FCC Part 15.247

TEST REPORT

For

Iconnect

No.9, Aly. 58, Ln. 112, Ruiguang Rd., Neihu Dist.,Taipei City,Taiwan.

FCC ID: 2AB8795312

Report Type:	**Product Name:**
Original Report	Outdoor AP/CPE

Report Producer : Coco Lin

Report Number : RXZ220419002RF01

Report Date : 2022-06-15

Reviewed By: Andy Shih Andy. Shih

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(New Taipei Laboratory)

Revision History

Revision	No.	Report Number	Issue Date	Description	Author/ Revised by
0.0	RXZ220419002	RXZ220419002RF01	2022-06-15	Original Report	Coco Lin

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1 General Information

1.1 Product Description for Equipment under Test (EUT)

Manufacturer	ALFA NETWORK Inc 4F.-1, NO. 106, Rueiguang Rd., Neihu District, Taipei City, Taiwan, R.O.C.
Brand(Trade) Name	ALFA
Product (Equipment)	Outdoor AP/CPE
Main Model Name	Tube-2HQP
Series Model Name	Tube-2HQ, Tube-2XXXXX, Tube-5XXXXX, Tube-25XXXX, Tube-52XXXX, Tube-XXXXXX , X:Any alphanumeric character or blank
Model Discrepancy	The major electrical and mechanical constructions of series models are identical to the basic model, except market segmentation. The model, Tube-2HQP is the testing sample, and the final test data are shown on this test report.
Frequency Range	IEEE 802.11b/g / IEEE 802.11n HT20 Mode: 2412 ~ 2462 MHz IEEE 802.11n HT40 Mode: 2422 ~ 2452 MHz
Conducted Peak Output Power	IEEE 802.11b Mode: 24.60 dBm IEEE 802.11g Mode: 25.37 dBm IEEE 802.11n HT20 Mode: 24.52 dBm IEEE 802.11n HT40 Mode: 19.84 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
Power Operation (Voltage Range)	☒ AC ☐ Adapter ☐ By AC Power Cord ☒ PoE I/P: 100-240Vac, 50-60Hz, 1.2A ; O/P: 56Vdc, 0.5A
	☐ DC ☐ Battery ☐ DC Power Supply ☐ External from USB Cable ☐ External DC Adapter
	☐ Host System
Received Date	Apr. 19, 2022
Date of Test	Apr. 21, 2022 ~ Apr. 28, 2022

*All measurement and test data in this report was gathered from production sample serial number: RXZ220419002-01 (Assigned by BACL, New Taipei Laboratory).

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1.2 Objective

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

1.3 Related Submittal(s)/Grant(s)

N/A

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 558074 D01 15.247 Meas Guidance v05r02

1.5 Statement

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

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Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.
Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.
The determination of the test results does not require consideration of the uncertainty of the measurement, unless the assessment is required by customer agreement, regulation or standard document specification.
Bay Area Compliance Laboratories Corp. (New Taipei Laboratory) is not responsible for the authenticity of the information provided by the applicant that affects the test results.

1.6 Measurement Uncertainty

Parameter		Uncertainty
AC Mains		+/- 2.36 dB
RF output power, conducted		+/- 0.93 dB
Power Spectral Density, conducted		+/- 0.93 dB
Occupied Bandwidth		+/- 0.35 dB
Unwanted Emissions, conducted		+/- 1.69 dB
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	2022/4/28	25	47	1010	Aaron Pan
Radiation Spurious Emissions	2022/4/21-2022/4/25	21.3-24.2	61-77	1010	Andy Cheng
Conducted Spurious Emissions	2022/4/25	24.2	52	1010	Jim Chen
6 dB Emission Bandwidth	2022/4/25	24.2	52	1010	Jim Chen
Maximum Output Power	2022/4/25	24.2	52	1010	Jim Chen
100 kHz Bandwidth of Frequency Band Edge	2022/4/25	24.2	52	1010	Jim Chen
Power Spectral Density	2022/4/25	24.2	52	1010	Jim Chen

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.

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2 System Test Configuration

2.1 Description of Test Configuration

For WIFI mode, there are totally 11 channels.

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

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

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

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

2.2 Equipment Modifications

No modification was made to the EUT.

2.3 EUT Exercise Software

The test software was used “art2_ver_4_9_815”

Test Frequency		Low	Middle	High
Power Level Setting	802.11b Mode	19	20	20
	802.11g Mode	17	16.5	16
	802.11n HT20 Mode	16.5	16	16
	802.11n HT40 Mode	13	13	12

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

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2.4 Test Mode

Full System (model: Tube-2HQP) for all test item.

2.5 Support Equipment List and Details

Description	Manufacturer	Model Number	S/N
POE Adapter	ALFA	PSE-1000GU	2012-0000690

2.6 External Cable List and Details

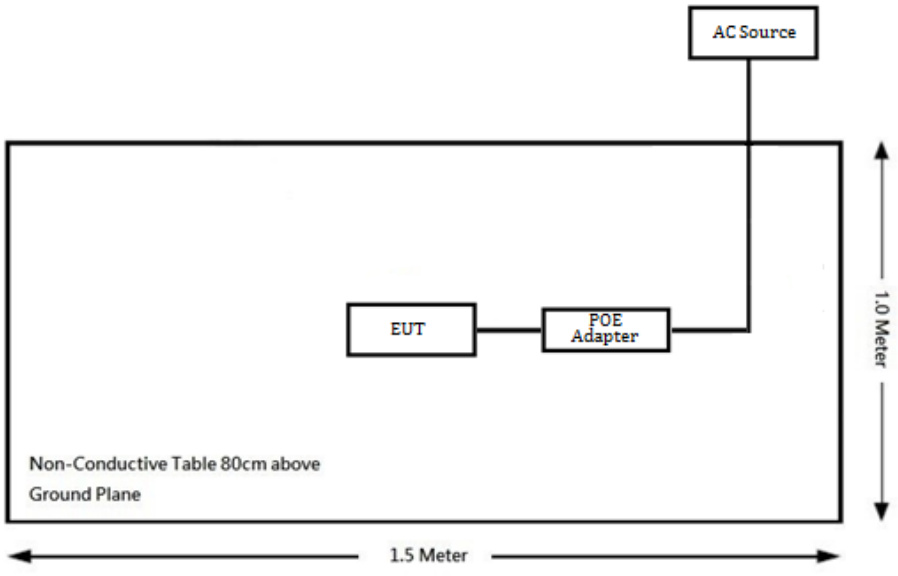
Cable Description	Length (m)	From	To
Power Cable	1.5	POE Adapter	AC Source
RJ-45 Cable	1	EUT	POE Adapter

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:



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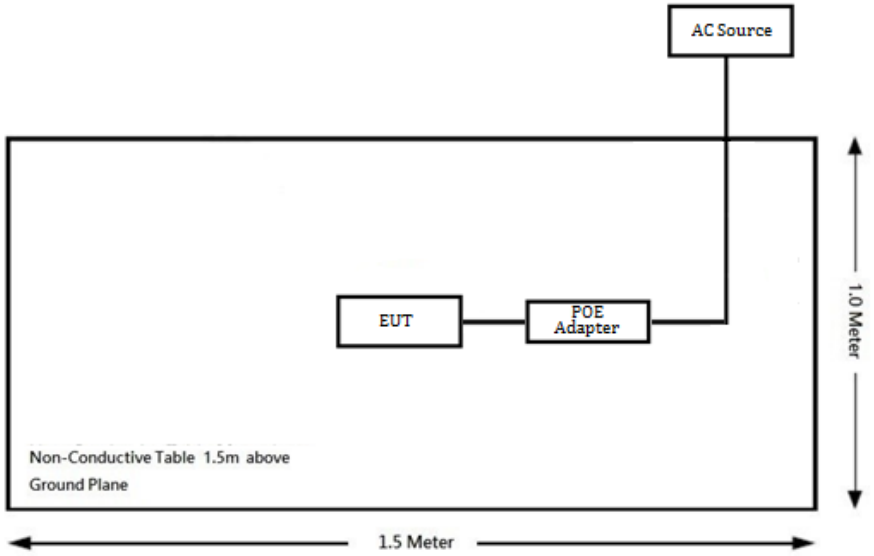
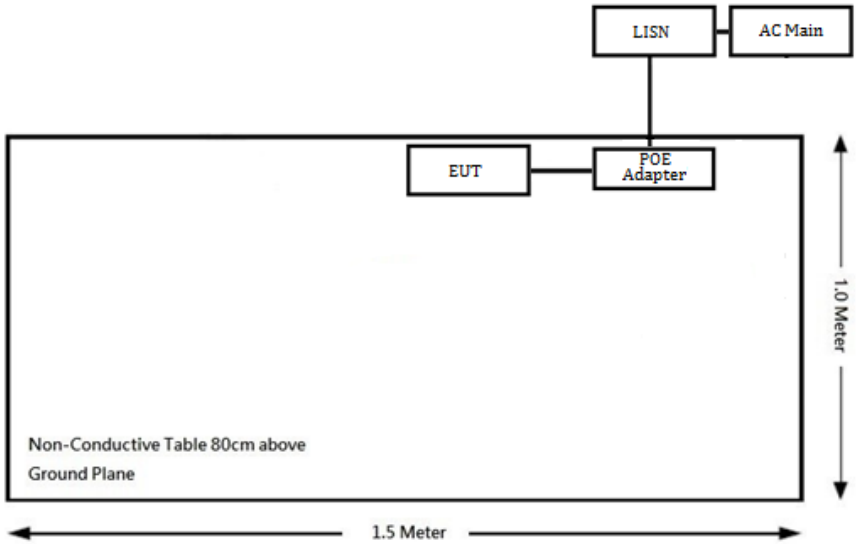
Above 1GHz:



Conduction:



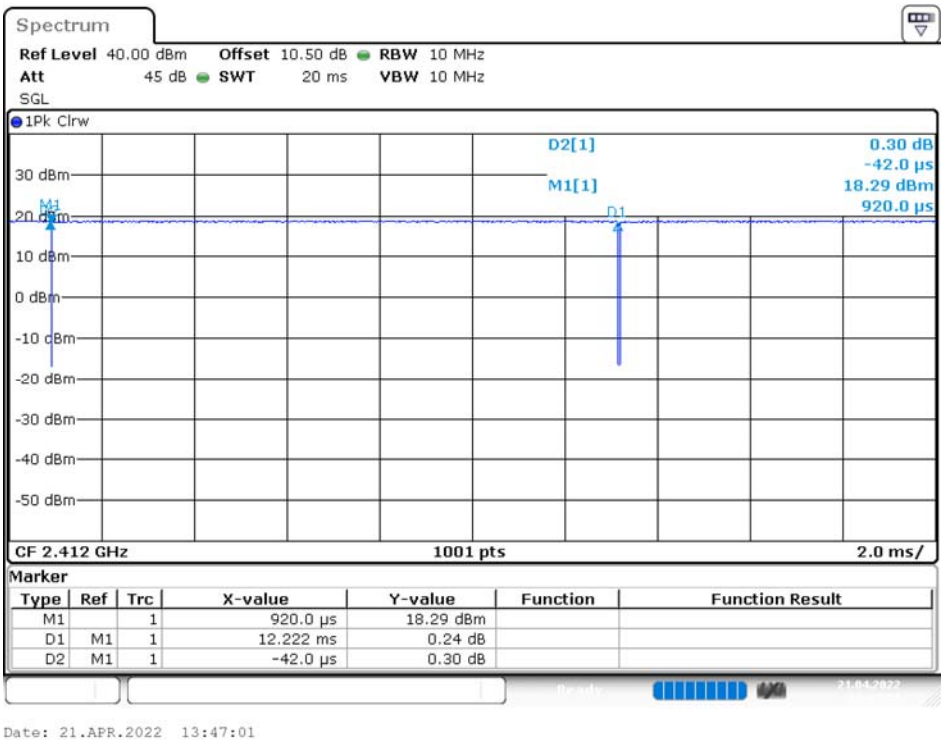
2.8 Duty Cycle

The duty cycle as below:

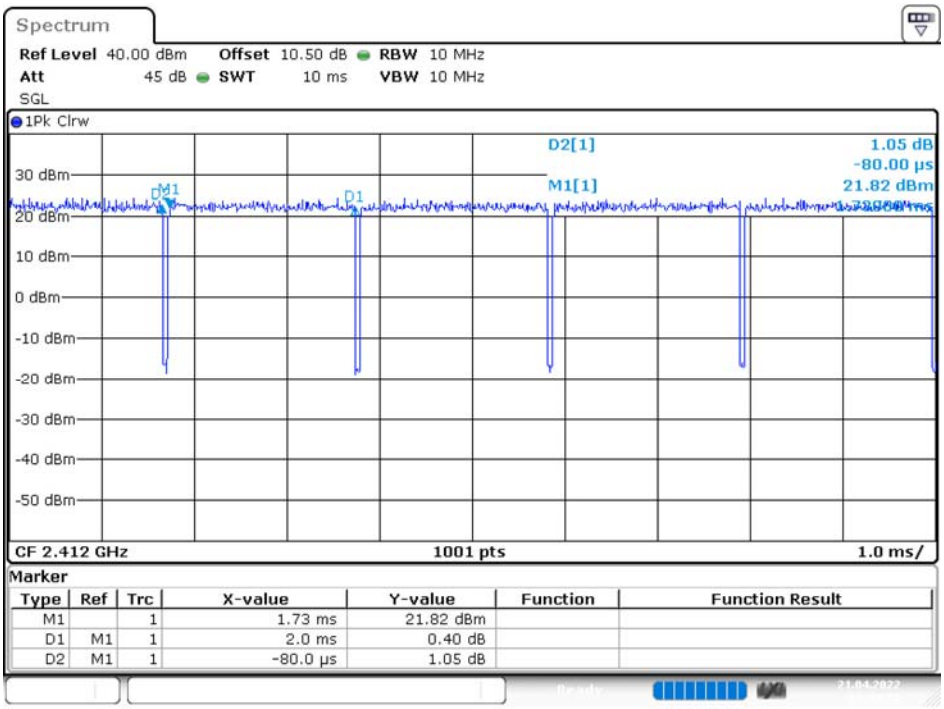
Radio Mode	T_{on} (ms)	$T_{on}+T_{off}$ (ms)	Duty Cycle (%)
802.11b	12.22	12.26	100
802.11g	2.0	2.08	96
802.11n20	1.87	1.95	96
802.11n40	0.92	0.96	96

Please refer to the following plots.

B Mode

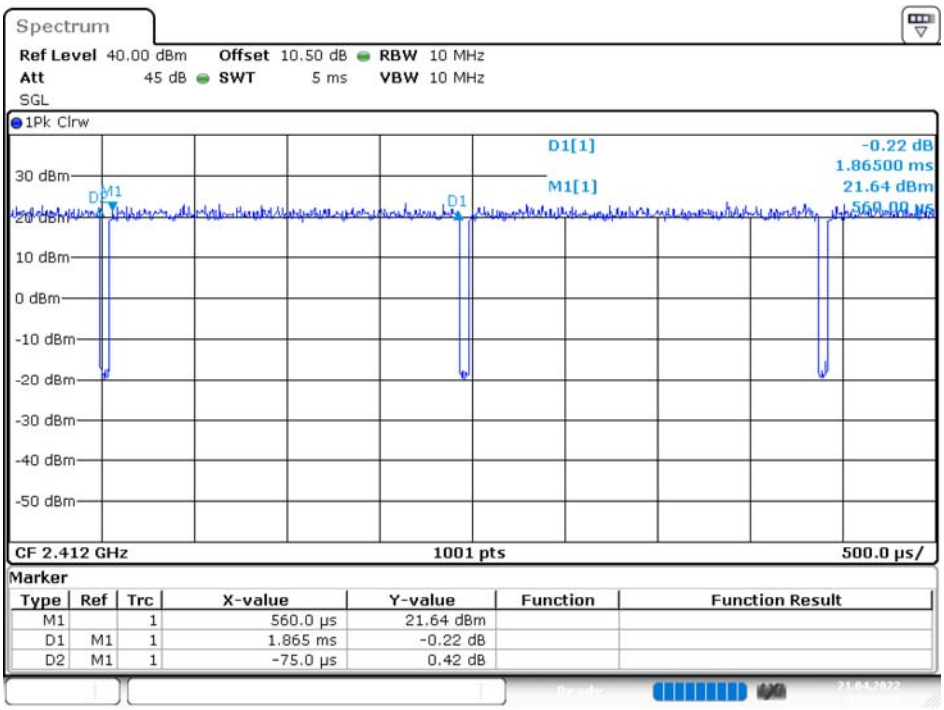


G Mode



Date: 21.APR.2022 13:38:20

N20 Mode



Date: 21.APR.2022 13:40:50

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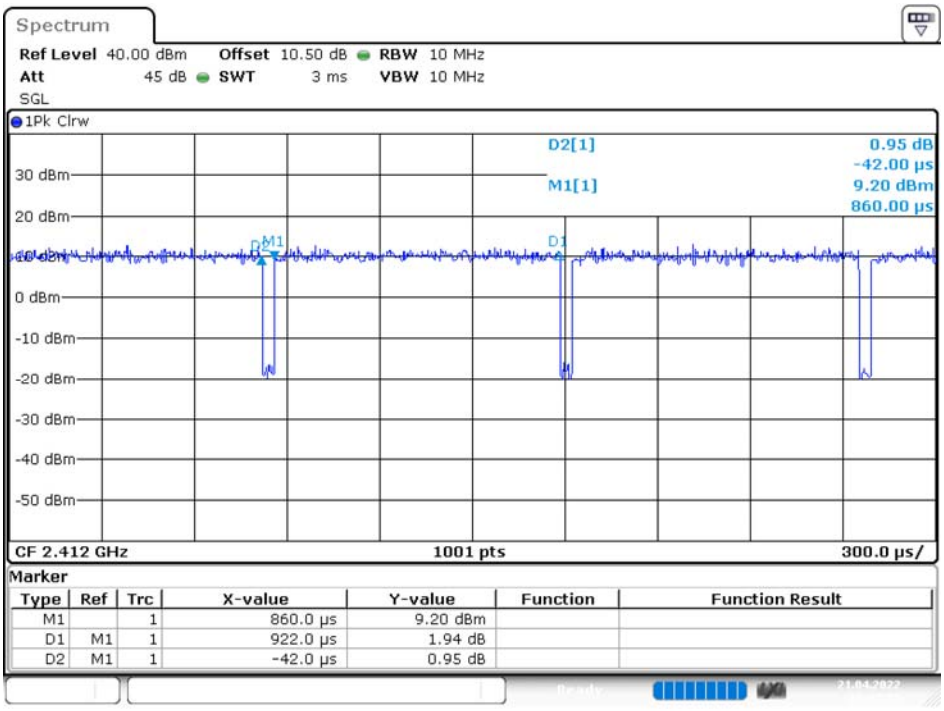
N40 Mode



Date: 21.APR.2022 13:42:23

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3 Summary of Test Results

FCC Rules	Description of Test	Results
§15.247(i), §1.1307(b)(3)(i)	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

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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
EMI Test Receiver	Rohde & Schwarz	ESW8	100947	2021/7/23	2022/7/22
Pulse Limiter	Rohde & Schwarz	ESH3Z2	TXZEM104	2021/7/29	2022/7/28
RF Cable	EMEC	EM-CB5D	1	2021/6/11	2022/6/10
Software	AUDIX	E3	V9.150826k	N.C.R	N.C.R
Radiated Room (966-A)					
Bilog Antenna with 6 dB Attenuator	SUNOL SCIENCES & MINI-CIRCUITS	JB6/UNAT-6+	A050115/15542_01	2022/2/14	2023/2/13
Horn Antenna	EMCO	SAS-571	1983	2021/5/6	2022/5/5
Horn Antenna	ETS-Lindgren	3116	62638	2021/8/11	2022/8/10
Preamplifier	Sonoma	310N	130602	2021/6/8	2022/6/7
Preamplifier	A.H. system Inc.	PAM-0118P	466	2021/11/4	2022/11/3
Microware Preamplifier	EM Electronics Corporation	EM18G40G	60656	2021/12/27	2022/12/26
Spectrum Analyzer	Rohde & Schwarz	FSV40	101435	2022/1/13	2023/1/12
EMI Test Receiver	Rohde & Schwarz	ESR7	101419	2021/11/9	2022/11/8
Micro flex Cable	UTIFLEX	UFB197C-1-2362-70U-70U	225757-001	2022/1/24	2023/1/23
Coaxial Cable	COMMATE	PEWC	8Dr	2021/12/24	2022/12/23
Coaxial Cable	UTIFLEX	UFB311A-Q-1440-300300	220490-006	2022/1/24	2023/1/23
Coaxial Cable	JUNFLON	J12J102248-00-B-5	AUG-07-15-044	2021/12/24	2022/12/23
Cable	EMC	EMC105-SM-SM-10000	201003	2022/1/24	2023/1/23
Coaxial Cable	ROSNOL	K1K50-UP0264-K1K50-450CM	160309-1	2022/1/24	2023/1/23

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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	101140	2022/2/18	2023/2/17
Power Sensor	KEYSIGHT	U2021XA	MY54080018	2022/1/24	2023/1/23
Cable	UTIFLEX	UFA210A	9435	2021/10/5	2022/10/4
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

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5 FCC §15.247(i), § 1.1307(b)(3)(i) – RF Exposure

5.1 Applicable Standard

According to subpart 15.247(i) and subpart §1.1307(b)(3)(i), 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.

