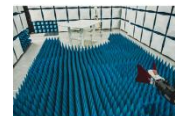




# Element Materials Technology

(Formerly PCTEST)  
18855 Adams Court, Morgan Hill, CA 95037 USA  
Tel. 408.538.5600  
<http://www.element.com>



## MEASUREMENT REPORT FCC PART 15.247 / ISSED RSS-247 WLAN OFDMA

**Applicant Name:**

Apple Inc.  
One Apple Park Way  
Cupertino, CA 95014  
United States

**Date of Testing:**

2/20/2023 - 4/24/2023

**Test Report Issue Date:**

11/30/2023

**Test Site/Location:**

Element Materials Technology Morgan Hill, CA USA

**Test Report Serial No.:**

1C2302130007-04.BCG

**FCC ID:**

BCGA2117

**IC:**

579C-A2117

**APPLICANT:**

Apple Inc.

**Application Type:**

Certification

**Model/HVIN:**

A2117

**EUT Type:**

Head Mounted Device

**Frequency Range:**

2412 – 2467MHz

**Modulation Type:**

OFDMA

**FCC Classification:**

Digital Transmission System (DTS)

**FCC Rule Part(s):**

Part 15 Subpart C (15.247)

**ISED Specification:**

RSS-247 Issue 3

**Test Procedure(s):**

ANSI C63.10-2013, KDB 558074 D01 v05r02,  
KDB 662911 D01 v02r01


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 ANSI C63.10-2013 and KDB 558074 D01 v05r02. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez

Executive Vice President



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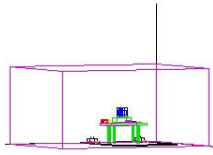
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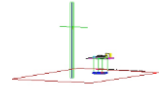
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## MEASUREMENT REPORT



Mode	RU	Tx Frequency [MHz]	Ant 1				Ant 2			
			Avg Conducted		Peak Conducted		Avg Conducted		Peak Conducted	
			Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
802.11ax OFDMA	26	2412 - 2467	17.783	12.50	135.519	21.32	17.742	12.49	133.968	21.27
802.11ax OFDMA	242	2412 - 2467	141.254	21.50	441.570	26.45	138.038	21.40	453.942	26.57

### EUT Overview SISO (802.11ax – RU)

Mode	RU	Tx Frequency [MHz]	Ant 1				Ant 2				CDD			
			Avg Conducted		Peak Conducted		Avg Conducted		Peak Conducted		Avg Conducted		Peak Conducted	
			Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)
802.11ax OFDMA	26	2412 - 2467	17.783	12.50	132.130	21.21	17.742	12.49	127.938	21.07	35.362	15.49	255.055	24.07
802.11ax OFDMA	242	2412 - 2467	132.739	21.23	441.570	26.45	139.316	21.44	446.684	26.50	269.933	24.31	883.199	29.46

### EUT Overview CDD (802.11ax – RU)

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## 1.0 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 Element Materials Technology Morgan Hill Test Location

These measurement tests were conducted at the Element Materials Technology Morgan Hill facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01r01.

### 1.3 Test Facility / Accreditations

Measurements were performed at Element Materials Technology Morgan Hill located in Morgan Hill, CA 95037, U.S.A.

- Element Materials Technology Morgan Hill is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- Element Washington DC LLC TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISSED Standards (RSS).
- Element Materials Technology Morgan Hill facility is a registered (22831) test laboratory with the site description on file with ISSED.
- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISSED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreements (MRAs)

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Head Mounted Device FCC ID: BCGA2117, IC: 579C-A2117**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN 802.11ax – RU (DTS) transmitter.

**Test Device Serial No.:** GPG3017001F20N78X, PYVWK6LLC6, WFGF7D9H60, MHP0XYH0XK, HP14K0WJ0Q

### 2.2 Device Capabilities

This device contains the following capabilities:

802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, Bluetooth (1x, EDR, LE1M, LE2M, HDR4, HDR8), NB UNII (1x, LE1M, LE2M, HDR4, HDR8, HDRp4, HDRp8)

This device supports BT Beamforming

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

**Table 2-1. 802.11ax Frequency/ Channel Operations**

\*Channel 13 is disabled for DTS 802.11ax HE20.

**Note:** The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = peak per the guidance of Section 6.0 b) of KDB 558074 D01 v05r02 and ANSI C63.10-2013. 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 are as follows:

Measured Duty Cycles				
802.11 Mode/Band		Duty Cycle [%]		
		Ant 1	Ant 2	CDD
2.4GHz	RU 26	88.7	88.7	88.9
	RU 242	87.3	87.5	88.0

**Table 2-2. Measured Duty Cycles**

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The device employs CDD technology. Below are the possible configurations.

WiFi Configurations		SISO		SDM		CDD	
		Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2
2.4GHz	11ax	✓	✓	✓	✓	✓	✓

**Table 2-3. WiFi Configurations**

✓ = Support ; ✕ = NOT Support

**SISO** = Single Input Single Output

**SDM** = Spatial Diversity Multiplexing – CDD function

**CDD** = Cyclic Delay Diversity - 2Tx Function

Data Rate(s) Supported: 8/8.6Mbps, 16/17.2Mbps, 24/25.8Mbps, 33/34.4Mbps, 49/51.6Mbps, 65/68.8Mbps, 73/77.4Mbps, 81/86.0Mbps, 98/103.2Mbps, 108/114.7Mbps (ax – 20MHz)  
16/17.2 Mbps, 32/34.4 Mbps, 48/51.6 Mbps, 66/68.8 Mbps, 98/103.2 Mbps,  
130/137.6 Mbps, 146/154.8 Mbps, 162/172 Mbps, 196/206.4 Mbps, 216/229.4Mbps  
(CDD ax – 20MHz)

This device supports simultaneous transmission operations, which allows for multiple transmitters to transmit simultaneously on the same antenna. The table below shows all configurations possible.

Simultaneous Tx Config	Ant1			Ant2			NB UNII_L		NB UNII_R
	WLAN 2.4G 802.11 b/g/n/ax	BT 2.4G BDR, EDR, HDR4/8, LE1M/2M, HDRp4/p8	WIFI 5G 802.11 a/n/ac/ax	WLAN 2.4G 802.11 b/g/n/ax	BT 2.4G BDR, EDR, HDR4/8, LE1M/2M, HDRp4/p8	WIFI 5G 802.11 a/n/ac/ax	BT 2.4G BDR, HDR4/8, LE1M/2M, HDRp4/p8	NB_UNII 5G BDR, HDR4/8, LE1M/2M, HDRp4/p8	NB_UNII 5G BDR, HDR4/8, LE1M/2M, HDRp4/p8
Config 1	✓	✕	✓	✕	✕	✕	✕	✓	✓
Config 2	✕	✕	✕	✓	✕	✓	✕	✓	✓
Config 3	✕	✓	✓	✕	✕	✕	✕	✓	✓
Config 4	✕	✓	✕	✕	✕	✓	✕	✓	✓
Config 5	✕	✓	✓	✕	✓	✕	✕	✕	✕
Config 6	✕	✓	✕	✕	✓	✓	✕	✕	✕
Config 7	✓	✕	✓	✕	✕	✕	✓	✓	✓
Config 8	✓	✕	✕	✕	✕	✓	✓	✓	✓
Config 9	✓	✕	✓	✕	✓	✕	✕	✕	✕
Config 10	✓	✕	✕	✕	✓	✓	✕	✕	✕
Config 11	✓	✕	✓	✓	✕	✓	✕	✕	✕
Config 12	✕	✓	✓	✕	✕	✓	✕	✕	✕
Config 13	✓	✕	✓	✕	✕	✓	✓	✕	✕

**Table 2-4. Simultaneous Transmission Configurations**

✓ = Support; ✕ = Not Support

#### Note:

All the above simultaneous transmission configurations have been tested and the worst case configuration was found to be config 7 and reported in UNII 802.11ax (OFDMA), Bluetooth LE, NB UNII LE, and WLAN 802.11 (OFDM) test reports.

## 2.3 Antenna Description

The following antenna gains provided by the manufacturer were used for testing.

Frequency [GHz]	Antenna Gain (dBi)	
	Ant1	Ant2
2.4	1.6	-1.0

**Table 2-5. Highest Antenna Gain**

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## 2.4 Test Support Equipment

1	Apple Macbook Pro	Model:	A2289	S/N:	C02DV7VGMD6T
	w/ AD/DC Adapter	Model:	A2164	S/N:	N/A
2	Apple USB-C Cable	Model:	Spartan	S/N:	000MKTR02U
3	Right Temple	Model:	N/A	S/N:	HTFGR70005J000020R
	Left Temple	Model:	N/A	S/N:	HTFGR40004A00002GY
	Headband	Model:	N/A	S/N:	GKNGNC0001H0000215
4	Light Seal	Model:	N/A	S/N:	GKNGQF000RX00003KB
	Light Seal Padding	Model:	N/A	S/N:	GKNGQ8001RD00002XA
5	EUT Power Pack	Model:	N/A	S/N:	HTFGQW0009800001MV

**Table 2-6. Test Support Equipment List**

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## 2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013 and KDB 558074 D01 v05r02. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing. See Sections 3.2 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5, and 7.6 for antenna port conducted emissions test setups.

There are two vendors of the WiFi/Bluetooth radio modules, variant 1 and variant 2. Both radio modules have the same mechanical outline, same on-board antenna matching circuit, identical antenna structure, and are built and tested to conform to the same specifications and to operate within the same tolerances. The worst case configuration was found between the two variants. The EUT with power pack was also investigated with and without charger.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration. The emissions below 1GHz and above 18GHz were tested with the highest transmitting power and the worst case channel.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions are reported in this test report.

For AC line conducted and radiated test below 1GHz, following configuration were investigated and EUT powered by AC/DC was the worst case.

- EUT powered by AC/DC adaptor to USB-C Power Pack to Magnetic Charging Cable
- EUT powered by host PC via USB-C Power Pack to Magnetic Charging Cable

802.11ax HE20 2Tx CDD mode test data provided in this report covers 802.11ax HE20 2Tx SDM.

For 802.11b/g/n/ax-SU test results, see separate WLAN report, 1C2302130007-05.BCG

## 2.6 Software and Firmware

The test was conducted with firmware version 20.94.1.18 installed on the EUT.

## 2.7 EMI Suppression Device(s)/Modifications

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

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## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

The measurement procedures described in the American National Standard of Procedures for Compliance Testing of 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 a 7m x 3.66m x 2.7m shielded enclosure. The shielded enclosure is manufactured by AP Americas. The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 65-6. A 1m x 1.5m 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/50μH 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. The external power line filter is EPCOS 2X60A Power Line Filter (100dB Attenuation, 14kHz-18GHz) and the two EPCOs 2X48A filters (100dB Minimum Insertion Loss, 14kHz - 10GHz). 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. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply line(s) will be connected to 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 groundplane. Power cables for support equipment were routed down to the second LISN while ensuring that the 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 spectrum analyzer and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The spectrum was scanned from 150kHz to 30MHz with a spectrum analyzer. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 10kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions is 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.

Line conducted emissions test results are shown in Section 7.9. Automated test software was used to perform the AC line conducted emissions testing. Automated measurement software utilized is Rohde & Schwarz EMC32, Version 10.50.40.

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### 3.3 Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. An 80cm tall test table made of Styrodur is placed on top of the turn table. For measurements above 1GHz, an additional Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.


Per KDB 414788 D01 v01r01, radiated emission test sites other than open-field test sites (e.g., shielded anechoic chambers), may be employed for emission measurements below 30MHz if characterized so that the measurements correspond to those obtained at an open-field test site. To determine test site equivalency, a reference sample transmitting at 149kHz was measured on an open field test site (asphalt with no ground plane) and then measured in the 3m semi-anechoic chamber. A calibrated 60cm loop antenna was rotated about its vertical axis while the reference device was rotated through the X, Y and Z axis in order to capture the worst case level. A maximum deviation of 2.77dB at 149kHz was measured when comparing the 3 meter semi-anechoic chamber to the open field site.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33 depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. 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 test set-up was placed on top of the 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

### 3.4 Environmental Conditions

The temperature is controlled within range of 15°C to 35°C. The relative humidity is controlled within range of 10% to 75%. The atmospheric pressure is monitored within the range 86-106kPa (860-1060mbar).

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## 4.0 ANTENNA REQUIREMENTS


### Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 antennas of the EUT are **permanently attached**.
- There are no provisions for connections to an external antenna.

### Conclusion:

The EUT unit complies with the requirement of §15.203.

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## 5.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.23-2012. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty ( $\pm$ dB)
Conducted Bench Top Measurements	1.77
Line Conducted Disturbance	2.70
Radiated Disturbance (<30MHz)	4.38
Radiated Disturbance (30MHz - 1GHz)	4.75
Radiated Disturbance (1 - 18GHz)	5.20
Radiated Disturbance (>18GHz)	4.72

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## 6.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial #
Agilent	N9020A	MXA Signal Analyzer	4/26/2022	Annual	4/26/2023	MY56470202
Anritsu	MA2411B	Pulse Power Sensor	5/19/2022	Annual	5/19/2023	1911106
Anritsu	ML2496A	Power Meter	10/17/2022	Annual	10/17/2023	2002005
ETS-Lindgren	3117	Double Ridged Guide Horn Antenna (1-18 GHz)	5/24/2022	Annual	5/24/2023	240049
Keysight Technologies	N9030A	PXA Signal Analyzer	6/10/2022	Annual	6/10/2023	MY49430244
Rohde & Schwarz	180-442A-KF	Horn (Small)	3/6/2023	Annual	3/6/2024	T058701-2
Rohde & Schwarz	ENV216	Two-Line V-Network	3/30/2023	Annual	3/30/2024	101364
Rohde & Schwarz	FSVA3044	Signal Analyzer 44GHz	5/12/2022	Annual	5/12/2023	101098
Rohde & Schwarz	FSW43	Signal and Spectrum Analyzer 2Hz to 43GHz	5/19/2022	Annual	5/19/2023	104093
Rohde & Schwarz	FSW67	Signal and Spectrum Analyzer (2Hz-67GHz)	4/21/2022	Annual	4/21/2023	101366
Rohde & Schwarz	HFH-2Z2	9kHz - 30MHz Loop Antenna	4/13/2022	Annual	4/13/2023	100546
Rohde & Schwarz	TS-PR1	Preamplifier - Antenna System; 30MHz - 1GHz	4/18/2022	Annual	4/18/2023	102081
Rohde & Schwarz	TS-PR18	Pre Amplifier 1-18GHz	3/3/2023	Annual	3/3/2024	102130
Rohde & Schwarz	TS-PR1840	Pre Amplifier 18-40GHz	4/18/2022	Annual	4/18/2023	100050
Schwarzbeck	VULB9162	Biconilog Antenna - (30MHz-6GHz)	7/27/2022	Annual	7/27/2023	121034

**Table 6-1. Test Equipment List**

### Note:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: Apple Inc.

FCC ID: BCGA2117

IC: 579C-A2117


FCC Classification: Digital Transmission System (DTS)

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	RSS-247 [5.2]	6dB Bandwidth	> 500kHz	CONDUCTED	PASS	Section 7.2
2.1049	RSS-Gen [6.7]	Occupied Bandwidth	N/A		N/A	Section 7.2
15.247(b)(3)	RSS-247 [5.4]	Transmitter Output Power	< 1 Watt		PASS	Sections 7.3
15.247(e)	RSS-247 [5.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz Band		PASS	Section 7.4
15.247(d)	RSS-247 [5.5]	Band Edge / Out-of-Band Emissions	≥ 20dBc		PASS	Sections 7.5, 7.6
15.205 15.209	RSS-Gen [8.9]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209 (RSS-Gen [8.9])	RADIATED	PASS	Sections 7.7, 7.8
15.207	RSS-Gen [8.8]	AC Conducted Emissions 150kHz – 30MHz	< FCC 15.207 limits (RSS-Gen[8.8])	AC LINE CONDUCTED	PASS	Section 7.9

**Table 7-1. Summary of Test Results**

#### Notes:

- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
- All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.
- For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is Element “WLAN Automation,” Version 5.0.
- For radiated band edge, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is Element “Chamber Automation,” Version 2.0.
- 802.11ax OFDMA testing was performed for all signal tone configurations as specified by the 802.11ax standard. Worst case results are determined and reported per the guidance provided at the October 2018 TCB Workshop.
- Only one RU index could be selected at a time so no contiguous or non-contiguous RU's were considered for testing.

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## 7.2 Bandwidth Measurement

§15.247(a.2); RSS-247 [5.2]; RSS-Gen [6.7]

### Test Overview and Limit

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the transmitter antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated and the worst case configuration results are reported in this section.

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

***The minimum permissible 6dB bandwidth is 500 kHz.***

### Test Procedure Used

ANSI C63.10-2013 – Subclause 11.8.2 Option 2

KDB 558074 D01 v05r02 – Section 8.2

RSS-Gen [6.7]

### Test Settings

1. The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 99% occupied bandwidth and the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to  $X = 6$ . The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 100kHz
3. VBW  $\geq 3 \times$  RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

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## Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-1. Test Instrument & Measurement Setup**

## Test Notes

1. All antenna configurations were investigated and only the worst case is reported.
2. All RU's were investigated and only worst case partially-loaded and fully-loaded RU's were reported

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## Ant 1 Bandwidth Measurements

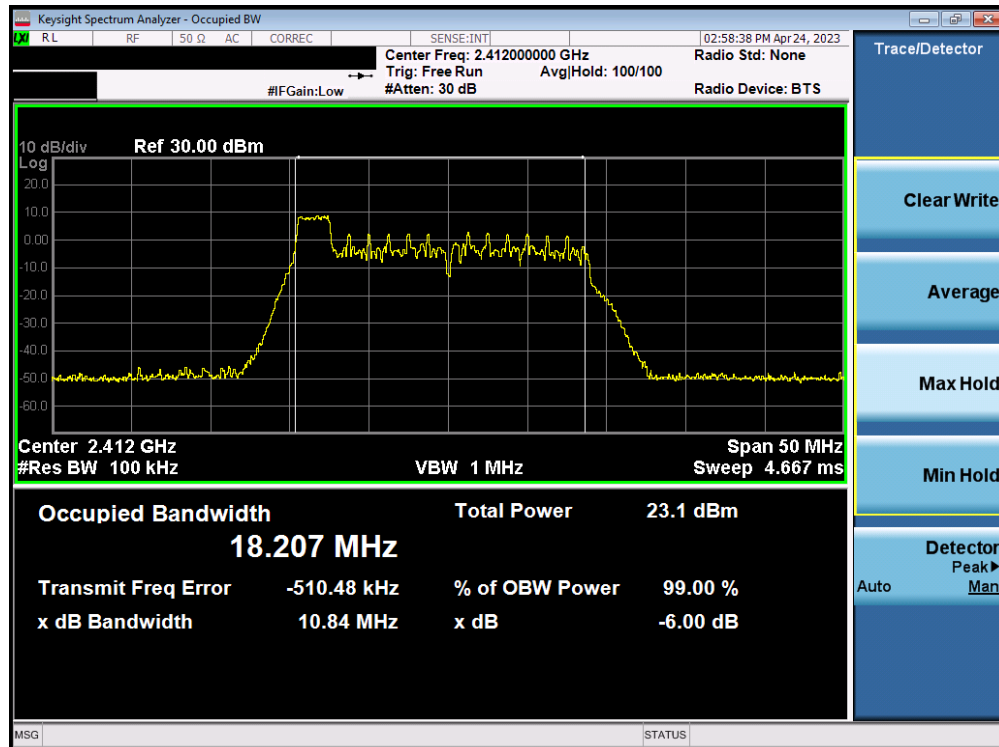
Frequency [MHz]	Channel No.	802.11 Mode	RU Size	RU Index	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Minimum 6dB Bandwidth [MHz]	Pass / Fail
2412	1	ax	26	0	108/114.7 (MCS9)	18.207	10.844	0.500	Pass
2412	1	ax	26	4	108/114.7 (MCS9)	17.114	2.707	0.500	Pass
2412	1	ax	26	8	108/114.7 (MCS9)	18.316	2.074	0.500	Pass
2437	6	ax	26	0	108/114.7 (MCS9)	18.202	2.158	0.500	Pass
2437	6	ax	26	4	108/114.7 (MCS9)	17.201	2.701	0.500	Pass
2437	6	ax	26	8	108/114.7 (MCS9)	18.368	2.137	0.500	Pass
2462	11	ax	26	0	108/114.7 (MCS9)	18.200	2.143	0.500	Pass
2462	11	ax	26	4	108/114.7 (MCS9)	17.187	2.713	0.500	Pass
2462	11	ax	26	8	108/114.7 (MCS9)	18.381	2.142	0.500	Pass
2412	1	ax	242	61	108/114.7 (MCS9)	18.931	19.077	0.500	Pass
2437	6	ax	242	61	108/114.7 (MCS9)	18.941	19.028	0.500	Pass
2462	11	ax	242	61	108/114.7 (MCS9)	18.937	19.111	0.500	Pass

Table 7-2. 6dB BW & 99% OBW Measurements Ant 1

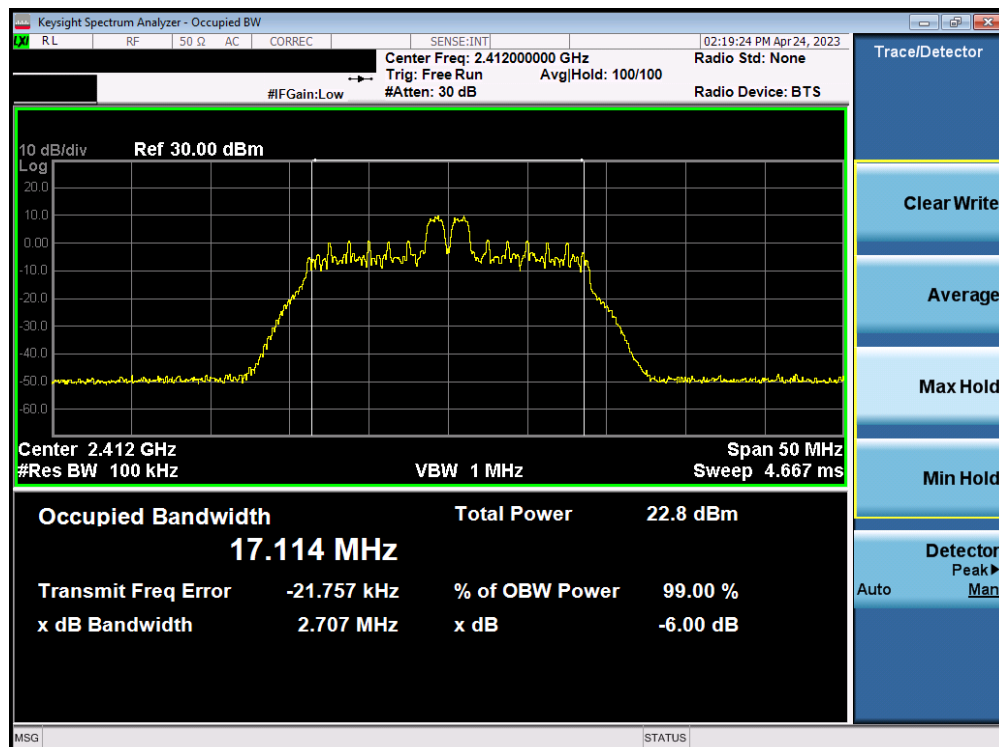
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-1. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

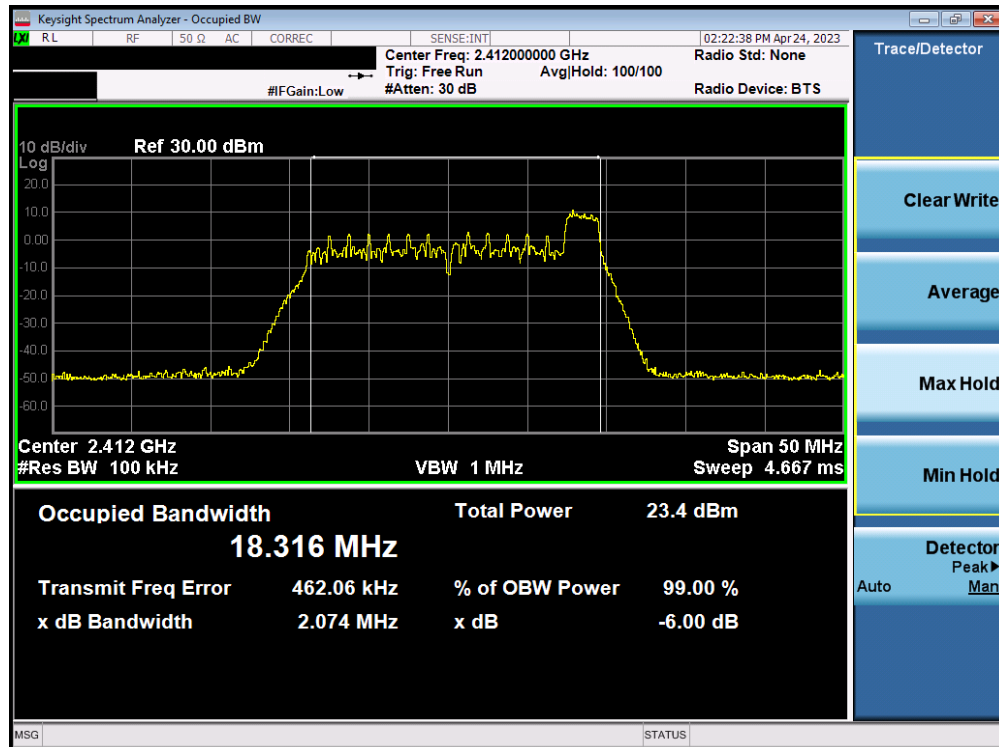


Plot 7-2. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 1)

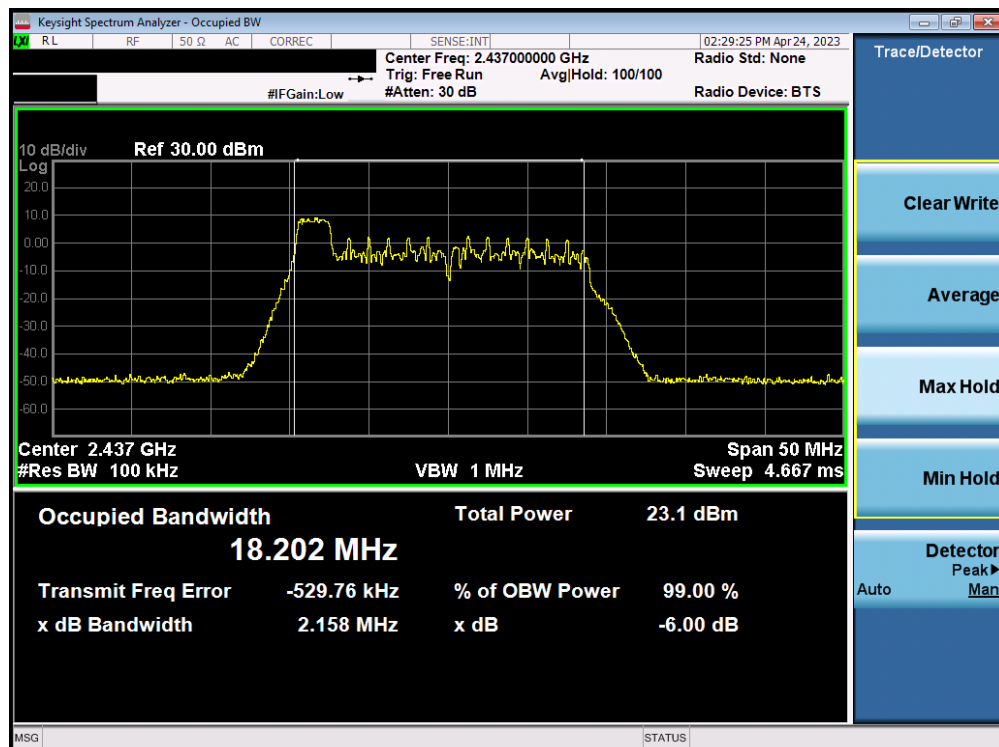
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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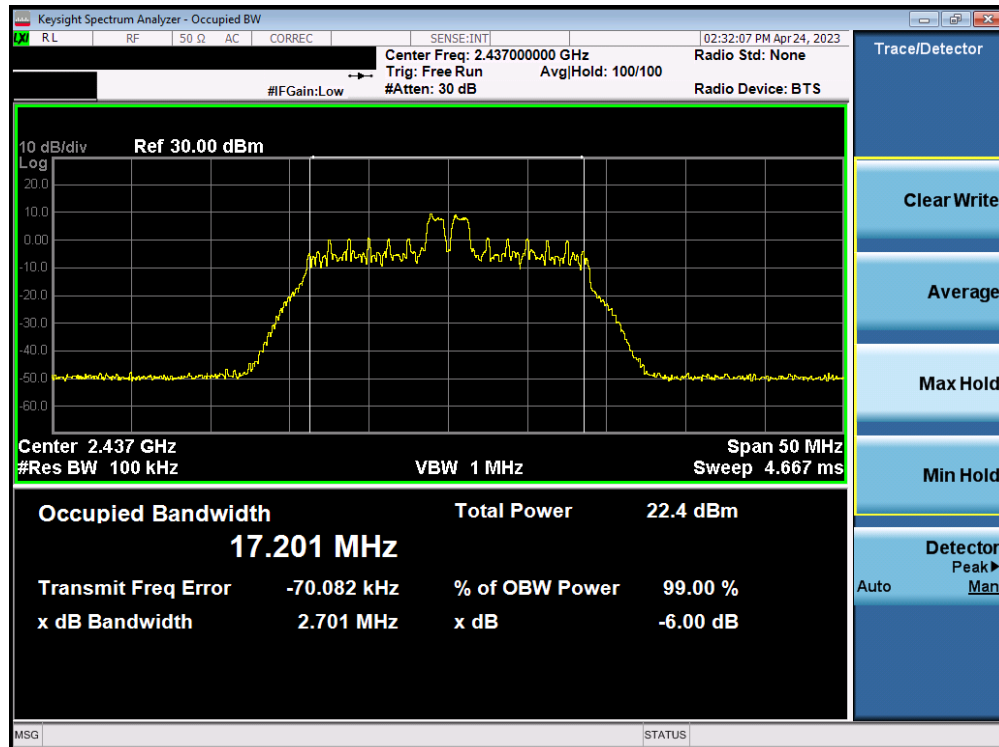


Plot 7-3. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 1)

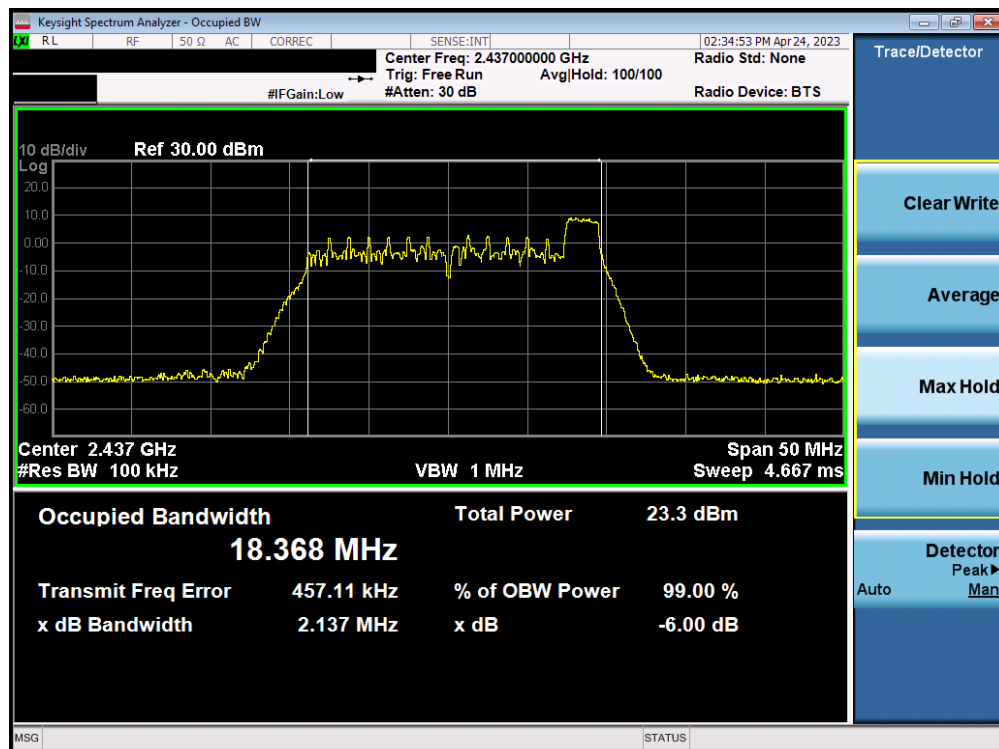


Plot 7-4. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 6)

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Plot 7-5. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 6)

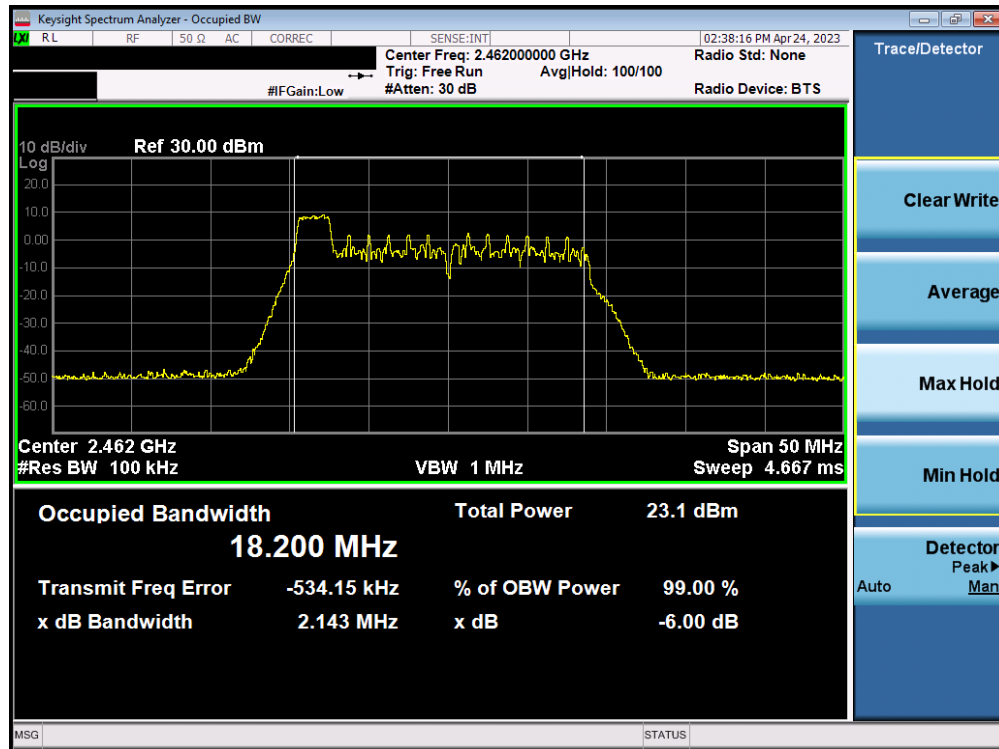


Plot 7-6. 6dB BW & 99% OBW Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 6)

