FCC Part 15.247

TEST REPORT

For

Hangzhou Meari Technology Co., Ltd.

Room 604-605, Building 1,No.768 Jianghong Road, Changhe street, Binjiang District, Hangzhou, Zhejiang, China

FCC ID: 2AG7C-BELL19T

Report Type:	**Product Type:**
Original Report	Wireless DoorBell

Report Producer : Nana Hsu

Report Number : RXZ211227005RF02

Report Date : 2022-04-12

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ211227005	RXZ211227005RF02	2022-04-12	Original Report	Nana Hsu

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	Hangzhou Meari Technology Co., Ltd.
	Room 604-605, Building 1,No.768 Jianghong Road, Changhe street, Binjiang District, Hangzhou, Zhejiang, China
Manufacturer	Hangzhou Meari Technology Co., Ltd.
	Room 604-605, Building 1,No.768 Jianghong Road, Changhe street, Binjiang District, Hangzhou, Zhejiang, China
Brand(Trade) Name	N/A
Product (Equipment)	Wireless DoorBell
Main Model Name	Bell 19S
Series Model Name	Bell 19T, Bell 19Q,Bell 19X
Model Discrepancy	The major electrical and mechanical constructions of series models are identical to the basic model, except different model name. The model, Bell 19S 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
Transmit Power	IEEE 802.11b Mode: 17.56 dBm IEEE 802.11g Mode: 25.07 dBm IEEE 802.11n HT20 Mode: 24.90 dBm
Modulation Technique	IEEE 802.11b Mode: DSSS IEEE 802.11g Mode: OFDM IEEE 802.11n HT20 Mode: OFDM
Power Operation (Voltage Range)	DC 5V/1A from adapter ; battery (4800mAh) adapter 1: Model: GTA92-0501000US adapter 2: Model: TPA-46B050100UU
Received Date	Dec 27, 2021
Date of Test	Jan 18, 2022 - Apr 11, 2022

*All measurement and test data in this report was gathered from production sample serial number: RXZ211227005-01 (Assigned by BACL, New Taipei Laboratory).

1.2 Objective

This report is prepared on behalf of *Hangzhou Meari Technology Co., Ltd. i*n accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commission's rules.

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

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.231 DSC submissions with FCC ID: 2AG7C-BELL19T

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 DTS Meas Guidance v05

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 dBm
Emissions 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	2022/01/20	22.6	63	1010	Boris Kao
Radiation Spurious Emissions	2022/01/18-2022/01/20	19.4-22.1	66-74	1010	Boris Kao
Conducted Spurious Emissions	2022/2/15	21.1	59	1010	Boris Kao
6 dB Emission Bandwidth	2022/2/15	21.1	59	1010	Boris Kao
Maximum Output Power	2022/2/15	21.1	59	1010	Boris Kao
100 kHz Bandwidth of Frequency Band Edge	2022/2/15	21.1	59	1010	Boris Kao
Power Spectral Density	2022/2/15	21.1	59	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.

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 “XCOM V2.0.exe”

Test Frequency		Low	Mid	High
Power Level Setting	802.11b Mode	-17	-17	-17
	802.11g Mode	0	0	-20
	802.11n HT20 Mode	0	0	-20

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

802.11b: 1Mbps

802.11g: 6Mbps

802.11n HT20: MCS0

2.4 Test Mode

Pre-scan

AC Line Conducted Emissions and Radiated Spurious Emissions

Model 1: Bell 19S + Adapter (GTA92-0501000US)

Model 2: Bell 19S + Adapter (TPA-46B050100UU)

Worst case is the Mode 2: Bell 19S + Adapter (TPA-46B050100UU)

Model 2: Bell 19S + Adapter (TPA-46B050100UU) for all test item.

Model 1: Bell 19S + Adapter (GTA92-0501000US) 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
Adapter	GPO	GTA92-0501000US	Adapter
Adapter	SZTY	TPA-46B050100UU	Adapter

2.6 External Cable List and Details

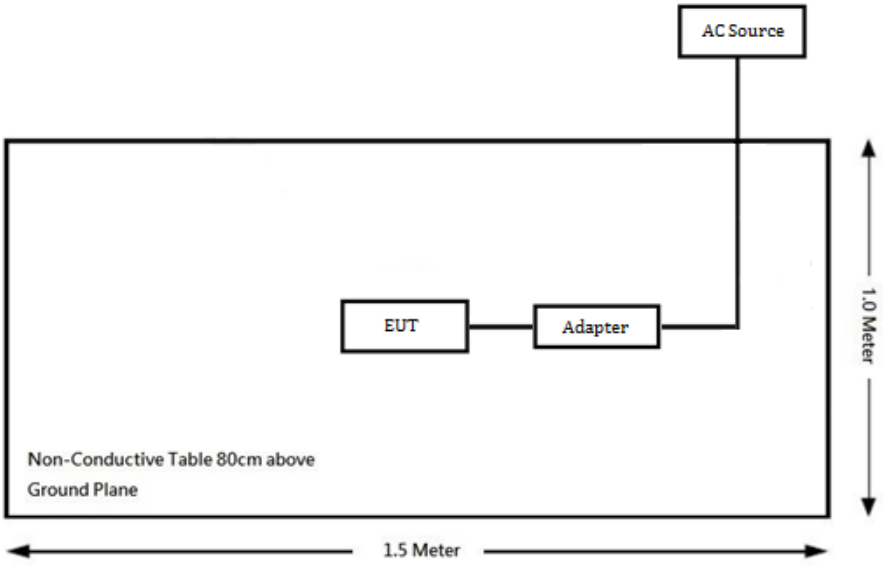
Cable Description	Length (m)	From	To
Micro USB Cable	1	EUT	Adapter

2.7 Block Diagram of Test Setup

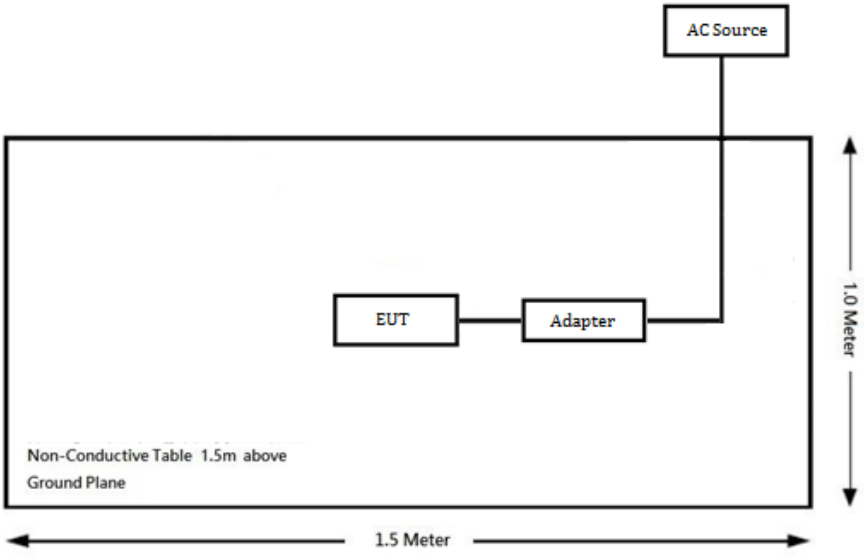
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

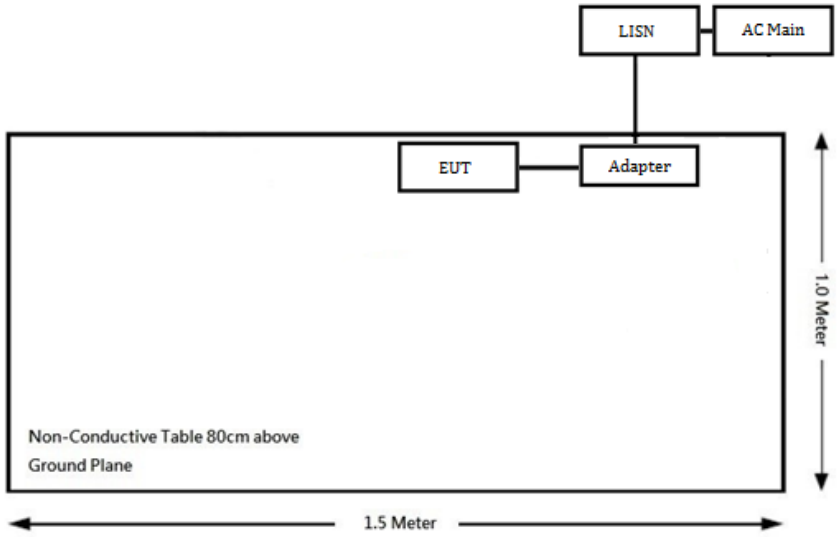
Below 1GHz:



Above 1GHz:



Conduction:



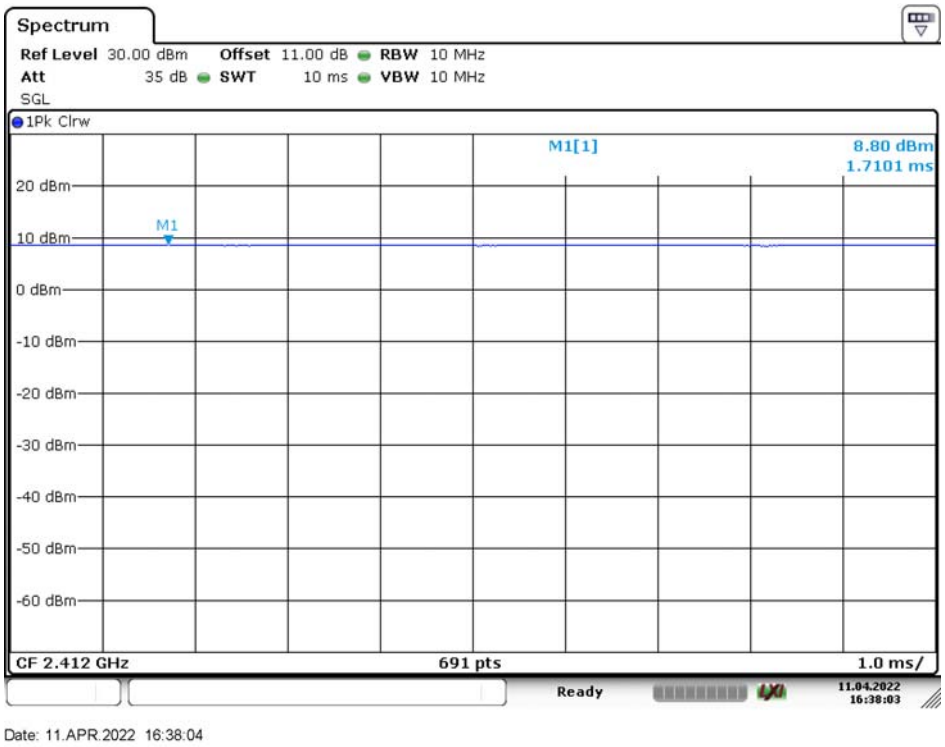
2.8 Duty Cycle

The duty cycle as below:

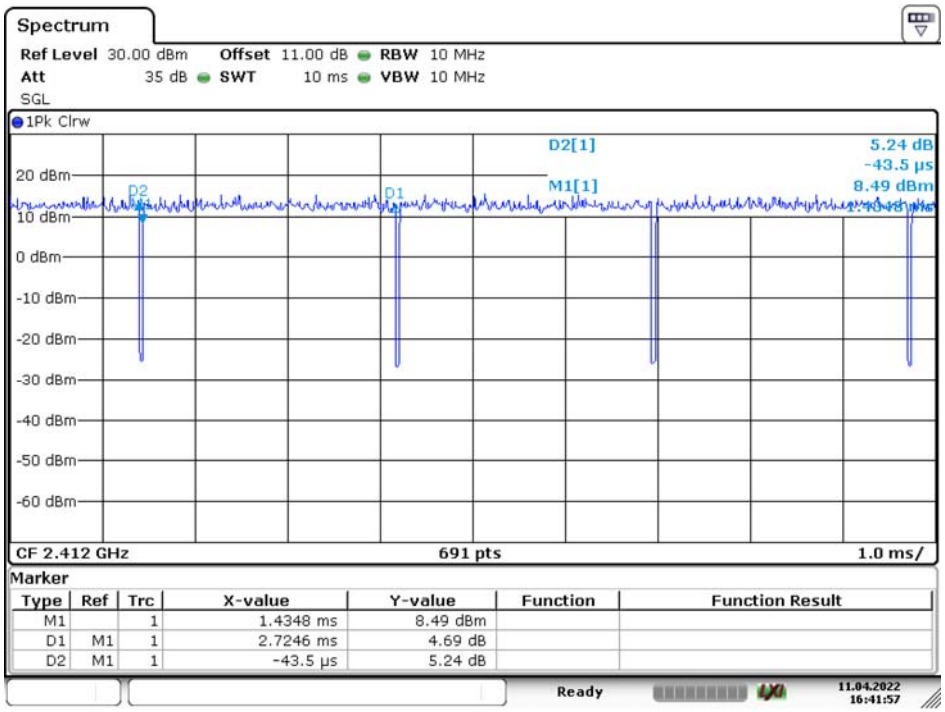
Radio Mode	T_{on} (ms)	$T_{on}+T_{off}$ (ms)	Duty Cycle (%)
802.11b	1	0	100
802.11g	2.7246	0.0435	98
802.11n20	2.5291	0.0506	98

Please refer to the following plots.

B Mode



G Mode



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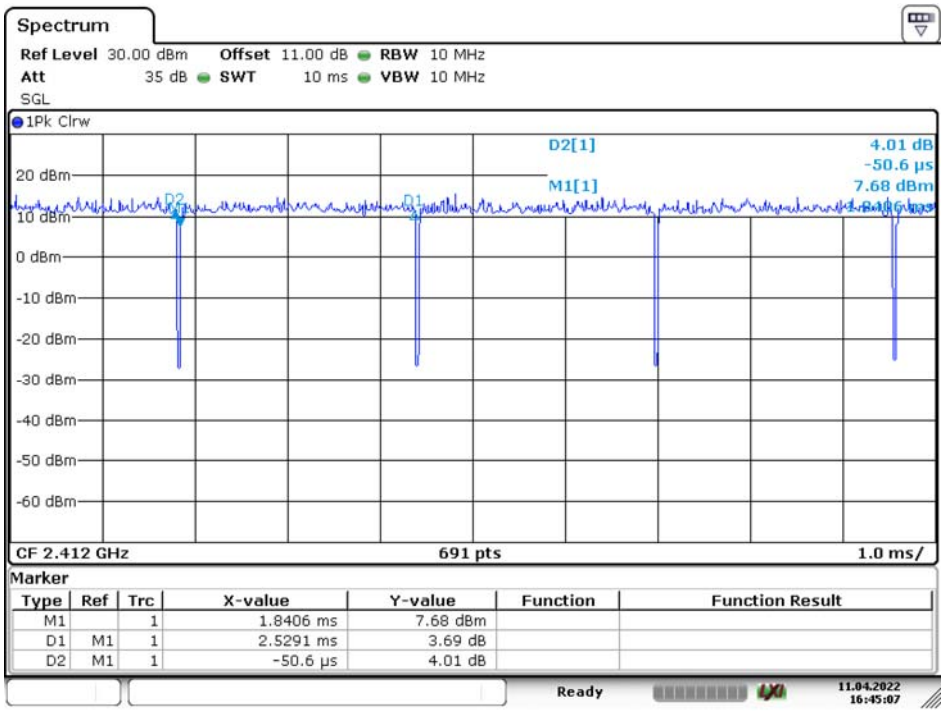
N20 Mode



Date: 11.APR.2022 16:45:08

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	SUNOL SCIENCES & EMEC	JB3 / EM-ATT6000-6-NN	A061204 /ATT-09-012	2021/01/25	2022/01/24
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
Coaxial Cable	EM	EM104	225757-001	2021/01/26	2022/01/25
Coaxial Cable	COMMATE	PEWC	8Dr	2021/12/24	2022/12/23
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	2021/12/24	2022/12/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2021/2/1	2022/1/31
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-50CM	15120-1	2022/1/18	2023/1/17

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	2022/1/24	2023/1/23
Attenuator	MINI-CIRCUITS	BW-S10W5+	1419	2022/2/11	2023/2/10

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

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

5.1 Applicable Standard

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

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

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

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

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

Calculated Formulary:

Predication of MPE limit at a given distance

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

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

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

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

5.2 RF Exposure Evaluation Result

MPE evaluation:

Mode	Frequency Range (MHz)	Antenna Gain		Target Power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
2.4G WIFI	2412-2462	2.54	1.795	25.5	354.813	20	0.1267	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
Dongguan UB Electronic Co,. Ltd	UB01C40F3D2002A	FPC Antenna	2.54 dBi

