TESTREPORT

Applicant Name :	Crestron Electronics Inc
Address :	15 Volvo Drive, Rockleigh, New Jersey, 07647, USA
Report Number :	SZNS220923-43608E-RF-00D
FCC ID:	EROAM-TX3-200

Test Standard (s)

FCC PART 15.247

Sample Description

Product Type:	WIRELESS MEDIA TRANSMITTER
Model No.:	M202106002
Trade Mark:	CRESTRON
Date Received:	2022/09/23
Report Date:	2022/12/08

Test Result:	Pass*

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

Prepared and Checked By:

Andy Yu
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 "★".
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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
SUPPORT EQUIPMENT LIST AND DETAILS 7
EXTERNAL I/O CABLE 7
BLOCK DIAGRAM OF TEST SETUP 8
SUMMARY OF TEST RESULTS **11**
TEST EQUIPMENT LIST **12**
FCC §15.247 (I) & §1.1307 (B) (3) & §2.1091- RF EXPOSURE **14**
APPLICABLE STANDARD 14
RESULT 15
FCC §15.203 - ANTENNA REQUIREMENT **16**
APPLICABLE STANDARD 16
ANTENNA CONNECTOR CONSTRUCTION 16
FCC §15.207 (A) – AC LINE CONDUCTED EMISSIONS **17**
APPLICABLE STANDARD 17
EUT SETUP 17
EMI TEST RECEIVER SETUP 17
TEST PROCEDURE 17
TRANSD FACTOR & MARGIN CALCULATION 18
TEST DATA 18
FCC §15.209, §15.205 & §15.247(D) - SPURIOUS EMISSIONS **25**
APPLICABLE STANDARD 25
EUT SETUP 25
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP 26
TEST PROCEDURE 26
FACTOR & MARGIN CALCULATION 26
TEST DATA 26
FCC §15.247(A) (2) – 6 DB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH **39**
APPLICABLE STANDARD 39
TEST PROCEDURE 39
TEST DATA 39
FCC §15.247(B) (3) - MAXIMUM CONDUCTED OUTPUT POWER **40**
APPLICABLE STANDARD 40
TEST PROCEDURE 40
TEST DATA 40

FCC §15.247(D) – 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE 41
APPLICABLE STANDARD 41
TEST PROCEDURE 41
TEST DATA 41
FCC §15.247(E) - POWER SPECTRAL DENSITY 42
APPLICABLE STANDARD 42
TEST PROCEDURE 42
TEST DATA 42
APPENDIX WI-FI 43
APPENDIX A: DTS BANDWIDTH 43
APPENDIX B: OCCUPIED CHANNEL BANDWIDTH 48
APPENDIX C: MAXIMUM CONDUCTED OUTPUT POWER 53
APPENDIX D: MAXIMUM POWER SPECTRAL DENSITY 55
APPENDIX E:BAND EDGE MEASUREMENTS 64
APPENDIX F: DUTY CYCLE 70

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	Wi-Fi: 2412-2462MHz
Maximum Conducted Peak Output Power	Wi-Fi:18.76dBm(802.11b), 20.28dBm(802.11g) 22.88dBm(802.11n-HT20), 23.44dBm(802.11ax20),
Modulation Technique	Wi-Fi: DSSS, OFDM, OFDMA
Antenna Specification*	4.5dBi (It is provided by the applicant)
Voltage Range	DC 24V from adapter or 48 from POE or DC 5V from Type-C port
Sample serial number	SZNS220923-43608E-RF-S1 for Conducted and Radiated Emissions SZNS220923-43608E-RF-S2 for RF Conducted Test (Assigned by ATC)
Sample/EUT Status	Good condition

Objective

This 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 Frequency		$0.082*10^{-7}$
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
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

For Wi-Fi mode, total 11 channels are provided to testing:

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

For 802.11b, 802.11g, 802.11n-HT20, 802.11ax20, EUT was tested with Channel 1, 6 and 11.

Equipment Modifications

No modification was made to the EUT tested.

EUT Exercise Software

"CMD command" was used. The software and power level was provided by the manufacturer.

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

Test Mode	Data rate	RuSize	RuIndex	Power Level*		
				Low Channel	Middle Channel	High Channel
802.11b	1 Mbps	/	/	12	12	12
802.11g	6 Mbps	/	/	12	12	12
802.11n20	MCS0	/	/	12	12	12
802.11ax20	MCS0	26Tone	RU0	8	8	8
		52Tone	RU37	8	8	8
		106Tone	RU53	8	8	8
		242Tone	RU61	12	12	12

For Wi-Fi mode, EUT have two antennas, the 802.11b/g mode only support SISO transmit, the 802.11n/ax mode support SISO/MIMO transmit. For 802.11n/ax mode, according pre-scan, the worst case MIMO mode was selected to test and record in report.

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

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	Note Book	XXJL-2	Unknown
HUAWEI	Router	WS5100	A4933FEF1D01
Unknown	U disk	Unknown	Unknown
GOSPELL	POE	G0720-480-050	200200019
CRESTRON	Adapter	HU10600-16024	344329
Grandstream	IP Phone	GXV 3450	Unknown
TECNO	Adapter1	U180TSA	Unknown

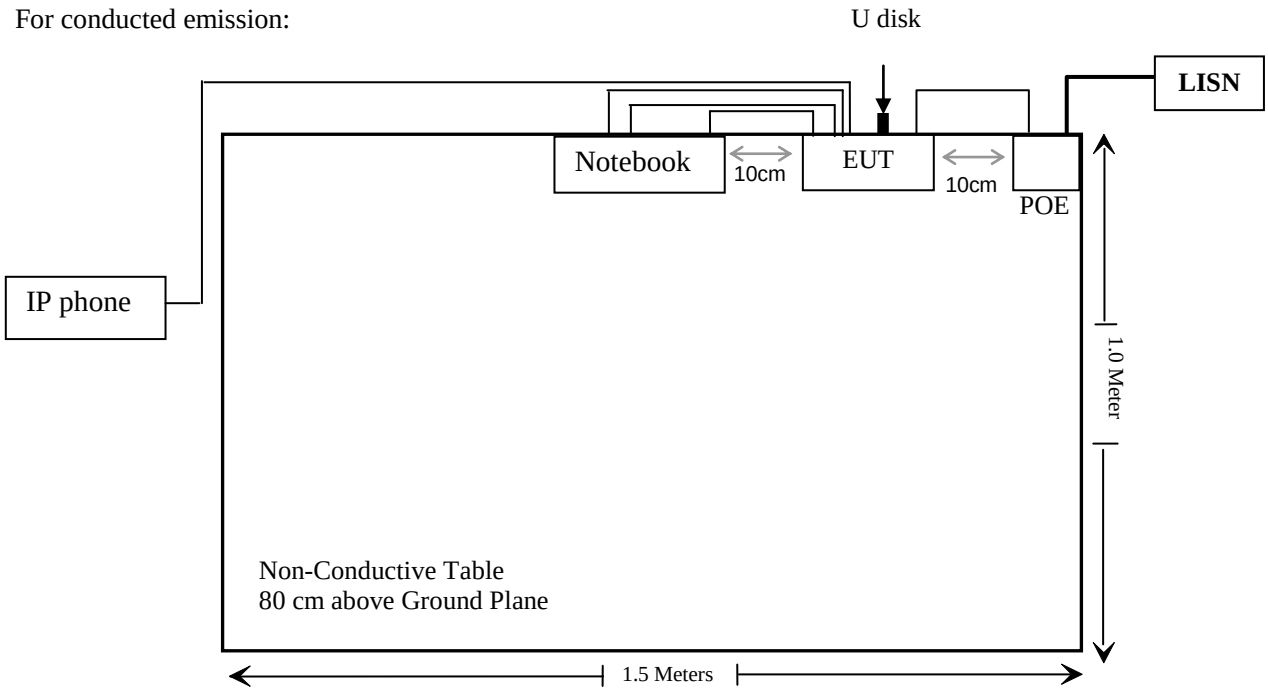
External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded detachable AC cable	1.5	POE/adapter	LISN
Un-shielded detachable RJ45 cable	1.5	POE	EUT
Un-shielded detachable RJ45 cable	8.0	EUT	Router
Un-shielded detachable HDMI cable	1.5	EUT	NoteBook
Un-shielded detachable RJ45 cable	8.0	IP Phone	EUT
Un-shielded Un-detachable DC cable	2.5	Adapter	EUT
Un-shielded Un-detachable USB cable*2	2.5	EUT	NoteBook
Un-shielded Un-detachable USB cable	2.5	EUT	Adapter1

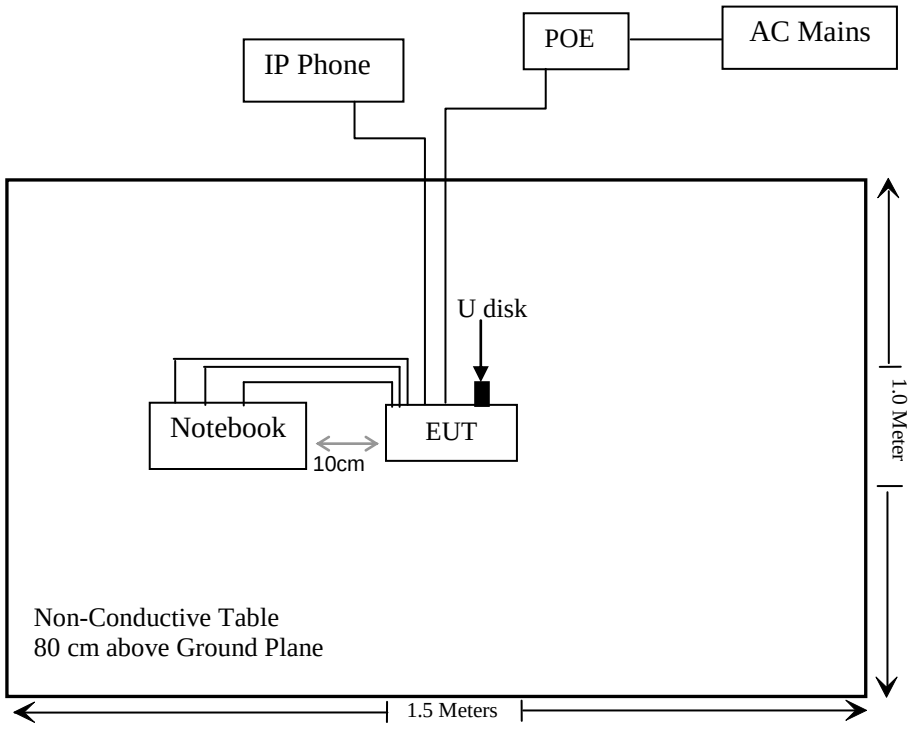
Block Diagram of Test Setup

Powered by POE:

For conducted emission:

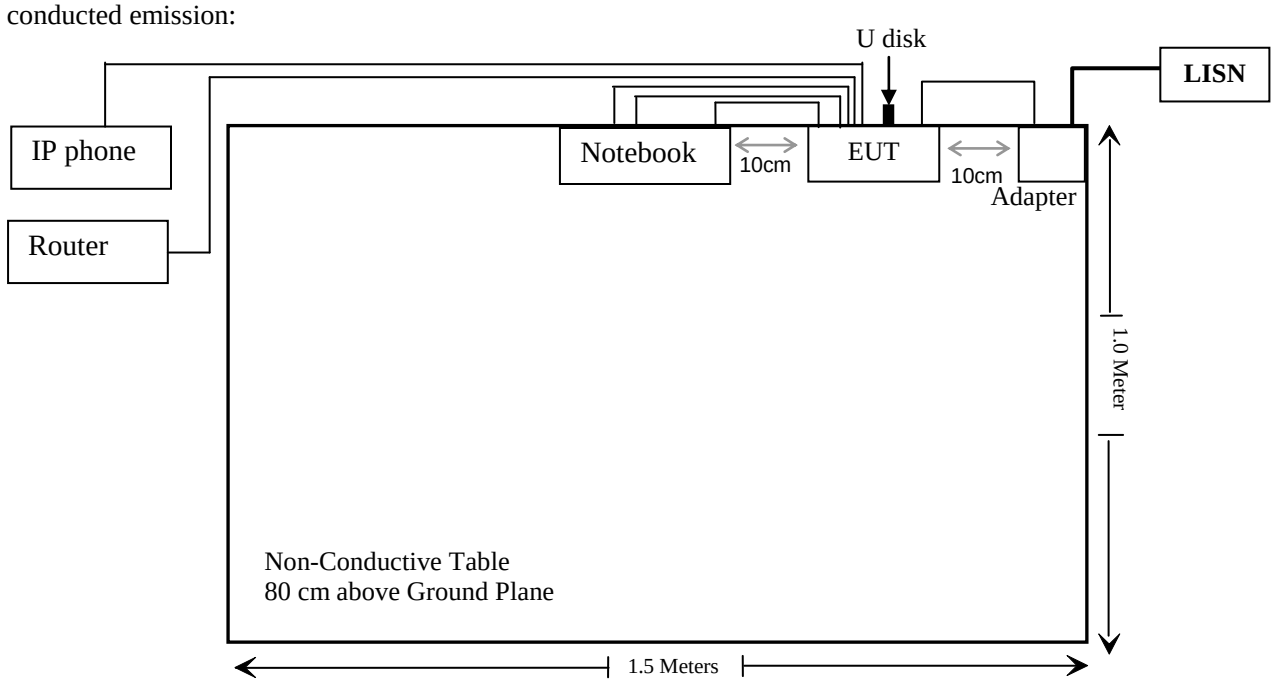


For radiated emission:

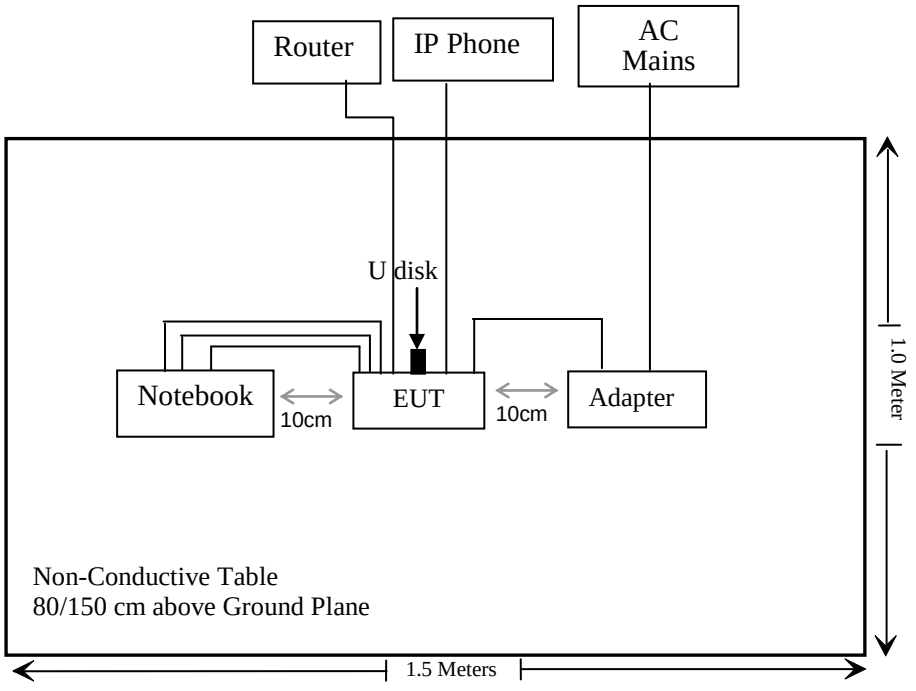


Powered by adapter:

For conducted emission:

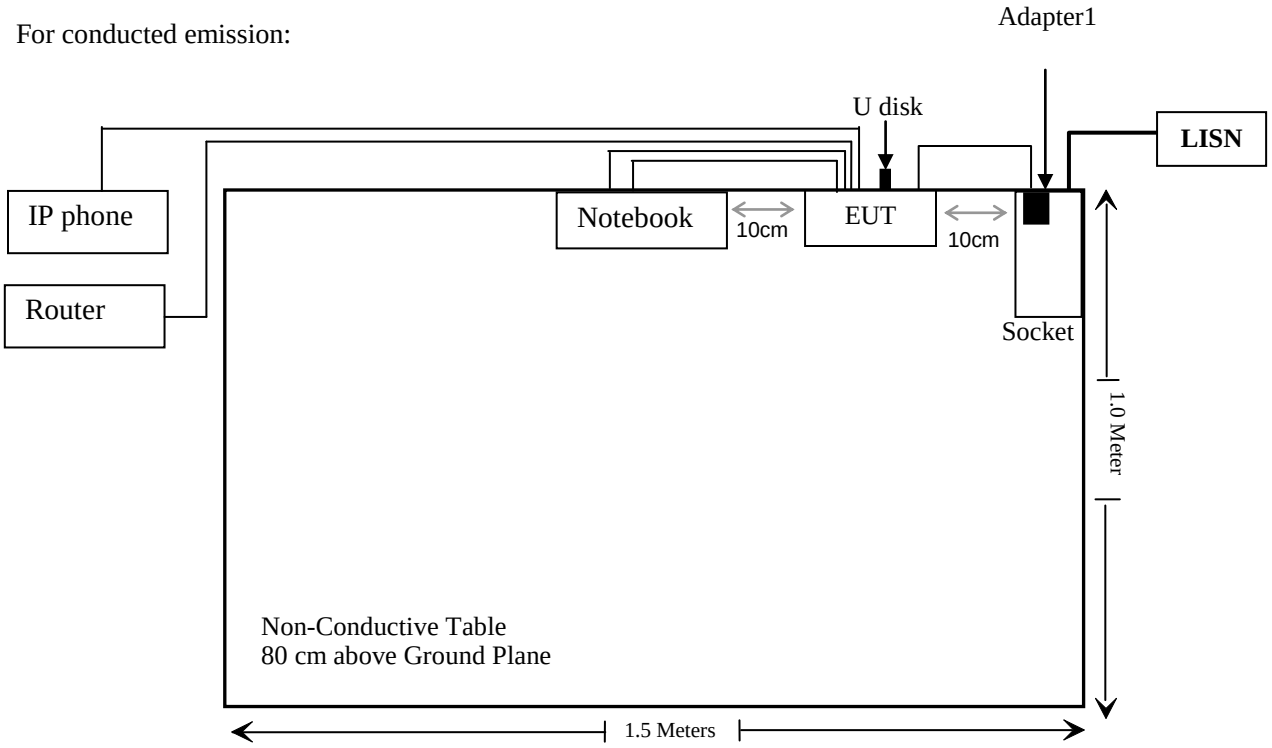


For radiated emission:

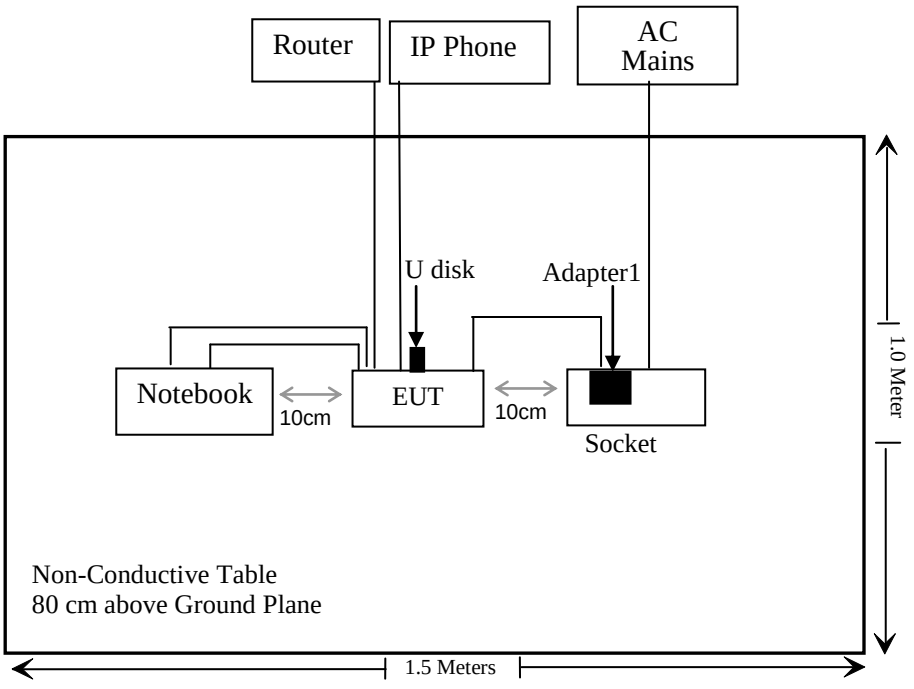


Powered by Type-C:

For conducted emission:



For radiated emission:



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.247 (i), §2.1091	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)	99% Occupied Bandwidth & 6 dB Emission 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
Rohde & Schwarz	L.I.S.N.	ENV216	101314	2021/12/13	2022/12/12
Anritsu Corp	50ΩCoaxial 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	2022/11/08	2023/11/07
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Quinstar	Amplifier	QLW-18405536-J0	15964001002	2021/11/09	2022/11/08
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
Radiated Emission Test Software: e3 19821b (V9)					
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
Unknown	RF Coaxial Cable	No.16	N650	2021/12/14	2022/12/13
Wainwright	High Pass Filter	WHKX3.6/18G-10SS	5	2021/12/14	2022/12/13

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Tonscend	RF Control Unit	JS0806-2	19G8060182	2022/10/24	2023/10/23
Rohde&Schwarz	Spectrum Analyzer	FSV-40	101495	2021/12/13	2022/12/12
WEINSCHEL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13
Unknown	RF Cable	Unknown	1	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 §15.247 (i) & §1.1307 (b) (3) & §2.1091- RF Exposure

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.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemptionfrom further evaluation from 300 kHz through 100 GHz.

Table 1 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^2f.
1,500-100,000	19.2R^2.

Ris the minimum separation distance in meters
f = frequency in MHz

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:

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

Result

Frequency (MHz)	Tune up conducted power	Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
	(dBm)	(dBi)	(dBd)	(dBm)	(W)		
2412-2462	24.0	4.5	2.35	26.35	0.432	0.2	0.768
5150-5250	16.5	3.5	1.35	17.85	0.061	0.2	0.768
5250-5350	16.0	3.5	1.35	17.35	0.054	0.2	0.768
5470-5725	18.5	3.5	1.35	19.85	0.097	0.2	0.768
5725-5850	16.0	3.5	1.35	17.35	0.054	0.2	0.768

Note: 1. The tune up conducted power and antenna gain was declared by the applicant.
2. The 2.4GHz wifi and 5GHz wifi 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.