For single RF sources (*i.e.,* any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2) of this section): A single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold *Pth* (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). *Pth* is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^{x} & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

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5.2 RF Exposure Evaluation Result

Project info

Band	Freq (MHz)	Tunp-up Power (dBm)	Ant Gain (dBi)	Distances (mm)	Duty (%)	Tunp-up Power (mW)	ERP (dBm)	ERP (mW)
WIFI 2.4G	2462	25.5	6	200	100%	354.81	29.35	860.99

Option A The available maximum time-averaged power is no more than 1 mW

Band	Freq (MHz)	Result Option A
WIFI 2.4G	2462	not exempt

Option B

The available maximum time-averaged power or effective radiated power (ERP), whichever is greater. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive).

Band	Freq (MHz)	Pth (mW)	X	ERP 20cm (mW)	Ratio	Result Option B
WIFI 2.4G	2462	3060.00	1.903	3060	0.28	exempt

Result: The device meets the exemption requirement.

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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
ALFA	AOA-2405TF	Omni Antenna	6 dBi

Result: Compliance

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

7.1 Applicable Standard

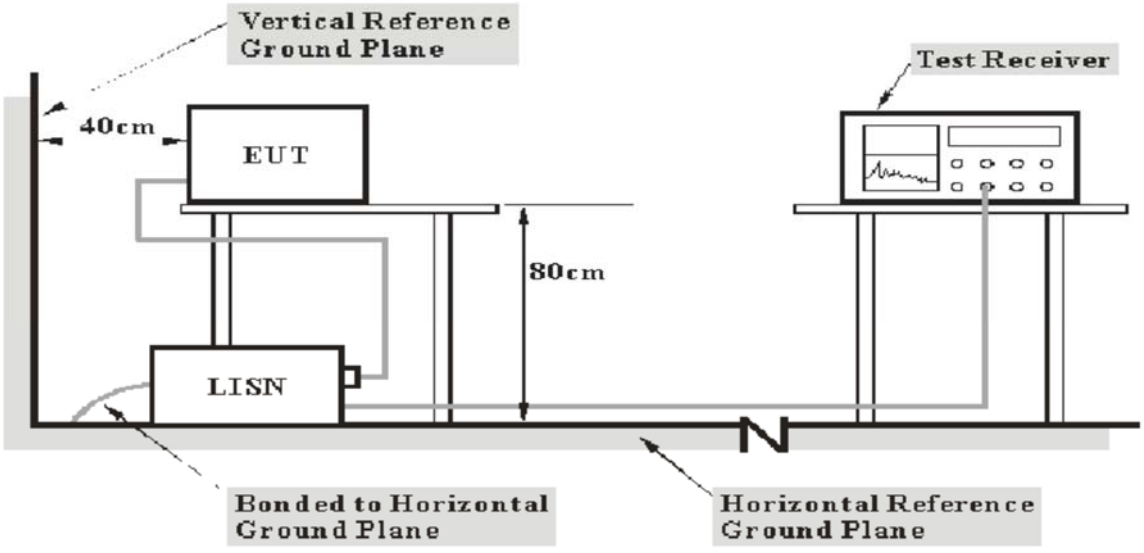
According to §15.207

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

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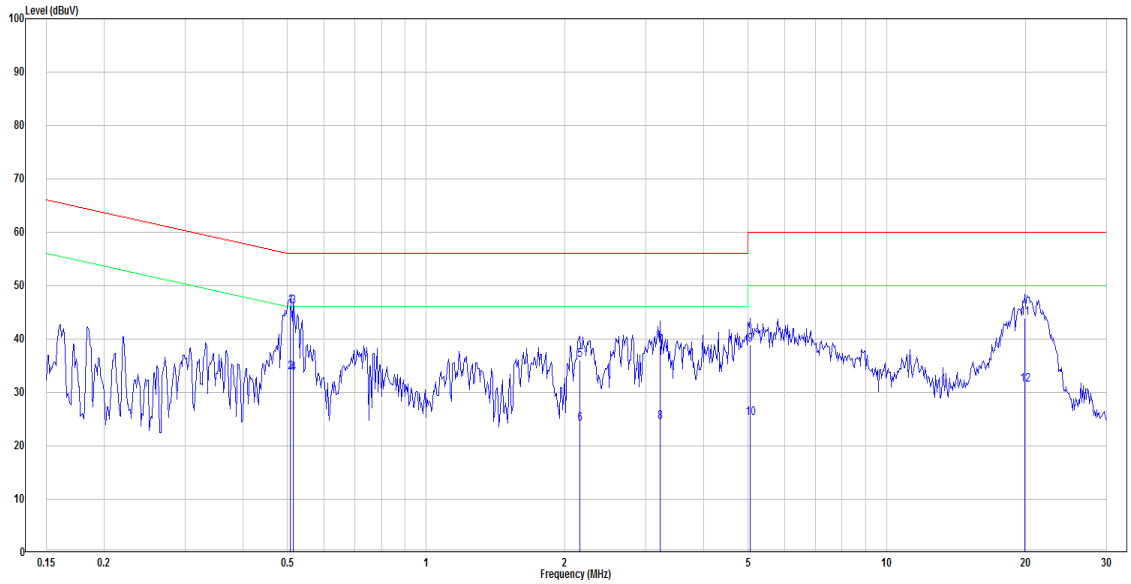
7.6 Test Results

Test Mode: Transmitting

(Worst case is 802.11g mode, Low Channel)

Main: AC120 V, 60 Hz, Line



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.507	26.70	19.52	46.22	56.00	-9.78	QP
2	0.507	14.29	19.52	33.81	46.00	-12.19	Average
3	0.516	26.55	19.52	46.07	56.00	-9.93	QP
4	0.516	14.13	19.52	33.65	46.00	-12.35	Average
5	2.155	16.53	19.58	36.11	56.00	-19.89	QP
6	2.155	4.48	19.58	24.06	46.00	-21.94	Average
7	3.224	19.11	19.61	38.72	56.00	-17.28	QP
8	3.224	4.77	19.61	24.38	46.00	-21.62	Average
9	5.058	19.19	19.66	38.85	60.00	-21.15	QP
10	5.058	5.43	19.66	25.09	50.00	-24.91	Average
11	19.950	24.16	19.82	43.98	60.00	-16.02	QP
12	19.950	11.63	19.82	31.45	50.00	-18.55	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

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

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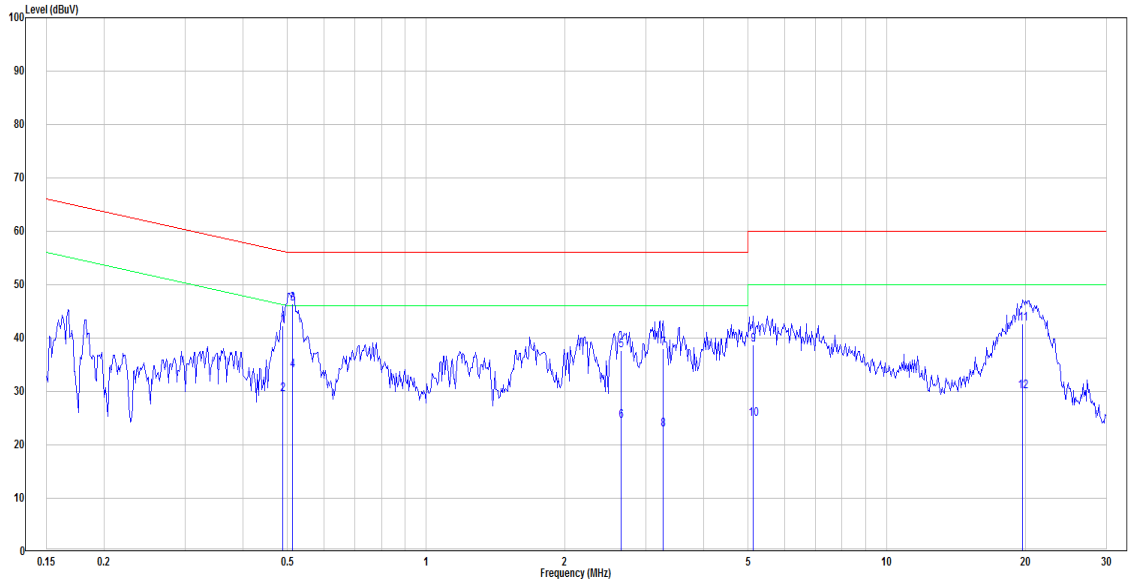
Main: AC120 V, 60 Hz, Neutral



No.	Frequency	Reading	Correct	Result	Limit	Over limit	Remark
	(MHz)	(dBµV)	Factor(dB)	(dBµV)	(dBµV)	(dB)	
1	0.489	22.83	19.52	42.35	56.19	-13.84	QP
2	0.489	10.02	19.52	29.54	46.19	-16.65	Average
3	0.513	26.95	19.52	46.47	56.00	-9.53	QP
4	0.513	14.46	19.52	33.98	46.00	-12.02	Average
5	2.650	18.14	19.59	37.73	56.00	-18.27	QP
6	2.650	4.95	19.59	24.54	46.00	-21.46	Average
7	3.276	18.38	19.61	37.99	56.00	-18.01	QP
8	3.276	3.32	19.61	22.93	46.00	-23.07	Average
9	5.139	19.05	19.67	38.72	60.00	-21.28	QP
10	5.139	5.21	19.67	24.88	50.00	-25.12	Average
11	19.740	22.80	19.89	42.69	60.00	-17.31	QP
12	19.740	10.14	19.89	30.03	50.00	-19.97	Average

Note:

Level = Read Level + Factor

Over Limit = Level – Limit Line

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

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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

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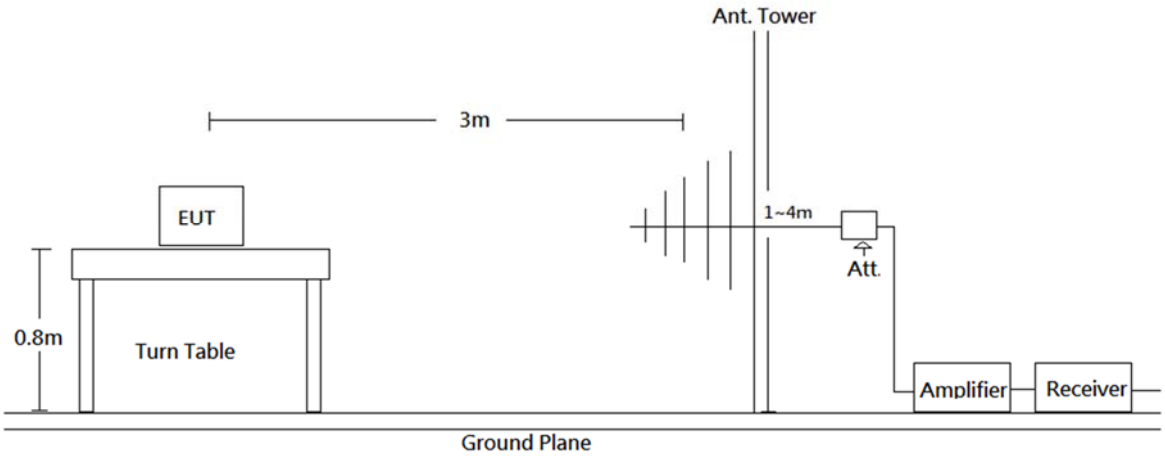
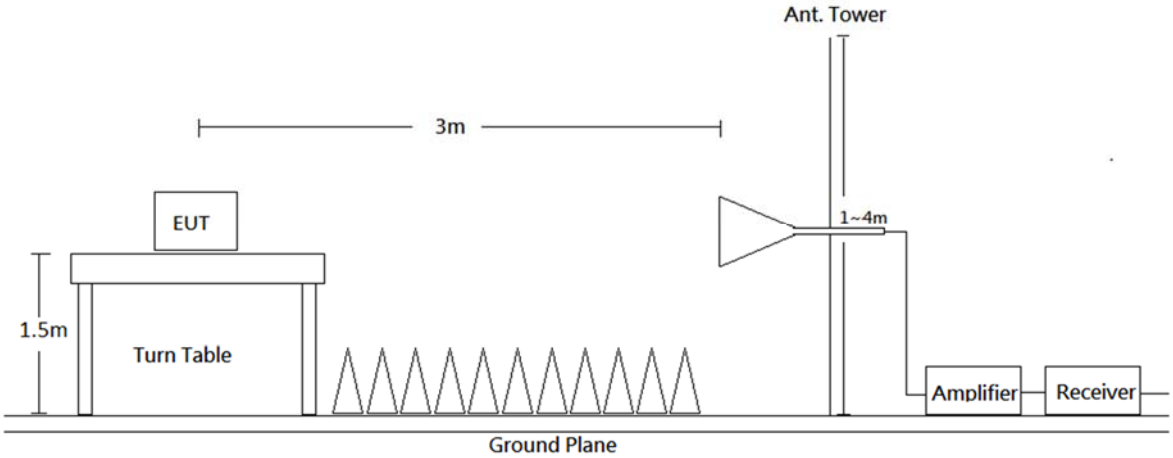
intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the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

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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

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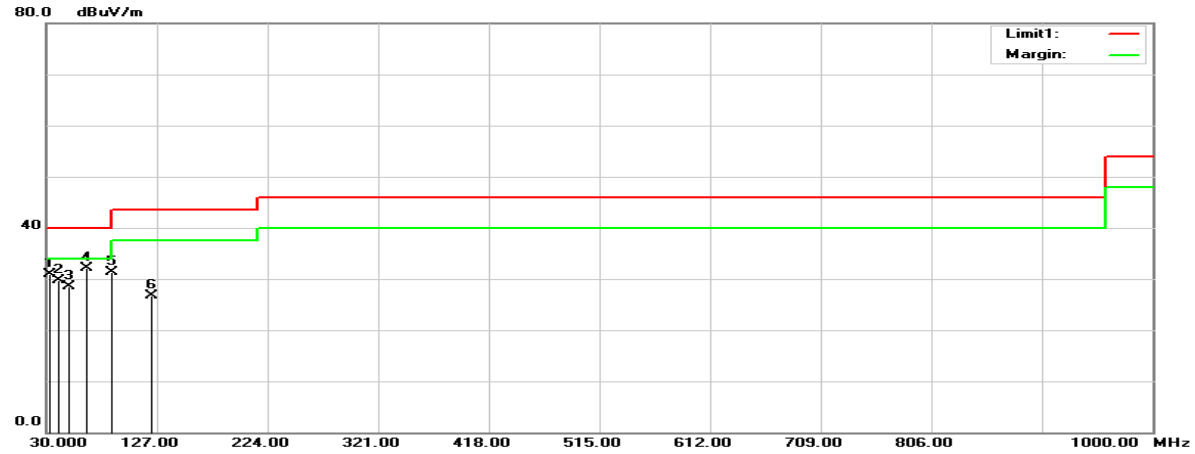
8.6 Test Results

Test Mode: Transmitting

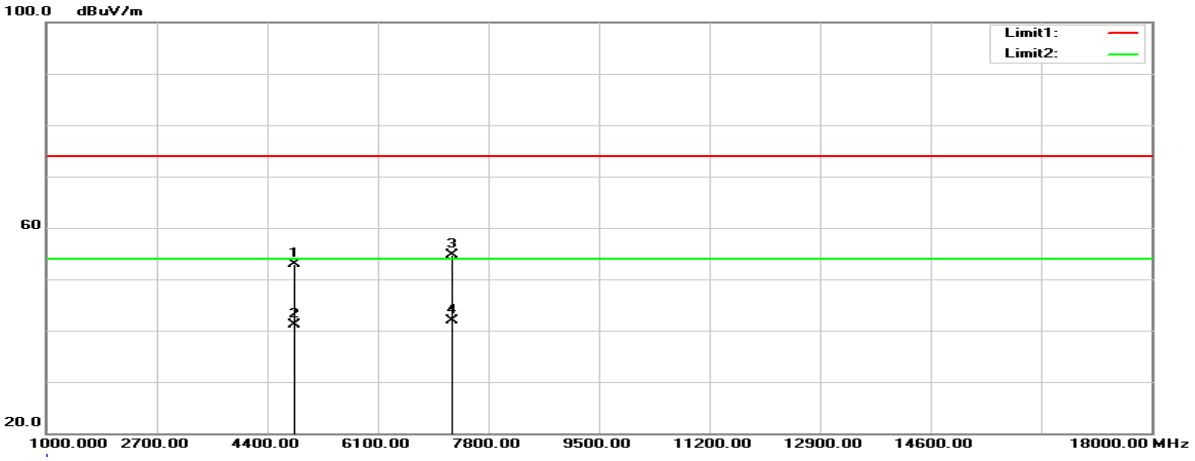
(Pre-scan with three orthogonal axis, and worse case as Y axis.)