Result: Compliance

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

7.1 Applicable Standard

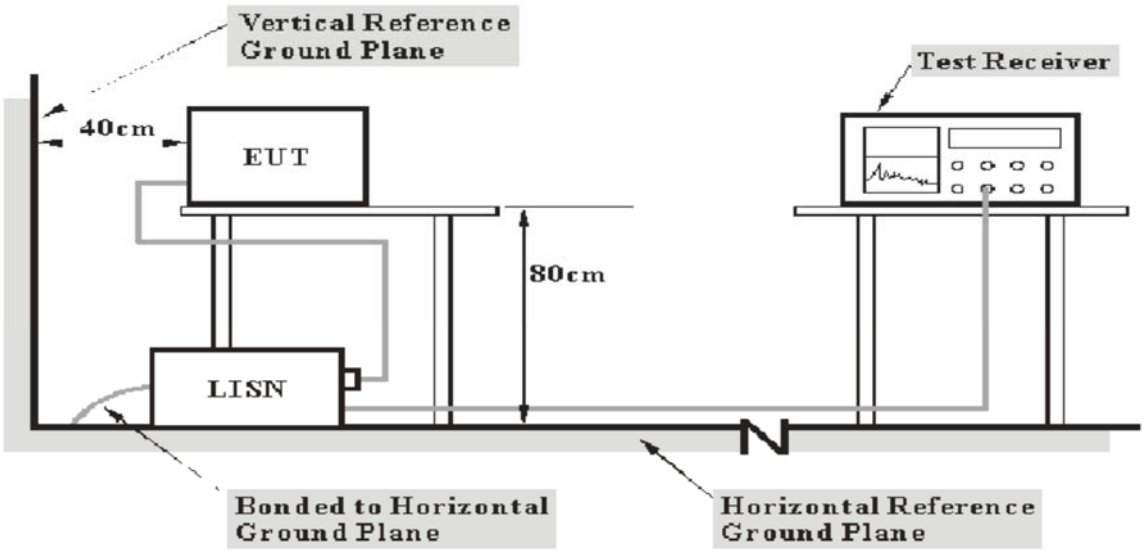
According to §15.207

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:

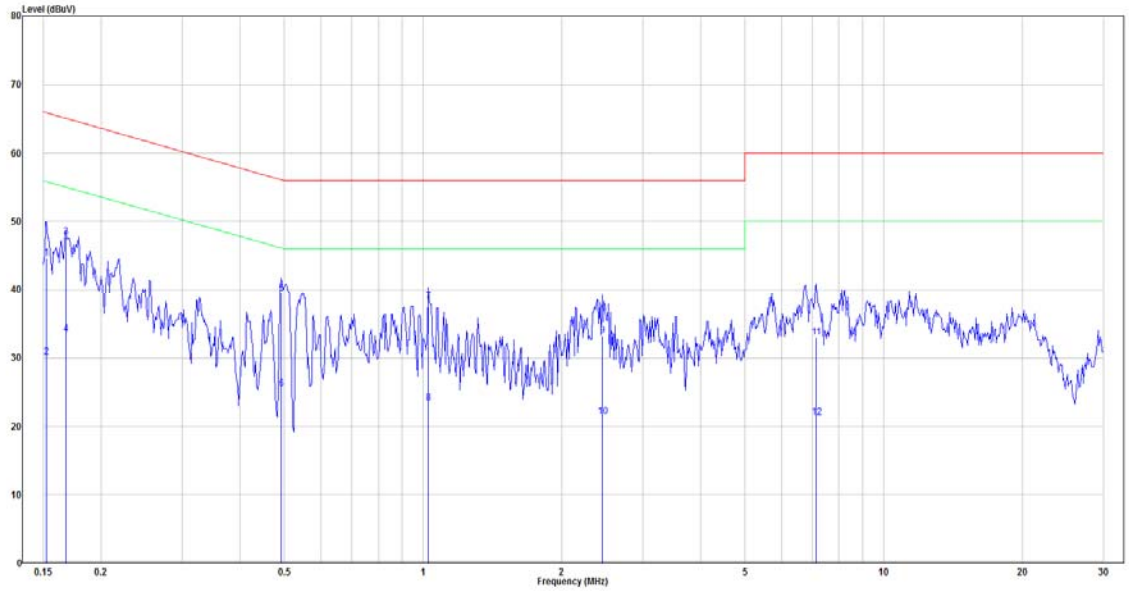
Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

Adapter-GTA92-0501000US

Main: AC120 V, 60 Hz, Line(Worst case is 802.11b mode, High Channel)



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.152	25.13	19.50	44.63	65.87	-21.24	QP
2	0.152	10.54	19.50	30.05	55.87	-25.82	Average
3	0.168	28.23	19.50	47.74	65.08	-17.34	QP
4	0.168	13.85	19.50	33.36	55.08	-21.72	Average
5	0.491	19.87	19.52	39.39	56.14	-16.75	QP
6	0.491	5.91	19.52	25.43	46.14	-20.71	Average
7	1.027	18.75	19.54	38.29	56.00	-17.71	QP
8	1.027	3.83	19.54	23.37	46.00	-22.63	Average
9	2.448	13.58	19.59	33.17	56.00	-22.83	QP
10	2.448	1.76	19.59	21.35	46.00	-24.65	Average
11	7.137	13.25	19.70	32.94	60.00	-27.06	QP
12	7.137	1.60	19.70	21.29	50.00	-28.71	Average

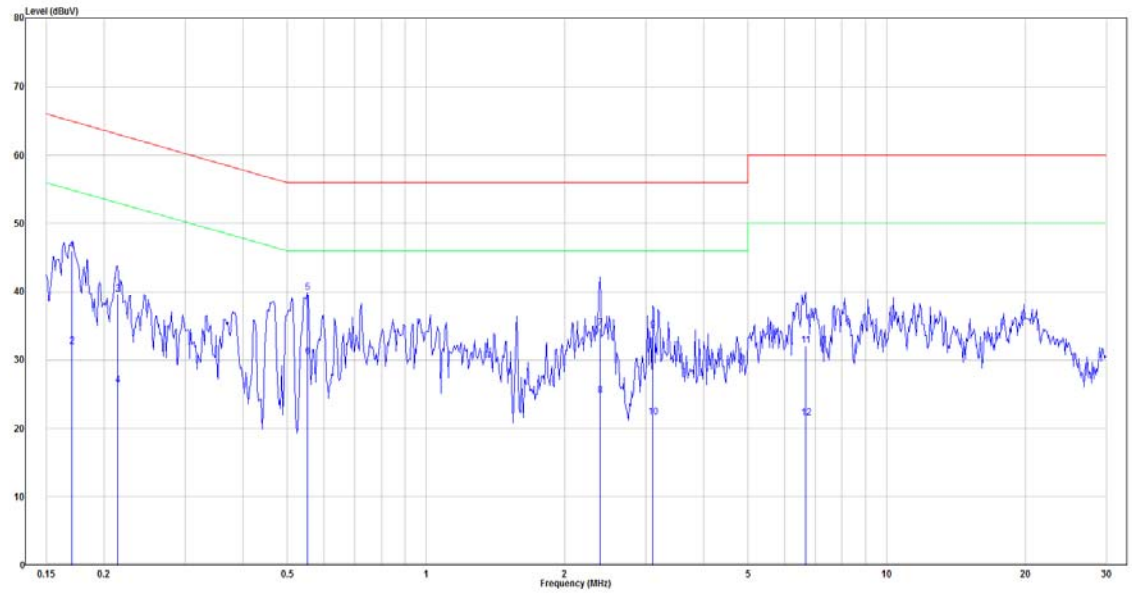
Note:

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	0.170	26.56	19.50	46.06	64.94	-18.89	QP
2	0.170	12.42	19.50	31.92	54.94	-23.02	Average
3	0.214	20.21	19.49	39.71	63.05	-23.35	QP
4	0.214	6.77	19.49	26.27	53.05	-26.79	Average
5	0.552	20.34	19.52	39.87	56.00	-16.13	QP
6	0.552	10.90	19.52	30.42	46.00	-15.58	Average
7	2.384	14.99	19.58	34.57	56.00	-21.43	QP
8	2.384	5.11	19.58	24.69	46.00	-21.31	Average
9	3.107	14.66	19.60	34.27	56.00	-21.73	QP
10	3.107	1.98	19.60	21.58	46.00	-24.42	Average
11	6.662	12.34	19.70	32.04	60.00	-27.96	QP
12	6.662	1.78	19.70	21.48	50.00	-28.52	Average

Note:

Level = Read Level + Factor

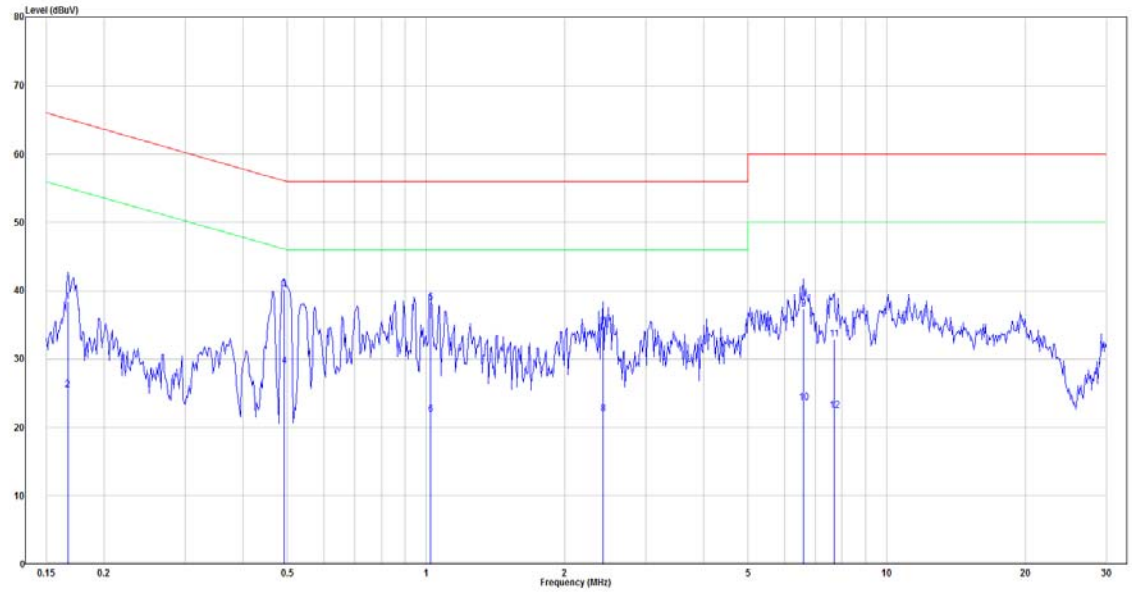
Over Limit = Level – Limit Line

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

Test Mode: Transmitting

Adapter-TPA-46B050100UU

Main: AC120 V, 60 Hz, Line(Worst case is 802.11b mode, High Channel)



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.167	18.73	19.50	38.23	65.12	-26.89	QP
2	0.167	5.92	19.50	25.42	55.12	-29.70	Average
3	0.491	20.76	19.52	40.28	56.14	-15.86	QP
4	0.491	9.33	19.52	28.86	46.14	-17.29	Average
5	1.021	18.57	19.54	38.11	56.00	-17.89	QP
6	1.021	2.35	19.54	21.89	46.00	-24.11	Average
7	2.422	15.11	19.59	34.70	56.00	-21.30	QP
8	2.422	2.34	19.59	21.93	46.00	-24.07	Average
9	6.592	17.57	19.69	37.26	60.00	-22.74	QP
10	6.592	3.95	19.69	23.64	50.00	-26.36	Average
11	7.687	13.13	19.71	32.83	60.00	-27.17	QP
12	7.687	2.74	19.71	22.44	50.00	-27.56	Average

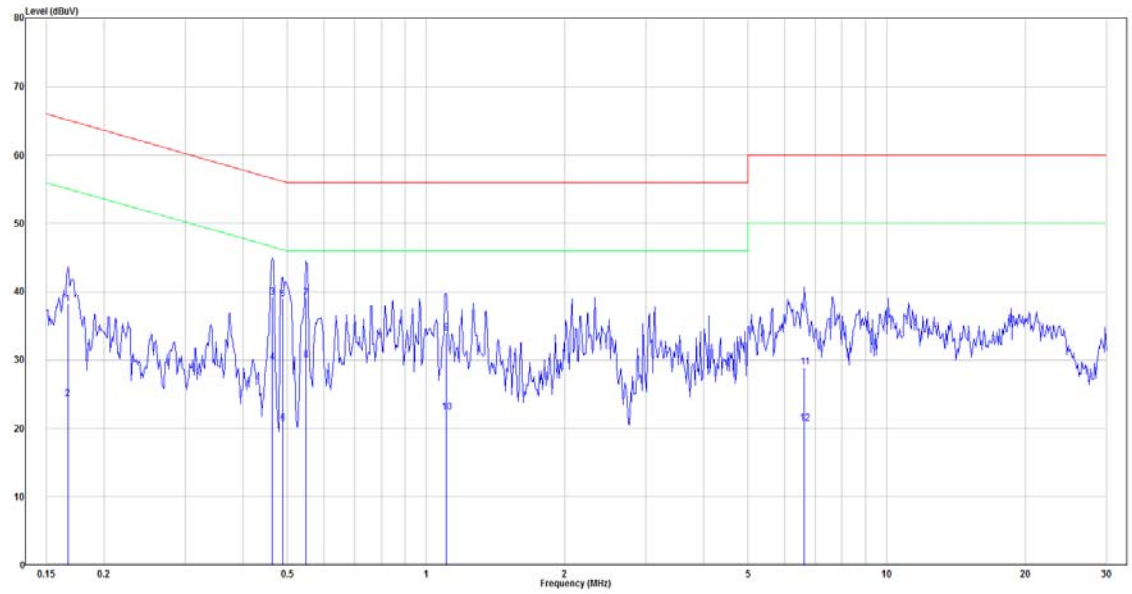
Note:

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	0.167	18.64	19.50	38.14	65.12	-26.98	QP
2	0.167	4.78	19.50	24.28	55.12	-30.84	Average
3	0.464	19.64	19.52	39.16	56.63	-17.47	QP
4	0.464	10.04	19.52	29.56	46.63	-17.07	Average
5	0.489	19.37	19.52	38.89	56.19	-17.30	QP
6	0.489	1.22	19.52	20.74	46.19	-25.44	Average
7	0.549	19.53	19.52	39.05	56.00	-16.95	QP
8	0.549	10.44	19.52	29.96	46.00	-16.04	Average
9	1.106	14.30	19.53	33.83	56.00	-22.17	QP
10	1.106	2.78	19.53	22.31	46.00	-23.69	Average
11	6.627	9.26	19.70	28.96	60.00	-31.04	QP
12	6.627	1.03	19.70	20.72	50.00	-29.28	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

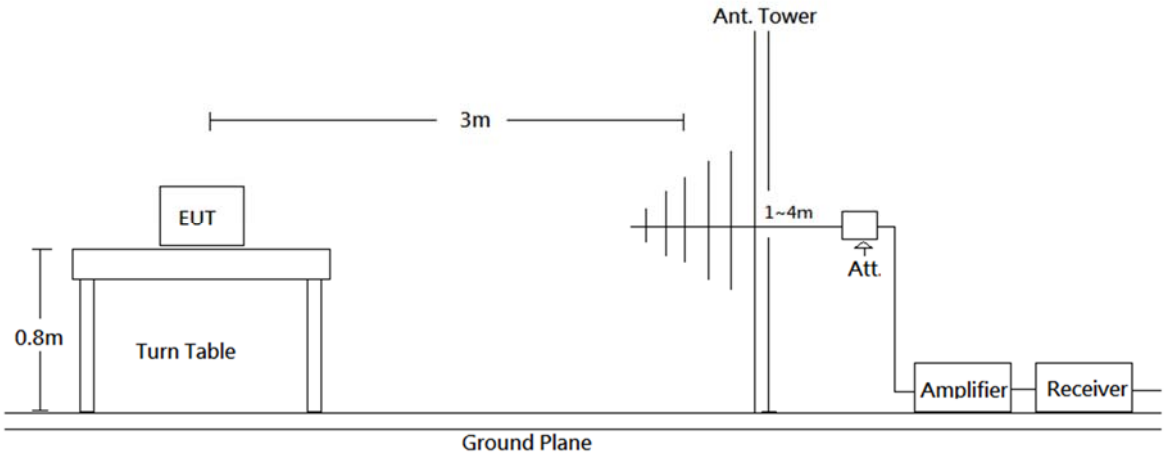
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

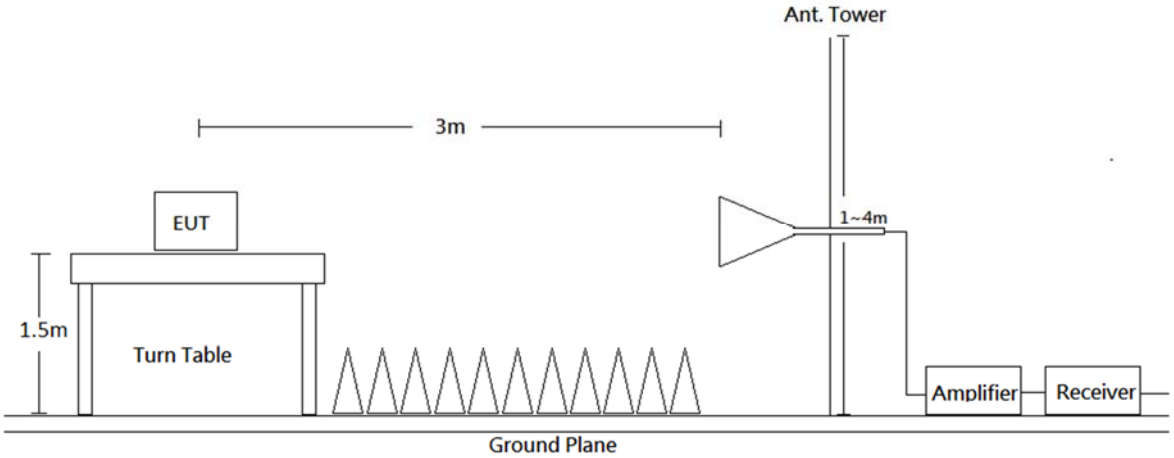
intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the 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

