



TEST REPORT

Applicant Name : Shenzhen Hi-Link Electronic CO.,Ltd
Address : Room 301, Building 1, 1970 Science & Technology Park, Minzhi Community, Minzhi Street, Longhua District, Shenzhen, China
Report Number : SZNS1220412-13800E-RF-00A
FCC ID: 2AD56HLK-RM60

Test Standard (s)

FCC Part 15.247

Sample Description

Product: WIFI6 Wireless Router Module
Tested Model: HLK-RM60
Date Received: 2022-04-12
Report Date: 2022-08-16

Test Result:	Pass*
--------------	-------

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

Prepared and Checked By:

Jeff Jiang
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.

Shenzhen Accurate Technology Co., Ltd.

1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China
Tel: +86 755-26503290 Fax: +86 755-26503396 Web: www.atc-lab.com

TABLE OF CONTENTS

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EQUIPMENT MODIFICATIONS	6
EUT EXERCISE SOFTWARE	6
DUTY CYCLE	6
SUPPORT EQUIPMENT LIST AND DETAILS	7
EXTERNAL I/O CABLE	7
BLOCK DIAGRAM OF TEST SETUP	7
SUMMARY OF TEST RESULTS	9
TEST EQUIPMENT LIST	10
FCC §1.1307 (b) – RF EXPOSURE	12
FCC §15.203 - ANTENNA REQUIREMENT	14
APPLICABLE STANDARD	14
ANTENNA CONNECTOR CONSTRUCTION	14
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	15
APPLICABLE STANDARD	15
EUT SETUP	15
EMI TEST RECEIVER SETUP	15
TEST PROCEDURE	15
FACTOR & MARGIN CALCULATION	16
TEST DATA	16
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS	19
APPLICABLE STANDARD	19
EUT SETUP	19
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	20
TEST PROCEDURE	20
FACTOR & MARGIN CALCULATION	20
TEST DATA	20
FCC §15.247(A) (2) – 6 DB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH	31
APPLICABLE STANDARD	31
TEST PROCEDURE	31
TEST DATA	31
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER	32
APPLICABLE STANDARD	32
TEST PROCEDURE	32
TEST DATA	32
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE	33
APPLICABLE STANDARD	33
TEST PROCEDURE	33

TEST DATA	33
FCC §15.247(e) - POWER SPECTRAL DENSITY	34
APPLICABLE STANDARD	34
TEST PROCEDURE	34
TEST DATA	34
APPENDIX Wi-Fi.....	35
APPENDIX A: 6DB EMISSION BANDWIDTH.....	35
APPENDIX B: OCCUPIED CHANNEL BANDWIDTH	48
APPENDIX C: MAXIMUM CONDUCTED OUTPUT POWER (PEAK)	61
APPENDIX D: POWER SPECTRAL DENSITY	64
APPENDIX E: BAND EDGE MEASUREMENTS.....	94
APPENDIX F: DUTY CYCLE	112

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	WIFI6 Wireless Router Module
Tested Model	HLK-RM60
Frequency Range	Wi-Fi: 2412-2462MHz(802.11 b/g/n20/ax20/n40/ax40)
Maximum Conducted Peak Output Power	Wi-Fi: 18.99dBm(802.11b), 18.65dBm(802.11g), 23.69dBm(802.11n20), 21.48dBm(802.11n40),16.32dBm(802.11ax20), 15.59dBm(802.11ax40)
Modulation Technique	Wi-Fi: DSSS, OFDM, OFDMA
Antenna Specification*	3.13dBi (provided by the applicant)
Voltage Range	DC 3.3V
Sample serial number	SZNS1220412-13800E-RF-S1 (Assigned by ATC)
Sample/EUT Status	Good condition

Objective

This test report is in accordance with Part 2-Subpart J, Part 15-Subparts A and C of the Federal Communication Commission's rules.

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

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, 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.

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°C
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 4297.01

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

For 802.11b, 802.11g, 802.11n-HT20, 802.11n-HT40, 802.11ax20 and 802.11ax40 mode, total 11 channels are provided to testing:

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	/	/

802.11b, 802.11g, 802.11n-HT20 and 802.11ax20 mode was tested with Channel1, 6 and 11.
802.11n-HT40 and 802.11ax40 mode was tested with Channel 3, 6 and 9.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

Software “MT795 QA 0.0.2.15”* was used during testing and power level as below:

Mode	Data Rate (Mbps)	Power Level*
802.11 b	1	Default
802.11 g	6	Default
802.11 n20	MCS0	Default
802.11 n40	MCS0	Default
802.11 ax20	MCS0	Default
802.11 ax40	MCS0	Default

The worst-case data rates are determined to be as above for each mode based upon investigations by measuring the average power and PSD across all data rates, bandwidths and modulations.

The device supports SISO for 802.11b, 802.11g modes, and supports SISO and MIMO for 802.11n, 802.11ax modes. Per pretest the SISO and MIMO modes, and the worst case recorded in this report for 802.11n, 802.11ax modes. All the antenna ports have the same power level for SISO and MIMO modes.

Duty cycle

Test Result: Compliant. Please refer to the Appendix Wi-Fi.

Support Equipment List and Details

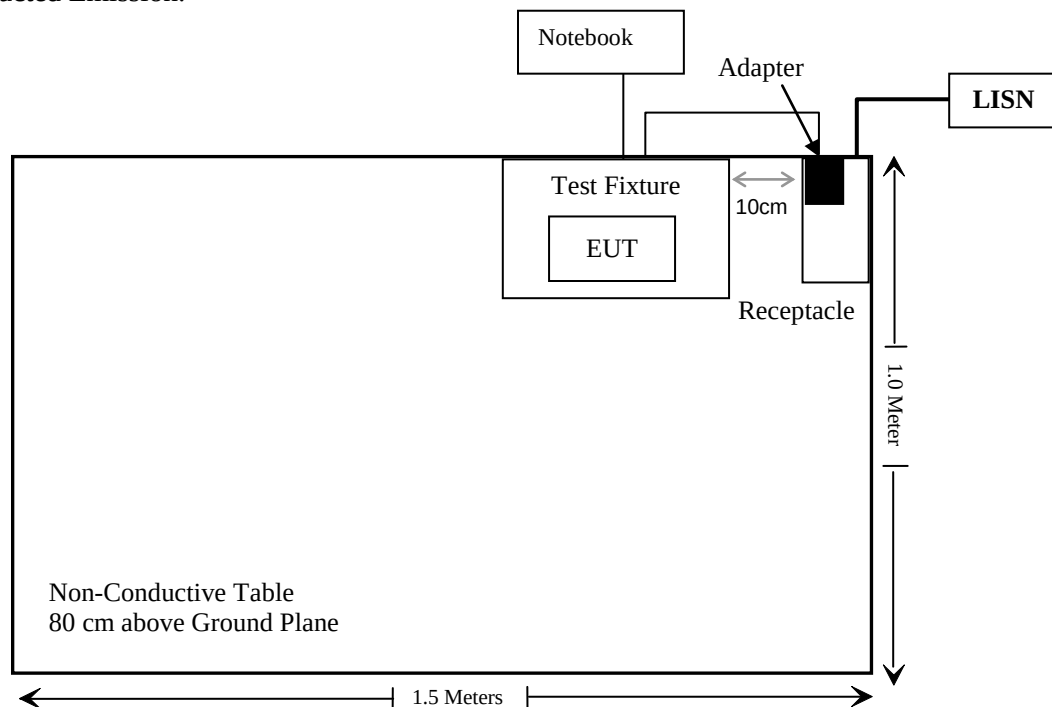
Manufacturer	Description	Model	Serial Number
MOSO POWER SUPPLY TECHNOLOGY CO., LTD.	Adapter	MS-V2500R120-030J0-DE	191612759
DELL	Notebook	Latitude E5570	6DCCRC2
Unknown	Test Fixture	Unknown	Unknown

External I/O Cable

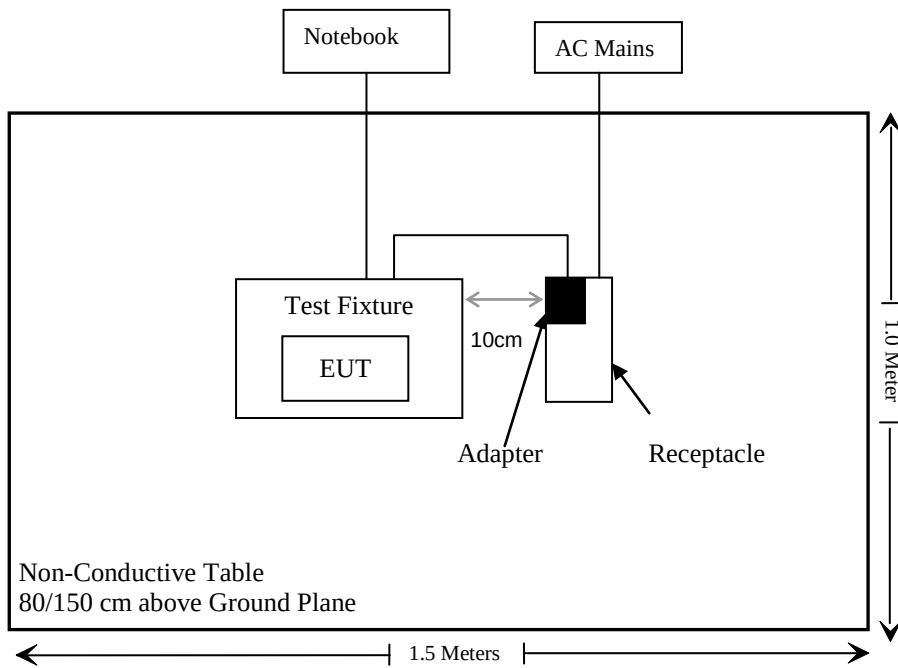
Cable Description	Length (m)	From Port	To
Un-shielding Detachable DC Cable	1.0	Test Fixture	Adapter
Un-shielding Detachable RJ45 Cable	8.0	Test Fixture	Notebook

Block Diagram of Test Setup

For Conducted Emission:



For Radiated Emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i) & 1.1307 (b)	RF Exposure	Compliant
§15.203	Antenna Requirement	Compliant
§15.207 (a)	AC Line Conducted Emissions	Compliant
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliant
§15.247 (a)(2)	6 dB Emission Bandwidth & Occupied Bandwidth	Compliant
§15.247(b)(3)	Maximum Conducted Output Power	Compliant
§15.247(d)	100 kHz Bandwidth of Frequency Band Edge	Compliant
§15.247(e)	Power Spectral Density	Compliant

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Conducted Emissions Test					
Rohde& Schwarz	EMI Test Receiver	ESCI	100784	2021/12/13	2022/12/12
R & S	L.I.S.N.	ENV216	101314	2021/12/13	2022/12/12
Anritsu Corp	50Ω Coaxial Switch	MP59B	6200506474	2021/12/13	2022/12/12
Unknown	RF Coaxial Cable	No.17	N0350	2021/12/14	2022/12/13
Conducted Emission Test Software: e3 19821b(V9)					
Radiated Emissions Test					
Rohde & Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
Rohde & Schwarz	Spectrum Analyzer	FSV40	101949	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2021/11/11	2022/11/10
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Schwarzbeck	HORN ANTENNA	BBHA9170	9170-359	2020/01/05	2023/01/04
Wainwright	High Pass Filter	WHKX3.6/18 G-10SS	5	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.15	N600	2021/12/14	2022/12/13
Radiated Emission Test Software: e3 19821b(V9)					

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
Rohde & Schwarz	Open Switch and Control Unit	OSP120 + OSP-B157	101244 + 100866	2021/12/13	2022/12/12
WEINSCHTEL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.33	RF-03	Each time	

*** 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 §1.1307 (b) – RF EXPOSURE

Applicable Standard

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

According to KDB 447498 D04 Interim General RF Exposure Guidance v01, clause 2.1.4 –MPE-Based Exemption:

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

Table to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1,920 R^2$.
1.34-30	$3,450 R^2/f^2$.
30-300	$3.83 R^2$.
300-1,500	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

f = frequency in MHz;

R = minimum separation distance from the body of a nearby person (appropriate units, e.g., m);

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

$P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERP_j = the ERP of fixed, mobile, or portable RF source j.

$ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

$Evaluated_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

$Exposure\ Limit_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.

Test Result

For worst case:

Mode	Frequency Range (MHz)	Tune-up Output Power		Antenna Gain		ERP		Evaluation Distance (cm)	MPE-Based Exemption Threshold (W)
		(dBm)	(mW)	(dBi)	(dBd)	(dBm)	(W)		
2.4G Wi-Fi	2412-2462	24.0	251.19	3.13	0.98	24.98	0.315	20	0.768
5G Wi-Fi	5150-5250	21.5	141.25	3.62	1.47	22.97	0.198	20	0.768
5G Wi-Fi	5725-5850	21.5	141.25	3.52	1.37	22.87	0.194	20	0.768

Note 1: The tune-up power was declared by the applicant.