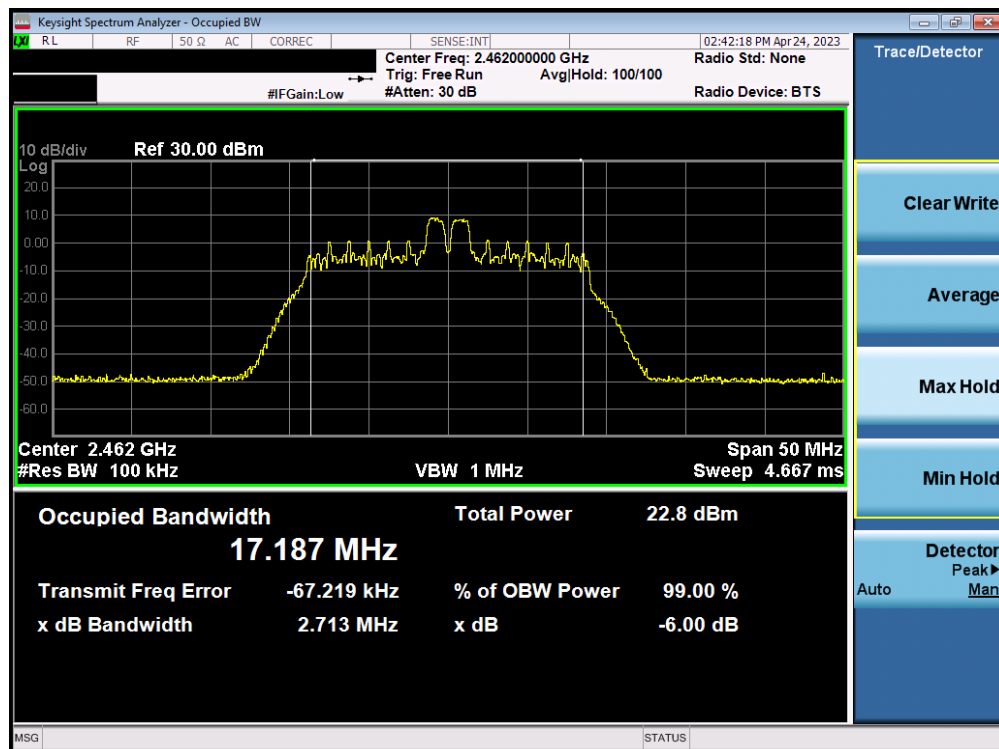
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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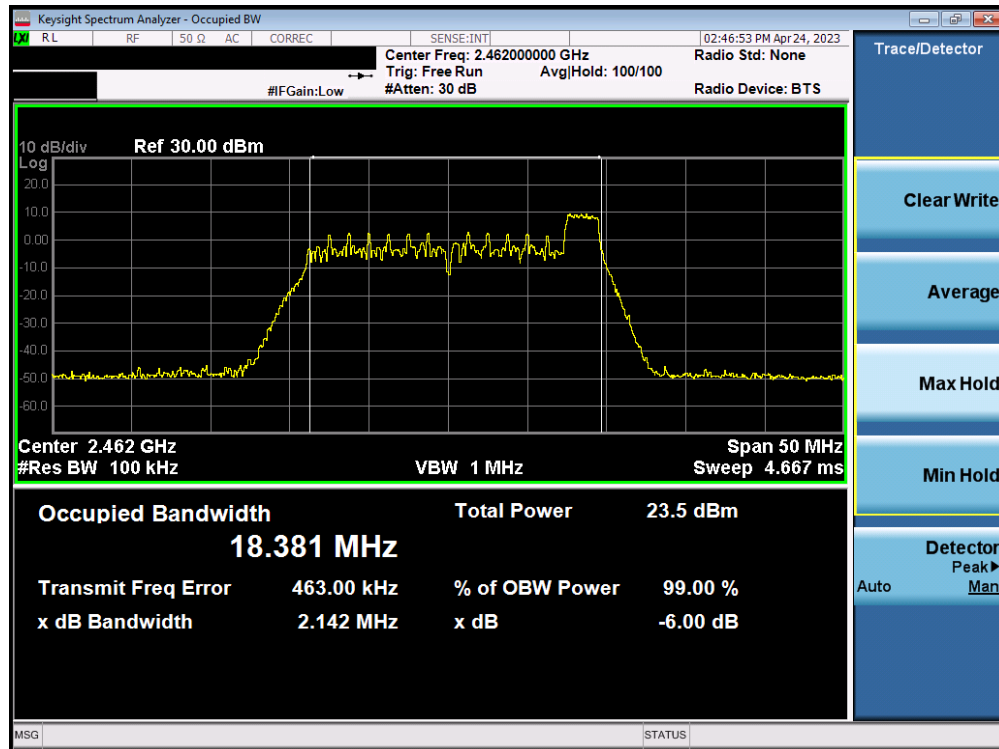


Plot 7-7. 6dB BW & 99% OBW Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 11)

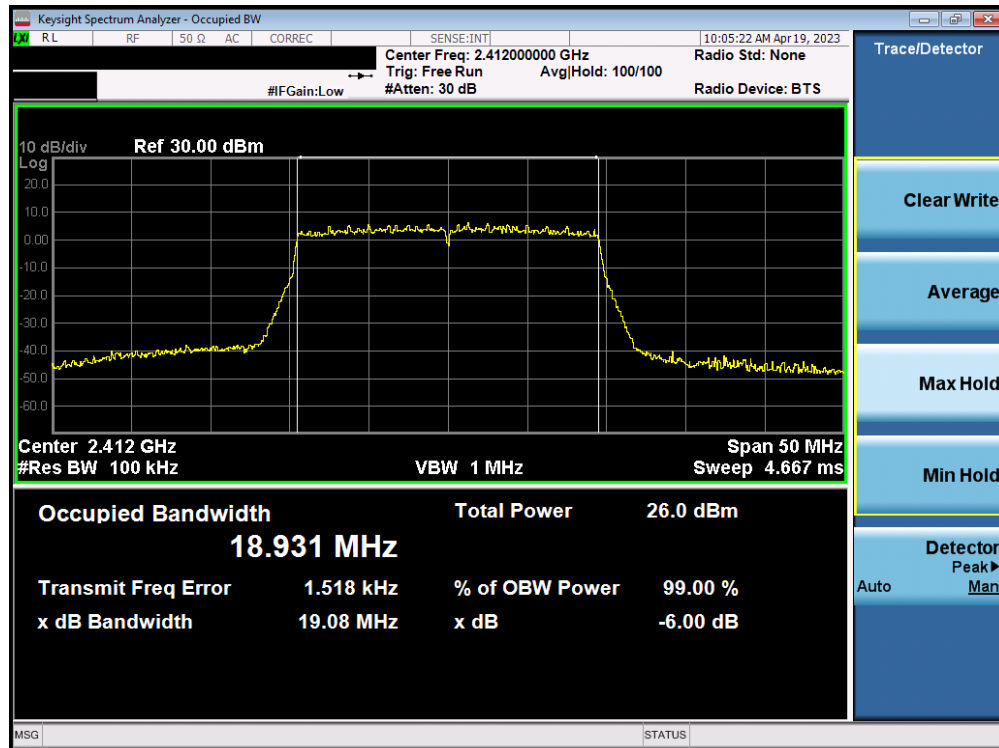


Plot 7-8. 6dB BW & 99% OBW Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 11)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-9. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

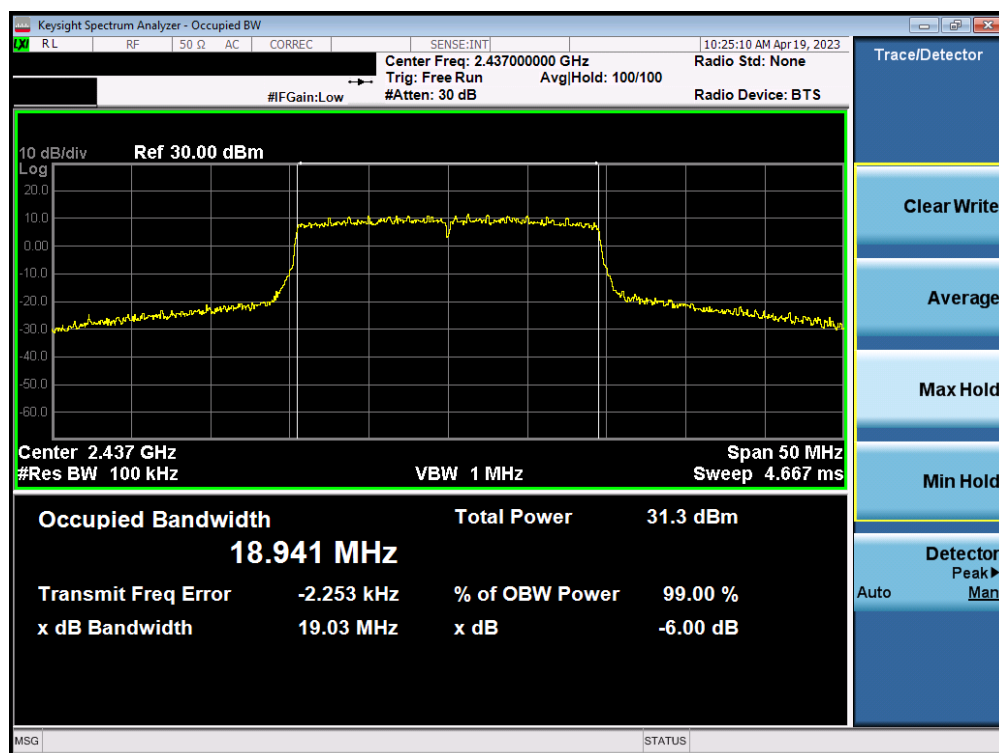


Plot 7-10. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU242 – Ch. 1)

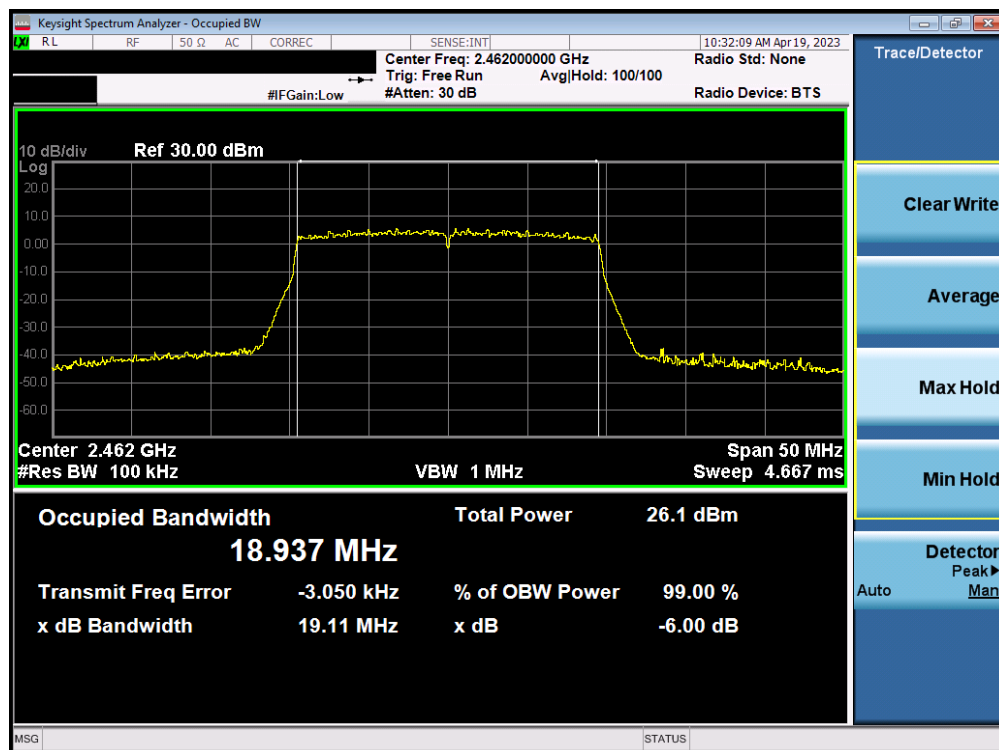
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-11. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU242 – Ch. 6)



Plot 7-12. 6dB BW & 99% OBW Plot Ant 1 (802.11ax OFDMA – RU242 – Ch. 11)

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## Ant 2 Bandwidth Measurements

Frequency [MHz]	Channel No.	802.11 Mode	RU Size	RU Index	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Minimum 6dB Bandwidth [MHz]	Pass / Fail
2412	1	ax	26	0	108/114.7 (MCS9)	18.231	2.114	0.500	Pass
2412	1	ax	26	4	108/114.7 (MCS9)	17.042	2.677	0.500	Pass
2412	1	ax	26	8	108/114.7 (MCS9)	18.244	2.117	0.500	Pass
2437	6	ax	26	0	108/114.7 (MCS9)	18.209	2.115	0.500	Pass
2437	6	ax	26	4	108/114.7 (MCS9)	17.108	2.706	0.500	Pass
2437	6	ax	26	8	108/114.7 (MCS9)	18.340	2.119	0.500	Pass
2462	11	ax	26	0	108/114.7 (MCS9)	18.177	2.111	0.500	Pass
2462	11	ax	26	4	108/114.7 (MCS9)	17.174	2.681	0.500	Pass
2462	11	ax	26	8	108/114.7 (MCS9)	18.361	2.139	0.500	Pass
2412	1	ax	242	61	108/114.7 (MCS9)	18.914	19.058	0.500	Pass
2437	6	ax	242	61	108/114.7 (MCS9)	18.959	19.056	0.500	Pass
2462	11	ax	242	61	108/114.7 (MCS9)	18.929	19.096	0.500	Pass

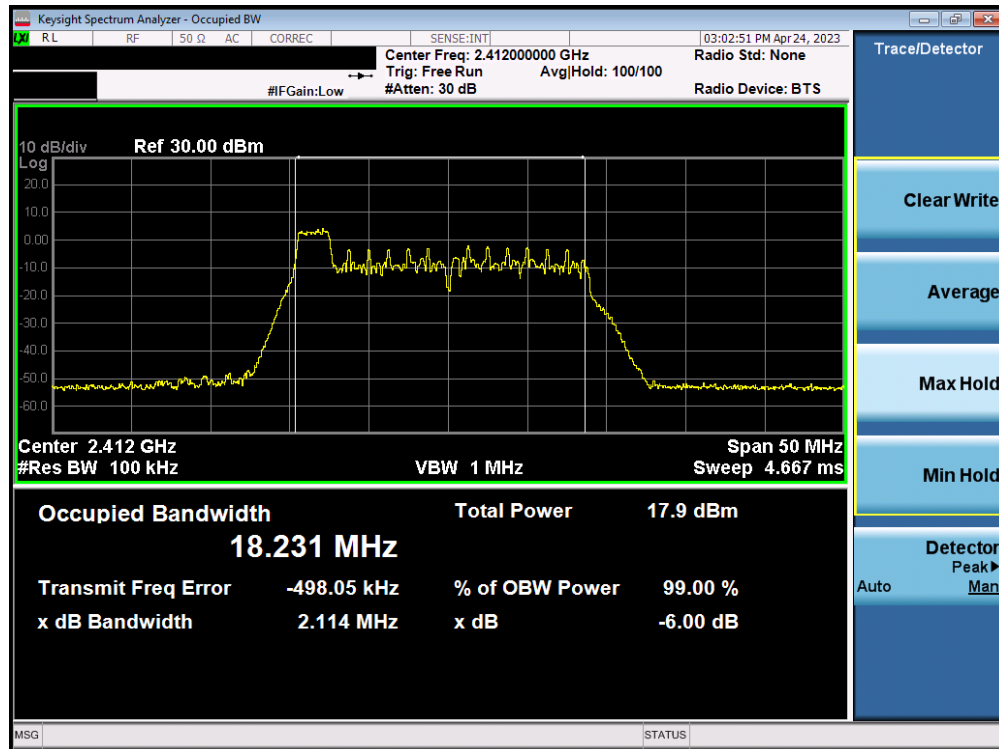
Table 7-3. 6dB BW & 99% OBW Measurements Ant 2

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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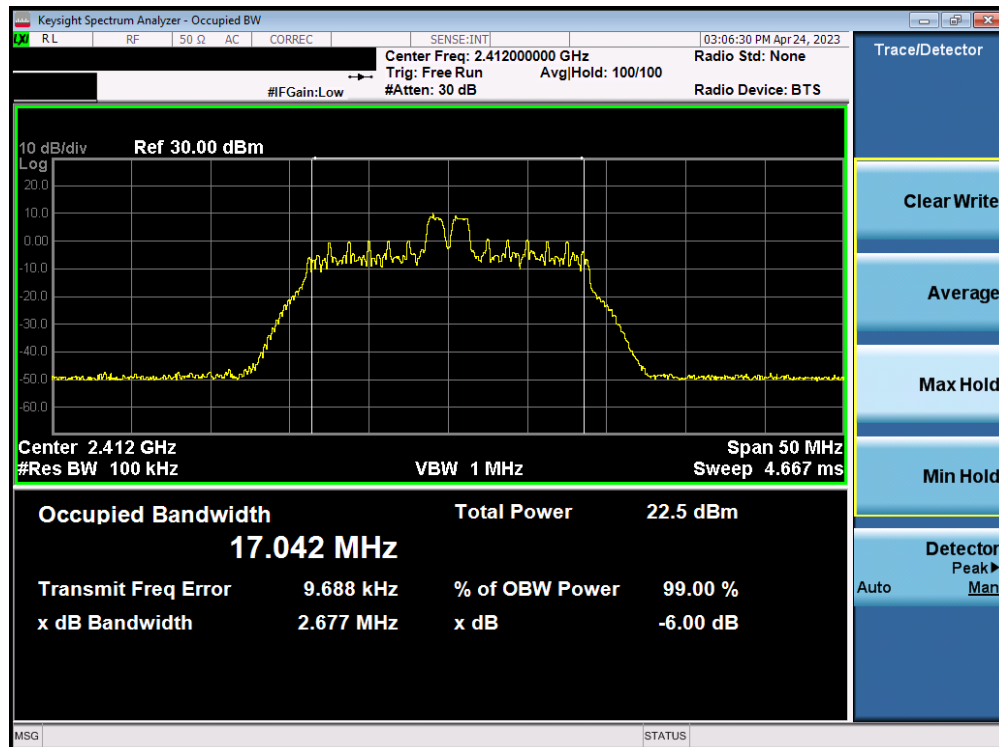
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Plot 7-13. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

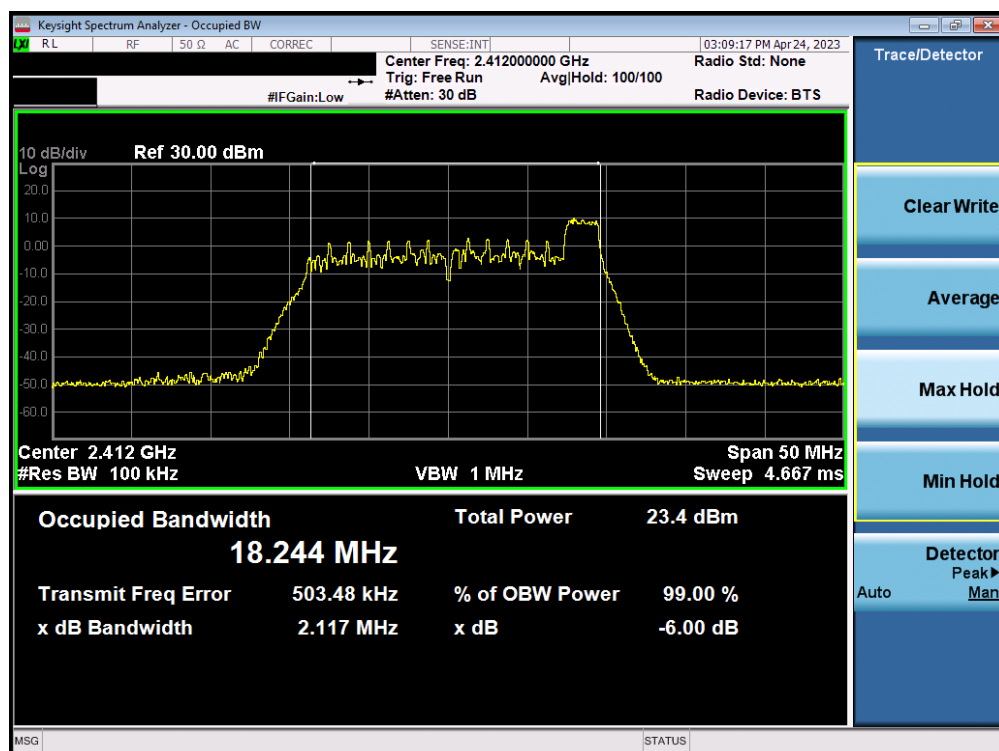


Plot 7-14. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 1)

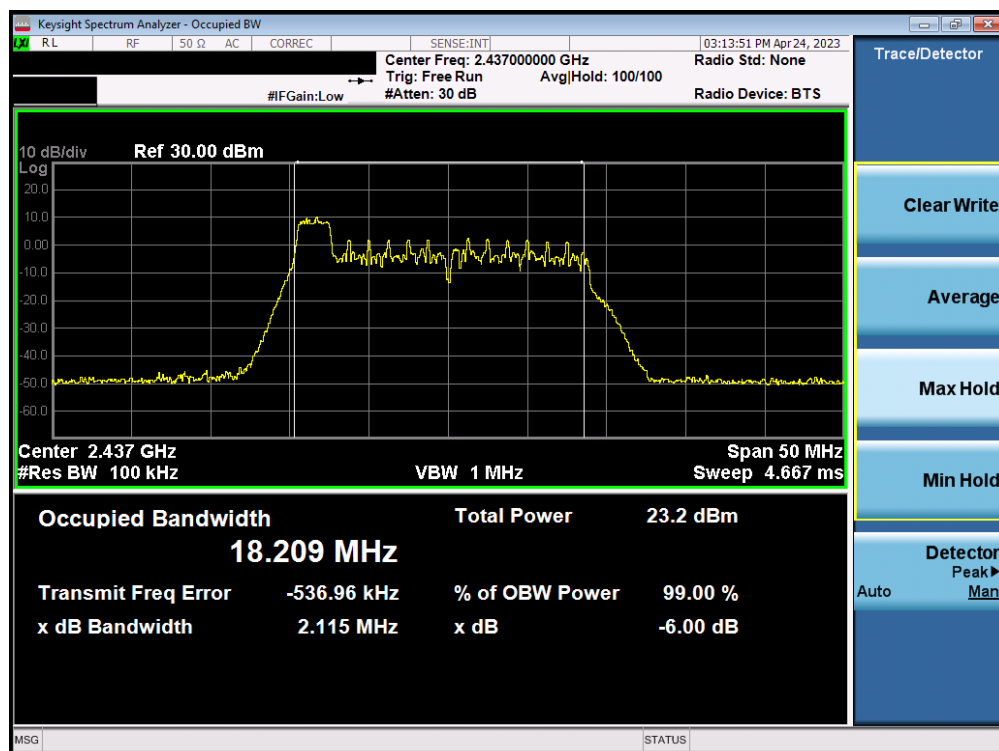
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-15. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 1)

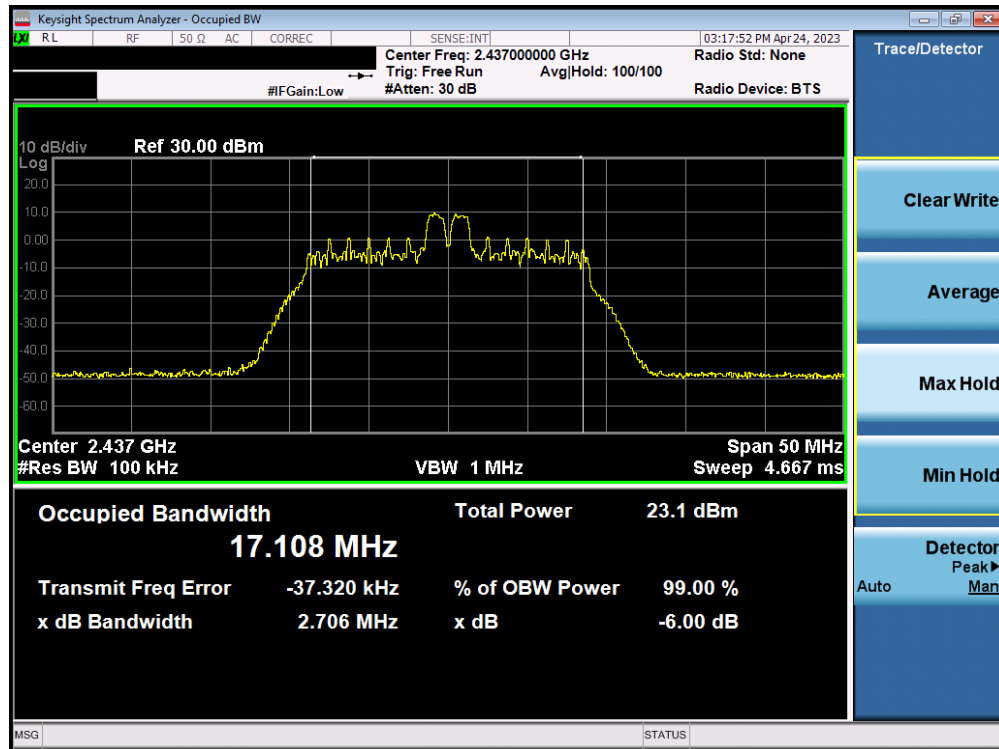


Plot 7-16. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 6)

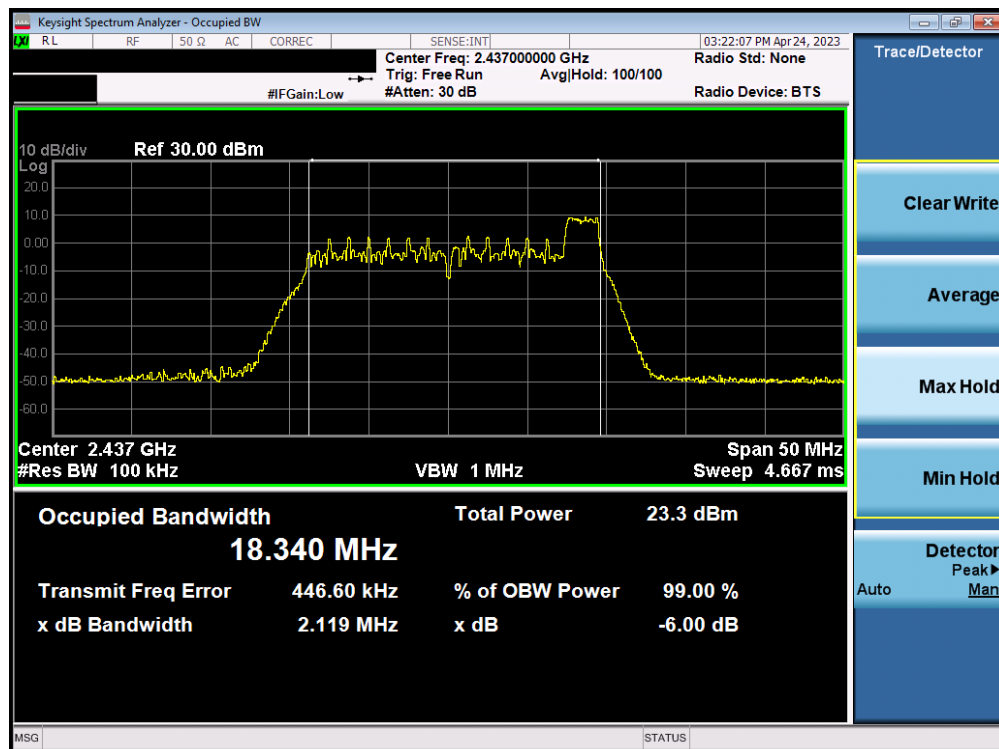
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Plot 7-17. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 6)

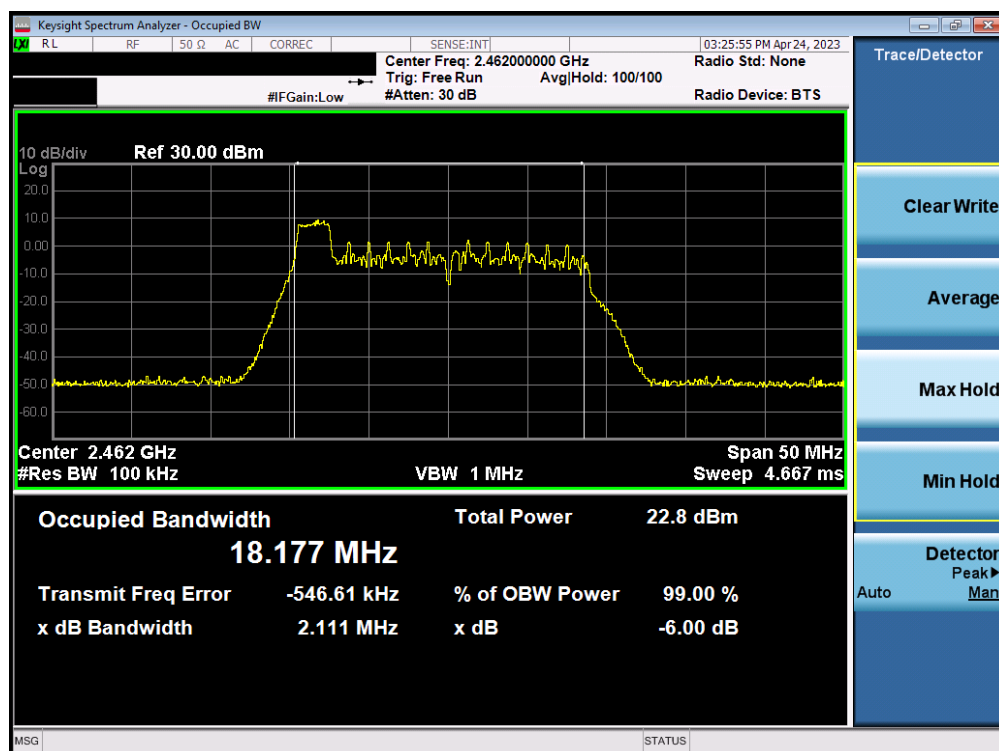


Plot 7-18. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 6)

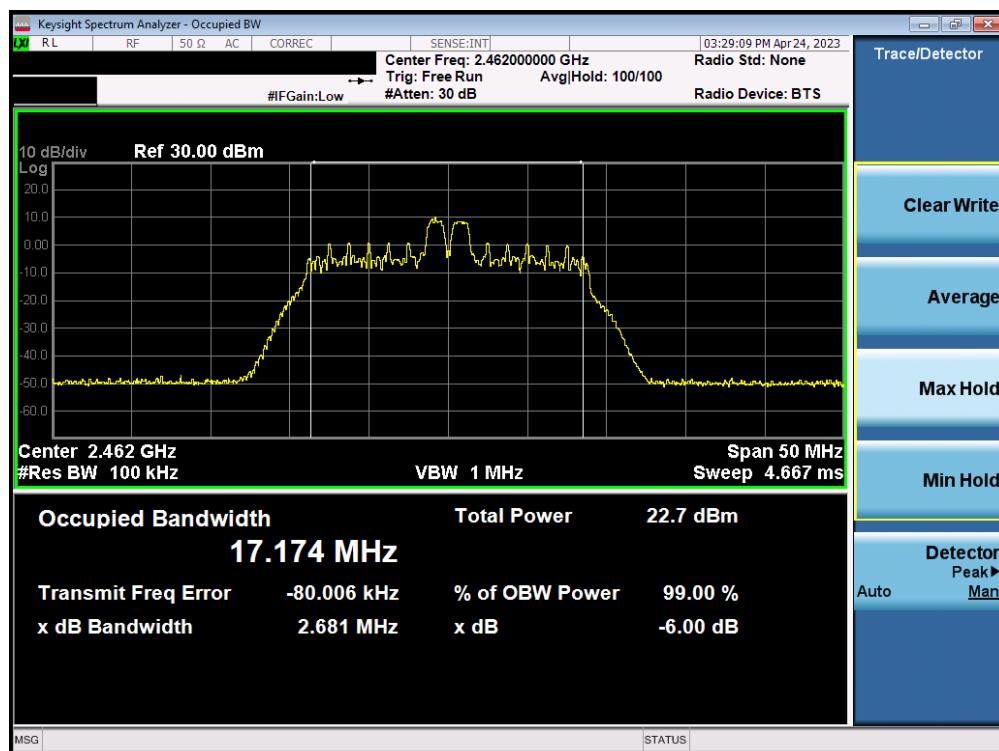
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Plot 7-19. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 11)

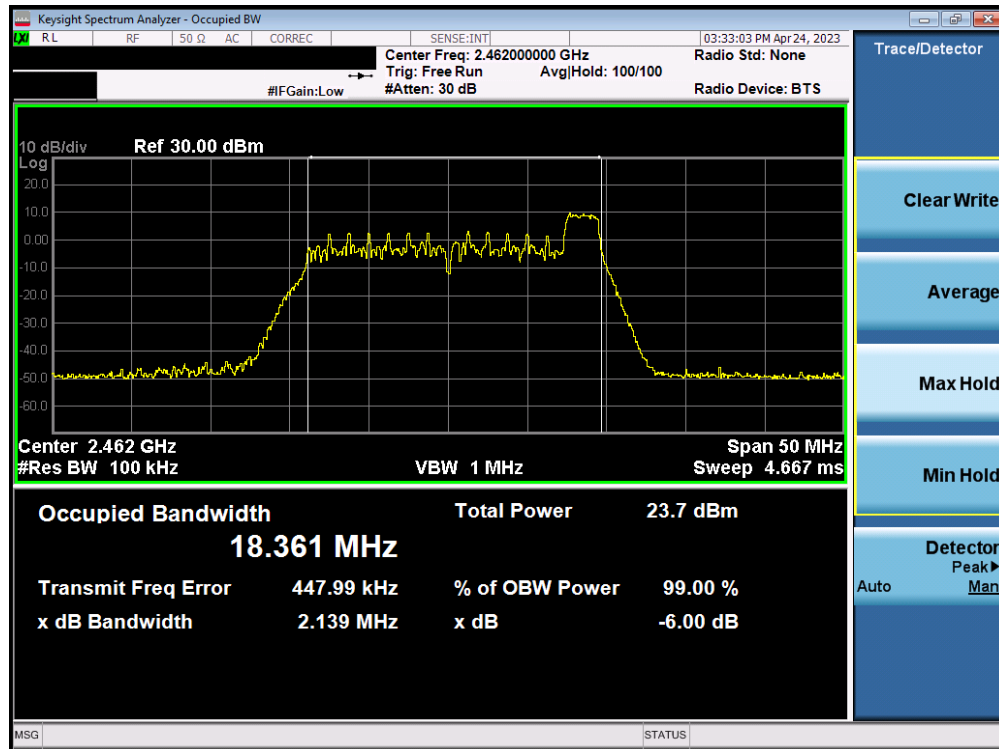


Plot 7-20. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 11)

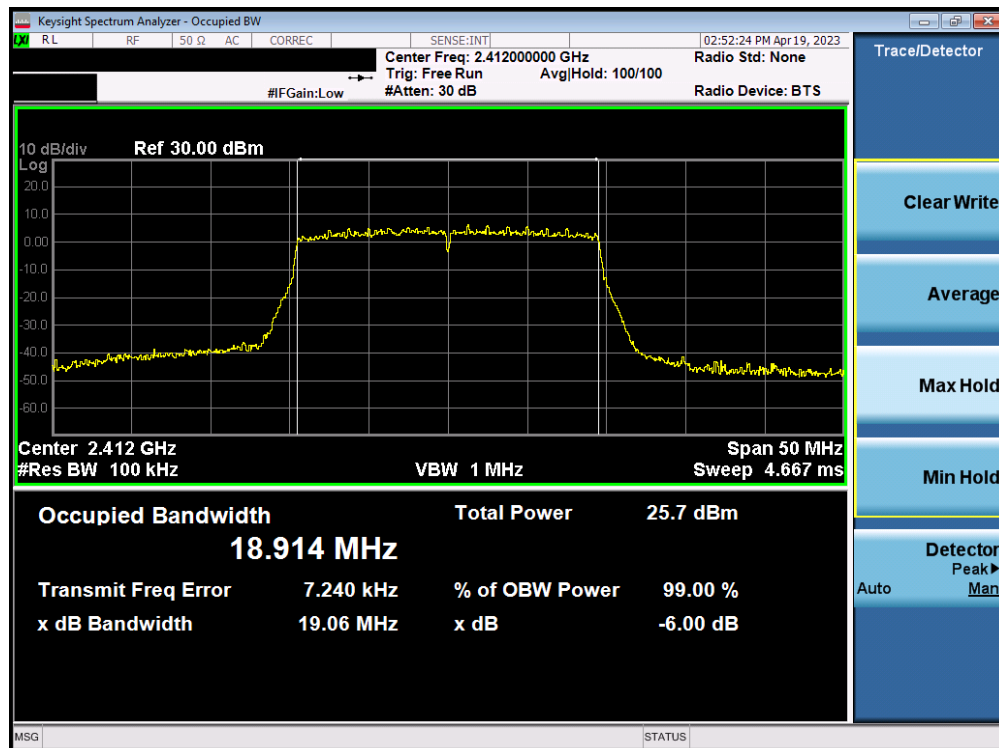
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-21. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

