	320	AVG
19496.000	54.20	-0.04	54.16	74.00	-19.84	155	80	peak
19496.000	41.68	-0.04	41.64	54.00	-12.36	155	80	AVG
B Mode, High channel								
2487.760	61.66	-8.39	53.27	74.00	-20.73	179	175	peak
2487.760	50.84	-8.39	42.45	54.00	-11.55	179	175	AVG
4924.000	48.68	-1.63	47.05	74.00	-26.95	150	203	peak
4924.000	41.79	-1.63	40.16	54.00	-13.84	150	203	AVG
7386.000	44.85	5.20	50.05	74.00	-23.95	142	288	peak
7386.000	31.20	5.20	36.40	54.00	-17.60	142	288	AVG
19696.000	53.98	0.60	54.58	74.00	-19.42	146	64	peak
19696.000	41.58	0.60	42.18	54.00	-11.82	146	64	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								
2386.384	61.28	-9.49	51.79	74.00	-22.21	209	263	peak
2386.384	51.08	-9.49	41.59	54.00	-12.41	209	263	AVG
4824.000	48.46	-2.15	46.31	74.00	-27.69	191	222	peak
4824.000	42.27	-2.15	40.12	54.00	-13.88	191	222	AVG
7236.000	45.89	4.55	50.44	74.00	-23.56	151	94	peak
7236.000	30.54	4.55	35.09	54.00	-18.91	151	94	AVG
19296.000	53.82	-0.45	53.37	74.00	-20.63	151	214	peak
19296.000	41.45	-0.45	41.00	54.00	-13.00	151	214	AVG
B Mode, Middle channel								
4874.000	48.75	-1.92	46.83	74.00	-27.17	150	7	peak
4874.000	42.42	-1.92	40.50	54.00	-13.50	150	7	AVG
7311.000	44.97	5.08	50.05	74.00	-23.95	147	264	peak
7311.000	30.52	5.08	35.60	54.00	-18.40	147	264	AVG
19496.000	53.84	-0.04	53.80	74.00	-20.20	150	89	peak
19496.000	41.70	-0.04	41.66	54.00	-12.34	150	89	AVG
B Mode, High channel								
2483.584	61.31	-8.45	52.86	74.00	-21.14	109	291	peak
2483.584	50.12	-8.45	41.67	54.00	-12.33	109	291	AVG
4924.000	47.56	-1.63	45.93	74.00	-28.07	150	126	peak
4924.000	39.70	-1.63	38.07	54.00	-15.93	150	126	AVG
7386.000	45.05	5.20	50.25	74.00	-23.75	152	218	peak
7386.000	31.68	5.20	36.88	54.00	-17.12	152	218	AVG
19696.000	53.96	0.60	54.56	74.00	-19.44	144	77	peak
19696.000	41.66	0.60	42.26	54.00	-11.74	144	77	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								
2389.632	64.49	-9.46	55.03	74.00	-18.97	145	175	peak
2389.632	48.16	-9.46	38.70	54.00	-15.30	145	175	AVG
4824.000	45.44	-2.15	43.29	74.00	-30.71	145	277	peak
4824.000	31.33	-2.15	29.18	54.00	-24.82	145	277	AVG
7236.000	45.11	4.55	49.66	74.00	-24.34	152	38	peak
7236.000	30.51	4.55	35.06	54.00	-18.94	152	38	AVG
19296.000	53.45	-0.45	53.00	74.00	-21.00	151	61	peak
19296.000	41.43	-0.45	40.98	54.00	-13.02	151	61	AVG
G Mode, Middle channel								
4874.000	45.13	-1.92	43.21	74.00	-30.79	151	41	peak
4874.000	31.22	-1.92	29.30	54.00	-24.70	151	41	AVG
7311.000	44.19	5.08	49.27	74.00	-24.73	157	70	peak
7311.000	30.50	5.08	35.58	54.00	-18.42	157	70	AVG
19496.000	53.76	-0.04	53.72	74.00	-20.28	156	322	peak
19496.000	41.71	-0.04	41.67	54.00	-12.33	156	322	AVG
G Mode, High channel								
2483.872	64.39	-8.44	55.95	74.00	-18.05	140	172	peak
2483.872	47.82	-8.44	39.38	54.00	-14.62	140	172	AVG
4924.000	45.84	-1.63	44.21	74.00	-29.79	142	51	peak
4924.000	31.50	-1.63	29.87	54.00	-24.13	142	51	AVG
7386.000	44.39	5.20	49.59	74.00	-24.41	148	237	peak
7386.000	30.27	5.20	35.47	54.00	-18.53	148	237	AVG
19696.000	54.12	0.60	54.72	74.00	-19.28	151	359	peak
19696.000	41.68	0.60	42.28	54.00	-11.72	151	359	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								
2389.968	61.31	-9.46	51.85	74.00	-22.15	204	264	peak
2389.968	45.46	-9.46	36.00	54.00	-18.00	204	264	AVG
4824.000	45.24	-2.15	43.09	74.00	-30.91	151	323	peak
4824.000	31.23	-2.15	29.08	54.00	-24.92	151	323	AVG
7236.000	45.51	4.55	50.06	74.00	-23.94	144	94	peak
7236.000	30.47	4.55	35.02	54.00	-18.98	144	94	AVG
19296.000	53.13	-0.45	52.68	74.00	-21.32	148	44	peak
19296.000	41.49	-0.45	41.04	54.00	-12.96	148	44	AVG
G Mode, Middle channel								
4874.000	45.47	-1.92	43.55	74.00	-30.45	145	74	peak
4874.000	31.11	-1.92	29.19	54.00	-24.81	145	74	AVG
7311.000	45.28	5.08	50.36	74.00	-23.64	149	282	peak
7311.000	30.52	5.08	35.60	54.00	-18.40	149	282	AVG
19496.000	56.03	-0.04	55.99	74.00	-18.01	148	246	peak
19496.000	41.68	-0.04	41.64	54.00	-12.36	148	246	AVG
G Mode, High channel								
2484.112	63.22	-8.44	54.78	74.00	-19.22	114	291	peak
2484.112	46.47	-8.44	38.03	54.00	-15.97	114	291	AVG
4924.000	45.03	-1.63	43.40	74.00	-30.60	152	224	peak
4924.000	31.26	-1.63	29.63	54.00	-24.37	152	224	AVG
7386.000	44.25	5.20	49.45	74.00	-24.55	147	109	peak
7386.000	30.31	5.20	35.51	54.00	-18.49	147	109	AVG
19696.000	53.92	0.60	54.52	74.00	-19.48	152	153	peak
19696.000	41.65	0.60	42.25	54.00	-11.75	152	153	AVG

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

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2389.856	68.59	-9.46	59.13	74.00	-14.87	128	174	peak
2389.856	48.55	-9.46	39.09	54.00	-14.91	128	174	AVG
4824.000	45.74	-2.15	43.59	74.00	-30.41	148	23	peak
4824.000	31.36	-2.15	29.21	54.00	-24.79	148	23	AVG
7236.000	44.04	4.55	48.59	74.00	-25.41	156	242	peak
7236.000	30.52	4.55	35.07	54.00	-18.93	156	242	AVG
19296.000	54.97	-0.45	54.52	74.00	-19.48	149	19	peak
19296.000	41.44	-0.45	40.99	54.00	-13.01	149	19	AVG
N20 Mode, Middle channel								
4874.000	45.74	-1.92	43.82	74.00	-30.18	151	61	peak
4874.000	31.03	-1.92	29.11	54.00	-24.89	151	61	AVG
7311.000	44.12	5.08	49.20	74.00	-24.80	156	225	peak
7311.000	30.53	5.08	35.61	54.00	-18.39	156	225	AVG
19496.000	53.99	-0.04	53.95	74.00	-20.05	152	316	peak
19496.000	41.69	-0.04	41.65	54.00	-12.35	152	316	AVG
N20 Mode, High channel								
2483.680	66.67	-8.45	58.22	74.00	-15.78	134	176	peak
2483.680	48.43	-8.45	39.98	54.00	-14.02	134	176	AVG
4924.000	46.23	-1.63	44.60	74.00	-29.40	154	3	peak
4924.000	31.17	-1.63	29.54	54.00	-24.46	154	3	AVG
7386.000	44.83	5.20	50.03	74.00	-23.97	148	161	peak
7386.000	30.32	5.20	35.52	54.00	-18.48	148	161	AVG
19696.000	55.03	0.60	55.63	74.00	-18.37	154	66	peak
19696.000	41.62	0.60	42.22	54.00	-11.78	154	66	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N20 Mode, Low channel								
2389.744	64.94	-9.46	55.48	74.00	-18.52	202	262	peak
2389.744	45.50	-9.46	36.04	54.00	-17.96	202	262	AVG
4824.000	45.37	-2.15	43.22	74.00	-30.78	145	210	peak
4824.000	31.18	-2.15	29.03	54.00	-24.97	145	210	AVG
7236.000	45.03	4.55	49.58	74.00	-24.42	149	196	peak
7236.000	30.46	4.55	35.01	54.00	-18.99	149	196	AVG
19296.000	54.87	-0.45	54.42	74.00	-19.58	146	180	peak
19296.000	41.45	-0.45	41.00	54.00	-13.00	146	180	AVG
N20 Mode, Middle channel								
4874.000	45.52	-1.92	43.60	74.00	-30.40	155	333	peak
4874.000	31.21	-1.92	29.29	54.00	-24.71	155	333	AVG
7311.000	44.83	5.08	49.91	74.00	-24.09	142	62	peak
7311.000	30.45	5.08	35.53	54.00	-18.47	142	62	AVG
19496.000	54.72	-0.04	54.68	74.00	-19.32	157	318	peak
19496.000	41.69	-0.04	41.65	54.00	-12.35	157	318	AVG
N20 Mode, High channel								
2483.632	63.97	-8.45	55.52	74.00	-18.48	111	296	peak
2483.632	46.35	-8.45	37.90	54.00	-16.10	111	296	AVG
4924.000	45.57	-1.63	43.94	74.00	-30.06	152	245	peak
4924.000	31.28	-1.63	29.65	54.00	-24.35	152	245	AVG
7386.000	44.50	5.20	49.70	74.00	-24.30	144	107	peak
7386.000	30.29	5.20	35.49	54.00	-18.51	144	107	AVG
19696.000	54.17	0.60	54.77	74.00	-19.23	144	216	peak
19696.000	41.63	0.60	42.23	54.00	-11.77	144	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.

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								
2389.728	75.07	-9.46	65.61	74.00	-8.39	132	183	peak
2389.728	53.96	-9.46	44.50	54.00	-9.50	132	183	AVG
4844.000	45.18	-2.11	43.07	74.00	-30.93	152	157	peak
4844.000	32.69	-2.11	30.58	54.00	-23.42	152	157	AVG
7266.000	44.92	4.83	49.75	74.00	-24.25	144	67	peak
7266.000	31.99	4.83	36.82	54.00	-17.18	144	67	AVG
19376.000	54.38	-0.23	54.15	74.00	-19.85	153	41	peak
19376.000	42.71	-0.23	42.48	54.00	-11.52	153	41	AVG
N40 Mode, Middle channel								
4874.000	45.21	-1.92	43.29	74.00	-30.71	154	275	peak
4874.000	32.50	-1.92	30.58	54.00	-23.42	154	275	AVG
7311.000	44.79	5.08	49.87	74.00	-24.13	146	172	peak
7311.000	31.82	5.08	36.90	54.00	-17.10	146	172	AVG
19496.000	54.36	-0.04	54.32	74.00	-19.68	146	60	peak
19496.000	42.92	-0.04	42.88	54.00	-11.12	146	60	AVG
N40 Mode, High channel								
2484.360	73.86	-8.44	65.42	74.00	-8.58	146	185	peak
2484.360	51.47	-8.44	43.03	54.00	-10.97	146	185	AVG
4904.000	45.08	-1.71	43.37	74.00	-30.63	142	98	peak
4904.000	32.61	-1.71	30.90	54.00	-23.10	142	98	AVG
7356.000	43.99	5.18	49.17	74.00	-24.83	155	343	peak
7356.000	31.86	5.18	37.04	54.00	-16.96	155	343	AVG
19616.000	55.32	0.32	55.64	74.00	-18.36	154	325	peak
19616.000	44.29	0.32	44.61	54.00	-9.39	154	325	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

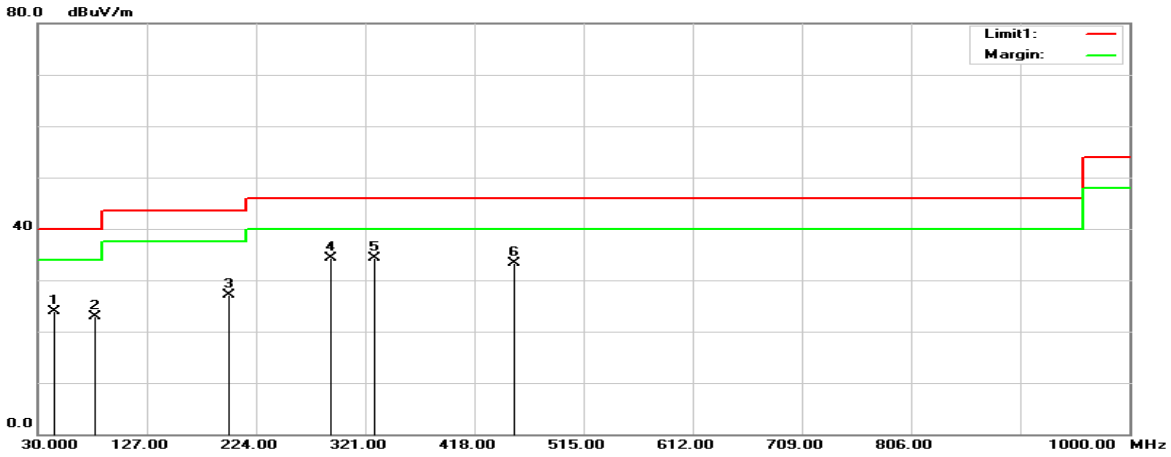
Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
2389.332	73.81	-9.47	64.34	74.00	-9.66	104	292	peak
2389.332	52.93	-9.47	43.46	54.00	-10.54	104	292	AVG
4844.000	45.23	-2.11	43.12	74.00	-30.88	151	360	peak
4844.000	32.48	-2.11	30.37	54.00	-23.63	151	360	AVG
7266.000	44.89	4.83	49.72	74.00	-24.28	155	257	peak
7266.000	31.66	4.83	36.49	54.00	-17.51	155	257	AVG
19376.000	54.18	-0.23	53.95	74.00	-20.05	158	28	peak
19376.000	42.62	-0.23	42.39	54.00	-11.61	158	28	AVG
N40 Mode, Middle channel								
4874.000	45.30	-1.92	43.38	74.00	-30.62	144	358	peak
4874.000	32.41	-1.92	30.49	54.00	-23.51	144	358	AVG
7311.000	44.56	5.08	49.64	74.00	-24.36	148	164	peak
7311.000	31.91	5.08	36.99	54.00	-17.01	148	164	AVG
19496.000	53.79	-0.04	53.75	74.00	-20.25	152	125	peak
19496.000	42.83	-0.04	42.79	54.00	-11.21	152	125	AVG
N40 Mode, High channel								
2483.680	72.10	-8.45	63.65	74.00	-10.35	101	293	peak
2483.680	49.94	-8.45	41.49	54.00	-12.51	101	293	AVG
4904.000	46.07	-1.71	44.36	74.00	-29.64	158	4	peak
4904.000	32.34	-1.71	30.63	54.00	-23.37	158	4	AVG
7356.000	44.11	5.18	49.29	74.00	-24.71	144	201	peak
7356.000	31.86	5.18	37.04	54.00	-16.96	144	201	AVG
19616.000	55.21	0.32	55.53	74.00	-18.47	152	201	peak
19616.000	44.28	0.32	44.60	54.00	-9.40	152	201	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.

