



MEASUREMENT REPORT

FCC PART 15.247 WLAN 802.11b/g/n/ax

Report No.: S2023090421420101

Issue Date: 09-14-2024

Applicant: Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address: Mindray Building, Keji 12th Road South, High-Tech
Industrial Park, Nanshan, 518057 Shenzhen, PEOPLE'S
REPUBLIC OF CHINA
FCC ID: ZLZ-WXT5CM2803
Product: WiFi module
Model No.: WXT5CM2803
FCC Classification: Digital Transmission System (DTS)
FCC Rule Part(s): Part 15 Subpart C (15.247)
Test Procedure(s): ANSI C63.10-2013, KDB 558074 D01v05r02
Result: Pass
Receipt date: Sep 04, 2023
Test Date: Sep 11 ~ Oct 27, 2023

Compiled By

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Approved By

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The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in KDB 558074 D01. Test results reported herein relate only to the item(s) tested.

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The test report must not be used by the client to claim product certifications, approval, or endorsement by NVLAP, NIST or any agency of U.S. Government.

Revision History

Report No.	Version	Description	Issue Date
S2023090421420101	Rev. 01	/	09-14-2024

CONTENTS

Description	Page
§2.1033 General Information	5
1. INTRODUCTION	6
1.1. Scope	6
1.2. Fangguang Test Location	6
2. PRODUCT INFORMATION	7
2.1. Equipment Description	7
2.2. Product Specification Subjective to this Report	7
2.3. Operation Frequency / Channel List	7
2.4. Description of Available Antennas	8
2.5. Device Capabilities	9
2.6. Description of Test Software	19
2.7. Test Mode	19
2.8. Test Configuration	19
2.9. EMI Suppression Device(s)/Modifications	19
2.10. Labeling Requirements	19
3. DESCRIPTION OF TEST	21
3.1. Evaluation Procedure	21
3.2. AC Line Conducted Emissions	21
3.3. Radiated Emissions	22
4. ANTENNA REQUIREMENTS	23
5. TEST EQUIPMENT CALIBRATION DATE	24
6. MEASUREMENT UNCERTAINTY	25
7. TEST RESULT	26
7.1. Summary	26
7.2. 6dB Bandwidth Measurement	27
7.2.1. Test Limit	27
7.2.2. Test Procedure used	27
7.2.3. Test Setting	27
7.2.4. Test Setup	27
7.2.5. Test Result	28
7.3. Output Power Measurement	65
7.3.1. Test Limit	65

7.3.2.	Test Procedure Used	65
7.3.3.	Test Setting	65
7.3.4.	Test Setup	66
7.3.5.	Test Result of Output Power	67
7.4.	Power Spectral Density Measurement	89
7.4.1.	Test Limit	89
7.4.2.	Test Procedure Used	89
7.4.3.	Test Setting	89
7.4.4.	Test Setup	90
7.4.5.	Test Result	91
7.5.	Conducted Band Edge and Out-of-Band Emissions	111
7.5.1.	Test Limit	111
7.5.2.	Test Procedure Used	111
7.5.3.	Test Setting	111
7.5.4.	Test Setup	111
7.5.5.	Test Result	112
7.6.	Radiated Spurious Emission Measurement	181
7.6.1.	Test Limit	181
7.6.2.	Test Procedure Used	181
7.6.3.	Test Setting	181
7.6.4.	Test Setup	183
7.6.5.	Test Result	185
7.7.	Restricted Band Edge Measurement	218
7.7.1.	Test Limit	218
7.7.2.	Test Procedure Used	219
7.7.3.	Test Setting	219
7.7.4.	Test Setup	220
7.7.5.	Test Result	221
7.8.	AC Conducted Emissions Measurement	251
7.8.1.	Test Limit	251
7.8.2.	Test Setup	251
7.8.3.	Test Result	251
8.	CONCLUSION	252