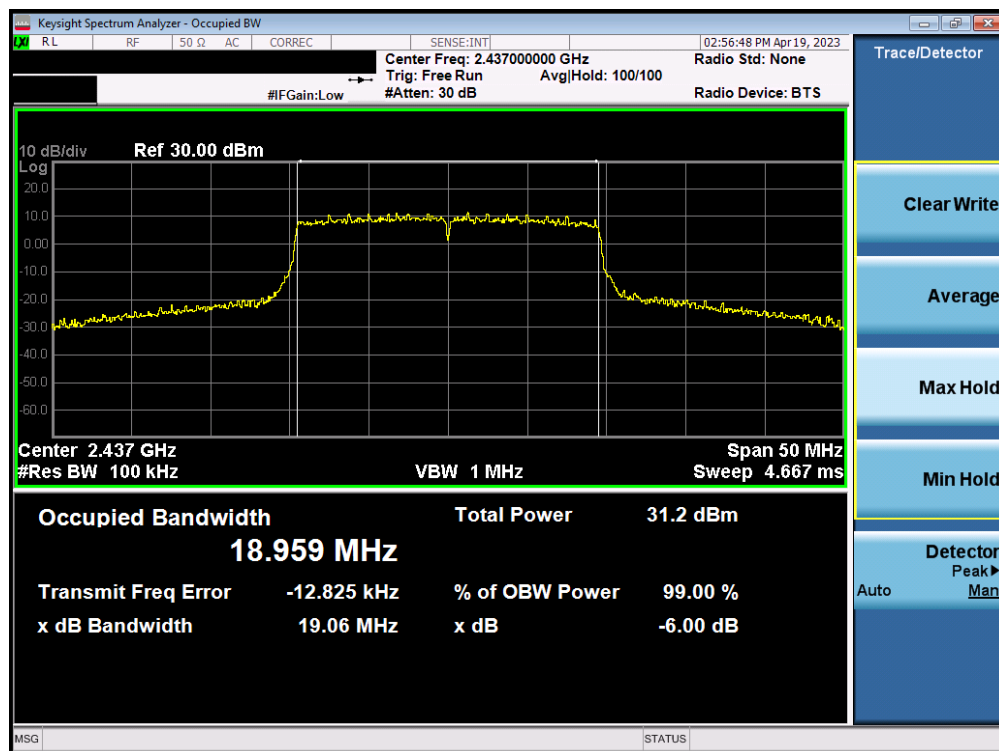


Plot 7-22. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU242 – Ch. 1)

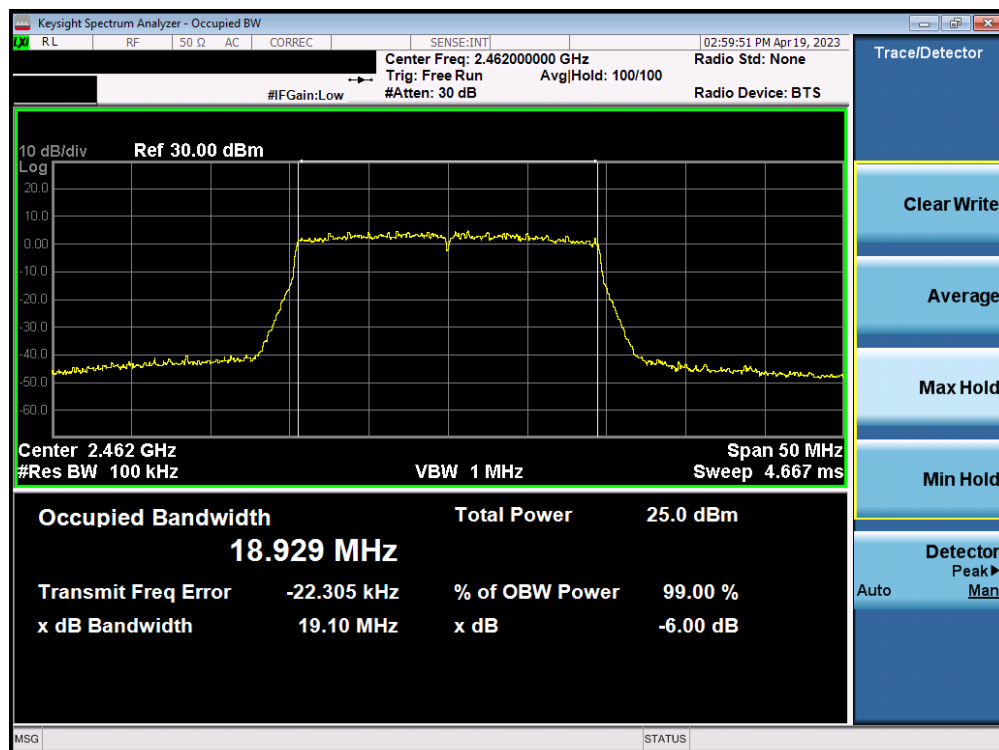
FCC ID: BCGA2117 IC: 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>		Approved by: Technical Manager
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Plot 7-23. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU242 – Ch. 6)



Plot 7-24. 6dB BW & 99% OBW Plot Ant 2 (802.11ax OFDMA – RU242 – Ch. 11)

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### 7.3 Output Power Measurement

**§15.247(b.3); RSS-247 [5.4]**

#### **Test Overview and Limits**

A transmitter antenna terminal of EUT is connected to the input of an RF power sensor. Measurement is made using a broadband power meter capable of making peak and average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

***The maximum peak conducted output power of digital modulation systems operating in the 2400-2483.5 MHz band is 1 Watt.***

***The conducted output power limit on paragraph above is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.***

***For DTSs employing digital modulation techniques operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W.***

#### **Test Procedure Used**

ANSI C63.10-2013 – Subclause 11.9.1.3 PKPM1 Peak Power Method  
 KDB 558074 D01 v05r02 – Section 8.3.1.3 PKPM1 Peak-reading Power Meter Method  
 ANSI C63.10-2013 – Subclause 11.9.2.3.2 Method AVGPM-G  
 KDB 558074 D01 v05r02 – Section 8.3.2.3 Measurement using a Power Meter (PM)  
 ANSI C63.10-2013 – Subclause 14.2 Measure-and-Sum Technique  
 KDB 662911 D01 v02r01 – Section E)1) Measure-and-Sum Technique

#### **Test Settings**

##### **Method PKPM1 (Peak Power Measurement)**

Peak power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The pulse sensor employs a VBW = 50MHz so this method was only used for signals whose DTS bandwidth was less than or equal to 50MHz.

##### **Method AVGPM-G (Average Power Measurement)**

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

#### **Test Setup**

The EUT and measurement equipment were set up as shown in the diagrams below.



**Figure 7-2. Test Instrument & Measurement Setup for Power Meter Measurements**

#### **Test Notes**

1. All RU's were investigated and only worst case partially-loaded and fully-loaded RU's are reported.

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### 7.3.1 Average Output Power Measurement

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	26	0	108/114.7 (MCS9)	AVG	12.47	30.00	-17.53	1.60	14.07	36.02	-21.95
2412	1	26	4	108/114.7 (MCS9)	AVG	12.44	30.00	-17.56	1.60	14.04	36.02	-21.98
2412	1	26	8	108/114.7 (MCS9)	AVG	12.41	30.00	-17.59	1.60	14.01	36.02	-22.01
2437	6	26	0	108/114.7 (MCS9)	AVG	12.42	30.00	-17.58	1.60	14.02	36.02	-22.00
2437	6	26	4	108/114.7 (MCS9)	AVG	12.29	30.00	-17.71	1.60	13.89	36.02	-22.13
2437	6	26	8	108/114.7 (MCS9)	AVG	12.49	30.00	-17.51	1.60	14.09	36.02	-21.93
2462	11	26	0	108/114.7 (MCS9)	AVG	12.49	30.00	-17.51	1.60	14.09	36.02	-21.93
2462	11	26	4	108/114.7 (MCS9)	AVG	12.42	30.00	-17.58	1.60	14.02	36.02	-22.00
2462	11	26	8	108/114.7 (MCS9)	AVG	12.50	30.00	-17.50	1.60	14.10	36.02	-21.92
2467	12	26	0	108/114.7 (MCS9)	AVG	12.20	30.00	-17.80	1.60	13.80	36.02	-22.22
2467	12	26	4	108/114.7 (MCS9)	AVG	12.43	30.00	-17.57	1.60	14.03	36.02	-21.99
2467	12	26	8	108/114.7 (MCS9)	AVG	12.44	30.00	-17.56	1.60	14.04	36.02	-21.98


**Table 7-4. Average Conducted Output Power Measurements Ant 1 (RU26)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	242	61	108/114.7 (MCS9)	AVG	16.19	30.00	-13.81	1.60	17.79	36.02	-18.23
2417	2	242	61	108/114.7 (MCS9)	AVG	17.62	30.00	-12.38	1.60	19.22	36.02	-16.80
2422	3	242	61	108/114.7 (MCS9)	AVG	18.88	30.00	-11.12	1.60	20.48	36.02	-15.54
2427	4	242	61	108/114.7 (MCS9)	AVG	19.85	30.00	-10.15	1.60	21.45	36.02	-14.57
2432	5	242	61	108/114.7 (MCS9)	AVG	21.46	30.00	-8.54	1.60	23.06	36.02	-12.96
2437	6	242	61	108/114.7 (MCS9)	AVG	21.50	30.00	-8.50	1.60	23.10	36.02	-12.92
2442	7	242	61	108/114.7 (MCS9)	AVG	21.09	30.00	-8.91	1.60	22.69	36.02	-13.33
2447	8	242	61	108/114.7 (MCS9)	AVG	19.97	30.00	-10.03	1.60	21.57	36.02	-14.45
2452	9	242	61	108/114.7 (MCS9)	AVG	18.99	30.00	-11.01	1.60	20.59	36.02	-15.43
2457	10	242	61	108/114.7 (MCS9)	AVG	17.21	30.00	-12.79	1.60	18.81	36.02	-17.21
2462	11	242	61	108/114.7 (MCS9)	AVG	15.94	30.00	-14.06	1.60	17.54	36.02	-18.48
2467	12	242	61	108/114.7 (MCS9)	AVG	14.84	30.00	-15.16	1.60	16.44	36.02	-19.58

**Table 7-5. Average Conducted Output Power Measurements Ant 1 (RU242)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	26	0	108/114.7 (MCS9)	AVG	12.49	30.00	-17.51	-1.00	11.49	36.02	-24.53
2412	1	26	4	108/114.7 (MCS9)	AVG	12.47	30.00	-17.53	-1.00	11.47	36.02	-24.55
2412	1	26	8	108/114.7 (MCS9)	AVG	12.46	30.00	-17.54	-1.00	11.46	36.02	-24.56
2437	6	26	0	108/114.7 (MCS9)	AVG	12.35	30.00	-17.65	-1.00	11.35	36.02	-24.67
2437	6	26	4	108/114.7 (MCS9)	AVG	12.41	30.00	-17.59	-1.00	11.41	36.02	-24.61
2437	6	26	8	108/114.7 (MCS9)	AVG	12.44	30.00	-17.56	-1.00	11.44	36.02	-24.58
2462	11	26	0	108/114.7 (MCS9)	AVG	12.47	30.00	-17.53	-1.00	11.47	36.02	-24.55
2462	11	26	4	108/114.7 (MCS9)	AVG	12.14	30.00	-17.86	-1.00	11.14	36.02	-24.88
2462	11	26	8	108/114.7 (MCS9)	AVG	12.39	30.00	-17.61	-1.00	11.39	36.02	-24.63
2467	12	26	0	108/114.7 (MCS9)	AVG	12.27	30.00	-17.73	-1.00	11.27	36.02	-24.75
2467	12	26	4	108/114.7 (MCS9)	AVG	12.32	30.00	-17.68	-1.00	11.32	36.02	-24.70
2467	12	26	8	108/114.7 (MCS9)	AVG	12.31	30.00	-17.69	-1.00	11.31	36.02	-24.71

**Table 7-6. Average Conducted Output Power Measurements Ant 2 (RU26)**

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Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers [dBm]	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	242	61	108/114.7 (MCS9)	AVG	16.25	30.00	-13.75	-1.00	15.25	36.02	-20.77
2417	2	242	61	108/114.7 (MCS9)	AVG	17.54	30.00	-12.46	-1.00	16.54	36.02	-19.48
2422	3	242	61	108/114.7 (MCS9)	AVG	18.67	30.00	-11.33	-1.00	17.67	36.02	-18.35
2427	4	242	61	108/114.7 (MCS9)	AVG	19.70	30.00	-10.30	-1.00	18.70	36.02	-17.32
2432	5	242	61	108/114.7 (MCS9)	AVG	21.29	30.00	-8.71	-1.00	20.29	36.02	-15.73
2437	6	242	61	108/114.7 (MCS9)	AVG	21.40	30.00	-8.60	-1.00	20.40	36.02	-15.62
2442	7	242	61	108/114.7 (MCS9)	AVG	21.13	30.00	-8.87	-1.00	20.13	36.02	-15.89
2447	8	242	61	108/114.7 (MCS9)	AVG	20.07	30.00	-9.93	-1.00	19.07	36.02	-16.95
2452	9	242	61	108/114.7 (MCS9)	AVG	18.80	30.00	-11.20	-1.00	17.80	36.02	-18.22
2457	10	242	61	108/114.7 (MCS9)	AVG	17.22	30.00	-12.78	-1.00	16.22	36.02	-19.80
2462	11	242	61	108/114.7 (MCS9)	AVG	15.81	30.00	-14.19	-1.00	14.81	36.02	-21.21
2467	12	242	61	108/114.7 (MCS9)	AVG	14.77	30.00	-15.23	-1.00	13.77	36.02	-22.25

**Table 7-7. Average Conducted Output Power Measurements Ant 2 (RU242)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
						Ant 1	Ant 2	Summed						
2412	1	26	0	216/229.4 (MCS9)	AVG	12.50	12.14	15.33	30.00	-14.67	3.41	18.74	36.02	-17.28
2412	1	26	4	216/229.4 (MCS9)	AVG	12.44	12.44	15.45	30.00	-14.55	3.41	18.86	36.02	-17.16
2412	1	26	8	216/229.4 (MCS9)	AVG	12.28	12.49	15.40	30.00	-14.60	3.41	18.80	36.02	-17.22
2437	6	26	0	216/229.4 (MCS9)	AVG	12.49	12.30	15.41	30.00	-14.59	3.41	18.81	36.02	-17.21
2437	6	26	4	216/229.4 (MCS9)	AVG	12.28	12.33	15.32	30.00	-14.68	3.41	18.72	36.02	-17.30
2437	6	26	8	216/229.4 (MCS9)	AVG	12.49	12.42	15.47	30.00	-14.53	3.41	18.87	36.02	-17.15
2462	11	26	0	216/229.4 (MCS9)	AVG	12.46	12.49	15.49	30.00	-14.51	3.41	18.89	36.02	-17.13
2462	11	26	4	216/229.4 (MCS9)	AVG	12.48	12.25	15.38	30.00	-14.62	3.41	18.78	36.02	-17.24
2462	11	26	8	216/229.4 (MCS9)	AVG	12.33	12.15	15.25	30.00	-14.75	3.41	18.66	36.02	-17.36
2467	12	26	0	216/229.4 (MCS9)	AVG	12.43	12.25	15.35	30.00	-14.65	3.41	18.76	36.02	-17.26
2467	12	26	4	216/229.4 (MCS9)	AVG	12.43	12.01	15.24	30.00	-14.76	3.41	18.64	36.02	-17.38
2467	12	26	8	216/229.4 (MCS9)	AVG	12.46	12.15	15.32	30.00	-14.68	3.41	18.73	36.02	-17.30

**Table 7-8. Average Conducted Output Power Measurements CDD (RU26)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
						Ant 1	Ant 2	Summed						
2412	1	242	61	216/229.4 (MCS9)	AVG	15.66	15.97	18.83	30.00	-11.17	3.41	22.24	36.02	-13.79
2417	2	242	61	216/229.4 (MCS9)	AVG	17.32	17.47	20.41	30.00	-9.59	3.41	23.81	36.02	-12.21
2422	3	242	61	216/229.4 (MCS9)	AVG	18.85	18.80	21.84	30.00	-8.16	3.41	25.24	36.02	-10.78
2427	4	242	61	216/229.4 (MCS9)	AVG	19.63	20.00	22.83	30.00	-7.17	3.41	26.24	36.02	-9.78
2432	5	242	61	216/229.4 (MCS9)	AVG	21.16	21.44	24.31	30.00	-5.69	3.41	27.72	36.02	-8.30
2437	6	242	61	216/229.4 (MCS9)	AVG	21.22	21.29	24.27	30.00	-5.73	3.41	27.67	36.02	-8.35
2442	7	242	61	216/229.4 (MCS9)	AVG	21.23	21.23	24.24	30.00	-5.76	3.41	27.65	36.02	-8.37
2447	8	242	61	216/229.4 (MCS9)	AVG	20.18	20.16	23.18	30.00	-6.82	3.41	26.59	36.02	-9.43
2452	9	242	61	216/229.4 (MCS9)	AVG	18.78	18.84	21.82	30.00	-8.18	3.41	25.23	36.02	-10.79
2457	10	242	61	216/229.4 (MCS9)	AVG	16.88	17.15	20.03	30.00	-9.97	3.41	23.43	36.02	-12.59
2462	11	242	61	216/229.4 (MCS9)	AVG	15.91	16.00	18.97	30.00	-11.03	3.41	22.37	36.02	-13.65
2467	12	242	61	216/229.4 (MCS9)	AVG	15.00	14.80	17.91	30.00	-12.09	3.41	21.32	36.02	-14.70

**Table 7-9. Average Conducted Output Power Measurements CDD (RU242)**

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## 7.3.2 Peak Output Power Measurement

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	26	0	108/114.7 (MCS9)	PEAK	21.15	30.00	-8.85	1.60	22.75	36.02	-13.27
2412	1	26	4	108/114.7 (MCS9)	PEAK	21.11	30.00	-8.89	1.60	22.71	36.02	-13.31
2412	1	26	8	108/114.7 (MCS9)	PEAK	21.09	30.00	-8.91	1.60	22.69	36.02	-13.33
2437	6	26	0	108/114.7 (MCS9)	PEAK	21.05	30.00	-8.95	1.60	22.65	36.02	-13.37
2437	6	26	4	108/114.7 (MCS9)	PEAK	21.00	30.00	-9.00	1.60	22.60	36.02	-13.42
2437	6	26	8	108/114.7 (MCS9)	PEAK	21.20	30.00	-8.80	1.60	22.80	36.02	-13.22
2462	11	26	0	108/114.7 (MCS9)	PEAK	21.22	30.00	-8.78	1.60	22.82	36.02	-13.20
2462	11	26	4	108/114.7 (MCS9)	PEAK	21.08	30.00	-8.92	1.60	22.68	36.02	-13.34
2462	11	26	8	108/114.7 (MCS9)	PEAK	21.32	30.00	-8.68	1.60	22.92	36.02	-13.10
2467	12	26	0	108/114.7 (MCS9)	PEAK	20.89	30.00	-9.11	1.60	22.49	36.02	-13.53
2467	12	26	4	108/114.7 (MCS9)	PEAK	21.10	30.00	-8.90	1.60	22.70	36.02	-13.32
2467	12	26	8	108/114.7 (MCS9)	PEAK	21.22	30.00	-8.78	1.60	22.82	36.02	-13.20

**Table 7-10. Peak Conducted Output Power Measurements Ant 1 (RU26)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	242	61	108/114.7 (MCS9)	PEAK	25.12	30.00	-4.88	1.60	26.72	36.02	-9.30
2417	2	242	61	108/114.7 (MCS9)	PEAK	26.30	30.00	-3.70	1.60	27.90	36.02	-8.12
2422	3	242	61	108/114.7 (MCS9)	PEAK	26.20	30.00	-3.80	1.60	27.80	36.02	-8.22
2427	4	242	61	108/114.7 (MCS9)	PEAK	26.35	30.00	-3.65	1.60	27.95	36.02	-8.07
2432	5	242	61	108/114.7 (MCS9)	PEAK	26.05	30.00	-3.95	1.60	27.65	36.02	-8.37
2437	6	242	61	108/114.7 (MCS9)	PEAK	26.04	30.00	-3.96	1.60	27.64	36.02	-8.38
2442	7	242	61	108/114.7 (MCS9)	PEAK	26.38	30.00	-3.62	1.60	27.98	36.02	-8.04
2447	8	242	61	108/114.7 (MCS9)	PEAK	26.45	30.00	-3.55	1.60	28.05	36.02	-7.97
2452	9	242	61	108/114.7 (MCS9)	PEAK	26.06	30.00	-3.94	1.60	27.66	36.02	-8.36
2457	10	242	61	108/114.7 (MCS9)	PEAK	26.03	30.00	-3.97	1.60	27.63	36.02	-8.39
2462	11	242	61	108/114.7 (MCS9)	PEAK	24.97	30.00	-5.03	1.60	26.57	36.02	-9.45
2467	12	242	61	108/114.7 (MCS9)	PEAK	23.97	30.00	-6.03	1.60	25.57	36.02	-10.45

**Table 7-11. Peak Conducted Output Power Measurements Ant 1 (RU242)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers (dBm)	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	26	0	108/114.7 (MCS9)	PEAK	21.20	30.00	-8.80	-1.00	20.20	36.02	-15.82
2412	1	26	4	108/114.7 (MCS9)	PEAK	21.15	30.00	-8.85	-1.00	20.15	36.02	-15.87
2412	1	26	8	108/114.7 (MCS9)	PEAK	21.24	30.00	-8.76	-1.00	20.24	36.02	-15.78
2437	6	26	0	108/114.7 (MCS9)	PEAK	21.00	30.00	-9.00	-1.00	20.00	36.02	-16.02
2437	6	26	4	108/114.7 (MCS9)	PEAK	21.09	30.00	-8.91	-1.00	20.09	36.02	-15.93
2437	6	26	8	108/114.7 (MCS9)	PEAK	21.27	30.00	-8.73	-1.00	20.27	36.02	-15.75
2462	11	26	0	108/114.7 (MCS9)	PEAK	20.98	30.00	-9.02	-1.00	19.98	36.02	-16.04
2462	11	26	4	108/114.7 (MCS9)	PEAK	20.81	30.00	-9.19	-1.00	19.81	36.02	-16.21
2462	11	26	8	108/114.7 (MCS9)	PEAK	21.16	30.00	-8.84	-1.00	20.16	36.02	-15.86
2467	12	26	0	108/114.7 (MCS9)	PEAK	20.85	30.00	-9.15	-1.00	19.85	36.02	-16.17
2467	12	26	4	108/114.7 (MCS9)	PEAK	20.93	30.00	-9.07	-1.00	19.93	36.02	-16.09
2467	12	26	8	108/114.7 (MCS9)	PEAK	21.13	30.00	-8.87	-1.02	20.11	36.02	-15.91

**Table 7-12. Peak Conducted Output Power Measurements Ant 2 (RU26)**

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Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Powers [dBm]	Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	1	242	61	108/114.7 (MCS9)	PEAK	25.14	30.00	-4.86	-1.00	24.14	36.02	-11.88
2417	2	242	61	108/114.7 (MCS9)	PEAK	26.15	30.00	-3.85	-1.00	25.15	36.02	-10.87
2422	3	242	61	108/114.7 (MCS9)	PEAK	26.47	30.00	-3.53	-1.00	25.47	36.02	-10.55
2427	4	242	61	108/114.7 (MCS9)	PEAK	26.41	30.00	-3.59	-1.00	25.41	36.02	-10.61
2432	5	242	61	108/114.7 (MCS9)	PEAK	26.42	30.00	-3.58	-1.00	25.42	36.02	-10.60
2437	6	242	61	108/114.7 (MCS9)	PEAK	26.40	30.00	-3.60	-1.00	25.40	36.02	-10.62
2442	7	242	61	108/114.7 (MCS9)	PEAK	26.45	30.00	-3.55	-1.00	25.45	36.02	-10.57
2447	8	242	61	108/114.7 (MCS9)	PEAK	26.57	30.00	-3.43	-1.00	25.57	36.02	-10.45
2452	9	242	61	108/114.7 (MCS9)	PEAK	26.47	30.00	-3.53	-1.00	25.47	36.02	-10.55
2457	10	242	61	108/114.7 (MCS9)	PEAK	26.20	30.00	-3.80	-1.00	25.20	36.02	-10.82
2462	11	242	61	108/114.7 (MCS9)	PEAK	24.87	30.00	-5.13	-1.00	23.87	36.02	-12.15
2467	12	242	61	108/114.7 (MCS9)	PEAK	23.89	30.00	-6.11	-1.00	22.89	36.02	-13.13

**Table 7-13. Peak Conducted Output Power Measurements Ant 2 (RU242)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
						Ant 1	Ant 2	Summed						
2412	1	26	0	216/229.4 (MCS9)	PEAK	21.02	20.61	23.83	30.00	-6.17	3.41	27.24	36.02	-8.78
2412	1	26	4	216/229.4 (MCS9)	PEAK	20.93	20.99	23.97	30.00	-6.03	3.41	27.38	36.02	-8.64
2412	1	26	8	216/229.4 (MCS9)	PEAK	20.89	21.07	23.99	30.00	-6.01	3.41	27.40	36.02	-8.62
2437	6	26	0	216/229.4 (MCS9)	PEAK	20.96	20.88	23.93	30.00	-6.07	3.41	27.34	36.02	-8.68
2437	6	26	4	216/229.4 (MCS9)	PEAK	20.81	20.81	23.82	30.00	-6.18	3.41	27.23	36.02	-8.79
2437	6	26	8	216/229.4 (MCS9)	PEAK	21.15	20.96	24.07	30.00	-5.93	3.41	27.47	36.02	-8.55
2462	11	26	0	216/229.4 (MCS9)	PEAK	21.01	21.03	24.03	30.00	-5.97	3.41	27.44	36.02	-8.58
2462	11	26	4	216/229.4 (MCS9)	PEAK	20.97	20.83	23.91	30.00	-6.09	3.41	27.32	36.02	-8.70
2462	11	26	8	216/229.4 (MCS9)	PEAK	21.04	20.73	23.90	30.00	-6.10	3.41	27.31	36.02	-8.72
2467	12	26	0	216/229.4 (MCS9)	PEAK	20.85	20.76	23.82	30.00	-6.18	3.41	27.22	36.02	-8.80
2467	12	26	4	216/229.4 (MCS9)	PEAK	20.97	20.41	23.71	30.00	-6.29	3.41	27.12	36.02	-8.90
2467	12	26	8	216/229.4 (MCS9)	PEAK	21.21	20.80	24.02	30.00	-5.98	3.40	27.42	36.02	-8.60

**Table 7-14. Peak Conducted Output Power Measurements CDD (RU26)**

Freq [MHz]	Channel	RU Size	RU Index	Data Rate [Mbps]	Detector	Conducted Power [dBm]			Conducted Power Limit [dBm]	Conducted Power Margin [dB]	Directional Ant. Gain [dBi]	Max e.i.r.p. [dBm]	Max e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
						Ant 1	Ant 2	Summed						
2412	1	242	61	216/229.4 (MCS9)	PEAK	25.80	25.41	28.62	30.00	-1.38	3.41	32.03	36.02	-3.99
2417	2	242	61	216/229.4 (MCS9)	PEAK	25.98	26.05	29.03	30.00	-0.97	3.41	32.43	36.02	-3.59
2422	3	242	61	216/229.4 (MCS9)	PEAK	26.45	26.40	29.44	30.00	-0.56	3.41	32.84	36.02	-3.18
2427	4	242	61	216/229.4 (MCS9)	PEAK	26.35	26.20	29.29	30.00	-0.71	3.41	32.69	36.02	-3.33
2432	5	242	61	216/229.4 (MCS9)	PEAK	26.25	26.45	29.36	30.00	-0.64	3.41	32.77	36.02	-3.25
2437	6	242	61	216/229.4 (MCS9)	PEAK	26.40	26.50	29.46	30.00	-0.54	3.41	32.87	36.02	-3.15
2442	7	242	61	216/229.4 (MCS9)	PEAK	26.34	26.45	29.41	30.00	-0.59	3.41	32.81	36.02	-3.21
2447	8	242	61	216/229.4 (MCS9)	PEAK	26.27	26.25	29.27	30.00	-0.73	3.41	32.68	36.02	-3.34
2452	9	242	61	216/229.4 (MCS9)	PEAK	26.24	26.35	29.31	30.00	-0.69	3.41	32.71	36.02	-3.31
2457	10	242	61	216/229.4 (MCS9)	PEAK	26.18	26.26	29.23	30.00	-0.77	3.41	32.64	36.02	-3.38
2462	11	242	61	216/229.4 (MCS9)	PEAK	26.27	26.43	29.36	30.00	-0.64	3.41	32.77	36.02	-3.25
2467	12	242	61	216/229.4 (MCS9)	PEAK	25.65	25.60	28.64	30.00	-1.36	3.41	32.04	36.02	-3.98

**Table 7-15. Peak Conducted Output Power Measurements CDD (RU242)**

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**Note:**

Per ANSI C63.10-2013 and KDB 662911 D01 v02r01 Section E)1), the conducted powers at Ant 1 and Ant 2 were first measured separately during CDD transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Per ANSI C63.10-2013 Subclause 14.4.3, the directional gain is calculated using the following formula, where  $G_N$  is the gain of the nth antenna and  $N_{ANT}$ , the total number of antennas used.

$$\text{Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{ANT}] \text{ dBi}$$

**Sample CDD Calculation:**

At 2412MHz the average conducted output power was measured to be dBm for Ant 1 and dBm for Ant 2.

$$\text{Ant 1} + \text{Ant 2} = \text{CDD}$$

$$(12.50 \text{ dBm} + 12.14 \text{ dBm}) = (17.783 \text{ mW} + 16.368 \text{ mW}) = 34.119 \text{ mW} = 15.33 \text{ dBm}$$

**Sample e.i.r.p. Calculation:**

At 2412MHz, the average conducted output power was calculated to be 15.33 dBm with directional gain of 3.41 dBi.

$$\text{e.i.r.p. (dBm)} = \text{Conducted Power (dBm)} + \text{Ant gain (dBi)}$$

$$15.33 \text{ dBm} + 3.41 \text{ dBi} = 18.74 \text{ dBm}$$

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## 7.4 Power Spectral Density

§15.247(e); RSS-247 [5.2]

### Test Overview and Limit

The peak power density is measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates, RU configurations, and RU indices were investigated and the worst case configuration results are reported in this section.

***The maximum permissible power spectral density is 8 dBm in any 3 kHz band.***

### Test Procedure Used

ANSI C63.10-2013 – Subclause 11.10.2 Method PKPSD

KDB 558074 D01 v05r02 – Section 8.4 DTS Maximum Power Spectral Density level in the fundamental emission

ANSI C63.10-2013 – Subclause 14.3.2.2 Measure-and-Sum Technique

KDB 662911 D01 v02r01 – Section E)2) Measure-and-Sum Technique

### Test Settings

1. Analyzer was set to the center frequency of the DTS channel under investigation
2. Span = 1.5 times the DTS channel bandwidth
3. RBW = 3kHz
4. VBW = 1MHz
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Trace was allowed to stabilize

### Test Setup


The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-3. Test Instrument & Measurement Setup**

### Test Notes

1. All data rates were investigated and only the worst case is reported.
2. All RU's were investigated and only worst case partially-loaded and fully-loaded RU's are reported.