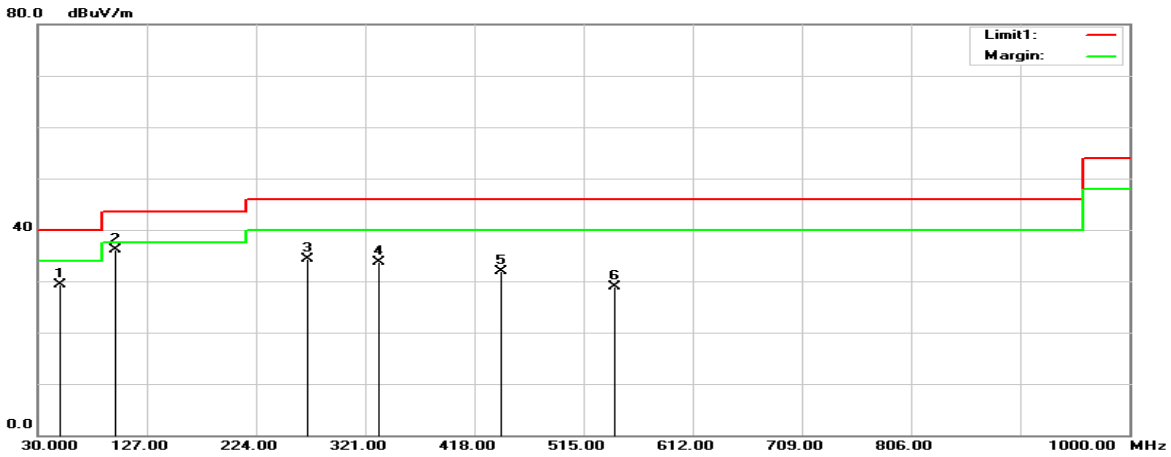
Model: PR902001-US

30MHz-1GHz: (worst case is 802.11b mode Middle channel)

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)	(°)	
44.5500	38.92	-14.97	23.95	40.00	-16.05	100	4	peak
81.4100	41.19	-18.25	22.94	40.00	-17.06	100	213	peak
199.7500	40.11	-13.09	27.02	43.50	-16.48	100	44	peak
289.9600	46.58	-12.23	34.35	46.00	-11.65	100	19	peak
329.7300	46.06	-11.70	34.36	46.00	-11.64	100	44	peak
453.8900	42.20	-8.94	33.26	46.00	-12.74	100	11	peak

Vertical

Frequency	Reading	Correct	Result	Limit	Margin	Height	Degree	Remark
(MHz)	(dBµV)	Factor(dB/m)	(dBµV/m)	(dBµV/m)	(dB)	(cm)	(°)	
49.4000	46.49	-17.11	29.38	40.00	-10.62	100	265	peak
98.8700	51.74	-15.58	36.16	43.50	-7.34	100	2	peak
269.5900	46.78	-12.55	34.23	46.00	-11.77	100	2	peak
333.6100	45.37	-11.63	33.74	46.00	-12.26	100	2	peak
442.2500	41.03	-9.10	31.93	46.00	-14.07	100	1	peak
543.1300	36.85	-7.99	28.86	46.00	-17.14	100	1	peak

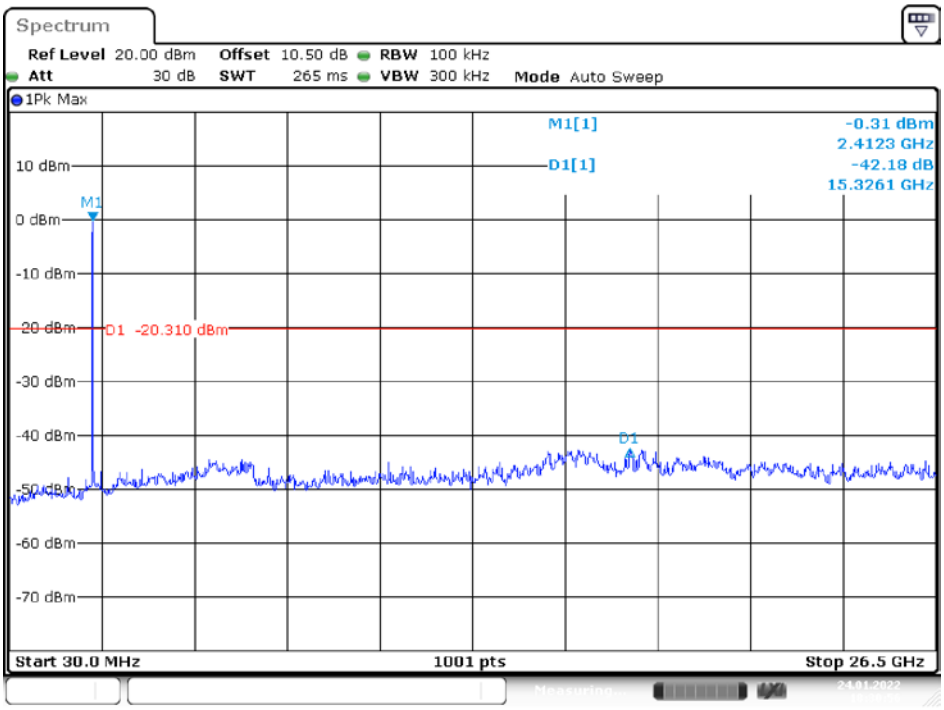
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	42.18	≥ 20	PASS
Middle	2437	42.50	≥ 20	PASS
High	2462	41.43	≥ 20	PASS
G Mode				
Low	2412	34.67	≥ 20	PASS
Middle	2437	35.59	≥ 20	PASS
High	2462	33.56	≥ 20	PASS
N20 Mode				
Low	2412	34.46	≥ 20	PASS
Middle	2437	36.21	≥ 20	PASS
High	2462	33.94	≥ 20	PASS
N40 Mode				
Low	2422	33.13	≥ 20	PASS
Middle	2437	31.90	≥ 20	PASS
High	2452	31.82	≥ 20	PASS