Horizontal (worst case is 802.11g mode, Low channel)

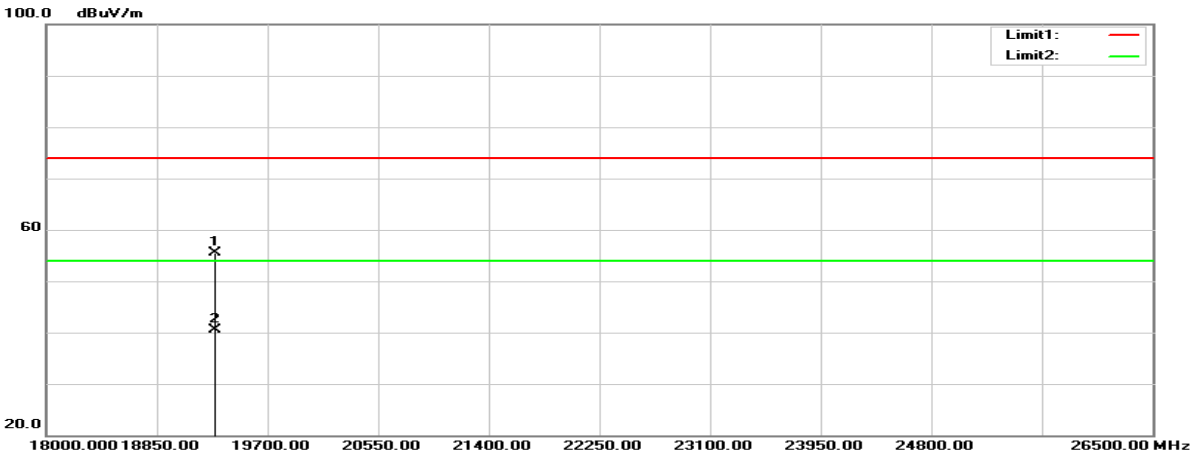
30MHz-1GHz:



1GHz-18GHz:



18GHz-26.5GHz:



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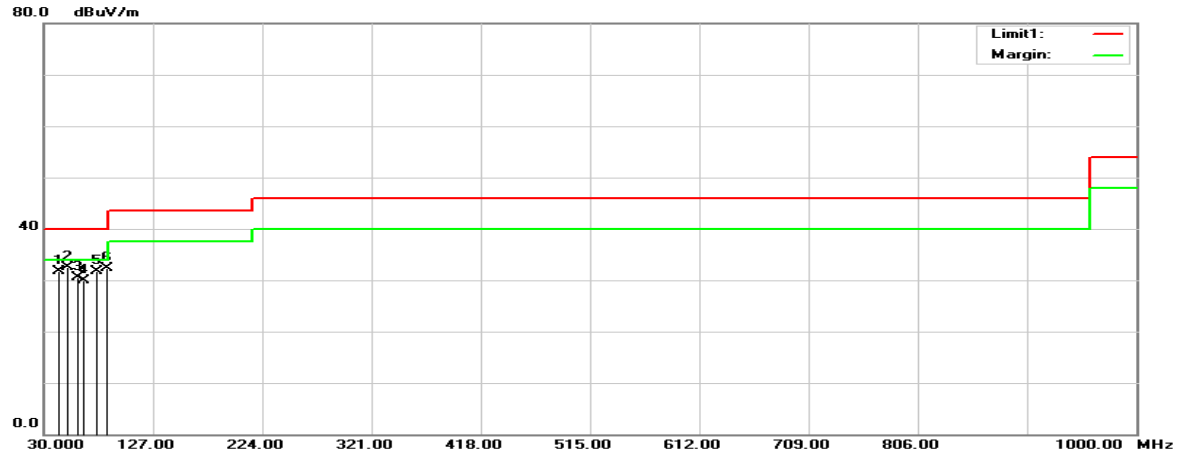
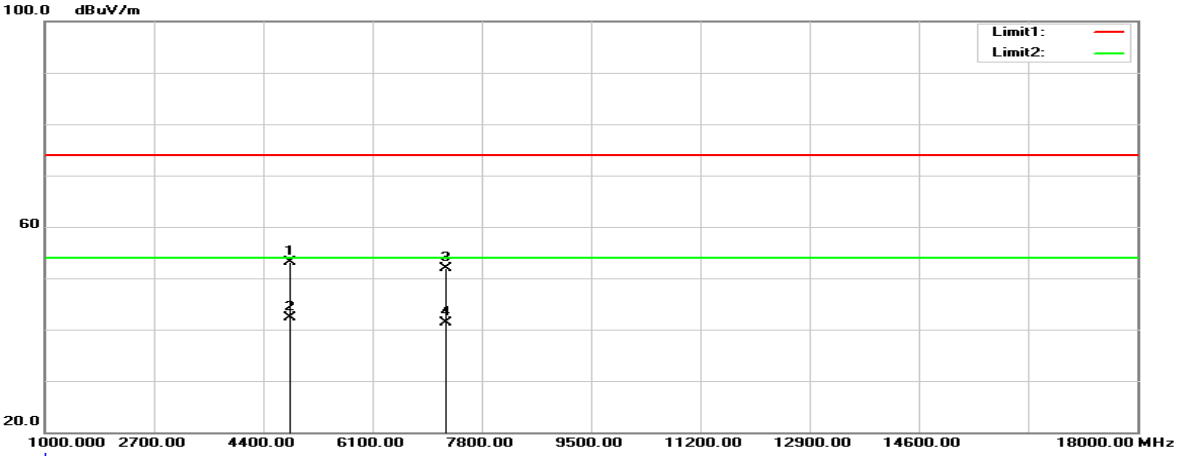
Vertical (worst case is 802.11g mode, Low channel)

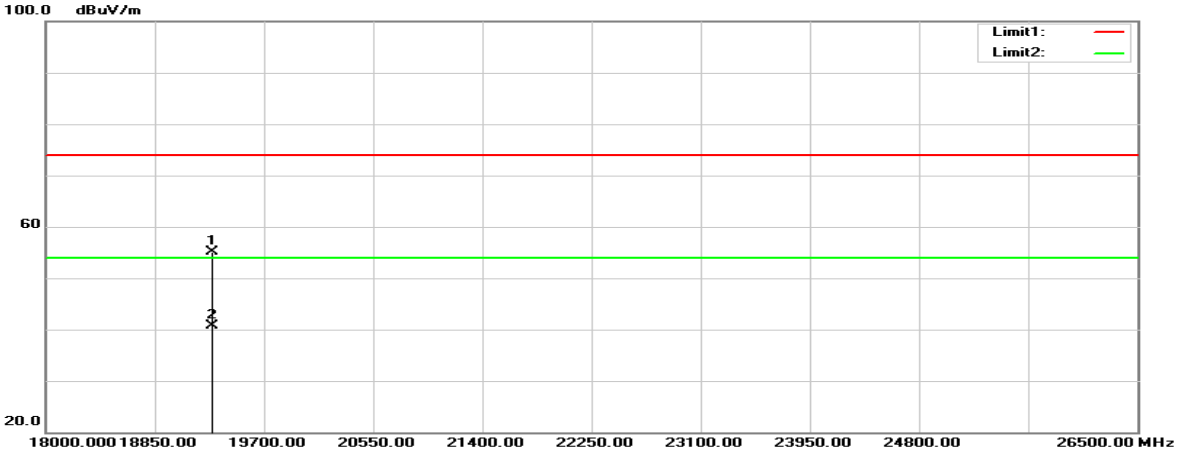
30MHz-1GHz:



1GHz-18GHz:



18GHz-26.5GHz:



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Below 1GHz

Horizontal

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
32.9100	35.59	-4.71	30.88	40.00	-9.12	100	1	peak
40.6700	39.82	-10.12	29.70	40.00	-10.30	100	323	peak
50.3700	43.38	-14.96	28.42	40.00	-11.58	100	150	peak
64.9200	46.99	-14.95	32.04	40.00	-7.96	100	359	peak
87.2300	46.43	-15.17	31.26	40.00	-8.74	100	360	peak
122.1500	35.00	-8.21	26.79	43.50	-16.71	100	75	peak

Vertical

Frequency (MHz)	Reading (dBµV)	Correct Factor(dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
43.5800	43.70	-12.00	31.70	40.00	-8.30	100	334	peak
51.3400	47.64	-15.20	32.44	40.00	-7.56	100	338	peak
60.0700	45.78	-15.34	30.44	40.00	-9.56	100	331	peak
65.8900	44.92	-15.04	29.88	40.00	-10.12	100	324	peak
76.5600	46.49	-14.78	31.71	40.00	-8.29	100	357	peak
86.2600	47.65	-15.30	32.35	40.00	-7.65	100	208	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.

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

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								
2369.004	71.16	-9.92	61.24	74.00	-12.76	162	270	peak
2369.004	57.60	-9.92	47.68	54.00	-6.32	162	270	AVG
4824.000	58.75	-2.74	56.01	74.00	-17.99	190	56	peak
4824.000	51.65	-2.74	48.91	54.00	-5.09	190	56	AVG
7236.000	53.82	2.98	56.80	74.00	-17.20	149	96	peak
7236.000	40.80	2.98	43.78	54.00	-10.22	149	96	AVG
B Mode, Middle channel								
4874.000	59.45	-2.70	56.75	74.00	-17.25	151	82	peak
4874.000	52.14	-2.70	49.44	54.00	-4.56	151	82	AVG
7311.000	54.07	3.16	57.23	74.00	-16.77	149	104	peak
7311.000	41.55	3.16	44.71	54.00	-9.29	149	104	AVG
B Mode, High channel								
2488.912	70.43	-8.81	61.62	74.00	-12.38	157	269	peak
2488.912	56.52	-8.81	47.71	54.00	-6.29	157	269	AVG
4924.000	59.88	-2.54	57.34	74.00	-16.66	143	55	peak
4924.000	52.96	-2.54	50.42	54.00	-3.58	143	55	AVG
7386.000	54.23	3.27	57.50	74.00	-16.50	190	78	peak
7386.000	41.72	3.27	44.99	54.00	-9.01	190	78	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.

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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								
2365.968	76.77	-9.94	66.83	74.00	-7.17	209	228	peak
2365.968	63.50	-9.94	53.56	54.00	-0.44	209	228	AVG
4824.000	62.29	-2.74	59.55	74.00	-14.45	170	49	peak
4824.000	53.92	-2.74	51.18	54.00	-2.82	170	49	AVG
7236.000	53.75	2.98	56.73	74.00	-17.27	156	131	peak
7236.000	41.17	2.98	44.15	54.00	-9.85	156	131	AVG
B Mode, Middle channel								
4874.000	61.73	-2.70	59.03	74.00	-14.97	171	60	peak
4874.000	52.29	-2.70	49.59	54.00	-4.41	171	60	AVG
7311.000	53.91	3.16	57.07	74.00	-16.93	149	83	peak
7311.000	41.92	3.16	45.08	54.00	-8.92	149	83	AVG
B Mode, High channel								
2499.328	73.18	-8.68	64.50	74.00	-9.50	197	167	peak
2499.328	56.76	-8.68	48.08	54.00	-5.92	197	167	AVG
4924.000	63.20	-2.54	60.66	74.00	-13.34	208	35	peak
4924.000	55.57	-2.54	53.03	54.00	-0.97	208	35	AVG
7386.000	53.64	3.27	56.91	74.00	-17.09	159	267	peak
7386.000	40.73	3.27	44.00	54.00	-10.00	159	267	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.

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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								
2366.448	70.77	-9.94	60.83	74.00	-13.17	196	73	peak
2366.448	57.56	-9.94	47.62	54.00	-6.38	196	73	AVG
4824.000	55.74	-2.74	53.00	74.00	-21.00	192	66	peak
4824.000	43.76	-2.74	41.02	54.00	-12.98	192	66	AVG
7236.000	51.66	2.98	54.64	74.00	-19.36	151	93	peak
7236.000	38.84	2.98	41.82	54.00	-12.18	151	93	AVG
G Mode, Middle channel								
4874.000	56.84	-2.70	54.14	74.00	-19.86	222	36	peak
4874.000	42.43	-2.70	39.73	54.00	-14.27	222	36	AVG
7311.000	51.98	3.16	55.14	74.00	-18.86	187	256	peak
7311.000	37.90	3.16	41.06	54.00	-12.94	187	256	AVG
G Mode, High channel								
2489.728	70.28	-8.80	61.48	74.00	-12.52	158	269	peak
2489.728	57.39	-8.80	48.59	54.00	-5.41	158	269	AVG
4924.000	57.25	-2.54	54.71	74.00	-19.29	141	60	peak
4924.000	41.92	-2.54	39.38	54.00	-14.62	141	60	AVG
7386.000	52.70	3.27	55.97	74.00	-18.03	197	61	peak
7386.000	38.52	3.27	41.79	54.00	-12.21	197	61	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.

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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	77.98	-9.74	68.24	74.00	-5.76	208	256	peak
2390.000	63.47	-9.74	53.73	54.00	-0.27	208	256	AVG
4824.000	55.93	-2.74	53.19	74.00	-20.81	160	322	peak
4824.000	44.97	-2.74	42.23	54.00	-11.77	160	322	AVG
7236.000	48.90	2.98	51.88	74.00	-22.12	152	131	peak
7236.000	38.22	2.98	41.20	54.00	-12.80	152	131	AVG
G Mode, Middle channel								
4874.000	59.31	-2.70	56.61	74.00	-17.39	158	72	peak
4874.000	42.85	-2.70	40.15	54.00	-13.85	158	72	AVG
7311.000	52.48	3.16	55.64	74.00	-18.36	186	338	peak
7311.000	37.97	3.16	41.13	54.00	-12.87	186	338	AVG
G Mode, High channel								
2483.500	78.37	-8.89	69.48	74.00	-4.52	168	186	peak
2483.500	62.10	-8.89	53.21	54.00	-0.79	168	186	AVG
4924.000	58.58	-2.54	56.04	74.00	-17.96	175	34	peak
4924.000	42.94	-2.54	40.40	54.00	-13.60	175	34	AVG
7386.000	52.34	3.27	55.61	74.00	-18.39	158	329	peak
7386.000	38.36	3.27	41.63	54.00	-12.37	158	329	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.

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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								
2366.896	72.13	-9.93	62.20	74.00	-11.80	197	74	peak
2366.896	58.46	-9.93	48.53	54.00	-5.47	197	74	AVG
4824.000	56.72	-2.74	53.98	74.00	-20.02	211	43	peak
4824.000	42.28	-2.74	39.54	54.00	-14.46	211	43	AVG
7206.000	45.24	2.76	48.00	74.00	-26.00	165	203	peak
7206.000	31.57	2.76	34.33	54.00	-19.67	165	203	AVG
N20 Mode, Middle channel								
4874.000	54.90	-2.70	52.20	74.00	-21.80	141	21	peak
4874.000	40.27	-2.70	37.57	54.00	-16.43	141	21	AVG
7311.000	48.27	3.16	51.43	74.00	-22.57	181	83	peak
7311.000	33.26	3.16	36.42	54.00	-17.58	181	83	AVG
N20 Mode, High channel								
2492.320	70.56	-8.77	61.79	74.00	-12.21	154	269	peak
2492.320	57.40	-8.77	48.63	54.00	-5.37	154	269	AVG
4924.000	54.80	-2.54	52.26	74.00	-21.74	132	31	peak
4924.000	40.30	-2.54	37.76	54.00	-16.24	132	31	AVG
7386.000	48.58	3.27	51.85	74.00	-22.15	184	45	peak
7386.000	33.95	3.27	37.22	54.00	-16.78	184	45	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.

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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	80.72	-9.74	70.98	74.00	-3.02	171	153	peak
2390.000	63.46	-9.74	53.72	54.00	-0.28	171	153	AVG
4824.000	61.55	-2.74	58.81	74.00	-15.19	127	3	peak
4824.000	45.02	-2.74	42.28	54.00	-11.72	127	3	AVG
7206.000	45.61	2.76	48.37	74.00	-25.63	168	300	peak
7206.000	31.50	2.76	34.26	54.00	-19.74	168	300	AVG
N20 Mode, Middle channel								
4874.000	63.03	-2.70	60.33	74.00	-13.67	148	357	peak
4874.000	45.06	-2.70	42.36	54.00	-11.64	148	357	AVG
7311.000	46.87	3.16	50.03	74.00	-23.97	161	273	peak
7311.000	32.06	3.16	35.22	54.00	-18.78	161	273	AVG
N20 Mode, High channel								
2483.500	78.77	-8.89	69.88	74.00	-4.12	149	186	peak
2483.500	61.77	-8.89	52.88	54.00	-1.12	149	186	AVG
4924.000	60.45	-2.54	57.91	74.00	-16.09	164	350	peak
4924.000	44.12	-2.54	41.58	54.00	-12.42	164	350	AVG
7386.000	46.81	3.27	50.08	74.00	-23.92	141	250	peak
7386.000	32.54	3.27	35.81	54.00	-18.19	141	250	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.

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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								
2382.204	70.93	-9.81	61.12	74.00	-12.88	181	267	peak
2382.204	58.07	-9.81	48.26	54.00	-5.74	181	267	AVG
4844.000	53.59	-2.78	50.81	74.00	-23.19	211	45	peak
4844.000	40.35	-2.78	37.57	54.00	-16.43	211	45	AVG
7266.000	46.04	3.09	49.13	74.00	-24.87	162	120	peak
7266.000	32.19	3.09	35.28	54.00	-18.72	162	120	AVG
N40 Mode, Middle channel								
4874.000	53.58	-2.70	50.88	74.00	-23.12	143	80	peak
4874.000	39.31	-2.70	36.61	54.00	-17.39	143	80	AVG
7311.000	47.28	3.16	50.44	74.00	-23.56	211	30	peak
7311.000	33.29	3.16	36.45	54.00	-17.55	211	30	AVG
N40 Mode, High channel								
2488.848	70.88	-8.81	62.07	74.00	-11.93	176	82	peak
2488.848	58.03	-8.81	49.22	54.00	-4.78	176	82	AVG
4904.000	53.86	-2.59	51.27	74.00	-22.73	111	40	peak
4904.000	40.20	-2.59	37.61	54.00	-16.39	111	40	AVG
7356.000	46.02	3.25	49.27	74.00	-24.73	122	82	peak
7356.000	32.63	3.25	35.88	54.00	-18.12	122	82	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.

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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	76.28	-9.74	66.54	74.00	-7.46	156	202	peak
2390.000	63.20	-9.74	53.46	54.00	-0.54	156	202	AVG
4844.000	57.30	-2.78	54.52	74.00	-19.48	157	4	peak
4844.000	43.81	-2.78	41.03	54.00	-12.97	157	4	AVG
7266.000	46.10	3.09	49.19	74.00	-24.81	124	182	peak
7266.000	32.53	3.09	35.62	54.00	-18.38	124	182	AVG
N40 Mode, Middle channel								
4874.000	57.58	-2.70	54.88	74.00	-19.12	158	2	peak
4874.000	44.13	-2.70	41.43	54.00	-12.57	158	2	AVG
7311.000	45.64	3.16	48.80	74.00	-25.20	163	81	peak
7311.000	32.67	3.16	35.83	54.00	-18.17	163	81	AVG
N40 Mode, High channel								
2484.836	74.86	-8.87	65.99	74.00	-8.01	166	194	peak
2484.836	61.51	-8.87	52.64	54.00	-1.36	166	194	AVG
4904.000	57.20	-2.59	54.61	74.00	-19.39	159	357	peak
4904.000	43.94	-2.59	41.35	54.00	-12.65	159	357	AVG
7356.000	46.46	3.25	49.71	74.00	-24.29	157	255	peak
7356.000	32.44	3.25	35.69	54.00	-18.31	157	255	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.