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## Ant 1 Power Spectral Density Measurements

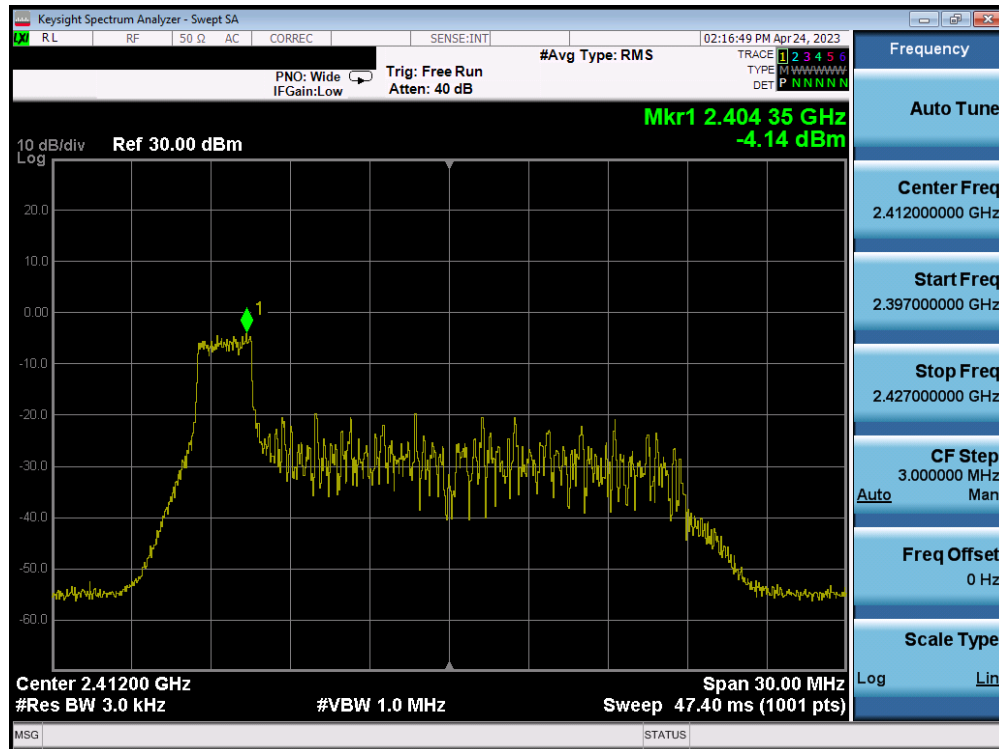
Frequency [MHz]	Channel No.	802.11 Mode	RU Size	RU Index	Data Rate [Mbps]	Measured Power Spectral Density [dBm / 3kHz]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	ax	26	0	108/114.7 (MCS9)	-4.14	8.00	-12.14	Pass
2412	1	ax	26	4	108/114.7 (MCS9)	-4.51	8.00	-12.51	Pass
2412	1	ax	26	8	108/114.7 (MCS9)	-3.39	8.00	-11.39	Pass
2437	6	ax	26	0	108/114.7 (MCS9)	-4.87	8.00	-12.87	Pass
2437	6	ax	26	4	108/114.7 (MCS9)	-4.42	8.00	-12.42	Pass
2437	6	ax	26	8	108/114.7 (MCS9)	-4.04	8.00	-12.04	Pass
2462	11	ax	26	0	108/114.7 (MCS9)	-4.00	8.00	-12.00	Pass
2462	11	ax	26	4	108/114.7 (MCS9)	-4.55	8.00	-12.55	Pass
2462	11	ax	26	8	108/114.7 (MCS9)	-4.39	8.00	-12.39	Pass
2412	1	ax	242	61	108/114.7 (MCS9)	-6.86	8.00	-14.86	Pass
2437	6	ax	242	61	108/114.7 (MCS9)	-1.34	8.00	-9.34	Pass
2462	11	ax	242	61	108/114.7 (MCS9)	-6.92	8.00	-14.92	Pass

**Table 7-16. Conducted Power Density Measurements Ant 1**

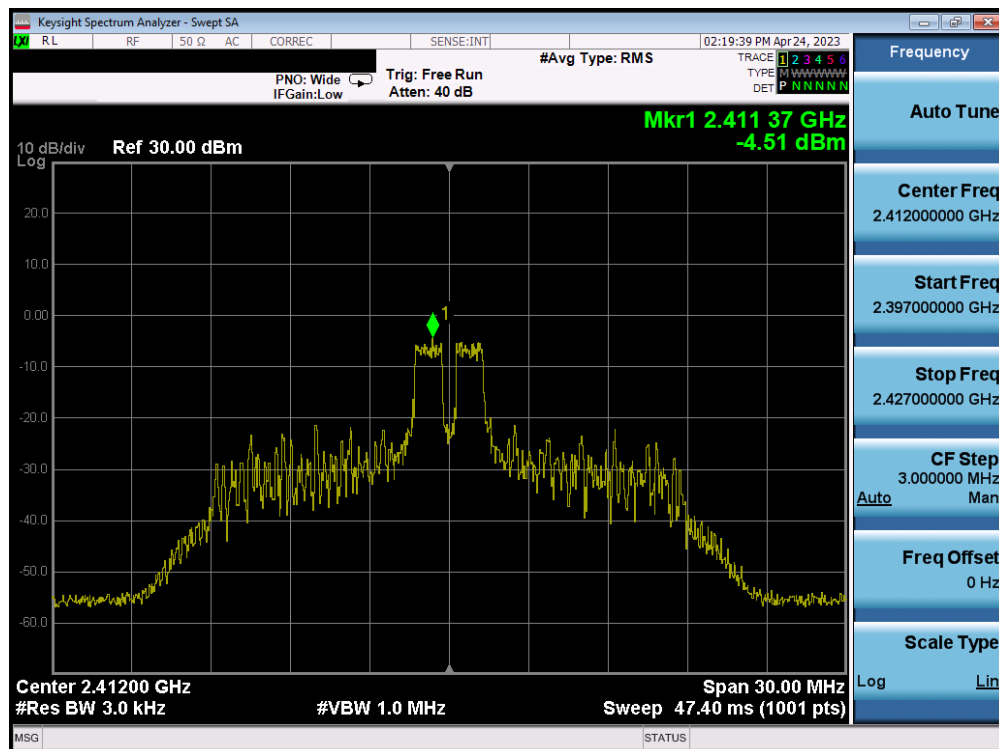
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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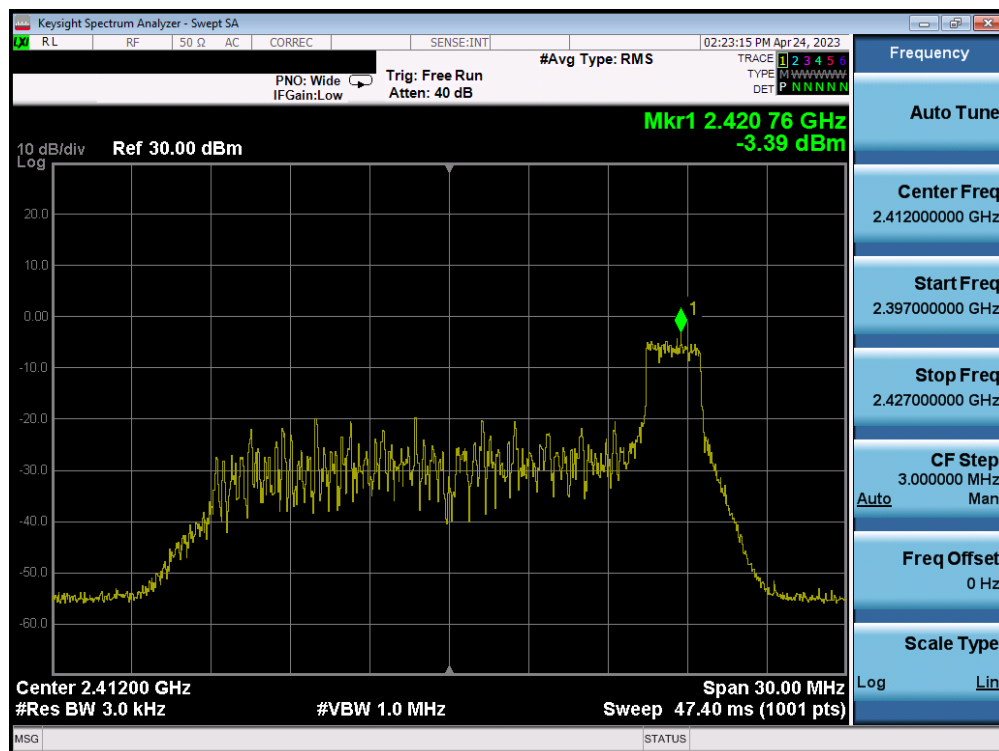


Plot 7-25. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

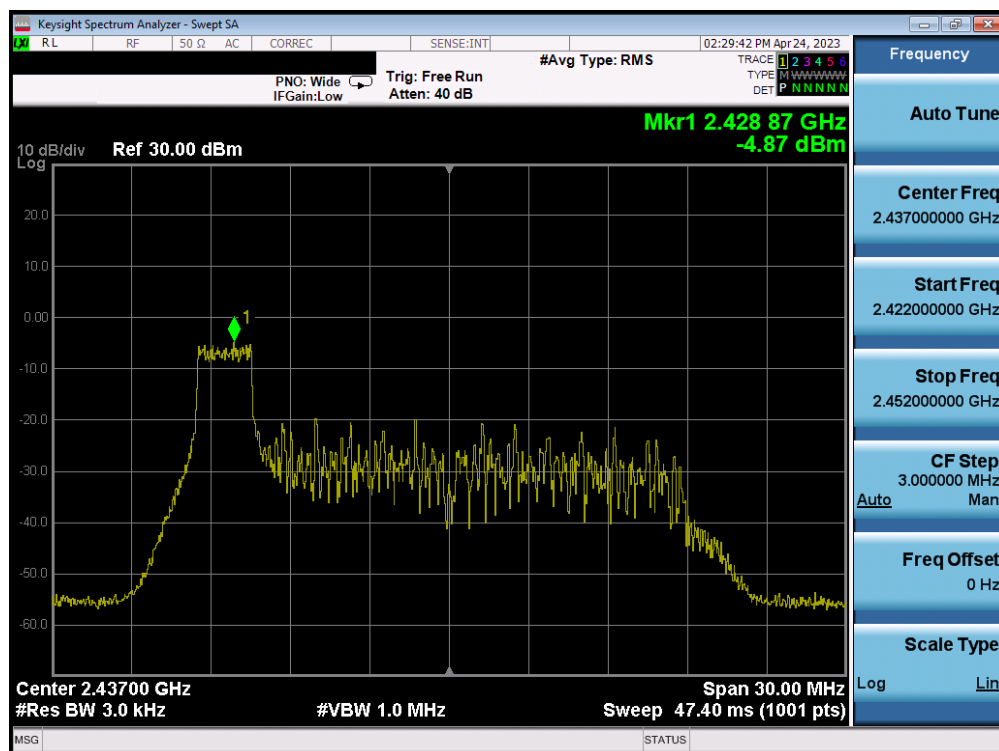


Plot 7-26. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 1)

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Plot 7-27. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 1)



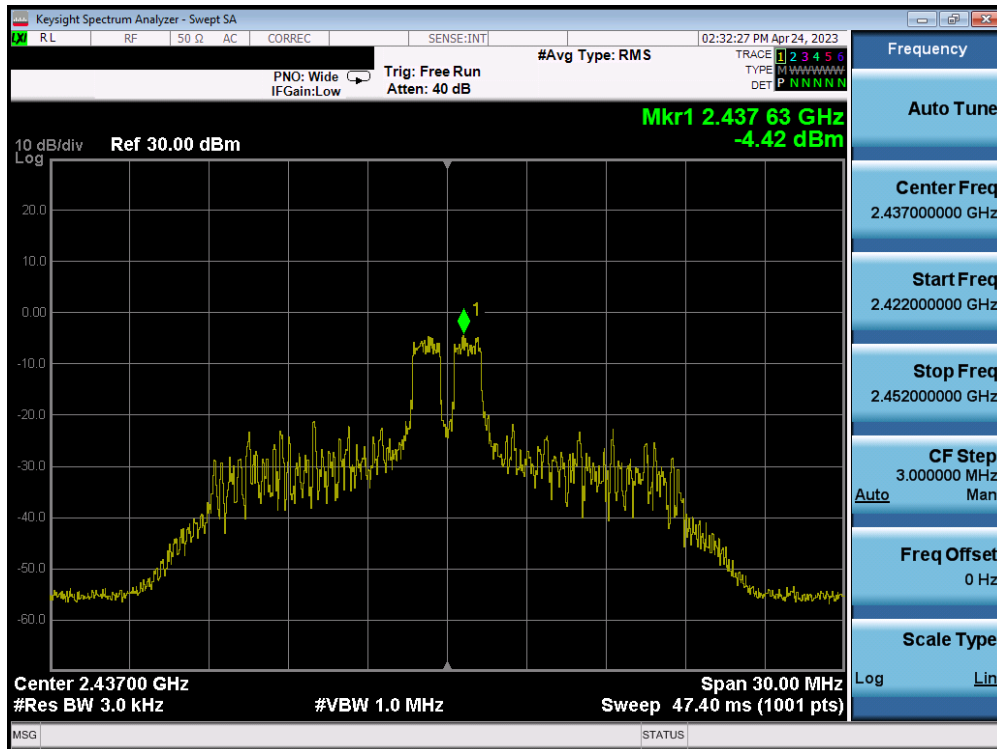
Plot 7-28. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 6)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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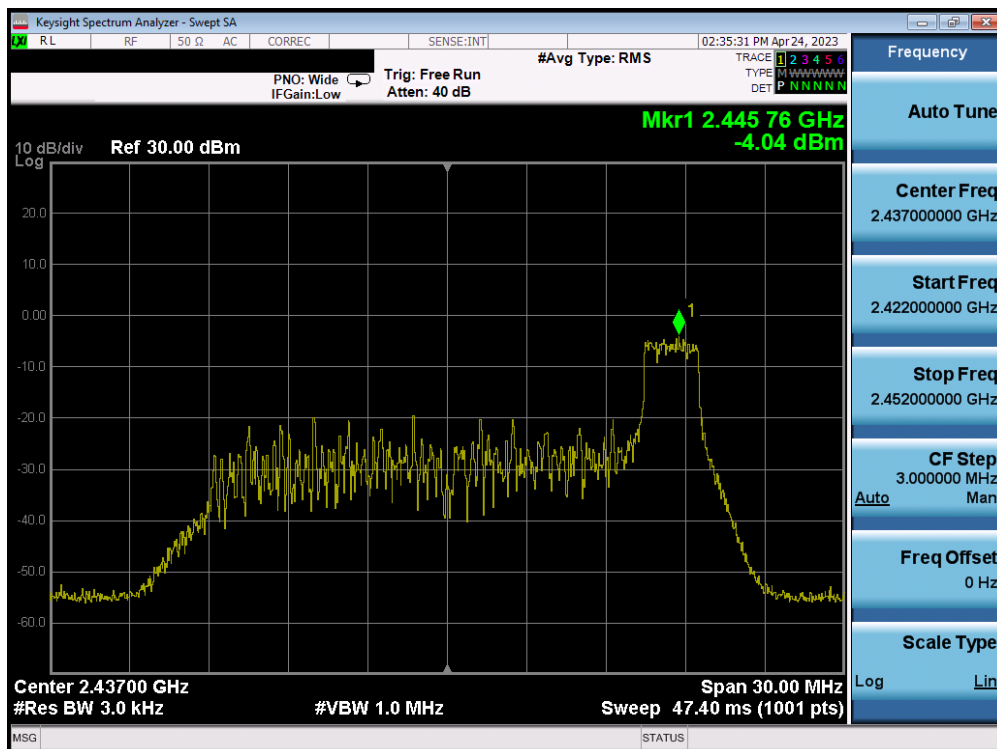
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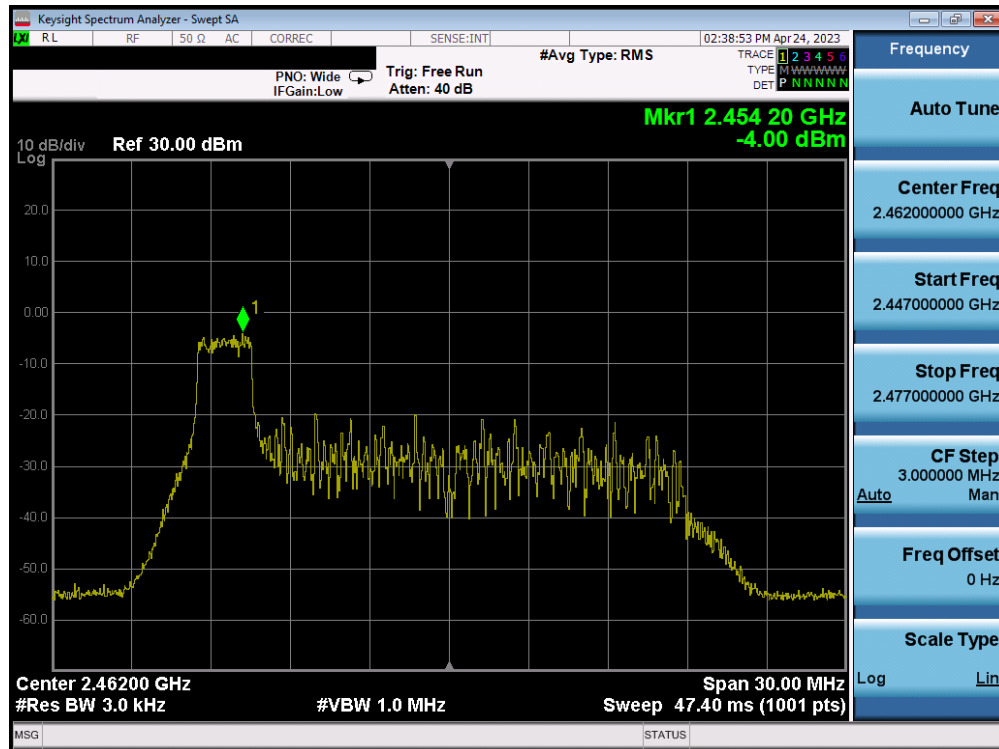


Plot 7-29. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 6)

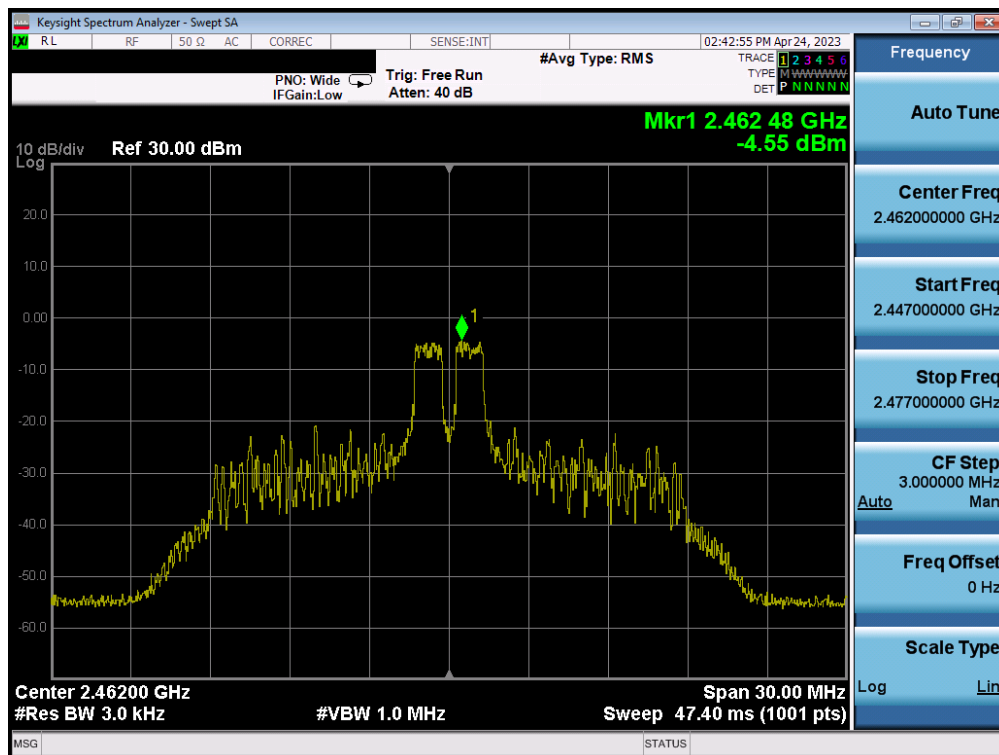


Plot 7-30. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 6)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 41 of 154

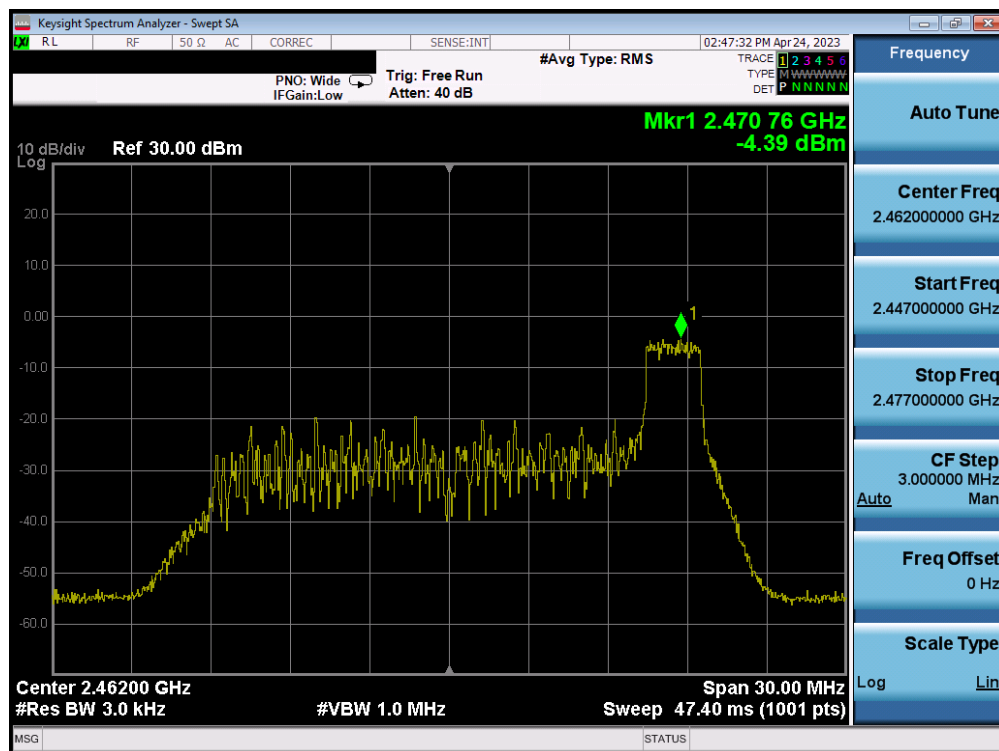


Plot 7-31. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 11)

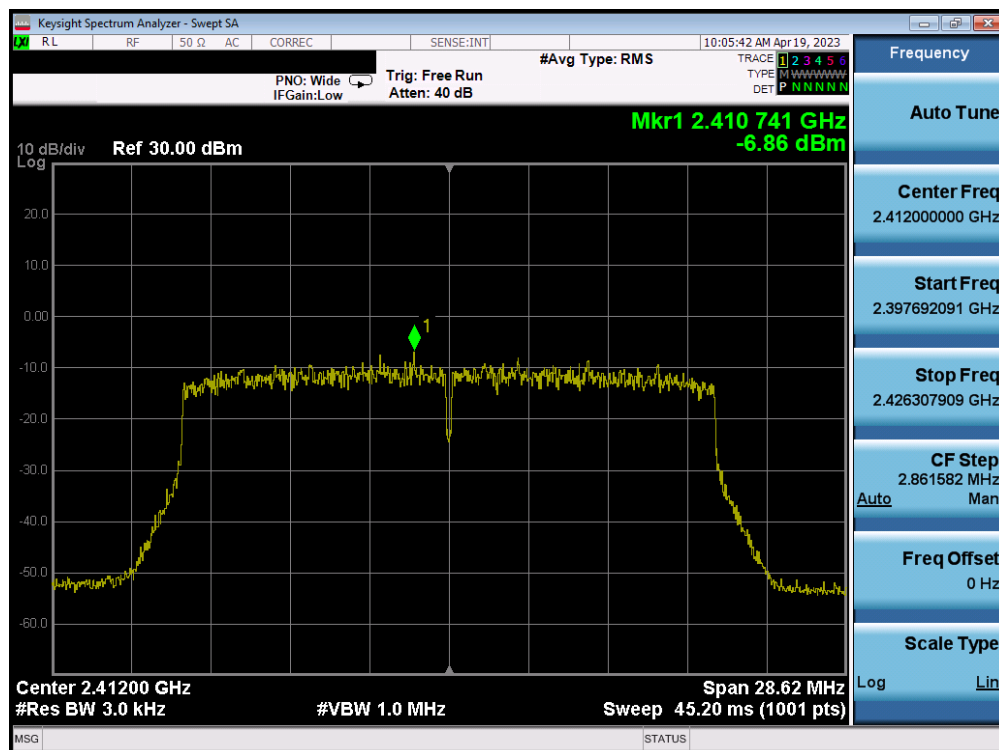


Plot 7-32. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 11)


FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 42 of 154



Plot 7-33. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

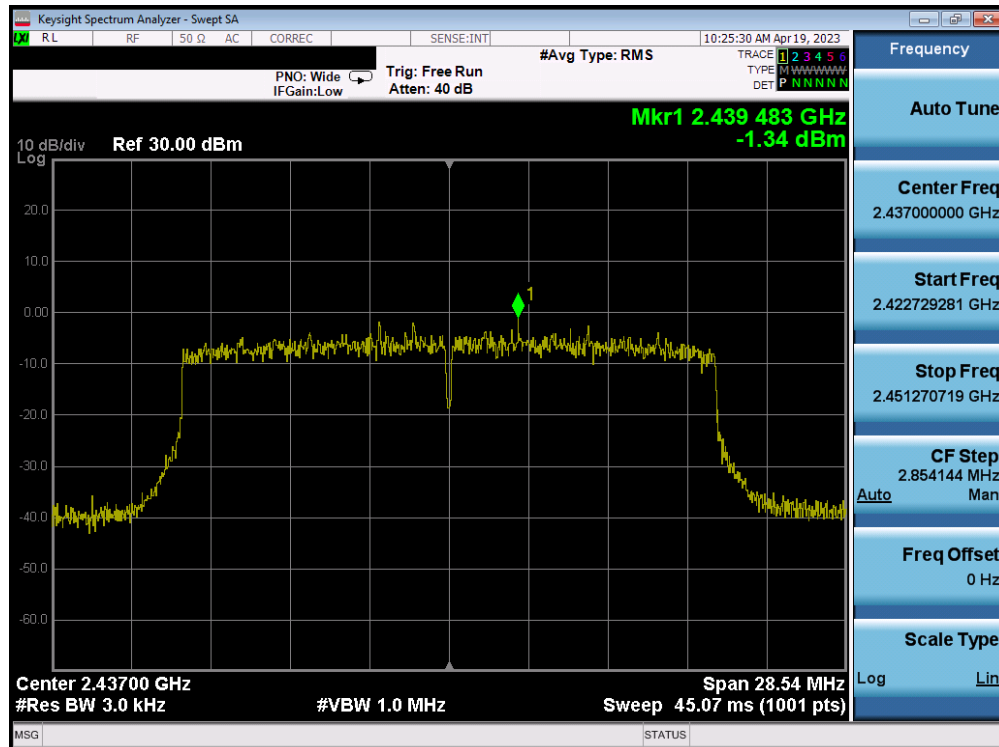


Plot 7-34. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU242 – Ch. 1)

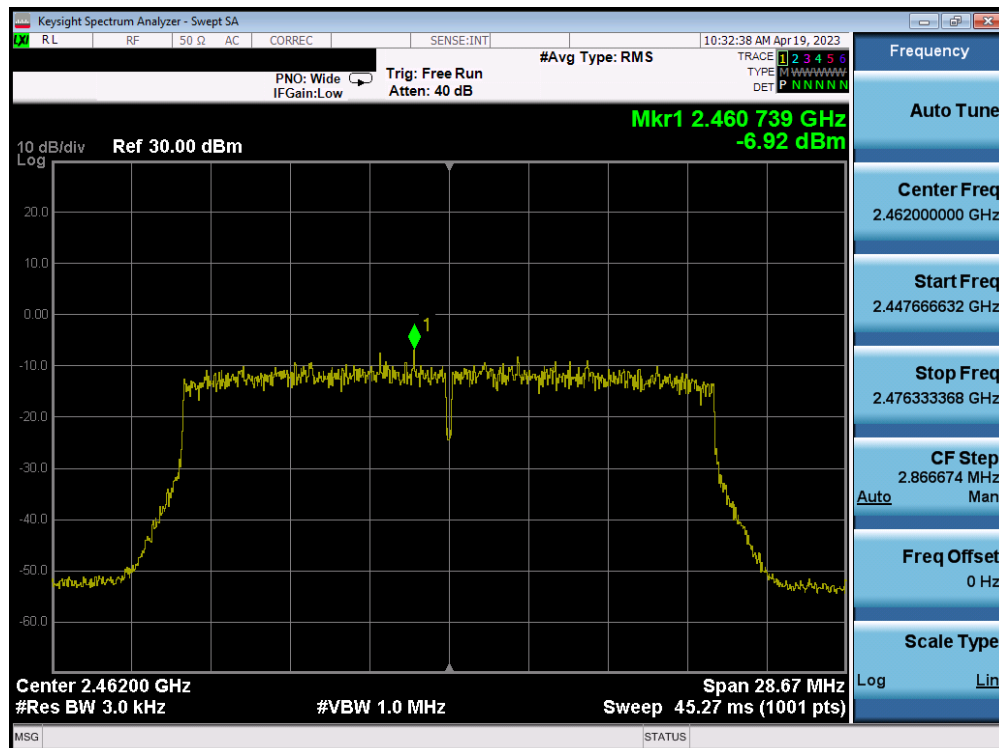
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 43 of 154

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Plot 7-35. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU242 – Ch. 6)



Plot 7-36. Power Spectral Density Plot Ant 1 (802.11ax OFDMA – RU242 – Ch. 11)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 44 of 154

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## Ant 2 Power Spectral Density Measurements

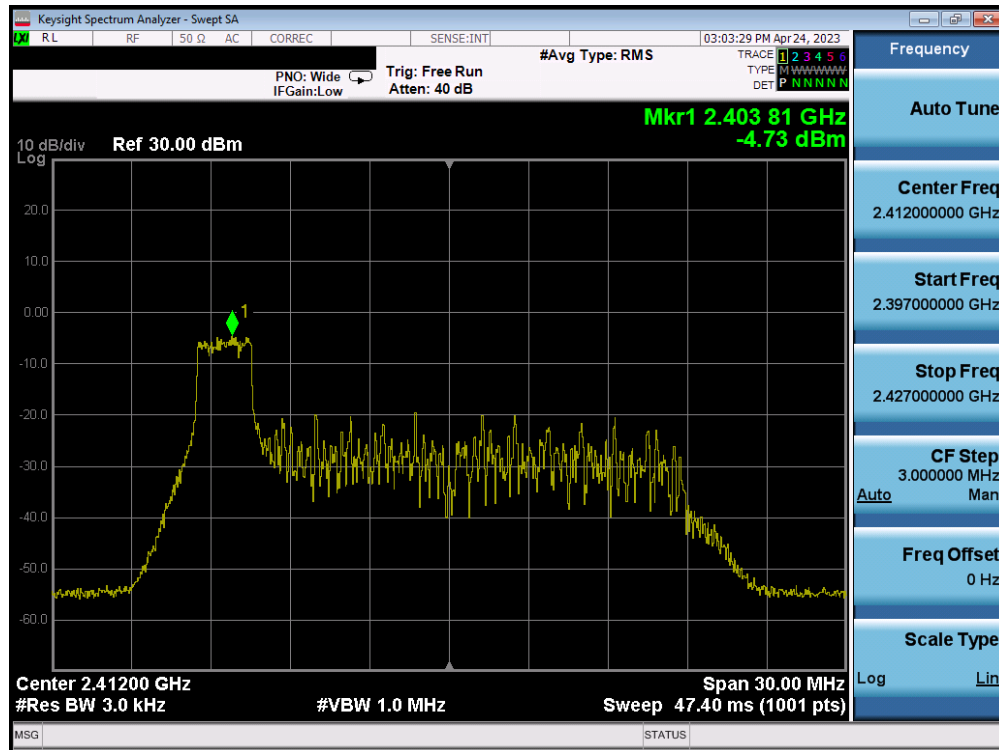
Frequency [MHz]	Channel No.	802.11 Mode	RU Size	RU Index	Data Rate [Mbps]	Measured Power Spectral Density [dBm / 3kHz]	Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
2412	1	ax	26	0	108/114.7 (MCS9)	-4.73	8.00	-12.73	Pass
2412	1	ax	26	4	108/114.7 (MCS9)	-4.43	8.00	-12.43	Pass
2412	1	ax	26	8	108/114.7 (MCS9)	-4.36	8.00	-12.36	Pass
2437	6	ax	26	0	108/114.7 (MCS9)	-4.50	8.00	-12.50	Pass
2437	6	ax	26	4	108/114.7 (MCS9)	-4.03	8.00	-12.03	Pass
2437	6	ax	26	8	108/114.7 (MCS9)	-3.73	8.00	-11.73	Pass
2462	11	ax	26	0	108/114.7 (MCS9)	-4.29	8.00	-12.29	Pass
2462	11	ax	26	4	108/114.7 (MCS9)	-3.98	8.00	-11.98	Pass
2462	11	ax	26	8	108/114.7 (MCS9)	-4.07	8.00	-12.07	Pass
2412	1	ax	242	61	108/114.7 (MCS9)	-6.69	8.00	-14.69	Pass
2437	6	ax	242	61	108/114.7 (MCS9)	-1.83	8.00	-9.83	Pass
2462	11	ax	242	61	108/114.7 (MCS9)	-8.54	8.00	-16.54	Pass

**Table 7-17. Conducted Power Density Measurements Ant 2**

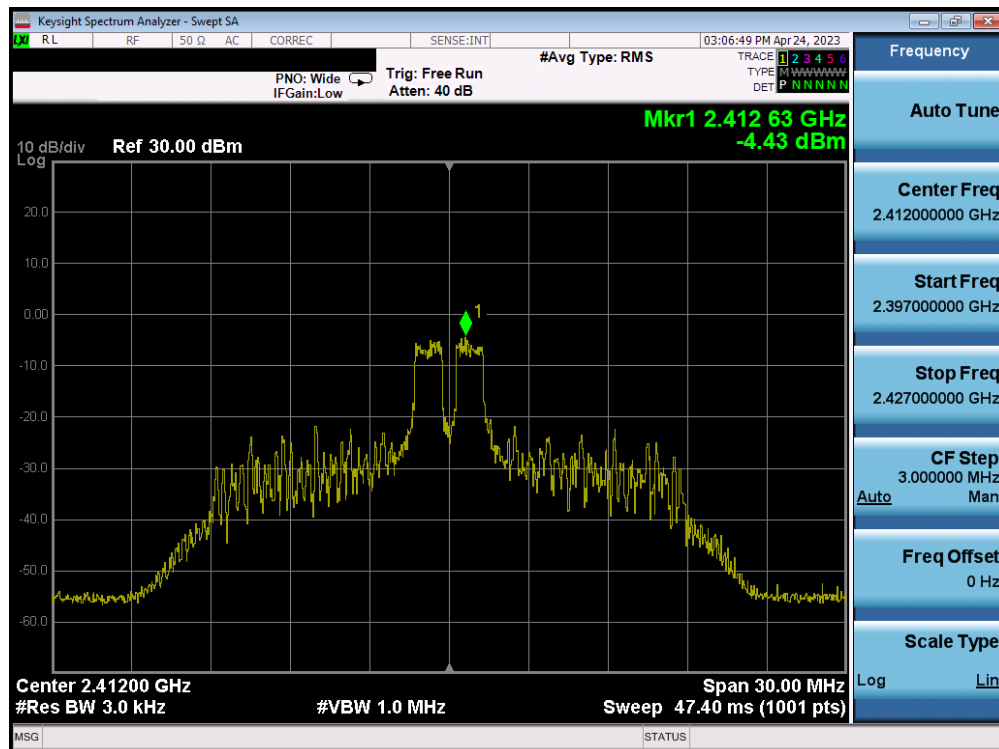
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 45 of 154

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Plot 7-37. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

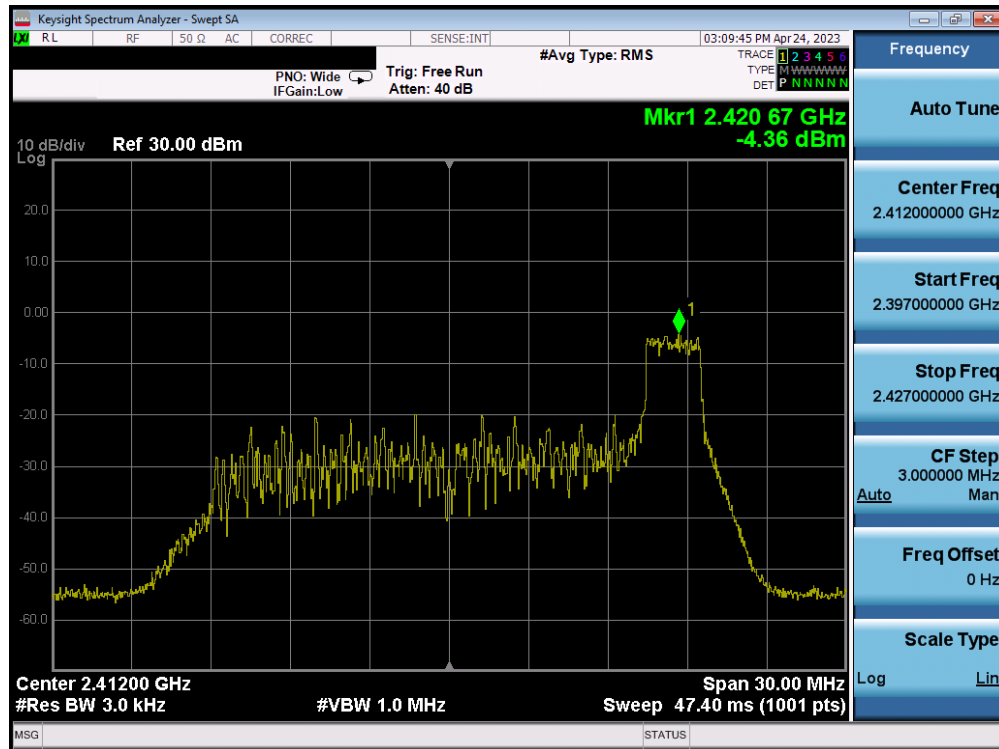


Plot 7-38. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 1)

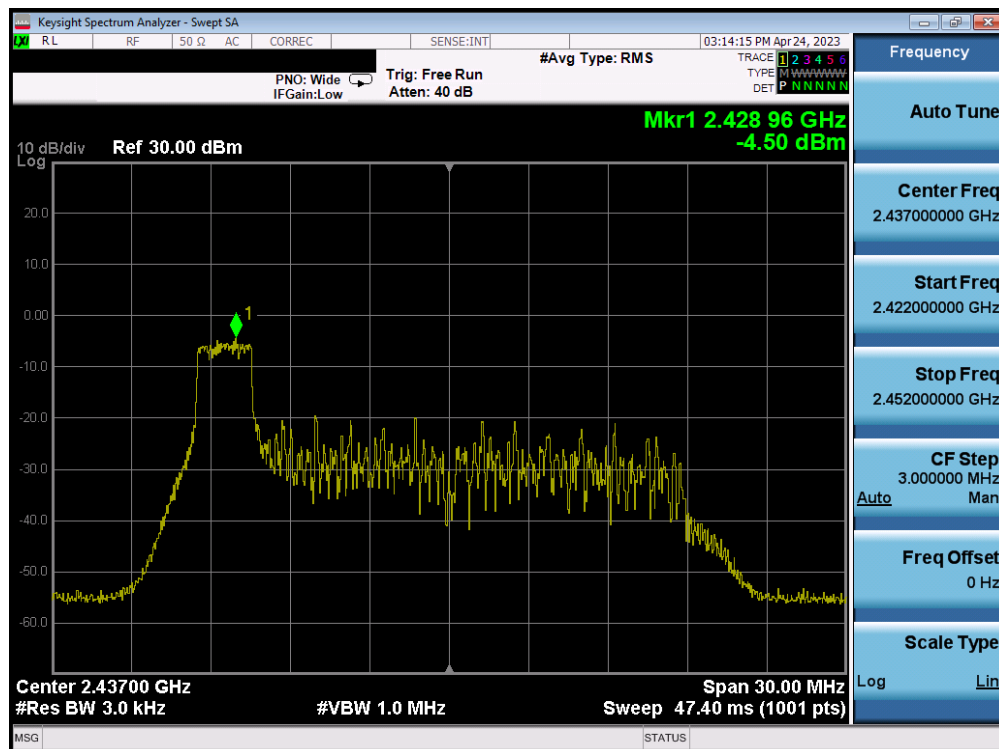
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 46 of 154

