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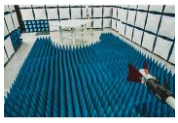

MEASUREMENT REPORT
FCC PART 15.407 / ISED RSS-248 UNII 802.11ax OFDMA WIFI 6E

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

Date of Testing:
11/28/2023 - 04/04/2024
Test Report Issue Date:
03/28/2024
Test Site/Location:
Element Materials Technology, Morgan Hill, CA, USA
Test Report Serial No.:
1C2311270064-27-R1.BCG

FCC ID:	**BCGA2903**
IC:	**579C-A2903**
APPLICANT:	**Apple Inc.**

Application Type:	Certification
Model/HVIN:	A2903, A2904
EUT Type:	Tablet Device
Frequency Range:	5955 – 7115MHz
Modulation Type:	OFDMA
FCC Classification:	15E 6GHz Low Power Dual Client (6CD)
FCC Rule Part(s):	Part 15 Subpart E (15.407)
ISED Specification:	RSS-248 Issue 2
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02 v02r01 KDB 662911 D01 v02r01, KDB 987594 D02 v02r01, KDB 987594 D04 v02

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013 and KDB 789033 D02 v02r01. Test results reported herein relate only to the item(s) tested.

This revised Test Report (S/N:1C2311270064-27-R1) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose accordingly.

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: WKR0000005796

Reviewed by: WKR0000005805

ACCREDITED
CERT #2041.02

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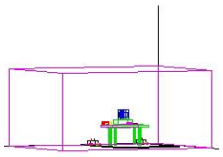
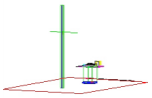


MEASUREMENT REPORT



UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO						CDD/SDM Primary		CDD/SDM Diversity	
				Antenna 3c		Antenna 3a		Antenna 1b		Summed		Summed	
				Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)
5	20	802.11ax	5955 - 6415	111.789	20.48	97.724	19.90	56.728	17.54	238.781	23.78	226.464	23.55
7		802.11ax	6535 - 6875	157.652	21.98	52.808	17.23	69.135	18.40	209.267	23.21	220.498	23.43
5	40	802.11ax	5965 - 6405	125.170	20.98	97.724	19.90	60.492	17.82	249.459	23.97	240.991	23.82
7		802.11ax	6565 - 6845	151.252	21.80	51.976	17.16	64.461	18.09	294.442	24.69	267.917	24.28
5	80	802.11ax	5985 - 6385	124.825	20.96	97.724	19.90	54.777	17.39	251.768	24.01	236.048	23.73
7		802.11ax	6545 - 6865	155.239	21.91	53.703	17.30	67.360	18.28	304.089	24.83	283.139	24.52
5	160	802.11ax	6025 - 6345	116.869	20.68	96.561	19.85	59.156	17.72	243.781	23.87	255.270	24.07
7		802.11ax	6665 - 6825	147.911	21.70	50.699	17.05	65.313	18.15	314.775	24.98	291.072	24.64

EUT Overview –SP Powers

UNII Band	Channel Bandwidth (MHz)	Mode	Tx Frequency (MHz)	SISO						SDM Primary		SDM Diversity	
				Antenna 3c		Antenna 3a		Antenna 1b		Summed		Summed	
				Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)	Max. e.i.r.p (mW)	Max. e.i.r.p (dBm)
5	20	802.11ax	5955 - 6415	6.950	8.42	5.495	7.40	3.548	5.50	7.345	8.66	6.310	8.00
6		802.11ax	6435 - 6515	7.079	8.50	4.266	6.30	4.150	6.18	6.761	8.30	6.637	8.22
7		802.11ax	6535 - 6875	7.015	8.46	2.360	3.73	3.475	5.41	6.339	8.02	7.096	8.51
8		802.11ax	6895 - 7095	6.683	8.25	1.799	2.55	1.528	1.84	6.622	8.21	6.457	8.10
5	40	802.11ax	5965 - 6405	14.125	11.50	10.965	10.40	6.950	8.42	14.555	11.63	12.388	10.93
6		802.11ax	6445 - 6525	14.125	11.50	8.511	9.30	8.318	9.20	13.490	11.30	13.274	11.23
7		802.11ax	6565 - 6845	14.125	11.50	4.775	6.79	7.079	8.50	12.417	10.94	13.804	11.40
8		802.11ax	6885 - 7085	13.335	11.25	3.589	5.55	3.055	4.85	13.274	11.23	12.794	11.07
5	80	802.11ax	5985 - 6385	28.184	14.50	21.878	13.40	14.060	11.48	29.242	14.66	25.003	13.98
6		802.11ax	6465	27.861	14.45	16.788	12.25	16.596	12.20	26.730	14.27	26.122	14.17
7		802.11ax	6545 - 6865	28.184	14.50	9.550	9.80	13.804	11.40	25.177	14.01	28.249	14.51
8		802.11ax	6945 - 7025	26.546	14.24	6.982	8.44	6.053	7.82	26.792	14.28	25.882	14.13
5	160	802.11ax	6025 - 6345	50.119	17.00	38.905	15.90	25.119	14.00	51.168	17.09	43.954	16.43
6		802.11ax	6505	33.574	15.26	20.184	13.05	20.606	13.14	36.644	15.64	37.154	15.70
7		802.11ax	6665 - 6825	47.973	16.81	16.218	12.10	24.889	13.96	44.361	16.47	49.888	16.98
8		802.11ax	6985	47.315	16.75	12.474	10.96	10.471	10.20	47.534	16.77	45.920	16.62

EUT Overview – LPI Powers

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: BCGA2903** and **IC: 579C-A2903**. The test data contained in this report pertains only to the emissions due to the EUT's UNII transmitter while operating in the 6GHz band.

Test Device Serial No.: D23WW2YJ9K, QH92MDCV7G, X734W71Q61, JY9YRX67WR, DLXH09000370000EVP, P12JFWQ1T9

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), WPT, NB UNII (1x, HDR4, HDR8)

This device supports BT Beamforming

Standard Power (SP) mode is supported for U-NII Bands 5 and 7. Lower Power Indoor (LPI) mode is supported for U-NII Bands 5, 6, 7, 8. Throughout report, data of Standard Power mode is denoted as SP while data of Lower Power Indoor mode is denoted as LPI.

Band 5		Band 6		Band 7		Band 8	
Ch.	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**
1	5955	97	6435	117	6535	189	6895
:	:	:	:	:	:	:	:
45	6175	105	6475	149	6695	209	6995
:	:	:	:	:	:	:	:
93	6415	113	6515	185	6875	229	7095

Table 2-1. 802.11a / 802.11ax (20MHz) Frequency / Channel Operations

Band 5		Band 6		Band 7		Band 8	
Ch.	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**	**Ch.**	**Frequency (MHz)**
3	5965	99	6445	123	6565	187	6885
:	:	:	:	:	:	:	:
43	6165	107	6485	155	6725	211	7005
:	:	:	:	:	:	:	:
91	6405	115	6525	179	6845	227	7085

Table 2-2. 802.11ax (40MHz BW) Frequency / Channel Operations

Band 5		Band 6		Band 7		Band 8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
7	5985	103	6465	119	6545	199	6945
:	:			:	:	:	:
39	6145			151	6705	215	7025
:	:			:	:		
87	6385			183	6865		

Table 2-3. 802.11ax (80MHz BW) Frequency / Channel Operations

Band 5		Band 6		Band 7		Band 8	
Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)	Ch.	Frequency (MHz)
15	6025	111	6505	143	6665	207	6985
:	:			:	:		
47	6185			175	6825		
:	:						
79	6345						

Table 2-4. 802.11ax (160MHz BW) Frequency / Channel Operations

Notes:

1. 6GHz NII operation is possible in 20MHz, 40MHz, 80MHz and 160MHz channel bandwidths. 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 B)2)b) KDB 789033 D02 v02r01 and ANSI C63.10-2013. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

802.11 Mode / Band		Duty Cycle [%]				
		Antenna 3c	Antenna 3a	Antenna 1b	SDM Primary	SDM Diversity
6GHz	11ax(RU26) (20MHz)	88.75	88.74	88.41	88.87	88.87
	11ax(RU242) (20MHz)	90.86	91.05	90.66	91.46	91.07
	11ax(RU26) (40MHz)	88.62	88.45	88.74	88.47	88.72
	11ax(RU484) (40MHz)	92.70	92.54	91.17	92.39	92.70
	11ax(RU26) (80MHz)	88.75	87.37	88.60	88.75	88.75
	11ax(RU996) (80MHz)	87.60	88.91	87.37	87.40	87.10
	11ax(RU26) (160MHz)	88.60	88.45	88.75	88.45	88.89
	11ax(RU996x2) (160MHz)	81.64	82.10	82.03	81.32	81.01

Table 2-5. Measured Duty Cycles

2. The device employs MIMO technology. Below are the possible configurations.

WiFi Configurations		SISO			CDD			SDM			STBC		
		Antenna 3c	Antenna 3a	Antenna 1b	Antenna 3c	Antenna 3a	Antenna 1b	Antenna 3c	Antenna 3a	Antenna 1b	Antenna 3c	Antenna 3a	Antenna 1b
6GHz	11ax(RU) (20MHz)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(RU) (40MHz)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(RU) (80MHz)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	11ax(RU) (160MHz)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 2-6. WIFI Configurations

✓= Support ; × = NOT Support
SISO = Single Input Single Output
SDM = Spatial Diversity Multiplexing – MIMO function
CDD = Cyclic Delay Diversity - 2Tx Function
STBC = Space-Time Block Coding – 2Tx Function

Data Rate(s) Tested: 8/8.6, 16/17.2, 24/25.8, 33/34.4, 49/51.6, 65/68.8, 73/77.4, 81/86.0, 98/103.2, 108/114.7, 122/129.0, 135/143.4 (ax – 20MHz)
16/17.2, 33/34.4, 49/51.6, 65/68.8, 98/103.2, 130/137.6, 146/154.9, 163/172.1, 195/206.5, 217/229.4, 244/258.1, 271/286.8 (ax – 40MHz BW)
34/36.0, 68/72.1, 102/108.1, 136/144.1, 204/216.2, 272/288.2, 306/324.4, 340/360.3, 408/432.4, 453/480.4, 510/540.4, 567/600.5 (ax – 80MHz BW)
34/36, 68.1/72.1, 102.1/108.1, 136.1/144.1, 204.2/216.2, 272.2/288.2, 306.3/324.3, 340.3/360.3, 408.3/432.4, 453.7/480.4, 510.4/540.4, 567.1/600.5 (ax – 160MHz BW)
16.3/17.2, 32.5/34.4, 48.8/51.6, 65/68.8, 97.5/103.2, 130/137.6, 146.3/154.9, 162.5/172.1, 195/206.5, 216.7/229.4, 243.8/258.1, 270.8/286.8 (ax – 20MHz MIMO)
32.5/34.4, 65/68.8, 97.5/103.2, 130/137.6, 195/206.5, 260/275.3, 292.5/309.7, 325/344.1, 390/412.9, 433.3/458.8, 487.5/516.2, 541.7/573.5 (ax – 40MHz MIMO)
68.1/72.1, 136.1/144.1, 204.2/216.2, 272.2/288.2, 408.3/432.4, 544.4/576.5, 612.5/648.5, 680.6/720.6, 816.7/864.7, 907.4/960.8, 1020.8/1080.9, 1134.3/1201 (ax – 80/160MHz MIMO)
136.2/144.2, 272.2/288.2, 408.4/432.4, 544.4/576.4, 816.6/864.8, 1088.8/1153, 1225/1297, 1361.2/1441.2, 1633.4/1729.4, 1814.8/1921.6, 2041.6/2161.8, 2268.6/2402 (ax – 160MHz MIMO)

