TEST REPORT

Applicant Name :	Zultys, Inc.
Address :	785 Lucerne Drive, Sunnyvale, California, 94085, United States
Report Number :	SZ1210916-48531E-RF-00B
FCC ID:	2APWA-ZIP47GE
IC	4478A-ZIP47GE

Test Standard (s)

FCC PART 15.247; RSS-GEN ISSUE 5, FEBRUARY 2021 AMENDMENT 2; RSS-247, ISSUE 2, FEBRUARY 2017

Sample Description

Product Type:	Gigabit SIP IP Phone
Model No.:	ZIP 47GE
Multiple Model(s) No.:	N/A
Trade Mark:	Zultys
Date Received:	2021/09/16
Date of Test:	2021/09/26~2021/11/12
Report Date:	2021/11/12

Test Result:	Pass*

* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:

Fan Yang
EMC Engineer

Approved By:

Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★ ".
Shenzhen Accurate Technology Co., Ltd. is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with an asterisk '*'. Customer model name, addresses, names, trademarks etc. are not considered data.
This report cannot be reproduced except in full, without prior written approval of the Company. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested. This report is valid only with a valid digital signature. The digital signature may be available only under the Adobe software above version 7.0.

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	Gigabit SIP IP Phone
Tested Model	ZIP 47GE
HVIN	ZIP 47GE
Frequency Range	BLE: 2402-2480MHz Wi-Fi: 2412-2472MHz
Maximum Conducted Peak Output Power	BLE: 10.67dBm Wi-Fi:10.46dBm(802.11b), 16.50dBm(802.11g), 16.53dBm(802.11n-HT20)
Modulation Technique	BLE: GFSK Wi-Fi: DSSS, OFDM
Antenna Specification*	3 dBi (It is provided by the applicant)
Voltage Range	DC48V from POE or DC5V from adapter
Date of Test	2021-09-26 to 2021-11-12
Sample serial number	CE&RE: SZ1210916-48531E-RF-S1, RF conducted: SZ1210916-48531E-RF-S2 (Assigned by ATC)
Received date	2021-09-16
Sample/EUT Status	Good condition
Adapter 1 information	Model: NSA10EU-05020002 Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 5V, 2.0A
Adapter 2 information	Model: OH-1015A0502000U4-UL Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 5V, 2.0A

Objective

This report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules and RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247, Issue 2, February 2017 of the Innovation, Science and Economic Development Canada rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.207, 15.209, 15.247 rules and RSS-Gen, RSS-247.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliant Testing of Unlicensed Wireless Devices and RSS-GEN Issue 5, February 2021 Amendment 2 and RSS-247, Issue 2, February 2017.

And KDB 558074 D01 15.247 Meas Guidance v05r02.

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	30MHz - 1GHz	4.28dB
	1GHz- 18GHz	4.98dB
	18GHz- 26.5GHz	5.06dB
Temperature		1℃
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

Listed by Innovation, Science and Economic Development Canada (ISEDC), the Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442	/	/

For 802.11b, 802.11g, 802.11n-HT20, EUT was tested with Channel 1, 7 and 13.

Channel List

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	21	2444
2	2406	22	2446
3	2408	23	2448
4	2410	24	2450
5	2412	25	2452
6	2414	26	2454
7	2416	27	2456
8	2418	28	2458
9	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
19	2440	39	2480

EUT was tested with Channel 0, 19 and 39.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

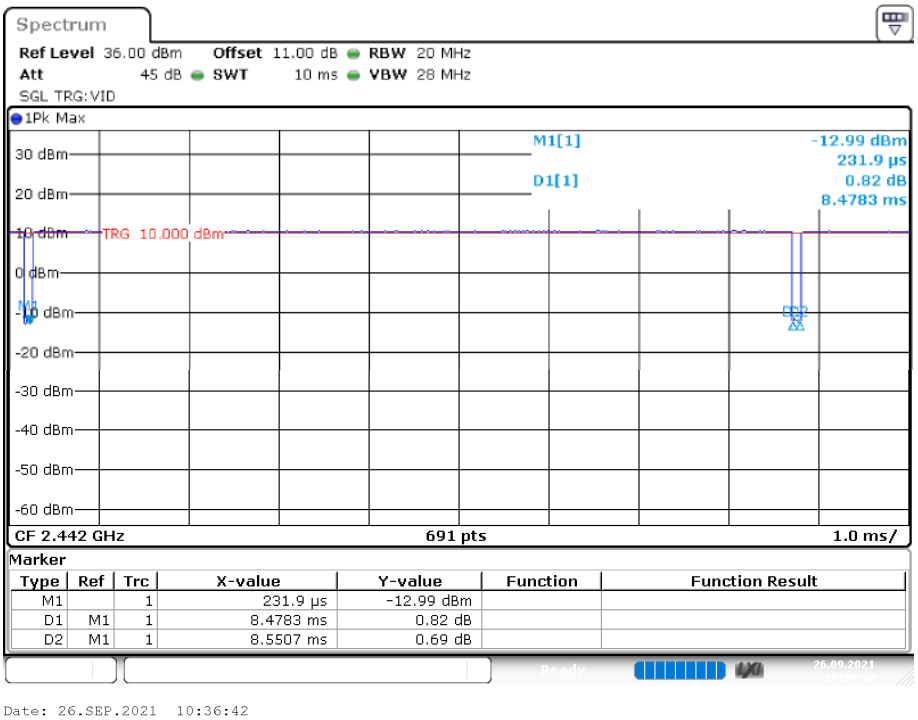
"Web explorer"* was used to the config EUT to test mode and power level as below*. The software and power level was provided by the applicant.

The device was tested with the worst case was performed as below:

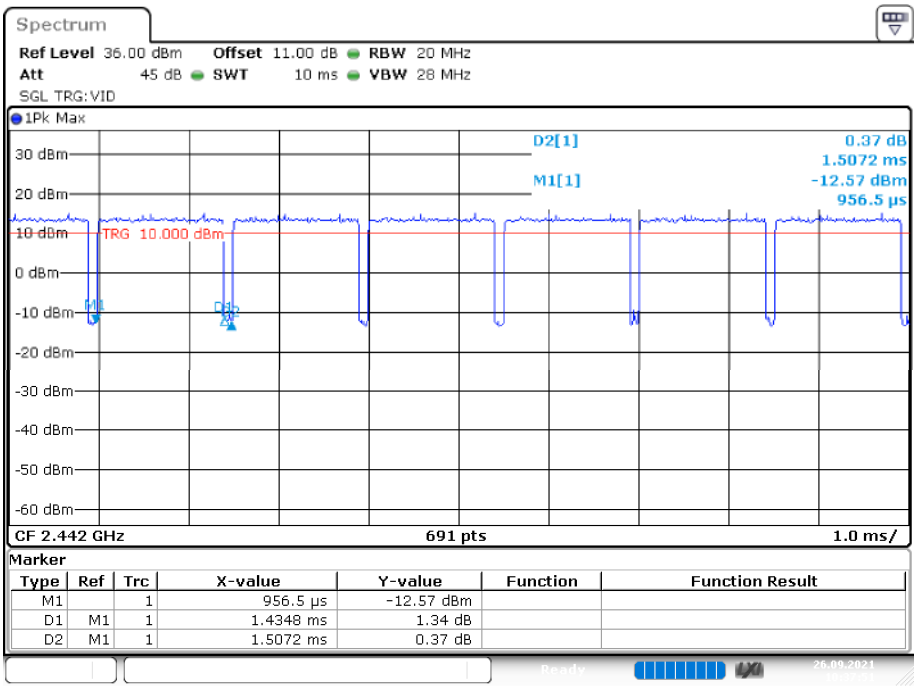
Mode	Data rate	Power level*		
		Low channel	Middle channel	High channel
802.11b	1 Mbps	10	10	10
802.11g	6 Mbps	10	10	10
802.11n-HT20	MCS0	10	10	10
BLE	1 Mbps	Default	Default	Default

Duty cycle

802.11b mode

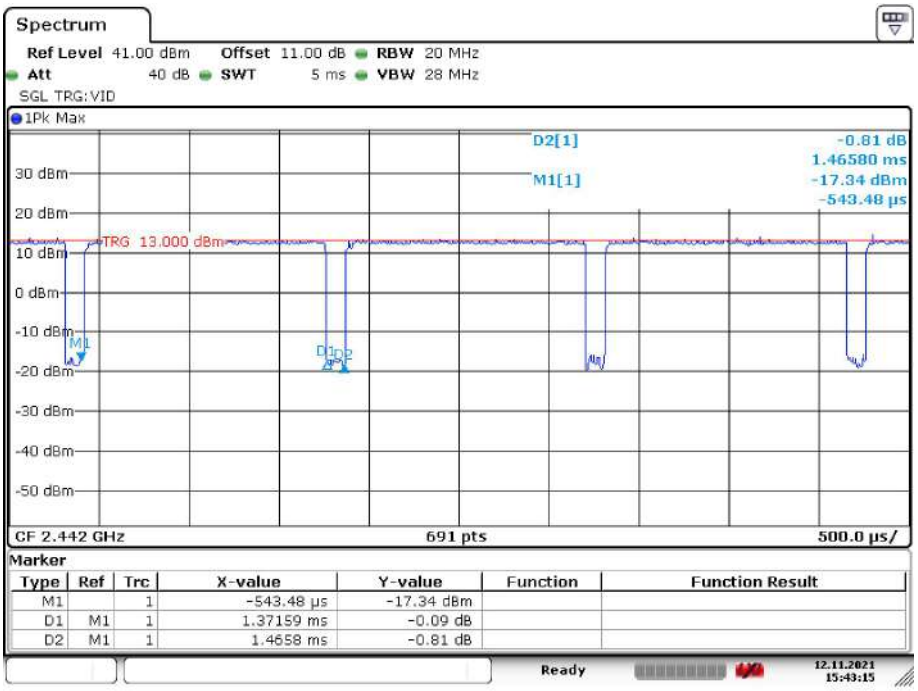


802.11g mode



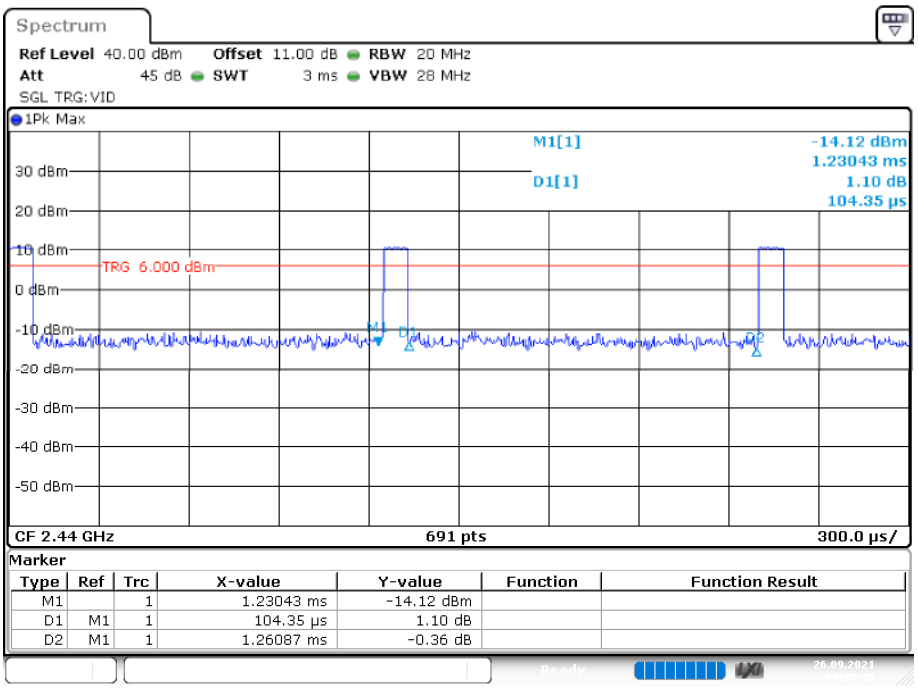
Date: 26.SEP.2021 10:37:51

802.11n20 Mode



Date: 12.NOV.2021 15:43:16

BLE Mode



Date: 26.SEP.2021 09:35:45

Mode	T_{on} (ms)	T_{on+off} (ms)	Duty Cycle (%)
802.11b	8.48	8.55	99.18
802.11g	1.43	1.51	94.71
802.11n-HT20	1.37	1.47	93.20
BLE	0.10	1.26	7.94

Support Equipment List and Details

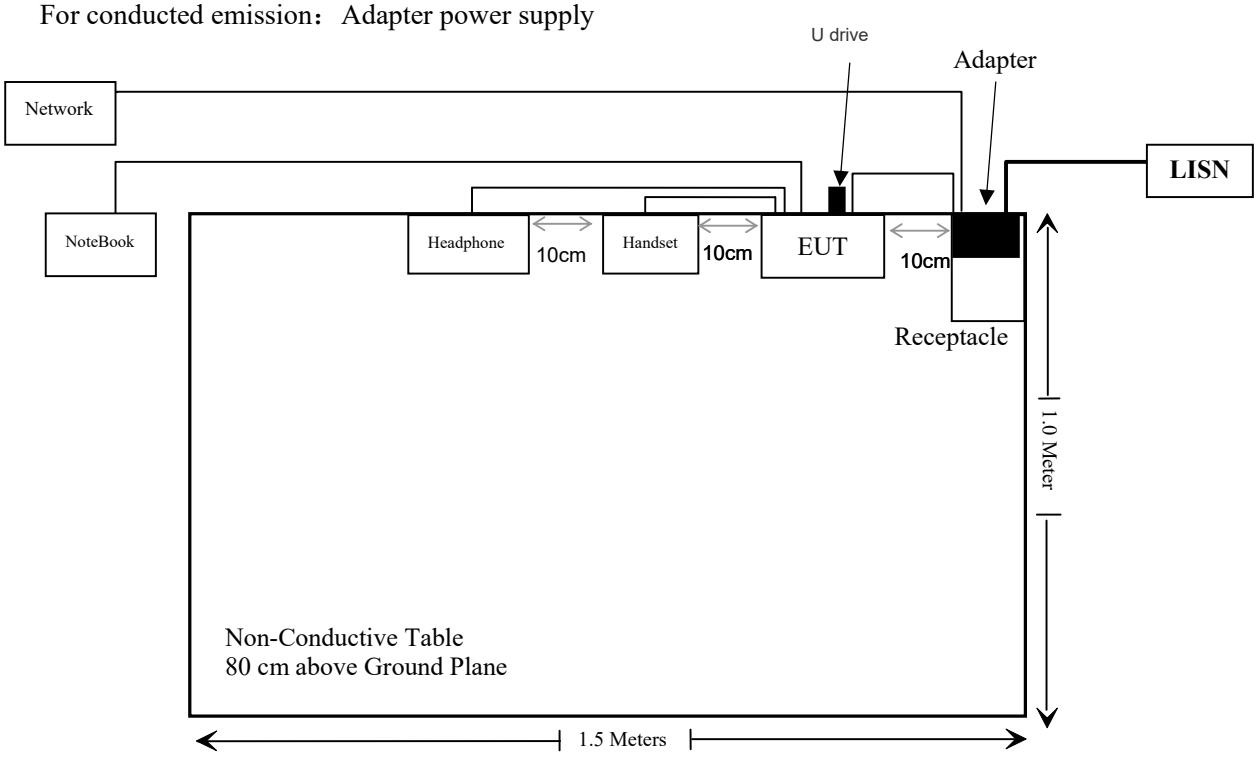
Manufacturer	Description	Model	Serial Number
DELL	NoteBook	Latitude E4710	PC201911252059
Grandstream	Headphone	Unknown	Unknown
Aigo	U drive	U268	Unknown
GOSPELL	POE	G0720-480-050	212701319

External I/O Cable

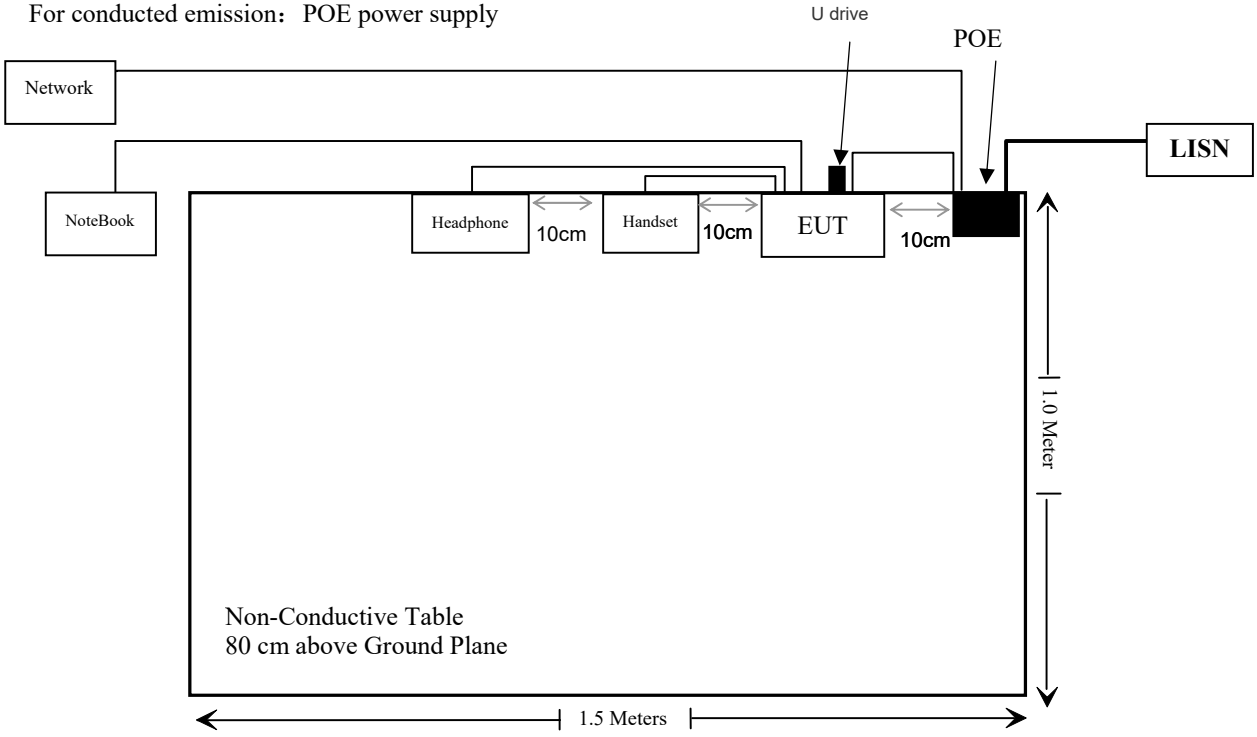
Cable Description	Length (m)	From Port	To
Un-shielding Un-Detachable AC Cable	1.2	LISN	Receptacle
Un-shielding Un-Detachable DC Cable	1.8	Adapter	EUT
Un-shielding Un-Detachable earphone Cable	1.5	EUT	Headphone
Un-shielding Detachable network Cable	6.0	EUT	Network
Un-shielding Detachable network Cable	6.0	EUT	NoteBook
Un-shielding Detachable network Cable	6.0	POE	Network
Un-shielding Detachable network Cable	1.0	POE	EUT

Block Diagram of Test Setup

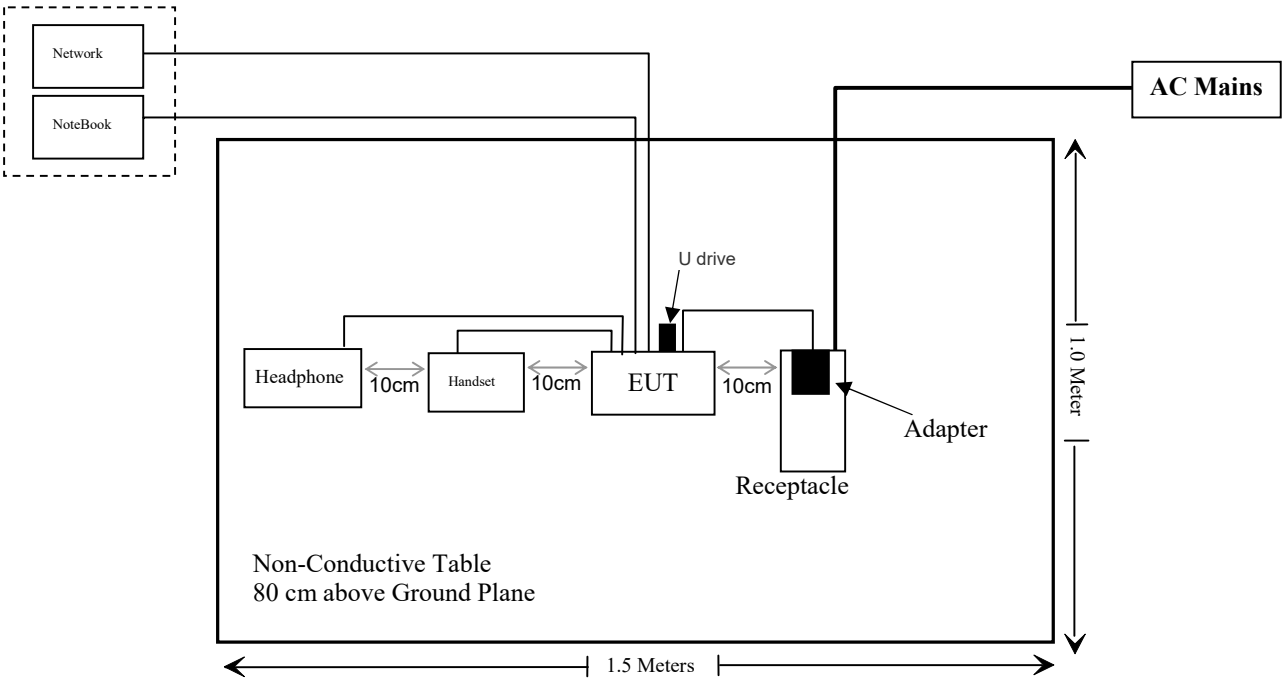
For conducted emission：Adapter power supply



