Element Materials Technology
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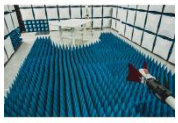

MEASUREMENT REPORT
FCC PART 15.247 / ISED RSS-247 WLAN 802.11b/g/n/ax

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

Date of Testing:
5/20/2024 - 7/12/2024
Test Report Issue Date:
9/9/2024
Test Site/Location:
Element Materials Technology Morgan Hill, CA, USA
Test Report Serial No.:
1C2405200018-14.BCG

FCC ID:	**BCGA2995**
IC:	**579C-A2995**
APPLICANT:	**Apple Inc.**

Application Type:	Certification
Model/HVIN:	A2995, A2996
EUT Type:	Tablet Device
Frequency Range:	2412 – 2472MHz
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 C63.10-2020, 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 C63.10-2020 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

Prepared by: WKR0000007111

Reviewed by: WKR0000005849

ACCREDITED
CERT #2041.02

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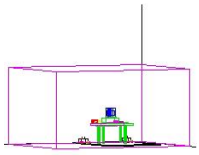
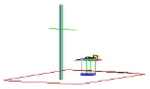


MEASUREMENT REPORT



Mode	Tx Frequency (MHz)	Antenna 3a				Antenna 1a				CDD Summed			
		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)
802.11g	2412 - 2472	133.352	21.25	490.908	26.91	130.918	21.17	463.447	26.66	239.883	23.80	877.001	29.43
802.11n	2412 - 2472	136.773	21.36	509.331	27.07	134.586	21.29	479.733	26.81	246.037	23.91	883.080	29.46
802.11ax (SU)	2412 - 2467	128.825	21.10	493.174	26.93	141.254	21.50	484.172	26.85	241.546	23.83	879.023	29.44

EUT Overview (Low Data Rate)

Mode	Tx Frequency (MHz)	Antenna 3a				Antenna 1a				CDD Summed			
		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)
802.11g	2412 - 2472	136.144	21.34	538.270	27.31	133.968	21.27	501.187	27.00	250.035	23.98	891.251	29.50
802.11n	2412 - 2472	137.088	21.37	557.186	27.46	134.586	21.29	514.044	27.11	242.103	23.84	866.962	29.38
802.11ax (SU)	2412 - 2467	135.207	21.31	552.077	27.42	140.281	21.47	517.607	27.14	244.906	23.89	891.251	29.50

EUT Overview (Mid Data Rate)

Mode	Tx Frequency (MHz)	Antenna 3a				Antenna 1a				CDD Summed			
		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)
802.11b	2412 - 2472	140.929	21.49	262.422	24.19	140.281	21.47	259.418	24.14	N/A	N/A	N/A	N/A
802.11g	2412 - 2472	114.815	20.60	580.764	27.64	112.980	20.53	532.108	27.26	212.324	23.27	891.251	29.50
802.11n	2412 - 2472	117.490	20.70	576.766	27.61	115.345	20.62	528.445	27.23	216.272	23.35	874.984	29.42
802.11ax (SU)	2412 - 2467	109.396	20.39	574.116	27.59	102.802	20.12	527.230	27.22	215.278	23.33	872.971	29.41

EUT Overview (High Data Rate)

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 Test Location

These measurement tests were conducted at the Element Materials Technology 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.

- Element Materials Technology 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 ISED Standards (RSS).

- Element Materials Technology facility is a registered (22831) test laboratory with the site description on file with ISED.

- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreements (MRAs).

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Tablet Device FCC ID: BCGA2995, IC: 579C-A2995**. The test data contained in this report pertains only to the emissions due to the EUT's WLAN (DTS) transmitter.

Test Device Serial No.: NWP2NHGM9L, X7WK4R1F4K, W64VVD6Q0H, DVXJDXL1QN, H9HH4U0007A0000R51, H9HH4Z000940000CFX

2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII, 802.11a/ax WIFI 6E, 802.15.4, Bluetooth (1x, EDR, LE1M, LE2M, HDR4, HDR8), NB UNII (1x, HDR4, HDR8), WPT

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. 802.11b/g/n/ax 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 C63.10-2020. 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 Cyles [%]		
		Antenna 3a	Antenna 1a	CDD
2.4GHz	b	100.0	100.0	N/A
	g (Low Data Rate)	96.1	96.3	96.2
	g (Mid Data Rate)	93.4	93.1	93.3
	g (High Data Rate)	91.7	91.5	91.4
	n (Low Data Rate)	96.3	93.3	96.2
	n (Mid Data Rate)	93.9	93.3	93.6
	n (High Data Rate)	91.2	91.2	90.6
	11ax (SU) (Low Data Rate)	95.8	95.4	95.5
	11ax (SU) (Mid Data Rate)	93.1	92.6	92.5
	11ax (SU) (High Data Rate)	87.6	88.1	88.2

Table 2-2. Measured Duty Cycles

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

WiFi Configurations		SISO		SDM		CDD	
		Antenna 3a	Antenna 1a	Antenna 3a	Antenna 1a	Antenna 3a	Antenna 1a
2.4GHz	11b	✓	✓	×	×	×	×
	11g	✓	✓	✓	✓	✓	✓
	11n	✓	✓	✓	✓	✓	✓
	11ax	✓	✓	✓	✓	✓	✓

Table 2-3. Wi-Fi Configurations

✓= Support ; × = NOT Support
SISO = Single Input Single Output
SDM = Spatial Diversity Multiplexing – CDD function
CDD = Cyclic Delay Diversity - 2Tx Function

The device supports the following data rates (shown in Mbps):

802.11b	802.11g	MCS Index		Spatial Stream	802.11n		OFDM (802.11ax)		
20MHz					20MHz		20MHz		
		HT	VHT		0.8µs GI	0.4µs GI	0.8µs GI	1.6µs GI	3.2µs GI
1	6	0	0	1	6.5	7.2	8.6	8.1	7.3
2	9	1	1	1	13	14.4	17.2	16.3	14.6
5.5	12	2	2	1	19.5	21.7	25.8	24.4	21.9
11	18	3	3	1	26	28.9	34.4	32.5	29.3
-	24	4	4	1	39	43.3	51.6	48.8	43.9
-	36	5	5	1	52	57.8	68.8	65	58.5
-	48	6	6	1	58.5	65	77.4	73.1	65.8
-	54	7	7	1	65	72.2	86	81.3	73.1
-	-	-	8	1	78	86.7	103.2	97.5	87.8
-	-	-	9	1	-	-	114.7	108.3	97.5
-	6	8	0	2	13	14.4	17.2	16.3	14.6
-	9	9	1	2	26	28.9	34.4	32.5	29.3
-	12	10	2	2	39	43.3	51.6	48.8	43.9
-	18	11	3	2	52	57.8	68.8	65	58.5
-	24	12	4	2	78	86.7	103.2	97.5	87.8
-	36	13	5	2	104	115.6	137.6	130	117
-	48	14	6	2	117	130	154.9	146.3	131.6
-	54	15	7	2	130	144.4	172.1	162.5	146.3
-	-	-	8	2	156	173.3	206.5	195	175.5
-	-	-	9	2	-	-	229.4	216.7	195

Table 2-4. Supported Data Rates

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.

Antenna	Simultaneous Tx Config	Bluetooth 2.4GHz	Thread	NB UNII	WLAN	WIFI 5GHz	WIFI 6GHz	LTE / FR1 NR		
		BDR, EDR, HDR4/8, LE1/2M	802.15.4	BDR, HDR4/8	802.11 b/g/n/ax	802.11 a/n/ac/ax	802.11 a/ax	LB	MB/HB	Ultra High Band
1a	Config 1	✓	×	×	×	×	×	×	×	✓
1a	Config 2	×	×	×	✓	×	×	×	×	✓
1a	Config 3	×	✓	×	×	×	×	×	×	✓
1b	Config 4	×	×	✓	×	×	×	×	✓	×
1b	Config 5	×	×	×	×	✓	×	×	✓	×
1b	Config 6	×	×	×	×	×	✓	×	✓	×
3a	Config 7	×	×	×	✓	×	×	×	×	✓
3a	Config 8	✓	×	×	×	×	×	×	×	✓
3a	Config 9	×	✓	×	×	×	×	×	×	✓
3b	Config 10	×	×	✓	×	×	×	×	✓	×
3b	Config 11	×	×	×	×	✓	×	×	✓	×
3b	Config 12	×	×	×	×	×	✓	×	✓	×
4	Config 13	✓	×	×	×	×	×	✓	×	×
4	Config 14	✓	×	×	×	×	×	×	✓	×
4	Config 15	✓	×	×	×	×	×	×	×	✓
4	Config 16	×	✓	×	×	×	×	✓	×	×
4	Config 17	×	✓	×	×	×	×	×	✓	×
4	Config 18	×	✓	×	×	×	×	×	×	✓

Table 2-5. 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 14 and reported in RF Bluetooth UNII, RF Part 27b and RSS 199 test reports.

Specific 2.4GHz Wi-Fi antenna that can only transmit simultaneously with 2.4GHz Bluetooth antenna is listed in the SAR test report. For BT (2.4GHz) in both connected and disconnected modes, and Wi-Fi (2.4GHz) - Wi-Fi max power will not exceed minimum of (13.5dBm, SAR max cap, Reg max cap) power. Bluetooth can simultaneously transmit with IEEE 802.11a/n/ac/ax 5/6 GHz on separate antenna.

2.3 Antenna Description

Following antenna gains provided by manufacturer were used for the testing.

Frequency [GHz]	Antenna Gain (dBi)	
	Antenna 3a	Antenna 1a
2.4	-0.3	0.9

Table 2-6. Highest Antenna Gain

2.4 Test Support Equipment

1	Apple MacBook Pro	Model:	A2141	S/N:	C02H604EQ05D
	w/AC/DC Adapter	Model:	A2166	S/N:	C4H042705ZNPM0WA6
2	Apple USB-C Cable	Model:	Spartan	S/N:	GXK1336018XKTR024
3	USB-C Cable	Model:	A246C	S/N:	DWH80115BK826GV19
	w/ AC Adapter	Model:	A2305	S/N:	C4H95160004PF4F4V
4	Apple Pencil	Model:	A2538	S/N:	KJ26TCFXJW
5	DC Power Supply	Model:	KPS3010D	S/N:	N/A

Table 2-7. Test Support Equipment List

2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2020 and KDB 558074 D01 v05r02. ANSI C63.10-2020 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing. See Sections 3.2 for AC line conducted emissions test setups, Section 3.3 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 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 were reported in this test report.

For AC line conducted and radiated test below 1GHz, following configuration were investigated and the worst case has been reported.

- EUT powered by AC/DC adaptor via USB-C cable with wire charger
- EUT powered by host PC via USB-C cable with wire charger

802.11n CDD mode test data provided in this report covers 802.11n SDM.
802.11ax-SU HE20 2TX CDD mode test data provided in this report covers 802.11ax-SU HE20 2TX SDM.

The data rates have been classified into three different groups; low data rate, middle data rate, and high data rate. All three groups of data rate have been investigated and only the worst case data rate per group is reported. The worst case data rate for each group per mode are as follows:

- 802.11b
  - 11Mbps
- 802.11g
  - Low Data Rate: 12Mbps
  - Mid Data Rate 24Mbps
  - High Data Rate: 54Mbps
- 802.11n
  - Low Data Rate: MCS2/MCS10 (SISO/CDD)
  - Mid Data Rate: MCS4/MCS12 (SISO/CDD)
  - High Data Rate: MCS7/MCS15 (SISO/CDD)
- 802.11ax(SU)
  - Low Data Rate: MCS2
  - Mid Data Rate: MCS4
  - High Data Rate: MCS9

For 802.11ax-RU test results, see separate WLAN (OFDMA) report, 1C2405200018-15.BCG

2.6 Software and Firmware

The test was conducted with firmware version 22A312 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.

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 C63.10-2020) 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.

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

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.

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_{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 (±dB)
Conducted Bench Top Measurements	2.07
Line Conducted Disturbance	1.91
Radiated Disturbance (<30MHz)	4.12
Radiated Disturbance (30MHz - 1GHz)	4.85
Radiated Disturbance (1 - 18GHz)	5.08
Radiated Disturbance (>18GHz)	5.22

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 Number
Agilent Technologies	N9030A	3Hz-26.5GHz PXA Signal Analyzer	10/18/2023	Annual	10/18/2024	MY55330128
Anritsu	ML2495A	Power Meter	7/8/2024	Annual	7/8/2025	1039008
Anritsu	MA2411B	Pulse Power Sensor	7/1/2024	Annual	7/1/2025	1911105
Anritsu	MA2411B	Pulse Power Sensor	11/8/2023	Annual	11/8/2024	1027293
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	3/14/2024	Annual	3/14/2025	T058701-01
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	4/9/2024	Annual	4/9/2025	00218555
Fairview Microwave/MCL	FMCA1975-36/BW-K10-2W44+	30MHz-40GHz Conducted Cable/Attenuator *	6/10/2024	Annual	6/10/2025	-
Keysight Technology	N9040B	UXA Signal Analyzer	5/28/2024	Annual	5/28/2025	MY57212015
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	8/15/2023	Annual	8/15/2024	101639
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	8/14/2024	Annual	8/15/2025	101648
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	5/29/2024	Annual	5/29/2025	101619
Rohde & Schwarz	ESW44	EMI Test Receiver	5/1/2024	Annual	5/1/2025	101867
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	7/3/2024	Annual	7/3/2025	102356
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	6/10/2024	Annual	6/10/2025	100057
Rohde & Schwarz	HFH2-Z2	Loop Antenna	6/21/2024	Annual	6/21/2025	100519
Rohde & Schwarz	ENV216	Two-Line V-Network	4/24/2024	Annual	4/24/2025	101364
Schwarzbeck	VULB 9162	Bilog Antenna (30MHz - 6GHz)	4/29/2024	Annual	4/29/2025	00304

Table 6-1. Test Equipment List

Note:

1. 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.

2. * denotes passive equipment that have been internally verified/calibrated.

7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.

FCC ID: BCGA2995

IC: 579C-A2995

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:

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. 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.
3. 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.
4. 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 "Conducted Automation Software," version 1.1.0.
5. 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 3.0.0.

7.2 6dB BW and 99% OBW Measurement

§15.247(a.2); §2.1049; 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 C63.10-2020 – Subclause 11.8.2 Option 2
KDB 558074 D01 v05r02 – Section 8.2
RSS-Gen [6.7]

Test Settings

1. The signal analyzer's 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 ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, step 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

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

The data rates have been classified into three different groups: low data rate, middle data rate, and high data rate. All three data rate groups have been investigated and only the worst case data rate per groups is reported.

7.2.1 Antenna 3a 6 dB BW and 99% OBW Measurements

Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Minimum 6dB Bandwidth [MHz]	Pass/Fail
2412	1	g	12	16.58	16.32	0.50	Pass
2437	6	g	12	16.47	16.44	0.50	Pass
2462	11	g	12	16.62	16.39	0.50	Pass
2412	1	n	19.5/21.7 (MCS2)	17.72	17.30	0.50	Pass
2437	6	n	19.5/21.7 (MCS2)	17.67	17.65	0.50	Pass
2462	11	n	19.5/21.7 (MCS2)	17.72	17.32	0.50	Pass
2412	1	ax (SU)	24/25.8 (MCS2)	18.91	18.77	0.50	Pass
2437	6	ax (SU)	24/25.8 (MCS2)	18.92	19.06	0.50	Pass
2462	11	ax (SU)	24/25.8 (MCS2)	18.94	18.91	0.50	Pass

Table 7-2. Conducted Bandwidth Measurements Antenna 3a (Low Data Rate)

Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Minimum 6dB Bandwidth [MHz]	Pass/Fail
2412	1	g	24	16.47	16.52	0.50	Pass
2437	6	g	24	16.46	16.52	0.50	Pass
2462	11	g	24	16.45	16.51	0.50	Pass
2412	1	n	39/43.3 (MCS4)	17.66	17.72	0.50	Pass
2437	6	n	39/43.3 (MCS4)	17.67	17.73	0.50	Pass
2462	11	n	39/43.3 (MCS4)	17.66	17.74	0.50	Pass
2412	1	ax (SU)	49/51.6 (MCS4)	18.88	19.05	0.50	Pass
2437	6	ax (SU)	49/51.6 (MCS4)	18.95	19.11	0.50	Pass
2462	11	ax (SU)	49/51.6 (MCS4)	18.91	19.06	0.50	Pass

Table 7-3. Conducted Bandwidth Measurements Antenna 3a (Mid Data Rate)

2412	1	b	11	12.76	8.50	0.50	Pass
2437	6	b	11	12.86	9.08	0.50	Pass
2462	11	b	11	12.84	9.06	0.50	Pass
2412	1	g	54	16.47	16.54	0.50	Pass
2437	6	g	54	16.51	16.57	0.50	Pass
2462	11	g	54	16.48	16.53	0.50	Pass
2412	1	n	65/72.2 (MCS7)	17.66	17.74	0.50	Pass
2437	6	n	65/72.2 (MCS7)	17.70	17.78	0.50	Pass
2462	11	n	65/72.2 (MCS7)	17.69	17.77	0.50	Pass
2412	1	ax (SU)	81/86 (MCS9)	18.95	19.09	0.50	Pass
2437	6	ax (SU)	81/86 (MCS9)	18.98	19.11	0.50	Pass
2462	11	ax (SU)	81/86 (MCS9)	18.95	19.11	0.50	Pass

Table 7-4. Conducted Bandwidth Measurements Antenna 3a (High Data Rate)

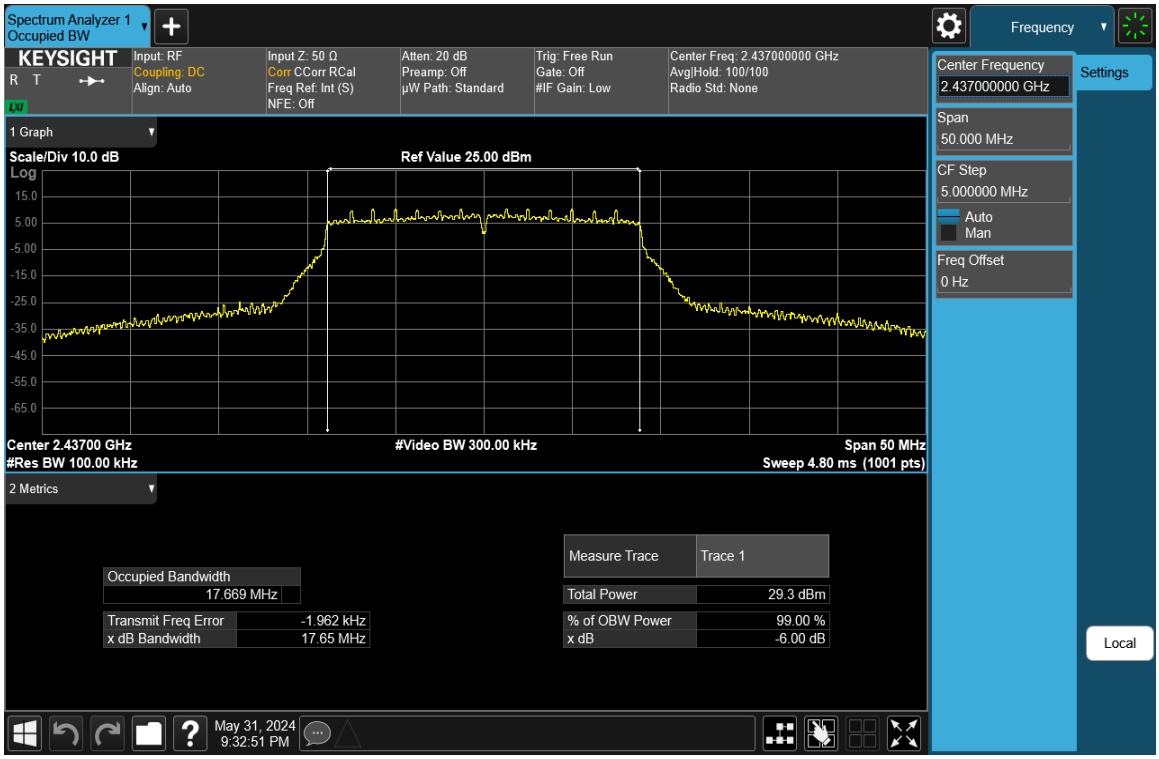
Low Rate

Plot 7-1. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 1) – 12Mbps

Plot 7-2. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 6) – 12Mbps

Plot 7-3. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 11) – 12Mbps

Plot 7-4. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 1) – MCS2



Plot 7-5. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 6) – MCS2

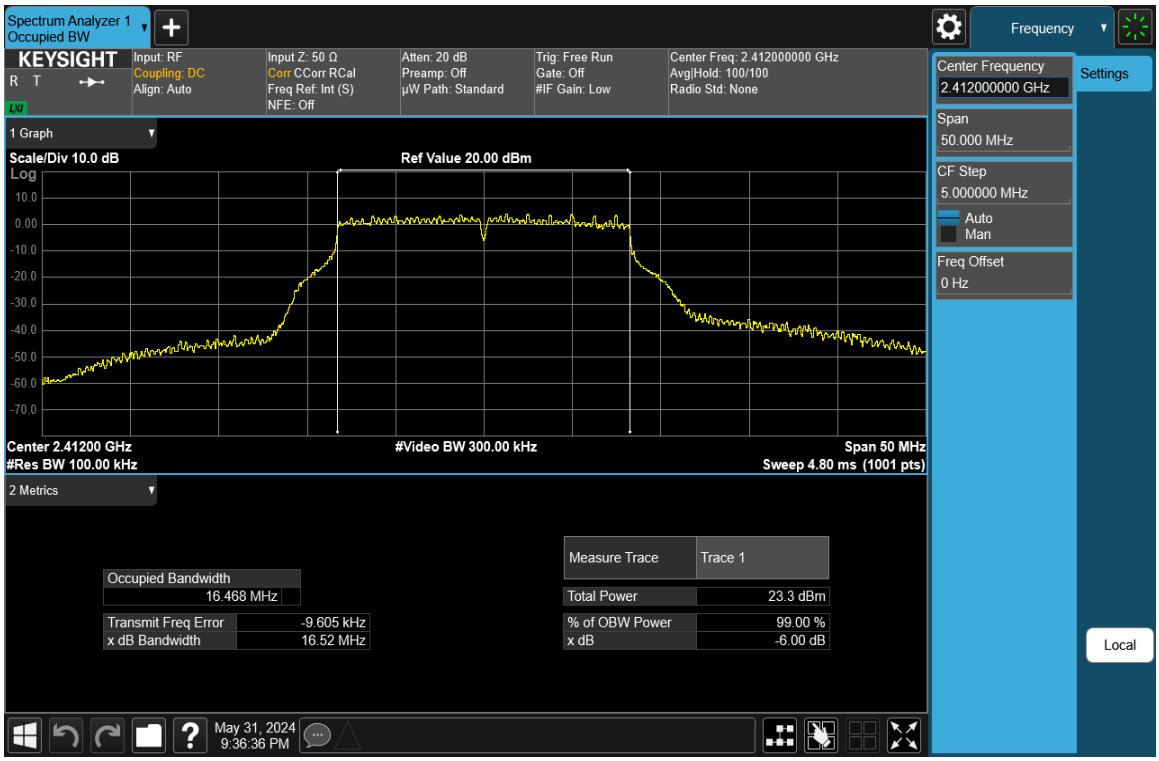
Plot 7-6. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 11) – MCS2

Plot 7-7. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS2

Plot 7-8. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS2

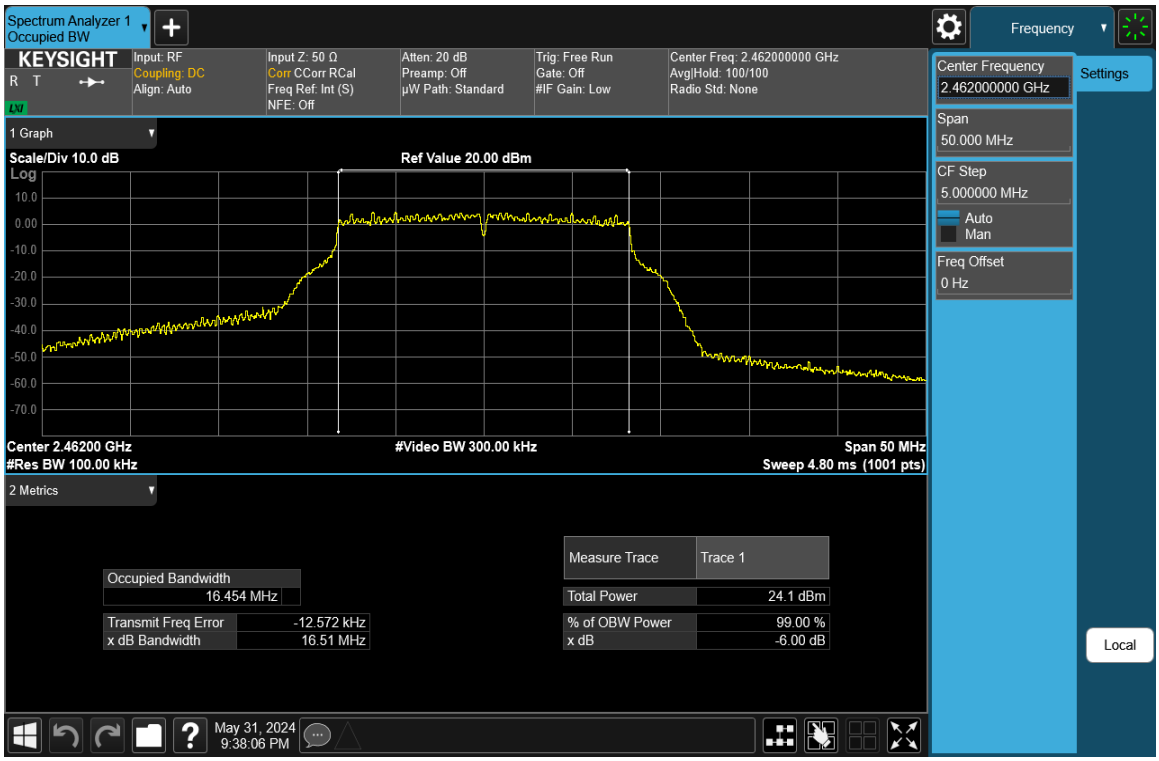
Plot 7-9. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS2