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:

Antenna must be permanently attached to the unit.
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 internal antenna which was permanently attached, and the maximum antenna gain is 4.5 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

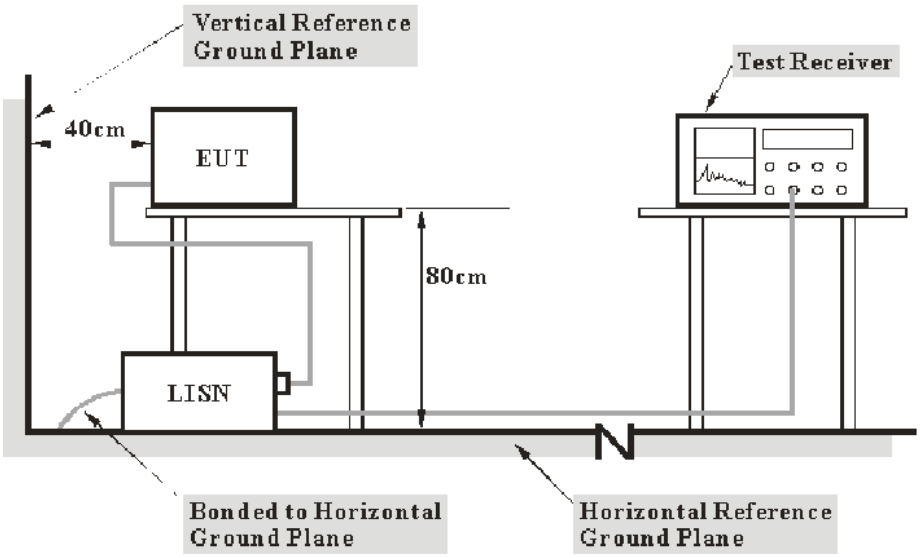
Result: Compliant

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.

Transd Factor & Margin Calculation

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

Transd Factor = LISN VDF + 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:

Over Limit = Level – Limit
Level = Read Level + Factor

Test Data

Environmental Conditions

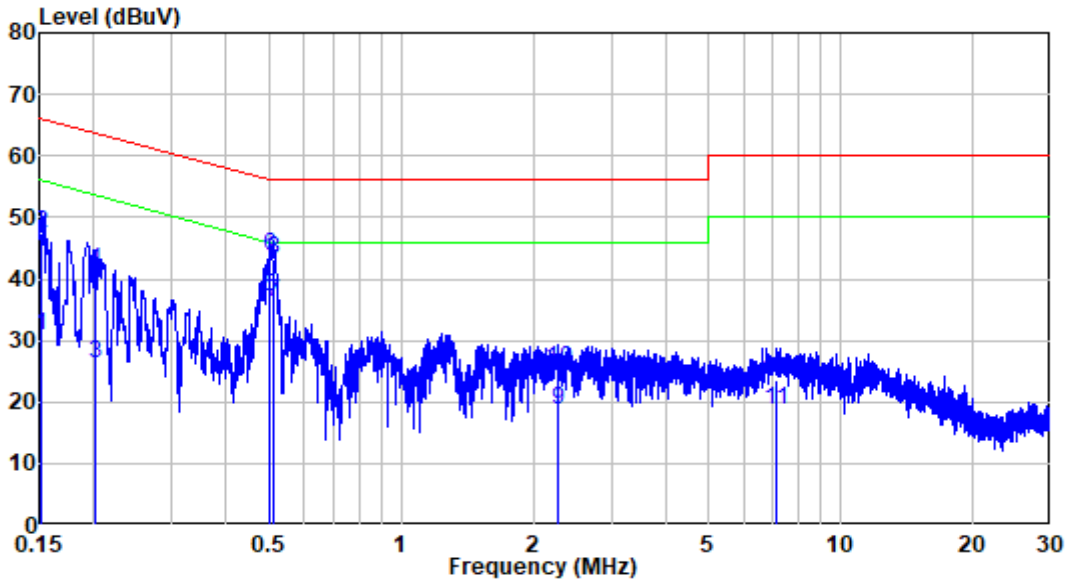
Temperature:	24~25°C
Relative Humidity:	47~60 %
ATM Pressure:	101.0 kPa

The testing was performed by Lipa on 2022-11-11 and 2022-12-06.

EUT operation mode: Transmitting (*the worst case is 802.11ax20 mode, low channel*)

For Adapter

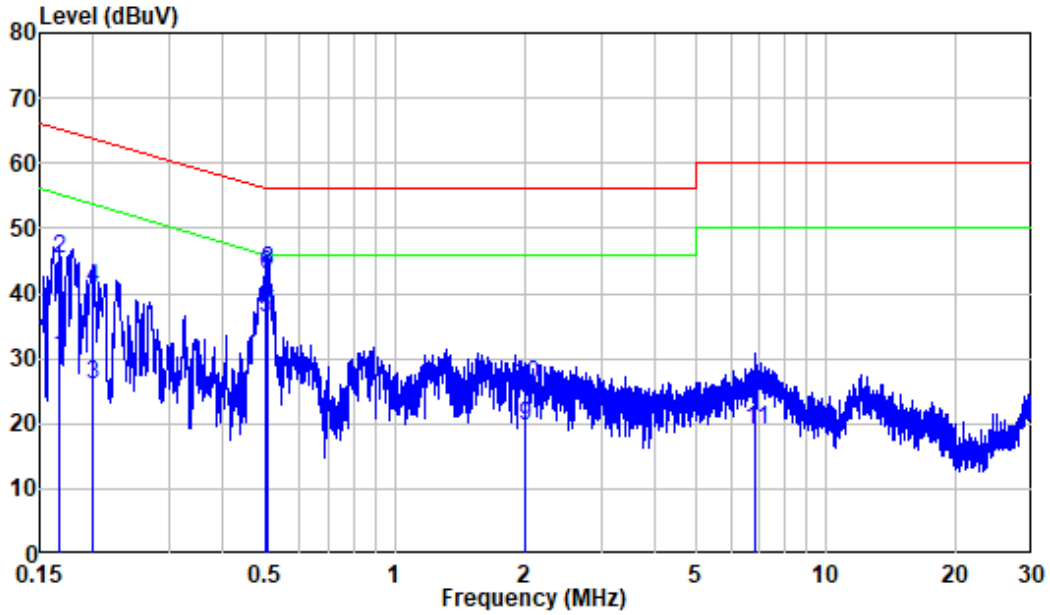
AC 120V/60 Hz, Line



Site : Shielding Room
Condition: Line
Job No. : SZNS220923-43608E-RF
Mode : 2.4G WIFI (Adapter)
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	21.10	30.90	55.93	-25.03	Average
2	0.151	9.80	37.73	47.53	65.93	-18.40	QP
3	0.200	9.80	16.59	26.39	53.59	-27.20	Average
4	0.200	9.80	31.52	41.32	63.59	-22.27	QP
5	0.500	9.80	27.21	37.01	46.00	-8.99	Average
6	0.500	9.80	33.98	43.78	56.00	-12.22	QP
7	0.512	9.81	26.39	36.20	46.00	-9.80	Average
8	0.512	9.81	33.39	43.20	56.00	-12.80	QP
9	2.274	9.82	8.92	18.74	46.00	-27.26	Average
10	2.274	9.82	15.63	25.45	56.00	-30.55	QP
11	7.090	9.87	8.70	18.57	50.00	-31.43	Average
12	7.090	9.87	13.69	23.56	60.00	-36.44	QP

AC 120V/60 Hz, Neutral

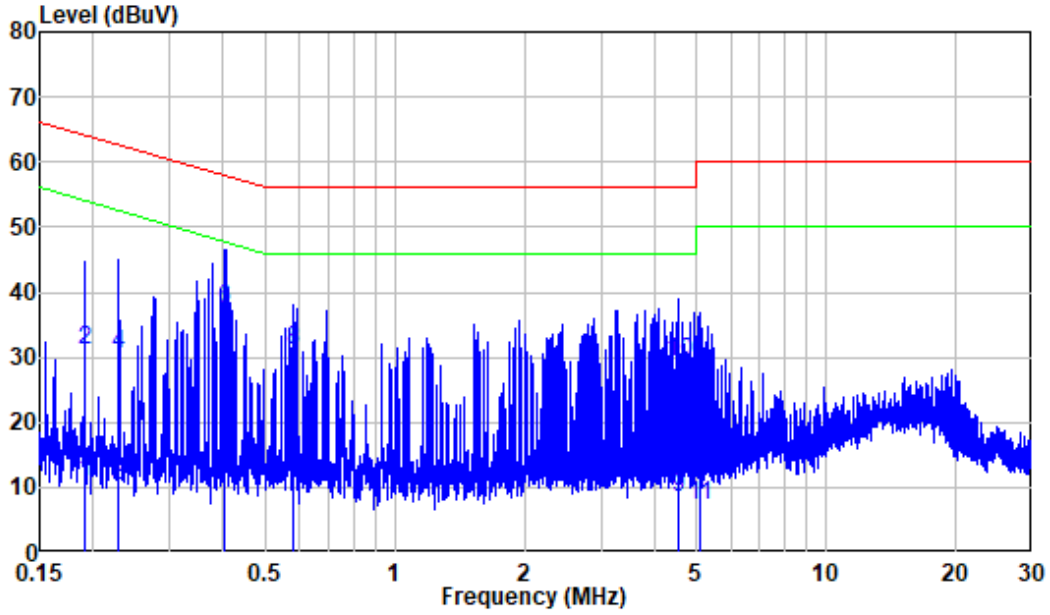


Site : Shielding Room
Condition: Neutral
Job No. : SZNS220923-43608E-RF
Mode : 2.4G WIFI (Adapter)
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.167	9.80	20.47	30.27	55.11	-24.84	Average
2	0.167	9.80	35.44	45.24	65.11	-19.87	QP
3	0.200	9.80	16.26	26.06	53.61	-27.55	Average
4	0.200	9.80	30.85	40.65	63.61	-22.96	QP
5	0.500	9.80	26.54	36.34	46.00	-9.66	Average
6	0.500	9.80	33.09	42.89	56.00	-13.11	QP
7	0.508	9.80	27.14	36.94	46.00	-9.06	Average
8	0.508	9.80	33.65	43.45	56.00	-12.55	QP
9	2.004	9.82	9.95	19.77	46.00	-26.23	Average
10	2.004	9.82	16.21	26.03	56.00	-29.97	QP
11	6.859	9.97	8.97	18.94	50.00	-31.06	Average
12	6.859	9.97	14.23	24.20	60.00	-35.80	QP

For POE:

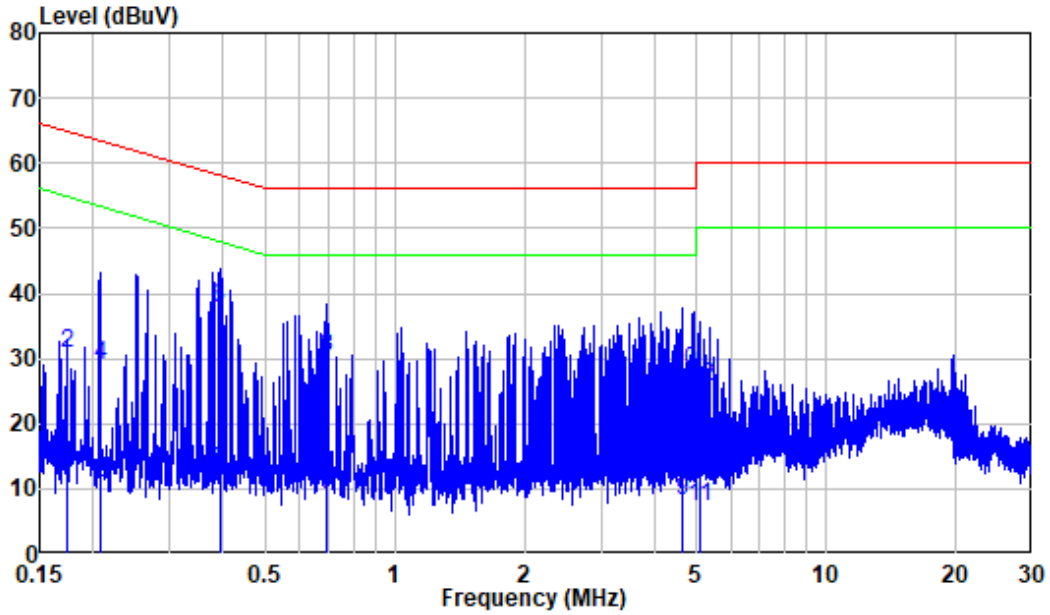
AC 120V/60 Hz, Line



Site : Shielding Room
Condition: Line
Job No. : SZNS220923-43608E-RF
Mode : 2.4G WIFI(POE)
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.191	9.80	1.15	10.95	54.00	-43.05	Average
2	0.191	9.80	21.16	30.96	64.00	-33.04	QP
3	0.228	9.80	0.33	10.13	52.51	-42.38	Average
4	0.228	9.80	20.72	30.52	62.51	-31.99	QP
5	0.404	9.80	3.19	12.99	47.77	-34.78	Average
6	0.404	9.80	27.69	37.49	57.77	-20.28	QP
7	0.580	9.81	-0.09	9.72	46.00	-36.28	Average
8	0.580	9.81	21.31	31.12	56.00	-24.88	QP
9	4.519	9.85	-1.48	8.37	46.00	-37.63	Average
10	4.519	9.85	19.45	29.30	56.00	-26.70	QP
11	5.085	9.85	-2.61	7.24	50.00	-42.76	Average
12	5.085	9.85	15.11	24.96	60.00	-35.04	QP

AC 120V/60 Hz, Neutral

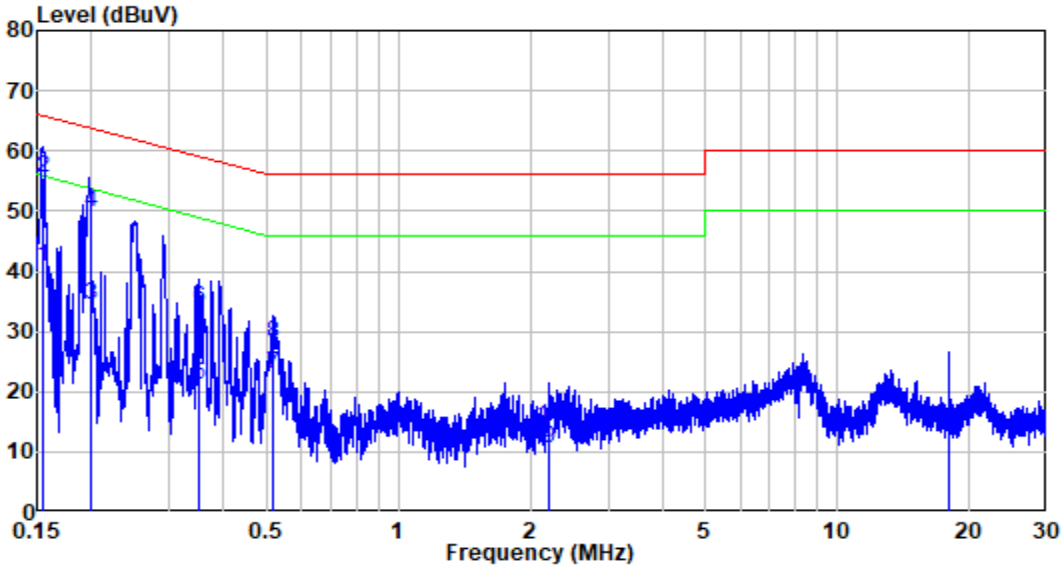


Site : Shielding Room
Condition: Neutral
Job No. : SZNS220923-43608E-RF
Mode : 2.4G WIFI(POE)
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.173	9.80	2.22	12.02	54.80	-42.78	Average
2	0.173	9.80	21.12	30.92	64.80	-33.88	QP
3	0.207	9.80	1.09	10.89	53.33	-42.44	Average
4	0.207	9.80	19.11	28.91	63.33	-34.42	QP
5	0.392	9.80	2.78	12.58	48.02	-35.44	Average
6	0.392	9.80	27.79	37.59	58.02	-20.43	QP
7	0.694	9.81	-0.90	8.91	46.00	-37.09	Average
8	0.694	9.81	20.26	30.07	56.00	-25.93	QP
9	4.641	9.88	-1.66	8.22	46.00	-37.78	Average
10	4.641	9.88	18.23	28.11	56.00	-27.89	QP
11	5.085	9.89	-2.64	7.25	50.00	-42.75	Average
12	5.085	9.89	15.73	25.62	60.00	-34.38	QP

For Type-C

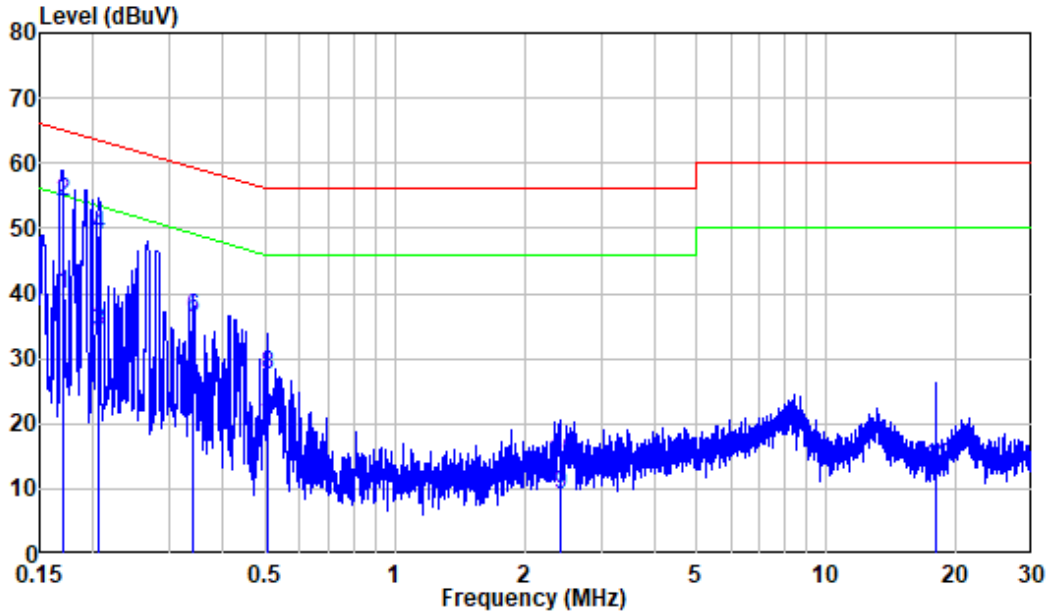
AC 120V/60 Hz, Line



Site : Shielding Room
Condition: Line
Job No. : SZNS220923-43608E-RF
Mode : 2.4G WIFI
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.154	9.80	30.86	40.66	55.76	-15.10	Average
2	0.154	9.80	45.80	55.60	65.76	-10.16	QP
3	0.200	9.80	24.52	34.32	53.61	-19.29	Average
4	0.200	9.80	39.89	49.69	63.61	-13.92	QP
5	0.350	9.80	11.36	21.16	48.97	-27.81	Average
6	0.350	9.80	23.92	33.72	58.97	-25.25	QP
7	0.517	9.81	13.18	22.99	46.00	-23.01	Average
8	0.517	9.81	18.13	27.94	56.00	-28.06	QP
9	2.209	9.82	0.74	10.56	46.00	-35.44	Average
10	2.209	9.82	4.46	14.28	56.00	-41.72	QP
11	17.944	9.98	2.57	12.55	50.00	-37.45	Average
12	17.944	9.98	3.54	13.52	60.00	-46.48	QP

AC 120V/60 Hz, Neutral



Site : Shielding Room
Condition: Neutral
Job No. : SZNS220923-43608E-RF
Mode : 2.4G WIFI
Power : AC 120V 60Hz

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB	dBuV	dBuV	dBuV	dB	
1	0.169	9.80	30.05	39.85	54.99	-15.14	Average
2	0.169	9.80	44.20	54.00	64.99	-10.99	QP
3	0.206	9.80	24.20	34.00	53.36	-19.36	Average
4	0.206	9.80	39.00	48.80	63.36	-14.56	QP
5	0.341	9.80	13.85	23.65	49.17	-25.52	Average
6	0.341	9.80	26.37	36.17	59.17	-23.00	QP
7	0.505	9.80	9.64	19.44	46.00	-26.56	Average
8	0.505	9.80	17.68	27.48	56.00	-28.52	QP
9	2.414	9.82	-0.80	9.02	46.00	-36.98	Average
10	2.414	9.82	4.38	14.20	56.00	-41.80	QP
11	17.944	10.08	1.28	11.36	50.00	-38.64	Average
12	17.944	10.08	3.22	13.30	60.00	-46.70	QP

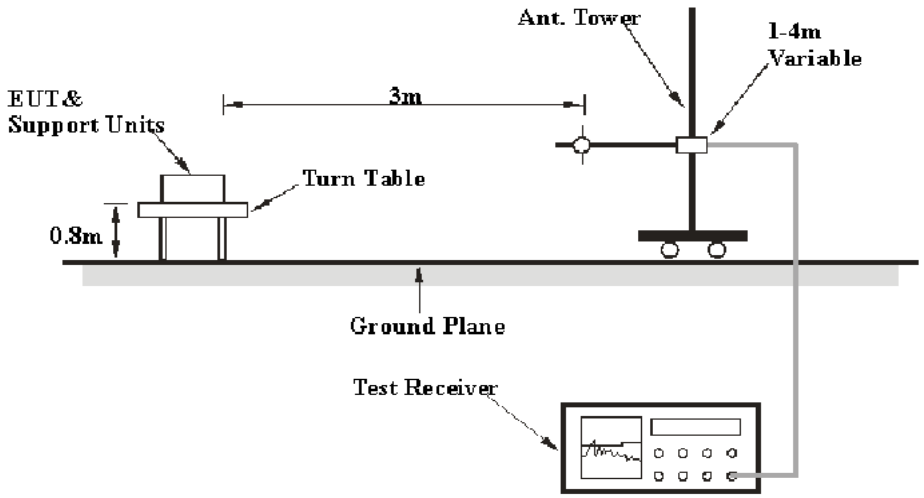
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

Applicable Standard

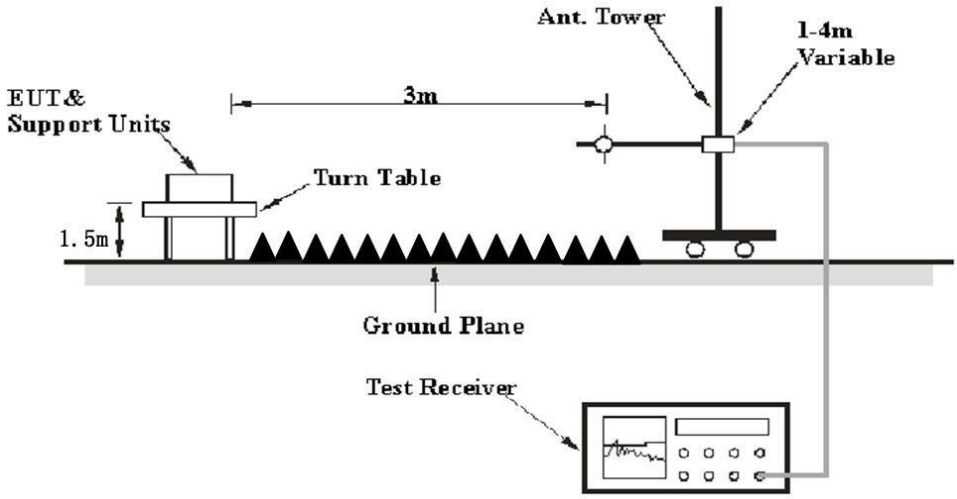
FCC §15.247 (d); §15.209; §15.205;

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%

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:

Factor = Antenna Factor + Cable Loss - 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:

Over Limit/Margin = Level / Corrected Amplitude – Limit
Level / Corrected Amplitude = Read Level + Factor

Test Data

Environmental Conditions

Temperature:	24~24.5℃
Relative Humidity:	50~59%
ATM Pressure:	101.0 kPa

The testing was performed by Level Li on 2022-11-22 and 2022-12-06 for below 1GHz,Jeff Jiang on 2022-10-09 for above 1GHz.