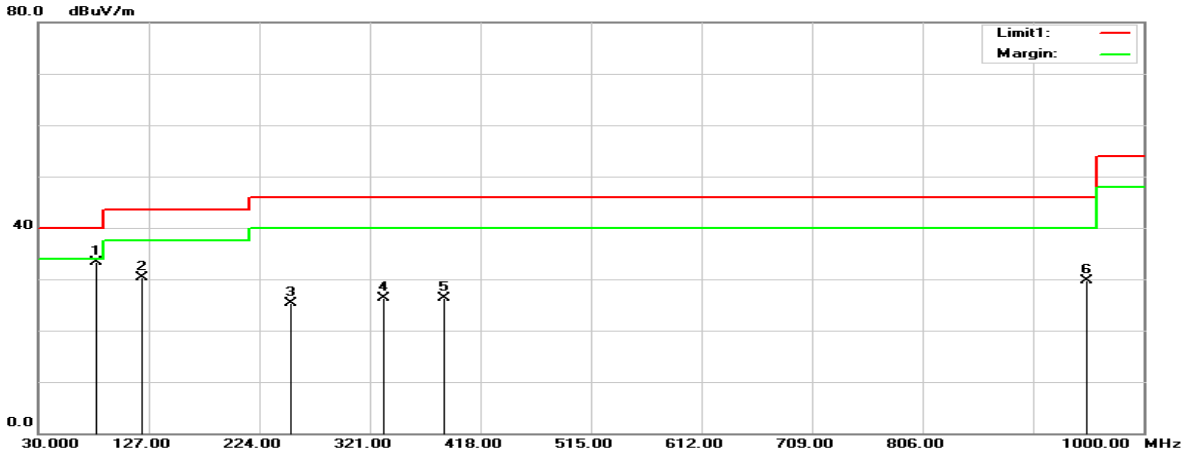
Test Mode: Transmitting

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

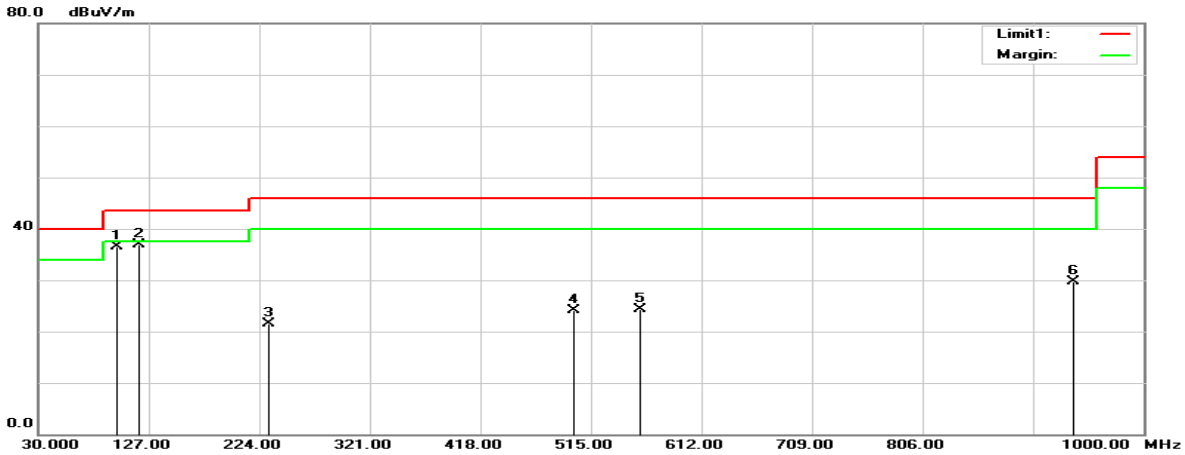
< Adapter- GTA92-0501000US >

30MHz-1GHz:

Horizontal



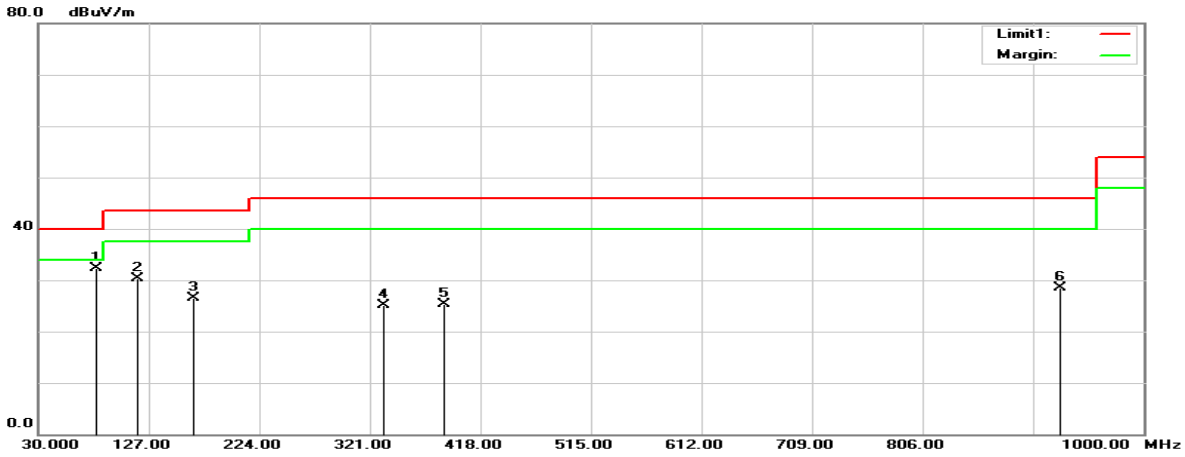
Vertical



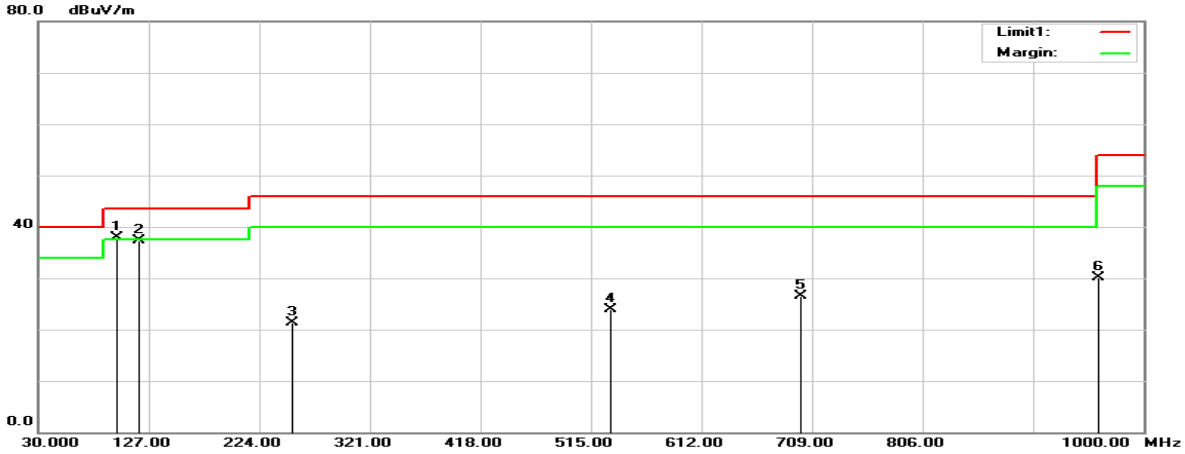
< Adapter- TPA-46B050100UU >

30MHz-1GHz:

Horizontal

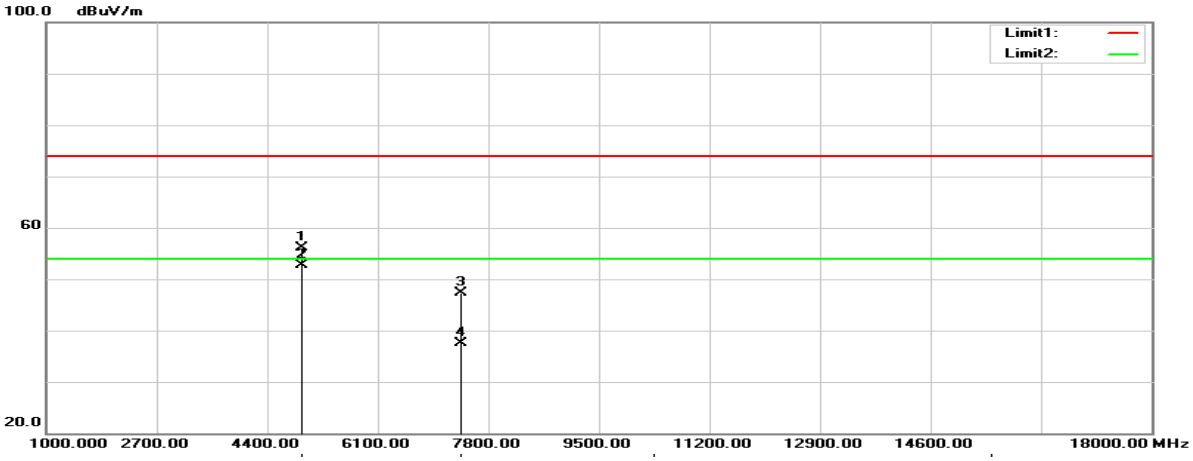


Vertical

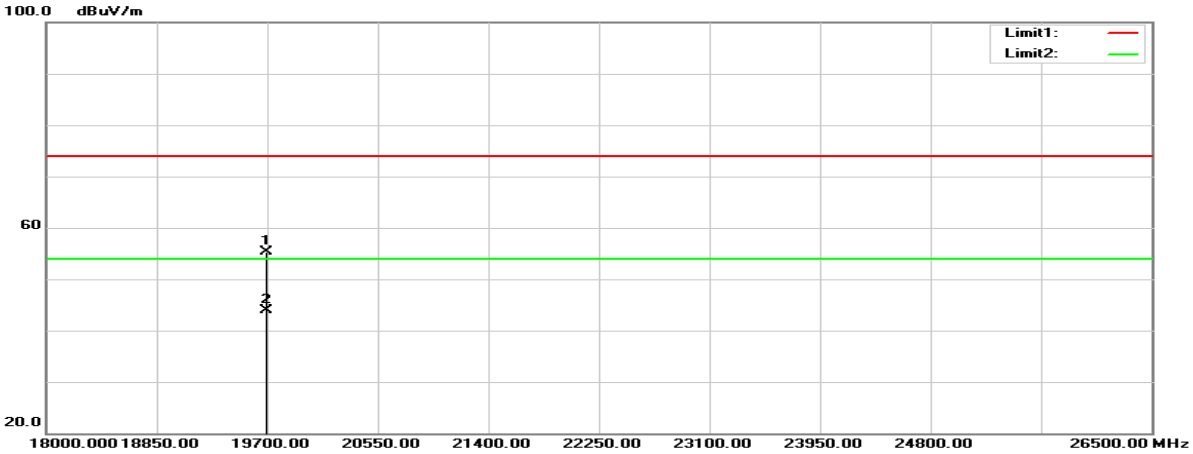


Horizontal (worst case is 802.11b mode high channel)

1GHz-18GHz:

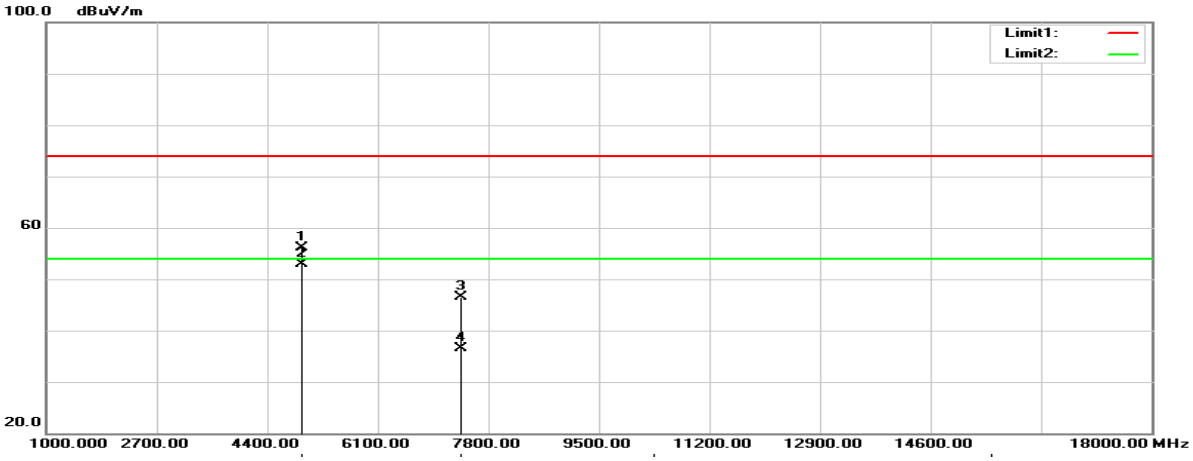


18GHz-26.5GHz:

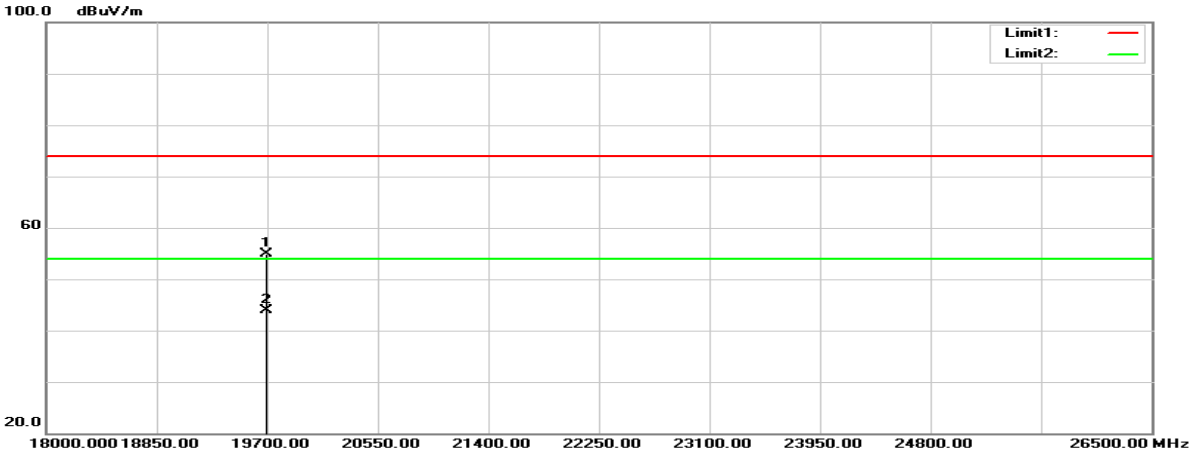


Vertical (worst case is 802.11b mode high channel)

1GHz-18GHz:



18GHz-26.5GHz:



<GTA92-0501000US>

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	49.84	-16.62	33.22	40.00	-6.78	100	153	peak
121.1800	40.57	-10.21	30.36	43.50	-13.14	100	225	peak
252.1300	37.55	-12.29	25.26	46.00	-20.74	100	32	peak
332.6400	35.71	-9.46	26.25	46.00	-19.75	100	85	peak
385.9900	34.58	-8.24	26.34	46.00	-19.66	100	128	peak
949.5600	27.66	2.11	29.77	46.00	-16.23	100	311	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
98.8700	51.00	-14.59	36.41	43.50	-7.09	100	328	peak
118.2700	47.55	-10.69	36.86	43.50	-6.64	100	125	peak
231.7600	34.15	-12.58	21.57	46.00	-24.43	100	89	peak
499.4800	29.80	-5.72	24.08	46.00	-21.92	100	34	peak
558.6500	30.00	-5.65	24.35	46.00	-21.65	100	155	peak
938.8900	27.64	2.02	29.66	46.00	-16.34	100	248	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.