§2.1033 General Information

Applicant:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Applicant Address:	Mindray Building, Keji 12th Road South, High-Tech Industrial Park, Nanshan, 518057 Shenzhen, PEOPLE's REPUBLIC OF CHINA
Manufacturer:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Manufacturer Address:	Mindray Building, Keji 12th Road South, High-Tech Industrial Park, Nanshan, 518057 Shenzhen, PEOPLE's REPUBLIC OF CHINA
Test Site:	Fangguang Inspection & Testing Co., Ltd.
LAB ID:	CN5037
Test Site Address:	G9 Building, China Sensor Network International Innovation Park No.200, Linghu Avenue Wuxi, Jiangsu 214000 China
FCC Rule Part(s):	Part 15 Subpart C (15.247)
FCC ID:	ZLZ-WXT5CM2803
Test Device Serial No.:	S/N.: / ☐ Production ☒ Pre-Production ☐ Engineering
FCC Classification:	Digital Transmission System (DTS)

1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2. Fangguang Test Location

These measurement tests were performed at the Fangguang Inspection and testing Co.,LTD located at 200 Linghu Avenue, Xinwu District, Wuxi City. The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.4-2014.

2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	WiFi module
Model Name:	WXT5CM2803
Trade Mark:	mindray
Input Voltage Range:	DC 3.3V
Wi-Fi Specification:	802.11b/g/n20/ax20/n40/ax40

Note:

There are three types of antennas for the WiFi module. The antennas are RD542109NB87-1, RD542109NB87-2 and RD542109NB87-3.

2.2. Product Specification Subjective to this Report

Frequency Range:	802.11b/g/n20/ax20: 2412 ~ 2462MHz 802.11n40/ax40:2422 ~ 2452MHz
Channel Number:	802.11b/g/n20/ax20: 11 802.11n40/ax40: 7
Type of Modulation:	802.11b: DSSS 802.11g/n/ax: OFDM
Data Rate:	802.11b: 1/2/5.5/11Mbps 802.11g: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0~MCS7 802.11ax: MCS0~MCS11
Antenna Type:	FPC dipole
Antenna Gain:	RD542109NB87-1 Antenna: Ant1 -0.68dBi, Ant2 -0.68dBi, RD542109NB87-2 Antenna: Ant1 2.05dBi, Ant2 2.05dBi RD542109NB87-3 Antenna: Ant1 2.45dBi, Ant2 2.45dBi

2.3. Operation Frequency / Channel List

802.11b/g/n20/ax20

Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n40/ax40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

2.4. Description of Available Antennas

1) For Antenna RD542109NB87-1

Antenna	Frequency Band (GHz)	Product Number	Tx Paths	Antenna
FPC dipole	2.4&5	WiFi module	2	Ant 1+Ant 2

Antenna	Frequency Band (MHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)		Beam Forming Directional Gain (dBi)	Directional Gain (dBi)
			Ant 0	Ant 1		
WIFI Ant 1+Ant 2	2412 ~2462	2	-0.68	-0.68	Nonsupport	2.33
	5150 ~ 5250	2	3.29	3.29	Nonsupport	6.30
	5250 ~ 5350					
	5450 ~ 5725					
	5725 ~ 5850					

2) For Antenna RD542109NB87-2

Antenna	Frequency Band (GHz)	Product Number	Tx Paths	Antenna
FPC dipole	2.4&5	WiFi module	2	Ant 1+Ant 2

Antenna	Frequency Band (MHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)		Beam Forming Directional Gain (dBi)	Directional Gain (dBi)
			Ant 0	Ant 1		
WIFI	2412 ~2462	2	2.05	2.05	Nonsupport	5.06

Ant 1+Ant 2	5150 ~ 5250 5250 ~ 5350 5450 ~ 5725 5725 ~ 5850	2	3.17	3.17	Nonsupport	6.18
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3) For Antenna RD542109NB87-3

Antenna	Frequency Band (GHz)	Product Number	Tx Paths	Antenna
FPC dipole	2.4&5	WiFi module	2	Ant 1+Ant 2

Antenna	Frequency Band (MHz)	Tx Paths	Per Chain Max Antenna Gain (dBi)		Beam Forming Directional Gain (dBi)	Directional Gain (dBi)
			Ant 0	Ant 1		
WIFI Ant 1+Ant 2	2412 ~2462	2	2.45	2.45	Nonsupport	5.46
	5150 ~ 5250	2	2.77	2.77	Nonsupport	5.78
	5250 ~ 5350					
	5450 ~ 5725					
	5725 ~ 5850					

