FCC Part 15.247

TEST REPORT

For

FEITIAN Technologies Co., Ltd.

Floor 17th, Tower B, Huizhi Mansion, No.9 Xueqing Road, Haidian District, Beijing, China

FCC ID: ZD3FTF20SC200RNA

Report Type:	**Product Type:**
Original Report	Android POS Terminal

Report Producer : **Jane Chen** Jane Chen

Report Number : **RXZ210922002RF03**

Report Date : **2021-11-01**

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Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ210922002	RXZ210922002RF03	2021-11-01	Original Report	Jane Chen

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Applicant	FEITIAN Technologies Co., Ltd. Floor 17th, Tower B, Huizhi Mansion, No.9 Xueqing Road, Haidian District, Beijing, China
Manufacturer	FEITIAN Technologies Co., Ltd. Floor 17th, Tower B, Huizhi Mansion, No.9 Xueqing Road, Haidian District, Beijing, China
Brand(Trade) Name	N/A
Product (Equipment)	Android POS Terminal
Main Model Name	F20 FP
Series Model Name	F20
Model Discrepancy	F20 FP with Touch Function F20 without Touch Function
Frequency Range	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz BLE Mode: 2402 ~ 2480 MHz
Transmit Power	IEEE 802.11b Mode: 12.14 dBm IEEE 802.11g Mode: 16.40 dBm IEEE 802.11n HT20 Mode: 16.52 dBm IEEE 802.11n HT40 Mode: 20.53 dBm BLE Mode: 1.36 dBm
Modulation Technique	IEEE 802.11b Mode: DSSS IEEE 802.11g Mode: OFDM IEEE 802.11n HT20 Mode: OFDM IEEE 802.11n HT40 Mode: OFDM BLE Mode: GFSK
Power Operation (Voltage Range)	☒ AC 120V/60Hz ☒ Adapter1 Brand Name: DEE VAN Model:DSA-10PF06-05 FUS I/P: 100-240Vac,0.3A O/P: 5Vdc, 2.0A Adapter2 Brand Name: TEKA Model:TEKA-UCA20US I/P: 100-240Vac,0.35A O/P: 5Vdc, 2.0A ☐ By AC Power Cord ☐ PoE
	☒ DC Type ☒ Battery: Rechargeable Li-ion Battery Rechargeable Li-polymer Battery

	Brand Name: ShenZhen Utility Power Source Co., Ltd. Model: D07 7.6V dc_2500mAh ☐ DC Power Supply ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	Sep. 24, 2021
Date of Test	Sep. 28, 2021 ~ Oct. 12, 2021

*All measurement and test data in this report was gathered from production sample serial number: RXZ210922002-01 (Assigned by BACL).

1.2 Objective

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

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

1.3 Related Submittal(s)/Grant(s)

FCC Part 15.407 NII submission with FCC ID: ZD3FTF20SC200RNA

FCC Part 15.247 DSS Submittal with FCC ID: ZD3FTF20SC200RNA

FCC Part 15.225 DXX submissions with FCC ID: ZD3FTF20SC200RNA

FCC Part 22H24E27 PCB submissions with FCC ID: ZD3FTF20SC200RNA

FCC Part 90 PCB submissions with FCC ID: ZD3FTF20SC200RNA

1.4 Test Methodology

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

KDB 558074 D01 15.247 Meas Guidance v05r02

1.5 Statement of Compliance

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

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

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

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

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dBm
Occupied Bandwidth		+/- 0.35 MHz
Unwanted Emissions, conducted		+/- 1.69 dBm
Emissions, radiated	30 MHz~1GHz	+/- 5.22 dB
	1 GHz~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	2021/10/12	27.2	50.5	1010	Boris Kao
Radiation Spurious Emissions	2021/9/30~2021/10/4	25.8~26.7	58~63	1010	David Lee/ Ken Yu
Conducted Spurious Emissions	2021/9/28~2021/10/12	25.1~25.4	47~50	1010	David Lee/ Boris Kao
6 dB Emission Bandwidth	2021/9/28~2021/10/12	25.1~25.4	47~50	1010	
Maximum Output Power	2021/9/28~2021/10/12	25.1~25.4	47~50	1010	
100 kHz Bandwidth of Frequency Band Edge	2021/9/28~2021/10/12	25.1~25.4	47~50	1010	
Power Spectral Density	2021/9/28~2021/10/12	25.1~25.4	47~50	1010	

1.8 Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. to collect test data is located on ☒70, Lane 169, Sec. 2, Datong Road, Xizhi Dist., New Taipei City 22183, Taiwan, R.O.C.

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

2 System Test Configuration

2.1 Description of Test Configuration

For WIFI mode, there are totally 11 channels.

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

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

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

For BLE mode, there are totally 40 channels.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	--	--
2	2406	--	--
3	2408	37	2476
--	--	38	2478
19	2440	39	2480

For BLE Modes were tested with channel 0, 19 and 39.

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

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

Used “QRCT V3.0” software.

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

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

BLE : 1 Mbps

2.4 Test Mode

Pre-scan

AC Line Conducted Emissions and Radiated Spurious Emissions

Mode 1: F20 FP + Adapter (Model : DSA-10PF06-05 FSU).

Mode 2: F20 FP + Adapter (Model : TEKA-UCA20US).

Mode 3: F20 + Adapter (Model : DSA-10PF06-05 FSU).

Mode 4: F20 + Adapter (Model : TEKA-UCA20US).

Worst case is the F20 + Adapter (Model : DSA-10PF06-05 FSU).

Full System F20 + Adapter (Model : DSA-10PF06-05 FSU) for all test item.

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
NB	DELL	E6410	8N7PXN1
Adapter-1	DEE VAN ENTERPRISE	DSA-10PF06-05 FSU	N/A
Adapter-2	TEKA	TEKA-UCA20US	N/A
Base frame	FEITIAN	F20-1	N/A

2.6 External Cable List and Details

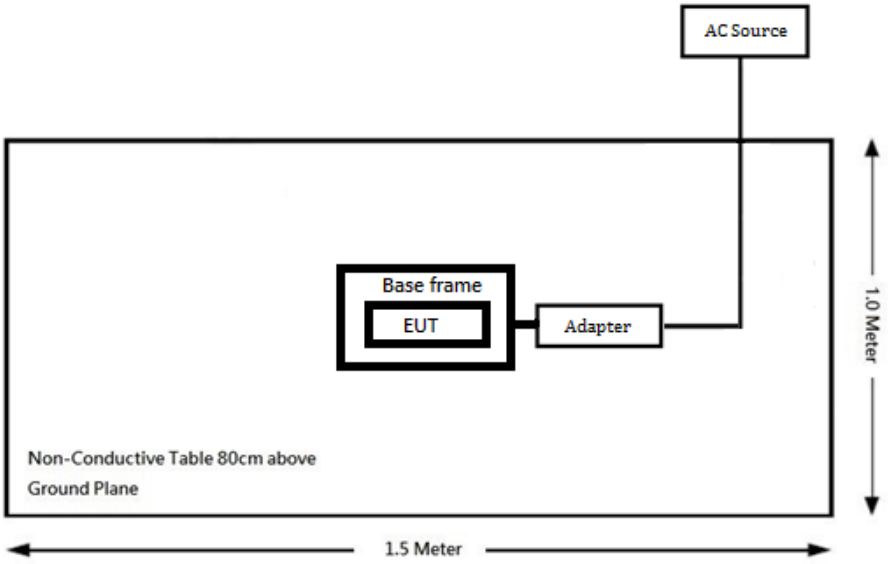
Cable Description	Length (m)	From	To
USB Cable	1.5	Adapter	EUT

2.7 Block Diagram of Test Setup

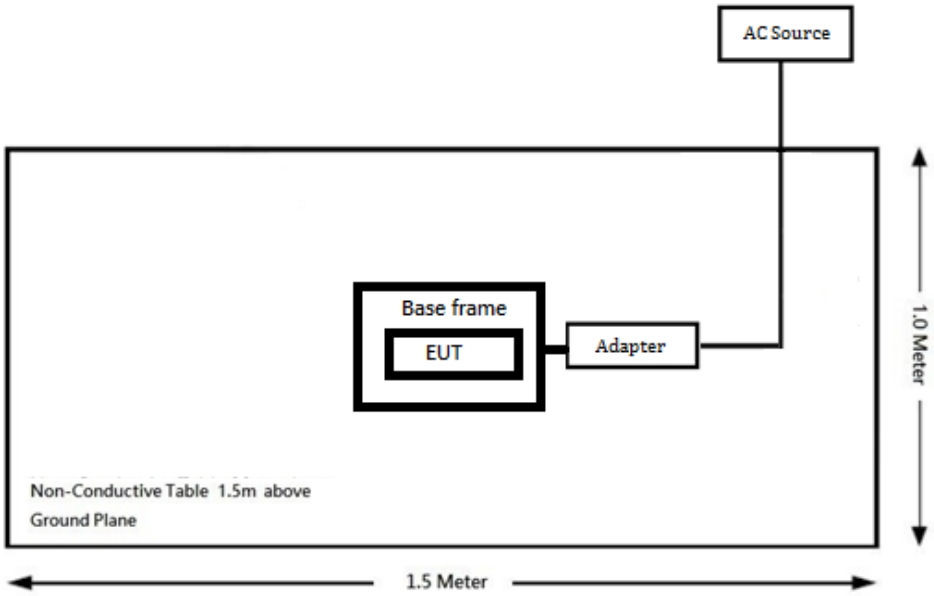
See test photographs attached in setup photos for the actual connections between EUT and support equipment.

Radiation:

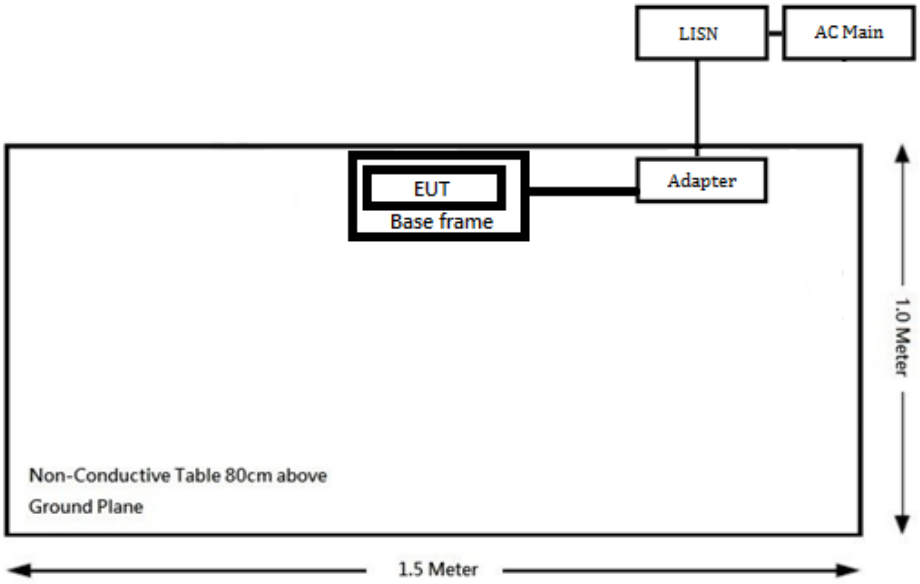
Below 1GHz:



Above 1GHz:



Conduction:



2.8 Duty Cycle

According to KDB 558074 D01 15.247 Meas Guidance v05r02 section 6.0:

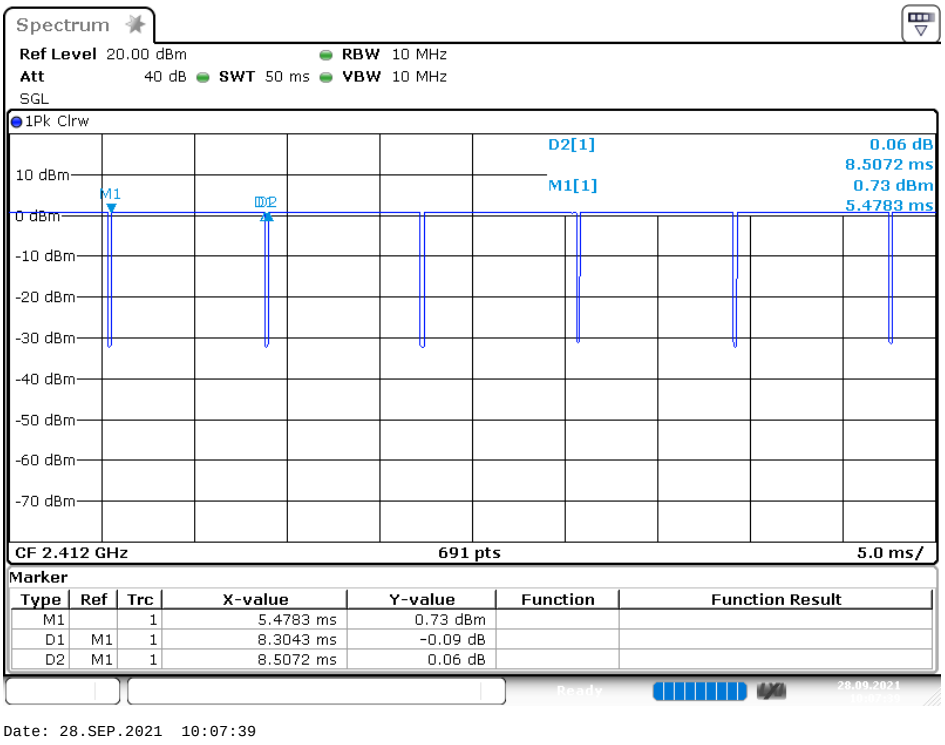
All measurements are to be performed with the EUT transmitting at 100% duty cycle at its maximum power control level; however, if 100% duty cycle cannot be achieved, measurements of duty cycle, x, and maximumpower transmission duration, T, are required for each tested mode of operation.

Radio Mode	On Time (ms)	Period (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
802.11b	8.3043	8.5072	98	0.09
802.11g	1.2754	1.5217	84	0.76
802.11n20	1.2464	1.4928	83	0.81
802.11n40	0.5797	0.8406	69	1.16
BLE	0.3884	0.6232	62	2.05

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

Please refer to the following plots.

B Mode



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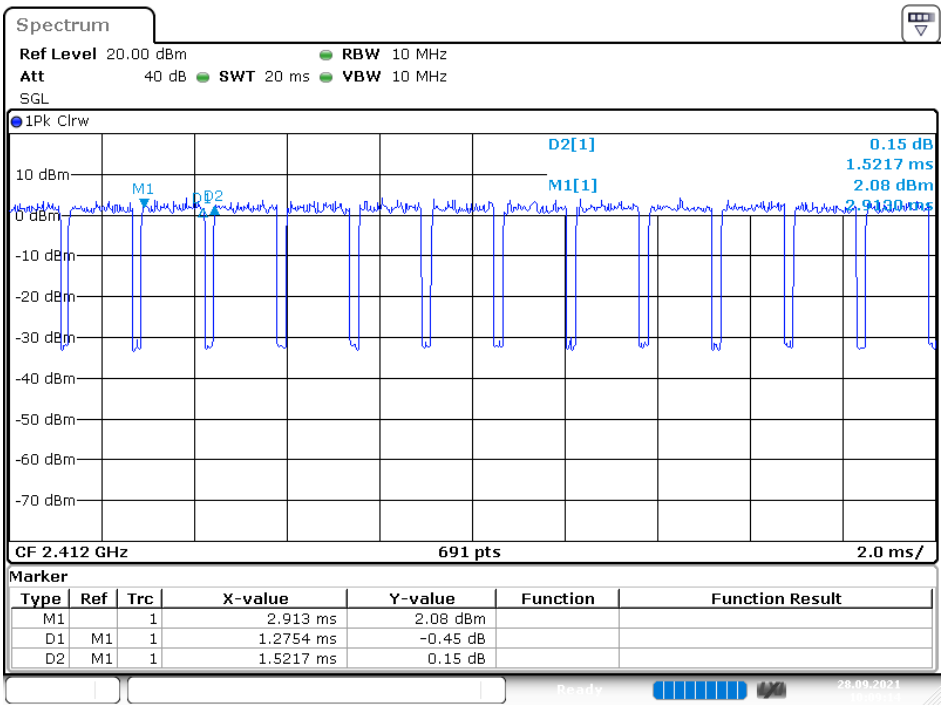
G Mode



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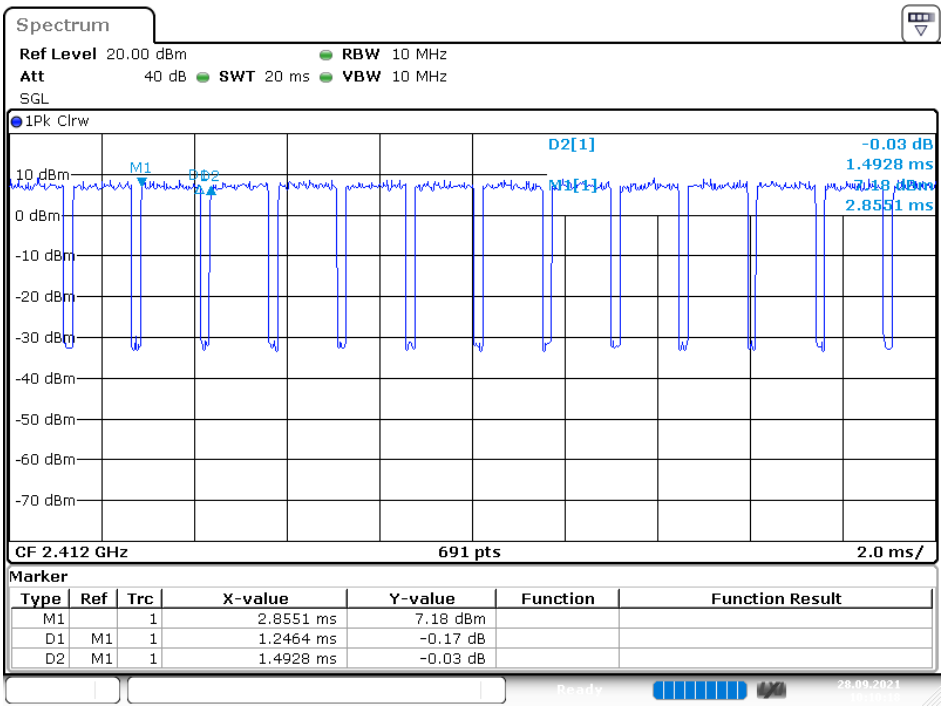
N20 Mode



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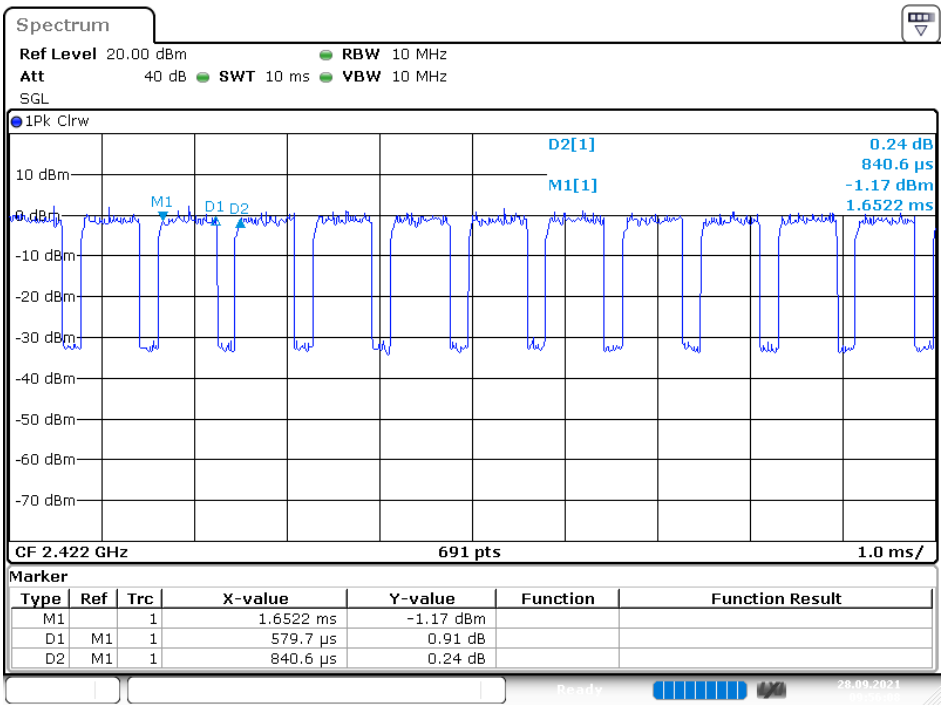
N40 Mode



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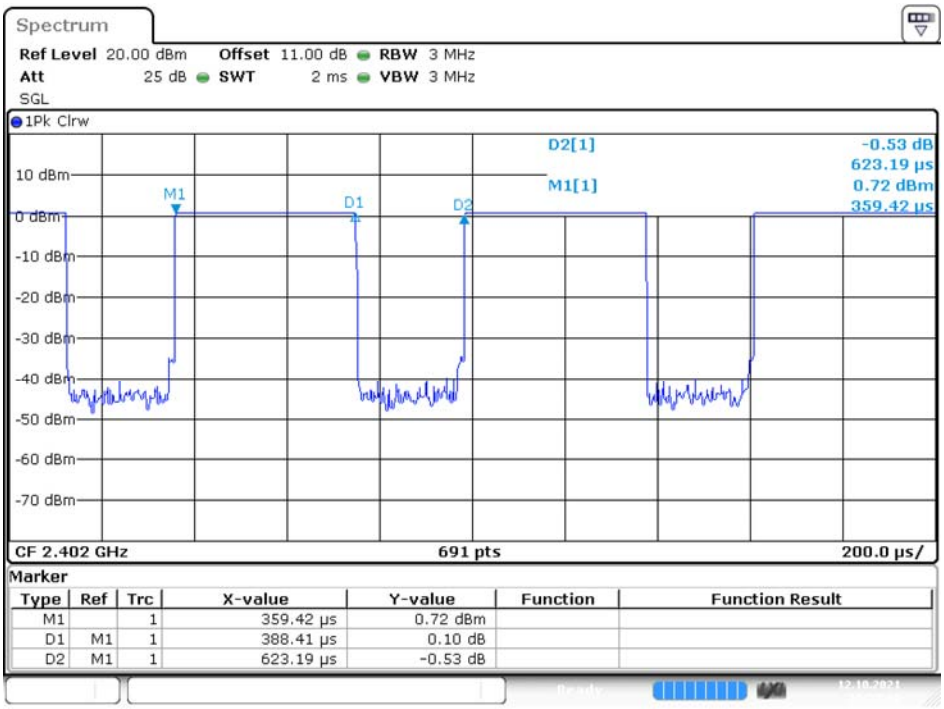
BLE Mode



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3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.247(i), §1.1310, §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207(a)	AC Line Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247(a)(2)	6 dB Emission Bandwidth	Compliance
§15.247(b)(3)	Maximum Peak Output Power	Compliance
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliance
§15.247(e)	Power Spectral Density	Compliance

4 Test Equipment List and Details

Description	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conduction Room (CON-A)					
LISN	Rohde & Schwarz	ENV216	101612	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2020/11/12	2021/11/11
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/29
RF Cable	EMEC	EM-CB5D	001	2021/6/11	2022/6/11
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2021/01/19	2022/01/18
Horn Antenna	EMCO	3115	9311-4158	2021/08/26	2022/08/25
Horn Antenna	ETS-Lindgren	3116	62638	2021/08/11	2022/08/10
Preamplifier	Sonoma	310N	130602	2021/06/08	2022/06/07
Preamplifier	A.H. system Inc.	PAM-0118P	466	2020/11/5	2021/11/4
Microware Preamplifier	EM Electronics Corporation	EM18G40G	060656	2020/12/30	2021/12/29
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2020/11/12	2021/11/11
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2021/01/07	2022/01/06
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2021/2/1	2022/1/31
Coaxial Cable	COMMATE	PEWC	8Dr	2020/12/25	2021/12/24
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2021/2/1	2022/1/31
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2020/12/25	2021/12/24
Cable	EMC	EMC105-SM-SM-10000	201003	2021/2/3	2022/2/2
Turn Table	Champro	TT-2000	060772-T	N.C.R	N.C.R
Antenna Tower	Champro	AM-BS-4500-B	060772-A	N.C.R	N.C.R
Controller	Champro	EM1000	60772	N.C.R	N.C.R
Software	Farad	EZ_EMC	BACL-03A1	N.C.R	N.C.R

Conducted Room					
Spectrum Analyzer	Rohde & Schwarz	FSV40	101140	2021/1/7	2022/1/6
Cable	UTIFLEX	UFA210A	9435	2020/10/08	2021/10/07
				2021/10/05	2022/10/04
Attenuator	MCL	BW-S10W5+	1419	2021/01/28	2022/01/27
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2021/01/28	2022/01/27

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

5 FCC §15.247(i), §1.1310, § 2.1093 - RF Exposure

5.1 Applicable Standard

According to §2.1093 and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB 447498 D01 General RF Exposure Guidance v06

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] •

[$\sqrt{}$f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

1. f(GHz) is the RF channel transmit frequency in GHz.
2. Power and distance are rounded to the nearest mW and mm before calculation.
3. The result is rounded to one decimal place for comparison.
4. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test Exclusion.

5.2 RF Exposure Evaluation Result

Please refer to the SAR report, report No.: RXZ210922002SA01.

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
AUDEN TECHNO (KUNSHAN) CO. LTD	F200	FPC Antenna	2 dBi

Result: Compliance

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

7.1 Applicable Standard

According to §15.207

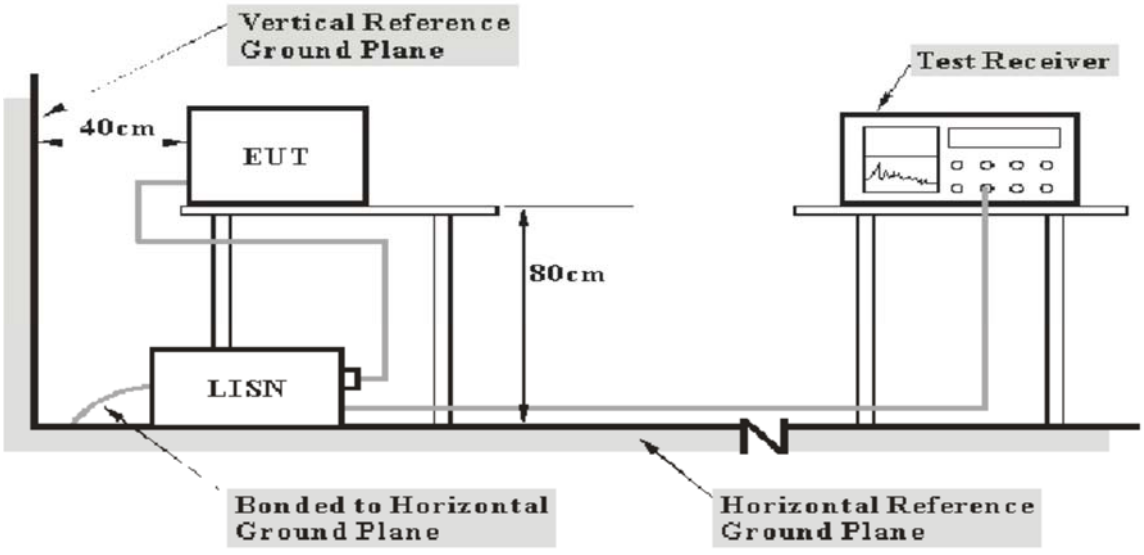
For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured 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 1	56 to 46 Note 2
0.5-5	56	46
5-30	60	50

Note 1: Decreases with the logarithm of the frequency.