3. 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	Wifi 2GHz	Bluetooth	Thread	Wifi 5GHz	Wifi 6GHz	NB UNII	LTE/FR1 NR	
		802.11 b/g/n/ax	BDR, EDR, HDR4/8, LE1/2M	802.15.4	802.11 a/n/ac/ax	802.11 a/ax	BDR, HDR4/8	MB/HB	UHB
3a	Config 1	✗	✓	✗	✓	✗	✗	✓	✗
3a	Config 2	✗	✓	✗	✗	✓	✗	✓	✗
3a	Config 3	✓	✗	✗	✗	✗	✓	✓	✗
3a	Config 4	✗	✗	✓	✓	✗	✗	✓	✗
3a	Config 5	✗	✗	✓	✗	✓	✗	✓	✗
3a	Config 6	✓	✗	✗	✗	✗	✓	✗	✗
3a	Config 7	✓	✗	✗	✗	✗	✗	✓	✗
3a	Config 8	✗	✓	✗	✓	✗	✗	✗	✗
3a	Config 9	✗	✓	✗	✗	✓	✗	✗	✗
3a	Config 10	✗	✓	✗	✗	✗	✗	✓	✗
3a	Config 11	✗	✗	✓	✓	✗	✗	✗	✗
3a	Config 13	✗	✗	✓	✗	✓	✗	✗	✗
3a	Config 14	✗	✗	✓	✗	✗	✗	✓	✗
3a	Config 15	✗	✗	✗	✓	✗	✗	✓	✗
3a	Config 16	✗	✗	✗	✗	✓	✗	✓	✗
3a	Config 17	✗	✗	✗	✗	✗	✓	✓	✗
1a	Config 18	✓	✗	✗	✗	✗	✗	✗	✓
1a	Config 15	✗	✓	✗	✗	✗	✗	✗	✓
1a	Config 16	✗	✗	✓	✗	✗	✗	✗	✓
1b	Config 17	✗	✗	✗	✓	✗	✗	✓	✗
1b	Config 18	✗	✗	✗	✗	✓	✗	✓	✗
1b	Config 19	✗	✗	✗	✗	✗	✓	✓	✗

Table 2-7. Simultaneous Transmission Configurations

✓ = Support; × = Not Support

4. All All the above simultaneous transmission configurations have been tested and the worst-case configuration was found to be Config 1 and reported in RF Bluetooth, RF UNII, RF Part 27b, and RF RSS-199 test reports.

5. Specific 2.4GHz Wi-Fi antenna that can only transmit simultaneously with 2.4GHz Bluetooth aenna is listed in the SAR test report. For BT (2.4GHz) in connected mode and Wi-Fi (2.4GHz) - Wi-Fi max power will not exceed minimum of (13.5dBm, SAR max cap, Reg max cap) power. For BT (2.4GHz) in disconnected mode and Wi-Fi (2.4GHz) - BT will be using iPA only and Wi-Fi max power will not exceed minimum of (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 were provided by the manufacturer.

UNII Band	Tx Frequency (MHz)	Highest Antenna Gain			Lowest Antenna Gain		
		Antenna 3c	Antenna 3a	Antenna 1b	Antenna 3c	Antenna 3a	Antenna 1b
5	5955-6415	2.0	0.9	-1.0	1.1	-0.4	-2.4
6	6435-6515	2.0	-0.2	-0.3	2.0	-0.2	-0.3
7	6535-6875	3.5	-1.2	0.5	2.5	-1.9	-1.3
8	6895-7115	4.0	-1.7	-2.4	3.1	-2.4	-3.2

Table 2-8. 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
6	Netgear AP	Model:	RAXE500	S/N:	6JX215GA10A5
7	Broadcom AP	Model:	N/A	S/N:	N/A

Table 2-9. Test Support Equipment List

2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.10-2013, KDB 789033 D02 v02r01 and KDB 987594 D04 v02. ANSI C63.10-2013 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, 3.3 for radiated emissions test setups, and 7.2, 7.3, 7.4, 7.5 and 7.5.9 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 EUT powered by AC/DC was the worst case.

- 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

For 802.11ax-SU test results, see separate UNII 6E OFDM report, 1C2311270064-26.BCG.

2.6 Software and Firmware

The test was conducted with firmware version 21E8197 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 C63.10-2013) and the guidance provided in KDB 789033 D02 v02r01 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 ground plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the 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, 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 used 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 connection to an external antenna.

Conclusion:

The EUT 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)	4.59

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-44GHz PXA Signal Analyzer	6/21/2023	Annual	6/21/2024	MY49430244
Anritsu	ML2496A	Power Meter	4/4/2023	Annual	4/4/2024	1840005
Anritsu	MA2411B	Pulse Power Sensor	8/22/2023	Annual	8/22/2024	1726262
Anritsu	MA2411B	Pulse Power Sensor	4/5/2023	Annual	4/5/2024	1726261
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	3/30/2023	Annual	3/30/2024	00218555
Keysight Technology	N9040B	UXA Signal Analyzer	3/10/2023	Annual	3/10/2024	MY57212015
Rohde & Schwarz	TS-PR18	Pre-Amplifier (1GHz - 18GHz)	8/31/2023	Annual	8/31/2024	100052
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	5/11/2023	Annual	5/11/2024	101619
Rohde & Schwarz	ESW44	EMI Test Receiver	6/6/2023	Annual	6/6/2024	101668
Rohde & Schwarz	TS-PR8	Pre-Amplifier (30MHz - 8GHz)	6/22/2023	Annual	6/22/2024	102356
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	6/2/2023	Annual	6/2/2024	100050
Rohde & Schwarz	HFH2-Z2	Loop Antenna	5/1/2023	Annual	5/1/2024	100519
Rohde & Schwarz	ENV216	Two-Line V-Network	6/8/2023	Annual	6/8/2024	192052
Schwarzbeck	VULB 9162	Bilog Antenna (30MHz - 6GHz)	4/17/2023	Annual	4/17/2024	00304

Table 6-1. Test Equipment List

Note:

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

7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.
FCC ID: BCGA2903
IC: 579C-A2903
FCC Classification: 15E 6GHz Low Power Dual Client (6CD)

FCC Part Section(s) / KDB Reference	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049, 15.407(a)(10)	RSS Gen [6.7], RSS-248 [4.4]	Occupied Bandwidth/ 26dB Bandwidth	99% of the occupied bandwidth of any channel must be contained within each of its respective U-NII sub bands < 320MHz (5.925 - 7.125GHz)	CONDUCTED	PASS	Section 7.2
15.407(a)(8)	RSS-248 [4.5.3]	Maximum Power Spectral Density	< -1dBm/MHz e.i.r.p. for Low Power indoor		PASS	Section 7.4
15.407(a)(7)	RSS-248 [4.5.5]		< 17dBm/MHz e.i.r.p. for Standard Power		PASS	Section 7.4
15.407(a)(8)	RSS-248 [4.5.3]	Maximum Radiated Output Power	< 24dBm over the frequency band of operation for Low Power Indoor		PASS	Section 7.3
15.407(a)(7)	RSS-248 [4.5.5]		< 30dBm over the frequency band of operation for Standard Power		PASS	Section 7.3
15.407(b)(7)	RSS-248 [4.7.2]	In-Band Emissions	EUT must meet the limits detailed in 15.407(b)(7) and RSS-248 [4.7.2]b)		PASS	Section 7.5
15.407(d)(6)	RSS-248 [4.8]	Contention Based Protocol	EUT must detect AWGN signal with 90% (or better) certainty		PASS	Section 7.6
15.407(a)(7)	RSS-248 [4.5.4]	Proper Power Adjustment, Client Devices Connected to a Standard Power Access Point	EUT maintains its power level at least 6 dB lower than that of the standard-power access point		PASS	Section 7.10
987594 D02 v02r01	N/A	Dual Client Test, Demonstration of Proper Power Adjustment based on Associated AP	EUT maximum power level shall not exceed 30dBm EIRP when connected to Standard Power AP, and 24dBm EIRP when connected to Low Power Indoor AP		PASS	Section 7.11
15.407(b)(6)	RSS-248 [4.7.2]	Undesirable Emissions	< -27dBm/MHz e.i.r.p. outside of the 5.925 – 7.125GHz band	RADIATED	PASS	Section 7.7
15.205, 15.209	RSS-248 [4.7]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS	Section 7.7, 7.8
15.407(b)(8)	RSS-248 [4.7]	AC Conducted Emissions (150kHz – 30MHz)	< FCC 15.207 limits	LINE CONDUCTED	PASS	Section 7.9

Table 7-1. Summary of Test Results

Notes:

1) All channels, modes, and modulations/data rates were investigated among all UNII bands. 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 EMC Software Tool v1.2.
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.
6) All radiated measurements were tested at the highest supported power setting per band.

7.2 26dB & 99% Bandwidth Measurement – 802.11ax OFDMA

§2.1049; §15.407; RSS-Gen [6.7]

Test Overview and Limit

The bandwidth at 26dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating at its maximum duty cycle, at its maximum power control level, as defined in ANSI C63.10-2013 and KDB 789033 D02 v02r01, and at the appropriate frequencies. The spectrum analyzer's bandwidth measurement function is configured to measure the 26dB bandwidth.

Test Procedure Used

ANSI C63.10-2013 – Section 12.4
KDB 789033 D02 v02r01 – Section C

Test Settings

1. The signal analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth
3. VBW $\geq$ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold

Test Setup

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

Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. All antenna configurations, power modes, and data rates were investigated and only the worst case is reported.
2. All RU's were investigated and only worst case partially-loaded and fully-loaded RU's were reported.
3. Low, mid, and high channels were tested and tabular data has been reported. Only mid channel bandwidth plots have been reported.