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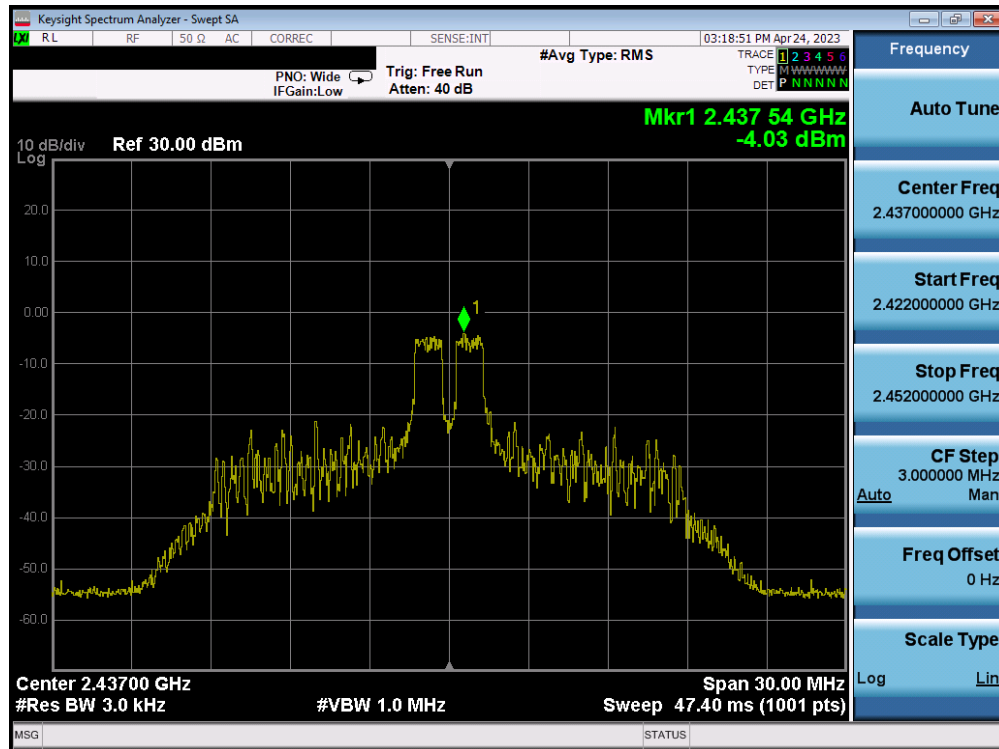


Plot 7-39. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 1)

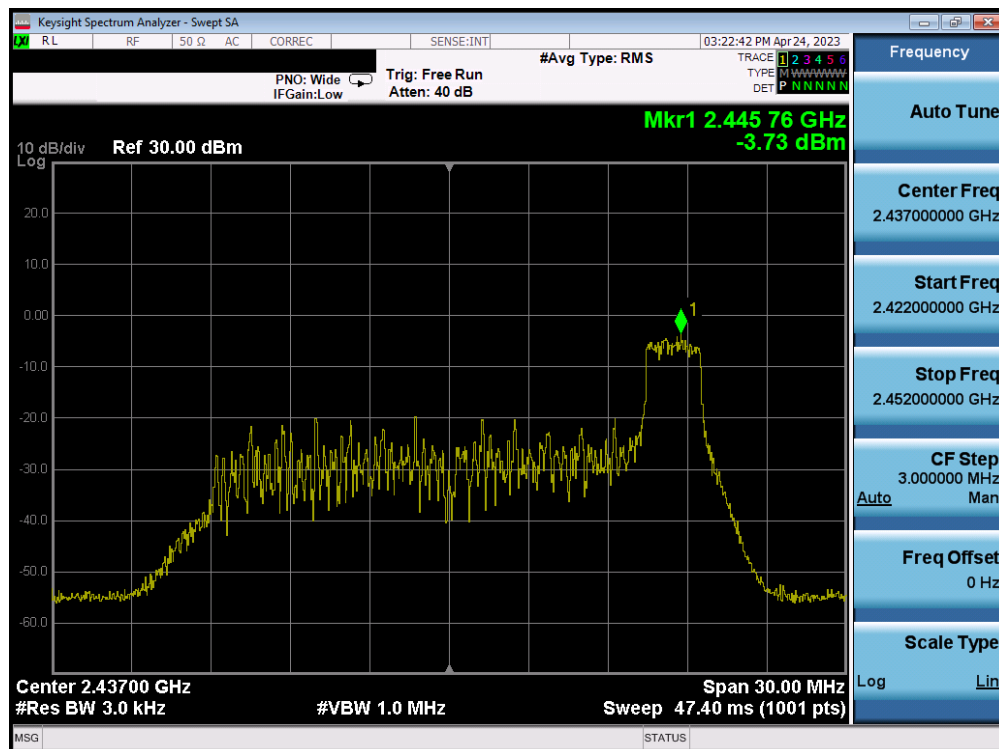


Plot 7-40. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 6)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 47 of 154



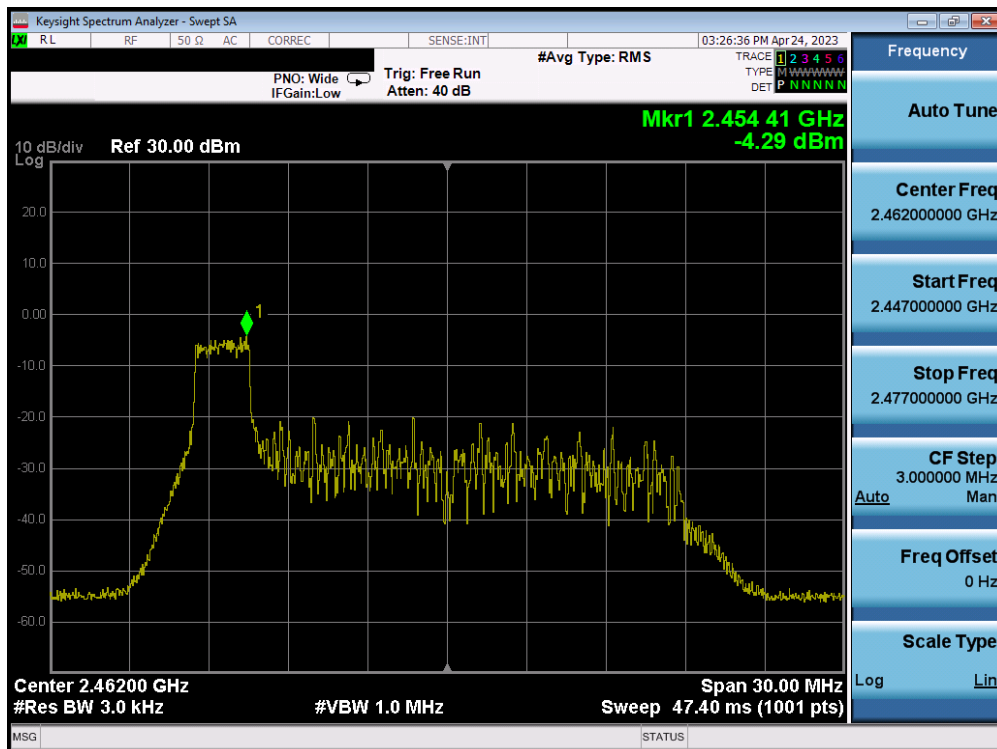
Plot 7-41. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 6)



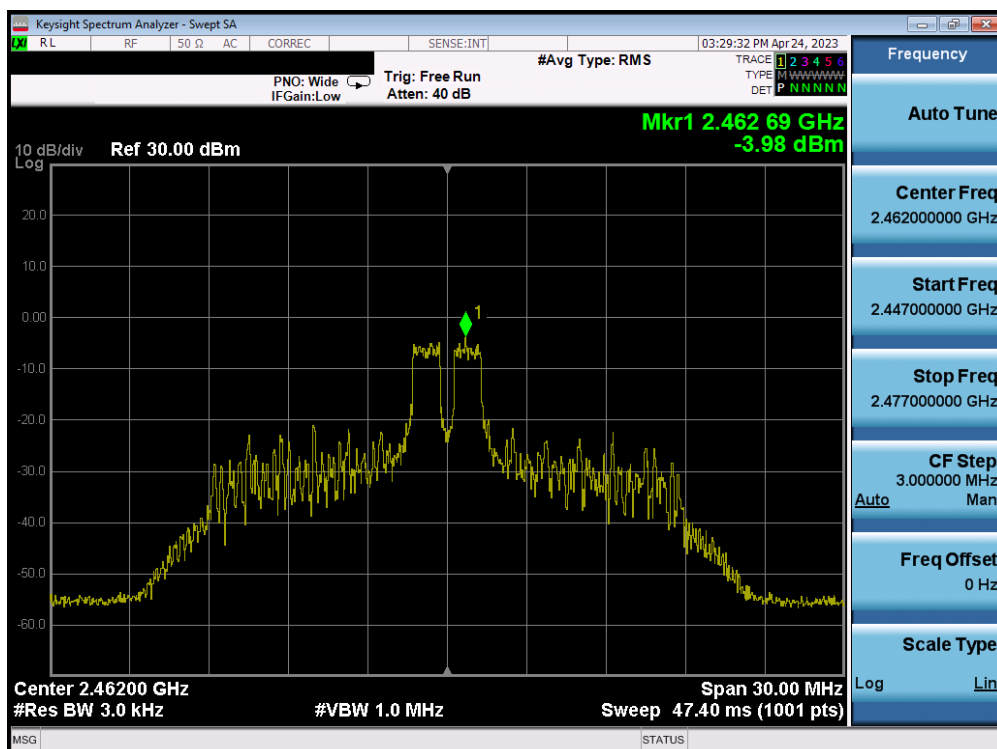
Plot 7-42. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 6)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 48 of 154





Plot 7-43. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 11)

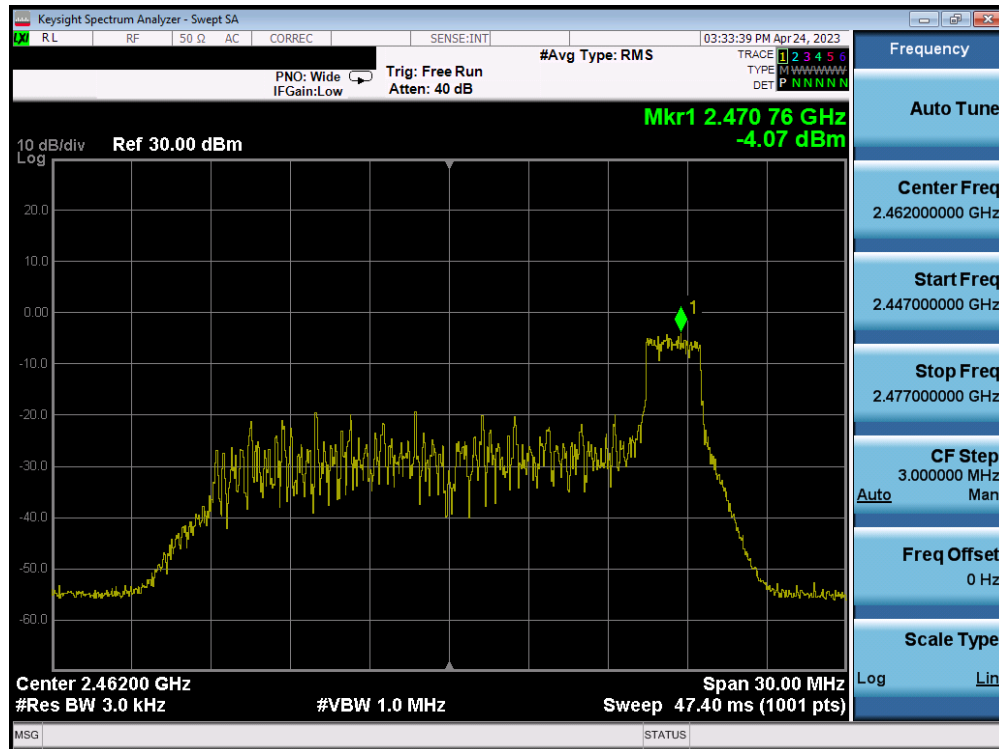


Plot 7-44. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 11)

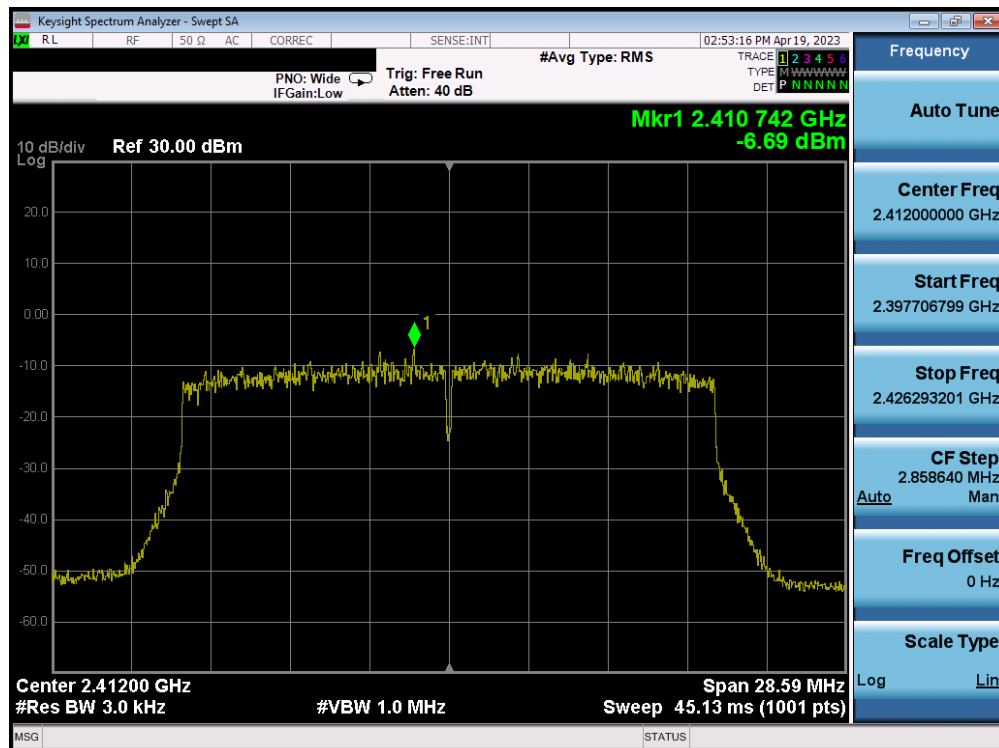
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 49 of 154

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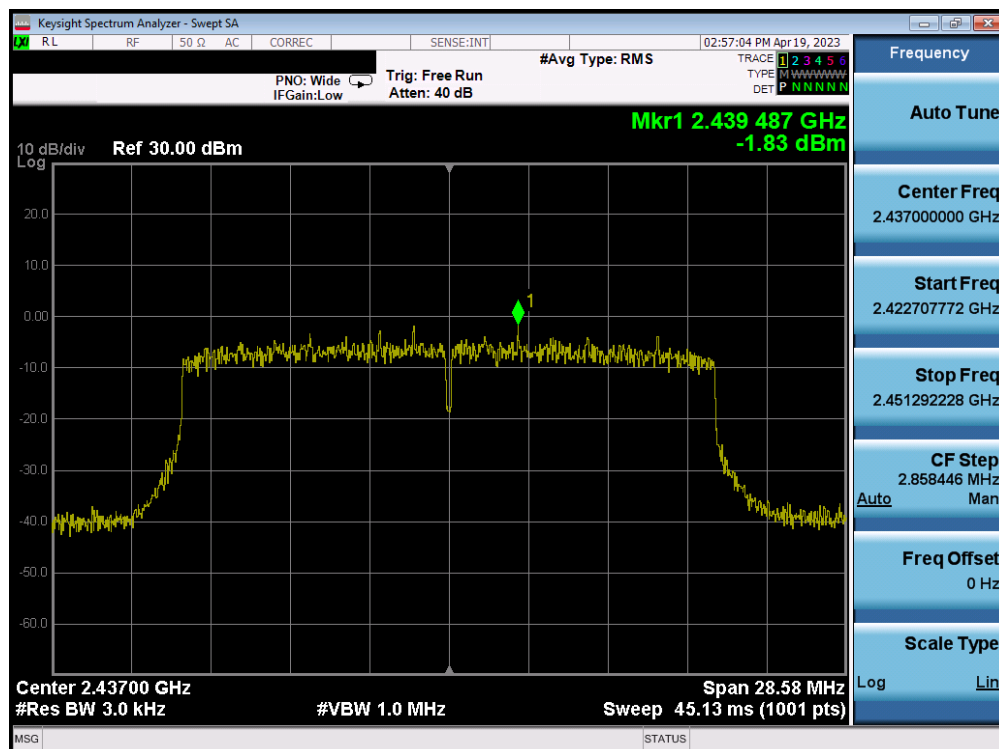


Plot 7-45. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

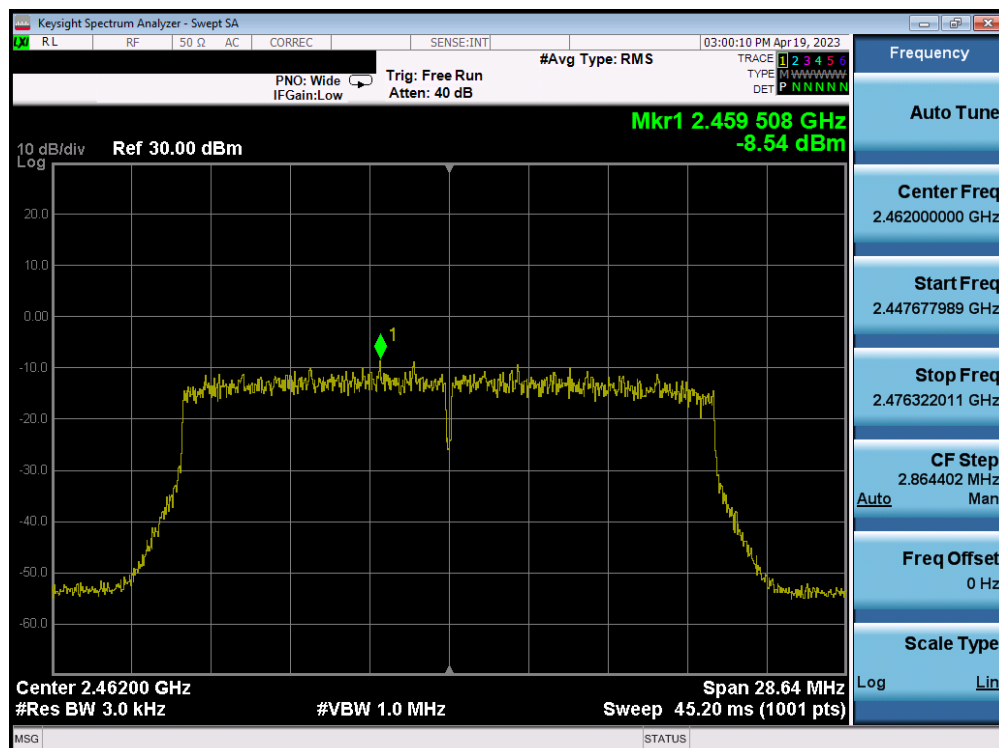


Plot 7-46. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU242 – Ch. 1)


FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 50 of 154



Plot 7-47. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU242 – Ch. 6)



Plot 7-48. Power Spectral Density Plot Ant 2 (802.11ax OFDMA – RU242 – Ch. 11)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 51 of 154

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## CDD Power Spectral Density Measurements

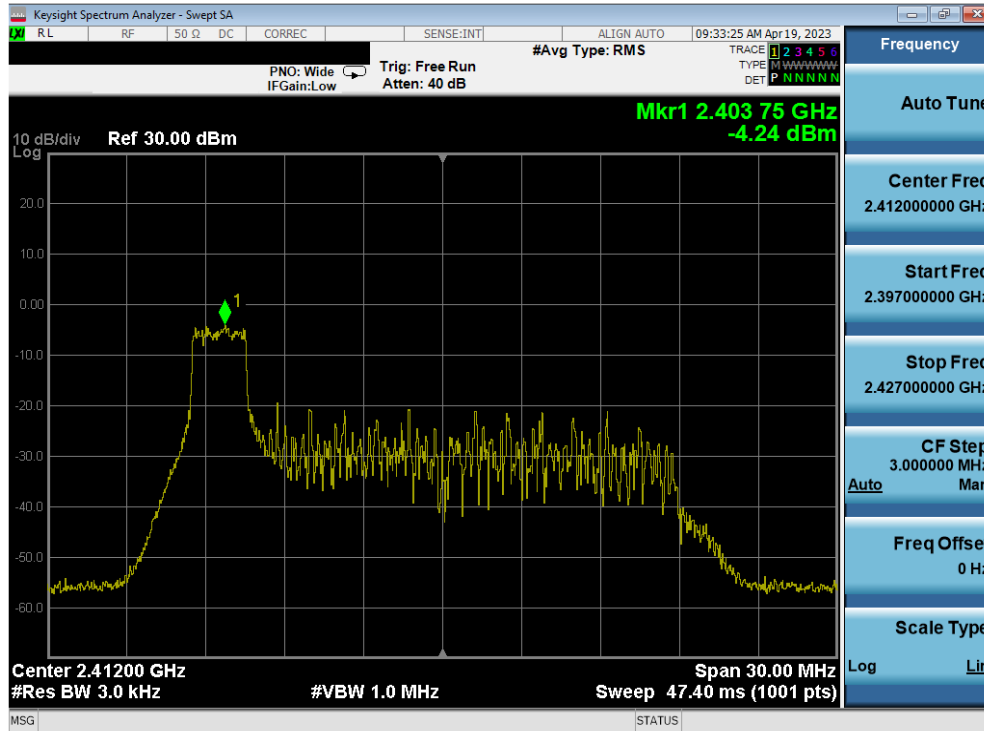
Frequency [MHz]	Channel No.	802.11 Mode	RU Size	RU Index	Data Rate [Mbps]	Power Spectral Density [dBm / 3kHz]			Maximum Permissible Power Density [dBm / 3kHz]	Margin [dB]	Pass / Fail
						Ant1	Ant2	Summed			
2412	1	ax	26	0	216/229.4 (MCS9)	-4.24	-4.39	-1.30	8.00	-9.30	Pass
2412	1	ax	26	4	216/229.4 (MCS9)	-3.77	-3.94	-0.84	8.00	-8.84	Pass
2412	1	ax	26	8	216/229.4 (MCS9)	-2.98	-3.76	-0.34	8.00	-8.34	Pass
2437	6	ax	26	0	216/229.4 (MCS9)	-3.66	-3.69	-0.66	8.00	-8.66	Pass
2437	6	ax	26	4	216/229.4 (MCS9)	-3.93	-5.16	-1.49	8.00	-9.49	Pass
2437	6	ax	26	8	216/229.4 (MCS9)	-3.83	-3.50	-0.65	8.00	-8.65	Pass
2462	11	ax	26	0	216/229.4 (MCS9)	-4.24	-3.40	-0.79	8.00	-8.79	Pass
2462	11	ax	26	4	216/229.4 (MCS9)	-3.39	-4.21	-0.77	8.00	-8.77	Pass
2462	11	ax	26	8	216/229.4 (MCS9)	-2.25	-4.55	-0.24	8.00	-8.24	Pass
2412	1	ax	242	61	216/229.4 (MCS9)	-7.75	-7.52	-4.62	8.00	-12.62	Pass
2437	6	ax	242	61	216/229.4 (MCS9)	-1.99	-1.64	1.20	8.00	-6.80	Pass
2462	11	ax	242	61	216/229.4 (MCS9)	-7.49	-8.02	-4.74	8.00	-12.74	Pass

Table 7-18.CDD Conducted Power Density Measurements

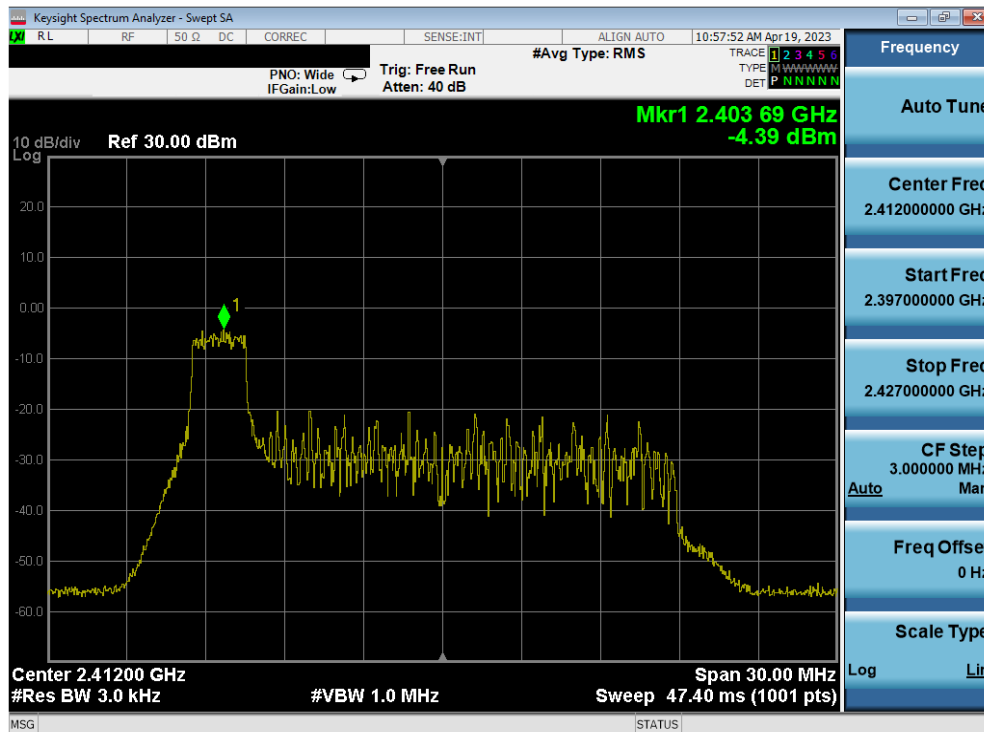
FCC ID: BCGA2117 IC: 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>		Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 52 of 154

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Plot 7-49. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

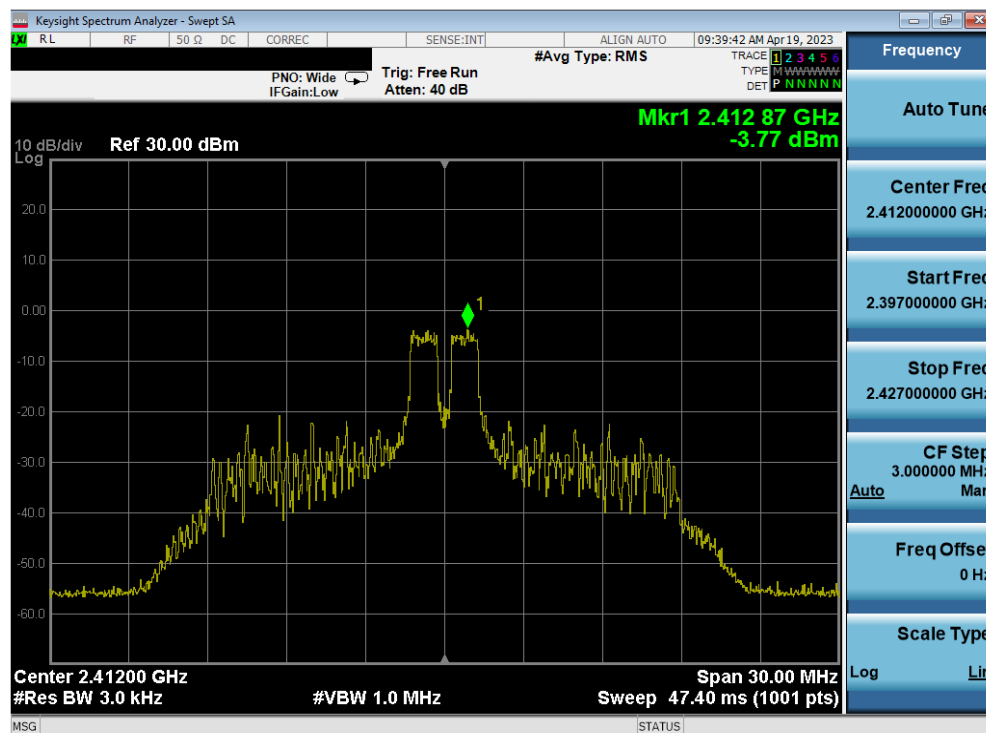


Plot 7-50. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

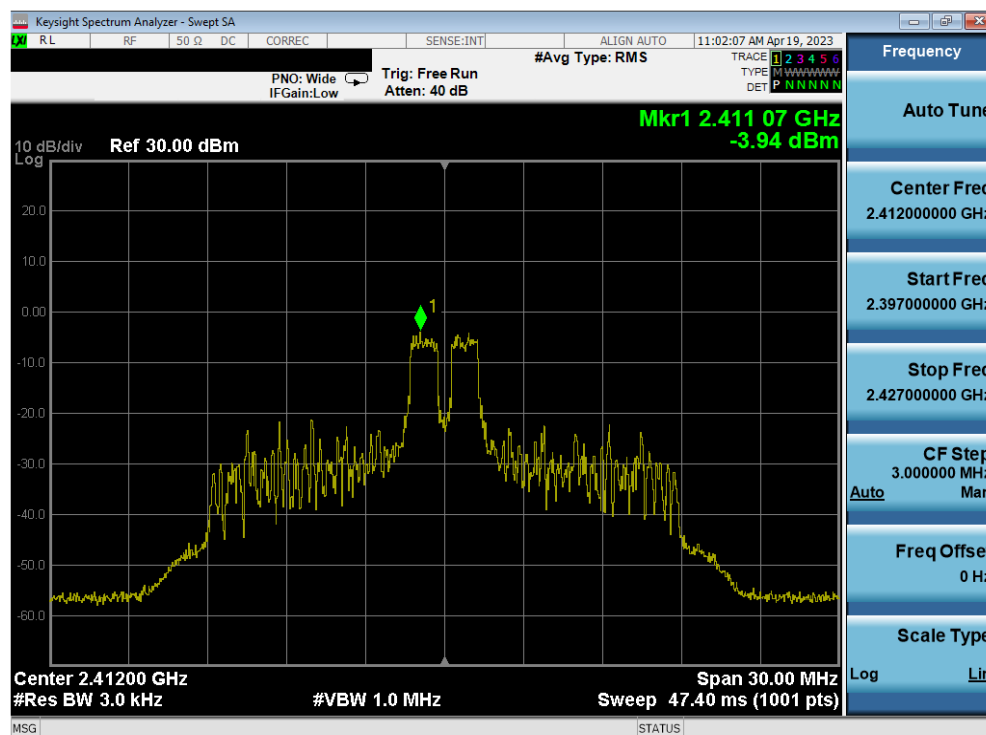
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 53 of 154

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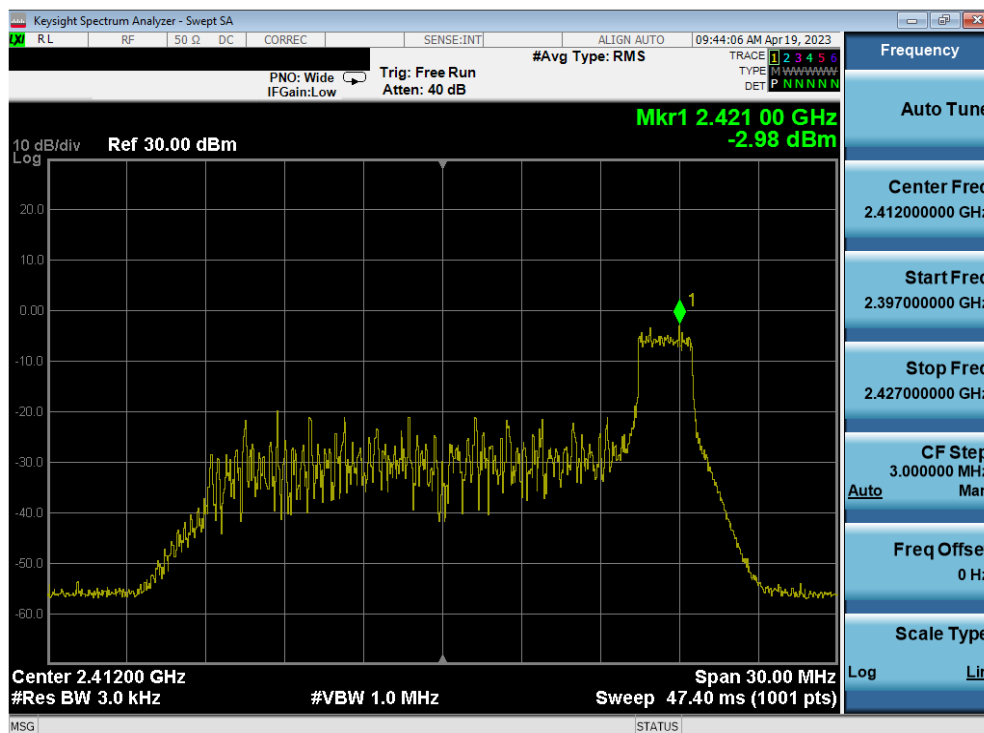


**Plot 7-51. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 1)**

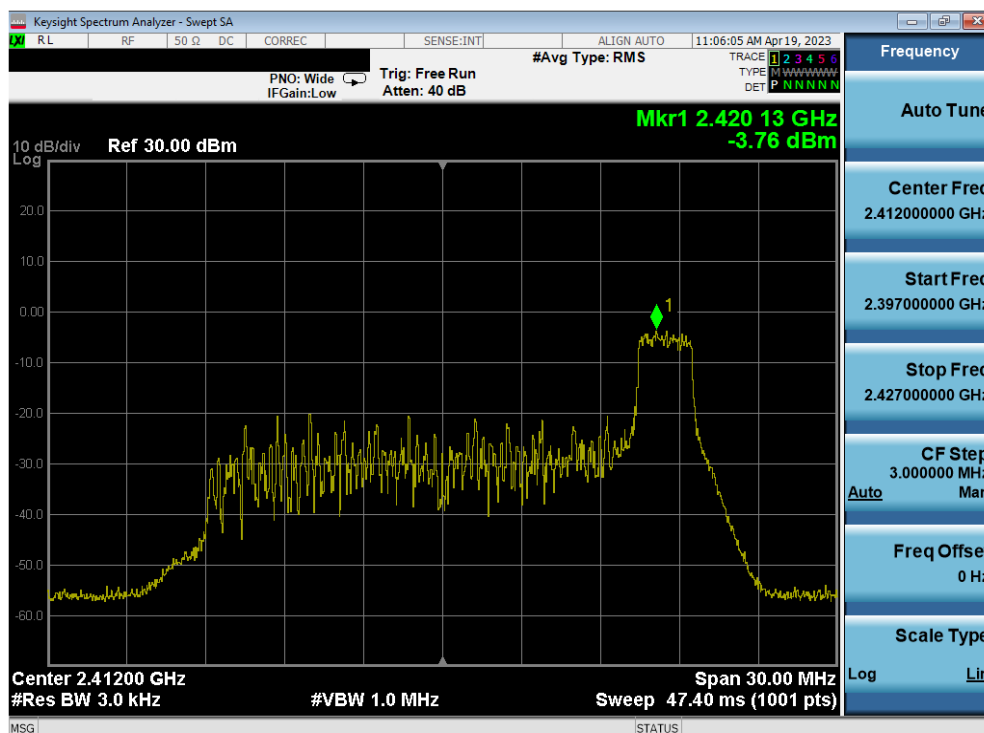


**Plot 7-52. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 1)**

<b>FCC ID:</b> BCGA2117 <b>IC:</b> 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2302130007-04.BCG	<b>Test Dates:</b> 2/20/2023 - 4/24/2023	<b>EUT Type:</b> Head Mounted Device	Page 54 of 154



Plot 7-53. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 1)