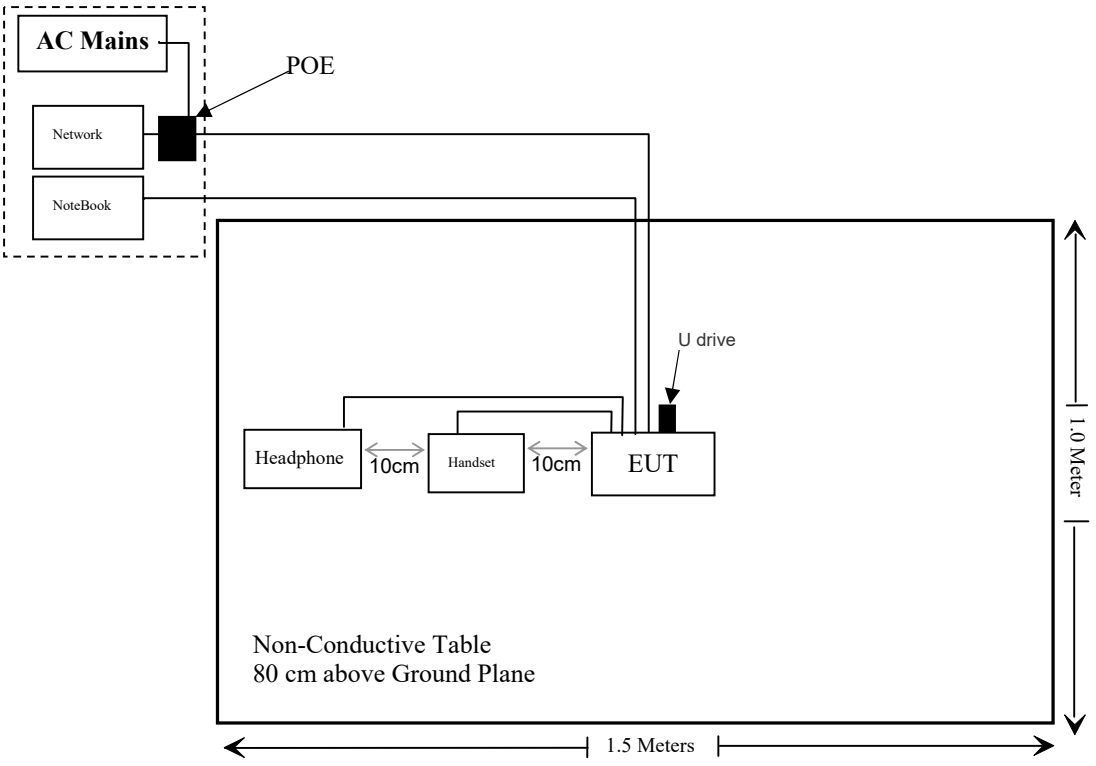
For conducted emission：POE power supply



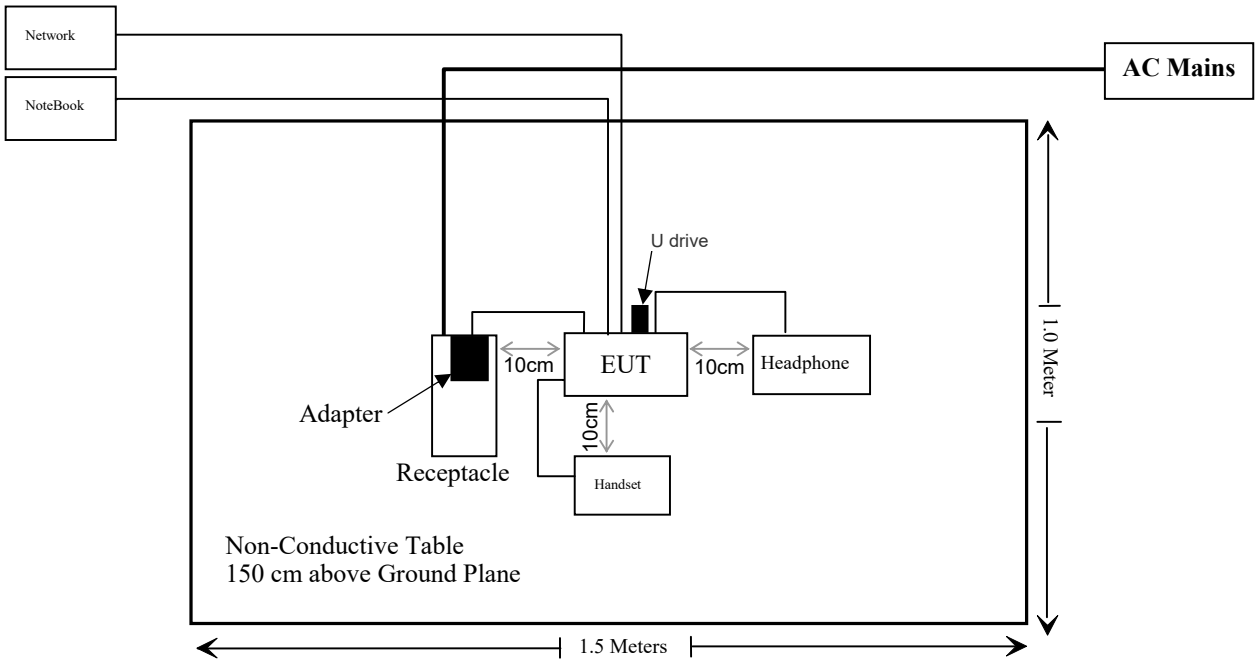
For Radiated emission(below 1G): Adapter power supply



For Radiated emission(below 1G): POE power supply



For Radiated emission(above 1G):



SUMMARY OF TEST RESULTS

FCC Rules	ISEDC Rules	Description of Test	Result
§15.247 (i), §2.1091	RSS-102 § 2.5.2	Maximum Permissible Exposure (MPE)& Exemption Limits for Routine Evaluation – RF Exposure Evaluation	Compliant
§15.203	RSS-Gen §6.8	Antenna Requirement	Compliant
§15.207 (a)	RSS-Gen §8.8	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	RSS-GEN § 8.10 & RSS-247 § 5.5	Spurious Emissions	Compliant
§15.247 (a)(2)	RSS- Gen§6.7 RSS-247 § 5.2 (a)	99% Occupied Bandwidth & 6 dB Emission Bandwidth	Compliant
§15.247(b)(3)	RSS-247 § 5.4(d)	Maximum Conducted Output Power	Compliant
§15.247(d)	RSS-247 § 5.5	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	RSS-247 § 5.2 (b)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	Test Receiver	ESPI3	100396	2020/12/24	2021/12/23
R & S	L.I.S.N.	ENV216	101314	2020/12/25	2021/12/24
Anritsu Corp	50ΩCoaxial Switch	MP59B	6200506474	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-2m	No.2	2020/12/25	2021/12/24
Conducted Emission Test Software: ES-K1 V1.71					
Radiated Emissions Test					
Rohde& Schwarz	Test Receiver	ESR	101817	2020/12/24	2021/12/23
Rohde&Schwarz	Spectrum Analyzer	FSV40	101495	2020/12/24	2021/12/23
SONOMA INSTRUMENT	Amplifier	310 N	186131	2020/12/25	2021/12/24
A.H. Systems, inc.	Preamplifier	PAM-0118P	531	2021/07/08	2022/07/07
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2020/11/28	2021/11/27
Anritsu Corp	50 Coaxial Switch	MP59B	6100237248	2020/12/25	2021/12/24
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Radiated Emission Test Software: EZ_EMC V 1.1.4.2					
Unknown	RF Coaxial Cable	N-5m	No.3	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-5m	No.4	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.5	2020/12/25	2021/12/24
Unknown	RF Coaxial Cable	N-1m	No.6	2020/12/25	2021/12/24
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2020/12/25	2021/12/24
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2020/12/24	2021/12/23
Rohde & Schwarz	Open Switch and Control Unit	OSP120 + OSP-B157	101244 + 100866	2020/12/24	2021/12/23

*** Statement of Traceability:** Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.247 (i) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

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

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

Result

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Mode	Frequency (MHz)	Antenna Gain		Tune up conducted power		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)	(mW)			
BLE	2402-2480	3.0	2.00	11.0	12.59	20	0.005	1
Wi-Fi	2412-2472	3.0	2.00	17.00	50.12	20	0.020	1

Note: 1. the tune up conducted power was declared by the applicant.
2. The Bluetooth, 2.4GHz Wi-Fi and 5GHz Wi-Fi cannot transmit at same time

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant

RSS-102 § 2.5.2 –EXEMPTION LIMITS FOR ROUTINE EVALUATION-RF EXPOSURE EVALUATION

Applicable Standard

According to RSS-102 § (2.5.2):

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:
• below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
• at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
• at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
• at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance). In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Result

Calculated Data:

For Wi-Fi:
The maximum tune-up conducted output power is 17.0 dBm, antenna gain is 3.0dBi.
So the maximum e.i.r.p. of the device is 17.0dBm + 3.0dBi = 20.0dBm =0.1W<2.68 W

The worst case is f = 2412 MHz:
The limit is $1.31 \times 10^{-2} f^{0.6834}$ W=2.68W

For BLE:
The maximum tune-up conducted output power is 11.0 dBm, antenna gain is 3.0dBi.
So the maximum e.i.r.p. of the device is 11.0dBm +3.0dBi = 14.0dBm =0.025W<2.68 W

The worst case is f = 2402 MHz:
The limit is $1.31 \times 10^{-2} f^{0.6834}$ W=2.68W

So EUT meet the RF Exposure evaluation.

§ 15.203 & RSS-Gen §6.8 ANTENNA REQUIREMENT

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. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

a. Antenna must be permanently attached to the unit.
b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.
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 exceeds 6 dBi.

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

For licence-exempt equipment with detachable antennas, the user manual shall also contain the following notice in a conspicuous location:

This radio transmitter [enter the device's ISED certification number] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

Antenna Connector Construction

The EUT has an internal antenna arrangement which was permanently attached and the antenna gain is 3 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Type	Antenna Gain	Impedance
PCB	3dBi	50 Ω

Result: Compliant

§ 15.207 (a) & RSS-GEN §8.8 AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC § 15.207 (a) & RSS-GEN §8.8

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μH / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

For an EUT that connects to the AC power lines indirectly, through another device, the requirement for compliance with the limits in table 4 shall apply at the terminals of the AC power-line mains cable of a representative support device, while it provides power to the EUT. The lower limit applies at the boundary between the frequency ranges. The device used to power the EUT shall be representative of typical applications.

Table 4 - AC Power Lines Conducted Emission Limits		
Frequency range (MHz)	Conducted limit (dBμV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56[1]	56 to 46[1]
0.5 – 5	56	46
5 – 30	60	50

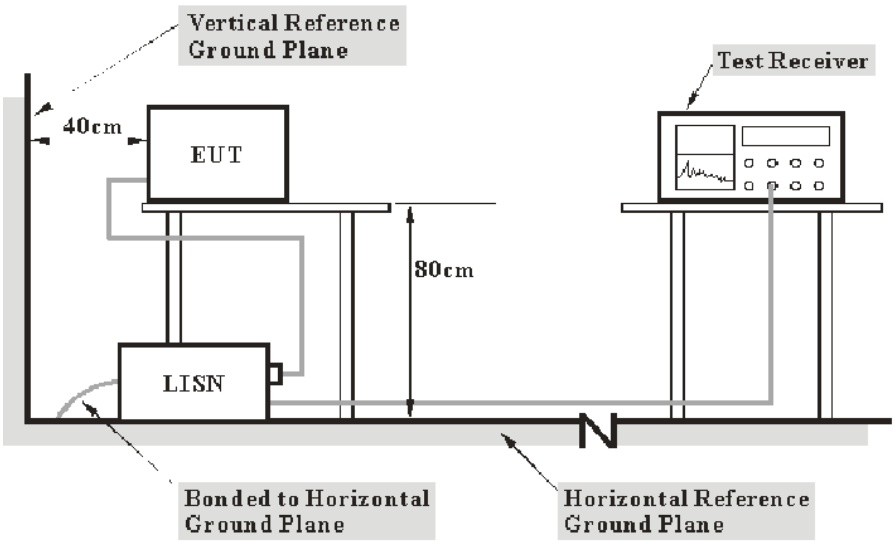
Note 1: The level decreases linearly with the logarithm of the frequency.

For an EUT with a permanent or detachable antenna operating between 150 kHz and 30 MHz, the AC power-line conducted emissions must be measured using the following configurations:

(a) Perform the AC power-line conducted emissions test with the antenna connected to determine compliance with the limits of table 4 outside the transmitter's fundamental emission band.

(b) Retest with a dummy load instead of the antenna to determine compliance with the limits of table 4 within the transmitter's fundamental emission band. For a detachable antenna, remove the antenna and connect a suitable dummy load to the antenna connector. For a permanent antenna, remove the antenna and terminate the RF output with a dummy load or network that simulates the antenna in the fundamental frequency band.

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 & RSS-247/RSS-Gen limits.

The spacing between the peripherals was 10 cm.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver Setup

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

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

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

Test Procedure

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

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

Corrected Factor & Margin Calculation

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

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

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 = Limit – Corrected Amplitude

Test Data

Environmental Conditions

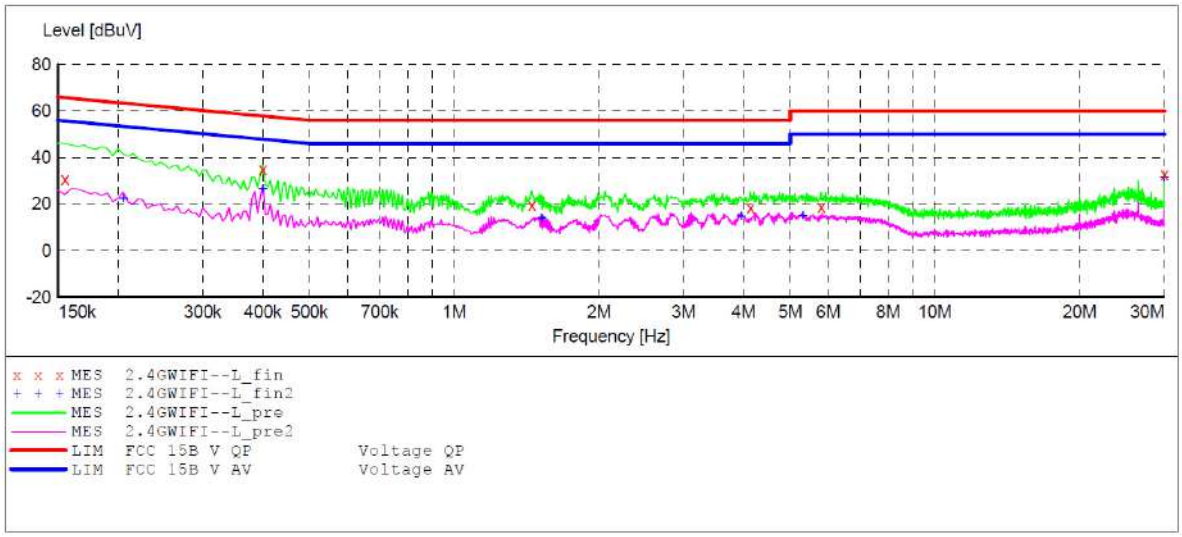
Temperature:	25 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Caro hu on 2021-10-02 and 2021-10-21.

EUT operation mode: Transmitting

For POE:

AC 120V/60 Hz, Line



MEASUREMENT RESULT: "2.4GWIFI--L_fin"

2021-10-21 11:24

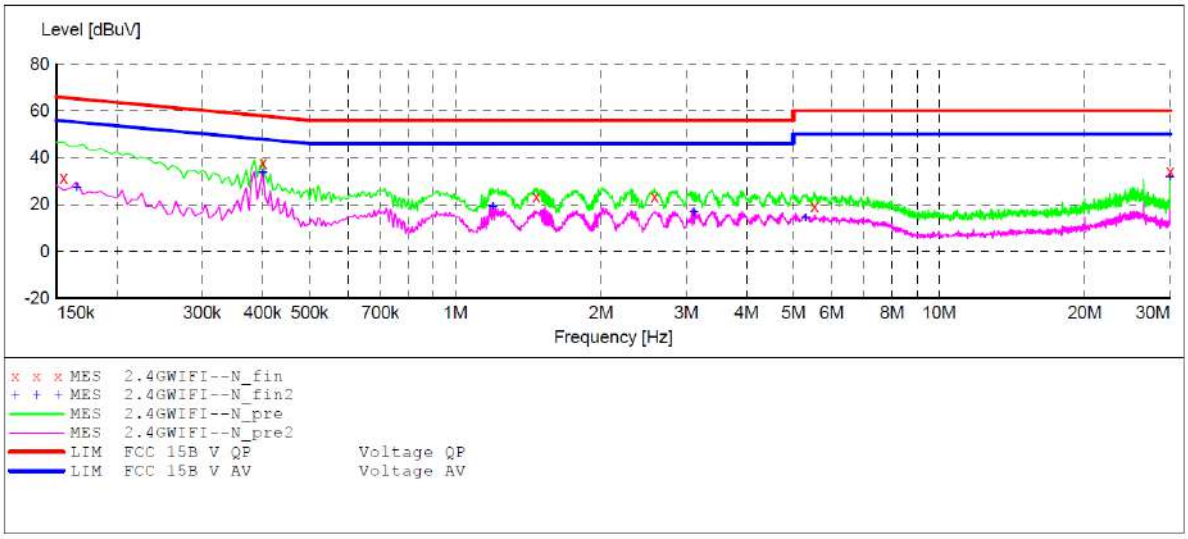
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.155000	30.80	10.8	66	35.2	QP	L1	GND
0.400000	34.80	11.0	58	23.2	QP	L1	GND
1.450000	19.40	11.2	56	36.6	QP	L1	GND
4.130000	18.50	11.4	56	37.5	QP	L1	GND
5.800000	18.90	11.5	60	41.1	QP	L1	GND
30.000000	32.70	11.8	60	27.3	QP	L1	GND

MEASUREMENT RESULT: "2.4GWIFI--L_fin2"

2021-10-21 11:24

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.205000	22.10	10.8	53	30.9	AV	L1	GND
0.400000	26.60	11.0	48	21.4	AV	L1	GND
1.520000	14.00	11.2	46	32.0	AV	L1	GND
3.960000	14.60	11.4	46	31.4	AV	L1	GND
5.310000	14.90	11.4	50	35.1	AV	L1	GND
30.000000	31.40	11.8	50	18.6	AV	L1	GND

AC 120V/60 Hz, Neutral



MEASUREMENT RESULT: "2.4GWIFI--N_fin"

2021-10-21 11:26

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.155000	31.40	10.8	66	34.6	QP	N	GND
0.400000	37.70	11.0	58	20.3	QP	N	GND
1.470000	23.20	11.2	56	32.8	QP	N	GND
2.580000	23.40	11.3	56	32.6	QP	N	GND
5.520000	19.30	11.5	60	40.7	QP	N	GND
30.000000	34.20	11.8	60	25.8	QP	N	GND

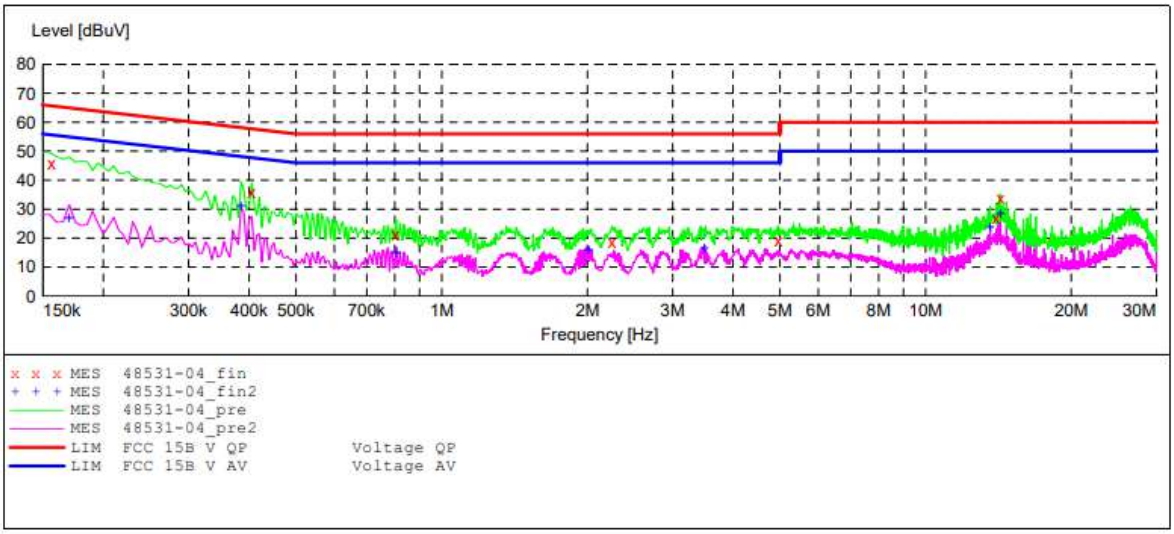
MEASUREMENT RESULT: "2.4GWIFI--N_fin2"

2021-10-21 11:26

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.165000	27.20	10.8	55	28.8	AV	N	GND
0.400000	33.50	11.0	48	14.5	AV	N	GND
1.195000	19.00	11.2	46	27.0	AV	N	GND
3.110000	16.70	11.3	46	29.3	AV	N	GND
5.290000	14.20	11.4	50	35.8	AV	N	GND
30.000000	31.70	11.8	50	18.3	AV	N	GND

For adapter NSA10EU-05020002:

AC 120V/60 Hz, Line



MEASUREMENT RESULT: "48531-04_fin"

2021-10-2 11:56

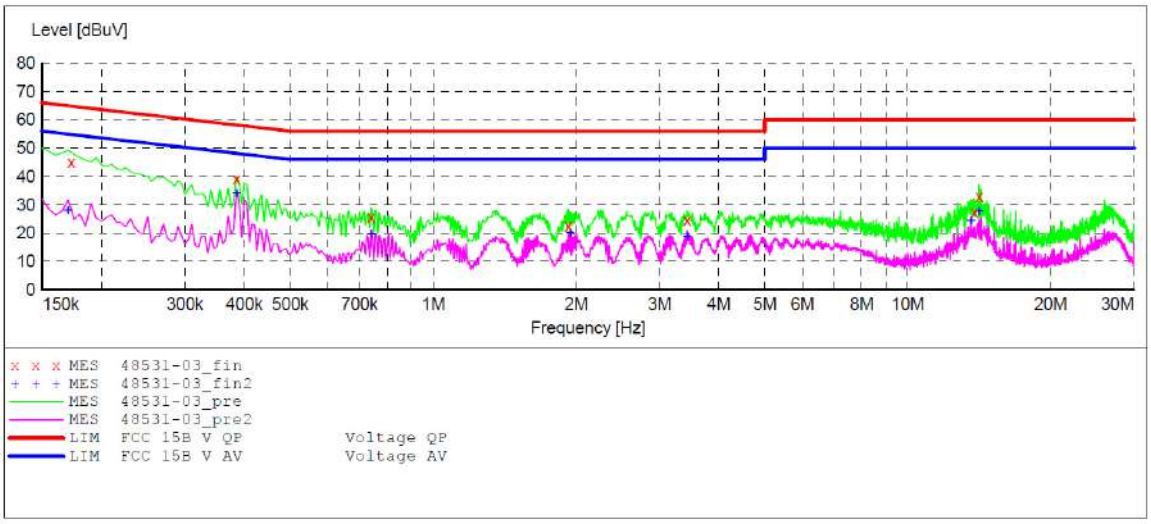
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.155000	47.60	10.8	66	18.4	QP	L1	GND
0.405000	35.70	11.0	58	22.3	QP	L1	GND
0.805000	21.00	11.1	56	35.0	QP	L1	GND
2.250000	18.70	11.3	56	37.3	QP	L1	GND
4.960000	19.30	11.4	56	36.7	QP	L1	GND
14.000000	27.10	11.6	60	32.9	QP	L1	GND
14.275000	33.50	11.6	60	26.5	QP	L1	GND