7.2.1 Antenna 3c 26dB & 99% Bandwidth Measurements

	Frequency [MHz]	Channel	802.11 MODE	RU Size	RU Index	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]	Maximum Bandwidth Limit [MHz]	Pass / Fail
Band 5	5935	1	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.20	19.57	320	Pass
	5935	1	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.06	18.17	320	Pass
	5935	1	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.38	19.73	320	Pass
	6175	45	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.24	19.53	320	Pass
	6175	45	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.09	18.13	320	Pass
	6175	45	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.29	19.55	320	Pass
	6415	93	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.26	19.51	320	Pass
	6415	93	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.16	18.20	320	Pass
	6415	93	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.32	19.53	320	Pass
	5965	3	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.12	19.65	320	Pass
	5965	3	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.79	21.71	320	Pass
	5965	3	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.19	19.89	320	Pass
	6165	43	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.14	19.70	320	Pass
	6165	43	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.83	21.78	320	Pass
	6165	43	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.20	20.01	320	Pass
	6165	91	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.08	19.55	320	Pass
	6165	91	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.62	21.67	320	Pass
	6165	91	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.15	19.94	320	Pass
	5985	7	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.16	19.49	320	Pass
	5985	7	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.23	38.38	320	Pass
	5985	7	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.18	19.39	320	Pass
	6145	39	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.07	19.63	320	Pass
	6145	39	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.52	39.20	320	Pass
	6145	39	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.19	19.45	320	Pass
	6385	87	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.08	19.65	320	Pass
	6385	87	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.27	38.77	320	Pass
	6385	87	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.19	19.73	320	Pass
	6025	15	ax (160MHz)	26	0	12.5/14.7 (MCS11)	18.77	20.17	320	Pass
	6025	15	ax (160MHz)	26	18	12.5/14.7 (MCS11)	20.59	23.10	320	Pass
	6025	15	ax (160MHz)	26	36	12.5/14.7 (MCS11)	19.03	21.17	320	Pass
	6185	47	ax (160MHz)	26	0	12.5/14.7 (MCS11)	18.87	20.41	320	Pass
	6185	47	ax (160MHz)	26	18	12.5/14.7 (MCS11)	21.16	23.35	320	Pass
	6185	47	ax (160MHz)	26	36	12.5/14.7 (MCS11)	19.18	21.12	320	Pass
	6345	79	ax (160MHz)	26	0	12.5/14.7 (MCS11)	18.72	20.51	320	Pass
	6345	79	ax (160MHz)	26	18	12.5/14.7 (MCS11)	20.78	22.52	320	Pass
	6345	79	ax (160MHz)	26	36	12.5/14.7 (MCS11)	19.34	20.75	320	Pass
Band 6	6345	97	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.22	19.58	320	Pass
	6345	97	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.11	18.19	320	Pass
	6345	97	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.35	19.52	320	Pass
	6475	105	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.24	19.76	320	Pass
	6475	105	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.11	18.14	320	Pass
	6475	105	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.33	19.52	320	Pass
	6515	113	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.16	19.66	320	Pass
	6515	113	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.09	18.15	320	Pass
	6515	113	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.29	19.62	320	Pass
	6445	99	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.13	19.55	320	Pass
	6445	99	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.69	21.85	320	Pass
	6445	99	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.22	19.75	320	Pass
	6485	107	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.08	19.65	320	Pass
	6485	107	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.76	22.18	320	Pass
	6485	107	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.18	19.64	320	Pass
	6525	115	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.05	19.63	320	Pass
	6525	115	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.62	22.02	320	Pass
	6525	115	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.19	19.78	320	Pass
	6465	103	ax (80Mhz)	26	0	12.5/14.7 (MCS11)	18.03	19.44	320	Pass
	6465	103	ax (80Mhz)	26	18	12.5/14.7 (MCS11)	37.42	38.52	320	Pass
	6465	103	ax (80Mhz)	26	36	12.5/14.7 (MCS11)	18.18	19.46	320	Pass
	6505	111	ax (160MHz)	26	0	12.5/14.7 (MCS11)	18.73	20.29	320	Pass
	6505	111	ax (160MHz)	26	18	12.5/14.7 (MCS11)	20.99	22.88	320	Pass
	6505	111	ax (160MHz)	26	36	12.5/14.7 (MCS11)	19.31	21.23	320	Pass

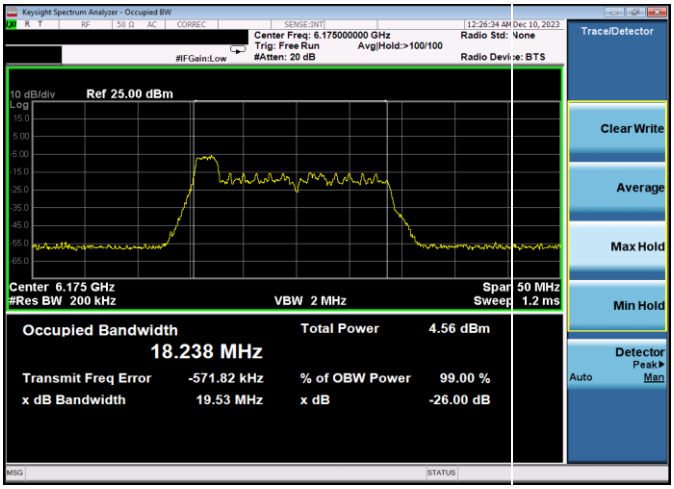
Table 7-2. Bands 5 and 6 Conducted Bandwidth Measurements Antenna 3c (RU26)

	Frequency [MHz]	Channel	802.11 MODE	RU Size	RU Index	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]	Maximum Bandwidth Limit [MHz]	Pass / Fail
Band 7	6535	117	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.26	19.61	320	Pass
	6535	117	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.16	18.15	320	Pass
	6535	117	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.31	19.63	320	Pass
	6695	149	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.23	19.54	320	Pass
	6695	149	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.09	18.19	320	Pass
	6695	149	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.33	19.52	320	Pass
	6875	185	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.24	19.43	320	Pass
	6875	185	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.13	18.17	320	Pass
	6875	185	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.35	19.46	320	Pass
	6565	123	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.10	19.73	320	Pass
	6565	123	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.89	22.49	320	Pass
	6565	123	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.17	19.75	320	Pass
	6725	155	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.12	19.68	320	Pass
	6725	155	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.50	21.00	320	Pass
	6725	155	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.18	19.71	320	Pass
	6845	179	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.06	19.44	320	Pass
	6845	179	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.62	22.18	320	Pass
	6845	179	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.17	19.89	320	Pass
	6545	119	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.17	19.66	320	Pass
	6545	119	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.47	39.16	320	Pass
	6545	119	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.19	19.43	320	Pass
	6705	151	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.08	19.66	320	Pass
	6705	151	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.33	38.58	320	Pass
	6705	151	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.29	19.55	320	Pass
	6865	183	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.03	19.41	320	Pass
	6865	183	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.46	39.36	320	Pass
	6865	183	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.25	19.62	320	Pass
	6665	143	ax (160MHz)	26	0	12.5/14.7 (MCS11)	18.71	20.65	320	Pass
	6665	143	ax (160MHz)	26	18	12.5/14.7 (MCS11)	19.96	21.43	320	Pass
	6665	143	ax (160MHz)	26	36	12.5/14.7 (MCS11)	19.28	21.62	320	Pass
	6825	175	ax (160MHz)	26	0	12.5/14.7 (MCS11)	18.66	20.66	320	Pass
	6825	175	ax (160MHz)	26	18	12.5/14.7 (MCS11)	20.98	22.56	320	Pass
	6825	175	ax (160MHz)	26	36	12.5/14.7 (MCS11)	19.59	21.05	320	Pass
Band 8	6895	189	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.22	19.72	320	Pass
	6895	189	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.09	18.19	320	Pass
	6895	189	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.30	19.40	320	Pass
	6995	209	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.30	19.52	320	Pass
	6995	209	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.09	18.12	320	Pass
	6995	209	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.34	19.53	320	Pass
	7115	233	ax (20MHz)	26	0	12.5/14.7 (MCS11)	18.24	19.63	320	Pass
	7115	233	ax (20MHz)	26	4	12.5/14.7 (MCS11)	17.13	18.18	320	Pass
	7115	233	ax (20MHz)	26	8	12.5/14.7 (MCS11)	18.37	19.51	320	Pass
	6885	187	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.05	19.63	320	Pass
	6885	187	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.52	22.21	320	Pass
	6885	187	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.25	19.95	320	Pass
	7005	211	ax (40MHz)	26	0	12.5/14.7 (MCS11)	18.05	19.59	320	Pass
	7005	211	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.53	21.92	320	Pass
	7005	211	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.20	20.00	320	Pass
	7085	227	ax (40MHz)	26	0	12.5/14.7 (MCS11)	17.95	19.46	320	Pass
	7085	227	ax (40MHz)	26	8	12.5/14.7 (MCS11)	19.77	21.61	320	Pass
	7085	227	ax (40MHz)	26	17	12.5/14.7 (MCS11)	18.29	20.12	320	Pass
	6945	199	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.03	19.36	320	Pass
	6945	199	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.61	39.07	320	Pass
	6945	199	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.26	19.76	320	Pass
	7025	215	ax (80MHz)	26	0	12.5/14.7 (MCS11)	18.11	19.55	320	Pass
	7025	215	ax (80MHz)	26	18	12.5/14.7 (MCS11)	37.38	38.77	320	Pass
	7025	215	ax (80MHz)	26	36	12.5/14.7 (MCS11)	18.32	19.86	320	Pass
	6985	207	ax (160MHz)	26	0	12.5/14.7 (MCS11)	18.46	20.47	320	Pass
	6985	207	ax (160MHz)	26	18	12.5/14.7 (MCS11)	21.18	22.86	320	Pass
	6985	207	ax (160MHz)	26	36	12.5/14.7 (MCS11)	20.35	21.03	320	Pass

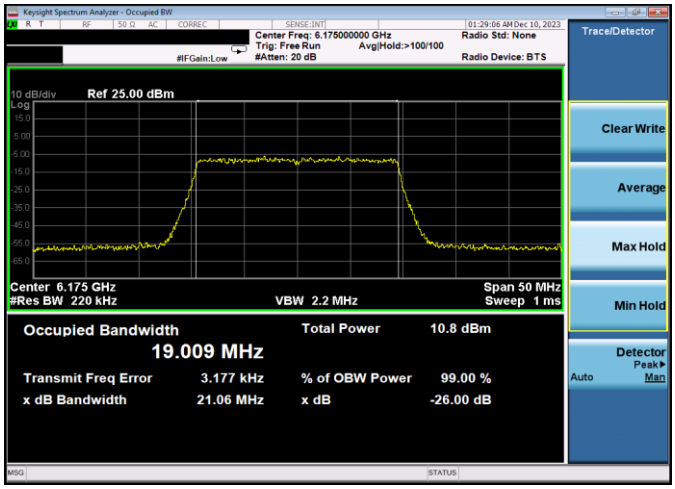
Table 7-3. Bands 7 and 8 Conducted Bandwidth Measurements Antenna 3c (RU26)