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Conducted Spurious Emissions:

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	51.64	≥ 20	PASS
Middle	2437	52.94	≥ 20	PASS
High	2462	51.76	≥ 20	PASS
G Mode				
Low	2412	47.05	≥ 20	PASS
Middle	2437	46.72	≥ 20	PASS
High	2462	44.73	≥ 20	PASS
N20 Mode				
Low	2412	46.41	≥ 20	PASS
Middle	2437	45.65	≥ 20	PASS
High	2462	45.00	≥ 20	PASS
N40 Mode				
Low	2422	39.69	≥ 20	PASS
Middle	2437	40.59	≥ 20	PASS
High	2452	40.05	≥ 20	PASS

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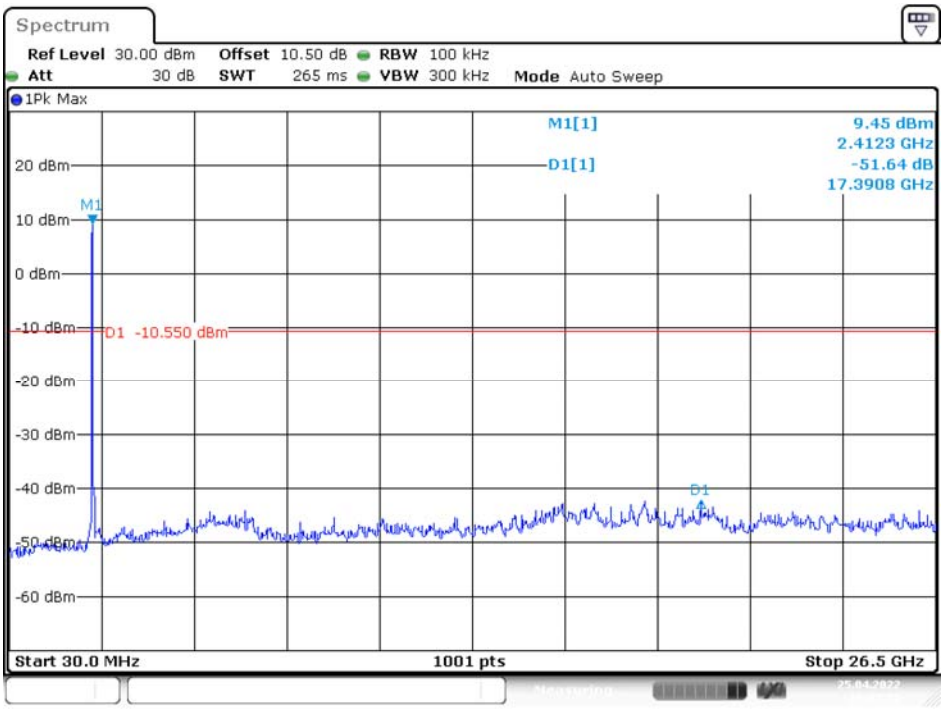
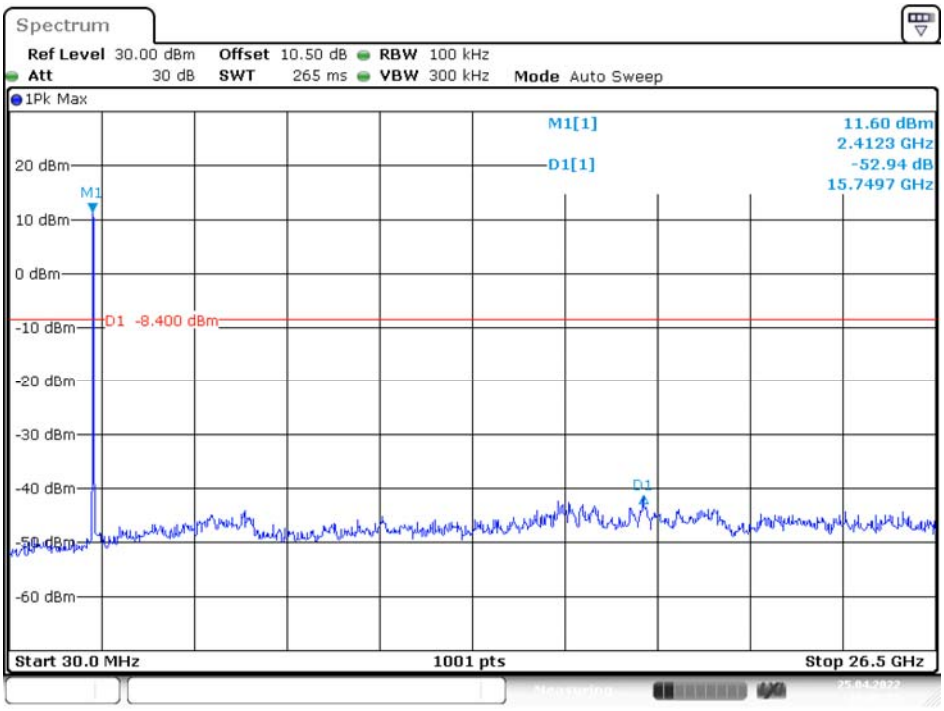
B Mode

Low Channel



Date: 25.APR.2022 18:01:37

Middle Channel



Date: 25.APR.2022 18:06:13

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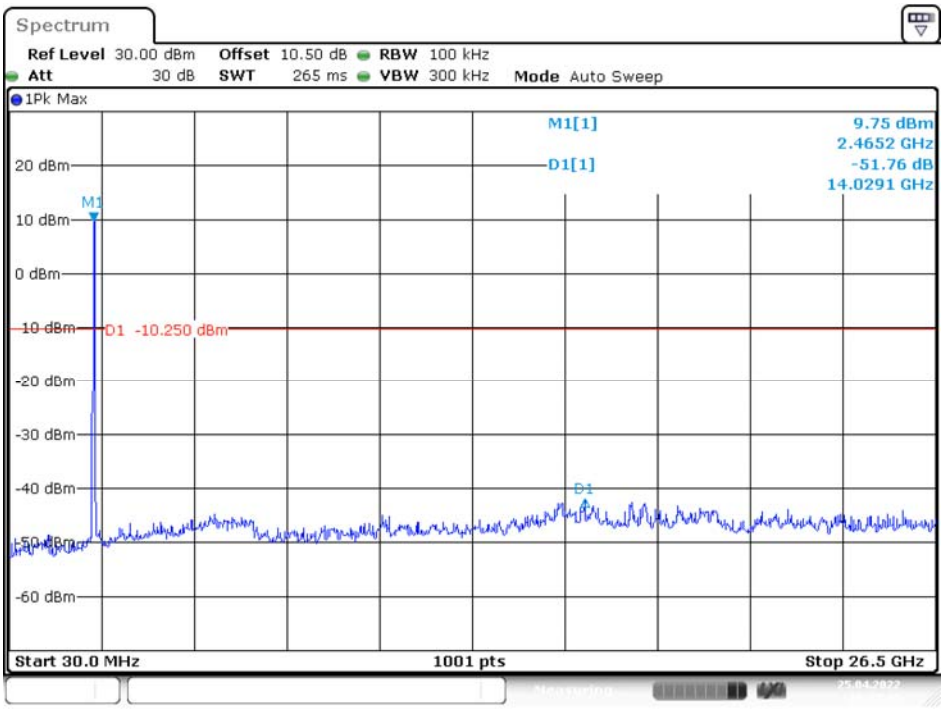
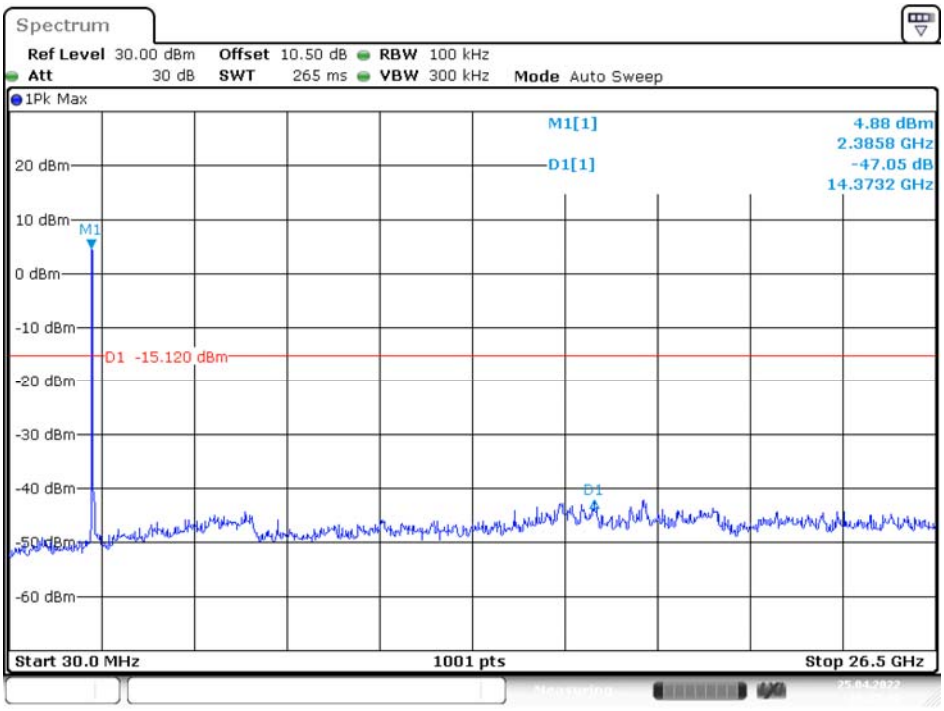
High Channel



Date: 25.APR.2022 18:11:45

G Mode

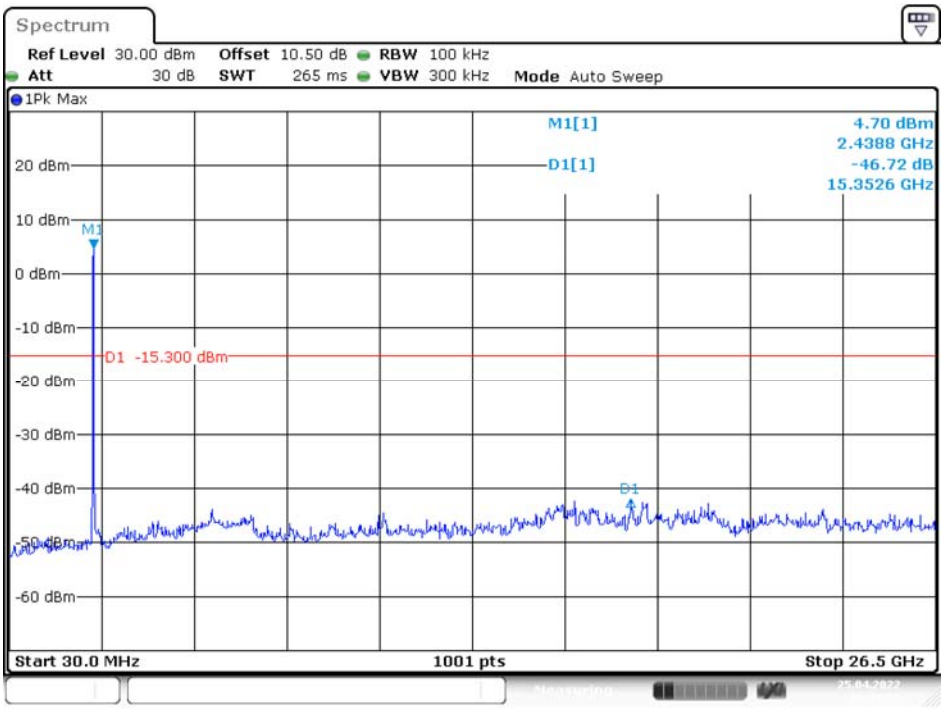
Low Channel



Date: 25.APR.2022 18:25:46

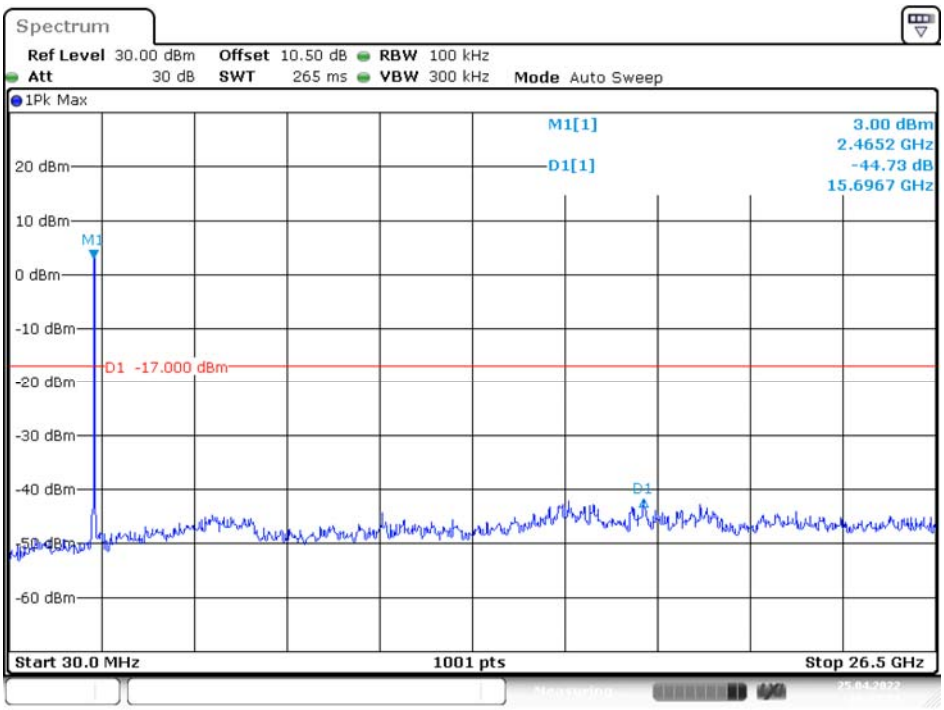
Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

Middle Channel



Date: 25.APR.2022 18:29:33

High Channel



Date: 25.APR.2022 18:33:25

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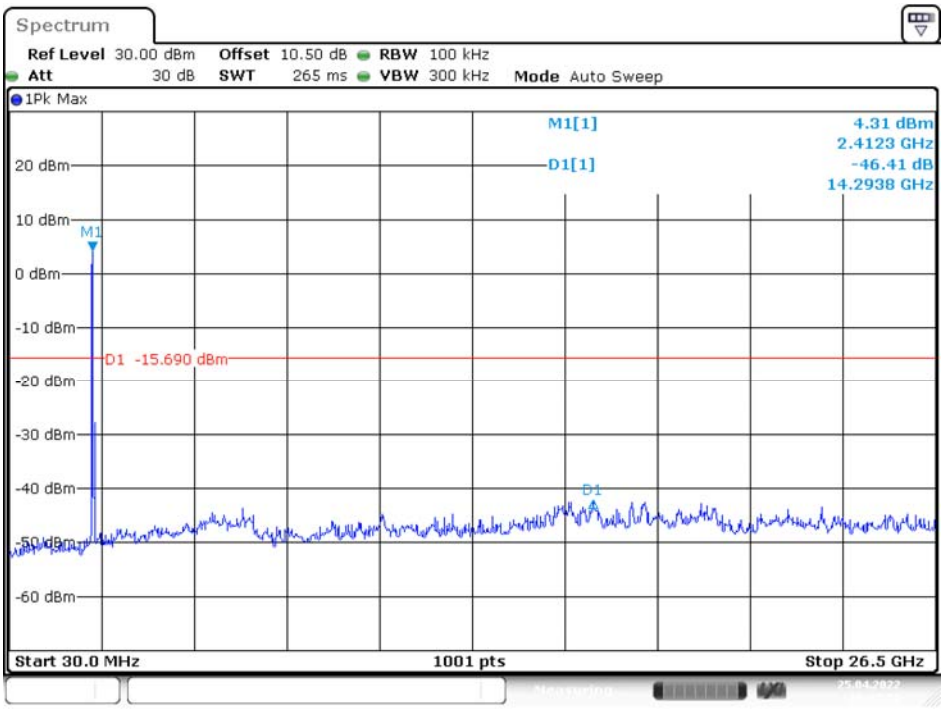
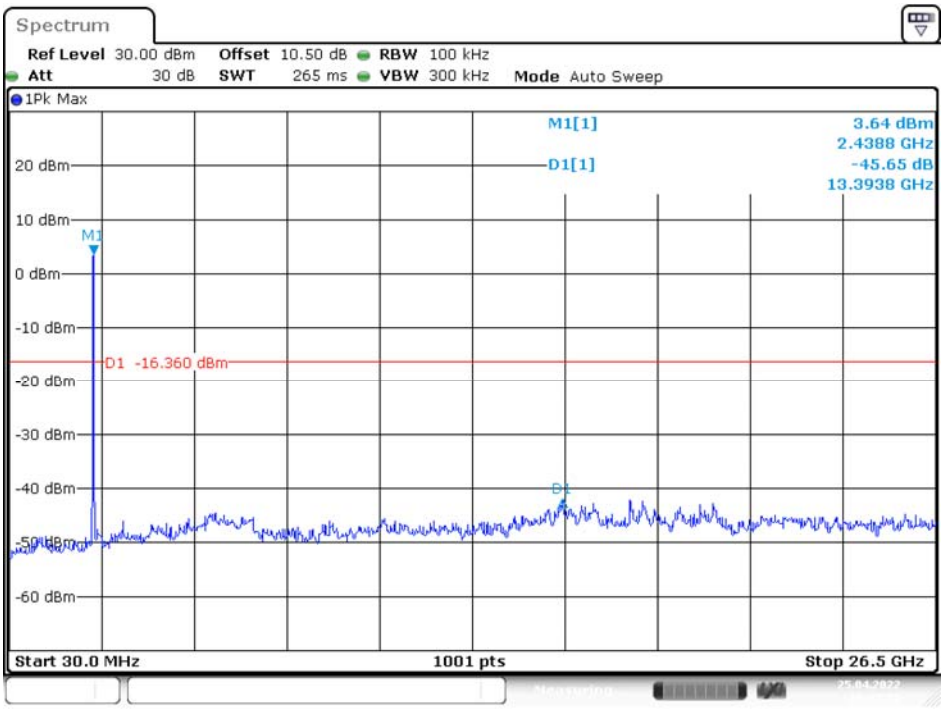
N20 Mode

Low Channel



Date: 25.APR.2022 18:42:08

Middle Channel



Date: 25.APR.2022 18:45:32

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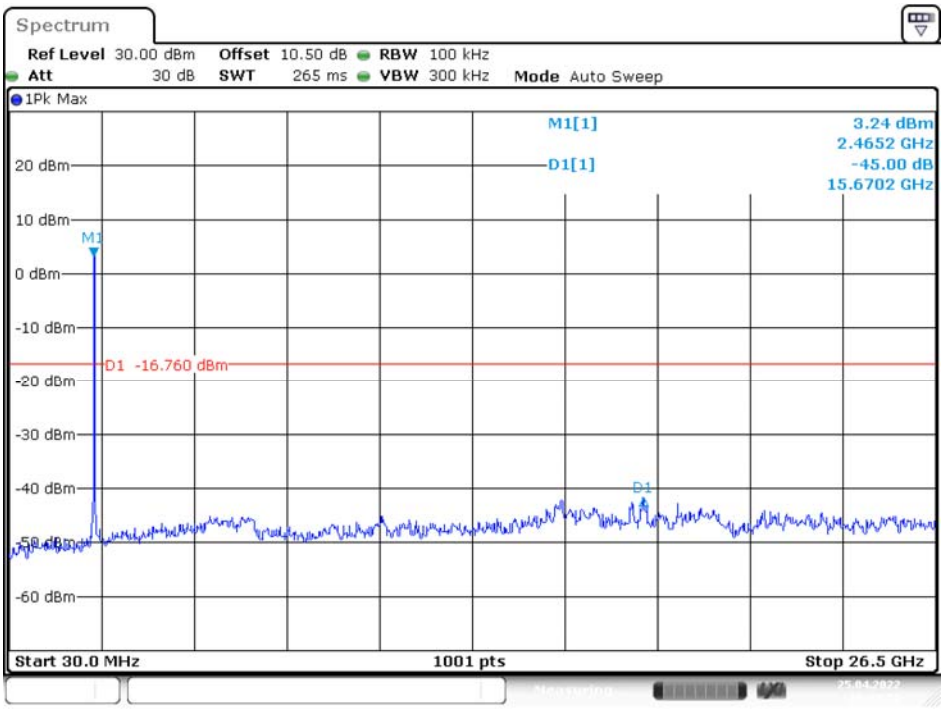
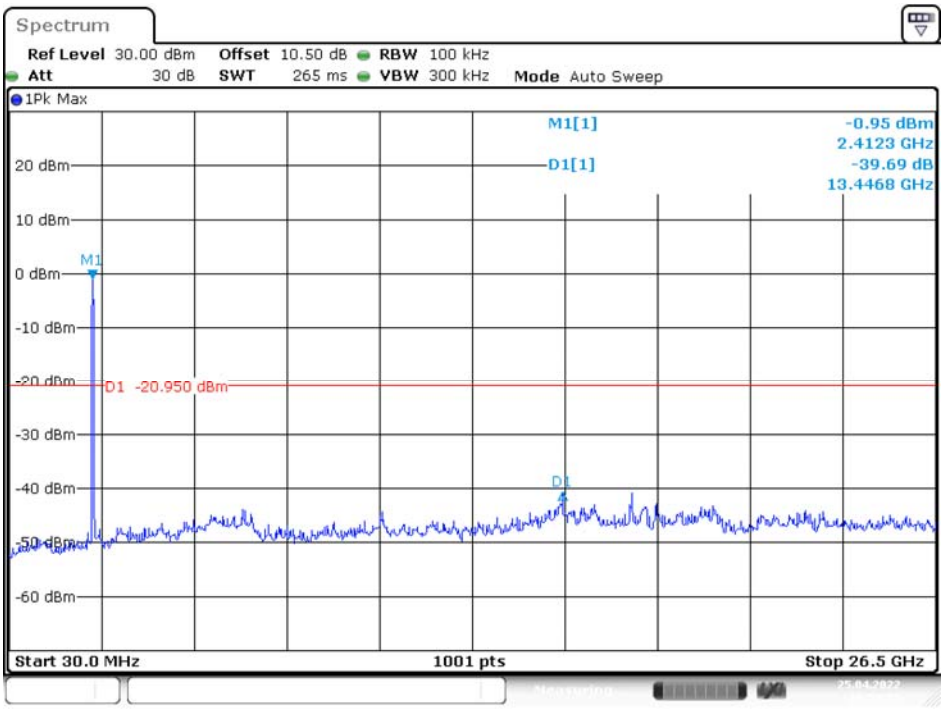
High Channel