Mid Rate



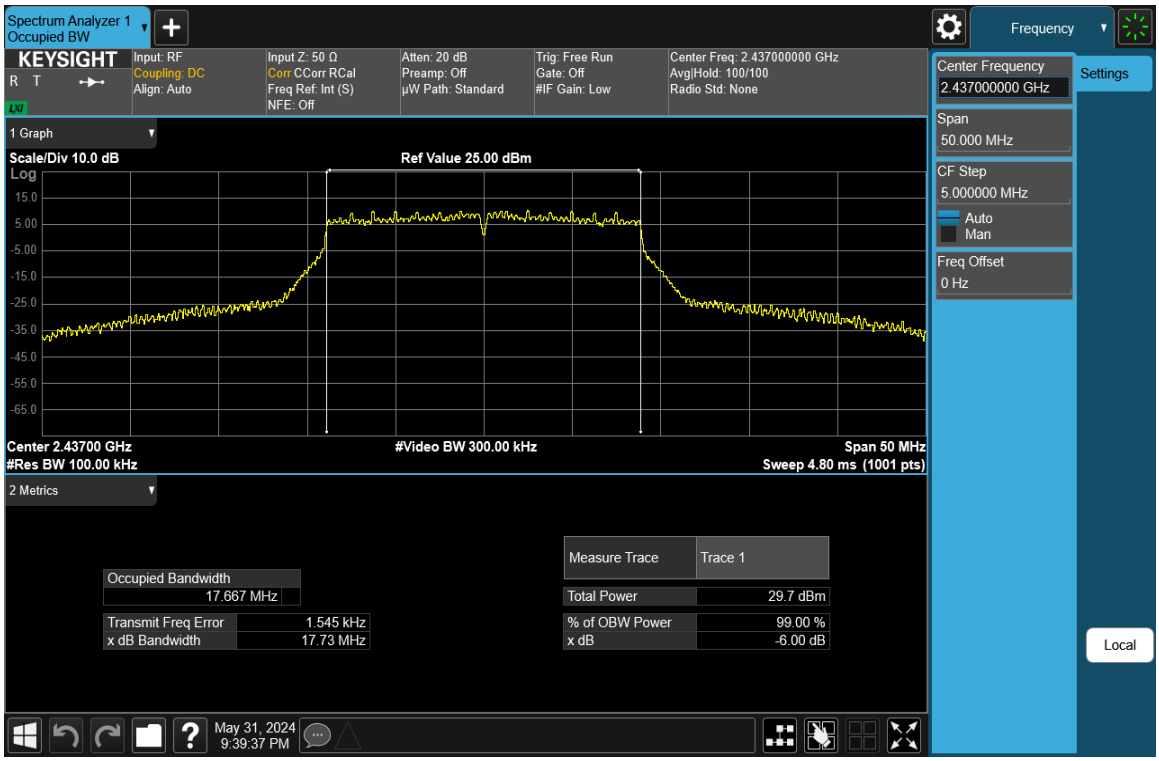
Plot 7-10. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 1) – 24Mbps

Plot 7-11. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 6) – 24Mbps



Plot 7-12. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 11) – 24Mbps

Plot 7-13. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 1) – MCS4



Plot 7-14. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 6) – MCS4

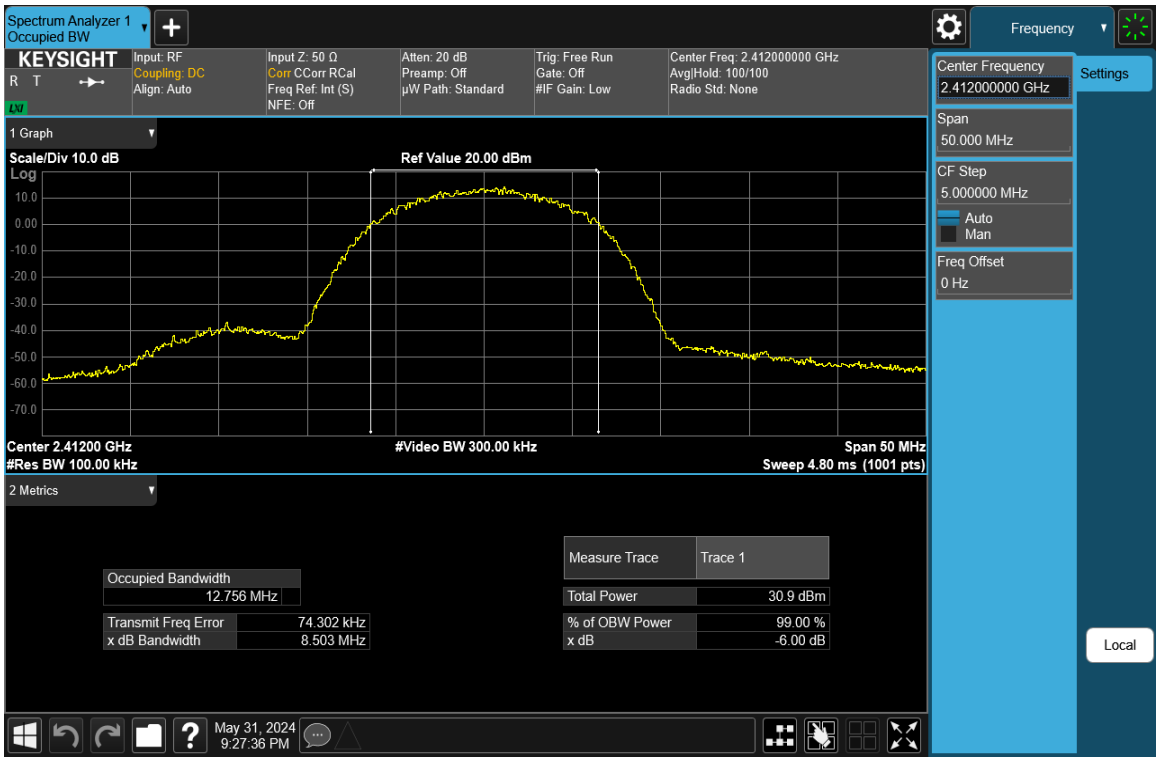
Plot 7-15. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 11) – MCS4

Plot 7-16. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS4

Plot 7-17. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS4

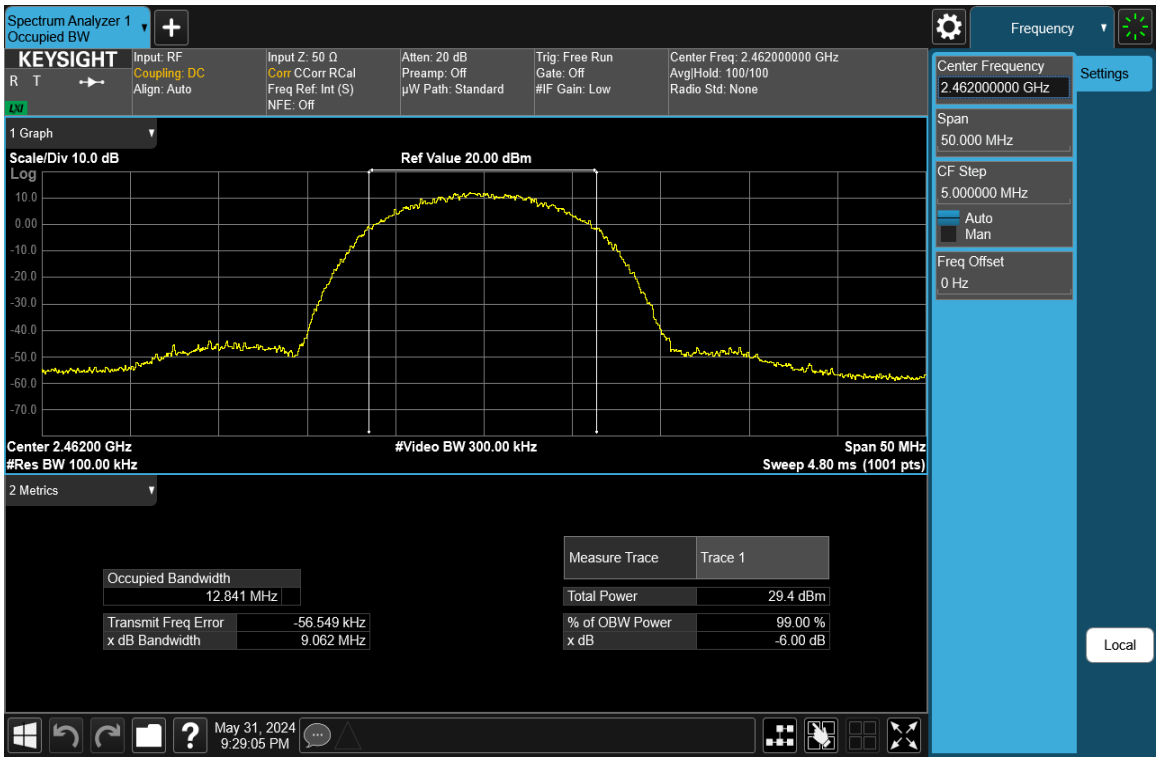
Plot 7-18. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS4

High Rate



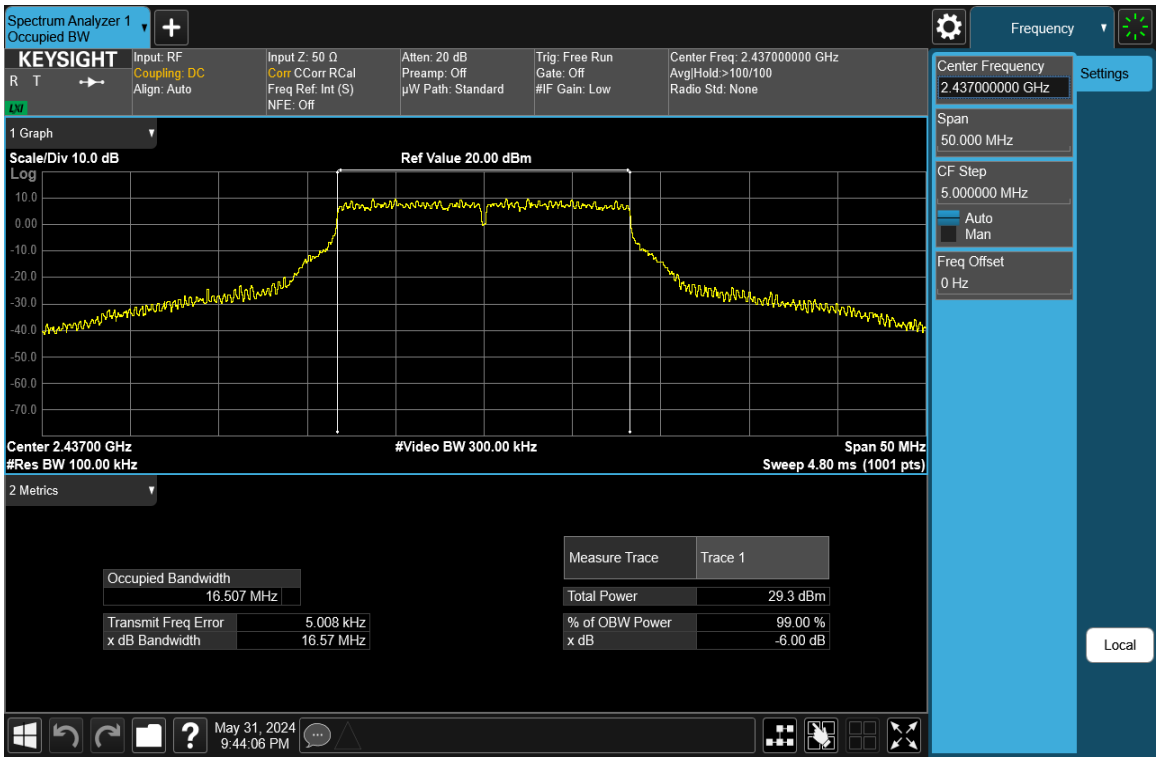
Plot 7-19. 6 dB BW and 99% OBW Plot Antenna 3a (802.11b – Ch. 1) – 11Mbps

Plot 7-20. 6 dB BW and 99% OBW Plot Antenna 3a (802.11b – Ch. 6) – 11Mbps



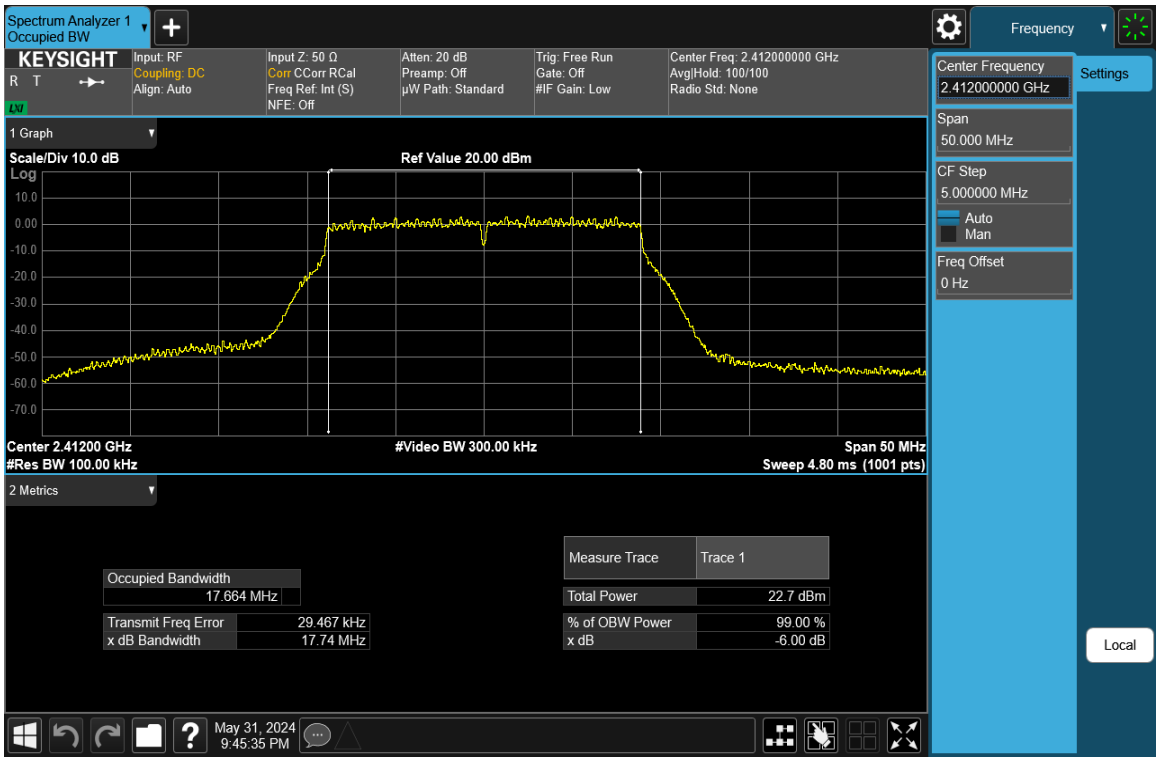
Plot 7-21. 6 dB BW and 99% OBW Plot Antenna 3a (802.11b – Ch. 11) – 11Mbps

Plot 7-22. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 1) – 54Mbps



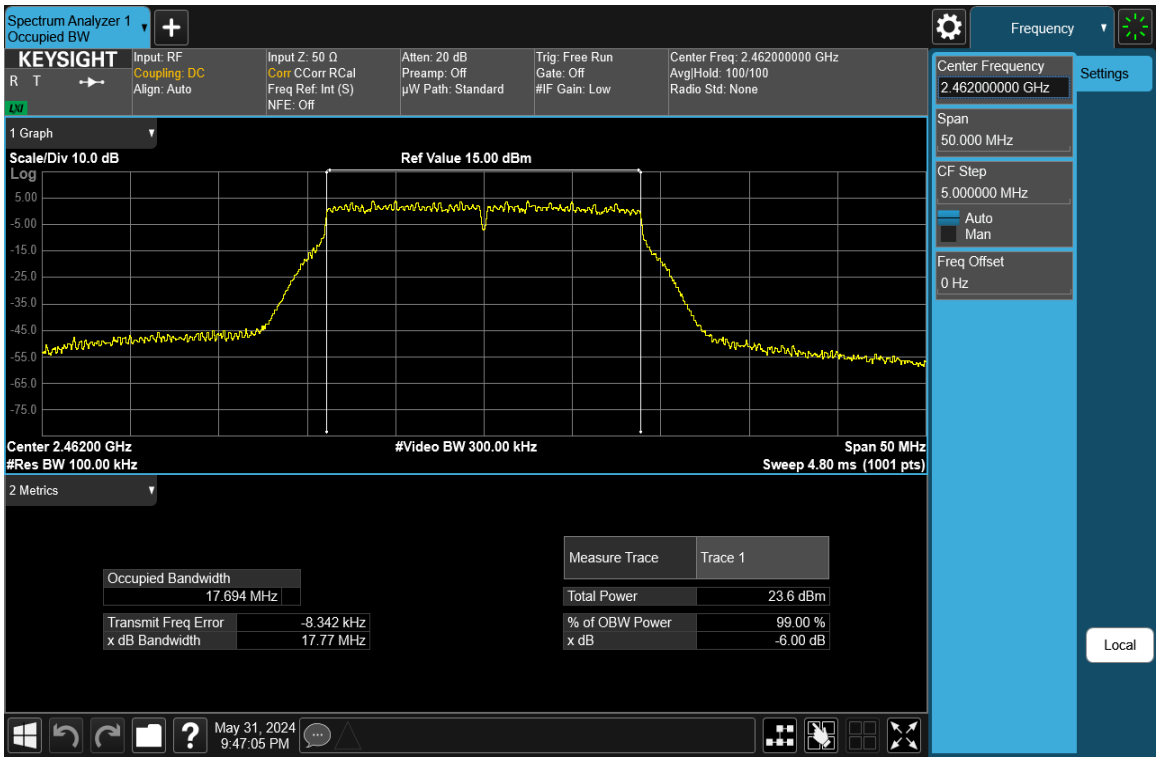
Plot 7-23. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 6) – 54Mbps

Plot 7-24. 6 dB BW and 99% OBW Plot Antenna 3a (802.11g – Ch. 11) – 54Mbps

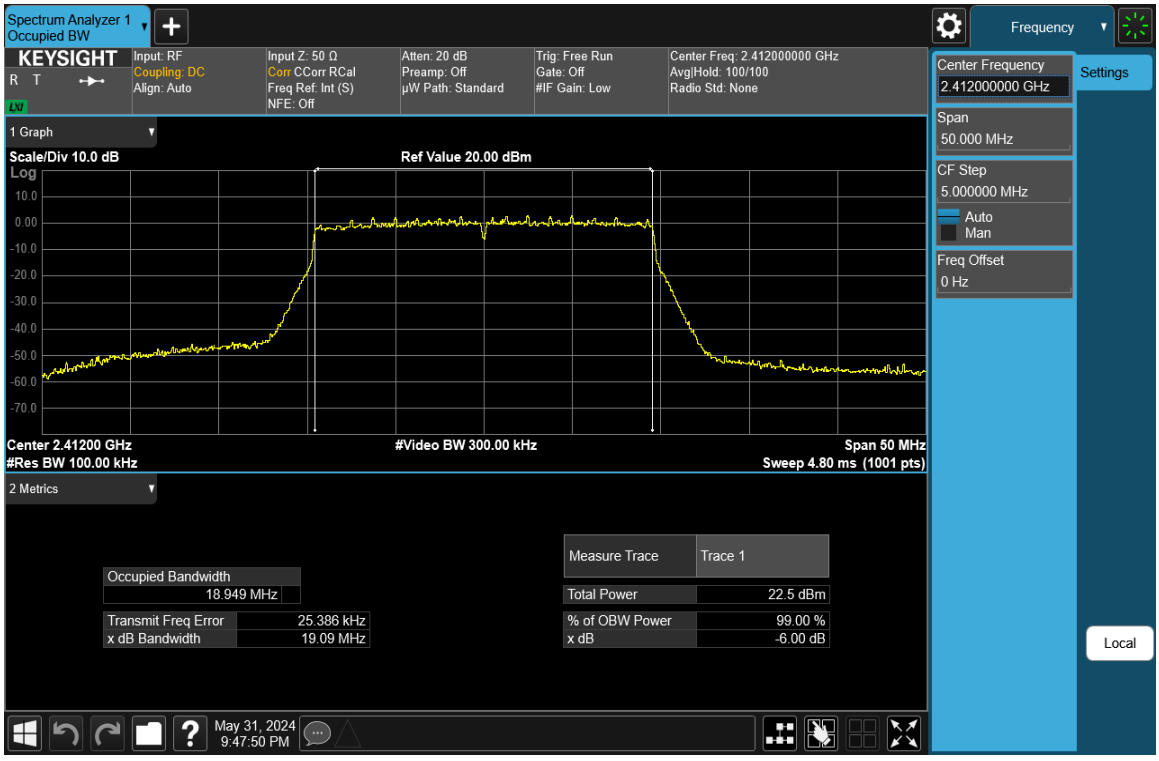


Plot 7-25. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 1) – MCS7

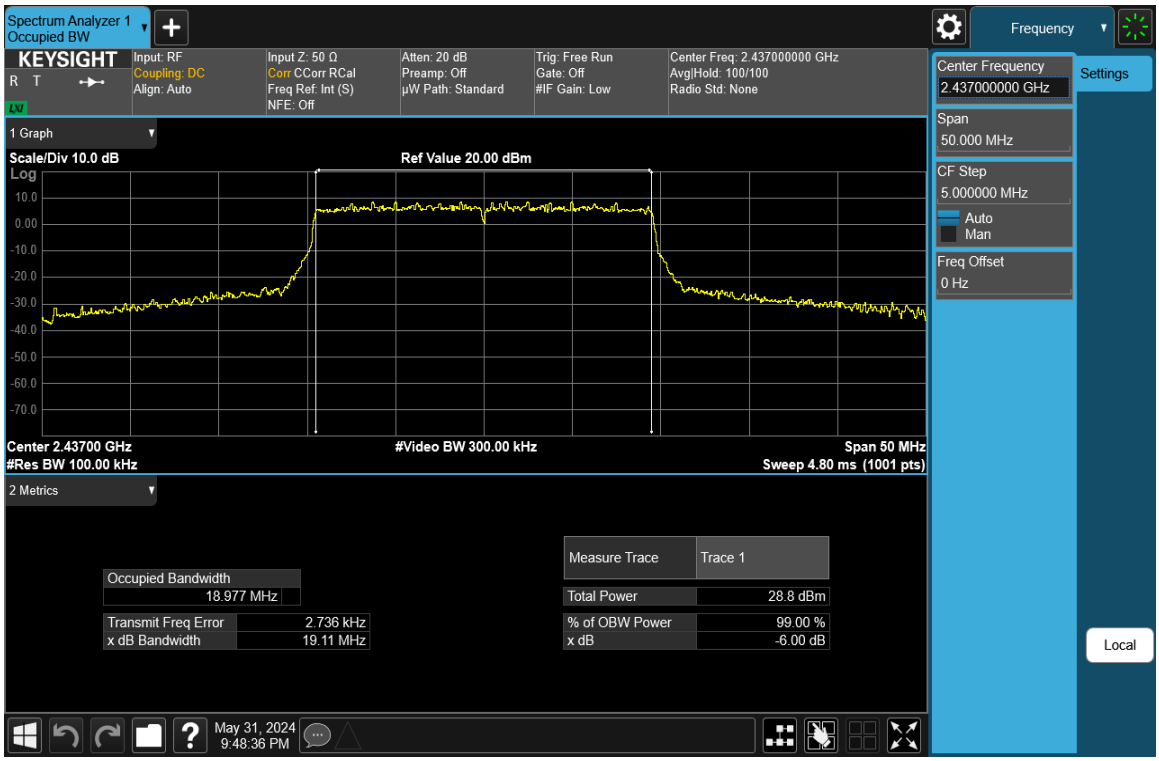
Plot 7-26. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 6) – MCS7