Note 2: A linear average detector is required

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:

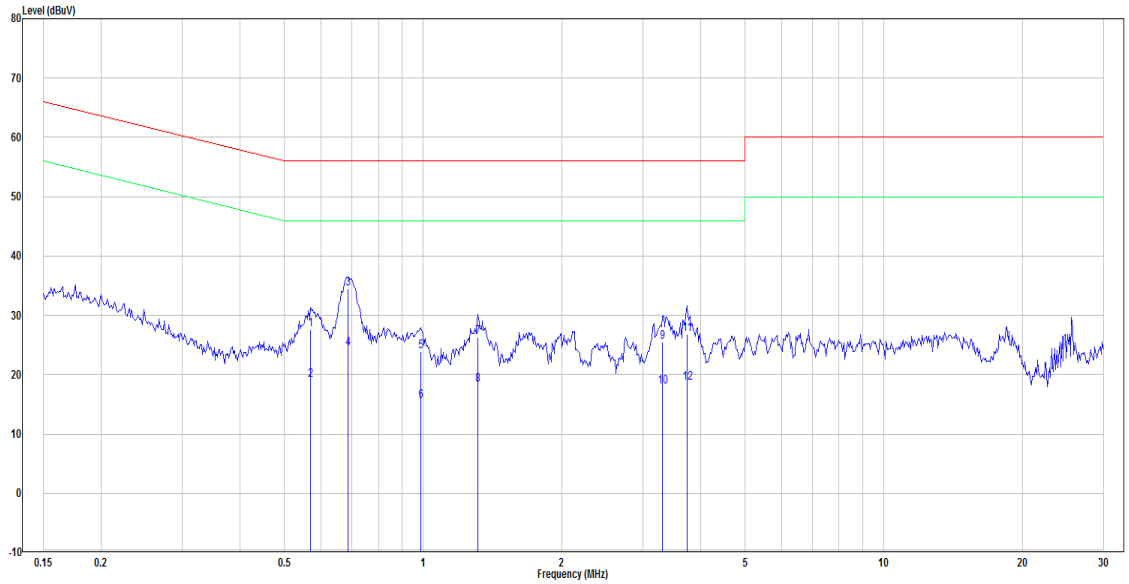
Over Limit = Level – Limit Line

7.6 Test Results

Test Mode: Transmitting

WIFI 2.4G Mode

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.570	7.95	19.59	27.54	56.00	-28.46	QP
2	0.570	-0.51	19.59	19.08	46.00	-26.92	Average
3	0.686	14.95	19.60	34.55	56.00	-21.45	QP
4	0.686	4.77	19.60	24.37	46.00	-21.63	Average
5	0.989	4.35	19.61	23.96	56.00	-32.04	QP
6	0.989	-4.12	19.61	15.49	46.00	-30.51	Average
7	1.317	6.72	19.62	26.34	56.00	-29.66	QP
8	1.317	-1.29	19.62	18.33	46.00	-27.67	Average
9	3.310	5.83	19.67	25.50	56.00	-30.50	QP
10	3.310	-1.75	19.67	17.92	46.00	-28.08	Average
11	3.740	7.13	19.68	26.81	56.00	-29.19	QP
12	3.740	-1.04	19.68	18.64	46.00	-27.36	Average

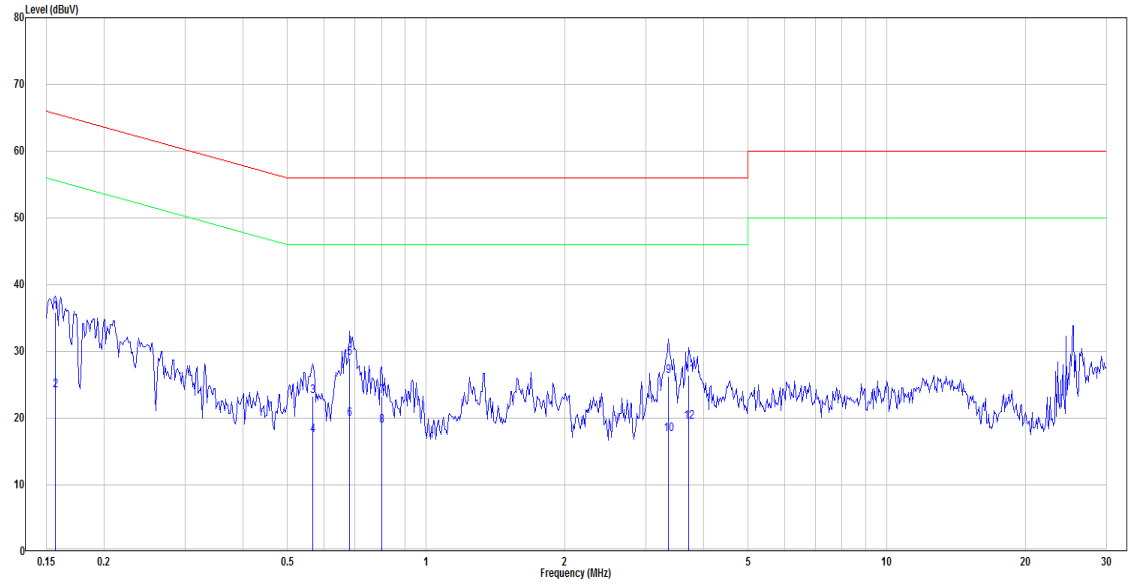
Note:

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	0.156	16.31	19.59	35.90	65.65	-29.75	QP
2	0.156	4.52	19.59	24.11	55.65	-31.54	Average
3	0.567	3.75	19.59	23.34	56.00	-32.66	QP
4	0.567	-2.14	19.59	17.45	46.00	-28.55	Average
5	0.683	9.40	19.59	28.99	56.00	-27.01	QP
6	0.683	0.28	19.59	19.87	46.00	-26.13	Average
7	0.800	3.69	19.60	23.29	56.00	-32.71	QP
8	0.800	-0.67	19.60	18.93	46.00	-27.07	Average
9	3.364	6.56	19.67	26.23	56.00	-29.77	QP
10	3.364	-2.16	19.67	17.51	46.00	-28.49	Average
11	3.720	6.81	19.68	26.49	56.00	-29.51	QP
12	3.720	-0.32	19.68	19.36	46.00	-26.64	Average

Note:

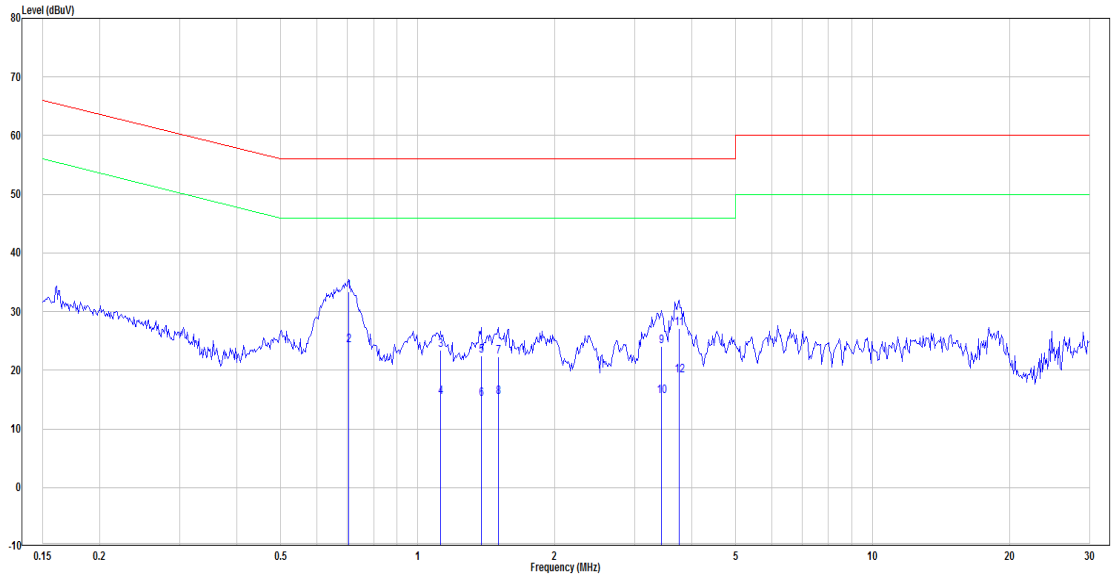
Level = Read Level + Factor

Over Limit = Level – Limit Line

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

BLE Mode

Main: AC120 V, 60 Hz, Line



No.	Frequency (MHz)	Reading (dBµV)	Correct Factor(dB)	Result (dBµV)	Limit (dBµV)	Over limit (dB)	Remark
1	0.705	13.85	19.60	33.45	56.00	-22.55	QP
2	0.705	4.63	19.60	24.23	46.00	-21.77	Average
3	1.123	3.87	19.61	23.48	56.00	-32.52	QP
4	1.123	-4.18	19.61	15.43	46.00	-30.57	Average
5	1.381	2.79	19.62	22.41	56.00	-33.59	QP
6	1.381	-4.54	19.62	15.08	46.00	-30.92	Average
7	1.503	2.64	19.63	22.27	56.00	-33.73	QP
8	1.503	-4.29	19.63	15.34	46.00	-30.66	Average
9	3.436	4.39	19.68	24.07	56.00	-31.93	QP
10	3.436	-4.18	19.68	15.50	46.00	-30.50	Average
11	3.759	7.49	19.68	27.17	56.00	-28.83	QP
12	3.759	-0.56	19.68	19.12	46.00	-26.88	Average

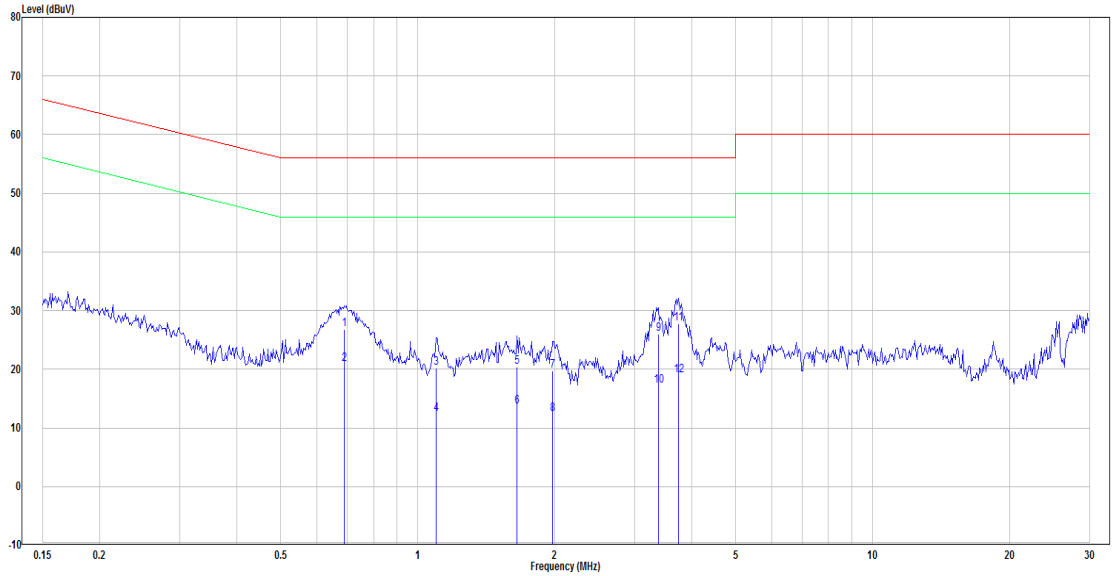
Note:

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	0.690	7.13	19.59	26.72	56.00	-29.28	QP
2	0.690	1.29	19.59	20.88	46.00	-25.12	Average
3	1.100	0.68	19.60	20.28	56.00	-35.72	QP
4	1.100	-7.20	19.60	12.40	46.00	-33.60	Average
5	1.654	0.67	19.63	20.30	56.00	-35.70	QP
6	1.654	-5.95	19.63	13.68	46.00	-32.32	Average
7	1.980	0.08	19.64	19.72	56.00	-36.28	QP
8	1.980	-7.36	19.64	12.28	46.00	-33.72	Average
9	3.381	6.31	19.67	25.98	56.00	-30.02	QP
10	3.381	-2.51	19.67	17.16	46.00	-28.84	Average
11	3.740	8.01	19.68	27.69	56.00	-28.31	QP
12	3.740	-0.76	19.68	18.92	46.00	-27.08	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

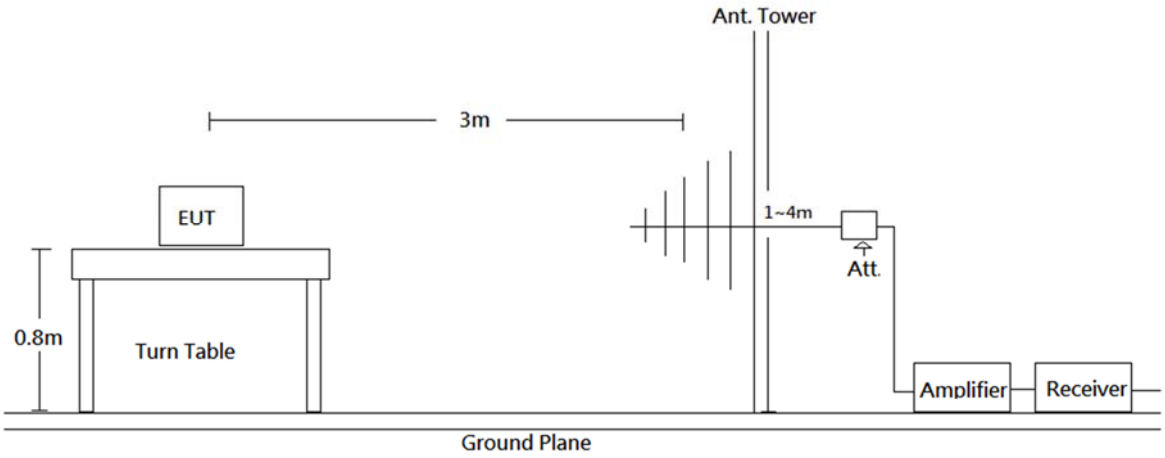
** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this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

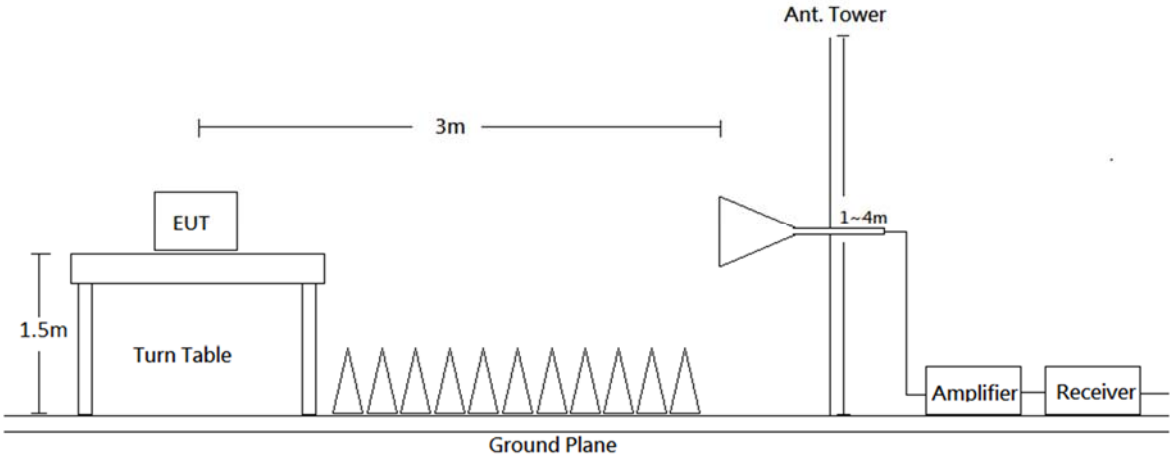
intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the 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	Detector	Duty cycle	Measurement method
30-1000 MHz	120 kHz	/	QP		QP
Above 1 GHz	1 MHz	3 MHz	PK		PK
	1 MHz	3 MHz	RMS	>98%	Ave
	1 MHz	1/T	PK	<98%	Ave

8.4 Test Procedure

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

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

8.5 Corrected Factor & Margin Calculation

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

Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain

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

Margin = Result – Limit

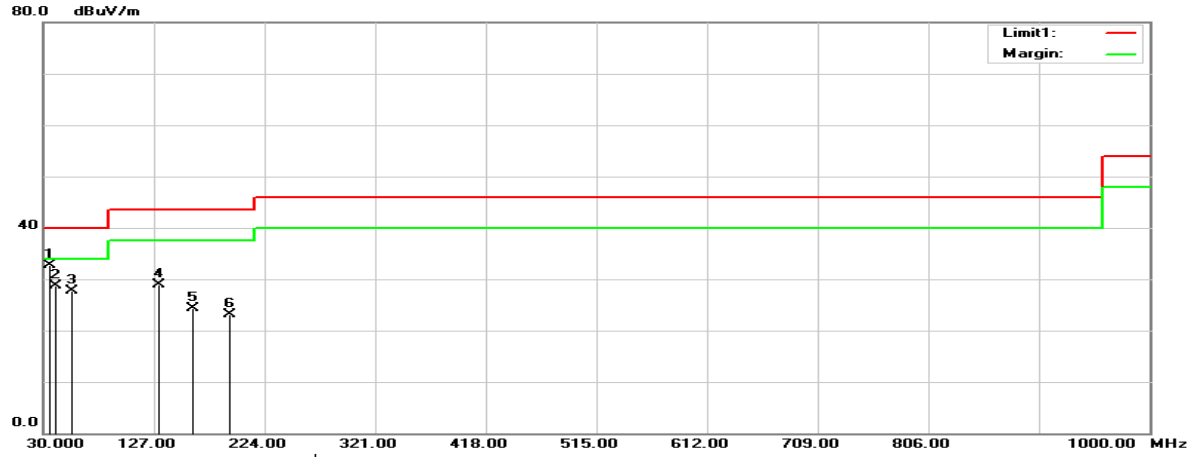
8.6 Test Results

Test Mode: Transmitting

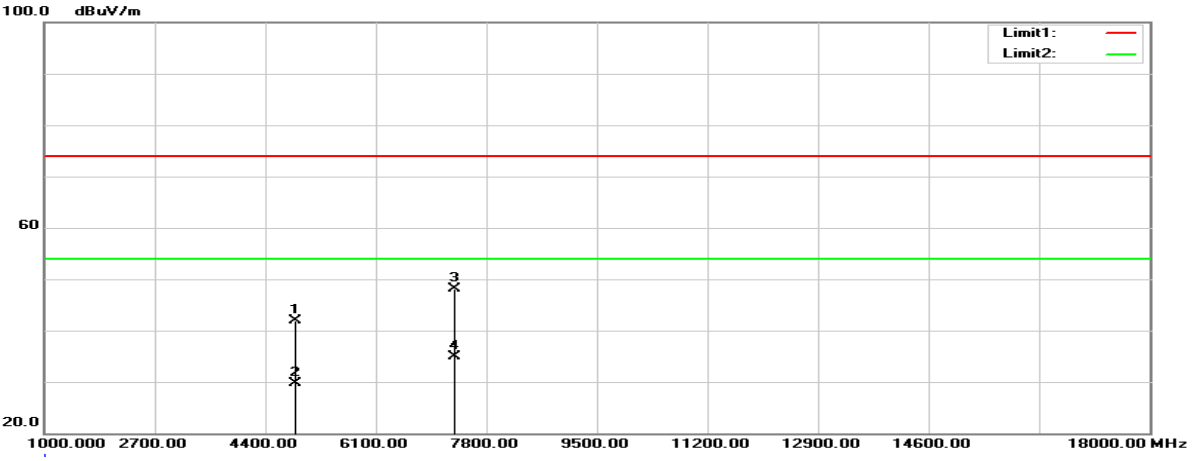
WIFI 2.4G Mode (Pre-scan with three orthogonal axis, and worse case as X axis.)

Horizontal (worst case is 802.11g mode middle channel)

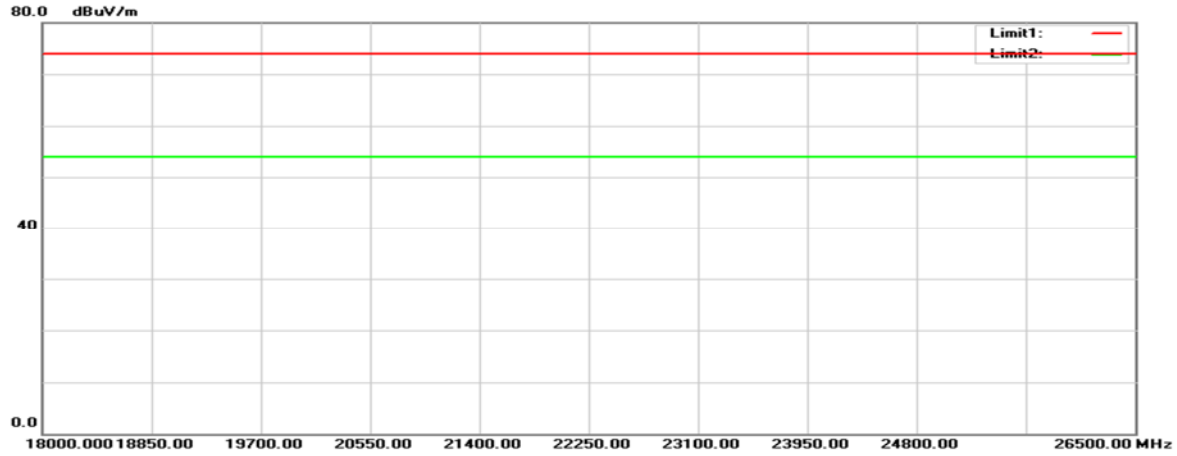
30MHz-1GHz:



1GHz-18GHz:

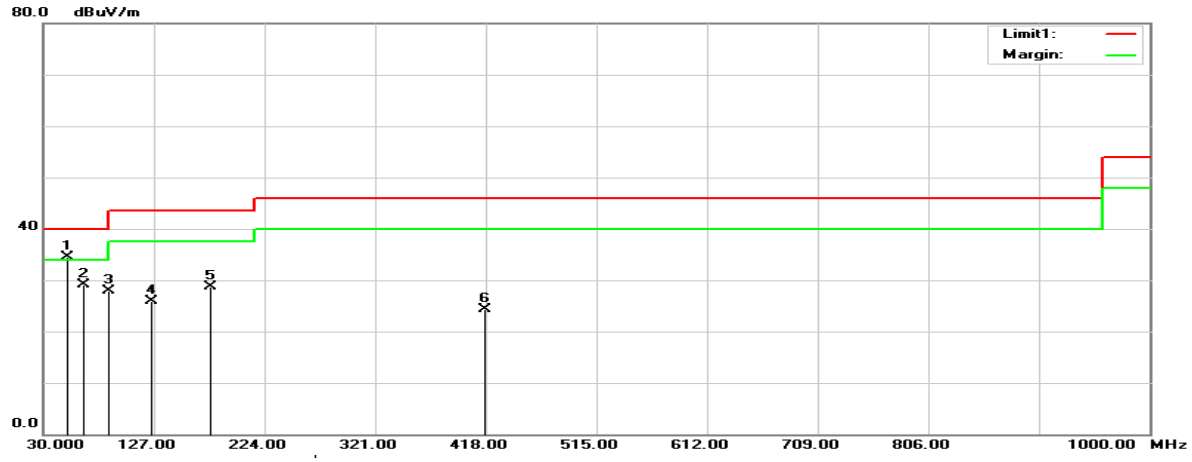


18GHz-26.5GHz:

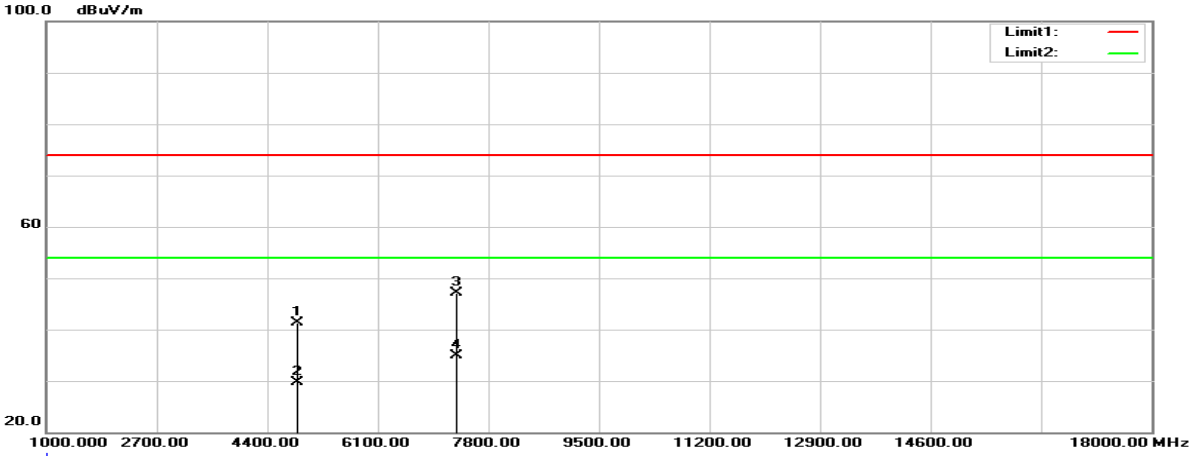


Vertical (worst case is 802.11g mode middle channel)