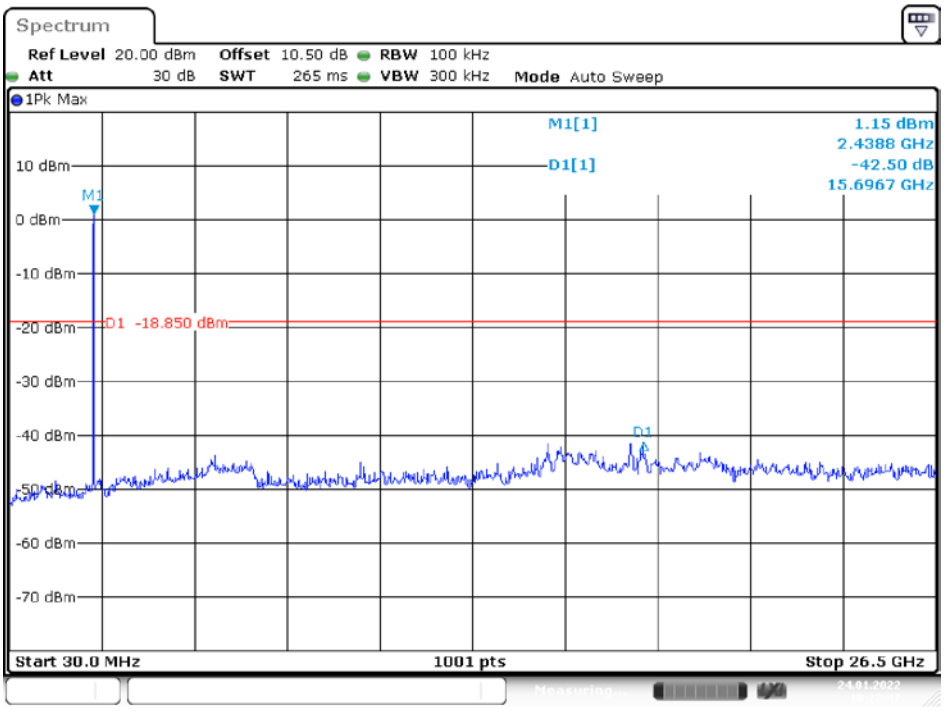
B Mode

Low Channel



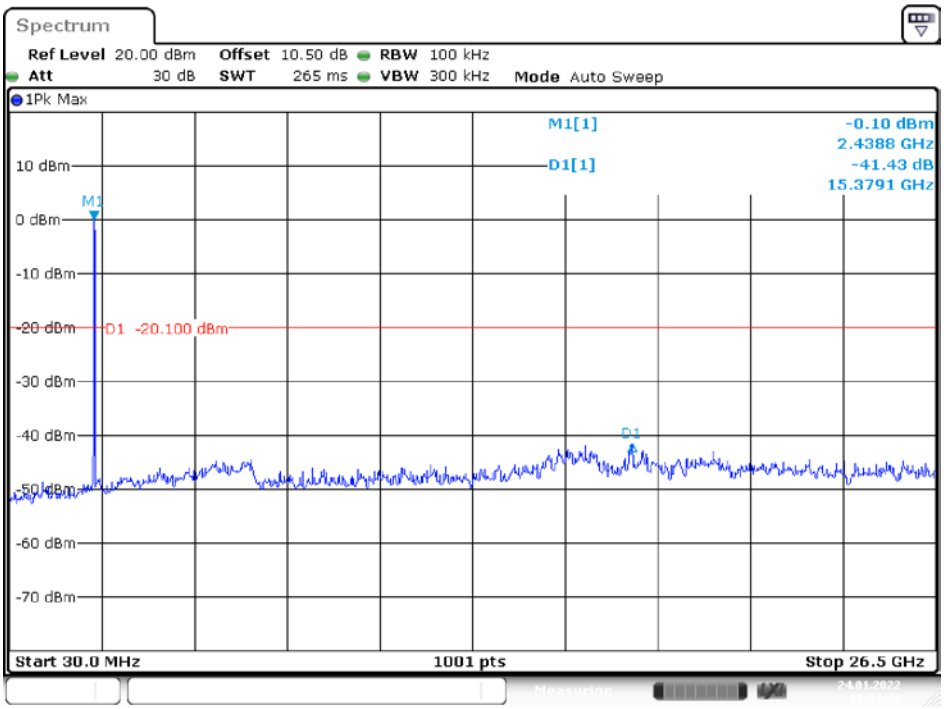
Date: 24.JAN.2022 18:30:56

Middle Channel



Date: 24.JAN.2022 18:22:47

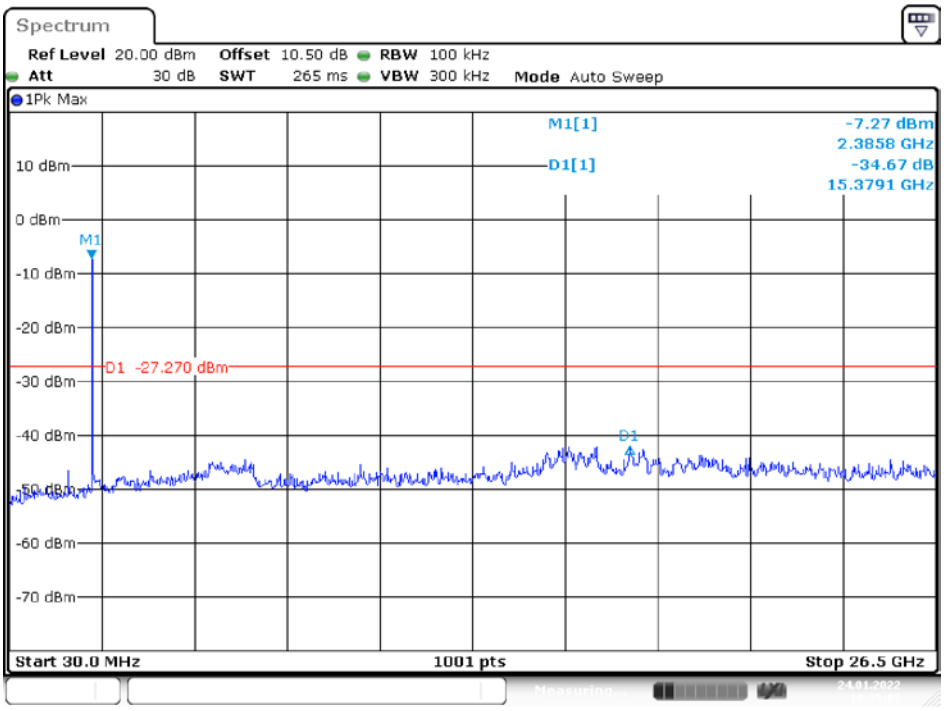
High Channel



Date: 24.JAN.2022 18:24:42

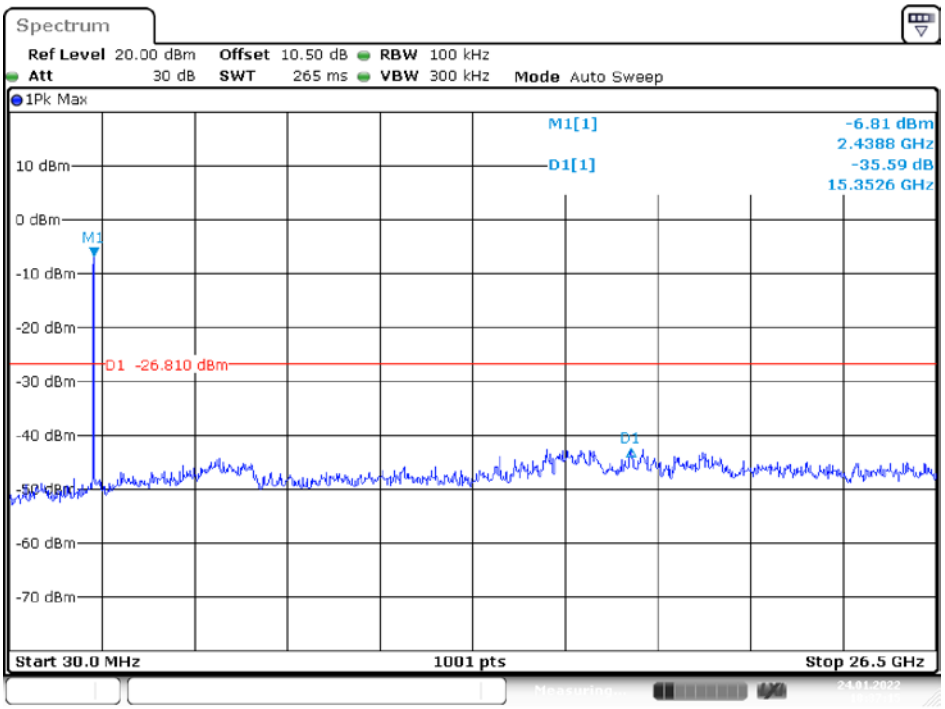
G Mode

Low Channel



Date: 24.JAN.2022 18:35:08

Middle Channel



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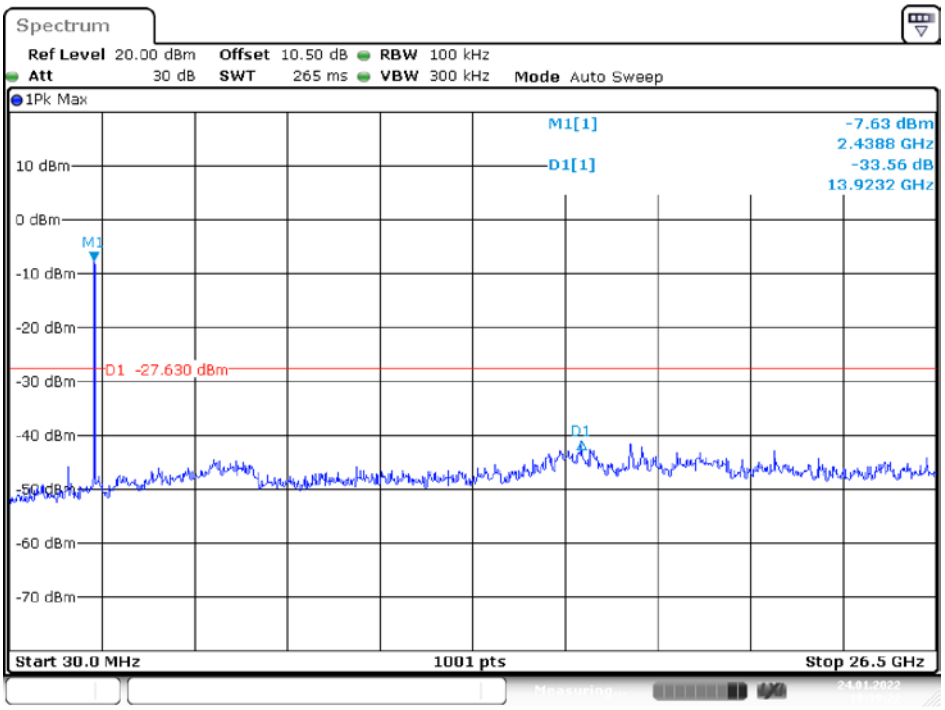
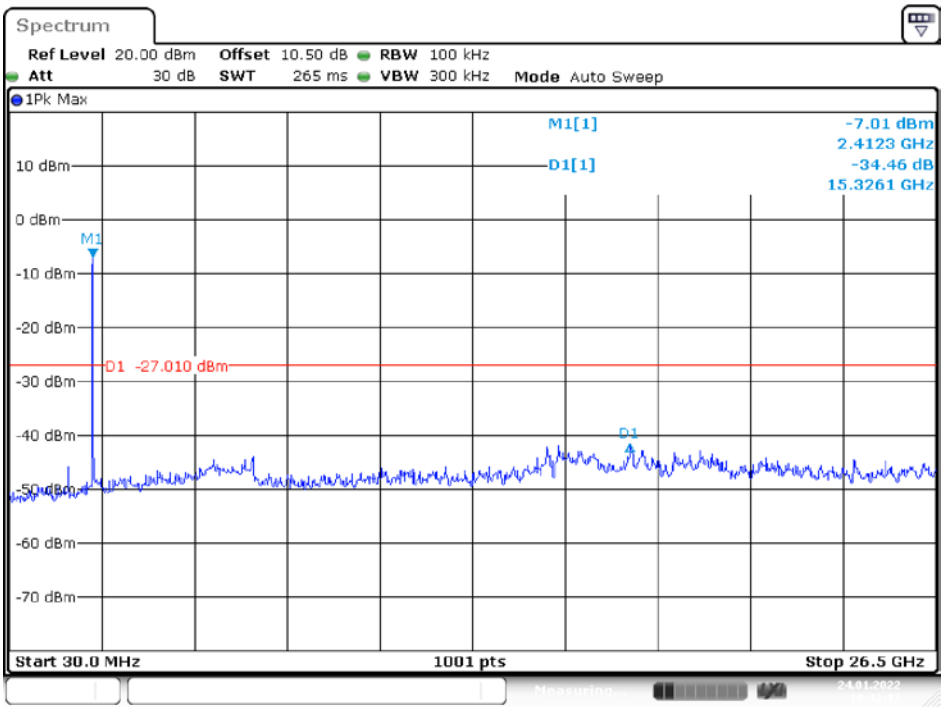
High Channel



Date: 24.JAN.2022 18:39:22

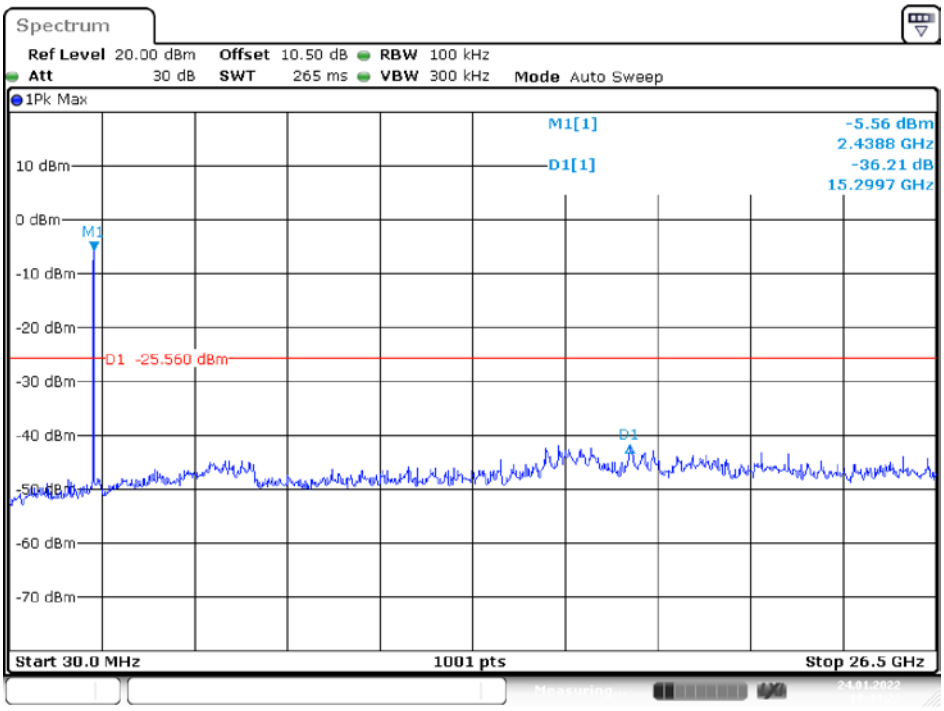
N20 Mode

Low Channel



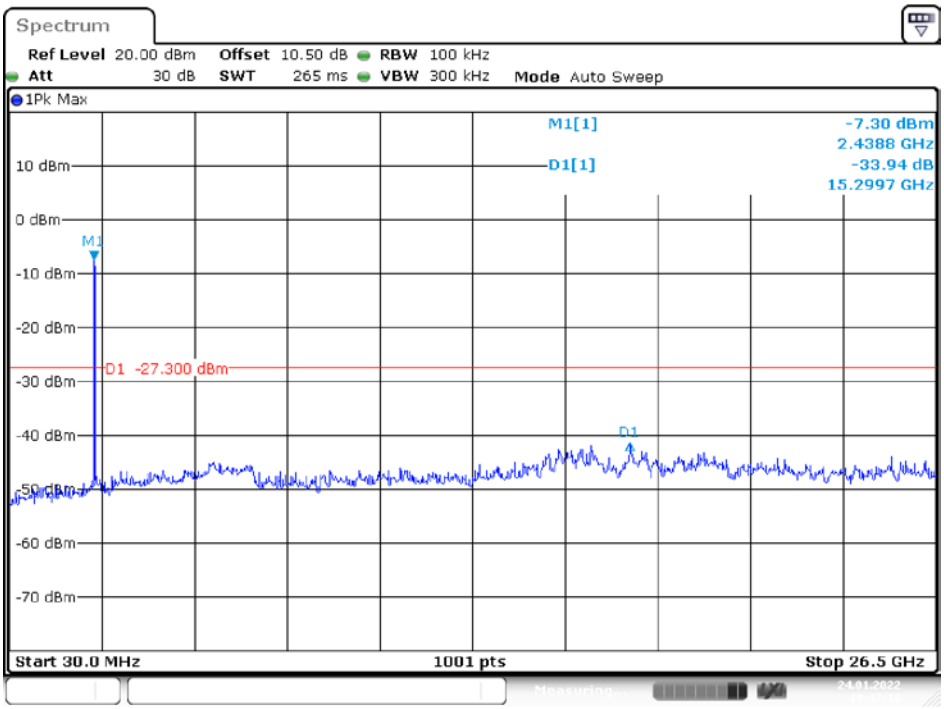
Date: 24.JAN.2022 18:42:17

Middle Channel



Date: 24.JAN.2022 18:44:22

High Channel



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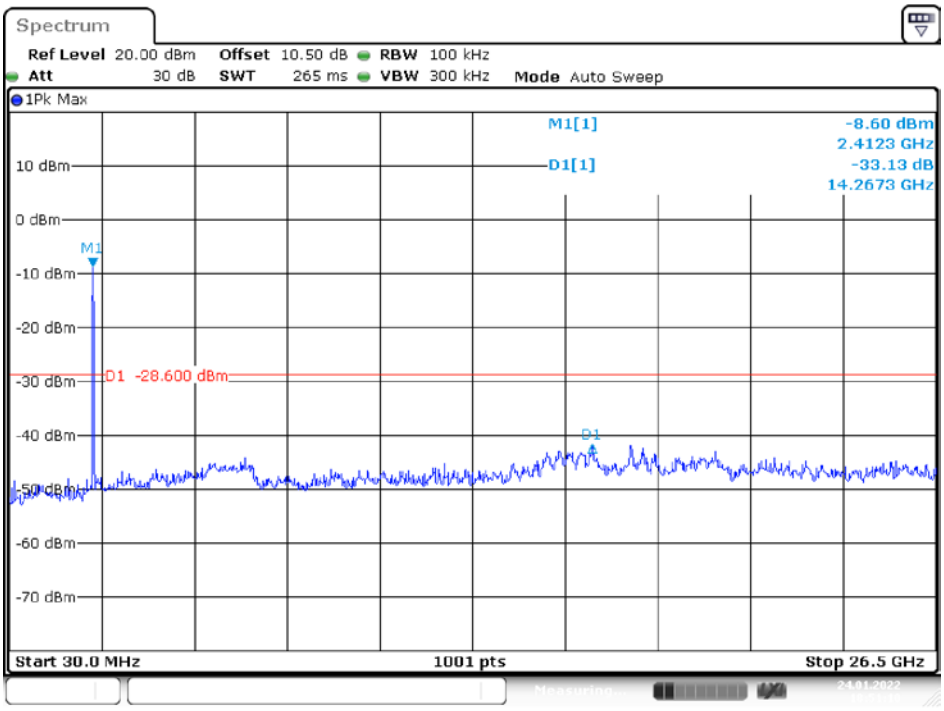
N40 Mode

Low Channel



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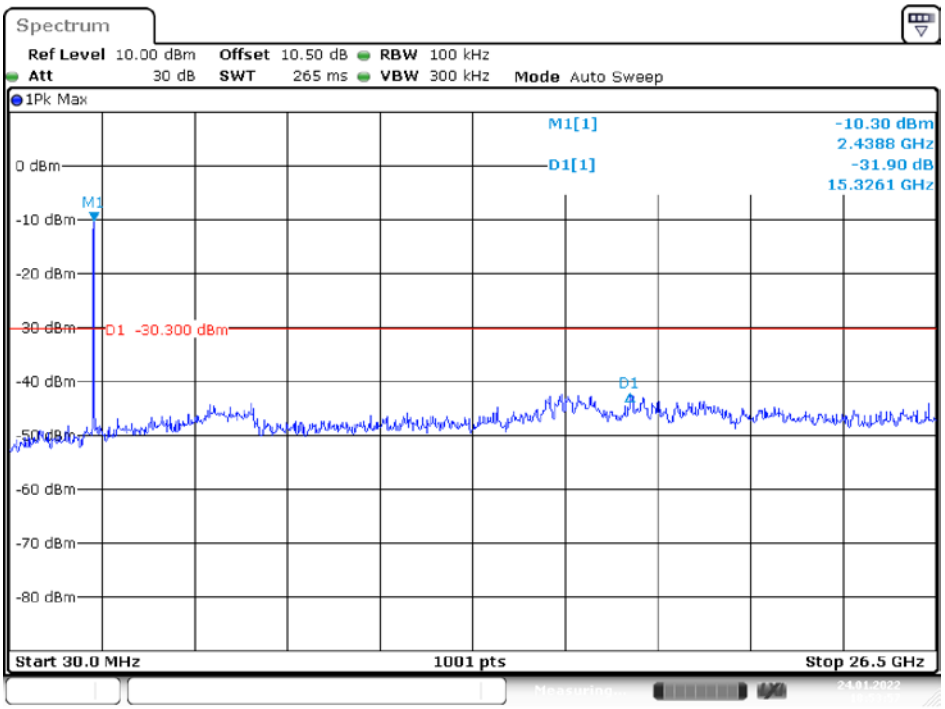
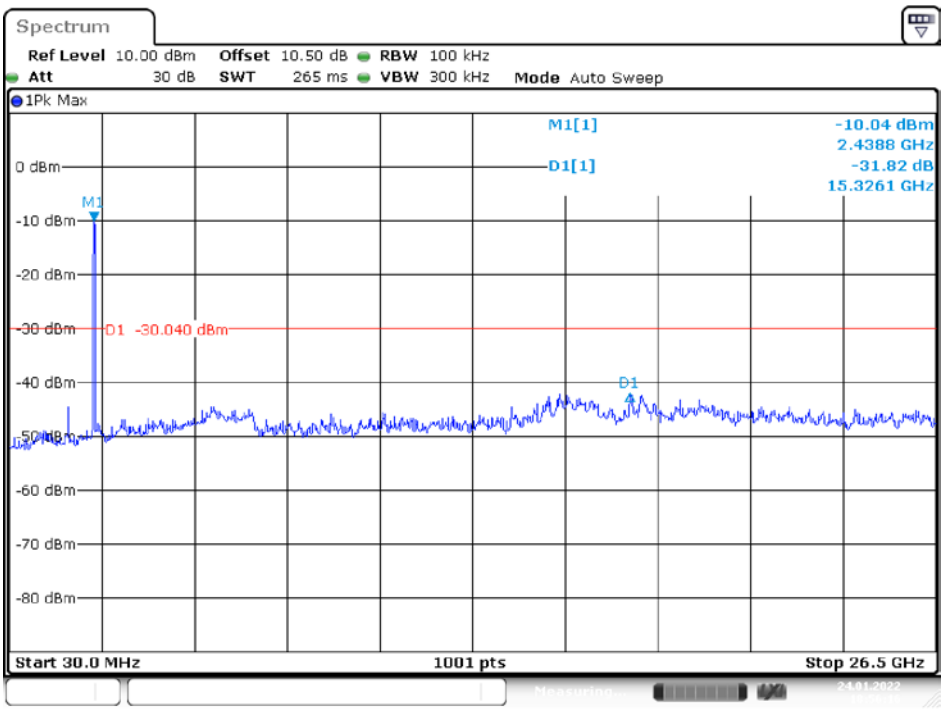
Middle Channel



Date: 24.JAN.2022 18:53:57

High Channel



Date: 24.JAN.2022 18:56:16

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.