MEASUREMENT RESULT: "48531-04_fin2"

2021-10-2 11:56

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.170000	27.20	10.8	55	27.8	AV	L1	GND
0.385000	31.00	10.9	48	17.0	AV	L1	GND
0.805000	15.00	11.1	46	31.0	AV	L1	GND
2.010000	15.80	11.3	46	30.2	AV	L1	GND
3.490000	16.40	11.4	46	29.6	AV	L1	GND
13.600000	24.00	11.6	50	26.0	AV	L1	GND
14.275000	28.60	11.6	50	21.4	AV	L1	GND

AC 120V/60 Hz, Neutral



MEASUREMENT RESULT: "48531-03_fin"

2021-10-2 11:54

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.170000	45.50	10.8	65	19.5	QP	N	GND
0.385000	39.20	10.9	58	18.8	QP	N	GND
0.740000	25.60	11.1	56	30.4	QP	N	GND
1.925000	22.60	11.3	56	33.4	QP	N	GND
3.430000	24.60	11.4	56	31.4	QP	N	GND
13.825000	27.40	11.6	60	32.6	QP	N	GND
14.150000	33.00	11.6	60	27.0	QP	N	GND

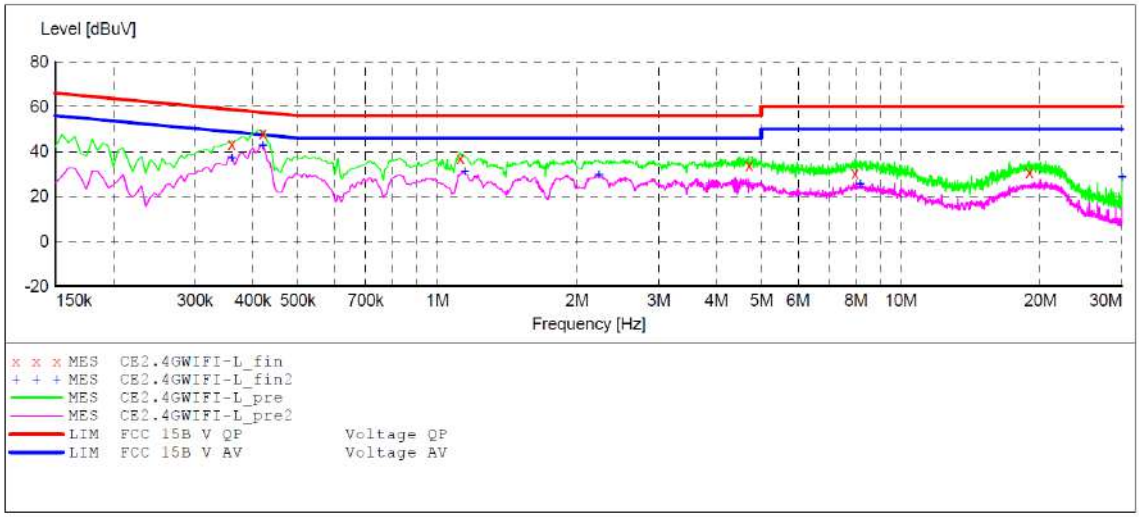
MEASUREMENT RESULT: "48531-03_fin2"

2021-10-2 11:54

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.170000	28.00	10.8	55	27.0	AV	N	GND
0.385000	34.20	10.9	48	13.8	AV	N	GND
0.740000	19.60	11.1	46	26.4	AV	N	GND
1.945000	20.10	11.3	46	25.9	AV	N	GND
3.430000	18.80	11.4	46	27.2	AV	N	GND
13.600000	24.30	11.6	50	25.7	AV	N	GND
14.150000	27.60	11.6	50	22.4	AV	N	GND

For adapter OH-1015A0502000U4-UL:

AC 120V/60 Hz, Line



MEASUREMENT RESULT: "CE2.4GWIFI-L_fin"

2021-10-21 02:59

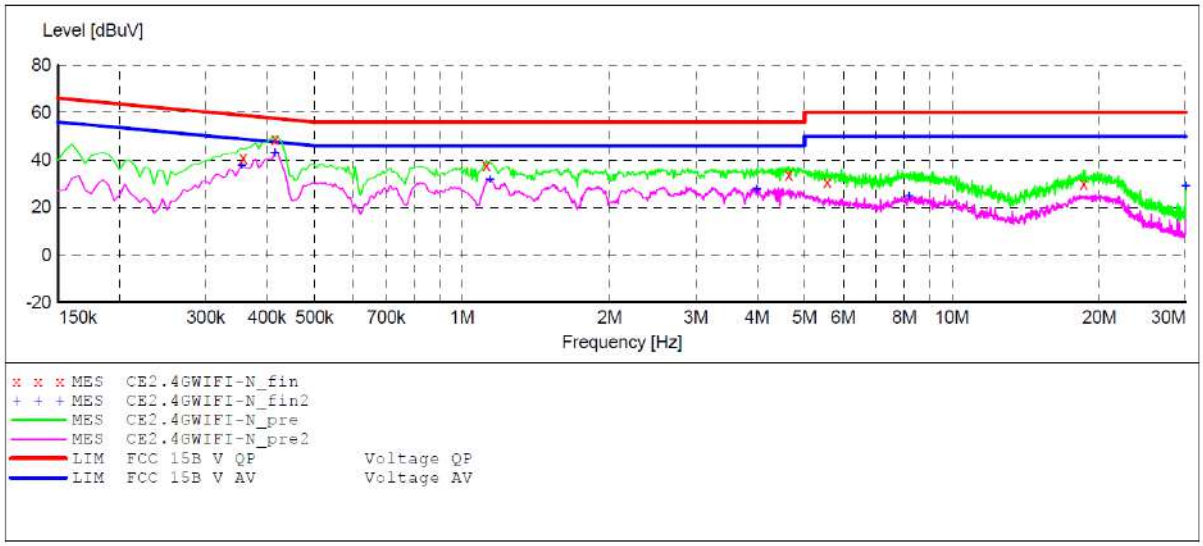
Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.360000	43.30	10.9	59	15.7	QP	L1	GND
0.420000	48.10	11.0	57	8.9	QP	L1	GND
1.120000	37.10	11.2	56	18.9	QP	L1	GND
4.700000	33.90	11.4	56	22.1	QP	L1	GND
7.960000	30.30	11.5	60	29.7	QP	L1	GND
18.925000	30.80	11.7	60	29.2	QP	L1	GND

MEASUREMENT RESULT: "CE2.4GWIFI-L_fin2"

2021-10-21 02:59

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.360000	36.90	10.9	49	12.1	AV	L1	GND
0.420000	42.50	11.0	47	4.5	AV	L1	GND
1.145000	31.00	11.2	46	15.0	AV	L1	GND
2.230000	29.70	11.3	46	16.3	AV	L1	GND
8.170000	25.50	11.5	50	24.5	AV	L1	GND
30.000000	28.60	11.8	50	21.4	AV	L1	GND

AC 120V/60 Hz, Neutral



MEASUREMENT RESULT: "CE2.4GWIFI-N_fin"

2021-10-21 03:01

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.355000	40.60	10.9	59	18.4	QP	N	GND
0.415000	48.90	11.0	58	9.1	QP	N	GND
1.120000	37.60	11.2	56	18.4	QP	N	GND
4.640000	33.90	11.4	56	22.1	QP	N	GND
5.560000	30.70	11.5	60	29.3	QP	N	GND
18.550000	29.80	11.7	60	30.2	QP	N	GND

MEASUREMENT RESULT: "CE2.4GWIFI-N_fin2"

2021-10-21 03:01

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.355000	37.80	10.9	49	11.2	AV	N	GND
0.415000	42.90	11.0	48	6.1	AV	N	GND
1.140000	31.80	11.2	46	14.2	AV	N	GND
3.990000	27.50	11.4	46	18.5	AV	N	GND
8.170000	24.80	11.5	50	25.2	AV	N	GND
30.000000	28.80	11.8	50	21.2	AV	N	GND

§15.205, §15.209, §15.247(d) & RSS-GEN § 8.10 & RSS-247 § 5.5 SPURIOUS EMISSIONS

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

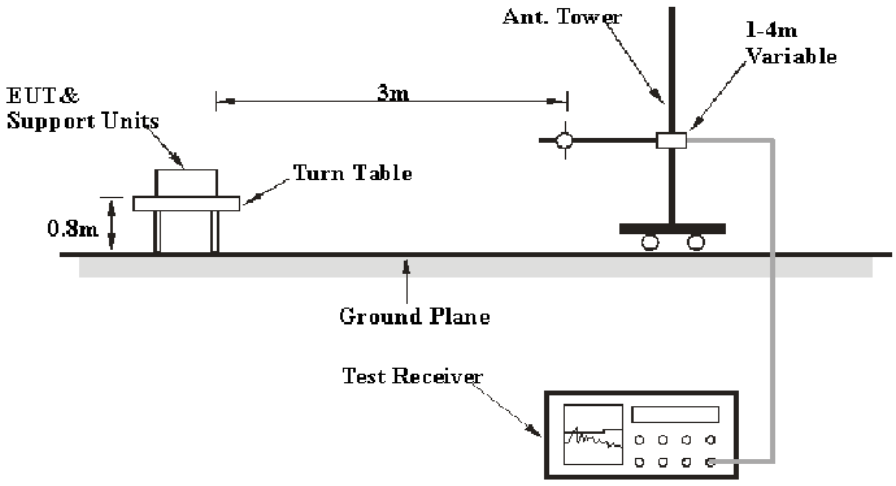
According to RSS-GEN § 8.10 & RSS-247 § 5.5

Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:(a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.(c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

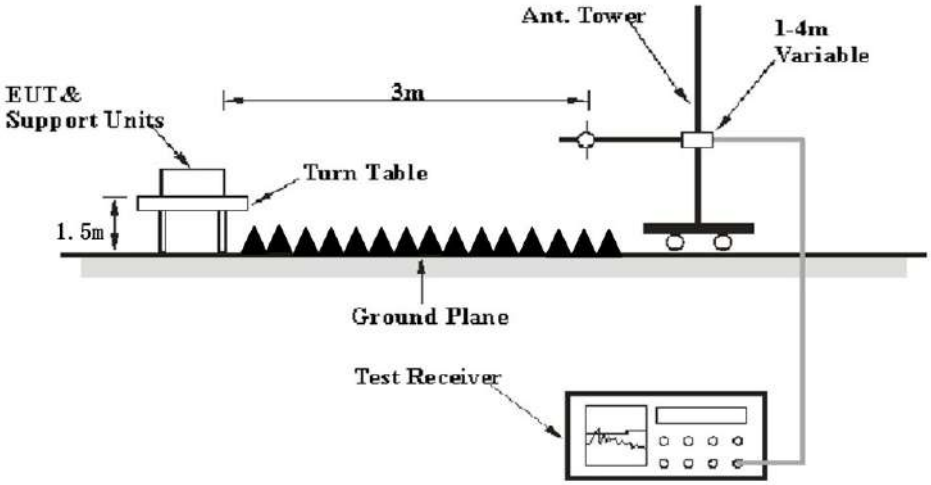
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

EUT Setup

Below 1 GHz:



Above 1GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013 & RSS-Gen. The specification used was the FCC 15.209, and FCC 15.247 & RSS-Gen limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

EMI Test Receiver & Spectrum Analyzer Setup

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Measurement
30 MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
	1MHz	10 Hz Note 1	/	Average
	1MHz	＞1/T Note 2	/	Average

Note 1: when duty cycle is no less than 98%
Note 2: when duty cycle is less than 98%

Test Procedure

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

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz-1 GHz, peak and Average detection modes for frequencies above 1 GHz.

Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

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.

Repeat above procedures until all measured frequencies were complete.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude 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:

Corrected Amplitude = Meter Reading + 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 -7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Corrected Amplitude - Limit

Test Data

Environmental Conditions

Temperature:	20~23 ℃
Relative Humidity:	45~50 %
ATM Pressure:	101.0~103.0 kPa

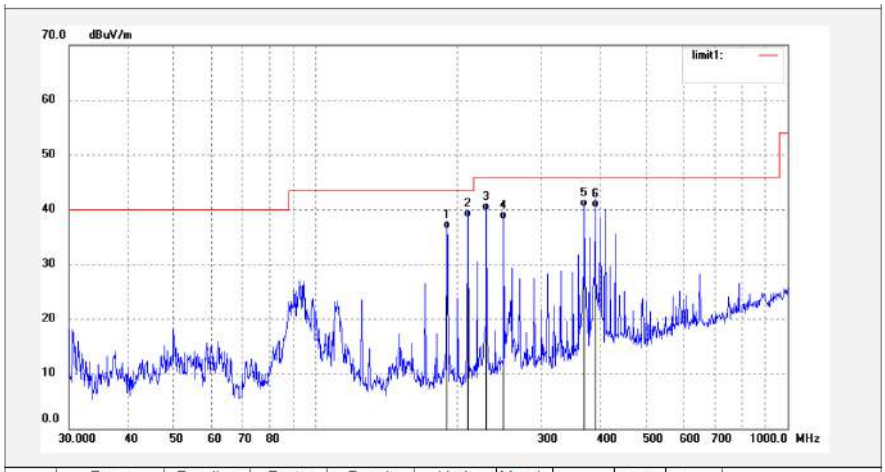
The testing was performed by Icey on 2021-10-23 for below 1GHz and Chao Mo on 2021-10-15 for above 1GHz.

EUT operation mode: Transmitting

30 MHz~1 GHz (Wi-Fi 802.11b mode, low channel worst case):

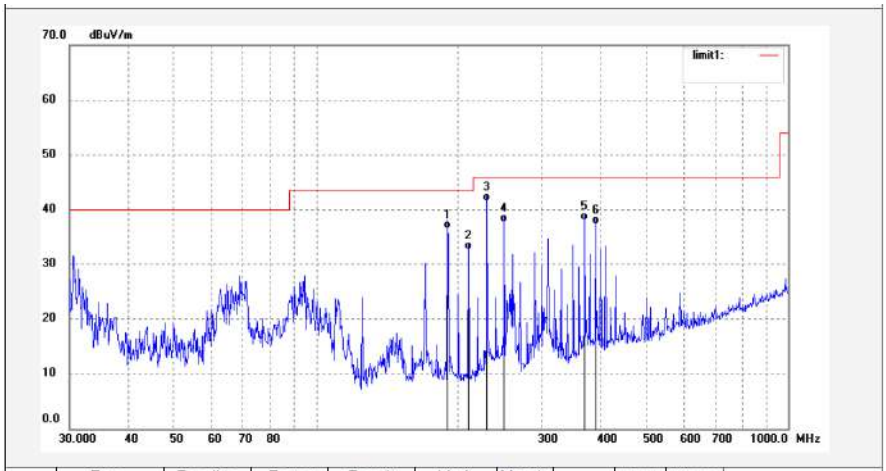
For POE:

Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	189.7384	54.23	-17.77	36.46	43.50	-7.04	QP			
2	210.0482	56.13	-17.46	38.67	43.50	-4.83	QP			
3	230.0985	56.52	-16.79	39.73	46.00	-6.27	QP			
4	250.3011	54.68	-16.44	38.24	46.00	-7.76	QP			
5	370.7022	53.56	-13.07	40.49	46.00	-5.51	QP			
6	390.7225	53.13	-12.79	40.34	46.00	-5.66	QP			

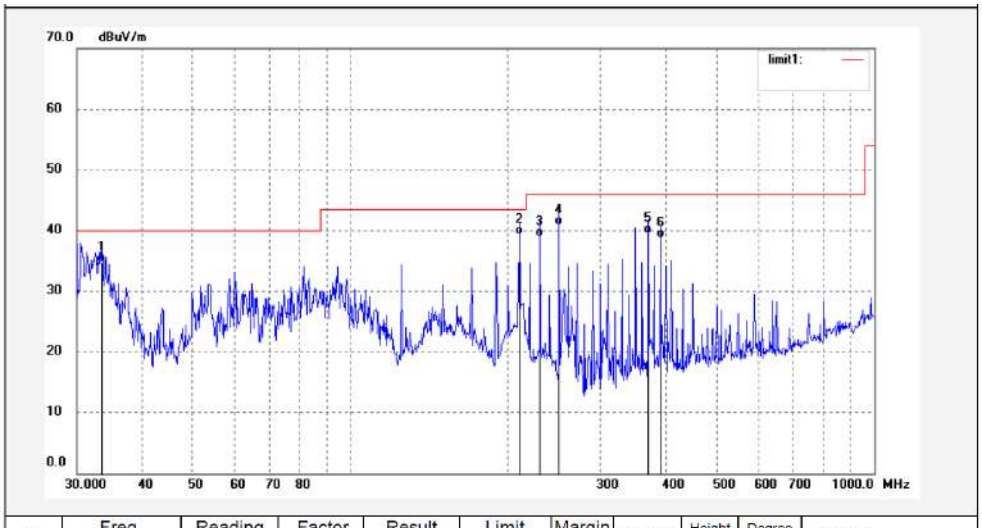
Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	189.7384	54.23	-17.77	36.46	43.50	-7.04	QP			
2	210.0482	50.11	-17.46	32.65	43.50	-10.85	QP			
3	230.0985	58.43	-16.79	41.64	46.00	-4.36	QP			
4	250.3011	54.12	-16.44	37.68	46.00	-8.32	QP			
5	370.7022	51.09	-13.07	38.02	46.00	-7.98	QP			
6	390.7225	50.20	-12.79	37.41	46.00	-8.59	QP			

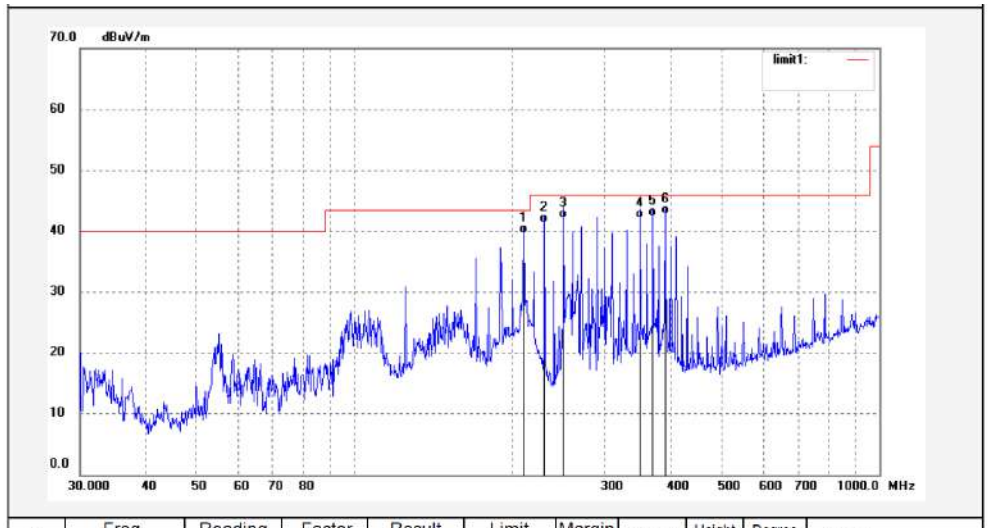
For adapter NSA10EU-05020002:

Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	33.4449	49.31	-14.59	34.72	40.00	-5.28	QP			
2	210.0482	56.82	-17.46	39.36	43.50	-4.14	QP			
3	230.0985	55.71	-16.79	38.92	46.00	-7.08	QP			
4	250.3012	57.31	-16.44	40.87	46.00	-5.13	QP			
5	370.7023	52.45	-13.07	39.38	46.00	-6.62	QP			
6	390.7226	51.62	-12.79	38.83	46.00	-7.17	QP			

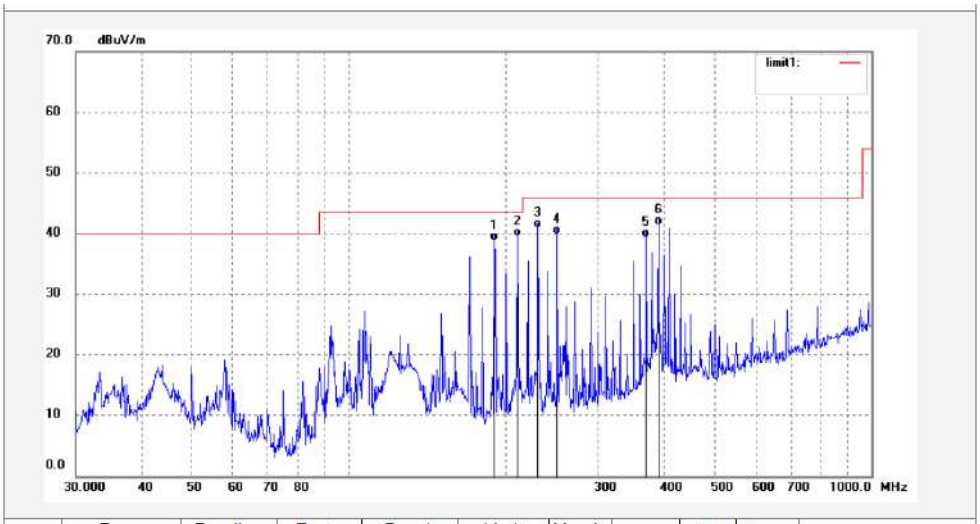
Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	210.0482	57.12	-17.46	39.66	43.50	-3.84	QP			
2	230.0985	58.21	-16.79	41.42	46.00	-4.58	QP			
3	250.3012	58.55	-16.44	42.11	46.00	-3.89	QP			
4	350.4768	55.34	-13.30	42.04	46.00	-3.96	QP			
5	370.7022	55.43	-13.07	42.36	46.00	-3.64	QP			
6	390.7225	55.66	-12.79	42.87	46.00	-3.13	QP			

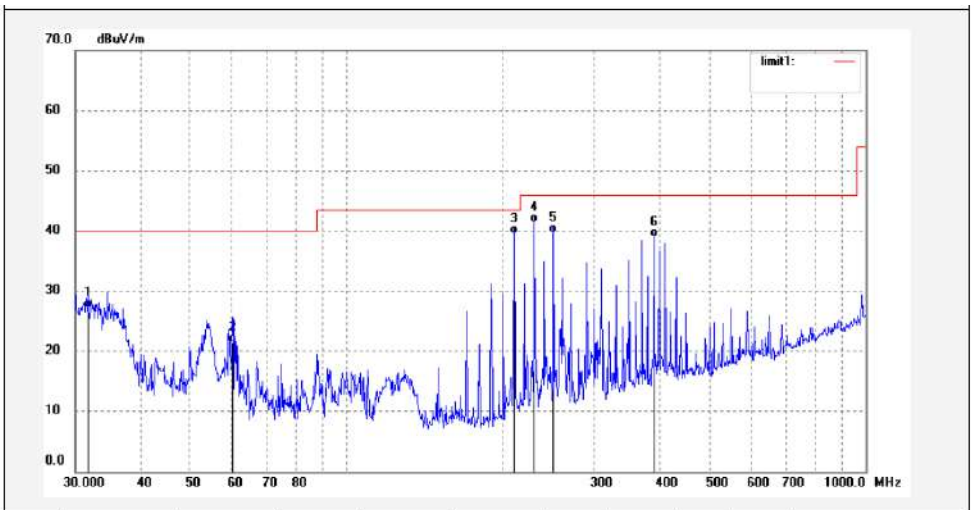
For adapter OH-1015A0502000U4-UL:

Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	189.7384	56.53	-17.77	38.76	43.50	-4.74	QP			
2	210.0482	56.86	-17.46	39.40	43.50	-4.10	QP			
3	230.0985	57.68	-16.79	40.89	46.00	-5.11	QP			
4	250.3011	56.21	-16.44	39.77	46.00	-6.23	QP			
5	370.7022	52.40	-13.07	39.33	46.00	-6.67	QP			
6	390.7225	54.11	-12.79	41.32	46.00	-4.68	QP			

Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	31.7313	41.31	-14.08	27.23	40.00	-12.77	QP			
2	60.2800	40.26	-18.78	21.48	40.00	-18.52	QP			
3	210.0482	56.89	-17.46	39.43	43.50	-4.07	QP			
4	230.0985	58.13	-16.79	41.34	46.00	-4.66	QP			
5	250.3011	56.09	-16.44	39.65	46.00	-6.35	QP			
6	390.7225	51.77	-12.79	38.98	46.00	-7.02	QP			

1 GHz-25 GHz: *(worst case is adapter NSA10EU-05020002)*

For Wi-Fi

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11b Mode:									
Low Channel (2412 MHz)									
2310	49.61	PK	317	1.1	H	-6.84	42.77	74	-31.23
2310	49.97	PK	3	1.4	V	-6.84	43.13	74	-30.87
2390	49.88	PK	221	1.3	H	-6.44	43.44	74	-30.56
2390	49.65	PK	60	2.1	V	-6.44	43.21	74	-30.79
4824	41.26	PK	236	1.9	H	2.87	44.13	74	-29.87
4824	40.99	PK	225	2.0	V	2.87	43.86	74	-30.14
Middle Channel (2442MHz)									
4884	40.11	PK	14	1.6	H	3.04	43.15	74	-30.85
4884	40.55	PK	319	1.4	V	3.04	43.59	74	-30.41
High Channel (2472 MHz)									
2483.5	48.44	PK	85	1.9	H	-5.96	42.48	74	-31.52
2483.5	47.82	PK	288	1.5	V	-5.96	41.86	74	-32.14
2500	49.21	PK	90	1.2	H	-5.88	43.33	74	-30.67
2500	49.47	PK	162	2.1	V	-5.88	43.59	74	-30.41
4944	40.9	PK	255	1.3	H	3.23	44.13	74	-29.87
4944	42.04	PK	203	1.2	V	3.23	45.27	74	-28.73
802.11g Mode									
Low Channel (2412 MHz)									
2310	51.5	PK	100	1.3	H	-6.84	44.66	74	-29.34
2310	51.27	PK	45	2.0	V	-6.84	44.43	74	-29.57
2390	50.93	PK	123	2.1	H	-6.44	44.49	74	-29.51
2390	50.77	PK	87	2.0	V	-6.44	44.33	74	-29.67
4824	42.42	PK	120	1.3	H	2.87	45.29	74	-28.71
4824	41.82	PK	350	1.4	V	2.87	44.69	74	-29.31
Middle Channel (2442 MHz)									
4884	40.45	PK	14	1.6	H	3.04	43.49	74	-30.51
4884	40.82	PK	319	1.4	V	3.04	43.86	74	-30.14
High Channel (2472 MHz)									
2483.5	49.94	PK	107	2.1	H	-5.96	43.98	74	-30.02
2483.5	49.95	PK	175	1.4	V	-5.96	43.99	74	-30.01
2500	50.45	PK	92	1.7	H	-5.88	44.57	74	-29.43
2500	50.39	PK	163	1.7	V	-5.88	44.51	74	-29.49
4944	42.06	PK	255	1.3	H	3.23	45.29	74	-28.71
4944	41.73	PK	203	1.2	V	3.23	44.96	74	-29.04

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
802.11n20 Mode									
Low Channel (2412 MHz)									
2310	51.5	PK	189	1.6	H	-6.84	44.66	74	-29.34
2310	50.77	PK	306	1.7	V	-6.84	43.93	74	-30.07
2390	51.89	PK	350	1.0	H	-6.44	45.45	74	-28.55
2390	51.27	PK	179	1.2	V	-6.44	44.83	74	-29.17
4824	40.85	PK	311	1.6	H	2.87	43.72	74	-30.28
4824	41.04	PK	213	1.7	V	2.87	43.91	74	-30.09
Middle Channel (2442MHz)									
4884	39.44	PK	14	1.6	H	3.04	42.48	74	-31.52
4884	40.07	PK	319	1.4	V	3.04	43.11	74	-30.89
High Channel (2472 MHz)									
2483.5	50.07	PK	157	1.5	H	-5.96	44.11	74	-29.89
2483.5	50.76	PK	294	1.4	V	-5.96	44.8	74	-29.2
2500	50.37	PK	225	1.7	H	-5.88	44.49	74	-29.51
2500	50.14	PK	101	1.7	V	-5.88	44.26	74	-29.74
4944	41.66	PK	255	1.3	H	3.23	44.89	74	-29.11
4944	42.38	PK	203	1.2	V	3.23	45.61	74	-28.39

BLE:

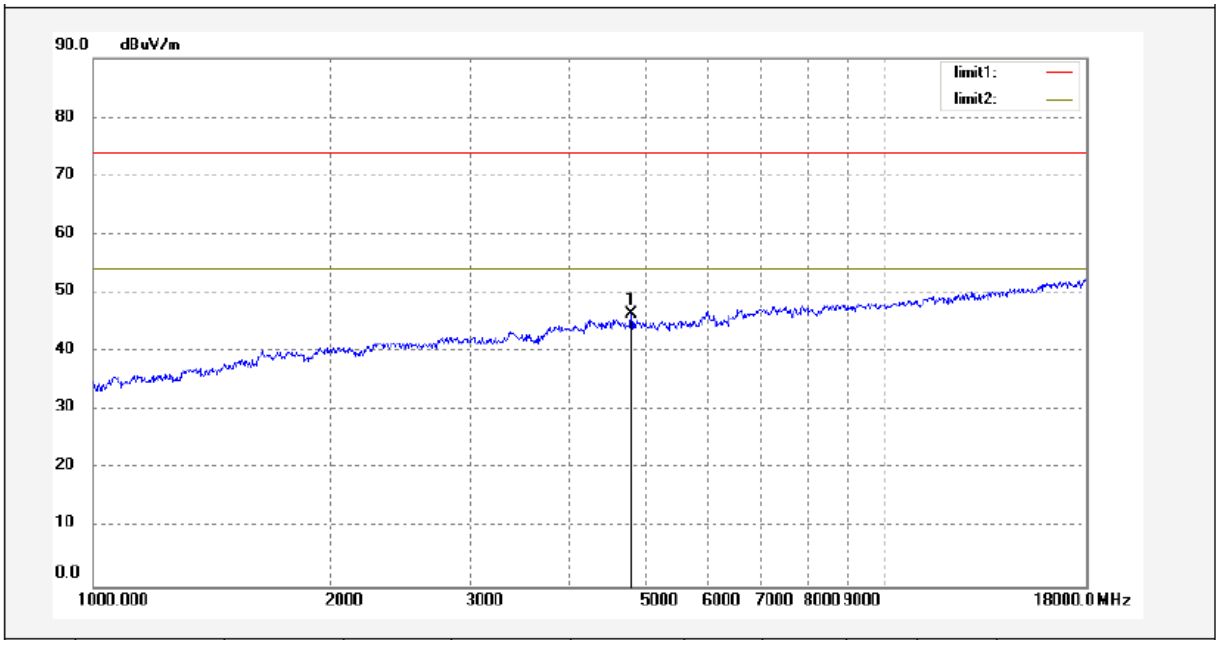
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/Ave.		Height (m)	Polar (H/V)				
Low Channel (2402 MHz)									
2310	49.13	PK	81	2.1	H	-6.84	42.29	74	-31.71
2310	48.91	PK	185	1.8	V	-6.84	42.07	74	-31.93
2390	50.89	PK	275	1.8	H	-6.44	44.45	74	-29.55
2390	50.7	PK	17	2.1	V	-6.44	44.26	74	-29.74
4804	43.88	PK	222	1.9	H	2.81	46.69	74	-27.31
4804	41.55	PK	299	1.1	V	2.81	44.36	74	-29.64
Middle Channel (2440 MHz)									
4880	40.75	PK	144	1.8	H	3.04	43.79	74	-30.21
4880	40.28	PK	343	1.5	V	3.04	43.32	74	-30.68
High Channel (2480 MHz)									
2483.5	49.11	PK	46	1.7	H	-5.96	43.15	74	-30.85
2483.5	49.63	PK	8	1.7	V	-5.96	43.67	74	-30.33
2500	49.63	PK	137	2.2	H	-5.88	43.75	74	-30.25
2500	49.26	PK	137	1.8	V	-5.88	43.38	74	-30.62
4960	40.61	PK	204	1.4	H	3.29	43.9	74	-30.1
4960	40.92	PK	74	1.1	V	3.29	44.21	74	-29.79

Note:
Corrected Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor
Corrected Amplitude = Corrected Factor + Reading
Margin = Corrected. Amplitude - Limit
The other spurious emission which is 20dB to the limit was not recorded.
The test result of peak was less than the limit of average, so just peak value were recorded.

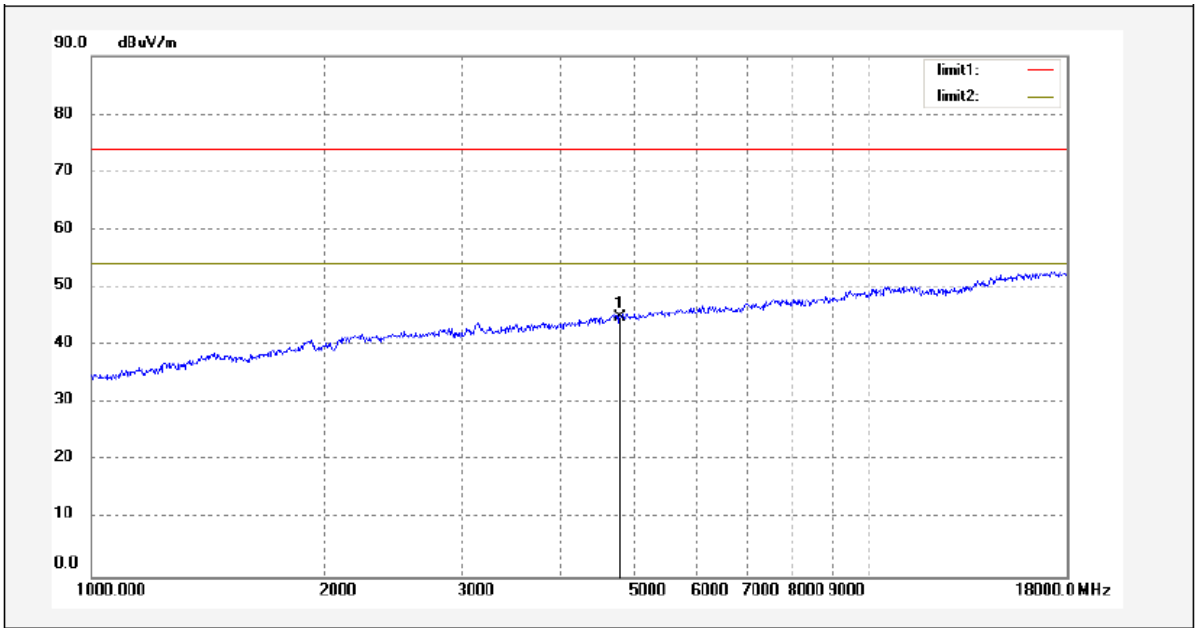
1 GHz - 18 GHz: (Pre-Scan plots)

802.11 n20, High channel

Horizontal



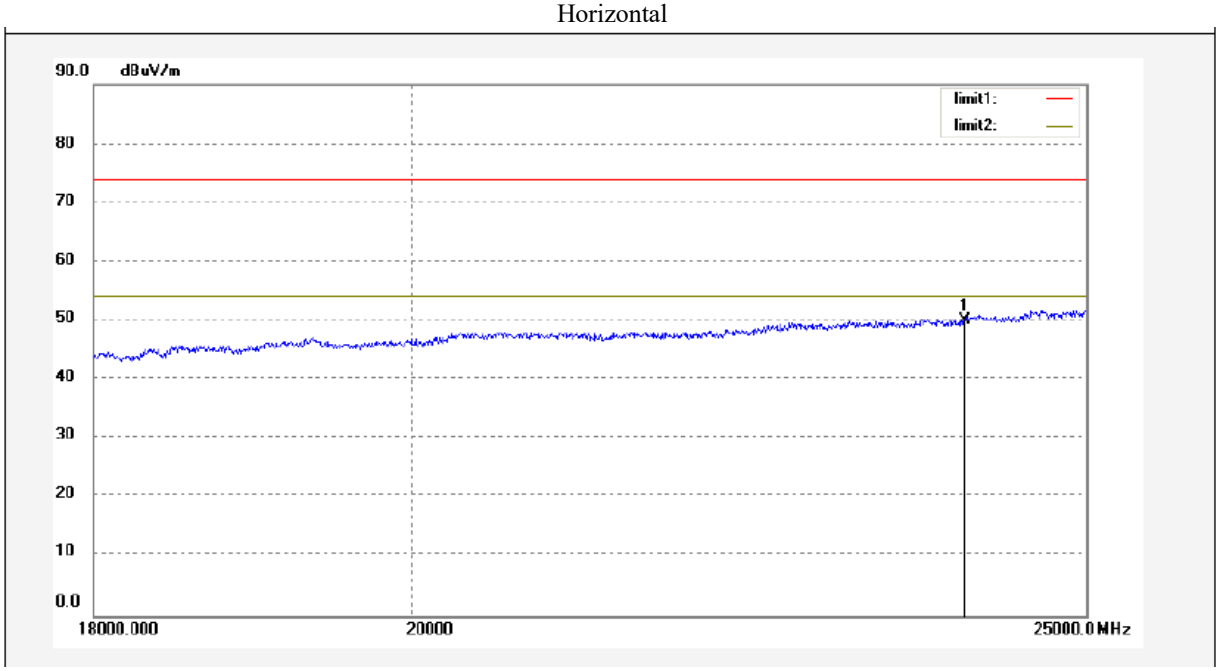
Vertical



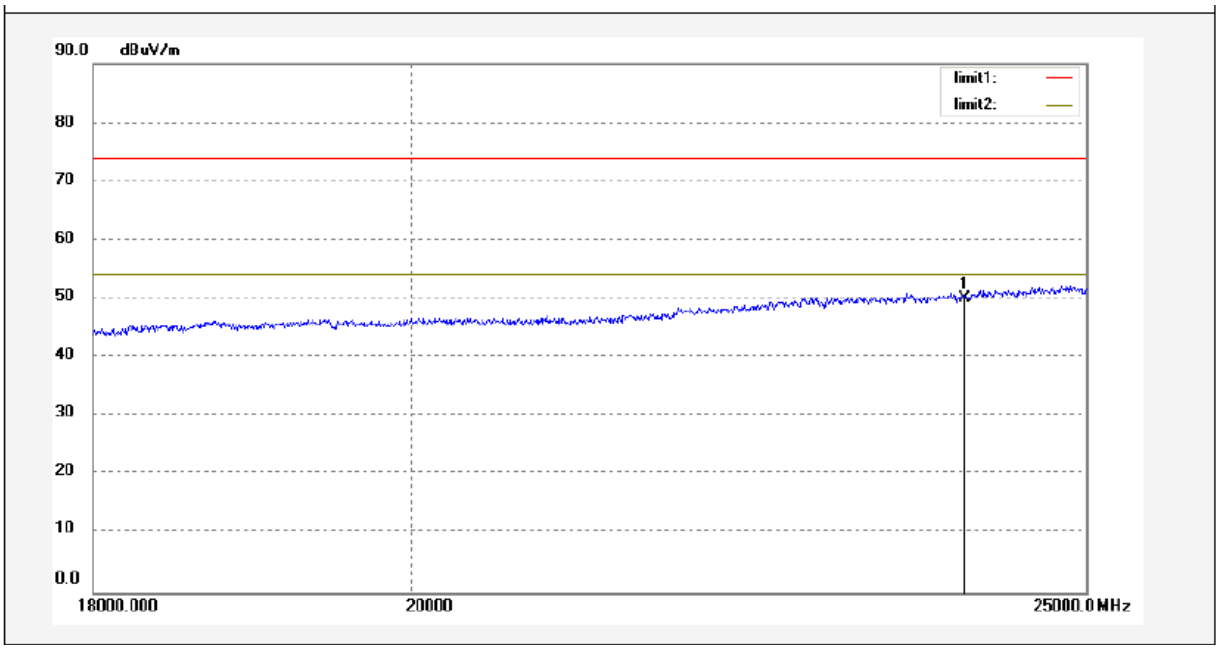
18-25GHz: (Pre-Scan plots)

802.11 n20, High channel

Horizontal



Vertical



§15.247 (a)(2) & RSS-Gen§6.7 RSS-247 § 5.2 (a) 99% OCCUPIED BANDWIDTH & 6 dB EMISSION BANDWIDTH

Applicable Standard

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.

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the "6 dB bandwidth" is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated 6 dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

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 it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

The following conditions shall be observed for measuring the occupied bandwidth and 6 dB bandwidth:
• The transmitter shall be operated at its maximum carrier power measured under normal test conditions.

• The span of the spectrum analyzer shall be set large enough to capture all products of the modulation process, including the emission skirts, around the carrier frequency, but small enough to avoid having other emissions (e.g. on adjacent channels) within the span.

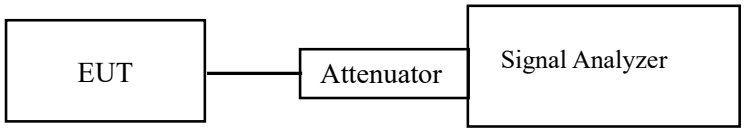
• The detector of the spectrum analyzer shall be set to "Sample". However, a peak, or peak hold, may be used in place of the sampling detector since this usually produces a wider bandwidth than the actual bandwidth (worst-case measurement). Use of a peak hold (or "Max Hold") may be necessary to determine the occupied / 6 dB bandwidth if the device is not transmitting continuously.

• The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the actual occupied / 6 dB bandwidth and the video bandwidth (VBW) shall not be smaller than three times the RBW value. Video averaging is not permitted.

Note: It may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

For the 99% emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed

in a running sum until 0.5% of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99% emission bandwidth).



Test Data

Environmental Conditions

Temperature:	25.3~26 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lv from 2021-09-26 and 2021-11-12.

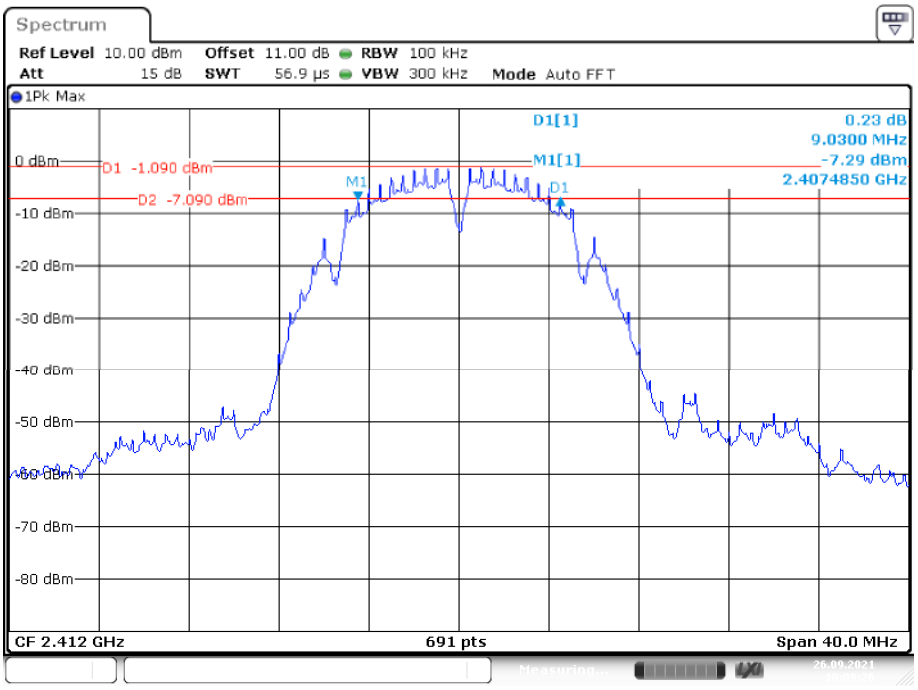
EUT operation mode: Transmitting

Please refer to the following table and plots.

Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)
802.11b mode				
Low	2412	9.03	11.64	≥500
Middle	2442	9.03	11.55	≥500
High	2472	9.03	11.46	≥500
802.11g mode				
Low	2412	15.46	16.67	≥500
Middle	2442	15.46	16.50	≥500
High	2472	15.46	16.50	≥500
802.11n-HT20 mode				
Low	2412	16.79	17.66	≥500
Middle	2442	16.90	17.66	≥500
High	2472	17.02	17.60	≥500

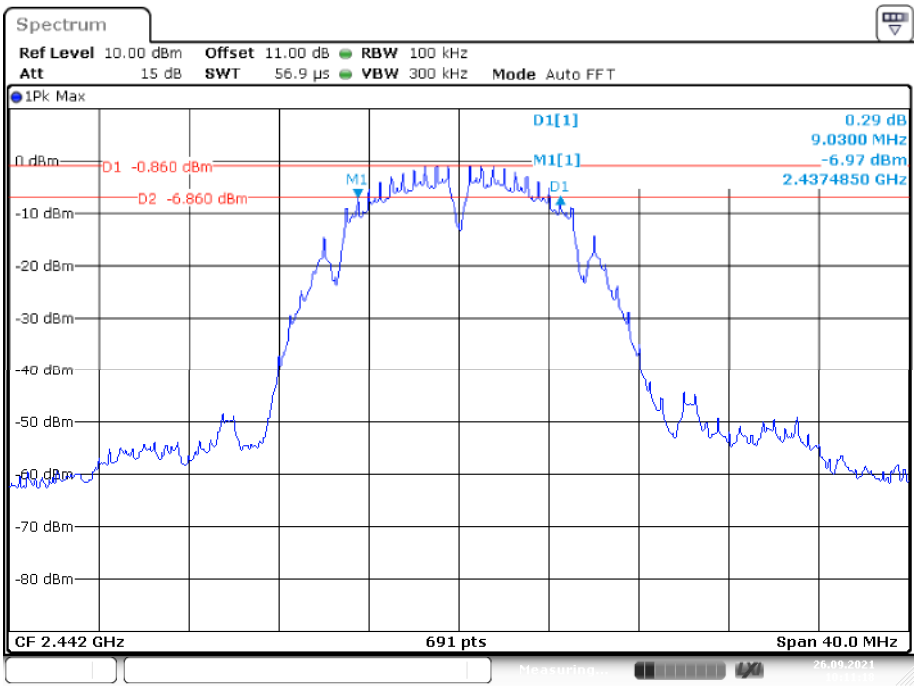
Channel	Frequency (MHz)	6 dB Emission Bandwidth (MHz)	99% Emission Bandwidth (MHz)	Limit (kHz)
BLE 1M				
Low	2402	0.504	1.042	≥500
Middle	2440	0.518	1.046	≥500
High	2480	0.533	1.046	≥500