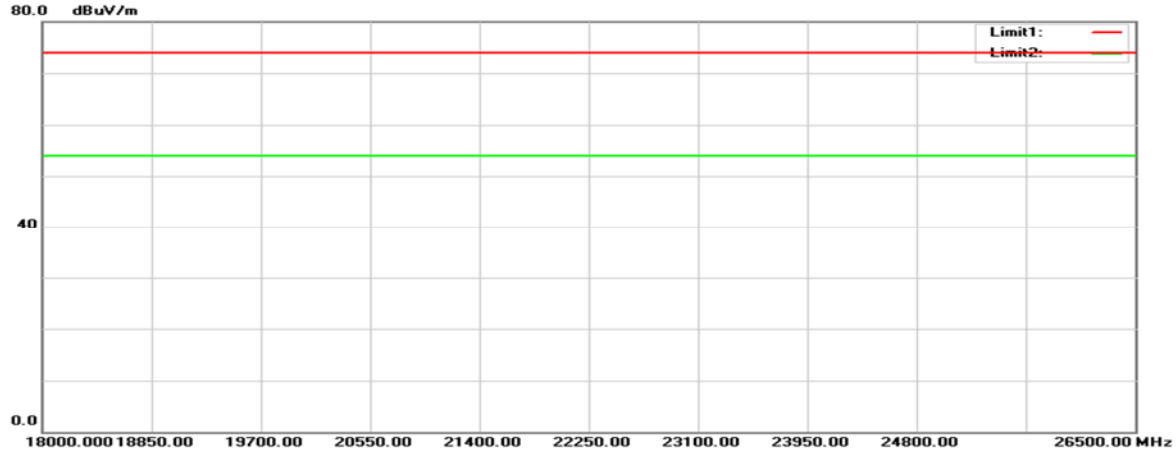
30MHz-1GHz:



1GHz-18GHz:



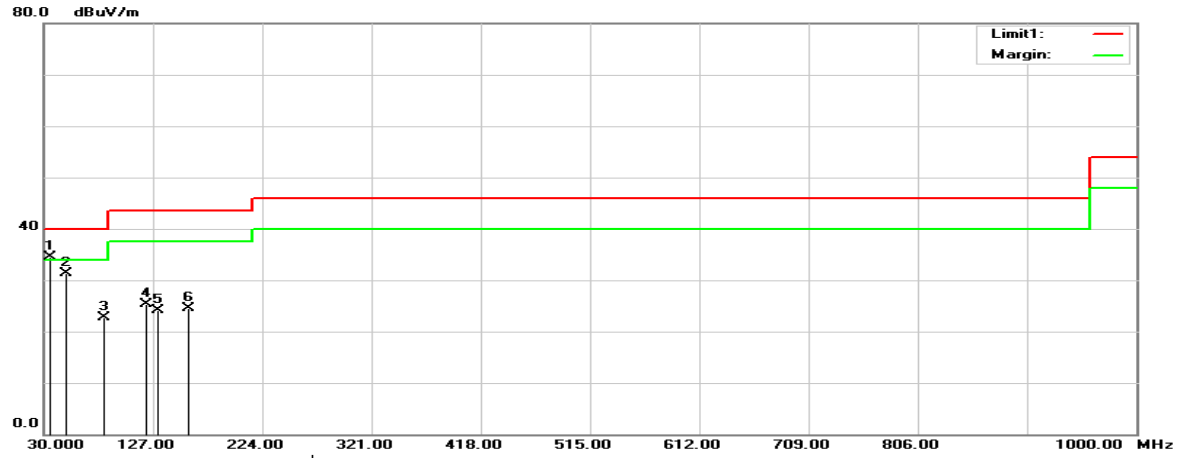
18GHz-26.5GHz:



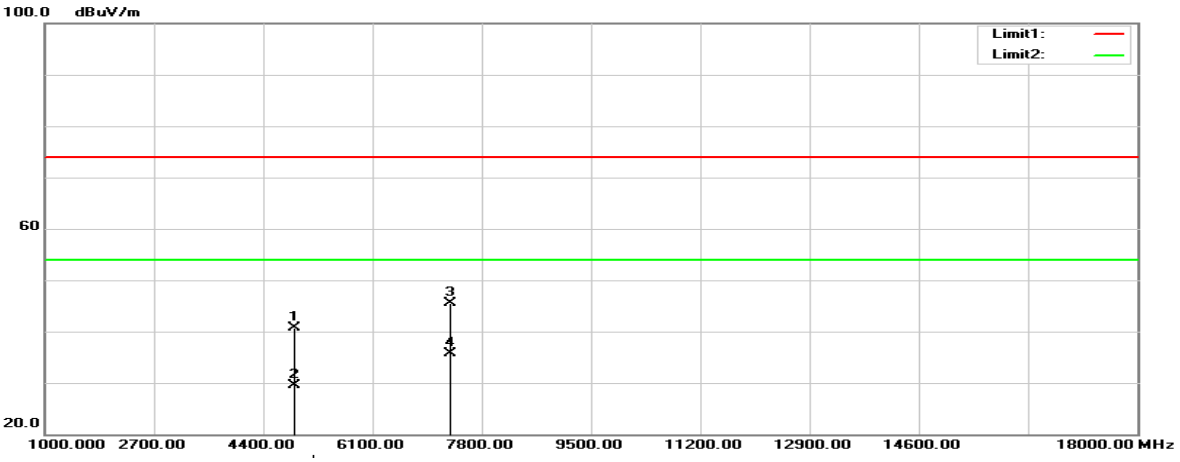
BLE Mode (Pre-scan with three orthogonal axis, and worse case as X axis.)

Horizontal (worst case is BLE mode Middle channel)

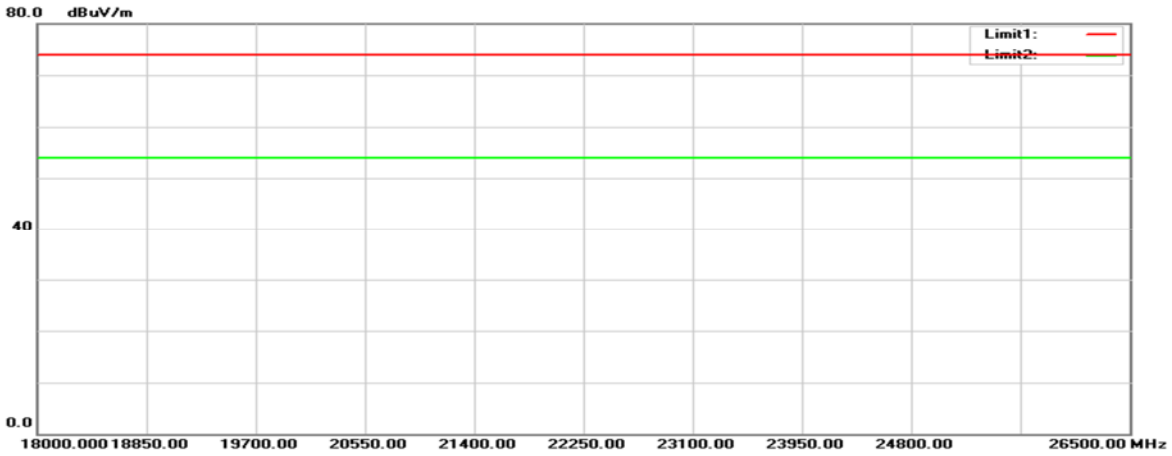
30MHz-1GHz:



1GHz-18GHz:

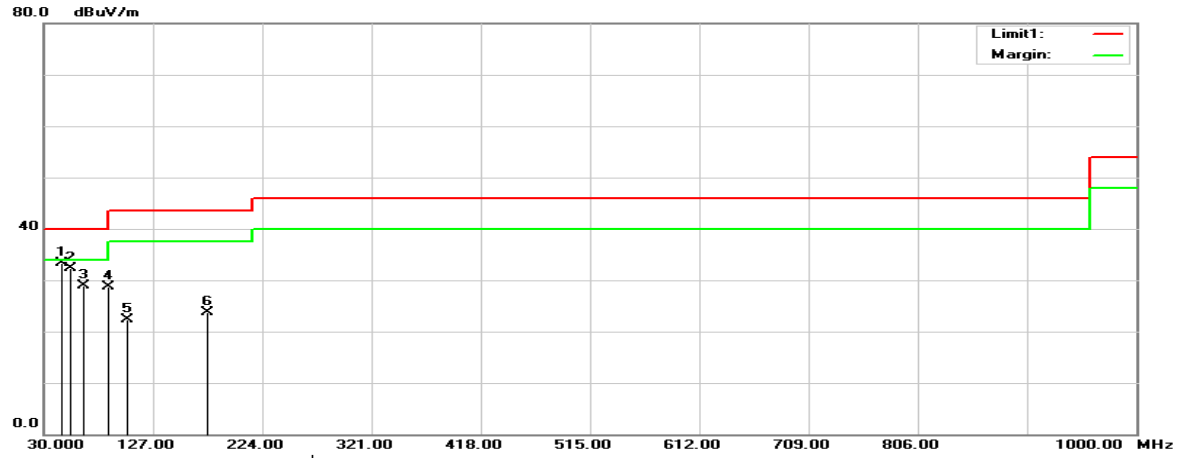


18GHz-26.5GHz:

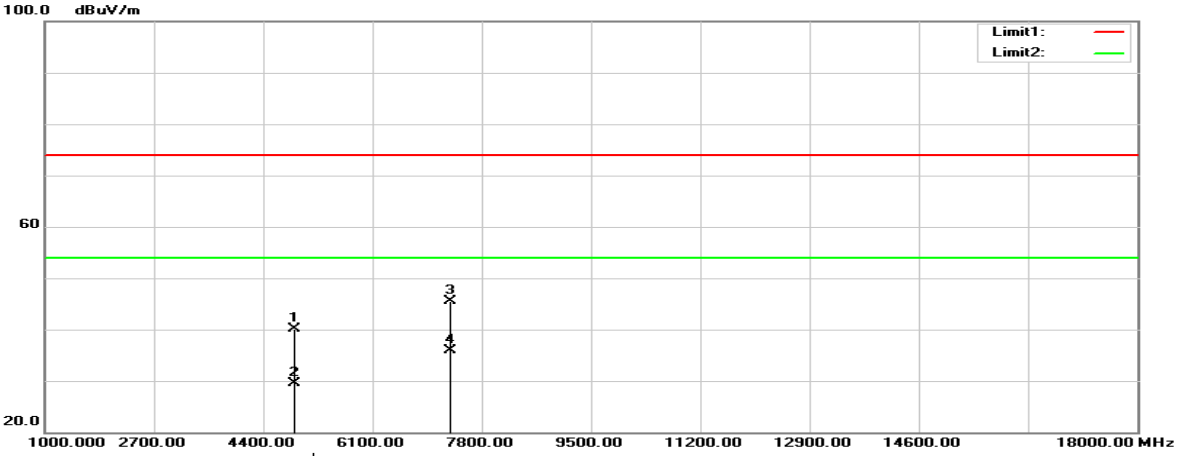


Vertical (worst case is BLE mode Middle channel)

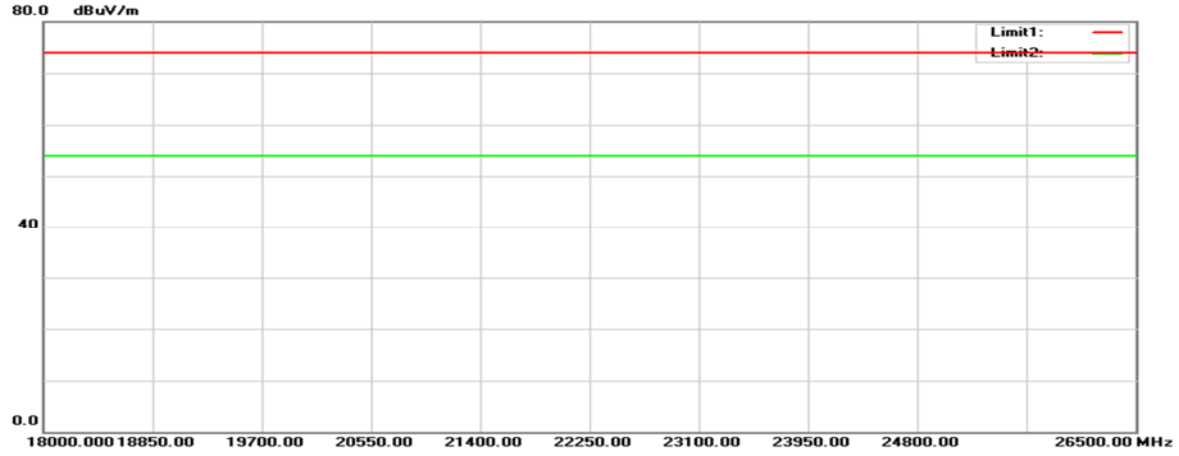
30MHz-1GHz:



1GHz-18GHz:



18GHz-26.5GHz:



WIFI 2.4G Mode

Below 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
35.8200	40.58	-7.87	32.71	40.00	-7.29	100	210	peak
40.6700	39.92	-11.14	28.78	40.00	-11.22	100	241	peak
55.2200	45.05	-17.29	27.76	40.00	-12.24	100	195	peak
130.8800	39.23	-10.29	28.94	43.50	-14.56	100	75	peak
160.9500	35.56	-11.33	24.23	43.50	-19.27	100	321	peak
192.9600	35.40	-12.29	23.11	43.50	-20.39	100	222	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
51.3400	51.17	-16.60	34.57	40.00	-5.43	100	214	peak
65.8900	45.92	-16.75	29.17	40.00	-10.83	100	254	peak
87.2300	44.78	-16.80	27.98	40.00	-12.02	100	148	peak
125.0600	36.00	-10.17	25.83	43.50	-17.67	100	96	peak
176.4700	41.55	-12.75	28.80	43.50	-14.70	100	241	peak
417.0300	31.69	-7.46	24.23	46.00	-21.77	100	246	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	54.97	-14.11	40.86	74.00	-33.14	124	169	peak
2390.000	43.30	-14.11	29.19	54.00	-24.81	124	169	AVG
2412.000	105.31	-13.97	91.34	N/A	N/A	124	169	peak
2412.000	101.62	-13.97	87.65	N/A	N/A	124	169	AVG
4824.000	44.42	-3.27	41.15	74.00	-32.85	150	358	peak
4824.000	32.45	-3.27	29.18	54.00	-24.82	150	358	AVG
7236.000	42.20	3.48	45.68	74.00	-28.32	150	257	peak
7236.000	30.34	3.48	33.82	54.00	-20.18	150	257	AVG
B Mode, Middle channel								
2437.000	107.32	-13.82	93.50	N/A	N/A	125	162	peak
2437.000	102.83	-13.82	89.01	N/A	N/A	125	162	AVG
4874.000	45.13	-3.07	42.06	74.00	-31.94	150	266	peak
4874.000	32.40	-3.07	29.33	54.00	-24.67	150	266	AVG
7311.000	43.01	4.04	47.05	74.00	-26.95	150	302	peak
7311.000	30.68	4.04	34.72	54.00	-19.28	150	302	AVG
B Mode, High channel								
2462.000	104.78	-13.60	91.18	N/A	N/A	134	174	peak
2462.000	100.99	-13.60	87.39	N/A	N/A	134	174	AVG
2485.300	62.61	-13.33	49.28	74.00	-24.72	134	174	peak
2485.300	45.08	-13.33	31.75	54.00	-22.25	134	174	AVG
4924.000	44.85	-2.82	42.03	74.00	-31.97	150	286	peak
4924.000	32.99	-2.82	30.17	54.00	-23.83	150	286	AVG
7386.000	43.65	4.19	47.84	74.00	-26.16	150	10	peak
7386.000	30.82	4.19	35.01	54.00	-18.99	150	10	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	54.96	-14.11	40.85	74.00	-33.15	146	68	peak
2390.000	42.60	-14.11	28.49	54.00	-25.51	146	68	AVG
2412.000	96.91	-13.97	82.94	N/A	N/A	146	68	peak
2412.000	93.24	-13.97	79.27	N/A	N/A	146	68	AVG
4824.000	45.10	-3.27	41.83	74.00	-32.17	150	266	peak
4824.000	32.84	-3.27	29.57	54.00	-24.43	150	266	AVG
7236.000	43.65	3.48	47.13	74.00	-26.87	150	72	peak
7236.000	30.36	3.48	33.84	54.00	-20.16	150	72	AVG
B Mode, Middle channel								
2437.000	96.08	-13.82	82.26	N/A	N/A	145	69	peak
2437.000	92.44	-13.82	78.62	N/A	N/A	145	69	AVG
4874.000	45.49	-3.07	42.42	74.00	-31.58	150	97	peak
4874.000	32.53	-3.07	29.46	54.00	-24.54	150	97	AVG
7311.000	43.16	4.04	47.20	74.00	-26.80	150	167	peak
7311.000	30.61	4.04	34.65	54.00	-19.35	150	167	AVG
B Mode, High channel								
2462.000	97.07	-13.60	83.47	N/A	N/A	134	66	peak
2462.000	93.28	-13.60	79.68	N/A	N/A	134	66	AVG
2484.600	57.57	-13.33	44.24	74.00	-29.76	134	66	peak
2484.600	44.24	-13.33	30.91	54.00	-23.09	134	66	AVG
4924.000	44.61	-2.82	41.79	74.00	-32.21	150	140	peak
4924.000	32.84	-2.82	30.02	54.00	-23.98	150	140	AVG
7386.000	45.18	4.19	49.37	74.00	-24.63	150	275	peak
7386.000	30.85	4.19	35.04	54.00	-18.96	150	275	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	60.45	-14.11	46.34	74.00	-27.66	118	143	peak
2390.000	45.59	-14.11	31.48	54.00	-22.52	118	143	AVG
2412.000	105.68	-13.97	91.71	N/A	N/A	118	143	peak
2412.000	94.79	-13.97	80.82	N/A	N/A	118	143	AVG
4824.000	45.23	-3.27	41.96	74.00	-32.04	150	259	peak
4824.000	32.92	-3.27	29.65	54.00	-24.35	150	259	AVG
7236.000	43.33	3.48	46.81	74.00	-27.19	150	292	peak
7236.000	30.69	3.48	34.17	54.00	-19.83	150	292	AVG
G Mode, Middle channel								
2437.000	107.46	-13.82	93.64	N/A	N/A	131	159	peak
2437.000	97.42	-13.82	83.60	N/A	N/A	131	159	AVG
4874.000	45.06	-3.07	41.99	74.00	-32.01	150	128	peak
4874.000	32.74	-3.07	29.67	54.00	-24.33	150	128	AVG
7311.000	44.02	4.04	48.06	74.00	-25.94	150	322	peak
7311.000	30.83	4.04	34.87	54.00	-19.13	150	322	AVG
G Mode, High channel								
2462.000	106.38	-13.60	92.78	N/A	N/A	117	186	peak
2462.000	96.53	-13.60	82.93	N/A	N/A	117	186	AVG
2483.500	68.54	-13.35	55.19	74.00	-18.81	117	186	peak
2483.500	47.89	-13.35	34.54	54.00	-19.46	117	186	AVG
4924.000	44.86	-2.82	42.04	74.00	-31.96	150	132	peak
4924.000	32.87	-2.82	30.05	54.00	-23.95	150	132	AVG
7386.000	43.90	4.19	48.09	74.00	-25.91	150	189	peak
7386.000	31.04	4.19	35.23	54.00	-18.77	150	189	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	54.23	-14.11	40.12	74.00	-33.88	146	55	peak
2390.000	43.42	-14.11	29.31	54.00	-24.69	146	55	AVG
2412.000	98.01	-13.97	84.04	N/A	N/A	146	55	peak
2412.000	87.21	-13.97	73.24	N/A	N/A	146	55	AVG
4824.000	46.21	-3.27	42.94	74.00	-31.06	150	155	peak
4824.000	32.75	-3.27	29.48	54.00	-24.52	150	155	AVG
7236.000	42.88	3.48	46.36	74.00	-27.64	150	122	peak
7236.000	30.67	3.48	34.15	54.00	-19.85	150	122	AVG
G Mode, Middle channel								
2437.000	96.60	-13.82	82.78	N/A	N/A	136	78	peak
2437.000	86.21	-13.82	72.39	N/A	N/A	136	78	AVG
4874.000	44.37	-3.07	41.30	74.00	-32.70	150	320	peak
4874.000	32.71	-3.07	29.64	54.00	-24.36	150	320	AVG
7311.000	43.13	4.04	47.17	74.00	-26.83	150	209	peak
7311.000	30.77	4.04	34.81	54.00	-19.19	150	209	AVG
G Mode, High channel								
2462.000	100.20	-13.60	86.60	N/A	N/A	129	67	peak
2462.000	88.78	-13.60	75.18	N/A	N/A	129	67	AVG
2486.500	58.06	-13.31	44.75	74.00	-29.25	129	67	peak
2486.500	43.92	-13.31	30.61	54.00	-23.39	129	67	AVG
4924.000	45.91	-2.82	43.09	74.00	-30.91	150	360	peak
4924.000	32.86	-2.82	30.04	54.00	-23.96	150	360	AVG
7386.000	43.68	4.19	47.87	74.00	-26.13	150	201	peak
7386.000	31.04	4.19	35.23	54.00	-18.77	150	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.

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								
2388.624	62.69	-14.12	48.57	74.00	-25.43	135	156	peak
2388.624	46.58	-14.12	32.46	54.00	-21.54	135	156	AVG
2412.000	106.40	-13.97	92.43	N/A	N/A	135	156	peak
2412.000	95.30	-13.97	81.33	N/A	N/A	135	156	AVG
4824.000	44.86	-3.27	41.59	74.00	-32.41	150	0	peak
4824.000	32.64	-3.27	29.37	54.00	-24.63	150	0	AVG
7236.000	42.07	3.48	45.55	74.00	-28.45	150	163	peak
7236.000	30.65	3.48	34.13	54.00	-19.87	150	163	AVG
N20 Mode, Middle channel								
2437.000	107.22	-13.82	93.40	N/A	N/A	115	206	peak
2437.000	96.99	-13.82	83.17	N/A	N/A	115	206	AVG
4874.000	44.31	-3.07	41.24	74.00	-32.76	150	53	peak
4874.000	32.69	-3.07	29.62	54.00	-24.38	150	53	AVG
7311.000	43.60	4.04	47.64	74.00	-26.36	150	79	peak
7311.000	30.73	4.04	34.77	54.00	-19.23	150	79	AVG
N20 Mode, High channel								
2462.000	106.02	-13.60	92.42	N/A	N/A	134	157	peak
2462.000	96.13	-13.60	82.53	N/A	N/A	134	157	AVG
2483.500	66.03	-13.35	52.68	74.00	-21.32	134	157	peak
2483.500	49.34	-13.35	35.99	54.00	-18.01	134	157	AVG
4924.000	45.36	-2.82	42.54	74.00	-31.46	150	143	peak
4924.000	32.78	-2.82	29.96	54.00	-24.04	150	143	AVG
7386.000	44.11	4.19	48.30	74.00	-25.70	150	287	peak
7386.000	31.34	4.19	35.53	54.00	-18.47	150	287	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	55.76	-14.11	41.65	74.00	-32.35	152	99	peak
2390.000	43.44	-14.11	29.33	54.00	-24.67	152	99	AVG
2412.000	97.59	-13.97	83.62	N/A	N/A	152	99	peak
2412.000	86.89	-13.97	72.92	N/A	N/A	152	99	AVG
4824.000	44.67	-3.27	41.40	74.00	-32.60	150	192	peak
4824.000	32.87	-3.27	29.60	54.00	-24.40	150	192	AVG
7236.000	42.84	3.48	46.32	74.00	-27.68	150	255	peak
7236.000	32.99	3.48	36.47	54.00	-17.53	150	255	AVG
N20 Mode, Middle channel								
2437.000	96.49	-13.82	82.67	N/A	N/A	162	75	peak
2437.000	85.98	-13.82	72.16	N/A	N/A	162	75	AVG
4874.000	46.04	-3.07	42.97	74.00	-31.03	150	44	peak
4874.000	32.67	-3.07	29.60	54.00	-24.40	150	44	AVG
7311.000	43.00	4.04	47.04	74.00	-26.96	150	108	peak
7311.000	30.82	4.04	34.86	54.00	-19.14	150	108	AVG
N20 Mode, High channel								
2462.000	98.78	-13.60	85.18	N/A	N/A	126	58	peak
2462.000	88.49	-13.60	74.89	N/A	N/A	126	58	AVG
2483.500	56.34	-13.35	42.99	74.00	-31.01	126	58	peak
2483.500	44.08	-13.35	30.73	54.00	-23.27	126	58	AVG
4924.000	45.33	-2.82	42.51	74.00	-31.49	150	13	peak
4924.000	32.99	-2.82	30.17	54.00	-23.83	150	13	AVG
7386.000	43.55	4.19	47.74	74.00	-26.26	150	195	peak
7386.000	31.29	4.19	35.48	54.00	-18.52	150	195	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								
2389.860	69.33	-14.11	55.22	74.00	-18.78	122	151	peak
2389.860	50.20	-14.11	36.09	54.00	-17.91	122	151	AVG
2422.000	104.56	-13.91	90.65	N/A	N/A	122	151	peak
2422.000	94.71	-13.91	80.80	N/A	N/A	122	151	AVG
4844.000	45.13	-3.25	41.88	74.00	-32.12	150	287	peak
4844.000	33.22	-3.25	29.97	54.00	-24.03	150	287	AVG
7266.000	44.14	3.77	47.91	74.00	-26.09	150	163	peak
7266.000	31.19	3.77	34.96	54.00	-19.04	150	163	AVG
N40 Mode, Middle channel								
2437.000	104.10	-13.82	90.28	N/A	N/A	122	170	peak
2437.000	94.46	-13.82	80.64	N/A	N/A	122	170	AVG
4874.000	45.21	-3.07	42.14	74.00	-31.86	150	223	peak
4874.000	33.14	-3.07	30.07	54.00	-23.93	150	223	AVG
7311.000	42.86	4.04	46.90	74.00	-27.10	150	144	peak
7311.000	31.46	4.04	35.50	54.00	-18.50	150	144	AVG
N40 Mode, High channel								
2452.000	103.95	-13.72	90.23	N/A	N/A	135	156	peak
2452.000	94.07	-13.72	80.35	N/A	N/A	135	156	AVG
2484.200	73.95	-13.34	60.61	74.00	-13.39	135	156	peak
2484.200	50.47	-13.34	37.13	54.00	-16.87	135	156	AVG
4904.000	44.68	-2.88	41.80	74.00	-32.20	150	304	peak
4904.000	33.24	-2.88	30.36	54.00	-23.64	150	304	AVG
7356.000	42.65	4.16	46.81	74.00	-27.19	150	314	peak
7356.000	31.23	4.16	35.39	54.00	-18.61	150	314	AVG

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

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
N40 Mode, Low channel								
2390.000	60.08	-14.11	45.97	74.00	-28.03	155	79	peak
2390.000	43.83	-14.11	29.72	54.00	-24.28	155	79	AVG
2416.920	94.36	-13.94	80.42	N/A	N/A	155	79	peak
2416.920	84.24	-13.94	70.30	N/A	N/A	155	79	AVG
4844.000	45.66	-3.25	42.41	74.00	-31.59	150	265	peak
4844.000	32.70	-3.25	29.45	54.00	-24.55	150	265	AVG
7266.000	42.89	3.77	46.66	74.00	-27.34	150	104	peak
7266.000	31.01	3.77	34.78	54.00	-19.22	150	104	AVG
N40 Mode, Middle channel								
2437.000	95.11	-13.82	81.29	N/A	N/A	136	68	peak
2437.000	83.97	-13.82	70.15	N/A	N/A	136	68	AVG
4874.000	45.14	-3.07	42.07	74.00	-31.93	150	55	peak
4874.000	33.17	-3.07	30.10	54.00	-23.90	150	55	AVG
7311.000	43.31	4.04	47.35	74.00	-26.65	150	118	peak
7311.000	31.23	4.04	35.27	54.00	-18.73	150	118	AVG
N40 Mode, High channel								
2452.000	95.58	-13.72	81.86	N/A	N/A	138	61	peak
2452.000	83.81	-13.72	70.09	N/A	N/A	138	61	AVG
2484.320	67.47	-13.34	54.13	74.00	-19.87	138	61	peak
2484.320	44.39	-13.34	31.05	54.00	-22.95	138	61	AVG
4904.000	44.45	-2.88	41.57	74.00	-32.43	150	139	peak
4904.000	33.32	-2.88	30.44	54.00	-23.56	150	139	AVG
7356.000	42.77	4.16	46.93	74.00	-27.07	150	212	peak
7356.000	31.04	4.16	35.20	54.00	-18.80	150	212	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.