Note:

Unequal Antenna gains, with equal transmit powers. For Antenna gains given by $G_1, G_2, \dots, G_N$ dBi transmit signals are correlated, then

- Directional gain = $10 \cdot \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{ANT}]$ dBi [Note the “20”s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]
- Directional Gain(2.4G) = $10 \cdot \log[(10^{-0.68/20} + 10^{-0.68/20})^2 / 2] = 2.33$ dBi
- Directional Gain(2.4G) = $10 \cdot \log[(10^{2.05/20} + 10^{2.05/20})^2 / 2] = 5.06$ dBi
- Directional Gain(2.4G) = $10 \cdot \log[(10^{2.45/20} + 10^{2.45/20})^2 / 2] = 5.46$ dBi
- Directional Gain(5G) = $10 \cdot \log[(10^{3.29/20} + 10^{3.29/20})^2 / 2] = 6.30$ dBi
- Directional Gain(5G) = $10 \cdot \log[(10^{3.17/20} + 10^{3.17/20})^2 / 2] = 6.18$ dBi
- Directional Gain(5G) = $10 \cdot \log[(10^{2.77/20} + 10^{2.77/20})^2 / 2] = 5.78$ dBi

2.5. Device Capabilities

This device contains the following capabilities:

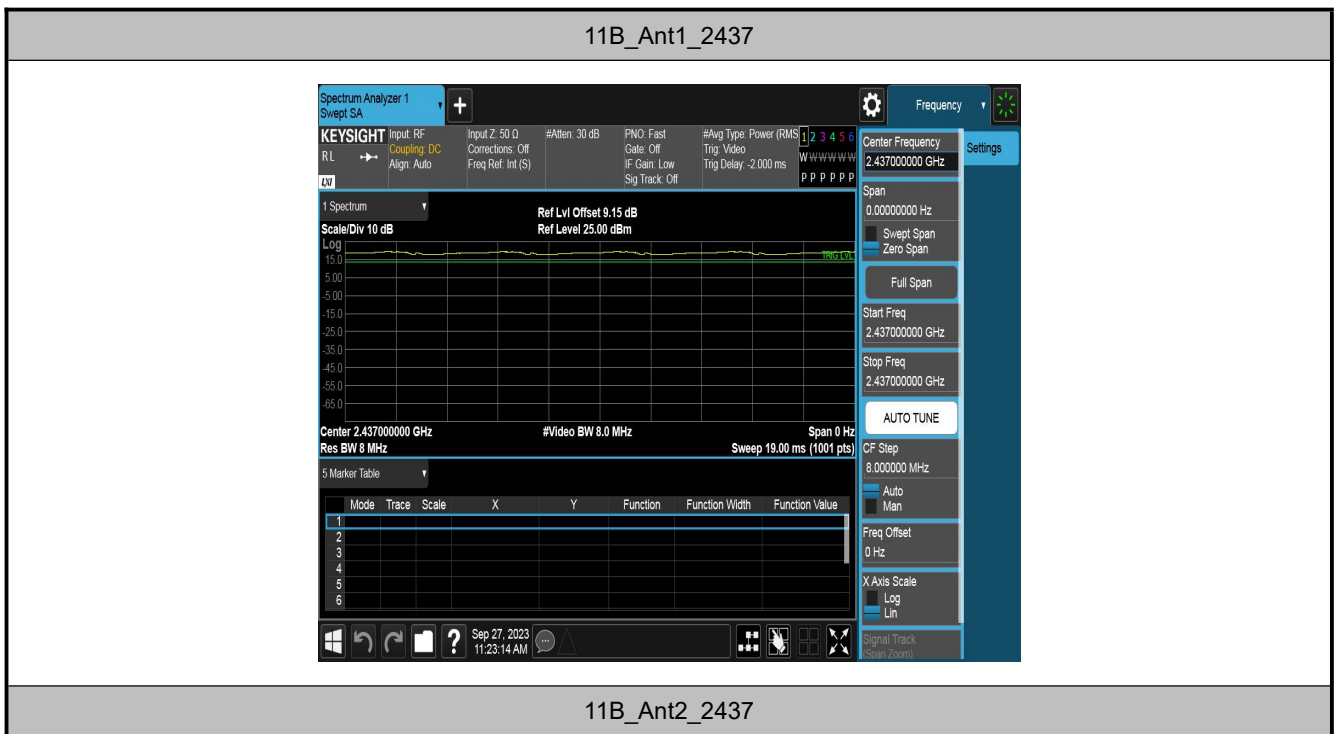
2.4GHz WLAN (DTS)&5GHz WLAN (UNII) &6GHz WLAN (UNII)