Plot 7-27. 6 dB BW and 99% OBW Plot Antenna 3a (802.11n (2.4GHz) – Ch. 11) – MCS7



Plot 7-28. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS9



Plot 7-29. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS9

Plot 7-30. 6 dB BW and 99% OBW Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS9

7.2.2 Antenna 1a 6 dB BW and 99% OBW Measurements

Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Minimum 6dB Bandwidth [MHz]	Pass/Fail
2412	1	g	12	16.53	16.09	0.50	Pass
2437	6	g	12	16.48	16.14	0.50	Pass
2462	11	g	12	16.60	16.33	0.50	Pass
2412	1	n	19.5/21.7 (MCS2)	17.69	16.94	0.50	Pass
2437	6	n	19.5/21.7 (MCS2)	17.69	17.31	0.50	Pass
2462	11	n	19.5/21.7 (MCS2)	17.71	17.23	0.50	Pass
2412	1	ax (SU)	24/25.8 (MCS2)	18.88	17.95	0.50	Pass
2437	6	ax (SU)	24/25.8 (MCS2)	18.93	19.01	0.50	Pass
2462	11	ax (SU)	24/25.8 (MCS2)	18.93	18.91	0.50	Pass

Table 7-5. Conducted Bandwidth Measurements Antenna 1a (Low Data Rate)

Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Minimum 6dB Bandwidth [MHz]	Pass/Fail
2412	1	g	24	16.44	16.50	0.50	Pass
2437	6	g	24	16.48	16.50	0.50	Pass
2462	11	g	24	16.45	16.50	0.50	Pass
2412	1	n	39/43.3 (MCS4)	17.64	17.70	0.50	Pass
2437	6	n	39/43.3 (MCS4)	17.67	17.70	0.50	Pass
2462	11	n	39/43.3 (MCS4)	17.66	17.72	0.50	Pass
2412	1	ax (SU)	49/51.6 (MCS4)	18.88	19.04	0.50	Pass
2437	6	ax (SU)	49/51.6 (MCS4)	18.95	19.06	0.50	Pass
2462	11	ax (SU)	49/51.6 (MCS4)	18.93	19.06	0.50	Pass

Table 7-6. Conducted Bandwidth Measurements Antenna 1a (Mid Data Rate)

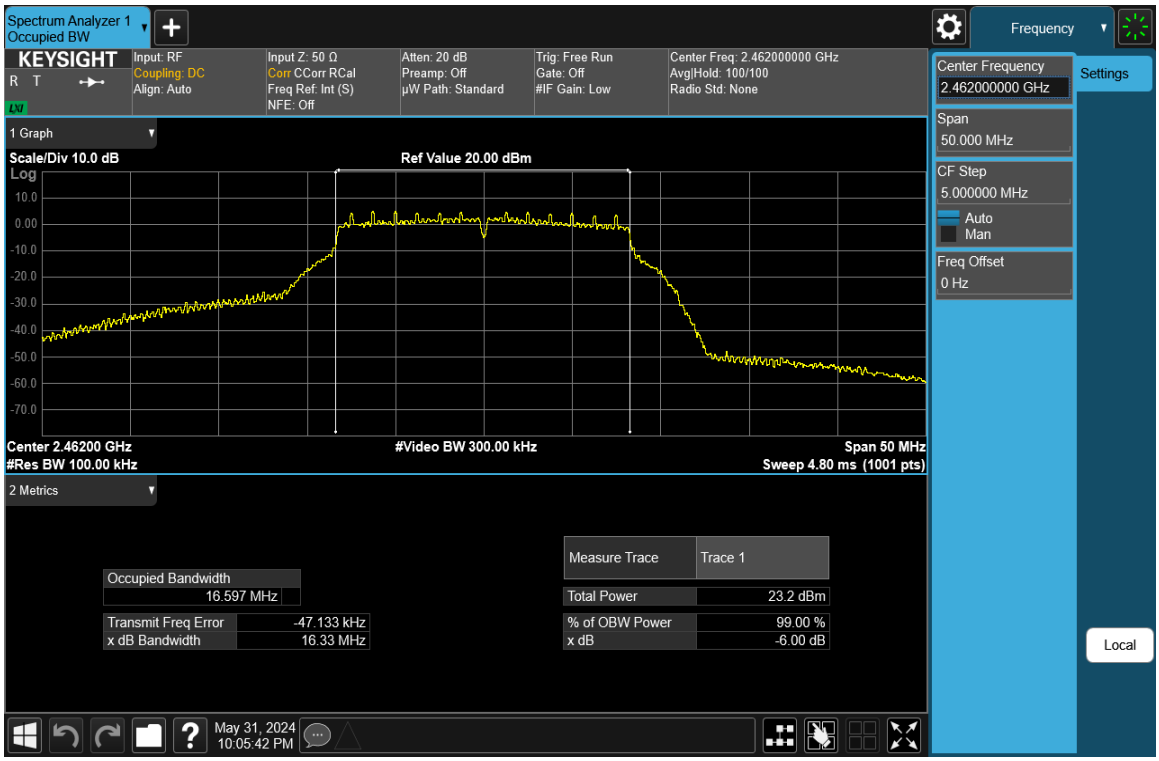
Frequency [MHz]	Channel	802.11 MODE	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 6dB Bandwidth [MHz]	Minimum 6dB Bandwidth [MHz]	Pass/Fail
2412	1	b	11	12.72	8.51	0.50	Pass
2437	6	b	11	12.87	8.92	0.50	Pass
2462	11	b	11	12.85	9.12	0.50	Pass
2412	1	g	54	16.46	16.52	0.50	Pass
2437	6	g	54	16.52	16.54	0.50	Pass
2462	11	g	54	16.48	16.53	0.50	Pass
2412	1	n	65/72.2 (MCS7)	17.65	17.74	0.50	Pass
2437	6	n	65/72.2 (MCS7)	17.70	17.74	0.50	Pass
2462	11	n	65/72.2 (MCS7)	17.68	17.75	0.50	Pass
2412	1	ax (SU)	81/86 (MCS9)	18.93	19.06	0.50	Pass
2437	6	ax (SU)	81/86 (MCS9)	18.99	19.10	0.50	Pass
2462	11	ax (SU)	81/86 (MCS9)	18.96	19.12	0.50	Pass

Table 7-7. Conducted Bandwidth Measurements Antenna 1a (High Data Rate)

Low Rate

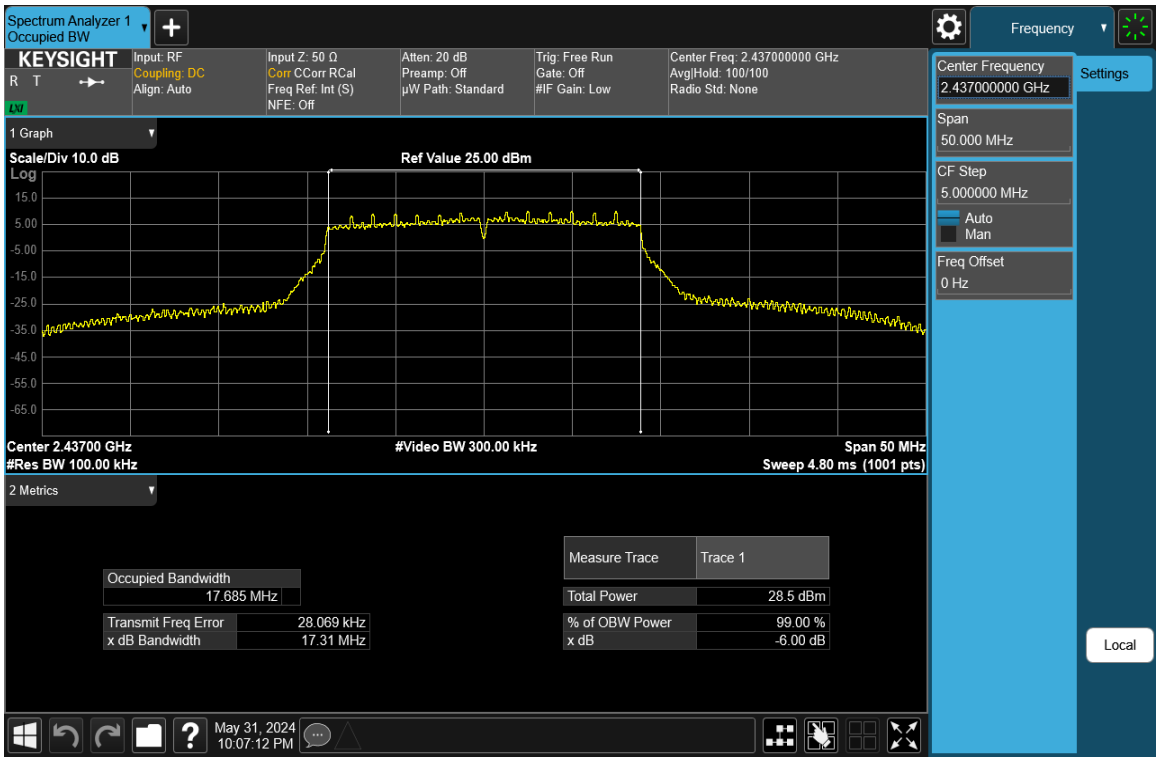
Plot 7-31. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 1) – 12Mbps

Plot 7-32. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 6) – 12Mbps



Plot 7-33. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 11) – 12Mbps

Plot 7-34. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 1) – MCS2



Plot 7-35. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 6) – MCS2

Plot 7-36. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 11) – MCS2

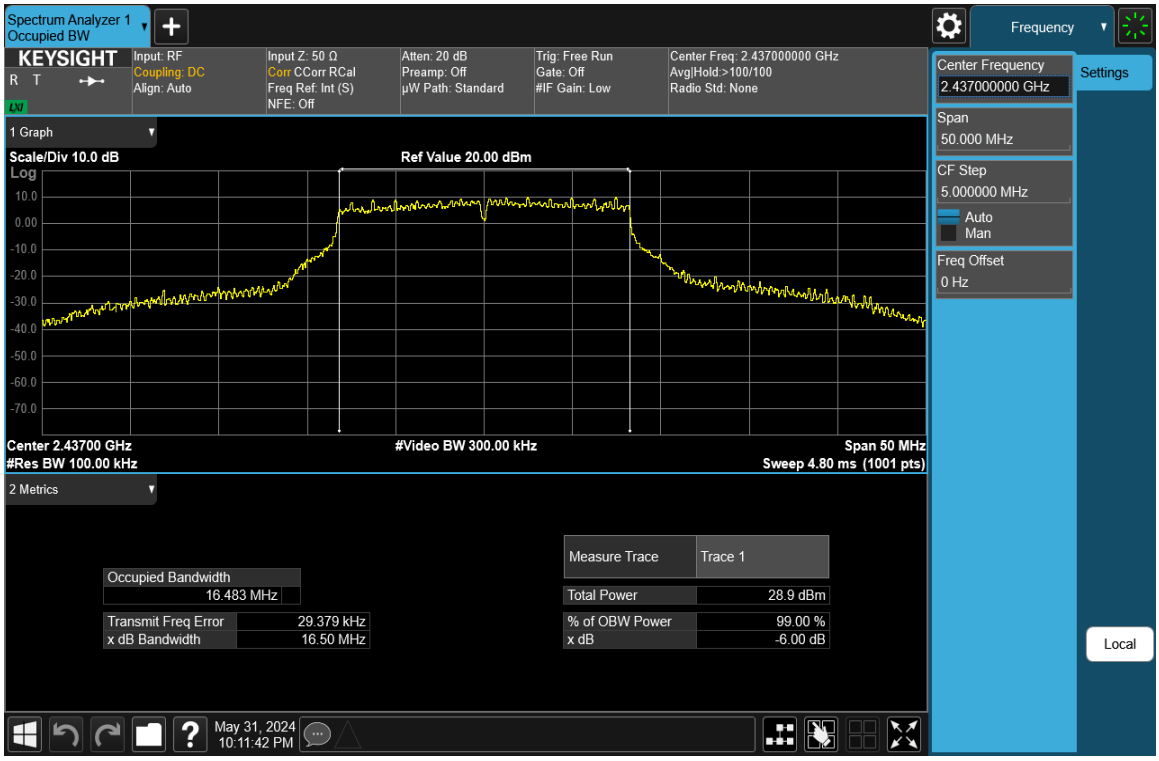
Plot 7-37. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS2

Plot 7-38. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS2

Plot 7-39. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS2

Mid Rate

Plot 7-40. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 1) – 24Mbps



Plot 7-41. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 6) – 24Mbps

Plot 7-42. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 11) – 24Mbps

Plot 7-43. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 1) – MCS4

Plot 7-44. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 6) – MCS4

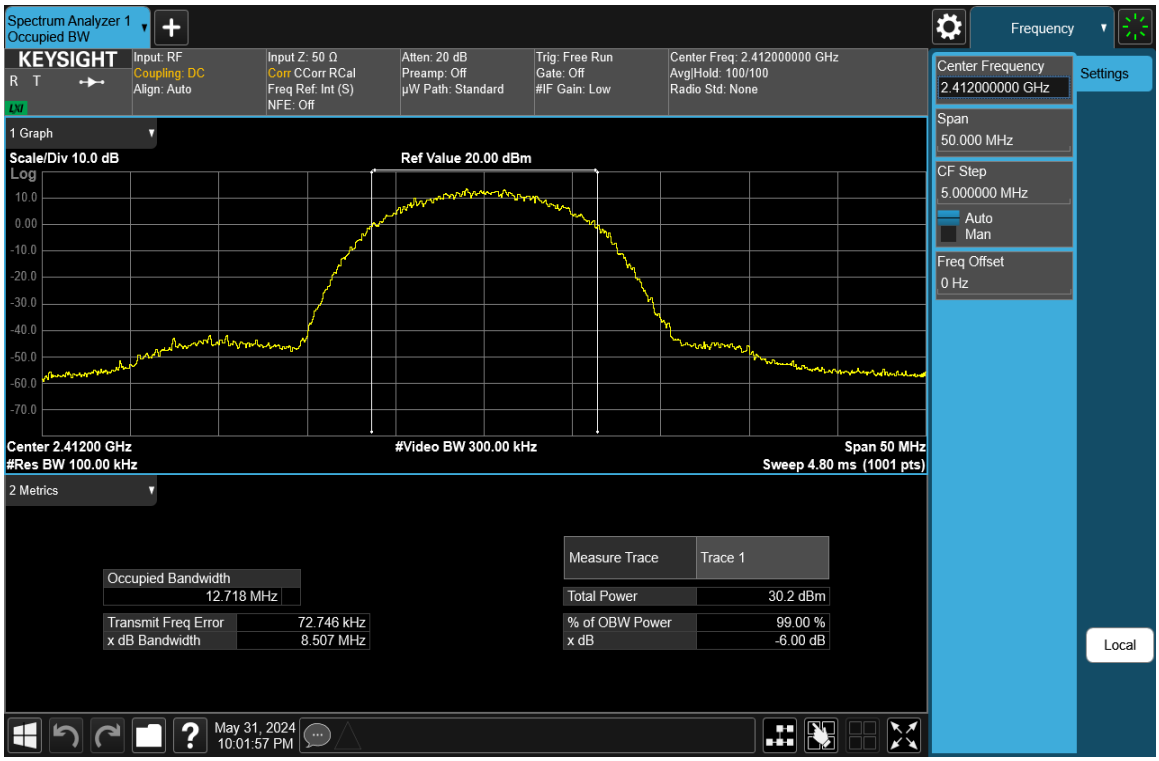
Plot 7-45. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 11) – MCS4

Plot 7-46. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS4

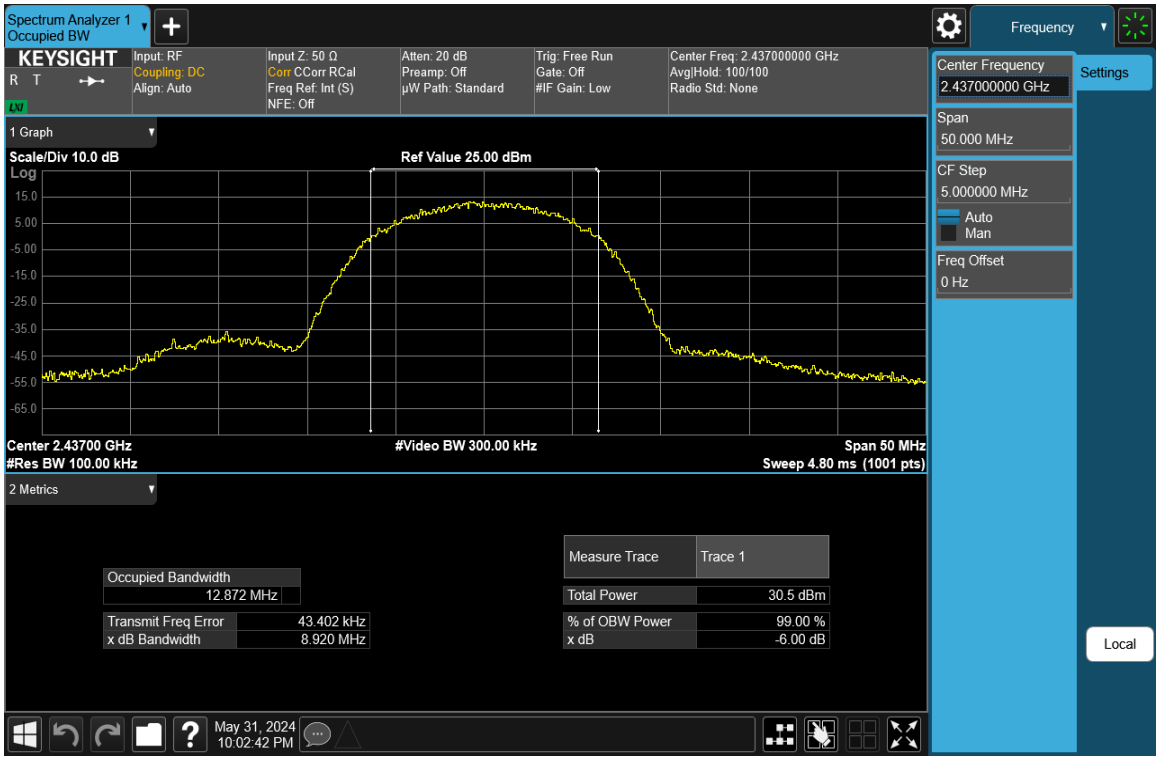
Plot 7-47. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS4

Plot 7-48. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS4

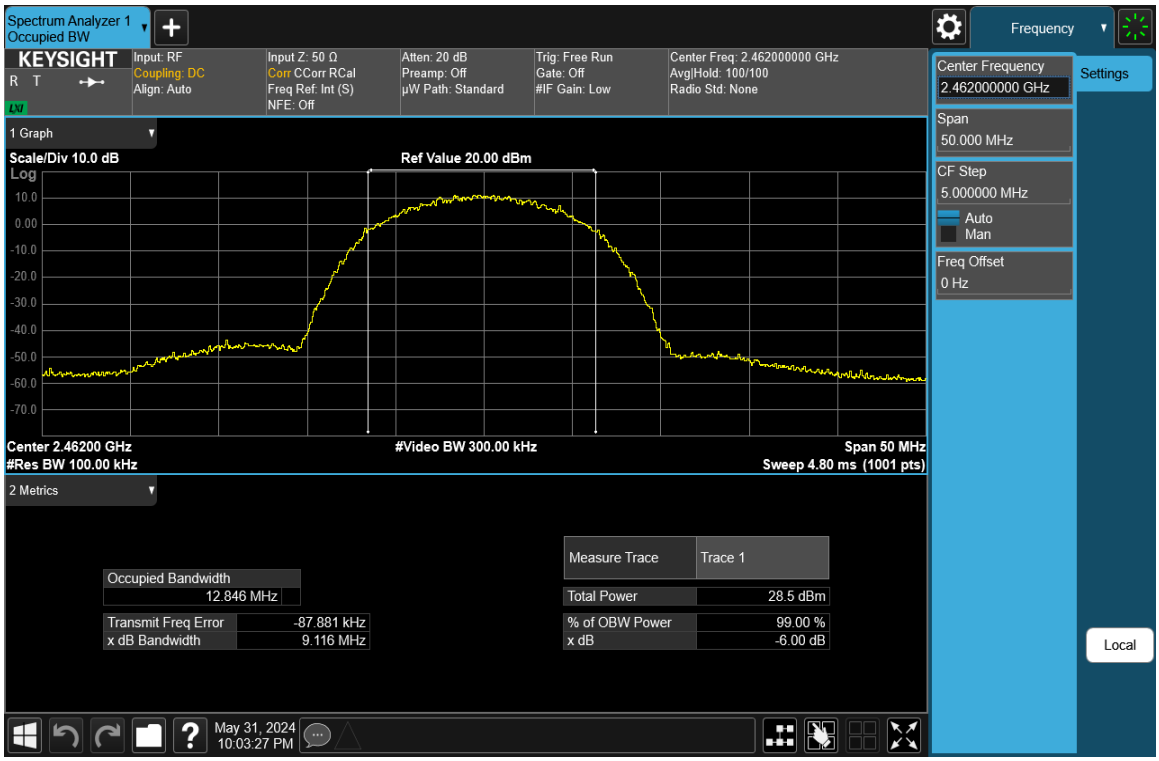
High Rate



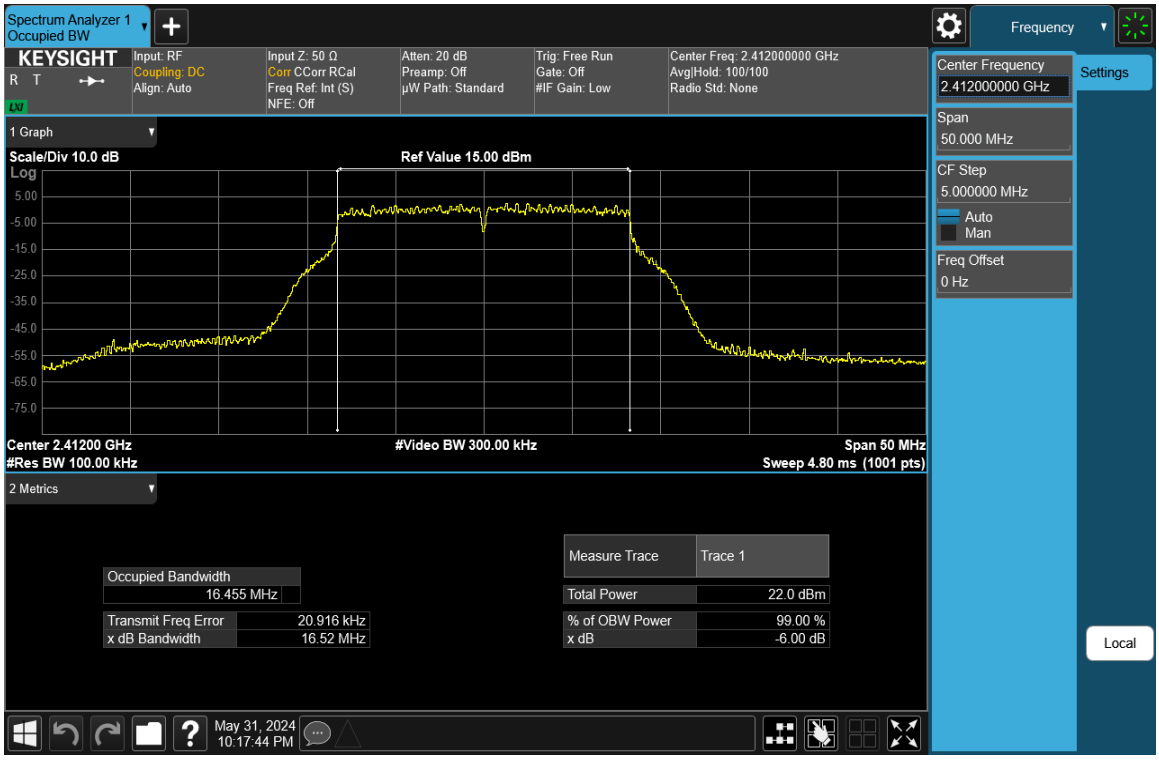
Plot 7-49. 6 dB BW and 99% OBW Plot Antenna 1a (802.11b – Ch. 1) – 11Mbps