BLE Mode

Below 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
35.8200	42.41	-7.87	34.54	40.00	-5.46	100	125	peak
50.3700	47.48	-16.25	31.23	40.00	-8.77	100	96	peak
83.3500	39.29	-16.66	22.63	40.00	-17.37	100	156	peak
121.1800	35.56	-10.21	25.35	43.50	-18.15	100	62	peak
130.8800	34.34	-10.29	24.05	43.50	-19.45	100	184	peak
159.0100	35.82	-11.24	24.58	43.50	-18.92	100	330	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
45.5200	47.40	-14.08	33.32	40.00	-6.68	100	200	peak
53.2800	49.27	-16.91	32.36	40.00	-7.64	100	96	peak
65.8900	45.75	-16.75	29.00	40.00	-11.00	100	148	peak
87.2300	45.49	-16.80	28.69	40.00	-11.31	100	96	peak
103.7200	35.56	-13.26	22.30	43.50	-21.20	100	36	peak
175.5000	36.26	-12.65	23.61	43.50	-19.89	100	241	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
Low channel								
2390.000	54.04	-10.23	43.81	74.00	-30.19	145	156	peak
2390.000	44.16	-10.23	33.93	54.00	-20.07	145	156	AVG
2402.000	102.55	-10.14	92.41	N/A	N/A	145	156	peak
2402.000	101.71	-10.14	91.57	N/A	N/A	145	156	AVG
4804.000	43.72	-3.28	40.44	74.00	-33.56	166	238	peak
4804.000	32.11	-3.28	28.83	54.00	-25.17	166	238	AVG
7206.000	43.62	3.10	46.72	74.00	-27.28	158	134	peak
7206.000	31.58	3.10	34.68	54.00	-19.32	158	134	AVG
Middle channel								
2440.000	103.11	-9.82	93.29	N/A	N/A	123	192	peak
2440.000	102.37	-9.82	92.55	N/A	N/A	123	192	AVG
4880.000	43.79	-3.03	40.76	74.00	-33.24	146	248	peak
4880.000	32.58	-3.03	29.55	54.00	-24.45	146	248	AVG
7320.000	41.48	4.07	45.55	74.00	-28.45	172	166	peak
7320.000	31.69	4.07	35.76	54.00	-18.24	172	166	AVG
High channel								
2480.168	99.54	-9.31	90.23	N/A	N/A	144	217	peak
2480.168	98.81	-9.31	89.50	N/A	N/A	144	217	AVG
2483.500	54.39	-9.26	45.13	74.00	-28.87	144	217	peak
2483.500	43.19	-9.26	33.93	54.00	-20.07	144	217	AVG
4960.000	43.46	-2.69	40.77	74.00	-33.23	152	174	peak
4960.000	32.87	-2.69	30.18	54.00	-23.82	152	174	AVG
7440.000	42.22	4.25	46.47	74.00	-27.53	163	258	peak
7440.000	31.66	4.25	35.91	54.00	-18.09	163	258	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
Low channel								
2390.000	54.52	-10.23	44.29	74.00	-29.71	137	255	peak
2390.000	44.03	-10.23	33.80	54.00	-20.20	137	255	AVG
2402.000	87.17	-10.14	77.03	N/A	N/A	137	255	peak
2402.000	85.98	-10.14	75.84	N/A	N/A	137	255	AVG
4804.000	43.20	-3.28	39.92	74.00	-34.08	166	218	peak
4804.000	31.28	-3.28	28.00	54.00	-26.00	166	218	AVG
7206.000	41.30	3.10	44.40	74.00	-29.60	154	186	peak
7206.000	30.89	3.10	33.99	54.00	-20.01	154	186	AVG
Middle channel								
2440.000	87.11	-9.82	77.29	N/A	N/A	125	207	peak
2440.000	86.37	-9.82	76.55	N/A	N/A	125	207	AVG
4880.000	43.07	-3.03	40.04	74.00	-33.96	138	251	peak
4880.000	32.55	-3.03	29.52	54.00	-24.48	138	251	AVG
7320.000	41.34	4.07	45.41	74.00	-28.59	147	176	peak
7320.000	31.89	4.07	35.96	54.00	-18.04	147	176	AVG
High channel								
2480.000	85.52	-9.31	76.21	N/A	N/A	138	192	peak
2480.000	84.77	-9.31	75.46	N/A	N/A	138	192	AVG
2494.518	56.21	-9.10	47.11	74.00	-26.89	138	192	peak
2494.518	46.33	-9.10	37.23	54.00	-16.77	138	192	AVG
4960.000	43.54	-2.69	40.85	74.00	-33.15	155	146	peak
4960.000	32.46	-2.69	29.77	54.00	-24.23	155	146	AVG
7440.000	42.72	4.25	46.97	74.00	-27.03	169	258	peak
7440.000	31.81	4.25	36.06	54.00	-17.94	169	258	AVG

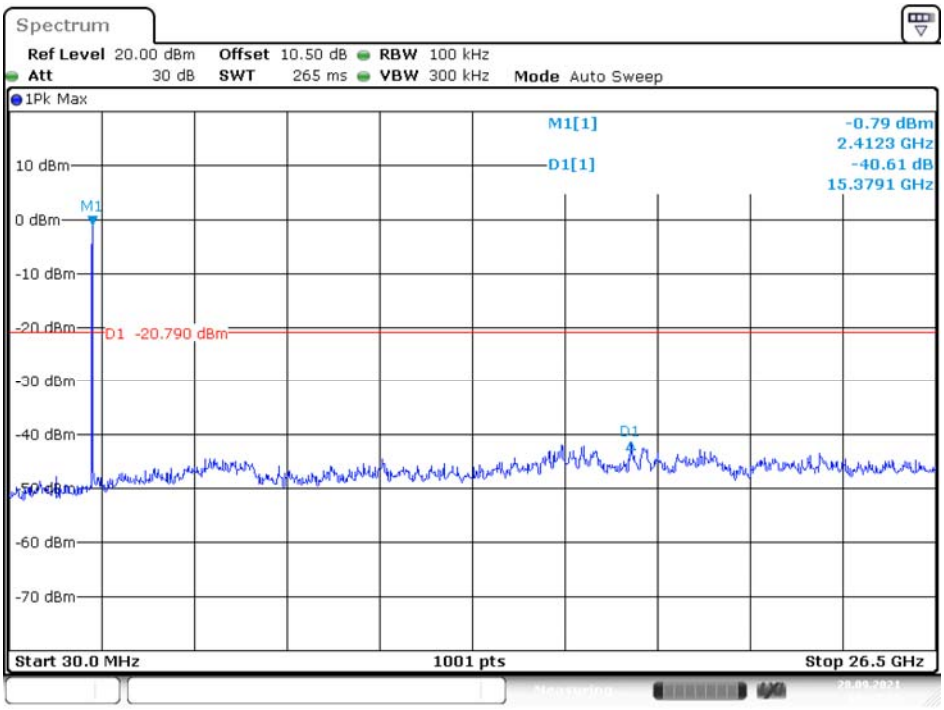
Result = Reading + Correct Factor
Margin = Result – Limit
Correct Factor = Antenna Factor + Cable Loss – Amplifier Gain
Spurious emissions more than 20 dB below the limit were not reported.

Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	40.61	≥ 20	PASS
Mid	2437	39.51	≥ 20	PASS
High	2462	39.60	≥ 20	PASS
G Mode				
Low	2412	34.27	≥ 20	PASS
Mid	2437	40.92	≥ 20	PASS
High	2462	34.18	≥ 20	PASS
N20 Mode				
Low	2412	36.22	≥ 20	PASS
Mid	2437	37.49	≥ 20	PASS
High	2462	36.29	≥ 20	PASS
N40 Mode				
Low	2422	34.96	≥ 20	PASS
Mid	2437	36.89	≥ 20	PASS
High	2452	37.74	≥ 20	PASS
BLE Mode				
Low	2402	38.96	≥ 20	PASS
Mid	2440	39.52	≥ 20	PASS
High	2480	39.58	≥ 20	PASS

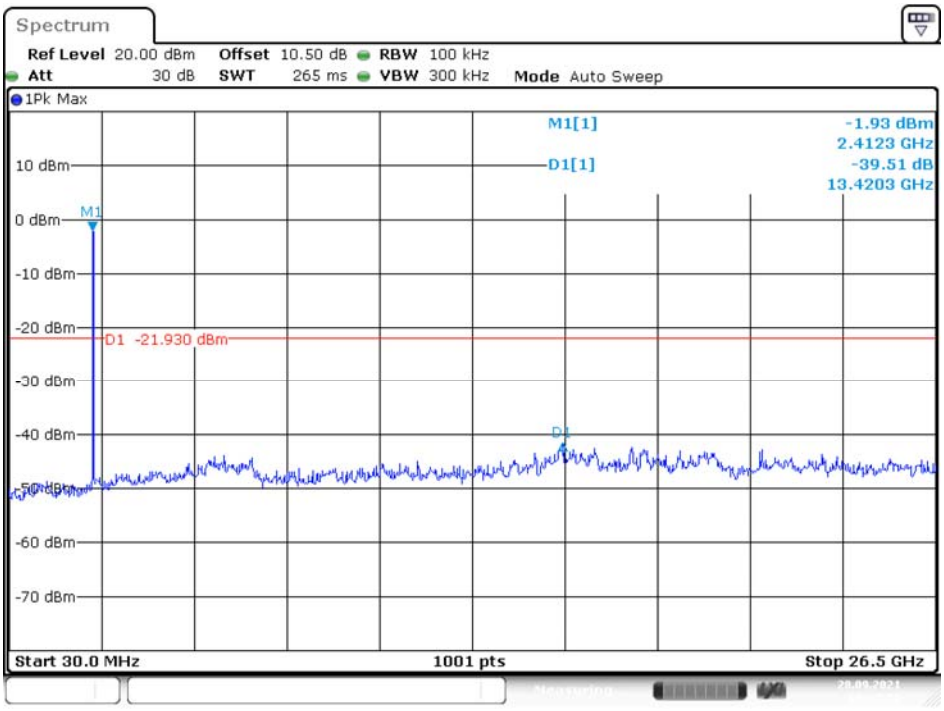
B Mode

Low Channel



Date: 28.SEP.2021 09:02:46

Middle Channel



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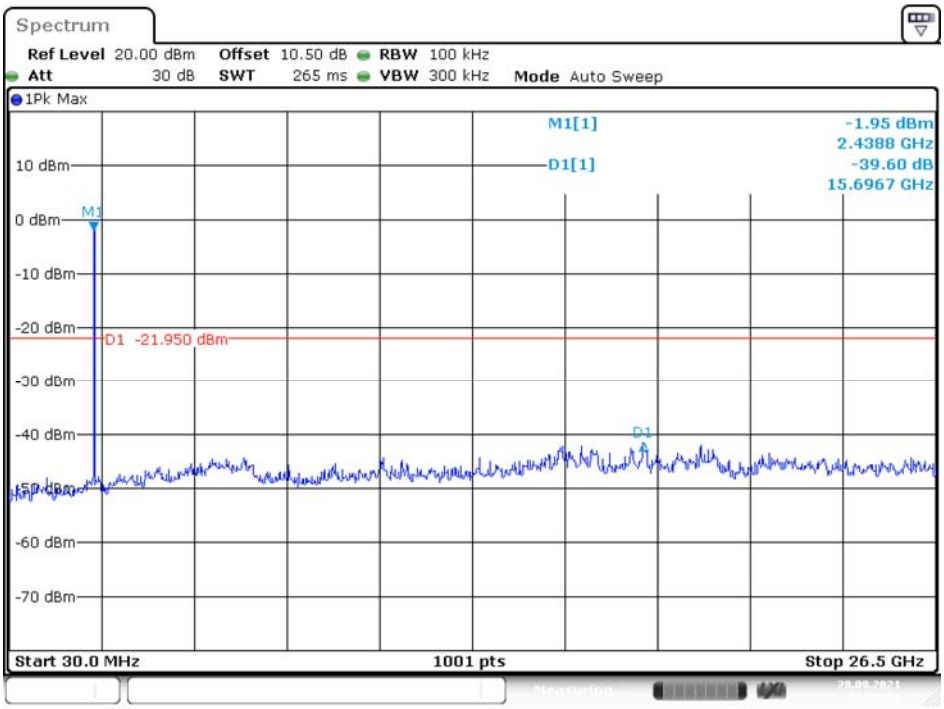
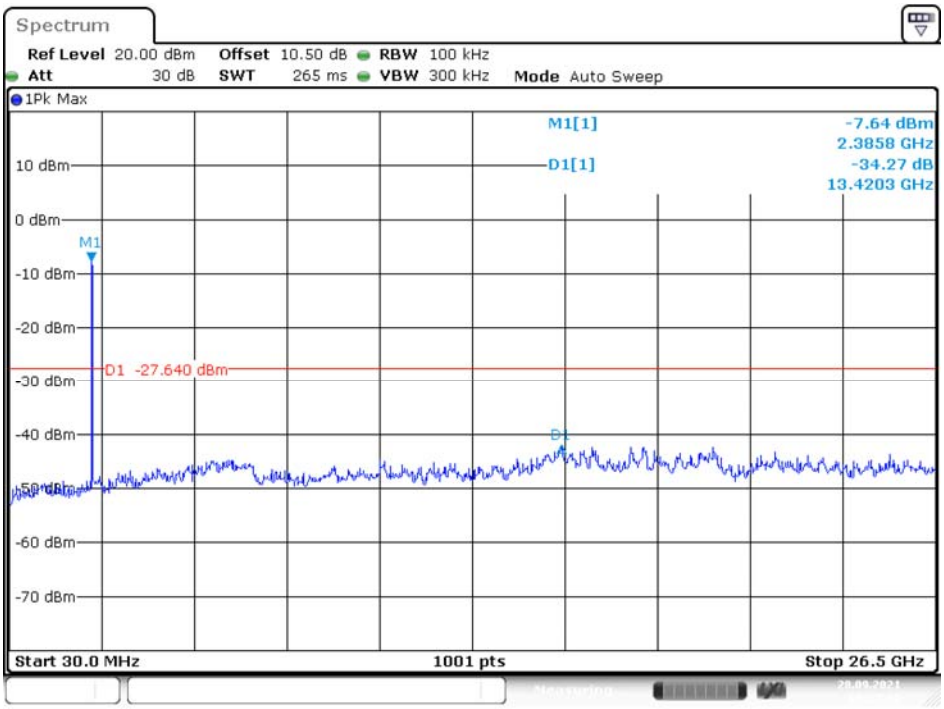
High Channel



Date: 28.SEP.2021 09:11:48

G Mode

Low Channel



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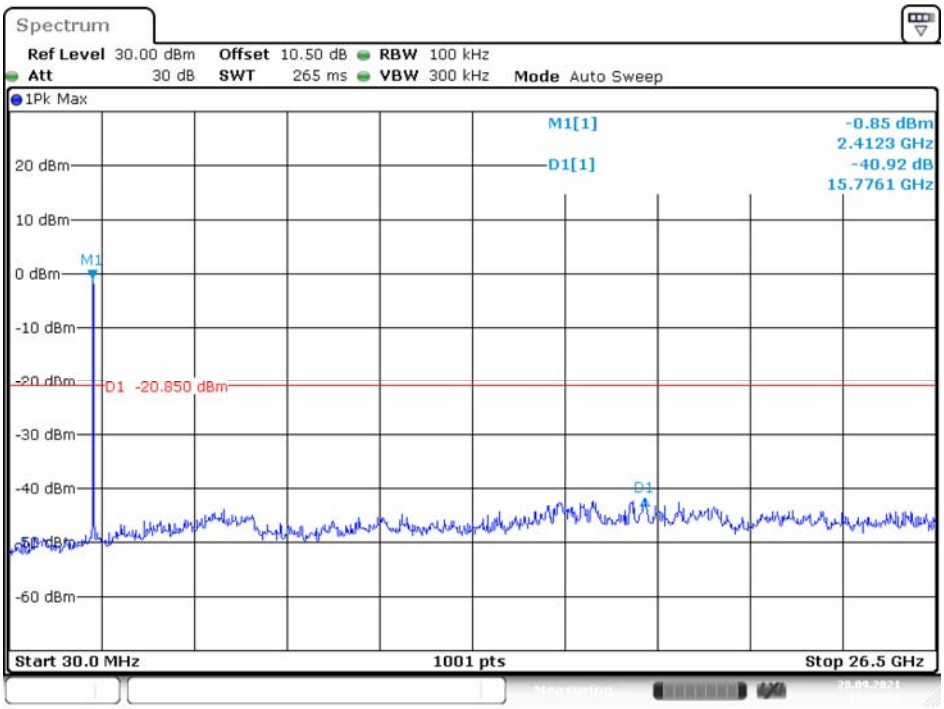
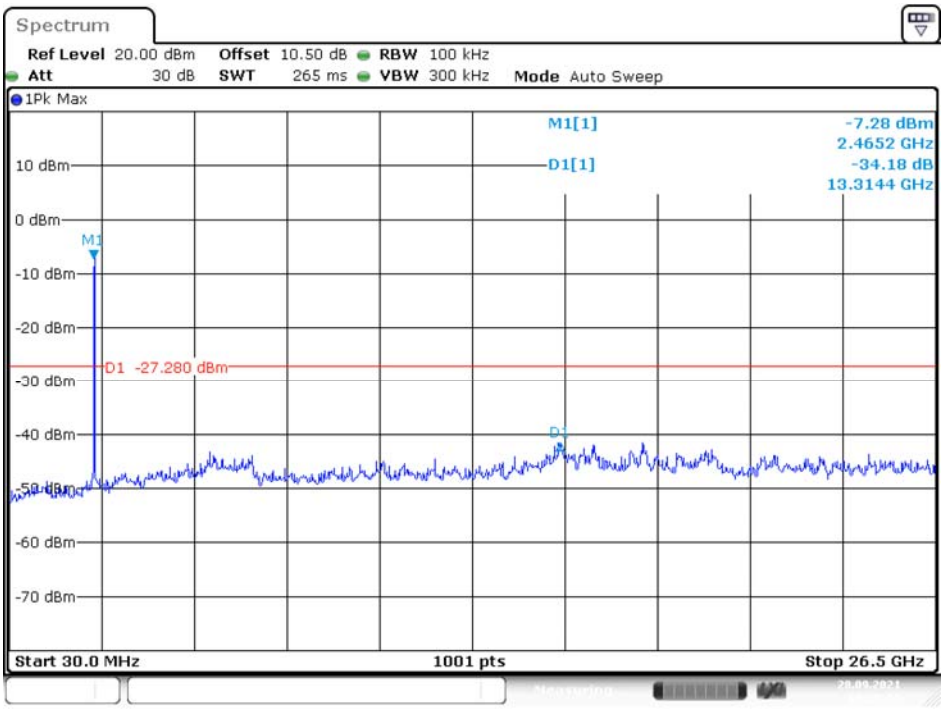
Middle Channel



Date: 28.SEP.2021 09:23:33

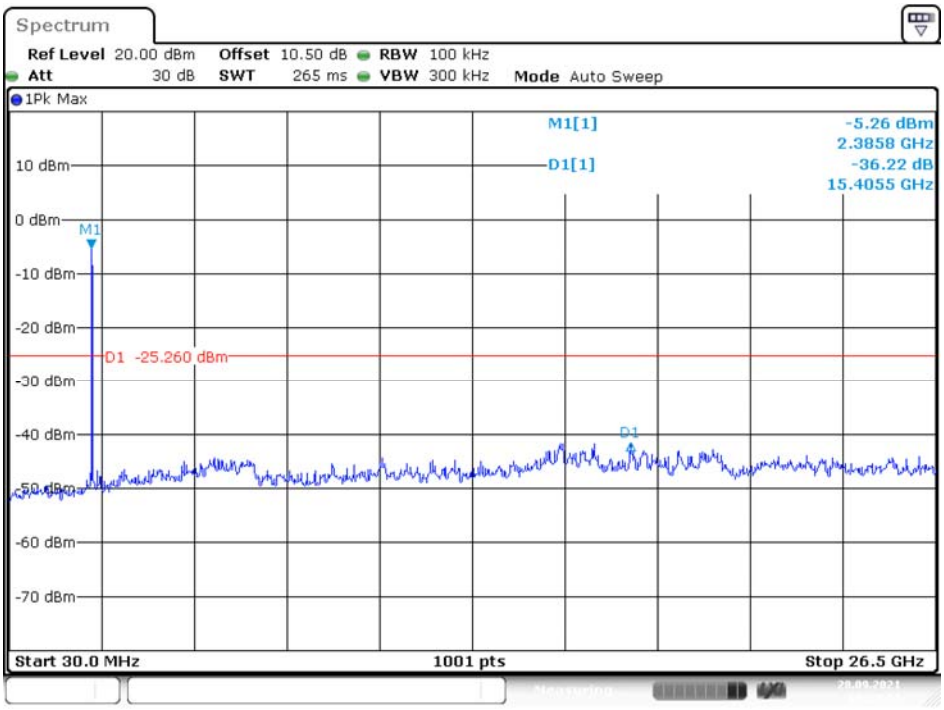
High Channel



Date: 28.SEP.2021 09:26:14

N20 Mode

Low Channel



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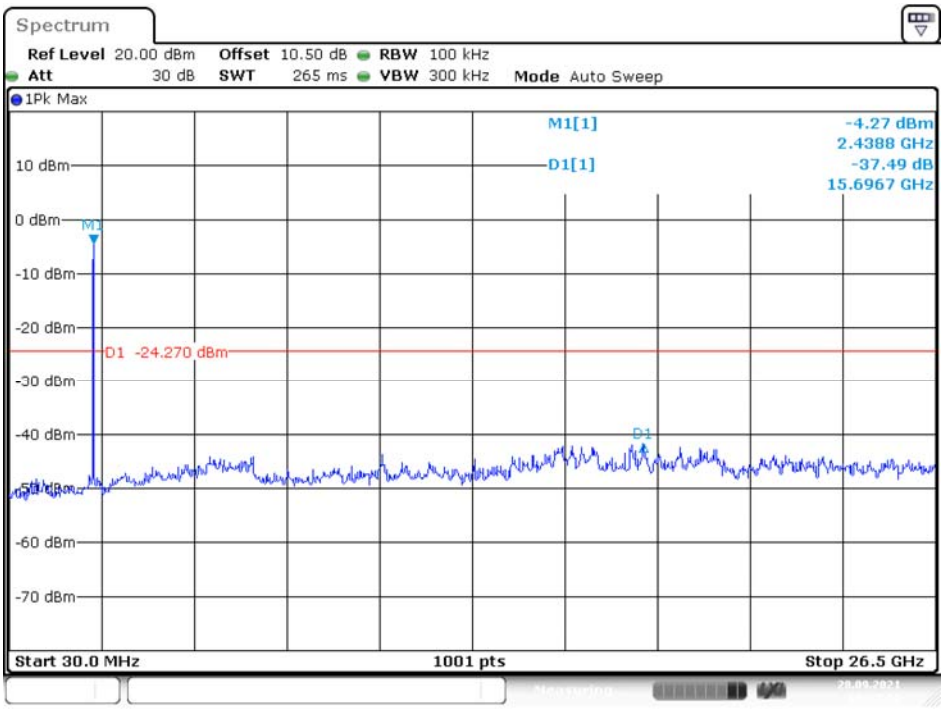
Middle Channel



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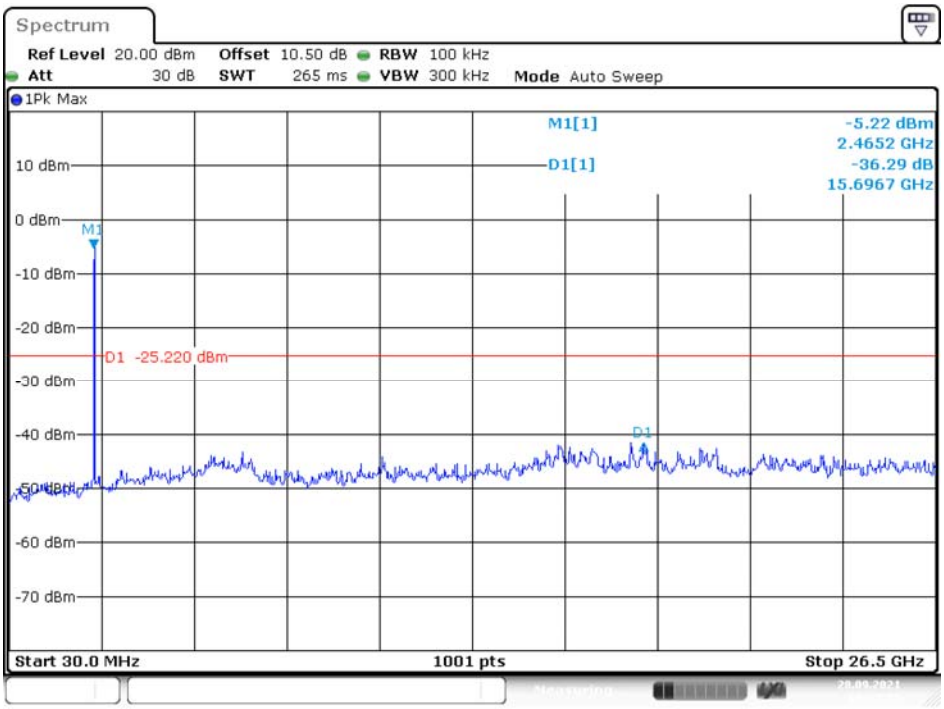
High Channel