Note 2: 0dBd=2.15dBi.

Note 3: The 2.4G Wi-Fi function can transmit at the same time with the 5G Wi-Fi function.

Simultaneous transmitting consideration:

The ratio= $MPE_{2.4G\ Wi-Fi}/limit + MPE_{5G\ Wi-Fi}/limit = 0.315/0.768 + 0.198/0.768 = 0.668 < 1.0$

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

Result: Compliant.

FCC §15.203 - 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.

Antenna Connector Construction

The EUT has two Antennas arrangement for 2.4G Wi-Fi, which was used a unique coupling attached and the antenna gain is 3.13dBi, fulfill the requirement of this section. Please refer to the EUT photos.

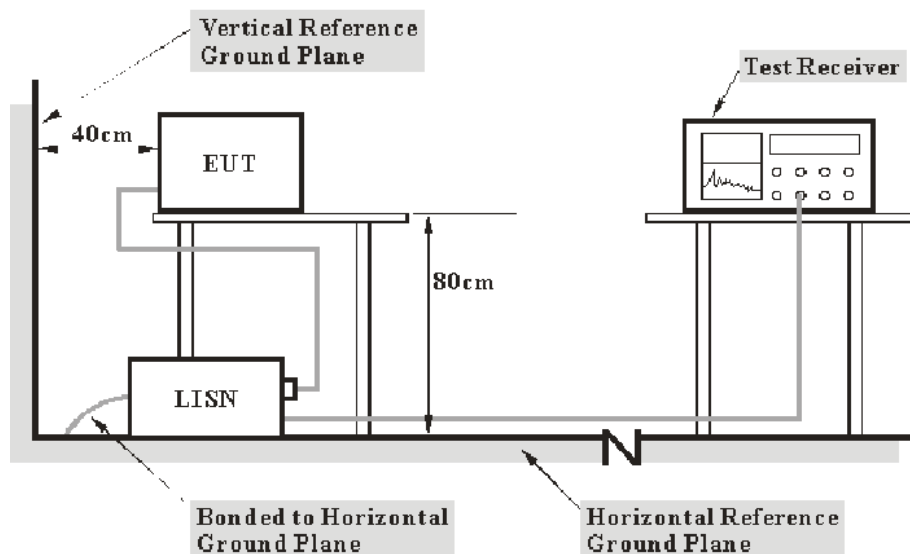
Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

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.

The spacing between the peripherals was 10 cm.

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

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

Factor & Margin Calculation

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

$$\text{Factor} = \text{LISN VDF} + \text{Cable Loss}$$

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 calculation is as follows:

$$\begin{aligned}\text{Over Limit} &= \text{Level} - \text{Limit} \\ \text{Level} &= \text{Read Level} + \text{Factor}\end{aligned}$$

Test Data

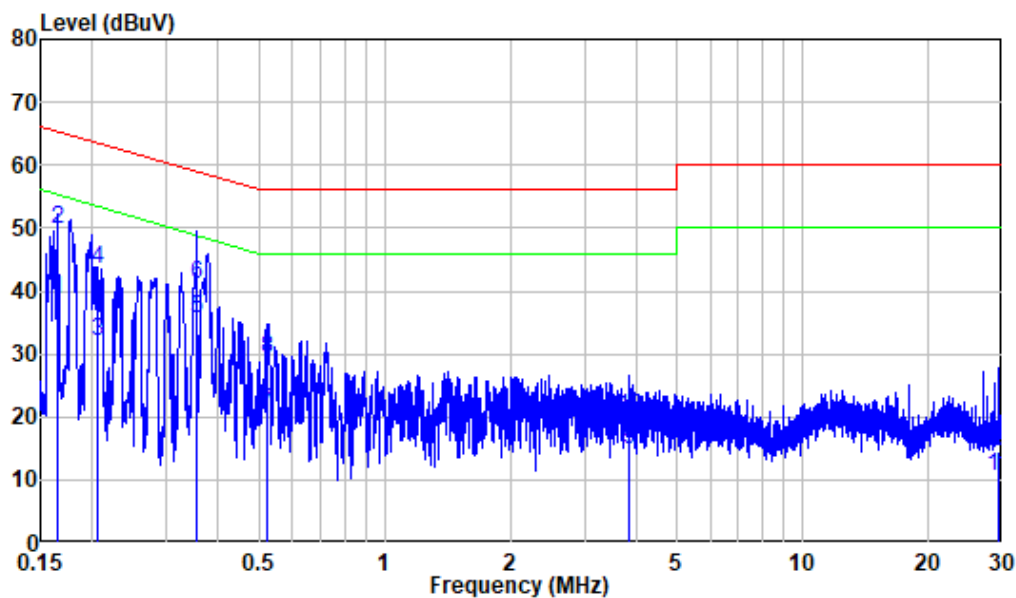
Environmental Conditions

Temperature:	23 °C
Relative Humidity:	55 %
ATM Pressure:	101.1 kPa

The testing was performed by Jason Liu on 2022-06-15.

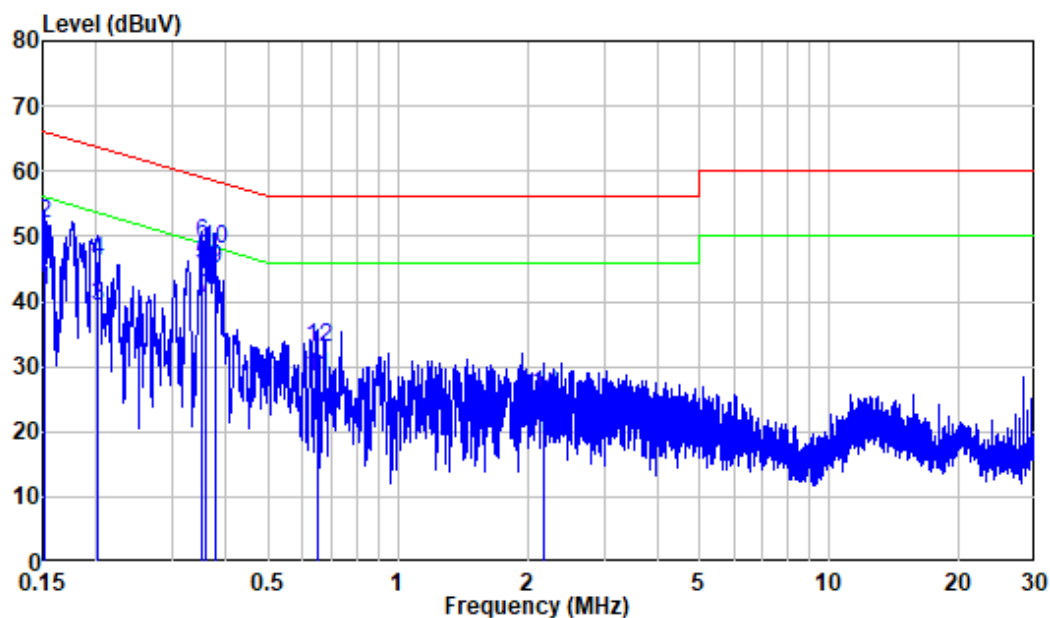
EUT operation mode: 2.4G Wi-Fi Transmitting (Worst case for antenna 1, 802.11B high channel as below)

AC 120V/60 Hz, Line



Site : Shielding Room
 Condition: Line
 Job No. : SZNS1220412-13800E-RF
 Mode : 2.4G WIFI Transmitting
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.164	9.80	28.72	38.52	55.24	-16.72	Average
2	0.164	9.80	40.12	49.92	65.24	-15.32	QP
3	0.205	9.80	22.07	31.87	53.39	-21.52	Average
4	0.205	9.80	33.65	43.45	63.39	-19.94	QP
5	0.354	9.80	25.94	35.74	48.87	-13.13	Average
6	0.354	9.80	31.38	41.18	58.87	-17.69	QP
7	0.525	9.81	11.11	20.92	46.00	-25.08	Average
8	0.525	9.81	19.46	29.27	56.00	-26.73	QP
9	3.835	9.84	4.92	14.76	46.00	-31.24	Average
10	3.835	9.84	10.12	19.96	56.00	-36.04	QP
11	29.351	10.09	0.41	10.50	50.00	-39.50	Average
12	29.351	10.09	4.41	14.50	60.00	-45.50	QP

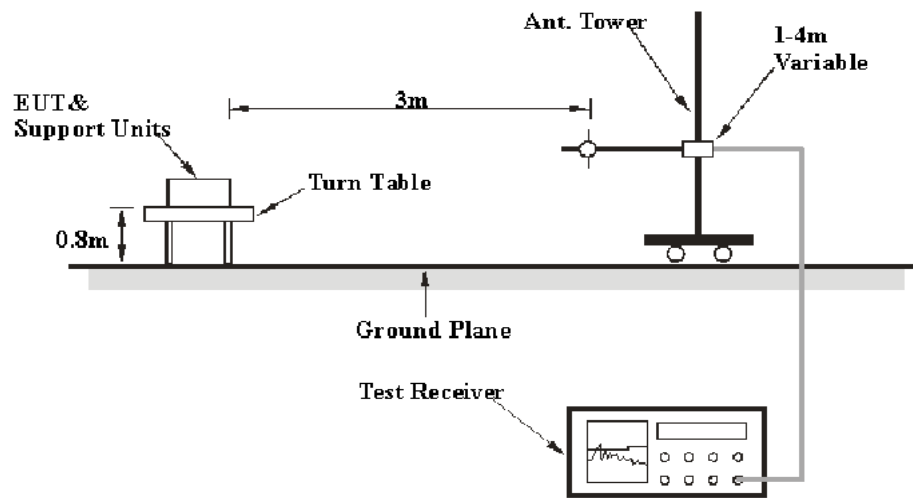
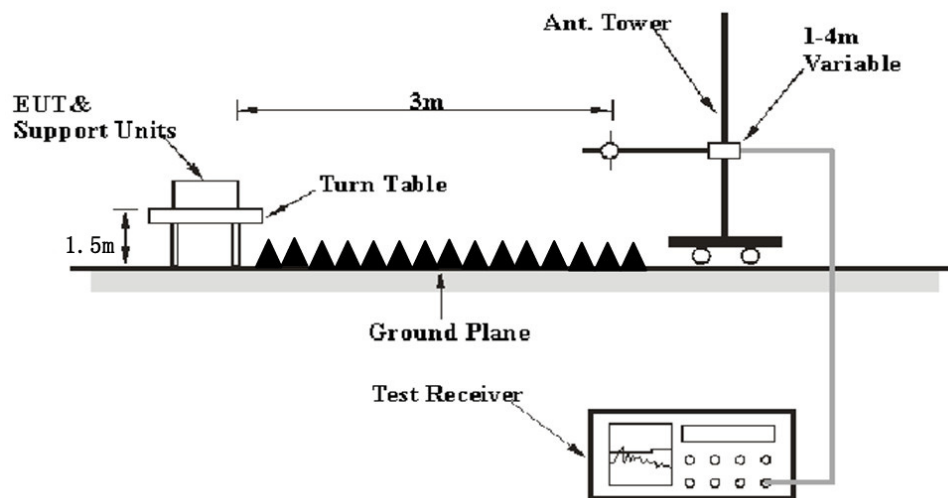
AC 120V/60 Hz, Neutral

Site : Shielding Room
 Condition: Neutral
 Job No. : SZNS1220412-13800E-RF
 Mode : 2.4G WIFI Transmitting
 Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.151	9.80	32.01	41.81	55.94	-14.13	Average
2	0.151	9.80	41.97	51.77	65.94	-14.17	QP
3	0.201	9.80	29.36	39.16	53.56	-14.40	Average
4	0.201	9.80	36.38	46.18	63.56	-17.38	QP
5	0.351	9.80	35.92	45.72	48.94	-3.22	Average
6	0.351	9.80	39.25	49.05	58.94	-9.89	QP
7	0.360	9.80	30.51	40.31	48.73	-8.42	Average
8	0.360	9.80	34.41	44.21	58.73	-14.52	QP
9	0.376	9.80	35.20	45.00	48.37	-3.37	Average
10	0.376	9.80	38.13	47.93	58.37	-10.44	QP
11	0.651	9.81	18.71	28.52	46.00	-17.48	Average
12	0.651	9.81	22.99	32.80	56.00	-23.20	QP
13	2.180	9.82	9.05	18.87	46.00	-27.13	Average
14	2.180	9.82	15.71	25.53	56.00	-30.47	QP

FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS**Applicable Standard**

FCC §15.247 (d); §15.209; §15.205;

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. The specification used was the FCC 15.209, and FCC 15.247 limits.