Plot 7-50. 6 dB BW and 99% OBW Plot Antenna 1a (802.11b – Ch. 6) – 11Mbps



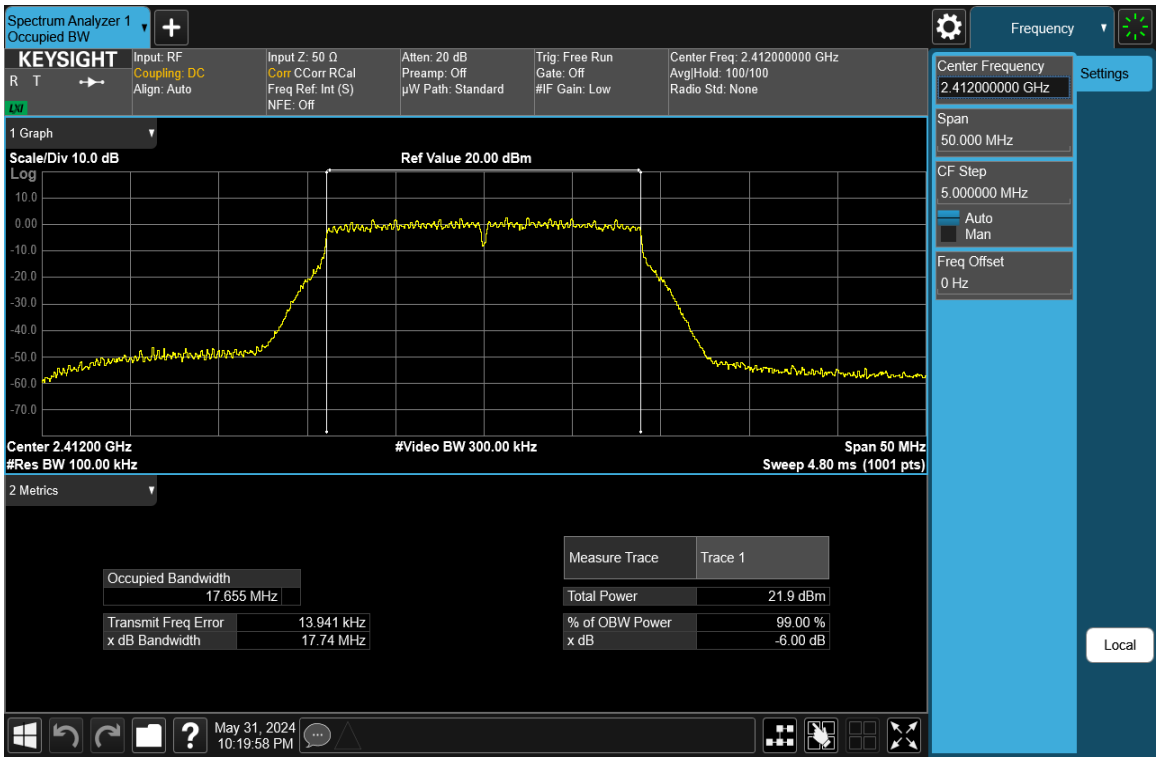
Plot 7-51. 6 dB BW and 99% OBW Plot Antenna 1a (802.11b – Ch. 11) – 11Mbps



Plot 7-52. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 1) – 54Mbps

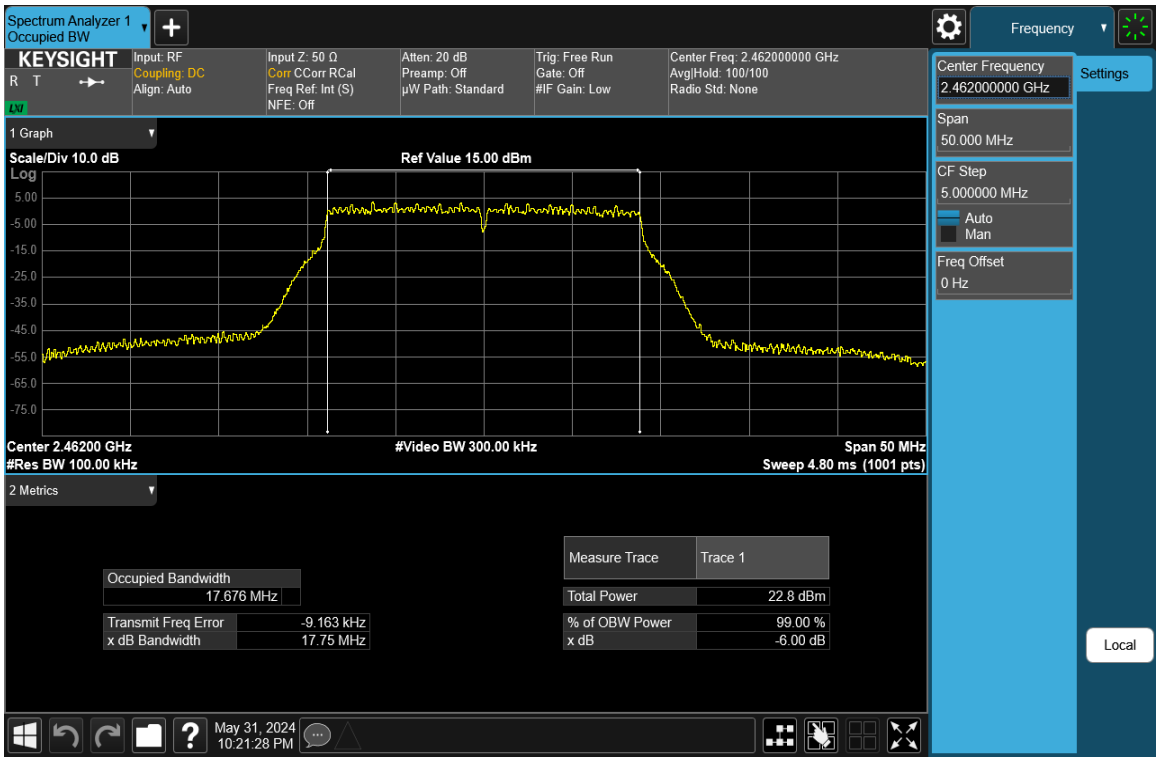
Plot 7-53. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 6) – 54Mbps

Plot 7-54. 6 dB BW and 99% OBW Plot Antenna 1a (802.11g – Ch. 11) – 54Mbps

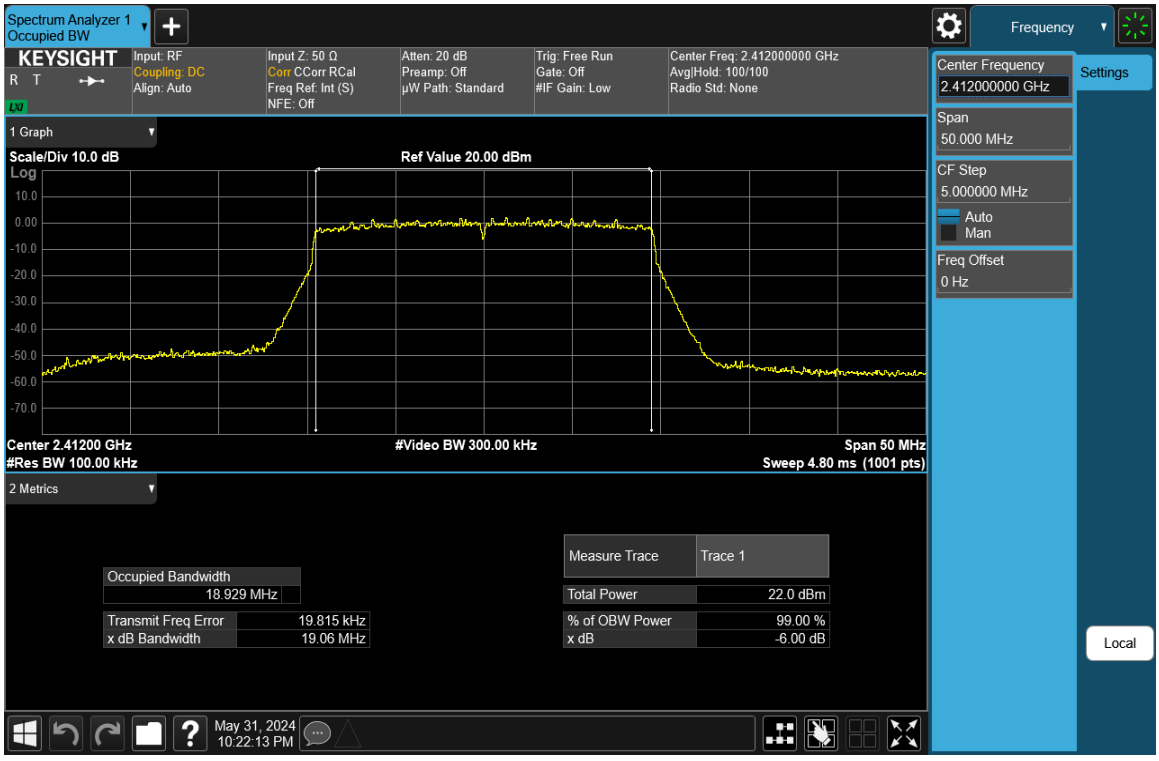


Plot 7-55. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 1) – MCS7

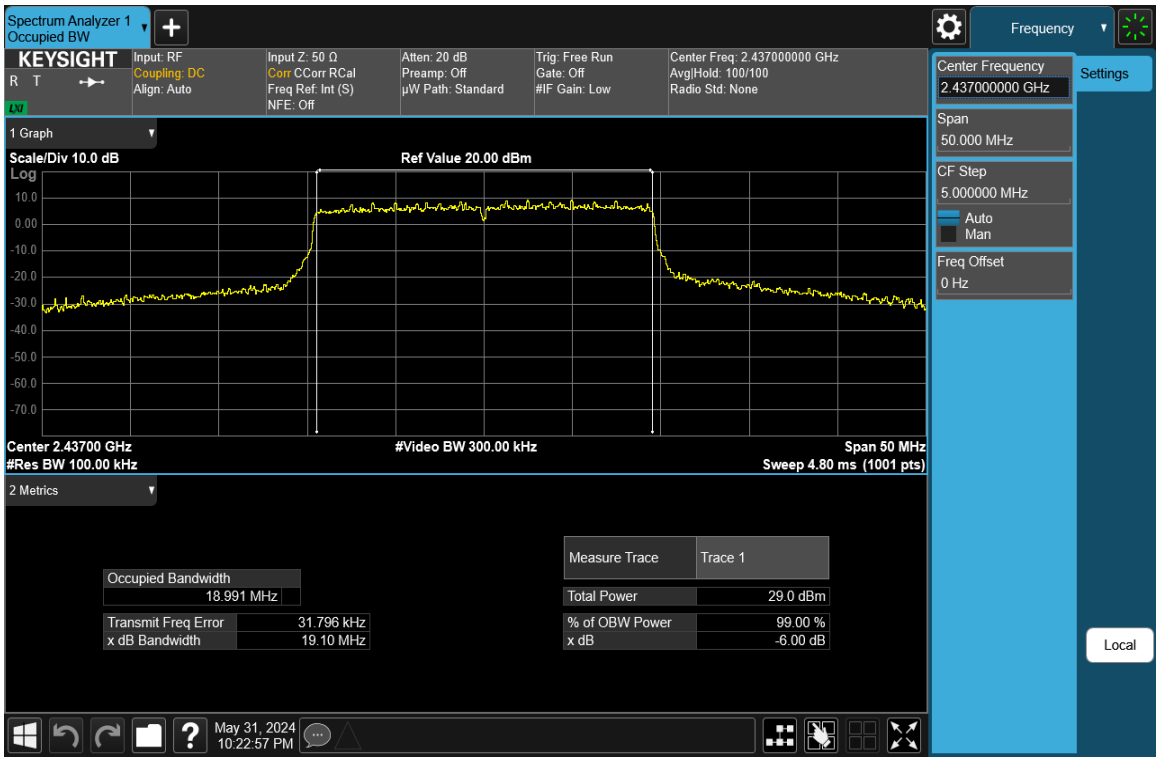
Plot 7-56. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 6) – MCS7



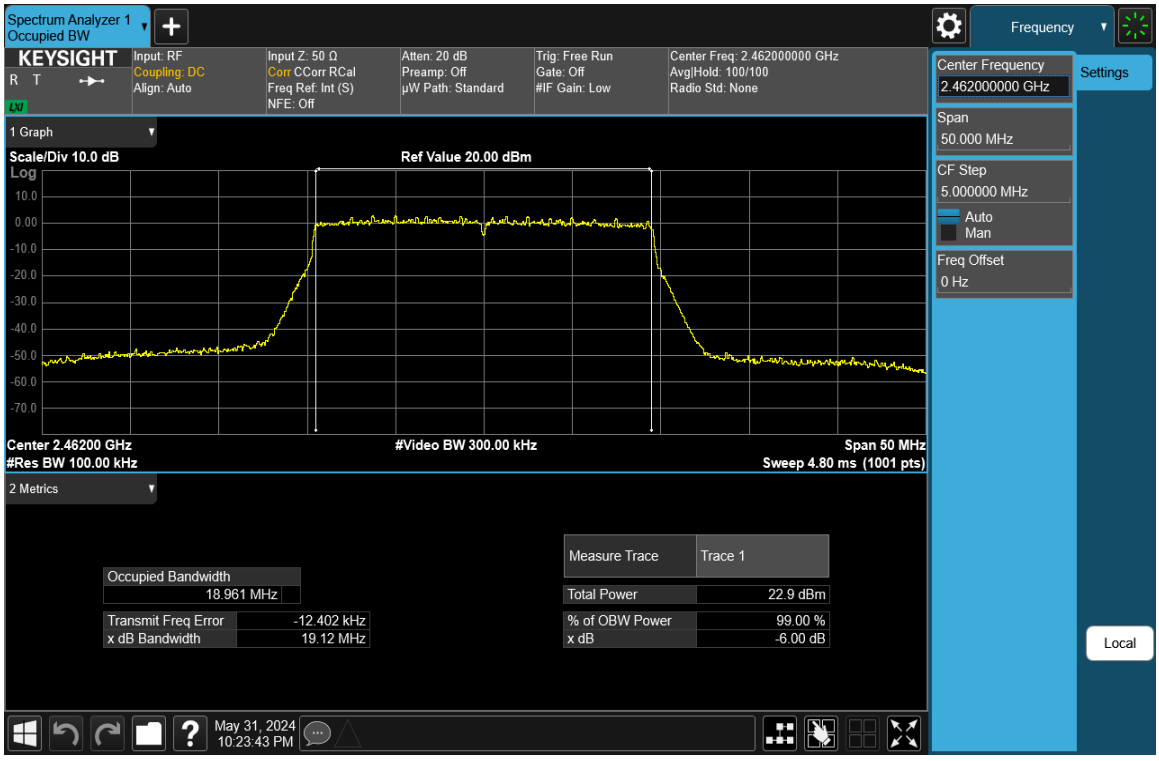
Plot 7-57. 6 dB BW and 99% OBW Plot Antenna 1a (802.11n (2.4GHz) – Ch. 11) – MCS7



Plot 7-58. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS9



Plot 7-59. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS9



Plot 7-60. 6 dB BW and 99% OBW Plot Antenna 1a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS9

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 C63.10-2020 – 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 C63.10-2020 – 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 C63.10-2020 – 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. For 802.11b, the worst case data rate was found to be 11Mbps.
2. 802.11ax does not support channel 13.

7.3.1 Average Output Power Measurement

§15.247(b.3); RSS-247 [5.4]

Low Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	AVG	13.81	13.92	13.75	30.00	-16.08	-0.30	13.62	36.02	-22.40
2417	2	AVG	18.70	18.71	17.36	30.00	-11.29	-0.30	18.41	36.02	-17.61
2422	3	AVG	19.23	19.21	19.39	30.00	-10.61	-0.30	19.09	36.02	-16.93
2427	4	AVG	20.69	20.54	20.33	30.00	-9.31	-0.30	20.39	36.02	-15.63
2432	5	AVG	20.93	20.90	21.10	30.00	-8.90	-0.30	20.80	36.02	-15.22
2437	6	AVG	21.25	21.36	21.08	30.00	-8.64	-0.30	21.06	36.02	-14.96
2442	7	AVG	19.73	19.88	19.67	30.00	-10.12	-0.30	19.58	36.02	-16.44
2447	8	AVG	19.74	19.47	19.05	30.00	-10.26	-0.30	19.44	36.02	-16.58
2452	9	AVG	19.36	19.34	19.00	30.00	-10.64	-0.30	19.06	36.02	-16.96
2457	10	AVG	18.78	18.69	17.38	30.00	-11.22	-0.30	18.48	36.02	-17.54
2462	11	AVG	15.38	15.34	15.13	30.00	-14.62	-0.30	15.08	36.02	-20.94
2467	12	AVG	12.63	12.97	12.66	30.00	-17.04	-0.30	12.67	36.02	-23.36
2472	13	AVG	8.36	8.12	-	30.00	-21.64	-0.30	8.06	36.02	-27.96

Table 7-8. Average Conducted Output Power Measurements Antenna 3a – Low Data Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	AVG	13.66	13.96	13.64	30.00	-16.04	0.90	14.86	36.02	-21.16
2417	2	AVG	18.67	18.86	17.19	30.00	-11.15	0.90	19.76	36.02	-16.27
2422	3	AVG	19.48	19.46	19.20	30.00	-10.52	0.90	20.38	36.02	-15.64
2427	4	AVG	20.55	20.59	20.60	30.00	-9.41	0.90	21.50	36.02	-14.53
2432	5	AVG	20.92	21.09	21.02	30.00	-8.91	0.90	21.99	36.02	-14.03
2437	6	AVG	21.17	21.29	21.50	30.00	-8.50	0.90	22.40	36.02	-13.62
2442	7	AVG	19.65	19.99	19.73	30.00	-10.01	0.90	20.89	36.02	-15.13
2447	8	AVG	19.51	19.39	19.24	30.00	-10.49	0.90	20.41	36.02	-15.61
2452	9	AVG	19.33	19.27	18.96	30.00	-10.67	0.90	20.23	36.02	-15.79
2457	10	AVG	18.87	18.64	17.14	30.00	-11.14	0.90	19.77	36.02	-16.26
2462	11	AVG	15.30	15.20	15.27	30.00	-14.70	0.90	16.20	36.02	-19.82
2467	12	AVG	12.77	12.74	12.39	30.00	-17.23	0.90	13.67	36.02	-22.35
2472	13	AVG	8.45	8.20	-	30.00	-21.55	0.90	9.35	36.02	-26.67

Table 7-9. Average Conducted Output Power Measurements Antenna 1a – Low Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	13.37	13.03	16.21	30.00	-13.79	3.33	19.54	36.02	-16.48
2417	2	AVG	18.50	18.40	21.46	30.00	-8.54	3.33	24.79	36.02	-11.23
2422	3	AVG	18.75	18.70	21.73	30.00	-8.27	3.33	25.06	36.02	-10.96
2427	4	AVG	20.02	20.06	23.05	30.00	-6.95	3.33	26.38	36.02	-9.64
2432	5	AVG	20.58	20.49	23.54	30.00	-6.46	3.33	26.87	36.02	-9.15
2437	6	AVG	20.84	20.74	23.80	30.00	-6.20	3.33	27.13	36.02	-8.89
2442	7	AVG	19.77	19.65	22.72	30.00	-7.28	3.33	26.05	36.02	-9.97
2447	8	AVG	18.14	17.91	21.04	30.00	-8.96	3.33	24.37	36.02	-11.65
2452	9	AVG	18.40	18.18	21.30	30.00	-8.70	3.33	24.63	36.02	-11.39
2457	10	AVG	18.23	18.35	21.30	30.00	-8.70	3.33	24.63	36.02	-11.39
2462	11	AVG	15.50	15.15	18.34	30.00	-11.66	3.33	21.67	36.02	-14.35
2467	12	AVG	12.85	12.73	15.80	30.00	-14.20	3.33	19.13	36.02	-16.89
2472	13	AVG	8.15	8.50	11.34	30.00	-18.66	3.33	14.67	36.02	-21.35

Table 7-10. Average Conducted Output Power Measurements CDD (802.11g) – Low Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	13.24	13.45	16.36	30.00	-13.64	3.33	19.69	36.02	-16.33
2417	2	AVG	18.31	18.12	21.23	30.00	-8.77	3.33	24.56	36.02	-11.46
2422	3	AVG	18.98	18.70	21.85	30.00	-8.15	3.33	25.18	36.02	-10.84
2427	4	AVG	20.09	20.07	23.09	30.00	-6.91	3.33	26.42	36.02	-9.60
2432	5	AVG	20.75	20.65	23.71	30.00	-6.29	3.33	27.04	36.02	-8.98
2437	6	AVG	20.86	20.95	23.91	30.00	-6.09	3.33	27.24	36.02	-8.78
2442	7	AVG	19.77	19.97	22.88	30.00	-7.12	3.33	26.21	36.02	-9.81
2447	8	AVG	18.11	18.23	21.18	30.00	-8.82	3.33	24.51	36.02	-11.51
2452	9	AVG	18.50	18.20	21.36	30.00	-8.64	3.33	24.69	36.02	-11.33
2457	10	AVG	18.21	18.34	21.29	30.00	-8.71	3.33	24.62	36.02	-11.40
2462	11	AVG	15.23	15.17	18.21	30.00	-11.79	3.33	21.54	36.02	-14.48
2467	12	AVG	12.73	12.80	15.78	30.00	-14.22	3.33	19.11	36.02	-16.91
2472	13	AVG	8.36	8.50	11.44	30.00	-18.56	3.33	14.77	36.02	-21.25

Table 7-11. Average Conducted Output Power Measurements CDD (802.11n) – Low Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	13.32	13.45	16.39	30.00	-13.61	3.33	19.72	36.02	-16.30
2417	2	AVG	17.50	17.45	20.48	30.00	-9.52	3.33	23.81	36.02	-12.21
2422	3	AVG	18.67	18.81	21.75	30.00	-8.25	3.33	25.08	36.02	-10.94
2427	4	AVG	19.97	19.72	22.85	30.00	-7.15	3.33	26.18	36.02	-9.84
2432	5	AVG	20.52	20.58	23.56	30.00	-6.44	3.33	26.89	36.02	-9.13
2437	6	AVG	20.86	20.79	23.83	30.00	-6.17	3.33	27.16	36.02	-8.86
2442	7	AVG	19.71	19.55	22.64	30.00	-7.36	3.33	25.97	36.02	-10.05
2447	8	AVG	17.77	17.75	20.77	30.00	-9.23	3.33	24.10	36.02	-11.92
2452	9	AVG	17.60	17.55	20.59	30.00	-9.41	3.33	23.92	36.02	-12.10
2457	10	AVG	16.86	16.68	19.78	30.00	-10.22	3.33	23.11	36.02	-12.91
2462	11	AVG	15.07	15.02	18.05	30.00	-11.95	3.33	21.38	36.02	-14.64
2467	12	AVG	12.73	12.41	15.58	30.00	-14.42	3.33	18.91	36.02	-17.11

Table 7-12. Average Conducted Output Power Measurements CDD (802.11ax - SU) – Low Data Rate

Mid Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	AVG	13.40	13.22	13.29	30.00	-16.61	-0.30	13.10	36.02	-22.93
2417	2	AVG	17.62	17.78	16.94	30.00	-12.22	-0.30	17.48	36.02	-18.54
2422	3	AVG	18.80	18.80	18.51	30.00	-11.20	-0.30	18.50	36.02	-17.52
2427	4	AVG	20.35	20.12	20.29	30.00	-9.65	-0.30	20.05	36.02	-15.97
2432	5	AVG	20.66	20.91	20.87	30.00	-9.09	-0.30	20.61	36.02	-15.41
2437	6	AVG	21.34	21.37	21.31	30.00	-8.63	-0.30	21.07	36.02	-14.95
2442	7	AVG	19.85	19.87	19.61	30.00	-10.13	-0.30	19.57	36.02	-16.45
2447	8	AVG	19.46	19.44	18.77	30.00	-10.54	-0.30	19.16	36.02	-16.86
2452	9	AVG	18.00	17.80	17.72	30.00	-12.00	-0.30	17.70	36.02	-18.32
2457	10	AVG	17.60	17.86	16.68	30.00	-12.14	-0.30	17.56	36.02	-18.46
2462	11	AVG	14.79	14.82	14.64	30.00	-15.18	-0.30	14.52	36.02	-21.50
2467	12	AVG	12.87	12.69	12.61	30.00	-17.13	-0.30	12.57	36.02	-23.45
2472	13	AVG	8.31	8.11	-	30.00	-21.69	-0.30	8.01	36.02	-28.01