Date: 25.APR.2022 18:48:53

N40 Mode

Low Channel



Date: 25.APR.2022 18:58:06

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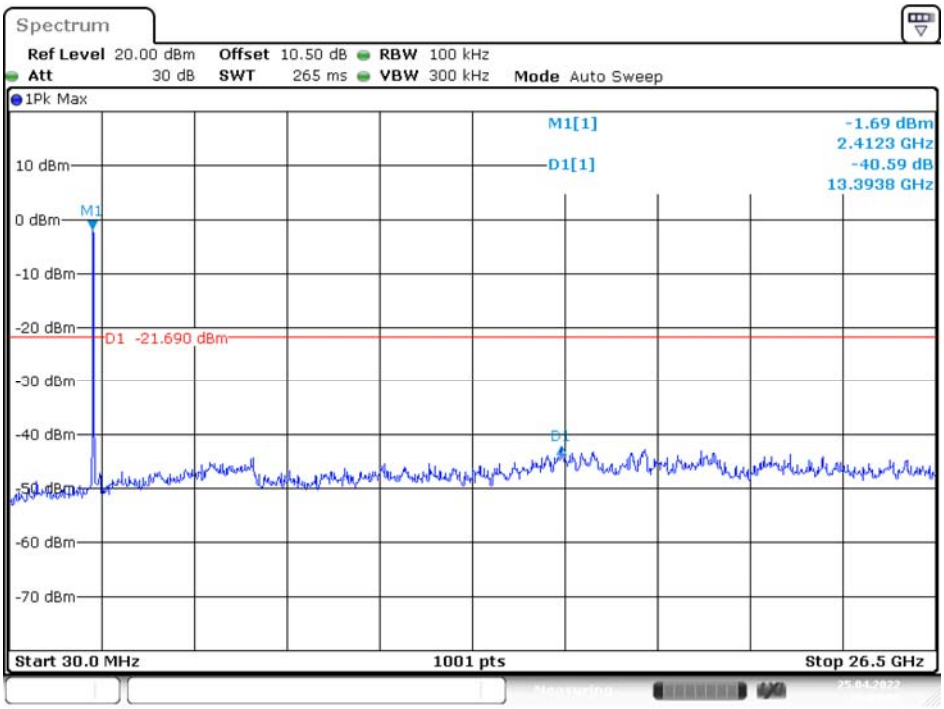
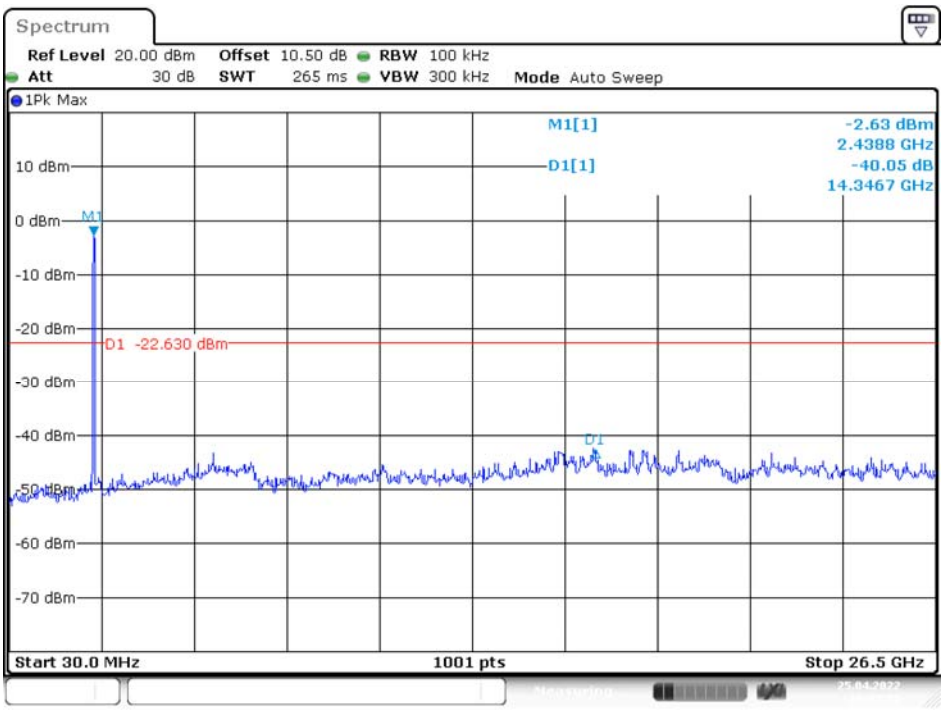
Middle Channel



Date: 25.APR.2022 19:00:10

High Channel



Date: 25.APR.2022 19:02:22

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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.

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9.3 Test Results

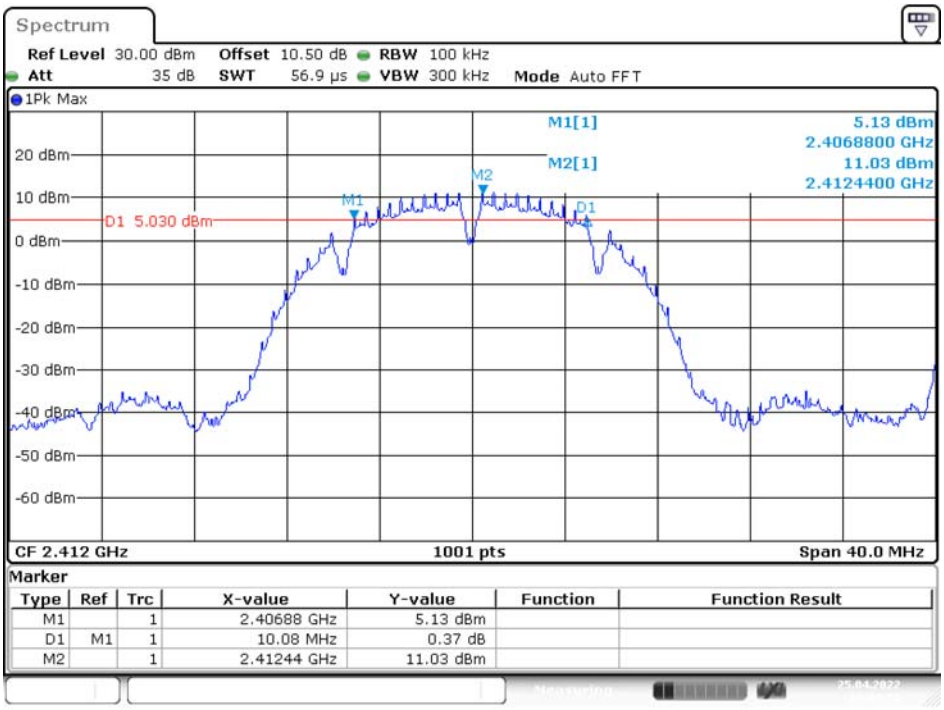
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	Limit (kHz)	Result
B Mode				
Low	2412	10.08	> 500	PASS
Middle	2437	10.08	> 500	PASS
High	2462	10.08	> 500	PASS
G Mode				
Low	2412	15.12	> 500	PASS
Middle	2437	15.12	> 500	PASS
High	2462	15.12	> 500	PASS
N20 Mode				
Low	2412	15.12	> 500	PASS
Middle	2437	15.12	> 500	PASS
High	2462	15.12	> 500	PASS
N40 Mode				
Low	2422	33.84	> 500	PASS
Middle	2437	33.84	> 500	PASS
High	2452	33.84	> 500	PASS

Please refer to the following plots

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

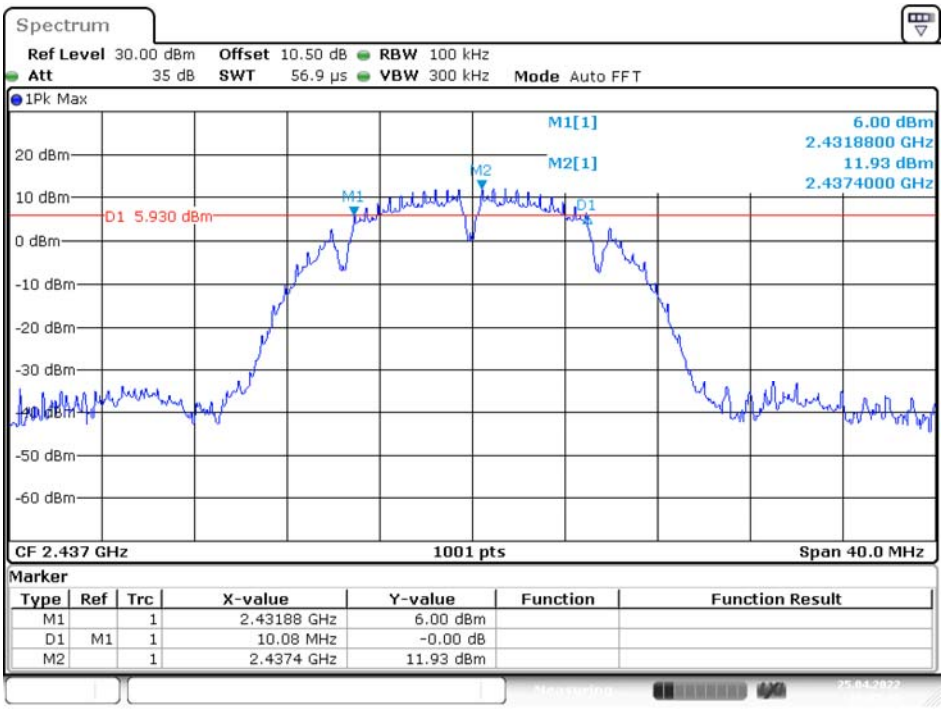
B Mode

Low Channel



Date: 25.APR.2022 18:00:56

Middle Channel



Date: 25.APR.2022 18:05:49

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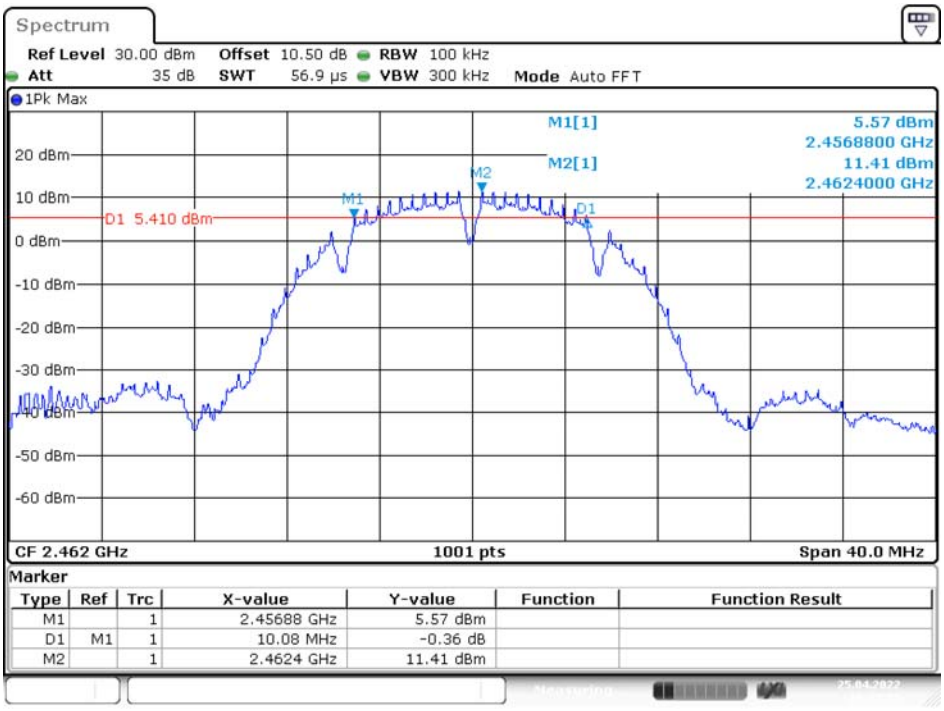
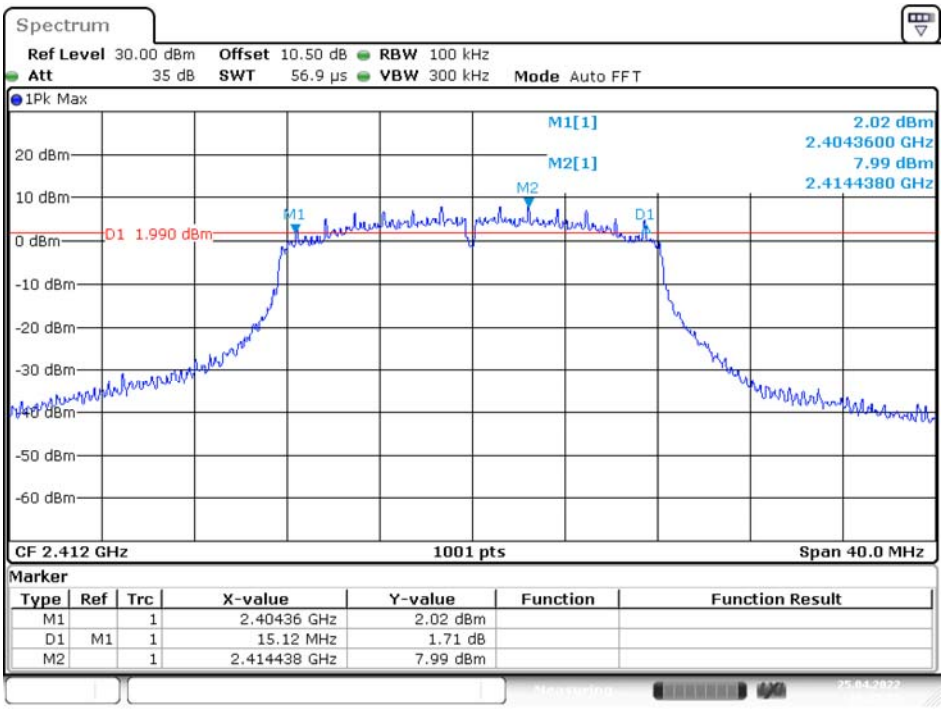
High Channel



Date: 25.APR.2022 18:11:05

G Mode

Low Channel



Date: 25.APR.2022 18:25:06

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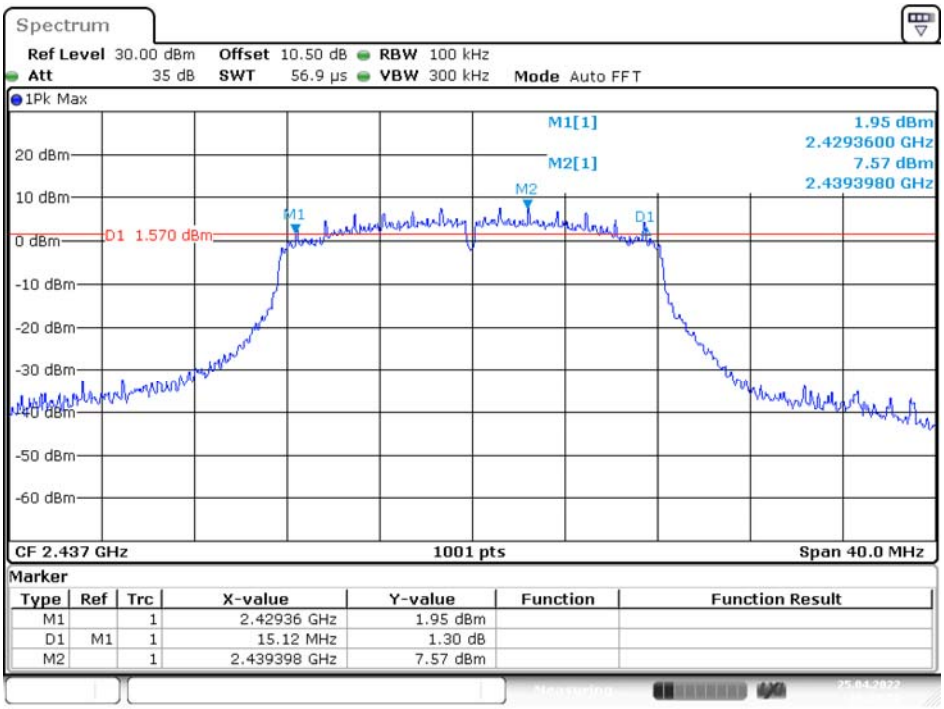
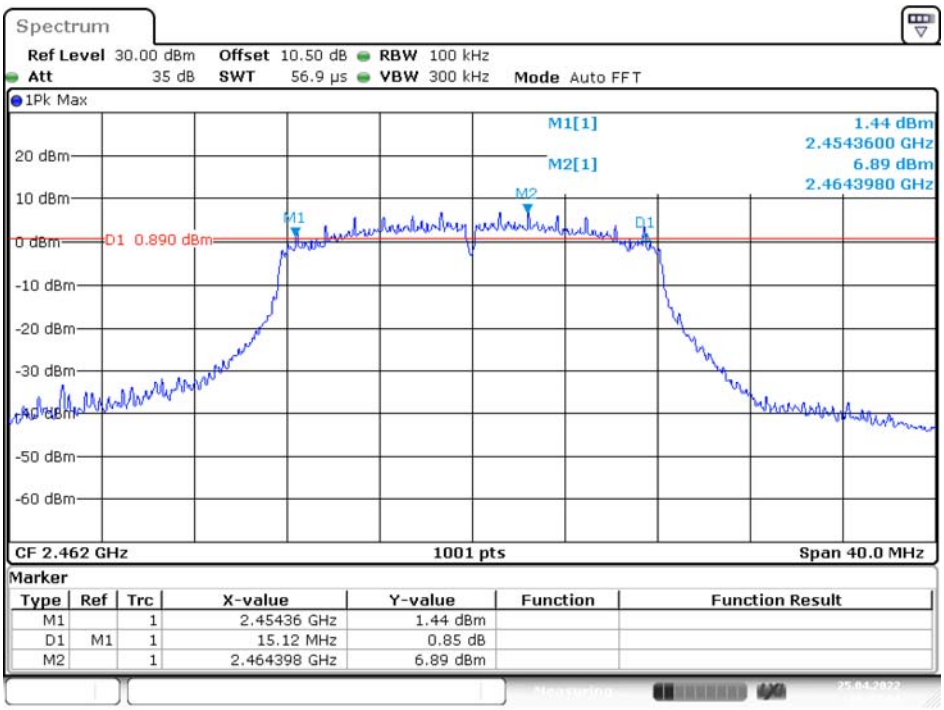
Middle Channel