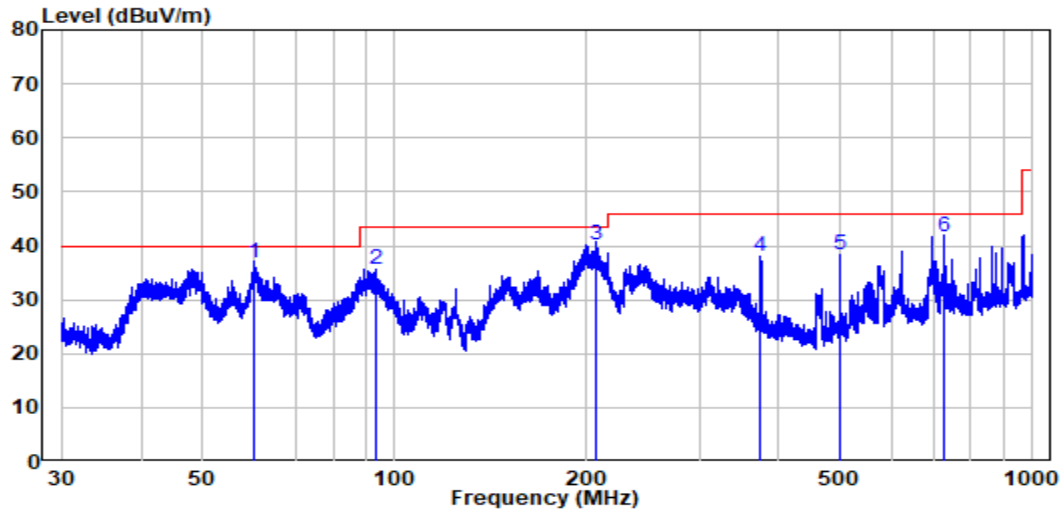
EUT operation mode: Transmitting (Pre-scan in the X,Y and Z axes of orientation, the worst case X-axes of orientation was recorded)

30 MHz~1 GHz: *(worst case is 802.11ax20 mode, low channel)*

Note: When the result of Peak less than the limit of QP by more than 6dB, just the peak value was recorded.

For Adapter

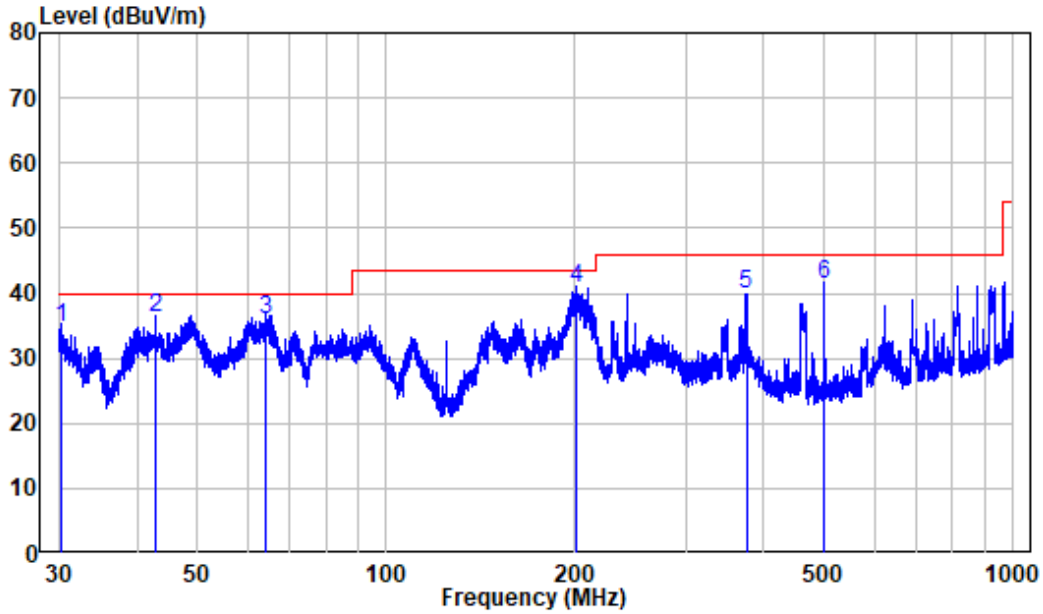
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS220923-43608E-RF
Test Mode: 2.4G WIFI
Note : Adapter

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	60.333	-10.75	47.49	36.74	40.00	-3.26	QP
2	93.113	-12.97	48.73	35.76	43.50	-7.74	Peak
3	207.123	-11.84	52.00	40.16	43.50	-3.34	QP
4	374.951	-7.27	45.44	38.17	46.00	-7.83	Peak
5	500.082	-4.25	42.49	38.24	46.00	-7.76	Peak
6	724.579	-1.29	43.10	41.81	46.00	-4.19	QP

Vertical

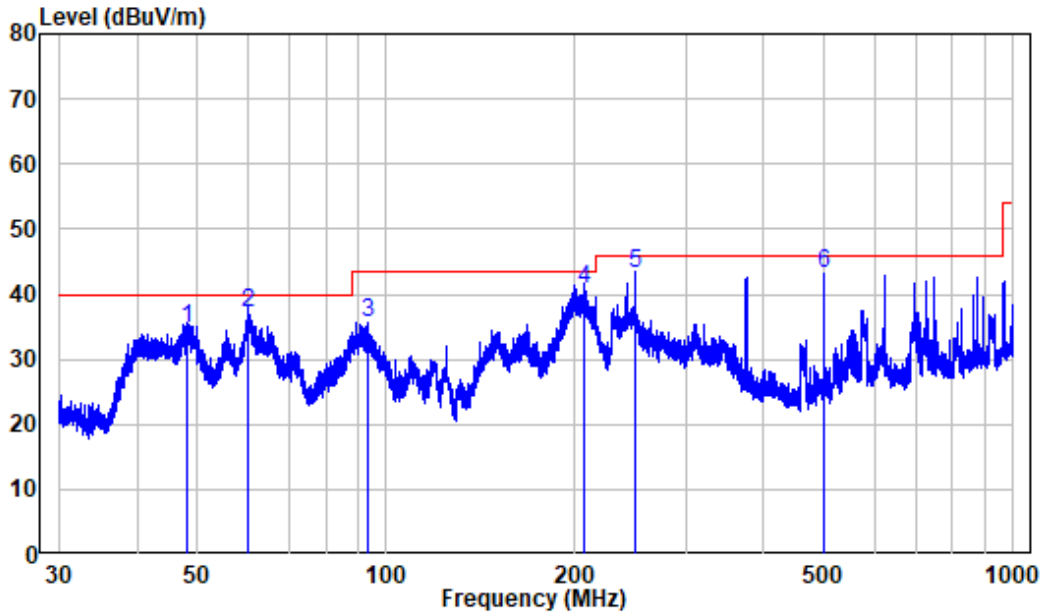


Site : chamber
Condition: 3m VERTICAL
Job No. : SZNS220923-43608E-RF
Test Mode: 2.4G WIFI
Note : Adapter

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	30.291	-12.36	46.99	34.63	40.00	-5.37	QP
2	42.750	-9.97	46.29	36.32	40.00	-3.68	QP
3	64.151	-12.20	48.09	35.89	40.00	-4.11	QP
4	201.481	-11.53	52.20	40.67	43.50	-2.83	QP
5	375.116	-7.28	47.21	39.93	46.00	-6.07	Peak
6	500.082	-4.25	45.60	41.35	46.00	-4.65	QP

For POE

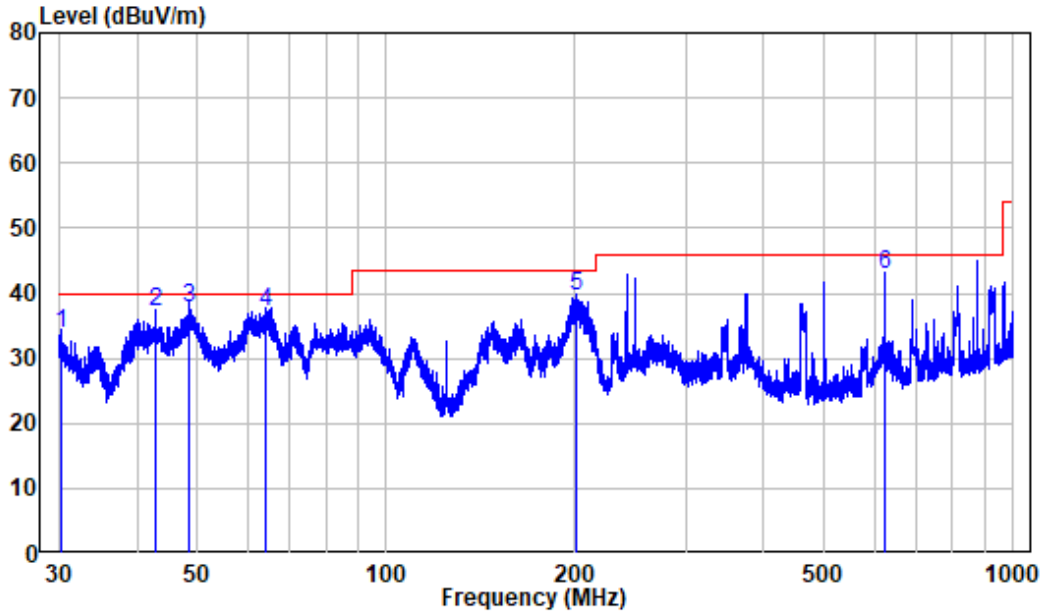
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS220923-43608E-RF
Test Mode: 2.4G WIFI
Note : POE

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	48.036	-10.00	44.70	34.70	40.00	-5.30	QP
2	60.333	-10.75	48.01	37.26	40.00	-2.74	QP
3	93.113	-12.97	48.73	35.76	43.50	-7.74	Peak
4	207.123	-11.84	52.50	40.66	43.50	-2.84	QP
5	249.972	-10.74	54.00	43.26	46.00	-2.74	QP
6	500.082	-4.25	47.30	43.05	46.00	-2.95	QP

Vertical

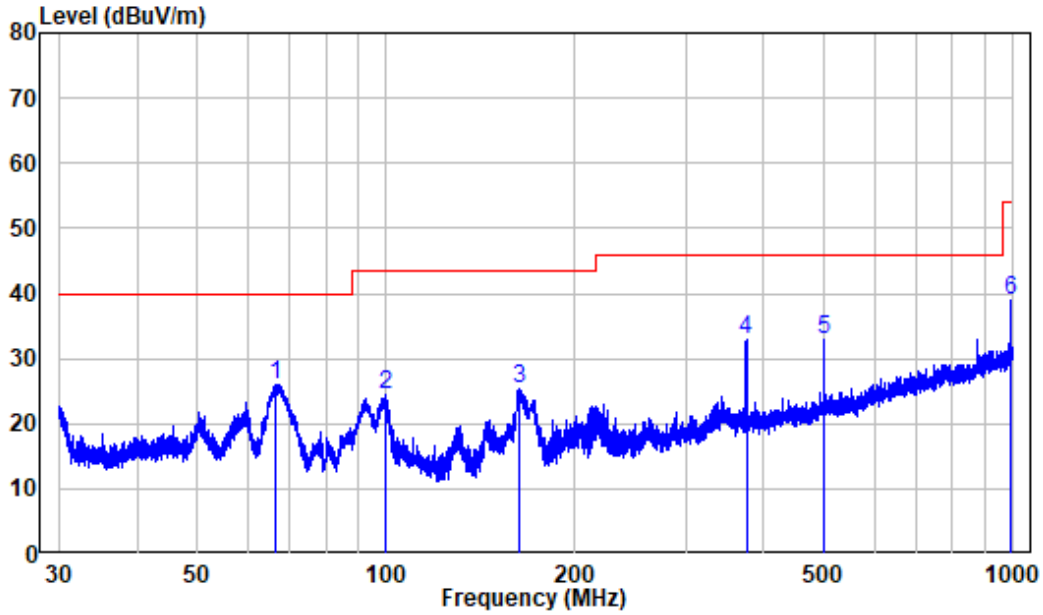


Site : chamber
Condition: 3m VERTICAL
Job No. : SZNS220923-43608E-RF
Test Mode: 2.4G WIFI
Note : POE

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	30.291	-12.36	46.09	33.73	40.00	-6.27	QP
2	42.750	-9.97	46.99	37.02	40.00	-2.98	QP
3	48.565	-9.97	47.59	37.62	40.00	-2.38	QP
4	64.151	-12.20	49.19	36.99	40.00	-3.01	QP
5	201.481	-11.53	51.20	39.67	43.50	-3.83	QP
6	625.078	-2.35	45.30	42.95	46.00	-3.05	QP

For Type-C:

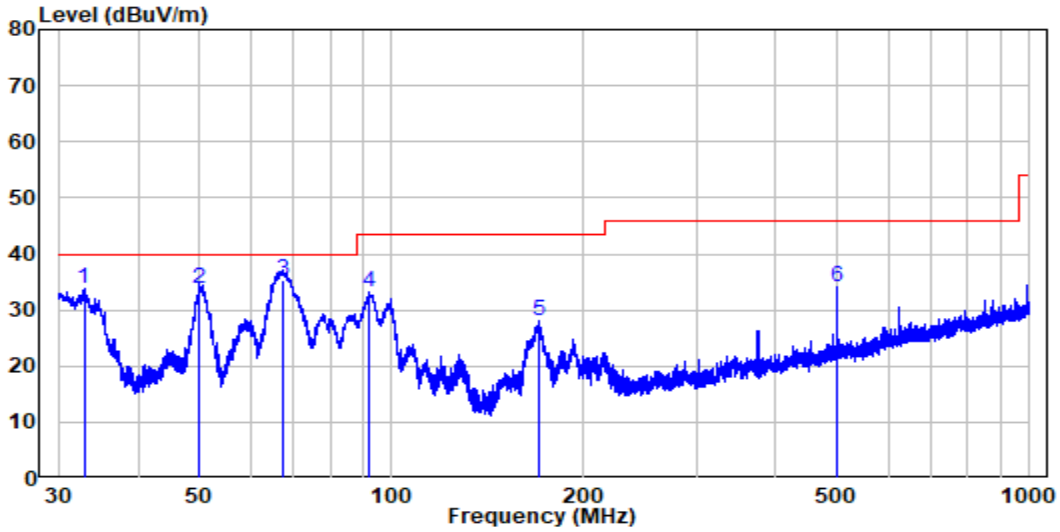
Horizontal



Site : chamber
Condition: 3m HORIZONTAL
Job No. : SZNS220923-43608E-RF
Test Mode: 2.4G Wifi

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	66.616	-13.18	39.22	26.04	40.00	-13.96	Peak
2	99.659	-11.88	36.35	24.47	43.50	-19.03	Peak
3	162.611	-14.29	39.69	25.40	43.50	-18.10	Peak
4	375.116	-7.28	40.15	32.87	46.00	-13.13	Peak
5	500.082	-4.25	37.17	32.92	46.00	-13.08	Peak
6	990.403	2.83	36.18	39.01	54.00	-14.99	Peak

Vertical



Site : chamber
Condition: 3m VERTICAL
Job No. : SZNS220923-43608E-RF
Test Mode: 2.4G Wifi

	Freq	Factor	Read Level	Level	Limit Line	Over Limit	Remark
	MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	
1	32.907	-12.03	45.75	33.72	40.00	-6.28	Peak
2	49.991	-9.91	43.70	33.79	40.00	-6.21	QP
3	67.705	-13.70	49.11	35.41	40.00	-4.59	QP
4	92.381	-13.19	46.28	33.09	43.50	-10.41	Peak
5	169.599	-13.62	41.55	27.93	43.50	-15.57	Peak
6	500.082	-4.25	38.24	33.99	46.00	-12.01	Peak

1 GHz-25 GHz: (worst case is adapter)

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/AV		Height (m)	Polar (H/V)				
802.11b Mode (worst case antenna 1)									
Low Channel(2412MHz)									
2310	67.58	PK	149	1.6	H	-7.24	60.34	74	-13.66
2310	53.05	AV	149	1.6	H	-7.24	45.81	54	-8.19
2310	67.52	PK	135	1.4	V	-7.24	60.28	74	-13.72
2310	53.22	AV	135	1.4	V	-7.24	45.98	54	-8.02
2390	71.49	PK	357	2	H	-7.22	64.27	74	-9.73
2390	54.36	AV	357	2	H	-7.22	47.14	54	-6.86
2390	68.37	PK	31	1.1	V	-7.22	61.15	74	-12.85
2390	54.26	AV	31	1.1	V	-7.22	47.04	54	-6.96
4824	61.08	PK	16	1.4	H	-3.52	57.56	74	-16.44
4824	55.47	AV	16	1.4	H	-3.52	51.95	54	-2.05
4824	56.69	PK	45	1	V	-3.52	53.17	74	-20.83
Middle Channel(2437MHz)									
4874	58.67	PK	123	2.2	H	-3.42	55.25	74	-18.75
4874	53.44	AV	123	2.2	H	-3.42	50.02	54	-3.98
4874	56.39	PK	299	2	V	-3.42	52.97	74	-21.03
High Channel(2462 MHz)									
2483.5	79.02	PK	0	1.5	H	-7.20	71.82	74	-2.18
2483.5	55.39	AV	0	1.5	H	-7.20	48.19	54	-5.81
2483.5	69.39	PK	47	2.5	V	-7.20	62.19	74	-11.81
2483.5	55.69	AV	47	2.5	V	-7.20	48.49	54	-5.51
2500	78.05	PK	134	1.9	H	-7.18	70.87	74	-3.13
2500	54.48	AV	134	1.9	H	-7.18	47.3	54	-6.70
2500	68.85	PK	17	2.4	V	-7.18	61.67	74	-12.33
2500	55.22	AV	17	2.4	V	-7.18	48.04	54	-5.96
4924	57.61	PK	343	2.2	H	-3.16	54.45	74	-19.55
4924	51.55	AV	343	2.2	H	-3.16	48.39	54	-5.61
4924	55.02	PK	297	1.5	V	-3.16	51.86	74	-22.14

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11g Mode(worst case antenna 1)									
Low Channel(2412MHz)									
2310	67.48	PK	282	2.2	H	-7.24	60.24	74	-13.76
2310	53.91	AV	282	2.2	H	-7.24	46.67	54	-7.33
2310	67.13	PK	124	2	V	-7.24	59.89	74	-14.11
2310	53.57	AV	124	2	V	-7.24	46.33	54	-7.67
2390	68.99	PK	102	1.9	H	-7.22	61.77	74	-12.23
2390	55.70	AV	102	1.9	H	-7.22	48.48	54	-5.52
2390	68.66	PK	85	1.9	V	-7.22	61.44	74	-12.56
2390	55.18	AV	85	1.9	V	-7.22	47.96	54	-6.04
4824	61.43	PK	57	2.1	H	-3.52	57.91	74	-16.09
4824	47.99	AV	57	2.1	H	-3.52	44.47	54	-9.53
4824	57.49	PK	291	2.2	V	-3.52	53.97	74	-20.03
Middle Channel(2437MHz)									
4874	61.24	PK	223	1.6	H	-3.42	57.82	74	-16.18
4874	48.70	AV	223	1.6	H	-3.42	45.28	54	-8.72
4874	58.84	PK	67	2.2	V	-3.42	55.42	74	-18.58
4874	43.70	AV	67	2.2	V	-3.42	40.28	54	-13.72
High Channel(2462 MHz)									
2483.5	72.03	PK	311	1.7	H	-7.20	64.83	74	-9.17
2483.5	57.56	AV	311	1.7	H	-7.20	50.36	54	-3.64
2483.5	68.95	PK	224	2.4	V	-7.20	61.75	74	-12.25
2483.5	55.88	AV	224	2.4	V	-7.20	48.68	54	-5.32
2500	70.08	PK	229	2.3	H	-7.18	62.9	74	-11.10
2500	56.95	AV	229	2.3	H	-7.18	49.77	54	-4.23
2500	68.86	PK	32	1	V	-7.18	61.68	74	-12.32
2500	56.20	AV	32	1	V	-7.18	49.02	54	-4.98
4924	58.51	PK	31	2	H	-3.16	55.35	74	-18.65
4924	46.09	AV	31	2	H	-3.16	42.93	54	-11.07
4924	56.51	PK	197	1.3	V	-3.16	53.35	74	-20.65