EMI Test Receiver & Spectrum Analyzer Setup

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%

If the maximized peak measured value complies with the limit, then it is unnecessary to perform QP/Average measurement.

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.

Factor & Margin Calculation

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

$$\text{Factor} = \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

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

$$\begin{aligned} \text{Over Limit/Margin} &= \text{Level} / \text{Corrected Amplitude} - \text{Limit} \\ \text{Level} / \text{Corrected Amplitude} &= \text{Read Level} + \text{Factor} \end{aligned}$$

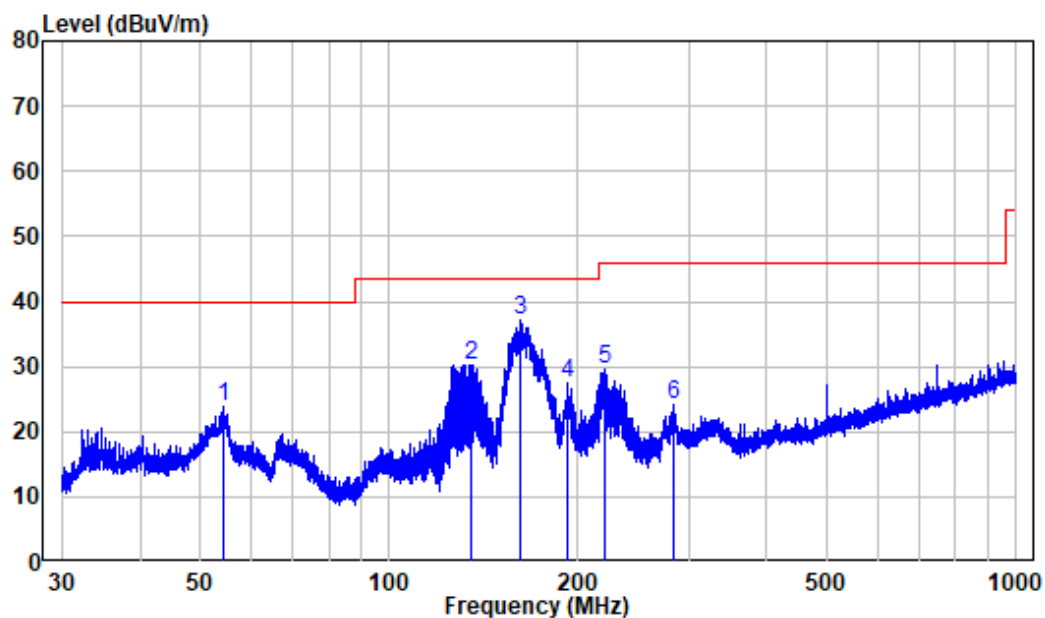
Test Data

Environmental Conditions

Temperature:	22~24°C
Relative Humidity:	49~61%
ATM Pressure:	101.0~103.0 kPa

The testing was performed by Level Li from 2022-05-10 to 2022-05-27.

EUT operation mode: 2.4G Wi-Fi Transmitting. (Pre-scan in the X, Y and Z axes of orientation, the worst case as setup photos as below)

30MHz-1GHz: (Worst case)**Wi-Fi: 802.11B mode, High Channel, Antenna 1****Horizontal**

Site : chamber

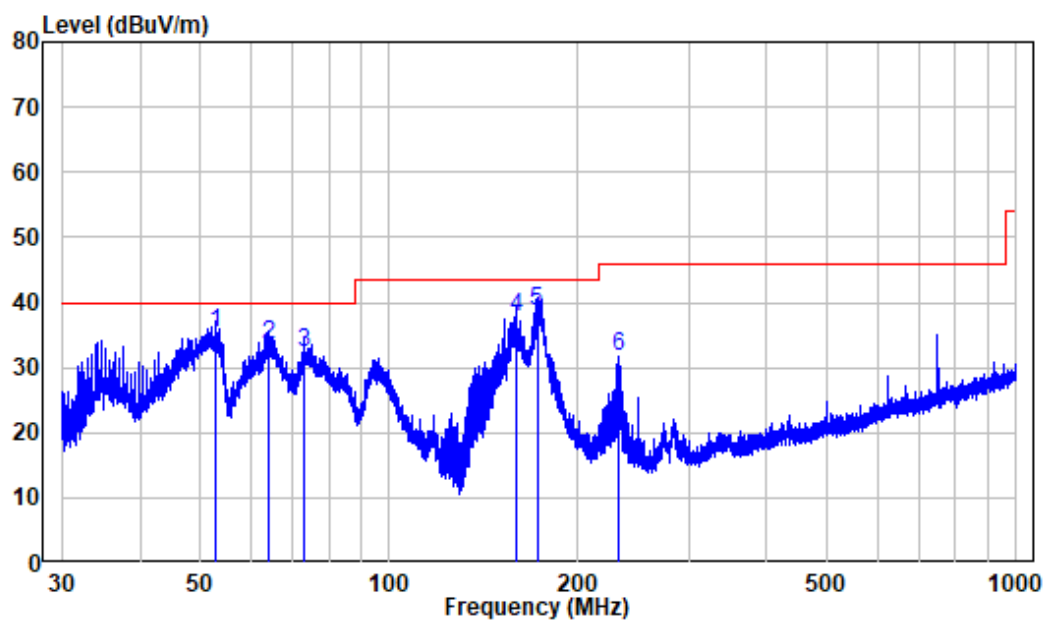
Condition: 3m HORIZONTAL

Job No. : SZNS1220412-13800E-RF

Test Mode: 2.4G WIFI Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	54.404	-10.32	34.22	23.90	40.00	-16.10	QP
2	135.388	-15.04	45.25	30.21	43.50	-13.29	QP
3	161.403	-14.25	51.32	37.07	43.50	-6.43	QP
4	192.756	-11.28	38.70	27.42	43.50	-16.08	QP
5	221.101	-11.38	40.92	29.54	46.00	-16.46	QP
6	284.228	-9.47	33.62	24.15	46.00	-21.85	QP

Vertical



Site : chamber

Condition: 3m VERTICAL

Job No. : SZNS1220412-13800E-RF

Test Mode: 2.4G WIFI Transmitting

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	52.969	-10.16	45.33	35.17	40.00	-4.83	QP
2	64.377	-12.28	45.80	33.52	40.00	-6.48	QP
3	73.103	-15.87	48.30	32.43	40.00	-7.57	QP
4	159.714	-14.23	51.85	37.62	43.50	-5.88	QP
5	171.995	-13.38	52.10	38.72	43.50	-4.78	QP
6	231.515	-11.06	42.85	31.79	46.00	-14.21	QP

1-25 GHz: Per pretest the SISO and MIMO modes, and the worst case is SISO was recorded in this report for 802.11n, 802.11ax modes.

Ant 1:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Reading (dBuV)	PK/AV		Height (m)	Polar (H/V)				
802.11B, Low Channel									
2310	54.69	PK	34	1.6	H	-7.23	47.46	74	-26.54
2310	55.02	PK	240	1.5	V	-7.23	47.79	74	-26.21
2390	60.3	PK	290	1.6	H	-7.21	53.09	74	-20.91
2390	57.98	PK	221	2.1	V	-7.21	50.77	74	-23.23
4824	55.17	PK	33	1.7	H	-3.53	51.64	74	-22.36
4824	53.89	PK	26	1.6	V	-3.53	50.36	74	-23.64
802.11B, Middle Channel									
4874	55.3	PK	180	1.4	H	-3.42	51.88	74	-22.12
4874	54.58	PK	20	1.3	V	-3.42	51.16	74	-22.84
802.11B, High Channel									
2483.5	65.05	PK	115	1.8	H	-7.2	57.85	74	-16.15
2483.5	55.37	AV	115	1.8	H	-7.2	48.17	54	-5.83
2483.5	61.01	PK	126	1.7	V	-7.2	53.81	74	-20.19
2500	58.92	PK	227	1.3	H	-7.18	51.74	74	-22.26
2500	57.5	PK	70	1.8	V	-7.18	50.32	74	-23.68
4924	55.36	PK	272	2.1	H	-3.16	52.20	74	-21.80
4924	54.82	PK	119	1.6	V	-3.16	51.66	74	-22.34
802.11G, Low Channel									
2310	54.93	PK	196	2.0	H	-7.23	47.70	74	-26.30
2310	54.75	PK	167	1.6	V	-7.23	47.52	74	-26.48
2390	72.08	PK	182	2.2	H	-7.21	64.87	74	-9.13
2390	55.43	AV	182	2.2	H	-7.21	48.22	54	-5.78
2390	69.93	PK	70	1.7	V	-7.21	62.72	74	-11.28
2390	52.93	AV	70	1.7	V	-7.21	45.72	54	-8.28
4824	53.56	PK	340	1.8	H	-3.53	50.03	74	-23.97
4824	53.02	PK	143	1.5	V	-3.53	49.49	74	-24.51
802.11G, Middle Channel									
4874	53.32	PK	207	2.0	H	-3.42	49.90	74	-24.10
4874	52.78	PK	349	1.4	V	-3.42	49.36	74	-24.64
802.11G, High Channel									
2483.5	67.35	PK	180	1.7	H	-7.2	60.15	74	-13.85
2483.5	52.47	AV	180	1.7	H	-7.2	45.27	54	-8.73
2483.5	56.44	PK	240	1.7	V	-7.2	49.24	74	-24.76
2500	56.39	PK	155	2.1	H	-7.18	49.21	74	-24.79
2500	54.96	PK	73	1.6	V	-7.18	47.78	74	-26.22
4924	53.6	PK	284	2.1	H	-3.16	50.44	74	-23.56
4924	53.19	PK	126	1.8	V	-3.16	50.03	74	-23.97

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Reading (dBuV)	PK/AV		Height (m)	Polar (H/V)				
802.11N20, Low Channel									
2310	53.39	PK	184	1.7	H	-7.23	46.16	74	-27.84
2310	54.62	PK	107	1.9	V	-7.23	47.39	74	-26.61
2390	67.46	PK	267	1.8	H	-7.21	60.25	74	-13.75
2390	51.3	AV	267	1.8	H	-7.21	44.09	54	-9.91
2390	58.03	PK	290	1.5	V	-7.21	50.82	74	-23.18
4824	53.23	PK	65	1.4	H	-3.53	49.70	74	-24.30
4824	54.02	PK	21	2.0	V	-3.53	50.49	74	-23.51
802.11N20, Middle Channel									
4874	57.3	PK	211	1.7	H	-3.42	53.88	74	-20.12
4874	55.92	PK	34	1.2	V	-3.42	52.50	74	-21.50
802.11N20, High Channel									
2483.5	68.65	PK	201	1.4	H	-7.2	61.45	74	-12.55
2483.5	53.49	AV	201	1.4	H	-7.2	46.29	54	-7.71
2483.5	57.76	PK	171	1.5	V	-7.2	50.56	74	-23.44
2500	56.87	PK	132	1.6	H	-7.18	49.69	74	-24.31
2500	53.88	PK	101	2.2	V	-7.18	46.70	74	-27.30
4924	53.59	PK	17	1.7	H	-3.16	50.43	74	-23.57
4924	53.3	PK	56	2.0	V	-3.16	50.14	74	-23.86
802.11N40, Low Channel									
2310	52.74	PK	273	1.3	H	-7.23	45.51	74	-28.49
2310	54.28	PK	276	1.5	V	-7.23	47.05	74	-26.95
2390	63.59	PK	218	1.8	H	-7.21	56.38	74	-17.62
2390	52.67	AV	218	1.8	H	-7.21	45.46	54	-8.54
2390	56.07	PK	236	1.6	V	-7.21	48.86	74	-25.14
4844	53.66	PK	328	1.9	H	-3.54	50.12	74	-23.88
4844	53.41	PK	193	1.7	V	-3.54	49.87	74	-24.13
802.11N40, Middle Channel									
4874	53.52	PK	192	2.1	H	-3.42	50.10	74	-23.90
4874	53.27	PK	150	2.2	V	-3.42	49.85	74	-24.15
802.11N40, High Channel									
2483.5	68.11	PK	208	2.0	H	-7.2	60.91	74	-13.09
2483.5	56.59	AV	208	2.0	H	-7.2	49.39	54	-4.61
2483.5	56.31	PK	121	1.5	V	-7.2	49.11	74	-24.89
2500	58.16	PK	71	1.6	H	-7.18	50.98	74	-23.02
2500	54.36	PK	133	1.7	V	-7.18	47.18	74	-26.82
4904	53	PK	5	1.4	H	-3.16	49.84	74	-24.16
4904	52.58	PK	327	1.9	V	-3.16	49.42	74	-24.58