Date: 25.APR.2022 18:29:09

High Channel



Date: 25.APR.2022 18:32:44

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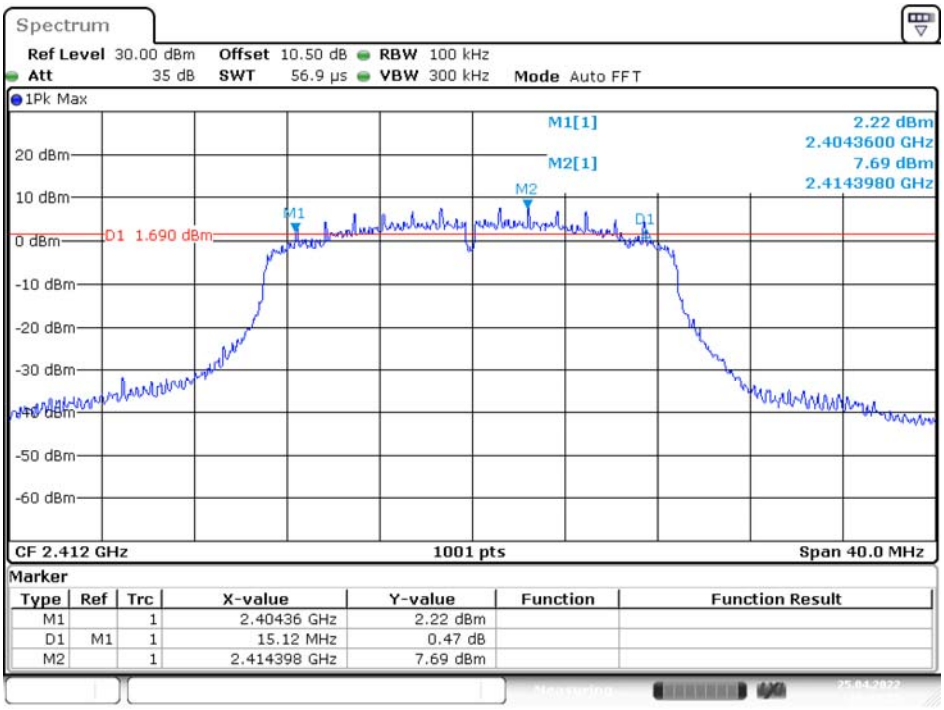
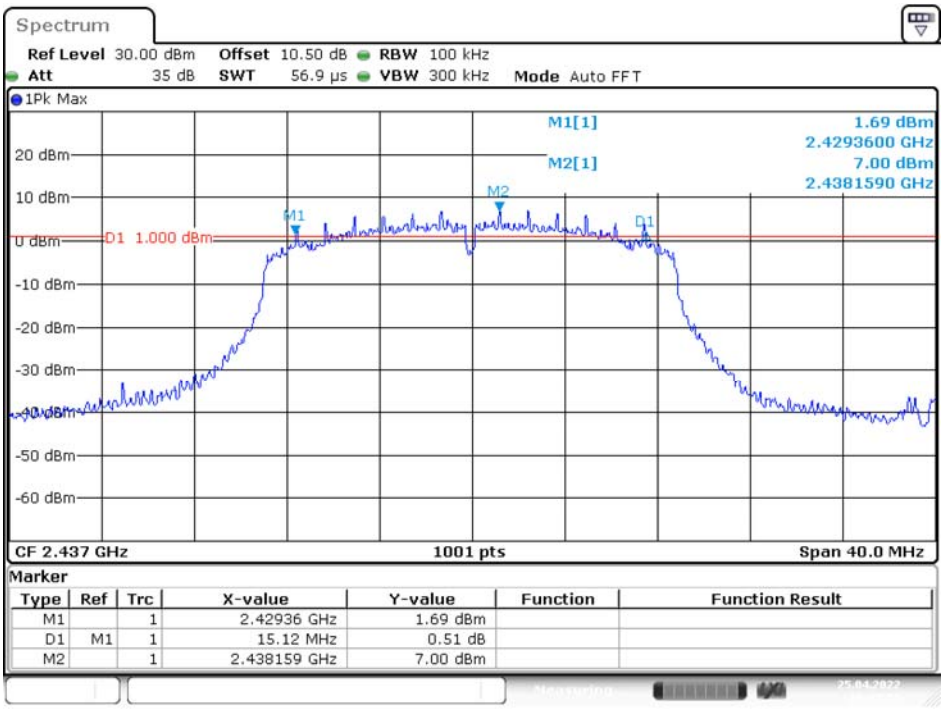
N20 Mode

Low Channel



Date: 25.APR.2022 18:41:27

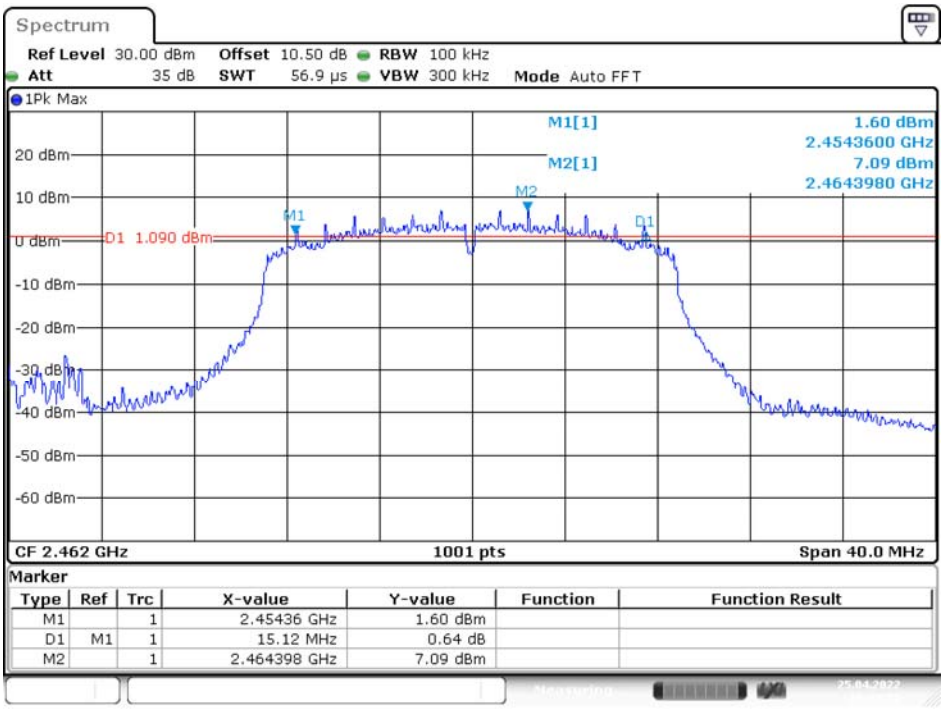
Middle Channel



Date: 25.APR.2022 18:45:08

Note: It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (New Taipei Laboratory)

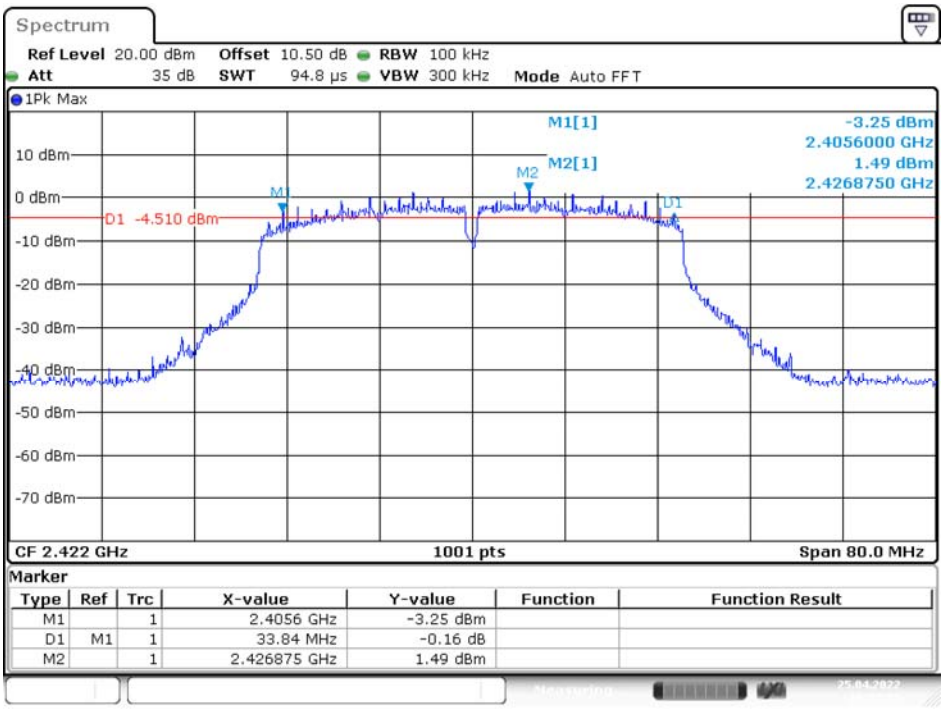
High Channel



Date: 25.APR.2022 18:48:12

N40 Mode

Low Channel



Date: 25.APR.2022 18:57:25

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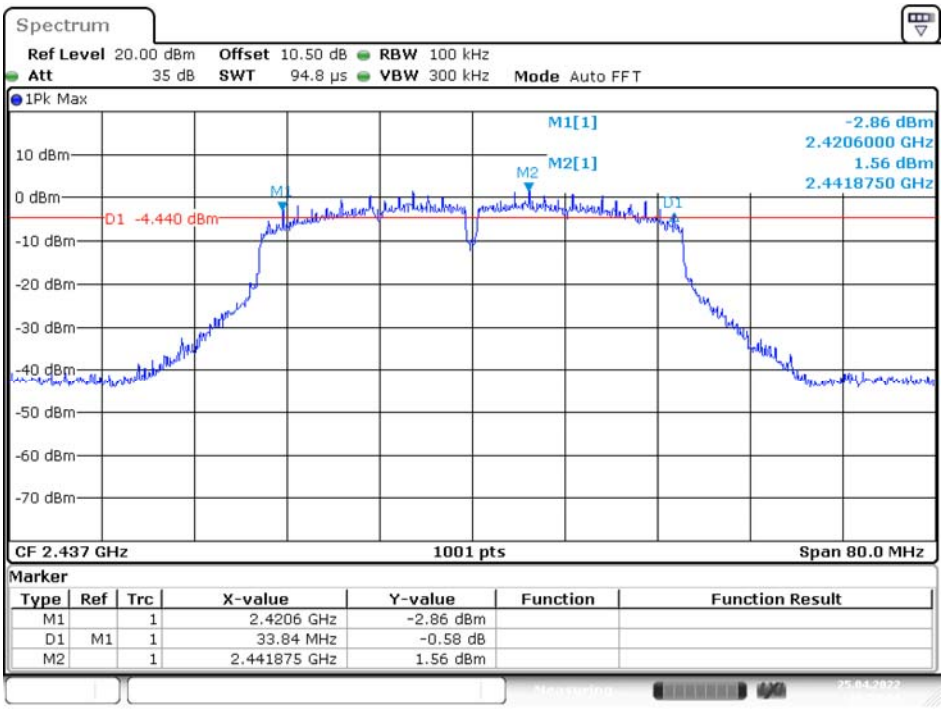
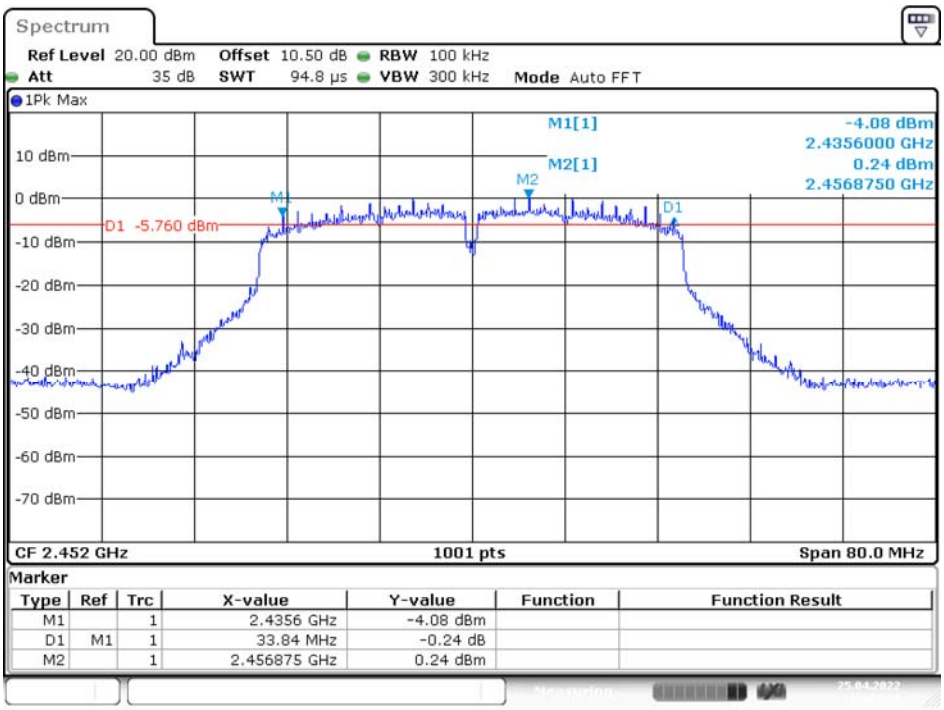
Middle Channel



Date: 25.APR.2022 18:59:45

High Channel



Date: 25.APR.2022 19:01:42

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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.

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10.3 Test Results

Conducted Peak Output Power

Channel	Frequency (MHz)	Conducted Peak Output Power		Limit (W)	Result
		(dBm)	(W)		
B Mode					
Low	2412	22.47	0.177	1	PASS
Middle	2437	24.60	0.288	1	PASS
High	2462	24.52	0.283	1	PASS
G Mode					
Low	2412	25.37	0.344	1	PASS
Middle	2437	25.12	0.325	1	PASS
High	2462	25.09	0.323	1	PASS
N20 Mode					
Low	2412	24.15	0.260	1	PASS
Middle	2437	24.50	0.282	1	PASS
High	2462	24.52	0.283	1	PASS
N40 Mode					
Low	2422	19.70	0.093	1	PASS
Middle	2437	19.84	0.096	1	PASS
High	2452	18.50	0.071	1	PASS

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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.

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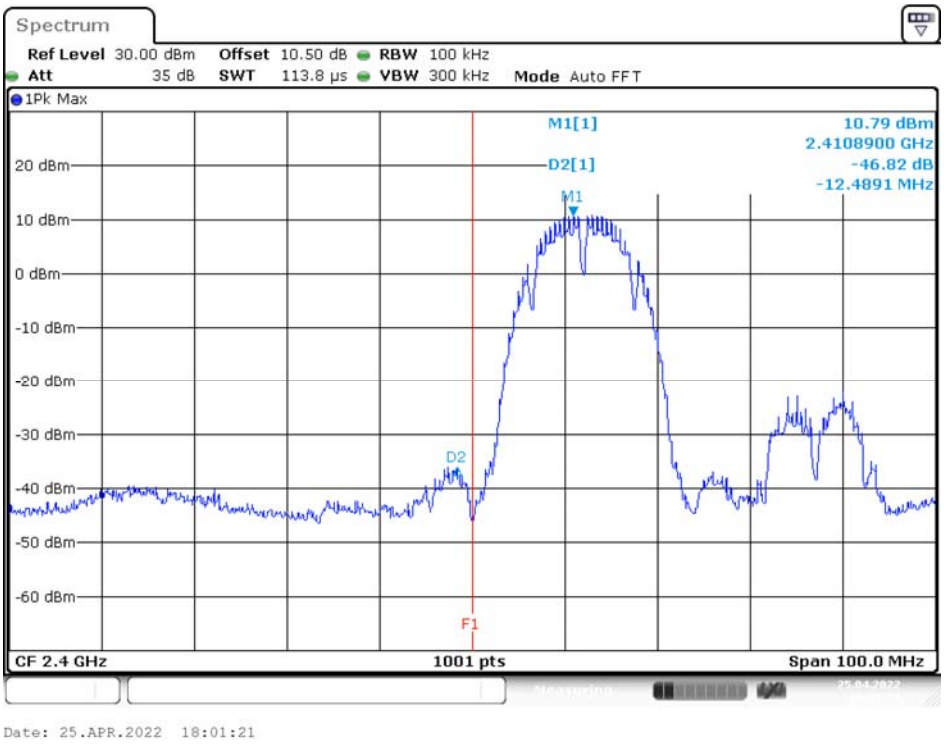
11.3 Test Results

Channel	Frequency (MHz)	Delta Peak to Band Emission (dBc)	Limit (dBc)	Result
B Mode				
Low	2412	46.82	≥ 20	PASS
High	2462	48.50	≥ 20	PASS
G Mode				
Low	2412	38.54	≥ 20	PASS
High	2462	45.56	≥ 20	PASS
N20 Mode				
Low	2412	40.15	≥ 20	PASS
High	2462	46.46	≥ 20	PASS
N40 Mode				
Low	2422	31.35	≥ 20	PASS
High	2452	42.01	≥ 20	PASS

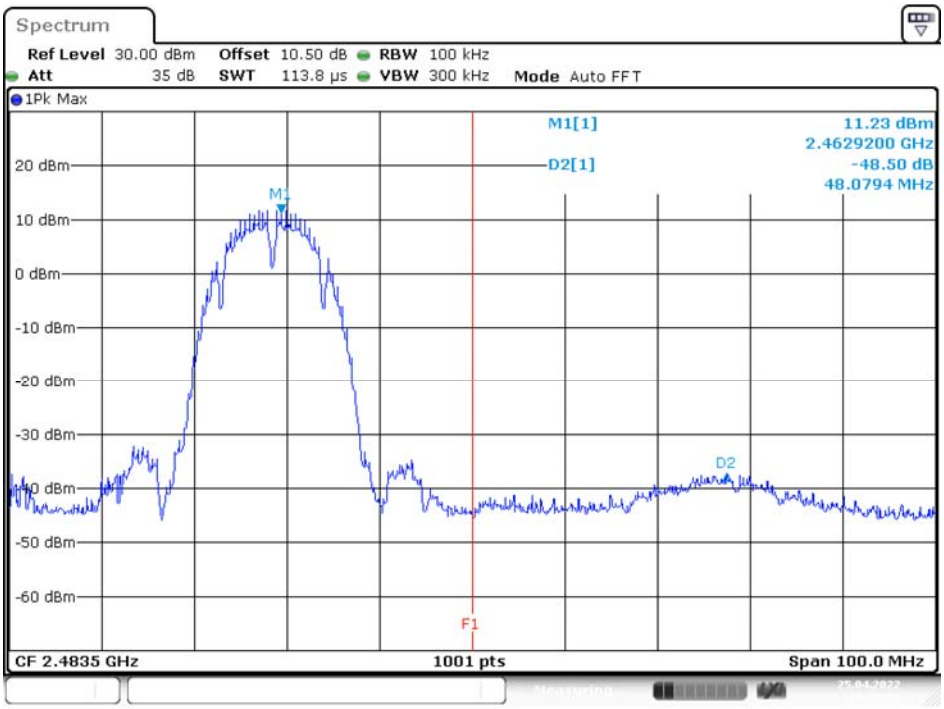
Please refer to the following plots.