<TPA-46B050100UU>

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	48.93	-16.62	32.31	40.00	-7.69	100	311	peak
117.3000	41.07	-10.73	30.34	43.50	-13.16	100	247	peak
165.8000	38.21	-11.71	26.50	43.50	-17.00	100	158	peak
332.6400	34.53	-9.46	25.07	46.00	-20.93	100	16	peak
385.9900	33.50	-8.24	25.26	46.00	-20.74	100	88	peak
927.2500	26.71	1.78	28.49	46.00	-17.51	100	138	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
98.8700	52.55	-14.59	37.96	43.50	-5.54	100	215	peak
118.2700	47.90	-10.69	37.21	43.50	-6.29	100	324	peak
253.1000	33.58	-12.26	21.32	46.00	-24.68	100	168	peak
532.4600	29.54	-5.64	23.90	46.00	-22.10	100	85	peak
699.3000	29.49	-2.97	26.52	46.00	-19.48	100	96	peak
960.2300	27.74	2.35	30.09	54.00	-23.91	100	127	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								
2390.000	66.92	-9.46	57.46	74.00	-16.54	127	346	peak
2390.000	56.56	-9.46	47.10	54.00	-6.90	127	346	AVG
4824.000	57.55	-2.15	55.40	74.00	-18.60	131	165	peak
4824.000	54.73	-2.15	52.58	54.00	-1.42	131	165	AVG
7236.000	44.25	4.55	48.80	74.00	-25.20	156	214	peak
7236.000	33.89	4.55	38.44	54.00	-15.56	156	214	AVG
19296.000	54.90	-0.24	54.66	74.00	-19.34	145	303	peak
19296.000	42.28	-0.24	42.04	54.00	-11.96	145	303	AVG
B Mode, Middle channel								
4874.000	57.15	-1.92	55.23	74.00	-18.77	165	334	peak
4874.000	54.28	-1.92	52.36	54.00	-1.64	165	334	AVG
7311.000	40.46	5.08	45.54	74.00	-28.46	147	215	peak
7311.000	30.57	5.08	35.65	54.00	-18.35	147	215	AVG
19496.000	53.75	0.25	54.00	74.00	-20.00	152	199	peak
19496.000	42.88	0.25	43.13	54.00	-10.87	152	199	AVG
B Mode, High channel								
2483.500	67.92	-8.45	59.47	74.00	-14.53	126	348	peak
2483.500	56.77	-8.45	48.32	54.00	-5.68	126	348	AVG
4924.000	57.64	-1.63	56.01	74.00	-17.99	145	221	peak
4924.000	54.37	-1.63	52.74	54.00	-1.26	145	221	AVG
7386.000	42.12	5.20	47.32	74.00	-26.68	138	348	peak
7386.000	32.33	5.20	37.53	54.00	-16.47	138	348	AVG
19696.000	54.32	0.98	55.30	74.00	-18.70	156	34	peak
19696.000	42.83	0.98	43.81	54.00	-10.19	156	34	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								
2390.000	59.29	-9.46	49.83	74.00	-24.17	240	360	peak
2390.000	50.18	-9.46	40.72	54.00	-13.28	240	360	AVG
4824.000	57.92	-2.15	55.77	74.00	-18.23	161	235	peak
4824.000	54.38	-2.15	52.23	54.00	-1.77	161	235	AVG
7236.000	42.63	4.55	47.18	74.00	-26.82	153	148	peak
7236.000	31.28	4.55	35.83	54.00	-18.17	153	148	AVG
19296.000	54.29	-0.24	54.05	74.00	-19.95	149	31	peak
19296.000	42.30	-0.24	42.06	54.00	-11.94	149	31	AVG
B Mode, Middle channel								
4874.000	57.66	-1.92	55.74	74.00	-18.26	155	325	peak
4874.000	54.13	-1.92	52.21	54.00	-1.79	155	325	AVG
7311.000	40.65	5.08	45.73	74.00	-28.27	169	224	peak
7311.000	30.21	5.08	35.29	54.00	-18.71	169	224	AVG
19496.000	54.06	0.25	54.31	74.00	-19.69	156	75	peak
19496.000	42.91	0.25	43.16	54.00	-10.84	156	75	AVG
B Mode, High channel								
2483.500	58.88	-8.45	50.43	74.00	-23.57	255	352	peak
2483.500	48.42	-8.45	39.97	54.00	-14.03	255	352	AVG
4924.000	57.64	-1.63	56.01	74.00	-17.99	166	258	peak
4924.000	54.48	-1.63	52.85	54.00	-1.15	166	258	AVG
7386.000	41.21	5.20	46.41	74.00	-27.59	157	138	peak
7386.000	31.29	5.20	36.49	54.00	-17.51	157	138	AVG
19696.000	53.86	0.98	54.84	74.00	-19.16	154	308	peak
19696.000	42.95	0.98	43.93	54.00	-10.07	154	308	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	78.09	-9.46	68.63	74.00	-5.37	150	80	peak
2390.000	57.08	-9.46	47.62	54.00	-6.38	150	80	AVG
4824.000	62.58	-2.15	60.43	74.00	-13.57	134	116	peak
4824.000	47.55	-2.15	45.40	54.00	-8.60	134	116	AVG
7236.000	42.06	4.55	46.61	74.00	-27.39	158	247	peak
7236.000	31.69	4.55	36.24	54.00	-17.76	158	247	AVG
19296.000	53.49	-0.24	53.25	74.00	-20.75	144	149	peak
19296.000	42.15	-0.24	41.91	54.00	-12.09	144	149	AVG
G Mode, Middle channel								
4874.000	63.34	-1.92	61.42	74.00	-12.58	138	254	peak
4874.000	47.69	-1.92	45.77	54.00	-8.23	138	254	AVG
7311.000	43.15	5.08	48.23	74.00	-25.77	161	327	peak
7311.000	31.28	5.08	36.36	54.00	-17.64	161	327	AVG
19496.000	53.97	0.25	54.22	74.00	-19.78	145	232	peak
19496.000	42.84	0.25	43.09	54.00	-10.91	145	232	AVG
G Mode, High channel								
2483.968	80.82	-8.44	72.38	74.00	-1.62	150	80	peak
2483.968	54.11	-8.44	45.67	54.00	-8.33	150	80	AVG
4924.000	63.42	-1.63	61.79	74.00	-12.21	157	357	peak
4924.000	47.29	-1.63	45.66	54.00	-8.34	157	357	AVG
7386.000	41.39	5.20	46.59	74.00	-27.41	163	211	peak
7386.000	30.66	5.20	35.86	54.00	-18.14	163	211	AVG
19696.000	54.03	0.98	55.01	74.00	-18.99	155	360	peak
19696.000	42.97	0.98	43.95	54.00	-10.05	155	360	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	68.84	-9.46	59.38	74.00	-14.62	181	312	peak
2390.000	48.82	-9.46	39.36	54.00	-14.64	181	312	AVG
4824.000	63.27	-2.15	61.12	74.00	-12.88	124	80	peak
4824.000	47.99	-2.15	45.84	54.00	-8.16	124	80	AVG
7236.000	43.25	4.55	47.80	74.00	-26.20	134	258	peak
7236.000	32.69	4.55	37.24	54.00	-16.76	134	258	AVG
19296.000	55.82	-0.24	55.58	74.00	-18.42	146	190	peak
19296.000	42.15	-0.24	41.91	54.00	-12.09	146	190	AVG
G Mode, Middle channel								
4874.000	63.55	-1.92	61.63	74.00	-12.37	156	211	peak
4874.000	47.49	-1.92	45.57	54.00	-8.43	156	211	AVG
7311.000	41.23	5.08	46.31	74.00	-27.69	147	139	peak
7311.000	31.27	5.08	36.35	54.00	-17.65	147	139	AVG
19496.000	53.73	0.25	53.98	74.00	-20.02	151	35	peak
19496.000	42.88	0.25	43.13	54.00	-10.87	151	35	AVG
G Mode, High channel								
2483.500	75.11	-8.45	66.66	74.00	-7.34	168	313	peak
2483.500	53.80	-8.45	45.35	54.00	-8.65	168	313	AVG
4924.000	63.54	-1.63	61.91	74.00	-12.09	165	166	peak
4924.000	47.28	-1.63	45.65	54.00	-8.35	165	166	AVG
7386.000	40.18	5.20	45.38	74.00	-28.62	158	134	peak
7386.000	30.29	5.20	35.49	54.00	-18.51	158	134	AVG
19696.000	54.01	0.98	54.99	74.00	-19.01	147	360	peak
19696.000	42.98	0.98	43.96	54.00	-10.04	147	360	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	78.87	-9.46	69.41	74.00	-4.59	148	81	peak
2390.000	59.48	-9.46	50.02	54.00	-3.98	148	81	AVG
4824.000	62.28	-2.15	60.13	74.00	-13.87	145	215	peak
4824.000	47.85	-2.15	45.70	54.00	-8.30	145	215	AVG
7236.000	40.45	4.55	45.00	74.00	-29.00	168	327	peak
7236.000	30.26	4.55	34.81	54.00	-19.19	168	327	AVG
19296.000	53.90	-0.24	53.66	74.00	-20.34	146	274	peak
19296.000	42.26	-0.24	42.02	54.00	-11.98	146	274	AVG
N20 Mode, Middle channel								
4874.000	63.56	-1.92	61.64	74.00	-12.36	166	214	peak
4874.000	47.28	-1.92	45.36	54.00	-8.64	166	214	AVG
7311.000	42.17	5.08	47.25	74.00	-26.75	158	138	peak
7311.000	31.56	5.08	36.64	54.00	-17.36	158	138	AVG
19496.000	54.32	0.25	54.57	74.00	-19.43	152	100	peak
19496.000	42.79	0.25	43.04	54.00	-10.96	152	100	AVG
N20 Mode, High channel								
2483.500	80.06	-8.45	71.61	74.00	-2.39	164	82	peak
2483.500	55.65	-8.45	47.20	54.00	-6.80	164	82	AVG
4924.000	63.59	-1.63	61.96	74.00	-12.04	135	251	peak
4924.000	47.52	-1.63	45.89	54.00	-8.11	135	251	AVG
7386.000	41.45	5.20	46.65	74.00	-27.35	146	348	peak
7386.000	30.68	5.20	35.88	54.00	-18.12	146	348	AVG
19696.000	54.48	0.98	55.46	74.00	-18.54	146	346	peak
19696.000	42.91	0.98	43.89	54.00	-10.11	146	346	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	69.20	-9.46	59.74	74.00	-14.26	178	311	peak
2390.000	50.88	-9.46	41.42	54.00	-12.58	178	311	AVG
4824.000	62.58	-2.15	60.43	74.00	-13.57	167	133	peak
4824.000	47.28	-2.15	45.13	54.00	-8.87	167	133	AVG
7236.000	42.67	4.55	47.22	74.00	-26.78	154	325	peak
7236.000	31.59	4.55	36.14	54.00	-17.86	154	325	AVG
19296.000	53.82	-0.24	53.58	74.00	-20.42	146	64	peak
19296.000	42.22	-0.24	41.98	54.00	-12.02	146	64	AVG
N20 Mode, Middle channel								
4874.000	63.57	-1.92	61.65	74.00	-12.35	145	225	peak
4874.000	47.55	-1.92	45.63	54.00	-8.37	145	225	AVG
7311.000	40.44	5.08	45.52	74.00	-28.48	152	347	peak
7311.000	30.21	5.08	35.29	54.00	-18.71	152	347	AVG
19496.000	54.20	0.25	54.45	74.00	-19.55	144	161	peak
19496.000	42.94	0.25	43.19	54.00	-10.81	144	161	AVG
N20 Mode, High channel								
2483.500	68.88	-8.45	60.43	74.00	-13.57	175	311	peak
2483.500	47.11	-8.45	38.66	54.00	-15.34	175	311	AVG
4924.000	63.45	-1.63	61.82	74.00	-12.18	146	245	peak
4924.000	47.28	-1.63	45.65	54.00	-8.35	146	245	AVG
7386.000	41.39	5.20	46.59	74.00	-27.41	138	358	peak
7386.000	30.55	5.20	35.75	54.00	-18.25	138	358	AVG
19696.000	55.24	0.98	56.22	74.00	-17.78	153	1	peak
19696.000	43.01	0.98	43.99	54.00	-10.01	153	1	AVG

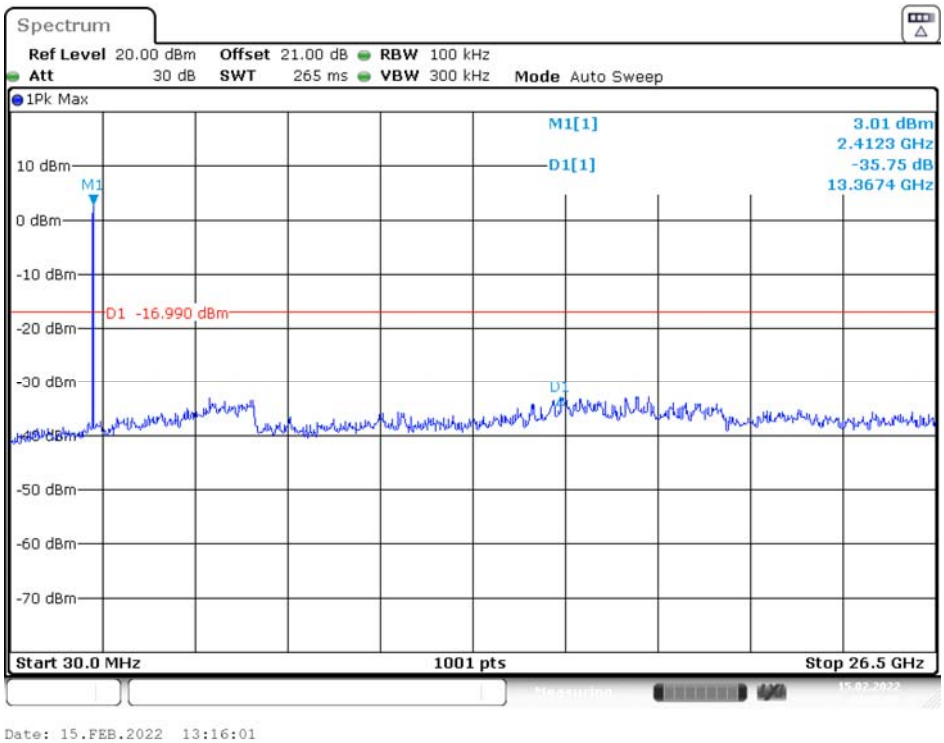
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

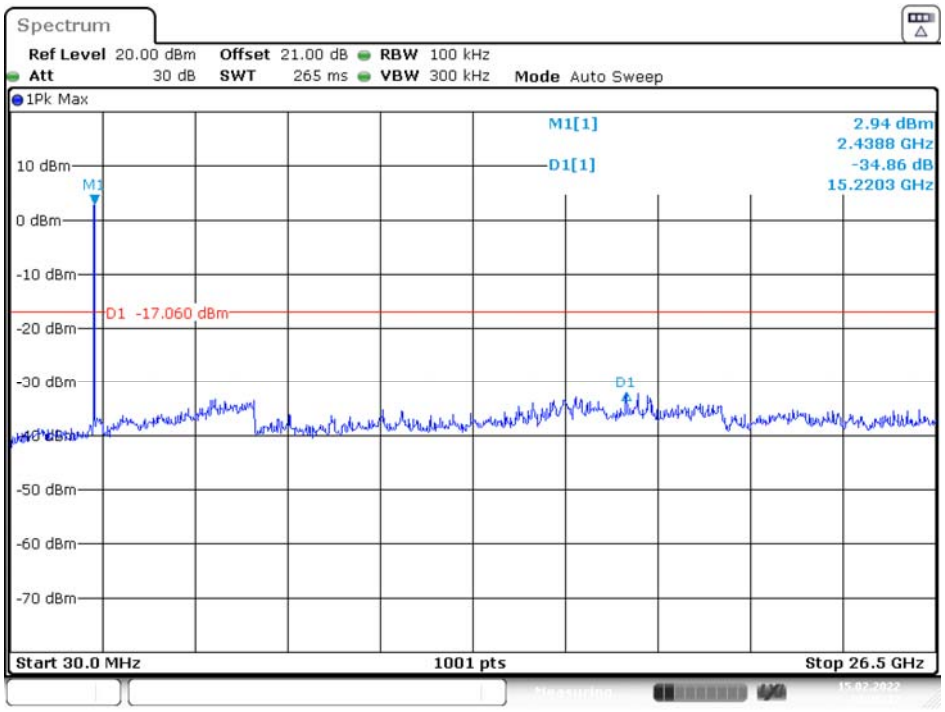
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	35.75	≥ 20	PASS
Mid	2437	34.86	≥ 20	PASS
High	2462	33.33	≥ 20	PASS
G Mode				
Low	2412	32.71	≥ 20	PASS
Mid	2437	32.49	≥ 20	PASS
High	2462	31.56	≥ 20	PASS
N20 Mode				
Low	2412	32.15	≥ 20	PASS
Mid	2437	32.27	≥ 20	PASS
High	2462	30.15	≥ 20	PASS