802.11b Low Channel



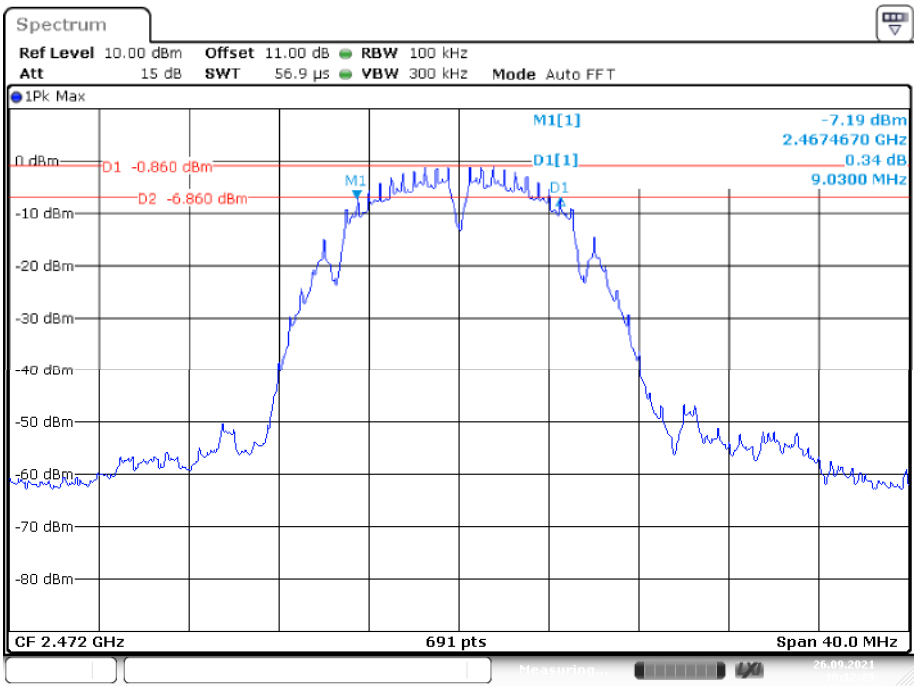
Date: 26.SEP.2021 10:09:26

802.11b Middle Channel



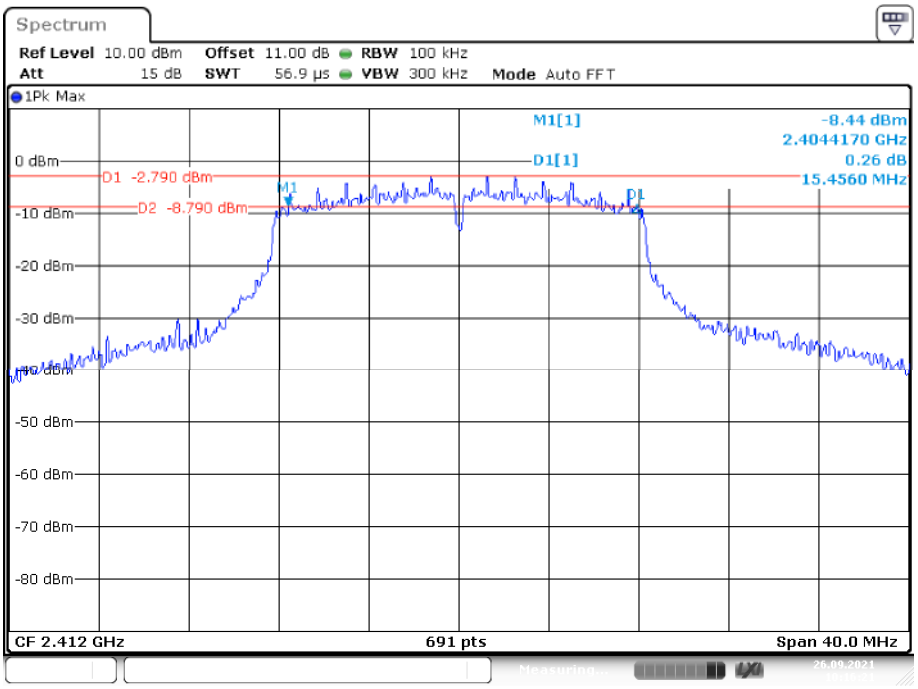
Date: 26.SEP.2021 10:11:18

802.11b High Channel



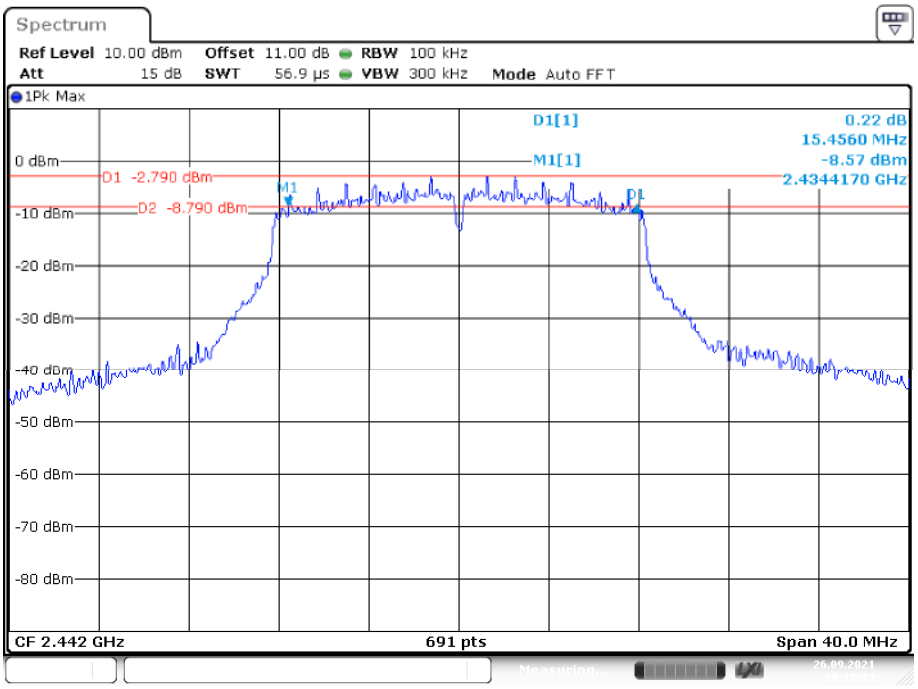
Date: 26.SEP.2021 10:12:25

802.11g Low Channel



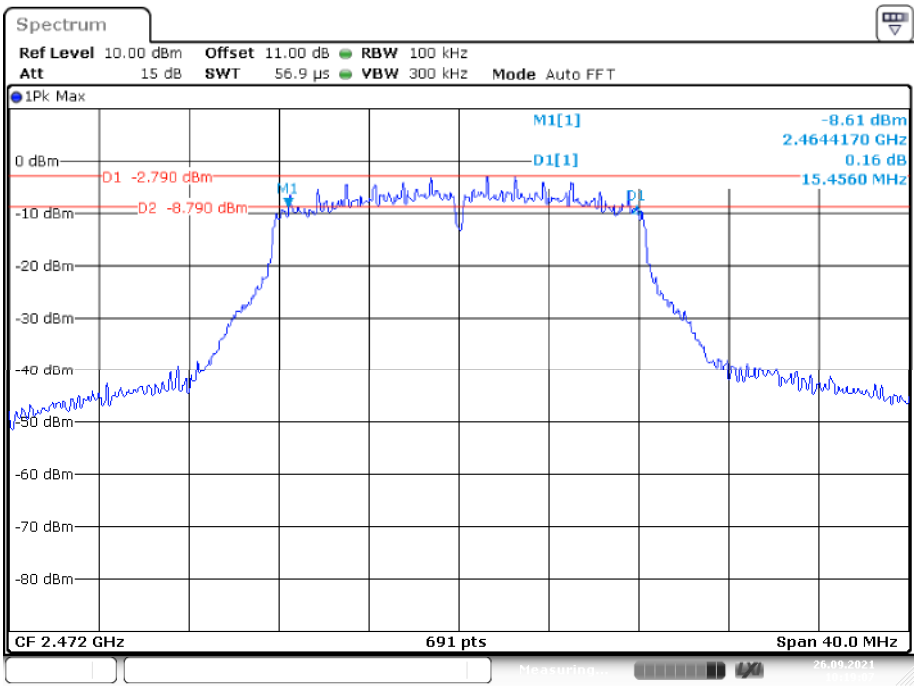
Date: 26.SEP.2021 10:16:21

802.11g Middle Channel



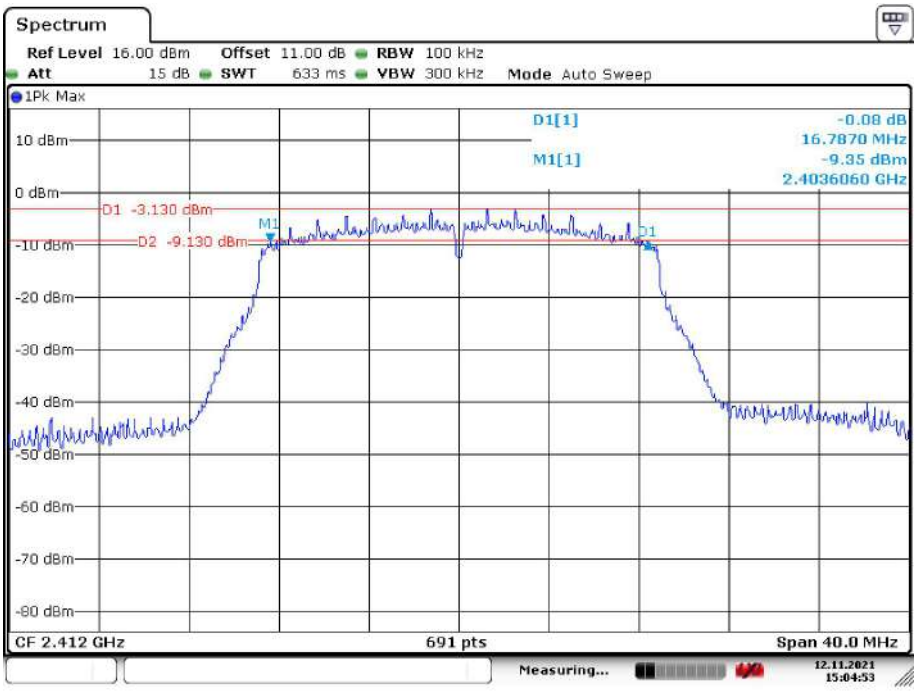
Date: 26.SEP.2021 10:18:12

802.11g High Channel



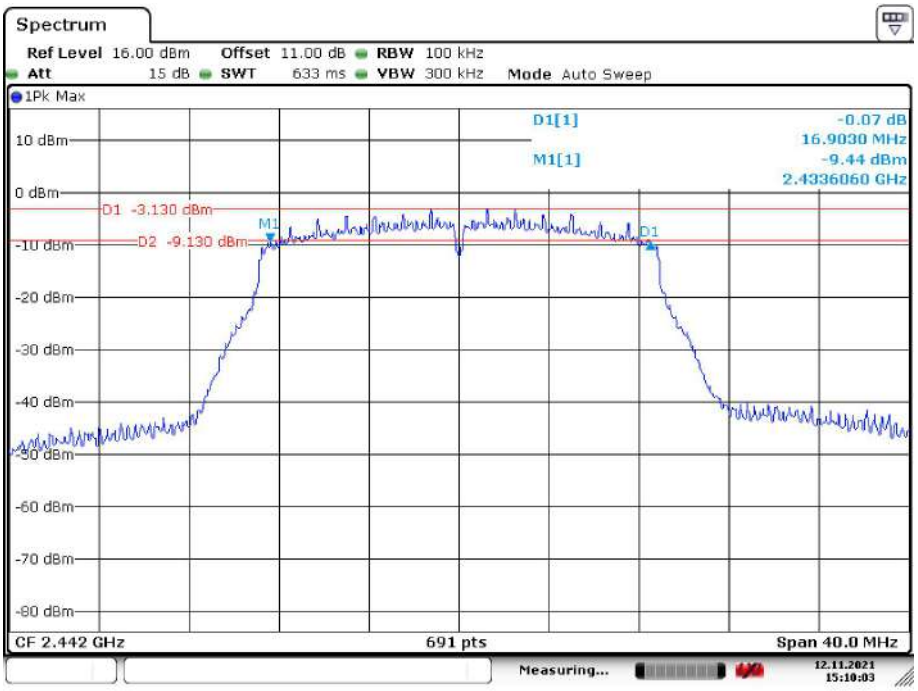
Date: 26.SEP.2021 10:19:07

802.11n20 Low Channel



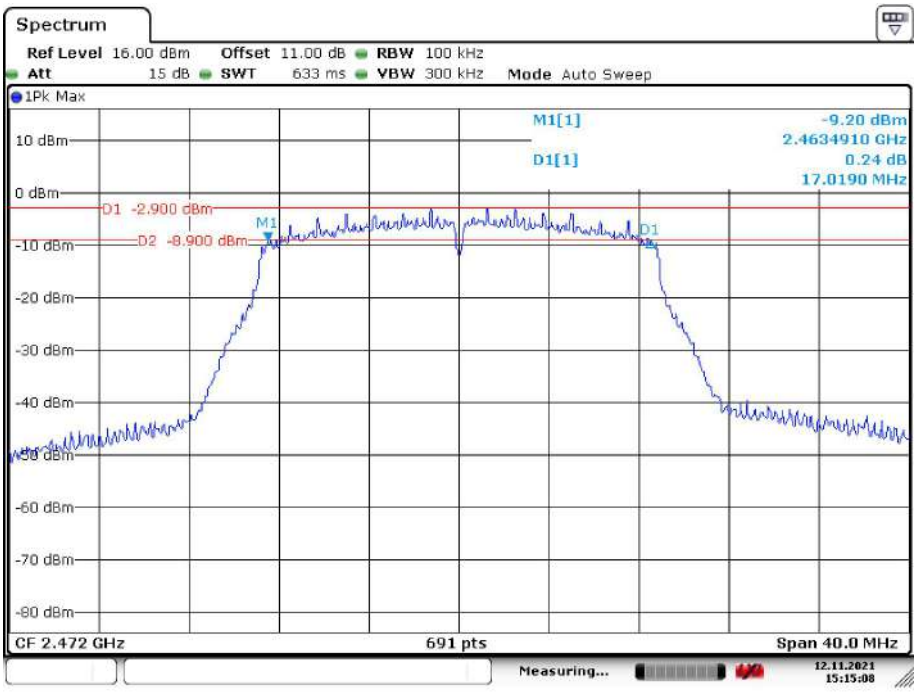
Date: 12.NOV.2021 15:04:53

802.11n20 Middle Channel



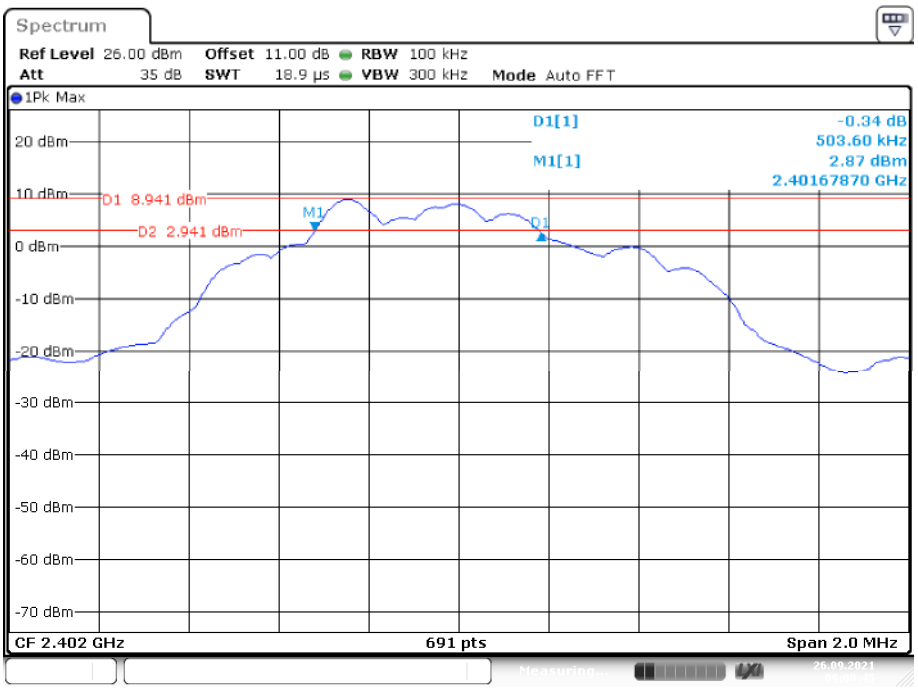
Date: 12.NOV.2021 15:10:03

802.11n20 High Channel



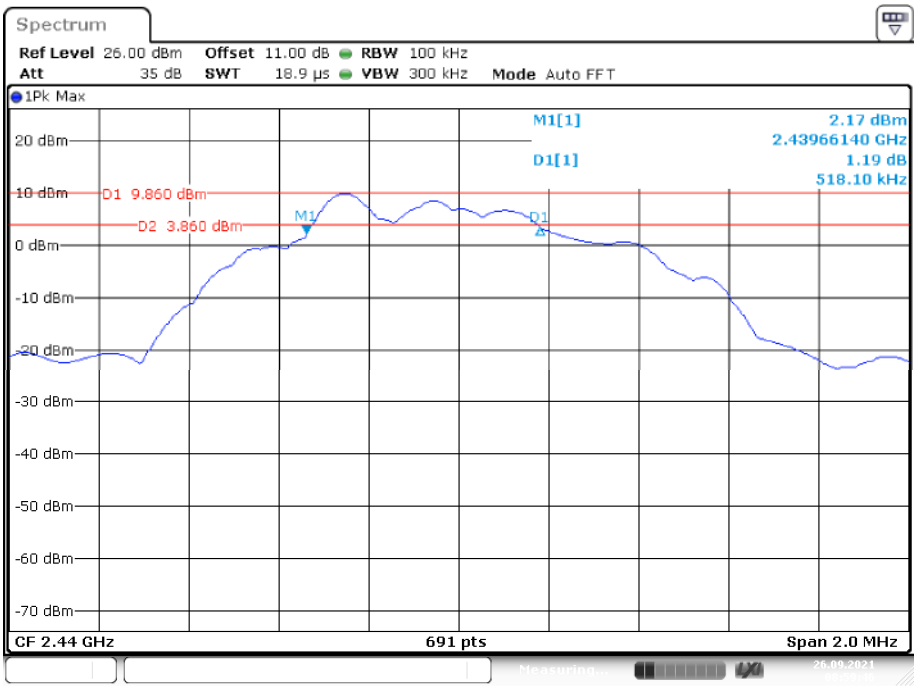
Date: 12.NOV.2021 15:15:08

BLE Low Channel



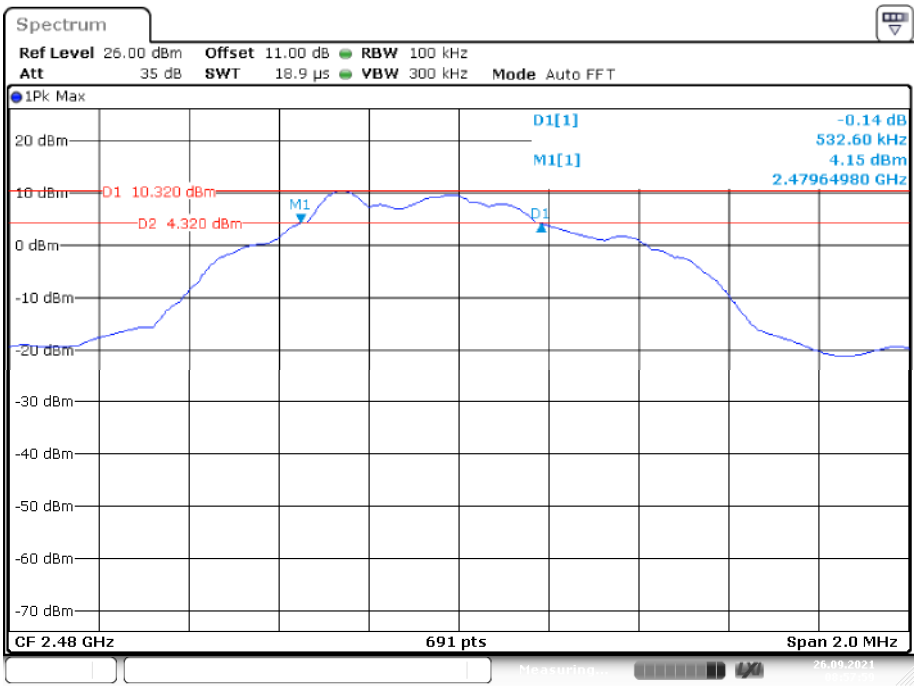
Date: 26.SEP.2021 09:00:46

BLE Middle Channel



Date: 26.SEP.2021 08:59:46

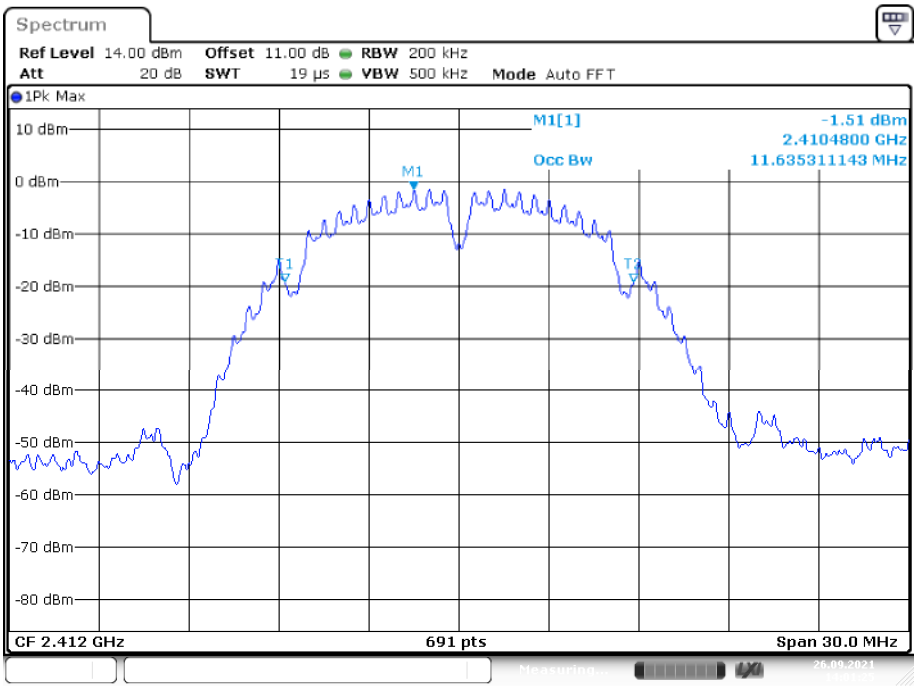
BLE High Channel



Date: 26.SEP.2021 08:58:00

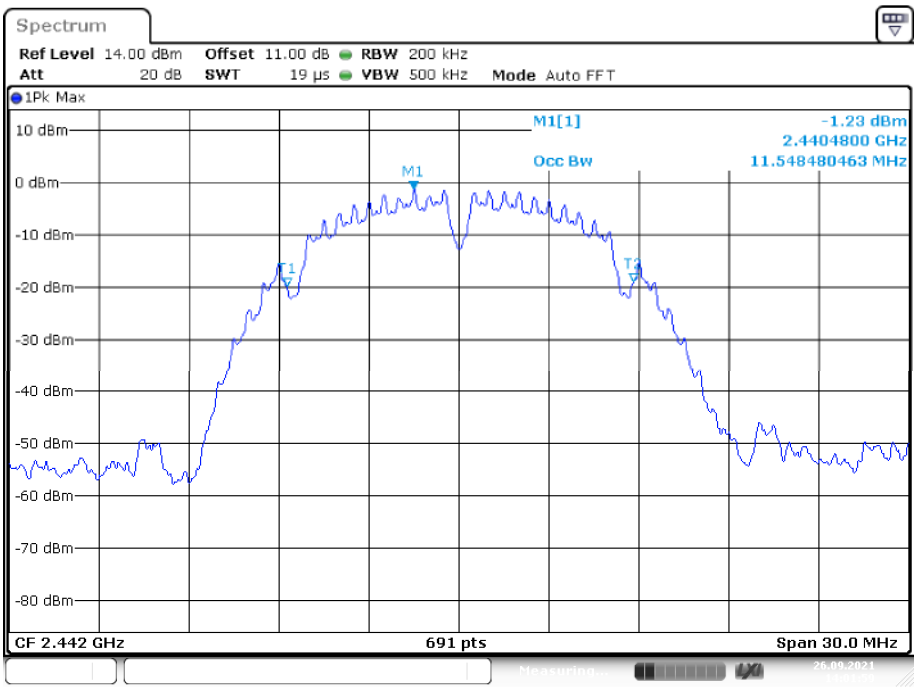
OBW

802.11b Low Channel



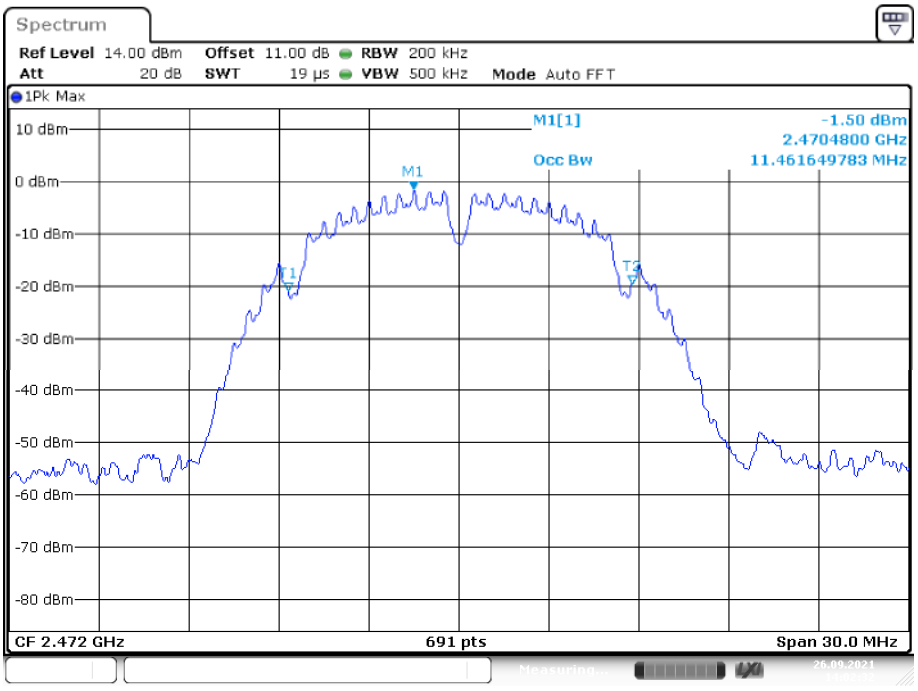
Date: 26.SEP.2021 14:01:26

802.11b Middle Channel



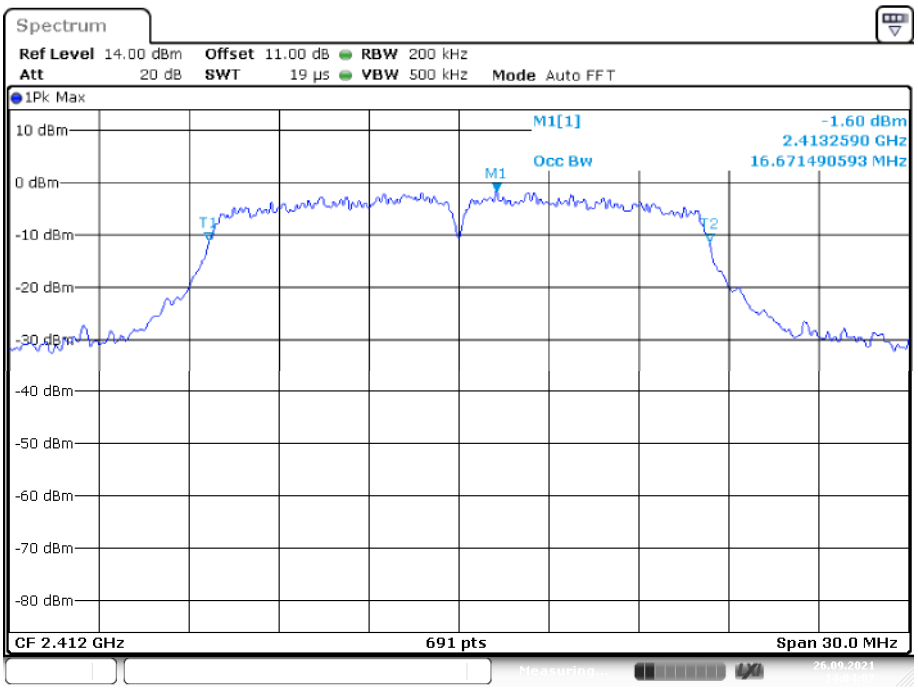
Date: 26.SEP.2021 14:02:00

802.11b High Channel



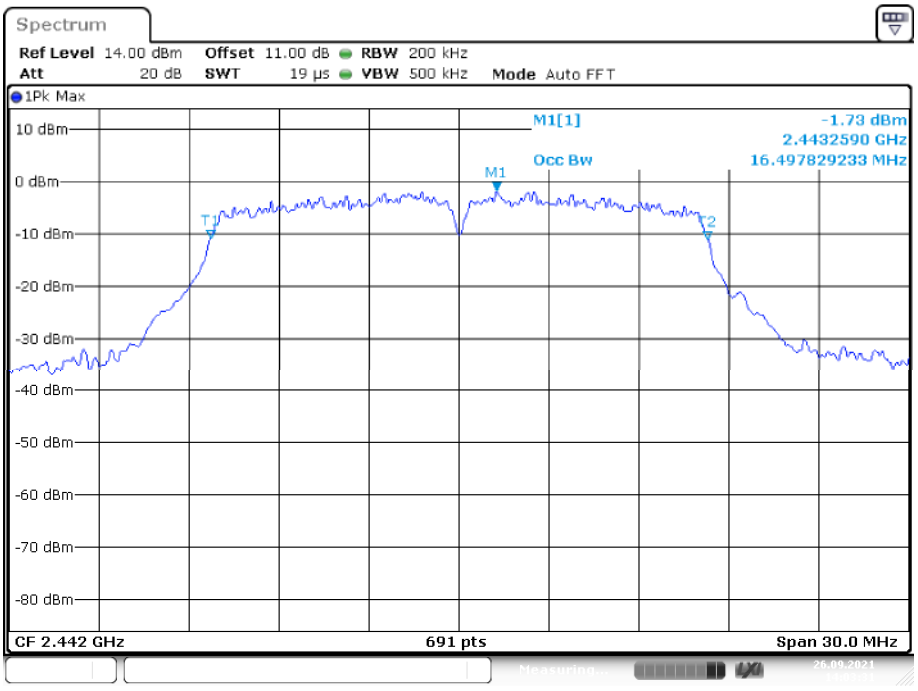
Date: 26.SEP.2021 14:02:32

802.11g Low Channel



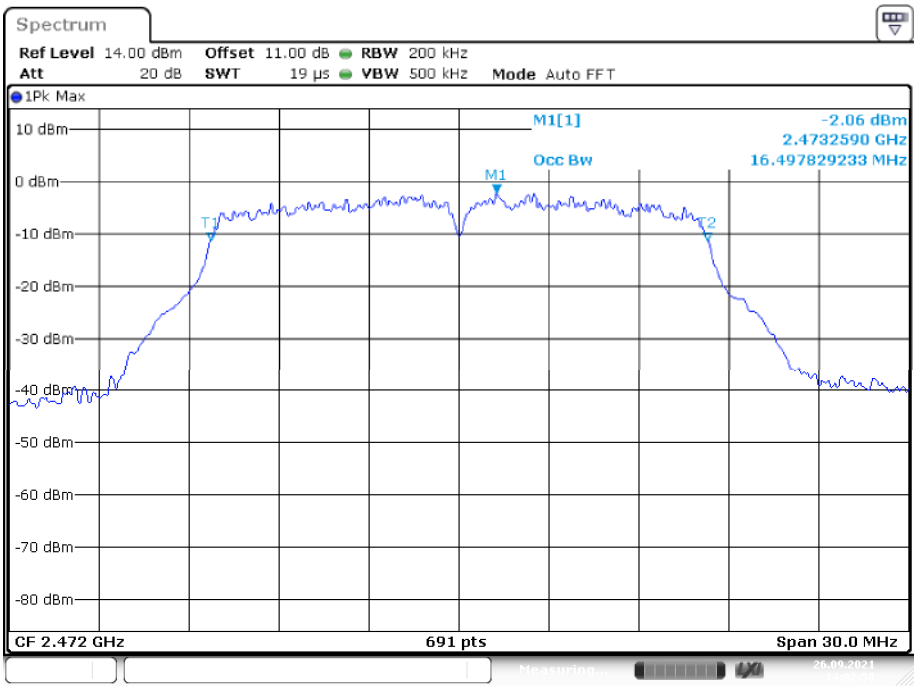
Date: 26.SEP.2021 14:04:08

802.11g Middle Channel



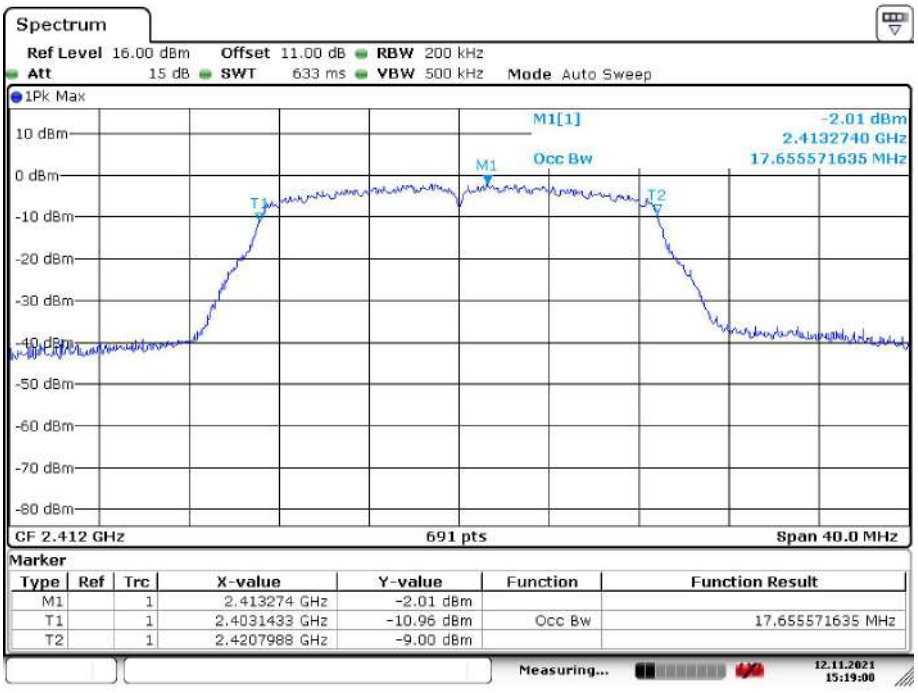
Date: 26.SEP.2021 14:03:32

802.11g High Channel



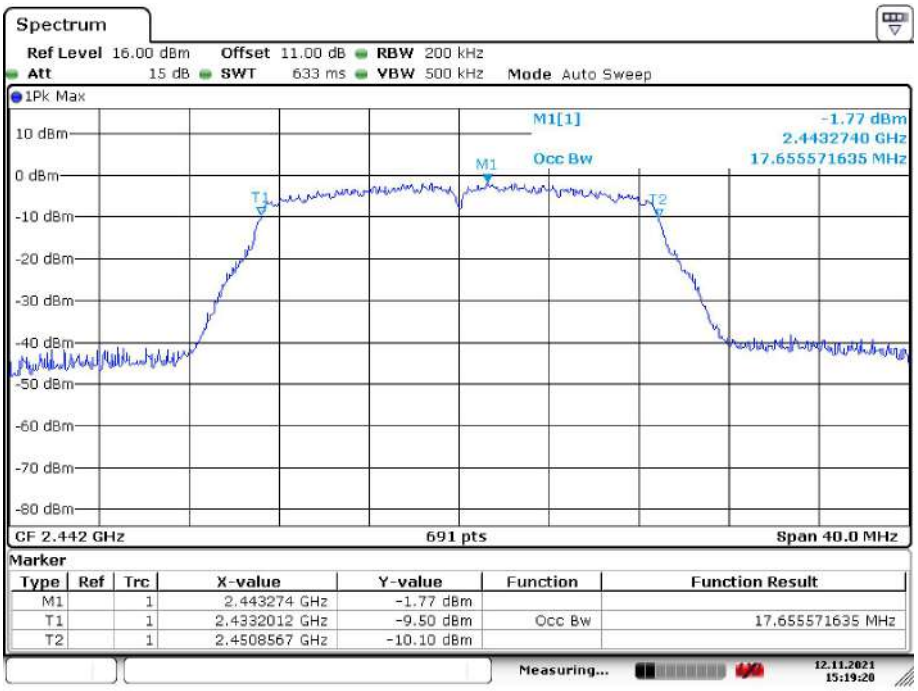
Date: 26.SEP.2021 14:02:59

802.11n20 Low Channel



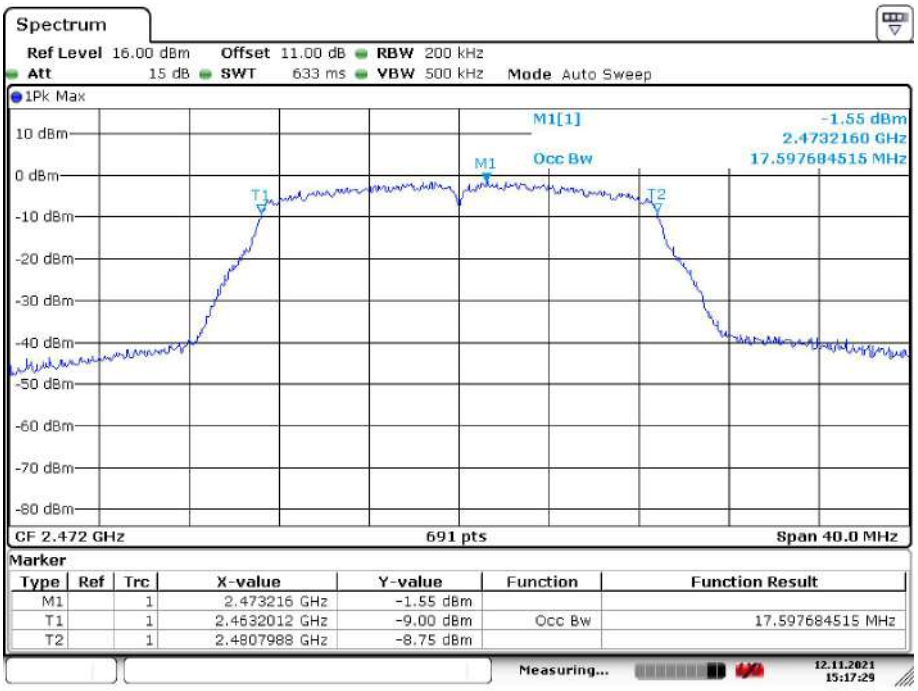
Date: 12.NOV.2021 15:19:00

802.11n20 Middle Channel



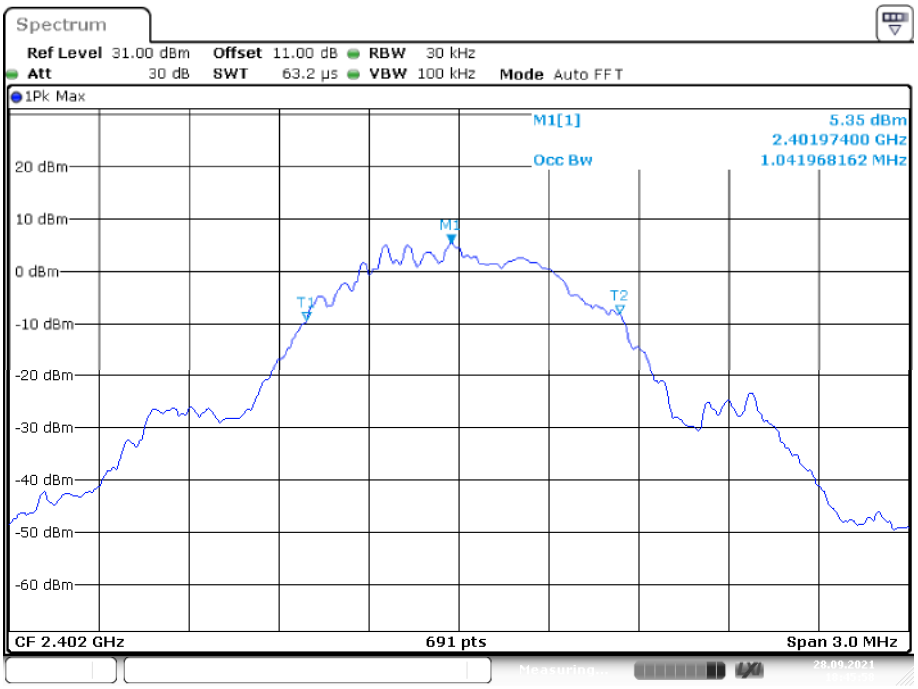
Date: 12.NOV.2021 15:19:20

802.11n20 High Channel



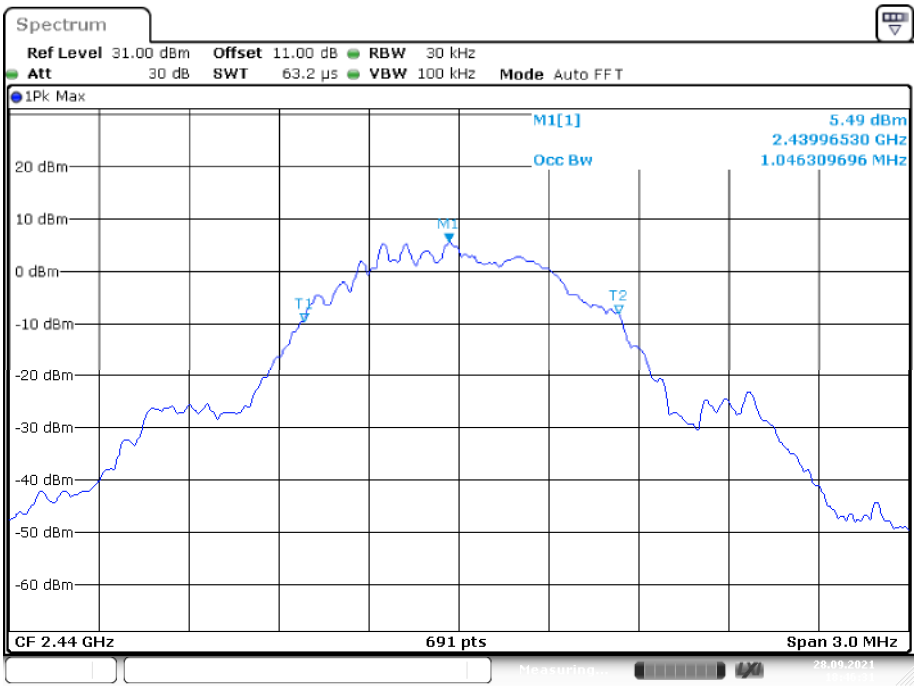
Date: 12.NOV.2021 15:17:30

BLE Low Channel



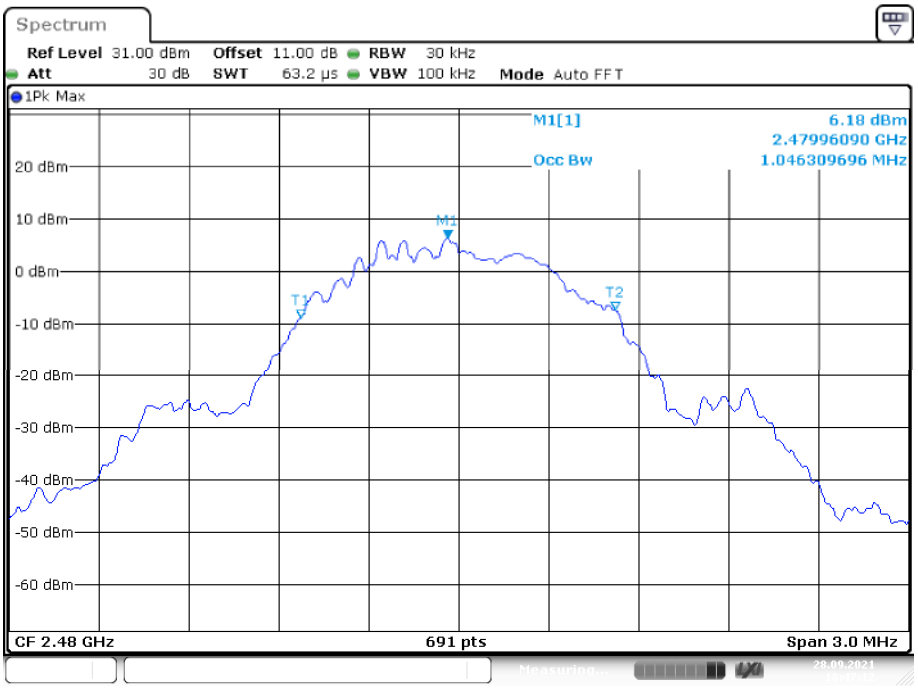
Date: 28.SEP.2021 18:45:58

BLE Middle Channel



Date: 28.SEP.2021 18:46:31

BLE High Channel



Date: 28.SEP.2021 18:47:13

§15.247(b)(3) & RSS-247 § 5.4(d) MAXIMUM CONDUCTED OUTPUT POWER

Applicable Standard

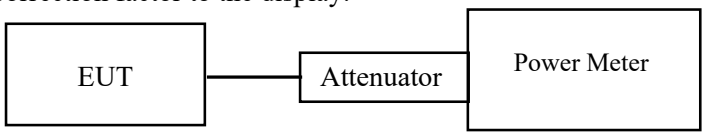
According to FCC §15.247(b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted 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.