Worst case Tones of 242 for 802.11AX20 and Worst case Tones of 484 for 802.11AX40:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Reading (dBuV)	PK/Ave		Height (m)	Polar (H/V)				
802.AX20, Low Channel									
2310	53.35	PK	246	1.8	H	-7.23	46.12	74	-27.88
2310	52.74	PK	81	1.4	V	-7.23	45.51	74	-28.49
2390	65.87	PK	206	1.7	H	-7.21	58.66	74	-15.34
2390	51.6	AV	206	1.7	H	-7.21	44.39	54	-9.61
2390	55.03	PK	82	1.4	V	-7.21	47.82	74	-26.18
4824	53.34	PK	179	1.4	H	-3.53	49.81	74	-24.19
4824	52.89	PK	209	1.9	V	-3.53	49.36	74	-24.64
802.AX20, Middle Channel									
4874	53.87	PK	140	2.0	H	-3.42	50.45	74	-23.55
4874	53.61	PK	35	1.5	V	-3.42	50.19	74	-23.81
802.AX20, High Channel									
2483.5	70.27	PK	214	2.0	H	-7.2	63.07	74	-10.93
2483.5	53.81	AV	214	2.0	H	-7.2	46.61	54	-7.39
2483.5	60.27	PK	190	1.9	V	-7.2	53.07	74	-20.93
2500	55.5	PK	335	1.5	H	-7.18	48.32	74	-25.68
2500	54.3	PK	216	2.1	V	-7.18	47.12	74	-26.88
4924	52.81	PK	237	1.8	H	-3.16	49.65	74	-24.35
4924	52.22	PK	235	1.7	V	-3.16	49.06	74	-24.94
802.AX40, Low Channel									
2310	53.83	PK	19	1.8	H	-7.23	46.60	74	-27.40
2310	53.8	PK	81	1.8	V	-7.23	46.57	74	-27.43
2390	65.79	PK	309	2.1	H	-7.21	58.58	74	-15.42
2390	54.3	AV	309	2.1	H	-7.21	47.09	54	-6.91
2390	55.34	PK	45	1.6	V	-7.21	48.13	74	-25.87
4844	54.03	PK	295	1.5	H	-3.54	50.49	74	-23.51
4844	53.64	PK	335	1.5	V	-3.54	50.10	74	-23.90
802.AX40, Middle Channel									
4874	53.14	PK	149	1.9	H	-3.42	49.72	74	-24.28
4874	52.69	PK	119	1.7	V	-3.42	49.27	74	-24.73
802.AX40, High Channel									
2483.5	65.95	PK	94	2.1	H	-7.2	58.75	74	-15.25
2483.5	52.46	AV	311	1.8	H	-7.2	45.26	54	-8.74
2483.5	55.84	PK	277	1.6	V	-7.2	48.64	74	-25.36
2500	58.45	PK	289	1.3	H	-7.18	51.27	74	-22.73
2500	53.91	PK	6	1.5	V	-7.18	46.73	74	-27.27
4904	53.52	PK	73	2.0	H	-3.16	50.36	74	-23.64
4904	52.91	PK	231	1.9	V	-3.16	49.75	74	-24.25

Ant2:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Reading (dBuV)	PK/AV		Height (m)	Polar (H/V)				
802.11B, Low Channel									
2310	53.69	PK	82	1.3	H	-7.23	46.46	74	-27.54
2310	53.38	PK	290	1.5	V	-7.23	46.15	74	-27.85
2390	59.43	PK	12	1.9	H	-7.21	52.22	74	-21.78
2390	57.09	PK	142	1.6	V	-7.21	49.88	74	-24.12
4824	54.08	PK	45	1.5	H	-3.53	50.55	74	-23.45
4824	52.92	PK	286	2.1	V	-3.53	49.39	74	-24.61
802.11B, Middle Channel									
4874	54.32	PK	139	1.4	H	-3.42	50.90	74	-23.10
4874	53.55	PK	358	1.7	V	-3.42	50.13	74	-23.87
802.11B, High Channel									
2483.5	63.55	PK	280	2.1	H	-7.2	56.35	74	-17.65
2483.5	54.46	AV	280	2.1	H	-7.2	47.26	54	-6.74
2483.5	58.87	PK	154	1.5	V	-7.2	51.67	74	-22.33
2500	57.77	PK	141	1.7	H	-7.18	50.59	74	-23.41
2500	56.64	PK	103	1.6	V	-7.18	49.46	74	-24.54
4924	54.86	PK	38	2.2	H	-3.16	51.70	74	-22.30
4924	54.01	PK	133	1.6	V	-3.16	50.85	74	-23.15
802.11G, Low Channel									
2310	53.76	PK	317	1.6	H	-7.23	46.53	74	-27.47
2310	53.38	PK	45	1.4	V	-7.23	46.15	74	-27.85
2390	70.78	PK	187	1.3	H	-7.21	63.57	74	-10.43
2390	54.34	AV	187	1.3	H	-7.21	47.13	54	-6.87
2390	68.57	PK	220	1.7	V	-7.21	61.36	74	-12.64
2390	52.03	AV	220	1.7	V	-7.21	44.82	54	-9.18
4824	52.96	PK	217	1.6	H	-3.53	49.43	74	-24.57
4824	52.22	PK	6	1.9	V	-3.53	48.69	74	-25.31
802.11G, Middle Channel									
4874	52.27	PK	62	1.5	H	-3.42	48.85	74	-25.15
4874	51.78	PK	72	1.4	V	-3.42	48.36	74	-25.64
802.11G, High Channel									
2483.5	62.67	PK	110	1.7	H	-7.2	55.47	74	-18.53
2483.5	51.32	AV	110	1.7	H	-7.2	44.12	54	-9.88
2483.5	55.59	PK	52	2.1	V	-7.2	48.39	74	-25.61
2500	55.21	PK	200	2.0	H	-7.18	48.03	74	-25.97
2500	54	PK	88	1.5	V	-7.18	46.82	74	-27.18
4924	52.97	PK	339	1.8	H	-3.16	49.81	74	-24.19
4924	52.35	PK	150	1.9	V	-3.16	49.19	74	-24.81

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Reading (dBuV)	PK/AV		Height (m)	Polar (H/V)				
802.11N20, Low Channel									
2310	52.68	PK	66	1.6	H	-7.23	45.45	74	-28.55
2310	53.59	PK	262	1.4	V	-7.23	46.36	74	-27.64
2390	66.53	PK	301	2.0	H	-7.21	59.32	74	-14.68
2390	50.68	AV	301	2.0	H	-7.21	43.47	54	-10.53
2390	57.1	PK	293	2.1	V	-7.21	49.89	74	-24.11
4824	52.64	PK	20	1.3	H	-3.53	49.11	74	-24.89
4824	52.16	PK	314	1.7	V	-3.53	48.63	74	-25.37
802.11N20, Middle Channel									
4874	56.24	PK	321	1.6	H	-3.42	52.82	74	-21.18
4874	55.46	PK	128	2.1	V	-3.42	52.04	74	-21.96
802.11N20, High Channel									
2483.5	67.53	PK	182	1.9	H	-7.2	60.33	74	-13.67
2483.5	52.26	AV	182	1.9	H	-7.2	45.06	54	-8.94
2483.5	56.55	PK	110	1.6	V	-7.2	49.35	74	-24.65
2500	54.24	PK	173	2.0	H	-7.18	47.06	74	-26.94
2500	52.67	PK	18	1.6	V	-7.18	45.49	74	-28.51
4924	52.83	PK	91	1.9	H	-3.16	49.67	74	-24.33
4924	52.37	PK	353	2.0	V	-3.16	49.21	74	-24.79
802.11N40, Low Channel									
2310	51.56	PK	82	1.6	H	-7.23	44.33	74	-29.67
2310	53.22	PK	288	2.1	V	-7.23	45.99	74	-28.01
2390	62.57	PK	305	1.4	H	-7.21	55.36	74	-18.64
2390	51.34	AV	305	1.4	H	-7.21	44.13	54	-9.87
2390	55.11	PK	226	1.4	V	-7.21	47.90	74	-26.10
4844	53.23	PK	67	1.3	H	-3.54	49.69	74	-24.31
4844	52.57	PK	235	1.8	V	-3.54	49.03	74	-24.97
802.11N40, Middle Channel									
4874	52.6	PK	159	1.6	H	-3.42	49.18	74	-24.82
4874	52.33	PK	24	1.8	V	-3.42	48.91	74	-25.09
802.11N40, High Channel									
2483.5	70.12	PK	226	1.6	H	-7.2	60.92	74	-13.08
2483.5	54.15	AV	226	1.6	H	-7.2	46.95	54	-7.05
2483.5	56.67	PK	82	1.3	V	-7.2	49.47	74	-24.53
2500	56.27	PK	144	2.1	H	-7.18	49.09	74	-24.91
2500	52.87	PK	338	1.7	V	-7.18	45.69	74	-28.31
4904	52.48	PK	357	2.2	H	-3.16	49.32	74	-24.68
4904	52.13	PK	67	1.5	V	-3.16	48.97	74	-25.03

Worst case Tones of 242 for 802.11AX20 and Worst case Tones of 484 for 802.11AX40:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
	Reading (dBuV)	PK/Ave		Height (m)	Polar (H/V)				
802.AX20, Low Channel									
2310	52.35	PK	190	1.4	H	-7.23	45.12	74	-28.88
2310	52.17	PK	153	2.1	V	-7.23	44.94	74	-29.06
2390	64.67	PK	280	1.5	H	-7.21	57.46	74	-16.54
2390	50.9	AV	280	1.5	H	-7.21	43.69	54	-10.31
2390	53.97	PK	149	1.9	V	-7.21	46.76	74	-27.24
4824	52.31	PK	11	1.4	H	-3.53	48.78	74	-25.22
4824	51.84	PK	181	1.8	V	-3.53	48.31	74	-25.69
802.AX20, Middle Channel									
4874	52.75	PK	231	1.9	H	-3.42	49.33	74	-24.67
4874	52.44	PK	176	1.7	V	-3.42	49.02	74	-24.98
802.AX20, High Channel									
2483.5	69.4	PK	348	1.6	H	-7.2	62.20	74	-11.80
2483.5	52.55	AV	348	1.6	H	-7.2	45.35	54	-8.65
2483.5	59.24	PK	80	1.5	V	-7.2	52.04	74	-21.96
2500	54.6	PK	72	2.1	H	-7.18	47.42	74	-26.58
2500	53.63	PK	138	1.9	V	-7.18	46.45	74	-27.55
4924	51.55	PK	105	1.6	H	-3.16	48.39	74	-25.61
4924	51.17	PK	90	1.4	V	-3.16	48.01	74	-25.99
802.AX40, Low Channel									
2310	52.9	PK	99	1.7	H	-7.23	45.67	74	-28.33
2310	52.59	PK	181	2.1	V	-7.23	45.36	74	-28.64
2390	64.65	PK	136	1.4	H	-7.21	57.44	74	-16.56
2390	53.38	AV	136	1.4	H	-7.21	46.17	54	-7.83
2390	54.34	PK	126	1.7	V	-7.21	47.13	74	-26.87
4844	53.16	PK	22	1.5	H	-3.54	49.62	74	-24.38
4844	52.69	PK	147	1.6	V	-3.54	49.15	74	-24.85
802.AX40, Middle Channel									
4874	51.93	PK	352	1.5	H	-3.42	48.51	74	-25.49
4874	51.45	PK	52	2.1	V	-3.42	48.03	74	-25.97
802.AX40, High Channel									
2483.5	64.86	PK	127	1.5	H	-7.2	57.66	74	-16.34
2483.5	51.37	AV	127	1.5	H	-7.2	44.17	54	-9.83
2483.5	54.92	PK	60	1.8	V	-7.2	47.72	74	-26.28
2500	54.49	PK	237	1.9	H	-7.18	47.31	74	-26.69
2500	53.02	PK	329	1.7	V	-7.18	45.84	74	-28.16
4904	52.85	PK	227	1.4	H	-3.16	49.69	74	-24.31
4904	52.23	PK	165	1.9	V	-3.16	49.07	74	-24.93

Note:

Factor = Antenna factor (RX) + Cable Loss – Amplifier Factor

Absolute Level (Corrected Amplitude) = Factor + Reading

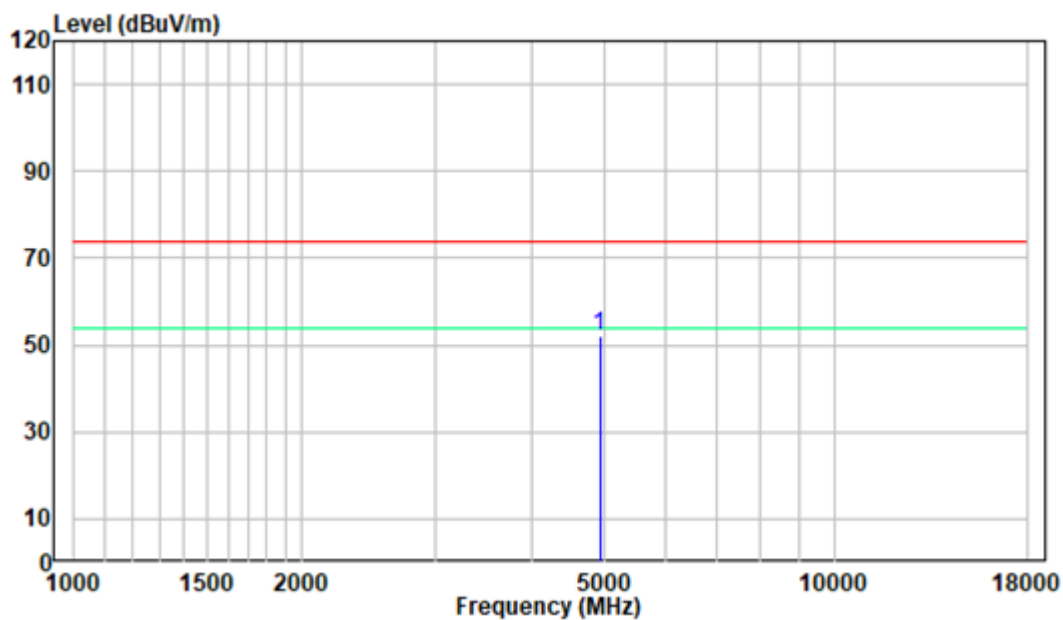
Margin = Absolute Level (Corrected Amplitude) – Limit

The other spurious emission which is in the noise floor level was not recorded.

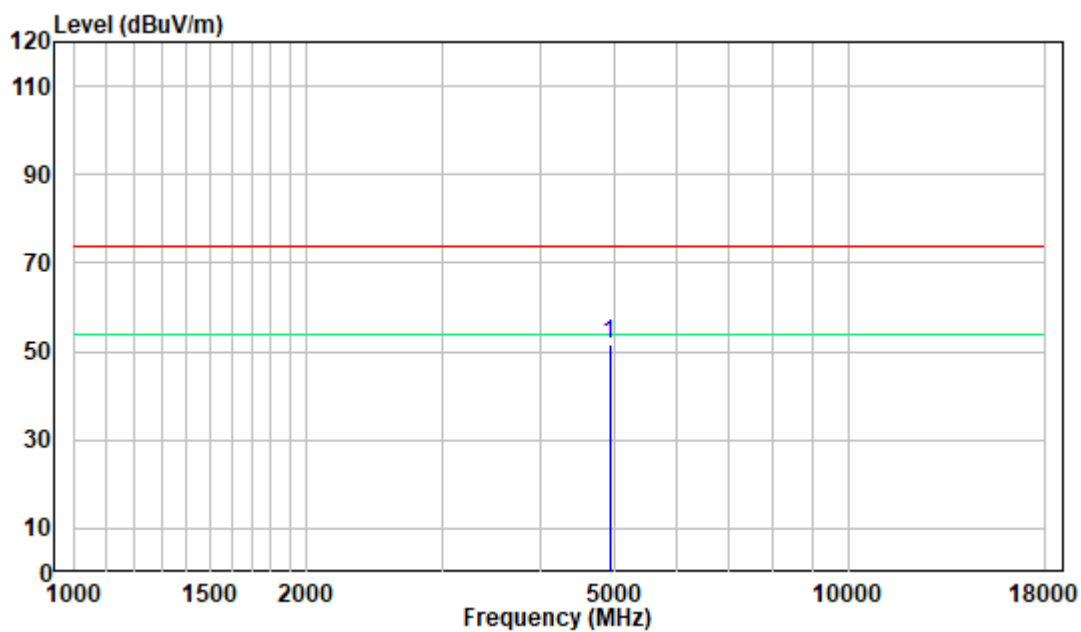
For above 1GHz, the test result of peak was 20dB below to the limit of peak, which can be compliant to the average limit, so just peak value was recorded.

1-18 GHz: (Worst case)

Pre-scan plots
Ant1, 802.11b High Channel
Horizontal

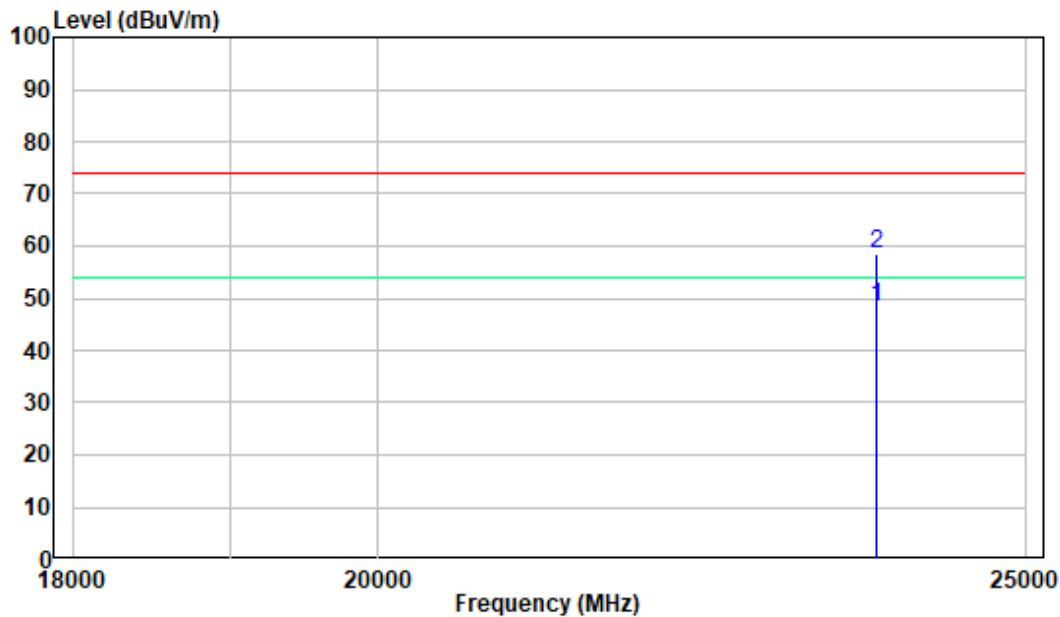


Vertical

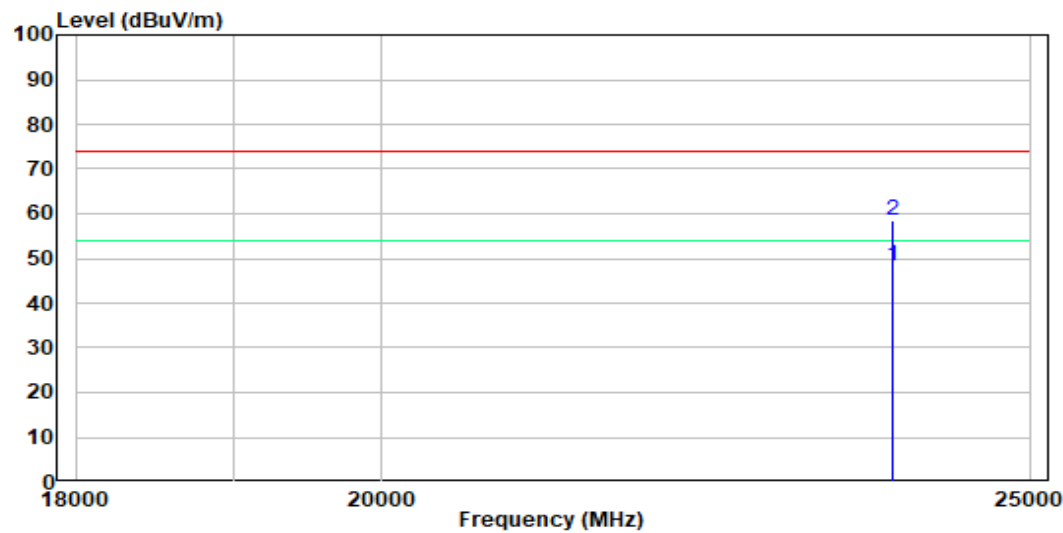


18 -25GHz: (Worst case)

Pre-scan plots
802.11 b High Channel
Horizontal



Vertical



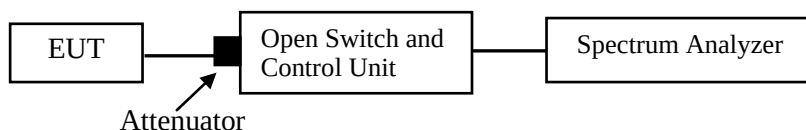
FCC §15.247(A) (2) – 6 DB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH

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.

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.



Test Data

Environmental Conditions

Temperature:	22 ~ 26 °C
Relative Humidity:	49 ~ 58 %
ATM Pressure:	101.1~101.2 kPa

The testing was performed by Cat Kang from 2022-05-21 to 2022-06-15.

EUT operation mode: Transmitting

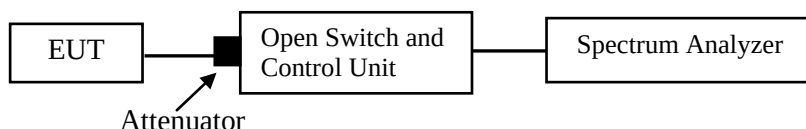
Test Result: Compliant. Please refer to the Appendix Wi-Fi.

FCC §15.247(b) (3) - 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.

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:	22 ~ 26 °C
Relative Humidity:	49 ~ 58 %
ATM Pressure:	101.1~101.2 kPa

The testing was performed by Cat Kang from 2022-06-14 to 2022-06-15 and Glenn Jiang on 2022-07-23.

EUT operation mode: Transmitting

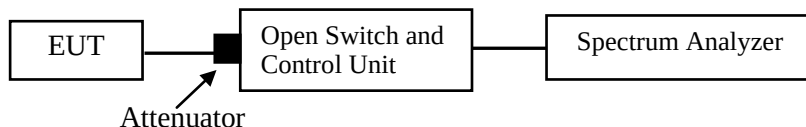
Test Result: Compliant. Please refer to the Appendix Wi-Fi.

FCC §15.247(d) – 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:	22 ~ 26 °C
Relative Humidity:	49 ~ 58 %
ATM Pressure:	101.1~101.2 kPa

The testing was performed by Cat Kang from 2022-05-31 to 2022-06-15 and Glenn Jiang on 2022-07-23.

EUT operation mode: Transmitting

Test Result: Compliant.

Conducted Band Edge Result:

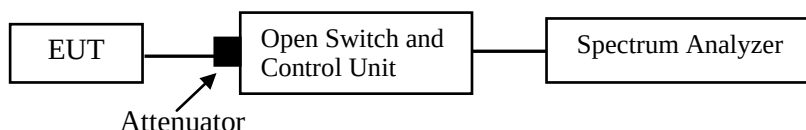
Please refer to the Appendix Wi-Fi.

FCC §15.247(e) - 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.

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: $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$.
3. Set the VBW $\geq 3 \times \text{RBW}$.
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:	22 ~ 26 °C
Relative Humidity:	49 ~ 58 %
ATM Pressure:	101.1~101.2 kPa

The testing was performed by Cat Kang from 2022-05-14 to 2022-06-15 and Glenn Jiang on 2022-07-23.

EUT operation mode: Transmitting

Test Result: Compliant. Please refer to the Appendix Wi-Fi.