B Mode

Low Channel

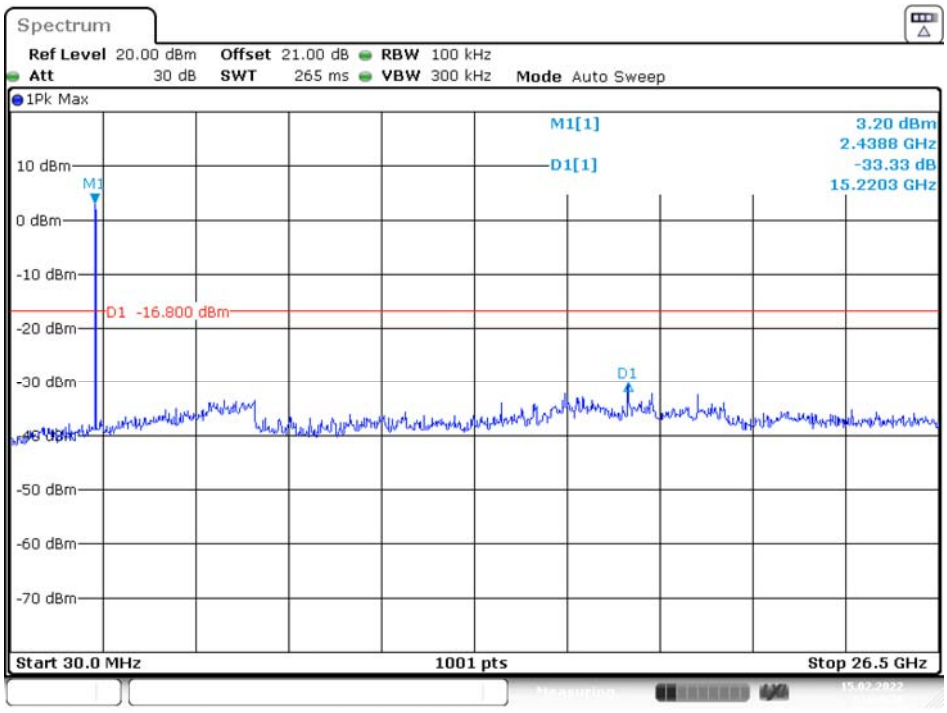


Middle Channel



Date: 15.FEB.2022 13:20:12

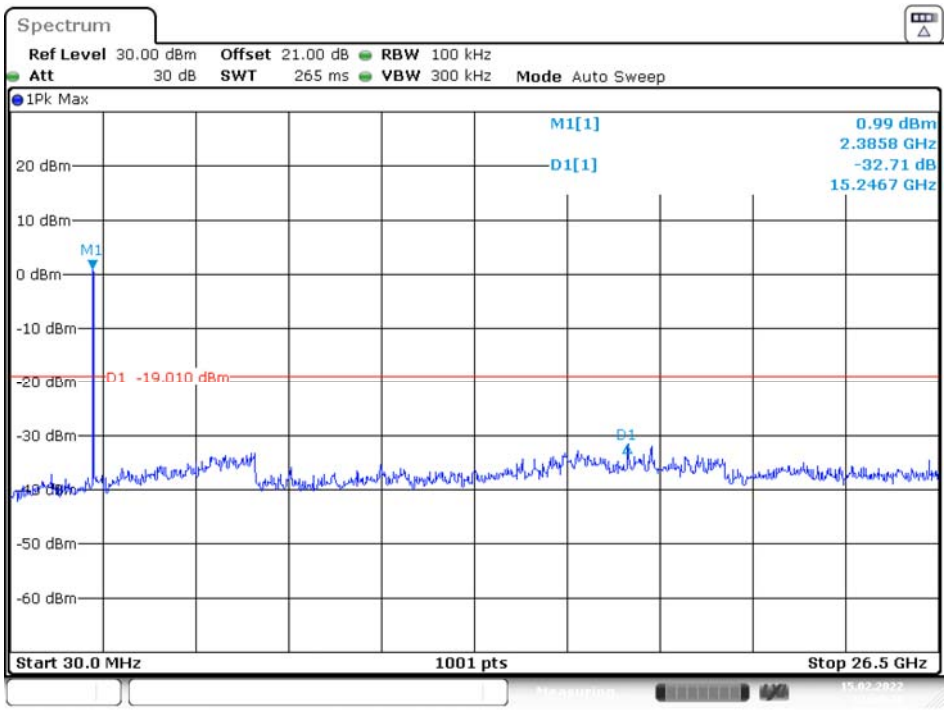
High Channel



Date: 15.FEB.2022 13:23:26

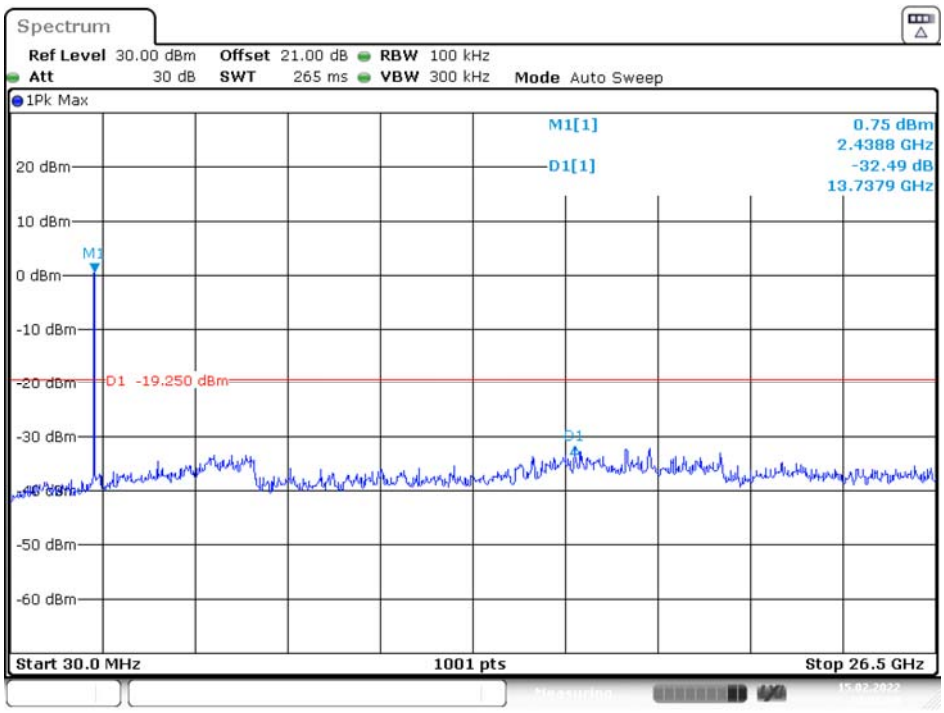
G Mode

Low Channel



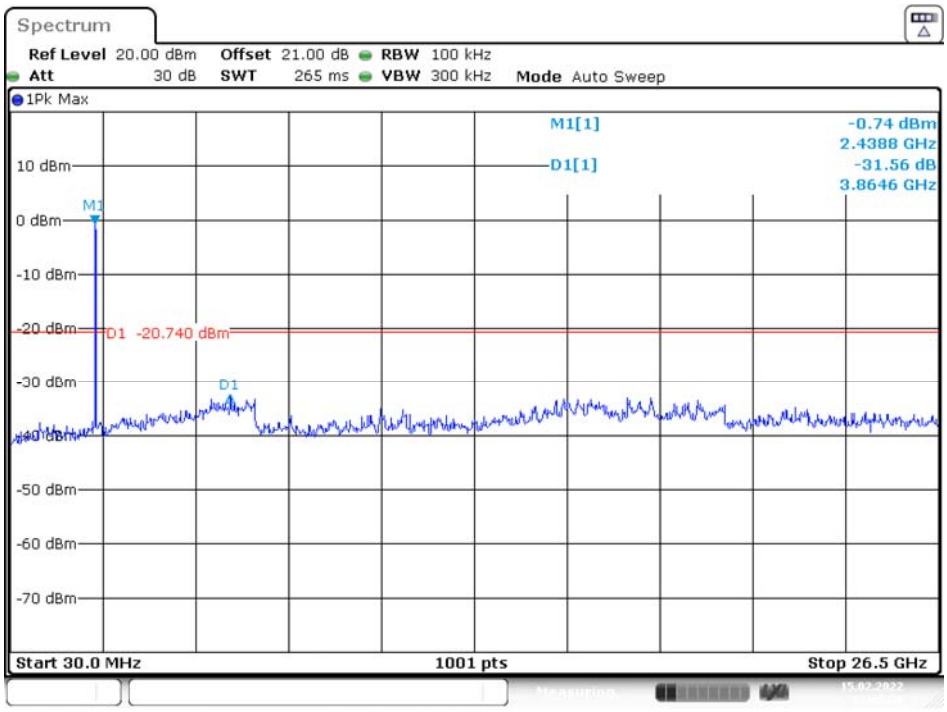
Date: 15.FEB.2022 13:28:47

Middle Channel



Date: 15.FEB.2022 13:32:00

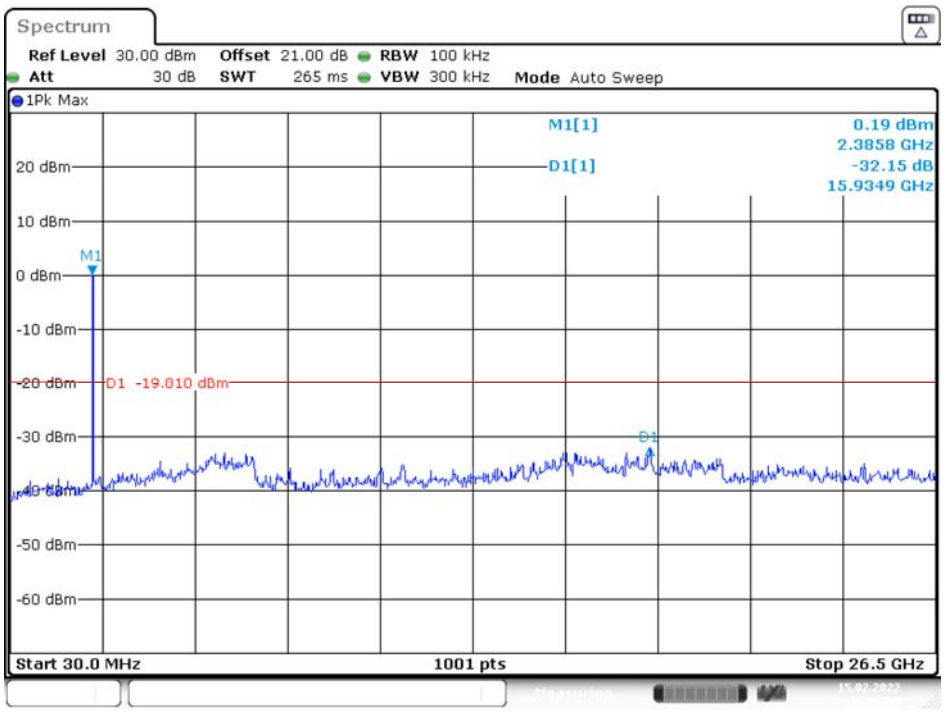
High Channel



Date: 15.FEB.2022 13:35:26

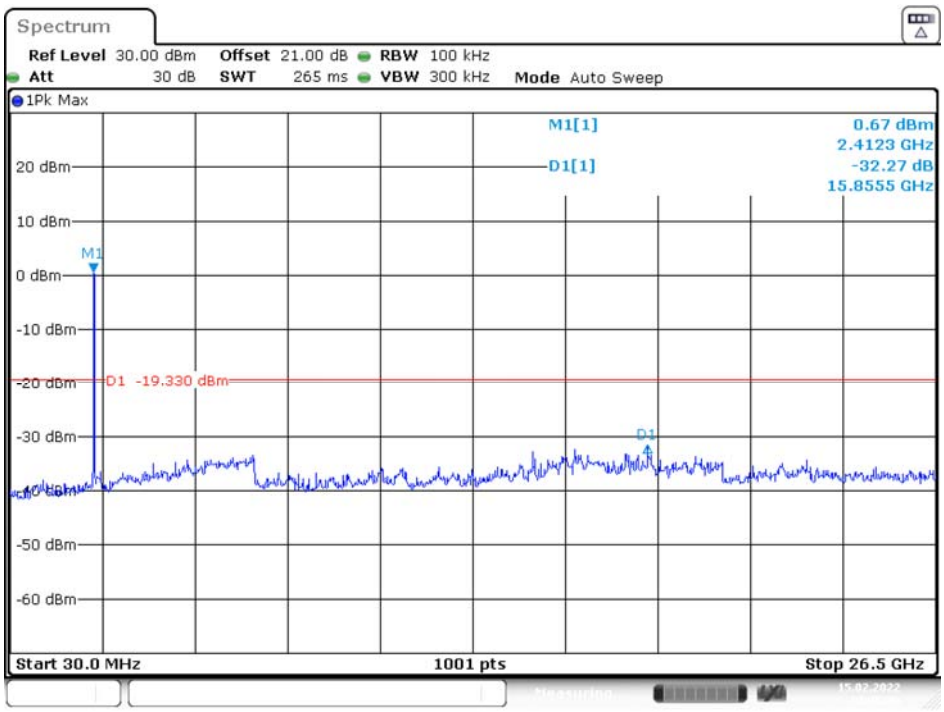
N20 Mode

Low Channel



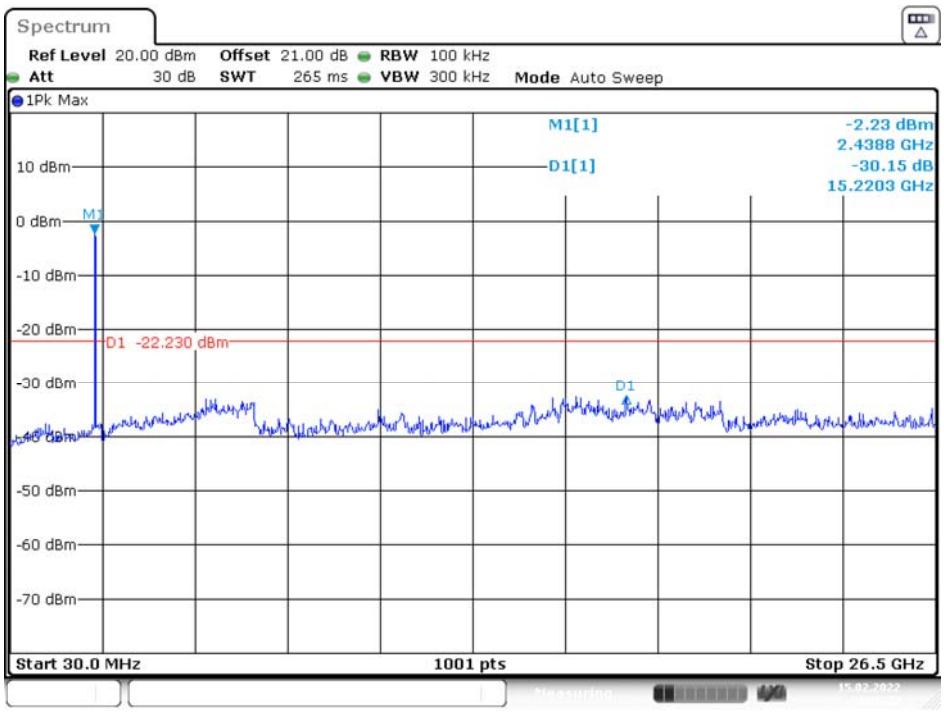
Date: 15.FEB.2022 13:41:00

Middle Channel



Date: 15.FEB.2022 13:45:46

High Channel



Date: 15.FEB.2022 13:50:24

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

9.1 Applicable Standard

According to FCC §15.247(a)(2).

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

9.2 Test Procedure

The steps for the first option are as follows:

a) Set RBW = 100 kHz.

b) Set the VBW ≥ [3 × RBW].

c) Detector = peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

f) Allow the trace to stabilize.

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

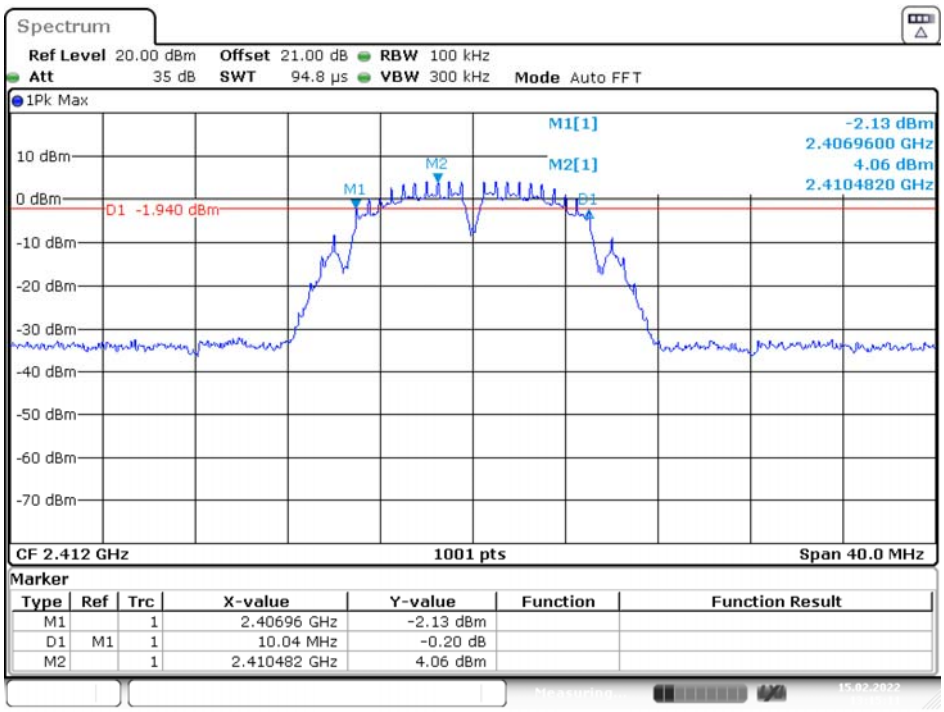
9.3 Test Results

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
B Mode				
Low	2412	10.04	> 500	PASS
Middle	2437	10.04	> 500	PASS
High	2462	10.04	> 500	PASS
G Mode				
Low	2412	16.36	> 500	PASS
Middle	2437	16.36	> 500	PASS
High	2462	16.36	> 500	PASS
N20 Mode				
Low	2412	17.60	> 500	PASS
Middle	2437	17.60	> 500	PASS
High	2462	17.60	> 500	PASS