	Frequency [MHz]	Channel	802.11 MODE	RU Size	RU Index	Data Rate [Mbps]	Measured 99% Occupied Bandwidth [MHz]	Measured 26dB Bandwidth [MHz]	Maximum Bandwidth Limit [MHz]	Pass / Fail
Band 5	5935	1	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.00	20.99	320	Pass
	6175	45	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.00	21.06	320	Pass
	6415	93	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.03	21.28	320	Pass
	5965	3	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.95	41.59	320	Pass
	6165	43	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.92	41.64	320	Pass
	6165	91	ax (40MHz)	484	65	243.8/286.8 (MCS11)	38.01	41.54	320	Pass
	5985	7	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.24	82.37	320	Pass
	6145	39	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.18	81.97	320	Pass
	6385	87	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.09	81.86	320	Pass
	6025	15	ax (160MHz)	996x2	68	1020.8/1201 (MCS11)	156.69	165.83	320	Pass
	6185	47	ax (160MHz)	996x2	68	1020.8/1201 (MCS11)	156.37	165.50	320	Pass
	6345	79	ax (160MHz)	996x2	68	1020.8/1201 (MCS11)	156.27	165.92	320	Pass
Band 6	6345	97	ax (20MHz)	242	61	121.9/143.4 (MCS11)	18.98	21.28	320	Pass
	6475	105	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.07	21.28	320	Pass
	6515	113	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.03	21.03	320	Pass
	6445	99	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.97	41.80	320	Pass
	6485	107	ax (40MHz)	484	65	243.8/286.8 (MCS11)	17.96	41.65	320	Pass
	6525	115	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.95	41.78	320	Pass
	6465	103	ax (80Mhz)	996	67	510.4/600.5 (MCS11)	77.15	82.14	320	Pass
	6505	111	ax (160MHz)	996x2	68	1020.8/1201 (MCS11)	156.37	165.10	320	Pass
Band 7	6535	117	ax (20MHz)	242	61	121.9/143.4 (MCS11)	18.99	20.93	320	Pass
	6695	149	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.02	20.98	320	Pass
	6875	185	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.03	21.03	320	Pass
	6565	123	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.95	41.74	320	Pass
	6725	155	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.91	41.62	320	Pass
	6845	179	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.98	41.83	320	Pass
	6545	119	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.13	81.40	320	Pass
	6705	151	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.20	82.02	320	Pass
	6865	183	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.10	81.55	320	Pass
	6665	143	ax (160MHz)	996x2	68	1020.8/1201 (MCS11)	156.16	165.90	320	Pass
	6825	175	ax (160MHz)	996x2	68	1020.8/1201 (MCS11)	156.40	165.90	320	Pass
Band 8	6895	189	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.01	21.17	320	Pass
	6995	209	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.01	20.99	320	Pass
	7115	233	ax (20MHz)	242	61	121.9/143.4 (MCS11)	19.04	21.18	320	Pass
	6885	187	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.94	41.38	320	Pass
	7005	211	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.95	41.82	320	Pass
	7085	227	ax (40MHz)	484	65	243.8/286.8 (MCS11)	37.92	41.46	320	Pass
	6945	199	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.15	81.79	320	Pass
	7025	215	ax (80MHz)	996	67	510.4/600.5 (MCS11)	77.20	81.53	320	Pass
	6985	207	ax (160MHz)	996x2	68	1020.8/1201 (MCS11)	156.38	167.50	320	Pass

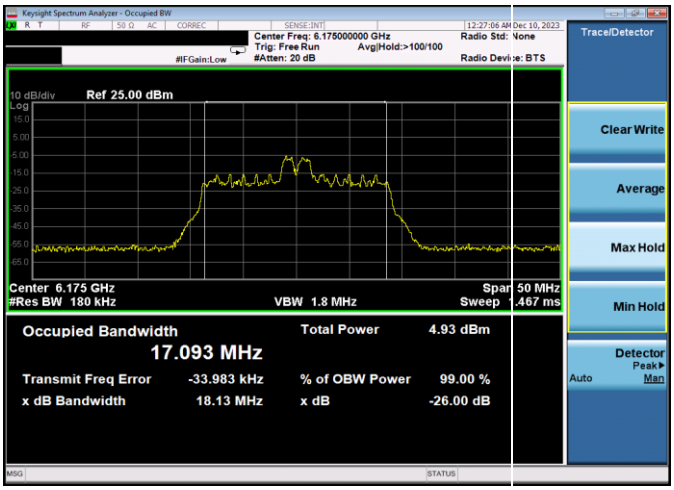
Table 7-4. Conducted Bandwidth Measurements Antenna 3c (Fully – Loaded RU)



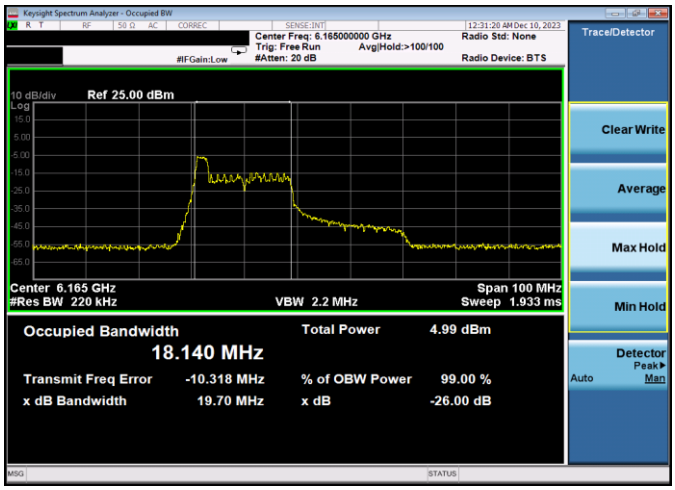
Plot 7-1. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 5) – Ch. 45)



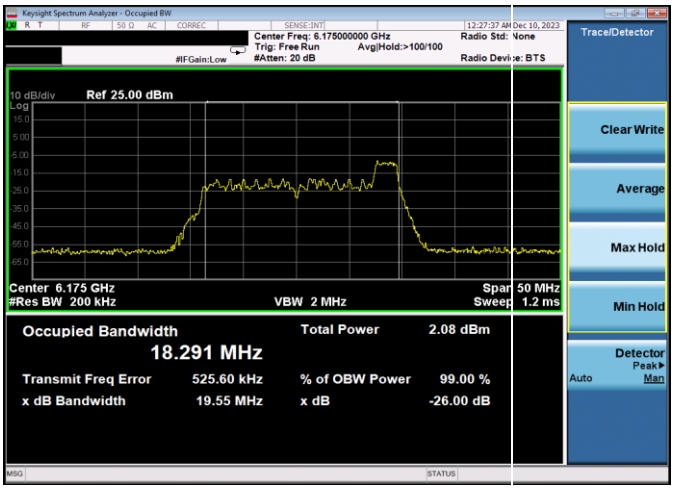
Plot 7-4. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU242 (UNII Band 5) – Ch. 45)



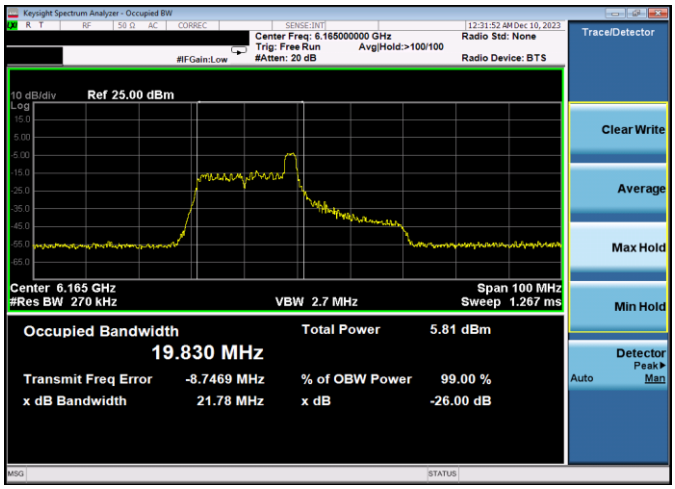
Plot 7-2. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 5) – Ch. 45)



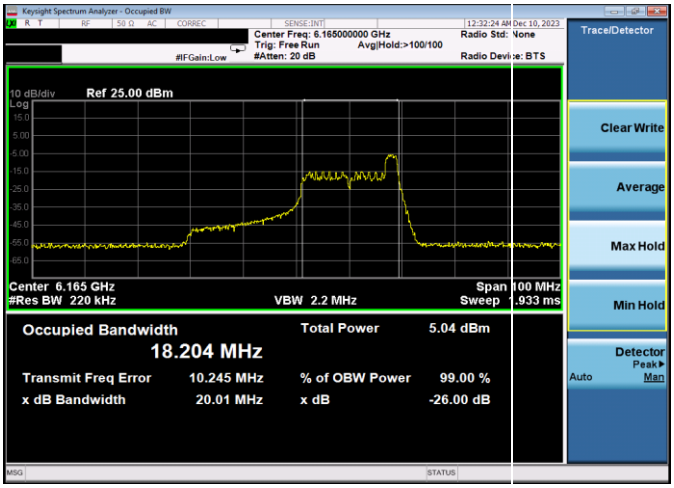
Plot 7-5. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 5) – Ch. 43)



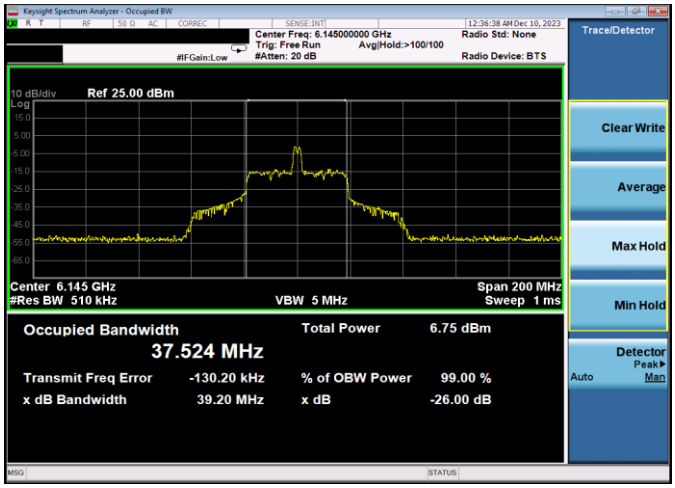
Plot 7-3. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 5) – Ch. 45)



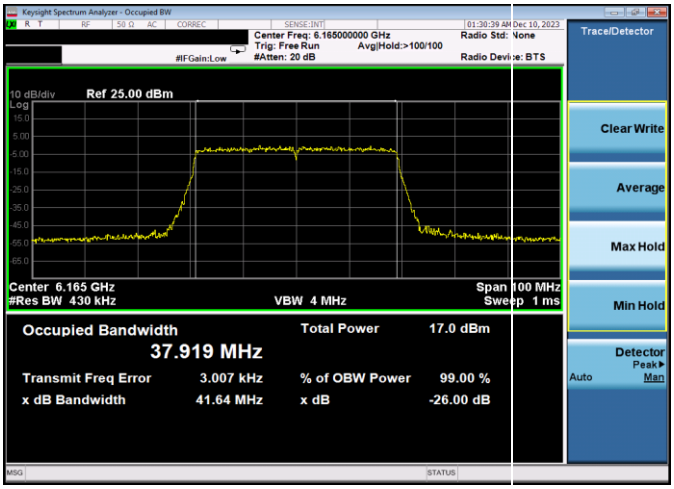
Plot 7-6. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 5) – Ch. 43)



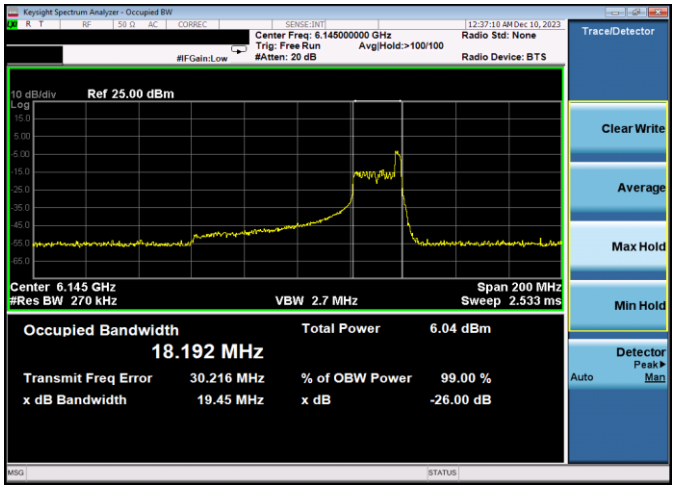
Plot 7-7. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 5) – Ch. 43)