Note: 2.4GHz WLAN (DTS) operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycle was determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles:

Test Mode	Antenna	Frequency [MHz]	Transmission Duration [ms]	Transmission Period [ms]	Duty Cycle [%]
11B	Ant1	2412	19.00	19.00	100.00
	Ant2	2412	19.00	19.00	100.00
	Ant1	2437	19.00	19.00	100.00
	Ant2	2437	19.00	19.00	100.00
	Ant1	2462	19.00	19.00	100.00
	Ant2	2462	19.00	19.00	100.00
11G	Ant1	2412	19.00	19.00	100.00
	Ant2	2412	19.00	19.00	100.00
	Ant1	2437	19.00	19.00	100.00
	Ant2	2437	19.00	19.00	100.00
	Ant1	2462	19.00	19.00	100.00
	Ant2	2462	19.00	19.00	100.00
11N20MIMO	Ant1	2412	19.00	19.00	100.00
	Ant2	2412	19.00	19.00	100.00
	Ant1	2437	19.00	19.00	100.00
	Ant2	2437	19.00	19.00	100.00
	Ant1	2462	19.00	19.00	100.00
	Ant2	2462	19.00	19.00	100.00
11N40MIMO	Ant1	2422	19.00	19.00	100.00
	Ant2	2422	19.00	19.00	100.00
	Ant1	2437	19.00	19.00	100.00
	Ant2	2437	19.00	19.00	100.00
	Ant1	2452	19.00	19.00	100.00
	Ant2	2452	19.00	19.00	100.00
11AX20MIMO	Ant1	2412	19.00	19.00	100.00
	Ant2	2412	19.00	19.00	100.00
	Ant1	2437	19.00	19.00	100.00
	Ant2	2437	19.00	19.00	100.00

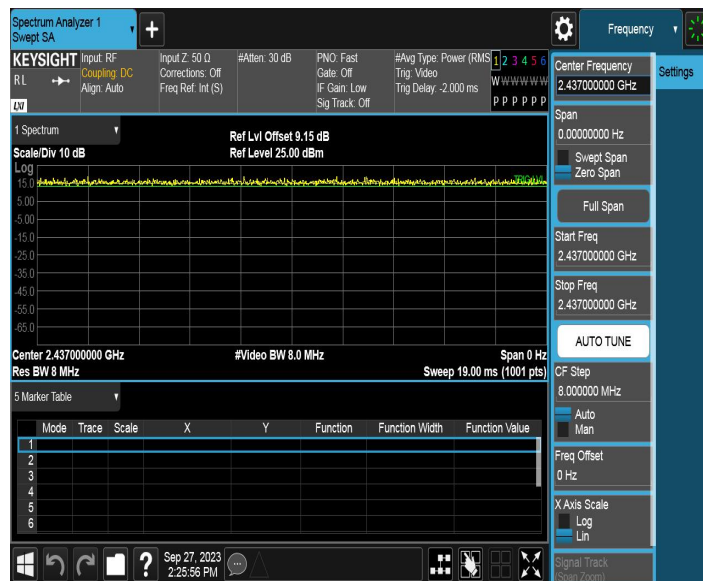
	Ant1	2462	19.00	19.00	100.00
	Ant2	2462	19.00	19.00	100.00
11AX40MIMO	Ant1	2422	19.00	19.00	100.00
	Ant2	2422	19.00	19.00	100.00
	Ant1	2437	19.00	19.00	100.00
	Ant2	2437	19.00	19.00	100.00
	Ant1	2452	19.00	19.00	100.00
	Ant2	2452	19.00	19.00	100.00