B Mode

Band Edge, Left Side



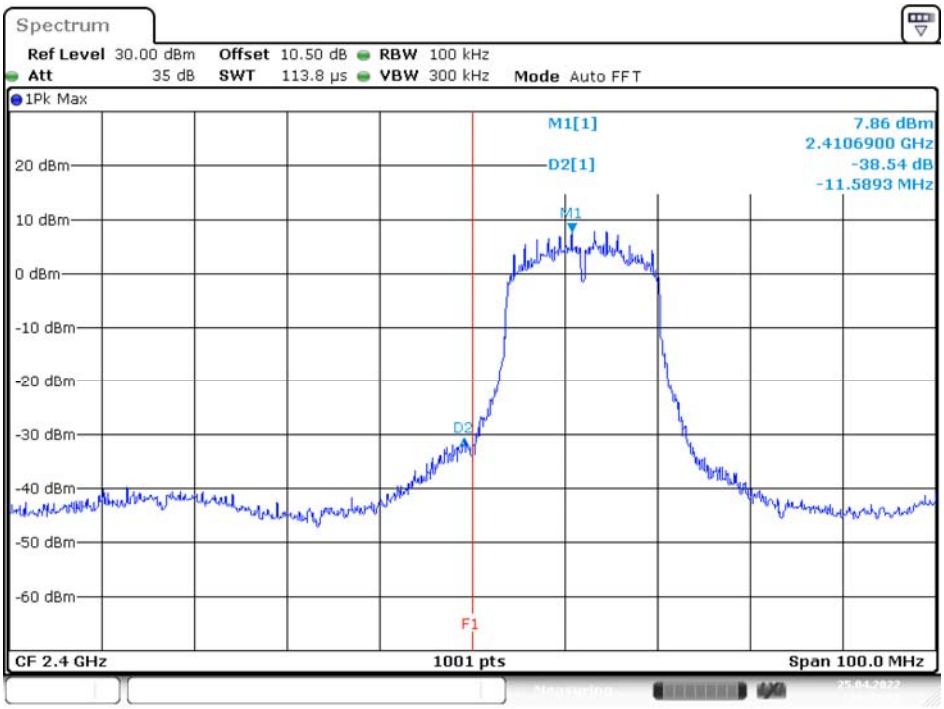
Band Edge, Right Side



Date: 25.APR.2022 18:11:30

G Mode

Band Edge, Left Side



Date: 25.APR.2022 18:25:31

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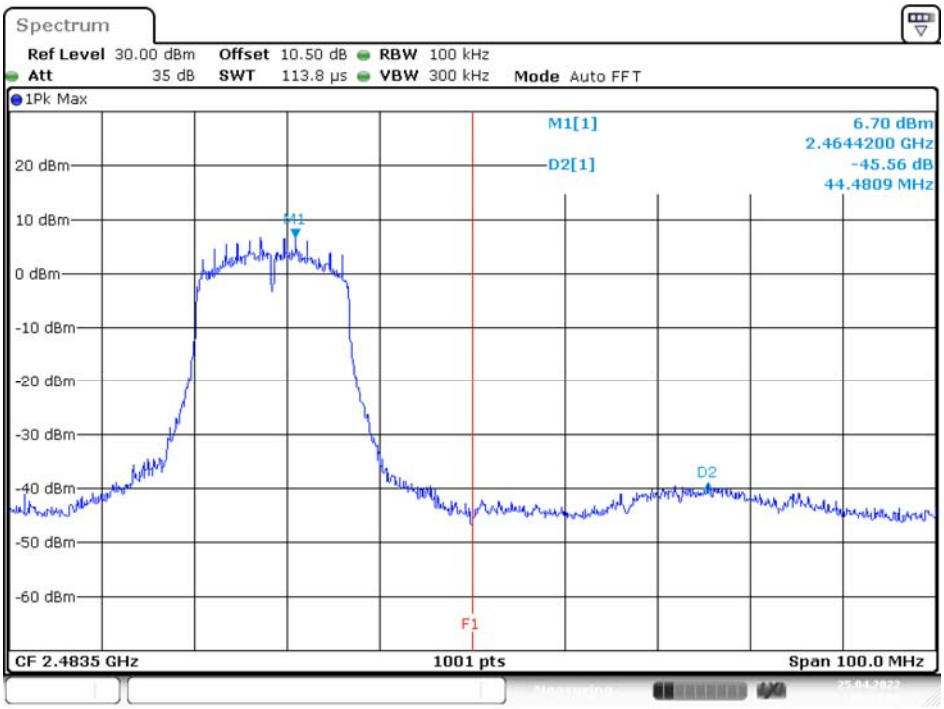
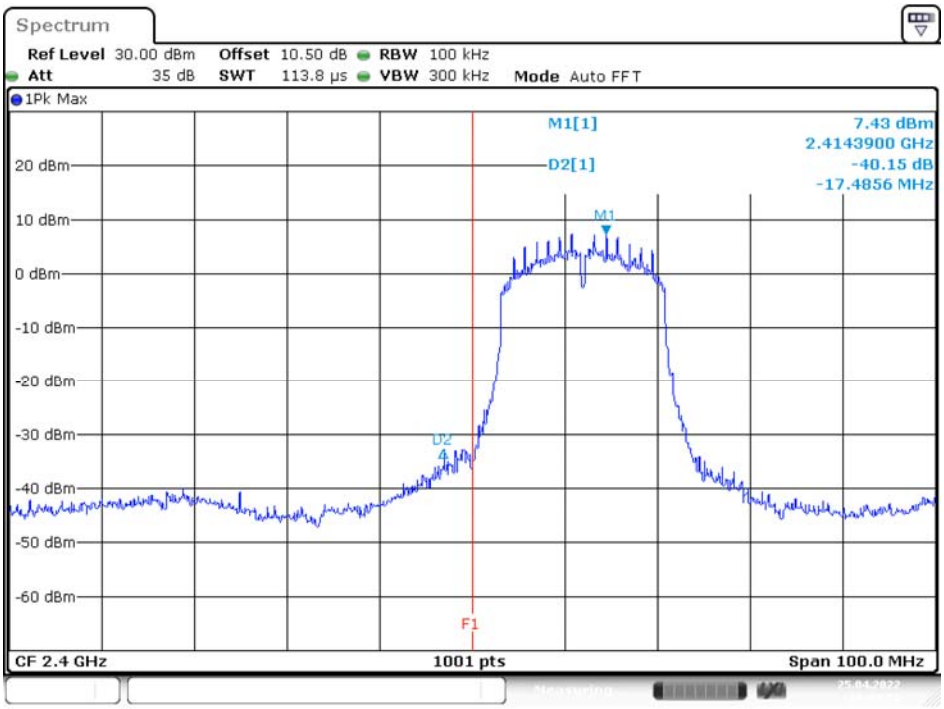
Band Edge, Right Side



Date: 25.APR.2022 18:33:09

N20 Mode

Band Edge, Left Side



Date: 25.APR.2022 18:41:52

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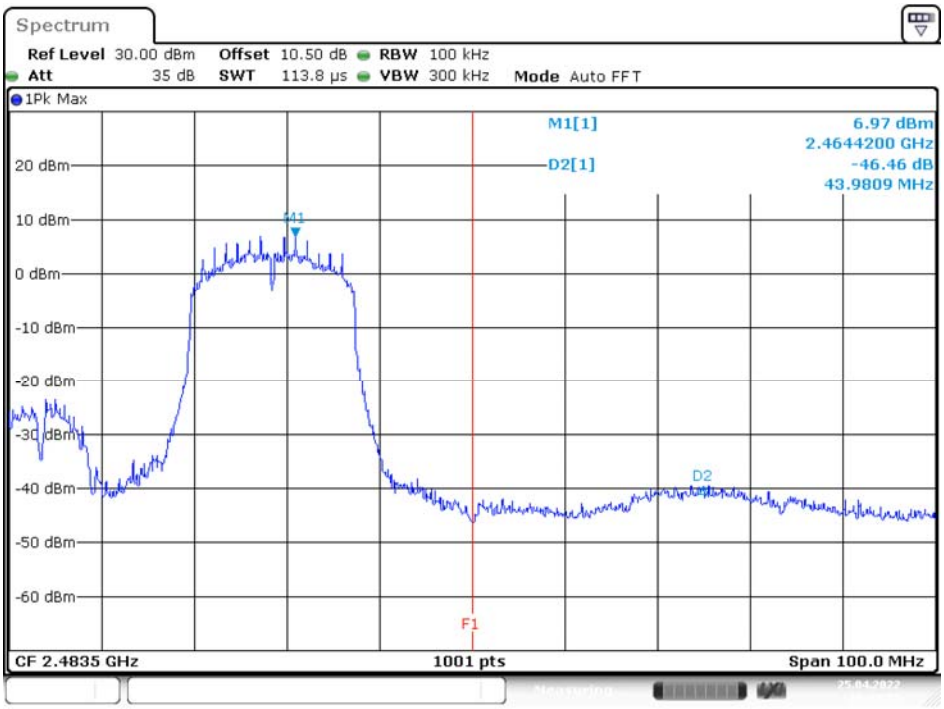
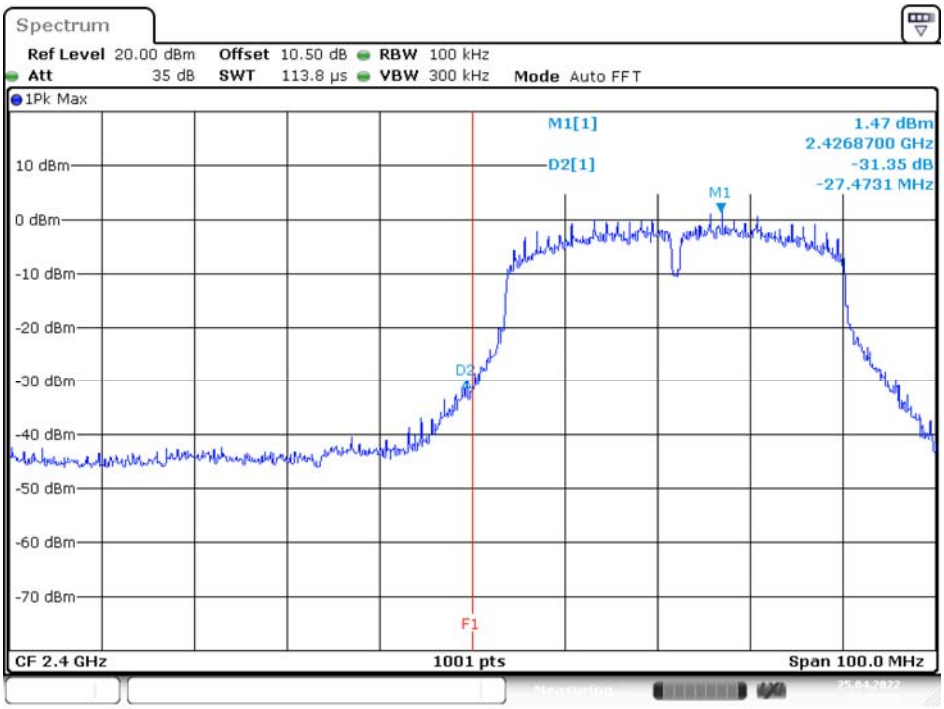
Band Edge, Right Side



Date: 25.APR.2022 18:48:37

N40 Mode

Band Edge, Left Side



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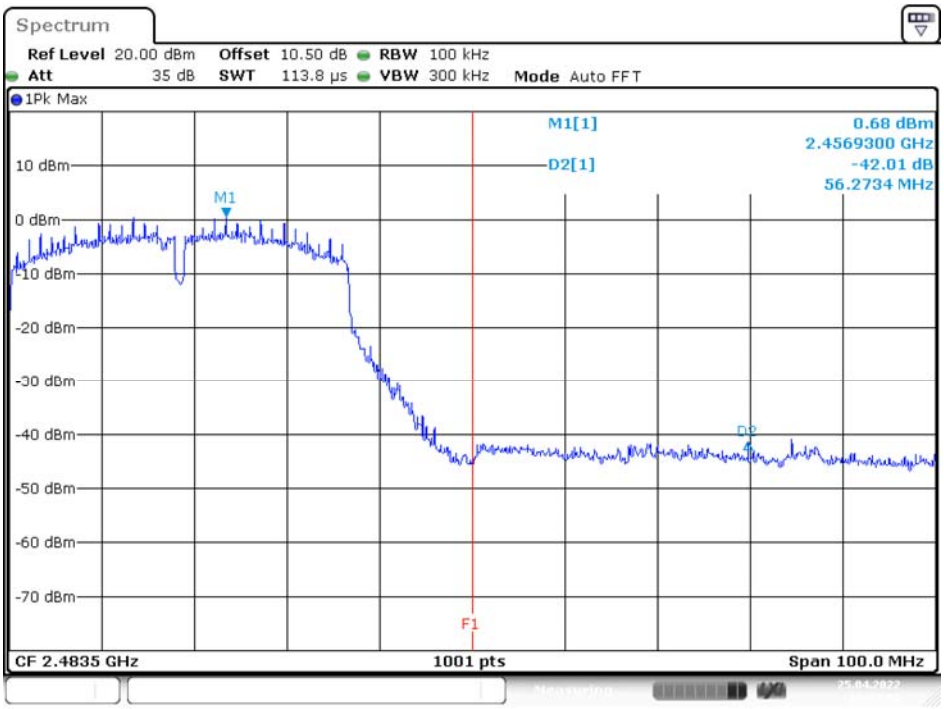
Band Edge, Right Side



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12 FCC §15.247(e) – Power Spectral Density

12.1 Applicable Standard

According to FCC §15.247(e).

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

12.2 Test Procedure

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

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

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

d) Set the VBW ≥ [3 × RBW].

e) Detector = peak.

f) Sweep time = auto couple.

g) Trace mode = max hold.

h) Allow trace to fully stabilize.

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

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

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12.3 Test Results

Channel	Frequency (MHz)	Power Spectral Density (dBm/3 kHz)	Limit (dBm/3 kHz)	Result
B Mode				
Low	2412	-2.97	8	PASS
Middle	2437	-1.92	8	PASS
High	2462	-2.38	8	PASS
G Mode				
Low	2412	-5.37	8	PASS
Middle	2437	-5.65	8	PASS
High	2462	-6.60	8	PASS
N20 Mode				
Low	2412	-6.07	8	PASS
Middle	2437	-6.67	8	PASS
High	2462	-6.74	8	PASS
N40 Mode				
Low	2422	-11.37	8	PASS
Middle	2437	-11.41	8	PASS
High	2452	-12.21	8	PASS

Please refer to the following plots

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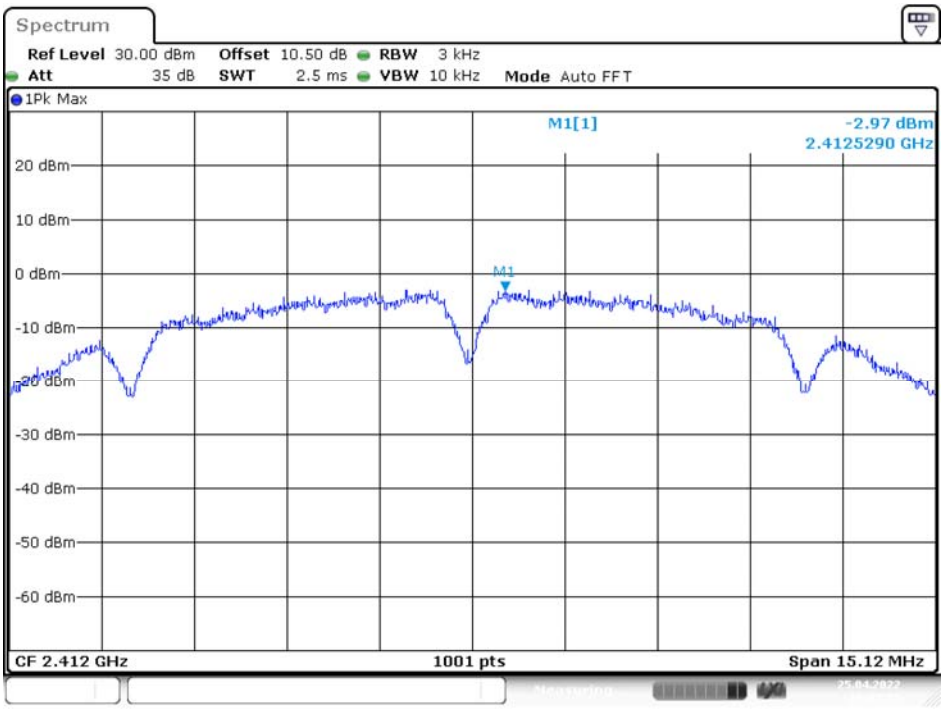
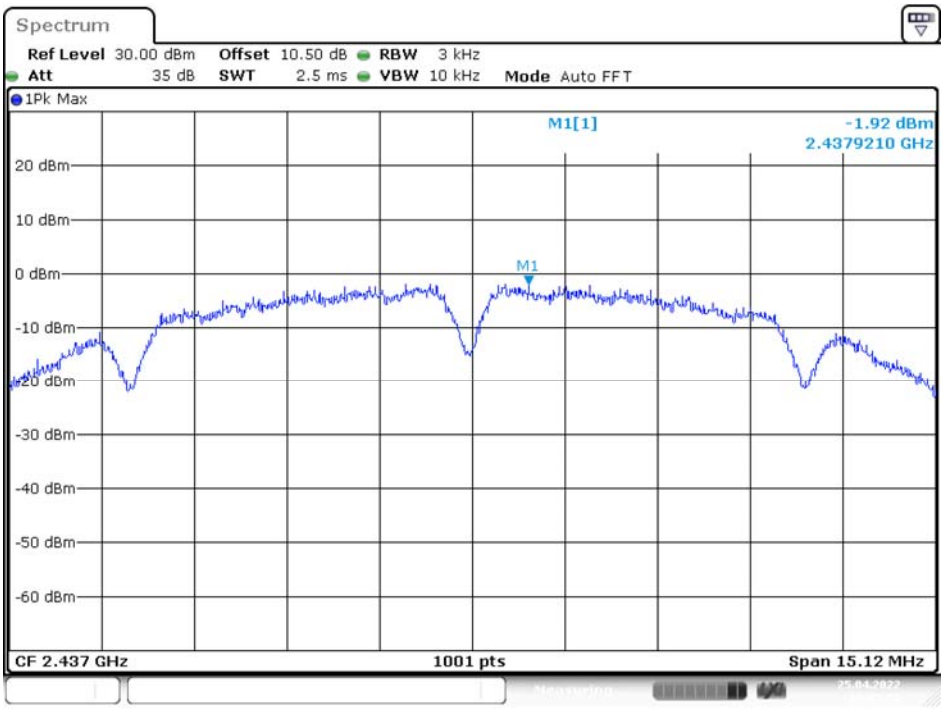
B Mode

Low Channel



Date: 25.APR.2022 18:01:05

Middle Channel



Date: 25.APR.2022 18:05:58

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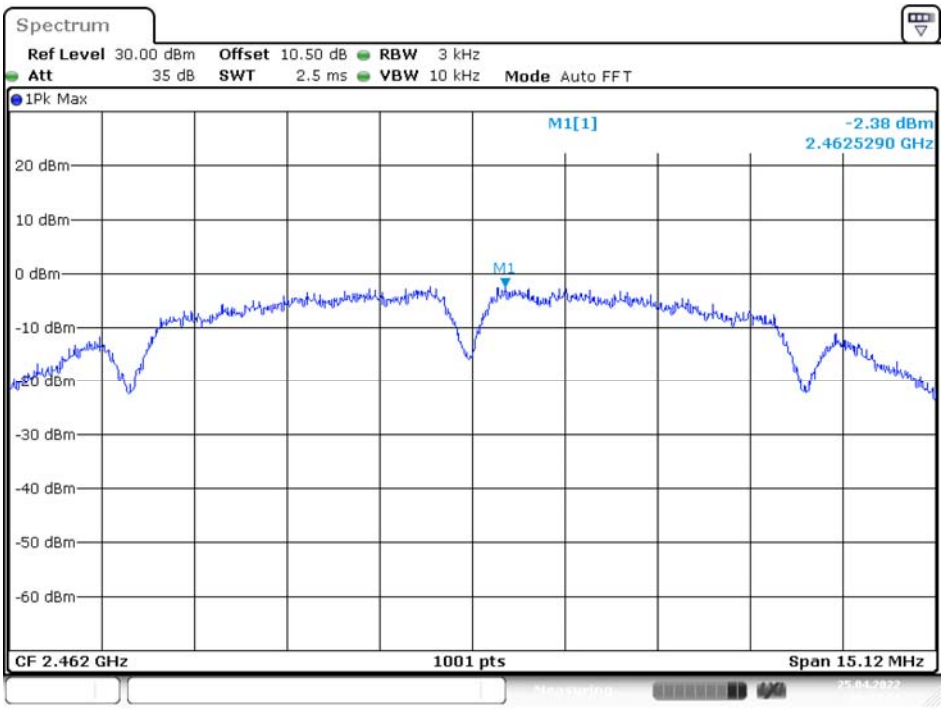
High Channel