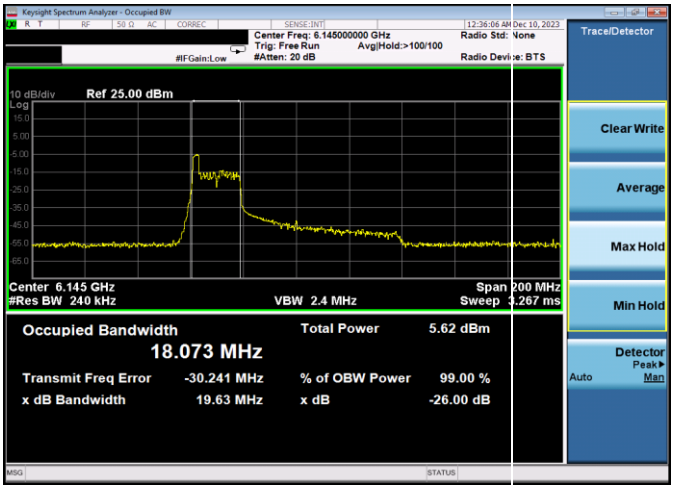
Plot 7-10. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 5) – Ch. 39)



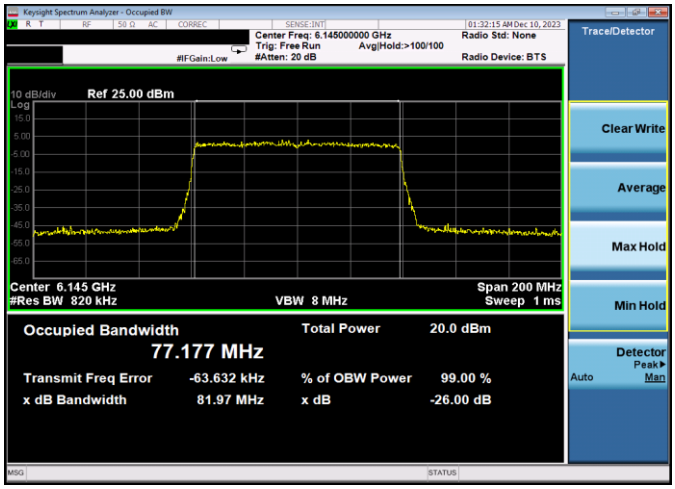
Plot 7-8. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU484 (UNII Band 5) – Ch. 43)



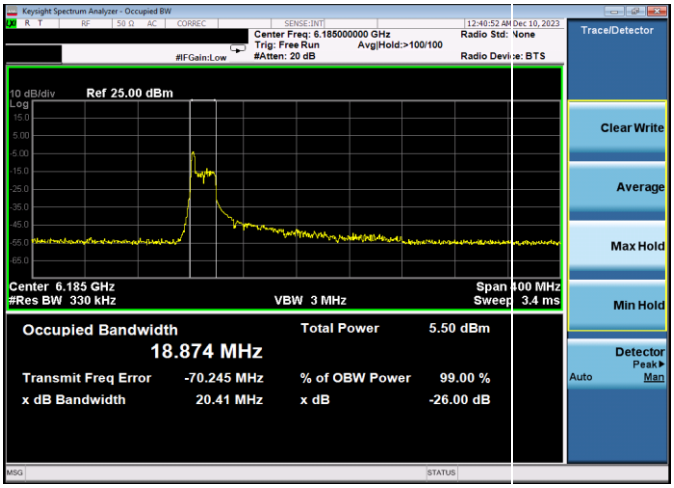
Plot 7-11. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 5) – Ch. 39)



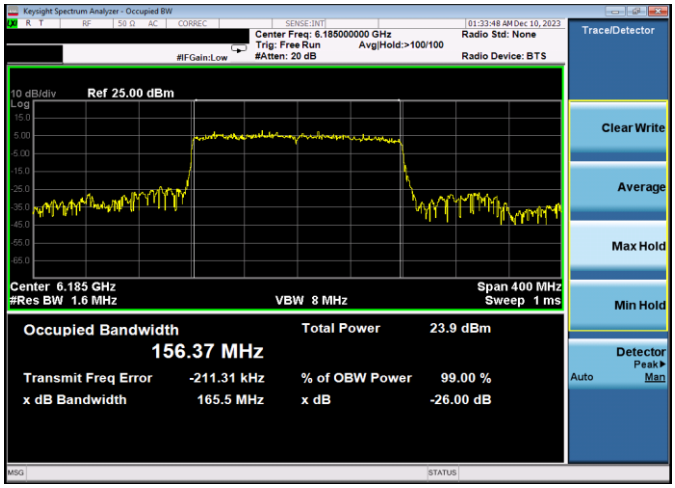
Plot 7-9. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 5) – Ch. 39)



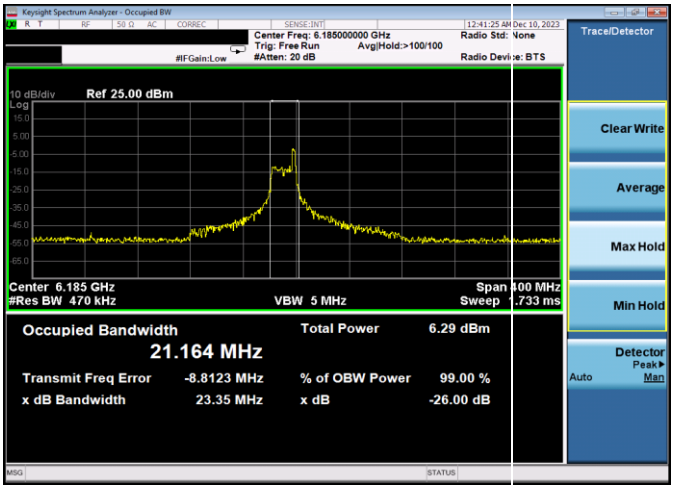
Plot 7-12. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU996 (UNII Band 5) – Ch. 39)



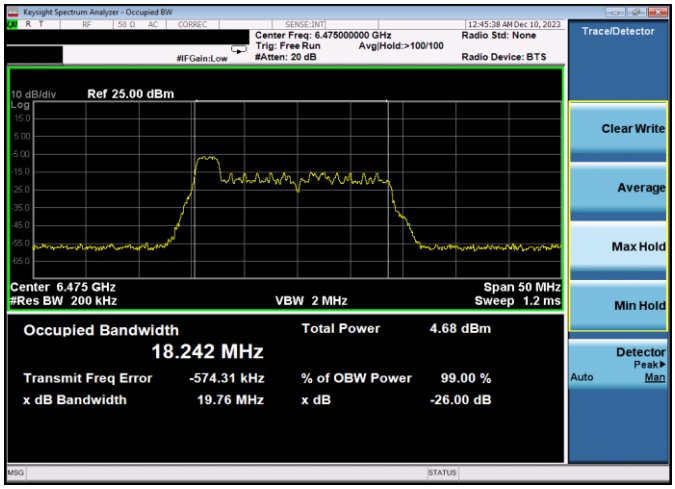
Plot 7-13. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 5) – Ch. 47)



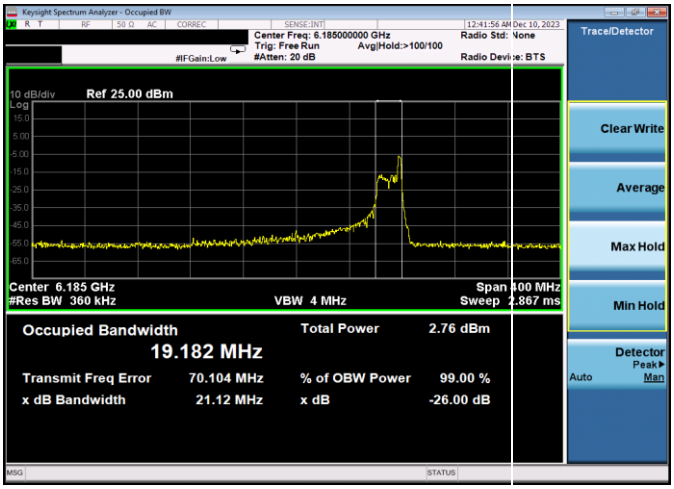
Plot 7-16. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU996x2 (UNII Band 5) – Ch. 47)



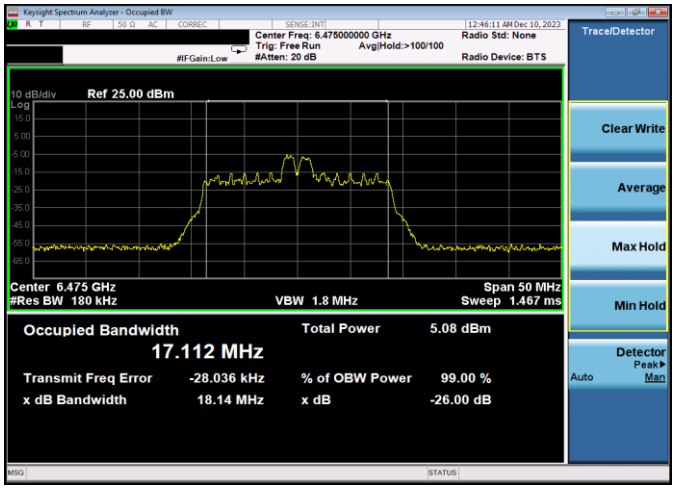
Plot 7-14. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 5) – Ch. 47)



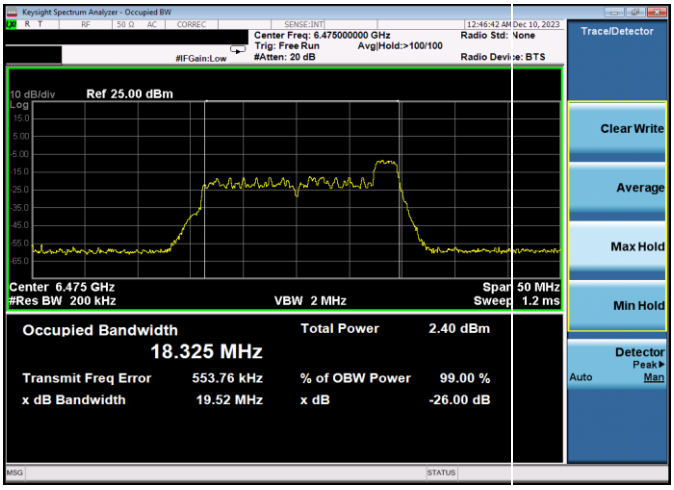
Plot 7-17. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 6) – Ch. 105)



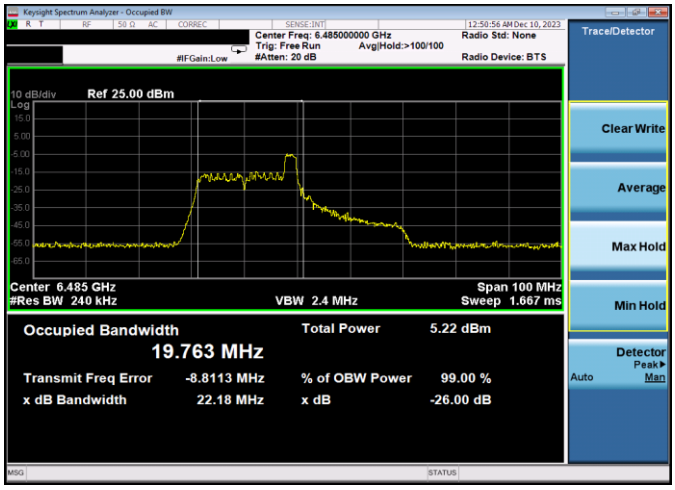
Plot 7-15. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 5) – Ch. 47)