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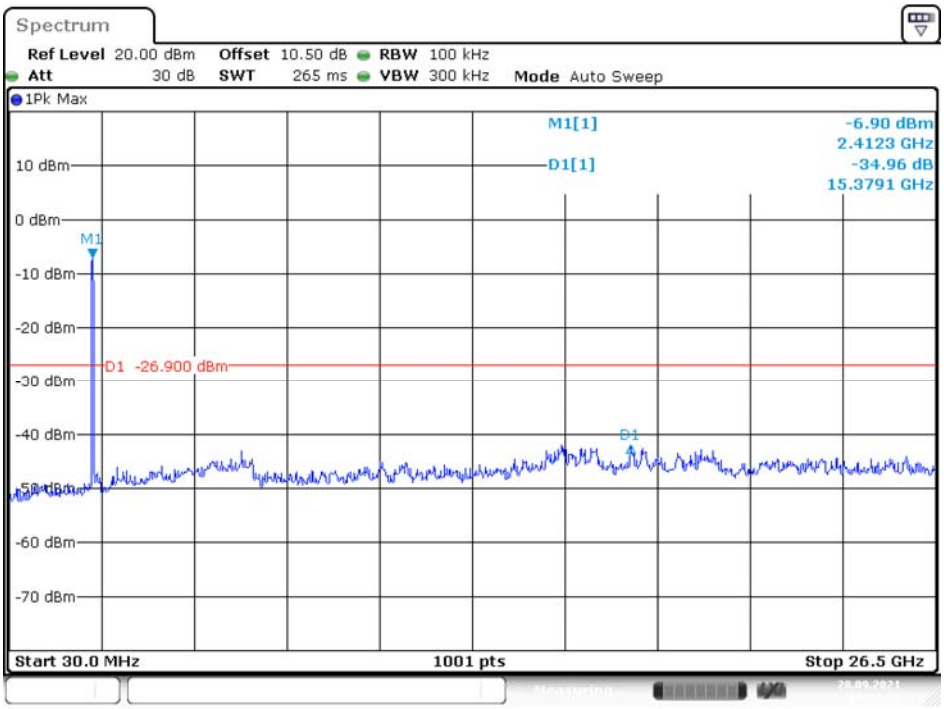
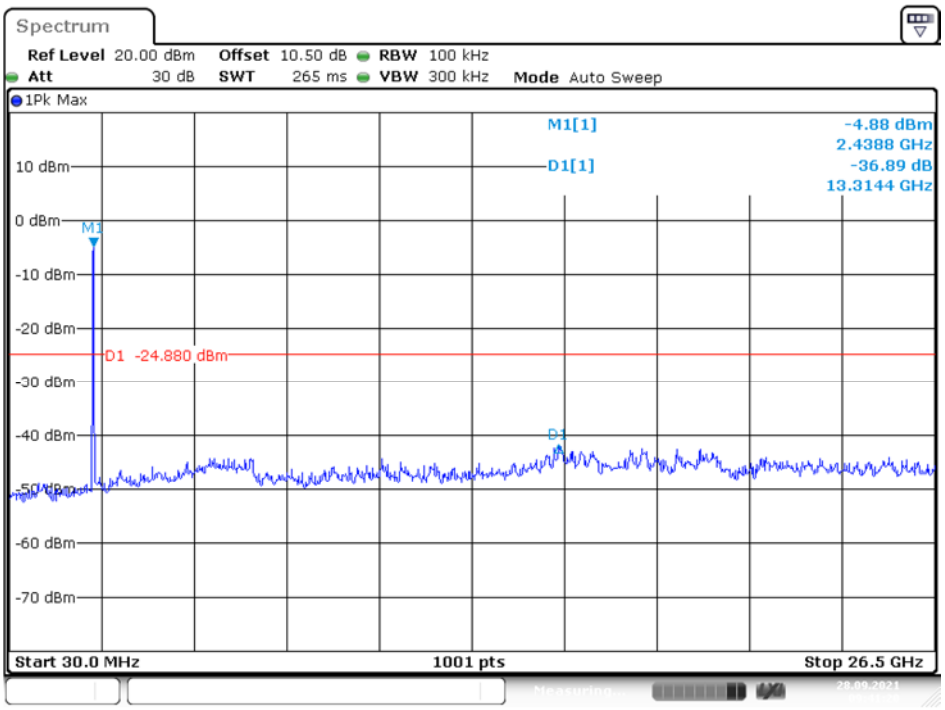
N40 Mode

Low Channel



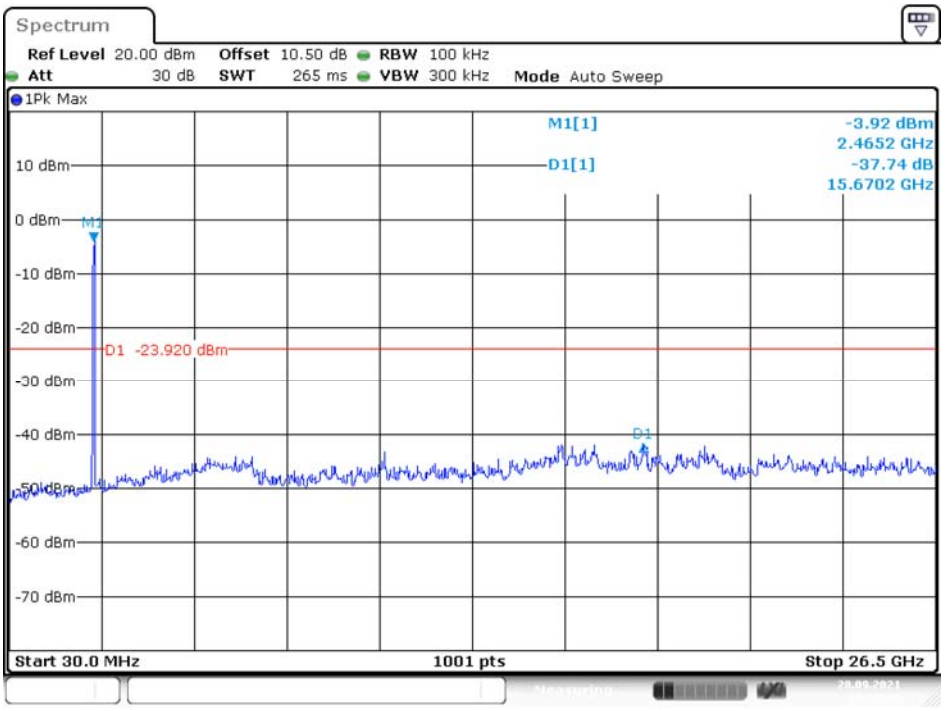
Date: 28.SEP.2021 09:54:36

Middle Channel



Date: 28.SEP.2021 09:41:20

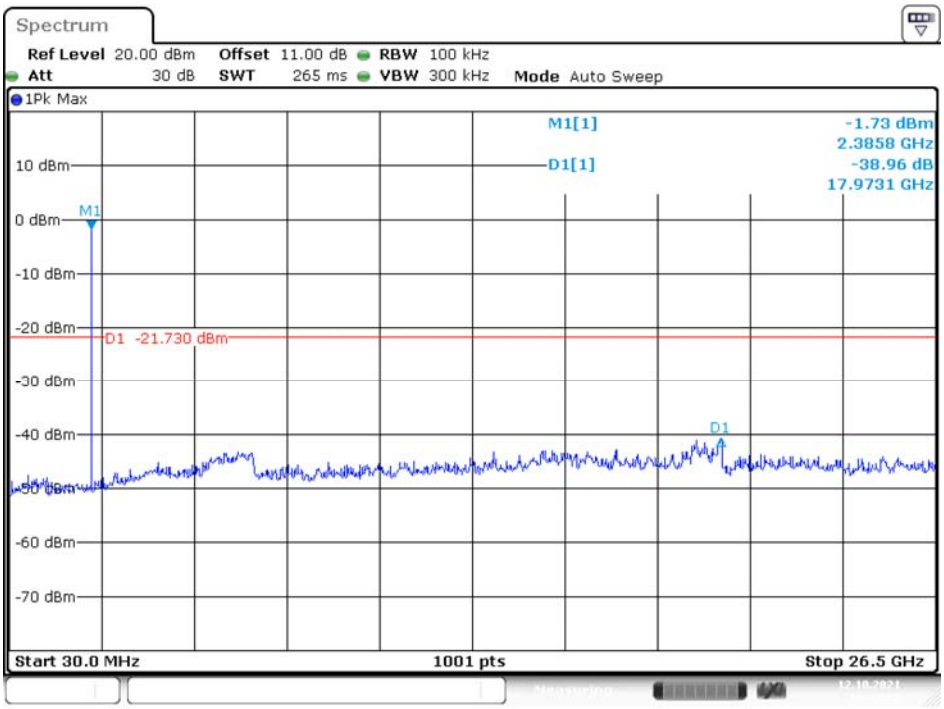
High Channel



Date: 28.SEP.2021 09:52:43

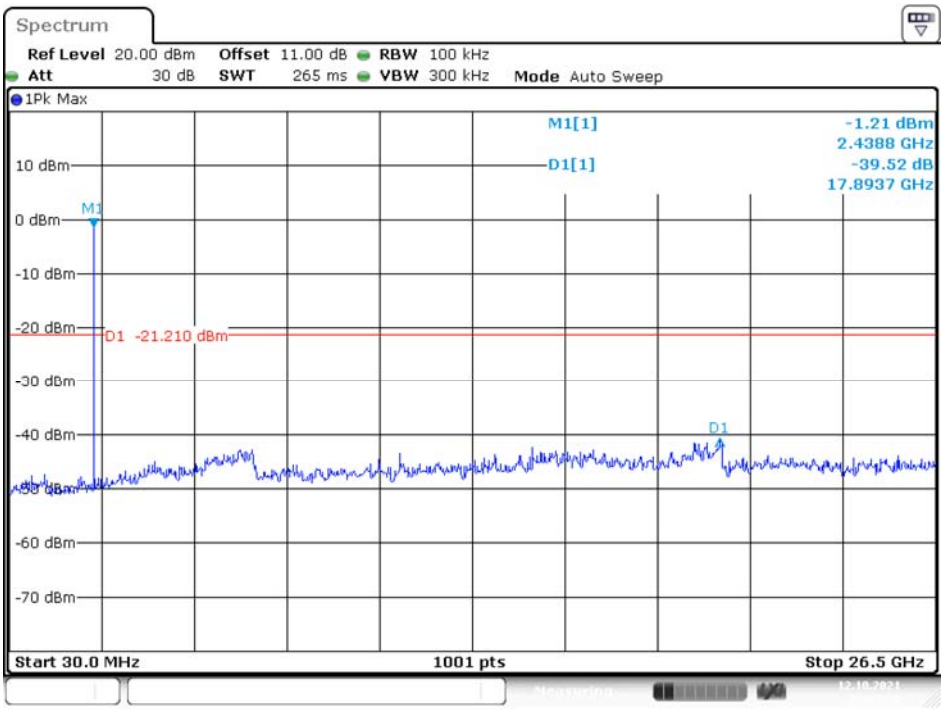
BLE Mode

Low Channel



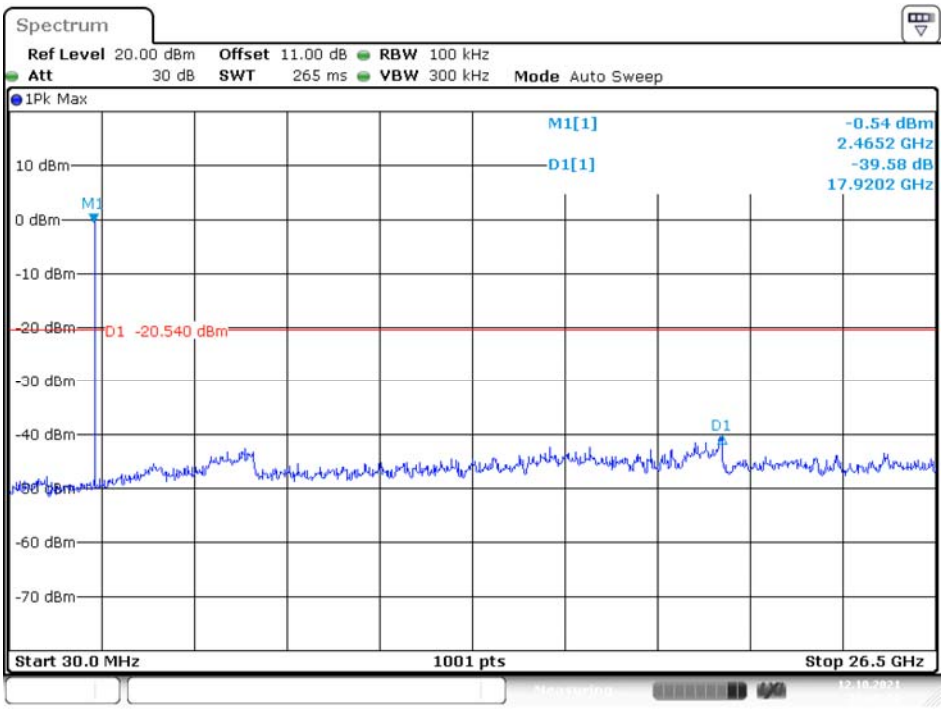
Date: 12.OCT.2021 17:02:23

Middle Channel



Date: 12.OCT.2021 17:03:37

High Channel



Date: 12.OCT.2021 17:06:17

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

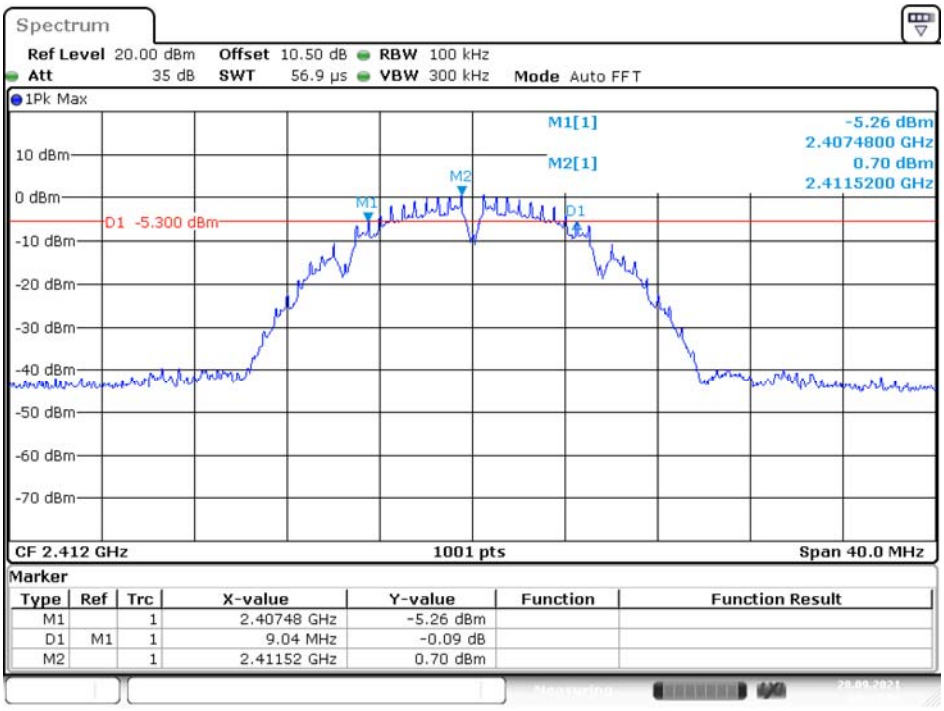
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
B Mode				
Low	2412	9.04	> 500	PASS
Middle	2437	8.56	> 500	PASS
High	2462	8.52	> 500	PASS
G Mode				
Low	2412	16.48	> 500	PASS
Middle	2437	16.32	> 500	PASS
High	2462	16.36	> 500	PASS
N20 Mode				
Low	2412	17.60	> 500	PASS
Middle	2437	17.32	> 500	PASS
High	2462	17.56	> 500	PASS
N40 Mode				
Low	2422	35.36	> 500	PASS
Middle	2437	35.20	> 500	PASS
High	2452	35.52	> 500	PASS
BLE Mode				
Low	2402	0.71	> 500	PASS
Middle	2440	0.71	> 500	PASS
High	2480	0.72	> 500	PASS