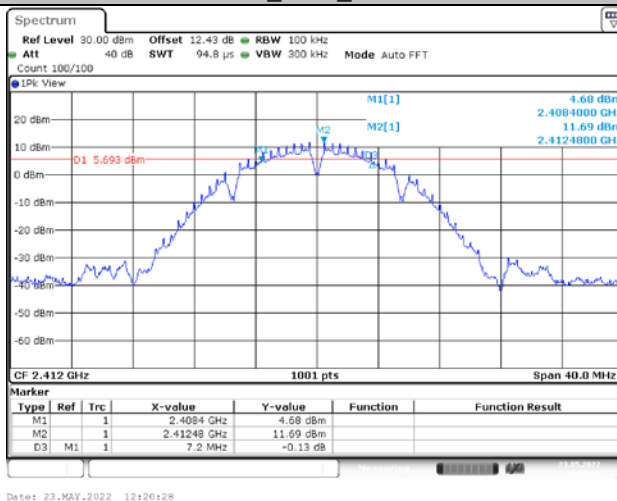
APPENDIX Wi-Fi**Appendix A: 6dB Emission Bandwidth****Test Result**

Test Mode	Antenna	Channel	DTS BW [MHz]	Limit[MHz]	Verdict
11B	2412	Ant1	7.200	0.5	PASS
		Ant2	7.160	0.5	PASS
	2437	Ant1	7.200	0.5	PASS
		Ant2	7.160	0.5	PASS
	2462	Ant1	7.200	0.5	PASS
		Ant2	7.200	0.5	PASS
11G	2412	Ant1	16.440	0.5	PASS
		Ant2	15.400	0.5	PASS
	2437	Ant1	16.440	0.5	PASS
		Ant2	15.200	0.5	PASS
	2462	Ant1	16.080	0.5	PASS
		Ant2	15.200	0.5	PASS
11N20MIMO	2412	Ant1	16.440	0.5	PASS
		Ant2	17.360	0.5	PASS
	2437	Ant1	16.720	0.5	PASS
		Ant2	17.040	0.5	PASS
	2462	Ant1	17.200	0.5	PASS
		Ant2	17.600	0.5	PASS
11N40MIMO	2422	Ant1	35.280	0.5	PASS
		Ant2	35.280	0.5	PASS
	2437	Ant1	35.280	0.5	PASS
		Ant2	35.600	0.5	PASS
	2452	Ant1	35.280	0.5	PASS
		Ant2	35.280	0.5	PASS
11AX20MIMO	2412	Ant1	19.160	0.5	PASS
		Ant2	18.680	0.5	PASS
	2437	Ant1	19.120	0.5	PASS
		Ant2	18.640	0.5	PASS
	2462	Ant1	18.720	0.5	PASS
		Ant2	18.680	0.5	PASS
11AX40MIMO	2422	Ant1	38.160	0.5	PASS
		Ant2	37.520	0.5	PASS
	2437	Ant1	38.080	0.5	PASS
		Ant2	37.760	0.5	PASS
	2452	Ant1	38.240	0.5	PASS
		Ant2	37.520	0.5	PASS

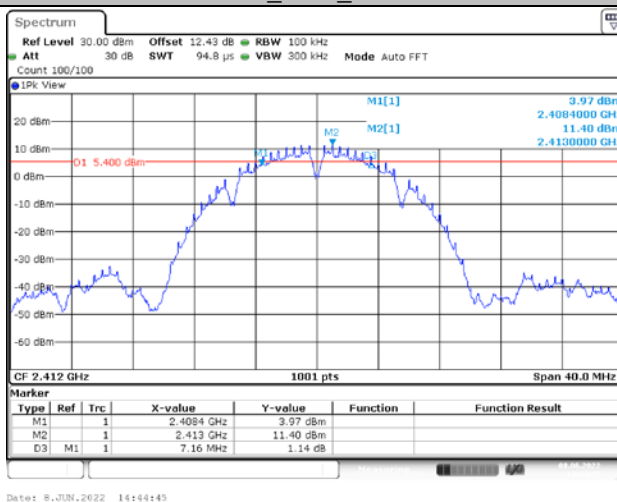
Note: The Maximum Tones and Full RU Index was tested and recorded for 802.11AX modes.