Table 7-13. Average Conducted Output Power Measurements Antenna 3a – Mid Data Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	AVG	13.29	13.32	13.17	30.00	-16.68	0.90	14.22	36.02	-21.80
2417	2	AVG	17.76	17.96	16.81	30.00	-12.04	0.90	18.86	36.02	-17.16
2422	3	AVG	18.84	18.82	18.39	30.00	-11.16	0.90	19.74	36.02	-16.28
2427	4	AVG	20.16	20.37	20.21	30.00	-9.63	0.90	21.27	36.02	-14.75
2432	5	AVG	20.81	20.80	20.72	30.00	-9.19	0.90	21.71	36.02	-14.31
2437	6	AVG	21.27	21.29	21.47	30.00	-8.54	0.90	22.37	36.02	-13.66
2442	7	AVG	19.77	19.99	19.68	30.00	-10.01	0.90	20.89	36.02	-15.13
2447	8	AVG	19.18	19.39	18.69	30.00	-10.61	0.90	20.29	36.02	-15.73
2452	9	AVG	17.76	17.69	17.67	30.00	-12.24	0.90	18.66	36.02	-17.36
2457	10	AVG	17.66	17.82	16.63	30.00	-12.18	0.90	18.72	36.02	-17.30
2462	11	AVG	14.98	14.66	14.85	30.00	-15.02	0.90	15.88	36.02	-20.14
2467	12	AVG	12.75	12.71	12.42	30.00	-17.26	0.90	13.65	36.02	-22.38
2472	13	AVG	8.41	8.45	-	30.00	-21.55	0.90	9.35	36.02	-26.67

Table 7-14. Average Conducted Output Power Measurements Antenna 1a – Mid Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	13.25	13.17	16.22	30.00	-13.78	3.33	19.55	36.02	-16.47
2417	2	AVG	17.63	17.82	20.73	30.00	-9.27	3.33	24.06	36.02	-11.96
2422	3	AVG	18.63	18.46	21.56	30.00	-8.44	3.33	24.89	36.02	-11.13
2427	4	AVG	19.95	19.64	22.80	30.00	-7.20	3.33	26.13	36.02	-9.89
2432	5	AVG	20.34	20.14	23.25	30.00	-6.75	3.33	26.58	36.02	-9.44
2437	6	AVG	21.00	20.94	23.98	30.00	-6.02	3.33	27.31	36.02	-8.71
2442	7	AVG	19.48	19.50	22.50	30.00	-7.50	3.33	25.83	36.02	-10.19
2447	8	AVG	17.11	17.09	20.11	30.00	-9.89	3.33	23.44	36.02	-12.58
2452	9	AVG	17.43	17.20	20.33	30.00	-9.67	3.33	23.66	36.02	-12.36
2457	10	AVG	17.17	17.31	20.25	30.00	-9.75	3.33	23.58	36.02	-12.44
2462	11	AVG	14.99	14.86	17.94	30.00	-12.06	3.33	21.27	36.02	-14.75
2467	12	AVG	12.86	12.62	15.75	30.00	-14.25	3.33	19.08	36.02	-16.94
2472	13	AVG	8.26	8.23	11.25	30.00	-18.75	3.33	14.58	36.02	-21.44

Table 7-15. Average Conducted Output Power Measurements CDD (802.11g) – Mid Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	13.30	13.39	16.36	30.00	-13.64	3.33	19.69	36.02	-16.33
2417	2	AVG	17.91	17.86	20.89	30.00	-9.11	3.33	24.22	36.02	-11.80
2422	3	AVG	18.39	18.69	21.55	30.00	-8.45	3.33	24.88	36.02	-11.14
2427	4	AVG	19.68	19.88	22.79	30.00	-7.21	3.33	26.12	36.02	-9.90
2432	5	AVG	20.21	20.16	23.20	30.00	-6.80	3.33	26.53	36.02	-9.49
2437	6	AVG	20.90	20.75	23.84	30.00	-6.16	3.33	27.17	36.02	-8.85
2442	7	AVG	19.40	19.37	22.39	30.00	-7.61	3.33	25.72	36.02	-10.30
2447	8	AVG	17.24	17.09	20.18	30.00	-9.82	3.33	23.51	36.02	-12.51
2452	9	AVG	17.09	17.50	20.31	30.00	-9.69	3.33	23.64	36.02	-12.38
2457	10	AVG	17.28	17.36	20.33	30.00	-9.67	3.33	23.66	36.02	-12.36
2462	11	AVG	14.91	14.73	17.83	30.00	-12.17	3.33	21.16	36.02	-14.86
2467	12	AVG	12.82	12.76	15.80	30.00	-14.20	3.33	19.13	36.02	-16.89
2472	13	AVG	8.39	8.48	11.44	30.00	-18.56	3.33	14.77	36.02	-21.25

Table 7-16. Average Conducted Output Power Measurements CDD (802.11n) – Mid Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	12.59	12.81	15.71	30.00	-14.29	3.33	19.04	36.02	-16.98
2417	2	AVG	16.79	16.84	19.83	30.00	-10.17	3.33	23.16	36.02	-12.86
2422	3	AVG	18.54	18.67	21.61	30.00	-8.39	3.33	24.94	36.02	-11.08
2427	4	AVG	19.95	19.62	22.80	30.00	-7.20	3.33	26.13	36.02	-9.89
2432	5	AVG	20.35	20.31	23.34	30.00	-6.66	3.33	26.67	36.02	-9.35
2437	6	AVG	20.86	20.90	23.89	30.00	-6.11	3.33	27.22	36.02	-8.80
2442	7	AVG	19.34	19.48	22.42	30.00	-7.58	3.33	25.75	36.02	-10.27
2447	8	AVG	17.26	17.24	20.26	30.00	-9.74	3.33	23.59	36.02	-12.43
2452	9	AVG	16.84	16.70	19.78	30.00	-10.22	3.33	23.11	36.02	-12.91
2457	10	AVG	16.86	16.83	19.85	30.00	-10.15	3.33	23.18	36.02	-12.84
2462	11	AVG	14.71	15.00	17.86	30.00	-12.14	3.33	21.19	36.02	-14.83
2467	12	AVG	12.60	12.44	15.53	30.00	-14.47	3.33	18.86	36.02	-17.16

Table 7-17. Average Conducted Output Power Measurements CDD (802.11ax - SU) – Mid Data Rate

High Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11b	802.11g	802.11n	802.11ax (SU)						
2412	1	AVG	21.49	13.29	13.22	12.80	30.00	-8.52	-0.30	21.19	36.02	-14.84
2417	2	AVG	21.40	17.23	17.17	16.33	30.00	-8.60	-0.30	21.10	36.02	-14.92
2422	3	AVG	21.33	18.49	18.46	18.49	30.00	-8.67	-0.30	21.03	36.02	-14.99
2427	4	AVG	21.46	19.84	19.99	19.39	30.00	-8.54	-0.30	21.16	36.02	-14.86
2432	5	AVG	21.11	20.60	20.70	20.38	30.00	-8.90	-0.30	20.81	36.02	-15.22
2437	6	AVG	21.12	20.56	20.70	20.39	30.00	-8.88	-0.30	20.82	36.02	-15.20
2442	7	AVG	21.23	19.37	19.16	19.21	30.00	-8.77	-0.30	20.93	36.02	-15.09
2447	8	AVG	21.44	18.14	18.28	17.66	30.00	-8.56	-0.30	21.14	36.02	-14.88
2452	9	AVG	21.11	17.96	17.63	16.92	30.00	-8.89	-0.30	20.81	36.02	-15.21
2457	10	AVG	21.27	16.23	16.24	15.76	30.00	-8.73	-0.30	20.97	36.02	-15.05
2462	11	AVG	21.23	14.13	14.48	13.93	30.00	-8.77	-0.30	20.93	36.02	-15.09
2467	12	AVG	19.75	12.02	11.92	11.97	30.00	-10.25	-0.30	19.45	36.02	-16.57
2472	13	AVG	16.43	7.80	7.74	-	30.00	-13.57	-0.30	16.13	36.02	-19.89

Table 7-18. Average Conducted Output Power Measurements Antenna 3a – High Data Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11b	802.11g	802.11n	802.11ax (SU)						
2412	1	AVG	21.34	13.48	13.15	12.69	30.00	-8.67	0.90	22.24	36.02	-13.79
2417	2	AVG	21.25	17.39	17.28	16.21	30.00	-8.76	0.90	22.15	36.02	-13.88
2422	3	AVG	21.33	18.75	18.69	18.13	30.00	-8.67	0.90	22.23	36.02	-13.79
2427	4	AVG	21.05	19.73	19.69	19.35	30.00	-8.96	0.90	21.95	36.02	-14.08
2432	5	AVG	21.34	20.53	20.62	20.12	30.00	-8.66	0.90	22.24	36.02	-13.78
2437	6	AVG	21.37	20.49	20.60	20.12	30.00	-8.63	0.90	22.27	36.02	-13.75
2442	7	AVG	21.34	19.10	19.20	19.26	30.00	-8.66	0.90	22.24	36.02	-13.78
2447	8	AVG	21.16	18.45	18.11	17.63	30.00	-8.84	0.90	22.06	36.02	-13.96
2452	9	AVG	21.40	17.61	17.68	16.96	30.00	-8.61	0.90	22.30	36.02	-13.73
2457	10	AVG	21.47	16.31	16.43	15.70	30.00	-8.53	0.90	22.37	36.02	-13.65
2462	11	AVG	21.31	14.36	14.29	13.80	30.00	-8.69	0.90	22.21	36.02	-13.81
2467	12	AVG	19.71	12.16	12.07	12.13	30.00	-10.29	0.90	20.61	36.02	-15.41
2472	13	AVG	16.47	7.63	7.99	-	30.00	-13.53	0.90	17.37	36.02	-18.65

Table 7-19. Average Conducted Output Power Measurements Antenna 1a – High Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	13.22	13.42	16.33	30.00	-13.67	3.33	19.66	36.02	-16.36
2417	2	AVG	17.26	17.31	20.30	30.00	-9.70	3.33	23.63	36.02	-12.39
2422	3	AVG	18.49	18.57	21.54	30.00	-8.46	3.33	24.87	36.02	-11.15
2427	4	AVG	19.14	19.26	22.21	30.00	-7.79	3.33	25.54	36.02	-10.48
2432	5	AVG	19.81	19.78	22.80	30.00	-7.20	3.33	26.13	36.02	-9.89
2437	6	AVG	20.33	20.20	23.27	30.00	-6.73	3.33	26.60	36.02	-9.42
2442	7	AVG	18.78	18.70	21.75	30.00	-8.25	3.33	25.08	36.02	-10.94
2447	8	AVG	16.76	16.74	19.76	30.00	-10.24	3.33	23.09	36.02	-12.93
2452	9	AVG	16.82	16.61	19.73	30.00	-10.27	3.33	23.06	36.02	-12.96
2457	10	AVG	16.28	16.33	19.31	30.00	-10.69	3.33	22.64	36.02	-13.38
2462	11	AVG	14.15	14.14	17.16	30.00	-12.84	3.33	20.49	36.02	-15.53
2467	12	AVG	12.04	12.24	15.15	30.00	-14.85	3.33	18.48	36.02	-17.54
2472	13	AVG	7.80	7.71	10.76	30.00	-19.24	3.33	14.09	36.02	-21.93

Table 7-20. Average Conducted Output Power Measurements CDD (802.11g) – High Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	13.23	13.11	16.18	30.00	-13.82	3.33	19.51	36.02	-16.51
2417	2	AVG	17.24	17.24	20.25	30.00	-9.75	3.33	23.58	36.02	-12.44
2422	3	AVG	18.68	18.63	21.66	30.00	-8.34	3.33	24.99	36.02	-11.03
2427	4	AVG	19.13	19.12	22.14	30.00	-7.86	3.33	25.47	36.02	-10.55
2432	5	AVG	19.92	19.63	22.79	30.00	-7.21	3.33	26.12	36.02	-9.90
2437	6	AVG	20.25	20.42	23.35	30.00	-6.65	3.33	26.68	36.02	-9.34
2442	7	AVG	18.95	18.66	21.82	30.00	-8.18	3.33	25.15	36.02	-10.87
2447	8	AVG	16.69	16.93	19.82	30.00	-10.18	3.33	23.15	36.02	-12.87
2452	9	AVG	16.96	16.82	19.90	30.00	-10.10	3.33	23.23	36.02	-12.79
2457	10	AVG	16.47	16.31	19.40	30.00	-10.60	3.33	22.73	36.02	-13.29
2462	11	AVG	14.32	14.18	17.26	30.00	-12.74	3.33	20.59	36.02	-15.43
2467	12	AVG	12.21	12.21	15.22	30.00	-14.78	3.33	18.55	36.02	-17.47
2472	13	AVG	7.99	7.85	10.93	30.00	-19.07	3.33	14.26	36.02	-21.76

Table 7-21. Average Conducted Output Power Measurements CDD (802.11n) – High Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	AVG	12.85	12.61	15.74	30.00	-14.26	3.33	19.07	36.02	-16.95
2417	2	AVG	16.18	16.47	19.34	30.00	-10.66	3.33	22.67	36.02	-13.35
2422	3	AVG	18.49	18.22	21.37	30.00	-8.63	3.33	24.70	36.02	-11.32
2427	4	AVG	19.10	19.27	22.20	30.00	-7.80	3.33	25.53	36.02	-10.49
2432	5	AVG	19.82	19.81	22.82	30.00	-7.18	3.33	26.15	36.02	-9.87
2437	6	AVG	20.39	20.25	23.33	30.00	-6.67	3.33	26.66	36.02	-9.36
2442	7	AVG	18.75	18.89	21.83	30.00	-8.17	3.33	25.16	36.02	-10.86
2447	8	AVG	16.61	16.99	19.81	30.00	-10.19	3.33	23.14	36.02	-12.88
2452	9	AVG	16.41	16.16	19.30	30.00	-10.70	3.33	22.63	36.02	-13.39
2457	10	AVG	15.75	15.85	18.81	30.00	-11.19	3.33	22.14	36.02	-13.88
2462	11	AVG	13.96	13.74	16.86	30.00	-13.14	3.33	20.19	36.02	-15.83
2467	12	AVG	11.98	12.04	15.02	30.00	-14.98	3.33	18.35	36.02	-17.67

Table 7-22. Average Conducted Output Power Measurements CDD (802.11ax - SU) – High Data Rate

7.3.2 Peak Output Power Measurement

§15.247(b.3); RSS-247 [5.4]

Low Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	PEAK	18.34	18.42	17.98	30.00	-11.58	-0.30	18.12	36.02	-17.90
2417	2	PEAK	23.13	23.14	21.66	30.00	-6.86	-0.30	22.84	36.02	-13.18
2422	3	PEAK	23.58	23.48	23.62	30.00	-6.38	-0.30	23.32	36.02	-12.70
2427	4	PEAK	26.59	26.66	26.48	30.00	-3.34	-0.30	26.36	36.02	-9.66
2432	5	PEAK	26.71	26.85	26.90	30.00	-3.10	-0.30	26.60	36.02	-9.42
2437	6	PEAK	26.91	27.07	26.93	30.00	-2.93	-0.30	26.77	36.02	-9.25
2442	7	PEAK	26.06	26.36	26.18	30.00	-3.64	-0.30	26.06	36.02	-9.96
2447	8	PEAK	26.03	26.09	25.75	30.00	-3.91	-0.30	25.79	36.02	-10.23
2452	9	PEAK	23.75	23.63	23.27	30.00	-6.25	-0.30	23.45	36.02	-12.57
2457	10	PEAK	23.09	22.99	21.67	30.00	-6.91	-0.30	22.79	36.02	-13.23
2462	11	PEAK	19.94	19.87	19.60	30.00	-10.07	-0.30	19.64	36.02	-16.39
2467	12	PEAK	17.45	17.70	17.47	30.00	-12.30	-0.30	17.40	36.02	-18.62
2472	13	PEAK	15.71	15.36	-	30.00	-14.30	-0.30	15.41	36.02	-20.62

Table 7-23. Peak Conducted Output Power Measurements Antenna 3a – Low Data Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	PEAK	18.29	18.54	18.02	30.00	-11.46	0.90	19.44	36.02	-16.58
2417	2	PEAK	23.20	23.38	21.68	30.00	-6.62	0.90	24.28	36.02	-11.74
2422	3	PEAK	23.98	23.89	23.69	30.00	-6.02	0.90	24.88	36.02	-11.14
2427	4	PEAK	26.39	26.54	26.50	30.00	-3.47	0.90	27.44	36.02	-8.59
2432	5	PEAK	26.46	26.66	26.61	30.00	-3.34	0.90	27.56	36.02	-8.46
2437	6	PEAK	26.66	26.81	26.85	30.00	-3.16	0.90	27.75	36.02	-8.28
2442	7	PEAK	25.92	26.30	26.08	30.00	-3.71	0.90	27.20	36.02	-8.83
2447	8	PEAK	25.78	25.97	25.83	30.00	-4.03	0.90	26.87	36.02	-9.15
2452	9	PEAK	23.71	23.55	23.24	30.00	-6.29	0.90	24.61	36.02	-11.41
2457	10	PEAK	23.11	22.92	21.34	30.00	-6.90	0.90	24.01	36.02	-12.02
2462	11	PEAK	19.76	19.55	19.62	30.00	-10.25	0.90	20.66	36.02	-15.37
2467	12	PEAK	17.44	17.36	17.04	30.00	-12.56	0.90	18.34	36.02	-17.68
2472	13	PEAK	15.61	15.33	-	30.00	-14.39	0.90	16.51	36.02	-19.51

Table 7-24. Peak Conducted Output Power Measurements Antenna 1a – Low Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	18.01	17.75	20.89	30.00	-9.11	3.33	24.22	36.02	-11.80
2417	2	PEAK	22.97	22.94	25.97	30.00	-4.03	3.33	29.30	36.02	-6.72
2422	3	PEAK	23.09	23.20	26.16	30.00	-3.84	3.33	29.49	36.02	-6.53
2427	4	PEAK	26.17	26.13	29.16	30.00	-0.84	3.33	32.49	36.02	-3.53
2432	5	PEAK	26.54	26.29	29.43	30.00	-0.57	3.33	32.76	36.02	-3.26
2437	6	PEAK	26.32	26.47	29.41	30.00	-0.59	3.33	32.74	36.02	-3.28
2442	7	PEAK	26.05	25.94	29.01	30.00	-0.99	3.33	32.34	36.02	-3.68
2447	8	PEAK	24.69	24.51	27.61	30.00	-2.39	3.33	30.94	36.02	-5.08
2452	9	PEAK	22.83	22.50	25.68	30.00	-4.32	3.33	29.01	36.02	-7.01
2457	10	PEAK	22.58	22.67	25.63	30.00	-4.37	3.33	28.96	36.02	-7.06
2462	11	PEAK	19.92	19.54	22.74	30.00	-7.26	3.33	26.07	36.02	-9.95
2467	12	PEAK	17.64	17.41	20.54	30.00	-9.46	3.33	23.87	36.02	-12.15
2472	13	PEAK	15.48	15.63	18.57	30.00	-11.43	3.33	21.90	36.02	-14.12

Table 7-25. Peak Conducted Output Power Measurements CDD (802.11g) – Low Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	17.76	18.09	20.94	30.00	-9.06	3.33	24.27	36.02	-11.75
2417	2	PEAK	22.70	22.74	25.73	30.00	-4.27	3.33	29.06	36.02	-6.96
2422	3	PEAK	23.27	23.19	26.24	30.00	-3.76	3.33	29.57	36.02	-6.45
2427	4	PEAK	26.43	26.30	29.38	30.00	-0.62	3.33	32.71	36.02	-3.31
2432	5	PEAK	26.39	26.51	29.46	30.00	-0.54	3.33	32.79	36.02	-3.23
2437	6	PEAK	26.37	26.31	29.35	30.00	-0.65	3.33	32.68	36.02	-3.34
2442	7	PEAK	26.31	26.32	29.32	30.00	-0.68	3.33	32.65	36.02	-3.37
2447	8	PEAK	25.08	25.19	28.15	30.00	-1.85	3.33	31.48	36.02	-4.54
2452	9	PEAK	22.89	22.53	25.72	30.00	-4.28	3.33	29.05	36.02	-6.97
2457	10	PEAK	22.57	22.67	25.63	30.00	-4.37	3.33	28.96	36.02	-7.06
2462	11	PEAK	19.77	19.64	22.72	30.00	-7.28	3.33	26.05	36.02	-9.97
2467	12	PEAK	17.49	17.55	20.53	30.00	-9.47	3.33	23.86	36.02	-12.16
2472	13	PEAK	15.66	15.67	18.68	30.00	-11.32	3.33	22.01	36.02	-14.01

Table 7-26. Peak Conducted Output Power Measurements CDD (802.11n) – Low Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	17.54	17.79	20.68	30.00	-9.32	3.33	24.01	36.02	-12.01
2417	2	PEAK	21.83	21.95	24.90	30.00	-5.10	3.33	28.23	36.02	-7.79
2422	3	PEAK	22.83	23.19	26.03	30.00	-3.97	3.33	29.36	36.02	-6.66
2427	4	PEAK	26.30	26.06	29.19	30.00	-0.81	3.33	32.52	36.02	-3.50
2432	5	PEAK	26.40	26.42	29.42	30.00	-0.58	3.33	32.75	36.02	-3.27
2437	6	PEAK	26.31	26.56	29.44	30.00	-0.56	3.33	32.77	36.02	-3.25
2442	7	PEAK	26.17	25.96	29.08	30.00	-0.92	3.33	32.41	36.02	-3.61
2447	8	PEAK	24.49	24.64	27.58	30.00	-2.42	3.33	30.91	36.02	-5.11
2452	9	PEAK	21.80	21.76	24.79	30.00	-5.21	3.33	28.12	36.02	-7.90
2457	10	PEAK	21.15	20.90	24.04	30.00	-5.96	3.33	27.37	36.02	-8.65
2462	11	PEAK	19.47	19.20	22.35	30.00	-7.65	3.33	25.68	36.02	-10.34
2467	12	PEAK	17.49	17.03	20.27	30.00	-9.73	3.33	23.60	36.02	-12.42

Table 7-27. Peak Conducted Output Power Measurements CDD (802.11ax - SU) – Low Data Rate

Mid Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	PEAK	20.57	20.30	19.96	30.00	-9.43	-0.30	20.27	36.02	-15.75
2417	2	PEAK	24.58	24.58	23.77	30.00	-5.42	-0.30	24.28	36.02	-11.74
2422	3	PEAK	25.52	25.39	25.08	30.00	-4.48	-0.30	25.22	36.02	-10.80
2427	4	PEAK	26.86	26.98	26.99	30.00	-3.01	-0.30	26.69	36.02	-9.33
2432	5	PEAK	27.03	27.28	27.24	30.00	-2.72	-0.30	26.98	36.02	-9.04
2437	6	PEAK	27.31	27.46	27.42	30.00	-2.55	-0.30	27.16	36.02	-8.87
2442	7	PEAK	26.75	27.00	26.84	30.00	-3.00	-0.30	26.70	36.02	-9.32
2447	8	PEAK	26.53	26.79	26.40	30.00	-3.21	-0.30	26.49	36.02	-9.53
2452	9	PEAK	24.92	24.55	24.45	30.00	-5.08	-0.30	24.62	36.02	-11.40
2457	10	PEAK	24.55	24.70	23.34	30.00	-5.30	-0.30	24.40	36.02	-11.62
2462	11	PEAK	21.72	21.69	21.42	30.00	-8.28	-0.30	21.42	36.02	-14.60
2467	12	PEAK	20.24	19.89	19.84	30.00	-9.76	-0.30	19.94	36.02	-16.08
2472	13	PEAK	17.35	16.79	-	30.00	-12.65	-0.30	17.05	36.02	-18.97

Table 7-28. Peak Conducted Output Power Measurements Antenna 3a – Mid Data Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11g	802.11n	802.11ax (SU)						
2412	1	PEAK	20.64	20.51	19.95	30.00	-9.36	0.90	21.54	36.02	-14.48
2417	2	PEAK	24.85	24.91	23.59	30.00	-5.09	0.90	25.81	36.02	-10.21
2422	3	PEAK	25.78	25.55	25.13	30.00	-4.22	0.90	26.68	36.02	-9.34
2427	4	PEAK	26.62	26.84	26.78	30.00	-3.16	0.90	27.74	36.02	-8.28
2432	5	PEAK	26.79	26.93	26.89	30.00	-3.07	0.90	27.83	36.02	-8.19
2437	6	PEAK	27.00	27.11	27.14	30.00	-2.86	0.90	28.04	36.02	-7.98
2442	7	PEAK	26.55	26.79	26.67	30.00	-3.21	0.90	27.69	36.02	-8.33
2447	8	PEAK	26.25	26.60	26.25	30.00	-3.40	0.90	27.50	36.02	-8.52
2452	9	PEAK	24.71	24.43	24.39	30.00	-5.29	0.90	25.61	36.02	-10.41
2457	10	PEAK	24.57	24.58	23.43	30.00	-5.42	0.90	25.48	36.02	-10.54
2462	11	PEAK	21.89	21.40	21.61	30.00	-8.11	0.90	22.79	36.02	-13.23
2467	12	PEAK	19.93	19.79	19.51	30.00	-10.08	0.90	20.83	36.02	-15.20
2472	13	PEAK	17.43	17.13	-	30.00	-12.57	0.90	18.33	36.02	-17.69