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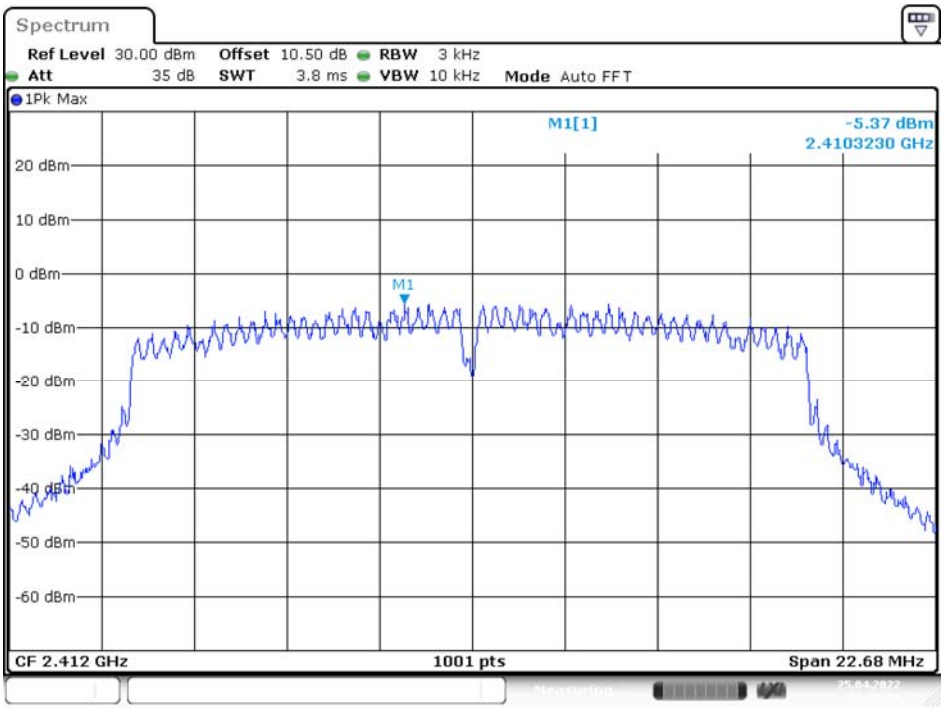
G Mode

Low Channel



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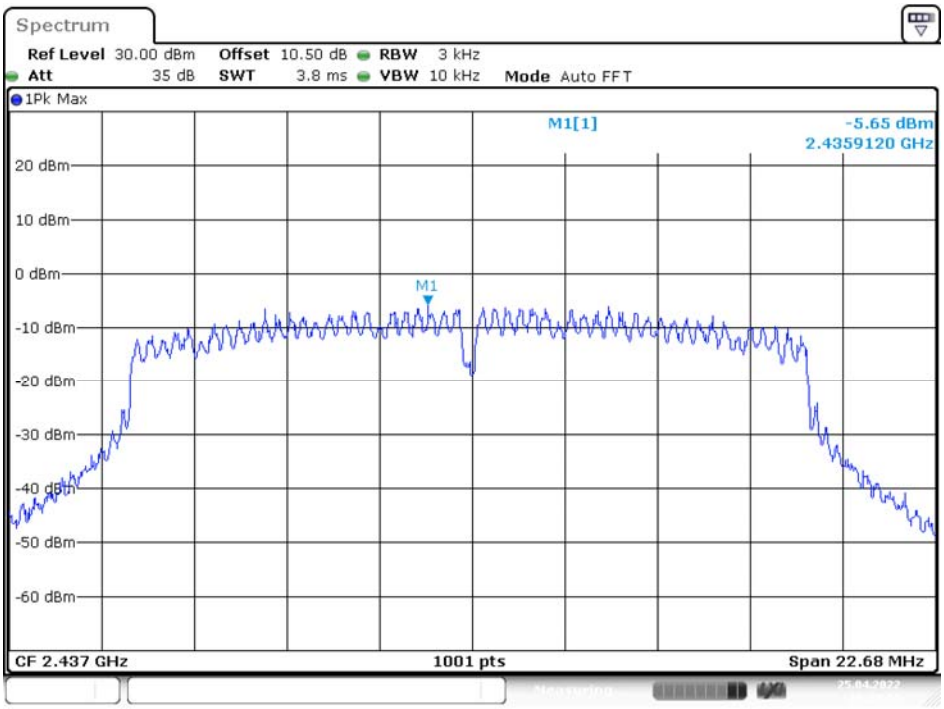
Middle Channel



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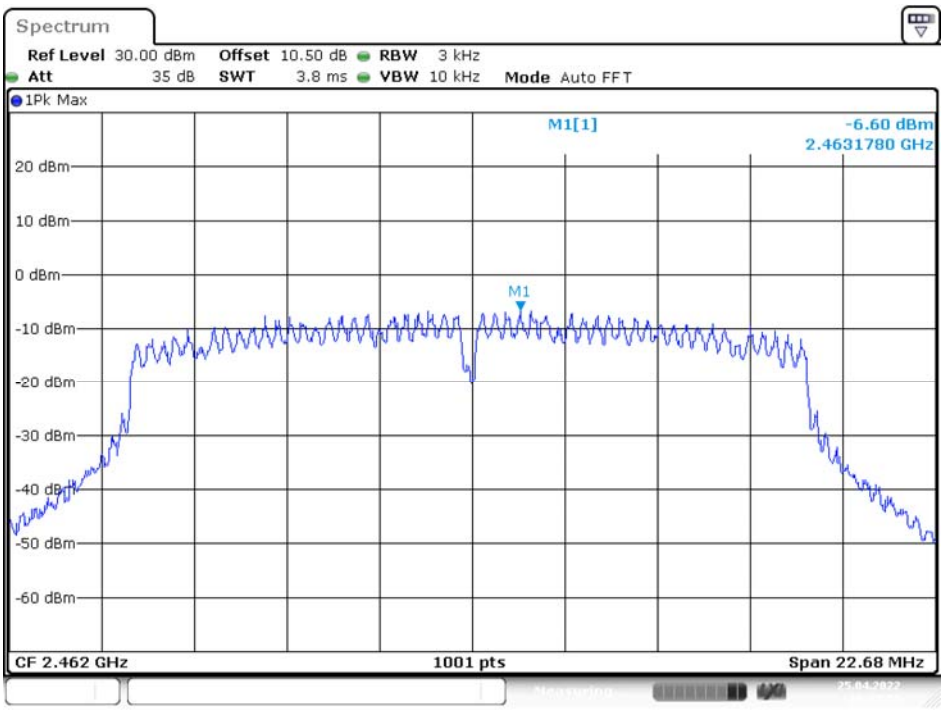
High Channel



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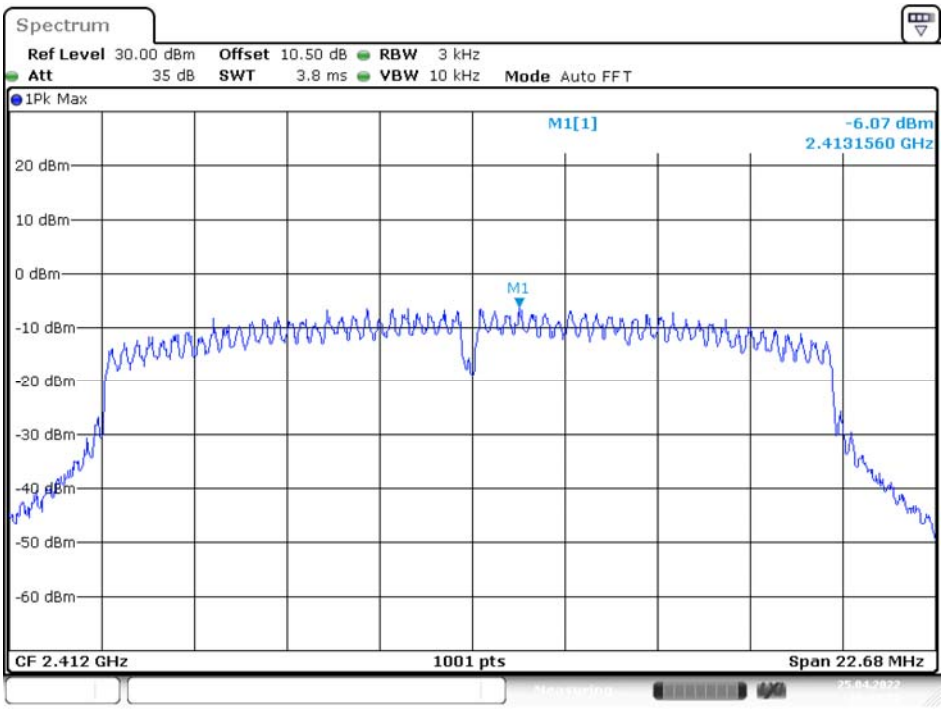
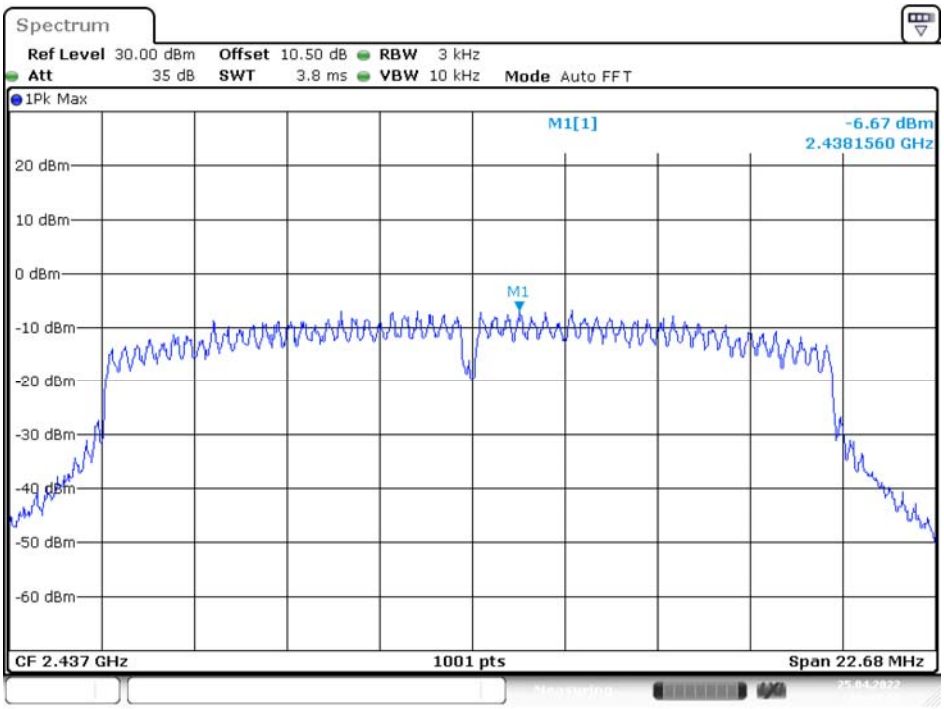
N20 Mode

Low Channel



Date: 25.APR.2022 18:41:37

Middle Channel



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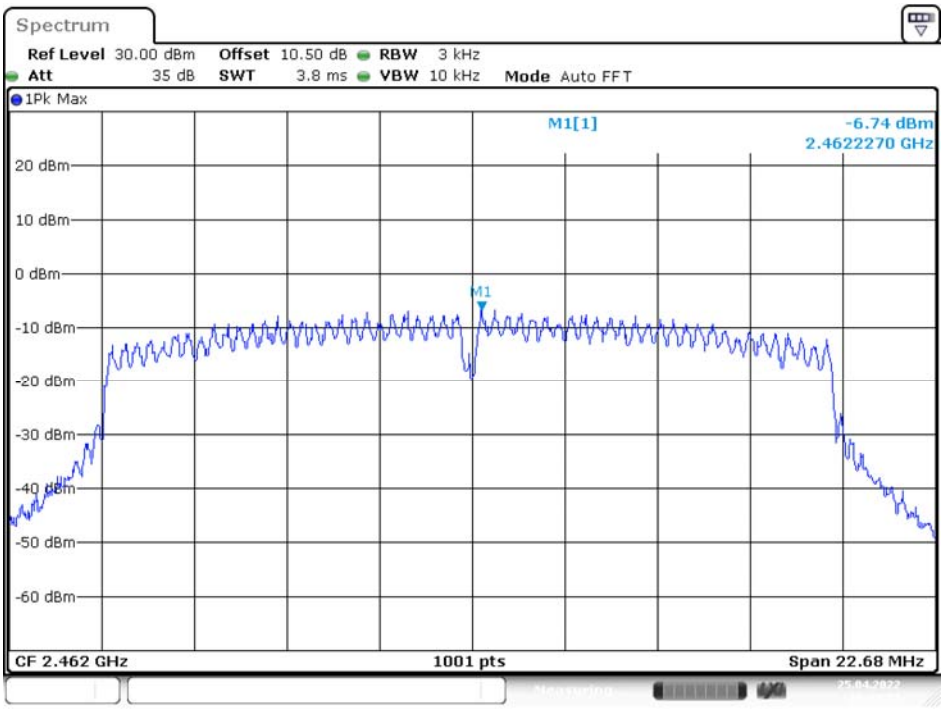
High Channel



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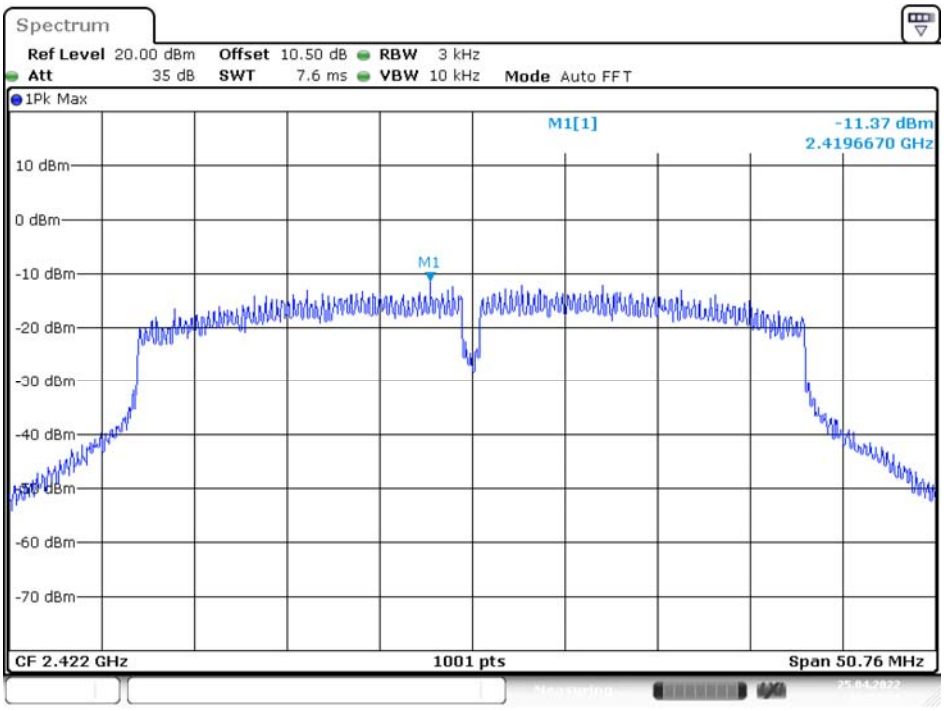
N40 Mode

Low Channel



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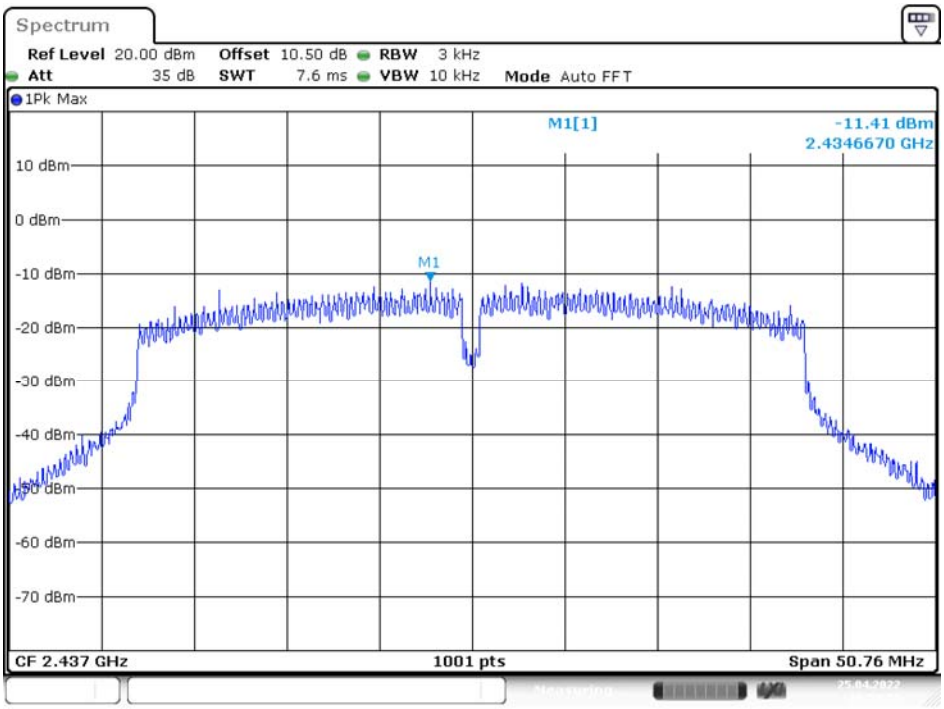
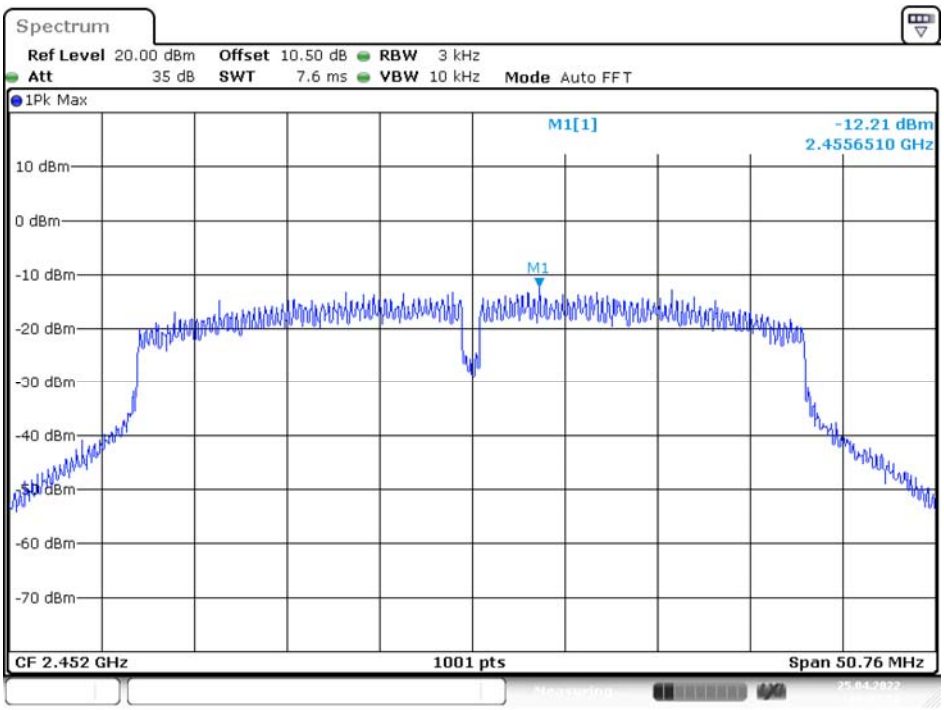
Middle Channel



Date: 25.APR.2022 18:59:54

High Channel



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