Please refer to the following plots

WIFI 2.4G Mode

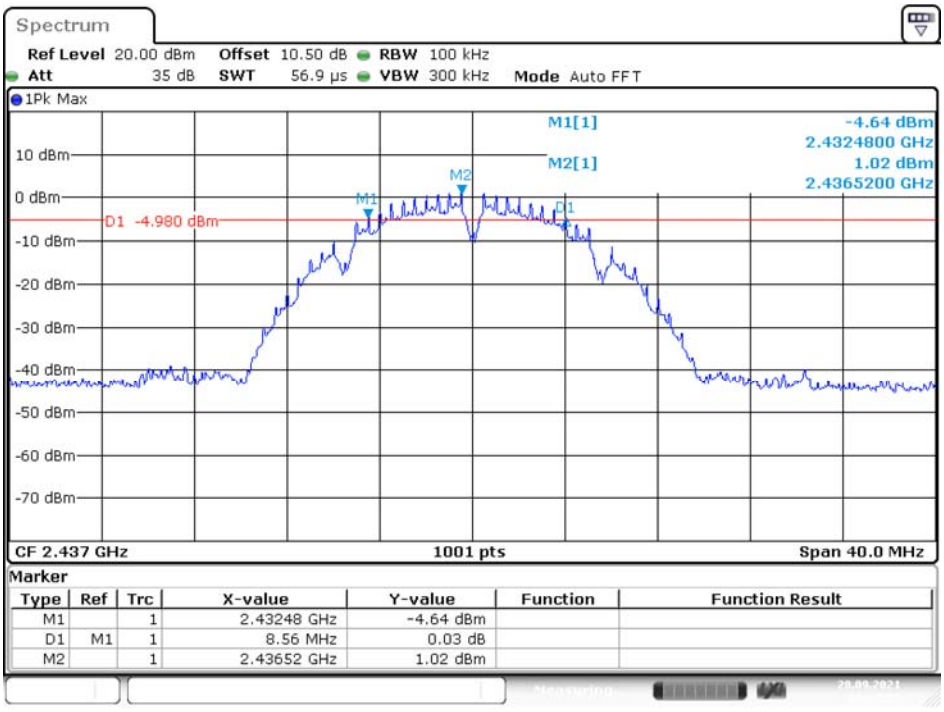
B Mode

Low Channel



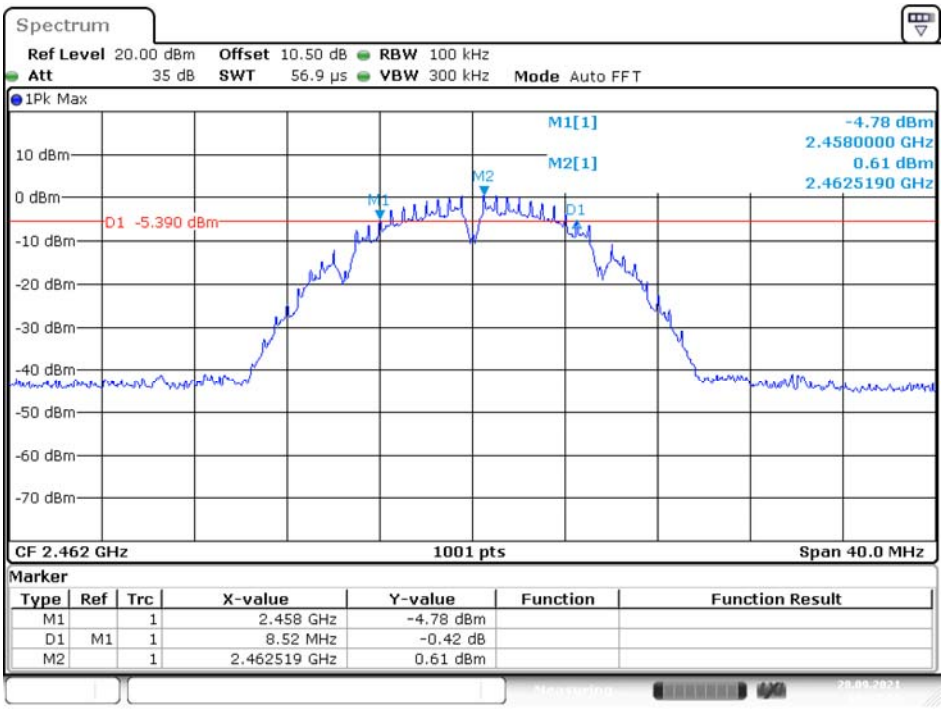
Date: 28.SEP.2021 09:02:05

Middle Channel



Date: 28.SEP.2021 09:07:28

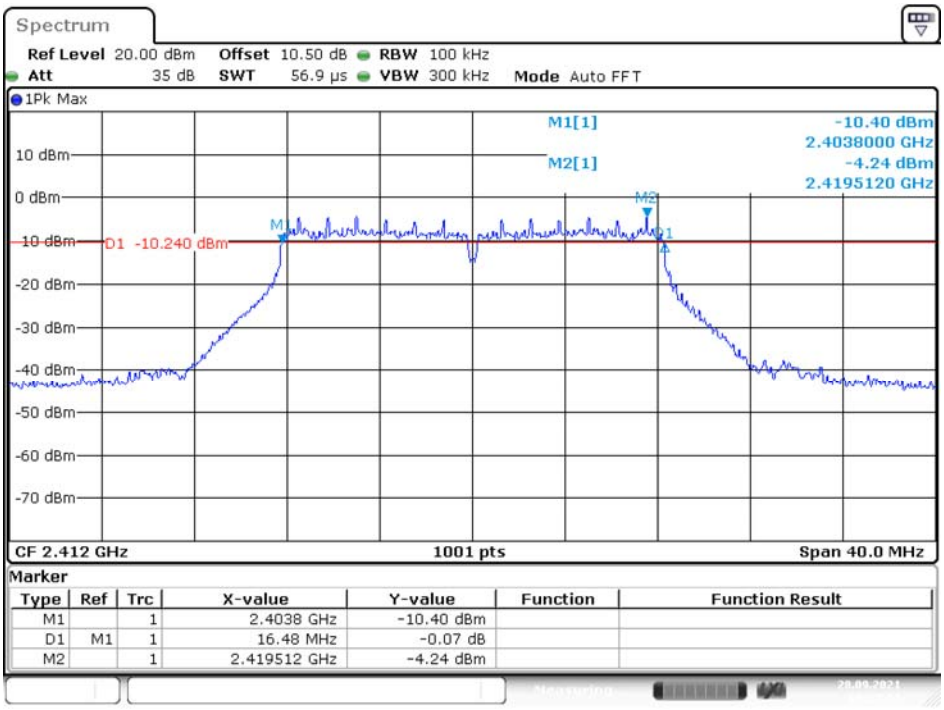
High Channel



Date: 28.SEP.2021 09:11:08

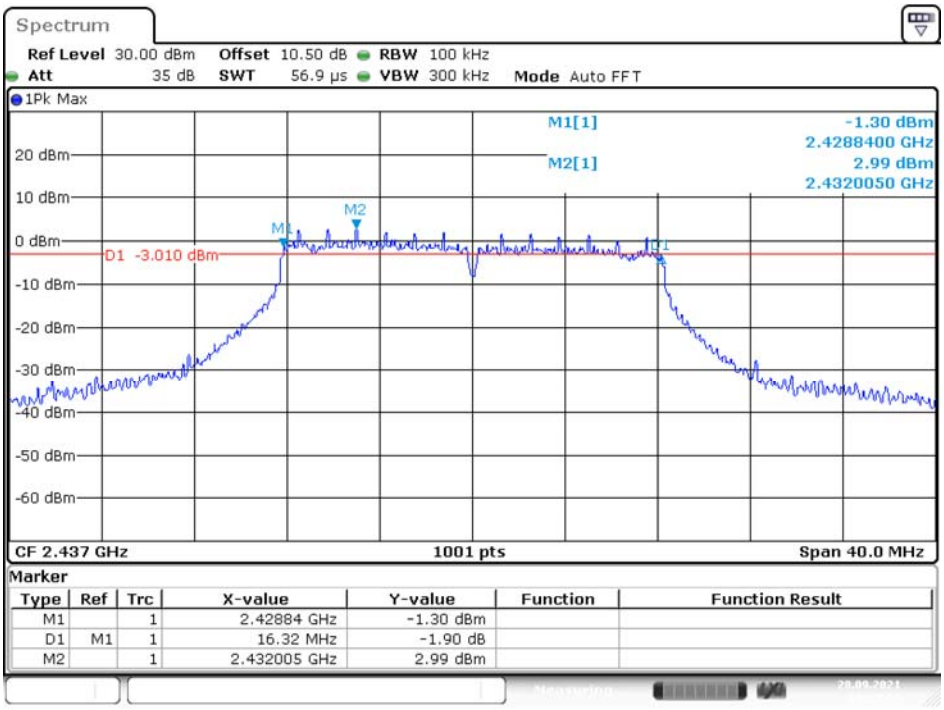
G Mode

Low Channel

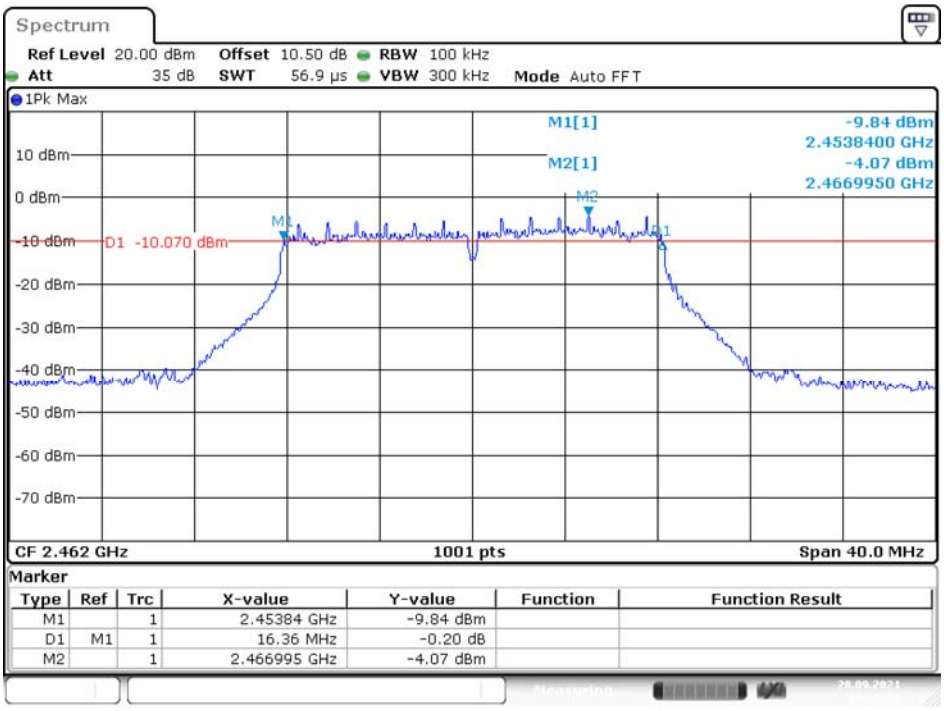


Date: 28.SEP.2021 09:21:02

Middle Channel

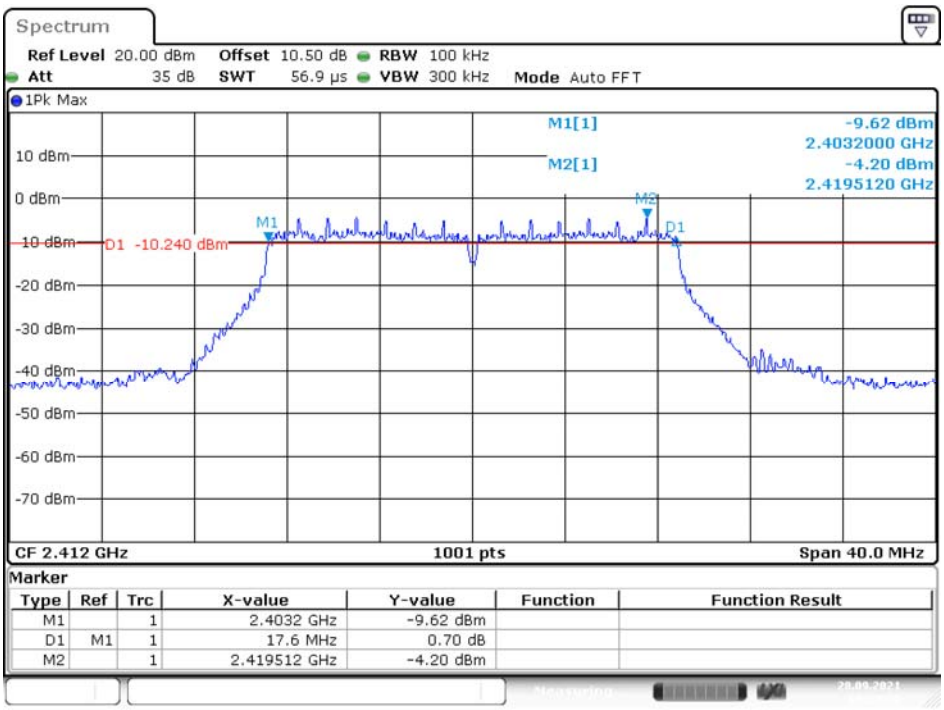


High Channel



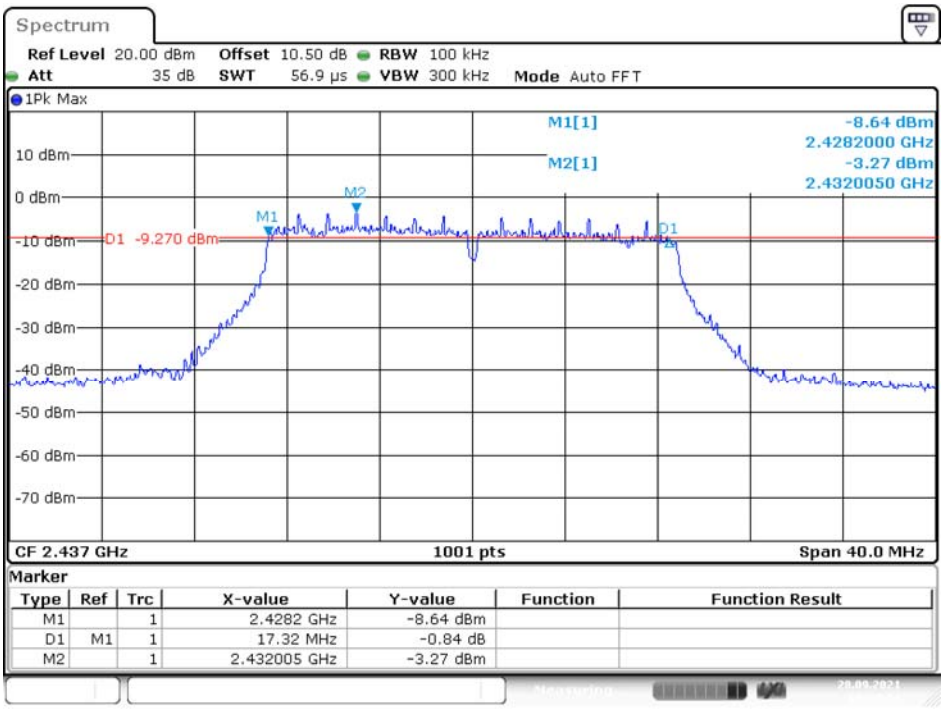
N20 Mode

Low Channel



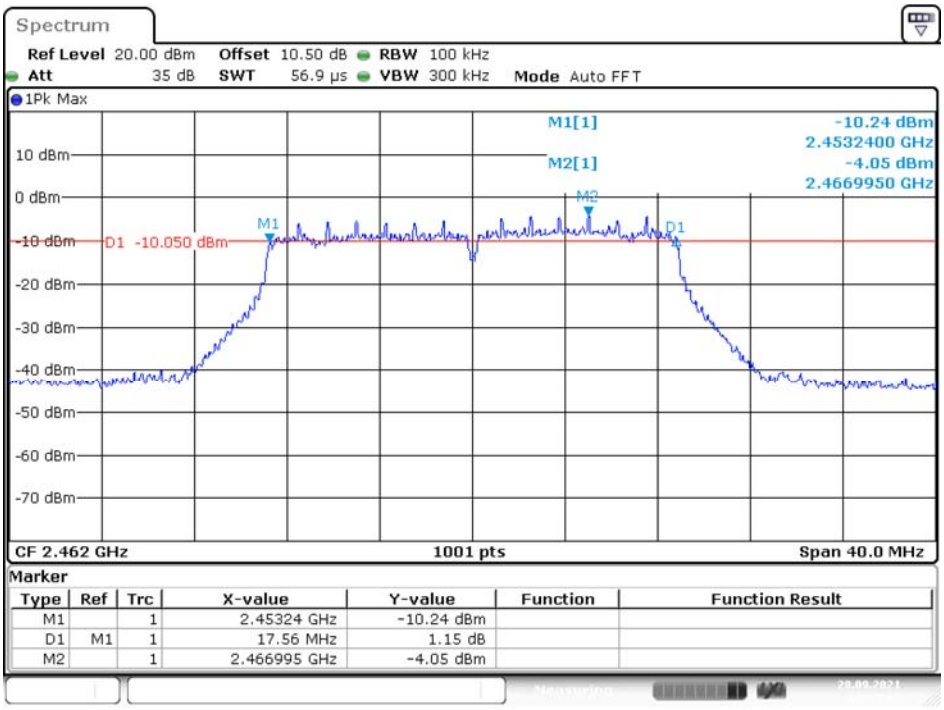
Date: 28.SEP.2021 09:28:30

Middle Channel



Date: 28.SEP.2021 09:30:54

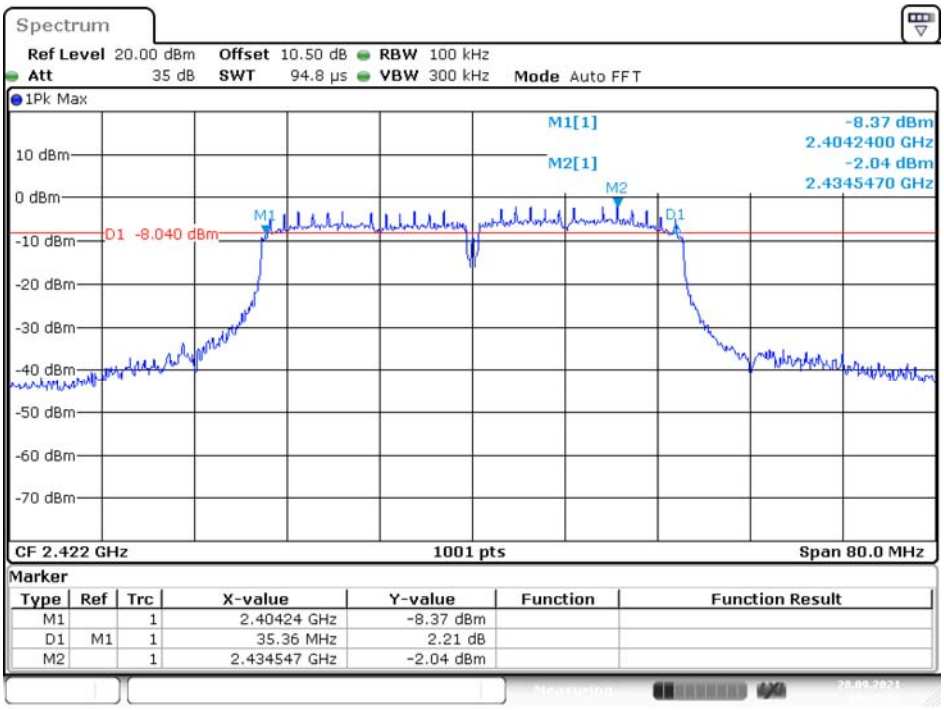
High Channel



Date: 28.SEP.2021 09:32:43

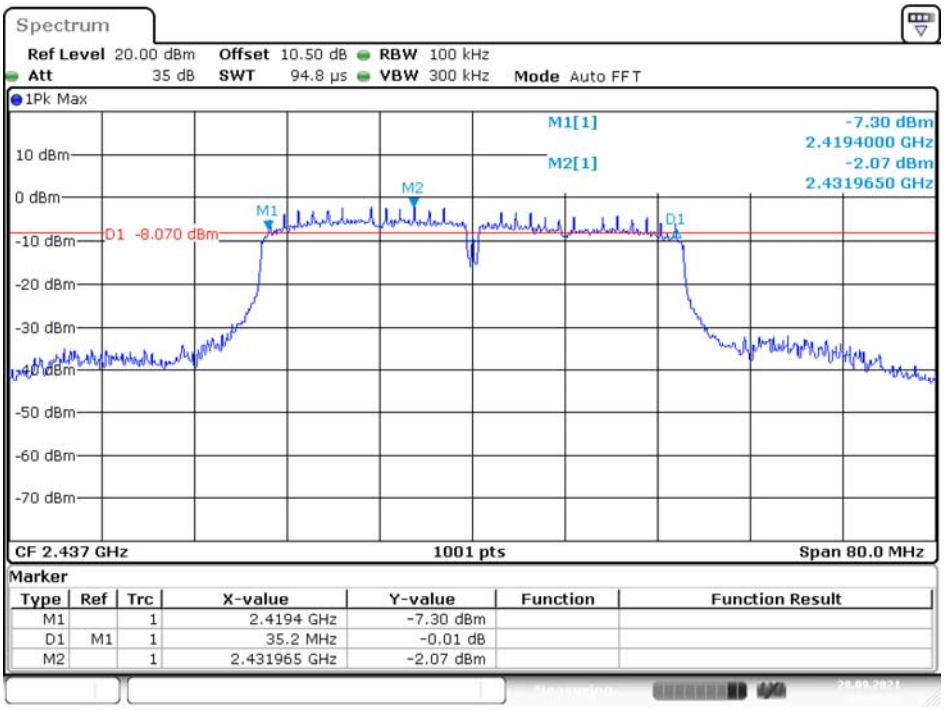
N40 Mode

Low Channel



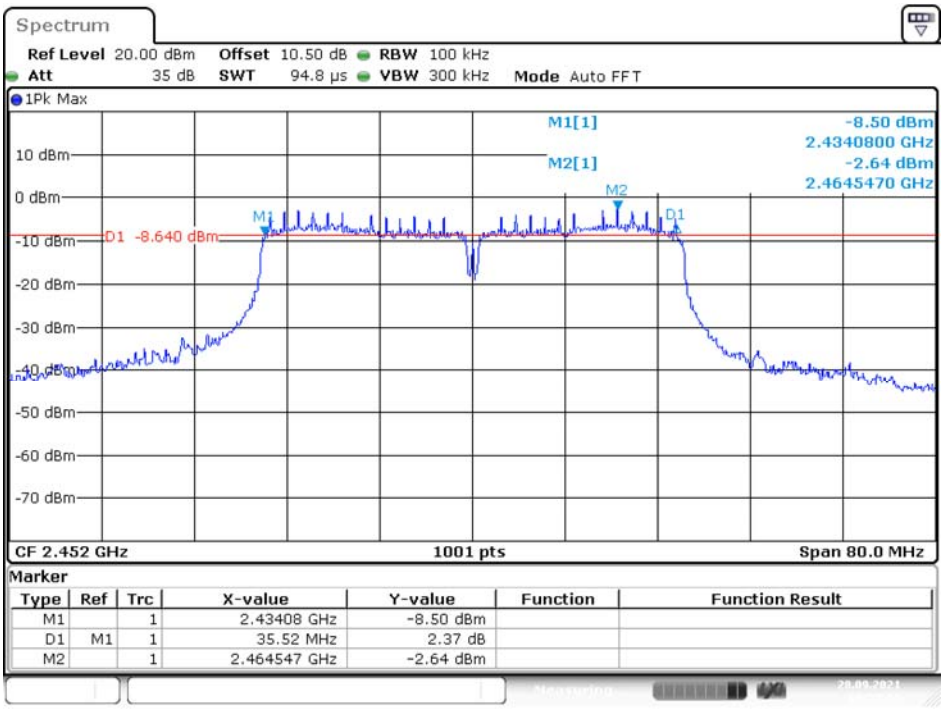
Date: 28.SEP.2021 09:35:02

Middle Channel



Date: 28.SEP.2021 09:40:56

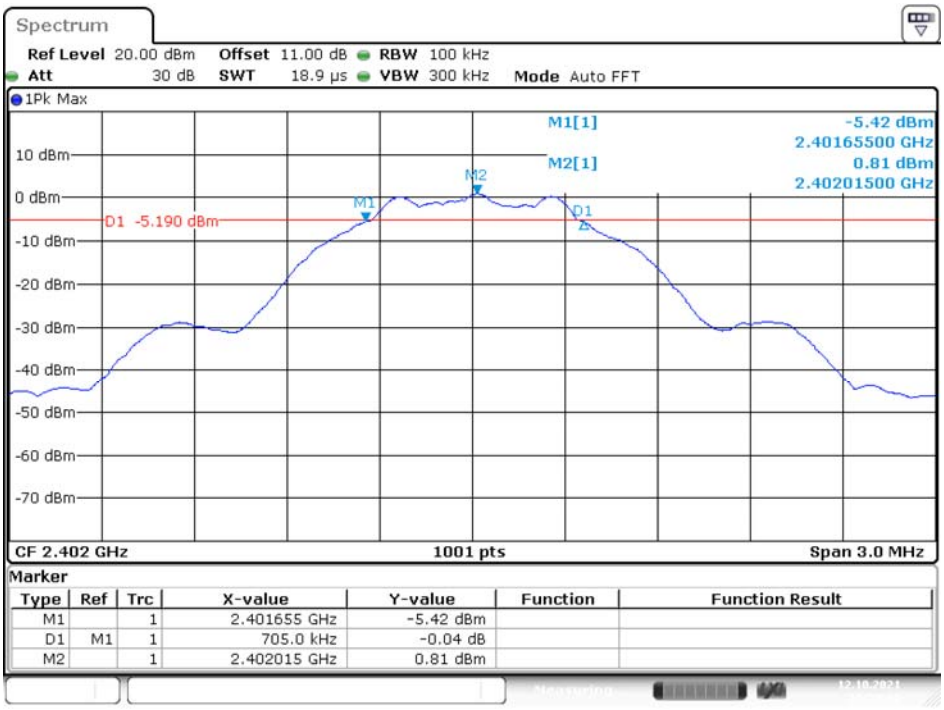
High Channel



Date: 28.SEP.2021 09:52:03

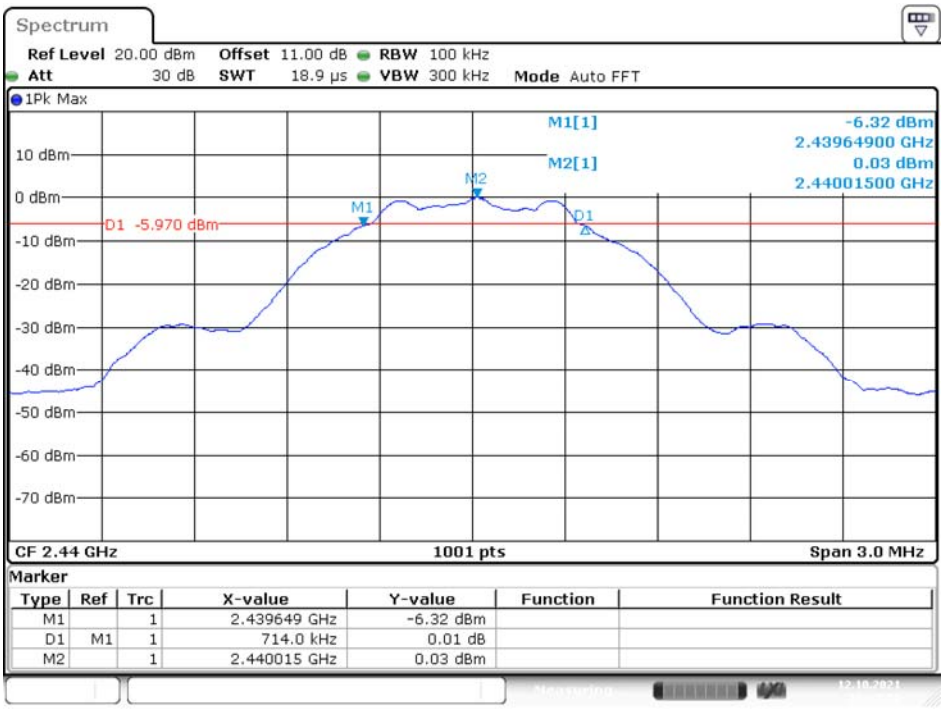
BLE Mode

Low Channel



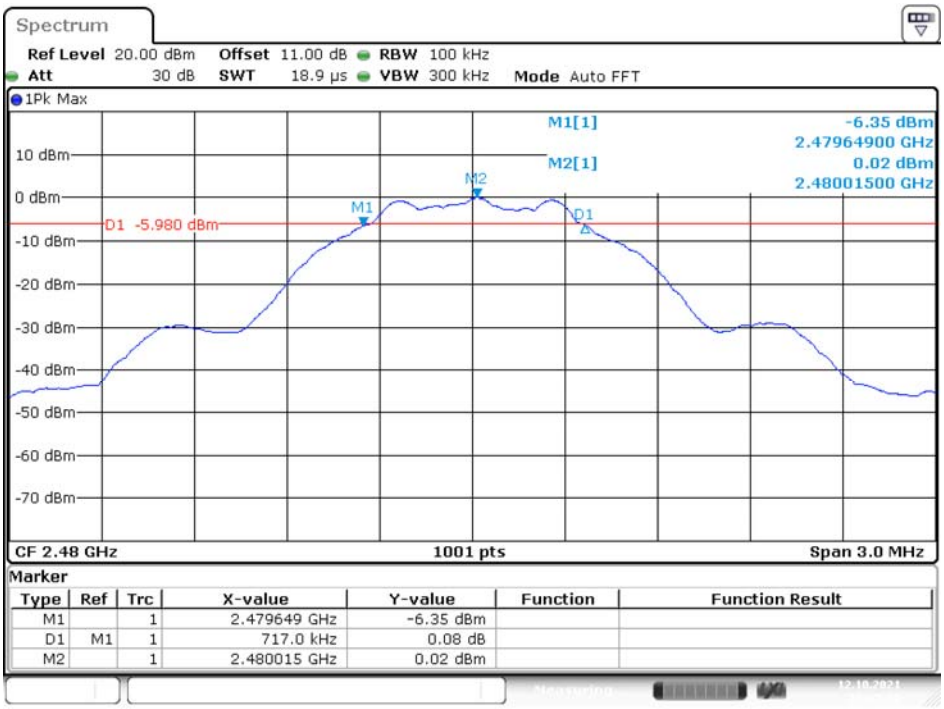
Date: 12.OCT.2021 16:59:43

Middle Channel



Date: 12.OCT.2021 17:02:56

High Channel



Date: 12.OCT.2021 17:05:20

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

10.1 Applicable Standard

According to FCC §15.247(b) (3).

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

10.2 Test Procedure

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

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

10.3 Test Results

Conducted Peak Output Power

Channel	Frequency (MHz)	Power (dBm)	Power (W)	Limit (W)	Result
B Mode					
Low	2412	11.88	0.015	1	PASS
Middle	2437	12.14	0.016	1	PASS
High	2462	11.73	0.015	1	PASS
G Mode					
Low	2412	15.70	0.037	1	PASS
Middle	2437	16.40	0.044	1	PASS
High	2462	15.84	0.038	1	PASS
N20 Mode					
Low	2412	15.93	0.039	1	PASS
Middle	2437	16.52	0.045	1	PASS
High	2462	15.94	0.039	1	PASS
N40 Mode					
Low	2422	19.81	0.096	1	PASS
Middle	2437	20.53	0.113	1	PASS
High	2452	19.55	0.090	1	PASS
BLE Mode					
Low	2402	1.36	0.001	1	PASS
Middle	2440	0.74	0.001	1	PASS
High	2480	0.87	0.001	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

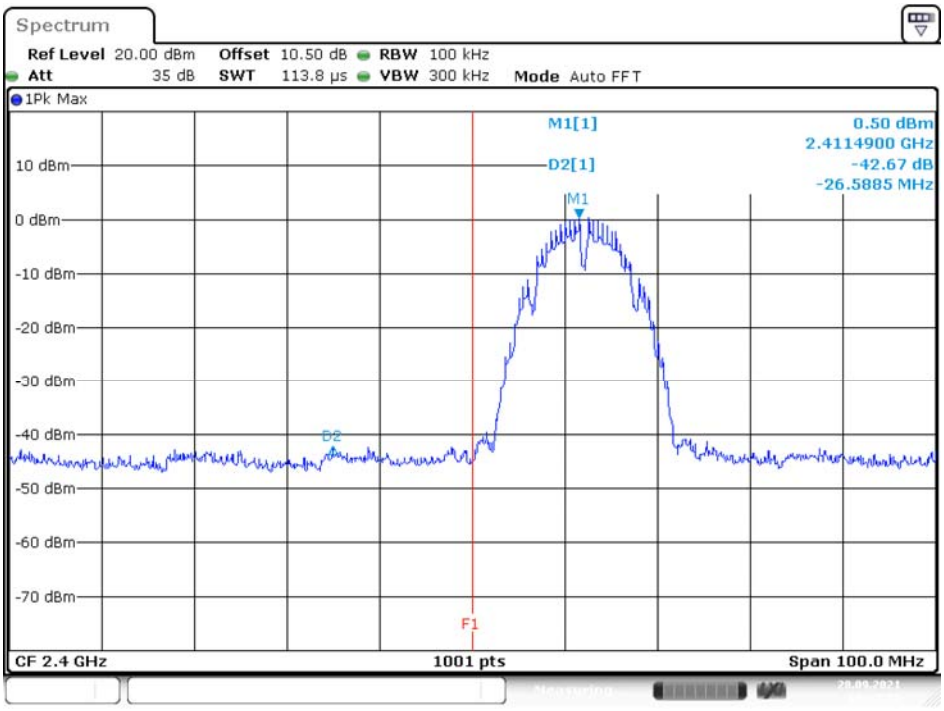
Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	42.67	≥ 20	PASS
High	2462	41.43	≥ 20	PASS
G Mode				
Low	2412	36.61	≥ 20	PASS
High	2462	37.70	≥ 20	PASS
N20 Mode				
Low	2412	34.09	≥ 20	PASS
High	2462	37.11	≥ 20	PASS
N40 Mode				
Low	2422	30.56	≥ 20	PASS
High	2452	37.02	≥ 20	PASS
BLE Mode				
Low	2402	49.74	≥ 20	PASS
High	2480	49.00	≥ 20	PASS

Please refer to the following plots.