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling 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 transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

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 one test equipment.
3. Add a correction factor to the display.



Test Data

Environmental Conditions

Temperature:	25.3~26 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lv from 2021-09-26.

EUT operation mode: Transmitting

Wi-Fi mode

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Max Conducted Average Output Power (dBm)	Limit (dBm)
802.11b mode				
Low	2412	10.46	7.19	30
Middle	2442	10.30	7.29	30
High	2472	10.45	7.36	30
802.11g mode				
Low	2412	16.22	9.48	30
Middle	2442	16.38	9.76	30
High	2472	16.50	10.16	30
802.11n HT20 mode				
Low	2412	16.39	9.61	30
Middle	2442	16.53	9.99	30
High	2472	16.47	9.88	30

Note 1: The data above was tested in conducted mode.
Note 2: The maximum EIRP is 16.53dBm+3.0dBi=19.53dBm<36dBm, so it can meet the EIRP limit of ISEDC.

BLE mode

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Limit (dBm)
Low	2402	9.08	30
Middle	2440	10.06	30
High	2480	10.67	30

Note 1: The data above was tested in conducted mode.
Note 2: The maximum EIRP is 10.67dBm+3.0dBi=13.67dBm<36dBm, so it can meet the EIRP limit of ISEDC.

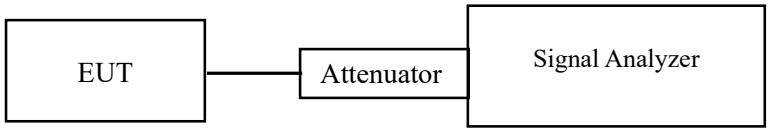
§ 15.247(d) & RSS-247 § 5.5 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

Applicable Standard

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)).

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.



Test Data

Environmental Conditions

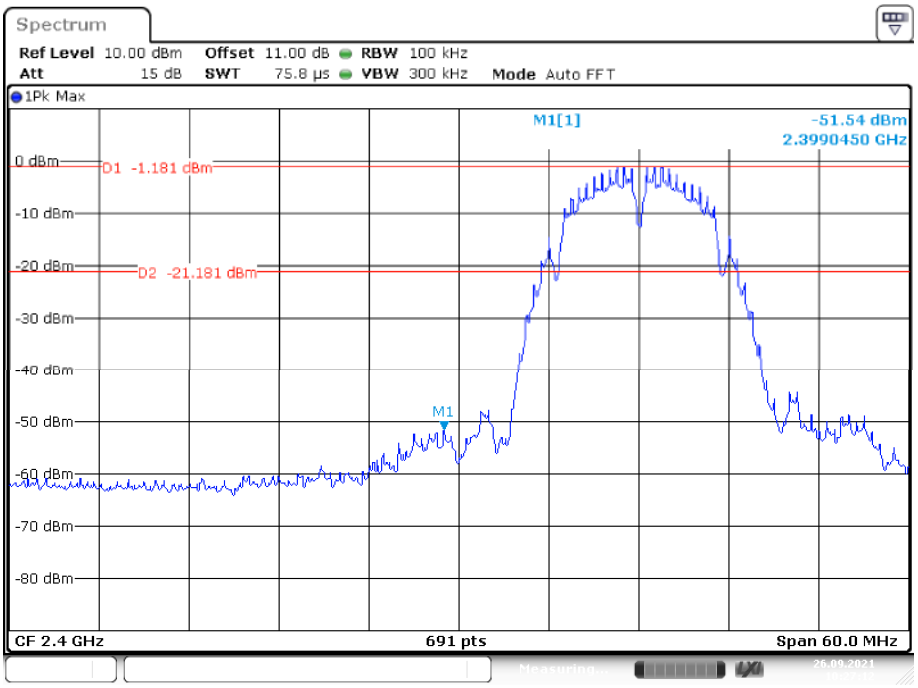
Temperature:	25.3~26 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Ting Lv from 2021-09-26 and 2021-11-12.

EUT operation mode: Transmitting

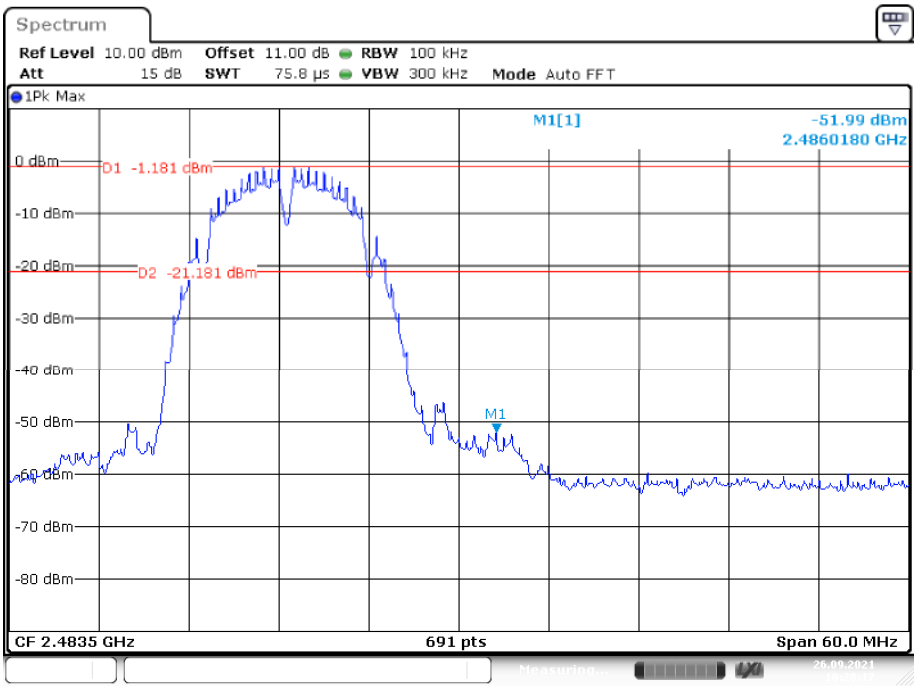
Please refer to the following plots.

802.11b: Band Edge, Left Side



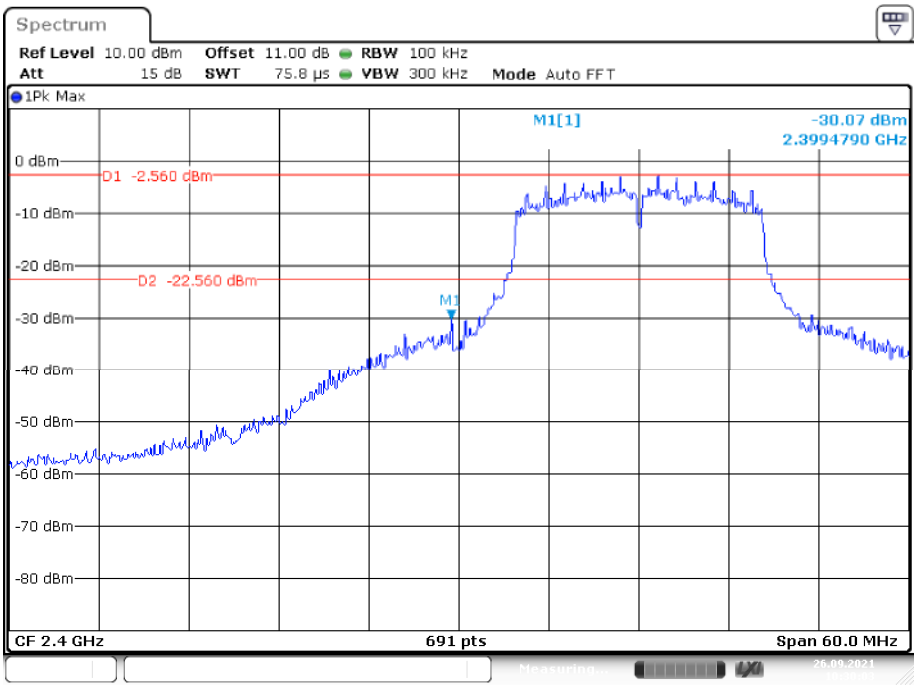
Date: 26.SEP.2021 10:27:13

802.11b: Band Edge, Right Side



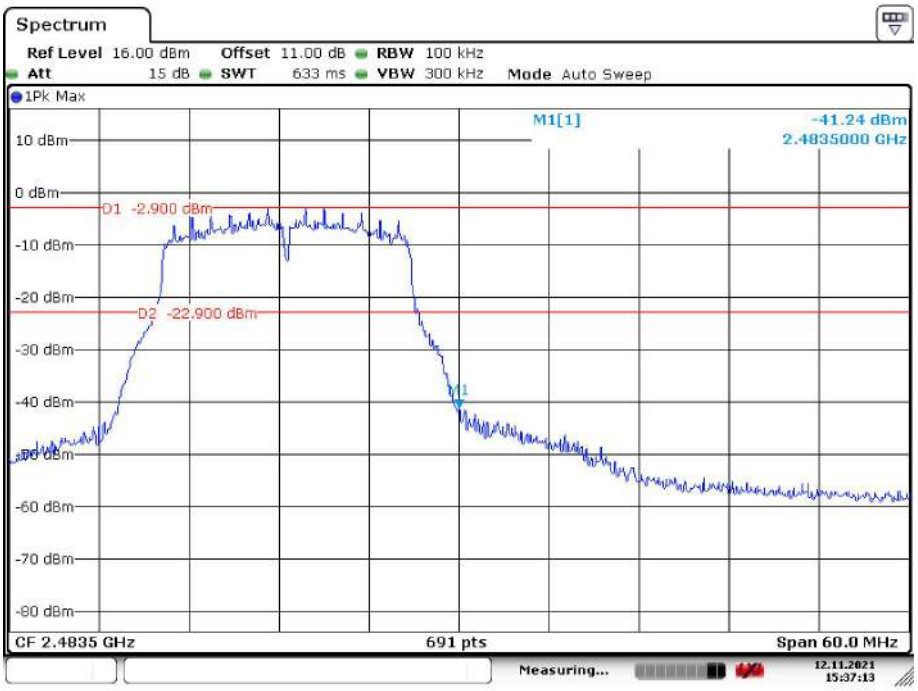
Date: 26.SEP.2021 10:28:17

802.11g: Band Edge, Left Side



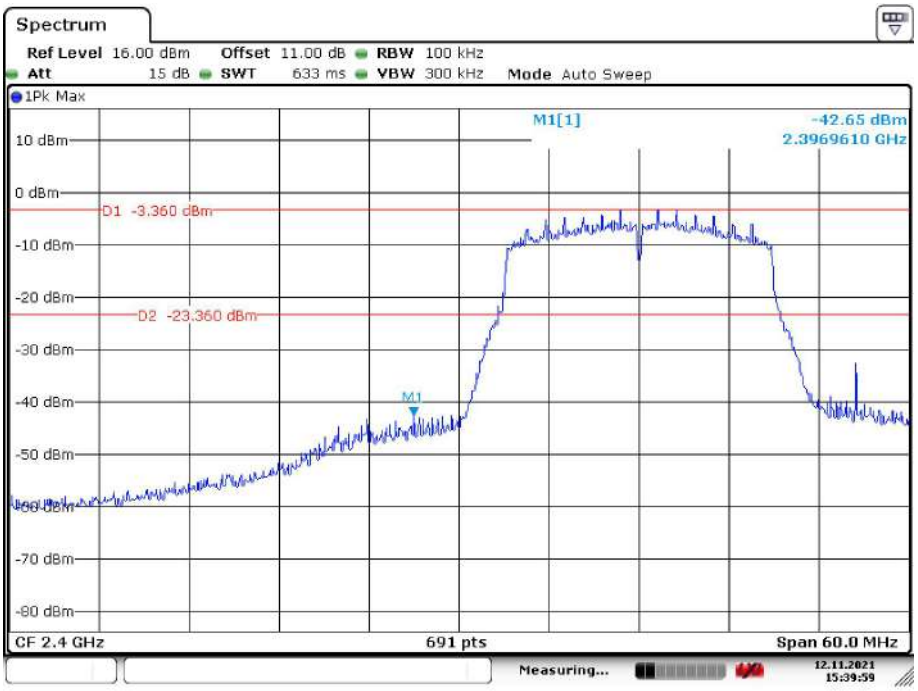
Date: 26.SEP.2021 10:30:03

802.11g: Band Edge, Right Side



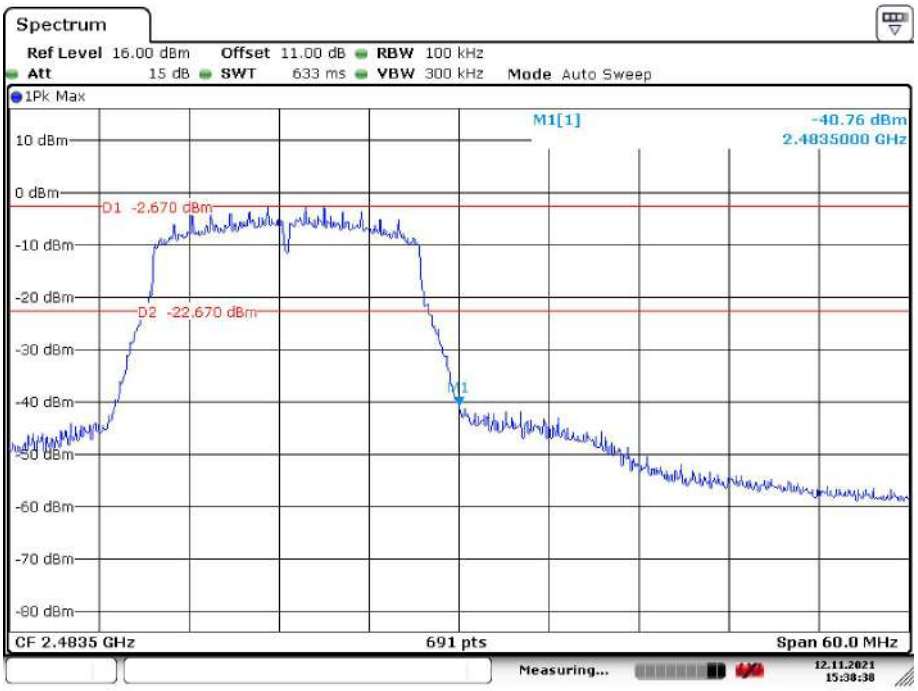
Date: 12.NOV.2021 15:37:13

802.11n20: Band Edge, Left Side



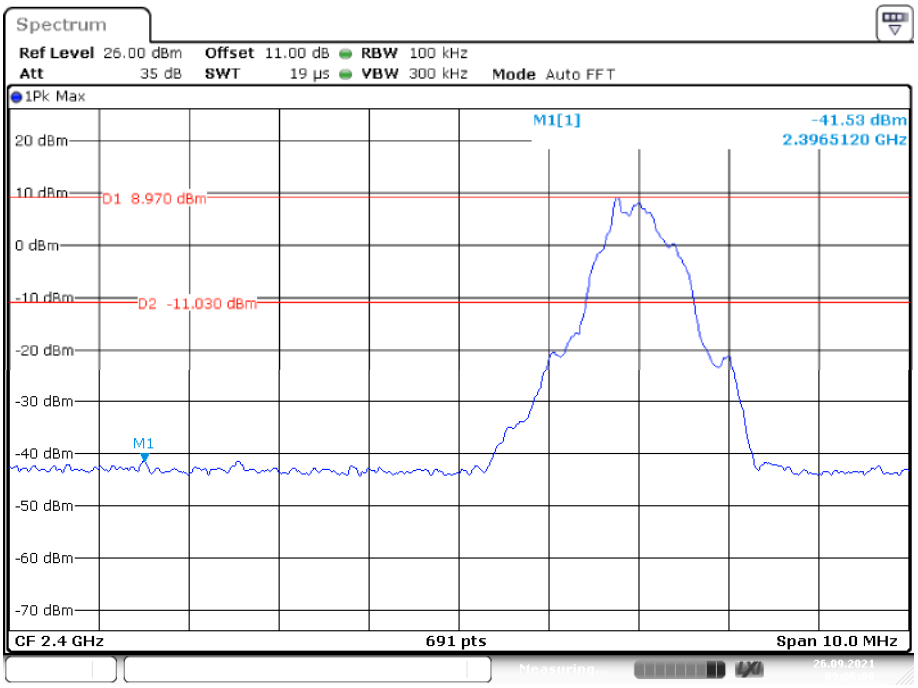
Date: 12.NOV.2021 15:39:59

802.11n20: Band Edge, Right Side



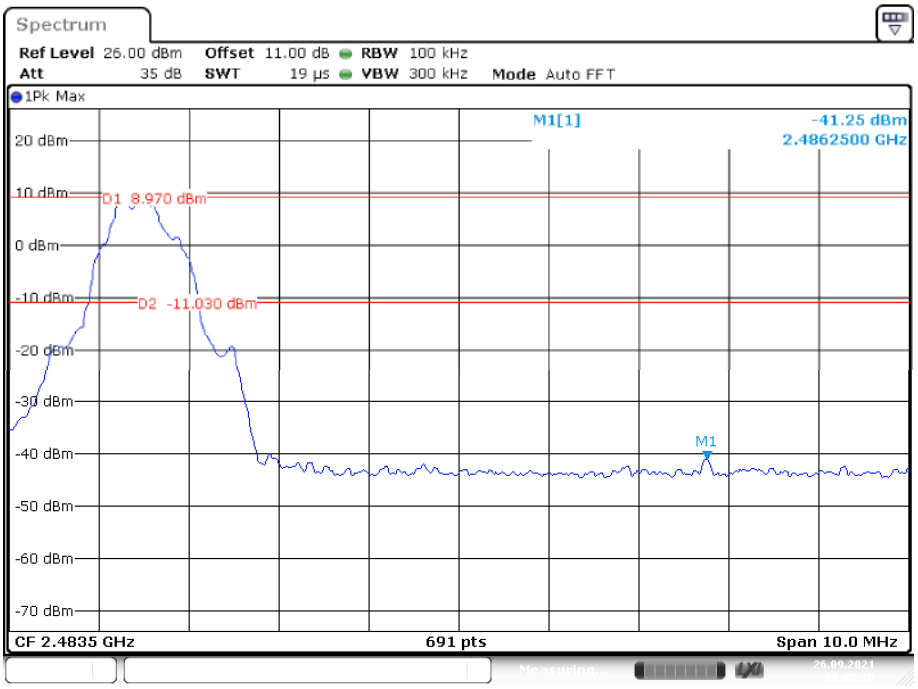
Date: 12.NOV.2021 15:38:39

BLE: Band Edge, Left Side



Date: 26.SEP.2021 09:06:08

BLE: Band Edge, Right Side



Date: 26.SEP.2021 09:08:19

§15.247(e) & RSS-247 § 5.2 (b) POWER SPECTRAL DENSITY

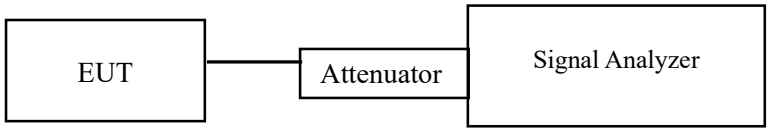
Applicable Standard

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.

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than8 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 section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW to: 3kHz≤ RBW≤100 kHz.
3. Set the VBW ≥ 3×RBW.
4. Set the span to 1.5 times the DTS bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.



Test Data

Environmental Conditions

Temperature:	25.3~26 ℃
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

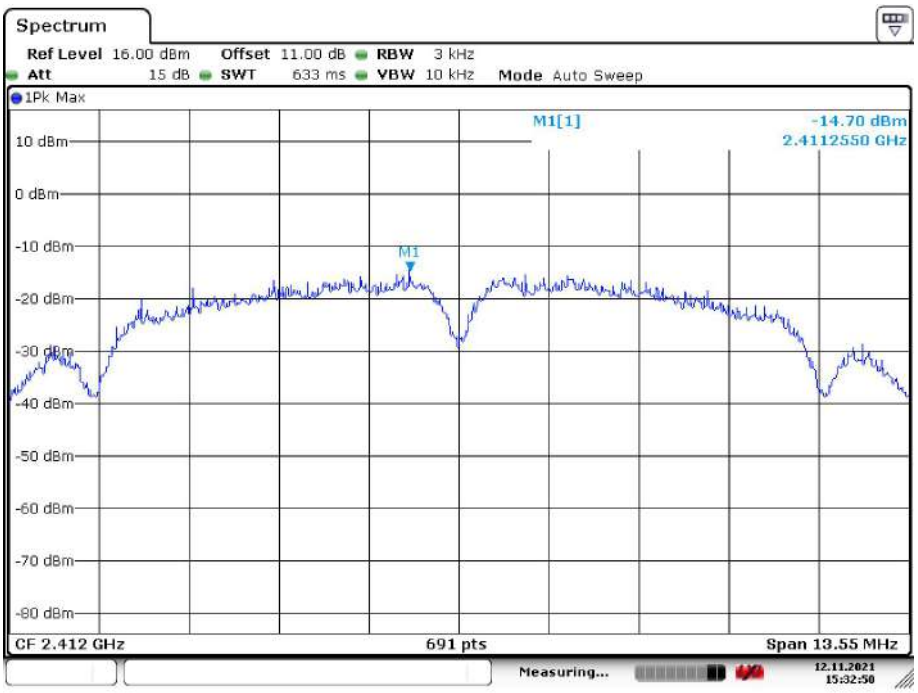
The testing was performed by Ting Lv from 2021-09-26 to 2021-11-12.