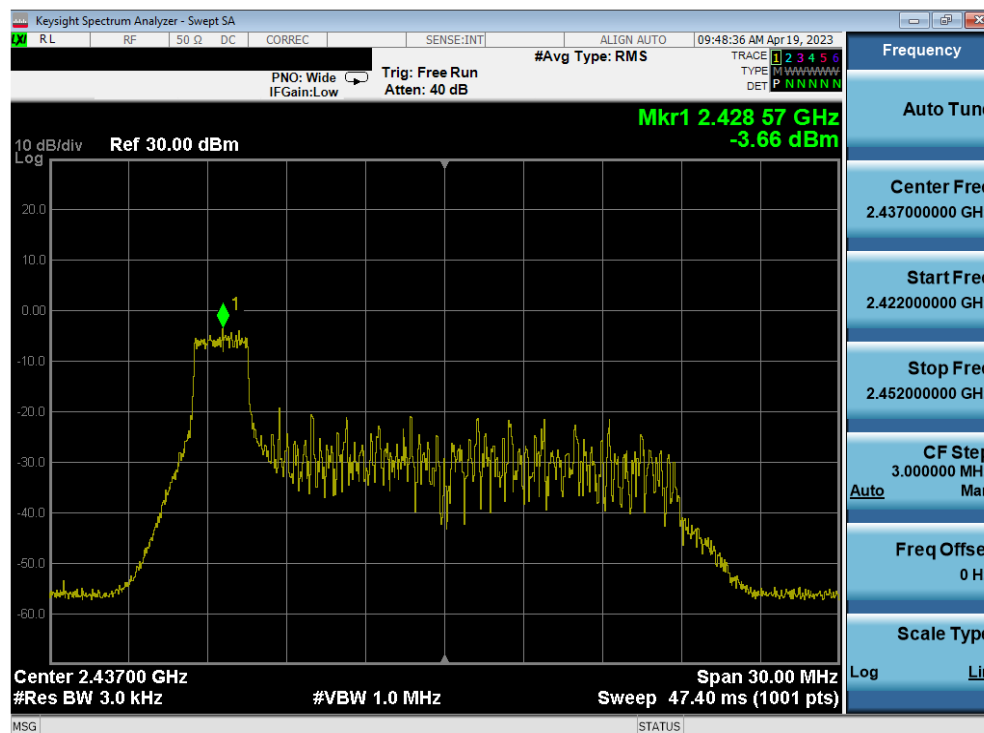


Plot 7-54. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 1)

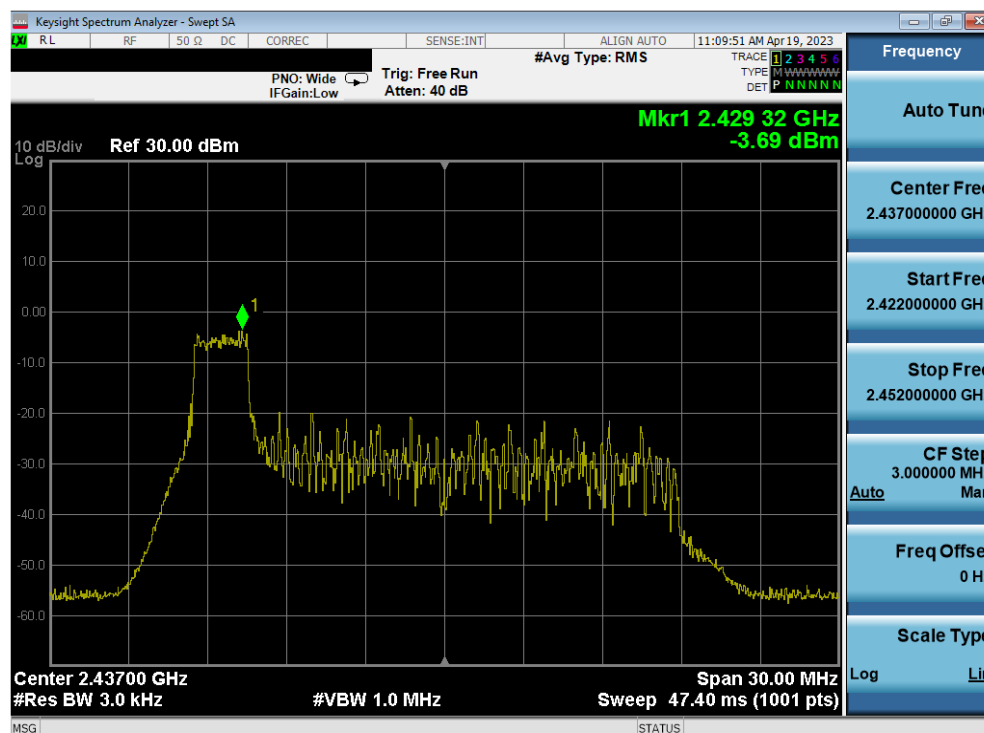
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 55 of 154

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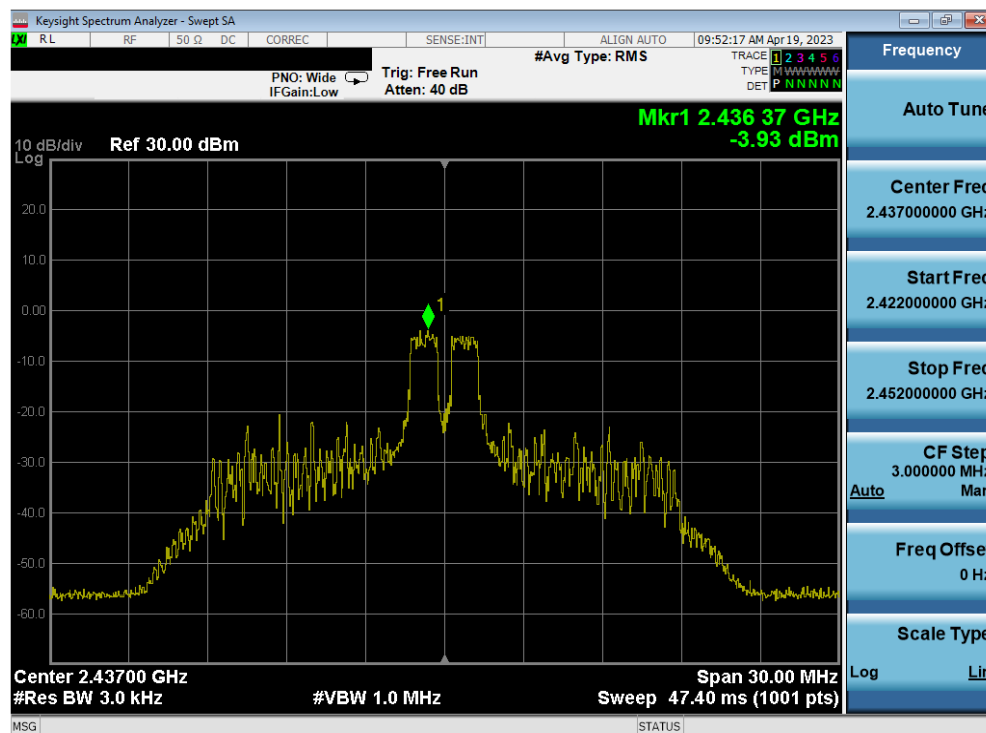
**Plot 7-55. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 6)**



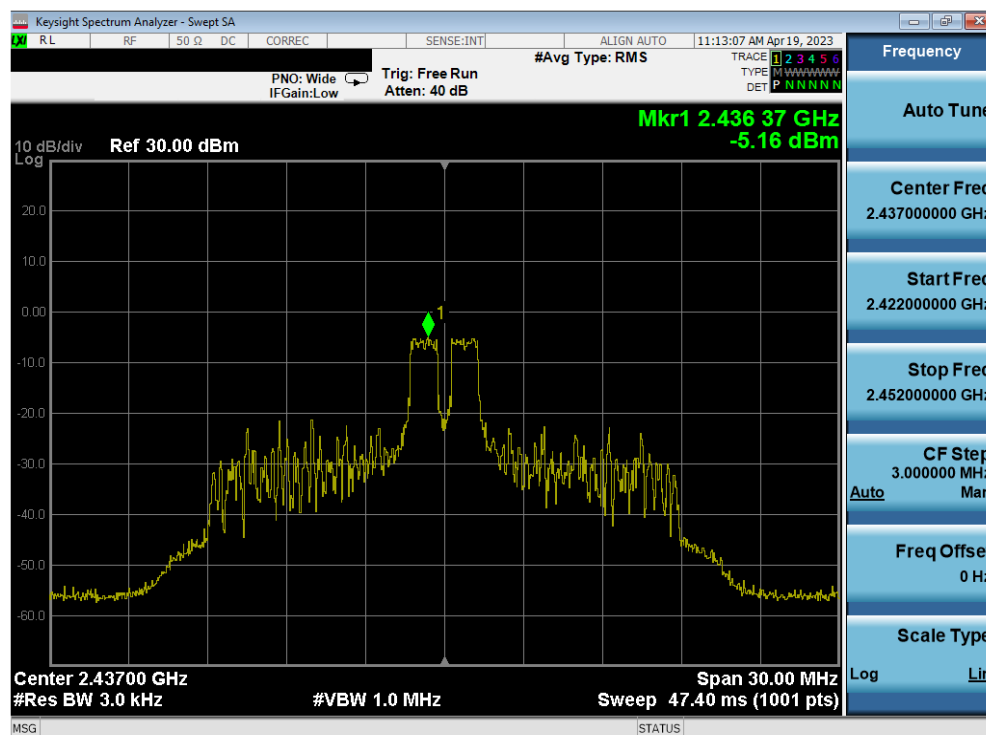
**Plot 7-56. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 6)**

<b>FCC ID:</b> BCGA2117 <b>IC:</b> 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2302130007-04.BCG	<b>Test Dates:</b> 2/20/2023 - 4/24/2023	<b>EUT Type:</b> Head Mounted Device	Page 56 of 154



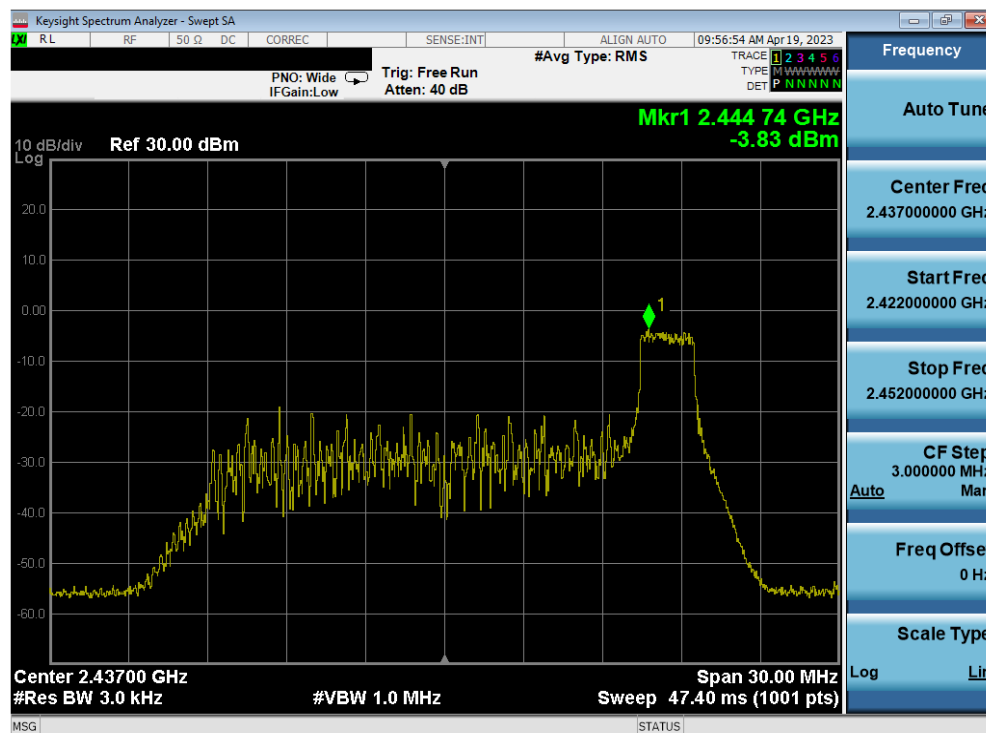


**Plot 7-57. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 6)**

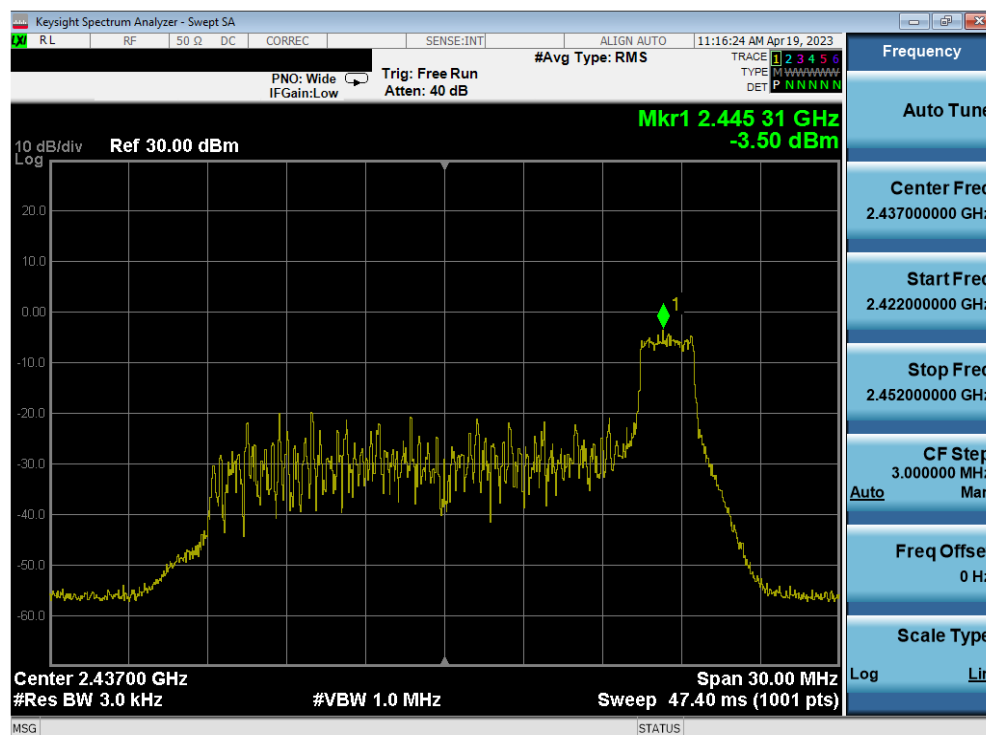


**Plot 7-58. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 6)**


<b>FCC ID:</b> BCGA2117 <b>IC:</b> 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2302130007-04.BCG	<b>Test Dates:</b> 2/20/2023 - 4/24/2023	<b>EUT Type:</b> Head Mounted Device	Page 57 of 154

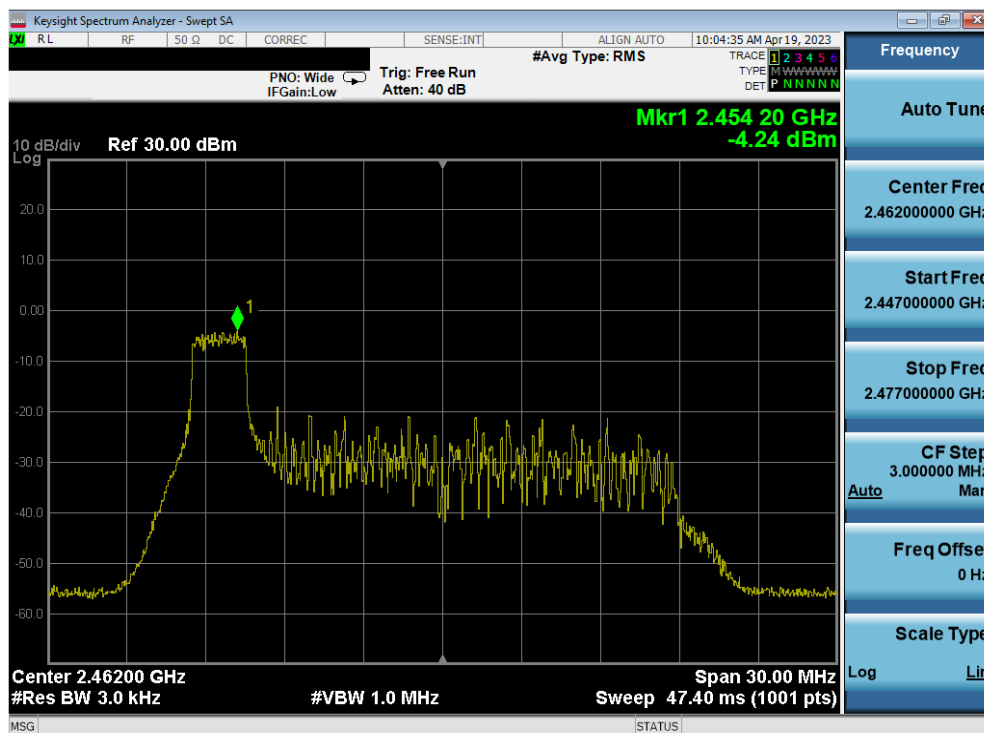


**Plot 7-59. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 6)**

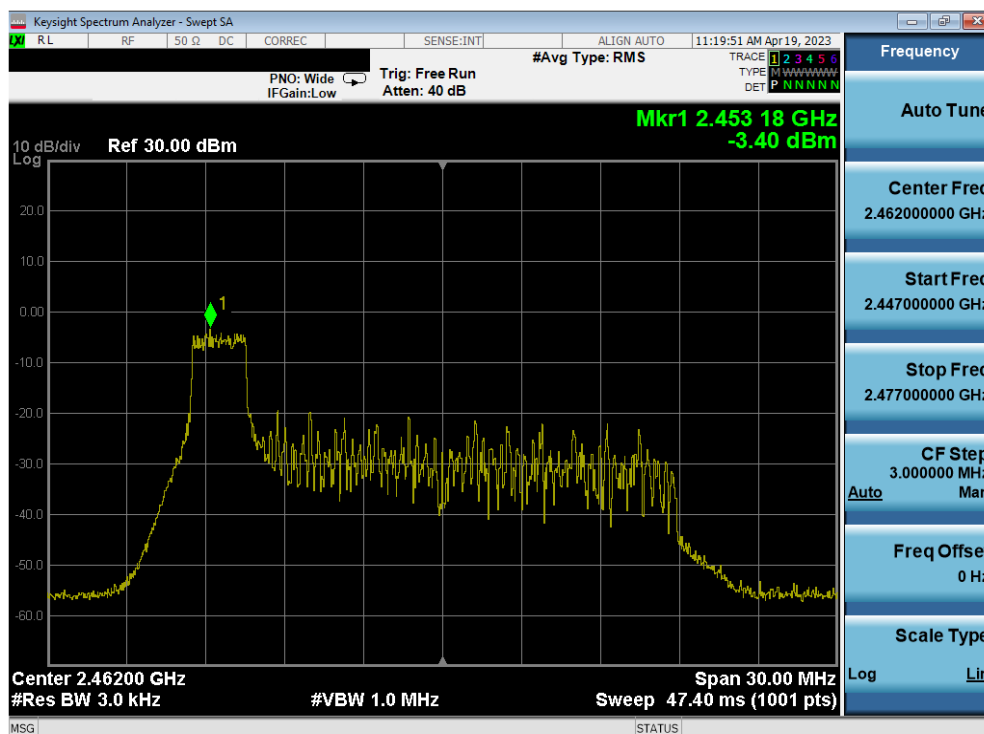


**Plot 7-60. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 6)**

<b>FCC ID:</b> BCGA2117 <b>IC:</b> 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2302130007-04.BCG	<b>Test Dates:</b> 2/20/2023 - 4/24/2023	<b>EUT Type:</b> Head Mounted Device	Page 58 of 154



Plot 7-61. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 11)

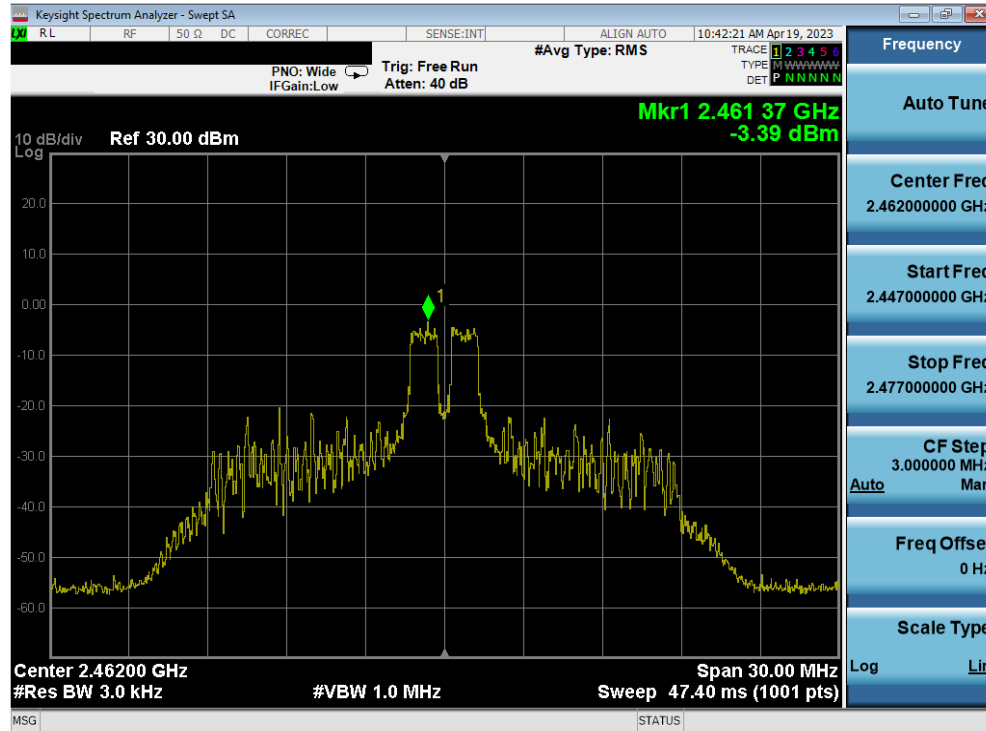


Plot 7-62. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 11)

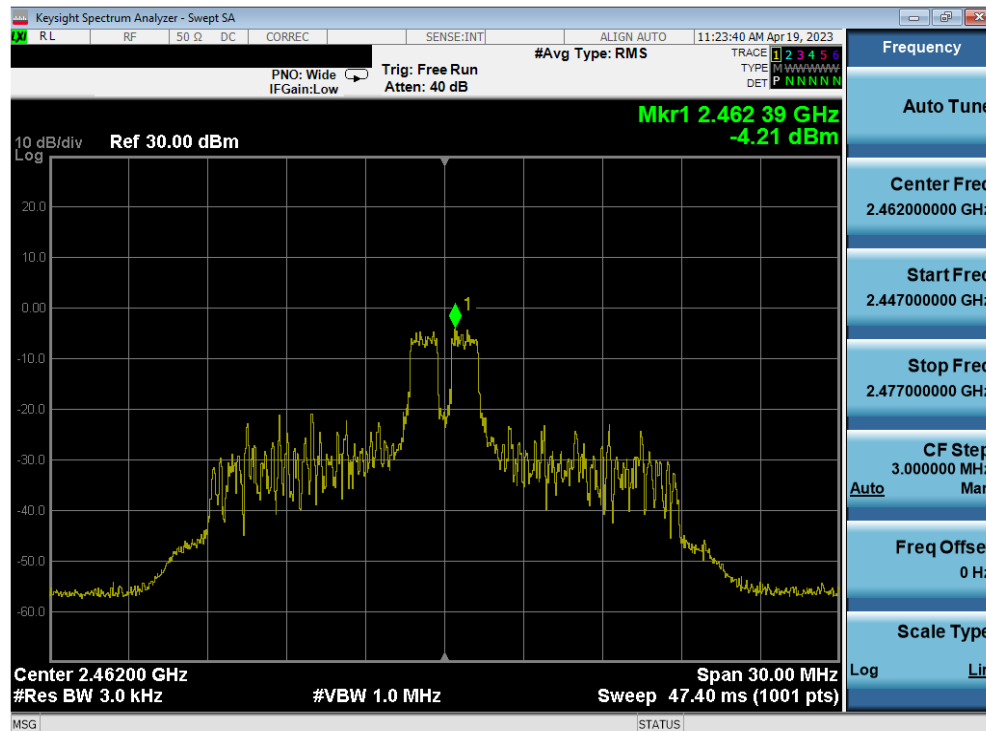
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 59 of 154

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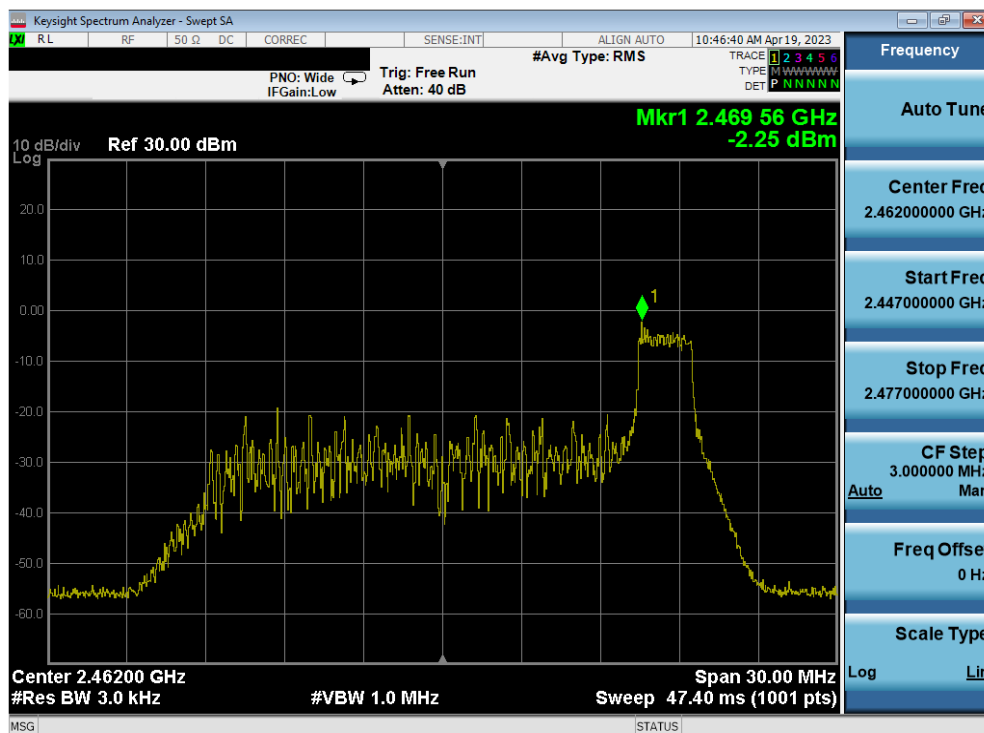


**Plot 7-63. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 4 – Ch. 11)**

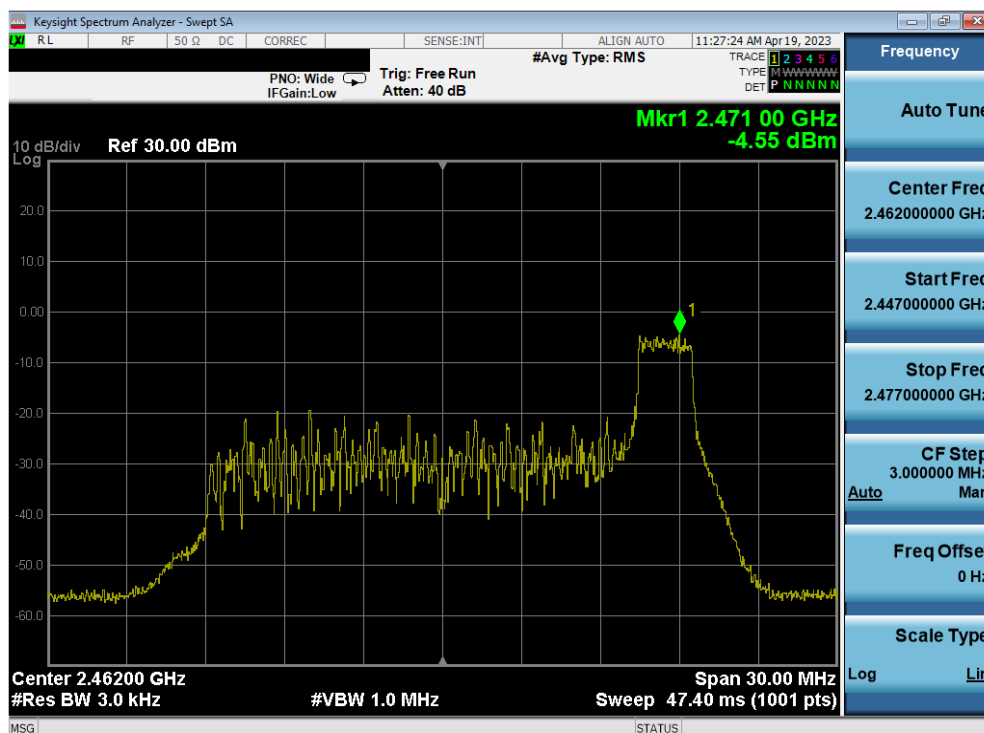


**Plot 7-64. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 4 – Ch. 11)**

<b>FCC ID:</b> BCGA2117 <b>IC:</b> 579C-A2117	 <b>MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1C2302130007-04.BCG	<b>Test Dates:</b> 2/20/2023 - 4/24/2023	<b>EUT Type:</b> Head Mounted Device	Page 60 of 154



Plot 7-65. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

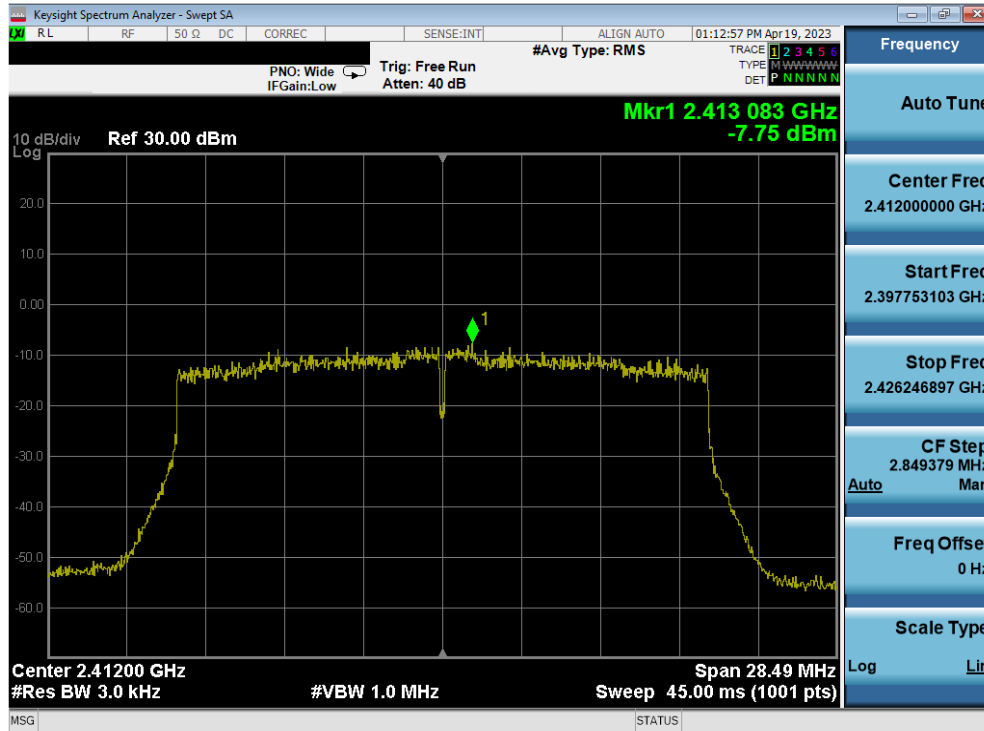


Plot 7-66. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

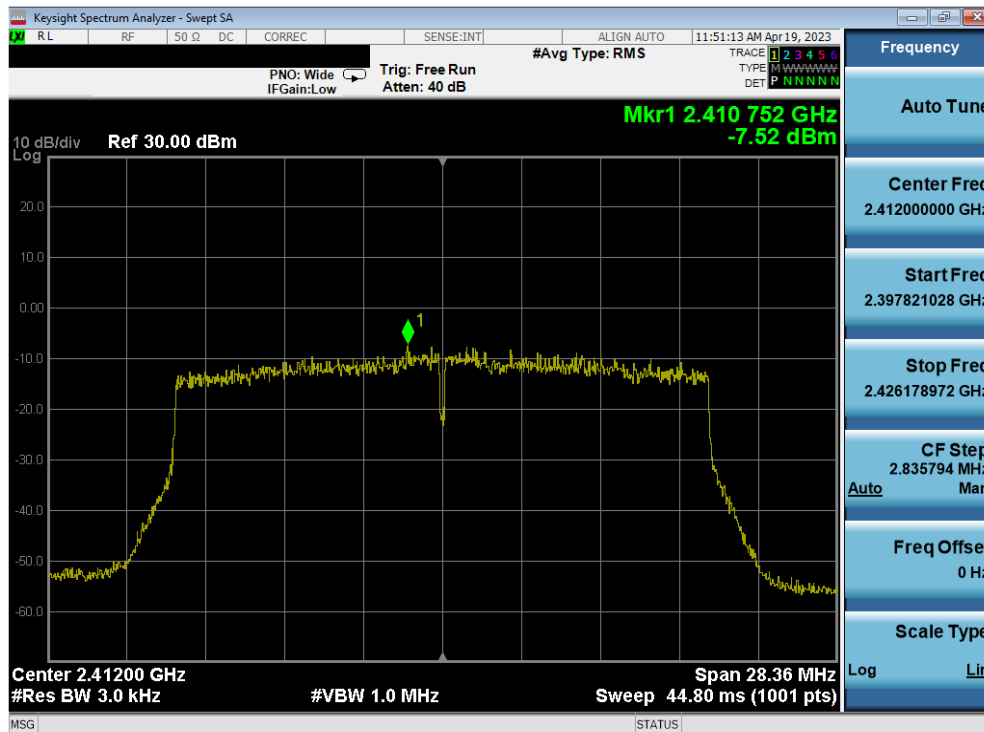
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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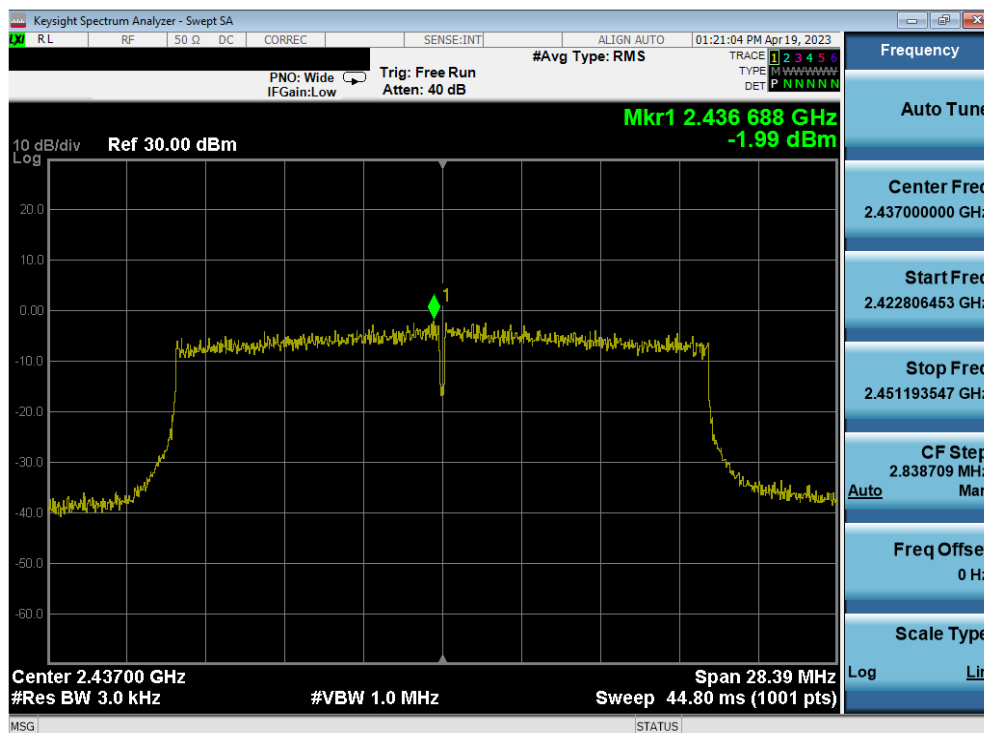