Test Graphs

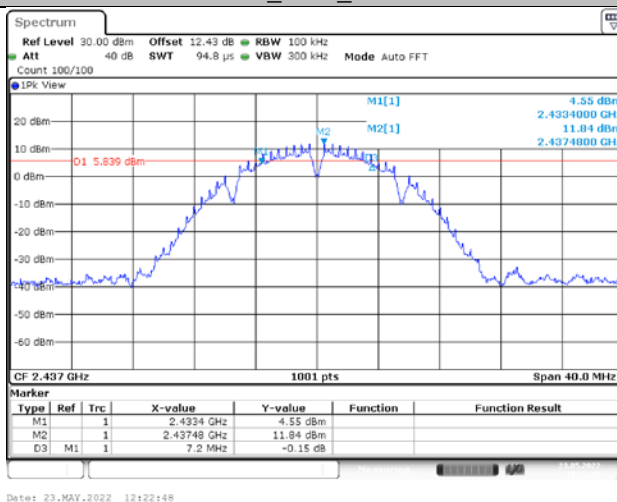
11B_Ant2_2412



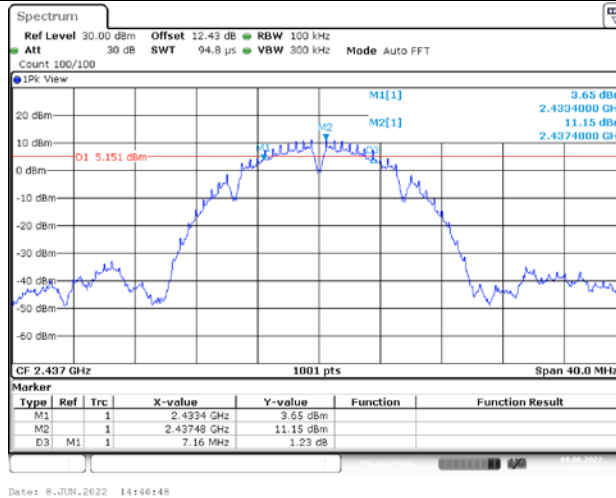
11B_Ant2_2412



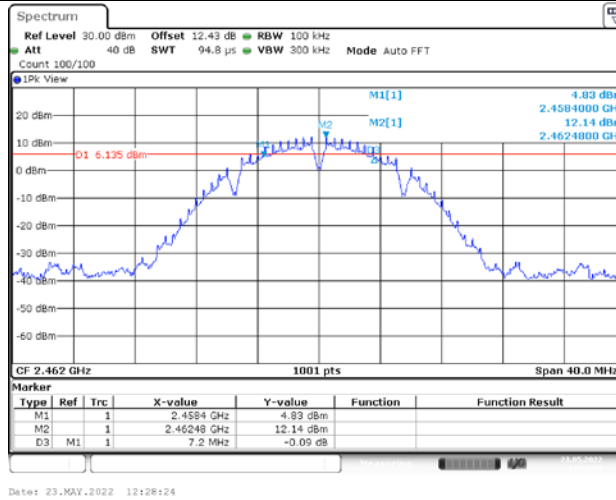
11B_Ant1_2437



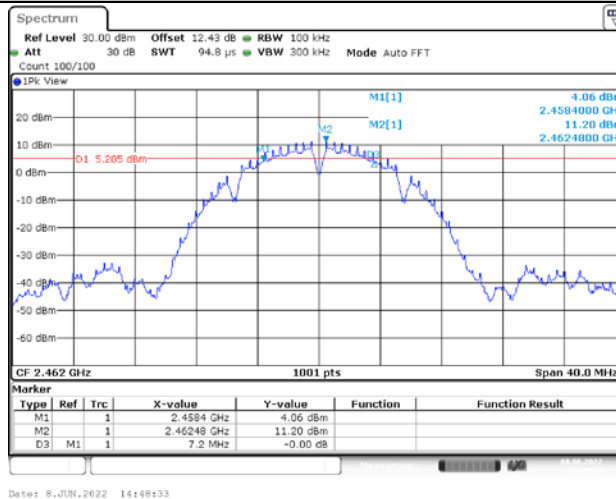
11B_Ant2_2437



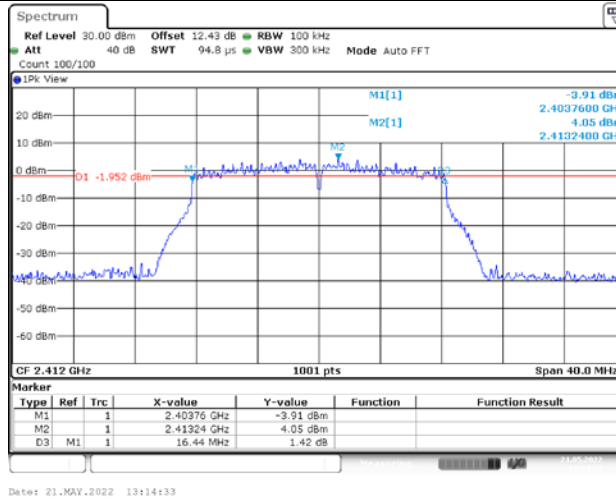
11B_Ant1_2462



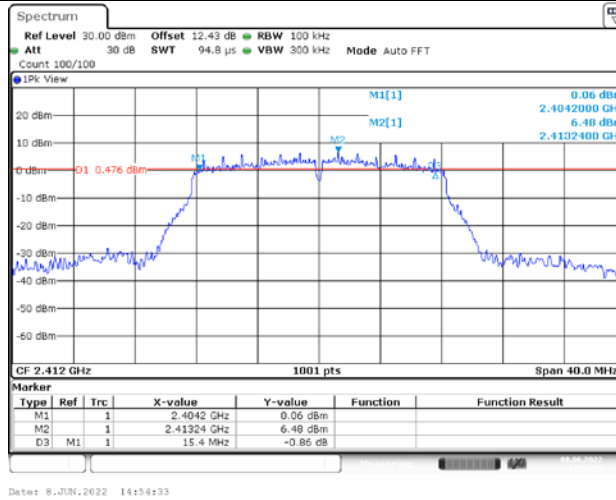
11B_Ant2_2462



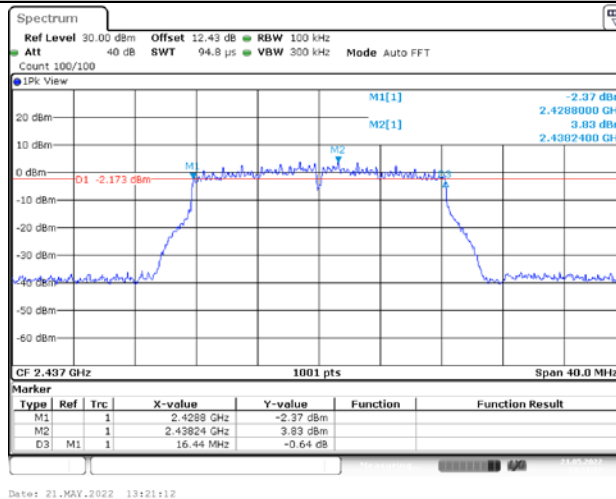
11G_Ant1_2412



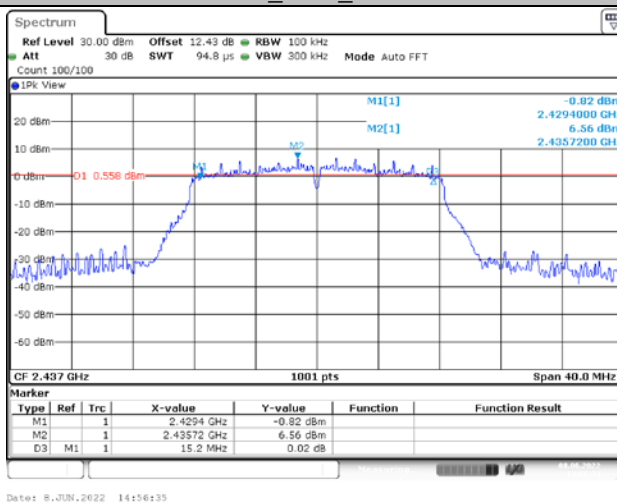
11G_Ant2_2412



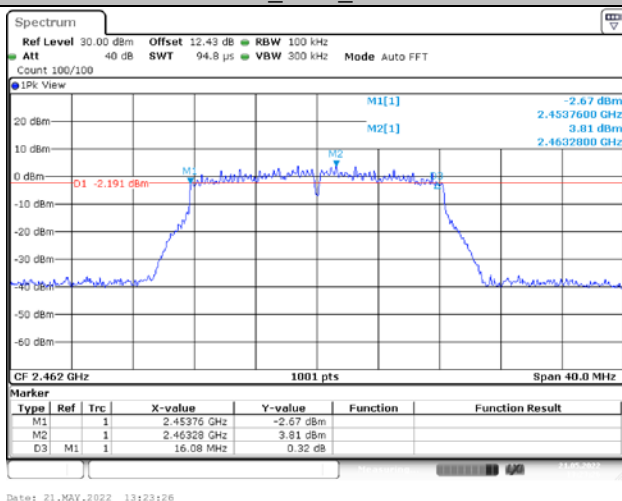
11G_Ant1_2437



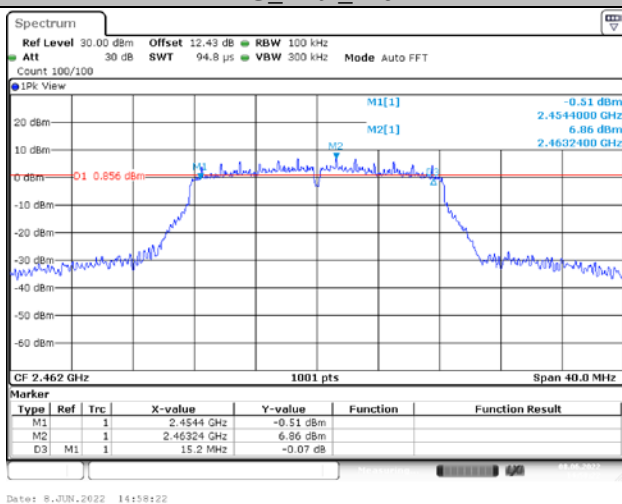
11G_Ant2_2437



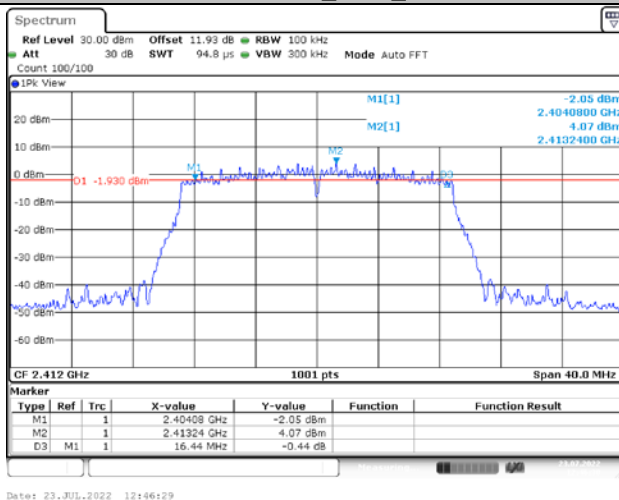
11G_Ant1_2462



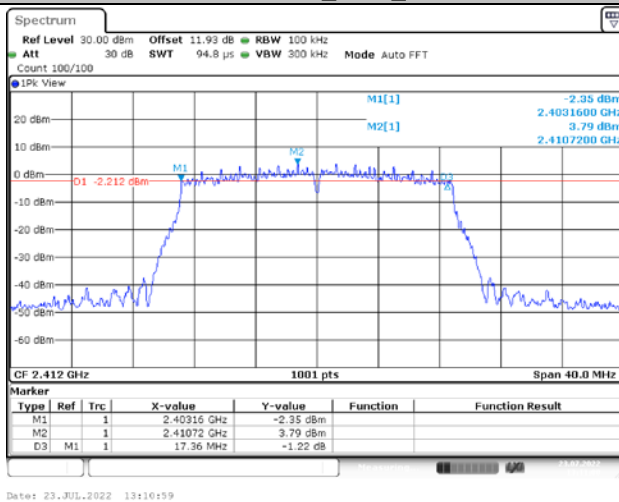
11G_Ant2_2462



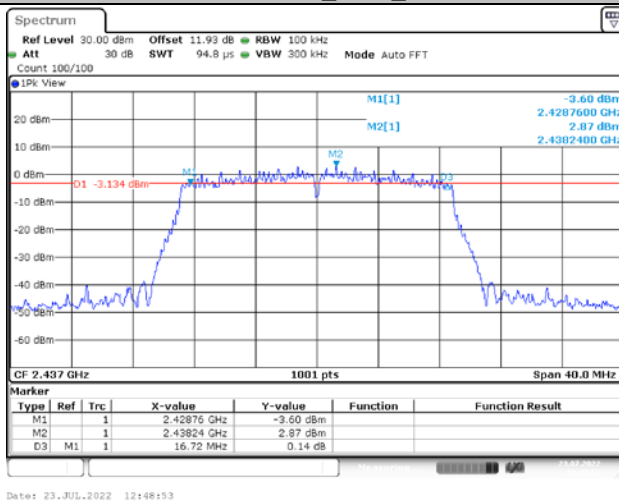
11N20MIMO_Ant1_2412



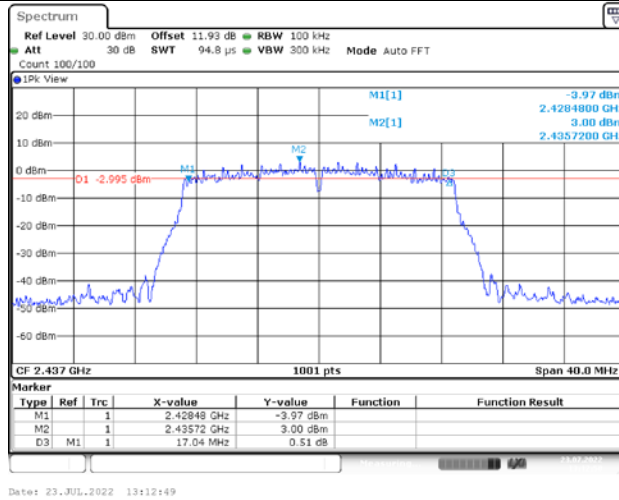
11N20MIMO_Ant2_2412



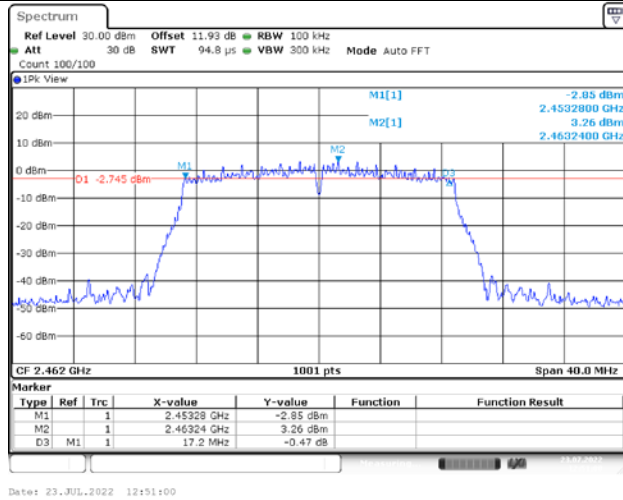
11N20MIMO_Ant1_2437



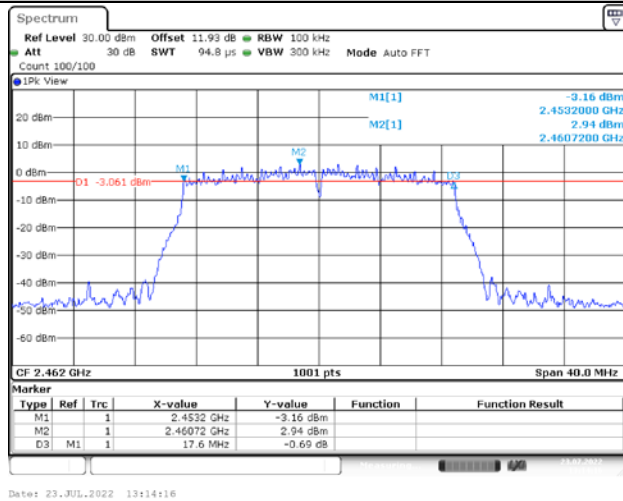
11N20MIMO_Ant2_2437



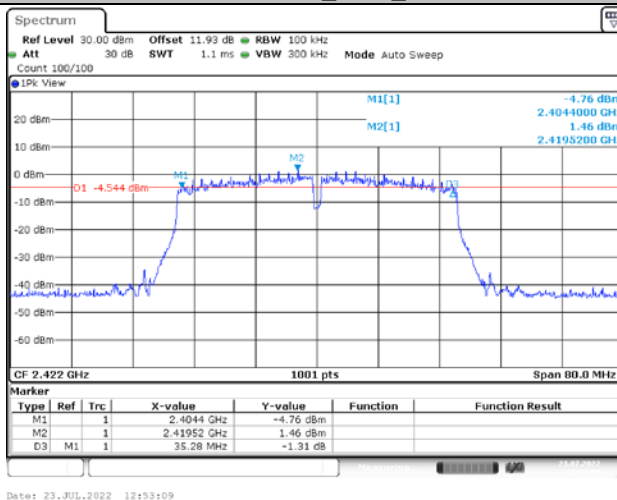
11N20MIMO_Ant1_2462



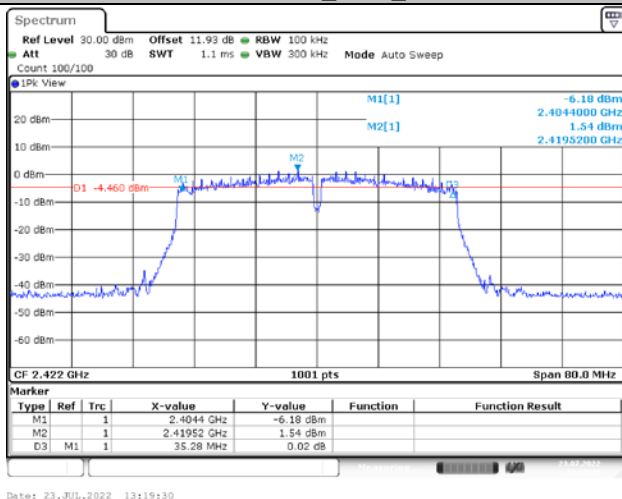
11N20MIMO_Ant2_2462



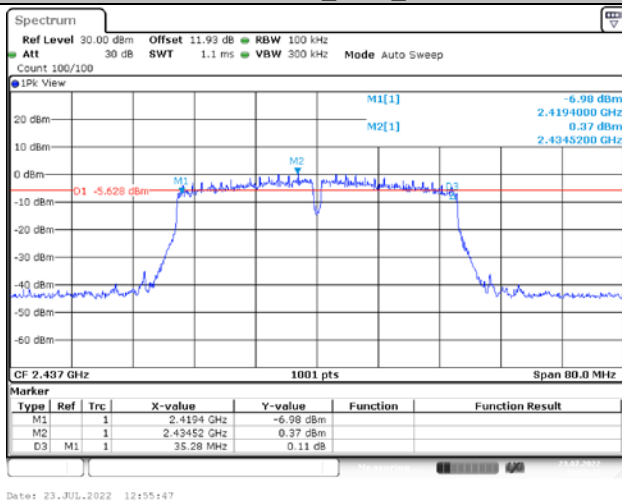
11N40MIMO_Ant1_2422