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/QP/AV		Height (m)	Polar (H/V)				
802.11n20 Mode (worst case MIMO)									
Low Channel(2412MHz)									
2310	67.41	PK	134	2.5	H	-7.24	60.17	74	-13.83
2310	56.07	AV	134	2.5	H	-7.24	48.83	54	-5.17
2310	67.45	PK	251	1.5	V	-7.24	60.21	74	-13.79
2310	55.94	AV	251	1.5	V	-7.24	48.70	54	-5.30
2390	68.19	PK	8	2.5	H	-7.22	60.97	74	-13.03
2390	57.03	AV	8	2.5	H	-7.22	49.81	54	-4.19
2390	67.92	PK	53	1.9	V	-7.22	60.70	74	-13.30
2390	56.64	AV	53	1.9	V	-7.22	49.42	54	-4.58
4824	57.40	PK	135	2.4	H	-3.52	53.88	74	-20.12
4824	54.04	PK	333	2.4	V	-3.52	50.52	74	-23.48
Middle Channel(2437MHz)									
4874	57.41	PK	57	2.2	H	-3.42	53.99	74	-20.01
4874	54.04	PK	291	2.2	V	-3.42	50.62	74	-23.38
High Channel(2462 MHz)									
2483.5	71.76	PK	17	1.9	H	-7.20	64.56	74	-9.44
2483.5	58.21	AV	17	1.9	H	-7.20	51.01	54	-2.99
2483.5	68.92	PK	64	2.3	V	-7.20	61.72	74	-12.28
2483.5	57.82	AV	64	2.3	V	-7.20	50.62	54	-3.38
2500	69.30	PK	255	1.6	H	-7.18	62.12	74	-11.88
2500	57.59	AV	255	1.6	H	-7.18	50.41	54	-3.59
2500	68.63	PK	263	2.3	V	-7.18	61.45	74	-12.55
2500	57.38	AV	263	2.3	V	-7.18	50.2	54	-3.80
4924	56.53	PK	92	1.4	H	-3.16	53.37	74	-20.63
4924	53.95	PK	319	1.4	V	-3.16	50.79	74	-23.21

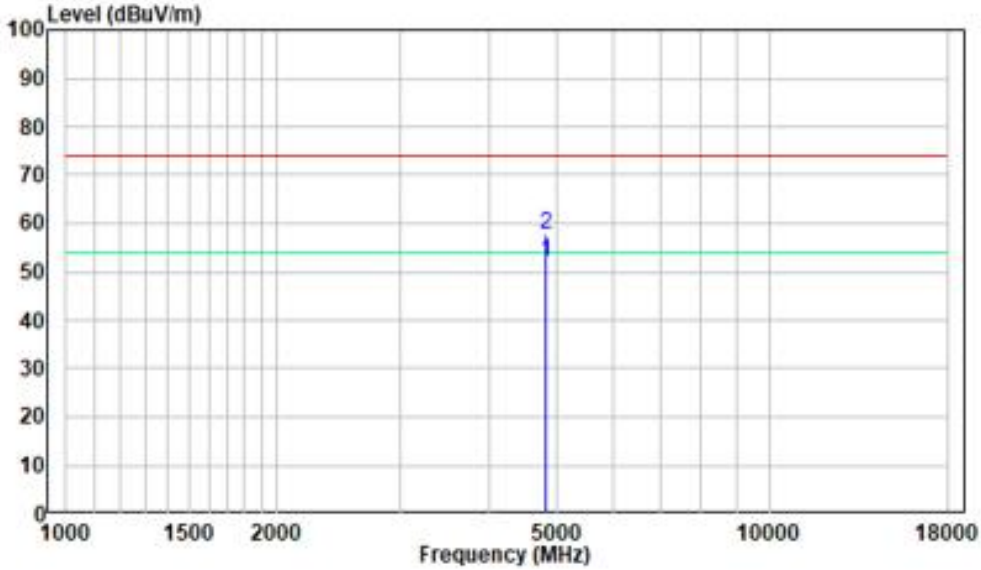
Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	PK/Ave		Height (m)	Polar (H/V)				
802.11ax20 (worst case MIMO)									
Low Channel 2412MHz_242Tone_RU61(Worst Case)									
2310	67.94	PK	331	1	H	-7.24	60.70	74	-13.30
2310	54.75	AV	331	1	H	-7.24	47.51	54	-6.49
2310	67.56	PK	39	1.9	V	-7.24	60.32	74	-13.68
2310	54.58	AV	39	1.9	V	-7.24	47.34	54	-6.66
2390	70.34	PK	82	1.2	H	-7.22	63.12	74	-10.88
2390	55.96	AV	82	1.2	H	-7.22	48.74	54	-5.26
2390	69.10	PK	91	1.1	V	-7.22	61.88	74	-12.12
2390	55.20	AV	91	1.1	V	-7.22	47.98	54	-6.02
4824	59.47	PK	16	2.1	H	-3.52	55.95	74	-18.05
4824	47.02	AV	16	2.1	H	-3.52	43.50	54	-10.50
4824	56.37	PK	258	2.3	V	-3.52	52.85	74	-21.15
Middle Channel 2437MHz_242Tone_RU61(Worst Case)									
4874	58.40	PK	80	1.2	H	-3.42	54.98	74	-19.02
4874	46.03	AV	80	1.2	H	-3.42	42.61	54	-11.39
4874	55.53	PK	295	2.3	V	-3.42	52.11	74	-21.89
High Channel 2462MHz_242Tone_RU61(Worst Case)									
2483.5	78.27	PK	222	1.6	H	-7.20	71.07	74	-2.93
2483.5	57.79	AV	222	1.6	H	-7.20	50.59	54	-3.41
2483.5	69.16	PK	81	1.9	V	-7.20	61.96	74	-12.04
2483.5	55.64	AV	81	1.9	V	-7.20	48.44	54	-5.56
2500	69.75	PK	123	2.2	H	-7.18	62.57	74	-11.43
2500	54.70	AV	123	2.2	H	-7.18	47.52	54	-6.48
2500	68.51	PK	103	1.5	V	-7.18	61.33	74	-12.67
2500	55.52	AV	103	1.5	V	-7.18	48.34	54	-5.66
4924	57.47	PK	163	1	H	-3.16	54.31	74	-19.69
4924	43.70	AV	163	1	H	-3.16	40.54	54	-13.46
4924	53.87	PK	208	1.5	V	-3.16	50.71	74	-23.29

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 or in noise floor level was not recorded.
The result of Peak less than the limit of average, so just the peak value was recorded.

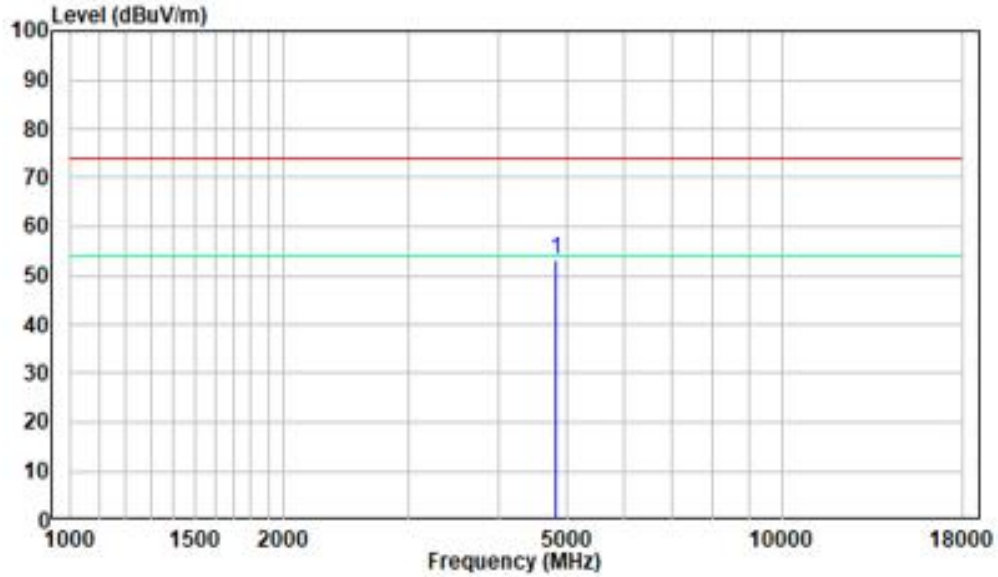
1-18 GHz:

Pre-scan for 802.11b Low Channel

Horizontal



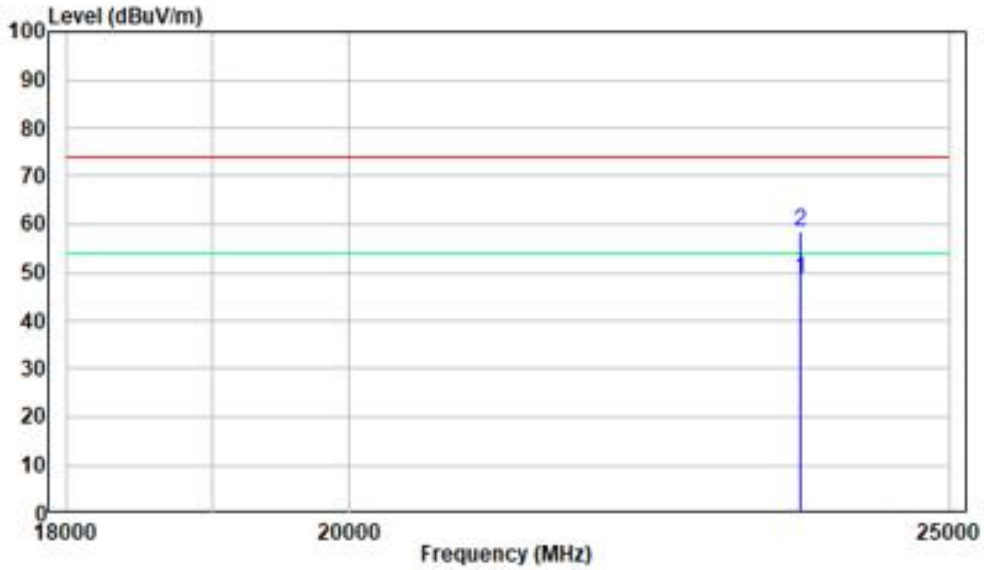
Vertical



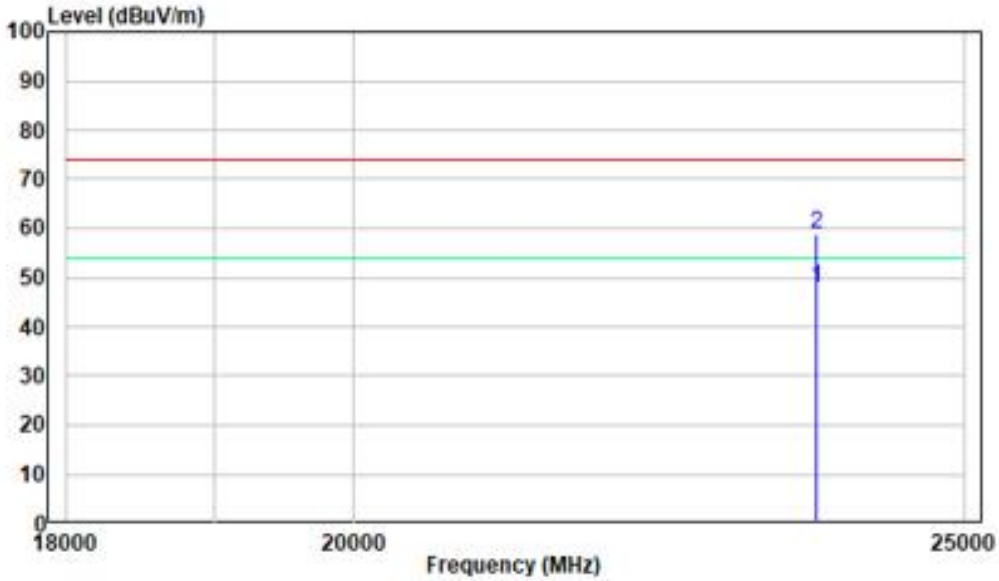
18 -25GHz:

Pre-scan for 802.11b Low Channel

Horizontal



Vertical



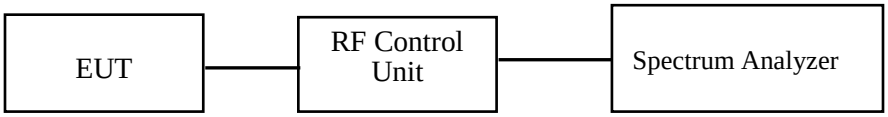
FCC §15.247(a) (2) – 6 dB EMISSION BANDWIDTH & OCCUPIED BANDWIDTH

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:	26.5℃
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2022-10-27.

EUT operation mode: Transmitting

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

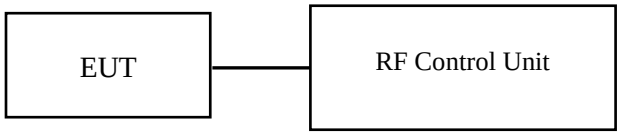
FCC §15.247(b) (3) - MAXIMUM CONDUCTED OUTPUT POWER

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.



Note: the RF Control Unit has a built-in power sensor.

Test Data

Environmental Conditions

Temperature:	26.5℃
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2022-10-27.

EUT operation mode: Transmitting

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

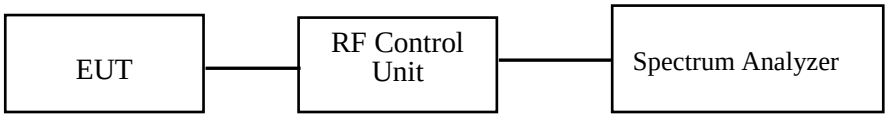
FCC §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

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:	26.5℃
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2022-10-27.

EUT operation mode: Transmitting

Test Result: Compliant.

Conducted Band Edge Result:

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

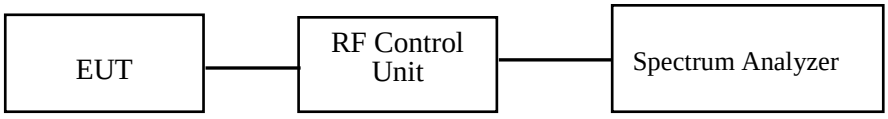
FCC §15.247(e) - POWER SPECTRAL DENSITY

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: 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:	26.5℃
Relative Humidity:	58 %
ATM Pressure:	101.0 kPa

The testing was performed by Paul Liu on 2022-10-27.

EUT operation mode: Transmitting

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

APPENDIX Wi-Fi

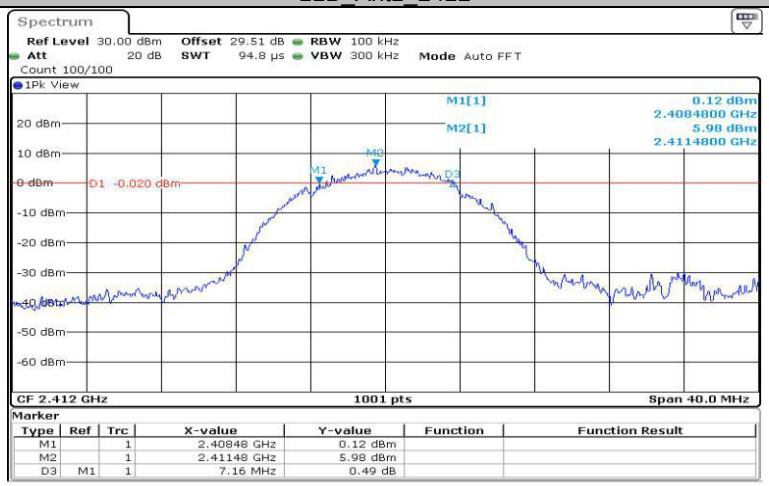
Appendix A: DTS Bandwidth

Test Result

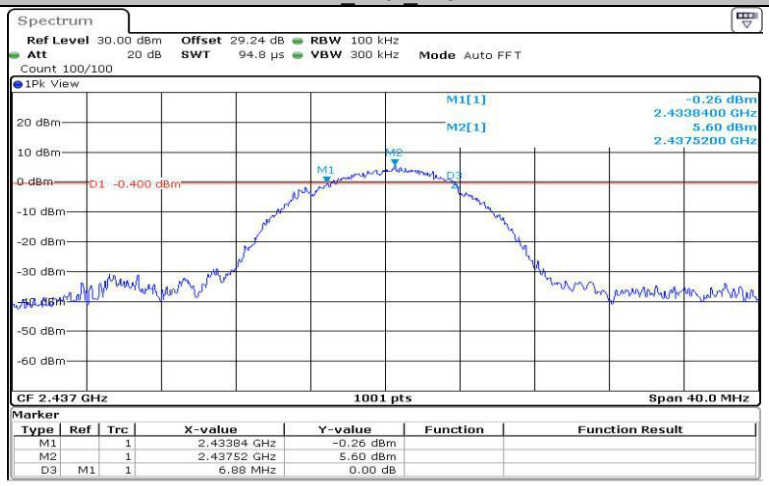
Test Mode	Antenna	Frequency[MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	7.16	2408.48	2415.64	0.5	PASS
	Ant1	2437	6.88	2433.84	2440.72	0.5	PASS
	Ant1	2462	7.36	2458.48	2465.84	0.5	PASS
11G	Ant1	2412	16.28	2403.88	2420.16	0.5	PASS
	Ant1	2437	16.04	2429.12	2445.16	0.5	PASS
	Ant1	2462	16.36	2453.84	2470.20	0.5	PASS
11N20MIMO	Ant1	2412	17.56	2403.24	2420.80	0.5	PASS
	Ant1	2437	16.60	2429.20	2445.80	0.5	PASS
	Ant1	2462	17.56	2453.24	2470.80	0.5	PASS
11AX20MIMO (worst case 242Tone_RU61)	Ant1	2412	18.36	2403.08	2421.44	0.5	PASS
	Ant1	2437	17.04	2429.16	2446.20	0.5	PASS
	Ant1	2462	17.88	2453.64	2471.52	0.5	PASS