Test Graphs

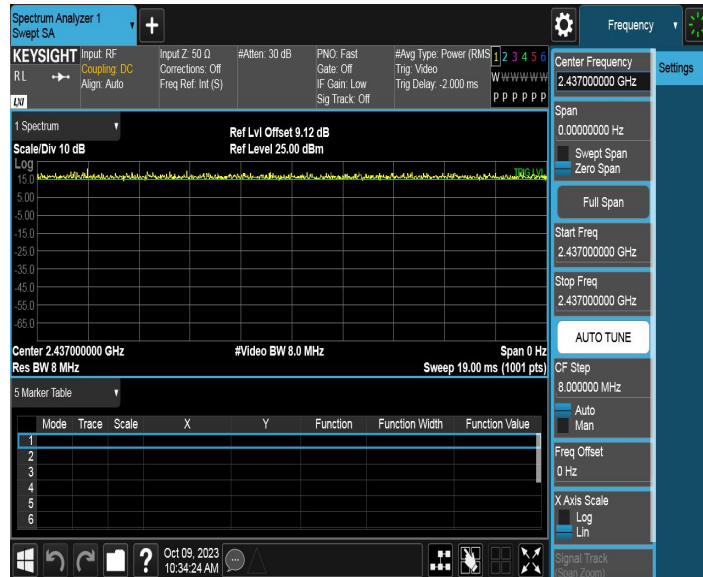




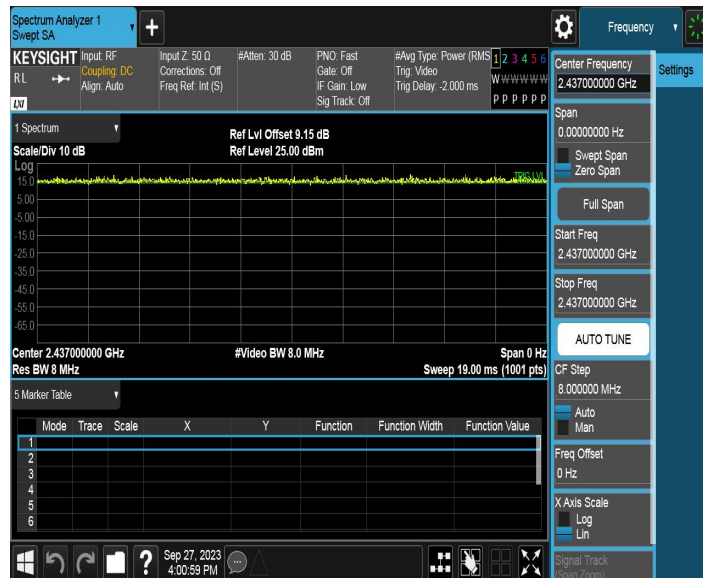
11G_Ant1_2437



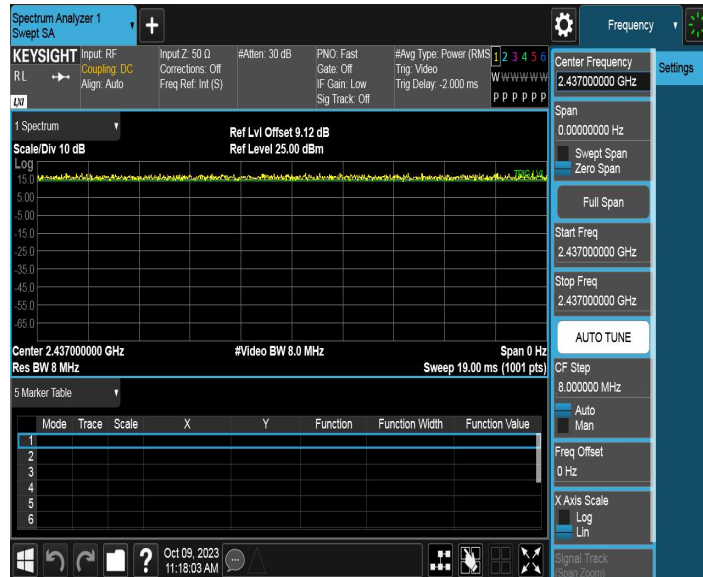
11G_Ant2_2437



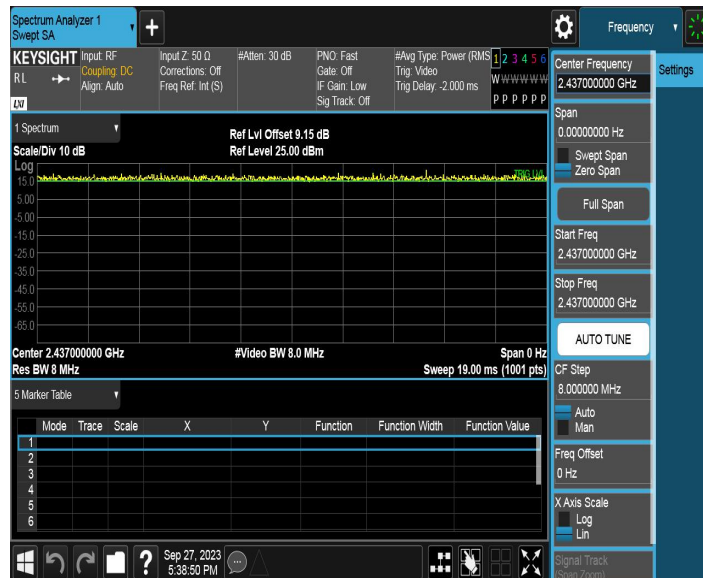
11N20MIMO_Ant1_2437



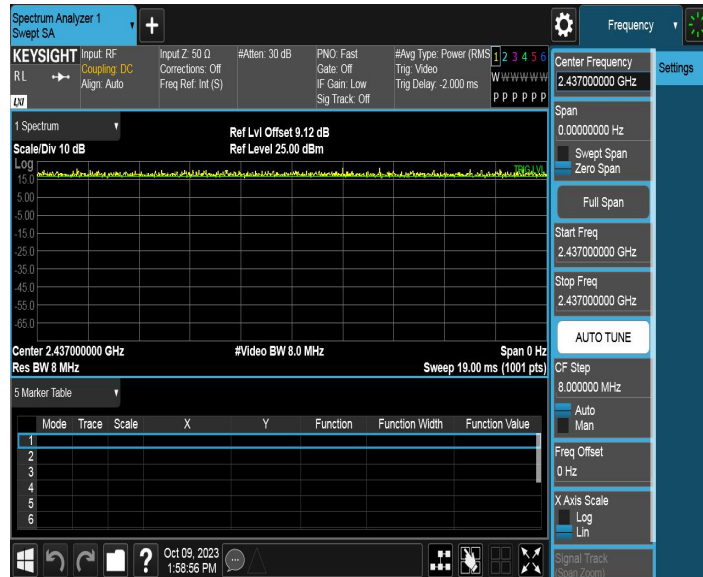
11N20MIMO_Ant2_2437



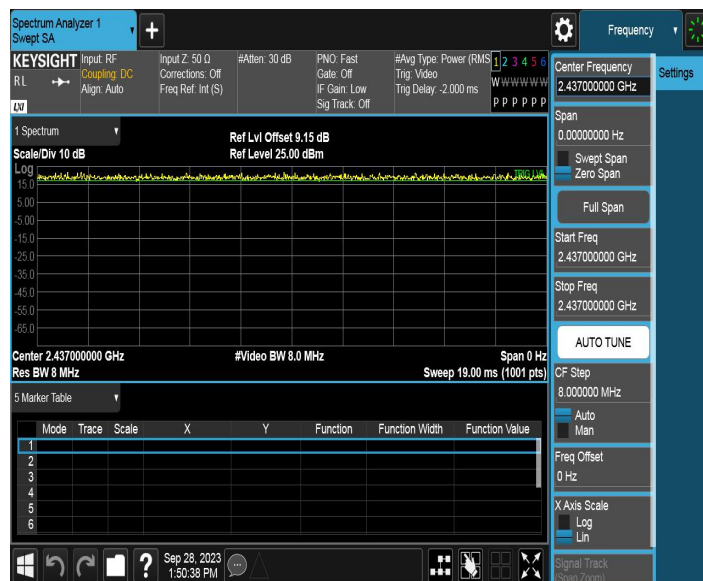
11N40MIMO_Ant1_2437



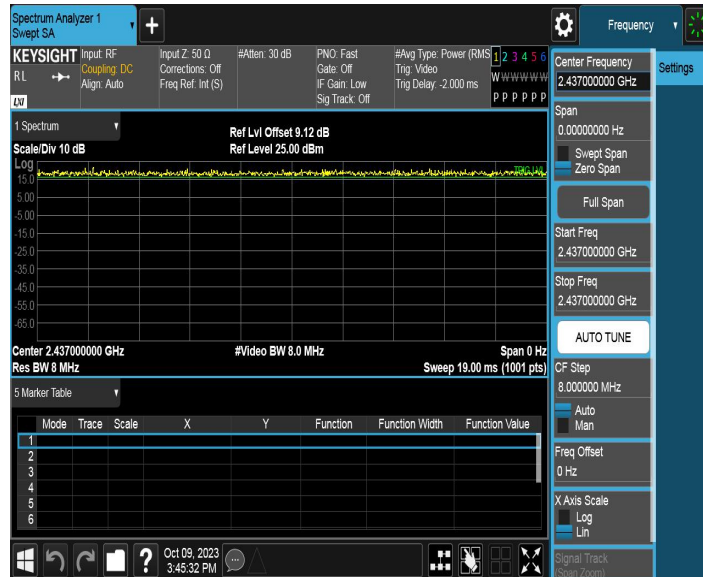
11N40MIMO_Ant2_2437