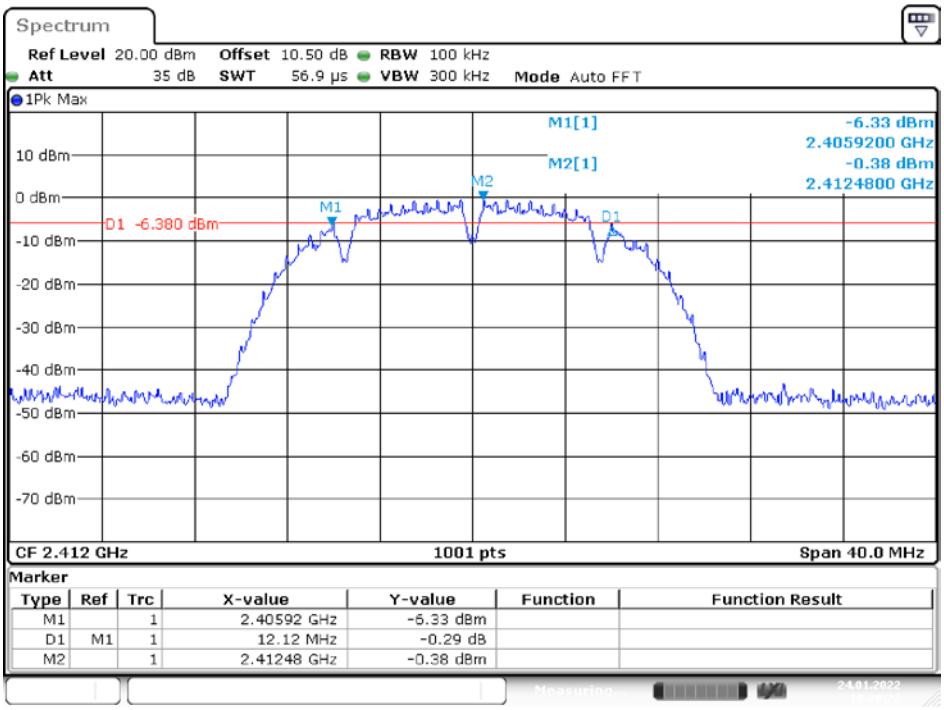
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
B Mode				
Low	2412	12.12	> 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	16.04	> 500	PASS
N20 Mode				
Low	2412	15.00	> 500	PASS
Middle	2437	15.04	> 500	PASS
High	2462	12.56	> 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