Test Graphs

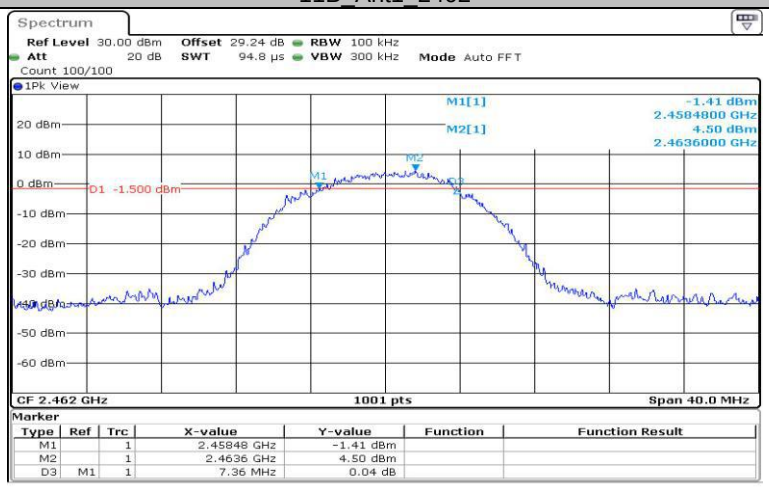
11B_Ant1_2412



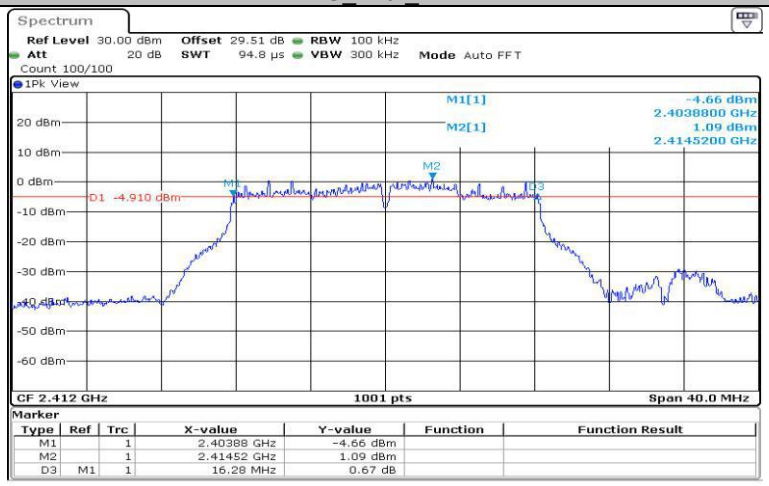
11B_Ant1_2437



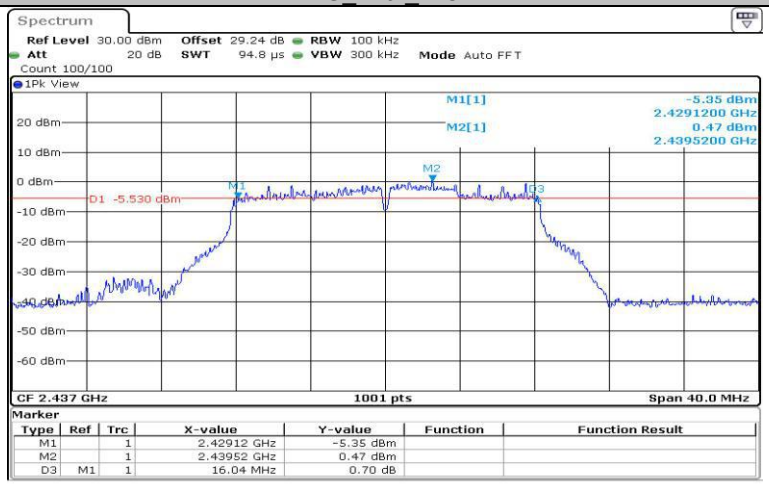
11B_Ant1_2462



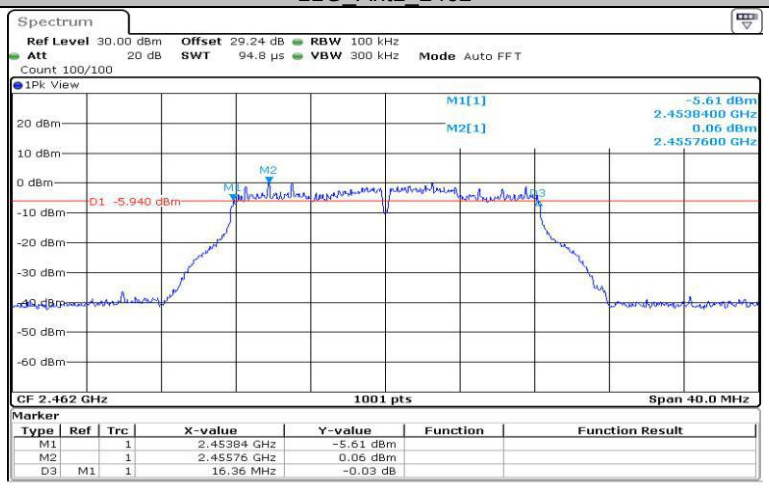
11G_Ant1_2412



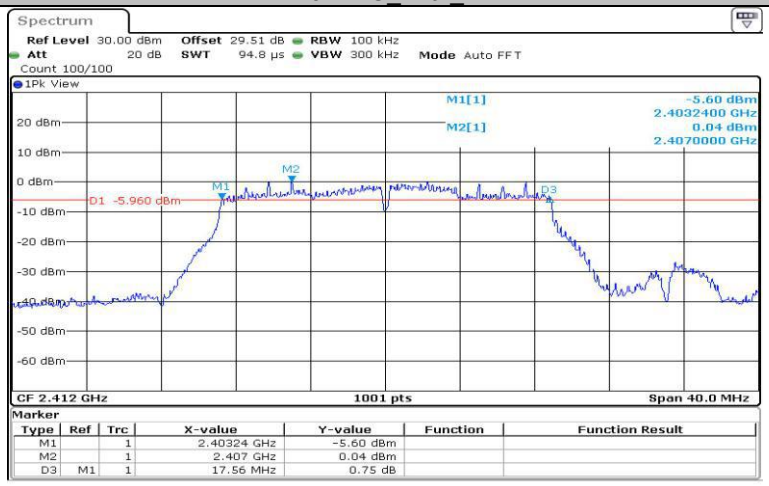
11G_Ant1_2437



11G_Ant1_2462

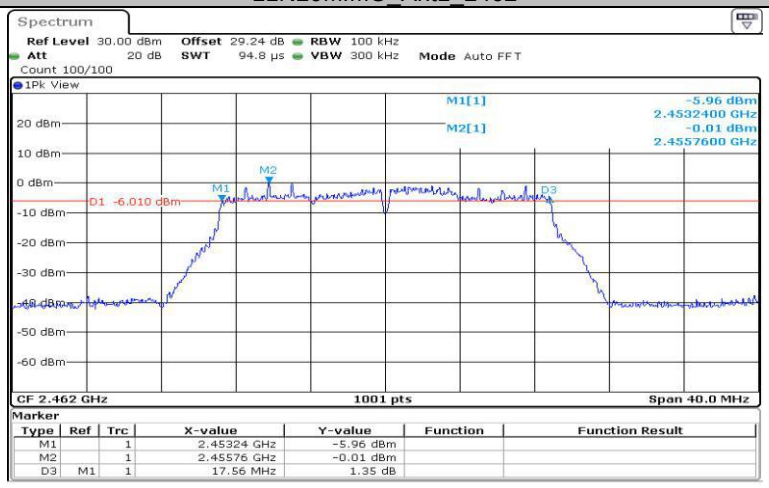


11N20MIMO_Ant1_2412

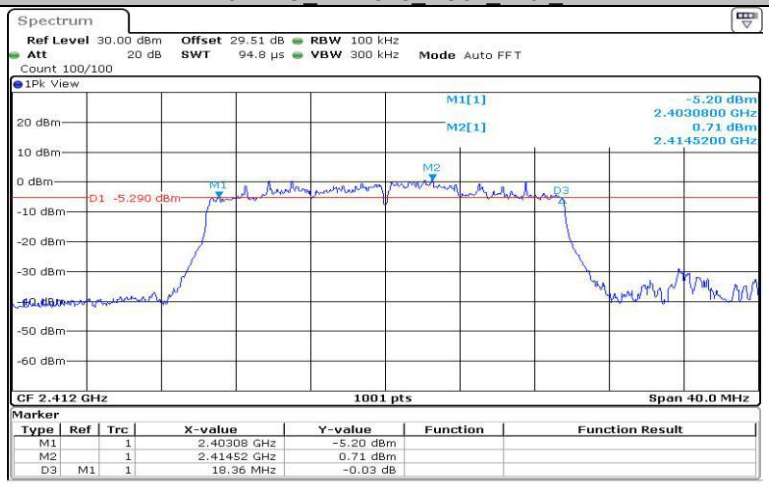


11N20MIMO_Ant1_2437

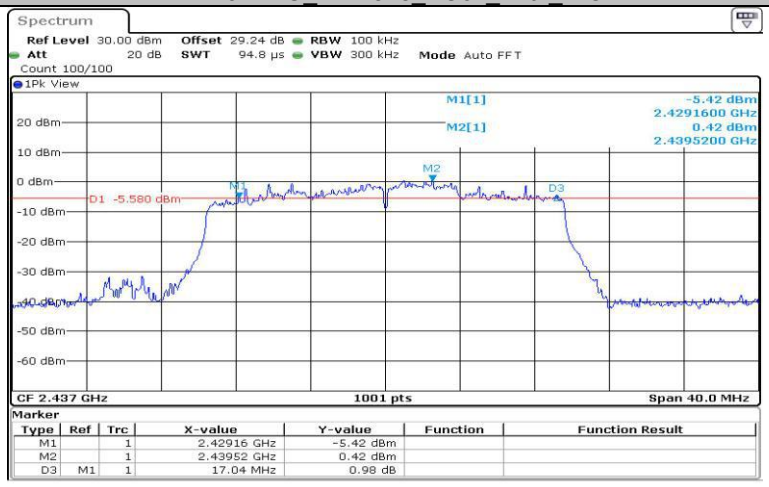
11N20MIMO_Ant1_2462



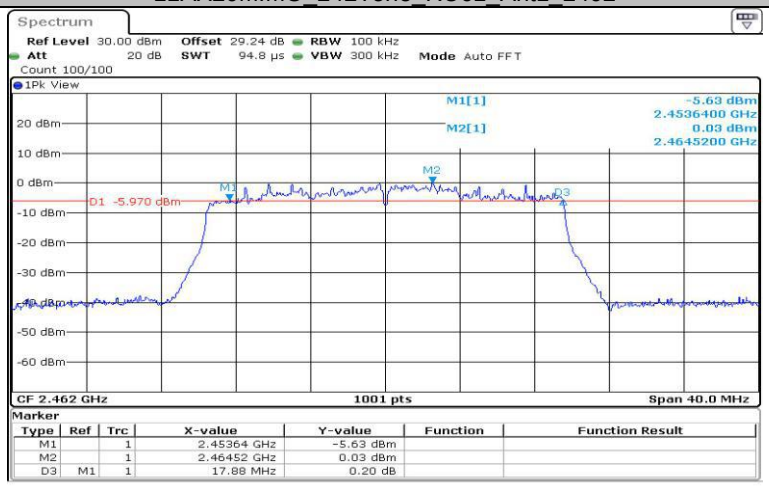
11AX20MIMO_242Tone_RU61_Ant1_2412



11AX20MIMO_242Tone_RU61_Ant1_2437



11AX20MIMO_242Tone_RU61_Ant1_2462



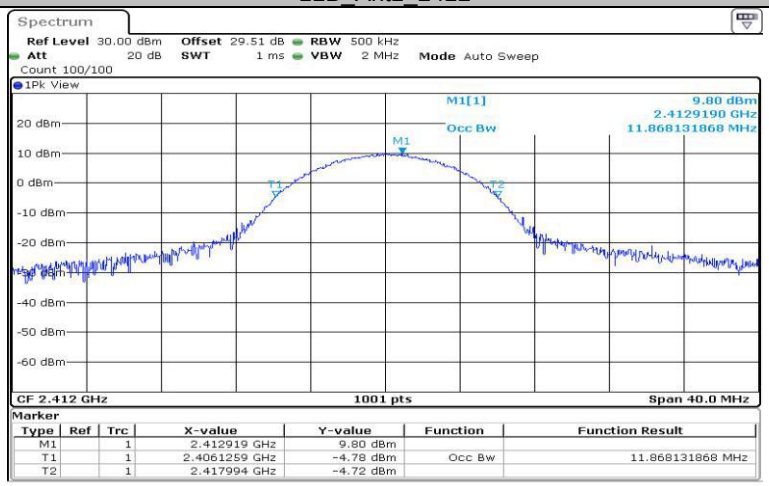
Appendix B: Occupied Channel Bandwidth

Test Result

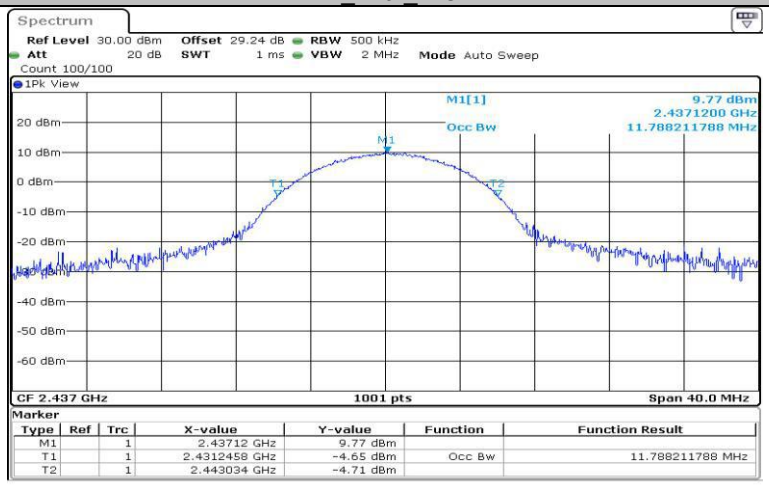
Test Mode	Antenna	Channel Frequency[MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	11.868	2406.126	2417.994	---	---
	Ant1	2437	11.788	2431.246	2443.034	---	---
	Ant1	2462	11.828	2456.166	2467.994	---	---
11G	Ant1	2412	17.742	2403.249	2420.991	---	---
	Ant1	2437	17.662	2428.329	2445.991	---	---
	Ant1	2462	17.782	2453.249	2471.031	---	---
11N20MIMO	Ant1	2412	18.701	2402.729	2421.431	---	---
	Ant1	2437	18.581	2427.849	2446.431	---	---
	Ant1	2462	18.661	2452.769	2471.431	---	---
11AX20MIMO (worst case 242Tone_RU61)	Ant1	2412	19.141	2402.490	2421.630	---	---
	Ant1	2437	19.101	2427.569	2446.670	---	---
	Ant1	2462	19.101	2452.529	2471.630	---	---

Test Graphs

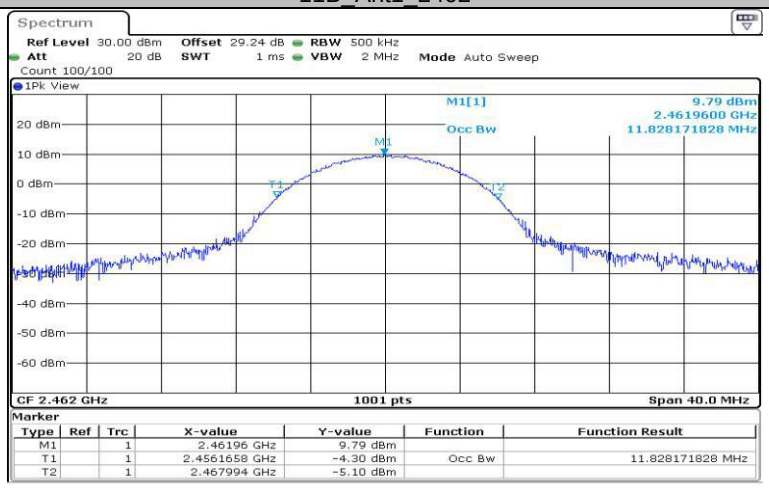
11B_Ant1_2412



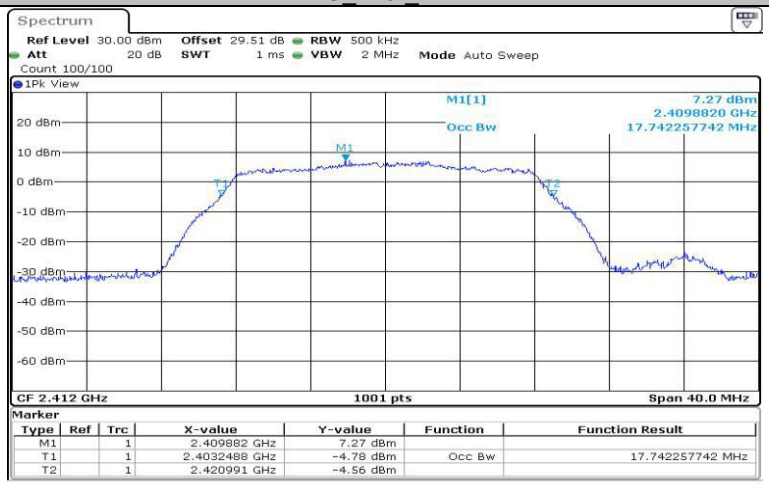
11B_Ant1_2437



11B_Ant1_2462

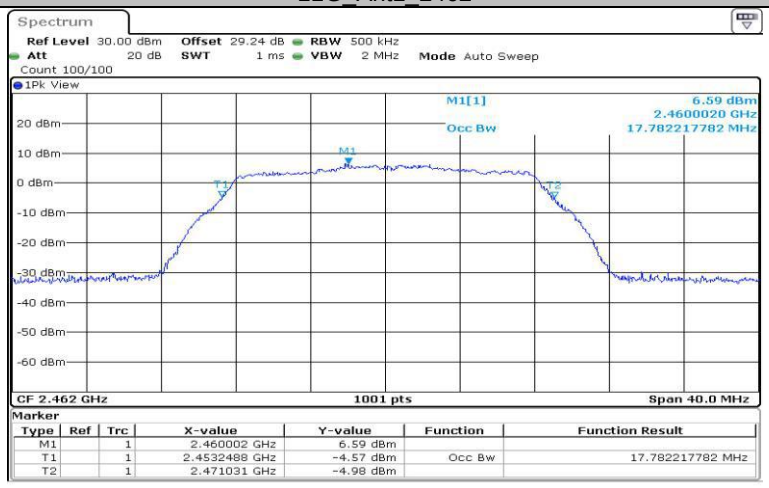


11G_Ant1_2412

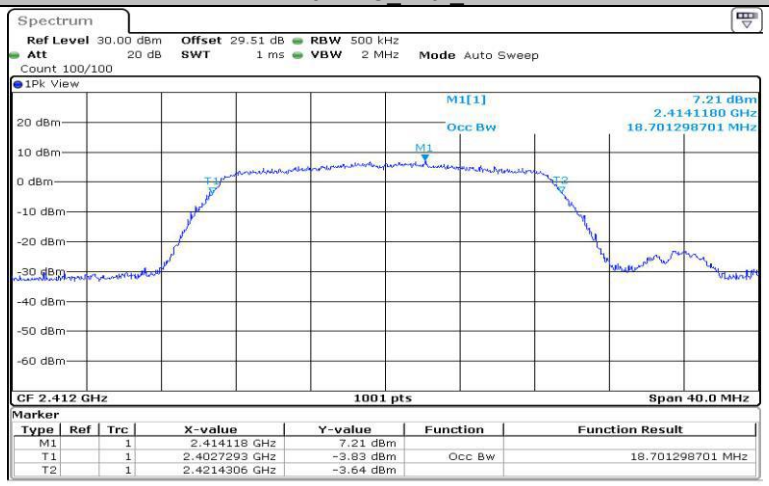


11G_Ant1_2437

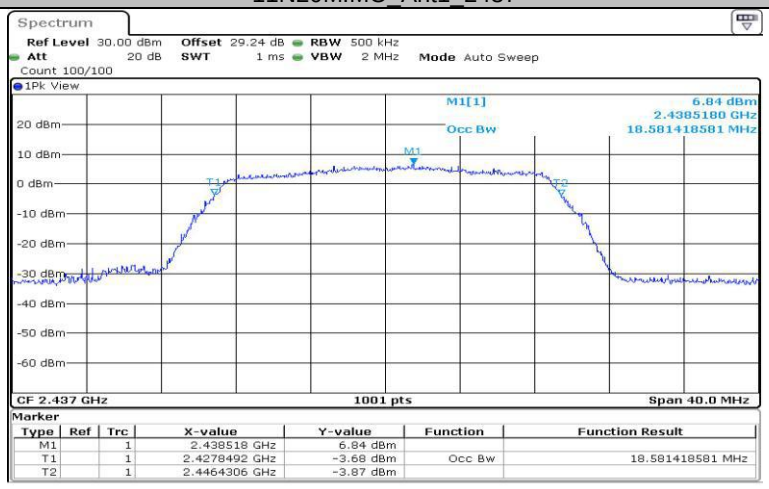
11G_Ant1_2462



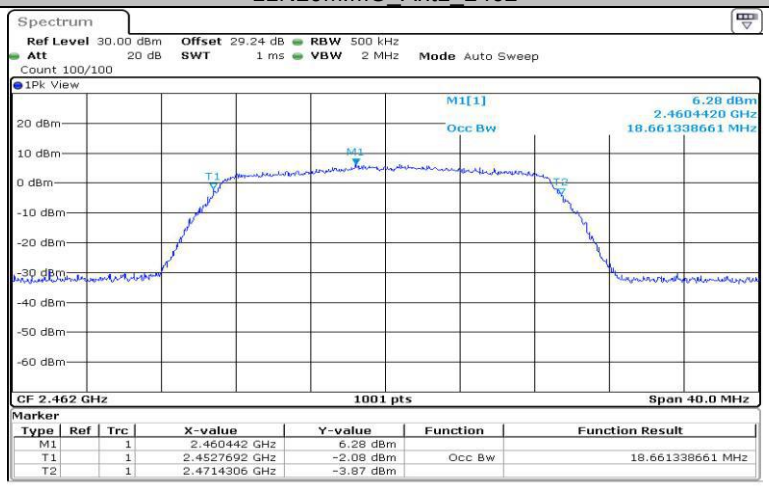
11N20MIMO_Ant1_2412



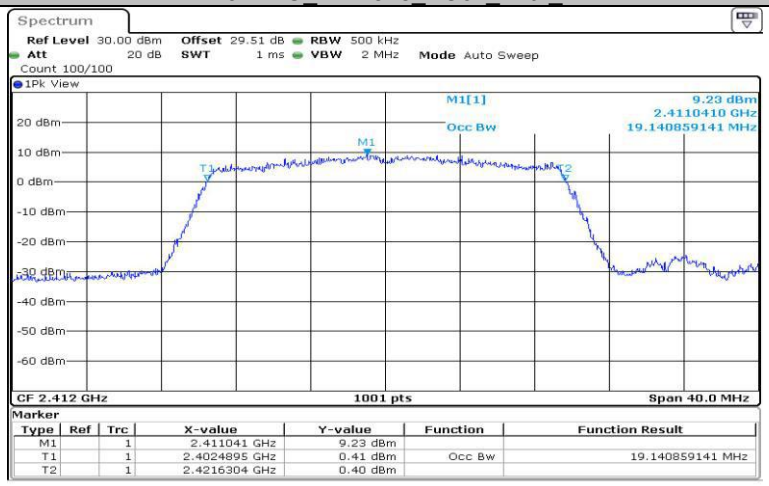
11N20MIMO_Ant1_2437



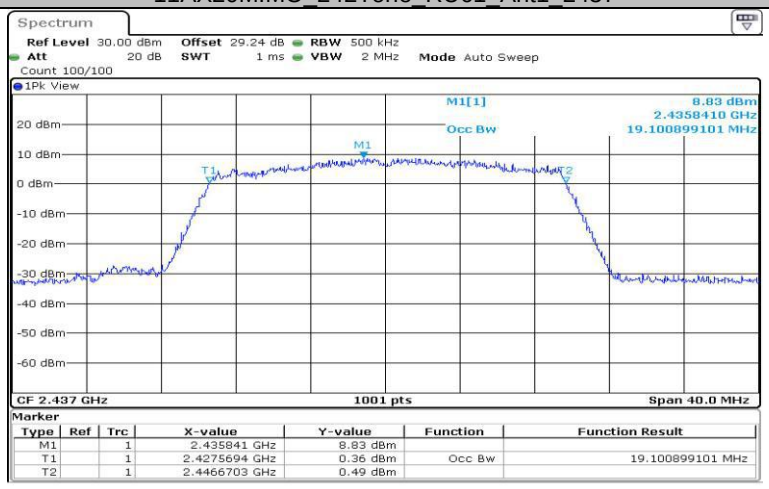
11N20MIMO_Ant1_2462



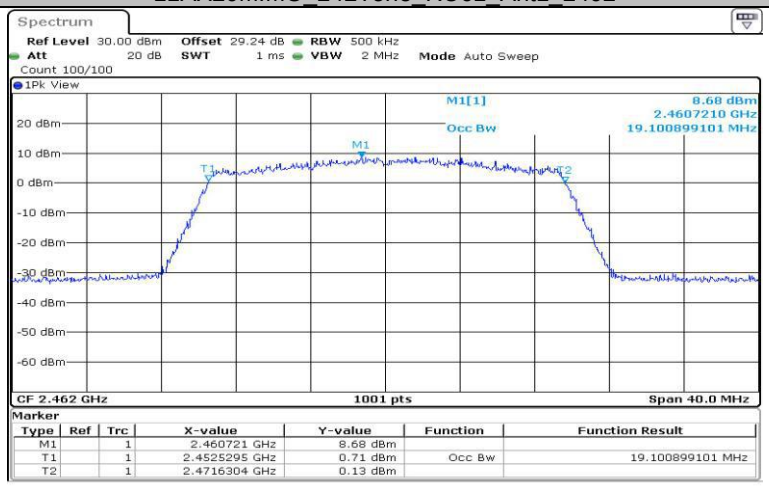
11AX20MIMO_242Tone_RU61_Ant1_2412



11AX20MIMO_242Tone_RU61_Ant1_2437



11AX20MIMO_242Tone_RU61_Ant1_2462



Appendix C: Maximum conducted output power

Test Result Peak

Test Mode	Antenna	Frequency[MHz]	Peak Power[dBm]	Conducted Limit[dBm]	Verdict
11B	Ant1	2412	18.14	≤30.00	PASS
	Ant2	2412	18.76	≤30.00	PASS
	Ant1	2437	17.94	≤30.00	PASS
	Ant2	2437	18.58	≤30.00	PASS
	Ant1	2462	17.02	≤30.00	PASS
	Ant2	2462	18.36	≤30.00	PASS
11G	Ant1	2412	19.58	≤30.00	PASS
	Ant2	2412	20.27	≤30.00	PASS
	Ant1	2437	19.19	≤30.00	PASS
	Ant2	2437	20.20	≤30.00	PASS
	Ant1	2462	19.09	≤30.00	PASS
	Ant2	2462	20.28	≤30.00	PASS
11N20MIMO	Ant1	2412	19.50	≤30.00	PASS
	Ant2	2412	20.21	≤30.00	PASS
	total	2412	22.88	≤30.00	PASS
	Ant1	2437	18.94	≤30.00	PASS
	Ant2	2437	20.40	≤30.00	PASS
	total	2437	22.74	≤30.00	PASS
	Ant1	2462	18.95	≤30.00	PASS
	Ant2	2462	20.26	≤30.00	PASS
	total	2462	22.66	≤30.00	PASS