Table 7-29. Peak Conducted Output Power Measurements Antenna 1a – Mid Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	20.52	20.33	23.43	30.00	-6.57	3.33	26.76	36.02	-9.26
2417	2	PEAK	24.56	24.88	27.73	30.00	-2.27	3.33	31.06	36.02	-4.96
2422	3	PEAK	25.35	25.29	28.33	30.00	-1.67	3.33	31.66	36.02	-4.36
2427	4	PEAK	26.38	26.39	29.39	30.00	-0.61	3.33	32.72	36.02	-3.30
2432	5	PEAK	26.39	26.58	29.50	30.00	-0.50	3.33	32.83	36.02	-3.19
2437	6	PEAK	26.40	26.32	29.37	30.00	-0.63	3.33	32.70	36.02	-3.32
2442	7	PEAK	26.53	26.41	29.48	30.00	-0.52	3.33	32.81	36.02	-3.21
2447	8	PEAK	24.80	24.78	27.80	30.00	-2.20	3.33	31.13	36.02	-4.89
2452	9	PEAK	24.41	24.11	27.27	30.00	-2.73	3.33	30.60	36.02	-5.42
2457	10	PEAK	24.16	24.13	27.15	30.00	-2.85	3.33	30.48	36.02	-5.54
2462	11	PEAK	22.00	21.69	24.86	30.00	-5.14	3.33	28.19	36.02	-7.83
2467	12	PEAK	20.23	19.77	23.01	30.00	-6.99	3.33	26.34	36.02	-9.68
2472	13	PEAK	17.36	17.22	20.30	30.00	-9.70	3.33	23.63	36.02	-12.39

Table 7-30. Peak Conducted Output Power Measurements CDD (802.11g) – Mid Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	20.53	20.42	23.49	30.00	-6.51	3.33	26.82	36.02	-9.20
2417	2	PEAK	24.83	24.86	27.85	30.00	-2.15	3.33	31.18	36.02	-4.84
2422	3	PEAK	25.09	25.42	28.26	30.00	-1.74	3.33	31.59	36.02	-4.43
2427	4	PEAK	26.31	26.31	29.32	30.00	-0.68	3.33	32.65	36.02	-3.37
2432	5	PEAK	26.33	26.35	29.35	30.00	-0.65	3.33	32.68	36.02	-3.34
2437	6	PEAK	26.31	26.39	29.36	30.00	-0.64	3.33	32.69	36.02	-3.33
2442	7	PEAK	26.38	26.36	29.38	30.00	-0.62	3.33	32.71	36.02	-3.31
2447	8	PEAK	25.49	25.29	28.40	30.00	-1.60	3.33	31.73	36.02	-4.29
2452	9	PEAK	23.92	24.27	27.11	30.00	-2.89	3.33	30.44	36.02	-5.58
2457	10	PEAK	24.09	24.12	27.12	30.00	-2.88	3.33	30.45	36.02	-5.57
2462	11	PEAK	21.85	21.56	24.71	30.00	-5.29	3.33	28.04	36.02	-7.98
2467	12	PEAK	20.13	19.88	23.02	30.00	-6.98	3.33	26.35	36.02	-9.67
2472	13	PEAK	16.97	17.11	20.05	30.00	-9.95	3.33	23.38	36.02	-12.64

Table 7-31. Peak Conducted Output Power Measurements CDD (802.11n) – Mid Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	19.19	19.49	22.35	30.00	-7.65	3.33	25.68	36.02	-10.34
2417	2	PEAK	23.48	23.69	26.60	30.00	-3.40	3.33	29.93	36.02	-6.09
2422	3	PEAK	25.07	25.25	28.17	30.00	-1.83	3.33	31.50	36.02	-4.52
2427	4	PEAK	26.36	26.54	29.46	30.00	-0.54	3.33	32.79	36.02	-3.23
2432	5	PEAK	26.35	26.35	29.36	30.00	-0.64	3.33	32.69	36.02	-3.33
2437	6	PEAK	26.28	26.38	29.34	30.00	-0.66	3.33	32.67	36.02	-3.35
2442	7	PEAK	26.40	26.58	29.50	30.00	-0.50	3.33	32.83	36.02	-3.19
2447	8	PEAK	25.23	25.29	28.27	30.00	-1.73	3.33	31.60	36.02	-4.42
2452	9	PEAK	23.48	23.30	26.40	30.00	-3.60	3.33	29.73	36.02	-6.29
2457	10	PEAK	23.44	23.47	26.46	30.00	-3.54	3.33	29.79	36.02	-6.23
2462	11	PEAK	21.43	21.61	24.53	30.00	-5.47	3.33	27.86	36.02	-8.16
2467	12	PEAK	19.70	19.40	22.57	30.00	-7.43	3.33	25.90	36.02	-10.12

Table 7-32. Peak Conducted Output Power Measurements CDD (802.11ax - SU) – Mid Data Rate

High Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11b	802.11g	802.11n	802.11ax (SU)						
2412	1	PEAK	24.19	23.87	23.33	22.89	30.00	-5.81	-0.30	23.89	36.02	-12.13
2417	2	PEAK	24.09	26.57	26.46	25.93	30.00	-3.43	-0.30	26.27	36.02	-9.75
2422	3	PEAK	24.02	27.03	26.97	26.99	30.00	-2.97	-0.30	26.73	36.02	-9.29
2427	4	PEAK	24.15	27.37	27.36	27.26	30.00	-2.64	-0.30	27.07	36.02	-8.96
2432	5	PEAK	23.79	27.55	27.55	27.56	30.00	-2.44	-0.30	27.26	36.02	-8.76
2437	6	PEAK	23.82	27.64	27.61	27.59	30.00	-2.36	-0.30	27.34	36.02	-8.68
2442	7	PEAK	23.95	27.42	27.34	27.39	30.00	-2.58	-0.30	27.12	36.02	-8.90
2447	8	PEAK	24.18	27.01	27.02	26.83	30.00	-2.98	-0.30	26.72	36.02	-9.30
2452	9	PEAK	23.81	26.90	26.73	26.52	30.00	-3.10	-0.30	26.60	36.02	-9.42
2457	10	PEAK	23.97	26.11	26.05	25.78	30.00	-3.89	-0.30	25.81	36.02	-10.21
2462	11	PEAK	23.93	24.45	24.68	23.98	30.00	-5.32	-0.30	24.38	36.02	-11.64
2467	12	PEAK	22.49	22.41	22.27	22.39	30.00	-7.51	-0.30	22.19	36.02	-13.83
2472	13	PEAK	19.28	18.06	17.88	-	30.00	-10.72	-0.30	18.98	36.02	-17.04

Table 7-33. Peak Conducted Output Power Measurements Antenna 3a – High Data Rate

Freq [MHz]	Channel	Detector	Conducted Power [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]
			802.11b	802.11g	802.11n	802.11ax (SU)						
2412	1	PEAK	24.04	24.13	23.56	22.86	30.00	-5.87	0.90	25.03	36.02	-10.99
2417	2	PEAK	23.98	26.49	26.43	25.91	30.00	-3.51	0.90	27.39	36.02	-8.63
2422	3	PEAK	24.05	26.90	26.86	26.79	30.00	-3.10	0.90	27.80	36.02	-8.22
2427	4	PEAK	23.77	27.09	27.06	26.99	30.00	-2.91	0.90	27.99	36.02	-8.03
2432	5	PEAK	24.04	27.26	27.23	27.18	30.00	-2.74	0.90	28.16	36.02	-7.86
2437	6	PEAK	24.09	27.24	27.22	27.22	30.00	-2.76	0.90	28.14	36.02	-7.88
2442	7	PEAK	24.05	27.07	27.01	27.12	30.00	-2.88	0.90	28.02	36.02	-8.00
2447	8	PEAK	23.88	26.92	26.77	26.63	30.00	-3.08	0.90	27.82	36.02	-8.20
2452	9	PEAK	24.07	26.62	26.61	26.33	30.00	-3.38	0.90	27.52	36.02	-8.50
2457	10	PEAK	24.14	26.02	26.07	25.89	30.00	-3.93	0.90	26.97	36.02	-9.05
2462	11	PEAK	23.99	24.58	24.38	23.78	30.00	-5.42	0.90	25.48	36.02	-10.54
2467	12	PEAK	22.48	22.66	22.51	22.65	30.00	-7.34	0.90	23.56	36.02	-12.46
2472	13	PEAK	19.27	17.98	18.23	-	30.00	-10.73	0.90	20.17	36.02	-15.85

Table 7-34. Peak Conducted Output Power Measurements Antenna 1a – High Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	23.71	23.97	26.85	30.00	-3.15	3.33	30.18	36.02	-5.84
2417	2	PEAK	26.53	26.45	29.50	30.00	-0.50	3.33	32.83	36.02	-3.19
2422	3	PEAK	26.31	26.32	29.32	30.00	-0.68	3.33	32.65	36.02	-3.37
2427	4	PEAK	26.20	26.37	29.30	30.00	-0.70	3.33	32.63	36.02	-3.39
2432	5	PEAK	26.42	26.40	29.42	30.00	-0.58	3.33	32.75	36.02	-3.27
2437	6	PEAK	26.57	26.18	29.39	30.00	-0.61	3.33	32.72	36.02	-3.30
2442	7	PEAK	26.24	26.35	29.30	30.00	-0.70	3.33	32.63	36.02	-3.39
2447	8	PEAK	26.39	26.00	29.21	30.00	-0.79	3.33	32.54	36.02	-3.48
2452	9	PEAK	26.43	26.18	29.32	30.00	-0.68	3.33	32.65	36.02	-3.37
2457	10	PEAK	26.10	25.97	29.04	30.00	-0.96	3.33	32.37	36.02	-3.65
2462	11	PEAK	24.50	24.43	27.47	30.00	-2.53	3.33	30.80	36.02	-5.22
2467	12	PEAK	22.45	22.59	25.53	30.00	-4.47	3.33	28.86	36.02	-7.16
2472	13	PEAK	18.13	18.09	21.12	30.00	-8.88	3.33	24.45	36.02	-11.57

Table 7-35. Peak Conducted Output Power Measurements CDD (802.11g) – High Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	23.79	23.63	26.72	30.00	-3.28	3.33	30.05	36.02	-5.97
2417	2	PEAK	26.30	26.51	29.42	30.00	-0.58	3.33	32.75	36.02	-3.27
2422	3	PEAK	26.34	26.38	29.37	30.00	-0.63	3.33	32.70	36.02	-3.32
2427	4	PEAK	26.37	26.38	29.39	30.00	-0.61	3.33	32.72	36.02	-3.30
2432	5	PEAK	26.42	26.37	29.40	30.00	-0.60	3.33	32.73	36.02	-3.29
2437	6	PEAK	26.54	26.24	29.40	30.00	-0.60	3.33	32.73	36.02	-3.29
2442	7	PEAK	26.27	26.33	29.31	30.00	-0.69	3.33	32.64	36.02	-3.38
2447	8	PEAK	26.17	26.64	29.42	30.00	-0.58	3.33	32.75	36.02	-3.27
2452	9	PEAK	26.48	26.30	29.40	30.00	-0.60	3.33	32.73	36.02	-3.29
2457	10	PEAK	26.20	26.06	29.14	30.00	-0.86	3.33	32.47	36.02	-3.55
2462	11	PEAK	24.76	24.60	27.69	30.00	-2.31	3.33	31.02	36.02	-5.00
2467	12	PEAK	22.76	22.74	25.76	30.00	-4.24	3.33	29.09	36.02	-6.93
2472	13	PEAK	18.29	18.32	21.31	30.00	-8.69	3.33	24.64	36.02	-11.38

Table 7-36. Peak Conducted Output Power Measurements CDD (802.11n) – High Data Rate

Freq [MHz]	Channel	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]
			Antenna 3a	Antenna 1a	Summed						
2412	1	PEAK	23.31	23.01	26.17	30.00	-3.83	3.33	29.50	36.02	-6.52
2417	2	PEAK	25.94	26.10	29.03	30.00	-0.97	3.33	32.36	36.02	-3.66
2422	3	PEAK	26.32	26.37	29.35	30.00	-0.65	3.33	32.68	36.02	-3.34
2427	4	PEAK	26.23	26.36	29.31	30.00	-0.69	3.33	32.64	36.02	-3.38
2432	5	PEAK	26.45	26.35	29.41	30.00	-0.59	3.33	32.74	36.02	-3.28
2437	6	PEAK	26.56	26.19	29.39	30.00	-0.61	3.33	32.72	36.02	-3.30
2442	7	PEAK	26.21	26.38	29.31	30.00	-0.69	3.33	32.64	36.02	-3.38
2447	8	PEAK	26.32	26.34	29.34	30.00	-0.66	3.33	32.67	36.02	-3.35
2452	9	PEAK	26.15	25.93	29.05	30.00	-0.95	3.33	32.38	36.02	-3.64
2457	10	PEAK	25.72	25.67	28.70	30.00	-1.30	3.33	32.03	36.02	-3.99
2462	11	PEAK	24.27	23.82	27.06	30.00	-2.94	3.33	30.39	36.02	-5.63
2467	12	PEAK	22.36	22.44	25.41	30.00	-4.59	3.33	28.74	36.02	-7.28

Table 7-37. Peak Conducted Output Power Measurements CDD (802.11ax - SU) – High Data Rate

Note:

Per ANSI C63.10-2020 and KDB 662911 D01 v02r01 Section E)1), the conducted powers at Antenna 3a and Antenna 1a 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 C63.10-2020 Section 14.6.3. the directional gain is calculated using the following formula, where GN is the gain of the nth antenna and N_{ANT}, the total number of antennas used.

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

Sample CDD Calculation:

At 2412MHz the average conducted output power was measured to be 13.37 dBm for Antenna 3a and 13.03 dBm for Antenna 1a.

Antenna 3a + Antenna 1a = CDD

(13.37 dBm + 13.03 dBm) = (21.727 mW + 20.091 mW) = 41.818 mW = 16.21 dBm

Sample e.i.r.p. Calculation:

At 2412MHz the average conducted output power was measured to be 16.21 dBm with directional gain of 3.33 dBi.

e.i.r.p (dBm) = Conducted Power (dBm) + Ant gain (dBi)

16.21 dBm + 3.33 dBi = 19.54 dBm

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 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 C63.10-2020 – Subclause 11.10.2 Method PKPSD
KDB 558074 D01 v05r02 – Section 8.4 DTS Maximum Power Spectral Density level in the fundamental emission
ANSI C63.10-2020 – 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

The data rates have been classified into three different groups: low data rate, middle data rate, and high data rate. All three data rate groups have been investigated and only the worst data rate per group is reported.

7.4.1 Antenna 3a Power Spectral Density Measurements

Frequency [MHz]	Channel No.	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/3kHz]	Max Power Density [dBm/3kHz]	Margin [dB]	Pass/Fail
2412	1	g	12	-8.79	8.00	-16.79	Pass
2437	6	g	12	-1.22	8.00	-9.22	Pass
2462	11	g	12	-7.43	8.00	-15.43	Pass
2412	1	n	19.5/21.7 (MCS2)	-9.30	8.00	-17.30	Pass
2437	6	n	19.5/21.7 (MCS2)	-2.34	8.00	-10.34	Pass
2462	11	n	19.5/21.7 (MCS2)	-8.63	8.00	-16.63	Pass
2412	1	ax (SU)	24/25.8 (MCS2)	-10.19	8.00	-18.19	Pass
2437	6	ax (SU)	24/25.8 (MCS2)	-4.10	8.00	-12.10	Pass
2462	11	ax (SU)	24/25.8 (MCS2)	-10.11	8.00	-18.11	Pass

Table 7-38. Conducted Power Density Measurements Antenna 3a (Low Data Rate)

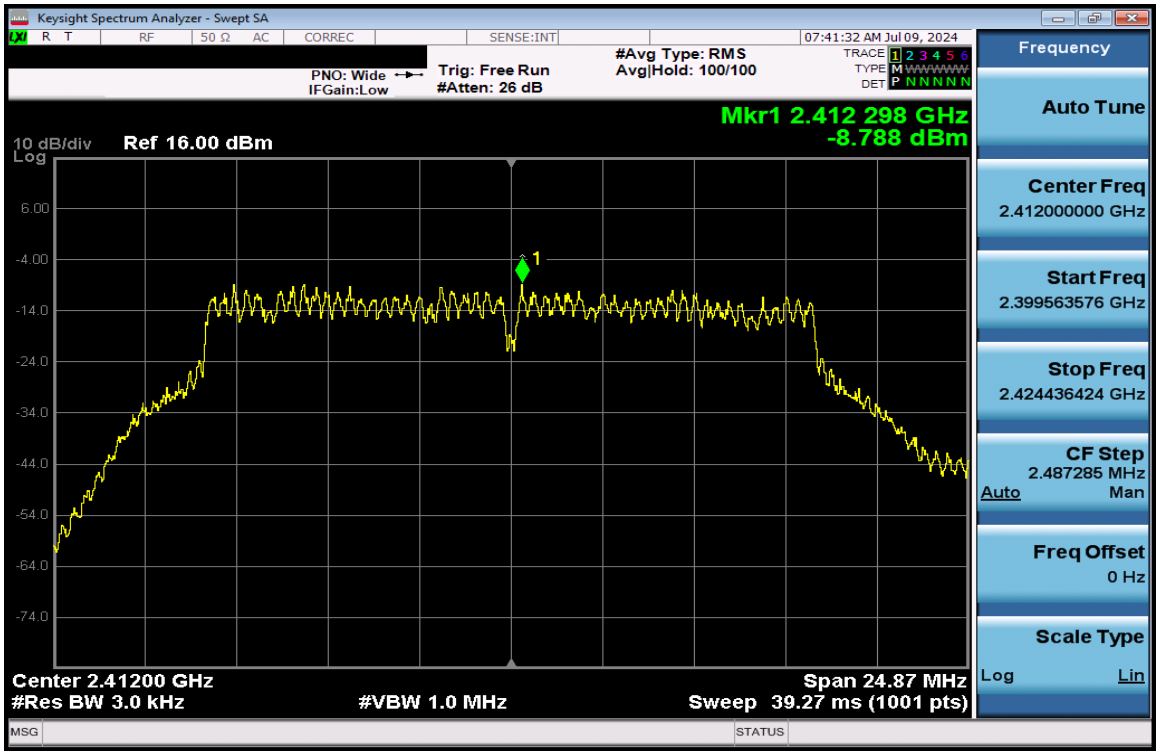
Frequency [MHz]	Channel No.	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/3kHz]	Max Power Density [dBm/3kHz]	Margin [dB]	Pass/Fail
2412	1	g	24	-9.46	8.00	-17.46	Pass
2437	6	g	24	-1.95	8.00	-9.95	Pass
2462	11	g	24	-8.38	8.00	-16.38	Pass
2412	1	n	39/43.3 (MCS4)	-10.02	8.00	-18.02	Pass
2437	6	n	39/43.3 (MCS4)	-2.12	8.00	-10.12	Pass
2462	11	n	39/43.3 (MCS4)	-8.23	8.00	-16.23	Pass
2412	1	ax (SU)	49/51.6 (MCS4)	-10.69	8.00	-18.69	Pass
2437	6	ax (SU)	49/51.6 (MCS4)	-3.14	8.00	-11.14	Pass
2462	11	ax (SU)	49/51.6 (MCS4)	-9.71	8.00	-17.71	Pass

Table 7-39. Conducted Power Density Measurements Antenna 3a (Mid Data Rate)

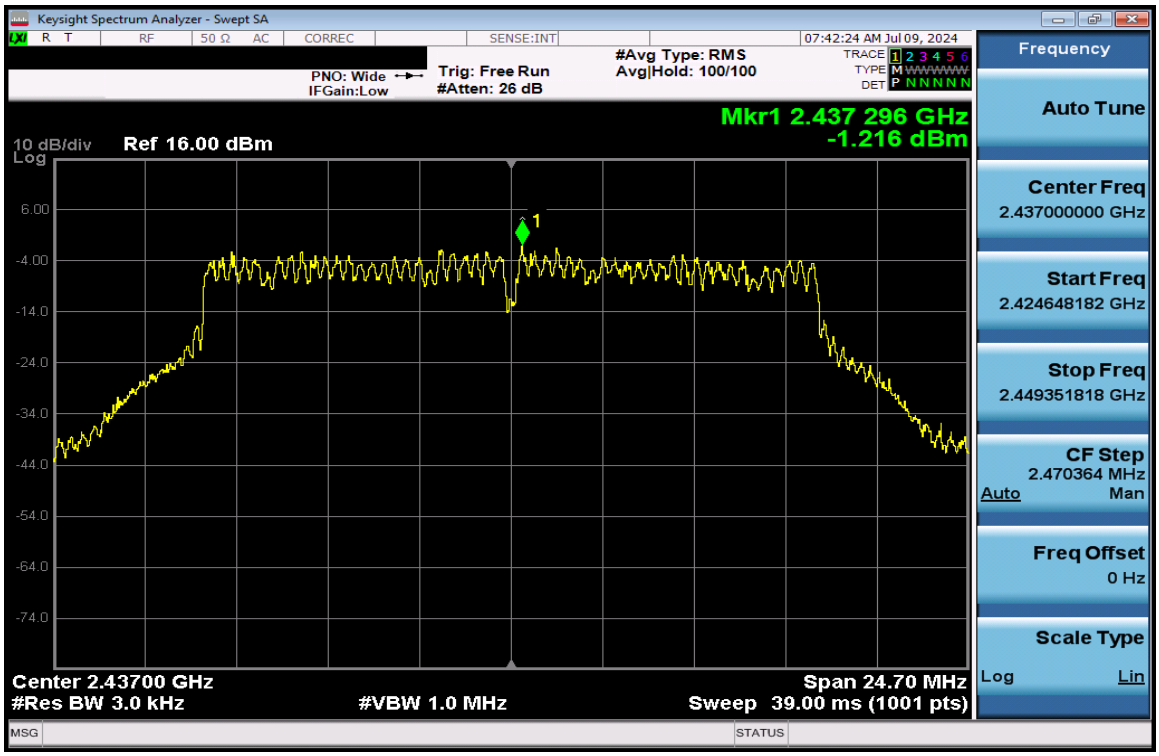
Frequency [MHz]	Channel No.	802.11 MODE	Data Rate [Mbps]	Measured Power Density [dBm/3kHz]	Max Power Density [dBm/3kHz]	Margin [dB]	Pass/Fail
2412	1	b	11	-1.23	8.00	-9.23	Pass
2437	6	b	11	-1.47	8.00	-9.47	Pass
2462	11	b	11	-1.40	8.00	-9.40	Pass
2412	1	g	54	-10.67	8.00	-18.67	Pass
2437	6	g	54	-3.03	8.00	-11.03	Pass
2462	11	g	54	-9.52	8.00	-17.52	Pass
2412	1	n	65/72.2 (MCS7)	-10.08	8.00	-18.08	Pass
2437	6	n	65/72.2 (MCS7)	-3.00	8.00	-11.00	Pass
2462	11	n	65/72.2 (MCS7)	-9.31	8.00	-17.31	Pass
2412	1	ax (SU)	81/86 (MCS9)	-10.71	8.00	-18.71	Pass
2437	6	ax (SU)	81/86 (MCS9)	-3.77	8.00	-11.77	Pass
2462	11	ax (SU)	81/86 (MCS9)	-9.64	8.00	-17.64	Pass

Table 7-40. Conducted Power Density Measurements Antenna 3a (High Data Rate)