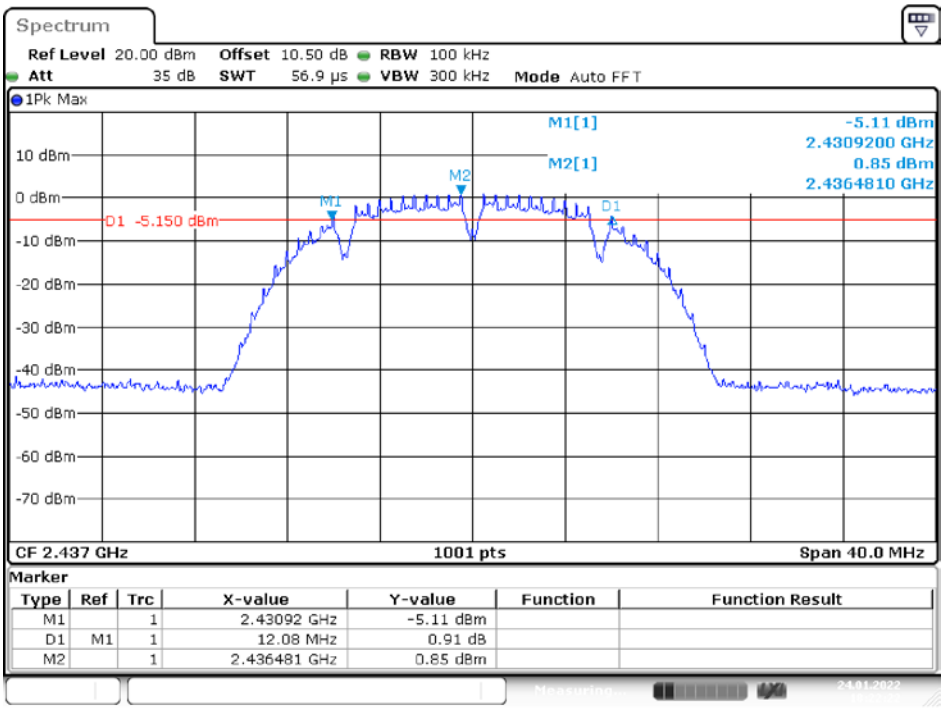
B Mode

Low Channel



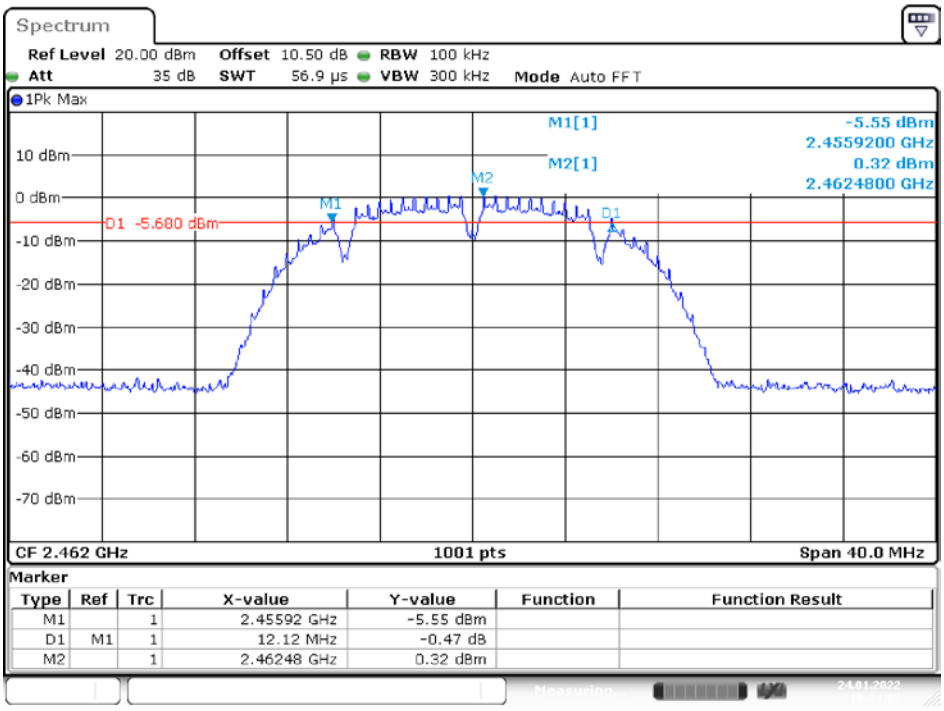
Date: 24.JAN.2022 18:20:22

Middle Channel



Date: 24.JAN.2022 18:22:22

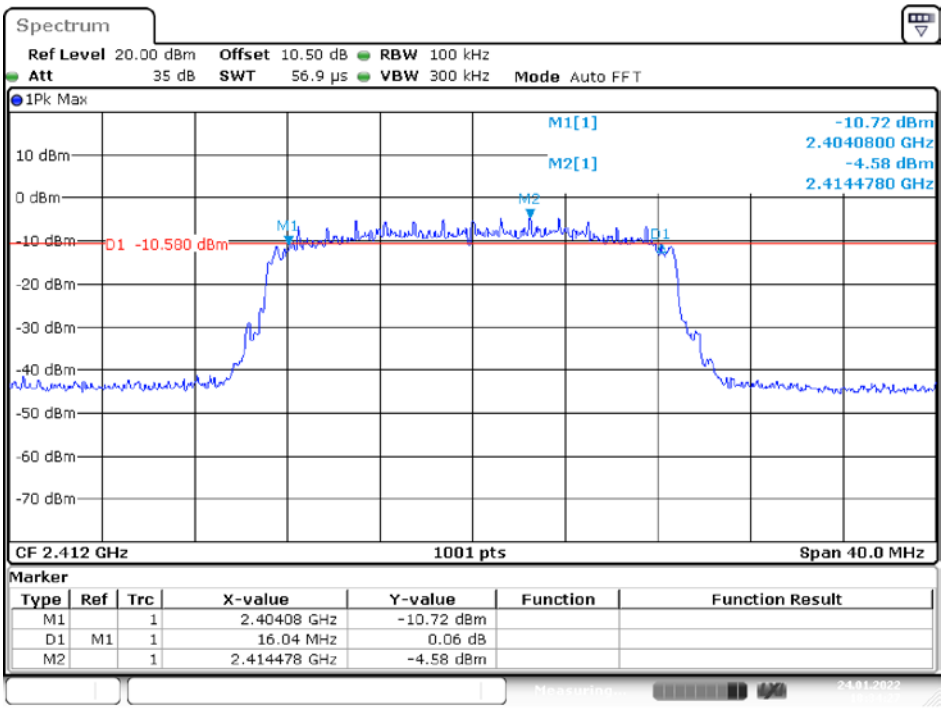
High Channel



Date: 24.JAN.2022 18:24:02

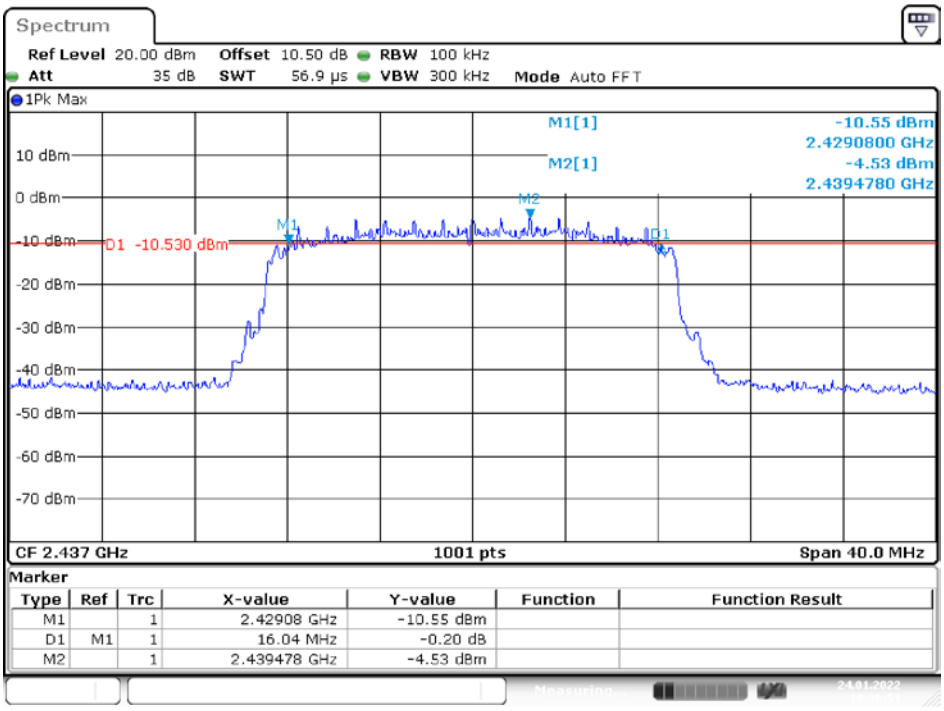
G Mode

Low Channel



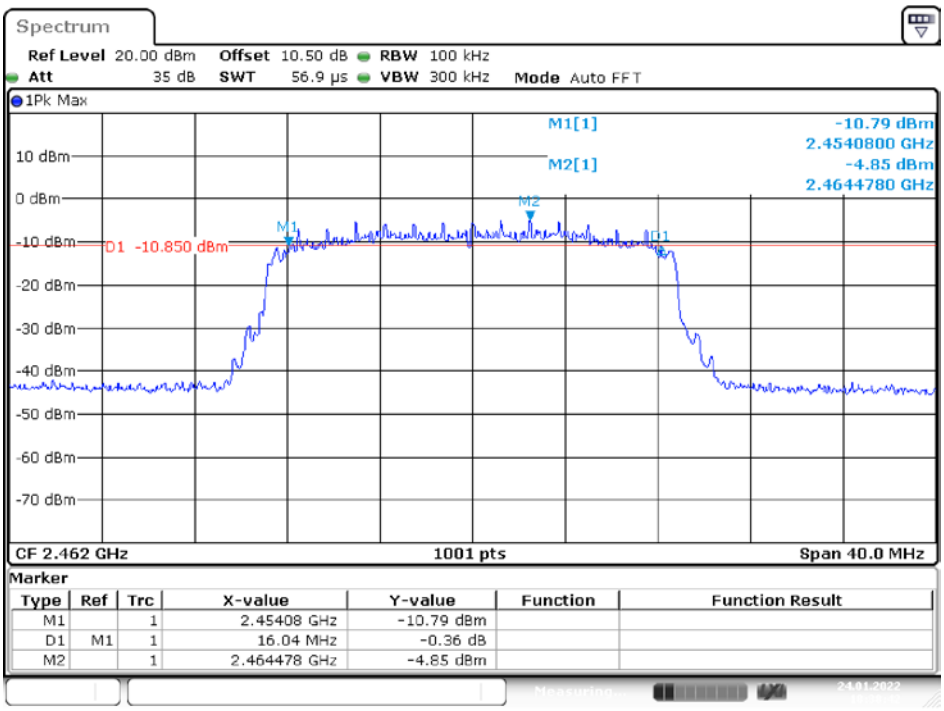
Date: 24.JAN.2022 18:34:27

Middle Channel



Date: 24.JAN.2022 18:36:51

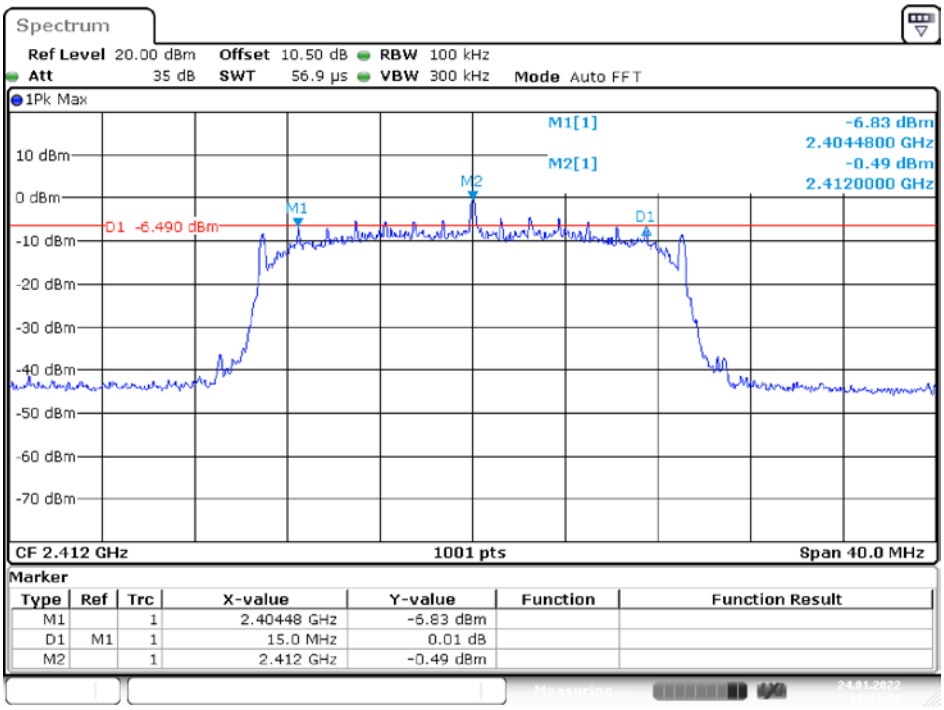
High Channel



Date: 24.JAN.2022 18:38:41

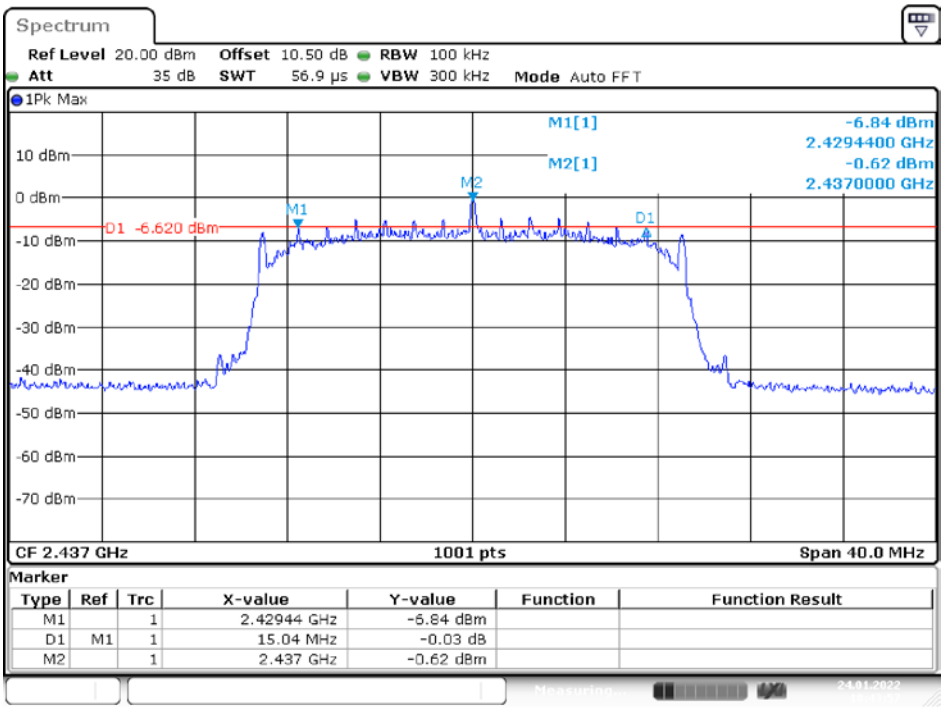
N20 Mode

Low Channel



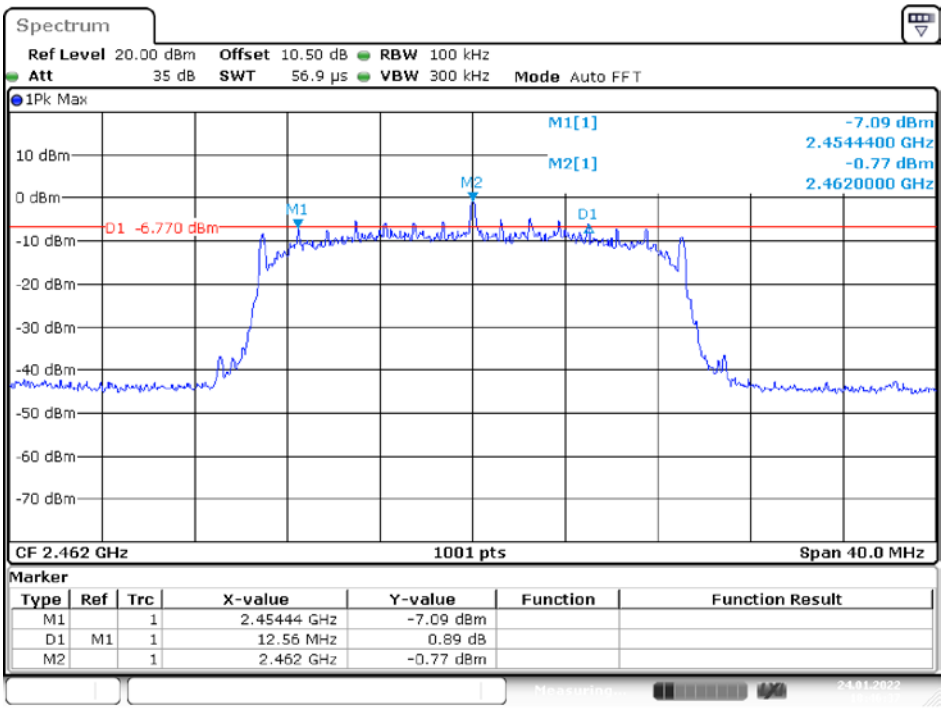
Date: 24.JAN.2022 18:41:36

Middle Channel



Date: 24.JAN.2022 18:43:57

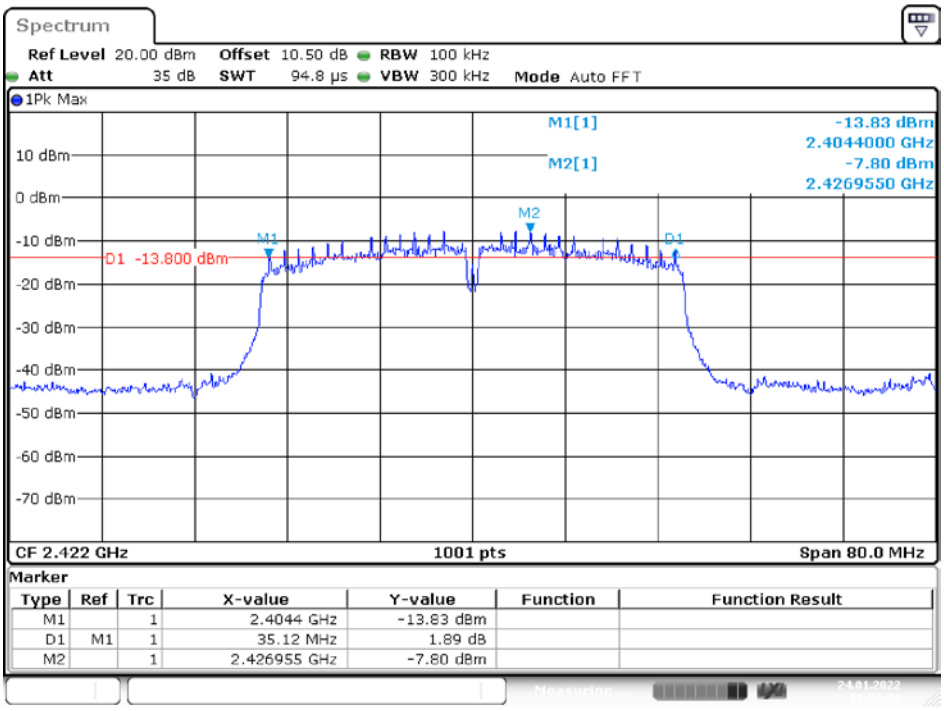
High Channel



Date: 24.JAN.2022 18:46:37

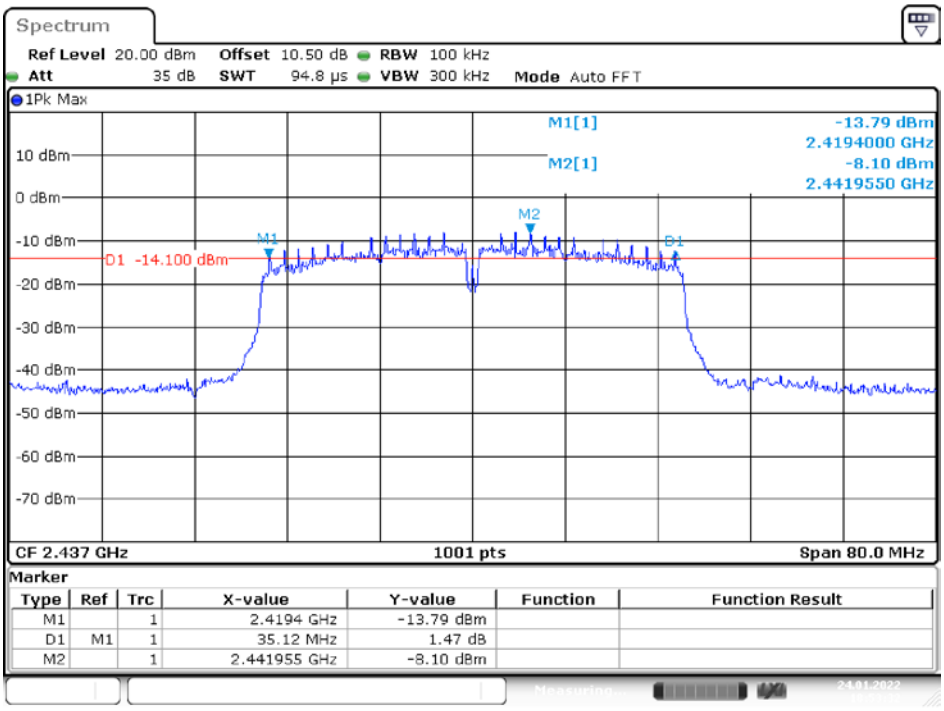
N40 Mode

Low Channel



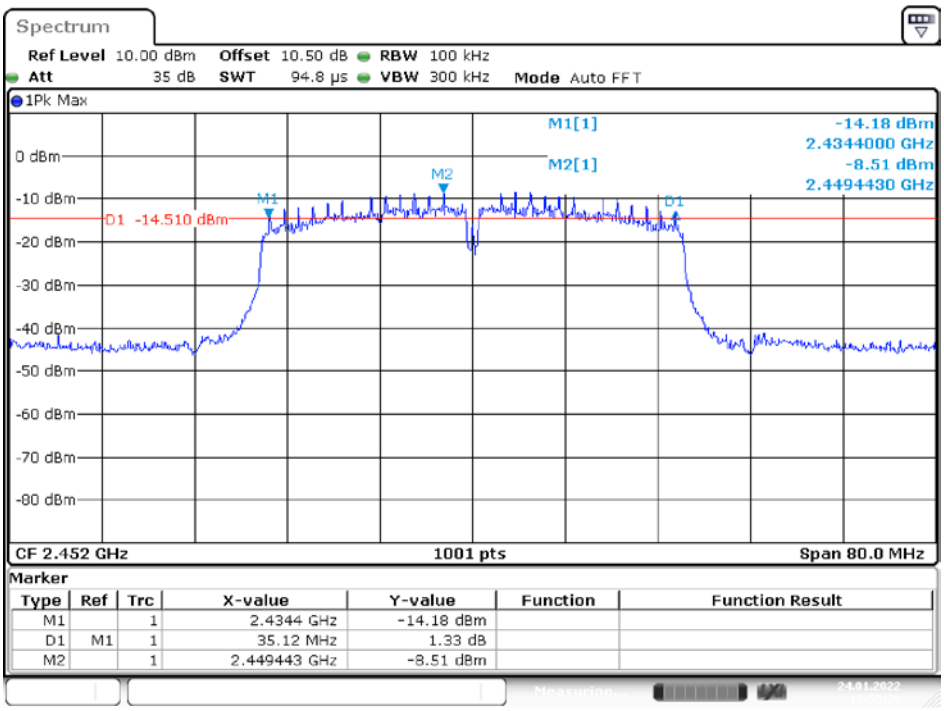
Date: 24.JAN.2022 18:50:30

Middle Channel



Date: 24.JAN.2022 18:53:32

High Channel



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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	14.85	0.031	1	PASS
Middle	2437	14.73	0.030	1	PASS
High	2462	14.51	0.028	1	PASS
802.11g Mode					
Low	2412	15.20	0.033	1	PASS
Middle	2437	15.24	0.033	1	PASS
High	2462	14.79	0.030	1	PASS
802.11n HT20 Mode					
Low	2412	15.41	0.035	1	PASS
Middle	2437	15.44	0.035	1	PASS
High	2462	15.01	0.032	1	PASS
802.11n HT40 Mode					
Low	2422	13.84	0.024	1	PASS
Middle	2437	13.64	0.023	1	PASS
High	2452	13.18	0.021	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.