Please refer to the following plots

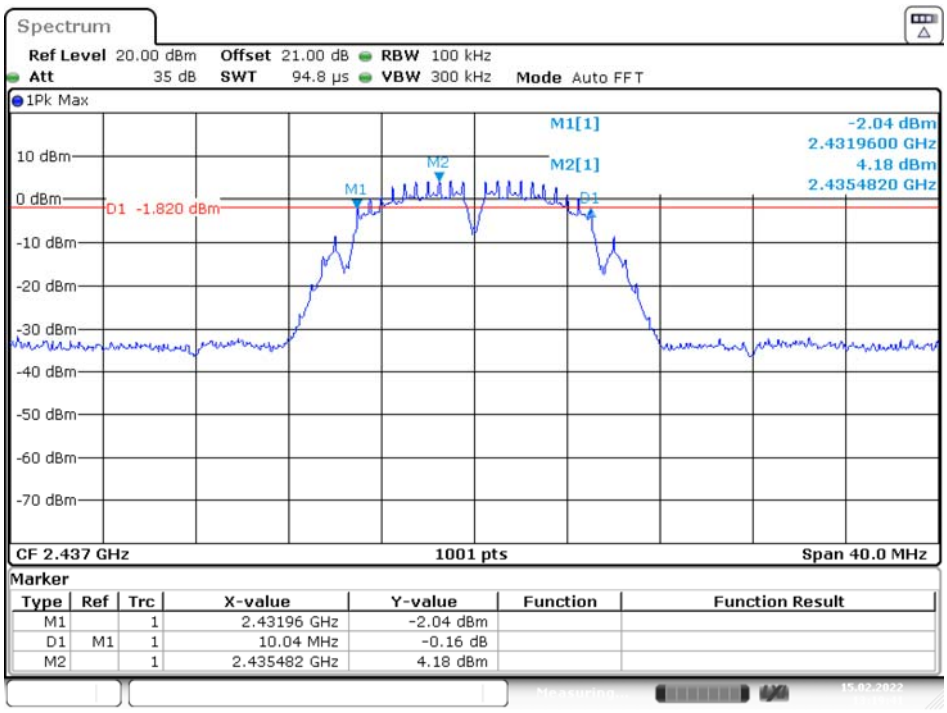
B Mode

Low Channel



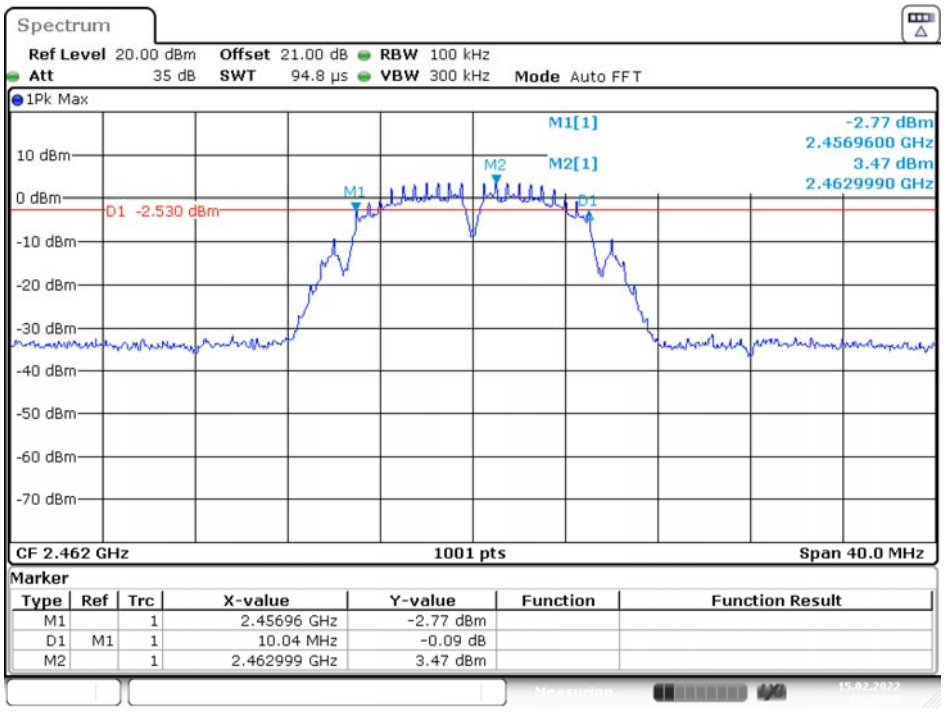
Date: 15.FEB.2022 13:15:12

Middle Channel



Date: 15.FEB.2022 13:19:42

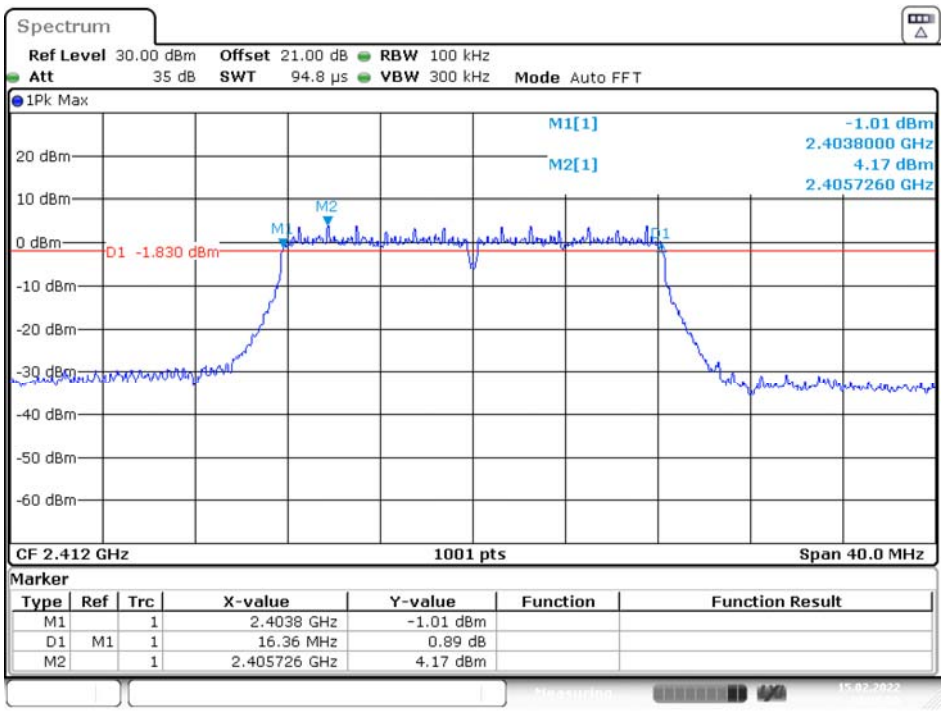
High Channel



Date: 15.FEB.2022 13:22:37

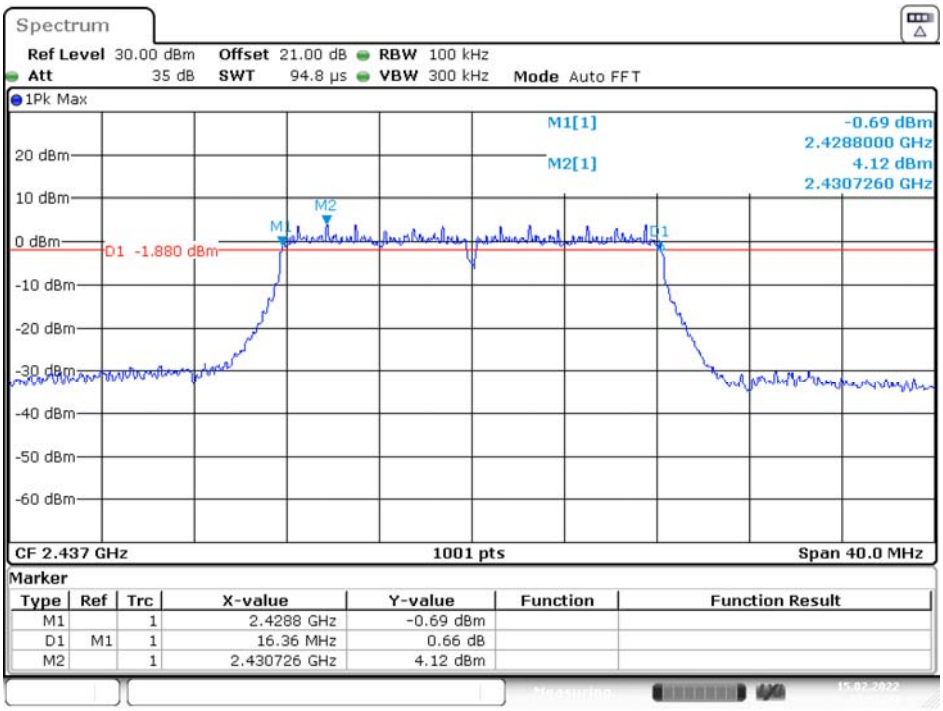
G Mode

Low Channel



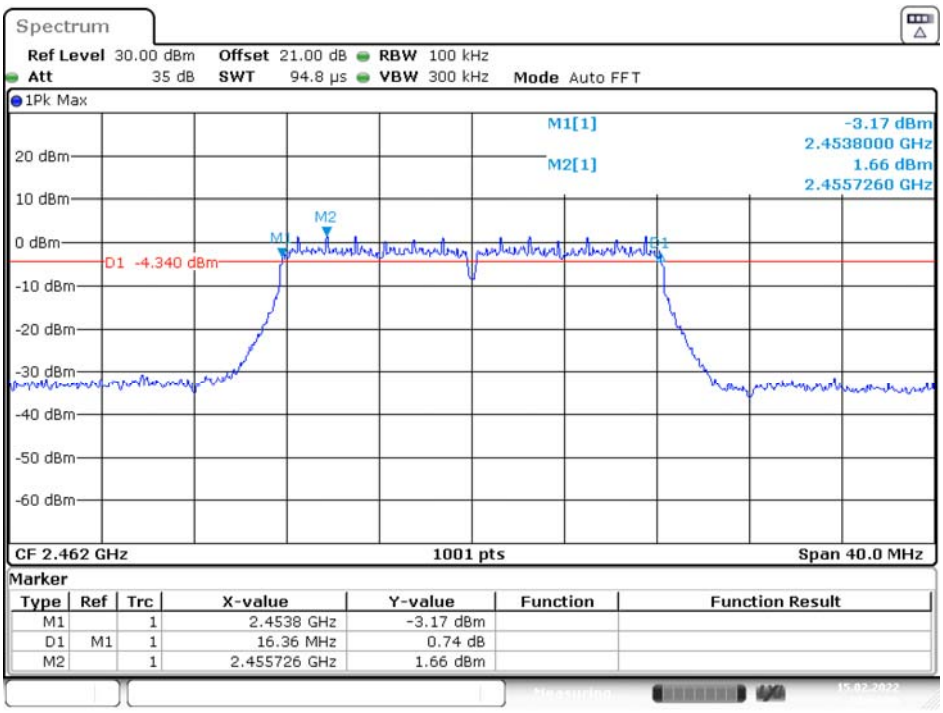
Date: 15.FEB.2022 13:27:57

Middle Channel



Date: 15.FEB.2022 13:31:30

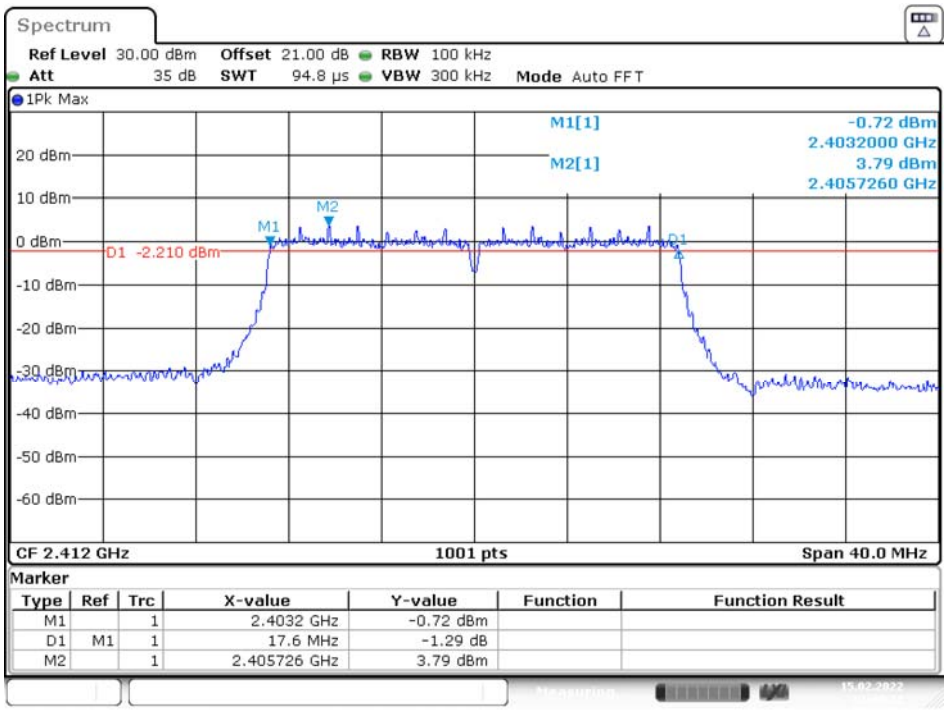
High Channel



Date: 15.FEB.2022 13:34:36

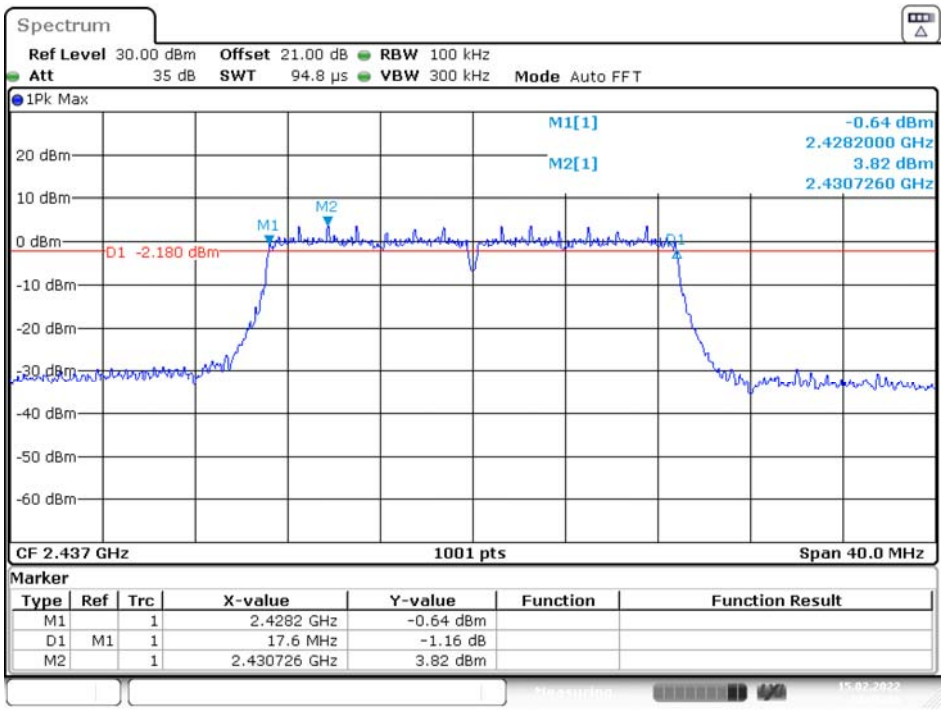
N20 Mode

Low Channel



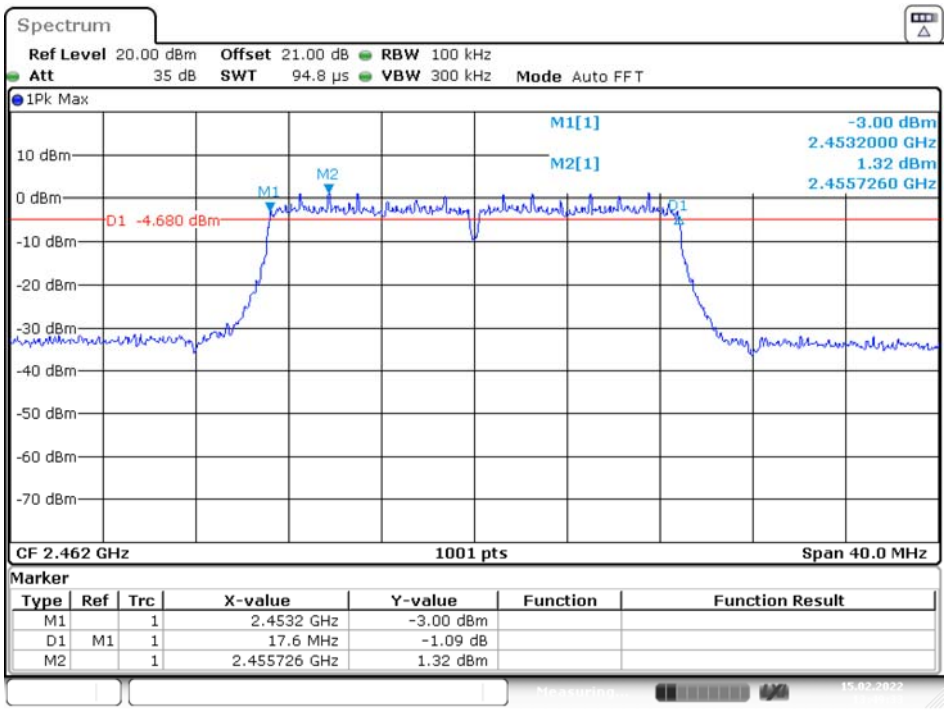
Date: 15.FEB.2022 13:40:11

Middle Channel



Date: 15.FEB.2022 13:45:16

High Channel



Date: 15.FEB.2022 13:49:34

10 FCC §15.247(b)(3) – Maximum Peak 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	17.56	0.057	1	PASS
Middle	2437	17.22	0.053	1	PASS
High	2462	16.88	0.049	1	PASS
G Mode					
Low	2412	25.04	0.319	1	PASS
Middle	2437	25.07	0.321	1	PASS
High	2462	23.02	0.200	1	PASS
N20 Mode					
Low	2412	24.90	0.309	1	PASS
Middle	2437	24.80	0.302	1	PASS
High	2462	23.41	0.219	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.