Plot 7-67. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU242 – Ch. 1)

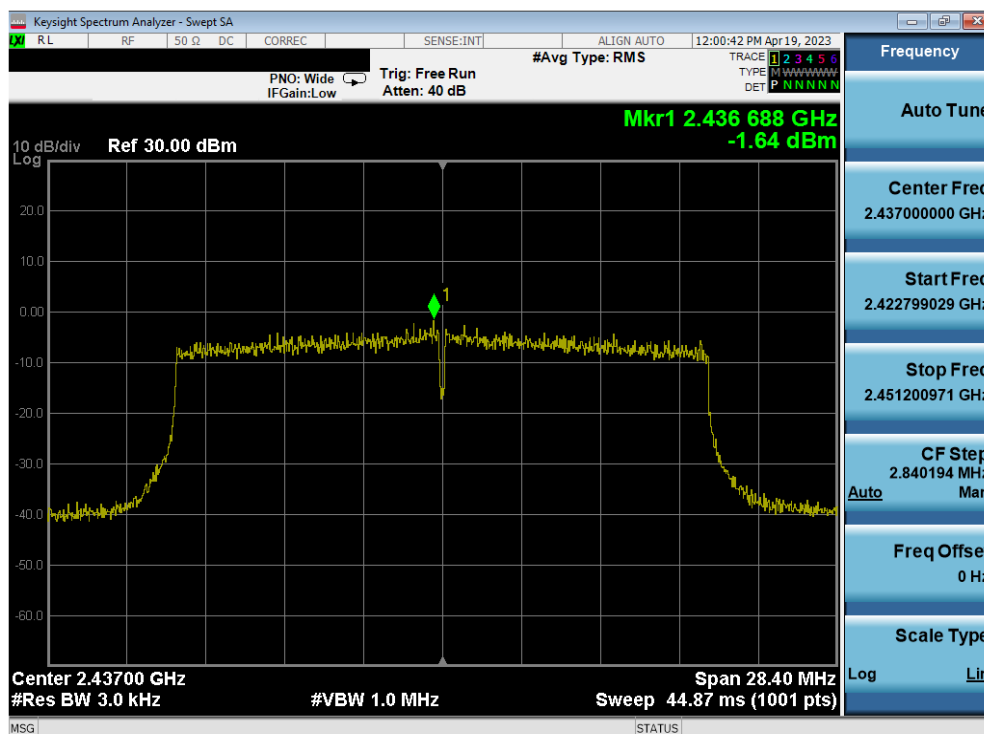


Plot 7-68. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU242 – Ch. 1)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-69. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU242 – Ch. 6)

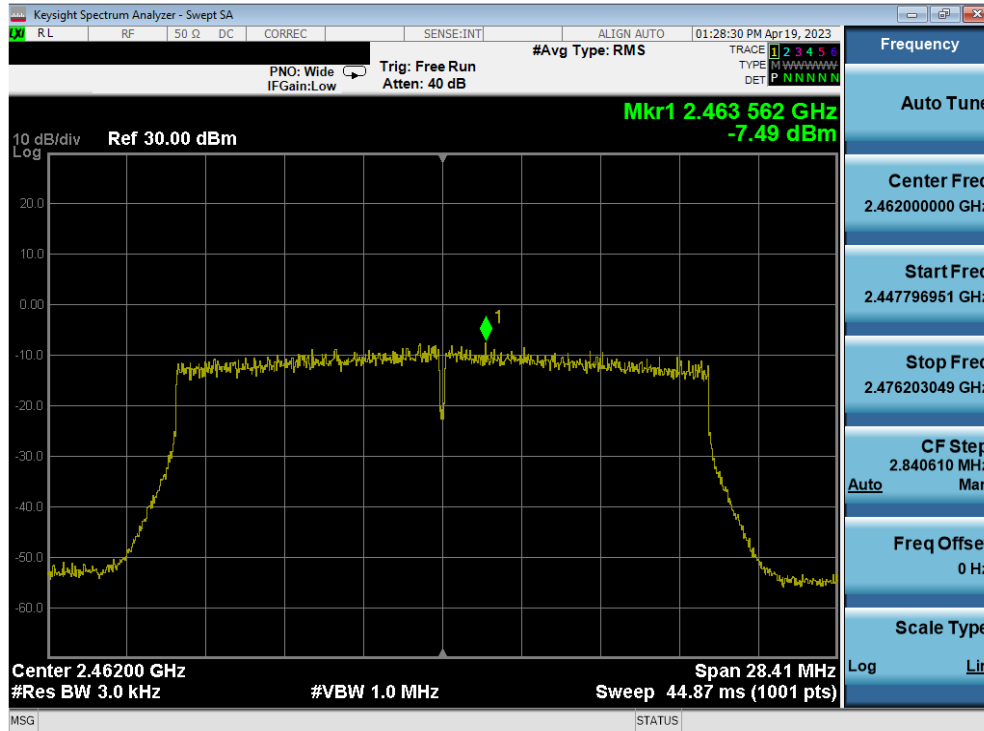


Plot 7-70. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU242 – Ch. 6)

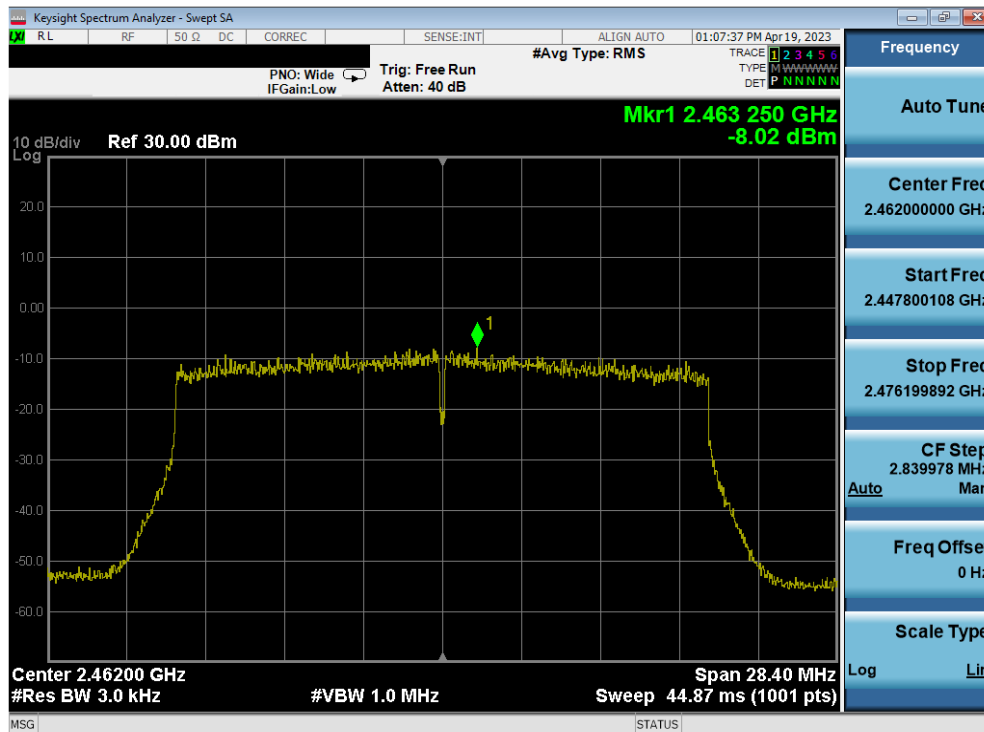
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-71. Power Spectral Density Plot CDD Ant 1 (802.11ax OFDMA – RU242 – Ch. 11)



Plot 7-72. Power Spectral Density Plot CDD Ant 2 (802.11ax OFDMA – RU242 – Ch. 11)

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**Note:**


Per ANSI C63.10-2013 Subclause 14.3.2.2 and KDB 662911 D01 v02r01 Section E)2), the power spectral density at Ant 1 and Ant 2 were first measured separately as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

**Sample CDD Calculation:**

At 2412MHz the average conducted power spectral density was measured to be -4.24 dBm for Ant 1 and -4.39 dBm for Ant 2.

$$\text{Ant 1} + \text{Ant 2} = \text{CDD}$$

$$(-4.24 \text{ dBm} + -4.39 \text{ dBm}) = (0.377 \text{ mW} + 0.364 \text{ mW}) = 0.741 \text{ mW} = -1.30 \text{ dBm}$$

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## 7.5 Conducted Authorized Band Edge

§15.247(d); RSS-247 [5.5]

### Test Overview and Limit

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates, tone configurations, and RU indices were investigated to determine the worst case configuration. For the following out of band conducted emissions plots at the band edge, the EUT was set to a data rate of MCS9 in 802.11ax-RU mode as this setting produced the worst-case emissions.

***The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100kHz bandwidth per the PSD procedure (Section 7.4).***

### Test Procedure Used

ANSI C63.10-2013 – Subclause 11.11.3  
KDB 558074 D01 v05r02 – Section 8.7.2

### Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 100kHz
4. VBW = 1MHz
5. Detector = Peak
6. Number of sweep points  $\geq 2 \times \text{Span/RBW}$
7. Trace mode = max hold
8. Sweep time = auto couple
9. The trace was allowed to stabilize

### Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



**Figure 7-4. Test Instrument & Measurement Setup**

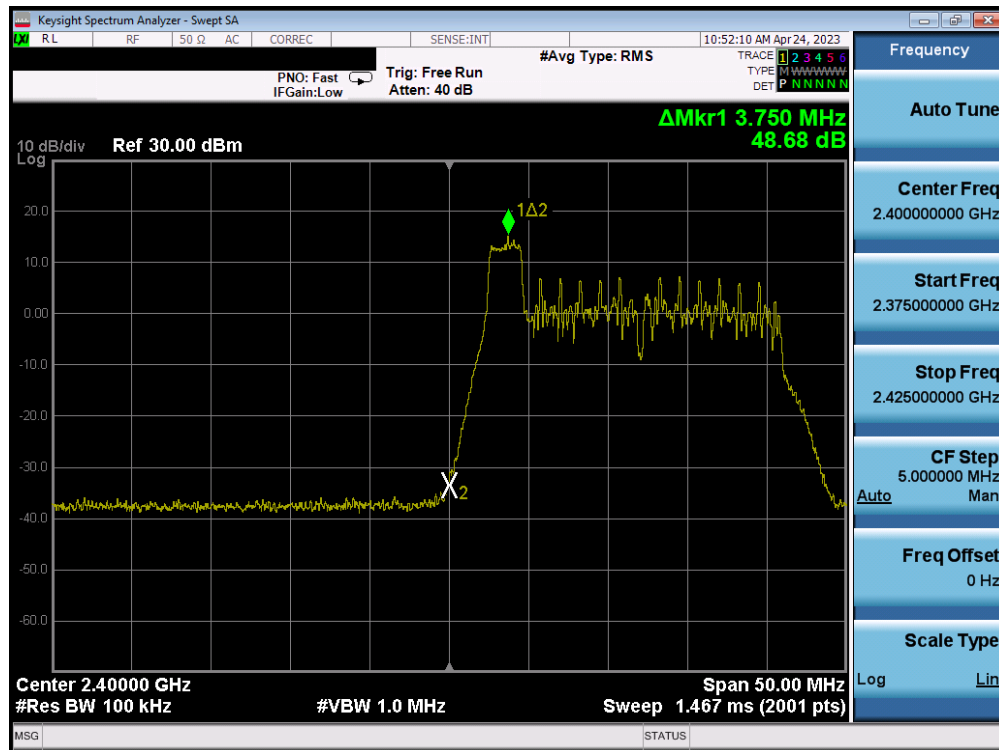
### Test Notes

1. All antenna configurations and data rates were investigated and only the worst case are reported.
2. All RU's were investigated and only worst case partially-loaded and fully-loaded RU's are reported.

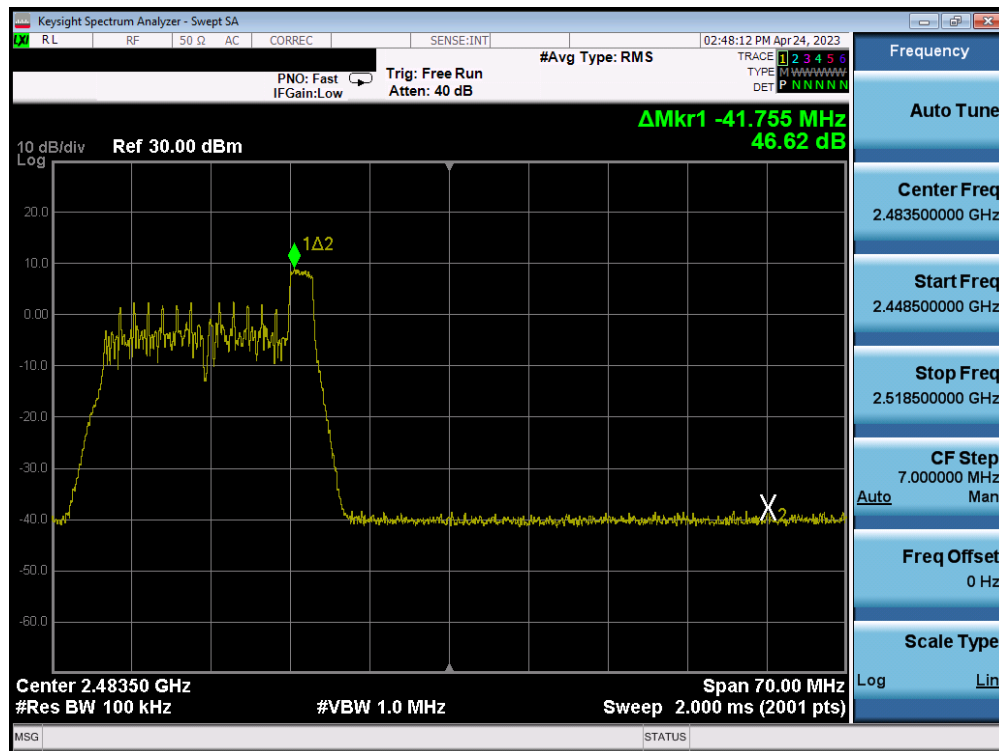
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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## Ant 1 Conducted Emissions at the Band Edge



Plot 7-73. Band Edge Ant 1 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

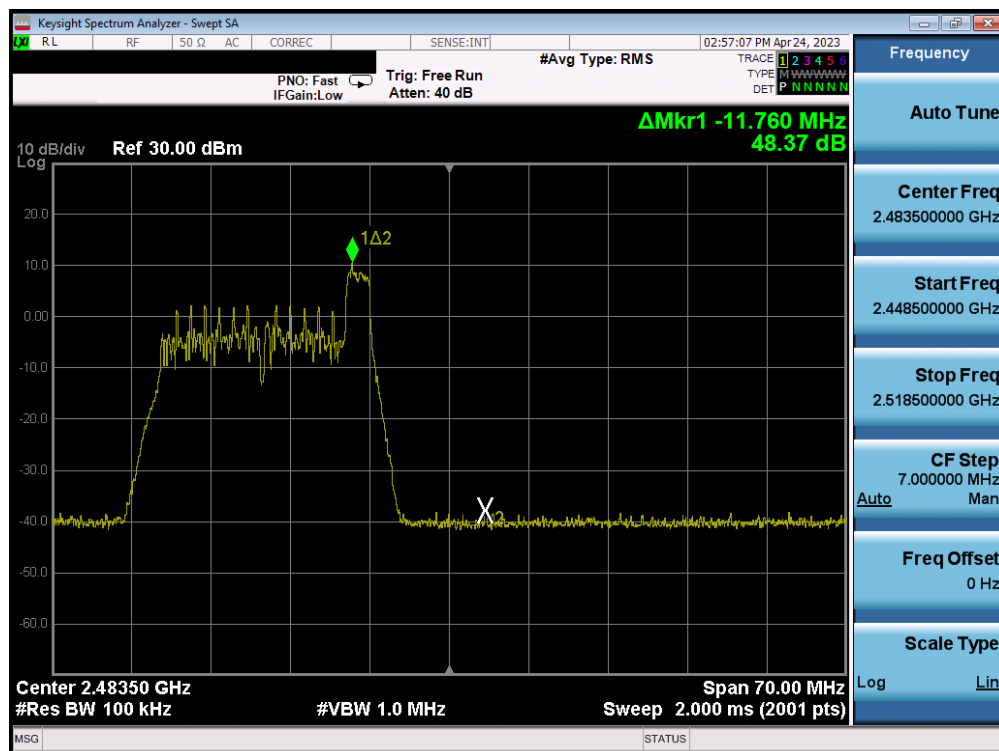


Plot 7-74. Band Edge Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

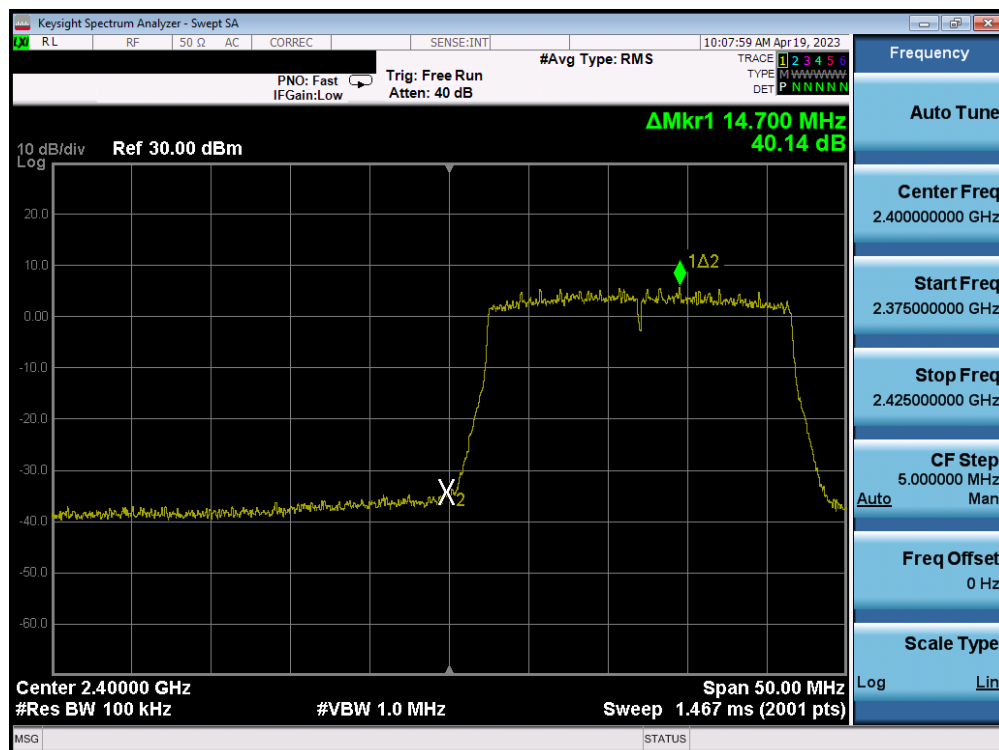
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 67 of 154

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Plot 7-75. Band Edge Ant 1 (802.11ax OFDMA – RU26 Index 8 – Ch. 12)

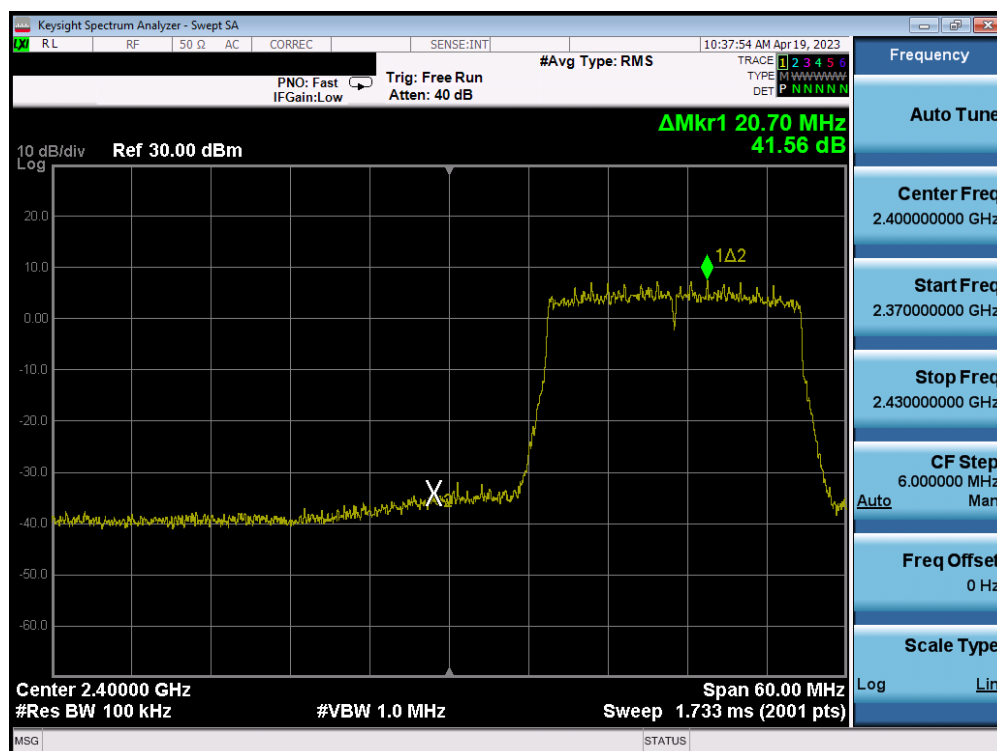


Plot 7-76. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 1)

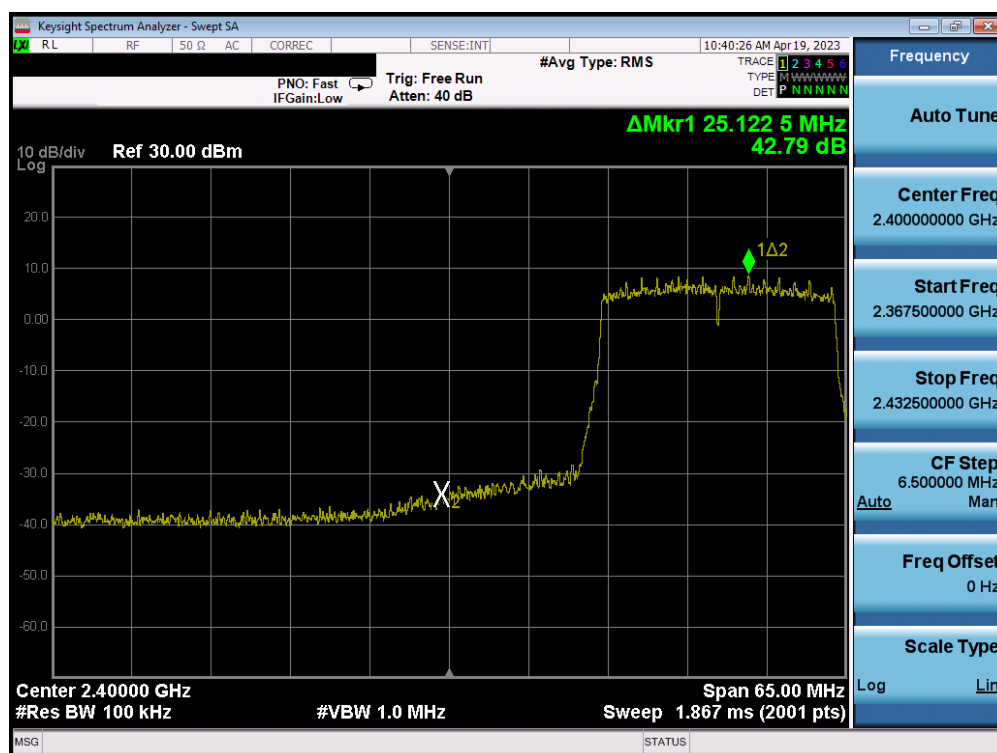
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
Test Report S/N: 1C2302130007-04.BCG	Test Dates: 2/20/2023 - 4/24/2023	EUT Type: Head Mounted Device	Page 68 of 154

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Plot 7-77. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 2)

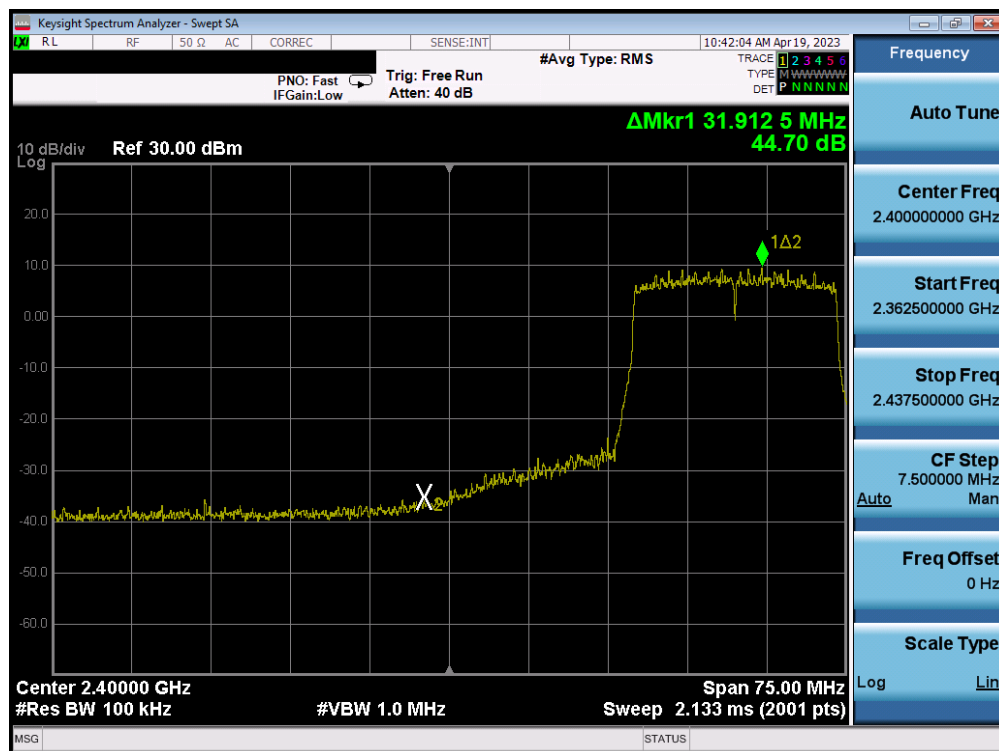


Plot 7-78. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 3)

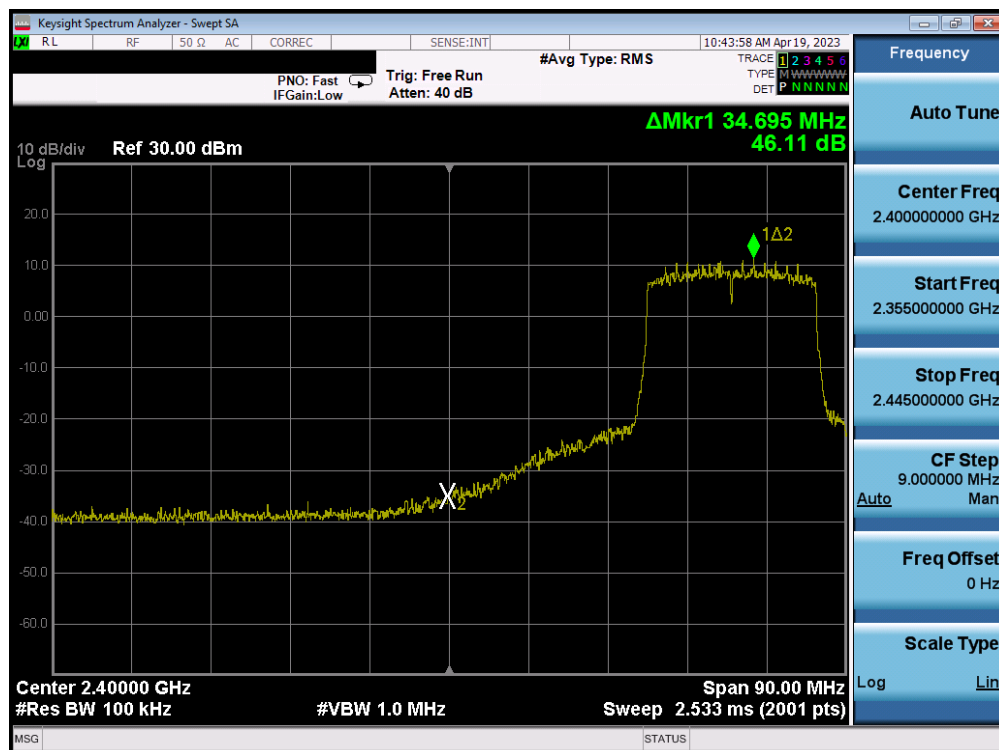
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-79. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 4)

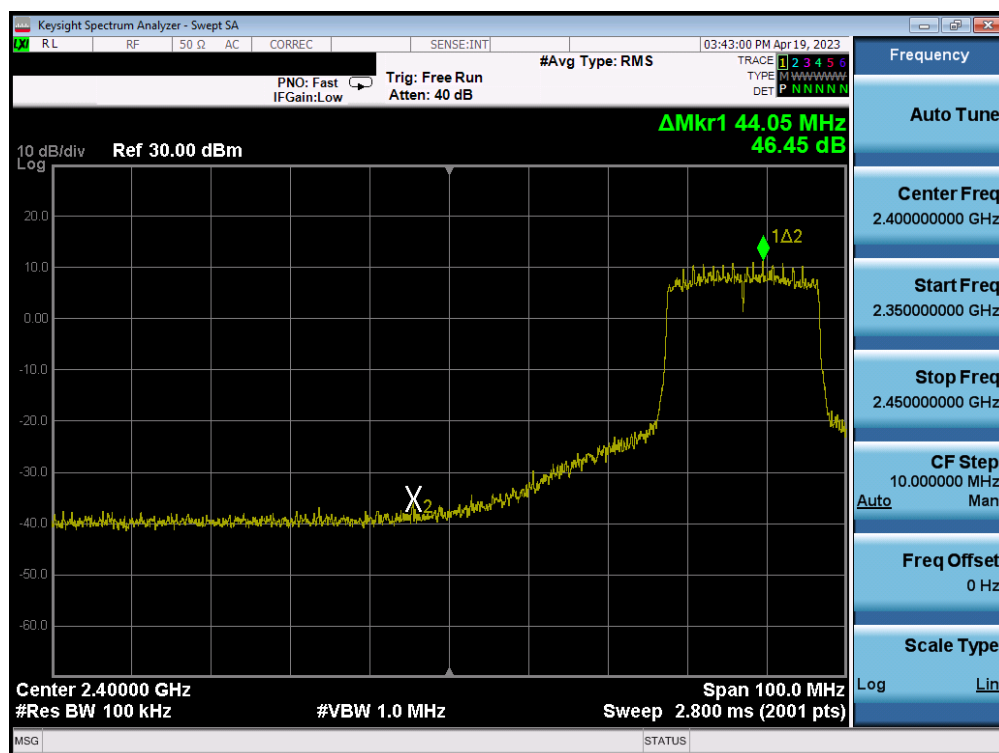


Plot 7-80. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 5)

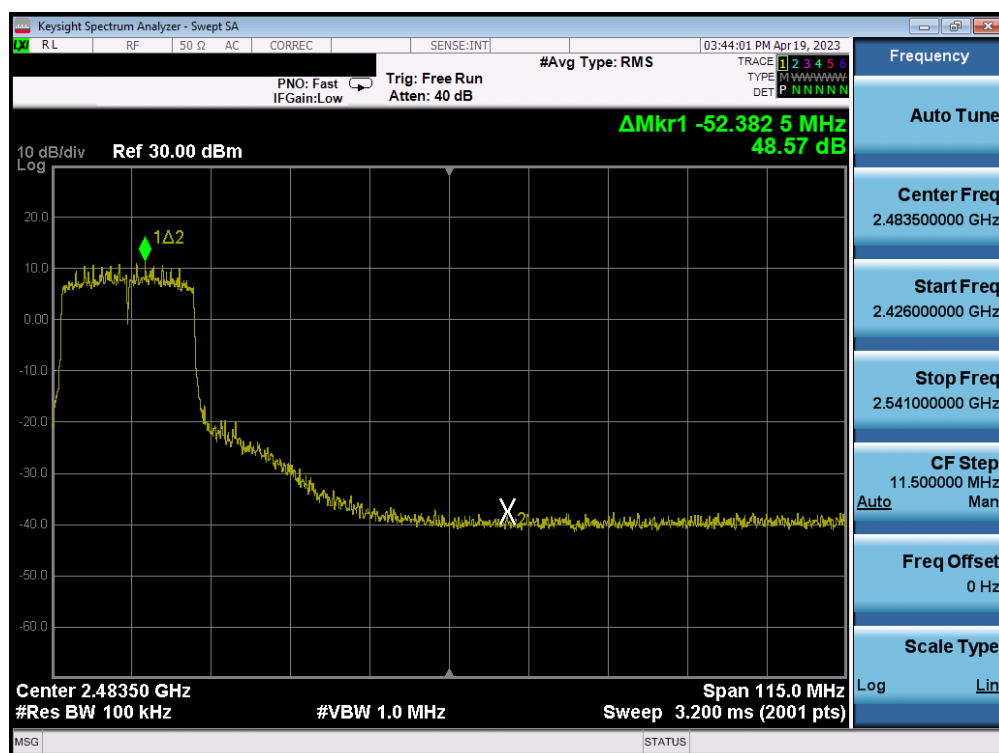
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-81. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 6(low))

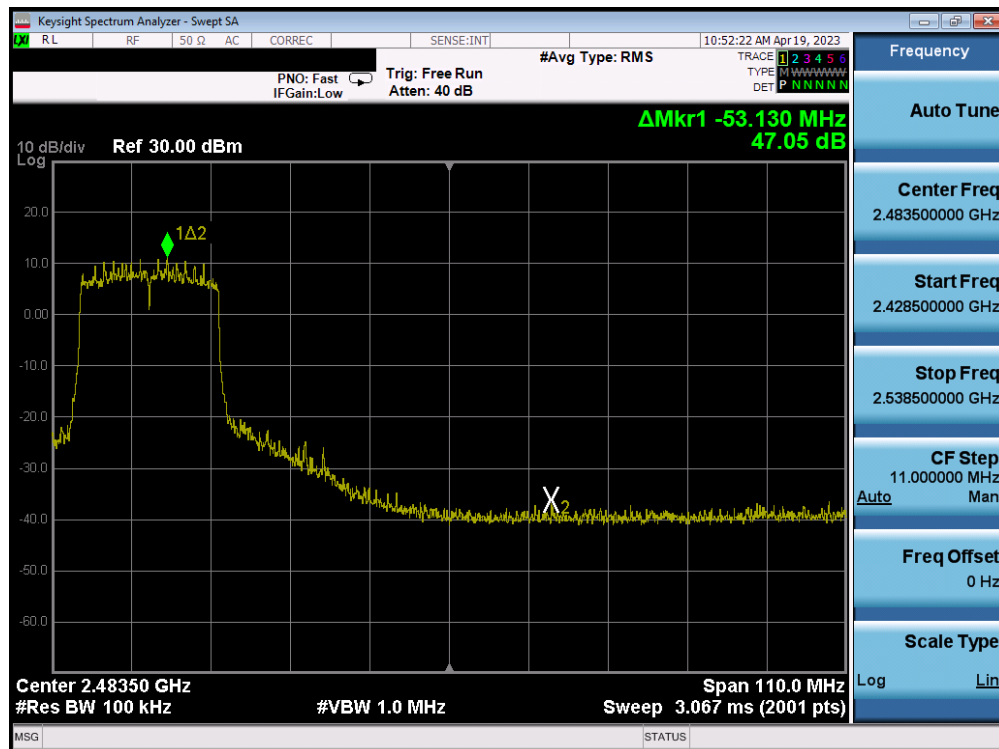


Plot 7-82. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 6(high))