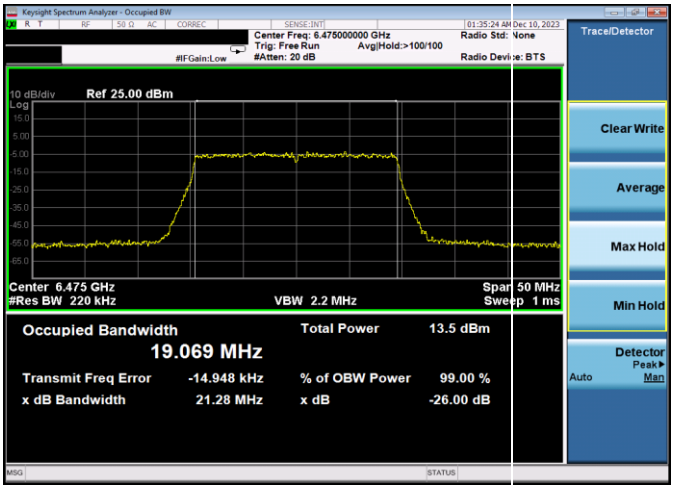
Plot 7-18. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 6) – Ch. 105)



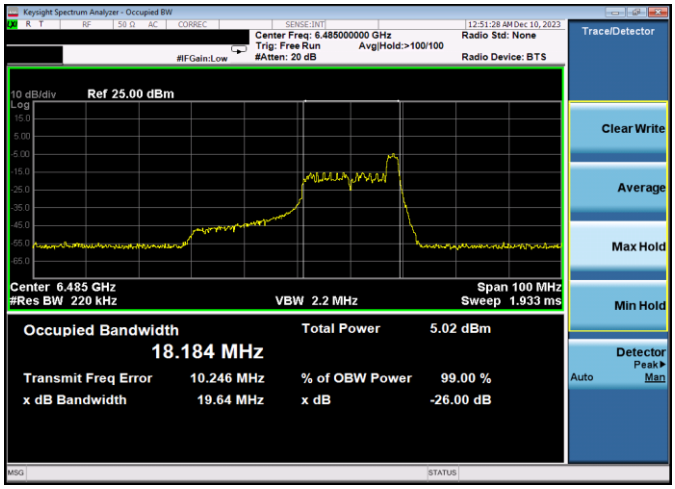
Plot 7-19. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 6) – Ch. 105)



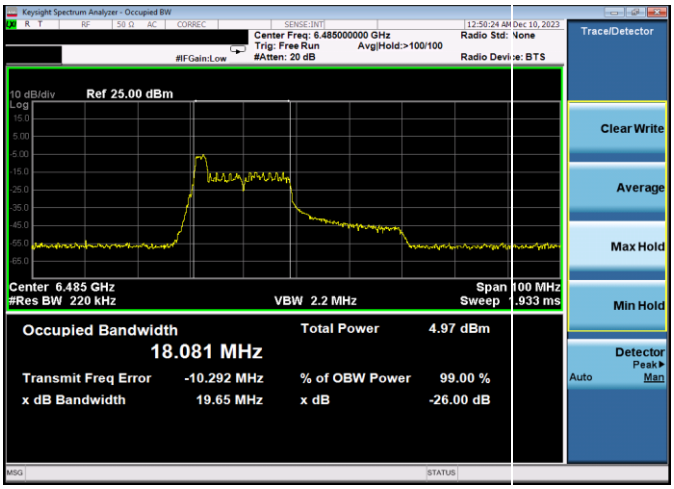
Plot 7-22. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 6) – Ch. 107)



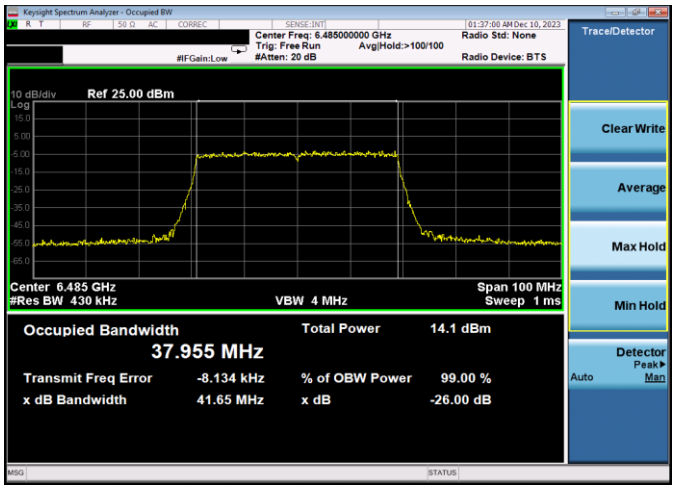
Plot 7-20. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU242 (UNII Band 6) – Ch. 105)



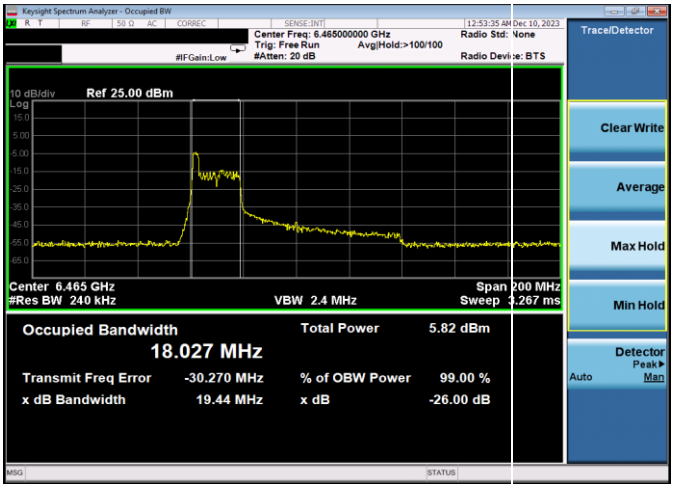
Plot 7-23. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 6) – Ch. 107)



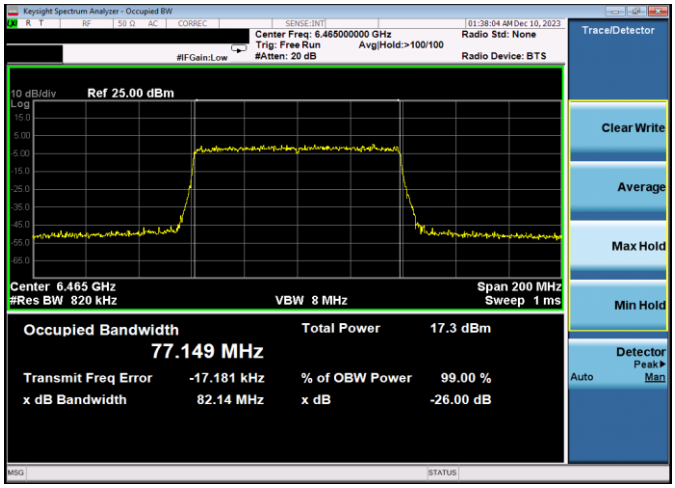
Plot 7-21. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 6) – Ch. 107)



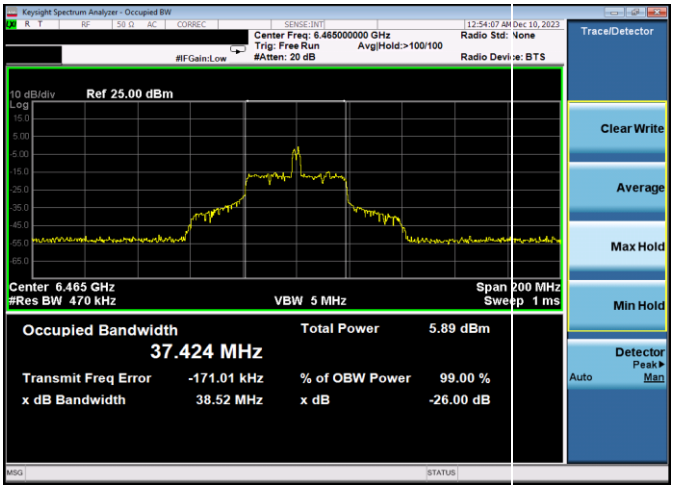
Plot 7-24. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU484 (UNII Band 6) – Ch. 107)



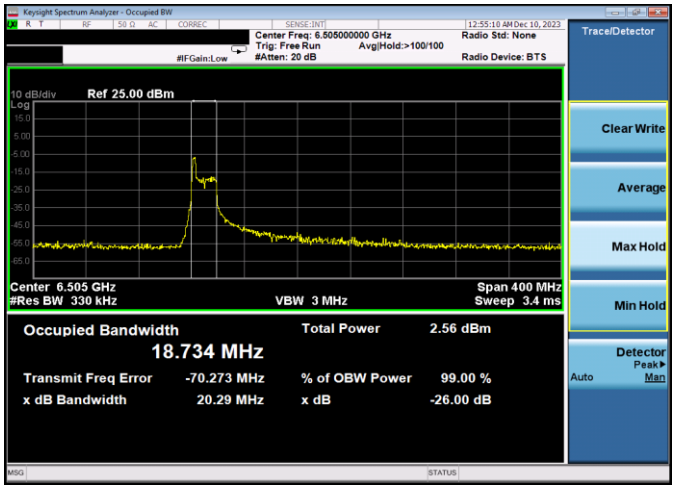
Plot 7-25. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 6) – Ch. 103)



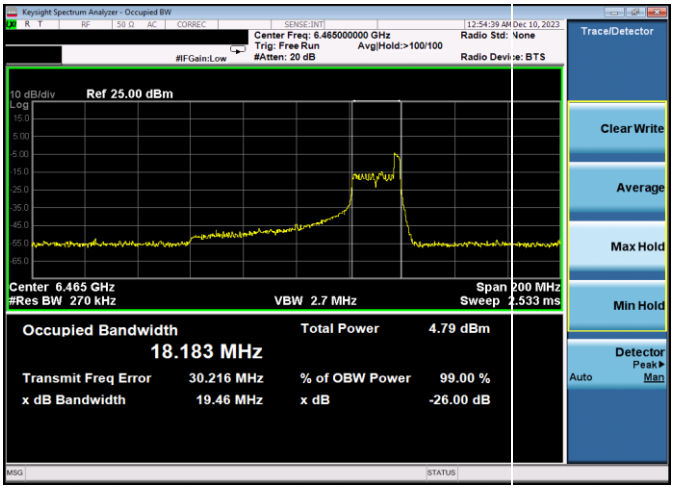
Plot 7-28. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU996 (UNII Band 6) – Ch. 103)