Test Mode	Antenna	Frequency[MHz]	Ru Size	Ru Index	Peak Power[dBm]	Conducted Limit[dBm]	Verdict
11AX20MIMO	Ant1	2412	26Tone	RU0	6.93	≤30.00	PASS
			52Tone	RU37	6.93	≤30.00	PASS
			106Tone	RU53	6.95	≤30.00	PASS
			242Tone	RU61	20.24	≤30.00	PASS
	Ant2	2412	26Tone	RU0	6.97	≤30.00	PASS
			52Tone	RU37	6.96	≤30.00	PASS
			106Tone	RU53	6.84	≤30.00	PASS
			242Tone	RU61	20.61	≤30.00	PASS
	total	2412	26Tone	RU0	9.96	≤30.00	PASS
			52Tone	RU37	9.96	≤30.00	PASS
			106Tone	RU53	9.91	≤30.00	PASS
			242Tone	RU61	23.44	≤30.00	PASS
	Ant1	2437	26Tone	RU0	5.73	≤30.00	PASS
			52Tone	RU37	5.60	≤30.00	PASS
			106Tone	RU53	5.95	≤30.00	PASS
			242Tone	RU61	19.57	≤30.00	PASS
	Ant2	2437	26Tone	RU0	5.71	≤30.00	PASS
			52Tone	RU37	5.68	≤30.00	PASS
			106Tone	RU53	5.91	≤30.00	PASS
			242Tone	RU61	20.74	≤30.00	PASS
	total	2437	26Tone	RU0	8.73	≤30.00	PASS
			52Tone	RU37	8.65	≤30.00	PASS
			106Tone	RU53	8.94	≤30.00	PASS
			242Tone	RU61	23.20	≤30.00	PASS
	Ant1	2462	26Tone	RU0	5.97	≤30.00	PASS
			52Tone	RU37	6.00	≤30.00	PASS
			106Tone	RU53	5.61	≤30.00	PASS
			242Tone	RU61	19.55	≤30.00	PASS
	Ant2	2462	26Tone	RU0	5.92	≤30.00	PASS
			52Tone	RU37	5.99	≤30.00	PASS

			106Tone	RU53	5.60	≤30.00	PASS
			242Tone	RU61	20.60	≤30.00	PASS
	total	2462	26Tone	RU0	8.96	≤30.00	PASS
			52Tone	RU37	9.01	≤30.00	PASS
			106Tone	RU53	8.62	≤30.00	PASS
			242Tone	RU61	23.12	≤30.00	PASS

Note:

For 802.11 n20/ax20 mode, EUT support CDD

Directional gain = G_{ANT} + Array Gain

Array Gain=0dB for NANT⩽4

G_{ANT}=4.5dBi

Directional gain=4.5dBi+0dB=4.5dBi⩽6dBi

Appendix D: Maximum power spectral density

Test Result

Test Mode	Antenna	Frequency[MHz]	Result[dBm/3kHz]	Limit[dBm/3kHz]	Verdict
11B	Ant1	2412	-8.67	≤8.00	PASS
	Ant2	2412	-8.06	≤8.00	PASS
	Ant1	2437	-8.82	≤8.00	PASS
	Ant2	2437	-8.25	≤8.00	PASS
	Ant1	2462	-9.35	≤8.00	PASS
	Ant2	2462	-8.61	≤8.00	PASS
11G	Ant1	2412	-11.42	≤8.00	PASS
	Ant2	2412	-11.06	≤8.00	PASS
	Ant1	2437	-12.1	≤8.00	PASS
	Ant2	2437	-11.17	≤8.00	PASS
	Ant1	2462	-12.05	≤8.00	PASS
	Ant2	2462	-11.04	≤8.00	PASS
11N20MIMO	Ant1	2412	-11.96	≤6.50	PASS
	Ant2	2412	-10.63	≤6.50	PASS
	total	2412	-8.23	≤6.50	PASS
	Ant1	2437	-11.88	≤6.50	PASS
	Ant2	2437	-10.89	≤6.50	PASS
	total	2437	-8.35	≤6.50	PASS
	Ant1	2462	-12.62	≤6.50	PASS
	Ant2	2462	-11.59	≤6.50	PASS
	total	2462	-9.06	≤6.50	PASS
11AX20MIMO (worst case 242Tone_RU61)	Ant1	2412	-12.73	≤6.50	PASS
	Ant2	2412	-11.99	≤6.50	PASS
	total	2412	-9.33	≤6.50	PASS
	Ant1	2437	-12.58	≤6.50	PASS
	Ant2	2437	-11.64	≤6.50	PASS
	total	2437	-9.07	≤6.50	PASS
	Ant1	2462	-13.09	≤6.50	PASS
	Ant2	2462	-12.16	≤6.50	PASS
	total	2462	-9.59	≤6.50	PASS

Note:

For 802.11 n20/ax20 mode, EUT support CDD

Directional gain = G_{ANT} + Array Gain

*Array Gain=10*log$_{NANT}$,*

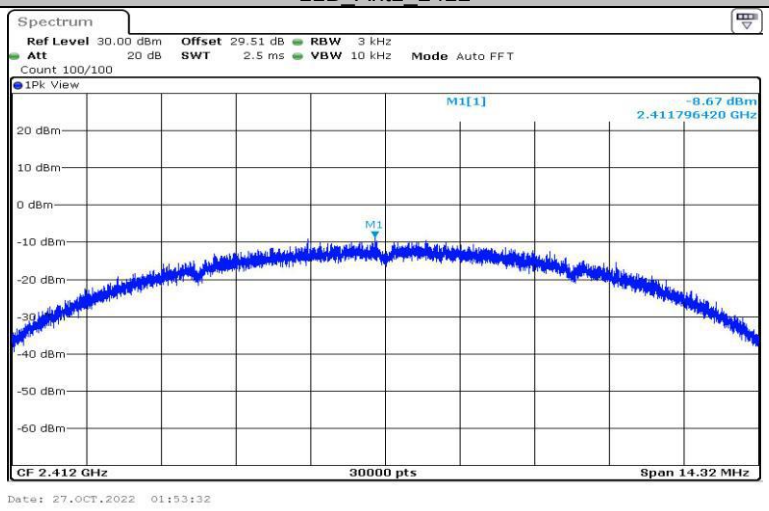
G_{ANT1}=4.5dBi

Directional gain=4.5dBi+10*log2dB=7.5dBi>6dBi

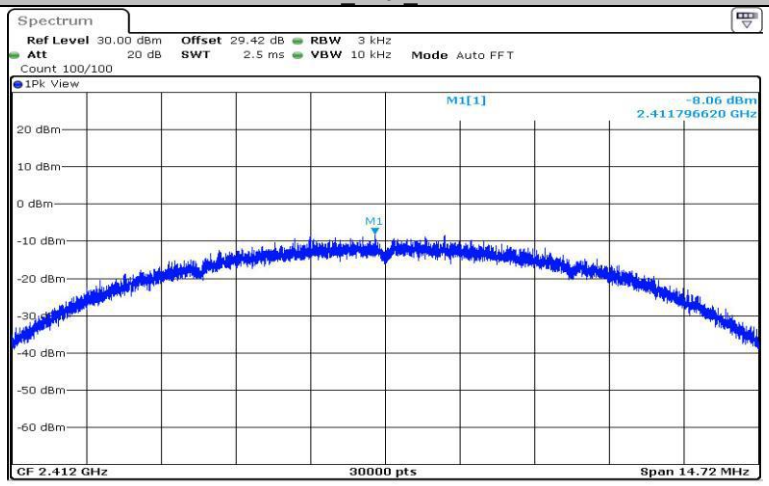
So the limit should reduce 1.5dB.