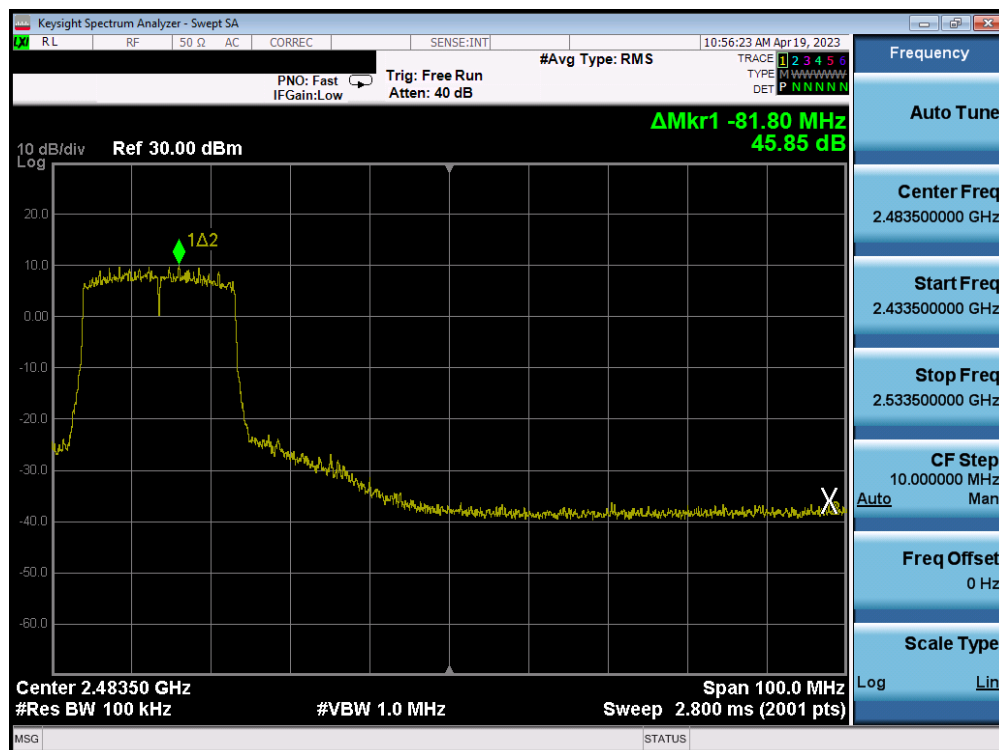
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-83. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 7)

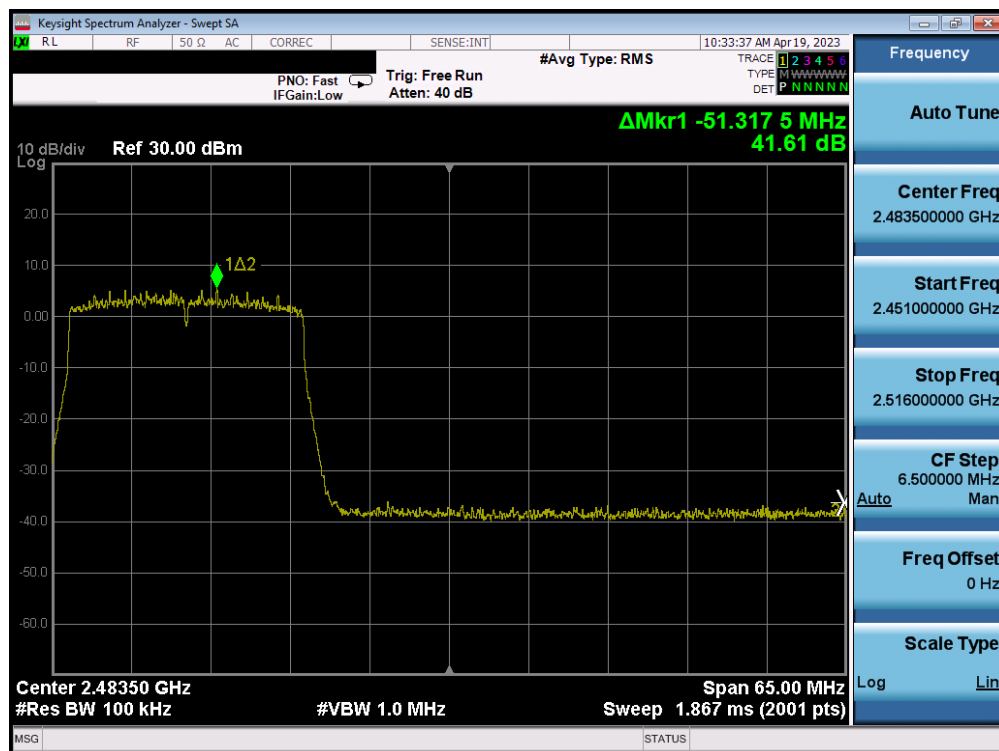


Plot 7-84. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 8)

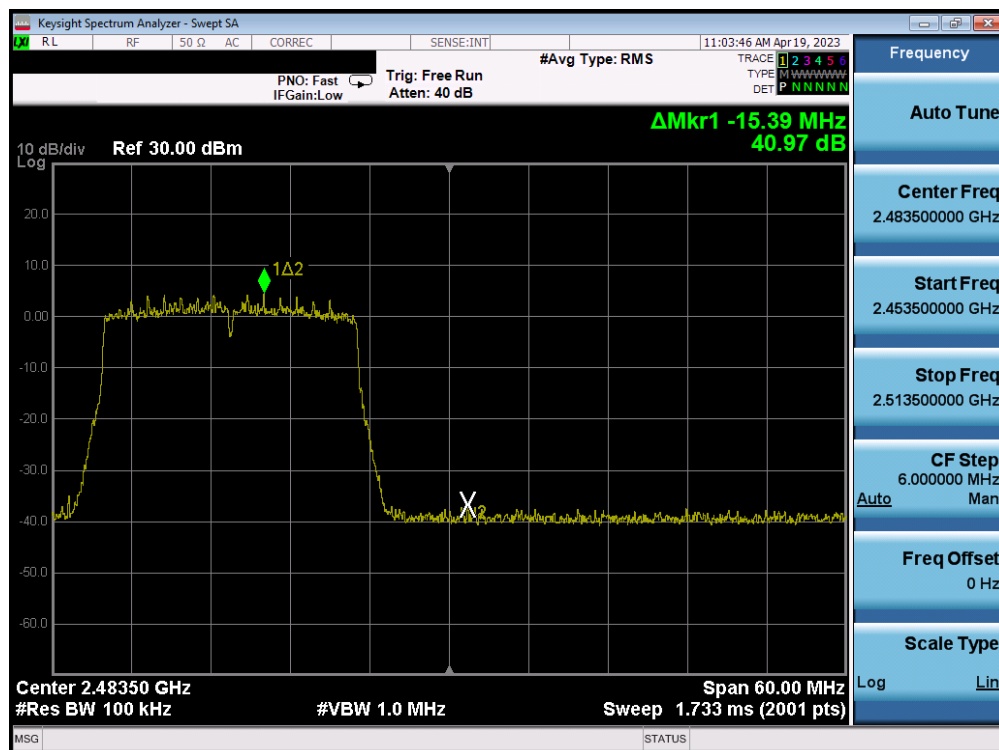
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-87. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 11)



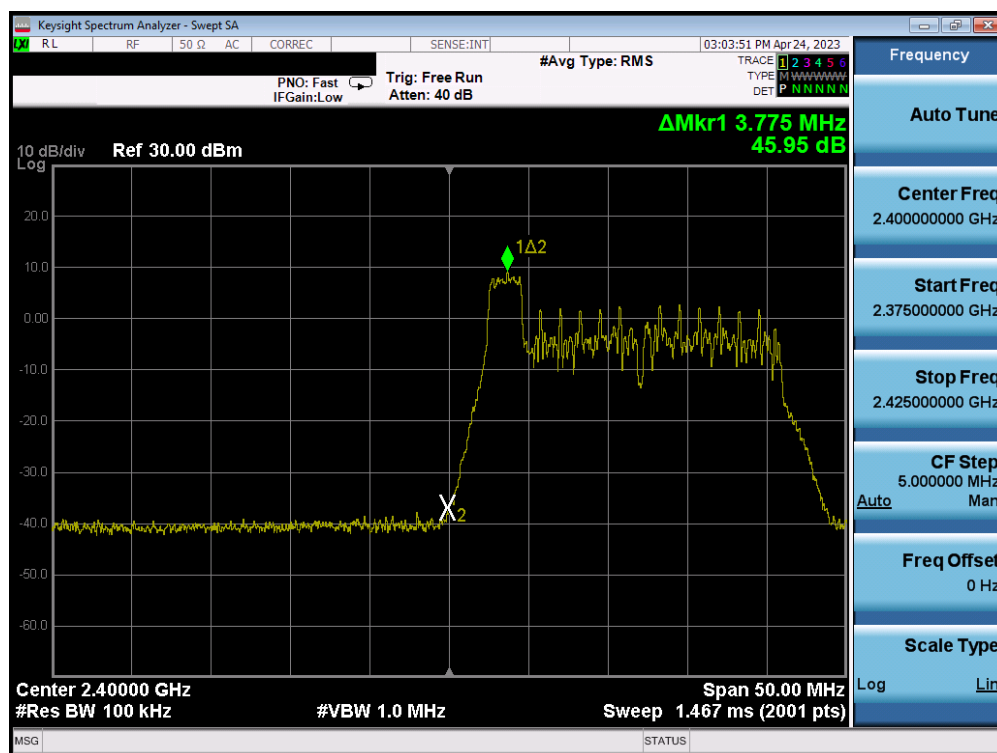
Plot 7-88. Band Edge Ant 1 (802.11ax OFDMA – RU242 – Ch. 12)

FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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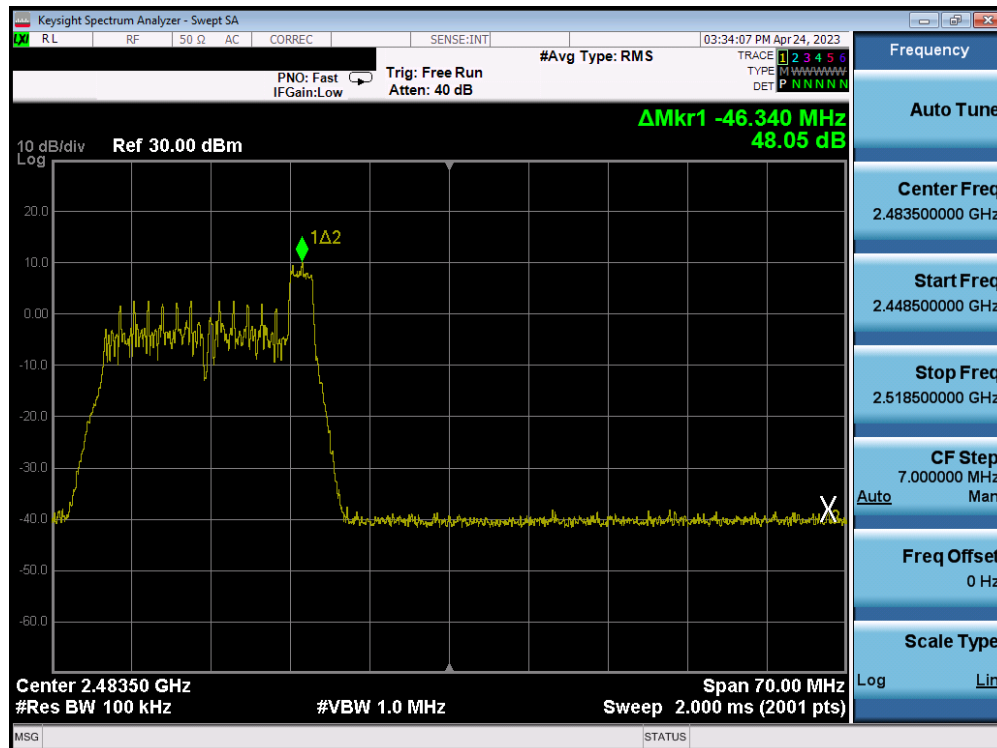
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## Ant 2 Conducted Emissions at the Band Edge



Plot 7-89. Band Edge Ant 2 (802.11ax OFDMA – RU26 Index 0 – Ch. 1)

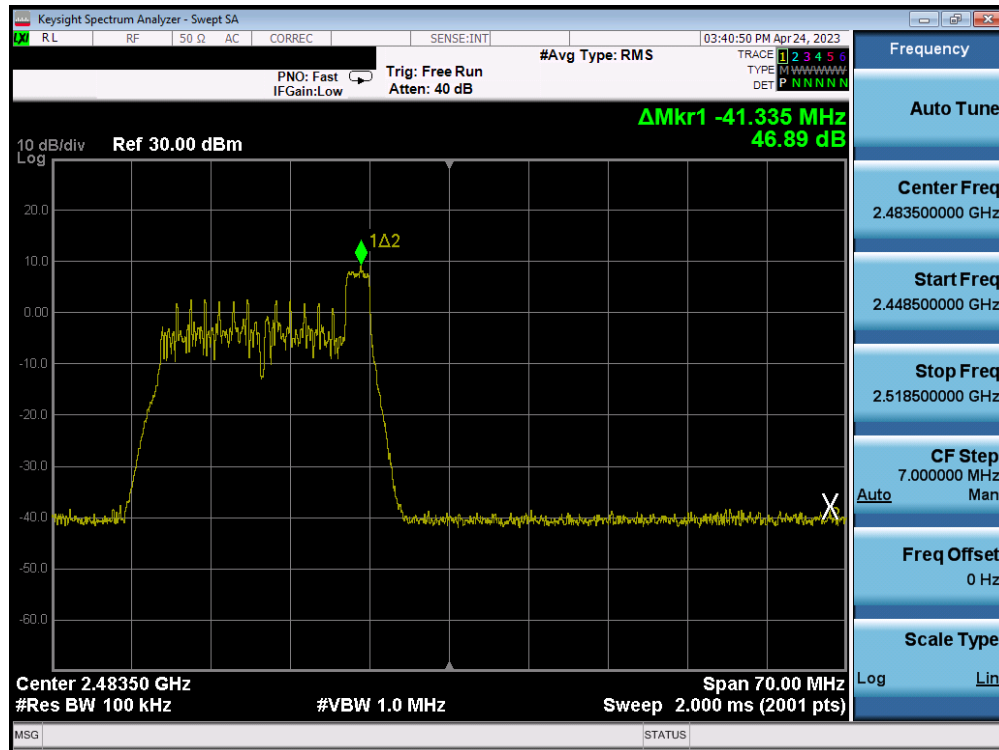


Plot 7-90. Band Edge Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 11)

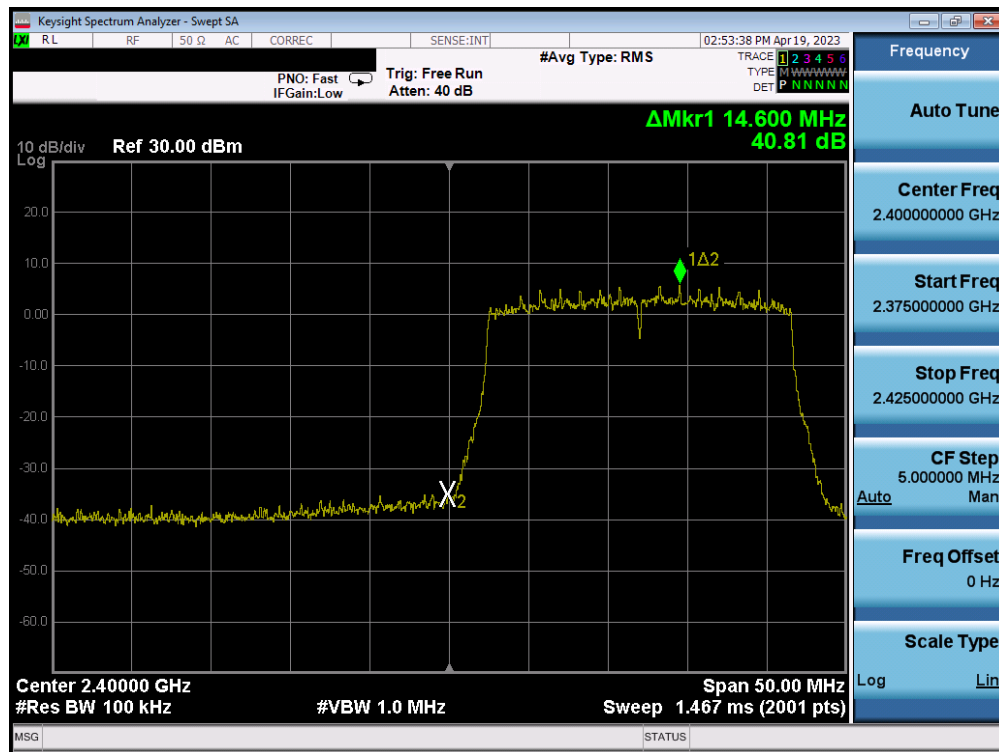
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-91. Band Edge Ant 2 (802.11ax OFDMA – RU26 Index 8 – Ch. 12)

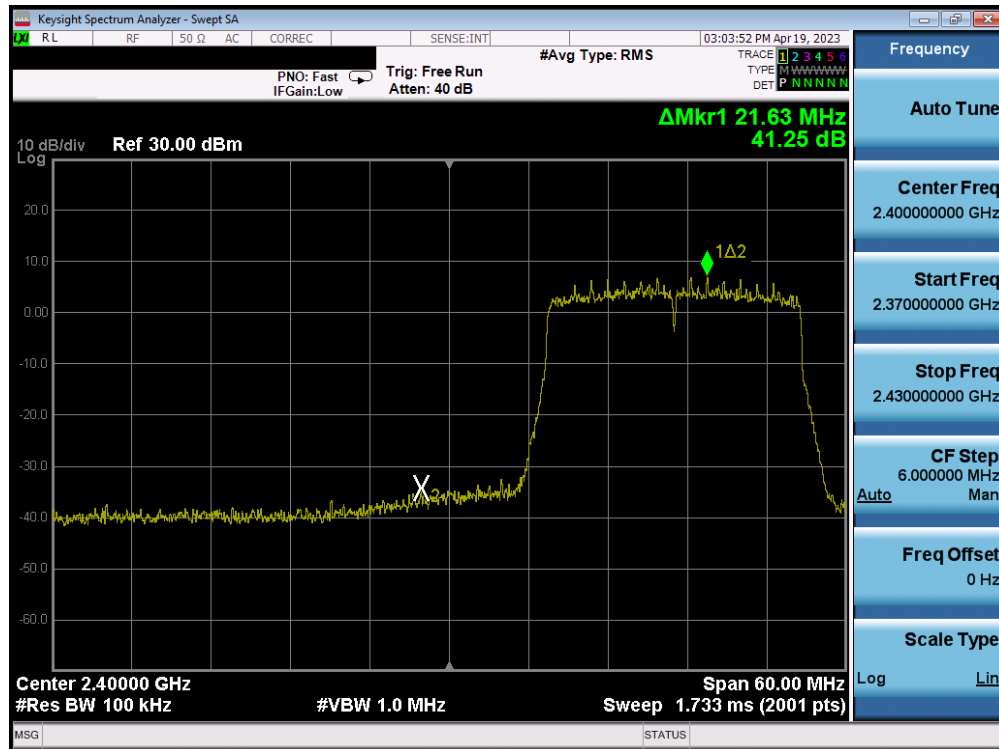


Plot 7-92. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 1)

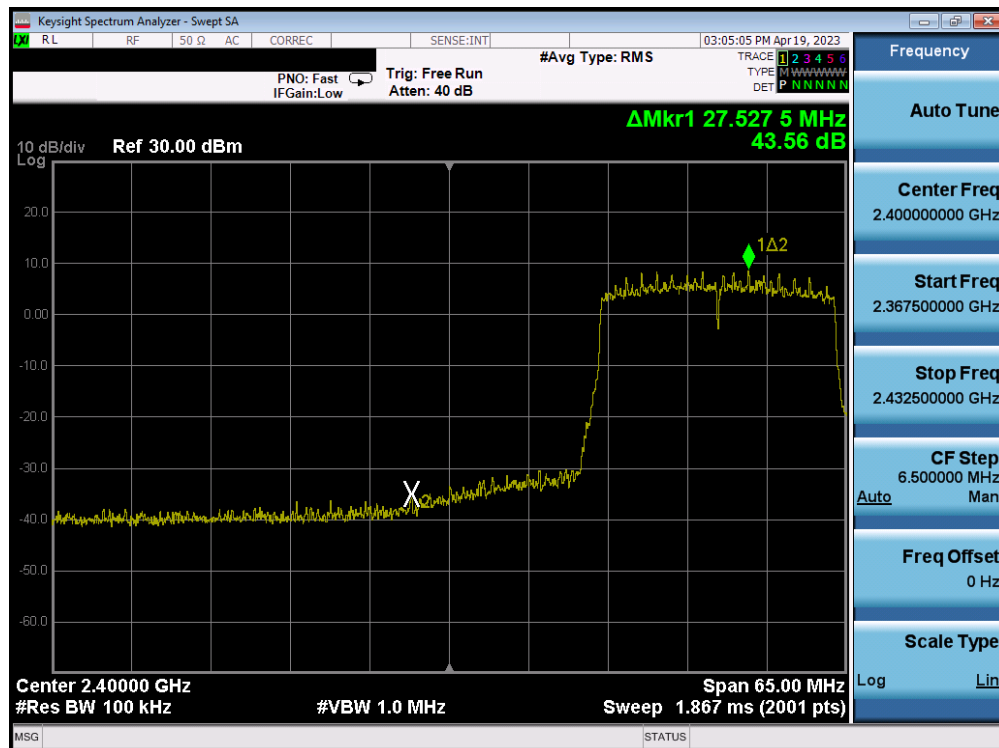
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-93. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 2)

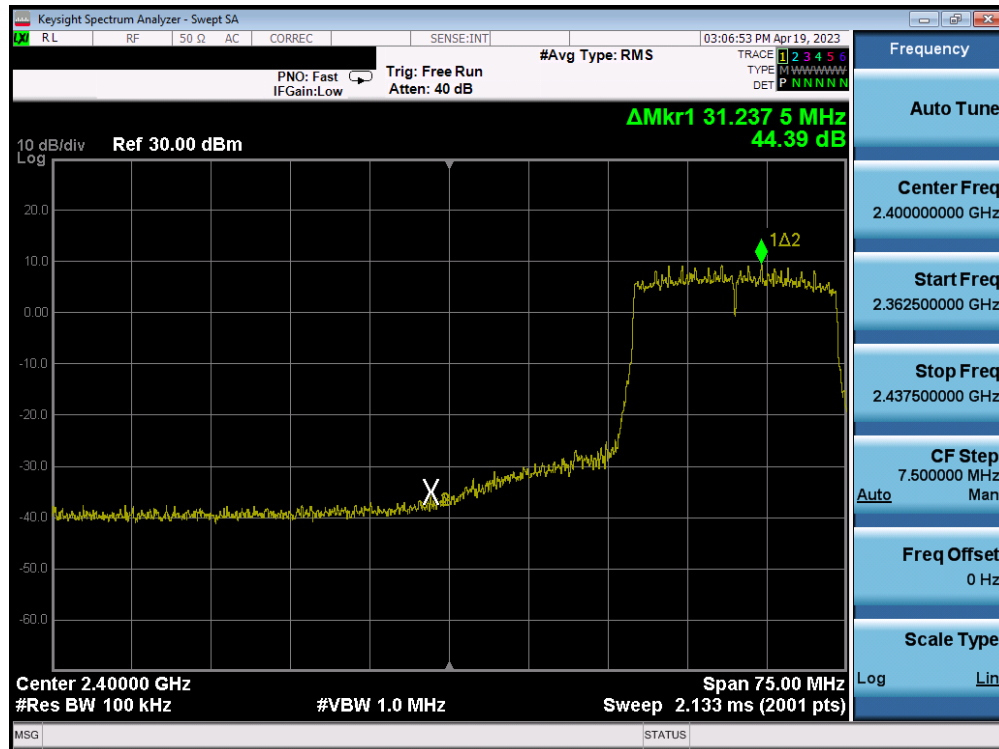


Plot 7-94. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 3)

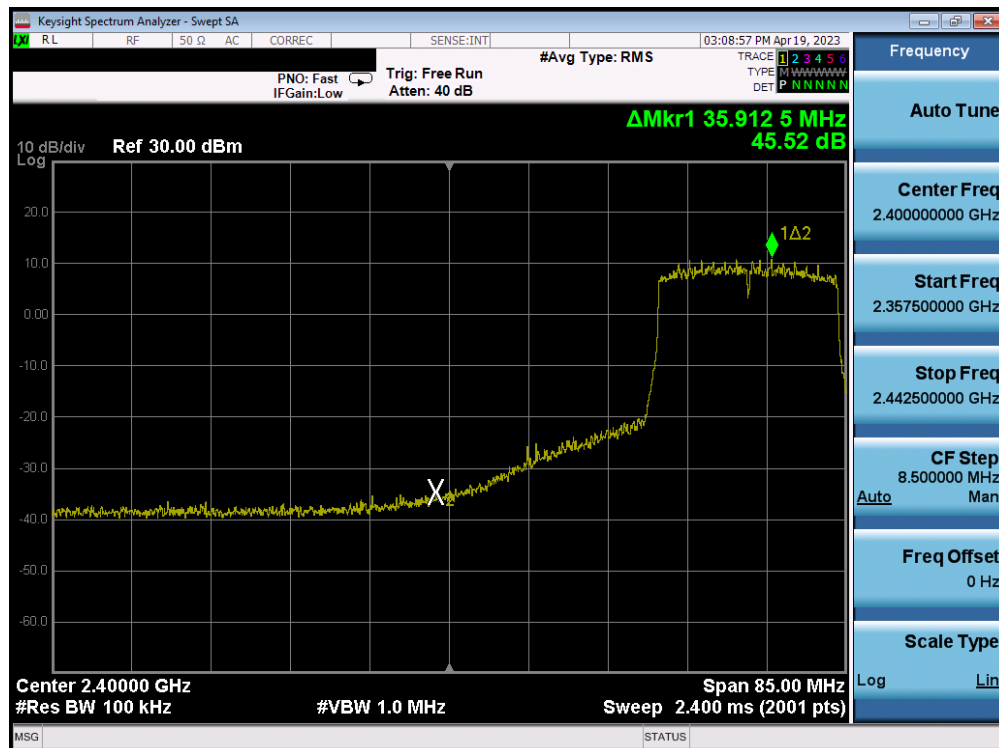
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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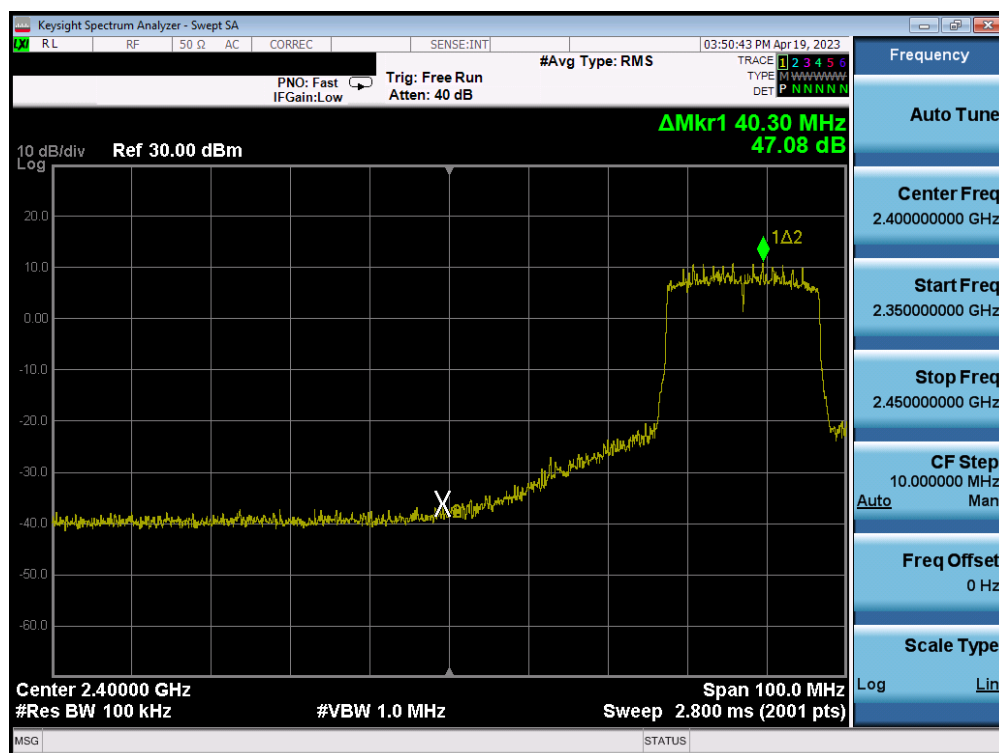


Plot 7-95. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 4)

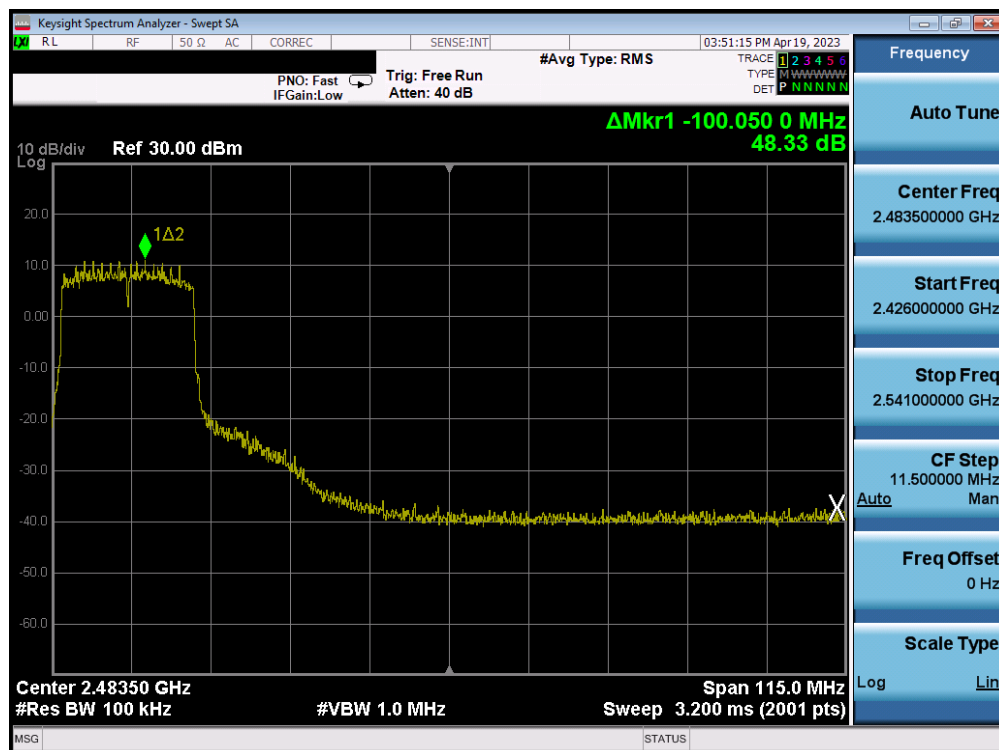


Plot 7-96. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 5)

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Plot 7-97. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 6(low))

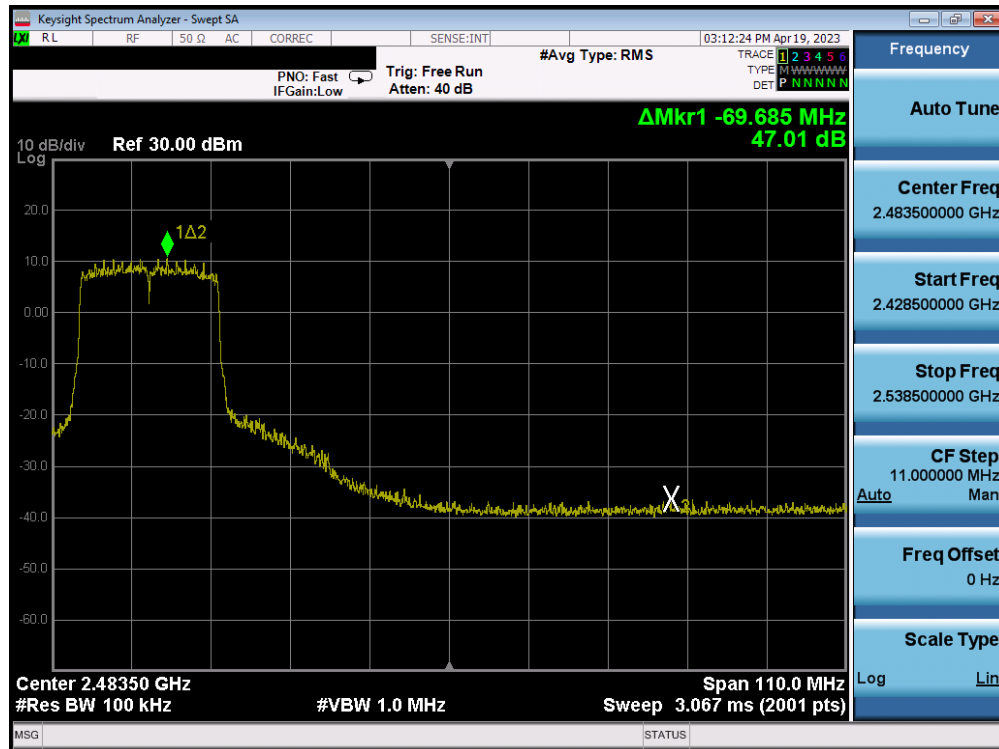


Plot 7-98. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 6(high))

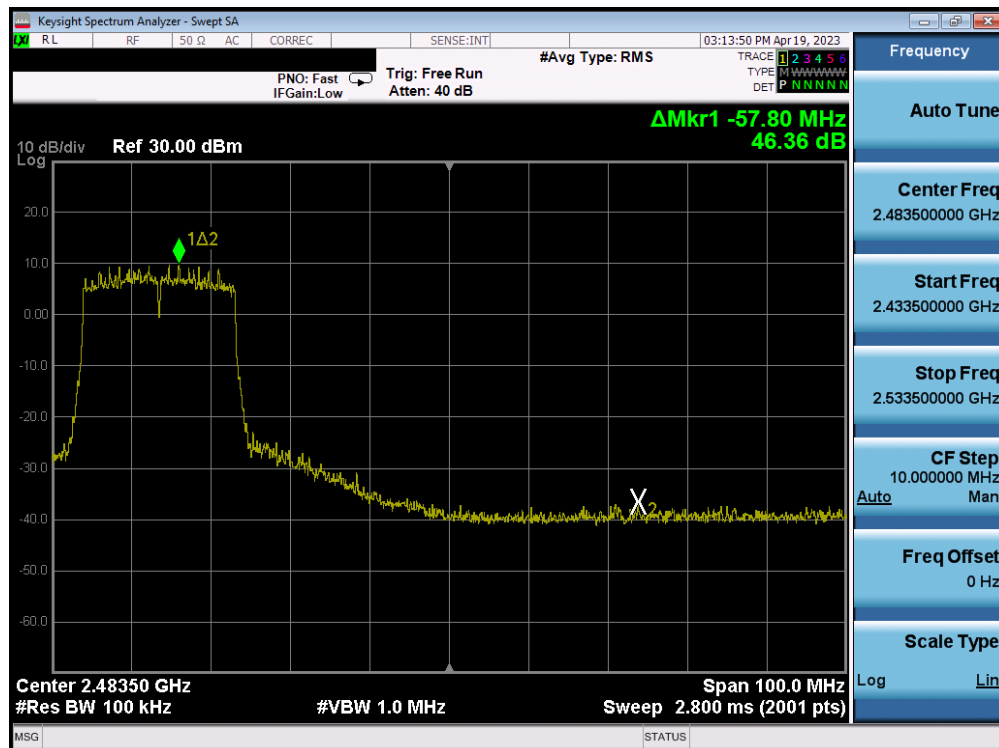
FCC ID: BCGA2117 IC: 579C-A2117		MEASUREMENT REPORT (CERTIFICATION)	Approved by: Technical Manager
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Plot 7-99. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 7)



Plot 7-100. Band Edge Ant 2 (802.11ax OFDMA – RU242 – Ch. 8)

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