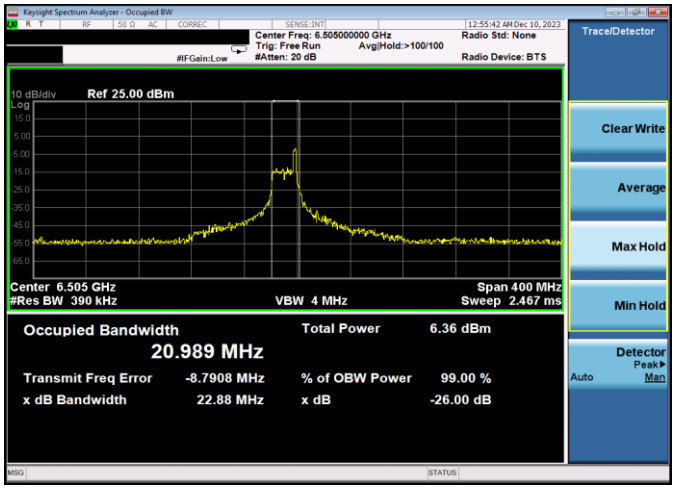
Plot 7-26. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 6) – Ch. 103)



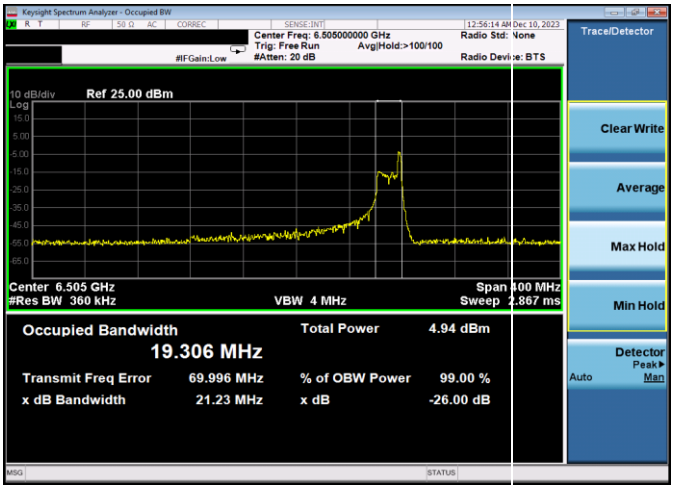
Plot 7-29. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 6) – Ch. 111)



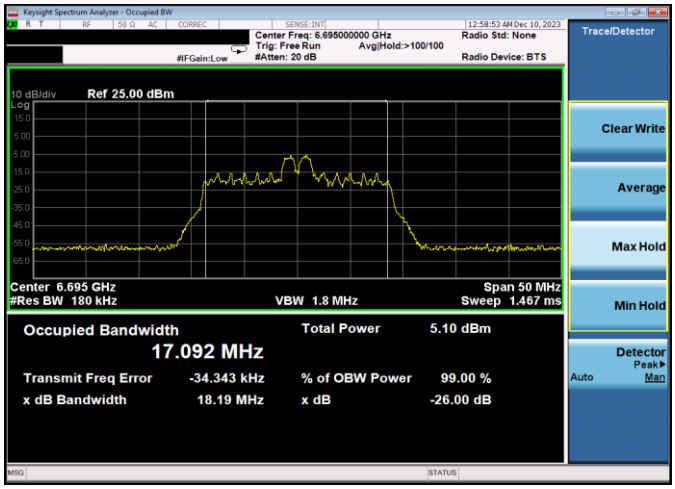
Plot 7-27. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 6) – Ch. 103)



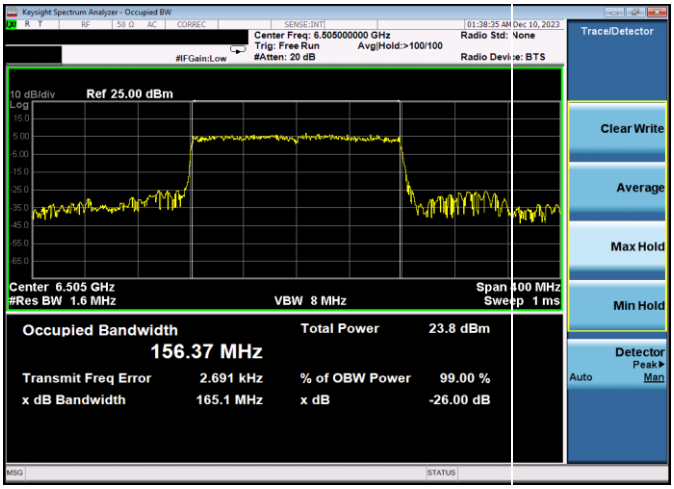
Plot 7-30. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 6) – Ch. 111)



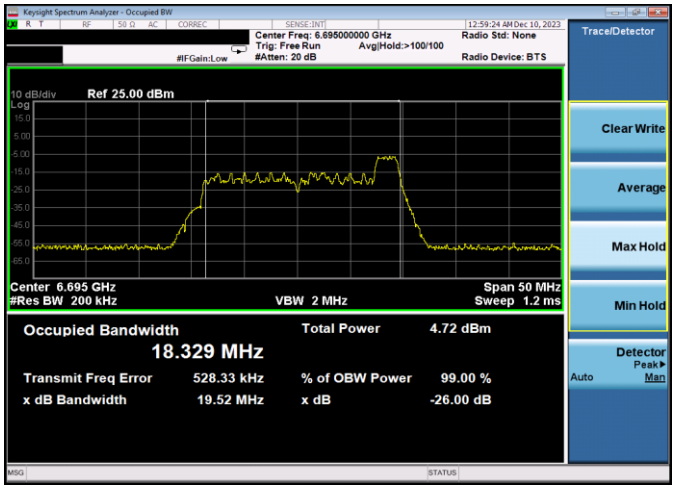
Plot 7-31. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 6) – Ch. 111)



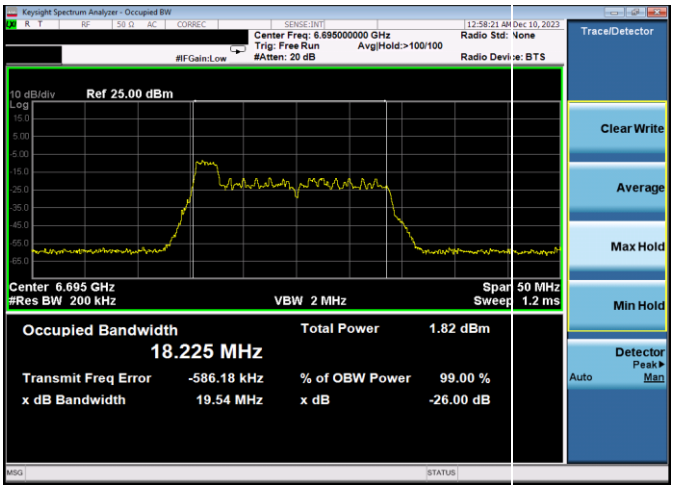
Plot 7-34. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 7) – Ch. 149)



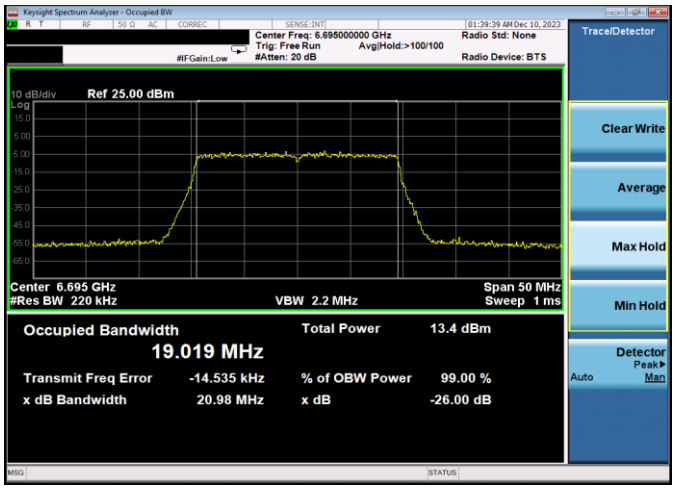
Plot 7-32. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU996x2 (UNII Band 6) – Ch. 111)



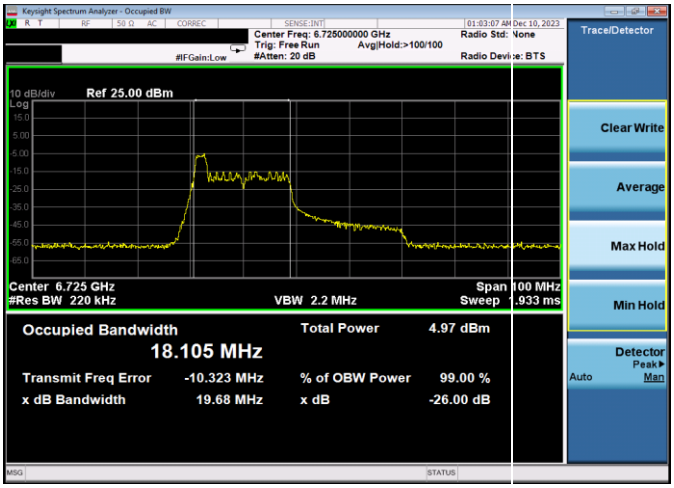
Plot 7-35. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 7) – Ch. 149)



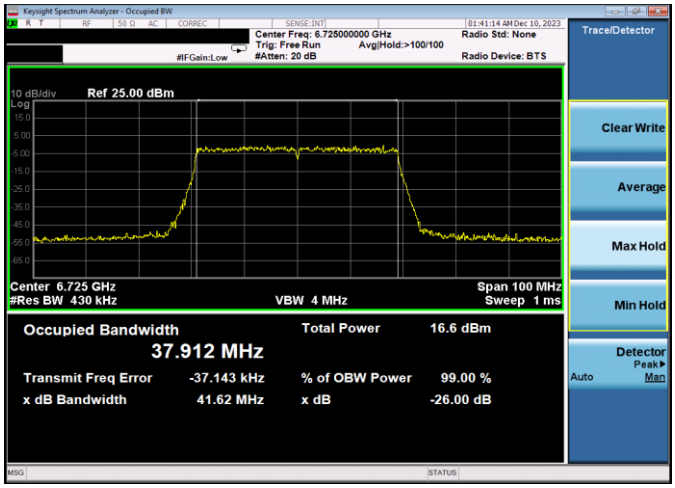
Plot 7-33. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU26 (UNII Band 7) – Ch. 149)



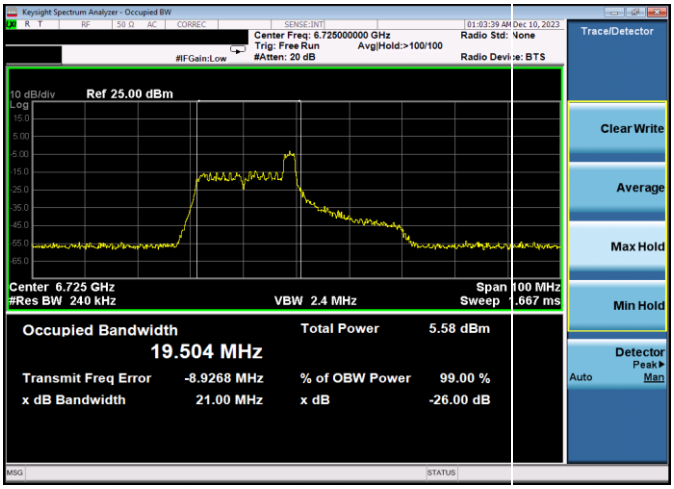
Plot 7-36. 26dB & 99% Bandwidth Plot Antenna 3c (20MHz 802.11ax RU242 (UNII Band 7) – Ch. 149)