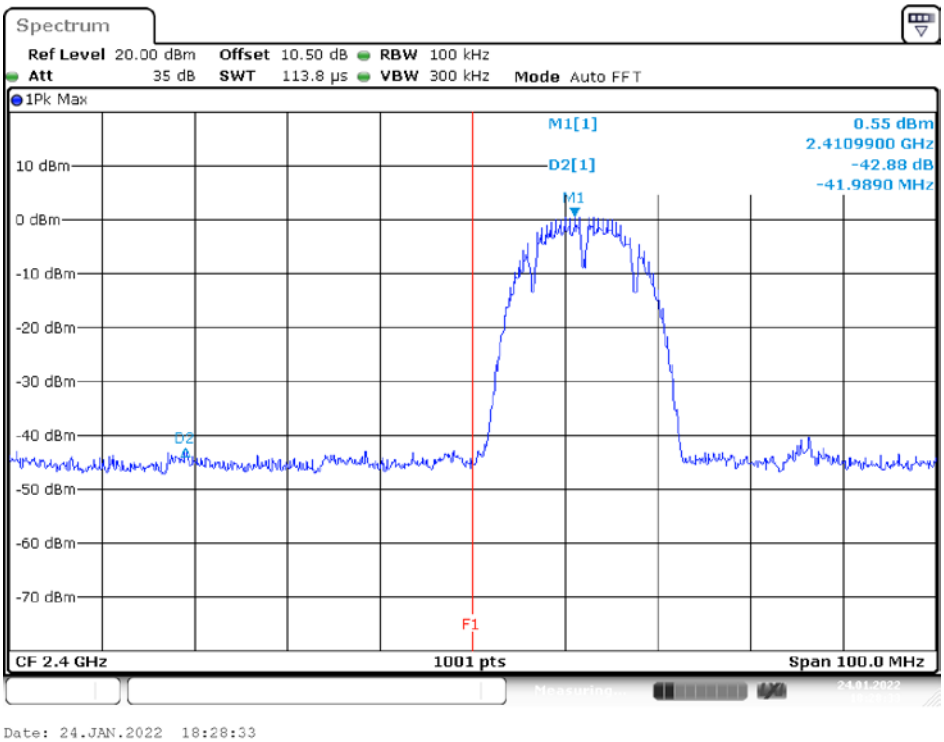
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	42.88	≥ 20	PASS
High	2462	42.67	≥ 20	PASS
G Mode				
Low	2412	38.05	≥ 20	PASS
High	2462	35.53	≥ 20	PASS
N20 Mode				
Low	2412	41.59	≥ 20	PASS
High	2462	41.18	≥ 20	PASS
N40 Mode				
Low	2422	34.88	≥ 20	PASS
High	2452	33.62	≥ 20	PASS

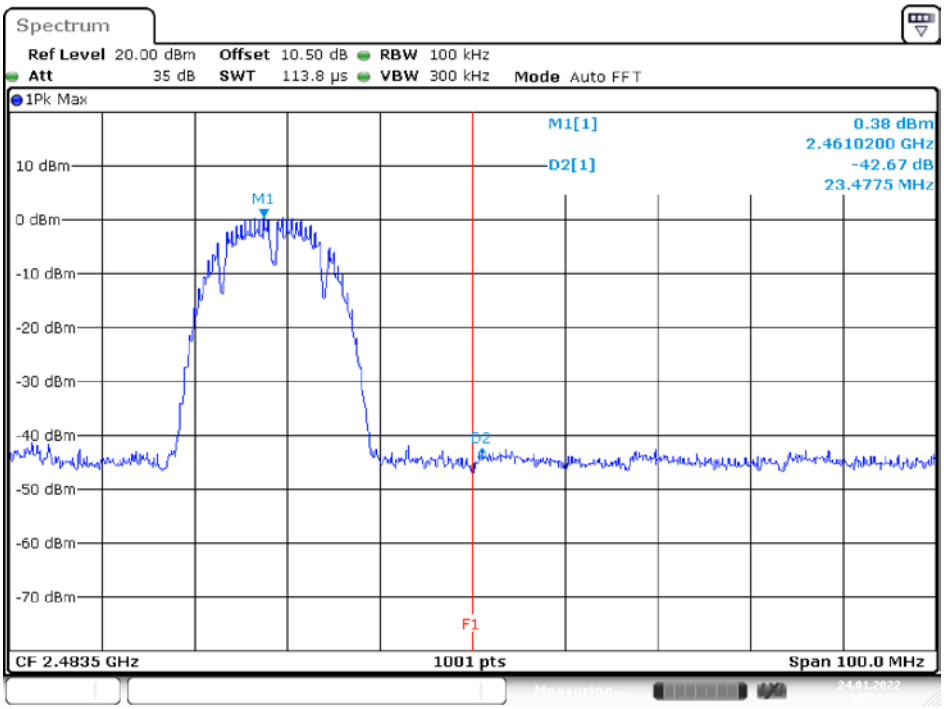
Please refer to the following plots.

B Mode

Band Edge, Left Side



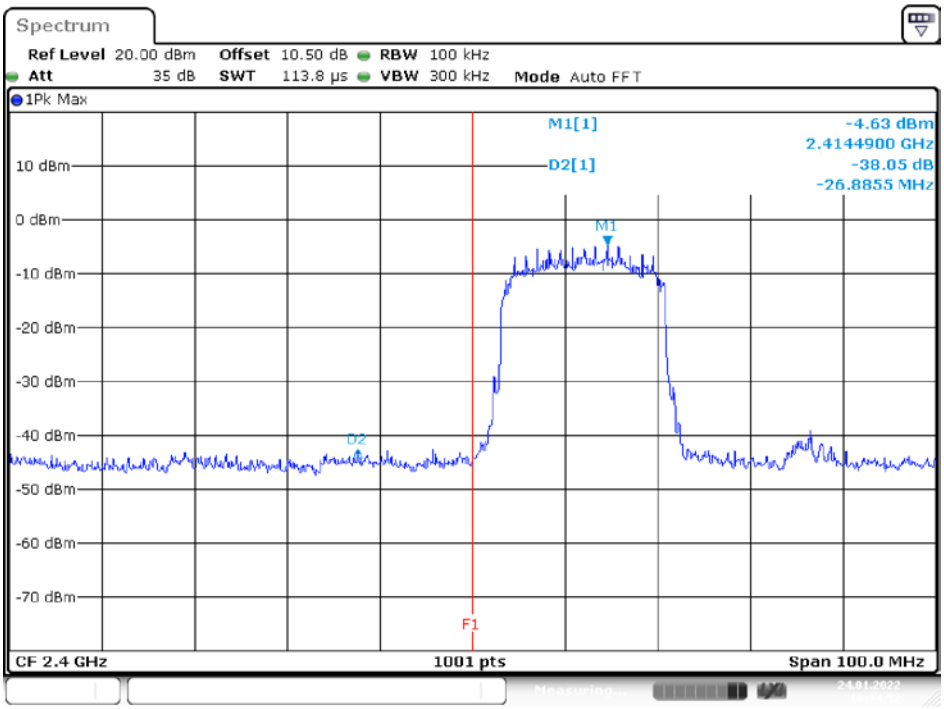
Band Edge, Right Side



Date: 24.JAN.2022 18:24:27

G Mode

Band Edge, Left Side



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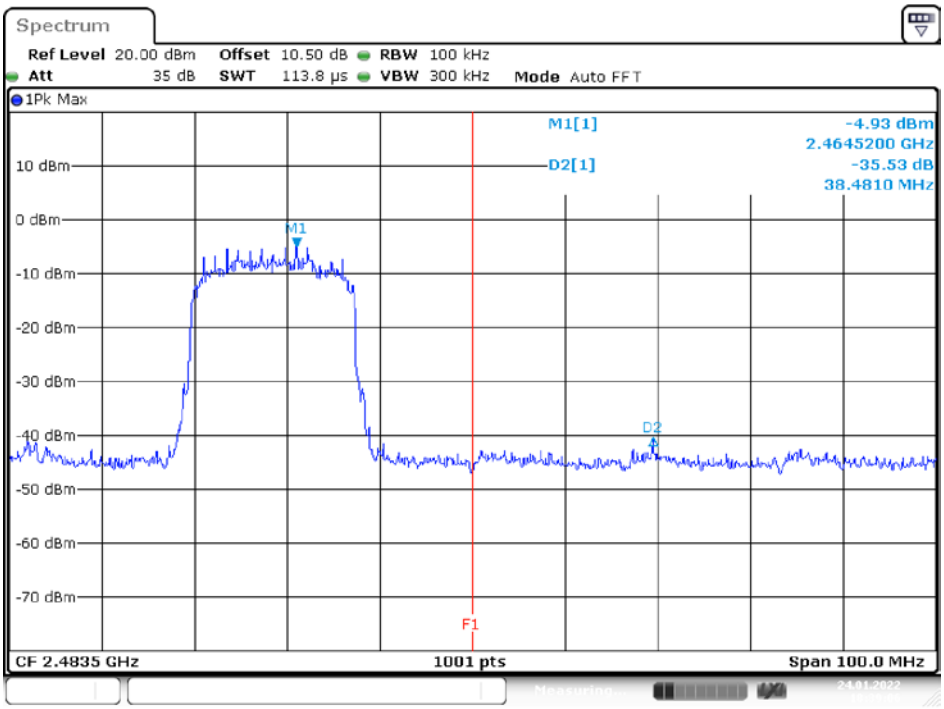
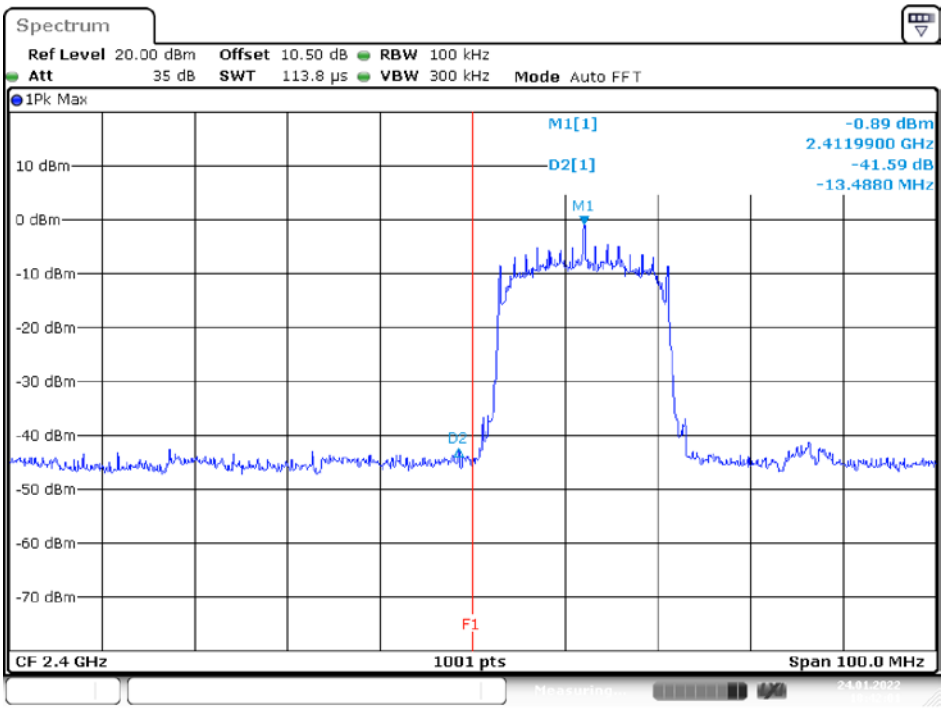
Band Edge, Right Side



Date: 24.JAN.2022 18:39:06

N20 Mode

Band Edge, Left Side



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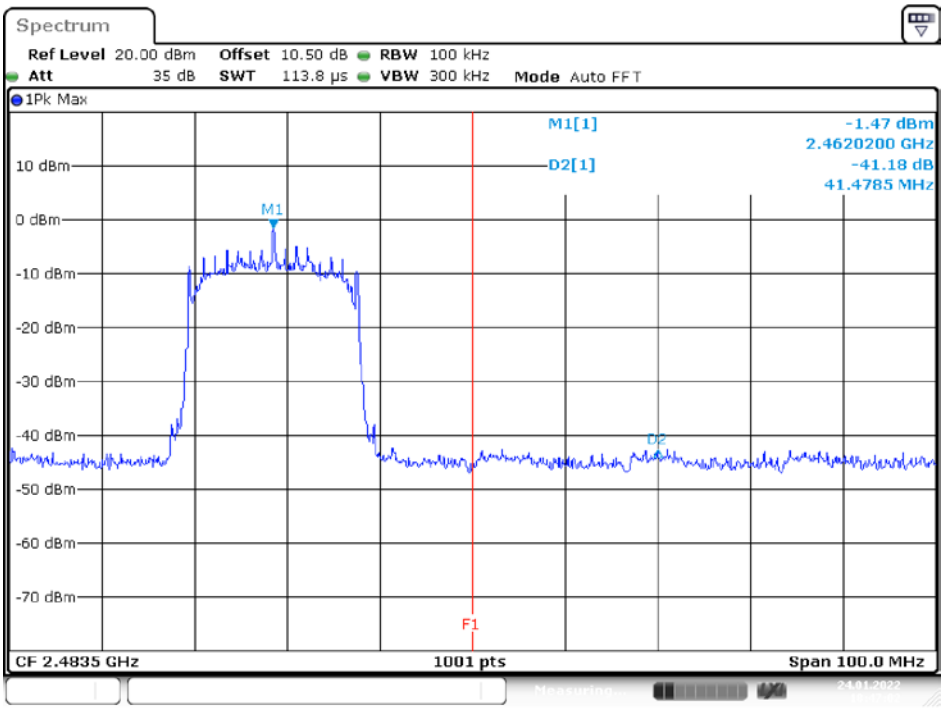
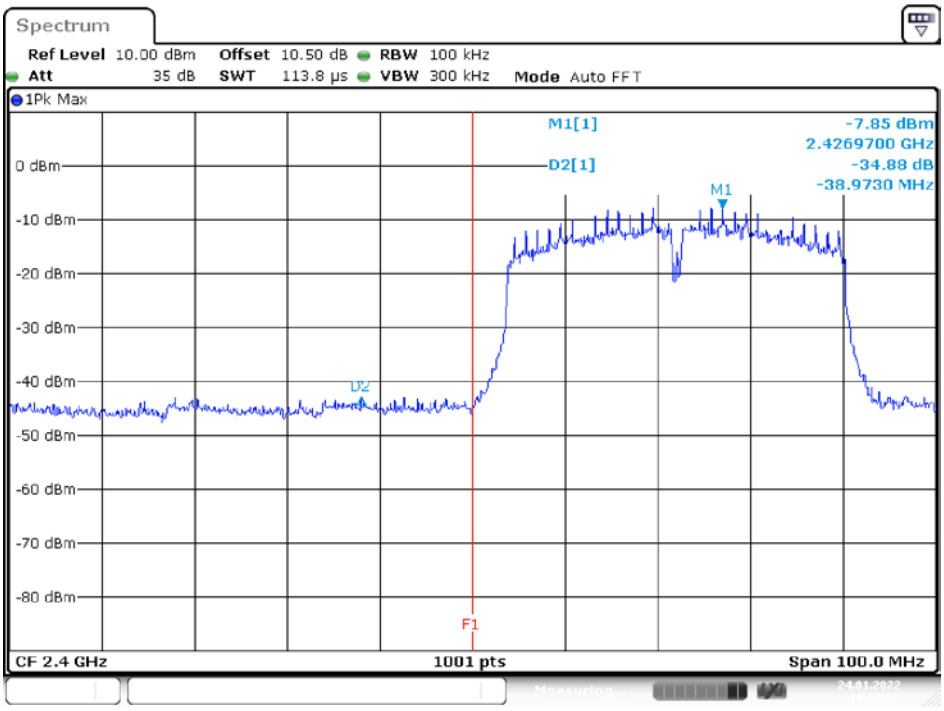
Band Edge, Right Side