Test Graphs

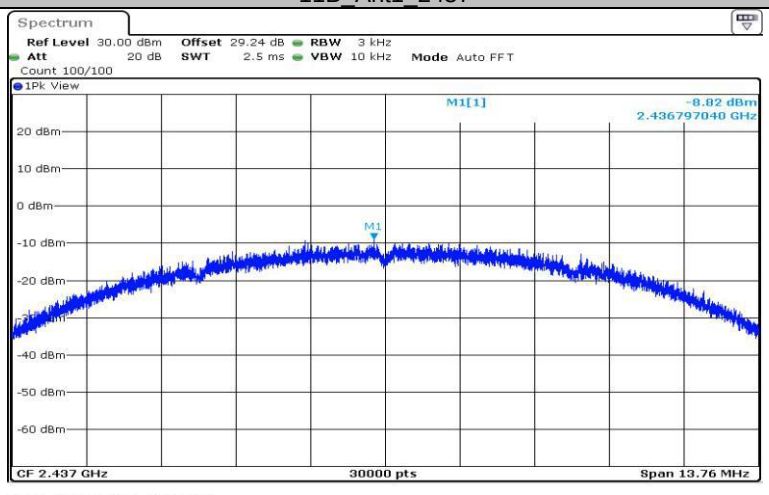
11B_Ant1_2412



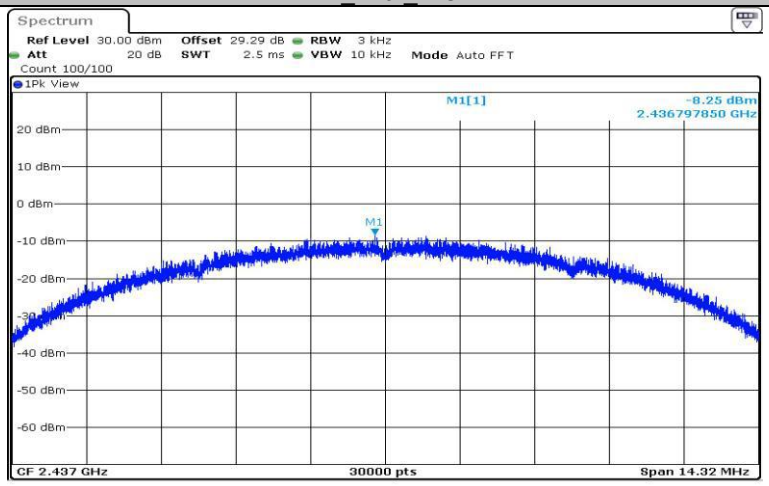
11B_Ant2_2412



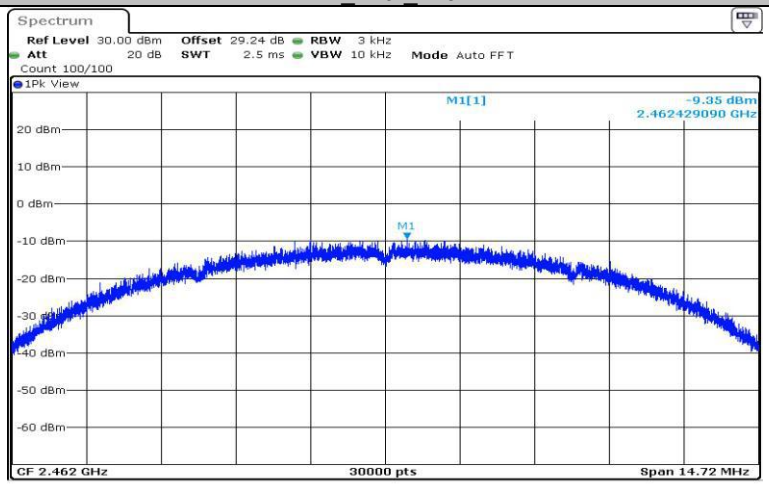
11B_Ant1_2437



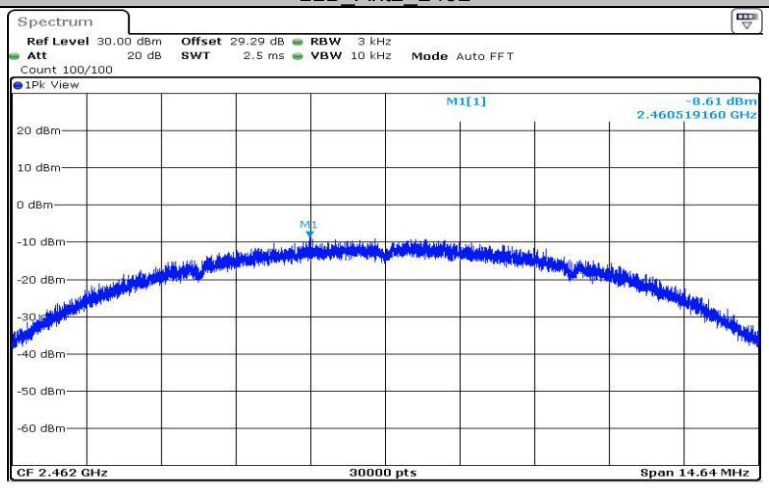
11B_Ant2_2437



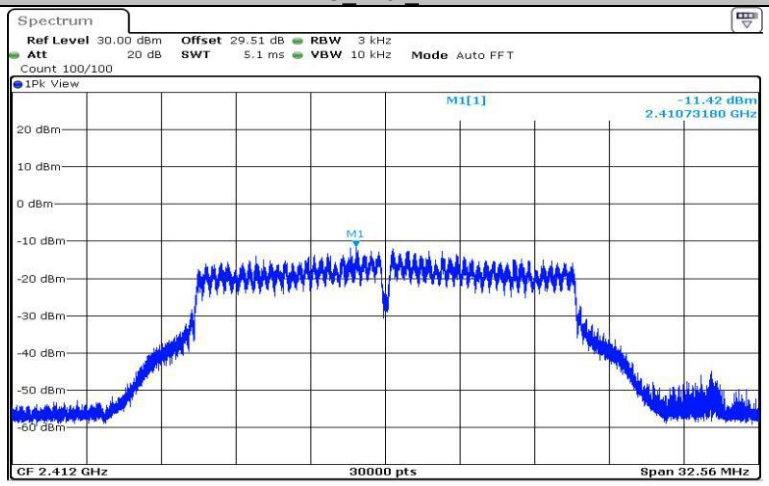
11B_Ant1_2462



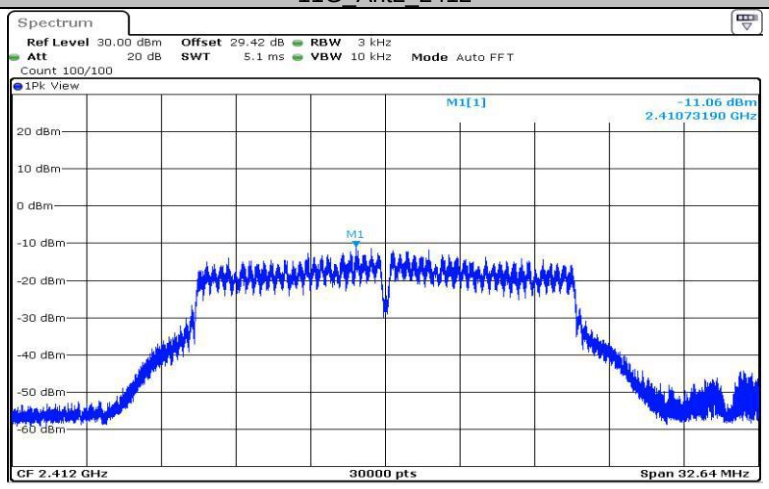
11B_Ant2_2462



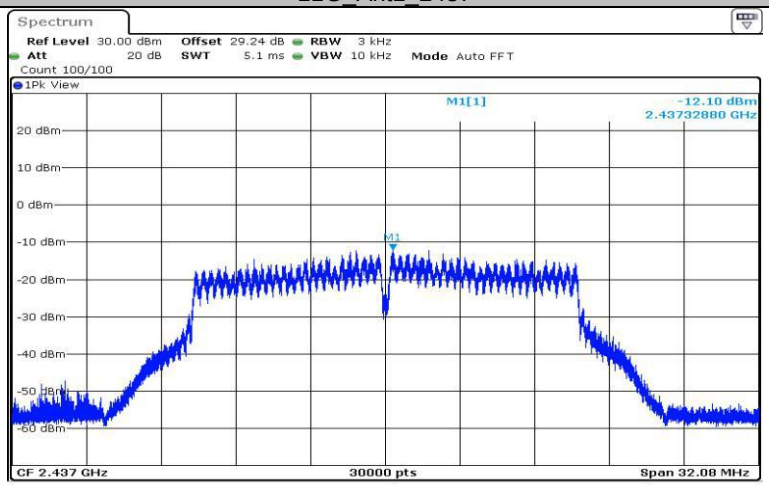
11G_Ant1_2412



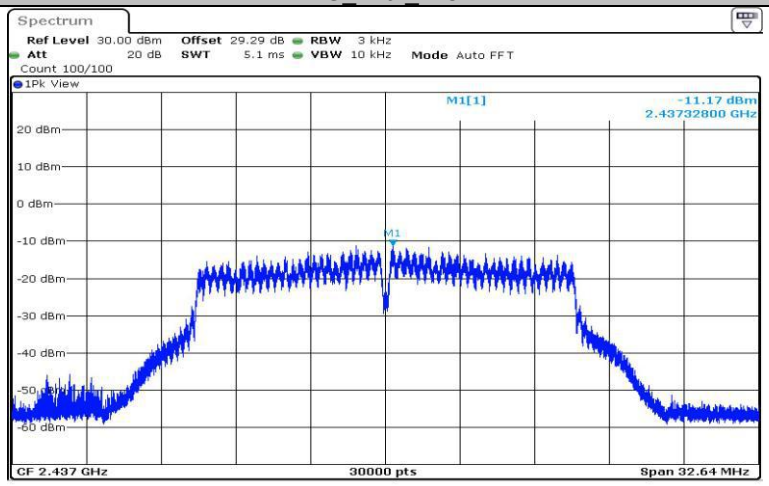
11G_Ant2_2412



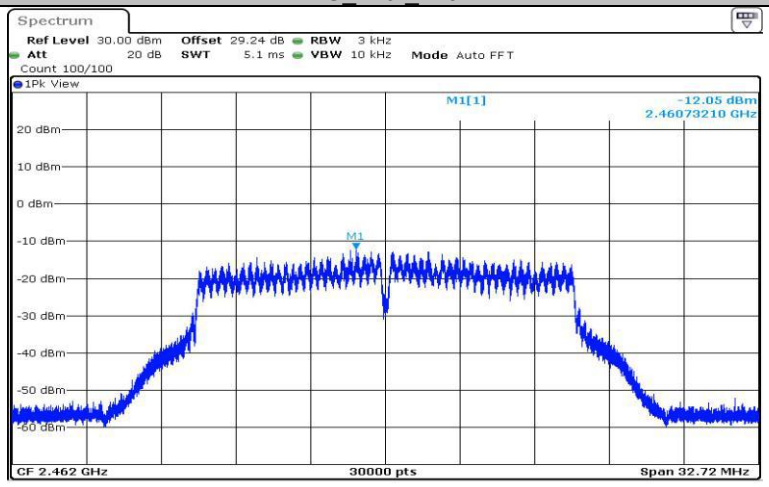
11G_Ant1_2437



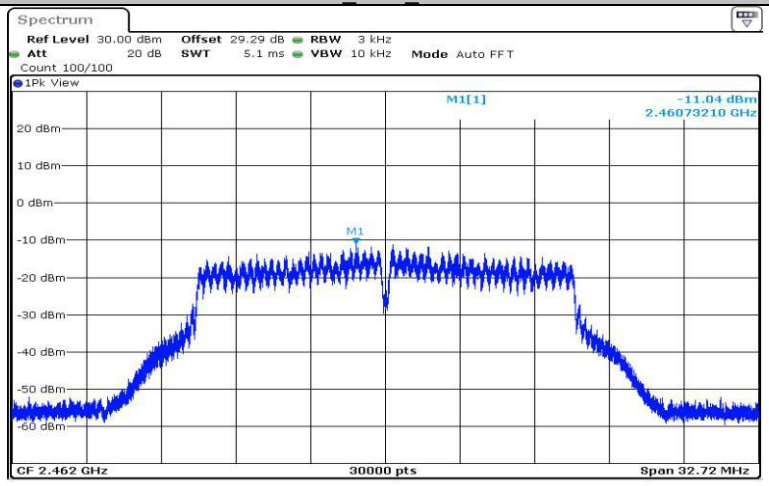
11G_Ant2_2437



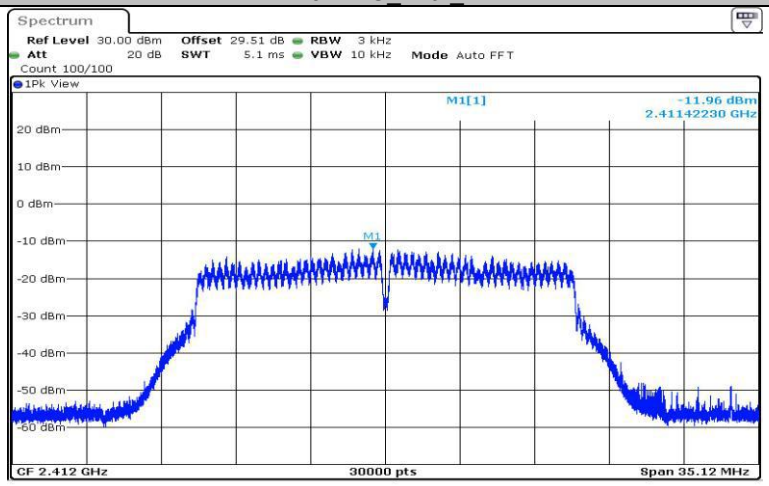
11G_Ant1_2462



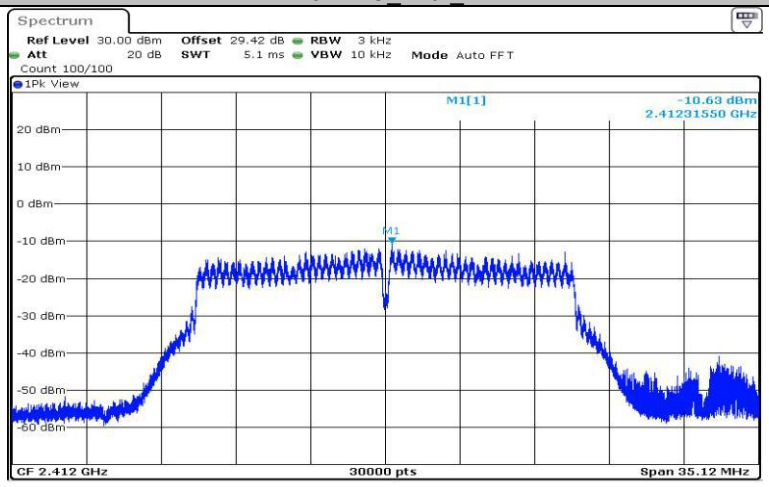
11G_Ant2_2462



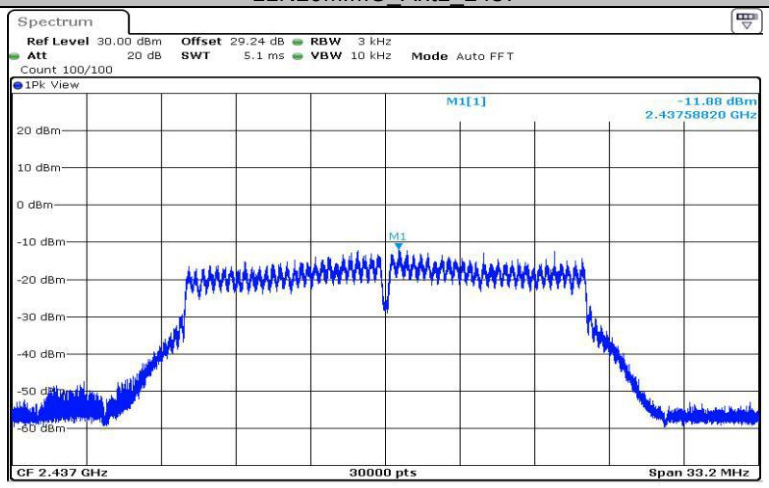
11N20MIMO_Ant1_2412



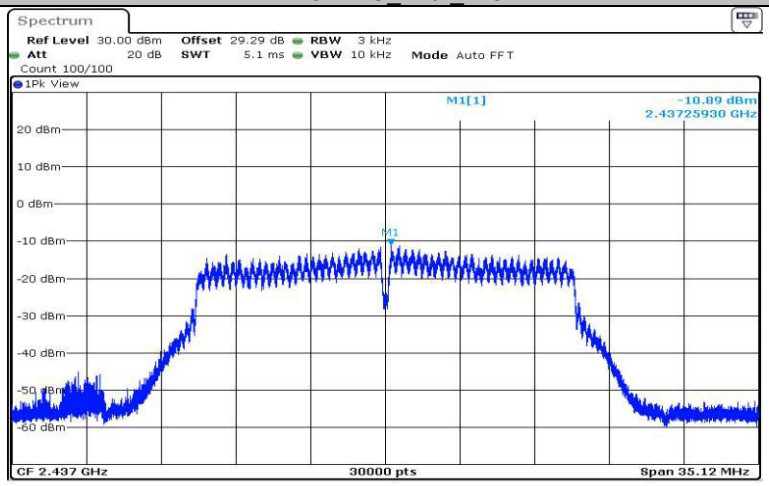
11N20MIMO_Ant2_2412



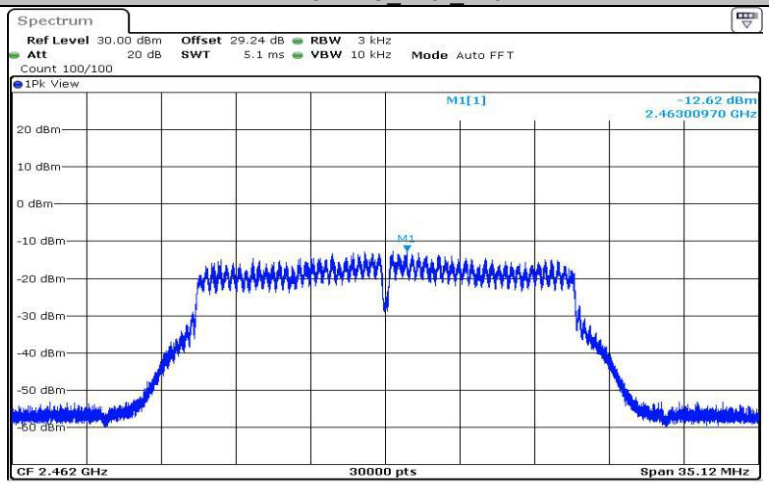
11N20MIMO_Ant1_2437



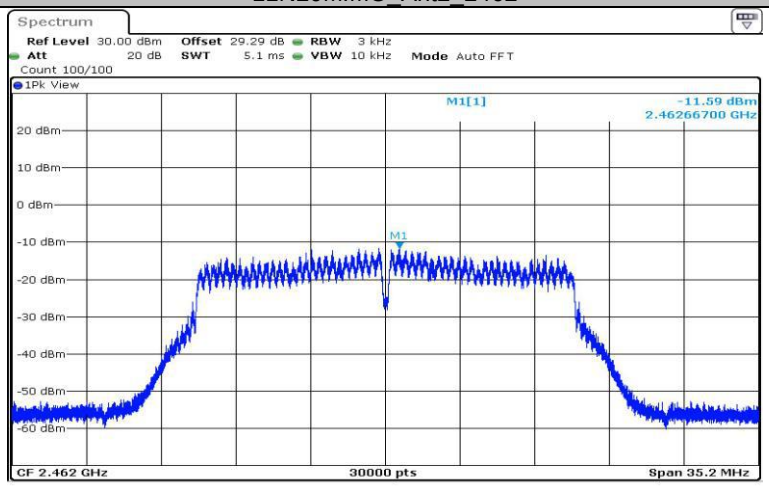
11N20MIMO_Ant2_2437



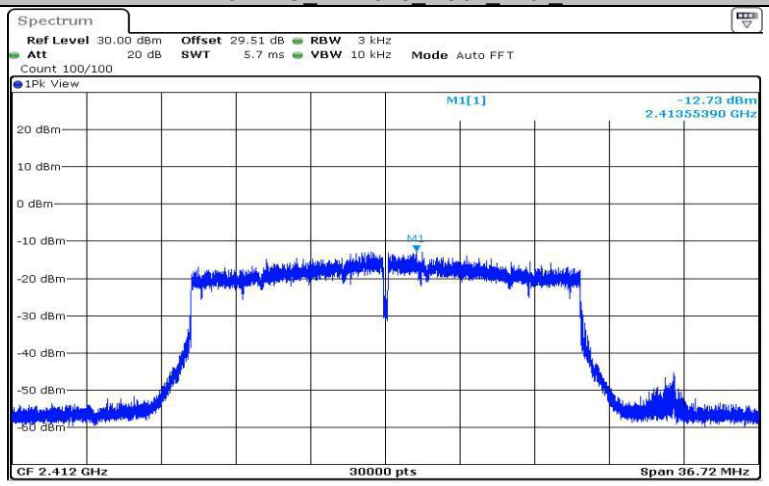
11N20MIMO_Ant1_2462



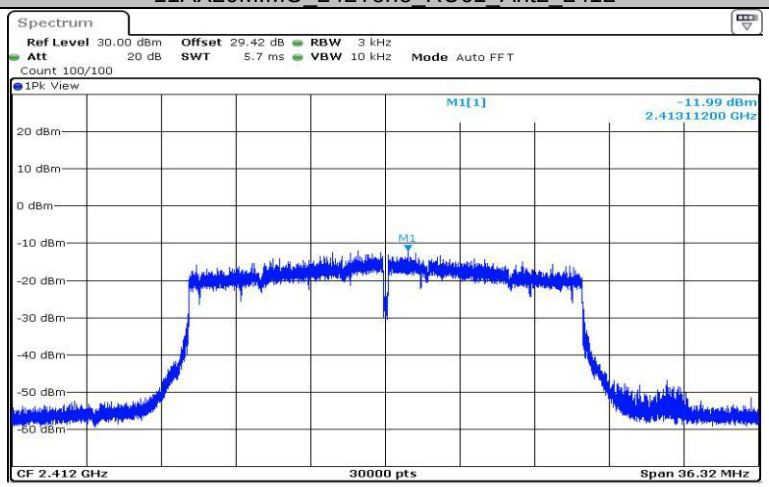
11N20MIMO_Ant2_2462



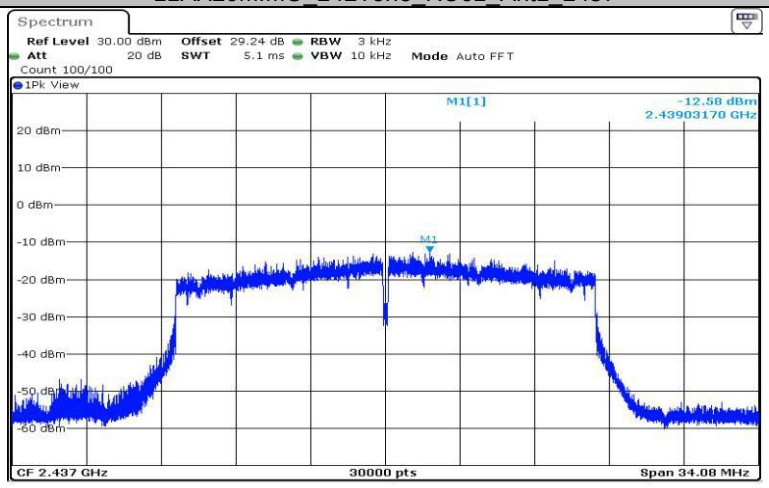
11AX20MIMO_242Tone_RU61_Ant1_2412



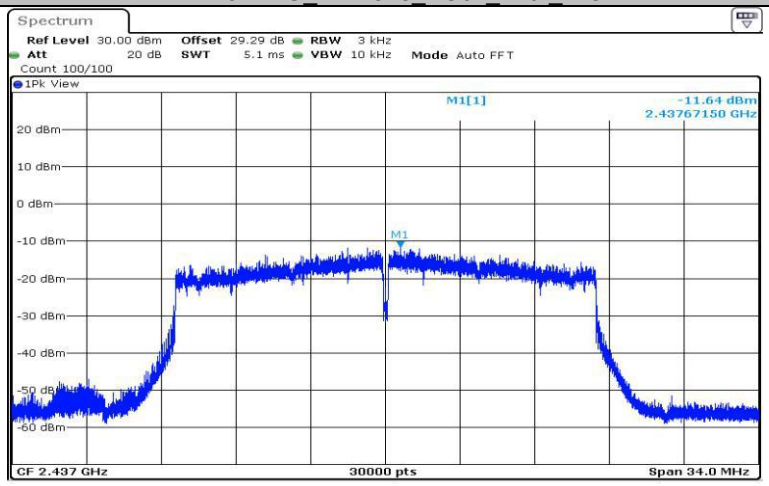
11AX20MIMO_242Tone_RU61_Ant2_2412



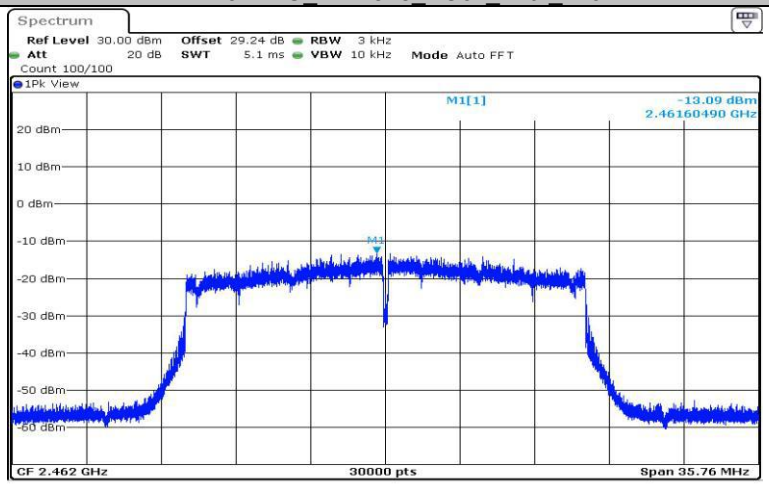
11AX20MIMO_242Tone_RU61_Ant1_2437



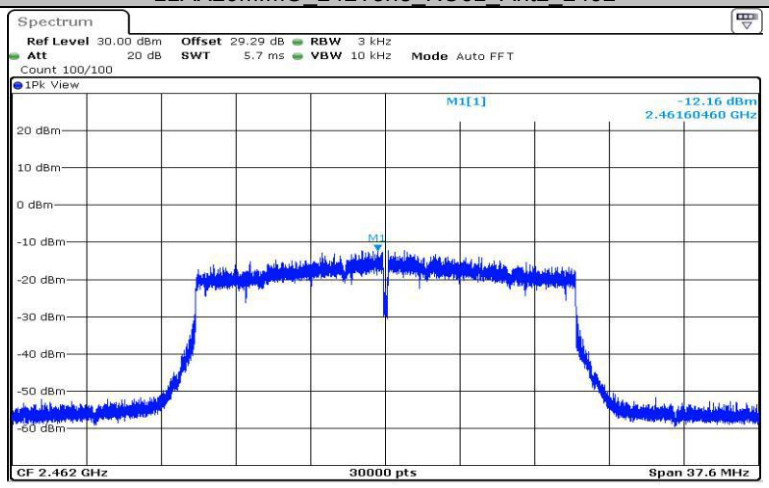
11AX20MIMO_242Tone_RU61_Ant2_2437



11AX20MIMO_242Tone_RU61_Ant1_2462



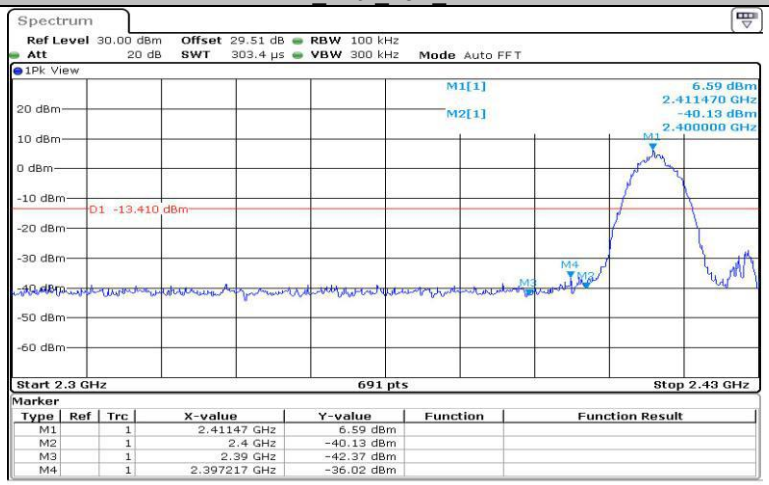
11AX20MIMO_242Tone_RU61_Ant2_2462



Appendix E:Band edge measurements

Test Graphs

11B_Ant1_Low_2412

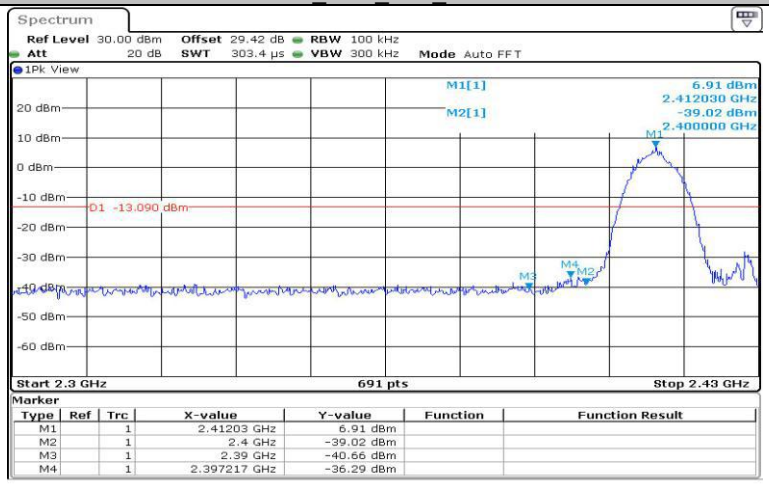


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41147 GHz	6.59 dBm		
M2		1	2.4 GHz	-40.13 dBm		
M3		1	2.39 GHz	-42.37 dBm		
M4		1	2.397217 GHz	-36.02 dBm		

Date: 27.OCT.2022 01:53:42

11B_Ant2_Low_2412

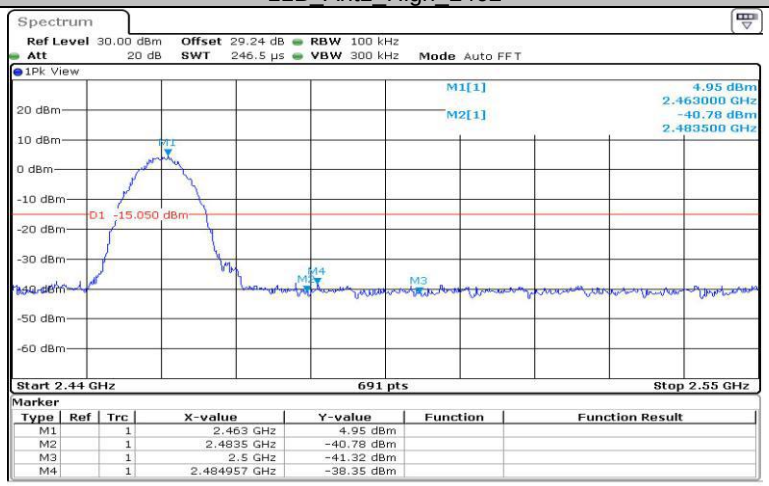


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41203 GHz	6.91 dBm		
M2		1	2.4 GHz	-39.02 dBm		
M3		1	2.39 GHz	-40.66 dBm		
M4		1	2.397217 GHz	-36.29 dBm		

Date: 27.OCT.2022 01:54:46

11B_Ant1_High_2462

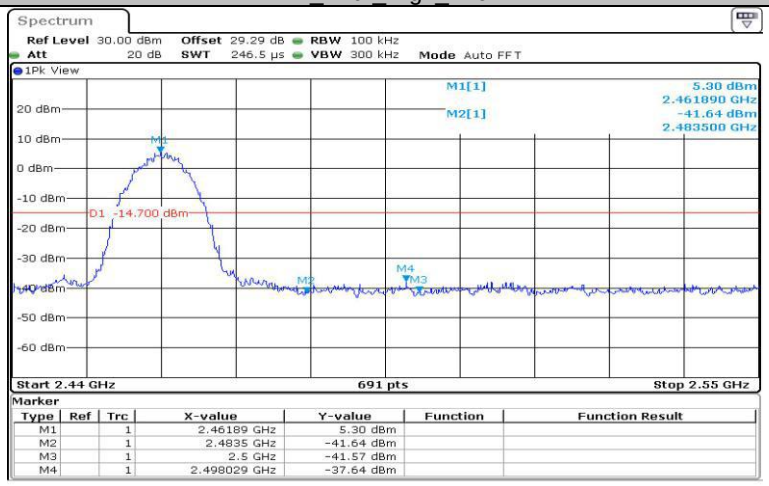


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.463 GHz	4.95 dBm		
M2		1	2.4835 GHz	-40.78 dBm		
M3		1	2.5 GHz	-41.32 dBm		
M4		1	2.484957 GHz	-38.35 dBm		

Date: 27.OCT.2022 01:58:28

11B_Ant2_High_2462

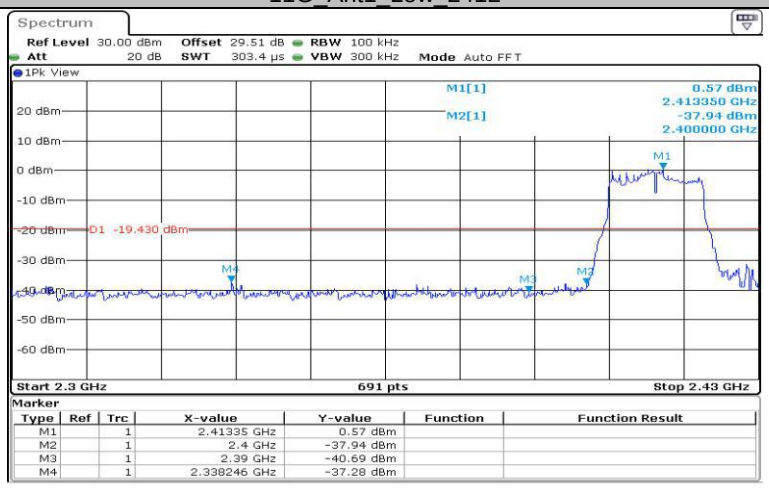


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46189 GHz	5.30 dBm		
M2		1	2.4835 GHz	-41.64 dBm		
M3		1	2.5 GHz	-41.57 dBm		
M4		1	2.498029 GHz	-37.64 dBm		