EUT operation mode: Transmitting

Test Result: Pass

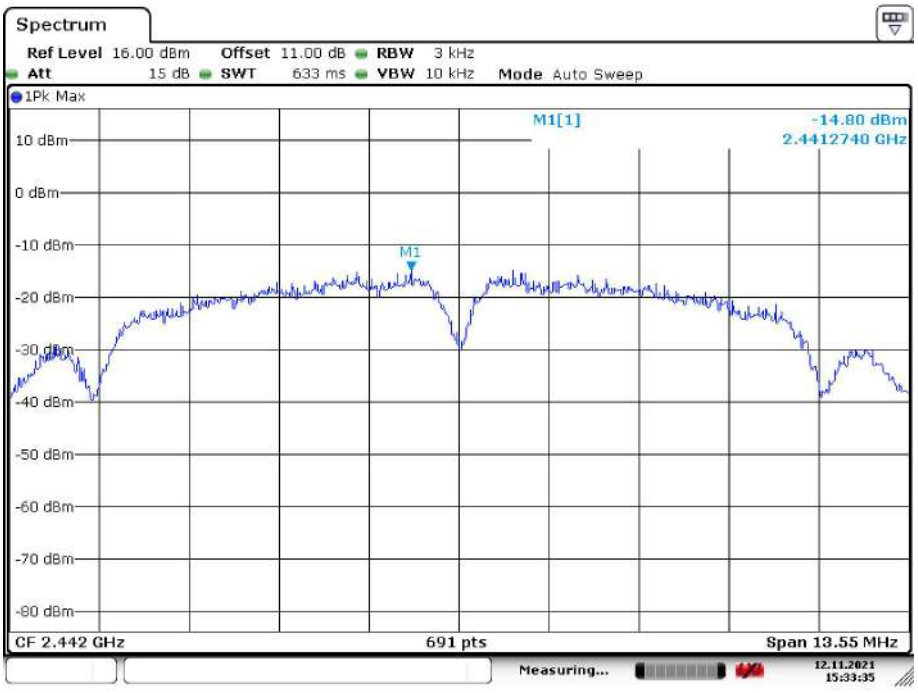
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
802.11b mode			
Low	2412	-14.70	≤8
Middle	2442	-14.80	≤8
High	2472	-14.30	≤8
802.11g mode			
Low	2412	-17.12	≤8
Middle	2442	-17.18	≤8
High	2472	-16.68	≤8
802.11n20 mode			
Low	2412	-17.67	≤8
Middle	2442	-17.18	≤8
High	2472	-17.20	≤8
BLE 1M			
Low	2402	-10.92	≤8
Middle	2440	-9.84	≤8
High	2480	-9.34	≤8

Power Spectral Density, 802.11b Low Channel



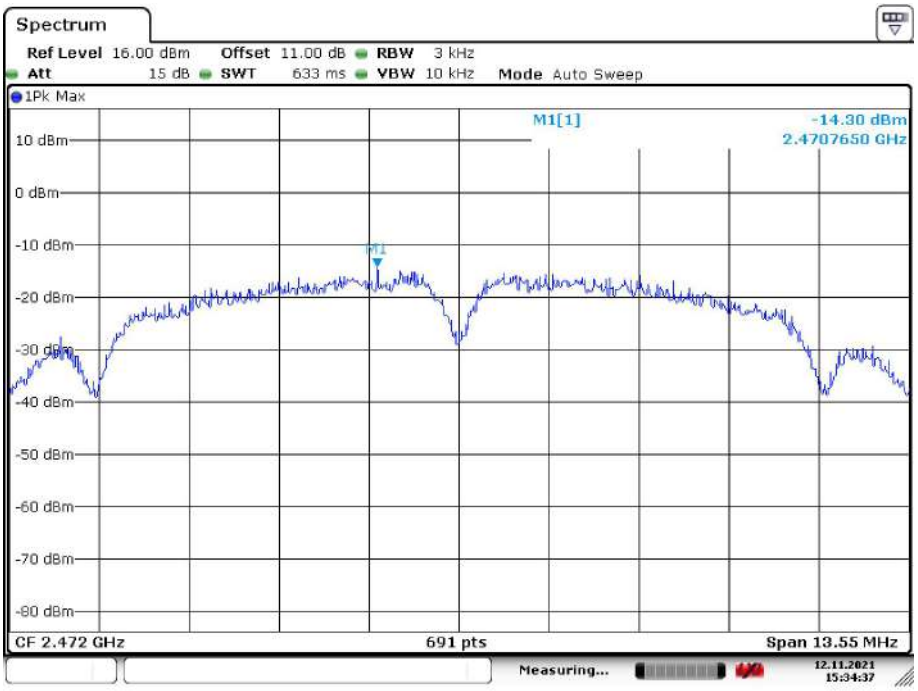
Date: 12.NOV.2021 15:32:50

Power Spectral Density, 802.11b Middle Channel



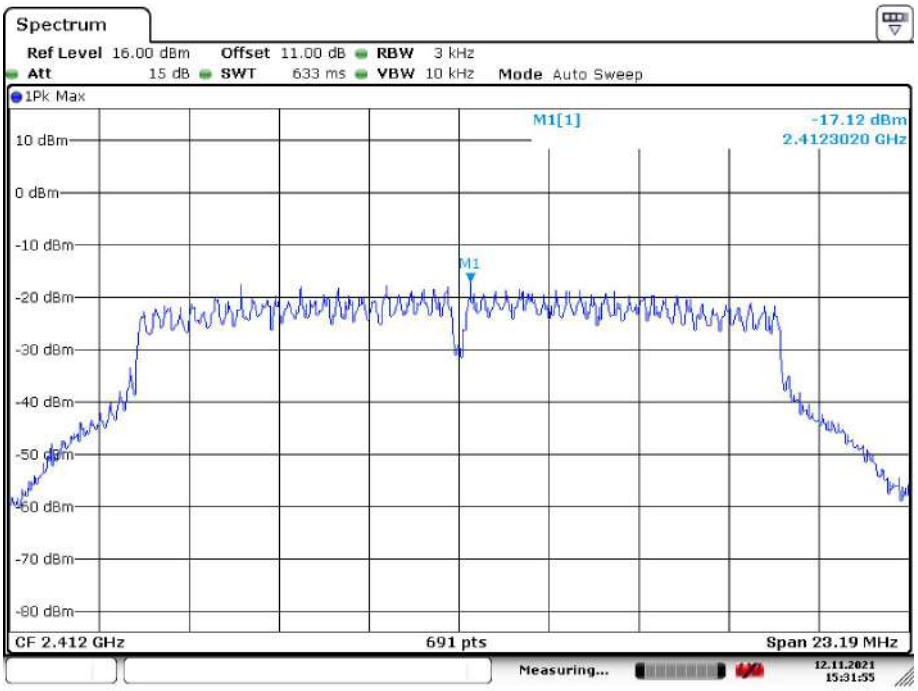
Date: 12.NOV.2021 15:33:36

Power Spectral Density, 802.11b High Channel



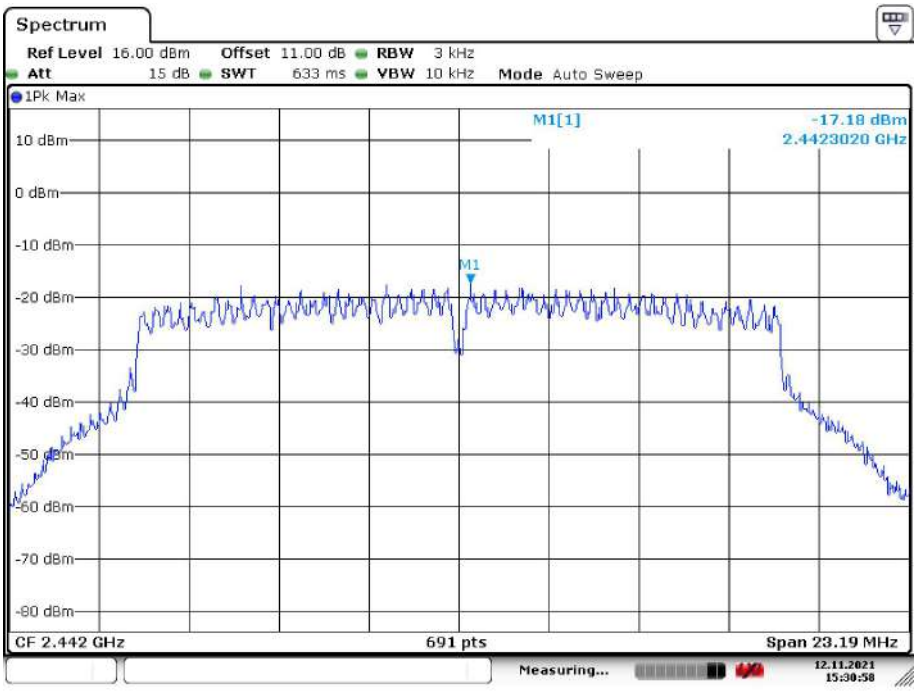
Date: 12.NOV.2021 15:34:37

Power Spectral Density, 802.11g Low Channel



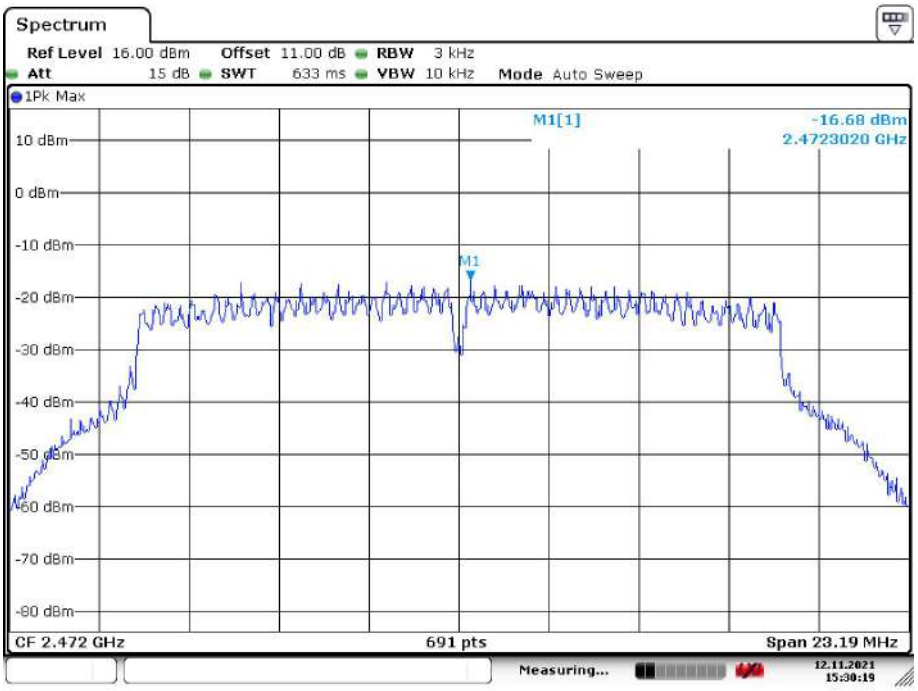
Date: 12.NOV.2021 15:31:55

Power Spectral Density, 802.11g Middle Channel



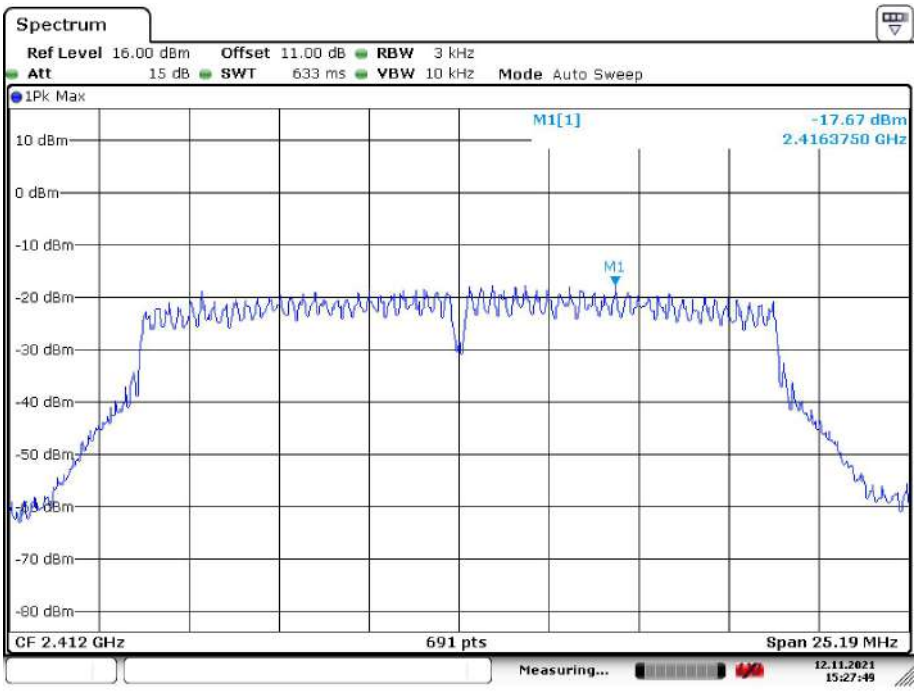
Date: 12.NOV.2021 15:30:58

Power Spectral Density, 802.11g High Channel



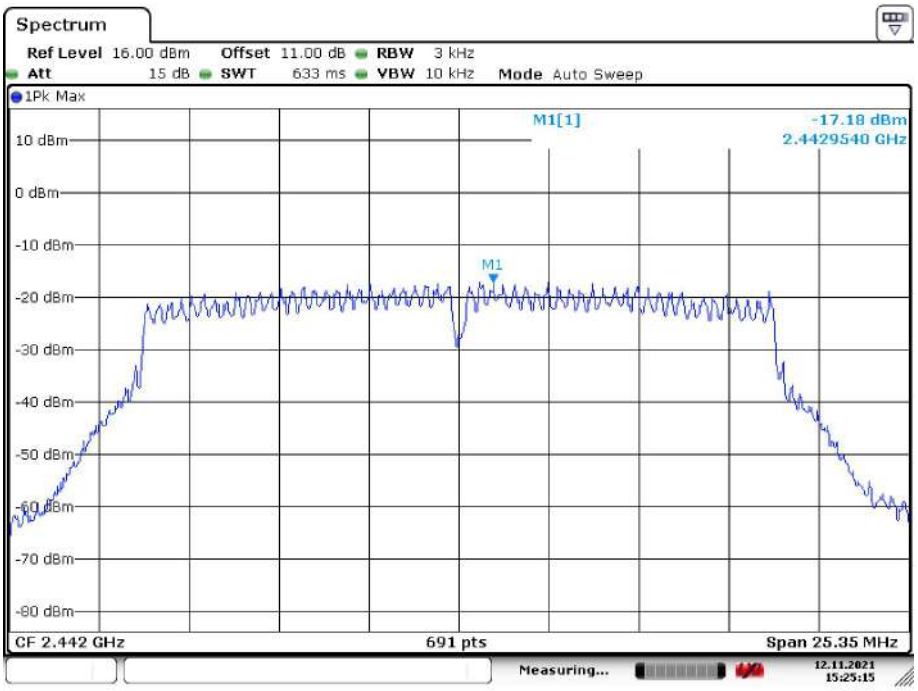
Date: 12.NOV.2021 15:30:20

Power Spectral Density, 802.11n20 Low Channel



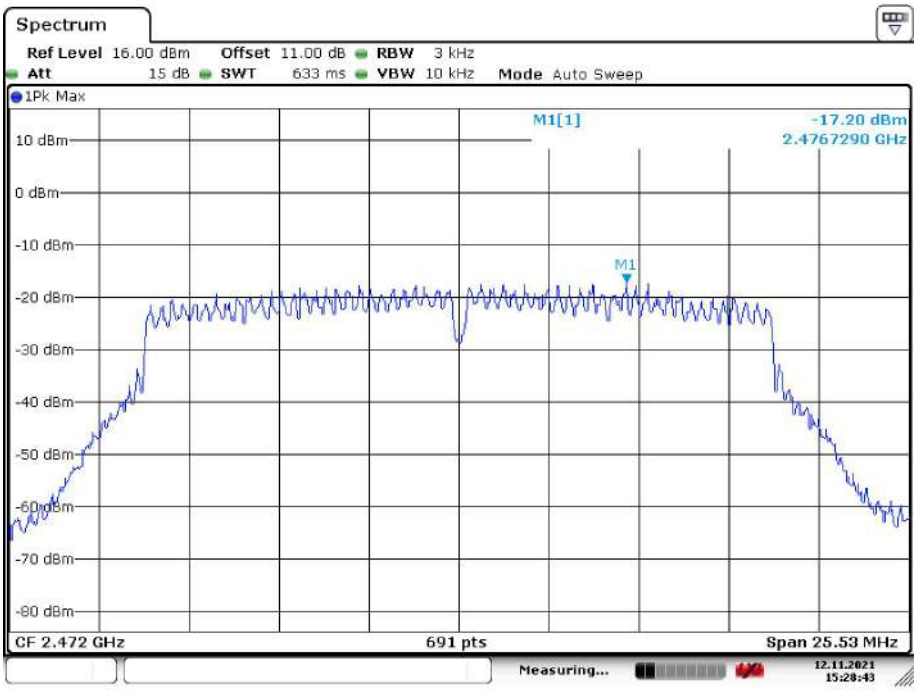
Date: 12.NOV.2021 15:27:50

Power Spectral Density, 802.11n20 Middle Channel



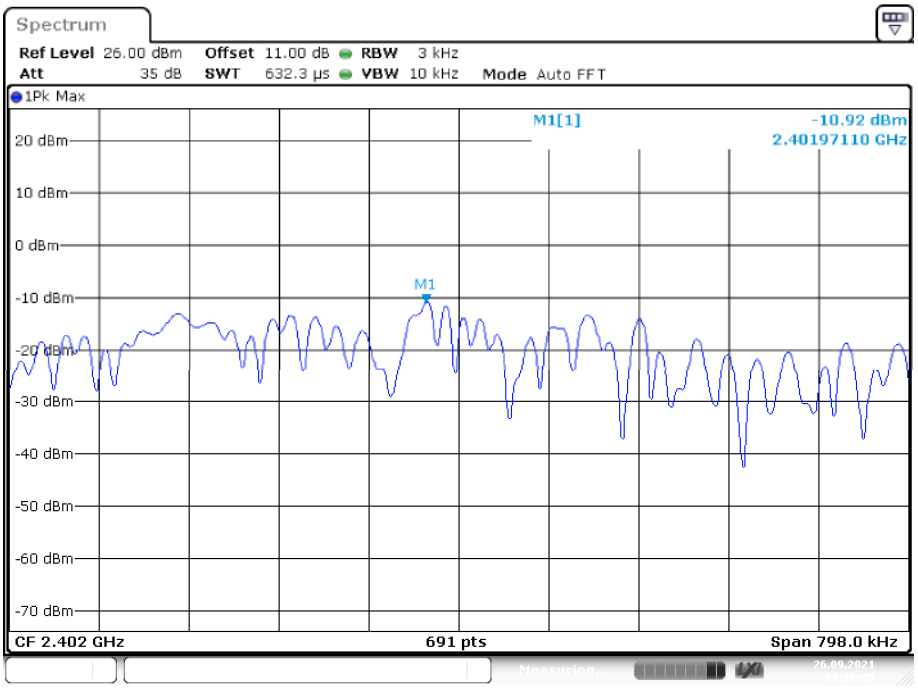
Date: 12.NOV.2021 15:25:15

Power Spectral Density, 802.11n20 High Channel



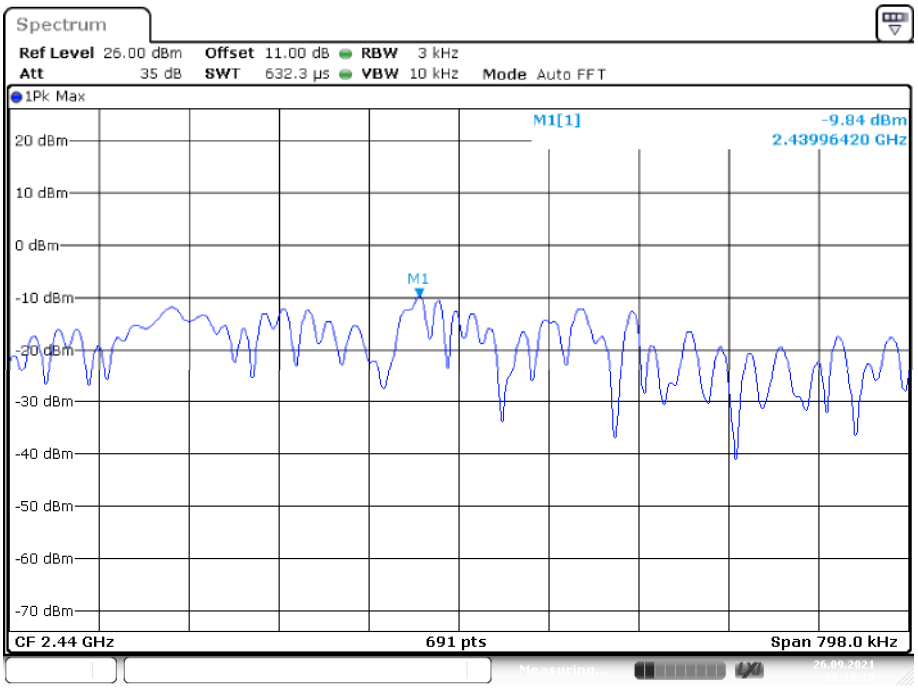
Date: 12.NOV.2021 15:28:44

Power Spectral Density, BLE Low Channel



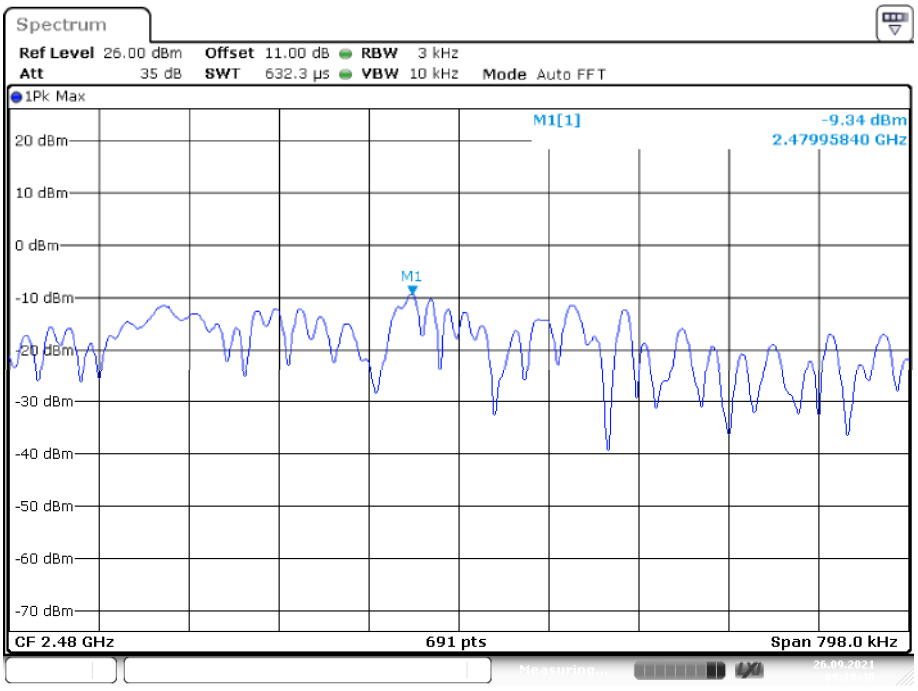
Date: 26.SEP.2021 09:16:36

Power Spectral Density, BLE Middle Channel



Date: 26.SEP.2021 09:16:11

Power Spectral Density, BLE High Channel



Date: 26.SEP.2021 09:10:40

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