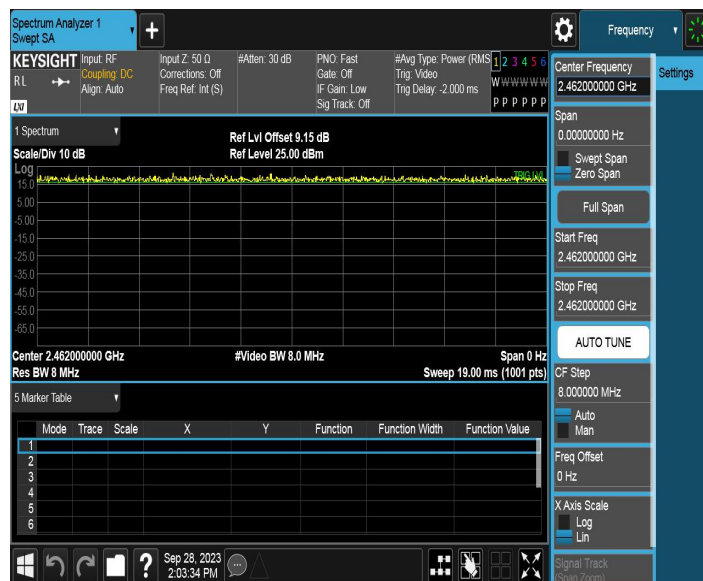
11AX20MIMO_Ant1_2437



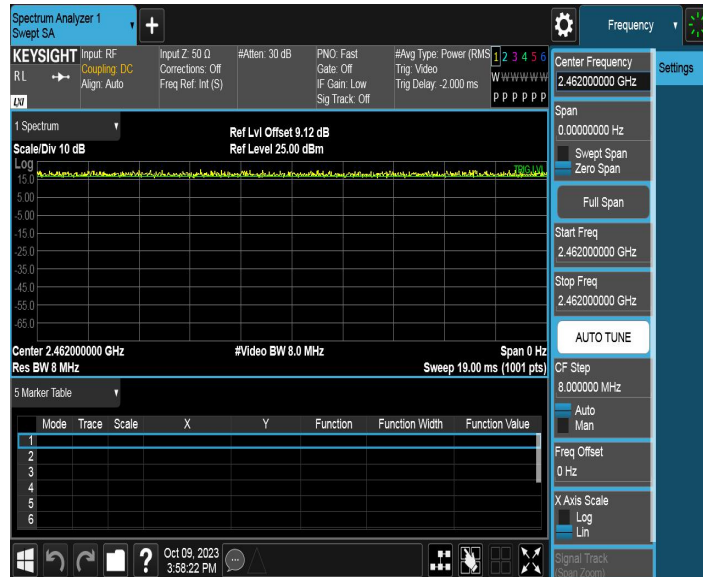
11AX20MIMO_Ant2_2437



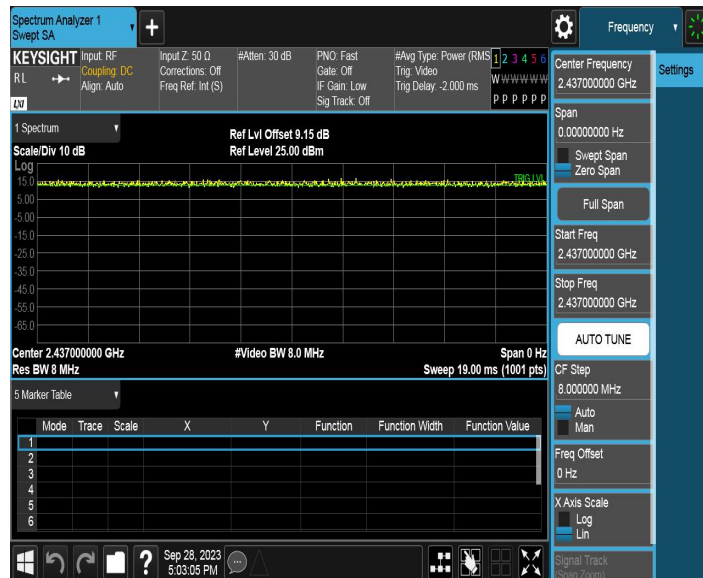
11AX20MIMO_Ant1_2462



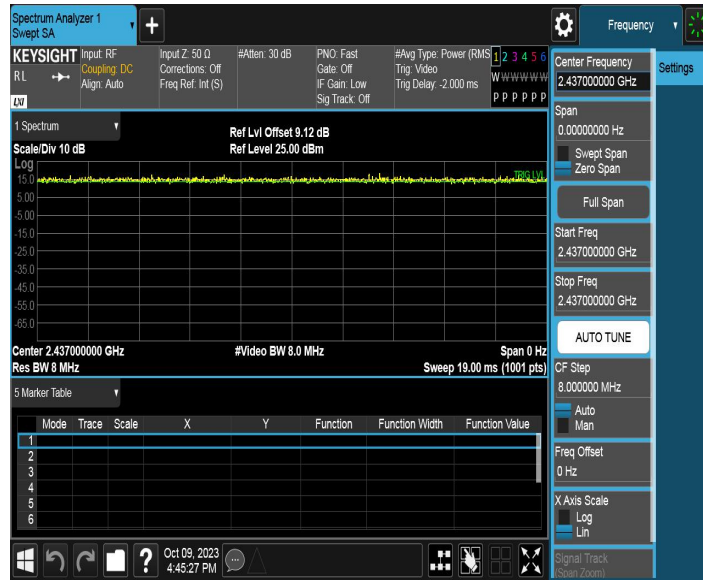
11AX20MIMO_Ant2_2462



11AX40MIMO_Ant1_2437



11AX40MIMO_Ant2_2437



2.6. Description of Test Software

The test utility software used during testing was "Putty.exe", Power Parameter Value:

Test Mode	Ant 1	Ant 2	MIMO
802.11b	15	15	---
802.11g	10	10	---
802.11n-HT20	---	---	10
802.11n-HT40	---	---	13
802.11ax-HE20	---	---	14
802.11ax-HE40	---	---	13

2.7. Test Mode

Test Mode	Mode 1: Transmit by 802.11b Ant 1
	Mode 2: Transmit by 802.11g Ant 1
	Mode 3: Transmit by 802.11b Ant 2
	Mode 4: Transmit by 802.11g Ant 2
	Mode 5: Transmit by 802.11n20 MIMO
	Mode 6: Transmit by 802.11n40 MIMO
	Mode 7: Transmit by 802.11ax20 MIMO
	Mode 8: Transmit by 802.11ax40 MIMO

2.8. Test Configuration

The EUT was tested per the guidance of KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase.

However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see

attachment for FCC ID label and label location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01 v05r02 were used in the measurement of the EUT.

Deviation from measurement procedure.....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.