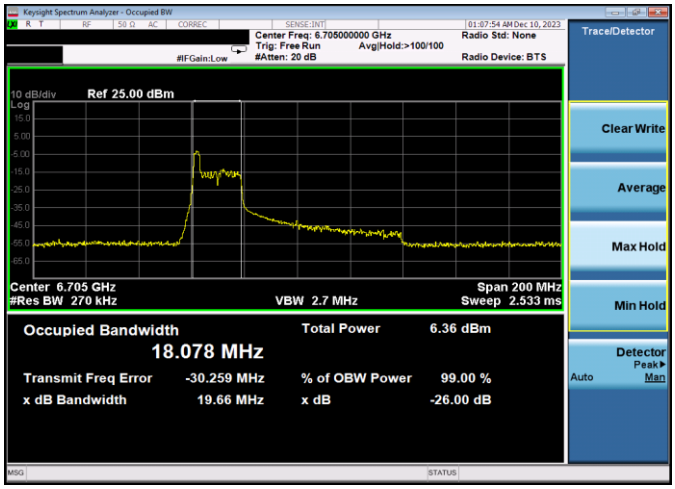
Plot 7-37. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 7) – Ch. 155)



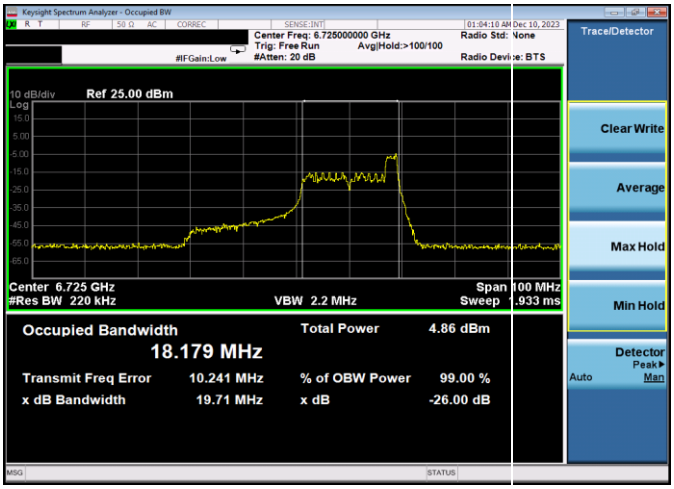
Plot 7-40. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU484 (UNII Band 7) – Ch. 155)



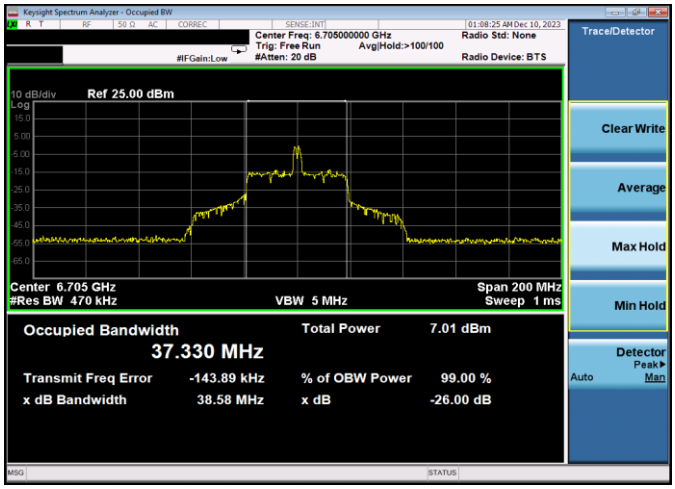
Plot 7-38. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 7) – Ch. 155)



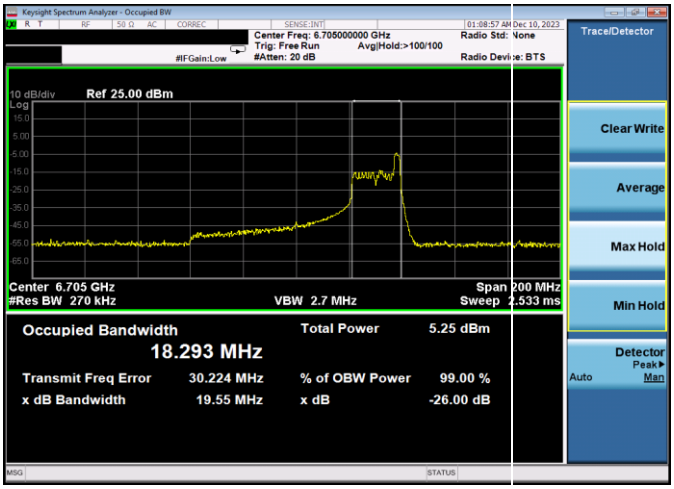
Plot 7-41. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 7) – Ch. 151)



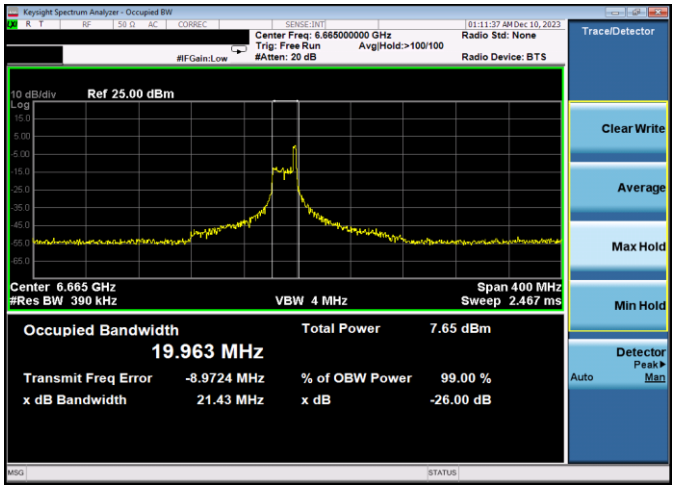
Plot 7-39. 26dB & 99% Bandwidth Plot Antenna 3c (40MHz 802.11ax RU26 (UNII Band 7) – Ch. 155)



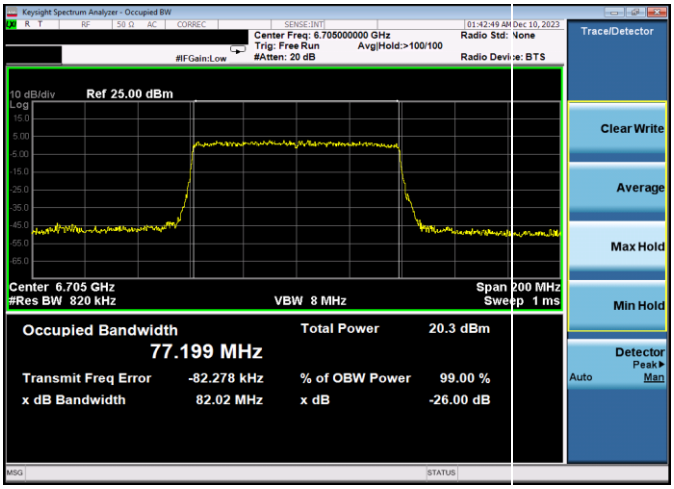
Plot 7-42. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 7) – Ch. 151)



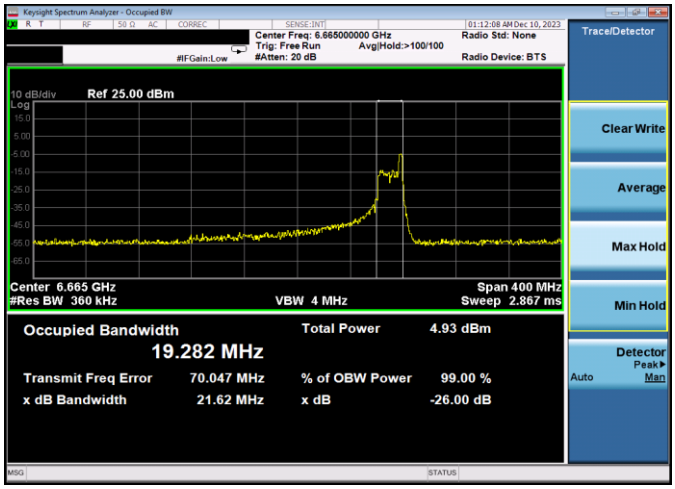
Plot 7-43. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU26 (UNII Band 7) – Ch. 151)



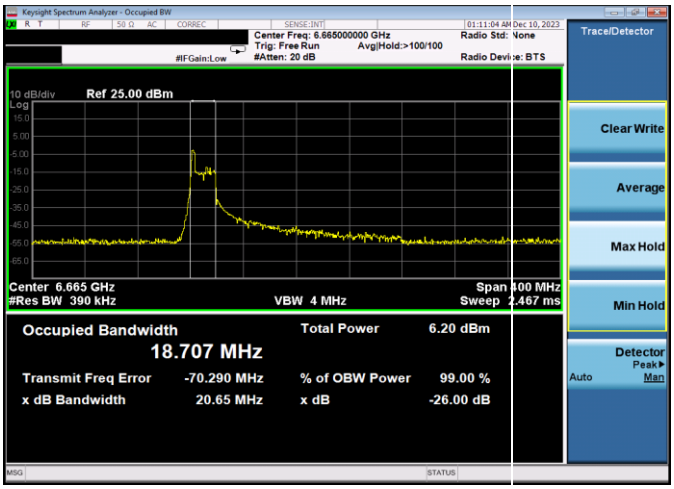
Plot 7-46. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 7) – Ch. 143)



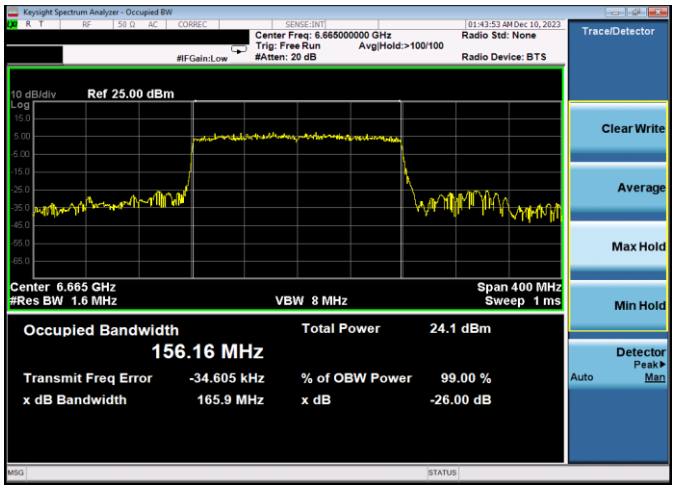
Plot 7-44. 26dB & 99% Bandwidth Plot Antenna 3c (80MHz 802.11ax RU996 (UNII Band 7) – Ch. 151)



Plot 7-47. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 7) – Ch. 143)



Plot 7-45. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU26 (UNII Band 7) – Ch. 143)



Plot 7-48. 26dB & 99% Bandwidth Plot Antenna 3c (160MHz 802.11ax RU996x2 (UNII Band 7) – Ch. 143)