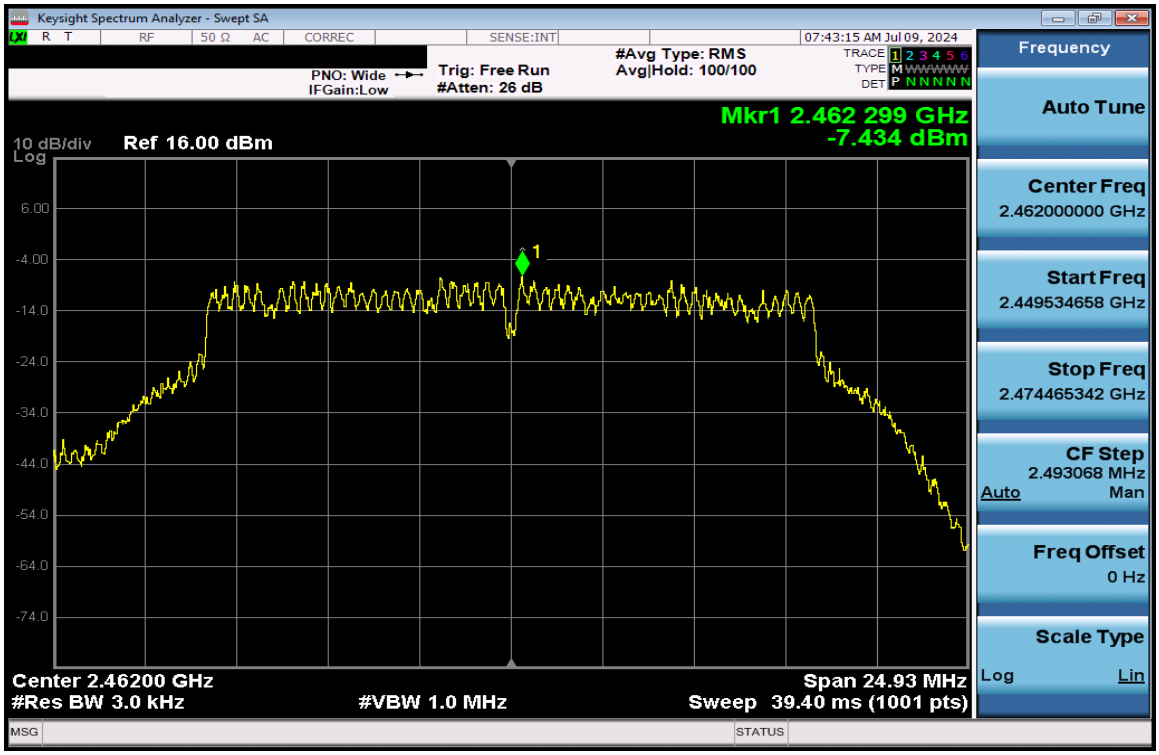
Low Rate



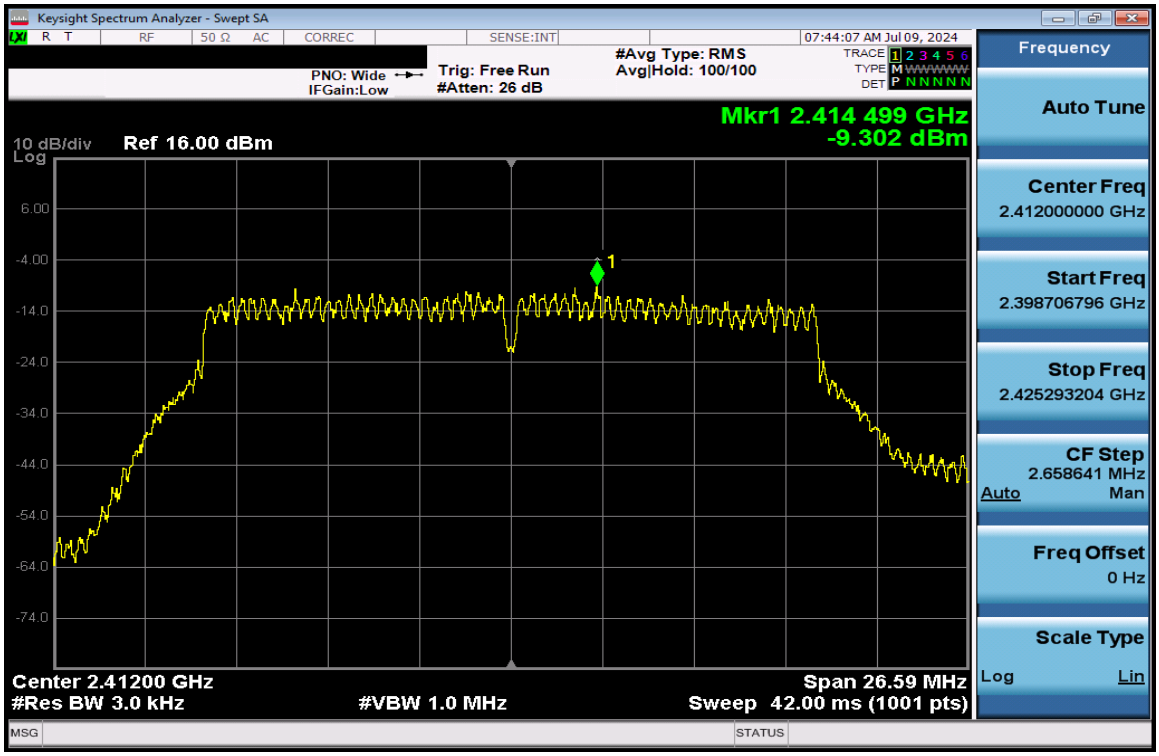
Plot 7-61. Power Spectral Density Plot Antenna 3a (802.11g – Ch. 1) – 12Mbps



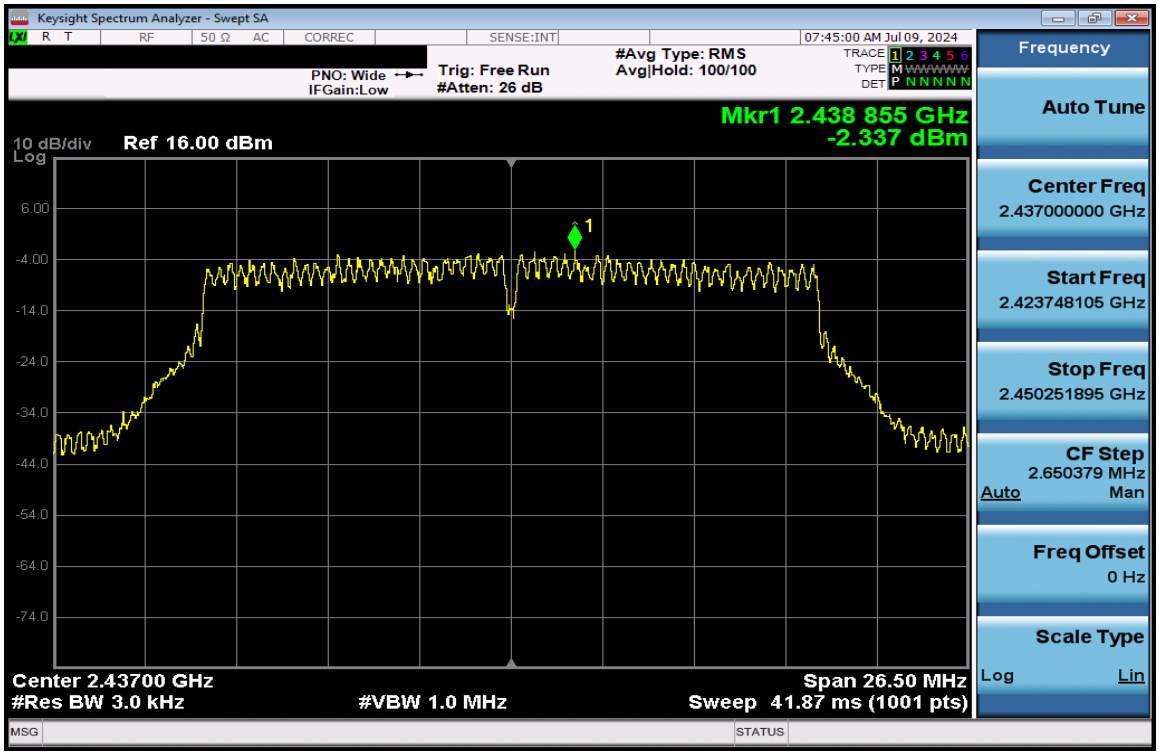
Plot 7-62. Power Spectral Density Plot Antenna 3a (802.11g – Ch. 6) – 12Mbps



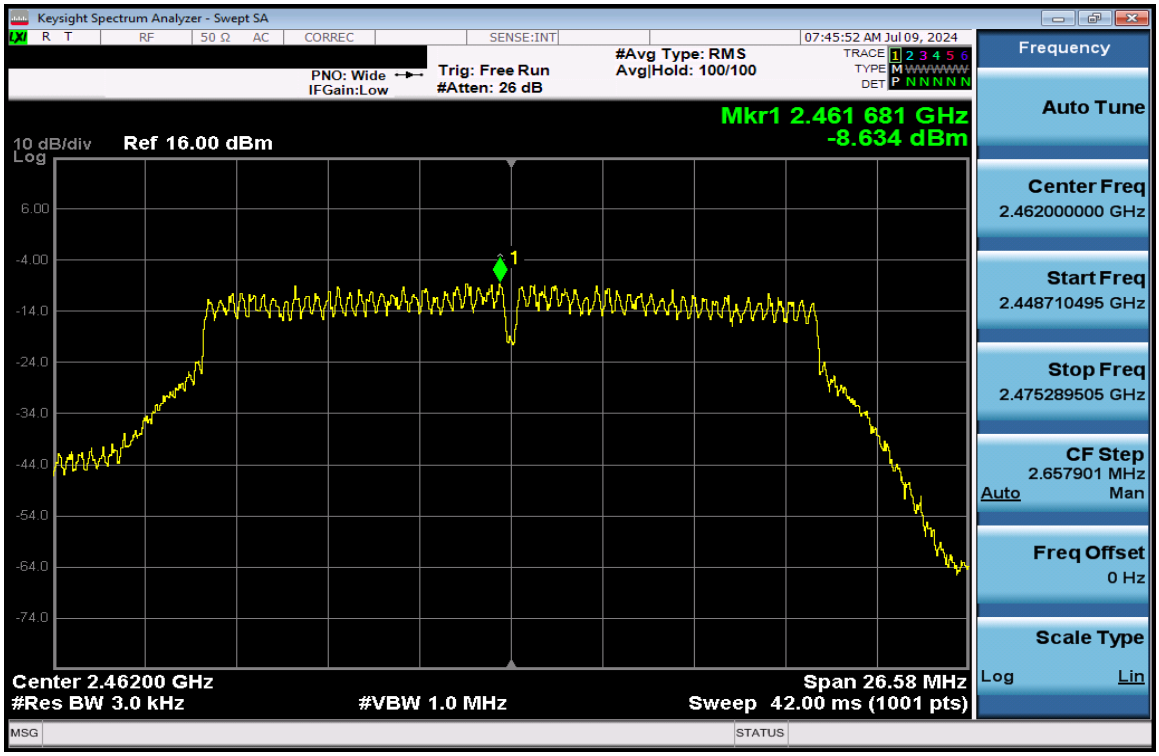
Plot 7-63. Power Spectral Density Plot Antenna 3a (802.11g – Ch. 11) – 12Mbps



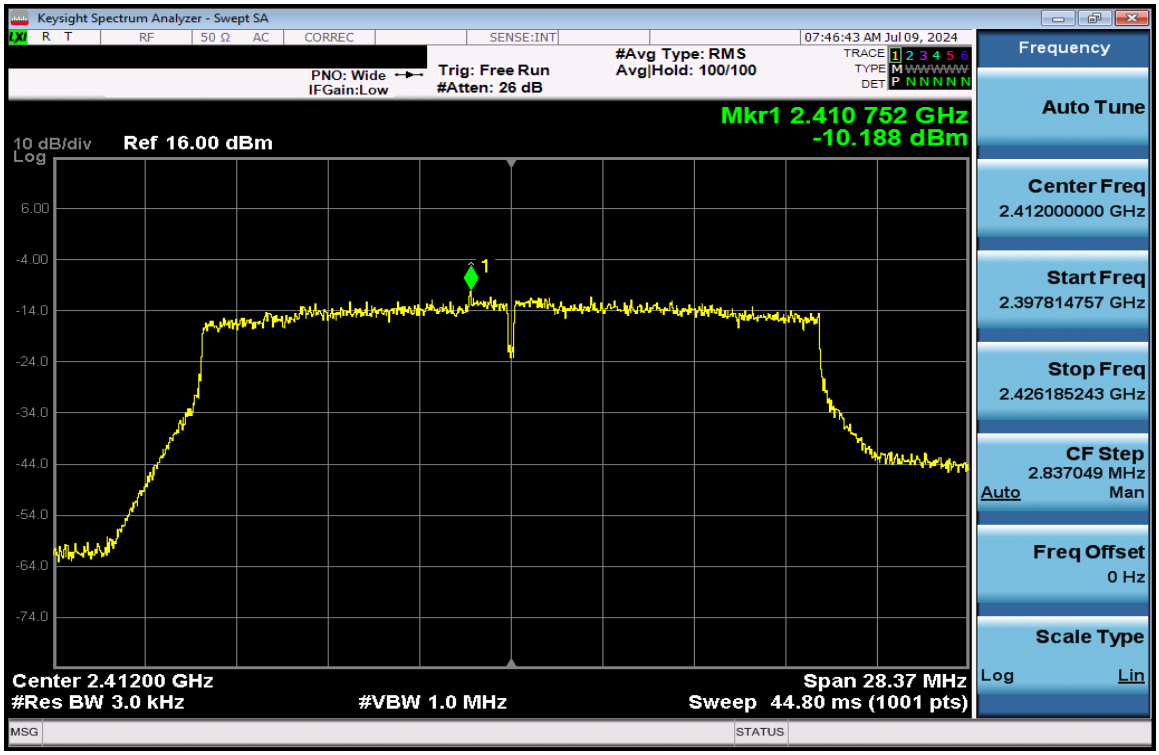
Plot 7-64. Power Spectral Density Plot Antenna 3a (802.11n (2.4GHz) – Ch. 1) – MCS2



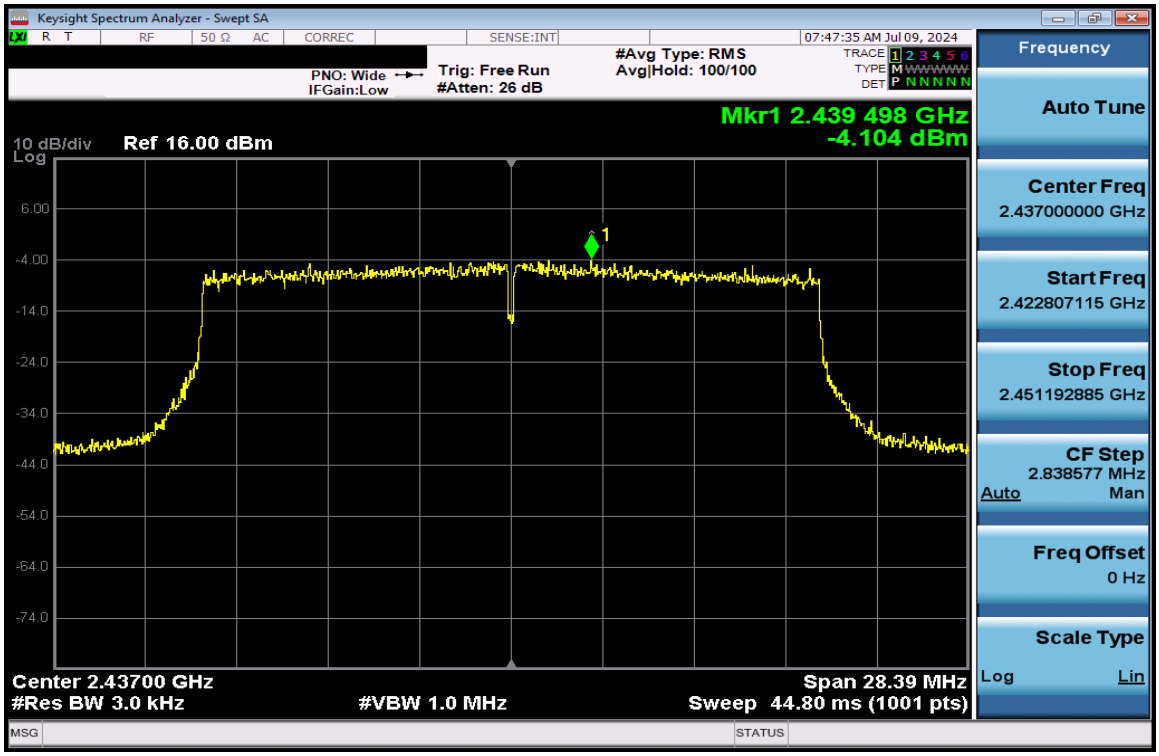
Plot 7-65. Power Spectral Density Plot Antenna 3a (802.11n (2.4GHz) – Ch. 6) – MCS2



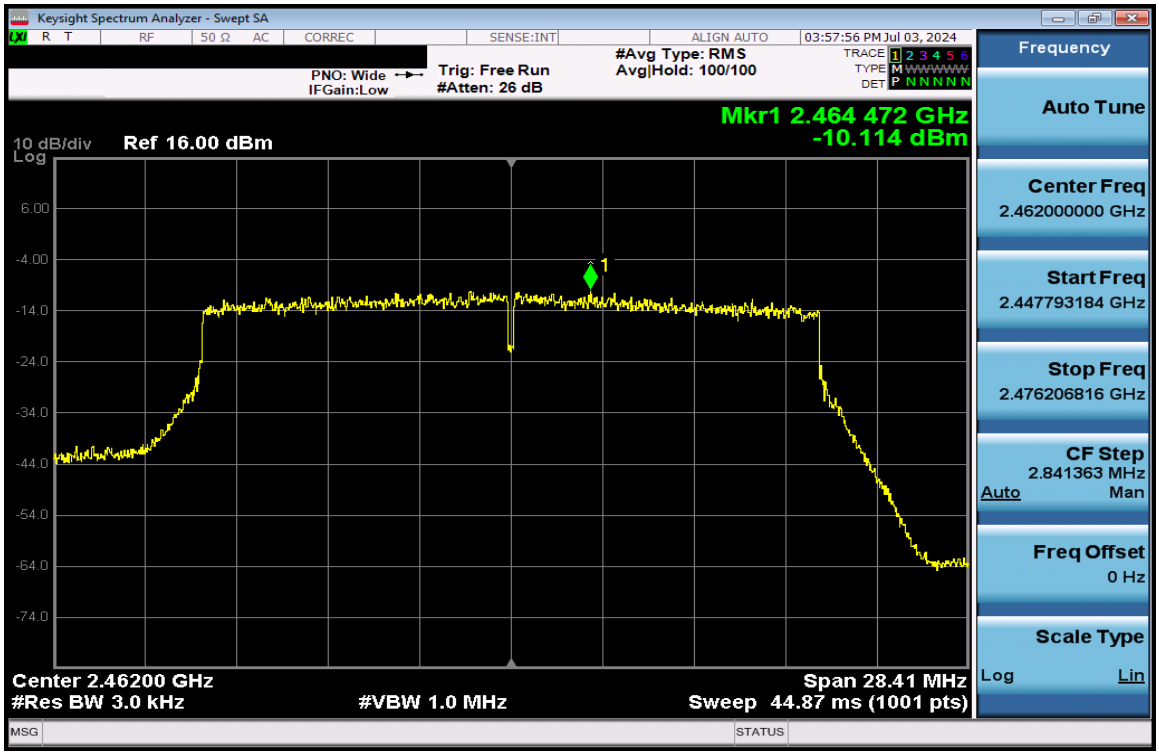
Plot 7-66. Power Spectral Density Plot Antenna 3a (802.11n (2.4GHz) – Ch. 11) – MCS2



Plot 7-67. Power Spectral Density Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS2

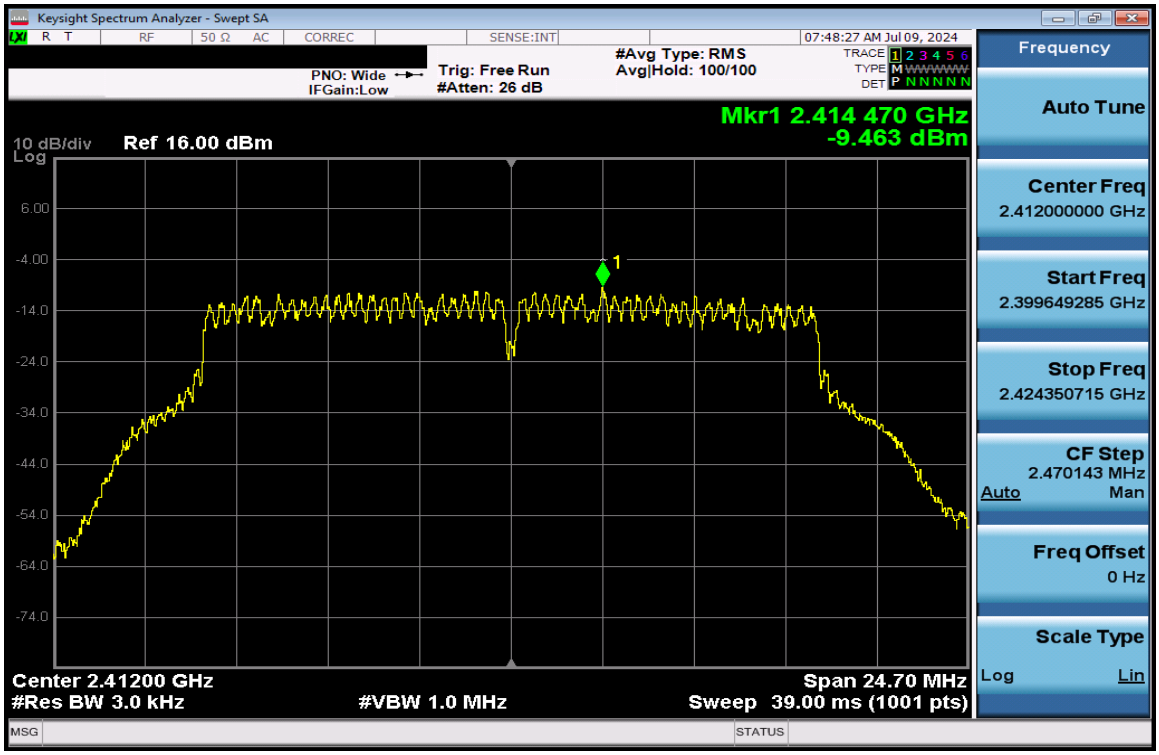


Plot 7-68. Power Spectral Density Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS2

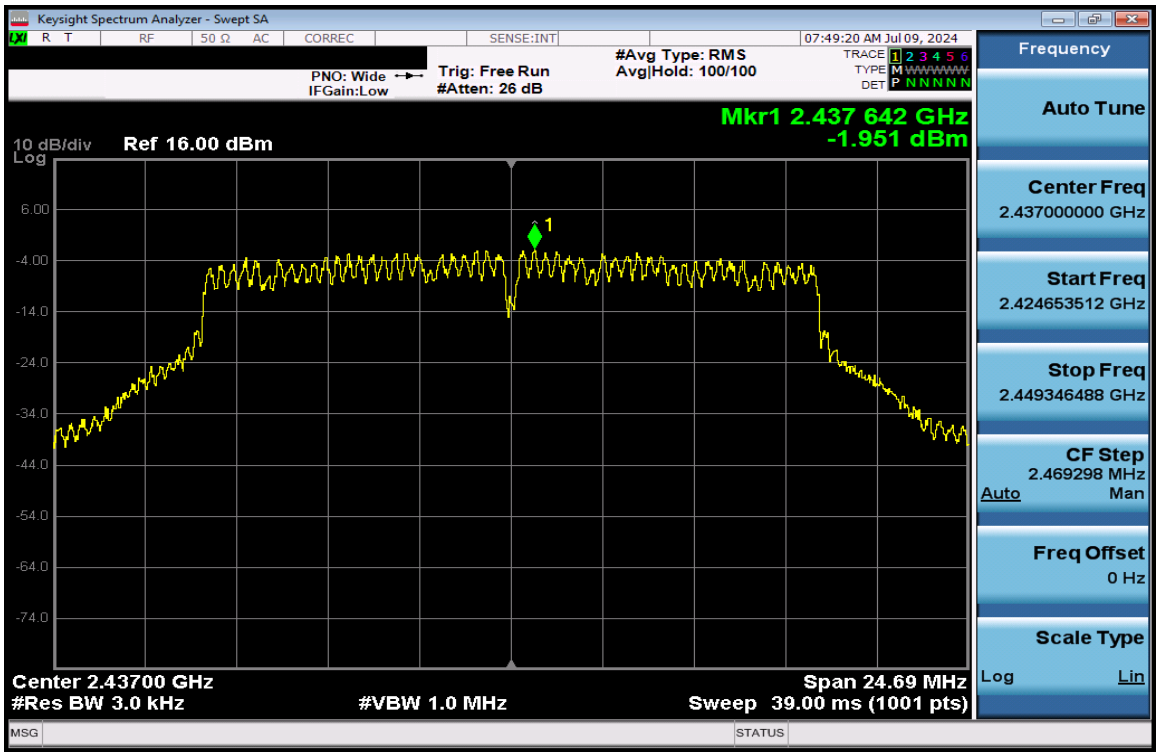


Plot 7-69. Power Spectral Density Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS2