WIFI 2.4G Mode

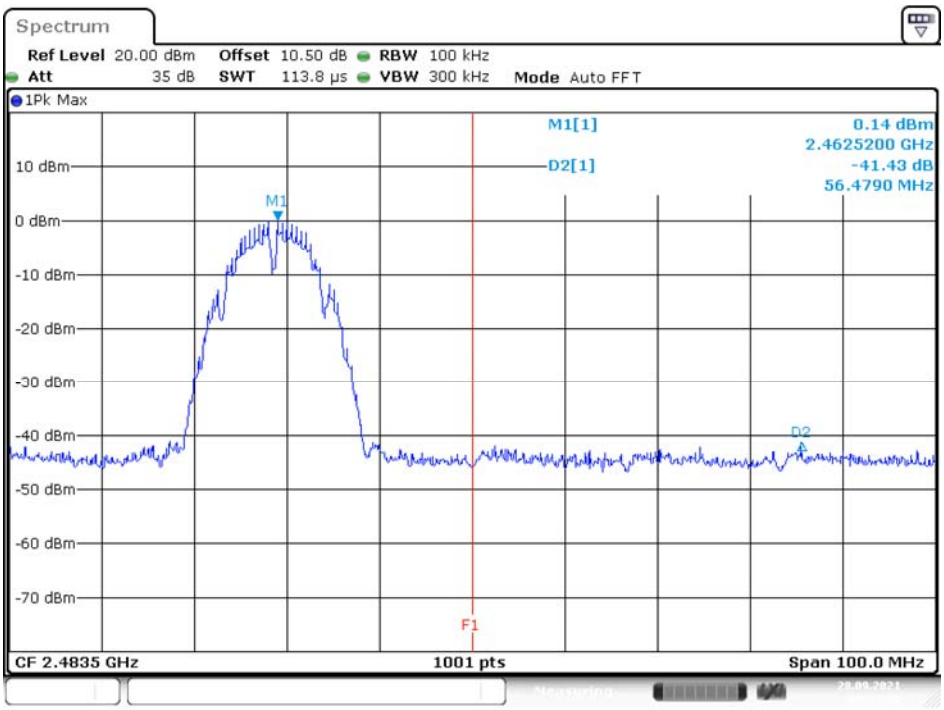
B Mode

Band Edge, Left Side



Date: 28.SEP.2021 09:02:30

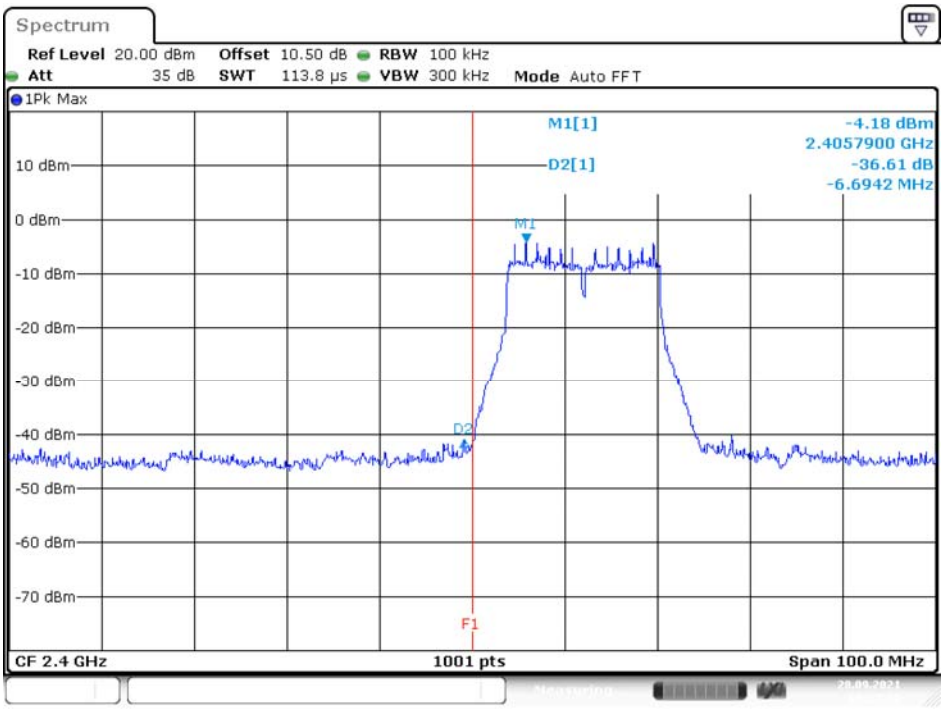
Band Edge, Right Side



Date: 28.SEP.2021 09:11:32

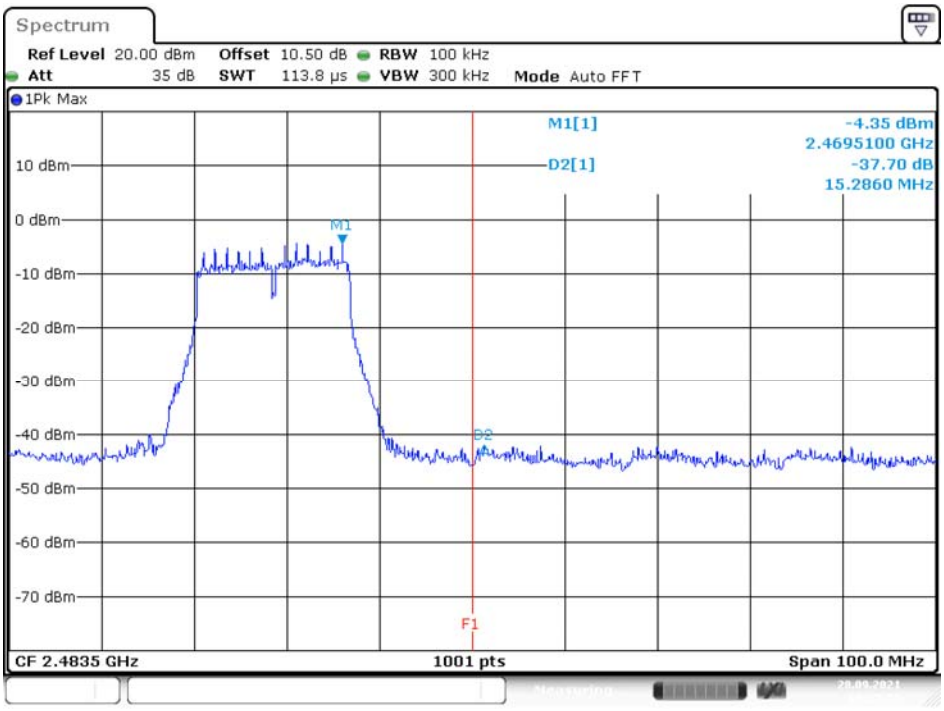
G Mode

Band Edge, Left Side



Date: 28.SEP.2021 09:21:27

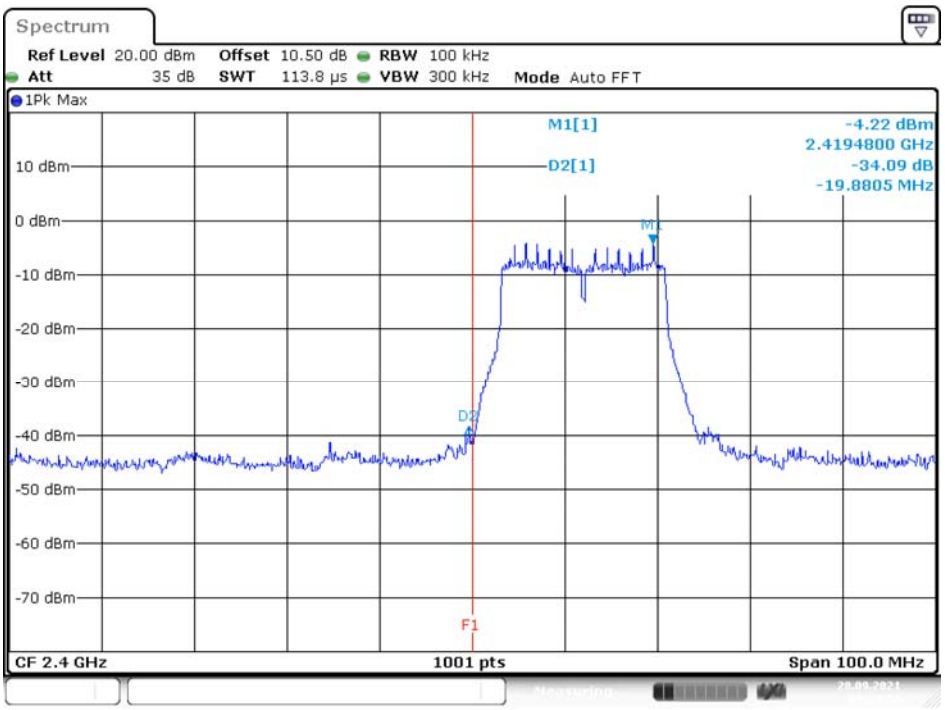
Band Edge, Right Side



Date: 28.SEP.2021 09:25:58

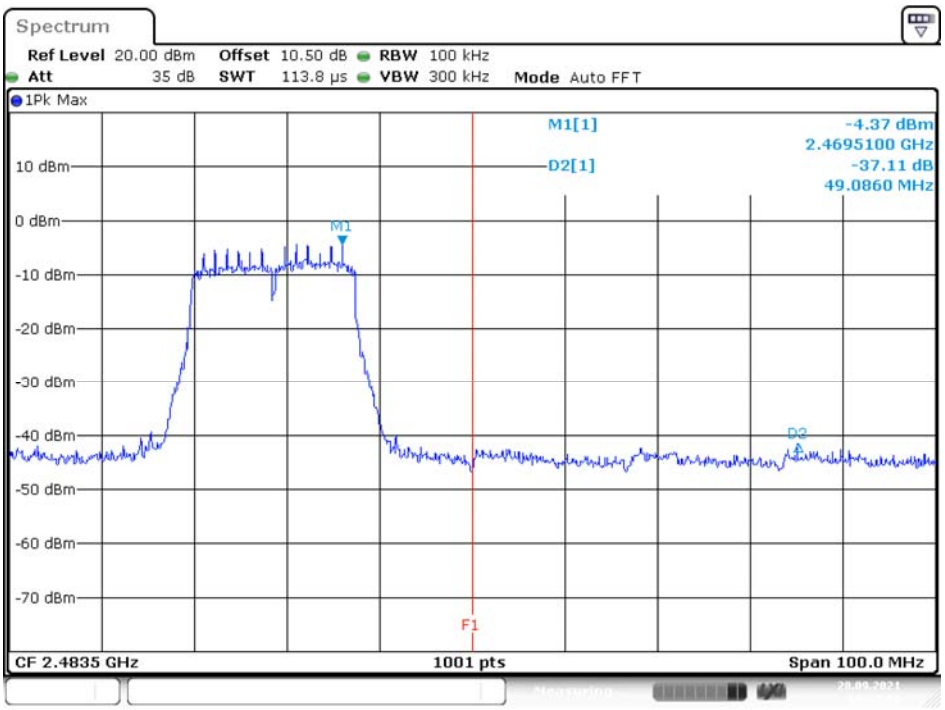
N20 Mode

Band Edge, Left Side



Date: 28.SEP.2021 09:28:55

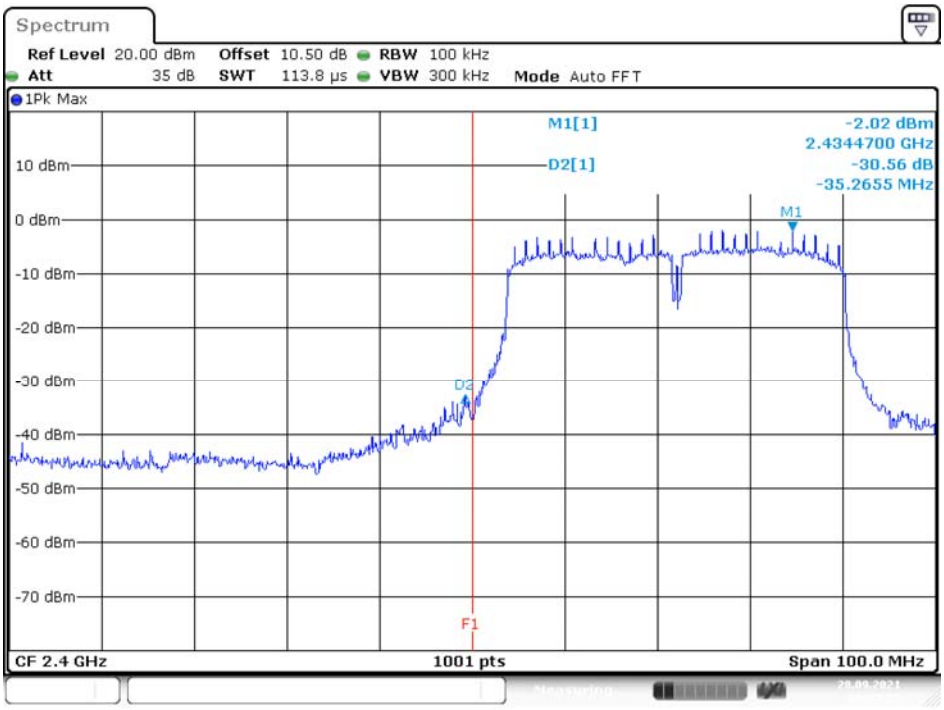
Band Edge, Right Side



Date: 28.SEP.2021 09:33:08

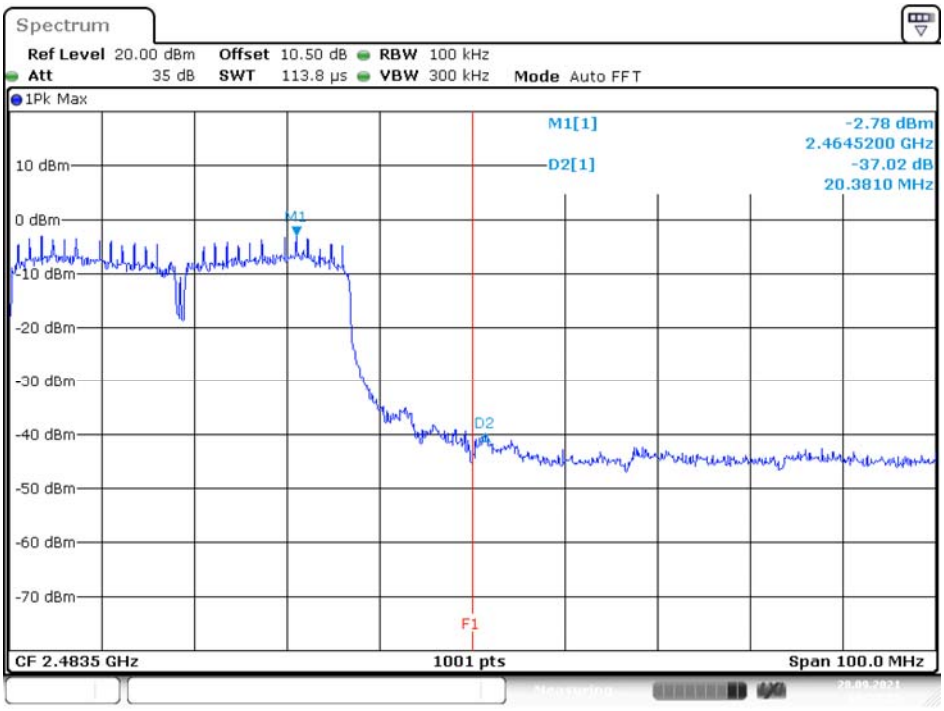
N40 Mode

Band Edge, Left Side



Date: 28.SEP.2021 09:35:27

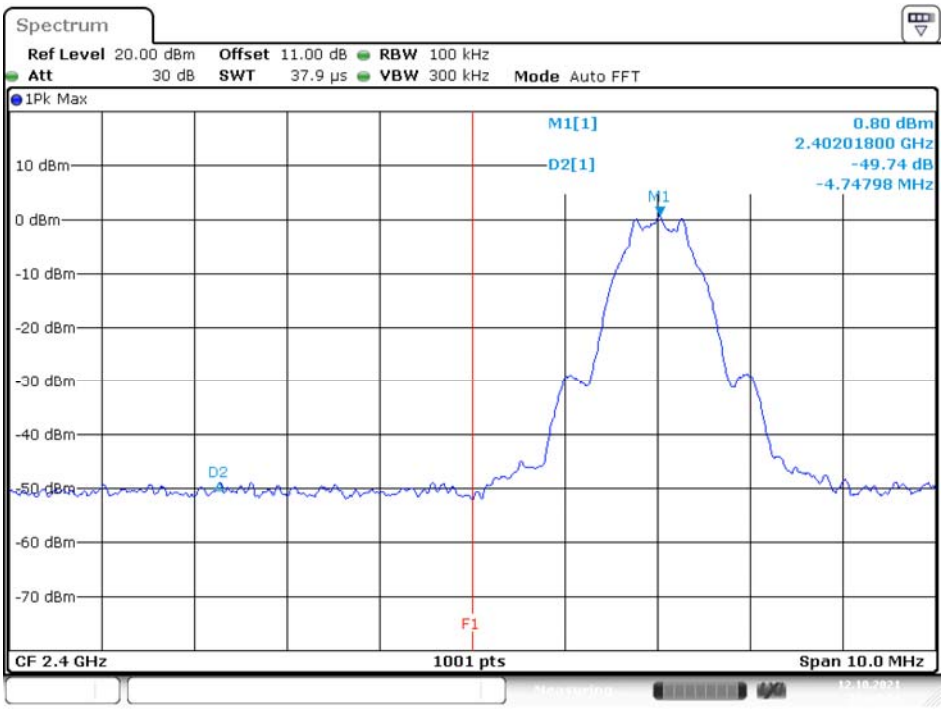
Band Edge, Right Side



Date: 28.SEP.2021 09:52:28

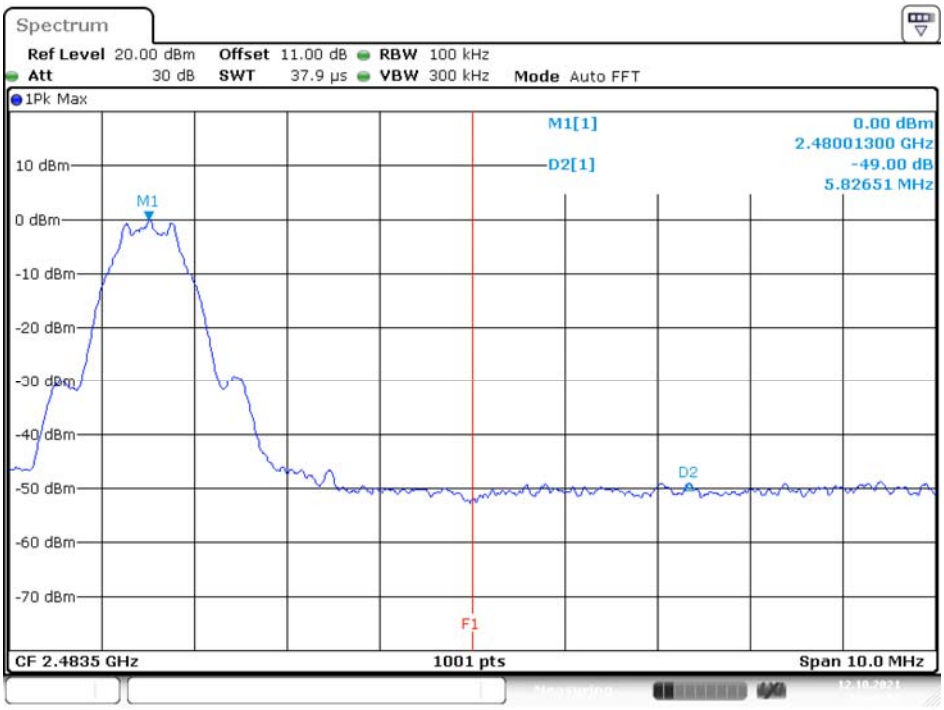
BLE Mode

Band Edge, Left Side



Date: 12.OCT.2021 17:00:23

Band Edge, Right Side



Date: 12.OCT.2021 17:06:01

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

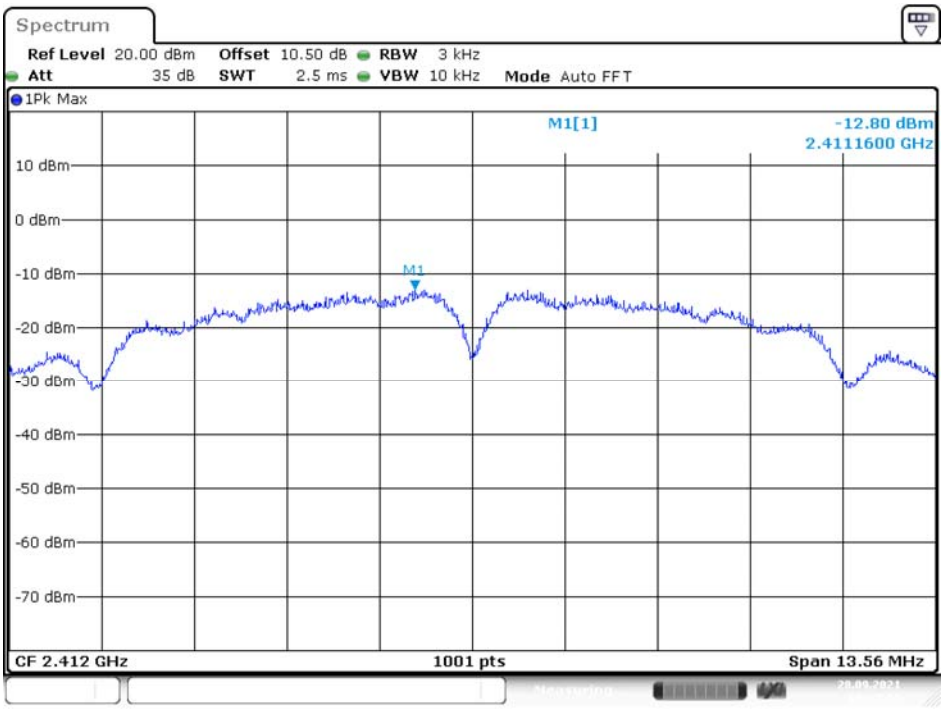
Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-12.80	8	PASS
Middle	2437	-12.76	8	PASS
High	2462	-12.11	8	PASS
G Mode				
Low	2412	-17.04	8	PASS
Middle	2437	-9.77	8	PASS
High	2462	-17.26	8	PASS
N20 Mode				
Low	2412	-16.36	8	PASS
Middle	2437	-17.10	8	PASS
High	2462	-17.02	8	PASS
N40 Mode				
Low	2422	-11.01	8	PASS
Middle	2437	-10.66	8	PASS
High	2452	-14.31	8	PASS
BLE Mode				
Low	2402	-14.16	8	PASS
Middle	2440	-14.88	8	PASS
High	2480	-14.91	8	PASS