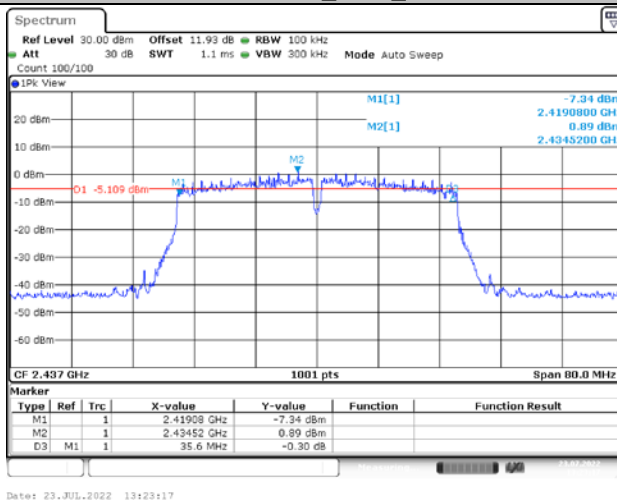
11N40MIMO_Ant2_2422



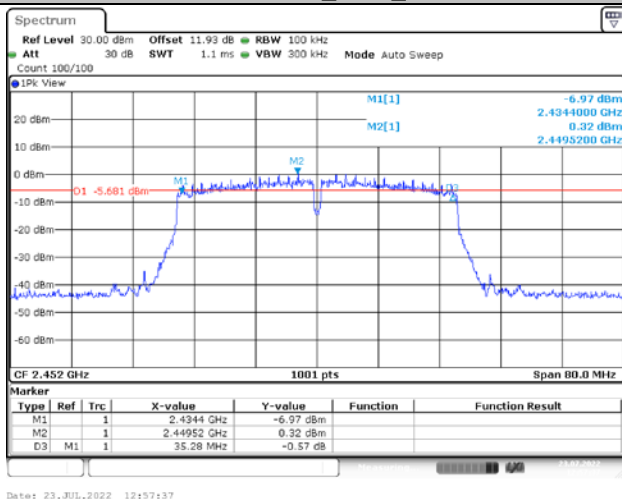
11N40MIMO_Ant1_2437



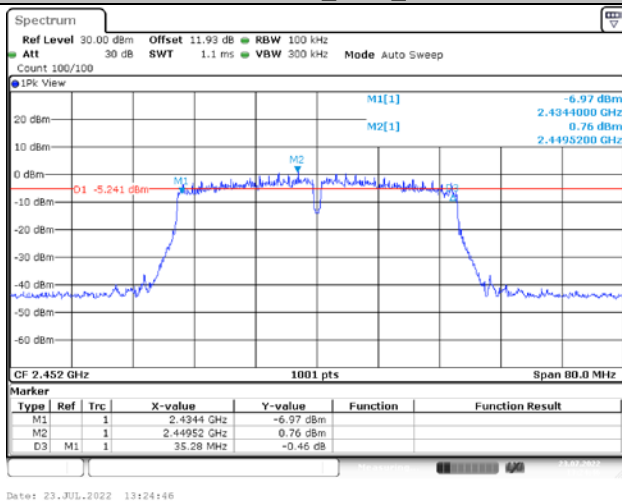
11N40MIMO_Ant2_2437



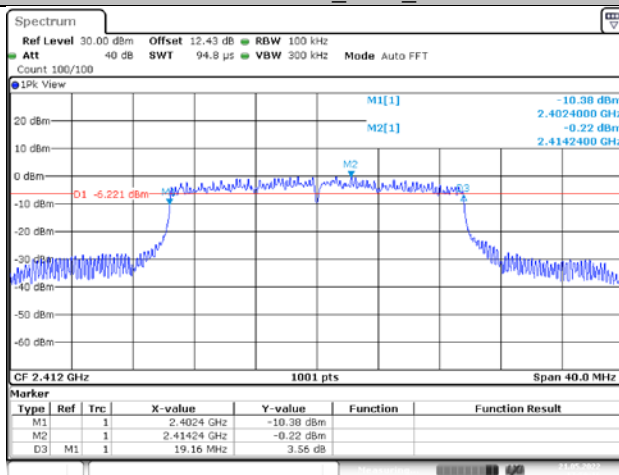
11N40MIMO_Ant1_2452



11N40MIMO_Ant2_2452

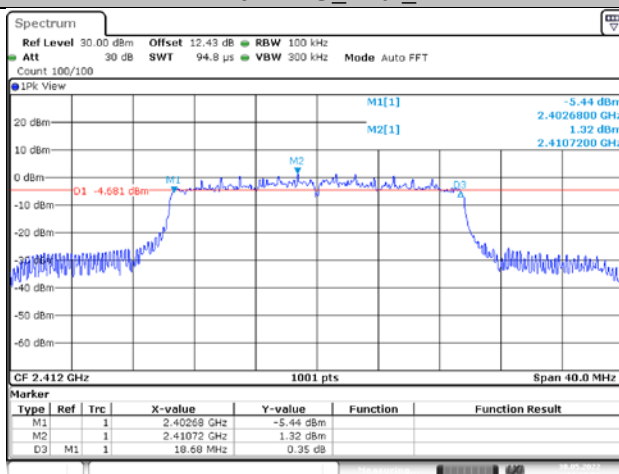


11AX20MIMO_Ant1_2412



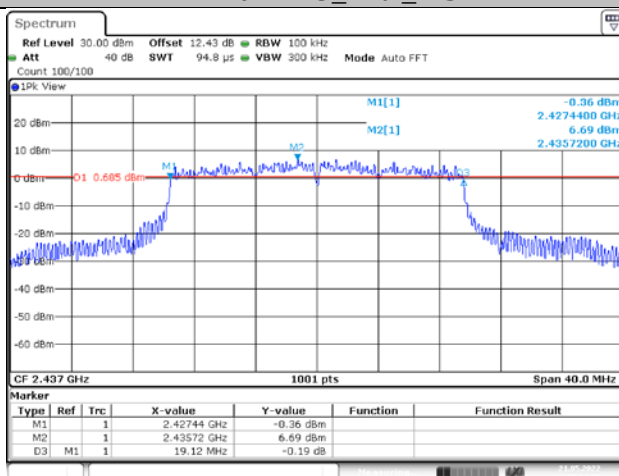
Date: 21.MAY.2022 17:50:16

11AX20MIMO_Ant2_2412



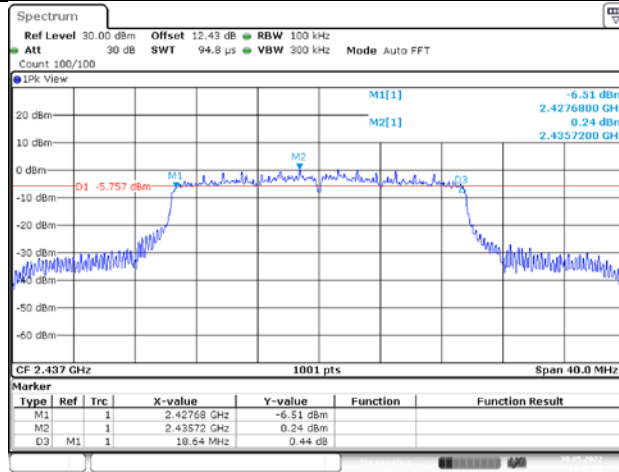
Date: 30.MAY.2022 11:33:31

11AX20MIMO_Ant1_2437



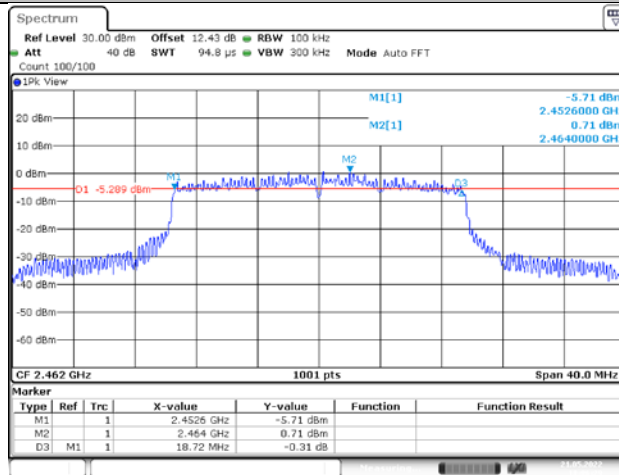
Date: 21.MAY.2022 18:02:56

11AX20MIMO_Ant2_2437



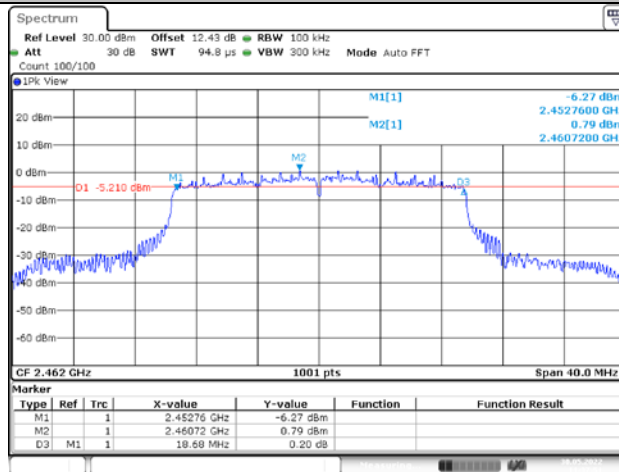
Date: 30.MAY.2022 11:36:10

11AX20MIMO_Ant1_2462



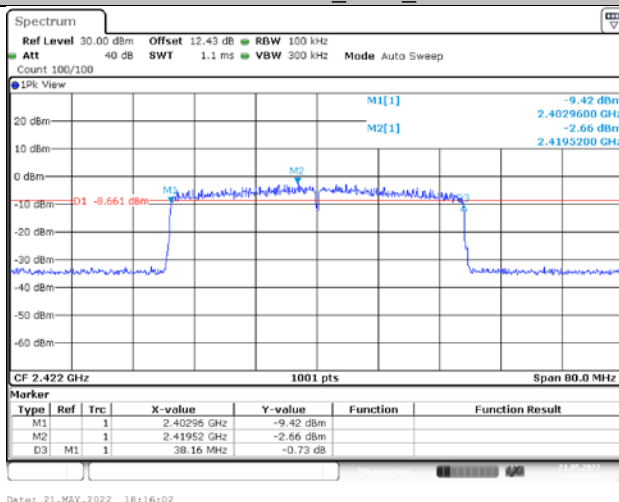
Date: 21.MAY.2022 18:06:29

11AX20MIMO_Ant2_2462

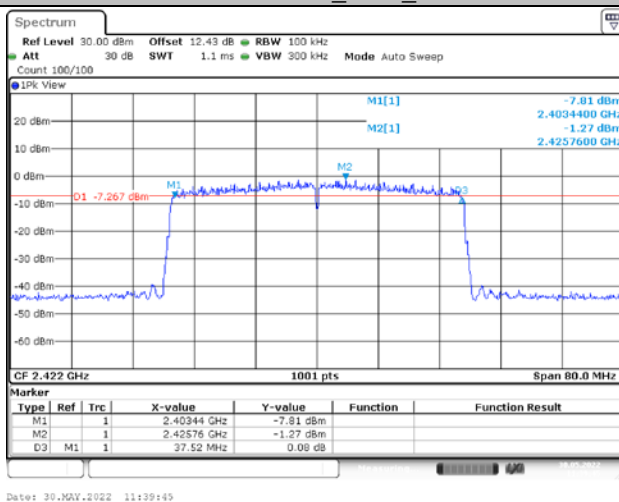


Date: 30.MAY.2022 11:37:52

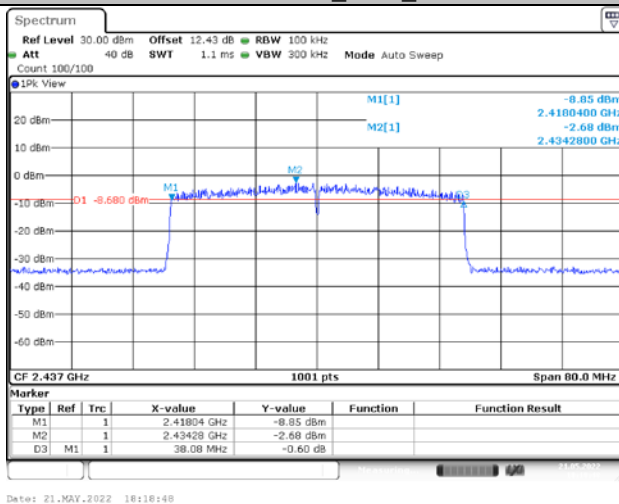
11AX40MIMO_Ant1_2422



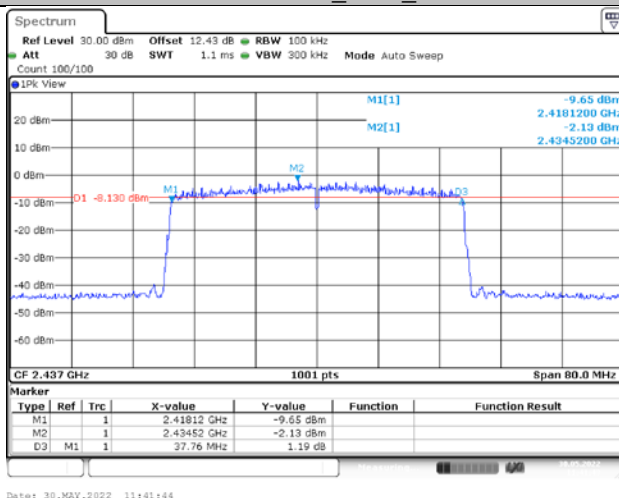
11AX40MIMO_Ant2_2422



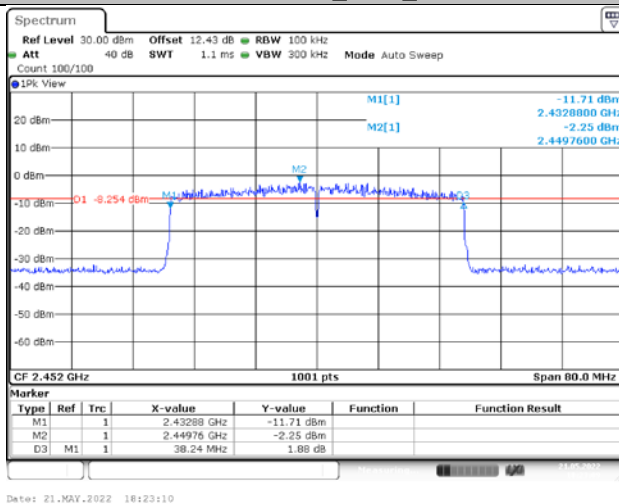
11AX40MIMO_Ant1_2437



11AX40MIMO_Ant2_2437



11AX40MIMO_Ant1_2452



11AX40MIMO_Ant2_2452