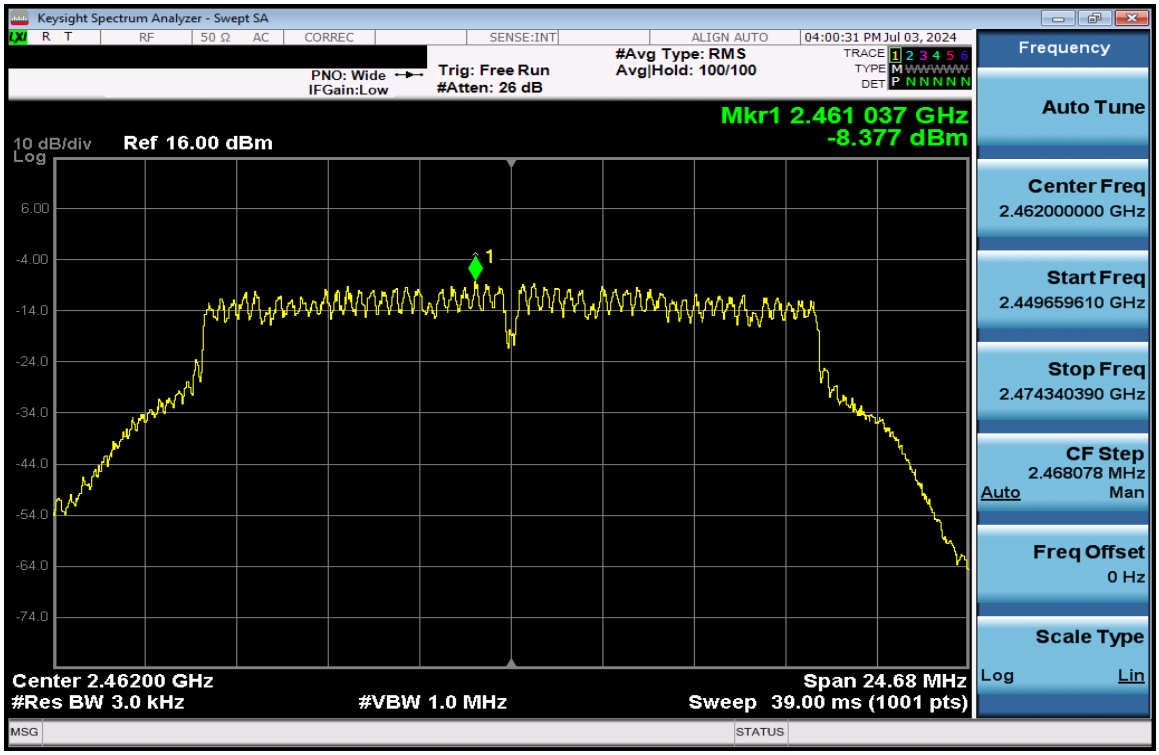
Mid Rate



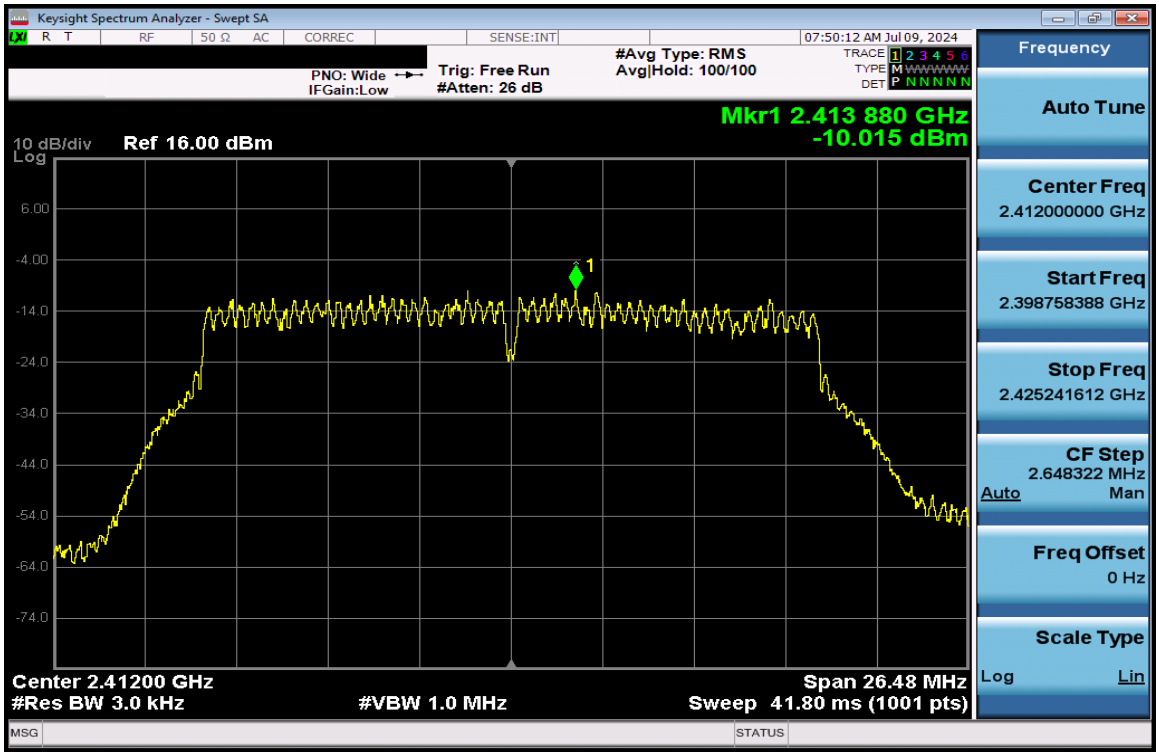
Plot 7-70. Power Spectral Density Plot Antenna 3a (802.11g – Ch. 1) – 24Mbps



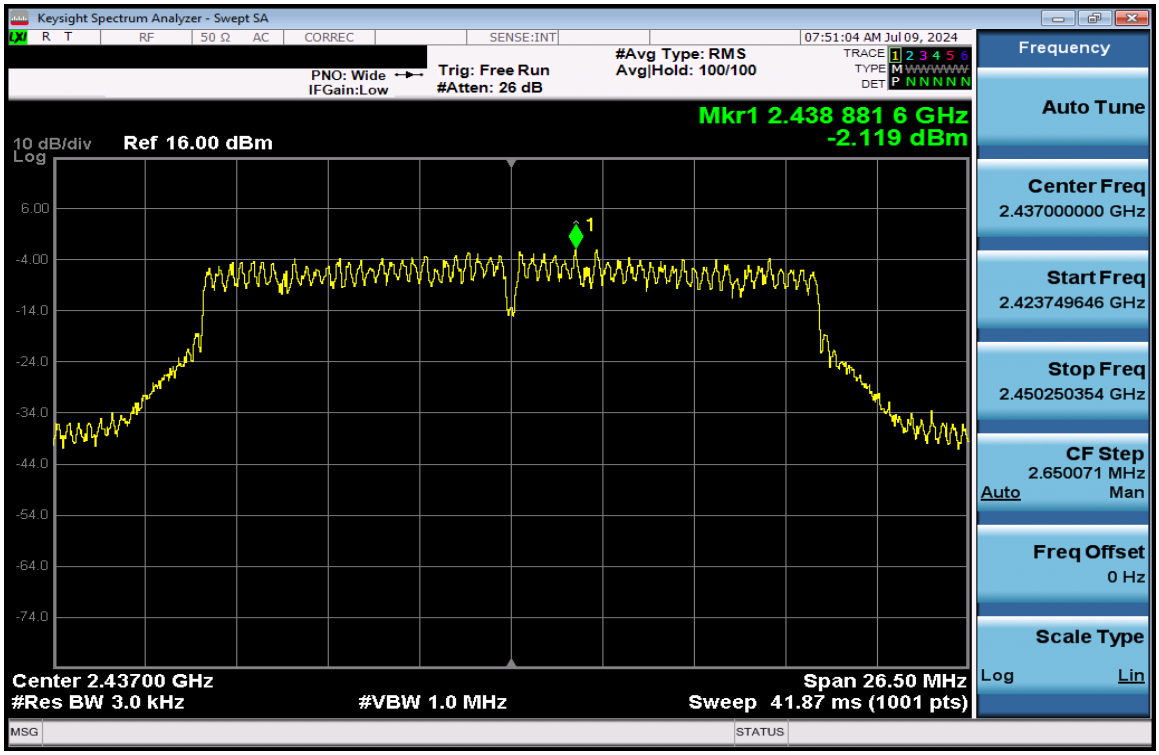
Plot 7-71. Power Spectral Density Plot Antenna 3a (802.11g – Ch. 6) – 24Mbps



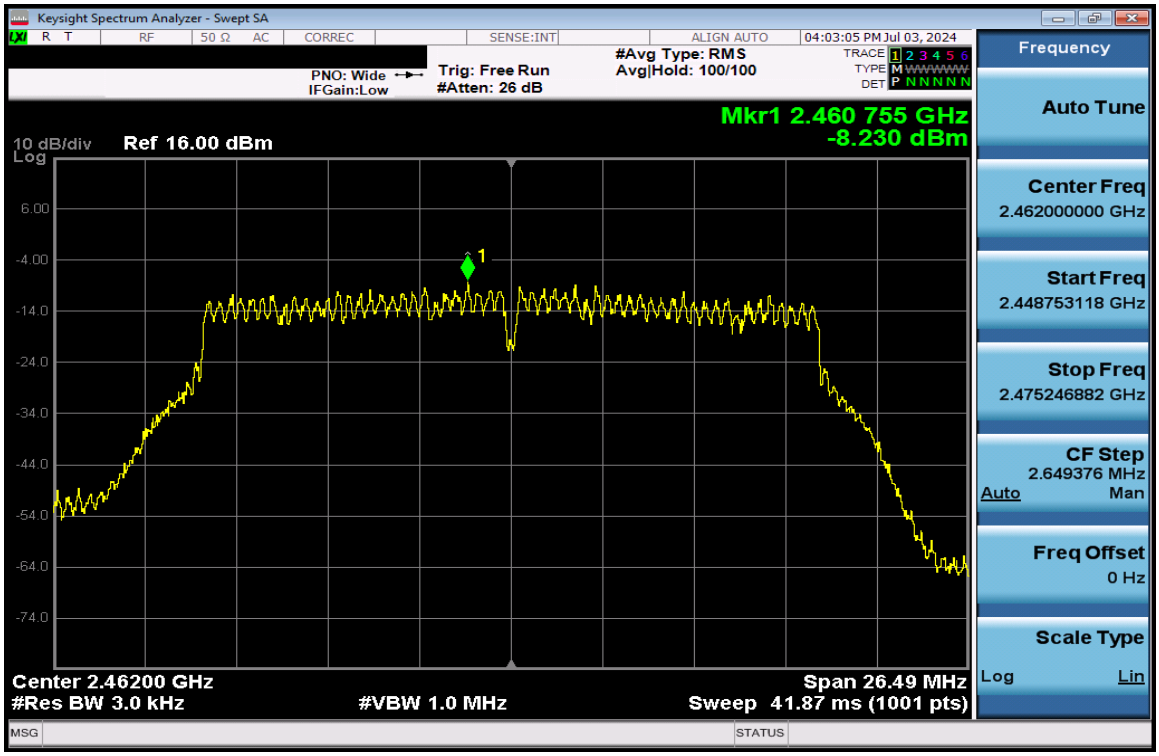
Plot 7-72. Power Spectral Density Plot Antenna 3a (802.11g – Ch. 11) – 24Mbps



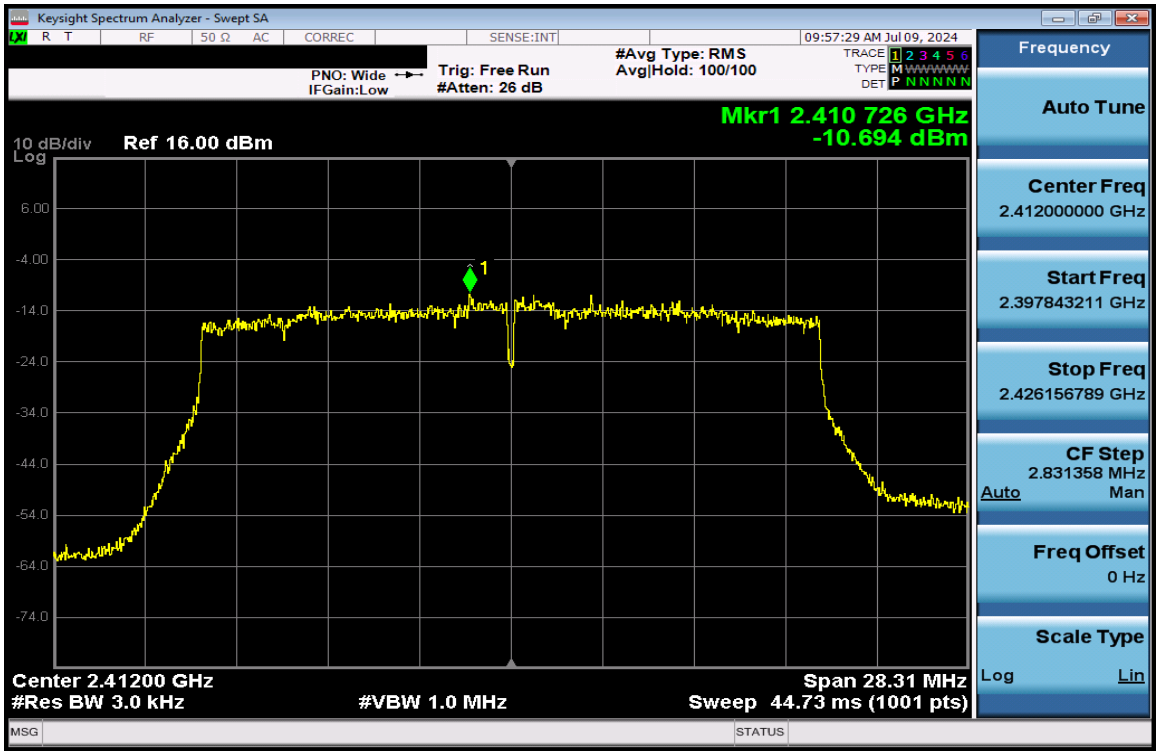
Plot 7-73. Power Spectral Density Plot Antenna 3a (802.11n (2.4GHz) – Ch. 1) – MCS4



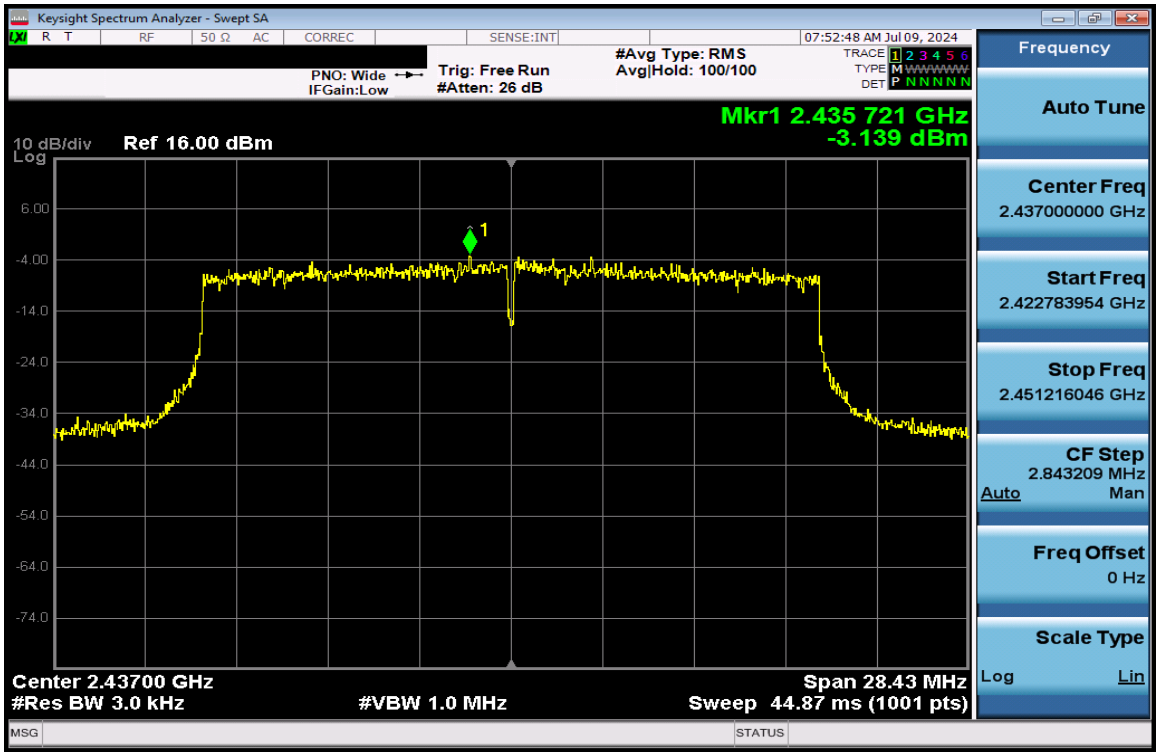
Plot 7-74. Power Spectral Density Plot Antenna 3a (802.11n (2.4GHz) – Ch. 6) – MCS4



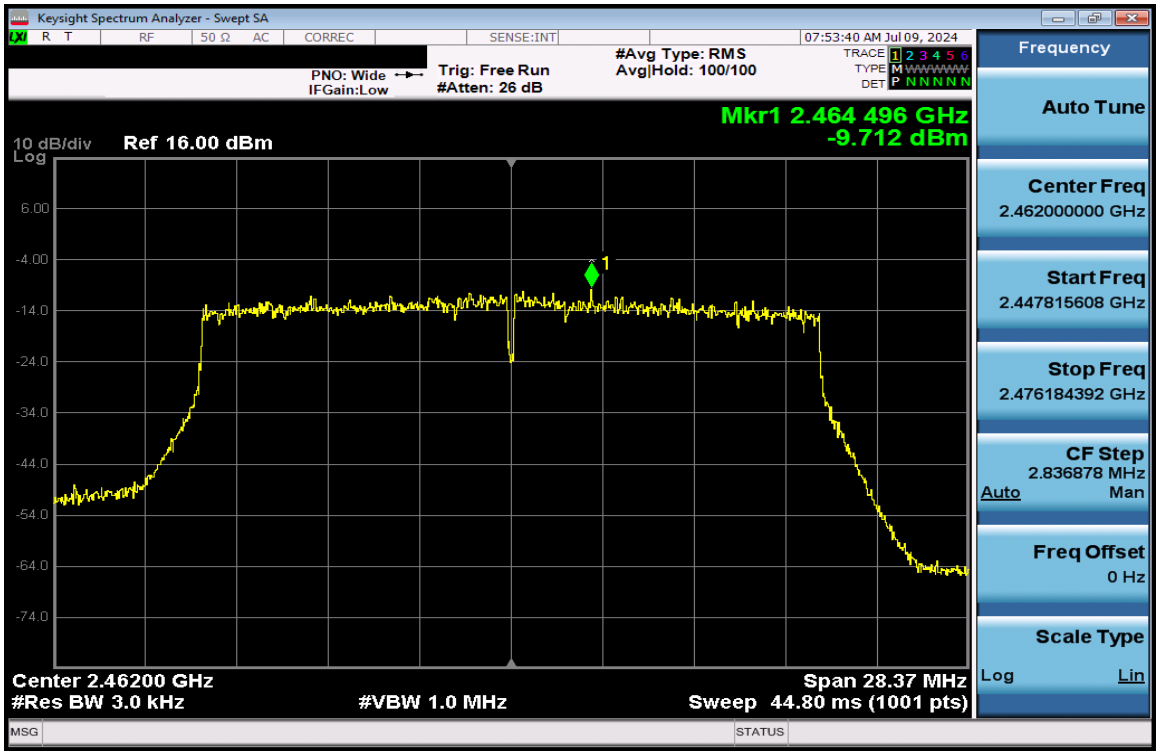
Plot 7-75. Power Spectral Density Plot Antenna 3a (802.11n (2.4GHz) – Ch. 11) – MCS4



Plot 7-76. Power Spectral Density Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 1) – MCS4

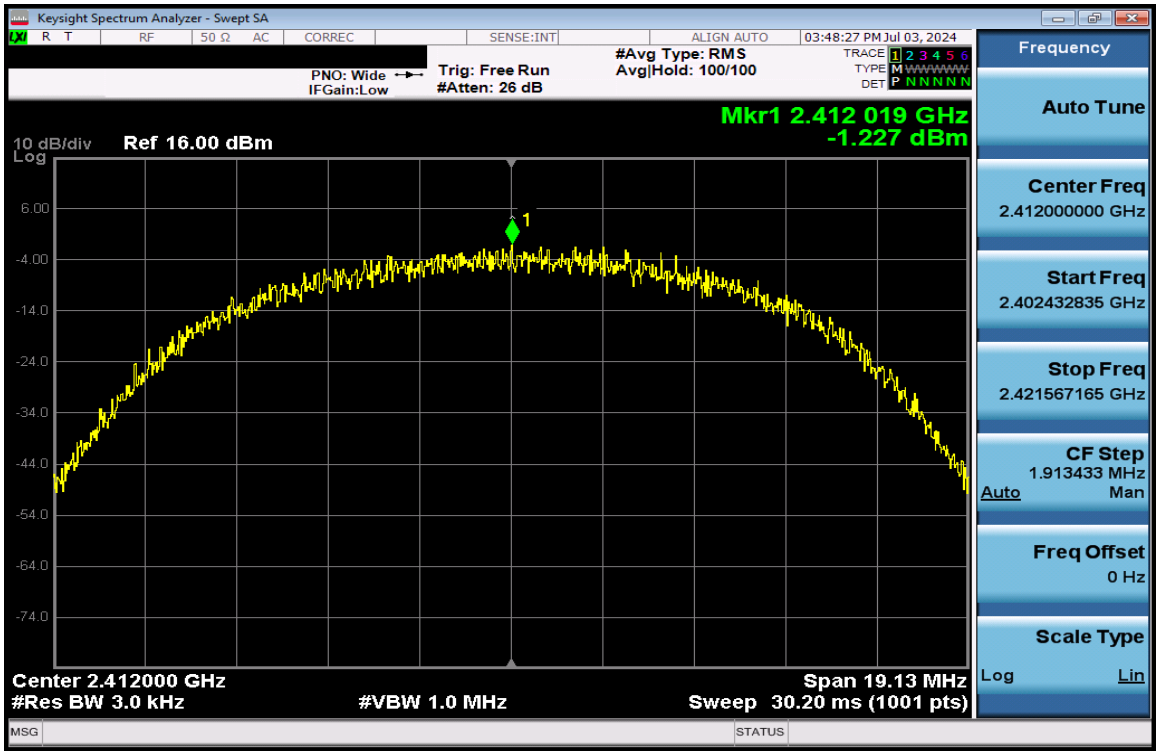


Plot 7-77. Power Spectral Density Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 6) – MCS4

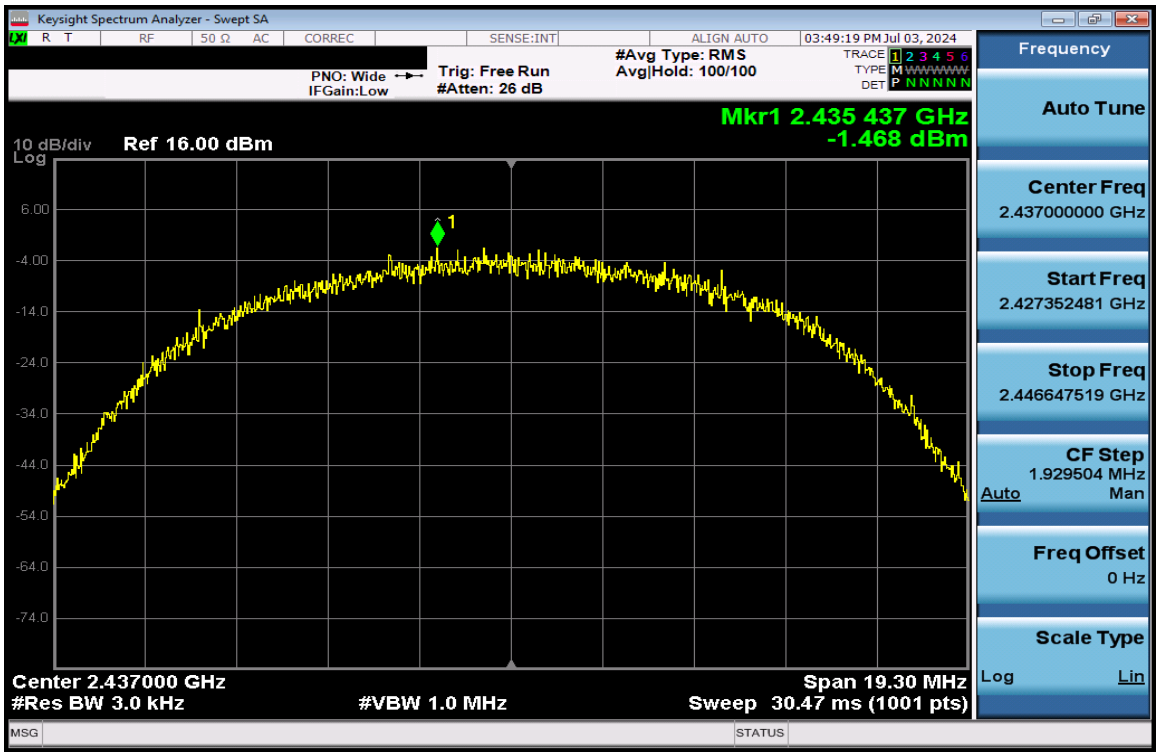


Plot 7-78. Power Spectral Density Plot Antenna 3a (802.11ax (SU - 2.4GHz) – Ch. 11) – MCS4

High Rate



Plot 7-79. Power Spectral Density Plot Antenna 3a (802.11b – Ch. 1) – 11Mbps



Plot 7-80. Power Spectral Density Plot Antenna 3a (802.11b – Ch. 6) – 11Mbps