Please refer to the following plots

WIFI 2.4G Mode

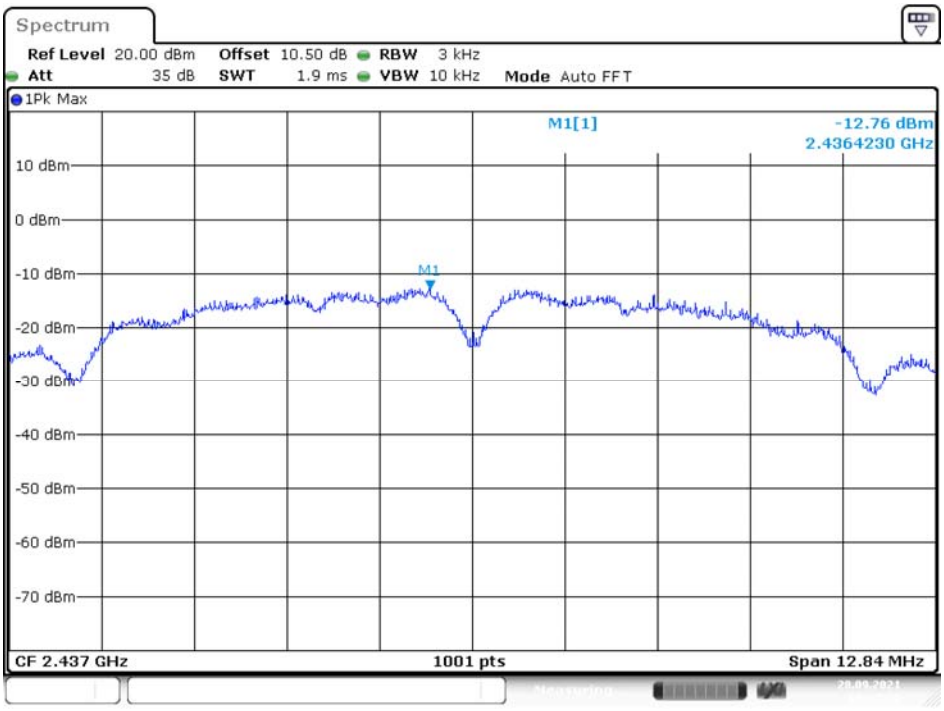
B Mode

Low Channel



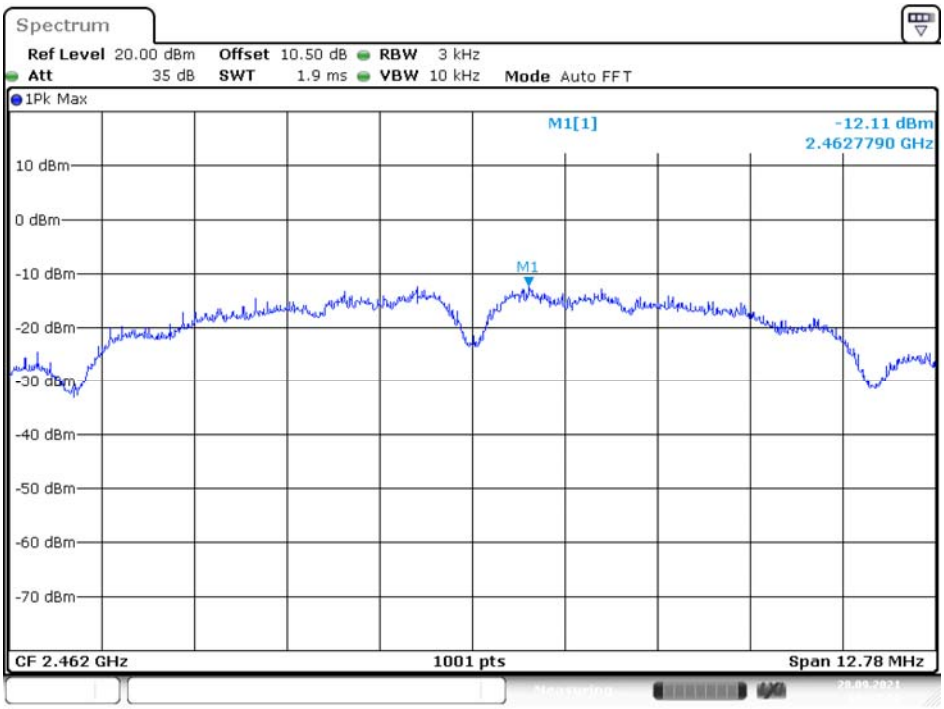
Date: 28.SEP.2021 09:02:14

Middle Channel



Date: 28.SEP.2021 09:07:37

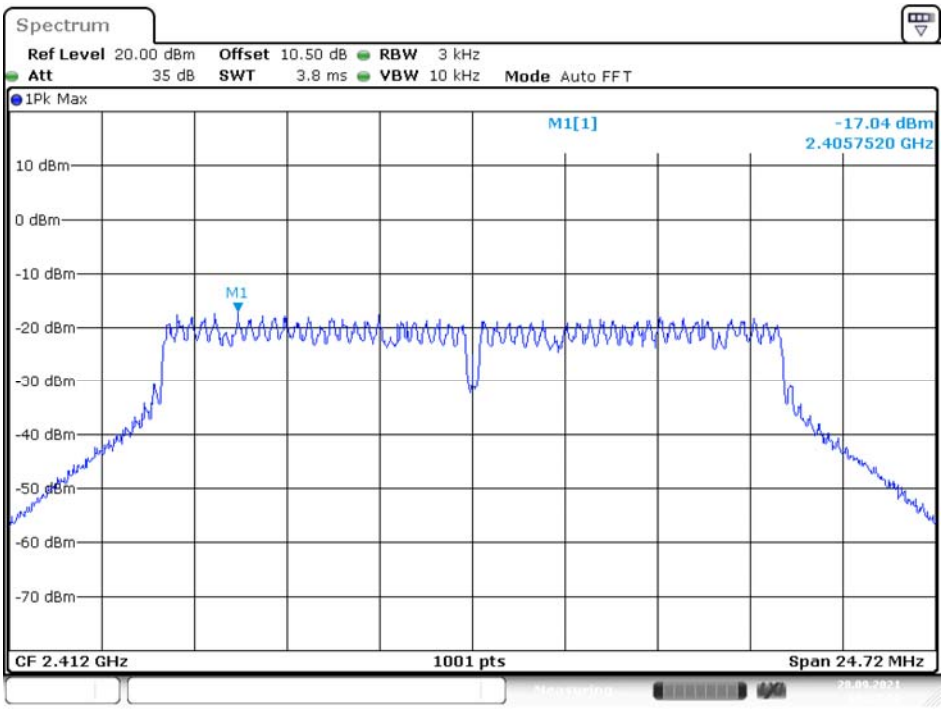
High Channel



Date: 28.SEP.2021 09:11:17

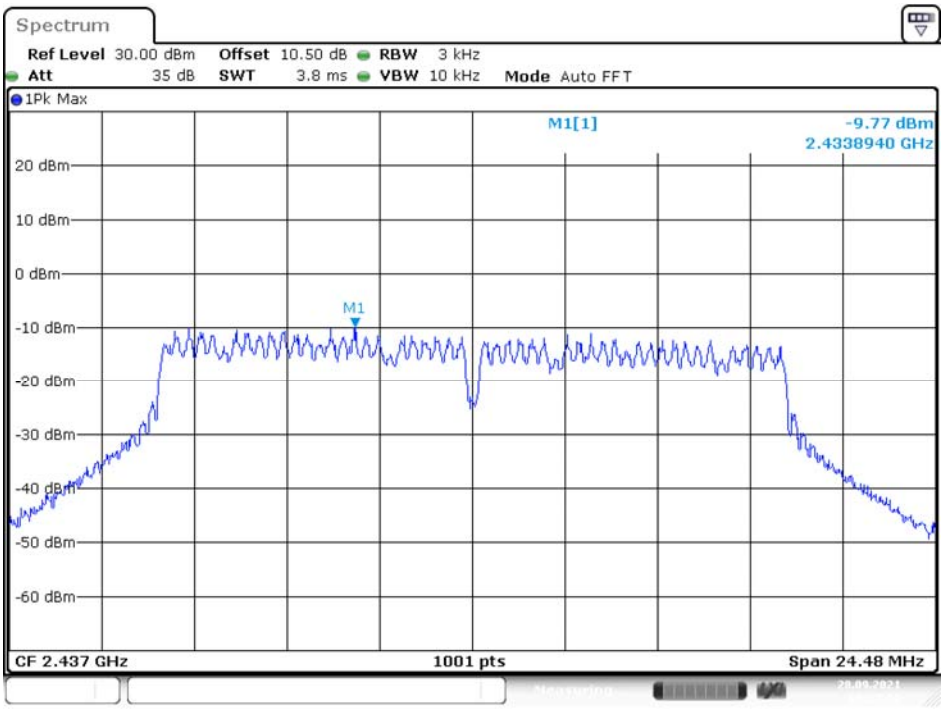
G Mode

Low Channel



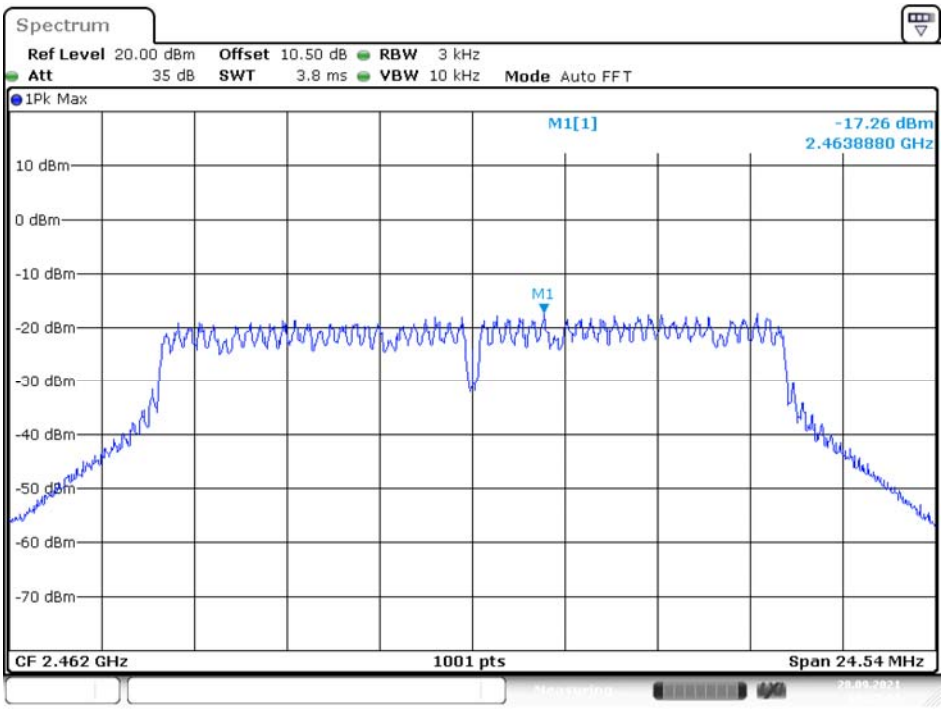
Date: 28.SEP.2021 09:21:11

Middle Channel



Date: 28.SEP.2021 09:23:17

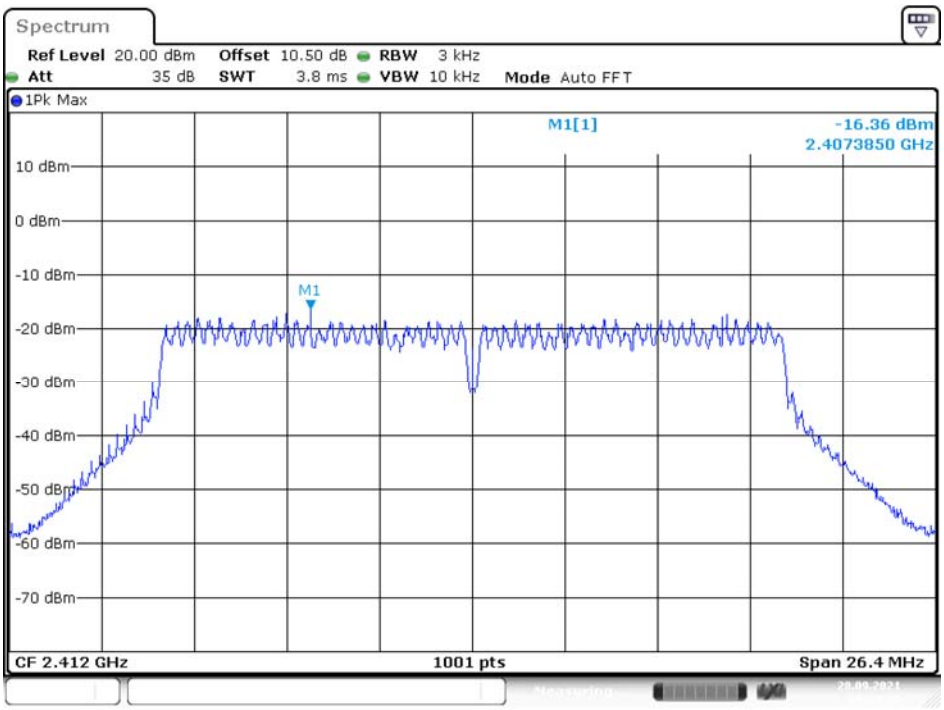
High Channel



Date: 28.SEP.2021 09:25:42

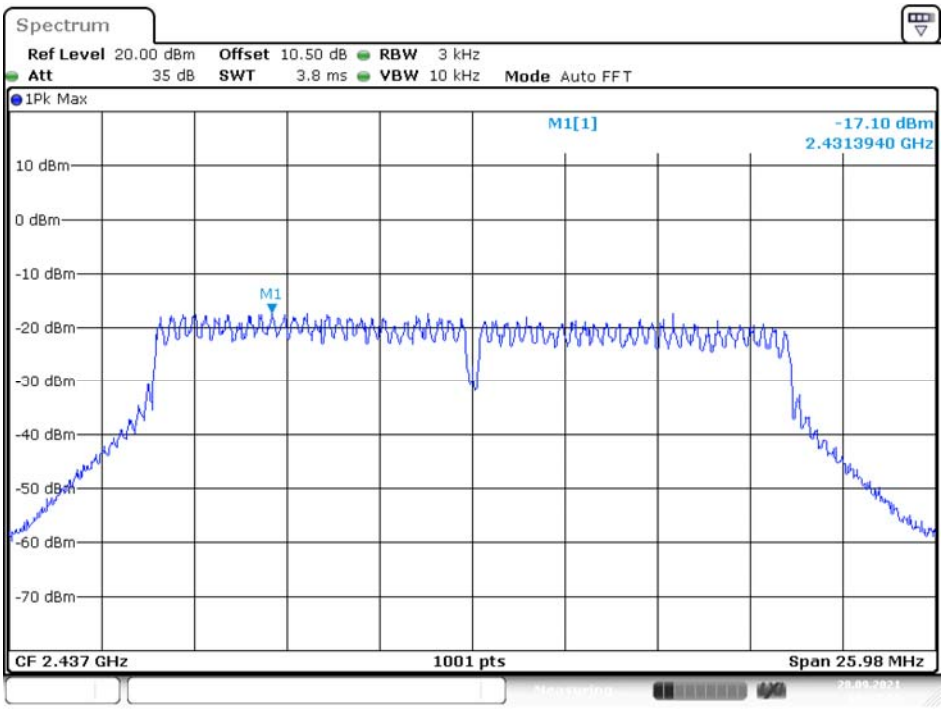
N20 Mode

Low Channel



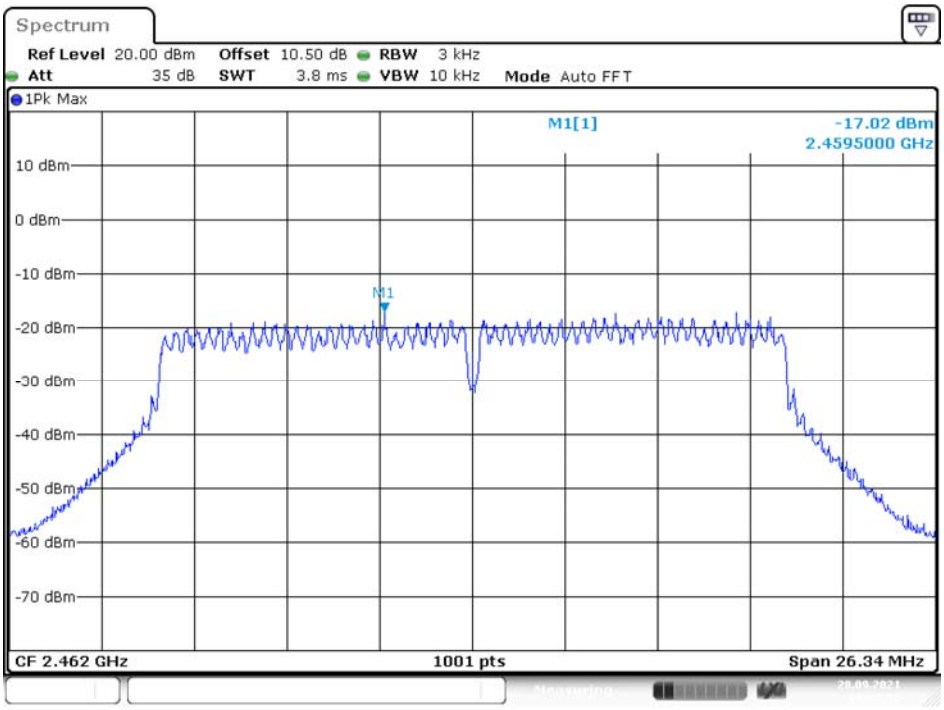
Date: 28.SEP.2021 09:28:39

Middle Channel



Date: 28.SEP.2021 09:31:03

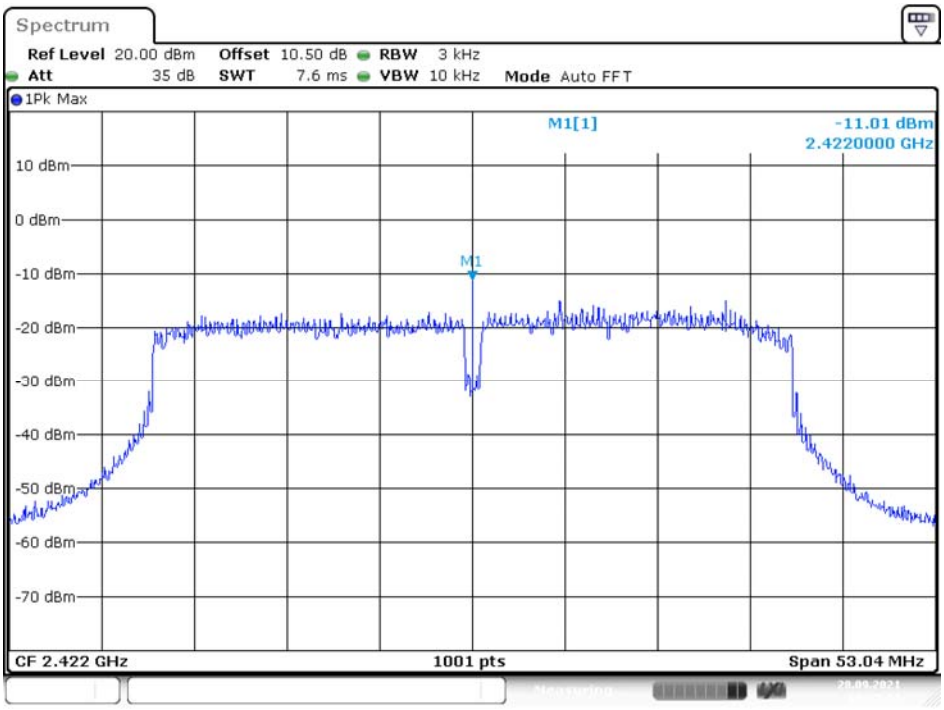
High Channel



Date: 28.SEP.2021 09:32:52

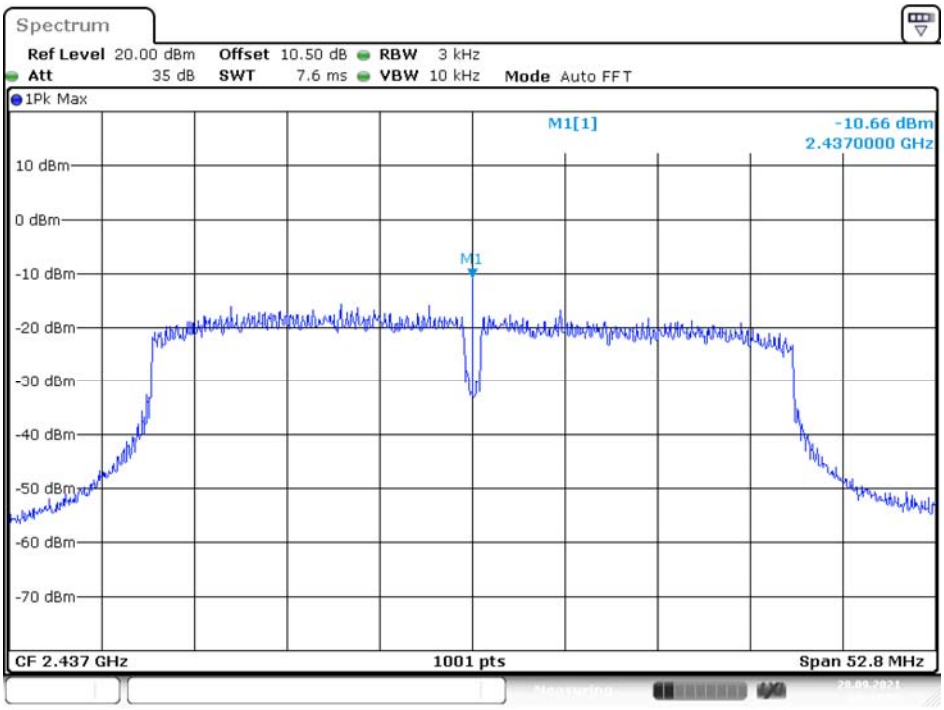
N40 Mode

Low Channel



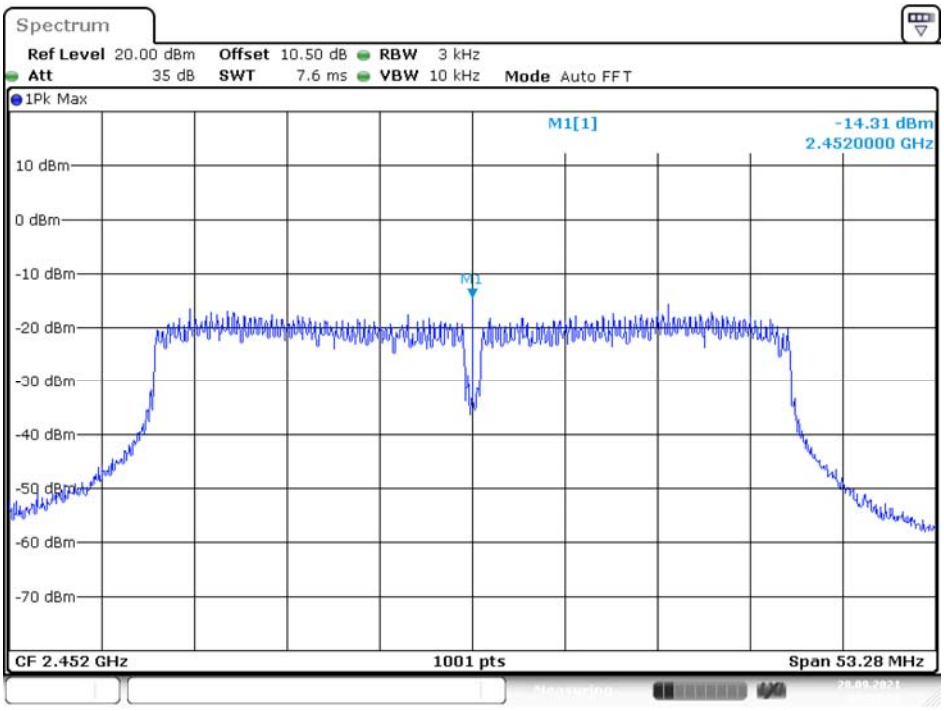
Date: 28.SEP.2021 09:35:11

Middle Channel



Date: 28.SEP.2021 09:41:05

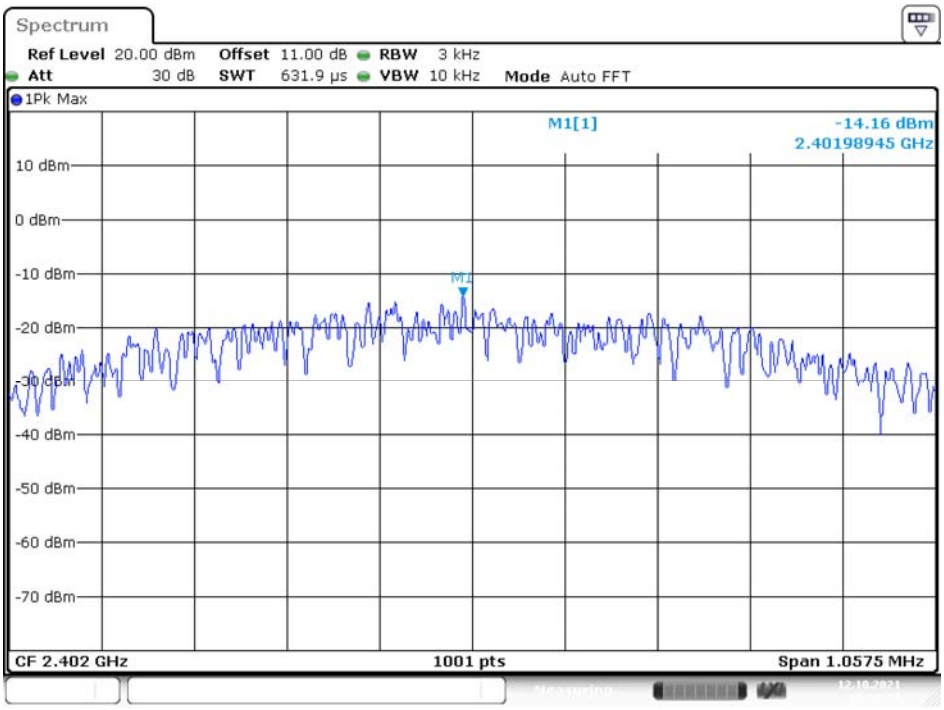
High Channel



Date: 28.SEP.2021 09:52:12

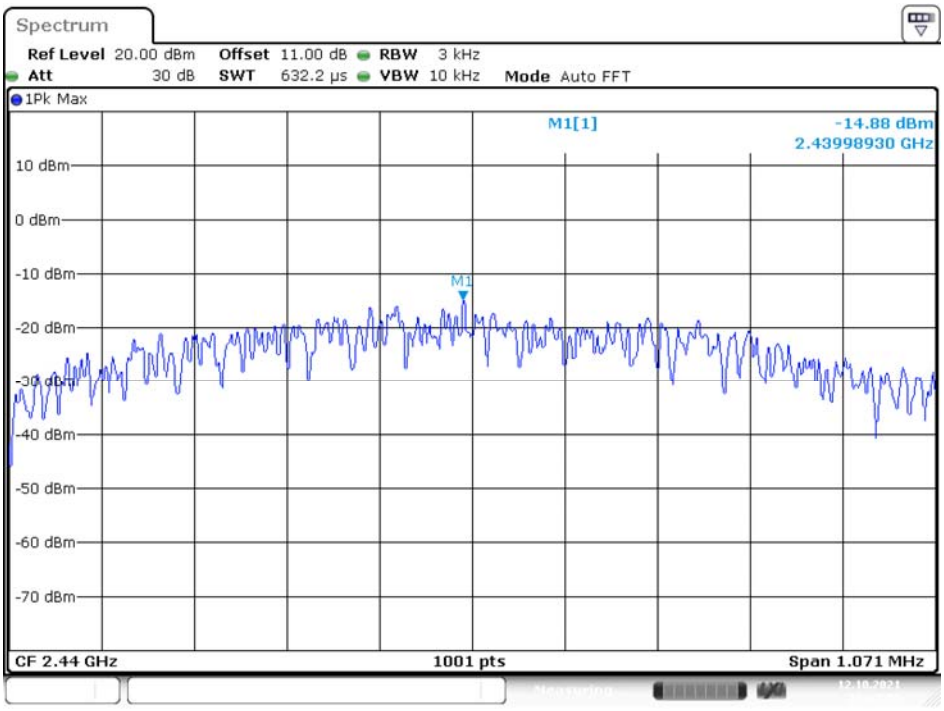
BLE Mode

Low Channel



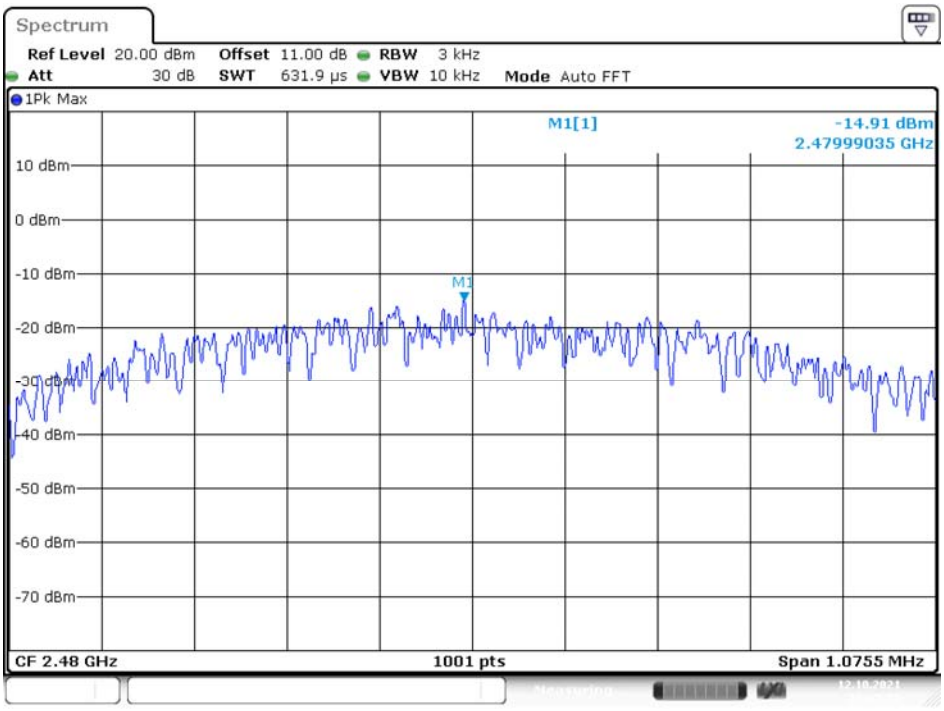
Date: 12.OCT.2021 16:59:52

Middle Channel



Date: 12.OCT.2021 17:03:05

High Channel



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