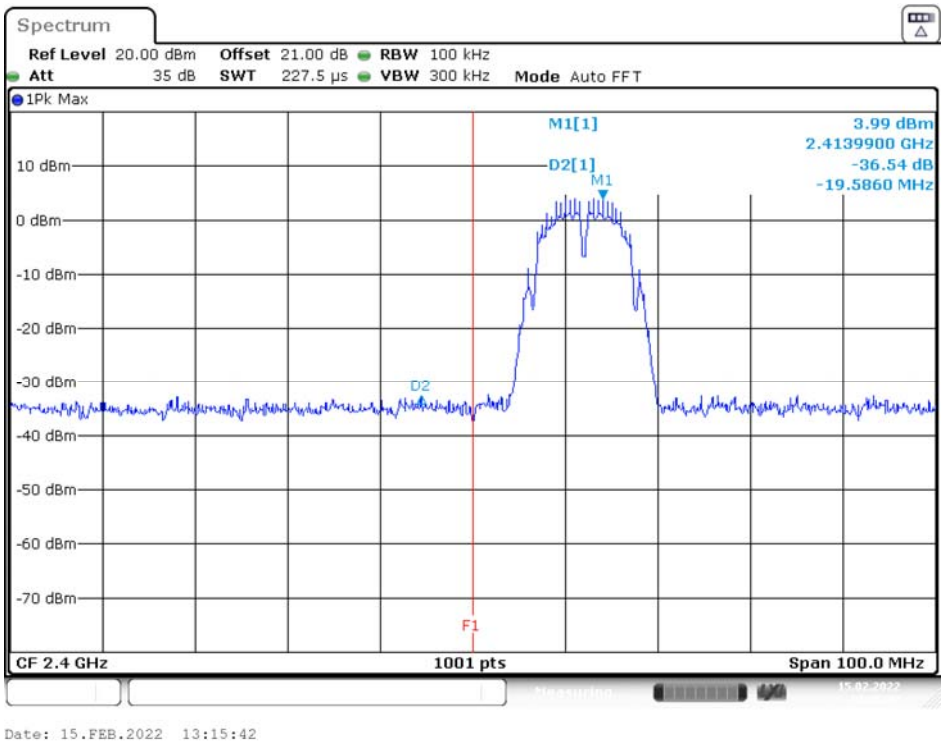
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	36.54	≥ 20	PASS
High	2462	35.83	≥ 20	PASS
G Mode				
Low	2412	33.62	≥ 20	PASS
High	2462	33.32	≥ 20	PASS
N20 Mode				
Low	2412	33.12	≥ 20	PASS
High	2462	33.74	≥ 20	PASS

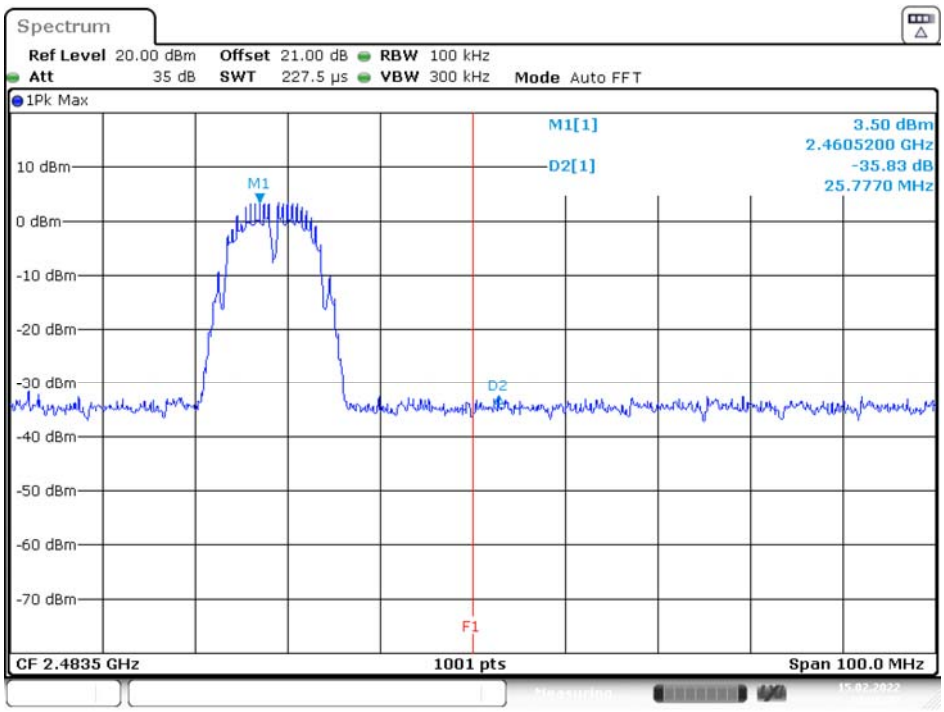
Please refer to the following plots.

B Mode

Band Edge, Left Side



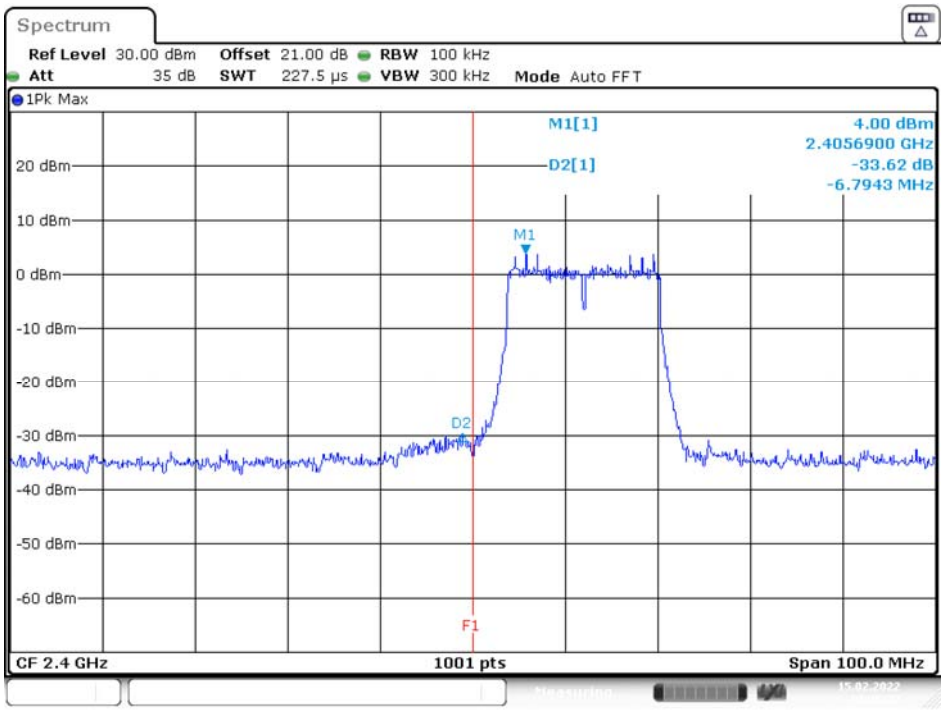
Band Edge, Right Side



Date: 15.FEB.2022 13:23:08

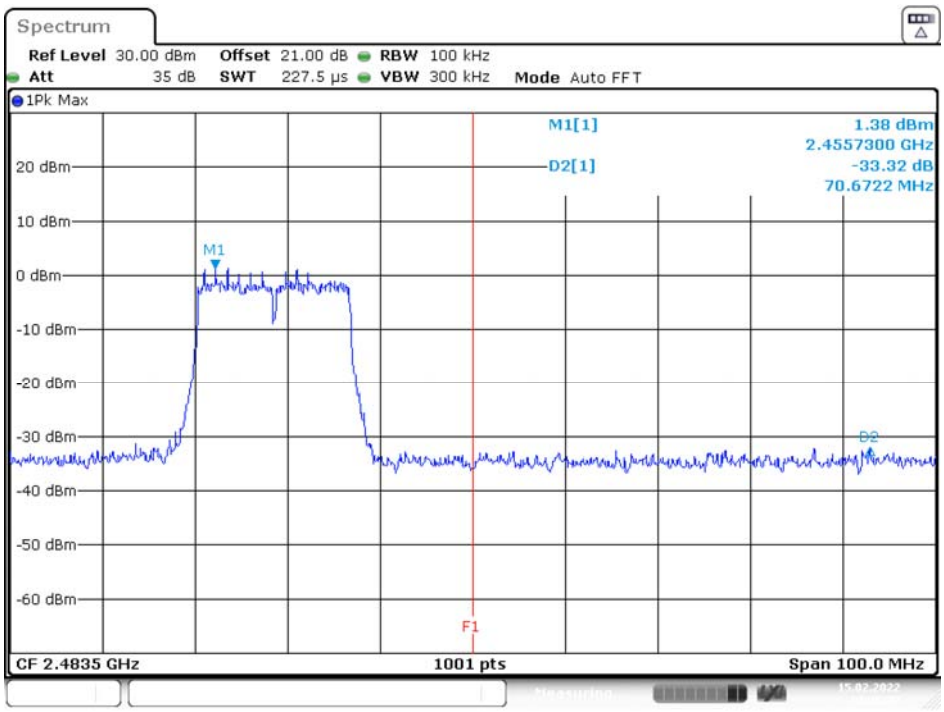
G Mode

Band Edge, Left Side



Date: 15.FEB.2022 13:28:27

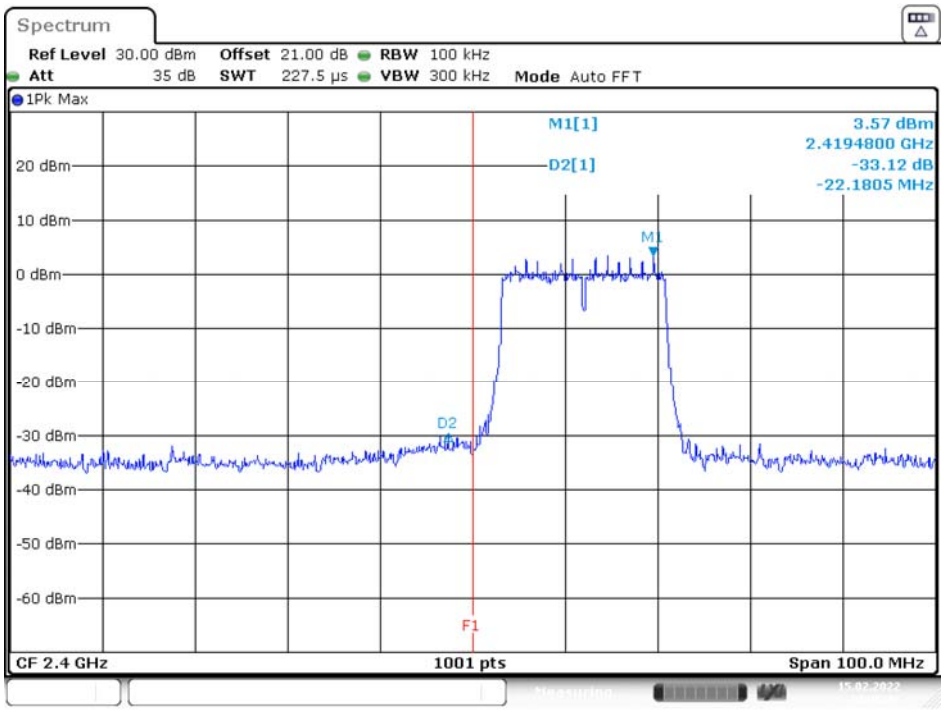
Band Edge, Right Side



Date: 15.FEB.2022 13:35:07

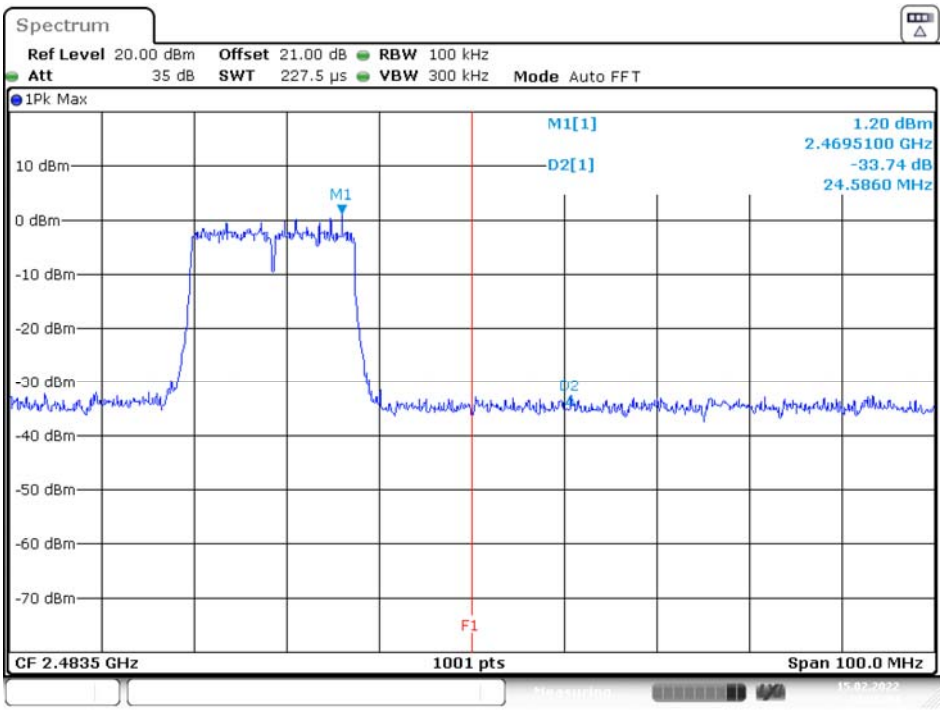
N20 Mode

Band Edge, Left Side



Date: 15.FEB.2022 13:40:41

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

According to ANSI C63.10-2013

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

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

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

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

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

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

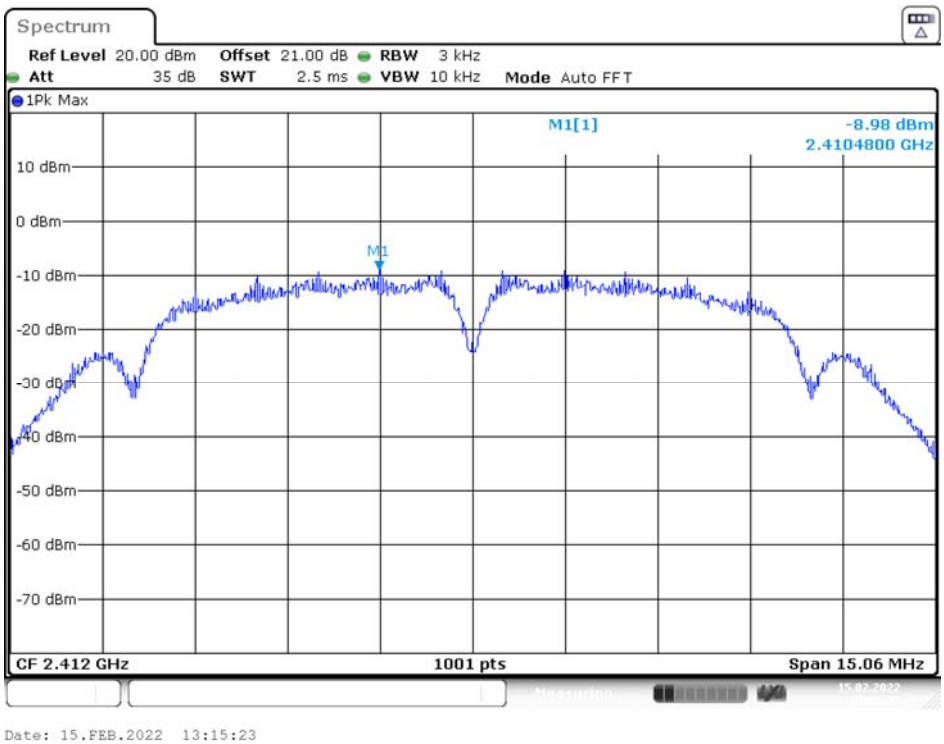
12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-8.98	8	PASS
Middle	2437	-8.90	8	PASS
High	2462	-9.62	8	PASS
G Mode				
Low	2412	-8.04	8	PASS
Middle	2437	-8.04	8	PASS
High	2462	-9.79	8	PASS
N20 Mode				
Low	2412	-8.42	8	PASS
Middle	2437	-9.17	8	PASS
High	2462	-9.73	8	PASS