Date: 24.JAN.2022 18:47:02

N40 Mode

Band Edge, Left Side



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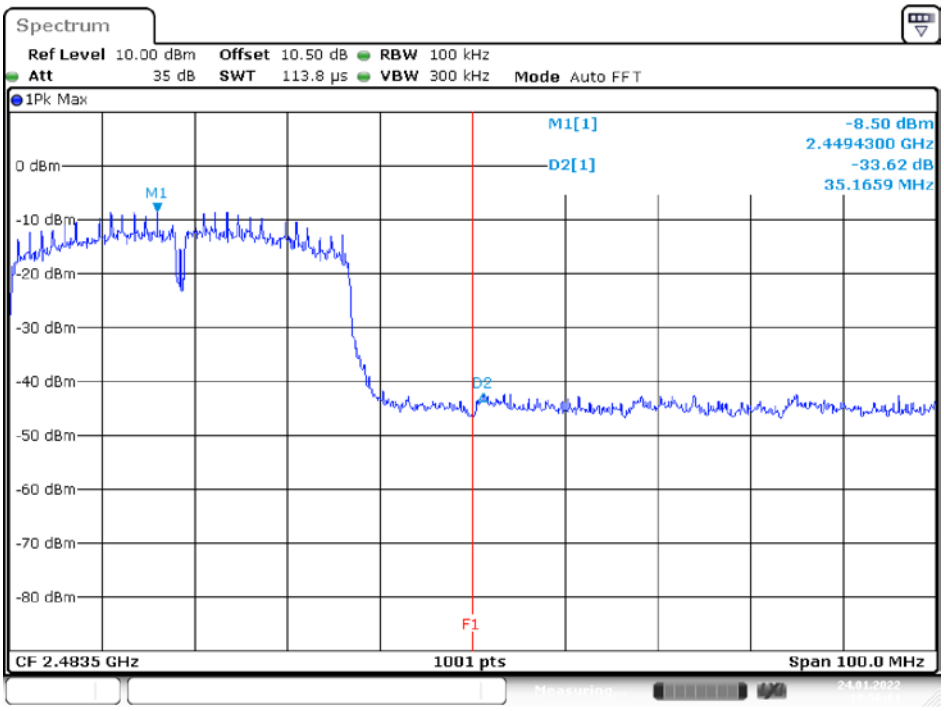
Band Edge, Right Side



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

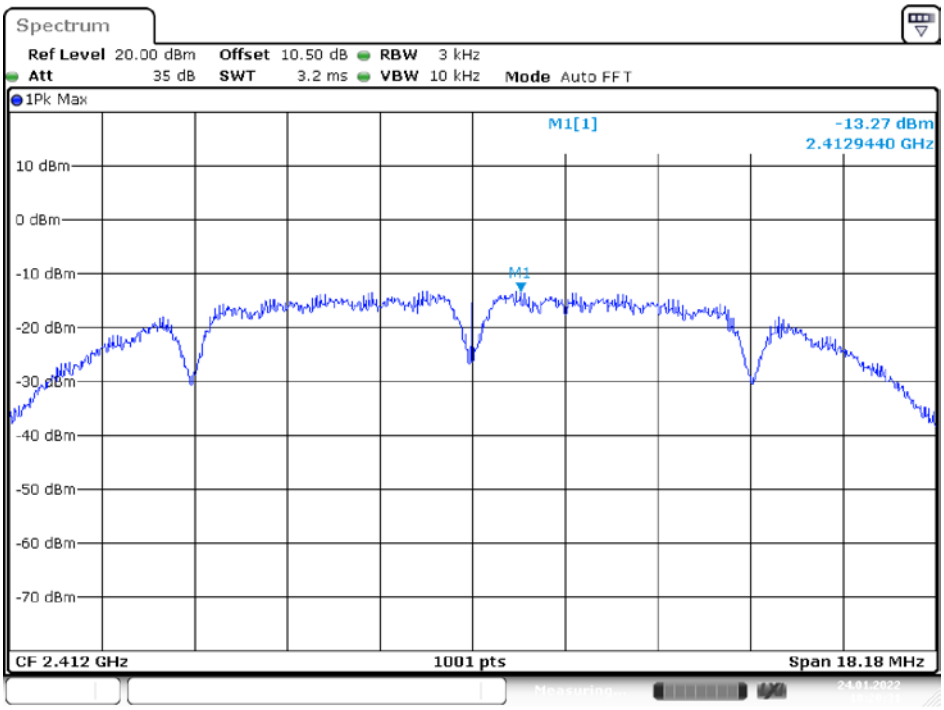
12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-13.27	8	PASS
Middle	2437	-13.17	8	PASS
High	2462	-13.65	8	PASS
G Mode				
Low	2412	-17.96	8	PASS
Middle	2437	-17.94	8	PASS
High	2462	-18.36	8	PASS
N20 Mode				
Low	2412	-17.37	8	PASS
Middle	2437	-17.30	8	PASS
High	2462	-17.69	8	PASS
N40 Mode				
Low	2422	-20.97	8	PASS
Middle	2437	-18.81	8	PASS
High	2452	-19.15	8	PASS