Date: 27.OCT.2022 01:59:30

11G_Ant1_Low_2412

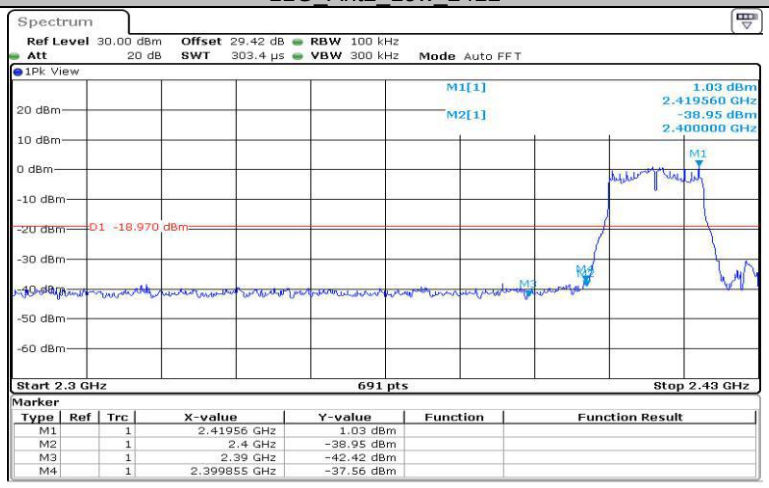


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41335 GHz	0.57 dBm		
M2		1	2.4 GHz	-37.94 dBm		
M3		1	2.39 GHz	-40.69 dBm		
M4		1	2.338246 GHz	-37.28 dBm		

Date: 27.OCT.2022 02:01:13

11G_Ant2_Low_2412

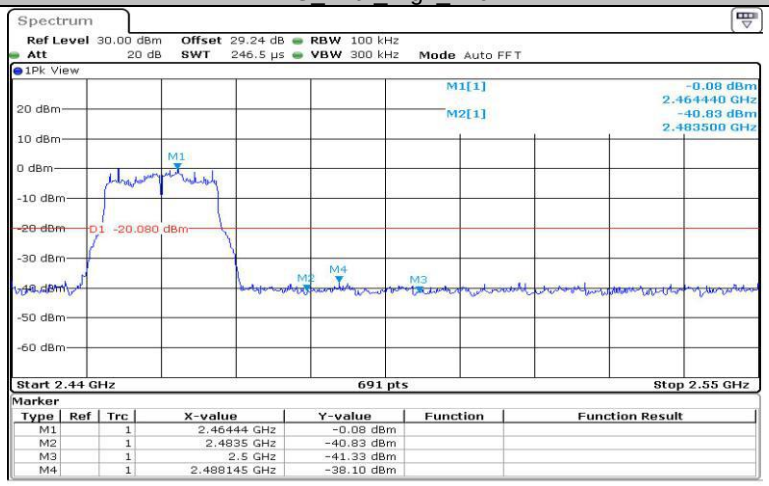


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41956 GHz	1.03 dBm		
M2		1	2.4 GHz	-38.95 dBm		
M3		1	2.39 GHz	-42.42 dBm		
M4		1	2.399855 GHz	-37.56 dBm		

Date: 27.OCT.2022 02:02:17

11G_Ant1_High_2462

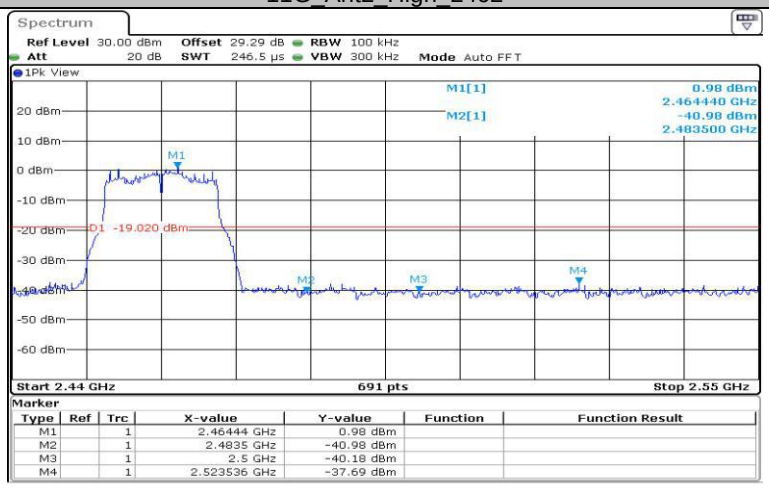


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46444 GHz	-0.08 dBm		
M2		1	2.4835 GHz	-40.83 dBm		
M3		1	2.5 GHz	-41.33 dBm		
M4		1	2.488145 GHz	-38.10 dBm		

Date: 27.OCT.2022 02:06:06

11G_Ant2_High_2462

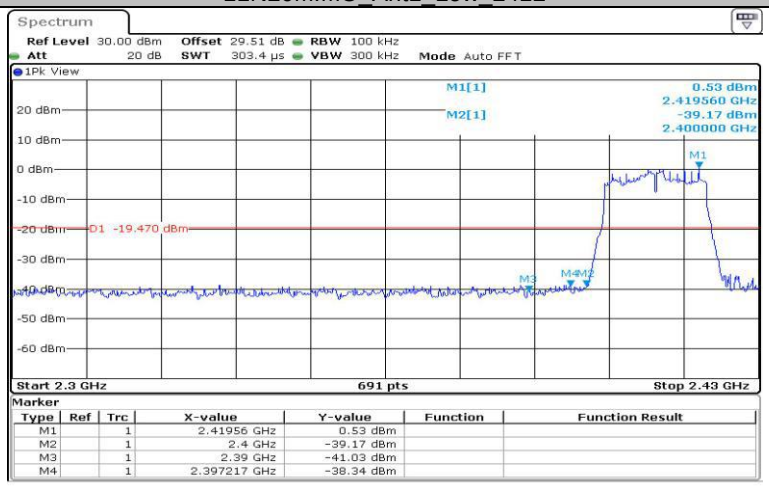


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46444 GHz	0.98 dBm		
M2		1	2.4835 GHz	-40.98 dBm		
M3		1	2.5 GHz	-40.18 dBm		
M4		1	2.523536 GHz	-37.69 dBm		

Date: 27.OCT.2022 02:07:10

11N20MIMO_Ant1_Low_2412

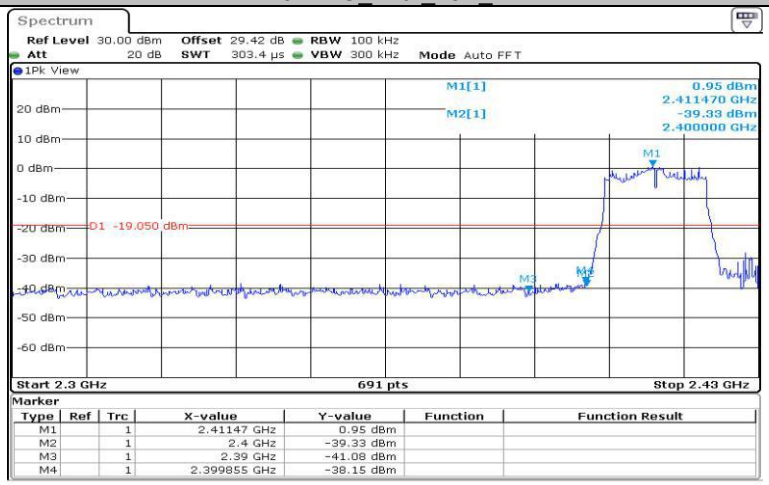


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41956 GHz	0.53 dBm		
M2		1	2.4 GHz	-39.17 dBm		
M3		1	2.39 GHz	-41.03 dBm		
M4		1	2.397217 GHz	-38.34 dBm		

Date: 27.OCT.2022 02:09:17

11N20MIMO_Ant2_Low_2412

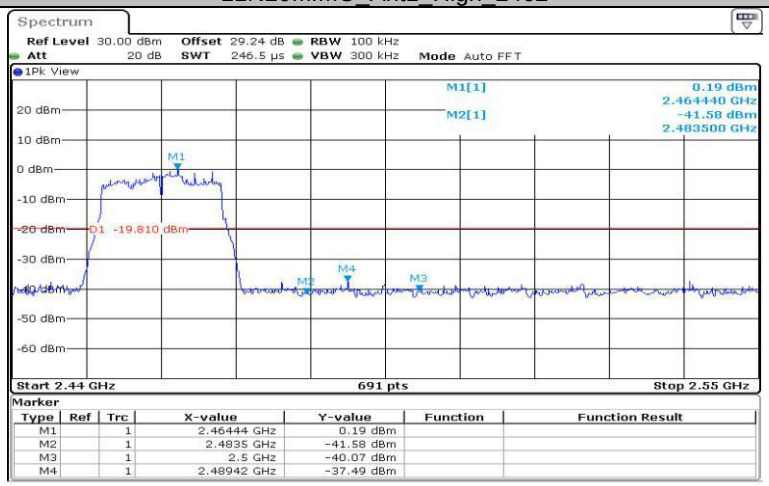


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41147 GHz	0.95 dBm		
M2		1	2.4 GHz	-39.33 dBm		
M3		1	2.39 GHz	-41.08 dBm		
M4		1	2.399855 GHz	-38.15 dBm		

Date: 27.OCT.2022 02:10:21

11N20MIMO_Ant1_High_2462

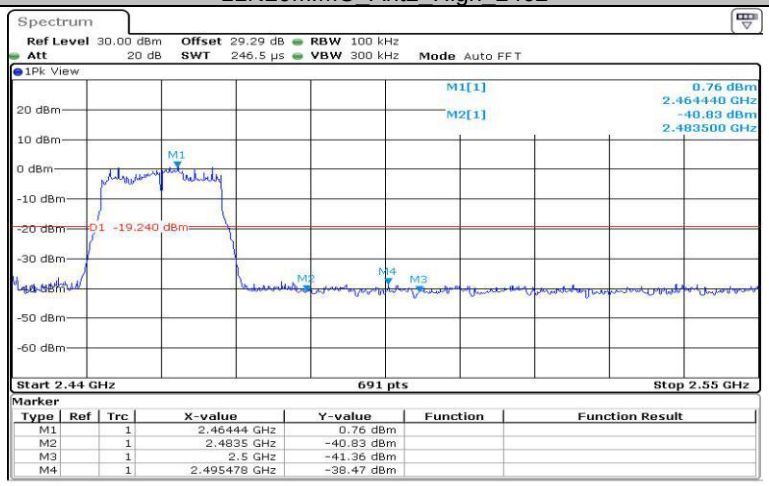


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46444 GHz	0.19 dBm		
M2		1	2.4835 GHz	-41.58 dBm		
M3		1	2.5 GHz	-40.07 dBm		
M4		1	2.48942 GHz	-37.49 dBm		

Date: 27.OCT.2022 02:13:56

11N20MIMO_Ant2_High_2462

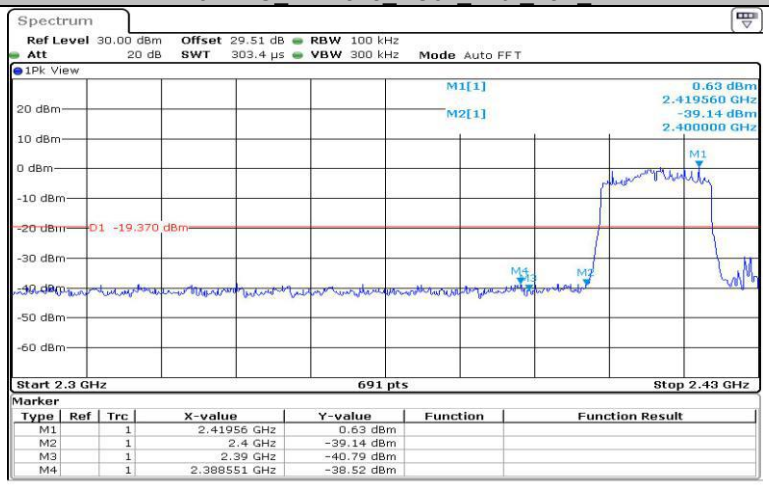


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46444 GHz	0.76 dBm		
M2		1	2.4835 GHz	-40.83 dBm		
M3		1	2.5 GHz	-41.36 dBm		
M4		1	2.495478 GHz	-38.47 dBm		

Date: 27.OCT.2022 02:15:01

11AX20MIMO_242Tone_RU61_Ant1_Low_2412

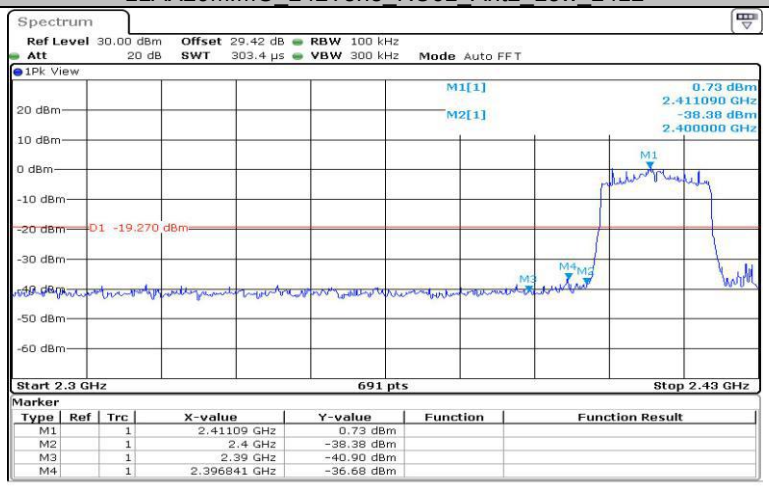


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41956 GHz	0.63 dBm		
M2		1	2.4 GHz	-39.14 dBm		
M3		1	2.39 GHz	-40.79 dBm		
M4		1	2.388551 GHz	-38.52 dBm		

Date: 27.OCT.2022 02:18:42

11AX20MIMO_242Tone_RU61_Ant2_Low_2412

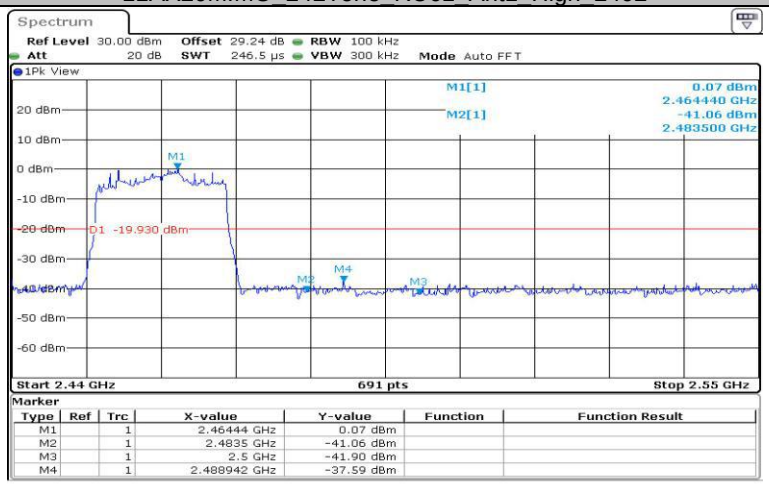


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.41109 GHz	0.73 dBm		
M2		1	2.4 GHz	-38.38 dBm		
M3		1	2.39 GHz	-40.90 dBm		
M4		1	2.396841 GHz	-36.68 dBm		

Date: 27.OCT.2022 02:19:44

11AX20MIMO_242Tone_RU61_Ant1_High_2462

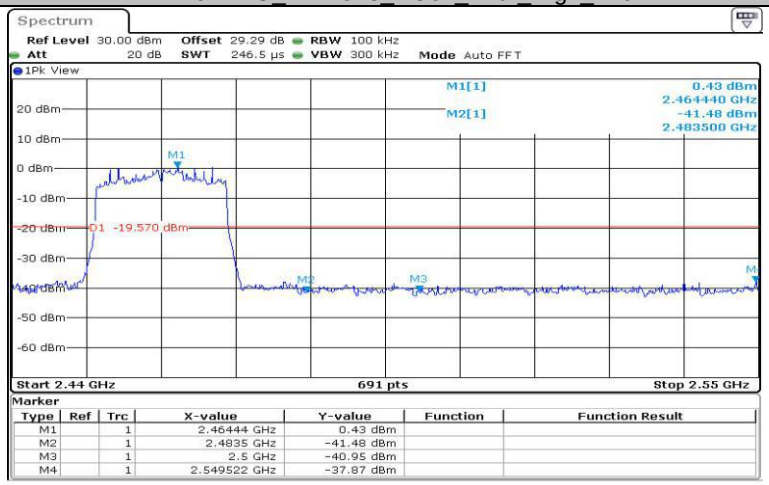


Marker

Type	Ref	Trc	X-value	Y-value	Function	Function Result
M1		1	2.46444 GHz	0.07 dBm		
M2		1	2.4835 GHz	-41.06 dBm		
M3		1	2.5 GHz	-41.90 dBm		
M4		1	2.488942 GHz	-37.59 dBm		

Date: 27.OCT.2022 02:23:15

11AX20MIMO_242Tone_RU61_Ant2_High_2462



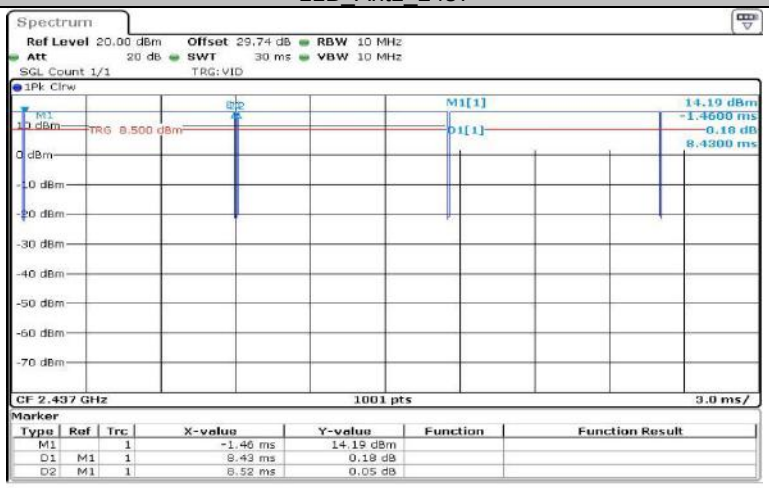
Appendix F: Duty Cycle

Test Result

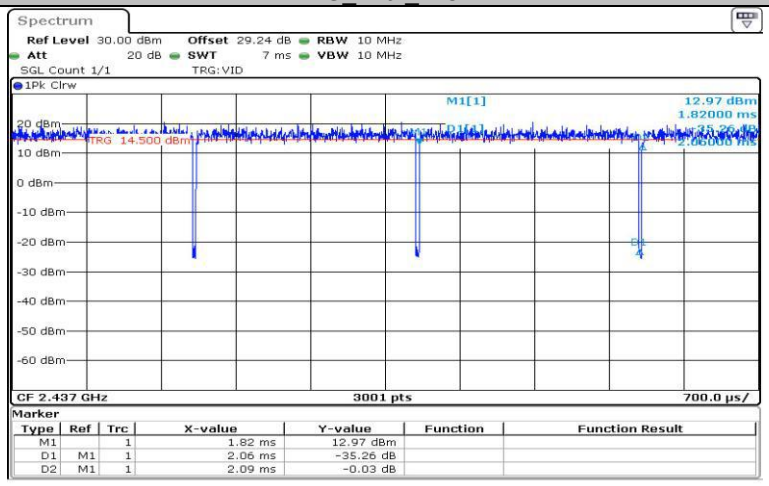
Test Mode	Antenna	Frequency[MHz]	TransmissionDuration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2437	8.43	8.52	98.94
11G	Ant1	2437	2.06	2.09	98.56
11N20MIMO	Ant1	2437	1.92	1.94	98.97
11AX20MIMO_242Tone_RU61	Ant1	2437	0.84	0.94	89.36

Test Graphs

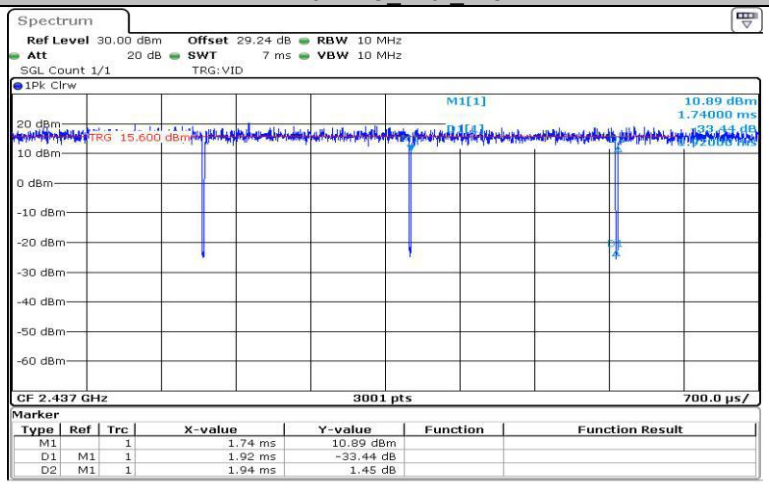
11B_Ant1_2437



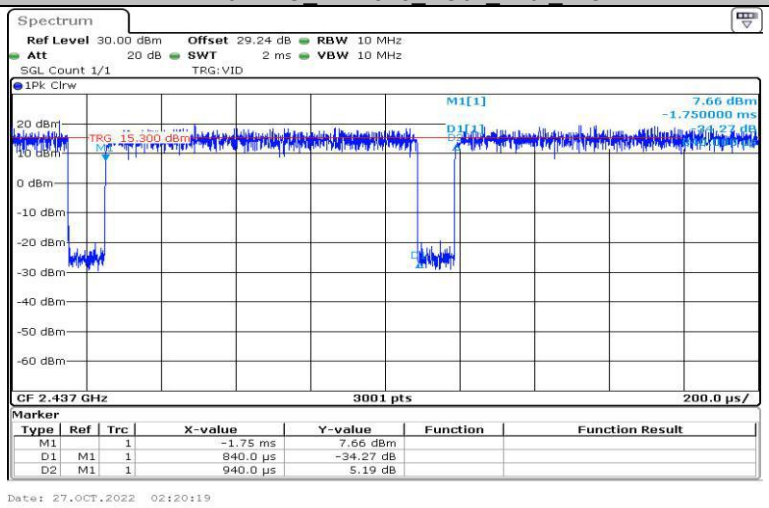
11G_Ant1_2437



11N20MIMO_Ant1_2437



11AX20MIMO_242Tone_RU61_Ant1_2437



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