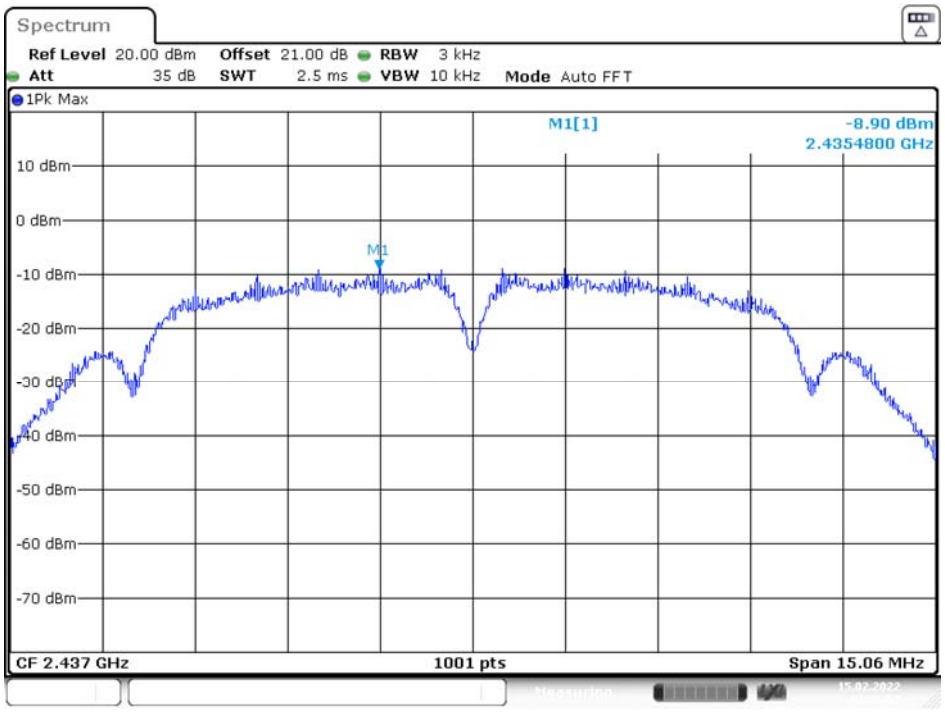
Please refer to the following plots

B Mode

Low Channel

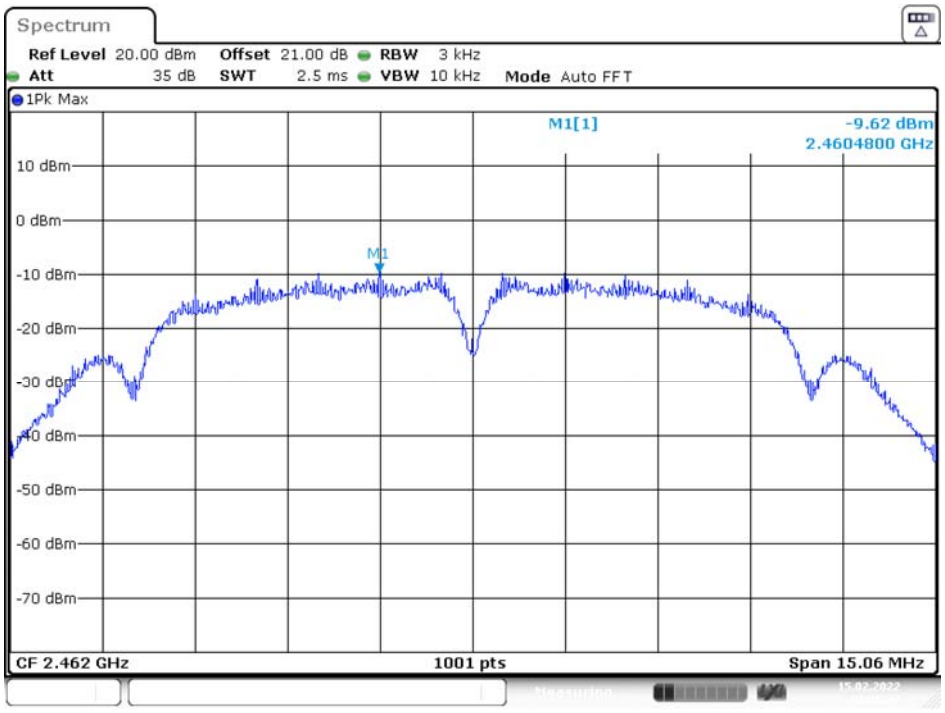


Middle Channel



Date: 15.FEB.2022 13:19:52

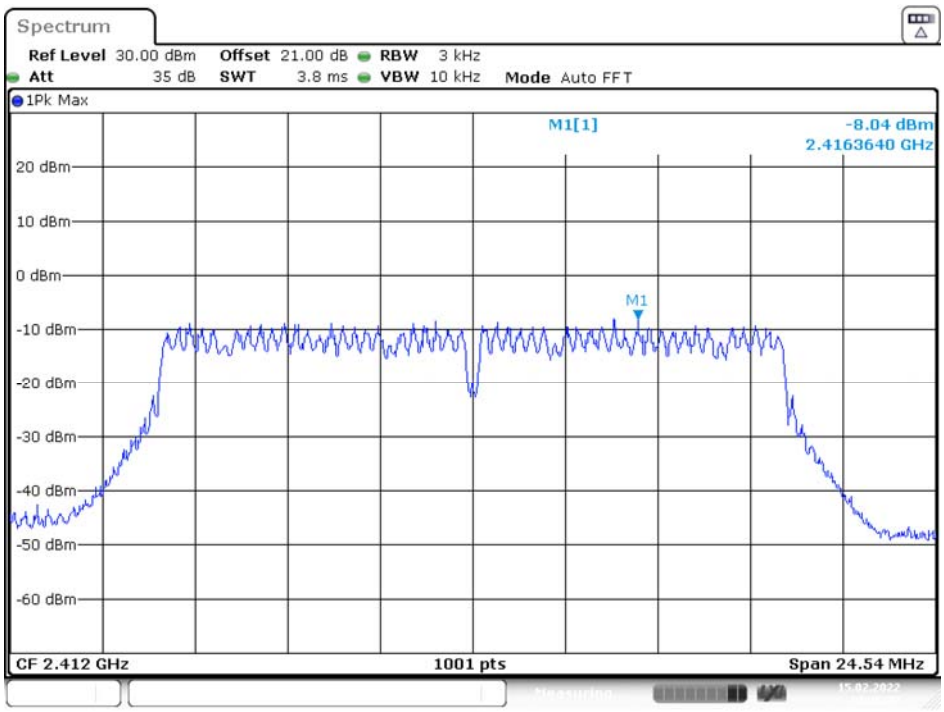
High Channel



Date: 15.FEB.2022 13:22:48

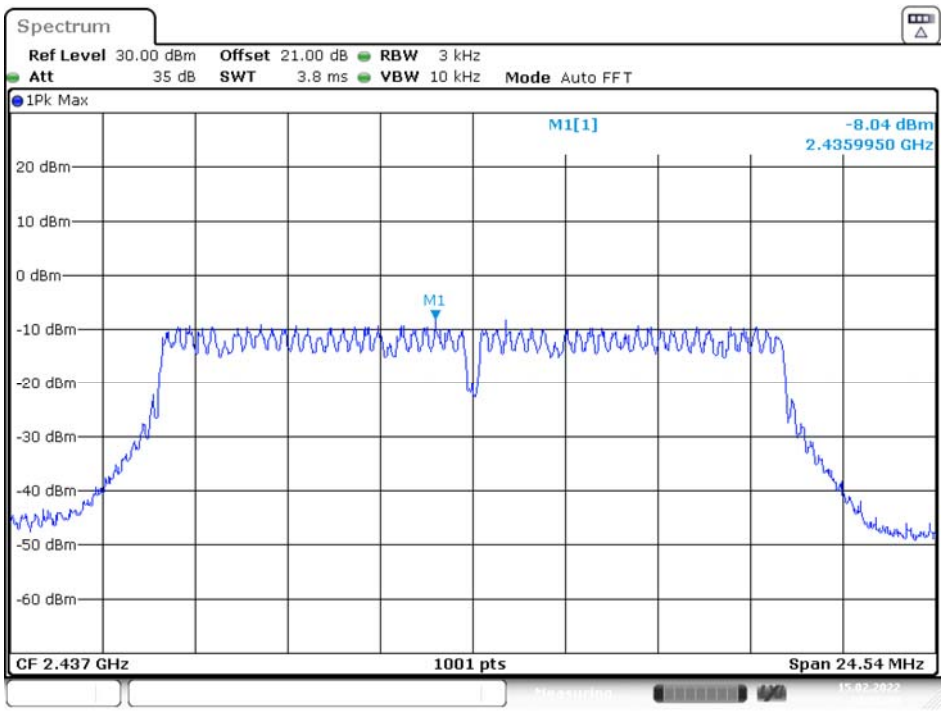
G Mode

Low Channel



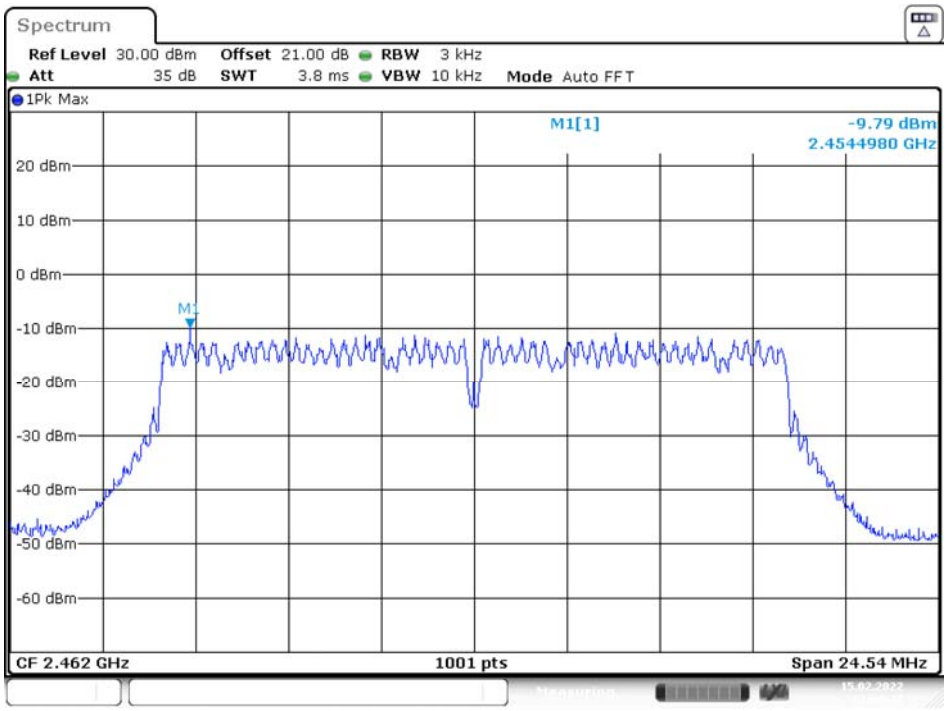
Date: 15.FEB.2022 13:28:07

Middle Channel



Date: 15.FEB.2022 13:31:41

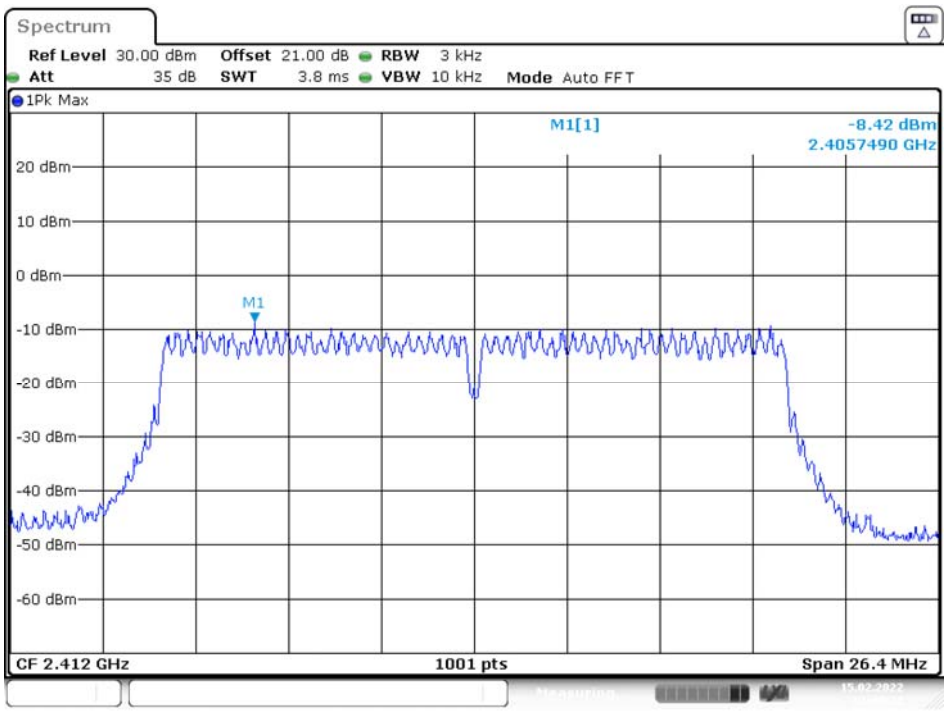
High Channel



Date: 15.FEB.2022 13:34:47

N20 Mode

Low Channel



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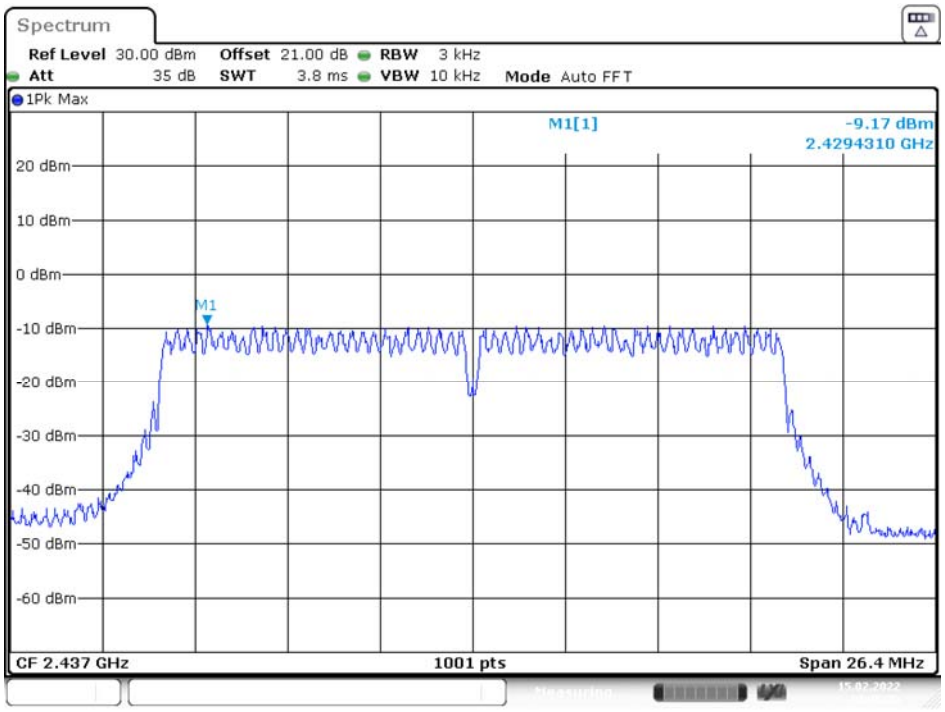
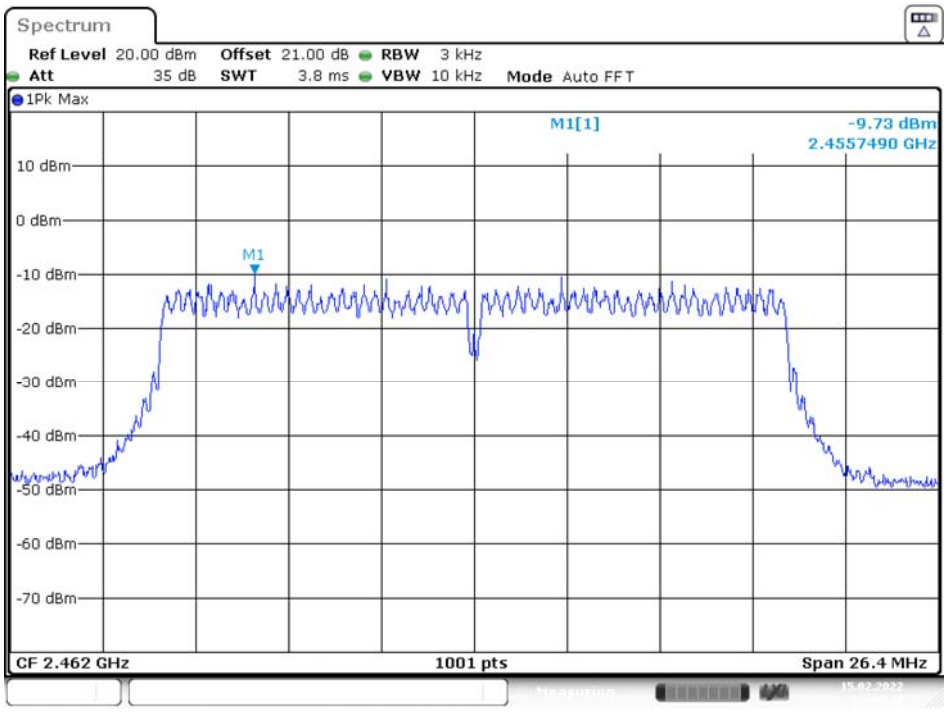
Middle Channel



Date: 15.FEB.2022 13:45:27

High Channel



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