Please refer to the following plots

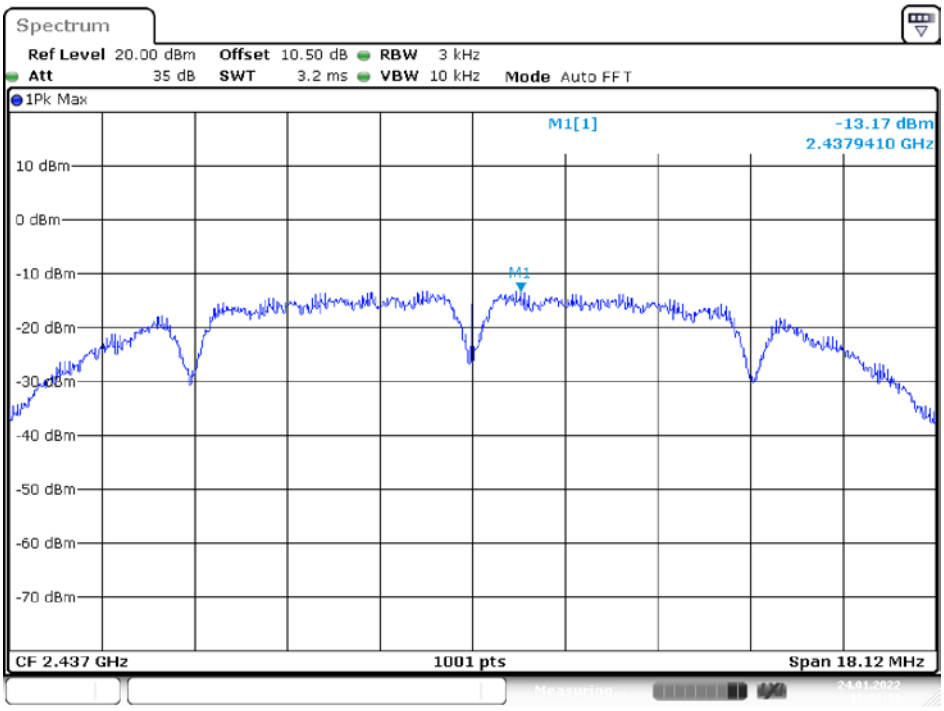
B Mode

Low Channel



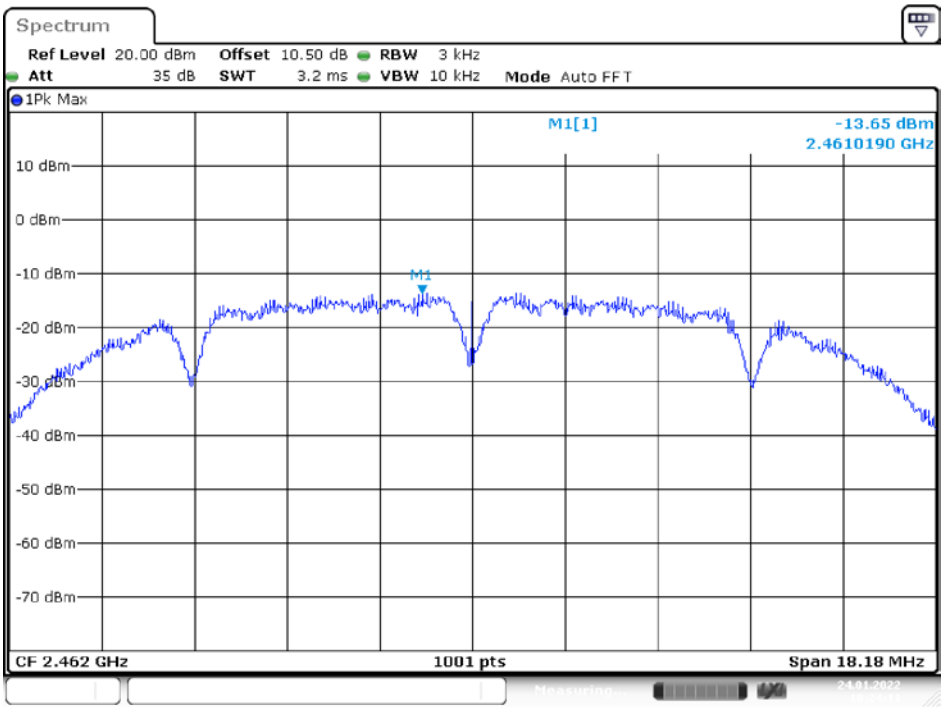
Date: 24.JAN.2022 18:20:31

Middle Channel



Date: 24.JAN.2022 18:22:31

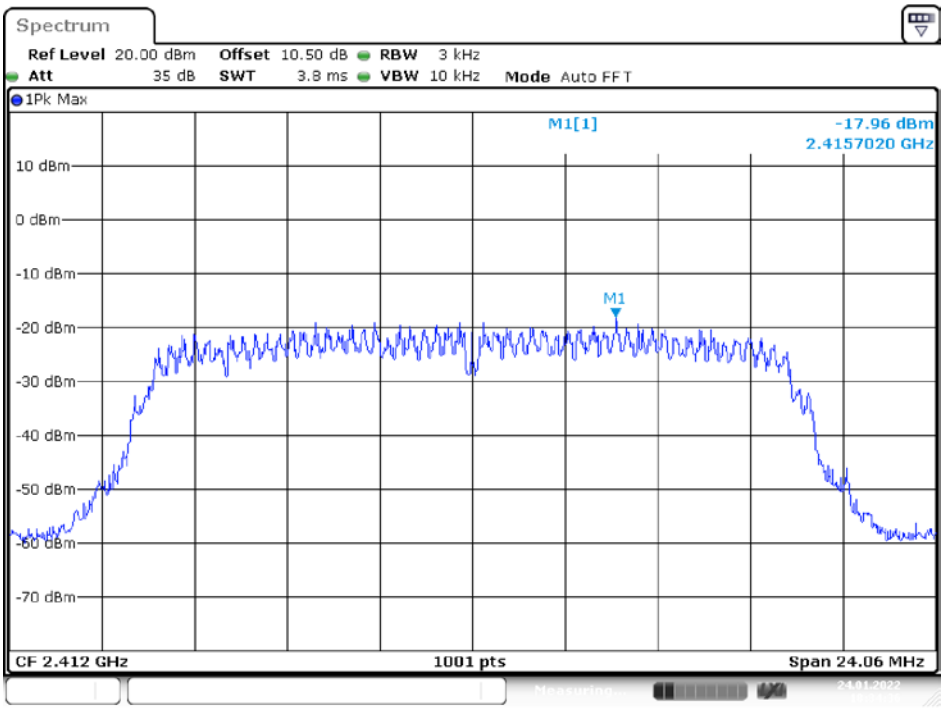
High Channel



Date: 24.JAN.2022 18:24:11

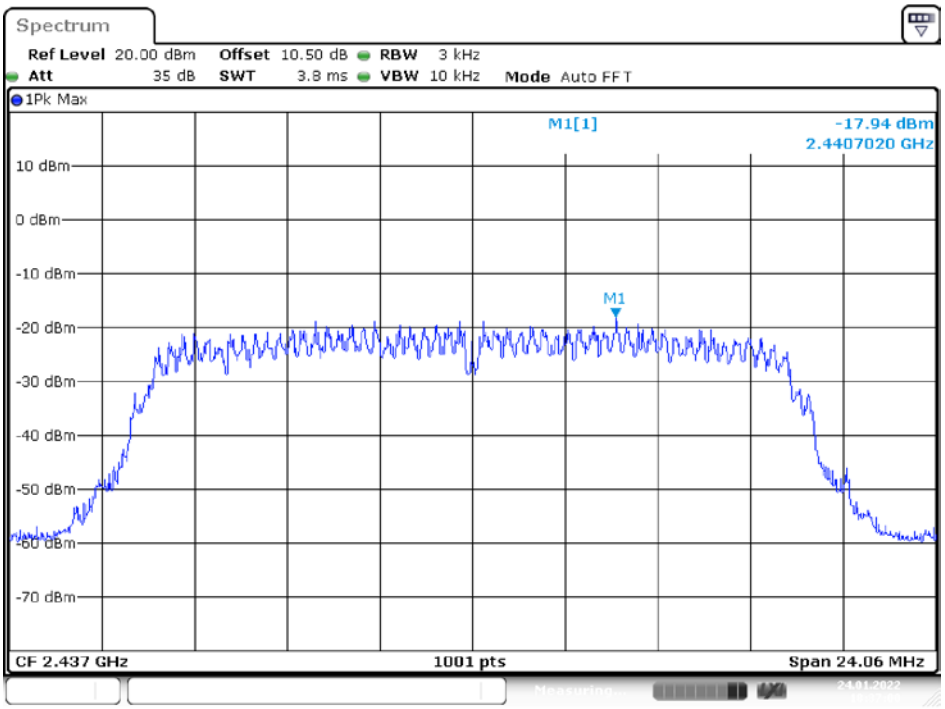
G Mode

Low Channel



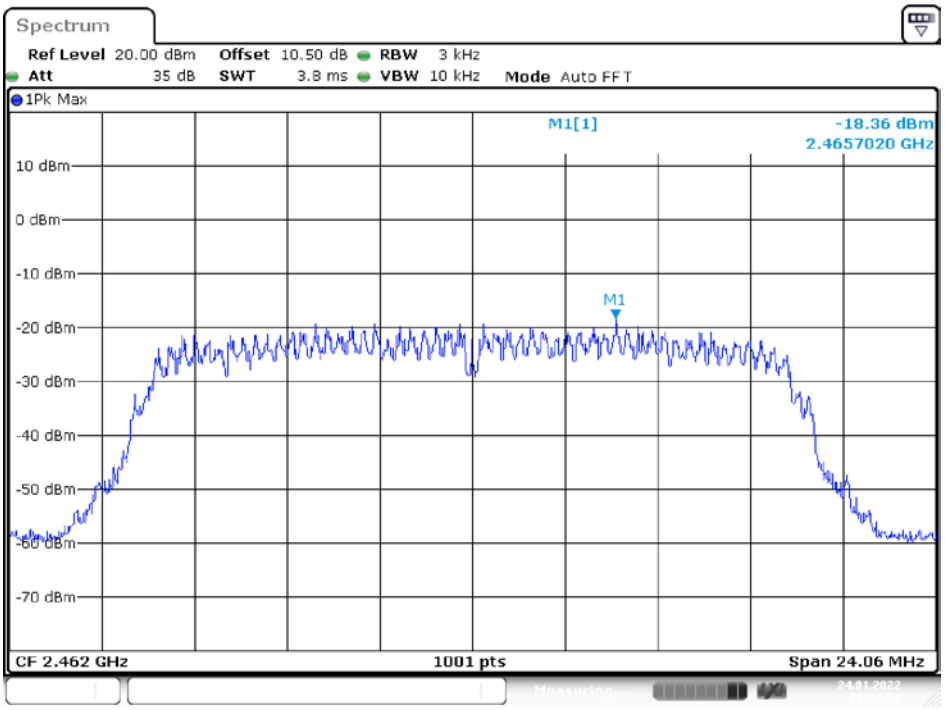
Date: 24.JAN.2022 18:34:36

Middle Channel



Date: 24.JAN.2022 18:37:00

High Channel



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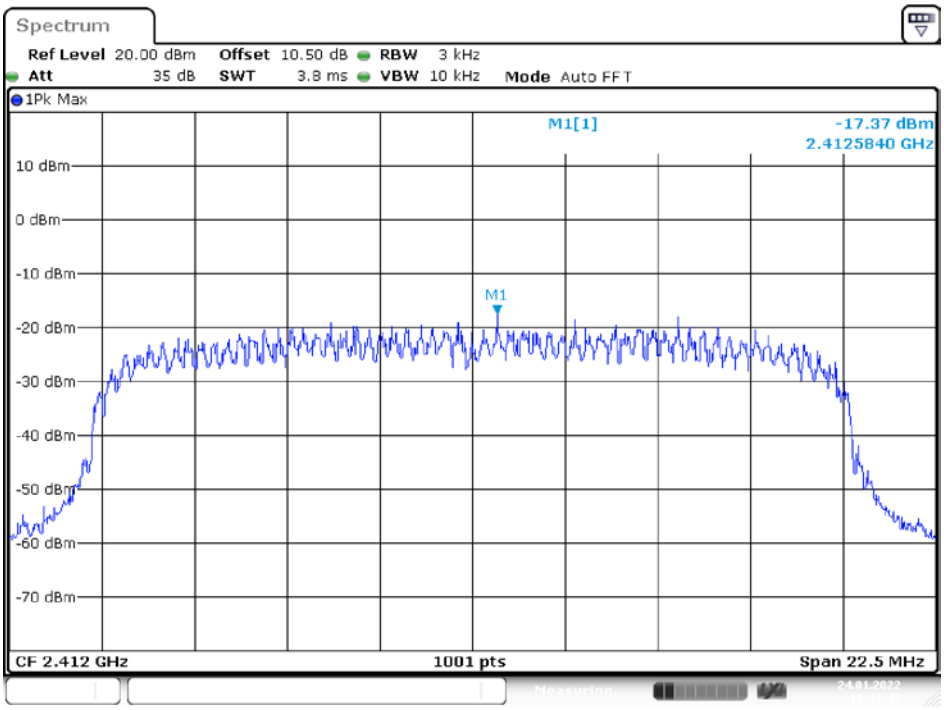
N20 Mode

Low Channel



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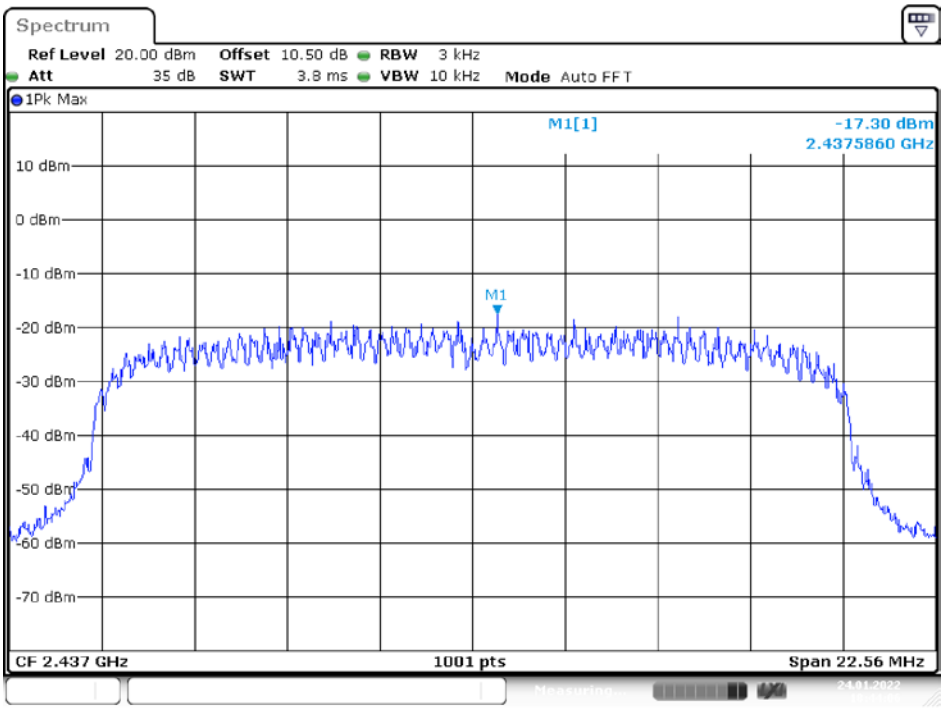
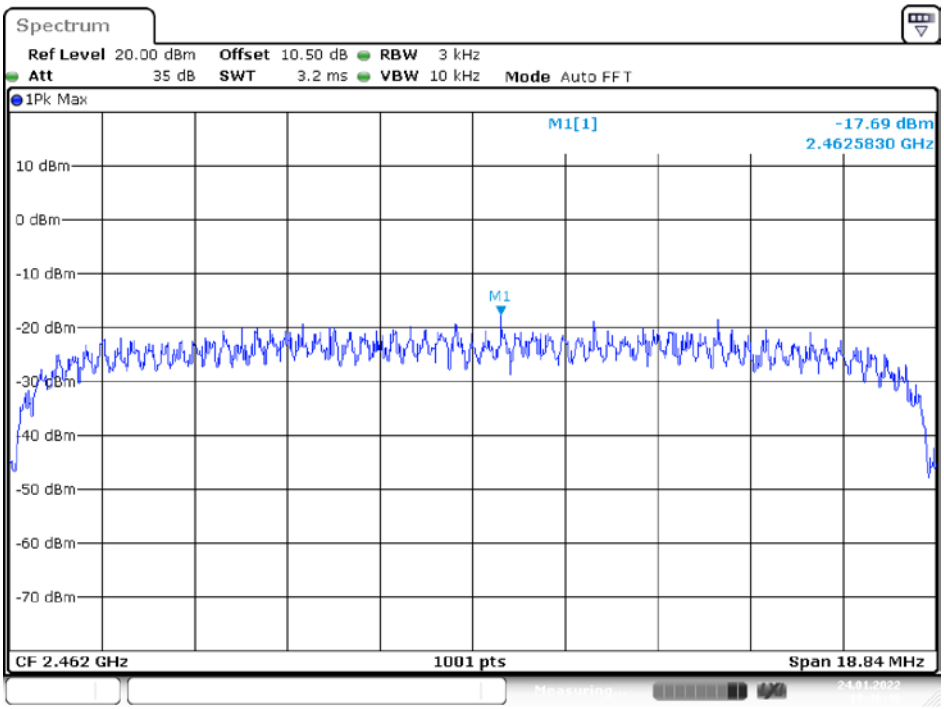
Middle Channel



Date: 24.JAN.2022 18:44:06

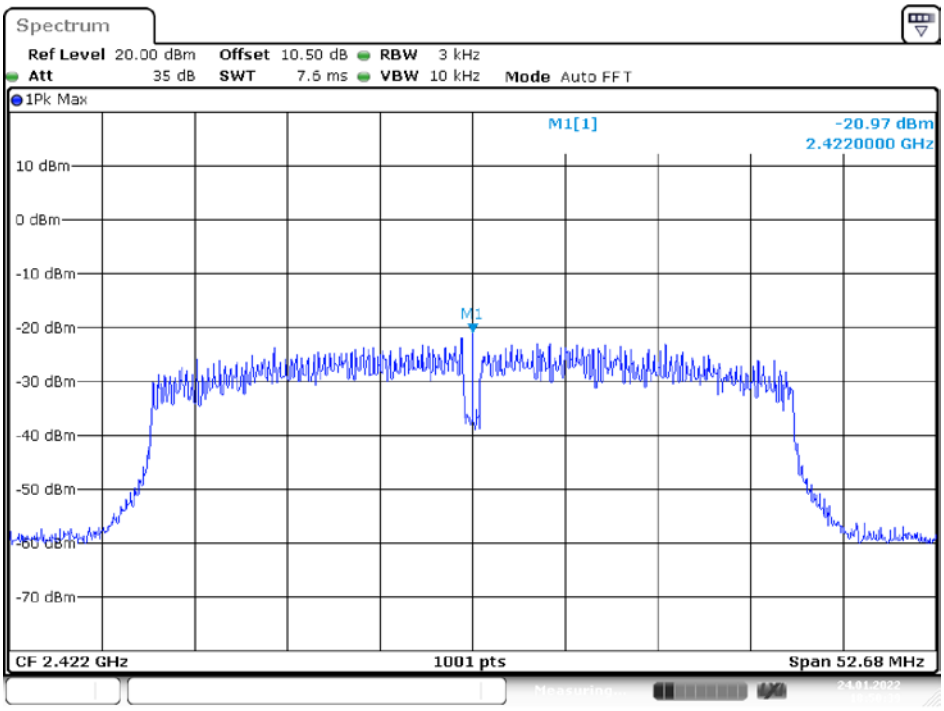
High Channel



Date: 24.JAN.2022 18:46:46

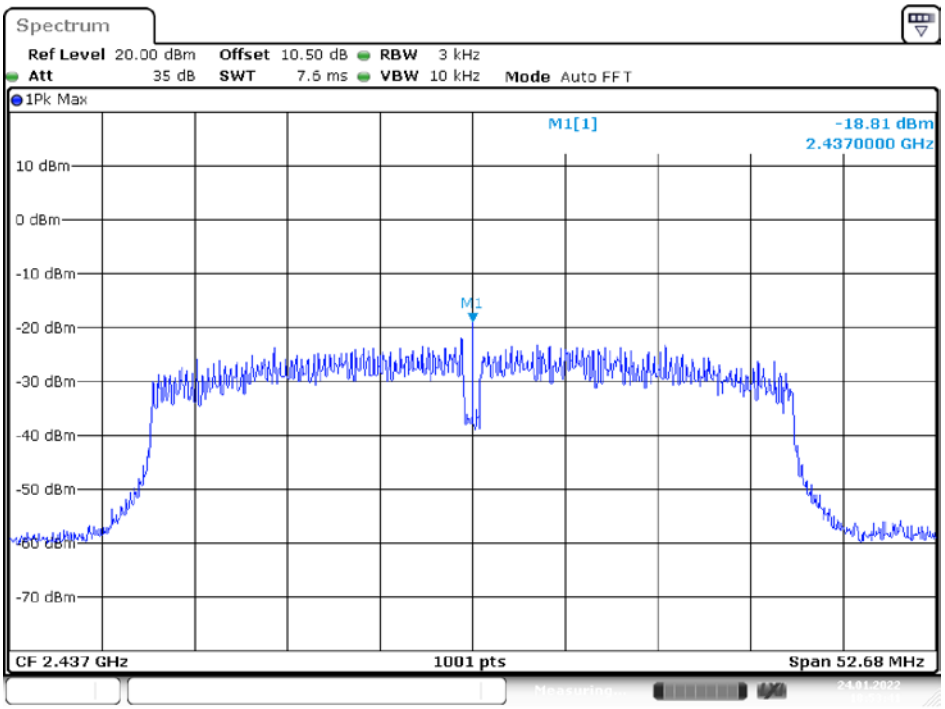
N40 Mode

Low Channel



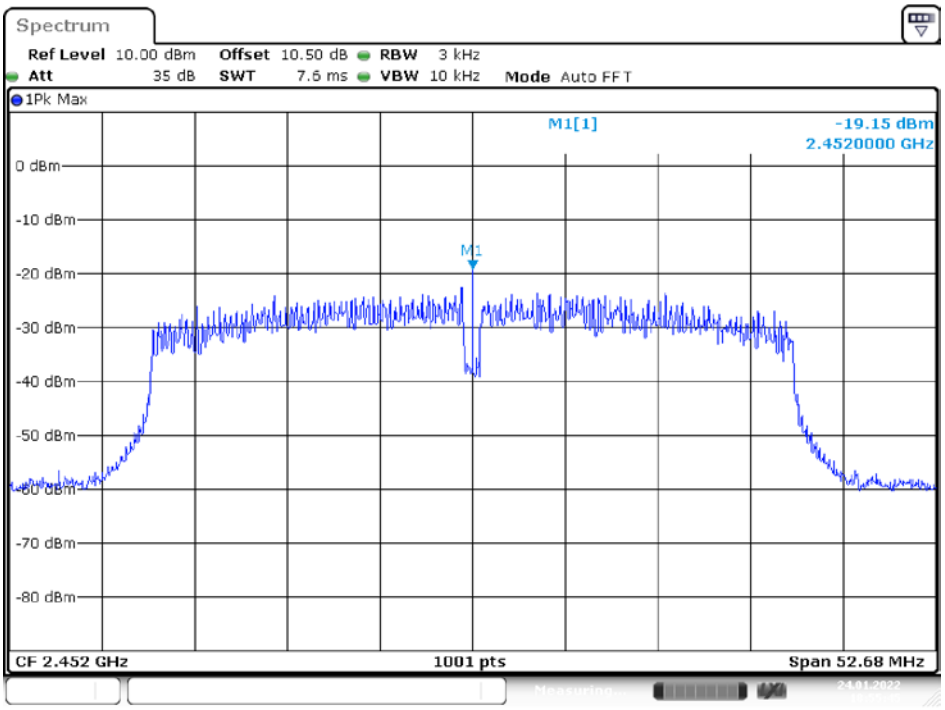
Date: 24.JAN.2022 18:50:39

Middle Channel



Date: 24.JAN.2022 18:53:41

High Channel



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